

**MICROSOFT®**

Microsoft Corporation  
10700 Northup Way  
Box 97200  
Bellevue, WA 98009

**MICROSOFT**

---

**Microsoft® Pascal**  
**Compiler**

---

**Quick Reference Guide**

---

Part No. 020-000-010

# **MICROSOFT.**

## **Pascal Compiler**

### **Quick Reference Guide**

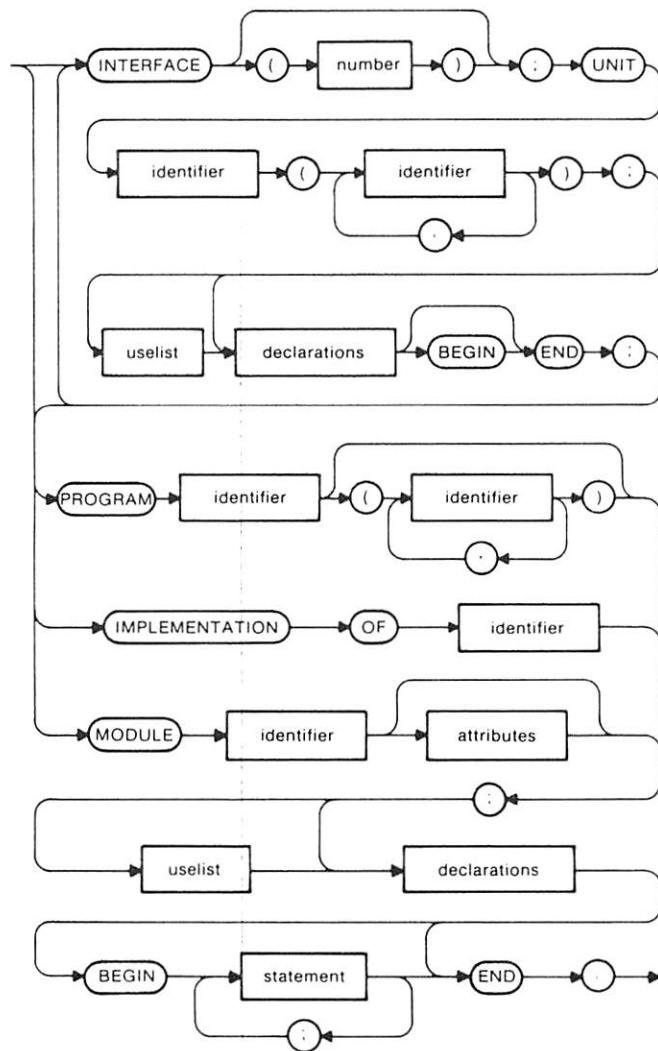
---

#### **Syntax Diagrams**

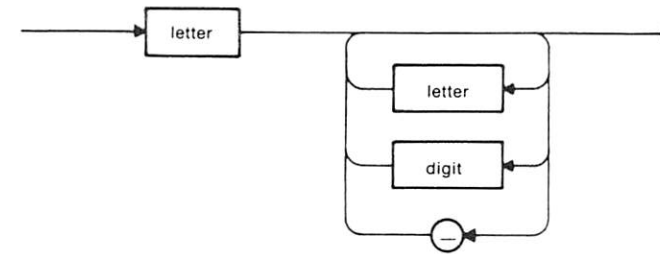
The diagrams on the following pages show the fundamental syntax of the MS<sup>TM</sup>-Pascal language. They are arranged in the order that you would be likely to use the elements while writing a program. The meaning of the differently shaped outlines is as follows:

|         |                                                                                                                  |
|---------|------------------------------------------------------------------------------------------------------------------|
| OVALS   | Indicate reserved words or symbols of the MS-Pascal language. These must be typed as shown.                      |
| BOXES   | Indicate higher-level constructions that usually have syntax diagrams of their own.                              |
| CIRCLES | Indicate punctuation that is required and must be typed as shown.                                                |
| ARROWS  | Help to show the path through the diagram, including any possible looping (i.e., repetition of syntax elements). |

