

***CLARION 5***

# **Language Reference**

**COPYRIGHT 1985, 1986, 1988, 1990, 1992, 1994, 1995, 1996, 1997, 1998 by TopSpeed Corporation. All rights reserved.**

This publication is protected by copyright and all rights are reserved by TopSpeed Corporation. It may not, in whole or part, be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form without prior consent, in writing, from TopSpeed Corporation.

This publication supports Clarion 5. It is possible that it may contain technical or typographical errors. TopSpeed Corporation provides this publication “as is,” without warranty of any kind, either expressed or implied.

**TopSpeed Corporation**  
150 East Sample Road  
Pompano Beach, Florida 33064  
(954) 785-4555

### **Trademark Acknowledgements:**

TopSpeed® is a registered trademark of TopSpeed Corporation.

Clarion 4™ is a trademark of TopSpeed Corporation.

Btrieve® is a registered trademark of Pervasive Software.

Microsoft® Windows® and Visual Basic® are registered trademarks of Microsoft Corporation. All other products and company names are trademarks of their respective owners.

# ***TABLE OF CONTENTS***

<b>FOREWORD - ORIGINS OF THE CLARION LANGUAGE</b>	<b>23</b>
<b>1 - INTRODUCTION</b>	<b>41</b>
<b>The Language Reference Manual</b>	<b>41</b>
Chapter Organization .....	41
Documentation Conventions and Symbols .....	43
Reference Item Format .....	43
<b>Clarion Conventions</b>	<b>45</b>
Standard Date .....	45
Standard Time .....	45
Clarion Keycodes .....	46
<b>2 - PROGRAM SOURCE CODE FORMAT</b>	<b>47</b>
<b>Statement Format</b>	<b>47</b>
Declaration and Statement Labels .....	47
Structure Termination .....	48
Field Qualification .....	48
Reserved Words .....	50
Special Characters .....	51
<b>Program Format</b>	<b>52</b>
PROGRAM (declare a program) .....	52
MEMBER (identify member source file) .....	54
MAP (declare PROCEDURE prototypes) .....	56
MODULE (specify MEMBER source file) .....	57
PROCEDURE (define a procedure) .....	58
CODE (begin executable statements) .....	61
DATA (begin routine local data section) .....	61
ROUTINE (declare local subroutine) .....	62
END (terminate a structure) .....	64
Statement Execution Sequence .....	65
PROCEDURE Calls .....	66
<b>PROCEDURE Prototypes</b>	<b>67</b>
Prototype Syntax .....	67
Prototype Parameter Lists .....	70
PROCEDURE Return Types .....	78

<b>Prototype Attributes</b>	<b>80</b>
C, PASCAL (parameter passing conventions) .....	80
DLL (set procedure defined externally in .DLL) .....	81
NAME (set prototype's external name) .....	81
PRIVATE (set procedure private to a CLASS or module) .....	82
PROC (set function called as procedure without warnings) .....	83
PROTECTED (set procedure private to a CLASS or derived CLASS) .....	84
RAW (pass address only) .....	85
REPLACE (set replacement constructor or destructor) .....	86
TYPE (specify PROCEDURE type definition) .....	87
VIRTUAL (set virtual method) .....	88
<b>Procedure Overloading</b>	<b>89</b>
Rules for Procedure Overloading .....	89
Name Mangling and C++ Compatability .....	91
<b>Compiler Directives</b>	<b>92</b>
ASSERT (set assumption for debugging) .....	92
BEGIN (define code structure) .....	93
COMPILE (specify source to compile) .....	94
INCLUDE (compile code in another file) .....	95
EQUATE (assign label) .....	96
ITEMIZE (enumeration data structure) .....	97
OMIT (specify source not to be compiled) .....	98
SECTION (specify source code section) .....	99
SIZE (memory size in bytes) .....	100
<b>3 - VARIABLE DECLARATIONS</b>	<b>101</b>
<b>Simple Data Types</b>	<b>101</b>
BYTE (one-byte unsigned integer) .....	101
SHORT (two-byte signed integer) .....	102
USHORT (two-byte unsigned integer) .....	103
LONG (four-byte signed integer) .....	104
ULONG (four-byte unsigned integer) .....	105
SIGNED (16/32-bit signed integer) .....	106
UNSIGNED (16/32-bit unsigned integer) .....	107
SREAL (four-byte signed floating point) .....	108
REAL (eight-byte signed floating point) .....	109
BFLOAT4 (four-byte signed floating point) .....	110
BFLOAT8 (eight-byte signed floating point) .....	111

DECIMAL (signed packed decimal) .....	112
PDECIMAL (signed packed decimal) .....	114
STRING (fixed-length string) .....	116
CSTRING (fixed-length null terminated string) .....	118
PSTRING (embedded length-byte string) .....	120
Implicit String Arrays and String Slicing .....	122
DATE (four-byte date) .....	123
TIME (four-byte time) .....	124
<b>Special Data Types</b> .....	<b>125</b>
ANY (any simple data type) .....	125
LIKE (inherited data type) .....	127
Implicit Variables .....	129
Reference Variables .....	130
<b>Data Declarations and Memory Allocation</b> .....	<b>134</b>
Global, Local, Static, and Dynamic .....	134
Data Declaration Sections .....	134
NEW (allocate heap memory) .....	136
DISPOSE (de-allocate heap memory) .....	137
<b>Picture Tokens</b> .....	<b>138</b>
Numeric and Currency Pictures .....	138
Scientific Notation Pictures .....	140
String Pictures .....	140
Date Pictures .....	141
Time Pictures .....	143
Pattern Pictures .....	144
Key-in Template Pictures .....	145
<b>4 - ENTITY DECLARATIONS</b> .....	<b>147</b>
<b>Complex Data Structures</b> .....	<b>147</b>
GROUP (compound data structure) .....	147
CLASS (object declaration) .....	150
<b>File Structures</b> .....	<b>159</b>
FILE (declare a data file structure) .....	159
INDEX (declare static file access index) .....	162
KEY (declare dynamic file access index) .....	163
MEMO (declare a text field) .....	165
BLOB (declare a variable-length field) .....	166
RECORD (declare record structure) .....	168

Null Data Processing .....	169
FILE Structure Properties .....	170
Environment Files .....	177
<b>View Structures</b> .....	<b>180</b>
VIEW (declare a “virtual” file) .....	180
PROJECT (set view fields) .....	183
JOIN (declare a “join” operation) .....	184
<b>Queue Structures</b> .....	<b>186</b>
QUEUE (declare a memory QUEUE structure) .....	186
<b>5 - DECLARATION ATTRIBUTES</b> .....	<b>189</b>
<b>Variable and Entity Attributes</b> .....	<b>189</b>
AUTO (uninitialized local variable) .....	189
BINARY (memo contains binary data) .....	189
BINDABLE (set runtime expression string variables) .....	190
CREATE (allow data file creation) .....	191
DIM (set array dimensions) .....	192
DLL (set variable defined externally in .DLL) .....	193
DRIVER (specify data file type) .....	195
DUP (allow duplicate KEY entries) .....	196
ENCRYPT (encrypt data file) .....	196
EXTERNAL (set defined externally) .....	197
FILTER (set view filter expression) .....	199
INNER (set inner join operation) .....	200
LINK (specify CLASS link into project) .....	201
MODULE (specify CLASS member source file) .....	201
NAME (set external name) .....	202
NOCASE (case insensitive KEY or INDEX) .....	204
OEM (set international string support) .....	205
OPT (exclude null KEY or INDEX entries) .....	206
ORDER (set view sort order expression) .....	207
OVER (set shared memory location) .....	208
OWNER (declare password for data encryption) .....	209
PRE (set label prefix) .....	210
PRIMARY (set relational primary key) .....	211
PRIVATE (set variable private to a CLASS module) .....	211
PROTECTED (set variable private to a CLASS or derived CLASS) .....	212
RECLAIM (reuse deleted record space) .....	212

STATIC (set allocate static memory) .....	213
THREAD (set thread-specific memory allocation) .....	214
TYPE (type definition) .....	216

## **6 - WINDOWS 217**

### **Window Structures 217**

APPLICATION (declare an MDI frame window) .....	217
WINDOW (declare a dialog window) .....	223
MENUBAR (declare a pulldown menu) .....	229
TOOLBAR (declare a tool bar) .....	232

### **Window Overview 235**

Window Controls and Input Focus .....	236
Field Equate Labels .....	236

### **Graphics Overview 239**

Current Target .....	239
Graphics Coordinates .....	239

## **7 - REPORTS 241**

### **Report Structures 241**

REPORT (declare a report structure) .....	241
BREAK (declare group break structure) .....	245
DETAIL (report detail line structure) .....	246
FOOTER (page or group footer structure) .....	248
FORM (page layout structure) .....	250
HEADER (page or group header structure) .....	251
Printer Control Properties .....	253

## **8 - CONTROLS 257**

### **Control Declarations 257**

BOX (declare a box control) .....	257
BUTTON (declare a pushbutton control) .....	259
CHECK (declare a checkbox control) .....	262
COMBO (declare an entry/list control) .....	265
ELLIPSE (declare an ellipse control) .....	270
ENTRY (declare a data entry control) .....	272
GROUP (declare a group of controls) .....	276
IMAGE (declare a graphic image control) .....	279
ITEM (declare a menu item) .....	281

LINE (declare a line control) .....	283
LIST (declare a window list control) .....	285
MENU (declare a menu box) .....	291
OLE (declare a window OLE or .OCX container control) .....	293
OPTION (declare a set of RADIO controls) .....	297
PANEL (declare a panel control) .....	300
PROMPT (declare a prompt control) .....	301
PROGRESS (declare a progress control) .....	303
RADIO (declare a radio button control) .....	305
REGION (declare a window region control) .....	308
SHEET (declare a group of TAB controls) .....	310
SPIN (declare a spinning list control) .....	313
STRING (declare a string control) .....	317
TAB (declare a page of a SHEET control) .....	320
TEXT (declare a multi-line text control) .....	322
VBX (declare a .VBX custom control) .....	325

## **9 - WINDOW AND REPORT ATTRIBUTES**

**329**

### **Attribute Property Equates**

**329**

PROP:Text .....	329
Attribute Property Parameters .....	329
Arrayed Properties .....	330

### **Window and Report Attributes**

**331**

ABSOLUTE (set fixed-position printing) .....	331
ALONE (set to print without page header, footer, or form) .....	331
ALRT (set window “hot” keys) .....	332
ANGLE (set control display or print angle) .....	334
AT (set position and size) .....	335
AUTO (set USE variable automatic re-display) .....	338
AUTOSIZE (set OLE object resizing) .....	338
AVE (set report total average) .....	339
BEVEL (set 3-D effect border) .....	340
BOXED (set controls group border) .....	341
CAP, UPR (set case) .....	341
CENTER (set centered window position) .....	341
CENTERED (set centered image) .....	342
CHECK (set on/off ITEM) .....	342
CLASS (set .VBX custom control class) .....	343
CLIP (set OLE object clipping) .....	343



CNT (set total count) .....	344
COLOR (set color) .....	345
COLUMN (set list box highlight bar) .....	347
COMPATIBILITY (set OLE control compatibility) .....	347
CREATE (create OLE control object) .....	348
CURSOR (set mouse cursor type) .....	349
DEFAULT (set enter key button) .....	350
DELAY (set repeat button delay) .....	350
DISABLE (set control dimmed at open) .....	350
DOCK (set dockable toolbox window) .....	351
DOCKED (set dockable toolbox window docked at open) .....	351
DOCUMENT (create OLE control object from file) .....	352
DOUBLE, NOFRAME, RESIZE (set window border) .....	353
DRAGID (set drag-and-drop host signatures) .....	354
DROP (set list box behavior) .....	355
DROPID (set drag-and-drop target signatures) .....	356
FILL (set fill color) .....	357
FIRST, LAST (set MENU or ITEM position) .....	357
FLAT (set flat buttons) .....	358
FONT (set default font) .....	359
FORMAT (set LIST or COMBO layout) .....	361
FROM (set listbox data source) .....	372
FULL (set full-screen) .....	374
GRAY (set 3-D look background) .....	374
GRID (set list grid-line display color) .....	375
HIDE (set control hidden) .....	375
HLP (set on-line help identifier) .....	376
HSCROLL, VSCROLL, HVSCROLL (set scroll bars) .....	377
ICON (set icon) .....	378
ICONIZE (set window open as icon) .....	380
IMM (set immediate event notification) .....	381
INS, OVR (set typing mode) .....	383
JOIN (set joined TAB scroll buttons) .....	383
KEY (set execution keycode) .....	384
LANDSCAPE (set page orientation) .....	384
LEFT, RIGHT, ABOVE, BELOW (set TAB position) .....	385
LEFT, RIGHT, CENTER, DECIMAL (set justification) .....	386
LINEWIDTH (set line thickness) .....	388
LINK (create OLE control link to object from file) .....	388

MARK (set multiple selection mode).....	389
MASK (set pattern editing data entry) .....	390
MAX (set maximize control or total maximum) .....	391
MAXIMIZE (set window open maximized) .....	393
MDI (set MDI child window) .....	394
META (set .VBX to print as .WMF) .....	394
MIN (set total minimum).....	395
MODAL (set system modal window) .....	396
MSG (set status bar message).....	397
NOBAR (set no highlight bar).....	398
NOCASE (case insensitive report BREAK) .....	398
NOMERGE (set merging behavior) .....	399
NOSHEET (set “floating” TABs).....	400
OPEN (open OLE control object from file) .....	400
PAGE (set page total reset) .....	400
PAGEAFTER (set page break after).....	401
PAGEBEFORE (set page break first) .....	402
PAGENO (set page number print) .....	403
PALETTE (set number of hardware colors) .....	403
PAPER (set report paper size) .....	404
PASSWORD (set data non-display) .....	404
PREVIEW (set report output to metafiles).....	405
RANGE (set range limits) .....	407
READONLY (set display-only) .....	407
REPEAT (set repeat button rate) .....	408
REQ (set required entry) .....	408
RESET (set total reset) .....	409
RESIZE (set variable height TEXT control) .....	409
RIGHT (set MENU position) .....	410
ROUND (set round-cornered BOX) .....	410
SCROLL (set scrolling control) .....	410
SEPARATOR (set separator line ITEM) .....	411
SINGLE (set TEXT for single line entry) .....	411
SKIP (set Tab key skip or conditional print control) .....	412
SPREAD (set evenly spaced TAB controls) .....	412
STATUS (set status bar) .....	413
STD (set standard behavior) .....	415
STEP (set SPIN increment) .....	416

STRETCH (set OLE object stretching) .....	416
SUM (set total) .....	417
SYSTEM (set system menu) .....	418
TALLY (set total calculation times) .....	418
THOUS, MM, POINTS (set report coordinate measure) .....	419
TILED (set tiled image) .....	419
TIMER (set periodic event) .....	420
TIP (set “balloon help” text) .....	421
TOOLBOX (set toolbox window behavior) .....	422
TRN (set transparent control) .....	424
UP, DOWN (set TAB text orientation) .....	424
USE (set field equate label or control update variable) .....	425
VALUE (set RADIO or CHECK control USE variable assignment) .....	428
VCR (set VCR control) .....	429
WALLPAPER (set background image) .....	430
WITHNEXT (set widow elimination) .....	431
WITHPRIOR (set orphan elimination) .....	432
WIZARD (set “tabless” SHEET control) .....	433
ZOOM (set OLE object zooming) .....	433

## **10 - EXPRESSIONS 435**

<b>Overview</b>	<b>435</b>
Expression Evaluation .....	435

<b>Operators</b>	<b>436</b>
Arithmetic Operators .....	436
The Concatenation Operator .....	436
Logical Operators .....	437

<b>Constants</b>	<b>438</b>
Numeric Constants .....	438
String Constants .....	439

<b>Types of Expressions</b>	<b>440</b>
Numeric Expressions .....	440
String Expressions .....	440
Logical Expressions .....	441
Property Expressions .....	442

<b>Runtime Expression Evaluation</b>	<b>445</b>
BIND (declare runtime expression string variable) .....	446
EVALUATE (return runtime expression string result) .....	448

POPBIND (restore runtime expression string name space) .....	449
PUSHBIND (save runtime expression string name space) .....	450
UNBIND (free runtime expression string variable) .....	451

## **11 - ASSIGNMENTS 453**

### **Assignment Statements 453**

Simple Assignments .....	453
Operating Assignments .....	454
Deep Assignment .....	455
Reference Assignments .....	457
CLEAR (clear a variable) .....	459

### **Data Type Conversion Rules 460**

Base Types .....	460
BCD Operations and Procedures .....	461
Type Conversion and Intermediate Results .....	462
Simple Assignment Data Type Conversion .....	463

## **12 - EXECUTION CONTROL 469**

### **Control Structures 469**

ACCEPT (the event processor) .....	469
CASE (selective execution structure) .....	471
EXECUTE (statement execution structure) .....	473
IF (conditional execution structure) .....	475
LOOP (iteration structure) .....	476

### **Execution Control Statements 478**

BREAK (immediately leave loop) .....	478
CYCLE (go to top of loop) .....	479
DO (call a ROUTINE) .....	480
EXIT (leave a ROUTINE) .....	480
GOTO (go to a label) .....	481
RETURN (return to caller) .....	482

## **13 - BUILT-IN PROCEDURES 483**

### **Procedures Listed by Function 483**

### **Built-in Procedures 491**

ABS (return absolute value) .....	491
ACCEPTED (return control just completed) .....	491
ACOS (return arccosine) .....	492

ADD (add an entry) .....	493
ADDRESS (return memory address) .....	496
AGE (return age from base date) .....	497
ALERT (set event generation key) .....	498
ALIAS (set alternate keycode) .....	500
ALL (return repeated characters) .....	500
APPEND (add a new file record) .....	501
ARC (draw an arc of an ellipse) .....	502
ASK (get one keystroke) .....	503
ASIN (return arcsine) .....	503
ATAN (return arctangent) .....	504
BAND (return bitwise AND) .....	505
BEEP (sound tone on speaker) .....	506
BLANK (erase graphics) .....	507
BOR (return bitwise OR) .....	508
BOX (draw a rectangle) .....	509
BSHIFT (return shifted bits) .....	510
BUFFER (set record paging) .....	511
BUILD (build keys and indexes) .....	513
BXOR (return bitwise exclusive OR) .....	515
BYTES (return size in bytes) .....	516
CALL (call procedure from a DLL) .....	517
CENTER (return centered string) .....	518
CHAIN (execute another program) .....	519
CHANGE (change control field value) .....	520
CHANGES (return changed queue) .....	521
CHOICE (return relative item position) .....	522
CHOOSE (return chosen value) .....	523
CHORD (draw a section of an ellipse) .....	524
CHR (return character from ASCII) .....	525
CLIP (return string without trailing spaces) .....	525
CLIPBOARD (return windows clipboard contents) .....	526
CLOCK (return system time) .....	527
CLOSE (close a data structure) .....	528
COLORDIALOG (return chosen color) .....	530
COMMAND (return command line) .....	531
COMMIT (terminate successful transaction) .....	532
CONTENTS (return contents of USE variable) .....	533
CONVERTANSITOOEM (convert ANSI strings to ASCII) .....	534

CONVERTOEMTOANSI (convert ASCII strings to ANSI).....	535
COPY (copy a file) .....	536
COS (return cosine) .....	537
CREATE (create an empty data file) .....	537
CREATE (return new control created) .....	538
DATE (return standard date).....	540
DAY (return day of month) .....	541
DEFORMAT (return unformatted numbers from string) .....	542
DELETE (delete a record) .....	543
DESTROY (remove a control) .....	545
DIRECTORY (get file directory) .....	546
DISABLE (dim a control) .....	548
DISPLAY (write USE variables to screen) .....	549
DRAGID (return matching drag-and-drop signature) .....	550
DROPID (return drag-and-drop string) .....	551
DUPLICATE (check for duplicate key entries).....	552
ELLIPSE (draw an ellipse) .....	553
EMPTY (empty a data file) .....	554
ENABLE (re-activate dimmed control).....	554
ENDPAGE (force page overflow) .....	555
ERASE (clear screen control and USE variables).....	557
ERROR (return error message) .....	557
ERRORCODE (return error code number) .....	558
ERRORFILE (return error filename) .....	558
EVENT (return event number) .....	559
EXISTS (return file existence) .....	560
FIELD (return control with focus) .....	561
FILEDIALOG (return chosen file).....	562
FILEERROR (return file driver error message) .....	564
FILEERRORCODE (return file driver error code number) .....	564
FIRSTFIELD (return first window control) .....	565
FLUSH (flush buffers).....	565
FOCUS (return control with focus) .....	566
FONTDIALOG (return chosen font) .....	567
FORMAT (return formatted numbers into a picture) .....	568
FREE (delete all entries) .....	568
GET (read a record or entry) .....	569
GETFONT (get font information) .....	572
GETINI (return INI file entry) .....	573

GETPOSITION (get control position) .....	574
HALT (exit program) .....	575
HELP (help window access) .....	576
HIDE (blank a control) .....	577
HOLD (exclusive record access) .....	578
IDLE (arm periodic procedure) .....	580
IMAGE (draw a graphic image) .....	581
INCOMPLETE (return empty REQ control) .....	582
INLIST (return entry in list) .....	583
INRANGE (check number within range) .....	584
INSTRING (return substring position) .....	585
INT (truncate fraction) .....	586
ISALPHA (return alphabetic character) .....	587
ISLOWER (return lower case character) .....	588
ISSTRING (return field string type or not) .....	589
ISUPPER (return upper case character) .....	590
KEYBOARD (return keystroke waiting) .....	590
KEYCHAR (return ASCII code) .....	591
KEYCODE (return last keycode) .....	591
KEYSTATE (return keyboard status) .....	592
LASTFIELD (return last window control) .....	592
LEFT (return left justified string) .....	593
LEN (return length of string) .....	593
LINE (draw a straight line) .....	594
LOCALE (load environment file) .....	595
LOCK (exclusive file access) .....	596
LOCKTHREAD (re-lock the current execution thread) .....	597
LOG10 (return base 10 logarithm) .....	597
LOGE (return natural logarithm) .....	598
LOGOUT (begin transaction) .....	599
LONGPATH (return long filename) .....	601
LOWER (return lower case) .....	601
MATCH (return matching values) .....	602
MAXIMUM (return maximum subscript value) .....	605
MESSAGE (return message box response) .....	606
MONTH (return month of date) .....	608
MOUSEX (return mouse horizontal position) .....	608
MOUSEY (return mouse vertical position) .....	609
NAME (return file name) .....	609

NEXT (read next record in sequence) .....	610
NOMEMO (read file record without reading memo) .....	612
NULL (return null file field) .....	613
NUMERIC (return numeric string) .....	614
OMITTED (return omitted parameters) .....	615
OPEN (open a data structure) .....	616
PACK (remove deleted records) .....	619
PATH (return current directory) .....	620
PEEK (read memory address) .....	621
PENCOLOR (return line draw color) .....	622
PENSTYLE (return line draw style) .....	623
PENWIDTH (return line draw thickness) .....	624
PIE (draw a pie chart) .....	625
POINTER (return last queue entry position) .....	627
POKE (write to memory address) .....	628
POLYGON (draw a multi-sided figure) .....	629
POPUP (return popup menu selection) .....	630
POSITION (return record sequence position) .....	632
POST (post user-defined event) .....	634
PRESS (put characters in the buffer) .....	635
PRESSKEY (put a keystroke in the buffer) .....	635
PREVIOUS (read previous view record in sequence) .....	636
PRINT (print a report structure) .....	638
PRINTERDIALOG (return chosen printer) .....	639
PUT (re-write record) .....	640
PUTINI (set INI file entry) .....	643
RANDOM (return random number) .....	644
RECORDS (return number of rows in data set) .....	645
REGISTER (register event handler) .....	647
REJECTCODE (return reject code number) .....	649
REGET (re-get record) .....	650
RELEASE (release a held record) .....	652
REMOVE (erase a file) .....	653
RENAME (change file directory name) .....	654
RESET (reset record sequence position) .....	655
RIGHT (return right justified string) .....	657
ROLLBACK (terminate unsuccessful transaction) .....	658
ROUND (return rounded number) .....	659
ROUNDBOX (draw a box with round corners) .....	660



RUN (execute command) .....	661
RUNCODE (return program exit code) .....	663
SELECT (select next control to process) .....	664
SELECTED (return control that has received focus) .....	666
SEND (send message to file driver) .....	666
SET (initiate sequential file processing) .....	667
SET3DLOOK (set 3D window look) .....	670
SETCLIPBOARD (set windows clipboard contents) .....	671
SETCLOCK (set system time) .....	672
SETCOMMAND (set command line parameters) .....	672
SETCURSOR (set temporary mouse cursor) .....	673
SETDROPID (set DROPID return string) .....	674
SETFONT (specify font) .....	675
SETKEYCHAR (specify ASCII code) .....	676
SETKEYCODE (specify keycode) .....	676
SETNONULL (set file field non-null) .....	677
SETNULL (set file field null) .....	678
SETPATH (change current drive and directory) .....	679
SETPENCOLOR (set line draw color) .....	680
SETPENSTYLE (set line draw style) .....	681
SETPENWIDTH (set line draw thickness) .....	682
SETPOSITION (specify new control position) .....	683
SETTARGET (set current window or report) .....	684
SETTODAY (set system date) .....	686
SHORTPATH (return short filename) .....	686
SHOW (write to screen) .....	687
SHUTDOWN (arm termination procedure) .....	687
SIN (return sine) .....	688
SKIP (bypass records in sequence) .....	689
SORT (sort queue entries) .....	690
SQRT (return square root) .....	691
START (return new execution thread) .....	692
STATUS (return file status) .....	694
STOP (suspend program execution) .....	695
STREAM (enable operating system buffering) .....	696
SUB (return substring of string) .....	697
TAN (return tangent) .....	698
THREAD (return current execution thread) .....	699
THREADLOCKED (returns current execution thread locked state) .....	700
TODAY (return system date) .....	700

TYPE (write string to screen) .....	701
UNHIDE (show hidden control) .....	701
UNLOAD (remove a CALLED DLL from memory) .....	702
UNLOCK (unlock a locked data file) .....	703
UNLOCKTHREAD (unlock the current execution thread) .....	704
UNREGISTER (unregister event handler) .....	705
UPDATE (write from screen to USE variables) .....	706
UPPER (return upper case) .....	707
VAL (return ASCII value) .....	707
WATCH (automatic concurrency check) .....	708
WHAT (return field from group) .....	709
WHERE (return field position in group) .....	710
WHO (return field name from group) .....	711
YEAR (return year of date) .....	712
YIELD (allow event processing) .....	713

## **APPENDIX A - DDE, OLE, AND .OCX** **715**

### **Dynamic Data Exchange** **715**

DDE Overview .....	715
DDE Events .....	716

### **DDE Procedures** **718**

DDEACKNOWLEDGE (send acknowledgement from DDE server) .....	718
DDEAPP (return server application) .....	719
DDECHANNEL (return DDE channel number) .....	720
DDECLIENT (return DDE client channel) .....	721
DDECLOSE (terminate DDE server link) .....	722
DDEEXECUTE (send command to DDE server) .....	723
DDEITEM (return server item) .....	724
DDEPOKE (send unsolicited data to DDE server) .....	725
DDEQUERY (return registered DDE servers) .....	727
DDEREAD (get data from DDE server) .....	728
DDESERVER (return DDE server channel) .....	730
DDETOPIC (return server topic) .....	731
DDEVALUE (return data value sent to server) .....	732
DDEWRITE (provide data to DDE client) .....	733

### **Object Linking and Embedding** **735**

OLE Overview .....	735
OLE Container Properties .....	736
OLEDIRECTORY (get list of installed OLE/OCX) .....	744

<b>OLE (.OCX) Custom Controls</b>	<b>745</b>
OverView .....	745
.OCX Control Properties .....	745
Callback Functions .....	746
<b>Calling OLE Object Methods</b>	<b>751</b>
Method Syntax Overview .....	751
Parameter Passing to OLE/OCX Methods .....	753
<b>OCX Library Procedures</b>	<b>756</b>
OCXREGISTERPROPEDIT (install property edit callback) .....	756
OCXREGISTERPROPCHANGE (install property change callback) .....	756
OCXREGISTEREVENTPROC (install event processing callback) .....	757
OCXUNREGISTERPROPEDIT (un-install property edit callback) .....	757
OCXUNREGISTERPROPCHANGE (un-install prop change callback) .....	758
OCXUNREGISTEREVENTPROC (un-install event process callback) .....	758
OCXGETPARAMCOUNT (return number of parameters for current event) ...	759
OCXGETPARAM (return current event parameter string) .....	760
OCXSETPARAM (set current event parameter string) .....	761
OCXLOADIMAGE (return an image object) .....	762
<b>APPENDIX B - EVENTS</b>	<b>763</b>
<b>Events</b>	<b>763</b>
Field-Independent Events .....	763
Field-Specific Events .....	767
<b>APPENDIX C - RUNTIME PROPERTIES</b>	<b>771</b>
<b>Runtime Properties</b>	<b>771</b>
PROP:AcceptAll .....	771
PROP:Active .....	772
PROP:AlwaysDrop .....	772
PROP:AppInstance .....	772
PROP:AutoPaper .....	773
PROP:BreakVar .....	773
PROP:Buffer .....	774
PROP:Checked .....	774
PROP:Child, PROP:ChildIndex .....	775
PROP:ChoiceFreq .....	776
PROP:ClientHandle .....	776
PROP:ClientWndProc .....	777
PROP:ClipBits .....	778

PROP:DDEMode .....	779
PROP:DDETimeOut .....	779
PROP:DeferMove .....	780
PROP:Edit .....	781
PROP:Enabled .....	782
PROP:EventsWaiting .....	783
PROP:ExeVersion .....	783
PROP:FlushPreview .....	784
PROP:Follows .....	785
PROP:Handle .....	785
PROP:HeaderHeight .....	786
PROP:HscrollPos .....	787
PROP:IconList .....	788
PROP:ImageBits .....	789
PROP:ImageBlob, PROP:PrintMode .....	790
PROP:InToolbar .....	791
PROP:Items .....	791
PROP:LazyDisplay .....	792
PROP:LFNSupport .....	792
PROP:LibHook .....	793
PROP:LibVersion .....	796
PROP:Line, PROP:LineCount .....	796
PROP:LineHeight .....	797
PROP:MaxHeight, PROP:MaxWidth, PROP:MinHeight, PROP:MinWidth .....	797
PROP:NextField .....	798
PROP:NextPageNo .....	799
PROP:NoHeight, PROP:NoWidth .....	800
PROP:NoTips .....	800
PROP:Parent .....	801
PROP:Pixels .....	801
PROP:PrintMode .....	802
PROP:Progress .....	802
PROP:RejectCode .....	803
PROP:ScreenText .....	804
PROP:SelStart, PROP:Selected, PROP:SelEnd .....	804
PROP:Size .....	805
PROP:TabRows, PROP:NumTabs .....	806
PROP:TempImage .....	807
PROP:TempImageStatus .....	807
PROP:TempPath .....	807

PROP:TempPagePath .....	807
PROP:TempImagePath .....	807
PROP:TempNameFunc .....	808
PROP:Thread .....	809
PROP:Threading .....	809
PROP:TipDelay, PROP:TipDisplay .....	809
PROP:Touched .....	810
PROP:Type .....	811
PROP:UpsideDown .....	812
PROP:VBXEvent, PROP:VBXEventArg .....	812
PROP:Visible .....	813
PROP:VLBproc, PROP:VLBval .....	814
PROP:VscrollPos .....	816
PROP:WndProc .....	817
<b>Runtime VIEW and FILE Properties</b>	<b>818</b>
PROP:ConnectionString .....	818
PROP:CurrentKey .....	818
PROP:DriverLogoutAlias .....	819
PROP:FetchSize .....	819
PROP:File .....	820
PROP:Files .....	820
PROP:GlobalHelp .....	821
PROP:Held .....	821
PROP:Logout .....	822
PROP:Profile .....	823
PROP:Log .....	823
PROP:ProgressEvents, PROP:Completed .....	824
PROP:SQLDriver .....	826
PROP:Text .....	826
PROP:Value .....	827
PROP:Watched .....	827
<b>Embedded SQL</b>	<b>828</b>
PROP:SQL .....	828
PROP:SQLFilter .....	828
<b>APPENDIX D - ERROR CODES</b>	<b>829</b>
<b>Run Time Errors</b>	<b>829</b>
Trappable Run Time Errors .....	829
Non-Trappable Run Time Errors .....	833

<b>Compiler Errors</b>	<b>835</b>
Specific Errors .....	835
Unknown errors .....	847
 <b>APPENDIX E - LEGACY STATEMENTS</b>	 <b>849</b>
BOF (return beginning of file) .....	849
EOF (return end of file) .....	850
FUNCTION (define a function) .....	851
POINTER (return relative record position) .....	852
SHARE (open data file for shared access) .....	853
 <b>INDEX</b>	 <b>855</b>

# **FOREWORD - ORIGINS OF THE CLARION LANGUAGE**

*by Bruce D. Barrington, CEO, TopSpeed Corporation*

As so often happens, I was just trying to please myself. I bought the first PC I ever saw and wanted to program it. That's what I do. Pascal was a straight-jacket and C wasn't available yet. So I tried BASIC. All it needed were some smart screen and keyboard routines. Right? Perhaps a little indexed sequential. Right?

Wrong! I could make it work. But I couldn't make it clean. I had just spent 10 years working with software development tools of my own design. I liked them. Maybe it was time to share what I had learned. Maybe the world really needed yet another computer language—a general-purpose, business programming language. Designed especially for PCs.

It may sound contradictory to call a business language “general-purpose,” but in the PC world there are many business “languages” that are anything but general-purpose. Writing spreadsheet macros is programming, I suppose, but the macros hardly comprise a general-purpose language. For that matter, most database languages are not general-purpose languages. They are really scripts to be executed by their database manager. The scripts define a role the database manager plays while acting out your application. Even the dBase language, which can be compiled and run on stand-alone basis, is not really general-purpose.

According to my definition, a general-purpose language should be able to exercise the entire repertoire of capability offered by the underlying platform. That means a program should be able to read any section of any file that is visible to the operating system. It should pass through all the versatility available for the user interface. It should connect, in standard ways, to other general-purpose languages and componentware. A general-purpose language does not contaminate a program with its own “look and feel.” It does not erect barriers to be surmounted. Rather, it grants wide latitude within the constraints of its platform to solve a broad range of programming problems with an extensive choice of styles.

But why restrict the new language to PCs? Other mainstream languages are meticulously portable. I decided that PCs deserve special treatment. Even in 1984, when I began designing Clarion in earnest, PCs already comprised a

substantial percentage of all the computers installed in the world. And PCs were different than other computers. They were inherently single-user devices with an integrated keyboard and monitor. The keyboard and monitor could be accessed instantly, without modems and communications lines. These machines begged for responsive, interactive application programs. I wanted to exploit this functionality by building memory-mapped video into my new language. If a Clarion program could “only” run on 40 or 50 million computers, that was all right by me.

I was driven by the steadfast belief that programming should be simpler. That programming languages should be easier to read and write. And that the poor productivity associated with software development stemmed from inadequate and poorly designed programming tools.

These feelings began as pet peeves: Why would anyone design an **IF** statement like **IF...THEN BEGIN;statements;END ELSE...** (Pascal). What possible value do the **THEN**, **BEGIN**, and **END** keywords serve in this structure? Why use “:=” instead of “=” for an assignment statement (Pascal, Modula-2, Ada). Didn’t the language designer know that assignments are the most numerous statements in a program or that “:=” is a finger locking combination of shifted and unshifted keys? How about a **READ...AT END** (COBOL) clause that sets an end-of-file variable that is tested to terminate a read loop? Why can’t the loop test for end-of-file? Having declared a variable, why must I remind the compiler to convert it in mixed expressions? Can’t the compiler remember that for me? Have you ever done lint collection? Did you ask why? And hex dumps. What about **HEX DUMPS!** After twenty years of programming, I felt like the anchorman in the movie *Network* who shouted out the window: “I’m mad as hell and I’m not going to take it anymore.”

## Setting the Style

---

So I set out to design a new computer language that was compact (easy to write) and expressive (easy to read). I began at the back and worked toward the front: First, I wrote lots of programs, experimenting with syntax and semantics until the programs looked great. Then I wrote a small language reference manual. When the manual was well along, the development team started writing a compiler. The language was changing daily. Our old development memos describe an energetic and interactive process. Many ideas were proposed and rejected for reasons of art. Others for poor technology. Some were simply insane. Like Darwin’s species, only the strong survived.

I classify programming languages into three styles: token oriented, sentence oriented, and statement oriented. Token oriented languages like Pascal and C are compact but not particularly expressive. Such languages treat a program as a set of tokens (keywords, data names, constants, punctuation, etc.) separated by “white space” (spaces, CR/LFs, comments, and sometimes



commas). The compiler collects the tokens and ignores the white space. Token oriented languages are one-dimensional, so programmers use white space to add a second dimension to their programs:

```
typedef struct {
    unsigned char  Type; /*the type of structure*/
    unsigned      Vlen; /*variable length*/
    unsigned char  Dplac; /*decimal places if decimal*/
    void          *Use; /*pointer to variable*/
}Usedef
```

This C programmer has done about everything possible to code a readable type definition. But the left brace seems to “dangle” off the **struct** keyword. And Usedef dangles off the right brace. After all, braces aren’t very artistic vertical delimiters.

Sentence oriented languages like COBOL and most database languages are expressive but not very compact. Sometimes statements in sentence oriented languages read like perfect English. This COBOL statement is certainly expressive:

```
MULTIPLY PRINCIPAL BY RATE GIVING PAYMENT ROUNDED.
```

But no more so than:

```
Payment = Principal * Rate
```

I would argue that in the context of an entire program, the second statement is easier to read than the first, which tends to melt into paragraphs full of verbiage. Other sentence formats are not very English-like at all. I found this “beauty” in an xBase language reference manual:

```
EDIT [FIELDS <field list>] [<scope>][FOR <expL1>]
[WHILE <expL2>][FREEZE <field>]
[KEY<expr1> [,<expr2>]] [LAST] [LEDIT] [REDIT]
[LPARTITION] [NOAPPEND] [NOCLEAR] [NODELETE]
[NOEDIT | NOMODIFY] [NOLINK] [NOMENU] [NOOPTIMIZE]
[NORMAL][NOWAIT][PARTITION <expN1>][REFERENCE <expC1>]
[SAVE][TIMEOUT <expN2>] [TITLE <expC2>]
[VALID [:F] <expL3> [ERROR <expC3>]] [WHEN <expL4>]
[WIDTH <expN3>] [[WINDOW <window name1>]
[IN [WINDOW] <window name2> | IN SCREEN]]
[COLOR SCHEME <expN4>] | COLOR <color pair list>]
```

Wow! These are certainly English words, but are they expressive? Could any programmer understand an instance of this statement format without a manual? Among many other questions I’d like to ask is: Who designed a **WHILE** clause and a **WHEN** clause in the same statement? It makes me want to scream out the window.

My experimental programs had become statement oriented—that old fashioned style used by FORTRAN and BASIC. Statement oriented languages exploit the fact that source programs are contained in ASCII source files—every line of a program is a record in the file. So record boundaries can be used to eliminate punctuation. I settled on a statement format that proved to be compact, expressive, and versatile:

```
label STATEMENT[(parameters)] [,ATTRIBUTE[(parameters)]] ...
```

Attributes are only used to declare data. Executable statements use the format of a standard procedure call. Of course, I defined different statement formats for assignment statements ( $A = B$ ) and (IF, CASE, etc.).

A statement label starts in column one (the first position of the record). A statement without a label must not start in column one. A statement is terminated by the end of the line unless it is continued by a vertical bar (|). I adopted the semi-colon as an optional statement separator to allow more than one statement per line. By adopting the Modula-2 concept of ignoring empty statements, I eliminated the distinction between statement separators and terminators that had confounded countless Pascal programmers.

This design eliminates the punctuation otherwise necessary to identify labels and separate statements. Blocks of statements are initiated by a single compound statement such as IF and are terminated by a statement separator such as ELSE (which initiates another statement block) or by an END statement (or period). There are no “dangling” keywords.

## Declaring Data

---

In its infancy, COBOL was said to be “self-documenting” because of its explicit data division and its expressive statement syntax.. Every element that a COBOL program processes must be declared in the data division: variables, constants, files, records, indexes—even sort sequences and report formats. I agreed that these declarations were essential for documenting business programs. And I felt that our new statement format would greatly improve their readability.

In the late 1960’s, IBM promoted PL/I as the successor to COBOL. The language was a disappointment to many, but it did offer a few fresh ideas. By condensing the data type keywords and introducing embedded comments (*/\*comment\*/*), PL/I provided enough space to comment every declaration statement. COBOL had been designed for long, descriptive data names. But programmers didn’t use long data names. There were good reasons for this: First of all, programmers like to columnarize programs to make them more readable. Arranging the data division in columns restricts data names to an arbitrary maximum length. Secondly, programmers don’t like long data names in the procedure division. Long names create unwieldy expressions and add to the writer’s cramp produced by an already verbose language. So most COBOL programmers used short, cryptic labels and wrote programs that weren’t nearly as self-documenting as they should have been.

PL/I programmers got around that problem by commenting their declaration statements. If there was a question about the meaning of a data name, it could be resolved by looking up its declaration. I had managed a large PL/I project in the 60’s and became convinced that declaration statements required three parts: a statement label, a data type, and a comment.

The new statement format was perfect. The statement label appeared on the left where it would be most visible. Data type keywords were short (BYTE, REAL, DIM, etc.) to maximize the space available for the comment. As a final space saver, a single exclamation character ( ! ) was designated as a comment initiator.

COBOL and PL/I use “levels” to declare data structures. Every variable has a level number. A variable with a higher level number is “part of” a prior variable with a lower level number. If a variable is not part of a data structure, it is declared as an “01” or “77” level. I never liked using “levels” and was surprised that they were carried over in PL/I. I considered them arbitrary and a waste of space. (What does “77” mean and why do unstructured variables need a level anyway?) I chose GROUP (named after COBOL’s “group item”) as a compound statement to initiate data structures (which we then called “groups”). This mechanism is similar to record...end used in Pascal, Modula-2, and ADA; and struct{..} used in C. Indenting nested GROUP statements produces a very readable declaration:

```
Error    GROUP,PRE(Err)      !Error information
Date     DATE                !Date of error
Time     TIME                !Time of error
Device   STRING(12)          !Active device
Message  GROUP               !Error message
MsgCode  STRING(@P###P)      !Message Code
          STRING(' - ')
MsgText  STRING(32)          !Message text
          END
          END
```

COBOL and PL/I permit the same data name to be used in different data structures. Such data names are referenced by the data name qualified by the structure name. This is a useful construct, since the same fields frequently appear in more than one data structure (e.g. ACCT-NO IN OLD-VENDOR, ACCT-NO IN CURRENT-PAYEE, etc.). But many programmers refuse to use this feature because it creates such long references. Instead, they code mnemonic prefixes on every field (e.g., VND-ACCT-NO). This takes extra coding time and reduces the available name space.

To deal with this issue, I included an optional prefix attribute that could be attached to any data structure (e.g. **PRE(VND)**). Elements of the structure are qualified by placing the prefix and a colon in front of their data name (e.g. VND:AcctNo, PAY:AcctNo).

To match the functionality of “MOVE CORRESPONDING” in COBOL and “BY NAME” assignments in PL/I, a “deep” assignment statement was added to move matching elements between groups:

```
DestinationGroup := SourceGroup
```

As a business language, Clarion needed a rich set of basic data types: All sizes of integers and real numbers were included to provide compatibility with external record layouts and parameter lists. Packed decimals were included to solve rounding problems and reduce memory usage. (They can

be declared in a range of sizes.) Various string formats (fixed, Pascal, and C), along with a complete set of string functions, were also included. And finally, data types for dates and times were designed to support direct arithmetic on these variables:

```
Tomorrow = Today + 1
```

But what about structured data types? In ALGOL-like languages such as Pascal, Modula-2, Ada, and C, groups and arrays are declared as types. You declare the type, then you declare a group or array as an instance of the predeclared type. I never have liked this syntax. In business programs, most groups and arrays are only declared once. Thinking up a type name and coding a **TYPE** statement is usually unnecessary busy-work. I have never considered a group or an array to be a data type anyway. Groups and arrays describe storage relationships, not data types.

So I made the type declaration optional. A Clarion declaration with a **TYPE** attribute declares a data type that can be used for recurring structures or structures that are passed as parameters. A declaration with no **TYPE** attribute declares both a data type and a variable of the same name. I adopted the PL/I **LIKE** statement to declare a variable of predeclared type. I felt that this design offered the best of both worlds:

```
Totals      GROUP,PRE(QTR)
GrossPay    DECIMAL(12,2)
Deductions  DECIMAL(12,2)
NetPay      DECIMAL(12,2)
            END

YTD:Totals  LIKE(Totals),PRE(YTD)
```

## Painless Typing

---

A computer language is strongly typed if every data element has a single data type and the language syntax makes it impossible to view that element as a different type. Many experts feel that strong typing increases program reliability. Perhaps. But strongly typed programs are harder to write, restricting the use of general purpose procedures, and requiring an unnecessarily vigilant awareness of data types. Furthermore, I have never heard a COBOL programmer accuse **REDEFINES** (used solely to defeat strong typing) of causing reliability problems. (COBOL programmers, by the way, are not uncritical of their language. The **ALTER** statement fell into disuse years ago because it produced unstable programs.)

I didn't want our new language to be strongly typed. First of all, I wanted to support re-declarations similar to **REDEFINES** or the **union type** in C. Redeclarations are useful for implementing record types (variant records in Pascal) and for handling special programming cases. I assigned the **OVER** attribute to this purpose:

```
MonthNames  STRING('JanFebMarAprMayJunJulAugSepOctNovDec')
Month       STRING(3),DIM(12),OVER(MonthNames)
```

Secondly, I wanted group structures to be treated like strings. This weakened data typing because groups can contain data types other than strings. But groups need functionality. They must be moved, passed as parameters, even (carefully) compared. That's the rub, of course. Most numeric data types don't collate as strings, so groups containing numeric elements usually won't collate properly. Negative integers collate higher than positive integers and floating-point numbers collate somewhat randomly. Design involves compromise (sigh) and I elected the functionality while accepting the risk.

It was important for Clarion data types to permit simple construction of general-purpose procedures. If a procedure expected a numeric parameter, then any numeric data type should suffice. I thought it was ridiculous to require different numeric functions to handle different numeric data types like the ALGOL derivative languages. To go even further, I think polymorphism, as implemented in C++, that requires separate functions for each data type but permits them to be called by a single function name is a notational sham.

In the original version of Clarion, parameters were not even prototyped. Whatever appeared in the callers argument list was used by the procedure. Clarion now requires parameter prototypes but permits the data type to be unspecified. Clarion procedures have always been truly polymorphic for unstructured data.

Clarion parameters are prototyped to be passed by value or by address. Clarion does not support pointers. There are two reasons for this: First, pointers don't carry data type information with them and can be easily misused. And second, pointer dereferences (syntax differentiating the pointer from its target) needlessly complicate programs. It has been my experience that pointer mishaps are involved in most C program bugs.

We chose reference variables, as implemented in C++, to support indirection. A reference variable contains the data type as well as the identity of its target. And a reference variable is automatically dereferenced when it is used. There is no possibility of confusion between a reference variable and its target. Consider the following:

```

CompanyA  FILE
          :
          END
CompanyB  FILE
          :
          END
Company   &FILE           !Company being processed
CODE
CASE CompanyLetter        !Which company to process?
OF 'A'
    Company &= CompanyA    !Point to Company A
OF 'B'
    Company &= CompanyB    !Point to Company B
END
OPEN(Company)              !Open selected company

```

The reference variable *Company* is set by a reference assignment statement (&=). The compiler will object if the data types don't match. Thereafter, a reference variable can be used in any context its target is permitted.

## Intermediate Values

---

Another important issue involved automatic type conversion. I felt strongly that you declared a data type so that the compiler would know! And that an obliging compiler would generate data type conversions as needed. I also felt that a great compiler would probe expressions for meaning and supply logical conversions.

For example, if I add a string to an integer, it is reasonable for the compiler to assume that the string contains an ASCII number and to generate such a conversion. Conversely, if I concatenate an integer to a string, I am asking the compiler to convert the integer first. By selecting appropriate data types for intermediate values, the compiler can safely convert data types in expressions without losing information. If you divide two integers, a good compiler will store the result in an intermediate value that will hold a fraction. If you add an integer to a string, the compiler will also use a fractional intermediate value because a string is capable of expressing a fraction.

Information can be lost, of course, when a value is moved, for instance, by an assignment statement or as a parameter of a procedure call. Moving a real number to an integer truncates the fraction. Moving a real number to a packed decimal rounds to the least significant decimal digit. Some languages, such as Pascal, require that such data conversions be explicitly called. I felt that by declaring a data type, a programmer was requesting the compiler to implicitly restrict the data element to a given domain of value.

Earlier versions of Clarion used just two data types for numeric intermediate values: 32 bit signed integer (LONG) and a 64 bit floating point (REAL). A divide operation or any operation with one or more REAL operands would produce a REAL intermediate value. This strategy provided sufficient accuracy since a REAL could express the maximum numeric significance (15 digits) supported by Clarion. Although they are accurate, floating point values are not discreet. Two equivalent expressions such as  $1 / 2$  and  $2 / 4$  can produce floating point results that differ in the least significant bit. This is usually a meaningless difference in computations.

But not in comparisons. A programmer expects one-half to equal two-fourths. I may be willing to avoid comparing REALs but I expect a logical expression such as this to work every time:

```
IF Hours > Normal * 1.5
```

Using a REAL to receive the expression on the right casts doubt on the results of the comparison. We resolved this issue in Clarion for Windows by

implementing fixed-point intermediate values with 31 decimal digits on each side of the decimal point. This change also increased our maximum numeric significance to 31 digits.

## Control Structures

---

While the business languages, COBOL and PL/I, offered the preferred model for declaring data, the ALGOL derivatives, especially Modula-2, offered better control structures. I modified the Modula-2 **IF** statement by making the **THEN** keyword replaceable by a statement separator. This had the effect of eliminating superfluous **THENs** from multi-line **IF** structures. By adopting Modula-2's **ELSIF**, I eliminated the massive indenting and multiple terminations caused by deeply nested **IF** structures:

```
IF Number < 0
  Sign = -1
ELSIF Number > 0
  Sign = +1
ELSE
  Sign = 0
END
```

I also used Modula-2 as a guide for Clarion's **CASE** statement. Modula-2's **CASE** supports enumerated case labels and case label ranges—very useful features. But I didn't like its punctuation. The **OF** keyword introduces the first case label, but subsequent case labels are initiated by a vertical bar (“|”). I felt this punctuation was ugly and not very intuitive. Instead, I used **OF** to introduce all case labels. I invented the **OROF** keyword to enumerate case labels and the **TO** keyword for case label ranges. These changes produced a very friendly syntax:

```
CASE SUB(Name,1,1)
OF 'A' TO 'M' OROF 'a' TO 'm'
  DO FirstHalf
OF 'N' TO 'Z' OROF 'n' TO 'z'
  DO SecondHalf
ELSE
  DO FirstHalf
END
```

Modula-2 was the first usage I had seen of the **LOOP** keyword in its proper context. In Modula-2, **LOOP...END** executes an unconditional loop that is terminated by executing an **EXIT** statement. I augmented this concept by adding a **CYCLE** statement to recycle the loop from within. (I also changed **EXIT** to **BREAK** because I was using **EXIT** for another purpose.) I implemented conditional loops by adding four optional clauses to the **LOOP** statement:

```
LOOP I = 1 TO 100 BY 2
LOOP 10000 TIMES
LOOP WHILE Count > 0
LOOP UNTIL EndOfFile
```

I felt that good program organization required local subroutines. A local subroutine is a block of statements that has been removed from the main logic and is executed by a subroutine call statement. If the subroutine is aptly named, the main logic becomes shorter without losing clarity. COBOL and BASIC use **PERFORM** and **GOSUB** for this purpose. Local procedures in Pascal and Modula-2 nearly fit the bill but they require a prototype statement to declare the parameter types. I didn't want to support subroutine parameters because I wanted all the caller's data to be visible to the subroutine. I designed the **ROUTINE** statement to initiate a local subroutine. **ROUTINEs** are placed at the end of a procedure or function and are executed by a **DO** statement.

A number of languages support executing a single statement from a list of statements as indicated by a statement selection integer. FORTRAN uses the computed **GOTO**. COBOL uses **GOTO...DEPENDING ON**. BASIC uses **ON...GOTO** and **ON...GOSUB**. I wanted to implement a similar capability that would execute any type of statement from a list of statements depending on an integer expression. I named this structure **EXECUTE** after the common **XEQ** machine language instruction which executes the single instruction addressed by its operand. This new structure is, I believe, unique to the Clarion language, but has proven quite useful:

```
EXECUTE UpdateAction
    ADD(Master)
    PUT(Master)
    DELETE(Master)
END
```

## Taming the User Interface

---

In 1970, I was working for McDonnell Douglas Automation Company when we purchased one of the first IV/70 computers built by Four Phase Systems, Inc. It was a marvelous machine—96K of solid-state memory, with a footprint not much larger than a PC. What made this box so interesting was its video support: 32 CRTs daisy-chained from 8 video ports that were refreshed directly from memory. Before the IV/70, every CRT I had used was a communications device. You could watch individual characters display as they arrived at the terminal. With the IV/70, an entire new screen was displayed every thirtieth of a second. It was the perfect platform for interactive programs. But no one seemed to notice. Four Phase was selling the system as a replacement for IBM's clustered CRTs and as a multi-station keypunch.

I had a higher use in mind. In 1973, I formed a company to develop a turn-key hospital information system based on the IV/70 computer. I wrote a multi-user operating system and a macro-language that exercised it. Then I wrote a macro pre-processor and a small hospital information system. The entire process took 9 months.



The macro language accessed the CRTs as if they were memory (that's what they were!) using move macros. The hospital application "painted" the screen by moving literals to the video memory, then placed entry field descriptions in a user field table and returned to the operating system for processing. When a field completed or a special key was pressed, control returned to the application.

This strategy had a distinct operating system "centric" viewpoint. Function keys were connected to screen procedures. Screen procedures created field tables that were connected to field edit procedures. A program didn't "run" in a conventional sense. In fact, there was no such thing as a program—just a set of procedures that responded to operating system events. The operating system was in control. It was up to the programmer to anticipate its needs. Our programmers eventually became so proficient with this approach that most hospital systems could be designed, implemented, and fully tested before the hardware was cabled together.

But it was never intuitive. Every one of our programmers climbed a steep learning curve. Event-driven programming is hard to grasp. Later, in one of the most vivid flashes of insight I have ever experienced, it dawned on me that an event-driven operating system could be controlled by a conventional program. The user interface would be invoked by a single statement. For Clarion, I called it **ACCEPT**. The leading edge of **ACCEPT** would return control to the operating system and the trailing edge could serve as the entry point for all event processing. A small set of functions would be crafted to identify the event that occurred and the fields involved.

Event-driven systems had always seemed "inside-out" to me. I was inside, chained to an oar, obeying the drummer, processing his events. I realized that **ACCEPT** would make me the master again. Now the drum was mine! I would call the operating system, not the other way around.

But how would Clarion depict a screen layout? Well, if screen literals are data and screen fields are data, then a screen layout has to be a data structure, doesn't it? I unimaginatively called it a **SCREEN** structure.

**OPEN(MyScreen)** would display a screen. **ACCEPT** would enable the keyboard and handles all of the behavior of operator entry. When the operator completes a field or presses a "hot" key, the **ACCEPT** statement would "fall through," releasing control to the program. **CLOSE(MyScreen)** would restore the state of the monitor before "MyScreen" was opened.

Declaring screen layouts made them easy to process but even easier to design. The development team integrated a screen painter into the Clarion source code editor which could generate **SCREEN** structures. The screen painter could also read **SCREEN** structures. Get the picture? Position the cursor in a **SCREEN** structure and invoke the screen painter. The screen painter interprets the source and displays the screen layout. Now "paint" some changes on the screen and exit. The screen painter changes the source code by replacing the old **SCREEN** structure with the updated version. Interactive visual design like this is impossible without declared structures.

I designed a similar structure for report layouts. **REPORT** structures contain layouts for print lines, page headers and page footers. The **PRINT** statement handles data formatting and page overflow automatically. And a report painter is integrated with the source code editor to maintain **REPORT** structures just like **SCREEN** structures.

## Opening Windows

---

As luck would have it, our user interface design was perfectly suited to Microsoft Windows—an “inside out” operating system if I ever saw one. Windows programmers were having a very difficult time—who could blame them? The “Hello World” example shipped with a popular C++ product was 8 pages long! Windows was in desperate need of a simple messaging model like the Clarion **ACCEPT** loop. We decided to provide just that.

We changed our **SCREEN** structures to **WINDOW** structures, introducing the grammar necessary to declare and contain Windows objects and properties. We added multi-threading to accommodate the multiple document interface. We changed the grammar of **REPORT** structures to depict WYSIWYG reports, background forms, and nested group headers, footers, and sub-totals.

The **ACCEPT** statement became a structure defining the boundaries of an event processing loop. We designed the compiler to cooperate with the run-time library to hide the direction of the procedure calls used to process window events. A call to a run-time window processor is generated above the **ACCEPT** loop. The loop itself is generated as an embedded accept procedure.

The window processor creates the necessary objects, specifying a common event processing procedure for every event produced by every object. This event processor handles “housekeeping” events such as redraws and calls the embedded accept procedure to deal with other events. When the window closes, the window processor returns control to the statement following the **ACCEPT** loop.

To the Clarion programmer, it is all quite simple. Open a window, then fall into an **ACCEPT** loop. The **ACCEPT** loop cycles for every event the program needs to see. Close the window and fall out of the loop.

We defined a convenient set of functions to identify the events and objects involved. The code necessary to process a typical dialog box looks like this:

```

OPEN(Window)                !Open the window
ACCEPT                      !Enable the window
CASE FIELD()                !Which field needs attention?
  OF ?OK                    ! 'OK' needs attention
    CASE EVENT()            ! Which event has occurred?
      OF EVENT:Accepted     ! 'OK' is pressed down
        :                   ! Process the OK button
        CLOSE(Window)       ! Close the window
      END                   ! End CASE EVENT()
    OF ?Cancel              ! 'Cancel' needs attention
      CASE EVENT()          ! Which event has occurred?
        OF EVENT:Accepted   ! 'Cancel' is pressed down
          :                  ! Process 'Cancel' button
          CLOSE(Window)      ! Close the window
        END                 ! End CASE EVENT()
      ELSE                  ! Must be a non-field event
        CASE EVENT()        ! Which event has occurred?
          OF EVENT:CloseWindow ! The window will be closed
            :                ! Process window close down
          END                ! End CASE EVENT()
        END                 ! End CASE FIELD()
      END                   !End ACCEPT
    RETURN                  !Return to the caller

```

A by-product of our object-oriented run-time library corrected a serious deficiency in the Clarion language—compiler invariants. Declaring screens, reports, and files is very illuminating. But it can also be restrictive. Because they are compiled in, you can't change most declarations at run-time. Many of the language extensions requested by Clarion programmers involved making declared attributes visible to and changeable by the program.

In our Windows run-time library, these structures are objects. Objects have properties. And properties can be changed. Anytime. Since we had already overloaded the period as both a structure terminator and a decimal point, we could not implement the standard object oriented notation of *object.property*. So we elected to use “curly brackets” to enclose properties. With this notation, any declared attribute, such as the text displayed on a button, can be modified by a statement such as:

```
?Button{PROP:Text} = 'My Button'
```

## Designing a Database

---

I wanted to implement a simple database syntax that would support all three standard file access methods: direct, sequential, and indexed. The underlying file organization would also be simple: the file would contain a header followed by fixed length data records. The header would describe the record layout and associated keys and memos which would reside in separate files. This arrangement is similar to that used by dBase—a record could be accessed sequentially or directly by key or by its relative record number. I designed a **FILE** structure, similar to a COBOL **FD**, to declare files and their components:

```

Detail      FILE,PRE(DTL),NAME('C:\LEDGER\DETAIL.DAT')
AcctKey     KEY(DTL:AcctNo,DTL:Period,DTL:Date)
BatchKey    KEY(DTL:Batch,DTL:Period),DUP
Comment     MEMO(4096)
            RECORD                      !Detail record
AcctNo      SHORT                      !Account number
Period      BYTE                       !Accounting period
Date        DATE                      !Transaction date
Batch       STRING(12)                 !Batch ID
Amount      DECIMAL(12,2)              !Amount (+/- = debit/credit)
            END
        END
    END

```

I implemented sequential processing using **SET**, **NEXT**, **PREVIOUS**, and **SKIP** verbs. **SET** establishes the sequence (by key or relative record number) and starting point for the other three verbs which read records forward and backward, and skip over records. These verbs combine nicely with the end-of-file function (**EOF**) in a read loop:

```

SET(Dtl:AcctKey)                !Set account number sequence
LOOP UNTIL EOF(Detail)          !Loop through every record
    NEXT(Detail)                 !Read the next record
    :
END

```

The **GET** verb reads a record randomly by key or relative record number. Importantly, **GET** does not interfere with sequential processing by resetting the next record processed. **PUT** and **DELETE** process records accessed by **NEXT**, **PREVIOUS**, or **GET**. **ADD** inserts a new record in the database. This database access grammar proved to be efficient, robust and versatile—an essential and popular component of our product.

As the Clarion language spread, however, it took on new responsibilities. Clarion developers needed to access dBase files. So we added a dBase procedure library (we called Clarion procedure libraries “Language Extension Modules”—or LEMs). Then Novell came out with client-server support for Btrieve (server-based indexing). Some large Clarion applications needed Btrieve to improve their transaction throughput. So two of our third-party developers came out with Btrieve LEMs.

That left DB2. And RDB. And Oracle. And SQL Server. And every other variety of database that runs on or is accessed by PCs. We were planning to support direct C function calls in the next version of the language, so any database with a C language API could be accessed by a Clarion program. But it was clear to me that this was not the answer. Surely a general-purpose business language shouldn’t be using a different grammar for every database format. Migrating a data file shouldn’t require a major program overhaul. The Clarion language needed standardized, built-in support for all common databases.

It was suggested that we adopt SQL as our database grammar. I took the suggestion seriously and rewrote some typical Clarion programs using embedded SQL. It wasn’t long before I realized this was a terrible idea. When used as a programming language, SQL is extremely verbose and

inelegant. The little four statement record loop illustrated earlier becomes this albatross under SQL:

```

DECLARE X CURSOR
  FOR SELECT      *
    FROM          Detail
    ORDER         BY Dtl:AcctNo,Dtl:Period,Dtl:Date
  END
END
OPEN X
LOOP
  FETCH X
  IF ReturnCode = 100 THEN BREAK.
  :
END
CLOSE X

```

Not only are SQL cursors inelegant, they are also nearly useless. You can't make a cursor skip—for example, to re-display a prior page of records. And you can't make it relocate—for example, to jump to “Jones” while browsing alphabetically. I concluded that if I were to replace the Clarion database access syntax with SQL, I would have been tarred and feathered and run out of town on a rail.

So we decided to implement replaceable database drivers. Clarion programmers liked their database grammar, they just needed support for other database formats. By building on the existing language structure, we would be leveraging their knowledge as well as enhancing their current applications. With our new database driver technology, we would make all databases look alike—a non-trivial benefit.

## A New View

---

To produce SQL database drivers, we map SQL syntax onto our own database grammar. Our **SET** statement constructs an SQL **SELECT** statement which is issued at the first instance of a **NEXT** or **PREVIOUS** operation. If you change directions (e.g. **NEXT...PREVIOUS**), the driver issues another **SELECT** with a different **ORDER BY** clause. Our **GET** issues a **SELECT...FETCH**. **ADD** issues an **INSERT**; **GET...DELETE** issues a **DELETE**; and **GET...PUT** issues an **UPDATE**. A few features, such as relative record access, are not supported for SQL databases, but otherwise, the implementation is quite complete.

However, our database grammar was unable to exercise some very important SQL features. Clarion programs implement record filters by reading and throwing out unwanted records:

```

LOOP UNTIL EOF(Part)
  NEXT(Part)
  IF Prt:OnHand > 0 THEN CYCLE
  :
END

```

An SQL database can filter records on the server and save a lot of time. Clarion programs join files by reading the primary record to prime a key in order to read the secondary record. An SQL database returns the primary and secondary records with a single access. And Clarion programs read every field in every record on every access. SQL returns only the fields you need.

Of course, an SQL database cannot read minds. You have to tell it what you want it to do. So we designed a VIEW structure for this purpose:

```
View  VIEW(Part),FILTER('PRT:OnHand = 0')
      PROJECT(PRT:Number,PRT:Name,PRT:OnHand,PRT:Usage)
      JOIN(Vendor,PRT:Vendor,VND:Number)
      PROJECT(VND:Name,VND:Address,VND:CityStateZip)
      END
      END
```

This VIEW structure consolidates the intentions of a Clarion program so that the database driver can utilize any services offered by its underlying database engine. The database driver either performs filter (record selection), join (record lookup), and project (field selection) operations or requests the database server to do so. In either case, performance is optimized.

There was also a problem implementing optimistic concurrency under SQL. To update a shared file, a Clarion program reads and saves a record. Then, before it is updated, the record is locked, reread, and compared to the saved copy. If they are the same, the changes are written to the database. Otherwise, the record has been changed by another workstation and the operator is so advised. This process is called “optimistic concurrency” and is based on the expectation that records are usually unchanged.

SQL implements optimistic concurrency with a WHERE clause that requires that all fields to be updated continue to have the same value. If one or more fields have changed, SQL returns an appropriate error. Since Clarion had no syntax to make such a request, we added a WATCH statement for this purpose. WATCH is issued before a GET, NEXT, or PREVIOUS to initiate optimistic concurrency. When the record is accessed, the driver saves a copy. In response to the PUT statement, the driver either rereads the record for comparison or issues an UPDATE...WHERE. to an SQL database. If the record has changed, PUT returns an error.

## Our First Compiler

---

We shipped version 1.0 of Clarion in May of 1986 with both a compiler and an interpreter. The Clarion Compiler produced intermediate code that was then interpreted by the Clarion Processor. The intermediate code was so compact, that large Clarion applications would run on the small memory sizes (256K) that characterized PCs of that era. The compiler produced such tight code by generating a binary description of every declaration statement. Then the data was addressed by a two-byte pointer to the binary description. So it took five bytes to add an integer to a string and format the result

according to a picture (one byte for the add operation and four bytes for the pointers to the integer and picture string descriptions). For every operation, the Processor examined the data types of the elements involved and performed any necessary conversions.

But tight intermediate code wasn't the primary reason for this design. By interpreting the output from the compiler, the Processor could execute a Clarion application without requiring a link step. This was no small consideration. In 1985 and for a long time thereafter, linking was a time-consuming process. Our customers appreciated quick testing, but they also let us know that "real" programming languages produced .EXE files! Early the next year, we released the Clarion Translator that converted Clarion intermediate code into .OBJ files by replacing the operation codes with procedure calls. The pointers were passed as parameters. This strategy served us well for six years but also posed some problems:

- We had trouble with external libraries. .OBJ files could be linked into a Clarion .EXE, but they could not be executed directly by the Processor. We designed a process that converted a suitable .OBJ into a special binary format (LEM) that could be executed by the processor and changed back into an .OBJ by the Translator. But the process was complicated and was only used by sophisticated developers.
- Simple Clarion programs produced big .EXEs. The run-time decision making referenced library procedures that were included in the .EXE but never called. That made a "Hello World" program take 141K.
- Clarion applications ran slower than C, Pascal, and Modula-2 programs because Clarion programs examined data types at run-time while the other languages did so at compile time.
- It was no longer necessary to avoid linking in the test cycle. New linkers that supported run-time libraries could link a program for testing as fast as we could load the Processor.

Most importantly, we needed technology that would provide a development path to Windows, protected mode, OS/2, UNIX, 32-bit, and non-Intel architectures.

## A New Partner

---

In May of 1990, we solved those problems and many others by licensing the TopSpeed technology from Jensen & Partners International (JPI), a British company. JPI was formed in 1988 when Niels Jensen, founder of Borland International, and his language development team left that company as a group. They purchased their work in progress and produced the TopSpeed product line, the top-rated compiler technology in the industry. JPI had developed C, C++, Pascal, and Modula-2 compilers that shared the same optimizing code generator and project system. JPI called the compilers "front-ends" and the code generator the "back-end."

We started immediately writing a Clarion front-end. As usual, it was harder than we thought. The language required more changes than we expected. The project took longer and used more resources than we thought it would. But we were thrilled with the results.

We knew the TopSpeed back-end was good, but we were astonished when a Clarion “Sieve of Eratosthenes” (an algorithm for finding prime numbers) ran twice as fast as the same program written with Borland’s Turbo C++. We had also licensed TopSpeed linking technology, but I hadn’t realized just how good it was. TopSpeed’s unique “Smart Linking” produced perfect granularity by eliminating all unreferenced procedures and static data elements from an .EXE. Better yet, while we were working on our front-end, JPI had developed an automatic overlay loader, DOS DLLs, a royalty-free DOS extender, and had announced 32-bit support. With this state-of-the-art technology, we had finally removed the performance penalty that had always been associated with high-level business languages.

In September of 1991, we announced our new product at the first Clarion Developers Conference. New features and the Clarion/TopSpeed connection drew rave reviews. Caught up in the festivity of the occasion, Niels Jensen, and I started talking about merging our companies. It made a great deal of sense. TopSpeed products would gain a US presence and access to a much larger programming market. Clarion products would own their core technology. We would be the first to apply leading edge compiler technology to business software development tools. After a lengthy negotiation, the merger was concluded in April of 1992. Two and a half years later, after the companies had completely homogenized their operations and product lines, the successor company was renamed TopSpeed Corporation. In October of 1994, TopSpeed Corporation released Clarion for Windows, the first product developed in its entirety by the merged companies.

## Where We Stand Now

---

These remarks originally comprised the introduction to the *Programmer’s Guide* that accompanied Clarion Database Developer Version 3.0, released in April of 1993. Extensive additions and revisions have been necessary for the Windows version of Clarion. Such is progress. I think of software development as the process of gently rocking a Chinese checker board until all the marbles fall into holes. I believe in the notion of a final, correct design. Until Clarion for Windows, I felt that we were a long way from our goal. Now I am not so sure. There are very few marbles rolling.



# **1 - INTRODUCTION**

## ***The Language Reference Manual***

Clarion is an integrated environment for writing data processing applications and management information systems for microcomputers using the Windows operating environment. Clarion's programming language is the foundation of this environment. In this manual, the language is concisely documented in a modular fashion. Although this is not a text book, you should consult this manual first when you want to know the precise syntax required to implement any declaration, statement, or function.

Wherever possible, we provide real-world example code for each item.

### **Chapter Organization**

---

**CHAPTER 1 - Introduction** provides an introduction to the Clarion Language Reference. It provides a brief overview of the contents of each chapter, and a guide to help the reader understand the documentation conventions used throughout the book.

**CHAPTER 2 - Program Source Code Format** provides the general layout of a Clarion Windows program. Punctuation, special characters, reserved words, and a detailed description of the "building blocks" required to create modular, structured Clarion source code are documented here.

**CHAPTER 3 - Variable Declarations** describes all the simple data types used to declare variables in a Clarion program. In addition, data display formatting masks, called "picture tokens," are defined and illustrated.

**CHAPTER 4 - Entity Declarations** describes all the complex data types used to declare GROUP, CLASS, FILE, VIEW, and QUEUE structures in a Clarion program.

**CHAPTER 5 - Declaration Attributes** describes all the attributes which can modify variable and entity declarations.

**CHAPTER 6 - Windows** describes the APPLICATION and WINDOW data structures and all their component structures.

**CHAPTER 7 - Reports** describes the REPORT data structure and all its component structures.

**CHAPTER 8 - Controls** describes all the controls that may be placed into APPLICATION, WINDOW, and REPORT data structures.

**CHAPTER 9 - Window and Report Attributes** describes all the attributes which can modify APPLICATION, WINDOW, and REPORT data structures and the controls they contain.

**CHAPTER 10 - Expressions** defines the syntax required to combine variables, procedures, and constants into numeric, string, or logical expressions.

**CHAPTER 11 - Assignments** defines all the methods to assign the value of an expression to variables. This chapter also discusses BCD operations and Clarions Automatic Data Type Conversion.

**CHAPTER 12 - Execution Control** describes the compound executable statements that control program flow and operation.

**CHAPTER 13 - Built-in Procedures** documents all the built-in Clarion library procedures which operate on the .

**APPENDIX A - DDE, OLE, and OCX** documents the procedures that perform Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), and OLE Custom Controls (OCX).

**APPENDIX B - Event Equates** documents the EQUATE statements for events that help make Clarion code readable.

**APPENDIX C - Runtime Property Assignments** documents all the runtime properties.

**APPENDIX D - Error Codes** documents the runtime and compiler errors.

**APPENDIX E - Legacy Statements** documents language statements which are maintained only for backward compatibility with previous versions of Clarion.

## Documentation Conventions and Symbols

---

Symbols are used in the syntax diagrams as follows:

<u>Symbol</u>	<u>Meaning</u>
[ ]	Brackets enclose an optional (not required) attribute or parameter.
( )	Parentheses enclose a parameter list.
	Vertical lines enclose parameter lists, where one, but only one, of the parameters is allowed.

Coding example conventions used throughout this manual:

IF NOT SomeDate	! IF and NOT are keywords
SomeDate = TODAY()	! SomeDate is a data name
END	! TODAY and END are keywords

### CLARION LANGUAGE KEYWORDS

Any word in “All Caps” is a Clarion Language keyword

**DataNames**      Use mixed case with caps for readability

**Comments**      Predominantly lower case

The purpose of these conventions is to make the code examples readable and clear.

## Reference Item Format

---

Each Clarion programming language element referenced in this manual is printed in UPPER CASE letters. Components of the language are documented with a syntax diagram, a detailed description, and source code examples.

Items are documented in logical groupings, dependent upon their hierarchical relationships. Therefore, the table of contents for this book is not listed in alphabetical order. In general, data types and structures occur at the beginning of a chapter, followed by their attributes, and executable statements and functions at the end.

The documentation format used in this book is illustrated in the syntax diagram on the following page.

**KEYWORD** (short description of intended use)

[label]	<b>KEYWORD</b> ( <div> <div><i>parameter1</i></div> <div><i>alternate</i></div> <div><i>parameter</i></div> <div><i>list</i></div> </div> <div>[ <i>parameter2</i> ]</div> ) <div>[ <b>ATTRIBUTE1</b>( ) ]</div> <div>[ <b>ATTRIBUTE2</b>( ) ]</div>
---------	--

<b>KEYWORD</b>	A brief statement of what the <b>KEYWORD</b> does.
<i>parameter1</i>	A complete description of <i>parameter1</i> , along with how it relates to <i>parameter2</i> and the <b>KEYWORD</b> .
<i>alternate parameter list</i>	A complete description of mutually exclusive alternates to <i>parameter1</i> , along with how they relate to <i>parameter2</i> and the <b>KEYWORD</b> .
<i>parameter2</i>	A complete description of <i>parameter2</i> , along with how it relates to <i>parameter1</i> and the <b>KEYWORD</b> . Because it is enclosed in brackets, [ ], it is optional, and may be omitted.
<b>ATTRIBUTE1</b>	A sentence describing the relation of <b>ATTRIBUTE1</b> to the <b>KEYWORD</b> .
<b>ATTRIBUTE2</b>	A sentence describing the relation of <b>ATTRIBUTE2</b> to the <b>KEYWORD</b> .

A concise description of what the **KEYWORD** does. In many cases the **KEYWORD** will be an attribute of a keyword that was described in the preceding text. Sometimes a **KEYWORD** has no parameters and/or attributes.

Events Generated:	If the <b>KEYWORD</b> generates events, they are listed here.
Return Data Type:	The data type returned if the <b>KEYWORD</b> returns a value.
Errors Posted:	If <b>KEYWORD</b> posts errors which may be trapped by the <b>ERROR</b> and <b>ERRORCODE</b> functions, they are listed here.
Related Procedures:	If <b>KEYWORD</b> defines a data structure, the procedures which operate on that data structure are listed here.

Example:

```

FieldOne = FieldTwo + FieldThree           !This is a source code example
FieldThree = KEYWORD(FieldOne,FieldTwo)     !Comments follow the "!" character

```

See Also:            Other pertinent keywords and topics

# **Clarion Conventions**

## **Standard Date**

---

A Clarion standard date is the number of days that have elapsed since December 28, 1800. The range of accessible dates is from January 1, 1801 (standard date 4) to December 31, 9999 (standard date 2,994,626). Date procedures will not return correct values outside the limits of this range. The standard date calendar also adjusts for each leap year within the range of accessible dates. Dividing a standard date by modulo 7 gives you the day of the week: zero = Sunday, one = Monday, etc.

The LONG data type with a date format (@D) display picture is normally used for a standard date. Data entry into any date format picture with a two-digit year defaults to the century of next 20 or previous 80 years. For example, entering 01/01/01 results in 01/01/2001 if the current year (per the system clock) is greater than 1980, and 01/01/1901 if the current year is 1980 or earlier.

The DATE data type is a data format used in the Btrieve Record Manager and some other file systems. A DATE field is internally converted to LONG containing the Clarion standard date before any mathematical or date procedure operation is performed. Therefore, DATE should be used for external file compatibility, and LONG is normally used for other dates.

See Also: Date Pictures, DAY, MONTH, YEAR, TODAY, SETTODAY, DATE

## **Standard Time**

---

A Clarion standard time is the number of hundredths of a second that have elapsed since midnight, plus one (1). The valid range is from 1 (defined as midnight) to 8,640,000 (defined as 11:59:59.99 PM). A standard time of one is exactly equal to midnight to allow a zero value to be used to detect no time entered. Although time is expressed to the nearest hundredth of a second, the system clock is only updated 18.2 times a second (approximately every 5.5 hundredths of a second).

The LONG data type with a time format (@T) display picture is normally used for a standard time. The TIME data type is a data format used in the Btrieve Record Manager. A TIME field is internally converted to LONG containing the Clarion standard time before any mathematical or time procedure operation is performed. Therefore, TIME should be used for external Btrieve file compatibility, and LONG should normally be used for other times.

See Also: Time Pictures, CLOCK, SETCLOCK

## Clarion Keycodes

---

### Windows Keycode Mapping Format

Each key on the keyboard is assigned a keycode. Keycodes are 16-bit values where the low-order 8 bits (values from 0 to 255) represent the key that was pressed, and the high-order 8 bits indicate the state of the Shift, Ctrl, and Alt keys. Keycodes are returned by the `KEYCODE()` and `KEYBOARD()` procedures, and use the following format:

		A		C		S		CODE		
Bits:		10		9		8		7		0

  

CODE	-	The Key pressed
A	-	Alt key bit
C	-	Ctrl key bit
S	-	Shift key bit

Calculating a keycode's numeric value is generally unnecessary, since most of the possible key combinations are listed as `EQUATE` statements in `KEYCODES.CLW` (`INCLUDE` this file and use the equates instead of the numbers for better code readability).

### KEYCODES.CLW

Keycode equate labels assign mnemonic labels to Clarion keycodes. The keycode equates file (`KEYCODES.CLW`) is a Clarion source file which contains an `EQUATE` statement for each keycode. This file is located in the `\CLARION4\LIBSRC` directory.

It may be merged into a source `PROGRAM` by placing the following statement in the global data section:

```
INCLUDE( 'KEYCODES.CLW' )
```

This file contains `EQUATE` statements for most of the keycodes supported by Windows. These keycode `EQUATE`s are used for greater code readability wherever you need to set or compare keyboard input.

See Also:

`KEYCODE`, `KEYBOARD`, `KEYCHAR`, `KEYSTATE`, `SETKEYCODE`, `ALERT`, `ALRT`

## **2 - PROGRAM SOURCE CODE FORMAT**

### **Statement Format**

Clarion is a “statement oriented” language. A statement oriented language makes use of the fact that its source code is contained in ASCII text files so every line of code is a separate record in the file. Therefore, the Carriage Return/Line Feed record delimiter can be used to eliminate punctuation.

In general, the Clarion statement format is:

```
label STATEMENT[(parameters)] [,ATTRIBUTE[(parameters)]] ...
```

Attributes specify the properties of the item and are only used on data declarations. Executable statements take the form of a standard procedure call, except assignment statements ( $A = B$ ) and control structures (such as IF, CASE, and LOOP).

A statement's label must begin in column one (1) of the source code. A statement without a label must not start in column one. A statement is terminated by the end of the line. A statement too long to fit on one line can be continued by a vertical bar (|). The semi-colon is an optional statement separator that allows you to place more than one statement on a line.

Being a statement oriented language eliminates from Clarion much of the punctuation required in other languages to identify labels and separate statements. Blocks of statements are initiated by a single compound statement, and are terminated by an END statement (or period).

### **Declaration and Statement Labels**

---

The language statements in a source module can be divided into two general categories: data declarations and executable statements, or simply “data” and “code.”

During program execution, data declarations reserve memory storage areas that are manipulated by executable statements. A label is required for the data to be referenced in executable code. All variables, data structures, PROCEDURES, and ROUTINES are referenced by labels.

A label defines a specific location in a PROGRAM. Any code statement may be identified and referenced by a label. This allows it to be used as the target of a GOTO statement. Each label on an executable statement adds ten bytes to the executable code size, even if not referenced.

The label on a PROCEDURE statement is the procedure's name. Using the label of a PROCEDURE in an executable statement executes the procedure,

or in expressions, or parameter lists of other procedures, assigns the value returned by the procedure.

The rules for valid Clarion labels are:

- A label **MUST** begin in column one (1) of the source code.
- A label may contain letters (upper or lower case), numerals 0 through 9, the underscore character (`_`), and colon (`:`).
- The first character must be a letter or the underscore character.
- Labels are not case sensitive (i.e. `CurRent` and `CURRENT` are the same).
- A label may not be a reserved word.

## Structure Termination

---

Compound data structures are created when data declarations are nested within other data declarations. There are many compound data structures within the Clarion language: `APPLICATION`, `WINDOW`, `REPORT`, `FILE`, `RECORD`, `GROUP`, `VIEW`, `QUEUE`, etc. These compound data structures must be terminated by a period (`.`) or the keyword `END`. `IF`, `CASE`, `EXECUTE`, `LOOP`, `BEGIN`, and `ACCEPT` are all executable control structures. They must also be terminated with a period or the `END` statement (a `LOOP` may optionally terminate with a `WHILE` or `UNTIL` statement).

## Field Qualification

---

Variables declared as members of complex data structures (`GROUP`, `QUEUE`, `FILE`, `RECORD`, etc.) may have duplicate labels, as long as the duplicates are not contained within the same structure. To explicitly reference fields with duplicate labels in separate structures, you may use the `PRE` attribute on the structures just as it is documented (`Prefix:FieldLabel`) to provide unique names for each field. However, the `PRE` attribute is not required for this purpose and may be omitted.

Any member of any complex structure can be explicitly referenced by prepending the label of the structure containing the field to the field label, separated by a period (`StructureName.FieldLabel`). You must use this Field Qualification syntax to reference any field in a complex structure that does not have a `PRE` attribute. You may use a colon (`:`) instead of a period (`StructureName:FieldLabel`) to reference member variables of any structure except `CLASS` and named reference variables (this syntax is only to provide backward compatibility with previous versions of Clarion for Windows).

If the variable is within nested complex data structures, you must prepend each successive level's structure label to the variable label to explicitly reference the variable (if the nested structure has a label). If any nested



structure does not have a label, then that part is omitted from the qualification sequence. This is similar to anonymous unions in C++. This means that, in the case of a GROUP structure (without a PRE attribute) in which a nested GROUP structure has a label, the fields in the inner GROUP must be referenced as *OuterGroupLabel.InnerGroupLabel.FieldLabel*. If the inner GROUP structure does not have a label, the individual fields are referenced as *OuterGroupLabel.FieldLabel*. There is one exception to this rule: the label of a RECORD structure within a FILE may be omitted so that you can reference individual fields within the file as *FileLabel.FieldLabel* instead of *FileLabel.RecordLabel.FieldLabel*.

This Field Qualification syntax is also used to reference all members of CLASS structures—both data members and methods. To call a member method of a CLASS structure, you specify *ClassName.MethodLabel* wherever the call to the PROCEDURE is valid.

To reference an element of a GROUP structure with the DIM attribute, you must specify the array element number in the Field Qualification syntax at the exact level at which the DIM attribute appears.

Example:

```

MasterFile  FILE, DRIVER('TopSpeed')
Record      RECORD
AcctNumber  LONG           !Reference as Masterfile.AcctNumber
. .

Detail      FILE, DRIVER('TopSpeed')
            RECORD
AcctNumber  LONG           !Reference as Detail.AcctNumber
. .

Memory      GROUP, PRE(Mem)
Message     STRING(30)     !May reference as Mem:Message or Memory.Message
END

SaveQueue   QUEUE
Field1      LONG           !Reference as SaveQueue.Field1
Field2      STRING        !Reference as SaveQueue.Field2
END

OuterGroup  GROUP
Field1      LONG           !Reference as OuterGroup.Field1
Field2      STRING        !Reference as OuterGroup.Field2
InnerGroup  GROUP
Field1      LONG           !Reference as OuterGroup.InnerGroup.Field1
Field2      STRING        !Reference as OuterGroup.InnerGroup.Field2
END
END

OuterGroup  GROUP, DIM(5)
Field1      LONG           !Reference as OuterGroup[1].Field1
InnerGroup  GROUP, DIM(5)  !Reference as OuterGroup[1].InnerGroup
Field1      LONG           !Reference as OuterGroup[1].InnerGroup[1].Field1
END
END

```

See Also:

PRE, CLASS, Reference Variables

## Reserved Words

---

The following keywords are reserved and may not be used as labels for any purpose:

ACCEPT	AND	BEGIN	BREAK
BY	CASE	CHOOSE	COMPILE
CYCLE	DO	ELSE	ELSIF
END	EXECUTE	EXIT	FUNCTION
GOTO	IF	INCLUDE	LOOP
MEMBER	NEW	NOT	NULL
OF	OMIT	OR	OROF
PARENT	PROCEDURE	PROGRAM	RETURN
ROUTINE	SECTION	SELF	THEN
TIMES	TO	UNTIL	WHILE
XOR			

The following keywords may be used as labels of data structures or executable statements. They may not be the label of any PROCEDURE statement. They may appear as the label of a parameter in a prototype only if the data type is also listed:

APPLICATION	CLASS	CODE	DATA
DETAIL	FILE	FOOTER	FORM
GROUP	HEADER	ITEM	ITEMIZE
JOIN	MAP	MENU	MENUBAR
MODULE	OLECONTROL	OPTION	QUEUE
RECORD	REPORT	ROW	SHEET
TAB	TABLE	TOOLBAR	VIEW
WINDOW			

## Special Characters

---

<b>Initiators:</b>	!	Exclamation point begins a source code comment.
	?	Question mark begins a field equate label.
	@	“At” sign begins a picture token.
	*	Asterisk begins a parameter passed by address in a MAP prototype.
	~	A leading tilde on a filename indicates a file linked into the project.
<b>Terminators:</b>	;	Semi-colon is an executable statement separator.
	CR/LF	Carriage-return/Line-feed is an executable statement separator.
	.	Period terminates a data or code structure (a substitute for END).
		Vertical bar is the source code line continuation character.
	#	Pound sign declares an implicit LONG variable.
	\$	Dollar sign declares an implicit REAL variable.
<b>Delimiters:</b>	”	Double quote declares an implicit STRING variable.
	( )	Parentheses enclose a parameter list.
	[ ]	Brackets enclose an array subscript list.
	' ‘	Single quotes enclose a string constant.
	{ }	Curly braces enclose a repeat count in a string constant, or a property parameter.
	< >	Angle brackets enclose an ASCII code in a string constant, or indicate a parameter in a MAP prototype which may be omitted.
	:	Colon separates the start and stop positions of a string “slice.”
<b>Connecters:</b>	,	Comma separates parameters in a parameter list.
	.	Period is a decimal point used in numeric constants, or connects a complex structure label to the label of one of its members.
	:	Colon connects a prefix to a label.
	\$	Dollar sign connects the WINDOW or REPORT label to a field equate label in a control's property assignment expression.
<b>Operators:</b>	+	Plus sign indicates addition.
	-	Minus sign indicates subtraction.
	*	Asterisk indicates multiplication.
	/	Slash indicates division.
	%	Percent sign indicates modulus division.
	^	Carat indicates exponentiation.
	<	Left angle bracket indicates less than.
	>	Right angle bracket indicates greater than.
	=	Equal sign indicates assignment or equivalence.
	~	Tilde indicates the logical (Boolean) NOT operator.
	&	Ampersand indicates concatenation.
	&=	Ampersand equal indicates reference assignment or reference equivalence.

## Program Format

### PROGRAM (declare a program)

```

PROGRAM
MAP
  prototypes
  [MODULE( )
    prototypes
  END ]
END
global data
CODE
  statements
[RETURN]
procedures

```

<b>PROGRAM</b>	The first declaration in a Clarion program source module. Required.
<b>MAP</b>	Global procedure declarations. Required.
<b>MODULE</b>	Declare member source modules.
<i>prototypes</i>	PROCEDURE declarations.
<i>global data</i>	Declare Global data which may be referenced by all procedures.
<b>CODE</b>	Terminate the data declaration section and begin the executable code section of the PROGRAM.
<i>statements</i>	Executable program instructions.
<b>RETURN</b>	Terminate program execution. Return to operating system <b>control</b> .
<i>procedures</i>	Source code for the procedures in the PROGRAM module.

The **PROGRAM** statement is required to be the first declaration in a Clarion program source module. It may only be preceded by source code comments. The PROGRAM source file name is used as the object (.OBJ) and executable (.EXE) file name, when compiled. The PROGRAM statement may have a label, but the label is ignored by the compiler.

A PROGRAM with PROCEDURES must have a MAP structure. The MAP declares the PROCEDURE prototypes. Any PROCEDURE contained in a separate source file must be declared in a MODULE structure within the MAP.

Data declared in the PROGRAM module, between the keywords PROGRAM and CODE, is Global data that may be accessed by any PROCEDURE in the PROGRAM. Its memory allocation is Static.

Example:

```

                                PROGRAM                !Sample program declaration
                                INCLUDE('EQUATES.C LW')    !Include standard equates
                                MAP
CalcTemp      PROCEDURE                !Procedure Prototype
                                END
                                CODE
                                CalcTemp                !Call procedure

CalcTemp      PROCEDURE
Fahrenheit    REAL(0)                !Global data declarations
Centigrade    REAL(0)
Window WINDOW('Temperature Conversion'),CENTER,SYSTEM
                                STRING('Enter Fahrenheit Temperature: '),AT(34,50,101,10)
                                ENTRY(@N-04),AT(138,49,60,12),USE(Fahrenheit)
                                STRING('Centigrade Temperature: '),AT(34,71,80,10),LEFT
                                ENTRY(@N-04),AT(138,70,60,12),USE(Centigrade),SKIP
                                BUTTON('Another'),AT(34,92,32,16),USE(?Another)
                                BUTTON('Exit'),AT(138,92,32,16),USE(?Exit)
                                END
                                CODE                !Begin executable code section
                                OPEN(Window)
                                ACCEPT
                                CASE ACCEPTED()
                                OF ?Fahrenheit
                                    Centigrade = (Fahrenheit - 32) / 1.8
                                    DISPLAY(?Centigrade)
                                OF ?Another
                                    Fahrenheit = 0
                                    Centigrade = 0
                                    DISPLAY
                                    SELECT(?Fahrenheit)
                                OF ?Exit
                                    BREAK
                                END
                                END
                                CLOSE(Window)
                                RETURN

```

See Also:

**MAP, MODULE, PROCEDURE, Data Declarations and Memory Allocation**

## MEMBER (identify member source file)

```

MEMBER( [ program ] )
[MAP
  prototypes
END ]
[label] local data
       procedures

```

<b>MEMBER</b>	The first statement in a source module that is not a PROGRAM source file. Required.
<i>program</i>	A string constant containing the filename (without extension) of a PROGRAM source file. If omitted, the module is a “universal member module” that you can compile in any program by adding it to the project.
<b>MAP</b>	Local procedure declarations. Any procedures declared here may be referenced by the procedures in the MEMBER module.
<i>prototypes</i>	PROCEDURE declarations.
<i>local data</i>	Declare Local Static data which may be referenced only by the procedures whose source code is in the MEMBER module.
<i>procedures</i>	Source code for the procedures in the MEMBER module.

**MEMBER** is the first statement in a source module that is not a PROGRAM source file. It may only be preceded by source code comments. It is required at the beginning of any source file that contains PROCEDURES that are used by a PROGRAM. The MEMBER statement identifies the *program* to which the source MODULE belongs.

A MEMBER module may have a local MAP structure (which may contain MODULE structures). The procedures *prototyped* in this MAP are available for use by the other procedures in the MEMBER module. The source code for the procedures declared in this MEMBER MAP may either be contained in the MEMBER source file, or another file (if *prototyped* in a MODULE structure within the MAP).

If the *program* parameter is omitted from the MEMBER statement, you must have a MAP structure that *prototypes* the procedures it contains. You also need to INCLUDE any standard EQUATEs files that are used in your source code.

If the source code for a PROCEDURE *prototyped* in a MEMBER module’s MAP is in a separate file, the *prototype* must be in a MODULE structure within the MAP. The source file MEMBER module containing the PROCEDURE definition must also contain its own MAP which declares the same *prototype* (that is, the *prototype* must appear in at least two MAP

structures—the source module containing it and the source module using it). Any PROCEDURE not declared in the Global (PROGRAM) MAP must be declared in a local MAP(s) in the MEMBER MODULE which contains its source code.

Data declared in the MEMBER module, after the keyword MEMBER and before the first PROCEDURE statement, is Member Local data that may only be accessed by PROCEDURES within the module (unless passed as a parameter). Its memory allocation is Static.

Example:

```
!Source1 module contains:
  MEMBER('OrderSys')      !Module belongs to the OrderSys program
  MAP                     !Declare local procedures
Func1 PROCEDURE(STRING),STRING !Func1 is known only in both module
  MODULE('Source2.clw')
HistOrd2 PROCEDURE        !HistOrd2 is known only in both modules
  END
END

LocalData STRING(10)      !Declare data local to MEMBER module

HistOrd PROCEDURE         !Declare order history procedure
HistData STRING(10)       !Declare data local to PROCEDURE
  CODE
  LocalData = Func1(HistData)

Func1 PROCEDURE(RecField) !Declare local procedure
  CODE
  !Executable code statements

!Source2 module contains:
  MEMBER('OrderSys')      !Module belongs to the OrderSys program
  MAP                     !Declare local procedures
HistOrd2 PROCEDURE        !HistOrd2 is known only in both modules
  MODULE('Source1.clw')
Func1 PROCEDURE(STRING),STRING !Func1 is known only in both module
  END
END

LocalData STRING(10)      !Declare data local to MEMBER module

HistOrd2 PROCEDURE        !Declare second order history procedure
  CODE
  LocalData = Func1(LocalData)
```

See Also:

**MAP, MODULE, PROCEDURE, CLASS, Data Declarations and Memory Allocation**

## MAP (declare PROCEDURE prototypes)

```
MAP
  prototypes
  [MODULE( )
    prototypes
  END ]
END
```

**MAP** Contains the *prototypes* which declare the procedures and external source modules used in a PROGRAM or MEMBER module.

*prototypes* Declare PROCEDURES.

**MODULE** Declare a member source module that contains the definitions of the *prototypes* in the MODULE..

A **MAP** structure contains the *prototypes* which declare the PROCEDURES and external source modules used in a PROGRAM or MEMBER module which are not members of a CLASS structure.

A MAP declared in the PROGRAM source module declares *prototypes* of PROCEDURES available for use throughout the program. A MAP in a MEMBER module declares *prototypes* of PROCEDURES that are explicitly available in that MEMBER module. The same *prototypes* may be placed in multiple MEMBER modules to make them explicitly available in each.

A MAP structure is mandatory for any non-trivial Clarion program because the BUILTINS.CLW file is automatically included in your PROGRAM's MAP structure by the compiler. This file contains prototypes of most of the procedures in the Clarion internal library that are available as part of the Clarion language. This file is required because the compiler does not have these prototypes built into it (making it more efficient). Since the prototypes in the BUILTINS.CLW file use some constant EQUATES that are defined in the EQUATES.CLW file, this file is also automatically included by the compiler in every Clarion program.

Example:

```
!One file contains:
  PROGRAM                !Sample program in sample.cla
  MAP                    !Begin map declaration
LoadIt  PROCEDURE       ! LoadIt procedure
  END                    !End of map
!A separate file contains:
  MEMBER('Sample')      !Declare MEMBER module
  MAP                    !Begin local map declaration
ComputeIt PROCEDURE     ! compute it procedure
  END                    !End of map
```

See Also:

PROGRAM, MEMBER, MODULE, PROCEDURE, PROCEDURE Prototypes



## MODULE (specify MEMBER source file)

```
MODULE(sourcefile)
  prototype
END
```

<b>MODULE</b>	Names a MEMBER module or external library file.
<i>sourcefile</i>	A string constant which contains the filename (without extension) of the Clarion language source code file containing the definitions of the PROCEDURES. If the <i>sourcefile</i> is an external library, this string may contain any unique identifier.
<i>prototype</i>	The prototype of a PROCEDURE whose definition is contained in the <i>sourcefile</i> .

A **MODULE** structure names a Clarion language MEMBER module or an external library file and contains the *prototypes* for the PROCEDURES contained in the *sourcefile*. A **MODULE** structure can only be declared within a MAP structure and is valid for use in any MAP structure, whether that MAP is in a PROGRAM module or MEMBER module.

Example:

```
!The "sample.clw" file contains:
PROGRAM                                !Sample program in sample.clw
MAP                                    !Begin map declaration
  MODULE('Loadit')                    ! source module loadit.clw
LoadIt PROCEDURE                      ! LoadIt procedure
END                                    ! end module
  MODULE('Compute')                  ! source module compute.clw
ComputeIt PROCEDURE                  ! compute it procedure
END                                    ! end module
END                                    !End map
```

```
!The "loadit.clw" file contains:
MEMBER('Sample')                    !Declare MEMBER module
MAP                                    !Begin local map declaration
  MODULE('Process')                  ! source module process.cla
ProcessIt PROCEDURE                  ! process it procedure
END                                    ! end module
END                                    !End map
```

See Also:

**MEMBER, MAP, PROCEDURE Prototypes**

## PROCEDURE (define a procedure)

```

label  PROCEDURE [ ( parameter list ) ]
        local data
        CODE
        statements
        [RETURN( [ value ] ) ]

```

<b>PROCEDURE</b>	Begins a section of source code that can be executed from within a PROGRAM.
<i>label</i>	Names the PROCEDURE. For a CLASS method's definition, this may contain the label of the CLASS prepended to the label of the PROCEDURE.
<i>parameter list</i>	A comma delimited list of names (and, optionally, their data types) of the parameters passed to the PROCEDURE. These names define the local references within the PROCEDURE to the passed parameters. For a CLASS method's definition, this may contain the label of the CLASS (named SELF) as an implicit first parameter (if the class is not prepended to the PROCEDURE's <i>label</i> ), and must always contain both the data type and parameter name.
<i>local data</i>	Declare Local data visible only in this procedure.
<b>CODE</b>	Terminate the data declaration section and begin the executable code section of the PROCEDURE.
<i>statements</i>	Executable program instructions.
<b>RETURN</b>	Terminate procedure execution. Return to the point from which the procedure was called and return the <i>value</i> to the expression in which the procedure was used (if the procedure has been prototyped to return a value).
<i>value</i>	A numeric or string constant or variable which specifies the result of the procedure call.

**PROCEDURE** begins a section of source code that can be executed from within a PROGRAM. It is called by naming the PROCEDURE *label* (with its *parameter list*, if any) as an executable statement in the code section of a PROGRAM or PROCEDURE.

The *parameter list* defines the data type of each parameter (optional) followed by the label of the parameter as used within the PROCEDURE's source code (required). Each parameter is separated by a comma. The data type of each parameter (including the angle brackets if the parameter is omittable) is required along with the parameter's label if the procedure is overloaded (has multiple definitions). The *parameter list* may be exactly the same as it appears in the PROCEDURE's prototype, if that prototype contains labels for the parameters.

A PROCEDURE may contain one or more ROUTINES in its executable code *statements*. A ROUTINE is a section of executable code local to the PROCEDURE which is called with the DO statement.

A PROCEDURE terminates and returns to its caller when a RETURN statement executes. An implicit RETURN occurs at the end of the executable code. The end of executable code for the PROCEDURE is defined as the end of the source file, or the first encounter of a ROUTINE or another PROCEDURE.

A RETURN statement is required if the PROCEDURE has been prototyped to return a *value*. A PROCEDURE which has been prototyped to return a *value* can be used as an expression component, or passed as a parameter to another PROCEDURE. A PROCEDURE which has been prototyped to return a *value* may also be called in the same manner as a PROCEDURE without a RETURN *value*, if the program logic does not require the RETURN *value*. In this case, if the PROCEDURE prototype does not have the PROC attribute, the compiler will generate a warning which may be safely ignored.

Data declared within a PROCEDURE, between the keywords PROCEDURE and CODE, is Procedure Local data that can only be accessed by that PROCEDURE (unless passed as a parameter to another PROCEDURE). This data is allocated memory upon entering the procedure, and de-allocated when it terminates. If the data is smaller than the stack threshold (5K is the default) it is placed on the stack, otherwise it is allocated from the heap.

A PROCEDURE must have a prototype declared in a CLASS or the MAP of a PROGRAM or MEMBER module. If declared in the PROGRAM MAP, it is available to any other procedure in the program. If declared in a MEMBER MAP, it is available to other procedures in that MEMBER module.

Example:

```

PROGRAM                                !Example program code
MAP
OpenFile  PROCEDURE(FILE AnyFile)      !Procedure prototype with parameter
ShoTime   PROCEDURE                    !Procedure prototype without parameter
DayString PROCEDURE,STRING              !Procedure prototype with a return value
END
TodayString STRING(9)
CODE
TodayString = DayString()               !Procedure called with a return value
OpenFile(FileOne)                       !Call procedure to open file
ShoTime                                     !Call ShoTime procedure
!More executable statements

OpenFile  PROCEDURE(FILE AnyFile)      !Open any file
CODE                                             !Begin code section
OPEN(AnyFile)                                !Open the file
IF ERRORCODE() = 2                           !If file not found
    CREATE(AnyFile)                           ! create it
END
RETURN                                     !Return to caller

ShoTime PROCEDURE                        !Show time
Time    LONG                            !Local variable
Window  WINDOW,CENTER
        STRING(@T3),USE(Time),AT(34,70)
        BUTTON('Exit'),AT(138,92),USE(?Exit)
END
CODE                                         !Begin executable code section
Time = CLOCK()                              !Get time from system
OPEN(Window)
ACCEPT
CASE ACCEPTED()
OF ?Exit
    BREAK
END
END
RETURN                                     !Return to caller

DayString  PROCEDURE                    !Day string procedure
ReturnString STRING(9),AUTO              !Uninitialized local stack variable
CODE                                             !Begin executable code section
EXECUTE (TODAY() % 7) + 1                   !Find day of week from system date
ReturnString = 'Sunday'
ReturnString = 'Monday'
ReturnString = 'Tuesday'
ReturnString = 'Wednesday'
ReturnString = 'Thursday'
ReturnString = 'Friday'
ReturnString = 'Saturday'
END
RETURN(ReturnString)                       !Return the resulting string

```

See Also:

**PROCEDURE Prototypes, Data Declarations and Memory Allocation,  
Procedure Overloading, CLASS, ROUTINE, MAP**

## CODE (begin executable statements)

### CODE

The **CODE** statement separates the data declaration section from the executable statement section within a **PROGRAM**, **PROCEDURE**, or **ROUTINE**. The first statement executed in a **PROGRAM**, **PROCEDURE**, or **ROUTINE** is the statement following **CODE**.

Example:

```

PROGRAM

!Global Data declarations go here

CODE
!Executable statements go here

OrdList PROCEDURE                                !Declare a procedure

!Local Data declarations go here

CODE                                              !This is the beginning of the "code" section
!Executable statements go here

```

See Also:                **PROGRAM, PROCEDURE**

## DATA (begin routine local data section)

### DATA

The **DATA** statement begins a local data declaration section in a **ROUTINE**. Any **ROUTINE** containing a **DATA** section must also contain a **CODE** statement to terminate the data declaration section. Variables declared in a **ROUTINE** data section may not have the **STATIC** or **THREAD** attributes.

Example:

```

SomeProc PROCEDURE
CODE
!Code statements
DO Tally                                           !Call the routine
!More code statements

Tally ROUTINE                                     !Begin routine, end procedure
DATA
CountVar BYTE                                     !Declare local variable
CODE
CountVar += 1                                     ! increment counter
DO CountItAgain                                  !Call another routine
EXIT                                              ! and exit the routine

```

See Also:                **CODE, ROUTINE**

## ROUTINE (declare local subroutine)

```
label  ROUTINE  
      [ DATA  
        local data  
      CODE ]  
      statements
```

<b>ROUTINE</b>	Declares the beginning of a local subroutine.
<i>label</i>	The name of the ROUTINE. This may not duplicate the label of any PROCEDURE.
<b>DATA</b>	Begin data declaration statements.
<i>local data</i>	Declare Local data visible only in this routine.
<b>CODE</b>	Begin executable statements.
<i>statements</i>	Executable program instructions.

**ROUTINE** declares the beginning of a local subroutine. It is local to the PROCEDURE in which it is written and must be at the end of the CODE section of the PROCEDURE to which it belongs. All variables visible to the PROCEDURE are available in the ROUTINE. This includes all Procedure Local, Module Local, and Global data.

A ROUTINE may contain its own local data which is limited in scope to the ROUTINE in which it is declared. If local data declarations are included in the ROUTINE, they must be preceded by a DATA statement and followed by a CODE statement. Since the ROUTINE has its own name scope, the labels of these variables may duplicate variable names used in other ROUTINES or even the procedure containing the ROUTINE.

A ROUTINE is called by the DO statement followed by the label of the ROUTINE. Program control following execution of a ROUTINE is returned to the statement following the calling DO statement. A ROUTINE is terminated by the end of the source module, or by another ROUTINE or PROCEDURE. The EXIT statement can also be used to terminate execution of a ROUTINE's code (similar to RETURN in a PROCEDURE).

A ROUTINE has some efficiency issues that are not obvious:

- DO and EXIT statements are very efficient.
- Accessing procedure-level local data is less efficient than accessing module-level or global data.
- Implicit variables used only within the ROUTINE are less efficient than using local variables.
- Each RETURN statement within a ROUTINE incurs a 40-byte overhead.

Example:

```
SomeProc PROCEDURE
CODE
!Code statements
DO Tally                                !Call the routine
!More code statements

Tally ROUTINE                          !Begin routine, end procedure
DATA
CountVar BYTE                          !Declare local variable
CODE
CountVar += 1                          ! increment counter
DO CountItAgain                        !Call another routine
EXIT                                  ! and exit the routine
```

See Also:                   **PROCEDURE, EXIT, DO, DATA, CODE**

## END (terminate a structure)

### END

**END** terminates a data declaration structure or a compound executable statement. It is functionally equivalent to a period (.).

By convention, the END statement is aligned in the same column as the beginning of the structure it terminates, and the code within the structure is indented for readability. END is usually used to terminate multi-line structures, while the period is used to terminate single-line statements. If multiple complex code structures are nested and they all terminate at the same place, multiple periods on one line are used instead of the END statements on multiple lines.

Example:

```
Customer  FILE,DRIVER('Clarion')  !Declare a file
          RECORD                  ! begin record declaration
Name      STRING(20)
Number    LONG
          END                      ! end record declaration
          END                      !End file declaration

Archive   FILE,DRIVER('Clarion')  !Declare a file
          RECORD                  ! begin record declaration
Name      STRING(20)
Number    LONG
          . .                      ! end both the record and file declarations

CODE

IF Number <> SavNumber              !Begin if structure
  DO GetNumber
END                                !End if structure

IF SomeCondition THEN BREAK.      !Terminate with a period

CASE Action                        !Begin case structure
OF 1
  DO AddRec
    IF Number <> SavNumber          !Begin if structure
      DO SomeRoutine
    END                            !End if structure
OF 2
  DO ChgRec
OF 3
  DO DelRec
END                                !End case structure
```



## Statement Execution Sequence

---

In the CODE section of a Clarion program, statements are normally executed line-by-line, in the sequence in which they appear in the source module. Control statements and procedure calls are used to modify this execution sequence.

PROCEDURE calls modify the execution sequence by branching to the called procedure and executing the code contained in it. Control returns to the executable statement following the procedure call when a RETURN statement is executed in the called procedure, or there are no more statements in the called procedure to execute, returning the value (if the PROCEDURE returns a value).

Control structures—IF, CASE, LOOP, ACCEPT, and EXECUTE—change the execution sequence by evaluating expressions. The control structure conditionally executes statements contained within the structure based on the evaluation of the expression(s) in the structure. ACCEPT is also a loop-type of structure, but does not evaluate any expression.

Branching also occurs with the GOTO, DO, CYCLE, BREAK, EXIT, and RETURN statements. These statements immediately and unconditionally alter the normal execution sequence.

The START procedure begins a new execution thread, unconditionally branching to that thread at the next instance of ACCEPT following the START. However, the user may choose to activate another thread by clicking the mouse on the other thread's active window.

Example:

```
PROGRAM

MAP
ComputeTime PROCEDURE(*GROUP)      !Passing a group parameter
MatchMaster PROCEDURE              !Passing no parameters
END

ParmGroup GROUP                    !Declare a group
FieldOne   STRING(10)
FieldTwo   LONG
END

CODE                               !Begin executable code
FieldTwo = CLOCK()                 !Executes 1st
ComputeTime(ParmGroup)             !Executes 2nd, passes control to procedure
MatchMaster                         !Executes after procedure executes fully
```

## PROCEDURE Calls

```
procname[(parameters)]  
return = funcname[(parameters)]
```

<i>procname</i>	The name of the PROCEDURE as declared in the procedure's prototype.
<i>parameters</i>	An optional parameter list passed to the PROCEDURE. A parameter list may be one or more variable labels or expressions. The <i>parameters</i> are delimited by commas and are declared in the prototype.
<i>return</i>	The label of a variable to receive the value returned by the PROCEDURE.
<i>funcname</i>	The name of a PROCEDURE which returns a value, as declared in the procedure's prototype.

A PROCEDURE is called by its label (including any parameter list) as a statement in the CODE section of a PROGRAM or PROCEDURE. The parameter list must match the parameter list declared in the procedure's prototype. Procedures cannot be called in expressions.

A PROCEDURE which returns a value is called by its label (including any parameter list) as a component of an expression or parameter list passed to another PROCEDURE. The parameter list must match the parameter list declared in the procedure's prototype. A PROCEDURE which returns a value may also be called by its label (including any parameter list), in the same manner as a PROCEDURE which doesn't return a value, if its return value is not needed. This will generate a compiler warning that can be safely ignored (unless the PROC attribute is placed on its prototype).

If the PROCEDURE is a method of a CLASS, the *procname* must begin with the label of an object instance of the CLASS followed by a period then the label of the PROCEDURE (*objectname.procname*).

Example:

```
PROGRAM
MAP
ComputeTime PROCEDURE(*GROUP)      !Passing a group parameter
MatchMaster PROCEDURE,BYTE,PROC    !PROCEDURE returning a value and passing no
parameters
END
ParmGroup GROUP                    !Declare a group
FieldOne  STRING(10)
FieldTwo  LONG
END
CODE
FieldTwo = CLOCK()                 !Built-in procedure called as expression
ComputeTime(ParmGroup)             !Call the compute time procedure
MatchMaster()                       !Call the procedure as a procedure
```

See Also:

**PROCEDURE**

# PROCEDURE Prototypes

## Prototype Syntax

```

name  PROCEDURE [(parameter list)] [,return type] [,calling convention] [,RAW] [,NAME( )] [,TYPE]
      [,DLL( )] [,PROC] [,PRIVATE] [,VIRTUAL] [,PROTECTED] [,REPLACE]

      name[(parameter list)] [,return type] [,calling convention] [,RAW] [,NAME( )] [,TYPE] [,DLL( )]
      [, PROC] [, PRIVATE]

```

<i>name</i>	The label of a PROCEDURE statement that defines the executable code.
<b>PROCEDURE</b>	Required keyword.
<i>parameter list</i>	The data types of the parameters. Each parameter's data type may be followed by a label used to document the parameter (only). Each numeric value parameter may also include an assignment of the default value (a constant) to pass if the parameter is omitted.
<i>return type</i>	The data type the PROCEDURE will RETURN.
<i>calling convention</i>	Specify the C or PASCAL stack-based parameter calling convention.
<b>RAW</b>	Specifies that STRING or GROUP parameters pass only the memory address (without passing the length of the passed string). It also alters the behaviour of ? and *? parameters. This attribute is only for 3GL language compatibility and is not valid on a Clarion language procedure.
<b>NAME</b>	Specify an alternate, "external" name for the PROCEDURE.
<b>TYPE</b>	Specify the prototype is a type definition for procedures passed as parameters.
<b>DLL</b>	Specify the PROCEDURE is in an external .DLL.
<b>PROC</b>	Specify the PROCEDURE with a <i>return type</i> may be called as a PROCEDURE without a <i>return type</i> without generating a compiler warning.
<b>PRIVATE</b>	Specify the PROCEDURE may be called only from another PROCEDURE within the same MODULE (usually used in a CLASS).
<b>VIRTUAL</b>	Specify the PROCEDURE is a virtual method of a CLASS structure.
<b>PROTECTED</b>	Specify the PROCEDURE may be called only from another PROCEDURE within the same CLASS or any directly derived CLASS.

**REPLACE** Specify the “Construct” or “Destruct” PROCEDURE in the derived CLASS completely replaces the constructor or destructor of its parent CLASS.

All PROCEDURES in a PROGRAM must have a prototype declaration in a MAP or CLASS structure. A prototype declares to the compiler exactly what form to expect to see when the PROCEDURE is used in executable code.

There are two valid forms of prototype declarations listed in the syntax diagram on the previous page. The first one, using the PROCEDURE keyword, is valid for use everywhere and is the preferred form to use. The second form is supported only for backward compatability with previous versions of Clarion.

A prototype contains:

- The *name* of the PROCEDURE.
- The keyword PROCEDURE is optional in a MAP structure, but required in a CLASS structure.
- An optional *parameter list* specifying all parameters that will be passed in.
- The data *return type*, if the prototype is for a PROCEDURE which will return a value.
- The parameter *calling convention*, if you are linking in objects that require stack-based parameter passing (such as objects that were not compiled with a Clarion TopSpeed compiler).
- The RAW, NAME, TYPE, DLL, PROC, PRIVATE, VIRTUAL, and PROTECTED attributes, as needed.

You can optionally specify the C (right to left) or PASCAL (left to right and compatible with Windows for both 16-bit and 32-bit) stack-based parameter *calling convention* for your PROCEDURE. This provides compatibility with third-party libraries written in other languages (if they were not compiled with a TopSpeed compiler). If you do not specify a *calling convention*, the default is the internal, register-based parameter passing convention used by all the TopSpeed compilers.

The RAW attribute allows you to pass just the memory address of a \*, STRING, or GROUP parameter (whether passed by value or by reference) to a non-Clarion language procedure or function. Normally, STRING or GROUP parameters pass both the address and the length of the string. The RAW attribute eliminates the length portion. This is provided for compatibility with external library functions which expect only the address of the string.

The NAME attribute provides the linker an external name for the PROCEDURE. This is also provided for compatibility with libraries written in other languages. For example: in some C language compilers, with the C

calling convention specified, the compiler adds a leading underscore to the function name. The NAME attribute allows the linker to resolve the name of the function correctly.

The TYPE attribute indicates the prototype does not reference a specific PROCEDURE. Instead, it defines a prototype *name* used in other prototypes to indicate the type of procedure passed to another PROCEDURE as a parameter.

The DLL attribute specifies that the PROCEDURE prototype on which it is placed is in a .DLL. The DLL attribute is required for 32-bit applications because .DLLs are relocatable in a 32-bit flat address space, which requires one extra dereference by the compiler to address the procedure.

The PRIVATE attribute specifies that only another PROCEDURE that is in the same MODULE may call it. This would most commonly be used on a prototype in a module's MAP structure, but may also be used in the global MAP.

When the *name* of a prototype is used in the *parameter list* of another prototype, it indicates the procedure being prototyped will receive the label of a PROCEDURE that receives the same *parameter list* (and has the same *return type*, if it returns a value). A prototype with the TYPE attribute may not also have the NAME attribute.

Example:

```
MAP
  MODULE('Test')                !'test.clw' contains these procedures
  MyProc1 PROCEDURE(LONG)        !LONG value-parameter
  MyProc2 PROCEDURE(< *LONG >)    !Omittable LONG variable-parameter
  MyProc3 PROCEDURE(LONG=23)      !Passes 23 if omitted
  END
  MODULE('Party3.Obj')           !A third-party library
  Func46 PROCEDURE(*CSTRING),REAL,C,RAW    !Pass CSTRING address-only to C function
  Func47 PROCEDURE(*CSTRING),*CSTRING,C,RAW !Returns pointer to a CSTRING
  Func48 PROCEDURE(REAL),REAL,PASCAL        !PASCAL calling convention
  Func49 PROCEDURE(SREAL),REAL,C,NAME('_func49') !C convention and external function name
  END
  MODULE('STDFuncs.DLL')          !A standard functions .DLL
  Func50 PROCEDURE(SREAL),REAL,PASCAL,DLL
  END
END
```

See Also:

MAP, MEMBER, MODULE, NAME, PROCEDURE, RETURN, Prototype  
Parameter Lists, Procedure Overloading, CLASS

## Prototype Parameter Lists

```
type [ label ]
< type [ label ] >
type [ label ] = default
```

<i>type</i>	The data type of the parameter. This may be a value-parameter, variable-parameter, array, unspecified data type, entity, procedure-parameter, or a named GROUP, QUEUE, or CLASS.
<i>label</i>	An optional documentary label for the parameter. This label is not required and is placed in the prototype for documentation purposes only.
< >	Angle brackets indicate the parameter is omissible. The OMITTED procedure detects the omission. All parameter <i>types</i> can be omitted.
= <i>default</i>	A <i>default</i> value indicates the numeric parameter is omissible, and if omitted, the <i>default</i> value is passed. The OMITTED procedure will not detect the omission—a value is passed. Valid only on simple numeric <i>types</i> .

The *parameter list* in a PROCEDURE prototype is a comma-delimited list of the data *types* to pass to the PROCEDURE. The entire *parameter list* is enclosed in the parentheses following the PROCEDURE keyword (or the *name*). Each parameter's *type* may be followed by a space then a valid Clarion *label* for the parameter (which is ignored by the compiler and only documents the purpose of the parameter). Each numeric value-parameter (passed by value) may also include an assignment of a constant value to the *type* (or the documentary *label*, if present) that defines the default value to pass if the parameter is omitted.

Any parameter that may be omitted when the PROCEDURE is called must be included in the prototype's *parameter list* and enclosed in angle brackets ( < > ) unless a *default* value is defined for the parameter. The OMITTED procedure allows you to test for unpassed parameters at runtime (except those parameters which have a *default* value).

Example:

```
MAP
  MODULE('Test')
MyProc1 PROCEDURE(LONG)                !LONG value-parameter
MyProc2 PROCEDURE(<LONG>)                !Omissible LONG value-parameter
MyProc3 PROCEDURE(LONG=23)              !Passes 23 if omitted
MyProc4 PROCEDURE(LONG Count, REAL Sum) !LONG passing a Count and REAL passing a Sum
MyProc5 PROCEDURE(LONG Count=1, REAL Sum=0) !Count defaults to 1 and Sum to 0
  END
END
```

See Also:

MAP, MEMBER, MODULE, PROCEDURE, CLASS

## Value-parameters

Value-parameters are “passed by value.” A copy of the variable passed in the parameter list of the “calling” PROCEDURE is used in the “called” PROCEDURE. The “called” PROCEDURE cannot change the value of the variable passed to it by the “caller.” Simple assignment data conversion rules apply; Value-parameters actually passed are converted to the data type in the PROCEDURE prototype. Valid value-parameters are:

```
BYTE  SHORT  USHORT  LONG  ULONG  SREAL  REAL  DATE
TIME  STRING
```

Example:

```
MAP
  MODULE('Test')
MyProc1 PROCEDURE(LONG)                !LONG value-parameter
MyProc2 PROCEDURE(<LONG>)              !Omittable LONG value-parameter
MyProc3 PROCEDURE(LONG=23)             !Passes 23 if omitted
MyProc4 PROCEDURE(LONG Count, REAL Sum) !LONG passing a Count and REAL passing a Sum
MyProc5 PROCEDURE(LONG Count=1, REAL Sum=0) !Count defaults to 1 and Sum to 0
  END
  MODULE('Party3.Obj')
Func48 PROCEDURE(REAL),REAL,PASCAL      !PASCAL calling convention
Func49 PROCEDURE(SREAL),REAL,C,NAME('_func49')
                                         !C convention and external function name
  END
END
```

## Variable-parameters

**Variable-parameters** are “passed by address.” A variable passed by address has only one memory address. Changing the value of the variable in the “called” PROCEDURE also changes its value in the “caller.” Variable-parameters are listed by data type with a leading asterisk (\*) in the PROCEDURE prototype in the MAP. Valid variable-parameters are:

```
*BYTE    *SHORT    *USHORT    *LONG    *ULONG    *SREAL    *REAL    *BFLOAT4
*BFLOAT8 *DECIMAL  *PDECIMAL *DATE    *TIME     *STRING   *PSTRING *CSTRING
*GROUP
```

Example:

```
MAP
  MODULE('Test')
MyProc2 PROCEDURE(<*LONG>)              !Omittable LONG variable-parameter
MyFunc1 PROCEDURE(*SREAL),REAL,C      !SREAL variable-parameter, REAL return, C call
conv
  END
  MODULE('Party3.Obj')
Func4  PROCEDURE(*CSTRING),REAL,C,RAW  !Pass CSTRING address-only to C function
Func47 PROCEDURE(*CSTRING),CSTRING,C,RAW !Returns pointer to a CSTRING
  END
END
```

## Passing Arrays

To pass an entire array as a parameter, the prototype must declare the array's data type as a Variable-parameter ("passed by address") with an empty subscript list. If the array has more than one dimension, commas (as position holders) must indicate the number of dimensions in the array. The calling statement must pass the entire array to the PROCEDURE, not just one element.

Example:

```
MAP
MainProc  PROCEDURE
AddCount  PROCEDURE(*LONG[,] Total,*LONG[,] Current)!Passing two 2-dimensional arrays
END
CODE
MainProc                                     !Call first procedure
MainProc PROCEDURE
TotalCount LONG,DIM(10,10)
CurrentCnt  LONG,DIM(10,10)
CODE
AddCount(TotalCount,CurrentCnt)                !Call the procedure passing the arrays
AddCount PROCEDURE(*LONG[,] Total,*LONG[,] Current) !Procedure expects two arrays
CODE
LOOP I# = 1 TO MAXIMUM(Total,1)                !Loop through first subscript
  LOOP J# = 1 TO MAXIMUM(Total,2)              !Loop through second subscript
    Total[I#,J#] += Current[I#,J#]            ! increment TotalCount from CurrentCnt
  .
  .
  .
CLEAR(Current)                                !Clear CurrentCnt array
```

## Parameters of Unspecified Data Type

You can write general purpose procedures which perform operations on passed parameters where the exact data type of the parameter may vary from one call to the next by using **untyped value-parameters** and **untyped variable-parameters**. These are polymorphic parameters; they may become any other simple data type depending upon the data type passed to the procedure.

**Untyped value-parameters** are represented in the prototype with a question mark (?). When the procedure executes, the parameter is dynamically typed and acts as a data object of the base type (LONG, DECIMAL, STRING, or REAL) of the passed variable, or the base type of whatever it was last assigned. This means that the "assumed" data type of the parameter can change within the PROCEDURE, allowing it to be treated as any data type.

An untyped value-parameter is "passed by value" to the PROCEDURE and its assumed data type is handled by Clarion's automatic Data Conversion Rules. Data types which may be passed as untyped value-parameters:

```
BYTE    SHORT    USHORT  LONG    ULONG    SREAL    REAL    BFLOAT4 BFLOAT8
DECIMAL PDECIMAL DATE    TIME    STRING    PSTRING  CSTRING
GROUP (treated as a STRING)
Untyped value-parameter (?)  Untyped Variable-parameter (*?)
```



The RAW attribute is valid for use if the untyped value-parameter (?) is being passed to external library functions written in other languages than Clarion. This converts the data to a LONG then passes the data as a C/C++ “void \*” parameter (which eliminates “type inconsistency” warnings).

**Untyped variable-parameters** are represented in the PROCEDURE prototype with an asterisk and a question mark (\*?). Within the procedure, the parameter acts as a data object of the type of the variable passed in at runtime. This means the data type of the parameter is fixed during the execution of the PROCEDURE.

An untyped variable-parameter is “passed by address” to the PROCEDURE. Therefore, any changes made to the passed parameter within the PROCEDURE are made directly to the variable which was passed in. This allows you to write polymorphic procedures.

Within a procedure which receives an untyped variable-parameter, it is not safe to make any assumptions about the data type coming in. The danger of making assumptions is the possibility of assigning an out-of-range value which the variable’s actual data type cannot handle. If this happens, the result may be disastrously different from that expected.

Data types which may be passed as untyped variable-parameters:

BYTE	SHORT	USHORT	LONG	ULONG	SREAL	REAL	BFLOAT4
BFLOAT8	DECIMAL	PDECIMAL	DATE	TIME	STRING	PSTRING	CSTRING
Untyped variable-parameter (*?)							

The RAW attribute is valid for use if the untyped variable-parameter (\*?) is being passed to external library functions written in other languages than Clarion. This has the same effect as passing a C or C++ “void \*” parameter.

Arrays may not be passed as either kind of untyped parameter.

Example:

```

PROGRAM
MAP
Proc1 PROCEDURE(?)                !Untyped value-parameter
Proc2 PROCEDURE(*)                !Untyped variable-parameter
Proc3 PROCEDURE(*)                !Untyped variable-parameter (set to crash)
Max  PROCEDURE(?,?),?            !Procedure returning Untyped value-parameter
END
GlobalVar1  BYTE(3)              !BYTE initialized to 3
GlobalVar2  DECIMAL(8,2,3)
GlobalVar3  DECIMAL(8,1,3)
MaxInteger  LONG
MaxString   STRING(255)
MaxFloat    REAL

CODE
Proc1(GlobalVar1)                !Pass in a BYTE, value is 3
Proc2(GlobalVar2)                !Pass it a DECIMAL(8,2), value is 3.00 - it prints 3.33
Proc2(GlobalVar3)                !Pass it a DECIMAL(8,1), value is 3.0 - it prints 3.3
Proc3(GlobalVar1)                !Pass it a BYTE and watch it crash
MaxInteger = Max(1,5)            !Max procedure returns the 5
MaxString = Max('Z','A')        !Max procedure returns the 'Z'
MaxFloat = Max(1.3,1.25)        !Max procedure returns the 1.3

Proc1 PROCEDURE(? ValueParm)
CODE
ValueParm = ValueParm & ValueParm    ! ValueParm starts at 3 and is a LONG
ValueParm = ValueParm / 10           !Now Contains '33' and is a STRING
ValueParm = ValueParm / 10           !Now Contains 3.3 and is a REAL

Proc2 PROCEDURE(*? VariableParm)
CODE
VariableParm = 10 / 3                !Assign 3.33333333... to passed variable

Proc3 PROCEDURE(*? VariableParm)
CODE
LOOP
  IF VariableParm > 250 THEN BREAK.    !If passed a BYTE, BREAK will never happen
  VariableParm += 10
END

Max PROCEDURE(Va11,Va12)            !Find the larger of two passed values
CODE
IF Va11 > Va12                      !Check first value against second
  RETURN(Va11)                      ! return first, if largest
ELSE                                !otherwise
  RETURN(Va12)                      ! return the second
END

```

See Also:

MAP, MEMBER, MODULE, PROCEDURE, CLASS

## Entity-parameters

**Entity-parameters** pass the name of a data structure to the “called” PROCEDURE. Passing the entity allows the “called” PROCEDURE to use those Clarion commands that require the label of the structure as a parameter. Entity-parameters are listed by entity type in the PROCEDURE prototype in the MAP. Entity-parameters are always “passed by address.” Valid entity-parameters are:

FILE VIEW KEY INDEX QUEUE WINDOW REPORT BLOB

A REPORT can be passed as the parameter to a procedure prototyped to receive a WINDOW, since internally they use the same passing structure.

Example:

```
MAP
  MODULE('Test')
MyFunc2  PROCEDURE(FILE),STRING      !FILE entity-parameter, returning a STRING
ProcType PROCEDURE(FILE),TYPE        !Procedure-parameter type definition
MyFunc4  PROCEDURE(FILE),STRING,PROC !May be called as a procedure without warnings
MyProc6  PROCEDURE(FILE),PRIVATE     !May only be called by other procs in TEST.CLW
  END
END
```

## Procedure-parameters

**Procedure-parameters** pass the name of another PROCEDURE to the “called” PROCEDURE. Procedure-parameters are listed by the name of a prototype of the same type in the PROCEDURE prototype in the MAP (which may or may not have the TYPE attribute). When called in executable code, the “called” PROCEDURE must be passed the name of a PROCEDURE whose prototype is exactly the same as the procedure named in the “called” procedure’s prototype.

Each parameter in the list may be followed by a valid Clarion label which is completely ignored by the compiler. This label is used only to document the parameter to make the prototype more readable, or to duplicate the PROCEDURE definition statement. Each passed parameter’s definition may also include the assignment of a constant value to the data type (or the documentary label, if present) that defines the default value to pass if the parameter is omitted.

Example:

```
MAP
  MODULE('Test')
ProcType PROCEDURE(FILE),TYPE        !Procedure-parameter type definition
MyFunc3  PROCEDURE(ProcType),STRING  !ProcType procedure-parameter, returning a STRING,
  END                                  ! must be passed a procedure that takes a FILE
END                                  ! as a parameter
```

## **Passing Named GROUPs, QUEUEs, and CLASSes**

Passing a GROUP as a Variable-Parameter, or a QUEUE as an Entity-Parameter, to a PROCEDURE does not allow you to reference the component fields within the structure in the receiving PROCEDURE . You can alternatively pass a “named” GROUP or QUEUE to achieve this. You may also name a CLASS in the same manner to allow the receiving procedure to access the public data members and methods of the CLASS.

To reference the component fields within the structure, place the label of a GROUP, QUEUE, or CLASS structure in the receiving PROCEDURE’s prototype *parameter list* as the data type for the parameter. This passes the parameter “by address” and allows the receiving procedure to reference the component fields of the structure (and the public methods of a CLASS pass in this manner).

The data actually passed as the parameter must always have a similar structure (defined with the same data types) for its component fields. The GROUP or QUEUE actually passed can be a “superset” of the named parameter, as long as the first fields in the “superset” group are the same as the GROUP or QUEUE named in the prototype. The actually passed CLASS object can also be a derived class of the CLASS named in the prototype. The “extra” fields in the passed GROUP, QUEUE, or CLASS are not available for use in the receiving procedure.

The GROUP, QUEUE, or CLASS named in the *parameter list* does not need to have the TYPE attribute, and does not have to be declared before the procedure’s prototype, but it must be declared before the PROCEDURE that will receive the parameter is called. This is the only instance in the Clarion language where the compiler allows such a “forward reference.”

Use Field Qualification syntax to reference the members of the passed group in the receiving procedure (LocalName.MemberName). The member fields of the structure are referenced by the labels given them in the group named as the data type in the prototype—not the labels of the fields in the structure actually passed in. This allows the receiving procedure to be completely generic, regardless of what actual data structure is passed to it.

Example:

```

        PROGRAM
        MAP
MyProc  PROCEDURE
AddQue  PROCEDURE(PassGroup PassedGroup, NameQue PassedQue)
        END
                                !AddQue receives a GROUP defined like PassGroup and
                                ! a QUEUE defined like NameQue

PassGroup  GROUP,TYPE      !Type definition -- no memory allocated
F1         STRING(20)      !  GROUP with 2 STRING(20) fields
F2         STRING(20)
        END

NameGroup  GROUP           !Name group
First      STRING(20)      !  first name
Last       STRING(20)      !  last name
Company    STRING(30)      !This extra field is not available to the receiving
        END                ! procedure (AddQue) since PassGroup only has two fields

NameQue    QUEUE,TYPE      !Name Queue, Type definition -- no memory allocated
First      STRING(20)
Last       STRING(20)
        END

        CODE
        MyProc

MyProc     PROCEDURE
LocalQue   NameQue         !Local Name Queue, declared exactly the same as NameQue

        CODE
        NameGroup.First = 'Fred'
        NameGroup.Last  = 'Flintstone'
        AddQue(NameGroup,LocalQue)           !Pass NameGroup and LocalQue to AddQue procedure

        NameGroup.First = 'Barney'
        NameGroup.Last  = 'Rubble'
        AddQue(NameGroup,LocalQue)

        NameGroup.First = 'George'
        NameGroup.Last  = '0''Jungle'
        AddQue(NameGroup,LocalQue)

        LOOP X# = 1 TO RECORDS(LocalQue)      !Look at what's in the LocalQue now
            GET(LocalQue,X#)
            MESSAGE(CLIP(LocalQue.First) & ' ' & LocalQue.Last)
        END

AddQue     PROCEDURE(PassGroup PassedGroup, NameQue PassedQue)
        CODE
        PassedQue.First = PassedGroup.F1      !Effectively: LocalQue.First = NameGroup.First
        PassedQue.Last  = PassedGroup.F2      !Effectively: LocalQue.Last  = NameGroup.Last
        ADD(PassedQue)                        !Add an entry into the PassedQue (LocalQue)
        ASSERT(NOT ERRORCODE())

```

See Also:

**MAP, MEMBER, MODULE, PROCEDURE, CLASS**

## PROCEDURE Return Types

A PROCEDURE prototyped with a return value must RETURN a value. The data type to return is listed, separated by a comma, after the optional parameter list.

### Value RETURN types:

```
BYTE  SHORT  USHORT  LONG  ULONG  SREAL  REAL  DATE
TIME  STRING  Untyped value-parameter (?)
```

An untyped value-parameter return value (?) indicates the data type of the value returned by the PROCEDURE is not known. This functions in exactly the same manner as an untyped value-parameter. When the value is returned from the PROCEDURE, standard Clarion Data Conversion Rules apply, no matter what data type is returned.

### Variable RETURN types:

```
CSTRING  *STRING  *BYTE  *SHORT  *USHORT  *LONG
*ULONG   *SREAL   *REAL   *DATE   *TIME
Untyped variable-parameter (*?)
```

Variable return types are provided just for prototyping external library functions (written in another language) which return only the address of data—they are not valid for use on Clarion language procedures.

Functions which return pointers (the address of some data) should be prototyped with an asterisk prepended to the return data type (except CSTRING). The compiler automatically handles the returned pointer at runtime. Functions prototyped this way act just like a variable defined in the program—when the function is used in Clarion code, the data referenced by the returned pointer is automatically used. This data can be assigned to other variables, passed as parameters to procedures, or the ADDRESS function may return the address of the data.

CSTRING is an exception because all the others are fixed length datums, and a CSTRING is not. So, any C function that returns a pointer to a CSTRING can be prototyped as “char \*” at the C end, but the compiler thinks the procedure and copies the datum onto the stack. Therefore, just like the other pointer return values, when the function is used in Clarion code the data referenced by the returned pointer is automatically used (the pointer is dereferenced).

As an example of this, assume that the XYZ() function returns a pointer to a CSTRING, CStringVar is a CSTRING variable, and LongVar is a LONG variable. The simple Clarion assignment statement, CStringVar = XYZ(), places the data referenced by the XYZ() function’s returned pointer, in the CStringVar variable. The assignment, LongVar = ADDRESS(XYZ()), places the memory address of that data in the LongVar variable.

An untyped variable-parameter return value (\*?) indicates the data type of the variable returned by the PROCEDURE is not known. This functions in exactly the same manner as an untyped variable-parameter.

### **Reference RETURN types:**

```
*FILE *KEY *WINDOW *VIEW
Named CLASS (*ClassName)
Named QUEUE (*QueueName)
```

A PROCEDURE may return a reference which may either be assigned to a reference variable, or used in a parameter list wherever the referenced object would be appropriate. A PROCEDURE that returns \*WINDOW may also return the label of an APPLICATION or REPORT structure. NULL is a valid value to return.

Example:

```
MAP
  MODULE('Party3.Obj')      !A third-party library
Func46 PROCEDURE(*CSTRING),REAL,C,RAW
                                !Pass CSTRING address-only to C function, return REAL
Func47 PROCEDURE(*CSTRING),CSTRING,C,RAW
                                !Returns pointer to a CSTRING
Func48 PROCEDURE(REAL),REAL,PASCAL
                                !PASCAL calling convention, return REAL
Func49 PROCEDURE(SREAL),REAL,C,NAME('_func49')
                                !C convention and external function name, return REAL
  END
END
```

See Also:

MAP, MEMBER, MODULE, NAME, PROCEDURE, RETURN, Reference Variables

## Prototype Attributes

### C, PASCAL (parameter passing conventions)

---

#### C PASCAL

The **C** and **PASCAL** attributes of a **PROCEDURE** prototype specifies that parameters are always passed on the stack. The **C** convention passes the parameters from right to left as they appear in the parameter list, while the **PASCAL** convention passes them from left to right. **PASCAL** is also completely compatible with the Windows API calling convention for both 16-bit and 32-bit compiled applications—it is the Windows-standard calling convention (and also disables name mangling).

These calling conventions provide compatibility with third-party libraries written in other languages (if they were not compiled with a TopSpeed compiler). If you do not specify a calling convention in the prototype, the default calling convention is the internal, register-based parameter passing convention used by all the TopSpeed compilers.

Example:

```
MAP
  MODULE('Party3.Obj')
Func46  PROCEDURE(*CSTRING,*REAL),REAL,C,RAW      !A third-party library
only                                         !Pass REAL then CSTRING, address-
Func49  PROCEDURE(*CSTRING,*REAL),REAL,PASCAL,RAW !Pass CSTRING then REAL, address-only
. .
```

See Also: **PROCEDURE Prototypes, Prototype Parameter Lists**



## DLL (set procedure defined externally in .DLL)

### DLL( [ *flag* ] )

<b>DLL</b>	Declares a PROCEDURE defined externally in a .DLL.
<i>flag</i>	A numeric constant, equate, or Project system define which specifies the attribute as active or not. If the <i>flag</i> is zero, the attribute is not active, just as if it were not present. If the <i>flag</i> is any value other than zero, the attribute is active. Uniquely, it may be an undefined label, in which case the attribute is active.

The **DLL** attribute specifies that the PROCEDURE on whose prototype it is placed is defined in a .DLL. The DLL attribute is required for 32-bit applications because .DLLs are relocatable in a 32-bit flat address space, which requires one extra dereference by the compiler to address the procedure.

Example:

```
MAP
  MODULE('STDFuncs.DLL')                !A standard functions .DLL
Func50  PROCEDURE(SREAL),REAL,PASCAL,DLL(dll_mode)  !
      END
END
```

See Also:                   **EXTERNAL**

## NAME (set prototype's external name)

### NAME( *constant* )

<b>NAME</b>	Specifies an “external” name for the linker.
<i>constant</i>	A string constant containing the external name to assign. This is case sensitive.

The **NAME** attribute specifies an “external” name for the linker. The NAME attribute may be placed on a PROCEDURE Prototype. The *constant* supplies the external name used by the linker to identify the procedure or function from an external library or to provide a Clarion language prototype with an external name for external linkage (usually to eliminate the compiler's standard name mangling), making it easier to construct an export list for a .DLL to be used in other language projects.

Example:

```
PROGRAM
MAP
  MODULE('External.Obj')
AddCount  PROCEDURE(LONG),LONG,C,NAME('_AddCount')    !C function named '_AddCount'
  ..
```

See Also:                   **PROCEDURE Prototypes, Name Mangling and C++ Compatibility**

## PRIVATE (set procedure private to a CLASS or module)

### PRIVATE

The **PRIVATE** attribute specifies that the PROCEDURE on whose prototype it is placed may only be called only from another PROCEDURE within the same source MODULE. This encapsulates it from other modules.

PRIVATE is normally used on method prototypes in CLASS structures, so that the method may only be called from the other CLASS methods in the module. PRIVATE methods are not inherited by CLASSES derived from the CLASS containing the PRIVATE method's prototype, although they can be VIRTUAL if the derived CLASS is contained in the same module.

Example:

```
MAP
  MODULE('STDFuncs.DLL')                !A standard functions .DLL
Func49  PROCEDURE(SREAL),REAL,PASCAL,PROC
Proc50  PROCEDURE(SREAL),PRIVATE        !Callable only from Func49
END
END

OneClass  CLASS,MODULE('OneClass.CLW'),TYPE
BaseProc  PROCEDURE(REAL Parm)          !Public method
Proc      PROCEDURE(REAL Parm),PRIVATE  !Declare a private method
END

TwoClass  OneClass                      !Instance of OneClass

CODE
TwoClass.BaseProc(1)                    !Legal call to BaseProc
TwoClass.Proc(2)                        !Illegal call to Proc

!In OneClass.CLW:
MEMBER()

OneClass.BaseProc  PROCEDURE(REAL Parm)
CODE
SELF.Proc(Parm)    !Legal call to Proc

OneClass.Proc      PROCEDURE(REAL Parm)
CODE
RETURN(Parm)
```

See Also:

**CLASS**

## PROC (set function called as procedure without warnings)

---

### PROC

The **PROC** attribute may be placed on a **PROCEDURE** prototyped with a return value. This allows you to use it as normal a **PROCEDURE** call, not only in expressions and assignments, for those instances in which you do not need the return value. The **PROC** attribute suppresses the compiler warnings you would otherwise get from such use.

Example:

```
MAP
  MODULE('STDFuncs.DLL')          !A standard functions .DLL
Func50  PROCEDURE(SREAL),REAL,PASCAL,PROC
  END
END
```

See Also:

**PROCEDURE**

## PROTECTED (set procedure private to a CLASS or derived CLASS)

### PROTECTED

The **PROTECTED** attribute specifies that the PROCEDURE on whose prototype it is placed is visible only to the PROCEDURES declared within the same CLASS structure (the other methods of that CLASS) and the methods of any CLASS derived from the CLASS. This encapsulates the PROCEDURE from being called from any code external to the CLASS within which it is prototyped or subsequently derived CLASSES.

Example:

```

OneClass  CLASS,MODULE('OneClass.CLW'),TYPE
BaseProc  PROCEDURE(REAL Parm)           !Public method
Proc      PROCEDURE(REAL Parm),PROTECTED !Declare a protected method
END

TwoClass  OneClass                       !Instance of OneClass

ThreeClass CLASS(OneClass),MODULE('ThreeClass.CLW') !Derived from OneClass
ThreeProc  PROCEDURE(REAL Parm)           !Declare a Public method
END

CODE
TwoClass.BaseProc(1)           !Legal call to BaseProc
TwoClass.Proc(2)               !Illegal call to Proc

!In OneClass.CLW:
MEMBER()

OneClass.BaseProc  PROCEDURE(REAL Parm)
CODE
SELF.Proc(Parm)           !Legal call to Proc

OneClass.Proc  PROCEDURE(REAL Parm)
CODE
RETURN(Parm)

!In ThreeClass.CLW:
MEMBER()

ThreeClass.NewProc  PROCEDURE(REAL Parm)
CODE
SELF.Proc(Parm)           !Legal call to Proc

```

See Also:

**CLASS**

## RAW (pass address only)

---

### RAW

The **RAW** attribute of a PROCEDURE prototype specifies that STRING or GROUP parameters pass the memory address only. This allows you to pass just the memory address of a \*?, STRING, or GROUP parameter, whether passed by value or by reference, to a non-Clarion language procedure or function. Normally, STRING or GROUP parameters pass the address and the length of the string. The RAW attribute eliminates the length portion. For a prototype with a ? parameter, the parameter is taken as a LONG but passed as a “void \*” which just eliminates linker warnings. This is provided for compatibility with external library functions which expect only the address of the string.

Example:

```
MAP
  MODULE('Party3.Obj')           !A third-party library
Func46  PROCEDURE(*CSTRING),REAL,C,RAW  !Pass CSTRING address-only to C function
. .
```

See Also:           PROCEDURE Prototypes, Prototype Parameter Lists

## REPLACE (set replacement constructor or destructor)

### REPLACE

The **REPLACE** attribute specifies that the **PROCEDURE** on whose prototype it is placed completely replaces the constructor or destructor from its parent class. **REPLACE** is valid only on a **PROCEDURE** labelled either “Construct” or “Destruct” and declared within a **CLASS** structure which is derived from a class which also contains a matching “Construct” or “Destruct” **PROCEDURE**. If the **PROCEDURE** label is “Construct” the method is a Constructor—automatically called when the object is instantiated. An object is instantiated when it comes into scope or when created with a **NEW** statement. If the **PROCEDURE** label is “Destruct” the method is a Destructor—automatically called when the object is destroyed. An object is destroyed when it goes out of scope or when destroyed with a **DISPOSE** statement.

Example:

```

PROGRAM
SomeQueue  QUEUE,TYPE
F1         STRING(10)
END
OneClass   CLASS,MODULE('OneClass.CLW'),TYPE
ObjectQueue &SomeQueue           !Declare a reference to a named queue
Construct  PROCEDURE             !Declare a Constructor
Destruct   PROCEDURE             !Declare a Destructor
END
TwoClass   CLASS(OneClass),MODULE('TwoClass.CLW'),TYPE
Construct  PROCEDURE,REPLACE     !Declare a replacement Constructor
END
MyClass    OneClass              !Instance of OneClass
YourClass  &TwoClass             !Reference to TwoClass
CODE       !MyClass object comes into scope,
           ! autocalling OneClass.Construct
           !YourClass object comes into scope,
           ! autocalling TwoClass.Construct
           !YourClass object goes out of scope,
           ! autocalling OneClass.Destruct
           !MyClass object goes out of scope,
           ! autocalling OneClass.Destruct

YourClass &= NEW(TwoClass)

DISPOSE(YourClass)

RETURN

!OneClass.CLW contains:
OneClass.Construct  PROCEDURE
CODE
SELF.ObjectQueue = NEW(SomeQueue)           !Create the object's queue
OneClass.Destruct  PROCEDURE
CODE
FREE(SELF.ObjectQueue)                       !Free the queue entries
DISPOSE(SELF.ObjectQueue)                   ! and remove the queue
!TwoClass.CLW contains:
TwoClass.Construct  PROCEDURE
CODE
SELF.ObjectQueue = NEW(SomeQueue)           !Create the object's queue
SELF.ObjectQueue.F1 = 'First Entry'
ADD(SELF.ObjectQueue)

```

See Also:

**NEW, DISPOSE, CLASS**

## TYPE (specify PROCEDURE type definition)

---

### TYPE

The **TYPE** attribute specifies a prototype that does not reference an actual PROCEDURE. Instead, it defines a prototype *name* to use in other prototypes to indicate the type of procedure passed to another PROCEDURE as a parameter.

When the *name* of the TYPED prototype is used in the *parameter list* of another prototype, the procedure being prototyped will receive, as a passed parameter, the label of a PROCEDURE that has the same type of *parameter list* (and has the same *return type*, if it returns a value).

Example:

```
MAP
ProcType  PROCEDURE(FILE),TYPE      !Procedure-parameter type definition
MyFunc3   PROCEDURE(ProcType),STRING !ProcType procedure-parameter, returning a STRING,
END                                              ! must be passed the label of a procedure that
                                              ! takes a FILE as a required parameter
```

See Also:

PROCEDURE Prototypes, Prototype Parameter Lists

## VIRTUAL (set virtual method)

### VIRTUAL

The **VIRTUAL** attribute specifies that the **PROCEDURE** on whose prototype it is placed is a virtual method of the **CLASS** containing the prototype. This allows methods in a parent **CLASS** to access methods in a derived **CLASS**. The **VIRTUAL** attribute must be placed on both the method's parent class prototype and the derived class's prototype.

Example:

```

OneClass  CLASS                                !Base class
BaseProc  PROCEDURE(REAL Parm)                !Non-virtual method
Proc      PROCEDURE(REAL Parm),VIRTUAL        !Declare a virtual method
END

TwoClass  CLASS(OneClass)                      !Derived class of OneClass
Proc      PROCEDURE(REAL Parm),VIRTUAL        !Declare a virtual method
END

ClassThree OneClass                          !Another Instance of a OneClass object
ClassFour  TwoClass                          !Another Instance of a TwoClass object

CODE
OneClass.BaseProc(1)                          !BaseProc calls OneClass.Proc
TwoClass.BaseProc(2)                          !BaseProc calls TwoClass.Proc
ClassThree.BaseProc(3)                        !BaseProc calls OneClass.Proc
ClassFour.BaseProc(4)                        !BaseProc calls TwoClass.Proc

OneClass.BaseProc  PROCEDURE(REAL Parm)
CODE
SELF.Proc(Parm)                                !Calls virtual method, either OneClass.Proc
                                              ! TwoClass.Proc, depending on which
                                              ! class instance is executing

```

See Also: **CLASS**



## ***Procedure Overloading***

Procedure Overloading means allowing multiple PROCEDURE definitions to use the same name. This is one form of polymorphism. In order to allow this each PROCEDURE using a shared name must receive different parameters so the compiler can decide, based on the parameters passed which PROCEDURE to call.

The idea here is to allow more than one procedure of the same name, but with different prototypes, so separate (but usually similar) operations can occur on different data types. From an efficiency viewpoint, Procedure Overloading is much more efficient than coding a single procedure with omittable parameters, for those cases where you may or may not receive multiple parameters.

The Clarion language also allows polymorphic procedures through the use of the ? and \*? parameters, but Procedure Overloading extends this polymorphic ability to also include Entity-parameters and “named group” parameters.

One example of Procedure Overloading is the Clarion OPEN statement, which initializes an entity for use in the program. Depending on what type of entity is passed to it (a FILE, a WINDOW, a VIEW, ...), it performs related but physically different functions.

### **Rules for Procedure Overloading**

---

The Clarion language has built-in data type conversion which can make overload resolution difficult for the compiler. Therefore, there are rules governing how the compiler resolves functional overloading, which are applied in the following order:

1. Entity-parameters are resolved to FILE, KEY, WINDOW, and QUEUE. If a prototype can be chosen on the basis of these alone then the compiler does (most of the Clarion built in procedures fall into this category). Note that KEY and VIEW are implicitly derived from FILE, just as APPLICATION and REPORT are implicitly derived from WINDOW.
2. All “named group” parameters must match a group of their own structure. Procedure-parameters are matched by structure. CLASSES must match by name, not simply by structure.
3. A prototype must match in the number and placement of non-omittable parameters. This is the third criteria (not the first) so that the compiler can usually guess which prototype the user was aiming at and give a more meaningful error message.

4. If there are no matching prototypes then allow derivation. At this point a KEY would be allowed to match a FILE and a group that is derived would match one of its base classes. If one level of derivation does not work, the compiler continues up the tree. All QUEUES now match QUEUE and GROUP etc. CLASSES derive before other parameter types.
5. Variable-parameters (unnamed) must exactly match the actual data type passed. A \*GROUP matches a \*STRING. Any variable-parameter matches \*?.
6. All Value-parameters are considered to have the same type.

Example:

```

MAP
Func  PROCEDURE(WINDOW)      ! 1
Func  PROCEDURE(FILE)        ! 2
Func  PROCEDURE(KEY)          ! 3
Func  PROCEDURE(FILE,KEY)     ! 4
Func  PROCEDURE(G1)           ! 5
Func  PROCEDURE(G0)           ! 6
Func  PROCEDURE(KEY,G0)       ! 7
Func  PROCEDURE(FILE,G1)      ! 8
Func  PROCEDURE(SHORT = 10)   ! 9
Func  PROCEDURE(LONG)         ! 10
Func  PROCEDURE()             ! Illegal, indistinguishable from 9
Func  PROCEDURE(*SHORT)       ! 11
Func1  PROCEDURE(*SHORT)
Func1a  PROCEDURE(*SHORT)
Func2  PROCEDURE(*LONG)
Func  PROCEDURE(Func1)        ! 12
Func  PROCEDURE(Func1a)       ! Illegal, same as 12
Func  PROCEDURE(Func2)        ! 13
END

G0  GROUP
END
G1  GROUP(G0)
END

CODE
Func(A:Window)  ! Calls 1 by rule 1
Func(A:File)    ! Calls 2 by rule 1
Func(A:Key)     ! Calls 3 by rule 1
Func(A:View)    ! Calls 2 by rule 4
Func(A:Key,A:Key) ! Calls 4 by rule 4 (would call key,key if present)
Func(A:G0)      ! Calls 6 by rule 2
Func(A:G1)      ! Calls 5 by rule 2
Func(A:Func2)   ! Calls 13 by rule 2
Func(A:Key,A:G1) ! Error - Ambiguous. If rule 4 is used then 7 & 8 are both possible
Func(A:Short)   ! Error - Ambiguous. Calls 9 or 11
Func(A:Real)    ! Calls 9 by rule 6
Func            ! Calls 9 by rule 3

```

See Also:

**CLASS**

## Name Mangling and C++ Compatability

Each overloaded function will have a link-time name composed of the procedure label and a “mangled” argument list (the NAME attribute can be used to disable name mangling). This is designed so that some degree of cross-calling between C++ and Clarion is possible. On the C++ side you need:

```
#pragma name(prefix=>“”)
```

and the name in all caps. On the Clarion side you need a MODULE structure with a null string as its parameter:

```
MODULE(‘’)
END
```

The only procedures that can be cross-called are those whose prototypes only contain data types from the following list. Clarion Variable-parameters (passed by address) correspond to reference parameters on the C side unless they are omissible, in which case they correspond to pointer parameters.

<u>Clarion</u>	<u>C++</u>
BYTE	unsigned char
USHORT	unsigned short
SHORT	short
LONG	long
ULONG	unsigned long
SREAL	float
REAL	double
*CSTRING (with RAW)	char&
<*CSTRING> (with RAW)	char*
<*GROUP> (with RAW)	void*

Note that for C++ compatability the return type of a PROCEDURE is not mangled into the name. A corollary effect is that procedures cannot be distinguished by return type.

Example:

```
//C++ prototypes:
#pragma name(prefix=>“”)
void HADD(short,short);
void HADD(long*,unsigned char);
void HADD(short unsigned &);
void HADD(char *,void *);

!Clarion prototypes:
MODULE(‘’)
  hADD(short,short)
  HaDD(<*long>,byte)
  HAdd(*ushort)
  HADD(<*CSTRING>,<*GROUP>),RAW
END
```

See Also:

NAME

## Compiler Directives

Compiler Directives are statements that tell the compiler to take some action at compile time. These statements are not included in the executable program object code which the compiler generates. Therefore, there is no run-time overhead associated with their use.

### ASSERT (set assumption for debugging)

#### ASSERT(*expression*)

<b>ASSERT</b>	Specifies an assumption for debugging purposes.
<i>expression</i>	A Boolean expression that <i>should</i> always evaluate as true (any value other than blank or zero).

The **ASSERT** statement specifies an *expression* to evaluate at the exact point in the program where the **ASSERT** is placed. This may be any kind of Boolean expression and should be formulated such that the expected evaluation result is always true (any value other than blank or zero). The purpose of **ASSERT** is to catch erroneous assumptions for the programmer.

If debug is on and the *expression* is false (blank or zero), an error message displays indicating the specific line number and source code module where the asserted *expression* was false. The user is invited to GPF the program at that point, which allows Clarion's post-mortem debuggers to activate.

If debug is off, the *expression* is still evaluated, but no error message is displayed if the result is false.

Example:

```
MyQueue QUEUE
F1      LONG
      END

CODE
LOOP X# = 1 TO 10
    MyQueue.F1 = X#
    ADD(MyQueue)
    IF ERRORCODE() THEN STOP(ERROR()).
END
LOOP X# = 1 TO 10
    GET(MyQueue, X#)
    ASSERT(~ERRORCODE())           !There should never be an error on this GET
END
```

## BEGIN (define code structure)

---

```
BEGIN  
  statements  
END
```

**BEGIN**                      Declares a single code statement structure.

*statements*                Executable program instructions.

The **BEGIN** compiler directive tells the compiler to treat the *statements* as a single structure. The **BEGIN** structure must be terminated by a period or the **END** statement.

**BEGIN** is usually used in an **EXECUTE** control structure to allow several lines of code to be treated as one.

Example:

```
EXECUTE Value  
  Proc1                    !Execute if Value = 1  
  BEGIN                    !Execute if Value = 2  
    Value += 1  
    Proc2  
  END  
  Proc3                    !Execute if Value = 3  
END
```

See Also:                    **EXECUTE**

## COMPILE (specify source to compile)

**COMPILE**(*terminator* [,*expression*])

<b>COMPILE</b>	Specifies a block of source code lines to be included in the compilation.
<i>terminator</i>	A string constant that marks the last line of a block of source code.
<i>expression</i>	An expression allowing conditional execution of the COMPILE. The expression is either an EQUATE whose value is zero or one, or EQUATE = integer.

The **COMPILE** directive specifies a block of source code lines to be included in the compilation. The included block begins with the **COMPILE** directive and ends with the line that contains the same string constant as the *terminator*. The entire terminating line is included in the **COMPILE** block.

The optional *expression* parameter permits conditional **COMPILE**. The form of the *expression* is fixed. It is the label of an **EQUATE** statement, or a Conditional Switch set in the Project System, and may be followed by an equal sign ( = ) and an integer constant.

The code between **COMPILE** and the *terminator* is compiled only if the *expression* is true. If the *expression* contains an **EQUATE** that has not yet been defined, then the referenced **EQUATE** is assumed to be zero (0).

Although the *expression* is not required, **COMPILE** without an *expression* parameter is not necessary because all source code is compiled unless explicitly omitted. **COMPILE** and **OMIT** are opposites.

Example:

```

    OMIT('***',_WIDTH32_)      !OMIT only if application is 32-bit
    SIGNED    EQUATE(SHORT)
    UNSIGNED  EQUATE(USHORT)
    ***

    COMPILE('***',_WIDTH32_)  !COMPILE only if application is 32-bit
    SIGNED    EQUATE(LONG)
    UNSIGNED  EQUATE(ULONG)
    ***

    COMPILE('EndOfFile',OnceOnly = 0) !COMPILE only the first time encountered because the
    OnceOnly EQUATE(1)                ! OnceOnly EQUATE is defined after the COMPILE that
                                        ! references it, so a second pass during the same
                                        ! compilation will not re-compile the code
                                        !Specify the Demo EQUATE value

    Demo EQUATE(1)
    CODE
    COMPILE('EndDemoChk',Demo = 1)    !COMPILE only if Demo equate is turned on
    DO DemoCheck                      !Check for demo limits passed
    ! EndDemoChk                      !End of conditional COMPILE code
    ! EndOfFile

```

See Also:

**OMIT, EQUATE**

## INCLUDE (compile code in another file)

**INCLUDE**(*filename* [,*section*])

<b>INCLUDE</b>	Specifies source code to be compiled which exists in a separate file which is not a MEMBER module.
<i>filename</i>	A string constant that contains the DOS file specification for a source file. If the extension is omitted, .CLW is assumed.
<i>section</i>	A string constant which is the <i>string</i> parameter of the SECTION directive marking the beginning of the source code to be included.

The **INCLUDE** directive specifies source code to be compiled which exists in a separate file which is not a MEMBER module. Starting on the line of the INCLUDE directive, the source file, or the specified *section* of that file, is compiled as if it appeared in sequence within the source module being compiled. You can nest INCLUDEs up to 3 deep, so you can INCLUDE a file that includes a file that includes a file but that latter file must not include anything....

The compiler uses the Redirection file (*CurrentReleaseName*.RED) to find the file, searching the path specified for that type of *filename* (usually by extension). This makes it unnecessary to provide a complete path in the *filename* to be included. A discussion of the Redirection file is in the *User's Guide* and the *Project System* chapter of the *Programmer's Guide*.

Example:

```
GenLedger PROCEDURE          !Declare procedure
  INCLUDE('filedefs.clw')    !Include file definitions here
  CODE                       !Begin code section
  INCLUDE('Setups','ChkErr') !Include error check from setups.clw
```

See Also:           **SECTION**

## EQUATE (assign label)

label	<b>EQUATE</b> (	<i>label</i>	
		[ <i>constant</i> ]	)
		<i>picture</i>	
		<i>type</i>	

### **EQUATE**

Assigns a label to another label or constant.

#### *label*

The *label* of any statement preceding the EQUATE statement. This is used to declare an alternate statement label. This may not be the label of a PROCEDURE or ROUTINE statement.

#### *constant*

A numeric or string *constant*. This is used to declare a shorthand label for a constant value. It also makes a constant easy to locate and change. This may be omitted only in an ITEMIZE structure.

#### *picture*

A *picture* token. This is used to declare a shorthand label for a picture token. However, the screen and report formatter in the Clarion Editor will not recognize the equated label as a valid picture.

#### *type*

A data type. This is usually used to declare a single method of declaring a variable as one of several data types, depending upon compiler settings (like a C++ typedef for a simple data type).

The **EQUATE** directive assigns a label to another label or constant. It does not use any run-time memory. The label of an EQUATE directive cannot be the same as its parameter.

Example:

```
Init      EQUATE(SetUpProg)           !Set alias label
Off       EQUATE(0)                   !Off means zero
On        EQUATE(1)                   !On means one
PI        EQUATE(3.1415927)           !The value of PI
EnterMsg  EQUATE('Press Ctrl-Enter to SAVE')
SocSecPic EQUATE(@P###-##-####P)     !Soc-sec number picture

      OMIT('End16BitChk',Flag32Bit = 0) !OMIT if 32-bit compile is turned off
SIGNED  EQUATE(LONG)                  !SIGNED = LONG in a 32-bit compile
! End16BitChk
      OMIT('End32BitChk',Flag32Bit = 1) !OMIT if 32-bit compile is turned on
SIGNED  EQUATE(SHORT)                 !SIGNED = SHORT in a 16-bit compile
! End32BitChk
```

See Also:

Reserved Words, ITEMIZE



## ITEMIZE (enumeration data structure)

```
[label]  ITEMIZE( [ seed ] ) [,PRE( )]
          equates
          END
```

<i>label</i>	An optional label for the ITEMIZE structure.
<b>ITEMIZE</b>	An enumeration data structure.
<i>seed</i>	An integer constant or constant expression specifying the value of the first EQUATE in the structure.
<b>PRE</b>	Declare a label prefix for variables within the structure.
<i>equates</i>	Multiple consecutive EQUATE declarations which specify positive integer values in the range 0 to 65,535.

An **ITEMIZE** structure declares an enumerated data structure. If the first *equate* does not declare a value and there is no *seed* value specified, its value is one (1). All following *equates* following the first increment by one (1) if no value is specified for the subsequent *equate*. If a value is specified on a subsequent *equate*, all *equates* following that continue incrementing by one (1) from the specified value.

*Equates* within the ITEMIZE structure are referenced by prepending the prefix to the label of the *equate* (PRE attribute—PRE:EquateLabel). If the ITEMIZE structure has an empty prefix, then the *equates* are referenced by prepending the ITEMIZE *label* to the label of the *equate* (*label*:EquateLabel). If there is no prefix or *label*, then the *equates* are referenced by their own label without a prefix.

Example:

```

ITEMIZE
False  EQUATE(0)      !False = 0
True   EQUATE         !True = 1
END

Color  ITEMIZE(0),PRE  !Seed value is zero
Red    EQUATE          !Color:Red = 0
White  EQUATE          !Color:White = 1
Blue   EQUATE          !Color:Blue = 2
Pink   EQUATE(5)       !Color:Pink = 5
Green  EQUATE          !Color:Green = 6
Last   EQUATE
END

Stuff  ITEMIZE(Color:Last + 1),PRE(My)  !Constant expression as seed
X      EQUATE                          !My:X = Color:Last + 1
Y      EQUATE                          !My:Y = Color:Last + 2
Z      EQUATE                          !My:Z = Color:Last + 3
END
```

See Also:

EQUATE, PRE

## OMIT (specify source not to be compiled)

**OMIT**(*terminator* [,*expression*])

<b>OMIT</b>	Specifies a block of source code lines to be omitted from the compilation.
<i>terminator</i>	A string constant that marks the last line of a block of source code.
<i>expression</i>	An expression allowing conditional execution of the OMIT. The expression is either an EQUATE whose value is zero or one, or EQUATE = integer.

The **OMIT** directive specifies a block of source code lines to be omitted from the compilation. These lines may contain source code comments or a section of code that has been “stubbed out” for testing purposes. The omitted block begins with the OMIT directive and ends with the line that contains the same string constant as the *terminator*. The entire terminating line is included in the OMIT block.

The optional *expression* parameter permits conditional OMIT. The form of the *expression* is fixed. It is the label of an EQUATE statement, or a Conditional Switch set in the Project System, and may be followed by an equal sign (=) and an integer constant.

The OMIT directive executes only if the *expression* is true. Therefore, the code between OMIT and the *terminator* is compiled only if the *expression* is not true. If the *expression* contains an EQUATE that has not yet been defined, then the referenced EQUATE is assumed to be zero (0). COMPILE and OMIT are opposites.

Example:

```

    OMIT('**END**')                !Unconditional OMIT
* Main Program Loop
**END**
    OMIT('***',_WIDTH32_)          !OMIT only if application is 32-bit
SIGNED      EQUATE(SHORT)
***
    COMPILE('***',_WIDTH32_)       !COMPILE only if application is 32-bit
SIGNED      EQUATE(LONG)
***
OMIT('EndOfFile',OnceOnly)         !Compile only the first time encountered because the
OnceOnly EQUATE(1)                 ! OnceOnly EQUATE is defined after the COMPILE that
                                   ! references it, so a second pass during the same
                                   ! compilation will not re-compile the code
Demo EQUATE(0)                     !Specify the Demo EQUATE value
CODE
    OMIT('EndDemoChk',Demo = 0)    !OMIT only if Demo is turned off
    DO DemoCheck                   !Check for demo limits passed
    ! EndDemoChk                   !End of omitted code
! EndOfFile

```

See Also:

**COMPILE, EQUATE**

## SECTION (specify source code section)

### SECTION(*string*)

**SECTION** Identifies the beginning of a block of executable source code or data declarations.

*string* A string constant which names the SECTION.

The **SECTION** compiler directive identifies the beginning of a block of executable source code or data declarations which may be INCLUDED in source code in another file. The SECTION's *string* parameter is used as an optional parameter of the INCLUDE directive to include a specific block of source code. A SECTION is terminated by the next SECTION or the end of the file.

Example:

```
SECTION('FirstSection')      !Begin section

FieldOne STRING(20)
FieldTwo LONG

SECTION('SecondSection')     !End previous section, begin new section

IF Number <> SayNumber
    DO GetNumber
END

SECTION('ThirdSection')      !End previous section, begin new section

CASE Action
OF 1
    DO AddRec
OF 2
    DO ChgRec
OF 3
    DO DelRec
END                          !Third section ends at end of file
```

See Also:

**INCLUDE**

# SIZE (memory size in bytes)

SIZE(	<i>variable</i>	
	<i>constant</i>	)
	<i>picture</i>	

- SIZE**Supplies the amount of memory used for storage.
- variable*The label of a previously declared variable.
- constant*A numeric or string constant.
- picture*A picture token.
- SIZE** directs the compiler to supply the amount of memory (in bytes) used to store the *variable*, *constant*, or *picture*.

Example:

```
SavRec    STRING(1),DIM(SIZE(Cus:Record)
                                !Dimension the string to size of record

StringVar STRING(SIZE('TopSpeed Corporation'))
                                !A string long enough for the constant

LOOP I# = 1 TO SIZE(ParseString) !Loop for number of bytes in the string

PicLen = SIZE(@P(####)###-####P)    !Save size of the picture
```

See Also:           LEN

## 3 - VARIABLE DECLARATIONS

### Simple Data Types

#### BYTE (one-byte unsigned integer)

```
label  BYTE(initial value) [,DIM( )] [,OVER( )] [,NAME( )] [,EXTERNAL] [,DLL] [,STATIC] [,THREAD]
        [,AUTO] [,PRIVATE] [,PROTECTED]
```

**BYTE** A one-byte unsigned integer.

Format: magnitude

```
      | ..... |
Bits: 7       0
```

Range: 0 to 255

*initial value* A numeric constant. If omitted, the initial value is zero, unless the AUTO attribute is present.

**DIM** Dimension the variable as an array.

**OVER** Share a memory location with another variable.

**NAME** Specify an alternate, “external” name for the field.

**EXTERNAL** Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.

**DLL** Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.

**STATIC** Specify the variable’s memory is permanently allocated.

**THREAD** Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data.

**AUTO** Specify the variable has no *initial value*.

**PRIVATE** Specify the variable is not visible outside the module containing the CLASS methods. Valid only in a CLASS.

**PROTECTED** Specify the variable is not visible outside base CLASS and derived CLASS methods. Valid only in a CLASS.

**BYTE** declares a one-byte unsigned integer.

Example:

```
Count1  BYTE                !Declare one byte integer
Count2  BYTE,OVER(Count1)   !Declare OVER the one byte integer
Count4  BYTE,DIM(5)         !Declare as a 5 element array
Count4  BYTE(5)             !Declare with initial value
```



## USHORT (two-byte unsigned integer)

## LONG (four-byte signed integer)

label    **LONG**(*[initial value]*) [, **DIM**( )] [, **OVER**( )] [, **NAME**( )] [, **EXTERNAL**] [, **DLL**] [, **STATIC**] [, **THREAD**] [, **AUTO**] [, **PRIVATE**] [, **PROTECTED**]

**LONG**                      A four-byte signed integer.

Format:                    ±                      magnitude

Bits:                      | . | ..... | 0

                             31    30

Range:                    -2,147,483,648 to 2,147,483,647

*initial value*            A numeric constant. If omitted, the initial value is zero, unless the **AUTO** attribute is present.

**DIM**                      Dimension the variable as an array.

**OVER**                    Share a memory location with another variable.

**NAME**                    Specify an alternate, “external” name for the field.

**EXTERNAL**              Specify the variable is defined, and its memory is allocated, in an external library. Not valid within **FILE**, **QUEUE**, or **GROUP** declarations.

**DLL**                      Specify the variable is defined in a **.DLL**. This is required in addition to the **EXTERNAL** attribute.

**STATIC**                  Specify the variable’s memory is permanently allocated.

**THREAD**                 Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the **STATIC** attribute on Procedure Local data.

**AUTO**                    Specify the variable has no *initial value*.

**PRIVATE**                Specify the variable is not visible outside the module containing the **CLASS** methods. Valid only in a **CLASS**.

**PROTECTED**             Specify the variable is not visible outside base **CLASS** and derived **CLASS** methods. Valid only in a **CLASS**.

