

# The GnuCOBOL 2.x Grammar

FOR R2115

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November 2, 2017

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<sup>2</sup>Sperry Rand's computer business is now part of Unisys.



# Contents



# Foreword

This document describes the syntax of COBOL as supported by GnuCOBOL. It is hoped it will complement Gary Cutler and Vincent Coen's *GnuCOBOL Programmer's Guide* which (currently) does not document recent features added to GnuCOBOL. This document is also formatted in  $\LaTeX$ , so that everything looks a bit prettier.

The syntax diagrams were transcribed from GnuCOBOL's parsers. It thus replicates some unusual syntax rules and misses some syntax rules implemented outside the parser. For example, the obsolete identification division comment paragraphs are allowed in any order and the syntax of **a file-control entry** does not distinguish between SEQUENTIAL, INDEXED and RELATIVE organisations.

This is a draft and so has many flaws. If people find this document useful, I will try to fix these shortcomings.



# Changelog

## 1 GnuCOBOL 2.x

### General

- **Expressions:** fixed [bug #431](#), where decimal constants were not initialised in INITIAL programs.
- **Nested programs:** fixed [bug #435](#), where identifiers in the containing program were not propagated to the contained program, causing a segfault.
- **Signals:** added error message for SIGFPE (see [bug #434](#)).
- **Solaris support:** fixed errors when compiling in Solaris 10.

### Configuration options

- **IBM dialect:** reserved words updated to Enterprise COBOL V6.2.
- **incorrect-conf-sec-order option:** changed to “ok” from “error” in mf and default dialects.
- **New compiler configuration options:** display-special-fig-consts, free-redefines-position ([feature request #211](#)), line-col-zero-default

### Environment division

- **ASSIGN clause:** re-enable use of linkage section or BASED items ([bug #421](#)).
- **CURRENCY phrase:** emit error when CURRENCY SIGN other than “\$” is entered.

### Procedure division

- **ACCEPT statement (screen):** fixed ACCEPT WITH UPDATE and not working ([bug #423](#)).
- **ACCEPT statement (screen):** fixed [bug #426](#), where backspacing at the start of a field moved the cursor to the second-to-last character of the preceding field.
- **DISPLAY statement (screen):** fixed DISPLAY LOW-VALUE not setting position of cursor for next DISPLAY statement ([bug #423](#)).



## Changelog

- **DISPLAY statement (screen)**: added configuration option to disable Micro Focus' special behaviour with some figurative constants (see [bug #423](#)).
- **DISPLAY statement (screen)**: fixed [bug #428](#), where DISPLAY ALL "x" WITH SIZE only displayed "x" once.
- **STOP statement**: fixed the NORMAL phrase causing a compilation error ([bug #433](#)).

### Intrinsic functions

- **WHEN-COMPILED function**: fixed incorrect timezone missing sign and containing nonsense when negative ([bug #436](#)).

## 2 GnuCOBOL 2.2

This list tracks changes made from 23 November 2013. This excludes many changes made in 2009–2013 which would be pertinent to those upgrading from a 2009 build of OpenCOBOL 1.1 found in many package repositories.

### General

- **64-bit numbers**: fixed bugs in handling of 64-bit numbers (e.g. [bug #229](#)).
- **ACUCOBOL windows**: added detection of ACUCOBOL's window/message box GUI syntax.
- **C API (data)**: added several functions for getting and setting cob\_field items.
- **C API (files)**: added cob\_file\_external\_addr, cob\_file\_malloc and cob\_file\_free.
- **C API (screen)**: added several functions from Micro Focus' C to COBOL API: cob\_display\_text, cob\_sys\_get\_char, cob\_get\_char, cob\_get\_text, cob\_display\_formatted\_text, cob\_sys\_get\_csr\_pos, cob\_sys\_set\_csr\_pos, cobmove, cobaddstrc, cobprintf and cobgetch (feature requests [#148](#) and [#187](#)).
- **C API (signals)**: added cob\_raise to send signal to signal handlers.
- **C compiler support**: fixed errors in compilers without designated initializers.
- **cobc command-line options**: added -O3 to enable more optimisations.
- **cobc command-line options**: added -Wfatal-error to make the compiler abort on the first error.
- **cobc command-line options**: added -Wpossible-overlap to warn items that *may* overlap (-Woverlap only warns if items definitely overlap).

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- **cobc command-line options:** added -fmax-errors to set number of errors at which the compiler aborts.
- **cobc command-line options:** added -fwinmain to output WinMain instead of main ([feature request #194](#)).
- **cobc command-line options:** added -t and -T for complete listing support (-t for 80-characters wide listings and -T for 132-characters wide) which includes cross-references (thanks to Dave Pitts).
- **cobc command-line options:** added -vvv (like -vv but passes verbose option to the linker as well) and -### (like -v but commands are not executed).
- **cobc command-line options:** allow -, i.e. stdin, as a source file.
- **COBOL-85 NIST testsuite:** tests now refer to \$COBC, \$COBCRUN and \$COBCRUN\_DIRECT environment variables instead of directly calling cobc and cobcrun, allowing the testsuite to run in conjunction with tools like valgrind.
- **COBOL-85 NIST testsuite:** tests for obsolete feature flagging are now executed, if possible.
- **Comments:** added ACUCOBOL comments: \$ as synonym for \* in indicator area and | as synonym for floating comment indicator \*>.
- **Communication facility:** added detection of communication facility syntax.
- **configure:** added useful error message when help2man, bison and flex are missing when they are needed.
- **curses:** fixed compilation errors when configured without curses ([bug #90](#)).
- **Error messages:** error messages are now lowercase, in line with the GNU Coding Standards ([bug #198](#)).
- **Error messages:** segfaults in the compiler now cause an error message to be displayed.
- **Error messages:** replaced instances of "ODO" by the clearer "OCCURS DEPENDING ON".
- **Expressions:** resolve constant expressions and optimise constant decimals at compile time.
- **Expressions:** added support for IBM OS/VS COBOL's arithmetic.
- **Expressions:** improved error messages for malformed expressions.
- **Indicators:** invalid indicators no longer cause compilation to immediately terminate ([feature request #126](#)).

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- **Information:** output compiler version used to build GnuCOBOL and any mathematical libraries used ([feature request #169](#)).
- **Information:** output what a reserved word is an alias for in the `-list-reserved` output ([feature request #214](#)).
- **Manpage:** added manpage generation and installation.
- **Nested programs:** Nested programs no longer need to have END PROGRAM.
- **National literals:** added basic support for national literals.
- **Numeric literals:** added ACUCOBOL numeric literals: B#... for binary, O#... for octal, and X#... and H#... for hexadecimal.
- **Literals:** fixed heap corruptions caused by uncommon literals ([bug #195](#)).
- **Literals:** allow concatenation of literal and Boolean literals.
- **Memory management:** all memory belonging to the parsers and lexers is freed upon a compiler `abend`.
- **Memory management:** fixed memory leaks due to recursive CALLs.
- **Microsoft Visual C++:** output when compiling with `cl.exe` is now filtered and temporary files are deleted.
- **MinGW:** fixed use of wrong directory separator.
- **Signals:** removed error message on SIGPIPE.
- **Signals:** added error message for SIGBUS.
- **Translations:** updated, with new support for German and Italian.
- **User-defined functions:** function definitions must now end with END FUNCTION.
- **User-defined functions:** function definitions may no longer be nested in programs ([bug #255](#)).
- **Windows support:** allow linking with `asm` files.
- **Windows support:** added support for DISAM in the batch file which creates distributables.
- **Windows support:** fixed environment-setting batch files not working with Microsoft Visual Studio 2017.
- **Windows support:** fixed 64-bit environment-setting batch files not checking the correct directories for binaries and libraries.

## Configuration options

- **Deleted compiler configuration options:** eject-statement, cobol85-reserved.
- **New compiler configurations:** all dialects have been split into standard and strict dialects, with strict dialects maintaining source compatibility with the dialect's compiler(s).
- **New compiler configurations:** acu for ACUCOBOL, cobol2014 for COBOL 2014, rm for RM-COBOL, xopen for X/Open.
- **New compiler configuration options:** accept-display-extensions, accept-update, accept-auto, acu-literals, arithmetic-osvs, call-overflow, console-is-crt, constant-01, constant-78, constant-folding, define-constant-directive, hexadecimal-boolean, hexadecimal-national-literals, incorrect-conf-sec-order, intrinsic-function, listing-statements, literal-length, move-figurative-constant-to-numeric, move-figurative-quote-to-numeric, move-ibm, national-literals, no-echo-means-secure, not-exception-before-exception, numeric-boolean, numeric-literal-length, numeric-value-for-edited-item, pic-length, program-name-redefinition, program-prototypes, reference-out-of-declaratives ([feature request #179](#)), register, renames-uncommon-levels, reserved, reserved-words, stop-identifier, system-name, title-statement, use-for-debugging, word-length ([feature request #43](#)).
- **Registers:** compiler configurations can now specify all the registers to generate.
- **Registers:** added registers not yet implemented by GnuCOBOL as reserved words.
- **Renamed compiler configuration options:** debugging-line to debugging-mode, relaxed-syntax-check to relax-syntax-checks.
- **Reserved words:** compiler configurations can now specify all the reserved words and context-sensitive words permitted.
- **Reserved words:** compiler configurations can now specify whether a reserved word is an alias for another reserved word.
- **Runtime configuration:** added ability to configure some libcob features at runtime.
- **Support options:** options which specify if a feature is supported can now take a "+" before their argument to indicate it takes effect only if the current level of support is less strict than "ok".

## Compiler directives

- **\$ indicator character:** added \$ as an indicator for compiler directive lines.
- **>>IF directive:** fixed [bug #263](#), where nested >>IF directives were not handled correctly.

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- **New constants:** GCCOMP, GNUCOBOL.
- **New directives:** >>CALL-CONVENTION, >>LISTING, >>PAGE.
- **New directives (detection only):** \*CBL, \*CONTROL, TITLE.
- **New >>SET phrase:** SOURCEFORMAT.

### Identification division

- **Comment paragraphs:** fixed invalid parsing of quote characters inside comment paragraphs ([bug #297](#)).
- **FUNCTION-ID:** added checks for redefinition of function-names.
- **INITIAL phrase:** fixed premature deallocation of INITIAL programs ([bug #52](#)).
- **OPTIONS paragraph:** added with implementation of DEFAULT ROUNDED MODE and ENTRY-CONVENTION phrases and recognition of INTERMEDIATE ROUNDING phrase.
- **PROGRAM-ID:** added checks for redefinition of program-names.
- **PROGRAM-ID phrases:** permit INITIAL or RECURSIVE before COMMON ([bug #244](#)).
- **Program/function-names:** warn if program/function-names contain spaces.

### Environment division

- **ASSIGN clause:** missing ASSIGN clauses are now detected at compile-time.
- **ASSIGN clause:** added PRINTER and PRINTER-1 device-names for writing to a printer.
- **ASSIGN clause:** added CARD-PUNCH, CARD-READER, CASSETTE, INPUT, INPUT-OUTPUT, MAGNETIC-TAPE and OUTPUT device-names for line sequential devices.
- **ASSIGN clause:** temporarily prohibit BASED and linkage items in ASSIGN USING due to [bug #421](#).
- **CALL-CONVENTION phrase:** statically calling functions with CALL-CONVENTION 74 no longer causes linker errors ([bug #316](#)).
- **CURRENCY phrase:** fixed [bug #182](#), where a preceding SWITCH phrase caused an incorrect duplicate CURRENCY clause error.
- **File-control entry:** fixed [bug #71](#), where referring to a global constant caused an internal error.

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- **File-control entry:** fixed [bug #331](#), where using an identifier in a file record qualified with the file's name caused an error.
- **FUNCTION phrase:** added checks for redefinition of function-(prototype-)names.
- **FUNCTION phrase:** compiler will no longer stop when it encounters a syntax error.
- **LOCK MODE clause:** fixed combination of LOCK MODE IS AUTOMATIC/MANUAL with LOCK ON MULTIPLE.
- **PROGRAM phrase:** added support for program-prototype-names.
- **SIGN clause:** improved syntax checks.
- **SWITCH phrase:** added check for duplicate on/off clauses ([bug #136](#)).
- **SWITCH phrase:** added new switch names: SWITCH-16 through to SWITCH-36 ([feature request #65](#)), "SWITCH 1" to "SWITCH 26" (and their aliases "SWITCH A" to "SWITCH Z"), UPSI-0 to UPSI-8 (equivalent to "SWITCH 0" to "SWITCH 8") and USW-0 to USW-31 (equivalent to "SWITCH 0" to "SWITCH 31").

### Data division

- **78-level items:** strengthened syntax checks.
- **88-level items:** strengthened syntax checks.
- **ANY NUMERIC clause:** ANY NUMERIC items must now have PIC 9.
- **ANY LENGTH clause:** ANY LENGTH items may no longer be BY VALUE parameters (see [bug #219](#)).
- **ANY LENGTH clause:** ANY LENGTH items must now have PIC X or PIC N.
- **BLANK clause:** fixed [bug #143](#), where BLANK LINE/SCREEN did not colour line/screen.
- **BLANK WHEN ZERO clause:** added checks that BLANK WHEN ZERO is not specified with PICTURE clauses containing S.
- **Constant items:** expressions in VALUE clauses now permitted.
- **Data description:** added a maximum record length.
- **Data description:** increased maximum size of non-indexed file record to 64 MiB (maximum size of an indexed file record is 65535 bytes).
- **ERASE clause:** fixed [bug #186](#), where ERASE EOL and ERASE EOS could be specified simultaneously.

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- **FULL clause:** added warning for useless FULL clauses on numeric items ([feature request #209](#)).
- **HIGHLIGHT and LOWLIGHT clauses:** added checks that HIGHLIGHT and LOWLIGHT are not specified simultaneously.
- **Local-storage section:** fixed [bug #78](#), where local-storage items were initialised after file section items.
- **LOWLIGHT clause:** implemented.
- **OCCURS clause:** fixed internal compiler when used with SYNC ([bug #155](#)).
- **OCCURS clause:** allow KEY phrase and INDEXED phrase in any order.
- **OCCURS clause:** fixed [bug #167](#), where overly large numeric literals were accepted in the OCCURS clause.
- **OCCURS clause (depending):** require the minimum length to be less than the maximum length ([feature request #99](#)).
- **OCCURS clause (depending):** disabled nested OCCURS DEPENDING tables due to bugs.
- **OCCURS clause (screen-section):** require relative LINE/COLUMN clauses in OCCURS entries ([bug #83](#)).
- **OCCURS clause (unbounded):** added by Frank Swarbrick ([patch #50](#)).
- **PICTURE clause:** restricted number of permitted PICTURE strings ([bug #232](#)).
- **PICTURE clause:** improved checks of constant-names referenced in PICTURE strings.
- **RENAMES items:** strengthened syntax checks.
- **RESERVE clause:** allow the optional word AREAS.
- **Screen description:** permit figurative constants in screen items ([bug #108](#)).
- **TALLY special register:** added.
- **USAGE clause:** added ACUCOBOL's HANDLE phrases (see [feature request #77](#)).
- **VALUE clause:** VALUE clauses in REDEFINES entries now cause warnings, not errors, for compatibility.
- **Variable records:** added checks that the minimum size of a variable record is large enough to contain the record key.

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### Procedure division

- **ACCEPT statement:** added ESCAPE as synonym for EXCEPTION.
- **ACCEPT statement:** permit clauses in any order.
- **ACCEPT statement:** allow WITH before every screen attribute clause.
- **ACCEPT statement:** entering control-C now terminates the program.
- **ACCEPT statement (screen):** fixed failed ACCEPTs caused by a buffer overflow.
- **ACCEPT statement (screen):** enhanced support for special keys (insert, tab, delete, alt-delete, etc.).
- **ACCEPT statement (screen):** fixed [bug #161](#) where screens terminated after entering a few characters in a field.
- **ACCEPT statement (screen):** added DEFAULT as synonym for UPDATE.
- **ACCEPT statement (screen):** ERASE and BLANK clauses in screens are now ignored ([bug #192](#)).
- **ACCEPT statement (screen):** fixed [bug #160](#) where ACCEPT statement LINE/COLUMN clauses did not work.
- **ACCEPT statement (screen):** fixed segfault on ACCEPT OMITTED ([bug #300](#)).
- **ACCEPT statement (screen):** added checks that screen attributes are not specified multiple times or after conflicting attributes.
- **ACCEPT statement (screen):** fixed some phrases not being recognised without being preceded by WITH ([bug #402](#)).
- **ACCEPT statement (screen):** fixed the backspace and delete keys not working and the insert key not toggling between insertion and overwriting.
- **ACCEPT statement (screen):** cursor now changes with insertion/overwrite mode (if supported by the terminal).
- **ACCEPT statement (screen):** a beep is emitted on attempts to *insert* data into a full field.
- **ADD statement (corresponding):** restricted to numeric items ([bug #235](#)).
- **ADD statement (table):** added detection of ADD TABLE.
- **Addition of COMP-3 numbers:** fixed bug where COMP-3 addition failed.
- **Addition of floating-point numbers:** fixed incorrect addition of floating-point numbers.



## Changelog

- **CALL statement:** implemented [feature request #101](#), allowing more arguments to be provided.
- **CALL statement:** fixed behaviour when calling cancelled modules.
- **CALL statement:** added RETURNING NOTHING.
- **CALL statement:** the generation of C function declarations for static CALLs can now be disabled.
- **CALL statement:** added checks for static CALLs referring to C macros.
- **CALL statement:** warn if a literal containing the program-name contains spaces.
- **CALL statement:** added detection of NESTED phrase.
- **CANCEL statement:** fixed crash caused by cancelling a cancelled module.
- **Conditions:** restricted use of IS ([bug #321](#)).
- **Conditions:** added warnings for always true/false conditions (including the reason why it is always true/false).
- **DESTROY statement:** added detection of DESTROY.
- **DISPLAY statement:** permit clauses in any order.
- **DISPLAY statement:** allow WITH before every screen attribute clause.
- **DISPLAY statement (screen):** fixed bug where EC-SCREEN exceptions did not trigger ON EXCEPTION handler ([bug #243](#)).
- **DISPLAY statement (screen):** fixed bugs in DISPLAY SPACES/ALL X"02"/ALL X"07".
- **DISPLAY statement (screen):** added checks that screen attributes are not specified multiple times or after conflicting attributes.
- **DISPLAY statement (screen):** DISPLAY OMITTED marked as unfinished; currently equivalent to DISPLAY LOW-VALUE.
- **DISPLAY statement (screen):** fixed some phrases not being recognised without being preceded by WITH ([bug #402](#)).
- **END DECLARATIVES phrase:** fixed [bug #88](#), where an erroneous unreachable code warning was emitted for code without a main procedure.
- **ENTRY statement:** suppress incorrect unreachable code warnings.
- **Exception handlers:** permit NOT ON EXCEPTION/END-OF-PAGE/etc. before ON EXCEPTION/END-OF-PAGE/etc.