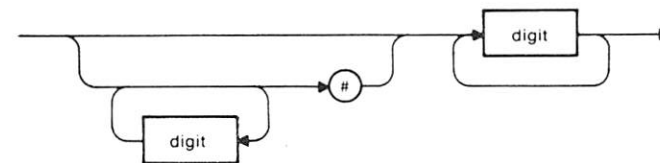
## Source File



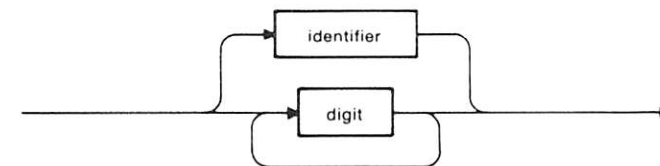
## Identifier



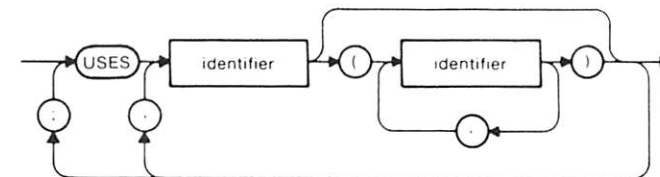
## Number



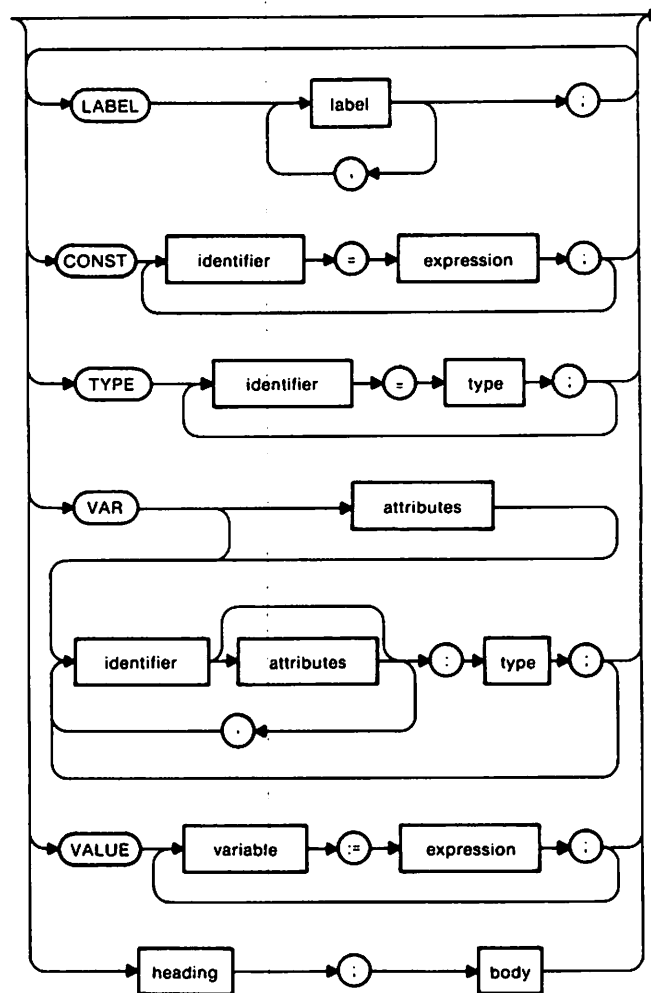
## Label



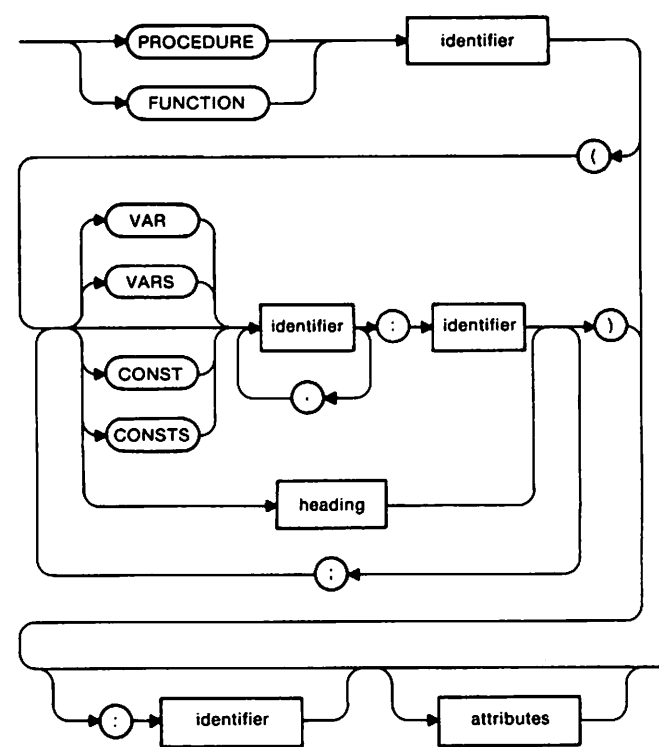
## Uselist



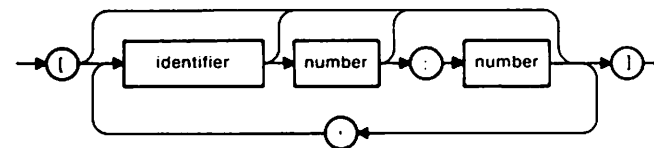
## Declarations



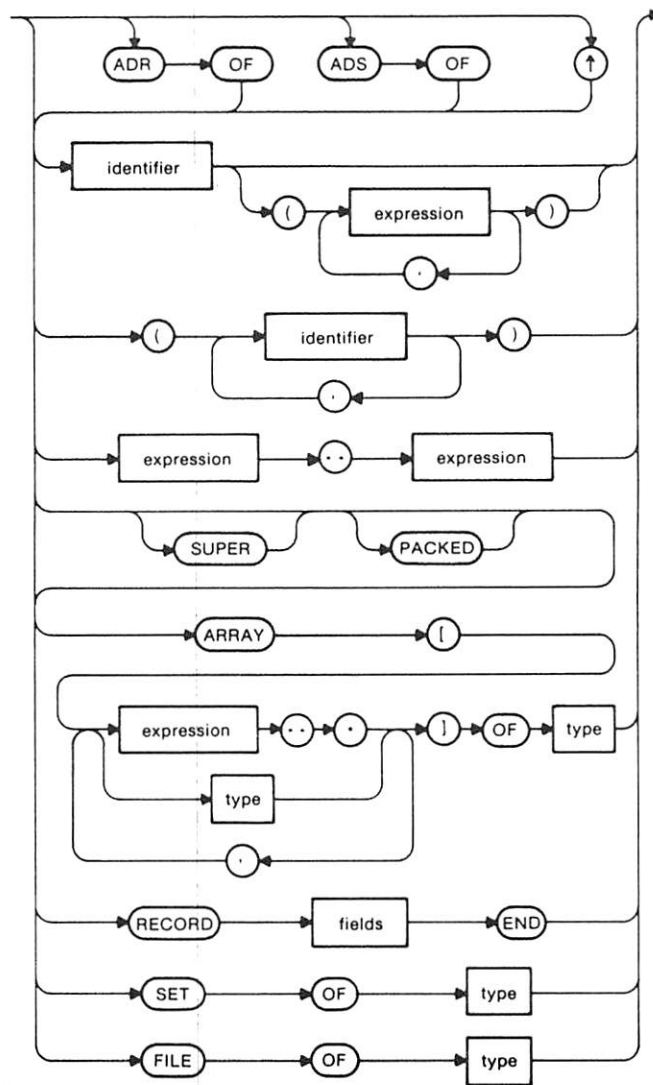
## Heading



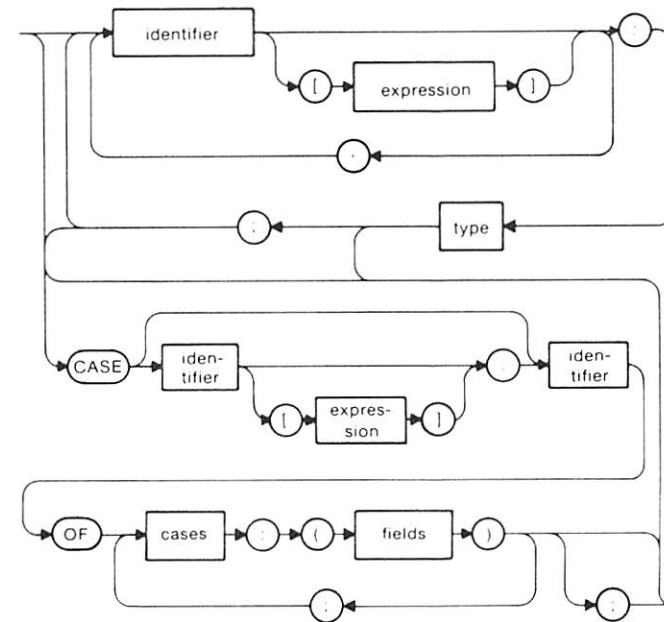
## Attributes



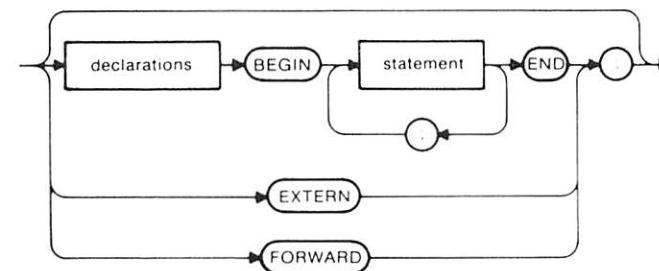
## Type



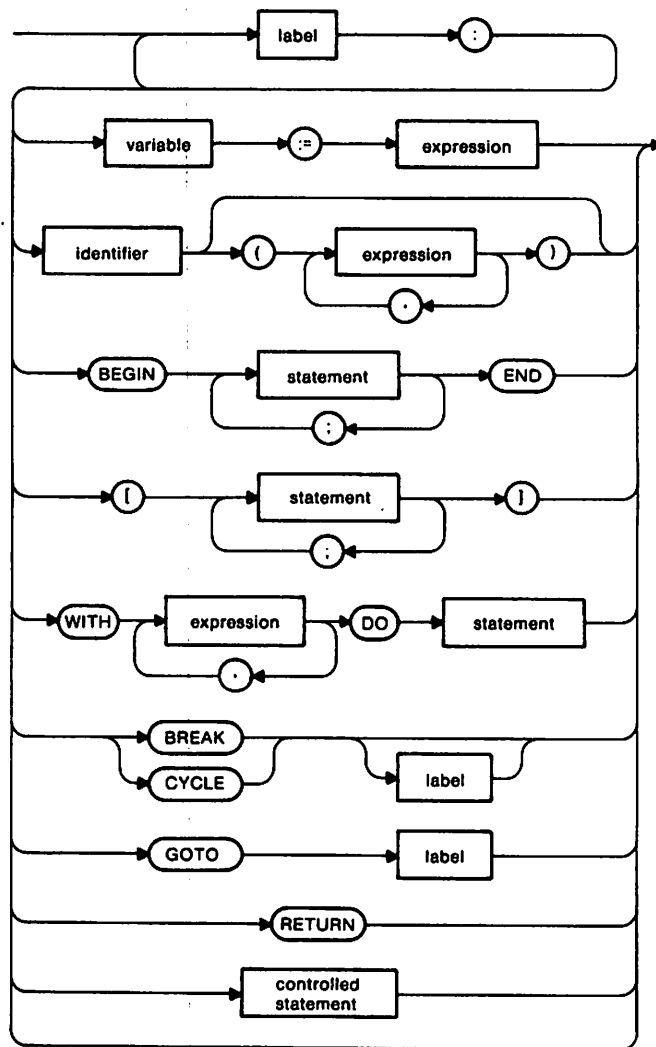
## Fields



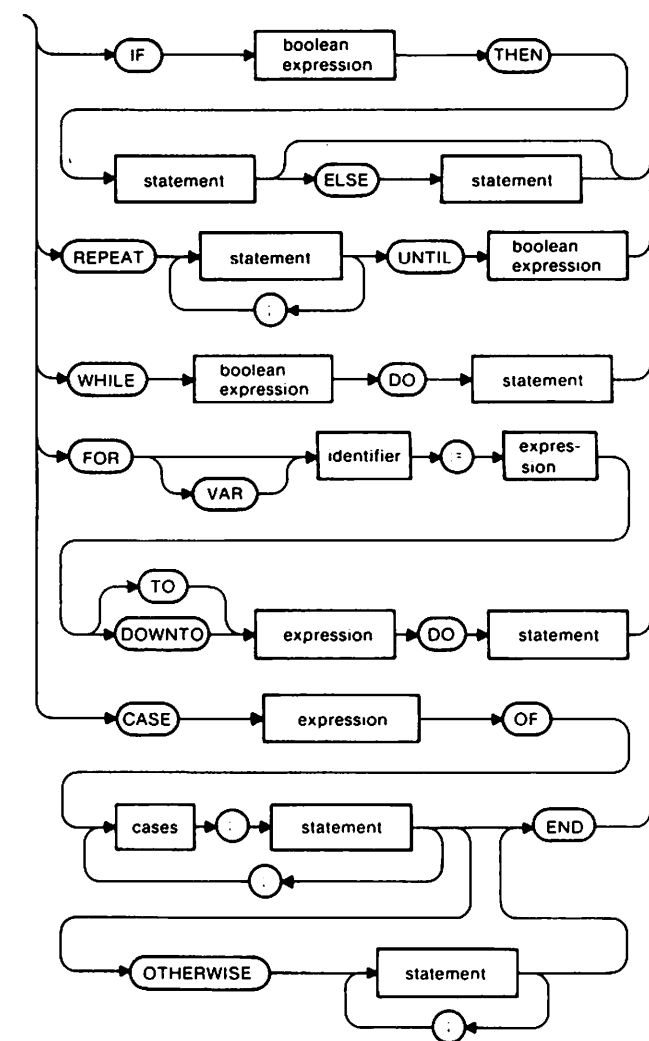
## Body



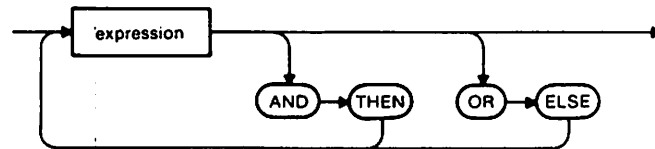
## Statement



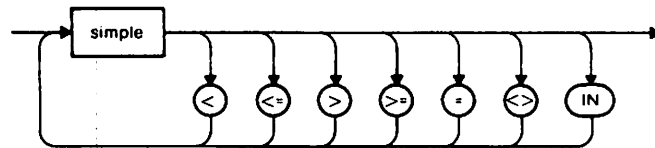
## Controlled Statement



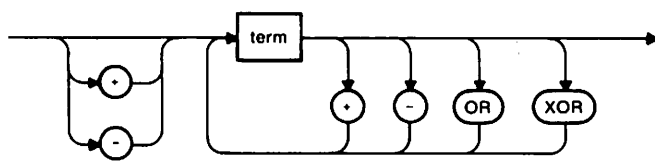
### Boolean Expression



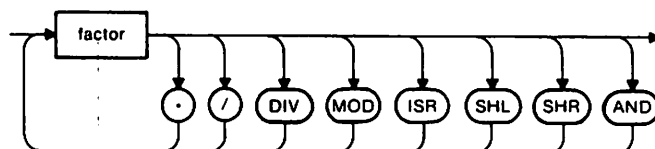
### Expression



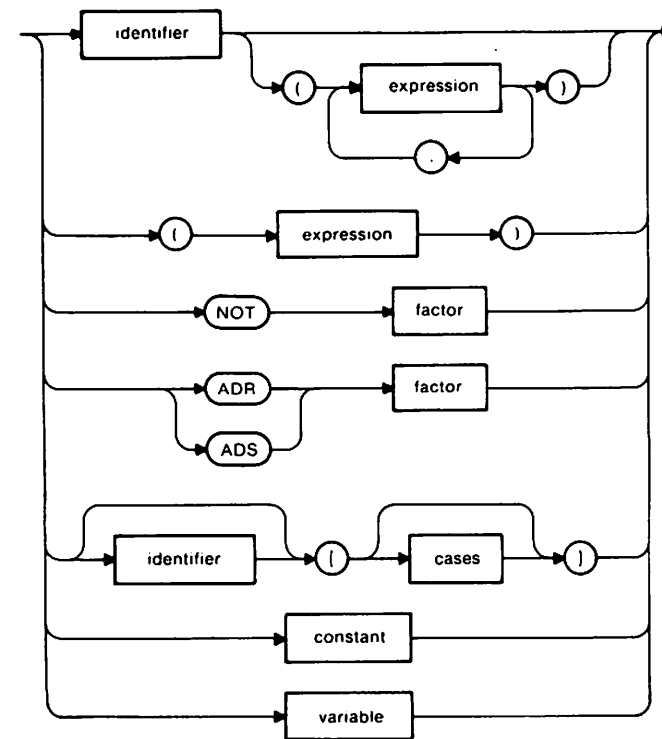
### Simple



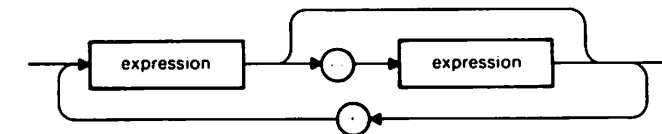
### Term



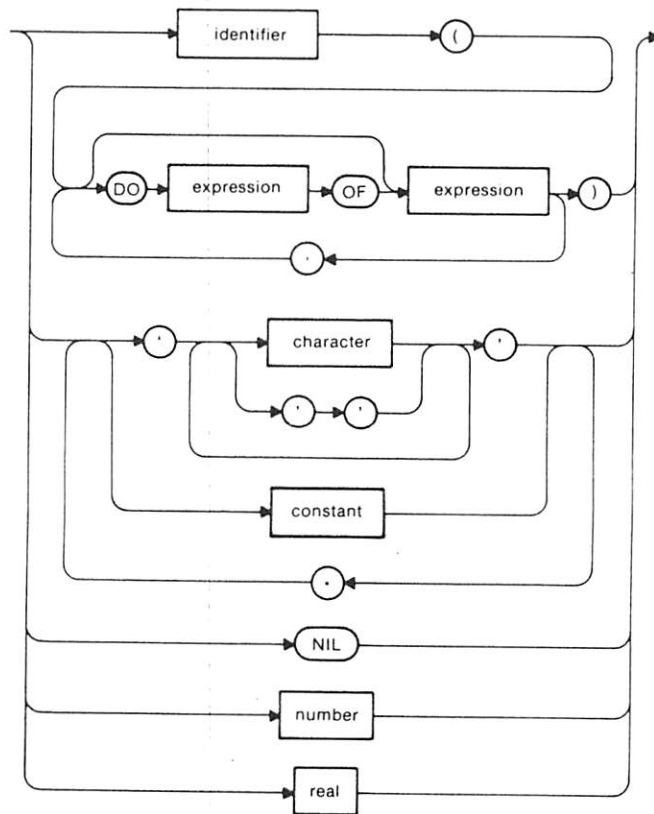
### Factor



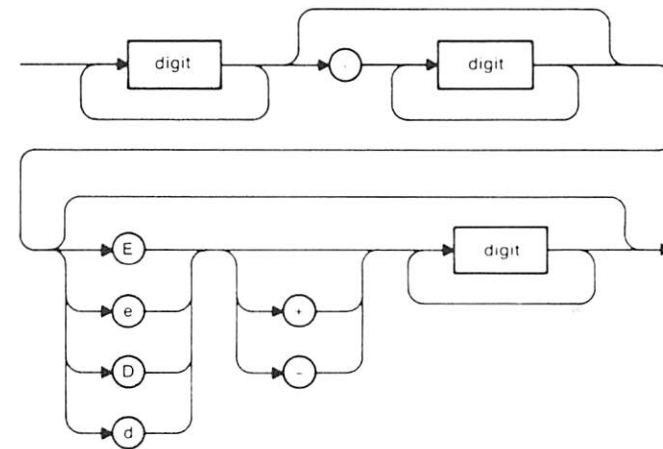
### Cases



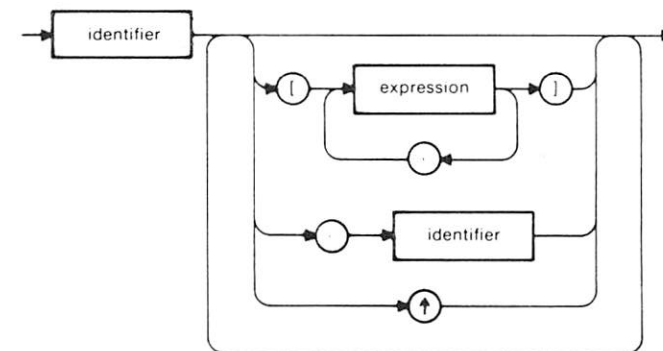
**Constant**



## Real



## Variable



## Available Procedures and Functions

| Name    | Description                  | Category        |
|---------|------------------------------|-----------------|
| ABORT   | Terminate program            | Extend Level    |