**LONG** declares a four-byte signed integer, using the Intel 8086 long integer format. The high-order bit is the sign bit (0 = positive, 1 = negative). Negative values are represented in standard two’s complement notation.

Example:

```
Count1  LONG                      !Declare four-byte signed integer
Count2  LONG,OVER(Count1)         !Declare OVER the four-byte signed integer
Count3  LONG,DIM(4)               !Declare it an array of 4 longs
Count4  LONG(5)                   !Declare with initial value
Count5  LONG,EXTERNAL             !Declare as external
Count6  LONG,EXTERNAL,DLL         !Declare as external in a .DLL
Count7  LONG,NAME('SixCount')    !Declare with external name
ExampleFile FILE,DRIVER('Clarion')!Declare a file
Record      RECORD
Count8      LONG,NAME('Counter') !Declare with external name
. . .
```



## ULONG (four-byte unsigned integer)

label **ULONG**(*[initial value]*) [**DIM**( )] [**OVER**( )] [**NAME**( )] [**EXTERNAL**] [**DLL**] [**STATIC**]  
[**THREAD**] [**AUTO**] [**PRIVATE**] [**PROTECTED**]

### ULONG

A four-byte unsigned integer.

Format:

magnitude

Bits: 31 | ..... | 0

Range: 0 to 4,294,967,295

### *initial value*

A numeric constant. If omitted, the initial value is zero, unless the **AUTO** attribute is present.

### **DIM**

Dimension the variable as an array.

### **OVER**

Share a memory location with another variable.

### **NAME**

Specify an alternate, “external” name for the field.

### **EXTERNAL**

Specify the variable is defined, and its memory is allocated, in an external library. Not valid within **FILE**, **QUEUE**, or **GROUP** declarations.

### **DLL**

Specify the variable is defined in a **.DLL**. This is required in addition to the **EXTERNAL** attribute.

### **STATIC**

Specify the variable’s memory is permanently allocated.

### **THREAD**

Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the **STATIC** attribute on Procedure Local data.

### **AUTO**

Specify the variable has no *initial value*.

### **PRIVATE**

Specify the variable is not visible outside the module containing the **CLASS** methods. Valid only in a **CLASS**.

### **PROTECTED**

Specify the variable is not visible outside base **CLASS** and derived **CLASS** methods. Valid only in a **CLASS**.

**ULONG** declares a four-byte unsigned integer, using the Intel 8086 long integer format. There is no sign bit in this configuration.

Example:

```
Count1  ULONG                      !Declare four-byte unsigned integer
Count2  ULONG,OVER(Count1)         !Declare OVER four-byte unsigned integer
Count3  ULONG,DIM(4)               !Declare it an array of 4 unsigned longs
Count4  ULONG(5)                   !Declare with initial value
Count5  ULONG,EXTERNAL             !Declare as external
Count6  ULONG,EXTERNAL,DLL         !Declare as external in a .DLL
Count7  ULONG,NAME('SixCount')     !Declare with external name
ExampleFile FILE,DRIVER('Btrieve') !Declare a file
Record      RECORD
Count8      ULONG,NAME('Counter') !Declare with external name
. . .
```

## SIGNED (16/32-bit signed integer)

label    **SIGNED**(*[initial value]*) [,**DIM**( )] [,**OVER**( )] [,**NAME**( )] [,**EXTERNAL**] [,**DLL**] [,**STATIC**] [,**THREAD**]  
          [,**AUTO**] [,**PRIVATE**] [,**PROTECTED**]

<b>SIGNED</b>	A signed integer which is either a <b>SHORT</b> or a <b>LONG</b> depending upon whether the code is compiled for 16-bit or 32-bit.
<i>initial value</i>	A numeric constant. If omitted, the initial value is zero, unless the <b>AUTO</b> attribute is present.
<b>DIM</b>	Dimension the variable as an array.
<b>OVER</b>	Share a memory location with another variable.
<b>NAME</b>	Specify an alternate, “external” name for the field.
<b>EXTERNAL</b>	Specify the variable is defined, and its memory is allocated, in an external library. Not valid within <b>FILE</b> , <b>QUEUE</b> , or <b>GROUP</b> declarations.
<b>DLL</b>	Specify the variable is defined in a <b>.DLL</b> . This is required in addition to the <b>EXTERNAL</b> attribute.
<b>STATIC</b>	Specify the variable’s memory is permanently allocated.
<b>THREAD</b>	Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the <b>STATIC</b> attribute on Procedure Local data.
<b>AUTO</b>	Specify the variable has no <i>initial value</i> .
<b>PRIVATE</b>	Specify the variable is not visible outside the module containing the <b>CLASS</b> methods. Valid only in a <b>CLASS</b> .
<b>PROTECTED</b>	Specify the variable is not visible outside base <b>CLASS</b> and derived <b>CLASS</b> methods. Valid only in a <b>CLASS</b> .

**SIGNED** declares a signed integer which is either a **SHORT** or a **LONG** depending upon whether the code is compiled for 16-bit or 32-bit. This is not actually a data type but an **EQUATE** defined in **EQUATES.CLW** like this:

```

      OMIT('***',_WIDTH32_)
SIGNED                               EQUATE(SHORT)
      ***
      COMPILE('***',_WIDTH32_)
SIGNED                               EQUATE(LONG)
      ***

```

The **SIGNED** data type is most useful for prototyping Windows API calls which take a **SHORT** parameter in their 16-bit version and a **LONG** parameter in their 32-bit version.

Example:

```
Count1  SIGNED           !Declares a SHORT in 16-bit and a LONG in 32-bit
```

## UNSIGNED (16/32-bit unsigned integer)

label    **UNSIGNED**(*[initial value]*) [, **DIM**( )] [, **OVER**( )] [, **NAME**( )] [, **EXTERNAL**] [, **DLL**] [, **STATIC**] [, **THREAD**] [, **AUTO**] [, **PRIVATE**] [, **PROTECTED**]

<b>UNSIGNED</b>	An unsigned integer which is either a USHORT or a LONG depending upon whether the code is compiled for 16-bit or 32-bit.
<i>initial value</i>	A numeric constant. If omitted, the initial value is zero, unless the AUTO attribute is present.
<b>DIM</b>	Dimension the variable as an array.
<b>OVER</b>	Share a memory location with another variable.
<b>NAME</b>	Specify an alternate, “external” name for the field.
<b>EXTERNAL</b>	Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.
<b>DLL</b>	Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.
<b>STATIC</b>	Specify the variable’s memory is permanently allocated.
<b>THREAD</b>	Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data.
<b>AUTO</b>	Specify the variable has no <i>initial value</i> .
<b>PRIVATE</b>	Specify the variable is not visible outside the module containing the CLASS methods. Valid only in a CLASS.
<b>PROTECTED</b>	Specify the variable is not visible outside base CLASS and derived CLASS methods. Valid only in a CLASS.

**UNSIGNED** declares an unsigned integer which is either a USHORT or a LONG depending upon whether the code is compiled for 16-bit or 32-bit. This is not actually a data type but an EQUATE defined in EQUATES.CLV like this:

```

        OMIT( '***', _WIDTH32_)
UNSIGNED          EQUATE(USHORT)
***
        COMPILE( '***', _WIDTH32_)
UNSIGNED          EQUATE(LONG)
***

```

The UNSIGNED data type is most useful for prototyping Windows API calls which take a USHORT parameter in their 16-bit version and a LONG (or ULONG) parameter in their 32-bit version.

Example:

```
Count1  UNSIGNED          !Declares a USHORT in 16-bit and a LONG in 32-bit
```

label    **SREAL**(*[initial value]*) [, **DIM**( )] [, **OVER**( )] [, **NAME**( )] [, **EXTERNAL**] [, **DLL**] [, **STATIC**]  
          [, **THREAD**] [, **AUTO**] [, **PRIVATE**] [, **PROTECTED**]

**SREAL** declares a four-byte floating point signed numeric variable, using the Intel 8087 short real (single precision) format.

Count1	SREAL	!Declare four-byte signed floating point
Count2	SREAL,OVER(Count1)	!Declare OVER the four-byte ! signed floating point
Count3	SREAL,DIM(4)	!Declare it an array of 4 floats
Count4	SREAL(5)	!Declare with initial value
Count5	SREAL,EXTERNAL	!Declare as external
Count6	SREAL,EXTERNAL,DLL	!Declare as external in a .DLL
Count7	SREAL,NAME('SixCount')	!Declare with external name
ExampleFile	FILE,DRIVER('Btrieve')	!Declare a file
Record	RECORD	
Count8	SREAL,NAME('Counter')	!Declare with external name

## REAL (eight-byte signed floating point)

label    **REAL**(*[initial value]*) [, **DIM**( )] [, **OVER**( )] [, **NAME**( )] [, **EXTERNAL**] [, **DLL**] [, **STATIC**] [, **THREAD**] [, **AUTO**] [, **PRIVATE**] [, **PROTECTED**]

**REAL**                      An eight-byte floating point number.

Format:	±	exponent	significand
	.		
Bits:	63 62	52	0
Range:	0, ± 2.225073858507201e-308 .. ± 1.79769313496231e+308 (15 significant digits)		

*initial value*            A numeric constant. If omitted, the initial value is zero, unless the **AUTO** attribute is present.

**DIM**                      Dimension the variable as an array.

**OVER**                    Share a memory location with another variable.

**NAME**                   Specify an alternate, “external” name for the field.

**EXTERNAL**             Specify the variable is defined, and its memory is allocated, in an external library. Not valid within **FILE**, **QUEUE**, or **GROUP** declarations.

**DLL**                     Specify the variable is defined in a **.DLL**. This is required in addition to the **EXTERNAL** attribute.

**STATIC**                 Specify the variable’s memory is permanently allocated.

**THREAD**                Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the **STATIC** attribute on Procedure Local data.

**AUTO**                    Specify the variable has no *initial value*.

**PRIVATE**               Specify the variable is not visible outside the module containing the **CLASS** methods. Valid only in a **CLASS**.

**PROTECTED**            Specify the variable is not visible outside base **CLASS** and derived **CLASS** methods. Valid only in a **CLASS**.

**REAL** declares an eight-byte floating point signed numeric variable, using the Intel 8087 long real (double precision) format.

Example:

```
Count1 REAL                                !Declare eight-byte signed floating point
Count2 REAL,OVER(Count1)                  !Declare OVER the eight-byte
                                           ! signed floating point
Count3 REAL,DIM(4)                        !Declare it an array of 4 reals
Count4 REAL(5)                            !Declare with initial value
Count5 REAL,EXTERNAL                      !Declare as external
Count6 REAL,EXTERNAL,DLL                  !Declare as external in a .DLL
Count7 REAL,NAME('SixCount')             !Declare with external name
ExampleFile FILE,DRIVER('Clarion')       !Declare a file
                                           RECORD
Count8 REAL,NAME('Counter')              !Declare with external name
. .
```

## BFLOAT4 (four-byte signed floating point)

label    **BFLOAT4**[(*initial value*)] [,**DIM**( )] [,**OVER**( )] [,**NAME**( )] [,**EXTERNAL**] [,**DLL**] [,**STATIC**] [,**THREAD**] [,**AUTO**] [,**PRIVATE**] [,**PROTECTED**]

**BFLOAT4**                      A four-byte floating point number.

Format:            exponent            ±                      significand

Bits: 31	.....	23	22	.....	0
----------	-------	----	----	-------	---

Range: 0, ± 5.87747e-39 .. ± 1.70141e+38    (6 significant digits)

*initial value*                      A numeric constant. If omitted, the initial value is zero, unless the **AUTO** attribute is present.

**DIM**                                  Dimension the variable as an array.

**OVER**                                Share a memory location with another variable.

**NAME**                                Specify an alternate, “external” name for the field.

**EXTERNAL**                          Specify the variable is defined, and its memory is allocated, in an external library. Not valid within **FILE**, **QUEUE**, or **GROUP** declarations.

**DLL**                                  Specify the variable is defined in a **.DLL**. This is required in addition to the **EXTERNAL** attribute.

**STATIC**                              Specify the variable’s memory is permanently allocated.

**THREAD**                            Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the **STATIC** attribute on Procedure Local data.

**AUTO**                                Specify the variable has no *initial value*.

**PRIVATE**                            Specify the variable is not visible outside the module containing the **CLASS** methods. Valid only in a **CLASS**.

**PROTECTED**                        Specify the variable is not visible outside base **CLASS** and derived **CLASS** methods. Valid only in a **CLASS**.

**BFLOAT4** declares a four-byte floating point signed numeric variable, using the Microsoft BASIC (single precision) format. This data type is normally used for compatibility with existing data since it is internally converted to a **REAL** before all arithmetic operations.

Example:

```
Count1 BFLOAT4                               !Declare four-byte signed floating point
Count2 BFLOAT4,OVER(Count1)                 !Declare OVER the four-byte
                                           ! signed floating point
Count3 BFLOAT4,DIM(4)                       !Declare array of 4 single-precision reals
Count4 BFLOAT4(5)                           !Declare with initial value
Count5 BFLOAT4,EXTERNAL                     !Declare as external
Count6 BFLOAT4,EXTERNAL,DLL                 !Declare as external in a .DLL
Count7 BFLOAT4,NAME('SixCount')             !Declare with external name
ExampleFile FILE,DRIVER('Btrieve')          !Declare a file
Record RECORD
Count8 BFLOAT4,NAME('Counter')              !Declare with external name
. . .
```

## BFLOAT8 (eight-byte signed floating point)

label    **BFLOAT8**(*[initial value]*) [,**DIM**( )] [,**OVER**( )] [,**NAME**( )] [,**EXTERNAL**] [,**DLL**] [,**STATIC**] [,**THREAD**] [,**AUTO**] [,**PRIVATE**] [,**PROTECTED**]

**BFLOAT8**            An eight-byte floating point number.

Format:    exponent            ±            significand

Bits:    63 | ..... | 55 | 54 | ..... | 0

Range:    0, ± 5.877471754e-39 .. ± 1.7014118346e+38 (15 significant digits)

*initial value*            A numeric constant. If omitted, the initial value is zero, unless the **AUTO** attribute is present.

**DIM**                    Dimension the variable as an array.

**OVER**                  Share a memory location with another variable.

**NAME**                  Specify an alternate, “external” name for the field.

**EXTERNAL**            Specify the variable is defined, and its memory is allocated, in an external library. Not valid within **FILE**, **QUEUE**, or **GROUP** declarations.

**DLL**                    Specify the variable is defined in a **.DLL**. This is required in addition to the **EXTERNAL** attribute.

**STATIC**                Specify the variable’s memory is permanently allocated.

**THREAD**                Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the **STATIC** attribute on Procedure Local data.

**AUTO**                  Specify the variable has no *initial value*.

**PRIVATE**              Specify the variable is not visible outside the module containing the **CLASS** methods. Valid only in a **CLASS**.

**PROTECTED**            Specify the variable is not visible outside base **CLASS** and derived **CLASS** methods. Valid only in a **CLASS**.

**BFLOAT8** declares an eight-byte floating point signed numeric variable, using the Microsoft BASIC (double precision) format. This data type is normally used for compatibility with existing data since it is internally converted to a **REAL** before all arithmetic operations.

Example:

```
Count1 BFLOAT8                                !Declare eight-byte signed floating point
Count2 BFLOAT8,OVER(Count1)                   !Declare OVER
Count3 BFLOAT8,DIM(4)                         !Declare it an array of 4 reals
Count4 BFLOAT8(5)                             !Declare with initial value
Count5 BFLOAT8,EXTERNAL                       !Declare as external
Count6 BFLOAT8,EXTERNAL,DLL                   !Declare as external in a .DLL
Count7 BFLOAT8,NAME('SixCount')              !Declare with external name
ExampleFile FILE,DRIVER('Btrieve')           !Declare a file
Record        RECORD
Count8        BFLOAT8,NAME('Counter')         !Declare with external name
. .
```

label    **DECIMAL**(*length* [,*places*] [,*initial value*]) [,**DIM**( )] [,**OVER**( )] [,**NAME**( )] [,**EXTERNAL**] [,**DLL**]  
           [,**STATIC**] [,**THREAD**] [,**AUTO**] [,**PRIVATE**] [,**PROTECTED**]

Format:      $\pm$                  magnitude

Bits: 127 . 124 0

Range: -9,999,999,999,999,999,999,999,999 to  
+9,999,999,999,999,999,999,999,999

**DECIMAL** declares a variable length packed decimal signed numeric variable. Each byte of a DECIMAL holds two decimal digits (4 bits per digit). The left-most byte holds the sign in its high-order nibble (0 = positive, anything else is negative) and one decimal digit. Therefore, DECIMAL variables always contain a fixed “odd” number of digits (DECIMAL(10) and DECIMAL(11) both use 6 bytes).



Example:

```
Count1  DECIMAL(5,0)                !Declare three-byte signed packed decimal
Count2  DECIMAL(5),OVER(Count1)      !Declare OVER the three-byte
                                         ! signed packed decimal
Count3  DECIMAL(5,0),DIM(4)          !Declare it an array of 4 decimals
Count4  DECIMAL(5,0,5)               !Declare with initial value
Count5  DECIMAL(5,0),EXTERNAL        !Declare as external
Count6  DECIMAL(5,0),EXTERNAL,DLL    !Declare as external in a .DLL
Count7  DECIMAL(5,0),NAME('SixCount') !Declare with external name
ExampleFile FILE,DRIVER('TopSpeed') !Declare a file
Record      RECORD
Count8      DECIMAL(5,0),NAME('Counter') !Declare with external name
. .
```

label    **PDECIMAL**(*length* [,*places*] [,*initial value*]) [,**DIM**( )] [,**OVER**( )] [,**NAME**( )] [,**EXTERNAL**] [,**DLL**]  
           [,**STATIC**] [,**THREAD**] [,**AUTO**] [,**PRIVATE**] [,**PROTECTED**]

**PDECIMAL** declares a variable length packed decimal signed numeric variable in the Btrieve and IBM/EBCDIC type of format. Each byte of an PDECIMAL holds two decimal digits (4 bits per digit). The right-most byte holds the sign in its low-order nibble (0Fh or 0Ch = positive, 0Dh = negative) and one decimal digit. Therefore, PDECIMAL variables always

contain a fixed “odd” number of digits (PDECIMAL(10) and PDECIMAL(11) both use 6 bytes).

Example:

```
Count1  PDECIMAL(5,0)                !Declare three-byte signed packed decimal
Count2  PDECIMAL(5),OVER(Count1)      !Declare OVER the three-byte
                                           ! signed packed decimal
Count3  PDECIMAL(5,0),DIM(4)          !Declare it an array of 4 decimals
Count4  PDECIMAL(5,0,5)               !Declare with initial value
Count5  PDECIMAL(5,0),EXTERNAL        !Declare as external
Count6  PDECIMAL(5,0),EXTERNAL,DLL    !Declare as external in a .DLL
Count7  PDECIMAL(5,0),NAME('SixCount') !Declare with external name
ExampleFile FILE,DRIVER('Btrieve')   !Declare a file
Record      RECORD
Count8      PDECIMAL(5,0),NAME('Counter') !Declare with external name
. .
```

## STRING (fixed-length string)

label	<b>STRING</b> (	<i>length</i>		
		<i>string constant</i>	)	[, <b>DIM</b> ( )][, <b>OVER</b> ( )][, <b>NAME</b> ( )][, <b>EXTERNAL</b> ][, <b>DLL</b> ][, <b>STATIC</b> ]
		<i>picture</i>		[, <b>THREAD</b> ][, <b>AUTO</b> ][, <b>PRIVATE</b> ][, <b>PROTECTED</b> ]

**STRING** A character string.

Format: A fixed number of bytes.

Size: 1 to 65,520 bytes in 16-bit, or 4MB in 32-bit.

*length* A numeric constant that defines the number of bytes in the STRING. String variables are not initialized unless given a *string constant*.

*string constant* The initial value of the STRING. The length of the STRING (in bytes) is set to the length of the *string constant*.

*picture* Used to format the values assigned to the STRING. The length is the number of bytes needed to contain the formatted STRING.

**DIM** Dimension the variable as an array.

**OVER** Share a memory location with another variable.

**NAME** Specify an alternate, “external” name for the field.

**EXTERNAL** Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.

**DLL** Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.

**STATIC** Specify the variable’s memory is permanently allocated.

**THREAD** Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data.

**AUTO** Specify the variable has no *initial value*.

**PRIVATE** Specify the variable is not visible outside the module containing the CLASS methods. Valid only in a CLASS.

**PROTECTED** Specify the variable is not visible outside base CLASS and derived CLASS methods. Valid only in a CLASS.

**STRING** declares a fixed-length character string. The memory assigned to the STRING is initialized to all blanks unless the AUTO attribute is present.

In addition to its explicit declaration, all STRING variables are also implicitly declared as STRING(1),DIM(*length of string*). This allows each character in the STRING to be addressed as an array element. If the STRING also has a DIM attribute, this implicit array declaration is the last (optional) dimension of the array (to the right of the explicit dimensions).

You may also directly address multiple characters within a `STRING` using the “string slicing” technique. This technique performs similar action to the `SUB` function, but is much more flexible and efficient (but does no bounds checking). It is more flexible because a “string slice” may be used on both the destination and source sides of an assignment statement and the `SUB` function can only be used as the source. It is more efficient because it takes less memory than individual character assignments or the `SUB` function.

To take a “slice” of the `STRING`, the beginning and ending character numbers are separated by a colon (`:`) and placed in the implicit array dimension position within the square brackets (`[]`) of the `STRING`. The position numbers may be integer constants, variables, or expressions. If variables are used, there must be at least one blank space between the variable name and the colon separating the beginning and ending number (to prevent `PREfix` confusion).

Example:

```
Name          STRING(20)                !Declare 20 byte name field
ArrayString    STRING(5),DIM(20)         !Declare array
Company        STRING('TopSpeed Corporation') !The software company - 20 bytes
Phone          STRING(@P(####)###-####P) !Phone number field - 13 bytes
ExampleFile    FILE,DRIVER('Clarion')    !Declare a file
Record         RECORD
NameField      STRING(20),NAME('Name')    !Declare with external name
. .
CODE
NameField = 'Tammi'                      !Assign a value
NameField[5] = 'y'                       ! change fifth letter
NameField[5:6] = 'ie'                    ! and change a "slice"
! -- the fifth and sixth letters
ArrayString[1] = 'First'                  !Assign value to first element
ArrayString[1,2] = 'u'                    !Change first element 2nd character
ArrayString[1,2:3] = NameField[5:6]      !Assign slice to slice
```

## CSTRING (fixed-length null terminated string)

label	<b>CSTRING</b> (	<i>length</i>	),	<b>DIM</b> ( )	,	<b>OVER</b> ( )	,	<b>NAME</b> ( )	,	<b>EXTERNAL</b>	,	<b>DLL</b>
		<i>string constant</i>										
		<i>picture</i>										

**CSTRING**      A character string.

Format: A fixed number of bytes.

Size: 2 to 65,521 bytes in 16-bit, or unlimited in 32-bit.

*length*      A numeric constant that defines the number of bytes of storage the string will use. This must include a position for the terminating null character. String variables are not initialized unless given a *string constant*.

*string constant*      A string constant containing the initial value of the string. The length of the string is set to the length of the *string constant* plus the terminating null character.

*picture*      The picture token used to format the values assigned to the string. The length of the string is the number of bytes needed to contain the formatted string and the terminating null character.

**DIM**      Dimension the variable as an array.

**OVER**      Share a memory location with another variable.

**NAME**      Specify an alternate, “external” name for the field.

**EXTERNAL**      Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.

**DLL**      Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.

**STATIC**      Specify the variable’s memory is permanently allocated.

**THREAD**      Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data.

**AUTO**      Specify the variable has no *initial value*.

**PRIVATE**      Specify the variable is not visible outside the module containing the CLASS methods. Valid only in a CLASS.

**PROTECTED**      Specify the variable is not visible outside base CLASS and derived CLASS methods. Valid only in a CLASS.

**CSTRING** declares a character string terminated by a null character (ASCII zero). The memory assigned to the CSTRING is initialized to a zero length string unless the AUTO attribute is present.

CSTRING matches the string data type used in the “C” language and the “ZSTRING” data type of the Btrieve Record Manager. Storage and memory

requirements are fixed-length, however the terminating null character is placed at the end of the data entered. CSTRING should be used to achieve compatibility with outside files or procedures.

In addition to its explicit declaration, all CSTRINGs are implicitly declared as a STRING(1),DIM(*length of string*). This allows each character in the CSTRING to be addressed as an array element. If the CSTRING also has a DIM attribute, this implicit array declaration is the last (optional) dimension of the array (to the right of the explicit dimensions).

You may also directly address multiple characters within a CSTRING using the “string slicing” technique. This technique performs similar action to the SUB function, but is much more flexible and efficient (but does no bounds checking). It is more flexible because a “string slice” may be used on both the destination and source sides of an assignment statement and the SUB function can only be used as the source. It is more efficient because it takes less memory than individual character assignments or the SUB function.

To take a “slice” of the CSTRING, the beginning and ending character numbers are separated by a colon (:) and placed in the implicit array dimension position within the square brackets ([]) of the CSTRING. The position numbers may be integer constants, variables, or expressions. If variables are used, there must be at least one blank space between the variable name and the colon separating the beginning and ending number (to prevent PREFIX confusion).

Since a CSTRING must be null-terminated, the programmer must be responsible for ensuring that an ASCII zero is placed at the end of the data if the field is only accessed through its array elements or as a “slice” (not as a whole entity). Also, a CSTRING can have “junk” stored after the null terminator. Because of this they do not work well inside GROUPs.

Example:

```

Name          CSTRING(21)                !Declare 21 byte field - 20 bytes data
OtherName     CSTRING(21),OVER(Name)      !Declare field over name field
Contact       CSTRING(21),DIM(4)          !Array 21 byte fields - 80 bytes data
Company       CSTRING('TopSpeed Corporation') !21 byte string - 20 bytes data
Phone         CSTRING(@P(###)###-###P)    !Declare 14 bytes - 13 bytes data
ExampleFile   FILE,DRIVER('Btrieve')      !Declare a file
Record        RECORD
NameField     CSTRING(21),NAME('ZstringField') !Declare with external name
. . .

CODE
Name = 'Tammi'                !Assign a value
Name[5] = 'y'                 ! then change fifth letter
Name[6] = 's'                 ! then add a letter
Name[7] = '<0>'                 ! and handle null terminator
Name[5:6] = 'ie'              ! and change a "slice"
                                ! -- the fifth and sixth letters
Contact[1] = 'First'          !Assign value to first element
Contact[1,2] = 'u'            !Change first element 2nd character
Contact[1,2:3] = Name[5:6]    !Assign slice to slice

```

## PSTRING (embedded length-byte string)

label	<b>PSTRING</b>	( <i>length</i>   <i>string constant</i>   <i>picture</i> )	[, <b>DIM</b> ( ) ] [, <b>OVER</b> ( ) ] [, <b>NAME</b> ( ) ] [, <b>EXTERNAL</b> ] [, <b>DLL</b> ] [, <b>STATIC</b> ] [, <b>THREAD</b> ] [, <b>AUTO</b> ] [, <b>PRIVATE</b> ] [, <b>PROTECTED</b> ]
-------	----------------	---	---

**PSTRING** A character string.

Format: A fixed number of bytes.

Size: 2 to 256 bytes.

*length* A numeric constant that defines the number of bytes in the string. This must include the length-byte.

*string constant* A string constant containing the initial value of the string. The length of the string is set to the length of the *string constant* plus the length-byte.

*picture* The picture token used to format the values assigned to the string. The length of the string is the number of bytes needed to contain the formatted string plus the first position length byte. String variables are not initialized unless given a *string constant*.

**DIM** Dimension the variable as an array.

**OVER** Share a memory location with another variable.

**NAME** Specify an alternate, “external” name for the field.

**EXTERNAL** Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.

**DLL** Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.

**STATIC** Specify the variable’s memory is permanently allocated.

**THREAD** Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data.

**AUTO** Specify the variable has no *initial value*.

**PRIVATE** Specify the variable is not visible outside the module containing the CLASS methods. Valid only in a CLASS.

**PROTECTED** Specify the variable is not visible outside base CLASS and derived CLASS methods. Valid only in a CLASS.

**PSTRING** declares a character string with a leading length byte included in the number of bytes declared for the string. The memory assigned to the PSTRING is initialized to a zero length string unless the AUTO attribute is present. PSTRING matches the string data type used by the Pascal language and the “LSTRING” data type of the Btrieve Record Manager. Storage and memory requirements are fixed-length, however, the leading length byte will contain the number of characters actually stored. PSTRING is internally



converted to a STRING intermediate value for string operations during program execution. PSTRING should be used to achieve compatibility with outside files or procedures.

In addition to its explicit declaration, all PSTRINGS are implicitly declared as a PSTRING(1),DIM(*length of string*). This allows each character in the PSTRING to be addressed as an array element. If the PSTRING also has a DIM attribute, this implicit array declaration is the last (optional) dimension of the array (to the right of the explicit dimensions).

You may also directly address multiple characters within a PSTRING using the “string slicing” technique. This technique performs similar action to the SUB function, but is much more flexible and efficient (but does no bounds checking). It is more flexible because a “string slice” may be used on both the destination and source sides of an assignment statement and the SUB function can only be used as the source. It is more efficient because it takes less memory than individual character assignments or the SUB function. To take a “slice” of the PSTRING, the beginning and ending character numbers are separated by a colon (:) and placed in the implicit array dimension position within the square brackets ([]) of the PSTRING. The position numbers may be integer constants, variables, or expressions. If variables are used, there must be at least one blank space between the variable name and the colon separating the beginning and ending number (to prevent PREFIX confusion).

Since a PSTRING must have a leading length byte, the programmer must be responsible for ensuring that its value is always correct if the field is only accessed through its array elements or as a “slice” (not as a whole entity). The PSTRING’s length byte is addressed as element zero (0) of the array (the only case in Clarion where an array has a zero element). Therefore, the valid range of array indexes for a PSTRING(30) would be 0 to 29. Also, a PSTRING can have ‘junk’ stored outside the active portion of the string. Because of this they do not work well inside GROUPs.

Example:

```
Name          PSTRING(21)                !Declare 21 byte field - 20 bytes data
OtherName      PSTRING(21),OVER(Name)    !Declare field over name field
Contact        PSTRING(21),DIM(4)        !Array 21 byte fields - 80 bytes data
Company        PSTRING('TopSpeed Corporation') !21 byte string - 20 bytes data
Phone          PSTRING(@P(###)###-###P)  !Declare 14 bytes - 13 bytes data
ExampleFile    FILE,DRIVER('Btrieve')    !Declare a file
Record         RECORD
NameField      PSTRING(21),NAME('LstringField') !Declare with external name
. . .
CODE
Name = 'Tammi'                !Assign a value
Name[5] = 'y'                 ! then change fifth letter
Name[6] = 's'                 ! then add a letter
Name[0] = '<6>'                 ! and handle length byte
Name[5:6] = 'ie'              ! and change a "slice" -- the 5th and 6th letters
Contact[1] = 'First'          !Assign value to first element
Contact[1,2] = 'u'            !Change first element 2nd character
Contact[1,2:3] = Name[5:6]    !Assign slice to slice
```

## Implicit String Arrays and String Slicing

In addition to their explicit declaration, all **STRING**, **CSTRING** and **PSTRING** variables have an implicit array declaration of one character strings, dimensioned by the length of the string. This is directly equivalent to declaring a second variable as:

```
StringVar      STRING(10)
StringArray    STRING(1),DIM(SIZE(StringVar)),OVER(StringVar)
```

This implicit array declaration allows each character in the string to be directly addressed as an array element, without the need of the second declaration. The **PSTRING**'s length byte is addressed as element zero (0) of the array, as is the first byte of a **BLOB** (the only two cases in Clarion where an array has a zero element).

If the string also has a **DIM** attribute, this implicit array declaration is the last (optional) dimension of the array (to the right of the explicit dimensions). The **MAXIMUM** procedure does not operate on the implicit dimension, you should use **SIZE** instead.

You may also directly address multiple characters within a string using the “string slicing” technique. This technique performs a similar function to the **SUB** procedure, but is much more flexible and efficient (but does no bounds checking). It is more flexible because a “string slice” may be used as either the *destination* or *source* sides of an assignment statement, while the **SUB** procedure can only be used as the source. It is more efficient because it takes less memory than either individual character assignments or the **SUB** procedure.

To take a “slice” of the string, the beginning and ending character numbers are separated by a colon (:) and placed in the implicit array dimension position within the square brackets ([]) of the string. The position numbers may be integer constants, variables, or expressions (internally computed as **LONG** base type). If variables are used, there must be at least one blank space between the variable name and the colon separating the beginning and ending number (to prevent **PRE**fix confusion).

Example:

```
Name      STRING(15)
CONTACT    STRING(15),DIM(4)
CODE
Name = 'Tammi'           !Assign a value
Name[5] = 'y'            ! then change fifth letter
Name[6] = 's'            ! then add a letter
Name[0] = '<6>'           ! and handle length byte
Name[5:6] = 'ie'         ! and change a “slice” -- the fifth and sixth letters
Contact[1] = 'First'     !Assign value to first element
Contact[1,2] = 'u'       !Change first element 2nd character
Contact[1,2:3] = Name[5:6] !Assign slice to first element 2nd & 3rd characters
```

See Also:

**STRING**, **CTRING**, **PSTRING**, **BLOB**

## DATE (four-byte date)

label    **DATE** [,**DIM**( )] [,**OVER**( )] [,**NAME**( )] [,**EXTERNAL**] [,**DLLL**] [,**STATIC**] [,**THREAD**] [,**AUTO**]  
          [,**PRIVATE**] [,**PROTECTED**]

<b>DATE</b>	A four-byte date.
-------------	-------------------

```

Format:      year      mm      dd
Bits:      31      ..... 15      .... 7      .... 0
Range:      year: 1 to 9999
            month: 1 to 12
            day: 1 to 31

```

<b>DIM</b>	Dimension the variable as an array.
------------	-------------------------------------

**OVER** Share a memory location with another variable.

**NAME** Specify an alternate, “external” name for the field.

<b>EXTERNAL</b>	Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.
-----------------	--

<b>DLL</b>	Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.
------------	--

<b>STATIC</b>	Specify the variable's memory is permanently allocated.
---------------	---

**THREAD** Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the **STATIC** attribute on Procedure Local data.

**AUTO** Specify the variable has no *initial value*.

<b>PRIVATE</b>	Specify the variable is not visible outside the module containing the CLASS methods. Valid only in a CLASS.
----------------	---

<b>PROTECTED</b>	Specify the variable is not visible outside base CLASS and derived CLASS methods. Valid only in a CLASS.
------------------	--

**DATE** declares a four-byte date variable. This format matches the “DATE” field type used by the Btrieve Record Manager. A DATE used in a numeric expression is converted to the number of days elapsed since December 28, 1800 (Clarion Standard Date - usually stored as a LONG). The valid Clarion Standard Date range is January 1, 1801 through December 31, 9999. Using an out-of-range date produces unpredictable results. DATE fields should be used to achieve compatibility with outside files or procedures.

Example:

DueDate	DATE	!Declare a date field
OtherDate	DATE,OVER(DueDate)	!Declare field over date field
ContactDate	DATE,DIM(4)	!Array of 4 date fields
ExampleFile	FILE,DRIVER('Btrieve')	!Declare a file
Record	RECORD	
DateRecd	DATE,NAME('DateField')	!Declare with external name

See Also:

Standard Date



## Special Data Types

### ANY (any simple data type)

label	ANY [,DIM( )] [,OVER( )] [,NAME( )] [,EXTERNAL] [,DLL] [,STATIC] [,THREAD] [,PRIVATE] [,PROTECTED]
-------	---

<b>ANY</b>	A variable that may contain any value (numeric or string) or a reference to any simple data type.
<b>NAME</b>	Specify an alternate, “external” name for the field.
<b>EXTERNAL</b>	Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.
<b>DLL</b>	Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.
<b>STATIC</b>	Specify the variable’s memory is permanently allocated.
<b>THREAD</b>	Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data.
<b>PRIVATE</b>	Specify the variable is not visible outside the module containing the CLASS methods. Valid only in a CLASS.
<b>PROTECTED</b>	Specify the variable is not visible outside base CLASS and derived CLASS methods. Valid only in a CLASS.

**ANY** declares a variable that may contain any value (numeric or string) or a reference to any simple data type. This allows an **ANY** variable to be used as a “generic” data type. An **ANY** variable may be declared within a **CLASS**, **GROUP**, or **QUEUE** structure, and may not be declared within a **FILE** structure or named in the **USE** attribute of any control in a window or report.

When an **ANY** variable is the *destination* of a simple assignment statement (*destination* = *source*), it receives the value of the *source* expression. An **ANY** variable uses **REAL** as its base type for numeric operations, which can mean loss of precision when assigned **DECIMAL** values with more than 14 significant digits. When an **ANY** variable is the *destination* of a reference assignment statement (*destination* &= *source*), it receives a reference to the *source* variable. You cannot pass an **ANY** variable as a variable-parameter (by address) unless the receiving procedure is prototyped to receive an untyped variable parameter (\*?) and the passed **ANY** contains a reference.

When an **ANY** variable is declared in a **QUEUE** structure, there are some special considerations that must be followed. This is due to the internal representation of an **ANY** and its polymorphic characteristics.

- You must either **CLEAR** the **QUEUE** structure or reference assign **NULL** to the **ANY** variable (AnyVar &= **NULL**) before adding a new **QUEUE** entry.

Once an ANY variable in a QUEUE has been assigned a value (simple assignment, AnyVar = SomeValue), another simple assignment statement will assign a new value to the ANY. This means the previous value is disposed of and replaced by the new value. If the first value has already been added to the QUEUE, then that entry will “point at” a value that no longer exists.

Once an ANY variable in a QUEUE has been reference assigned a variable (AnyVar &= SomeVariable), another reference assignment statement will assign a new variable to the ANY. This means the previous “pointer” is disposed of and replaced by the new “pointer.” If the first reference has already been added to the QUEUE, then that entry will “point at” a “pointer” that no longer exists.

In both these scenarios, you must either CLEAR the QUEUE, or reference assign NULL to the ANY variable before adding a new entry to the QUEUE to prevent your QUEUE from containing “garbage data.”

- You must either CLEAR the QUEUE structure, or reference assign NULL to the ANY variable (AnyVar &= NULL), before deleting the QUEUE entry.

As explained above, the ANY variable maintains its own data area where it keeps the value or “pointer” to the referenced variable. Therefore, clearing the ANY variable is required to prevent “memory leaks.”

Example:

```
MyQueue  QUEUE
AnyField  ANY                                !Declare a variable to contain any value
Type      STRING(1)
END
DueDate   DATE                                !Declare a date field
CODE
MyQueue.AnyField = 'TopSpeed'                !Assign a string value
MyQueue.Type = 'S'                          !Flag data type
ADD(MyQueue)
CLEAR(MyQueue)                              !Clear the reference
MyQueue.AnyField &= DueDate                  !Assign a Reference to a DATE
MyQueue.Type = 'R'                          !Flag data type
ADD(MyQueue)
MyQueue.AnyField &= NULL                    !Reference assign NULL to clear
LOOP X# = RECORDS(MyQueue) TO 1 BY -1      !Process the QUEUE
  GET(MyQueue,X#)
  ASSERT(~ERRORCODE())
  CASE MyQueue.Type
    OF 'S'
      DO StringRoutine
    OF 'R'
      DO ReferenceRoutine
  END
  MyQueue.AnyField &= NULL                  !Reference assign NULL before deleting
  DELETE(MyQueue)
  ASSERT(~ERRORCODE())
END
```

See Also:

Simple Assignment Statements, Reference Assignment Statements

## LIKE (inherited data type)

*new declaration* **LIKE**(*like declaration*) [, **DIM**( )] [, **OVER**( )] [, **PRE**( )] [, **NAME**( )] [, **EXTERNAL**] [, **DLL**] [, **STATIC**] [, **THREAD**] [, **BINDABLE**]

<b>LIKE</b>	Declares a variable whose data type is inherited from another variable.
<i>new declaration</i>	The label of the new data element declaration.
<i>like declaration</i>	The label of the data element declaration whose definition will be used. This may be any simple data type, or a reference to any simple data type (except &STRING), or the label of a GROUP or QUEUE structure.
<b>DIM</b>	Dimension the variables into an array.
<b>OVER</b>	Share a memory location with another variable or structure.
<b>PRE</b>	Declare a label prefix for variables within the <i>new declaration</i> structure (if the <i>like declaration</i> is a complex data structure). This is not required, since you may use the <i>new declaration</i> in the Field Qualification syntax to directly reference any member of the new structure.
<b>NAME</b>	Specify an alternate, “external” name for the field.
<b>EXTERNAL</b>	Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.
<b>DLL</b>	Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.
<b>STATIC</b>	Specify the variable’s memory is permanently allocated.
<b>THREAD</b>	Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data.
<b>BINDABLE</b>	Specify all variables in the group may be used in dynamic expressions.

**LIKE** tells the compiler to define the *new declaration* using the same definition as the *like declaration*, including all attributes. If the original *like declaration* changes, so does the *new declaration*.

The *new declaration* may use the DIM and OVER attributes. If the *like declaration* has a DIM attribute, the *new declaration* is already an array. If a further DIM attribute is added to the *new declaration*, the array is further dimensioned.

The PRE and NAME attributes may be used, if appropriate. If the *like declaration* already has these attributes, the *new declaration* will inherit

them and compiler errors can occur. To correct this, specify a PRE or NAME attribute on the *new declaration* to override the inherited attribute.

If the *like declaration* names a QUEUE, LIKE does not create a new QUEUE, because the *like declaration* is simply treated as a GROUP. The *like declaration* QUEUE is converted to a *new declaration* GROUP. The same is true if the *like declaration* is a RECORD structure. Similarly, if the *like declaration* is a MEMO, the *new declaration* becomes a STRING of the maximum size of the MEMO.

You may use LIKE to create a new instance of a CLASS. However, simply declaring the new instance by naming the CLASS as the data type performs an implicit LIKE. For either type of instance declaration, the DIM, OVER, PRE, and NAME attributes are invalid; all other attributes are valid for a CLASS instance declaration.

Example:

```

Amount      REAL                      !Define a field
QTDAmount   LIKE(Amount)              !Use same definition
YTDAmount   LIKE(QTDAmount)           !Use same definition again
MonthlyAmts LIKE(Amount),DIM(12)      !Use same definition for array, 12 elements
AmtPrPerson LIKE(MonthlyAmts),DIM(10) !Use same definition for array of 120 elements (12,10)

Construct   GROUP                    !Define a group
Field1      LIKE(Amount)             ! Construct.field1 - real
Field2      STRING(10)               ! Construct.field2 - string(10)
END

NewGroup    LIKE(Construct)          !Define new group, containing
                                                ! NewGroup.field1 - real
                                                ! NewGroup.field2 - string(10)

MyQue       QUEUE                    !Define a queue
Field1      STRING(10)
Field2      STRING(10)
END

MyGroup     LIKE(MyQue)              !Define new GROUP, like the QUEUE

AmountFile  FILE,DRIVER('Clarion'),PRE(Amt)
Record      RECORD
Amount      REAL                      !Define a field
QTDAmount   LIKE(Amount)             !Use same definition
. .

Animal      CLASS
Feed        PROCEDURE(short amount),VIRTUAL
Die         PROCEDURE
Age         LONG
Weight      LONG
END
Cat         LIKE(Animal)             !New instance of an Animal CLASS
Bird        Animal                   !New instance of an Animal CLASS (implicit LIKE)

```

See Also: DIM, OVER, PRE, NAME, Field Qualification



## Implicit Variables

Implicit variables are not declared in data declarations. They are created by the compiler when it first encounters them. Implicit variables are automatically initialized to blank or zero; they do not have to be explicitly assigned values before use. You may always assume that they contain blanks or zero before your program's first assignment to them. Implicit variables are generally used for: array subscripts, true/false switches, intermediate variables in complex calculations, loop counters, etc.

The Clarion language provides three types of implicit variables:

- # A label terminated by a # names an implicit LONG.
- \$ A label terminated by a \$ names an implicit REAL.
- “ A label terminated by a “ names an implicit STRING(32).

Any implicit variable used in the global data declaration area (between the keywords PROGRAM and CODE) is Global data, assigned static memory and visible throughout the program. Any implicit variable used between the keywords MEMBER and PROCEDURE is Module data, assigned static memory and visible only to the procedures defined in the module. Any other implicit variable is Local data, assigned dynamic memory on the program's stack and visible only in the procedure. Implicits used in ROUTINES incur more overhead than those not in ROUTINES, so should be used sparingly, if at all.

Since the compiler dynamically creates implicit variables as they are encountered, there is a danger that problems may arise that can be difficult to trace. This is due to the lack of compile-time error and type checking on implicit variables. For example, if you incorrectly spell the name of a previously used implicit variable, the compiler will not tell you, but will simply create a new implicit variable with the new spelling. When your program checks the value in the original implicit variable, it will be incorrect. Therefore, implicit variables should be used with care and caution, and only within a limited scope (or not at all).

Example:

```

LOOP Counter# = 1 TO 10                                !Implicit LONG loop counter
  ArrayField[Counter#] = Counter# * 2                  ! to initialize an array
END

Address" = CLIP(City) & ', ' & State & ' ' & Zip        !Implicit STRING(32)
MESSAGE(Address")                                       !Used to display a temporary value

Percent$ = ROUND((Quota / Sales),.1) * 100             !Implicit REAL
MESSAGE(FORMAT(Percent$,@P%<<<.#P))                  !Used to display a temporary value

```

See Also:

**Data Declarations and Memory Allocation**

## Reference Variables

---

A reference variable contains a reference to another data declaration (its “target”). You declare a reference variable by prepending an ampersand (&) to the data type of its target (such as, &BYTE, &FILE, &LONG, etc.) or by declaring an ANY variable. Depending upon the target’s data type, the reference variable may contain the target’s memory address, or a more complex internal data structure (describing the location and type of target data).

### Valid reference variable declarations:

&BYTE	&SHORT	&USHORT	&LONG	&ULONG	&DATE	&TIME
&REAL	&SREAL	&BFLOAT8	&BFLOAT4	&DECIMAL	&PDECIMAL	&STRING
&CSTRING	&PSTRING	&GROUP	&QUEUE	&FILE	&KEY	&BLOB
&VIEW	&WINDOW	ANY				

The &STRING, &CSTRING, &PSTRING, &DECIMAL, and &PDECIMAL declarations do not require length parameters, since all the necessary information about the specific target data item is contained in the reference itself. This means a &STRING reference variable may contain a reference to any length STRING variable.

A reference variable declared as &WINDOW can target an APPLICATION, WINDOW, or REPORT structure. References to these structures are internally treated as the same by the Clarion runtime library.

An ANY variable can contain a reference to any of the simple data types, and so, is equivalent to any of the above except &GROUP, &QUEUE, &FILE, &KEY, &BLOB, &VIEW, and &WINDOW.

### Reference Assignment

The &= operator executes a reference assignment statement (destination &= source) to assign the *source’s* reference to the *destination* reference variable. You may also use a reference assignment statement in conditional expressions.

The NULL built-in variable is used to “un-reference” a reference variable or to detect an “un-referenced” reference variable in a conditional expression.

### Reference Variable Usage

The label of a reference variable is syntactically correct every place in executable code where its target is allowed. This means that, any statement that takes the label of a WINDOW as a parameter can also take the label of an &WINDOW reference variable which has been reference-assigned a WINDOW structure.

When used in a code statement, the reference variable is automatically “dereferenced” to supply the statement with the value of its target. The only exception is reference assignment statements, when the reference assigns the reference to the data item it is referencing. For example:

```

Var1      LONG           !Var1 is a LONG
RefVar1   &LONG          !RefVar1 is a reference to a LONG
RefVar2   &LONG          !RefVar2 is also a reference to a LONG
CODE
  RefVar1 &= Var1        !RefVar1 now references Var1
  RefVar2 &= RefVar1     !RefVar2 now also references Var1
  RefVar1 &= NULL        !RefVar1 now references nothing

```

## **Reference Variable Declarations**

Reference variables may not be declared within FILE or VIEW structures, but they may be declared within GROUP, QUEUE, and CLASS structures. Issuing CLEAR(StructureName) for a GROUP, QUEUE, or CLASS structure containing a reference variable is equivalent to reference assigning NULL to the reference variable.

Global references cross thread boundaries, and so, may be used to reference data items in other execution threads.

## **Named QUEUE and CLASS References**

In addition to the data types listed above, you may also have references to “named” QUEUES (&*QueueName*) and to named CLASSES (&*ClassName*). This allows you to use references to pass “named group” parameters, which allow the receiving procedure access to the component fields of the named structure.

A reference to a named QUEUE or CLASS may be a “forward reference.” That is, the named QUEUE or CLASS does not have to have been declared previous to the reference variable declaration which “points at” it. However, the forward reference must be resolved before the reference variable can be used. In the case where the reference variable is contained within a CLASS declaration, the forward reference must be resolved before the object is instantiated, else the reference will be blank and unusable.

There are several advantages to using forward references. You can have a QUEUE of object references which each contains a reference to a QUEUE of object references ... For example, you could create a queue of siblings within a CLASS structure like this:

```

FamilyQ   QUEUE
Sibling   &FamilyClass      !A forward reference
END
FamilyClass CLASS
Family    &FamilyQ          !
END

```

Another advantage is the ability to truly “hide” the targets of PRIVATE references in CLASS declarations. For example:

```
!An include file (MyFile.inc) contains:
WidgetManager CLASS,TYPE
WidgetList      &WidgetQ,PRIVATE !
DoSomething     PROCEDURE
                END

!Another file (MyFile.CLW) contains:
MEMBER('MyApp')
INCLUDE('MyFile.INC')

WidgetQ        QUEUE,TYPE
Widget         STRING(40)
WidgetNumber   LONG
                END

MyWidget       WidgetManager      !Actual instantiation must follow
                                   ! forward reference resolution
MyWidget.DoSomething    PROCEDURE
CODE
  SELF.WidgetList &= NEW(WidgetQ) !Valid code
  SELF.WidgetList.Widget = 'Widget One'
  SELF.WidgetList.WidgetNumber = 1
  ADD(SELF.WidgetList)
```

In this example, references to SELF.WidgetList are valid only within the MyFile.CLW file.

Example:

```

App1      APPLICATION('Hello')
          END

App2      APPLICATION('Buenos Dias')
          END

AppRef    &WINDOW                      !Reference to an APPLICATION, WINDOW, or REPORT

Animal    CLASS
Feed      PROCEDURE(SHORT amount),VIRTUAL
Die       PROCEDURE
Age       LONG
Weight    LONG
          END

Carnivore CLASS(Animal),TYPE
Feed      PROCEDURE(Animal)
          END

Cat        CLASS(Carnivore)
Feed      PROCEDURE(SHORT amount),VIRTUAL
Potty     BYTE
          END

Bird       Animal                      !Instance of an Animal CLASS
AnimalRef &Animal                      !Reference to an Animal CLASS

CODE
IF CTL:Language = 'Spanish'           !If spanish language user
  AppRef &= App2                       ! reference spanish application frame
ELSE
  AppRef &= App1                       ! else reference english application frame
END
OPEN(AppRef)                          !Open the referenced application frame window

IF SomeCondition
  AnimalRef &= Cat                     !Reference the Cat
ELSE
  AnimalRef &= Bird                   !Reference the Bird
END
AnimalRef.Feed(10)                    !Feed whatever is referenced

```

See Also:

Reference Assignment Statements, CLASS, GROUP, QUEUE, ANY

# ***Data Declarations and Memory Allocation***

## **Global, Local, Static, and Dynamic**

---

Data declarations automatically allocate memory to store the data values. Global, Local, Static, and Dynamic are terms that describe types of memory allocation.

The terms “Global” and “Local” refer to the visibility of data (also known as its “scope”):

- “Global” means the data is visible to all procedures in the program.
- “Local” means the data has limited visibility. This may be limited to one PROCEDURE or ROUTINE, or limited to a specific set of procedures in a single source module.

The terms “Static” and “Dynamic” refer to the persistence of the data’s memory allocation:

- “Static” means the data is allocated memory that is not released until the entire program is finished executing.
- “Dynamic” means the data is allocated memory on the program’s stack. Dynamic memory is released when the PROCEDURE or ROUTINE that allocated the stack memory returns to the place in the program from which it was called.

## **Data Declaration Sections**

---

There are three areas where data can be declared in a Clarion program:

- In the PROGRAM module, after the keyword PROGRAM and before the CODE statement. This is the **Global data** section.
- In a MEMBER module, after the keyword MEMBER and before the first PROCEDURE statement. This is the **Module data** section.
- In a PROCEDURE, after the keyword PROCEDURE and before the CODE statement. This is the **Local data** section.
- In a ROUTINE, after the keyword DATA and before the CODE statement. This is the **Routine Local data** section.

**Global data** is visible to executable statements and expressions in every PROCEDURE in the PROGRAM. Global data is always in scope. Global data is allocated Static memory and is available to every PROCEDURE in the PROGRAM.

**Module data** is visible only to the set of PROCEDURES contained in the MEMBER module. It may be passed as a parameter to PROCEDURES in other MEMBER modules, if required. Module data first comes into scope when any PROCEDURE in the MODULE is called. Module data is also allocated Static memory.

**Local data** is visible only within the PROCEDURE in which it is declared, or any Local Derived Methods declared within the PROCEDURE. Local data comes into scope when the PROCEDURE is called and goes out of scope when a RETURN statement (explicit or implicit) executes. It may be passed as a parameter to any other PROCEDURE. Local data is allocated Dynamic memory. The memory is allocated on the program's stack for variables smaller than the stack threshold (5K default), otherwise they are automatically placed onto the heap. This can be overridden by using the STATIC attribute, making its value persistent between calls to the procedure. FILE declarations are always allocated static memory (on the heap), even when declared in a Local Data section.

Dynamic memory allocation for Local data allows a PROCEDURE to be truly recursive, receiving a new copy of its local variables each time it is called.

**Routine Local data** is visible only within the ROUTINE in which it is declared. It may be passed as a parameter to any PROCEDURE. Routine Local data comes into scope when the ROUTINE is called and goes out of scope when an EXIT statement (explicit or implicit) executes. Routine Local data is allocated Dynamic memory. The memory is allocated on the program's stack for variables smaller than the stack threshold (5K default), otherwise they are automatically placed onto the heap. A ROUTINE has its own name scope, so the labels used for Routine Local data may duplicate variable names used in other ROUTINES or even the procedure containing the ROUTINE. Variables declared in a ROUTINE may not have the STATIC or THREAD attributes.

See Also:

PROGRAM, MEMBER, PROCEDURE, CLASS, PROCEDURE Prototypes, STATIC, THREAD

## NEW (allocate heap memory)

*reference* &= NEW( *datatype* )

<i>reference</i>	The label of a reference variable that matches the <i>datatype</i> .
<b>NEW</b>	Creates a new instance of the <i>datatype</i> on the heap.
<i>datatype</i>	The label of a previously declared CLASS or QUEUE structure, or any simple data type declaration. This may contain a variable as the parameter of the data type to allow truly dynamic declarations.

The **NEW** statement creates a new instance of the *datatype* on the heap. **NEW** is only valid on the *source* side of a reference assignment statement. Memory allocated by **NEW** is automatically initialized to blank or zero when allocated, and must be explicitly de-allocated with the **DISPOSE** statement (else you'll create a "memory leak").

Example:

```
StringRef &STRING           !A refence to any STRING variable
LongRef  &LONG              !A refence to any LONG variable

Animal   CLASS
Feed     PROCEDURE(short amount)
Weight   LONG
        END
AnimalRef &Animal           !A reference to any Animal CLASS

NameQ     QUEUE
Name      STRING(30)
        END
QueRef    &NameQ            !A reference to any QUEUE with only a STRING(30)

CODE
AnimalRef &= NEW(Animal)    !Create new instance of an Animal class

QueRef &= NEW(NameQ)        !Create new instance of a NameQ QUEUE

StringRef &= NEW(STRING(50)) !Create new STRING(50) variable

X# = 35                      !Assign 35 to a variable and then
StringRef &= NEW(STRING(X#)) ! use that variable to Create a new STRING(35)

LongRef &= NEW(LONG)        !Create new LONG variable
```

See Also:

**DISPOSE**



## DISPOSE (de-allocate heap memory)

### DISPOSE( *reference* )

#### DISPOSE

De-allocates heap memory previously allocated by a NEW statement.

#### *reference*

The label of a reference variable previously used in a reference assignment with the NEW statement. This *reference* may be NULL and no ill effects will occur.

The **DISPOSE** statement de-allocates the heap memory previously allocated by a NEW statement. If DISPOSE is not called, the memory is not returned to the operating system for re-use (creating a “memory leak”). However, if you DISPOSE of a *reference* that is still in use (such as a QUEUE being displayed in a LIST control) you will quite likely cause a GPF that will be very difficult to track down.

DISPOSE(SELF) is a legal statement to de-allocate the current object instance. However, if used, it must be the last statement in the procedure, or any following references to the object will cause problems.

Example:

```
StringRef &STRING                !A reference to any STRING variable

Animal CLASS,TYPE
Feed      PROCEDURE(short amount),VIRTUAL
Weight    LONG
END
AnimalRef &Animal                !A reference to any Animal CLASS

NameQ      QUEUE
Name       STRING(30)
END
QueRef     &NameQ                !A reference to any QUEUE with only a STRING(30)

CODE
AnimalRef &= NEW(Animal)         !Create new instance of an Animal class
DISPOSE(AnimalRef)              !De-allocate the Animal

QueRef &= NEW(NameQ)             !Create new instance of a NameQ QUEUE
DISPOSE(QueRef)                 !De-allocate the queue

StringRef &= NEW(STRING(50()))   !Create new STRING(50) variable
DISPOSE(StringRef)              !De-allocate the STRING(50)
```

See Also:

**NEW**

## Picture Tokens

Picture tokens provide a masking format for displaying and editing variables. There are seven types of picture tokens: numeric and currency, scientific notation, string, date, time, pattern, and key-in template.

### Numeric and Currency Pictures

@N [currency] [sign] [fill] size [grouping] [places] [sign] [currency] [B]

@N	All numeric and currency pictures begin with @N.
currency	Either a dollar sign (\$) or any string constant enclosed in tildes (~). When it precedes the <i>sign</i> indicator and there is no <i>fill</i> indicator, the <i>currency</i> symbol “floats” to the left of the high order digit. If there is a <i>fill</i> indicator, the <i>currency</i> symbol remains fixed in the left-most position. If the <i>currency</i> indicator follows the <i>size</i> and <i>grouping</i> , it appears at the end of the number displayed.
sign	Specifies the display format for negative numbers. If a hyphen precedes the <i>fill</i> and <i>size</i> indicators, negative numbers will display with a leading minus sign. If a hyphen follows the <i>size</i> , <i>grouping</i> , <i>places</i> , and <i>currency</i> indicators, negative numbers will display with a trailing minus sign. If parentheses are placed in both positions, negative numbers will be displayed enclosed in parentheses. To prevent ambiguity, a trailing minus <i>sign</i> should always have <i>grouping</i> specified.
fill	Specifies leading zeros, spaces, or asterisks (*) in any leading zero positions, and suppresses default <i>grouping</i> . If the <i>fill</i> is omitted, leading zeros are suppressed. <ul style="list-style-type: none"> <li>0 (zero) Produces leading zeroes</li> <li>_ (underscore) Produces leading spaces</li> <li>* (asterisk) Produces leading asterisks</li> </ul>
size	The <i>size</i> is required to specify the total number of significant digits to display, including the number of digits in the <i>places</i> indicator and any formatting characters.
grouping	A <i>grouping</i> symbol, other than a comma (the default), can appear right of the <i>size</i> indicator to specify a three digit group separator. To prevent ambiguity, a hyphen <i>grouping</i> indicator should also specify the <i>sign</i> . <ul style="list-style-type: none"> <li>. (period) Produces periods</li> <li>- (hyphen) Produces hyphens</li> <li>_ (underscore) Produces spaces</li> </ul>

*places*

Specifies the decimal separator symbol and the number of decimal digits. The number of decimal digits must be less than the *size*. The decimal separator may be a period (.), grave accent (‘) (produces periods *grouping* unless overridden), or the letter “v” (used only for STRING field storage declarations—not for display).

- . (period) Produces a period
- ‘ (grave accent) Produces a comma
- v Produces no decimal separator

**B**

Specifies blank display whenever its value is zero.

The numeric and currency pictures format numeric values for screen display or in reports. If the value is greater than the maximum value the picture can display, a string of pound signs (#) is displayed.

Example:

<u>Numeric</u>	<u>Result</u>	<u>Format</u>
@N9	4,550,000	Nine digits, group with commas (default)
@N_9B	4550000	Nine digits, no grouping, leading blanks if zero
@N09	004550000	Nine digits, leading zero
@N*9	***45,000	Nine digits, asterisk fill, group with commas
@N9_	4 550 000	Nine digits, group with spaces
@N9.	4.550.000	Nine digits, group with periods
<u>Decimal</u>	<u>Result</u>	<u>Format</u>
@N9.2	4,550.75	Two decimal places, period decimal separator
@N_9.2B	4550.75	Two decimal places, period decimal separator, no grouping, blank if zero
@N_9‘2	4550.75	Two decimal places, comma decimal separator
@N9.‘2	4,550.75	Comma decimal separator, group with periods
@N9_‘2	4 550.75	Comma decimal separator, group with spaces,
<u>Signed</u>	<u>Result</u>	<u>Format</u>
@N-9.2B	-2,347.25	Leading minus sign, blank if zero
@N9.2-	2,347.25-	Trailing minus sign
@N(10.2)	(2,347.25)	Enclosed in parens when negative
<u>Dollar Currency</u>	<u>Result</u>	<u>Format</u>
@N\$9.2B	\$2,347.25	Leading dollar sign, blank if zero
@N\$10.2-	\$2,347.25-	Leading dollar sign, trailing minus when negative
@N\$(11.2)	\$(2,347.25)	Leading dollar sign, in parens when negative
<u>Int'l Currency</u>	<u>Result</u>	<u>Format</u>
@N12_‘2~ F~	1 5430,50 F	France
@N~L. ~12‘	L. 1.430.050	Italy
@N~£~12.2	£1,240.50	United Kingdom
@N~kr~12‘2	kr1.430.50	Norway
@N~DM~12‘2	DM1.430.50	Germany
@N12_‘2~ mk~	1 430,50 mk	Finland
@N12‘2~ kr~	1.430.50 kr	Sweden

Storage-Only Pictures:

```
Variable1 STRING(@N_6v2)      !Declare as 6 bytes stored without decimal
CODE
Variable1 = 1234.56           !Assign value, stores '123456' in file
MESSAGE(FORMAT(Variable1,@N_7.2)) !Display with decimal point: '1234.56'
```

Scientific Notation Pictures

@Emsn[B]

@E	All scientific notation pictures begin with @E.
m	Determines the total number of characters in the format provided by the picture.
s	Specifies the decimal separation character, and the grouping character when the n value is greater than 3.  .(period)                      period and comma ..(period period)            period and period '(grave accent)              comma and period _(underscore period)       period and space
n	Indicates the number of digits that appear to the left of the decimal point.
B	Specifies that the format displays as blank when the value is zero.

The scientific notation picture formats very large or very small numbers. The format is a decimal number raised by a power of ten.

Example:

Picture	Value	Result
@E9.0	1,967,865	.20e+007
@E12.1	1,967,865	1.9679e+006
@E12.1B	0	
@E12.1	-1,967,865	-1.9679e+006
@E12.1	.000000032	3.2000e-008
@E12_.4	1,967,865	1 967.865e+003

String Pictures

@Slength

@S	All string pictures begin with @S.
length	Determines the number of characters in the picture format.

A string picture describes an unformatted string of a specific *length*.

Example:

Name    STRING(@S20)       !A 20 character string field

## Date Pictures

**@Dn[s] [direction [range] ] [B]**

<b>@D</b>	All date pictures begin with @D.
<b>n</b>	Determines the date picture format. Date picture formats range from 1 through 18. A leading zero (0) indicates a zero-filled day or month.
<b>s</b>	A separation character between the month, day, and year components. If omitted, the slash ( / ) appears. <ul style="list-style-type: none"> <li>. (period) Produces periods</li> <li>` (grave accent) Produces commas</li> <li>- (hyphen) Produces hyphens</li> <li>_ (underscore) Produces spaces</li> </ul>
<i>direction</i>	A right or left angle bracket (> or <) that specifies the “Intellidate” direction (> indicates future, < indicates past) for the <i>range</i> parameter. Valid only on date pictures with two-digit years.
<i>range</i>	An integer constant in the range of zero (0) to ninety-nine (99) that specifies the “Intellidate” century for the <i>direction</i> parameter. Valid only on date pictures with two-digit years. If omitted, the default value is 80.
<b>B</b>	Specifies that the format displays as blank when the value is zero.

Dates may be stored in numeric variables (usually LONG), a DATE field (for Btrieve compatibility), or in a STRING declared with a date picture. A date stored in a numeric variable is called a “Clarion Standard Date.” The stored value is the number of days since December 28, 1800. The date picture token converts the value into one of the date formats.

The century for dates in any picture with a two-digit year is resolved using “Intellidate” logic. Date pictures that do not specify *direction* and *range* parameters assume the date falls in the range of the next 20 or previous 80 years. The *direction* and *range* parameters allow you to change this default. The *direction* parameter specifies whether the *range* specifies the future or past value. The opposite *direction* then receives the opposite value (100-*range*) so that any two-digit year results in the correct century.

For example, the picture @D1>60 specifies using the appropriate century for each year 60 years in the future and 40 years in the past. If the current year is 1996, when the user enters “5/01/40,” the date is in the year 2040, and when the user enters “5/01/60,” the date is in the year 1960.

For those date pictures which contain month names, the actual names are customizable in an Environment file (.ENV). See the Internationalization section for more information.

Example:

<u>Picture</u>	<u>Format</u>	<u>Result</u>
@D1	mm/dd/yy	10/31/59
@D1>40	mm/dd/yy	10/31/59
@D01	mm/dd/yy	01/01/95
@D2	mm/dd/yyyy	10/31/1959
@D3	mmm dd, yyyy	OCT 31,1959
@D4	mmmmmmmm dd, yyyy	October 31, 1959
@D5	dd/mm/yy	31/10/59
@D6	dd/mm/yyyy	31/10/1959
@D7	dd mmm yy	31 OCT 59
@D8	dd mmm yyyy	31 OCT 1959
@D9	yy/mm/dd	59/10/31
@D10	yyyy/mm/dd	1959/10/31
@D11	yyymmdd	591031
@D12	yyyymmdd	19591031
@D13	mm/yy	10/59
@D14	mm/yyyy	10/1959
@D15	yy/mm	59/10
@D16	yyyy/mm	1959/10
@D17		Windows Control Panel setting for Short Date
@D18		Windows Control Panel setting for Long Date
Alternate separators		
@D1.	mm.dd.yy	Period separator
@D2-	mm-dd-yyyy	Dash separator
@D5_	dd mm yy	Underscore produces space separator
@D6‘	dd,mm,yyyy	Grave accent produces comma separator

See Also:

Standard Date, FORMAT, DEFORMAT, Environment Files

## Time Pictures

### @Tn[s][B]

<b>@T</b>	All time pictures begin with @T.
<b>n</b>	Determines the time picture format. Time picture formats range from 1 through 8. A leading zero (0) indicates zero-filled hours.
<b>s</b>	A separation character. By default, colon ( : ) characters appear between the hour, minute, and second components of certain time picture formats. The following s indicators provide an alternate separation character for these formats. <ul style="list-style-type: none"> <li>. (period) Produces periods</li> <li>` (grave accent) Produces commas</li> <li>- (hyphen) Produces hyphens</li> <li>_ (underscore) Produces spaces</li> </ul>
<b>B</b>	Specifies that the format displays as blank when the value is zero.

Times may be stored in a numeric variable (usually a LONG), a TIME field (for Btrieve compatibility), or in a STRING declared with a time picture. A time stored in a numeric variable is called a “Standard Time.” The stored value is the number of hundredths of a second since midnight. The picture token converts the value to one of the eight time formats.

For those time pictures which contain string data, the actual strings are customizable in an Environment file (.ENV). See the Internationalization section for more information.

Example:

<u>Picture</u>	<u>Format</u>	<u>Result</u>
@T1	hh:mm	17:30
@T2	hhmm	1730
@T3	hh:mmXM	5:30PM
@T03	hh:mmXM	05:30PM
@T4	hh:mm:ss	17:30:00
@T5	hhmmss	173000
@T6	hh:mm:ssXM	5:30:00PM
@T7		Windows Control Panel setting for Short Time
@T8		Windows Control Panel setting for Long Time
Alternate separators		
@T1.	hh.mm	Period separator
@T1-	hh-mm	Dash separator
@T3_	hh mmXM	Underscore produces space separator
@T4‘	hh,mm,ss	Grave accent produces comma separator

See Also:

Standard Time, FORMAT, DEFORMAT, Environment Files

Pattern Pictures

@P[<][#][x]P[B]	
@P	All pattern pictures begin with the @P delimiter and end with the P delimiter. The case of the delimiters must be the same.
<	Specifies an integer position that is blank for leading zeroes.
#	Specifies an integer position.
x	Represents optional display characters. These characters appear in the final result string.
P	All pattern pictures must end with P. If a lower case @p delimiter is used, the ending P delimiter must also be lower case.
B	Specifies that the format displays as blank when the value is zero.

Pattern pictures contain optional integer positions and optional edit characters. Any character other than < or # is considered an edit character which will appear in the formatted picture string. The @P and P delimiters are case sensitive. Therefore, an upper case “P” can be included as an edit character if the delimiters are both lower case “p” and vice versa.

Pattern pictures do not recognize decimal points, in order to permit the period to be used as an edit character. Therefore, the value formatted by a pattern picture should be an integer. If a floating point value is formatted by a pattern picture, only the integer portion of the number will appear in the result.

Example:

Picture	Value	Result
@P###-##-####P	215846377	215-84-6377
@P<#/#/#/#P	103159	10/31/59
@P(####)###-####P	3057854555	(305)785-4555
@P####/#/#/#-####P	7854555	000/785-4555
@p<#:##PMp	530	5:30PM
@P<#’ <#”P	506	5’ 6”
@P<#1b. <#0z.P	902	91b. 20z.
@P4##A-#P	112	411A-2
@PA##.C#P	312.45	A31.C2



## Key-in Template Pictures

@K[@][#][<][x][N][?][^][\_][|][K][B]

<b>@K</b>	All key-in template pictures begin with the @K delimiter and end with the K delimiter. The case of the delimiters must be the same.
<b>@</b>	Specifies only uppercase and lowercase alphabetic characters.
<b>#</b>	Specifies an integer 0 through 9.
<b>&lt;</b>	Specifies an integer that is blank for high order zeros.
<b>x</b>	Represents optional constant display characters (any displayable character). These characters appear in the final result string.
<b>\</b>	Indicates the following character is a display character. This allows you to include any of the picture formatting characters (@, #, <, \, ?, ^, _,  ) within the string as a display character.
<b>?</b>	Specifies any character may be placed in this position.
<b>^</b>	Specifies only uppercase alphabetic characters in this position.
<b>_</b>	Underscore specifies only lowercase alphabetic characters in this position.
<b> </b>	Allows the operator to “stop here” if there are no more characters to input. Only the data entered and any display characters up to that point will be in the string result.
<b>K</b>	All key-in template pictures must end with K. If a lower case @k delimiter is used, the ending K delimiter must also be lower case.
<b>B</b>	Specifies that the format displays as blank when the value is zero.

Key-in pictures may contain integer positions ( # < ), alphabet character positions ( @ ^ \_ ), any character positions ( ? ), and display characters. Any character other than a formatting indicator is considered a display character, which appears in the formatted picture string. The @K and K delimiters are case sensitive. Therefore, an upper case “K” may be included as a display character if the delimiters are both lower case “k” and vice versa.

Key-in pictures are used specifically with STRING, PSTRING, and CSTRING fields to allow custom field editing control and validation. Using a key-in picture containing any of the alphabet indicators ( @ ^ \_ ) on a numeric entry field produces unpredictable results.

Using the Insert typing mode for a key-in picture could produce unpredictable results. Therefore, key-in pictures always receive data entry in Overwrite mode, even if the INS attribute is present.

Example:

<u>Picture</u>	<u>Value Entered</u>	<u>Result String</u>
@K###-##-#####K	215846377	215-84-6377
@K#####  -#####K	33064	33064
@K#####  -#####K	330643597	33064-3597
@K<# ^^^ #K	10AUG59	10 AUG 59
@K(#####)@@-##\@#####K	305abc4555	(305)abc-45@55
@K###/?##-#####K	7854555	000/785-4555
@k<#:##^Mk	530P	5:30PM
@K<#' <#"K	506	5' 6"
@K4#_#A-#K	1g12	41g1A-2

# 4 - ENTITY DECLARATIONS

## Complex Data Structures

### GROUP (compound data structure)

```
label  GROUP( [ group ] ) [,PRE( )] [,DIM( )] [,OVER( )] [,NAME( )] [,EXTERNAL] [,DLL] [,STATIC]
        [,THREAD] [,BINDABLE] [, TYPE] [,PRIVATE] [,PROTECTED]
        declarations
END
```

<b>GROUP</b>	A compound data structure.
<i>group</i>	The label of a previously declared GROUP or QUEUE structure from which it will inherit its structure. This may be a GROUP or QUEUE with the TYPE attribute.
<b>PRE</b>	Declare a label prefix for variables within the structure. Not valid on a GROUP within a FILE structure.
<b>DIM</b>	Dimension the variables into an array.
<b>OVER</b>	Share a memory location with another variable or structure.
<b>NAME</b>	Specify an alternate, “external” name for the field.
<b>EXTERNAL</b>	Specify the variable is defined, and its memory is allocated, in an external library. Not valid within FILE, QUEUE, or GROUP declarations.
<b>DLL</b>	Specify the variable is defined in a .DLL. This is required in addition to the EXTERNAL attribute.
<b>STATIC</b>	Specify the variable’s memory is permanently allocated.
<b>THREAD</b>	Specify memory for the variable is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data.
<b>BINDABLE</b>	Specify all variables in the group may be used in dynamic expressions.
<b>TYPE</b>	Specify the GROUP is a type definition for GROUPs passed as parameters.
<b>PRIVATE</b>	Specify the GROUP and all the component fields of the GROUP are not visible outside the module containing the CLASS methods. Valid only in a CLASS.
<b>PROTECTED</b>	Specify the variable is not visible outside base CLASS and derived CLASS methods. Valid only in a CLASS.
<i>declarations</i>	Multiple consecutive variable declarations.

A **GROUP** structure allows multiple variable declarations to be referenced by a single label. It may be used to dimension a set of variables, or to assign or compare sets of variables in a single statement. In large complicated programs, a GROUP structure is helpful for keeping sets of related data organized. A GROUP must be terminated by a period or the END statement.

The structure of a GROUP declared with the *group* parameter begins with the same structure as the named *group*; the GROUP inherits the fields of the named *group*. The GROUP may also contain its own *declarations* that follow the inherited fields. If the group parameter names a QUEUE or RECORD structure, only the fields are inherited and not the functionality implied by the QUEUE or RECORD.

When referenced in a statement or expression, a GROUP is treated as a STRING composed of all the variables within the structure. A GROUP structure may be nested within another data structure, such as a RECORD or another GROUP.

Because of their internal storage format, numeric variables (other than DECIMAL) declared in a group do not collate properly when treated as strings. For this reason, building a KEY on a GROUP that contains numeric variables may produce an unexpected collating sequence.

A GROUP with the BINDABLE attribute makes all the variables within the GROUP available for use in a dynamic expression. The contents of each variable's NAME attribute is the logical name used in the dynamic expression. If no NAME attribute is present, the label of the variable (including prefix) is used. Space is allocated in the .EXE for the names of all of the variables in the structure. This creates a larger program that uses more memory than it normally would. Therefore, the BINDABLE attribute should only be used when a large proportion of the constituent fields are going to be used.

A GROUP with the TYPE attribute is not allocated any memory; it is only a type definition for GROUPs that are passed as parameters to PROCEDURES. This allows the receiving procedure to directly address component fields in the passed GROUP. The parameter declaration on the PROCEDURE statement can instantiate a local prefix for the passed GROUP as it names the passed GROUP for the procedure, however this is not necessary if you use the Field Qualification syntax instead of prefixes. For example, PROCEDURE(LOC:PassedGroup) declares the procedure uses the LOC: prefix (along with the individual field names used in the type definition) to directly address component fields of the GROUP passed as the parameter.

The data elements of a GROUP with the DIM attribute (a structured array) are referenced using standard Field Qualification syntax with each subscript specified at the GROUP level at which it is dimensioned.

The WHAT and WHERE procedures allow access to the fields by their relative position within the GROUP structure.

Example:

```

PROGRAM
  PassGroup  GROUP,TYPE      !Type-definition for passed GROUP parameters
  F1         STRING(20)      ! first field
  F2         STRING(1)       ! middle field
  F3         STRING(20)      ! last field
END

MAP
  MyProc1(PassGroup)        !Passes a GROUP defined the same as PassGroup
END

NameGroup  GROUP            !Name group
First      STRING(20)       ! first name
Middle     STRING(1)        ! middle initial
Last       STRING(20)       ! last name
END          !End group declaration

NameGroup2 GROUP(PassGroup) !Group that inherits PassGroup's fields
           ! resulting in NameGroup2.F1, NameGroup2.F2,
           ! and NameGroup2.F3
           ! fields declared in this group
END

DateTimeGrp GROUP,DIM(10)   !Date/time array
Date        LONG            ! Referenced as DateTimeGrp[1].Date
StartStopTime LONG,DIM(2)   ! Referenced as DateTimeGrp[1].Time[1]
END          !End group declaration

FileNames  GROUP,BINDABLE   !Bindable group
FileName   STRING(8),NAME('FILE') !Dynamic name: FILE
Dot        STRING('.')      !Dynamic name: Dot
Extension  STRING(3),NAME('EXT') !Dynamic name: EXT
END

CODE
  MyProc1(NameGroup)        !Call proc passing NameGroup as parameter
  MyProc1(NameGroup2)       !Call proc passing NameGroup2 as parameter

MyProc1    PROCEDURE(PassedGroup) !Proc to receive GROUP parameter
LocalVar   STRING(20)
CODE
  LocalVar = PassedGroup.F1     !Assign value in the first field to LocalVar
                                ! from passed parameter

```

See Also: **Field Qualification, WHAT, WHERE**

## CLASS (object declaration)

```
label  CLASS( [ parentclass ] ) [,EXTERNAL] [,DLL] [,STATIC] [,THREAD] [,BINDABLE] [,MODULE( )]
                                     [, LINK( )] [, TYPE]
                                     [ data members and methods ]
      END
```

<b>CLASS</b>	An object containing <i>data members</i> and <i>methods</i> that operate on the data.
<i>parentclass</i>	The label of a previously declared CLASS structure whose data and methods the new CLASS inherits. This may be a CLASS with the TYPE attribute.
<b>EXTERNAL</b>	Specify the object is defined, and its memory is allocated, in an external library.
<b>DLL</b>	Specify the object is defined in a .DLL. This is required in addition to the EXTERNAL attribute.
<b>STATIC</b>	Specify the <i>data members</i> ' memory is permanently allocated.
<b>THREAD</b>	Specify memory for the variables is allocated once for each execution thread. Also implicitly adds the STATIC attribute on Procedure Local data. Not valid with TYPE.
<b>BINDABLE</b>	Specify all variables in the class may be used in dynamic expressions.
<b>MODULE</b>	Specify the source code module containing the CLASS's member PROCEDURE definitions. This serves the same function as the MODULE structure within a MAP structure. If omitted, the member PROCEDURE definitions must all be in the same source code module containing the CLASS declaration.
<b>LINK</b>	Specify the source code module containing the CLASS's member PROCEDURE definitions is automatically added to the compiler's link list. This eliminates the need to specifically add the file to the project.
<b>TYPE</b>	Specify the CLASS is only a type definition and not also an object instance of the CLASS.

### *data members and methods*

Data declarations and PROCEDURE prototypes. The *data members* may only be data declarations appropriate to a GROUP structure, and may include references to the same class (recursive classes). The WHAT and WHERE procedures allow access to the *data members* by their relative position within the CLASS structure.

A **CLASS** structure declares an object which contains *data members* (properties) and the *methods* (PROCEDURES) that act on that data. A CLASS structure must be terminated by a period or the END statement.

### **Derived CLASSES (Inheritance)**

A CLASS declared with the *parentclass* parameter creates a *derived class* which inherits all the *data members and methods* of the named *parentclass*. The *derived class* may also contain its own *data members and methods*.

All *data members* explicitly declared in the *derived class* create new variables, and cannot be declared with the same labels as *data members* in the *parentclass*.

Any *method* prototyped in the *derived class* with the same name as a *method* in the *parentclass* overrides the inherited *method* if both have the same parameter lists. If the two *methods* have different parameter lists, they create polymorphic functions in the *derived class* that must obey the rules of Procedure Overloading.

### **Object Properties (Encapsulation)**

Each instance of a CLASS, whether a base class, derived class, or a declared instance of either, contains its own set of *data members* (properties) specific to that instance. These may be private or public. However, there is only one copy of any inherited *methods* (residing in the CLASS that declared it) which any instance of that CLASS, or any of its *derived classes*, calls.

The *methods* of a CLASS with the TYPE attribute cannot be directly called (as *ClassName.Method*)—they must be called only as a member *methods* of the objects declared as the type (as *Object.Method*).

### **VIRTUAL Methods (Polymorphism)**

If there is a *method* prototyped in the CLASS with the same label as a *method* in the *parentclass* with the VIRTUAL attribute, it must also be prototyped with the VIRTUAL attribute in the *derived class*.

The VIRTUAL attribute on both prototypes creates virtual methods that allow the *methods* in a *parentclass* to call the same named VIRTUAL *methods* in the *derived class* to perform functions specific to the *derived class* that the *parentclass* does not know about.

VIRTUAL *methods* in the *derived class* may directly call the *parentclass* method of the same name by prepending PARENT to the method's name. This allows incremental derivation wherein a *derived class* method may simply call down to the *parentclass* method to perform its functionality, then extend it for the requirements of the *derived class*.

### **Scoping Issues**

The scope of an object is dependent upon where it is declared. Generally, a declared object comes into scope at the CODE statement following its declaration and goes out of scope at the end of the related executable code

section. A dynamically instantiated object (using NEW) shares the scope of the executable code section in which it is instantiated.

An Object declared:

- As Global data is in scope throughout the application.
- As Module data is in scope throughout the module.
- As Local data is in scope only in the procedure, except ...

Methods prototyped in a derived CLASS declaration within a procedure's Local data section are Local Derived Methods and share the declaring procedure's scope for all local data declarations and routines. The methods must be defined within the same source module as the procedure within which the CLASS is declared and must immediately follow the procedure within that source—that is, they must come after any ROUTINEs and before any other procedures that may be in the same source module. This means the procedure's Local data declarations and ROUTINEs are all visible and can be referenced within these methods.

For example:

```
SomeProc          PROCEDURE
MyLocalVar        LONG
MyDerivedClass    CLASS(MyClass)    !Derived class with a virtual method
MyProc            PROCEDURE,VIRTUAL
                  END

CODE
!SomeProc main executable code goes here
!SomeProc ROUTINEs goes here
MyRoutine ROUTINE
!Routine code goes here

!MyDerivedClass methods immediately follow:

MyDerivedClass.MyProc PROCEDURE
CODE
MyLocalVar = 10    !MyLocalVar is still in scope, and available for use
DO MyRoutine      !MyRoutine is still in scope, and available for use

!Any other procedures in the same module go here, following all
! derivd class methods
```

## **Instantiation**

You declare an instance of a CLASS (an object) by simply naming the CLASS as the data type of the new instance, or by executing the NEW procedure in a reference assignment statement to a reference variable for that named CLASS. Either way, the new instance inherits all the *data members and methods* of the CLASS for which it is an instance. All the attributes of a CLASS except MODULE and TYPE are valid on an instance declaration.

If there is no TYPE attribute on the CLASS, the CLASS structure itself declares both the CLASS and an object instance of that CLASS. A CLASS with the TYPE attribute does not create an object instance of the CLASS.



For example, the following CLASS declaration declares the CLASS as a data type and an object of that type:

```
MyClass  CLASS           !Both a data type declaration and an object instance
MyField  LONG
MyProc   PROCEDURE
END
```

while this only declares the CLASS as a data type:

```
MyClass  CLASS,TYPE      !Only a data type declaration
MyField  LONG
MyProc   PROCEDURE
END
```

It is preferable to directly declare object instances as the CLASS data type rather than as a reference to the CLASS. This results in smaller quicker code and does not require you to use NEW and DISPOSE to explicitly create and destroy the object instance. The advantage of using NEW and DISPOSE is explicit control over the lifetime of the object. For example:

```
MyClass  CLASS,TYPE
MyField  LONG
MyProc   PROCEDURE
END
OneClass MyClass          !Declared object instance, smaller and quicker
TwoClass &MyClass         !Object reference, must use New and DISPOSE
CODE
!execute some code here
TwoClass &= NEW(MyClass)  !The lifetime of the object starts here
!execute some code here
DISPOSE(TwoClass)        ! and extends only to here
!execute some code here
```

Another advantage of declaring the object is the ability to declare the object with any of the attributes available for the CLASS declaration itself (except TYPE and MODULE). For instance, you can declare an object with the THREAD attribute, whether the CLASS is declared with THREAD or not.

The lifetime of an object depends on how it is instantiated:

- An object declared in the Global data section or a Module's data section is instantiated at the CODE statement following the PROGRAM statement and de-instantiated when the application terminates.
- A reference to an object is instantiated by the NEW statement, and de-instantiated by the DISPOSE statement.
- An object declared in a procedure's Local data section is instantiated at the CODE statement following the PROCEDURE statement and de-instantiated when a RETURN (implicit or explicit) executes to terminate the procedure.

## **Data (Property) Initialization**

The simple data type *data members* of an object are automatically allocated memory and initialized to blank or zero (unless the AUTO attribute is specified) when the object comes into scope. The allocated memory is returned to the operating system when the object goes out of scope.

The reference variable *data members* of an object are not allocated memory and are not initialized when the object comes into scope—you must specifically execute a reference assignment or a NEW statement. These references variables are not automatically cleared when the object goes out of scope, so you must DISPOSE of all NEWed properties before the object goes out of scope.

## **Constructors and Destructors**

A CLASS *method* labelled “Construct” is a constructor method which is automatically invoked when the object comes into scope, immediately after the *data members* of the object are allocated and initialized. The “Construct” *method* may not receive any parameters and may not be VIRTUAL. You may explicitly call the “Construct” method in addition to its automatic invocation.

If an object is an instance of a derived CLASS and both the *parentclass* and the derived CLASS contain constructors and the derived CLASS’s constructor does not have the REPLACE attribute, then the *parentclass* constructor is automatically invoked at the beginning of the derived CLASS’s constructor. If the derived CLASS’s constructor does have the REPLACE attribute, then only derived CLASS’s constructor is automatically invoked (the derived CLASS’s constructor method can explicitly call PARENT.Construct if it needs to).

A CLASS *method* labelled “Destruct” is a destructor method which is automatically invoked when the object leaves scope, immediately before the *data members* of the object are de-allocated. The “Destruct” *method* may not receive any parameters. You may explicitly call the “Destruct” method in addition to its automatic invocation.

If an object is an instance of a derived CLASS and both the *parentclass* and the derived CLASS contain destructors and the derived CLASS’s destructor does not have the REPLACE attribute, then the *parentclass* destructor is automatically invoked at the end of the derived CLASS’s destructor. If the derived CLASS’s destructor does have the REPLACE attribute, then only derived CLASS’s destructor is automatically invoked (the derived CLASS’s destructor method can explicitly call PARENT.Destruct if it needs to).

## **Public, PRIVATE, and PROTECTED (Encapsulation)**

Public *data members and methods* of a CLASS or derived CLASS are declared without either the PRIVATE or PROTECTED attributes. Public

*data members and methods* are visible to all the *methods* of the declaring CLASS, and derived CLASSES, and any code where the object is in scope.

Private *data members and methods* are declared with the PRIVATE attribute. Private *data members and methods* are visible only to the *methods* of the CLASS within which they are declared and any other procedures contained in the same source code module.

Protected *data members and methods* are declared with the PROTECTED attribute. Protected *data members and methods* are visible only to the *methods* of the CLASS within which they are declared, and to the *methods* of any CLASS derived from the CLASS within which they are declared.

### **Method Definition**

The PROCEDURE definition of a *method* (its executable code, not its prototype) is external to the CLASS structure. The *method's* definition must either prepend the label of the CLASS to the label of the PROCEDURE, or name the CLASS (and label it SELF) as the first (implicit) parameter in the list of parameters passed in to the PROCEDURE.

Remember that on the PROCEDURE definition statement you are assigning labels for use within the method to all the passed parameters, and so, since the CLASS's label is the data type of the implicit first parameter, you must use SELF as the assigned label for the CLASS name parameter. For example, for the following CLASS declaration:

```
MyClass  CLASS
MyProc   PROCEDURE(LONG PassedVar)    !The method takes 1 parameter
      END
```

you may define the MyProc PROCEDURE either as:

```
MyClass.MyProc  PROCEDURE(LONG PassedVar)    !Prepend the CLASS name to
      CODE                                           ! the method's label
```

or as:

```
MyProc  PROCEDURE(MyClass SELF, LONG PassedVar)    !The CLASS name is the
      CODE                                           ! implicit first parameter's data type, labeled SELF
```

### **Referencing an Object's properties and methods in your code**

You must reference the *data members* of a CLASS using Clarion's Field Qualification syntax. To do this, you prepend the label of the CLASS (if it is an object instance of itself) or the label of an object instance of the CLASS to the label of the *data member*.

For example, for the following CLASS declarations:

```
MyClass  CLASS          !Without TYPE, this is also an object instance
MyField  LONG           ! in addition to a class type declaration
MyProc   PROCEDURE
      END
MyClass2 MyClass        !Declare another object instance of MyClass
```

you must reference the two MyField variables from procedures external to the object as:

```
MyClass.MyField = 10      !References the MyClass CLASS declaration's object
MyClass2.MyField = 10    !References the MyClass2 declaration's object
```

You may call the *methods* of a CLASS either using Field Qualification syntax (by prepending the label of the CLASS to the label of the *method*), or by passing the label of the CLASS as the first (implicit) parameter in the list of parameters passed to the PROCEDURE.

For example, for the following CLASS declaration:

```
MyClass    CLASS
MyProc     PROCEDURE
END
```

you may call the MyProc PROCEDURE either as:

```
CODE
MyClass.MyProc
```

or as:

```
CODE
MyProc(MyClass)
```

## **SELF and PARENT**

Within the *methods* of a CLASS, the *data members and methods* of the current object's instance are referenced with SELF prepended to their labels instead of the name of the CLASS. This allows the *methods* to generically reference the *data members and methods* of the currently executing instance of the CLASS, without regard to whether it is executing the *parentclass*, a *derived class*, or any instance of either. This is also the mechanism that allows a *parentclass* to call virtual *methods* of a *derived class*.

For example, expanding on the previous example, MyField is referenced within the MyClass.MyProc method as:

```
MyClass.MyProc PROCEDURE
CODE
SELF.MyField = 10      !Assign to the current object instance's property
```

The *data members and methods* of a *parentclass* can be directly referenced from within the methods of a *derived class* with PARENT prepended to their labels instead of SELF.

For example:

```
MyDerivedClass.MyProc PROCEDURE
CODE
!execute some code
PARENT.MyProc                !Call the base class method
!execute some more code
!
```

Example:

```

!The ClassPrg.CLW file contains:
PROGRAM
MAP.                                !MAP required to get BUILTINS.CLW

OneClass    CLASS                    !Base class
NameGroup   GROUP                    !Reference as OneClass.NameGroup
First       STRING(20)                ! reference as OneClass.NameGroup.First
Last        STRING(20)                ! reference as OneClass.NameGroup.Last
END

BaseProc    PROCEDURE(REAL Parm)      !Declare method prototype
Func        PROCEDURE(REAL Parm),STRING,VIRTUAL !Declare virtual method prototype
Proc        PROCEDURE(REAL Parm),VIRTUAL !Declare virtual method prototype
END                                                !End CLASS declaration

TwoClass    CLASS(OneClass),MODULE('TwoClass.CLW') !Derived from OneClass
Func        PROCEDURE(LONG Parm),STRING ! replaces OneClass.Func
Proc        PROCEDURE(STRING Msg,LONG Parm) !Functionally overloaded
END

ClassThree   CLASS(TwoClass),MODULE('Class3.CLW') !Derived from TwoClass
Func         PROCEDURE(<STRING Msg>,LONG Parm),STRING,VIRTUAL
Proc         PROCEDURE(REAL Parm),VIRTUAL
END

ClassFour    ClassThree              !Declare an instance of ClassThree
ClassFive    ClassThree              !Declare an instance of ClassThree

CODE
OneClass.NameGroup = '|OneClass Method' !Assign values to each instance of NameGroup
TwoClass.NameGroup = '|TwoClass Method'
ClassThree.NameGroup = '|ClassThree Method'
ClassFour.NameGroup = '|ClassFour Method'
MESSAGE(OneClass.NameGroup & OneClass.Func(1.0)) !Calls OneClass.Func
MESSAGE(TwoClass.NameGroup & TwoClass.Func(2)) !Calls TwoClass.Func
MESSAGE(ClassThree.NameGroup & ClassThree.Func('|Call ClassThree.Func',3.0)) !Calls ClassThree.Func
MESSAGE(ClassFour.NameGroup & ClassFour.Func('|Call ClassFour.Func',4.0)) !Also Calls ClassThree.Func
OneClass.BaseProc(5) !BaseProc Calls OneClass.Proc & Func
BaseProc(TwoClass,6) !BaseProc Also calls OneClass.Proc & Func
TwoClass.Proc('Second Class',7) !Calls TwoClass.Proc (overloaded)
ClassThree.BaseProc(8) !BaseProc Calls ClassThree.Proc & Func
ClassFour.BaseProc(9) !BaseProc Also Calls ClassThree.Proc & Func
Proc(ClassFour,'Fourth Class',10) !Calls TwoClass.Proc (overloaded)

OneClass.BaseProc PROCEDURE(REAL Parm) !Definition of OneClass.BaseProc
CODE
MESSAGE(Parm & SELF.NameGroup & '|BaseProc executing|calling SELF.Proc Virtual method')
SELF.Proc(Parm) !Calls virtual method
MESSAGE(Parm & SELF.NameGroup & '|BaseProc executing|calling SELF.Func Virtual method')
MESSAGE(SELF.NameGroup & SELF.Func(Parm)) !Calls virtual method

OneClass.Func PROCEDURE(REAL Parm) !Definition of OneClass.Func
CODE
RETURN('|Executing OneClass.Func - ' & Parm)

Proc PROCEDURE(OneClass SELF,REAL Parm) !Definition of OneClass.Proc
CODE
MESSAGE(SELF.NameGroup & '|Executing OneClass.Proc - ' & Parm)

```

!The TwoClass.CLW file contains:  
 MEMBER('ClassPrg')

```
Func          PROCEDURE(TwoClass SELF, LONG Parm)    !Definition of TwoClass.Func
CODE
RETURN('|Executing TwoClass.Func - ' & Parm)
```

```
TwoClass.Proc  PROCEDURE(STRING Msg, LONG Parm)      !Definition of TwoClass.Proc
CODE
MESSAGE(Msg & '|Executing TwoClass.Proc - ' & Parm)
```

!The Class3.CLW file contains:  
 MEMBER('ClassPrg')

```
ClassThree.Func  PROCEDURE(<STRING Msg>, LONG Parm)  !Definition of ClassThree.Func
CODE
SELF.Proc(Msg, Parm)                                !Call TwoClass.Proc (overloaded)
RETURN(Msg & '|Executing ClassThree.Func - ' & Parm)
```

```
ClassThree.Proc  PROCEDURE(REAL Parm)                !Definition of ClassThree.Proc
CODE
SELF.Proc('Called from ClassThree.Proc', Parm)      !Call TwoClass.Proc
MESSAGE(SELF.NameGroup & '|Executing ClassThree.Proc - ' & Parm)
```

See Also:            **Field Qualification, MODULE, PROCEDURE Prototypes, Procedure  
 Overloading, WHAT, WHERE**

## File Structures

### FILE (declare a data file structure)

```

label  FILE, DRIVER( ) [, CREATE] [, RECLAIM] [, OWNER( )] [, ENCRYPT] [, NAME( )] [, PRE( )]
                                     [, BINDABLE] [, THREAD] [, EXTERNAL] [, DLL] [, OEM]
label  [INDEX( )]
label  [KEY( )]
label  [MEMO( )]
label  [BLOB]
[label] RECORD
[label]   fields
        END
        END

```

*label* A valid Clarion label for the FILE, INDEX, KEY, MEMO, BLOB, RECORD, or *field* (PROP:Label).

**FILE** Declares a data file.

**DRIVER** Specifies the data file type (PROP:DRIVER). The DRIVER attribute is required on all FILE structure declarations.

**CREATE** Allows the file to be created with the CREATE statement during program execution (PROP:CREATE).

**RECLAIM** Specifies reuse of deleted record space (PROP:RECLAIM).

**OWNER** Specifies the password for data encryption (PROP:OWNER).

**ENCRYPT** Encrypt the data file (PROP:ENCRYPT).

**NAME** Set DOS filename specification (PROP:NAME).

**PRE** Declare a label prefix for the structure.

**BINDABLE** Specify all variables in the RECORD structure may be used in dynamic expressions.

**THREAD** Specify memory for the record buffer is separately allocated for each execution thread, when the file is opened on the thread (PROP:THREAD).

**EXTERNAL** Specify the FILE is defined, and the memory for its record buffer is allocated, in an external library.

**DLL** Specify the FILE is defined in a .DLL. This is required in addition to the EXTERNAL attribute.

**OEM** Specify string data is converted from OEM ASCII to ANSI when read from disk and ANSI to OEM ASCII before writing to disk (PROP:OEM).

<b>INDEX</b>	Declare a static file access index which must be built at run time.
<b>KEY</b>	Declare a dynamically updated file access index.
<b>MEMO</b>	Declare a variable length text field up to 64K in length.
<b>BLOB</b>	Declare a variable length memo field which may be greater than 64K in length.
<b>RECORD</b>	Declare a record structure for the <i>fields</i> . A RECORD structure is required in all FILE structure declarations.
<i>fields</i>	Data elements in the RECORD structure.

**FILE** declares a data file structure which is an exact description of a data file residing on disk. The label of the FILE structure is used in file processing statements and procedures to effect operations on the disk file. The FILE structure must be terminated by a period or the END statement.

All attributes of the FILE, KEY, INDEX, MEMO, data declaration statements, and the data types which a FILE may contain, are dependent upon the support of the file driver. Anything in the FILE declaration which is not supported by the file system specified in the DRIVER attribute will cause a file driver error when the FILE is opened. Attribute and/or data type exclusions for a specific file system are listed in each file driver's documentation.

At run-time, the RECORD structure is assigned memory for a data buffer where records from the disk file may be processed by executable statements. This record buffer is always allocated static memory on the heap, even if the FILE is declared in a local data section. A RECORD structure is required in a FILE structure. Memory for a data buffer for any MEMO fields is allocated only when the FILE is opened, and de-allocated when the FILE is closed. The memory for BLOB fields is allocated as needed once the FILE is open.

A FILE with the BINDABLE attribute declares all the variables within the RECORD structure as available for use in a dynamic expression, without requiring a separate BIND statement for each (allowing BIND(file) to enable all the fields in the file). The contents of each variable's NAME attribute is the logical name used in the dynamic expression. If no NAME attribute is present, the label of the variable (including any prefix) is used. Space is allocated in the .EXE for the names of all of the variables in the structure. This creates a larger program that uses more memory than it normally would. Therefore, the BINDABLE attribute should only be used when a large proportion of the constituent fields are going to be used.

A FILE with the THREAD attribute declares a separate record buffer (and file control block) for each execution thread that OPENS the FILE. If the thread does not OPEN the file, no record buffer is allocated for the file on that thread.



A FILE with the EXTERNAL attribute is declared and may be referenced in Clarion code, but is not allocated memory. The memory for the FILE's record buffer is allocated by the external library. This allows a Clarion program access to FILEs declared as public in external libraries.

Related Procedures: BUFFER, BUILD, CLOSE, COPY, CREATE, EMPTY, FLUSH, LOCK, NAME, OPEN, PACK, RECORDS, REMOVE, RENAME, SEND, SHARE, STATUS, STREAM, UNLOCK, ADD, APPEND, BOF, BYTES, DELETE, DUPLICATE, EOF, GET, HOLD, NEXT, NOMEMO, POINTER, POSITION, PREVIOUS, PUT, RELEASE, REGET, RESET, SET, SKIP, WATCH

Example:

```
Names FILE, DRIVER('Clarion')    !Declare a file structure
Rec   RECORD                     !Required record structure
Name   STRING(20)                ! containing one or more data elements
. .                               !End file and record declaration
```

See Also: KEY, INDEX, MEMO, BLOB, RECORD

## INDEX (declare static file access index)

*label*    **INDEX**(*[-/+][field],...[-/+][field]*) [**NAME**( )] [**NOCASE**] [**OPT**]

<i>label</i>	The label of the INDEX (PROP:Label).
<b>INDEX</b>	Declares a static index into the data file.
<i>-/+</i>	The - ( <i>minus sign</i> ) preceding an index component <i>field</i> specifies descending order for that component. If omitted, or + ( <i>plus sign</i> ) the component is sorted in ascending order.
<i>field</i>	The label of a field in the RECORD structure of the FILE in which the INDEX is declared. The <i>field</i> is an index component. Fields declared with the DIM attribute (arrays) may not be used as index components.
<b>NAME</b>	Specifies the disk file specification for the INDEX (PROP:NAME).
<b>OPT</b>	Excludes those records with null values (zero or blank) in all index component fields (PROP:OPT).
<b>NOCASE</b>	Specifies case insensitive sort order (PROP:NOCASE).

**INDEX** declares a “static key” for a FILE structure. An INDEX is updated only by the BUILD statement. It is used to access records in a different logical order than the “physical order” of the file. An INDEX may be used for either sequential file processing or direct random access.

An INDEX always allows duplicate entries. An INDEX may have more than one component *field*. The order of the components determines the sort sequence of the index. The first component is the most general, and the last component is the most specific. Generally, a data file may have up to 255 indexes (and/or keys) and each index may be up to 255 bytes, but the exact numbers are file driver dependent.

An INDEX declared without a *field* creates a “dynamic index.” A dynamic index may use any field (or fields) in the RECORD as components (except arrays). The component fields of a dynamic index are defined at run time in the second parameter of the BUILD statement. The same dynamic index declaration may be built and re-built using different components each time.

Example:

```
Names      FILE, DRIVER('TopSpeed'), PRE(Nam)
NameNdx    INDEX(Nam:Name), NOCASE           !Declare the name index
NbrNdx     INDEX(Nam:Number), OPT             !Declare the number index
DynamicNdx INDEX()                           !Declare a dynamic index
Rec        RECORD
Name       STRING(20)
Number     SHORT
```

See Also:            **SET, GET, KEY, BUILD**

## KEY (declare dynamic file access index)

*label*    **KEY**(*[-/+]**field*,...,*[-/+]**field*) [**DUP**] [**NAME**( )] [**NOCASE**] [**OPT**] [**PRIMARY**]

<i>label</i>	The label of the KEY (PROP:Label).
<b>KEY</b>	Declares a dynamically maintained index into the data file.
<i>-/+</i>	The - ( <i>minus sign</i> ) preceding a key component <i>field</i> specifies descending order for that component. If omitted, or + ( <i>plus sign</i> ), the component is sorted in ascending order.
<i>field</i>	The label of a field in the RECORD structure of the FILE in which the KEY is declared. The <i>field</i> is a key component. A field declared with the DIM attribute (an array) may not be used as a key component.
<b>NAME</b>	Specifies the disk file specification of the KEY (PROP:NAME).
<b>DUP</b>	Allows multiple records with duplicate values in their key component fields (PROP:DUP).
<b>NOCASE</b>	Specifies case insensitive sort order (PROP:NOCASE).
<b>OPT</b>	Excludes, from the KEY, those records with null (zero or blank) values in all key component fields (PROP:OPT).
<b>PRIMARY</b>	Specifies the KEY is the file's relational primary key (a unique key containing all records in the file) (PROP:PRIMARY).

A **KEY** is an index into the data file which is automatically updated whenever records are added, changed, or deleted. It is used to access records in a different logical order than the “physical order” of the file. A **KEY** may be used for either sequential file processing or direct random access.

A **KEY** may have more than one component *field*. The order of the components determines the sort sequence of the key. The first component is the most general, and the last component is the most specific. Generally, a data file may have up to 255 keys (and indexes) and each key may be up to 255 bytes, but the exact numbers are file driver dependent.

Example:

```
Names    FILE,DIVER('Clarion'),PRE(Nam)
NameKey   KEY(Nam:Name),NOCASE,DUP      !Declare the name key
NbrKey    KEY(Nam:Number),OPT          !Declare the number key
Rec       RECORD
Name      STRING(20)
Number    SHORT

      . .
CODE
Nam:Name = 'Clarion Software'          !Initialize key field
GET(Names,Nam:NameKey)                 !Get the record
SET(Nam:NbrKey)                        !Set sequential by number
```

See Also:            **SET, GET, INDEX, BUILD, PACK**

## MEMO (declare a text field)

<i>label</i>	<b>MEMO</b> ( <i>length</i> ) [, <b>BINARY</b> ] [, <b>NAME</b> ( )]
<i>label</i>	The label of the MEMO (PROP:Label).
<b>MEMO</b>	Declares a fixed-length string which is stored variable-length on disk.
<i>length</i>	A numeric constant that determines the maximum number of characters. The maximum range is from 1 to 65,520 bytes in 16-bit applications and unlimited in 32-bit applications (dependent on the file driver's MEMO support).
<b>BINARY</b>	Declares the MEMO a storage area for binary data (PROP:BINARY).
<b>NAME</b>	Specifies the disk filename for the MEMO field (PROP:NAME).

**MEMO** declares a fixed-length string field which is stored variable-length on disk. The *length* parameter defines the maximum size of a memo. A MEMO must be declared before the RECORD structure. Memory is allocated for a MEMO field's buffer when the file is opened, and is de-allocated when the file is closed. MEMO fields are usually displayed in TEXT fields in SCREEN and REPORT structures.

Generally, up to 255 MEMO fields may be declared in a FILE structure. The exact size and number of MEMO fields, and their manner of storage on disk, is file driver dependent.

Example:

```
Names      FILE,DRIVER('Clarion'),PRE(Nam)
NameKey    KEY(Nam:Name)
NbrKey     KEY(Nam:Number)
Notes      MEMO(4800)           !Memo, 4800 bytes
Rec        RECORD
Name       STRING(20)
Number     SHORT
. . .
```

## BLOB (declare a variable-length field)

*label*    **BLOB** [,BINARY] [,NAME( )]

<i>label</i>	The label of the BLOB (PROP:Label).
<b>BLOB</b>	Declares a variable-length string which may be greater than 64K (in both 16 and 32-bit applications).
<b>BINARY</b>	Declares the BLOB a storage area for binary data (PROP:BINARY).
<b>NAME</b>	Specifies the disk filename for the BLOB field (PROP:NAME).

**BLOB** (Binary Large Object) declares a string field which is completely variable-length and may be greater than 64K in size in both 16-bit and 32-bit applications. A BLOB must be declared before the RECORD structure. Generally, up to 255 BLOB fields may be declared in a FILE structure (the exact number and their manner of storage on disk is file driver dependent).

A BLOB may not be used as a variable—you may not name a BLOB as a control's USE attribute, or directly assign data to or from the BLOB. You can use PROP:Handle to get the Windows handle to the BLOB entity and assign one BLOB to another: get the handle of both BLOB entities and then assign one BLOB's handle to the other BLOB's handle. A BLOB may not be accessed "as a whole;" you must either use Clarion's string slicing syntax to access the data (up to 64K at a time in 16-bit, unlimited in 32-bit), or PROP:ImageBlob. The individual bytes of data in the BLOB are numbered starting with zero (0), not one (1).

The SIZE procedure returns the number of bytes contained in the BLOB field for the current record in memory. You can also get (and set) the size of a BLOB using PROP:Size. You may set the size of the BLOB before assigning data to a new BLOB using string slicing, but it is not necessary as the size is automatically set by the string slice operation. You can also use PROP:ImageBlob to store and retrieve graphic images without first setting PROP:Size. It is a good idea to first set PROP:Size to zero (0) before assigning data to a BLOB that has not previously contained data, to eliminate any "junk" leftover from any previously accessed BLOB. When assigning from one BLOB to another using PROP:Handle, you may need to use PROP:Size to adjust the size of the destination BLOB to the size of the source BLOB. PROP:Touched can be used to determine if the content of the BLOB has changed since it was retrieved from disk.

Example:

```
ArchiveFile PROCEDURE
Names      FILE,DRIVER('TopSpeed')
NameKey    KEY(Name)
Notes      BLOB                !Can be larger than 64K
Rec        RECORD
Name       STRING(20)
. .
```

```

ArcNames  FILE, DRIVER('TopSpeed')
Notes     BLOB
Rec       RECORD
Name      STRING(20)
. .
CODE
SET(Names)
LOOP
  NEXT(Names)
  IF ERRORCODE() THEN BREAK.
  ArcNames.Rec = Names.Rec           !Assign rec data to Archive
  ArcNames.Notes{PROP:Handle} = Names.Notes{PROP:Handle} !Assign BLOB to Archive
  ArcNames.Notes{PROP:Size} = Names.Notes{PROP:Size}    ! and adjust the size
  ADD(ArcNames)
END

StoreFileInBlob PROCEDURE                               !Stores any disk file into a BLOB
DosFileName  STRING(260), STATIC
LastRec      LONG
SavPtr       LONG(1)                                     !Start at 1
FileSize     LONG
DosFile      FILE, DRIVER('DOS'), PRE(DOS), NAME(DosFileName)
Record       RECORD
F1           STRING(2000)
. .
BlobStorage  FILE, DRIVER('TopSpeed'), PRE(STO)
File         BLOB, BINARY
Record       RECORD
FileName     STRING(64)
. .
CODE
IF NOT FILEDIALOG('Choose File to Store', DosFileName, , 0010b) THEN RETURN.
OPEN(BlobStorage)                                     !Open the BLOB file
STO:FileName = DosFileName                             ! and store the filename
OPEN(DosFile)                                         !Open the file
FileSize = BYTES(DosFile)                             !Get size of file
STO:File{PROP:Size} = FileSize                       ! and set the BLOB to store the file
LastRec = FileSize % SIZE(DOS:Record)                 !Check for short record at end of file
LOOP INT(FileSize/SIZE(DOS:Record)) TIMES
  GET(DosFile, SavPtr)                                !Get each record
  ASSERT(NOT ERRORCODE())
  STO:File[SavPtr - 1 : SavPtr + SIZE(DOS:Record) - 2] = DOS:Record
                                                         !String slice data into BLOB
  SavPtr += SIZE(DOS:Record)                           !Compute next record pointer
END
IF LastRec                                             !If short record at end of file
  GET(DosFile, SavPtr)                                !Get last record
  ASSERT(BYTES(DosFile) = LastRec)                    ! size read should match computed size
  STO:File[SavPtr - 1 : SavPtr + LastRec - 2] = DOS:Record
END
ADD(BlobStorage)
ASSERT(NOT ERRORCODE())
CLOSE(DosFile); CLOSE(BlobStorage)

```

See Also:

**PROP:ImageBlob, PROP:Size, Implicit String Arrays and String Slicing**

## RECORD (declare record structure)

```
[label]  RECORD [,PRE( )] [,NAME( )]
         fields
         END
```

**RECORD** Declares the beginning of the data structure within the FILE declaration.

*fields* Multiple variable declarations.

**PRE** Specify a label prefix for the structure.

**NAME** Specifies an external name for the RECORD structure.

The **RECORD** statement declares the beginning of the data structure within the FILE declaration. A RECORD structure is required in a FILE declaration. Each *field* is an element of the RECORD structure. The length of a RECORD structure is the sum of the length of its fields. When the label of a RECORD structure is used in an assignment statement, expression, or parameter list, it is treated as a GROUP data type.

At run time, static memory is allocated as a data buffer for the RECORD structure. The *fields* in the record buffer are available whether the file is open or closed.

If the *fields* contain variable declarations with initial values, that initial value is only used to determine the size of the variable, the record buffer is not initialized to the value. For example, a STRING('abc') field declaration creates a three-byte string, but it's value is not automatically initialized to 'abc' unless the program's executable code assigns it that value.

Records from the data file on disk are read into the data buffer with the NEXT, PREVIOUS, GET, or REGET statements. Data in the *fields* are processed, then written to the data file as a single RECORD unit by the ADD, APPEND, PUT, or DELETE statements.

The WHAT and WHERE procedures allow access to the *fields* by their relative position within the RECORD structure.

Example:

```
Names  FILE,DRIVER('Clarion')    !Declare a file structure
Record  RECORD                  ! begin record declaration
Name    STRING(20)              !  declare name field
Number  SHORT                   !  declare number field
. . .                            !End file, end record declaration
```

See Also: FILE, NEXT, PREVIOUS, GET, REGET, ADD, APPEND, PUT, DELETE, WHAT, WHERE



## Null Data Processing

---

The concept of a null “value” in a field of a FILE indicates that the user has never entered data into the field. Null actually means “value not known” for the field. This is completely different from a blank or zero value, and makes it possible to detect the difference between a field which has never had data, and a field which has a (true) blank or zero value.

In expressions, null does not equal blank or zero. Therefore, any expression which compares the value of a field from a FILE with another value will always evaluate as unknown if the field is null. This is true even if the value of both elements in the expression are unknown (null) values. For example, the conditional expression `Pre:Field1 = Pre:Field2` will evaluate as true only if both fields contain known values. If both fields are null, the result of the expression is also unknown.

<code>Known = Known</code>	!Evaluates as True or False
<code>Known = Unknown</code>	!Evaluates as unknown
<code>Unknown = Unknown</code>	!Evaluates as unknown
<code>Unknown &lt;&gt; 10</code>	!Evaluates as unknown
<code>1 + Unknown</code>	!Evaluates as unknown

The only four exceptions to this rule are boolean expressions using OR and AND where only one portion of the entire expression is unknown and the other portion of the expression meets the expression criteria:

<code>Unknown OR True</code>	!Evaluates as True
<code>True OR Unknown</code>	!Evaluates as True
<code>Unknown AND False</code>	!Evaluates as False
<code>False AND Unknown</code>	!Evaluates as False

Support for null “values” in a FILE is entirely dependent upon the file driver. Some file drivers support the null field concept (SQL drivers, for the most part), while others do not. Consult the documentation for the specific file driver to determine whether or not your file system’s driver supports nulls.

See Also:

NULL, SETNULL, SETNONULL

## FILE Structure Properties

---

The following properties are all elements of a FILE data structure. They describe the attributes, fields, keys, memos, and blobs that may occur within a FILE structure. All these FILE structure properties are READ ONLY except: PROP:NAME (which can be used to change the name of a field in a file), PROP:OWNER, and PROP:DriverString. Assigning values to these properties overrides any values in the relevant declared attributes

Some properties are specific to the FILE and take the label of the FILE structure as the *target*, others are specific to a KEY (or INDEX) and take the label of the KEY (or INDEX) as the *target*, and others are specific to a BLOB and take the label of the BLOB as the *target*. Several properties are arrays which take the number of the specific field or key as their element number to identify which field or key to return.

Each field that appears within the RECORD structure receives a positive number. In the RECORD structure, field declarations begin with 1 and increment by 1 for each subsequent field, in the order in which they appear within the RECORD structure. Terminating END statements for GROUP structures are not numbered, as they are not a field declaration.

MEMO fields are numbered negatively. MEMO declarations begin with -1 and decrement by 1 for each subsequent MEMO, in the order in which they appear within the FILE structure. BLOB fields are numbered positively. BLOB declarations begin with 1 and increment by 1 for each subsequent BLOB, in the order in which they appear within the FILE structure.

### Multi-Use Properties

#### PROP:Label

Returns the label of a declaration statement.

When no array element number is specified and the *target* is the label of a KEY (or INDEX), PROP:Label returns the label of the KEY (or INDEX).

When a positive array element number is specified and the *target* is a FILE, PROP:Label returns the label of the specified field within the RECORD structure.

When a negative array element number is specified and the *target* is a FILE, PROP:Label returns the label of the specified MEMO within the FILE structure.

When a positive array element number is specified and the *target* is a BLOB, PROP:Label returns the label of the specified BLOB.

#### PROP:NAME

The NAME attribute of the declaration statement.

When no array element number is specified and the *target* is the label of a FILE, PROP:Name returns the contents of the FILE statement's NAME attribute.

When a positive array element number is specified and the *target* is the label of a FILE, PROP:Name returns the NAME attribute of the specified field within the RECORD structure.

When a negative array element number is specified and the *target* is the label of a FILE, PROP:Name returns the NAME attribute of the specified MEMO within the FILE structure.

When no array element number is specified and the *target* is the label of a KEY (or INDEX), PROP:Name returns the NAME attribute of the specified KEY (or INDEX).

When a positive array element number is specified and the *target* is a BLOB, PROP:Name returns the NAME attribute of the specified BLOB.

#### PROP:Type

The data type of the declaration statement.

When no array element number is specified and the *target* is the label of a KEY (or INDEX), PROP:Type returns either "KEY" or "INDEX."

When a positive array element number is specified and the *target* is the label of a FILE, PROP:Type returns the data type of the specified field within the RECORD structure.

### **FILE Statement Properties**

These properties all take the label of a FILE as their *target*.

#### PROP:DRIVER

The DRIVER attribute. Returns the file driver of the FILE.

#### PROP:CREATE

The CREATE attribute on the FILE statement. A toggle attribute which contains a null string (") if absent, and '1' if present.

#### PROP:RECLAIM

The RECLAIM attribute on the FILE statement. A toggle attribute which contains a null string (") if absent, and '1' if present.

#### PROP:OWNER

The OWNER attribute on the FILE statement.

#### PROP:ENCRYPT

The ENCRYPT attribute on the FILE statement. A toggle

attribute which contains a null string (") if absent, and '1' if present.

**PROP:THREAD**

The **THREAD** attribute on the **FILE** statement. A toggle attribute which contains a null string (") if absent, and '1' if present.

**PROP:OEM**

The **OEM** attribute on the **FILE** statement. A toggle attribute which contains a null string (") if absent, and '1' if present.

**PROP:Keys**

Returns the number of **KEY** and **INDEX** declarations in the **FILE** structure.

**PROP:Key**

An array that returns a reference to the specified **KEY** or **INDEX** in the **FILE** structure. This reference can be used as the source side of a reference assignment statement.

## **Key Properties**

These properties all take the label of a **KEY** (or **INDEX**) as their *target*.

**PROP:PRIMARY**

The **PRIMARY** attribute on the **KEY** statement. A toggle attribute which contains a null string (") if absent, and '1' if present.

**PROP:DUP**

The **DUP** attribute on the **KEY** statement. A toggle attribute which contains a null string (") if absent, and '1' if present.

**PROP:NOCASE**

The **NOCASE** attribute on the **KEY** or **INDEX** statement. A toggle attribute which contains a null string (") if absent, and '1' if present.

**PROP:OPT**

The **OPT** attribute on the **KEY** or **INDEX** statement. A toggle attribute which contains a null string (") if absent, and '1' if present.

**PROP:Components**

Returns the number of component fields of a **KEY** or **INDEX**.

**PROP:Field**

An array that returns the field number (within the **RECORD** structure) of the specified component field of a **KEY** or **INDEX**. This field number can be used as the array element number for **PROP:Label** or **PROP:Name**.

**PROP:Ascending**

An array that returns '1' if the specified key component is in ascending order, and a null string (") if in descending order.

## **Field Properties**

These properties all take the label of a FILE as their *target*.

### **PROP:Memos**

Returns the number of MEMO fields in the FILE structure.

### **PROP:Blobs**

Returns the number of BLOB fields in the FILE structure.

### **PROP:BINARY**

The **BINARY** attribute on the MEMO or BLOB statement in the FILE structure. A toggle attribute which contains a null string (") if absent, and '1' if present.

### **PROP:Fields**

Returns the number of fields declared in the RECORD structure.

### **PROP:Size**

An array that returns the declared size of the specified MEMO, STRING, CSTRING, PSTRING, DECIMAL, or PDECIMAL field.

### **PROP:Places**

An array that returns the number of decimal places declared for the specified DECIMAL or PDECIMAL field.

### **PROP:Dim**

An array property of a file that returns the product of the array dimensions specified in the DIM attribute of the specified field. For example, for a field DIM(3,2) PROP:Dim returns 6.

### **PROP:Over**

An array property of a file that returns the field number of the field referenced in the OVER attribute on the specified field.

Example:

```

MEMBER
MAP
DumpGroupDetails  PROCEDURE(USHORT start, USHORT total)
DumpFieldDetails  PROCEDURE(USHORT indent, USHORT FieldNo)
DumpToFile        PROCEDURE
SetAttribute       PROCEDURE(SIGNED Prop, STRING Value)
StartLine         PROCEDURE(USHORT indent, STRING label, STRING type)
Concat            PROCEDURE(STRING s)
END

LineSize          EQUATE(255)
FileIndent        EQUATE(20)

DestName          STRING(FILE:MaxFilePath)
DestFile          FILE, DRIVER('ASCII'), CREATE, NAME(DestName)
Record            RECORD
Line              STRING(LineSize)
. .
TheFile           &FILE

```

```
ABlob      &BLOB
AKey       &KEY
Line       STRING(LineSize)
```

```
PrintFile PROCEDURE(*FILE F)
CODE
  IF NOT FILEDIALOG('Choose Output File',DestName,'Text|*.TXT|Source|*.CLW',0100b)
    RETURN
  END
  OPEN(DestFile)
  IF ERRORCODE()
    CREATE(DestFile)
    OPEN(DestFile)
  END
  ASSERT(ERRORCODE()==0)

  TheFile &= F
  DO DumpFileDetails
  DO DumpKeys
  DO DumpMemos
  DO DumpBlobs
  DumpGroupDetails(0, F{PROP:Fields})
  StartLine(FileIndent,',' , 'END')
  DumpToFile
```

```
DumpFileDetails ROUTINE
  StartLine(FileIndent,TheFile{PROP:label},'FILE')
  Concat(',DRIVER('' & CLIP(TheFile{PROP:Driver}))'
  IF TheFile{PROP:DriverString}
    Concat(', ' & CLIP(TheFile{PROP:DriverString}))
  END
  Concat('')')
  SetAttribute(TheFile{PROP:Create},'CREATE')
  SetAttribute(TheFile{PROP:Reclaim},'RECLAIM')
  IF TheFile{PROP:Owner}
    Concat(',OWNER('' & CLIP(TheFile{PROP:Owner}) & '')')
  END
  SetAttribute(TheFile{PROP:Encrypt},'ENCRYPT')
  Concat(',NAME('' & CLIP(TheFile{PROP:Name}) & '')')
  SetAttribute(TheFile{PROP:Thread},'THREAD')
  SetAttribute(TheFile{PROP:OEM},'OEM')
  DumpToFile
```

```
DumpMemos ROUTINE
  LOOP X# = 1 TO TheFile{PROP:Memos}
    StartLine(FileIndent+2,TheFile{PROP:label,-X#},'MEMO(')
    Concat(CLIP(TheFile{PROP:Size,-X#})&'')')
    SetAttribute(TheFile{PROP:Binary,-X#},'BINARY')
    IF TheFile{PROP:Name,-X#}
      Concat(',NAME(' & CLIP(TheFile{PROP:Name,-X#}) & ')')
    END
    DumpToFile
  END
```

```

DumpBlobs ROUTINE
  Blobs = TheFile{PROP:Blobs}
  LOOP X# = 1 TO TheFile{PROP:Blobs}
    ABlob &= TheFile{PROP:Blob,X#}
    StartLine(FileIndent+2,ABlob{PROP:label},'BLOB')
    SetAttribute(ABlob{PROP:Binary},'BINARY')
    IF ABlob{PROP:Name}
      Concat(',NAME(' & CLIP(ABlob{PROP:Name}) & ')')
    END
    DumpToFile
  END

DumpKeys ROUTINE
  LOOP X# = 1 TO TheFile{PROP:Keys}
    AKey &= TheFile{PROP:Key,X#}
    StartLine(FileIndent+2,AKey{PROP:label},AKey{PROP:Type})
    Concat('(')
    LOOP Y# = 1 TO AKey{PROP:Components}
      IF Y# > 1 THEN Concat(',').
      IF Key{PROP:Ascending,Y#}
        Concat('+')
      ELSE
        Concat('-')
      END
      Concat(TheFile{PROP:Label,key{PROP:Field,Y#}})
    END
    Concat(')')
    SetAttribute(AKey{PROP:Dup},'DUP')
    SetAttribute(AKey{PROP:NoCase},'NOCASE')
    SetAttribute(AKey{PROP:Opt},'OPT')
    SetAttribute(AKey{PROP:Primary},'PRIMARY')
    IF AKey{PROP:Name}
      Concat(',NAME(' & CLIP(AKey{PROP:Name}) & ')')
    END
    DumpToFile
  END

DumpGroupDetails PROCEDURE(USHORT start, USHORT total)
  fld          USHORT
  fieldsInGroup USHORT
  GroupIndent   USHORT,STATIC
  CODE
  IF start = 0 THEN
    GroupIndent = FileIndent+2
    StartLine(GroupIndent,'RECORD','RECORD')
    DumpToFile
  END
  GroupIndent += 2
  LOOP fld = start+1 TO start+total
    DumpFieldDetails(GroupIndent,fld)
    IF TheFile{PROP:Type,fld} = 'GROUP'
      fieldsInGroup = TheFile{PROP:Fields,fld}
      DumpGroupDetails (fld, fieldsInGroup)
      fld += fieldsInGroup
    END
  END
  GroupIndent -= 2
  StartLine(GroupIndent,',','END')
  DumpToFile

```

```

DumpFieldDetails PROCEDURE(USHORT indent, USHORT FieldNo)
FldType  STRING(20)
CODE
  FldType = TheFile{PROP:Type,FieldNo}
  StartLine(indent,TheFile{PROP:Label,FieldNo},FldType)
  IF INSTRING('STRING',FldType,1,1) OR INSTRING('DECIMAL',FldType,1,1)
    Concat('(' & TheFile{PROP:Size,FieldNo})
    IF FldType = 'DECIMAL' OR FldType = 'PDECIMAL'
      Concat(',') & TheFile{PROP:Places,FieldNo})
    END
    Concat(')')
  END
  IF TheFile{PROP:Dim,FieldNo} <> 0
    Concat(',DIM(' & CLIP(TheFile{PROP:Dim,FieldNo}) & ')')
  END
  IF TheFile{PROP:Over,FieldNo} <> 0
    Concat(',OVER(' & CLIP(TheFile{PROP:Label,TheFile{PROP:Over,FieldNo}}) & ')')
  END
  IF TheFile{PROP:Name,FieldNo}
    Concat(',NAME(' & CLIP(TheFile{PROP:Name,FieldNo}) & ')')
  END
  DumpToFile

SetAttribute PROCEDURE (Prop,Value)
CODE
  IF Prop THEN Line = CLIP(Line) & ',' & CLIP(Value).

StartLine PROCEDURE (USHORT indent,STRING label, STRING type)
TypeStart USHORT
CODE
  Line = label
  IF LEN(CLIP(Line)) < Indent
    TypeStart = Indent
  ELSE
    TypeStart = LEN(CLIP(Line)) + 4
  END
  Line[TypeStart : LineSize] = type

Concat  PROCEDURE (STRING s)
CODE
  Line = CLIP(Line) & s

DumpToFile PROCEDURE
CODE
  DestFile.Line = Line
  ADD(DestFile)
  ASSERT(ERRORCODE()=0)

```



## Environment Files

---

An environment file contains internationalization settings for an application. On program initialization, the Clarion run-time library attempts to locate an environment file with the same name and location as your application's program file (*appname*.ENV). If an environment file is not found, the run-time library defaults to standard English/ASCII. You can also use these settings to specify internationalization issues for the Clarion environment by creating a CLARION4.ENV file (the Database Manager uses these settings when displaying data files).

The .ENV file is compatible with the .INI files used by Clarion for DOS (both versions 3 and 3.1) if the CLACHARSET is set to OEM, because Clarion for DOS .INI files are generally written using OEM ASCII, not the ANSI character set.

The LOCALE procedure can be used to load environment files at run-time to dynamically change the international settings. LOCALE can also be used to set individual entries. International support is dependent on support in the File Driver (generally for the OEM attribute); consult the File Driver documentation for information on international support in specific drivers.

The following settings can be set in an environment file:

### **CLACHARSET=WINDOWS** **CLACHARSET=OEM**

This determines the character set used by the entries in the .ENV file. WINDOWS is the default if this setting is omitted from the environment file. Use the OEM setting if you are using a DOS editor to edit the .ENV file, or if it has to be compatible with Clarion for DOS. Otherwise, specify WINDOWS or omit the entry. This should always be the first setting in the environment file.

### **CLACOLSEQ=WINDOWS** **CLACOLSEQ="string"**

Specifies a specific collating sequence for use at run-time. This collating sequence is used for building KEY and INDEX files, as well as for sorting QUEUES and all string/character comparisons.

If the WINDOWS setting is used, then the default collation sequence is defined by Windows' Country setting (in the Control Panel). If this entry is omitted from the environment file, then the default ANSI ordering is used, not the windows default.

Using the WINDOWS setting, the ordering can 'interleave' characters of differing case (AaBbCc ...), so code such as

```
CASE SomeString[1]  
OF 'A' TO 'Z'
```

includes 'a' TO 'y' as well. Use the ISUPPER and ISLOWER procedures in preference to this kind of code if WINDOWS (or other non-default) collation sequences are used.

In addition to the WINDOWS setting, you may specify a *string* of characters (in double quotes) to explicitly define the collation sequence to use. Only those characters that need to have their sort order specified need be included; all other characters not listed remain in their same relative order. For example, if CLACOLSEQ="CA" is specified for the standard English sort (ABCD ...) the resulting sort order is "CBAD." This is a change from the Clarion for DOS versions of this setting that needed exactly 222 characters, but it is backward compatible.

**NOTE: You should always read and write files using the same collation sequence.** Using a different sequence may result in keys becoming out of order and records becoming inaccessible. Specifying CLACOLSEQ=WINDOWS means that the collation sequence may change if the user changes the Country in Windows' Control Panel. If the collation sequence changes, use BUILD to rebuild the keys in your data files.

#### **CLAAMPM=WINDOWS**

**CLAAMPM="AMstring","PMstring"**

This specifies the text used to indicate AM or PM as a part of a time display field. The WINDOWS setting specifies use of the AM/PM strings set up in the Windows Control Panel. The *AMstring* and *PMstring* settings are the same as in Clarion for DOS, except that they take notice of the setting of CLACHARSET.

#### **CLAMONTH="Month1","Month2", ... ,"Month12"**

Specifies the text returned by procedures and picture formats involving the month full name.

#### **CLAMON="AbbrevMonth1","AbbrevMonth2", ... ,"AbbrevMonth12"**

Specifies the text returned by procedures and picture formats involving the abbreviated month name.

#### **CLADIGRAPH="DigraphChar1Char2, ... "**

This allows *Digraph* characters to collate correctly. A *Digraph* is a single logical character that is a combination of two characters (*Char1* and *Char2*). The *Digraph* is collated as the two characters that combine to create it. They are more common in non-English languages. For example, with CLADIGRAPH="ÆAe,æae" specified, the word "Jæger" sorts before "Jager" (since "Jae" comes before "Jag").

Multiple *DigraphChar1Char2* combinations may be defined, separated by commas. This setting takes notice of the CLACHARSET setting.

**CLACASE=WINDOWS****CLACASE="UpperString","LowerString"**

Allows you to specify upper and lower case letter pairs.

The WINDOWS setting uses the default upper/lower case pair sets as defined by the Windows Country setting (in the Control Panel). If this entry is omitted from the environment file, then the default ANSI ordering is used, not the windows default.

The *UpperString* and *LowerString* parameters specify a set of uppercase characters and each one's lowercase equivalent. The length of the *UpperString* and *LowerString* parameters must be equal. CLACASE takes notice of the setting of CLACHARSET. ANSI characters less than 127 are not affected.

**CLABUTTON='OK','&Yes','&No','&Abort','&Retry','&Ignore','Cancel','&Help'**

This defines the text used by the buttons of the MESSAGE procedure. The text is specified as a list of comma separated strings in the following order: OK, YES, NO, ABORT, RETRY, IGNORE, CANCEL, HELP. The default is as specified above.

**CLAMSGerrornumber="ErrorMessage"**

This allows run-time error messages to be overridden with translated strings. The *errornumber* is a standard Clarion error code number appended to CLAMSG. *ErrorMessage* is the string value used to replace that error number's default message. For example, CLAMSG2="No File Found" makes "No File Found" the return value of the ERROR() procedure when ERRORCODE() = 2.

**CLALFN=OFF**

This disables use of long filenames in the program.

Example:

```
CLACHARSET=WINDOWS
CLACOLSEQ="AÄÅÆaääääääæBbCçCcDdEéEëëëëFfGgHhIiïíîJjKkLlMmNñÑñOoôôôôPpQqRrSsTtUüUüúúüVvWwXxYyZzÿ"
CLAAMPM="AM","PM"
CLAMONTH="January","February","March","April","May","June","July","August","September","October","November","December"
CLAMON="Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"
CLADIGRAPH="ÆAe,æae"
CLACASE="ÄÅÆÇÉÑÖÜ","äåæçéñöü"
CLABUTTON="OK","&Si","&No","&Abortar","&Volveratratar","&Ignora","&Cancelar","&Ayuda"
CLAMSG2="No File Found"
```

## View Structures

### VIEW (declare a “virtual” file)

```

label  VIEW(primary file) [,FILTER( )] [,ORDER( )]
        [PROJECT( )]
        [JOIN( )
          [PROJECT( )]
          [JOIN( )
            [PROJECT( )]
          END]
        END]
      END

```

**VIEW** Declares a “virtual” file as a composite of related files.

*label* The name of the VIEW.

*primary file* The label of the primary FILE of the VIEW.

**FILTER** Declares an expression used to filter valid records for the VIEW (PROP:FILTER).

**ORDER** Declares an expression or list of expressions used to define the sorted order of records for the VIEW (PROP:ORDER or PROP:SQLOrder).

**PROJECT** Specifies the fields from the *primary file*, or the secondary related file specified by a JOIN structure, that the VIEW will retrieve. If omitted, all fields from the file are retrieved.

**JOIN** Declares a secondary related file.

**VIEW** declares a “virtual” file as a composite of related data files. The data elements declared in a VIEW do not physically exist in the VIEW, because the VIEW structure is a logical construct. VIEW is a separate method of addressing data physically residing in multiple, related FILE structures. At run-time, the VIEW structure is not assigned memory for a data buffer, so the fields used in the VIEW are placed in their respective FILE structure’s record buffer.

A VIEW structure must be explicitly OPENed before use, and all primary and secondary related files used in the VIEW must have been previously OPENed.

Either a SET statement on the VIEW’s primary file before the OPEN(view), or a SET(*view*) statement after the OPEN(view), must be issued to set the VIEW’s processing order and starting point, then NEXT(view) or PREVIOUS(view) allow sequential access to the VIEW.

The VIEW data structure is designed for sequential access, but also allows random access using the REGET statement. The REGET statement is also

available for VIEW, but only to specify the primary and secondary related file records that should be current in their respective record buffers after the VIEW is CLOSED. If no REGET statement is issued immediately before the CLOSE(view) statement, the primary and secondary related file record buffers are set to no current record.

The processing sequence of the primary and secondary related files is undefined after the VIEW is CLOSED. Therefore, SET or RESET must be used to establish sequential file processing order, if necessary, after closing the VIEW.

The VIEW data structure is designed to facilitate database access on client-server systems. It accomplishes two relational operations at once: the relational “Join” and “Project” operations. On client-server systems, these operations are performed on the file server, and only the result of the operation is sent to the client. This can dramatically improve performance of network applications.

A relational “Join” retrieves data from multiple files, based upon the relationships defined between the files. The JOIN structure in a VIEW structure defines the relational “Join” operation. There may be multiple JOIN structures within a VIEW, and they may be nested within each other to perform multiple-level “Join” operations. The VIEW structure defaults to a “left outer join,” where all records for the VIEW’s *primary file* are retrieved whether the secondary file named in a JOIN structure contains any related records or not. The secondary file fields are implicitly CLEARED (zero or blank) for those primary file records without related secondary records. You can override the default left outer join by specifying the INNER attribute on the JOIN (creating an “inner join”) so that only those *primary file* records with related secondary file records are retrieved.

A relational “Project” operation retrieves only specified data elements from the files involved, not their entire record structure. Only those fields explicitly declared in PROJECT statements in the VIEW structure are retrieved if there are any PROJECT statements declared. Therefore, the relational “Project” operation is automatically implemented by the VIEW structure. The contents of any fields that are not contained in PROJECT statements are undefined.

The FILTER attribute restricts the VIEW to a sub-set of records. The FILTER expression may include any of the fields explicitly declared in the VIEW structure and restrict the VIEW based upon the contents of any of the fields. This makes the FILTER operate across all levels of the “Join” operation.

Related Procedures:

BUFFER, CLOSE, FLUSH, OPEN, RECORDS, DELETE, HOLD, NEXT, POSITION, PREVIOUS, PUT, RELEASE, REGET, RESET, SET, SKIP, WATCH

Example:

```

Customer  FILE,DRIVER('Clarion'),PRE(Cus) !Declare customer file layout
AcctKey    KEY(Cus:AcctNumber)
Record     RECORD
AcctNumber LONG
OrderNumber LONG
Name       STRING(20)
Addr       STRING(20)
City       STRING(20)
State      STRING(20)
Zip        STRING(20)
. .

Header     FILE,DRIVER('Clarion'),PRE(Hea) !Declare header file layout
AcctKey    KEY(Hea:AcctNumber)
OrderKey   KEY(Hea:OrderNumber)
Record     RECORD
AcctNumber LONG
OrderNumber LONG
ShipToName STRING(20)
ShipToAddr STRING(20)
ShipToCity STRING(20)
ShipToState STRING(20)
ShipToZip  STRING(20)
. .

Detail     FILE,DRIVER('Clarion'),PRE(Dtl) !Declare detail file layout
OrderKey   KEY(Dtl:OrderNumber)
Record     RECORD
OrderNumber LONG
Item       LONG
Quantity   SHORT
. .

Product    FILE,DRIVER('Clarion'),PRE(Pro) !Declare product file layout
ItemKey     KEY(Pro:Item)
Record      RECORD
Item        LONG
Description STRING(20)
Price       DECIMAL(9,2)
. .

ViewOrder  VIEW(Customer)                                !Declare VIEW structure
            PROJECT(Cus:AcctNumber,Cus:Name)
            JOIN(Hea:AcctKey,Cus:AcctNumber)              !Join Header file
            PROJECT(Hea:OrderNumber)
            JOIN(Dtl:OrderKey,Hea:OrderNumber)            !Join Detail file
            PROJECT(Det:Item,Det:Quantity)
            JOIN(Pro:ItemKey,Dtl:Item)                    !Join Product file
            PROJECT(Pro:Description,Pro:Price)
            END
            END
            END
            END
            END

```

See Also: **JOIN, PROJECT**

## PROJECT (set view fields)

### PROJECT( *fields* )

<b>PROJECT</b>	Declares the fields retrieved for the VIEW.
<i>fields</i>	A comma delimited list of fields (including prefixes) from the primary file of the VIEW, or the secondary related file named in the JOIN structure, containing the PROJECT declaration.

The **PROJECT** statement declares *fields* retrieved for a relational “Project” operation. A relational “Project” operation retrieves only the specified *fields* from the file, not the entire record structure.

A PROJECT statement may be declared in the VIEW, or within one of its component JOIN structures. If there is no PROJECT declaration in the VIEW or JOIN structure, all fields in the relevant file are retrieved.

If a PROJECT statement is present in the VIEW or JOIN structure, only those *fields* explicitly declared in the PROJECT are retrieved, the content of all other fields in the relevant file is undefined.

Example:

```

Detail      FILE,DRIVER('Clarion'),PRE(Dtl) !Declare detail file layout
OrderKey    KEY(Dtl:OrderNumber)
Record      RECORD
OrderNumber LONG
Item        LONG
Quantity    SHORT
Description  STRING(20)    !Line item comment
. .

Product     FILE,DRIVER('Clarion'),PRE(Pro) !Declare product file layout
ItemKey     KEY(Pro:Item)
Record      RECORD
Item        LONG
Description  STRING(20)    !Product description
Price       DECIMAL(9,2)
. .

ViewOrder   VIEW(Detail)
            PROJECT(Det:OrderNumber,Det:Item,Det:Description)
            JOIN(Pro:ItemKey,Det:Item)
            PROJECT(Pro:Description,Pro:Price)
            END
END

```

## JOIN (declare a “join” operation)

```

JOIN( | secondary key ,linking fields | ) [, INNER ]
    | secondary file ,expression |
    [PROJECT( )]
    [JOIN( )
        [PROJECT( )]
    ]
    END]
END

```

<b>JOIN</b>	Declares a secondary file for a relational “Join” operation.
<i>secondary key</i>	The label of a <b>KEY</b> which defines the secondary <b>FILE</b> and its access key.
<i>linking fields</i>	A comma-delimited list of fields in the related file that contain the values the <i>secondary key</i> uses to get records.
<i>secondary file</i>	The label of the secondary <b>FILE</b> .
<i>expression</i>	A string constant containing a single logical expression for joining the files (PROP:JoinExpression or PROP:SQLJoinExpression). This expression may include any of the logical and Boolean operators.
<b>INNER</b>	Specifies an “inner join” instead of the default “left outer join”—the only records retrieved from the <b>VIEW</b> ’s <i>primary file</i> parent are those with at least one related record in the <b>JOIN</b> ’s <i>secondary file</i> .
<b>PROJECT</b>	Specifies the fields from the secondary related file specified by a <b>JOIN</b> structure that the <b>VIEW</b> will retrieve. If omitted, all fields from the file are retrieved.

The **JOIN** structure declares a secondary file for a relational “Join” operation. A relational “Join” retrieves data from multiple files, based upon the relationships defined between the files. There may be multiple **JOIN** structures within a **VIEW**, and they may be nested within each other to perform multiple-level “Join” operations.

The *secondary key* defines the access key for the secondary file. The *linking fields* name the fields in the file to which the secondary file is related, that contain the values used to retrieve the related records. For a **JOIN** directly within the **VIEW**, these fields come from the **VIEW**’s primary file. For a **JOIN** nested within another **JOIN**, these fields come from the secondary file of the **JOIN** in which it is nested. Non-linking fields in the *secondary key* are allowed as long as they appear in the list of the key’s component fields after all the linking fields.

When data is retrieved, if there are no matching secondary file records for a primary file record, blank or zero values are supplied in the fields specified in the **PROJECT**. This type of relational “Join” operation is known as a “left outer join.”



The *expression* parameter allows you to join files which contain related fields but no keys defined for the relationship. PROP:JoinExpression and PROP:SQLJoinExpression are array properties whose the array element number references the ordinal position of the JOIN in the VIEW to affect. PROP:SQLJoinExpression is an SQL-only version of PROP:JoinExpression. If the first character of the expression assigned to PROP:JoinExpression or PROP:SQLJoinExpression is a plus sign (+) the new expression is concatenated to the existing join expression.

Example:

```

Customer  FILE,DRIVER('Clarion'),PRE(Cus) !Declare customer file layout
AcctKey   KEY(Cus:AcctNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
Name      STRING(20)
. . .
Header    FILE,DRIVER('Clarion'),PRE(Hea) !Declare header file layout
AcctKey   KEY(Hea:AcctNumber)
OrderKey  KEY(Hea:AcctNumber,Hea:OrderNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
Total     DECIMAL(11,2)      !Total cash paid
Discount  DECIMAL(11,2)      !Discount amount given
OrderDate LONG
. . .
Detail    FILE,DRIVER('Clarion'),PRE(Dtl) !Declare detail file layout
OrderKey  KEY(Dtl:AcctNumber,Dtl:OrderNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
Item      LONG
Quantity  SHORT
. . .
Product   FILE,DRIVER('Clarion'),PRE(Pro) !Declare product file layout
ItemKey   KEY(Pro:Item)
Record    RECORD
Item      LONG
Description STRING(20)
Price     DECIMAL(9,2)
. . .
ViewOrder1 VIEW(Header)                                !Declare VIEW structure
            PROJECT(Hea:AcctNumber,Hea:OrderNumber)
            JOIN(Dtl:OrderKey,Hea:AcctNumber,Hea:OrderNumber) !Join Detail file
            PROJECT(Dtl:ItemDtl:Quantity)
            JOIN(Pro:ItemKey,Dtl:Item)                      !Join Product file
            PROJECT(Pro:Description,Pro:Price)
. . .
ViewOrder2 VIEW(Customer)                                !Declare VIEW structure
            JOIN(Header,'Cus:AcctNumber = Hea:AcctNumber AND ' & |
            ' (Hea:Discount + Hea:Total) * .1 > Hea:Discount')
            PROJECT(Hea:AcctNumber,Hea:OrderNumber)
            JOIN(Dtl:OrderKey,Hea:AcctNumber,Hea:OrderNumber) !Join Detail file
            PROJECT(Dtl:ItemDtl:Quantity)
. . .

```

See Also:

INNER

## Queue Structures

### QUEUE (declare a memory QUEUE structure)

```

label    QUEUE( [ group ] ) [,PRE] [,STATIC] [,THREAD] [,TYPE] [,BINDABLE] [,EXTERNAL] [,DLL]
fieldlabel variable [,NAME( )]
END

```

<b>QUEUE</b>	Declares a memory queue structure.
<i>label</i>	The name of the QUEUE.
<i>group</i>	The label of a previously declared GROUP or QUEUE structure from which it will inherit its structure. This may be a GROUP or QUEUE with or without the TYPE attribute.
<b>PRE</b>	Declare a <i>fieldlabel</i> prefix for the structure.
<b>STATIC</b>	Declares a QUEUE, local to a PROCEDURE, whose buffer is allocated in static memory.
<b>THREAD</b>	Specify memory for the queue is allocated once for each execution thread. This implies the STATIC attribute on Procedure Local data.
<b>TYPE</b>	Specify the QUEUE is just a type definition for other QUEUE declarations.
<b>BINDABLE</b>	Specify all variables in the queue may be used in dynamic expressions.
<b>EXTERNAL</b>	Specify the QUEUE is defined, and its memory is allocated, in an external library.
<b>DLL</b>	Specify the QUEUE is defined in a .DLL. This is required in addition to the EXTERNAL attribute.
<i>fieldlabel</i>	The name of the <i>variables</i> in the queue.
<i>variable</i>	Data declaration. The sum of the memory required for all declared <i>variables</i> in the QUEUE must not be greater than 65,520 bytes in 16-bit applications and 4MB in 32-bit applications.

**QUEUE** declares a memory QUEUE structure. The *label* of the QUEUE structure is used in queue processing statements and procedures. When used in assignment statements, expressions, or parameter lists, a QUEUE is treated like a GROUP data type.

The structure of a QUEUE declared with the *group* parameter begins with the same structure as the named *group*; the QUEUE inherits the fields of the named *group*. The QUEUE may also contain its own *declarations* that follow the inherited fields. If the QUEUE will not contain any other fields, the name

of the *group* from which it inherits may be used as the data type without the `QUEUE` or `END` keywords.

A `QUEUE` may be thought of as a “memory file” internally implemented as a “dynamic array” of `QUEUE` entries. When a `QUEUE` is declared, a data buffer is allocated (just as with a file). Each entry in the `QUEUE` is run-length compressed during an `ADD` or `PUT` to occupy as little memory as necessary, and de-compressed during `GET`. There is no per-entry overhead.

The data buffer for a Procedure local `QUEUE` (declared in the data section of a `PROCEDURE`) is allocated on the stack (unless it has the `STATIC` attribute or is too large). The memory allocated to the entries in a procedure-local `QUEUE` without the `STATIC` attribute is allocated only until you `FREE` the `QUEUE`, or you `RETURN` from the `PROCEDURE`—the `QUEUE` is automatically `FREED` upon `RETURN`.

For a Global data, Module data, or Local data `QUEUE` with the `STATIC` attribute, the data buffer is allocated static memory and the data in the buffer is persistent between procedure calls. The memory allocated to the entries in the `QUEUE` remains allocated until you `FREE` the `QUEUE`.

The *variables* in the `QUEUE`’s data buffer are not automatically initialized to any value, they must be explicitly assigned values. Do not assume that they contain blanks or zero before your program’s first assignment to them.

As entries are added to the `QUEUE`, memory for the entry is dynamically allocated then the data copied from the buffer to the entry and compressed. As entries are deleted from the `QUEUE`, the memory used by the deleted entry is freed. The maximum number of entries in a `QUEUE` is theoretically  $2^{32}$ , but is actually dependant upon available virtual memory. The actual memory used by each entry in the `QUEUE` is dependent on the data compression ratio achieved by the runtime library.

A `QUEUE` with the `BINDABLE` attribute makes all the variables within the `QUEUE` available for use in a dynamic expression, without requiring a separate `BIND` statement for each (allowing `BIND(queue)` to enable all the fields in the queue). The contents of each variable’s `NAME` attribute is the logical name used in the dynamic expression. If no `NAME` attribute is present, the label of the variable (including prefix) is used. Space is allocated in the `.EXE` for the names of all of the variables in the structure. This creates a larger program that uses more memory than it normally would. Therefore, the `BINDABLE` attribute should only be used when a large proportion of the constituent fields are going to be used.

A `QUEUE` with the `TYPE` attribute is not allocated any memory; it is only a type definition for `QUEUE`s that are passed as parameters to `PROCEDURES`. This allows the receiving procedure to directly address component fields in the passed `QUEUE`. The parameter declaration on the `PROCEDURE` statement instantiates a local prefix for the passed `QUEUE` as

it names the passed QUEUE for the procedure. For example, PROCEDURE(LOC:PassedGroup) declares the procedure uses the LOC: prefix (along with the individual field names used in the type declaration) to directly address component fields of the QUEUE actually passed as the parameter.

The WHAT and WHERE procedures allow access to the fields by their relative position within the QUEUE structure.

Related Procedures:    **ADD, CHANGES, DELETE, FREE, GET, POINTER, PUT, RECORDS, SORT**

Example:

```
NameQue  QUEUE,PRE(Nam)                !Declare a queue
Name      STRING(20)
Zip       DECIMAL(5,0),NAME('SortField')
          END                          !End queue structure

NameQue2  QUEUE(NameQue),PRE(Nam2)      !Queue that inherits Name and Zip fields
Phone     STRING(10)                   ! and adds a Phone field
          END

NameQue3  NameQue2                     !Declare a second QUEUE with exactly
                                          ! the same structure as NameQue2
```

See Also:            **PRE, STATIC, NAME, FREE, THREAD, WHAT, WHERE**

## 5 - DECLARATION ATTRIBUTES

### Variable and Entity Attributes

#### AUTO (uninitialized local variable)

##### AUTO

The **AUTO** attribute allows a variable, declared within a PROCEDURE, to be allocated uninitialized stack memory. Without the AUTO attribute, a numeric variable is initialized to zero and a string variable is initialized to all blanks when its memory is assigned at run-time.

The AUTO attribute is used when you do not need to rely on an initial blank or zero value because you intend to assign some other value to the variable. This saves a small amount of run-time memory by eliminating the internal code necessary to perform the automatic initialization for the variable.

Example:

```
SomeProc  PROCEDURE
SaveCustID LONG,AUTO      !Non-initialized local variable
```

See Also: Data Declarations and Memory Allocation

#### BINARY (memo contains binary data)

##### BINARY

The **BINARY** attribute (PROP: BINARY) of a MEMO or BLOB declaration specifies the MEMO or BLOB will receive data that is not just ASCII characters. This attribute is normally used to store graphic images for display in an IMAGE field on screen. OEM conversion is not applied to MEMO or BLOB fields with the BINARY attribute. Some file drivers (Clarion, Btrieve, xBase) assume that the data in a BINARY MEMO or BLOB field is zero-padded, while non-BINARY data is space-padded.

Example:

```
Names      FILE,DRIVER('Clarion'),PRE(Nam)
NbrKey     KEY(Nam: Number)
Picture    MEMO(48000),BINARY      !Binary memo - 48,000 bytes
Rec        RECORD
Number     SHORT
. .
```

See Also: MEMO, BLOB, IMAGE. OEM

## BINDABLE (set runtime expression string variables)

### BINDABLE

The **BINDABLE** attribute declares a **GROUP**, **QUEUE**, **FILE**, or **VIEW** whose constituent variables are all available for use in a runtime expression string. The contents of each variable's **NAME** attribute is the logical name used in the dynamic expression. If no **NAME** attribute is present, the label of the variable (including prefix) is used. Space is allocated in the .EXE for the names of all of the variables in the structure. This creates a larger program that uses more memory than it normally would. Therefore, the **BINDABLE** attribute should only be used when a large proportion of the constituent fields are going to be used.

The **BIND(group)** form of the **BIND** statement must still be used in the executable code before the individual fields in the **QUEUE** structure may be used.

Example:

```
Names      QUEUE,BINDABLE                !Bindable Record structure
Name       STRING(20)
FileName   STRING(8),NAME('FName')      !Dynamic name: FName
Dot        STRING(1)                    !Dynamic name: Dot
Extension  STRING(3),NAME('EXT')         !Dynamic name: EXT
END

CODE
BIND(Names)

Names      FILE,DRIVER('Clarion'),BINDABLE !Bindable Record structure
Record     RECORD
Name       STRING(20)
FileName   STRING(8),NAME('FName')      !Dynamic name: FName
Dot        STRING(1)                    !Dynamic name: Dot
Extension  STRING(3),NAME('EXT')         !Dynamic name: EXT
. .
CODE
OPEN(Names)
BIND(Names)

FileNames  GROUP,BINDABLE                !Bindable group
FileName   STRING(8),NAME('FILE')        !Dynamic name: FILE
Dot        STRING('.')                   !Dynamic name: Dot
Extension  STRING(3),NAME('EXT')         !Dynamic name: EXT
END
```

See Also: **BIND, UNBIND, EVALUATE**

## CREATE (allow data file creation)

---

### CREATE

The **CREATE** attribute (PROP:CREATE) of a FILE declaration allows a disk file to be created by the CREATE statement from within the PROGRAM where the FILE is declared. This adds some overhead, as all the file information must be contained in the executable program.

Example:

```
Names FILE, DRIVER('Clarion'), CREATE      !Declare a file, allow create
Rec    RECORD
Name    STRING(20)
. .
```

## DIM (set array dimensions)

**DIM**(*dimension*,...,*dimension*)

<b>DIM</b>	Declares a variable as an array.
<i>dimension</i>	A numeric constant which specifies the number of elements in this <i>dimension</i> of the array.

The **DIM** attribute declares a variable as an array. The variable is repeated the number of times specified by the *dimension* parameters. Multi-dimensional arrays may be thought of as nested. Each *dimension* in the array has a corresponding subscript. Therefore, referencing a variable in a three dimensional array requires three subscripts. There is no limit to the number of dimensions; however, the total size of an array must not exceed 65,520 bytes of data in 16-bit applications (there is no limit in 32-bit applications).

Subscripts identify which element of the array is being referenced. A subscript list contains a subscript for each *dimension* of the array. Each subscript is separated by a comma and the entire list is enclosed in brackets ([ ]). A subscript may be a numeric constant, expression, or function. The entire array may be referenced by the label of the array without a subscript list.

A GROUP structure array is a special case. Each level of nesting adds subscripts to the GROUP. Data declared within the GROUP is referenced using standard Field Qualification syntax with each subscript specified at the GROUP level at which it is dimensioned.

Example:

```

Scr      GROUP                                !Characters on a DOS text-mode screen
Row      GROUP,DIM(25)                        !Twenty-five rows
Pos      GROUP,DIM(80)                        !Two thousand positions
Attr     BYTE                                !Attribute byte
Char     BYTE                                !Character byte
. . .                                         !Terminate the group structures
! In the group above:
!   Scr                                is a 4,000 byte GROUP
!   Scr.Row                           is a 4,000 byte GROUP
!   Scr.Row[1]                        is a 160 byte GROUP
!   Scr.Row[1].Pos                     is a 160 byte GROUP
!   Scr.Row[1].Pos[1]                 is a 2 byte GROUP
!   Scr.Row[1].Pos[1].Attr             is a single BYTE
!   Scr.Row[1].Pos[1].Char             is a single BYTE

Month    STRING(10),DIM(12)                  !Dimension the month to 12
CODE
CLEAR(Month)                                !Assign blanks to the entire array
Month[1] = 'January'                          !Load the months into the array
Month[2] = 'February'
Month[3] = 'March'

```

See Also:

**MAXIMUM**, Prototype Parameter Lists (Passing Arrays)



## DLL (set variable defined externally in .DLL)

**DLL**( [ *flag* ] )

**DLL** Declares a variable, FILE, QUEUE, GROUP, or CLASS defined externally in a .DLL.

*flag* A numeric constant, equate, or Project system define which specifies the attribute as active or not. If the *flag* is zero, the attribute is not active, just as if it were not present. If the *flag* is any value other than zero, the attribute is active.

The **DLL** attribute specifies that the declaration (this may any variable dclaration, or a FILE, QUEUE, GROUP, or CLASS structure) on which it is placed is defined in a .DLL. A declaration with DLL attribute must also have the EXTERNAL attribute. The DLL attribute is required for 32-bit applications because .DLLs are relocatable in a 32-bit flat address space, which requires one extra dereference by the compiler to address the variable. The DLL attribute is not valid on variables declared within FILE, QUEUE, CLASS, or GROUP structures.

The declarations in all libraries (or .EXEs) must be EXACTLY the same (with the appropriate addition of the EXTERNAL and DLL attributes). If they are not exactly the same, data corruption could occur. Any incompatibilities between libraries cannot be detected by the compiler or linker, therefore it is the programmer's responsibility to ensure that consistency is maintained.

When using EXTERNAL and DLL on declarations shared by .DLLs and .EXE, only one .DLL should define the variable, FILE, CLASS, or QUEUE without the EXTERNAL and DLL attributes. All the other .DLLs (and the .EXE) should declare the variable, FILE, CLASS, or QUEUE with the EXTERNAL and DLL attributes. This ensures that there is only one memory allocation for the variable, FILE, CLASS, or QUEUE and all the .DLLs and the .EXE will reference the same memory when referring to that variable, FILE, or QUEUE.

One suggested way of coding large systems using many .DLLs and/or .EXEs that share the same variables would have one .DLL containing the actual data definition that only contains FILE and global variable definitions that are shared among all (or most) of the .DLLs and .EXEs. This makes one central library in which the actual file definitions are maintained. This one central .DLL is linked into all .EXEs that use those common files. All other .DLLs and/or .EXEs in the system would declare the common variables with the EXTERNAL and DLL attributes.

Example:

```
TotalCount  LONG,EXTERNAL,DLL(dll_mode)      !A variable declared in an external .DLL
Cust        FILE,PRE(Cus),EXTERNAL(''),DLL(1) !File defined in PROGRAM module of a .DLL
CustKey      KEY(Cus:Name)
Record       RECORD
Name         STRING(20)

. .
DLLQueue     QUEUE,PRE(Que),EXTERNAL,DLL(1)  !A queue declared in an external .DLL
TotalCount   LONG
END
```

See Also:

**EXTERNAL**

## DRIVER (specify data file type)

**DRIVER**(*filetype* [,*driver string*])

<b>DRIVER</b>	Specifies the file system the file uses.
<i>filetype</i>	A string constant containing the name of the file manager (Btrieve, Clarion, etc.).
<i>driver string</i>	A string constant or variable containing any additional instructions to the file driver. All the valid values for this parameter are listed in each file driver's documentation.

The **DRIVER** attribute (PROP:DRIVER) specifies which file driver is used to access the data file. DRIVER is a required attribute of all FILE declarations.

Clarion programs use file drivers for physical file access. A file driver acts as a translator between a Clarion program and the file system, eliminating different access commands for each file system. File drivers allow access to files from different file systems without changes in the Clarion syntax.

The specific implementation method of each Clarion file access command is dependent on the file driver. Some commands may not be available in a file driver due to limitations in the file system. Each file driver is documented in the *User's Guide*. Any unsupported file access commands, FILE declaration attributes, data types, and/or file system idiosyncracies are listed there.

Example:

```
Names    FILE,DRIVER('Clarion')      !Begin file declaration
Record   RECORD
Name     STRING(20)
. .
```

## DUP (allow duplicate KEY entries)

### DUP

The **DUP** attribute (PROP:DUP) of a KEY declaration allows multiple records with the same key values to occur in a FILE. If the DUP attribute is omitted, attempting to ADD or PUT records with duplicate key values will generate the “Creates Duplicate Key” error, and the record will not be written to the file. During sequential processing using the KEY, records with duplicate key values are accessed in the physical order their entries appear in the KEY. The GET and SET statements generally access the first record in a set of duplicates.

The DUP attribute is unnecessary on INDEX declarations because an INDEX always allows duplicate entries.

Example:

```
Names      FILE,DRIVER('Clarion'),PRE(Nam)
NameKey    KEY(Nam:Name),DUP                !Declare name key, allow duplicate names
NbrKey     KEY(Nam:Number)                  !Declare number key, no duplicates allowed
Rec        RECORD
Name       STRING(20)
Number     SHORT
. .
```

See Also:           KEY, GET, SET

## ENCRYPT (encrypt data file)

### ENCRYPT

The **ENCRYPT** attribute (PROP:ENCRYPT) is used in conjunction with the OWNER attribute to disguise the information in a data file. ENCRYPT is only valid with an OWNER attribute. Even with a “hex-dump” utility, the data in an encrypted file is extremely difficult to decipher.

Example:

```
Names      FILE,DRIVER('Clarion'),OWNER('Clarion'),ENCRYPT
Record     RECORD
Name       STRING(20)
. .
```

See Also:           OWNER, EXTERNAL

## EXTERNAL (set defined externally)

### EXTERNAL(*member*)

<b>EXTERNAL</b>	Specifies the variable, FILE, &FILE, QUEUE, GROUP, or CLASS is defined in an external library.
<i>member</i>	A string constant (valid only on FILE or &FILE declarations) containing the filename (without extension) of the MEMBER module containing the actual FILE definition (the one without an EXTERNAL attribute). If the FILE is defined in a PROGRAM module, an empty <i>member</i> string (‘’) is required.

The **EXTERNAL** attribute specifies the variable, FILE, QUEUE, GROUP, or CLASS on which it is placed is defined in an external library. Therefore, a variable, FILE, QUEUE, GROUP, or CLASS with the EXTERNAL attribute is declared and may be referenced in the Clarion code, but is not allocated memory—the memory for the variable, FILE, QUEUE, GROUP, or CLASS is allocated by the external library. This allows the Clarion program access to any variable, FILE, QUEUE, GROUP, or CLASS declared as public in external libraries. The EXTERNAL attribute is not valid on variables declared inside FILE, QUEUE, GROUP, or CLASS structures.

When using EXTERNAL(*member*) to declare a FILE shared by multiple libraries (.LIBs, or .DLLs and .EXE), only one library should define the FILE without the EXTERNAL attribute. All the other libraries (and the .EXE) should declare the FILE with the EXTERNAL attribute. This ensures that there is only one record buffer allocated for the FILE and all the libraries and the .EXE will reference the same memory when referring to data elements from that FILE.

The declarations in all libraries (or .EXEs) must be EXACTLY the same (with the appropriate addition of the EXTERNAL and DLL attributes). For example, the FILE declarations in all libraries (or .EXEs) that reference common files must contain exactly the same keys, memos, and fields declared in exactly the same order. If they are not exactly the same, data corruption could occur. Any incompatibilities between libraries cannot be detected by the compiler or linker, therefore it is the programmer's responsibility to ensure that consistency is maintained.

Do not place the OWNER, ENCRYPT, or NAME attributes on a FILE which has the EXTERNAL attribute. These attributes should only be on the FILE structure declared without the EXTERNAL, because the EXTERNAL declaration is actually a re-declaration of a FILE already declared elsewhere. Therefore, these attributes are unnecessary.

One suggested way of coding large systems using many .DLLs and/or .EXEs that share the same files would have one .DLL containing the actual FILE definition that only contains FILE and global variable definitions that are

shared among all (or most) of the .DLLs and .EXEs. This makes one central library in which the actual file definitions are maintained. This one central .DLL is linked into all .EXEs that use those common files. All other .DLLs and/or .EXEs in the system would declare the common FILES with the EXTERNAL attribute.

Example:

```

PROGRAM
MAP
MODULE('LIB.LIB')
AddCount  PROCEDURE                                !External library procedure
. .
TotalCount  LONG,EXTERNAL                          !A variable declared in an external library
Cust  FILE,PRE(Cus),EXTERNAL('')                  !A File defined in a PROGRAM module
CustKey  KEY(Cus:Name)                             ! whose .LIB is linked into this program
Record  RECORD
Name  STRING(20)

. .
Contact  FILE,PRE(Con),EXTERNAL('LIB01')          !A File defined in a MEMBER module
ContactKey  KEY(Con:Name)                          ! whose .LIB is linked into this program
Record  RECORD
Name  STRING(20)
. .

! The LIB.CLW file contains:
PROGRAM
MAP
MODULE('LIB01')
AddCount  PROCEDURE                                !Library procedure
. .

TotalCount  LONG                                  !The TotalCount variable definition
Cust  FILE,PRE(Cus)                              !The Cust File definition where the
CustKey  KEY(Cus:Name)                            ! record buffer is allocated
Record  RECORD
Name  STRING(20)
. .

CODE
!Executable code ...

! The LIB01.CLW file contains:
MEMBER('LIB')

Contact  FILE,PRE(Con)                            !The Contact File definition where the
ContactKey  KEY(Con:Name)                          ! record buffer is allocated
Record  RECORD
Name  STRING(20)
. .

AddCount  PROCEDURE
CODE
TotalCount += 1

```

See Also: **DLL, NAME**

## FILTER (set view filter expression)

### FILTER(*expression*)

**FILTER** Specifies a filter *expression* used to evaluate records to include in the VIEW.

*expression* A string constant containing a logical expression.

The **FILTER** attribute (PROP:FILTER) specifies a filter *expression* used to evaluate records to include in the VIEW.

The *expression* may reference any field in the VIEW, at all levels of JOIN structures. The entire *expression* must evaluate as true for a record to be included in the VIEW. The *expression* may contain any valid Clarion language logical expression. The *expression* is evaluated at runtime (just like the EVALUATE procedure), therefore you must BIND all variables used in the *expression*.

Example:

```
BRW1::View:Browse VIEW(Members)
    PROJECT(Mem:MemberCode,Mem:LastName,Mem:FirstName)
    END
KeyValue STRING(20)
!Get only orders for customer 9999 since order number 100
ViewOrder VIEW(Customer),FILTER('Cus:AcctNumber = 9999 AND Hea:OrderNumber > 100')
    PROJECT(Cus:AcctNumber,Cus:Name)
    JOIN(Hea:AcctKey,Cus:AcctNumber)           !Join Header file
    PROJECT(Hea:OrderNumber)
    JOIN(Dtl:OrderKey,Hea:OrderNumber)         !Join Detail file
    PROJECT(Det:Item,Det:Quantity)
    JOIN(Pro:ItemKey,Dtl:Item)                 !Join Product file
    PROJECT(Pro:Description,Pro:Price)
    . . .
CODE
BIND('KeyValue',KeyValue)
BIND(Mem:Record)
KeyValue = 'Smith'
BRW1::View:Browse{PROP:Filter} = 'Mem:LastName = KeyValue' !Specify filter condition
OPEN(BRW1::View:Browse)                        !Open the view
SET(BRW1::View:Browse)                        ! and set to the beginning of the filtered
CODE                                           ! and ordered result set
OPEN((Customer,22h); OPEN((Header,22h); OPEN((Product,22h); OPEN(Detail,22h)
BIND('Cus:AcctNumber',Cus:AcctNumber)
BIND('Hea:OrderNumber',Hea:OrderNumber)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP
    NEXT(ViewOrder)
    IF ERRORCODE() THEN BREAK.
    !Process the valid record
END
UNBIND('Cus:AcctNumber',Cus:AcctNumber)
UNBIND('Hea:AcctNumber',Hea:AcctNumber)
CLOSE(Header); CLOSE(Customer); CLOSE(Product); CLOSE(Detail)
```

See Also:

**BIND, UNBIND, EVALUATE**

## INNER (set inner join operation)

### INNER

The **INNER** attribute (PROP:INNER) specifies the JOIN structure declares an “inner join” instead of the default “left outer join.”

The VIEW structure defaults to a “left outer join,” where all records for the VIEW’s *primary file* are retrieved whether the secondary file named in the JOIN structure contains any related records or not. Specifying the INNER attribute on the JOIN creates an “inner join” so that only those *primary file* records with related secondary file records are retrieved. Inner joins are normally more efficient than outer joins.

PROP:INNER is an array property of a VIEW indicating the presence or absence of the INNER attribute on a specific JOIN. Each array element returns one (‘1’) if the JOIN has the INNER attribute and blank (‘’) if it does not. The JOINS are numbered within the VIEW starting with 1 as they appear within the VIEW structure. (READ ONLY)

Example:

```

AView  VIEW(BaseFile)
        JOIN(ParentFile,'BaseFile.parentID = ParentFile.ID')           !JOIN 1
        JOIN(GrandParent.PrimaryKey, ParentFile.GrandParentID)       !JOIN 2
        END
        JOIN(OtherParent.PrimaryKey,BaseFile.OtherParentID),INNER      !JOIN 3
        END
END
        ! AView{PROP:Inner,1} returns ''
        ! AView{PROP:Inner,2} returns ''
        ! AView{PROP:Inner,3} returns '1'

ViewOrder VIEW(Customer),ORDER('Hea:OrderDate,Cus:Name')
        PROJECT(Cus:AcctNumber,Cus:Name,Cus:Zip)
        JOIN(Hea:AcctKey,Cus:AcctNumber),INNER           !Inner Join on Header
        PROJECT(Hea:OrderNumber,Hea:OrderDate)           ! gets only customers with orders
        JOIN(Dtl:OrderKey,Hea:OrderNumber),INNER          !Inner join on Detail file
        PROJECT(Det:Item,Det:Quantity)                   ! is natural and more efficient
        JOIN(Pro:ItemKey,Dtl:Item),INNER                  !Inner join on Product file
        PROJECT(Pro:Description,Pro:Price)                ! is natural and more efficient
        END
        END
        END
        END
END

```

See Also:

**JOIN**



## LINK (specify CLASS link into project)

**LINK**( *linkfile*, [ *flag* ] )

### **LINK**

Names a file to add to the link list for the current project.

### *linkfile*

A string constant naming an file (without an extension .OBJ is assumed) to link into the project. Normally, this would be the same as the parameter to the **MODULE** attribute, but may explicitly name a .LIB or .OBJ file.