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- **EXIT statement:** added extension RETURNING/GIVING clause for PROGRAM phrase.
- **File I-O:** added detection of and handling for error when no disc space is available for output files.
- **File I-O:** added RETRY and ADVANCING ON LOCK as pending features.
- **File I-O:** fixed detection of DISAM file handler.
- **FREE statement:** NULL addresses no longer cause an exception.
- **GOBACK statement:** added extension RETURNING/GIVING clause.
- **INITIALIZE statement:** fixed [bug #84](#), where literals could be passed to INITIALIZE.
- **INITIALIZE statement:** fixed [bug #287](#), where reference-modified group items were not treated like elementary items.
- **INSPECT statement:** fixed [bug #47](#), where clauses were permitted in invalid orders.
- **LENGTH OF phrase:** fixed [bug #89](#), where the length of REDEFINES item where calculated incorrectly.
- **LENGTH OF phrase:** fixed [bug #110](#), where LENGTH OF was not allowed in the UNTIL phrase of a PERFORM statement or in a VALUE clause.
- **MOVE statement:** added more checks for overlapping MOVE statements.
- **MOVE statement:** fixed truncation of COMP numbers not conforming to the binary-truncate setting ([bug #69](#)).
- **MOVE statement:** fixed [bug #344](#), where trying to MOVE to a procedure-name caused a segfault.
- **MOVE statement:** added support for IBM's character-by-character MOVE.
- **PERFORM statement:** fixed [bug #368](#), where the compiler segfaulted when there was a PERFORM statement with an empty body and DEBUGGING MODE was specified.
- **Procedure division header:** fixed [bug #55](#), where a user-defined function without parameters failed to compile.
- **Procedure division header:** disabled the BY VALUE phrase, pending a working implementation.
- **Procedure division header:** fixed [bug #349](#), where BY VALUE pointer parameters lead to code that couldn't be compiled by older versions of Microsoft Visual C++ (patched by Mario Matos).

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- **Procedure division header:** RETURNING items must now be declared in the linkage section.
- **Procedure division header:** added RETURNING OMITTED.
- **Procedure division header:** added entry-convention specifiers.
- **Procedure division header:** now mandatory in function definitions (see [bug #271](#)).
- **Procedure division header:** CHAINING programs may no longer be called by other programs ([bug #354](#)), per the ACUCOBOL implementation.
- **Reference modification:** fixed [bug #146](#), where the length of reference-modified item in an OCCURS DEPENDING table was too long because it was assumed the OCCURS DEPENDING table was at its maximum size.
- **READ statement:** a failed second READ of a missing OPTIONAL file now results in a file status of 46, not 23.
- **REWRITE statement:** added REWRITE FILE ([feature request #170](#)).
- **Screen I-O:** added detection of situations which raise EC-SCREEN-LINE-NUMBER, EC-SCREEN-STARTING-COLUMN and EC-SCREEN-ITEM-TRUNCATED.
- **Screen I-O:** added support for the LINE 0 and COL 0 extensions.
- **Screen I-O:** added some ACUCOBOL synonyms (NO ECHO, OFF, REVERSED, REVERSE, etc.).
- **Screen I-O:** added detection of ACUCOBOL's non-standard clauses like TAB, NO-ECHO, STANDARD, BACKGROUND-HIGH, BACKGROUND-LOW, BACKGROUND-STANDARD and SIZE.
- **SEARCH statement (ALL):** fixed [bug #314](#), where SEARCH ALL with an empty OCCURS DEPENDING table did not exit as soon as possible.
- **Segment numbers:** added syntax checks.
- **SET statement (address):** disallowed changing address of non-01/77-level item ([bug #366](#)).
- **SET statement (attribute):** made HIGHLIGHT ON imply LOWLIGHT OFF and vice versa.
- **SET statement (exception):** added.
- **SET statement (thread):** added detection of ACUCOBOL extension.
- **STOP statement (identifier):** added (see [bug #320](#)).
- **STOP statement (literal):** fixed segfault.

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- **STOP statement (thread)**: added detection of ACUCOBOL extension.
- **STRING statement**: strengthened syntax checks ([bug #259](#)).
- **SUBTRACT statement (corresponding)**: restricted to numeric items ([bug #235](#)).
- **SUBTRACT statement (table)**: added detection of SUBTRACT TABLE.
- **Tracing**: fixed [bug #216](#), where a segfault occurred with a program made from modules some of which had been compiled with tracing and physical CANCEL enabled and some of which hadn't.
- **UNSTRING statement**: fixed [bug #54](#), where the POINTER value was calculated incorrectly when the delimiter was longer than one character.
- **UNSTRING statement**: allow a literal to be the subject of an UNSTRING.
- **WRITE statement**: added WRITE FILE ([feature request #170](#)).

### Intrinsic functions

- **New functions (ACUCOBOL)**: ABSOLUTE-VALUE (synonym for ABS).
- **New functions (COBOL 2014)**: FORMATTED-CURRENT-DATE, FORMATTED-DATE, FORMATTED-DATETIME, FORMATTED-TIME, INTEGER-OF-FORMATTED-DATE, TEST-FORMATTED-DATETIME.
- **ISO-8601-date-handling functions**: added extension SYSTEM-OFFSET as replacement for last optional argument.
- **ISO-8601-date-handling functions**: added EC-IMP-UTC-UNKNOWN if a time format ending in Z is provided but the timezone cannot be found.
- **LENGTH function**: added detection of PHYSICAL phrase.
- **RANDOM function**: fixed non-random number generation.

### Built-in subprograms

- **CBL\_GC\_FORK**: added.
- **CBL\_GC\_PRINTABLE**: renamed from C\$PRINTABLE.
- **CBL\_GC\_WAITPID**: added.
- **CBL\_SET\_CSR\_POS**: added (feature requests [#148](#) and [#187](#)).
- **CBL\_READ\_KBD\_CHAR**: added (feature requests [#148](#) and [#187](#)).

## *Changelog*



# 1 Key

| Element  | Notes  |
|--|--|
| Braces, { }  | One element within the braces must be selected.  |
| Brackets, [ ]  | One or zero elements within the brackets must be selected.   |
| Vertical lines,  | Each element may be selected once and in any order; if within braces, at least one element must be selected.             |
| Ellipsis, ...  | The preceding element may be repeated any number of times.   |
| OPTIONAL-RESERVED-WORD<br><u>MANDATORY-RESERVED-WORD</u> | Mandatory reserved words in brackets are often used instead of optional reserved words to indicate an optional feature.  |
| Deleted element  | These elements were previously in the COBOL standard but have since been deleted. Their use is strongly discouraged.     |
| Archaic element  | These elements remain in the standard, but their use is considered poor style and is strongly discouraged.               |
| Obsolete element   | These elements are slated to be deleted from the standard. Their use is strongly discouraged.                            |
| X/Open extension   |  |
| GnuCOBOL-only extension                                  |  |
| Miscellaneous extension                                  | An extension which may have come from COBOL dialects by Micro Focus, IBM, Acucorp, Ryan-McFarland, Fujitsu or Microsoft. |
| <del>Unimplemented element</del>                         | These elements are recognised by GnuCOBOL, but result in errors.   |





## 2 Language fundamentals

### 2.1 Lexical elements

#### 2.1.1 COBOL words

#### 2.1.2 User-defined words

#### 2.1.3 Reserved words

#### 2.1.4 Literals

##### Alphanumeric literals

##### Format 1 (standard)

$$\left\{ \begin{array}{l} \text{'character-1...'} \\ \text{"character-2..."} \end{array} \right\}$$

##### Format 2 (hexadecimal)

$$\left\{ \begin{array}{l} \text{X'hex-character-1...'} \\ \text{X"hex-character-2..."} \end{array} \right\}$$

##### Format 3 (null-terminated)

$$\left\{ \begin{array}{l} \text{Z'character-3...'} \\ \text{Z"character-4..."} \end{array} \right\}$$

## 2 Language fundamentals

### Format 4 (raw-C-string)

$$\left\{ \begin{array}{l} \text{L}' \text{character-5} \dots \text{' } \\ \text{L}'' \text{character-6} \dots \text{' } \end{array} \right\}$$

### Numeric literals

#### Format 5 (integer)

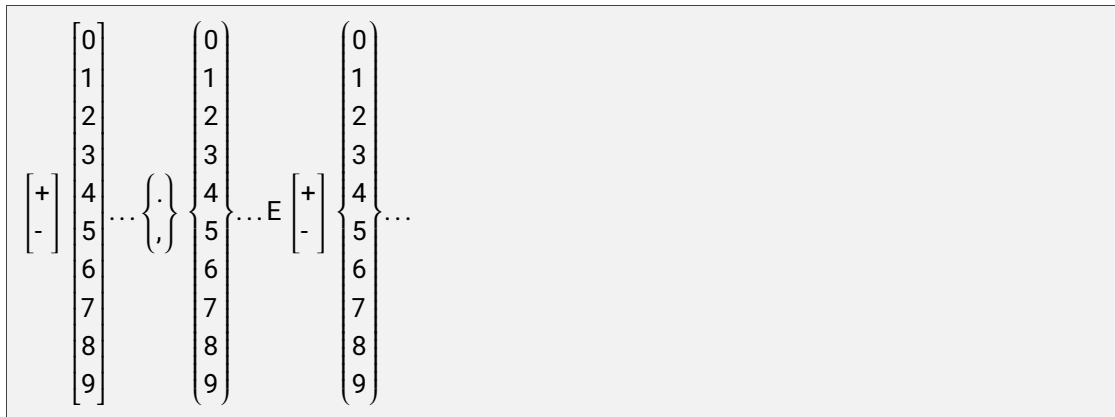
$$\left[ \begin{array}{l} + \\ - \end{array} \right] \left\{ \begin{array}{l} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ \dots \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \end{array} \right\}$$

#### Format 6 (fixed-point)

$$\left[ \begin{array}{l} + \\ - \end{array} \right] \left\{ \begin{array}{l} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ \dots \left\{ \begin{array}{l} . \\ , \end{array} \right\} \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \end{array} \right\} \left\{ \begin{array}{l} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ \dots \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \end{array} \right\}$$

#### Format 7 (floating-point)

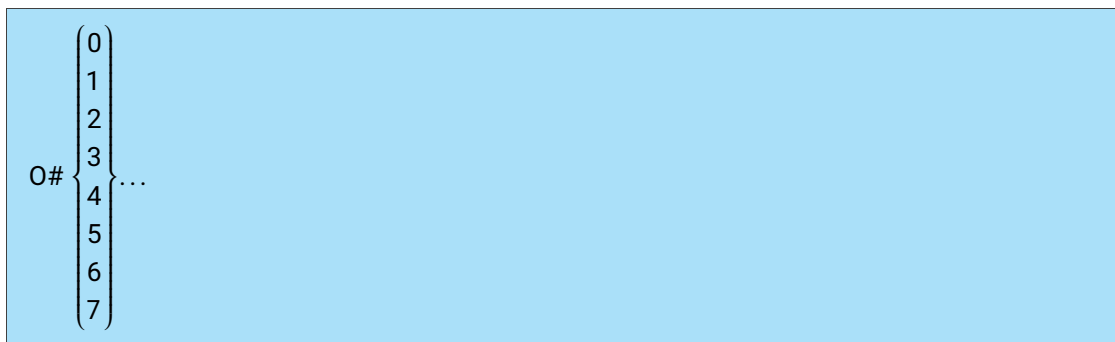
## 2 Language fundamentals



### Format 8 (binary)



### Format 9 (octal)



### Format 10 (hexadecimal-number)

## 2 Language fundamentals



### Format 11 (hexadecimal-string)



### Boolean literals

#### Format 12 (standard)



#### Format 13 (hexadecimal)



### National literals

#### Format 14 (standard)

## 2 Language fundamentals

$$\left\{ \begin{array}{l} N' [ \text{character-11} ] \dots ' \\ N'' [ \text{character-12} ] \dots '' \end{array} \right\}$$

### Format 15 (hexadecimal)

$$\left\{ \begin{array}{l} NX' [ \text{hex-character-5} ] \dots ' \\ NX'' [ \text{hex-character-6} ] \dots '' \end{array} \right\}$$

### Figurative constants

#### Format 16 (zero)

$$\text{ALL} \left\{ \begin{array}{l} \underline{\text{ZERO}} \\ \underline{\text{ZEROES}} \\ \underline{\text{ZEROS}} \end{array} \right\}$$

#### Format 17 (space)

$$\text{ALL} \left\{ \begin{array}{l} \underline{\text{SPACE}} \\ \underline{\text{SPACES}} \end{array} \right\}$$

#### Format 18 (high-value)

$$\text{ALL} \left\{ \begin{array}{l} \underline{\text{HIGH-VALUE}} \\ \underline{\text{HIGH-VALUES}} \end{array} \right\}$$

#### Format 19 (low-value)

## 2 Language fundamentals

ALL {  
LOW-VALUE  
LOW-VALUES

### Format 20 (quote)

ALL {  
QUOTE  
QUOTES

### Format 21 (null)

ALL {  
NULL  
NULLS

### Format 22 (literal)

ALL *literal-1*

### Format 23 (symbolic-character)

ALL *symbolic-character-1*

## 2.2 References

## 2.3 Expressions

### 2.3.1 Arithmetic expressions

Arithmetic expressions may contain the following operators:

| Binary operators | Purpose              | Precedence |
|------------------|----------------------|------------|
| +                | addition             | 1          |
| -                | subtraction          | 1          |
| *                | multiplication       | 2          |
| /                | division             | 2          |
| **               | exponentiation       | 3          |
| ^                | exponentiation       | 3          |
| Unary operators  |                      |            |
| +                | no effect            | 4          |
| -                | multiplication by -1 | 4          |

Binary operators must have a numeric item or expression to both their left and right. Unary operators must have a numeric item or expression to their right only.

Operators with greatest precedence are evaluated first. If an expression contains multiple operators of equal precedence, they are evaluated from left to right.

Arithmetic expressions may contain arithmetic expressions surrounded by parentheses. These nested expressions are evaluated first, before any of the operators of the outer expression.

| First symbol          | Second symbol         |                 |                |     |
|-----------------------|-----------------------|-----------------|----------------|-----|
|                       | Identifier or literal | Binary operator | Unary operator | ( ) |
| Identifier or literal |                       | ✓               |                | ✓   |
| Binary operator       | ✓                     |                 | ✓              | ✓   |
| Unary operator        | ✓                     |                 |                | ✓   |
| (                     | ✓                     |                 | ✓              | ✓   |
| )                     |                       | ✓               |                | ✓   |



### 2.3.2 Concatenation expressions

$\left. \begin{array}{l} \text{literal-1} \\ \text{concatenation-expression-1} \end{array} \right\} \& \text{literal-2}$

### 2.3.3 Conditional expressions

| Binary operators | Purpose     | Precedence |
|------------------|-------------|------------|
| AND              | logical and | 1          |
| OR               | logical or  | 2          |

---

| Unary operator |             |   |
|----------------|-------------|---|
| NOT            | logical not | 3 |

## 2.4 Concepts

### 2.4.1 Files

#### I-O status

##### Successful completion of an operation

- 00 Success
- 02 Success – duplicate
- 04 Success – incomplete
- 05 Success – optional
- 07 Success – no unit

##### Implementor-defined successful completion

##### End of file

- 10 End of file
- 14 Out of key range
- 21 Key invalid
- 22 Key exists
- 23 Key does not exist
- 24 Key boundary
- 30 Permanent I-O error
- 31 Inconsistent filename
- 34 Boundary violation
- 35 File does not exist
- 37 Permission denied
- 38 Closed with lock
- 39 Conflict attribute

## 2 *Language fundamentals*

- 41 File already open
- 42 File not open
- 43 Read not done
- 44 Record overflow
- 46 Read error
- 47 Input denied
- 48 Output denied
- 49 I-O denied
- 51 Record locked
- 57 I-O lineage
- 61 File sharing
- 91 Not available

### **Organizations**

### **Locking**

### **2.4.2 Locales**

### **2.4.3 Screens**

### **2.4.4 User-defined functions**



## 3 Compiler directives

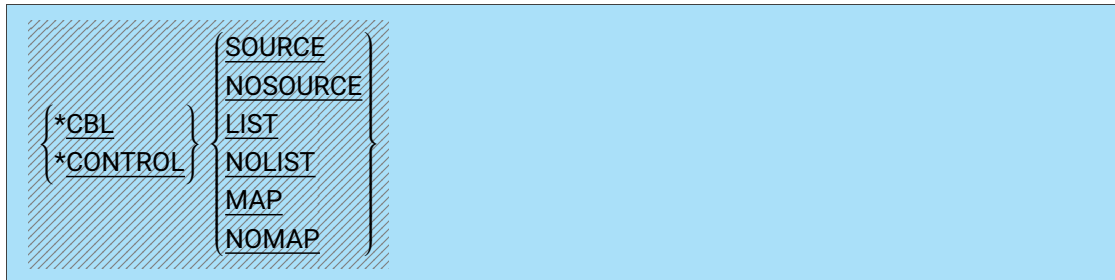
### 3.1 CALL-CONVENTION directive

|                                |  |
|--------------------------------|--|
| <u>&gt;&gt;CALL-CONVENTION</u> | $\left\{ \begin{array}{l} \text{COBOL} \\ \text{EXTERN} \\ \text{STDCALL} \\ \text{STATIC} \end{array} \right\}$ |
|--------------------------------|--|

**Syntax rules**

**General rules**

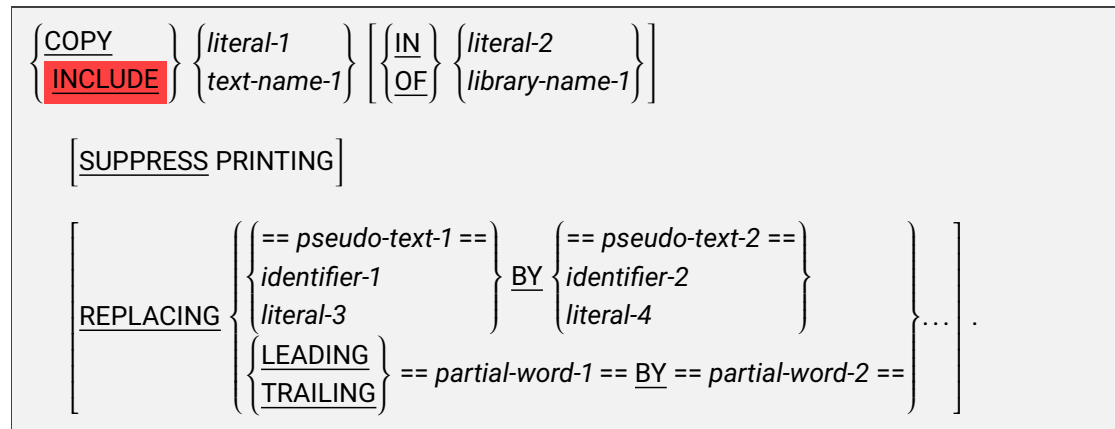
### 3.2 \*CONTROL statement



**Syntax rules**

**General rules**

### 3.3 COPY statement



**Syntax rules**

**General rules**

### 3.4 **D directive**

```
>>D source-text-1
```

**Syntax rules**

**General rules**



### 3.5 DEFINE directive

$\left\{ \begin{array}{l} >> \\ \$ \end{array} \right\}$  DEFINE CONSTANT *compilation-variable-1* AS  $\left\{ \begin{array}{l} \textit{literal-1} \\ \text{PARAMETER} \\ \text{OFF} \end{array} \right\}$   $\left[ \text{OVERRIDE} \right]$

**Syntax rules**

**General rules**

### 3.6 DISPLAY directive

$$\left\{ \begin{array}{l} >> \\ \$ \end{array} \right\} \underline{\text{DISPLAY}} \text{ source-text-1 } \left[ \underline{\text{VCS}} = \text{version-string} \right]$$