| ABS     | Absolute value function      | Arithmetic      |
| ACDRQQ  | REAL8 arc cosine function    | Arithmetic      |
| ACSRQQ  | REAL4 arc cosine function    | Arithmetic      |
| AIDRQQ  | REAL8 truncate function      | Arithmetic      |
| AISRQQ  | REAL4 truncate function      | Arithmetic      |
| ALLHQQ  | Allocate heap item           | Library         |
| ANDRQQ  | REAL8 round toward zero      | Arithmetic      |
| ANSRQQ  | REAL4 round toward zero      | Arithmetic      |
| ARCTAN  | Arc tangent function         | Arithmetic      |
| ASDRQQ  | REAL8 arc sine function      | Arithmetic      |
| ASSRQQ  | REAL4 arc sine function      | Arithmetic      |
| ASSIGN  | Assign filename              | File System     |
| ATDRQQ  | REAL8 arc tangent function   | Arithmetic      |
| ATSRQQ  | REAL4 arc tangent function   | Arithmetic      |
| A2DRQQ  | REAL8 arc tangent (A/B)      | Arithmetic      |
| A2SRQQ  | REAL4 arc tangent (A/B)      | Arithmetic      |
| BEGOQQ  | Initialize user              | Library         |
| BEGXQQ  | Overall initialization       | Library         |
| BYLONG  | WORD or INTEGER to INTEGER4  | Extend Level    |
| BYWORD  | Put bytes in word            | Extend Level    |
| CHDRQQ  | REAL8 hyperbolic cosine      | Arithmetic      |
| CHR     | Get ASCII char of value      | Data Conversion |