### *flag*

A numeric constant, equate, or Project system define which specifies the attribute as active or not. If the *flag* is zero or omitted, the attribute is not active, just as if it were not present. If the *flag* is any value other than zero, the attribute is active.

A **LINK** attribute of a **CLASS** structure names a *linkfile* to add to the compiler's link list for the project. **LINK** is only valid on a **CLASS** structure.

Example:

```
OneClass  CLASS,MODULE('OneClass'),LINK('OneClass',1)      !Link in OneClass.OBJ
LoadIt    PROCEDURE
ComputeIt  PROCEDURE
END
```

See Also: **CLASS**, **MEMBER**, **MODULE**

## MODULE (specify CLASS member source file)

**MODULE**(*sourcefile*)

### **MODULE**

Names a **MEMBER** module or external library file.

### *sourcefile*

A string constant. If the sourcefile contains Clarion language source code, this specifies the filename (without extension) of the source file which contains the **PROCEDURES**. If the sourcefile is an external library, this string may contain any unique identifier.

A **MODULE** attribute of a **CLASS** structure names a **MEMBER** module or external library file which contains the **PROCEDURE** definitions for the **CLASS**'s member methods. **MODULE** is only valid on a **CLASS** structure.

Example:

```
OneClass  CLASS,MODULE('OneClass')      !Method definitions in OneClass.CLW
LoadIt    PROCEDURE                     !LoadIt procedure prototype
ComputeIt  PROCEDURE                     !ComputeIt procedure prototype
END
```

See Also: **CLASS**, **MEMBER**, **LINK**, **PROCEDURE** Prototypes

## NAME (set external name)

**NAME**( [*name*] )

<b>NAME</b>	Specifies an external name.
<i>name</i>	A string constant containing the external name or the label of a static string variable. This may be declared as Global data, Module data, or Local data with the <b>STATIC</b> attribute..

The **NAME** attribute (**PROP:NAME**) specifies an external name. The **NAME** attribute is completely independent of the **EXTERNAL** attribute—there is no required connection between the two, although both attributes may be used on the same declaration.

The **NAME** attribute may be placed on a **PROCEDURE** Prototype, **FILE**, **KEY**, **INDEX**, **MEMO**, any field declared within a **FILE**, any field declared within a **QUEUE** structure, or any variable not declared within a structure. The **NAME** attribute has different implications depending on where it is used.

### PROCEDURE Prototype Usage

**NAME** may be specified on a **PROCEDURE** Prototype. The *name* supplies the external name used by the linker to identify the procedure or function from an external library.

### Variable Usage

**NAME** may be used on any variable declared outside of any structure. This provides the linker with an external name to identify a variable declared in an external library. If the variable also has the **EXTERNAL** attribute, it is declared, and its memory is allocated, as a public variable in the external library. Without the **EXTERNAL** attribute, it is declared, and its memory is allocated, in the Clarion program, and it is declared as an external variable in the external library.

### FILE Usage

On a **FILE** statement, **NAME** specifies the filename of the data file for the file driver. If the *name* does not contain a drive and path, the current drive and directory are assumed. If the extension is omitted, the directory entry assumes the file driver's default value.

Some file drivers require that **KEYs**, **INDEXes**, or **MEMOs** be in separate files. Therefore, a **NAME** may also be placed on a **KEY**, **INDEX**, or **MEMO** declaration. A **NAME** attribute without a *name* parameter defaults to the label of the declaration statement on which it is placed (including any specified prefix).

NAME may be used on any field declared within a RECORD structure (the *name* parameter must be a constant, in this case). This provides the file driver with the name of a field as it may be used in that driver's file system.

You can dynamically change the name of a field within a FILE using PROP:NAME as an array. The array element number references the ordinal position of the field within the FILE.

### **QUEUE Usage**

The NAME attribute on a variable declared in a QUEUE structure specifies an external *name* for queue processing. The *name* provides an alternate method of addressing the variables in the QUEUE which may be used by the SORT, GET, PUT, and ADD statements.

Example:

```

PROGRAM
MAP
  MODULE('External.Obj')
AddCount  PROCEDURE(LONG),LONG,C,NAME('_AddCount')    !C function named '_AddCount'
  . .

Cust      FILE,PRE(Cus),NAME(CustName)                !Filename in CustName variable
CustKey   KEY('Name'),NAME('c:\data\cust.idx')        !Declare key, cust.idx
Record    RECORD
Name      STRING(20)                                  !Default NAME to 'Cus:Name'
  . .

SortQue   QUEUE
Field1    STRING(10),NAME('FirstField')              !QUEUE SORT NAME
Field2    LONG,NAME('SecondField')                   !QUEUE SORT NAME
  END

CurrentCnt LONG,EXTERNAL,NAME('Cur')                 !Field declared public in
                                                ! external library as 'Cur'
TotalCnt  LONG,NAME('Tot')                            !Field declared external
                                                ! in external library as 'Tot'

CODE
OPEN(Cust)
Cust{PROP:NAME,1} = 'Fred'                          !Cus:Name field now referenced as 'Fred'

```

See Also:

**PROCEDURE Prototypes, QUEUE, SORT, GET, PUT, ADD, FILE, KEY, INDEX, EXTERNAL**

**NOCASE (case insensitive KEY or INDEX)**

**NOCASE**

The **NOCASE** attribute (PROP:NOCASE) of a **KEY** or **INDEX** declaration makes the sorted sequence of alphabetic characters insensitive to the ASCII upper/lower case sorting convention. All alphabetic characters in key fields are converted to upper case as they are written to the **KEY**. This case conversion has no affect on the case of the stored data. The **NOCASE** attribute has no effect on non-alphabetic characters.

Example:

```
Names      FILE,DRIVER('Clarion'),PRE(Nam)
NameKey    KEY(Nam:Name),NOCASE           !Declare name key, make case insensitive
NbrKey     KEY(Nam:Number)                !Declare number key
Rec        RECORD
Name       STRING(20)
Number     SHORT
. .
```

See Also:           **INDEX, KEY**

## OEM (set international string support)

### OEM

The **OEM** attribute (PROP:OEM) specifies that the FILE on which it is placed contains non-English language string data that was stored by a DOS based program or needs to be read by a DOS based program. These strings are automatically translated from the OEM ASCII character set data contained in the file to the ANSI character set for display in Windows. All string data in the record is automatically translated from the ANSI character set to the OEM ASCII character set before the record is written to disk.

The specific OEM ASCII character set used for the translation comes from the DOS code page loaded by the *country*.SYS file. This makes the data file specific to the language used for that code page, and means the data may not be useable on a computer with a different code page loaded. This attribute may not be supported by all file systems; consult the specific file driver's documentation.

Example:

```
Cust    FILE,DRIVER('TopSpeed'),PRE(Cus),OEM    !Contains international strings
CustKey KEY(Cus:Name)
Record  RECORD
Name    STRING(20)
. .

Screen WINDOW('Window')
        ENTRY(@S20),USE(Cus:Name)
        BUTTON('&OK'),USE(?Ok),DEFAULT
        BUTTON('&Cancel'),USE(?Cancel)
        END

CODE
OPEN(Cust)                                !Open Cust file
SET(Cust)
NEXT(Cust)                                !Get record, ASCII strings are automatically
                                           ! translated to ANSI character set
OPEN(Screen)                              !Open window and display ANSI data
ACCEPT
CASE FIELD()
OF ?Ok
CASE EVENT()
OF EVENT:Accepted
    PUT(Cust)                              !Put record, ANSI strings are automatically
                                           ! translated to the OEM ASCII character set
                                           ! per the loaded DOS code page

    BREAK
END
END
END
CLOSE(Screen)
CLOSE(Cust)
```

See Also:

Environment Files, LOCALE

OPT (exclude null KEY or INDEX entries)

OPT

The **OPT** attribute (PROP:OPT) excludes entries in the **KEY** or **INDEX** for records with “null” values in all fields comprising the **KEY** or **INDEX**. For the purpose of this attribute, a “null” value is defined as zero in a numeric field or all blank spaces (20h) in a string field.

Example:

```
Names      FILE,DRIVER('Clarion'),PRE(Nam)      !Declare a file structure
NameKey     KEY(Nam:Name),OPT                    !Declare name key, exclude blanks
NbrKey      KEY(Nam:Number),OPT                  !Declare number key, exclude zeroes
Rec         RECORD
Name        STRING(20)
Number      SHORT
. .
```

See Also: INDEX, KEY

## ORDER (set view sort order expression)

### ORDER(*expression list*)

**ORDER** Specifies an *expression list* used to sort the records in the VIEW.

*expression list* A single string constant containing one or more expressions. Each expression in the list must be separated by a comma from the preceding expression.

The **ORDER** attribute (PROP:ORDER) specifies an *expression list* used to sort the records in the VIEW. The expressions within the *expression list* evaluate from left to right, with the leftmost expression defining the most significant sort and the rightmost defining the least significant sort. Expressions that begin with a unary minus (-) sort in descending order.

The *expression* may reference any field in the VIEW, at all levels of JOIN structures. The expressions in the *expression list* may contain any valid Clarion language expression. The *expression list* is evaluated at runtime (just like the EVALUATE procedure), therefore you must BIND all variables used in the *expression*.

For non-SQL file systems, the VIEW will use keys to do most of the sorting wherever possible, sorting only groups of records which have the same key values, keeping one 'bucket' sorted. Therefore, additional sort fields on top of a key can be quite efficient.

For SQL file systems, PROP:SQLOrder is an SQL-only equivalent to PROP:ORDER. For both of these properties, if the first character of the expression assigned to them is a plus sign (+) then that expression is concatenated to the existing order expression. For PROP:SQLOrder, if the first character of the expression assigned is a minus sign (-) then the existing order expression is concatenated to that expression. If the first character is not plus (or minus), the new expression overrides the existing expression.

Example:

```
!Orders sorted in descending date order, then customer name (by name within each date)
ViewOrder VIEW(Customer),ORDER(' -Hea:OrderDate,Cus:Name')
    PROJECT(Cus:AcctNumber,Cus:Name,Cus:Zip)
    JOIN(Hea:AcctKey,Cus:AcctNumber)          !Join Header file
    PROJECT(Hea:OrderNumber,Hea:OrderDate)
    JOIN(Dtl:OrderKey,Hea:OrderNumber)       !Join Detail file
    PROJECT(Det:Item,Det:Quantity)
    JOIN(Pro:ItemKey,Dtl:Item)               !Join Product file
    PROJECT(Pro:Description,Pro:Price)
    . . . .
CODE
ViewOrder{PROP:ORDER} = ' -Hea:OrderDate,Pro:Price-Det:DiscountPrice'
!Orders sorted by greatest discount within descending order date
```

See Also:

**BIND, UNBIND, EVALUATE**

## OVER (set shared memory location)

### OVER(*overvariable*)

#### OVER

Allows one memory address to be referenced two different ways.

#### *overvariable*

The label of a variable that already occupies the memory to be shared.

The **OVER** attribute allows one memory address to be referenced two different ways. The variable declared with the OVER attribute must not be larger than the *overvariable* it is being declared OVER (it may be smaller, though).

You may declare a variable OVER an *overvariable* which is part of the parameter list passed into a PROCEDURE.

A field within a GROUP structure cannot be declared OVER a *variable* outside that GROUP structure.

Example:

```
SomeProc PROCEDURE(PassedGroup)      !Proc receives a GROUP parameter

NewGroup GROUP,OVER(PassedGroup)     !Redeclare passed GROUP parameter
Field1   STRING(10)                  !Compiler warning issued that
Field2   STRING(2)                   ! NewGroup must not be larger
END                                     ! than PassedGroup

CustNote FILE,PRE(Csn)               !Declare CustNote file
Notes    MEMO(2000)                  !The memo field
Record   RECORD
CustID    LONG
. .

CsnMemoRow STRING(10),DIM(200),OVER(Csn:Notes)
                                           !Csn:Notes memo may be addressed
                                           ! as a whole or in 10-byte chunks
```

See Also:

**DIM**



## OWNER (declare password for data encryption)

OWNER(*password*)

OWNER

Specifies a file encryption password.

*password*

A string constant or variable.

The **OWNER** attribute (PROP:OWNER) specifies the *password* which is used by the ENCRYPT attribute to encrypt the data. An “Invalid Data File” error occurs if the *password* does not match the password that was actually used to encrypt the file.

An OWNER attribute without an accompanying ENCRYPT attribute is allowed by some file systems.

Example:

```
Customer  FILE,DRIVER('Clarion'),OWNER('abCdeF'),ENCRYPT
           !Encrypt data password "abCdeF"
Record    RECORD
Name      STRING(20)
. .
```

See Also:            ENCRYPT, EXTERNAL

## PRE (set label prefix)

### PRE( [ *prefix* ] )

<b>PRE</b>	Provides a label prefix for complex data structures.
<i>prefix</i>	Acceptable characters are alphabet letters, numerals 0 through 9, and the underscore character. A <i>prefix</i> must start with an alpha character or underscore. By convention, a <i>prefix</i> is 1-3 characters, although it can be longer.

The **PRE** attribute provides a label prefix for a FILE, QUEUE, GROUP, REPORT, or ITEMIZE structure. PRE is also valid on a LIKE declaration to provide a separate prefix when LIKE is used to declare another copy of a complex data structure.

PRE is used to distinguish between identical variable names that occur in different structures. When a data element from a complex data structure is referenced in executable statements, assignments, and parameter lists, the *prefix* is attached to its label by a colon (Pre:Label).

PRE is essentially a legacy attribute which is being replaced by a more flexible method to distinguish between identical variable names that occur in different structures: Field Qualification syntax. When referenced in executable statements, assignments, and parameter lists, the label of the structure containing the field is attached to the field label by a period (GroupName.Label).

Example:

```
MasterFile  FILE,DRIVER('Clarion'),PRE(Mst)           !Declare master file layout
Record      RECORD
AcctNumber  LONG                                     !Referenced as Mst:AcctNumber or MasterFile.AcctNumber
. .
Detail      FILE,DRIVER('Clarion'),PRE(Dtl)           !Declare detail file layout
Record      RECORD
AcctNumber  LONG                                     !Referenced as Dtl:AcctNumber or Detail.AcctNumber
. .
SaveQueue   QUEUE,PRE(Sav)
AcctNumber  LONG                                     !Referenced as Sav:AcctNumber or SaveQueue.AcctNumber
END
G1           GROUP,PRE(Mem)                           !Declare some memory variables
Message     STRING(30)                                ! with the Mem prefix
END
G2           LIKE(G1),PRE(Me2)                         !Another GROUP LIKE the first containing same
CODE        ! variables using the "Me2" prefix
IF Dtl:AcctNumber <> Mst:AcctNumber                    !Is it a new account
    Mem:Message = 'New Account'                        ! display message
    Me2:Message = 'Variable in LIKE group'
END
IF Detail.AcctNumber <> Masterfile.AcctNumber          !Same expression
    G1.Message = 'New Account'                         ! display message
    G2.Message = 'Same Variable in LIKE group'
END
```

See Also: Reserved Words, Field Qualification

## PRIMARY (set relational primary key)

### PRIMARY

The **PRIMARY** attribute (PROP:PRIMARY) specifies the KEY is unique, includes all records in the file, and does not allow “null” values in any of the fields comprising the KEY. This is the definition of a file’s “Primary Key” per the relational database theory as expressed by E. F. Codd.

Example:

```
Names      FILE, DRIVER('TopSpeed'), PRE(Nam)      !Declare a file structure
NameKey     KEY(Nam:Name), OPT                     !Declare name key, exclude blanks
NbrKey      KEY(Nam:Number), PRIMARY               !Declare number key as the primary key
Rec         RECORD
Name        STRING(20)
Number      SHORT
. .
```

See Also:           KEY

## PRIVATE (set variable private to a CLASS module)

### PRIVATE

The **PRIVATE** attribute specifies that the variable on which it is placed is visible only to the PROCEDURES defined within the source module containing the methods of the CLASS structure (whether members of the CLASS or not). This encapsulates the data from other CLASSES.

Example:

```
OneClass    CLASS, MODULE('OneClass.CLW'), TYPE
PublicVar   LONG                                !Declare a Public variable
PrivateVar  LONG, PRIVATE                       !Declare a Private variable
BaseProc    PROCEDURE(REAL Parm)               !Declare a Public method
            END
TwoClass    OneClass                            !Instance of OneClass
            CODE
            TwoClass.PublicVar = 1               !Legal assignment
            TwoClass.PrivateVar = 1             !Illegal assignment

!OneClass.CLW contains:
            MEMBER()
            MAP
SomeLocalProc  PROCEDURE
            END
OneClass.BaseProc  PROCEDURE(REAL Parm)
            CODE
            SELF.PrivateVar = Parm              !Legal assignment
SomeLocalProc  PROCEDURE
            CODE
            TwoClass.PrivateVar = 1             !Legal assignment
```

See Also:           CLASS

## PROTECTED (set variable private to a CLASS or derived CLASS)

### PROTECTED

The **PROTECTED** attribute specifies that the variable on which it is placed is visible only to the PROCEDURES declared within the same CLASS structure (the methods of that CLASS) and any CLASS derived from the CLASS in which it is declared. This encapsulates the data from any code external to the specific CLASS and its derived CLASSES.

Example:

```
OneClass      CLASS,MODULE('OneClass.CLW'),TYPE
PublicVar     LONG                                !Declare a Public variable
PrivateVar    LONG,PRIVATE                        !Declare a Private variable
BaseProc      PROCEDURE(REAL Parm)               !Declare a Public method
END
TwoClass      OneClass                            !Instance of OneClass
CODE
  TwoClass.PublicVar = 1                          !Legal assignment
  TwoClass.PrivateVar = 1                        !Illegal assignment

!OneClass.CLW contains:
  MEMBER()
  MAP
SomeLocalProc  PROCEDURE
END

OneClass.BaseProc  PROCEDURE(REAL Parm)
CODE
  SELF.PrivateVar = Parm                        !Legal assignment

SomeLocalProc  PROCEDURE
CODE
  TwoClass.PrivateVar = 1                      !Legal assignment
```

See Also:            **CLASS**

## RECLAIM (reuse deleted record space)

### RECLAIM

The **RECLAIM** attribute (PROP:RECLAIM) specifies that the file driver adds new records to the file in the space previously used by a record that has been deleted, if available. Otherwise, the record is added at the end of the file. Implementation of RECLAIM is file driver specific and may not be supported in all file systems.

Example:

```
Names      FILE,DRIVER('Clarion'),RECLAIM !Reuse deleted record space
Record     RECORD
Name       STRING(20)
. . .
```

## STATIC (set allocate static memory)

### STATIC

The **STATIC** attribute allocates a variable, GROUP, or QUEUE structure declared within a PROCEDURE static memory instead of stack memory. On a QUEUE structure, only the data buffer is allocated static memory—QUEUE entries are always allocated memory dynamically on the heap. **STATIC** makes values contained in the variable or QUEUE data buffer “persistent” from one instance of the procedure to the next.

Example:

```
SomeProc  PROCEDURE
SaveQueue QUEUE,STATIC      !Static QUEUE data buffer
Field1    LONG              !Value retained between
Field2    STRING            ! procedure calls
END

AcctFile  STRING(64),STATIC  !STATIC needed for use as
                                ! Variable in NAME attribute

Transactions  FILE,DRIVER('Clarion'),PRE(TRA),NAME(AcctFile)
AccountKey    KEY(TRA:Account),OPT,DUP
Record        RECORD
Account       SHORT          !Account code
Date          LONG           !Transaction Date
Amount        DECIMAL(13,2)  !Transaction Amount
. .
```

See Also: [Data Declarations and Memory Allocation](#)

## THREAD (set thread-specific memory allocation)

---

### THREAD

The **THREAD** attribute declares a variable, FILE, GROUP, QUEUE, or CLASS which is allocated memory separately for each execution thread in the program. This makes the values dependent upon which thread is executing.

A threaded variable must be allocated static memory, so Local data with the THREAD attribute is automatically considered STATIC. This attribute creates runtime “overhead,” particularly on Global or Module data. Therefore, it should be used only when necessary.

### Variable and GROUP Usage

The THREAD attribute declares a static variable which is allocated memory separately for each execution thread in the program. This makes the value contained in the variable dependent upon which thread is executing. Whenever a new execution thread is begun, a new instance of the variable, specific to that thread, is created and initialized to blank or zero (unless the AUTO attribute is also present).

### FILE Usage

The THREAD attribute (PROP:THREAD—valid only for a FILE) on a FILE declaration allocates memory for its record buffer (and file control block) separately for each execution thread in the program. This makes the values contained in the record buffer dependent upon which thread is executing.

Whenever a new execution thread is started, the FILE must be OPENed again to receive a new instance of the record buffer. When the FILE is closed, the thread’s instance of the record buffer is de-allocated.

### QUEUE Usage

The THREAD attribute on a QUEUE declaration declares a static QUEUE data buffer which is allocated memory separately for each execution thread in the program. This makes the values contained in the QUEUE dependent upon which thread is executing. Whenever a new execution thread is begun, a new instance of the QUEUE, specific to that thread, is created.

Example:

```

        PROGRAM
        MAP
Thread1   PROCEDURE
Thread2   PROCEDURE
        END

Names     FILE, DRIVER('Clarion'), PRE(Nam), THREAD    !Threaded file
NbrNdx    INDEX(Nam: Number), OPT
Rec       RECORD
Name      STRING(20)
Number    SHORT
        . .

GlobalVar LONG, THREAD    !Each execution thread gets its own copy OF GlobalVar

        CODE
        START(Thread1)
        START(Thread2)

Thread1   PROCEDURE
LocalVar  LONG, THREAD    !Local threaded variable (automatically STATIC)
        CODE
        OPEN(Names)      !OPEN creates new record buffer instance
        SET(Names)       ! containing the first record in the file
        NEXT(Names)

Thread2   PROCEDURE
SaveQueue QUEUE, THREAD    !Static QUEUE data buffer Thread-specific QUEUE
Name      STRING(20)
Number    SHORT
        END
        CODE
        OPEN(Names)      !OPEN creates another new record buffer instance
        SET(Names)       ! containing the last record in the file
        PREVIOUS(Names)

```

See Also:            **START, Data Declarations and Memory Allocation, STATIC, AUTO**

## TYPE (type definition)

### TYPE

The **TYPE** attribute creates a type definition for a **GROUP**, **QUEUE**, or **CLASS** (a “named structure”). The label of the named structure can then be used as a data type to define other similar **GROUP**s, **QUEUE**s, or **CLASSES** (or you can use **LIKE**). **TYPE** may also be used to define named structures passed to **PROCEDURES**, allowing the receiving procedure to directly address components of the type definition using Field Qualification syntax.

A **GROUP**, **QUEUE**, or **CLASS** declaration with the **TYPE** attribute is not allocated any memory. While the data members of a **CLASS** with the **TYPE** attribute are not allocated memory, the methods prototyped in the **CLASS** must be defined for use by any subsequent objects declared as that type. **EXTERNAL** and **DLL** are irrelevant.

When a type definition is used to pass a named structure as a parameter to a **PROCEDURE**, the receiving procedure may directly address component fields in the passed **QUEUE** using the Field Qualification syntax. This is the preferred method of addressing the components of the passed structure.

There is also a legacy method of addressing the components of the passed structure. The named structure parameter declaration on the **PROCEDURE** definition statement (not the prototype) can instantiate a local prefix for the passed **QUEUE** as it names the passed **QUEUE** for the procedure. For example, **PROCEDURE(LOC:PassedQueue)** declares the procedure uses the **LOC**: prefix (along with the individual field names used in the type definition) to directly address component fields of the **QUEUE** passed as the parameter using the same type of syntax that the **PRE** attribute specifies. However, using Field Qualification syntax is preferable—locally instantiated prefixes are only maintained for backward compatibility.

Example:

```

MAP
MyProc1    PROCEDURE(PassQue)      !Passes a QUEUE defined the same as PassGroup
END
PassQue    QUEUE,TYPE              !Type-definition for passed QUEUE parameters
First      STRING(20)              ! first name
Middle     STRING(1)               ! middle initial
Last       STRING(20)              ! last name
END
NameQue    QUEUE(PassQue)          !Name queue-- same structure as PassQue
END
!End queue declaration

CODE
MyProc1(NameQue)                   !Call proc passing NameQue as parameter

MyProc1    PROCEDURE(PassedQue)    !Proc to receive QUEUE parameter
LocalVar   STRING(20)
CODE
LocalVar = PassedQue.First         !Assign NameQue.First to LocalVar from parameter

```

See Also: Field Qualification, Prototype Parameters Lists, **CLASS**, **GROUP**



# 6 - WINDOWS

## Window Structures

### APPLICATION (declare an MDI frame window)

```

label  APPLICATION('title') [,AT( )] [,CENTER] [,SYSTEM] [,MAX] [,ICON( )] [,STATUS( )] [,HLP( )]
        [,CURSOR( )] [,TIMER( )] [,ALRT( )] [,ICONIZE] [,MAXIMIZE] [,MASK] [,FONT( )]
        [,MSG( )] [,IMM] [,AUTO] [,PALETTE()]
        [,WALLPAPER( )] [, | TILED      | ] [, | HSCROLL  | ] [, | DOUBLE   | ]
        | CENTERED | | | VSCROLL  | | | NOFRAME  |
        |           | | | HVSCROLL | | | RESIZE   |
        [ MENUBAR
          multiple menu and/or item declarations
        END ]
        [ TOOLBAR
          multiple control field declarations
        END ]
      END

```

<b>APPLICATION</b>	Declares a Multiple Document Interface (MDI) frame.
<i>label</i>	A valid Clarion label (required).
<i>title</i>	Specifies the title text for the application window (PROP:Text).
<b>AT</b>	Specifies the initial size and location of the application window (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CENTER</b>	Specifies that the window's initial position is centered in the screen by default (PROP:CENTER). This attribute takes effect only if at least one parameter of the <b>AT</b> attribute is omitted.
<b>SYSTEM</b>	Specifies the presence of a system menu (PROP:SYSTEM).
<b>MAX</b>	Specifies the presence of a maximize control (PROP:MAX).
<b>ICON</b>	Specifies the presence of a minimize control, and names a file or standard icon identifier for the icon displayed when the window is minimized (PROP:ICON).
<b>STATUS</b>	Specifies the presence of a status bar at the base of the application window (PROP:STATUS).
<b>HLP</b>	Specifies the "Help ID" associated with the APPLICATION window and provides the default for any child windows (PROP:HLP).

<b>CURSOR</b>	Specifies a mouse cursor to be displayed when the mouse is positioned over the APPLICATION window (PROP:CURSOR). If omitted, the Windows default cursor is used.
<b>TIMER</b>	Specifies periodic timed event generation (PROP:TIMER).
<b>ALRT</b>	Specifies “hot” keys active for the APPLICATION (PROP:ALRT).
<b>ICONIZE</b>	Specifies the APPLICATION is opened as an icon (PROP:ICONIZE).
<b>MAXIMIZE</b>	Specifies the APPLICATION is maximized when opened (PROP:MAXIMIZE).
<b>MASK</b>	Specifies pattern input editing mode of all ENTRY controls in the TOOLBAR (PROP:MASK).
<b>FONT</b>	Specifies the default font for all controls in the toolbar (PROP:FONT).
<b>MSG</b>	Specifies a string constant containing the default text to display in the status bar for all controls in the APPLICATION (PROP:MSG).
<b>IMM</b>	Specifies the window generates events whenever it is moved or resized (PROP:IMM).
<b>AUTO</b>	Specifies all toolbar controls’ USE variables re-display on screen each time through the ACCEPT loop (PROP:AUTO).
<b>PALETTE</b>	Specifies the number of hardware colors used for graphics in the window (PROP:PALETTE).
<b>WALLPAPER</b>	Specifies the background image to display in the window’s client area (PROP:WALLPAPER). The image stretches to fill the entire client area of the window unless the TILED or CENTERED attribute is also present.
<b>TILED</b>	Specifies the WALLPAPER image displays at its default size and is tiled to fill the entire client area of the window (PROP:TILED).
<b>CENTERED</b>	Specifies the WALLPAPER image displays at its default size and is centered in the entire client area of the window (PROP:CENTERED).
<b>HSCROLL</b>	Specifies a horizontal scroll bar is automatically added to the application frame when any portion of a child window lies horizontally outside the visible area (PROP:FSCROLL).

<b>VSCROLL</b>	Specifies a vertical scroll bar is automatically added to the application frame when any portion of a child window lies vertically outside the visible area (PROP:VSCROLL).
<b>HVSCROLL</b>	Specifies both vertical and horizontal scroll bars are automatically added to the application frame when any portion of a child window lies outside the visible area (PROP:HVSCROLL).
<b>DOUBLE</b>	Specifies a double-width frame around the window (PROP:DOUBLE).
<b>NOFRAME</b>	Specifies a window with no frame (PROP:NOFRAME).
<b>RESIZE</b>	Specifies a thick frame around the window which does allow window resizing (PROP:RESIZE).
<b>MENUBAR</b>	Defines the menu structure (optional). The menu specified in an APPLICATION is the “Global menu.”
<b>TOOLBAR</b>	Defines a toolbar structure (optional). The toolbar specified in an APPLICATION is the “Global toolbar.”

**APPLICATION** declares a Multiple Document Interface (MDI) frame window. MDI is a part of the standard Windows interface, and is used by Windows applications to present several “views” in different windows. This is a way of organizing and grouping these. The MDI frame window (APPLICATION structure) acts as a “parent” for all the MDI “child” windows (WINDOW structures with the MDI attribute). These MDI “child” windows are clipped to the APPLICATION frame and automatically moved when the frame is moved, and can be totally concealed by minimizing the parent.

There may be only one APPLICATION window open at any time in a Clarion Windows program, and it must be opened before any MDI “child” windows may be opened. However, non-MDI windows may be opened before or after the APPLICATION is opened, and may be on the same execution thread as the APPLICATION.

An MDI “child” window must not be on the same execution thread as the APPLICATION. Therefore, any MDI “child” window called directly from the APPLICATION must be in a separate procedure so the START procedure can be used to begin a new execution thread. Once started, multiple MDI “child” windows may be called in the new thread.

A “conventional” APPLICATION window would have the ICON, MAX, STATUS, RESIZE, and SYSTEM attributes. This creates an application frame window with minimize and maximize buttons, a status bar, a resizable frame, and a system menu. It would also have a MENUBAR structure containing the global menu items, and may have a TOOLBAR with “shortcuts” to global menu items. These attributes create a standard Windows look and feel for the application frame.

An APPLICATION window may not contain controls except within its MENUBAR and TOOLBAR structures, and cannot be used for any output. For output, document windows or dialog boxes are required (defined using the WINDOW structure).

When the APPLICATION window is first opened, it remains hidden until the first DISPLAY statement or ACCEPT loop is encountered. This enables any changes to be made to the appearance before it is displayed. Events for the APPLICATION window are processed by the first ACCEPT loop encountered after the APPLICATION window is first opened.

Events Generated:

EVENT:PreAlertKey	The user pressed an ALRT attribute hot key.
EVENT:AlertKey	The user pressed an ALRT attribute hot key.
EVENT:CloseWindow	The window is closing.
EVENT:CloseDown	The application is closing.
EVENT:OpenWindow	The window is opening.
EVENT:LoseFocus	The window is losing focus to another thread.
EVENT:GainFocus	The window is gaining focus from another thread.
EVENT:Suspend	The window still has input focus but is giving control to another thread to process timer events.
EVENT:Resume	The window still has input focus and is regaining control from an EVENT:Suspend.
EVENT:Timer	The TIMER attribute has triggered.
EVENT:Move	The user is moving the window. CYCLE aborts the move.
EVENT:Moved	The user has moved the window.
EVENT:Size	The user is resizing the window. CYCLE aborts the resize.
EVENT:Sized	The user has resized the window.
EVENT:Restore	The user is restoring the window's previous size. CYCLE aborts the resize.
EVENT:Restored	The user has restored the window's previous size.
EVENT:Maximize	The user is maximizing the window. CYCLE aborts the resize.
EVENT:Maximized	The user has maximized the window.
EVENT:Iconize	The user is minimizing the window. CYCLE aborts the resize.

EVENT:Iconized The user has minimized the window.

EVENT:Completed AcceptAll (non-stop) mode has finished processing all the window's controls.

EVENT:DDErequest  
A client has requested a data item from this Clarion DDE server application.

EVENT:DDEadvise  
A client has requested continuous updates of a data item from this Clarion DDE server application.

EVENT:DDEexecute  
A client has executed a DDEEXECUTE statement to this Clarion DDE server application.

EVENT:DDEpoke A client has sent unsolicited data to this Clarion DDE server application.

EVENT:DDEdata A DDE server has supplied an updated data item to this Clarion client application.

EVENT:DDEclosed A DDE server has terminated the DDE link to this Clarion client application.

Related Procedures:

ACCEPT, ALERT, EVENT, POST, REGISTER, UNREGISTER, YIELD, ACCEPTED, CHANGE, CHOICE, CLOSE, CONTENTS, CREATE, DESTROY, DISABLE, DISPLAY, ENABLE, ERASE, FIELD, FIRSTFIELD, FOCUS, GETFONT, GETPOSITION, HELP, HIDE, INCOMPLETE, LASTFIELD, MESSAGE, MOUSEX, MOUSEY, OPEN, POPUP, SELECT, SELECTED, SET3DLOOK, SETCURSOR, SETFONT, SETPOSITION, SETTARGET, UNHIDE, UPDATE

Example:

```

!An MDI application frame window with system menu, minimize and maximize
! buttons, a status bar, scroll bars, and a resizable frame, containing the
! main menu and toolbar for the application:
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS |
,HVSCROLL,RESIZE
    MENUBAR
        MENU('&File'),USE(?FileMenu)
            ITEM('&Open...'),USE(?OpenFile)
            ITEM('&Close'),USE(?CloseFile),DISABLE
            ITEM('E&xit'),USE(?MainExit)
        END
        MENU('&Edit'),USE(?EditMenu)
            ITEM('Cu&t'),USE(?CutText),KEY(CtrlX),STD(STD:Cut),DISABLE
            ITEM('&Copy'),USE(?CopyText),KEY(CtrlC),STD(STD:Copy),DISABLE
            ITEM('&Paste'),USE(?PasteText),KEY(CtrlV),STD(STD:Paste),DISABLE
        END
        MENU('&Window'),STD(STD:WindowList),LAST
            ITEM('&Tile'),STD(STD:TileWindow)
            ITEM('&Cascade'),STD(STD:CascadeWindow)
            ITEM('&Arrange Icons'),STD(STD:ArrangeIcons)
        END
        MENU('&Help'),USE(?HelpMenu)
            ITEM('&Contents'),USE(?HelpContents),STD(STD:HelpIndex)
            ITEM('&Search...'),USE(?HelpSearch),STD(STD:HelpSearch)
            ITEM('&How to Use Help'),USE(?HelpOnHelp),STD(STD:HelpOnHelp)
            ITEM('&About MyApp...'),USE(?HelpAbout)
        END
    END
    TOOLBAR
        BUTTON('E&xit'),USE(?MainExitButton)
        BUTTON('&Open'),USE(?OpenButton),ICON(ICON:Open)
    END
END
CODE
OPEN(MainWin)                !Open APPLICATION
ACCEPT                        !Display APPLICATION and accept user input
    CASE ACCEPTED()           !Which control was chosen?
        OF ?OpenFile          !Open... menu selection
        OROF ?OpenButton      !Open button on toolbar
            START(OpenFileProc) !Start new execution thread
        OF ?MainExit           !Exit menu selection
        OROF ?MainExitButton   !Exit button on toolbar
            BREAK              !Break ACCEPT loop
        OF ?HelpAbout          !About... menu selection
            HelpAboutProc       !Call application information procedure
    END
END
CLOSE(MainWin)                !Close APPLICATION

```

See Also:

ACCEPT, WINDOW, MDI, MENUBAR, TOOLBAR

## WINDOW (declare a dialog window)

```

label    WINDOW('title') [,AT( )] [,CENTER] [,SYSTEM] [,MAX] [,ICON( )] [,STATUS( )] [,HLP( )]
        [,CURSOR( )] [,MDI] [,MODAL] [,MASK] [,FONT( )] [,GRAY] [,TIMER( )] [,ALRT( )]
        [,ICONIZE] [,MAXIMIZE] [,MSG( )] [,PALETTE( )] [,DROPID( )] [,IMM]
        [,AUTO] [,COLOR( )] [,TOOLBOX] [,DOCK( )] [,DOCKED( )]
        [,WALLPAPER( )] [, , | TILED | ] [, | HSCROLL | ] [, | DOUBLE | ]
        | CENTERED | | VSCROLL | | NOFRAME |
        | | HVSCROLL | | RESIZE |

[ MENUBAR
  menus and/or items
END ]
[ TOOLBAR
  controls
END ]
controls
END

```

<b>WINDOW</b>	Declares a document window or dialog box.
<i>label</i>	A valid Clarion label. A <i>label</i> is required.
<i>title</i>	A string constant containing the window's title text (PROP:Text).
<b>AT</b>	Specifies the initial size and location of the window (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CENTER</b>	Specifies that the window's initial position is centered on screen relative to its parent window, by default (PROP:CENTER). This attribute takes effect only if at least one parameter of the AT attribute is omitted.
<b>SYSTEM</b>	Specifies the presence of a system menu (PROP:SYSTEM).
<b>MAX</b>	Specifies the presence of a maximize control (PROP:MAX).
<b>ICON</b>	Specifies the presence of a minimize control, and names a file or standard icon identifier for the icon displayed when the window is minimized (PROP:ICON).
<b>STATUS</b>	Specifies the presence of a status bar for the window (PROP:STATUS).
<b>HLP</b>	Specifies the "Help ID" associated with the window (PROP:HLP).
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the window (PROP:CURSOR). This cursor is inherited by the WINDOW's controls unless overridden on the individual control.
<b>MDI</b>	Specifies that the window conforms to normal MDI child-window behavior (PROP:MDI).

<b>MODAL</b>	Specifies the window is “system modal” and must be closed before the user may do anything else (PROP:MODAL).
<b>MASK</b>	Specifies pattern input editing mode of all entry controls in this window (PROP:MASK).
<b>FONT</b>	Specifies the default font for all controls in this window (PROP:FONT).
<b>GRAY</b>	Specifies that the window has a gray background for use with 3-D look controls (PROP:GRAY).
<b>TIMER</b>	Specifies periodic timed event generation (PROP:TIMER).
<b>ALRT</b>	Specifies “hot” keys active when the window has focus (PROP:ALRT).
<b>ICONIZE</b>	Specifies the window is opened as an icon (PROP:ICONIZE).
<b>MAXIMIZE</b>	Specifies the window is maximized when opened (PROP:MAXIMIZE).
<b>MSG</b>	Specifies a string constant containing the default text to display in the status bar for all controls in the window (PROP:MSG).
<b>PALETTE</b>	Specifies the number of hardware colors used for graphics in the window (PROP:PALETTE).
<b>DROPID</b>	Specifies the window may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>IMM</b>	Specifies the window generates events whenever it is moved or resized (PROP:IMM).
<b>AUTO</b>	Specifies all window controls’ USE variables re-display on screen each time through the ACCEPT loop (PROP:AUTO).
<b>COLOR</b>	Specifies a background color for the WINDOW and default background and selected colors for the controls in the WINDOW (PROP:COLOR).
<b>TOOLBOX</b>	Specifies the window is “always on top” and its controls never retain focus (PROP:TOOLBOX).
<b>DOCK</b>	Specifies a window with the TOOLBOX attribute is dockable (PROP:DOCK).
<b>DOCKED</b>	Specifies a window with the DOCK attribute is opens docked (PROP:DOCKED).
<b>WALLPAPER</b>	Specifies the background image to display in the window’s client area (PROP:WALLPAPER). The image stretches to fill the entire client area of the window unless the TILED or CENTERED attribute is also present.



<b>TILED</b>	Specifies the WALLPAPER image displays at its default size and is tiled to fill the entire client area of the window (PROP:TILED).
<b>CENTERED</b>	Specifies the WALLPAPER image displays at its default size and is centered in the entire client area of the window (PROP:CENTERED).
<b>HSCROLL</b>	Specifies a horizontal scroll bar is automatically added to the window when any scrollable portion of the window lies horizontally outside the visible area (PROP:HSCROLL).
<b>VSCROLL</b>	Specifies a vertical scroll bar is automatically added to the window when any scrollable portion of the window lies vertically outside the visible area (PROP:VSCROLL).
<b>HVSCROLL</b>	Specifies both vertical and horizontal scroll bars are automatically added to the window when any scrollable portion of the window lies outside the visible area (PROP:HVSCROLL).
<b>DOUBLE</b>	Specifies a double-width frame around the window (PROP:DOUBLE).
<b>NOFRAME</b>	Specifies a window with no frame (PROP:NOFRAME).
<b>RESIZE</b>	Specifies a thick frame around the window, which does allow window resizing (PROP:RESIZE).
<b>MENUBAR</b>	Defines a menu structure (optional).
<i>menus and/or items</i>	MENU and/or ITEM declarations that define the menu selections.
<b>TOOLBAR</b>	Defines a toolbar structure (optional).
<i>controls</i>	Control declarations that define tools available on the TOOLBAR, or the control fields in the WINDOW.

A **WINDOW** declares a document window or dialog box which may contain controls, and may be used to display output to the user. When the **WINDOW** is first opened, it remains hidden until the first **DISPLAY** statement or **ACCEPT** loop is encountered. This enables any changes to be made to the appearance before it is displayed. Any previously opened **WINDOW** on the same execution thread is disabled. Events for the **WINDOW** are processed by the first **ACCEPT** loop encountered after the **WINDOW** is first opened.

A **WINDOW** automatically receives a single-width border frame unless one of the **DOUBLE**, **NOFRAME**, or **RESIZE** attributes are specified. Screen coordinates are measured in dialog units. A dialog unit is defined as one-quarter the average character width and one-eighth the average character height of the font specified in the **WINDOW**'s **FONT** attribute (or the system font, if no **FONT** attribute is specified on the **WINDOW**).

A WINDOW with the MODAL attribute is system modal; it takes exclusive control of the computer. This means that any other program running in the background halts its execution until the MODAL WINDOW is closed. Therefore, the MODAL attribute should be used only when absolutely necessary. Also, the RESIZE attribute is ignored, and the WINDOW cannot be moved when the MODAL attribute is present.

A WINDOW without the MDI attribute, when opened in an MDI program on an MDI execution thread, is application modal. This means that the user must respond before moving to any other window in the application. The user may, however, move to any other program running in Windows at the time. Non-MDI windows may be opened either before or after an APPLICATION is opened, and may be on the same execution thread as the APPLICATION or any MDI child window (application modal) or their own thread (not application modal).

A WINDOW with the MDI attribute is an MDI “child” window. MDI “child” windows are clipped to the APPLICATION frame and automatically moved when the frame is moved, and can be totally concealed by minimizing the parent APPLICATION. MDI “child” windows are modeless; the user may change to the top window of another execution thread, within the same application or any other application running in Windows, at any time. An MDI “child” window must not be on the same execution thread as the APPLICATION. Therefore, any MDI “child” window called directly from the APPLICATION must be in a separate procedure so the START procedure can be used to begin a new execution thread. Once started, multiple MDI “child” windows may be called in the new thread.

The MENUBAR specified in a WINDOW with the MDI attribute is automatically merged into the “Global menu” (from the APPLICATION) when the WINDOW receives focus unless either the WINDOW’s or APPLICATION’s MENUBAR has the NOMERGE attribute. A MENUBAR specified in a WINDOW without the MDI attribute is never merged into the “Global menu”—it always appears in the window itself.

The TOOLBAR specified in a WINDOW with the MDI attribute is automatically merged into the “Global toolbar” (from the APPLICATION) when the WINDOW receives focus, unless either the WINDOW’s or APPLICATION’s TOOLBAR has the NOMERGE attribute. The toolbar specified in a WINDOW without the MDI attribute is never merged into the “Global toolbar”—it always appears in the window itself.

A WINDOW with the TOOLBOX attribute is automatically “always on top” and its controls do not retain focus (just as if they all had the SKIP attribute). This creates a window whose controls all behave in the same manner as controls in the toolbar. Normally, a WINDOW with the TOOLBOX attribute would be executed in its own thread.

Events Generated:

EVENT:PreAlertKey

The user pressed an ALRT attribute hot key.

EVENT:AlertKey	The user pressed an ALRT attribute hot key.
EVENT:CloseWindow	The window is closing.
EVENT:CloseDown	The application is closing.
EVENT:OpenWindow	The window is opening.
EVENT:LoseFocus	The window is losing focus to another thread.
EVENT:GainFocus	The window is gaining focus from another thread.
EVENT:Suspend	The window still has input focus but is giving control to another thread to process timer events.
EVENT:Resume	The window still has input focus and is regaining control from an EVENT:Suspend.
EVENT:Docked	A TOOLBOX window has been docked.
EVENT:Undocked	A TOOLBOX window has been undocked.
EVENT:Timer	The TIMER attribute has triggered.
EVENT:Move	The user is moving the window. CYCLE aborts the move.
EVENT:Moved	The user has moved the window.
EVENT:Size	The user is resizing the window. CYCLE aborts the resize.
EVENT:Sized	The user has resized the window.
EVENT:Restore	The user is restoring the window's previous size. CYCLE aborts the resize.
EVENT:Restored	The user has restored the window's previous size.
EVENT:Maximize	The user is maximizing the window. CYCLE aborts the resize.
EVENT:Maximized	The user has maximized the window.
EVENT:Iconize	The user is minimizing the window. CYCLE aborts the resize.
EVENT:Iconized	The user has minimized the window.
EVENT:Completed	AcceptAll (non-stop) mode has finished processing all the window's controls.
EVENT:DDErequest	A client has requested a data item from this Clarion DDE server application.
EVENT:DDEadvise	A client has requested continuous updates of a data item from this Clarion DDE server application.

**EVENT:DDEexecute**

A client has executed a DDEEXECUTE statement to this Clarion DDE server application.

**EVENT:DDEpoke**

A client has sent unsolicited data to this Clarion DDE server application.

**EVENT:DDEdata**

A DDE server has supplied an updated data item to this Clarion client application.

**EVENT:DDEclosed**

A DDE server has terminated the DDE link to this Clarion client application.

**Related Procedures:**

ACCEPT, ALERT, EVENT, POST, REGISTER, UNREGISTER, YIELD, ACCEPTED, CHANGE, CHOICE, CLOSE, CONTENTS, CREATE, DESTROY, DISABLE, DISPLAY, ENABLE, ERASE, FIELD, FIRSTFIELD, FOCUS, GETFONT, GETPOSITION, HELP, HIDE, INCOMPLETE, LASTFIELD, MESSAGE, MOUSEX, MOUSEY, OPEN, POPUP, SELECT, SELECTED, SET3DLOOK, SETCURSOR, SETFONT, SETPOSITION, SETTARGET, UNHIDE, UPDATE

**Example:**

```
!MDI child window with system menu, minimize and maximize buttons, status bar,
! scroll bars, a resizable frame, with menu and toolbar which are merged into the
!application's menubar and toolbar:
MDIChild WINDOW('Child One'),MDI,SYSTEM,MAX,ICON('Icon.ICO'),STATUS,HVSCROLL,RESIZE
    MENUBAR
        MENU('File'),USE(?FileMenu)
            ITEM('Close'),USE(?CloseFile)
        END
        MENU('Edit'),USE(?EditMenu)
            ITEM('Undo'),USE(?UndoText),KEY(CTRLZ),STD(STD:Undo)
            ITEM('Cu&t'),USE(?CutText),KEY(CTRLX),STD(STD:Cut)
            ITEM('Copy'),USE(?CopyText),KEY(CTRLC),STD(STD:Copy)
            ITEM('Paste'),USE(?PasteText),KEY(CTRLV),STD(STD:Paste)
        END
    END
    TOOLBAR
        BUTTON('Cut'),USE(?CutButton),ICON(ICON:Cut),STD(STD:Cut)
        BUTTON('Copy'),USE(?CopyButton),ICON(ICON:Copy),STD(STD:Copy)
        BUTTON('Paste'),USE(?PasteButton),ICON(ICON:Paste),STD(STD:Paste)
    END
    TEXT,HVSCROLL,USE(Pre:Field)
    BUTTON('&OK'),USE(?Exit),DEFAULT
END
!Non-MDI, system menu, maximize button, status bar, non-resizable frame,
NonMDI WINDOW('Dialog Window'),SYSTEM,MAX,STATUS
    TEXT,HVSCROLL,USE(Pre:Field),MSG('Enter some text here')
    BUTTON('&OK'),USE(?Exit),DEFAULT
END
!System-modal window with non-resizable frame, with only a message and Ok button:
ModalWin WINDOW('Modal Window'),MODAL
    IMAGE(ICON:Exclamation)
    STRING('An ERROR has occurred')
    BUTTON('&OK'),USE(?Exit),DEFAULT
END
```

**See Also:**

ACCEPT, APPLICATION

## MENUBAR (declare a pulldown menu)

```
MENUBAR [, NOMERGE ]  
  [ MENU( )  
    [ ITEM( )  
    [ MENU( )  
      [ ITEM( )  
      END ]  
    END ]  
  [ ITEM( )  
  END
```

<b>MENUBAR</b>	Declares the menu for an APPLICATION or WINDOW.
<b>NOMERGE</b>	Specifies menu merging behavior.
<b>MENU</b>	A menu item with an associated drop box containing other menu selections.
<b>ITEM</b>	A menu item for selection.

The **MENUBAR** structure declares the pulldown menu selections displayed for an APPLICATION or WINDOW. MENUBAR must appear in the source code before any TOOLBAR or controls.

On an APPLICATION, the MENUBAR defines the Global menu selections for the program. These are active and available on all MDI “child” windows (unless the window’s own MENUBAR structure has the NOMERGE attribute). If the NOMERGE attribute is specified on the APPLICATION’s MENUBAR, then the menu is a local menu displayed only when no MDI child windows are open and there is no global menu.

On an MDI WINDOW, the MENUBAR defines menu selections that are automatically merged with the Global menu. Both the Global and the window’s menu selections are then active while the MDI “child” window has input focus. Once the window loses focus, its specific menu selections are removed from the Global menu. If the NOMERGE attribute is specified on an MDI WINDOW’s MENUBAR, the menu overwrites and replaces the Global menu.

On a non-MDI WINDOW, the MENUBAR is never merged with the Global menu. A MENUBAR on a non-MDI WINDOW always appears in the WINDOW, not on any APPLICATION which may have been previously opened.

Events generated by local menu items are sent to the WINDOW’s ACCEPT loop in the normal way. Events generated by global menu items are sent to the active event loop of the thread which opened the APPLICATION (in a normal multi-thread application this means the APPLICATION’s own ACCEPT loop).

Dynamic changes to menu items which reference the currently active window affect only the currently displayed menu, even if global items are changed. Changes made to the Global menu items when the APPLICATION is the current window, or which reference the global APPLICATION window affect the global portions of all menus, whether already open or not.

When a WINDOW's MENUBAR is merged into an APPLICATION's MENUBAR, the global menu selections appear first, followed by the local menu selections, unless the FIRST or LAST attributes are specified on individual menu selections.

A two-column drop menu can be achieved by assigning PROP:Max = 1 to the ITEM which should begin the second column.

Example:

```
!An MDI application frame window with main menu for the application:
MainWin APPLICATION('My Application')
    MENUBAR
        MENU('File'),USE(?FileMenu)
            ITEM('Open...'),USE(?OpenFile)
            ITEM('Close'),USE(?CloseFile),DISABLE
            ITEM('E&xit'),USE(?MainExit),LAST
        END
        MENU('Edit'),USE(?EditMenu)
            ITEM('Cu&t'),USE(?CutText),KEY(CtrlX),STD(STD:Cut),DISABLE
            ITEM('Copy'),USE(?CopyText),KEY(CtrlC),STD(STD:Copy),DISABLE
            ITEM('Paste'),USE(?PasteText),KEY(CtrlV),STD(STD:Paste),DISABLE
        END
        MENU('Window'),STD(STD:WindowList),LAST
            ITEM('Tile'),STD(STD:TileWindow)
            ITEM('Cascade'),STD(STD:CascadeWindow)
        END
        MENU('Help'),USE(?HelpMenu),LAST
            ITEM('Contents'),USE(?HelpContents),STD(STD:HelpIndex)
            ITEM('Search for Help On...'),USE(?HelpSearch),STD(STD:HelpSearch)
            ITEM('How to Use Help'),USE(?HelpOnHelp),STD(STD:HelpOnHelp)
            ITEM('About MyApp...'),USE(?HelpAbout)
        END
    END
END

!An MDI child window with menu for the window, merged into the
! application's menubar:
MDIChild WINDOW('Child One'),MDI
    MENUBAR
        MENU('File'),USE(?FileMenu)           !Merges into File menu
        ITEM('Pick...'),USE(?PickFile)         !Added to menu selections
    END
    MENU('Edit'),USE(?EditMenu)                !Merges into Edit menu
        ITEM('Undo'),USE(?UndoText),KEY(CtrlZ),STD(STD:Undo) !Added to menu
    END
END
TEXT,HVSCROLL,USE(Pre:Field)
BUTTON('&OK'),USE(?Exit),DEFAULT
END
```

```

!An MDI window with its own menu, overwriting the main menu:
MDIChild2 WINDOW('Dialog Window'),MDI,SYSTEM,MAX,STATUS
    MENUBAR,NOMERGE
        MENU('File'),USE(?FileMenu)
            ITEM('Close'),USE(?CloseFile)
        END
        MENU('Edit'),USE(?EditMenu)
            ITEM('Undo'),USE(?UndoText),KEY(CtrlZ),STD(STD:Undo)
            ITEM('Cu&t'),USE(?CutText),KEY(CtrlX),STD(STD:Cut)
            ITEM('Copy'),USE(?CopyText),KEY(CtrlC),STD(STD:Copy)
            ITEM('Paste'),USE(?PasteText),KEY(CtrlV),STD(STD:Paste)
        END
    END
    TEXT,HVSCROLL,USE(Pre:Field),MSG('Enter some text here')
    BUTTON('&OK'),USE(?Exit),DEFAULT
END

!A non-MDI window with its own menu:
NonMDI WINDOW('Dialog Window'),SYSTEM,MAX,STATUS
    MENUBAR
        MENU('File'),USE(?FileMenu)
            ITEM('Close'),USE(?CloseFile)
        END
        MENU('Edit'),USE(?EditMenu)
            ITEM('Undo'),USE(?UndoText),KEY(CtrlZ),STD(STD:Undo)
            ITEM('Cu&t'),USE(?CutText),KEY(CtrlX),STD(STD:Cut)
            ITEM('Copy'),USE(?CopyText),KEY(CtrlC),STD(STD:Copy)
            ITEM('Paste'),USE(?PasteText),KEY(CtrlV),STD(STD:Paste)
        END
    END
    TEXT,HVSCROLL,USE(Pre:Field),MSG('Enter some text here')
    BUTTON('&OK'),USE(?Exit),DEFAULT
END

```

## TOOLBAR (declare a tool bar)

```

TOOLBAR [,AT( )] [,USE( )] [,CURSOR( )] [,FONT( )] [,NOMERGE] [,COLOR]
           [,WALLPAPER( )] [, | TILED | ]
                           | CENTERED |

```

*controls*

**END**

<b>TOOLBAR</b>	Declares tools for an APPLICATION or WINDOW.
<b>AT</b>	Specifies the initial size of the toolbar. If omitted, default values are selected by the runtime library.
<b>USE</b>	A field equate label to reference the toolbar in executable code (PROP:USE).
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the TOOLBAR. If omitted, the WINDOW or APPLICATION structure's CURSOR attribute is used, else the Windows default cursor is used.
<b>FONT</b>	Specifies the default display font for the controls in the TOOLBAR.
<b>NOMERGE</b>	Specifies tools merging behavior.
<b>COLOR</b>	Specifies a background color for the TOOLBAR and default background and selected colors for the controls in the TOOLBAR.
<b>WALLPAPER</b>	Specifies the background image to display in the toolbar (PROP:WALLPAPER). The image stretches to fill the entire toolbar unless the TILED or CENTERED attribute is also present.
<b>TILED</b>	Specifies the WALLPAPER image displays at its default size and is tiled to fill the entire toolbar (PROP:TILED).
<b>CENTERED</b>	Specifies the WALLPAPER image displays at its default size and is centered in the toolbar (PROP:CENTERED).
<i>controls</i>	Control field declarations that define the available tools.

The **TOOLBAR** structure declares the tools displayed for an APPLICATION or WINDOW. On an APPLICATION, the TOOLBAR defines the Global tools for the program. If the NOMERGE attribute is specified on the APPLICATION's TOOLBAR, the tools are local and are displayed only when no MDI child windows are open; there are no global tools. Global tools are active and available on all MDI "child" windows unless an MDI "child" window's TOOLBAR structure has the NOMERGE attribute. If so, the "child" window's tools overwrite the Global tools.

On an MDI WINDOW, the TOOLBAR defines tools that are automatically merged with the Global toolbar. Both the Global and the window's tools are then active while the MDI "child" window has input focus. Once the window



loses focus, its specific tools are removed from the Global toolbar. If the NOMERGE attribute is specified on an MDI WINDOW's TOOLBAR, the tools overwrite and replace the Global toolbar. On a non-MDI WINDOW, the TOOLBAR is never merged with the Global menu. A TOOLBAR on a non-MDI WINDOW always appears in the WINDOW, not on any APPLICATION which may have been previously opened.

Events generated by local tools are sent to the WINDOW's ACCEPT loop in the normal way. Events generated by global tools are sent to the active event loop of the thread which opened the APPLICATION. In a normal multi-thread application, this means the APPLICATION's own ACCEPT loop.

TOOLBAR controls generate events in the normal manner. However, they do not retain focus, and cannot be operated from the keyboard unless accelerator keys are provided. As soon as user interaction with a TOOLBAR control is done, focus returns to the window and local control which previously had it.

Dynamic changes to tools which reference the currently active window affect only the currently displayed toolbar, even if global tools are changed. Changes made to the Global toolbar when the APPLICATION is the current window, or which reference the global APPLICATION's window affect the global portions of all toolbars, whether already open or not. This means that, when an MDI child window is active, the APPLICATION frame's TOOLBAR controls displayed on the APPLICATION frame are actually copies of the frame's controls. This allows each MDI child to modify its own set of toolbar controls without affecting the controls displayed for other MDI child windows. The events for these controls are still processed by the APPLICATION's ACCEPT loop. For example, assuming a button declared in the APPLICATION's TOOLBAR has a field number of 150. The MDI Child window's procedure can modify the appearance of that button by directly setting the properties of control number 150, which would change its appearance only while the MDI Child window's procedure is active and has focus.

When a WINDOW's TOOLBAR is merged into an APPLICATION's TOOLBAR, the global tools appear first, followed by the local tools. The toolbars are merged so that the fields in the WINDOW's toolbar begin just right of the position specified by the value of the width parameter of the APPLICATION TOOLBAR's AT attribute. The height of the displayed toolbar is the maximum height of the "tallest" tool, whether global or local. If any part of a control falls below the bottom, the height is increased accordingly.

Example:

```

!An MDI application frame window containing the
! main menu and toolbar for the application:
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS |
    ,HVSCROLL,RESIZE
    MENUBAR
        ITEM('E&xit'),USE(?MainExit)
    END
    TOOLBAR
        BUTTON('Exit'),USE(?MainExitButton)
    END
END
!An MDI child window with toolbar for the window, merged into the
! application's toolbar:
MDIChild WINDOW('Child One'),MDI
    TOOLBAR
        BUTTON('Cut'),USE(?CutButton),STD(STD:Cut)
        BUTTON('Copy'),USE(?CopyButton),STD(STD:Copy)
        BUTTON('Paste'),USE(?PasteButton),STD(STD:Paste)
    END
    TEXT,HVSCROLL,USE(Pre:Field)
    BUTTON('&OK'),USE(?Exit),DEFAULT
END
!An MDI window with its own toolbar, overwriting the main toolbar:
MDIChild2 WINDOW('Dialog Window'),MDI,SYSTEM,MAX,STATUS
    TOOLBAR,NOMERGE
        BUTTON('Cut'),USE(?CutButton),STD(STD:Cut)
        BUTTON('Copy'),USE(?CopyButton),STD(STD:Copy)
        BUTTON('Paste'),USE(?PasteButton),STD(STD:Paste)
    END
    TEXT,HVSCROLL,USE(Pre:Field),MSG('Enter some text here')
    BUTTON('&OK'),USE(?Exit),DEFAULT
END
END

```

## **Window Overview**

In most Windows programs there are three types of screen windows used: application windows, document windows, and dialog boxes. An application window is the first window opened in a Windows program, and it usually contains the main menu as the entry point to the rest of the program. All other windows in the program are document windows or dialog boxes.

Along with these three screen window types, there are two user interface design conventions that are used in Windows programs: the Single Document Interface (SDI), and the Multiple Document Interface (MDI).

An SDI program usually only contains linear logic that allows the user to take only one execution path (thread) at a time; it does not open separate execution threads which the user may move between. This is the same type of program logic used in most DOS programs. An SDI program would not contain a Clarion APPLICATION structure as its application window. The Clarion WINDOW structure (without an MDI attribute) is used to define an SDI program's application window, and the subsequent document windows or dialog boxes opened on top of it.

An MDI program allows the user to choose multiple execution paths (threads) and change from one to another at any time. This is a very common Windows program user interface. It is used by applications as a way of organizing and grouping windows which present several execution paths for the user to take.

A Clarion APPLICATION structure defines the MDI application window. The MDI application window acts as a parent for all the MDI child windows (document windows and dialog boxes), in that the child windows are clipped to its frame and automatically moved when the application frame is moved. They can also be concealed en masse by minimizing the parent. There may be only one APPLICATION open at any time in a Clarion Windows program.

Document windows and dialog boxes are very similar in that they are both defined as Clarion WINDOW structures. They differ in the conventional context in which they are commonly used and the conventions regarding appearance and attributes. In many cases, the difference is not distinguishable and does not matter. The generic term for both document windows and dialog boxes is "window" and that is the term used throughout this text.

Document windows usually display data. By convention they are movable and resizable. They usually have a title, a system menu, and maximize button. For example, in the Windows environment, the "Main" program group window that appears when you DOUBLE-CLICK on the "Main" icon in the Program Manager's desktop, is a document window.

Dialog boxes usually request information from the user or alert the user to some condition, usually prior to performing some action requested by the user. They may or may not be movable, and so, may or may not have a system menu and title. By convention, they are not resizable, although they can have a maximize button which gives the dialog two alternate sizes. A dialog box may be system modal (the user must respond before doing anything else in Windows), application modal (the user must respond before doing anything in the application), or modeless. For example, in the Clarion environment, the window that appears from the **File** menu's **Open** selection is an application modal dialog box that requests the name of the file to open.

## Window Controls and Input Focus

---

The objects placed in an APPLICATION or WINDOW structure are “controls.” “Control” is a standard Windows term used to refer to any screen object—command buttons, text entry fields, radio buttons, list boxes, etc. In most DOS programs, the term “field” is usually used to refer to these objects. In this document, the terms “control” and “field” are generally interchangeable.

Controls appear only in MENUBARs, TOOLBARs, or WINDOW structures. Controls are available to the user to select and/or edit the data they contain only when it has “input focus.” This occurs when the user uses the TAB key, the mouse, or an accelerator key combination to highlight the control.

A WINDOW also has “input focus” when it is the top WINDOW in the currently active execution thread. Since Clarion for Windows allows multi-threaded programs, the concept of which WINDOW currently has focus is important. Only the thread whose uppermost WINDOW has focus is active. The user may edit data in the WINDOW's control fields only when it has focus.

## Field Equate Labels

---

### Control Numbering

In WINDOW structures, every control (field) with a USE attribute is assigned a number by the compiler. By default, these field numbers begin with one (1) and are assigned to controls in the order they appear in the WINDOW structure code (the window itself is numbered zero). The actual assigned numbers can be overridden in the second parameter of the control's USE attribute.

The order of appearance in the WINDOW structure code determines the “natural” selection order of controls (which may be altered during program execution with the SELECT statement). The order of appearance in the

WINDOW structure code is independent of the control's placement on the screen. Therefore, there is not necessarily any correlation between a control's position on screen and the field number assigned by the compiler.

In APPLICATION structures, every menu selection in the MENUBAR, and every control with a USE attribute placed in the TOOLBAR, is assigned a number by the compiler. By default, these numbers begin with negative one (-1) and are decremented by one (1) in the order the menu selections and controls appear in the APPLICATION structure code.

### **Equate for Control Numbers**

There are a number of statements that use these compiler-assigned field numbers as parameters to indicate which controls are affected by the statement. It would be very tedious to "hard code" these numbers in order to use these statements. Therefore, Clarion provides a mechanism to address this problem: Field Equate Labels.

Field Equate Labels always begin with a question mark (?) followed by the label of the variable named in the control's USE attribute. The leading question mark indicates to the compiler a Field Equate Label. Field Equate Labels are very similar to normal EQUATE compiler directives. The compiler substitutes the field number for the Field Equate Label at compile time. This makes it unnecessary to know field numbers in advance.

Two or more controls with exactly the same USE variable in one WINDOW or APPLICATION structure would attempt to create the same Field Equate Label for all (each referencing a different field number). Therefore, when the compiler encounters this condition, all the Field Equate Labels for that USE variable are discarded. This makes it impossible to reference any of these controls in executable code, preventing confusion about which control you really want to reference. You can eliminate this problem by explicitly specifying the Field Equate Label for use by each control in the third parameter to the controls' USE attribute.

### **Array and Complex Structure Field Equates**

Field Equate Labels for USE variables which are array elements always begin with a question mark ( ? ) followed by the name of the USE variable followed by an underscore and the array element number. For example, the field equate for USE(ArrayField[1]) would be ?ArrayField\_1. Multi-dimensioned arrays are treated similarly (?ArrayField\_1\_1, ?ArrayField\_1\_2, ...). You can override this default by explicitly specifying the Field Equate Label for use by each control in the third parameter to the controls' USE attribute.

Field Equate Labels for USE variables which are elements of a complex data structure always begin with a question mark ( ? ) followed by the name of the USE variable with colons (:) replacing the periods (.). For example, the field

equate for USE(Phones.Rec.Name) would be ?Phones:Rec:Name. This is done because Clarion labels may contain colons, but not periods, and a field equate is a label.

## **Using Field Equate Labels**

Some controls' have USE attributes that can only be Field Equate Labels (a unique label with a leading question mark). This simply provides a way of referencing these fields in code or property assignment statements.

In executable code, there are many statements which use the field equate label to reference the control to affect (such as the DISPLAY statement). In all these statements, using a question mark (?) alone, without the USE variable name appended), always indicates performing the action on the current control that has input focus.

Example:

```
Window WINDOW('Dialog Window'),SYSTEM,MAX,STATUS
    TEXT,HVSCROLL,USE(Pre:Field)           !FEQ = ?Pre:Field
    ENTRY(@N3),HVSCROLL,USE(Pre:Array[1]) !FEQ = ?Pre:Array_1
    ENTRY(@N3),HVSCROLL,USE(File.MyField) !FEQ = ?File:MyField
    IMAGE(ICON:Exclamation),USE(?Image)    !USE attribute is a Field Equate Label
    BUTTON('&OK'),USE(?Ok)                  !USE attribute is a Field Equate Label
END

CODE
OPEN(Window)
?Ok{PROP:DEFAULT} = TRUE                    !Field Equates used in property assignments
?Image{PROP:Text} = 'MyImage.GIF'
ACCEPT
    DISPLAY(?)                             !Re-Display control with current input focus
END
```

## Graphics Overview

Clarion supplies a set of “graphics primitives” procedures to allow drawing in windows and reports: ARC, BLANK, BOX, CHORD, ELLIPSE, IMAGE, LINE, PIE, POLYGON, ROUNDBox, SHOW, and TYPE. Controls always appear on top of any graphics drawn to the window. This means the graphics appear to underly any controls in the window, so they don’t get in the way of the controls the user needs to access.

### Current Target

---

Graphics are always drawn to the “current target.” Unless overridden with SETTARGET, the “current target” is the last window opened (and not yet closed) on the current execution thread and is the window with input focus. Drawings in a window are persistent—redraws are handled automatically by the runtime library.

#### Graphics in Reports

Graphics can also be drawn to a report. To do this, SETTARGET must first be used to nominate the REPORT as the “current target.” Optionally, SETTARGET can nominate a specific report band to receive the graphics.

#### Consistent Graphics

Every window or report has its own current pen width, color, and style. Therefore, to consistently use the same pen (which does not use the default settings) across multiple windows, the SETPENWIDTH, SETPENCOLOR, and SETPENSTYLE statements should be issued for each window.

### Graphics Coordinates

---

The graphics coordinate system starts with the x,y coordinates (0,0) at the top left corner of the window. The coordinates are specified in dialog units (unless overridden by the THOUS, MM, or POINTS attributes when used on graphics placed in a REPORT). A dialog unit is defined as one-quarter the average character width and one-eighth the average character height of the font specified in the window’s FONT attribute (or the system font, if no FONT attribute is specified on the window).

Graphics drawn outside the currently visible portion of the window will appear if the window is scrolled. The size of the virtual screen over which the window may scroll automatically expands to include all graphics drawn to the window. Drawing graphics outside the visible portion of the window automatically causes the scroll bars to appear (if the window has the HSCROLL, VSCROLL, or HVSCROLL attribute).





# 7 - REPORTS

## Report Structures

### REPORT (declare a report structure)

```
label  REPORT([jobname]), AT( ) [, FONT( )] [, PRE( )] [, LANDSCAPE] [, PREVIEW] [, PAPER]
                                           [, COLOR( )] [ | THOUS | ]
                                           | MM      |
                                           | POINTS |
[FORM
  controls
END ]
[HEADER
  controls
END ]
label  DETAIL
        controls
label  END
label  [BREAK( )
        group break structures
        END ]
[FOOTER
  controls
END ]
END
```

<b>REPORT</b>	Declares the beginning of a report data structure.
<i>label</i>	The name by which the REPORT structure is addressed in executable code.
<i>jobname</i>	Names the print job for the Windows Print Manager (PROP:Text). If omitted, the REPORT's <i>label</i> is used.
<b>AT</b>	Specifies the size and location of the area for printing report detail, relative to the top left corner of the page (PROP:AT).
<b>FONT</b>	Specifies the default font for all controls in this report (PROP:FONT). If omitted, the printer's default font is used.
<b>PRE</b>	Specifies the label prefix for the report or structure.
<b>LANDSCAPE</b>	Specifies printing the report in landscape mode (PROP:LANDSCAPE). If omitted, printing defaults to portrait mode.
<b>PREVIEW</b>	Specifies report output to Windows metafiles; one file per report page (PROP:PREVIEW).
<b>PAPER</b>	Specifies the paper size for the report output. If omitted, the default printer's paper size is used.

<b>COLOR</b>	Specifies a background color for the REPORT and default background colors for the bands in the REPORT (PROP:COLOR).
<b>THOUS</b>	Specifies thousandths of an inch as the measurement unit used for all attributes which use coordinates (PROP:THOUS).
<b>MM</b>	Specifies millimeters as the measurement unit used for all attributes which use coordinates (PROP:MM).
<b>POINTS</b>	Specifies points as the measurement unit used for all attributes which use coordinates (PROP:POINTS). There are 72 points per inch, vertically and horizontally.
<b>FORM</b>	Page layout structure defining pre-printed items on every page.
<i>controls</i>	Report output controls.
<b>HEADER</b>	Page header structure, printed at the start of each page.
<b>DETAIL</b>	Report detail structure.
<b>BREAK</b>	A group break structure, defining the variable which causes a group break to occur when its value changes.
<i>group break structures</i>	Group break HEADER, FOOTER, and DETAIL structures, and/or other nested BREAK structures.
<b>FOOTER</b>	Page footer structure, printed at the end of each page.

The **REPORT** statement declares the beginning of a report data structure. A REPORT structure must terminate with a period or END statement. Within the REPORT, the FORM, HEADER, DETAIL, FOOTER, and BREAK structures are the components that format the output of the report. A REPORT must be explicitly opened with the OPEN statement.

A REPORT with the PREVIEW attribute sends the report output to Windows metafiles containing one report page per file. The PREVIEW attribute names a QUEUE to receive the names of the metafiles. You can then create a window to display the report in an IMAGE control, using the QUEUE field contents (the file names) to set the IMAGE control's {PROP:Text} property. This allows the end user to view the report before printing.

The REPORT's AT attribute defines the area of each page devoted to printing DETAIL structures. This includes any HEADERS and FOOTERS that are contained within a BREAK structure (group headers and footers).

Only DETAIL structures can (and must) be printed with the PRINT statement. All other report structures (HEADER, FOOTER, and FORM) automatically print at the appropriate place in the report.

The FORM structure prints on every page except pages containing DETAIL structures with the ALONE attribute. Its format is determined once at the

beginning of the report. This makes it the logical place to design a pre-printed form template, which is filled in by the subsequent HEADER, DETAIL, and FOOTER structures. The page HEADER and FOOTER structures are not within a BREAK structure. They automatically print whenever a page break occurs.

The BREAK structure defines a group break. It may contain its own HEADER, FOOTER, and DETAIL structures, and/or other nested BREAK structures. It may also contain multiple DETAIL structures. The HEADER and FOOTER structures that are within a BREAK structure are the group header and footer. They are automatically printed when the value in a specified group break variable changes.

A REPORT data structure never defaults as the current target for runtime property assignment the way the most recently opened WINDOW or APPLICATION structure does. Therefore, the REPORT *label* must be explicitly named as the target, or the SETTARGET statement must be used to make the REPORT the current target, before using runtime property assignment to a REPORT control. Since the graphics commands draw graphics only to the current target, the SETTARGET statement must be used to make the REPORT the current target before using the graphics procedures on a REPORT.

### **Page-based Printing**

Clarion reports use a page-based printing paradigm instead of the line-based paradigm used by some older report generators. Instead of printing each line as its values are generated, nothing is sent to the printer until an entire page is ready to print. This means that the “print engine” in the Clarion runtime library can do a lot of work for you, based on the attributes you specify in the REPORT structure.

Some of the things that the “print engine” in the Clarion runtime library does for you are:

- Prints “pre-printed” forms on each page, that are then filled in by the data
- Calculates totals (count, sum, average, minimum, maximum)
- Automatically handles page breaks, including page headers and footers
- Automatically handles group breaks, including group headers and footers
- Provides complete widow/orphan control.

This automatic functionality makes the executable code required to print a complex report very small, making your programming job easier. Since the “print engine” is page-based, the concepts of headers and footers lose their context indicating both page positioning and print sequence, and only retain their meaning of print sequence. Headers are printed at the beginning of a

print sequence, and footers are printed at the end—their actual positioning on the page is irrelevant. For example, you could position the page footer, containing page totals, to print at the top of the page.

## **Page Overflow**

**Page Overflow** occurs when the PRINT statement cannot fit a DETAIL structure on a page. This may be due to a lack of space, or the presence of the PAGEBEFORE or PAGEAFTER attribute on a DETAIL structure. The following steps occur during page overflow, in this sequence:

- 1 If the REPORT has a page FOOTER, it prints at the position specified by its AT attribute.
- 2 The page counter is incremented.
- 3 If the REPORT has a FORM structure, it prints at the position specified by its AT attribute.
- 4 If the REPORT has a page HEADER, it prints at the position specified by its AT attribute.

Related Procedures: CLOSE, OPEN, ENDPAGE, PRINT

Example:

```

CustRpt REPORT, AT(1000,1000,6500,9000), THOUS, FONT('Arial',12), PRE(Rpt)
    FORM, AT(1000,1000,6500,9000)
    IMAGE('LOGO.BMP'), AT(0,0,1200,1200), USE(?I1)
    END
    HEADER, AT(1000,1000,6500,1000)
    STRING('ABC Company'), AT(3000,500,1500,500), FONT('Arial',18)
    END
Break1 BREAK(Pre:Key1)
    HEADER, AT(0,0,6500,1000)
    STRING('Group Head'), AT(3000,500,1500,500), FONT('Arial',18)
    END
Detail DETAIL, AT(0,0,6500,1000)
    STRING(@N$11.2), AT(6000,1500,500,500), USE(Pre:F1)
    END
    FOOTER, AT(0,0,6500,1000)
    STRING('Group Total:'), AT(5500,500,1500,500)
    STRING(@N$11.2), AT(6000,500,500,500), USE(Pre:F1), SUM, RESET(Break1)
    END
    END
    FOOTER, AT(1000,1000,6500,1000)
    STRING('Page Total:'), AT(5500,1500,1500,500)
    STRING(@N$11.2), AT(6000,1500,500,500), USE(Pre:F1), SUM, PAGE
    END
    END                                     !End report declaration
CODE
OPEN(CustReport)
SET(DataFile)
LOOP
    NEXT(DataFile); IF ERRORCODE() THEN BREAK.
    PRINT(Rpt:Detail)
END
CLOSE(CustReport)

```



## DETAIL (report detail line structure)

```

label  DETAIL ,AT( ) [,FONT( )] [,ALONE] [,ABSOLUTE] [,PAGEBEFORE( )] [,PAGEAFTER( )]
        [,WITHPRIOR( )] [,WITHNEXT( )] [,USE( )] [,COLOR( )]
        controls
        END

```

<b>DETAIL</b>	Declares items to be printed as the body of the report.
<i>label</i>	The name by which the structure is addressed in executable code.
<b>AT</b>	Specifies the offset and minimum width and height of the DETAIL, relative to the size of the area specified by the REPORT's AT attribute (PROP:AT).
<b>FONT</b>	Specifies the default font for all controls in this structure (PROP:FONT). If omitted, the REPORT's FONT attribute (if present) is used, or else the printer's default font is used.
<b>ALONE</b>	Declares the DETAIL structure must be printed on a page without FORM, (page) HEADER, or (page) FOOTER structures (PROP:ALONE).
<b>ABSOLUTE</b>	Declares the DETAIL prints at a fixed position relative to the page (PROP:ABSOLUTE).
<b>PAGEBEFORE</b>	Declares the DETAIL prints at the start of a new page, after activating normal page overflow actions (PROP:PAGEBEFORE).
<b>PAGEAFTER</b>	Declares the DETAIL prints, and then starts a new page by activating normal page overflow actions (PROP:PAGEAFTER).
<b>WITHPRIOR</b>	Declares the DETAIL prints on the same page as the DETAIL, or group HEADER or FOOTER that immediately precedes it during printing (PROP:WITHPRIOR).
<b>WITHNEXT</b>	Declares the DETAIL prints on the same page as the DETAIL, or group HEADER or FOOTER that immediately follows it during printing (PROP:WITHNEXT).
<b>USE</b>	A field equate label to reference the DETAIL structure in executable code (PROP:USE).
<b>COLOR</b>	Specifies a background color for the DETAIL and the default background color for the controls in the DETAIL (PROP:COLOR).
<i>controls</i>	Report output control fields.

The **DETAIL** structure declares items to be printed as the body of the report. A DETAIL structure must be terminated with a period or END statement. A REPORT may have multiple DETAIL structures.

A **DETAIL** structure is never automatically printed, therefore **DETAIL** structures are always explicitly printed by the **PRINT** statement. This means that a *label* is required for each **DETAIL** you wish to **PRINT**.

The **DETAIL** structure may be printed whenever necessary. Since you may have multiple **DETAIL** structures, they provide the ability to optionally print alternate print formats. This is determined by the logic in the executable code which prints the report.

**DETAIL** structures print within the detail print area specified by the **REPORT** statement's **AT** attribute. The **DETAIL** structure's **AT** attribute specifies the relative position, width and height of the detail to print. If there is horizontal room within the detail print area for multiple **DETAIL** structures, they print side-by-side.

Example:

```

CustRpt      REPORT                                !Declare customer report
              HEADER                                ! begin page header declaration
              !structure elements
              END                                    ! end header declaration
CustDetail1  DETAIL                                ! begin detail declaration
              !structure elements
              END                                    ! end detail declaration
CustDetail2  DETAIL                                ! begin detail declaration
              !structure elements
              END                                    ! end detail declaration
              END                                    !End report declaration
CODE
OPEN(CustRpt)
SET(SomeFile)
LOOP
  NEXT(SomeFile)
  IF ERRORCODE() THEN BREAK.
  IF SomeCondition
    PRINT(CustDetail1)
  ELSE
    PRINT(CustDetail2)
  END
END
CLOSE(CustRpt)

```

See Also: **PRINT, AT**

## FOOTER (page or group footer structure)

```
FOOTER ,AT( ) [,FONT( )] [,ABSOLUTE] [,PAGEBEFORE( )] [,PAGEAFTER( )]
      [,WITHPRIOR( )] [,WITHNEXT( )] [,ALONE] [,USE( )] [,COLOR( )]
      controls
END
```

<b>FOOTER</b>	Declares a page or group footer structure.
<b>AT</b>	Specifies the size and location of the FOOTER (PROP:AT).
<b>FONT</b>	Specifies the default font for all controls in this structure (PROP:FONT). If omitted, the REPORT's FONT attribute (if present) is used, or else the printer's default font is used.
<b>ABSOLUTE</b>	Declares the FOOTER prints at a fixed position relative to the page (PROP:ABSOLUTE). Valid only on a FOOTER within a BREAK structure.
<b>PAGEBEFORE</b>	Declares the FOOTER prints at the start of a new page, after activating normal page overflow actions (PROP:PAGEBEFORE). Valid only on a FOOTER within a BREAK structure.
<b>PAGEAFTER</b>	Declares the FOOTER prints, and then starts a new page by activating normal page overflow actions (PROP:PAGEAFTER). Valid only on a FOOTER within a BREAK structure.
<b>WITHPRIOR</b>	Declares the FOOTER prints on the same page as the DETAIL, group HEADER, or FOOTER that immediately precedes it during printing (PROP:WITHPRIOR). Valid only on a FOOTER within a BREAK structure.
<b>WITHNEXT</b>	Declares the FOOTER prints on the same page as the DETAIL, group HEADER, or FOOTER that immediately follows it during printing (PROP:WITHNEXT). Valid only on a FOOTER within a BREAK structure.
<b>ALONE</b>	Declares the (group) FOOTER structure must be printed on a page without FORM, (page) HEADER, or (page) FOOTER structures (PROP:ALONE).
<b>USE</b>	A field equate label to reference the FOOTER structure in executable code (PROP:USE).
<b>COLOR</b>	Specifies a background color for the FOOTER and the default background color for the controls in the FOOTER (PROP:COLOR).
<i>controls</i>	Report output control fields.



The **FOOTER** structure declares the output which prints at the end of each page or group. A FOOTER structure must be terminated with a period or END statement.

A FOOTER structure that is not within a BREAK structure is a page footer. Only one page FOOTER is allowed in a REPORT. The page FOOTER is automatically printed whenever a page break occurs, at the page-relative position specified by its AT attribute.

The BREAK structure defines a group break. It may contain its own HEADER, FOOTER, and DETAIL structures, and/or other nested BREAK structures. It may also contain multiple DETAIL structures. The HEADER and FOOTER structures that are within a BREAK structure are the group header and footer. They are automatically printed when the value in a specified group break variable changes, at the next position available in the detail print area (specified by the REPORT's AT attribute). Only one FOOTER is allowed in a BREAK structure.

Example:

CustRpt	REPORT	!Declare customer report
	FOOTER	! begin page FOOTER declaration
	!report controls	
	END	! end FOOTER declaration
Break1	BREAK(SomeVariable)	
GroupDet	DETAIL	
	!report controls	
	END	! end detail declaration
	FOOTER	! begin group footer declaration
	!report controls	
	END	! end footer declaration
	END	! end group break declaration
	END	!End report declaration

## FORM (page layout structure)

```
FORM ,AT( ) [,FONT( )] [,USE( )] [,COLOR( )]
  controls
END
```

<b>FORM</b>	Declares a report structure which prints on each page.
<b>AT</b>	Specifies the size and location, relative to the top left corner of the page, of the FORM (PROP:AT).
<b>FONT</b>	Specifies the default font for all controls in this report structure (PROP:FONT). If omitted, the REPORT's FONT attribute (if present) is used, or else the printer's default font is used.
<b>USE</b>	A field equate label to reference the FORM structure in executable code (PROP:USE).
<b>COLOR</b>	Specifies a background color for the FORM and the default background color for the controls in the FORM (PROP:COLOR).

*controls*      Report output control fields.

**FORM** declares a report structure which prints on every page of the report (except pages containing DETAIL structures with the ALONE attribute). A FORM structure must be terminated with a period or END statement. Only one FORM is allowed in a REPORT structure. The FORM structure automatically prints during page overflow.

The printed output of the FORM is determined only once at the beginning of the report. The page positioning of the FORM does not affect the page positioning of any other report structure. Once printed, all other structures may “overwrite” the FORM. Therefore, FORM is most often used to design pre-printed forms which are filled in by the subsequent HEADER, DETAIL, and FOOTER structures. It may also be used to generate “watermarks” or page border graphics.

Example:

```
CustRpt REPORT           !Declare customer report
  FORM
    IMAGE( 'LOGO.BMP' ),AT(0,0,1200,1200),USE(?I1)
    STRING(@N3),AT(6000,500,500,500),PAGE0
  END
GroupDet DETAIL
  !report controls
END
END                       !End report declaration
```

# HEADER (page or group header structure)

```
HEADER ,AT( ) [,FONT( )] [,ABSOLUTE] [,PAGEBEFORE( )] [,PAGEAFTER( )]
      [,WITHPRIOR( )] [,WITHNEXT( )] [,ALONE] [,USE( )] [,COLOR( )]
controls
END
```

HEADER	Declares a page or group header structure.
AT	Specifies the size and location of the HEADER (PROP:AT).
FONT	Specifies the default font for all controls in this structure (PROP:FONT). If omitted, the REPORT's FONT attribute (if present) is used, or else the printer's default font is used.
ABSOLUTE	Declares the HEADER prints at a fixed position relative to the page (PROP:ABSOLUTE). Valid only on a HEADER within a BREAK structure.
PAGEBEFORE	Declares the HEADER prints at the start of a new page after activating normal page overflow actions (PROP:PAGEBEFORE). Valid only on a HEADER within a BREAK structure.
PAGEAFTER	Declares the HEADER prints, and then starts a new page by activating normal page overflow actions (PROP:PAGEAFTER). Valid only on a HEADER within a BREAK structure.
WITHPRIOR	Declares the HEADER prints on the same page as the DETAIL, group HEADER, or FOOTER that immediately precedes it during printing (PROP:WITHPRIOR). Valid only on a HEADER within a BREAK structure.
WITHNEXT	Declares the HEADER prints on the same page as the DETAIL, group HEADER, or FOOTER that immediately follows it during printing (PROP:WITHNEXT). Valid only on a HEADER within a BREAK structure.
ALONE	Declares the (group) HEADER structure must be printed on a page without FORM, (page) HEADER, or (page) FOOTER structures (PROP:ALONE).
USE	A field equate label to reference the HEADER structure in executable code (PROP:USE).
COLOR	Specifies a background color for the HEADER and the default background color for the controls in the HEADER (PROP:COLOR).
controls	Report output control fields.

The **HEADER** structure declares the output which prints at the beginning of each page or group. A **HEADER** structure must be terminated with a period or **END** statement.

A **HEADER** structure that is not within a **BREAK** structure is a page header. Only one page **HEADER** is allowed in a **REPORT**. The page **HEADER** is automatically printed whenever a page break occurs, at the page-relative position specified by its **AT** attribute.

The **BREAK** structure defines a group break. It may contain its own **HEADER**, **FOOTER**, and **DETAIL** structures, and/or other nested **BREAK** structures. It may also contain multiple **DETAIL** structures. The **HEADER** and **FOOTER** structures that are within a **BREAK** structure are the group header and footer. They are automatically printed when the value in a specified group break variable changes, at the next position available in the detail print area (specified by the **REPORT**'s **AT** attribute). Only one **HEADER** is allowed in a **BREAK** structure.

Example:

```

CustRpt REPORT           !Declare customer report
    HEADER               ! begin page header declaration
        !report controls
    END                   ! end header declaration
Break1  BREAK(SomeVariable)
    HEADER               ! begin group header declaration
        !report controls
    END                   ! end header declaration
GroupDet  DETAIL
        !report controls
    END                   ! end detail declaration
    END                   ! end group break declaration
END                       !End report declaration

```

## Printer Control Properties

These properties control report and printer behavior. All of these properties can be used with either the PRINTER built-in variable or the label of the report as the *target*, however they may not all make sense with both. These properties are contained in the PRNPROP.CLW file, which you must explicitly INCLUDE in your code in order to use them.

### PROPPRINT:DevMode

The entire device mode (devmode) structure as defined in the Windows Software Development Kit. This provides direct API access to all printer properties. Consult a Windows API manual before using this.

```

DevMode      GROUP          !16-bit DevMode
DeviceName   STRING(32)    !PROPPRINT:Device
SpecVersion  USHORT
DriverVersion USHORT
Size         USHORT
DriverExtra  USHORT
Fields       ULONG
Orientation  SHORT
PaperSize    SHORT         !PROPPRINT:Paper
PaperLength  SHORT         !PROPPRINT:PaperHeight
PaperWidth   SHORT         !PROPPRINT:PaperWidth
Scale        SHORT         !PROPPRINT:Percent
Copies       SHORT         !PROPPRINT:Copies
DefaultSource SHORT       !PROPPRINT:PaperBin
PrintQuality SHORT       !PROPPRINT:Resolution
Color        SHORT       !PROPPRINT:Color
Duplex       SHORT       !PROPPRINT:Duplex
END

```

The devmode structure is different in 32-bit (consult a Windows API manual). However, the following properties are the most common and useful:

### PROPPRINT:Collate

Specify the printer should collate the output: 0=off, 1=on (not supported by all printers).

### PROPPRINT:Color

Color or monochrome print flag: 1=mono, 2=color (not supported by all printers).

### PROPPRINT:Context

Returns the handle to the printer's device context after the first PRINT statement for the report, or an information context before the first PRINT statement. This may not be set for the built-in Global PRINTER variable and is normally only read (not set).

### PROPPRINT:Copies

The number of copies to print (not supported by all printers).

**PROPPRINT:Device**

The name of the Printer as it appears in the Windows Printer Dialog. If multiple printer names start with the same characters, the first encountered is used (not case sensitive). May be set for the PRINTER built-in variable only before the report is open.

**PROPPRINT:Driver**

The printer driver's filename (without the .DLL extension).

**PROPPRINT:Duplex**

The duplex printing mode (not supported by all printers). Equates (DUPLEX::xxx) for the standard choices are listed in the PRNPROP.CLW file.

**PROPPRINT:FontMode**

The TrueType font mode. Equates (FONTMODE:xxx) for the modes are listed in the PRNPROP.CLW file.

**PROPPRINT:FromMin**

When set for the built-in PRINTER variable, this forces the value into the "From:" page number in the PRINTERDIALOG. Specify -1 to disable ranges

**PROPPRINT:FromPage**

The page number on which to start printing. Specify -1 to print from the start.

**PROPPRINT:Paper**

Standard paper size. Equates (PAPER:xxx) for the standard sizes are listed in the PRNPROP.CLW file. This defines the dimensions of the .WMF files that are created by the Clarion runtime library's "print engine."

**PROPPRINT:PaperBin**

The paper source. Equates (PAPERBIN:xxx) for the standard locations are listed in the PRNPROP.CLW file.

**PROPPRINT:PaperHeight**

The paper height in tenths of millimeters (mm/10). There are 25.4 mm per inch. Used when setting PROPPRINT:Paper to PAPER:Custom (not normally used for laser printers).

**PROPPRINT:PaperWidth**

The paper width in tenths of millimeters (mm/10). There are 25.4 mm per inch. Used when setting PROPPRINT:Paper to PAPER:Custom (not normally used for laser printers).

**PROPPRINT:Percent**

The scaling factor used to enlarge or reduce the printed output, in percent (not supported by all printers). This defaults to 100 percent. Set this value to print at the desired percentage (if your printer and driver support scaling). For example, set to 200 to print at double size, or 50 to print at half size.

**PROPPRINT:Port**

Output port name (LPT1, COM1, etc.).

**PROPPRINT:PrintToFile**

The Print to File flag: 0=off, 1=on.

**PROPPRINT:PrintToName**

The output filename when printing to a file.

**PROPPRINT:Resolution**

The print resolution in Dots Per Inch (DPI). Equates (RESOLUTION:xxx)for the standard resolutions are listed in the PRNPROP.CLW file. Must be issued before the report is open.

**PROPPRINT:ToMax**

When set for the built-in PRINTER variable, this forces the value into the "To:" page number in the PRINTERDIALOG. Specify -1 to disable ranges

**PROPPRINT:ToPage**

The page number on which to end printing. Specify -1 to print to end.

**PROPPRINT:Yresolution**

Vertical print resolution in Dots Per Inch (DPI). Equates (RESOLUTION:xxx)for the standard resolutions are listed in the PRNPROP.CLW file.

Example:

```
SomeReport  REPORT
            END

CODE
PRINTER{PROPPRINT:Device} = 'Epson'           !Pick 1st Epson in the list

PRINTER{PROPPRINT:Port} = 'LPT2:'             !Send report to LPT2

PRINTER{PROPPRINT:Percent} = 250              !page printed 2.5 times normal

PRINTER{PROPPRINT:Copies} = 3                 !print 3 copies of each page
PRINTER{PROPPRINT:Collate} = False            !print 1,1,1,2,2,2,3,3,3,...
PRINTER{PROPPRINT:Collate} = True             !print 1,2,3..., 1,2,3...,

PRINTER{PROPPRINT:PrintToFile} = True         !print to a file
PRINTER{PROPPRINT:PrintToName} = 'OUTPUT.RPT' !filename to print to

OPEN(SomeReport)                             !Open report after setting PRINTER properties
SomeReport{PROPPRINT:Paper} = PAPER:User     !Custom paper size
SomeReport{PROPPRINT:PAPERHeight} = 6 * 254  !6" form height
SomeReport{PROPPRINT:PAPERWidth} = 3.5 * 254 !3.5" form width
```





## 8 - CONTROLS

### Control Declarations

#### BOX (declare a box control)

```
BOX ,AT( ) [,USE( )] [,DISABLE] [,COLOR( )] [,FILL( )] [,ROUND] [,FULL] [,SCROLL] [,HIDE]
[,LINEWIDTH( )]
```

<b>BOX</b>	Places a rectangular box on the window or report.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW (or APPLICATION) is first opened (PROP:DISABLE).
<b>COLOR</b>	Specifies the color for the border of the control (PROP:COLOR). If omitted, there is no border.
<b>FILL</b>	Specifies the fill color for the control (PROP:FILL). If omitted, the box is not filled with color.
<b>ROUND</b>	Specifies the box corners are rounded (PROP:ROUND). If omitted, the corners are square.
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened. UNHIDE must be used to display it (PROP:HIDE). In a REPORT, specifies the control does not print unless UNHIDE is used to allow it to print
<b>LINEWIDTH</b>	Specifies the width of the BOX's border (PROP:LINEWIDTH).

The **BOX** control places a rectangular box on the WINDOW, TOOLBAR, or REPORT at the position and size specified by its AT attribute. This control cannot receive input focus and does not generate events.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    BOX,AT(0,0,20,20)                !Unfilled, black border
    BOX,AT(0,20,20,20),USE(?Box1),DISABLE
                                     !Unfilled, black border, dimmed
    BOX,AT(20,20,20,20),ROUND        !Unfilled, rounded, black border
    BOX,AT(40,40,20,20),FILL(COLOR:ACTIVEBORDER)
                                     !Filled, black border
    BOX,AT(60,60,20,20),COLOR(COLOR:ACTIVEBORDER)
                                     !Unfilled, active border color border
    BOX,AT(480,180,20,20),SCROLL    !Scrolls with screen
END

CustRpt  REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail  DETAIL,AT(0,0,6500,1000)
    BOX,AT(0,0,20,20),USE(?B1)      !Unfilled, black border
    BOX,AT(20,20,20,20),ROUND      !Unfilled, rounded, black border
    BOX,AT(40,40,20,20),FILL(COLOR:ACTIVEBORDER)
                                     !Filled, black border
    BOX,AT(60,60,20,20),COLOR(COLOR:ACTIVEBORDER)
                                     !Unfilled, active border color border
    END
END
```

See Also:

**PANEL**

## BUTTON (declare a pushbutton control)

```

BUTTON(text) [, AT( ) ] [, CURSOR( ) ] [, USE( ) ] [, DISABLE] [, KEY( ) ] [, MSG( ) ] [, HLP( ) ] [, SKIP]
[, STD( ) ] [, FONT( ) ] [, ICON( ) ] [, DEFAULT] [, IMM] [, REQ] [, FULL] [, SCROLL] [, ALRT( ) ]
[, HIDE] [, DROPID( ) ] [, TIP( ) ] [, FLAT] [, REPEAT( ) ] [, DELAY( ) ] [, | LEFT | ]
| RIGHT | ]

```

<b>BUTTON</b>	Places a command button on the WINDOW or TOOLBAR.
<i>text</i>	A string constant containing the text to display on the button face, along with any ICON specified (PROP:Text). This may contain an ampersand (&) to indicate the “hot” letter (accelerator key) for the button.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are set by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW’s CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to and presses the button (PROP:KEY).
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG).
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP).
<b>SKIP</b>	Specifies the control does not receive input focus and may only be accessed with the mouse or accelerator key (PROP:SKIP).
<b>STD</b>	Specifies an integer constant or equate that identifies a “Windows standard action” the control executes (PROP:STD).
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>ICON</b>	Specifies an image file or standard icon to display on the button face (PROP:ICON).
<b>DEFAULT</b>	Specifies the BUTTON is automatically pressed when the user presses the ENTER key (PROP:DEFAULT).

<b>IMM</b>	Specifies the control generates an event when the left mouse button is pressed, continuing as long as it is depressed (PROP:IMM). If omitted, an event is generated only when the left mouse button is pressed and released on the control.
<b>REQ</b>	Specifies that when the <b>BUTTON</b> is pressed, the runtime library automatically checks all <b>ENTRY</b> controls in the same <b>WINDOW</b> with the <b>REQ</b> attribute to ensure they contain data other than blanks or zeroes (PROP:REQ).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the <b>WINDOW</b> for any missing <b>AT</b> attribute width or height parameter (PROP:FULL).
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT).
<b>HIDE</b>	Specifies the control does not appear when the <b>WINDOW</b> or <b>APPLICATION</b> is first opened (PROP:HIDE). <b>UNHIDE</b> must be used to display it.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip).
<b>FLAT</b>	Specifies the button appears flat except when the mouse cursor passes over the control (PROP:FLAT). Requires the <b>ICON</b> attribute.
<b>REPEAT</b>	Specifies the rate at which <b>EVENT:Accepted</b> generates when the button with the <b>IMM</b> attribute is held down by the user (PROP:REPEAT). Requires the <b>IMM</b> attribute.
<b>DELAY</b>	Specifies the delay between the first and second generation of <b>EVENT:Accepted</b> for a button with the <b>IMM</b> attribute (PROP:DELAY). Requires the <b>IMM</b> attribute.
<b>LEFT</b>	Specifies that the icon appears to the left of the <i>text</i> (PROP:LEFT).
<b>RIGHT</b>	Specifies that the icon appears to the right of the <i>text</i> (PROP:RIGHT).

The **BUTTON** control places a pushbutton on the **WINDOW** or **TOOLBAR** (not valid in a **REPORT**) at the position and size specified by its **AT** attribute.

A **BUTTON** with the **IMM** attribute generates **EVENT:Accepted** as soon as the left mouse button is pressed on the control and continues to do so until it is released. This allows the **BUTTON** control’s executable code to execute continuously until the mouse button is released. The rate and delay before

continuous event generation can be set by the REPEAT and DELAY attributes. A BUTTON without the IMM attribute generates EVENT:Accepted only when the left mouse button is pressed and then released on the control.

A BUTTON with the REQ attribute is a “required control fields check” button. REQ attributes of ENTRY or TEXT control fields are not checked until a BUTTON with the REQ attribute is pressed or the INCOMPLETE procedure is called. Focus is given to the first required control which is blank or zero.

A BUTTON with an ICON attribute displays the image on the button face in addition to its *text* parameter (which appears below the image, by default). The *text* parameter also serves for accelerator “hot” key definition.

Events Generated:	EVENT:Selected	The control has received input focus.
	EVENT:Accepted	The control has been pressed by the user.
	EVENT:PreAlertKey	The user pressed an ALRT attribute hot key.
	EVENT:AlertKey	The user pressed an ALRT attribute hot key.
	EVENT:Drop	A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    BUTTON('1'),AT(0,0,20,20),USE(?B1)
    BUTTON('2'),AT(20,0,20,20),USE(?B2),KEY(F10Key)
    BUTTON('3'),AT(40,0,20,20),USE(?B3),MSG('Button 3')
    BUTTON('4'),AT(60,0,20,20),USE(?B4),HLP('Button4Help')
    BUTTON('5'),AT(80,0,20,20),USE(?B5),STD(STD:Cut)
    BUTTON('6'),AT(100,0,20,20),USE(?B6),FONT('Arial',12)
    BUTTON('7'),AT(120,0,20,20),USE(?B7),ICON(ICON:Question)
    BUTTON('8'),AT(140,0,20,20),USE(?B8),DEFAULT
    BUTTON('9'),AT(160,0,20,20),USE(?B9),IMM
    BUTTON('10'),AT(180,0,20,20),USE(?B10),CURSOR(CURSOR:Wait)
    BUTTON('11'),AT(200,0,20,20),USE(?B11),REQ
    BUTTON('12'),AT(220,0,20,20),USE(?B12),ALRT(F10Key)
    BUTTON('13'),AT(240,0,20,20),USE(?B13),SCROLL
END
CODE
OPEN(MDIChild)
ACCEPT
    CASE ACCEPTED()
    OF ?B1
        !Perform some action
    END
END
END
```

See Also: CHECK, OPTION, RADIO

## CHECK (declare a checkbox control)

```
CHECK(text) ,AT( ) [,CURSOR( )] [,USE( )] [,DISABLE] [,KEY( )] [,MSG( )] [,HLP( )] [,SKIP]
    [,FONT( )] [,ICON( )] [,FULL] [,SCROLL] [,ALRT( )] [,HIDE] [,DROPID( )] [,TIP( )]
    [, LEFT | RIGHT] [,VALUE( )] [,TRN] [,COLOR( )] [,FLAT]
```

<b>CHECK</b>	Places a check box on the WINDOW, TOOLBAR, or REPORT.
<i>text</i>	A string constant containing the text to display next to the check box (PROP:Text). This may contain an ampersand (&) to indicate the “hot” letter for the check box.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW’s CURSOR attribute is used, else the Windows default cursor is used. Not valid in a REPORT.
<b>USE</b>	The label of a variable to receive the value of the check box (PROP:USE). Zero (0) indicates OFF (un-checked) or one (1) indicates ON (checked) unless the VALUE attribute specifies other values.
<b>DISABLE</b>	Specifies the control appears dimmed in the WINDOW or APPLICATION (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to and toggles the box (PROP:KEY). Not valid in a REPORT.
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG). Not valid in a REPORT.
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP). Not valid in a REPORT.
<b>SKIP</b>	Specifies the control does not receive input focus and may only be accessed with the mouse or accelerator key (PROP:SKIP). Not valid in a REPORT.
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>ICON</b>	Specifies an image file or standard icon to display on the button face of a “latching” pushbutton (PROP:ICON). Not valid in a REPORT.
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.

<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened, or the control is not printed in the REPORT (PROP:HIDE). UNHIDE must be used to display or print it.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID). Not valid in a REPORT.
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip). Not valid in a REPORT.
<b>LEFT</b>	Specifies that the <i>text</i> appears to the left of the check box (PROP:LEFT).
<b>RIGHT</b>	Specifies that the <i>text</i> appears to the right of the check box (PROP:RIGHT). This is the default position.
<b>VALUE</b>	Specifies the true and false values the USE variable receives when the box is checked by the user (PROP:Value).
<b>TRN</b>	Specifies the control transparently displays over the background (PROP:TRN).
<b>COLOR</b>	Specifies a background color for the control’s text (PROP:COLOR).
<b>FLAT</b>	Specifies the button appears flat except when the mouse cursor passes over the control (PROP:FLAT). Requires the ICON attribute. Not valid in a REPORT.

The **CHECK** control places a check box on the WINDOW, TOOLBAR, or REPORT at the position and size specified by its AT attribute.

A CHECK in a window with an ICON attribute appears as a “latched” button with the image displayed on the button face. When the button appears “up” the CHECK is off; when it appears “down” the CHECK is on.

By default, when the CHECK is off the USE variable receives a value of zero (0); and when the CHECK is on, the USE variable receives a value of one (1). The VALUE attribute and its runtime properties (PROP:TrueValue and PROP:FalseValue) can be used to change this default behavior and automatically set the USE variable to values other than the defaults.

Events Generated:	EVENT:Selected	The control has received input focus.
	EVENT:Accepted	The control has been toggled by the user.

EVENT:PreAlertKey

The user pressed an ALRT attribute hot key.

EVENT:AlertKey    The user pressed an ALRT attribute hot key.

EVENT:Drop        A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    CHECK('1'),AT(0,0,20,20),USE(C1)
    CHECK('2'),AT(0,20,20,20),USE(C2),VALUE('T','F')
END

CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail DETAIL,AT(0,0,6500,1000)
    CHECK('1'),AT(0,0,20,20),USE(C1)
    CHECK('2'),AT(20,80,20,20),USE(C2),LEFT
    CHECK('3'),AT(0,100,20,20),USE(C3),FONT('Arial',12)
END
END

CODE
OPEN(MDIChild)
ACCEPT
CASE ACCEPTED()
OF ?C1
    IF C1 = 1 THEN DO C1Routine.
OF ?C2
    IF C2 = 'T' THEN DO C2Routine.
END
END
```

See Also:

**BUTTON, OPTION, RADIO**



## COMBO (declare an entry/list control)

```
COMBO(picture) ,FROM( ) ,AT( ) [,CURSOR( )] [,USE( )] [,DISABLE] [,KEY( )] [,MSG( )] [,HLP( )]
[,SKIP][,FONT( )][,FORMAT( )][,DROP][,COLUMN][,VCR][,FULL][,GRID( )][,SCROLL]
[,ALRT( )][,HIDE][,READONLY][,REQ][,NOBAR][,DROPID( )][,TIP( )][,TRN][,COLOR()]
[, | MARK( )] [, | HSCROLL] [, | LEFT] [, | INS] [, | UPR] [, | MASK]
[, | IMM] [, | VSCROLL] [, | RIGHT] [, | OVR] [, | CAP]
[, | HVSCROLL] [, | CENTER]
[, | DECIMAL]
```

<b>COMBO</b>	Places a data entry field with an associated list of data items on the WINDOW or TOOLBAR.
<i>picture</i>	A display picture token that specifies the input format for the data entered into the control (PROP:Text).
<b>FROM</b>	Specifies the origin of the data displayed in the list (PROP:FROM).
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, the runtime library chooses a value.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	A field equate label to reference the control in executable code or the label of the variable that receives the value selected by the user (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the control (PROP:KEY).
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG).
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP).
<b>SKIP</b>	Specifies the control receives input focus to enter text only with the mouse or accelerator key and does not retain focus (PROP:SKIP).
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>FORMAT</b>	Specifies the display format of the data (PROP:FORMAT).
<b>DROP</b>	Specifies a drop-down list box and the number of elements the drop-down portion contains (PROP:DROP).

<b>COLUMN</b>	Specifies a field-by-field highlight bar on multi-column list boxes (PROP:COLUMN).
<b>VCR</b>	Specifies a VCR-type control that appears left of any horizontal scroll bar (PROP:VCR).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>GRID</b>	Specifies the color of the grid lines between columns in the list (PROP:GRID).
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>READONLY</b>	Specifies the control does not allow data entry (PROP:READONLY).
<b>NOBAR</b>	Specifies the highlight bar is displayed only when the LIST has focus (PROP:NOBAR).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip).
<b>TRN</b>	Specifies the control transparently displays over the background (PROP:TRN).
<b>COLOR</b>	Specifies background and selected colors for the control (PROP:COLOR).
<b>REQ</b>	Specifies the control may not be left blank or zero (PROP:REQ).
<b>MARK</b>	Specifies multiple item selection mode (PROP:MARK).
<b>IMM</b>	Specifies generation of an event whenever the user presses any key (PROP:IMM).
<b>HSCROLL</b>	Specifies that a horizontal scroll bar is automatically added to the list box when any portion of the data item lies horizontally outside the visible area (PROP:HSCROLL).
<b>VSCROLL</b>	Specifies that a vertical scroll bar is automatically added to the list box when any data items lie vertically outside the visible area (PROP:VSCROLL).

<b>HVSCROLL</b>	Specifies that both vertical and horizontal scroll bars are automatically added to the list box when any portion of the data items lies outside the visible area (PROP:HVSCROLL).
<b>LEFT</b>	Specifies that the data is left justified within the control (PROP:LEFT).
<b>RIGHT</b>	Specifies that the data is right justified within the control (PROP:RIGHT).
<b>CENTER</b>	Specifies that the data is centered within the control (PROP:CENTER).
<b>DECIMAL</b>	Specifies that the data is aligned on the decimal point within the control (PROP:DECIMAL).
<b>INS / OVR</b>	Specifies Insert or Overwrite entry mode (PROP:INS and PROP:OVR). This is valid only on windows with the MASK attribute).
<b>UPR / CAP</b>	Specifies all upper case or proper name capitalization (First Letter Of Each Word Capitalized) data entry (PROP:UPR and PROP:CAP).
<b>MASK</b>	Specifies pattern input editing mode of the ENTRY portion of the control (PROP:MASK).

The **COMBO** control places a data entry field with an associated list of data items on the WINDOW or TOOLBAR (not valid in a REPORT) at the position and size specified by its AT attribute (a combination of an ENTRY and LIST control). The user may type in data or select an item from the list. The entered data is not automatically validated against the entries in the list. The data entry portion of the COMBO acts as an “incremental locator” to the list—as the user types each character, the highlight bar is positioned to the closest matching entry.

A COMBO with the DROP attribute displays only the currently selected data item on screen until the control has focus and the user presses the down arrow key, or CLICKS ON the the icon to the right of the displayed data item. When either of these occurs, the selection list appears (“drops down”) to allow the user to select an item.

A COMBO with the IMM attribute generates an EVENT:NewSelection every time the user moves the highlight bar to another selection, or presses any key (all keys are implicitly ALRTed). This allows an opportunity for the source code to re-fill the display QUEUE, or get the currently highlighted record to display other fields from the record. A COMBO with the VCR attribute has scroll control buttons like a **V**ideo **C**assette **R**ecorder to the left of the horizontal scroll bar (if there is one). These buttons allow the user to use the mouse to scroll through the list.

Events Generated:	EVENT:Selected	The control has received input focus.
	EVENT:Accepted	The user has either selected an entry from the list or entered data directly into the control, and moved on to another control.
	EVENT:Rejected	The user has entered an invalid value for the entry picture.
	EVENT:NewSelection	The current selection in the list has changed (highlight bar has moved up or down) or the user pressed any key (only with the IMM attribute).
	EVENT:PreAlertKey	The user pressed an ALRT attribute hot key.
	EVENT:AlertKey	The user pressed an ALRT attribute hot key.
	EVENT:Drop	A successful drag-and-drop to the control.
	EVENT:ScrollUp	The user pressed the up arrow (only with the IMM attribute).
	EVENT:ScrollDown	The user pressed the down arrow (only with the IMM attribute).
	EVENT:PageUp	The user pressed PgUp (only with the IMM attribute).
	EVENT:PageDown	The user pressed PgDn (only with the IMM attribute).
	EVENT:ScrollTop	The user pressed Ctrl-PgUp (only with the IMM attribute).
	EVENT:ScrollBottom	The user pressed Ctrl-PgDn (only with the IMM attribute).
	EVENT:PreAlertKey	The user pressed a printable character (only with the IMM attribute) or an ALRT attribute hot key.
	EVENT:AlertKey	The user pressed a printable character (only with the IMM attribute) or an ALRT attribute hot key.
	EVENT:Locate	The user pressed the locator VCR button (only with the IMM attribute).
	EVENT:ScrollDrag	The user moved the scroll bar's "thumb" and its new position is in PROP:VScrollPos (only with the IMM attribute).
	EVENT:ScrollTrack	The user is moving the scroll bar's "thumb" and its new position is in PROP:VScrollPos (only with the IMM attribute).

**EVENT:DropDown**

The user pressed the down arrow button (only with the DROP attribute).

**EVENT:DroppedDown**

The list has dropped (only with the DROP attribute).

**EVENT:ColumnResize**

A column in the list has been resized.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    COMBO(@S8),AT(0,0,20,20),USE(C1),FROM(Que)
    COMBO(@S8),AT(20,0,20,20),USE(C2),FROM(Que),KEY(F10Key)
    COMBO(@S8),AT(40,0,20,20),USE(C3),FROM(Que),MSG('Button 3')
    COMBO(@S8),AT(60,0,20,20),USE(C4),FROM(Que),HLP('Check4Help')
    COMBO(@S8),AT(80,0,20,20),USE(C5),FROM(Q) |
        ,FORMAT('5C~List~15L~Box~'),COLUMN
    COMBO(@S8),AT(100,0,20,20),USE(C6),FROM(Que),FONT('Arial',12)
    COMBO(@S8),AT(120,0,20,20),USE(C7),FROM(Que),DROP(8)
    COMBO(@S8),AT(140,0,20,20),USE(C8),FROM(Que),HVSCROLL,VCR
    COMBO(@S8),AT(160,0,20,20),USE(C9),FROM(Que),IMM
    COMBO(@S8),AT(180,0,20,20),USE(C10),FROM(Que),CURSOR(CURSOR:Wait)
    COMBO(@S8),AT(200,0,20,20),USE(C11),FROM(Que),ALRT(F10Key)
    COMBO(@S8),AT(220,0,20,20),USE(C12),FROM(Que),LEFT
    COMBO(@S8),AT(240,0,20,20),USE(C13),FROM(Que),RIGHT
    COMBO(@S8),AT(260,0,20,20),USE(C14),FROM(Que),CENTER
    COMBO(@N8,2),AT(280,0,20,20),USE(C15),FROM(Que),DECIMAL
    COMBO(@S8),AT(300,0,20,20),USE(C16),FROM('Apples|Peaches|Pumpkin|Pie')
    COMBO(@S8),AT(320,0,20,20),USE(C17),FROM('TBA')
END
CODE
OPEN(MDIChild)
?C17{PROP:From} = 'Live|Long|And|Prosper'      !Runtime FROM attribute assignment
ACCEPT
CASE ACCEPTED()
OF ?C1
    LOOP X# = 1 to RECORDS(Que)                  !Check for user's entry in Que
        GET(Que,X#)
        IF C1 = Que THEN BREAK.                  !Break loop if present
    END
    IF X# > RECORDS(Que)                          !Check for BREAK
        Que = C1                                ! and add the entry
        ADD(Que)
    . . .
```

See Also:

**LIST, ENTRY**

## ELLIPSE (declare an ellipse control)

**ELLIPSE** ,AT( ) [,USE( )] [,DISABLE] [,COLOR( )] [,FILL( )] [,FULL] [,SCROLL] [,HIDE]  
[,LINEWIDTH]

<b>ELLIPSE</b>	Places a “circular” figure on the WINDOW, TOOLBAR, or REPORT.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>USE</b>	Specifies a field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>COLOR</b>	Specifies the color for the border of the ellipse (PROP:COLOR). If omitted, the ellipse has no border.
<b>FILL</b>	Specifies the fill color for the control (PROP:FILL). If omitted, the ellipse is not filled with color.
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>LINEWIDTH</b>	Specifies the width of the ELLIPSE’s border (PROP:LINEWIDTH).

The **ELLIPSE** control places a “circular” figure on the WINDOW, TOOLBAR, or REPORT at the position and size specified by its AT attribute. The ellipse is drawn inside a “bounding box” defined by the *x*, *y*, *width*, and *height* parameters of its AT attribute. The *x* and *y* parameters specify the starting point, and the *width* and *height* parameters specify the horizontal and vertical size of the “bounding box.” This control cannot receive input focus and does not generate events.

Example:

```

MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    ELLIPSE,FILL(COLOR:MENU),FULL                !Filled, full screen, black border
    ELLIPSE,AT(0,0,20,20)                        !Unfilled, black border
    ELLIPSE,AT(0,20,20,20),USE(?Box1),DISABLE    !Dimmed
    ELLIPSE,AT(20,20,20,20),ROUND                !Unfilled, rounded, black border
    ELLIPSE,AT(40,40,20,20),FILL(COLOR:ACTIVEBORDER)
                                                !Filled, black border
    ELLIPSE,AT(60,60,20,20),COLOR(COLOR:ACTIVEBORDER)
                                                !Unfilled, active border color border
    ELLIPSE,AT(480,180,20,20),SCROLL !Scrolls with screen
END
CustRpt  REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail  DETAIL,AT(0,0,6500,1000)
    ELLIPSE,AT(0,0,20,20)                        !Unfilled, black border
    ELLIPSE,AT(0,20,20,20),USE(?EllipSel),DISABLE
                                                !Unfilled, black border, dimmed
    ELLIPSE,AT(20,20,20,20),ROUND                !Unfilled, rounded, black border
    ELLIPSE,AT(40,40,20,20),FILL(COLOR:ACTIVEBORDER)
                                                !Filled, black border
    ELLIPSE,AT(60,60,20,20),COLOR(COLOR:ACTIVEBORDER)
                                                !Unfilled, active border color border
END
END

```

## ENTRY (declare a data entry control)

```
ENTRY(picture) ,AT() [,CURSOR()] [,USE()] [,DISABLE] [,KEY()] [,MSG()] [,HLP()] [,SKIP] [,FONT()]
[,IMM] [,PASSWORD] [,REQ] [,FULL] [,SCROLL] [,ALRT()] [,HIDE] [,TIP( )] [,TRN] [,READONLY]
[DROPID( )] [,INS ] [,CAP ] [,LEFT ] [,COLOR( )] [,MASK]
           |OVR |      |UPR |      |RIGHT
           |      |      |CENTER
           |      |      |DECIMAL
```

<b>ENTRY</b>	Places a data entry field on the WINDOW or TOOLBAR.
<i>picture</i>	A display picture token that specifies the input format for the data entered into the control (PROP:Text).
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	The label of the variable that receives the value entered into the control by the user (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the control (PROP:KEY).
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG).
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP).
<b>SKIP</b>	Specifies the control receives input focus to enter text only with the mouse or accelerator key and does not retain focus (PROP:SKIP).
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>IMM</b>	Specifies immediate event generation whenever the user presses any key (PROP:IMM).
<b>PASSWORD</b>	Specifies non-display of the data entered (password mode) (PROP:PASSWORD).
<b>REQ</b>	Specifies the control may not be left blank or zero (PROP:REQ).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).



<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip).
<b>TRN</b>	Specifies the control transparently displays over the background (PROP:TRN).
<b>READONLY</b>	Specifies the control does not allow data entry (PROP:READONLY).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>INS / OVR</b>	Specifies Insert or Overwrite entry mode (PROP:INS and PROP:OVR). This is valid only on windows with the MASK attribute.
<b>UPR / CAP</b>	Specifies all upper case or proper name capitalization (First Letter Of Each Word Capitalized) data entry (PROP:UPR and PROP:CAP).
<b>LEFT</b>	Specifies that the data entered is left justified within the area specified by the AT attribute (PROP:LEFT).
<b>RIGHT</b>	Specifies that the data entered is right justified within the area specified by the AT attribute (PROP:RIGHT).
<b>CENTER</b>	Specifies that the data entered is centered within the area specified by the AT attribute (PROP:CENTER).
<b>DECIMAL</b>	Specifies that the data entered is aligned on the decimal point within the area specified by the AT attribute (PROP:DECIMAL).
<b>COLOR</b>	Specifies background and selected colors for the control (PROP:COLOR).
<b>MASK</b>	Specifies pattern input editing mode of the ENTRY control (PROP:MASK).

The **ENTRY** control places a data entry field on the WINDOW or TOOLBAR (not valid in a REPORT) at the position and size specified by its AT attribute. Data entered is formatted according to the *picture*, and the variable specified in the USE attribute receives the data entered when the user has completed data entry and moves on to another control. Data entry scrolls horizontally to allow the user to enter data to the full length of the variable. Therefore, the right and left arrow keys move within the data in the ENTRY control.

Standard Windows behavior (Cut, Copy, and Paste) are automatically available using CTRL+X, CTRL+C, and CTRL+V while the ENTRY control has focus. Undo is also implemented using CTRL+Z (before the user leaves the control).

An ENTRY control with the PASSWORD attribute displays asterisks when the user enters data (and Cut and Copy are disabled ). This is useful for password-type variables. An ENTRY control with the SKIP attribute is used for seldom-used data entry. Display-only data should be declared with the READONLY attribute.

The MASK attribute specifies pattern input editing mode of the control. This means that, as the user types in data, each character is automatically validated against the control's picture for proper input (numbers only in numeric pictures, etc.). This forces the user to enter data in the format specified by the control's display picture. If omitted, Windows free-input is allowed in the control. This is Windows' default data entry mode. Free-input means the user's data is formatted to the control's picture only after entry (on EVENT:Accepted). This allows users to enter data as they choose and it is automatically formatted to the control's picture after entry. If the user types in data in a format different from the control's picture, the libraries attempt to determine the format the user used, and convert the data to the control's display picture. For example, if the user types "January 1, 1995" into a control with a display picture of @D1, the runtime library formats the user's input to "1/1/95." This action occurs only after the user completes data entry and moves to another control. If the runtime library cannot determine what format the user used, it will not update the USE variable and will simply generate EVENT:Rejected.

Events Generated:	EVENT:Selected	The control has received input focus.
	EVENT:Accepted	The user has completed data entry in the control.
	EVENT:Rejected	The user has entered an invalid value for the entry picture.
	EVENT:PreAlertKey	The user pressed an ALRT attribute hot key.
	EVENT:AlertKey	The user pressed an ALRT attribute hot key.
	EVENT:Drop	A successful drag-and-drop to the control.
	EVENT:NewSelection	The user entered a character (with IMM attribute only).

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    ENTRY(@S8),AT(0,0,20,20),USE(E1)
    ENTRY(@S8),AT(20,0,20,20),USE(E2),KEY(F10Key)
    ENTRY(@S8),AT(40,0,20,20),USE(E3),MSG('Button 3')
    ENTRY(@S8),AT(60,0,20,20),USE(E4),HLP('Entry4Help')
    ENTRY(@S8),AT(80,0,20,20),USE(E5),DISABLE
    ENTRY(@S8),AT(100,0,20,20),USE(E6),FONT('Arial',12)
    ENTRY(@S8),AT(120,0,20,20),USE(E7),REQ,INS,CAP
    ENTRY(@S8),AT(140,0,20,20),USE(E8),SCROLL,OVR,UPR
    ENTRY(@S8),AT(180,0,20,20),USE(E9),CURSOR(CURSOR:Wait),IMM
    ENTRY(@S8),AT(200,0,20,20),USE(E10),ALRT(F10Key)
    ENTRY(@N8.2),AT(280,0,20,20),USE(E11),DECIMAL(10)
END
```

See Also:

**TEXT, PROMPT**

## GROUP (declare a group of controls)

```
GROUP(text) ,AT() [,CURSOR()][,USE()][,DISABLE()][,KEY()][,MSG()][,HLP()][,FONT()][,TIP()]
[,BOXED()][,FULL()][,SCROLL()][,HIDE()][,ALRT()][,SKIP()][,DROPID()][,COLOR()][,BEVEL()]
controls
END
```

<b>GROUP</b>	Declares a group of controls that may be referenced as one entity.
<i>text</i>	A string constant containing the prompt for the group of controls (PROP:Text). This may contain an ampersand (&) to indicate the “hot” letter for the prompt. The <i>text</i> is displayed on screen only if the BOXED attribute is also present.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control, or any control within the GROUP (PROP:CURSOR). If omitted, the window’s CURSOR attribute is used, else the Windows default cursor is used. Not valid in a REPORT.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the GROUP control and the controls in the GROUP appear dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE). Not valid in a REPORT.
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the first control in the GROUP (PROP:KEY). Not valid in a REPORT.
<b>MSG</b>	Specifies a string constant containing the default text to display in the status bar when any control in the GROUP has focus (PROP:MSG). Not valid in a REPORT.
<b>HLP</b>	Specifies a string constant containing the default help system identifier for any control in the GROUP (PROP:HLP). Not valid in a REPORT.
<b>FONT</b>	Specifies the display font for the control and the default for all the controls in the GROUP (PROP:FONT).
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip). Not valid in a REPORT.
<b>BOXED</b>	Specifies a single-track border around the group of controls with the text at the top of the border (PROP:BOXED).

<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>SCROLL</b>	Specifies the GROUP control and the controls in the GROUP scroll with the window (PROP:SCROLL).
<b>HIDE</b>	Specifies the GROUP control and the controls in the GROUP do not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display them.
<b>ALRT</b>	Specifies “hot” keys active for the controls in the GROUP (PROP:ALRT).
<b>SKIP</b>	Specifies the controls in the GROUP do not receive input focus and may only be accessed with the mouse or accelerator key (PROP:SKIP). Not valid in a REPORT.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID). Not valid in a REPORT.
<b>COLOR</b>	Specifies default background and selected colors for the controls in the GROUP (PROP:COLOR).
<b>BEVEL</b>	Specifies custom 3-D effect borders (PROP:BEVEL). Not valid in a REPORT.
<i>controls</i>	Control declarations that may be referenced as the GROUP.

The **GROUP** control declares a group of controls to reference as one entity. GROUP allows the user to use the cursor keys instead of the TAB key to move between the *controls* in the GROUP, and provides default MSG and HLP attributes for all controls in the GROUP. This control cannot receive input focus.

Events Generated:      **EVENT:Drop**      A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    GROUP('Group 1'),USE(?G1),KEY(F10Key)
        ENTRY(@S8),AT(0,0,20,20),USE(?E1)
        ENTRY(@S8),AT(20,0,20,20),USE(?E2)
    END
    GROUP('Group 2'),USE(?G2),MSG('Group 2'),CURSOR(CURSOR:Wait)
        ENTRY(@S8),AT(40,0,20,20),USE(?E3)
        ENTRY(@S8),AT(60,0,20,20),USE(?E4)
    END
    GROUP('Group 3'),USE(?G3),AT(80,0,20,20),BOXED
        ENTRY(@S8),AT(80,0,20,20),USE(?E5)
        ENTRY(@S8),AT(100,0,20,20),USE(?E6)
    END
END
CustRpt    REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail DETAIL,AT(0,0,6500,1000)
    GROUP('Group 1'),USE(!G1),AT(80,0,20,20),BOXED
        STRING(@S8),AT(80,0,20,20),USE(E5)
        STRING(@S8),AT(100,0,20,20),USE(E6)
    END
    GROUP('Group 2'),USE(?G2),FONT('Arial',12)
        STRING(@S8),AT(120,0,20,20),USE(E7)
        STRING(@S8),AT(140,0,20,20),USE(E8)
    END
END
END
```

See Also:

**PANEL**

## IMAGE (declare a graphic image control)

```
IMAGE(file) ,AT( ) [,USE( )] [,DISABLE] [,FULL] [,SCROLL] [,HIDE]
                                     [, | TILED      | ] [, | HSCROLL  | ]
                                     | | CENTERED   | | | | VSCROLL  | |
                                     | |           | | | | HVSCROLL  | |
```

<b>IMAGE</b>	Places a graphic image on the WINDOW, TOOLBAR, or REPORT.
<i>file</i>	A string constant containing the name of the file to display (PROP:Text). The named file is automatically linked into the .EXE as a resource.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION opens (PROP:HIDE). UNHIDE must be used to display it.
<b>TILED</b>	Specifies the image displays at its default size and is tiled to fill the entire area of the IMAGE (PROP:TILED).
<b>CENTERED</b>	Specifies the image displays at its default size and is centered in the area of the IMAGE (PROP:CENTERED).
<b>HSCROLL</b>	Specifies a horizontal scroll bar is automatically added to the IMAGE control when the graphic image is wider than the area specified for display (PROP:HSCROLL). Not valid in a REPORT.
<b>VSCROLL</b>	Specifies a vertical scroll bar is automatically added to the IMAGE control when the graphic image is taller than the area specified for display (PROP:VSCROLL). Not valid in a REPORT.

**HVSCROLL** Specifies both vertical and horizontal scroll bars are automatically added to the **IMAGE** control when the graphic image is larger than the display area (**PROP:HVSCROLL**). Not valid in a **REPORT**.

The **IMAGE** control places a graphic image on the **WINDOW** (or **TOOLBAR**) at the position specified by its **AT** attribute. The image is stretched to fill the area specified by the **AT** attribute unless the **TILED** or **CENTERED** attribute is present. The displayed *file* may be a bitmap (.BMP), PaintBrush (.PCX), Graphic Interchange Format (.GIF), JPEG (.JPG), or Windows metafile (.WMF). The *file* may be an icon (.ICO) in an **IMAGE** on a **WINDOW** but not on a **REPORT**, because Windows does not support printing icons. The type of *file* is determined by its extension.

This control cannot receive input focus and does not generate events.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    IMAGE('PIC.BMP'),AT(0,0,20,20),USE(?I1)
    IMAGE('PIC.WMF'),AT(40,0,20,20),USE(?I3),SCROLL
END
CustRpt   REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail  DETAIL,AT(0,0,6500,1000)
    IMAGE('PIC.BMP'),AT(0,0,20,20),USE(?I1)
    IMAGE('PIC.WMF'),AT(40,0,20,20),USE(?I2)
    IMAGE('PIC.JPG'),AT(60,0,20,20),USE(?I3)
END
END
```

See Also:

**PALETTE**



## ITEM (declare a menu item)

```
ITEM(text) [,USE( )] [,KEY( )] [,MSG( )] [,HLP( )] [,STD( )] [,CHECK] [,DISABLE] [,SEPARATOR]
           [,ICON( )] [,FONT( )] [, FIRST | ]
                               | LAST |
```

<b>ITEM</b>	Declares a menu choice within a MENUBAR or MENU structure.
<i>text</i>	A string constant containing the display text for the menu item (PROP:Text).
<b>USE</b>	A field equate label to reference the menu item in executable code, or the variable used with CHECK (PROP:USE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately executes the menu item (PROP:KEY).
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the menu item is highlighted (PROP:MSG).
<b>HLP</b>	Specifies a string constant containing the help system identifier for the menu item (PROP:HLP).
<b>STD</b>	Specifies an integer constant or equate that identifies a “Windows standard action” the menu item executes (PROP:STD).
<b>CHECK</b>	Specifies an on/off ITEM (PROP:CHECK).
<b>DISABLE</b>	Specifies the menu item appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>SEPARATOR</b>	Specifies the ITEM displays a solid horizontal line across the menu box at run-time to delimit groups of menu selections. No other attributes may be specified with SEPARATOR.
<b>ICON</b>	Specifies an image file or standard icon to display on the menu item (PROP:ICON).
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>FIRST</b>	Specifies the ITEM appears at the top of the menu when menus are merged (PROP:FIRST).
<b>LAST</b>	Specifies the ITEM appears at the bottom of the menu when menus are merged (PROP:LAST).

**ITEM** declares a menu choice within a MENUBAR or MENU structure. The *text* string may contain an ampersand ( & ) which designates the following character as an accelerator “hot” key which is automatically underlined. If the ITEM is on the menu bar, pressing the Alt key together with the accelerator key highlights and executes the ITEM. If the ITEM is in

a MENU, pressing the accelerator key, alone, when the menu is displayed, highlights and executes the ITEM. If there is no ampersand in the *text*, the first non-blank character in the *text* string is the accelerator key for the ITEM, which will not be underlined. To include an ampersand as part of the *text*, place two ampersands together (&&) in the *text* string and only one will display. The KEY attribute designates a separate “hot” key for the item. This may be any valid Clarion keycode to immediately execute the ITEM’s action.

A cursor bar highlights individual ITEMS within the MENU structure. Each ITEM is usually associated with some code to be executed upon selection of that ITEM, unless the STD attribute is present. The STD attribute specifies a standard Windows action the menu item performs, such as Tile or Cascade the windows. The SEPARATOR attribute creates an ITEM which serves only to delimit groups of menus selections so it should not have a *text* parameter, nor any other attributes. It creates a solid horizontal line across the menu box. An ITEM that is not within a MENU structure is placed on the menu bar. This creates a menu bar selection which has no related drop-down menu. The normal convention to indicate this to the user is to terminate the *text* displayed for the item with an exclamation point (!). For example, the *text* for the ITEM might contain ‘Exit!’ to alert the user to the executable nature of the menu choice.

Events Generated:      EVENT:Accepted    The control has been pressed by the user.

Example:

```
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS |
,HVSCROLL,RESIZE
MENUBAR
  ITEM('E&xit!'),USE(?MainExit),FIRST
  MENU('File'),USE(?FileMenu),FIRST
    ITEM('Open...'),USE(?OpenFile),HLP('OpenFileHelp'),FIRST
    ITEM('Close'),USE(?CloseFile),HLP('CloseFileHelp'),DISABLE
    ITEM('Auto Increment'),USE(ToggleVar),CHECK
  END
  MENU('Edit'),USE(?EditMenu),KEY(CTRL E),HLP('EditMenuHelp')
    ITEM('Undo'),USE(?UndoText),KEY(CTRL Z),STD(STD:Undo),DISABLE
    ITEM,SEPARATOR
    ITEM('Cu&t'),USE(?CutText),KEY(CTRL X),STD(STD:Cut),DISABLE
    ITEM('Copy'),USE(?CopyText),KEY(CTRL C),STD(STD:Copy),DISABLE
    ITEM('Paste'),USE(?PasteText),KEY(CTRL V),STD(STD:Paste),DISABLE
  END
  MENU('Window'),STD(STD:WindowList),MSG('Arrange or Select Window'),LAST
    ITEM('Tile'),STD(STD:TileWindow)
    ITEM('Cascade'),STD(STD:CascadeWindow)
    ITEM('Arrange Icons'),STD(STD:ArrangeIcons)
    ITEM,SEPARATOR
  END
  MENU('Help'),USE(?HelpMenu),LAST,RIGHT
    ITEM('Contents'),USE(?HelpContents),STD(STD:HelpIndex)
    ITEM('Search for Help On...'),USE(?HelpSearch),STD(STD:HelpSearch)
    ITEM('How to Use Help'),USE(?HelpOnHelp),STD(STD:HelpOnHelp)
    ITEM('About MyApp...'),USE(?HelpAbout),MSG('Copyright Info'),LAST
  END
END
END
```

## LINE (declare a line control)

**LINE** ,AT( ) [,USE( )] [,DISABLE] [,COLOR( )] [,FULL] [,SCROLL] [,HIDE] [,LINEWIDTH( )]

<b>LINE</b>	Places a straight line on the WINDOW, TOOLBAR, or REPORT.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>COLOR</b>	Specifies the color for the line (PROP:COLOR). If omitted, the color is black.
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>LINEWIDTH</b>	Specifies the thickness of the LINE (PROP:LINEWIDTH).

The **LINE** control places a straight line on the WINDOW, TOOLBAR, or REPORT at the position and size specified by its AT attribute. The *x* and *y* parameters of the AT attribute specify the starting point of the line. The *width* and *height* parameters of the AT attribute specify the horizontal and vertical distance to the end point of the line. If these are both positive numbers, the line slopes to the right and down from its starting point. If the *width* is negative, the line slopes left; if the *height* is negative, the line slopes left. If either the *width* or *height* is zero, the line is horizontal or vertical. This control cannot receive input focus and does not generate events.

<u>Width</u>	<u>Height</u>	<u>Result</u>
positive	positive	right and down from start point
negative	positive	left and down from start point
positive	negative	right and up from start point
negative	negative	left and up from start point
zero	positive	vertical, down from start point
zero	negative	vertical, up from start point
positive	zero	horizontal, right from start point
negative	zero	horizontal, left from start point

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    LINE,AT(60,60,20,20),COLOR(COLOR:ACTIVEBORDER)    !Border color
    LINE,AT(480,180,20,20),SCROLL                      !Scrolls with screen
END
CustRpt    REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail DETAIL,AT(0,0,6500,1000)
    LINE,AT(60,60,20,20),COLOR(COLOR:ACTIVEBORDER)    !Border color
    LINE,AT(480,180,20,20),USE(?L2)
END
END
```

## LIST (declare a window list control)

```

LIST ,FROM( ) ,AT( ) [,CURSOR( )] [,USE( )] [,DISABLE] [,KEY( )] [,MSG( )] [,HLP( )] [,SKIP]
    [,FONT( )] [,FORMAT( )] [,DROP] [,COLUMN] [,VCR] [,FULL] [,SCROLL] [,NOBAR]
    [,ALRT( )] [,HIDE] [,DRAGID( )] [,DROPID( )] [,TIP( )] [,GRID( )] [,TRN] [,COLOR( )]
    [, MARK( )] | | [, HSCROLL | | [, LEFT | |
    | IMM | | | VSCROLL | | | RIGHT | |
    | | | HVSCROLL | | | CENTER | |
    | | | | | DECIMAL | |

```

<b>LIST</b>	Places a scrolling list of data items on the WINDOW, TOOLBAR, or REPORT.
<b>FROM</b>	Specifies the origin of the data displayed in the list (PROP:FROM).
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, the runtime library chooses a value.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used. Not valid in a REPORT.
<b>USE</b>	A field equate label to reference the control in executable code, or the label of the variable that receives the value selected by the user (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the control (PROP:KEY). Not valid in a REPORT.
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG). Not valid in a REPORT.
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP). Not valid in a REPORT.
<b>SKIP</b>	Specifies the control does not receive input focus and may only be accessed with the mouse or accelerator key (PROP:SKIP). Not valid in a REPORT.
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>FORMAT</b>	Specifies the display format of the data in the list (PROP:FORMAT). This can include icons, colors, and tree controls.
<b>DROP</b>	Specifies a drop-down list box and the number of elements the drop-down portion contains (PROP:DROP). Not valid in a REPORT.

<b>COLUMN</b>	Specifies cell-by-cell highlighting on multi-column lists (PROP:COLUMN). Not valid in a REPORT.
<b>VCR</b>	Specifies a VCR-type control to the left of any horizontal scroll bar (PROP:VCR). Not valid in a REPORT.
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>NOBAR</b>	Specifies the highlight bar is displayed only when the LIST has focus (PROP:NOBAR). Not valid in a REPORT.
<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT). Not valid in a REPORT.
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION opens (PROP:HIDE). UNHIDE must be used to display it.
<b>DRAGID</b>	Specifies the control may serve as a drag host for drag-and-drop actions (PROP:DRAGID). Not valid in a REPORT.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID). Not valid in a REPORT.
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip). Not valid in a REPORT.
<b>GRID</b>	Specifies the color of the grid lines between columns in the list (PROP:GRID).
<b>TRN</b>	Specifies the control transparently displays over the background (PROP:TRN).
<b>COLOR</b>	Specifies background and selected colors for the control (PROP:COLOR).
<b>MARK</b>	Specifies multiple items selection mode (PROP:MARK). Not valid in a REPORT.
<b>IMM</b>	Specifies generation of an event whenever the user presses any key (PROP:IMM). Not valid in a REPORT.
<b>HSCROLL</b>	Specifies that a horizontal scroll bar is automatically added to the list box when any portion of the data item lies horizontally outside the visible area (PROP:HSCROLL). Not valid in a REPORT.

<b>VSCROLL</b>	Specifies that a vertical scroll bar is automatically added to the list box when any data items lie vertically outside the visible area (PROP:VSCROLL). Not valid in a REPORT.
<b>HVSCROLL</b>	Specifies that both vertical and horizontal scroll bars are automatically added to the list box when any portion of the data items lies outside the visible area (PROP:HVSCROLL). Not valid in a REPORT.
<b>LEFT</b>	Specifies that the data is left justified within the LIST (PROP:LEFT).
<b>RIGHT</b>	Specifies that the data is right justified within the LIST (PROP:RIGHT).
<b>CENTER</b>	Specifies that the data is centered within the LIST (PROP:CENTER).
<b>DECIMAL</b>	Specifies that the data is aligned on the decimal point within the LIST (PROP:DECIMAL).

The **LIST** control places a scrolling list of data items on the WINDOW, TOOLBAR, or REPORT at the position and size specified by its AT attribute. The data items displayed in the LIST come from a QUEUE or STRING specified by the FROM attribute and are formatted by the parameters specified in the FORMAT attribute (which can include colors, icons, and tree control parameters).

The CHOICE procedure returns the QUEUE entry number (the value returned by POINTER(queue)) of the selected item when the EVENT:Accepted event has been generated by the LIST. The data displayed in the LIST is automatically refreshed every time through the ACCEPT loop, whether the AUTO attribute is present or not.

A LIST with the DROP attribute displays only the currently selected data item on screen until the control has focus and the user presses the down arrow key, or CLICKS ON the the icon to the right of the displayed data item. When either of these occurs, the selection list appears (“drops down”) to allow the user to select an item.

A LIST with the IMM attribute generates an event every time the user moves the highlight bar to another selection, or presses any key (all keys are implicitly ALRTed). This allows an opportunity for the source code to re-fill the display QUEUE, or get the currently highlighted record to display other fields from the record. If VSCROLL is also present, the vertical scroll bar is always displayed and when the end-user CLICKS on the scroll bar, events are generated but the list does not move (executable code should perform this action). You can interrogate the PROP:VscrollPos property to determine the scroll thumb’s position from 0 (top) to 255 (bottom).

A LIST with the VCR attribute has scroll control buttons like a Video Cassette Recorder to the left of the horizontal scroll bar (if there is one). These buttons allow the user to use the mouse to scroll through the list.

A LIST with the DRAGID attribute can serve as a drag-and-drop host, providing information to be moved or copied to another control. A LIST with the DROPID attribute can serve as a drag-and-drop target, receiving information from another control. These attributes work together to specify drag-and-drop “signatures” that define a valid target for the operation. The DRAGID() and DROPID() procedures, along with the SETDROPID procedure, are used to perform the data exchange.

### **REPORT Usage**

LIST is valid only in a DETAIL structure. Its purpose is to allow the report format to duplicate the screen appearance of the LIST's FORMAT setting. When the first instance of the DETAIL structure containing the LIST prints, any headers in the FORMAT attribute print along with the current FROM attribute entry. When the last DETAIL structure containing the LIST prints, the LIST footers print along with the current FROM attribute entry.

Events Generated:	EVENT:Selected	The control has received input focus.
	EVENT:Accepted	The user has selected an entry from the control.
	EVENT:NewSelection	The current selection in the list has changed (the highlight bar has moved up or down).
	EVENT:ScrollUp	The user pressed the up arrow (only with the IMM attribute).
	EVENT:ScrollDown	The user pressed the down arrow (only with the IMM attribute).
	EVENT:PageUp	The user pressed PGUP (only with the IMM attribute).
	EVENT:PageDown	The user pressed PGDN (only with the IMM attribute).
	EVENT:ScrollTop	The user pressed CTRL+PGUP (only with IMM attribute).
	EVENT:ScrollBottom	The user pressed CTRL+PGDN (only with IMM attribute).
	EVENT:Locate	The user pressed the locator VCR button (only with the IMM attribute).
	EVENT:ScrollDrag	The user moved the scroll bar's “thumb” and its new position is in PROP:VScrollPos (only with the IMM attribute).



- EVENT:ScrollTrack**  
The user is moving the scroll bar's "thumb" and its new position is in PROP:VScrollPos (only with the IMM attribute).
- EVENT:PreAlertKey**  
The user pressed a printable character (only with the IMM attribute) or an ALRT attribute hot key.
- EVENT:AlertKey** The user pressed a printable character (only with the IMM attribute) or an ALRT attribute hot key.
- EVENT:Dragging** The mouse cursor is over a potential drag target (only with the DRAGID attribute).
- EVENT:Drag** The mouse cursor has been released over a drag target (only with the DRAGID attribute).
- EVENT:Drop** The mouse cursor has been released over a drag target (only with the DROPID attribute).
- EVENT:DroppingDown**  
The user has requested the droplist drop down (only with the DROP attribute). CYCLE aborts the dropdown.
- EVENT:DroppedDown**  
The user has dropped the droplist (only with the DROP attribute).
- EVENT:Expanding**  
The user has clicked on a tree expansion box (only with the T in the FORMAT attribute string). CYCLE aborts the expansion.
- EVENT:Expanded** The user has clicked on a tree expansion box (only with the T in the FORMAT attribute string).
- EVENT:Contracting**  
The user has clicked on a tree contraction box (only with the T in the FORMAT attribute string). CYCLE aborts the contraction.
- EVENT:Contracted**  
The user has clicked on a tree contraction box (only with the T in the FORMAT attribute string).
- EVENT:ColumnResize**  
A column in the list has been resized.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    LIST,AT(0,0,20,20),USE(?L1),FROM(Que),IMM
    LIST,AT(20,0,20,20),USE(?L2),FROM(Que),KEY(F10Key)
    LIST,AT(40,0,20,20),USE(?L3),FROM(Que),MSG('Button 3')
    LIST,AT(60,0,20,20),USE(?L4),FROM(Que),HLP('Check4Help')
    LIST,AT(80,0,20,20),USE(?L5),FROM(Q),FORMAT('5C~List~15L~Box~'),COLUMN
    LIST,AT(100,0,20,20),USE(?L6),FROM(Que),FONT('Arial',12)
    LIST,AT(120,0,20,20),USE(?L7),FROM(Que),DROP(6)
    LIST,AT(140,0,20,20),USE(?L8),FROM(Que),HVSCROLL,VCR
    LIST,AT(180,0,20,20),USE(?L10),FROM(Que),CURSOR(CURSOR:Wait)
    LIST,AT(200,0,20,20),USE(?L11),FROM(Que),ALRT(F10Key)
    LIST,AT(220,0,20,20),USE(?L12),FROM(Que),LEFT
    LIST,AT(240,0,20,20),USE(?L13),FROM(Que),RIGHT
    LIST,AT(260,0,20,20),USE(?L14),FROM(Que),CENTER
    LIST,AT(280,0,20,20),USE(?L15),FROM(Que),DECIMAL
    LIST,AT(300,0,20,20),USE(?L16),FROM('Apples|Peaches|Pumpkin|Pie')
    LIST,AT(320,0,20,20),USE(?L17),FROM('TBA')
END

CODE
OPEN(MDIChild)
?L17{PROP:From} = 'Live|Long|And|Prosper'    !Runtime FROM attribute assignment

Q        QUEUE
F1        STRING(1)
F2        STRING(4)
END
CustRpt   REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail DETAIL,AT(0,0,6500,1000)
    LIST,AT(80,0,20,20),USE(?L1),FROM(Q),FORMAT('5C~List~15L~Box~')
END
END
```

See Also:

**COMBO, DRAGID, DROPID, SETDROPID**

## MENU (declare a menu box)

```

MENU(text) [,USE( )] [,KEY( )] [,MSG( )] [,HLP( )] [,STD( )] [,RIGHT] [,DISABLE]
           [,ICON( )] [,FONT( )] [, FIRST  | ]
                               | LAST  |
END

```

<b>MENU</b>	Declares a menu box within a MENUBAR.
<i>text</i>	A string constant containing the display text for the menu selection (PROP:Text).
<b>USE</b>	A field equate label to reference the menu selection in executable code(PROP:USE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately opens the menu (PROP:KEY).
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the menu is pulled down (PROP:MSG).
<b>HLP</b>	Specifies a string constant containing the help system identifier for the menu (PROP:HLP).
<b>STD</b>	Specifies an integer constant or equate that identifies a “Windows standard behavior” for the menu (PROP:STD).
<b>RIGHT</b>	Specifies the MENU appears at the far right of the action bar (PROP:RIGHT).
<b>DISABLE</b>	Specifies the menu appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>ICON</b>	Specifies an image file or standard icon to display on the menu (PROP:ICON).
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>FIRST</b>	Specifies the MENU appears at the left or top of the menu when merged (PROP:FIRST).
<b>LAST</b>	Specifies the MENU appears at the right or bottom of the menu when merged (PROP:LAST).

**MENU** declares a drop-down or cascading menu box structure within a MENUBAR structure. When the MENU is selected, the MENU and/or ITEM statements within the structure are displayed in a menu box. A menu box usually appears (drops down) immediately below its *text* on the menu bar (or above, if there is no room below). When selected with ENTER or RIGHT ARROW, any subsequent menu drop-box appears (cascades) immediately to the right of the MENU *text* in the preceding menu box (or left, if there is no room to the right). LEFT ARROW backs up to the preceding menu. The KEY attribute designates a separate accelerator key for the field. This may be any valid Clarion keycode to immediately pull down the MENU.

The *text* string may contain an ampersand ( & ) which designates the following character as the accelerator “hot” key which is automatically underlined. If the MENU is on the menu bar, pressing the Alt key together with the accelerator key highlights and displays the MENU. If the MENU is within another MENU, pressing the accelerator key, alone, highlights and executes the MENU. If there is no ampersand in the *text*, the first non-blank character in the *text* string is the accelerator key for the MENU, but it will not be underlined. To include an ampersand as part of the *text*, place two ampersands together (&&) in the *text* string and only one will display.

Example:

```
!An MDI application frame window with main menu for the application:
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS |
    ,HVSCROLL,RESIZE
    MENUBAR
        MENU('File'),USE(?FileMenu),FIRST
            ITEM('Open...'),USE(?OpenFile)
            ITEM('Close'),USE(?CloseFile),DISABLE
            ITEM('E&xit'),USE(?MainExit)
        END
        MENU('Edit'),USE(?EditMenu),KEY(CTRL E),HLP('EditMenuHelp')
            ITEM('Undo'),USE(?UndoText),KEY(CTRL Z),STD(STD:Undo),DISABLE
            ITEM('Cu&t'),USE(?CutText),KEY(CTRL X),STD(STD:Cut),DISABLE
            ITEM('Copy'),USE(?CopyText),KEY(CTRL C),STD(STD:Copy),DISABLE
            ITEM('Paste'),USE(?PasteText),KEY(CTRL V),STD(STD:Paste),DISABLE
        END
        MENU('Window'),STD(STD:WindowList),MSG('Arrange or Select Window'),LAST
            ITEM('Tile'),STD(STD:TileWindow)
            ITEM('Cascade'),STD(STD:CascadeWindow)
            ITEM('Arrange Icons'),STD(STD:ArrangeIcons)
        END
        MENU('Help'),USE(?HelpMenu),LAST,RIGHT
            ITEM('Contents'),USE(?HelpContents),STD(STD:HelpIndex)
            ITEM('Search for Help On...'),USE(?HelpSearch),STD(STD:HelpSearch)
            ITEM('How to Use Help'),USE(?HelpOnHelp),STD(STD:HelpOnHelp)
            ITEM('About MyApp...'),USE(?HelpAbout)
        END
    END
END
```

## OLE (declare a window OLE or .OCX container control)

```

OLE ,AT( ) [,CURSOR( )] [,USE()] [,DISABLE] [,KEY()] [,MSG()] [,HLP()] [,SKIP] [,FULL] [,TIP()]
    [,SCROLL] [,ALRT( )] [,HIDE] [,FONT( )] [,DROPID( )] [,COMPATIBILITY( )]
    [, CREATE( ) ] [, CLIP ] [,property( value )]
    [, OPEN( ) ] [, AUTOSIZE ]
    [, LINK( ) ] [, STRETCH ]
    [, DOCUMENT( ) ] [, ZOOM ]
[ MENUBAR
    multiple menu and/or item declarations
END ]
END

```

<b>OLE</b>	Places an OLE (Object Linking and Embedding) or .OCX control on the WINDOW or TOOLBAR.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the control.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	A Field Equate Label or the label of a variable to receive the "value" of the control (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the control (PROP:KEY).
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG).
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP).
<b>SKIP</b>	Specifies the control does not receive input focus and may only be accessed with the mouse or accelerator key (PROP:SKIP).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>TIP</b>	Specifies the text that displays as "balloon help" when the mouse cursor pauses over the control (PROP:ToolTip).
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).

<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>COMPATIBILITY</b>	Specifies a compatibility mode for certain OLE or .OCX objects that require it (PROP:COMPATIBILITY).
<b>CREATE</b>	Specifies the control creates a new OLE object or .OCX (PROP:CREATE).
<b>OPEN</b>	Specifies the control opens an object from an OLE Compound Storage file (PROP:AT). When the object is opened, the saved version of the container properties are reloaded, so properties do not need to be re-specified.
<b>LINK</b>	Specifies the OLE object is a link to an object from a file, for example an Excel spreadsheet (PROP:LINK).
<b>DOCUMENT</b>	Specifies the OLE object is an object from a file, for example an Excel spreadsheet (PROP:DOCUMENT).
<b>CLIP</b>	Specifies the OLE object only displays what fits into the size of the OLE container control’s AT attribute (PROP:CLIP). If the object is larger than the OLE container control, only the top left corner displays.
<b>AUTOSIZE</b>	Specifies the OLE object automatically resizes itself when the OLE container control’s AT attribute parameters change at runtime using PROP:AT, (PROP:AUTOSIZE).
<b>STRETCH</b>	Specifies the OLE object stretches to completely fill the size specified by the OLE container control’s AT attribute (PROP:STRETCH).
<b>ZOOM</b>	Specifies the OLE object stretches to fill the size specified by the OLE container control’s AT attribute while maintaining the object’s aspect ratio (PROP:ZOOM).
<i>property</i>	A string constant containing the name of a custom property setting for the control.
<i>value</i>	A string constant containing the property value number or EQUATE for the <i>property</i> .
<b>MENUBAR</b>	Defines a menu structure for the control. This is exactly the same type of structure as a MENUBAR in an APPLICATION or WINDOW structure and is merged into the application’s menu.

*menus and/or items*

MENU and/or ITEM declarations that define the menu selections.

The **OLE** control places an OLE or .OCX control on the WINDOW or TOOLBAR (not valid in a REPORT) at the position and size specified by its AT attribute. The *property* attribute allows you to specify any additional property settings the OLE or .OCX control may require. These are properties that need to be set for the OLE or .OCX control to properly function, and are not standard Clarion properties (such as AT, CURSOR, or USE). The custom control should only receive values for these properties that are defined for that control. Valid properties and values for those properties would be defined in the custom control's documentation. You may have multiple *property* attributes on a single OLE control.

Events Generated:	EVENT:Selected	The control has received input focus.
	EVENT:Accepted	The user has completed using the control.
	EVENT:PreAlertKey	
		The user pressed an ALRT attribute hot key.
	EVENT:AlertKey	The user pressed an ALRT attribute hot key.
	EVENT:Drop	A successful drag-and-drop to the control.

Example:

```

PROGRAM
MAP
    INCLUDE('OCX.CLW')
END
W WINDOW('OCX Controls'),AT(,,200,200),RESIZE,STATUS(-1,-1),SYSTEM
    MENUBAR
        ITEM ('E&xit!'),USE(?Exit)
        ITEM('&About!'),USE(?About)
        ITEM('&Properties!'),USE(?Property)
    END
    OLE,AT(0,0,0,0),USE(?oc1),HIDE,CREATE('COMCTL.ImageListCtrl.1').
    OLE,AT(0,0,150,20),USE(?oc2),CREATE('TOOLBAR.ToolbarCtrl.1').
END
CODE
OPEN(W)
?OC1{'ListImages.Add(1,xyz,' & ocxloadimage('IRCLOCK.BMP') & '')}
?OC1{'ListImages.Add(2,abc,' & ocxloadimage('IRCLOCK2.BMP') & '')}
?oc2{'ImageList'} = ?oc1{PROP:Object}
LOOP X# = 1 TO 3
    ?oc2{'Buttons.Add(,,,1)'}; ?oc2{'Buttons.Add(,,,2)'}
END
ACCEPT
CASE EVENT()
OF EVENT:Accepted
    CASE FIELD()
    OF ?Exit
        BREAK
    OF ?About
        ?oc1{'AboutBox'}                !Display the OCX control's About Box
    OF ?Property
        ?oc1{PROP:DoVerb} = -7          !Display the OCX control's properties dialog
    . . .

```

See Also:

**Object Linking and Embedding, OLE (.OCX) Custom Controls, OCX Library Procedures**



## OPTION (declare a set of RADIO controls)

```
OPTION(text) ,AT( ) [,CURSOR( )] [,USE( )] [,DISABLE] [,KEY( )] [,MSG( )] [,HLP( )] [,BOXED]
[,FULL] [,SCROLL] [,HIDE] [,FONT( )] [,ALRT( )] [,SKIP] [DROPID( )] [,TIP( )] [,TRN]
[,COLOR( )] [,BEVEL( )]
    radios
END
```

<b>OPTION</b>	Declares a set of RADIO controls.
<i>text</i>	A string constant containing the prompt for the set of controls (PROP:Text). This may contain an ampersand (&) to indicate the “hot” letter for the prompt. The <i>text</i> is displayed on screen only if the BOXED attribute is also present.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW’s CURSOR attribute is used, else the Windows default cursor is used. Not valid in a REPORT.
<b>USE</b>	The label of a variable to receive the choice (PROP:USE). If this is a string variable, it receives the value of the RADIO string (with any accelerator key ampersand stripped out) selected by the user. If a numeric variable, it receives the ordinal position within the OPTION of the RADIO button selected by the user (the value returned by the CHOICE() procedure).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the currently selected RADIO in the OPTION control (PROP:KEY). Not valid in a REPORT.
<b>MSG</b>	Specifies a string constant containing the default text to display in the status bar when any control in the OPTION has focus (PROP:MSG). Not valid in a REPORT.
<b>HLP</b>	Specifies a string constant containing the default help system identifier for any control in the OPTION (PROP:HLP). Not valid in a REPORT.
<b>BOXED</b>	Specifies a single-track border around the RADIO controls with the text at the top of the border (PROP:BOXED).

<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>FONT</b>	Specifies the display font for the control and the default for all the controls in the OPTION (PROP:FONT).
<b>ALRT</b>	Specifies “hot” keys active for the controls in the OPTION (PROP:ALRT). Not valid in a REPORT.
<b>SKIP</b>	Specifies the controls in the OPTION do not receive input focus and may only be accessed with the mouse or accelerator key (PROP:SKIP). Not valid in a REPORT.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID). Not valid in a REPORT.
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip). Not valid in a REPORT.
<b>COLOR</b>	Specifies a background color for the control (PROP:COLOR).
<b>BEVEL</b>	Specifies custom 3-D effect borders (PROP:BEVEL). Not valid in a REPORT.

*radios* Multiple RADIO control declarations.

The **OPTION** control declares a set of RADIO controls which offer the user a list of choices. The multiple RADIO controls in the OPTION structure define the choices offered to the user. On a REPORT, the OPTION control prints a group of RADIO controls which display a list of choices. The selected choice is identified by a filled RADIO button.

Input focus changes between the OPTION’s RADIO controls are signalled only to the individual RADIO controls affected. This means the EVENT:Selected events generated when the user changes input focus within an OPTION structure are field-specific events for the affected RADIO controls, not the OPTION structure which contains them. There is no EVENT:Selected generated for an OPTION structure. However, the RADIO control does not receive EVENT:Accepted, the OPTION structure receives the EVENT:Accepted when the user has selected a RADIO.

A string variable as the OPTION structure’s USE attribute receives the text of the RADIO control selected by the user, and the CHOICE(?Option)

procedure returns the number of the selected RADIO button. If the contents of the OPTION structure's USE attribute is a numeric variable, it receives the number of the RADIO button selected by the user (the value returned by the CHOICE procedure).

No RADIO button selected is a valid option, which occurs only when the OPTION structure's USE variable does not contain a value related to one of its component RADIO controls. This condition only lasts until the user has selected one of the RADIOS.

Events Generated: **EVENT:Accepted** One of the OPTION's RADIO controls has been selected by the user.

**EVENT:PreAlertKey** The user pressed an ALRT attribute hot key.

**EVENT:AlertKey** The user pressed an ALRT attribute hot key.

**EVENT:Drop** A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
  OPTION('Option 1'),USE(OptVar1),KEY(F10Key),HLP('Option1Help')
    RADIO('Radio 1'),AT(0,0,20,20),USE(?R1)
    RADIO('Radio 2'),AT(20,0,20,20),USE(?R2)
  END
  OPTION('Option 2'),USE(OptVar2),MSG('Option 2'),SCROLL
    RADIO('Radio 3'),AT(40,0,20,20),USE(?R3)
    RADIO('Radio 4'),AT(60,0,20,20),USE(?R4)
  END
  OPTION('Option 3'),USE(OptVar3),AT(80,0,20,20),BOXED
    RADIO('Radio 5'),AT(80,0,20,20),USE(?R5)
    RADIO('Radio 6'),AT(100,0,20,20),USE(?R6)
  END
  OPTION('Option 4'),USE(OptVar4),FONT('Arial',12),CURSOR(CURSOR:Wait)
    RADIO('Radio 7'),AT(120,0,20,20),USE(?R7)
    RADIO('Radio 8'),AT(140,0,20,20),USE(?R8)
  END
END
CustRpt  REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail  DETAIL,AT(0,0,6500,1000)
  OPTION('Option'),USE(OptVar),AT(80,0,20,20),BOXED
    RADIO('Radio 1'),AT(80,0,20,20),USE(?R1)
    RADIO('Radio 2'),AT(100,0,20,20),USE(?R2)
  END
END
END
```

See Also: **RADIO, BUTTON, CHECK**

## PANEL (declare a panel control)

**PANEL** [,AT( )] [,USE( )] [,DISABLE] [,FULL] [,FILL( )] [,SCROLL] [,HIDE] [,BEVEL( )]

<b>PANEL</b>	Defines an area in the WINDOW or TOOLBAR.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control is disabled when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>FILL</b>	Specifies the fill color for the control (PROP:FILL). If omitted, the panel is not filled with color.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>BEVEL</b>	Specifies custom 3-D effect borders (PROP:BEVEL).

The **PANEL** control defines an area WINDOW or TOOLBAR (not valid in a REPORT) at the position and size specified by its AT attribute. Typically, the purpose of a PANEL is to frame the area with a custom BEVEL. This control cannot receive input focus and does not generate events.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    PANEL,AT(10,100,20,20),USE(?P1),BEVEL(-2,2)
END
```

See Also:

**BOX, GROUP**

## PROMPT (declare a prompt control)

```
PROMPT(text) ,AT( ) [,CURSOR( )] [,USE( )] [,DISABLE] [,FONT( )] [,FULL] [,SCROLL] [,TRN]
[,HIDE] [,DROPID( )] [, LEFT | RIGHT | CENTER ] [,COLOR( )]
```

<b>PROMPT</b>	Places a prompt for the next active control following it, in the WINDOW or TOOLBAR.
<i>text</i>	A string constant containing the text to display (PROP:Text). This may contain an ampersand (&) to indicate the “hot” letter for the prompt.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW’s CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>FONT</b>	Specifies the font used to display the text (PROP:FONT).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>TRN</b>	Specifies the control transparently displays over the background (PROP:TRN).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>LEFT</b>	Specifies that the prompt is left justified (PROP:LEFT).
<b>RIGHT</b>	Specifies that the prompt is right justified (PROP:RIGHT).
<b>CENTER</b>	Specifies that the prompt is centered (PROP:CENTER).

**COLOR** Specifies a background color for the control (PROP:COLOR).

The **PROMPT** control places a prompt for the next active control following the **PROMPT** in the **WINDOW** or **TOOLBAR** structure (not valid in a **REPORT**). The prompt *text* is placed at the position and size specified by its **AT** attribute.

The *text* may contain an ampersand (&) to indicate the letter immediately following the ampersand is the “hot” letter for the prompt. By default, the “hot” letter displays with an underscore below it to indicate its special purpose. This “hot” letter, when pressed in conjunction with the **ALT** key, changes input focus to the next control following the **PROMPT** in the **WINDOW** or **TOOLBAR** structure, which is capable of receiving focus.

Disabling or hiding the control directly following the **PROMPT** in the window structure does not automatically disable or hide the **PROMPT**; it must also be explicitly disabled or hidden, otherwise the **PROMPT** will then refer to the next currently active control following the disabled control. This allows you to place one **PROMPT** control on the window that will apply to any of multiple controls (if only one will be active at a time). If the next active control is a **BUTTON**, it is pressed when the user presses the **PROMPT**'s “hot key.”

To include an ampersand as part of the prompt *text*, place two ampersands together (&&) in the *text* string and only one will display.

This control cannot receive input focus.

Events Generated: **EVENT:Drop** A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    PROMPT('Enter Data:'),AT(10,100,20,20),USE(?P1),CURSOR(CURSOR:Wait)
    ENTRY(@S8),AT(100,100,20,20),USE(E1)
    PROMPT('Enter More Data:'),AT(10,200,20,20),USE(?P2),CURSOR(CURSOR:Wait)
    ENTRY(@S8),AT(100,200,20,20),USE(E2)
    ENTRY(@D1),AT(100,200,20,20),USE(E3)
END
CODE
OPEN(MDIChild)
IF SomeCondition
    HIDE(?E2)          !Prompt will refer to E3
ELSE
    HIDE(?E3)          !Prompt will refer to E2
END
```

See Also: **ENTRY, TEXT**

## PROGRESS (declare a progress control)

**PROGRESS**, **AT**( ) [, **CURSOR**( )] [, **USE**( )] [, **DISABLE**] [, **FULL**] [, **SCROLL**] [, **HIDE**] [, **DROPID**( )] [, **RANGE**( )]

<b>PROGRESS</b>	Places a control that displays the current progress of a batch process in the WINDOW or TOOLBAR.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	The label of the variable containing the value of the current progress, or a field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>RANGE</b>	Specifies the range of values the progress bar displays (PROP:RANGE). If omitted, the default range is zero (0) to one hundred (100).

The **PROGRESS** control declares a control that displays a progress bar in a WINDOW or TOOLBAR (not valid in a REPORT). This usually displays the current percentage of completion of a batch process.

If a variable is named as the USE attribute, the progress bar is automatically updated whenever the value in that variable changes. If the USE attribute is a field equate label, you must directly update the display by assigning a value (within the range defined by the RANGE attribute) to the control's PROP:progress property (an undeclared property equate -- see *Undeclared Properties*).

This control cannot receive input focus.

Events Generated:      **EVENT:Drop**      A successful drag-and-drop to the control.

Example:

```

BackgroundProcess    PROCEDURE            !Background processing batch process

ProgressVariable    LONG

Win    WINDOW('Batch Processing...'),AT(,,400,400),TIMER(1),MDI,CENTER
      PROGRESS,AT(100,100,200,20),USE(ProgressVariable),RANGE(0,200)
      PROGRESS,AT(100,140,200,20),USE(?ProgressBar),RANGE(0,200)
      BUTTON('Cancel'),AT(190,300,20,20),STD(STD:Close)
      END

CODE
OPEN(Win)
OPEN(File)
?ProgressVariable{PROP:rangehigh} = RECORDS(File)
?ProgressBar{PROP:rangehigh} = RECORDS(File)
SET(File)                                !Set up a batch process
ACCEPT
CASE EVENT()
OF EVENT:CloseWindow
  BREAK
OF EVENT:Timer                            !Process records when timer allows it
  ProgressVariable += 3                    !Auto-updates 1st progress bar
  LOOP 3 TIMES
    NEXT(File)
    IF ERRORCODE() THEN BREAK.
    ?ProgressBar{PROP:progress} = ?ProgressBar{PROP:progress} + 1
                                          !Manually update 2nd progress bar
    !Perform some batch processing code
  ..
CLOSE(File)

```



## RADIO (declare a radio button control)

```
RADIO(text) ,AT( ) [,CURSOR( )] [,USE( )] [,DISABLE] [,KEY( )] [,MSG( )] [,HLP( )] [,SKIP]
    [,FONT( )] [,ICON( )] [,FULL] [,SCROLL] [,HIDE] [,ALRT( )] [,DROPID( )] [,VALUE( )]
    [,TIP( )] [,TRN] [,COLOR( )] [,FLAT] [, |LEFT| ]
    |RIGHT| ]
```

<b>RADIO</b>	Places a radio button on the WINDOW or TOOLBAR.
<i>text</i>	A string constant containing the text to display for the radio button (PROP:Text). This may contain an ampersand (&) to indicate the “hot” letter for the radio button.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW’s CURSOR attribute is used, else the Windows default cursor is used. Not valid in a REPORT.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately selects the radio button (PROP:KEY). Not valid in a REPORT.
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG). Not valid in a REPORT.
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP). Not valid in a REPORT.
<b>SKIP</b>	Specifies the control does not receive input focus and may only be accessed with the mouse or accelerator key (PROP:SKIP). Not valid in a REPORT.
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>ICON</b>	Specifies an image file or standard icon to display on the face of a “latching” button (PROP:ICON). Not valid in a REPORT.
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.

<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT). Not valid in a REPORT.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID). Not valid in a REPORT.
<b>VALUE</b>	Specifies the value the OPTION structure’s USE variable receives when the radio button is selected by the user (PROP:VALUE).
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip). Not valid in a REPORT.
<b>TRN</b>	Specifies the control transparently displays over the background (PROP:TRN).
<b>COLOR</b>	Specifies a background color for the control (PROP:COLOR).
<b>FLAT</b>	Specifies the button appears flat except when the mouse cursor passes over the control (PROP:FLAT). Requires the ICON attribute. Not valid in a REPORT.
<b>LEFT</b>	Specifies the text appears to the left of the radio button (PROP:LEFT).
<b>RIGHT</b>	Specifies the text appears to the right of the radio button (PROP:RIGHT). This is the default position.

The **RADIO** control places a radio button on the WINDOW, TOOLBAR, or REPORT at the position and size specified by its AT attribute. A RADIO control may only be placed within an OPTION control. When selected by the user, the RADIO *text* (with any accelerator key ampersand stripped out) is placed in the OPTION’s USE variable, unless the VALUE attribute is used. On a REPORT, the RADIO selected by the user (the value in the OPTION’s USE variable) is displayed as a filled RADIO button.

A RADIO with an ICON attribute appears as a “latched” pushbutton with the image on the button face. When the button appears “up” the RADIO is off; when it appears “down” the RADIO is on and the OPTION’s USE variable receives the value in the selected RADIO’s *text* parameter (unless the VALUE attribute is used).

There is an EVENT:Selected is generated for a RADIO control, but the OPTION structure containing it receives the EVENT:Accepted.

Events Generated:    **EVENT:Selected**    The control has received input focus.