**Syntax rules**

**General rules**

### 3.7 EJECT statement

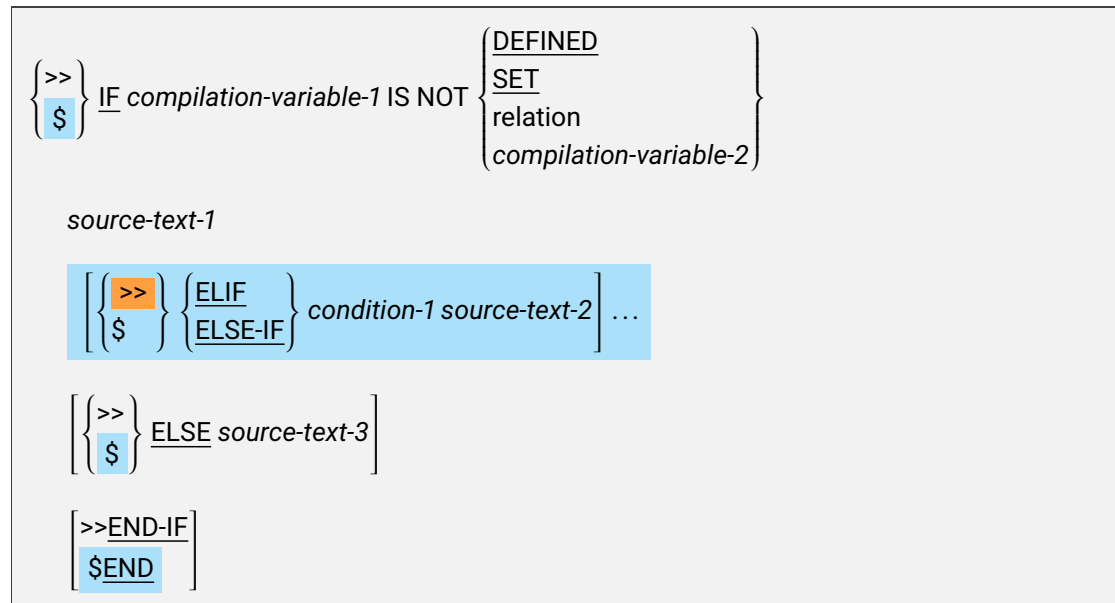


**EJECT**

**Syntax rules**

**General rules**

### 3.8 IF directive



#### Syntax rules

#### General rules

### 3.9 LEAP-SECOND directive

```
>>LEAP-SECOND
```

**Syntax rules**

**General rules**

### 3.10 LISTING directive

```
>>LISTING {  
          ON  
          OFF  
          }
```

**Syntax rules**

**General rules**

### 3.11 PAGE directive

```
>>PAGE [comment-text]
```

**Syntax rules**

**General rules**

## 3.12 **PROCESS** statement

**PROCESS**

**Syntax rules**

**General rules**



### 3.13 REPLACE statement

#### Format 1 (on)

$$\text{REPLACE } [\text{ALSO}] \left\{ \begin{array}{l} \left\{ \begin{array}{l} \text{== pseudo-text-1 ==} \\ \text{identifier-1} \end{array} \right\} \underline{\text{BY}} \left\{ \begin{array}{l} \text{== pseudo-text-2 ==} \\ \text{identifier-2} \end{array} \right\} \\ \left\{ \begin{array}{l} \underline{\text{LEADING}} \\ \underline{\text{TRAILING}} \end{array} \right\} \text{== partial-word-1 == } \underline{\text{BY}} \text{ == partial-word-2 ==} \end{array} \right\} \dots$$

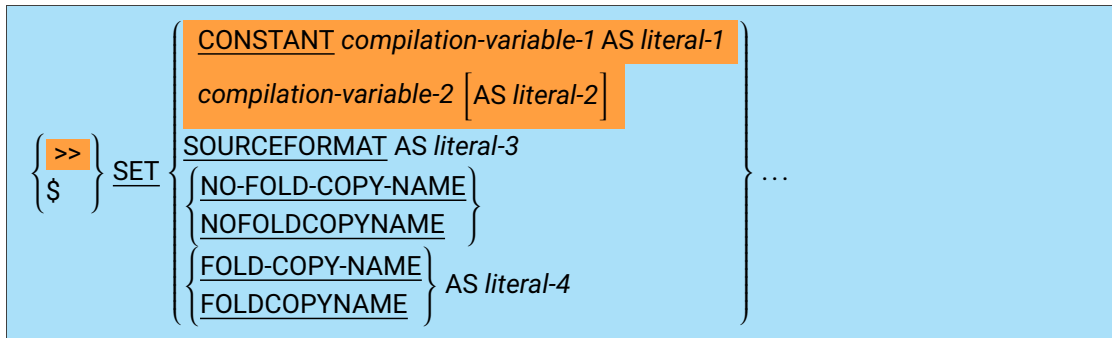
#### Format 2 (off)

$$\text{REPLACE } [\underline{\text{LAST}}] \underline{\text{OFF.}}$$

#### Syntax rules

#### General rules

### 3.14 SET directive



**Syntax rules**

**General rules**

### 3.15 SKIP1 statement



**Syntax rules**

**General rules**

### 3.16 SKIP2 statement



**SKIP2**

**Syntax rules**

**General rules**

### 3.17 SKIP3 statement



**SKIP3**

**Syntax rules**

**General rules**

### 3.18 SOURCE directive

>>SOURCE FORMAT IS {  
    FIXED  
    FREE  
    VARIABLE }

**Syntax rules**

**General rules**

### 3.19 TITLE statement

TITLE *literal-1*

**Syntax rules**

**General rules**

### 3.20 TURN directive

```
>>TURN {exception-name-1} ... 

|     |
|-----|
| ON  |
| OFF |

 [WITH LOCATION]
```

**Syntax rules**

**General rules**



### 3.21 Predefined compilation variables

GnuCOBOL defines compilation variables when certain conditions are true. If the condition associated with a variable is false, the variable is not defined.

| Name             | Condition   |
|------------------|---|
| DEBUG            | The -d debug flag is specified.   |
| EXECUTABLE       | The module being compiled contains the main program.  |
| GCCOMP           | The size of a COMP item is determined according to the GnuCOBOL scheme, where for a PICTURE of length: <ul style="list-style-type: none"> <li>• 1–2, the item has 1 byte</li> <li>• 3–4, the item has 2 bytes</li> <li>• 5–9, the item has 4 bytes</li> <li>• 10–18, the item has 8 bytes.</li> </ul> |
| GNUCOBOL         | GnuCOBOL is compiling the source unit.  |
| HOSTSIGNS        | A <i>signed</i> packed-decimal item's value may be considered NUMERIC if the sign has value X"F".   |
| IBMCOMP          | The size of a COMP item is determined according to the IBM scheme, where for a PICTURE of length: <ul style="list-style-type: none"> <li>• 1–4, the item has 2 bytes</li> <li>• 5–9, the item has 4 bytes</li> <li>• 10–18, the item has 8 bytes.</li> </ul>  |
| MODULE           | The module being compiled does not contain the main program.  |
| NOHOSTSIGNS      | A <i>signed</i> packed-decimal item's value may not be considered NUMERIC if the sign has value X"F".   |
| NOIBMCOMP        | The size of a COMP item is not determined according to the IBM scheme.  |
| NOSTICKY-LINKAGE | Sticky-linkage (linkage-section items remaining allocated between invocations) is not enabled.  |
| NOTRUNC          | Numeric data items are truncated according to their internal representation.  |

### 3 Compiler directives

|                |  |
|----------------|--|
| OCCOMP         | The size of a COMP item is determined according to the GnuCOBOL scheme, where for a PICTURE of length: <ul style="list-style-type: none"><li>• 1–2, the item has 1 byte</li><li>• 3–4, the item has 2 bytes</li><li>• 5–9, the item has 4 bytes</li><li>• 10–18, the item has 8 bytes.</li></ul> |
| OPENCOBOL      | GnuCOBOL is compiling the source unit.   |
| P64            | Pointers are greater than 32 bits long   |
| STICKY-LINKAGE | Sticky-linkage (linkage-section items remaining allocated between invocations) is enabled.   |
| TRUNC          | Numeric data items are truncated according to their PICTURE clauses.   |

---



## 4 Compilation group

[*program-definition*  
*function-definition*] ...

where *program-definition* is

[ { IDENTIFICATION } DIVISION.  
 { ID }  
 PROGRAM-ID. { *program-name-1* } [ AS *literal-2* ] IS { { COMMON }  
 { INITIAL }  
 { RECURSIVE } } } PROGRAM .  
 { EXTERNAL } ]

[ *comment-paragraphs* ]

[ *environment-division* ]

[ *data-division* ]

[ *procedure-division* [ *program-definition* ] ... ]

[ END PROGRAM { *program-name-1* }  
 { *literal-1* } ]

where *function-definition* is

[ { IDENTIFICATION } DIVISION.  
 { ID }  
 FUNCTION-ID. { *function-name-1* } [ AS *literal-4* ].  
 { *literal-3* } ]

[ *comment-paragraphs* ]

[ *environment-division* ]

[ *data-division* ]

[ *procedure-division* ]

[ END FUNCTION { *function-name-1* }  
 { *literal-3* } ]

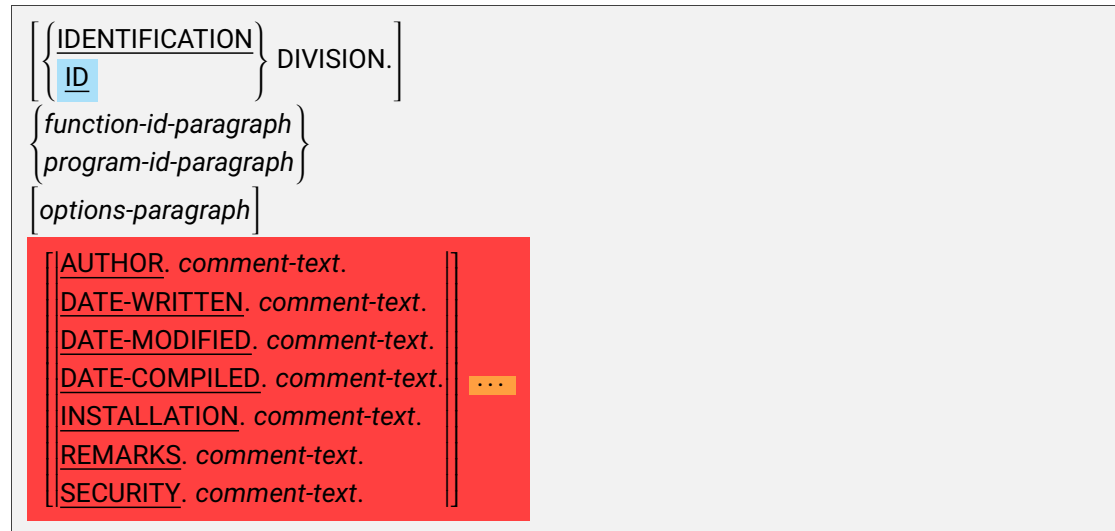
## *4 Compilation group*

**Syntax rules**

**General rules**



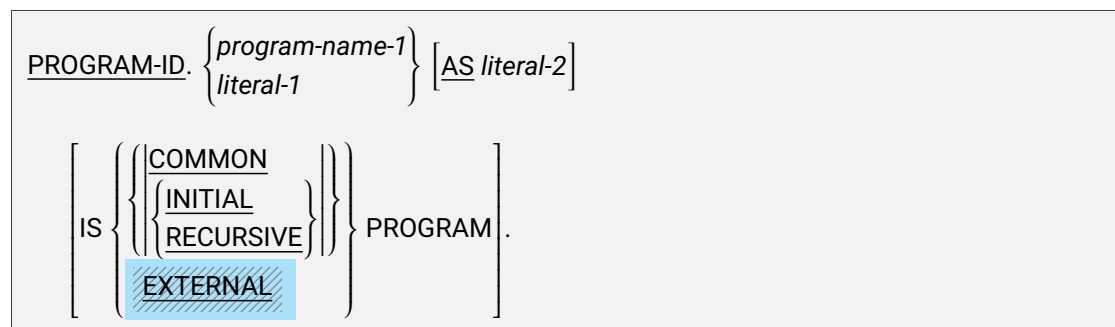
## 5 Identification division



Syntax rules

General rules

### 5.1 PROGRAM-ID paragraph



Syntax rules

General rules

## 5.2 FUNCTION-ID paragraph

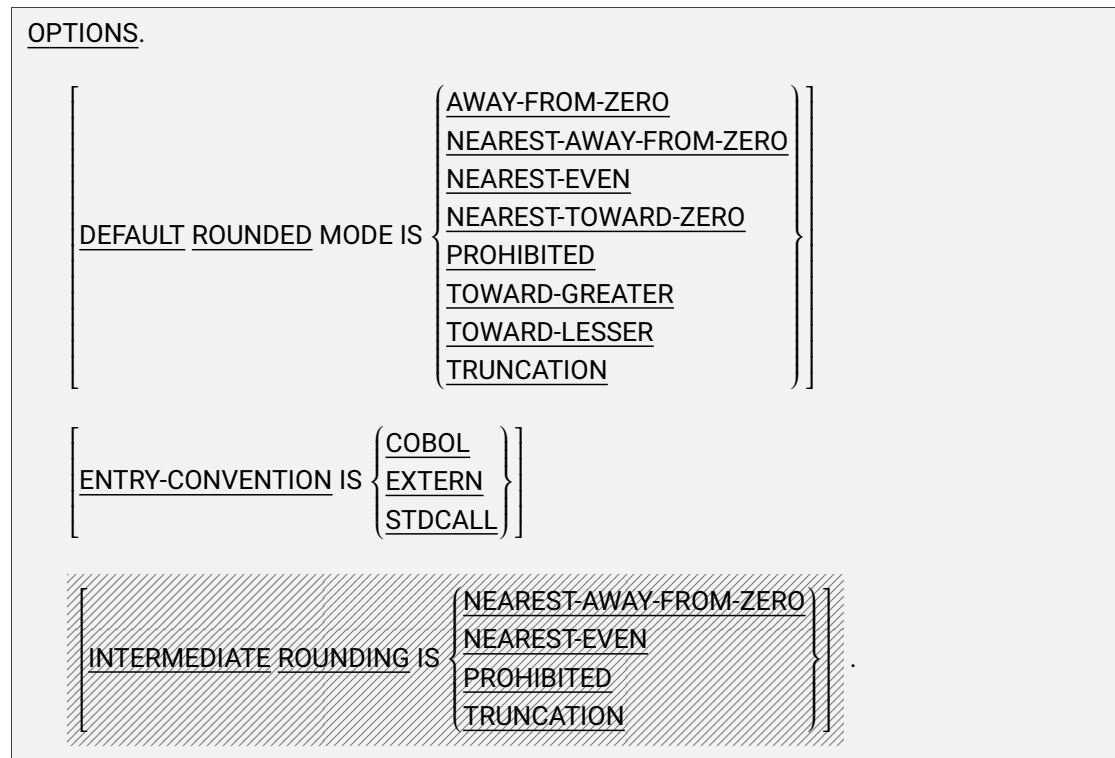
$$\underline{\text{FUNCTION-ID.}} \left\{ \begin{array}{l} \text{function-name-1} \\ \text{literal-1} \end{array} \right\} \left[ \underline{\text{AS}} \text{ literal-2} \right].$$

**Syntax rules**

**General rules**



### 5.3 OPTIONS paragraph



**Syntax rules**

**General rules**



## 6 Environment division

```
[ENVIRONMENT DIVISION.]  
[configuration-section]  
[input-output-section]
```

### Syntax rules

### General rules

## 6.1 Configuration section

### Format 1 (standard)

```
[CONFIGURATION SECTION.]  
[source-computer-paragraph]  
[object-computer-paragraph]  
[special-names-paragraph]  
[special-names-entry]  
[repository-paragraph]
```

### Format 2 (gnucobol)

```
[CONFIGURATION SECTION.]  
[source-computer-paragraph  
object-computer-paragraph  
special-names-paragraph  
special-names-entry  
repository-paragraph]
```

**Syntax rules**

**General rules**

**6.1.1 SOURCE-COMPUTER paragraph**

The SOURCE-COMPUTER paragraph identifies the computer on which the compilation unit should be compiled.

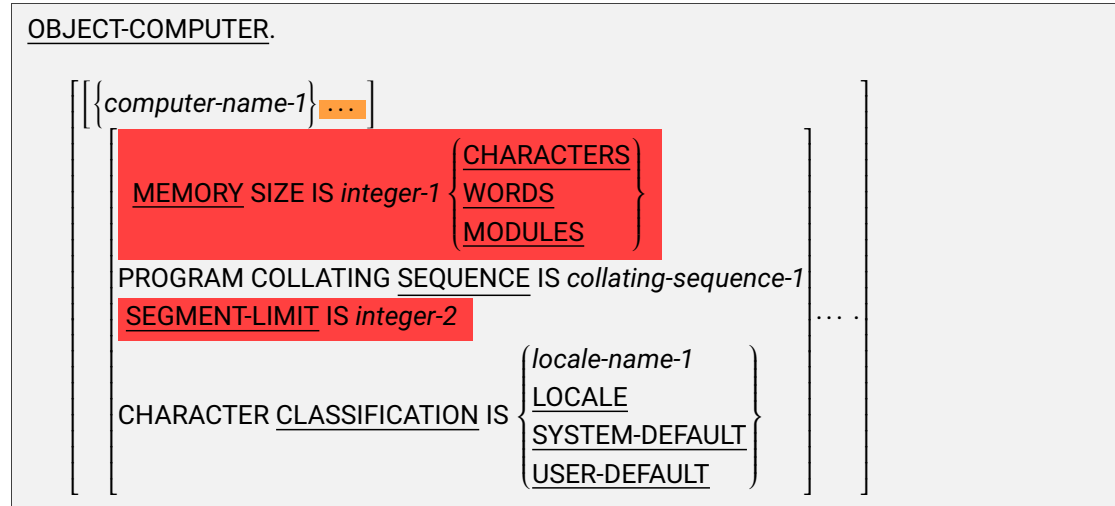
```
SOURCE-COMPUTER. [ {computer-name-1} ... [ WITH DEBUGGING MODE ] . ]
```

**Syntax rules**

**General rules**

### 6.1.2 OBJECT-COMPUTER paragraph

The OBJECT-COMPUTER paragraph identifies the computer on which the runtime module should be run.