| CHSRQQ  | REAL4 hyperbolic cosine      | Arithmetic      |
| CLOSE   | Close file                   | File System     |
| CNDRQQ  | REAL8 cosine function        | Arithmetic      |
| CNSRQQ  | REAL4 cosine function        | Arithmetic      |
| CONCAT  | Concatenate LSTRING          | String          |
| COPYLST | Copy to LSTRING              | String          |
| COPYSTR | Copy to STRING               | String          |
| COS     | Cosine function              | Arithmetic      |
| DATE    | Date function                | Library         |
| DECODE  | Decode LSTRING to variable   | Extend Level    |
| DELETE  | Remove portion of LSTRING    | String          |
| DISBIN  | Disable interrupts           | Library         |
| DISCARD | Close and delete file        | File System     |
| DISPOSE | Dispose of heap item         | Dynamic Alloc   |
| ENABIN  | Enable interrupts            | Library         |
| ENCODE  | Encode expression to LSTRING | Extend Level    |
| ENDOQQ  | User termination             | Library         |
| ENDXQQ  | Program termination          | Library         |
| EOF     | Boolean end-of-file          | File System     |

| Name   | Description                  | Category        |
|--------|------------------------------|-----------------|
| EOLN   | Boolean end-of-line          | File System     |
| EVAL   | Evaluate functions           | Extend Level    |
| EXDRQQ | REAL8 exponential function   | Arithmetic      |
| EXP    | Exponential function         | Arithmetic      |
| EXSRQQ | REAL4 exponential function   | Arithmetic      |
| FILLC  | Fill area with C, relative   | System Level    |
| FILLSC | Fill area with C, segmented  | System Level    |
| FLOAT  | Convert INTEGER to REAL      | Data Conversion |
| FLOAT4 | Convert INTEGER4 to REAL     | Data Conversion |
| FREET  | Give count of free blocks    | Library         |
| GET    | Get next file component      | File System     |
| GTUQQ  | Direct terminal input        | Library         |
| HDLUQQ | Return file handle           | File System     |
| HIBYTE | Get high BYTE                | Extend Level    |
| HIWORD | Get high WORD                | Extend Level    |
| INSERT | Insert string                | String          |
| LADDOK | 32-bit signed addition check | Library         |
| LDDRQQ | REAL8 log base ten function  | Arithmetic      |
| LDSRQQ | REAL4 log base ten function  | Arithmetic      |
| LMULOK | 32-bit signed multiply check | Arithmetic      |
| LN     | Natural log function         | Arithmetic      |
| LNDRQQ | REAL8 natural log function   | Arithmetic      |
| LNSRQQ | REAL4 natural log function   | Arithmetic      |