**EVENT:PreAlertKey**  
    The user pressed an ALRT attribute hot key.

**EVENT:AlertKey**    The user pressed an ALRT attribute hot key.

**EVENT:Drop**        A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
  OPTION('Option 1'),USE(OptVar1)
    RADIO('Radio 1'),AT(0,0,20,20),USE(?R1),KEY(F10Key)
    RADIO('Radio 2'),AT(20,0,20,20),USE(?R2),MSG('Radio 2')
  END
  OPTION('Option 2'),USE(OptVar2)
    RADIO('Radio 3'),AT(40,0,20,20),USE(?R3),FONT('Arial',12)
    RADIO('Radio 4'),AT(60,0,20,20),USE(?R4),CURSOR(CURSOR:Wait)
  END
  OPTION('Option 3'),USE(OptVar3)
    RADIO('Radio 5'),AT(80,0,20,20),USE(?R5),HLP('Radio5Help')
    RADIO('Radio 6'),AT(100,0,20,20),USE(?R6)
  END
  OPTION('Option 4'),USE(OptVar4)
    RADIO('Radio 7'),AT(120,0,20,20),USE(?R7),ICON('Radio1.ICO')
    RADIO('Radio 8'),AT(140,0,20,20),USE(?R8),ICON('Radio2.ICO')
  END
  OPTION('Option 5'),USE(OptVar5)
    RADIO('Radio 9'),AT(100,20,20,20),USE(?R9),LEFT
    RADIO('Radio 10'),AT(120,20,20,20),USE(?R10),LEFT
  END
  OPTION('Option 6'),USE(OptVar6),SCROLL
    RADIO('Radio 11'),AT(200,0,20,20),USE(?R11),SCROLL
    RADIO('Radio 12'),AT(220,0,20,20),USE(?R12),SCROLL
  END
END
CustRpt   REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail  DETAIL,AT(0,0,6500,1000)
  OPTION('Option'),USE(OptVar),AT(80,0,20,20),BOXED
    RADIO('Radio 1'),AT(80,0,20,20),USE(?R1)
    RADIO('Radio 2'),AT(100,0,20,20),USE(?R2)
    RADIO('Radio 3'),AT(100,0,20,20),USE(?R2),LEFT
  END
END
END
```

See Also:            **OPTION, CHECK, BUTTON**

## REGION (declare a window region control)

**REGION** [,AT( )] [,CURSOR( )] [,USE( )] [,DISABLE] [,FILL] [,COLOR( )] [,IMM] [,FULL] [,TRN]  
[,SCROLL] [,HIDE] [,DRAGID( )] [,DROPID( )] [,BEVEL( )]

<b>REGION</b>	Defines an area in the WINDOW or TOOLBAR.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	A field equate label to reference the control in executable code (PROP:USE).
<b>DISABLE</b>	Specifies the control is disabled when the WINDOW or APPLICATION is first opened (PROP:DISABLE).
<b>FILL</b>	Specifies the red, green, and blue component values that create the fill color for the control (PROP:FILL). If omitted, the region is not filled with color.
<b>COLOR</b>	Specifies the border color of the control (PROP:COLOR). If omitted, there is no border.
<b>IMM</b>	Specifies control generates an event whenever the mouse is moved in the region (PROP:IMM).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>DRAGID</b>	Specifies the control may serve as a drag host for drag-and-drop actions (PROP:DRAGID).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>BEVEL</b>	Specifies custom 3-D effect borders (PROP:BEVEL).

The **REGION** control defines an area on a WINDOW or TOOLBAR (not valid in a REPORT) at the position and size specified by its AT attribute. Generally, tracking the position of the mouse is the reason for defining a REGION. The MOUSEX and MOUSEY procedures can be used to determine the exact position of the mouse when the event occurs. Use of the

IMM attribute causes some excess code and speed overhead at runtime, so it should be used only when necessary. This control cannot receive input focus.

A REGION with the DRAGID attribute can serve as a drag-and-drop host, providing information to be moved or copied to another control. A REGION with the DROPID attribute can serve as a drag-and-drop target, receiving information from another control. These attributes work together to specify drag-and-drop “signatures” that define a valid target for the operation. The DRAGID() and DROPID() procedures, along with the SETDROPID procedure, are used to perform the data exchange. Since a REGION can be defined over any other control, you can write drag-and-drop code between any two controls. Simply define REGION controls to handle the required drag-and drop functionality.

Events Generated:	EVENT:Accepted	The mouse has been clicked by the user in the region.
	EVENT:MouseIn	The mouse has entered the region (only with the IMM attribute).
	EVENT:MouseOut	The mouse has left the region (only with the IMM attribute).
	EVENT:MouseMove	The mouse has moved within the region (only with the IMM attribute).
	EVENT:Dragging	The mouse cursor is over a potential drag target (only with the DRAGID attribute).
	EVENT:Drag	The mouse cursor has been released over a drag target (only with the DRAGID attribute).
	EVENT:Drop	The mouse cursor has been released over a drag target (only with the DROPID attribute).

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
  REGION,AT(10,100,20,20),USE(?R1),BEVEL(-2,2)
  REGION,AT(100,100,20,20),USE(?R2),CURSOR(CURSOR:Wait)
  REGION,AT(10,200,20,20),USE(?R3),IMM
  REGION,AT(100,200,20,20),USE(?R4),COLOR(COLOR:ACTIVEBORDER)
  REGION,AT(10,300,20,20),USE(?R4),FILL(COLOR:ACTIVEBORDER)
END
```

See Also: **PANEL**

## SHEET (declare a group of TAB controls)

```

SHEET ,AT( ) [,CURSOR( )][,USE( )][,DISABLE][,KEY( )][,FULL][,SCROLL][,HIDE][,FONT()
[,DROPID()][,WIZARD][,SPREAD][,HSCROLL][,JOIN][,NOSHEET][,COLOR()]
[,UP ] [,DOWN ] [, LEFT      ] [, IMM ]
                        | RIGHT  |
                        | ABOVE  |
                        | BELOW  |

    tabs
END

```

<b>SHEET</b>	Declares a group of TAB controls.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	The label of a variable to receive the current TAB choice (PROP:USE). If this is a string variable, it receives the value of the TAB string (with any ampersands stripped out) selected by the user. If a numeric variable, it receives the number of the TAB selected by the user (the value returned by the CHOICE() procedure).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the currently selected TAB in the SHEET control (PROP:KEY).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>FONT</b>	Specifies the display font for the control and the default for all the controls in the SHEET (PROP:FONT).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>WIZARD</b>	Specifies the SHEET's TAB controls do not appear (PROP:WIZARD). The user moves from TAB to TAB under program control.

<b>SPREAD</b>	Specifies the TABs are evenly spaced on one line (PROP:SPREAD).
<b>HSCROLL</b>	Specifies the TABs display all on one row instead of multiple rows, no matter how many TABs there are (PROP:HSCROLL). Right and left (or up and down) scroll buttons appear at either end of the TABs to scroll through the TABs.
<b>JOIN</b>	Specifies the TABs display all on one row instead of multiple rows, no matter how many TABs there are (PROP:JOIN). Right and left (or up and down) scroll buttons appear together at the right (or bottom) end of the TABs to scroll through the TABs.
<b>NOSHEET</b>	Specifies the TABs display without a visible sheet (PROP:NOSHEET).
<b>COLOR</b>	Specifies a background color for the control (PROP:COLOR).
<b>UP</b>	Specifies the TAB text is vertical reading upwards (PROP:UP).
<b>DOWN</b>	Specifies the TAB text is vertical reading downwards (PROP:DOWN).
<b>LEFT</b>	Specifies the TABs appear to the left of the sheet (PROP:LEFT).
<b>RIGHT</b>	Specifies the TABs appear to the right of the sheet (PROP:RIGHT).
<b>ABOVE</b>	Specifies the TABs appear above the sheet (PROP:ABOVE). This is the default position.
<b>BELOW</b>	Specifies the TABs appear below the sheet (PROP:BELOW).
<b>IMM</b>	Specifies EVENT:NewSelection generates whenever the user clicks on a TAB (PROP:IMM).
<i>tabs</i>	Multiple TAB control declarations.

The **SHEET** control declares a group of TAB controls that offer the user multiple “pages” of controls for the window (not valid in a REPORT). The TAB controls in the SHEET structure define the “pages” displayed.

Input focus changes between the SHEET’s TAB controls are signalled only to the SHEET control affected. This means the events generated when the user changes input focus within a SHEET structure are field-specific events for the affected SHEET structure, not the individual TAB control.

A string variable as the SHEET structure’s USE attribute receives the text of the TAB control selected by the user, and the CHOICE(*?Option*) procedure returns the number of the selected TAB control. If the SHEET structure’s

USE attribute is a numeric variable, it receives the number of the TAB control selected by the user (the same value returned by the CHOICE procedure).

You can use the SELECT statement to force navigation to a specific tab by specifying the TAB control's position number within the sheet as the second parameter: SELECT(?Sheet,TabNumber).

Events Generated:	<b>EVENT:TabChanging</b> Focus is about to pass to another tab.  <b>EVENT:NewSelection</b> Focus has passed to another tab, or the user clicked on a TAB in a SHEET with the IMM attribute.  <b>EVENT:Drop</b> A successful drag-and-drop to the control.
-------------------	---

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
SHEET,AT(0,0,320,175),USE(SelectedTab)
  TAB('Tab One'),USE(?TabOne)
    OPTION('Option 1'),USE(OptVar1),KEY(F10Key),HLP('Option1Help')
    RADIO('Radio 1'),AT(20,0,20,20),USE(?R1)
    RADIO('Radio 2'),AT(40,0,20,20),USE(?R2)
  END
  OPTION('Option 2'),USE(OptVar2),MSG('Option 2')
    RADIO('Radio 3'),AT(60,0,20,20),USE(?R3)
    RADIO('Radio 4'),AT(80,0,20,20),USE(?R4)
  END
  PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
  ENTRY(@S8),AT(100,140,32,20),USE(E1)
  PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P2)
  ENTRY(@S8),AT(100,240,32,20),USE(E2)
END
TAB('Tab Two'),USE(?TabTwo)
  OPTION('Option 3'),USE(OptVar3)
    RADIO('Radio 1'),AT(20,0,20,20),USE(?R5)
    RADIO('Radio 2'),AT(40,0,20,20),USE(?R6)
  END
  PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P3)
  ENTRY(@S8),AT(100,140,32,20),USE(E3)
  PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P4)
  ENTRY(@S8),AT(100,240,32,20),USE(E4)
END
END
BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
END
```

See Also:           **TAB**



## SPIN (declare a spinning list control)

```

SPIN(picture) ,AT( ) [,CURSOR()][,USE()][,DISABLE()][,KEY()][,MSG()][,HLP()][,SKIP()][,FONT()][,FULL]
[,SCROLL][,ALRT()][,HIDE()][,READONLY][,REQ] [,IMM][,TIP()][,TRN][,DROPID()][,COLOR()]
[,REPEAT()][,DELAY( )][,MASK]
[,UPR [][,LEFT [][,INS [][,RANGE()][,STEP] [][,HSCROLL []]
|CAP | |RIGHT | |OVR | |FROM() | |VSCROLL |
| |CENTER | |
| |DECIMAL |

```

<b>SPIN</b>	Places a “spinning” list of data items on the WINDOW or TOOLBAR.
<i>picture</i>	A display picture token that specifies the format for the data displayed in the control (PROP:Text).
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW’s CURSOR attribute is used, else the Windows default cursor is used.
<b>USE</b>	A field equate label to reference the control in executable code or the label of the variable that receives the value selected by the user (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the control (PROP:KEY).
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG).
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP).
<b>SKIP</b>	Specifies the control receives input focus to enter text only with the mouse or accelerator key and does not retain focus (PROP:SKIP).
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL).
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL).
<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT).

<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>READONLY</b>	Specifies the control does not allow data entry (PROP:READONLY).
<b>REQ</b>	Specifies the control may not be left blank or zero (PROP:REQ).
<b>IMM</b>	Specifies immediate event generation whenever the user presses any key (PROP:IMM).
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip).
<b>TRN</b>	Specifies the control transparently displays over the background (PROP:TRN).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>COLOR</b>	Specifies background and selected colors for the control (PROP:COLOR).
<b>REPEAT</b>	Specifies the rate at which EVENT:NewSelection generates when the spin buttons are held down by the user (PROP:REPEAT).
<b>DELAY</b>	Specifies the delay between the first and second generation of EVENT:NewSelection when the spin buttons are held down by the user (PROP:DELAY).
<b>MASK</b>	Specifies pattern input editing mode of the ENTRY portion of the control (PROP:MASK).
<b>UPR / CAP</b>	Specifies all upper case or proper name capitalization (First Letter Of Each Word Capitalized) entry (PROP:UPR and PROP:CAP).
<b>LEFT</b>	Specifies that the data is left justified within the area specified by the AT attribute (PROP:LEFT).
<b>RIGHT</b>	Specifies that the data is right justified within the area specified by the AT attribute (PROP:RIGHT).
<b>CENTER</b>	Specifies that the data is centered within the area specified by the AT attribute (PROP:CENTER).
<b>DECIMAL</b>	Specifies that the data is aligned on the decimal point within the area specified by the AT attribute (PROP:DECIMAL).
<b>INS / OVR</b>	Specifies Insert or Overwrite entry mode (PROP:INS and PROP:OVR). Valid only on windows with the MASK attribute.

<b>RANGE</b>	Specifies the range of values the user may choose (PROP:RANGE).
<b>STEP</b>	Specifies the increment/decrement amount of the choices within the specified RANGE (PROP:STEP). If omitted, the STEP is 1.0.
<b>FROM</b>	Specifies the origin of the choices displayed for the user (PROP:FROM).
<b>HSCROLL</b>	Specifies the spin buttons are side by side, pointing right and left (PROP:HSCROLL).
<b>VSCROLL</b>	Specifies the spin buttons are one above the other, pointing right and left (PROP:VSCROLL).
<b>HVSCROLL</b>	Specifies the spin buttons are side by side, pointing up and down (PROP:HVSCROLL).

The **SPIN** control places a “spinning” list of data items on the **WINDOW** or **TOOLBAR** (not valid in a **REPORT**) at the position and size specified by its **AT** attribute. The “spinning” list displays only the current selection with a pair of buttons to the right to allow the user to “spin” through the available selections (similar to a slot machine wheel).

If the **SPIN** control offers the user regularly spaced numeric choices, the **RANGE** attribute specifies the valid range of values from which the user may choose. The **STEP** attribute then works in conjunction with **RANGE** to increment/decrement those values by the specified amount. If the choices are not regular, or are string values, the **FROM** attribute is used instead of **RANGE** and **STEP**. The **FROM** attribute provides the **SPIN** control its list of choices from a memory **QUEUE** or a string. Using the **FROM** attribute, you may provide the user any type of choices in the **SPIN** control. The user may select an item from the list or type in the desired value, so this control also acts as an **ENTRY** control.

Events Generated:	<b>EVENT:Selected</b>	The control has received input focus.
	<b>EVENT:Accepted</b>	The user has either selected a value or entered data directly into the control, and moved on to another control..
	<b>EVENT:Rejected</b>	The user has entered an invalid value for the entry picture.
	<b>EVENT:NewSelection</b>	The user has changed the displayed value.
	<b>EVENT:PreAlertKey</b>	The user pressed an <b>ALRT</b> attribute hot key.
	<b>EVENT:AlertKey</b>	The user pressed an <b>ALRT</b> attribute hot key.
	<b>EVENT:Drop</b>	A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    SPIN(@S8),AT(0,0,20,20),USE(SpinVar1),FROM(Que)
    SPIN(@N3),AT(20,0,20,20),USE(SpinVar2),RANGE(1,999),KEY(F10Key)
    SPIN(@N3),AT(40,0,20,20),USE(SpinVar3),RANGE(5,995),STEP(5)
    SPIN(@S8),AT(60,0,20,20),USE(SpinVar4),FROM(Que),HLP('Check4Help')
    SPIN(@S8),AT(80,0,20,20),USE(SpinVar5),FROM(Que),MSG('Button 3')
    SPIN(@S8),AT(100,0,20,20),USE(SpinVar6),FROM(Que),FONT('Arial',12)
    SPIN(@S8),AT(120,0,20,20),USE(SpinVar7),FROM(Que),DROP
    SPIN(@S8),AT(160,0,20,20),USE(SpinVar8),FROM(Que),IMM
    SPIN(@S8),AT(220,0,20,20),USE(SpinVar9),FROM('Mr|Mrs|Ms'),LEFT
END
```

## STRING (declare a string control)

```

STRING(text) ,AT( ) [, CURSOR( ) ] [, USE( ) ] [, DISABLE] [, FONT( ) ] [, FULL] [, SCROLL] [, HIDE]
[, TRN] [, DROPID( ) ] [, COLOR( ) ] [, ANGLE( ) ] [, SKIP]
[, | LEFT | ] [, | PAGENO | ]
| RIGHT | | CNT( ) [, RESET( ) / PAGE ] [, TALLY( ) | ]
| CENTER | | SUM( ) [, RESET( ) / PAGE ] [, TALLY( ) | ]
| DECIMAL | | AVE( ) [, RESET( ) / PAGE ] [, TALLY( ) | ]
| | MIN( ) [, RESET( ) / PAGE ] [, TALLY( ) | ]
| | MAX( ) [, RESET( ) / PAGE ] [, TALLY( ) | ]

```

<b>STRING</b>	Places the <i>text</i> on the WINDOW, TOOLBAR, or REPORT.
<i>text</i>	A string constant containing the text to display, or a display picture token to format the variable specified in the USE attribute (PROP:Text).
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used. Not valid in a REPORT.
<b>USE</b>	A field equate label to reference the control in executable code, or a variable whose contents are displayed in the format of the picture token declared instead of string text (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>FONT</b>	Specifies the font used to display the text (PROP:FONT).
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>TRN</b>	Specifies the text or USE variable characters transparently display over the background (PROP:TRN).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID). Not valid in a REPORT.

<b>SKIP</b>	Specifies not to print the control if the content is blank, and to move all following controls in the band upward to “fill in” the blank (PROP:SKIP). Valid only in a REPORT.
<b>LEFT</b>	Specifies that the text is left justified within the area specified by the AT attribute (PROP:LEFT).
<b>RIGHT</b>	Specifies that the text is right justified within the area specified by the AT attribute (PROP:RIGHT).
<b>CENTER</b>	Specifies that the text is centered within the area specified by the AT attribute (PROP:CENTER).
<b>DECIMAL</b>	Specifies that the text is aligned on the decimal point within the area specified by the AT attribute (PROP:DECIMAL).
<b>COLOR</b>	Specifies a background color for the control (PROP:COLOR).
<b>ANGLE</b>	Specifies displaying or printing the control at a specified angle measured counter-clockwise from the horizontal or the report’s orientation (PROP:ANGLE).
<b>PAGENO</b>	Specifies the current page number is printed in the format of the picture token declared instead of string text (PROP:PAGENO). Valid only in a REPORT.
<b>CNT</b>	Specifies the number of details printed is printed in the format of the picture token declared instead of string text (PROP:CNT). Valid only in a REPORT.
<b>SUM</b>	Specifies the sum of the USE variable is printed in the format of the picture token declared instead of string text (PROP:SUM). Valid only in a REPORT.
<b>AVE</b>	Specifies the average value of the USE variable is printed in the format of the picture token declared instead of string text (PROP:AVE). Valid only in a REPORT.
<b>MIN</b>	Specifies the minimum value of the USE variable is printed in the format of the picture token declared instead of string text (PROP:MIN). Valid only in a REPORT.
<b>MAX</b>	Specifies the maximum value of the USE variable is printed in the format of the picture token declared instead of string text (PROP:MAX). Valid only in a REPORT.
<b>RESET</b>	Specifies the CNT, SUM, AVE, MIN, or MAX is reset when the specified group break occurs (PROP:RESET). Valid only in a REPORT.

**PAGE** Specifies the CNT, SUM, AVE, MIN, or MAX is reset to zero when the page break occurs (PROP:PAGE). Valid only in a REPORT.

**TALLY** Specifies when to calculate the CNT, SUM, AVE, MIN, or MAX (PROP:TALLY). Valid only in a REPORT.

The **STRING** control places the *text* on the WINDOW, TOOLBAR, or REPORT at the position and size specified by its AT attribute.

If the *text* parameter is a picture token instead of a string constant, the contents of the variable named in the USE attribute are formatted to that display picture, at the position and size specified by the AT attribute. This makes the STRING with a USE variable a “display-only” control for the variable. The data displayed in the STRING is automatically refreshed every time through the ACCEPT loop, whether the AUTO attribute is present or not.

There is a difference between ampersand (&) use in STRING and PROMPT controls. An ampersand in a STRING displays as part of the *text*, while an ampersand in a PROMPT defines the prompt’s “hot” letter.

A STRING with the TRN attribute displays or prints characters transparently, without obliterating the background. This means only the pixels required to create each character are written to screen. This allows the STRING to be placed directly on top of an IMAGE without destroying the background picture.

This control cannot receive input focus.

Events Generated: **EVENT:Drop** A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
  STRING('String Constant'),AT(10,0,20,20),USE(?S1)
  STRING(@S30),AT(10,20,20,20),USE(StringVar1)
  STRING(@S30),AT(10,20,20,20),USE(StringVar2),CURSOR(CURSOR:Wait)
  STRING(@S30),AT(10,20,20,20),USE(StringVar3),FONT('Arial',12)
END
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Break1 BREAK(Pre:Key1)
  HEADER,AT(0,0,6500,1000)
    STRING('Group Head'),AT(3000,500,1500,500),FONT('Arial',18)
  END
Detail
  DETAIL,AT(0,0,6500,1000)
    STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
  END
  FOOTER,AT(0,0,6500,1000)
    STRING('Group Total:'),AT(5500,500,1500,500)
    STRING(@N$11.2),AT(6000,500,500,500),USE(Pre:F1),SUM,RESET(Pre:Key1)
  END
END
END
```

## TAB (declare a page of a SHEET control)

```
TAB( text ) [,USE()] [,KEY()] [,MSG()] [,HLP()] [,REQ] [DROPID()] [,TIP()]
      [,COLOR()] [,FONT()]
      controls
END
```

<b>TAB</b>	Declares a group of controls that constitute one of the multiple “pages” of controls contained within a SHEET structure.
<i>text</i>	A string constant containing the text to display on the TAB (PROP:Text).
<b>USE</b>	Specifies a field equate label to reference the control in executable code (PROP:USE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the control (PROP:KEY).
<b>MSG</b>	Specifies a string constant containing the default text to display in the status bar when any control in the TAB has focus (PROP:MSG).
<b>HLP</b>	Specifies a string constant containing the default help system identifier for any control in the TAB (PROP:HLP).
<b>REQ</b>	Specifies that when another TAB is selected, the runtime library automatically checks all ENTRY controls in the same TAB structure with the REQ attribute to ensure they contain data other than blanks or zeroes (PROP:REQ).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID).
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip).
<b>COLOR</b>	Specifies a background color for the control and the default for all controls on the TAB (PROP:COLOR).
<b>FONT</b>	Specifies the font used to display the text on the tab (PROP:FONT). This does not affect the <i>controls</i> placed in the TAB.
<i>controls</i>	Multiple control declarations.

The **TAB** structure declares a group of controls that constitute one of the multiple “pages” of controls contained within a SHEET structure (not valid in a REPORT). The multiple TAB controls in the SHEET structure define the “pages” displayed to the user. The SHEET structure’s USE attribute receives the *text* of the TAB control selected by the user.



Input focus changes between the SHEET's TAB controls are signalled only to the SHEET control affected. This means the events generated when the user changes input focus within a SHEET structure are field-specific events for the SHEET control, and the individual TAB controls do not generate events.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
SHEET,AT(0,0,320,175),USE(SelectedTab)
  TAB('Tab One'),USE(?TabOne)
    OPTION('Option 1'),USE(OptVar1),KEY(F10Key),HLP('Option1Help')
      RADIO('Radio 1'),AT(20,0,20,20),USE(?R1)
      RADIO('Radio 2'),AT(40,0,20,20),USE(?R2)
    END
    OPTION('Option 2'),USE(OptVar2),MSG('Option 2')
      RADIO('Radio 3'),AT(60,0,20,20),USE(?R3)
      RADIO('Radio 4'),AT(80,0,20,20),USE(?R4)
    END
    PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
    ENTRY(@S8),AT(100,140,32,20),USE(E1)
    PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P2)
    ENTRY(@S8),AT(100,240,32,20),USE(E2)
  END
  TAB('Tab Two'),USE(?TabTwo)
    OPTION('Option 3'),USE(OptVar3)
      RADIO('Radio 1'),AT(20,0,20,20),USE(?R5)
      RADIO('Radio 2'),AT(40,0,20,20),USE(?R6)
    END
    OPTION('Option 4'),USE(OptVar4)
      RADIO('Radio 3'),AT(60,0,20,20),USE(?R7)
      RADIO('Radio 4'),AT(80,0,20,20),USE(?R8)
    END
    PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P3)
    ENTRY(@S8),AT(100,140,32,20),USE(E3)
    PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P4)
    ENTRY(@S8),AT(100,240,32,20),USE(E4)
  END
END
  BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
  BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
END
```

See Also:

**SHEET**

## TEXT (declare a multi-line text control)

```
TEXT ,AT( ) [,CURSOR( )] [,USE( )] [,DISABLE] [,KEY( )] [,MSG( )] [,HLP( )] [,SKIP] [,FONT( )]
    [,REQ] [,FULL] [,SCROLL] [,ALRT( )] [,HIDE] [,READONLY] [,DROPID( )] [,UPR] [,TRN]
    [,TIP( )] [, |INS |] [,HSCROLL |] [,LEFT |] [,COLOR( )] [,SINGLE] [,RESIZE]
    |OVR | |VSCROLL | |RIGHT |
    |HVSCROLL | |CENTER |
```

<b>TEXT</b>	Places a multi-line data entry field on the WINDOW, TOOLBAR, or REPORT.
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the runtime library.
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used. Not valid in a REPORT.
<b>USE</b>	The label of the variable that receives the value entered into the control by the user (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the control (PROP:KEY). Not valid in a REPORT.
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG). Not valid in a REPORT.
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP). Not valid in a REPORT.
<b>SKIP</b>	Specifies the control receives input focus to enter text only with the mouse or accelerator key and does not retain focus (PROP:SKIP). In a REPORT, SKIP specifies not to print the control if the content is blank, and to move all following controls in the band upward to "fill in" the blank.
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>REQ</b>	Specifies the control may not be left blank or zero (PROP:REQ). Not valid in a REPORT.
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.

<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>ALRT</b>	Specifies “hot” keys active for the control (PROP:ALRT). Not valid in a REPORT.
<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>READONLY</b>	Specifies the control does not allow data entry (PROP:READONLY). Not valid in a REPORT.
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID). Not valid in a REPORT.
<b>UPR</b>	Specifies all upper case entry (PROP:UPR).
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip). Not valid in a REPORT.
<b>INS / OVR</b>	Specifies Insert or Overwrite entry mode (PROP:INS and PROP:OVR). Valid only on windows with the MASK attribute. Not valid in a REPORT.
<b>HSCROLL</b>	Specifies that a horizontal scroll bar is automatically added to the text field when any portion of the data lies horizontally outside the visible area (PROP:HSCROLL). Not valid in a REPORT.
<b>VSCROLL</b>	Specifies that a vertical scroll bar is automatically added to the text field when any of the data lies vertically outside the visible area (PROP:VSCROLL). Not valid in a REPORT.
<b>HVSCROLL</b>	Specifies that both vertical and horizontal scroll bars are automatically added to the text field when any portion of the data lies outside the visible area (PROP:HVSCROLL). Not valid in a REPORT.
<b>LEFT</b>	Specifies that the text is left justified within the area specified by the AT attribute (PROP:LEFT).
<b>RIGHT</b>	Specifies that the text is right justified within the area specified by the AT attribute (PROP:RIGHT).
<b>CENTER</b>	Specifies that the text is centered within the area specified by the AT attribute (PROP:CENTER).
<b>COLOR</b>	Specifies a background color for the control (PROP:COLOR).
<b>SINGLE</b>	Specifies the control is only for single line data entry (PROP:SINGLE). This is specifically to allow use of TEXT controls instead of ENTRY for Hebrew or Arabic data entry. Not valid in a REPORT.

**RESIZE** Specifies adjusting the print height for the control according to the actual content (PROP:RESIZE). Valid only in a REPORT.

The **TEXT** control places a multi-line data entry field on the WINDOW (or TOOLBAR) at the position and size specified by its AT attribute. The variable specified in the USE attribute receives the data entered when the user has completed data entry and moves on to another control. The entered data automatically “word-wraps” to fit in the text box.

The capacity of a TEXT control varies depending on the operating system. In 16-bit systems, the capacity is related to the amount of free space in the default data segment. In 32-bit systems, the capacity is much larger.

Events Generated:

- EVENT:Selected The control has received input focus.
- EVENT:Accepted The user has completed data entry in the control.
- EVENT:PreAlertKey  
The user pressed an ALRT attribute hot key.
- EVENT:AlertKey The user pressed an ALRT attribute hot key.
- EVENT:Drop A successful drag-and-drop to the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    TEXT,AT(0,0,40,40),USE(E1),ALRT(F10Key),CENTER
    TEXT,AT(20,0,40,40),USE(E2),KEY(F10Key),HLP('Text4Help')
    TEXT,AT(40,0,40,40),USE(E3),SCROLL,OVR,UPR
    TEXT,AT(60,0,40,40),USE(E4),CURSOR(CURSOR:Wait),RIGHT
    TEXT,AT(80,0,40,40),USE(E5),DISABLE,FONT('Arial',12)
    TEXT,AT(100,0,40,40),USE(E6),HVSCROLL,LEFT
    TEXT,AT(120,0,40,40),USE(E7),REQ,INS,CAP,MSG('Text Field 7')
END
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Detail  DETAIL,AT(0,0,6500,1000)
    TEXT,AT(0,0,40,40),USE(E1)
    TEXT,AT(100,0,40,40),USE(E6),FONT('Arial',12)
    TEXT,AT(120,0,40,40),USE(E7),CAP
    TEXT,AT(140,0,40,40),USE(E8),UPR
    TEXT,AT(160,0,40,40),USE(E9),LEFT
    TEXT,AT(180,0,40,40),USE(E10),RIGHT
    TEXT,AT(200,0,40,40),USE(E11),CENTER
END
```

See Also: **ENTRY**

## VBX (declare a .VBX custom control)

```
VBX(text) [,AT( )] [,CLASS( )] [,CURSOR( )] [,USE( )] [,DISABLE] [,KEY( )] [,MSG( )]
[,HLP( )] [,SKIP] [,FULL] [,SCROLL] [,ALRT( )] [,HIDE] [,FONT( )] [,DROPID( )]
[,TIP( )] [,META] [,property( value )]
```

<b>VBX</b>	Places a Visual Basic .VBX control on the WINDOW, TOOLBAR, or REPORT.
<i>text</i>	A string constant containing the title for the control (PROP:Text).
<b>AT</b>	Specifies the initial size and location of the control (PROP:AT). If omitted, default values are selected by the control.
<b>CLASS</b>	Specifies the .VBX filename and type of control (PROP:CLASS).
<b>CURSOR</b>	Specifies a mouse cursor to display when the mouse is positioned over the control (PROP:CURSOR). If omitted, the WINDOW's CURSOR attribute is used, else the Windows default cursor is used. Not valid in a REPORT.
<b>USE</b>	The label of a variable to receive the value of the control (PROP:USE).
<b>DISABLE</b>	Specifies the control appears dimmed when the WINDOW or APPLICATION opens (PROP:DISABLE).
<b>KEY</b>	Specifies an integer constant or keycode equate that immediately gives focus to the control (PROP:KEY). Not valid in a REPORT.
<b>MSG</b>	Specifies a string constant containing the text to display in the status bar when the control has focus (PROP:MSG). Not valid in a REPORT.
<b>HLP</b>	Specifies a string constant containing the help system identifier for the control (PROP:HLP). Not valid in a REPORT.
<b>SKIP</b>	Specifies the control does not receive input focus and may only be accessed with the mouse or accelerator key (PROP:SKIP). Not valid in a REPORT.
<b>FULL</b>	Specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter (PROP:FULL). Not valid in a REPORT.
<b>SCROLL</b>	Specifies the control scrolls with the window (PROP:SCROLL). Not valid in a REPORT.
<b>ALRT</b>	Specifies "hot" keys active for the control (PROP:ALRT). Not valid in a REPORT.

<b>HIDE</b>	Specifies the control does not appear when the WINDOW or APPLICATION is first opened (PROP:HIDE). UNHIDE must be used to display it.
<b>FONT</b>	Specifies the display font for the control (PROP:FONT).
<b>DROPID</b>	Specifies the control may serve as a drop target for drag-and-drop actions (PROP:DROPID). Not valid in a REPORT.
<b>TIP</b>	Specifies the text that displays as “balloon help” when the mouse cursor pauses over the control (PROP:ToolTip). Not valid in a REPORT.
<b>META</b>	Specifies printing as a Windows metafile (.WMF) (PROP:META). Valid only in a REPORT.
<i>property</i>	A string constant containing the name of a custom property setting for the control.
<i>value</i>	A string constant containing the property value number or EQUATE for the <i>property</i> .

The **VBX** control places a Visual Basic .VBX control on the WINDOW, TOOLBAR, or REPORT at the position and size specified by its AT attribute.

The *property* attribute allows you to specify any additional property settings the .VBX control may require. These are properties that need to be set for the .VBX control to properly function, and are not standard Clarion properties (such as AT, CURSOR, or USE). The custom control should only receive values for these properties that are defined for that control. Valid properties and values for those properties would be defined in the custom control's documentation. You may have multiple *property* attributes on a single VBX control.

VBX supports a mechanism analogous to the Visual Basic ON ERROR statement. Whenever the .VBX generates an internal error, the program will receive EVENT:VBXevent where the PROP:VBXEvent is set to '&OnError' and the PROP:VBXEventArgs contains the error number as the first argument, and the error text as the second.

Events Generated:	EVENT:Selected	The control has received input focus.
	EVENT:VBXevent	A VBX-specific event occurred. Interrogate the PROP:VBXEvent and PROP:VBXEventArgs properties for the event.
	EVENT:Accepted	The user has completed using the control.
	EVENT:PreAlertKey	The user pressed an ALRT attribute hot key.
	EVENT:AlertKey	The user pressed an ALRT attribute hot key.
	EVENT:Drop	A successful drag-and-drop to the control.

Example:

```
MDIChild  WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
           VBX,AT(0,0,120,320),USE(C1), |
           CLASS('graph.vbx','graph'),'graphstyle'('2')
           END
MsgNum    LONG
MsgTxt    STRING
CODE
OPEN(MDIChild)
ACCEPT
CASE EVENT()
OF ?EVENT:VBXevent
  IF ?C1{PROP:VBXEvent} = '&OnError' !Detect ON ERROR condition
    MsgNum = ?C1{PROP:VBXArg,1}
    MsgTxt = ?C1{PROP:VBXArg,2}
    MESSAGE('VBX Error ' & MsgNum & ' ' & MsgTxt)
  END
END
CASE ACCEPTED()
OF ?C1
  ?C1{'graphstyle'} = '3' !Change graphstyle property "on the fly"
                           ! using runtime property access syntax
END
END
Report    REPORT
DetailOne  DETAIL
           VBX,AT(0,0,120,320),CLASS('graph.vbx','graph'),'graphstyle'('2')
           END
END
```

See Also:

**OLE**





## 9 - WINDOW AND REPORT ATTRIBUTES

### Attribute Property Equates

Each attribute has a corresponding runtime property listed in its description (PROP:*attribute*). Equates for all runtime properties are contained in the PROPERTY.CLW file. This file also contains equates for the standard values used by some of these properties. Some properties are “read-only” and their value may not be changed, and others are “write-only” properties whose value cannot be determined. These restrictions are noted as applicable.

#### PROP:Text

---

PROP:Text is the *text* parameter of an APPLICATION(*text*), WINDOW(*text*), or any control(*text*). This property represents the parameter to any control or window declaration, and could contain any value that is valid as the parameter to the specific control's declaration. For example:

Example:

```
?Image{PROP:Text} = 'My.BMP'           !a new bitmap for the referenced IMAGE control
?Prompt{PROP:Text} = 'New Prompt text'  !new text in the referenced PROMPT control
?Entry{PROP:Text} = '@N03'             !new picture for the referenced ENTRY control
```

#### Attribute Property Parameters

---

Many attributes take no parameter—they are either present or absent. Therefore, their corresponding runtime properties simply toggle the attribute on or off. Assigning an empty string (") or zero (0) turns them off. Assigning '1' or 1 turns them on. Typically, the standard equates for TRUE and FALSE are used for this purpose. Querying any of these properties returns a blank string when the attribute is not active for the window, report, or control. Examples of these types of attribute properties are: PROP:ABOVE, PROP:ABSOLUTE, and PROP:ALONE.

Example:

```
?MyControl{PROP:DISABLE} = TRUE        !disables the referenced control
```

Many attributes take a single parameter whose presence specifies both the presence of the attribute and its value. Assigning an empty string (") or zero (0) turns them off. Assigning any other valid value turns them on. Examples of these types of attribute properties are PROP:TIMER and PROP:DROP.

Example:

```
MyWindow{PROP:TIMER} = 100             !set the window's timer to 1 second
```

## Arrayed Properties

A number of attribute properties are actually arrays which either contain multiple values (such as PROP:ALRT, which may contain up to 255 separately alerted keycodes) or which may be referenced as arrays to directly address their multiple parameters instead of using separately declared equates for each of the individual parameters (like PROP:AT, whose parameters may be addressed either as {PROP:AT,n} or as the separately declared equates for each of the individual parameters: PROP:Xpos, PROP:Ypos, PROP:Width, and PROP:Height).

Example:

```

CheckField  STRING(1)

Screen  WINDOW
    ENTRY(@N3),USE(Ctl:Code)
    ENTRY(@S30),USE(Ctl:Name),REQ
    CHECK('True or False'),USE(CheckField)
    IMAGE('SomePic.BMP'),USE(?Image)
    BUTTON('OK'),USE(?OkButton),KEY(EnterKey)
    BUTTON('Cancel'),USE(?CanxButton),KEY(EscKey)
END

CODE
OPEN(Screen)
Screen{PROP:AT,1} = 0           !Position window to top left corner
Screen{PROP:AT,2} = 0
Screen{PROP:GRAY} = 1          !Give window 3D look
Screen{PROP:STATUS,1} = -1      !Create status bar with two sections
Screen{PROP:STATUS,2} = 180
Screen{PROP:STATUS,3} = 0       !Terminate status bar array

Screen{PROP:StatusText,2} = FORMAT(TODAY(),@D2)
                                !Put date in status bar section 2

?CtlCode{PROP:ALRT,1} = F10Key  !Alert F10 on Ctl:Code entry control

?CtlCode{PROP:Text} = '@N4'     !Change entry picture token

?Image{PROP:Text} = 'MyPic.BMP' !Change image control filename

?OkButton{PROP:DEFAULT} = '1'   !Put DEFAULT attribute on OK button

?MyButton{PROP:ICON} = 'C:\Windows\MORICONS.DLL[10]'
                                !Display 11th icon in MORICONS.DLL (zero-based)

?MyButton{PROP:ICON} = 'C:\Windows\MORICONS.DLL[0]'
                                !Display first icon in MORICONS.DLL (zero-based)

?CheckField{PROP:TrueValue} = 'T' !Checked and unchecked values for CHECK control
?CheckField{PROP:FalseValue} = 'F'
ACCEPT
END

```

## Window and Report Attributes

### ABSOLUTE (set fixed-position printing)

#### ABSOLUTE

The **ABSOLUTE** attribute (PROP:ABSOLUTE) ensures that the DETAIL, or group HEADER or FOOTER structure (contained within a BREAK structure), always prints at a fixed position on the page. When ABSOLUTE is present, the position specified by the *x* and *y* parameters of the structure's AT attribute is relative to the top left corner of the page. ABSOLUTE has no effect on following structures printed without the ABSOLUTE attribute.

Example:

```
CustRpt      REPORT,AT(1000,2000,6500,9000),THOUS
              HEADER
              !structure elements
              END
CustDetail1  DETAIL,AT(0,0,6500,1000)
              !structure elements
              END
CustDetail2  DETAIL,AT(1000,1000,6500,1000),ABSOLUTE      ! fixed position detail
              !structure elements
              END
              END
```

### ALONE (set to print without page header, footer, or form)

#### ALONE

The **ALONE** attribute (PROP:ALONE) specifies that the DETAIL, or group HEADER or FOOTER structure (contained within a BREAK structure), is to print on the page without any FORM, or page HEADER or FOOTER (not within a BREAK structure). The normal use is for report title and grand total pages.

Example:

```
CustRpt      REPORT
TitlePage    DETAIL,ALONE      !Title page detail structure
              !structure elements
              END
CustDetail    DETAIL
              !structure elements
              END
              FOOTER
              !structure elements
              END
              END
```

## ALRT (set window “hot” keys)

### ALRT(*keycode*)

**ALRT** Specifies a “hot” key active while the APPLICATION, WINDOW, or control on which it is placed has focus.

*keycode* A numeric constant keycode or keycode EQUATE.

The **ALRT** attribute (PROP:ALRT) specifies a “hot” key active while the APPLICATION, WINDOW, or control on which it is placed has focus.

When the user presses an ALRT “hot” key, two events (field-independent if the ALRT is on an APPLICATION or WINDOW, field-specific if the ALRT is on a control), EVENT:PreAlertKey and EVENT:AlertKey, are generated (in that order). If the code does not execute a CYCLE statement when processing EVENT:PreAlertKey, you “shortstop” the library’s default action on the alerted keypress. If the code does execute a CYCLE statement when processing EVENT:PreAlertKey, the library performs its default action for the alerted keypress. In either case, EVENT:AlertKey is generated following EVENT:PreAlertKey. When EVENT:AlertKey is generated, the USE variable of the control with input focus is not automatically updated (use UPDATE if this is required).

You may have multiple ALRT attributes on one APPLICATION, WINDOW, or control (up to 255). The ALERT statement and the ALRT attribute of a window or control are completely separate. This means that clearing ALERT keys has no effect on any keys alerted by ALRT attributes.

PROP:ALRT is an array, containing up to 255 keycodes. The array element number actually used is internally assigned to the first free array element if the specified element number is larger than the current number of assigned keycodes. For example, assuming there are no keys alerted at all, if you specify assigning to element number 255, it is actually assigned to element number 1. Subsequently assigning another keycode to element number 255 (still free), it is actually assigned to element number 2. Explicitly assigning a keycode to element number 1, however, overwrites any other keycode already assigned to element number 1.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
    ENTRY,AT(6,40),USE(SomeVar1),ALRT(MouseLeft) !Mouse click alerted for control
    ENTRY,AT(60,40),USE(SomeVar2),ALRT(F10Key)   !F10 alerted for control
END
CODE
OPEN(WinOne)
ACCEPT
CASE FIELD()
OF ?SomeVar1
CASE EVENT()
OF EVENT:PreAlertKey      !Pre-check alert events
CYCLE                    !Allow standard MouseLeft action to process
OF EVENT:AlertKey         !Alert processing
DO ClickRoutine
END
OF ?SomeVar2
CASE EVENT()
OF EVENT:AlertKey         !Alert processing
DO F10Routine
END
END
END
```



## AT (set position and size)

**AT**([*x*] [,*y*] [,*width*] [,*height*])

<b>AT</b>	Defines the position and size of the structure or control on which it is placed.
<i>x</i>	An integer constant or constant expression that specifies the horizontal position of the top left corner (PROP:Xpos, equivalent to {PROP:At,1}). If omitted, the runtime library provides a default value.
<i>y</i>	An integer constant or constant expression that specifies the vertical position of the top left corner (PROP:Ypos, equivalent to {PROP:At,2}). If omitted, the runtime library provides a default value.
<i>width</i>	An integer constant or constant expression that specifies the width (PROP:Width, equivalent to {PROP:At,3}). If omitted, the runtime library provides a default value.
<i>height</i>	An integer constant or constant expression that specifies the height (PROP:Height, equivalent to {PROP:At,4}). If omitted, the runtime library provides a default value.

The **AT** attribute (PROP:AT) defines the position and size of the structure or control on which it is placed. The *x,y* position is relative and dependent upon the statement on which the AT attribute is placed.

The values contained in the *x*, *y*, *width*, and *height* parameters are measured in dialog units for an APPLICATION or WINDOW. The *x*, *y*, *width*, and *height* parameters on a REPORT without the THOUS, MM, or POINTS attribute are also measured in dialog units.

Dialog units are defined as one-quarter the average character width by one-eighth the average character height. The actual size of a dialog unit is dependent upon the size of the default font for the window or report. This measurement is based on the font specified in the FONT attribute of the window or report, or the system default font specified by Windows (if there is no FONT attribute on the window or report).

### Window Usage

The *x* and *y* parameters are relative to the top left corner of the video screen when the AT attribute is on an APPLICATION structure, or a WINDOW without the MDI attribute that is opened before an APPLICATION structure is opened by the program.

The *x* and *y* parameters are relative to the top left corner of the APPLICATION's client area when the AT attribute is placed on a WINDOW with the MDI attribute, or a WINDOW without the MDI attribute opened after an APPLICATION structure has been opened.

The *width* and *height* parameters specify the size of the “client area” or “workspace” of an APPLICATION. This is the area below the MENUBAR and above the status bar which defines the area in which the TOOLBAR is placed and MDI “child” windows are opened. On a WINDOW, they specify the size of the “workspace” which may contain control fields.

### **Window Control Usage**

The *x* and *y* parameters are relative to the top left corner of the APPLICATION or WINDOW’s client area.

### **REPORT Structure Usage**

The AT attribute on a REPORT structure defines the position and size of the area of the page devoted to printing report detail. This is the area in which all DETAIL structures and any group HEADER and FOOTER structures contained within BREAK structures will print.

### **Print Structure Usage**

The AT attribute on print structures performs two different functions, depending upon the structure on which it is placed.

When placed on a FORM, or page HEADER or FOOTER (not within a BREAK structure), the AT attribute defines the position and size on the page at which the structure prints. The position specified by the *x* and *y* parameters is relative to the top left corner of the page.

When placed on a DETAIL, or group HEADER or FOOTER (contained within a BREAK structure), the print structure prints according to the following rules (unless the ABSOLUTE attribute is also present):

- The *width* and *height* parameters of the AT attribute specify the minimum print size of the structure.
- The structure actually prints at the next available position within the detail print area (specified by the REPORT’s AT attribute).
- The position specified by the *x* and *y* parameters of the structure’s AT attribute is an offset from the next available print position within the detail print area.
- The first print structure on the page prints at the top left corner of the detail print area (at the offset specified by its AT attribute).
- Next and subsequent print structures print relative to the ending position of the previous print structure:
  - If there is room to print the next structure beside the previous structure, it prints there.
  - If not, it prints below the previous.



## **REPORT Control Usage**

The *x* and *y* parameters are relative to the top left corner of the print structure containing the control.

Example:

```

WinOne      WINDOW,AT(0,0,380,200),MDI      !top left corner, relative to app frame
END

WinTwo      WINDOW,AT(0,0,380,200)          !Top left corner, relative to video screen
END

!Measurement in dialog units
WinOne      WINDOW,AT(0,0,160,400)
            ENTRY,AT(8,40,80,8)            !Approx. 2 characters in, 5 down, 20 wide, 1 high
            END

CustRpt     REPORT,AT(1000,1000,6500,9000),THOUS      !AT specifies detail print area
Detail      DETAIL,AT(0,0,6500,1000)                  !AT specifies band size and
                                                    ! relative position offset from
                                                    ! last printed detail
            STRING('String Constant'),AT(500,500,1500,500)
                                                    !AT specifies control size and
                                                    ! offset within the detail band
            END
END

CustRpt     REPORT,AT(1000,2000,6500,7000),THOUS      !1" margins all around
HEADER,AT(1000,1000,6500,1000)                      !Page relative position
            !structure elements                      !1" band across top of page
            END

CustDetail1 DETAIL,AT(0,0,6500,1000)                  !Detail relative position
            !structure elements                      !1" band across page
            END

CustDetail2 DETAIL,ABSOLUTE,AT(1000,8000,6500,1000)    !Page relative position
            !structure elements                      !1" band near page bottom
            END
FOOTER,AT(1000,9000,6500,1000)                      !Page relative position
            !structure elements                      !1" band across page bottom
            END
END

CustRpt1    REPORT,AT(1000,1000,6500,9000),THOUS      !1" margins all around for
                                                    ! detail area on 8.5" x 11"
            !report declarations
            END

CustRpt2    REPORT,AT(72,72,468,648),POINTS          !1" margins all around for
                                                    ! detail area on 8.5" x 11"
            !report declarations
            END

```

See Also: **SETPOSITION, GETPOSITION**

## AUTO (set USE variable automatic re-display)

---

### AUTO

The **AUTO** attribute (PROP:AUTO) specifies all window and toolbar controls' USE variables re-display on screen each time through the ACCEPT loop. This incurs some overhead, but ensures the data displayed is current, without requiring explicit DISPLAY statements.

Example:

```
WinOne WINDOW,AT(,,380,200),MDI,CENTER,AUTO    !All controls values always display
    !controls
END
CODE
ACCEPT          !ACCEPT automatically re-displays changed USE variables
END
```

## AUTOSIZE (set OLE object resizing)

---

### AUTOSIZE

The **AUTOSIZE** attribute (PROP:AUTOSIZE, write-only) specifies the OLE object automatically resizes itself when the OLE container control's AT attribute parameters change at runtime using property syntax to change the values of PROP:AT.

## AVE (set report total average)

**AVE**( [ *variable* ] )

**AVE** Calculates the average (arithmetic mean) of the STRING controls' USE variable is printed.

*variable* The label of a numeric variable to receive the intermediate values calculated for the AVE. This allows you to create totals on other totals. The value in the *variable* is internally updated by the print engine, so it is only useful for use within the REPORT structure.

The **AVE** attribute (PROP:AVE) specifies printing the average (arithmetic mean) of the STRING controls' USE variable. Unless the TALLY attribute is present, the result is calculated as follows:

- An AVE field in a DETAIL structure is calculated each time the DETAIL structure containing the control PRINTs.
- An AVE field in a group FOOTER structure is calculated each time any DETAIL structure in the BREAK structure containing the control PRINTs.
- An AVE field in a page FOOTER structure is calculated each time any DETAIL structure in any BREAK structure PRINTs.
- An AVE field in a HEADER is meaningless, since no DETAIL structures will have been printed at the time the HEADER is printed.

The average is reset only if the RESET or PAGE attribute is also specified. The STRING control using this attribute would usually be placed in a group or page FOOTER.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Break1  BREAK(LocalVar),USE(?BreakOne)
Break2  BREAK(Pre:Key1),USE(?BreakTwo)
Detail  DETAIL,AT(0,0,6500,1000),USE(?DetailOne)
        STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Group Average:'),AT(5500,500)
        STRING(@N$11.2),AT(6000,500),USE(Pre:F1),AVE(LocalVar),RESET(Break2)
        END
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Grand Average:'),AT(5500,500)
        STRING(@N$11.2),AT(6000,500),USE(LocalVar),AVE,TALLY(?BreakTwo)
        END
        END
        END
```



## BOXED (set controls group border)

---

### BOXED

The **BOXED** attribute (PROP:BOXED) specifies a single-track border around a GROUP or OPTION structure. The *text* parameter of the GROUP or OPTION control appears in a gap at the top of the border box. If BOXED is omitted, the *text* parameter of the GROUP or OPTION control is not printed or displayed on screen.

## CAP, UPR (set case)

---

### CAP UPR

The **CAP** and **UPR** attributes specify the automatic case of text entered into ENTRY or TEXT controls when the MASK attribute is on the window or of text printed in a TEXT control.

The UPR attribute (PROP:UPR) specifies all upper case.

The CAP attribute (PROP:CAP) specifies “Proper Name Capitalization,” where the first letter of each word is capitalized and all other letters are lower case. The user can override this default behavior by pressing the SHIFT key to allow an upper case letter in the middle of a name (allowing for names such as, “McDowell”) or SHIFT while CAPS-LOCK is on, forcing a lower case first letter (allowing for names such as, “von Richtofen”).

## CENTER (set centered window position)

---

### CENTER

The **CENTER** attribute (PROP:CENTER) indicates that the window’s default position is centered. A WINDOW structure with the MDI attribute is centered on the APPLICATION. An APPLICATION structure is centered on the screen. A non-MDI WINDOW is centered on its parent (the window currently with focus when the non-MDI WINDOW is opened).

This attribute has no meaning unless at least one parameter of the AT attribute is omitted. This means that the CENTER attribute provides a default value for any omitted AT parameter.

Example:

```
WinOne  WINDOW,AT(,,380,200),MDI,CENTER    !Window centered relative to application frame
        END

WinTwo  WINDOW,AT(,,380,200),CENTER        !Window centered relative to its parent:
        END
```

## CENTERED (set centered image)

### CENTERED

The **CENTERED** attribute (PROP:CENTERED) indicates an image displayed at its default size and centered in its display area:

- On an **IMAGE** control, the image is centered in the area specified by the **AT** attribute.
- On a **TOOLBAR** with the **WALLPAPER** attribute, the toolbar's background image is centered in the toolbar.
- On an **APPLICATION** or **WINDOW** with the **WALLPAPER** attribute, the window's background image is centered in the client area of the window.

Example:

```
MDIChild WINDOW('Child One'),MDI,SYSTEM,MAX
    MENUBAR
        MENU('Edit'),USE(?EditMenu)
            ITEM('Undo'),USE(?UndoText),KEY(CtrlZ),STD(STD:Undo)
            ITEM('Cu&t'),USE(?CutText),KEY(CtrlX),STD(STD:Cut)
            ITEM('Copy'),USE(?CopyText),KEY(CtrlC),STD(STD:Copy)
            ITEM('Paste'),USE(?PasteText),KEY(CtrlV),STD(STD:Paste)
        END
    END
    TOOLBAR,USE(?Toolbar),WALLPAPER('MyWall.GIF'),CENTERED
        BUTTON('Cut'),USE(?CutButton),ICON(ICON:Cut),STD(STD:Cut),FLAT
        BUTTON('Copy'),USE(?CopyButton),ICON(ICON:Copy),STD(STD:Copy),FLAT
        BUTTON('Paste'),USE(?PasteButton),ICON(ICON:Paste),STD(STD:Paste),FLAT
    END
END

WinOne WINDOW,AT(, ,380,200),MDI,WALLPAPER('MyWall.GIF'),CENTERED
END

WinOne WINDOW,AT(, ,380,200),MDI
    IMAGE('MyWall.GIF'),AT(0,0,380,200),CENTERED
END
```

See Also: **WALLPAPER, TILED**

## CHECK (set on/off ITEM)

### CHECK

The **CHECK** attribute (PROP:CHECK) specifies an **ITEM** that may be either **ON** or **OFF**. When **ON**, a check appears to the left of the menu selection and the **USE** variable receives the value one (1). When **OFF**, the check to the left of the menu selection disappears and the **USE** variable receives the value zero (0).

## CLASS (set .VBX custom control class)

---

### CLASS(*file* [,*name*] )

**CLASS** Specifies the filename and type of .VBX custom control.

*file* A string constant containing the name of the .VBX file (including the .VBX extension) in which the custom control is implemented (PROP:VbxFile, equivalent to {PROP:Class,1}).

*name* A string constant containing the name of the custom control type from the .VBX file (PROP:VbxName, equivalent to {PROP:Class,2}). If omitted, the first control type defined in the .VBX file is used.

The **CLASS** attribute (PROP:CLASS) specifies the filename and type of .VBX custom control. The *name* parameter identifies the specific control to use in a .VBX that contains multiple controls.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
        CUSTOM,AT(0,0,120,320),CLASS('graph.vbx','graph'),'graphstyle'('2')
END
```

## CLIP (set OLE object clipping)

---

### CLIP

The **CLIP** attribute (PROP:CLIP, write-only) specifies the OLE object only displays what fits into the size of the OLE container control's AT attribute. If the object is larger than the OLE container control, only the top left corner displays.

## CNT (set total count)

CNT([ *variable* ])

<b>CNT</b>	Calculates the number of times DETAIL structures have been printed.
<i>variable</i>	The label of a numeric variable to receive the intermediate values calculated for the CNT. This allows you to create totals on other totals. The value in the <i>variable</i> is internally updated by the print engine, so it is only useful for use within the REPORT structure.

The **CNT** attribute (PROP:CNT) specifies an automatic count of the number of times DETAIL structures have been printed. Unless the TALLY attribute is present, the result is calculated as follows:

- A CNT field in a DETAIL structure increments each time the DETAIL structure containing the control PRINTs. This provides a “running” count.
- A CNT field in a group FOOTER structure increments each time any DETAIL structure in the BREAK structure containing the control PRINTs. This provides a total of the number of DETAIL structures printed in the group.
- A CNT field in a page FOOTER structure increments each time any DETAIL structure in any BREAK structure PRINTs. This provides a total of the number of DETAIL structures printed on the page (or report).
- A CNT field in a HEADER is meaningless, since no DETAIL structures will have been printed at the time the HEADER is printed.

The CNT is reset only if the RESET or PAGE attribute is also specified.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Break1  BREAK(LocalVar),USE(?BreakOne)
Break2  BREAK(Pre:Key1),USE(?BreakTwo)
Detail  DETAIL,AT(0,0,6500,1000),USE(?DetailOne)
        STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Group Count:'),AT(5500,500)
        STRING(@N$11.2),AT(6000,500),USE(Pre:F1),CNT(LocalVar),RESET(Break2)
        END
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Grand Count:'),AT(5500,500)
        STRING(@N$11.2),AT(6000,500),USE(LocalVar),CNT,TALLY(?BreakTwo)
        END
        END
        END
```



## COLOR (set color)

**COLOR**( *color* [, *selected fore* ] [, *selected back* ] )

<b>COLOR</b>	Specifies display or print color.
<i>color</i>	Specifies the background color (PROP:Background or PROP:FillColor, equivalent to {PROP:Color,1}). Foreground color is specified in the FONT attribute.
<i>selected fore</i>	Specifies the default foreground color for the selected text on a control that can receive focus (PROP:SelectedColor, equivalent to {PROP:Color,2}). Not valid in a REPORT.
<i>selected back</i>	Specifies the default background color for the selected text on a control that can receive focus (PROP:SelectedFillColor, equivalent to {PROP:Color,3}). Not valid in a REPORT.

The **COLOR** attribute (PROP:COLOR) specifies the default background and selected foreground and background colors.

The color values in each of the three parameters are constants which contain the red, green, and blue components to create the color in the three low-order bytes of a LONG value (bytes 0, 1, and 2: Red = 000000FFh, Green = 0000FF00h, and Blue = 00FF0000h), or EQUATES for a standard Windows color value (which are all negative values). EQUATES for Windows' standard colors are contained in the EQUATES.CLW file. Each of the runtime properties returns COLOR:None if the associated parameter is absent.

Windows automatically finds the closest match to the specified color value for the hardware on which the program is run. Windows standard colors may be reconfigured by the user in the Windows Control Panel. Any control using a Windows standard color is automatically repainted with the new color when this occurs.

### WINDOW and TOOLBAR Usage

On a WINDOW or TOOLBAR, the COLOR attribute specifies the background display color of the WINDOW or TOOLBAR and the default background and selected foreground and background colors for all controls in the WINDOW or TOOLBAR without their own COLOR attribute.

### Window Control Usage

The COLOR attribute specifies the display color of a LINE control. On a BOX, ELLIPSE, or REGION control, the *color* parameter specifies the color used for the control's border. On all other controls, the *color* parameter specifies the background control color, overriding the user's standard Windows color scheme for that control type.

For most of those controls that can receive focus, the *selected fore* and *selected back* parameters specify the foreground and background colors of the selected text or item.

## **Report Usage**

On a REPORT statement, the COLOR attribute specifies the background print color of the REPORT and the default background color for all DETAIL, HEADER, FOOTER, or FORM in the REPORT without a COLOR attribute.

The COLOR attribute specifies the background print color of the DETAIL, HEADER, FOOTER, or FORM on which it is placed, and the default background color for all controls in the DETAIL, HEADER, FOOTER, or FORM without a COLOR attribute.

The COLOR attribute specifies the print color of a LINE control, specifies the border color of a BOX or ELLIPSE control, or the background color of any other control.

Example:

```
WinOne  WINDOW,AT(0,0,160,400),COLOR(00FF0000h,0000FF00h,000000FFh)
        !Blue background, Green selected foreground, Red selected background
        TOOLBAR,COLOR(00FF0000h,0000FF00h,000000FFh)
        !Blue background, Green selected foreground, Red selected background
        BOX,AT(20,20,20,20),COLOR(COLOR:ACTIVEBORDER) !Windows' active border color
        END
        BOX,AT(100,100,20,20),COLOR(00FF0000h)           !Blue
        BOX,AT(140,140,20,20),COLOR(0000FF00h)          !Green
        BOX,AT(180,180,20,20),COLOR(000000FFh)          !Red
        END

CustRpt  REPORT,AT(1000,1000,6500,9000),THOUS,COLOR(00FF0000h) !Blue background
CustDetail  DETAIL,AT(0,0,6500,1000)
        ELLIPSE,AT(60,60,200,200),COLOR(COLOR:ACTIVEBORDER) !Color EQUATE
        BOX,AT(360,60,200,200),COLOR(00FF0000h)           !Pure Red
        END
        END

RptOne  REPORT,AT(0,0,160,400),COLOR(00FF0000h)           !Blue default background
        HEADER,COLOR(0000FF00h)                             !Green page header background
        !structure elements
        END
CustDetail1  DETAIL                                         !uses the default background color
        !structure elements
        END
        FOOTER,COLOR(000000FFh)                             !Red page footer background
        !structure elements
        END
        END
```

See Also:

**FONT**

## COLUMN (set list box highlight bar)

---

### COLUMN

The **COLUMN** attribute (PROP:COLUMN) specifies a field-by-field highlight bar on a LIST or COMBO control with multiple display columns. PROP:COLUMN returns zero (0) if off, else it returns the currently highlighted column number.

## COMPATIBILITY (set OLE control compatibility)

---

### COMPATIBILITY( *mode* )

#### COMPATIBILITY

Specifies OLE control compatibility setting.

*mode*                      An integer constant for the compatibility setting.

The **COMPATIBILITY** attribute (PROP:COMPATIBILITY, write-only) specifies a compatibility mode for certain OLE or .OCX objects that require it. The *mode* should in general be zero (0), however some OLE objects (like Windows bitmap editor) do not work unless it is set to one (1).

Example:

```
WinOne WINDOW,AT(0,0,200,200)
      OLE,AT(10,10,160,100),USE(?OLEObject),CREATE('Excel.Sheet.5'),COMPATIBILITY(0)
      END
END
```

## CREATE (create OLE control object)

---

**CREATE**( *server* [, *object* ] )

<b>CREATE</b>	Specifies creating a new object for the OLE control.
<i>server</i>	A string constant containing the name of an OLE Server application, as it appears in the operating system's registry.
<i>object</i>	A string constant containing the name of the OLE Compound Storage file and the object within it to open.

The **CREATE** attribute (PROP:CREATE, write-only) specifies the OLE control creates a new OLE or .OCX object. The *server* value is the object name as it appears in the Operating System's Registry Settings (in Win95, this information is available in REGEDIT.EXE under HKEY\_CLASSES\_ROOT, or in the Microsoft System Information program that comes with Microsoft Office—MSINFO32.EXE).

When the *object* parameter is present, CREATE operates just as the OPEN attribute does, opening the saved *object* for the OLE control from an OLE Compound Storage file (and ignoring the *server* parameter). When the object is opened, the saved version of the container properties are re-loaded, so properties do not need to be specified on an object opened. The *object* parameter syntax must take the form: *Filename\!ObjectName*.

Example:

```
WinOne WINDOW,AT(0,0,200,200)
      OLE,AT(10,10,160,100),USE(?OLEObject),CREATE('Excel.Sheet.5')
      END
END
```

## CURSOR (set mouse cursor type)

### CURSOR(*file*)

#### CURSOR

Specifies a mouse cursor to display.

#### *file*

A string constant containing the name of a .CUR file, or an EQUATE naming a Windows-standard mouse cursor. The .CUR file is linked into the .EXE as a resource.

The **CURSOR** attribute (PROP:CURSOR) specifies a mouse cursor to be displayed when the mouse is positioned over the APPLICATION, WINDOW, TOOLBAR, or control. This cursor is inherited by the controls in the APPLICATION, WINDOW, or TOOLBAR unless overridden. Windows 3.1 only supports monochrome cursors (326-byte .CUR files).

EQUATE statements for the Windows-standard mouse cursors are contained in the EQUATES.CLW file. The following list is a representative sample of these (see EQUATES.CLW for the complete list):

CURSOR:None	No mouse cursor
CURSOR:Arrow	Normal windows arrow cursor
CURSOR:IBeam	Capital "I" like a steel I-beam
CURSOR:Wait	Hourglass
CURSOR:Cross	Large plus sign
CURSOR:UpArrow	Vertical arrow
CURSOR:Size	Four-headed arrow
CURSOR:Icon	Box within a box
CURSOR:SizeNWSE	Double-headed arrow slanting left
CURSOR:SizeNESW	Double-headed arrow slanting right
CURSOR:SizeWE	Double-headed horizontal arrow
CURSOR:SizeNS	Double-headed vertical arrow
CURSOR:DragWE	Double-headed horizontal arrow

Example:

```
!Window with custom cursor
WinTwo WINDOW,CURSOR('CUSTOM.CUR')
    TOOLBAR,CURSOR('CURSOR:Cross') !Toolbar with large plus sign cursor
    BUTTON('Cut'),USE(?CutButton),STD(STD:Cut)
    BUTTON('Copy'),USE(?CopyButton),STD(STD:Copy)
    BUTTON('Paste'),USE(?PasteButton),STD(STD:Paste)
END
REGION,AT(20,20,20,20),CURSOR(CURSOR:IBeam) !Region with I-beam cursor
REGION,AT(100,100,20,20)
END
```

## DEFAULT (set enter key button)

### DEFAULT

The **DEFAULT** attribute (PROP:DEFAULT) specifies a **BUTTON** that is automatically pressed when the user presses the **ENTER** key. Only one active **BUTTON** on a window should have this attribute.

## DELAY (set repeat button delay)

### DELAY( *time* )

**DELAY** Specifies the delay between first and second event generation.

*time* An integer constant containing the time delay to set, in hundredths of a second.

The **DELAY** attribute (PROP:DELAY) specifies the delay between first and second event generation for automatically repeating buttons. For a **BUTTON** control with the **IMM** attribute, this is the time between the first and second **EVENT:Accepted**. For a **SPIN** control, this is the time between the first and second **EVENT:NewSelection** generated by the spin buttons.

The purpose of the **DELAY** attribute is to change the delay time from its default value so that users do not inadvertently begin repeating the action when that is not their intention. Assigning a zero to **PROP:DELAY** resets the default setting, any other value sets the repeat delay for the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    BUTTON('Press Me'),AT(10,10,40,20),USE(?PressMe),IMM,DELAY(100)    !1 second
    SPIN(@n3),AT(60,10,40,10),USE(SpinVar),RANGE(0,999),DELAY(100)    !1 second
END
CODE
OPEN(MDIChild)
?PressMe{PROP:Delay} = 50    !Reset delay to 1/2 second
?SpinVar{PROP:Delay} = 50    !Reset delay to 1/2 second
?PressMe{PROP:Repeat} = 5    !Set repeat to 5 hundredths of a second
?SpinVar{PROP:Repeat} = 5    !Set repeat to 5 hundredths of a second
```

See Also: **IMM, REPEAT**

## DISABLE (set control dimmed at open)

### DISABLE

The **DISABLE** attribute (PROP:DISABLE) specifies a control that is disabled when the **WINDOW** or **APPLICATION** is opened. The disabled control may be activated with the **ENABLE** statement.

## DOCK (set dockable toolbox window)

### DOCK( *positions* )

#### DOCK

Specifies a dockable TOOLBOX.

#### *positions*

A bitmap specifying the edges available for docking.

The **DOCK** attribute (PROP:DOCK) specifies a WINDOW with the TOOLBOX attribute which may be docked to an edge of the application frame. The following EQUATES for standard *positions* values are contained in EQUATES.CLW:

DOCK:Left	EQUATE(1)
DOCK:Top	EQUATE(2)
DOCK:Right	EQUATE(4)
DOCK:Bottom	EQUATE(8)
DOCK:Float	EQUATE(16)
DOCK:All	EQUATE(31)

Example:

```
Win1 WINDOW('Tools'),TOOLBOX,DOCK(DOCK:Left+DOCK:Right)    !Dockable left and right, only
      BUTTON('Date'),USE(?Button1)
      BUTTON('Time'),USE(?Button2)
      END
```

See Also:

DOCKED,TOOLBOX

## DOCKED (set dockable toolbox window docked at open)

### DOCKED( *position* )

#### DOCKED

Specifies a dockable TOOLBOX docked at open.

#### *position*

A bitmap specifying the edge to which it is docked.

The **DOCKED** attribute (PROP:DOCKED) specifies a WINDOW with the DOCK attribute is docked when the window is opened. The following EQUATES for standard *position* values are contained in EQUATES.CLW:

DOCK:Left	EQUATE(1)
DOCK:Top	EQUATE(2)
DOCK:Right	EQUATE(4)
DOCK:Bottom	EQUATE(8)
DOCK:Float	EQUATE(16)
DOCK:All	EQUATE(31)

Example:

```
Win1 WINDOW('Tools'),TOOLBOX,DOCK(DOCK:All),DOCKED(DOCK:Top) !Dockable anywhere
      BUTTON('Date'),USE(?Button1)                             !Docked at top on open
      BUTTON('Time'),USE(?Button2)
      END
```

See Also:

DOCK, TOOLBOX

## DOCUMENT (create OLE control object from file)

---

### DOCUMENT( *filename* )

**DOCUMENT** Specifies creating an object for the OLE control from a data file specific to an OLE server application.

*filename* A string constant containing the name of the file.

The **DOCUMENT** attribute (PROP:DOCUMENT, write-only) specifies creating an object for the OLE control from a data file specific to an OLE server application. The *filename* parameter syntax must be a fully-qualified pathname, unless the file exists in the same directory as the OLE Controller application.

Example:

```
WinOne WINDOW,AT(0,0,200,200)
      OLE,AT(10,10,160,100),USE(?OLEObject),DOCUMENT('Book1.XLS')    !Excel
Spreadsheet
      MENUBAR
      MENU('&Clarion App')
      ITEM('&Deactivate Object'),USE(?DeactOLE)
      END
    END
  END
END
```



## DOUBLE, NOFRAME, RESIZE (set window border)

### DOUBLE NOFRAME RESIZE

The **DOUBLE**, **NOFRAME**, and **RESIZE** attributes specify a WINDOW or APPLICATION border frame style other than the default single-width border. The **DOUBLE** attribute (PROP:DOUBLE) places a double-width border around the window and the **NOFRAME** attribute (PROP:NOFRAME) places no border on the window. A window with these frame types may not be resized.

The **RESIZE** attribute (PROP:RESIZE) places a thick border frame around the window. This is the only type that allows the user to dynamically resize the window. RESIZE is ignored on any WINDOW with the MODAL attribute.

The RESIZE frame type is normally used on APPLICATION structures and WINDOW structures used as document windows, not dialog boxes. NOFRAME is usually used on “hidden” windows used only to activate an ACCEPT loop. DOUBLE is a common dialog box frame type.

Example:

```
!A Window with a single-width border:
Win1 WINDOW
    END

!A resizable Window:
Win2 WINDOW,RESIZE
    END

!A Window with a double-width border:
Win3 WINDOW,DOUBLE
    END

!A Window without a border:
Win4 WINDOW,NOFRAME
    END
```

## DRAGID (set drag-and-drop host signatures)

**DRAGID**( *signature* [, *signature*] )

### **DRAGID**

Specifies a LIST or REGION control that can serve as a drag-and-drop host.

### *signature*

A string constant containing an identifier used to indicate valid drop targets. Any *signature* that begins with a tilde (~) indicates that the information can also be dragged to an external (Clarion) program. A single DRAGID may contain up to 16 *signatures*.

The **DRAGID** attribute (PROP:DRAGID, an array) specifies a LIST or REGION control that can serve as a drag-and-drop host. DRAGID works in conjunction with the DROPID attribute. The DRAGID *signature* strings (up to 16) define validation keys to match against the *signature* parameters of the target control's DROPID. This provides control over where successful drag-and-drop operations are allowed.

A drag-and-drop operation occurs when the user drags information from a control with the DRAGID attribute to a control with the DROPID attribute. For a successful drag-and-drop operation, both controls must have at least one identical *signature* string in their respective DRAGID and DROPID attributes.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
    LIST,AT(120,0,20,20),USE(?List1),FROM(Que1),DRAGID('FromList1')
                                !Allows drags, but not drops
    LIST,AT(120,120,20,20),USE(?List2),FROM(Que2),DROPID('FromList1')
                                !Allows drops from List1, but no drags
END
CODE
OPEN(WinOne)
ACCEPT
CASE EVENT()
OF EVENT:Drag
    IF DRAGID()
        SETDROPID(Que1)
    END
    !When a drag event is attempted
    ! check for success
    ! and setup info to pass
OF EVENT:Drop
    Que2 = DROPID()
    ADD(Que2)
    !When drop event is successful
    ! get dropped info
    ! and add it to the queue
END
END
```

See Also:

**DROPID**

## DROP (set list box behavior)

**DROP**( *count* [, *width* ] )

<b>DROP</b>	Specifies the list appears only when the user presses an arrow cursor key or clicks on the drop icon.
<i>count</i>	An integer constant that specifies the number of elements displayed.
<i>width</i>	An integer constant that specifies the width of the dropped list, in dialog units (PROP:DropWidth, equivalent to {PROP:DROP,2}).

The **DROP** attribute (PROP:DROP) specifies that the selection list appears only when the user presses an arrow cursor key or clicks on the drop icon to the right of the currently selected value display. Once it drops into view, the list displays *count* number of elements. If the DROP attribute is omitted, the LIST or COMBO control always displays the number of data items specified by the *height* parameter of the control's AT attribute in the selection list.

The DROP attribute does not work on a WINDOW with the MODAL attribute and should not be used.

You can assign the name of another icon to the control's PROP:Icon property to override the default down-arrow drop icon.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
    LIST,AT(120,0,20,20),USE(?L7),FROM(Que1),DROP(6)
    COMBO(@S8),AT(120,120,20,20),USE(?C7),FROM(Que2),DROP(8)
END
CODE
OPEN(WinOne)
?C7{PROP:Icon} = 'MyDrop.ICO'    !Change the drop icon on the COMBO control
```

## DROPID (set drag-and-drop target signatures)

**DROPID**( *signature* [, *signature*] )

### **DROPID**

Specifies a control that can serve as a drag-and-drop target.

### *signature*

A string constant containing an identifier used to indicate valid drag hosts. A single DROPID may contain up to 16 *signatures*. Any *signature* that begins with a tilde (~) indicates that the information can also be dropped from an external (Clarion) program. A DROPID *signature* of '~FILE' indicates the target accepts a comma-delimited list of filenames dragged from the Windows File Manager.

The **DROPID** attribute (PROP:DROPID, an array) specifies a control that can serve as a drag-and-drop target. DROPID works in conjunction with the DRAGID attribute. The DROPID *signature* strings (up to 16) define validation keys to match against the *signature* parameters of the host control's DRAGID. This provides control over where successful drag-and-drop operations are allowed.

A drag-and-drop operation occurs when the user drags information from a control with the DRAGID attribute to a control with the DROPID attribute. For a successful drag-and-drop operation, both controls must have at least one identical *signature* string in their respective DRAGID and DROPID attributes.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
    LIST,AT(120,0,20,20),USE(?List1),FROM(Que1),DRAGID('FromList1')
                                !Allows drags, but not drops
    LIST,AT(120,120,20,20),USE(?List2),FROM(Que2),DROPID('FromList1','~FILE')
                                !Allows drops from List1 or the Windows
                                ! File Manager, but no drags
END
CODE
OPEN(WinOne)
ACCEPT
CASE EVENT()
OF EVENT:Drag                  !When a drag event is attempted
    IF DRAGID()                ! check for success
        SETDROPID(Que1)       ! and setup info to pass
    END
OF EVENT:Drop                  !When drop event is successful
    Que2 = DROPID()            ! get dropped info
    ADD(Que2)                  ! and add it to the queue
END
END
```

See Also:

**DRAGID**

## FILL (set fill color)

FILL( <i>rgb</i> )		
<b>FILL</b>	Specifies the fill color of a BOX or ELLIPSE control.	
<i>rgb</i>	A LONG or ULONG integer constant containing the red, green, and blue components that create the color in the three low-order bytes (bytes 0, 1, and 2) or an EQUATE for a standard Windows color value.	
The <b>FILL</b> attribute (PROP:FILL) specifies the display or print fill color of a BOX or ELLIPSE control. If omitted, the control is not filled with color. PROP:FILL returns COLOR:None if the FILL attribute is absent.		

Example:

```
CustRpt    REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail DETAIL,AT(0,0,6500,1000)
            ELLIPSE,AT(60,60,200,200),FILL(COLOR:ACTIVEBORDER)    !Color EQUATE
            BOX,AT(360,60,200,200),FILL(00FF0000h)                !Pure Red
            END
        END

WinOne     WINDOW,AT(0,0,160,400)
            BOX,AT(20,20,20,20),FILL(COLOR:ACTIVEBORDER)
                                     !Windows' active border color
            BOX,AT(100,100,20,20),FILL(00FF0000h)                !Blue
            BOX,AT(140,140,20,20),FILL(0000FF00h)                !Green
            BOX,AT(180,180,20,20),FILL(000000FFh)                !Red
        END
```

## FIRST, LAST (set MENU or ITEM position)

FIRST LAST	
The <b>FIRST</b> and <b>LAST</b> attributes (PROP:FIRST and PROP:LAST) specify menu selection positioning within the global pulldown menu, when a WINDOW's MENUBAR is merged into the global menu. The order of priorities is:	
<ol style="list-style-type: none"><li>1. Global selections with FIRST attribute</li><li>2. Local selections with FIRST attribute</li><li>3. Global selections without FIRST or LAST attributes</li><li>4. Local selections without FIRST or LAST attributes</li><li>5. Global selections with LAST attribute</li><li>6. Local selections with LAST attribute</li></ol>	

## FLAT (set flat buttons)

---

### FLAT

The **FLAT** attribute (PROP:FLAT) specifies the **BUTTON**, **CHECK**, or **RADIO** with an **ICON** attribute appears flat until the mouse cursor passes over it. This attribute is typically used on controls placed in a **TOOLBAR**.

This feature works best if the **ICON** attribute names a .GIF file to display, as the image will automatically be “grayed” when the control is not active (the mouse cursor is not directly over the control).

Example:

```
WinOne WINDOW,AT(0,0,160,400)
      TOOLBAR
        CHECK('1'),AT(0,0,20,20),USE(C1),ICON('Check1.GIF'),FLAT
        BUTTON,AT(120,0,20,20),USE(?B7),ICON('Button1.GIF'),FLAT
        OPTION('Option 4'),USE(OptVar4)
          RADIO('Radio 7'),AT(120,0,20,20),USE(?R7),ICON('Radio1.GIF'),FLAT
          RADIO('Radio 8'),AT(140,0,20,20),USE(?R8),ICON('Radio2.GIF').FLAT
        END
      END
    END
```

## FONT (set default font)

**FONT**([*typeface*] [,*size*] [,*color*] [,*style*])

<b>FONT</b>	Specifies the default display font for the TOOLBAR .
<i>typeface</i>	A string constant containing the name of the font (PROP:FontName, equivalent to {PROP:Font,1}). If omitted, the system font is used.
<i>size</i>	An integer constant containing the size (in points) of the font (PROP:FontSize, equivalent to {PROP:Font,2}). If omitted, the system default font size is used.
<i>color</i>	A LONG integer constant containing the red, green, and blue values for the color of the font in the low-order three bytes, or an EQUATE for a standard Windows color value (PROP:FontColor, equivalent to {PROP:Font,3}). If omitted, black is used.
<i>style</i>	An integer constant or constant expression or EQUATE specifying the strike weight and style of the font (PROP:FontStyle, equivalent to {PROP:Font,4}). If omitted, the weight is normal.

The **FONT** attribute (PROP:FONT) specifies the default display font for controls. When the property assignment's *target* is the SYSTEM built-in variable, PROP:FONT sets the font for the MESSAGE procedure.

The *typeface* parameter may name any font registered in the Windows system. For a report, the printer driver must support the specified *typeface* (this includes the TrueType fonts for most printers).

The EQUATES.CLW file contains EQUATE values for standard *style* values. A *style* in the range zero (0) to one thousand (1000) specifies the strike weight of the font. You may add to that values that indicate italic, underline, or strikeout text. The following EQUATES are in EQUATES.CLW:

FONT:thin	EQUATE (100)
FONT:regular	EQUATE (400)
FONT:bold	EQUATE (700)
FONT:italic	EQUATE (01000H)
FONT:underline	EQUATE (02000H)
FONT:strikeout	EQUATE (04000H)

### Window Usage

The FONT attribute on a WINDOW or APPLICATION structure specifies the default display font for all controls in the WINDOW or APPLICATION that do not have a FONT attribute. This is also the default font for newly created controls on the window, and is the font used by the SHOW and TYPE statements when writing to the window.

The FONT attribute on a TOOLBAR structure specifies the default display font for all controls in the TOOLBAR that do not have a FONT attribute.

Setting any of the runtime properties (PROP:*property*) of the FONT attribute for the WINDOW, APPLICATION, or TOOLBAR does not affect the existing controls already displayed. Controls CREATED after the property has been reset are affected, however.

The FONT attribute on a control declaration overrides any FONT specified on the WINDOW, APPLICATION, or TOOLBAR.

### **Report Usage**

The FONT attribute on a REPORT structure specifies the default print font for all controls in the REPORT. This font is used when the control does not have its own FONT attribute and the print structure containing the control also has no FONT attribute.

The FONT attribute on FORM, DETAIL, HEADER, and FOOTER structures specifies the default print font for all controls in the structures that do not have a FONT attribute.

The FONT attribute on a control declaration overrides any FONT specified on the REPORT or print structure.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
    LIST,AT(120,0,20,20),USE(?L7),FROM(Que1),FONT('Arial',14,0FFh)
        !14 point Arial typeface, Red, normal
    LIST,AT(120,120,20,20),USE(?C7),FROM(Que2),FONT('Arial',14,0,700)
        !14 point Arial typeface, Black, Bold
    LIST,AT(120,240,20,20),USE(?C7),FROM(Que2),FONT('Arial',14,0,700+01000h)
        !14 point Arial typeface, Black, Bold Italic
END
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS, |
    FONT('Arial',12,,FONT:Bold+FONT:Italic)
    !report declarations
END
!A Window using 14 point Times New Roman, Bold and Italic
Win WINDOW,FONT('Times New Roman',14,00H,FONT:italic+FONT:bold)
    STRING('This is Times 14 pt Bold Italic'),AT(42,14),USE(?String1)
END
CODE
OPEN(Win)
Win{PROP:FontSize} = 20                !Set default font size for CREATED controls
CREATE(100,CREATE:string)              !Create a control
100{PROP:Text} = 'This is 20 point'
SETPOSITION(100,82,24)
UNHIDE(100)
ACCEPT
END
```

See Also:

SETFONT, GETFONT, FONTDIALOG, COLOR, CREATE



## FORMAT (set LIST or COMBO layout)

### FORMAT(*format string*)

**FORMAT** Specifies the display or print format of the data in the LIST or COMBO control.

*format string* A string constant specifying the display format.

The **FORMAT** attribute (PROP:FORMAT) specifies the display format of the data in the LIST or COMBO control. The *format string* contains the information for formatting of data. PROP:FORMAT is updated whenever the user dynamically changes the format of the LIST or COMBO at runtime.

The *format string* contains “field-specifiers” which map to the fields of the QUEUE being displayed. Multiple “field-specifiers” may be grouped together as a “field-group” in square brackets ( [ ] ) to display as a single unit.

Only the fields in the QUEUE for which there are “field-specifiers” are included in the display. This means that, if there are two fields specified in the *format string* and three fields in the QUEUE, only the two specified in the *format string* are displayed in the LIST or COMBO control.

### “Field-specifier” format:

Each column in the LIST is formatted with the following components. The format for a particular column is returned or set by PROPLIST:Format.

*width justification* [ (*indent*) ] [ *modifiers* ]

*width*

A required integer defining the width of the field (PROPLIST:Width). Specified in dialog units.

*justification*

A single capital letter (**L** , **R** , **C** , or **D**) that specifies Left (PROPLIST:Left), Right (PROPLIST:Right), Center (PROPLIST:Center), or Decimal (PROPLIST:Decimal) justification. One is required.

*indent*

An optional integer, enclosed in parentheses, that specifies the indent from the justification. This may be negative. With left (**L**) (PROPLIST:LeftOffset) justification, *indent* defines a left margin ; with right (**R**) (PROPLIST:RightOffset) or decimal (**D**) (PROPLIST:DecimalOffset), it defines a right margin; and with center (**C**) (PROPLIST:CenterOffset), it defines an offset from the center of the field (negative = left offset).

*modifiers:*

Optional special characters (listed below) to modify the display format of the field or group. Multiple *modifiers* may be used on one field or group.

**Modifiers:**

**\*** An asterisk (PROPLIST:Color) indicates color information for the field is contained in four LONG fields that immediately follow the data field in the QUEUE (or FROM attribute string). The four colors are normal foreground, normal background, selected foreground, and selected background (in that order). Not valid in a REPORT.

**Y** A Y (PROPLIST:CellStyle) indicates a pre-defined style for the field (column) is contained in a LONG field that immediately follows the data field in the QUEUE (or FROM attribute string). The LONG field contains a number that refers to an entry in an array of styles associated with the LIST control through the PROPSYLE: runtime properties (see below). Not valid in a REPORT.

The style for an entire column may be set with PROPLIST:ColStyle. Using PROPLIST:ColStyle, the LONG field is not necessary in the QUEUE but without the LONG field you cannot assign different styles to individual cells in the column.

**I** An I (PROPLIST:Icon) indicates an icon displays in the column, at the left edge of the column (prepended to the data). An icon number is contained in a LONG field immediately following the data field in the QUEUE (or FROM attribute string). The LONG field contains a number that refers to an entry in a list of icons associated with the LIST control through the PROP:IconList runtime property. If an asterisk is also specified for color, this LONG must follow all the color information. Not valid in a REPORT.

**J** A J (PROPLIST:IconTrn) indicates a transparent icon displays in the column. The same information as I applies to J. Not valid in a REPORT.

**T** [ *suppress* ]

A T (PROPLIST:Tree) indicates the LIST is a tree control. The tree level is contained in a LONG field that immediately follows the data field in the QUEUE (or FROM attribute string). If **\*** and **I** are also specified, this LONG must follow all their LONG fields. The expanded/contracted state of the tree level is determined by the sign of the tree level LONG field's value (positive value=expanded and negative value=contracted). Not valid in a REPORT.

The optional *suppress* parameter can contain a **1** (PROPLIST:TreeOffset) to indicate the root is level number one (1) instead of zero (0), allowing -1 to indicate a contracted root. It can also contain an **R** (PROPLIST:TreeRoot) to suppress the connecting lines to the root level, an **L** (PROPLIST:TreeLines) to suppress the connecting lines between all levels, a **B**

(PROPLIST:TreeBoxes) to suppress expansion boxes, and an **I** (PROPLIST:TreeIndent) to suppress level indentation (which also implicitly suppresses both lines and boxes).

*~header~ [ justification [ (indent) ] ]*

A header string enclosed in tildes (PROPLIST:Header), followed by optional justification parameter (**L** = PROPLIST:HeaderLeft, **R** = PROPLIST:HeaderRight, **C** = PROPLIST:HeaderCenter, or **D** = PROPLIST:HeaderDecimal, ) and/or indent value in parentheses (PROPLIST:HeaderLeftOffset, PROPLIST:HeaderRightOffset, PROPLIST:HeaderCenterOffset, or PROPLIST:HeaderDecimalOffset), displays the header at the top of the list. The header uses the same justification and indent as the field, if not specifically overridden.

*@picture@*

The *picture* (PROPLIST:Picture) formats the field for display. The trailing @ is required to define the end of the *picture*, so that display pictures lsuch as @N12~Kr~ can be used in the format string without creating ambiguity.

**?** A question mark (PROPLIST:Locator) defines the locator field for a COMBO list box with a selector field. For a drop-down multi-column list box, this is the value displayed in the current-selection box. Not valid in a REPORT.

*#number#*

The *number* enclosed in pound signs (#) (PROPLIST:FieldNo) indicates the QUEUE field to display. Following fields in the format string without an explicit *#number#* are taken in order from the fields following the *#number#* field. For example, #2# on the first field in the format string indicates starting with the second field in the QUEUE, skipping the first. If the number of fields specified in the format string are >= the number of fields in the QUEUE, the format “wraps around” to the start of the QUEUE.

**\_** An underscore (PROPLIST:Underline) underlines the field.

**/** A slash (PROPLIST>LastOnLine) causes the next field to appear on a new line (only used on a field within a group).

**|** A vertical bar (PROPLIST:RightBorder) places a vertical line to the right of the field.

**M** An M (PROPLIST:Resize) allows the field or group of fields to be dynamically re-sized at runtime. This allows the user to drag the right vertical bar (if present) or right edge of the data area. Not valid in a REPORT.

**F** An F (PROPLIST:Fixed) creates a fixed column in the list that stays on screen when the user horizontally pages through the fields (by the HSCROLL attribute). Fixed fields or groups must be at the start of the list. This is ignored if placed on a field within a group. Not valid in a REPORT.

**S(*integer*)**

An *S* followed by an *integer* (PROPLIST:Scroll) in parentheses adds a scroll bar to the group. The *integer* defines the total number of dialog units to scroll. This allows large fields to be displayed in a small column width. This is ignored if placed on a field within a group. Not valid in a REPORT.

**“Field-group” format:**

[ *multiple field-specifiers* ] [ (*size*) ] [ *modifiers* ]

*multiple field-specifiers*

A list of field-specifiers contained in square brackets ( [ ] ) that cause them to be treated as a single display unit.

*size* An optional integer, enclosed in parentheses, that specifies the width of the group (PROPLIST:Width). If omitted, the size is calculated from the enclosed fields.

*modifiers*

The “field-group” *modifiers* act on the entire group of fields. These are the same *modifiers* listed above for a field (except the \*, I, T, and #*number*# *modifiers* which are not appropriate to groups). Add PROPLIST:Group to the appropriate field property to affect the group properties.

**Display QUEUE Field Format**

The order of fields that appear in the QUEUE to display in the LIST is important. Since there are several modifiers which require separate fields in the QUEUE to hold formatting data, the following is the order in which those fields must appear in the QUEUE:

1. The field containing the data to display (always).
2. The **Y** flag’s style field (if the Y is present, or PROPLIST:CellStyle is set).
3. The **T** flag’s tree level field (if the T is present, or PROPLIST:Tree is set).
4. The **I** or **J** flag’s tree level field (if the I or J is present, or PROPLIST:Icon or PROPLIST:IconTrn is set).
5. The \* flag’s foreground color field (if the \* is present, or PROPLIST:Color is set).
6. The \* flag’s background color field (if the \* is present, or PROPLIST:Color is set).
7. The \* flag’s selected foreground color field (if the \* is present, or PROPLIST:Color is set).
8. The \* flag’s selected background color field (if the \* is present, or PROPLIST:Color is set).

## Runtime Properties

The properties of the individual fields and groups in a multi-column LIST or COMBO control can also be set using the property equates for each (the PROPLIST:Item listed above for each property). These properties eliminate the need to create a complete FORMAT attribute string just to change a single property of a single field in the LIST.

These are all property arrays that require an explicit array element number following the property equate (separated by a comma) to specify which column in the LIST or COMBO is affected. All of them contain blank (‘’) if missing, and a one (1) if present.

Example:

```

PROGRAM
MAP
DisplayList      PROCEDURE
PrintList        PROCEDURE
RandomAlphaData  PROCEDURE(*STRING)
END

TreeDemo         QUEUE                !Data list box FROM queue
FName            STRING(20)
ColorNFG         LONG(COLOR:White)   !Normal Foreground color for FName
ColorNBG         LONG(COLOR:Maroon)  !Normal Background color for FName
ColorSFG         LONG(COLOR:Yellow)  !Selected Foreground color for FName
ColorSBG         LONG(COLOR:Blue)    !Selected Background color for FName
IconField        LONG                 !Icon number for FName
TreeLevel        LONG                 !Tree Level
LName            STRING(20)
Init             STRING(4)
END

CODE
DisplayList
PrintList

DisplayList      PROCEDURE
Win WINDOW('List Boxes'),AT(0,0,366,181),SYSTEM,DOUBLE
LIST,AT(0,34,366,146),FROM(TreeDemo),USE(?Show),HVSCROLL, |
FORMAT('80L*IT~First Name~*80L~Last Name~16C~Initials~')
END
CODE
LOOP X# = 1 TO 20
RandomAlphaData(TreeDemo.FName)
TreeDemo.IconField = ((X#-1) % 4) + 1           !Assign icon number
TreeDemo.TreeLevel = ((X#-1) % 4) + 1           !Assign tree level
RandomAlphaData(TreeDemo.LName)
RandomAlphaData(TreeDemo.Init)
ADD(TreeDemo)
END
OPEN(Win)
?Show{PROP:iconlist,1} = ICON:VCRback           !Icon 1 = <
?Show{PROP:iconlist,2} = ICON:VCRrewind         !Icon 2 = <<
?Show{PROP:iconlist,3} = ICON:VCRplay           !Icon 3 = >
?Show{PROP:iconlist,4} = ICON:VCRfastforward    !Icon 4 = >>
ACCEPT
END

```

```

RandomAlphaData PROCEDURE(Field)      !MAP Prototype is: RandomAlphaData(*STRING)
CODE
  CLEAR(Field)
  RandomSize# = RANDOM(1,SIZE(Field))  !Random fill size
  Field[1] = CHR(RANDOM(65,90))        !Start with a random upper case letter
  LOOP Z# = 2 to RandomSize#           !Fill each character with
    Field[Z#] = CHR(RANDOM(97,122))    ! a random lower case letter
  END
PrintList PROCEDURE
DemoQ      QUEUE
FName      STRING(20)
ColorNFG1  LONG
ColorNBG1  LONG
ColorSFG1  LONG(COLOR:Black)          !Printed Foreground color for FName
ColorSBG1  LONG(COLOR:White)          !Printed Background color for FName
LName      STRING(20)
ColorNFG2  LONG
ColorNBG2  LONG
ColorSFG2  LONG(COLOR:Black)          !Printed Foreground color for LName
ColorSBG2  LONG(COLOR:White)          !Printed Background color for LName
Init       STRING(4)
ColorNFG3  LONG
ColorNBG3  LONG
ColorSFG3  LONG(COLOR:Black)          !Printed Foreground color for Init
ColorSBG3  LONG(COLOR:White)          !Printed Background color for Init
Wage       REAL
ColorNFG4  LONG
ColorNBG4  LONG
ColorSFG4  LONG(COLOR:Black)          !Printed Foreground color for Wage
ColorSBG4  LONG(COLOR:White)          !Printed Background color for Wage
END
CustRpt    REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail DETAIL,AT(0,0,6500,200)
          LIST,AT(0,0,6000,200),FORMAT(' '),FROM(DemoQ),USE(?Show)
      . .
CODE
  LOOP X# = 1 TO 20
    CLEAR(DemoQ)
    RandomAlphaData(DemoQ.FName)
    RandomAlphaData(DemoQ.LName)
    RandomAlphaData(DemoQ.Init)
    DemoQ.Wage = RANDOM(100000,1000000)/100
    ADD(DemoQ)
  END
  OPEN(CustRpt)
  SETTARGET(CustRpt)
  IF RANDOM(0,1)
    ?Show{PROP:format} = '2000L*~First Name~2000L*~Last Name~500L*~Intls~1000L*~Wage~|'
  ELSE
    ?Show{PROP:format} = '2000L*~First Name~2000L*~Last ' & |
                        'Name~500L*~Intls~1000D(400)*~Wage~|'
    ?Show{PROPLIST:Header,1} = 'First Field'          !Change first field's header text
    ?Show{PROPLIST:Header + PROPLIST:Group,1} = 'First Group'
  END
  LOOP X# = 1 TO RECORDS(DemoQ)
    GET(DemoQ,X#)
    PRINT(CustDetail)
  END
  CLOSE(CustRpt)
  FREE(DemoQ)

```

## **Style Properties**

The following properties are used to set up the array of styles available to a column with the **Y** modifier or for use with **PROPLIST:ColStyle**. These define an array of available styles. Assigning the array element number to the **Y** modifier's **LONG** field or to **PROPLIST:ColStyle** sets the display style for the individual cell or column.

**PROPSTYLE:FontName**

An array property that sets or returns the font name for the style number specified as the array element.

**PROPSTYLE:FontSize**

An array property that sets or returns the font size for the style number specified as the array element.

**PROPSTYLE:FontColor**

An array property that sets or returns the font color for the style number specified as the array element.

**PROPSTYLE:FontStyle**

An array property that sets or returns the font style (strike weight, etc.) for the style number specified as the array element.

**PROPSTYLE:TextColor**

An array property that sets or returns the text color for the style number specified as the array element (same as fontcolor).

**PROPSTYLE:BackColor**

An array property that sets or returns the background color for the style number specified as the array element.

**PROPSTYLE:TextSelected**

An array property that sets or returns the selected text color for the style number specified as the array element.

**PROPSTYLE:BackSelected**

An array property that sets or returns the selected background color for the style number specified as the array element.

**PROPSTYLE:Picture**

An array property that sets or returns the display picture associated with the style number specified as the array element.





## Other List Box Properties

The following properties are not part of the FORMAT attribute string, but may be used to dynamically affect the appearance of the LIST or COMBO control.

### PROPLIST:BackColor

An array property that sets or returns the default background color for the text in the column number specified as the array element. This coloring can be overridden on a per-cell basis by the standard cell coloring mechanism.

### PROPLIST:BackSelected

An array property that sets or returns the default selected background color for the text in the column number specified as the array element. This coloring can be overridden on a per-cell basis by the standard cell coloring mechanism.

### PROPLIST:TextColor

An array property that sets or returns the default text color for the text in the column number specified as the array element. This coloring can be overridden on a per-cell basis by the standard cell coloring mechanism.

### PROPLIST:TextSelected

An array property that sets or returns the default selected text color for the text in the column number specified as the array element. This coloring can be overridden on a per-cell basis by the standard cell coloring mechanism.

### PROPLIST:Exists

An array property that returns 1 if the column number specified as the array element exists. For example, `?List{PROPLIST:Exists,1}` tests whether column 1 exists in the list. This is useful for generic list box processing.

Example:

```
WinView      WINDOW('View'),AT(.,340,200),SYSTEM,CENTER
              LIST,AT(0,0,300,200),USE(?List),FROM(Que),FORMAT('80L~F1~80L~F2~80L~F3~')
              END

CODE
OPEN(WinView)
LOOP X# = 1 TO 255
  IF ?List{PROPLIST:Exists,X#} = 1                !If there is a column with this number
    ?List{PROPLIST:TextColor,X#} = COLOR:Red
    ?List{PROPLIST:BackColor,X#} = COLOR:White
    ?List{PROPLIST:TextSelected,X#} = COLOR:Yellow
    ?List{PROPLIST:TextSelected,X#} = COLOR:Blue
  ELSE
    BREAK
  END
END
END
```

## **List Box Mouse Click Properties**

The following runtime properties return the mouse position within the LIST or COMBO control when pressed or released. They can also be written to, which has no effect except to temporarily change the value that the property returns when next read (within the same ACCEPT loop iteration). This may make coding easier in some circumstances.

PROPLIST:MouseDownField

Returns the field number when the mouse is pressed.

PROPLIST:MouseDownRow

Returns the row number when the mouse is pressed.

PROPLIST:MouseDownZone

Returns the zone number when the mouse is pressed.

PROPLIST:MouseMoveField

Returns the field number when the mouse is moved.

PROPLIST:MouseMoveRow

Returns the row number when the mouse is moved.

PROPLIST:MouseMoveZone

Returns the zone number when the mouse is moved.

PROPLIST:MouseUpField

Returns the field number when the mouse is released.

PROPLIST:MouseUpRow

Returns the row number when the mouse is released.

PROPLIST:MouseUpZone

Returns the zone number when the mouse is released.

The three “Row” properties all return zero (0) for header text and negative one (-1) if below the last displayed item.

Equates for the following Zones are listed on EQUATES.CLW:

LISTZONE:Field

On a field in the LIST

LISTZONE:Right

On the field's right border resize zone

LISTZONE:Header

On a field or group header

LISTZONE:ExpandBox

On an expand box in a Tree

LISTZONE:Tree

On the connecting lines of a Tree

LISTZONE:Icon

On an icon (Tree or not)

LISTZONE:Nowhere

Anywhere else

Example:

```

Que          QUEUE
F1           STRING(50)
F2           STRING(50)
F3           STRING(50)
            END

WinView      WINDOW('View'),AT(,,340,200),SYSTEM,CENTER
            LIST,AT(20,0,300,200),USE(?List),FROM(Que),HVSCROLL, |
            FORMAT('80L~F1~80L~F2~80L~F3~'),ALRT(MouseLeft)
            END

SaveFormat   STRING(20)
SaveColumn   BYTE
Columns      BYTE,DIM(3)

CODE
OPEN(WinView)
Columns[1] = 1
Columns[2] = 2
Columns[3] = 3
DO BuildListQue
ACCEPT
CASE EVENT()
OF EVENT:PreAlertKey
CYCLE                                     !Allow standard LIST clicks to process
OF EVENT:AlertKey
IF ?List{PROPLIST:MouseDownRow} = 0          !Check for click in header
EXECUTE Columns[?List{PROPLIST:MouseDownField}] !Check which header
SORT(Que,Que.F1)
SORT(Que,Que.F2)
SORT(Que,Que.F3)
END
SaveFormat = ?List{PROPLIST:Format,?List{PROPLIST:MouseDownField}}
?List{PROPLIST:Format,?List{PROPLIST:MouseDownField}} = ?List{PROPLIST:Format,1}
?List{PROPLIST:Format,1} = SaveFormat
SaveColumn = Columns[?List{PROPLIST:MouseDownField}]
Columns[?List{PROPLIST:MouseDownField}] = Columns[1]
Columns[1] = SaveColumn
DISPLAY
. . .
FREE(Que)

BuildListQue ROUTINE
LOOP Y# = 1 TO 9
Que.F1 = 'Que.F1 - ' & Y#
Que.F2 = 'Que.F2 - ' & RANDOM(10,99)
Que.F3 = 'Que.F3 - ' & RANDOM(100,999)
ADD(Que)
ASSERT(NOT ERRORCODE())
END

```

## FROM (set listbox data source)

### FROM(*source*)

<b>FROM</b>	Specifies the source of the data displayed or printed in a LIST control.
<i>source</i>	The label of a QUEUE or field within a QUEUE, or a string constant or variable (normally a GROUP) containing the data items to display or print in the LIST. If the QUEUE has been dynamically created with NEW, the corresponding DISPOSE <u>must</u> come after the window has been closed.

The **FROM** attribute (PROP:FROM, write-only) specifies the source of the data elements displayed in a LIST, COMBO, or SPIN control, or printed in a LIST control.

If a string constant is specified as the *source*, the individual data elements must be delimited by a vertical bar (|) character. To include a vertical bar as part of one data element, place two adjacent vertical bars in the string (||), and only one will be displayed. To indicate that an element is empty, place at least one blank space between the two vertical bars delimiting the elements (| |).

### Window Usage

For a SPIN control, the *source* would usually be a QUEUE field or string. If the *source* is a QUEUE with multiple fields, only the first field is displayed in the SPIN.

For LIST and COMBO controls, the data elements are formatted for display according to the information in the FORMAT attribute. If the label of a QUEUE is specified as the *source*, all fields in the QUEUE are displayed as defined by the FORMAT attribute. If the label of one field in a QUEUE is specified as the *source*, only that field is displayed.

### Report Usage

If the label of a QUEUE is specified as the *source*, all fields in the QUEUE are printed. If the label of one field in a QUEUE is specified as the *source*, only that field is printed. Only the current QUEUE entry in the queue's data buffer is printed in the LIST. If a string constant or variable is specified as the *source*, the entire string (all entries in the vertical bar delimited list of data elements) is printed in the LIST. The data elements are formatted for printing in the LIST according to the information in the FORMAT attribute.

Example:

```

TD      QUEUE,AUTO
FName   STRING(20)
LName   STRING(20)
Init     STRING(4)
Wage     REAL
        END

CustRpt  REPORT,AT(1000,1000,6500,9000),THOUS
CustDetail  DETAIL,AT(0,0,6500,1000)
          LIST,AT(0,34,366,146),FORMAT('80L80L16L60L'),FROM(TD),USE(?Show1)
          LIST,AT(0,200,100,146),FORMAT('80L'),FROM(Fname),USE(?Show2)
          END
        END

Que1     QUEUE,PRE(Q1)
F1       LONG
F2       STRING(8)
        END

Win1     WINDOW,AT(0,0,160,400)
          LIST,AT(120,0,20,20),USE(?L1),FROM(Que1),FORMAT('5C~List~15L~Box~'),COLUMN
          COMBO(@S8),AT(120,120,20,20),USE(?C1),FROM(Q1:F2)
          SPIN(@N8.2),AT(280,0,20,20),USE(SpinVar1),FROM(Q1:F1)
          SPIN(@S4),AT(280,0,20,20),USE(SpinVar2),FROM('Mr.|Mrs.|Ms.|Dr. ')
        END

```

## FULL (set full-screen)

---

### FULL

The **FULL** attribute (PROP:FULL) specifies the control expands to occupy the entire size of the WINDOW for any missing AT attribute width or height parameter.

FULL may not be specified for TOOLBAR controls.

## GRAY (set 3-D look background)

---

### GRAY

The **GRAY** attribute (PROP:GRAY) indicates that the WINDOW has a gray background, suitable for use with three-dimensional dialog controls. All controls on a WINDOW with the GRAY attribute are automatically given a three-dimensional appearance. Controls in a TOOLBAR are always automatically given a three-dimensional appearance, without the GRAY attribute.

This attribute is not valid on an APPLICATION structure.

The three-dimensional look may be disabled by SET3DLOOK.

Example:

```
!A Window with 3-D controls
Win1 WINDOW,GRAY
END
```

See Also:

SET3DLOOK

## GRID (set list grid-line display color)

---

### GRID(*rgb*)

**GRID**

Specifies list box grid-line display color.

*rgb*

A LONG or ULONG integer constant, or constant EQUATE, containing the red, green, and blue components that create the color in the three low-order bytes (bytes 0, 1, and 2), or an EQUATE for a standard Windows color value.

The **GRID** attribute (PROPLIST:GRID) specifies the display color of grid-lines in a COMBO, or LIST control. EQUATEs for Windows' standard colors are contained in the EQUATES.CLW file. Windows automatically finds the closest match to the specified *rgb* color value for the hardware on which the program is run.

Example:

```
WinOne WINDOW,AT(0,0,400,400)
      LIST,AT(0,34,366,146),FROM(TreeDemo),USE(?Show),HVSCROLL,GRID(COLOR:Red) |
      FORMAT('80L*IT~First Name~*80L~Last Name~16C~Initials~')
END
```

## HIDE (set control hidden)

---

### HIDE

The **HIDE** attribute (PROP:HIDE) specifies the control does not appear when the WINDOW or APPLICATION is first opened. UNHIDE must be used to display it. In a REPORT, the control does not print unless the UNHIDE statement is used to allow it to print. PROP:HIDE may be used with the TARGET built-in variable to hide/unhide the current target window.

## HLP (set on-line help identifier)

### HLP(*helpID*)

**HLP** Specifies the *helpID* for the APPLICATION, WINDOW, or control.

*helpID* A string constant specifying the key used to access the Help system. This may be either a Help keyword or a “context string.”

The **HLP** attribute (PROP:HLP) specifies the *helpID* for the APPLICATION or WINDOW. Help, if available, is automatically displayed by Windows whenever the user presses F1.

If the user presses F1 to request help when the APPLICATION window is foremost and no menus are active, the APPLICATION's *helpID* is used to locate the Help text. Otherwise, the library automatically uses the *helpID* of the active menu of uppermost control or window, searching up the hierarchy until an object with that *helpID* is found. The *helpID* of the APPLICATION is at the top of the hierarchy.

The *helpID* may contain a Help keyword or a “context string.”

- A Help keyword is a word or phrase displayed in the Help Search dialog. When the user presses F1, if only one topic in the help file specifies this keyword, the help file is opened at that topic; if more than one topic specifies the keyword, the search dialog is opened for the user.
- A “context string” is identified by a leading tilde (~) in the *helpID*, followed by a unique identifier (no spaces allowed) associated with exactly one help topic. When the user presses F1, the help file is opened at the specific topic associated with that “context string.” If the tilde is missing, the *helpID* is assumed to be a help keyword.

Example:

```
!A Window with a help context string:
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS,HLP('~App')
    MENUBAR
        MENU('&File'),USE(?FileMenu)
            ITEM('&Open...'),USE(?OpenFile),HLP('~OpenFileHelp')
        END
    END
END

!A Window with a help keyword:
Win2 WINDOW,HLP('Window One Help')
    ENTRY(@s30),USE(SomeVariable),HLP('~Entry1Help')!A help context string
    ENTRY(@s30),USE(SomeVariable),HLP('Control Two Help')!A help keyword
END
```



## HSCROLL, VSCROLL, HVSCROLL (set scroll bars)

### HSCROLL VSCROLL HVSCROLL

The **HSCROLL**, **VSCROLL**, and **HVSCROLL** attributes place scroll bars on an APPLICATION or WINDOW structure, or a COMBO, LIST, IMAGE, or TEXT control. HSCROLL (PROP:HSCROLL) adds a horizontal scroll bar to the bottom, VSCROLL (PROP:VSCROLL) adds a vertical scroll bar on the right side, and HVSCROLL (PROP:HVSCROLL) adds both.

The HSCROLL attribute is also available for a SHEET control. This specifies the TABs display all on one row instead of multiple rows, no matter how many TABs there are. Right and left (or up and down) scroll buttons appear at both ends of the TABs to allow the user to scroll through all the TABs. PROP:BrokenTabs may be set to FALSE to turn off the “broken tab” visual effect.

The vertical scroll bar allows a mouse to scroll the display up or down. The horizontal scroll bar allows a mouse to scroll the control’s display left or right. The scroll bars appear whenever any scrollable portion of the control lies outside the visible area on screen.

When you place VSCROLL on a LIST with the IMM attribute, the vertical scroll bar is always present, even when the list is not full. When the user clicks on the scroll bar, events are generated, but the list contents do not move (executable code should perform this task). You can interrogate the PROP:VscrollPos property to determine the scroll thumb’s position in the range 0 (top) to 255 (bottom).

HSCROLL, VSCROLL, and HVSCROLL are also valid on a SPIN control and specify optional spin button arrangements from the default (one above the other, pointing up and down). HSCROLL places the spin buttons side by side pointing left and right, VSCROLL places the spin buttons one above the other pointing left and right, and HVSCROLL places the spin buttons side by side, pointing up and down.

Example:

```
!A Window with a horizontal scroll bar:
Win1 WINDOW,HSCROLL,RESIZE
    END

!A Window with a vertical scroll bar:
Win2 WINDOW,VSCROLL,RESIZE
    END

!A Window with both scroll bars:
Win2 WINDOW,HVSCROLL,RESIZE
    END
```

## ICON (set icon)

### ICON( [*file*] )

<b>ICON</b>	Specifies an icon to display for the APPLICATION, WINDOW, or control.
<i>file</i>	A string constant containing the name of the image file (.ICO, .GIF, .JPG, .PCX) or an EQUATE for the Windows standard icon to display. The image file is automatically linked into the .EXE as a resource.

The **ICON** attribute (PROP:ICON) specifies an icon to display for the APPLICATION, WINDOW, or control.

On an APPLICATION or WINDOW, ICON also specifies the presence of a minimize control, and must name an .ICO file as its *file* parameter. The minimize control appears in the top right corner of the window as a downward pointing triangle (in Windows 3.1) or an underscore (Windows 95). When the user clicks the mouse on it, the window shrinks to an icon without halting its execution. When an APPLICATION or non-MDI WINDOW is minimized, the icon *file* is displayed in the operating system's desktop; when a WINDOW with the MDI attribute is minimized, the icon *file* is displayed in the APPLICATION's client area.

On a BUTTON, RADIO, or CHECK control, ICON specifies an image to display as the control. The image *file* displays on the button face of the control. For RADIO and CHECK controls, the ICON attribute creates "latched" pushbuttons, where the control button appears "down" when on and "up" when off.

EQUATE statements for the Windows-standard icons are contained in the EQUATES.CLW file. The following list is a representative sample of these (see EQUATES.CLW for the complete list):

ICON:None	No icon
ICON:Application	
ICON:Question	?
ICON:Exclamation	!
ICON:Asterisk	*
ICON:VCRtop	>>
ICON:VCRrewind	<<
ICON:VCRback	<
ICON:VCRplay	>
ICON:VCRfastforward	>>
ICON:VCRbottom	<<
ICON:VCRlocate	?

If the name of the icon file to assign to PROP:Icon has a number in square brackets appended to its end (IconFile.DLL[1]), this indicates the file

contains multiple icons and the number specifies which to assign (using zero-based numbering). If the name of the icon file has a tilde (~) prepended to it (~IconFile.ICO), this indicates the file has been linked into the project as a resource and is not on disk.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL,ICON('MyIcon.ICO')
    OPTION('Option'),USE(OptVar)
        RADIO('Radio 1'),AT(120,0,20,20),USE(?R1),ICON('Radio1.ICO')
        RADIO('Radio 2'),AT(140,0,20,20),USE(?R2),ICON('Radio2.GIF')
    END
    CHECK('&A'),AT(0,120,20,20),USE(?C7),ICON(ICON:Asterisk)
    BUTTON('&1'),AT(120,0,20,20),USE(?B7),ICON(ICON:Question)
END
```

See Also:            **ICONIZE, MAX, MAXIMIXE, IMM**

## ICONIZE (set window open as icon)

---

### ICONIZE

The **ICONIZE** attribute (PROP:ICONIZE) specifies the APPLICATION or WINDOW is opened minimized as the icon specified by the ICON attribute. When an APPLICATION or non-MDI WINDOW is minimized, the icon *file* is displayed in the operating system's desktop; when a WINDOW with the MDI attribute is minimized, the icon *file* is displayed in the APPLICATION.

With the SYSTEM built-in variable as the property assignment *target*, PROP:ICONIZE returns 1 if the Windows PIF setting for the application is set to open the application iconized.

Example:

```
!A Window with a minimize button, opened as the icon:  
Win2 WINDOW,ICON('MyIcon.ICO'),ICONIZE  
END
```

See Also:

ICON, IMM

## IMM (set immediate event notification)

---

### IMM

The **IMM** attribute (PROP:IMM) specifies immediate event generation.

### Window Usage

On a **WINDOW** or **APPLICATION** the **IMM** attribute specifies immediate event generation whenever the user moves or resizes the window. It generates one the following events before the action is executed:

- EVENT:Move
- EVENT:Size
- EVENT:Restore
- EVENT:Maximize
- EVENT:Iconize

If the code that handles these events executes a **CYCLE** statement, the action is not performed. This allows you to prevent the user from moving or resizing the window. Once the action has been performed, one or more of the following events are generated:

- EVENT:Moved
- EVENT:Sized
- EVENT:Restored
- EVENT:Maximized
- EVENT:Iconized

Multiple post-action events generate because some actions have multiple results. For example, if the user **CLICKS** on the maximize button, **EVENT:Maximize** generates. If there is no **CYCLE** statement executed for this event, the action is performed, then **EVENT:Maximized**, **EVENT:Moved**, and **EVENT:Sized** all generate. This occurs because the window was maximized, which also moves and resizes it at the same time.

### Control Usage

On a **REGION** control, the **IMM** attribute generates an event whenever the mouse enters (**EVENT:MouseIn**), moves within (**EVENT:MouseMove**), or leaves (**EVENT:MouseOut**) the area specified by the **REGION**'s **AT** attribute. The exact position of the mouse can be determined by the **MOUSEX** and **MOUSEY** procedures.

On a **BUTTON** control, the **IMM** attribute indicates the **BUTTON** generates **EVENT:Accepted** when the left mouse button is pressed down on the control, instead of on its release. **EVENT:Accepted** repeatedly generates as long as the user keeps the mouse button pressed. The **DELAY** and **REPEAT** attributes on the **BUTTON** can change the rate the events generate.

The IMM attribute specifies immediate event generation each time the user presses any keystroke on a LIST or COMBO control, usually requiring the QUEUE to be re-filled. This means all keys are implicitly ALRTed for the control. When the user presses a character, EVENT:NewSelection generates.

For an ENTRY or SPIN control, EVENT:NewSelection generates whenever the control's contents or the cursor position changes. To do something only when the content changes, you must save the previous contents then compare against the current contents (probably using PROP:ScreenText).

For a SHEET control, EVENT:NewSelection generates whenever the user clicks on a TAB (even when that TAB is already the currently selected TAB). This can be useful when there are multiple SHEET controls on the same window.

Example:

```
Win2 WINDOW('Some Window'),AT(58,11,174,166),MDI,DOUBLE,MAX,IMM
    LIST,AT(109,48,50,50),USE(?List),FROM('Que'),IMM
    BUTTON('&Ok'),AT(111,108,,),USE(?Ok)
    BUTTON('&Cancel'),AT(111,130,,),USE(?Cancel)
END
CODE
OPEN(Win2)
ACCEPT
CASE EVENT()
OF EVENT:Move                !Prevent user from moving window
    CYCLE
OF EVENT:Maximized           !When Maximized
    ?List{PROP:Height} = 100 ! resize the list
OF EVENT:Restored            !When Restored
    ?List{PROP:Height} = 50  ! resize the list
END
END
```

See Also: RESIZE, MAX, ICON, DELAY, REPEAT

## INS, OVR (set typing mode)

---

**INS**  
**OVR**

The **INS** and **OVR** attributes (PROP:INS and PROP:OVR) specify the typing mode for an ENTRY or TEXT control when the MASK attribute is present on the window. INS specifies insert mode while OVR specifies overwrite mode. These modes are only active on windows with the MASK attribute.

## JOIN (set joined TAB scroll buttons)

---

**JOIN**

The **JOIN** attribute (PROP:JOIN) on a SHEET control specifies the TABs display all on one row instead of multiple rows, no matter how many TABs there are. Right and left (or up and down) scroll buttons appear together at the right end (or top) of the TABs to allow the user to scroll through all the TABs.

## KEY (set execution keycode)

### KEY(*keycode*)

**KEY** Specifies a “hot” key for the control

*keycode* A Clarion Keycode or keycode equate label.

The **KEY** attribute (PROP:KEY) specifies a “hot” key to immediately give focus to the control or execute the control’s associated action.

The following controls receive focus: COMBO, CUSTOM, ENTRY, GROUP, LIST, OPTION, PROMPT, SPIN, TEXT.

The following controls both receive focus and immediately execute: BUTTON, CHECK, CUSTOM, RADIO, MENU, ITEM.

Example:

```
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS
MENUBAR
  MENU('&Edit'),USE(?EditMenu)
    ITEM('Cu&t'),USE(?CutText),KEY(CtrlX),STD(STD:Cut),DISABLE
    ITEM('&Copy'),USE(?CopyText),KEY(CtrlC),STD(STD:Copy),DISABLE
    ITEM('&Paste'),USE(?PasteText),KEY(CtrlV),STD(STD:Paste),DISABLE
  END
END
TOOLBAR
  COMBO(@S8),AT(120,120,20,20),USE(?C1),FROM(Q1:F2),KEY(F1Key)
  LIST,AT(120,0,20,20),USE(?L1),FROM(Que1),KEY(F2Key)
  SPIN(@N8.2),AT(280,0,20,20),USE(SpinVar1),FROM(Q),KEY(F3Key)
  TEXT,AT(20,0,40,40),USE(E2),KEY(F4Key)
  PROMPT('Enter &Data in E2:'),AT(10,200,20,20),USE(?P2),KEY(F5Key)
  ENTRY(@S8),AT(100,200,20,20),USE(E2),KEY(F6Key)
  BUTTON('&1'),AT(120,0,20,20),USE(?B7),KEY(F7Key)
  CHECK('&A'),AT(0,120,20,20),USE(?C7),KEY(F8Key)
  OPTION('Option'),USE(OptVar),KEY(F9Key)
  RADIO('Radio 1'),AT(120,0,20,20),USE(?R1),KEY(F10Key)
  RADIO('Radio 2'),AT(140,0,20,20),USE(?R2),KEY(F11Key)
END
END
END
```

## LANDSCAPE (set page orientation)

### LANDSCAPE

The **LANDSCAPE** attribute (PROP:LANDSCAPE) on a REPORT indicates the report is to print in landscape mode by default. If the LANDSCAPE attribute is omitted, printing defaults to portrait mode.

Example:

```
Report REPORT,PRE('Rpt'),LANDSCAPE !Defaults to landscape mode
!Report structure declarations
END
```



## LEFT, RIGHT, ABOVE, BELOW (set TAB position)

```
LEFT( [width] )
RIGHT( [width] )
ABOVE( [width] )
BELOW( [width] )
```

*width*

An integer constant specifying the width of the TAB controls in dialog units. For the LEFT attribute, this is PROP:LeftOffset (equivalent to {PROP:LEFT,2}). For RIGHT, this is PROP:RightOffset (equivalent to {PROP:RIGHT,2}). For ABOVE, this is PROP:AboveSize (equivalent to {PROP:ABOVE,2}). For BELOW, this is PROP:BelowSize (equivalent to {PROP:BELOW,2}).

The **LEFT**, **RIGHT**, **ABOVE**, and **BELOW** attributes of a SHEET control specify the position of the TAB controls. LEFT (PROP:LEFT) specifies the TABs appear to the left of the sheet, RIGHT (PROP:RIGHT) specifies the TABs appear to the right of the sheet, ABOVE (PROP:ABOVE) specifies the TABs appear at the top of the sheet (the default position), and BELOW (PROP:BELOW) specifies the TABs appear at the bottom of the sheet.

The *width* parameter allows you to set the size of the TAB controls. The text that appears on the TAB is always horizontal unless you specify the UP or DOWN attribute.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
SHEET,AT(0,0,320,175),USE(SelectedTab),BELOW      !Place Tabs below sheet
TAB('Tab One'),USE(?TabOne)
    OPTION('Option 1'),USE(OptVar1),KEY(F10Key),HLP('Option1Help')
    RADIO('Radio 1'),AT(20,0,20,20),USE(?R1)
    RADIO('Radio 2'),AT(40,0,20,20),USE(?R2)
END
PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
ENTRY(@S8),AT(100,140,32,20),USE(E1)
PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P2)
ENTRY(@S8),AT(100,240,32,20),USE(E2)
END
TAB('Tab Two'),USE(?TabTwo)
    PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P3)
    ENTRY(@S8),AT(100,140,32,20),USE(E3)
    PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P4)
    ENTRY(@S8),AT(100,240,32,20),USE(E4)
END
END
BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
END
```

## LEFT, RIGHT, CENTER, DECIMAL (set justification)

```
LEFT( [offset] )
RIGHT( [offset] )
CENTER( [offset] )
DECIMAL( [offset] )
```

*offset*

An integer constant specifying the amount of offset from the justification point. This is in dialog units (unless overridden by the THOUS, MM, or POINTS attribute on a REPORT). For the LEFT attribute, this is PROP:LeftOffset (equivalent to {PROP:LEFT,2}). For RIGHT, this is PROP:RightOffset (equivalent to {PROP:RIGHT,2}). For CENTER, this is PROP:CenterOffset (equivalent to {PROP:CENTER,2}). For DECIMAL, this is PROP:DecimalOffset (equivalent to {PROP:DECIMAL,2}).

The **LEFT**, **RIGHT**, **CENTER**, and **DECIMAL** attributes specify the justification of data printed. LEFT (PROP:LEFT) specifies left justification, RIGHT (PROP:RIGHT) specifies right justification, CENTER (PROP:CENTER) specifies centered text, and DECIMAL (PROP:DECIMAL) specifies numeric data aligned on the decimal point.

On the LEFT attribute, *offset* specifies the amount of indentation from the left. On the RIGHT attribute, *offset* specifies the amount of indentation from the right. The *offset* parameter on the CENTER attribute specifies an offset value from the center (negative = left offset). On the DECIMAL attribute, *offset* specifies the decimal point's indentation from the right.

### Window Usage

The following controls allow LEFT or RIGHT only (without an *offset* parameter): BUTTON, CHECK, RADIO.

The following controls allow LEFT(*offset*), RIGHT(*offset*), CENTER(*offset*), or DECIMAL(*offset*): COMBO, ENTRY, LIST, SPIN, STRING.

The TEXT control allows LEFT(*offset*), RIGHT(*offset*), or CENTER(*offset*).

### Report Usage

The following controls allow LEFT or RIGHT only (without an *offset* parameter): CHECK, GROUP, OPTION, RADIO.

The following controls allow LEFT(*offset*), RIGHT(*offset*), CENTER(*offset*), or DECIMAL(*offset*): LIST, STRING.

The TEXT control allows LEFT, RIGHT, and CENTER (without an *offset* parameter).

Example:

```
Rpt    REPORT,AT(1000,1000,6500,9000),THOUS
Detail  DETAIL,AT(0,0,6500,1000)
        LIST,AT(0,20,100,146),FORMAT('800L'),FROM(Fname),USE(?Show2),LEFT(100)
        END
      END
WinOne  WINDOW,AT(0,0,160,400)
        COMBO(@S8),AT(120,120,20,20),USE(?C1),FROM(Q1:F2),RIGHT(4)
        LIST,AT(120,0,20,20),USE(?L1),FROM(Que1),CENTER
        SPIN(@N8.2),AT(280,0,20,20),USE(SpinVar1),FROM(Q),DECIMAL(8)
        TEXT,AT(20,0,40,40),USE(E2),LEFT(8)
        ENTRY(@S8),AT(100,200,20,20),USE(E2),LEFT(4)
        CHECK('&A'),AT(0,120,20,20),USE(?C7),LEFT
        OPTION('Option'),USE(OptVar)
        RADIO('Radio 1'),AT(120,0,20,20),USE(?R1),LEFT
        RADIO('Radio 2'),AT(140,0,20,20),USE(?R2),RIGHT
      END
    END
```

## LINEWIDTH (set line thickness)

### LINEWIDTH( *width* )

**LINEWIDTH** Specifies the LINE control and BOX and ELLIPSE border thickness.

*width* A positive integer constant specifying the thickness in pixels.

The **LINEWIDTH** attribute (PROP:LINEWIDTH) specifies the thickness of the LINE control and the BOX and ELLIPSE controls' border.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Detail  DETAIL,AT(0,0,6500,1000),USE(?DetailOne)
        LINE,AT(105,78,-49,0),USE(?Line1),LINEWIDTH(3)  !3 pixel line
        BOX,AT(182,27,50,50),USE(?Box1),LINEWIDTH(3)    !Box with 3 pixel border
        STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
        END
    END

window WINDOW('Caption'),AT(.,260,100),GRAY
        LINE,AT(105,78,-49,0),USE(?Line1),LINEWIDTH(3)  !3 pixel line
        BOX,AT(182,27,50,50),USE(?Box1),LINEWIDTH(3)    !Box with 3 pixel border
        END
```

## LINK (create OLE control link to object from file)

### LINK( *filename* )

**LINK** Specifies creating a link to an object for the OLE control from a data file specific to an OLE server application.

*filename* A string constant containing the name of the file.

The **LINK** attribute (PROP:LINK, write-only) specifies creating a link to an object for the OLE control from a data file specific to an OLE server application. The *filename* parameter syntax must be a fully-qualified pathname, unless the file exists in the same directory as the OLE Controller application.

Example:

```
WinOne WINDOW,AT(0,0,200,200)
        OLE,AT(10,10,160,100),USE(?OLEObject),LINK('Book1.XLS')  !Excel Spreadsheet
        MENUBAR
            MENU(' &Clarion App')
                ITEM('&Deactivate Object'),USE(?DeactOLE)
            END
        END
    END
END
```

## MARK (set multiple selection mode)

**MARK(*flag*)**

<b>MARK</b>	Enables multiple items selection.
-------------	-----------------------------------

<i>flag</i>	The label of a QUEUE field.
-------------	-----------------------------

The **MARK** attribute (PROP:MARK, write-only) enables multiple item selections from a LIST or COMBO control. When an item in the LIST is selected, the appropriate *flag* field is set to true (1). Each marked entry is automatically highlighted in the LIST or COMBO. Changing the value of the *flag* field also changes the screen display for the related LIST or COMBO entry.

If the MARK attribute is specified on the LIST or COMBO, the IMM attribute may not be.

Example:

```

Que1      QUEUE
MarkFlag   BYTE
F1         LONG
F2         STRING(8)
          END

WinOne    WINDOW,AT(0,0,160,400),SYSTEM
          LIST,AT(120,0,20,20),USE(?L1),FROM(Que1.F1),MARK(Que1.MarkFlag)
          COMBO(@S8),AT(120,120,,),USE(?C1),FROM(Que1.F2),MARK(Que1.MarkFlag)
          END

CODE
DO LoadQuee                                !Load Que1 with data
OPEN(WinOne)
ACCEPT
CASE EVENT()
  OF EVENT:CloseWindow
    BREAK
  END
END
LOOP X# = 1 to RECORDS(Que1)              !Loop through queue entries
  GET(Que1,X#)
  IF Que1.MarkFlag                         !If the user marked the entry
    DO ProcessMarked                      ! then process it
  END
END
END

```

## MASK (set pattern editing data entry)

### MASK

The **MASK** attribute (PROP:MASK) specifies pattern input editing mode of the specific COMBO, ENTRY, or SPIN control on which it is placed, or all controls in the window (when placed on the WINDOW statement). Toggling the value of PROP:MASK for a window only affects controls created after—it does not affect any existing controls.

Pattern input editing mode means that, as the user types in data, each character is automatically validated against the control's picture for proper input (numbers only in numeric pictures, etc.). This forces the user to enter data in the format specified by the control's display picture.

If MASK is omitted, Windows free-input is allowed in the controls. Free-input means the user's data is formatted to the control's picture only after entry. This allows users to enter data as they choose and it is automatically formatted to the control's picture after entry. If the user types in data in a format different from the control's picture, the libraries attempt to determine the format the user used, and convert the data to the control's display picture. For example, if the user types "January 1, 1995" into a control with a display picture of @D1, the runtime library formats the user's input to "1/1/95." This action occurs only after the user completes data entry and moves to another control. If the runtime library cannot determine what format the user used, it will not update the USE variable. It then beeps and leaves the user on the same control with the data they entered, to allow them to try again.

Example:

```
!A Window with pattern input editing enabled
Win2 WINDOW,MASK
    END

!Controls with pattern input editing enabled
Win2 WINDOW
    COMBO(@P(###) ###-####P),AT(120,120,20,20),USE(Phone),FROM(Q1:F2),MASK
    SPIN(@N8.2),AT(280,0,20,20),USE(SpinVar1),FROM(Q),MASK
    ENTRY(@D2),AT(100,200,20,20),USE(DateField),MASK
    END
```

## MAX (set maximize control or total maximum)

**MAX**( [ *variable* ] )

<b>MAX</b>	Specifies a maximize control on an APPLICATION or WINDOW, or calculates the maximum value a REPORT STRING control's USE variable has contained so far.
<i>variable</i>	The label of a numeric variable to receive the intermediate values calculated for the MAX (valid only in a REPORT). This allows you to create totals on other totals. The value in the <i>variable</i> is internally updated by the print engine, so it is only useful for use by other "totaling" controls within the REPORT structure.

The **MAX** attribute (PROP:MAX) specifies a maximize control on an APPLICATION or WINDOW, or calculates the maximum value a REPORT STRING control's USE variable has contained so far.

### Window Usage

The maximize control appears in the top right corner of the window as a box containing either an upward pointing triangle, or an upward pointing triangle above a downward pointing triangle (in Windows 3.1). When the user clicks the mouse on it, an APPLICATION or non-MDI WINDOW expands to occupy the full screen, an MDI WINDOW expands to occupy the entire APPLICATION. Once expanded, the maximize control appears as an upward pointing triangle above a downward pointing triangle. Click the mouse on it again, and the window returns to its previous size and the maximize control appears as an upward pointing triangle.

### Report Usage

The MAX attribute specifies printing the maximum value the STRING control's USE variable has contained so far. Unless the TALLY attribute is present, the result is calculated as follows:

- A MAX field in a DETAIL structure is evaluated each time the DETAIL structure containing the control PRINTs. This provides a "running" maximum value.
- A MAX field in a group FOOTER structure is evaluated each time any DETAIL structure in the BREAK structure containing the control PRINTs. This provides the maximum value of the variable in the group.
- A MAX field in a page FOOTER structure is evaluated each time any DETAIL structure in any BREAK structure PRINTs. This is the maximum value of the variable in the page (or report to date).
- A MAX field in a HEADER is meaningless, since no DETAIL structures will have been printed at the time the HEADER is printed.

The MAX value is reset only if the RESET or PAGE attribute is also specified.

Example:

```
!A Window with a maximize button:
Win2 WINDOW,MAX
    END

CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Break1    BREAK(LocalVar),USE(?BreakOne)
Break2    BREAK(Pre:Key1),USE(?BreakTwo)
Detail    DETAIL,AT(0,0,6500,1000),USE(?DetailOne)
            STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
            END
            FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
            STRING('Group Maximum:'),AT(5500,500)
            STRING(@N$11.2),AT(6000,500),USE(Pre:F1),MAX(LocalVar),RESET(Break2)
            END
            END
            FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
            STRING('Grand Maximum:'),AT(5500,500)
            STRING(@N$11.2),AT(6000,500),USE(LocalVar),MAX,TALLY(?BreakTwo)
            END
            END
            END
            END
```

See Also:

ICONIZE, ICON, MAXIMIXE, IMM, TALLY, RESET, PAGE



## MAXIMIZE (set window open maximized)

---

### MAXIMIZE

The **MAXIMIZE** attribute (PROP:MAXIMIZE) specifies the APPLICATION or WINDOW is opened maximized. When maximized, an APPLICATION or non-MDI WINDOW expands to occupy the full screen, and an MDI WINDOW expands to occupy the entire APPLICATION. Once expanded, the maximize control appears as an upward pointing triangle above a downward pointing triangle (in Windows 3.1).

With the SYSTEM built-in variable as the property assignment *target*, PROP:MAXIMIZE returns 1 if the Windows PIF setting for the application is set to open the application maximized.

Example:

```
!A Window with a maximize button, opened maximized:  
Win2 WINDOW,MAX,MAXIMIZE  
END
```

See Also:

MAX, IMM

## MDI (set MDI child window)

---

### MDI

The **MDI** attribute (PROP:MDI, read-only) specifies a WINDOW that acts as a “child” window to an APPLICATION. MDI windows are clipped to the APPLICATION frame—they display only in the APPLICATION’s client area. MDI windows automatically move when the APPLICATION frame is moved, and are totally concealed by minimizing the APPLICATION. An MDI WINDOW cannot open until there is an active APPLICATION.

### Modeless Windows

MDI “child” windows are modeless; the user may change to the top window of another execution thread, within the same application or any other application running in Windows, at any time. An MDI “child” window must not be on the same execution thread as the APPLICATION. Therefore, any MDI “child” window called directly from the APPLICATION must be in a separate procedure so the START procedure can be used to begin a new execution thread. Once started, multiple MDI “child” windows may be called in the new thread.

### Application Modal Windows

A non-MDI WINDOW operates independently of any previously opened APPLICATION. It will, however, disable an APPLICATION if it or any of its MDI “child” windows are on the same execution thread as the non-MDI window. This makes a non-MDI window opened in an MDI thread an “application modal” window which effectively disables the application while the user has the window open (unless it is opened in its own separate execution thread). It does not, however, prevent the user from changing to another application running under Windows. An MDI window may not be opened on the same thread as an already open non-MDI window.

Example:

```
Win2 WINDOW,MDI      !An MDI child Window
END
```

See Also:           MODAL, THREAD

## META (set .VBX to print as .WMF)

---

### META

The **META** attribute (PROP:META) specifies printing a .VBX custom control as a windows metafile (.WMF) instead of a bitmap. This typically results in a better printed image, uses less memory and prints faster, but metafile printing is not supported by all VBX’s. If you are not sure your VBX supports META output, try using it, then if it causes any problems during printing, remove it.

## MIN (set total minimum)

**MIN**( [ *variable* ] )

**MIN**

Calculates the minimum value the STRING control's USE variable has contained so far.

*variable*

The label of a numeric variable to receive the intermediate values calculated for the MIN. This allows you to create totals on other totals. The value in the *variable* is internally updated by the print engine, so it is only useful for use within the REPORT structure.

The **MIN** attribute (PROP:MIN) specifies printing the minimum value the STRING control's USE variable has contained so far. Unless the TALLY attribute is present, the result is calculated as follows:

- A MIN field in a DETAIL structure is evaluated each time the DETAIL structure containing the control PRINTs. This provides a “running” minimum value.
- A MIN field in a group FOOTER structure is evaluated each time any DETAIL structure in the BREAK structure containing the control PRINTs. This provides the minimum value of the variable in the group.
- A MIN field in a page FOOTER structure is evaluated each time any DETAIL structure in any BREAK structure PRINTs. This is the minimum value of the variable in the page (or report to date).
- A MIN field in a HEADER is meaningless, since no DETAIL structures will have been printed at the time the HEADER is printed.

The MIN value is reset only if the RESET or PAGE attribute is also specified.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Break1  BREAK(LocalVar),USE(?BreakOne)
Break2  BREAK(Pre:Key1),USE(?BreakTwo)
Detail  DETAIL,AT(0,0,6500,1000),USE(?DetailOne)
        STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Group Minimum:'),AT(5500,500)
        STRING(@N$11.2),AT(6000,500),USE(Pre:F1),MIN(LocalVar),RESET(Break2)
        END
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Grand Minimum:'),AT(5500,500)
        STRING(@N$11.2),AT(6000,500),USE(LocalVar),MIN,TALLY(?BreakTwo)
        END
        END
        END
```

## MODAL (set system modal window)

---

### MODAL

The **MODAL** attribute (PROP:MODAL, read-only) specifies the WINDOW is “system modal” in 16-bit programs. This means that no other window (in the same or any other concurrent program) can receive focus while the MODAL window has focus—the MODAL window has exclusive control of the computer. MODAL windows are usually used for error messages, or messages which require immediate attention by the user, such as: “Please insert a disk in drive A:.”

MODAL has no effect for 32-bit applications. The Microsoft Win32 API does not support system modal windows.

### Application Modal Windows

A WINDOW without the MODAL attribute, may be either “application-modal” or “modeless.” An application-modal window is a non-MDI window opened as the top window of an MDI execution thread. An application-modal window restricts the user from moving to another execution thread in the same application, but does not restrict them from changing to another Windows program.

### Modeless Windows

A modeless window is an MDI “child” WINDOW (with the MDI attribute) without the MODAL attribute. From a modeless window, The top window on other execution threads may be selected by the mouse, keyboard, or menu commands. If so, the other window takes focus and becomes uppermost on the video display. Any window not on the top of its execution thread may not be selected to receive focus, even from a modeless window.

Example:

```
Win2 WINDOW,MODAL      !A system-modal Window
END
```

See Also:

MDI, THREAD

# MSG (set status bar message)

MSG( *text* )

MSG	Specifies <i>text</i> to display in the status bar.
<i>text</i>	A string constant containing the message to display in the status bar.

The **MSG** attribute (PROP:MSG) specifies *text* to display in the first zone of the status bar.

On a control declaration, MSG specifies the *text* to display when the control has focus. If the control has non-persistent focus (has the SKIP attribute, or is placed in a TOOLBAR or a window with the TOOLBOX attribute) the *text* displays whenever the mouse cursor is positioned over the control.

On an APPLICATION or WINDOW structure, MSG specifies *text* to display in the first zone of the status bar when the control with focus has no MSG attribute of its own.

Example:

```
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS
    MENUBAR
        MENU('&File'),USE(?FileMenu)
            ITEM('&Open...'),USE(?OpenFile),MSG('Open a file')
            ITEM('&Close'),USE(?CloseFile),DISABLE,MSG('Close the open file')
            ITEM(),SEPARATOR
            ITEM('E&xit'),USE(?MainExit),MSG('Exit the program')
        END
    END
END

WinOne WINDOW,AT(0,0,160,400),MSG('Enter Data')           !Default MSG to use
    COMBO(@S8),AT(120,120,20,20),USE(?C1),FROM(Q1:F2),MSG('Enter or Select')
    TEXT,AT(20,0,40,40),USE(E2)                           !Default MSG used
    ENTRY(@S8),AT(100,200,20,20),USE(E2)                  !Default MSG used
    CHECK('&A'),AT(0,120,20,20),USE(?C7),MSG('On or Off')
    OPTION('Option 1'),USE(OptVar),MSG('Pick One or Two')
        RADIO('Radio 1'),AT(120,0,20,20),USE(?R1)
        RADIO('Radio 2'),AT(140,0,20,20),USE(?R2)
    END
END
```

See Also: STATUS

## NOBAR (set no highlight bar)

---

### NOBAR

The **NOBAR** attribute (PROP:NOBAR) specifies the currently selected element in the LIST is only highlighted when the LIST control has focus.

## NOCASE (case insensitive report BREAK)

---

### NOCASE

The **NOCASE** attribute (PROP:NOCASE) of a BREAK structure in a REPORT declaration makes the comparison for detecting a changed value (indicating a group break) insensitive to the ASCII upper/lower case sorting convention. All characters in the break field and the saved comparison value are converted to upper case before the comparison. This case conversion has no affect on the case of the stored data. The NOCASE attribute has no effect on non-alphabetic characters.

Example:

```
Report  REPORT
        BREAK(BreakVariable),NOCASE    !Case insensitive group break
        HEADER
            STRING(@n4),USE(BreakVariable)
        END
Detail  DETAIL
        STRING(@n4),USE(SomeField)
        END
        END
END
```

See Also:        **BREAK**

## NOMERGE (set merging behavior)

### NOMERGE

The **NOMERGE** attribute (PROP:NOMERGE) indicates that the MENUBAR or TOOLBAR on a WINDOW should not merge with the Global menu or toolbar.

The NOMERGE attribute on an APPLICATION's MENUBAR indicates that the menu is local and to be displayed only when no MDI "child" windows are open and that there is no Global menu. The NOMERGE attribute on an APPLICATION's TOOLBAR indicates that the tools are local and display only when no MDI "child" windows are open—there are no Global tools.

Without the NOMERGE attribute, an MDI WINDOW's menu and toolbar are automatically merged with the global menu and toolbar, and then displayed in the APPLICATION menu and toolbar. When NOMERGE is specified, the WINDOW's menu and toolbar overwrite the Global menu and toolbar. The menu and toolbar displayed when the WINDOW has focus are only the WINDOW's own menu and toolbar. However, they are still displayed on the APPLICATION.

A MENUBAR or TOOLBAR specified in a non-MDI WINDOW is never merged with the Global menu or toolbar—they appear in the WINDOW.

Example:

```
!An MDI application frame window with local-only menu and toolbar:
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS
    MENUBAR,NOMERGE
        ITEM('E&xit'),USE(?MainExit)
    END
    TOOLBAR,NOMERGE
        BUTTON('Exit'),USE(?MainExitButton)
    END
END
!MDI window with its own menu and toolbar, overwriting the application's:
MDIChild WINDOW('Dialog Window'),MDI,SYSTEM,MAX,STATUS
    MENUBAR,NOMERGE
        MENU('Edit'),USE(?EditMenu)
            ITEM('Cu&t'),USE(?CutText),KEY(CtrlX),STD(STD:Cut)
            ITEM('Copy'),USE(?CopyText),KEY(CtrlC),STD(STD:Copy)
            ITEM('Paste'),USE(?PasteText),KEY(CtrlV),STD(STD:Paste)
        END
    END
    TOOLBAR,NOMERGE
        BUTTON('Cut'),USE(?CutButton),STD(STD:Cut)
        BUTTON('Copy'),USE(?CopyButton),STD(STD:Copy)
        BUTTON('Paste'),USE(?PasteButton),STD(STD:Paste)
    END
    TEXT,HVSCROLL,USE(Pre:Field),MSG('Enter some text here')
    BUTTON('&OK'),USE(?Exit),DEFAULT
END
```

See Also:

**MENUBAR, TOOLBAR**

## NOSHEET (set “floating” TABs)

---

### NOSHEET

The **NOSHEET** attribute (PROP:NOSHEET) on a SHEET control specifies the TABs display without a visible sheet to contain the controls. This creates a “floating tab” effect.

## OPEN (open OLE control object from file)

---

### OPEN( *object* )

#### **OPEN**

Specifies opening a saved object for the OLE control from an OLE Compound Storage file.

#### *object*

A string constant containing the name of the OLE Compound Storage file and the object within it to open.

The **OPEN** attribute (PROP:OPEN, write-only) specifies opening a saved *object* for the OLE control from an OLE Compound Storage file. When the object is opened, the saved version of the container properties are reloaded, so properties do not need to be specified on an object opened. The *object* parameter syntax must take the form: *Filename\!ObjectName*.

Example:

```
WinOne WINDOW,AT(0,0,200,200)
      OLE,AT(10,10,160,100),USE(?OLEObject),OPEN('SavFile.OLE\!MyObject')
      MENUBAR
      MENU('&Clarion App')
      ITEM('&Deactivate Object'),USE(?DeactOLE)
      END
    END
  END
END
```

## PAGE (set page total reset)

---

### PAGE

The **PAGE** attribute (PROP:PAGE) specifies the CNT, SUM, AVE, MIN, or MAX is reset to zero (0) when page break occurs.



PAGEAFTER (set page break after)

PAGEAFTER( [*newpage*] )

PAGEAFTER	Specifies the structure is printed, then initiates page overflow.
<i>newpage</i>	An integer constant or constant expression that specifies the page number to print on the next page (PROP:PageAfterNum, equivalent to {PROP:PageAfter,2}). If zero (0) or omitted, forced page overflow does not occur. If negative one (-1) , the current page number increments during page overflow.

The **PAGEAFTER** attribute (PROP:PAGEAFTER) specifies that the DETAIL, or group HEADER or FOOTER structure (contained within a BREAK structure), initiates page overflow after it is printed. This means that the print structure on which the PAGEAFTER attribute is present is printed, followed by the page FOOTER, and then the FORM and page HEADER.

The *newpage* parameter, if present, resets automatic page numbering at the number specified.

Example:

```
CustRpt  REPORT
          HEADER
          !structure elements
          END
Break1   BREAK(SomeVariable)
          HEADER
          !structure elements
          END
CustDetail  DETAIL
            !structure elements
            END
            FOOTER,PAGEAFTER(-1)           !Group Footer, initiates page overflow
            !structure elements
            END
          END
          FOOTER
          !structure elements
          END
        END
```

## PAGEBEFORE (set page break first)

**PAGEBEFORE**( [ *newpage* ] )

**PAGEBEFORE** Specifies the structure is printed on a new page, after page overflow.

*newpage* An integer constant or constant expression that specifies the page number to print on the new page (PROP:PageBeforeNum, equivalent to {PROP:PageBefore,2}). If zero (0) or omitted, forced page overflow does not occur. If negative one (-1), the current page number increments during page overflow.

The **PAGEBEFORE** attribute (PROP:PAGEBEFORE) specifies that the DETAIL, or group HEADER or FOOTER structure (contained within a BREAK structure), is printed on a new page, after page overflow. This means that first, the page FOOTER is printed, then the FORM and page HEADER. The print structure on which the PAGEBEFORE attribute is present is printed only after these page overflow actions are complete.

The *newpage* parameter, if present, resets automatic page numbering at the number specified.

Example:

```

CustRpt  REPORT
          HEADER
            !structure elements
          END
Break1   BREAK(SomeVariable)
          HEADER,PAGEBEFORE(-1)      !Group Header, initiates page overflow
            !structure elements
          END
CustDetail  DETAIL
            !structure elements
          END
          FOOTER
            !structure elements
          END
          END
          FOOTER
            !structure elements
          END
          END
END

```

## PAGENO (set page number print)

PAGENO
The <b>PAGENO</b> attribute (PROP:PAGENO) specifies the STRING control prints the current page number.

## PALETTE (set number of hardware colors)

PALETTE(*colors*)

<b>PALETTE</b>	Specifies the number of hardware colors displayed in the window.
<i>colors</i>	An integer constant specifying the number of hardware colors displayed in the window.

The **PALETTE** attribute (PROP:PALETTE) on an APPLICATION or WINDOW structure specifies how many colors in the hardware palette you want this window to use when it is the foreground window. This is only applicable in hardware modes where a palette is in use and spare colors (not reserved by the system) are available - in practice this means 256 color mode. This enforces a particular set of colors for the graphics. 24-bit color (16.7M) does not use a hardware palette. Values of PALETTE above 256 are not recommended.

The value returned by PROP:PALETTE is the number of colors actually assigned (not necessarily the number asked for). Since the system normally reserves 20 in 256-color mode, setting PROP:PALETTE = 256 then immediately retrieving its value will usually result in a returned value of 236.

Example:

```
WinOne WINDOW,AT(0,0,160,400),PALETTE(256)           !Display 256-color
      IMAGE,AT(120,120,20,20),USE(ImageField)
END
```

See Also:           **IMAGE**

## PAPER (set report paper size)

**PAPER**( [*type*] [,*width*] [,*height*])

### **PAPER**

Defines the paper size for the report.

#### *type*

An integer constant or EQUATE that specifies a standard Windows paper size. EQUATES for these are contained in the PRNPROP.CLW file.

#### *width*

An integer constant or constant expression that specifies the width of the paper (PROPPRINT:paperwidth, equivalent to {PROPPRINT:PAPER,2})

#### *height*

An integer constant or constant expression that specifies the height of the paper (PROPPRINT:paperheight, equivalent to {PROPPRINT:PAPER,3}).

The **PAPER** attribute (PROPPRINT:PAPER) on a REPORT structure defines the paper size for the report. The *width* and *height* parameters are only required when PAPER:User is selected as the *type*. Not all printers support all paper sizes.

The values contained in the *width*, and *height* parameters default to dialog units unless the THOUS, MM, or POINTS attribute is also present. Dialog units are defined as one-quarter the average character width by one-eighth the average character height. The size of a dialog unit is dependent upon the size of the default font for the report. This measurement is based on the font specified in the FONT attribute of the report, or the printer's default font.

Example:

```
CustRpt1  REPORT,AT(1000,1000,6500,9000),THOUS,PAPER(PAPER:Custom,8500,7000)
                                                ! print on 8.5" x 7" paper
        !report declarations
END

CustRpt2  REPORT,AT(72,72,468,648),POINTS,PAPER(PAPER:A4)
                                                ! print on A4 size paper
        !report declarations
END
```

## PASSWORD (set data non-display)

**PASSWORD**

The **PASSWORD** attribute (PROP:PASSWORD) specifies non-display of the data entered in the ENTRY control. When the user types in data, asterisks are displayed on screen for each character entered. The Windows standard Cut and Copy features are disabled when the PASSWORD attribute is active.

## PREVIEW (set report output to metafiles)

---

### PREVIEW(*queue*)

<b>PREVIEW</b>	Specifies report output goes to Windows metafiles containing one report page per file.
<i>queue</i>	The label of a QUEUE or a field in a QUEUE to receive the names of the metafiles.

The **PREVIEW** attribute (PROP:PREVIEW, write-only) on a REPORT sends the report output to Windows metafiles containing one report page per file. The PREVIEW attribute names a *queue* to receive the names of the metafiles. The filenames are temporary filenames internally created by the Clarion library and are complete file specifications (up to 64 characters, including drive and path). These temporary files are deleted from disk when you CLOSE the REPORT, unless you use PROP:TempNameFunc to provide your own names for the files.

You can create a window to display the report in an IMAGE control, using the *queue* containing the file names to set the IMAGE control's {PROP:text} property. This allows the end user to view the report before printing. A runtime-only property, {PROP:flushpreview}, when set to ON, flushes the metafiles to the printer.



## RANGE (set range limits)

RANGE( <i>lower,upper</i> )		
	<b>RANGE</b>	Specifies the valid range of data values the user may select in a SPIN control, or the range of values displayed in a PROGRESS control.
	<i>lower</i>	A numeric constant that specifies the lower inclusive limit of valid data (PROP:RangeLow, equivalent to {PROP:Range,1}).
	<i>upper</i>	A numeric constant that specifies the upper inclusive limit of valid data (PROP:RangeHigh, equivalent to {PROP:Range,2}).

The **RANGE** attribute (PROP:RANGE) specifies the valid range of data values the user may select in a SPIN control. RANGE also defines the range of values that are displayed in a PROGRESS control. This attribute works in conjunction with the STEP attribute on SPIN controls. On a SPIN control, the STEP attribute provides the user with the valid choices within the range.

PROP:RangeHigh returns “+Infinity” if no RANGE is set. PROP:RangeLow returns “-Infinity” if no RANGE is set.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
    SPIN(@N4.2),AT(280,0,20,20),USE(SpinVar1),RANGE(.05,9.95),STEP(.05)
    SPIN(@n3),AT(280,0,20,20),USE(SpinVar2),RANGE(5,995),STEP(5)
END
```

## READONLY (set display-only)

READONLY	
	The <b>READONLY</b> attribute (PROP:READONLY) specifies a display-only COMBO, ENTRY, SPIN or TEXT control. The control may receive input focus with the mouse, but may not enter data. If the user attempts to change the displayed value, a beep warns the user that data entry is not allowed.

## REPEAT (set repeat button rate)

### REPEAT( *time* )

<b>REPEAT</b>	Specifies the rate of event generation.
<i>time</i>	An integer constant containing the rate to set, in hundredths of a second.

The **REPEAT** attribute (PROP:REPEAT) specifies rate of event generation for automatically repeating buttons. For a **BUTTON** control with the **IMM** attribute, this is the generation rate for EVENT:Accepted. For a **SPIN** control, this is the generation rate for EVENT:NewSelection generated by the spin buttons.

Assigning a zero (0) to PROP:REPEAT resets the default setting, any other value sets the repeat rate for the control.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    BUTTON('Press Me'),AT(10,10,40,20),USE(?PressMe),IMM,REPEAT(100)    !1/second
    SPIN(@n3),AT(60,10,40,10),USE(SpinVar),RANGE(0,999),REPEAT(100)    !1/second
END
CODE
OPEN(MDIChild)
?PressMe{PROP:Delay} = 50    !Set delay to 1/2 second
?SpinVar{PROP:Delay} = 50    !Set delay to 1/2 second
?PressMe{PROP:Repeat} = 5    !Reset repeat to 5 hundredths of a second
?SpinVar{PROP:Repeat} = 5    !Reset repeat to 5 hundredths of a second
```

See Also: IMM, DELAY

## REQ (set required entry)

### REQ

The **REQ** attribute (PROP:REQ) specifies an **ENTRY** or **TEXT** control that may not be left blank or zero. The **REQ** attribute on an **ENTRY** or **TEXT** control is not checked until a **BUTTON** with the **REQ** attribute is pressed, or the **INCOMPLETE()** procedure is called.

When a **BUTTON** with the **REQ** attribute is pressed, or the **INCOMPLETE()** procedure is called, all **ENTRY** and **TEXT** controls with the **REQ** attribute are checked to ensure they contain data. The first control encountered in this check that does not contain data immediately receives input focus.



RESET (set total reset)

RESET(*breaklevel*)

**RESET**                      Resets the CNT, SUM, AVE, MIN, or MAX to zero (0).  
*breaklevel*                The label of a BREAK structure.

The **RESET** attribute (PROP:RESET) specifies the group break at which the CNT, SUM, AVE, MIN, or MAX is reset to zero (0). PROP:RESET returns zero (0) if not present, else it returns the breaklevel nesting depth.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Break1  BREAK(Pre:Key1)
        HEADER,AT(0,0,6500,1000)
          STRING('Group Head'),AT(3000,500,1500,500),FONT('Arial',18)
        END
Detail  DETAIL,AT(0,0,6500,1000)
        STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
        END
        FOOTER,AT(0,0,6500,1000)
          STRING('Group Total:'),AT(5500,500,1500,500)
          STRING(@N$11.2),AT(6000,500,500,500),USE(Pre:F1),SUM,RESET(Break1)
        END
      END
    END
```

RESIZE (set variable height TEXT control)

RESIZE

The **RESIZE** attribute (PROP:RESIZE) specifies height of the TEXT control varies according to the amount of data to print in it, up to the maximum height specified by the control's AT attribute.

The *height* parameter in the AT attribute of the DETAIL, HEADER, or FOOTER strcuture containing the TEXT control must not be set (let it default) for the RESIZE attribute to have any effect.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Detail  DETAIL,AT(0,0,6500,)                                !Detail height defaults
        STRING(@N$11.2),AT(500,500,500,),USE(Pre:F1)
        TEXT,AT(500,1000,500,5000),USE(Pre:Memo1),RESIZE  !Print height up to 5"
      END
    END
```

## RIGHT (set MENU position)

---

### RIGHT

The **RIGHT** attribute (PROP:RIGHT) specifies the MENU is placed at the right end of the action bar.

## ROUND (set round-cornered BOX)

---

### ROUND

The **ROUND** attribute (PROP:ROUND) specifies a BOX control with rounded corners.

## SCROLL (set scrolling control)

---

### SCROLL

The **SCROLL** attribute (PROP:SCROLL) specifies a control that moves with the window when the WINDOW scrolls. This allows “virtual” windows larger than the physical video display.

The presence of the SCROLL attribute means that the control stays fixed at a position in the window relative to the top left corner of the virtual window, whether that position is currently in view or not. This means that the control appears to move as the window scrolls.

If the SCROLL attribute is omitted, the control stays fixed at a position in the window relative to the top left corner of the currently visible portion of the window. This means that the control appears to stay in the same position on screen while the rest of the window scrolls, which is useful for controls which should stay visible to the user at all times (such as Ok or Cancel buttons).

Mixing controls with and without the SCROLL attribute on the same WINDOW can result in multiple controls appearing to occupy the same screen position. This occurs because the controls with SCROLL move and the controls without SCROLL do not. This condition is temporary and scrolling the window further will correct the situation. The situation can be avoided entirely by careful placement of controls in the window. For example, you can place all controls without SCROLL at the bottom of the window then place all controls with SCROLL above them extending to the right and left. This would create a window that is designed to scroll horizontally (the WINDOW should have the HSCROLL attribute and not the VSCROLL or HVSCROLL attributes).

## SEPARATOR (set separator line ITEM)

---

### SEPARATOR

The **SEPARATOR** attribute specifies an ITEM in a MENU that displays a horizontal line to group ITEMS within the MENU. No other attributes may be specified for the ITEM.

## SINGLE (set TEXT for single line entry)

---

### SINGLE

The **SINGLE** attribute (PROP:SINGLE) specifies the control is only for single line data entry. This is specifically to allow use of TEXT controls instead of ENTRY for data entry in languages that write from right to left (such as Hebrew or Arabic).

## SKIP (set Tab key skip or conditional print control)

### SKIP

The **SKIP** attribute (PROP:SKIP) on a window control specifies user access to the control is only with the mouse or an accelerator key, not the TAB key. Data entry controls receive input focus only during data entry and the control does not retain focus, while non-data entry controls do not receive or retain input focus (the same behavior demonstrated by controls in a toolbar or toolbox).

When the mouse is over a control with the SKIP attribute, the control's MSG attribute displays in the status bar.

The SKIP attribute on a report control specifies the STRING or TEXT control prints only if its USE variable contains data. If the USE variable does not contain data, the STRING or TEXT control does not print and all controls following in the band "move up" to fill in the space. This is most useful for label printing to prevent extra blank lines in addresses.

Example:

```
CustRpt REPORT,AT(1000,1000,6000,9000),THOUS
Detail    DETAIL,AT(0,0,2000,1000)                !Fixed height detail
          STRING(@s35),AT(250,250,500,),USE(Pre:Name)
          STRING(@s35),AT(250,250,500,),USE(Pre:Address1)
          STRING(@s35),AT(250,250,500,),USE(Pre:Address2),SKIP !don't print if blank
          STRING(@s35),AT(250,250,500,),USE(CityStateZip)      ! and move this up
          END
        END
```

## SPREAD (set evenly spaced TAB controls)

### SPREAD

The **SPREAD** attribute (PROP:SPREAD) specifies a SHEET's TAB controls are evenly spaced.

## STATUS (set status bar)

### STATUS( [*widths*] )

<b>STATUS</b>	Specifies the presence of a status bar.
<i>widths</i>	A list of integer constants (separated by commas) specifying the size of each zone in the status bar. If omitted, the status bar has one zone the width of the window.

The **STATUS** attribute (PROP:STATUS) specifies the presence of a status bar at the base of the APPLICATION or WINDOW. The status bar of an MDI WINDOW is always displayed at the bottom of the APPLICATION. A WINDOW without the MDI attribute displays its status bar at the base of the WINDOW. If the STATUS attribute is not present on the APPLICATION or WINDOW, there is no status bar.

The status bar may be divided into multiple zones specified by the *widths* parameters. The size of each zone is specified in dialog units. A negative value indicates the zone is expandable, but has a minimum width indicated by the parameter's absolute value. If no *widths* parameters are specified, a single expanding zone with no minimum width is created, which is equivalent to a STATUS(-1).

PROP:STATUS contains the *widths* of each status bar section in separate array elements. A zero (0) value is required in the last element to terminate the array.

The first zone of the status bar is always used to display MSG attributes. The MSG attribute string is displayed in the status bar as long as its control field still has input focus. A control or menu item without a MSG attribute causes the status bar to revert to its former state (either blank or displaying the text previously displayed in the zone).

Text may be placed in, or retrieved from, any zone of the status bar using runtime property assignment to PROP:StatusText. PROP:StatusText is an array containing the text of each section of the status bar. A zero (0) value is required in the last element to terminate the array. The text remains present until replaced.

Example:

```
!An APPLICATION with a one-zone status bar:
MainWin APPLICATION,STATUS
    END

!A WINDOW with a two-zone status bar:
Win1 WINDOW,STATUS(160,160)
    END
CODE
OPEN(Win1)
Win1{PROP:STATUS,3} = 160 !Add a status bar zone
Win1{PROP:STATUS,4} = 0   ! and terminate the array
Win1{PROP:StatusText,3} = 'Hello Zone 3'!Put text in the new zone
```

See Also:

**MSG**

## STD (set standard behavior)

### STD(*behavior*)

**STD** Specifies standard Windows *behavior*.  
*behavior* An integer constant or EQUATE specifying the identifier of a standard windows behavior.

The **STD** attribute (PROP:STD) specifies the control activates some standard Windows action. This action is automatically executed by the runtime library and does not generate any events (that is, the control does not receive an EVENT:Accepted).

EQUATE statements for the standard Windows actions are contained in the EQUATES.CLW file. The following list is a representative sample of these (see EQUATES.CLW for the complete list):

STD:WindowList	List of open MDI windows
STD:TileWindow	Tile Windows
STD:CascadeWindow	Cascade Windows
STD:ArrangeIcons	Arrange Icons
STD:HelpIndex	Help Contents
STD:HelpSearch	Help Search dialog

Example:

```
MDIChild WINDOW('Child One'),MDI,SYSTEM,MAX
MENUBAR
MENU('Edit'),USE(?EditMenu)
ITEM('Undo'),USE(?UndoText),KEY(CtrlZ),STD(STD:Undo)
ITEM('Cu&t'),USE(?CutText),KEY(CtrlX),STD(STD:Cut)
ITEM('Copy'),USE(?CopyText),KEY(CtrlC),STD(STD:Copy)
ITEM('Paste'),USE(?PasteText),KEY(CtrlV),STD(STD:Paste)
END
END
TOOLBAR
BUTTON('Cut'),USE(?CutButton),ICON(ICON:Cut),STD(STD:Cut)
BUTTON('Copy'),USE(?CopyButton),ICON(ICON:Copy),STD(STD:Copy)
BUTTON('Paste'),USE(?PasteButton),ICON(ICON:Paste),STD(STD:Paste)
END
END
```

## STEP (set SPIN increment)

---

### STEP(*count*)

**STEP** Specifies a SPIN control RANGE attribute's increment/decrement value.

*count* A numeric constant specifying the amount to increment or decrement.

The **STEP** attribute (PROP:STEP) specifies the amount by which a SPIN control's value is incremented or decremented within its valid RANGE. The default STEP value is 1.0.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
    SPIN(@N4.2),AT(280,0,20,20),USE(SpinVar1),RANGE(.05,9.95),STEP(.05)
    SPIN(@N3),AT(280,0,20,20),USE(SpinVar2),RANGE(5,995),STEP(5)
    SPIN(@T3),AT(280,0,20,20),USE(SpinVar3),RANGE(1,8640000),STEP(6000)
END
```

## STRETCH (set OLE object stretching)

---

### STRETCH

The **STRETCH** attribute (PROP:STRETCH, write-only) specifies the OLE object stretches to completely fill the size specified by the OLE container control's AT attribute. This attribute does not preserve the object's aspect ratio.



## SUM (set total)

**SUM**( [ *variable* ] )

### **SUM**

Calculates the the sum of the values contained in the STRING control's USE variable.

### *variable*

The label of a numeric variable to receive the intermediate values calculated for the SUM. This allows you to create totals on other totals. The value in the *variable* is internally updated by the print engine, so it is only useful for use within the REPORT structure.

The **SUM** attribute (PROP:SUM) specifies printing the sum of the values contained in the STRING control's USE variable. Unless the TALLY attribute is present, the result is calculated as follows:

- A SUM field in a DETAIL structure increments each time the DETAIL structure containing the control PRINTs. This provides a “running” total.
- A SUM field in a group FOOTER structure increments each time any DETAIL structure in the BREAK structure containing the control PRINTs. This provides the sum of the value contained in the variable in the group.
- A SUM field in a page FOOTER structure increments each time any DETAIL structure in any BREAK structure PRINTs. This is the sum of the values contained in the variable in the page.
- A SUM field in a HEADER is meaningless, since no DETAIL structures will have been printed at the time the HEADER is printed.

The SUM value is reset only if the RESET or PAGE attribute is also specified.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Break1  BREAK(LocalVar),USE(?BreakOne)
Break2  BREAK(Pre:Key1),USE(?BreakTwo)
Detail  DETAIL,AT(0,0,6500,1000),USE(?DetailOne)
        STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Group Total:'),AT(5500,500)
        STRING(@N$11.2),AT(6000,500),USE(Pre:F1),SUM(LocalVar),RESET(Break2)
        END
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Grand Total:'),AT(5500,500)
        STRING(@N$11.2),AT(6000,500),USE(LocalVar),SUM,TALLY(?BreakTwo)
        END
        END
        END
```

## SYSTEM (set system menu)

### SYSTEM

The **SYSTEM** attribute (PROP:SYSTEM) specifies the presence of a Windows system menu (also called the control menu) on the APPLICATION or WINDOW. This menu contains standard Windows menu selections, such as: Close, Minimize, Maximize (the window), and Switch To (another window). The actual selections available on a given window depend upon the attributes set for that window.

Example:

```
!An APPLICATION with a system menu:
MainWin APPLICATION,SYSTEM
    END
!A WINDOW with a system menu:
Win1 WINDOW,SYSTEM
    END
```

## TALLY (set total calculation times)

### TALLY( *points* )

#### TALLY

Specifies when to calculate an AVE, CNT, MAX, MIN, or SUM.

#### *points*

A comma delimited list of the labels of the DETAIL and/or BREAK structures on which to calculate the total.