**Syntax rules**

**General rules**

### 6.1.3 SPECIAL-NAMES paragraph

|   |   |   |
|---|---|---|
| [ | <p><u>SPECIAL-NAMES.</u></p> <p><i>mnemonic-name-clause</i></p> <p><i>alphabet-name-clause</i></p> <p><i>symbolic-characters-clause</i></p> <p><u>LOCALE</u> <i>locale-name-1</i> IS <i>literal-1</i></p> <p><u>CLASS</u> <i>class-name-1</i> IS { <i>literal-2</i> { <u>THRU</u> } <i>literal-3</i> } ...</p> <p><u>CURRENCY SIGN</u> IS <i>literal-4</i> [ <u>WITH PICTURE-SYMBOL</u> <i>literal-5</i> ]</p> <p><u>DECIMAL-POINT</u> IS <u>COMMA</u></p> <p><u>NUMERIC SIGN</u> IS <u>TRAILING SEPARATE</u></p> <p><u>CURSOR</u> IS <i>identifier-1</i></p> <p><u>CRT STATUS</u> IS <i>identifier-2</i></p> <p><u>SCREEN-CONTROL</u> IS <i>identifier-3</i></p> <p><u>EVENT-STATUS</u> IS <i>identifier-4</i></p> | ] |
|---|---|---|

where *mnemonic-name-clause* is

|                        |  |   |               |   |  |   |   |   |  |   |   |  |
|------------------------|--|---|---------------|---|--|---|---|---|--|---|---|--|
| <i>mnemonic-name-1</i> | <table style="border: none;"> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;">IS <u>CRT</u></td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;"><i>integer-1</i> IS <i>system-name-1</i></td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;">[ IS <i>switch-name-1</i> ] { <u>ON STATUS</u> IS <i>switch-status-name-1</i> }</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="padding: 0 10px;">[ <u>OFF STATUS</u> IS <i>switch-status-name-2</i> ] }</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="padding: 0 10px;">}</td> </tr> </table> | { | IS <u>CRT</u> | { | <i>integer-1</i> IS <i>system-name-1</i> | { | [ IS <i>switch-name-1</i> ] { <u>ON STATUS</u> IS <i>switch-status-name-1</i> } | } | [ <u>OFF STATUS</u> IS <i>switch-status-name-2</i> ] } | } | } |  |
| {                      | IS <u>CRT</u>  |   |               |   |  |   |   |   |  |   |   |  |
| {                      | <i>integer-1</i> IS <i>system-name-1</i>   |   |               |   |  |   |   |   |  |   |   |  |
| {                      | [ IS <i>switch-name-1</i> ] { <u>ON STATUS</u> IS <i>switch-status-name-1</i> }  |   |               |   |  |   |   |   |  |   |   |  |
| }                      | [ <u>OFF STATUS</u> IS <i>switch-status-name-2</i> ] }   |   |               |   |  |   |   |   |  |   |   |  |
| }                      | }  |   |               |   |  |   |   |   |  |   |   |  |

where *alphabet-name-clause* is

|   |   |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
|---|---|---|--------------|---|---------------|---|---------------|---|-------------------|---|-------------------|---|--|---|---------------------|---|--------------------------------------|---|---|--|
| <u>ALPHABET</u> <i>alphabet-name-1</i> IS | <table style="border: none;"> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;"><u>ASCII</u></td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;"><u>EBCDIC</u></td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;"><u>NATIVE</u></td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;"><u>STANDARD-1</u></td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;"><u>STANDARD-2</u></td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding: 0 10px;">{ <i>literal-6</i> { <u>THROUGH</u> } <i>literal-7</i> }</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="padding: 0 10px;">{ <u>THRU</u> } ...</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="padding: 0 10px;">{ <u>ALSO</u> <i>literal-8</i> } ...</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="padding: 0 10px;">}</td> </tr> </table> | { | <u>ASCII</u> | { | <u>EBCDIC</u> | { | <u>NATIVE</u> | { | <u>STANDARD-1</u> | { | <u>STANDARD-2</u> | { | { <i>literal-6</i> { <u>THROUGH</u> } <i>literal-7</i> } | } | { <u>THRU</u> } ... | } | { <u>ALSO</u> <i>literal-8</i> } ... | } | } |  |
| {   | <u>ASCII</u>  |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
| {   | <u>EBCDIC</u>   |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
| {   | <u>NATIVE</u>   |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
| {   | <u>STANDARD-1</u>   |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
| {   | <u>STANDARD-2</u>   |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
| {   | { <i>literal-6</i> { <u>THROUGH</u> } <i>literal-7</i> }  |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
| }   | { <u>THRU</u> } ...   |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
| }   | { <u>ALSO</u> <i>literal-8</i> } ...  |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |
| }   | }   |   |              |   |               |   |               |   |                   |   |                   |   |  |   |                     |   |                                      |   |   |  |

where *symbolic-characters-clause* is

## 6 Environment division

### SYMBOLIC CHARACTERS

$$\left\{ \left\{ \text{symbolic-character-name-1} \right\} \dots \left\{ \begin{array}{c} \underline{\text{IS}} \\ \underline{\text{ARE}} \end{array} \right\} \left\{ \text{integer-2} \right\} \dots \right\} \dots \left[ \underline{\text{IN WORD}} \right]$$

### Syntax rules

### General rules

### 6.1.4 REPOSITORY paragraph

REPOSITORY.

$$\left[ \left( \begin{array}{l} \underline{\text{FUNCTION}} \left\{ \begin{array}{l} \{function-name-1\} \dots \\ \underline{\text{ALL}} \end{array} \right\} \underline{\text{INTRINSIC}} \\ \underline{\text{FUNCTION}} \text{function-name-2} \left[ \underline{\text{AS literal-1}} \right] \\ \underline{\text{PROGRAM}} \text{program-name-1} \left[ \underline{\text{AS literal-2}} \right] \end{array} \right) \dots \right]$$

**Syntax rules**

**General rules**



## 6.2 Input-output section

[INPUT-OUTPUT SECTION.]  
 [file-control-paragraph]  
 [i-o-control-paragraph]

### Syntax rules

#### General rules

##### 6.2.1 FILE-CONTROL paragraph

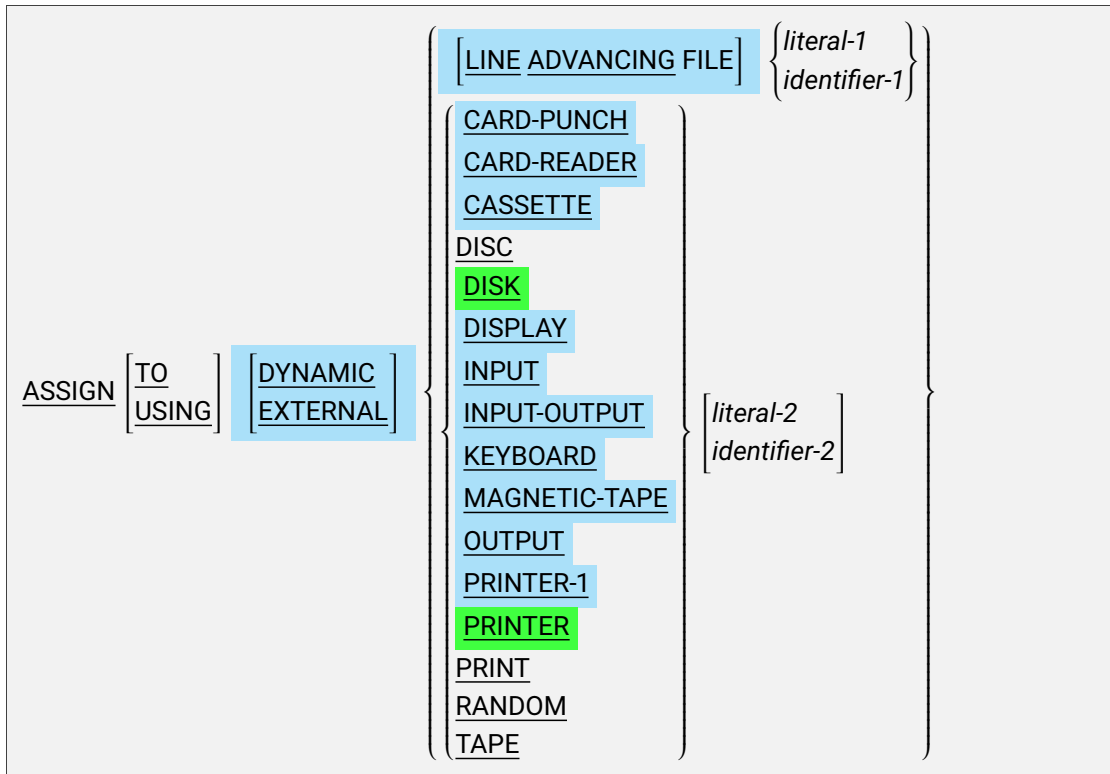
[FILE-CONTROL.]  
 [file-control-entry] ...

where *file-control-entry* is

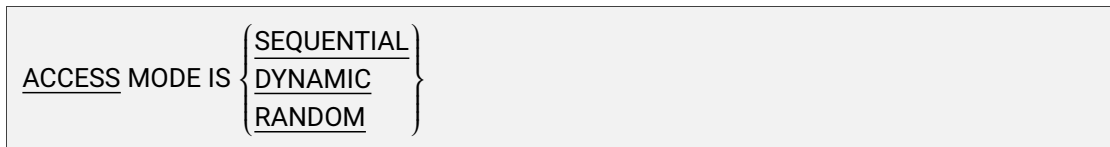
|  |   |              |
|--|---|--------------|
| <p><u>SELECT</u> [OPTIONAL<br/>                 NOT OPTIONAL] <i>file-name-1</i></p> | <p>[<i>assign-clause</i><br/> <i>access-mode-clause</i><br/> <i>alternative-record-key-clause</i><br/> <i>collating-sequence-clause</i><br/> <i>file-status-clause</i><br/> <i>lock-mode-clause</i><br/> <i>organization-clause</i><br/> <i>padding-character-clause</i><br/> <i>record-delimiter-clause</i><br/> <i>record-key-clause</i><br/> <i>relative-key-clause</i><br/> <i>reserve-clause</i><br/> <i>sharing-clause</i>]</p> | <p>... .</p> |
|--|---|--------------|

where *assign-clause* is

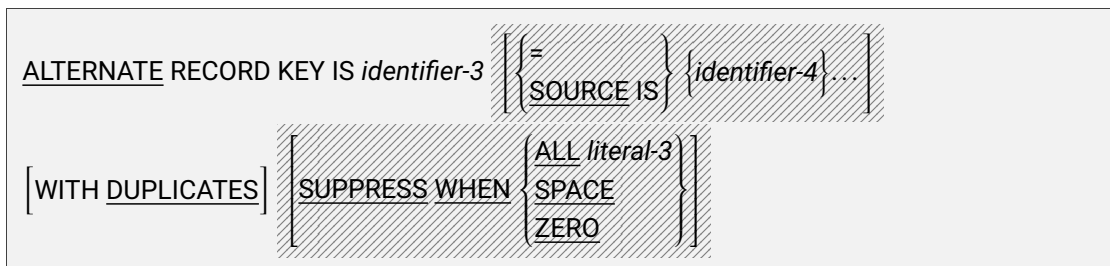
## 6 Environment division



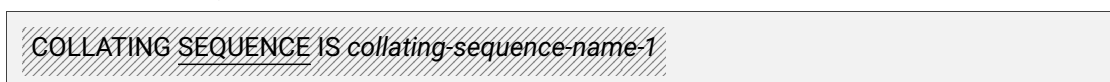
where *access-mode-clause* is



where *alternative-record-key-clause* is



where *collating-sequence-clause* is



where *file-status-clause* is

## 6 Environment division

$\left[ \begin{array}{l} \text{FILE} \\ \text{SORT} \end{array} \right] \text{STATUS IS } \textit{identifier-5}$

where *lock-mode-clause* is

$\text{LOCK MODE IS } \left\{ \left\{ \begin{array}{l} \text{MANUAL} \\ \text{AUTOMATIC} \end{array} \right\} \left[ \text{WITH LOCK ON } \left[ \text{MULTIPLE} \right] \left\{ \begin{array}{l} \text{RECORD} \\ \text{RECORDS} \end{array} \right\} \right] \right\} \left\{ \begin{array}{l} \text{EXCLUSIVE} \\ \text{WITH ROLLBACK} \end{array} \right\}$

where *organization-clause* is

$\left\{ \left\{ \begin{array}{l} \text{ORGANIZATION} \\ \text{ORGANISATION} \end{array} \right\} \text{ IS } \left\{ \begin{array}{l} \text{INDEXED} \\ \text{LINE SEQUENTIAL} \\ \text{RECORD BINARY SEQUENTIAL} \\ \text{RELATIVE} \end{array} \right\} \right\}$

where *padding-character-clause* is

$\text{PADDING CHARACTER IS } \left\{ \begin{array}{l} \textit{identifier-6} \\ \textit{literal-4} \end{array} \right\}$

where *record-delimiter-clause* is

$\text{RECORD DELIMITER IS STANDARD-1}$

where *record-key-clause* is

$\text{RECORD KEY IS } \textit{identifier-7} \left[ \left\{ \begin{array}{l} = \\ \text{SOURCE IS} \end{array} \right\} \left\{ \textit{identifier-8} \right\} \dots \right]$

where *relative-key-clause* is

$\text{RELATIVE KEY IS } \textit{identifier-9}$

where *reserve-clause* is

$\text{RESERVE } \left\{ \begin{array}{l} \text{NO} \\ \textit{integer-1} \end{array} \right\} \left\{ \begin{array}{l} \text{AREA} \\ \text{AREAS} \end{array} \right\}$

where *sharing-clause* is

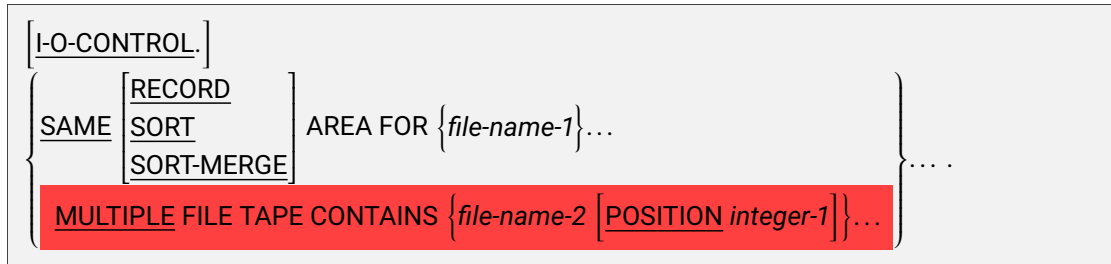
## 6 Environment division

|  |
|--|
| <u>SHARING WITH</u> {<br><u>ALL OTHER</u><br><u>NO OTHER</u><br><u>READ ONLY</u> |
|--|

**Syntax rules**

**General rules**

### 6.2.2 I-O-CONTROL paragraph

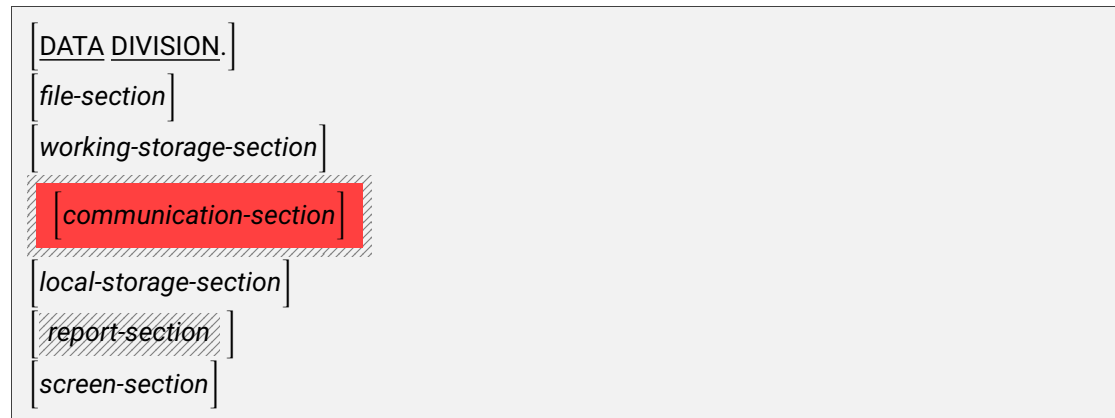


**Syntax rules**

**General rules**



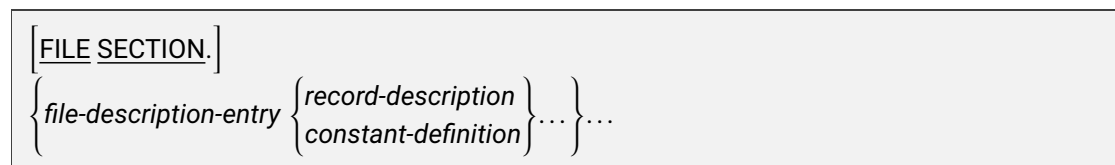
## 7 Data division



### Syntax rules

### General rules

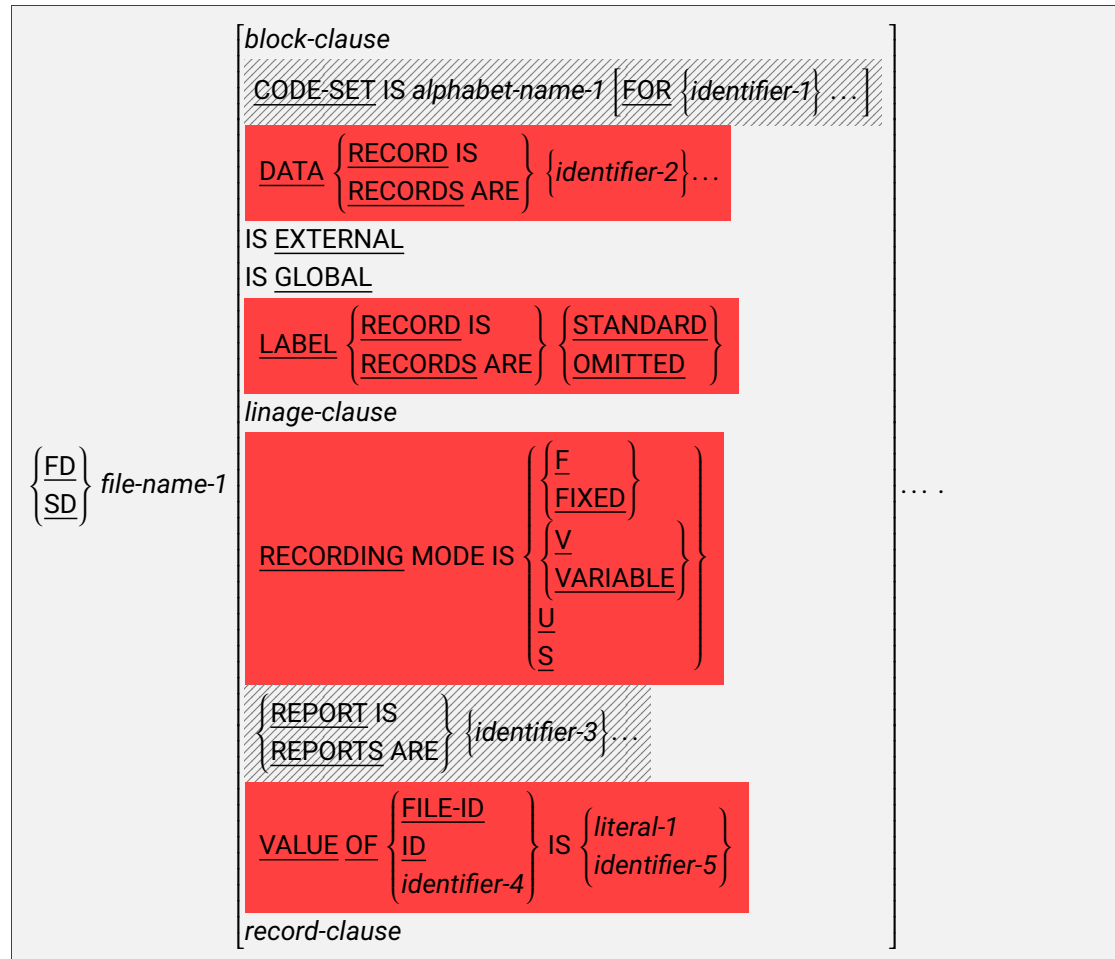
## 7.1 File section



**Syntax rules**

**General rules**

**7.1.1 File description entry**



**Syntax rules**

**General rules**



## 7.2 Working-storage section

WORKING-STORAGE SECTION.

*constant-definition*  
*record-description* ...

**Syntax rules**

**General rules**

### 7.3 Communication section

```

COMMUNICATION SECTION. [ communication-description-entry [ record-description ] ... ] ...
                        [ constant-definition ] ... ] ...
    
```

#### 7.3.1 Communication description entry

##### Format 1 (input)

```

CD entry-name FOR [ INITIAL ] INPUT
{
  ( SYMBOLIC QUEUE IS identifier-1
    SYMBOLIC SUB-QUEUE-1 IS identifier-2
    SYMBOLIC SUB-QUEUE-2 IS identifier-3
    SYMBOLIC SUB-QUEUE-3 IS identifier-4
    MESSAGE DATE IS identifier-5
    MESSAGE TIME IS identifier-6
    SYMBOLIC SOURCE IS identifier-7
    TEXT LENGTH IS identifier-8
    END KEY IS identifier-9
    STATUS KEY IS identifier-10
    MESSAGE COUNT IS identifier-11
    identifier-12 identifier-13 identifier-14
    identifier-15 identifier-16 identifier-17
    identifier-18 identifier-19 identifier-20
    identifier-21 identifier-22
  ) .
}
    
```

##### Format 2 (output)

```

CD entry-name FOR OUTPUT
{
  DESTINATION COUNT IS identifier-23
  TEXT LENGTH IS identifier-24
  STATUS KEY IS identifier-25
  DESTINATION TABLE OCCURS integer-1 TIMES [ INDEXED BY { index-name-1 } ... ]
  ERROR KEY IS identifier-26
  DESTINATION IS identifier-27
  SYMBOLIC DESTINATION IS identifier-28
} .
    
```

**Format 3 (I-O)**

```
CD entry-name FOR INITIAL I-O  
[ ( MESSAGE DATE IS identifier-29  
  ( MESSAGE TIME IS identifier-30  
    ( SYMBOLIC TERMINAL IS identifier-31  
      ( TEXT LENGTH IS identifier-32  
        ( END KEY IS identifier-33  
          ( STATUS KEY IS identifier-34 )  
        )  
      )  
    )  
  )  
] identifier-35 identifier-36 identifier-37 identifier-38 identifier-39 identifier-40
```

## 7.4 Local-storage section

LOCAL-STORAGE SECTION.