| LOBYTE | Get low BYTE                 | Extend Level    |
| LOCKED | Resource locked status       | Library         |
| LOWER  | Get lower bound              | Extend Level    |
| LOWORD | Get low WORD                 | Extend Level    |
| MARKAS | Mark heap bounds             | Library         |
| MDDRQQ | REAL8 modulo function        | Arithmetic      |
| MDSRQQ | REAL4 modulo function        | Arithmetic      |
| MEMAVL | Available memory             | Library         |
| MNDRQQ | REAL8 minimum function       | Arithmetic      |
| MNSRQQ | REAL4 minimum function       | Arithmetic      |
| MOVE   | Move bytes left, relative    | System Level    |
| MOVER  | Move bytes right, relative   | System Level    |
| MOVESL | Move bytes left, segmented   | System Level    |
| MOVESR | Move bytes right, segmented  | System Level    |
| MXDRQQ | REAL8 maximum function       | Arithmetic      |
| MXSRQQ | REAL4 maximum function       | Arithmetic      |
| NEW    | Allocate new heap item       | Dynamic Alloc   |
| ODD    | Boolean odd function         | Data Conversion |
| ORD    | Get ordinal value            | Data Conversion |
| PACK   | Pack CHAR array              | Data Conversion |
| PAGE   | Write new page               | File System     |
| PIDRQQ | REAL8 to INTEGER power       | Arithmetic      |
| PISRQQ | REAL4 to INTEGER power       | Arithmetic      |