The **TALLY** attribute (PROP:TALLY) specifies when to calculate an AVE, CNT, MAX, MIN, or SUM. The appropriate total is calculated each time any of the DETAIL structures named in the *points* list prints, or in the case of a BREAK structure, when the group break occurs.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Break1  BREAK(LocalVar),USE(?BreakOne)
Break2  BREAK(Pre:Key1),USE(?BreakTwo)
        HEADER,AT(0,0,6500,1000),USE(?GroupHead)
        STRING('Group Head'),AT(3000,500,1500,500),FONT('Arial',18)
        END
Detail  DETAIL,AT(0,0,6500,1000),USE(?DetailOne)
        STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
        END
        END
        FOOTER,AT(0,0,6500,1000),USE(?BreakOneGroupFoot)
        STRING('Group Total:'),AT(5500,500,1500,500)
        STRING(@N$11.2),AT(6000,500,500,500),USE(Pre:F1),CNT,TALLY(Break2)
        END
        END
        END
CODE
OPENCustRpt)
CustRpt$?Pre:F1{PROP:Tally} = ?BreakOne    !Change the TALLY to Break1
```

## THOUS, MM, POINTS (set report coordinate measure)

### THOUS MM POINTS

The **THOUS**, **MM**, and **POINTS** attributes specify the coordinate measures used to position controls on the REPORT.

**THOUS** (PROP:THOUS) specifies thousandths of an inch, **MM** (PROP:MM) specifies millimeters, and **POINTS** (PROP:POINTS) specifies points (there are seventy-two points per inch, both vertically and horizontally).

If all these attributes are omitted, the measurements default to dialog units. Dialog units are defined as one-quarter the average character width by one-eighth the average character height. The size of a dialog unit is dependent upon the size of the default font for the report. This measurement is based on the font specified in the FONT attribute of the REPORT, or the system default font specified by Windows.

## TILED (set tiled image)

### TILED

The **TILED** attribute (PROP:TILED) indicates that the image displayed in the IMAGE control, or the window or toolbar's background image (specified in the WALLPAPER attribute) displays at its default size and is tiled to fill the entire window, toolbar, or area specified by the IMAGE's AT attribute.

Example:

```
WinOne WINDOW,AT(, ,380,200),MDI
    IMAGE('MyWall.GIF'),AT(0,0,380,200),TILED
END
MDIChild WINDOW('Child One'),MDI,SYSTEM,MAX
    MENUBAR
        MENU('Edit'),USE(?EditMenu)
            ITEM('Undo'),USE(?UndoText),KEY(CTRLZ),STD(STD:Undo)
            ITEM('Cu&t'),USE(?CutText),KEY(CTRLX),STD(STD:Cut)
            ITEM('Copy'),USE(?CopyText),KEY(CTRLC),STD(STD:Copy)
            ITEM('Paste'),USE(?PasteText),KEY(CTRLV),STD(STD:Paste)
        END
    END
    TOOLBAR,USE(?Toolbar),WALLPAPER('MyWall.GIF'),TILED
        BUTTON('Cut'),USE(?CutButton),ICON(ICON:Cut),STD(STD:Cut),FLAT
        BUTTON('Copy'),USE(?CopyButton),ICON(ICON:Copy),STD(STD:Copy),FLAT
        BUTTON('Paste'),USE(?PasteButton),ICON(ICON:Paste),STD(STD:Paste),FLAT
    END
END
WinOne WINDOW,AT(, ,380,200),MDI,WALLPAPER('MyWall.GIF'),TILED
END
```

See Also:

CENTERED, WALLPAPER

## TIMER (set periodic event)

### TIMER(*period*)

#### **TIMER**

Specifies a periodic event.

#### *period*

An integer constant or constant expression specifying the interval between timed events, in hundredths of a second. The maximum *period* you can specify is 6553 (a Windows limitation). If zero (0), no timed events generate.

The **TIMER** attribute (PROP:TIMER) specifies generation of a periodic field-independent event (EVENT:Timer) whenever the time *period* passes. The FOCUS() procedure returns the number of the control that currently has focus at the time of the event.

If the window that has the **TIMER** attribute does not have focus when **EVENT:Timer** occurs, the window that does have focus first receives **EVENT:Suspend** before the window with the **TIMER** attribute receives **EVENT:Timer**. After an **EVENT:Suspend** occurs in the window with focus, **EVENT:Resume** is generated before any other events are generated for that window, and the **EVENT:Resume** does not generate until there is another event to process in that window (the window is suspended and timer events continue processing until there is some activity to process in window with focus).

Example:

```
RunClock PROCEDURE
ShowTime LONG

    !A WINDOW with a timed event occurring every second:
Win1 WINDOW,TIMER(100)
    STRING(@T4),USE(ShowTime)
    END
CODE
OPEN(Win1)
ShowTime = CLOCK()
ACCEPT
CASE EVENT()
OF EVENT:Timer
    ShowTime = CLOCK()
    DISPLAY
END
END
CLOSE(Win1)
```

## TIP (set “balloon help” text)

### TIP( *string* )

**TIP** Specifies the text to display when the mouse cursor pauses over the control.

*string* A string constant that specifies the text to display.

The **TIP** attribute (PROP:TIP) on a control specifies the text to display in a “balloon help” box when the mouse cursor pauses over the control. Although there is no specific limit on the number of characters, the *string* should not be longer than can be displayed on the screen.

Although it is valid on any control that can gain focus for user input, this attribute is most commonly used on **BUTTON** controls with the **ICON** attribute that are placed on the **TOOLBAR**. This allows the user to quickly determine the control’s purpose without accessing the on-line Help system.

Automatic **TIP** attribute display can be disabled for any single control or window by setting the **PROP:NoTips** undeclared property to one (1). It can be disabled for an entire application by setting the **PROP:NoTips** for the built-in variable **SYSTEM** to one (1).

The time delay before **TIP** display can be set for an entire application by setting the **PROP:TipDelay** for the built-in variable **SYSTEM** to the desired delay amount (in hundredths of a second). This is valid only for 16-bit applications; in 32-bit operating systems, the amount of tip delay is an operating system setting under the user’s control.

Example:

```
WinOne WINDOW,AT(0,0,160,400)
    TOOLBAR
        BUTTON('E&xit'),USE(?MainExitButton),ICON(ICON:hand),TIP('Exit Window')
        BUTTON('&Open'),USE(?OpenButton),ICON(ICON:Open),TIP('Open a File')
    END
    COMBO(@S8),AT(120,120,20,20),USE(?C1),FROM(Q1:F2)
    ENTRY(@S8),AT(100,200,20,20),USE(E2)
END
```

## TOOLBOX (set toolbox window behavior)

### TOOLBOX

The **TOOLBOX** attribute (PROP:TOOLBOX) specifies a WINDOW that is “always on top” and may be docked if the DOCK attribute is also present. Neither the WINDOW nor its controls retain input focus. This creates control behavior as if all the controls in the WINDOW had the SKIP attribute.

Normally, a WINDOW with the TOOLBOX attribute executes in its own execution thread to provide a set of tools to the window with input focus. The MSG attributes of the controls in the window appear in the status bar when the mouse cursor is positioned over the control.

Example:

```

PROGRAM
MainWin APPLICATION('My Application')
    MENUBAR
        MENU('File'),USE(?FileMenu)
            ITEM('E&xit'),USE(?MainExit),LAST
        END
        MENU('Edit'),USE(?EditMenu)
            ITEM('Use Tools'),USE(?UseTools)
        END
    END
END
Pre:Field      STRING(400)
UseToolsThread BYTE
ToolsThread    BYTE
CODE
OPEN(MainWin)
ACCEPT
CASE ACCEPTED()
OF ?MainExit
    BREAK
OF ?UseTools
    UseToolsThread = START(UseTools)
END
END

UseTools PROCEDURE                                !A procedure that uses a toolbox
MDIChild WINDOW('Use Tools Window'),MDI
    TEXT,HVSCROLL,USE(Pre:Field)
    BUTTON('&OK'),USE(?Exit),DEFAULT
END
CODE
OPEN(MDIChild)                                !Open the window
DISPLAY                                           ! and display it
ToolsThread = START(Tools)                      !Pop up the toolbox
ACCEPT
CASE EVENT()                                    !Check for user-defined events
OF 401h                                         ! posted by toolbox controls
    Pre:Field += ' ' & FORMAT(TODAY(),@D1)    ! append date to end of field
OF 402h
    Pre:Field += ' ' & FORMAT(CLOCK(),@T1)    ! append time to end of field
END

```

```

CASE ACCEPTED()
OF ?Exit
    POST(400h,,ToolsThread)           !Signal to close tools window
    BREAK
END
END
CLOSE(MDICHild)

Tools PROCEDURE !The toolbox procedure
Win1 WINDOW('Tools'),TOOLBOX
    BUTTON('Date'),USE(?Button1)
    BUTTON('Time'),USE(?Button2)
END
CODE
OPEN(Win1)
ACCEPT
    IF EVENT() = 400h THEN BREAK.      !Check for close window signal
CASE ACCEPTED()
OF ?Button1
    POST(401h,,UseToolsThread)        !Post datestamp signal
OF ?Button2
    POST(402h,,UseToolsThread)        !Post timestamp signal
END
END
CLOSE(Win1)

```

See Also:

**DOCK**

## TRN (set transparent control)

### TRN

The **TRN** attribute (PROP:TRN) on a control specifies the characters print or display transparently, without obliterating the background over which the control is placed. Only the dots or pixels required to create each character are printed or displayed. This allows you to place the control directly on top of an **IMAGE** without destroying the background picture.

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
      FORM,AT(0,0,6500,9000)
      IMAGE('PIC.BMP'),USE(?I1)AT(0,0,6500,9000)          !Full page image
      STRING('String Constant'),AT(10,0,20,20),USE(?S1),TRN
                                                    !Transparent string on the image
      END
    END
WinOne WINDOW,AT(0,0,160,400)
      IMAGE('PIC.BMP'),USE(?I1),FULL                      !Full window image
      STRING('String Constant'),AT(10,0,20,20),USE(?S1),TRN
                                                    !Transparent string on image
    END
```

## UP, DOWN (set TAB text orientation)

### UP DOWN

The **UP** and **DOWN** attributes of a **SHEET** control specify the orientation of the text on the **TAB** controls. **UP** (PROP:UP) specifies the **TAB** text appears vertical reading upwards, while **DOWN** (PROP:DOWN) specifies the **TAB** text appears vertical reading downwards. If both **UP** and **DOWN** attributes are present, the **TAB** text appears inverted (PROP:UpsideDown).

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
      SHEET,AT(0,0,320,175),USE(SelectedTab),RIGHT,DOWN  !Tabs right reading down
      TAB('Tab One'),USE(?TabOne)
      PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
      ENTRY(@S8),AT(100,140,32,20),USE(E1)
      PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P2)
      ENTRY(@S8),AT(100,240,32,20),USE(E2)
    END
      PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P3)
      ENTRY(@S8),AT(100,140,32,20),USE(E3)
      PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P4)
      ENTRY(@S8),AT(100,240,32,20),USE(E4)
    END
  END
  BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
  BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
END
```



# USE (set field equate label or control update variable)

USE(   <i>label</i>     [, <i>number</i> ] [, <i>equate</i> ] )   <i>variable</i>		
USE	Specifies a variable or field equate label.	
<i>label</i>	A field equate label to reference the control or structure in executable code. This must begin with a question mark (?) and meet all the requirements of a valid Clarion label.	
<i>variable</i>	The label of the variable to receive the value the user enters in the control. The variable's label (with a leading question mark - ? <i>VariableLabel</i> ) becomes the field equate label for the control, unless the <i>equate</i> parameter is used.	
<i>number</i>	An integer constant that specifies the number the compiler equates to the field equate label for the control (PROP:Feq, equivalent to {PROP:USE,2}).	
<i>equate</i>	A field equate label to reference the control in executable code when the named <i>variable</i> has already been used in the same structure. This provides a mechanism to provide a unique field equate when the <i>variable</i> would not.	

The **USE** attribute (PROP:USE) specifies a field equate label for the control or structure, or a variable for the control to update.

USE with a *label* parameter simply provides a mechanism for executable source code statements to reference the control or structure. USE with a *variable* parameter supplies the control with a variable to update by operator entry (on a window control) or to provide the value to print (on a report control).

The USE attribute's *number* parameter allows you to specify the actual field number the compiler assigns to the control. This *number* also is used as the new starting point for subsequent field numbering for controls without a *number* parameter in their USE attribute. Subsequent controls without a *number* parameter in their USE attribute are incremented (or decremented) relative to the last *number* assigned.

Two or more controls with exactly the same USE *variable* in one WINDOW or APPLICATION structure would create the same Field Equate Label for all, therefore, when the compiler encounters this condition, all Field Equate Labels for that USE variable are discarded. This makes it impossible to reference any of these controls in executable code, preventing confusion about which control you really want to reference. It also allows you to deliberately create this condition to display the contents of the variable in

multiple controls with different display pictures. You may eliminate this situation by using *equate* parameters on these controls.

Writing to PROP:USE changes the USE attribute to use the name of the variable assigned. Reading it returns the contents of the current USE variable. PROP:Feq sets and returns the field number for the control.

### **Window Usage**

Some controls or structures only allow a field equate *label* as the USE parameter, not a *variable*. These are: PROMPT, IMAGE, LINE, BOX, ELLIPSE, GROUP, RADIO, REGION, MENU, BUTTON, and TOOLBAR.

USE with a *variable* parameter supplies the control with a variable to update by operator entry. This is applicable to an ITEM with the CHECK attribute, ENTRY, OPTION, SPIN, TEXT, LIST, COMBO, CHECK, and CUSTOM.

PROP:ListFeq is equivalent to {PROP:USE,3} and sets the field equate label for the list portion of a COMBO control or a LIST control with the DROP attribute.

PROP:ButtonFeq is equivalent to {PROP:USE,4} and sets the field equate label for the drop button portion of a COMBO control or a LIST control with the DROP attribute.

### **Report Usage**

Some controls and structures only allow a field equate *label* as the USE parameter, not a *variable*. These are: IMAGE, LINE, BOX, ELLIPSE, GROUP, RADIO, FORM, BREAK, DETAIL, HEADER, and FOOTER.

USE with a *variable* parameter supplies the control with a variable to update by operator entry. This is applicable to an OPTION, TEXT, LIST, CHECK, or CUSTOM. STRING controls may use either a field equate *label* or *variable*.

All controls and structures in a REPORT are automatically assigned numbers by the compiler. By default, these numbers start at one (1) and increment by one (1) for each control in the REPORT. The USE attribute's *number* parameter allows you to specify the actual field number the compiler assigns to the control or structure. This *number* also is used as the new starting point for subsequent numbering for controls and structures without a *number* parameter in their USE attribute. Subsequent controls and structures without a *number* parameter in their USE attribute are incremented relative to the last *number* assigned.

Example:

```

MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS
    MENUBAR
        MENU('&File'),USE(?FileMenu)
            ITEM('&Open...'),USE(?OpenFile)
            ITEM('&Close'),USE(?CloseFile),DISABLE
            ITEM('E&xit'),USE(?MainExit)
        END
    END
    TOOLBAR,USE(?Toolbar)
        BUTTON('Exit'),USE(?MainExitButton)
        ENTRY(@S8),AT(100,160,20,20),USE(E2)
        ENTRY(@S8),AT(100,200,20,20),USE(E3,100)           !Field number 100
        ENTRY(@S8),AT(100,240,20,20),USE(E2,,?Number2:E2) !
    END
END

CustRpt REPORT,AT(1000,1000,6500,9000),THOUS
Detail   DETAIL,AT(0,0,6500,1000),USE(?Detail)           !Line item detail
        STRING('Group Total:'),AT(5500,500,1500,500),USE(?Constant)
                                                !Field equate label
        STRING(@N$11.2),AT(6000,1500,500,500),USE(Pre:F1)
                                                !USE variable
    END
END

CODE
OPEN(MainWin)
DISABLE(?E2)           !Disable first entry control
DISABLE(100)           !Disable second entry control
DISABLE(?Number2:E2)   !Disable third entry control
PrintRpt(CustRpt,?Detail) !Pass report and detail equate to print proc
ACCEPT
END

PrintRpt PROCEDURE(RptToPrint,DetailNumber)
CODE
OPEN(RptToPrint)           !Open passed report
PRINT(RptToPrint,DetailNumber) !Print its detail
CLOSE(RptToPrint)          !Close passed report

```

See Also: **Field Equate Labels**

## VALUE (set RADIO or CHECK control USE variable assignment)

**VALUE**( *string* | *truevalue* , *falsevalue* | )

**VALUE** Specifies the value assigned to the OPTION structure's USE variable when the RADIO control is selected by the user, or the values assigned to the CHECK control's USE variable when checked and un-checked by the user.

*string* A string constant containing the value to assign to the OPTION's USE variable.

*truevalue* A string constant containing the value to assign to the CHECK's USE variable when the user has checked the box (PROP:TrueValue, equivalent to {PROP:Value,1}).

*falsevalue* A string constant containing the value to assign to the CHECK's USE variable when the user has un-checked the box (PROP:FalseValue, equivalent to {PROP:Value,2}).

The **VALUE** attribute (PROP:VALUE) on a RADIO control specifies the value that is automatically assigned to the OPTION structure's USE variable when the RADIO control is selected by the user. This attribute overrides the RADIO control's *text* parameter.

The **VALUE** attribute on a CHECK control specifies the values that are automatically assigned to the control's USE variable when the user checks and un-checks the box. This attribute overrides the default assignment of zero and one.

All automatic type conversion rules apply to the values assigned to the control's USE variable. Therefore, if the *string*, *truevalue*, or *falsevalue* contains only numeric data and the USE variable is a numeric data type, it receives the numeric value.

PROP:VALUE may also be used on an ENTRY, SPIN, or COMBO control to interrogate the value that would be placed into the control's USE variable by UPDATE (or when the control loses focus) without actually updating the USE variable. This can cause EVENT:Rejected to generate, if appropriate.

Example:

```
Win WINDOW,AT(0,0,180,400)
  OPTION('Option 1'),USE(OptVar1),MSG('Pick One or Two')
    RADIO('Radio 1'),AT(120,0,20,20),USE(?R1),VALUE('10') !OptVar1 gets 10
    RADIO('Radio 2'),AT(140,0,20,20),USE(?R2),VALUE('20') !OptVar1 gets 20
  END
  OPTION('Option 2'),USE(OptVar2),MSG('Pick One or Two')
    RADIO('Radio 1'),AT(120,0,20,20),USE(?R1),VALUE('10') !OptVar2 gets '10'
    RADIO('Radio 2'),AT(140,0,20,20),USE(?R2),VALUE('20') !OptVar2 gets '20'
  END
  CHECK('Check 1'),AT(160,0),USE(Check1),VALUE('T','F')
END
```

## VCR (set VCR control)

### VCR( [*field*] )

**VCR** Places Video Cassette Recorder (VCR) style buttons on a LIST or COMBO control.

*field* A field equate label that specifies the ENTRY control to use as a locator for a LIST or COMBO (PROP:VcrFreq, equivalent to {PROP:VCR,2}). This ENTRY control must appear before the LIST or COMBO control in the WINDOW structure.

The **VCR** attribute (PROP:VCR) places Video Cassette Recorder (VCR) style buttons on a LIST or COMBO control. The VCR style buttons affect the scrolling characteristics of the data displayed in the LIST or COMBO. There are seven buttons displayed as the VCR:

<	Top of list	(EVENT:ScrollTop)
<<	Page Up	(EVENT:PageUp)
<	Entry Up	(EVENT:ScrollUp)
?	Locate	(EVENT:Locate)
>	Entry Down	(EVENT:ScrollDown)
>>	Page Down	(EVENT:PageDown)
>	Bottom of list	(EVENT:ScrollBottom)

The *field* parameter names the control to get focus when the user presses the ? button. When the user enters data and then presses TAB on the locator *field*, the LIST or COMBO scrolls to its closest matching entry. If no *field* parameter is named, the ? button still appears but does nothing. To avoid even displaying the ? button, you may set PROP:VCR to TRUE instead of adding the VCR attribute to the LIST or COMBO control declaration.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
LIST,AT(140,0,20,20),USE(?L1),FROM(Que),HVSCROLL
ENTRY(@S8),AT(100,200,20,20),USE(E2) !Locator control for L2
LIST,AT(140,100,20,20),USE(?L2),FROM(Que),HVSCROLL,VCR(?E2) !VCR with Locator active
END
CODE
OPEN(MDIChild)
?L1{PROP:VCR} = TRUE !VCR buttons without the ? button
ACCEPT
END
```

## WALLPAPER (set background image)

### WALLPAPER(*image*)

**WALLPAPER** Specifies a background image to display in the toolbar or window's client area.

*image* A string constant specifying the name of the file to display.

The **WALLPAPER** attribute (PROP:WALLPAPER) specifies displaying the *image* as a background for the toolbar or window's client area. The image is stretched to fill the entire toolbar or window's client area unless either the **TILED** or **CENTERED** attributes are present.

Example:

```
MDIChild WINDOW('Child One'),MDI,SYSTEM,MAX
  MENUBAR
    MENU('Edit'),USE(?EditMenu)
      ITEM('Undo'),USE(?UndoText),KEY(CTRLZ),STD(STD:Undo)
      ITEM('Cu&t'),USE(?CutText),KEY(CTRLX),STD(STD:Cut)
      ITEM('Copy'),USE(?CopyText),KEY(CTRLC),STD(STD:Copy)
      ITEM('Paste'),USE(?PasteText),KEY(CTRLV),STD(STD:Paste)
    END
  END
  TOOLBAR,USE(?Toolbar),WALLPAPER('MyWall.GIF')
    BUTTON('Cut'),USE(?CutButton),ICON(ICON:Cut),STD(STD:Cut),FLAT
    BUTTON('Copy'),USE(?CopyButton),ICON(ICON:Copy),STD(STD:Copy),FLAT
    BUTTON('Paste'),USE(?PasteButton),ICON(ICON:Paste),STD(STD:Paste),FLAT
  END
END

WinOne WINDOW,AT(,380,200),MDI,WALLPAPER('MyWin.GIF')
END
```

See Also: **CENTERED, TILED**

## WITHNEXT (set widow elimination)

### WITHNEXT( [*siblings*] )

**WITHNEXT** Specifies the structure is always printed on the same page as print structures PRINTed immediately following it.

*siblings* An integer constant or constant expression that specifies the number of following print structures to print on the same page. If omitted, the default value is one.

The **WITHNEXT** attribute (PROP:WITHNEXT) specifies that the DETAIL, or group HEADER or FOOTER structure (contained within a BREAK structure), is always printed on the same page as the specified number of print structures PRINTed immediately following it. This ensures that the structure is never printed on a page by itself, eliminating “widow” print structures. A “widow” print structure is defined as a group header, or first detail item in a related group of items, printed on the preceding page, separated from the rest of its related items.

The *siblings* parameter, if present, sets the number of following print structures that must be printed on the same page with the structure. To be counted, the following print structures must come from the same, or nested, BREAK structures. They must be related items. Any print structures not within the same, or nested, BREAK structures are printed but not counted as part of the required number of *siblings*.

Example:

```
CustRpt  REPORT
Break1   BREAK(SomeVariable)
          HEADER,WITHNEXT(2)      !Always print with 2 siblings
          !structure elements
          END
CustDetail  DETAIL,WITHNEXT()      !Always print with 1 sibling
           !structure elements
           END
           FOOTER
           !structure elements
           END
           END
           END
END
```

## WITHPRIOR (set orphan elimination)

### WITHPRIOR( [*siblings*] )

**WITHPRIOR** Specifies the structure is always printed on the same page as print structures PRINTed immediately preceding it.

*siblings* An integer constant or constant expression that specifies the number of preceding print structures to print on the same page. If omitted, the default value is one.

The **WITHPRIOR** attribute (PROP:WITHPRIOR) specifies that the DETAIL, or group HEADER or FOOTER structure (contained within a BREAK structure), is always printed on the same page as the specified number of print structures PRINTed immediately preceding it. This ensures that the structure is never printed on a page by itself, eliminating “orphan” print structures. An “orphan” print structure is defined as a group footer, or last detail item in a related group of items, that is printed on the following page separated from the rest of its related items.

The *siblings* parameter, if present, sets the number of preceding print structures that must be printed on the same page with the structure. To be counted, the preceding print structures must come from the same, or nested, BREAK structures. They must be related items. Any print structures not within the same, or nested, BREAK structures are printed, but not counted as part of the required number of *siblings*.

Example:

```

CustRpt  REPORT
Break1   BREAK(SomeVariable)
          HEADER
          !structure elements
          END
CustDetail  DETAIL,WITHPRIOR()           !Always print with 1 sibling
          !structure elements
          END
          FOOTER,WITHPRIOR(2)           !Always print with 2 siblings
          !structure elements
          END
          END
          END
END

```



## WIZARD (set “tabless” SHEET control)

---

### WIZARD

The **WIZARD** attribute (PROP:WIZARD) specifies a SHEET control that does not display its TAB controls. This allows the program to direct the user through each TAB in a specified sequence (usually with “Next” and “Previous” buttons).

## ZOOM (set OLE object zooming)

---

### ZOOM

The **ZOOM** attribute (PROP:ZOOM, write-only) specifies the OLE object stretches to fill the size specified by the OLE container control’s AT attribute while maintaining the object’s aspect ratio.



# 10 - EXPRESSIONS

## Overview

An expression is a mathematical, string, or logical formula that produces a value. An expression may be the source variable of an assignment statement, a parameter of a procedure, a subscript of an array (a dimensioned variable), or the condition of an IF, CASE, LOOP, or EXECUTE structure.

Expressions may contain constant values, variables, and procedures which return values, all connected by logical and/or arithmetic or string operators.

## Expression Evaluation

---

Expressions are evaluated in the standard algebraic order of operations. The precedence of operations is controlled by operator type and placement of parentheses. Each operation produces an (internal) intermediate value used in subsequent operations. Parentheses may be used to group operations within expressions. Expressions are evaluated beginning with the inner-most set of parentheses and working through to the outer-most set.

Precedence levels for expression evaluation, from highest to lowest, and left-to-right within each level, are:

Level 1	( )	Parenthetical Grouping
Level 2	-	Unary Minus (Negative sign)
Level 3	procedure call	Gets the RETURN value
Level 4	^	Exponentiation
Level 5	* / %	Multiplication, Division, Modulus Division
Level 6	+ -	Addition, Subtraction
Level 7	&	Concatenation
Level 8	= <>	Logical Comparisons
Level 9	NOT, AND, OR/XOR	Boolean expressions

Expressions may produce numeric values, string values, or logical values (true/false evaluation). An expression may contain no operators at all; it may be a single variable, constant value, or procedure call which returns a value.

# Operators

## Arithmetic Operators

---

An arithmetic operator combines two operands arithmetically to produce an intermediate value. The operators are:

- + Addition (A + B gives the sum of A and B)
- Subtraction (A - B gives the difference of A and B)
- \* Multiplication (A \* B multiplies A by B)
- / Division (A / B divides A by B)
- ^ Exponentiation (A ^ B raises A to power of B)
- % Modulus Division (A % B gives the remainder of A divided by B)

Division by zero returns zero by default, because Clarion is designed as a business programming language. There is a project system setting (zero\_divide, see the *Programmer's Guide*) which can be set to alter this behavior so that an exception (run-time halt) is returned instead.

## The Concatenation Operator

---

The ampersand ( & ) concatenation operator is used to append one string or string variable to another. The length of the resulting string is the sum of the lengths of the two values being concatenated. Numeric data types may be concatenated with strings or other numeric variables or constants. In many cases, the CLIP procedure should be used to remove any trailing spaces from a string being concatenated to another string.

Example:

CLIP(FirstName) & ' ' Initial & '. ' & LastName	!Concatenate full name
'TopSpeed Corporation' & ', Inc.'	!Concatenate two constants

See Also:

CLIP, Numeric Expressions, Data Conversion Rules, FORMAT

## Logical Operators

A logical operator compares two operands or expressions and produces a true or false condition. There are two types of logical operators: conditional and Boolean. Conditional operators compare two values or expressions. Boolean operators connect string, numeric, or logical expressions together to determine true-false logic. Operators may be combined to create complex operators.

<b>Conditional Operators</b>	=	Equal sign
	<	Less than
	>	Greater than
<b>Boolean Operators</b>	<b>NOT</b>	Boolean (logical) NOT
	~	Tilde (logical NOT)
	<b>AND</b>	Boolean AND
	<b>OR</b>	Boolean OR
	<b>XOR</b>	Boolean eXclusive OR
<b>Combined operators</b>	<>	Not equal
	~=	Not equal
	<b>NOT</b> =	Not equal
	<=	Less than or equal to
	=<	Less than or equal to
	~>	Not greater than
	<b>NOT</b> >	Not greater than
	>=	Greater than or equal to
	=>	Greater than or equal to
	~<	Not less than
	<b>NOT</b> <	Not less than

During logical evaluation, any non-zero numeric value or non-blank string value indicates a true condition, and a null (blank) string or zero numeric value indicates a false condition.

Example:

<u>Logical Expression</u>	<u>Result</u>
A = B	True when A is equal to B
A < B	True when A is less than B
A > B	True when A is greater than B
A <> B, A ~= B, A NOT = B	True when A is not equal to B
A ~< B, A >= B, A NOT < B	True when A is not less than B
A ~> B, A <= B, A NOT > B	True when A is not greater than B
~ A, NOT A	True when A is null or zero
A AND B	True when A is true and B is true
A OR B	True when A is true, or B is true, or both are true
A XOR B	True when A is true or B is true, but not both.

# Constants

## Numeric Constants

---

Numeric constants are fixed numeric values. They may occur in data declarations, in expressions, and as parameters of procedures or attributes. A numeric constant may be represented in decimal (base 10—the default), binary (base 2), octal (base 8), hexadecimal (base 16), or scientific notation formats. Formatting characters, such as dollar signs and commas, are not permitted in numeric constants; only leading plus or minus signs and the decimal point are allowed.

Decimal (base ten) numeric constants may contain an optional leading minus sign (hyphen character), an integer, and an optional decimal with a fractional component. Binary (base two) numeric constants may contain an optional leading minus sign, the digits 0 and 1, and a terminating B or b character. Octal (base eight) numeric constants contain an optional leading minus sign, the digits 0 through 7, and a terminating O or o character. Hexadecimal (base sixteen) numeric constants contain an optional leading minus sign, the digits 0 through 9, alphabet characters A through F (representing the numbers 10 through 15) and a terminating H or h character. If the left-most character is a letter A through F, a leading zero must be used.

Example:

-924	!Decimal constants
76.346	
+76.346	
1011b	!Binary constants
-1000110B	
3403o	!Octal constants
-70413120	
-1FFBh	!Hexadecimal constants
0CD1F74FH	

## String Constants

---

A string constant is a set of characters enclosed in single quotes (apostrophes). The maximum length of a string constant is 255 characters. Characters that cannot be entered from the keyboard may be inserted into a string constant by enclosing their ASCII character codes in angle brackets (<>). ASCII character codes may be represented in decimal, hexadecimal, binary, or octal numeric constant format.

In a string constant, a left angle bracket ( < ) initiates a scan for a right angle bracket. Therefore, to include a left angle bracket in a string constant requires two left angle brackets in succession. To include an apostrophe as part of the value inside a string constant requires two apostrophes in succession. Two apostrophes ( ' ' ), with no characters (or just spaces) between them, represents a null, or blank, string. Consecutive occurrences of the same character within a string constant may be represented by *repeat count* notation. The number of times the character is to be repeated is placed within curly braces ( { } ) immediately following the character to repeat. To include a left curly brace ( { ) as part of the value inside a string constant requires two left curly braces ( { { ) in succession.

The ampersand (&) is always valid in a string constant. However, depending on the assignment's destination, it may be interpreted as an underscore for a hot letter (for example, a PROMPT control's display *text*). In this case, you double it up (&&) to end up with a single ampersand in the screen display.

Example:

'string constant'	!A string constant
'It''s a girl!'	!With embedded apostrophe
'<27,15>'	!Using decimal ASCII codes
'A << B'	!With embedded left angle, A < B
'*{20}'	!Twenty asterisks, repeat-count notation
''	!A null (blank) string

## Types of Expressions

### Numeric Expressions

---

Numeric expressions may be used as parameters of procedures, the condition of IF, CASE, LOOP, or EXECUTE structures, or as the source portion of an assignment statement where the destination is a numeric variable. A numeric expression may contain arithmetic operators and the concatenation operator, but they may not contain logical operators. When used in a numeric expression, string constants and variables are converted to numeric intermediate values. If the concatenation operator is used, the intermediate value is converted to numeric after the concatenation occurs.

Example:

```
Count + 1           !Add 1 to Count
(1 - N * N) / R      !N times N subtracted from 1 then divided by R
305 & 7854555        !Concatenate area code with phone number
```

See Also:               Data Conversion Rules

### String Expressions

---

String expressions may be used as parameters of procedures and attributes, or as the source portion of an assignment statement when the destination is a string variable. String expressions may contain a single string or numeric variable, or a complex combination of sub-expressions, procedures, and operations.

Example:

```
StringVar  STRING(30)
Name       STRING(10)
Weight     STRING(3)
Phone      LONG
CODE
StringVar = 'Address:' & Cus:Address      !Concatenate a constant and variable

StringVar = 'Phone:' & ' 305-' & FORMAT(Phone,@P###-###P)
                                           !Concatenate constant values
                                           ! and FORMAT procedure's return value

StringVar = Weight & 'lbs.'                !Concatenate a constant and variable
```

See Also:               CLIP, The Concatenation Operator, Data Conversion Rules, FORMAT



## Logical Expressions

---

Logical expressions evaluate true-false conditions in IF, LOOP UNTIL, and LOOP WHILE control structures. Control is determined by the final result (true or false) of the expression. Logical expressions are evaluated from left to right. The right operand of an AND, OR, or XOR logical expression will only be evaluated if it could affect the result. Parentheses should be used to eliminate ambiguous evaluation and to control evaluation precedence. The level or precedence for the logical operators is as follows:

Level 1	Conditional operators
Level 2	~, NOT
Level 3	AND
Level 4	OR, XOR

Example:

```
LOOP UNTIL KEYBOARD()      !True when user presses any key
    !some statements
END

IF A = B THEN RETURN.       !RETURN if A is equal to B

LOOP WHILE ~ Done#         !Loop while false (Done# = 0)
    !some statements
END

IF A >= B OR (C > B AND E = D) THEN RETURN.
    !True if a >= b, also true if
    ! both c > b and e = d.
    !The second part of the expression
    ! (after OR) is evaluated only if the
    ! first part is not true.
```

See Also:

IF, LOOP

## Property Expressions

[*target*] [\$] [*control*] { *property* [,*element*] }

<i>target</i>	The label of an APPLICATION, WINDOW, REPORT, VIEW, or FILE structure, the label of a BLOB, or one of the built-in variables: TARGET, PRINTER, or SYSTEM. If omitted, TARGET is assumed.
\$	Required delimiter when both <i>target</i> and <i>control</i> are specified. Omit if either <i>target</i> or <i>control</i> is omitted.
<i>control</i>	A field number or field equate label for the control in the <i>target</i> structure (APPLICATION, WINDOW, or REPORT) to affect. If omitted, the <i>target</i> must be specified. The <i>control</i> must be omitted if the <i>target</i> is a FILE, BLOB, or the PRINTER or SYSTEM built-in variables.
<i>property</i>	An integer constant, EQUATE, or variable that specifies the property (attribute) to change. It can also be a string when referencing a .VBX property.
<i>element</i>	An integer constant or variable that specifies which element to change (for <i>properties</i> which are arrays).

This property expression syntax allows you access to all the attributes (properties) of APPLICATION, WINDOW, or REPORT structures, or any control within these structures. To specify an attribute of an APPLICATION, WINDOW, REPORT, VIEW, or FILE structure (not a component control), omit the *control* portion of the property expression. To specify a control in the current window, omit the *target* portion of the property expression.

REPORT data structures are never the *target* by default. Therefore, either SETTARGET must be used to change the *target* to the REPORT, or the REPORT structure's label must be explicitly specified as the *target* before you can change any property of the structure, or any control it contains.

Property expressions may be used in Clarion language statements anywhere a string expression is allowed, or as the destination or source of simple assignment statements. They may not be used in operating assignment statements (such as +=, \*=, etc.). Assigning a new value to a property is a simple assignment with the property as the destination and the new value as the source. Determining the current value of a property is a simple assignment where the property is the source and the variable to receive its value is the destination. A Property expression may also be used as an executable statement (without an assignment statement) when the property expression is a method call for a VBX, OLE, or OCX control.

All properties are treated as string data at runtime; the compiler automatically performs any necessary data type conversion. Any property without parameters is binary (toggle). Binary properties are either "present" or "missing" and return a '1' if present, and "" (null) if missing. Changing the

value of a binary property to “ (null), ‘0’ (zero), or any non-numeric string sets it to missing. Changing it to any other value sets it to “present.”

Most properties can be both examined (read) and changed (written). However, some properties are “read-only” and cannot be changed. Assigning a value to a “read-only” property has no effect at all. Other properties are “write-only” properties that are meaningless if read. Some properties are arrays that contain multiple values. The syntax for addressing a particular property array *element* uses a comma (not square brackets) as the delimiter between the *property* and the *element* number.

### **Built-in Variables**

There are three built-in variables in the Clarion for Windows runtime library: TARGET, PRINTER, and SYSTEM. These are only used with the property assignment syntax to identify the *target* in a property expression.

TARGET normally references the window that currently has focus. It can also be set to reference a window in another execution thread or the currently printing REPORT, enabling you to affect the properties of controls and windows in other execution threads and dynamically change report control properties while printing. The SETTARGET statement changes the TARGET variable’s reference.

PRINTER references the Printer Properties (only) to be used by the next REPORT opened (and any subsequent reports).

SYSTEM specifies global properties used by the entire application. There are a number of runtime properties that may use the SYSTEM variable to set or query application-wide properties.

Example:

```

MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS,RESIZE
    MENUBAR
        MENU('File'),USE(?FileMenu)
            ITEM('Open...'),USE(?OpenFile)
            ITEM('Close'),USE(?CloseFile),DISABLE
            ITEM('E&xit'),USE(?MainExit)
        END
        MENU('Help'),USE(?HelpMenu)
            ITEM('Contents'),USE(?HelpContents),STD(STD:HelpIndex)
            ITEM('Search for Help On...'),USE(?HelpSearch),STD(STD:HelpSearch)
            ITEM('How to Use Help'),USE(?HelpOnHelp),STD(STD:HelpOnHelp)
            ITEM('About MyApp...'),USE(?HelpAbout)
        END
    TOOLBAR
        BUTTON('Open'),USE(?OpenButton),ICON(ICON:Open)
    END
CODE
OPEN(MainWin)
MainWin{PROP:Text} = 'A New Title'           !Change window title
?OpenButton{PROP:ICON} = ICON:Asterisk       !Change button icon
?OpenButton{PROP:AT,1} = 5                   !Change button x position
?OpenButton{PROP:AT,2} = 5                   !Change button y position
IF MainWin$?HelpContents{PROP:STD} <> STD:HelpIndex
    MainWin$?HelpContents{PROP:STD} = STD:HelpIndex
END
MainWin{PROP:MAXIMIZE} = 1                   !Expand to full screen
ACCEPT
    CASE ACCEPTED()                          !Which control was chosen?
    OF ?OpenFile                             !Open... menu selection
    OROF ?OpenButton                         !Open button on toolbar
        START(OpenFileProc)                 !Start new execution thread
    OF ?MainExit                             !Exit menu selection
    OROF ?MainExitButton                     !Exit button on toolbar
        BREAK                               !Break ACCEPT loop
    OF ?HelpAbout                             !About... menu selection
        HelpAboutProc                       !Call application information procedure
    END
END
CLOSE(MainWin)                              !Close APPLICATION
RETURN

```

See Also: **SETTARGET, Runtime Properties**

## ***Runtime Expression Evaluation***

Clarion has the ability to evaluate expressions dynamically created at runtime, rather than at development time. This allows a Clarion program to construct expressions “on the fly.” This also makes it possible to allow an end-user to enter the expression to evaluate.

An expression is a mathematical or logical formula that produces a value; it is not a complete Clarion language statement. Expressions may only contain constant values, variables, or procedure calls which return a value, all connected by logical and/or arithmetic operators. An expression may be used as the source side of an assignment statement, a parameter of a procedure, a subscript of an array (a dimensioned variable), or the conditions of IF, CASE, LOOP, or EXECUTE structures.

Any program variable, and most of the internal Clarion procedures, can be used as part of a runtime expression string. User-defined procedures that fall within certain specific guidelines (described in the BIND statement documentation) may also be used in runtime expression strings.

All of the standard Clarion expression syntax is available for use in runtime expression strings. This includes parenthetical grouping and all the arithmetic, logical, and string operators. Dynamic expressions are evaluated just as any other Clarion expression and all the standard operator precedence level rules described in the Expression Evaluation section (see page 3) apply.

It takes three steps to use runtime expression strings:

- The variables that are allowed to be used in the expressions must be explicitly declared with the BIND statement.
- The expression must be built. This may involve concatenating user choices or allowing the user to directly type in their own expression.
- The expression is passed to the EVALUATE procedure which returns the result. If the expression is not a valid Clarion expression, ERRORCODE is set.

Once the expression is evaluated, its result is used just as the result of any hard-coded expression would be. For example, a runtime expression string could provide a filter expression to eliminate certain records when viewing or printing a database (the FILTER expression of a VIEW structure is an implicit runtime expression string).

## BIND (declare runtime expression string variable)

```

BIND( | name,variable | )
      | name,procedure |
      | group           |

```

<b>BIND</b>	Identifies variables allowed to be used in dynamic expressions.
<i>name</i>	A string constant containing the identifier used in the dynamic expression. This may be the same as the <i>variable</i> or <i>procedure</i> label.
<i>variable</i>	The label of any variable (including fields in FILE, GROUP, or QUEUE structures) or passed parameter. If it is an array, it must have only one dimension.
<i>procedure</i>	The label of a Clarion language PROCEDURE which returns a STRING, REAL, or LONG value. If parameters are passed to the <i>procedure</i> , they must be STRING value-parameters (passed by value, not by address) and may not be omissible.
<i>group</i>	The label of a GROUP, RECORD, or QUEUE structure declared with the BINDABLE attribute.

The **BIND** statement declares the logical name used to identify a variable or user-defined procedure in runtime expression strings. A variable or user-defined procedure must be identified with the BIND statement before it can be used in an expression string for either the EVALUATE procedure or a VIEW structure's FILTER attribute.

### BIND(*name,variable*)

The specified *name* is used in the expression in place of the label of the *variable*.

### BIND(*name,procedure*)

The specified *name* is used in the expression in place of the label of the *procedure*.

### BIND(*group*)

Declares all the variables within the GROUP, RECORD, or QUEUE (with the BINDABLE attribute) available for use in a dynamic expression. The contents of each variable's NAME attribute is the logical name used in the dynamic expression. If no NAME attribute is present, the label of the variable (including prefix) is used.

A GROUP, RECORD, or QUEUE structure declared with the BINDABLE attribute has space allocated in the .EXE for the names of all of the data elements in the structure. This creates a larger program that uses more memory than it normally would. Also, the more variables that are bound at one time, the slower the EVALUATE procedure will work. Therefore,

**BIND(*group*)** should only be used when a large proportion of the constituent fields are going to be used.

Example:

```

PROGRAM
MAP
  AllCapsFunc(STRING),STRING                                !Clarion procedure
END
Header      FILE,DIVER('Clarion'),PRE(Hea),BINDABLE        !Declare header file layout
OrderKey    KEY(Hea:OrderNumber)
Record      RECORD
OrderNumber LONG
ShipToName  STRING(20)
. .
StringVar   STRING(20)
CODE
  BIND('ShipName',Hea:ShipToName)
  BIND('SomeFunc',AllCapsFunc)
  BIND('StringVar',StringVar)
  StringVar = 'SMITH'
  CASE EVALUATE('StringVar = SomeFunc(ShipName)')
  OF ''
    IF ERRORCODE()
      MESSAGE('Error ' & ERRORCODE() & ' -- ' & ERROR())
    ELSE
      MESSAGE('Unkown error evaluating expression')
    END
  OF '0'
    DO NonSmithProcess
  OF '1'
    DO SmithProcess
  END
AllCapsFunc PROCEDURE(PassedString)
CODE
  RETURN(UPPER(PassedString))

```

See Also:

**UNBIND, EVALUATE, PUSHBIND, POPBIND, FILTER**

## EVALUATE (return runtime expression string result)

### EVALUATE(*expression*)

#### EVALUATE

Evaluates runtime expression strings.

#### *expression*

A string constant or variable containing the expression to evaluate.

The **EVALUATE** procedure evaluates the *expression* and returns the result as a **STRING** value. If the *expression* does not meet the rules of a valid Clarion expression, the result is a null string (''), and **ERRORCODE** is set. A logical *expression* returns a string containing either zero ('0') or one ('1'), while an arithmetic *expression* returns the actual result of the *expression* (in a string). To use less than (<) in the *expression*, you must double it up (<<) to prevent compiler errors. The more variables are bound at one time, the slower the **EVALUATE** procedure works. Therefore, **BIND(group)** should only be used when most of the *group*'s fields are needed, and **UNBIND** should be used to free all variables and user-defined procedures not currently required for use in dynamic expressions.

Return Data Type: **STRING**

Errors Posted: 800 Illegal Expression  
801 Variable Not Found

Example:

```
MAP
AllCapsFunc PROCEDURE(STRING),STRING                !Clarion procedure
END
Header      FILE,DRIVER('Clarion'),PRE(Hea),BINDABLE  !Declare header file layout
OrderKey    KEY(Hea:OrderNumber)
Record      RECORD
OrderNumber LONG
ShipToName  STRING(20)
.
StringVar   STRING(20)
CODE
  BIND('ShipName',Hea:ShipToName)
  BIND('SomeFunc',AllCapsFunc)
  BIND('StringVar',StringVar)
  StringVar = 'SMITH'
  CASE EVALUATE('StringVar = SomeFunc(ShipName)')
  OF ''
    IF ERRORCODE() THEN MESSAGE('Error ' & ERRORCODE() & ' -- ' & ERROR()).
  OF '0'
    DO NonSmithProcess
  OF '1'
    DO SmithProcess
  END
AllCapsFunc PROCEDURE(PassedString)
CODE
  RETURN(UPPER(PassedString))
```

See Also: **BIND, UNBIND, PUSHBIND, POPBIND, FILTER**



## POPBIND (restore runtime expression string name space)

### POPBIND

The **POPBIND** statement restores the previous BIND statement's *name* space for variables and procedures previously bound. This restores the previous scope used by previous BIND statements.

Example:

```
SomeProc PROCEDURE

  OrderNumber      LONG
  Item             LONG
  Quantity         SHORT

  CODE
  BIND('OrderNumber',OrderNumber)
  BIND('Item',Item)
  BIND('Quantity',Quantity)

  AnotherProc      !Call another procedure

  UNBIND('OrderNumber',OrderNumber)
  UNBIND('Item',Item)
  UNBIND('Quantity',Quantity)

AnotherProc PROCEDURE

  OrderNumber      LONG
  Item             LONG
  Quantity         SHORT

  CODE
  PUSHBIND          !Create new scope for BIND
  BIND('OrderNumber',OrderNumber) !Bind variables with same names in new scope
  BIND('Item',Item)
  BIND('Quantity',Quantity)

  !Do some Processing

  UNBIND('OrderNumber')
  UNBIND('Item')
  UNBIND('Quantity')
  POPBIND           !Restore previous scope for BIND
```

See Also: **PUSHBIND, EVALUATE**

## PUSHBIND (save runtime expression string name space)

**PUSHBIND**( [ *clearflag* ] )

### **PUSHBIND**

Creates a new scope for subsequent BIND statements.

*clearflag*

An integer constant or variable containing either zero (0) or one (1). When zero, the BIND statement's *name* space is cleared of all variables and procedures previously bound. When one, all variables and procedures previously bound are left in place. If omitted, the *clearflag* is zero.

The **PUSHBIND** statement creates a new scope for subsequent BIND statements. This scope terminates with the next POPBIND statement. This creates a new scope for subsequent BIND statements, allowing you to create new BIND *names* for variables with the same *name* without creating conflicts with the *names* from a previous scope.

Example:

```
SomeProc PROCEDURE
OrderNumber    LONG
Item           LONG
Quantity       SHORT

CODE
BIND('OrderNumber',OrderNumber)
BIND('Item',Item)
BIND('Quantity',Quantity)

AnotherProc                                !Call another procedure

UNBIND('OrderNumber',OrderNumber)
UNBIND('Item',Item)
UNBIND('Quantity',Quantity)

AnotherProc PROCEDURE
OrderNumber    LONG
Item           LONG
Quantity       SHORT

CODE
PUSHBIND                                !Create new scope for BIND
BIND('OrderNumber',OrderNumber)        !Bind variables with same names in new scope
BIND('Item',Item)
BIND('Quantity',Quantity)

!Do some Processing

UNBIND('OrderNumber')
UNBIND('Item')
UNBIND('Quantity')
POPBIND                                !Restore previous scope for BIND
```

See Also:

**POPBIND, EVALUATE**

## UNBIND (free runtime expression string variable)

### UNBIND( [*name*] )

#### UNBIND

Frees variables from use in runtime expression strings.

#### *name*

A string constant that specifies the identifier used by the dynamic expression evaluator. If omitted, all bound variables are unbound.

The **UNBIND** statement frees logical names previously bound by the **BIND** statement. The more variables that are bound at one time, the slower the **EVALUATE** procedure works. Therefore, **UNBIND** should be used to free all variables and user-defined procedures not currently available for use in runtime expression strings.

Example:

```

PROGRAM
MAP
    AllCapsFunc(STRING),STRING           !Clarion procedure
END

Header      FILE,DRIVER('Clarion'),PRE(Hea)  !Declare header file layout
AcctKey      KEY(Hea:AcctNumber)
OrderKey     KEY(Hea:OrderNumber)
Record       RECORD
AcctNumber   LONG
OrderNumber  LONG
ShipToName   STRING(20)
ShipToAddr   STRING(20)
ShipToCity   STRING(20)
ShipToState  STRING(20)
ShipToZip    STRING(20)
. .

Detail       FILE,DRIVER('Clarion'),PRE(Dt1),BINDABLE  !Bindable RECORD structure
OrderKey     KEY(Dt1:OrderNumber)
Record       RECORD
OrderNumber  LONG
Item         LONG
Quantity     SHORT
. .

CODE
BIND('ShipName',Hea:ShipToName)
BIND(Dt1:Record)
BIND('SomeFunc',AllCapsFunc)
UNBIND('ShipName')           !UNBIND the variable
UNBIND('SomeFunc')           !UNBIND the Clarion language procedure
UNBIND                       !UNBIND all bound variables

AllCapsFunc PROCEDURE(PassedString)
CODE
RETURN(UPPER(PassedString))

```

See Also:

**BIND, EVALUATE, PUSHBIND, POPBIND**



# 11 - ASSIGNMENTS

## Assignment Statements

### Simple Assignments

<i>destination</i>	=	<i>source</i>
<i>destination</i>		The label of a variable or runtime property.
<i>source</i>		A numeric or string constant, variable, procedure, expression, or data structure property.
The = sign assigns the value of <i>source</i> to the <i>destination</i> ; it copies the value of the <i>source</i> expression into the <i>destination</i> variable. If <i>destination</i> and <i>source</i> are different data types, the value the <i>destination</i> receives from the <i>source</i> is dependent upon the Data Conversion Rules.		

Example:

```
StringVar STRING(10)
LongVar LONG
RealVar REAL
CODE
StringVar = 'JONES'           !Variable = string constant
RealVar = 3.14159             !Variable = numeric constant
RealVar = Sqrt(1 - Sine * Sine) !Variable = procedure return value
LongVar = B + C + 3           !Variable = numeric expression
StringVar = CLIP(FirstName) & ' ' Initial & ' ' & LastName
                                !Variable = string expression

StringVar = '10'              !Assign numeric data to string then
Longvar = StringVar            !Automatic data conversion results
                                ! and Longvar will contain: 10
```

See Also:                   Data Conversion Rules, Property Expressions

## Operating Assignments

<i>destination</i>	<b>+=</b>	<i>source</i>
<i>destination</i>	<b>-=</b>	<i>source</i>
<i>destination</i>	<b>*=</b>	<i>source</i>
<i>destination</i>	<b>/=</b>	<i>source</i>
<i>destination</i>	<b>^=</b>	<i>source</i>
<i>destination</i>	<b>%=</b>	<i>source</i>

*destination*      Must be the label of a variable. This may not be a runtime property.

*source*      A constant, variable, procedure, or expression.

Operating assignment statements perform their operation on the *destination* and *source*, then assign the result to the *destination*. Operating assignment statements are more efficient than their functionally equivalent operations.

Example:

<u>Operating Assignment</u>	<u>Functional Equivalent</u>
A += 1	A = A + 1
A -= B	A = A - B
A *= -5	A = A * -5
A /= 100	A = A / 100
A ^= I + 1	A = A ^ (I + 1)
A %= 7	A = A % 7

See Also:

Data Conversion Rules, Property Expressions

## Deep Assignment

<i>destination</i>	<code>::=</code>	<i>source</i>
--------------------	------------------	---------------

<i>destination</i>		The label of a GROUP, RECORD, or QUEUE data structure, or an array.
--------------------	--	---

<i>source</i>		The label of a GROUP, RECORD, or QUEUE data structure, or a numeric or string constant, variable, procedure, or expression.
---------------	--	---

The `::=` sign executes a deep assignment statement which performs multiple individual component variable assignments from one data structure to another. The assignments are only performed between the variables within each structure that have exactly matching labels, ignoring all prefixes. The compiler looks within nested GROUP structures to find matching labels. Any variable in the *destination* which does not have a label exactly matching a variable in the *source*, is not changed.

Deep assignments are performed just as if each matching variable were individually assigned to its matching variable. This means that all normal data conversion rules apply to each matching variable assignment. For example, the label of a nested *source* GROUP may match a nested *destination* GROUP or simple variable. In this case, the nested *source* GROUP is assigned to the *destination* as a STRING, just as normal GROUP assignment is handled.

The name of a *source* array may match a *destination* array. In this case, each element of the *source* array is assigned to its corresponding element in the *destination* array. If the *source* array has more or fewer elements than the *destination* array, only the matching elements are assigned to the *destination*.

If the *destination* is an array variable that is not part of a GROUP, RECORD, or QUEUE, and the *source* is a constant, variable, or expression, then each element of the *destination* array is initialized to the value of the *source*. This is a much more efficient method of initializing an array to a specific value than using a LOOP structure and assigning each element in turn.

The *destination* or *source* may also name a CLASS structure, which, in this case, will be treated as a GROUP. However, if you do so, you violate the concept of encapsulation, since deep assignment is a structure piercing operation. Therefore, it is not recommended.

Example:

```
Group1  GROUP
S        SHORT
L        LONG
        END
```

```
Group2  GROUP
L        SHORT
S        REAL
T        LONG
        END
```

```
ArrayField  SHORT,DIM(1000)
```

```
CODE
Group2 :=: Group1      !Is equivalent to:
                        !  Group2.S = Group1.S
                        !  Group2.L = Group1.L
                        ! and performs all necessary data conversion

ArrayField :=: 7       !Is equivalent to:
                        !  LOOP I# = 1 to 1000
                        !    ArrayField[I#] = 7
                        !  END
```

See Also:           **GROUP, RECORD, QUEUE, DIM**



## Reference Assignments

*destination* &= *source*

*destination*

The label of a reference variable.

*source*

This may be:

- The label of a variable or data structure of the same type as referenced by the *destination*.
- The label of another reference variable of the same type as the *destination*.
- A PROCEDURE which returns the data type the *destination* will receive.
- An expression (yielding a LONG value, such as the return value of the ADDRESS procedure) that defines the memory address of a variable of the same type as referenced by the *destination* (which must be a reference to any simple data type except STRING, CSTRING, or PSTRING).
- The NULL built-in variable.

The &= sign executes a reference assignment statement. A reference assignment statement assigns a reference to the *source* variable to the *destination* reference variable. When used in a conditional expression (such as an IF statement), a reference assignment statement determines reference equality (are the two reference variables “pointing at” the same thing?).

Depending upon the data type being referenced, the *destination* reference variable may receive the *source*’s memory address, or a more complex internal data structure (describing the location and type of *source* data).

When the *source* is the built-in variable NULL, the reference assignment statement may either clear the *destination* reference variable, or detect an unreferenced reference variable (when the reference assignment statement is placed in a conditional expression).

The declarations of the *destination* reference variable and its *source* must match exactly (unless the *destination* is declared as an ANY variable); reference assignment does not perform automatic type conversion. For example, a reference assignment statement to a *destination* declared as &QUEUE must have a *source* that is either another &QUEUE reference variable, the label of a QUEUE structure, or the ADDRESS(MyQueue) procedure. However, if the *destination* is a reference to a string (&STRING), the *source* may also be a data structure that is normally treated as string data when addressed as a single unit (GROUP, RECORD, QUEUE, MEMO).

Example:

```

Queue1    QUEUE
ShortVar   SHORT
LongVar1   LONG
LongVar2   LONG
END

QueueRef   &QUEUE           !Reference a QUEUE, only
Queue1Ref  &Queue1          !Reference to a QUEUE defined exactly as Queue1, only

LongRef    &LONG            !Reference a LONG, only

LongRef2   &LONG            !Reference a LONG, only

CODE
QueueRef  &= Queue1         !Assign QUEUE reference
Queue1Ref &= Queue1         !Assign QUEUE reference

IF Queue1Ref &= QueueRef     !Are they referencing the same QUEUE?
    MESSAGE('Both Pointing at same QUEUE')
END

IF SomeCondition             !Evaluate some condition
    LongRef &= Queue1.LongVar1 ! and reference an appropriate variable
ELSE
    LongRef &= Queue1.LongVar2
END
LongRef += 1                 !Increment either LongVar1 or LongVar2
                             ! depending upon which variable is referenced

IF LongRef2 &= NULL          !Detect unreferenced reference variable and
    LongRef2 &= LongRef      ! create a second reference to the same data
END

LongRef &= ADDRESS(Queue1.LongVar1) !Reference assign the address of
                                     ! a simple data type

```

See Also:                    **Reference Variables, ANY, NEW**

## CLEAR (clear a variable)

### CLEAR(*label* [,*n*])

<b>CLEAR</b>	Clears the value from a variable.
<i>label</i>	The label of a variable (except BLOB types), GROUP, RECORD, QUEUE, CLASS, or FILE structure. If the variable has a DIM attribute, the entire array is cleared. A single element of an array cannot be CLEARED.
<i>n</i>	A numeric constant; either 1 or -1. If omitted, numeric variables are cleared to zero, STRING variables are cleared to spaces, and PSTRING and CSTRING variables are set to zero length.

The **CLEAR** statement clears the value from the *label* variable.

The presence of the *n* parameter indicates a cleared value other than zero or blank. If *n* is 1, the *label* variable is set to the highest possible value for that data type. For the STRING, PSTRING and CSTRING data types, that is all ASCII 255. If *n* is -1, the *label* variable is set to the lowest possible value for that data type. For the STRING data type, that is all ASCII zeroes (0). For the PSTRING and CSTRING data types, that is a zero length string.

If the *label* parameter names a GROUP, RECORD, or QUEUE structure, all variables in the structure are cleared and all reference variables in the structure are set to NULL. If the *label* parameter names a FILE structure and the *n* parameter is omitted, all variables in the FILE structure (including any MEMO and/or BLOB fields) are cleared. If the *label* parameter names a CLASS structure or an object derived from a CLASS, all variables in the object are cleared and all reference variables are set to NULL.

Example:

```
MyQue QUEUE
F1      LONG
F2      STRING(20)
F3      &CSTRING      !Reference to a CSTRING
F4      ANY            !ANY can be a reference variable to any simple data type
END
CODE
CLEAR(MyQue)           !Equivalent to:
                        ! MyQue.F1 = 0
                        ! MyQue.F2 = ''
                        ! MyQue.F3 &= NULL
                        ! MyQue.F4 &= NULL

CLEAR(Count)           !Clear a variable
CLEAR(Cus:Record)      !Clear the record structure
CLEAR(Customer)        !Clear the record structure and any memos and blobs
CLEAR(Amount,1)        !Clear variable to highest possible value
CLEAR(Amount,-1)       !Clear variable to lowest possible value
```

See Also:

Reference Assignment Statements, GROUP, RECORD, QUEUE, DIM, CLASS, ANY

## Data Type Conversion Rules

The Clarion language provides automatic conversion between data types. However, some assignments can produce an unequal source and destination. Assigning an “out of range” value can produce unpredictable results.

### Base Types

---

To facilitate this automatic data type conversion, Clarion internally uses four Base Types to which all data items are automatically converted when any operation is performed on the data. These types are: **STRING**, **LONG**, **DECIMAL**, and **REAL**. These are all standard Clarion data types.

The **STRING** Base Type is used as the intermediate type for all string operations. The **LONG**, **DECIMAL**, and **REAL** Base Types are used in all arithmetic operations. Which numeric type is used, and when, is determined by the original data types of the operands and the type of operation being performed on them.

The “normal” Base Type for each data type is:

Base Type LONG:

BYTE  
SHORT  
USHORT  
LONG  
DATE  
TIME  
Integer Constants  
Strings declared with @P pictures

Base Type DECIMAL:

ULONG  
DECIMAL  
PDECIMAL  
STRING(@Nx.y)  
Decimal Constants

Base Type REAL:

SREAL  
REAL  
BFLOAT4  
BFLOAT8  
STRING(@Ex.y)  
Scientific Notation Constants  
Untyped (? and \*?) Parameters

Base Type STRING:

STRING  
CSTRING  
PSTRING  
String Constants



However, standard “tricks of the trade” (such as multiplying by a power of ten by shifting the decimal point) are spotted, making the BCD libraries fast in real world applications.

The following operations may execute as BCD operations:

**Addition (+), Subtraction (-), Multiplication (\*)**

Performed as a BCD operation when neither operand has a REAL Base Type (both are LONG or DECIMAL) and one has the DECIMAL Base Type. Any digits appearing to the right of 1e31 disappear (wrap), and any to the left of 1e-30 are rounded up.

**Division (/)**

Performed as a BCD operation when neither operand has a REAL Base Type (both are LONG or DECIMAL). Any digits appearing to the right of 1e31 disappear (wrap), and any to the left of 1e-30 are rounded up.

**Exponentiation (^)** Performed as a BCD operation when the first operand is a DECIMAL or LONG Base Type and the second operand is a LONG Base Type. Any digits appearing to the right of 1e31 disappear (wrap), and any to the left of 1e-30 are rounded.

**ABS()**

Removes the sign from a DECIMAL variable or intermediate value and returns the DECIMAL value.

**INT()**

Truncates a DECIMAL intermediate value and returns a DECIMAL value.

**ROUND()**

If the second parameter is a LONG or DECIMAL Base Type, then rounding is performed as a BCD operation which returns a DECIMAL value. ROUND is very efficient as a BCD operation and should be used to compare REALs to DECIMALs at decimal width.

## Type Conversion and Intermediate Results

---

Internally, a BCD intermediate result may have up to 31 digits of accuracy on both sides of the decimal point, so any two DECIMALs can be added with complete accuracy. Therefore, storage from BCD intermediate results to a data type can result in loss of precision. This is handled as follows :

**Decimal(x,y) = BCD**

First the BCD value is rounded to y decimal places. If the result overflows x digits then leading digits are removed (this corresponds to “wrapping around” a decimal counter).

**Integer = BCD**

Any digits to the right of the decimal point are ignored. The decimal is then converted to an integer with complete accuracy and then taken modulo  $2^{32}$ .

**String(@Nx.y) = BCD**

The BCD value is rounded to y decimal places, the result is fitted into the pictured string. If overflow occurs, an invalid picture (####) results.

**Real = BCD**

The most significant 15 digits are taken and the decimal point 'floated' accordingly.

For those operations and procedures that do not support DECIMAL types, the DECIMAL is converted to REAL first. In cases where more than 15 digits were available in the DECIMAL value, there is a loss of accuracy.

**Note:** Unspecified Data Type parameters have an implicit REAL Base Type, therefore DECIMAL Base Type data passed as an Unspecified Data Type Parameters will only have 15 digits of precision. DECIMAL Base Types can be passed as \*DECIMAL parameters with no loss of precision.

When EVALUATEing a expression (or processing a VIEW FILTER) the REAL Base Type is used.

## Simple Assignment Data Type Conversion

---

The rules of simple assignment data type conversion from source into destination are as follows:

**BYTE =****(SHORT, USHORT, LONG, or ULONG)**

The destination receives the low-order 8 bits of the source.

**(DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)**

The source is first converted to a LONG, which truncates any decimal portion, then the destination receives the low-order 8 bits of the LONG.

**(STRING, CSTRING, or PSTRING)**

The source must be a numeric value with no formatting characters. The source is converted to a LONG, which truncates any decimal portion, then the destination receives the low-order 8 bits of the LONG.

<b>SHORT =</b>	<b>BYTE</b>	The destination receives the value of the source.
	<b>(USHORT, LONG, or ULONG)</b>	The destination receives the low-order 16 bits of the source.
	<b>(DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)</b>	The source is first converted to a LONG, which truncates any decimal portion, then the destination receives the low-order 16 bits of the LONG.
	<b>(STRING, CSTRING, or PSTRING)</b>	The source must be a numeric value with no formatting characters. The source is first converted to a LONG, which truncates any decimal portion, then the destination receives the low-order 16 bits of the LONG.
<b>USHORT =</b>	<b>BYTE</b>	The destination receives the value of the source.
	<b>(SHORT, LONG, or ULONG)</b>	The destination receives the low-order 16 bits of the source.
	<b>(DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)</b>	The source is first converted to a LONG, which truncates any decimal portion, then the destination receives the low-order 16 bits of the LONG.
	<b>(STRING, CSTRING, or PSTRING)</b>	The source must be a numeric value with no embedded formatting characters. The source is first converted to a LONG, which truncates any decimal portion, then the destination receives the low-order 16 bits of the LONG.
<b>LONG =</b>	<b>(BYTE, SHORT, USHORT, or ULONG)</b>	The destination receives the value and the sign of the source.
	<b>(DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)</b>	The destination receives the value of the source, including the sign, up to $2^{31}$ . If the number is greater than $2^{31}$ , the destination receives the result of modulo $2^{31}$ . Any decimal portion is truncated.
	<b>(STRING, CSTRING, or PSTRING)</b>	The source must be a numeric value with no embedded formatting characters. The source is first converted to a REAL, which is then converted to the LONG.



**DATE =****(BYTE, SHORT, USHORT, or ULONG)**

The destination receives the Btrieve format for the Clarion Standard Date for the value of the source.

**(DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)**

The source is first converted to a LONG as a Clarion Standard Date, which truncates any decimal portion, then the destination receives the Btrieve format for the Clarion Standard Date.

**(STRING, CSTRING, or PSTRING)**

The source must be a numeric value with no embedded formatting characters. The source is first converted to a LONG as a Clarion Standard Date, which truncates any decimal portion, then the destination receives the Btrieve format for the Clarion Standard Date.

**TIME =****(BYTE, SHORT, USHORT, or ULONG)**

The destination receives the Btrieve format for the Clarion Standard Time for the value of the source.

**(DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)**

The source is first converted to a LONG as a Clarion Standard Time, which truncates any decimal portion, then the destination receives the Btrieve format for the Clarion Standard Time.

**(STRING, CSTRING, PSTRING)**

The source must be a numeric value with no embedded formatting characters. The source is first converted to a LONG as a Clarion Standard Time, which truncates any decimal portion, then the destination receives the Btrieve format for the Clarion Standard Time.

**ULONG =****(BYTE, SHORT, or USHORT)**

The source is first converted to a LONG, then the destination receives the entire 32 bits of the LONG.

**LONG**

The destination receives the entire 32 bits of the source.

**(DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)**

The source is first converted to a LONG, which truncates any decimal portion, then the destination receives the entire 32 bits of the LONG.

**(STRING, CSTRING, or PSTRING)**

The source must be a numeric value with no embedded formatting characters. The source is first converted to a LONG, which truncates any decimal portion, then the destination receives the entire 32 bits of the LONG.

**REAL =****(BYTE, SHORT, USHORT, LONG, or ULONG)**

The destination receives the full integer portion and the sign of the source.

**(DECIMAL, PDECIMAL, SREAL, BFLOAT8, or BFLOAT4)**

The destination receives the sign, integer portion, and the decimal portion of the source.

**(STRING, CSTRING, PSTRING)**

The source must be a numeric string value with no embedded formatting characters. The destination receives the sign, integer, and decimal portion of the number. Trailing spaces are ignored.

**SREAL =****(BYTE, SHORT, USHORT, LONG, or ULONG)**

The destination receives the sign and value of the source.

**(DECIMAL, PDECIMAL, or REAL)**

The destination receives the sign, integer, and fractional portion of the source.

**(STRING, CSTRING, or PSTRING)**

The source must be a numeric string value with no embedded formatting characters. The destination receives the sign, integer, and decimal portion of the number. Trailing spaces are ignored.

**BFLOAT8 =****(BYTE, SHORT, USHORT, LONG, or ULONG)**

The destination receives the sign and value of the source.

**(DECIMAL, PDECIMAL, or REAL)**

The destination receives the sign, integer, and fractional portion of the source.

**(STRING, CSTRING, or PSTRING)**

The source must be a numeric string value with no embedded formatting characters. The destination receives the sign, integer, and decimal portion of the number. Trailing spaces are ignored.

- BFLOAT4 =** **(BYTE, SHORT, USHORT, LONG, or ULONG)**  
The destination receives the sign and value of the source.
- (DECIMAL, PDECIMAL, or REAL)**  
The destination receives the sign, integer, and fractional portion of the source.
- (STRING, CSTRING, or PSTRING)**  
The source must be a numeric string value with no embedded formatting characters. The destination receives the sign, integer, and decimal portion of the number. Trailing spaces are ignored.
- DECIMAL =** **(BYTE, SHORT, USHORT, LONG, ULONG, or PDECIMAL)**  
The destination receives the sign and the value of the source, wrapping or rounding as appropriate.
- (REAL, or SREAL)**  
The destination receives the sign, integer, and the high order part of the fraction from the source. The high order fractional portion is rounded in the destination.
- (STRING, CSTRING, PSTRING)**  
The source must be a numeric string value with no embedded formatting characters. The destination receives the sign, integer, and decimal portion of the number. Trailing spaces are ignored.
- PDECIMAL =** **(BYTE, SHORT, USHORT, LONG, ULONG, or DECIMAL)**  
The destination receives the sign and the value of the source, wrapping or rounding as appropriate.
- (REAL, SREAL, BFLOAT8, or BFLOAT4)**  
The destination receives the sign, integer, and the high order part of the fraction from the source. The high order fractional portion is rounded in the destination.
- (STRING, CSTRING, or PSTRING)**  
The source must be a numeric string value with no embedded formatting characters. The destination receives the sign, integer, and decimal portion of the number. Trailing spaces are ignored.

- STRING =** **(BYTE, SHORT, USHORT, LONG, or ULONG)**  
The destination receives the sign and the unformatted number. The value is left justified in the destination.
- (DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)**  
The destination receives the sign, integer, and fractional portion of the source (rounded into the string's picture format). The value is left justified in the destination.
- CSTRING =** **(BYTE, SHORT, USHORT, LONG, or ULONG)**  
The destination receives the sign and the unformatted number. The value is left justified in the destination.
- (DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)**  
The destination receives the sign, integer, and fractional portion of the source (rounded into the string's picture format). The value is left justified in the destination.
- PSTRING =** **(BYTE, SHORT, USHORT, LONG, or ULONG)**  
The destination receives the sign and the unformatted number. The value is left justified in the destination.
- (DECIMAL, PDECIMAL, REAL, SREAL, BFLOAT8, or BFLOAT4)**  
The destination receives the sign, integer, and fractional portion of the source (rounded into the string's picture format). The value is left justified in the destination.

# 12 - EXECUTION CONTROL

## Control Structures

### ACCEPT (the event processor)

```
ACCEPT
  statements
END
```

**ACCEPT**                      The event handler.

*statements*                      Executable code statements.

The **ACCEPT** loop is the event handler that processes events generated by Windows for the **APPLICATION** or **WINDOW** structures. An **ACCEPT** loop and a window are bound together, in that, when the window is opened, the next **ACCEPT** loop encountered will process all events for that window.

**ACCEPT** operates in the same manner as a **LOOP**—the **BREAK** and **CYCLE** statements can be used within it. The **ACCEPT** loop cycles for every event that requires program action. **ACCEPT** waits until the Clarion runtime library sends it an event that the program should process, then cycles through to execute its *statements*. During the time **ACCEPT** is waiting, the Clarion runtime library has control, automatically handling common events from Windows that do not need specific program action (such as screen re-draws).

The current contents of all **STRING** control **USE** variables (in the top window of each thread) automatically display on screen each time the **ACCEPT** loop cycles to the top. This eliminates the need to explicitly issue a **DISPLAY** statement to update the video display for display-only data. **USE** variable contents for any other control automatically display on screen for any event generated for that control, unless **PROP:Auto** is turned on to automatically display all **USE** variables each time through the **ACCEPT** loop.

Within the **ACCEPT** loop, the program determines what happened by using the following procedures:

<b>EVENT()</b>	Returns a value indicating what happened. Symbolic constants for events are in the <b>EQUATES.CLW</b> file.
<b>FIELD()</b>	Returns the field number for the control to which the event refers, if the event is a field-specific event.
<b>ACCEPTED()</b>	Returns the field number for the control to which the event refers for the <b>EVENT:Accepted</b> event.
<b>SELECTED()</b>	Returns the field number for the control to which the event refers for the <b>EVENT:Selected</b> event.

**FOCUS()** Returns the field number of the control that has input focus, no matter what event occurred.

**MOUSEX()** Returns the x-coordinate of the mouse cursor.

**MOUSEY()** Returns the y-coordinate of the mouse cursor.

Two events cause an implicit **BREAK** from the **ACCEPT** loop. These are the events that signal the close of a window (**EVENT:CloseWindow**) or close of a program (**EVENT:CloseDown**). The program's code need not check for these events as they are handled automatically. However, the code may check for them and execute some specific action, such as displaying a "You sure?" window or handling some housekeeping details. A **CYCLE** statement at that point returns to the top of the **ACCEPT** loop without exiting the window or program.

Similarly, there are several other events whose action can also be terminated by a **CYCLE** statement: **EVENT:Move**, **EVENT:Size**, **EVENT:Restore**, **EVENT:Maximize**, and **EVENT:Iconize**. A **CYCLE** statement in response to any of these events stops the normal action and prohibits generation of the related **EVENT:Moved**, **EVENT:Sized**, **EVENT:Restored**, **EVENT:Maximized**, or **EVENT:Iconized**.

Example:

```
CODE
OPEN(Window)
ACCEPT                                !Event handler
  CASE FIELD()
  OF 0                                !Handle Field-independent events
    CASE EVENT()
    OF EVENT:Move
      CYCLE                          !Do not allow user to move the window
    OF EVENT:Suspend
      CASE FOCUS()
      OF ?Field1
        !Save some stuff
      END
    OF EVENT:Resume
      !Restore the stuff
    END
  OF ?Field1                          !Handle events for Field1
    CASE EVENT()
    OF EVENT:Selected
      ! pre-edit code for field1
    OF EVENT:Accepted
      ! completion code for field1
    END
  END
END
```

See Also: **EVENT, APPLICATION, WINDOW, FIELD, FOCUS, ACCEPTED, SELECTED, CYCLE, BREAK**

## CASE (selective execution structure)

```

CASE condition
  OF expression [ TO expression ]
    statements
  [ OROF expression [ TO expression ] ]
    statements
  [ ELSE ]
    statements
END

```

<b>CASE</b>	Initiates a selective execution structure.
<i>condition</i>	A numeric or string variable or expression.
<b>OF</b>	The <i>statements</i> following an <b>OF</b> are executed when the <i>expression</i> following the OF option is equal to the <i>condition</i> of the CASE. There may be many OF options in a CASE structure.
<i>expression</i>	A numeric or string constant, variable, or expression.
<b>TO</b>	<b>TO</b> allows a range of values in an OF or OROF. The <i>statements</i> following the OF (or OROF) are executed if the value of the <i>condition</i> falls within the inclusive range specified by the <i>expressions</i> . The <i>expression</i> following OF (or OROF) must contain the lower limit of the range. The <i>expression</i> following TO must contain the upper limit of the range.
<b>OROF</b>	The <i>statements</i> following an <b>OROF</b> are executed when either the <i>expression</i> following the OROF or the OF option is equal to the <i>condition</i> of the CASE. There may be many OROF options associated with one OF option. An OROF may optionally be put on a separate line. An OROF does not terminate preceding <i>statements</i> groups, so control “falls into” the OROF <i>statements</i> .
<b>ELSE</b>	The <i>statements</i> following <b>ELSE</b> are executed when all preceding OF and OROF options have been evaluated as not equivalent. ELSE is not required; however, when used, it must be the last option in the CASE structure.
<i>statements</i>	Any valid Clarion executable source code.

A **CASE** structure selectively executes the first set of *statements* encountered for which there is equivalence between the *condition* and *expression* or range of *expressions*. CASE structures may be nested within other executable structures and other executable structures may be nested within CASE structures. The CASE structure must terminate with an END statement (or period).

For those situations where the program’s logic could allow using either a CASE structure or a complex IF/ELSIF structure, the CASE structure will

generally generate more efficient object code. EXECUTE generates the most efficient object code for those special cases where the condition evaluates to an integer in the range of 1 to n.

Example:

```

CASE ACCEPTED()                                !Evaluate field edit routine
OF ?Name                                         !If field is Name
  ERASE(?Address,?Zip)                          ! erase Address through Zip
  GET(NameFile,NameKey)                        ! get the record

CASE Action                                     !Evaluate Action
OF 1                                             ! adding record - does not exist
  IF NOT ERRORCODE()                          ! should be a file error
    ErrMsg = 'ALREADY ON FILE'                ! otherwise display error message
    DISPLAY(?Address,?Zip)                    ! display address through zipcode
    SELECT(?Name)                             ! re-enter the name
  END
OF 2 OROF 3                                     ! change or delete - record exists
  DISPLAY(?Address,?Zip)                      ! display address through zipcode
END                                             ! end case action

CASE Name[1]                                   !Get first letter of name
OF 'A' TO 'M'                                  !Process first half of alphabet
OROF 'a' TO 'm'
  DO FirstHalf
OF 'N' TO 'Z' OROF 'n' TO 'z'                  !Process second half of alphabet
  DO SecondHalf
END                                             !End case sub(name)

OF ?Address                                     !If field is address
  DO AddressVal                               ! call validation routine
END                                             !End case accepted()

```

See Also: EXECUTE, IF



## EXECUTE (statement execution structure)

```

EXECUTE expression
  statement 1
  statement 2
  [ BEGIN
    statements
  END ]
  statement n
  [ ELSE ]
    statement
  END

```

<b>EXECUTE</b>	Initiates a single statement execution structure.
<i>expression</i>	A numeric expression or a variable that contains a numeric integer.
<i>statement 1</i>	A single statement that executes only when the <i>expression</i> is equal to 1.
<i>statement 2</i>	A single statement that executes only when the <i>expression</i> is equal to 2.
<b>BEGIN</b>	<b>BEGIN</b> marks the beginning of a structure containing a number of lines of code. The BEGIN structure will be treated as a single statement by the EXECUTE structure. The BEGIN structure is terminated by a period or the keyword END.
<i>statement n</i>	A single statement that executes only when the <i>expression</i> is equal to <i>n</i> .
<b>ELSE</b>	The <i>statement</i> following <b>ELSE</b> executes when the <i>expression</i> evaluates to a value outside the range of 1 to <i>n</i> , where <i>n</i> is defined as the total number of single statements between the EXECUTE and the ELSE.
<i>statement</i>	A single statement that executes only when the <i>expression</i> is outside the valid range.

An **EXECUTE** structure selects a single executable statement (or executable code structure) based on the value of the *expression*. The EXECUTE structure must terminate with an END statement (or period).

If the *expression* equals 1, the first statement (*statement 1*) executes. If *expression* equals 2, the second statement (*statement 2*) executes, and so on. If the value of the *expression* is zero, or greater than the total number of statements (or structures) within the EXECUTE structure, the *statement* in the ELSE clause executes. If no ELSE clause is present, program execution continues with the next statement following the EXECUTE structure.

EXECUTE structures may be nested within other executable structures and other executable code structures (IF, CASE, LOOP, EXECUTE, and

BEGIN) may be nested within an EXECUTE. For those situations where the program's logic could allow using either an EXECUTE, CASE, or an IF/ELSIF structure, the EXECUTE structure will generate more efficient object code, and is the preferred method.

Example:

```
EXECUTE Transact          !Evaluate Transact
  ADD(Customer)           !Execute if Transact = 1
  PUT(Customer)           !Execute if Transact = 2
  DELETE(Customer)        !Execute if Transact = 3
END                        !End execute

EXECUTE CHOICE()          !Evaluate CHOICE() procedure
  OrderPart               !Execute if CHOICE() = 1
  BEGIN                   !Execute if CHOICE() = 2
    SavVendor" = Vendor
    UpdVendor
    IF Vendor <> SavVendor"
      Mem:Message = 'VENDOR NAME CHANGED'
    . .
  CASE VendorType         !Execute if CHOICE() = 3
  OF 1
    UpdPartNo1
  OF 2
    UpdPartNo2
  END
  RETURN                  !Execute if CHOICE() = 4
END                        !End execute

EXECUTE SomeValue
  DO OneRoutine
  DO TwoRoutine
ELSE
  MESSAGE('SomeValue did not contain a 1 or 2')
END
```

See Also: **BEGIN, CASE, IF**

## IF (conditional execution structure)

```

IF logical expression [ THEN ]
    statements
[ ELSIF logical expression [ THEN ]
    statements ]
[ ELSE
    statements ]
END

```

<b>IF</b>	Initiates a conditional statement execution structure.
<i>logical expression</i>	A variable, procedure, or expression which evaluates a condition. Control is determined by the result (true or false) of the expression. Zero (or blank) evaluates as false, anything else is true.
<b>THEN</b>	The <i>statements</i> following <b>THEN</b> execute when the preceding <i>logical expression</i> is true. If used, <b>THEN</b> must only appear on the same line as <b>IF</b> or <b>ELSIF</b> .
<i>statements</i>	An executable statement, or a sequence of executable statements.
<b>ELSIF</b>	The <i>logical expression</i> following an <b>ELSIF</b> is evaluated only when all preceding <b>IF</b> or <b>ELSIF</b> conditions were evaluated as false.
<b>ELSE</b>	The <i>statements</i> following <b>ELSE</b> execute only when all preceding <b>IF</b> and <b>ELSIF</b> options evaluate as false. <b>ELSE</b> is not required, however, when used, it must be the last option in the IF structure.

An **IF** structure controls program execution based on the outcome of one or more *logical expressions*. IF structures may have any number of **ELSIF** statement groups. IF structures may be “nested” within other executable structures. Other executable structures may be nested within an IF structure. Each IF structure must terminate with an **END** statement (or period).

Example:

```

IF Cus:TransCount = 1                                !If new customer
    AcctSetup                                           ! call account setup procedure
ELSIF Cus:TransCount > 10 AND Cus:TransCount < 100    !If regular customer
    DO RegularAcct                                     ! process the account
ELSIF Cus:TransCount > 100                             !If special customer
    DO SpecialAcct                                     ! process the account
ELSE                                                    !Otherwise
    DO NewAcct                                         ! process the account
    IF Cus:Credit THEN CheckCredit ELSE CLEAR(Cus:CreditStat).
                                                    ! verify credit status
END
IF ERRORCODE() THEN ErrHandler(Cus:AcctNumber,Trn:InvoiceNbr). !Handle errors

```

See Also:

**EXECUTE, CASE**

## LOOP (iteration structure)

```

label  LOOP [ | count TIMES | | ]
          | i = initial TO limit [ BY step ] | |
          | UNTIL logical expression | |
          | WHILE logical expression | |
          | statements | |
          | END | |
          | UNTIL logical expression | |
          | WHILE logical expression | |

```

<b>LOOP</b>	Initiates an iterative statement execution structure.
<i>count</i>	An integer constant, variable, or expression specifying the number of TIMES <i>statements</i> in the LOOP execute.
<b>TIMES</b>	Executes <i>count</i> number of iterations of the <i>statements</i> .
<i>i</i>	The label of a variable which automatically increments (or decrements, if <i>step</i> is negative) on each iteration.
= <i>initial</i>	A numeric constant, variable, or expression specifying the value of the increment variable ( <i>i</i> ) on the first pass through the LOOP structure.
TO <i>limit</i>	A numeric constant, variable, or expression specifying the terminating value for the LOOP. When <i>i</i> is greater than <i>limit</i> (or less than, if the <i>step</i> is a negative value) the LOOP structure control sequence terminates. The <i>i</i> variable contains the last incremental value greater than (or less than) the <i>limit</i> after the LOOP terminates.
BY <i>step</i>	A numeric constant, variable, or expression specifying the quantity by which the <i>i</i> variable increments (or decrements, if the value is negative) on each iteration of the LOOP. If BY <i>step</i> is omitted, <i>i</i> increments by 1.
<b>UNTIL</b>	When placed on the LOOP statement, UNTIL evaluates the <i>logical expression</i> before each iteration. When terminating the LOOP structure, UNTIL evaluates the <i>logical expression</i> after each iteration. If the <i>logical expression</i> evaluates to true, the LOOP terminates.
<b>WHILE</b>	When placed on the LOOP statement, WHILE evaluates the <i>logical expression</i> before each iteration. When terminating the LOOP structure, WHILE evaluates the <i>logical expression</i> after each iteration. If the <i>logical expression</i> evaluates to false, the LOOP terminates.
<i>logical expression</i>	A numeric or string variable, expression, or procedure. A <i>logical expression</i> evaluates a condition. Control is determined by the result (true or false) of the expression. A zero numeric or blank string value evaluates as false, anything else is true.

*statements*                      An executable statement, or a sequence of executable statements.

A **LOOP** structure repetitively executes the *statements* within its structure. LOOP structures may be nested within other executable code structures. Other executable code structures may be nested within a LOOP structure. Each LOOP structure must terminate with an END statement (or period), an UNTIL, or a WHILE statement.

A LOOP with no condition at the top or bottom iterates continuously until a BREAK or RETURN statement executes. BREAK discontinues the LOOP and continues program execution with the statement following the LOOP structure. All statements within a LOOP structure executes unless a CYCLE statement executes. CYCLE immediately sends program execution back to the top of the LOOP for the next iteration, without executing any further statements in the LOOP following the CYCLE.

LOOP UNTIL or LOOP WHILE *logical expressions* are always evaluated at the top of the LOOP, before the LOOP *statements* execute. Therefore, if the *logical expression* is false on the first pass, the LOOP *statements* will not execute even once. To create a LOOP that always executes its *statements* at least once, the UNTIL or WHILE clause must terminate the LOOP structure.

Example:

LOOP	!Continuous loop
Char = GetChar()	! get a character
IF Char <> CarrReturn	! if it's not a carriage return
Field = CLIP(Field) & Char	! append the character
ELSE	! otherwise
BREAK	! break out of the loop
.	!End if, end loop
IF ERRORCODE()	!On error
LOOP 3 TIMES	! loop three times
BEEP	! sound the alarm
.	!End loop, end if
LOOP I# = 1 TO 365 BY 7	!Loop, increment I# by 7 each time
GET(DailyTotal,I#)	! read every 7th record
DO WeeklyJob	
END	!I# contains 372 when the LOOP terminates
LOOP I# = 10 TO 1 BY -1	!Loop, decrementing I# by 1 each time
DO SomeRoutine	
END	!I# contains zero (0) when the LOOP terminates
SET(MasterFile)	!Point to first record
LOOP UNTIL EOF(MasterFile)	!Process all the records
NEXT(MasterFile)	! read a record
ProcMaster	! call the procedure
END	
LOOP WHILE KEYBOARD()	!Empty the keyboard buffer
ASK	! without processing keystrokes
UNTIL KEYCODE() = EscKey	! but break the loop for Escape

See Also:

**BREAK, CYCLE**

## Execution Control Statements

### BREAK (immediately leave loop)

**BREAK** [ *label* ]

#### **BREAK**

Transfers control to the first statement following the terminator of a LOOP or ACCEPT structure.

#### *label*

The label on the LOOP or ACCEPT statement from which to break. This must be the label of a nested loop structure containing the BREAK statement.

The **BREAK** statement immediately terminates processing in the LOOP or ACCEPT structure and transfers control to the first statement following the terminating END, WHILE, or UNTIL statement of the LOOP, or the terminating END statement of the ACCEPT structure.

BREAK may only be used in a LOOP or ACCEPT loop structure. The use of the optional *label* argument allows you to cleanly break out of multiple levels of nested loops, eliminating one common use of GOTO.

Example:

```

LOOP                                !Loop
  ASK                               ! wait for a keystroke
  IF KEYCODE() = EscKey             ! if Esc key pressed
    BREAK                           ! break out of the loop
  ELSE                              ! otherwise
    BEEP                            ! sound the alarm
  END
END

Loop1 LOOP                           !Loop1 is the label
  DO ParentProcess
Loop2 LOOP                           !Loop2 is the label
  DO ChildProcess
    IF SomeCondition
      BREAK Loop1                  !Break out of both nested loops
    END
  END
END

ACCEPT                              !ACCEPT loop structure
CASE ACCEPTED()
OF ?Ok
  CallSomeProc
OF ?Cancel
  BREAK                            ! break out of the loop
END
END

```

See Also:

LOOP, CYCLE, ACCEPT

## CYCLE (go to top of loop)

### CYCLE [ *label* ]

#### CYCLE

Transfers control back to the top of a LOOP or ACCEPT structure.

#### *label*

The label on the LOOP or ACCEPT statement to which to return. This must be the label of a nested loop structure containing the CYCLE statement.

The **CYCLE** statement passes control immediately back to the top of the LOOP or ACCEPT loop. CYCLE may only be used in a LOOP or ACCEPT loop structure. The use of the optional *label* argument allows you to cleanly go back to the top of outer levels of nested loops, eliminating one common use of GOTO.

In an ACCEPT loop, for certain events, CYCLE terminates an automatic action before it is performed (such as EVENT:Move). This behavior is documented for each event so affected.

Example:

```

SET(MasterFile)                !Point to first record
LOOP                           !Process all the records
  NEXT(MasterFile)              ! read a record
  IF ERRORCODE() THEN BREAK.    !Get out of loop at end of file
  DO MatchMaster                ! check for a match
  IF NoMatch                    ! if match not found
    CYCLE                       ! jump to top of loop
  END
  DO TransVal                  ! validate the transaction
  PUT(MasterFile)              ! write the record
END

Loop1 LOOP                      !Loop1 is the label
  DO ParentProcess
Loop2 LOOP                      !Loop2 is the label
  DO ChildProcess
    IF SomeCondition
      CYCLE Loop1              !Cycle back to top of outer loop
    END
  END
END
END
```

See Also:

LOOP, BREAK, ACCEPT

## DO (call a ROUTINE)

---

### DO *label*

**DO** Executes a ROUTINE.

*label* The label of a ROUTINE statement.

The **DO** statement is used to execute a ROUTINE local to a PROGRAM or PROCEDURE. When a ROUTINE completes execution, program control reverts to the statement following the DO statement. A ROUTINE may only be called within the CODE section containing the ROUTINE's source code.

Example:

```
DO NextRecord      !Call the next record routine
DO CalcNetPay      !Call the calc net pay routine
```

See Also: EXIT, ROUTINE

## EXIT (leave a ROUTINE)

---

### EXIT

The **EXIT** statement immediately leaves a ROUTINE and returns program control to the statement following the DO statement that called it. This is different from RETURN, which completely exits the PROCEDURE even when called from within a ROUTINE.

An EXIT statement is not required. A ROUTINE with no EXIT statement terminates automatically when the entire sequence of statements in the ROUTINE is complete.

Example:

```
CalcNetPay ROUTINE
  IF GrossPay = 0      !If no pay
    EXIT              ! exit the routine
  END
  NetPay = GrossPay - FedTax - Fica
  QtdNetPay += NetPay
  YtdNetPay += NetPay
```

See Also: DO, RETURN



## GOTO (go to a label)

---

### **GOTO** *target*

**GOTO**

Unconditionally transfers program control to another statement.

*target*

The label of another executable statement within the PROGRAM, PROCEDURE, or ROUTINE.

The **GOTO** statement unconditionally transfers control from one statement to another. The *target* of a GOTO must not be the label of a ROUTINE or PROCEDURE.

The scope of GOTO is limited to the currently executing ROUTINE or PROCEDURE—it may not *target* a label outside the ROUTINE or PROCEDURE in which it is used.

Extensive use of GOTO is generally not considered good structured programming practice. LOOP is usually considered a better alternative.

Example:

```
ComputeIt PROCEDURE(Level)
  CODE
  IF Level = 0 THEN GOTO PassCompute.    !Skip rate calculation if no Level
  Rate = Level * Markup                  !Compute Rate
  RETURN(Rate)                           ! and return it
PassCompute RETURN(999999)               !Return bogus number
```

See Also:

**LOOP**

## RETURN (return to caller)

**RETURN**( [*expression*] )

### **RETURN**

Terminates a PROGRAM or PROCEDURE.

*expression*

The *expression* passes the return value of a PROCEDURE prototyped to return a value back to the expression in which the PROCEDURE was used. This may be NULL if the PROCEDURE returns a reference.

The **RETURN** statement terminates a PROGRAM or PROCEDURE and passes control back to the caller. When RETURN is executed from the CODE section of a PROGRAM, the program is terminated, all files and windows are closed, and control is passed to the operating system.

RETURN is required in a PROCEDURE prototyped to return a value and optional in a PROGRAM or PROCEDURE which does not return a value. If RETURN is not used in a PROCEDURE or PROGRAM, an implicit RETURN occurs at the end of the executable code. The end of executable code is defined as the end of the source file, or the beginning of another PROCEDURE or ROUTINE.

RETURN from a PROCEDURE (whether explicit or implicit) automatically closes any local APPLICATION, WINDOW, REPORT, or VIEW structure opened in the PROCEDURE. It does not automatically close any Global or Module Static APPLICATION, WINDOW, REPORT, or VIEW. It also closes and frees any local QUEUE structure declared without the STATIC attribute.

Example:

```

IF Done# THEN RETURN.           !Quit when done

DayOfWeek PROCEDURE(Date)       !Procedure to return the day of the week
RetVal    STRING(9)
CODE
EXECUTE Date % 7                !Determine what day of week Date is
    RetVal = 'Monday'
    RetVal = 'Tuesday'
    RetVal = 'Wednesday'
    RetVal = 'Thursday'
    RetVal = 'Friday'
    RetVal = 'Saturday'
ELSE
    RetVal = 'Sunday'
END
RETURN(RetVal)                  ! and RETURN the correct day string

```

See Also:

PROCEDURE, PROCEDURE Return Types

# **13 - BUILT-IN PROCEDURES**

## ***Procedures Listed by Function***

### **Logic Control**

---

CHAIN (execute another program)  
HALT (exit program)  
IDLE (arm periodic procedure)  
RUN (execute command)  
SHUTDOWN (arm termination procedure)  
STOP (suspend program execution)

### **Event Processing**

---

ACCEPT (the event processor)  
ALERT (set event generation key)  
EVENT (return event number)  
POST (post user-defined event)  
REGISTER (register event handler)  
UNREGISTER (unregister event handler)  
YIELD (allow event processing)

### **Multi-Threading**

---

START (return new execution thread)  
THREAD (return current execution thread)  
UNLOCKTHREAD (unlock the current execution thread)  
LOCKTHREAD (re-lock the current execution thread)  
THREADLOCKED (returns current execution thread locked state)

### **Window Processing**

---

ACCEPTED (return control just completed)  
CHANGE (change control field value)  
CHOICE (return relative item position)  
CLOSE (close window)  
CONTENTS (return contents of USE variable)  
CREATE (create new control)  
DESTROY (remove a control)  
DISABLE (dim a control)

DISPLAY (write USE variables to screen)  
ENABLE (re-activate dimmed control)  
ERASE (clear screen control and USE variables)  
FIELD (return control with focus)  
FIRSTFIELD (return first window control)  
FOCUS (return control with focus)  
GETFONT (get font information)  
GETPOSITION (get control position)  
HELP (help window access)  
HIDE (blank a control)  
INCOMPLETE (return empty REQ control)  
LASTFIELD (return last window control)  
MESSAGE (return message box response)  
MOUSEX (return mouse horizontal position)  
MOUSEY (return mouse vertical position)  
OPEN (open window for processing)  
POPUP (return popup menu selection)  
SELECT (select next control to process)  
SELECTED (return control that has received focus)  
SET3DLOOK (set 3D window look)  
SETCURSOR (set temporary mouse cursor)  
SETFONT (specify font)  
SETPOSITION (specify new control position)  
SETTARGET (set current window or report)  
UNHIDE (show hidden control)  
UPDATE (write from screen to USE variables)

## Keyboard Processing

---

ALIAS (set alternate keycode)  
ASK (get one keystroke)  
KEYBOARD (return keystroke waiting)  
KEYCHAR (return ASCII code)  
KEYCODE (return last keycode)  
KEYSTATE (return keyboard status)  
PRESS (put characters in the buffer)  
PRESSKEY (put a keystroke in the buffer)  
SETKEYCHAR (specify ASCII code)  
SETKEYCODE (specify keycode)

## Windows Standard Dialogs

---

COLORDIALOG (return chosen color)  
FILEDIALOG (return chosen file)  
FONTDIALOG (return chosen font)  
PRINTERDIALOG (return chosen printer)

## Drag and Drop Processing

---

CLIPBOARD (return windows clipboard contents)  
DRAGID (return matching drag-and-drop signature)  
DROPID (return drag-and-drop string)  
SETCLIPBOARD (set windows clipboard contents)  
SETDROPID (set DROPID return string)

## Maintaining INI Files

---

GETINI (return INI file entry)  
PUTINI (set INI file entry)

## Report Processing

---

CLOSE (close an active report structure)  
ENDPAGE (force page overflow)  
OPEN (open a report structure for processing)  
PRINT (print a report structure)

## Graphics Processing

---

ARC (draw an arc of an ellipse)  
BLANK (erase graphics)  
BOX (draw a rectangle)  
CHORD (draw a section of an ellipse)  
ELLIPSE (draw an ellipse)  
IMAGE (draw a graphic image)  
LINE (draw a straight line)  
PENCOLOR (return line draw color)  
PENSTYLE (return line draw style)  
PENWIDTH (return line draw thickness)  
PIE (draw a pie chart)  
POLYGON (draw a multi-sided figure)  
ROUNDBOX (draw a box with round corners)  
SETPENCOLOR (set line draw color)  
SETPENSTYLE (set line draw style)  
SETPENWIDTH (set line draw thickness)  
SHOW (write to screen)  
TYPE (write string to screen)

## File Processing

---

BUFFER (set FILE record paging)  
BUILD (build keys and indexes)  
CLOSE (close a data file)  
COPY (copy a file)  
CREATE (create an empty data file)  
EMPTY (empty a data file)  
FLUSH (flush buffers)  
LOCK (exclusive file access)  
NAME (return file name)  
OPEN (open a data file)  
PACK (remove deleted records)  
RECORDS (return number of file or key records)  
REMOVE (erase a file)  
RENAME (change file directory name)  
SEND (send message to file driver)  
STATUS (return file status)  
STREAM (enable operating system buffering)  
UNLOCK (unlock a locked data file)

## Record Processing

---

ADD (add a new file record)  
APPEND (add a new file record)  
BYTES (return size in bytes)  
DELETE (delete a file record)  
DUPLICATE (check for duplicate key entries)  
GET (read a file record by direct access)  
HOLD (exclusive file record access)  
NEXT (read next file record in sequence)  
NOMEMO (read file record without reading memo)  
POSITION (return file record sequence position)  
PREVIOUS (read previous file record in sequence)  
PUT (write record back to file)  
RELEASE (release a held file record)  
REGET (reget file record)  
RESET (reset file record sequence position)  
SET (initiate sequential file processing)  
SKIP (bypass file records in sequence)  
WATCH (automatic file concurrency check)

## Transaction Processing

---

COMMIT (terminate successful transaction)  
LOGOUT (begin transaction)  
ROLLBACK (terminate unsuccessful transaction)

## Null Data Processing

---

NULL (return null file field)  
SETNULL (set file field null)  
SETNONNULL (set file field non-null)

## Internationalization Support

---

CONVERTANSITOOEM (convert ANSI strings to ASCII)  
CONVERTOEMTOANSI (convert ASCII strings to ANSI)  
ISALPHA (return alphabetic character)  
ISLOWER (return lower case character)  
ISUPPER (return upper case character)  
LOCALE (load environment file)

## View Processing

---

BUFFER (set VIEW record paging)  
CLOSE (close a VIEW)  
OPEN (open a VIEW)  
DELETE (delete a view primary file record)  
FLUSH (flush buffers)  
HOLD (exclusive view record access)  
NEXT (read next view record in sequence)  
POSITION (return view record sequence position)  
PREVIOUS (read previous view record in sequence)  
PUT (write VIEW primary file record back)  
RECORDS (return number of rows in data set)  
REGET (reget view record)  
RELEASE (release a held view record)  
RESET (reset view record sequence position)  
SET (set view record sequence position)  
SKIP (bypass view records in sequence)  
WATCH (automatic view concurrency check)

## Queue Processing

---

ADD (add an entry)  
CHANGES (return changed queue)  
DELETE (delete an entry)  
FREE (delete all entries)  
GET (read an entry)  
POINTER (return last entry position)  
PUT (write an entry)  
RECORDS (return number of entries)  
SORT (sort entries)

## Mathematical Procedures

---

ABS (return absolute value)  
INRANGE (check number within range)  
INT (truncate fraction)  
LOGE (return natural logarithm)  
LOG10 (return base 10 logarithm)  
RANDOM (return random number)  
ROUND (return rounded number)  
SQRT (return square root)

## Trigonometric Procedures

---

SIN (return sine)  
COS (return cosine)  
TAN (return tangent)  
ASIN (return arcsine)  
ACOS (return arccosine)  
ATAN (return arctangent)

## String Processing

---

ALL (return repeated characters)  
CENTER (return centered string)  
CHR (return character from ASCII)  
CLIP (return string without trailing spaces)  
DEFORMAT (return unformatted numbers from string)  
FORMAT (return formatted numbers into a picture)  
INLIST (return entry in list)  
INSTRING (return substring position)  
LEFT (return left justified string)  
LEN (return length of string)



LOWER (return lower case)  
MATCH (return matching strings)  
NUMERIC (return numeric string)  
RIGHT (return right justified string)  
SUB (return substring of string)  
UPPER (return upper case)  
VAL (return ASCII value)

## Bit Manipulation

---

BAND (return bitwise AND)  
BOR (return bitwise OR)  
BXOR (return bitwise exclusive OR)  
BSHIFT (return shifted bits)

## Date / Time Processing

---

TODAY (return system date)  
SETTODAY (set system date)  
CLOCK (return system time)  
SETCLOCK (set system time)  
DATE (return standard date)  
DAY (return day of month)  
MONTH (return month of date)  
YEAR (return year of date)  
AGE (return age from base date)

## Field Access

---

ISSTRING (return field string type or not)  
WHAT (return field from group)  
WHERE (return field position in group)

## Operating System Procedures

---

COMMAND (return command line)  
DIRECTORY (get file directory)  
LONGPATH (return long filename)  
PATH (return current directory)  
RUNCODE (return program exit code)  
SETCOMMAND (set command line parameters)  
SETPATH (change current drive and directory)  
SHORTPATH (return short filename)

## Error Reporting

---

ERROR (return error message)  
ERRORCODE (return error code number)  
ERRORFILE (return error filename)  
FILEERROR (return file driver error message)  
FILEERRORCODE (return file driver error code number)  
REJECTCODE (return reject code number)

## Miscellaneous

---

ADDRESS (return memory address)  
BEEP (sound tone on speaker)  
CALL (call procedure from a DLL)  
CHOOSE (return chosen value)  
MAXIMUM (return maximum subscript value)  
OMITTED (return omitted parameters)  
PEEK (read memory address)  
POKE (write to memory address)  
UNLOAD (remove a CALLED DLL from memory)

## Built-in Procedures

### ABS (return absolute value)

#### ABS(*expression*)

**ABS** Returns absolute value.

*expression* A constant, variable, or expression.

The **ABS** procedure returns the absolute value of an *expression*. The absolute value of a number is always positive (or zero).

Return Data Type: REAL or DECIMAL

Example:

```
C = ABS(A - B)           !C is absolute value of the difference
IF B < 0 THEN B = ABS(B). !If b is negative make it positive
```

See Also: BCD Operations and Procedures

### ACCEPTED (return control just completed)

#### ACCEPTED( )

The **ACCEPTED** procedure returns the field number of the control on which an EVENT:Accepted event occurred. **ACCEPTED** returns zero (0) for all other events.

Positive field numbers are assigned by the compiler to all WINDOW controls, in the order their declarations occur in the WINDOW structure. Negative field numbers are assigned to all APPLICATION controls. In executable code statements, field numbers are usually represented by field equate labels—the label of the USE variable preceded by a question mark (?FieldName).

Return Data Type: SIGNED

Example:

```
CASE ACCEPTED()          !Process post-edit code
OF ?Cus:Company
    !Edit field value
OF ?Cus:CustType
    !Edit field value
END
```

See Also: ACCEPT, EVENT

ACOS (return arccosine)

ACOS(*expression*)

<b>ACOS</b>	Returns inverse cosine.
<i>expression</i>	A numeric constant, variable, or expression for the value of the cosine.

The **ACOS** procedure returns the inverse cosine. The inverse of a cosine is the angle that produces the cosine. The return value is the angle in radians.  $\pi$  is a constant which represents the ratio of the circumference and radius of a circle. There are  $2\pi$  radians (or 360 degrees) in a circle.

Return Data Type:      **REAL**

Example:

```
PI           EQUATE(3.1415926535898)      !The value of PI
Rad2Deg      EQUATE(57.295779513082)      !Number of degrees in a radian
Deg2Rad      EQUATE(0.0174532925199)      !Number of radians in a degree
CODE
InvCosine = ACOS(CosineAngle)    !Get the Arccosine
```

See Also:              **TAN, ATAN, SIN, ASIN, COS**

## ADD (add an entry)

ADD(	<i>file</i>	
	<i>file</i> , <i>length</i>	
	<i>queue</i>	)
	<i>queue</i> , [+] <i>key</i> ,...,[-] <i>key</i>	
	<i>queue</i> , <i>name</i>	
	<i>queue</i> , <i>pointer</i>	

<b>ADD</b>	Writes a new record to a FILE or QUEUE.
<i>file</i>	The label of a FILE declaration.
<i>length</i>	An integer constant, variable, or expression which contains the number of bytes in the RECORD buffer to write to the <i>file</i> . If omitted or out of range, <i>length</i> defaults to the length of the RECORD structure.
<i>queue</i>	The label of a QUEUE structure, or the label of a passed QUEUE parameter.
+ -	The leading plus or minus sign specifies the <i>key</i> is sorted in ascending or descending sequence. If omitted, ascending sequence is the default.
<i>key</i>	The label of a field declared within the QUEUE structure. If the QUEUE has a PRE attribute, the <i>key</i> must include the prefix.
<i>name</i>	A string constant, variable, or expression containing the NAME attribute of QUEUE fields, separated by commas, and optional leading + or - signs for each attribute. This parameter is case sensitive.
<i>pointer</i>	A numeric constant, variable, or numeric expression. The <i>pointer</i> must be in the range from 1 to the number of entries in the memory queue.

The **ADD** statement writes a new record to a FILE or QUEUE.

### FILE Usage

All KEYs associated with the *file* are also updated during each ADD. If there is no room for the record on disk, the “Access Denied” error is posted. If an error is posted, no record is added to the file.

You can use the DUPLICATE procedure to check whether the ADD will return the “Creates Duplicate Key” error. The DUPLICATE procedure assumes that the contents of the RECORD structure data buffer are duplicated at the current record pointer location. Therefore, when using DUPLICATE prior to ADDing a record, the record pointer should be cleared with: GET(*file*,0).

**ADD(*file*)**

Adds a new record to the *file* by writing the entire contents of the data file's record buffer to disk.

**ADD(*file,length*)**

Adds a new record to the *file* by writing *length* number of bytes from the data file's record buffer to disk. The *length* must be greater than zero and not greater than the length of the RECORD. This form of ADD is not supported by all file drivers—check your file driver documentation.

**QUEUE Usage**

ADD writes a new entry from the QUEUE structure data buffer to the QUEUE. If there is not enough memory to ADD a new entry, the “Insufficient Memory” error is posted.

**ADD(*queue*)**

Appends a new entry to the end of the QUEUE.

**ADD(*queue,pointer*)**

Places a new entry at the relative position specified by the *pointer* parameter. If there is an entry already at the relative *pointer* position, it is “pushed down” to make room for the new entry. All following pointers are readjusted to account for the new entry. For example, an entry added at position 10 pushes entry 10 to position 11, entry 11 to position 12, etc. If *pointer* is zero or greater than the number of entries in the QUEUE, the entry is added at the end.

**ADD(*queue,key*)**

Inserts a new entry in a sorted memory queue. Multiple *key* parameters may be used (up to 16), separated by commas, with optional leading plus or minus signs to indicate ascending or descending sequence. The entry is inserted immediately after all other entries with matching *key* values. Using only this form of ADD will build the QUEUE in sorted order.

**ADD(*queue,name*)**

Inserts a new queue entry in a sorted memory queue. The *name* string must contain the NAME attributes of the fields, separated by commas, with optional leading plus or minus signs to indicate ascending or descending sequence. The entry is inserted immediately after all other entries with matching field values. If there are no entries, ADD(*queue,name*) may be used to build the QUEUE in sorted order.

If the QUEUE contains any reference variables or fields with the ANY data type, you must first CLEAR the QUEUE entry before assigning new values to the component fields of the QUEUE. This avoids possible memory leaks, since these data types automatically allocate memory.

Errors Posted:      05 Access Denied  
                       08 Insufficient Memory  
                       37 File Not Open  
                       40 Creates Duplicate Key  
                       75 Invalid Field Type Descriptor

Example:

```

NameQue  QUEUE
Name      STRING(20),NAME('FirstField')
Zip       DECIMAL(5,0),NAME('SecondField')
AnyField  ANY
          END

CODE
ADD(Customer)                                !Add a new customer file record
IF ERRORCODE() THEN STOP(ERROR()).          ! and check for errors

NameQue.Name = 'Jones'                      !Assign data
NameQue.Zip = 12345
NameQue.AnyField &= NEW(STRING(10))         !Create a new STRING(10) field in the QUEUE
ADD(NameQue)                                !Add an entry to the end of the QUEUE
CLEAR(NameQue)                              !Clear ANY for next entry

NameQue.Name = 'Taylor'                    !Assign data
NameQue.Zip = 12345
NameQue.AnyField &= NEW(STRING(20))         !Create a new STRING(20) field in the QUEUE
ADD(NameQue,+NameQue.Name,-NameQue.Zip)     !Ascending name, descending zip order
CLEAR(NameQue)                              !Clear ANY for next entry

NameQue.Name = 'Adams'                    !Assign data
NameQue.Zip = 12345
NameQue.AnyField &= NEW(STRING(30))         !Create a new STRING(30) field in the QUEUE
ADD(NameQue,1)                              !Add an entry at position 1
CLEAR(NameQue)                              !Clear ANY for next entry

Que:Name = 'Smith'                        !Assign data
Que:Zip = 12345
NameQue.AnyField &= NEW(STRING(40))         !Create a new STRING(40) field in the QUEUE
ADD(NameQue,+FirstField,-SecondField)      !Ascending name, descending zip order
CLEAR(NameQue)                              !Clear ANY for next entry

```

See Also:            SORT, CLEAR, Reference Variables, PUT, GET, DUPLICATE, APPEND

## ADDRESS (return memory address)

<b>ADDRESS(</b>	<i>segment, offset</i>	<b>)</b>
	<i>variable</i>	

### ADDRESS

Returns memory address of a variable.

#### *segment*

The label of a data element, or an integer expression containing the segment portion of a segment:offset real-mode absolute memory address.

#### *offset*

An integer expression containing the offset portion of a segment:offset real-mode absolute memory address.

#### *variable*

The label of a data item or PROCEDURE.

The **ADDRESS** procedure returns a **LONG** integer containing a memory address in selector:offset format, where the selector is a reference into the protected mode lookup table.

### ADDRESS(*segment, offset*)

Returns the protected mode selector:offset for the real mode address specified by the *segment* and *offset* parameters. This allows protected mode direct memory access without incurring a protection violation. Valid only in 16-bit programs.

### ADDRESS(*variable*)

Returns the protected mode address of the specified data item or PROCEDURE.

The **ADDRESS** procedure allows you to pass the address of a *variable* or *procedure* to external libraries written in other languages, or to reference assign the address to a reference variable.

Return Data Type:      **LONG**

Example:

```
MAP
  ClarionProc                                !A Clarion language procedure
  MODULE('External.Obj')                    !An external library
    ExternVarProc(LONG)                     !C procedure receiving variable address
    ExternProc(LONG)                       !C procedure receiving procedure address
  . .
Var1 CSTRING(10)                           !Define a null-terminated string
CODE
  ExternVarProc(ADDRESS(Var1))              !Pass address of Var1 to external procedure
  ExternProc(ADDRESS(ClarionProc))         !Pass address of ClarionProc
ClarionProc PROCEDURE                      !A Clarion language procedure
CODE
RETURN
```

See Also:      PEEK, POKE, Reference Assignment Statements



## AGE (return age from base date)

---

**AGE**(*birthdate* [,*base date*])

<b>AGE</b>	Returns elapsed time.
<i>birthdate</i>	A numeric expression for a standard date.
<i>base date</i>	A numeric expression for a standard date. If this parameter is omitted, the operating system date is used for the computation.

The **AGE** procedure returns a string containing the time elapsed between two dates. The age return string is in the following format:

1 to 60 days	- 'nn DAYS'
61 days to 24 months	- 'nn MOS'
2 years to 999 years	- 'nnn YRS'

Return Data Type:       **STRING**

Example:

```
Message = Emp:Name & 'is ' & AGE(Emp:DOB,TODAY()) & ' old today.'
```

See Also:               **Standard Date, DAY, MONTH, YEAR, TODAY, DATE**

## ALERT (set event generation key)

---

**ALERT**([*first-keycode*] [,*last-keycode*])

<b>ALERT</b>	Specifies keys that generate an event.
<i>first-keycode</i>	A numeric keycode or keycode equate label. This may be the lower limit in a range of keycodes.
<i>last-keycode</i>	The upper limit keycode, or keycode equate label, in a range of keycodes.

**ALERT** specifies a key, or an inclusive range of keys, as event generation keys for the currently active window. The **ALERT** statement with no parameters clears all **ALERT** keys.

Two field-independent events, **EVENT:PreAlertKey** and **EVENT:AlertKey**, generate when the user presses the **ALERTed** key (in that order). If the code does not execute a **CYCLE** statement when processing **EVENT:PreAlertKey**, you “shortstop” the library’s default action on the alerted keypress. If the code does execute **CYCLE** when processing **EVENT:PreAlertKey**, the library performs its default action for the alerted keypress. In either case, **EVENT:AlertKey** generates following **EVENT:PreAlertKey**.

Any key with a keycode may be used as the parameter of an **ALERT** statement. **ALERT** generates field-independent events, since it is not associated with any particular control. When **EVENT:AlertKey** is generated by an **ALERT** key, the **USE** variable of the control that currently has input focus is not automatically updated (use **UPDATE** if this is required).

The **ALERT** statement alerts its keys separately from the **ALRT** attribute of a window or control. This means that clearing all **ALERT** keys has no effect on any keys alerted by **ALRT** attributes.

Example:

```

Screen WINDOW,ALRT(F10Key),ALRT(F9Key) !F10 and F9 alerted
      LIST,AT(109,48,50,50),USE(?List),FROM(Que),IMM
      BUTTON('&Ok'),AT(111,108,,),USE(?Ok)
      BUTTON('&Cancel'),AT(111,130,,),USE(?Cancel)
    END
CODE
OPEN(Screen)
ALERT                                     !Turn off all alerted keys
ALERT(F1Key,F12Key)                     !Alert all function keys
ALERT(279)                              !Alert the Ctrl-Esc key
ACCEPT
CASE EVENT()
  OF EVENT:PreAlertKey                  !Pre-check alert events
    IF KEYCODE() <> F4Key               !Dis-Allow F4 key standard library action, and allow
      CYCLE                             ! all other F keys to perform their standard functions
    END
  OF EVENT:AlertKey                    !Alert processing
    CASE KEYCODE()
      OF 279                          !Check for Ctrl+Esc
        BREAK
      OF F9Key                        !Check for F9
        F9HotKeyProc                 !Call hot key procedure
      OF F10Key                      !Check for F10
        F10HotKeyProc                !Call hot key procedure
    END
  END
END
END

```

See Also:

UPDATE, ALRT

## ALIAS (set alternate keycode)

**ALIAS**( [*keycode*, [*new keycode*] ] )

**ALIAS** Changes the keycode generated when the original key is pressed.

*keycode* A numeric keycode or keycode EQUATE. If both parameters are omitted, all ALIASed keys are reset to their original values.

*new keycode* A numeric keycode or keycode EQUATE. If omitted, the *keycode* is reset to its original value.

**ALIAS** changes the *keycode* to generate the *new keycode* when the user presses the original key. **ALIAS** does not affect keypresses generated by **PRESSKEY**. The effect of **ALIAS** is global, throughout all execution threads, no matter where the **ALIAS** statement executes. Therefore, to only change the *keycode* locally, you must reset ALIASed keys when the window loses focus.

Keycode values 0800h through 0FFFFh are unassigned and may be used as a *new keycode*. The practical effect of this is to disable the original key if your program does not test for the *new keycode*.

Example:

```
ALIAS(EnterKey,TabKey)    !Allow user to press enter instead of tab
ALIAS(F3Key,F1Key)        !Move help to F3
ALIAS                     !Clear all aliased keys
```

See Also: **KEYCODE**

## ALL (return repeated characters)

**ALL**(*string* [,*length*])

**ALL** Returns repeated characters.

*string* A string expression containing the character sequence to be repeated.

*length* The length of the return string. If omitted the *length* of the return string is 255 characters.

The **ALL** procedure returns a string containing repetitions of the character sequence *string*.

Return Data Type: **STRING**

Example:

```
Starline = ALL('*',25)    !Get 25 asterisks
Dotline = ALL('.',25)    !Get 255 dots
```

## APPEND (add a new file record)

### APPEND(*file* [, *length*])

#### APPEND

Writes a new record to a FILE.

#### *file*

The label of a FILE declaration.

#### *length*

An integer constant, variable, or expression which contains the number of bytes to write to the *file*. The *length* must be greater than zero and not greater than the length of the RECORD. If omitted or out of range, *length* defaults to the length of the RECORD structure.

The **APPEND** statement writes a new record from the RECORD structure data buffer to the data file. No KEYs associated with the *file* are updated during an APPEND. After APPENDING records, the KEYs must be rebuilt with the BUILD command.

APPEND is usually used in batch processes, to speed the process of adding a large number of records at one time to the *file*. For most every file system, it is much faster to add 5000 records to a *file* using APPEND (and then issue BUILD at the end of the process to rebuild all the keys at once) than it is to use ADD to add the same 5000 records (which automatically updates the keys with each new record added).

If an error is posted, no record is added to the file. If there is no room for the record on disk, the “Access Denied” error is posted.

Errors Posted:      05 Access Denied  
                         37 File Not Open

Example:

```

LOOP                                !Process an input file
  NEXT(InFile)                      ! getting each record in turn
  IF ERRORCODE() THEN BREAK.        ! break loop on error
  Cus:Record = Inf:Record           !Copy the data to Customer file
  APPEND(Customer)                  ! and APPEND a customer record
  IF ERRORCODE() THEN STOP(ERROR()). ! check for errors
END
BUILD(Customer)                     !Re-build Keys

```

See Also:            BUILD, ADD

## ARC (draw an arc of an ellipse)

**ARC( *x* ,*y* ,*width* ,*height* ,*startangle* ,*endangle* )**

<b>ARC</b>	Draws an arc of an ellipse on the current window or report.
<i>x</i>	An integer expression that specifies the horizontal position of the starting point.
<i>y</i>	An integer expression that specifies the vertical position of the starting point.
<i>width</i>	An integer expression that specifies the width.
<i>height</i>	An integer expression that specifies the height.
<i>startangle</i>	An integer expression that specifies the starting point of the arc, in tenths of degrees (10 = 1 degree) measured counter-clockwise from three o'clock.
<i>endangle</i>	An integer expression that specifies the ending point of the arc, in tenths of degrees (10 = 1 degree) measured counter-clockwise from three o'clock.

The **ARC** procedure places an arc of an ellipse on the current target. The ellipse is drawn inside a “bounding box” defined by the *x*, *y*, *width*, and *height* parameters. The *x* and *y* parameters specify the starting point, and the *width* and *height* parameters specify the horizontal and vertical size of the “bounding box.”

The *startangle* and *endangle* parameters specify what sector of the ellipse will be drawn, as an arc.

The border color is the current pen color set by **SETPENCOLOR**; the default color is the Windows system color for window text. The border width is the current width set by **SETPENWIDTH**; the default width is one pixel. The border style is the current pen style set by **SETPENSTYLE**; the default style is a solid line.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
ARC(100,50,100,50,0,900)    !Draw 90 degree arc from 3 to 12 o'clock, as
                           ! the top-right quadrant of ellipse
```

See Also:

Current Target, **SETPENCOLOR**, **SETPENWIDTH**, **SETPENSTYLE**

## ASK (get one keystroke)

### ASK

**ASK** reads a single keystroke from the keyboard buffer. Program execution stops to wait for a keystroke. If there is already a keystroke in the keyboard buffer, ASK gets one keystroke without waiting. The ASK statement also allows any TIMER attribute events to generate and cycle their own ACCEPT loop. This means any batch processing code can allow other threads to execute their TIMER attribute tasks during the batch process.

Example:

```
ASK                                !Wait for a keystroke
LOOP WHILE KEYBOARD()            !Empty the keyboard buffer
  ASK                            ! without processing keystrokes
END
```

See Also:               KEYCODE, KEYBOARD

## ASIN (return arcsine)

### ASIN(*expression*)

**ASIN**                       Returns inverse sine.

*expression*               A numeric constant, variable, or expression for the value of the sine.

The **ASIN** procedure returns the inverse sine. The inverse of a sine is the angle that produces the sine. The return value is the angle in radians.  $\pi$  is a constant which represents the ratio of the circumference and radius of a circle. There are  $2\pi$  radians (or 360 degrees) in a circle.

Return Data Type:       **REAL**

Example:

```
PI           EQUATE(3.1415926535898)           !The value of PI
Rad2Deg     EQUATE(57.295779513082)           !Number of degrees in a radian
Deg2Rad     EQUATE(0.0174532925199)           !Number of radians in a degree
CODE
  InvSine = ASIN(SineAngle)   !Get the Arcsine
```

See Also:               **TAN, ATAN, SIN, COS, ACOS**

ATAN (return arctangent)

ATAN(*expression*)

ATAN	Returns inverse tangent.
<i>expression</i>	A numeric constant, variable, or expression for the value of the tangent.

The ATAN procedure returns the inverse tangent. The inverse of a tangent is the angle that produces the tangent. The return value is the angle in radians.  $\pi$  is a constant which represents the ratio of the circumference and radius of a circle. There are  $2\pi$  radians (or 360 degrees) in a circle.

Return Data Type      REAL

Example:

```
PI            EQUATE(3.1415926535898)            !The value of PI
Rad2Deg      EQUATE(57.295779513082)            !Number of degrees in a radian
Deg2Rad      EQUATE(0.0174532925199)            !Number of radians in a degree
CODE
InvTangent = ATAN(TangentAngle)            !Get the Arctangent
```

See Also:            TAN, SIN, ASIN, COS, ACOS



## BAND (return bitwise AND)

### BAND(*value*,*mask*)

#### BAND

Performs bitwise AND operation.

#### *value*

A numeric constant, variable, or expression for the bit *value* to be compared to the bit *mask*. The *value* is converted to a LONG data type prior to the operation, if necessary.

#### *mask*

A numeric constant, variable, or expression for the bit *mask*. The *mask* is converted to a LONG data type prior to the operation, if necessary.

The **BAND** procedure compares the *value* to the *mask*, performing a Boolean AND operation on each bit. The return value is a LONG integer with a one (1) in the bit positions where the *value* and the *mask* both contain one (1), and zeroes in all other bit positions.

BAND is usually used to determine whether an individual bit, or multiple bits, are on (1) or off (0) within a variable.

Return Data Type:      **LONG**

Example:

```
!BAND(0110b,0010b) returns 0010b!0110b = 6, 0010b = 2
```

```
RateType  BYTE                !Type of rate
Female    EQUATE(0001b)       !Female mask
Male      EQUATE(0010b)       !Male mask
Over25    EQUATE(0100b)       !Over age 25 mask
CODE
  IF BAND(RateType,Female) |   !If female
    AND BAND(RateType,Over25) ! and over 25
    DO BaseRate                ! use base premium
  ELSIF BAND(RateType,Male)    !If male
    DO AdjBase                 ! adjust base premium
END
```

See Also:                **BOR, BXOR, BSHIFT**

## BEEP (sound tone on speaker)

---

### BEEP( [*sound*] )

<b>BEEP</b>	Generates a sound through the system speaker.
<i>sound</i>	A numeric constant, variable, expression, or EQUATE for the Windows sound to issue.

The **BEEP** statement generates a sound through the system speaker. These are standard Windows sounds available through the [sounds] section of the WIN.INI file. Standard EQUATE values similar to these are listed in the EQUATES.CLW file:

```
BEEP:SystemDefault
BEEP:SystemHand
BEEP:SystemQuestion
BEEP:SystemExclamation
BEEP:SystemAsterisk
```

Example:

```
IF ERRORCODE()                                !If unexpected error
    BEEP(BEEP:SystemDefault)                  ! sound a standard beep
    STOP(ERROR())                             ! stop for the error
END
```

## BLANK (erase graphics)

**BLANK**( [*x*] [*y*] [,*width*] [,*height*] )

### **BLANK**

Erases all graphics written to the specified area of the current window or report.

*x*

An integer expression that specifies the horizontal position of the starting point. If omitted, the default is zero.

*y*

An integer expression that specifies the vertical position of the starting point. If omitted, the default is zero.

*width*

An integer expression that specifies the width. If omitted, the default is the width of the window.

*height*

An integer expression that specifies the height. If omitted, the default is the height of the window.

The **BLANK** procedure erases all graphics written to the specified area of the current window or report. Controls are not erased. **BLANK** with no parameters erases the entire window or report.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
ARC(100,50,100,50,0,900)    !Draw arc
BLANK                      !Then erase it
```

See Also:

Current Target

## BOR (return bitwise OR)

### BOR(*value*,*mask*)

<b>BOR</b>	Performs bitwise OR operation.
<i>value</i>	A numeric constant, variable, or expression for the bit <i>value</i> to be compared to the bit <i>mask</i> . The <i>value</i> is converted to a LONG data type prior to the operation, if necessary.
<i>mask</i>	A numeric constant, variable, or expression for the bit <i>mask</i> . The <i>mask</i> is converted to a LONG data type prior to the operation, if necessary.

The **BOR** procedure compares the *value* to the *mask*, performing a Boolean OR operation on each bit. The return value is a LONG integer with a one (1) in the bit positions where the *value*, or the *mask*, or both, contain a one (1), and zeroes in all other bit positions.

BOR is usually used to unconditionally turn on (set to one), an individual bit, or multiple bits, within a variable.

Return Data Type:      **LONG**

Example:

```
!BOR(0110b,0010b) returns 0110b    !0110b = 6, 0010b = 2
```

```
RateType  BYTE                      !Type of rate
Female    EQUATE(0001b)             !Female mask
Male      EQUATE(0010b)             !Male mask
Over25    EQUATE(0100b)             !Over age 25 mask
CODE
RateType = BOR(RateType,Over25)     !Turn on over 25 bit
RateType = BOR(RateType,Male)       !Set rate to male
```

See Also:                **BAND, BXOR, BSHIFT**

## BOX (draw a rectangle)

**BOX**( *x* , *y* , *width* , *height* [, *fill*] )

<b>BOX</b>	Draws a rectangular box on the current window or report.
<i>x</i>	An integer expression that specifies the horizontal position of the starting point.
<i>y</i>	An integer expression that specifies the vertical position of the starting point.
<i>width</i>	An integer expression that specifies the width.
<i>height</i>	An integer expression that specifies the height.
<i>fill</i>	A LONG integer constant, constant EQUATE, or variable containing the red, green, and blue components that create the color in the three low-order bytes (bytes 0, 1, and 2) or an EQUATE for a standard Windows color value.

The **BOX** procedure places a rectangular box on the current window or report. The position and size of the box are specified by *x*, *y*, *width*, and *height* parameters.

The *x* and *y* parameters specify the starting point, and the *width* and *height* parameters specify the horizontal and vertical size of the box. The box extends to the right and down from its starting point.

The border color is the current pen color set by SETPENCOLOR; the default color is the Windows system color for window text. The border width is the current width set by SETPENWIDTH; the default width is one pixel. The border style is the current pen style set by SETPENSTYLE; the default style is a solid line.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
BOX(100,50,100,50,00FF0000h)    !Red box
```

See Also:

Current Target, SETPENCOLOR, SETPENWIDTH, SETPENSTYLE

## BSHIFT (return shifted bits)

---

### **BSHIFT**(*value*,*count*)

**BSHIFT**

Performs the bit shift operation.

*value*

A numeric constant, variable, or expression. The *value* is converted to a LONG data type prior to the operation, if necessary.

*count*

A numeric constant, variable, or expression for the number of bit positions to be shifted. If *count* is positive, *value* is shifted left. If *count* is negative, *value* is shifted right.

The **BSHIFT** procedure shifts a bit *value* by a bit *count*. The bit value may be shifted left (toward the high order), or right (toward the low order). Zero bits are supplied to fill vacated bit positions when shifting.

Return Data Type:      **LONG**

Example:

```
!BSHIFT(0110b,1)    returns 1100b
!BSHIFT(0110b,-1)   returns 0011b
```

```
Varswitch = BSHIFT(20,3)           !Multiply by eight
Varswitch = BSHIFT(Varswitch,-2)   !Divide by four
```

See Also:              **BAND, BOR, BXOR**

## BUFFER (set record paging)

**BUFFER**( *entity* [, *pagesize*] [, *behind*] [, *ahead*] [, *timeout*] )

<b>BUFFER</b>	Specifies FILE or VIEW paging.
<i>entity</i>	The label of a FILE or VIEW structure.
<i>pagesize</i>	An integer constant or variable which specifies the number of records in a single “page” of records (PROP:FetchSize). If omitted, the default value is one (1).
<i>behind</i>	An integer constant or variable which specifies the number of “pages” of records to store after they’ve been read. If omitted, the default value is zero (0).
<i>ahead</i>	An integer constant or variable which specifies the number of additional “pages” of records to read ahead of the currently displayed page. If omitted, the default value is zero (0).
<i>timeout</i>	An integer constant or variable which specifies the number of seconds the buffered records are considered not to be obsolete in a network environment. If omitted, the default value is zero (0), which indicates no time limit.

The **BUFFER** statement specifies automatic record set buffering for the specified *entity* by the file driver. If there are multiple file drivers used by the files in a VIEW *entity*, **BUFFER** is ignored.

The number of records in a single “page” of records is specified by the *pagesize* parameter. This is also the number of records fetched in a single call to the database. The *ahead* parameter specifies asynchronous read-ahead buffering of a number of pages, while the *behind* parameter saves pages of already read records.

The records in the buffer must be contiguous. Therefore, issuing a SET to an area of the *entity* that is not currently in the buffer, or changing the sort order or the FILTER condition of a VIEW, will clear the buffers. The buffers remain active until the *entity* is closed, or a FLUSH statement is issued. The buffers will reflect the results of ADD, PUT, or DELETE statements, however, this may cause an implicit flush if a PUT changes key components or an ADD adds a record that is not within the current contiguous set of buffered records.

BUFFER allows the performance of “browse” type procedures to be virtually instantaneous when displaying pages of records already read, due to use of the *ahead* and *behind* parameters. BUFFER can also optimize performance when the file driver is a Client/Server back-end database engine (usually SQL-based), since the file driver can then optimize the calls made to the back-end database for minimum network traffic.

**BUFFER** is not supported by all file drivers—see the relevant file driver's documentation for further information.

Example:

```
CODE
OPEN(MyView)
BUFFER(MyView,10,5,2,300)  !10 records per page, 5 pages behind and 2 read-ahead,
                           !  with a 5 minute timeout

CODE
OPEN(MyFile)
BUFFER(MyFile,10,5,2,300)  !10 records per page, 5 pages behind and 2 read-ahead,
                           !  with a 5 minute timeout
```

See Also:

**FLUSH**



## BUILD (build keys and indexes)

<b>BUILD</b> (	<i>file</i>	[, <i>components</i> [, <i>filter</i> ] ] )
	<i>index</i>	
	<i>key</i>	

<b>BUILD</b>	Builds keys and indexes.
<i>file</i>	The label of a FILE declaration.
<i>index</i>	The label of an INDEX declaration.
<i>key</i>	The label of a KEY declaration.
<i>components</i>	A string constant or variable containing the list of the component fields on which to BUILD the dynamic INDEX. The fields must be separated by commas, with leading plus (+) or minus (-) to indicate ascending or descending sequence (if supported by the file driver).
<i>filter</i>	A string constant, variable, or expression containing a logical expression with which to filter out unneeded records from the dynamic <i>index</i> . This requires that you name <i>components</i> for the <i>index</i> . You must BIND all variables used in the <i>filter</i> expression.

The **BUILD** statement re-builds keys and indexes in a FILE..

### BUILD(*file*)

Builds all the KEYs declared for the file. The file must be closed, LOCKed, or opened with *access mode* set to 12h (ReadWrite/DenyAll) or 22h (ReadWrite/DenyWrite).

### BUILD(*key*) or BUILD(*index*)

Builds only the specified KEY or INDEX. The file must be closed, LOCKed, or opened with *access mode* set to either 12h (ReadWrite/DenyAll) or 22h (ReadWrite/DenyWrite).

### BUILD(*index,components,filter*)

Builds a dynamic INDEX. This form does not require exclusive access to the file, however, the file must be open (with any valid *access mode*). The dynamic INDEX is created as a temporary file, exclusive to the user who BUILDS it. The temporary file is automatically deleted when the file is closed. If a *filter* is specified, the resulting INDEX will contain only those records which meet the *filter* criteria. The *filter* must be in a format supported by the file driver.

BUILD will generate events to the currently open window if you assign a value (an integer from 1 to 100) to PROP:ProgressEvents for the affected FILE before you issue the BUILD. The larger the value you assign to PROP:ProgressEvents, the more events are generated and the slower the BUILD will progress. These events allow you to indicate to the user the progress of the BUILD. This can keep end-users informed that BUILD is

still working while building large files (so they don't re-boot thinking the machine has locked up).

It is not valid to make any calls to the *file* being built except to query its properties, call NAME(*file*), or CLOSE(*file*) (which aborts the process and is not recommended). Issuing a CYCLE statement in response to any of the events generated (except EVENT:BuildDone) cancels the operation. During the BUILD operation, *file*{PROP:Completed} returns the percentage completed of the re-build and you can use *file*{PROP:CurrentKey} to get a key reference then either *key*{PROP:Name} or *key*{PROP:Label} to return the name of the current key being built.

Errors Posted:

- 37 File Not Open
- 40 Creates Duplicate Key
- 63 Exclusive Access Required
- 76 Invalid Index String
- 93 BUILD Cancelled

Events Generated:

- EVENT:BuildFile BUILD(*file*) is rebuilding the data portion of the *file*.
- EVENT:BuildKey BUILD(*key*) or BUILD(*index*) is rebuilding the key, or BUILD(*file*) is rebuilding the keys in the *file*.
- EVENT:BuildDone The BUILD is complete. If the user cancelled the BUILD, ERRORCODE 93 is set.

Example:

```
Names    FILE, DRIVER('TopSpeed'), PRE(Nam)    !Declare a file structure
NameKey   KEY(Nam:Name), OPT                  !Declare name key
NbrNdx    INDEX(Nam:Number), OPT              !Declare number index
DynNdx    INDEX()                            !Declare a dynamic index
Rec       RECORD
Name      STRING(20), NAME('Nam:Name')
Number    SHORT, NAME('Nam:Number')
. .

CODE
OPEN(Names, 12h)          !Open file, exclusive read/write
BUILD(Names)              !Build all keys on Names file
BUILD(Nam:NbrNdx)         !Build the number index
BUILD(Nam:DynNdx, '+Nam:Number, +Nam:Name')
                          !Build dynamic index ascending number, ascending name

BIND('Nam:Name', Nam:Name) !BIND the filter variable
BUILD(Nam:DynNdx, '+Nam:Name', 'UPPER(Nam:Name[1]) = A')
                          !Build dynamic index of names that start with A
UNBIND('Nam:Name')        !UNBIND the filter variable
```

See Also: OPEN, SHARE, BIND, PROP:ProgressEvents, PROP:Completed

## BXOR (return bitwise exclusive OR)

**BXOR**(*value*,*mask*)

### **BXOR**

Performs bitwise exclusive OR operation.

*value*

A numeric constant, variable, or expression for the bit *value* to be compared to the bit *mask*. The *value* is converted to a LONG data type prior to the operation, if necessary.

*mask*

A numeric constant, variable, or expression for the bit *mask*. The *mask* is converted to a LONG data type prior to the operation, if necessary.

The **BXOR** procedure compares the *value* to the *mask*, performing a Boolean XOR operation on each bit. The return value is a LONG integer with a one (1) in the bit positions where either the *value* or the *mask* contain a one (1), but not both. Zeroes are returned in all bit positions where the bits in the *value* and *mask* are alike.

**BXOR** is usually used to toggle on (1) or off (0) an individual bit, or multiple bits, within a variable.

Return Data Type: **LONG**

Example:

```
!BXOR(0110b,0010b) returns 0100b !0110b = 6, 0100b = 4, 0010b = 2
```

```
RateType  BYTE                !Type of rate
Female    EQUATE(0001b)       !Female mask
Male      EQUATE(0010b)       !Male mask
Over25    EQUATE(0100b)       !Over age 25 mask
Over65    EQUATE(1100b)       !Over age 65 mask
CODE
RateType = BXOR(RateType,Over65) !Toggle over 65 bits
```

See Also: **BAND, BOR, BSHIFT**

## BYTES (return size in bytes)

### BYTES(*file*)

**BYTES** Returns number of bytes in FILE, or most recently read.  
*file* The label of a FILE.

The **BYTES** procedure returns the size of a FILE in bytes or the number of bytes in the last record successfully accessed. Following an OPEN statement, BYTES returns the size of the file. After the *file* has been successfully accessed by GET, REGET, NEXT, PREVIOUS, ADD, or PUT, the BYTES procedure returns the number of bytes accessed in the RECORD. The BYTES procedure may be used to return the number of bytes read in a variable length record.

Return Data Type: LONG

Example:

```
DosFileName  STRING(260),STATIC
LastRec      LONG
SavPtr       LONG(1)                !Start at 1
FileSize     LONG
DosFile      FILE,DRIVER('DOS'),PRE(DOS),NAME(DosFileName)
Record       RECORD
F1           STRING(2000)
.
.
BlobStorage  FILE,DRIVER('TopSpeed'),PRE(ST0)
File         BLOB,BINARY
Record       RECORD
FileName     STRING(64)
.
.
CODE
IF NOT FILEDIALOG('Choose File to Store',DosFileName,,0010b) THEN RETURN.
OPEN(BlobStorage)                !Open the BLOB file
ST0:FileName = DosFileName        ! and store the filename
OPEN(DosFile)                    !Open the file
FileSize = BYTES(DosFile)        !Get size of file
ST0:File[PROP:Size] = FileSize   ! and set the BLOB to store the file
LastRec = FileSize % SIZE(DOS:Record) !Check for short record at end of file
LOOP INT(FileSize/SIZE(DOS:Record)) TIMES
    GET(DosFile,SavPtr)          !Get each record
    ASSERT(NOT ERRORCODE())
    ST0:File[SavPtr - 1 : SavPtr + SIZE(DOS:Record) - 2] = DOS:Record
                                !String slice data into BLOB
    SavPtr += SIZE(DOS:Record)   !Compute next record pointer
END
IF LastRec                      !If short record at end of file
    GET(DosFile,SavPtr)        !Get last record
    ASSERT(BYTES(DosFile) = LastRec) ! size read should match computed size
    ST0:File[SavPtr - 1 : SavPtr + LastRec - 2] = DOS:Record
END
ADD(BlobStorage)
ASSERT(NOT ERRORCODE())
CLOSE(DosFile);CLOSE(BlobStorage)
```

See Also: OPEN

## CALL (call procedure from a DLL)

**CALL**( *file*, *procedure* [, *flags* ] )

<b>CALL</b>	Calls a procedure that has not been prototyped in the application's MAP structure from a Windows standard .DLL.
<i>file</i>	A string constant, variable, or expression containing the name (including extension) of the .DLL to open. This may include a full path.
<i>procedure</i>	A string constant, variable, or expression containing the name of the <i>procedure</i> to call (which may not receive parameters or return a value). This can also be the ordinal number indicating the <i>procedure's</i> position within the .DLL.
<i>flags</i>	An UNSIGNED integer constant, variable, or expression containing bitmap flag settings.

The **CALL** procedure calls a *procedure* from a Windows-standard .DLL. The *procedure* does not need to be prototyped in the application's MAP structure. If it is not already loaded by Windows, the .DLL *file* is loaded into memory. The .DLL *file* is automatically unloaded from memory when the *procedure* terminates unless the lowest *flags* bit is set to one (1). A .DLL *file* left loaded may be explicitly unloaded with the UNLOAD procedure.

CALL returns zero (0) for a successful *procedure* call, or one of the following error values:

- 2 File not found
- 3 Path not found
- 5 Attempted to load a task, not a .DLL
- 6 Library requires separate data segments for each task
- 10 Wrong Windows version
- 11 Invalid .EXE file (DOS file or error in program header)
- 12 OS/2 application
- 13 DOS 4.0 application
- 14 Unknown .EXE type
- 15 Attempt to load an .EXE created for an earlier version of Windows.  
This error will not occur if Windows is run in Real mode.
- 16 Attempt to load a second instance of an .EXE file containing  
multiple, writeable data segments.
- 17 EMS memory error on the second loading of a .DLL
- 18 Attempt to load a protected-mode-only application while Windows is  
running in Real mode

Return Data Type: **SIGNED**

Example:

```
X# = CALL('CUSTOM.DLL',1')    !Call first procedure in CUSTOM.DLL
IF X# THEN STOP(X#).          !Check for successful execution
```

See Also: **UNLOAD**

## CENTER (return centered string)

---

**CENTER**(*string* [,*length*])

**CENTER**

Returns centered string.

*string*

A string constant, variable or expression.

*length*

The length of the return string. If omitted, the length of the *string* parameter is used.

The **CENTER** procedure first removes leading and trailing spaces from a *string*, then pads it with leading and trailing spaces to center it within the *length*, and returns a centered string.

Return Data Type:      **STRING**

Example:

```
!CENTER('ABC',5)      returns ' ABC '
```

```
!CENTER('ABC ')      returns ' ABC '
```

```
!CENTER(' ABC')      returns ' ABC '
```

```
Message = CENTER(Message)      !Center the message  
Rpt:Title = CENTER(Name,60)      !Center the name
```

See Also:      **LEFT, RIGHT**

## CHAIN (execute another program)

### CHAIN(*program*)

#### CHAIN

*program*

Terminates the current program and executes another.

A string constant or variable containing the name of the program to execute. This may be any .EXE or .COM program.

**CHAIN** terminates the current program, closing all files and returning its memory to the operating system, and executes another *program*.

Example:

```

PROGRAM                                !MainMenu program code
CODE
EXECUTE CHOICE()
    CHAIN('Ledger')                    !Execute LEDGER.EXE
    CHAIN('Payroll')                  !Execute PAYROLL.EXE
    RETURN                            !Return to DOS
END

PROGRAM                                !Ledger program code
CODE
EXECUTE CHOICE()
    CHAIN('MainMenu')                  !Return to MainMenu program
    RETURN                            !Return to DOS
END

PROGRAM                                !Payroll program code
CODE
EXECUTE CHOICE()
    CHAIN('MainMenu')                  !Return to MainMenu program
    RETURN                            !Return to DOS
END

```

See Also:

**RUN**

## CHANGE (change control field value)

### CHANGE(*control,value*)

#### CHANGE

Changes the *value* displayed in a *control* in an APPLICATION or WINDOW structure.

#### *control*

Field number or field equate label of a window control field.

#### *value*

A constant or variable containing the *control's* new value.

The **CHANGE** statement changes the *value* displayed in a *control* in an APPLICATION or WINDOW structure. CHANGE updates the *control's* USE variable with the *value*, and then displays that new *value* in the control field.

Example:

```
Screen WINDOW,PRE(Scr)
    ENTRY(@N3),USE(Ctl:Code)
    ENTRY(@S30),USE(Ctl:Name)
    BUTTON('OK'),USE(?OkButton),KEY(EnterKey)
    BUTTON('Cancel'),USE(?CanxButton),KEY(EscKey)
END

CODE
OPEN(Screen)
ACCEPT
CASE EVENT()
OF EVENT:Selected
CASE SELECTED()
OF ?Ctl:Code
CHANGE(?Ctl:Code,4)           !Change Ctl:Code to 4 and display it
OF ?Ctl:Name
CHANGE(?Ctl:Name,'ABC Company') !Change Ctl:Name to ABC Company and display
END
OF EVENT:Accepted
CASE ACCEPTED()
OF ?OkButton
BREAK
OF ?CanxButton
CLEAR(Ctl:Record)
BREAK
END
END
```

See Also:

DISPLAY, UPDATE



## CHANGES (return changed queue)

## CHANGES( *queue* )

## CHANGES

Returns a “hash” value for the QUEUE.

*queue*

The label of a QUEUE structure, or the label of a passed QUEUE parameter.

The **CHANGES** procedure returns a LONG integer containing a unique “hash” value for the current QUEUE contents. Saving this value then later comparing the saved value to the current return value from CHANGES allows you to easily detect that the contents of the QUEUE have changed (in any way at all).

Return Data Type: LONG

Example:

```
SaveHash      LONG
Que           QUEUE
Name          STRING(10)
END

CODE
Que.Name = 'Jones'
ADD(Que)                                !Add the entry
ASSERT(~ERRORCODE())
SaveHash = CHANGES(Que)                !Save the "hash" value
Que.Name = 'Jones II'
ADD(Que)                                !Add another entry
ASSERT(~ERRORCODE())
IF SaveHash <> CHANGES(Que)              !This should be a true expression here
    MESSAGE('CHANGES procedure worked correctly')
END
```

See Also: **QUEUE**

## CHOICE (return relative item position)

### CHOICE( [*control*] )

#### **CHOICE**

Returns a user selection number.

#### *control*

A field equate label of a LIST, COMBO, or OPTION control.

The **CHOICE** procedure returns the sequence number of a selected item in an OPTION structure, SHEET structure, LIST box, or COMBO control. With no parameter, CHOICE returns the sequence number of the selected item in the last control (LIST, SHEET, OPTION, or COMBO) that generated a Field-specific event to cycle the ACCEPT loop. CHOICE(*control*) returns the current selection number of any LIST, SHEET, OPTION, or COMBO in the currently active window.

CHOICE returns the sequence number of the selected RADIO control within an OPTION structure. The sequence number is determined by relative position within the OPTION. The first control listed in the OPTION structure's code is relative position 1, the second is 2, etc.

CHOICE returns the memory QUEUE entry number of the selected item when a LIST or COMBO box is completed.

Return Data Type:

**SIGNED**

Example:

```
CODE
ACCEPT
  EXECUTE CHOICE()      !Perform menu option
    AddRec              ! procedure to add record
    PutRec              ! procedure to change record
    DelRec              ! procedure to delete record
  RETURN                ! return to caller
END
END
```

See Also:

**LIST, SHEET, COMBO, OPTION, QUEUE, RADIO**

# CHOOSE (return chosen value)

CHOOSE( | *expression* ,*value*, *value* [,*value*...] | )  
| *condition* [,*value*, *value* ] | )

CHOOSE	Returns the chosen value from a list of possible values.
<i>expression</i>	An arithmetic expression which determines which <i>value</i> parameter to return. This expression must resolve to a positive integer.
<i>value</i>	A variable, constant, or expression for the procedure to return.
<i>condition</i>	A logical expression which determines which of the two <i>value</i> parameters to return.If no <i>value</i> parameters are present, one (1) is returned when the <i>expression</i> is true, and zero (0) is returned when the <i>expression</i> is false.

The **CHOOSE** procedure evaluates the *expression* or *condition* and returns the appropriate *value* parameter. If the *expression* resolves to a positive integer, that integer selects the corresponding *value* parameter for the CHOOSE procedure to return. If the *expression* evaluates to an out-of-range integer, then CHOOSE returns the last *value* parameter.

When the *condition* evaluates as true, then CHOOSE returns the first *value* parameter. When the *condition* evaluates to false, then CHOOSE returns the second *value* parameter. If no *value* parameters are present, CHOOSE returns one (1) for true, and zero (0) for false.

The return data type is dependent upon the data types of the *value* parameters:

All Value Parameters	Return Data Type
LONG	LONG
DECIMAL or LONG	DECIMAL
STRING	STRING
DECIMAL, LONG, or STRING	DECIMAL
anything else	REAL

Return Data Type:        LONG, DECIMAL, STRING, or REAL

Example:

```
!CHOOSE(4,'A','B','C','D','E')  returns 'D'
!CHOOSE(1 > 2,'A','B')          returns 'B'
!CHOOSE(1 > 2)                   returns zero (0)

?MyControl{PROP:Hide} = CHOOSE(SomeField = 0,TRUE,FALSE)
                           !Hide or unhide control, based on the value in SomeField
MyView{PROP:Filter} = 'Weight > CHOOSE(Sex = 'M',180,120)'
                           !VIEW filter to select "overweight" people of both sexes
```

See Also:                INLIST

## CHORD (draw a section of an ellipse)

**CHORD**( *x* , *y* , *width* , *height* , *startangle* , *endangle* [, *fill*] )

<b>CHORD</b>	Draws a closed sector of an ellipse on the current window or report.
<i>x</i>	An integer expression that specifies the horizontal position of the starting point.
<i>y</i>	An integer expression that specifies the vertical position of the starting point.
<i>width</i>	An integer expression that specifies the width.
<i>height</i>	An integer expression that specifies the height.
<i>startangle</i>	An integer expression that specifies the starting point of the chord, in tenths of degrees (10 = 1 degree) measured counter-clockwise from three o'clock.
<i>endangle</i>	An integer expression that specifies the ending point of the chord, in tenths of degrees (10 = 1 degree) measured counter-clockwise from three o'clock.
<i>fill</i>	A LONG integer constant, constant EQUATE, or variable containing the red, green, and blue components that create the color in the three low-order bytes (bytes 0, 1, and 2) or an EQUATE for a standard Windows color value.

The **CHORD** procedure places a closed sector of an ellipse on the current window or report. The ellipse is drawn inside a “bounding box” defined by the *x*, *y*, *width*, and *height* parameters. The *x* and *y* parameters specify the starting point, and the *width* and *height* parameters specify the horizontal and vertical size of the “bounding box.” The *startangle* and *endangle* parameters specify what sector of the ellipse will be drawn, as an arc. The two end points of the arc are also connected with a straight line.

The border color is the current pen color set by SETPENCOLOR; the default color is the Windows system color for window text. The border width is the current width set by SETPENWIDTH; the default width is one pixel. The border style is the current pen style set by SETPENSTYLE; the default style is a solid line.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
CHORD(100,50,100,50,0,900,00FF0000h)    !Red 90 degree crescent
```

See Also: Current Target, SETPENCOLOR, SETPENWIDTH, SETPENSTYLE

## CHR (return character from ASCII)

### CHR(*code*)

#### CHR

Returns the display character.

*code*

A numeric expression containing a numeric ASCII character code.

The **CHR** procedure returns the ANSI character represented by the ASCII character *code* parameter.

Return Data Type: **STRING**

Example:

```
Stringvar = CHR(122)      !Get lower case z
Stringvar = CHR(65)      !Get upper case A
```

See Also: **VAL**

## CLIP (return string without trailing spaces)

### CLIP(*string*)

#### CLIP

Removes trailing spaces.

*string*

A string expression.

The **CLIP** procedure removes trailing spaces from a *string*. The return string is a substring with no trailing spaces. **CLIP** is frequently used with the concatenation operator in string expressions using **STRING** data types.

**CLIP** is not normally needed with **CSTRING** data types, since these have a terminating character. **CLIP** is also not normally needed with **PSTRING** data types, since these have a length byte.

When used in conjunction with the **LEFT** procedure, you can remove both leading and trailing spaces (frequently called **ALLTRIM** in other languages).

Return Data Type: **STRING**

Example:

```
Name = CLIP>Last) & ', ' & CLIP(First) & Init & '.'    !Full name in military order
Name = CLIP(First) & CLIP(' ' & Middle) & ' ' & Last  !Full name with or with middle
AllTrimVar = CLIP(LEFT(MyVar))                      !Trim leading and trailing spaces at once
```

See Also: **LEFT**

## CLIPBOARD (return windows clipboard contents)

### CLIPBOARD( [*format*] )

#### CLIPBOARD

Returns the current contents of the Windows clipboard.

#### *format*

An integer constant or variable that defines the format of the clipboard's contents. If omitted, the default is CF\_TEXT .

The **CLIPBOARD** procedure returns the current contents of the windows clipboard. The *format* parameter defaults to CF\_TEXT (as defined in the Windows API) but any of the other CF\_ values can be specified (see a Windows API reference book for details). If the data in the clipboard is not in the specified *format*, CLIPBOARD returns a null string (''). The following clipboard formats are predefined in the Windows API:

CF_TEXT	1
CF_BITMAP	2
CF_METAFILEPICT	3
CF_SYLK	4
CF_DIF	5
CF_TIFF	6
CF_OEMTEXT	7
CF_DIB	8
CF_PALETTE	9
CF_PENDATA	10
CF_RIFF	11
CF_WAVE	12

Return Data Type: **STRING**

Example:

```

Que1  QUEUE
      STRING(30)
      END
Que2  QUEUE
      STRING(30)
      END
WinOne WINDOW,AT(0,0,160,400)
      LIST,AT(120,0,20,20),USE(?List1),FROM(Que1),DRAGID('List1')
      LIST,AT(120,120,20,20),USE(?List2),FROM(Que2),DROPID('List1','~FILE')
      END
CODE
OPEN(WinOne)
ACCEPT
CASE EVENT()
OF EVENT:Drag
  IF DRAGID()
    SETCLIPBOARD(Que1)
  END
OF EVENT:Drop
  Que2 = CLIPBOARD()
  ADD(Que2)
END
END

```

!When a drag event is attempted  
! check for success  
! and setup info to pass  
  
!When drop event is successful  
! get dropped info  
! and add it to the queue

See Also: **SETCLIPBOARD**

## CLOCK (return system time)

---

### CLOCK( )

The **CLOCK** procedure returns the time of day from the operating system time in standard time (expressed as hundredths of a second since midnight, plus one). Although the time is expressed to the nearest hundredth of a second, the system clock is only updated 18.2 times a second (approximately every 5.5 hundredths of a second).

Return Data Type:      **LONG**

Example:

```
Time = CLOCK()      !Save the system time
```

See Also:              Standard Time, **SETCLOCK**

## CLOSE (close a data structure)

---

### CLOSE( *entity* )

**CLOSE**

Closes a data structure.

*entity*

The label of a FILE, VIEW, APPLICATION, WINDOW, or REPORT structure.

**CLOSE** terminates processing on the active *entity*. Any memory used by the active *entity* is released when it is closed.

### FILE Usage

CLOSE(file) closes an active FILE. Generally, this flushes DOS buffers and frees any memory used by the open file other than the RECORD structure's data buffer. If the file is a member of a transaction set, error 56 (LOGOUT active) is posted.

### VIEW Usage

CLOSE(view) closes an active VIEW. A VIEW declared within a procedure is implicitly closed upon RETURN from the procedure, if it has not already been explicitly CLOSED. If the CLOSE(view) statement is not immediately preceded by a REGET statement, the state of the primary and secondary related files in the VIEW are undefined. The contents of their record buffers are undefined and a SET or RESET statement may be required before performing sequential processing on the file.

### APPLICATION and WINDOW Usage

CLOSE(window) closes an active APPLICATION or WINDOW structure. Memory used by the active window is released when it is closed and the underlying screen is automatically re-drawn. When a window is closed, if it is not the top-most window on its execution thread, all windows opened subsequent to the window being closed are automatically closed first. This occurs in the reverse order from which they were opened. An APPLICATION or WINDOW that is declared local to (within) a PROCEDURE is automatically closed when the program RETURNS from the procedure.

### REPORT Usage

CLOSE(report) closes an active REPORT structure, which prints the last page FOOTER (unless the last structure printed has the ALONE attribute) and any required group FOOTER structures, and closes the REPORT. If the REPORT has the PREVIEW attribute, all the temporary metafiles are deleted. RETURN from a procedure in which a REPORT is opened automatically closes the REPORT.



Errors Posted:           56 LOGOUT active

Example:

```

Customer      FILE,DRIER('Clarion'),PRE(Cus) !Declare customer file layout
AcctKey        KEY(Cus:AcctNumber)
Record         RECORD
AcctNumber     LONG
OrderNumber    LONG
Name           STRING(20)
Addr           STRING(20)
City           STRING(20)
State          STRING(20)
Zip            STRING(20)

ViewCust      . .
              VIEW(Customer) !Declare VIEW structure
              PROJECT(Cus:AcctNumber,Cus:Name)
              END

CODE
OPEN(Customer,22h)
SET(Cus:AcctKey)
OPEN(ViewCust)      !Open the customer view
!executable statements
CLOSE(ViewCust)     !and close it again

CLOSE(Customer)     !Close the customer file
CLOSE(MenuScr)      !Close the menu screen
CLOSE(CustEntry)    !Close customer data entry screen
CLOSE(CustRpt)      !Close the report

```

See Also:               OPEN, LOGOUT, ACCEPT

## COLORDIALOG (return chosen color)

**COLORDIALOG**( [*title*] ,*rgb* [, *suppress*] )

**COLORDIALOG** Displays the Windows standard color choice dialog box to allow the user to choose a color.

*title* A string constant or variable containing the title to place on the color choice dialog. If omitted, a default *title* is supplied by Windows.

*rgb* A LONG integer variable to receive the selected color.

*suppress* An integer constant or variable containing either zero (0) or one (1). If one, the list of standard colors is suppressed. If omitted or zero (0) the list of standard colors is displayed.

The **COLORDIALOG** procedure displays the Windows standard color choice dialog box and returns the color chosen by the user in the *rgb* parameter. Any existing value in the *rgb* parameter sets the default color choice presented to the user in the color choice dialog. The color chosen by the user may be either an RGB value (a positive value) or one of the Windows standard element colors (a negative value).

COLORDIALOG returns zero (0) if the user pressed the Cancel button, or one (1) if the user pressed the Ok button on the color choice dialog.

Return Data Type: **SIGNED**

Example:

```
MDIChild1 WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END

ColorNow LONG

CODE
IF NOT COLORDIALOG('Choose Box Color',ColorNow)
    ColorNow = 000000FFh          !Default to Red if user pressed Cancel
END
OPEN(MDIChild1)
BOX(100,50,100,50,ColorNow)    !User-defined color for box
```

See Also: **COLOR, FONT**

## COMMAND (return command line)

### COMMAND( [ *flag* ] )

#### COMMAND

Returns command line parameters.

#### *flag*

A string constant or variable containing the parameter for which to search, or the number of the command line parameter to return. If omitted or an empty string (''), all command parameters are returned as entered on the command line, appended to a leading space.

The **COMMAND** procedure returns the value of the *flag* parameter from the command line. If the *flag* is not found, **COMMAND** returns an empty string. If the *flag* is multiply defined, only the first occurrence encountered is returned.

**COMMAND** searches the command line for *flag=value* and returns *value*. There must be no blanks between *flag*, the equal sign, and *value*. The returned *value* terminates at the first comma or blank space. If a blank or comma is desired in a command line parameter, everything to the right of the equal sign must be enclosed in double quotes (*flag="value"*).

**COMMAND** will also search the command line for a *flag* containing a leading slash (/). If found, **COMMAND** returns the value of *flag* without the slash. If the *flag* only contains a number, **COMMAND** returns the parameter at that numbered position on the command line. A *flag* of '0' returns the minimum path the operating system used to find the command. This minimum path always includes the command (without command line parameters) but may not include the path (if the operating system found it in the current directory). A *flag* containing '1' returns the first command line parameter.

Return Data Type: **STRING**

Example:

```

IF COMMAND('/N')                !Was /N on the command line?
  DO SomeProcess
END
IF COMMAND('Option') = '1'      !Was Option=1 on the command line?
  DO OneProcess
END
CommandString = COMMAND('')     !Get all command parameters
CommandItself = COMMAND('0')    !Get the command itself
SecondParm = COMMAND('2')       !Get second parameter from command line

```

See Also: **SETCOMMAND**

## COMMIT (terminate successful transaction)

### COMMIT

The **COMMIT** statement terminates an active transaction. Execution of a **COMMIT** statement assumes that the transaction was completely successful and no **ROLLBACK** is necessary. Once **COMMIT** has been executed, **ROLLBACK** of the transaction is impossible.

**COMMIT** informs the file driver involved in the transaction that the temporary files containing the information necessary to restore the database to its previous state may be deleted. The file driver then performs the actions necessary to its file system to successfully terminate a transaction.

Errors Posted:        48 Unable to Log Transaction  
                          91 No Logout Active

Example:

```

LOGOUT(1,OrderHeader,OrderDetail)      !Begin Transaction
DO ErrHandler                          ! always check for errors
ADD(OrderHeader)                        !Add Parent record
DO ErrHandler                          ! always check for errors
LOOP X# = 1 TO RECORDS(DetailQue)      !Process stored detail records
    GET(DetailQue,X#)                   ! Get one from the QUEUE
    DO ErrHandler                      ! always check for errors
    Det:Record = DetailQue              ! Assign to record buffer
    ADD(OrderDetail)                   ! and add it to the file
    DO ErrHandler                      ! always check for errors
END
COMMIT                                 !Terminate successful transaction
ASSERT(~ERRORCODE())

ErrHandler ROUTINE                      !Error routine
IF NOT ERRORCODE() THEN EXIT.           !Bail out if no error
Err" = ERROR()                          !Save the error message
ROLLBACK                                !Rollback the aborted transaction
ASSERT(~ERRORCODE())
BEEP                                    !Alert the user
MESSAGE('Transaction Error - ' & Err")
RETURN                                  ! and get out

```

See Also:            **LOGOUT, ROLLBACK**

## CONTENTS (return contents of USE variable)

---

### CONTENTS(*control*)

**CONTENTS** Returns the value in the USE variable of a control.

*control* A field number or field equate label.

The **CONTENTS** procedure returns a string containing the value in the USE variable of an ENTRY, OPTION RADIO, or TEXT control.

A USE variable may be longer than its associated control field display picture OR may contain fewer characters than its total capacity. The **CONTENTS** procedure always returns the full length of the USE variable.

Return Data Type: **STRING**

Example:

```
IF CONTENTS(?LastName) = '' AND CONTENTS(?FirstName) = '' !If first and last name blank,  
    MessageField = 'Must Enter a First or Last Name' ! display error message  
END
```

## CONVERTANSITOOEM (convert ANSI strings to ASCII)

### CONVERTANSITOOEM( *string* )

#### CONVERTANSITOOEM

Translates ANSI strings to OEM ASCII.

*string*                      The label of the string to convert. This may be a single variable or a any structure that is treated as a GROUP (RECORD, QUEUE, etc.).

The **CONVERTANSITOOEM** statement translates either a single string or the strings within a GROUP from the ANSI (Windows display) character set into the OEM character set (ASCII with extra characters defined by the active code page).

This procedure is not required on data files if the OEM attribute is set on the file.

Example:

```
Customer  FILE,DRIVER('Clarion'),PRE(Cus)    !Declare file without OEM attribute
AcctKey   KEY(Cus:AcctNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
Name      STRING(20)
Addr      STRING(20)
. . .
Win WINDOW,SYSTEM
    STRING(@s20),USE(Cus:Name)
    END
CODE
OPEN(Customer)
SET(Customer)
NEXT(Customer)
CONVERTOEMTOANSI(Cus:Record) !Convert all strings from ASCII to ANSI
OPEN(Win)
ACCEPT
    !Process window controls
END
CONVERTANSITOOEM(Cus:Record) !Convert back to ASCII from ANSI
PUT(Customer)
```

See Also:                      CONVERTOEMTOANSI, OEM

## CONVERTOEMTOANSI (convert ASCII strings to ANSI)

### CONVERTOEMTOANSI( *string* )

#### CONVERTOEMTOANSI

Translates OEM ASCII strings to ANSI.

*string*                      The label of the string to convert. This may be a single variable or a any structure that is treated as a GROUP (RECORD, QUEUE, etc.).

The **CONVERTOEMTOANSI** statement translates either a single string or the strings within a GROUP from the the OEM character set (ASCII with extra characters defined by the active code page) into ANSI (Windows display) character set.

This procedure is not required on data files if the OEM attribute is set on the file.

Example:

```
Customer  FILE,DRIVER('Clarion'),PRE(Cus)    !Declare file without OEM attribute
AcctKey   KEY(Cus:AcctNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
Name      STRING(20)
Addr      STRING(20)
. . .
Win WINDOW,SYSTEM
    STRING(@s20),USE(Cus:Name)
END
CODE
OPEN(Customer)
SET(Customer)
NEXT(Customer)
CONVERTOEMTOANSI(Cus:Record) !Convert all strings from ASCII to ANSI
OPEN(Win)
ACCEPT
    !Process window controls
END
CONVERTANSITOOEM(Cus:Record) !Convert back to ASCII from ANSI
PUT(Customer)
```

See Also:                      **CONVERTANSITOOEM, OEM**

## COPY (copy a file)

### **COPY**(*file*,*new file*)

#### **COPY**

Duplicates a file.

#### *file*

The label of a **FILE** structure, or a string constant or variable containing the file specification of the file to copy.

#### *new file*

A string constant or variable containing a file specification. If the file specification does not contain a drive and path, the current drive and directory are assumed. If only the path is specified, the filename and extension of the original *file* are used for the *new file*.

The **COPY** statement duplicates a **FILE** and enters the specification for the *new file* in the operating system's directory listing. The *file* to copy must be closed, or the "File Already Open" error is posted. If the file specification of the *new file* is identical to the original *file*, the **COPY** statement is ignored.

Since some file drivers use multiple physical disk files for one logical **FILE** structure, the default filename and extension assumptions are dependent on the file driver. If any error is posted, the file is not copied.

Errors Posted:

02 File Not Found  
03 Path Not Found  
05 Access Denied  
52 File Already Open

Example:

```
TheFile  STRING(256),STATIC
SomeFile FILE,DRIVER('DOS'),NAME(TheFile)
Record   RECORD
F1       STRING(1)
        . .
CODE
TheFile = 'Names.DAT'
COPY(TheFile,'A:\')           !Copy file to floppy
COPY('C:\AUTOEXEC.BAT','A:\AUTOEXEC.BAT') !Copy file to floppy
```

See Also:

**CLOSE**



## COS (return cosine)

### COS(*radians*)

**COS**

Returns cosine.

*radians*

A numeric constant, variable or expression for the angle in radians.  $\pi$  is a constant which represents the ratio of the circumference and radius of a circle. There are  $2\pi$  radians (or 360 degrees) in a circle.

The **COS** procedure returns the trigonometric cosine of an angle measured in *radians*. The cosine is the ratio of the length of the angle's adjacent side divided by the length of the hypotenuse.

Return Data Type: **REAL**

Example:

```
PI      EQUATE(3.1415926535898)      !The value of PI
Rad2Deg EQUATE(57.295779513082)      !Number of degrees in a radian
Deg2Rad EQUATE(0.0174532925199)      !Number of radians in a degree
CODE
Angle = 45 * Deg2Rad      !Translate 45 degrees to Radians
CosineAngle = COS(Angle)  !Get the cosine of 45 degree angle
```

See Also: **TAN, ATAN, SIN, ASIN, ACOS**

## CREATE (create an empty data file)

### CREATE(*file*)

**CREATE**

Creates an empty data file.

*file*

The label of the FILE to be created.

The **CREATE** statement adds an empty data file to the operating system directory. If the *file* already exists, it is deleted and recreated as an empty file. The *file* must be closed, or the "File Already Open" error is posted. **CREATE** does not open the file for access.

Errors Posted:

- 03 Path Not Found
- 04 Too Many Open Files
- 05 Access Denied
- 52 File Already Open
- 54 No Create Attribute

Example:

```
CREATE(Master)      !Create a new master file
CREATE(Detail)      !Create a new detail file
```

See Also: **CLOSE**

## CREATE (return new control created)

**CREATE**( [ *control* ] , *type* [, *parent* ] [, *position* ] )

### **CREATE**

Creates a new control.

#### *control*

A field number or field equate label for the control to create. If omitted, the CREATE procedure returns the next available field number and assigns that to the control being created.

#### *type*

An integer constant, expression, EQUATE, or variable that specifies the type of control to create.

#### *parent*

A field number or field equate label that specifies the OPTION, GROUP, SHEET, TAB, MENU, HEADER, FOOTER, DETAIL, BREAK, or FORM to contain the new *control*. If omitted, the control has no *parent*.

#### *position*

An integer constant, expression, or variable that specifies the position within a MENU to place a new ITEM *control*. If omitted, the ITEM is added to the end.

**CREATE** dynamically creates a new control in the currently active APPLICATION or WINDOW, returning the value of the *control* parameter. When first created, the new *control* is initially hidden, so its properties can be set using the runtime property assignment syntax, SETPOSITION, and SETFONT. It appears on screen only by issuing an UNHIDE statement for the *control*.

You can also use CREATE to create report controls. To do this, you must first use SETTARGET to make the report the currently active TARGET, and you must also specify a *parent* for the control.

EQUATE statements for the *type* parameter are contained in the EQUATES.CLW file. The following list is a comprehensive sample of these (see EQUATES.CLW for the complete list):

CREATE:sstring	STRING(picture),USE(variable)
CREATE:string	STRING(constant)
CREATE:image	IMAGE()
CREATE:region	REGION()
CREATE:line	LINE()
CREATE:box	BOX()
CREATE:ellipse	ELLIPSE()
CREATE:entry	ENTRY()
CREATE:button	BUTTON()
CREATE:prompt	PROMPT()
CREATE:option	OPTION()
CREATE:radio	RADIO()
CREATE:check	CHECK()
CREATE:group	GROUP()

CREATE:list	LIST()
CREATE:combo	COMBO()
CREATE:spin	SPIN()
CREATE:text	TEXT()
CREATE:custom	CUSTOM()
CREATE:droplist	LIST(),DROP()
CREATE:dropcombo	COMBO(),DROP()
CREATE:menu	MENU()
CREATE:item	ITEM()

Return Data Type:      **LONG**

Example:

```

Screen  WINDOW,PRE(Scr)
        ENTRY(@N3),USE(Ctl:Code)
        ENTRY(@S30),USE(Ctl:Name)
        BUTTON('OK'),USE(?OkButton),KEY(EnterKey)
        BUTTON('Cancel'),USE(?CanxButton),KEY(EscKey)
END

X      SHORT
Y      SHORT
Width  SHORT
Height SHORT

Code4Entry  STRING(10)
?Code4Entry EQUATE(100)      !Create an arbitrary field equate number for CREATE to use

CODE
OPEN(Screen)
ACCEPT
CASE ACCEPTED()
OF ?Ctl:Code
    IF Ctl:Code = 4
        CREATE(?Code4Entry,CREATE:entry)      !Create the control
        ?Code4Entry{PROP:use} = Code4Entry      !Set USE variable
        ?Code4Entry{PROP:text} = '@s10'        !Set entry picture
        GETPOSITION(?Ctl:Code,X,Y,Width,Height)
        ?Code4Entry{PROP:Xpos} = X + Width + 40 !Set x position
        ?Code4Entry{PROP:Ypos} = Y             !Set y position
        UNHIDE(?Code4Entry)                   !Display the new control
    END
OF ?OkButton
    BREAK
OF ?CanxButton
    CLEAR(Ctl:Record)
    BREAK
END
END
CLOSE(Screen)
RETURN

```

See Also:      **DESTROY, SETTARGET**

## DATE (return standard date)

**DATE**(*month,day,year*)

<b>DATE</b>	Return standard date.
<i>month</i>	A positive numeric constant, variable, or expression for the <i>month</i> .
<i>day</i>	A positive numeric constant, variable, or expression for the <i>day</i> of the month.
<i>year</i>	A numeric constant, variable or expression for the <i>year</i> . The valid range for a <i>year</i> value is 00 through 99 (using “Intellidate” logic), or 1801 through 2099.

The **DATE** procedure returns a standard date for a given *month*, *day*, and *year*. The *month* and *day* parameters do allow positive out-of-range values (zero or negative values are invalid). A *month* value of 13 is interpreted as January of the next year. A *day* value of 32 in January is interpreted as the first of February. Consequently, DATE(12,32,97), DATE(13,1,97), and DATE(1,1,98) all produce the same result.

The century for a two-digit *year* parameter is resolved using the default “Intellidate” logic, which assumes the date falls in the range of the next 20 or previous 80 years from the current operating system date. For example, assuming the current year is 1998, if the *year* parameter is “15,” the date returned is in the year 2015, and if the *year* parameter is “60,” the date returned is in 1960.

Return Data Type:      **LONG**

Example:

```
HireDate = DATE(Hir:Month,Hir:Day,Hir:Year)           !Compute hire date
FirstOfMonth = DATE(MONTH(TODAY()),1,YEAR(TODAY())) !Compute First day of month
```

See Also:              **Standard Date, DAY, MONTH, YEAR, TODAY**

## DAY (return day of month)

---

### DAY(*date*)

**DAY**

Returns day of month.

*date*

A numeric constant, variable, expression, or the label of a STRING, CSTRING, or PSTRING variable declared with a date picture token. The *date* must be a standard date. A variable declared with a date picture token is automatically converted to a standard date intermediate value.

The **DAY** procedure computes the day of the month (1 to 31) for a given standard date.