[*constant-definition*  
*record-description*] ...

**Syntax rules**

**General rules**

## 7.5 Linkage section

```
LINKAGE SECTION.  
[constant-definition  
record-description] ...
```

**Syntax rules**

**General rules**

## 7.6 Report section

|  |
|--|
| $\text{REPORT SECTION.} \left[ \begin{array}{l} \text{constant-definition} \\ \text{report-description} \end{array} \right] \dots$ |
|--|

### Syntax rules

#### General rules

#### 7.6.1 Report description

|   |
|---|
| <p><u>RD</u> <i>report-name-1</i></p> $\left[ \begin{array}{l} \text{IS GLOBAL} \\ \text{CODE IS } \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \end{array} \right\} \\ \left\{ \begin{array}{l} \text{CONTROL IS} \\ \text{CONTROLS ARE} \end{array} \right\} \text{FINAL } \left\{ \text{identifier-2} \right\} \dots \\ \text{PAGE } \left[ \begin{array}{l} \text{LIMIT IS} \\ \text{LIMITS ARE} \end{array} \right] \text{integer-1} \left[ \begin{array}{l} \text{LINE} \\ \text{LINES} \end{array} \right] \left[ \text{integer-2} \left\{ \begin{array}{l} \text{COLUMNS} \\ \text{COLS} \end{array} \right\} \right] \end{array} \right] \dots$ <p><math>\left\{ \text{report-group-description-1} \right\} \dots</math></p> |
|---|

where *report-group-description* is

|                     |                   |                            |       |
|---------------------|-------------------|----------------------------|-------|
| <i>level-number</i> | <i>entry-name</i> | <i>blank-clause</i>        |       |
|                     |                   | <i>column-clause</i>       |       |
|                     |                   | <b>GROUP INDICATE</b>      |       |
|                     |                   | <i>justified-clause</i>    |       |
|                     |                   | <i>line-clause</i>         |       |
|                     |                   | <i>next-group-clause</i>   |       |
|                     |                   | <i>picture-clause</i>      |       |
|                     |                   | <i>present-when-clause</i> | ..... |
|                     |                   | <i>occurs-clause</i>       |       |
|                     |                   | <i>sign-clause</i>         |       |
|                     |                   | <i>source-clause</i>       |       |
|                     |                   | <i>sum-clause</i>          |       |
|                     |                   | <i>type-clause</i>         |       |
|                     |                   | <b>USAGE IS DISPLAY</b>    |       |
|                     |                   | <i>value-clause</i>        |       |
|                     |                   | <i>varying-clause</i>      |       |

**Syntax rules**

**General rules**

## 7.7 Screen section

SCREEN SECTION.  
[ *constant-definition*  
  *screen-description* ] ...



## Syntax rules

## General rules

## 7.7.1 Screen description

|                                |  |     |
|--------------------------------|--|-----|
| <i>level-number entry-name</i> | <pre> appearance-attribute-clauses {   AUTO   AUTO-SKIP   AUTOTERMINATE } column-clause ERASE {   EOL   EOS   [END OF] {     LINE     SCREEN   } } {   FULL   LENGTH-CHECK } IS GLOBAL GRID INITIAL LEFTLINE justified-clause line-clause {   NO-ECHO   NO ECHO   OFF } occurs-clause picture-clause {   REQUIRED   EMPTY-CHECK } source-destination-clauses SECURE sign-clause usage-clause value-clause </pre> | ... |
|--------------------------------|--|-----|

where *appearance-attribute-clauses* is

$$\left[ \left\{ \begin{array}{l} \text{BACKGROUND-COLOR} \\ \text{BACKGROUND-COLOUR} \end{array} \right\} \text{ IS } \left\{ \begin{array}{l} \text{identifier-1} \\ \text{integer-1} \end{array} \right\} \right]$$

$$\left[ \begin{array}{l} \text{BELL} \\ \text{BEEP} \end{array} \right]$$

$$\text{BLANK} \left\{ \begin{array}{l} \text{LINE} \\ \text{SCREEN} \end{array} \right\}$$

$$\left\{ \begin{array}{l} \text{BLINK} \\ \text{BLINKING} \end{array} \right\}$$

$$\text{WITH} \left\{ \begin{array}{l} \text{COLOR} \\ \text{COLOUR} \end{array} \right\} \text{ IS } \left\{ \begin{array}{l} \text{identifier-2} \\ \text{integer-2} \end{array} \right\}$$

$$\left[ \left\{ \begin{array}{l} \text{FOREGROUND-COLOR} \\ \text{FOREGROUND-COLOUR} \end{array} \right\} \text{ IS } \left\{ \begin{array}{l} \text{identifier-3} \\ \text{integer-3} \end{array} \right\} \right]$$

$$\left[ \begin{array}{l} \text{HIGHLIGHT} \\ \text{HIGH} \\ \text{BOLD} \\ \text{LOWLIGHT} \\ \text{LOW} \end{array} \right]$$

$$\left[ \text{WITH STANDARD} \right]$$

$$\left[ \text{WITH BACKGROUND-HIGH} \right]$$

$$\left[ \text{WITH BACKGROUND-STANDARD} \right]$$

$$\left[ \text{WITH BACKGROUND-LOW} \right]$$

$$\left[ \text{OVERLINE} \right]$$

$$\left[ \text{PROMPT} \left[ \text{CHARACTER IS} \left\{ \begin{array}{l} \text{identifier-4} \\ \text{literal-1} \end{array} \right\} \right] \right]$$

$$\left[ \begin{array}{l} \text{REVERSE-VIDEO} \\ \text{REVERSED} \\ \text{REVERSE} \end{array} \right]$$

70

$$\left[ \text{SIZE IS integer-4} \right]$$

$$\left[ \begin{array}{l} \text{UNDERLINE} \\ \text{UNDERLINED} \end{array} \right]$$

## 7 Data division

where *source-destination-clauses* is

[FROM { *identifier-5*  
*literal-2* } ]

[TO *identifier-6* ]

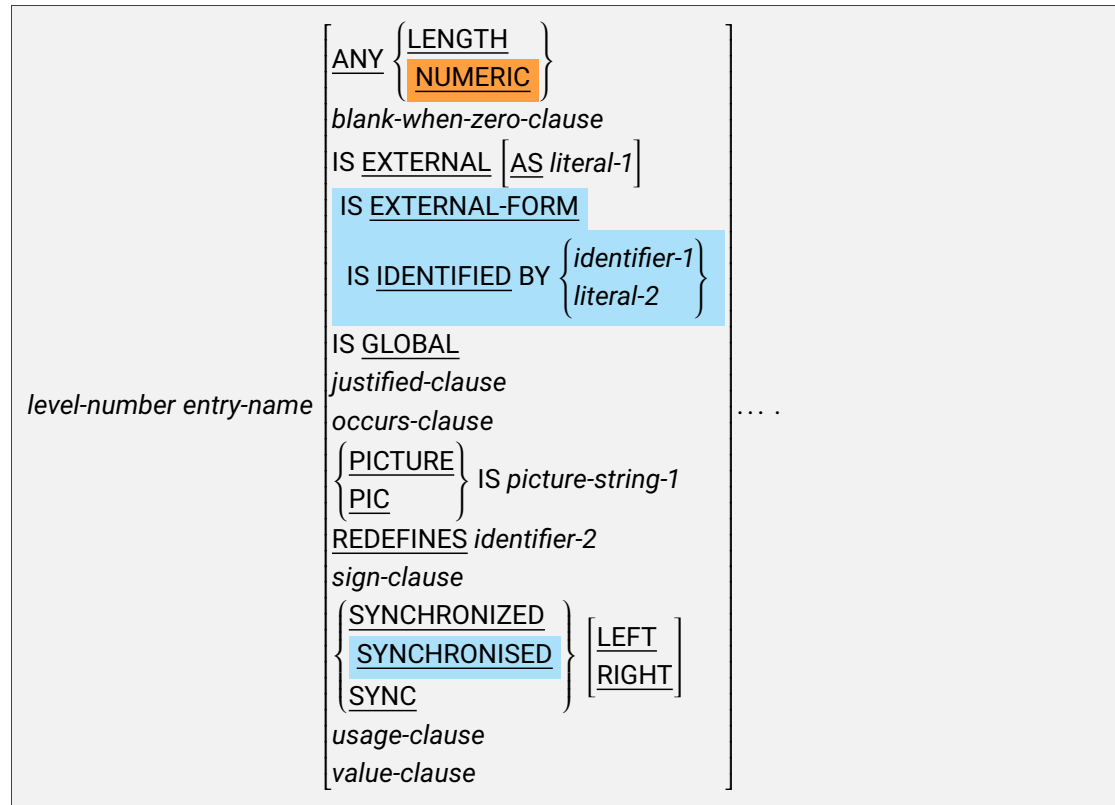
[USING *identifier-7* ]

**Syntax rules**

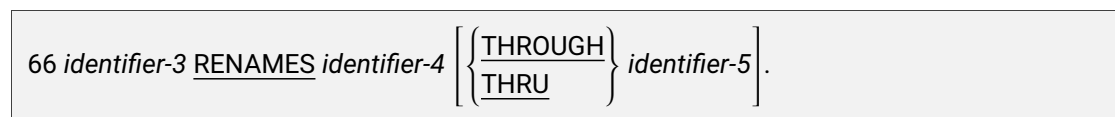
**General rules**

## 7.8 Record description

### Format 1 (data-description)



### Format 2 (renames)



### Format 3 (condition-name)

## 7 Data division

88 *identifier-6* { VALUE } [ IS ] { *literal-3* [ { THROUGH } *literal-4* ] } ...  
[ WHEN SET TO FALSE IS *literal-5* ].

**Syntax rules**

**General rules**

## 7.9 Constant definition

### Format 1 (standard)

$$\left. \begin{array}{l} \{1 \\ 01\} \end{array} \right\} \text{identifier-1 } \underline{\text{CONSTANT}} \left[ \text{IS GLOBAL} \right] \left\{ \begin{array}{l} \text{AS } \left\{ \begin{array}{l} \text{literal-1} \\ \underline{\text{BYTE-LENGTH}} \\ \underline{\text{LENGTH}} \end{array} \right\} \text{OF identifier-2} \\ \underline{\text{FROM identifier-3}} \end{array} \right\} .$$

### Format 2 (micro-focus)

$$78 \text{ identifier-4 } \left[ \text{IS GLOBAL} \right] \underline{\text{VALUE}} \left[ \begin{array}{l} \text{IS} \\ \text{ARE} \end{array} \right] \text{literal-2} .$$

### Syntax rules

### General rules

## 7.10 Data division clauses

### 7.10.1 ANY LENGTH clause

The ANY LENGTH clause specifies that the length of the data item will be determined at runtime.

|  |
|--|
| $\text{ANY} \left\{ \begin{array}{l} \text{LENGTH} \\ \text{NUMERIC} \end{array} \right\}$ |
|--|

**Syntax rules**

**General rules**

### 7.10.2 AUTO clause

The AUTO clause specifies that the screen cursor will immediately move to the next screen item when the current screen item is full.

```
{  
  AUTO  
  AUTO-SKIP  
  AUTOTERMINATE  
}
```

#### Syntax rules

#### General rules



### 7.10.3 BACKGROUND-COLOR clause

The BACKGROUND-COLOR clause specifies the background-color of the screen item.

|   |
|---|
| $\left\{ \begin{array}{l} \text{BACKGROUND-COLOR} \\ \text{BACKGROUND-COLOUR} \end{array} \right\} \text{ IS } \left\{ \begin{array}{l} \textit{identifier-1} \\ \textit{literal-1} \end{array} \right\}$ |
|---|

**Syntax rules**

**General rules**

#### 7.10.4 BACKGROUND-HIGH clause

**BACKGROUND-HIGH**

**Syntax rules**

**General rules**

### 7.10.5 BACKGROUND-LOW clause

BACKGROUND-LOW

**Syntax rules**

**General rules**

### 7.10.6 BACKGROUND-STANDARD clause

BACKGROUND-STANDARD

**Syntax rules**

**General rules**

### 7.10.7 BELL clause

{  
BELL  
BEEP  
}

**Syntax rules**

**General rules**

### 7.10.8 BLANK clause

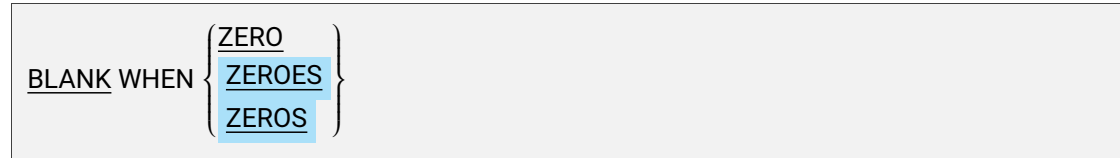
BLANK {  
  LINE  
  SCREEN  
}

**Syntax rules**

**General rules**

### 7.10.9 BLANK WHEN ZERO clause

The BLANK WHEN ZERO clause causes an item to be blanked when a value of zero is stored in it.



**Syntax rules**

**General rules**

### 7.10.10 BLINK clause

{  
BLINK  
BLINKING  
}

**Syntax rules**

**General rules**



### 7.10.11 BLOCK clause

The BLOCK clause specifies the size of a physical record, that is, how many logical records should be read in one physical I/O operation.

|   |
|---|
| <p><u>BLOCK</u> CONTAINS <i>integer-1</i> [<u>TO</u> <i>integer-2</i>] [<u>CHARACTERS</u><br/><u>RECORDS</u>]</p> |
|---|

#### Syntax rules

#### General rules

### 7.10.12 COLOR clause

$$\text{WITH } \left\{ \begin{array}{l} \text{COLOR} \\ \text{COLOUR} \end{array} \right\} \text{ IS } \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \end{array} \right\}$$

**Syntax rules**

**General rules**

**7.10.13 COLUMN clause**

The COLUMN clause specifies what column an item should be printed or displayed at.

**Format 1 (report-section)**

$$\left\{ \begin{array}{l} \left\{ \begin{array}{l} \underline{\text{COLUMN}} \\ \underline{\text{COL}} \end{array} \right\} \text{ NUMBERS} \\ \left\{ \begin{array}{l} \underline{\text{COLUMNS}} \\ \underline{\text{COLS}} \end{array} \right\} \text{ ARE} \end{array} \right\} \left[ \begin{array}{l} \underline{\text{IS}} \\ \underline{\text{ARE}} \end{array} \right] \left\{ \left[ \underline{\text{PLUS}} \right] \text{ integer-1} \right\} \dots$$
**Format 2 (screen-section)**

$$\left\{ \begin{array}{l} \underline{\text{COLUMN}} \\ \underline{\text{COL}} \end{array} \right\} \text{ NUMBER IS} \left[ \begin{array}{l} + \\ - \\ \underline{\text{PLUS}} \\ \underline{\text{MINUS}} \end{array} \right] \left\{ \begin{array}{l} \text{identifier-1} \\ \text{integer-2} \end{array} \right\}$$
**Syntax rules****General rules**

#### 7.10.14 DATA RECORDS clause

DATA { RECORD IS  
RECORDS ARE } { *identifier-1* } ...

**Syntax rules**

**General rules**

### 7.10.15 DESTINATION clause

DESTINATION IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.16 DESTINATION COUNT clause

DESTINATION COUNT IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.17 DESTINATION TABLE OCCURS clause

```
DESTINATION TABLE OCCURS integer-1 TIMES [INDEXED BY {index-name-1}...]
```

**Syntax rules**

**General rules**

### 7.10.18 END KEY clause

END KEY IS *identifier-1*

**Syntax rules**

**General rules**



### 7.10.19 Entry name

The entry name specifies the name of the item being declared.

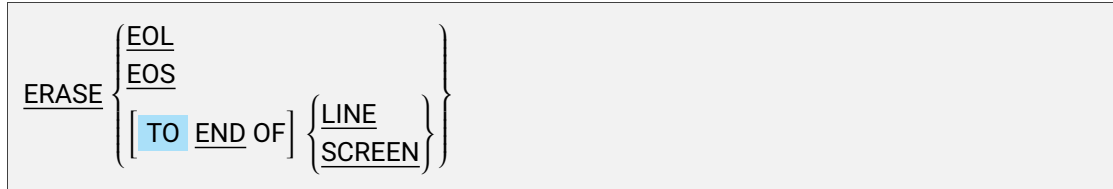
|  |
|--|
| $\left[ \begin{array}{l} \text{FILLER} \\ \text{identifier-1} \end{array} \right]$ |
|--|

**Syntax rules**

**General rules**

### 7.10.20 ERASE clause

The ERASE clause indicates part of the screen to be blanked before displaying the item.



#### Syntax rules

#### General rules

### 7.10.21 ERROR KEY clause

ERROR KEY IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.22 EXTERNAL clause

IS EXTERNAL [AS literal-1]

**Syntax rules**

**General rules**

### 7.10.23 EXTERNAL-FORM clause

$\left\{ \begin{array}{l} \text{IS EXTERNAL-FORM} \\ \text{IS IDENTIFIED BY } \left\{ \begin{array}{l} \textit{identifier-1} \\ \textit{literal-1} \end{array} \right\} \end{array} \right\}$

**Syntax rules**

**General rules**

### 7.10.24 FOREGROUND-COLOR clause

|   |
|---|
| $\left\{ \begin{array}{l} \text{FOREGROUND-COLOR} \\ \text{FOREGROUND-COLOUR} \end{array} \right\} \text{ IS } \left\{ \begin{array}{l} \textit{identifier-1} \\ \textit{literal-1} \end{array} \right\}$ |
|---|

**Syntax rules**

**General rules**

### 7.10.25 FROM clause

FROM { *identifier-1* }  
          { *literal-1* }

**Syntax rules**

**General rules**

### 7.10.26 FULL clause

The FULL clause specifies that the item must be filled entirely before the cursor can move to another item.

{  
FULL  
LENGTH-CHECK  
}

#### Syntax rules

#### General rules



### 7.10.27 GLOBAL clause

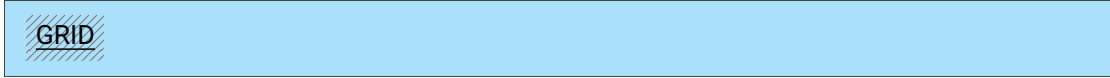
The GLOBAL clause specifies that an item may be accessed from within nested programs.

```
IS GLOBAL
```

#### Syntax rules

#### General rules

### 7.10.28 GRID clause



**Syntax rules**

**General rules**

### 7.10.29 HIGHLIGHT clause



**Syntax rules**

**General rules**

**7.10.30 INITIAL clause**

INIITAL

**Syntax rules**

**General rules**

### 7.10.31 JUSTIFIED clause

The JUSTIFIED clause causes data smaller than the data item to be padded by spaces on the left to fill the item.

|   |
|---|
| $\left. \begin{array}{l} \text{JUSTIFIED} \\ \text{JUST} \end{array} \right\} \text{RIGHT}$ |
|---|

**Syntax rules**

**General rules**

### 7.10.32 LABEL RECORDS clause

LABEL { RECORD IS  
RECORDS ARE } { STANDARD  
OMITTED }

**Syntax rules**

**General rules**

### 7.10.33 LEFTLINE clause

**LEFTLINE**

**Syntax rules**

**General rules**

### 7.10.34 Level-number

A 1- or 2-digit integer having a value that is either between 1 and 49 or is 66, 77, 78 or 88.