| Name    | Description                    | Category        |
|---------|--------------------------------|-----------------|
| PLYUQQ  | Direct terminal end line       | Library         |
| POSITN  | Find position of substring     | String          |
| PRDRQQ  | REAL8 to REAL8 power           | Arithmetic      |
| PRED    | Predecessor function           | Data Conversion |
| PRSRQQ  | REAL4 to REAL4 power           | Arithmetic      |
| PTYUQQ  | Direct terminal output         | Library         |
| PUT     | Put value to file              | File System     |
| READ    | Read file                      | File System     |
| READFN  | Read filename                  | File System     |
| READLN  | Read file to end-of-line       | File System     |
| READSET | Read set                       | File System     |
| RELEASE | Release heap space             | Library         |
| RESET   | Ready file for read            | File System     |
| RESULT  | Return result of function      | Extend Level    |
| RETYPE  | Force expression to type       | System Level    |
| REWRITE | Ready file for write           | File System     |
| ROUND   | Round REAL                     | Data Conversion |
| ROUND4  | Round INTEGER4                 | Data Conversion |
| SADDOK  | 16-bit signed addition check   | Library         |
| SCANEQ  | Scan until char found          | String          |
| SCANNE  | Scan until char not found      | String          |
| SEEK    | Position at direct file record | File System     |
| SHDRQQ  | REAL8 hyperbolic sine          | Arithmetic      |
| SHSRQQ  | REAL4 hyperbolic sine          | Arithmetic      |
| SIN     | Sine function                  | Arithmetic      |
| SIZEOF  | Get size of structure          | Extend Level    |
| SMULOK  | 16-bit signed multiply check   | Library         |
| SNDRQQ  | REAL8 sine function            | Arithmetic      |
| SNSRQQ  | REAL4 sine function            | Arithmetic      |
| SQR     | Square function                | Arithmetic      |
| SQRT    | Square root function           | Arithmetic      |
| SRDRQQ  | REAL8 square root function     | Arithmetic      |
| SRSRQQ  | REAL4 square root function     | Arithmetic      |
| SUCC    | Successor function             | Data Conversion |
| THDRQQ  | REAL8 hyperbolic tangent       | Arithmetic      |
| THSRQQ  | REAL4 hyperbolic tangent       | Arithmetic      |
| TICS    | Time in arbitrary units        | Library         |
| TIME    | Time of day function           | Library         |
| TNDRQQ  | REAL8 tangent function         | Arithmetic      |
| TNSRQQ  | REAL4 tangent function         | Arithmetic      |
| TRUNC   | Truncate REAL                  | Data Conversion |
| TRUNC4  | Truncate INTEGER4              | Data Conversion |
| UADDOK  | Unsigned addition check        | Library         |
| UMULOK  | Unsigned multiply check        | Library         |
| UNLOCK  | Unlock resource                | Library         |
| UNPACK  | Unpack STRING to array         | Data Conversion |

| Name    | Description           | Category        |
|---------|-----------------------|-----------------|
| UPPER   | Get upper bound       | Extend Level    |
| VECTIN  | Set interrupt vector  | Library         |
| WRD     | Convert to WORD value | Data Conversion |
| WRITE   | Write file            | File System     |
| Writeln | Write line to file    | File System     |

### Metacommands

Defaults, if any, are shown following the metacommand in column one.

| Metacommand                                                        | Action                                                                                                    |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| \$brave+                                                           | Sends messages to the terminal screen.                                                                    |
| \$debug-                                                           | Turns on or off all error checking (CK).                                                                  |
| \$decmath-                                                         | Directs the compiler to use the decimal math routines in the auxiliary math runtime library, DECMATH.LIB. |
| \$entry-                                                           | Generates procedure entry and exit calls for debugger.                                                    |
| \$errors:25                                                        | Sets number of errors allowed per page.                                                                   |
| \$extend                                                           | Adds extend level features.                                                                               |
| \$floatcalls+                                                      | Directs the compiler to make calls to the real number math routines.                                      |
| \$goto-                                                            | Flags GOTOs as "considered harmful."                                                                      |
| \$if <i>constant</i><br>\$then <i>text1</i><br>\$else <i>text2</i> | Allows conditional compilation of <i>text1</i> source if <i>constant</i> is greater than zero.            |
| \$end                                                              |                                                                                                           |
| \$include:'file'                                                   | Switches compilation to file named.                                                                       |
| \$inconst: <i>text</i>                                             | Allows interactive setting of constant values at compile time.                                            |
| \$indexck-                                                         | Checks for array index values in range.                                                                   |
| \$initck-                                                          | Checks for use of uninitialized values.                                                                   |

| <i>Metacommand</i> | <i>Action</i>                                 |
|--------------------|-----------------------------------------------|
| \$integer:2        | Sets the length of the INTEGER type.          |
| \$line-            | Generates line number calls for debugger.     |
| \$linesize:79      | Sets width of source listing.                 |
| \$list+            | Turns on or off source listing.               |
| \$mathck-          | Checks for mathematical errors.               |
| \$message:'text'   | Displays a message on terminal screen.        |
| \$nilck-           | Checks for bad pointer values.                |
| \$ocode+           | Turns on or off object code listing.          |
| \$page+            | Skips to next page.                           |
| \$page:n           | Sets page number for next page.               |
| \$pageif:n         | Skips to next page if less than n lines left. |
| \$pagesize:55      | Sets page length of source listing.           |
| \$pop              | Restores saved value of all metacommands.     |
| \$push             | Saves current value of all metacommands.      |
| \$rangeck-         | Checks for subrange validity.                 |
| \$real:4           | Sets the length of the REAL type.             |
| \$rom              | Warns on static initialization.               |
| \$runtime-         | Determines context of runtime errors.         |
| \$simple           | Disables global optimizations.                |
| \$size             | Minimizes size of code generated.             |
| \$skip:n           | Skips n lines or to end of page.              |
| \$speed            | Minimizes execution time of code.             |
| \$stackck-         | Checks for stack overflow at entry.           |
| \$standard         | Enables standard level only.                  |

| <i>Metacommand</i> | <i>Action</i>                             |
|--------------------|-------------------------------------------|
| \$subtitle:'text'  | Sets page subtitle.                       |
| \$symtab+          | Sends symbol table to source listing.     |
| \$system           | Adds extend and system level features.    |
| \$tagck-           | Checks tag fields in variant records.     |
| \$title:'text'     | Gives page title for source listing.      |
| \$warn+            | Gives warning messages in source listing. |