Return Data Type:      **LONG**

Example:

```
OutDay = DAY(TODAY())      !Get the day from today's date
DueDay = DAY(TODAY()+2)    !Calculate the return day
```

See Also:              Standard Date, MONTH, YEAR, TODAY, DATE

## DEFORMAT (return unformatted numbers from string)

**DEFORMAT**(*string* [,*picture*])

<b>DEFORMAT</b>	Removes formatting characters from a numeric string.
<i>string</i>	A string expression containing a numeric string.
<i>picture</i>	A picture token, or the label of a CSTRING variable containing a picture token. If omitted, the picture for the <i>string</i> parameter is used. If the <i>string</i> parameter was not declared with a picture token, the return value will contain only characters that are valid for a numeric constant.

The **DEFORMAT** procedure removes formatting characters from a numeric string, returning only the numbers contained in the string. When used with a date or time *picture* (except those containing alphabetic characters), it returns a STRING containing the Clarion Standard Date or Time.

Return Data Type:      **STRING**

Example:

```
!DEFORMAT('$1,234.56')      returns 1234.56
!DEFORMAT('309-53-9954')   returns 309539954
!DEFORMAT('40A1-7',@P##A1-#P) returns 407

DialString = 'ATDT1' & DEFORMAT(Phone,@P(###)###-####P) & '<13,10>'
                                           !Get phone number for modem to dial
ClarionDate = DEFORMAT(dBaseDate,@D1)    !Clarion Standard date from mm/dd/yy string

Data = '45,123'                      !Assign a formatted number to a string
Number = DEFORMAT(Data)              ! then remove non-numeric characters
```

See Also:              **FORMAT, Standard Date, Standard Time**

## DELETE (delete a record)

### DELETE( *entity* )

**DELETE** Removes a record from a FILE, VIEW, or QUEUE structure.

*entity* The label of a FILE, VIEW, or QUEUE structure.

The **DELETE** statement removes a record.

### FILE Usage

DELETE(file) removes the last record successfully accessed by NEXT, PREVIOUS, GET, REGET, ADD, or PUT. The key entries for that record are also removed from the KEYS. DELETE does not clear the record buffer. Therefore, data values from the record just deleted still exist and are available for use until the record buffer is overwritten. If no record was previously accessed, or the record is held by another workstation, DELETE posts the “Record Not Available” error and no record is deleted.

### VIEW Usage

DELETE(view) removes the last VIEW primary file record that was successfully accessed by a NEXT or PREVIOUS statement. The key entries for that record are also removed from the KEYS. DELETE does not remove records from any secondary JOIN files in the VIEW. If no record was previously accessed, or the record is held by another workstation, DELETE posts the “Record Not Available” error and no record is deleted. The specific disk action DELETE performs in the file is file driver dependent.

DELETE only deletes the primary file record in the VIEW because the VIEW structure performs both relational Project and Join operations at the same time. Therefore, it is possible to create a VIEW structure that, if all its component files were updated, would violate the Referential Integrity rules set for the database. The common solution to this problem in SQL-based database products is to delete only the Primary file record. Therefore, Clarion has adopted this same industry standard solution.

### QUEUE Usage

DELETE(queue) removes the QUEUE entry at the position of the last successful GET or ADD and de-allocates its memory. If no previous GET or ADD was executed, the “Entry Not Found” error is posted. DELETE does not affect the current POINTER procedure return value, however, once the entry is deleted, the POINTER value for all subsequent entries in the QUEUE decrement by one (1).

If the QUEUE contains any reference variables or fields with the ANY data type, you must first CLEAR the QUEUE before deleting the entry. This will

avoid memory leaks by freeing up the memory used by the ANY variables before the DELETE statement removes the pointer to the allocated memory.

Errors Posted:       05 Access Denied  
                       08 Insufficient Memory  
                       30 Entry Not Found  
                       33 Record Not Available

Example:

```

Customer  FILE,DRIVER('Clarion'),PRE(Cus)  !Declare customer file layout
AcctKey    KEY(Cus:AcctNumber)
Record     RECORD
AcctNumber LONG
Name       STRING(20)
Addr       STRING(20)
City       STRING(20)
State      STRING(20)
Zip        STRING(20)

CustView   . .
            VIEW(Customer)                  !Declare VIEW structure
            PROJECT(Cus:AcctNumber,Cus:Name)
            END
NameQue     QUEUE,PRE(Que)
Name        STRING(20),NAME('FirstField')
Zip         DECIMAL(5,0),NAME('SecondField')
            END

CODE
DO BuildQue                               !Call routine to build the queue
LOOP X# = RECORDS(NameQue) TO 1 BY -1     !Loop backwards through queue
    GET(NameQue,X#)                       ! getting each entry
    ASSERT(NOT ERRORCODE())
    IF NameQue.Name[1] = 'J'               !Evaluate a condition
        DELETE(NameQue)                   ! and delete only specific entries
    ASSERT(NOT ERRORCODE())
END
END

OPEN(Customer)
Cus:AcctNumber = 12345                     !Initialize key field
SET(Cus:AcctKey,Cus:AcctKey)
OPEN(CustView)
NEXT(CustView)                             !Get that record
    IF ERRORCODE() THEN STOP(ERROR()).
DELETE(CustView)                           !Delete the customer record
CLOSE(CustView)                           !Close the VIEW

Cus:AcctNumber = 12345                     !Initialize key field
GET(Customer,Cus:AcctKey)                  !Get that record
IF ERRORCODE() THEN STOP(ERROR()).
DELETE(Customer)                           !Delete the customer record

```

See Also:           HOLD, NEXT, PREVIOUS, PUT, GET, ADD, ANY, CLEAR, Reference Variables



## DESTROY (remove a control)

**DESTROY**( [ *first control* ] [, *last control* ] )

<b>DESTROY</b>	Removes window controls.
<i>first control</i>	Field number or field equate label of a control, or the first control in a range of controls. If omitted, defaults to zero (0).
<i>last control</i>	Field number or field equate label of the last control in a range of controls.

The **DESTROY** statement removes a control, or range of controls, from an **APPLICATION** or **WINDOW** structure. When removed, the control's resources are returned to the operating system.

DESTROYing a **GROUP**, **OPTION**, **MENU**, **TAB**, or **SHEET** control also destroys all controls contained within it.

Example:

```
Screen WINDOW,PRE(Scr)
    ENTRY(@N3),USE(Ct1:Code)
    ENTRY(@S30),USE(Ct1:Name)
    BUTTON('OK'),USE(?OkButton),KEY(EnterKey)
    BUTTON('Cancel'),USE(?CanxButton),KEY(EscKey)
END

CODE
OPEN(Screen)
DESTROY(?Ct1:Code)           !Remove a control
DESTROY(?Ct1:Code,?Ct1:Name) !Remove range of controls
DESTROY(2)                   !Remove the second control
```

See Also: **CREATE**

## DIRECTORY (get file directory)

### DIRECTORY( *queue*, *path*, *attributes* )

<b>DIRECTORY</b>	Gets a file directory listing (just like the DIR command in DOS).
<i>queue</i>	The label of the QUEUE structure that will receive the directory listing.
<i>path</i>	A string constant, variable, or expression that specifies the path and filenames directory listing to get. This may include the wildcard characters (* and ?).
<i>attributes</i>	An integer constant, variable, or expression that specifies the attributes of the files to place in the <i>queue</i> .

The **DIRECTORY** procedure returns a directory listing of all files in the *path* with the specified *attributes* into the specified *queue*.

The *queue* parameter must name a QUEUE with a structure that begins the same as the following structure contained in EQUATES.CLW:

```
ff_:queue    QUEUE,PRE(ff_),TYPE
name        STRING(13)
date        LONG
time        LONG
size        LONG
attrib      BYTE    !A bitmap, the same as the attributes EQUATES
END
```

or the following structure (for long filename support):

```
FILE:queue   QUEUE,PRE(FILE),TYPE
name         STRING(FILE:MAXFILENAME)    !FILE:MAXFILENAME is an EQUATE
shortname    STRING(13)
date         LONG
time         LONG
size         LONG
attrib      BYTE    !A bitmap, the same as the attributes EQUATES
END
```

Your QUEUE may contain more fields, but must begin with these fields. It will receive the returned information about each file in the *path* that has the *attributes* you specify. The date and time fields will contain standard Clarion date and time information (the conversion from the operating system's storage format to Clarion standard format is automatic).

The *attributes* parameter is a bitmap which specifies what filenames to place in the *queue*. The following equates are contained in EQUATES.CLW:

```
ff_:NORMAL    EQUATE(0)    !Always active
ff_:READONLY  EQUATE(1)    !Not for use as attributes parameter
ff_:HIDDEN    EQUATE(2)
ff_:SYSTEM    EQUATE(4)
ff_:DIRECTORY EQUATE(10H)
ff_:ARCHIVE   EQUATE(20H)  ! NOT Win95 compatible
```

The *attributes* bitmap is an OR filter: if you add the equates, you get files with any of the attributes you specify. This means that, when you just set the *attributes* to `ff_:NORMAL`, you only get files (no sub-directories) without the hidden, system, or archive bits set. If you add `ff_:DIRECTORY` to `ff_:NORMAL`, you will get files AND sub-directories from the *path*. Since `ff_:NORMAL` is an equate for zero (0), you will always get files.

Example:

```
DirectoryList PROCEDURE

AllFiles      QUEUE(File:queue),PRE(FIL)      !Inherit exact declaration of File:queue
END

LP            LONG
Recs          LONG

CODE
DIRECTORY(AllFiles,'*.*',ff_:DIRECTORY)      !Get all files and directories
Recs = RECORDS(AllFiles)
LOOP LP = Recs TO 1 BY -1
  GET(AllFiles,LP)
  IF BAND(FIL:Attrib,ff_:DIRECTORY) AND FIL:ShortName <> '..' AND FIL:ShortName <> '.'
    CYCLE                                     !Let sub-directory entries stay
  ELSE
    DELETE(AllFiles)                         !Get rid of all other entries
  END
END
```

See Also:

**SHORTPATH, LONGPATH, PATH**

## DISABLE (dim a control)

**DISABLE**( [ *first control* ] [, *last control* ] )

### **DISABLE**

Dims controls on the window.

*first control*

Field number or field equate label of a control, or the first control in a range of controls. If omitted, defaults to zero (0).

*last control*

Field number or field equate label of the last control in a range of controls.

The **DISABLE** statement disables a control or a range of controls on an **APPLICATION** or **WINDOW** structure. When disabled, the control appears dimmed on screen.

Example:

```
Screen WINDOW, PRE(Scr)
    ENTRY(@N3), USE(Ct1:Code)
    ENTRY(@S30), USE(Ct1:Name)
    BUTTON('OK'), USE(?OkButton), KEY(EnterKey)
    BUTTON('Cancel'), USE(?CanxButton), KEY(EscKey)
END

CODE
OPEN(Screen)
DISABLE(?Ct1:Code)                !Disable a control
DISABLE(?Ct1:Code, ?Ct1:Name)    !Disable range of controls
DISABLE(2)                        !Disable the second control
```

See Also:

**ENABLE, HIDE, UNHIDE**

## DISPLAY (write USE variables to screen)

**DISPLAY**( [*first control*] [,*last control*] )

<b>DISPLAY</b>	Writes the contents of USE variables to their associated controls.
<i>first control</i>	Field number or field equate label of a control, or the first control in a range of controls.
<i>last control</i>	Field number or field equate label of the last control in a range of controls.

**DISPLAY** writes the contents of the USE variables to their associated controls on the active window. **DISPLAY** with no parameters writes the USE variables for all controls on the screen. Using *first control* alone, as the parameter of **DISPLAY**, writes a specific USE variable to the screen. Both *first control* and *last control* parameters are used to display the USE variables for an inclusive range of controls on the screen.

The current contents of the USE variables of all controls are automatically displayed on screen each time the **ACCEPT** loop cycles if the window has the **AUTO** attribute present. This eliminates the need to explicitly issue a **DISPLAY** statement to update the video display. Of course, if your application performs some operation that takes a long time and you want to indicate to the user that something is happening without cycling back to the top of the **ACCEPT** loop, you should **DISPLAY** some variable that you have updated.

Example:

```

DISPLAY                !Display all controls on the screen
DISPLAY(2)             !Display control number 2
DISPLAY(3,7)           !Display controls 3 through 7
DISPLAY(?MenuControl)  !Display the menu control
DISPLAY(?TextBlock,?Ok) !Display range of controls

```

See Also:           Field Equate Labels, **UPDATE**, **ERASE**, **CHANGE**, **AUTO**

## DRAGID (return matching drag-and-drop signature)

**DRAGID**( [*thread*] [, *control*] )

### **DRAGID**

Returns matching host and target signatures on a successful drag-and-drop operation.

### *thread*

The label of a numeric variable to receive the thread number of the host control. If the host control is in an external program, *thread* receives zero (0).

### *control*

The label of a numeric variable to receive the field equate label of the host control.

The **DRAGID** procedure returns the matching host and target control signatures on a successful drag-and-drop operation. If the user aborted the operation, **DRAGID** returns an empty string (''), otherwise it returns the first signature that matched between the two controls.

Return Data Type: **STRING**

Example:

```

Que1  QUEUE
      STRING(30)
      END
Que2  QUEUE(Que1)           !Que2 declared same as Que1
      END
Que3  QUEUE(Que1)           !Que3 declared same as Que1
      END
WinOne WINDOW,AT(0,0,360,400)
      LIST,AT(120,0,20,20),USE(?List1),FROM(Que1),DRAGID('List1')
                                   !Allows drags, but not drops
      LIST,AT(120,120,20,20),USE(?List2),FROM(Que2),DROPID('List1','List3')
                                   !Allows drops from List1 or List3, but no drags
      LIST,AT(120,240,20,20),USE(?List3),FROM(Que3),DRAGID('List3')
                                   !Allows drags, but not drops
      END
CODE
OPEN(WinOne)
ACCEPT
CASE EVENT()
OF EVENT:Drop
CASE DRAGID()
OF 'List1'
Que2 = Que1           ! get dropped info from Que1
OF 'List3'
Que2 = Que3           ! get dropped info from Que3
END
ADD(Que2)             ! add either one to the drop queue
END
END

```

See Also: **DROPID, SETDROPID**

## DROPID (return drag-and-drop string)

**DROPID**( [*thread*] [, *control*] )

### **DROPID**

Returns matching host and target signatures on a successful drag-and-drop operation.

#### *thread*

The label of a numeric variable to receive the thread number of the target control. If the target control is in an external program, *thread* receives zero (0).

#### *control*

The label of a numeric variable to receive the field equate label of the target control.

The **DROPID** procedure returns the matching host and target control signatures on a successful drag-and-drop operation (just as **DRAGID** does), or the specific string set by the **SETDROPID** procedure. The **DROPID** procedure returns a comma-delimited list of filenames dragged from the Windows File Manager when '~FILE' is the **DROPID** attribute.

Return Data Type: **STRING**

Example:

```

DragDrop    PROCEDURE
Que1  QUEUE
        STRING(90)
        END
Que2  QUEUE
        STRING(90)
        END
WinOne  WINDOW('Test Drag Drop'),AT(10,10,240,320),SYSTEM,MDI
        LIST,AT(12,0,200,80),USE(?List1),FROM(Que1),DRAGID('List1') !Drag but no drop
        LIST,AT(12,120,200,80),USE(?List2),FROM(Que2),DROPID('List1','~FILE')
                                                !Allows drops from List1 or the Windows File Manager,
                                                ! but no drags
        END
CODE
OPEN(WinOne)
ACCEPT
CASE EVENT()
OF EVENT:Drag
    IF DRAGID()
        GET(Que1,CHOICE())
        SETDROPID(Que1)
    !When a drag event is attempted
    ! check for success
    ! and setup info to pass
    END
OF EVENT:Drop
    IF INSTRING(', ',DROPID(),1,1)
        Que2 = SUB(DROPID(),1,INSTRING(', ',DROPID(),1,1)-1)
        ADD(Que2)
    !When drop event is successful
    !Check for multiple files from File Manager
    ! and only get first
    ! and add it to the queue
    ELSE
        Que2 = DROPID()
        ADD(Que2)
    ! get dropped info, from List1 or File Manager
    ! and add it to the queue
    END
END
END
END

```

See Also:

**DRAGID, SETDROPID**

## DUPLICATE (check for duplicate key entries)

```
DUPLICATE( | key | )
           | file |
```

**DUPLICATE** Checks duplicate entries in unique keys.

*key* The label of a KEY declaration.

*file* The label of a FILE declaration.

The **DUPLICATE** procedure returns a non-zero value (true) if writing the current record to the data file would post the “Creates Duplicate Key” error. With a *key* parameter, only the specified KEY is checked. With a *file* parameter, all KEYs declared without a DUP attribute are checked. **DUPLICATE** is most useful to detect potential duplicate key errors before writing to disk.

The **DUPLICATE** procedure assumes that the contents of the **RECORD** structure data buffer are duplicated at the current record pointer location. Therefore, when using **DUPLICATE** prior to **ADD**ing a record, the record pointer should be cleared with: **GET**(*file*,0).

Return Data Type: **LONG**

Example:

```
IF Action = 'ADD' THEN GET(Vendor,0).      !If adding, clear the file pointer
IF DUPLICATE(Vendor)                     !If this vendor already exists
    SCR:MESSAGE = 'Vendor Number already assigned' ! display message
    SELECT(?)                               ! and stay on the field
END
```

See Also: **GET, ADD, DUP**



## ELLIPSE (draw an ellipse)

**ELLIPSE**( *x* , *y* , *width* , *height* [, *fill*] )

<b>ELLIPSE</b>	Draws an ellipse on the current window or report.
<i>x</i>	An integer expression that specifies the horizontal position of the starting point.
<i>y</i>	An integer expression that specifies the vertical position of the starting point.
<i>width</i>	An integer expression that specifies the width.
<i>height</i>	An integer expression that specifies the height.
<i>fill</i>	A LONG integer constant, constant EQUATE, or variable containing the red, green, and blue components that create the color in the three low-order bytes (bytes 0, 1, and 2) or an EQUATE for a standard Windows color value.

The **ELLIPSE** procedure places an ellipse on the current window or report. The ellipse is drawn inside a “bounding box” defined by the *x*, *y*, *width*, and *height* parameters. The *x* and *y* parameters specify the starting point, and the *width* and *height* parameters specify the horizontal and vertical size of the “bounding box.”

The border color is the current pen color set by **SETPENCOLOR**; the default color is the Windows system color for window text. The border width is the current width set by **SETPENWIDTH**; the default width is one pixel. The border style is the current pen style set by **SETPENSTYLE**; the default style is a solid line.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
ELLIPSE(100,50,100,50,00FF0000h)    !Red ellipse
```

See Also:                   Current Target, **SETPENCOLOR**, **SETPENWIDTH**, **SETPENSTYLE**

## EMPTY (empty a data file)

### EMPTY(*file*)

**EMPTY** Deletes all records from a FILE.

*file* The label of a FILE.

**EMPTY** deletes all records from the specified *file*. **EMPTY** requires exclusive access to the file. Therefore, the file must be opened with *access mode* set to 12h (Read/Write Deny All) or 22h (Read/Write Deny Write).

Errors Posted: 63 Exclusive Access Required  
37 File Not Open

Example:

```
OPEN(Master,18)      !Open the master file
EMPTY(Master)        ! and start a new one
```

See Also: OPEN, SHARE

## ENABLE (re-activate dimmed control)

### ENABLE( [ *first control* ] [, *last control* ] )

**ENABLE** Reactivates disabled controls.

*first control* Field number or field equate label of a control, or the first control in a range of controls. If omitted, defaults to zero (0).

*last control* Field number or field equate label of the last control in a range of controls.

The **ENABLE** statement reactivates a control, or range of controls, that were dimmed by the **DISABLE** statement, or were declared with the **DISABLE** attribute. Once reactivated, the control is again available to the operator for selection.

Example:

```
CODE
OPEN(Screen)
DISABLE(?Control2)      !Control2 is deactivated
IF Ct1:Password = 'Supervisor'
    ENABLE(?Control2)    !Re-activate Control2
END
```

See Also: DISABLE, HIDE, UNHIDE

## ENDPAGE (force page overflow)

---

**ENDPAGE**( *report* [, *printfooters* ] )

**ENDPAGE**

Forces page overflow.

*report*

The label of a REPORT structure.

*printfooters*

An integer constant or variable. If omitted or zero (0), this prints group footers by forcing a group BREAK (usually used to terminate a report for preview). If one (1), group BREAKs are left open and no group footers print (usually used during a continuing report).

The **ENDPAGE** statement initiates page overflow and flushes the print engine's print structure buffer. If the REPORT has the PREVIEW attribute, this has the effect of ensuring that the entire report is available to view.

Example:

```

SomeReport  PROCEDURE

WMFQue      QUEUE                      !Queue to contain .WMF filenames
            STRING(64)
            END

NextEntry   BYTE(1)                  !Queue entry counter variable

Report      REPORT,PREVIEW(WMFQue)    !Report with PREVIEW attribute
DetailOne   DETAIL
            !Report controls
            . .

ViewReport  WINDOW('View Report'),AT(0,0,320,200),MDI,MAX,HVSCROLL
            IMAGE('',AT(0,0,320,180),USE(?ImageField)
            BUTTON('View Next Page'),AT(0,180,60,20),USE(?NextPage),DEFAULT
            BUTTON('Print Report'),AT(80,180,60,20),USE(?PrintReport)
            BUTTON('Exit Without Printing'),AT(160,180,60,20),USE(?ExitReport)
            END

CODE
OPEN(Report)
SET(SomeFile)                      !Code to generate the report
LOOP
    NEXT(SomeFile)
    PRINT(DetailOne)
END
ENDPAGE(Report)                    !Flush the buffer
OPEN(ViewReport)                   !Open report preview window
GET(WMFQue,NextEntry)              !Get first queue entry
?ImageField{PROP:text} = WMFQue    !Load first report page
ACCEPT
CASE ACCEPTED()
    OF ?NextPage
        NextEntry += 1              !Increment entry counter
        IF NextEntry > RECORDS(WMFQue) THEN CYCLE. !Check for end of report
        GET(WMFQue,NextEntry)      !Get next queue entry
        ?ImageField{PROP:text} = WMFQue !Load next report page
        DISPLAY                     ! and display it
    OF ?PrintReport
        Report{PROP:flushpreview} = ON !Flush files to printer
        BREAK                       ! and exit procedure
    OF ?ExitReport
        BREAK                       !Exit procedure
    . .
CLOSE(ViewReport)                  !Close window
FREE(WMFQue)                       !Free the queue memory
CLOSE(Report)                      !Close report (deleting all .WMF files)
RETURN                             ! and return to caller

```

See Also:

Page Overflow, PREVIEW

## ERASE (clear screen control and USE variables)

**ERASE**( [*first control*] [,*last control*] )

### **ERASE**

Blanks controls and clears their USE variables.

*first control*

Field number or field equate label of a control, or the first control in a range of controls. If omitted, defaults to zero (0).

*last control*

Field number or field equate label of the last control in a range of controls.

The **ERASE** statement erases the data from controls in the window and clears their corresponding USE variables. ERASE with no parameters erases all controls in the window. Using *first control* alone, as the parameter of ERASE, clears a specific USE variable and its associated control. Both *first control* and *last control* parameters are used to clear the USE variables and associated controls for an inclusive range of controls in the window.

Example:

```
ERASE(?)           !Erase the currently selected control
ERASE              !Erase all controls on the screen
ERASE(3,7)         !Erase controls 3 through 7
ERASE(?Name,?Zip)  !Erase controls from name through zip
ERASE(?City,?City+2) !Erase City and 2 controls following City
```

See Also: Field equate labels, CHANGE

## ERROR (return error message)

**ERROR**( )

The **ERROR** procedure returns a string containing a description of any error that was posted. If no error was posted, ERROR returns an empty string. You should interrogate ERROR immediately after the statement which you suspect may post an error because processing any other statement which *could* post an error will clear the internal errorcode.

Return Data Type: STRING

Example:

```
PUT(NameQueue)           !Write the record
IF ERROR() = 'Queue Entry Not Found' !If not found
  ADD(NameQueue)          ! add new entry
  IF ERRORCODE() THEN STOP(ERROR()). !Check for unexpected error
END
```

See Also: ERRORCODE, ERRORFILE, FILEERROR, FILEERRORCODE, Trappable Run Time Errors

## ERRORCODE (return error code number)

---

### ERRORCODE( )

The **ERRORCODE** procedure returns the code number for any error that was posted. If no error was posted, **ERRORCODE** returns zero. You should interrogate **ERRORCODE** immediately after the statement which you suspect may post an error because processing any other statement which *could* post an error will clear the internal errorcode.

Return Data Type:        **LONG**

Example:

```
ADD(Location)                !Add new entry
IF ERRORCODE() = 8            !If not enough memory
    MESSAGE('Out of Memory')  ! display message
END
```

See Also:                **ERROR, ERRORFILE, FILEERROR, FILEERRORCODE, Trappable Run Time Errors**

## ERRORFILE (return error filename)

---

### ERRORFILE( )

The **ERRORFILE** procedure returns the name of the file for which an error was posted. If the file is open, the full DOS file specification is returned. If the file is not open, the contents of the **FILE** statement's **NAME** attribute is returned. If the file is not open and the file has no **NAME** attribute, the label of the **FILE** statement is returned. If no error was posted, or the posted error did not involve a file, **ERRORFILE** returns an empty string.

Return Data Type:        **STRING**

Example:

```
ADD(Location)                !Add new entry
IF ERRORCODE()
    MESSAGE('Error with ' & ERRORFILE()) !Display error filename
END
```

See Also:                **ERRORCODE, ERROR, FILEERRORCODE, FILEERROR, Trappable Run Time Errors**

## EVENT (return event number)

### EVENT( )

The **EVENT** procedure returns a number indicating what caused **ACCEPT** to alert the program that something has happened that it may need to handle. There are **EQUATES** listed in **EQUATES.CLW** for all the events the program may need to handle.

There are two types of events generated by **ACCEPT**: field-specific and field-independent events. Field-specific events affect a single control, while field-independent events affect the window or program. The type of event can be determined by the values returned by the **ACCEPTED**, **SELECTED**, and **FIELD** procedures. If you need to know which field has input focus on a field-independent event, use the **FOCUS** procedure.

For field-specific events:

The **FIELD** procedure returns the field number of the control on which the event occurred. The **ACCEPTED** procedure returns the field number if the event is **EVENT:Accepted**. The **SELECTED** procedure returns the field number if the event is **EVENT:Selected**.

For field-independent events:

The **FIELD**, **ACCEPTED**, and **SELECTED** procedures all return zero (0).

Return Data Type: **SIGNED**

Example:

```
ACCEPT
CASE EVENT()
OF EVENT:Selected
CASE SELECTED()
OF ?Control1
!Pre-edit code here
OF ?Control2
!Pre-edit code here
END
OF EVENT:Accepted
CASE ACCEPTED()
OF ?Control1
!Post-edit code here
OF ?Control2
!Post-edit code here
END
OF EVENT:Suspend
!Save some stuff
OF EVENT:Resume
!Restore the stuff
END
END
```

See Also: **ACCEPT, FIELD, FOCUS, ACCEPTED, SELECTED**

## EXISTS (return file existence)

---

### EXISTS( *file* )

**EXISTS** Returns TRUE if the *file* is available on disk.

*file* An expression containing the DOS filename.

The **EXISTS** procedure returns true (1) if the *file* is available on disk. If the *file* is not available, FILEEXISTS returns false (0).

Return Data Type:      **LONG**

Example:

```
IF EXISTS(SomeFile)
  OPEN(%SomeFile)
ELSE
  CREATE(%SomeFile)
END
```



## FIELD (return control with focus)

### FIELD( )

The **FIELD** procedure returns the field number of the control which has focus at the time of any field-specific event. This includes both the EVENT:Selected and EVENT:Accepted events. FIELD returns zero (0) for field-independent events.

Positive field numbers are assigned by the compiler to all WINDOW controls, in the order their declarations occur in the WINDOW structure. Negative field numbers are assigned to all APPLICATION controls. In executable code statements, field numbers are usually represented by field equate labels—the label of the USE variable preceded by a question mark (?FieldName).

Return Data Type:      **SIGNED**

Example:

```
Screen WINDOW
    ENTRY(@N4),USE(Control1)
    ENTRY(@N4),USE(Control2)
    ENTRY(@N4),USE(Control3)
    ENTRY(@N4),USE(Control4)
END

CODE
ACCEPT
    IF NOT ACCEPTED() THEN CYCLE.
    CASE FIELD()                !Control edit control
    OF ?Control1                ! Field number 1
        IF Control1 = 0        ! if no entry
            BEEP                !   sound alarm
            SELECT(?)           !   stay on control
        END
    OF ?Control2                ! Field number 2
        IF Control2 > 4        ! if status is more than 4
            Scr:Message = 'Control must be less than 4'
            ERASE(?)            !   clear control
            SELECT(?)           !   edit the control again
        ELSE                    ! value is valid
            CLEAR(Scr:Message)  !   clear message
        END
    OF ?Control4                ! Field number 4
        BREAK                  ! exit processing loop
    . .                        ! end case, end loop
```

See Also:      **ACCEPT, ACCEPTED, SELECTED, FOCUS, EVENT**

## FILEDIALOG (return chosen file)

**FILEDIALOG**( [*title*] ,*file* [,*extensions*] [,*flag*] )

<b>FILEDIALOG</b>	Displays Windows standard file choice dialogs to allow the user to choose a file.
<i>title</i>	A string constant or variable containing the title to place on the dialog. If omitted, Windows supplies a default.
<i>file</i>	The label of the string variable to receive the selected filename(s).
<i>extensions</i>	A string constant or variable containing the available file extension selections for the “List Files of Type” drop list. If omitted, the default is all files (*.*) .
<i>flag</i>	An integer constant or variable containing a bitmap to indicate the type of file action to perform.

The **FILEDIALOG** procedure displays Windows standard file choice dialogs and returns the file chosen by the user in the *file* parameter. Any existing value in the *file* parameter sets the default file choice presented to the user in the file choice dialog.

FILEDIALOG displays either the standard *Open...* dialog or the standard *Save...* dialog. By default, on the *Open...* dialog, the user is warned if the file they choose does not exist and the file is not opened. On the *Save...* dialog, the user is warned if the file does exist and the file is not saved.

The *extensions* parameter string must contain a description followed by the file mask. All elements in the string must be delimited by the vertical bar (|) character. For example, the *extensions* string ‘All Files | \*.\* | Clarion Source | \*.CLW’ defines two selections for the “List Files of Type” drop list. The first extension listed in the *extensions* string is the default.

The *flag* parameter is a bitmap that indicates the type of file action to perform (see EQUATES.CLW for symbolic constants). For bit number:

- 0 If zero (0000b), the *Open...* dialog displays. If one (0001b), the *Save...* dialog displays.
- 1 If one (0010b), saves and restores the current directory path.
- 2 If one (0100b), doesn't report errors if the file does exist on *Save...* or does not exist on *Open...*
- 3 If one (1000b), returns multiple selections as a space-delimited string of filenames (with the full path on the first). Long filenames with embedded spaces are enclosed in double quotes.
- 4 If one (10000b), uses long filename dialog in 32-bit programs.
- 5 If one (100000b), displays a directory select dialog for selecting a directory path.

FILEDIALOG returns zero (0) if the user pressed the Cancel button, or one (1) if the user pressed the Ok button on the file choice dialog. If the user changes directories using the file dialog, your application's current directory also changes (unless you have *flag* bit 1 set). This is a feature of the Windows operating system. If you do not want users to change your application's current directory but do want them to be able look in other directories, either save the current directory with the PATH() procedure before calling FILEDIALOG then restore it with the SETPATH() statement, or set the *flag* parameter's bit 1 to one.

Return Data Type:      **SHORT**

Example:

```
ViewTextFile  PROCEDURE
ViewQueue     QUEUE                      !LIST control display queue
              STRING(255)
              END

FileName      STRING(64),STATIC          !Filename variable

ViewFile      FILE,DRIVER('ASCII'),NAME(FileName),PRE(View)
Record        RECORD
              STRING(255)
              END
              END

MDIChild1 WINDOW('View Text File'),AT(0,0,320,200),MDI,SYSTEM,HVSCROLL
              LIST,AT(0,0,320,200),USE(?L1),FROM(ViewQueue),HVSCROLL
              END

CODE
IF NOT FILEDIALOG('Choose File to View',FileName,'Text|*.TXT|Source|*.CLW',10b)
  RETURN                                !Return if no file chosen
END
OPEN(ViewFile)                          !Open the file
IF ERRORCODE() THEN RETURN.              ! aborting on any error
SET(ViewFile)                            !Start at top of file
LOOP
  NEXT(ViewFile)                          !Reading each line of text
  IF ERRORCODE() THEN BREAK.              !Break loop at end of file
  ViewQueue = View:Record                  !Assign text to queue
  ADD(ViewQueue)                           ! and add a queue entry
END
CLOSE(ViewFile)                           !Close the file
OPEN(MDIChild1)                           ! and open the window
ACCEPT                                    !Allow the user to read the text and
END                                        ! break out of ACCEPT loop only from
                                           ! system menu close option
FREE(ViewQueue)                           !Free the queue memory
RETURN                                    ! and return to caller
```

See Also:              **SETPATH, SHORTPATH, LONGPATH, DIRECTORY**

## FILEERROR (return file driver error message)

---

### FILEERROR( )

The **FILEERROR** procedure returns a string containing the “native” error message from the file system (file driver) being used to access a data file. Valid only when `ERRORCODE() = 90`.

Return Data Type:        **STRING**

Example:

```
PUT(NameFile)           !Write the record
IF ERRORCODE() = 90      !Back-end-specific error occurred
    MESSAGE(FILEERROR())
    RETURN
END
```

See Also:                **ERRORCODE, ERROR, ERRORFILE, FILEERRORCODE, Trappable Run Time Errors**

## FILEERRORCODE (return file driver error code number)

---

### FILEERRORCODE( )

The **FILEERRORCODE** procedure returns a string containing the code number for the “native” error message from the file system (file driver) being used to access a data file. Valid only when `ERRORCODE() = 90`.

Return Data Type:        **STRING**

Example:

```
PUT(NameFile)           !Write the record
IF ERRORCODE() = 90      !Back-end-specific error occurred
    MESSAGE(FILEERRORCODE())
    RETURN
END
```

See Also:                **FILEERROR, ERRORFILE, ERRORCODE, ERROR, Trappable Run Time Errors**

## FIRSTFIELD (return first window control)

### FIRSTFIELD( )

The **FIRSTFIELD** procedure returns the lowest field number in the currently active window (or REPORT) as specified by SETTARGET. This does not include any controls in a TOOLBAR or MENUBAR or any controls created after the window is opened.

Return Data Type:        SIGNED

Example:

```
DISABLE(FIRSTFIELD(),LASTFIELD())    !Dim all control fields
```

See Also:                LASTFIELD

## FLUSH (flush buffers)

### FLUSH(*file*)

**FLUSH**                Terminates a STREAM operation, flushing the operating system buffers to disk, or flushes the BUFFER statement's buffers.

*file*                    The label of a FILE or VIEW.

The **FLUSH** statement terminates a STREAM operation. It flushes the operating system buffers, which updates the directory entry for that *file*. FLUSH will also flush the file driver's buffers allocated by the BUFFER statement. If both STREAM and BUFFER are active, all buffers are flushed.

Support for this statement is dependent upon the file system and its specific action is described in the file driver documentation (if different from that described here).

Example:

```
STREAM(History)                !Use DOS buffering
SET(Current)                !Set to top of current file
LOOP
  NEXT(Current)
  IF ERRORCODE() THEN BREAK.
  His:Record = Cur:Record
  ADD(History)
END
FLUSH(History)                !End streaming, flush buffers
OPEN(MyView)
BUFFER(MyView,10,5,2,300)    !10 records per page, 5 pages behind and 2 read-ahead,
!    with a 5 minute timeout
!Process records
FLUSH(MyView)                !Flush buffers
```

See Also:                STREAM, BUFFER

## FOCUS (return control with focus)

---

### FOCUS( )

The **FOCUS** procedure returns the field number of the control which has input focus at any time any event occurs. Positive field numbers are assigned by the compiler to all WINDOW controls, in the order their declarations occur in the WINDOW structure. Negative field numbers are assigned to all APPLICATION controls. In executable code statements, field numbers are usually represented by field equate labels—the label of the USE variable preceded by a question mark (?FieldName).

Return Data Type:       **SIGNED**

Example:

```
Screen WINDOW
    ENTRY(@N4),USE(Control1)
    ENTRY(@N4),USE(Control2)
    ENTRY(@N4),USE(Control3)
END
CODE
ACCEPT
CASE EVENT()
OF EVENT:LoseFocus
OROF EVENT:CloseWindow
CASE FOCUS()      !Control edit control
OF ?Control1      ! Field number 1
    UPDATE(?Control1)
OF ?Control2      ! Field number 2
    UPDATE(?Control2)
OF ?Control3      ! Field number 3
    UPDATE(?Control3)
END
END
END
```

See Also:               **ACCEPTED, SELECTED, FIELD, EVENT**

## FONTDIALOG (return chosen font)

**FONTDIALOG**( [*title*] [, *typeface*] [, *size*] [, *color*] [, *style*] [, *added*] )

<b>FONTDIALOG</b>	Displays the standard Windows font choice dialog box to allow the user to choose a font.
<i>title</i>	A string constant or variable containing the title to place on the font choice dialog. If omitted, a default <i>title</i> is supplied by Windows.
<i>typeface</i>	A string variable to receive the name of the chosen font.
<i>size</i>	An integer variable to receive the size (in points) of the chosen font.
<i>color</i>	A LONG integer variable to receive the red, green, and blue values for the color of the chosen font in the low-order three bytes.
<i>style</i>	An integer variable to receive the strike weight and style of the chosen font.
<i>added</i>	An integer constant or variable that specifies adding screen or printer fonts, or both, to the list of available fonts. Zero (0) adds screen fonts, one (1) adds printer fonts, and two (2) adds both. If omitted, only Windows registered fonts are listed.

The **FONTDIALOG** procedure displays the Windows standard font choice dialog box to allow the user to choose a font. When called, any values in the parameters set the default font values presented to the user in the font choice dialog. They also receive the user's choice when the user presses the Ok button on the dialog. **FONTDIALOG** returns zero (0) if the user pressed the Cancel button, or one (1) if the user pressed the Ok button.

Return Data Type: **SHORT**

Example:

```
MDIChild1  WINDOW('View Text File'),AT(0,0,320,200),MDI,SYSTEM,HVSCROLL
            !window controls
            END
Typeface   STRING(20)
FontSize   LONG
FontColor   LONG
FontStyle   LONG
CODE
OPEN(MDIChild1)                !open the window
IF FONTDIALOG('Choose Display Font',Typeface,FontSize,FontColor,FontStyle,0)
    SETFONT(0,Typeface,FontSize,FontColor,FontStyle) !Set window font
ELSE
    SETFONT(0,'Arial',12)      !Set default font
END
ACCEPT
!Window handling code
END
```

## FORMAT (return formatted numbers into a picture)

### FORMAT(*value*,*picture*)

#### FORMAT

Returns a formatted numeric string.

*value*

A numeric expression for the *value* to be formatted.

*picture*

A picture token or the label of a CSTRING variable containing a picture token.

The **FORMAT** procedure returns a numeric string formatted according to the *picture* parameter.

Return Data Type: **STRING**

Example:

```
Rpt:SocSecNbr = FORMAT(Emp:SSN,@P###-##-####P)      !Format the soc-sec-nbr
Phone = FORMAT(DEFORMAT(Phone,@P###-##-####P),@P(###)###-####P)
                                     !Change phone format from dashes to parens
DateString = FORMAT(DateLong,@D1)      !Format a date as a string
```

See Also: **DEFORMAT**

## FREE (delete all entries)

### FREE(*queue*)

#### FREE

Deletes all entries from a QUEUE.

*queue*

The label of a QUEUE structure, or the label of a passed QUEUE parameter.

**FREE** deletes all entries from a QUEUE and de-allocates the memory they occupied. It also de-allocates the memory used by the QUEUE's "overhead." FREE does not clear the QUEUE's data buffer.

If the QUEUE contains any reference variables or fields with the ANY data type, you must first **CLEAR** each QUEUE entry before **FREE**ing the QUEUE. This will avoid memory leaks by freeing up the memory used by the ANY variables before the **FREE** statement removes the pointer to the allocated memory.

Errors Posted: **08 Insufficient Memory**

Example:

```
FREE(Location)      !Free the location queue
FREE(NameQue)       !Free the name queue
```

See Also: **ANY, CLEAR, Reference Variables**



## GET (read a record or entry)

```

GET( | file , key
    | file , filepointer [, length ] )
    | key , keypointer
    | queue , pointer
    | queue , [+]key,...,[-]key
    | queue , name

```

### GET

Retrieves a specific record from a FILE or entry from a QUEUE.

*file*

The label of a FILE declaration.

*key*

The label of a KEY or INDEX declaration.

*filepointer*

A numeric constant, variable, or expression for the value returned by the POINTER(*file*) procedure.

*length*

An integer constant, variable, or expression which contains the number of bytes to read from the *file*. The *length* must be greater than zero and not greater than the RECORD length. If omitted or out of range, *length* defaults to the length of the RECORD structure.

*keypointer*

A numeric constant, variable, or expression for the value returned by the POINTER(*key*) procedure.

*queue*

The label of a QUEUE structure.

*pointer*

A numeric constant, variable, or numeric expression. The *pointer* must be in the range from 1 to the number of entries in the memory queue.

+ -

The leading plus or minus sign specifies the *key* is sorted in ascending or descending sequence.

*key*

The label of a field declared within the QUEUE structure. If the QUEUE has a PRE attribute, the *key* must include the prefix.

*name*

A string constant, variable, or expression containing the NAME attribute of QUEUE fields, separated by commas, and optional leading + or - signs for each attribute. This parameter is case sensitive.

The **GET** statement locates a specific record in a FILE or specific entry in a QUEUE and retrieves it.

### FILE Usage

The GET statement locates a specific record in the data file and reads it into the RECORD structure data buffer. Direct access to the record is achieved by relative record position within the file, or by matching key values. If the GET is unsuccessful, the previous content of the RECORD buffer is not affected.

**GET(*file*,*key*)**

Gets the first record from the file (as listed in the *key*) which contains values matching the values in the component fields of the *key*.

**GET(*file*,*filepointer* [,*length*])**

Gets a record from the file based on the *filepointer* relative position within the *file*. If *filepointer* is zero, the current record pointer is cleared and no record is retrieved.

**GET(*key*,*keypointer*)**

Gets a record from the file based on the *keypointer* relative position within the *key*.

The values for *filepointer* and *keypointer* are file driver dependent. They could be: record number; relative byte position within the file; or, some other kind of “seek position” within the file. If the *filepointer* or *keypointer* value is out of range, or there are no matching *key* values in the data file, the “Record Not Found” error is posted.

The DUPLICATE procedure assumes that the contents of the RECORD structure data buffer are duplicated at the current record pointer location. Therefore, when using DUPLICATE prior to ADDing a record, the record pointer should be cleared with: GET(*file*,0).

## **QUEUE Usage**

GET reads an entry into the QUEUE structure data buffer for processing. If GET does not find a match, the “Entry Not Found” error is posted.

**GET(*queue*,*pointer*)**

Retrieves the entry at the relative entry position specified by the *pointer* value in the order the QUEUE entries were added, or last SORTed. If *pointer* is zero, the value returned by the POINTER procedure is set to zero.

**GET(*queue*,*key*)**

Searches for the first QUEUE entry that matches the value in the *key* field(s). Multiple *key* parameters may be used (up to 16), separated by commas. If the QUEUE has not been SORTed on the field(s) used as the *key* parameter(s), the *key* indicates an “alternate sort order” which is then cached (making a subsequent SORT on those same fields very efficient).

**GET(*queue*,*name*)**

Searches for a QUEUE entry that matches the value in the *name* field(s). The *name* string must contain the NAME attributes of the fields, separated by commas, with optional leading plus or minus signs to indicate ascending or descending sequence. If the QUEUE has not been SORTed on the *named* field(s), the *name* indicates an “alternate sort order” which is then cached (making a subsequent SORT on those same fields very efficient).

Errors Posted:       08 Insufficient Memory  
                       30 Entry Not Found  
                       35 Record Not Found  
                       37 File Not Open  
                       43 Record Is Already Held  
                       75 Invalid Field Type Descriptor

Example:

```
NameQue  QUEUE,PRE(Que)
Name      STRING(20),NAME('FirstField')
Zip       DECIMAL(5,0),NAME('SecondField')
END
Customer  FILE,DRIVER('Clarion'),PRE(Cus)
NameKey   KEY(Cus:Name),OPT
NbrKey    KEY(Cus:Number),OPT
Rec       RECORD
Name      STRING(20)
Number    SHORT
. . .

CODE
DO BuildQue                                !Call routine to build the queue
GET(NameQue,1)                             !Get the first entry
IF ERRORCODE() THEN STOP(ERROR()).

Que:Name = 'Jones'                         !Initialize key field
GET(NameQue,Que:Name)                      !Get the matching record
IF ERRORCODE() THEN STOP(ERROR()).

Que:Name = Fil:Name                        !Initialize to value in Fil:Name
GET(NameQue,Que:Name)                      !Get the matching record
IF ERRORCODE() THEN STOP(ERROR()).

Que:Name = 'Smith'                         !Initialize the key fields
Que:Zip = 12345
GET(NameQue,'FirstField,SecondField')     !Get the matching record
IF ERRORCODE() THEN STOP(ERROR()).

LOOP X# = 1 TO RECORDS(NameQue)
  GET(NameQue,X#)                          !Loop through every entry in the QUEUE
  IF ERRORCODE() THEN STOP(ERROR()).
  !Process the entry
END

Cus:Name = 'Clarion'                       !Initialize key field
GET(Customer,Cus:NameKey)                  ! get record with matching value
IF ERRORCODE() THEN STOP(ERROR()).

GET(Customer,3)                            !Get 3rd rec in physical file order
IF ERRORCODE() THEN STOP(ERROR()).

GET(Cus:NameKey,3)                         !Get 3rd rec in keyed order
IF ERRORCODE() THEN STOP(ERROR()).
```

See Also:

**SORT, PUT, POINTER, DUPLICATE, HOLD, WATCH**

## GETFONT (get font information)

---

**GETFONT**( *control* [, *typeface*] [, *size*] [, *color*] [, *style*] )

<b>GETFONT</b>	Gets display font information.
<i>control</i>	A field number or field equate label for the control from which to get the information. If <i>control</i> is zero (0), it specifies the WINDOW.
<i>typeface</i>	A string variable to receive the name of the font.
<i>size</i>	An integer variable to receive the size (in points) of the font.
<i>color</i>	A LONG integer variable to receive the red, green, and blue values for the color of the font in the low-order three bytes. If the value is negative, the <i>color</i> represents a system color.
<i>style</i>	An integer variable to receive the strike weight and style of the font.

**GETFONT** gets the display font information for the *control*. If the *control* parameter is zero (0), GETFONT gets the default display font for the window.

Example:

```
TypeFace  STRING(20)
Size      BYTE
Color     LONG
Style     LONG

CODE
OPEN(Screen)
GETFONT(0,TypeFace,Size,Color,Style)           !Get font info for the window
```

See Also:           **SETFONT**

## GETINI (return INI file entry)

**GETINI**( *section* ,*entry* [,*default*] [,*file*] )

<b>GETINI</b>	Returns the value for an INI file entry.
<i>section</i>	A string constant or variable containing the name of the portion of the INI file which contains the <i>entry</i> .
<i>entry</i>	A string constant or variable containing the name of the specific setting for which to return the value.
<i>default</i>	A string constant or variable containing the default value to return if the <i>entry</i> does not exist (up to 1023 characters). If omitted and the entry does not exist, GETINI returns an empty string.
<i>file</i>	A string constant or variable containing the name of the INI file to search (looks for the <i>file</i> in the Windows directory unless a full path is specified). If the <i>file</i> does not exist, GETINI returns an empty string. If omitted, GETINI searches the WIN.INI file.

The **GETINI** procedure returns the value of an *entry* in a Windows-standard INI file (maximum file size is 64K). A Windows-standard INI file is an ASCII text file with the following format:

```
[some section name]
entry=value
next entry=another value
```

For example, WIN.INI contains entries such as:

```
[intl]
sLanguage=enu
sCountry=United States
iCountry=1
```

The **GETINI** procedure searches the specified *file* for the *entry* within the *section* you specify. It returns everything on the *entry*'s line of text that appears to the right of the equal sign (=).

Return Data Type: **STRING**

Example:

```
Value   STRING(30)
CODE
Value = GETINI('intl','sLanguage')    !Get the language entry
```

See Also: **PUTINI**

## GETPOSITION (get control position)

**GETPOSITION**( *control* [, *x*] [, *y*] [, *width*] [, *height*] )

<b>GETPOSITION</b>	Gets the position and size of an APPLICATION, WINDOW, or control.
<i>control</i>	A field number or field equate label for the control from which to get the information. If <i>control</i> is zero (0), it specifies the window.
<i>x</i>	An integer variable to receive the horizontal position of the top left corner.
<i>y</i>	An integer variable to receive the vertical position of the top left corner.
<i>width</i>	An integer variable to receive the width.
<i>height</i>	An integer variable to receive the height.

**GETPOSITION** gets the position and size of an APPLICATION, WINDOW, or control. The position and size values are dependent upon the presence or absence of the SCROLL attribute on the *control*. If SCROLL is present, the values are relative to the virtual window. If SCROLL is not present, the values are relative to the top left corner of the currently visible portion of the window. This means the values returned always match those specified in the AT attribute or most recent SETPOSITION.

The values in the *x*, *y*, *width*, and *height* parameters are measured in dialog units. Dialog units are defined as one-quarter the average character width by one-eighth the average character height. The size of a dialog unit is dependent upon the size of the default font for the window. This measurement is based on the font specified in the FONT attribute of the window, or the system default font specified by Windows.

Example:

```
Screen WINDOW, PRE(Scr)
    ENTRY(@N3), USE(Ct1:Code)
    ENTRY(@S30), USE(Ct1:Name)
    BUTTON('OK'), USE(?OkButton), KEY(EnterKey)
    BUTTON('Cancel'), USE(?CanxButton), KEY(EscKey)
END

X      SHORT
Y      SHORT
Width  SHORT
Height SHORT
CODE
OPEN(Screen)
GETPOSITION(?Ct1:Code,X,Y,Width,Height)
```

See Also:

**SETPOSITION**

## HALT (exit program)

**HALT**([*errorlevel*] [,*message*])

<b>HALT</b>	Immediately terminates the program.
<i>errorlevel</i>	A positive integer constant or variable (range: 0 - 250) which is the exit code to pass to DOS, setting the DOS ERRORLEVEL. If omitted, the default is zero.
<i>message</i>	A string constant or variable which is typed on the screen after program termination.

The **HALT** statement immediately returns to the operating system, setting the *errorlevel* and optionally displaying a *message* after the program terminates. All standard runtime library procedures for application closedown are performed (all open windows and files are closed and flushed and all allocated memory is returned to the operating system) without executing any further Clarion code in the application.

Example:

```

PasswordProc PROCEDURE
Password  STRING(10)
Window  WINDOW,CENTER
        ENTRY(@s10),AT(5,5),USE(Password),HIDE
        END
CODE
OPEN(Window)
ACCEPT
CASE ACCEPTED()
OF ?Password)
    IF Password <> 'Pay$MeMoRe'
        HALT(0,'Incorrect Password entered.')
    END
END
END
END

```

See Also:

**STOP**

## HELP (help window access)

**HELP**([*helpfile*] [,*window-id*])

### **HELP**

Opens a help file and activates a help window.

#### *helpfile*

A string constant or the label of a STRING variable that has the DOS directory file specification for the help file. If the file specification does not contain a complete path and filename, the help file is assumed to be in the current directory. If the file extension is omitted, “.HLP” is assumed. If the *helpfile* parameter is omitted, a comma is required to hold its position.

#### *window-id*

A string constant or the label of a STRING variable that contains the key used to access the help system. This may be either a help keyword or a “context string.”

The **HELP** statement opens a designated *helpfile*, and activates the window named by the *window-id*. While an ASK or ACCEPT is controlling program execution, the active help window is displayed when the operator presses F1 (the “Help” key).

If the *window-id* parameter is omitted, the *helpfile* is nominated but not opened. If the *helpfile* parameter is omitted, the current help file is opened, and the window identified by *window-id* is activated. If both parameters are omitted, the current *helpfile* is opened at the current topic.

The *window-ID* may contain a Help keyword. This is a keyword that is displayed in the Help Search dialog. When the user presses F1, if only one topic in the help file specifies this keyword, the help file is opened at that topic; if more than one topic specifies the keyword, the search dialog is opened for the user.

A “context string” is identified by a leading tilde (~) in the *window-ID*, followed by a unique identifier associated with exactly one help topic. If the tilde is missing, the *window-ID* is assumed to be a help keyword. When the user presses F1, the help file is opened at the specific topic associated with that “context string.”

Help windows are also activated by the HLP attribute of an APPLICATION, WINDOW, or control.

Example:

```
HELP('C:\HLPDIR\LEDGER.HLP')    !Open the gen ledger help file
HELP(',~CustUpd')                !Activate customer update help window
HELP                             !Display the help window
```

See Also:

ASK, ACCEPT, HLP



## HIDE (blank a control)

**HIDE**( [ *first control* ] [, *last control* ] )

### **HIDE**

Hides window controls.

*first control*

Field number or field equate label of a control, or the first control in a range of controls. If omitted, defaults to zero (0).

*last control*

Field number or field equate label of the last control in a range of controls.

The **HIDE** statement hides a control, or range of controls, on an **APPLICATION** or **WINDOW** structure. When hidden, the control does not appear on screen.

Example:

```
Screen WINDOW,PRE(Scr)
    ENTRY(@N3),USE(Ct1:Code)
    ENTRY(@S30),USE(Ct1:Name)
    BUTTON('OK'),USE(?OkButton),KEY(EnterKey)
    BUTTON('Cancel'),USE(?CanxButton),KEY(EscKey)
END

CODE
OPEN(Screen)
HIDE(?Ct1:Code)           !Hide a control
HIDE(?Ct1:Code,?Ct1:Name) !Hide range of controls
HIDE(2)                  !Hide the second control
```

See Also:

UNHIDE, ENABLE, DISABLE

## HOLD (exclusive record access)

**HOLD**( *entity* [,*seconds*])

<b>HOLD</b>	Arms record locking.
<i>entity</i>	The label of a FILE opened for shared access or a VIEW whose component files are opened for shared access.
<i>seconds</i>	A numeric constant or variable which specifies the maximum wait time in seconds.

The **HOLD** statement arms record locking for a following GET, REGET, NEXT, or PREVIOUS statement in a multi-user environment. The GET, REGET, NEXT, or PREVIOUS flags the record as “held” when it successfully gets the record. Generally, this excludes other users from writing to, but not reading, the record. The specific action HOLD takes is file driver dependent. When the *entity* parameter is the label of a VIEW structure, HOLD operates on the primary file in the VIEW, only.

**HOLD**( *entity* )

Arms HOLD so that the following GET, REGET, NEXT, or PREVIOUS attempts to hold the record until it is successful. If it is held by another workstation, GET, REGET, NEXT, or PREVIOUS will wait until the other workstation releases it.

**HOLD**(*entity* , *seconds* )

Arms HOLD for the following GET, REGET, NEXT, or PREVIOUS to post the “Record Is Already Held” error after unsuccessfully trying to hold the record for *seconds*.

A user may only HOLD one record at a time. If a second record is to be accessed in the same file, the previously held record must be released (see RELEASE).

A common problem to avoid is “deadly embrace.” This occurs when two workstations attempt to hold the same set of records in two different orders and both are using the HOLD(*entity*) form of HOLD. One workstation has already held a record that the other is trying to HOLD, and vice versa. You can avoid this problem by using the HOLD(*entity,seconds*) form of HOLD, and trapping for the “Record Is Already Held” error after the GET, REGET, NEXT, or PREVIOUS statement.

Example:

```

ViewOrder  VIEW(Customer)      !Declare VIEW structure
           PROJECT(Cus:AcctNumber,Cus:Name)
           JOIN(Hea:AcctKey,Cus:AcctNumber) !Join Header file
           PROJECT(Hea:OrderNumber)
           JOIN(Dt1:OrderKey,Hea:OrderNumber) !Join Detail file
           PROJECT(Det:Item,Det:Quantity)
           JOIN(Pro:ItemKey,Dt1:Item) !Join Product file
           PROJECT(Pro:Description,Pro:Price)
           END
           END
           END
           END
CODE
OPEN(Customer,22h)
OPEN((Header,22h)
OPEN(Detail,22h)
OPEN(Product,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP
LOOP
HOLD(ViewOrder,1)
NEXT(ViewOrder)
IF ERRORCODE() = 43
CYCLE
ELSE
BREAK
END
END
IF ERRORCODE() THEN BREAK.
!Process the records
RELEASE(ViewOrder)
END
CLOSE(ViewOrder)

```

See Also: **RELEASE, NEXT, PREVIOUS, WATCH, GET, REGET**

## IDLE (arm periodic procedure)

**IDLE**(*[procedure]* [, *separation*])

<b>IDLE</b>	Arms a <i>procedure</i> that periodically executes.
<i>procedure</i>	The label of a PROCEDURE. The <i>procedure</i> may not take any parameters.
<i>separation</i>	An integer that specifies the minimum wait time (in seconds) between calls to the <i>procedure</i> . A <i>separation</i> of 0 specifies continuous calls. If <i>separation</i> is omitted, the default value is 1 second.

An **IDLE** procedure is active while ASK or ACCEPT are waiting for user input. Only one IDLE procedure may be active at a time. Naming a new IDLE *procedure* overrides the previous one. An IDLE statement with no parameters disarms the IDLE process.

The IDLE *procedure* executes on thread one (1)—the same thread as the APPLICATION frame in an MDI application. Therefore, any WINDOW structure in an IDLE *procedure* must not have the MDI attribute. Since opening a non-MDI window in the same thread as the APPLICATION frame creates an application modal window, it would be more usual for an IDLE *procedure* not to have a WINDOW structure at all.

An IDLE *procedure* is usually prototyped in the PROGRAM's MAP. If prototyped in a MEMBER MAP, the IDLE statements which activate and deactivate it must be contained in a procedure within the same MEMBER module.

Example:

```
IDLE(ShoTime,10)      !Call shotime every 10 seconds
IDLE(CheckNet)        !Check network activity every 1 second
IDLE                  !Disarm idle procedure
```

See Also:

ASK, ACCEPT, PROCEDURE, MAP, MDI

## IMAGE (draw a graphic image)

**IMAGE**( *x* , *y* , [ *width* ] , [ *height* ] , *filename* )

<b>IMAGE</b>	Places a graphic image on the current window or report.
<i>x</i>	An integer expression that specifies the horizontal position of the starting point.
<i>y</i>	An integer expression that specifies the vertical position of the starting point.
<i>width</i>	An integer expression that specifies the width. This may be a negative number. If omitted, defaults to the width of the graphic as it is stored.
<i>height</i>	An integer expression that specifies the height. This may be a negative number. If omitted, defaults to the height of the graphic as it is stored.
<i>filename</i>	A string constant or variable containing the name of the file to display.

The **IMAGE** procedure places a graphic image on the current window or report at the position and size specified by its *x*, *y*, *width*, and *height* parameters. This may be a bitmap (.BMP), icon (.ICO), PaintBrush (.PCX), Graphic Interchange Format (.GIF), JPEG (.JPG), or Windows metafile (.WMF).

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
IMAGE(100,50,100,50,'LOGO.BMP')    !Draw graphic image
```

See Also: Current Target, SETPENCOLOR, SETPENWIDTH, SETPENSTYLE

## INCOMPLETE (return empty REQ control)

---

### INCOMPLETE( )

The **INCOMPLETE** procedure returns the field number of the first control with the REQ attribute in the currently active window that has been left zero or blank, and gives input focus to that control. If all REQ controls in the window contain data, **INCOMPLETE** returns zero (0) and leaves input focus on the control that already had it.

The **INCOMPLETE** procedure duplicates the action performed by the REQ attribute on a **BUTTON** control.

Return Data Type:       **SIGNED**

Example:

```
CODE
OPEN(Screen)
ACCEPT
CASE ACCEPTED()
  OF ?OkButton
    IF INCOMPLETE()           !Any REQ fields empty?
      SELECT(INCOMPLETE())    ! if so, go to it
      CYCLE
    ELSE
      BREAK                  !If not, go on
    END
  END
END
END
```

See Also:               **REQ, BUTTON**

## INLIST (return entry in list)

**INLIST**(*searchstring*,*liststring*,*liststring* [,*liststring*...])

<b>INLIST</b>	Returns item in a list.
<i>searchstring</i>	A constant, variable, or expression that contains the value for which to search. If the value is numeric, it is converted to a string before comparisons are made.
<i>liststring</i>	The label of a variable or constant value to compare against the <i>searchstring</i> . If the value is numeric, it is converted to a string before comparisons are made. There may be up to 25 <i>liststring</i> parameters, and there must be at least two.

The **INLIST** procedure compares the contents of the *searchstring* against the values contained in each *liststring* parameter. If a matching value is found, the procedure returns the number of the first *liststring* parameter containing the matching value (relative to the first *liststring* parameter). If the *searchstring* is not found in any *liststring* parameter, **INLIST** returns zero.

Return Data Type: **LONG**

Example:

```
!INLIST('D','A','B','C','D','E') returns 4
!INLIST('B','A','B','C','D','E') returns 2

EXECUTE INLIST(Emp:Status,'Fulltime','Parttime','Retired','Consultant')
  Scr:Message = 'All Benefits'           !Full timer
  Scr:Message = 'Holidays Only'         !Part timer
  Scr:Message = 'Medical/Dental Only'    !Retired
  Scr:Message = 'No Benefits'           !Consultant
END
```

See Also: **CHOOSE**

## INRANGE (check number within range)

---

**INRANGE**(*expression,low,high*)

**INRANGE**

Return number in valid range.

*expression*

A numeric constant, variable, or expression.

*low*

A numeric constant, variable, or expression of the lower boundary of the range.

*high*

A numeric constant, variable, or expression of the upper boundary of the range.

The **INRANGE** procedure compares a numeric *expression* to an inclusive range of numbers. If the value of the *expression* is within the range, the procedure returns the value 1 for “true.” If the *expression* is greater than the *high* parameter, or less than the *low* parameter, the procedure returns a zero for “false.”

Return Data Type:      **LONG**

Example:

```
IF INRANGE(Date % 7,1,5)  !If this is a week day
  DO WeekdayRate          ! use the weekday rate
ELSE                      !Otherwise
  DO WeekendRate          ! use the weekend rate
END
```



## INSTRING (return substring position)

**INSTRING**(*substring*,*string* [,*step*] [,*start*!])

<b>INSTRING</b>	Searches for a substring in a string.
<i>substring</i>	A string constant, variable, or expression that contains the string for which to search. You should CLIP a variable <i>substring</i> so INSTRING will not look for a match that contains the trailing spaces in the variable.
<i>string</i>	A string constant, or the label of the STRING, CSTRING, or PSTRING variable to be searched.
<i>step</i>	A numeric constant, variable, or expression which specifies the step length of the search. A <i>step</i> of 1 searches for the <i>substring</i> beginning at every character in the <i>string</i> , a <i>step</i> of 2 starts at every other character, and so on. If <i>step</i> is omitted, the step length defaults to the length of the <i>substring</i> .
<i>start</i>	A numeric constant, variable, or expression which specifies where to begin the search of the <i>string</i> . If omitted, the search starts at the first character position.

The **INSTRING** procedure *steps* through a *string*, searching for the occurrence of a *substring*. If the *substring* is found, the procedure returns the *step* number on which the *substring* was found. If the *substring* is not found in the *string*, **INSTRING** returns zero.

Return Data Type:      UNSIGNED

Example:

```
!INSTRING('DEF','ABCDEFGHIJ',1,1) returns 4
!INSTRING('DEF','ABCDEFGHIJ',2,1) returns 0
!INSTRING('DEF','ABCDEFGHIJ',2,2) returns 2
!INSTRING('DEF','ABCDEFGHIJ',3,1) returns 2
```

```
Extension = SUB(FileSpec,INSTRING('.',FileSpec) + 1,3)
                                         !Extract extension from file spec
```

```
IF INSTRING(CLIP(Search),Cus:Notes,1,1)    !If search variable found
  Scr:Message = 'Found'                    ! display message
END
```

See Also:      SUB, STRING, CSTRING, PSTRING, String Slicing

## INT (truncate fraction)

---

**INT**(*expression*)

**INT**

Return integer.

*expression*

A numeric constant, variable, or expression.

The **INT** procedure returns the integer portion of a numeric expression. No rounding is performed, and the sign remains unchanged.

Return Data Type:      **REAL or DECIMAL**

Example:

```
!INT(8.5)      returns 8  
!INT(-5.9)     returns -5
```

```
x = INT(y)      !Return integer portion of y variable contents
```

See Also:              **BCD Operations and Procedures, ROUND**

## ISALPHA (return alphabetic character)

ISALPHA( <i>string</i> )		
ISALPHA	Returns whether the <i>string</i> passed to it contains an alphabetic character.	
<i>string</i>	The label of the character string to test. If the <i>string</i> contains more than one character, only the first character is tested.	
The ISALPHA procedure returns TRUE if the <i>string</i> passed to it is alphabetic (an upper or lower case letter) and false otherwise. This is independent of the language and collation sequence. This procedure requires that CLACASE has been set in the application's environment file or through the LOCALE statement.		

Return Data Type:       LONG

Example:

```
SomeString  STRING(1)
CODE
SomeString = 'A'                                !ISALPHA returns true
IF ISALPHA(SomeString)
    X##= MESSAGE('Alpha string')
END
SomeString = '1'                                !ISALPHA returns false
IF ISALPHA(SomeString)
    X##= MESSAGE('Alpha string')
ELSE
    X##= MESSAGE('Not Alpha string')
END
```

See Also:               ISUPPER, ISLOWER, LOCALE, Environment Files

## ISLOWER (return lower case character)

---

### ISLOWER( *string* )

**ISLOWER**

Returns whether the *string* passed to it contains a lower case alphabetic character.

*string*

The label of the string to test. If the *string* contains more than one character, only the first character is tested.

The ISLOWER procedure returns TRUE if the *string* passed to it is a lower case letter and false otherwise. This is independent of the language and collation sequence. This procedure requires that CLACASE has been set in the application's environment file or through the LOCALE statement.

Return Data Type:      **LONG**

Example:

```
SomeString  STRING(1)
CODE
SomeString = 'a'                !ISLOWER returns true
IF ISLOWER(SomeString)
  X# = MESSAGE('Lower case string')
END
SomeString = 'A'                !ISLOWER returns false
IF ISLOWER(SomeString)
  X# = MESSAGE('Lower case string')
ELSE
  X# = MESSAGE('Not lower case string')
END
```

See Also:                **ISUPPER, ISALPHA, LOCALE, Environment Files**

## ISSTRING (return field string type or not)

ISSTRING( <i>field</i> )		
ISSTRING		Returns true if the <i>field</i> is a STRING, CSTRING, or PSTRING data type.
<i>field</i>		The label of a field.
The <b>ISSTRING</b> statement returns true if the <i>field</i> is a STRING, CSTRING, or PSTRING data type.		

Return Data Type:       **SIGNED**

Example:

```
MyGroup  GROUP
F1        LONG           !Field number 1
F2        SHORT          !Field number 2
F3        STRING(30)     !Field number 3
InGroup   GROUP          !Field number 3
F1        LONG           !Field number 4
F2        SHORT          !Field number 5
F3        STRING(30)     !Field number 6
          END
          END

Flag     LONG
CODE
Flag = ISSTRING(MyGroup.F1)

Flag = ISSTRING(MyGroup.F3)
```

See Also:               **WHAT, WHERE**

## ISUPPER (return upper case character)

### ISUPPER( *string* )

**ISUPPER** Returns whether the *string* passed to it contains an upper case alphabetic character.

*string* The label of the string to test. If the *string* contains more than one character, only the first character is tested.

The ISUPPER procedure returns TRUE if the *string* passed to it is an upper case letter and false otherwise. This is independent of the language and collation sequence. This procedure requires that CLACASE has been set in the application's environment file or through the LOCALE statement.

Return Data Type: LONG

Example:

```
SomeString STRING(1)
CODE
SomeString = 'A'           !ISUPPER returns true
IF ISUPPER(SomeString)
    X# = MESSAGE('Upper case string')
END
SomeString = 'a'           !ISUPPER returns false
IF ISUPPER(SomeString)
    X# = MESSAGE('Upper case string')
ELSE
    X# = MESSAGE('Not upper case string')
END
```

See Also: ISLOWER, ISALPHA, LOCALE, Environment Files

## KEYBOARD (return keystroke waiting)

### KEYBOARD( )

The **KEYBOARD** procedure returns the keycode of the first keystroke in the keyboard buffer. It is used to determine if there are keystrokes waiting to be processed by an ASK or ACCEPT statement.

Return Data Type: UNSIGNED

Example:

```
LOOP UNTIL KEYBOARD()           !Wait for any key
    ASK
    IF KEYCODE() = EscKey THEN BREAK.    !On esc key, break the loop
END
```

See Also: ASK, ACCEPT, KEYCODE, Keycode Equate Labels

## KEYCHAR (return ASCII code)

---

### KEYCHAR( )

The **KEYCHAR** procedure returns the ASCII value of the last key pressed at the time the event occurred.

Return Data Type:        **UNSIGNED**

Example:

```

ACCEPT                                !Wait for an event
CASE KEYCHAR()                       !Process the last keystroke
OF VAL('A') TO VAL('Z')              ! upper case?
DO ProcessUpper
OF VAL('a') TO VAL('z')              ! lower case?
DO ProcesLower
END
END

```

See Also:                **SETKEYCHAR, ASK, ACCEPT, SELECT, VAL, CHR**

## KEYCODE (return last keycode)

---

### KEYCODE( )

The **KEYCODE** procedure returns the keycode of the last key pressed at the time the event occurred, or the last keycode value set by the **SETKEYCODE** procedure.

Return Data Type:        **UNSIGNED**

Example:

```

ACCEPT                                !Loop on the display
CASE KEYCODE()                       !Process the keystroke
OF UpKey                             ! up arrow
DO GetRecordUp                       !  get a record
OF DownKey                           ! down arrow
DO GetRecordDn                       !  get a record
END
END

```

See Also:                **ASK, ACCEPT, KEYBOARD, SETKEYCODE, KEYSTATE, Keycode Equate labels**

## KEYSTATE (return keyboard status)

### KEYSTATE( )

The **KEYSTATE** procedure returns a bitmap containing the status of the SHIFT, CTRL, ALT, any extended key, CAPS LOCK, NUM LOCK, SCROLL LOCK, and INSERT keys for the last **KEYCODE** procedure return value. The bitmap is contained in the high-order byte of the returned **SHORT**.

```

x . . . . . insert key  (8000h)
. x . . . . . scroll lock (4000h)
. . x . . . . . num lock  (2000h)
. . . x . . . . . caps lock (1000h)
. . . . x . . . . . extended (0800h)
. . . . . x . . . . . alt    (0400h)
. . . . . x . . . . . ctrl   (0200h)
. . . . . x . . . . . shift  (0100h)

```

Return Data Type:      **UNSIGNED**

Example:

```

ACCEPT                                !Loop on the display
CASE KEYCODE()                       !Process the keystroke
OF EnterKey                          !User pressed Enter
  IF BAND(KEYSTATE(),0800h)          !Detect enter on numeric keypad
    PRESSKEY(TabKey)                ! press tab for the user
  END
END
END

```

See Also:              **KEYCODE, BAND**

## LASTFIELD (return last window control)

### LASTFIELD( )

The **LASTFIELD** procedure returns the highest field number in the currently active window (or **REPORT**) as specified by **SETTARGET**. This does not include any controls in a **TOOLBAR** or **MENUBAR** or any controls created after the window is opened.

Return Data Type:      **SIGNED**

Example:

```

DISABLE(FIRSTFIELD(),LASTFIELD())    !Dim all control fields

```

See Also:              **FIRSTFIELD**



## LEFT (return left justified string)

**LEFT**(*string* [,*length*])

**LEFT**

Left justifies a string.

*string*

A string constant, variable, or expression.

*length*

A numeric constant, variable, or expression for the length of the return string. If omitted, *length* defaults to the length of the *string*.

The **LEFT** procedure returns a left justified string. Leading spaces are removed from the *string*.

Return Data Type: **STRING**

Example:

```
!LEFT(' ABC') returns 'ABC '
```

```
CompanyName = LEFT(CompanyName)      !Left justify the company name
```

See Also: **RIGHT, CENTER**

## LEN (return length of string)

**LEN**(*string*)

**LEN**

Returns length of a string.

*string*

A string constant, variable, or expression.

The **LEN** procedure returns the length of a *string*. If the *string* parameter is the label of a **STRING** variable, the procedure will return the declared length of the variable. If the *string* parameter is the label of a **CSTRING** or **PSTRING** variable, the procedure will return the length of the contents of the variable. Numeric variables are automatically converted to **STRING** intermediate values.

Return Data Type: **UNSIGNED**

Example:

```
IF LEN(CLIP(Title) & ' ' & CLIP(First) & ' ' & CLIP(Last)) > 30
    Rpt:Name = CLIP(Title) & ' ' & SUB(First,1,1) & '. ' & Last      !If full name won't fit
    ! use first initial
ELSE
    Rpt:Name = CLIP(Title) & ' ' & CLIP(First) & ' ' & CLIP(Last)
    ! else use full name
END
Rpt:Title = CENTER(Cus:Name,LEN(Rpt:Title))      !Center the name in the title
```

## LINE (draw a straight line)

**LINE**( *x* , *y* , *width* , *height* )

<b>LINE</b>	Draws a straight line on the current window or report.
<i>x</i>	An integer expression specifying the horizontal position of the starting point.
<i>y</i>	An integer expression specifying the vertical position of the starting point.
<i>width</i>	An integer expression specifying the width. This may be a negative number.
<i>height</i>	An integer expression specifying the height. This may be a negative number.

The **LINE** procedure places a straight line on the current window or report. The starting position, slope, and length of the line are specified by *x*, *y*, *width*, and *height* parameters. The *x* and *y* parameters specify the starting point of the line. The *width* and *height* parameters specify the horizontal and vertical distance to the end point of the line. If these are both positive numbers, the line slopes to the right and down from its starting point. If the *width* parameter is negative, the line slopes left; if the *height* parameter is negative, the line slopes left. If either the *width* or *height* parameter is zero, the line is horizontal or vertical.

<u>Width</u>	<u>Height</u>	<u>Result</u>
positive	positive	right and down from start point
negative	positive	left and down from start point
positive	negative	right and up from start point
negative	negative	left and up from start point
zero	positive	vertical, down from start point
zero	negative	vertical, up from start point
positive	zero	horizontal, right from start point
negative	zero	horizontal, left from start point

The line color is the current pen color set by **SETPENCOLOR**; the default color is the Windows system color for window text. The width is the current width set by **SETPENWIDTH**; the default width is one pixel. The line's style is the current pen style set by **SETPENSTYLE**; the default style is a solid line.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
!window controls
END
CODE
OPEN(MDIChild)
LINE(100,50,100,50)      !Draw line
```

See Also:

Current Target, **SETPENCOLOR**, **SETPENWIDTH**, **SETPENSTYLE**

## LOCALE (load environment file)

**LOCALE(** | *file* | )  
| *setting, value* | )

## LOCALE

Allows the user to load a specific environment file (.ENV) at run-time and also to set individual environment settings.

$$file$$

A string constant or variable containing the name (including extension) of the environment file (.ENV) to load, or the keyword **WINDOWS**. This may be a fully-qualified DOS pathname.

*setting*

A string constant or variable containing the name of the environment variable to set. Valid choices are listed under the *Environment Files* section.

*value*

A string constant or variable containing the environment variable setting.

The **LOCALE** procedure allows the user to load a specific environment file (.ENV) at run-time and also to set individual environment settings. This allows an application to load another file to override the default *appname*.ENV file, or to specify individual environment file settings when no environment file exists.

The `WINDOWS` keyword as the *file* parameter specifies use of Windows' default values for `CLACOLSEQ`, `CLACASE` and `CLAAMPM`. When specifying individual *settings*, the *value* parameter does not require double quotes around each individual item in the *value* string, unlike the syntax required in an `.ENV` file.

Errors Posted:

```
02 File Not Found
05 Access Denied
```

Example:

LOCALE('MY.ENV')	!Load an environment file
LOCALE('WINDOWS')	!Set default CLACOLSEQ, CLACASE and CLAAMPM
LOCALE('CLABUTTON','OK,&Si,&No,&Abortar,&Ignora,&Volveratratar,Cancelar,&Ayuda')	!Set CLABUTTON to Spanish
LOCALE('CLACOLSEQ','ÄÅÆāāāāāāæBbCcççDdEēēēēēFfGgHhIīīīīīJjKkLlMmNñññññOōōōōōPpQqRrSsTtUūūūūūVvWwXxYyZzÿ')	!Set the collating sequence
LOCALE('CLACASE','ÄÅÆÇÑÖÜ,äåæçëñü')	!Set upper/lower case pairs
LOCALE('CLMSG2','No File Found')	!Set ERROR() message for ERRORCODE()=2

See Also:

## Environment Files, OEM

## LOCK (exclusive file access)

### LOCK(*file* [,*seconds*])

<b>LOCK</b>	Locks a data file.
<i>file</i>	The label of a FILE opened for shared access.
<i>seconds</i>	A numeric constant or variable which specifies the maximum wait time in seconds.

The **LOCK** statement locks a *file* against access by other workstations in a multi-user environment. Generally, this excludes other users from writing to or reading from the *file*. The file driver may or may not treat separate execution threads within a single program as another workstation or not.

#### LOCK(*file*)

Attempts to lock the *file* until it is successful. If it is already locked by another workstation, LOCK will wait until the other workstation unlocks it.

#### LOCK(*file*,*seconds*)

Posts the “File Is Already Locked” error after unsuccessfully trying to lock the file for the specified number of *seconds*.

The most common problem to avoid when locking files is referred to as “deadly embrace.” This condition occurs when two workstations attempt to lock the same set of files in two different orders and both are using the LOCK(*file*) form of LOCK. One workstation has already locked a file that the other is trying to LOCK, and vice versa. This problem may be avoided by using the LOCK(*file*,*seconds*) form of LOCK, and always locking files in the same order.

Errors Posted: 32 File Is Already Locked

Example:

```

LOOP                                !Loop to avoid “deadly embrace”
  LOCK(Master,1)                    !Lock the master file, try 1 second
  IF ERRORCODE() = 32               !If someone else has it
    CYCLE                           ! try again
  END
  LOCK(Detail,1)                    !Lock the detail file, try 1 second
  IF ERRORCODE() = 32               !If someone else has it
    UNLOCK(Master)                  ! unlock the locked file
    CYCLE                           ! try again
  END
  BREAK                             !Break loop when both files are locked
END

```

See Also: UNLOCK, HOLD, LOGOUT

## LOCKTHREAD (re-lock the current execution thread)

### LOCKTHREAD

The **LOCKTHREAD** statement re-locks the current execution thread that has been unlocked with the **UNLOCKTHREAD** statement. **LOCKTHREAD** has no effect in 16-bit code and is ignored. It is only needed in 32-bit applications.

The **THREADLOCKED()** procedure determines whether the thread has been unlocked or not.

Example:

```
UNLOCKTHREAD           !Unlock the thread
MyLibraryCodeWithMessageLoop  !Call the code that has its own message loop
LOCKTHREAD             !Re-lock the thread
```

See Also: **ACCEPT, UNLOCKTHREAD, THREADLOCKED**

## LOG10 (return base 10 logarithm)

### LOG10(*expression*)

**LOG10** Returns base 10 logarithm.

*expression* A numeric constant, variable, or expression. If the value of the *expression* is zero or less, the return value will be zero. The base 10 logarithm is undefined for values less than or equal to zero.

The **LOG10** (pronounced “log ten”) procedure returns the base 10 logarithm of a numeric *expression*. The base 10 logarithm of a value is the power to which 10 must be raised to equal that value.

Return Data Type: **REAL**

Example:

```
!LOG10(10)    returns 1
!LOG10(1)     returns 0

LogStore = LOG10(Var)      !Store the log 10 of var
```

See Also: **LOGE**

## LOGE (return natural logarithm)

---

### LOGE(*expression*)

**LOGE**

Returns the natural logarithm.

*expression*

A numeric constant, variable, or expression. If the value of the *expression* is less than zero, the return value is zero. The natural logarithm is undefined for values less than zero.

The **LOGE** (pronounced “log-e”) procedure returns the natural logarithm of a numeric *expression*. The natural logarithm of a value is the power to which **e** must be raised to equal that value. The value of **e** used internally by the Clarion library for these calculations is 2.71828182846.

Return Data Type:      **REAL**

Example:

```
!LOGE(2.71828182846)  returns 1
!LOGE(1)              returns 0
```

```
LogVal = LOGE(Val)    !Get the natural log of Val
```

See Also:              **LOG10**

## LOGOUT (begin transaction)

**LOGOUT**(*timeout* [, *file*, ... , *file* ] )

<b>LOGOUT</b>	Initiates transaction processing.
<i>timeout</i>	A numeric constant or variable specifying the number of seconds to attempt to begin the transaction for a <i>file</i> before aborting the transaction and posting an error.
<i>file</i>	The label of a FILE declaration. There may be multiple <i>file</i> parameters, separated by commas, in the parameter list (up to 50 in 16-bit and 100 in 32-bit). If no <i>file</i> is specified, all <i>files</i> in the transaction must have been previously named using PROP:Logout.

The **LOGOUT** statement initiates transaction processing for a specified set of *files*. All *files* in the transaction set must have the same file driver and must already be open.

LOGOUT informs the file driver that a transaction is beginning. The file driver then performs the actions necessary to that file system to initiate transaction processing for the specified set of *files*. For example, if the file system requires that the *files* be locked for transaction processing, LOGOUT automatically locks the *files*.

Only one LOGOUT transaction may be active at a time. A second LOGOUT statement without a prior COMMIT or ROLLBACK generates errorcode 56.

Errors Posted:	32 File Is Already Locked
	37 File Not Open
	48 Unable to Log Transaction
	56 LOGOUT Already Active
	80 Function Not Supported

Example:

```

LOGOUT(1,OrderHeader,OrderDetail)      !Begin Transaction
DO ErrHandler                          ! always check for errors
ADD(OrderHeader)                       !Add Parent record
DO ErrHandler                          ! always check for errors
LOOP X# = 1 TO RECORDS(DetailQue)      !Process stored detail records
    GET(DetailQue,X#)                  ! Get one from the QUEUE
    DO ErrHandler                      ! always check for errors
    Det:Record = DetailQue             ! Assign to record buffer
    ADD(OrderDetail)                   ! and add it to the file
    DO ErrHandler                      ! always check for errors
END
COMMIT                                 !Terminate successful transaction
ASSERT(~ERRORCODE())

ErrHandler ROUTINE                     !Error routine
IF NOT ERRORCODE() THEN EXIT.          !Bail out if no error
Err" = ERROR()                        !Save the error message
ROLLBACK                              !Rollback the aborted transaction
ASSERT(~ERRORCODE())
BEEP                                  !Alert the user
MESSAGE('Transaction Error - ' & Err")
RETURN                                ! and get out

```

See Also:

**COMMIT, ROLLBACK, PROP:Logout**



## LONGPATH (return long filename)

### LONGPATH( [ *shortfilename* ] )

#### LONGPATH

Returns the fully-qualified long filename for a given short filename.

#### *shortfilename*

A string constant, variable, or expression that specifies the DOS standard filename to convert. This may include the complete path. If omitted, LONGPATH returns the current drive and directory in long name form.

The **LONGPATH** procedure returns the long filename for a given *short* filename. The file named in the *shortfilename* parameter must already exist on disk.

Return Data Type:      **STRING**

Example:

```
MyLongFile  STRING(260)
CODE
MyLongFile = LONGPATH('c:\progra~1\mytext~1.txt')
!returns: c:\program files\my text file.txt
```

See Also:                **SHORTPATH, PATH, DIRECTORY**

## LOWER (return lower case)

### LOWER(*string*)

#### LOWER

Converts a string to all lower case.

#### *string*

A string constant, variable, or expression for the *string* to be converted.

The **LOWER** procedure returns a string with all letters converted to lower case.

Return Data Type:      **STRING**

Example:

```
!LOWER('ABC') returns 'abc'

Name = SUB(Name,1,1) & LOWER(SUB(Name,2,19))
!Make the rest of the name lower case
```

See Also:                **UPPER, ISUPPER, ISLOWER**

## MATCH (return matching values)

**MATCH**( *first*, *second* [, *mode* ] )

<b>MATCH</b>	Returns true or false based on a comparison of the first two parameters passed.
<i>first</i>	A string containing data to compare against the <i>second</i> parameter.
<i>second</i>	A string containing data to compare against the <i>first</i> parameter.
<i>mode</i>	An integer constant or equate which specifies the method of comparison. If omitted, a wild card comparison is the default.

The **MATCH** procedure returns true or false as to whether the *first* and *second* parameters match according to the comparison *mode* specified. The following *mode* value EQUATES are listed in EQUATES.CLW:

### Match:Simple

A straight-forward equivalence comparison (*first* = *second*), which is most useful when combined with Match:IgnoreCase.

### Match:Wild (default)

A wild card match with the *second* parameter containing the pattern that can contain 'asterisk (\*)' to match 0 or more of any character, and question mark (?) to match any single character.

### Match:RegExpr

A regular expression match where the *second* parameter contains the regular expression. Repeated usage with the same regular expression value is optimized (to avoid recompiling the expression).

### Match:Soundex

A standard soundex comparison of the two strings, returning true if they have the same soundex value.

### Match:IgnoreCase

Add to the *mode* for a case insensitive match (except Soundex).

## Regular Expression Operators

Regular expressions are used to describe patterns in text. The following characters are regular expression operators (or metacharacters) used to increase the power and versatility of regular expressions.

- ^   Caret matches the beginning of the string or the beginning of a line within the string. For example:  
       ^@chapter  
       matches the “@chapter” at the beginning of a string.

\$ Dollar sign is similar to the caret, but it matches only at the end of a string or the end of a line within the string. For example:

`p$`

matches a record that ends with a p.

. Period matches any single character except a newline. For example:

`.P`

matches any single character followed by a P in a string. Using concatenation we can make regular expressions like ``U.A'`, which matches any three-character sequence that begins with ``U` and ends with ``A`.

[...] This is called a character set. It matches any one of the characters that are enclosed in the square brackets. For example:

`[MVX]`

matches any one of the characters M, V, or X in a string. Ranges of characters are indicated by using a hyphen between the beginning and ending characters, and enclosing the whole thing in brackets. For example:

`[0-9]`

matches any digit. To match ``-'`, write it as ``---'`, which is a range containing only ``-'`. You may also give ``-'` as the first or last character in the set. To match ``^'`, put it anywhere except as the first character of a set. To match a ``]'`, make it the first character in the set. For example:

`[ ]d^]`

matches either ``]'`, ``d'` or ``^'`.

[^ ...]

This is a complemented character set. The first character after the `[` must be a `^`. It matches any characters except those in the square brackets (or newline). For example:

`[^0-9]`

matches any character that is not a digit.

| Vertical bar is the alternation operator and it is used to specify alternatives. For example:

`^P|[0-9]`

matches any string that matches either `^P` or `[0-9]`. This means it matches any string that contains a digit or starts with P. The alternation applies to the largest possible regexps on either side.

(...)

Parentheses are used for grouping in regular expressions as in arithmetic. They can be used to concatenate regular expressions containing the alternation operator, `|`.

- \* Asterisk means that the preceding regular expression is to be repeated as many times as possible to find a match. For example:

ph\*

applies the \* symbol to the preceding h and looks for matches to one p followed by any number of h's. This will also match just p if no h's are present. The \* repeats the smallest possible preceding expression (use parentheses if you wish to repeat a larger expression). It finds as many repetitions as possible. For example:

(c[ad][ad]\*r x)

matches a string of the form (car x), (cdr x), (cadr x), and so on.

- + Plus sign is similar to \*, but the preceding expression must be matched at least once. This means that:

wh+y

would match “why” and “whhy” but not “wy,” whereas wh\*y would match all three of these strings. This is a simpler way of writing the last \* example:

(c[ad]+r x)

- ? Question mark is similar to \*, but the preceding expression can be matched once or not at all. For example:

fe?d

will match fed and fd, but nothing else.

- \ Backslash is used to suppress the special meaning of a character when matching. For example:

\\$

matches the character \$.

In regular expressions, the \*, +, and ? operators have the highest precedence, followed by concatenation, and finally by |.

Return Data Type: **BYTE**

Example:

```
A STRING('Richard')
B STRING('RICHARD')
C STRING('R*')
```

```
! MATCH(A,B,Match:Simple+Match:IgnoreCase)
! MATCH(A,B,Match:Soundex)
! MATCH(A,C)
```

```
Returns true - case insensitive match
Returns true - same soundex values
Returns true - wildcard match
```

## MAXIMUM (return maximum subscript value)

**MAXIMUM**(*variable*,*subscript*)

<b>MAXIMUM</b>	Returns maximum subscript value.
<i>variable</i>	The label of a variable declared with a DIM attribute.
<i>subscript</i>	A numeric constant, variable, or expression for the subscript number. The <i>subscript</i> identifies which array dimension is passed to the procedure.

The **MAXIMUM** procedure returns the maximum subscript value for an explicitly dimensioned variable. **MAXIMUM** does not operate on the implicit array dimension of **STRING**, **CSTRING**, or **PSTRING** variables. This is usually used to determine the size of an array passed as a parameter to a procedure or procedure.

Return Data Type: **LONG**

Example:

```

Array BYTE,DIM(10,12)           !Define a two-dimensional array

!For the above Array:          MAXIMUM(Array,1) returns 10
!                               MAXIMUM(Array,2) returns 12

CODE
LOOP X# = 1 TO MAXIMUM(Array,1)  !Loop until end of 1st dimension
  LOOP Y# = 1 TO MAXIMUM(Array,2) ! Loop until end of 2nd dimension
    Array[X#,Y#] = 27           ! Initialize each element to default
  END
END

```

See Also: **DIM**, Prototype Parameter Lists (Passing Arrays)

## MESSAGE (return message box response)

**MESSAGE**( *text* [, *caption*] [, *icon*] [, *buttons*] [, *default*] [, *style*] )

<b>MESSAGE</b>	Displays a message dialog box and returns the button the user pressed.
<i>text</i>	A string constant or variable containing the text to display in the message box. A vertical bar ( ) in the text indicates a line break for multi-line messages. Including '<9>' in the text inserts a tab for text alignment.
<i>caption</i>	The dialog box title. If omitted, the dialog has no title.
<i>icon</i>	A string constant or variable naming the .ICO file to display, or an EQUATE for one of Windows' standard icons (these EQUATES are listed in EQUATES.CLW). If omitted, no icon is displayed on the dialog box.
<i>buttons</i>	Either an integer expression which indicates which Windows standard buttons (may indicate multiple buttons) to place on the dialog box, or a string expression containing a vertical bar ( ) delimited list of the text for up to 8 buttons. If omitted, the dialog displays an Ok button.
<i>default</i>	An integer constant, variable, EQUATE, or expression which indicates the default button on the dialog box. If omitted, the first button is the default.
<i>style</i>	An integer constant or variable which specifies the dialog is Application Modal (0) or System Modal (1). If omitted, the dialog is Application Modal.

The **MESSAGE** procedure displays a Windows-standard message box, typically requiring only a Yes or No response, or no specific response at all. You can specify the font for MESSAGE by setting SYSTEM{PROP:FONT}.

The EQUATES.CLW file contains symbolic constants for the *icon*, *buttons*, and *default* parameters. The following list is all the EQUATES available for use in the *buttons* and *default* parameters for use when the *buttons* parameter is not a string:

BUTTON:OK  
 BUTTON:YES  
 BUTTON:NO  
 BUTTON:ABORT  
 BUTTON:RETRY  
 BUTTON:IGNORE  
 BUTTON:CANCEL  
 BUTTON:HELP

When *buttons* is a string, the *default* must be an integer in the range of 1 to the number of buttons defined in the *buttons* text (a maximum of 8).

The MESSAGE procedure returns the number of the button the user presses to exit the dialog box. The button number returned is the constant value that each of these EQUATES represents (when the *buttons* parameter is an integer), and an integer in the range of 1 to the number of buttons defined in the *buttons* text (up to 8) when *buttons* contains string text.

The following list shows the most common EQUATES used in the *icon* parameter (there are more listed in EQUATES.CLW):

```

ICON:None
ICON:Application
ICON:Hand
ICON:Question
ICON:Exclamation
ICON:Asterisk
ICON:Pick
ICON:Clarion

```

The *style* parameter determines whether the message window is Application Modal or System Modal. An Application Modal window must be closed before the user is allowed to do anything else in the application, but does not prevent the user from switching to another Windows application. A System Modal window must be closed before the user is allowed to do anything else in Windows.

Return Data Type:      **UNSIGNED**

Example:

```

CASE MESSAGE('Quit?', 'Editor', ICON:Question, BUTTON:Yes+BUTTON:No, BUTTON:No, 1)
    !A ? icon with Yes and No buttons, the default button is No
OF BUTTON:No
    ! the window is System Modal
    CYCLE
OF BUTTON:Yes
    MESSAGE('Goodbye|So Long|Sayonara')    !A 3-line message with only an Ok button.
    RETURN
END

CASE MESSAGE('Quit?', 'Editor', ICON:Question, '&Yes|&No|&Maybe', 3, 0)
    !Yes, No, and Maybe buttons, default is Maybe, Application Modal
OF 1
    !Yes button
    RETURN
OF 2
    !No button
    CYCLE
OF 3
    !Maybe button
    MESSAGE('You have a 50-50 change of staying or going')
    IF CLOCK() % 2
        !Is the current time an odd or even hundredth of a second?
        RETURN
    ELSE
        CYCLE
    END
END

```

## MONTH (return month of date)

---

### MONTH(*date*)

**MONTH**

Returns month in year.

*date*

A numeric constant, variable, expression, or the label of a STRING, CSTRING, or PSTRING variable declared with a date picture token. The *date* must be a standard date. A variable declared with a date picture token is automatically converted to a standard date intermediate value.

The **MONTH** procedure returns the month of the year (1 to 12) for a given standard date.

Return Data Type:      **LONG**

Example:

```
PayMonth = MONTH(DueDate)      !Get the month from the date
```

See Also:              Standard Date, DAY, YEAR, TODAY, DATE

## MOUSEX (return mouse horizontal position)

---

### MOUSEX( )

The **MOUSEX** procedure returns a numeric value corresponding to the current horizontal position of the mouse cursor at the time of the event. The position is relative to the origin of that window.

The return value is in dialog units.

Return Data Type:      **SIGNED**

Example:

```
SaveMouseX = MOUSEX()      !Save mouse position
```

See Also:              **MOUSEY**



## MOUSEY (return mouse vertical position)

---

### MOUSEY( )

The **MOUSEY** procedure returns a numeric value corresponding to the current vertical position of the mouse cursor at the time of the event. The position is relative to the origin of that window.

The return value is in dialog units.

Return Data Type:      **SIGNED**

Example:

```
SaveMouseY = MOUSEY()      !Save mouse position
```

See Also:      **MOUSEX**

## NAME (return file name)

---

### NAME(*label*)

**NAME**      Returns name of a file.

*label*      The label of a FILE declaration.

The **NAME** procedure returns a string containing the operating system device name for the structure identified by the *label*. For FILE structures, if the file is OPEN, the complete DOS file specification (drive, path, name, and extension) is returned. If the FILE is closed, the contents of the NAME attribute on the FILE are returned. If there is no NAME attribute, the FILE label is returned.

Return Data Type:      **STRING**

Example:

```
OpenFile = NAME(Customer)      !Save the name of the open file
```

## NEXT (read next record in sequence)

---

### NEXT( *entity* )

**NEXT** Reads the next record in sequence from a FILE or VIEW.

*entity* The label of a FILE or VIEW declaration.

**NEXT** reads the next record in sequence from a FILE or VIEW. The SET (or RESET) statement determines the sequence in which records are read. The first NEXT following a SET reads the record at the position specified by the SET statement. Subsequent NEXT statements read subsequent records in that sequence. The sequence is not affected by any GET, REGET, ADD, PUT, or DELETE. Executing NEXT without a preceding SET, or attempting to read past the end of file posts the “Record Not Available” error.

### FILE Usage

NEXT reads the next record in sequence from the data FILE and places it in the RECORD structure data buffer.

### VIEW Usage

NEXT reads the next record(s) in sequence from a VIEW and places the appropriate fields in the VIEW structure component files' data buffer(s). If the VIEW contains JOIN structures, NEXT retrieves the appropriate next set of related records.

Either the last SET statement issued on the VIEW's primary file before the OPEN(view) statement, or the SET(view) statement issued after the OPEN(view) determines the sequence in which records are read.

Errors Posted:

33 Record Not Available  
37 File Not Open  
43 Record Is Already Held

Example:

```

ViewOrder  VIEW(Customer)                                !Declare VIEW structure
            PROJECT(Cus:AcctNumber,Cus:Name)
            JOIN(Hea:AcctKey,Cus:AcctNumber)              !Join Header file
            PROJECT(Hea:OrderNumber)
            JOIN(Dtl:OrderKey,Hea:OrderNumber)            !Join Detail file
            PROJECT(Det:Item,Det:Quantity)
            END
            END
            END
CODE
OPEN(Customer,22h)
SET(Cus:NameKey)                                         !Beginning of file in keyed sequence
LOOP                                                    !Read all records through end of file
    NEXT(Customer)                                       ! read a record sequentially
    IF ERRORCODE() THEN BREAK.                          ! break on end of file
    DO PostTrans                                         ! call transaction posting routine
END

OPEN((Header,22h)
OPEN(Detail,22h)
OPEN(Product,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP                                                    !Read all records through end of primary file
    NEXT(ViewOrder)                                     ! read a record sequentially
    IF ERRORCODE() THEN BREAK.                          ! break on end of file
    DO PostTrans                                         ! call transaction posting routine
END                                                    !End loop

```

See Also:

**SET, RESET, PREVIOUS, EOF, HOLD, WATCH**

## NOMEMO (read file record without reading memo)

### NOMEMO(*file*)

**NOMEMO** Arms “memoless” record retrieval.

*file* The label of a FILE.

The **NOMEMO** statement arms “memoless” record retrieval for the next GET, REGET, NEXT, or PREVIOUS statement encountered. The following GET, REGET, NEXT, or PREVIOUS gets the record but does not get any associated MEMO or BLOB field(s) for the record. Generally, this speeds up access to the record when the contents of the MEMO or BLOB field(s) are not needed by the procedure.

Example:

```
SET(Master)
LOOP
  NOMEMO(Master)           !Arm “memoless” access
  NEXT(Master)             !Get record without memo
  IF ERRORCODE() THEN BREAK.
  Queue = Mst:Record       !Fill memory queue
  ADD(Queue)
  IF ERRORCODE() THEN STOP(ERROR()).
END
DISPLAY(?ListBox)         !Display the queue
```

See Also: GET, NEXT, PREVIOUS, MEMO

## NULL (return null file field)

### NULL(*field*)

**NULL**

Determines null “value” of a *field*.

*field*

The label (including prefix) of a field in a FILE structure. This may be a GROUP or RECORD structure.

The **NULL** procedure returns a non-zero value (true) if the *field* is null, and zero (false) if the *field* contains any known value (including blank or zero). If the *field* is a GROUP or RECORD structure, all component fields of the GROUP or RECORD must be null for NULL to return true. Support for null “values” in a FILE is entirely dependent upon the file driver.

Return Data Type: **LONG**

Example:

```
Customer  FILE,DRIVER('Clarion'),PRE(Cus)    !Declare customer file layout
AcctKey   KEY(Cus:AcctNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
Name      STRING(20)
Addr      STRING(20)
CSZ       STRING(35)
. .

Header    FILE,DRIVER('Clarion'),PRE(Hea)    !Declare header file layout
AcctKey   KEY(Hea:AcctNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
ShipToName STRING(20)
ShipToAddr STRING(20)
ShipToCSZ STRING(35)
. .

CODE
OPEN(Header)
OPEN(Customer)
SET(Hea:AcctKey)
LOOP
  NEXT(Header)
  IF ERRORCODE() THEN BREAK.
  IF NULL(Hea:ShipToName)          !Check for null ship-to address
    Cus:AcctNumber = Hea:AcctNumber
    GET(Customer,Cus:AcctKey)      !Get Customer record
    IF ERRORCODE() THEN CLEAR(Cus:Record).
    Hea:ShipToName = Cus:Name      ! and assign customer address
    Hea:ShipToAddr = Cus:Addr      ! as the ship-to address
    Hea:ShipToCSZ = Cus:CSZ
  END
  PUT(Header)                      !Put Header record back
END
```

See Also: **SETNULL, SETNONNULL**

## NUMERIC (return numeric string)

---

### NUMERIC(*string*)

**NUMERIC**

Validates all numeric string.

*string*

A string constant, variable, or expression.

The **NUMERIC** procedure returns the value 1 (true) if the *string* only contains a valid numeric value. It returns zero (false) if the *string* contains any non-numeric characters. Valid numeric characters are the digits 0 through 9, a leading minus sign, and a decimal point. **DEFORMAT** is used to return unformatted numbers from a formatted string.

Return Data Type:

**UNSIGNED**

Example:

```
!NUMERIC('1234.56') returns 1
!NUMERIC('1,234.56') returns 0
!NUMERIC('-1234.56') returns 1
!NUMERIC('1234.56-') returns 0
```

```
IF NOT NUMERIC(PartNumber)      !If part number is not numeric
  DO ChkValidPart               ! check for valid part number
END                             !End if
```

See Also:

**DEFORMAT**

## OMITTED (return omitted parameters)

### OMITTED(*position*)

#### OMITTED

Tests for unpassed parameters.

#### *position*

An integer constant or variable which specifies the ordinal parameter position to test.

The **OMITTED** procedure tests whether a parameter of a **PROCEDURE** was actually passed. The return value is one (true) if the parameter in the specified *position* was omitted. The return value is zero (false) if the parameter was passed. Any *position* past the last parameter passed is considered omitted.

For the purpose of the **OMITTED** procedure, a parameter may only be omitted if its data type is enclosed in angle brackets ( < > ) in the **PROCEDURE** prototype . Although parameters prototyped with default values may be omitted from the procedure call, the default value is actually passed, and the **OMITTED** procedure therefore returns false (0) for those parameters.

All **CLASS** methods have an implicit first parameter which is always passed—the **CLASS** name. This means that **OMITTED**(1) will always return false for a **CLASS** method. Any actual parameters passed to the method are numbered beginning with two (2). Therefore, to test whether two actual parameters to a **CLASS** method are passed means you must test *positions* two (2) and three (3).

Return Data Type: **LONG**

Example:

```
MAP
SomeProc      PROCEDURE(STRING,<LONG>,<STRING>)    !Procedure prototype
END
MyClass      CLASS
MyMethod      PROCEDURE(STRING Field1,<LONG Date>,<STRING Field3>) !Method prototype
END

CODE
SomeProc(Field1,,Field3) !For this statement:
                        ! OMITTED(1) returns 0, OMITTED(2) returns 1
                        ! OMITTED(3) returns 0, OMITTED(4) returns 1
SomeProc PROCEDURE(Field1,Date,Field3)
CODE
IF OMITTED(2)          !If date parameter was omitted
    Date = TODAY()     ! substitute the system date
END
MyClass.MyMethod PROCEDURE(STRING Field1,<LONG Date>,<STRING Field3>)
CODE
IF OMITTED(3)          !If date parameter was omitted
    Date = TODAY()     ! substitute the system date
END
```

See Also: **Prototype Parameter Lists**

## OPEN (open a data structure)

**OPEN**( *entity* [, *access mode* / *owner* ] )

<b>OPEN</b>	Opens a FILE, VIEW, APPLICATION, WINDOW, or REPORT structure for processing.
<i>entity</i>	The label of a FILE, VIEW, APPLICATION, WINDOW, or REPORT structure.
<i>access mode</i>	A numeric constant, variable, or expression which determines the level of access granted to both the user opening the FILE <i>entity</i> , and other users in a multi-user system. If omitted, the default value is 22h (Read/Write + Deny Write). Valid only when the <i>entity</i> parameter names a FILE structure.
<i>owner</i>	The label of the APPLICATION or WINDOW structure which “owns” the window <i>entity</i> being opened. Normally, this parameter would be an &WINDOW reference variable. Valid only when the <i>entity</i> parameter names an APPLICATION or WINDOW structure.

The **OPEN** statement opens a FILE, VIEW, APPLICATION, WINDOW, or REPORT structure for processing.

### FILE Usage

The OPEN statement opens a FILE structure for processing and sets the *access mode*. Support for various *access modes* are file driver dependent. All files must be explicitly opened before the records may be accessed.

The *access mode* is a bitmap which tells the operating system what access to grant the user opening the file and what access to deny to others using the file.

The actual values for each access level are:

	<u>Dec.</u>	<u>Hex.</u>	<u>Access</u>
User Access:	0	0h	Read Only
	1	1h	Write Only
	2	2h	Read/Write
Other's Access:	0	0h	Any Access (FCB compatibility mode)
	16	10h	Deny All
	32	20h	Deny Write
	48	30h	Deny Read
	64	40h	Deny None

### VIEW Usage

The OPEN statement opens a VIEW structure for processing. A VIEW must be explicitly opened before it may be accessed. The files used in the VIEW must already be open.



Before the `OPEN(view)` statement, you may issue a `SET` statement to the `VIEW` structure's primary file to setup sequential processing for the `VIEW`. You cannot issue a `SET` statement to the primary file while the `VIEW` is `OPEN`—you must `CLOSE(view)`, then issue the `SET`, and then `OPEN(view)` again. `SET(view)` may be issued while the `VIEW` is open to setup sequential processing using the `ORDER` attribute.

### **Window Usage**

`OPEN` activates an `APPLICATION` or `WINDOW` for processing. However, nothing is displayed until a `DISPLAY` statement or the `ACCEPT` loop is encountered. This allows an opportunity to execute pre-display code to customize the display.

A *window* with an *owner* always appears on top of its *owner*, and is automatically hidden if the *owner* is minimized or hidden. If the *owner* is closed, all owned windows are also automatically closed. MDI windows are implicitly owned by the frame window. Non-MDI windows do not have an *owner* by default.

### **REPORT Usage**

`OPEN` activates a `REPORT` structure. You must explicitly `OPEN` a `REPORT` before any of the structures may be printed.

Errors Posted:

- 02 File Not Found
- 03 Path Not Found
- 04 Too Many Open Files
- 05 Access Denied
- 32 File Is Already Locked
- 36 Invalid Data File
- 38 Invalid Key File
- 45 Invalid File Name
- 46 Key Files Must Be Rebuilt
- 47 Invalid File Declaration
- 52 File Already Open
- 57 Invalid Memo File
- 73 Memo File is Missing
- 75 Invalid Field Type Descriptor
- 79 Unsupported Data Type In File
- 88 Invalid Key Length
- 90 File System Error
- 92 Build In Progress

Example:

```

ReadOnly    EQUATE(0)           !Access mode equates
WriteOnly   EQUATE(1)
ReadWrite   EQUATE(2)
DenyAll    EQUATE(10h)
DenyWrite  EQUATE(20h)
DenyRead   EQUATE(30h)
DenyNone    EQUATE(40h)
Header      FILE,DRIVER('Clarion'),PRE(Hea)           !Declare header file layout
AcctKey      KEY(Hea:AcctNumber)
OrderKey     KEY(Hea:OrderNumber)
Record       RECORD
AcctNumber   LONG
OrderNumber  LONG
ShipToName   STRING(20)
ShipToAddr   STRING(20)

. .
Detail      FILE,DRIVER('Clarion'),PRE(Dt1)           !Declare detail file layout
OrderKey     KEY(Dt1:OrderNumber)
Record       RECORD
OrderNumber  LONG
Item         LONG
Quantity     SHORT

. .
ViewOrder   VIEW(Header),ORDER('+Hea:OrderNumber')     !Declare VIEW structure
              PROJECT(Hea:OrderNumber)
              JOIN(Dt1:OrderKey,Hea:OrderNumber)       !Join Detail file
              PROJECT(Det:Item,Det:Quantity)

. .
CODE
OPEN(Names,ReadWrite+DenyNone)    !Open fully shared access
OPEN(Header)
OPEN(Detail)
SET(Hea:AcctKey)                  !Set to primary file
OPEN(ViewOrder)                   ! then Open view
SET(ViewOrder)                    ! or SET(view) after opening to use ORDER attribute
OPEN(CustRpt)                     !Open a report

Win1Proc PROCEDURE
Win1  WINDOW,ALRT(F10Key)
      END

      CODE
      OPEN(Win1)                  !Open the window
      GlobalWindowReference &= Win1    !Assign window reference to a global &WINDOW
      ACCEPT
      IF EVENT() = EVENT:AlertKey
        START(Win2Proc)
      END
      END

Win2Proc PROCEDURE
Win2  WINDOW
      END

      CODE
      OPEN(Win2,GlobalWindowReference) !Open Win2, "owned" by Win1
      ACCEPT
      END

```

See Also:

**SHARE, CLOSE, SET, FILE, VIEW, APPLICATION, WINDOW, REPORT,  
ACCEPT, DISPLAY, CLOSE**

## PACK (remove deleted records)

### PACK(*file*)

**PACK** Removes deleted records from a data file and rebuilds its keys.

*file* The label of a FILE declaration.

The **PACK** statement removes deleted records from a data file and rebuilds its keys. The resulting data files are as compact as possible. PACK requires at least twice the disk space that the file, keys, and memos occupy to perform the process. New files are created from the old, and the old files are deleted only after the process is complete. PACK requires exclusive access to the file. Therefore, the file must be opened with *access mode* set to 12h (Read/Write Deny All) or 22h (Read/Write Deny Write).

PACK will generate events to the currently open window if you assign a value (an integer from 1 to 100) to PROP:ProgressEvents for the affected FILE before you issue the PACK. The larger the value you assign to PROP:ProgressEvents, the more events are generated and the slower the PACK will progress. These events allow you to indicate to the user the progress of the PACK. This can keep end-users informed that PACK is still working while building large files (so they don't re-boot thinking the machine has locked up).

It is not valid to make any calls to the *file* being built except to query its properties, call NAME(*file*), or CLOSE(*file*) (which aborts the process and is not recommended). Issuing a CYCLE statement in response to any of the events generated (except EVENT:BuildDone) cancels the operation. During the PACK operation, *file*{PROP:Completed} returns the percentage completed of the re-build and you can use *file*{PROP:CurrentKey} to get a key reference then either *key*{PROP:Name} or *key*{PROP:Label} to return the name of the current key being built.

Errors Posted: 63 Exclusive Access Required

Events Generated: EVENT:BuildFile PACK(*file*) is rebuilding the data portion of the *file*.  
 EVENT:BuildKey PACK(*file*) is rebuilding the keys in the *file*.  
 EVENT:BuildDone The PACK is complete.

Example:

```
OPEN(Trans,12h)      !Open the file in exclusive mode
PACK(Trans)          ! and pack it
```

See Also: OPEN, SHARE, BUILD, PROP:ProgressEvents, PROP:Completed

## PATH (return current directory)

---

### PATH( )

**PATH** returns a string containing the current drive and directory. This is equivalent to the **SHORTPATH** procedure.

Return Data Type:      **STRING**

Example:

```
IF PATH() = 'C:\'                !If in the root
    MESSAGE('You are in the Root Directory')    ! display message
END
```

See Also:              **SETPATH, SHORTPATH, LONGPATH, DIRECTORY**

## PEEK (read memory address)

**PEEK**(*segment:offset,destination*)

### **PEEK**

Reads data from a memory address.

*segment:offset*

A numeric constant, variable, or expression which specifies a memory address. The segment must be in the high order two bytes, and the offset in the low order two bytes. The integer portion of a REAL is the data type used for the intermediate value, to assure 32 bit precision. This parameter should always use the ADDRESS procedure, to ensure the correct protected mode selector:offset address is used.

*destination*

The label of a variable to receive the contents of the memory location.

The **PEEK** statement reads the memory address at *segment:offset* and copies the data found there into the *destination* variable. PEEK reads as many bytes as are required to fill the *destination* variable.

It is easily possible to create a General Protection Fault (GPF) if you PEEK at an address that belongs to another program, so great care should be taken when using PEEK. There are usually Windows API procedures that will do whatever you require of PEEK and these should be used in preference to PEEK.

Example:

```
Segment      USHORT
Offset       USHORT
Dest1        BYTE
Dest2        SHORT
Dest3        REAL
KeyboardFlag BYTE
```

```
CODE
PEEK(ADDRESS(Segment,Offset),Dest1)      !Read 1 byte
PEEK(ADDRESS(Segment,Offset),Dest2)      !Read 2 bytes
PEEK(ADDRESS(Segment,Offset),Dest3)      !Read 8 bytes
PEEK(ADDRESS(0040h,0017h),KeyboardFlag)  !Read keyboard status byte
```

See Also:

**POKE, ADDRESS**

## PENCOLOR (return line draw color)

---

### PENCOLOR( )

The **PENCOLOR** procedure returns the current pen color set by SETPENCOLOR.

Return Data Type:      **LONG**

Example:

```

Proc1      PROCEDURE
MDIChild1  WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
           !window controls
           END

CODE
OPEN(MDIChild1)
SETPENCOLOR(000000FFh)      !Set blue pen color
Proc2      !Call another procedure

Proc2      PROCEDURE
MDIChild2  WINDOW('Child Two'),AT(0,0,320,200),MDI,MAX,HVSCROLL
           !window controls
           END

ColorNow   LONG
CODE
ColorNow = PENCOLOR()      !Get current pen color
OPEN(MDIChild2)
SETPENCOLOR(ColorNow)      !Set same pen color
SETPENSTYLE(PEN:dash)      !Set dashes for line style
SETPENWIDTH(2)             !Set two dialog unit thickness
BOX(100,50,100,50,00FF0000h) !Red box with thick blue dashed border

```

See Also:              **SETPENCOLOR**

## PENSTYLE (return line draw style)

### PENSTYLE()

The **PENSTYLE** procedure returns the current line draw style set by **SETPENSTYLE**.

EQUATE statements for the pen styles are contained in the **EQUATES.CLW** file. The following list is a representative sample of these (see **EQUATES.CLW** for the complete list):

PEN:solid	Solid line
PEN:dash	Dashed line
PEN:dot	Dotted line
PEN:dashdot	Mixed dashes and dots

Return Data Type: **SIGNED**

Example:

```

Proc1    PROCEDURE
MDIChild1 WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
        !window controls
        END

CODE
OPEN(MDIChild1)
SETPENCOLOR(000000FFh)      !Set blue pen color
SETPENSTYLE(PEN:dash)      !Set dashes for line style
Proc2                                !Call another procedure

Proc2    PROCEDURE
MDIChild2 WINDOW('Child Two'),AT(0,0,320,200),MDI,MAX,HVSCROLL
        !window controls
        END

ColorNow LONG
StyleNow LONG
CODE
ColorNow = PENCOLOR()      !Get current pen color
StyleNow = PENSTYLE()      !Get current pen style
OPEN(MDIChild2)
SETPENCOLOR(ColorNow)      !Set same pen color
SETPENSTYLE(StyleNow)      !Set same pen style
SETPENWIDTH(2)             !Set two dialog unit thickness
BOX(100,50,100,50,00FF0000h) !Red box with thick blue dashed border

```

See Also: **SETPENSTYLE**

## PENWIDTH (return line draw thickness)

### PENWIDTH()

The **PENWIDTH** procedure returns the current line draw thickness set by **SETPENWIDTH**. The return value is in dialog units (unless overridden by the **THOUS**, **MM**, or **POINTS** attributes on a **REPORT**).

Return Data Type:      **SIGNED**

Example:

```

Proc1      PROCEDURE
MDIChild1 WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
           !window controls
           END

           CODE
           OPEN(MDIChild1)
           SETPENCOLOR(000000FFh)           !Set blue pen color
           SETPENSTYLE(PEN:dash)           !Set dashes for line style
           SETPENWIDTH(2)                   !Set two dialog unit thickness
           Proc2                             !Call another procedure

Proc2      PROCEDURE
MDIChild2 WINDOW('Child Two'),AT(0,0,320,200),MDI,MAX,HVSCROLL
           !window controls
           END

ColorNow   LONG
StyleNow   LONG
WidthNow   LONG
           CODE
           ColorNow = PENCOLOR()           !Get current pen color
           StyleNow = PENSTYLE()           !Get current pen style
           WidthNow = PENWIDTH()           !Get current pen width
           OPEN(MDIChild2)
           SETPENCOLOR(ColorNow)           !Set same pen color
           SETPENSTYLE(StyleNow)           !Set same pen style
           SETPENWIDTH(WidthNow)           !Set same pen width
           BOX(100,50,100,50,00FF0000h)   !Red box with thick blue dashed border

```

See Also:              **SETPENWIDTH**



## PIE (draw a pie chart)

**PIE**( *x* , *y* , *width* , *height* , *slices* , *colors* [ , *depth* ] [ , *wholevalue* ] [ , *startangle* ] )

<b>PIE</b>	Draws a pie chart on the current window or report.
<i>x</i>	An integer expression that specifies the horizontal position of the starting point.
<i>y</i>	An integer expression that specifies the vertical position of the starting point.
<i>width</i>	An integer expression that specifies the width.
<i>height</i>	An integer expression that specifies the height.
<i>slices</i>	A SIGNED array of values that specify the relative size of each slice of the pie.
<i>colors</i>	A LONG array that specifies the fill color for each slice.
<i>depth</i>	An integer expression that specifies the depth of the three-dimensional pie chart. If omitted, the chart is two-dimensional.
<i>wholevalue</i>	A numeric constant or variable that specifies the total value required to create a complete pie chart. If omitted, the sum of the <i>slices</i> array is used.
<i>startangle</i>	A numeric constant or variable that specifies the starting point of the first slice of the pie, measured as a fraction of the <i>wholevalue</i> . If omitted (or zero), the first slice starts at the twelve o'clock position.

The **PIE** procedure creates a pie chart on the current window or report. The pie (an ellipse) is drawn inside a “bounding box” defined by the *x*, *y*, *width*, and *height* parameters. The *x* and *y* parameters specify the starting point, and the *width* and *height* parameters specify the horizontal and vertical size of the “bounding box.”

The slices of the pie are created clockwise from the *startangle* parameter as a fraction of the *wholevalue*. Supplying a *wholevalue* parameter that is greater than the sum of all the *slices* array elements creates a pie chart with a piece missing.

The color of the lines is the current pen color set by **SETPENCOLOR**; the default color is the Windows system color for window text. The width of the lines is the current width set by **SETPENWIDTH**; the default width is one pixel. The line style is the current pen style set by **SETPENSTYLE**; the default style is a solid line.

Example:

```
MDIChild  WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
           !window controls
           END

SliceSize  SIGNED,DIM(4)
SliceColor LONG,DIM(4)

CODE
SliceSize[1] = 90
SliceColor[1] = 0           !Black
SliceSize[2] = 90
SliceColor[2] = 00FF0000h   !Red
SliceSize[3] = 90
SliceColor[3] = 0000FF00h   !Green
SliceSize[4] = 90
SliceColor[4] = 000000FFh   !Blue
OPEN(MDIChild)
PIE(100,50,100,50,SliceSize,SliceColor)
           !Draw pie chart containing
           ! four equal slices, starting at 12 o'clock
           ! drawn counter-clockwise - Black, Red, Green, and Blue
```

See Also:

Current Target, SETPENCOLOR, SETPENWIDTH, SETPENSTYLE

# POINTER (return last queue entry position)

POINTER( *queue* )

<b>POINTER</b>	Returns the entry number of the last entry accessed in a QUEUE.
<i>queue</i>	The label of a QUEUE structure, or the label of a passed QUEUE parameter.

The **POINTER** procedure returns a LONG integer specifying the entry number of the last QUEUE entry accessed by ADD, GET, or PUT.

One common use of **POINTER** follows an unsuccessful GET(queue,key) to a sorted QUEUE. At the point where the GET fails, the **POINTER** procedure returns the location within the sorted QUEUE where the missing entry should be, which allows you to issue an ADD(queue,POINTER(queue)) statement to add the missing entry at its appropriate location.

Return Data Type:       LONG

Example:

```
Que:Name = 'Jones'           !Initialize key field in sorted queue
GET(NameQue,Que:Name)        !Get the entry, if available
IF ERRORCODE()               !Check for errors
    ADD(NameQue,POINTER(NameQue)) ! and add the sorted entry, if missing
END
```

See Also:               GET, PUT, ADD

## POKE (write to memory address)

**POKE**(*segment:offset,source*)

### **POKE**

Writes data to a memory address.

*segment:offset*

A numeric constant, variable, or expression which specifies a memory address. The segment must be in the high order two bytes, and the offset in the low order two bytes. The integer portion of a REAL is the data type used for the intermediate value, to assure 32 bit precision. This parameter should always use the ADDRESS procedure, to ensure the correct protected mode selector:offset address is used.

*source*

The label of a variable.

The **POKE** statement writes the contents of the *source* variable to the memory address at *segment:offset*. POKE writes as many bytes as are in the *source* variable.

It is easily possible to create a General Protection Fault (GPF) if you POKE to an address that belongs to another program, so great care should be taken when using POKE. There are usually Windows API functions that will do whatever you require of POKE and these should be used in preference to POKE.

Example:

```
Segment      USHORT
Offset       USHORT
Source1      BYTE
Source2      SHORT
Source3      REAL
KeyboardFlag BYTE
```

```
CODE
POKE(ADDRESS(Segment,Offset),Source1)      !Write 1 byte to the memory location

POKE(ADDRESS(Segment,Offset),Source2)      !Write 2 bytes to the memory location

POKE(ADDRESS(Segment,Offset),Source3)      !Write 8 bytes to the memory location

PEEK(ADDRESS(0040h,0017h),KeyboardFlag)    !Read keyboard status byte
KeyboardFlag = BOR(KeyboardFlag,40h)       !  turn on caps lock
POKE(ADDRESS(0040h,0017h),KeyboardFlag)    !  and put it back
```

See Also:

**PEEK, ADDRESS**

## POLYGON (draw a multi-sided figure)

**POLYGON**( *array* [,*fill*] )

<b>POLYGON</b>	Draws a multi-sided figure on the current window or report.
<i>array</i>	An array of SIGNED integers that specify the x and y coordinates of each “corner point” of the polygon.
<i>fill</i>	A LONG integer constant, constant EQUATE, or variable containing the red, green, and blue components that create the color in the three low-order bytes (bytes 0, 1, and 2) or an EQUATE for a standard Windows color value.

The **POLYGON** procedure places a multi-sided figure on the current window or report. The polygon is always closed.

The *array* parameter contains the x and y coordinates of each “corner point” of the polygon. The polygon will have as many corner points as the total number of array elements divided by two. For each corner point in turn, its x coordinate is taken from the odd-numbered array element and the y coordinate from the immediately following even-numbered element.

The border color is the current pen color set by SETPENCOLOR; the default color is the Windows system color for window text. The border width is the current width set by SETPENWIDTH; the default width is one pixel. The line’s style is the current pen style set by SETPENSTYLE; the default style is a solid line.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
Corners SIGNED,DIM(8)

CODE
Corners[1] = 0      !1st x position
Corners[2] = 90     !1st y position
Corners[3] = 90     !2nd x position
Corners[4] = 190    !2nd y position
Corners[5] = 100    !3rd x position
Corners[6] = 200    !3rd y position
Corners[7] = 50     !4th x position
Corners[8] = 60     !4th y position
OPEN(MDIChild)
POLYGON(Corners,000000FFh)      !Blue filled four-sided polygon
```

See Also: Current Target, SETPENCOLOR, SETPENWIDTH, SETPENSTYLE

## POPUP (return popup menu selection)

**POPUP**( *selections* [, *x*] [, *y*] )

<b>POPUP</b>	Returns an integer indicating the user's choice from the menu.
<i>selections</i>	A string constant, variable, or expression containing the text for the menu choices.
<i>x</i>	An integer constant, variable, or expression that specifies the horizontal position of the top left corner. If omitted, the menu appear at the current cursor position.
<i>y</i>	An integer constant, variable, or expression that specifies the vertical position of the top left corner. If omitted, the menu appear at the current cursor position.

The **POPUP** procedure returns an integer indicating the user's choice from the popup menu that appears when the procedure is invoked. If the user CLICKS outside the menu or presses ESC (indicating no choice), POPUP returns zero.

Within the *selections* string, each choice in the popup menu must be delimited by a vertical bar (|) character. The following rules apply:

- A set of vertical bars containing only a hyphen (|-|) defines a separator between groups of menu choices.
- A menu choice immediately preceded by a tilde (~) is disabled (it appears dimmed out in the popup menu).
- A menu choice immediately preceded by a plus sign (+) appears with a check mark to its left in the popup menu.
- A menu choice immediately preceded by a minus sign (-) appears without a check mark to its left in the popup menu.
- A menu choice immediately followed by a set of choices contained within curly braces (|SubMenu{ {SubChoice 1|SubChoice 2}}|) defines a sub-menu within the popup menu (the two beginning curly braces are required by the compiler to differentiate your sub-menu from a string repeat count).
- You may use the ASCII tab character (<9>) in your *selection* string to right-align text.
- You may specify an icon for the menu item by preceding the menu choice with square brackets enclosing PROP:Icon and the name of the icon file in parens, like this:

```
POPUP('[' & PROP:Icon & '(MyIco.IC0)]MenuChoice')
```

Each menu selection is numbered in ascending sequence according to its position within the *selections* string, beginning with one (1). Separators and selections that call a sub-menu are not included in the numbering sequence

(which makes an EXECUTE structure the most efficient code structure to use with this procedure). When the user CLICKS or presses ENTER on a choice, the procedure terminates, returning the position number of the selected menu item.

Return Data Type:      **SIGNED**

Example:

```

PopupString = 'First|+Second|Sub menu{{One|Two}}|-|Third|~Disabled|' & |
               '[' & PROP:Icon & '(MyIco.ICO)]Last Menu Choice'
ToggleChecked = 1
ACCEPT
CASE EVENT()
OF EVENT:AlertKey
  IF KEYCODE() = MouseRight
    EXECUTE POPUP(PopupString)
      FirstProc                !Call proc for selection 1
    BEGIN                      !Code to execute for toggle selection 2
      IF ToggleChecked = 1     !Check toggle state
        SecondProc(Off)       !Call proc to turn off something
        PopupString[7] = '-'   !Reset string so the check mark does not appear
        ToggleChecked = 0     !Set toggle flag
      ELSE
        SecondProc(On)        !Call proc to turn off something
        PopupString[7] = '+'   !Reset string so the check mark does appear
        ToggleChecked = 1     !Set toggle flag
      END
    END                        !End Code to execute for toggle selection 2
    OneProc                    !Call proc for selection 3
    TwoProc                     !Call proc for selection 4
    ThirdProc                   !Call proc for selection 5
    DisabledProc                !Selection 6 is dimmed so it cannot run this proc
    IconProc                    !Selection 7 displays an icon in the menu
  END
END
END
END
END

```

## POSITION (return record sequence position)

---

### POSITION( *sequence* )

<b>POSITION</b>	Identifies a record's unique position in a FILE or VIEW.
<i>sequence</i>	The label of a VIEW, FILE, KEY, or INDEX declaration.

**POSITION** returns a STRING which identifies a record's unique position within the *sequence*. **POSITION** returns the position of the last record accessed in the file or VIEW. The **POSITION** procedure is used with **RESET** to temporarily suspend and resume sequential processing.

### FILE usage

The value contained in the returned STRING and the length of that STRING are dependent on the file driver. As a general rule, for file systems that have record numbers, the size of the STRING returned by **POSITION(file)** is 4 bytes. The return string from **POSITION(key)** is 4 bytes plus the sum of the sizes of the fields in the key. For file systems that do not have record numbers, the size of the STRING returned by **POSITION(file)** is generally the sum of the sizes of the fields in the Primary Key (the first KEY on the FILE that does not have the DUP or OPT attribute). The return string from **POSITION(key)** is the sum of the sizes of the fields in the Primary Key plus the sum of the sizes of the fields in the key.

### VIEW usage

The return string for **POSITION(view)** contains all the information required by the underlying file system to reset to the one specific position within the record set currently in the VIEW. It also contains the file system's **POSITION** return value for the primary file key and all secondary file linking keys. This allows **POSITION(view)** to accurately define a position for all related records in the VIEW.

Return Data Type:      **STRING**



Example:

```

ViewOrder  VIEW(Customer)      !Declare VIEW structure
           PROJECT(Cus:AcctNumber,Cus:Name)
           JOIN(Hea:AcctKey,Cus:AcctNumber) !Join Header file
           PROJECT(Hea:OrderNumber)
           JOIN(Dtl:OrderKey,Hea:OrderNumber) !Join Detail file
           PROJECT(Det:Item,Det:Quantity)
           JOIN(Pro:ItemKey,Dtl:Item) !Join Product file
           PROJECT(Pro:Description,Pro:Price)
           END
           END
           END
RecordQue  QUEUE,PRE(Que)
AcctNumber  LIKE(Cus:AcctNumber)
Name        LIKE(Cus:Name)
OrderNumber LIKE(Hea:OrderNumber)
Item        LIKE(Det:Item)
Quantity    LIKE(Det:Quantity)
Description  LIKE(Pro:Description)
Price       LIKE(Pro:Price)
           END
SavPosition STRING(260)
CODE
OPEN(Customer,22h)
OPEN((Header,22h)
OPEN(Detail,22h)
OPEN(Product,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP
    NEXT(ViewOrder)
    IF ERRORCODE()
        DO DisplayQue
        BREAK
    END
    RecordQue :=: Cus:Record
    RecordQue :=: Hea:Record
    RecordQue :=: Dtl:Record
    RecordQue :=: Pro:Record
    ADD(RecordQue)
    ASSERT(~ERRORCODE())
    IF RECORDS(RecordQue) = 20
        DO DisplayQue
    . .
DisplayQue  ROUTINE
    SavPosition = POSITION(ViewOrder)
    DO ProcessQue
    FREE(RecordQue)
    RESET(ViewOrder,SavPosition)
    NEXT(ViewOrder)

```

!Top of file in keyed sequence  
!Read all records in file  
! read a record sequentially  
!Display the queue  
!Move record into queue  
!Move record into queue  
!Move record into queue  
!Move record into queue  
! and add it  
!20 records in queue?  
!Display the queue

!Save record position  
!Display the queue  
! and free it  
!Reset the record pointer  
! and get the record again

See Also:

**RESET, REGET**

## POST (post user-defined event)

**POST**( *event* [,*control*] [,*thread*] [,*position*] )

<b>POST</b>	Posts an event.
<i>event</i>	An integer constant, variable, expression, or EQUATE containing an event number. A value in the range 400h to 0FFFh is a User-defined event.
<i>control</i>	An integer constant, EQUATE, variable, or expression containing the field number of the control affected by the event. If omitted, the event is field-independent.
<i>thread</i>	An integer constant, EQUATE, variable, or expression containing the execution thread number whose ACCEPT loop is to process the event. If omitted, the event is posted to the current thread.
<i>position</i>	An integer constant, EQUATE, variable, or expression containing either zero (0) or one (1). If one (1), the <i>event</i> message is placed at the front of the event message queue. If omitted or zero (0), the <i>event</i> message is placed at the end of the event message queue.

**POST** posts an event to the currently active ACCEPT loop of the specified *thread*. This may be a User-defined event, or any other event. User-defined event numbers can be defined as any integer between 400h and 0FFFh. Any *event* posted with a *control* specified is a field-specific event, while those without are field-independent events.

POSTing an event causes the ACCEPT loop to fire but does not cause the event to “happen.” For example, POST(EVENT:Selected,?MyControl) executes any code in EVENT:Selected for ?MyControl but does not cause ?MyControl to gain focus.

Example:

```
Win1      WINDOW('Tools'),AT(156,46,32,28),TOOLBOX
          BUTTON('Date'),AT(0,0,,),USE(?Button1)
          BUTTON('Time'),AT(0,14,,),USE(?Button2)
          END
CODE
OPEN(Win1)
ACCEPT
  IF EVENT() = EVENT:User THEN BREAK.      !Detect user-defined event
  CASE ACCEPTED()
  OF ?Button1
    POST(EVENT:User,,UseToolsThread)      !Post field-independent event to other thread
  OF ?Button2
    POST(EVENT:User)                       !Post field-independent event to this thread
  END
END
CLOSE(Win1)
```

See Also:           ACCEPT, EVENT

## PRESS (put characters in the buffer)

### PRESS(*string*)

**PRESS** Places characters in the keyboard input buffer.  
*string* A string constant, variable, or expression.

**PRESS** places characters in the Windows keyboard input buffer. The entire *string* is placed in the buffer. Once placed in the keyboard buffer, the *string* is processed just as if the user had typed in the data.

Example:

```
IF LocalRequest = AddRecord           !On the way into a memo on adding a record
    TempString = FORMAT(TODAY(),@D1) & ' ' & FORMAT(CLOCK(),@T4)
    PRESS(TempString)                 !Pre-load first line of memo with date and time
END
```

See Also: **PRESSKEY**

## PRESSKEY (put a keystroke in the buffer)

### PRESSKEY(*keycode*)

**PRESSKEY** Places one keystroke in the keyboard input buffer.  
*keycode* An integer constant or keycode EQUATE label.

**PRESSKEY** places one keystroke in the Windows keyboard input buffer. Once placed in the keyboard buffer, the *keycode* is processed just as if the user had pressed the key. **ALIAS** does not transform a **PRESSKEY** *keycode*.

Example:

```
IF Action = 'Add'                     !On the way into a memo control on an add record
    Cus:MemoControl = FORMAT(TODAY(),@D1) & ' ' & FORMAT(CLOCK(),@T4)
                                !Pre-load first line of memo with date and time
    PRESSKEY(EnterKey)             ! and position user on second line
END
```

See Also: **PRESS**

## PREVIOUS (read previous view record in sequence)

### PREVIOUS( *entity* )

#### PREVIOUS

Reads the previous record in sequence.

*entity*

The label of a FILE or VIEW declaration.

**PREVIOUS** reads the previous record(s) in sequence from a FILE or VIEW. The SET (or RESET) statement determines the sequence in which records are read. Executing PREVIOUS without a preceding SET, or attempting to read past the beginning of a file posts the “Record Not Available” error.

#### FILE Usage

PREVIOUS reads the previous record in sequence from a data file and places it in the RECORD structure data buffer. The first PREVIOUS following a SET reads the record at the position specified by the SET statement. Subsequent PREVIOUS statements read subsequent records in reverse sequence. The sequence is not affected by any GET, REGET, ADD, PUT, or DELETE.

#### VIEW Usage

PREVIOUS reads the previous record(s) in sequence from a VIEW and places the appropriate fields in the VIEW structure component files' data buffer(s). If the VIEW contains JOIN structures, PREVIOUS retrieves the appropriate previous set of related records.

Either the SET statement issued on the VIEW's primary file before the OPEN(view) statement, or the SET(*view*) statement issued after the OPEN(view) determines the sequence in which records are read. The first PREVIOUS(*view*) reads the record at the position specified by the SET statement. Subsequent PREVIOUS statements read subsequent records in that sequence. The sequence is not affected by PUT or DELETE statements.

Errors Posted:

- 33 Record Not Available
- 37 File Not Open
- 43 Record Is Already Held

Example:

```

ViewOrder  VIEW(Header)
            PROJECT(Hea:OrderNumber)
            JOIN(Dtl:OrderKey,Hea:OrderNumber)      !Join Detail file
            PROJECT(Det:Item,Det:Quantity)
            JOIN(Pro:ItemKey,Dtl:Item)              !Join Product file
            PROJECT(Pro:Description,Pro:Price)
            END
        END
    END

CODE
OPEN((Header,22h)
OPEN(Detail,22h)
OPEN(Product,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
    LOOP                                !Read all records through beginning of primary file
        PREVIOUS(ViewOrder)            ! read a record sequentially
        IF ERRORCODE() THEN BREAK.      ! break on end of file
        DO PostTrans                    ! call transaction posting routine
    END                                  !End loop

```

See Also:                **SET, RESET, NEXT, BOF, HOLD, WATCH, REGET, ADD, PUT, DELETE**

## PRINT (print a report structure)

```
PRINT( | structure | )
      | report ,number |
```

<b>PRINT</b>	Prints a report <b>DETAIL</b> structure.
<i>structure</i>	The label of a <b>DETAIL</b> structure.
<i>report</i>	The label of a <b>REPORT</b> structure.
<i>number</i>	The number or <b>EQUATE</b> label of a report <b>DETAIL</b> structure to print (only valid with a <i>report</i> parameter).

The **PRINT** statement prints a report structure to the Windows default printer or the destination specified by the user in the Windows Print... dialog. **PRINT** automatically activates group breaks and page overflow as needed.

Example:

```
BuildRpt  PROCEDURE
CustRpt   REPORT
           HEADER,USE(?PageHeader)      !Page header
           !structure elements
           END
CustDetail DETAIL,USE(?Detail)           !Line item detail
           !structure elements
           END
           !
           END
CODE
PRINT(CustDetail)                       !Print order detail line
PrintRpt(CustRpt,?PageHeader)           !Pass report and equate to print proc

PrintRpt PROCEDURE(RptToPrint,DetailNumber)
CODE
PRINT(RptToPrint,DetailNumber)          !Print its structure
```

See Also: **Page Overflow, BREAK, DETAIL**

## PRINTERDIALOG (return chosen printer)

**PRINTERDIALOG**( [*title*] [,*flag*] )

### PRINTERDIALOG

Displays the Windows standard printer choice dialog box to allow the user to choose a file.

*title* A string constant or variable containing the title to place on the file choice dialog. If omitted, a default *title* is supplied by Windows.

*flag* A numeric constant or variable which, if non-zero, displays the Print Setup dialog instead of the printer choice dialog. This is the same dialog as called by placing STD:PrintSetup in the STD attribute of a menu item.

The **PRINTERDIALOG** procedure displays the Windows standard printer choice dialog box (or the Print Setup dialog) and returns the printer chosen by the user in the PRINTER “built-in” variable in the internal library. This sets the default printer used for the next REPORT opened.

PRINTERDIALOG returns zero (0) if the user pressed the Cancel button, or one (1) if the user pressed the Ok button on the dialog.

Return Data Type: **SHORT**

Example:

```
CustRpt REPORT,AT(1000,1000,6500,9000),THOUS,Font('Arial',12),PRE(Rpt)
    !Report structures and controls
END

CODE
IF NOT PRINTERDIALOG('Choose Printer')
    RETURN !Abort if user pressed Cancel
END
OPEN(CustRpt)
```

## PUT (re-write record)

```

PUT( | file [, filepointer [, length ] ] | )
    | queue , [+]key,...,-key |
    | queue , name |
    | view |

```

<b>PUT</b>	Writes a record back to a FILE, QUEUE, or VIEW.
<i>file</i>	The label of a FILE declaration.
<i>filepointer</i>	A numeric constant, variable, or expression for the value returned by the POINTER( <i>file</i> ) procedure.
<i>length</i>	An integer constant, variable, or expression containing the number of bytes to write to the <i>file</i> . This must be greater than zero and not greater than the RECORD length. If omitted or out of range, the RECORD length is used.
<i>queue</i>	The label of a QUEUE structure.
+ -	The leading plus or minus sign specifies the <i>key</i> is sorted in ascending or descending sequence.
<i>key</i>	The label of a field declared within the QUEUE structure. If a the QUEUE has a PRE attribute, the <i>key</i> must include the prefix.
<i>name</i>	A string constant, variable, or expression containing the NAME attribute of QUEUE fields, separated by commas, and optional leading + or - signs for each attribute. This parameter is case sensitive.
<i>view</i>	The label of a VIEW declaration.

The **PUT** statement re-writes a previously accessed record in a FILE, QUEUE, or VIEW.

### **FILE Usage**

The **PUT** statement writes the current values in the RECORD structure data buffer to a previously accessed record in the *file*.

#### **PUT(*file*)**

Writes back the last record accessed with NEXT, PREVIOUS, GET, or ADD. If the values in the key variables were changed, the KEYs are updated.

#### **PUT(*file*,*filepointer*)**

Writes the record to the *filepointer* location in the *file* and the KEYs are updated.

#### **PUT(*file*,*filepointer*,*length*)**

Writes *length* bytes to the *filepointer* location in the *file* and the KEYs are updated.



If a record was not accessed with NEXT, PREVIOUS, GET, REGET, ADD, or was deleted, the “Record Not Available” error is posted. PUT also posts the “Creates Duplicate Key” error. If any error is posted, the record is not written to the file.

### **QUEUE Usage**

**PUT** writes the contents of the data buffer back to the QUEUE (after a successful GET or ADD) to the position returned by the POINTER procedure. If no previous GET or ADD was executed, the “Entry Not Found” error is posted.

**PUT**(*queue*)

Writes the data buffer back to the same relative position within the QUEUE of the last successful GET or ADD.

**PUT**(*queue, key*)

Returns an entry to a sorted memory queue after a successful GET or ADD, maintaining the sort order if any *key* fields have changed value. Multiple *key* parameters may be used (up to 16), separated by commas, with optional leading plus or minus signs to indicate ascending or descending sequence. The entry is inserted immediately after all other entries with matching *key* values.

**PUT**(*queue, name*)

Returns an entry to a sorted memory queue after a successful GET or ADD, maintaining the sort order if any key fields have changed value. The *name* string must contain the NAME attributes of the fields, separated by commas, with optional leading plus or minus signs to indicate ascending or descending sequence. The entry is inserted immediately after all other entries with matching field values.

### **VIEW Usage**

The **PUT** statement writes the current values in the VIEW structure’s primary file’s data buffer to a previously accessed primary file record in the *view*. If the record was held, it is automatically released. PUT writes to the last record accessed with the REGET, NEXT, or PREVIOUS statements. If the values in the key variables were changed, then the KEYs are updated.

PUT only writes to the primary file in the VIEW because the VIEW structure performs both relational Project and Join operations at the same time. Therefore, it is possible to create a VIEW structure that, if all its component files were updated, would violate the Referential Integrity rules set for the database. The common solution to this problem in SQL-based database products is to write only to the Primary file. Therefore, Clarion has adopted this same industry standard solution.

If a record was not accessed with REGET, NEXT, or PREVIOUS statements, or was deleted, then the “Record Not Available” error is posted.

PUT also posts the “Creates Duplicate Key” error. If any error is posted, then the record is not written to disk.

Errors Posted:

- 05 Access Denied
- 08 Insufficient Memory
- 30 Entry Not Found
- 33 Record Not Available
- 40 Creates Duplicate Key
- 75 Invalid Field Type Descriptor
- 89 Record Changed By Another Station

Example:

```
ViewOrder  VIEW(Header)
            JOIN(Dt1:OrderKey,Hea:OrderNumber) !Join Detail file
            PROJECT(Det:Item,Det:Quantity)
            END
            END
NameQue     QUEUE,PRE(Que)
Name        STRING(20),NAME('FirstField')
Zip         DECIMAL(5,0),NAME('SecondField')
            EBD

CODE
OPEN((Header,22h)
OPEN(Detail,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP
    PREVIOUS(ViewOrder)           !Read all records in reverse order
    IF ERRORCODE() THEN BREAK.     ! read a record sequentially
    DO LastInFirstOut              ! break at beginning of file
    PUT(ViewOrder)                 !Call last in first out routine
    IF ERRORCODE() THEN STOP(ERROR()). !Write transaction record back to the file
END                                !End loop

DO BuildQue                        !Call routine to build the queue

Que:Name = 'Jones'                !Initialize key field
GET(NameQue,Que:Name)             !Get the matching record
    IF ERRORCODE() THEN STOP(ERROR()).
Que:Zip = 12345                    !Change the zip
PUT(NameQue)                      !Write the changes to the queue
    IF ERRORCODE() THEN STOP(ERROR()).
Que:Name = 'Jones'                !Initialize key field
GET(NameQue,Que:Name)             !Get the matching record
    IF ERRORCODE() THEN STOP(ERROR()).
Que:Name = 'Smith'                !Change key field
PUT(NameQue,Que:Name)             !Write changes to the queue
    IF ERRORCODE() THEN STOP(ERROR()).
Que:Name = 'Smith'                !Initialize key field
GET(NameQue,'FirstField')         !Get the matching record
    IF ERRORCODE() THEN STOP(ERROR()).
Que:Name = 'Jones'                !Change key field
PUT(NameQue,'FirstField')         !Write changes to the queue
    IF ERRORCODE() THEN STOP(ERROR()).
```

See Also:               NEXT, PREVIOUS, GET, ADD, WATCH, HOLD, RELEASE, SORT,

## PUTINI (set INI file entry)

**PUTINI**( *section* ,*entry* [,*value*] [,*file*] )

<b>PUTINI</b>	Sets the value for an INI file entry.
<i>section</i>	A string constant or variable containing the name of the portion of the INI file which contains the <i>entry</i> .
<i>entry</i>	A string constant or variable containing the name of the specific entry to set.
<i>value</i>	A string constant or variable containing the setting to place in the <i>entry</i> (up to 1023 characters). An empty string (``) leaves the <i>entry</i> empty. If omitted, the <i>entry</i> is deleted.
<i>file</i>	A string constant or variable containing the name of the INI file to search (looks for the <i>file</i> in the Windows directory unless a full path is specified). If omitted, PUTINI places the <i>entry</i> in the WIN.INI file.

The **PUTINI** procedure places the *value* into an *entry* in a Windows-standard .INI file (maximum size of the file is 64K). A Windows-standard .INI file is an ASCII text file with the following format:

```
[some section name]
entry=value
next entry=another value
```

For example, WIN.INI contains entries such as:

```
[windows]
spooler=yes
load=nwpopup.exe
[intl]
sLanguage=enu
sCountry=United States
iCountry=1
```

The **PUTINI** procedure searches the specified *file* for the *entry* within the *section* you specify. It replaces the current entry value with the *value* you specify. If necessary, the *section* and *entry* are created.

Example:

```
CODE
PUTINI('MyApp','SomeSetting','Initialized')    !Place setting in WIN.INI
PUTINI('MyApp','ASetting','2','MYAPP.INI')    !Place setting in MYAPP.INI
```

See Also:

**GETINI**

## RANDOM (return random number)

---

### **RANDOM**(*low,high*)

**RANDOM**

Returns random integer.

*low*

A numeric constant, variable, or expression for the lower boundary of the range.

*high*

A numeric constant, variable, or expression for the upper boundary of the range.

The **RANDOM** procedure returns a random integer between the *low* and *high* values, inclusively. The *low* and *high* parameters may be any numeric expression, but only their integer portion is used for the inclusive range.

Return Data Type:      **LONG**

Example:

```
Num                BYTE,DIM(49)
LottoNbr           BYTE,DIM(6)
CODE
CLEAR(Num)
CLEAR(LottoNbr)
LOOP X# = 1 TO 6
    LottoNbr[X#] = RANDOM(1,49)      !Pick numbers for Lotto
    IF NOT Num[LottoNbr[X#]]
        Num[LottoNbr[X#]] = 1
    ELSE
        X# -= 1
. .
```

## RECORDS (return number of rows in data set)

---

### RECORDS( *entity* )

**RECORDS**

Returns the number of records.

*entity*

The label of a QUEUE, VIEW, FILE, KEY, or INDEX declaration.

The **RECORDS** procedure returns a LONG integer containing the number of entries in the *entity*.

### FILE Usage

The RECORDS procedure returns the number of records in a FILE, KEY, or INDEX. Since the OPT attribute of a KEY or INDEX excludes “null” entries, RECORDS may return a smaller number for the KEY or INDEX than the FILE.

### QUEUE Usage

The RECORDS procedure returns a LONG integer containing the number of entries in the QUEUE.

### VIEW Usage

The RECORDS procedure returns a LONG integer containing the number of rows in the VIEW’s return data set, if no KEY fields are used in the VIEW’s ORDER attribute.

For non-SQL file systems, if a KEY field is used in the VIEW’s ORDER attribute, then RECORDS returns negative one (-1). RECORDS can only return a valid value in the cases where the VIEW engine must build its own index of all the records in the return data set. For those non-SQL VIEWS which do use a KEY field in the ORDER attribute, Clarion’s VIEW engine optimizations make use of that KEY (allowing for faster overall processing), so no index is built and the number of records in the return data set is therefore not known.

Return Data Type:

LONG

Example:

```

SomeProc  PROCEDURE(LocationQueue Location)    !receives named QUEUE structure

Customer  FILE,DRIVER('Clarion'),PRE(Cus)
AcctKey   KEY(Cus:AcctNumber)
NameKey   KEY(Cus:Name)
Record    RECORD
AcctNumber LONG
Name      STRING(20)
Addr      STRING(20)
CSZ       STRING(60)
        . .

Header    FILE,DRIVER('Clarion'),PRE(Hea)
AcctKey   KEY(Hea:AcctNumber)
OrderKey  KEY(Hea:OrderNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
OrderAmount DECIMAL(11,2)
        . .

ViewOrder VIEW(Customer),ORDER('Cus:Name,-Hea:OrderAmount') !ORDER without KEY fields
        PROJECT(Cus:AcctNumber,Cus:Name)
        JOIN(Hea:AcctKey,Cus:AcctNumber)
        PROJECT(Hea:OrderNumber)
        PROJECT(Hea:OrderAmount)
        END
        END

SaveCount      LONG
SaveNameCount  LONG

CODE
OPEN(Customer)
OPEN(Header)
SaveCount = RECORDS(Customer)           !Save the record count
SaveNameCount = RECORDS(Cus:NameKey)     !Number of records with names filled in
OPEN(ViewOrder)
MESSAGE("Records in VIEW = " & RECORDS(ViewOrder))

Entries# = RECORDS(Location)             !Determine number of entries in passed QUEUE
LOOP I# = 1 TO Entries#                   !Loop through QUEUE
    GET(Location,I#)                     ! getting each entry
    ASSERT(NOT ERRORCODE())
    DO SomeProcess                       ! process the entry
END

```

See Also: **QUEUE, ADD, KEY, INDEX, OPT**

## REGISTER (register event handler)

**REGISTER**( *event*, *handler*, *object* [, *window*] [, *control*] )

### **REGISTER**

Registers an event handling procedure.

*event*

An integer constant, variable, expression, or EQUATE containing an event number. A value in the range 400h to 0FFFh is a User-defined event.

*handler*

A LONG variable, or expression containing the return value from ADDRESS for the PROCEDURE to handle the *event*.

*object*

A LONG integer constant, variable, or expression containing any 32-bit unique value to identify the specific *handler*. This is generally the return value of ADDRESS(SELF) when the *handler* is a CLASS method.

*window*

The label of the WINDOW or REPORT whose *event* to handle. If omitted, the current target WINDOW or REPORT is assumed.

*control*

An integer constant, EQUATE, variable, or expression containing the field number of the specific control whose *event* to handle. If omitted, the *event* is handled for every control on the *window*.

**REGISTER** registers an event *handler* PROCEDURE called internally by the currently active ACCEPT loop of the specified *window* whenever the specified *event* occurs. This may be a User-defined event, or any other event. User-defined event numbers can be defined as any integer between 400h and 0FFFh.

You may REGISTER multiple *handlers* for the same *event* if you choose—the *handlers* are called by ACCEPT in reverse order of their registration (the last one registered executes first). You may explicitly call UNREGISTER to remove the registration of any specific *handler*. The Clarion runtime library automatically unregisters all registered *event handlers* upon RETURN from the PROCEDURE in which they were registered (when the ACCEPT loop terminates its execution), so explicitly calling UNREGISTER is not required unless your program's logic requires it.

Anytime the *event* occurs, the *handler* procedure is called internally by the currently active ACCEPT loop to process the event. The value returned by the *handler* determines whether or not ACCEPT cycles for any additional *event* processing.

The *handler* PROCEDURE must not take any parameters and must return a BYTE containing one of the following EQUATED values (these EQUATES are defined in the ABERROR.INC file):

Level:Benign

Calls any other *handlers* and the ACCEPT loop, if available.

Level:Notify

Doesn't call other *handlers* or the ACCEPT loop. This is like executing CYCLE when processing the event in an ACCEPT loop.

Level:Fatal

Doesn't call other *handlers* or the ACCEPT loop. This is like executing BREAK when processing the event in an ACCEPT loop.

Example:

```
WindowResizeClass.Init  PROCEDURE
CODE
REGISTER(EVENT:Sized,ADDRESS(SELF.TakeResize),ADDRESS(SELF))
!Other code follows

WindowResizeClass.TakeResize  PROCEDURE
ReturnValue  BYTE
CODE
ReturnValue  = Level:Benign
RETURN(ReturnValue)
```

See Also:           UNREGISTER, ACCEPT, EVENT



## REJECTCODE (return reject code number)

---

### REJECTCODE( )

The **REJECTCODE** procedure returns the code number for the reason any **EVENT:Rejected** that was posted. If no **EVENT:Rejected** was posted, **REJECTCODE** returns zero. The **EQUATES.CLW** file contains equates for the values returned by **REJECTCODE**:

<b>REJECT:RangeHigh</b>	! Above the top range on a SPIN
<b>REJECT:RangeLow</b>	! Below the bottom range on a SPIN
<b>REJECT:Range</b>	! Other range error
<b>REJECT:Invalid</b>	! Invalid input

Return Data Type:      **SIGNED**

Example:

```
CASE EVENT()  
OF EVENT:Rejected  
  EXECUTE REJECTCODE()  
    MESSAGE('Input invalid -- out of range -- too high')  
    MESSAGE('Input invalid -- out of range -- too low')  
    MESSAGE('Input invalid -- out of range')  
    MESSAGE('Input invalid')  
  END  
END
```

## REGET (re-get record)

---

**REGET**( *sequence*, *string*)

<b>REGET</b>	Regets a specific record.
<i>sequence</i>	The label of a VIEW, FILE, KEY, or INDEX declaration.
<i>string</i>	The string returned by the POSITION procedure.

The **REGET** re-reads a previously accessed record.

### FILE Usage

REGET reads the record identified by the *string* returned by the POSITION procedure. The value contained in the *string* returned by the POSITION procedure, and its length, are dependent on the file driver.

### VIEW Usage

REGET reads the VIEW record identified by the *string* returned by the POSITION(view) procedure. The value contained in the *string* returned by the POSITION procedure, and its length, are file driver dependent. If the VIEW contains JOIN structures, REGET retrieves the appropriate set of related records.

REGET re-loads all the VIEW component files' record buffers with complete records. It does not perform the relational "Project" operation. REGET(*view*) is explicitly designed to reset the record buffers to the appropriate records immediately prior to a CLOSE(*view*) statement. However, the processing sequence of the files must be reset with a SET or RESET statement.

Errors Posted:

35 Record Not Found  
37 File Not Open  
43 Record Is Already Held

Example:

```

ViewOrder  VIEW(Customer)      !Declare VIEW structure
           PROJECT(Cus:AcctNumber,Cus:Name)
           JOIN(Hea:AcctKey,Cus:AcctNumber) !Join Header file
           PROJECT(Hea:OrderNumber)
           JOIN(Dtl:OrderKey,Hea:OrderNumber) !Join Detail file
           PROJECT(Det:Item,Det:Quantity)
           JOIN(Pro:ItemKey,Dtl:Item) !Join Product file
           PROJECT(Pro:Description,Pro:Price)

RecordQue  . . .
AcctNumber  LIKE(Cus:AcctNumber)
Name        LIKE(Cus:Name)
OrderNumber LIKE(Hea:OrderNumber)
Item        LIKE(Det:Item)
Quantity    LIKE(Det:Quantity)
Description LIKE(Pro:Description)
Price       LIKE(Pro:Price)
SavPosition STRING(260)
           END

CODE
OPEN(Customer,22h)
OPEN((Header,22h)
OPEN(Detail,22h)
OPEN(Product,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP
  NEXT(ViewOrder)           !Read all records in file
                             ! read a record sequentially
  IF ERRORCODE()
    DO DisplayQue
    BREAK
  END
  RecordQue :=: Cus:Record   !Move record into queue
  RecordQue :=: Hea:Record   !Move record into queue
  RecordQue :=: Dtl:Record   !Move record into queue
  RecordQue :=: Pro:Record   !Move record into queue
  SavPosition = POSITION(ViewOrder) !Save record position
  ADD(RecordQue)             ! and add it
  ASSERT(NOT ERRORCODE())
END
ACCEPT
CASE ACCEPTED()
OF ?ListBox
  GET(RecordQue,CHOICE())
  REGEX(ViewOrder,Que:SavPosition) !Reset the record buffers
  CLOSE(ViewOrder)                 ! and get the record again
  FREE(RecordQue)
  UpdateProc                       !Call Update Procedure
  BREAK
END
END

```

See Also:

POSITION, SET, RESET, WATCH, GET, NEXT, PREVIOUS

## RELEASE (release a held record)

### RELEASE( *entity* )

#### RELEASE

Releases the held record(s).

#### *entity*

The label of a FILE or VIEW declaration.

The **RELEASE** statement releases a record previously held by the **HOLD** procedure. It will not release a record held by another user in a multi-user environment. If the record is not held, or is held by another user, **RELEASE** is ignored.

Example:

```
ViewOrder  VIEW(Customer)      !Declare VIEW structure
            PROJECT(Cus:AcctNumber,Cus:Name)
            JOIN(Hea:AcctKey,Cus:AcctNumber) !Join Header file
            PROJECT(Hea:OrderNumber)
            JOIN(Dtl:OrderKey,Hea:OrderNumber) !Join Detail file
            PROJECT(Det:Item,Det:Quantity)
            JOIN(Pro:ItemKey,Dtl:Item) !Join Product file
            PROJECT(Pro:Description,Pro:Price)
            END
            END
            END
            END
CODE
OPEN(Customer,22h)
OPEN((Header,22h)
OPEN(Detail,22h)
OPEN(Product,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP                                !Process records Loop
  LOOP                              !Loop to avoid "deadly embrace"
    HOLD(ViewOrder,1)              !Arm Hold on view, try for 1 second
    NEXT(ViewOrder)                !Get and hold the record
    IF ERRORCODE() = 43             !If someone else has it
      CYCLE                        ! and try again
    ELSE
      BREAK                        !Break if not held
    END
  END
END
IF ERRORCODE() THEN BREAK.         !Check for end of file
  !Process the records
  RELEASE(ViewOrder)              !release held records
END
```

See Also:

**HOLD, PUT**

## REMOVE (erase a file)

---

### REMOVE(*file*)

**REMOVE**

Deletes a FILE.

*file*

The label of the FILE to be removed, or a string constant or variable containing the filename of the file to erase.

The **REMOVE** statement erases a file specification from the operating system directory in the same manner as the DOS “Delete” command. The *file* must be closed, or the “File Already Open” error is posted. If any error is posted, the file is not removed.

Since some file drivers use multiple physical disk files for one logical FILE structure, the default filename and extension assumptions are dependent on the file driver. If any error is posted, the file is not deleted.

Errors Posted:

- 02 File Not Found
- 05 Access Denied
- 52 File Already Open

Example:

```
REMOVE(OldFile)           !Delete the old file
REMOVE('Changes.dat')     !Delete the changes file
```

See Also:        **CLOSE**

## RENAME (change file directory name)

---

**RENAME**(*file*,*new file*)

**RENAME**

Renames a FILE.

*file*

The label of a FILE to rename, or a string constant or variable containing a file specification.

*new file*

A string constant or variable containing a file specification. If the file specification does not contain a drive and path, the current drive and directory are assumed. If only the path is specified, the filename and extension of the original *file* are used for the *new file*. Files cannot be renamed to a new drive.

The **RENAME** statement changes the *file* specification to the specification for the *new file* in the directory. The *file* to rename must be closed, or the “File Already Open” error is posted. If the file specification of the *new file* is identical to the original *file*, the **RENAME** statement is ignored. If any error is posted, the file is not renamed.

Since some file drivers use multiple physical disk files for one logical FILE structure, the default filename and extension assumptions are dependent on the file driver.

Errors Posted:

- 02 File Not Found
- 03 Path Not Found
- 05 Access Denied
- 52 File Already Open

Example:

```
RENAME(Text,'text.bak')           !Make it the backup
RENAME(Master,'\newdir')          !Move it to another directory
RENAME('C:\AUTOEXEC.BAT','C:\AUTOEXEC.SAV') !Make it the backup
```

See Also: **CLOSE**

## RESET (reset record sequence position)

RESET(	<i>view, string</i>	)
	<i>view, file</i>	
	<i>sequence, string</i>	

- RESET**
- Resets sequential processing to a specific record.
- view*
- The label of a VIEW.
- string*
- The string returned by the POSITION procedure.
- file*
- The label of a component file of the VIEW.
- sequence*
- The label of a FILE, KEY, or INDEX declaration.
- RESET** resets sequential processing to a specific record.

### VIEW Usage

RESET restores the VIEW to a previously read position in the return record set.

- RESET(*view,string*)
- Resets to the record identified by the *string* that was returned by the POSITION procedure. Once RESET has restored the record pointer, either NEXT or PREVIOUS will read that record.
- RESET(*view,file*)
- Resets to the record identified by the current contents of the *file*'s record buffer. This is used when the order of the VIEW is specified using PROP:Order and is equivalent to a RESET(*view,string*).

The value contained in the *position* string (a value returned by the POSITION procedure) and its length, are file driver dependent. RESET is usually used in conjunction with POSITION to temporarily suspend and resume sequential VIEW processing.

### FILE Usage

RESET restores the record pointer to the record identified by the *string* returned by the POSITION procedure. Once RESET has restored the record pointer, either NEXT or PREVIOUS will read that record.

The value contained in the *string* returned by the POSITION procedure, and its length, are dependent on the file driver. RESET is used in conjunction with POSITION to temporarily suspend and resume sequential file processing.

Example:

```

ViewOrder  VIEW(Customer)      !Declare VIEW structure
            PROJECT(Cus:AcctNumber,Cus:Name)
            JOIN(Hea:AcctKey,Cus:AcctNumber) !Join Header file
            PROJECT(Hea:OrderNumber)
            JOIN(Dtl:OrderKey,Hea:OrderNumber) !Join Detail file
            PROJECT(Det:Item,Det:Quantity)
            JOIN(Pro:ItemKey,Dtl:Item) !Join Product file
            PROJECT(Pro:Description,Pro:Price)
            END
        END
    END
END
RecordQue  QUEUE,PRE(Que)
AcctNumber  LIKE(Cus:AcctNumber)
Name        LIKE(Cus:Name)
OrderNumber LIKE(Hea:OrderNumber)
Item        LIKE(Det:Item)
Quantity    LIKE(Det:Quantity)
Description  LIKE(Pro:Description)
Price       LIKE(Pro:Price)
            END
SavPosition STRING(260)
CODE
OPEN(Customer,22h)
OPEN((Header,22h)
OPEN(Detail,22h)
OPEN(Product,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP
    NEXT(ViewOrder)
    IF ERRORCODE()
        DO DisplayQue
        BREAK
    END
    RecordQue :=: Cus:Record
    RecordQue :=: Hea:Record
    RecordQue :=: Dtl:Record
    RecordQue :=: Pro:Record
    ADD(RecordQue)
    ASSERT(NOT ERRORCODE())
    IF RECORDS(RecordQue) = 20
        DO DisplayQue
    . .
    !Top of file in keyed sequence
    !Read all records in file
    ! read a record sequentially
    !Move record into queue
    !Move record into queue
    !Move record into queue
    !Move record into queue
    ! and add it
    !20 records in queue?
    !Display the queue
    !End loop

DisplayQue  ROUTINE
    SavPosition = POSITION(ViewOrder)
    DO ProcessQue
    FREE(RecordQue)
    RESET(ViewOrder,SavPosition)
    NEXT(ViewOrder)
    !Save record position
    !Display the queue
    ! and free it
    !Reset the record pointer
    ! and get the record again

```

See Also:

**POSITION, SET, NEXT, PREVIOUS, REGET**



## RIGHT (return right justified string)

---

**RIGHT**(*string* [,*length*])

**RIGHT**

Right justifies a string.

*string*

A string constant, variable, or expression.

*length*

A numeric constant, variable, or expression for the length of the return string. If omitted, the *length* is set to the length of the *string*.

The **RIGHT** procedure returns a right justified string. Trailing spaces are removed, then the string is right justified and returned with leading spaces.

Return Data Type: **STRING**

Example:

```
!RIGHT('ABC ') returns ' ABC'
```

```
Message = RIGHT(Message)      !Right justify the message
```

See Also: **LEFT, CENTER**

## ROLLBACK (terminate unsuccessful transaction)

### ROLLBACK

The **ROLLBACK** statement terminates an active transaction. Execution of a **ROLLBACK** statement assumes that the transaction was unsuccessful and the database must be restored to the state it was in before the transaction began.

**ROLLBACK** informs the file driver involved in the transaction that the temporary files containing the information necessary to restore the database to its previous state must be used to restore the database. The file driver then performs the actions necessary to its file system to roll back the transaction.

Errors Posted:        65   Unable to ROLLBACK Transaction  
                          91   No Logout Active

Example:

```

LOGOUT(1,OrderHeader,OrderDetail)      !Begin Transaction
DO ErrHandler                          ! always check for errors
ADD(OrderHeader)                        !Add Parent record
DO ErrHandler                          ! always check for errors
LOOP X# = 1 TO RECORDS(DetailQue)      !Process stored detail records
    GET(DetailQue,X#)                  ! Get one from the QUEUE
    DO ErrHandler                      ! always check for errors
    Det:Record = DetailQue              ! Assign to record buffer
    ADD(OrderDetail)                   ! and add it to the file
    DO ErrHandler                      ! always check for errors
END
COMMIT                                !Terminate successful transaction
ASSERT(~ERRORCODE())

ErrHandler ROUTINE                      !Error routine
IF NOT ERRORCODE() THEN EXIT.           !Bail out if no error
ROLLBACK                               !Rollback the aborted transaction
ASSERT(~ERRORCODE())
BEEP                                   !Alert the user
MESSAGE('Transaction Error - ' & ERROR())
RETURN                                  ! and get out

```

See Also:            **LOGOUT, COMMIT**

## ROUND (return rounded number)

**ROUND**(*expression*,*order*)

**ROUND**

Returns rounded value.

*expression*

A numeric constant, variable, or expression.

*order*

A numeric expression with a value equal to a power of ten, such as 1, 10, 100, 0.1, 0.001, etc. If the value is not an even power of ten, the next lowest power is used; 0.55 will use 0.1 and 155 will use 100.

The **ROUND** procedure returns the value of an *expression* rounded to a power of ten. If the *order* is a LONG or DECIMAL Base Type, then rounding is performed as a BCD operation. Note that if you want to round a real number larger than 1e30, you should use ROUND(num,1.0e0), and not ROUND(num,1). The ROUND procedure is very efficient (“cheap”) as a BCD operation and should be used to compare REALs to DECIMALs at decimal width.

Return Data Type:      DECIMAL or REAL

Example:

```
!ROUND(5163,100)      returns 5200
!ROUND(657.50,1)      returns 658
!ROUND(51.63594,.01)  returns 51.64
```

```
Commission = ROUND(Price / Rate,.01)  !Round the commission to the nearest cent
```

See Also:      BCD Operations and Procedures

## ROUNDBOX (draw a box with round corners)

**ROUNDBOX**( *x* , *y* , *width* , *height* [, *fill*] )

<b>ROUNDBOX</b>	Draws a rectangular box with rounded corners on the current window or report.
<i>x</i>	An integer expression that specifies the horizontal position of the starting point.
<i>y</i>	An integer expression that specifies the vertical position of the starting point.
<i>width</i>	An integer expression that specifies the width.
<i>height</i>	An integer expression that specifies the height.
<i>fill</i>	A LONG integer constant, constant EQUATE, or variable containing the red, green, and blue components that create the color in the three low-order bytes (bytes 0, 1, and 2) or an EQUATE for a standard Windows color value.

The **ROUNDBOX** procedure places a rectangular box with rounded corners on the current window or report. The position and size of the box are specified by *x*, *y*, *width*, and *height* parameters.

The *x* and *y* parameters specify the starting point, and the *width* and *height* parameters specify the horizontal and vertical size of the box. The box extends to the right and down from its starting point.