**Syntax rules**

**General rules**



### 7.10.35 LINAGE clause

The LINAGE clause specifies the page limits of a logical page.

|  |
|--|
| $\underline{\text{LINAGE}} \text{ IS } \left. \begin{array}{l} \textit{identifier-1} \\ \textit{literal-1} \end{array} \right\} \text{ LINES } \left[ \left. \begin{array}{l} \underline{\text{BOTTOM}} \\ \underline{\text{TOP}} \\ \underline{\text{WITH FOOTING AT}} \end{array} \right\} \left. \begin{array}{l} \textit{identifier-2} \\ \textit{literal-2} \end{array} \right\} \dots \right]$ |
|--|

**Syntax rules**

**General rules**

**7.10.36 LINE clause**

The LINE clause specifies the line an item should be printed or displayed on.

**Format 1 (report section)**

$$\left\{ \begin{array}{l} \underline{\text{LINE NUMBERS}} \left[ \begin{array}{l} \underline{\text{IS}} \\ \underline{\text{ARE}} \end{array} \right] \\ \underline{\text{LINES ARE}} \end{array} \right\} \left\{ \begin{array}{l} \left[ \underline{\text{PLUS}} \right] \text{integer-1} \\ \underline{\text{NEXT PAGE}} \end{array} \right\} \dots$$
**Format 2 (screen section)**

$$\underline{\text{LINE NUMBER IS}} \left[ \begin{array}{l} + \\ - \\ \underline{\text{MINUS}} \\ \underline{\text{PLUS}} \end{array} \right] \left\{ \begin{array}{l} \text{identifier-1} \\ \text{integer-2} \end{array} \right\}$$
**Syntax rules****General rules**

### 7.10.37 LOWLIGHT clause

{  
LOWLIGHT  
LOW  
}

**Syntax rules**

**General rules**

### 7.10.38 MESSAGE COUNT clause

MESSAGE COUNT IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.39 MESSAGE DATE clause

MESSAGE DATE IS identifier-1

**Syntax rules**

**General rules**

#### 7.10.40 MESSAGE TIME clause

MESSAGE TIME IS identifier-1

**Syntax rules**

**General rules**

#### 7.10.41 NEXT GROUP clause

The NEXT GROUP clause specifies the number of blank lines that should follow the end of a report group.

$$\text{NEXT\_GROUP IS } \left\{ \begin{array}{l} \text{[PLUS] integer-1} \\ \text{NEXT PAGE} \end{array} \right\}$$

**Syntax rules**

**General rules**

**7.10.42 NO ECHO clause**

$\left\{ \begin{array}{l} \underline{\text{NO ECHO}} \\ \underline{\text{NO-ECHO}} \\ \underline{\text{OFF}} \end{array} \right\}$

**Syntax rules**

**General rules**



**7.10.43 OCCURS clause**

The OCCURS clause describes tables, repeated data items accessible by subscripts.

**Format 1 (usual)**

```

OCCURS
  { integer-1 [TO integer-2] TIMES [DEPENDING ON identifier-1]
  { DYNAMIC [CAPACITY IN identifier-2] [FROM integer-3] [TO integer-4] [INITIALIZED] }
  [ [ { ASCENDING } KEY IS { identifier-3 } ... } ... ] ]
  [ INDEXED BY { index-name-1 } ... ] ]

```

**Format 2 (report section)**

```

OCCURS integer-5 [TO integer-6] TIMES [DEPENDING ON identifier-4] [STEP integer-7]

```

**Format 3 (screen section)**

```

OCCURS integer-8 TIMES

```

**Format 4 (unbounded)**

```

OCCURS [integer-9 TO] UNBOUNDED TIMES DEPENDING ON identifier-5
  [ [ { ASCENDING } KEY IS { identifier-6 } ... } ... ] ]
  [ INDEXED BY { index-name-2 } ... ] ]

```

**Syntax rules**

**General rules**

#### 7.10.44 OVERLINE clause

OVERLINE

**Syntax rules**

**General rules**

### 7.10.45 PICTURE clause

The PICTURE clause describes the general characteristics and editing requirements of an elementary data item.

|   |
|---|
| $\left. \begin{array}{l} \text{PICTURE} \\ \text{PIC} \end{array} \right\} \text{ IS picture-string-1}$ |
|---|

#### Syntax rules

#### General rules

#### 7.10.46 PRESENT WHEN clause

The PRESENT WHEN clause specifies a condition under which a report section entry will be processed.

```
PRESENT WHEN condition-1
```

**Syntax rules**

**General rules**

### 7.10.47 PROMPT clause

PROMPT [ CHARACTER IS { *identifier-1*  
*literal-1* } ]

**Syntax rules**

**General rules**

### 7.10.48 RECORD clause

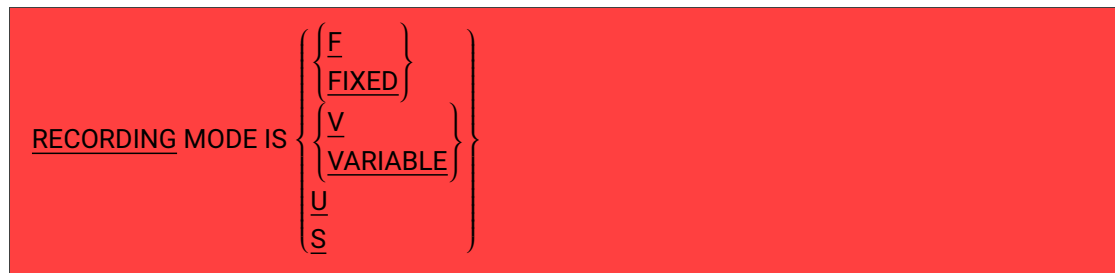
The RECORD clause specifies the number of bytes of a logical record.

|   |
|---|
| $\text{RECORD} \left\{ \begin{array}{l} \text{CONTAINS } \textit{integer-1} \left[ \underline{\text{TO}} \textit{integer-2} \right] \text{ CHARACTERS} \\ \text{IS } \underline{\text{VARYING}} \text{ in size } \left[ \text{FROM } \textit{integer-3} \right] \left[ \underline{\text{TO}} \textit{integer-4} \right] \text{ CHARACTERS} \\ \underline{\text{DEPENDING ON}} \textit{identifier-1} \end{array} \right\}$ |
|---|

**Syntax rules**

**General rules**

### 7.10.49 RECORDING MODE clause



**Syntax rules**

**General rules**



### 7.10.50 REDEFINES clause

The REDEFINES clause indicates the data shares the same memory as an item with a different description.

```
REDEFINES identifier-1
```

**Syntax rules**

**General rules**

### 7.10.51 REPORT clause



**Syntax rules**

**General rules**

### 7.10.52 REQUIRED clause

{  
  REQUIRED  
  EMPTY-CHECK  
}

**Syntax rules**

**General rules**

### 7.10.53 REVERSE-VIDEO clause

{ REVERSE-VIDEO  
  REVERSED  
  REVERSE }

**Syntax rules**

**General rules**

**7.10.54 SECURE clause**

SECURE

**Syntax rules**

**General rules**

### 7.10.55 STATUS KEY clause

STATUS KEY IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.56 SIGN clause

The SIGN clause defines how to store item's sign.

|   |
|---|
| SIGN IS { $\frac{\text{LEADING}}{\text{TRAILING}}$ } [SEPARATE CHARACTER] |
|---|

**Syntax rules**

**General rules**

### 7.10.57 SIZE clause

SIZE IS integer-1

**Syntax rules**

**General rules**



### 7.10.58 SOURCE clause

The SOURCE clause identifies data to be used in processing a report section entry.

SOURCE IS *number-1* [*rounded-phrase*]

**Syntax rules**

**General rules**

**7.10.59 STANDARD clause**

WITH STANDARD

**Syntax rules**

**General rules**

### 7.10.60 SUM clause

The SUM clause provides a list of data items to be summed for use in an elementary report item.

|  |
|--|
| $\underline{\text{SUM}} \text{ OF } \{ \textit{number-1} \} \dots \left[ \underline{\text{RESET}} \text{ ON } \left\{ \begin{array}{l} \textit{identifier-1} \\ \underline{\text{FINAL}} \end{array} \right\} \right]$ |
|--|

#### Syntax rules

#### General rules

### 7.10.61 SYMBOLIC DESTINATION clause

SYMBOLIC DESTINATION IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.62 SYMBOLIC QUEUE clause

SYMBOLIC QUEUE IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.63 SYMBOLIC SOURCE clause

SYMBOLIC SOURCE IS *identifier-1*

**Syntax rules**

**General rules**

#### 7.10.64 SYMBOLIC SUB-QUEUE-1 clause

SYMBOLIC SUB-QUEUE-1 IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.65 SYMBOLIC SUB-QUEUE-2 clause

SYMBOLIC SUB-QUEUE-2 IS *identifier-1*

**Syntax rules**

**General rules**



### 7.10.66 SYMBOLIC SUB-QUEUE-3 clause

SYMBOLIC SUB-QUEUE-3 IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.67 SYMBOLIC TERMINAL clause

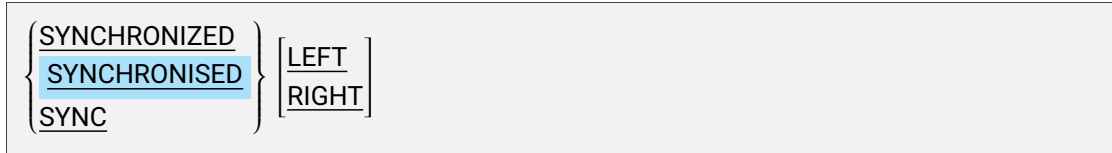
SYMBOLIC TERMINAL IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.68 SYNCHRONIZED clause

The SYNCHRONIZED clause specifies an item should be aligned in a byte boundary and in what way.



**Syntax rules**

**General rules**

**7.10.69 TEXT LENGTH clause**

TEXT LENGTH IS *identifier-1*

**Syntax rules**

**General rules**

### 7.10.70 TO clause

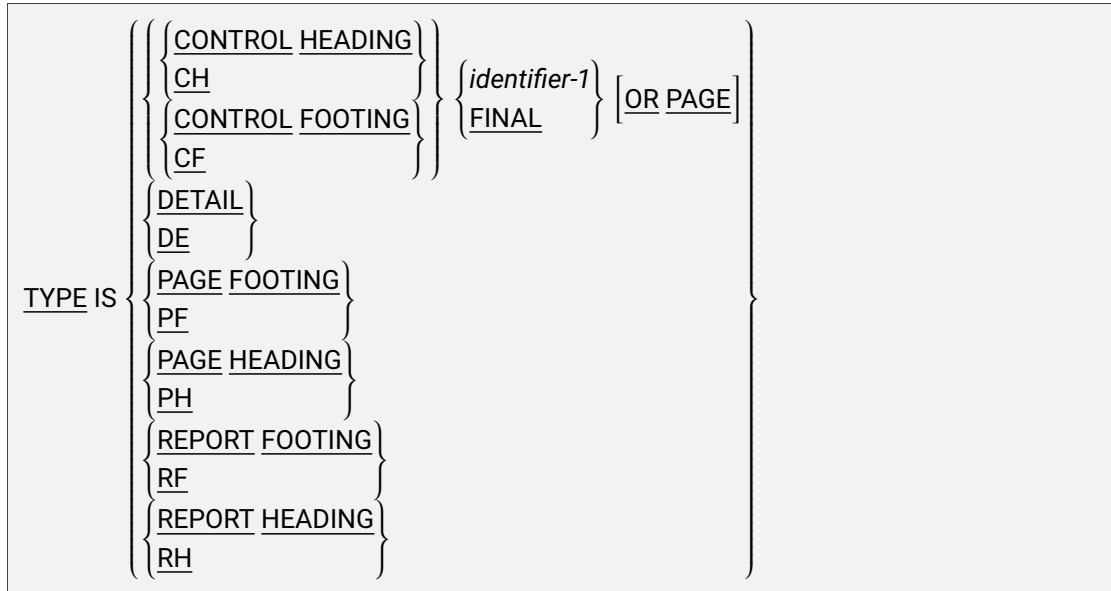
TO *identifier-1*

**Syntax rules**

**General rules**

**7.10.71 TYPE clause**

The TYPE clause specifies when to print a report group.

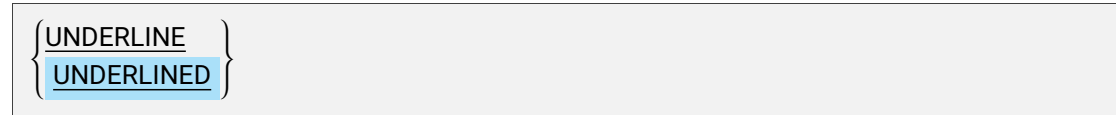


**Syntax rules**

**General rules**

### 7.10.72 UNDERLINE clause

The UNDERLINE clause specifies that each character of a field is to be displayed with an underline.

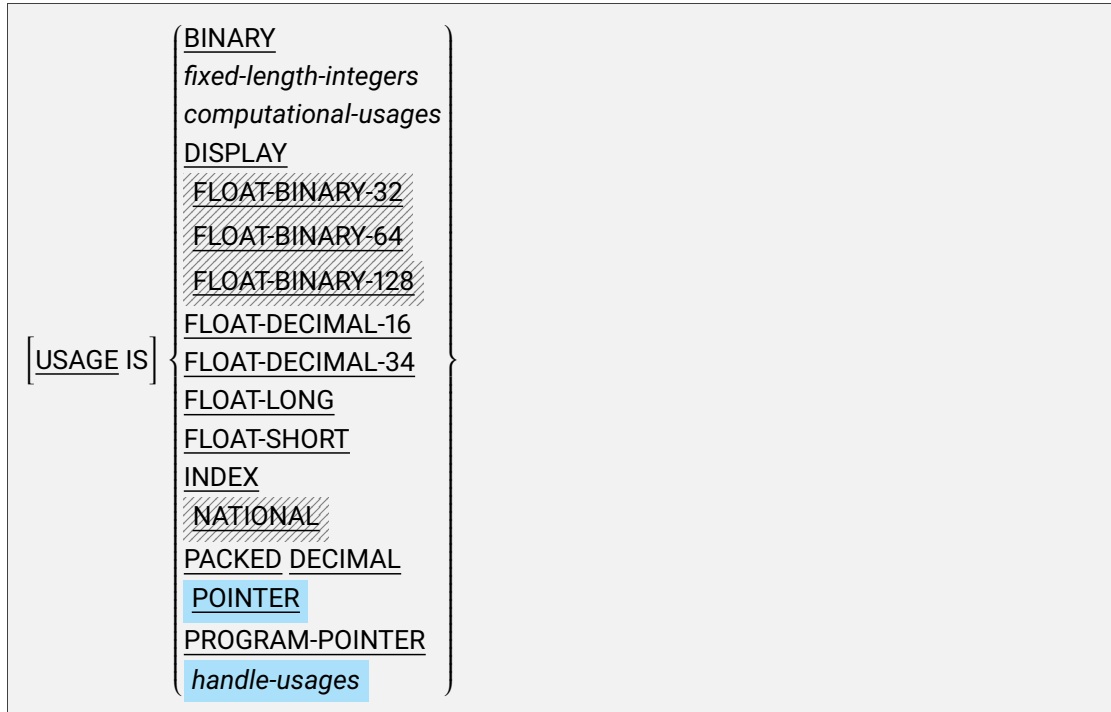


#### Syntax rules

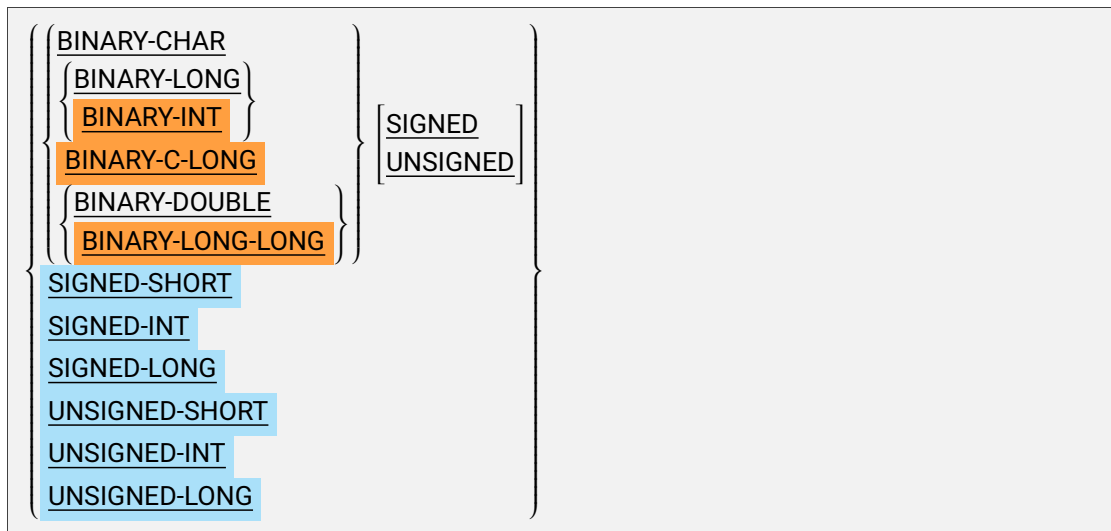
#### General rules

### 7.10.73 USAGE clause

The USAGE clause specifies the representation of a data item in memory.