### Error Code Classification

| <i>Range</i> | <i>Classification</i>           |
|--------------|---------------------------------|
| 1- 999       | Front end errors                |
| 1000-1099    | Unit U file system errors       |
| 1100-1199    | Unit F file system errors       |
| 1200-1299    | Unit V file system errors       |
| 1300-1999    | Reserved                        |
| 2000-2049    | Heap, stack, memory             |
| 2050-2099    | Ordinal and INTEGER4 arithmetic |
| 2100-2149    | REAL4 and REAL8 arithmetic      |
| 2150-2199    | Structures, sets, and strings   |
| 2200-2399    | Reserved                        |
| 2400-2449    | P-code interpreter              |
| 2450-2499    | Other internal errors           |
| 2500-2999    | Reserved                        |

## ASCII Character Codes

| Dec | Hex | CHR    | Dec | Hex | CHR | Dec | Hex | CHR |
|-----|-----|--------|-----|-----|-----|-----|-----|-----|
| 000 | 00H | NUL    | 043 | 2BH | +   | 086 | 56H | V   |
| 001 | 01H | SOH    | 044 | 2CH | ,   | 087 | 57H | W   |
| 002 | 02H | STX    | 045 | 2DH | -   | 088 | 58H | X   |
| 003 | 03H | ETX    | 046 | 2EH | .   | 089 | 59H | Y   |
| 004 | 04H | EOT    | 047 | 2FH | /   | 090 | 5AH | Z   |
| 005 | 05H | ENQ    | 048 | 30H | 0   | 091 | 5BH | [   |
| 006 | 06H | ACK    | 049 | 31H | 1   | 092 | 5CH | \   |
| 007 | 07H | BEL    | 050 | 32H | 2   | 093 | 5DH | ]   |
| 008 | 08H | BS     | 051 | 33H | 3   | 094 | 5EH | ^   |
| 009 | 09H | HT     | 052 | 34H | 4   | 095 | 5FH | _   |
| 010 | 0AH | LF     | 053 | 35H | 5   | 096 | 60H | `   |
| 011 | 0BH | VT     | 054 | 36H | 6   | 097 | 61H | a   |
| 012 | 0CH | FF     | 055 | 37H | 7   | 098 | 62H | b   |
| 013 | 0DH | CR     | 056 | 38H | 8   | 099 | 63H | c   |
| 014 | 0EH | SO     | 057 | 39H | 9   | 100 | 64H | d   |
| 015 | 0FH | SI     | 058 | 3AH | :   | 101 | 65H | e   |
| 016 | 10H | DLE    | 059 | 3BH | ;   | 102 | 66H | f   |
| 017 | 11H | DC1    | 060 | 3CH | <   | 103 | 67H | g   |
| 018 | 12H | DC2    | 061 | 3DH | =   | 104 | 68H | h   |
| 019 | 13H | DC3    | 062 | 3EH | >   | 105 | 69H | i   |
| 020 | 14H | DC4    | 063 | 3FH | ?   | 106 | 6AH | j   |
| 021 | 15H | NAK    | 064 | 40H | @   | 107 | 6BH | k   |
| 022 | 16H | SYN    | 065 | 41H | A   | 108 | 6CH | l   |
| 023 | 17H | ETB    | 066 | 42H | B   | 109 | 6DH | m   |
| 024 | 18H | CAN    | 067 | 43H | C   | 110 | 6EH | n   |
| 025 | 19H | EM     | 068 | 44H | D   | 111 | 6FH | o   |
| 026 | 1AH | SUB    | 069 | 45H | E   | 112 | 70H | p   |
| 027 | 1BH | ESCAPE | 070 | 46H | F   | 113 | 71H | q   |
| 028 | 1CH | FS     | 071 | 47H | G   | 114 | 72H | r   |
| 029 | 1DH | GS     | 072 | 48H | H   | 115 | 73H | s   |
| 030 | 1EH | RS     | 073 | 49H | I   | 116 | 74H | t   |
| 031 | 1FH | US     | 074 | 4AH | J   | 117 | 75H | u   |
| 032 | 20H | SPACE  | 075 | 4BH | K   | 118 | 76H | v   |
| 033 | 21H | !      | 076 | 4CH | L   | 119 | 77H | w   |
| 034 | 22H | "      | 077 | 4DH | M   | 120 | 78H | x   |
| 035 | 23H | #      | 078 | 4EH | N   | 121 | 79H | y   |
| 036 | 24H | \$     | 079 | 4FH | O   | 122 | 7AH | z   |
| 037 | 25H | %      | 080 | 50H | P   | 123 | 7BH | {   |
| 038 | 26H | &      | 081 | 51H | Q   | 124 | 7CH |     |
| 039 | 27H | '      | 082 | 52H | R   | 125 | 7DH | }   |
| 040 | 28H | (      | 083 | 53H | S   | 126 | 7EH | ~   |
| 041 | 29H | )      | 084 | 54H | T   | 127 | 7FH | DEL |
| 042 | 2AH | ·      | 085 | 55H | U   |     |     |     |

Dec=Decimal, Hex=Hexadecimal (H), CHR=Character, LF=Linefeed, FF=Form Feed, CR=Carriage Return, DEL=Rubout