The border color is the current pen color set by SETPENCOLOR; the default color is the Windows system color for window text. The border width is the current width set by SETPENWIDTH; the default width is one pixel. The border style is the current pen style set by SETPENSTYLE; the default style is a solid line.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
ROUNDBOX(100,50,100,50,00FF0000h)      !Red round-cornered box
```

See Also:

Current Target, SETPENCOLOR, SETPENWIDTH, SETPENSTYLE

## RUN (execute command)

**RUN( *command* [, *waitflag* ] )**

<b>RUN</b>	Executes a <i>command</i> as if it were entered on the DOS command line.
<i>command</i>	A string constant or variable containing the command to execute. This may include a full path and command line parameters.
<i>waitflag</i>	An integer constant, variable, or EQUATE indicating whether RUN should launch the <i>command</i> and wait for its termination, or immediately return after launching. If omitted or zero (0), control immediately returns to the statement following the RUN. If one (1), control returns to the statement following the RUN only after the <i>command</i> has completed its execution.

The **RUN** statement executes a *command* to execute a DOS or Windows program. If the *command* parameter is a STRING variable, you must first use CLIP to remove trailing spaces (not necessary if the *command* is a CSTRING variable). Internally, RUN uses the winexec() Windows API call to execute the *command*.

When the *command* executes, the new program is loaded as the ontop and active program. Execution control in the launching program returns immediately to the statement following RUN and the launching program continues executing as a background application if the *waitflag* is set to zero (0). The user can return to the launching program by either terminating the launched program, or switching back to it through the Windows Task List. Execution control in the launching program returns to the statement following RUN only after the *command* has terminated its execution if the *waitflag* is set to one (1).

If the *command* does not contain a path to the program, the following search sequence is followed:

1. The DOS current directory
2. The Windows directory
3. The Windows system directory
4. Each directory in the DOS PATH
5. Each directory mapped in a network

The successful execution of the *command* may be verified with the RUNCODE procedure, which returns the DOS exit code of the *command*. If unsuccessful, RUN posts the error to the ERROR and ERRORCODE procedures.

Errors Posted:

RUN may post any possible error

Example:

```
ProgNameC   CSTRING(100)
ProgNameS   STRING(100)
```

CODE

```
RUN('notepad.exe readme.txt')      !Run Notepad, automatically loading readme.txt file
```

```
RUN(ProgNameC)                     !Run the command in the ProgNameC CSTRING variable
```

```
RUN(CLIP(ProgNameS))               !Run the command in the ProgNameS STRING variable
```

```
RUN('command.com /c MyBat.bat',1) !Run the command and wait for it to complete
```

See Also:

**RUNCODE, HALT, ERROR, ERRORCODE**

## RUNCODE (return program exit code)

---

### RUNCODE( )

The **RUNCODE** procedure returns the exit code passed to the operating system from the command executed by the **RUN** statement. This is the exit code passed by the **HALT** statement in Clarion programs and is the same as the **DOS ERRORLEVEL**. **RUNCODE** returns a **LONG** integer which may be any value that is returned to **DOS** as an exit code by the child program.

The child program may only supply a **BYTE** value as an exit code, therefore negative values are not possible as exit codes. This fact allows **RUNCODE** to reserve these values to handle situations in which an exit code is not available:

- 0 normal termination
- 1 program terminated with Ctrl-C
- 2 program terminated with Critical error
- 3 TSR exit
- 4 program did not run (check **ERROR()**)

Return Data Type: **LONG**

Example:

```
RUN('Nextprog.exe')           !Run next program
IF RUNCODE() = -4
    IF ERROR() = 'Not Enough Memory'  !If program didn't run for lack of memory
        MESSAGE('Insufficient memory') ! display a message
        RETURN                        ! and terminate the procedure
    ELSE
        STOP(ERROR())                ! terminate program
. .
```

See Also: **RUN, HALT**

## SELECT (select next control to process)

**SELECT**( [*control*] [,*position*] [,*endposition*] )

<b>SELECT</b>	Sets the next control to receive input focus.
<i>control</i>	A field number or field equate label of the next control to process. If omitted, the SELECT statement initiates AcceptAll mode.
<i>position</i>	Specifies a position within the <i>control</i> to place the cursor. For an ENTRY or TEXT, SPIN, or COMBO control this is a character position, or a beginning character position for a marked block. For an OPTION structure, this is the selection number within the OPTION. For a LIST control, this is the QUEUE entry number. This parameter can also be specified using property syntax by PROP:Selected or PROP:SelStart.
<i>endposition</i>	Specifies an ending character position within an ENTRY, TEXT, SPIN, or COMBO <i>control</i> . The character position specified by <i>position</i> and <i>endposition</i> are marked as a block, available for cut and paste operations. This parameter can also be specified using property syntax by PROP:SelEnd.

**SELECT** overrides the normal TAB key sequence control selection order of an APPLICATION or WINDOW. Its action affects the next ACCEPT statement that executes. The *control* parameter determines which control the ACCEPT loop will process next. If *control* specifies a control which cannot receive focus because a DISABLE or HIDE statment has been issued, focus goes to the next control following it in the window's source code that can receive focus. If *control* specifies a control on a TAB which does not have focus, the TAB is brought to the front before the control receives focus.

SELECT with *position* and *endposition* parameters specifies a marked block in the *control* which is available for cut and paste operations.

SELECT with no parameters initiates AcceptAll mode (also called non-stop mode). This is a field edit mode in which each control in the window is processed in TAB key sequence by generating EVENT:Accepted for each. This allows data entry validation code to execute for all controls, including those that the user has not touched.

AcceptAll mode terminates when any of the following conditions is met:

- A SELECT(?) statement selects the same control for the user to edit. This code usually indicates the value it contains is invalid and the user must re-enter data.



- The Window{PROP:AcceptAll} property is set to zero (0). This property contains one (1) when AcceptAll mode is active. Assigning values to this property can also be used to initiate and terminate AcceptAll mode.
- A control with the REQ attribute is blank or zero. AcceptAll mode terminates with the control highlighted for user entry, without processing any more fields in the TAB key sequence.

When all controls have been processed, EVENT:Completed is posted to the window.

Example:

```
Screen WINDOW,PRE(Scr)
    ENTRY(@N3),USE(Ctl:Code)
    ENTRY(@S30),USE(Ctl:Name)
    LIST,USE(Ctl:Type),From(TypeQue),Drop(5)
    BUTTON('OK'),USE(?OkButton),KEY(EnterKey)
    BUTTON('Cancel'),USE(?CanxButton),KEY(EscKey)
END

CODE
OPEN(Screen)
SELECT(?Ctl:Code)                                !Start with Ctl:Code
ACCEPT
CASE SELECTED()
OF ?Ctl:Type
    GET(TypeQue,Ctl:Type)                        !Find type in List
    SELECT(?Ctl:Type,POINTER(TypeQue))          !Select list to element
END
CASE ACCEPTED()
OF ?Ctl:Code
    IF Ctl:Code > 150                             !If data entered is invalid
        BEEP                                     ! alert the user and
        SELECT(?)                               ! make them re-enter the data
    END
OF ?Ctl:Name
    SELECT(?Ctl:Name,1,5)                        !Mark first five characters as a block
OF ?OkButton
    SELECT                                       !Initiate AcceptAll mode
END
IF EVENT() = EVENT:Completed THEN BREAK.
                                           !AcceptAll mode terminated
END
```

See Also:

**ACCEPT**

## SELECTED (return control that has received focus)

### SELECTED( )

The **SELECTED** procedure returns the field number of the control receiving input focus when an EVENT:Selected event occurs. **SELECTED** returns zero (0) for all other events.

Positive field numbers are assigned by the compiler to all WINDOW controls, in the order their declarations occur in the WINDOW structure. Negative field numbers are assigned to all APPLICATION controls. In executable code statements, field numbers are usually represented by field equate labels—the label of the USE variable preceded by a question mark (?FieldName).

Return Data Type: **SIGNED**

Example:

```
CASE SELECTED( )           !Process pre-edit code
OF ?Cus:Company
    !Pre-load field value
OF ?Cus:CustType
    !Pre-load field value
END
```

See Also: **ACCEPT, SELECT**

## SEND (send message to file driver)

### SEND(*file,message*)

**SEND**

Sends a message to the file driver.

*file*

The label of a FILE declaration. The FILE's DRIVER attribute identifies the file driver to receive the *message*.

*message*

A string constant or variable containing the information to supply to the file driver.

The **SEND** procedure allows the program to pass any driver-specific information to a file driver during program execution. Valid *messages* are dependent upon the file driver in use. Documentation of all valid **SEND** *messages* for a given file driver are listed in the file driver's documentation.

Return Data Type: **STRING**

Example:

```
FileCheck = SEND(ClarionFile,'RECOVER=120')
            !Arm recovery process for a Clarion data file
```

## SET (initiate sequential file processing)

```

SET(
  file
  file, key
  file, filepointer
  key
  key, key
  key, keypointer
  key, key, filepointer
  view
  view , number
)

```

<b>SET</b>	Initializes sequential processing of a FILE or VIEW.
<i>file</i>	The label of a FILE declaration. This parameter specifies processing in the physical order in which records occur in the data file.
<i>key</i>	The label of a KEY or INDEX declaration. When used in the first parameter position, <i>key</i> specifies processing in the sort sequence of the KEY or INDEX.
<i>filepointer</i>	A numeric constant, variable, or expression for the value returned by the POINTER(file) procedure.
<i>keypointer</i>	A numeric constant, variable, or expression for the value returned by the POINTER(key) procedure.
<i>view</i>	The label of a VIEW.
<i>number</i>	An integer constant, variable or expression that specifies the start position based on the first <i>number</i> of components of the ORDER attribute. If omitted, all ORDER attribute components are used.

**SET** initializes sequential processing for a FILE or VIEW. SET does not get a record, but only sets up processing order and starting point for the following NEXT or PREVIOUS statements.

### FILE Usage

SET initializes sequential processing of a data file. The first parameter determines the order in which records are processed. The second and third parameters determine the starting point within the file. If the second and third parameters are omitted, processing begins at the beginning (or end) of the file.

#### SET(*file*)

Specifies physical record order processing and positions to the beginning (SET...NEXT) or end (SET...PREVIOUS) of the file.

#### SET(*file,key*)

Specifies physical record order processing and positions to the first record which contains values matching the values in the

component fields of the *key*. NOTE: This form is rarely used and is only useful if the file has been physically sorted in the *key* order. A common mistake is to use this form when SET(*key,key*) is the actual form desired.

SET(*file,filepointer*)

Specifies physical record order processing and positions to the *filepointer* record within the *file*.

SET(*key*)

Specifies keyed sequence processing and positions to the beginning (SET...NEXT) or end (SET...PREVIOUS) of the file in that sequence.

SET(*key,key*)

Specifies keyed sequence processing and positions to the first or last record which contains values matching the values in the component fields of the *key*. Both *key* parameters must be the same.

SET(*key,keypointer*)

Specifies keyed sequence processing and positions to the *keypointer* record within the *key*.

SET(*key,key,filepointer*)

Specifies keyed sequence processing and positions to a record which contains values matching the values in the component fields of the *key* at the exact record number specified by *filepointer*. Both *key* parameters must be the same.

When *key* is the second parameter, processing begins at the first or last record containing values matching the values in all the component fields of the specified KEY or INDEX. If an exact match is found, NEXT will read the first matching record while PREVIOUS will read the last matching record. If no exact match is found, the record with the next greater value is read by NEXT, the record with next lesser value is read by PREVIOUS.

The values for *filepointer* and *keypointer* are dependent on the file driver. They could be a record number, the relative byte position within the file, or some other kind of “seek position” within the file. These parameters are used to begin processing at a specific record within the file.

For all file drivers, an attempt to SET past the end of the file will set the EOF procedure to true, and an attempt to SET before the beginning of the file will set the BOF procedure to true.

## **VIEW Usage**

SET sets sequential processing for the VIEW to the beginning or end of the set of records specified by the FILTER attribute, sorted by the ORDER attribute. The optional *number* parameter limits the SET to assume that the values in the first specified *number* of expressions in the ORDER attribute are fixed. The VIEW must be OPEN before the SET.

Example:

```

ViewOrder  VIEW(Customer),FILTER('Hea:OrderTotal >= 500') |
            ,ORDER('-Hea:OrderDate,Cus:Name')
            PROJECT(Cus:AcctNumber,Cus:Name)
            JOIN(Hea:AcctKey,Cus:AcctNumber)      !Join Header file
            PROJECT(Hea:OrderNumber,Hea:OrderTotal,Hea:OrderDate)
            JOIN(Dtl:OrderKey,Hea:OrderNumber)    !Join Detail file
            PROJECT(Det:Item,Det:Quantity)
            JOIN(Pro:ItemKey,Dtl:Item)           !Join Product file
            PROJECT(Pro:Description,Pro:Price)
            END
            END
            END
            END
CODE
DO OpenAllFiles
SET(Customer)                !Physical file order, beginning of file

Cus:Name = 'Smith'
SET(Customer,Cus:NameKey)    !Physical file order, first record where Name = 'Smith'

SavePtr = POINTER(Customer)
SET(Customer,SavePtr)       !Physical file order, physical record number = SavePtr

SET(Cus:NameKey)            !NameKey order, beginning of file (relative to the key)

SavePtr = POINTER(Cus:NameKey)
SET(Cus:NameKey,SavePtr)    !NameKey order, key-relative record number = SavePtr

Cus:Name = 'Smith'
SET(Cus:NameKey,Cus:NameKey)
                                !NameKey order, first record where Name = 'Smith'

Cus:Name = 'Smith'
SavePtr = POINTER(Customer)
SET(Cus:NameKey,Cus:NameKey,SavePtr)
                                !NameKey order, Name = 'Smith' and rec number = SavePtr

OPEN(ViewOrder)
SET(ViewOrder)                !Top of record set in ORDER sequence
LOOP                          !Read all records in file
    NEXT(ViewOrder)           ! read a record sequentially
    IF ERRORCODE() THEN BREAK.
    !Process the order
. .
Hea:OrderDate = TODAY()-1     !Assign yesterday's date
SET(ViewOrder,1)              ! and process just yesterday's orders
LOOP                          !Read all records in file
    NEXT(ViewOrder)           ! read a record sequentially
    IF ERRORCODE() THEN BREAK.
    !Process the order
. .

```

See Also:

**NEXT, PREVIOUS, FILTER, ORDER, OPEN, POINTER, GET, RESET, POSITION**

## SET3DLOOK (set 3D window look)

### SET3DLOOK( *switch* )

**SET3DLOOK** Toggles three-dimensional look and feel.

*switch* An integer constant switching the 3D look off (0) and on (1).

The **SET3DLOOK** procedure sets up the program to display a three-dimensional look and feel. The default program setting is 3D enabled. On a **WINDOW**, the **GRAY** attribute causes the controls to display with a three-dimensional appearance. Controls in the **TOOLBAR** are always displayed with the three-dimensional look, unless disabled by **SET3DLOOK**. When three-dimensional look is disabled by **SET3DLOOK**, the **GRAY** attribute has no effect.

**SET3DLOOK(0)** turns off the three-dimensional look and feel.

**SET3DLOOK(1)** turns on the three-dimensional look and feel. Values other than zero or one are reserved for future use.

Example:

```
MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS |
,HSVSCROLL,RESIZE
    MENUBAR
        MENU('&File'),USE(?FileMenu)
            ITEM('&Open...'),USE(?OpenFile)
            ITEM('&Close'),USE(?CloseFile),DISABLE
            ITEM('Turn off 3D Look'),USE(?Toggle3D),CHECK
            ITEM('E&xit'),USE(?MainExit)
        END
    END
END
CODE
OPEN(MainWin)
ACCEPT
CASE ACCEPTED()
OF ?Toggle3D
    IF MainWin$?Toggle3D{PROP:text} = 'Turn off 3D Look'      !If on
        SET3DLOOK(0)                                          !Turn off
        MainWin$?Toggle3D{PROP:text} = 'Turn on 3D Look'    ! and change text
    ELSE
        SET3DLOOK(1)                                          !Else
        MainWin$?Toggle3D{PROP:text} = 'Turn off 3D Look'    !Turn on
                                                                ! and change text
    END
OF ?OpenFile
    START(OpenFileProc)
OF ?MainExit
    BREAK
END
END
CLOSE(MainWin)
```

## SETCLIPBOARD (set windows clipboard contents)

### SETCLIPBOARD( *string* )

**SETCLIPBOARD** Puts information in the Windows clipboard.

*string*                      A string constant or variable containing the information to place in the Windows clipboard. This should not contain any embedded null characters (ASCII 0). This is placed in the CF\_TEXT format, only.

The **SETCLIPBOARD** procedure places the contents of the *string* into the Windows clipboard, overwriting any previous contents.

Example:

```

Que1  QUEUE
      STRING(30)
      END
Que2  QUEUE
      STRING(30)
      END
WinOne WINDOW,AT(0,0,160,400)
      LIST,AT(120,0,20,20),USE(?List1),FROM(Que1),DRAGID('List1')
                                   !Allows drags, but not drops
      LIST,AT(120,120,20,20),USE(?List2),FROM(Que2),DROPID('List1')
                                   !Allows drops from List1, but no drags
      END
CODE
OPEN(WinOne)
ACCEPT
CASE EVENT()
OF EVENT:Drag
    IF DRAGID()
        SETCLIPBOARD(Que1)
    END
OF EVENT:Drop
    Que2 = CLIPBOARD()
    ADD(Que2)
END
END

```

See Also:

**CLIPBOARD**

## SETCLOCK (set system time)

---

### SETCLOCK(*time*)

**SETCLOCK**

Sets the DOS system clock.

*time*

A numeric constant, variable, or expression for a standard time (expressed as hundredths of a second since midnight, plus one).

The **SETCLOCK** statement sets the operating system time of day.

Example:

```
SETCLOCK(1)           !Set clock to midnight
SETCLOCK(6001)        !Set clock to one minute past midnight
```

See Also:

Standard Time, CLOCK

## SETCOMMAND (set command line parameters)

---

### SETCOMMAND(*commandline*)

**SETCOMMAND**

Internally sets command line parameters.

*commandline*

A string constant, variable, or expression containing the new command line parameters.

**SETCOMMAND** allows the program to internally specify command line parameters that may be read by the **COMMAND** procedure.

**SETCOMMAND** overwrites any previous command line flag of the same value. To turn off a leading slash flag, append an equal sign (=) to it in the *commandline*.

**SETCOMMAND** may not be used to set system level switches which must be specified when the program is loaded. The temporary files directory switch (CLATMP=) may be set with **SETCOMMAND**.

Example:

```
SETCOMMAND(' /N')    !Add /N parameter
SETCOMMAND(' /N=')    !Turn off /N parameter
```

See Also:

COMMAND



## SETCURSOR (set temporary mouse cursor)

### SETCURSOR( [*cursor*] )

#### SETCURSOR

Specifies a temporary mouse cursor to display.

#### *cursor*

An EQUATE naming a Windows-standard mouse cursor, or a string constant naming a cursor resource linked into the project—the name of a .CUR file with a leading tilde ('~Mycur.CUR'). If omitted, turns off the temporary cursor.

The **SETCURSOR** statement specifies a temporary mouse *cursor* to display until a SETCURSOR statement without a *cursor* parameter turns it off. This cursor overrides all CURSOR attributes. When SETCURSOR without a *cursor* parameter is encountered, all CURSOR attributes once again take effect. SETCURSOR is generally used to display the hourglass while your program is doing some “behind the scenes” work that the user should not break into.

EQUATE statements for the Windows-standard mouse cursors are contained in the EQUATES.CLW file. The following list is a representative sample of these (see EQUATES.CLW for the complete list):

CURSOR:None	No mouse cursor
CURSOR:Arrow	Normal windows arrow cursor
CURSOR:IBeam	Capital “I” like a steel I-beam
CURSOR:Wait	Hourglass
CURSOR:Cross	Large plus sign
CURSOR:UpArrow	Vertical arrow
CURSOR:Size	Four-headed arrow
CURSOR:Icon	Box within a box
CURSOR:SizeNWSE	Double-headed arrow slanting left
CURSOR:SizeNESW	Double-headed arrow slanting right
CURSOR:SizeWE	Double-headed horizontal arrow
CURSOR:SizeNS	Double-headed vertical arrow

Example:

```

MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS,HVSCROLL
        MENUBAR
        ITEM('Batch Update'),USE(?Batch)
    END
END
CODE
OPEN(MainWin)
ACCEPT
CASE ACCEPTED()
    OF ?Batch
        SETCURSOR(CURSOR:Wait)      !Turn on hourglass mouse cursor
        BatchUpdate                 ! and call the batch update procedure
        SETCURSOR                   ! then turn off hourglass
    END
END
END

```

## SETDROPID (set DROPID return string)

### SETDROPID( *string* )

#### SETDROPID

Sets the DROPID procedure's return value.

*string*

A string constant or variable containing the value the DROPID procedure will return.

The **SETDROPID** procedure sets the DROPID procedure's return value. This allows the DROPID procedure to pass the data in a drag-and-drop operation. When drag-and-drop operations are performed between separate Clarion applications, this is the mechanism to use to pass the data.

Example:

```

Que1  QUEUE
      STRING(30)
      END
Que2  QUEUE
      STRING(30)
      END
WinOne WINDOW,AT(0,0,160,400)
      LIST,AT(120,0,20,20),USE(?List1),FROM(Que1),DRAGID('List1')
          !Allows drags, but not drops
      LIST,AT(120,120,20,20),USE(?List2),FROM(Que2),DROPID('List1')
          !Allows drops from List1 or the Windows File Manager,
          ! but no drags
      END
CODE
OPEN(WinOne)
ACCEPT
CASE EVENT()
OF EVENT:Drag
    IF DRAGID()
        !When a drag event is attempted
        ! check for success
        SETDROPID(Que1)
        ! and setup info to pass
    END
OF EVENT:Drop
    Que2 = DROPID()
    !When drop event is successful
    ! get dropped info, from List1 or File Manager
    ADD(Que2)
    ! and add it to the queue
END
END

```

See Also:

**DRAGID, DROPID**

## SETFONT (specify font)

**SETFONT**( *control* , [ *typeface* ] , [ *size* ] , [ *color* ] , [ *style* ] )

<b>SETFONT</b>	Dynamically sets the display font for a control.
<i>control</i>	A field number or field equate label for the control to affect. If <i>control</i> is zero (0), it specifies the WINDOW.
<i>typeface</i>	A string constant or variable containing the name of the font. If omitted, the system font is used.
<i>size</i>	An integer constant or variable containing the size (in points) of the font. If omitted, the system default font size is used.
<i>color</i>	A LONG integer constant or variable containing the red, green, and blue values for the color of the font in the low-order three bytes, or an EQUATE for a standard Windows color value. If omitted, black is used.
<i>style</i>	An integer constant, constant expression, EQUATE, or variable specifying the strike weight and style of the font. If omitted, the weight is normal.

**SETFONT** dynamically specifies the display font for the *control*, overriding any FONT attribute. If the *control* parameter is zero (0), SETFONT specifies the default font for the window. However, this does not affect existing controls—only controls CREATED after SETFONT executes are affected.

SETFONT allows you to specify all parameters of a font change at once, instead of one at a time as runtime property assignment allows. This has the advantage of implementing all changes at once, whereas runtime property assignment would change each individually, displaying each separate change as it occurs.

The *typeface* may name any font registered in the Windows system. The EQUATES.CLW file contains EQUATE values for standard *style* values. A *style* on the range zero (0) to one thousand (1000) specifies the strike weight of the font. You may also add values that indicate italic, underline, or strikeout text. The following EQUATES are in EQUATES.CLW:

FONT:thin	EQUATE (100)
FONT:regular	EQUATE (400)
FONT:bold	EQUATE (700)
FONT:italic	EQUATE (01000H)
FONT:underline	EQUATE (02000H)
FONT:strikeout	EQUATE (04000H)

Example:

```
SETFONT(1,'Arial',14,,FONT:thin+FONT:Italic)    !14 pt. Arial black thin italic
```

See Also:

**GETFONT**

## SETKEYCHAR (specify ASCII code)

---

### SETKEYCHAR(*keychar*)

**SETKEYCHAR** Sets the ASCII character returned by the KEYCHAR procedure.

*keychar* An integer constant, variable, or expression containing the ASCII value of the character to set.

**SETKEYCHAR** sets the internal ASCII character returned by the KEYCHAR procedure. The character is not put into the keyboard buffer.

Example:

```
SETKEYCHAR(VAL('A'))      !Set up the keychar procedure to return 'A'
```

See Also:           KEYCHAR

## SETKEYCODE (specify keycode)

---

### SETKEYCODE(*keycode*)

**SETKEYCODE** Sets the keycode returned by the KEYCODE procedure.

*keycode* An integer constant or keycode EQUATE label.

**SETKEYCODE** sets the internal keycode returned by the KEYCODE procedure. The keycode is not put into the keyboard buffer.

Example:

```
SETKEYCODE(0800h)         !Set up the keycode procedure to return 0800h
```

See Also:           KEYCODE, Keycode Equate Labels

## SETNONULL (set file field non-null)

### SETNONULL(*field*)

**SETNONULL** Assigns non-null value (blank or zero) to a *field*.  
*field* The label (including prefix) of a field in a FILE structure. This may be a GROUP or RECORD structure.

The **SETNONULL** statement assigns a non-null value (blank or zero) to a *field* in a FILE structure. If the *field* is a GROUP or RECORD structure, all component fields are set non-null. Support for null “values” in a FILE is entirely dependent upon the file driver.

Return Data Type: **LONG**

Example:

```
Customer  FILE,DIRECT('Clarion'),PRE(Cus)  !Declare customer file layout
AcctKey   KEY(Cus:AcctNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
Name      STRING(20)
Addr      STRING(20)
. .

Header    FILE,DIRECT('Clarion'),PRE(Hea)  !Declare header file layout
AcctKey   KEY(Hea:AcctNumber)
OrderKey  KEY(Hea:OrderNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
ShipToName STRING(20)
ShipToAddr STRING(20)
. .

CODE
OPEN(Header)
OPEN(Customer)
SET(Hea:AcctKey)
LOOP
  NEXT(Header)
  IF ERRORCODE() THEN BREAK.
  Cus:AcctNumber = Hea:AcctNumber
  GET(Customer,Cus:AcctKey)           !Get Customer record
  IF ERRORCODE() THEN CLEAR(Cus:Record).
  IF NULL(Hea:ShipToName) OR Hea:ShipToName = Cus:Name
                                     !Check same ship-to address
    Hea:ShipToName = 'Same as Customer Address' ! flag the record
    SETNONULL(Hea:ShipToAddr)           ! and blank out ship-to address
    SETNONULL(Hea:ShipToCSZ)
  END
  PUT(Header)                         !Put Header record back
END
```

See Also: **NULL, SETNULL**

## SETNULL (set file field null)

### SETNULL(*field*)

#### SETNULL

Assigns null “value” to a *field*.

#### *field*

The label (including prefix) of a field in a FILE structure. This may be a GROUP or RECORD structure.

The **SETNULL** statement assigns a null “value” to a *field* in a FILE structure. If the *field* is a GROUP or RECORD structure, all component fields are set to null. Support for null “values” in a FILE is entirely dependent upon the file driver.

Return Data Type: **LONG**

Example:

```
Customer  FILE,DRIVER('Clarion'),PRE(Cus) !Declare customer file layout
AcctKey   KEY(Cus:AcctNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
Name      STRING(20)
Addr      STRING(20)
CSZ       STRING(35)
. .

Header    FILE,DRIVER('Clarion'),PRE(Hea) !Declare header file layout
AcctKey   KEY(Hea:AcctNumber)
OrderKey  KEY(Hea:OrderNumber)
Record    RECORD
AcctNumber LONG
OrderNumber LONG
ShipToName STRING(20)
ShipToAddr STRING(20)
ShipToCSZ STRING(35)
. .

CODE
OPEN(Header)
OPEN(Customer)
SET(Hea:AcctKey)
LOOP
  NEXT(Header)
  IF ERRORCODE() THEN BREAK.
  Cus:AcctNumber = Hea:AcctNumber
  GET(Customer,Cus:AcctKey)           !Get Customer record
  IF ERRORCODE() THEN CLEAR(Cus:Record).
  IF NOT NULL(Hea:ShipToName) AND Hea:ShipToName = Cus:Name
                                     !Check ship-to address
                                     ! and assign null “values”
    SETNULL(Hea:ShipToName)           ! to ship-to address
    SETNULL(Hea:ShipToAddr)
    SETNULL(Hea:ShipToCSZ)
  END
  PUT(Header)                         !Put Header record back
END
```

See Also: **NULL, SETNONNULL**

## SETPATH (change current drive and directory)

---

### SETPATH(*path*)

**SETPATH**

Changes the current drive and directory.

*path*

A string constant or the label of a STRING, CSTRING, or PSTRING variable containing a new drive and/or directory specification.

**SETPATH** changes the current drive and directory. If the *drive and path* entry is invalid, the “Path Not Found” error is posted, and the current directory is not changed.

If the drive letter and colon are omitted from the *path*, the current drive is assumed. If only a drive letter and colon are in the *path*, SETPATH changes to the current directory of that drive.

Errors Posted:           03 Path Not Found

Example:

```
SETPATH('C:\LEDGER')           !Change to the ledger directory
SETPATH(UserPath)           !Change to the user's directory
```

See Also:           PATH, SHORTPATH, LONGPATH, DIRECTORY

## SETPENCOLOR (set line draw color)

---

**SETPENCOLOR**( [*color*] )

**SETPENCOLOR** Sets the current pen color.

*color*                      A LONG integer constant, constant EQUATE, or variable containing the red, green, and blue components that create the color in the three low-order bytes (bytes 0, 1, and 2) or an EQUATE for a standard Windows color value. If omitted, the Windows system color for window text is set.

The **SETPENCOLOR** procedure sets the current pen color for use by all graphics procedures. The default color is the Windows system color for window text.

Every window has its own current pen color. Therefore, to consistently use the same pen (which does not use the default color setting) across multiple windows, the SETPENCOLOR statement should be issued for each window.

Example:

```
MDIChild  WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
           !window controls
END

CODE
OPEN(MDIChild)
SETPENCOLOR(000000FFh)           !Set blue pen color
ROUNDBox(100,50,100,50,00FF0000h) !Red round-cornered box with blue border
```

See Also:

**PENCOLOR**



## SETPENSTYLE (set line draw style)

### SETPENSTYLE( [*style*] )

**SETPENSTYLE** Sets the current pen style.

*style* An integer constant, constant EQUATE, or variable that specifies the pen's style. If omitted, a solid line is set.

The **SETPENSTYLE** procedure sets the current line draw style for use by all graphics procedures. The default is a solid line.

Every window has its own current pen style. Therefore, to consistently use the same pen (which does not use the default style setting) across multiple windows, the **SETPENSTYLE** statement should be issued for each window.

EQUATE statements for the pen styles are contained in the EQUATES.CLW file. The following list is a representative sample of these (see EQUATES.CLW for the complete list):

PEN:solid	Solid line
PEN:dash	Dashed line
PEN:dot	Dotted line
PEN:dashdot	Mixed dashes and dots

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END

CODE
OPEN(MDIChild)
SETPENCOLOR(000000FFh)           !Set blue pen color
SETPENSTYLE(PEN:dash)           !Set dashes for line style
ROUNDBOX(100,50,100,50,00FF0000h)
                                !Red round-cornered box with blue dashed border
```

See Also:

**PENSTYLE**

## SETPENWIDTH (set line draw thickness)

### SETPENWIDTH( [*width*] )

**SETPENWIDTH** Sets the current pen width.

*width* An integer expression that specifies the pen's thickness, measured in dialog units (unless overridden by the THOUS, MM, or POINTS attribute on a REPORT). If omitted, the default (one pixel) is set.

The **SETPENWIDTH** procedure sets the current line draw thickness for use by all graphics procedures. The default is one pixel, which may be set with a *width* of zero (0).

Every window has its own current pen width. Therefore, to consistently use the same pen (which does not use the default width setting) across multiple windows, the **SETPENWIDTH** statement should be issued for each window.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END

CODE
OPEN(MDIChild)
SETPENCOLOR(000000FFh)      !Set blue pen color
SETPENSTYLE(PEN:dash)      !Set dashes for line style
SETPENWIDTH(2)              !Set two dialog unit thickness
BOX(100,50,100,50,00FF0000h) !Red box with thick blue dashed border
```

See Also:

**PENWIDTH**

## SETPOSITION (specify new control position)

**SETPOSITION**( *control* [, *x*] [, *y*] [, *width*] [, *height*] )

<b>SETPOSITION</b>	Dynamically specifies the position and size of an APPLICATION, WINDOW, or control.
<i>control</i>	A field number or field equate label for the control to affect. If <i>control</i> is zero (0), it specifies the window.
<i>x</i>	An integer constant, expression, or variable that specifies the horizontal position of the top left corner. If omitted, the <i>x</i> position is not changed.
<i>y</i>	An integer constant, expression, or variable that specifies the vertical position of the top left corner. If omitted, the <i>y</i> position is not changed.
<i>width</i>	An integer constant, expression, or variable that specifies the width. If omitted, the <i>width</i> is not changed.
<i>height</i>	An integer constant, expression, or variable that specifies the height. If omitted, the <i>height</i> is not changed.

**SETPOSITION** dynamically specifies the position and size of an APPLICATION, WINDOW, or control. If any parameter is omitted, the value is not changed.

The values contained in the *x*, *y*, *width*, and *height* parameters are measured in dialog units. Dialog units are defined as one-quarter the average character width by one-eighth the average character height. The size of a dialog unit is dependent upon the size of the default font for the window. This measurement is based on the font specified in the FONT attribute of the window, or the system default font specified by Windows.

Using SETPOSITION produces a “smoother” control appearance change than using property expressions to change the AT attribute’s parameter values. This is because SETPOSITION changes all four parameters at once. Property expressions must change one parameter at a time. Since each individual parameter change would be immediately visible on screen, this would cause the control to appear to “jump.”

Example:

```
CREATE(?Code4Entry,CREATE:entry,?Ctl:Code)  !Create a control
?Code4Entry{PROP:use} = 'Code4Entry'        !Set USE variable
?Code4Entry{PROP:text} = '@s10'             !Set entry picture
GETPOSITION(?Ctl:Code,X,Y,Width,Height)     !Get Ctl:Code position
SETPOSITION(?Code4Entry,X+Width+40,Y)       !Set x 40 past Ctl:Code
UNHIDE(?Code4Entry)                         !Display the new control
```

See Also:

GETPOSITION

## SETTARGET (set current window or report)

```
SETTARGET([ | target           | ] )
           | , thread        |
           | target , band |
```

**SETTARGET** Sets the current window (or report) for drawing graphics and other window-interaction statements.

*target* The label of an APPLICATION, WINDOW, or REPORT structure, or a reference to any of those structures. The execution *thread* is always deduced from the *target* and any specified *thread* parameter is ignored. If omitted, the last window opened and not yet closed in the specified *thread* is used.

*thread* The number of the execution thread whose topmost procedure contains the window to set as the *target*. If omitted, the execution *thread* is deduced from the *target*.

*band* The control number or field equate label of the REPORT band (or IMAGE control in a window *target*) to draw graphics primitives to (ARC, CHORD, etc.).

**SETTARGET** sets the current *target* for runtime property assignment, and the CREATE, SETPOSITION, GETPOSITION, SETFONT, GETFONT, DISABLE, HIDE, CONTENTS, DISPLAY, ERASE, and UPDATE statements. Using these statements with SETTARGET allows you to manipulate the window display in the topmost window of any execution thread. SETTARGET also specifies the *target* structure for drawing with the graphics primitives procedures (ARC, CHORD, etc.).

SETTARGET sets the “built-in” variable TARGET (also set when a window opens), which may be used in any statement which requires the label of the current window or report. SETTARGET does not change procedures, and does not change which ACCEPT loop receives the events generated by Windows. SETTARGET without any parameters resets to the procedure and execution thread with the currently active ACCEPT loop.

A REPORT structure is never the default TARGET. Therefore, SETTARGET must be used before using the graphics primitives procedures to draw graphics on a REPORT. To draw graphics to a specific band in the REPORT (or onto an IMAGE in a window), you must specify the *band* as the second parameter.

### SETTARGET

Resets TARGET to the topmost window in the execution thread with the currently active ACCEPT loop.

### SETTARGET(*target*)

Sets TARGET to the specified window or report. The execution *thread* is deduced from the *target*.

**SETTARGET(*target,thread*)**

Sets TARGET to the specified window or report. The execution *thread* is deduced from the *target* parameter and any specified *thread* parameter is ignored.

**SETTARGET( , *thread*)**

Sets TARGET to the topmost window in the specified execution *thread*.

**SETTARGET(*target,band*)**

Sets TARGET to the specified *target* window or report, and draws graphics primitives to the specified *band* (report band or IMAGE control).

Example:

```
Report  REPORT
        HEADER,USE(?PageHeader)
        END
Detail  DETAIL
        END
        END
CODE
OPEN(Report)
SETTARGET(Report,?PageHeader)      !Make the report the current target
TARGET{PROP:Landscape} = 1        ! and turn on landscape mode
ARC(100,50,100,50,0,900)           !Draw 90 degree arc from 3 to 12 o'clock, as
                                   ! the top-right quadrant of ellipse
                                   ! to the page HEADER band

SETTARGET                           !Reset to top window
```

See Also:           **START, THREAD**

## SETTODAY (set system date)

---

### SETTODAY(*date*)

**SETTODAY**

Sets the DOS system date.

*date*

A numeric constant, variable, or expression for a standard date.

The **SETTODAY** statement sets the operating system date.

Example:

```
SETTODAY(TODAY() + 1)      !Set the date ahead one day
```

See Also:

Standard Date, DAY, MONTH, YEAR, TODAY, DATE

## SHORTPATH (return short filename)

---

### SHORTPATH( [ *longfilename* ] )

**SHORTPATH**

Returns the fully-qualified short filename for a given long filename.

*longfilename*

A string constant, variable, or expression that specifies the long filename to convert. This may include the complete path. If omitted, **SHORTPATH** returns the current drive and directory in short name form.

The **SHORTPATH** procedure returns the DOS standard short filename for a given *longfilename*. The file named as the parameter must exist on disk.

Return Data Type:

STRING

Example:

```
MyFile  STRING(64)
CODE
MyFile = SHORTPATH('c:\program files\my text file.txt') !c:\progra~1\mytext~1.txt
```

See Also:

SETPATH, LONGPATH, PATH, DIRECTORY

## SHOW (write to screen)

**SHOW**( *x*, *y*, *string* )

**SHOW**

Writes a *string* to the current window or report.

*x*

An integer expression that specifies the horizontal position of the starting point, in dialog units.

*y*

An integer expression that specifies the vertical position of the starting point, in dialog units.

*string*

A string constant, variable, or expression containing the formatted text to place on the current window or report.

**SHOW** writes the *string* text to the current window or report. The font used is the current font for the window or report.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
DISPLAY
SHOW(100,100,FORMAT(TODAY(),@D3))      !Display the date
SHOW(20,20,'Press Any Key to Continue') !Display a message
```

See Also: Current Target

## SHUTDOWN (arm termination procedure)

**SHUTDOWN**([*procedure*])

**SHUTDOWN**

Arms a procedure which is called when the program terminates.

*procedure*

The label of a **PROCEDURE**. If omitted, the **SHUTDOWN** process is disarmed.

The **SHUTDOWN** statement arms a *procedure* which is called when the program terminates. The shutdown *procedure* is called by normal program termination or by an abnormal-end/run-time halt. It may not be able to execute for an abnormal-end/run-time halt, depending upon the state of the system resources at the time of the crash. It is not called if the computer is rebooted or the program is terminated due to power failure. The same effect as **SHUTDOWN** can be more safely achieved by simply calling a procedure to execute on **EVENT:CloseDown** for the application frame.

Example:

```
SHUTDOWN(CloseSys)      !Arm CloseSys as the shutdown procedure
```

See Also: HALT, RETURN

## SIN (return sine)

---

### SIN(*radians*)

**SIN**

Returns sine.

*radians*

A numeric constant, variable or expression for the angle expressed in radians.  $\pi$  is a constant which represents the ratio of the circumference and radius of a circle. There are  $2\pi$  radians (or 360 degrees) in a circle.

The **SIN** procedure returns the trigonometric sine of an angle measured in *radians*. The sine is the ratio of the length of the angle's opposite side divided by the length of the hypotenuse.

Return Data Type:      **REAL**

Example:

```
PI           EQUATE(3.1415926535898)      !The value of PI
Rad2Deg      EQUATE(57.295779513082)      !Number of degrees in a radian
Deg2Rad      EQUATE(0.0174532925199)      !Number of radians in a degree
CODE
Angle = 45 * Deg2Rad      !Translate 45 degrees to Radians
SineAngle = SIN(Angle)    !Get the sine of 45 degree angle
```

See Also:              **TAN, ATAN, ASIN, COS, ACOS**



## SKIP (bypass records in sequence)

### SKIP( *entity*, *count* )

<b>SKIP</b>	Bypasses records during sequential processing.
<i>entity</i>	The label of a FILE or VIEW declaration.
<i>count</i>	A numeric constant or variable. The <i>count</i> specifies the number of records to bypass. If the value is positive, records are skipped in forward (NEXT) sequence; if <i>count</i> is negative, records are skipped in reverse (PREVIOUS) sequence.

The **SKIP** statement is used to bypass records during sequential processing. It bypasses records, in the sequence specified by the SET statement, by moving the file pointer *count* records. SKIP is more efficient than NEXT or PREVIOUS for skipping past records because it does not move records into the RECORD structure data buffer. If SKIP reads past the end or beginning of file, the EOF( ) and BOF( ) procedures return true. If no SET has been issued, SKIP posts error 33 (Record Not Available).

Errors Posted:      33 Record Not Available  
                          37 File Not Open

Example:

```

ViewOrder  VIEW(Customer)                !Declare VIEW structure
            PROJECT(Cus:AcctNumber,Cus:Name)
            JOIN(Hea:AcctKey,Cus:AcctNumber) !Join Header file
            PROJECT(Hea:OrderNumber)
            JOIN(Dtl:OrderKey,Hea:OrderNumber) !Join Detail file
            PROJECT(Det:Item,Det:Quantity)
            JOIN(Pro:ItemKey,Dtl:Item)        !Join Product file
            PROJECT(Pro:Description,Pro:Price)

SavOrderNo  . . . .
CODE
OPEN(Customer,22h)
OPEN((Header,22h)
OPEN(Detail,22h)
OPEN(Product,22h)
SET(Cus:AcctKey)
OPEN(ViewOrder)
LOOP
    NEXT(ViewOrder)
    IF ERRORCODE() THEN BREAK.
    IF Hea:OrderNumber <> SavOrderNo
    IF Hea:OrderStatus = 'Cancel'
        SKIP(Items,Vew:ItemCount-1)
        CYCLE
    . . .
    DO ItemProcess
    SavInvNo = Hea:OrderNumber
END

```

!Top of file in keyed sequence  
!Process all records  
! Get a record  
! Check for first item in order  
! Is it a canceled order?  
! SKIP rest of the items  
! and process next order  
! end ifs  
! process the item  
! save the invoice number  
!End loop

See Also:            SET, RESET, NEXT, PREVIOUS

## SORT (sort queue entries)

```
SORT(queue, |[+]key,...,[-]key | )
           | name |
```

<b>SORT</b>	Reorders entries in a QUEUE.
<i>queue</i>	The label of a QUEUE structure, or the label of a passed QUEUE parameter.
+ -	The leading plus or minus sign specifies the <i>key</i> will be sorted in ascending or descending sequence.
<i>key</i>	The label of a field declared within the QUEUE structure. If the QUEUE has a PRE attribute, the <i>key</i> must include the prefix. This may not be a reference variable.
<i>name</i>	A string constant, variable, or expression containing the NAME attribute of QUEUE fields, separated by commas, and optional leading + or - signs for each attribute. This parameter is case sensitive and may not contain any reference variables.

**SORT** reorders the entries in a QUEUE. QUEUE entries with identical key values maintain their relative position.

### SORT(*queue*,*key*)

Reorders the QUEUE in the sequence specified by the *key*. Multiple *key* parameters may be used (up to 16), separated by commas, with optional leading plus or minus signs to indicate ascending or descending sequence.

### SORT(*queue*,*name*)

Reorders the QUEUE in the sequence specified by the *name* string. The *name* string must contain the NAME attributes of the fields, separated by commas, with leading plus or minus signs to indicate ascending or descending sequence.

Errors Posted:      08 Insufficient Memory  
                       75 Invalid Field Type Descriptor

Example:

```
Location  QUEUE,PRE(Loc)
Name      STRING(20),NAME('FirstField')
City      STRING(10),NAME('SecondField')
State     STRING(2)
Zip       DECIMAL(5,0)
END

CODE
SORT(Location,Loc:State,Loc:City,Loc:Zip)      !Sort by zip in city in state
SORT(Location,+Loc:State,-Loc:Zip)             !Sort descending by zip in state
SORT(Location,'FirstField,-SecondField')       !Sort descending by city in name
```

See Also:            ADD, GET, PUT

## SQRT (return square root)

---

### **SQRT**(*expression*)

**SQRT**

Returns square root.

*expression*

A numeric constant, variable, or expression. If the value of the expression is less than zero, the return value is zero.

The **SQRT** procedure returns the square root of the *expression*. If *X* represents any positive real number, the square root of *X* is a number that, when multiplied by itself, produces a product equal to *X*.

Return Data Type:

**REAL**

Example:

Length = SQRT(X^2 + Y^2)!Find the distance from 0,0 to x,y (pythagorean theorem)

## START (return new execution thread)

**START**(*procedure* [, *stack*] [, *passed value*] )

<b>START</b>	Begins a new execution thread.
<i>procedure</i>	The label of the first PROCEDURE to call on the new execution thread.
<i>stack</i>	An integer constant or variable containing the size of the stack to allocate to the new execution thread. If omitted, the default stack is 10,000 bytes.
<i>passed value</i>	A string constant, variable, or expression containing the value to pass as a parameter to the <i>procedure</i> . There may be up to three <i>passed values</i> listed.

The **START** procedure begins a new execution thread, calling the *procedure* and returning the number assigned to the new thread. The returned thread number is used by procedures and procedures whose action may be performed on any execution thread (such as SETTARGET). The maximum number of simultaneously available execution threads in a single application is 64.

Code execution in the launching thread immediately continues with the next statement following the **START** and continues until an **ACCEPT** statement executes. Once the launching thread executes **ACCEPT**, the launched *procedure* begins executing its code in its new thread, retaining control until it executes an **ACCEPT**.

The *procedure* may be prototyped to receive up to three **STRING** parameters (passed by value) which may not be omitted. The values to pass to the *procedure* are listed as the *passed values* parameters to the **START** statement, and not in a parameter list attached to the *procedure* within the **START** statement.

The first execution thread in any program is the main program code, which is always numbered one (1). Therefore, the lowest value **START** can return is two (2), when the first **START** procedure is executed in a program. **START** may return zero (0), which indicates failure to open the thread. This can occur by attempting to **START** a 65th thread, or by running out of memory, or by starting a thread when the system is modal.

Return Data Type:

**SIGNED**

Example:

```

MAP
NewProc1  PROCEDURE
NewProc2  PROCEDURE(String)
NewProc3  PROCEDURE(String,String)
NewProc4  PROCEDURE(String,String,String)
END

MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS |
,HVSCROLL,RESIZE
MENUBAR
MENU('&File'),USE(?FileMenu)
ITEM('Selection &1...'),USE(?MenuSelection1)
ITEM('Selection &2...'),USE(?MenuSelection2)
ITEM('Selection &3...'),USE(?MenuSelection3)
ITEM('Selection &4...'),USE(?MenuSelection4)
ITEM('E&xit'),USE(?Exit)
END
END
END

SaveThread1 LONG    !Declare thread number save variables
SaveThread2 LONG
SaveThread3 LONG
SaveThread4 LONG
GroupName    GROUP
F1           STRING(30)
F2           LONG
END

CODE
OPEN(MainWin)                                !Open the APPLICATION
ACCEPT
CASE ACCEPTED()
OF ?MenuSelection1
SaveThread1 = START(NewProc1,35000)           !Start thread with 35K stack
OF ?MenuSelection2
SaveThread2 = START(NewProc2,35000,GroupName) !Start thread, passing 1 parm
OF ?MenuSelection3
SaveThread3 = START(NewProc3,35000,'X','21')  !Start thread, passing 2 parms
OF ?MenuSelection4
SaveThread4 = START(NewProc4,35000,'X','21',GroupName) !Start a new thread
OF ?Exit
RETURN
END
END

NewProc2  PROCEDURE(MyGroup)
LocalGroup GROUP(GroupName)    !Declare local group same as passed group
END

CODE
LocalGroup = MyGroup           !Get the passed data

```

See Also: **ACCEPT, THREAD, SETTARGET, POST**

## STATUS (return file status)

### STATUS( *file* )

**STATUS**

Returns the current file status.

*file*

The label of a FILE statement.

The **STATUS** procedure returns zero (0) if the *file* is not open, and the *file's* *access mode* if it is open. If the *access mode* is actually zero (Read Only / Any Access), 40h (Read Only / Deny None) is returned (see OPEN).

Return Data Type:      **LONG**

Example:

```
IF STATUS(DataFile) % 16 = 0      !Opened Read-Only?
  RETURN                          ! get out
ELSE                               !Otherwise
  EXECUTE DiskAction              ! Write record to disk
  ADD(DataFile)
  PUT(DataFile)
  DELETE(DataFile)
. .
```

See Also:              **OPEN**

## STOP (suspend program execution)

**STOP**( [ *message* ] )

**STOP**

Suspends program execution and displays a message window.

*message*

An optional string expression (up to 64K) which displays in the error window.

**STOP** suspends program execution and displays a message window. It offers the user the option of continuing the program or exiting. When exiting, it closes all files and frees the allocated memory.

Example:

```
PswdScreen  WINDOW
              STRING(' Please Enter the Password '),AT(5,5)
              ENTRY(@10),AT(20,5),USE(Password),PASSWORD
              END

CODE
OPEN(PswdScreen)                                !Open the password screen
ACCEPT                                             ! and get user input
CASE ACCEPTED
  OF ?Password)
    IF Password <> 'PayMe$moRe'                    !Correct password?
      STOP('Incorrect Password Entered -- Access Denied -- Retry?')
      X# += 1
    IF X# > 3                                       !Let them try 3 times
      HALT(0,'Incorrect password')                 ! then throw them out
    END
  END
END
END
END
```

See Also:

**HALT**

## STREAM (enable operating system buffering)

### STREAM(*file*)

**STREAM** Disables automatic FILE flushing.

*file* The label of a FILE.

Some file systems flush the operating system's buffers on each disk write keeping the file "logically closed" (for example, the Clarion and TopSpeed file drivers do this by default). The **STREAM** statement disables this automatic flushing operation. A **STREAM** operation is terminated by closing the file, which automatically flushes the buffers, or by issuing a **FLUSH** statement.

**STREAM** and **FLUSH** are inherently single-user, batch process type of statements, although you can use them in networked environments. In some file systems, **STREAM** and **FLUSH** are simply ignored when the file is opened for shared access while in others they execute but it is possible to create a "deadlock" situation between workstations for multiple file updates. **LOGOUT** accomplishes a similar purpose in multi-user environments and is much safer.

Support for this statement is dependent upon the file system and is described in its file driver's documentation.

Example:

```
STREAM(History)           !Use DOS buffering
SET(Current)              !Set to top of current file
LOOP
  NEXT(Current)
  IF ERRORCODE() THEN BREAK.
  His:Record = Cur:Record
  ADD(History)
END
FLUSH(History)            !End streaming, flush buffers
```

See Also: **FLUSH, LOGOUT, BUFFER**



## SUB (return substring of string)

**SUB**(*string*,*position*,*length*)

<b>SUB</b>	Returns a portion of a string.
<i>string</i>	A string constant, variable or expression.
<i>position</i>	A integer constant, variable, or expression. If positive, it points to a character position relative to the beginning of the <i>string</i> . If negative, it points to the character position relative to the end of the <i>string</i> (i.e., a <i>position</i> value of -3 points to a position 3 characters from the end of the <i>string</i> ).
<i>length</i>	A numeric constant, variable, or expression of number of characters to return.

The **SUB** procedure parses out a sub-string from a *string* by returning *length* characters from the *string*, starting at *position*.

The SUB procedure is similar to the “string slicing” operation on STRING, CSTRING, and PSTRING variables. SUB is less flexible and efficient than string slicing, but SUB is “safer” because it ensures that the operation does not overflow the bounds of the *string*.

“String slicing” is more flexible than SUB because it may be used on both the destination and source sides of an assignment statement, while the SUB procedure can only be used as the source. It is more efficient because it takes less memory than individual character assignments or the SUB procedure (however, no bounds checking occurs).

To take a “slice” of a string, the beginning and ending character numbers are separated by a colon (:) and placed in the implicit array dimension position within the square brackets ([]) of the string. The position numbers may be integer constants, variables, or expressions. If variables are used, there must be at least one blank space between the variable name and the colon separating the beginning and ending number (to prevent PREFIX confusion).

Return Data Type: **STRING**

Example:

```
!SUB('ABCDEFGHI',1,1)returns 'A'
!SUB('ABCDEFGHI',-1,1) returns 'I'
!SUB('ABCDEFGHI',4,3)returns 'DEF'
Extension = SUB(FileName,INSTRING('.',FileName,1,1)+1,3)
!Get the file extension using SUB procedure
Extension = FileName[(INSTRING('.',FileName,1,1)+1) : (INSTRING('.',FileName,1,1)+3)]
!The same operation using string slicing
```

See Also: **INSTRING, STRING, CSTRING, PSTRING, String Slicing**

TAN (return tangent)

TAN(*radians*)

**TAN** Returns tangent.

*radians* A numeric constant, variable or expression for the angle in radians.  $\pi$  is a constant which represents the ratio of the circumference and radius of a circle. There are  $2\pi$  radians (or 360 degrees) in a circle.

The **TAN** procedure returns the trigonometric tangent of an angle measured in *radians*. The tangent is the ratio of the angle’s opposite side divided by its adjacent side.

Return Data Type: **REAL**

Example:

```
PI      EQUATE(3.1415926535898)      !The value of PI
Rad2Deg EQUATE(57.295779513082)      !Number of degrees in a radian
Deg2Rad EQUATE(0.0174532925199)      !Number of radians in a degree
CODE
Angle = 45 * Deg2Rad      !Translate 45 degrees to Radians
TangentAngle = TAN(Angle) !Get the tangent of 45 degree angle
```

See Also: **ATAN, SIN, ASIN, COS, ACOS**

## THREAD (return current execution thread)

### THREAD ( )

The **THREAD** procedure returns the currently executing thread number. The returned thread number can be used by procedures and procedures whose action may be performed on any execution thread (such as **SETTARGET**).

The maximum number of simultaneously available execution threads in a single application is 64. The first execution thread in any program is the main program code, which is always thread number one (1). Therefore, **THREAD** always returns a value in the range of one (1) to sixty-four (64).

Return Data Type: **SIGNED**

Example:

```

MainWin APPLICATION('My Application'),SYSTEM,MAX,ICON('MyIcon.ICO'),STATUS |
,HVSCROLL,RESIZE
    MENUBAR
        MENU('&File'),USE(?FileMenu)
            ITEM('Selection &1...'),USE(?MenuSelection1)
            ITEM('Selection &2...'),USE(?MenuSelection2)
        END
    END
END

SaveThread    LONG    !Declare thread number save variable
SaveThread1   LONG    !Declare thread number save variable
SaveThread2   LONG    !Declare thread number save variable
CODE
    SaveThread = THREAD()           !Save thread number
    OPEN(MainWin)                  !Open the APPLICATION
    ACCEPT                          !Handle Global events
    CASE ACCEPTED()
    OF ?MenuSelection1
        SaveThread1 = START(NewProc1) !Start a new thread
    OF ?MenuSelection2
        SaveThread2 = START(NewProc2) !Start a new thread
    OF ?Exit
        RETURN
    END
END
END

```

See Also: **START**

## THREADLOCKED (returns current execution thread locked state)

---

### THREADLOCKED()

The **THREADLOCKED** procedure returns the current execution thread's locked/unlocked state. It returns zero (0) if the thread is unlocked and one (1) if the thread is locked. **THREADLOCKED** always returns zero (1) in 16-bit code.

Return Data Type:        **SIGNED**

Example:

```
X# = THREADLOCKED()    !Returns 1
UNLOCKTHREAD           !Unlock the thread
X# = THREADLOCKED()    !Returns 0
MyLibraryCodeWithMessageLoop    !Call the code that has its own message loop
LOCKTHREAD             !Re-lock the thread
```

See Also:                **ACCEPT, LOCKTHREAD, UNLOCKTHREAD**

## TODAY (return system date)

---

### TODAY( )

The **TODAY** procedure returns the operating system date as a standard date. The range of possible dates is from January 1, 1801 (standard date 4) to December 31, 2099 (standard date 109,211).

Return Data Type:        **LONG**

Example:

```
OrderDate = TODAY()    !Set the order date to system date
```

See Also:                **Standard Date, DAY, MONTH, YEAR, SETTODAY, DATE**

## TYPE (write string to screen)

### TYPE(*string*)

**TYPE** Writes a *string* to the current window or report.

*string* A string constant, variable, or expression.

**TYPE** writes a *string* to the current window or report. The *string* appears on the window or report at the current cursor position, if there's room, if not, it appears on the next line. The font used is the current font for the window or report. The **SHOW** statement may be used to position the cursor before output from **TYPE**.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    !window controls
END
CODE
OPEN(MDIChild)
DISPLAY
TYPE(Cus:Notes)           !Type the notes field
```

See Also: Current Target

## UNHIDE (show hidden control)

### UNHIDE( [ *first control* ] [, *last control* ] )

**UNHIDE** Displays previously hidden controls.

*first control* Field number or field equate label of a control, or the first control in a range of controls. If omitted, defaults to zero (0).

*last control* Field number or field equate label of the last control in a range of controls.

The **UNHIDE** statement reactivates a control or range of controls, that were hidden by the **HIDE** statement. Once un-hidden, the control is again visible on screen.

Example:

```
CODE
OPEN(Screen)
HIDE(?Control2)           !Control2 is hidden
IF Ctl:Password = 'Supervisor'
    UNHIDE(?Control2)      !Unhide Control2
END
```

See Also: HIDE, ENABLE, DISABLE

## UNLOAD (remove a CALLED DLL from memory)

### UNLOAD( *file* )

#### UNLOAD

Unloads a Windows standard .DLL previously loaded by CALL.

#### *file*

A string constant, variable, or expression containing the name (including extension) of the .DLL to unload. This may include a full path.

The **UNLOAD** procedure unloads a .DLL *file* left loaded by the CALL procedure.

Example:

```
Win1  WINDOW
      BUTTON('Load DLL'),USE(?DLLButton)
      END
CODE
OPEN(Win1)
ACCEPT
CASE EVENT()
OF EVENT:Accepted
  IF ACCEPTED() = ?DLLButton
    X# = CALL('CUSTOM.DLL','EntryPoint',1)
                                !Call procedure in CUSTOM.DLL and leave DLL resident
    IF X# THEN STOP(X#).       !Check for successful execution
  END
OF EVENT:CloseWindow
  UNLOAD('CUSTOM.DLL')       !Unload the CUSTOM.DLL
END
END
!Process
```

See Also:

**CALL**

## UNLOCK (unlock a locked data file)

---

### UNLOCK(*file*)

**UNLOCK**

Unlocks a previously locked data file.

*file*

The label of a FILE declaration.

The **UNLOCK** statement unlocks a previously **LOCKed** data file. It will not unlock a file locked by another user. If the *file* is not locked, or is locked by another user, **UNLOCK** is ignored. **UNLOCK** posts no errors.

Example:

```
LOOP                                !Loop to avoid "deadly embrace"
  LOCK(Master,1)                    !Lock the master file, try for 1 second
  IF ERRORCODE() = 32               !If someone else has it
    CYCLE                           ! try again
  END
  LOCK(Detail,1)                    !Lock the detail file, try for 1 second
  IF ERRORCODE() = 32               !If someone else has it
    UNLOCK(Master)                  ! unlock the locked file
    CYCLE                           ! try again
  END
  BREAK                             !Break loop when both files are locked
END
```

See Also:

**LOCK**

## UNLOCKTHREAD (unlock the current execution thread)

### UNLOCKTHREAD

The **UNLOCKTHREAD** statement allows a Clarion program to call 3rd-party code or API procedures that contain their own message loop (like Clarion's **ACCEPT** loop).

Normally, **ACCEPT** loops in a Clarion program execute in turn (even in 32-bit programs) so that problems do not arise due to simultaneous access to data. Thread-switching only occurs at an **ACCEPT** statement, and thus only one thread can execute Clarion code at a time. However, if the currently executing thread calls an external procedure (including API functions) that (for example) opens a window and processes messages until the window closes, then other threads must be allowed to execute (co-operatively) to process their own messages. You do this by calling **UNLOCKTHREAD** before the external procedure, then **LOCKTHREAD** after it returns.

Because **UNLOCKTHREAD** may allow other threads to pre-empt the currently executing thread, it is important that you make **NO** calls to the Clarion runtime library between **UNLOCKTHREAD** and its corresponding **LOCKTHREAD**. This means you must not call any Clarion language procedure. You also must not perform any operations involving a **STRING**, **CSTRING**, **PSTRING**, **DECIMAL**, or **PDECIMAL** data types. The one exception is that you may pass a **STRING**, **CSTRING**, or **PSTRING** variable as a **RAW** parameter to an external (non-Clarion) procedure. **Failure to observe this restriction may result in data on another thread becoming corrupted, or other generally unpredictable misbehavior.**

**UNLOCKTHREAD** has no effect in 16-bit code and is ignored. It is only needed in 32-bit applications.

The **THREADLOCKED()** procedure determines whether the thread has been unlocked or not.

Example:

<b>UNLOCKTHREAD</b>	!Unlock the thread
<b>MyLibraryCodeWithMessageLoop</b>	!Call the code that has its own message loop
<b>LOCKTHREAD</b>	!Re-lock the thread

See Also:

**ACCEPT, LOCKTHREAD, THREADLOCKED**



## UNREGISTER (unregister event handler)

**UNREGISTER**( [*event*] [, *handler*] [, *object*] [,*window*] [,*control*] )

<b>UNREGISTER</b>	Unregisters an event handling procedure.
<i>event</i>	An integer constant, variable, expression, or EQUATE containing an event number. A value in the range 400h to 0FFFh is a User-defined event. If omitted, all <i>events</i> are unregistered.
<i>handler</i>	A LONG variable, or expression containing the return value from ADDRESS for the PROCEDURE to handle the <i>event</i> . If omitted, all <i>handlers</i> are unregistered.
<i>object</i>	A LONG integer constant, variable, or expression containing any 32-bit unique value to identify the specific <i>handler</i> . This is generally the return value of ADDRESS(SELF) when the <i>handler</i> is a CLASS method.
<i>window</i>	The label of the WINDOW or REPORT whose <i>event</i> to handle. If omitted, the current target WINDOW or REPORT is assumed.
<i>control</i>	An integer constant, EQUATE, variable, or expression containing the field number of the specific control whose <i>event</i> to handle. If omitted, the <i>event</i> is handled for every control on the <i>window</i> .

**UNREGISTER** prevents a previously REGISTERed event *handler* PROCEDURE from being called to handle its *event*.

Example:

```
WindowResizeClass.Kill  PROCEDURE
CODE
UNREGISTER(EVENT:Sized,ADDRESS(SELF.TakeResize),ADDRESS(SELF))
!Other code follows

WindowResizeClass.TakeResize  PROCEDURE
ReturnValue  BYTE
CODE
ReturnValue  = Level:Benign
RETURN(ReturnValue)
```

See Also:           **REGISTER, ACCEPT, EVENT**

## UPDATE (write from screen to USE variables)

**UPDATE**( [*first control*] [,*last control*] )

### **UPDATE**

Writes the contents of a control to its USE variable.

*first control*

Field number or field equate label of a control, or the first control in a range of controls.

*last control*

Field number or field equate label of the last control in a range of controls.

**UPDATE** writes the contents of a screen control to its USE variable. This takes the value displayed on screen and places it in the variable specified by the control's USE attribute.

USE variables are updated automatically by **ACCEPT** as each control is accepted. However, certain events (such as an **ALERT**ed key press) do not automatically update USE variables. This is the purpose of the **UPDATE** statement.

### **UPDATE**

Updates all controls on the screen.

### **UPDATE**(*first control*)

Updates a specific USE variable from its associated screen control.

### **UPDATE**(*first control*,*last control*)

Updates the USE variables of an inclusive range of screen controls.

Example:

```
UPDATE(?)           !Update the currently selected control
UPDATE              !Update all controls on the screen
UPDATE(?Address)    !Update the address control
UPDATE(3,7)         !Update controls 3 through 7
UPDATE(?Name,?Zip)  !Update controls from name through zip
UPDATE(?City,?City+2) !Update city and 2 controls following
```

See Also:

Field equate Labels, **DISPLAY**, **CHANGE**

## UPPER (return upper case)

---

### UPPER(*string*)

**UPPER**

Returns all upper case string.

*string*

A string constant, variable, or expression for the *string* to be converted.

The **UPPER** procedure returns a string with all letters converted to upper case.

Return Data Type:      **STRING**

Example:

```
!UPPER('abc') returns 'ABC'
```

```
Name = UPPER(Name)      !Make the name upper case
```

See Also:              **LOWER, ISUPPER, ISLOWER**

## VAL (return ASCII value)

---

### VAL(*character*)

**VAL**

Returns ASCII code.

*character*

A one-byte string containing an ANSI character.

The **VAL** procedure returns the ASCII code of a *character*.

Return Data Type:      **LONG**

Example:

```
!VAL('A')      returns 65
```

```
!VAL('z')      returns 122
```

```
CharVal = VAL(StrChar)      !Get the ASCII value of the string character
```

See Also:              **CHR**

## WATCH (automatic concurrency check)

### WATCH( *entity* )

#### WATCH

Arms automatic optimistic concurrency checking.

#### *entity*

The label of a FILE or VIEW declaration.

The **WATCH** statement arms automatic optimistic concurrency checking by the file driver for a following GET, REGET, NEXT, or PREVIOUS statement in a multi-user environment. The WATCH terminates when the WATCHed record is PUT back to the *entity*, or another GET, NEXT, PREVIOUS, or REGET statement executes on the same *entity* without first executing another WATCH statement.

Generally, the file driver retains a copy of the retrieved record on the GET, NEXT, PREVIOUS, or REGET when it successfully gets the record. When the retrieved record is PUT to the *file*, the record on disk is compared to the original record retrieved. Error 89 (Record Changed By Another Station) is posted by the PUT statement if the record has been changed by another user.

Example:

```

SET(Itm:InvoiceKey)           !Start at beginning of Items file
LOOP                           !Process all records
  WATCH(Items)                !Arm concurrency check
  NEXT(Items)                  ! Get a record
  IF ERRORCODE() THEN BREAK.
  DO ItemProcess                ! process the item
  PUT(Items)                    ! and put it back
  IF ERRORCODE() = RecordChangedErr !If changed by another station
    PREVIOUS(Items)            !Setup to re-process the changed record
  ELSE
    STOP(ERROR())              !Stop on any other error
  END
END
END

```

See Also:

NEXT, PREVIOUS, GET, REGET, HOLD

# WHAT (return field from group)

WHAT( <i>group</i> , <i>number</i> )		
	<b>WHAT</b>	Returns a specified field from a <i>group</i> structure.
	<i>group</i>	The label of a GROUP, RECORD, CLASS, or QUEUE declaration.
	<i>number</i>	An integer expression specifying the ordinal position of a field in the <i>group</i> .

The **WHAT** statement returns the *number* specified field from a *group* structure. Generally, this would be assigned to an ANY variable.

Return Data Type:      ANY

Example:

```
MyGroup  GROUP
F1        LONG           !Field number 1
F2        SHORT          !Field number 2
F3        STRING(30)     !Field number 3
InGroup   GROUP          !Field number 4
F1        LONG           !Field number 5
F2        SHORT          !Field number 6
F3        STRING(30)     !Field number 7
          END
          END

CurrentField  ANY

CODE
CurrentField &= WHAT(MyGroup,1)           !Returns MyGroup.F1

CurrentField &= WHAT(MyGroup,6)           !Returns MyGroup.Ingroup.F2
```

See Also:              ANY, WHERE, WHO, ISSTRING, GROUP, RECORD, CLASS, QUEUE

## WHERE (return field position in group)

**WHERE**( *group*, *field* )

### WHERE

Returns a *field*'s ordinal position within a GROUP, RECORD, CLASS, or QUEUE structure.

*group*

The label of a GROUP, RECORD, CLASS, or QUEUE declaration.

*field*

The label of a field in the *group* declaration.

The **WHERE** statement returns the ordinal position of a specified *field* in a *group* structure.

Return Data Type: **SIGNED**

Example:

```
MyGroup  GROUP
F1        LONG           !Field number 1
F2        SHORT          !Field number 2
F3        STRING(30)     !Field number 3
InGroup   GROUP
F1        LONG           !Field number 5
F2        SHORT          !Field number 6
F3        STRING(30)     !Field number 7
          END
```

```
CurrentField  LONG
```

```
CODE
CurrentField = WHERE(MyGroup,MyGroup.F1)           !WHERE returns 1

CurrentField = WHERE(MyGroup,MyGroup.Ingroup.F2)   !WHERE returns 6

CurrentField = WHERE(MyGroup.Ingroup,MyGroup.Ingroup.F2) !WHERE returns 2
```

See Also: **WHAT, WHO, ISSTRING, GROUP, RECORD, CLASS, QUEUE**

# WHO (return field name from group)

WHO( <i>group</i> , <i>number</i> )		
	WHAT	Returns a string containing the name of a specified field from a <i>group</i> structure.
	<i>group</i>	The label of a GROUP, RECORD, CLASS, or QUEUE declaration with the BINDABLE attribute.
	<i>number</i>	An integer expression specifying the ordinal position of a field in the <i>group</i> .
The <b>WHO</b> statement returns a string containing the name of the <i>number</i> specified field from a <i>group</i> structure.		

Return Data Type:        **STRING**

Example:

```
MyGroup  GROUP
F1        LONG           !Field number 1
F2        SHORT          !Field number 2
F3        STRING(30)     !Field number 3
InGroup   GROUP          !Field number 4
F1        LONG           !Field number 5
F2        SHORT          !Field number 6
F3        STRING(30)     !Field number 7
          END
          END

CurrentField  ANY

CODE
CurrentField &= WHO(MyGroup,1)           !Returns "MyGroup.F1"

CurrentField &= WHO(MyGroup,6)           !Returns "MyGroup.Ingroup.F2"
```

See Also:                **WHAT, WHERE, GROUP, RECORD, CLASS, QUEUE, BINDABLE**

## YEAR (return year of date)

---

### YEAR(*date*)

**YEAR**

Returns the year.

*date*

A numeric constant, variable, expression, or the label of a string variable declared with a date picture, containing a standard date. A variable declared with a date picture is automatically converted to a standard date intermediate value.

The **YEAR** procedure returns a four digit number for the year of a standard *date* (1801 to 9999).

Return Data Type:      **LONG**

Example:

```
IF YEAR>LastOrd) < YEAR(TODAY())  !If last order date not from this year
DO StartNewYear                    ! start new year to date totals
END
```

See Also:              Standard Date, DAY, MONTH, TODAY, DATE



## YIELD (allow event processing)

---

### YIELD

**YIELD** temporarily gives control to Windows to allow other concurrently executing Windows applications to process events they need to handle (except those events that would post messages back to the program containing the YIELD statement, or events that would change focus to the other application).

YIELD is used to ensure that long batch processing in a Clarion application does not completely “lock out” other applications from completing their tasks. This is known as “cooperative multi-tasking” and ensures that your Windows programs peacefully co-exist with any other Windows applications.

Within your Clarion application, YIELD only allows control to pass to EVENT:Timer events in other execution threads. This allows you to code a “background” procedure in its own execution thread using the TIMER attribute to perform some long batch processing without requiring the user to wait until the task is complete before continuing with other work in the application. This is an industry-standard Windows method of doing background processing within an application.

The example code on the next page demonstrates both approaches to performing batch processing: making the user wait for the process to complete, and processing in the background. Only the WaitForProcess procedure requires the YIELD statement, because it takes full control of the program. Background processing using EVENT:Timer does not need a YIELD statement, since the ACCEPT loop automatically performs cooperative multi-tasking with other Windows applications.

Example:

```

StartProcess  PROCEDURE
Win  WINDOW('Choose a Batch Process'),MDI
      BUTTON('Full Control'),USE(?FullControl)
      BUTTON('Background'),USE(?Background)
      BUTTON('Close'),USE(?Close)
      END
CODE
OPEN(Win)
ACCEPT
CASE ACCEPTED()
OF ?FullControl
      DISABLE(FIRSTFIELD(),LASTFIELD())      !Disable all buttons
      WaitForProcess                          ! and call the batch process procedure
      ENABLE(FIRSTFIELD(),LASTFIELD())        !Enable buttons when batch is complete
OF ?Background
      START(BackgroundProcess)                !Start new execution thread for the process
OF ?Close
      BREAK
END
END

WaitForProcess  PROCEDURE                        !Full control Batch process
CODE
SETCURSOR(CURSOR:Wait)                        !Alert user to batch in progress
SET(File)                                     !Set up a batch process
LOOP
      NEXT(File)
      IF ERRORCODE() THEN BREAK.
      !Perform some batch processing code
      YIELD                                    !Yield to other applications and EVENT:Timer
END
SETCURSOR                                     !Restore mouse cursor

BackgroundProcess  PROCEDURE                    !Background processing batch process
Win  WINDOW('Batch Processing...'),TIMER(1),MDI
      BUTTON('Cancel'),STD(STD:Close)
      END
CODE
OPEN(Win)
SET(File)                                     !Set up a batch process
ACCEPT
CASE EVENT()
OF EVENT:CloseWindow
      BREAK
OF EVENT:Timer
      !Process records whenever the timer allows it
      LOOP 3 TIMES
      NEXT(File)
      IF ERRORCODE()
          POST(EVENT:CloseWindow)
          BREAK
      END
      !Perform some batch processing code
. . .

```

See Also:

**ACCEPT, TIMER**

# ***APPENDIX A - DDE, OLE, AND .OCX***

## ***Dynamic Data Exchange***

### **DDE Overview**

---

Dynamic Data Exchange (DDE) is a very powerful Windows tool that allows a user to access data from another separately executing Windows application. This allows the user to work with the data in its native format (in the originating application), while ensuring that the application in which the data is used always has the most current values.

DDE is based upon establishing “conversations” (links) between two concurrently executing Windows applications. One of the applications acts as the DDE server to provide the data, and the other is the DDE client that receives the data. A single application may be both a DDE client and server, getting data from other applications and providing data to other applications. Multiple DDE “conversations” can occur concurrently between any given DDE server and client.

#### **To be a DDE server, a Clarion application must:**

- Open at least one window, since all DDE servers must be associated with a window (and its ACCEPT loop).
- Register with Windows as a DDE server, using the DDESERVER procedure.
- Provide the requested data to the client, using the DDEWRITE statement.
- When DDE is no longer required, terminate the link by using the DDECLOSE statement. You can also allow it to terminate when the user closes the server application or the window that started the link.

#### **To be a DDE client, a Clarion application must:**

- Open at least one window, since all DDE events must be processed with a window’s ACCEPT loop.
- Open a link to a DDE server as its client, using the DDECLIENT procedure.
- Ask the server for data, using the DDEREAD statement, or ask the server for a service using the DDEEXECUTE statement.
- When DDE is no longer required, terminate the link by using the DDECLOSE statement. You can also allow it to terminate automatically when the user closes the client window or application.

The DDE procedures are prototyped in the DDE.CLW file, which you must **INCLUDE** in your program's MAP structure. The DDE process posts DDE-specific field-independent events to the **ACCEPT** loop of the window that opened the link between applications as a server or client.

## DDE Events

---

The DDE process is governed by several field-independent events specific to DDE. These events are posted to the **ACCEPT** loop of the window that opened the link between applications, either as a server or client.

The following events are posted only to a Clarion server application:

**EVENT:DDErequest**

A client has requested a data item.

**EVENT:DDEadvise**

A client has requested continuous updates of a data item.

**EVENT:DDEexecute**

A client has executed a **DDEEXECUTE** statement.

**EVENT:DDEpoke** A client has sent unsolicited data

The following events are posted only to a Clarion client application:

**EVENT:DDEdata**

A server has supplied an updated data item.

**EVENT:DDEclosed**

A server has terminated the DDE link.

When one of these DDE events occur there are several procedures that tell you what posted the event:

- **DDECHANNEL()** returns the handle of the DDE server or client.
- **DDEITEM()** returns the item or command string passed to the server by the **DDEREAD** or **DDEEXECUTE** statements.
- **DDEAPP()** returns the name of the application.
- **DDETOPIC()** returns the name of the topic.

When a Clarion program creates a DDE server, external clients can link to this server and request data. Each data request is accompanied by a string (in some specific format which the server program knows) indicating the required data item. If the Clarion server already knows the value for a given item, it supplies it to the client automatically without generating any events. If it doesn't, an **EVENT:DDErequest** or **EVENT:DDEadvise** event is posted to the server window's **ACCEPT** loop.

When a Clarion program creates a DDE client, it can link to external servers which can provide data. When the server first provides the value for a given item, it supplies it to the client automatically without generating any events. If the client has established a “hot” link with the server, an EVENT:DDEdata event is posted to the client window’s ACCEPT loop whenever the server posts a new value for the data item.

## DDE Procedures

### DDEACKNOWLEDGE (send acknowledgement from DDE server)

**DDEACKNOWLEDGE**( *response* )

#### DDEACKNOWLEDGE

Sends acknowledgement of the current DDEPOKE or DDEEXECUTE statement sent to the DDE server.

*response*      An integer constant, variable, or expression containing zero (0) or one (1) to indicate negative or positive acknowledgement.

The **DDEACKNOWLEDGE** procedure allows a DDE server program to immediately acknowledge unsolicited data sent from DDEPOKE, or commands sent from DDEEXECUTE. This allows the client application to immediately continue its processing. Although a CYCLE statement after EVENT:DDEpoke or EVENT:DDEexecute also signals positive acknowledgement to the client, DDEACKNOWLEDGE allows you to send negative acknowledgement.

Example:

```

!The client application's code contains:
WinOne    WINDOW,AT(0,0,160,400)
          END
SomeServer LONG
DDEChannel LONG
CODE
OPEN(WinOne)
DDEChannel = DDECLIENT('MyServer','System')
DDEEXECUTE(DDEChannel,'[ShowList]')
```

!Open a channel to MyServer app  
!Tell it to do something

```

!The server application's code contains:
WinOne    WINDOW,AT(0,0,160,400)
          END
DDEChannel LONG
CODE
OPEN(WinOne)
DDEChannel = DDESERVER('MyServer','System')
ACCEPT
CASE EVENT()
OF EVENT:DDEExecute
CASE DDEVALUE()
OF 'ShowList'
DDEACKNOWLEDGE(1)
DO ShowList
ELSE
DDEACKNOWLEDGE(0)
END
END
END
```

!Open channel  
  
!Check the requested action  
!Send positive acknowledgement  
! and take the action  
!If requested action is unknown  
!Send negative acknowledgement

See Also:

DDEPOKE, DDEEXECUTE

## DDEAPP (return server application)

### DDEAPP( )

The **DDEAPP** procedure returns a string containing the application name in the DDE channel that has just posted a DDE event. This is usually the same as the first parameter to the DDESERVER or DDECLIENT procedure when the DDE channel is established.

Return Data Type:        **STRING**

Example:

```
ClientApp STRING(20)
WinOne   WINDOW,AT(0,0,160,400)
         STRING(@S20),AT(5,5,90,20),USE(ClientApp)
END

TimeServer LONG
DateServer LONG
FormatTime STRING(5)
FormatDate STRING(8)

CODE
OPEN(WinOne)
TimeServer = DDESERVER('SomeApp','Time')      !Open as server
DateServer = DDESERVER('SomeApp','Date')      !Open as server
ACCEPT
CASE EVENT()
OF EVENT:DDerequest
CASE DDECHANNEL()
OF TimeServer
ClientApp = DDEAPP()                          !Get client's name
DISPLAY                                       ! and display on screen
FormatTime = FORMAT(CLOCK(),@T1)
DDEWRITE(TimeServer,DDE:manual,'Time',FormatTime)
OF DateServer
ClientApp = DDEAPP() !Get client's name
DISPLAY                                       ! and display on screen
FormatDate = FORMAT(TODAY(),@D1)
DDEWRITE(DateServer,DDE:manual,'Date',FormatDate)
END
END
END
```

See Also:                **DDECLIENT, DDESERVER**

## DDECHANNEL (return DDE channel number)

---

### DDECHANNEL( )

The **DDECHANNEL** procedure returns a LONG integer containing the channel number of the DDE client or server application that has just posted a DDE event. This is the same value returned by the **DDESERVER** or **DDECLIENT** procedure when the DDE channel is established.

Return Data Type:        **LONG**

Example:

```
WinOne  WINDOW,AT(0,0,160,400)
        END
TimeServer LONG
DateServer LONG
FormatTime STRING(5)
FormatDate STRING(8)
CODE
OPEN(WinOne)
TimeServer = DDESERVER('SomeApp','Time')      !Open as server
DateServer = DDESERVER('SomeApp','Date')      !Open as server
ACCEPT
CASE EVENT()
OF EVENT:DDErequest
    CASE DDECHANNEL()                          !Check which channel
    OF TimeServer
        FormatTime = FORMAT(CLOCK(),@T1)
        DDEWRITE(TimeServer,DDE:manual,'Time',FormatTime)
    OF DateServer
        FormatDate = FORMAT(TODAY(),@D1)
        DDEWRITE(DateServer,DDE:manual,'Date',FormatDate)
    END
END
END
END
```

See Also:                **DDECLIENT, DDESERVER**



## DDECLIENT (return DDE client channel)

**DDECLIENT**( [ *application* ] [, *topic* ] )

<b>DDECLIENT</b>	Returns a new DDE client channel number.
<i>application</i>	A string constant or variable containing the name of the server application to link to. Usually, this is the name of the application. If omitted, the first DDE server application available is used.
<i>topic</i>	A string constant or variable containing the name of the application-specific topic. If omitted, the first topic available in the <i>application</i> is used.

The **DDECLIENT** procedure returns a new DDE client channel number for the *application* and *topic*. If the *application* is not currently executing, DDECLIENT returns zero (0).

Typically, when opening a DDE channel as the client, the *application* is the name of the server application. The *topic* is a string that the *application* has either registered with Windows as a valid *topic* for the *application*, or represents some value that tells the *application* what data to provide. You can use the DDEQUERY procedure to determine the *applications* and *topics* currently registered with Windows.

Return Data Type: **LONG**

Example:

```

DDEReadVal REAL
WinOne     WINDOW,AT(0,0,160,400)
           ENTRY(@s20),USE(DDEReadVal)
           END
ExcelServer LONG
CODE
OPEN(WinOne)
ExcelServer = DDECLIENT('Excel','MySheet.XLS')

!Open as client to Excel spreadsheet
IF NOT ExcelServer !If the server is not running
    MESSAGE('Please start Excel') !alert the user to start it
    RETURN ! and try again
END
DDEREAD(ExcelServer,DDE:auto,'R5C5',DDEReadVal)
ACCEPT
CASE EVENT()
OF EVENT:DDEdata !As changed data comes from Excel
    PassedData(DDEReadVal) ! process the new data
END
END

```

See Also: **DDEQUERY, DDEWRITE, DDESERVER**

## DDECLOSE (terminate DDE server link)

---

### DDECLOSE( *channel* )

**DDECLOSE**

Closes an open DDE channel.

*channel*

The label of the LONG integer variable containing the channel number—the value returned by the DDESERVER or DDECLIENT procedure.

The **DDECLOSE** procedure allows a DDE client program to terminate the specified *channel*. A *channel* is automatically terminated when the window which opened the *channel* is closed.

Errors Posted:

601 Invalid DDE Channel  
602 DDE Channel Not Open  
605 Time Out

Example:

```
WinOne      WINDOW,AT(0,0,160,400)
            END
SomeServer  LONG
            CODE
            OPEN(WinOne)
            SomeServer = DDECLIENT('SomeApp','MyTopic') !Open as client
            ACCEPT
            END
            DDECLOSE(SomeServer)
```

See Also:

DDECLIENT, DDESERVER

## DDEEXECUTE (send command to DDE server)

### DDEEXECUTE( *channel*, *command* )

**DDEEXECUTE** Sends a command string to an open DDE client channel.

*channel* A LONG integer constant or variable containing the client channel—the value returned by the DDECLIENT procedure.

*command* A string constant or variable containing the application-specific command for the server to execute.

The **DDEEXECUTE** procedure allows a DDE client program to communicate a *command* to the server. The *command* must be in a format the server application can recognize and act on. The server does not need to be a Clarion program. By convention, the entire *command* string is normally contained within square brackets ( [ ] ).

A Clarion DDE server can use the DDEVALUE() procedure to determine what *command* the client has sent. The CYCLE statement after an EVENT:DDEexecute signals positive acknowledgement to the client that sent the *command*. DDEACKNOWLEDGE can send either positive or negative acknowledgement.

Errors Posted: 601 Invalid DDE Channel  
602 DDE Channel Not Open  
603 DDEEXECUTE Failed  
605 Time Out

Events Generated: EVENT:DDEexecute  
A client has sent a command.

Example:

```
!The client application's code contains:
WinOne    WINDOW,AT(0,0,160,400)
          END
SomeServer LONG
DDEChannel LONG
CODE
OPEN(WinOne)
DDEChannel = DDECLIENT('PROGMAN','PROGMAN')
          !Open a channel to Windows Program Manager
DDEEXECUTE(DDEChannel,['CreateGroup(Clarion Applications)'])
          !Create a new program group
DDEEXECUTE(DDEChannel,['ShowGroup(1)']) !Display it
DDEEXECUTE(DDEChannel,['AddItem(MYAPP.EXE,My Program,PROGMAN.EXE,2)'])
          !Create new item in the group
          ! using second icon in progman.exe
```

See Also: DDEACKNOWLEDGE, DDEVALUE

## DDEITEM (return server item)

### DDEITEM( )

The **DDEITEM** procedure returns a string containing the name of the item for the current DDE event. This is the item requested by a DDEREAD, or the data item supplied by DDEPOKE.

Return Data Type:      **STRING**

Example:

```
WinOne      WINDOW,AT(0,0,160,400)
            END

Server      LONG
FormatTime    STRING(5)
FormatDate    STRING(8)

CODE
OPEN(WinOne)
Server = DDESERVER('SomeApp','Clock')    !Open as server for my topic
ACCEPT
CASE EVENT()
OF EVENT:DDErequest
CASE DDEITEM()
OF 'Time'
FormatTime = FORMAT(CLOCK(),@T1)
DDEWRITE(Server,DDE:manual,'Time',FormatTime)
OF 'Date'
FormatDate = FORMAT(TODAY(),@D1)
DDEWRITE(Server,DDE:manual,'Date',FormatDate)
END
OF EVENT:DDEadvise
CASE DDEITEM()
OF 'Time'
FormatTime = FORMAT(CLOCK(),@T1)
DDEWRITE(Server,1,'Time',FormatTime)
OF 'Date'
FormatDate = FORMAT(TODAY(),@D1)
DDEWRITE(Server,60,'Date',FormatDate)
END
END
END
```

See Also:              **DDEREAD, DDEEXECUTE, DDEPOKE**

## DDEPOKE (send unsolicited data to DDE server)

**DDEPOKE**( *channel*, *item*, *value* )

**DDEPOKE**

Sends unsolicited data through an open DDE client channel to a DDE server.

*channel*

A LONG integer constant or variable containing the client channel—the value returned by the DDECLIENT procedure.

*item*

A string constant or variable containing the application-specific item to receive the unsolicited data.

*value*

A string constant or variable containing the data to place in the *item*.

The **DDEPOKE** procedure allows a DDE client program to communicate unsolicited data to the server. The *item* and *value* parameters must be in a format the server application can recognize and act on. The server does not need to be a Clarion program.

A Clarion DDE server can use the DDEITEM() and DDEVALUE() procedures to determine what the client has sent. The CYCLE statement after an EVENT:DDEpoke signals positive acknowledgement to the client that sent the unsolicited data. DDEACKNOWLEDGE can send either positive or negative acknowledgement.

Errors Posted:

601 Invalid DDE Channel  
602 DDE Channel Not Open  
604 DDEPOKE Failed  
605 Time Out

Events Generated:

EVENT:DDEpoke A client has sent unsolicited data

Example:

```

WinOne      WINDOW,AT(0,0,160,400)
            END
DDEChannel  LONG
CODE
OPEN(WinOne)
DDEChannel = DDECLIENT('Excel','System')           !Open channel to Excel
DDEEXECUTE(DDEChannel,['NEW(1)'])                   !Create a new spreadsheet
DDEEXECUTE(DDEChannel,['Save.As("DDE_CHART.XLS")']) !Save it as DDE_CHART.XLS
DDECLOSE(DDEChannel)                               !Close conversation
DDEChannel = DDECLIENT('Excel','DDE_CHART.XLS')     !Open channel to new chart
DDEPOKE(DDEChannel,'R1C2','Widgets')               !Send it data
DDEPOKE(DDEChannel,'R1C3','Gadgets')
DDEPOKE(DDEChannel,'R2C1','East')
DDEPOKE(DDEChannel,'R3C1','West')
DDEPOKE(DDEChannel,'R2C2','450')
DDEPOKE(DDEChannel,'R3C2','275')
DDEPOKE(DDEChannel,'R2C3','340')
DDEPOKE(DDEChannel,'R3C3','390')
DDEEXECUTE(DDEChannel,['SELECT("R1C1:R3C2")'])     !Highlight the data
DDEEXECUTE(DDEChannel,['NEW(2,2)'])                 ! and create a new chart
            !Send some more commands to format the chart and work with it
DDECLOSE(DDEChannel)                               !Close channel when done

```

See Also:

**DDEACKNOWLEDGE, DDEITEM, DDEVALUE**

## DDEQUERY (return registered DDE servers)

**DDEQUERY**( [ *application* ] [, *topic* ] )

<b>DDEQUERY</b>	Returns currently executing DDE servers.
<i>application</i>	A string constant or variable containing the name of the application to query. For most applications, this is the name of the application. If omitted, all registered <i>applications</i> registered with the specified <i>topic</i> are returned.
<i>topic</i>	A string constant or variable containing the name of the application-specific topic to query. If omitted, all <i>topics</i> for the <i>application</i> are returned.

The **DDEQUERY** procedure returns a string containing the names of the currently available DDE server *applications* and their *topics*.

If the *topic* parameter is omitted, all *topics* for the specified *application* are returned. If the *application* parameter is omitted, all registered *applications* registered with the specified *topic* are returned. If both parameters are omitted, DDEQUERY returns all currently available DDE servers.

The format of the data in the return string is *application:topic* and it can contain multiple *application* and *topic* pairs delimited by commas (for example, 'Excel:MySheet.XLS,ClarionApp:DataFile.DAT').

Return Data Type: **STRING**

Example:

```
!This example code does not handle DDEADVISE
WinOne WINDOW,AT(0,0,160,400)
    END
SomeServer    LONG
ServerString  STRING(200)
    CODE
    OPEN(WinOne)
    LOOP
        ServerString = DDEQUERY()                !Return all registered servers
        IF NOT INSTRING('SomeApp:MyTopic',ServerString,1,1)
            MESSAGE('Open SomeApp, Please')
        ELSE
            BREAK
        END
    END
END
SomeServer = DDECLIENT('SomeApp','MyTopic')      !Open as client
ACCEPT
END
DDECLOSE(SomeServer)
```

## DDEREAD (get data from DDE server)

**DDEREAD**( *channel*, *mode*, *item* [, *variable* ] )

<b>DDEREAD</b>	Gets data from a previously opened DDE client channel.
<i>channel</i>	A LONG integer constant or variable containing the client channel—the value returned by the DDECLIENT procedure.
<i>mode</i>	An EQUATE defining the type of data link: DDE:auto, DDE:manual, or DDE:remove (defined in EQUATES.CLW).
<i>item</i>	A string constant or variable containing the application-specific name of the data item to retrieve.
<i>variable</i>	The name of the variable to receive the retrieved data. If omitted and <i>mode</i> is DDE:remove, all links to the <i>item</i> are canceled.

The **DDEREAD** procedure allows a DDE client program to read data from the *channel* into the *variable*. The type of update is determined by the *mode* parameter. The *item* parameter supplies some string value to the server application that tells it what specific data item is being requested. The format and structure of the *item* string is dependent upon the server application.

If the *mode* is DDE:auto, the *variable* is continually updated by the server (a “hot” link). An EVENT:DDEdata is generated each time the *variable* is updated by the server.

If the *mode* is DDE:manual, the *variable* is updated once and no event is generated. Another DDEREAD request must be sent to the server to check for any changed value (a “cold” link).

If the *mode* is DDE:remove, a previous “hot” link to the *variable* is terminated. If the *mode* is DDE:remove and *variable* is omitted, all previous “hot” links to the *item* are terminated, no matter what *variables* were linked. This means the client must send another DDEREAD request to the server to check for any changed value.

Errors Posted:

601 Invalid DDE Channel  
 602 DDE Channel Not Open  
 605 Time Out



Events Generated:      These events are posted to the client application:

                            EVENT:DDEdata    A server has supplied an updated data item for a hot link.

                            EVENT:DDEclosed    A server has terminated the DDE link.

Example:

```
WinOne      WINDOW,AT(0,0,160,400)
            END

ExcelServer LONG(0)
DDEReadVal REAL

CODE
OPEN(WinOne)
ExcelServer = DDECLIENT('Excel','MySheet.XLS')
                            !Open as client to Excel spreadsheet
IF NOT ExcelServer                      !If the server is not running
    MESSAGE('Please start Excel')      ! alert the user to start it
    CLOSE(WinOne)
    RETURN
END
DDEREAD(ExcelServer,DDE:auto,'R5C5',DDEReadVal)
                            !Request continual update from server

ACCEPT
CASE EVENT()
OF EVENT:DDEdata                      !As changed data comes from Excel
    PassedData(DDEReadVal)           ! call proc to process the new data
END
END
```

See Also:                DDEQUERY, DDEWRITE, DDESERVER

## DDESERVER (return DDE server channel)

**DDESERVER**( [ *application* ] [, *topic* ] )

<b>DDESERVER</b>	Returns a new DDE server channel number.
<i>application</i>	A string constant or variable containing the name of the application. Usually, this is the name of the application. If omitted, the filename of the application (without extension) is used.
<i>topic</i>	A string constant or variable containing the name of the application-specific topic. If omitted, the <i>application</i> will respond to any data request.

The **DDESERVER** procedure returns a new DDE server channel number for the *application* and *topic*. The channel number specifies a *topic* for which the *application* will provide data. This allows a single Clarion *application* to register as a DDE server for multiple *topics*.

Return Data Type:      **LONG**

Example:

```

DDERetVal  STRING(20)
WinOne     WINDOW,AT(0,0,160,400)
           ENTRY(@s20),USE(DDERetVal)
           END
MyServer   LONG
CODE
OPEN(WinOne)
MyServer = DDESERVER('MyApp','DataEntered')  !Open as server
ACCEPT
CASE EVENT()
OF EVENT:DDErequest                !As server for data requested once
  DDEWRITE(MyServer,DDE>manual,'DataEntered',DDERetVal) !Provide data once
OF EVENT:DDEadvise                 !As server for constant update request
  DDEWRITE(MyServer,15,'DataEntered',DDERetVal)
                                   !Check for change every 15 seconds
                                   ! and provide data whenever changed

END
END

```

See Also:              **DDECLIENT, DDEWRITE**

## DDETOPIC (return server topic)

---

### DDETOPIC( )

The **DDETOPIC** procedure returns a string containing the topic name for the DDE channel that has just posted a DDE event.

Return Data Type:       **STRING**

Example:

```
WinOne  WINDOW,AT(0,0,160,400)
        END

TimeServer LONG
DateServer LONG
FormatTime STRING(5)
FormatDate STRING(8)

CODE
OPEN(WinOne)
TimeServer = DDESERVER('SomeApp')      !Open as server
ACCEPT
CASE EVENT()
OF EVENT:DDErequest
CASE DDETOPIC()                        !Get requested topic
OF 'Time'
FormatTime = FORMAT(CLOCK(),@T1)
DDEWRITE(TimeServer,DDE:manual,'Time',FormatTime)
OF 'Date'
FormatDate = FORMAT(TODAY(),@D1)
DDEWRITE(DateServer,DDE:manual,'Date',FormatDate)
END
END
END
```

See Also:               **DDEREAD, DDECLIENT, DDESERVER**

## DDEVALUE (return data value sent to server)

### DDEVALUE( )

The **DDEVALUE** procedure returns a string containing the data sent to a Clarion DDE server by the DDEPOKE statement, or the command to execute from a DDEEXECUTE statement.

Return Data Type:        **STRING**

Example:

```
WinOne      WINDOW,AT(0,0,160,400)
            END
TimeServer  LONG

TimeStamp   FILE,DRIER(ASCII),PRE(Tim)
Record      RECORD
FormatTime  STRING(5)
FormatDate  STRING(8)
Message     STRING(50)
            . .

CODE
OPEN(WinOne)
TimeServer = DDESERVER('TimeStamp')           !Open as server
ACCEPT
CASE EVENT()
OF EVENT:DDEpoke
  OPEN(TimeStamp)
  Tim:FormatTime = FORMAT(CLOCK(),@T1)
  Tim:FormatDate = FORMAT(TODAY(),@D1)
  Tim:Message    = DDEVALUE()                  !Get data
  ADD(TimeStamp)
  CLOSE(TimeStamp)
  CYCLE                                           !Ensure acknowledgement
END
END
```

See Also:                **DDEPOKE, DDEEXECUTE**

## DDEWRITE (provide data to DDE client)

**DDEWRITE**( *channel*, *mode*, *item* [, *variable* ] )

<b>DDEWRITE</b>	Provide data to an open DDE server channel.
<i>channel</i>	A LONG integer constant or variable containing the server channel—the value returned by the DDESERVER procedure.
<i>mode</i>	An integer constant or variable containing the interval (in seconds) to poll for changes to the <i>variable</i> , or an EQUATE defining the type of data link: DDE:auto, DDE>manual, or DDE:remove (defined in EQUATES.CLW).
<i>item</i>	A string constant or variable containing the application-specific name of the data item to provide.
<i>variable</i>	The name of the variable providing the data. If omitted and <i>mode</i> is DDE:remove, all links to the <i>item</i> are canceled.

The **DDEWRITE** procedure allows a DDE server program to provide the *variable*'s data to the client. The *item* parameter supplies a string value that identifies the specific data item being provided. The format and structure of the *item* string is dependent upon the *server* application. The type of update performed is determined by the *mode* parameter.

If the *mode* is DDE:auto, the client program receives the current value of the variable and the internal libraries continue to provide that value whenever the client (or any other client) asks for it again. If the client requested a “hot” link, any changes to the *variable* should be tracked by the Clarion program so it can issue a new DDEWRITE statement to update the client with the new value.

If the *mode* is DDE>manual, the *variable* is updated only once. If the client requested a “hot” link, any changes to the *variable* should be tracked by the Clarion program so it can issue a new DDEWRITE statement to update the client with the new value. PROP:DDETimeout can be used to set or get the time out value for the DDE connection (default is five seconds).

If the *mode* is a positive integer, the internal libraries check the value of the *variable* whenever the specified number of seconds has passed. If the value has changed, the client is automatically updated with the new value by the internal libraries (without the need for any further Clarion code). This can incur significant overhead, depending upon the data, and so should be used only when necessary.

If the *mode* is DDE:remove, any previous “hot” link to the *variable* is terminated. If the *mode* is DDE:remove and *variable* is omitted, all previous “hot” links to the *item* are terminated, no matter what *variables* were linked.

This means the client must send another DDEREAD request to the server to check for any changed value.

Errors Posted: 601 Invalid DDE Channel  
602 DDE Channel Not Open  
605 Time Out

Events Generated: EVENT:DDerequest  
A client has requested a data item (a “cold” link).  
EVENT:DDEadvise  
A client has requested continuous updates of a data item (a “hot” link).

Example:

```

DDERetVal  STRING(20)
WinOne     WINDOW,AT(0,0,160,400)
           ENTRY(@s20),USE(DDERetVal)
           END
MyServer   LONG
CODE
OPEN(WinOne)
MyServer = DDESERVER('MyApp','DataEntered')    !Open as server
ACCEPT
CASE EVENT()
OF EVENT:DDerequest                             !As server for data requested once
  DDEWRITE(MyServer,DDE:manual,'DataEntered',DDERetVal)
                                           !Provide data once
OF EVENT:DDEadvise                             !As server for constant update request
  DDEWRITE(MyServer,15,'DataEntered',DDERetVal)
                                           !Check for change every 15 seconds
                                           ! and provide data whenever changed

END
END

```

See Also: DDEQUERY, DDEREAD, DDESERVER

# ***Object Linking and Embedding***

## **OLE Overview**

---

Object Linking and Embedding (OLE) allows “objects” from one application to be linked or embedded into a “document” (data structure) of another application. The application that creates and maintains the object is an OLE Server application, while the application that contains the object is an OLE Controller application (sometimes referred to as an OLE Client application). OLE “objects” are data structures appropriate to the OLE Server application (such as a chart from a spreadsheet, or an image from a paint or drawing application). The object is placed in a “container window” in the Controller application. In Clarion for Windows, “container windows” are OLE controls.

Clarion’s implementation of OLE allows a Clarion for Windows application to serve as an OLE Controller application, linking or embedding objects from any OLE Server application. Clarion also supports OLE Automation, which gives an OLE Controller application dynamic control of the OLE Server application, using the OLE Server’s macro language.

### **Object Linking**

Object Linking generally means the OLE Controller application stores “pointer” information to the object, whether that object is the entire data structure (like a spreadsheet file) or a component of the data structure (like a range of cells in a spreadsheet). When an Object is linked into the OLE Controller application the OLE Controller application contains only the information necessary to reference the linked data. This can be stored in either a BLOB or an OLE Compound Storage file.

### **Object Embedding**

Object Embedding generally means the OLE Controller application stores the entire object, independently of the OLE Server application. An Object embedded into the OLE Controller application does not exist as a separate data file which the OLE Server application may access. The OLE Controller application completely contains the active object, which can be stored in either a BLOB or an OLE Compound Storage file.

### **Maintaining the OLE Object**

Any object in the OLE Controller application, whether linked or embedded, is maintained by the OLE Server application which created it, not the OLE Controller application. This means that when the user wants to change the object, the OLE Controller application activates the OLE Server application to make the changes. There are two ways to activate an OLE Server: “in-place activation” and “open-mode.”

### **In-place activation**

In-place activation means the user seems to stay in the OLE Controller application, but the OLE Server's menus and toolbar merge into the OLE Controller's menus and toolbar and the OLE Server is the currently executing application. The Object being edited has a "hash-mark" border to indicate that it is in edit-mode.

If the OLE Server application has one or more toolbars then the toolbars will appear either as pop-up toolbars or as toolbars attached to one of the edges of the frame, or a combination of both. This can appear to "push down" the controls on your window, so take care designing your window.

### **Open-mode activation**

Open-mode activation means the user is switched into the OLE Server application executing in a separate window. The Object being edited is in the Server application and ready to edit, while the Object in the OLE Controller application has "hash-marks" completely covering it to indicate a separate window is editing the object.

## **OLE Container Properties**

---

There are a number of properties associated with an OLE container control that deal only with OLE objects (not .OCX controls).

### **Attribute Properties**

PROP:Create	The CREATE attribute (blank if none). (WRITE ONLY)
PROP:Open	The OPEN attribute (blank if none). (WRITE ONLY)
PROP:Document	The DOCUMENT attribute (blank if none). (WRITE ONLY)
PROP:Link	The LINK attribute (blank if none). (WRITE ONLY)
PROP:Clip	The CLIP attribute. A toggle attribute. Assigning a null string (") or zero turns it off, and '1' or 1 turns it on. (WRITE ONLY)
PROP:Stretch	The STRETCH attribute. A toggle attribute. Assigning a null string (") or zero turns it off, and '1' or 1 turns it on. (WRITE ONLY)
PROP:Autosize	The AUTOSIZE attribute. A toggle attribute. Assigning a null string (") or zero turns it off, and '1' or 1 turns it on. (WRITE ONLY)
PROP:Zoom	The ZOOM attribute. A toggle attribute. Assigning a null string (") or zero turns it off, and '1' or 1 turns it on. (WRITE ONLY)



**PROP:Compatibility**

The COMPATIBILITY attribute (blank if none).  
(WRITE ONLY)

**Undeclared Properties**

**PROP:Blob** Convert an object to and from a blob. (READ/WRITE)

**PROP:SaveAs** Saves the object to an OLE Compound Storage file.  
(WRITE ONLY)

The syntax for placing the object in the file is  
*'filename\!component'* For example:

```
?controlx{PROP:SaveAs} = 'myfile\!objectx'
```

**PROP:DoVerb** Executes an OLE doverb command from the following set of commands (WRITE ONLY):

**DOVERB:Primary (0)**

Calls the object's primary action. The object, not the container, determines this action. If the object supports in-place activation, the primary verb usually activates the object in-place.

**DOVERB:Show (-1)**

Tells the object to show itself for editing or viewing. Called to display newly inserted objects for initial editing and to show link sources. This is usually an alias for some other object-defined action.

**DOVERB:Open (-2)**

Tells the object to open itself for editing in a separate window from its container (this includes objects that support in-place activation). If the object does not support in-place activation, this has the same action as DOVERB:Show.

**DOVERB:Hide (-3)**

Tells the object to remove its user interface. This applies only to objects activated in-place.

**DOVERB:UIActivate (-4)**

Activates the object in place, along with its full set of user-interface tools, including menus, toolbars, and its name in the title bar of the container window.

**DOVERB:InPlaceActivate (-5)**

Activates the object in-place without displaying the tools (menus and toolbars) that end-users need to change the behavior or appearance of the object.

**DOVERB:DiscardUndoState (-6)**

Tells the object to discard any undo state that it may be maintaining without deactivating the object.

	DOVERB:Properties (-7) Invokes the modal system property browser for the object to allow the user to set its properties.
PROP:Deactivate	Deactivates an in-place active OLE object. (READ/WRITE/EXECUTE)
PROP:Update	Tells the OLE object to update itself. (READ/WRITE/EXECUTE)
PROP:CanPaste	Can you paste the object in the clipboard? (READ ONLY)
PROP:Paste	Pastes an object from the clipboard to an OLE container control. (READ/WRITE/EXECUTE)
PROP:CanPasteLink	Can the object in the clipboard be pasted as a link? (READ ONLY)
PROP:PasteLink	Pastes and links an object from the clipboard to an OLE container control. (READ/WRITE/EXECUTE)
PROP:Copy	Copies an object in an OLE container control to the clipboard. (READ/WRITE/EXECUTE)
PROP:ReportException	Report OLE exceptions (for debug). (WRITE ONLY)
PROP:OLE	Is there an OCX or OLE object in the container? (READ ONLY)
PROP:Language	The number for the language used for OLE Automation or OCX Method. The number for US English is 0409H, and other language numbers can be computed from the data in the WINNT.H file in the MS Windows SDK. (READ/WRITE)

Example:

```

PROGRAM
MAP
    INCLUDE('OCX.CLW')
SelectOleServer PROCEDURE(OleQ PickQ),STRING
    END
    INCLUDE 'XL.CLW'           !Constants that Excel uses
    INCLUDE 'ERRORS.CLW'       !Include errorcode constants
SaveLinks    FILE,DRIVER('TopSpeed'),PRE(SAV),CREATE
Object       BLOB
Record       RECORD
LinkType     STRING(1)        !F = File, B = BLOB
LinkFile     STRING(64)       !OLE Compound Storage file name and object
    END
    END
i            LONG             !Loop counters
j            LONG
ResultQ      QUEUE           !Queue to hold return from OLEDIRECTORY
Name         CSTRING(64)
CLSID        CSTRING(64)

```

```

ProgID      CSTRING(64)
END
MainWin WINDOW('OLE Demo'),AT(.,350,200),STATUS(-1,-1),SYSTEM,GRAY,RESIZE,MAX,TIMER(1)
MENUBAR
  MENU('&File')
    ITEM('e&xit'),USE(?exit)
  END
  MENU('&Objects')
    ITEM('Create Object'),USE(?CreateObject)
    ITEM('Paste Object'),USE(?PasteObject)
    ITEM('PasteLink Object'),USE(?PasteLinkObject)
    ITEM('Save Object to BLOB'),USE(?SaveObjectBlob),DISABLE
    ITEM('Save Object to OLE File'),USE(?SaveObjectFile),DISABLE
    ITEM('Retrieve Saved Object'),USE(?GetObject),DISABLE
  END
  MENU('&Activate')
    ITEM('&Spreadsheet'),USE(?ActiveExcel)
    ITEM('&Any OLE Object'),USE(?ActiveOLE),DISABLE
  END
END
OLE,AT(5,10,160,100),COLOR(0808000H),USE(?ExcelObject)
MENUBAR
  MENU('&Clarion App')
    ITEM('&Deactivate Excel'),USE(?DeactExcel)
  END
END
OLE,AT(170,10,160,100),USE(?AnyOLEObject),AUTOSIZE
MENUBAR
  MENU('&Clarion App')
    ITEM('&Deactivate Object'),USE(?DeactOLE)
  END
END
END
CODE
OPEN(SaveLinks)
IF ERRORCODE()                                !Check for error on Open
  IF ERRORCODE() = NoFileErr                  ! if the file doesn't exist
    CREATE(SaveLinks)                         ! then create it
    IF ERRORCODE() THEN HALT(,ERROR()).
    OPEN(SaveLinks)                           ! then open it for use
    IF ERRORCODE() THEN HALT(,ERROR()).
  ELSE
    HALT(,ERROR())
  END
END
OPEN(MainWin)
?ExcelObject{PROP:Create} = 'Excel.Sheet.5'   !Create an Excel spreadsheet object
DO BuildSheetData                             ! populate it with some random data
IF RECORDS(SaveLinks)                         !Check for existing saved record
  SET(SaveLinks)                              ! and get it
  NEXT(SaveLinks)
  POST(EVENT:Accepted,?GetObject)             ! and display it
DO MenuEnable
ELSE
  ADD(SaveLinks)                              ! or add blank record
END
IF ERRORCODE() THEN HALT(,ERROR()).

```

```

ACCEPT
CASE EVENT()
OF EVENT:CloseWindow
    ?ExcelObject{PROP:Deactivate}                !Deactivate the OLE Server applications
    ?AnyOLEObject{PROP:Deactivate}
OF EVENT:Timer
    IF CLIPBOARD()
        IF ?AnyOLEObject{PROP:CanPaste}          !Can Paste object from the clipboard?
            IF ?PasteObject{PROP:Disable} THEN ENABLE(?PasteObject).
        ELSIF NOT ?PasteObject{PROP:Disable}
            DISABLE(?PasteObject)
        END
        IF ?AnyOLEObject{PROP:CanPasteLink}        !Can PasteLink object from clipboard?
            IF ?PasteLinkObject{PROP:Disable} THEN ENABLE(?PasteLinkObject).
        ELSIF NOT ?PasteLinkObject{PROP:Disable}
            DISABLE(?PasteLinkObject)
        END
    END
END
OF EVENT:Accepted
CASE FIELD()
OF ?Exit
    POST(EVENT:CloseWindow)
OF ?CreateObject
    OLEDIRECTORY(ResultQ,0)                        !Get a list of installed OLE Servers
    ?AnyOLEObject{PROP:Create} = SelectOLEServer(ResultQ) !Let the user pick one
    ?AnyOLEObject{PROP:DoVerb} = 0                !Activate OLE Server in its default mode
    DO MenuEnable
OF ?PasteObject
    ?AnyOLEObject{PROP:Paste}                    !Paste the object
    SETCLIPBOARD('Paste Completed')              !Assign non-object text to clipboard
    DO MenuEnable
OF ?PasteLinkObject
    ?AnyOLEObject{PROP:PasteLink}                !PasteLink the object
    SETCLIPBOARD('PasteLink Completed')           !Assign non-object text to clipboard
    DO MenuEnable
OF ?SaveObjectBlob
    SAV:Object{PROP:Handle} = ?AnyOLEObject{PROP:Blob} !Save object to BLOB
    SAV:LinkType = 'B'
    PUT(SaveLinks)
    IF ERRORCODE() THEN STOP(ERROR()).
OF ?SaveObjectFile
    ?AnyOLEObject{PROP:SaveAs} = 'TEST1.OLE\!Object' !Save to OLE Compound Storage file
    SAV:LinkFile = 'TEST1.OLE\!Object'
    SAV:LinkType = 'F'
    PUT(SaveLinks)
    IF ERRORCODE() THEN STOP(ERROR()).
OF ?GetObject
    IF SAV:LinkType = 'F'                        !Saved to OLE Compound Storage file?
        ?AnyOLEObject{PROP:Open} = SAV:LinkFile
    ELSIF SAV:LinkType = 'B'                      !Saved to BLOB?
        ?AnyOLEObject{PROP:Blob} = SAV:Object{PROP:Handle}
    END
    DISPLAY
OF ?ActiveExcel
    ?ExcelObject{PROP:DoVerb} = 0                !In-place activate Excel
OF ?ActiveOLE
    ?AnyOLEObject{PROP:DoVerb} = 0                !Activate OLE Server in its default mode
OF ?DeactExcel
    ?ExcelObject{PROP:Deactivate}                !Return to the Clarion application
OF ?DeactOLE

```

```

        ?AnyOLEObject{PROP:Deactivate}           !Return to the Clarion application
    END
END
END

BuildSheetData  ROUTINE                          !Use OLE Automation to build spreadsheet
?ExcelObject{PROP:ReportException} = TRUE        !Excel will report any errors
?ExcelObject{Application.Calculation} = xlManual  !turn off auto recalc
LOOP i = 1 TO 3                                  !Fill Sheet with some values
    LOOP j = 1 TO 3
        ?ExcelObject{'Cells(' & i & ', ' & j & ').Value'} = Random(100,900)
    END
    ?ExcelObject{'Cells(4,' & i & ').Value'} = 'Sum'
    ?ExcelObject{'Cells(5,' & i & ').FormulaR1C1'} = '=SUM(R[-4]C:R[-2]C)'
    ?ExcelObject{'Cells(6,' & i & ').Value'} = 'Average'
    ?ExcelObject{'Cells(7,' & i & ').FormulaR1C1'} = '=AVERAGE(R[-6]C:R[-4]C)'
END
?ExcelObject{Application.Calculation} = xlAutomatic !turn auto recalc back on
DISPLAY

MenuEnable      ROUTINE                          !Enable menu items
ENABLE(?ActiveOLE)
ENABLE(?SaveObjectBlob,?GetObject)

SelectOleServer PROCEDURE(OLEQ PickQ)
window WINDOW('Choose OLE Server'),AT(,,122,159),CENTER,SYSTEM,GRAY
    LIST,AT(11,8,100,120),USE(?List),HVSCROLL, |
        FORMAT('146L~Name~@s64@135L~CLSID~@s64@20L~ProgID~@s64@'),FROM(PickQ)
    BUTTON('Select'),AT(42,134),USE(?Select)
END

CODE
OPEN(window)
SELECT(?List,1)
ACCEPT
CASE ACCEPTED()
OF ?Select
    GET(PickQ,CHOICE(?List))
    IF ERRORCODE() THEN STOP(ERROR()).
    POST(EVENT:CloseWindow)
END
END
RETURN(PickQ.ProgID)

```

## **Interface Properties**

**PROP:Object** Gets the Dispatch interface for the object. (READ ONLY)

In VB the toolbar and tree control use the image-list control to show icons in the tree control and on the buttons on the toolbar. To associate an image control with a toolbar, use the following code:

```
?toolbar{'ImageList'} = ?imagelist{prop:object}
```

**PROP>SelectInterface** Selects the interface to use with the object. (WRITE ONLY)

```
?x{PROP>SelectInterface} = 'x.y'
?x{'z(1)'} = 1
?x{'z(2)'} = 2
```

has the same meaning as

```
?x{'x.y.z(1)'} = 1
?x{'x.y.z(2)'} = 2
```

**PROP:AddRef** Increments the reference count for an interface. (WRITE ONLY)

**PROP:Release** Decrements the reference count for an interface. (WRITE ONLY)

## **Clarion OLE/OCX library and object hierarchies:**

At the time of the design and implementation of the Clarion OLE library, the lack of access to secondary objects created by a primary object (example from excel: ExcelUse{'Application.Charts.Add'}), was not considered a problem as there were other ways of accessing the object(ExcelUse {'Application.Charts(Chart1).ChartWizard(' &?ex{'Range(A5:C5)'}&','&xl3DPie&','7,1,0,0,2,,,')})

At the time there was only one known instance where this was not the case. This is probably still true today as the OLE standard states that an object implement a collection, must also implement a method for accessing the objects by indexing.

Due to the special case mentioned above, when an object was created by one control and passed onto an other object as a parameter, a method which would be more or less transparent to the user, was implemented.

Calling a method which returns an IDispatchInterface is converted into a special representation (a '"' followed by a number of digits). This special representation is recognized in a couple of places in the OLE library.

The place that you will find most useful is, when the special representation is in the place where an interface could occur in the property syntax it will replace any previous interface in the access of the properties or methods of the object. For example:

```
x=y{'charts.add()'}  
y{x&'p(7)'}
```

where y is an ole object and x is a cstring. This is an example of a method returning an interface and later this interface is used to access a method p with the parameter 7.

In this context a further complication arises from the reference counting used in OLE. Which means that if the object are used more than once it must have it's reference count increased before use.

```
x=y{'charts.add()'}  
y{PROP:AddRef}=x  
y{x&'p(7)'}  
y{x&'p(7)'} ;last use of x
```

## OLEDIRECTORY (get list of installed OLE/OCX)

**OLEDIRECTORY**( *list* , *flag* [, *bits* ] )

### OLEDIRECTORY

Gets a list of all installed OLE servers or OCX controls.

*list*                      The label of the QUEUE structure to receive the list.

*flag*                      An integer constant or variable that determines whether to get a list of OLE servers (*flag* = 0) or OCX controls (*flag* = 1).

*bits*                      An integer constant or variable that determines whether to get a list of 16-bit or 32-bit OCX controls. If one (1), it returns 16-bit OCX controls. If two (2), it returns 32-bit OCX controls. If three (3), it returns both 16-bit and 32-bit OCX controls. If omitted or zero, 16-bit programs return 16-bit OCX controls and 32-bit programs return 32-bit OCX controls.

**OLEDIRECTORY** gets a list of all installed OLE servers or OCX controls and places it in the *list* QUEUE. The *list* QUEUE must be declared with the same structure as the OleQ QUEUE declaration in EQUATES.CLW:

```
OleQ      QUEUE,TYPE
Name      CSTRING(64)      !Name of the OLE Server application
CLSID     CSTRING(64)      !Unique identifier for the operating system
ProgID    CSTRING(64)      !Registry name, such as: Excel.Sheet.5
END
```

Example:

```
ResultQ QUEUE(OleQ).      !Declare ResultQ the same as OleQ QUEUE in EQUATES.CLW
CODE
  OLEDIRECTORY(ResultQ,0)  !Get list of installed OLE Servers & put it in ResultQ
  ?OleControl{PROP:Create} = SelectOleServer(ResultQ)  ! then let the user pick one

SelectOleServer PROCEDURE(OleQ PickQ)      !User's OLE Server choice
procedure
window WINDOW('Choose OLE Server'),AT(.,122,159),CENTER,SYSTEM,GRAY
  LIST,AT(11,8,100,120),USE(?List),HVSCROLL, |
    FORMAT('146L~Name~@s64@135L~CLSID~@s64@20L~ProgID~@s64@'),FROM(PickQ)
  BUTTON('Select'),AT(42,134),USE(?Select)
END
CODE
OPEN(window)
SELECT(?List,1)
ACCEPT
CASE ACCEPTED()
OF ?Select
  GET(PickQ,CHOICE(?List))
  IF ERRORCODE() THEN STOP(ERROR()).
  POST(EVENT:CloseWindow)
..
RETURN(PickQ.ProgID)
```



# OLE (.OCX) Custom Controls

## Overview

---

OLE custom controls commonly have the .OCX file extension. Therefore, they are commonly referred to as .OCX controls. .OCX controls are similar to .VBX controls in that they are self-contained and designed to perform a specific task when used in a program. However, .OCX controls do not have the limitations that .VBX controls have, since .OCX controls are built to Microsoft's OLE 2 specification, which was designed with cross-language compatibility in mind (to languages other than just Visual Basic).

## .OCX Control Properties

---

PROP:Create	The CREATE attribute (blank if none). (WRITE ONLY)
PROP:DesignMode	Is the .OCX control in the container in design-mode (does it have a size border around it)? (WRITE ONLY)
PROP:Ctrl	Is this an .OCX control?(READ ONLY)
PROP:GrabHandles	Makes the .OCX control show grab handles. (WRITE ONLY)
PROP:OLE	Is there an OCX or OLE object in the container? (READ ONLY)
PROP:IsRadio	Is this an OCX radio button? (READ ONLY)
PROP:LastEventName	Gets the name of the last event sent to an .OCX control. (READ ONLY)
PROP:SaveAs	Saves the object to an OLE Compound Storage file. (WRITE ONLY)
	The syntax for placing the object in the file is <i>'filename\!component'</i> For example:
	<code>?controlx{PROP:SaveAs} = 'myfile\!objectx'</code>
PROP:ReportException	Report OLE exceptions (for debug). (WRITE ONLY)
PROP:DoVerb	Executes an OLE doverb command from the following set of commands (WRITE ONLY):
	DOVERB:Primary (0)
	Calls the object's primary action. The object, not the container, determines this action. If the object supports in-place activation, the primary verb usually activates the object in-place.

**DOVERB:Show (-1)**

Tells the object to show itself for editing or viewing. Called to display newly inserted objects for initial editing and to show link sources. This is usually an alias for some other object-defined action.

**DOVERB:Open (-2)**

Tells the object to open itself for editing in a separate window from its container (this includes objects that support in-place activation). If the object does not support in-place activation, this has the same action as **DOVERB:Show**.

**DOVERB:Hide (-3)**

Tells the object to remove its user interface. This applies only to objects activated in-place.

**DOVERB:UIActivate (-4)**

Activates the object in-place, along with its full set of user-interface tools, including menus, toolbars, and its name in the title bar of the container window.

**DOVERB:InPlaceActivate (-5)**

Activates the object in-place without displaying tools (menus and toolbars) that end-users need to change the behavior or appearance of the object.

**DOVERB:DiscardUndoState (-6)**

Tells the object to discard any undo state that it may be maintaining without deactivating the object.

**DOVERB:Properties (-7)**

Invokes the modal system property browser for the object to allow the user to set its properties.

**PROP:Language**

The number for the language used for OLE Automation or OCX Method. The number for US English is 0409H, and other language numbers can be computed from the data in the WINNT.H file in the MS Windows SDK. (READ/WRITE)

## Callback Functions

---

Callback functions are a standard part of Windows programming in most programming languages. A callback function is a **PROCEDURE** that you (the programmer) write to handle specific situations that the operating system deems the programmer may need to deal with. A callback function is called by the operating system whenever it needs to pass on these situations. Therefore, a callback function does not appear to be part of the logic flow, but instead appears to be separate and “magic” without any logical connection to other procedures in your program.

The Clarion for Windows language does not force you to write your own callback functions for all the common tasks that other programming languages require you to, since the Clarion runtime library and the ACCEPT loop handles most of that for you. However, since .OCX controls are written in other languages that do require callback functions, you will need to write your own to deal with the events and other programming issues for the .OCX controls you use in Clarion programs. Since CLASS methods have an implicit first parameter of the class name, they cannot be used as callbacks.

There are three callback functions you can write for your .OCX controls: an event processor, a property edit controller, and a property change handler. You may name these whatever you want, but they have specific requirements for the parameters that they receive.

### **OCX Event Processor Callback Function**

The prototype for the event processor must be:

```
OcxEventFuncName  PROCEDURE(*SHORT,SIGNED,LONG),LONG
```

The parameters it receives from the operating system are:

*SHORT	A Reference parameter to pass onto the following other OCX library procedures: OCXGETPARAM, OCXGETPARAMCOUNT, and OCXSETPARAM as their first parameter.
SIGNED	The field number for the control. This is the same number that is represented by the control's field equate label.
LONG	The number of the .OCX event. Equates for some pre-defined event numbers are contained in the OCXEVENT.CLW file.

The LONG return value indicates to the operating system whether any further processing is necessary. Returning zero (0) indicates some further processing is necessary (like updating a USE variable or unchecking a radio button), while returning any other value indicates processing is complete.

Processing the events generated by an .OCX control must occur quickly, since some events have critical timing. Therefore, there should be no user interaction possible within this procedure (such as WINDOWs, ASK statements, or MESSAGE procedures). The code should process only what it needs to, just as quickly as possible (usually, this means eliminating all mouse events).

## **OCX Property Edit Controller Callback Function**

The prototype for the property edit controller must be:

```
OcxPropEditFuncName    PROCEDURE(SIGNED,STRING),LONG
```

The parameters it receives from the operating system are:

**SIGNED**                      The field number for the control. This is the same as the number represented by the control's field equate label.

**STRING**                      The name of the property about to be edited.

The **LONG** return value indicates to the operating system whether permission to edit the property has been granted by the callback function. If the procedure returns zero (0), then permission is denied and the user is not allowed to edit the property. If the procedure returns any value other than zero (0), then permission is granted and the user is allowed to edit the property.

## **OCX Property Change Callback Function**

The prototype for the property change handler must be:

```
OcxPropChangeProcName  PROCEDURE(SIGNED,STRING)
```

The parameters it receives from the operating system are:

**SIGNED**                      The field number for the control. This is the same as the number represented by the control's field equate label.

**STRING**                      The name of the changed property.

This procedure is called when a property has been changed.

Example:

```
! This program uses the Calendar OCX that Microsoft ships with its Access95
! product (specifically, the one in MS Office Professional for Windows 95).
PROGRAM
MAP
    INCLUDE('OCX.CLW')
EventFunc    PROCEDURE(*SHORT Reference,SIGNED OleControl,LONG CurrentEvent),LONG
PropChange   PROCEDURE(SIGNED OleControl,STRING CurrentProp)
PropEdit     PROCEDURE(SIGNED OleControl,STRING CurrentProp),LONG
END
    INCLUDE('OCXEVENT.CLW')          !Constants that OCX events use
    INCLUDE('ERRORS.CLW')            !Include errorcode constants

GlobalQue QUEUE                        !Event and change display queue
F1           STRING(255)
END
```

```

SaveDate  FILE,DRIVER('TopSpeed'),PRE(SAV),CREATE
Record    RECORD
DateField STRING(10)
          END
          END

MainWin WINDOW('OCX Demo'),AT(,350,200),STATUS(-1,-1),SYSTEM,GRAY,MAX,RESIZE
MENUBAR
  MENU('&File')
    ITEM('Save Date to File'),USE(?SaveObjectValue)
    ITEM('Retrieve Saved Date'),USE(?GetObject)
    ITEM('E&xit'),USE(?exit)
  END
  MENU('&Object')
    ITEM('About Box'),USE(?AboutObject)
    ITEM('Set Date to TODAY'),USE(?SetObjectValueToday)
    ITEM('Set Date to 1st of Month'),USE(?SetObjectValueFirst)
  END
  ITEM('&Properties!'),USE(?ActiveObj)
END
LIST,AT(237,6,100,100),USE(?List1),HVSCROLL,FROM(GlobalQue)
OLE,AT(5,10,200,150),USE(?OcxObject)
END
END

CODE
OPEN(SaveDate)
IF ERRORCODE()                                !Check for error on Open
  IF ERRORCODE() = NoFileErr                    ! if the file doesn't exist
    CREATE(SaveDate)                           ! create it
    IF ERRORCODE() THEN HALT(,ERROR()).
    OPEN(SaveDate)                             ! then open it for use
    IF ERRORCODE() THEN HALT(,ERROR()).
  ELSE
    HALT(,ERROR())
  END
END
OPEN(MainWin)
?OcxObject{PROP:Create} = 'MSACAL.MSACALCtrl.7' !MS Access 95 Calendar OCX control
IF RECORDS(SaveDate)                                !Check for existing saved record
  SET(SaveDate)                                     ! and get it
  NEXT(SaveDate)
  IF ERRORCODE() THEN STOP(ERROR()).
  POST(EVENT:Accepted,?GetObject)
ELSE
  ADD(SaveDate)                                     ! or add one
  IF ERRORCODE() THEN STOP(ERROR()).
END
IF ?OcxObject{PROP:OLE}                                !Check for an OLE Object
  GlobalQue = 'An Object is in the OLE control'
  ADD(GlobalQue)
  IF ?OcxObject{PROP:Ctrl}                                !See if Object is an OCX
    GlobalQue = 'It is an OCX Object'
    ADD(GlobalQue)
  END
END
DISPLAY
OCXREGISTEREVENTPROC(?OcxObject,EventFunc)          !Register Event processing Callback
OCXREGISTERPROPCHANGE(?OcxObject,PropChange)        !Register Property Change Callback
OCXREGISTERPROPEdit(?OcxObject,PropEdit)            !Register Property Edit Callback

```

```

?OcxObject{PROP:ReportException} = 1           !Enable the OCX's error reporting
ACCEPT
CASE EVENT()
OF EVENT:Accepted
CASE FIELD()
OF ?Exit
POST(EVENT:CloseWindow)
OF ?AboutObject
?OcxObject{'AboutBox'}           !Display control's About Box
OF ?SetObjectValueToday
?OcxObject{'Value'} = FORMAT(TODAY(),@D1) !Set control to TODAY's date
OF ?SetObjectValueFirst
?OcxObject{'Value'} = MONTH(TODAY()) & '/1/' & SUB(YEAR(TODAY()),3,2)
OF ?SaveObjectValue           !Save control's value to file
SAV:DateField = ?OcxObject{'Value'}
PUT(SaveDate)
IF ERRORCODE() THEN STOP(ERROR()).
OF ?GetObject           !Set control's value from file
?OcxObject{'Value'} = SAV:DateField
OF ?ActiveObj
?OcxObject{PROP:DoVerb} = 0       !Activate control's property dialog
END
END
END

EventFunc  PROCEDURE(*SHORT Reference,SIGNED OleControl,LONG CurrentEvent)
Count      LONG           !Event processing callback function
Res        CSTRING(200)
Parm       CSTRING(30)
CODE
IF CurrentEvent <> OCXEVENT:MouseMove           !Eliminate mouse move events
Res = 'Event: ' & OleControl{PROP:LastEventName}
LOOP Count = 1 TO OCXGETPARAMCOUNT(Reference) !Cycle through all parameters
  Parm = OCXGETPARAM(Reference,Count)           ! getting each parameter name
  Res = CLIP(Res) & ' - ' & Parm                 ! and concatenate them together
END
GlobalQue = Res           !Assign to a global QUEUE
ADD(GlobalQue)           ! and add the entry
DISPLAY
END
RETURN(True)

PropChange PROCEDURE(SIGNED OleControl,STRING CurrentProp) !Change property callback
CODE
GlobalQue = 'PropChange: ' & CurrentProp & ' = ' & OleControl{CurrentProp}
!Assign to a global QUEUE
ADD(GlobalQue)           ! add the entry for display
IF ERRORCODE() THEN STOP(ERROR()).

PropEdit   PROCEDURE(SIGNED OleControl,STRING CurrentProp) !Edit property callback
CODE
IF MESSAGE('Allow?','Change',ICON:Question,BUTTON:Yes+BUTTON:No,BUTTON:Yes,1) |
  = BUTTON:Yes           !Ask permission to change value
RETURN(1)                 !Allow the change
ELSE
RETURN(0)                 !Dis-allow the change
END

```

## Calling OLE Object Methods

Both OLE Automation to an OLE Server application and OCX/ActiveX objects publish methods (procedures) that you can call to have the object perform specified actions. Since OCXs are the OLE successors to VBX controls, most OCX vendors provide their example code using Visual Basic (VB) syntax. Those that can be used in C++ programs usually also have C++ code examples.

Translating these examples to the relevant Clarion code usually requires some knowledge of VB or C++. This section demonstrates the most common types of method calls in VB examples and how they translate to Clarion.

### Method Syntax Overview

---

To call any OLE/OCX method, you use Clarion's Property Syntax. You specify the control to which the method or property belongs as the field equate label of the OLE control, then write the method call in a string constant inside the curly braces ({ }).

The example code supplied with most OLE controls uses the VB/C++ "dot property" syntax to specify the name of the control and the method to call or the property to set. For example, the following VB code:

```
ControlName.AboutBox
```

translates to Clarion as:

```
?01e{'AboutBox'}
```

This code displays the "About" dialog for the *ControlName* control. You might also see this example's VB code as:

```
Form1.ControlName.AboutBox
```

This form simply specifies the dialog containing the *ControlName* object. The Clarion translation for this is still the same.

The OLE/OCX object is always referenced in Clarion code by the field equate label of the Clarion OLE control, no matter what the name of the control is in VB, because the object's registered name is specified in the CREATE or OPEN attribute of the OLE control. Therefore, the Clarion runtime library only needs to know the field equate label to know exactly which object is being referenced.

### Translating VB's "With" Syntax

Many OLE/OCX code examples use the VB *With ... End With* structure to associate multiple property assignments and/or method calls with a single object. In this case, the object is named in the *With* statement and all the property assignments and method calls within the structure begin with the

dot separator, then the name of the property to set or method to call. For example, the following VB code:

```
With Form1.VtChart1
    'displays a 3d chart with 8 columns and 8 rows data
    .chartType = VtChChartType3dBar
    .columnCount = 8
    .rowCount = 8
    For column = 1 To 8
        For row = 1 To 8
            .column = column
            .row = row
            .Data = row * 10
        Next row
    Next column
    'use the chart as the backdrop of the legend
    .ShowLegend = True
End With
```

translates to Clarion as:

```
!           displays a 3d chart with 8 columns and 8 rows data
?01e{'chartType'} = VtChChartType3dBar
?01e{'columnCount'} = 8
?01e{'rowCount'} = 8
LOOP column# = 1 TO 8
    LOOP row# = 1 TO 8
        ?01e{'column'} = column#
        ?01e{'row'} = row#
        ?01e{'Data'} = row# * 10
    END
END
!           use the chart as the backdrop of the legend
?01e{'ShowLegend'} = True
```

Since Clarion has no direct equivalent to the VB *With ... End With* structure, you just explicitly name the OLE control's field equate label on each property assignment or method call. The single quote (') in VB code indicates a comment.

VB allows nesting these *With ... End With* structures, so you may need to "travel" back to find the object's name. This example demonstrates nested VB *With* structures:

```
With MyObject
    .Height = 100           ' Same as MyObject.Height = 100.
    .Caption = "Hello World" ' Same as MyObject.Caption = "Hello World".
    With .Font
        .Color = Red       ' Same as MyObject.Font.Color = Red.
        .Bold = True       ' Same as MyObject.Font.Bold = True.
    End With
End With
```

which translates to Clarion as:

```
?01e{'Height'} = 100           ! MyObject.Height = 100
?01e{'Caption'} = 'Hello World' ! MyObject.Caption = "Hello World"
?01e{'Font.Color'} = Red       ! MyObject.Font.Color = Red
?01e{'Font.Bold'} = True      ! MyObject.Font.Bold = True
```



## Parameter Passing to OLE/OCX Methods

Just as in Clarion, there are two ways to pass parameters in VB: by value, or by address (by reference). The VB keywords *ByVal* and *ByRef* specify these two methods in VB code. These terms mean the same thing in VB as in Clarion—passing a parameter by value passes a copy of the contents of the variable, while passing a parameter by reference (VB's default) passes the address of the variable itself so the receiving method can modify its contents.

### Using Parentheses

VB syntax can either use parentheses surrounding the parameter list or not. If the VB method does not return a value, or you don't care about the returned value, the parameters are passed in VB without parentheses, like this:

```
VtChart1.InsertColumns 6,3
```

If you do want the returned value, then the parameters are passed in VB within parentheses, like this:

```
ReturnValue = VtChart1.InsertColumns (6,3)
```

In Clarion syntax, parameters are always passed within parentheses. Therefore, these two examples translate to:

```
?01e{'InsertColumns(6,3)'}
ReturnValue = ?01e{'InsertColumns(6,3)'}
```

### Passing Parameters By Value

Value parameters are passed to OLE/OCX objects as strings (except Boolean parameters). Since OLE/OCX objects are supposed to cast their input to the correct data types using a VARIANT mechanism (similar to Clarion's data type conversion), this allows the most compatibility with the least work. Any string which requires a double quote mark (") needs to include two ("").

Value parameters may be passed to OLE/OCX object methods as constants or variables. The examples above pass parameters as constants. You may not have blank spaces in the constant unless the parameter is contained in double quotes (for example, "Value with blanks").

There are two ways to pass a Clarion variable to an OLE/OCX method by value: concatenated into the string constant that calls the method, or by using BIND on the variable name and placing the name of the variable directly in the string constant that calls the method. For example, to re-write the above example passing the variable values in a concatenated string:

```
ColumnNumber = 6
NumberOfColumns = 3
?01e{'InsertColumns(' & ColumnNumber & ',' & NumberOfColumns & ')'}
!Same as ?01e{'InsertColumns(6,3)'}
```

The second way to pass variables by value is to BIND them and name them in the string constant, like this:

```

BIND('ColumnNumber',ColumnNumber)
BIND('NumberOfColumns',NumberOfColumns)
?01e{'InsertColumns(ColumnNumber,NumberOfColumns)'}
!Same as ?01e{'InsertColumns(6,3)'}

```

This method makes the code more easily readable, but you must first BIND the variables to pass.

## **Passing Parameters By Address (Reference)**

Parameters passed by address may be passed to OLE/OCX object methods only as named variables in the constant string. Therefore, you must use BIND on the variable name and place the name of the variable directly in the string constant that calls the method with an ampersand prepended to the variable name to signal that the variable is being passed by reference. For example, to re-write the above example to pass the variables by address:

```

ColumnNumber = 6
NumberOfColumns = 3
BIND('ColumnNumber',ColumnNumber)
BIND('NumberOfColumns',NumberOfColumns)
?01e{'InsertColumns(&ColumnNumber,&NumberOfColumns)'}

```

Parameters passed by address are passed to OLE/OCX objects as the data type of the bound variable (except Boolean parameters). The variables are actually passed as temporary string variables which the Clarion library automatically dereferences so that any modifications to the passed variable by the OLE/OCX method are carried back to the original variable passed.

## **Boolean Parameters**

Boolean parameters (1/0 or True/False) are passed either by value or by address. When passing by value, you may either pass a constant (a 1 or 0, or the words TRUE or FALSE), like this:

```

?01e{'ODBCConnect(&DataSource,1,&RetVal)'}
?01e{'ODBCConnect(&DataSource,TRUE,&RetVal)'}

```

or pass a variable name (after BINDing it) within a “bool()” call , like this:

```

BoolParm = 1
BIND('BoolParm',BoolParm)
?01e{'ODBCConnect(&DataSource,bool(BoolParm),&RetVal)'}

```

Bool() is a construct that tells the property expression parser to pass it as a Boolean value. Bool() is only valid within an OLE/OCX method call string.

To pass by reference, simply prepend an ampersand to the variable name within the bool() construct, like this:

```

BIND('BoolParm',BoolParm)
?01e{'ODBCConnect(&DataSource,bool(&BoolParm),&RetVal)'}

```

## **Named Parameters**

In VB, there are two ways to pass parameters: positionally, or as “named arguments.” Positional parameters imply that you must either pass a parameter or place a comma place-holder for any omitted parameters in the method call. Since some methods can receive a large number of parameters, this can result in a long string of comma place-holders when you simply want to pass one or two parameters to the method. VB solves this problem by allowing programmers to “name” the parameters, which allows the programmer calling the method to only pass the few parameters they choose to without regard to their position or order within the parameter list.

Named parameters are not universally supported in VB, so the OLE/OCX vendor needs to have written their methods specifically to support them. The OLE/OCX help file should state whether named parameters are supported, or you can use VB’s Object Browser to determine whether they are supported and the parameter names to use.

The VB syntax for named parameters uses `:=` to assign the value to the parameter’s name. For example, for the following VB statement:

```
OpenIt(Name:=, [Exclusive]:=, [ReadOnly]:=, [Connect]:=)
```

you can call the method in VB using positional parameters, like this:

```
Db = OpenIt("MyFile",False,False,"ODBC;UID=Fred")
```

which translates to Clarion (using positional parameters) as:

```
Db = ?Ole{'OpenIt("MyFile",False,False,"ODBC;UID=Fred")'}
```

You can call the same method in VB using named parameters, like this (the underscore character is VB’s line continuation character):

```
Db = OpenIt(Name:="MyFile",Exclusive:=False,ReadOnly:=False, _  
Connect:="ODBC;UID=Fred")
```

which translates to Clarion as:

```
Db = ?Ole{'OpenIt(Name="MyFile",Exclusive=False,ReadOnly=False, ' & |  
'Connect="ODBC;UID=Fred")'}
```

or you can pass the parameters in VB in a different order:

```
Db = OpenIt(Connect:="ODBC;UID=Fred", _  
Name:="MyFile", _  
ReadOnly:=False, _  
Exclusive:=False)
```

which translates to Clarion as:

```
Db = ?Ole{'OpenIt(Connect="ODBC;UID=Fred",Name="MyFile",' & |  
'Exclusive=False,ReadOnly=False')'}
```

## OCX Library Procedures

### OCXREGISTERPROEDIT (install property edit callback)

---

**OCXREGISTERPROEDIT**( *control* , *procedure* )

#### **OCXREGISTERPROEDIT**

Installs a property edit callback function.

*control*                      An integer expression containing the field number or field equate label of the OLE control to affect.

*procedure*                  The label of the property edit callback function for the *control*.

**OCXREGISTERPROEDIT** installs a property edit callback *procedure* for the *control*. The callback function *procedure* controls property edits to the *control* by allowing or disallowing them.

Example:

```
OCXREGISTERPROEDIT(?OLEControl,CallbackFunc)
```

See Also:                      Callback Functions

### OCXREGISTERPROPCHANGE (install property change callback)

---

**OCXREGISTERPROPCHANGE**( *control* , *procedure* )

#### **OCXREGISTERPROPCHANGE**

Installs a property change callback procedure.

*control*                      An integer expression containing the field number or field equate label of the OLE control to affect.

*procedure*                  The label of the property change callback procedure for the *control*.

**OCXREGISTERPROPCHANGE** installs a property change callback *procedure* for the *control*. The callback *procedure* is called when a property of the *control* has been changed.

Example:

```
OCXREGISTERPROPCHANGE(?OLEControl,CallbackProc)
```

See Also:                      Callback Functions

## OCXREGISTEREVENTPROC (install event processing callback)

---

**OCXREGISTEREVENTPROC**( *control* , *procedure* )

### **OCXREGISTEREVENTPROC**

Installs an OCX event callback procedure.

*control*                      An integer expression containing the field number or field equate label of the OLE control to affect.

*procedure*                  The label of the event processing callback procedure for the *control*.

**OCXREGISTEREVENTPROC** installs an OCX event callback *procedure* for the *control*. The callback *procedure* is called when any event is posted by the operating system for the *control*.

Example:

```
OCXREGISTEREVENTPROC(?01eControl,CallbackProc)
```

See Also:                      Callback Functions

## OCXUNREGISTERPROPEDIT (un-install property edit callback)

---

**OCXUNREGISTERPROPEDIT**( *control* )

### **OCXUNREGISTERPROPEDIT**

Un-installs a property edit callback procedure.

*control*                      An integer expression containing the field number or field equate label of the OLE control to affect.

**OCXUNREGISTERPROPEDIT** un-installs a property edit callback *procedure* for the *control*.

Example:

```
OCXUNREGISTERPROPEDIT(?01eControl)
```

See Also:                      Callback Functions

## OCXUNREGISTERPROPCHANGE (un-install prop change callback)

---

**OCXUNREGISTERPROPCHANGE**( *control* )

### **OCXUNREGISTERPROPCHANGE**

Un-installs a property change callback procedure.

*control*                      An integer expression containing the field number or field equate label of the OLE control to affect.

**OCXUNREGISTERPROPCHANGE** un-installs a property change callback *procedure* for the *control*.

Example:

```
OCXUNREGISTERPROPCHANGE(?01eControl)
```

See Also:                      Callback Functions

## OCXUNREGISTEREVENTPROC (un-install event process callback)

---

**OCXUNREGISTEREVENTPROC**( *control* )

### **OCXUNREGISTEREVENTPROC**

Un-installs an OCX event callback procedure.

*control*                      An integer expression containing the field number or field equate label of the OLE control to affect.

**OCXUNREGISTEREVENTPROC** un-installs an OCX event callback *procedure* for the *control*.

Example:

```
OCXUNREGISTEREVENTPROC(?01eControl)
```

See Also:                      Callback Functions

## OCXGETPARAMCOUNT (return number of parameters for current event)

**OCXGETPARAMCOUNT**( *reference* )

### OCXGETPARAMCOUNT

Returns the number of parameters associated with the current OCX event.

*reference*                      The label of the first parameter of the event processing callback procedure.

**OCXGETPARAMCOUNT** returns the number of parameters associated with the current .OCX event. This procedure is only valid when the .OCX event processing callback function is active.

Return Data Type:            USHORT

Example:

```
OEvent  PROCEDURE(Reference,OleControl,CurrentEvent)    !Event processing callback proc
Count   LONG
Res     CSTRING(200)
Parm    CSTRING(30)
CODE
IF CurrentEvent <> OCXEVENT:MouseMove                !Eliminate mouse move events
  Res = 'Control ' & OleControl & ' Event ' & OleControl{PROP:LastEventName} & ':'
  LOOP Count = 1 TO OCXGETPARAMCOUNT(Reference)    !Cycle through all parameters
    Parm = OCXGETPARAM(Reference,Count)              ! getting each parameter name
    Res = CLIP(Res) & ' ' & Parm                      ! and concatenate them together
  END
  GlobalQue = Res                                     !Assign to a global QUEUE
  ADD(GlobalQue)                                     ! add the entry for later display
END                                                  ! of all the OCX events and their
RETURN(True)                                         ! parameters
```

See Also:                      Callback Functions, OCXGETPARAM

## OCXGETPARAM (return current event parameter string)

**OCXGETPARAM**( *reference* , *number* )

**OCXGETPARAM** Returns the value of a parameter associated with the current OCX event.

*reference*                      The label of the first parameter of the event processing callback procedure.

*number*                        The number of the parameter to retrieve.

**OCXGETPARAM** returns the value of the *number* parameter associated with the current .OCX event. This procedure is only valid when the .OCX event processing callback function is active.

Return Data Type:        **STRING**

Example:

```
OEvent  PROCEDURE(Reference,OleControl,CurrentEvent)    !Event processing callback proc
Count   LONG
Res     CSTRING(200)
Parm    CSTRING(30)

CODE
IF CurrentEvent <> OCXEVENT:MouseMove                    !Eliminate mouse move events
  Res = 'Control ' & OleControl & ' Event ' & OleControl{PROP:LastEventName} & ':'
  LOOP Count = 1 TO OCXGETPARAMCOUNT(Reference)        !Cycle through all parameters
    Parm = OCXGETPARAM(Reference,Count)                  ! getting each parameter name
    Res = CLIP(Res) & ' ' & Parm                          ! and concatenate them together
  END
  GlobalQue = Res                                         !Assign to a global QUEUE
  ADD(GlobalQue)                                          ! add the entry for later display
END                                                       ! of all the OCX events and their
RETURN(True)                                             ! parameters
```

See Also:                      Callback Functions,OCXSETPARAM, OCXGETPARAMCOUNT



## OCXSETPARAM (set current event parameter string)

**OCXSETPARAM**( *reference* ,*number* ,*value* )

**OCXSETPARAM** Sets the value of a parameter associated with the current OCX event.

*reference*                      The label of the first parameter of the event processing callback procedure.

*number*                        The number of the parameter to set.

*value*                         A string constant or variable containing the value to set.

**OCXSETPARAM** sets the value of the *number* parameter associated with the current event. This is only allowed on parameters that are passed by address (see the OCX control's documentation for valid parameters to set). If the modification is not allowed it will be ignored. This procedure is only valid when the .OCX event processing callback function is active.

Example:

```
OEvent  PROCEDURE(Reference,OleControl,CurrentEvent)    !Event processing callback proc
Count   LONG
Res     CSTRING(200)
Parm    CSTRING(30)
CODE
IF CurrentEvent <> OCXEVENT:MouseMove                  !Eliminate mouse move events
  Res = 'Control ' & OleControl & ' Event ' & OleControl{PROP:LastEventName} & ':'
  LOOP Count = 1 TO OCXGETPARAMCOUNT(Reference)      !Cycle through all parameters
    Parm = OCXGETPARAM(Reference,Count)                ! getting each parameter name
    Res = CLIP(Res) & ' ' & Parm                        ! and concatenate them together
    OCXSETPARAM(Reference,1,'1')                      !Change the parameter's value
  END
  GlobalQue = Res                                       !Assign to a global QUEUE
  ADD(GlobalQue)                                       ! add the entry for later display
END                                                    ! of all the OCX events and their
RETURN(True)                                           ! parameters
```

See Also:                      Callback Functions, OCXGETPARAM

## OCXLOADIMAGE (return an image object)

---

**OCXLOADIMAGE**( *name* )

### **OCXLOADIMAGE**

Returns an image object.

*name*                      A string expression containing the name of the file or resource to load.

**OCXLOADIMAGE** returns an image object. This image object can be assigned to any control that uses an image object (such as a VB imagelist control).

Return Data Type:        **STRING**

Example:

```
?imagelist{ 'ListImages.Add(,, ' & OCXLOADIMAGE('CLOCK.BMP') & ' )' }  
!Add an image to an ImageList control
```

# APPENDIX B - EVENTS

## Events

In Clarion Windows programs, most of the messages from Windows are automatically handled internally by the ACCEPT event processor. These are the common events handled by the runtime library (screen re-draws, etc.). Only those events that actually may require program action are passed on by ACCEPT to your Clarion code. The net effect of this is to make your programming job easier by removing the low-level “drudgery” code from your program, allowing you to concentrate on the high-level aspects of programming, instead. Of course, it is also possible to handle these low-level messages yourself by “sub-classing” the window, but that is a low-level technique that should only be used if absolutely necessary. Consult Charles Petzold’s book *Programming Windows* published by Microsoft Press if you need more information on sub-classing.

There are two types of events passed on to the program by ACCEPT: **Field-specific** and **Field-independent** events. The following lists are the event EQUATES that are contained in EQUATES.CLW.

## Field-Independent Events

---

A **Field-independent** event does not relate to any one control but requires some program action (for example, to close a window, quit the program, or change execution threads). Most of these events cause the system to become modal for the period during which they are processing, since they require a response before the program may continue.

### EVENT:AlertKey

The user pressed an ALRT attribute (or ALERT statement) hot key for an ALRT attribute on the window. This is the event on which you perform the action the user has requested by pressing the alert key.

### EVENT:BuildDone

The BUILD or PACK statement has completed re-building the keys. This is the event on which you perform any build cleanup code. If the user cancelled the BUILD, ERRORCODE 93 is set.

### EVENT:BuildFile

The BUILD or PACK statement is re-building the file. This is the event on which you inform your user of the progress of the build.

### EVENT:BuildKey

The BUILD or PACK statement is re-building the key. This is the event on which you inform your user of the progress of the build.

**EVENT:CloseDown**

The application is closing. POSTing this event closes the application. This is the event on which you perform any application cleanup code.

**EVENT:CloseWindow**

The window is closing. POSTing this event closes the window. This is the event on which you perform any window cleanup code.

**EVENT:Completed**

AcceptAll (non-stop) mode has finished processing all the window's controls. This is the event on which you have executed all data entry validation code for the controls in the window and can safely write to disk.

**EVENT:DDEadvise**

A client has requested continuous updates of a data item from this Clarion DDE server application. This is the event on which you execute DDEWRITE to provide the data to the client every time it changes.

**EVENT:DDEclosed**

A DDE server has terminated the DDE link to this Clarion client application.

**EVENT:DDEdata**

A DDE server has supplied an updated data item to this Clarion client application.

**EVENT:DDEexecute**

A client has sent a command to this Clarion DDE server application (if the client is another Clarion application, it has executed a DDEEXECUTE statement). This is the event on which you determine the action the client has requested and perform it, then execute a CYCLE statement to signal positive acknowledgement to the client that sent the command.

**EVENT:DDEpoke**

A client has sent unsolicited data to this Clarion DDE server application. This is the event on which you determine what the client has sent and where to place it, then execute a CYCLE statement to signal positive acknowledgement to the client that sent the data.

**EVENT:DDErequest**

A client has requested a data item from this Clarion DDE server application. This is the event on which you execute DDEWRITE to provide the data to the client once.

**EVENT:Docked**

A dockable toolbox window has been docked or its docked position has been changed.

**EVENT:Undocked**

A dockable toolbox window has been undocked.

**EVENT:GainFocus**

The window is gaining input focus from another thread. This is the event on which you restore any data you saved in EVENT:LoseFocus. The system is modal during this event.

**EVENT:Iconize**

The user is minimizing a window with the IMM attribute. If a CYCLE statement is encountered in the code to process this event, the EVENT:Iconized is not generated and the action is aborted. This is the event on which you can prevent users from minimizing a window. The system is modal during this event.

**EVENT:Iconized**

The user has minimized a window with the IMM attribute. This is the event on which you readjust anything that is screen-size-dependent.

**EVENT:LoseFocus**

The window is losing input focus to another thread. This is the event on which you save any data that could be at risk of being changed by another thread. The system is modal during this event.

**EVENT:Maximize**

The user is maximizing a window with the IMM attribute. If a CYCLE statement is encountered in the code to process this event, EVENT:Maximized is not generated and the action is aborted. This is the event on which you can prevent users from maximizing a window. The system is modal during this event.

**EVENT:Maximized**

The user has maximized a window with the IMM attribute. This is the event on which you readjust anything that is screen-size-dependent.

**EVENT:Move**

The user is moving a window with the IMM attribute. If a CYCLE statement is encountered in the code to process this event, EVENT:Moved is not generated and the action is aborted. This is the event on which you can prevent users from moving a window. The system is modal during this event.

**EVENT:Moved**

The user has moved a window with the IMM attribute. This is the event on which you readjust anything that is screen-position-dependent.

**EVENT:OpenWindow**

The window is opening. This is the event on which you perform any window initialization code.

**EVENT:PreAlertKey**

The user pressed an ALRT attribute (or ALERT statement) hot key for an ALRT attribute on the window. If a CYCLE statement executes in the code to process this event, the normal library action for the keystroke executes before EVENT:AlertKey generates. This event allows you to specify whether the normal library action for the keystroke executes or not, in addition to the code you place in EVENT:AlertKey. The system is modal during this event.

**EVENT:Restore**

The user is restoring the previous size of a window with the IMM attribute. If a CYCLE statement is encountered in the code to process this event, EVENT:Restored is not generated and the action is aborted. This is the event on which you can prevent users from restoring a window. The system is modal during this event.

**EVENT:Restored**

The user has restored the previous size of a window with the IMM attribute. This is the event on which you readjust anything that is screen-size-dependent.

**EVENT:Resume**

The window still has input focus and is regaining control from an EVENT:Suspend. The system is modal during this event.

**EVENT:Size**

The user is resizing a window with the IMM attribute. If a CYCLE statement is encountered in the code to process this event, EVENT:Sized is not generated and the action is aborted. This is the event on which you can prevent users from resizing a window. The system is modal during this event.

**EVENT:Sized**

The user has resized a window with the IMM attribute. This is the event on which you readjust anything that is screen-size-dependent.

**EVENT:Suspend**

The window still has input focus but is giving control to another thread to process timer events. The system is modal during this event.

**EVENT:Timer**

The TIMER attribute has triggered. This is the event on which you perform any timed actions, such as clock display, or background record processing for reports or batch processes.

## Field-Specific Events

---

A **Field-specific** event occurs when the user presses a key that may require the program to perform a specific action related to that control.

### **EVENT:Accepted**

The user has entered data or made a selection then pressed `TAB` or `CLICKED` the mouse to move on to another control. This is the event on which you should perform any data input validation code.

### **EVENT:AlertKey**

The user pressed an `ALRT` attribute hot key for an `ALRT` attribute on the control. This is the event on which you perform the action the user has requested by pressing the alert key.

### **EVENT:ColumnResize**

On a `LIST` control with an `M` in the `FORMAT` attribute string, the user has resized a column.

### **EVENT:Contracted**

On a `LIST` control with `T` in the `FORMAT` attribute string, the user has clicked on a tree expansion box.

### **EVENT:Contracting**

On a `LIST` control with `T` in the `FORMAT` attribute string, the user has clicked on a tree contraction box. If a `CYCLE` statement is encountered in the code to process this event, the `EVENT:Contracted` is not generated and the contraction is aborted. The system is modal during this event.

### **EVENT:Drag**

The user released the mouse button over a valid drop target. This event is posted to the control from which the user is dragging. This is the event on which you set the program to pass the dragged data to the drop target.

### **EVENT:Dragging**

The user is dragging the mouse from a control with the `DRAGID` attribute and the mouse cursor is over a valid potential drop target. This event is posted to the control from which the user is dragging. This is the event on which you can change the mouse cursor to indicate a valid drop target.

### **EVENT:Drop**

The user released the mouse button over a valid drop target. This event is posted to the drop target control. This is the event on which you receive the dragged data.

### **EVENT:DroppedDown**

On a `LIST` or `COMBO` control with the `DROP` attribute, the list has dropped. This is the event on which you can hide other controls that the droplist covers to prevent “screen clutter” from distracting the user.

**EVENT:DroppingDown**

On a LIST or COMBO control with the DROP attribute, the user pressed the down arrow button. This is the event on which you get the records when “demand-loading” the list.

**EVENT:Expanded**

On a LIST control with T in the FORMAT attribute string, the user has clicked on a tree expansion box.

**EVENT:Expanding**

On a LIST control with T in the FORMAT attribute string, the user has clicked on a tree expansion box. If a CYCLE statement is encountered in the code to process this event, the EVENT:Expanded is not generated and the expansion is aborted. The system is modal during this event.

**EVENT:Locate**

On a LIST control with the VCR attribute, the user pressed the locator (?) VCR button. This is the event on which you can unhide the locator entry control, if it is kept hidden.

**EVENT:MouseDown**

On a REGION with the IMM attribute, a synonym for EVENT:Accepted (for code readability, only).

**EVENT:MouseIn**

On a REGION with the IMM attribute, the mouse cursor has entered the region.

**EVENT:MouseMove**

On a REGION with the IMM attribute, the mouse cursor has moved within the region.

**EVENT:MouseOut**

On a REGION with the IMM attribute, the mouse cursor has left the region.

**EVENT:MouseUp**

On a REGION with the IMM attribute, the mouse button has been released.

**EVENT:NewSelection**

In a LIST, COMBO, SHEET, or SPIN control, this event generates when the current selection has changed. In an ENTRY control with the IMM attribute, this event generates whenever the contents of the control changes or the cursor moves. This is the event on which you perform any “housekeeping” to synchronize other controls with the currently highlighted record in the list, or determine that the user has entered all allowable data in the ENTRY.

**EVENT:PageDown**

On a LIST or COMBO control with the IMM attribute, the user pressed PGDN. This is the event on which you get the next page of records when “page-loading” the list.



**EVENT:PageUp**

On a LIST or COMBO control with the IMM attribute, the user pressed PGUP. This is the event on which you get the previous page of records when “page-loading” the list.

**EVENT:PreAlertKey**

The user pressed an ALRT attribute hot key for an ALRT attribute on the control. If a CYCLE statement is encountered in the code to process this event, the normal library action for the keystroke executes before EVENT:AlertKey generates. This event allows you to specify whether the normal library action for the keystroke executes or not, in addition to the code you place in EVENT:AlertKey. The system is modal during this event.

**EVENT:Rejected**

The user has entered an invalid value for the entry picture, or an out-of-range number on a SPIN control. The REJECTCODE procedure returns the reason the user’s input has been rejected and you can use the PROP:ScreenText property to get the user’s input from the screen. This is the event on which you alert the user to the exact problem with their input.

**EVENT:ScrollBottom**

On a LIST or COMBO control with the IMM attribute, the user pressed CTRL+PGDN. This is the event on which you get the last page of records when “page-loading” the list.

**EVENT:ScrollDown**

On a LIST or COMBO control with the IMM attribute, the user has attempted to move the highlight bar down in the LIST. This is the event on which you get the next record when “page-loading” the list or just move the highlight bar when getting another record isn’t needed.

**EVENT:ScrollDrag**

On a LIST or COMBO control with the IMM attribute, the user has moved the scroll bar’s “thumb” and has just released the mouse button. This is the event on which you dynamically scroll the displayed records based on the current value of PROP:VScrollPos.

**EVENT:ScrollTop**

On a LIST or COMBO control with the IMM attribute, the user pressed CTRL+PGUP. This is the event on which you get the first page of records when “page-loading” the list.

**EVENT:ScrollTrack**

On a LIST or COMBO control with the IMM attribute, the user is currently moving the scroll bar’s “thumb.” This is an event on which you can dynamically scroll the displayed records based on the current value of PROP:VScrollPos.

**EVENT:ScrollUp**

On a LIST or COMBO control with the IMM attribute, the user has attempted to move the highlight bar up in the LIST. This is the event on which you get the previous record when “page-loading” the list or just move the highlight bar when getting another record isn’t needed.

**EVENT:Selected**

The control has received input focus. This is the event on which you should perform any data initialization code.

**EVENT:TabChanging**

On a SHEET control, focus is about to pass to another tab. This is the event on which you perform any necessary “housekeeping” code for the tab you’re leaving.

**EVENT:VBXevent**

On a CUSTOM control, a VBX-specific event occurred. This is the event on which you query the PROP:VBXEvent and PROP:VBXEventArg properties to determine what event occurred and its parameters.

## APPENDIX C - RUNTIME PROPERTIES

## Runtime Properties

## PROP:AcceptAll

Property of a WINDOW which returns one (1) if AcceptAll mode is active and zero (0) if it is not, and may also be used to toggle AcceptAll (non-stop) mode. SELECT with no parameters usually initiates AcceptAll mode. This is a field edit mode in which each control in the window is processed by generating EVENT:Accepted for each. This allows data entry validation code to execute for all controls, including those that the user has not touched. AcceptAll mode immediately terminates when any of the following conditions is met:

SELECT(?)  
Window{PROP:AcceptAll} = 0  
A REQ control is left blank or zero.

The `SELECT(?)` statement selects the same control for the user to edit. This code usually indicates the value it contains is invalid and the user must re-enter data. The `Window{PROP:AcceptAll} = 0` statement toggles `AcceptAll` mode off. Assigning values to this property can be used to initiate and terminate `AcceptAll` mode. When a control with the `REQ` attribute is left blank or zero, `AcceptAll` mode terminates with the control highlighted for user entry, without processing any more fields in the `TAB` key sequence. `EVENT:Completed` is posted to the window when all controls have been successfully processed.

Example:

[illegible]

## PROP:Active

---

WINDOW property which returns 1 if the window is the active window, blank if not. Set to 1 to make the top window of a thread the active window.

Example:

```
CODE
OPEN(ThisWindow)
X# = START(AnotherThread)           !Start another thread
ACCEPT
CASE EVENT()
  OF EVENT:LoseFocus                 !When this window is losing focus
    IF Y# <> X#                       ! check for the first focus change
      ThisWindow{PROP:Active} = 1    ! and return focus to this thread
      Y# = X#                       ! then flag first focus change completed
    . . .
```

## PROP:AlwaysDrop

---

When set to zero, the drop portion of a COMBO or LIST control with the DROP attribute only drops down when the user clicks on the dropdown icon, and when the user presses the down arrow key the displayed entries rotate without dropping down the list. When set to anything other than zero, the drop portion drops down either on the down arrow key or click on the dropdown icon.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
COMBO(@S20),AT(0,0,20,220),USE(MyCombo),FROM(Que),DROP(5)
END

CODE
OPEN(MDIChild)
?MyCombo{PROP:AlwaysDrop} = 0 !Set windows-like drop behavior
```

## PROP:AppInstance

---

Returns the instance handle (HInstance) of the .EXE file for use in low-level API calls which require it. This is only used with the SYSTEM built-in variable. (READ-ONLY)

Example:

```
PROGRAM
HInstance LONG
CODE
OPEN(AppFrame)
HInstance = SYSTEM{PROP:AppInstance} !Get .EXE instance handle for later use
ACCEPT
END
```

## PROP:AutoPaper

---

Sets and returns the state of the automatic best-fit paper selection feature of the report engine. The default value is feature-enabled. This is only used with the SYSTEM built-in variable.

Example:

```
PROGRAM
CODE
OPEN(AppFrame)
SYSTEM{PROP:AutoPaper} = ' ' !Turn off best-fit paper selection
ACCEPT
END
```

## PROP:BreakVar

---

Sets the variable for a BREAK structure within a REPORT.

Example:

```
Report  REPORT,AT(1000,2000,6000,7000).PRE(RPT),FONT('Arial',10,,FONT:regular),THOUS
Break1  BREAK(ORD:CustNumber),USE(?Break1)
Break2  BREAK(DTL:OrderNumber),USE(?Break2)
        HEADER,AT(,,,2167)
        END
detail  DETAIL,AT(,,,385)
        END
        FOOTER,PAGEAFTER(-1)
        END
        END
        FOOTER,PAGEAFTER(-1),AT(,,,1385)
        END
        END
        FOOTER,AT(1000,9000,6000,1000)
        END
        END

CODE
OPEN(Report)
Report$?Break1{PROP:BreakVar} = ORD:CustName !Change the break variable for Break1
```

## PROP:Buffer

---

Property of a window which allows you to select off-display background repaints. This can dramatically reduce screen flicker in some situation (such as animated GIF images), but incurs a potentially large memory overhead.

The default value is zero (0) which draws directly to the screen. This is fastest and incurs no memory overhead, but may create flicker in some cases.

Assigning one (1) allocates a permanent memory buffer for the window. This is quite fast, but incurs the most memory overhead.

Assigning two (2) re-allocates a memory buffer for the window each time a re-paint is required. This is slower, but incurs the least memory overhead while still reducing flicker.

Example:

```
WinView WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    END
CODE
OPEN(WinView)
WinView{PROP:Buffer} = 1      !Permanent redraw buffer for the window
```

## PROP:Checked

---

Returns the current display state of a CHECK control—checked (1) or unchecked (‘'). (READ ONLY)

Example:

```
WinView WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    CHECK('Check Me'),AT(20,0,20,20),USE(CheckVar)
    END

CODE
OPEN(WinView)
IF ?CheckVar{PROP:Checked} = TRUE    !Is it checked?
    !Do something
END
ACCEPT
END
```

## PROP:Child, PROP:ChildIndex

---

PROP:Child is an array property which returns the control number of a child control in a parent control structure (such as an TAB, OPTION, or GROUP). (READ ONLY) The element number is the ordinal position of the control in the parent structure. Returns null string (‘’) if the element number is out of range.

PROP:ChildIndex is an array property which returns the ordinal position of all the child controls in a parent control structure (such as an TAB, OPTION, or GROUP). (READ ONLY) The element number is the control number of the control in the parent structure. Returns a null string (‘’) if the element number is out of range.

Example:

```
WinView WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    OPTION('Option 1'),USE(OptVar1),KEY(F10Key),HLP('Option1Help')
        RADIO('Radio 1'),AT(0,0,20,20),USE(?R1)
        RADIO('Radio 2'),AT(20,0,20,20),USE(?R2)
    END
END
CODE
OPEN(WinView)
LOOP X# = 1 TO 99
    Y# = ?OptVar1{PROP:Child,X#}          !Get field numbers of controls in OPTION
    IF NOT Y# THEN BREAK.
    Z# = ?OptVar1{PROP:ChildIndex,Y#}      !Get ordinal position of controls in OPTION
    MESSAGE('Radio ' & Z# & ' is field number ' & Y#)
END
ACCEPT
END
```

## PROP:ChoiceFreq

---

Returns or sets the field number of the currently selected TAB in a SHEET, or RADIO in an OPTION structure.

Example:

```
WinView WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    OPTION('Option 1'),USE(OptVar1),KEY(F10Key),HLP('Option1Help')
        RADIO('Radio 1'),AT(0,0,20,20),USE(?R1)
        RADIO('Radio 2'),AT(20,0,20,20),USE(?R2)
    END
END

CODE
OPEN(WinView)
?OptVar1{PROP:ChoiceFreq} = ?R1  !Select radio one
ACCEPT
END
```

## PROP:ClientHandle

---

WINDOW property which returns the client window handle (the area of the window that contains the controls) for use with low-level Windows API calls that require it. (READ-ONLY)

Example:

```
WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
END

MessageText  CSTRING('You cannot exit the program from this window ')
MessageCaption CSTRING('No EVENT:CloseDown Allowed ')
TextAddr     LONG
CaptionAddr  LONG
RetVal       SHORT

CODE
OPEN(WinView)
ACCEPT
CASE EVENT()
OF EVENT:CloseDown
    TextAddr = ADDRESS(MessageText)
    CaptionAddr = ADDRESS(MessageCaption)
    RetVal = MessageBox(WinView{PROP:ClientHandle},TextAddr,CaptionAddr,MB_OK)
    !Windows API call using a window handle
CYCLE
    !Disallow program closedown from this window
END
END
```



## PROP:ClientWndProc

**WINDOW** property which sets or gets the client window (not including title or status areas) messaging procedure for use with low-level Windows API calls that require it. Generally used with sub-classing to track all Windows messages.

Example:

[illegible]

## PROP:ClipBits

---

Property of an IMAGE control that allows bitmap images to be moved into (but not out of) the Windows clipboard when set to one (1). Only .BMP, .PCX, or .GIF image types can be stored as a bitmap (.BMP) image in the Clipboard.

Example:

```
WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
              IMAGE(),AT(0,0,,),USE(?Image)
              BUTTON('Save Picture'),AT(80,180,60,20),USE(?SavePic)
              BUTTON('New Picture'),AT(160,180,60,20),USE(?NewPic)
              END

FileName      STRING(64)                                !Filename variable

CODE
OPEN(WinView)
DISABLE(?LastPic)
IF NOT FILEDIALOG('Choose File to View',FileName,'BitMap|*.BMP|PCX|*.PCX',0)
    RETURN                                              !Return if no file chosen
END
?Image{PROP:Text} = FileName
ACCEPT
CASE ACCEPTED()
    OF ?NewPic
        IF NOT FILEDIALOG('Choose File to View',FileName,'BitMap|*.BMP|PCX|*.PCX',0)
            BREAK                                      !Return if no file chosen
        END
        ?Image{PROP:Text} = FileName
    OF ?SavePic
        ?Image{PROP:ClipBits} = 1                    !Put image into Clipboard
        ENABLE(?LastPic)                             ! activate Last Picture button
    END
END
END
```

## PROP:DDEMode

A property of the `SYSTEM` built-in variable that allows you to set normal DDE event behavior (0, the default) whereby all DDE events are sent to the window that opened the DDE channel, or one (1), which causes all DDE events to be sent to the top window of the current thread.

Example:

```

DDERetVal1  STRING(20)
WinOne      WINDOW,AT(0,0,160,400)
            ENTRY(@s20),USE(DDERetVal1)
            END
MyServer     LONG
            CODE
            OPEN(WinOne)
            SYSTEM{PROP:DDEMode} = 1                !Send events to top window of current thread
            MyServer = DDESERVER('MyApp','DataEntered') !Open as server
            ACCEPT
            END

```

## PROP:DDETimeOut

A property of the `SYSTEM` built-in variable that allows you to set and get the DDE timeout used for all DDE commands. This value is in hundredths of seconds and the default value is 500.

Example:

[illegible]

## PROP:DeferMove

A property of the SYSTEM built-in variable that defers the resizing and/or movement of controls until the end of the ACCEPT loop or SYSTEM{PROP:DeferMove} is reset to zero (0). This disables the immediate effect of all assignments to position and size properties, enabling the library to perform all moves at once (which eliminates temporarily overlapping controls). The absolute value of the number assigned to SYSTEM{PROP:DeferMove} defines the number of deferred moves for which space is pre-allocated (automatically expanded when necessary, but less efficient and may fail). Assigning a positive number automatically resets PROP:DeferMove to zero at the next ACCEPT, while a negative number leaves it set until explicitly reset to zero (0).

Example:

```

WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
              IMAGE(),AT(0,0,,),USE(?Image)
              BUTTON('New Picture'),AT(160,180,60,20),USE(?NewPic)
              BUTTON('Close'),AT(80,180,60,20),USE(?Close)
              END
FileName      STRING(64)                                !Filename variable
ImageWidth    SHORT
ImageHeight    SHORT
CODE
OPEN(WinView)
DISABLE(?LastPic)
IF NOT FILEDIALOG('Choose File to View',FileName,'BitMap|*.BMP|PCX|*.PCX',0)
    RETURN                                           !Return if no file chosen
END
?Image{PROP:Text} = FileName
ACCEPT
CASE ACCEPTED()
OF ?NewPic
    IF NOT FILEDIALOG('Choose File to View',FileName,'BitMap|*.BMP|PCX|*.PCX',0)
        BREAK                                           !Return if no file chosen
    END
    ?Image{PROP:Text} = FileName
    SYSTEM{PROP:DeferMove} = 4                        !Defer move and resize
    ImageWidth = ?Image{PROP:Width}                  !1 move
    ImageHeight = ?Image{PROP:Height}                 !2 moves
    IF ImageWidth > 320
        ?Image{PROP:Width} = 320
        ?Image{PROP:XPos} = 0
    ELSE
        ?Image{PROP:XPos} = (320 - ImageWidth) / 2    !Center horizontally
    END
    IF ImageHeight > 180
        ?Image{PROP:Height} = 180
        ?Image{PROP:YPos} = 0
    ELSE
        ?Image{PROP:YPos} = (180 - ImageHeight) / 2   !Center vertically
    END
OF ?Close
    BREAK
. .
                                         !Moves and resizing happen at end of ACCEPT loop

```

## PROP:Edit

LIST control property which specifies the field equate label of the control to perform edit-in-place for a LIST box column. This is an array whose element number indicates the column number to edit. When non-zero, the control is unhidden and moved/resized over the current row in the column indicated to allow the user to input data. Assign zero to re-hide the data entry control.