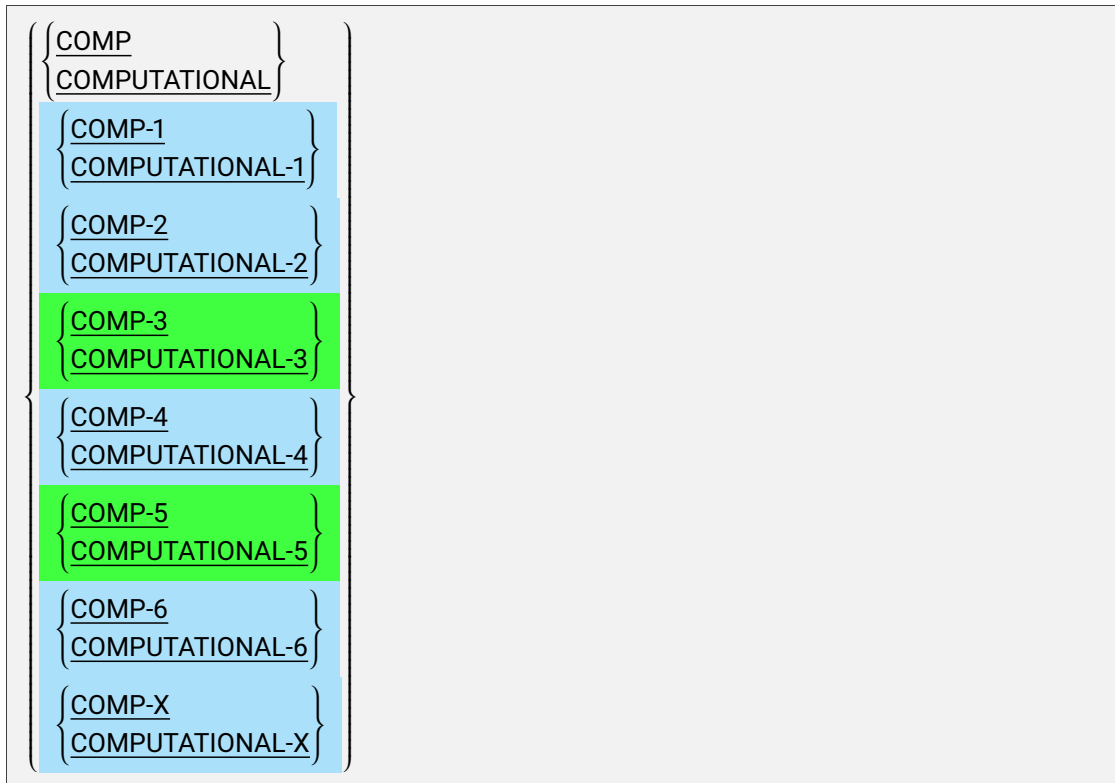
where *fixed-length-integers* is



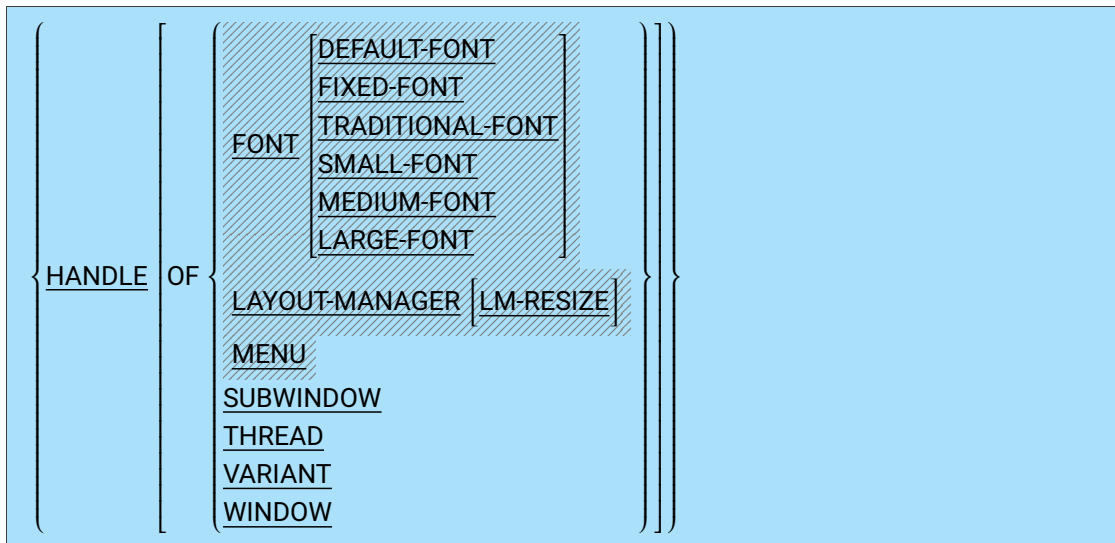
where *computation-usages* is



## 7 Data division



where *handle-usages* is



**Syntax rules**

**General rules**

### 7.10.74 USING clause

USING *identifier-1*

**Syntax rules**

**General rules**

**7.10.75 VALUE clause**

The VALUE clause specifies the initial value of the local-storage and working-storage section data items and the values to be used in INITIALIZE statements.

The VALUE clause for condition-names specifies the values under which a condition-name is true (or false).

**Format 1 (initialization)**

$$\left\{ \begin{array}{l} \text{VALUE} \\ \text{VALUES} \end{array} \right\} \left[ \begin{array}{l} \text{IS} \\ \text{ARE} \end{array} \right] \text{literal-1}$$
**Format 2 (condition)**

$$\left\{ \begin{array}{l} \text{VALUE} \\ \text{VALUES} \end{array} \right\} \left[ \begin{array}{l} \text{IS} \\ \text{ARE} \end{array} \right] \left\{ \text{literal-2} \left[ \begin{array}{l} \text{THROUGH} \\ \text{THRU} \end{array} \right] \text{literal-3} \right\} \dots$$

$$\left[ \text{WHEN SET TO FALSE IS literal-4} \right]$$
**Syntax rules****General rules**

### 7.10.76 VALUE OF clause

VALUE OF { FILE-ID  
ID  
*identifier-1* } IS { *literal-1*  
*identifier-2* }

**Syntax rules**

**General rules**

### 7.10.77 VARYING clause

The VARYING clause declares counters to be used in printing repeated items in the report writer.

```
VARYING identifier-1 FROM number-1 BY number-2
```

#### Syntax rules

#### General rules



# 8 Procedure division

## 8.1 Concepts

### 8.1.1 Exceptions

- EC-ALL
- EC-ARGUMENT
  - EC-ARGUMENT-FUNCTION
  - EC-ARGUMENT-IMP
- EC-BOUND
  - EC-BOUND-IMP
  - EC-BOUND-ODO
  - EC-BOUND-OVERFLOW
  - EC-BOUND-PTR
  - EC-BOUND-REF-MOD
  - EC-BOUND-SET
  - EC-BOUND-SUBSCRIPT
  - EC-BOUND-TABLE-LIMIT
- EC-DATA
  - EC-DATA-CONVERSION
  - EC-DATA-IMP
  - EC-DATA-INCOMPATIBLE
  - EC-DATA-OVERFLOW
  - EC-DATA-PTR-NULL
- EC-FLOW
  - EC-FLOW-GLOBAL-EXIT
  - EC-FLOW-GLOBAL-GOBACK
  - EC-FLOW-IMP
  - EC-FLOW-RELEASE

## 8 Procedure division

- EC-FLOW-REPORT
- EC-FLOW-RETURN
- EC-FLOW-SEARCH
- EC-FLOW-USE
- EC-FUNCTION
  - EC-FUNCTION-PTR-INVALID
  - EC-FUNCTION-PTR-NULL
- EC-I-O
  - EC-I-O-AT-END
  - EC-I-O-EOP
  - EC-I-O-EOP-OVERFLOW
  - EC-I-O-FILE-SHARING
  - EC-I-O-IMP
  - EC-I-O-INVALID-KEY
  - EC-I-O-LINAGE
  - EC-I-O-LOGIC-ERROR
  - EC-I-O-PERMANENT-ERROR
  - EC-I-O-RECORD-OPERATION
- EC-IMP
  - EC-IMP-ACCEPT
  - EC-IMP-DISPLAY
  - EC-IMP-UTC-UNKNOWN
- EC-LOCALE
  - EC-LOCALE-IMP
  - EC-LOCALE-INCOMPATIBLE
  - EC-LOCALE-INVALID
  - EC-LOCALE-INVALID-PTR
  - EC-LOCALE-MISSING
  - EC-LOCALE-SIZE
- EC-OO
  - EC-OO-CONFORMANCE
  - EC-OO-EXCEPTION



## 8 Procedure division

- EC-OO-FINALIZABLE
- EC-OO-IMP
- EC-OO-METHOD
- EC-OO-NULL
- EC-OO-RESOURCE
- EC-OO-UNIVERSAL
- EC-ORDER
  - EC-ORDER-IMP
  - EC-ORDER-NOT-SUPPORTED
- EC-OVERFLOW
  - EC-OVERFLOW-IMP
  - EC-OVERFLOW-STRING
  - EC-OVERFLOW-UNSTRING
- EC-PROGRAM
  - EC-PROGRAM-ARG-MISMATCH
  - EC-PROGRAM-ARG-OMITTED
  - EC-PROGRAM-CANCEL-ACTIVE
  - EC-PROGRAM-IMP
  - EC-PROGRAM-NOT-FOUND
  - EC-PROGRAM-PTR-NULL
  - EC-PROGRAM-RECURSIVE-CALL
  - EC-PROGRAM-RESOURCES
- EC-RAISING
  - EC-RAISING-IMP
  - EC-RAISING-NOT-SPECIFIED
- EC-RANGE
  - EC-RANGE-IMP
  - EC-RANGE-INDEX
  - EC-RANGE-INSPECT-SIZE
  - EC-RANGE-INVALID
  - EC-RANGE-PERFORM-VARYING
  - EC-RANGE-PTR

## 8 Procedure division

- EC-RANGE-SEARCH-INDEX
- EC-RANGE-SEARCH-NO-MATCH
- EC-REPORT
  - EC-REPORT-ACTIVE
  - EC-REPORT-COLUMN-OVERLAP
  - EC-REPORT-FILE-MODE
  - EC-REPORT-IMP
  - EC-REPORT-INACTIVE
  - EC-REPORT-LINE-OVERLAP
  - EC-REPORT-NOT-TERMINATED
  - EC-REPORT-PAGE-LIMIT
  - EC-REPORT-PAGE-WIDTH
  - EC-REPORT-SUM-SIZE
  - EC-REPORT-VARYING
- EC-SCREEN
  - EC-SCREEN-FIELD-OVERLAP
  - EC-SCREEN-IMP
  - EC-SCREEN-ITEM-TRUNCATED
  - EC-SCREEN-LINE-NUMBER
  - EC-SCREEN-STARTING-COLUMN
- EC-SIZE
  - EC-SIZE-ADDRESS
  - EC-SIZE-EXPONENTIATION
  - EC-SIZE-IMP
  - EC-SIZE-OVERFLOW
  - EC-SIZE-TRUNCATION
  - EC-SIZE-UNDERFLOW
  - EC-SIZE-ZERO-DIVIDE
- EC-SORT-MERGE
  - EC-SORT-MERGE-ACTIVE
  - EC-SORT-MERGE-FILE-OPEN
  - EC-SORT-MERGE-IMP

## 8 Procedure division

- EC-SORT-MERGE-RELEASE
- EC-SORT-MERGE-RETURN
- EC-SORT-MERGE-SEQUENCE
- EC-STORAGE
  - EC-STORAGE-IMP
  - EC-STORAGE-NOT-ALLOC
  - EC-STORAGE-NOT-AVAIL
- EC-USER
- EC-VALIDATE
  - EC-VALIDATE-CONTENT
  - EC-VALIDATE-FORMAT
  - EC-VALIDATE-IMP
  - EC-VALIDATE-RELATION
  - EC-VALIDATE-VARYING
- EC-XML
  - EC-XML-CODESET
  - EC-XML-CODESET-CONVERSION
  - EC-XML-COUNT
  - EC-XML-DOCUMENT-TYPE
  - EC-XML-IMPLICIT-CLOSE
  - EC-XML-INVALID
  - EC-XML-NAMESPACE
  - EC-XML-STACKED-OPEN
  - EC-XML-RANGE

## 8.2 Procedure division header

```

PROCEDURE DIVISION [mnemonic-name-1] [using-chaining-clause]
  [RETURNING {identifier-1} ]
  [declaratives]
  [section-name-2 SECTION.
  paragraph-name-2.
  imperative-statement-1 . ] ...

```

where *using-chaining-clause* is

```

{ USING
  CHAINING }

{ BY { REFERENCE
      VALUE }
  [ [UNSIGNED] SIZE IS { AUTO
                        integer-1 } ]
  [SIZE IS DEFAULT] [OPTIONAL] identifier-2 } ...

```

where *declaratives* is

```

DECLARATIVES.
  [section-name-1 SECTION. use-statement [paragraph-name-2.
  imperative-statement-2 . ] ... ] ...
END DECLARATIVES.

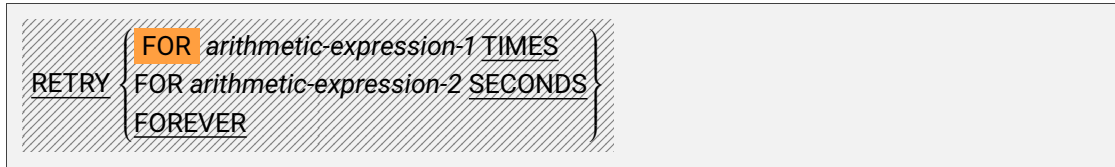
```

### Syntax rules

### General rules

## 8.3 Common phrases

### 8.3.1 RETRY phrase



**Syntax rules**

**General rules**

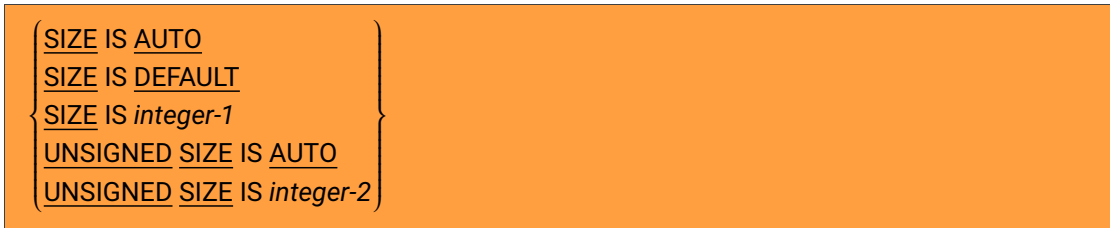
### 8.3.2 **ROUNDED** phrase

|                |                |  |
|----------------|----------------|--|
| <u>ROUNDED</u> | <u>MODE IS</u> | {<br><u>AWAY-FROM-ZERO</u><br><u>NEAREST-AWAY-FROM-ZERO</u><br><u>NEAREST-EVEN</u><br><u>NEAREST-TOWARD-ZERO</u><br><u>PROHIBITED</u><br><u>TOWARD-GREATER</u><br><u>TOWARD-LESSER</u><br><u>TRUNCATION</u><br>} |
|----------------|----------------|--|

**Syntax rules**

**General rules**

### 8.3.3 SIZE phrase



{  
SIZE IS AUTO  
SIZE IS DEFAULT  
SIZE IS *integer-1*  
UNSIGNED SIZE IS AUTO  
UNSIGNED SIZE IS *integer-2*  
}

**Syntax rules**

**General rules**

## 8.4 ACCEPT statement

The ACCEPT statement transfers data provided by the user or the operating system to the specified data item.

### Format 1 (device)

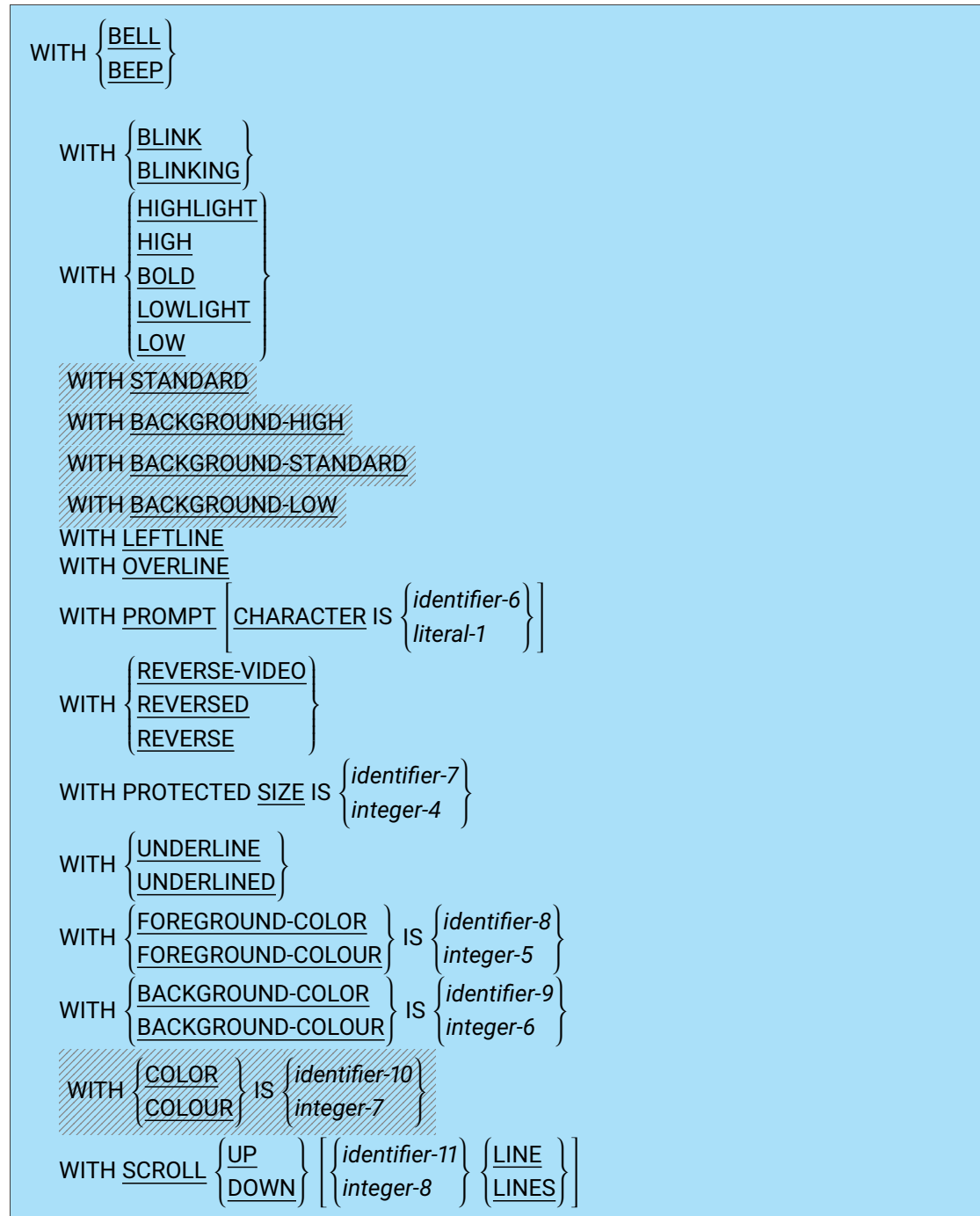
```
ACCEPT { identifier-1 } [ OMITTED ] [ FROM mnemonic-name-1 ] [ END-ACCEPT ]
```

### Format 2 (screen)

```
ACCEPT { identifier-2 }
      { OMITTED }
      {
        {
          { AT LINE NUMBER { identifier-3 } }
          { integer-1 }
          {
            { AT { COLUMN } }
            { COL }
            { POSITION }
            { NUMBER { identifier-4 } }
            { integer-2 }
          }
        }
        { AT { identifier-5 } }
        { integer-3 }
        { FROM CRT }
        { MODE IS BLOCK }
        { appearance-attribute-clauses }
        { accept-attribute-clauses }
      }
```

where *appearance-attribute-clauses* is





where *accept-attribute-clauses* is

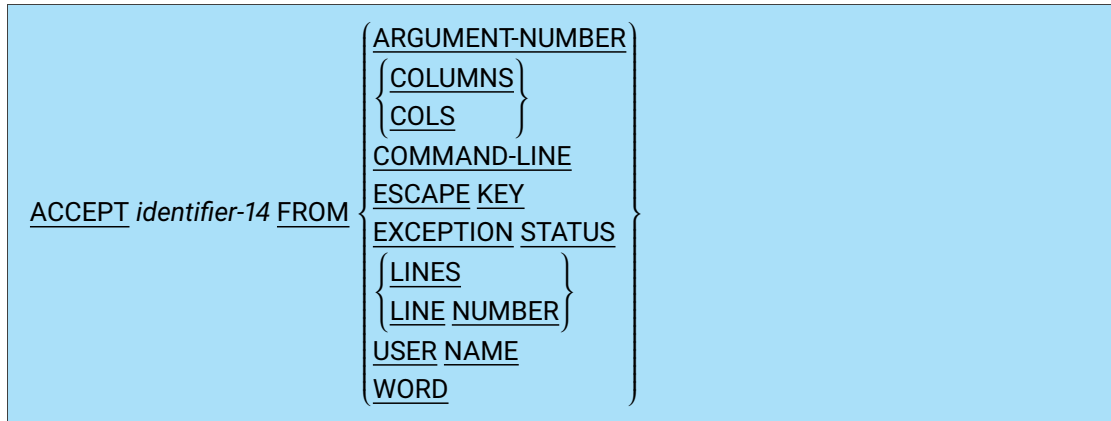
WITH { AUTO }  
       { TAB }  
  
 WITH { CONVERSION }  
       { CONVERT }  
 WITH { FULL }  
       { LENGTH-CHECK }  
 WITH { LOWER }  
       { UPPER }  
 WITH { NO-ECHO }  
       { NO ECHO }  
       { OFF }  
 WITH { REQUIRED }  
       { EMPTY-CHECK }  
 WITH SECURE  
 WITH [ NO ] { DEFAULT }  
               { UPDATE }  
 { WITH { TIMEOUT } AFTER } { *identifier-12* }  
   { TIME-OUT } } { *integer-9* }  
 { BEFORE TIME }