Example:

```

Q      QUEUE
f1      STRING(15)
f2      STRING(15)
      END
Win1 WINDOW('List Edit In Place'),AT(0,1,308,172),SYSTEM
      LIST,AT(6,6,120,90),USE(?List),COLUMN,FORMAT('60L@s15@60L@s15@'), |
      FROM(Q),ALRT(EnterKey)
      END
?EditEntry EQUATE(100)
CODE
OPEN(Win1)
CREATE(?EditEntry,CREATE:Entry)
SELECT(?List,1)
ACCEPT
CASE FIELD()
OF ?List
CASE EVENT()
OF EVENT:AlertKey
IF KEYCODE() = EnterKey
SETKEYCODE(MouseLeft2)
POST(EVENT:Accepted,?List)
END
OF EVENT:NewSelection
IF ?List{PROP:edit,?List{PROP:column}}
GET(Q,CHOICE())
END
OF EVENT:Accepted
IF KEYCODE() = MouseLeft2
GET(Q,CHOICE())
?EditEntry{PROP:text} = ?List{PROPLIST:picture,?List{PROP:column}}
CASE ?List{PROP:column}
OF 1
?EditEntry{PROP:use} = Q.F1
OF 2
?EditEntry{PROP:use} = Q.F2
END
?List{PROP:edit,?List{PROP:column}} = ?EditEntry
. . .
OF ?EditEntry
CASE EVENT()
OF EVENT:Selected
?EditEntry{PROP:Touched} = 1
OF EVENT:Accepted
PUT(Q)
?List{PROP:edit,?List{PROP:column}} = 0
. . .

```

## PROP:Enabled

Returns an empty string if the control is not enabled either because it itself has been disabled, or because it is a member of a “parent” control (OPTION, GROUP, MENU, SHEET, or TAB) that has been disabled. (READ-ONLY)

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    SHEET,AT(0,0,320,175),USE(SelectedTab)
        TAB('Tab One'),USE(?TabOne)
            PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
            ENTRY(@S8),AT(100,140,32,20),USE(E1)
            PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P2)
            ENTRY(@S8),AT(100,240,32,20),USE(E2)
        END
        TAB('Tab Two'),USE(?TabTwo)
            PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P3)
            ENTRY(@S8),AT(100,140,32,20),USE(E3)
            PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P4)
            ENTRY(@S8),AT(100,240,32,20),USE(E4)
        END
    END
    BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
    BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
END

CODE
OPEN(MDIChild)
ACCEPT
    CASE EVENT()
    OF EVENT:Completed
        BREAK
    END
    CASE FIELD()
    OF ?Ok
        CASE EVENT()
        OF EVENT:Accepted
            SELECT
            END
        OF ?E3
            CASE EVENT()
            OF EVENT:Accepted
                IF ?E3{PROP:Enabled} AND MDIChild{PROP:AcceptAll}
                    !Check for visibility during AcceptAll mode
                    E3 = UPPER(E3)           !Convert the data entered to Upper case
                    DISPLAY(?E3)           ! and display the upper cased data
                END
            END
        OF ?Cancel
            CASE EVENT()
            OF EVENT:Accepted
                BREAK
            END
        END
    END
END
```

## PROP:EventsWaiting

---

WINDOW property which returns whether the window has any further events waiting to be processed. Generally only used by Internet Connect to know when to format an HTML page. (READ-ONLY)

Example:

```
IF TARGET{PROP:EventsWaiting}      !Check for waiting events
    !Do something
END
```

## PROP:ExeVersion

---

A property of the SYSTEM built-in variable that returns the version number of an EXE created by Clarion for Windows. This is the version number of Clarion for Windows which compiled the EXE file, even if the runtime library .DLL is from a newer release (see PROP:LibVersion). This first appeared in Clarion for Windows release 1501, so PROP:ExeVersion returns blank for releases prior to 1501. (READ-ONLY)

Example:

```
MESSAGE('Compiled in CW release ' & SYSTEM{PROP:ExeVersion})
```

## PROP:FlushPreview

Flushes the REPORT structure's PREVIEW attribute metafiles to the printer (0 = off, else on, always 0 at report open).

Example:

```

SomeReport  PROCEDURE
WMFQueue    QUEUE                                !Queue to contain .WMF filenames
            STRING(64)
            END
NextEntry   BYTE(1)                              !Queue entry counter variable

Report      REPORT,PREVIEW(WMFQueue)             !Report with PREVIEW attribute
DetailOne   DETAIL
            !Report controls
            END
            END

ViewReport  WINDOW('View Report'),AT(0,0,320,200),MDI,MAX,HVSCROLL
            IMAGE(),AT(0,0,320,180),USE(?ImageField)
            BUTTON('View Next Page'),AT(0,180,60,20),USE(?NextPage),DEFAULT
            BUTTON('Print Report'),AT(80,180,60,20),USE(?PrintReport)
            BUTTON('Exit Without Printing'),AT(160,180,60,20),USE(?ExitReport)
            END

CODE
OPEN(Report)
SET(SomeFile)                                !Code to generate the report
LOOP
    NEXT(SomeFile)
    IF ERRORCODE() THEN BREAK.
    PRINT(DetailOne)
END
ENDPAGE(Report)
OPEN(ViewReport)                             !Open report preview window
GET(WMFQueue,NextEntry)                       !Get first queue entry
?ImageField{PROP:text} = WMFQueue             !Load first report page
ACCEPT
CASE ACCEPTED()
OF ?NextPage
    NextEntry += 1                             !Increment entry counter
    IF NextEntry > RECORDS(WMFQueue) THEN CYCLE. !Check for end of report
    GET(WMFQueue,NextEntry)                     !Get next queue entry
    ?ImageField{PROP:text} = WMFQueue           !Load next report page
    DISPLAY                                     ! and display it
OF ?PrintReport
    Report{PROP:FlushPreview} = 1               !Flush files to printer
    BREAK                                       ! and exit procedure
OF ?ExitReport
    BREAK                                       !Exit procedure
END
END
RETURN                                         !Return to caller, automatically
                                           ! closing the window and report
                                           ! freeing the queue and automatically
                                           ! deleting all the temporary .WMF files

```



## PROP:Follows

Changes the tab order to specify the position within the parent that the control will occupy. The control follows the control number you specify in the tab order. This must specify an existing control within the parent (window, option, group, menu, report, detail, etc.). Setting PROP:Follows to a REGION control will be ignored, as REGIONS are not in the Windows tab order. (WRITE-ONLY)

Example:

```
WinView      WINDOW('View Report'),AT(0,0,320,200),MDI,MAX,HVSCROLL
              BUTTON('View Next Page'),AT(0,180,60,20),USE(?NextPage),DEFAULT
              BUTTON('Print Report'),AT(80,180,60,20),USE(?PrintReport)
              BUTTON('Exit Without Printing'),AT(160,180,60,20),USE(?ExitReport)
              END
CODE
OPEN(WinView)
              !Print Report button normally follows View button
?PrintReport{PROP:Follows} = ?ExitReport
              !Now Print Report button follows Exit button in the tab order
ACCEPT
END
```

## PROP:Handle

Returns the window or control handle for use with low-level Windows API calls that require it. (READ-ONLY)

Example:

```
WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
              END
MessageText   CSTRING('You cannot exit the program from this window ')
MessageCaption CSTRING('No EVENT:CloseDown Allowed ')
TextAddress   LONG
CaptionAddress LONG
RetVal        SHORT
CODE
OPEN(WinView)
ACCEPT
CASE EVENT()
OF EVENT:CloseDown
  TextAddress = ADDRESS(MessageText)
  CaptionAddress = ADDRESS(MessageCaption)
  RetVal = MessageBox(WinView{PROP:Handle},TextAddress,CaptionAddress,MB_OK)
              !Windows API call using a window handle
CYCLE
              !Disallow program closedown from this window
END
END
```

## PROP:HeaderHeight

---

Returns the height of the header in a LIST or COMBO control. The height is measured in dialog units (unless PROP:Pixels is active). (READ-ONLY)

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    LIST,AT(0,0,220,220),USE(?L1),FROM(Que),IMM,FORMAT('60L~Header Text~')
END
CODE
OPEN(MDIChild)
X# = ?L1{PROP:HeaderHeight}           !Get height of header in dialog units
```

## PROP:HscrollPos

Returns the position of the horizontal scroll bar's "thumb" (from 0 to 255) on a window, IMAGE, TEXT, LIST or COMBO with the HSCROLL attribute. Setting this causes the control or window's contents to scroll horizontally.

Example:

```

Que          QUEUE
F1           STRING(50)
F2           STRING(50)
F3           STRING(50)
            END
WinView      WINDOW('View'),AT(,,340,200),SYSTEM,CENTER
            LIST,AT(20,0,300,200),USE(?List),FROM(Que),IMM,HVSCROLL |
            FORMAT('80L#1#80L#2#80L#3#')
            END
CODE
OPEN(WinView)
DO BuildListQue
ACCEPT
CASE FIELD()
OF ?List
CASE EVENT()
OF EVENT:ScrollDrag
CASE (?List{PROP:HscrollPos} % 200) + 1
OF 1
?List{PROP:Format} = '80L#1#80L#2#80L#3#'
OF 2
?List{PROP:Format} = '80L#2#80L#3#80L#1#'
OF 3
?List{PROP:Format} = '80L#3#80L#1#80L#2#'
END
DISPLAY
. . .
FREE(Que)
BuildListQue ROUTINE
LOOP 15 TIMES
Que.F1 = 'F1F1F1F1'
Que.F2 = 'F2F2F2F2'
Que.F3 = 'F3F3F3F3'
ADD(Que)
END

```

## PROP:IconList

An array that sets or returns the icons displayed in a LIST formatted to display icons (usually a tree control). If the name of the icon file to assign has a number in square brackets appended to its end, this indicates the file contains multiple icons and the number specifies which to assign (zero-based). If the name of the icon file has a tilde (~) prepended to it (~IconFile.ICO), this indicates the file has been linked into the project as a resource and is not on disk.

Example:

```

PROGRAM
MAP
RandomAlphaData  PROCEDURE(*STRING Field)
END
TreeDemo          QUEUE,PRE()           !Data list box FROM queue
FName             STRING(20)
ColorNFG          LONG                  !Normal Foreground color for FName
ColorNBG          LONG                  !Normal Background color for FName
ColorSFG          LONG                  !Selected Foreground color for FName
ColorSBG          LONG                  !Selected Background color for FName
IconField         LONG                  !Icon number for FName
TreeLeve         LONG                  !Tree Level
LName             STRING(20)
Init              STRING(4)
END
Win WINDOW('List Boxes'),AT(0,0,366,181),SYSTEM,DOUBLE
LIST,AT(0,34,366,146),FROM(TreeDemo),USE(?Show),HVSCROLL, |
    FORMAT('80L*IT~First Name~*80L~Last Name~16C~Initials~')
END
CODE
LOOP 20 TIMES
    RandomAlphaData(FName)
    ColorNFG = COLOR:White              !Assign FNAME's colors
    ColorNBG = COLOR:Maroon
    ColorSFG = COLOR:Yellow
    ColorSBG = COLOR:Blue
    IconField = ((x#-1) % 4) + 1        !Assign icon number
    TreeLevel = ((x#-1) % 4) + 1        !Assign tree level
    RandomAlphaData(LName)
    RandomAlphaData(Init)
    ADD(TD)
END
OPEN(Win)
?Show{PROP:iconlist,1} = ICON:VCRback  !Icon 1 = <
?Show{PROP:iconlist,2} = ICON:VCRrewind !Icon 2 = <<
?Show{PROP:iconlist,3} = 'VCRdown.ico' !Icon 3 = > not linked into project
?Show{PROP:iconlist,4} = '~VCRnext.ico' !Icon 4 = >>linked into project
ACCEPT
END

RandomAlphaData PROCEDURE(*STRING Field)
CODE
y# = RANDOM(1,SIZE(Field))             !Random fill size
LOOP x# = 1 to y#                      !Fill each character with
    Field[x#] = CHR(RANDOM(97,122))    ! a random lower case letter
END

```

## PROP:ImageBits

Property of an IMAGE control that allows bitmap images displayed in the control to be moved into and out of memo fields. Any image displayed in the control can be stored. PROP:ImageBlob performs the same type of function for a BLOB.

Example:

```

WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
              IMAGE(),AT(0,0,,),USE(?Image)
              BUTTON('Save Picture'),AT(80,180,60,20),USE(?SavePic)
              BUTTON('New Picture'),AT(160,180,60,20),USE(?NewPic)
              BUTTON('Last Picture'),AT(240,180,60,20),USE(?LastPic)
              END

SomeFile      FILE,DRIVER('Clarion'),PRE(Fil)          !A file with a memo field
MyMemo        MEMO(65520),BINARY
Rec           RECORD
F1            LONG
              . .

FileName      STRING(64)                               !Filename variable

CODE
OPEN(SomeFile)
OPEN(WinView)
DISABLE(?LastPic)
IF NOT FILEDIALOG('Choose File to View',FileName,'BitMap|*.BMP|PCX|*.PCX',0)
  RETURN                                              !Return if no file chosen
END
?Image{PROP:Text} = FileName
ACCEPT
CASE ACCEPTED()
OF ?NewPic
  IF NOT FILEDIALOG('Choose File to View',FileName,'BitMap|*.BMP|PCX|*.PCX',0)
    BREAK                                          !Return if no file chosen
  END
  ?Image{PROP:Text} = FileName
OF ?SavePic
  Fil:MyMemo = ?Image{PROP:ImageBits}              !Put image into memo
  ADD(SomeFile)                                    ! and save it to the file on disk
  ENABLE(?LastPic)                                ! activate Last Picture button
OF ?LastPic
  ?Image{PROP:ImageBits} = Fil:MyMemo              !Put last saved memo into image
END
END

```

## PROP:ImageBlob, PROP:PrintMode

### PROP:ImageBlob

Property of an IMAGE control that allows bitmap images displayed in the control to be moved into and out of BLOB fields. Any image displayed in the control can be stored. PROP:ImageBits performs the same type of function for a MEMO. Most images are stored in a bitmap format by default (except PCX and GIF), unless PROP:PrintMode is set to store the native format.

### PROP:PrintMode

Bitmap property of an IMAGE control (or SYSTEM) that specifies how PROP:ImageBlob stores images in the BLOB. Bit 0 indicates whether decoded image information is required, and bit 1 indicates whether undecoded image information is required. When set to 3, both the original data and decoded DIB data are available, allowing PROP:ImageBlob to store the image in its native format (such as JPG) in the BLOB.

Example:

```
WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
              IMAGE(),AT(0,0,,),USE(?Image)
              BUTTON('Save Picture'),AT(80,180,60,20),USE(?SavePic)
              BUTTON('New Picture'),AT(160,180,60,20),USE(?NewPic)
              BUTTON('Last Picture'),AT(240,180,60,20),USE(?LastPic)
              END
SomeFile     FILE,DRIVER('TopSpeed'),PRE(Fil)          !A file with a memo field
MyBlob       BLOB,BINARY
Rec          RECORD
Fl           LONG

FileName     . .
              STRING(64)                               !Filename variable
CODE
OPEN(SomeFile); OPEN(WinView)
DISABLE(?LastPic)
IF NOT FILEDIALOG('File to View',FileName,'Images|*.BMP;*.PCX;*.JPG;*.WMF',0)
    RETURN                                             !Return if no file chosen
END
?Image{PROP:PrintMode} = 3                           !Setup to store native formats
?Image{PROP:Text} = FileName
ACCEPT
CASE ACCEPTED()
OF ?NewPic
    IF NOT FILEDIALOG('File to View',FileName,'Images|*.BMP;*.PCX;*.JPG;*.WMF',0)
        BREAK
    END
    ?Image{PROP:Text} = FileName
OF ?SavePic
    Fil:MyBlob{PROP:Handle} = ?Image{PROP:ImageBlob}    !Put image into BLOB
    ADD(SomeFile)                                         ! and save it to the file on disk
    ENABLE(?LastPic)                                     ! activate Last Picture button
OF ?LastPic
    ?Image{PROP:ImageBlob} = Fil:MyBlob{PROP:Handle}    !Put last saved BLOB into image
END
END
```

## PROP:InToolbar

---

A toggle attribute which returns whether the control is in a TOOLBAR structure. (READ-ONLY)

Example:

```
WinView      WINDOW('View'),AT(0,0,,),MDI,MAX,HVSCROLL,SYSTEM,RESIZE
              TOOLBAR
              BUTTON('Save Picture'),AT(80,180,60,20),USE(?SavePic)
              END
              LIST,AT(6,6,120,90),USE(?List),FORMAT('120L'),FROM(Q),IMM
              END

CODE
OPEN(WinView)
IF ?SavePic{PROP:InToolbar} = TRUE
  !DO Something
END
ACCEPT
END
```

## PROP:Items

---

Returns or sets the number of entries visible in a LIST or COMBO control.

Example:

```
Que          QUEUE
              STRING(30)
              END

WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL,SYSTEM
              LIST,AT(6,6,120,90),USE(?List),FORMAT('120L'),FROM(Q),IMM
              END

CODE
OPEN(WinView)
SET(SomeFile)
LOOP ?List{PROP:Items} TIMES  !Fill display queue to limit of displayable items
  NEXT(SomeFile)
  Que = Fil:Record
  ADD(Que)
END
ACCEPT
END
```

## PROP:LazyDisplay

---

SYSTEM property which disables (when set to 1) or enables (when set to 0, the default) the feature where all window re-painting is completely done before processing continues with the next statement following a DISPLAY. Setting PROP:LazyDisplay = 1 creates seemingly faster video processing, since the re-paints occur at the end of the ACCEPT loop if there are no other messages pending. This can improve the performance of some applications, but can also have a negative impact on appearance.

Example:

```
WinView      APPLICATION('MyApp'),AT(0,0,320,200),MAX,HVSCROLL,SYSTEM
              END

CODE
OPEN(WinView)
SYSTEM{PROP:LazyDisplay} = 1      !Disable extra paint message display
                                   ! throughout entire application
ACCEPT
END
```

## PROP:LFNSupport

---

A property of the SYSTEM built-in variable in 16-bit programs that returns one (1) if the operating system supports long filenames, and an empty string (") if it does not. 32-bit operating systems all support long filenames. (READ-ONLY)

Example:

```
IF SYSTEM{PROP:LFNSupport} = TRUE
    MESSAGE('Long Filenames are supported')
ELSE
    MESSAGE('Long Filenames are NOT supported')
END
```



## **PROP:LibHook**

---

An array property of the SYSTEM built-in variable that sets override procedures for several internal Clarion procedures. For each of these procedures, you assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the Clarion library procedure. The overriding procedure's prototype must be exactly the same as the internal Clarion procedure. These properties were implemented to facilitate Internet Connect. (WRITE-ONLY)

### **PROP:ColorDialogHook**

A property of the SYSTEM built-in variable that sets the override procedure for the COLORDIALOG internal Clarion procedure. Equivalent to {PROP:LibHook,1}. Assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the COLORDIALOG procedure. Assign zero and the runtime library will once again call its internal procedure. The overriding procedure's prototype must be exactly the same as the COLORDIALOG procedure. (WRITE-ONLY)

### **PROP:FileDialogHook**

A property of the SYSTEM built-in variable that sets the override procedure for the FILEDIALOG internal Clarion procedure. Equivalent to {PROP:LibHook,2}. Assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the FILEDIALOG procedure. Assign zero and the runtime library will once again call its internal procedure. The overriding procedure's prototype must be exactly the same as the FILEDIALOG procedure. (WRITE-ONLY)

### **PROP:FontDialogHook**

A property of the SYSTEM built-in variable that sets the override procedure for the FONTDIALOG internal Clarion procedure. Equivalent to {PROP:LibHook,3}. Assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the FONTDIALOG procedure. Assign zero and the runtime library will once again call its internal procedure. The overriding procedure's prototype must be exactly the same as the FONTDIALOG procedure. (WRITE-ONLY)

### **PROP:PrinterDialogHook**

A property of the SYSTEM built-in variable that sets the override procedure for the PRINTERDIALOG internal Clarion procedure. Equivalent to {PROP:LibHook,4}. Assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the PRINTERDIALOG procedure. Assign zero and the runtime library will once

again call its internal procedure. The overriding procedure's prototype must be exactly the same as the PRINTERDIALOG procedure. (WRITE-ONLY)

### **PROP:HaltHook**

A property of the SYSTEM built-in variable that sets the override procedure for the HALT internal Clarion procedure. Equivalent to {PROP:LibHook,5}. Assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the HALT procedure. Assign zero and the runtime library will once again call its internal procedure. The overriding procedure's prototype must be exactly the same as the HALT procedure. (WRITE-ONLY)

### **PROP:MessageHook**

A property of the SYSTEM built-in variable that sets the override procedure for the MESSAGE internal Clarion procedure. Equivalent to {PROP:LibHook,6}. Assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the MESSAGE procedure. Assign zero and the runtime library will once again call its internal procedure. The overriding procedure's prototype must be exactly the same as the MESSAGE procedure. (WRITE-ONLY)

### **PROP:StopHook**

A property of the SYSTEM built-in variable that sets the override procedure for the STOP internal Clarion procedure. Equivalent to {PROP:LibHook,7}. Assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the STOP procedure. Assign zero and the runtime library will once again call its internal procedure. The overriding procedure's prototype must be exactly the same as the STOP procedure. (WRITE-ONLY)

### **PROP:AssertHook**

A property of the SYSTEM built-in variable that sets the override procedure for the ASSERT internal Clarion procedure. Equivalent to {PROP:LibHook,8}. Assign the ADDRESS of the overriding procedure, and the runtime library will call the overriding procedure instead of the ASSERT procedure. Assign zero and the runtime library will once again call its internal procedure. The overriding procedure's prototype must be exactly the same as the ASSERT procedure (STRING message, UNSIGNED LineNumber). (WRITE-ONLY)

### **PROP:FatalErrorHook**

A property of the SYSTEM built-in variable that sets the override procedure for the internal Clarion procedure. Equivalent to {PROP:LibHook,9}. Assign the ADDRESS of the overriding procedure, and the runtime library will call

the overriding procedure instead of the internal procedure. Assign zero and the runtime library will once again call its internal procedure. The overriding procedure's prototype must be exactly the same as the internal procedure's (STRING message, UNSIGNED ErrorNumber). (WRITE-ONLY)

Example:

```

PROGRAM
MAP
MyColorDialog      PROCEDURE(<STRING>,*?,SIGNED=0),SIGNED,PROC
MyFileDialog        PROCEDURE(<STRING>,*?,<STRING>,SIGNED=0),PROC,BOOL
MyFontDialog        PROCEDURE(<STRING>,*?,<*>,<*>,<*>,SIGNED = 0),BOOL,PROC
MyPrinterDialog     PROCEDURE(<STRING>,BOOL=FALSE),BOOL,PROC
MyHalt              PROCEDURE(UNSIGNED=0,<STRING>)
MyMessage           PROCEDURE(STRING,<STRING>,<STRING>,<STRING>,UNSIGNED=0,BOOL=FALSE), |
                    UNSIGNED,PROC
MyStop              PROCEDURE(<STRING>)
MyAssert            PROCEDURE(<STRING>,UNSIGNED)
MyFatalError        PROCEDURE(<STRING>,UNSIGNED)
END
CODE
!Hook all my own procedures
SYSTEM{PROP:ColorDialogHook} = ADDRESS(MyColorDialog)
SYSTEM{PROP:FileDialogHook}  = ADDRESS(MyFileDialog)
SYSTEM{PROP:FontDialogHook}  = ADDRESS(MyFontDialog)
SYSTEM{PROP:PrinterDialogHook} = ADDRESS(MyPrinterDialog)
SYSTEM{PROP:HaltHook}        = ADDRESS(MyHalt)
SYSTEM{PROP:MessageHook}     = ADDRESS(MyMessage)
SYSTEM{PROP:StopHook}        = ADDRESS(MyStop)
SYSTEM{PROP:AssertHook}      = ADDRESS(MyAssert)
SYSTEM{PROP:FatalErrorHook}  = ADDRESS(MyFatalError)

!UnHook all my own procedures and return to the library procedures
SYSTEM{PROP:ColorDialogHook} = 0
SYSTEM{PROP:FileDialogHook}  = 0
SYSTEM{PROP:FontDialogHook}  = 0
SYSTEM{PROP:PrinterDialogHook} = 0
SYSTEM{PROP:HaltHook}        = 0
SYSTEM{PROP:MessageHook}     = 0
SYSTEM{PROP:StopHook}        = 0
SYSTEM{PROP:AssertHook}      = 0
SYSTEM{PROP:FatalErrorHook}  = 0

```

## PROP:LibVersion

---

A property of the SYSTEM built-in variable that returns the version number of the Clarion for Windows runtime library .DLL currently loaded for the EXE currently executing. This is separate from the version number of Clarion for Windows which compiled the EXE file (see PROP:ExeVersion). This first appeared in Clarion for Windows release 1501, so PROP:ExeVersion returns blank for releases prior to 1501. (READ-ONLY)

Example:

```
MESSAGE('Runtime DLL from release ' & SYSTEM{PROP:LibVersion})
```

## PROP:Line, PROP:LineCount

---

PROP:Line is an array whose elements each contain one line of the text in a TEXT control. (READ ONLY)

PROP:LineCount returns the number of lines of text in a TEXT control. (READ ONLY)

Example:

```

LineCount  SHORT
MemoLine   STRING(80)

CustRpt    REPORT,AT(1000,1000,6500,9000),THOUS
Detail1    DETAIL,AT(0,0,6500,6000)
            TEXT,AT(0,0,6500,6000),USE(Fil:MemoField)
            END
Detail2    DETAIL,AT(0,0,6500,125)
            STRING(@s80),AT(0,0,6500,125),USE(MemoLine)
            END
            END

CODE
OPEN(File)
SET(File)
OPEN(CustRpt)
LOOP
  NEXT(File)
  LineCount = CustRpt$?Fil:MemoField{PROP:LineCount}
  LOOP X# = 1 TO LineCount
    MemoLine = CustRpt$?Fil:MemoField{PROP:Line,X#}
    PRINT(Detail2)
  END
END
END
```

## PROP:LineHeight

---

Sets or returns the height of the rows in a LIST or COMBO control. The height is measured in dialog units (unless PROP:Pixels is active). For a TEXT control, it returns the character cell height of the control's font (the distance from the top of one line of text to the top of the next) in whatever measurement unit is currently in use. READ-ONLY for a TEXT control.

Example:

```
MDIChild  WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
          LIST,AT(0,0,220,220),USE(?L1),FROM(Que),IMM
          END
CODE
OPEN(MDIChild)
?L1{PROP:LineHeight} = 8           !Set height to 8 dialog units
```

## PROP:MaxHeight, PROP:MaxWidth, PROP:MinHeight, PROP:MinWidth

---

PROP:MaxHeight sets or returns the maximum height of a resizable window.

PROP:MaxWidth sets or returns the maximum width of a resizable window.

PROP:MinHeight sets or returns the minimum height of a resizable window.

PROP:MinWidth sets or returns the minimum width of a resizable window. Also sets the minimum width of TAB controls in a SHEET.

Example:

```
WinView   WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL,SYSTEM,RESIZE
          LIST,AT(6,6,120,90),USE(?List),FORMAT('120L'),FROM(Q),IMM
          END
CODE
OPEN(WinView)
WinView{PROPMaxHeight} = 200       !Set boundaries beyond which the user cannot
WinView{PROPMaxWidth} = 320        ! resize the window
WinView{PROPMinHeight} = 90
WinView{PROPMinWidth} = 120
ACCEPT
END
```



## PROP:NextPageNo

---

A property which sets or returns the next page number in a report.

Example:

```
CustRpt  REPORT,AT(1000,1000,6500,9000),THOUS
          HEADER
          STRING(@n3),USE(?Page),PAGENO
          END
Detail   DETAIL,AT(0,0,6500,1000)
          STRING,AT(10,10),USE(Fil:Field)
          . .
CODE
OPEN(File);SET(File)
OPEN(CustRpt)
LOOP
  NEXT(File)
  IF Fil:KeyField <> Sav:KeyField  !Detect group break
    Sav:KeyField = Fil:KeyField  !Detect group break
    ENDPAGE                      !Force page break
    CustRpt{PROP:NextPageNo} = 1 !Every group starts on page one
  END
PRINT(Detail)
END
```

## PROP:NoHeight, PROP:NoWidth

---

PROP:NoHeight is a toggle attribute which returns whether the window or control was set to default its height (had an omitted height parameter in its AT attribute). Setting this property to TRUE is equivalent to resetting the control to its default height as determined by the library (which you cannot do using PROP:Height).

PROP:NoWidth is a toggle attribute which returns whether the window or control was set to default its width (had an omitted width parameter in its AT attribute). Setting this property to TRUE is equivalent to resetting the control to its default width as determined by the library (which you cannot do using PROP:Width).

Example:

```
WinView    WINDOW('View'),AT(0,0,,),MDI,MAX,HVSCROLL,SYSTEM,RESIZE
           LIST,AT(6,6,120,90),USE(?List),FORMAT('120L'),FROM(Q),IMM
           END

CODE
OPEN(WinView)
IF WinView{PROP:NoHeight} = TRUE
    WinView{PROP:Height} = 200                !Set height
END
IF WinView{PROP:NoWidth} = TRUE
    WinView{PROP:Width} = 320                !Set width
END
ACCEPT
END
```

## PROP:NoTips

---

Disables (when set to 1) or re-enables (when set to 0) tooltip display (TIP attribute) for the SYSTEM, window, or control.

Example:

```
WinView    APPLICATION('MyApp'),AT(0,0,320,200),MAX,HVSCROLL,SYSTEM
           END

CODE
OPEN(WinView)
SYSTEM{PROP:NoTips} = 1    !Disable TIP display throughout entire application
ACCEPT
END
```



## PROP:Parent

Returns the parent control for a control within a structure (such as an **OPTION** or **GROUP** control structure, or a **DETAIL**, **TOOLBAR**, or **MENUBAR** structure). (**READ ONLY**)

Example:

```
WinView      WINDOW('MyApp'),AT(0,0,320,200),MAX,HVSCROLL,SYSTEM
              END
OptionSelected  STRING(6)
?OptionControl  EQUATE(100)           !A field equate number for CREATE to use
?Radio1         EQUATE(101)           !A field equate number for CREATE to use
?Radio2         EQUATE(102)           !A field equate number for CREATE to use
CODE
OPEN(WinView)
CREATE(?OptionControl,CREATE:option)           !Create the OPTION control
?OptionControl{PROP:use} = OptionSelected
?OptionControl{PROP:Text} = 'Pick one'
?OptionControl{PROP:Boxed} = TRUE
SETPOSITION(?OptionControl,10,10)
CREATE(?Radio1,CREATE:radio,?OptionControl)     !Create a RADIO control
?Radio1{PROP:Text} = 'First'
SETPOSITION(?Radio1,12,20)
CREATE(?Radio2,CREATE:radio,?Radio1{PROP:Parent}) !Create another with same parent
?Radio2{PROP:Text} = 'Second'
SETPOSITION(?Radio2,12,30)
UNHIDE(?OptionControl,?Radio2)                 !Display the new controls
ACCEPT
END
```

## PROP:Pixels

**WINDOW** property which toggles screen measurement between dialog units (DLUs) and pixels (not available for reports). After setting this property, all screen positioning (such as **GETPOSITION**, **SETPOSITION**, **PROP:Xpos**, **PROP:Ypos**, **PROP:Width**, and **PROP:Height**) return and require coordinates in pixels rather than DLUs.

Example:

```
WinView      WINDOW('MyApp'),AT(0,0,320,200),MAX,HVSCROLL,SYSTEM
              END
CODE
OPEN(WinView)
WinView{PROP:Pixels} = 1 !Change measurement to pixels
ACCEPT
END
```

## PROP:PrintMode

---

SYSTEM or IMAGE control property which sets or returns the mode in which images print in reports. Setting to one (1) generates the images to temporary files. Setting to two (2 - the default) prints the images. Setting to three (3) does both. This property is used internally by the Internet Connect templates, only.

Example:

See the Internet Connect templates

## PROP:Progress

---

You can directly update the display of a PROGRESS control by assigning a value (which must be within the range defined by the RANGE attribute) to the control's PROP:progress property.

Example:

```

BackgroundProcess  PROCEDURE                !Background processing batch process

Win  WINDOW('Batch Processing...'),AT(.,400,400),TIMER(1),MDI,CENTER
      PROGRESS,AT(100,140,200,20),USE(?ProgressBar),RANGE(0,200)
      BUTTON('Cancel'),AT(190,300,20,20),STD(STD:Close)
      END

CODE
OPEN(Win)
OPEN(File)
?ProgressBar{PROP:rangehigh} = RECORDS(File)
SET(File)                      !Set up a batch process
ACCEPT
CASE EVENT()
OF EVENT:CloseWindow
  BREAK
OF EVENT:Timer
  ProgressVariable += 3          !Process records when timer allows it
                                !Auto-updates 1st progress bar
  LOOP 3 TIMES
    NEXT(File)
    IF ERRORCODE() THEN BREAK.
    ?ProgressBar{PROP:progress} = ?ProgressBar{PROP:progress} + 1
                                !Manually update progress bar
    !Perform some batch processing code
  . . .
CLOSE(File)

```

## PROP:RejectCode

---

ENTRY, TEXT, COMBO, or SPIN control property which returns the last value REJECTCODE value set in EVENT:Rejected. PROP:RejectCode is persistent, while the REJECTCODE procedure only returns a valid value during EVENT:Rejected.

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
    ENTRY(@N8),AT(100,140,32,20),USE(E1)
    BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
    BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
END

CODE
OPEN(MDIChild)
ACCEPT
CASE EVENT()
OF EVENT:Completed
    BREAK
END
CASE FIELD()
OF ?Ok
    CASE EVENT()
    OF EVENT:Accepted
        SELECT
    END
OF ?E1
    CASE EVENT()
    OF EVENT:Accepted
        IF ?E1{PROP:RejectCode} <> 0      !Check for rejected entry
            SELECT(?)                    ! and make the user re-enter
            CYCLE                        ! immediately
        END
    END
OF ?Cancel
    CASE EVENT()
    OF EVENT:Accepted
        BREAK
    END
END
END
```

## PROP:ScreenText

---

Returns the text displayed on screen in the specified control.

Example:

```
WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
              SPIN(@n3),AT(0,0,320,180),USE(Fil:Field),RANGE(0,255)
              END

CODE
OPEN(WinView)
ACCEPT
CASE FIELD()
OF ?Fil:Field
CASE EVENT()
OF EVENT:Rejected
MESSAGE(?Fil:Field{PROP:ScreenText} & ' is not in the range 0-255')
SELECT(?)
CYCLE
END
END
END
```

## PROP:SelStart, PROP:Selected, PROP:SelEnd

---

PROP:SelStart (also named PROP:Selected) sets or retrieves the beginning (inclusive) character to mark as a block in an ENTRY or TEXT control. It positions the data entry cursor left of the character, and sets PROP:SelEnd to zero (0) to indicate no block is marked. It also identifies the currently highlighted entry in a LIST or COMBO control (usually coded as PROP:Selected for this purpose).

PROP:SelEnd sets or retrieves the ending (inclusive) character to mark as a block in an ENTRY or TEXT control.

Example:

```
WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
              ENTRY(@S30),AT(0,0,320,180),USE(Fil:Field),ALRT(F10Key)
              LIST,AT(6,6,120,90),USE(?List),FORMAT('120L'),FROM(Q),IMM
              END

CODE
OPEN(WinView)
ACCEPT
CASE ACCEPTED()
OF ?List
GET(Q,?List{PROP:Selected})           !Get highlighted entry from queue
OF ?Fil:Field
SETCLIPBOARD(Fil:Field[?Fil:Field{PROP:SelStart} : ?Fil:Field{PROP:SelEnd}])
                                     !Place highlighted string slice in Windows' clipboard
END
END
```

## PROP:Size

Returns or sets the size of a BLOB field. Before assigning data to the BLOB using the string slicing technique, if the BLOB does not yet contain any data you must set its size using PROP:Size. Before assigning additional data that will increase the amount of data in the BLOB (using the string slicing technique), you must reset its size using PROP:Size.

Example:

```
Names      FILE, DRIVER('TopSpeed')
NbrKey     KEY(Names: Number)
Notes      BLOB                      !Can be larger than 64K
Rec        RECORD
Name       STRING(20)
Number     SHORT
. .

BlobSize   LONG
BlobBuffer1 STRING(65520), STATIC    !Maximum size string
BlobBuffer2 STRING(65520), STATIC    !Maximum size string

WinView    WINDOW('View BLOB Contents'), AT(0,0,320,200), SYSTEM
           TEXT, AT(0,0,320,180), USE(BlobBuffer1), VSCROLL
           TEXT, AT(0,190,320,180), USE(BlobBuffer2), VSCROLL, HIDE
           END

CODE
OPEN(Names)
SET(Names)
NEXT(Names)
OPEN(WinView)
BlobSize = Names.Notes{PROP:Size}      !Get size of BLOB contents
IF BlobSize > 65520
  BlobBuffer1 = Names.Notes[0 : 65519]
  BlobBuffer2 = Names.Notes[65520 : BlobSize - 1]
  WinView{PROP:Height} = 400
  UNHIDE(?BlobBuffer2)
ELSE
  BlobBuffer1 = Names.Notes[0 : BlobSize - 1]
END
ACCEPT
END
```

## PROP:TabRows, PROP:NumTabs

PROP:TabRows returns the number of rows of TABs in a SHEET. (READ-ONLY)

PROP:NumTabs returns the number of TABs in a SHEET. (READ-ONLY)

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
SHEET,AT(0,0,320,175),USE(SelectedTab)
TAB('Tab One'),USE(?TabOne)
    OPTION('Option 1'),USE(OptVar1),KEY(F10Key),HLP('Option1Help')
    RADIO('Radio 1'),AT(20,0,20,20),USE(?R1)
    RADIO('Radio 2'),AT(40,0,20,20),USE(?R2)
    END
    OPTION('Option 2'),USE(OptVar2),MSG('Option 2')
    RADIO('Radio 3'),AT(60,0,20,20),USE(?R3)
    RADIO('Radio 4'),AT(80,0,20,20),USE(?R4)
    END
END
TAB('Tab Two'),USE(?TabTwo)
    PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
    ENTRY(@S8),AT(100,140,32,20),USE(E1)
    PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P2)
    ENTRY(@S8),AT(100,240,32,20),USE(E2)
    END
TAB('Tab Three'),USE(?TabThree)
    OPTION('Option 3'),USE(OptVar3)
    RADIO('Radio 1'),AT(20,0,20,20),USE(?R5)
    RADIO('Radio 2'),AT(40,0,20,20),USE(?R6)
    END
    OPTION('Option 4'),USE(OptVar4)
    RADIO('Radio 3'),AT(60,0,20,20),USE(?R7)
    RADIO('Radio 4'),AT(80,0,20,20),USE(?R8)
    END
END
TAB('Tab Four'),USE(?TabFour)
    PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P3)
    ENTRY(@S8),AT(100,140,32,20),USE(E3)
    PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P4)
    ENTRY(@S8),AT(100,240,32,20),USE(E4)
    END
END
BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
END

CODE
OPEN(MDIChild)
MESSAGE('Number of TABs: ' & ?SelectedTab{PROP:NumTabs})
MESSAGE('Number of rows of TABs: ' & ?SelectedTab{PROP:TabRows})
ACCEPT
END
```

## **PROP:TempImage**

---

Property of an IMAGE control which returns the filename it creates for an image. For internal use in the Internet Connect templates, only.

## **PROP:TempImageStatus**

---

Property of an IMAGE control which returns whether or not PROP:TempImage created a new file or overwrote an existing file. For internal use in the Internet Connect templates, only.

## **PROP:TempPath**

---

Array SYSTEM property which sets or returns the path containing the temporary files for the page images or the path containing the temporary image files set by PROP:PrintMode. For internal use in the Internet Connect templates, only.

## **PROP:TempPagePath**

---

SYSTEM property which sets or returns the path containing the temporary files for the page images. Equivalent to {PROP:TempPath,1}. For internal use in the Internet Connect templates, only.

## **PROP:TempImagePath**

---

SYSTEM property which sets or returns the path containing the temporary image files set by PROP:PrintMode or PROP:TempImage. Equivalent to {PROP:TempPath,2}. For internal use in the Internet Connect templates, only.

## PROP:TempNameFunc

Property of a REPORT which allows you to create your own names for the metafiles generated for the PREVIEW attribute by writing a callback function to supply the metafile name for each page of the report. The callback function must be a PROCEDURE which takes a SIGNED parameter and returns a STRING.

To turn this on, you must assign the ADDRESS of your callback function to PROP:TempNameFunc. To turn it off, you must assign zero (0).

The report engine, when it is about to write a page of the report to disk, calls your procedure, passing it the page number, and uses the return value from your procedure as the name of the metafile (both on disk and in the PREVIEW attribute's QUEUE). The callback function must create the file to ensure that the name is available.

When using PROP:TempNameFunc, PROP:FlushPreview writes the metafiles to the printer but does not automatically delete them (you must clean them up yourself, whenever your program is finished using them).

Example:

```

MEMBER('MyApp')
MAP
PageNames  PROCEDURE(SIGNED),STRING           !Callback function prototype
END

MyReport   PROCEDURE
MyQueue    QUEUE                               !Preview queue
           STRING(64)
END
Report     REPORT,PREVIEW(MyQueue)             !ReportDeclaration
END

CODE
OPEN(Report)
Report{PROP:TempNameFunc} = ADDRESS(PageNames) !Assign ADDRESS to property so the
                                           ! report engine calls PageNames to
                                           ! get the name to use for each page

!Report processing code goes here
Report{PROP:TempNameFunc} = 0                !Assign zero to property to turn off
Report{PROP:FlushPreview} = TRUE              !Send the report to the printer
                                           ! and the .WMF files are still on disk

PageNames  PROCEDURE(PageNumber)              !Callback function for page names
NameVar    STRING(260),STATIC
PageFile   FILE,DRIVER('DOS'),NAME(NameVar),CREATE
Rec        RECORD
F1         LONG
. .
CODE
NameVar = PATH() & '\\PAGE' & FORMAT(PageNumber,@n04) & '.WMF'
CREATE(PageFile)
RETURN(NameVar)

```



## PROP:Thread

---

Returns the thread number of a window. This is not necessarily the currently executing thread, if you've used SETTARGET to set the TARGET built-in variable. (READ-ONLY)

Example:

```
WinView      WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL,SYSTEM
              END
ToolboxThread BYTE
CODE
OPEN(WinView)
ToolboxThread = ToolboxWin{PROP:Thread}      !Get window thread number
ACCEPT
END
```

## PROP:Threading

---

Property of the SYSTEM built-in variable which, when set to zero (0), disables all MDI behavior and turns the application into an SDI application.

Example:

```
PROGRAM
!Data declarations
CODE
IF SomeCondition = TRUE
    SYSTEM{PROP:Threading} = 0      !Set to SDI behavior
END
```

## PROP:TipDelay, PROP:TipDisplay

---

PROP:TipDelay sets the time delay before tooltip display (TIP attribute) for the SYSTEM (16-bit only).

PROP:TipDisplay sets the duration of tooltip display (TIP attribute) for the SYSTEM (16-bit only).

Example:

```
WinView      APPLICATION('MyApp'),AT(0,0,320,200),MAX,HVSCROLL,SYSTEM
              END

CODE
OPEN(WinView)
SYSTEM{PROP:TipDelay} = 50          !Delay TIP display for 1/2 second
SYSTEM{PROP:TipDisplay} = 500      !TIP display for 5 seconds
ACCEPT
END
```

## PROP:Touched

When non-zero, indicates the data in the ENTRY, TEXT, SPIN, or COMBO control with input focus has been changed by the user since the last EVENT:Accepted. This is automatically reset to zero each time the control generates an EVENT:Accepted. Setting this property (in EVENT:Selected) allows you to ensure that EVENT:Accepted generates to force data validation code to execute, overriding Windows' standard behavior—simply pressing TAB to navigate to another control does not automatically generate EVENT:Accepted.

PROP:Touched can also be interrogated to determine if the content of a BLOB has changed since it was retrieved from disk.

Example:

```
WinView    WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
            ENTRY(@S30),AT(0,0,320,180),USE(Fil:Field)
            BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
            BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
            END
SaveCancelPos LONG,DIM(4)
CODE
OPEN(WinView)
SaveCancelPos[1] = ?Cancel{PROP:Xpos}           !Save Cancel button area
SaveCancelPos[2] = ?Cancel{PROP:Xpos}+?Cancel{PROP:Width}
SaveCancelPos[3] = ?Cancel{PROP:Ypos}
SaveCancelPos[4] = ?Cancel{PROP:Ypos}+?Cancel{PROP:Height}
ACCEPT
CASE FIELD()
OF ?Fil:Field
CASE EVENT()
OF EVENT:Selected
    ?Fil:Field{PROP:Touched} = 1                !Force EVENT:Accepted to generate
OF EVENT:Accepted
    IF KEYCODE() = MouseLeft AND |              !Detect user clicking on Cancel
        INRANGE(MOUSEX(),SaveCancelPos[1],SaveCancelPos[2]) AND |
        INRANGE(MOUSEY(),SaveCancelPos[3],SaveCancelPos[4])
        CYCLE                                  !User clicked on Cancel
    ELSE
        !Process the data, whether entered by the user or in the field at the start
    END
OF ?Ok
CASE EVENT()
OF EVENT:Accepted
    !Write the data to disk
END
OF ?Cancel
CASE EVENT()
OF EVENT:Accepted
    !Do not write the data to disk
END
END
END
END
```

## PROP:Type

---

Contains the type of control. Values are the CREATE:xxxx equates (listed in EQUATES.CLW). (READ-ONLY)

Example:

```
MyField  STRING(1)
?MyField  EQUATE(100)

WinView   WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
          END

CODE
OPEN(WinView)
IF UserChoice = 'CheckField'
    CREATE(?MyField,CREATE:Check)
ELSE
    CREATE(?MyField,CREATE:Entry)
END
?MyField{PROP:Use} = MyField
SETPOSITION(?MyField,10,10)
IF ?MyField{PROP:Type} = CREATE:Check           !Check control type
    ?MyField{PROP:TrueValue} = 'T'
    ?MyField{PROP:FalseValue} = 'F'
END
ACCEPT
END
```

## PROP:UpsideDown

This toggles both the UP and DOWN attributes at once to display inverted TAB control text in a SHEET structure.

Example:

```
WinView  WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
          SHEET,AT(0,0,320,175),USE(SelectedTab),RIGHT,DOWN  !Tabs right reading down
          TAB('Tab One'),USE(?TabOne)
            PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
            ENTRY(@S8),AT(100,140,32,20),USE(E1)
            PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P2)
            ENTRY(@S8),AT(100,240,32,20),USE(E2)
          END
            PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P3)
            ENTRY(@S8),AT(100,140,32,20),USE(E3)
            PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P4)
            ENTRY(@S8),AT(100,240,32,20),USE(E4)
          END
        END
        BUTTON('OK'),AT(100,180,20,20),USE(?Ok)
        BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
      END
CODE
OPEN(WinView)
?SelectedTab{PROP:BELOW} = TRUE      !Set tabs to display at bottom of sheet
?SelectedTab{PROP:UpsideDown} = TRUE !Invert the text displayed on the tabs
ACCEPT
END
```

## PROP:VBXEvent, PROP:VBXEventArgs

PROP:VBXEvent returns the name of a VBX event. (READ-ONLY)

PROP:VBXEventArgs returns VBX event parameters. An array.

Example:

```
WinView  WINDOW('View'),AT(0,0,320,200),MDI,MAX,HVSCROLL
          CUSTOM,USE(?Graph),CLASS('graph.vbx','graph'),'graphstyle'('2')
        END

CODE
OPEN(WinView)
ACCEPT
CASE EVENT()
OF EVENT:VBXEvent
  IF ?Graph{PROP:VBXEvent} = 'FooEvent'      !Check event name
    ProcessFoo(?Graph{PROP:VBXEventArgs,1},?Graph{PROP:VBXEventArgs,2})
    !Get 1st and 2nd event parameters and pass to process procedure
  END
END
END
END
```

## PROP:Visible

Returns an empty string if the control is not visible because either because it has been hidden, or it is a member of a “parent” control (OPTION, GROUP, MENU, SHEET, or TAB) that is hidden, or is on a TAB control page that is not currently selected. (READ-ONLY)

Example:

```
MDIChild WINDOW('Child One'),AT(0,0,320,200),MDI,MAX,HVSCROLL
    SHEET,AT(0,0,320,175),USE(SelectedTab)
        TAB('Tab One'),USE(?TabOne)
            PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P1)
            ENTRY@S8,AT(100,140,32,20),USE(E1)
            PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P2)
            ENTRY@S8,AT(100,240,32,20),USE(E2)
        END
        TAB('Tab Two'),USE(?TabTwo)
            PROMPT('Enter Data:'),AT(100,100,20,20),USE(?P3)
            ENTRY@S8,AT(100,140,32,20),USE(E3)
            PROMPT('Enter More Data:'),AT(100,200,20,20),USE(?P4)
            ENTRY@S8,AT(100,240,32,20),USE(E4)
        END
    END
    BUTTON('Ok'),AT(100,180,20,20),USE(?Ok)
    BUTTON('Cancel'),AT(200,180,20,20),USE(?Cancel)
END

CODE
OPEN(MDIChild)
ACCEPT
    CASE EVENT()
    OF EVENT:Completed
        BREAK
    END
    CASE FIELD()
    OF ?Ok
        CASE EVENT()
        OF EVENT:Accepted
            SELECT
            END
        OF ?E3
            CASE EVENT()
            OF EVENT:Accepted
                E3 = UPPER(E3)                !Convert the data entered to Upper case
                IF ?E3{PROP:Visible} AND MDIChild{PROP:AcceptAll}
                    !Check for visibility during AcceptAll mode
                    DISPLAY(?E3)             ! and display the upper cased data
                END
            END
        OF ?Cancel
            CASE EVENT()
            OF EVENT:Accepted
                BREAK
            END
        END
    END
END
```

## PROP:VLBproc, PROP:VLBval

PROP:VLBProc sets the source procedure for a “Virtual List Box” LIST or COMBO control without a FROM attribute. This procedure provides the control with the data to display.

The procedure’s prototype must take three parameters:

```
VLBProc PROCEDURE(LONG, LONG, SHORT), STRING
```

where the first LONG is either SELF (indicating the procedure is a method of a CLASS) or the value set for PROP:VLBval. The second LONG passes the row number of the virtual list box to affect. There are three “special” values for this parameter, -1 asks for the number of records to display in the list, -2 asks for the number of fields in the nominal Queue (data and color/tree/icon fields) to display in the list, and -3 asks if there are any changes to display. The SHORT parameter specifies the column number of the virtual list box to affect.

PROP:VLBVal sets the source object for a “Virtual List Box” LIST or COMBO control without a FROM attribute. This can be any 32-bit unique value to identify the specific list box, but is generally the return value of ADDRESS(SELF) when the PROP:VLBProc procedure is a CLASS method.

Example:

```
PROGRAM
MAP
    Main
END

StripedListQ  QUEUE,TYPE
S              STRING(20)
END

StripedList  CLASS,TYPE
Init          PROCEDURE(WINDOW w, SIGNED feq, StripedListQ Q)
VLBproc       PROCEDURE(LONG row, SHORT column),STRING,PRIVATE
               !Required first parameter is implicit in a CLASS method
Q             &StripedListQ,PRIVATE
ochanges      LONG,PRIVATE
END

CODE
Main

StripedList.Init  PROCEDURE(WINDOW w, SIGNED feq, StripedListQ Q)

CODE
SELF.Q &= Q
SELF.ochanges = CHANGES(Q)

w $ feq{PROP:VLBval} = ADDRESS(SELF)           !Must assign this first
w $ feq{PROP:VLBproc} = ADDRESS(SELF.VLBproc)  ! then this
```

StripedList.VLBproc PROCEDURE(LONG row, SHORT col) !Required first parameter is implied

nchanges LONG

```

CODE
CASE row
OF -1
    RETURN RECORDS(SELF.Q)          ! How many rows?
OF -2
    RETURN 5                        ! How many columns?
    ! 1 data, four color fields in the "nominal Q"
OF -3
    RETURN 1                        ! Has it changed
    nchanges = CHANGES(SELF.Q)
    IF nchanges <> SELF.ochanges THEN
        SELF.ochanges = nchanges
        RETURN 1
    ELSE
        RETURN 0
    END
ELSE
    GET(SELF.Q, row)
    CASE col
    OF 1
        RETURN WHAT(SELF.Q,1)      !Data field
    OF 3
        RETURN CHOOSE(BAND(row,1), COLOR:none, 0c00000H)
        !Background color field
    ELSE
        RETURN COLOR:None          !All other fields
        ! Use default color
    END
END
END

```

Main PROCEDURE

```

window WINDOW('Caption'),AT(.,153,103),GRAY
    LIST,AT(33,12,80,80),USE(?List1),FORMAT('20L*')
    END
Q    QUEUE(StripedListQ)
    END
SL   StripedList
i    SIGNED
CODE
LOOP i = 1 TO 20
    Q.s = 'Line ' & i
    ADD(Q)
END
OPEN(window)
SL.Init(window, ?list1, Q)
ACCEPT
END

```





## PROP:WndProc

Sets or gets the window's (not the client area) or a specific control's messaging procedure for use with low-level Windows API calls that require it. Generally used in sub-classing to track all Windows messages.

Example:

```

PROGRAM
MAP
Main      PROCEDURE
SubClassFunc1  PROCEDURE(USHORT,SHORT,USHORT,LONG),LONG,PASCAL
SubClassFunc2  PROCEDURE(USHORT,SHORT,USHORT,LONG),LONG,PASCAL
MODULE('Windows')                                !TopSpeed Win31 Library
CallWindowProc PROCEDURE(LONG,UNSIGNED,SIGNED,UNSIGNED,LONG),LONG,PASCAL
. . .                                             !End MAP and MODULE
SavedProc1    LONG
SavedProc2    LONG
WM_MOUSEMOVE  EQUATE(0200H)
PT            GROUP
X             SHORT
Y             SHORT
END

CODE
Main
Main      PROCEDURE
WinView   WINDOW('View'),AT(0,0,320,200),HVSCROLL,MAX,TIMER(1),STATUS
          STRING('X Pos'),AT(1,1,,),USE(?String1)
          STRING(@n3),AT(24,1,,),USE(PT:X)
          STRING('Y Pos'),AT(44,1,,),USE(?String2)
          STRING(@n3),AT(68,1,,),USE(PT:Y)
          BUTTON('Close'),AT(240,180,60,20),USE(?Close)
END

CODE
OPEN(WinView)
SavedProc1 = WinView{PROP:WndProc}                !Save this procedure
WinView{PROP:WndProc} = ADDRESS(SubClassFunc1)     !Name subclass procedure
SavedProc2 = WinView{PROP:ClientWndProc}           !Save this procedure
WinView{PROP:ClientWndProc} = ADDRESS(SubClassFunc2) !Name subclass procedure
ACCEPT
CASE ACCEPTED()
OF ?Close
BREAK
. . .
SubClassFunc1  PROCEDURE(hWnd,wMsg,wParam,lParam)  !Sub class procedure
CODE                                                  ! to track mouse movement in
IF wMsg = WM_MOUSEMOVE                               ! window's status bar (only)
PT.X = MOUSEX() ; PT.Y = MOUSEY()                   !Assign mouse position
END
RETURN(CallWindowProc(SavedProc1,hWnd,wMsg,wParam,lParam))!Pass control to SavedProc1

SubClassFunc2  PROCEDURE(hWnd,wMsg,wParam,lParam)  !Sub class procedure
CODE                                                  ! to track mouse movement in
IF wMsg = WM_MOUSEMOVE                               ! window's client area
PT.X = MOUSEX() ; PT.Y = MOUSEY()                   !Assign mouse position
END
RETURN(CallWindowProc(SavedProc2,hWnd,wMsg,wParam,lParam))!Pass control to SavedProc2

```

## ***Runtime VIEW and FILE Properties***

### **PROP:ConnectString**

---

Property of a FILE using the ODBC driver that returns the connection string (normally stored in the file's OWNER attribute) that would allow a complete connection. If the OWNER attribute contains only a data source name, a login screen appears to ask for the rest of the required details before the connection is made. This login window appears every time you log on. With this property, the developer can enter information in the login screen once, then set the OWNER attribute to the return value from PROP:ConnectString, eliminating the login.

Example:

```
OwnerString  STRING(20)
Customer  FILE,DRIVER('ODBC'),OWNER(OwnerString)
Record      RECORD
Name        STRING(20)
. .
CODE
OwnerString = 'DataSourceName'
OPEN(Customer)
OwnerString = Customer{PROP:ConnectString}      !Get full connect string
MESSAGE(OwnerString)                            !Display it for future use
```

### **PROP:CurrentKey**

---

Property of a FILE that returns a reference to the current KEY or INDEX being used for sequential processing, or the current key being built during a BUILD or PACK operation (READ ONLY). Valid only as the source side of a reference assignment statement or in a logical expression comparing the return result to NULL. Returns NULL if the file is being processed in record order.

Example:

```
KeyRef  &KEY
Customer  FILE,DRIVER('Clarion'), PRE(Cus)
NameKey   KEY(Cus:Name),DUP
Record      RECORD
Name        STRING(20)
. .
CODE
OPEN(Customer)
SET(Customer)
KeyRef &= Customer{PROP:CurrentKey}      !Returns NULL
IF Customer{PROP:CurrentKey} &= NULL      !Compare to NULL
    MESSAGE('SET to record order')
END
SET(Cus:NameKey)
KeyRef &= Customer{PROP:CurrentKey}      !Returns reference to Cus:NameKey
```

## PROP:DriverLogoutAlias

---

Property of a FILE that returns whether the file driver allows the LOGOUT statement to name both a file and an alias for the file in the same statement (READ ONLY).

Example:

```
IF Customer{PROP:DriverLogoutAlias} = ''    !Test for alias allowed in LOGOUT
  MESSAGE('Driver does not allow files and their aliases in LOGOUT')
END
```

## PROP:FetchSize

---

Property of a FILE or VIEW which sets or gets the *pagesize* parameter for the last BUFFER statement executed.

Example:

```
CODE
OPEN(MyFile)
BUFFER(MyFile,10,5,2,300)    !10 records per page, 5 pages behind and 2 read-ahead,
                             ! with a 5 minute timeout
MyFile{PROP:FetchSize} = 1  !Change fetch rate to one record at a time
```

## PROP:File

---

An array property of a VIEW. Each array element returns a reference to the numbered file in the VIEW. This reference can be used as the source side of a reference assignment statement. The files are numbered within the VIEW starting with 1 (the primary file in the VIEW) and continuing for each JOIN, as they appear within the VIEW structure. (READ ONLY)

## PROP:Files

---

Property of a VIEW which returns the total number of files in the VIEW. This is equivalent to the total number of JOIN structures, plus one (the primary file named in the VIEW statement itself). (READ ONLY)

Example:

```

AView  VIEW(BaseFile)                                !File 1
        JOIN(ParentFile,'BaseFile.parentID = ParentFile.ID') !File 2
        JOIN(GrandParent.PrimaryKey, ParentFile.GrandParentID) !File 3
        END
    END
        JOIN(OtherParent.PrimaryKey,BaseFile.OtherParentID)      !File 4
    END
END
        ! AView{PROP:Files} returns 4
        ! AView{PROP:File,1} returns a reference to BaseFile
        ! AView{PROP:File,2} returns a reference to Parent
        ! AView{PROP:File,3} returns a reference to GrandParent
        ! AView{PROP:File,4} returns a reference to OtherParent

FilesQ  QUEUE
FileRef  &FILE
        END

CODE
LOOP X# = 1 TO AView{PROP:Files}                !Loop 4 times
    FilesQ.FileRef &= AView{PROP:File,X#}        !Reference assign each file in the VIEW
    ADD(FilesQ)                                  ! and add it to the queue
    ASSERT(~ERRORCODE())                        !Assume no errors
    CLEAR(FilesQ)                                !Clear the queue for the next assignment
END

```

## PROP:GlobalHelp

---

SYSTEM property which, when on, specifies disabling automatic .HLP file closing when the window which opened the .HLP file is closed. This makes the .HLP file stay open until the user closes it.

Example:

```
SYSTEM{PROP:GlobalHelp} = TRUE           !Disable automatic HLP file close
```

## PROP:Held

---

Property of a FILE that returns whether the current record is held. Returns 1 if the record is held and an empty string (‘’) if not. (READ ONLY)

Example:

```
FileName  STRING(256)
Customer  FILE, DRIVER('Clarion')
Record    RECORD
Name      STRING(20)

      . .
CODE
  OPEN(Customer)
  SET(Customer)
  LOOP
    HOLD(Customer,1)
    NEXT(Customer)
    IF ERRORCODE() THEN BREAK.
    IF Customer{PROP:Held} <> ''
      MESSAGE('Record Held')
  END
END
```

## PROP:Logout

Property of a FILE that assigns or returns the priority level of the referenced FILE within a transaction. PROP:Logout may be used to build the list of files in the transaction before issuing the LOGOUT(*seconds*) statement to begin the transaction. By using PROP:Logout, you can add more files to the transaction than the limited number of parameters the LOGOUT statement will allow. If the LOGOUT statement lists any files at all, all files previously set for the transaction by PROP:Logout are removed from the transaction and only the files listed in the LOGOUT statement are logged out.

The priority level indicates the order in which the file is logged out in the transaction, with lower numbers being logged out before the higher numbers. If two files have the same priority level, they are logged out in the order in which they were added to the logout list. Assigning a positive priority level adds the FILE to the transaction, assigning a negative priority level removes the FILE from the transaction, and assigning zero (0) has no effect. Querying PROP:Logout returns the priority level assigned to the file, and zero (0) if the file is not a part of the transaction.

Attempting to use PROP:Logout to add a file to the transaction which uses a different file driver will result in ERRORCODE 48, "Unable to log transaction."

Example:

```

Customer  FILE,DRIVER('TopSpeed')
Record    RECORD
CustNumber LONG
Name      STRING(20)
.
Orders    FILE,DRIVER('TopSpeed')
Record    RECORD
CustNumber LONG
OrderNumber LONG
OrderDate  LONG
.
Items     FILE,DRIVER('TopSpeed')
Record    RECORD
OrderNumber LONG
ItemNumber LONG
.
CODE
Customer{PROP:Logout} = 1      !Add Customer file to logout list and set priority to 1
Items{PROP:Logout} = 2        !Add Items file to logout list and set priority to 2
Orders{PROP:Logout} = 1       !Add Orders file to logout list and set priority to 1
X# = Items{PROP:Logout}       !Return Items file priority level (X# = 2)
Customer{PROP:Logout} = -1    !Remove Customer file from logout list
LOGOUT(1)                     !Begin transaction and
                               ! logout files in this order: Orders, Items
COMMIT                         !Terminate the transaction

```

## PROP:Profile

---

Property of a FILE that toggles logging out (profiling) all file I/O calls and errors returned by the file driver to a specified text file. Assigning a filename to PROP:Profile initiates profiling, while assigning an empty string (‘’) turns off profiling. Querying this property returns the name of the current logfile, and an empty string (‘’) if profiling is turned off.

## PROP:Log

---

Property of a FILE that writes a string to the current profile output file (assigned to PROP:Profile). This string is placed on its own line in the file. (WRITE ONLY)

Example:

```

FileName  STRING(256)
Customer  FILE, DRIVER('TopSpeed')
Record    RECORD
Name      STRING(20)
. . .

CODE
Customer{PROP:Profile} = 'CustLog.TXT'    !Turn profiling on, output file: CustLog.TXT
OPEN(Customer)
Filename = Customer{PROP:Profile}         !Get name of current log file
Customer{PROP:Log} = CLIP(Filename)       & ' ' & |
                                         FORMAT(TODAY(),@D2) & ' ' & |
                                         FORMAT(CLOCK(),@T1)
                                         !Write a line of text to the log file

SET(Customer)
LOOP
  NEXT(Customer)                         !All file I/O action is logged out to
  IF ERRORCODE() THEN BREAK.             ! the CustLog.TXT file
END
Customer{PROP:Profile} = ''              !Turn profiling off

```

## PROP:ProgressEvents, PROP:Completed

PROP:ProgressEvents is a property of a FILE that generates events to the currently open window during a BUILD or PACK operation (WRITE ONLY). This property is driver-dependent, see the file driver's documentation for support.

Assigning a value of zero (0) turns off event generation for the next BUILD or PACK statement executed, while assigning any other value (valid range—1 to 100) turns on event generation. Out of range assignments are treated as follows: a negative number is treated as one (1), and any value greater than one hundred (100) is treated as one hundred (100). The larger the value assigned, the more events are generated and the slower the BUILD or PACK will progress.

Events generated are: EVENT:BuildFile, EVENT:BuildKey, and EVENT:BuildDone. It is not valid to make any calls to the FILE being built except to query its properties, call NAME(*file*), or CLOSE(*file*) (which aborts the process and is not recommended). Issuing a CYCLE statement in response to any of the events generated (except EVENT:BuildDone) cancels the operation.

PROP:CurrentKey may be used to get a reference to the current key being built, then PROP:Label may be used to retrieve the key's label for display to the user.

PROP:Completed is a property of a FILE that returns the percentage completed of the re-build during a BUILD or PACK operation for which PROP:ProgressEvents has been turned on. Returns zero (0) if the file driver does not know how much of the BUILD or PACK has been done. (READ ONLY)

Example:

```
PROGRAM
MAP.
INCLUDE('ERRORS.CLW')
Test  FILE, DRIVER('TOPSPEED', '/FULLBUILD=ON'), CREATE, PRE(TEST)
K1    KEY(Test:Xval)
      RECORD
Xval  LONG
      . .
counter  LONG
CurrentKey &KEY
cancelling BYTE(FALSE)
BuildDone BYTE(FALSE)
Completed LONG(1)
CurEvent LONG
window  WINDOW('Time Slicing Build Example'), AT(., 127, 68), SYSTEM, GRAY
      STRING('Building'), AT(9, 6), USE(?BuildStr)
      STRING(''), AT(39, 6), USE(?Name)
      PROGRESS, USE(counter), AT(9, 25, 107, 8), RANGE(0, 100)
```



```

        BUTTON('&Cancel'),AT(82,45),USE(?Cancel),DISABLE
    END
CODE
OPEN(Test)
IF ERRORCODE()
    CREATE(Test); OPEN(Test); STREAM(Test)
    LOOP 20000 TIMES
        Test.Xval = X#; X# += 1; APPEND(Test)
    END
    FLUSH(Test)
END
OPEN(window)
ACCEPT
    CurEvent = EVENT()
    CASE CurEvent
    OF EVENT:OpenWindow
        Test{PROP:ProgressEvents} = 100                !Turn on event generation
        BUILD(Test)
        ENABLE(?Cancel)
    OF EVENT:Accepted
        IF ACCEPTED() = ?Cancel
            IF BuildDone THEN BREAK.
            IF MESSAGE('Cancelling build leaves file unusable. Cancel Anyway?', 'Warning', |
                ICON:Exclamation,BUTTON:Yes+BUTTON:No,BUTTON:No) = BUTTON:Yes
                Cancelling = TRUE
                ?BuildStr{PROP:Text} = 'Please Wait. Cancelling Build'
                ?Name{PROP:Text} = ''
                DISPLAY(?BuildStr,?Name)
            END
        END
    OF EVENT:BuildFile
    OR OF EVENT:BuildKey                                !Process BUILD events
        IF Cancelling = TRUE; DO Done; CYCLE.
        IF CurEvent = EVENT:BuildKey
            CurrentKey &= Test{PROP:CurrentKey}          !Get current key reference
            IF NOT (CurrentKey &= NULL)
                ?Name{PROP:Text} = CurrentKey{PROP:Label} !Display key name
            END
        ELSE
            ?Name{PROP:Text} = NAME(Test)
        END
        IF Completed <> 0; Completed = Test{PROP:Completed}. !Get completion percentage
        IF Completed = 0
            counter += 10
            IF (counter>100) THEN counter = 0.
        ELSE
            counter = Completed
        END
        DISPLAY(?Name,?Counter)
    OF EVENT:BuildDone
        DO Done
    END
END
OPEN(Test)
IF ERRORCODE() = BadKeyErr THEN MESSAGE(NAME(Test) & ' BUILD failed' ).

Done ROUTINE
    BuildDone = TRUE
    ?Cancel{PROP:Text} = '&OK'
    CLOSE(Test)

```

## PROP:SQLDriver

---

A of a FILE that returns '1' if the file driver accepts SQL, otherwise it returns an empty string (''). (READ ONLY)

Example:

```
Customer  FILE,DRIVER('Clarion'),PRE(CUS)
Record    RECORD
Name      STRING(20)
. . .
SQLFlag  BYTE
CODE
IF Customer{PROP:SQLDriver} THEN SQLFlag = TRUE.
```

## PROP:Text

---

An array property of a FILE that sets or returns the specified MEMO field's data. MEMO controls are negatively numbered, therefore the array element number must be a negative value.

Example:

```
MemoText  STRING(2000)
Customer  FILE,DRIVER('Clarion'),PRE(CUS)
Notes     MEMO(2000)
Record    RECORD
Name      STRING(20)
. . .
CODE
OPEN(Customer)
SET(Customer)
NEXT(Customer)
ASSERT(~ERRORCODE())
Memotext = Customer{PROP:Text,-1}
```

## PROP:Value

---

An array property of a FILE that sets or returns the data contained in a specified MEMO field (use the WHAT procedure for any other type of field). The array element for PROP:Value is a simple negative number which indicates the -n<sup>th</sup> MEMO.

Example:

```
Text      STRING(2000)
Number    LONG
Customer  FILE, DRIVER('TopSpeed'), PRE(CUS)
Notes     MEMO(2000)
Record    RECORD
Number    LONG, DIM(20)
Name      STRING(20)
. .
CODE
OPEN(Customer)
SET(Customer)
NEXT(Customer)
ASSERT(~ERRORCODE())
Text      = Customer{PROP:Value, -1}           !Get CUS:Notes contents
```

## PROP:Watched

---

Property of a FILE that returns whether the current record is being WATCHed. Returns 1 if the record is watched and an empty string (‘’) if not. (READ ONLY)

Example:

```
FileName  STRING(256)
Customer  FILE, DRIVER('Clarion')
Record    RECORD
Name      STRING(20)
. .
CODE
OPEN(Customer)
SET(Customer)
LOOP
  WATCH(Customer)
  NEXT(Customer)
  IF ERRORCODE() THEN BREAK.
  IF Customer{PROP:Watched} <> ''
    MESSAGE('Record watched')
  END
END
```

## Embedded SQL

### PROP:SQL

---

You can use Clarion's property syntax to execute SQL statements in your program code by using PROP:SQL and naming the FILE or VIEW as the *target*. This is only appropriate when using an SQL file driver (such as the ODBC, Scalable SQL, or Oracle drivers). You may also query the contents of PROP:SQL to get the last SQL statement issued by the file driver.

You may embed any SQL statements supported by the back-end SQL server. If you issue an SQL statement that causes a result set to be returned (such as an SQL SELECT statement), you must use NEXT(file) to retrieve the result set (one row at a time) into the file's record buffer. The FILE declaration receiving the result set must have the same number of fields as the SQL SELECT statement will return. The FILEERRORCODE() and FILEERROR() procedures will return any error code and error string set by the back-end SQL server if the Clarion ERRORCODE procedure returns 90.

Example:

```
SQLFile{PROP:SQL} = 'SELECT field1,field2 FROM table1'      |
                   & 'WHERE field1 > (SELECT max(field1))' |
                   & 'FROM table2'                        !Returns a result set that you get one
                                                         ! row at a time using NEXT(SQLFile)

SQLFile{PROP:SQL} = 'CALL GetRowsBetween(2,8)'             !Call a stored procedure
IF ERRORCODE() THEN STOP(FILEERROR()).                    !Check for errors

SQLFile{PROP:SQL} = 'CREATE INDEX ON table1 (field1, field2 DESC)' !No result set
SQLString = SQLFile{PROP:SQL}                             !Get last SQL statement issued by driver
```

### PROP:SQLFilter

---

You can use PROP:SQLFilter to filter VIEWS using native SQL code rather than Clarion code. This is only appropriate when using an SQL file driver (such as the ODBC, Scalable SQL, or Oracle drivers). If the first character of the PROP:SQLFilter expression is a plus sign (+), the PROP:SQLFilter expression is appended to any existing PROP:Filter expression and both are used. Omitting the plus sign replaces the existing PROP:Filter expression with the PROP:SQLFilter. When you use PROP:SQLFilter, the SQL filter is passed directly to the server. As such, it cannot contain the name of variables or procedures that the server is not aware of.

Example:

```
View{PROP:SQLFilter} = 'DateField = TO_DATE(''01-MAY-1995'', 'DD-MON-YYYY')'
                                                         !Replaces any PROP:Filter expression
View{PROP:SQLFilter} = '+StrField LIKE ''AD%'''
                                                         !Appended to the PROP:Filter expression
```

# APPENDIX D - ERROR CODES

## Run Time Errors

### Trappable Run Time Errors

---

The following errors can be trapped in code with the `ERRORCODE` and `ERROR` procedures. Each error has a code number (returned by the `ERRORCODE` procedure) and an associated text message (returned by the `ERROR` procedure) indicating what the problem is.

**2 File Not Found**

The requested file does not exist in the specified directory.

**3 Path Not Found**

The directory name specified as part of the path does not exist.

**4 Too Many Open Files**

The total number of file handles available has been used. Check the `FILES=` setting in the `CONFIG.SYS` file, or the user's or network's simultaneous open files setting in a network environment.

**5 Access Denied**

The file has already been opened by another user for exclusive access, has been left in a locked state, or you do not have network rights to open the file. This error can also occur when no disk space is available.

**7 Memory Corrupted**

Some unknown memory corruption has occurred.

**8 Insufficient Memory**

There is not enough unallocated memory left to perform the operation. Closing other applications may free up enough memory. With `Btrieve`, this indicates that you do not have enough real mode memory left to load `BTR32.EXE`. In Win95, loading `WBTR32.EXE` in `WINSTART.BAT` can avoid this problem.

**15 Invalid Drive**

An attempt to read a non-existent disk drive has failed.

**30 Entry Not Found**

A `GET` to `QUEUE` has failed. For `GET(Q, key)`, the matching *key* value was not found, and for `GET(Q, pointer)`, the *pointer* is out of range.

**32 File Is Already Locked**

An attempt to `LOCK` a file has failed because another user has already locked it.

**33 Record Not Available**

Usually an attempt to read past the end or beginning of file with NEXT or PREVIOUS. May also be posted by PUT or DELETE when no record was read before the attempted PUT or DELETE.

**35 Record Not Found**

For a GET(File,*key*), the matching *key* field value was not found.

**36 Invalid Data File**

Some unknown data file corruption has occurred, or the OWNER attribute does not match the password used to encrypt the file.

**37 File Not Open**

An attempt to perform some operation that requires the file be already open has failed because the file is not open.

**38 Invalid Key File**

Some unknown key file corruption has occurred.

**40 Creates Duplicate Key**

An attempt to ADD or PUT a record with key field values that duplicate another existing record in the file has been made to a file with a key that does not allow duplicate entries.

**43 Record Is Already Held**

An attempt to HOLD a record has failed because another user has already held it.

**45 Invalid Filename**

The filename does not meet the definition of a valid DOS filename.

**46 Key File Must Be Rebuilt**

Some unknown key corruption has occurred that requires the BUILD statement to re-build the key.

**47 Invalid Record Declaration**

The data file on disk does not match the file's declaration in the .EXE, usually because you have changed the file's definition in the Data Dictionary and have not yet converted the existing data file to the new format.

**48 Unable To Log Transaction**

A transaction logout or pre-image file cannot be written to disk. This usually occurs because no disk space is available, or the user does not have the proper network rights.

**52 File Already Open**

An attempt to OPEN a file that has already been opened by this user.

**54 No Create Attribute**

An attempt to execute the CREATE procedure on a file whose declaration does not include the CREATE attribute.

**55 File Must Be Shared**

An attempt to open a file for exclusive access that must be shared. (Legacy error, no longer used)

**56 LOGOUT Already Active**

An attempt to issue a second LOGOUT statement while a transaction is already in progress.

**57 Invalid Memo File**

Some unknown memo file corruption has occurred. For Clarion data files, this could come from a corrupt .MEM file “signature” or pointers to the memo file in the data file that are “out of sync” (usually due to copying files from one location to another and copying the wrong .MEM file).

**63 Exclusive Access Required**

An attempt to perform a BUILD(file), BUILD(key), EMPTY(file) or PACK(file) was made when the file had not been opened with exclusive access.

**64 Sharing Violation**

An attempt to perform some action on a file which requires that the file be opened for shared access.

**65 Unable To ROLLBACK Transaction**

An attempt to ROLLBACK a transaction has failed for some unknown reason.

**73 Memo File Missing**

An attempt to OPEN a file that has been declared with a MEMO field and the file containing that memo data does not exist.

**75 Invalid Field Type Descriptor**

Either the type descriptor is corrupt, you have used a *name* that does not exist in GET(Q,*name*), or the file definition is not valid for the file driver. For example, trying to define a LONG field in an xBase file without a matching MEMO field.

**76 Invalid Index String**

The index *string* passed to BUILD(DynIndex,*string*) was invalid.

**77 Unable To Access Index**

An attempt to retrieve records using a dynamic index failed because the dynamic index could not be found.

**78 Invalid Number Of Parameters**

You did not pass the correct number of parameters to a procedure called in an EVALUATE statement.

**79 Unsupported Data Type In File**

The file driver has detected a field in the file declared with a data type that is not supported by the file system the driver is designed to access.

**80 Unsupported File Driver Function**

The file driver has detected a file access statement that is not supported. This is frequently an unsupported form (different parameters) of a statement that is supported.

**81 Unknown Error Posted**

The file driver has detected some error from the backend file system that it cannot get further information about.

**88 Invalid Key Length**

An attempt to CREATE a Clarion file driver KEY or INDEX with more than 245 characters. Other file drivers can also return this error when their file system key length limits are exceeded.

**89 Record Changed By Another Station**

The WATCH statement has detected a record on disk that does not match the original version of the record about to be updated in a network situation.

**90 File Driver Error**

The file driver has detected some other error reported by the file system. You can use the FILEERRORCODE and FILEERROR procedures to determine exactly what native error the file system is reporting.

**91 No Logout Active**

The COMMIT or ROLLBACK statement has been issued outside of a transaction frame (no LOGOUT statement has been executed).

**92 BUILD in Progress**

A BUILD statement has been issued and PROP:ProgressEvents has been set to generate events. The statement generating this error is not appropriate to execute during a BUILD process.

**93 BUILD Cancelled**

The user cancelled the BUILD. This error is set when EVENT:BuildDone is posted.

**800 Illegal Expression**

The EVALUATE procedure has detected an error in the syntax of the expression it is attempting to evaluate.

**801 Variable Not Found**

The EVALUATE procedure has not found a variable used in the expression it is attempting to evaluate. You must first BIND all variables used in the expression for them to be visible to EVALUATE.



## Non-Trappable Run Time Errors

---

The following errors occur at run time and cannot be trapped with the `ERRORCODE` or `ERROR` procedures.

**ACCEPT loop requires a window**

An `ACCEPT` loop that has no associated window.

**ENDPAGE must only be called for reports**

An attempt to execute the `ENDPAGE` statement when no `REPORT` is active.

**Event posted to a report control**

An attempt to `POST` an event to a control in a `REPORT` structure.

**Metafile record too large in report**

A `.WMF` file is too large to print in the report.

**Mismatch with C4VBX.DLL detected**

The first `C4VBX.DLL` file encountered in the path is not the same version (usually an earlier version) than was used to create the `.EXE`.

**PRINT must only be called for reports**

An attempt to `PRINT` a structure that is not part of a `REPORT`.

**Report is already open**

An attempt to `OPEN` a `REPORT` that has already been opened and not yet closed.

**Too many keystrokes PRESSED**

The parameter to the `PRESS` statement contains too many characters.

**Unable to complete operation (system is MODAL)**

An attempt to perform an illegal action in a program that has already opened a `MODAL` window or is processing a modal event.

**Unable to create control (system is MODAL)**

An attempt to `CREATE` a control in a program that has already opened a `MODAL` window or is processing a modal event.

**Unable to open APPLICATION (APPLICATION already active)**

An attempt to `OPEN` an `APPLICATION` in a program that has already opened an MDI application frame window.

**Unable to open APPLICATION (system is MODAL)**

An attempt to `OPEN` an `APPLICATION` in a program that has already opened a `MODAL` window or is processing a modal event.

**Unable to open APPLICATION**

A failed attempt to `OPEN` an `APPLICATION`.

**Unable to open MDI window (No APPLICATION active)**

An attempt to OPEN an MDI WINDOW in a program that has not yet opened an MDI APPLICATION frame window.

**Unable to open MDI window (system is MODAL)**

An attempt to OPEN an MDI WINDOW in a program that has already opened a MODAL window or is processing a modal event.

**Unable to open MDI window on APPLICATION's thread**

An attempt to OPEN an MDI WINDOW in the same execution thread as the MDI APPLICATION frame window.

**Unable to open MDI WINDOW**

A failed attempt to OPEN an MDI WINDOW.

**Unable to open WINDOW**

A failed attempt to OPEN a WINDOW.

**Unable to process ACCEPT (system is MODAL)**

An attempt to perform an illegal action in a program that has already opened a MODAL window or is processing a modal event.

**Unexpected error opening printer device**

An unexpected error occurred while attempting to open a printer.

**VBX control is too complex**

A .VBX control containing more than 64 dialogs (hidden or visible). This limit exists only in 16-bit.

**Window is already open**

An attempt to OPEN a WINDOW that is already open.

**Window is not open**

An attempt has been made to perform some action that requires a window be opened first. Usually a property assignment statement.

## Compiler Errors

The compiler generates an error message at exactly the point in the source code where it determines that something has gone wrong. Therefore, the problem is always either right at that point, or somewhere in the code preceding that point. For most error messages, the problem exists right at the point at which it is detected, but some error messages are typically generated by problems that far precede their detection by the compiler, making some “detective work” necessary, along with an understanding of what the compiler is trying to tell you in the error message itself.

Deciphering compiler error messages to determine exactly what syntax error needs to be corrected can be a bit of an arcane science. The major reason for this is that a single (relatively minor) error can create a “cascade effect,” a long list of error messages that all have one root cause. This is typically the case in the situation where there are a very large number of compiler errors reported in the same source module. To handle this, you should correct just the first error reported then re-compile to see how many errors are left (quite often, none). If you have just a couple of errors reported that are widely separated in the source code, it is likely that each is a discrete error and you should correct them all before re-compiling.

### Specific Errors

---

The following error messages occur when the compiler has detected a specific syntax problem and is attempting to alert you to exactly what the problem is so that you may correct it.

Some of the following error messages contain a “%V” token. The compiler substitutes an explicit label indicating what problem is occurring for this token when it generates the error message, which should help point to the cause of the error.

**! introduces a comment**

This is a common C programmer’s error. If you type `IF A != 1 THEN` you get this warning.

**Actual value parameter cannot be array**

The passed parameter must not be an array.

**ADDRESS parameter ambiguous**

`ADDRESS(MyLabel)` where *MyLabel* is the label of both a procedure and a data item.

**All fields must be declared before JOINS**

All `PROJECT` statements for the file must precede any `JOIN` statements in the `VIEW` structure.

**Ambiguous label**

The field qualification syntax has come up with more than one solution for the label you have supplied.

For example:

```
G    GROUP
S:T  SHORT    !Referenced as G:S:T
      END
G:S  GROUP
T    SHORT    !Referenced as G:S:T
      END
CODE
G:S:T = 7      !Which are you talking about?
```

### **Array too big**

Arrays are limited to 64K in 16 bit.

### **Attribute parameter must be QUEUE, QUEUE field or constant string**

The parameter must be the label of a previously declared QUEUE structure, a field within a QUEUE structure, or a string constant.

### **Attribute requires more parameters**

You must pass all required parameters to an attribute that takes parameters.

### **Attribute string must be constant**

The parameter must be a string constant, not the label of a variable.

### **Attribute variable must be global**

The parameter must be a variable declared in the PROGRAM module as global data.

### **Attribute variable must have string type**

The parameter must be a variable declared as a STRING, CSTRING, or PSTRING.

### **BREAK structure must enclose DETAIL**

There must be at least one DETAIL structure within nested BREAK structures (at the lowest level).

### **Calling function as procedure**

A Warning that a PROCEDURE which returns a value and does not have the PROC attribute is being called as a PROCEDURE without a return value would be and the return value will be lost.

### **Cannot call procedure as function**

You cannot call a PROCEDURE which does not return a value as the source of an assignment statement or as a parameter.

### **Cannot declare KEY in a VIEW**

A KEY declaration is not valid in a VIEW structure.

### **Cannot EXIT from here**

Only a ROUTINE may contain the EXIT statement.

**Cannot GOTO into ROUTINE**

The target of GOTO must be the label of an executable code statement within the same procedure or ROUTINE, and may not be the label of a ROUTINE.

**Cannot have default parameter here**

You may only have a default value on non-omittable integer data type parameters passed by value.

**Cannot have initial values with OVER**

A variable declaration with the OVER attribute may not also have an initial value parameter.

**Cannot have statement here**

This happens if the compiler thinks you have tried to define a code label inside the global data section.

**Cannot initialize variable reference**

A reference variable cannot have an initial value.

**Cannot return CSTRING from CLARION function**

CSTRING is not a valid return data type for a PROCEDURE written in Clarion (only for functions written in other languages).

**Cannot RETURN value from procedure**

Only a PROCEDURE prototyped to return a value may contain the RETURN statement with a return value parameter.

**CLARION function cannot use RAW or NAME**

These attributes are not appropriate for a PROCEDURE written in Clarion (only for functions written in other languages).

**DECIMAL has too many places**

A DECIMAL or PDECIMAL declaration may only have a maximum of 30 places to the right of the decimal, and the decimal portion must be less than the total length.

**DECIMAL too long**

A DECIMAL or PDECIMAL declaration may have a maximum length of 31 digits.

**Declaration not valid in FILE structure**

This data declaration may not be contained within a FILE structure.

**Declaration too big**

The compiler has detected a PSTRING > 255 or MEMO > 64K in 16 bit, etc.

**DLL attribute requires EXTERNAL attribute**

The DLL attribute further defines the EXTERNAL attribute and is necessary in 32-bit programs.

**Dynamic INDEX must be empty**

An attempt to use the 2 parameter form of BUILD on a KEY or INDEX declared with component fields.

**Embedded OVER must name field in same structure**

The parameter to the OVER attribute must be the label of a previously declared variable in the same structure.

**ENCRYPT attribute requires OWNER**

The ENCRYPT attribute and OWNER attribute function together.

**Entity-parameter cannot be an array**

You cannot pass an array of entity parameters (FILE, QUEUE, etc.).

**Expected: %V**

This is one of the most common errors. The compiler was expecting to find something (one of the items in the list substituted for the %V token) as the next code to compile, but instead found the code at the point in the source that the error is generated.

**Expression cannot be picture**

You have attempted to use an EQUATE label to a picture token in a place where a picture token is not valid.

**Expression cannot have conditional type**

An expression is not a numeric value. For example, MyValue = A > B is invalid.

**Expression must be constant**

Variables are not valid in this expression.

**Field equate label not defined: %V**

The named field equate label has not been previously declared.

**Field not found**

Using field qualification syntax to reference a field that is not in the parent item. For example, referencing MyGroup.SomeField where SomeField is not in the MyGroup declaration.

**Field not found in parent FILE**

A JOIN statement must declare all the linking fields between the parent and child files.

**Field requires (more) subscripts**

This is referencing an array with multiple dimensions, and you must supply an index into each dimension.

**FILE must have DRIVER attribute**

The DRIVER attribute is required to declare the file system for which the data file is formatted.

**FILE must have RECORD structure**

It is invalid to declare a FILE which does not contain a RECORD structure.

**FILES must have same DRIVER attribute**

All files named in a LOGOUT statement must use the same file system.

**Function did not return a result**

A warning that the implementation of the PROCEDURE prototyped to return a value did not return a result.

**Function result is not of correct type**

The RETURN statement must return a value consistent with the return data type prototyped in the MAP structure.

**Group too big**

GROUPs are limited to 64K in 16 bit.

**Ignoring EQUATE redefinition: %V**

A Warning that the named equate is being ignored. This is really a label-redefined error except that the definition is not thrown away.

**Illegal array assignment**

An assignment to an array must reference a single element, not the entire array.

**Illegal character**

A non-valid lexical token. For example, an ASCII 255 in your source.

**Illegal data type: %V**

The named data type is inappropriate for the structure in which it is placed.

**Illegal key component**

A KEY has any type of illegal component.

**Illegal nesting of window controls**

Window controls other than RADIO have been placed within an OPTION structure, or controls other than TAB have been placed directly within a SHEET structure.

**Illegal parameter for LIKE**

An illegal parameter to a LIKE declaration. For example, LIKE(7).

**Illegal parameter type for STRING**

An illegal parameter to a STRING declaration. For example, STRING(MyVar) where MyVar is the label of a variable and not an EQUATE.

**Illegal reference assignment**

A reference variable may only be assigned another reference variable of the same type, or the label of a variable of the type it references.

**Illegal return type or attribute**

The prototype contains an invalid data type as the return data type (such as \*CSTRING).

**Illegal target for DO**

The target of DO must be the label of a ROUTINE.

**Illegal target for GOTO**

The target of GOTO must be the label of an executable code statement within the same procedure or ROUTINE, and may not be the label of a ROUTINE.

**INCLUDE invalid, expected: %V**

The INCLUDE statement's parameter must be a well formed Clarion string. In particular, type conversion is not valid, so INCLUDE('MyFile' &MyValue) is invalid.

**INCLUDE misplaced**

INCLUDE has to follow a line-break, or a semi-colon (possibly followed by white space).

**INCLUDE nested too deep**

You can only nest INCLUDEs 3 deep. In other words you can INCLUDE a file that INCLUDEs a file that INCLUDEs a file, but the last file must not INCLUDE anything.

**Incompatible assignment types**

An attempt to assign between incompatible data types.

**Incorrect procedure profile**

An attempt to pass a procedure with the wrong prototype as a procedure-parameter.

**Indices must be constant**

An attempt has been made to have a USE variable that is an array element with variable indices.

**Indistinguishable new prototype: %V**

A prototype that the compiler cannot uniquely distinguish from a previous prototype using the rules for procedure overloading .

**Integer expression expected**

The expression must evaluate to an integer.

**Invalid BREAK statement**

A BREAK that attempts to break to a non-LOOP label or is outside a LOOP or ACCEPT structure.

**Invalid CYCLE statement**

A CYCLE that attempts to cycle to a non-LOOP label or is outside a LOOP or ACCEPT structure.

**Invalid data declaration attribute**

An attribute that is inappropriate on the data declaration.

**Invalid data type for value parameter**

The data type prototyped in the MAP may not be passed by value and must be passed by address. For example, to pass a CSTRING parameter to a Clarion procedure, it may only be prototyped as \*CSTRING.

**Invalid FILE attribute**

An attribute that is inappropriate on a FILE declaration.



**Invalid first parameter of ADD**

The statement's first parameter is not appropriate.

**Invalid first parameter of FREE**

The statement's first parameter is not appropriate.

**Invalid first parameter of NEXT**

The statement's first parameter is not appropriate.

**Invalid first parameter of PUT**

The statement's first parameter is not appropriate.

**Invalid GROUP/QUEUE/RECORD attribute**

An attribute that is inappropriate on a GROUP, QUEUE, or RECORD declaration.

**Invalid KEY/INDEX attribute**

An attribute that is inappropriate on a KEY or INDEX declaration.

**Invalid label**

A label that contains characters other than letters, numbers, underscore (\_), or colon (:), or does not start with a letter or underscore.

**Invalid LOOP variable**

An attempt to use an illegal data type (DATE, TIME, STRING, etc.) as a LOOP variable.

**Invalid MEMBER statement**

The parameter to the MEMBER statement is not a string constant or does not reference the PROGRAM module for the current project.

**Invalid method invocation syntax**

An attempt to use the { } syntax for method invocation on a BLOB or FILE.

**Invalid number**

A number is required, for example inside the repeat character notation ({ }) in a string constant.

**Invalid OMIT expression**

The parameter to the OMIT statement is invalid.

**Invalid parameters for attribute**

You must pass valid parameters to an attribute that takes them.

**Invalid picture token**

A picture token that contains inappropriate characters.

**Invalid printer control token**

A PRINT statement containing a printer control token.

**Invalid QUEUE/RECORD attribute**

An attribute that is inappropriate on a QUEUE or RECORD declaration.

**Invalid SIZE parameter**

SIZE(Junk+SomeMoreJunk)

**Invalid string (misused <...> or {...} )**

A string constant contains a single beginning bracket (< or {) without a matching terminating bracket (> or }). These characters must have two together (<< or {{) if intended to be part of the string.

**Invalid structure as first parameter**

The statement's first parameter is not appropriate.

**Invalid structure within property syntax**

A structure that is inappropriate in a property assignment statement.

**Invalid USE attribute parameter**

The parameter is not appropriate for a USE attribute.

**Invalid use of PRIVATE data**

Attempt to access a PRIVATE data member outside the CLASS module.

**Invalid use of PRIVATE procedure**

Attempt to call a PRIVATE method outside the CLASS module.

**Invalid variable data parameter type**

When passing parameters by address, you must pass the same data type as prototyped in the MAP structure.

**Invalid WINDOW control**

A control that is inappropriate in a WINDOW structure.

**ISL error: %V**

Contact Technical Support and provide all details of the error message.

**KEY must have components**

You cannot declare a KEY without naming the component fields that establish the KEY's sort order.

**Label duplicated, second used: %V**

The named field equate label is used multiple times within the same module and only the last encountered is used in the list of equate labels that may be used within the executable code. Correctable with the third parameter to the USE attribute.

**Label in prototype not defined: %V**

Using a prototype where one of the data types has not yet been defined.

**Label not defined: %V**

The named label has not been previously declared.

**Mis-placed string slice operator**

A string slice that is not the last array index. For example, MyStringArray[3:4,5].

**Missing procedure definition: %V**

The named procedure is not prototyped in a MAP structure.

**Missing virtual function**

Compiler bug.

**Must be dimensioned variable**

This must be an array.

**Must be field of a FILE or VIEW**

Must be a field that is a member of a FILE or VIEW structure.  
For example NULL(LocalVariable) will give this error.

**Must be FILE or KEY**

The parameter to JOIN is not a FILE or KEY label.

**Must be reference variable**

You can only DISPOSE of a reference variable.

**Must be variable**

This must be the label of a previously declared variable.

**Must have constant string parameter**

The parameter must be a string constant, not the label of a variable.

**Must RETURN value from function**

A PROCEDURE prototyped to return a value must contain the RETURN statement with a return value parameter.

**Must specify DECIMAL size**

A DECIMAL or PDECIMAL declaration must declare the maximum number of digits it stores.

**Must specify identifier**

An identifier was required but not supplied.

**Must specify print-structure**

A PRINT statement may only print a structure in a REPORT.

**No matching prototype available**

Attempt to define a procedure for which there is no matching prototype in a MAP or CLASS.

**Not valid inside structure**

A data type is inappropriate for the structure in which it is placed.

**OMIT cannot be nested**

You are in an OMIT (or COMPILE) that is *not* omitting code and the compiler encounters another OMIT.

**OMIT misplaced**

OMIT has to follow a line-break, or a semi-colon (possibly followed by white space).

**OMIT not terminated: %V**

The referenced OMIT parameter was not found before the end of the source module.

**Order is MENUBAR, TOOLBAR, Controls**

The MENUBAR structure must come before the TOOLBAR, and the TOOLBAR structure must come before the controls in a WINDOW or APPLICATION.

**OVER must name variable**

The parameter to the OVER attribute must be the label of a previously declared variable.

**OVER must not be larger than target variable**

The parameter to the OVER attribute must be the label of a previously declared variable that is greater than or equal to the size of the variable being declared OVER it.

**OVER not allowed with STATIC or THREAD**

A variable declaration with the OVER attribute may not also have the STATIC or THREAD attribute (these must be on the initial declaration).

**Parameter cannot be omitted**

The procedure call must pass all parameters that have not been prototyped as omissible parameters.

**Parameter kind does not match**

When passing parameters by address, you must pass the same data type as prototyped in the MAP structure.

**Parameter must be picture**

This must be a display picture token.

**Parameter must be procedure label**

This must be the label of a procedure.

**Parameter must be report DETAIL label**

A PRINT statement may only print a DETAIL structure in a REPORT.

**Parameters must have labels**

Attempt to define a procedure without using labels on parameters.

**Parameter type label ambiguous (CODE or DATA)**

You may have a PROCEDURE and data declaration with the same name, but then you cannot use that name in a procedure prototype.

**PROCEDURE cannot have return type**

If you declare a prototype without a return data type in the MAP, you must create it as a PROCEDURE.

**Procedure doesn't belong to module: %V**

An attempt to define a procedure that has a prototype that says it belongs in another module.

**Procedure in parent CLASS has VIRTUAL mismatch**

Virtual methods require the VIRTUAL attribute on the prototypes in both the parent and derived CLASSES.

**Prototype is: %V**

Attempt to define a procedure with the wrong prototype.

**QUEUE/RECORD not valid in GROUP**

A GROUP structure may not contain a QUEUE or RECORD structure.

**Redefining system intrinsic: %V**

A Warning that the named procedure (part of your source code) has the same name as a Clarion run time library procedure and that your procedure will be called instead of the built-in library's.

**Routine label duplicated**

The label of a ROUTINE statement has been previously used on another statement.

**Routine not defined: %V**

The named ROUTINE does not exist.

**SECTION duplicated: %V**

The named SECTION exists twice in the INCLUDE file.

**SECTION not found: %V**

The named SECTION does not exist in the INCLUDE file.

**Statement label duplicated**

Two lines of executable source code have the same label.

**Statement must have label**

The statement (such as a ROUTINE or PROCEDURE statement) must have a label.

**String not terminated**

A string constant without a terminating single quote (').

**Subscript out of range**

An attempt to reference an array element beyond the valid number of elements dimensioned in the data declaration.

**Too few indices**

This is referencing an array with multiple dimensions, and you must supply an index into each dimension.

**Too few parameters**

The procedure call must pass all parameters that have not been prototyped as omissible parameters.

**Too many indices**

This is referencing an array and you are supplying too many indexes into the dimensions.

**Too many parameters**

The procedure call may not pass more parameters than have been prototyped.

**Unable to verify validity of OVER attribute**

A Warning that you are declaring a variable OVER a passed parameter and the data types may not match at run time.

**Unknown attribute: %V**

The named attribute is not part of the Clarion language.

**Unknown function label**

The PROCEDURE has not been previously prototyped in a MAP structure.

**Unknown identifier**

The label has not been previously declared.

**Unknown identifier: %V**

The named identifier has not been previously declared.

**Unknown key component: %V**

The named key component does not exist within the FILE structure.

**Unknown procedure label**

The PROCEDURE has not been previously prototyped in a MAP structure.

**UNTIL/WHILE illegal here**

Attempt to use UNTIL or WHILE to terminate a LOOP structure that is already terminated.

**Value-parameter cannot be an array**

You cannot pass an array as a value-parameter.

**Value requires (more) subscripts**

This is referencing an array with multiple dimensions, and you must supply an index into each dimension.

**Variable expected** This must be the label of a previously declared variable.

**Variable-size must be constant**

The variable declaration must contain a constant expression for its size parameter.

**VIRTUAL illegal outside of CLASS structure**

You can only use the VIRTUAL attribute on prototypes in a CLASS structure, not in a MAP.

**Wrong number of parameters**

The procedure call must pass all parameters that have not been prototyped as omissible parameters.

**Wrong number of subscripts**

An attempt to access a multi-dimensioned array without providing an element number for each dimension.

For example:

```
MyShort SHORT,DIM(8,2) !Two-dimensional array
CODE
MyValue = MyShort[7] !Wrong number of subscripts error
```

## Unknown errors

---

These are errors that should never happen and are only to give *TopSpeed's compiler writer* a clue as to what is wrong. Report the problem immediately to TopSpeed together with the source file that generated the error.

Inconsistent scanner initialization

Unknown operator

Unknown expression type

Unknown expression kind

Unknown variable context

Unknown parameter kind

Unknown assignment operator

Unknown variable type

Unknown case type

Unknown equate type

Unknown string kind

Unknown picture type

Unknown descriptor type

Unknown initializer type

Unknown designator kind

Unknown structure field

Unknown formal entity

Type descriptor not static

Unknown clear type

Unknown simple formal type

Out of attribute space

Unknown label/routine

Unknown special identifier  
Value not static  
Unknown static label  
Unknown screen structure kind  
Corrupt pragma string  
Old symbol non-NIL  
Not implemented yet  
String not CCST



# APPENDIX E - LEGACY STATEMENTS

All the statements listed in this Appendix are valid only for compatibility with previous versions of Clarion. They are all subject to complete removal in future releases of Clarion and so, should not be used.

## BOF (return beginning of file)

### BOF(*file*)

**BOF** Flags the beginning of the FILE during sequential processing.

*file* The label of a FILE declaration.

The **BOF** procedure returns a non-zero value (true) when the first record in relative file sequence has been read by **PREVIOUS** or passed by **SKIP**. Otherwise, the return value is zero (false).

The **BOF** procedure is not supported by all file drivers, and can be very inefficient even if supported (check the driver documentation). Therefore, for efficiency and guaranteed file system support it is not recommended to use this procedure. Instead, check the **ERRORCODE()** procedure after each disk read to detect an attempt to read past the beginning of the file.

The **BOF** procedure was most often used as an **UNTIL** condition evaluated at the top of a **LOOP**, so **BOF** returns true after the last record has been read and processed in reverse order (using **PREVIOUS**).

Return Data Type: **LONG**

Example:

```
!Not recommended, but still supported for backward compatibility:
SET(Trn:DateKey)                !End/Beginning of file in keyed sequence
LOOP UNTIL BOF(Trans)            !Process file backwards
    PREVIOUS(Trans)              ! read a record sequentially
    IF ERRORCODE() THEN STOP(ERROR()).
    DO LastInFirstOut            ! call last in first out routine
END

!Recommended as most efficient code for use with all file drivers:
SET(Trn:DateKey)                !End/Beginning of file in keyed sequence
LOOP                             !Process file backwards
    PREVIOUS(Trans)              ! read a record sequentially
    IF ERRORCODE() THEN BREAK.    !Break loop at attempt to read past beginning
    DO LastInFirstOut            ! call last in first out routine
END
```

See Also:

**ERRORCODE**

## EOF (return end of file)

### EOF(*file*)

**EOF** Flags the end of the FILE during sequential processing.  
*file* The label of a FILE declaration.

The **EOF** procedure returns a non-zero value (true) when the last record in relative file sequence has been read by **NEXT** or passed by **SKIP**. Otherwise, the return value is zero (false).

The EOF procedure is not supported by all file drivers, and can be very inefficient even if supported (check the driver documentation). Therefore, for efficiency and guaranteed file system support it is not recommended to use this procedure. Instead, check the **ERRORCODE()** procedure after each disk read to detect an attempt to read past the end of the file.

The EOF procedure was most often used as an **UNTIL** condition at the top of a **LOOP**, so EOF returns true after the last record has been read and processed.

Return Data Type: **LONG**

Example:

```
!Not recommended, and still available for backward compatibility:
SET(Trn:DateKey)           !Beginning of file in keyed sequence
LOOP UNTIL EOF(Trans)      !Process all records
  NEXT(Trans)              ! read a record sequentially
  IF ERRORCODE() THEN STOP(ERROR()).
  DO LastInFirstOut        ! call last in first out routine
END

!Recommended for use with all file drivers:
SET(Trn:DateKey)           !Beginning of file in keyed sequence
LOOP                       !Process all records
  NEXT(Trans)              ! read a record sequentially
  IF ERRORCODE() THEN BREAK. !Break loop on attempt to read past end of file
  DO LastInFirstOut        ! call last in first out routine
END
```

See Also: **ERRORCODE**

## FUNCTION (define a function)

*label*    **FUNCTION** [(*parameter list*)]  
           *local data*  
           **CODE**  
           *statements*  
           **RETURN**(*value*)

**FUNCTION** is a statement which once defined a **PROCEDURE** prototyped to return a value (referred to as a “function” in some other programming languages). The **FUNCTION** keyword has been replaced by the **PROCEDURE** statement and is now a synonym for **PROCEDURE** in all cases.

Example:

```

PROGRAM
MAP
FullName  FUNCTION(STRING Last,STRING First,<STRING Init>),STRING
                                     !Function prototype with parameters
DayString FUNCTION,STRING           !Function prototype without parameters
END
TodayString STRING(3)
CODE
    TodayString = DayString()         !Function call without parameters
                                     ! the () is required for a function

FullName  FUNCTION(STRING Last, STRING First,STRING Init)           !Full name function
CODE
    IF OMITTED(3) OR Init = ''    !Begin executable code section
    !If no middle initial
        RETURN(CLIP(First) & ' ' & Last)    ! return full name
    ELSE
    !Otherwise
        RETURN(CLIP(First) & ' ' & Init & ' ' & Last)    ! return full name
    END

DayString      FUNCTION           !Day string function
ReturnString   STRING(9),AUTO     !Uninitialized local stack variable
CODE
    RETURN(CHOOSE(TODAY()%7)+1,'Sun','Mon','Tue','Wed','Thu','Fri','Sat'))

```

See Also:

**PROCEDURE**

## POINTER (return relative record position)

```
POINTER( | file | )  
        | key |
```

**POINTER**

Returns relative record position.

*file*

The label of a FILE declaration. This specifies physical record order within the file.

*key*

The label of a KEY or INDEX declaration. This specifies the entry order within the KEY or INDEX file.

**POINTER** returns the relative record position within the data file (in *file* sequence), or the relative record position within the KEY or INDEX file (in *key* sequence) of the last record accessed.

The value returned by the POINTER procedure is dependent on the file driver. It may be a record number, the relative byte position within the file, or some other kind of “seek position” within the file.

The POINTER procedure is not supported by all file drivers. Therefore it should be used only when you know the file system supports it and you will not be changing file systems in the future. The preferred method of record positioning that is designed to work across all file systems is the POSITION procedure with RESET and REGET.

Return Data Type:      LONG

Example:

```
SavePtr# = POINTER(Customer)      !Save file pointer
```

See Also:              POSITION

## SHARE (open data file for shared access)

**SHARE**(*file* [,*access mode*])

<b>SHARE</b>	Opens a FILE structure for processing.
<i>file</i>	The label of a FILE declaration.
<i>access mode</i>	A numeric constant, variable, or expression which determines the level of access granted to both the user opening the file, and other users in a multi-user system. If omitted, the default value is 42h (Read/Write, Deny None).

The **SHARE** statement opens a FILE structure for processing and sets the *access mode*. The **SHARE** statement is exactly the same as the **OPEN** statement, with the exception of the default value of *access mode*.

The *access mode* is a bitmap which tells the operating system what access to grant the user opening the file and what access to deny to others using the file.

The actual values for each access level are:

	<u>Dec.</u>	<u>Hex.</u>	<u>Access</u>
User Access:	0	0h	Read Only
	1	1h	Write Only
	2	2h	Read/Write
Other's Access:	0	0h	Any Access (FCB compatibility mode)
	16	10h	Deny All
	32	20h	Deny Write
	48	30h	Deny Read
	64	40h	Deny None

Errors Posted:

The same set of errors that may be posted by **OPEN**

Example:

```

ReadOnly    EQUATE(0)      !Access mode equates
WriteOnly   EQUATE(1)
ReadWrite   EQUATE(2)
DenyAll     EQUATE(10h)
DenyWrite   EQUATE(20h)
DenyRead    EQUATE(30h)
DenyNone     EQUATE(40h)
CODE
  SHARE(Master,ReadOnly+DenyWrite)  !Open read only mode

```

See Also:

**OPEN**

# Legacy Statement

# INDEX

## Symbols

‘ ‘ (single quotes) .....	51
, (comma) .....	51
“ (double quote) .....	51
! (exclamation) .....	51
! introduces a comment .....	835
# (pound sign) .....	51
\$ (dollar sign) .....	51
% (percent sign) .....	51
& (ampersand) .....	51
&= (ampersand equal) .....	51
( ) (parentheses) .....	51
(.) .....	51
* (asterisk) .....	51
+ (plus sign) .....	51
- (minus sign) .....	51
. (period) .....	51
.DLL .....	197
.ENV .....	177, 595
.INI .....	
GETINI .....	573
PUTINI .....	643
.OBJ files .....	39
.OCX .....	745
.VBX .....	745
.VBX control .....	325
.VBX file .....	343
/ (slash) .....	51
: (colon) .....	51
:= .....	455
; (semi-colon) .....	51
< (left angle bracket) .....	51
< > (angle brackets) .....	51
= (equal sign) .....	51
> (right angle bracket) .....	51
? (field equate labels) .....	237
? (question mark) .....	51
@ (“AT” sign) .....	51
[ ] (brackets) .....	51
^ (carat) .....	51
{ } (curly braces) .....	51
(vertical bar) .....	51
~ (tilde) .....	51
32-bit .....	39

## A

ABOVE .....	
SHEET control attribute .....	385
ABS (absolute value) .....	491
ABSOLUTE .....	331
ACCEPT .....	33, 469
ACCEPT loop requires a window .....	833
AcceptAll mode .....	664, 771
ACCEPTED .....	491
Access Denied .....	829
ACOS (arccosine) .....	492
Actual value parameter cannot be array .....	835
ADD .....	36
QUEUE .....	493
Addition operator .....	436
ADDRESS .....	496
ADDRESS parameter ambiguous .....	835
AGE .....	497
Alarm (BEEP) .....	506
ALERT .....	498
Algebraic Order of Operation .....	435
ALIAS .....	500
ALL .....	500
All fields must be declared before JOINS .....	835
allocate heap memory .....	136
Allocation, memory .....	
Dynamic .....	134
Static .....	134
ALLTRIM .....	525
ALONE .....	
Print structure attribute .....	331
Alphanumeric .....	
CSTRING .....	118
PSTRING .....	120
STRING .....	116
ALRT .....	
window attribute .....	332
Ambiguous label .....	835
Ampersand (&) .....	51
Ampersand equal (&=) .....	51
AND .....	437
ANGLE .....	334
Angle brackets (<>) .....	51
animated GIF images .....	774
ANY .....	

data type .....	125	automatic destructor .....	154
Apostrophe .....	51	Automatic overlay loader .....	40
APPEND .....		Automatic variables .....	58, 851
FILE .....	501	AUTOSIZE .....	338
APPLICATION .....	217	AVE .....	339
Application modal .....	226		
Application Modal Windows .....	394, 396	<b>B</b>	
Application windows .....	235	B (blank when zero) .....	139
ARC .....	502	background color .....	345
Arguments (Parameters) .....	70	background re-paints .....	774
Arithmetic Operator .....		BAND (Bitwise AND) .....	505
Addition .....	436	Base 10 logarithm .....	597
Division .....	436	Base Data Types .....	460
Exponentiation .....	436	Base numbers .....	
Modulus .....	436	Binary .....	438
Multiplication .....	436	Decimal .....	438
Subtraction .....	436	Hexadecimal .....	438
Arithmetic Operators .....	436, 440	Octal .....	438
Arithmetic overflow .....	139, 460	BCD .....	461
Array .....		BEEP .....	506
DIM .....	192	BEGIN .....	93, 473
passing as parameter .....	72	Begin executable CODE .....	61
subscript .....	435, 445	BELOW .....	
array elements .....		SHEET control attribute .....	385
field equate labels .....	237	BEVEL .....	340
Array too big .....	836	BFLOAT4 .....	110
ASCII Character Codes .....	439	BFLOAT8 .....	111
ASIN (arcsine) .....	503	BINARY .....	
ASK .....	503	MEMO attribute .....	189
ASSERT .....	92	Binary .....	
Assignment Statements .....		Numeric constant .....	438
CLEAR .....	459	Binary Coded Decimal (BCD) .....	461
Deep .....	455	BIND .....	446
Operating .....	454	BINDABLE .....	190
Reference .....	457	Bit manipulation .....	
Simple .....	453	BAND .....	505
Assignment statements .....	47	BOR .....	508
Asterisk (*) .....	51	BSHIFT .....	510
AT .....	335	BXOR .....	515
At sign (@) .....	51	bitmap images in memo fields .....	778, 789, 790
ATAN (arctangent) .....	504	BLANK .....	507
Attribute Equates .....	329	Blank when zero .....	139
Attribute parameter must be QUEUE, QUEUE field or .....	836	BLOB .....	166
Attribute requires more parameters .....	836	BLOB has changed .....	
Attribute string must be constant .....	836	PROP:Touched .....	810
Attribute variable must be global .....	836	BOF (beginning of file) .....	849
Attribute variable must have string type .....	836	Boolean operators .....	437
AUTO .....		BOR (Bitwise OR) .....	508
Variable attribute .....	189	BOX .....	
Window attribute .....	338	control .....	257
automatic constructor .....	154		
Automatic Conversion of Data Types .....	460		



- graphics procedure ..... 509
- BOXED ..... 341
- Brackets ([]) ..... 51
- BREAK ..... 31
  - LOOP control statement ..... 478
  - REPORT group break structure ..... 245
- BREAK structure must enclose DETAIL ..... 836
- BSHIFT (Bitwise SHIFT) ..... 510
- Btrieve
  - DATE ..... 123
  - LSTRING ..... 120
  - TIME ..... 124
  - ZSTRING ..... 118
- BUFFER
  - VIEW ..... 511
- BUILD ..... 513
- BUILD Cancelled ..... 832
- BUILD in Progress ..... 832
- Built-in Variables ..... 443
- Built-in variables
  - PRINTER ..... 639
  - TARGET ..... 684
- BUILTINS.CLW ..... 56
- BUTTON ..... 259
- BXOR (Bitwise eXclusive OR) ..... 515
- BY ..... 476
- BYTE ..... 101
- BYTES ..... 516
- C**
- C ..... 67
  - calling convention ..... 80
- C++ Compatability ..... 91
- Call
  - FUNCTION ..... 66
  - PROCEDURE ..... 66
- CALL (call procedure from a DLL) ..... 517
- Callback functions ..... 746
- calling convention
  - C ..... 80
  - PASCAL ..... 80
- Calling function as procedure ..... 836
- Cannot call procedure as function ..... 836
- Cannot declare KEY in a VIEW ..... 836
- Cannot EXIT from here ..... 836
- Cannot GOTO into ROUTINE ..... 837
- Cannot have default parameter here ..... 837
- Cannot have initial values with OVER ..... 837
- Cannot have statement here ..... 837
- Cannot initialize variable reference ..... 837
- Cannot return CSTRING from CLARION function ..... 837
- Cannot RETURN value from procedure ..... 837
- CAP ..... 341
- Carat (" ..... 51
- Carriage-return/Line-feed ..... 51
- CASE ..... 31, 471
- Case insensitive key ..... 204
- Case insensitive report break ..... 398
- CENTER
  - function ..... 518
  - report control attribute ..... 386
  - window attribute ..... 341
- CENTERED
  - TOOLBAR attribute ..... 342
- CHAIN ..... 519
- CHANGE ..... 520
- CHANGES
  - QUEUE ..... 521
- Character String
  - CSTRING ..... 118
  - PSTRING ..... 120
  - STRING ..... 116
- CHECK ..... 262
  - window control attribute ..... 342
- CHOICE ..... 522
- CHOOSE ..... 523
- CHORD ..... 524
- CHR (character from ASCII) ..... 525
- CLAAMP ..... 178
- CLABUTTON ..... 179
- CLACASE ..... 179
- CLACHARSET ..... 177
- CLACOLSEQ ..... 177
- CLADIGRAPH ..... 178
- CLAMON ..... 178
- CLAMONTH ..... 178
- CLAMSG ..... 179
- CLARION function cannot use RAW or NAME ..... 837
- Clarion internal library ..... 56
- Clarion standard date ..... 45
- Clarion standard time ..... 45
- Clarion4.ENV ..... 177
- CLASS ..... 150, 343
  - LINK ..... 201
  - MODULE ..... 201
- CLASS method
  - PRIVATE ..... 82
- CLASS Variables
  - PRIVATE ..... 211
  - PROTECTED ..... 84, 212
- CLEAR ..... 459
- clear the reference
  - NULL ..... 457

CLIP		Conventions and Symbols .....	43
function .....	525	Conversion, date	
OLE control attribute .....	343	DEFORMAT .....	542
CLIPBOARD .....	526	Conversion of Data Types .....	460
CLOCK .....	527	convert ANSI strings to ASCII .....	534
CLOSE .....	528	convert ASCII strings to ANSI .....	535
CNT .....	344	CONVERTANSITOOEM .....	534
CODE .....	61	CONVERTOEMTOANSI .....	535
Collating sequence		Cooperative multi-tasking .....	713
SORT (QUEUE) .....	690	COPY .....	536
collating sequence		Corrupt pragma string .....	848
INDEX .....	162	COS (cosine of angle) .....	537
KEY .....	163	CR/LF .....	51
Colon .....	51	CREATE	
COLOR .....	345	FILE .....	537
COLORIALOG .....	530	FILE attribute .....	191
colorized list box fields .....	362	OLE control attribute .....	348
colors in list boxes .....	285	window control .....	538
COLUMN .....	347	Creates Duplicate Key .....	830
COMBO .....	265	Credit (CR) pictures .....	138
Comma (,) .....	51	CSTRING .....	118
COMMAND		Curly braces ({} ) .....	51
command line .....	531	Currency Pictures .....	138
Command line		Current Target .....	239
COMMAND .....	531	CURSOR .....	349
SETCOMMAND .....	672	Custom .VBX control .....	325
COMMIT .....	532	CYCLE .....	31, 479
Commit boundaries .....	599		
Comparison Operators .....	437	<b>D</b>	
COMPATIBILITY .....	347	DATA .....	61
COMPILE .....	94	Data names (Labels) .....	47
Compiler .....	92	Data Type Conversion .....	462
Compiler Error Messages .....	835	Data Type Conversion Rules .....	460
Concatenation .....	440	Data Types	
Concatenation Operator .....	436	ANY .....	125
Conditional loops .....	31	BFLOAT4 .....	110
Conditional Operators .....	437	BFLOAT8 .....	111
Constants		BYTE .....	101
Numeric Constants .....	438	CSTRING .....	118
String Constant .....	439	DATE .....	123
Constructor .....	86	DECIMAL .....	112
constructor .....	154	GROUP .....	147
container control .....	293	ITEMIZE .....	97
container windows .....	735	LIKE .....	127
CONTENTS .....	533	LONG .....	104
Continuation character ( ) .....	51	PDECIMAL .....	114
Control Fields .....	236	PSTRING .....	120
control handle .....	785	REAL .....	109
Control menu .....	418	SHORT .....	102
Control Numbering .....	236	SIGNED .....	106
Control statements .....	47	SREAL .....	108
Control Structures .....	471		

- STRING ..... 116
- TIME ..... 124
- ULONG ..... 105
- UNSIGNED ..... 107
- USHORT ..... 103
- DATE
  - data type ..... 123
  - function ..... 540
- Date
  - Standard Date ..... 45
- Date conversion
  - DEFORMAT ..... 542
- Date Pictures ..... 141
- DAY ..... 541
- Day of the week ..... 45
- DDE ..... 715
- DDE Events ..... 716
- DDEACKNOWLEDGE ..... 718
- DDEAPP ..... 719
- DDECHANNEL ..... 720
- DDECLIENT ..... 721
- DDECLUSE ..... 722
- DDEEXECUTE ..... 723
- DDEITEM ..... 724
- DDEPOKE ..... 725
- DDEQUERY ..... 727
- DDERead ..... 728
- DDESERVER ..... 730
- DDETOPIC ..... 731
- DDEVALUE ..... 732
- DDEWRITE ..... 733
- de-allocate heap memory ..... 137
- Debit (DB) pictures ..... 138
- DECIMAL
  - data type ..... 112
  - report control attribute ..... 386
- Decimal
  - Numeric Constant ..... 438
- Decimal Arithmetic ..... 461
- DECIMAL has too many places ..... 837
- DECIMAL too long ..... 837
- Declaration not valid in FILE structure ..... 837
- Declaration too big ..... 837
- Deep Assignment Statements ..... 455
- DEFAULT ..... 350
- DEFORMAT ..... 542
- DELAY
  - control attribute ..... 350
- DELETE ..... 36, 543
- Delete a file (REMOVE) ..... 653
- Delimiters ..... 51
- Derived CLASSES (Inheritance) ..... 151
- Destination variable ..... 453, 454, 455, 457
- DESTROY ..... 545
- Destructor ..... 86
- destructor ..... 154
- DETAIL ..... 246
- Dialog boxes ..... 235
- Dialog units ..... 335, 404
- dialog units ..... 225, 361, 364, 385, 413
- DIM ..... 192
- DIRECTORY ..... 546
- DISABLE
  - control attribute ..... 350
  - statement ..... 548
- disable MDI behavior
  - PROP:Threading ..... 809
- Dispatch interface ..... 742
- DISPLAY ..... 549
- DISPOSE ..... 137
- Division by zero ..... 436
- Division operator ..... 436
- DLL ..... 193, 197
  - prototype attribute ..... 81
- DLL attribute requires EXTERNAL attribute ..... 837
- DO ..... 32, 480
- DOCK ..... 351
- DOCKED ..... 351
- DOCUMENT
  - OLE control attribute ..... 352
- Document windows ..... 235
- Dollar sign ..... 138
- Dollar sign (\$) ..... 51
- DOS DLLs ..... 40
- DOS extender ..... 40
- DOUBLE ..... 353
- Double quote (") ..... 51
- Double-precision real ..... 109, 111
- DOWN
  - SHEET control attribute ..... 424
- DRAGID
  - function ..... 550
  - window control attribute ..... 354
- DRIVER ..... 195
- DROP ..... 355
- DROPID
  - function ..... 551
  - window control attribute ..... 356
- DUP ..... 196
- DUPLICATE
  - FILE ..... 552
- Dynamic Data ..... 134
- Dynamic Data Exchange ..... 715
- Dynamic index

BUILD .....	513
dynamic INDEX .....	162
Dynamic INDEX must be empty .....	837

## E

Editing data .....	145
ELLIPSE .....	270
graphics procedure .....	553
ELSE .....	47, 471, 473, 475
ELSIF .....	31, 475
Embedded OVER must name field in same structure .....	838
Embedded SQL .....	36
EMPTY	
FILE .....	554
ENABLE .....	554
Encapsulation .....	151, 154
ENCRYPT .....	196
ENCRYPT attribute requires OWNER .....	838
END .....	47, 64
ENDPAGE .....	555
ENDPAGE must only be called for reports .....	833
Entity-parameter cannot be an array .....	838
Entity-parameters .....	75
ENTRY .....	272
Entry Not Found .....	829
Enumeration .....	97
ENV .....	177
ENV file .....	595
Environment Files .....	177
EOF .....	36
EOF (end of file) .....	850
Equal sign (=) .....	51
EQUATE .....	96
ERASE .....	557
ERROR .....	557
Error Codes .....	829
Error Messages .....	835
Error messages	
Compiler .....	835
Run time .....	829, 833
ERRORCODE .....	558
ERRORFILE .....	558
ERRORLEVEL .....	575, 663
EVALUATE .....	448
Evaluations, logical .....	437
EVENT .....	559
Event posted to a report control .....	833
Event processor .....	469
EVENT:Accepted .....	767
EVENT:AlertKey .....	763, 767
EVENT:BuildDone .....	763

EVENT:BuildFile .....	763
EVENT:BuildKey .....	763
EVENT:CloseDown .....	764
EVENT:CloseWindow .....	764
EVENT:ColumnResize .....	767
EVENT:Completed .....	764, 771
EVENT:Contracted .....	767
EVENT:Contracting .....	767
EVENT:DDEadvise .....	764
EVENT:DDEclose .....	764
EVENT:DDEdata .....	764
EVENT:DDEexecute .....	764
EVENT:DDEpoke .....	764
EVENT:DDErequest .....	764
EVENT:Docked .....	764
EVENT:Drag .....	767
EVENT:Dragging .....	767
EVENT:Drop .....	767
EVENT:DroppedDown .....	767
EVENT:DroppingDown .....	768
EVENT:Expanded .....	768
EVENT:Expanding .....	768
EVENT:GainFocus .....	765
EVENT:Iconize .....	381, 765
EVENT:Iconized .....	381, 765
EVENT:Locate .....	768
EVENT:LoseFocus .....	765
EVENT:Maximize .....	381, 765
EVENT:Maximized .....	381, 765
EVENT:MouseIn .....	768
EVENT:MouseMove .....	768
EVENT:MouseOut .....	768
EVENT:MouseUp .....	768
EVENT:Move .....	381, 765
EVENT:Moved .....	381, 765
EVENT:NewSelection .....	768
EVENT:OpenWindow .....	765
EVENT:PageDown .....	768
EVENT:PageUp .....	769
EVENT:PreAlertKey .....	766, 769
EVENT:Rejected .....	649, 769
EVENT:Restore .....	381, 766
EVENT:Restored .....	381, 766
EVENT:Resume .....	766
EVENT:ScrollBottom .....	769
EVENT:ScrollDown .....	769
EVENT:ScrollDrag .....	769
EVENT:ScrollTop .....	769
EVENT:ScrollTrack .....	769
EVENT:ScrollUp .....	770
EVENT:Selected .....	770
EVENT:Size .....	381, 766

EVENT:Sized .....	381, 766	File Must Be Shared .....	831
EVENT:Suspend .....	766	FILE must have DRIVER attribute .....	838
EVENT:TabChanging .....	770	FILE must have RECORD structure .....	838
EVENT:Timer .....	766	File Not Found .....	829
EVENT:Undocked .....	765	File Not Open .....	830
EVENT:VBXevent .....	770	file STATUS .....	694
Events .....	763	FILE structure .....	35
Exclamation (!) .....	51	FILEDIALOG .....	562
Exclude null key entries .....	206	FILEERROR .....	564
Exclusive Access Required .....	831	FILEERRORCODE .....	564
EXECUTE .....	32, 473	FILES must have same DRIVER attribute .....	838
BEGIN .....	473	FILES with the EXTERNAL attribute .....	198
Execution Sequence .....	65	FILL .....	357
EXISTS .....	<b>560</b>	FILTER	
EXIT .....	480	VIEW attribute .....	199
Expected: %V .....	838	FIRST .....	357
Exponentiation operator .....	436	FIRSTFIELD .....	565
Expression cannot be picture .....	838	FLAT	
Expression cannot have conditional type .....	838	window control attribute .....	358
Expression Evaluation .....	435	flicker .....	774
Expression must be constant .....	838	Floating Point	
Expression Strings .....	445	Double Precision .....	109, 111
Expressions .....	435	Single Precision .....	108, 110
Evaluation Precedence .....	435	floating tabs .....	400
Logical Expressions .....	441	FLUSH .....	565
Numeric Expressions .....	440	FOCUS .....	566
Runtime .....	445	FONT	
String Expressions .....	440	TOOLBAR attribute .....	359
EXTERNAL .....	197	FONTDIALOG .....	567
<b>F</b>		FOOTER .....	248
FIELD .....	561	force data validation .....	810
Field Completion Keys		Foreground color .....	345
ALERT .....	498	FORM .....	250
ALRT .....	332	FORMAT	
Field equate label not defined: %V .....	838	control attribute .....	361
Field Equate Labels .....	236	function .....	568
Field not found .....	838	Format String Properties .....	365
Field not found in parent FILE .....	838	forward reference .....	131
Field Qualification .....	48	FREE .....	568
Field requires (more) subscripts .....	838	FROM .....	372
Field-Independent Events .....	763	FULL .....	374
Field-independent events .....	763	FUNCTION .....	851
Field-Specific Events .....	767	FUNCTION Call .....	66
Field-specific events .....	763	Function did not return a result .....	839
Fields (controls) .....	236	Function Overloading	
FILE .....	159	Procedure Overloading .....	89
File Already Open .....	830	Function result is not of correct type .....	839
file directory .....	546	FUNCTION Return Types .....	78
File Driver Error .....	832		
file existence .....	560	<b>G</b>	
File Is Already Locked .....	829	GET .....	36, 569
		GETFONT .....	572

GETINI .....	573
GETPOSITION .....	574
Global data .....	134
Global Data Declarations .....	52
Global menu .....	229
Global tools .....	232
GOTO .....	481
GPF .....	92
Graphics Coordinates .....	239
GRAY .....	374
GRID .....	375
GROUP .....	147, 276
Group too big .....	839

## H

HALT .....	575
handle .....	776, 785
HEADER .....	251
HELP .....	576
Hexadecimal (numeric constant) .....	438
HIDE .....	
control attribute .....	375
procedure .....	577
HLP .....	376
HOLD .....	
VIEW .....	578
HSCROLL .....	377
HVSCROLL .....	377

## I

ICON .....	378
ICONIZE .....	380
Icons in List boxes .....	362
icons in list boxes .....	285
icons in list fields .....	362
IDLE .....	580
IF .....	31, 475
Ignoring EQUATE redefinition: %V .....	839
Illegal array assignment .....	839
Illegal character .....	839
Illegal data type: %V .....	839
Illegal Expression .....	832
Illegal key component .....	839
Illegal nesting of window controls .....	839
Illegal parameter for LIKE .....	839
Illegal parameter type for STRING .....	839
Illegal reference assignment .....	839
Illegal return type or attribute .....	839
Illegal target for DO .....	839
Illegal target for GOTO .....	840

IMAGE .....	279
graphics procedure .....	581
IMM .....	
window attribute .....	381
Implicit String Arrays .....	122
Implicit type conversions .....	30
Implicit Variables .....	129
Implicit variables .....	
LONG .....	129
REAL .....	129
STRING(32) .....	129
In-place activation .....	736
INCLUDE .....	95
INCLUDE invalid, expected: %V .....	840
INCLUDE misplaced .....	840
INCLUDE nested too deep .....	840
Incompatible assignment types .....	840
INCOMPLETE .....	582
Inconsistent scanner initialization .....	847
Incorrect procedure profile .....	840
INDEX .....	162
Indices must be constant .....	840
Indistinguishable new prototype: %V .....	840
Inheritance .....	151
INI .....	
GETINI .....	573
PUTINI .....	643
INLIST .....	583
INNER .....	
JOIN attribute .....	200
inner join .....	200
Input Focus .....	236
INRANGE .....	584
INS .....	383
Instantiation .....	152
INSTRING .....	585
Insufficient Memory .....	829
INT (integer function) .....	586
Integer expression expected .....	840
Intermediate Value .....	436
Intermediate value .....	435
internal library .....	56
Internationalization .....	177
Invalid BREAK statement .....	840
Invalid CYCLE statement .....	840
Invalid data declaration attribute .....	840
Invalid Data File .....	830
Invalid data type for value parameter .....	840
Invalid Drive .....	829
Invalid Field Type Descriptor .....	831
Invalid FILE attribute .....	840
Invalid Filename .....	830

Invalid first parameter of ADD .....	841	Keyboard Functions .....	590
Invalid first parameter of FREE .....	841	Keyboard Procedures .....	500
Invalid first parameter of NEXT .....	841	KEYCHAR .....	591
Invalid first parameter of PUT .....	841	KEYCODE .....	591
Invalid GROUP/QUEUE/RECORD attribute .....	841	Keycode EQUATE Labels .....	46
Invalid Index String .....	831	Keycodes .....	46
Invalid Key File .....	830	KEYCODES.EQU .....	46
Invalid Key Length .....	832	KEYSTATE .....	592
Invalid KEY/INDEX attribute .....	841	KEYWORD .....	
Invalid label .....	841	Reserved .....	50
Invalid LOOP variable .....	841	Syntax Diagram .....	44
Invalid MEMBER statement .....	841		
Invalid Memo File .....	831	<b>L</b>	
Invalid method invocation syntax .....	841	Label duplicated, second used: %V .....	842
Invalid number .....	841	Label in prototype not defined: %V .....	842
Invalid Number Of Parameters .....	831	Label not defined: %V .....	842
Invalid OMIT expression .....	841	Labels .....	47
Invalid parameters for attribute .....	841	LANDSCAPE .....	384
Invalid picture token .....	841	Language Extension Modules .....	36
Invalid printer control token .....	841	LAST .....	357
Invalid QUEUE/RECORD attribute .....	841	LASTFIELD .....	592
Invalid Record Declaration .....	830	Leading zeroes .....	138
Invalid SIZE parameter .....	842	LEFT .....	
Invalid string (misused <...> or {...} ) .....	842	function .....	593
Invalid structure as first parameter .....	842	report control attribute .....	386
Invalid structure within property syntax .....	842	SHEET control attribute .....	385
Invalid USE attribute parameter .....	842	Left angle bracket (<) .....	51
Invalid use of PRIVATE data .....	842	LEMs .....	36
Invalid use of PRIVATE procedure .....	842	LEN .....	593
Invalid variable data parameter type .....	842	LIKE .....	28, 127
Invalid WINDOW control .....	842	LINE .....	
ISALPHA .....	587	control declaration .....	283
ISL error: %V .....	842	graphics procedure .....	594
ISLOWER .....	588	Line continuation character (!) .....	51
ISSTRING .....	589	LINEWIDTH .....	388
ISUPPER .....	590	LINK .....	
ITEM .....	281	Attribute of CLASS .....	201
ITEMIZE .....	97	OLE control attribute .....	388
<b>J</b>		Linking .....	39
JOIN .....	184	LIST .....	285
window control attribute .....	383	List Box Format String Properties .....	370
<b>K</b>		List Box Mouse Click Properties .....	370
KEY .....	163	LISTZONE:ExpandBox .....	370
control attribute .....	384	LISTZONE:Field .....	370
Key File Must Be Rebuilt .....	830	LISTZONE:Header .....	370
KEY must have components .....	842	LISTZONE:Icon .....	370
Key-in Pictures .....	145	LISTZONE:Nowhere .....	370
KEYBOARD .....	590	LISTZONE:Right .....	370
		LISTZONE:Tree .....	370
		Local data .....	134
		Local data declarations .....	54

Local Derived Methods .....	152	Memory redeclaration (OVER) .....	208
Local menu .....	229	Memory-mapped video .....	33
Local subroutines .....	32	MENU .....	291
Local tools .....	233	MENUBAR .....	229
LOCALE .....	595	MESSAGE .....	606
LOCK .....		META .....	394
FILE .....	596	Metafile record too large in report .....	833
LOCKTHREAD .....	597	Method .....	
LOG10 (base 10 logarithm) .....	597	PRIVATE .....	82
Logarithm .....	597, 598	Methods .....	
LOGE (natural logarithm) .....	598	VIRTUAL .....	151
Logical Evaluations .....	437	methods (PROCEDURES) .....	150
Logical Expressions .....	441	MIN .....	395
Logical Operators .....	437	Minus sign (-) .....	51
LOGOUT .....	599	Mis-placed string slice operator .....	842
LOGOUT Already Active .....	831	Mismatch with C4VBX.DLL detected .....	833
LONG .....	104	Missing procedure definition: %V .....	843
long filename support .....	792	Missing virtual function .....	843
Long to Short filename conversion .....		Mixed data types .....	147
SHORTPATH .....	686	MM .....	
LONGPATH .....	601	REPORT attribute .....	419
LOOP .....	31, 476	MODAL .....	396
LOWER .....	601	modal .....	226
<b>M</b>			
Maintaining INI Files .....	573	Modal Windows .....	394, 396
Mangling .....	91	Modeless Windows .....	394, 396
MAP .....	56	MODULE .....	
MODULE .....	57	Attribute of CLASS .....	201
MARK .....	389	structure of a MAP .....	57
MASK .....	390	Module data .....	134
control-level .....	390	Modulus operator .....	436
MAX .....		MONTH .....	608
report control attribute .....	391	Mouse Click Properties .....	370
MAXIMIZE .....	393	MOUSEX .....	608
MAXIMUM .....	605	MOUSEY .....	609
MDI .....	394	move .....	381
MDI application window .....	235	MSG .....	397
MDI child windows .....	235	Multi-threading .....	
MDI frame window .....	217	LOCKTHREAD .....	597
MDI program .....	235	START .....	692
MEMBER .....	54	THREAD .....	699
MAP .....	56	THREADLOCKED .....	700
MEMO .....	165	UNLOCKTHREAD .....	704
BINARY .....	189	Multiple Document Interface (MDI) .....	235
Memo File Missing .....	831	Multiplication operator .....	436
Memory allocation .....		Must be dimensioned variable .....	843
Dynamic .....	134	Must be field of a FILE or VIEW .....	843
Static .....	134	Must be FILE or KEY .....	843
Memory Corrupted .....	829	Must be reference variable .....	843
memory QUEUE .....	186	Must be variable .....	843
		Must have constant string parameter .....	843
		Must RETURN value from function .....	843
		Must specify DECIMAL size .....	843



Must specify identifier .....	843
Must specify print-structure .....	843

## N

NAME .....	202
function .....	609
on a prototype declaration .....	68
variable declaration attribute .....	81
Name Mangling .....	91
Named CLASSES .....	76
named group .....	131
Named GROUPs .....	76
named GROUPs and QUEUEs .....	131
Named QUEUEs .....	76
Natural logarithm .....	598
NEW .....	136
NEXT .....	36, 610
No Create Attribute .....	830
No Logout Active .....	832
No matching prototype available .....	843
NOBAR .....	398
NOCASE .....	204
BREAK attribute .....	398
NOFRAME .....	353
NOMEMO .....	
FILE .....	612
NOMERGE .....	399
Non-stop mode .....	664, 771
non-stop mode .....	664, 771
Non-Trappable Run Time Errors .....	833
NOSHEET .....	400
NOT .....	437
Not implemented yet .....	848
Not valid inside structure .....	843
NULL .....	613
reference variable .....	457
Null String .....	439
Null "value" .....	169
NUMERIC .....	614
Numeric Constants .....	438
Numeric Pictures .....	138

## O

Object declaration .....	
CLASS .....	150
Object Linking and Embedding .....	735
Object Properties (Encapsulation) .....	151
Octal (numeric constant) .....	438
OCX Callback functions .....	746

OCX controls .....	745
OCX Events .....	747
OCX PropertyS .....	748
OCXGETPARAM .....	760
OCXGETPARAMCOUNT .....	759
OCXLOADIMAGE .....	762
OCXREGISTEREVENTPROC .....	757
OCXREGISTERPROPCHANGE .....	756
OCXREGISTERPROPEdit .....	756
OCXSETPARAM .....	761
OCXUNREGISTEREVENTPROC .....	758
OCXUNREGISTERPROPCHANGE .....	758
OCXUNREGISTERPROPEdit .....	757
ODBC .....	818
ODBC Connect String .....	818
OEM .....	205
OF .....	31, 471
off-display background re-paints .....	774
Old symbol non-NIL .....	848
OLE .....	293, 735
container windows .....	735
OLE Automation .....	735
OLE Controller application .....	735
OLE custom controls .....	745
OLE Server application .....	735
OLEDIRECTORY .....	744
OMIT .....	98
OMIT cannot be nested .....	843
OMIT misplaced .....	843
OMIT not terminated: %V .....	844
OMITTED .....	615
Omitted parameters .....	70
OPEN .....	
FILE .....	616
OLE control attribute .....	400
Open-mode activation .....	736
Operating Assignment Statements .....	454
Operator Precedence .....	435
Operators .....	
Conditional Operators .....	437
Logical Operators .....	437
OPT .....	206
OPTION .....	
window control .....	297
OR .....	437
ORDER .....	
VIEW attribute .....	207
Order is MENUBAR, TOOLBAR, Controls .....	844
OROF .....	31, 471
OS/2 .....	39
Out of attribute space .....	847
outline control .....	362

OVER .....	208
OVER attribute .....	28
OVER must name variable .....	844
OVER must not be larger than target variable .....	844
OVER not allowed with STATIC or THREAD .....	844
Overflow, arithmetic .....	139, 460
Overloading	
Procedure or Function .....	89
OVR .....	383
OWNER .....	209
OWNER attribute .....	818

## P

PACK .....	619	Passed by value; Parameters .....	71
Packed Decimal .....	112, 114	Passing GROUPS, QUEUES, and CLASSES as Parameters ..	76
PAGE .....	400	PASSWORD .....	404
Page Overflow .....	244	PATH .....	620
Page-based printing .....	243	Path Not Found .....	829
PAGEAFTER .....	401	Pattern Pictures .....	144
PAGEBEFORE .....	402	PDECIMAL .....	114
PAGENO .....	403	PEEK .....	621
PALETTE .....	403	PENCOLOR .....	622
PANEL .....	300	PENSTYLE .....	623
PAPER .....	404	PENWIDTH .....	624
Parameter cannot be omitted .....	844	Percent sign (%) .....	51
Parameter kind does not match .....	844	Period .....	47
Parameter List .....	70	Period (.) .....	51
Parameter must be picture .....	844	Picture Tokens .....	138
Parameter must be procedure label .....	844	Pictures	
Parameter must be report DETAIL label .....	844	Date .....	141
Parameter type label ambiguous (CODE or DATA) .....	844	Key-in .....	145
Parameters .....	440	Numeric and Currency .....	138
CLASSES .....	76	Pattern .....	144
expression used as .....	435, 445	Scientific Notation .....	140
Named GROUPS .....	76	String .....	140
omitted .....	70	Time .....	143
pass address only .....	85	PIE .....	625
passed by address .....	71	Pixels .....	801
passed by value .....	71	Plus sign (+) .....	51
Passing Arrays .....	72	POINTER	
Passing Entities .....	75	FILE .....	852
Passing Procedures .....	75	INDEX .....	852
Polymorphic .....	72	KEY .....	852
polymorphism .....	89	QUEUE .....	627
QUEUES .....	76	POINTS	
Parameters must have labels .....	844	REPORT attribute .....	419
PARENT .....	151	POKE .....	628
Parentheses () .....	51	POLYGON .....	629
PASCAL .....	67	polymorphic parameters .....	72
calling convention .....	80	Polymorphism .....	151
Passed by address; Parameters .....	71	polymorphism .....	89
		POPBIND .....	449
		POPUP .....	630
		POSITION .....	632
		POST	
		EVENT .....	634
		post-mortem debuggers .....	92
		Pound sign (#) .....	51
		PRE .....	210
		Prefix attribute .....	27
		PRESS .....	635
		PRESSKEY .....	635
		PREVIEW .....	405
		PREVIOUS .....	36, 636
		PRIMARY .....	211

primary key .....	211	PROP:BELOW .....	385
PRINT .....	34, 638	PROP:BelowSize .....	385
"print engine" .....	243	PROP:BEVEL .....	340
PRINT must only be called for reports .....	833	PROP:BevelInner .....	340
Print structure		PROP:BevelOuter .....	340
BREAK .....	245	PROP:BevelStyle .....	340
DETAIL .....	246	PROP:BINARY .....	189
FOOTER .....	248	PROP:Binary .....	173
FORM .....	250	PROP:Blob .....	737
HEADER .....	251	PROP:Blobs .....	173
PRINTER		PROP:BOXED .....	341
built-in variable .....	443	PROP:BreakVar .....	773
PRINTER "built-in" variable .....	639	PROP:BrokenTabs .....	377
Printer Control Properties .....	253	PROP:Buffer .....	774
PRINTERDIALOG .....	639	PROP:ButtonFeq .....	426
PRIVATE		PROP:CanPaste .....	738
CLASS methods .....	82	PROP:CanPasteLink .....	738
variables .....	211	PROP:CAP .....	341
PROC .....	83	PROP:CENTER .....	341, 386
PROCEDURE .....	58	PROP:CENTERED .....	342
Procedure Call .....	66	PROP:CenterOffset .....	386
PROCEDURE cannot have return type .....	844	PROP:CHECK .....	342
Procedure doesn't belong to module: %V .....	844	PROP:Checked .....	774
Procedure in parent CLASS has VIRTUAL mismatch .....	845	PROP:Child .....	775
Procedure Overloading .....	89	PROP:ChildIndex .....	775
PROCEDURE Return Types .....	78	PROP:ChoiceFeq .....	776
Procedure-parameters .....	75	PROP:CLASS .....	343
PROGRAM .....	52	PROP:ClientHandle .....	776
MAP .....	56	PROP:ClientWndProc .....	777
PROGRESS .....	303	PROP:CLIP .....	343
PROJECT .....	183	PROP:Clip .....	736
PROMPT .....	301	PROP:ClipBits .....	778
PROP:ABOVE .....	385	PROP:CNT .....	344
PROP:AboveSize .....	385	PROP:COLOR .....	345
PROP:ABSOLUTE .....	331	PROP:ColorDialogHook .....	793
PROP:AcceptAll .....	771	PROP:COLUMN .....	347
PROP:Active .....	772	PROP:COMPATIBILITY .....	347
PROP:AddRef .....	742	PROP:Compatibility .....	737
PROP:ALONE .....	331	PROP:Completed .....	824
PROP:ALRT .....	332	PROP:Components .....	172
PROP:AlwaysDrop .....	772	PROP:ConnectString .....	818
PROP:ANGLE .....	334	PROP:Copy .....	738
PROP:AppInstance .....	772	PROP:CREATE .....	191, 348
PROP:Ascending .....	172	PROP>Create .....	171, 736, 745
PROP:AssertHook .....	794	PROP>CreateFromFile .....	736
PROP:AT .....	335	PROP:CreateLinkToFile .....	736
PROP:AUTO .....	338	PROP:Ctrl .....	745
PROP:AutoPaper .....	773	PROP:CurrentKey .....	818
PROP:AUTOSIZE .....	338	PROP:CURSOR .....	349
PROP:Autosize .....	736	PROP:DDETimeOut .....	779
PROP:AVE .....	339	PROP:Deactivate .....	738
PROP:Background .....	345	PROP:DECIMAL .....	386

PROP:DecimalOffset .....	386	PROP:GrabHandles .....	745
PROP:DEFAULT .....	350	PROP:GRAY .....	374
PROP:DeferMove .....	780	PROP:HaltHook .....	794
PROP:DELAY .....	350	PROP:Handle .....	785
PROP:DesignMode .....	745	PROP:HeaderHeight .....	786
PROP:Dim .....	173	PROP:Height .....	335
PROP:DISABLE .....	350	PROP:Held .....	821
PROP:DOCK .....	351	PROP:HIDE .....	375
PROP:DOCKED .....	351	PROP:HLP .....	376
PROP:DOCUMENT .....	352	PROP:HSCROLL .....	377
PROP:DOUBLE .....	353	PROP:HscrollPos .....	787
PROP:DoVerb .....	737, 745	PROP:HVSCROLL .....	377
PROP:DRAGID .....	354	PROP:ICON .....	378
PROP:DRIVER .....	195	PROP:ICONIZE .....	380
PROP:Driver .....	171	PROP:IconList .....	788
PROP:DriverLogoutAlias .....	819	PROP:ImageBits .....	789
PROP:DROP .....	355	PROP:ImageBlob .....	790
PROP:DROPID .....	356	PROP:IMM .....	381
PROP:DropWidth .....	355	PROP:INNER .....	200
PROP:DUP .....	196	PROP:INS .....	383
PROP:Dup .....	172	PROP:InToolbar .....	791
PROP>Edit .....	781	PROP:IsRadio .....	745
PROP:Enabled .....	782	PROP:Items .....	791
PROP:ENCRYPT .....	196	PROP:JOIN .....	383
PROP:Encrypt .....	171	PROP:JoinExpression .....	184
PROP:EventsWaiting .....	783	PROP:KEY .....	384
PROP:ExeVersion .....	783	PROP:Key .....	172
PROP:FalseValue .....	428	PROP:Keys .....	172
PROP:FatalErrorHook .....	794	PROP:Label .....	170
PROP:Feq .....	425	PROP:LANDSCAPE .....	384
PROP:FetchSize .....	511, 819	PROP:Language .....	738, 746
PROP:Field .....	172	PROP:LAST .....	357
PROP:Fields .....	173	PROP:LastEventName .....	745
PROP:File .....	820	PROP:LazyDisplay .....	792
PROP:FileDialogHook .....	793	PROP:LEFT .....	385, 386
PROP:Files .....	820	PROP:LeftOffset .....	385, 386
PROP:FILL .....	357	PROP:LFNSupport .....	792
PROP:FillColor .....	345	PROP:LibHook .....	793
PROP:FILTER .....	199	PROP:LibVersion .....	796
PROP:FIRST .....	357	PROP:Line .....	796
PROP:FLAT .....	358	PROP:LineCount .....	796
PROP:FlushPreview .....	784	PROP:LineHeight .....	797
PROP:Follows .....	785	PROP:LINEWIDTH .....	388
PROP:FONT .....	359	PROP:LINK .....	388
PROP:FontColor .....	359	PROP:ListFeq .....	426
PROP:FontDialogHook .....	793	PROP:Log .....	823
PROP:FontName .....	359	PROP:Logout .....	822
PROP:FontSize .....	359	PROP:MARK .....	389
PROP:FontStyle .....	359	PROP:MASK .....	390
PROP:FORMAT .....	361	PROP:MAX .....	391
PROP:FROM .....	372	PROP:Max .....	230
PROP:FULL .....	374	PROP:MaxHeight .....	797

PROP:MAXIMIZE .....	393	PROP:POINTS .....	419
PROP:MaxWidth .....	797	PROP:PREVIEW .....	405
PROP:MDI .....	394	PROP:PRIMARY .....	211
PROP:Memos .....	173	PROP:Primary .....	172
PROP:MessageHook .....	794	PROP:PrinterDialogHook .....	793
PROP:META .....	394	PROP:PrintMode .....	790, 802
PROP:MIN .....	395	PROP:Profile .....	823
PROP:MinHeight .....	797	PROP:Progress .....	802
PROP:MinWidth .....	797	PROP:ProgressEvents .....	824
PROP:MM .....	419	PROP:RANGE .....	407
PROP:MODAL .....	396	PROP:RangeHigh .....	407
PROP:MSG .....	397	PROP:RangeLow .....	407
PROP:NAME .....	202	PROP:READONLY .....	407
PROP:Name .....	170	PROP:RECLAIM .....	212
PROP:NextField .....	798	PROP:Reclaim .....	171
PROP:NextPageNo .....	799	PROP:RejectCode .....	803
PROP:NOBAR .....	398	PROP:Release .....	742
PROP:NOCASE .....	204	PROP:REPEAT .....	408
PROP:NoCase .....	172	PROP:ReportException .....	738, 745
PROP:NOFRAME .....	353	PROP:REQ .....	408
PROP:NoHeight .....	800	PROP:RESET .....	409
PROP:NOMERGE .....	399	PROP:RESIZE .....	353, 409
PROP:NOSHEET .....	400	PROP:RIGHT .....	385, 386, 410
PROP:NoTips .....	800	PROP:ROUND .....	410
PROP:NoWidth .....	800	PROP:SaveAs .....	737, 745
PROP:NumTabs .....	806	PROP:ScreenText .....	804
PROP:Object .....	742	PROP:SCROLL .....	410
PROP:OEM .....	205	PROP:Selected .....	804
PROP:Oem .....	172	PROP:SelectedColor .....	345
PROP:OLE .....	738, 745	PROP:SelectedFillColor .....	345
PROP:OPEN .....	400	PROP>SelectInterface .....	742
PROP:Open .....	736	PROP:SelEnd .....	804
PROP:OPT .....	206	PROP:SelStart .....	804
PROP:Opt .....	172	PROP:SINGLE .....	411
PROP:ORDER .....	207	PROP:Size .....	173, 805
PROP:Over .....	173	PROP:SKIP .....	412
PROP:OVR .....	383	PROP:SPREAD .....	412
PROP:OWNER .....	209	PROP:SQL .....	828
PROP:Owner .....	171	PROP:SQLDriver .....	826
PROP:PAGE .....	400	PROP:SQLFilter .....	828
PROP:PAGEAFTER .....	401	PROP:SQLJoinExpression .....	184
PROP:PageAfterNum .....	401	PROP:SQLOrder .....	207
PROP:PAGEBEFORE .....	402	PROP:STATUS .....	413
PROP:PageBeforeNum .....	402	PROP:StatusText .....	413
PROP:PAGENO .....	403	PROP:STD .....	415
PROP:PALETTE .....	403	PROP:STEP .....	416
PROP:Parent .....	801	PROP:StopHook .....	794
PROP:PASSWORD .....	404	PROP:STRETCH .....	416
PROP:Paste .....	738	PROP:Stretch .....	736
PROP:PasteLink .....	738	PROP:SUM .....	417
PROP:Pixels .....	801	PROP:SYSTEM .....	418
PROP:Places .....	173	PROP:TabRows .....	806

PROP:TALLY .....	418
PROP:TemplImage .....	807
PROP:TemplImagePath .....	807
PROP:TemplImageStatus .....	807
PROP:TempNameFunc .....	808
PROP:TempPagePath .....	807
PROP:TempPath .....	807
PROP:Text .....	329, 826
PROP:THOUS .....	419
PROP:THREAD .....	214
PROP:Thread .....	172, 809
PROP:Threading .....	809
PROP:TILED .....	419
PROP:TIMER .....	420
PROP:TIP .....	421
PROP:TipDelay .....	809
PROP:TipDisplay .....	809
PROP:TOOLBOX .....	422
PROP:Touched .....	810
PROP:TRN .....	424
PROP:TrueValue .....	428
PROP:Type .....	171, 811
PROP:UP .....	424
PROP:Update .....	738
PROP:UPR .....	341
PROP:UpsideDown .....	424, 812
PROP:USE .....	425
PROP:VALUE .....	428
PROP:Value .....	827
PROP:VBXEvent .....	326, 812
PROP:VBXEventArg .....	326, 812
PROP:VbxFile .....	343
PROP:VbxName .....	343
PROP:VCR .....	429
PROP:VcrFreq .....	429
PROP:Visible .....	813
PROP:VLBproc .....	814
PROP:VLBval .....	814
PROP:VSCROLL .....	377
PROP:VscrollPos .....	816
PROP:WALLPAPER .....	430
PROP:Watched .....	827
PROP:Width .....	335
PROP:WITHNEXT .....	431
PROP:WITHPRIOR .....	432
PROP:WIZARD .....	433
PROP:WndProc .....	817
PROP:Xpos .....	335
PROP:Ypos .....	335
PROP:ZOOM .....	433
PROP:Zoom .....	736
PROP:DOWN .....	424

## Properties

active window .....	772
bitmap images in memo fields .....	778, 789, 790
data changed by the user .....	810
edit-in-place .....	781
FlushPreview .....	784
mark as a block .....	804
name of a VBX event .....	812
number of entries visible in a LIST .....	791, 797
Object .....	151
tab order .....	785
thread number .....	809
window or control handle .....	776, 777, 785, 817
Property Access Syntax .....	442
Property Equates .....	329
Property Expressions .....	442
PROPLIST:BackColor .....	369
PROPLIST:BackSelected .....	369
PROPLIST:CellStyle .....	362
PROPLIST:Center .....	361
PROPLIST:CenterOffset .....	361
PROPLIST:Color .....	362
PROPLIST:ColStyle .....	362, 367
PROPLIST:Decimal .....	361
PROPLIST:DecimalOffset .....	361
PROPLIST:Exists .....	369
PROPLIST:FieldNo .....	363
PROPLIST:Fixed .....	363
PROPLIST:Format .....	361
PROPLIST:GRID .....	375
PROPLIST:Group .....	364
PROPLIST:Header .....	363
PROPLIST:HeaderCenter .....	363
PROPLIST:HeaderCenterOffset .....	363
PROPLIST:HeaderDecimal .....	363
PROPLIST:HeaderDecimalOffset .....	363
PROPLIST:HeaderLeft .....	363
PROPLIST:HeaderLeftOffset .....	363
PROPLIST:HeaderRight .....	363
PROPLIST:HeaderRightOffset .....	363
PROPLIST:Icon .....	362
PROPLIST:IconTrn .....	362
PROPLIST:LastOnLine .....	363
PROPLIST:Left .....	361
PROPLIST:LeftOffset .....	361
PROPLIST:Locator .....	363
PROPLIST:MouseDownField .....	370
PROPLIST:MouseDownRow .....	370
PROPLIST:MouseDownZone .....	370
PROPLIST:MouseMoveField .....	370
PROPLIST:MouseMoveRow .....	370
PROPLIST:MouseMoveZone .....	370

PROPLIST:MouseUpField .....	370	PROPSTYLE:Picture .....	367
PROPLIST:MouseUpRow .....	370	PROPSTYLE:TextColor .....	367
PROPLIST:MouseUpZone .....	370	PROPSTYLE:TextSelected .....	367
PROPLIST:Picture .....	363	PROTECTED .....	84, 212
PROPLIST:Resize .....	363	Protected mode .....	39
PROPLIST:Right .....	361	Prototype is: %V .....	845
PROPLIST:RightBorder .....	363	prototypes .....	56
PROPLIST:RightOffset .....	361	PSTRING .....	120
PROPLIST:Scroll .....	364	PUSHBIND .....	450
PROPLIST:TextColor .....	369	PUT .....	36, 640
PROPLIST:TextSelected .....	369	PUTINI .....	643
PROPLIST:Tree .....	362		
PROPLIST:TreeBoxes .....	363	<b>Q</b>	
PROPLIST:TreeIndent .....	363	Question mark (?) .....	51
PROPLIST:TreeLines .....	362	QUEUE .....	186
PROPLIST:TreeOffset .....	362	ADD .....	493
PROPLIST:TreeRoot .....	362	CHANGES .....	521
PROPLIST:Underline .....	363	POINTER .....	627
PROPLIST:Width .....	361, 364	SORT .....	690
PROPPRINT:Collate .....	253	QUEUE/RECORD not valid in GROUP .....	845
PROPPRINT:Color .....	253		
PROPPRINT:Context .....	253	<b>R</b>	
PROPPRINT:Copies .....	253	RADIO	
PROPPRINT:Device .....	254	window control .....	305
PROPPRINT:DevMode .....	253	RANDOM .....	644
PROPPRINT:Driver .....	254	RANGE .....	407
PROPPRINT:Duplex .....	254	Range validation .....	584
PROPPRINT:FontMode .....	254	RAW .....	68, 85
PROPPRINT:FromMin .....	254	Re-declarations .....	28
PROPPRINT:FromPage .....	254	re-paints .....	774
PROPPRINT:PAPER .....	404	READONLY .....	407
PROPPRINT:Paper .....	254	REAL .....	109
PROPPRINT:PaperBin .....	254	RECLAIM .....	212
PROPPRINT:PaperHeight .....	254	RECORD .....	168
PROPPRINT:paperheight .....	404	Record Changed By Another Station .....	832
PROPPRINT:PaperWidth .....	254	Record Is Already Held .....	830
PROPPRINT:paperwidth .....	404	Record Not Available .....	830
PROPPRINT:Percent .....	254	Record Not Found .....	830
PROPPRINT:Port .....	255	RECORDS .....	645
PROPPRINT:PrintToFile .....	255	Recursive	
PROPPRINT:PrintToName .....	255	FUNCTION .....	135
PROPPRINT:Resolution .....	255	PROCEDURE .....	135
PROPPRINT:ToMax .....	255	Redeclares (OVER) .....	208
PROPPRINT:ToPage .....	255	Redefining system intrinsic: %V .....	845
PROPPRINT:Yresolution .....	255	Redirection file .....	95
PROPSTYLE:BackColor .....	367	Reference Assignment Statements .....	457
PROPSTYLE:BackSelected .....	367	Reference Variables .....	130
PROPSTYLE:FontColor .....	367	REGEX	
PROPSTYLE:FontName .....	367	VIEW .....	650
PROPSTYLE:FontSize .....	367	REGION .....	308
PROPSTYLE:FontStyle .....	367		

REGISTER		
EVENT .....	647	
regular expression match .....	602	
REJECTCODE .....	649	
Relative record .....	852	
RELEASE		
VIEW .....	652	
Remainder (Modulus division) .....	436	
REMOVE .....	653	
RENAME .....	654	
REPEAT		
control attribute .....	408	
Repeat count notation .....	439	
Repeated characters .....	500	
Replaceable database drivers .....	37	
REPORT .....	241	
Page Overflow .....	244	
Report is already open .....	833	
REPORT structures .....	34	
Report totals		
AVE .....	339	
CNT .....	344	
MAX .....	391	
MIN .....	395	
SUM .....	417	
REQ .....	408	
Reserved Words .....	50	
RESET .....	655	
report control attribute .....	409	
RESIZE .....	353, 409	
resize .....	381	
RETURN .....	482	
return file existence .....	560	
RETURN value .....	78	
Rewrite (PUT) .....	640	
RIGHT		
function .....	657	
MENU control attribute .....	410	
report control attribute .....	386	
SHEET control attribute .....	385	
Right angle bracket (>) .....	51	
ROLLBACK .....	658	
ROUND		
control attribute .....	410	
function .....	659	
ROUNDBOX .....	660	
ROUTINE .....	32, 62	
DO .....	480	
EXIT .....	480	
Routine label duplicated .....	845	
Routine not defined: %V .....	845	
RUN .....	661	
Run Time Errors .....	829, 833	
RUNCODE .....	663	
Runtime Expression .....	445	
Runtime Property Assignment		
Property Access Syntax .....	442	
Property Equates .....	329	
<b>S</b>		
Scientific Notation Pictures .....	140	
scope .....	134	
Screen Fields (controls) .....	236	
screen flicker .....	774	
SCREEN structure .....	33	
SCROLL .....	410	
SDI application		
PROP:Threading .....	809	
SECTION .....	99	
SECTION duplicated: %V .....	845	
SECTION not found: %V .....	845	
SELECT .....	664	
SELECTED .....	666	
SELF .....	155	
Semi-colon .....	47	
Semi-colon (;) .....	51	
SEND .....	666	
Sentence oriented languages .....	25	
SEPARATOR .....	411	
SET .....	36	
FILE .....	667	
SET3DLOOK .....	670	
SETCLIPBOARD .....	671	
SETCLOCK .....	672	
SETCOMMAND .....	672	
SETCURSOR .....	673	
SETDROPID .....	674	
SETFONT .....	675	
SETKEYCHAR .....	676	
SETKEYCODE .....	676	
SETNONULL .....	677	
SETNULL .....	678	
SETPATH .....	679	
SETPENCOLOR .....	680	
SETPENSTYLE .....	681	
SETPENWIDTH .....	682	
SETPOSITION .....	683	
SETTARGET .....	443, 684	
SETTODAY .....	686	
SHARE		
FILE .....	853	
Sharing Violation .....	831	
SHEET .....	310	



SHORT .....	102	STREAM .....	696
Short to Long filename conversion		STRETCH .....	416
LONGPATH .....	601	STRING	
SHORTPATH .....	686	data type .....	116
SHOW .....	687	window control .....	317
SHUTDOWN .....	687	String Constants .....	439
Sieve of Eratosthenes .....	40	String Expressions .....	440
SIGNED .....	106	String not CCST .....	848
Simple Assignment Statements .....	453	String not terminated .....	845
SIN (sine of angle) .....	688	String Pictures .....	140
SINGLE .....	411	String Slicing .....	122
Single Document Interface (SDI) .....	235	Strong typing .....	28
Single quotes (") .....	51	Structure Termination .....	48
Single-precision real .....	108, 110	SUB (substring function) .....	697
SIZE .....	100	sub-classing .....	763, 777, 817
SKIP .....	36	Sub-routine (ROUTINE) .....	62
control attribute .....	412	Subscript	
procedure .....	689	Array .....	192
Slash (/) .....	51	MAXIMUM .....	605
Smart Linking .....	40	Subscript out of range .....	845
SORT (QUEUE) .....	690	Subtraction operator .....	436
sort order		SUM .....	417
INDEX .....	162	Switch To .....	418
KEY .....	163	SYSTEM	
VIEW .....	207	built-in variable .....	443
Sound (BEEP) .....	506	window attribute .....	418
soundex .....	602	System Date	
Source variable .....	453	SETTODAY .....	686
Special Characters .....	51	TODAY .....	700
used in string constants .....	439	System menu .....	418
SPIN .....	313	System modal .....	226, 396
SPREAD .....	412	System Time	
SQL .....	36, 828	CLOCK .....	527
SQRT (square root) .....	691	SETCLOCK .....	672
SREAL .....	108		
Standard Date .....	45	<b>T</b>	
Standard Time .....	45	TAB .....	320
START .....	692	TALLY .....	418
Statement Execution Sequence .....	65	TAN (tangent of angle) .....	698
Statement Format .....	47	TARGET	
Statement label duplicated .....	845	built-in variable .....	443
Statement Labels .....	47	TARGET, built-in variable .....	684
Statement must have label .....	845	Termination	
Statement oriented languages .....	25	FUNCTION .....	482
Statement selection integer .....	32	HALT .....	575
STATIC .....	213	PROCEDURE .....	482
Static Data .....	134	PROGRAM .....	482
STATUS .....	694	ROUTINE .....	480
window attribute .....	413	structure .....	48
STD .....	415	TEXT .....	322
STEP .....	416	THEN .....	31, 475
STOP .....	695		

THOUS	
REPORT attribute .....	419
THREAD .....	214
Function .....	699
THREADLOCKED .....	700
Tilde (~) .....	51
TILED	
IMAGE attribute .....	419
TIME	
data type .....	124
Time	
Standard Time .....	45
Time Pictures .....	143
TIMER .....	420
TIMES .....	476
TIP .....	421
TO .....	31, 471, 476
TODAY .....	700
Token oriented languages .....	24
Too few indices .....	845
Too few parameters .....	845
Too many indices .....	845
Too many keystrokes PRESSed .....	833
Too Many Open Files .....	829
Too many parameters .....	846
TOOLBAR .....	232
TOOLBOX .....	422
Totals	
AVE .....	339
CNT .....	344
MAX .....	391
MIN .....	395
SUM .....	417
Transaction Processing	
COMMIT .....	532
LOGOUT .....	599
ROLLBACK .....	658
Trappable Run Time Errors .....	829
tree control .....	362
tree controls in list boxes .....	285
TRN .....	424
Truncation	
Data Type Conversion Rules .....	460
INT .....	586
two-column drop menu .....	230
TYPE .....	87, 216, 701
Type Conversion .....	460, 462
type definition .....	216
Type descriptor not static .....	847

## U

ULONG .....	105
Unable To Access Index .....	831
Unable to complete operation (system is MODAL) .....	833
Unable to create control (system is MODAL) .....	833
Unable To Log Transaction .....	830
Unable to open APPLICATION .....	833
Unable to open APPLICATION (APPLICATION already ac .....	833
Unable to open APPLICATION (system is MODAL) .....	833
Unable to open MDI WINDOW .....	834
Unable to open MDI window (No APPLICATION active) .....	834
Unable to open MDI window (system is MODAL) .....	834
Unable to open MDI window on APPLICATION's thread ....	834
Unable to open WINDOW .....	834
Unable to process ACCEPT (system is MODAL) .....	834
Unable To ROLLBACK Transaction .....	831
Unable to verify validity of OVER attribute .....	846
UNBIND .....	451
Unexpected error opening printer device .....	834
UNHIDE .....	701
UNIX .....	39
Unknown assignment operator .....	847
Unknown attribute: %V .....	846
Unknown case type .....	847
Unknown clear type .....	847
Unknown descriptor type .....	847
Unknown designator kind .....	847
Unknown equate type .....	847
Unknown Error Posted .....	832
Unknown expression kind .....	847
Unknown expression type .....	847
Unknown formal entity .....	847
Unknown function label .....	846
Unknown identifier .....	846
Unknown identifier: %V .....	846
Unknown initializer type .....	847
Unknown key component: %V .....	846
Unknown label/routine .....	847
Unknown operator .....	847
Unknown parameter kind .....	847
Unknown picture type .....	847
Unknown procedure label .....	846
Unknown screen structure kind .....	848
Unknown simple formal type .....	847
Unknown special identifier .....	848
Unknown static label .....	848
Unknown string kind .....	847
Unknown structure field .....	847
Unknown variable context .....	847
Unknown variable type .....	847
UNLOAD .....	702

UNLOCK	
FILE .....	703
UNLOCKTHREAD .....	704
UNREGISTER	
EVENT .....	705
UNSIGNED .....	107
Unspecified Data Type Parameters .....	72
Unsupported Data Type In File .....	831
Unsupported File Driver Function .....	832
UNTIL .....	476
UNTIL/WHILE illegal here .....	846
Untyped value-parameters .....	72
Untyped variable-parameters .....	72
UP	
SHEET control attribute .....	424
UPDATE .....	706
UPPER .....	707
UPR .....	341
USE	
window control attribute .....	425
USHORT .....	103

## V

VAL (ASCII value) .....	707
VALUE .....	428
Value not static .....	848
Value requires (more) subscripts .....	846
Value-parameter cannot be an array .....	846
Value-parameters .....	71
Variable expected .....	846
Variable Not Found .....	832
Variable-parameters .....	71
Variable-size must be constant .....	846
Variables	
ANY .....	125
BFLOAT4 .....	110
BFLOAT8 .....	111
BYTE .....	101
CSTRING .....	118
DATE .....	123
DECIMAL .....	112
GROUP .....	147
Implicit .....	129
ITEMIZE .....	97
LONG .....	104
PDECIMAL .....	114
PRIVATE .....	211
PROTECTED .....	84, 212
PSTRING .....	120
REAL .....	109
SHORT .....	102

SIGNED .....	106
SREAL .....	108
STRING .....	116
TIME .....	124
ULONG .....	105
UNSIGNED .....	107
USHORT .....	103
VARIANT .....	125
VBX .....	325, 745
VBX control is too complex .....	834
VCR .....	429
Vertical bar .....	47
Vertical bar ( ) .....	51
VIEW .....	180
view sort order .....	207
VIRTUAL .....	88
VIRTUAL illegal outside of CLASS structure .....	846
virtual method .....	88
VIRTUAL Methods .....	151
Visual Basic .VBX control .....	325
VSCROLL .....	377

## W

WALLPAPER .....	430
WATCH	
VIEW .....	708
WHAT .....	709
WHERE .....	710
WHILE .....	476
WHO .....	711
wild card match .....	602
WINDOW .....	223
MDI child window .....	223
non-MDI window .....	223
Window Functions .....	491
Window is already open .....	834
Window is not open .....	834
window or control handle .....	776, 777, 785, 817
Window Overview .....	235
Window Procedures .....	520
Windows .....	39
Windows Standard Dialog Functions .....	530
WITHNEXT .....	431
WITHPRIOR .....	432
WIZARD .....	433
Wrong number of parameters .....	846
Wrong number of subscripts .....	847

## X

XOR .....	437
-----------	-----

**Y**

YEAR .....	712
YIELD.....	713

**Z**

zero_divide .....	436
ZOOM .....	433

# ***NOTES***