**Format 3 (temporal)**

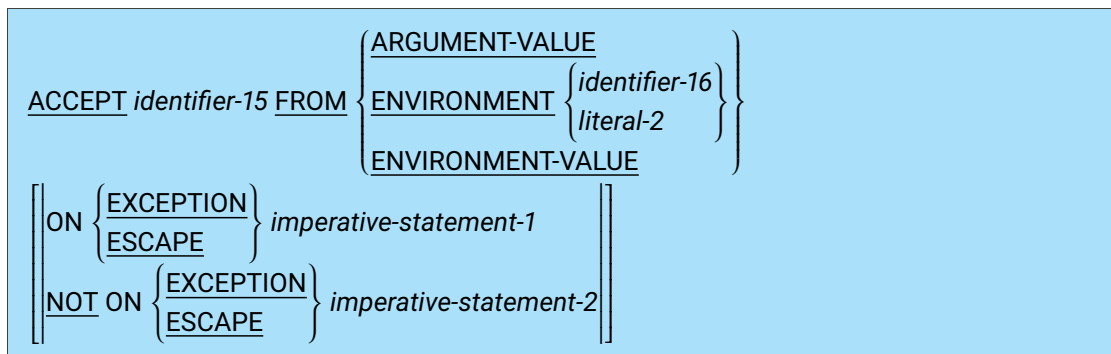
ACCEPT *identifier-13* FROM { DATE [ YYYYMMDD ] }  
                                   { DAY [ YYYYDDD ] }  
                                   { DAY-OF-WEEK }  
                                   { TIME }

**Format 4 (environment)**

## 8 Procedure division



### Format 5 (environment-exception)

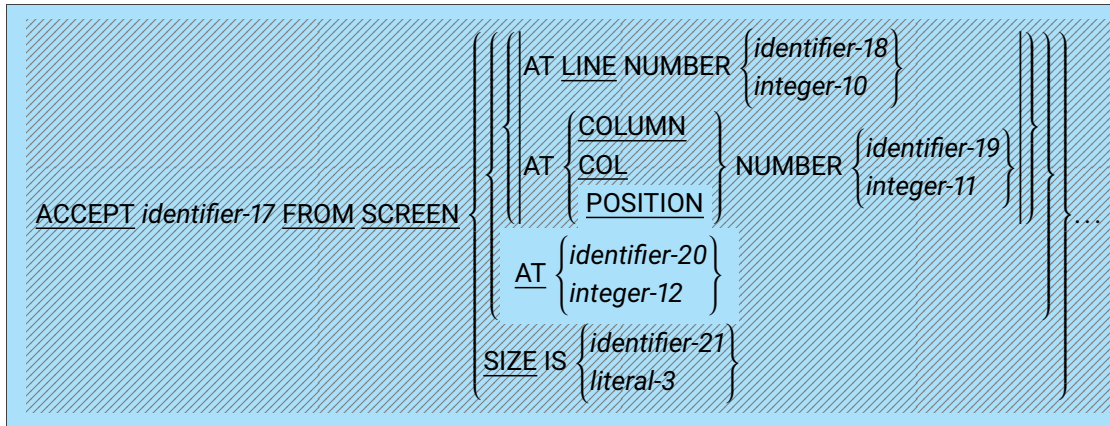


### Format 6 (message)

ACCEPT cd-name-1 MESSAGE COUNT

### Format 7 (from screen)

## 8 Procedure division



**Syntax rules**

**General rules**

## 8.5 ADD statement

The ADD statement adds two or more numbers and stores the result.

### Format 1 (simple)

```

ADD { identifier-1
      literal-1 } ... TO { identifier-2 } ...

  [ ON SIZE ERROR imperative-statement-1
    NOT ON SIZE ERROR imperative-statement-2 ]

  [ END-ADD ]

```

### Format 2 (giving)

```

ADD { identifier-3
      literal-2 } ... [ TO [ identifier-4 ] ... ]

  GIVING { identifier-5 [ rounded-phrase ] } ...

  [ ON SIZE ERROR imperative-statement-3
    NOT ON SIZE ERROR imperative-statement-4 ]

  [ END-ADD ]

```

### Format 3 (corresponding)

## 8 Procedure division

```
ADD {CORRESPONDING  
CORR} identifier-6 TO identifier-7 [rounded-phrase]  
  
[[ON SIZE ERROR imperative-statement-5  
NOT ON SIZE ERROR imperative-statement-6]]  
  
[END-ADD]
```

### Format 4 (table)

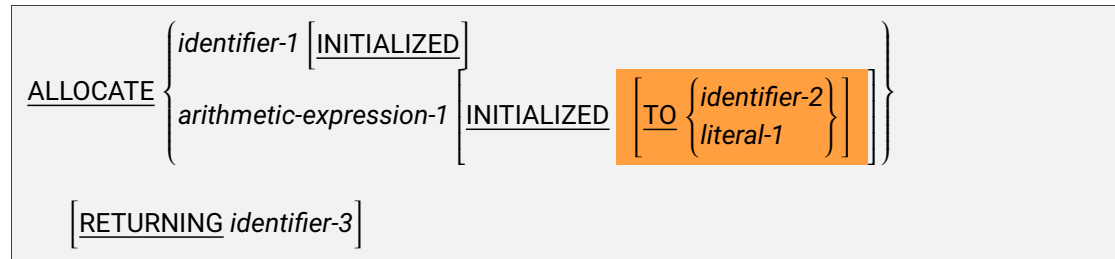
```
ADD TABLE identifier-8 TO identifier-9 [rounded-phrase]  
  
[FROM INDEX integer-1 TO integer-2]  
  
[DESTINATION INDEX integer-3]  
  
[[ON SIZE ERROR imperative-statement-7  
NOT ON SIZE ERROR imperative-statement-8]]  
  
[END-ADD]
```

### Syntax rules

### General rules

## 8.6 ALLOCATE statement

The ALLOCATE statement requests memory from the operating system for a BASED data item or to be referenced by a data-pointer.



**Syntax rules**

**General rules**

## 8.7 ALTER statement

The ALTER statement changes the target of a GO TO statement. Its use is strongly discouraged and commonly proscribed.

```
ALTER {procedure-name-1 TO PROCEED TO procedure-name-2} ...
```

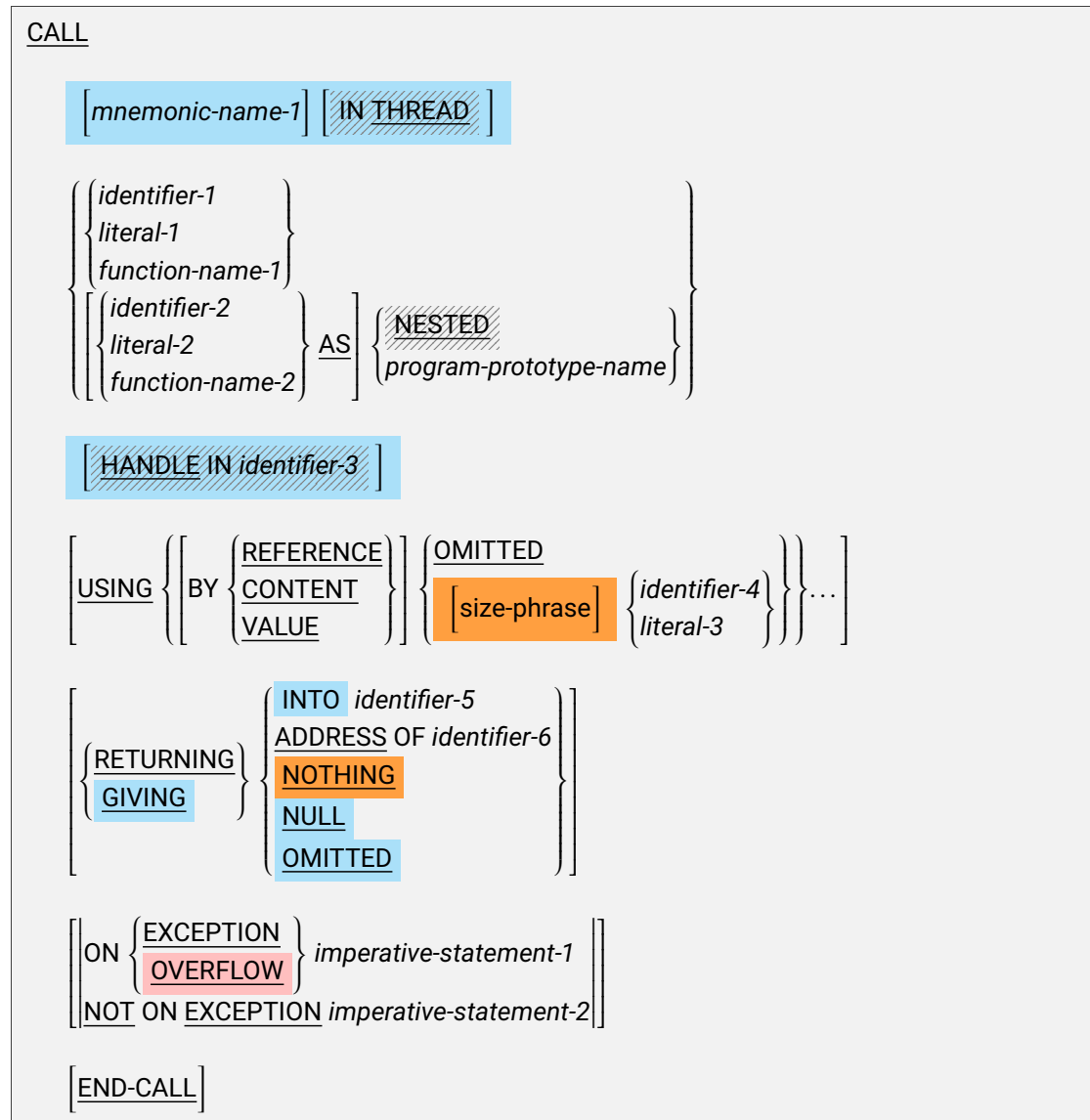
**Syntax rules**

**General rules**



## 8.8 CALL statement

The CALL statement transfers execution to another program, optionally with arguments and storing a return value.



**Syntax rules**

**General rules**

## 8.9 CANCEL statement

The CANCEL statement unloads a program from the operating system memory. This has the effect of freeing all the program's working-storage items and closing all files the program left open.

$$\underline{\text{CANCEL}} \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \end{array} \right\} \dots$$

### Syntax rules

### General rules

## 8.10 CLOSE statement

The CLOSE statement prevents the program from accessing or modifying an open file. It first processes all pending writes for the file and releases all locks still held in the file.

### Format 1 (file)

$$\text{CLOSE } \left\{ \begin{array}{l} \text{file-name-1} \left[ \begin{array}{l} \left[ \begin{array}{l} \text{REEL} \\ \text{UNIT} \end{array} \right] \left[ \text{FOR REMOVAL} \right] \\ \text{WITH NO REWIND} \\ \text{WITH LOCK} \end{array} \right] \end{array} \right\} \dots$$

### Format 2 (window)

$$\text{CLOSE WINDOW identifier-1 [WITH NO DISPLAY]}$$

### Syntax rules

### General rules

## 8.11 COMMIT statement

The COMMIT statement forces all pending file writes to be processed.

COMMIT

**Syntax rules**

**General rules**

## 8.12 COMPUTE statement

The COMPUTE statement evaluates an arithmetic expression and stores the result.

$$\underline{\text{COMPUTE}} \left\{ \text{identifier-1} \left[ \text{rounded-phrase} \right] \right\} \dots \left\{ \begin{array}{l} = \\ \underline{\text{EQUAL}} \\ \underline{\text{EQUALS}} \end{array} \right\} \text{arithmetic-expression-1}$$

$$\left[ \left[ \underline{\text{ON SIZE ERROR}} \text{imperative-statement-1} \right] \right. \\ \left. \left[ \underline{\text{NOT ON SIZE ERROR}} \text{imperative-statement-2} \right] \right]$$

$$\left[ \underline{\text{END-COMPUTE}} \right]$$

**Syntax rules**

**General rules**

### 8.13 CONTINUE statement

The CONTINUE statement has no effect on program execution.

```
CONTINUE
```

**Syntax rules**

**General rules**

## 8.14 DELETE statement

The DELETE statement removes a record from a file or removes an entire file.

### Format 1 (record)

```
DELETE file-name-1 RECORD
```

```
[retry-phrase]
```

```
[ [INVALID KEY imperative-statement-1  
  [NOT INVALID KEY imperative-statement-2 ] ] ]
```

```
[END-DELETE]
```

### Format 2 (file)

```
DELETE FILE {file-name-2} ... [END-DELETE]
```

### Syntax rules

### General rules

## 8.15 DESTROY statement

DESTROY { ALL CONTROLS }  
          { identifier-1 ... }

**Syntax rules**

**General rules**



## 8.16 DISABLE statement

The DISABLE statement prevents the program from modifying or accessing an enabled communication descriptor.

```

DISABLE INPUT TERMINAL
        OUTPUT
        I-O TERMINAL
        TERMINAL
        cd-name-1 [ WITH KEY { identifier-1
                          literal-1 } ]

```

**Syntax rules**

**General rules**

## 8.17 DISPLAY statement

The DISPLAY statement displays data to a user or sends data to the operating system.

### Format 1 (device)

```

DISPLAY { identifier-1 } ... [ [ UPON mnemonic-name-1 ] ]
      { literal-1 }      [ WITH NO ADVANCING ] ]

[ [ ON EXCEPTION imperative-statement-1 ] ]
[ [ NOT ON EXCEPTION imperative-statement-2 ] ]

[ END-DISPLAY ]

```

### Format 2 (environment)

```

DISPLAY { identifier-2 } UPON { ARGUMENT-NUMBER }
      { literal-2 }          { COMMAND-LINE }
                                { ENVIRONMENT-NAME }
                                { ENVIRONMENT-VALUE }

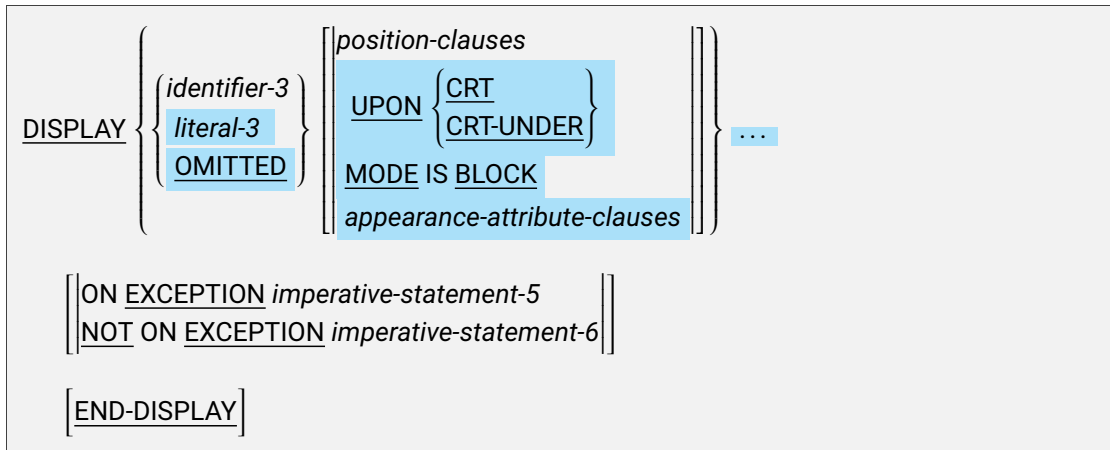
[ [ ON EXCEPTION imperative-statement-3 ] ]
[ [ NOT ON EXCEPTION imperative-statement-4 ] ]

[ END-DISPLAY ]

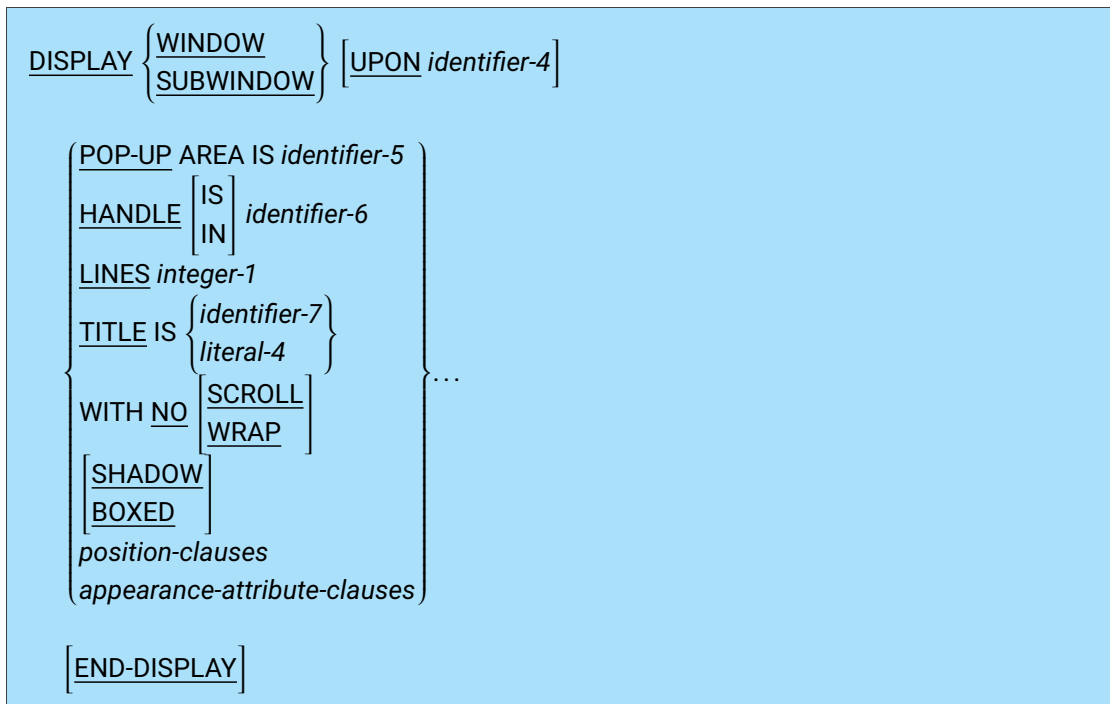
```

### Format 3 (screen)

## 8 Procedure division



### Format 4 (ordinary window)



### Format 5 (floating window)

```

DISPLAY FLOATING [GRAPHICAL] WINDOW [UPON identifier-8]

(POP-UP AREA IS identifier-9)
HANDLE [IS] identifier-10
        [IN]
LINES integer-2
TITLE IS {identifier-11}
         {literal-5}
WITH NO [SCROLL]
        [WRAP]
[SHADOW]
[BOXED]
position-clauses
appearance-attribute-clauses)

[END-DISPLAY]
    
```

**Format 6 (special window)**

```

DISPLAY {INITIAL
        STANDARD
        INDEPENDENT} [GRAPHICAL] WINDOW [UPON identifier-12]

(POP-UP AREA IS identifier-13)
HANDLE [IS] identifier-14
        [IN]
LINES integer-3
TITLE IS {identifier-15}
         {literal-6}
WITH NO [SCROLL]
        [WRAP]
[SHADOW]
[BOXED]
position-clauses
appearance-attribute-clauses)

[END-DISPLAY]
    
```

**Format 7 (message box)**

```

DISPLAY MESSAGE BOX { identifier-16 } ...
                       { literal-7 }

[ TITLE [ IS ] { identifier-17 } ]
[ = { literal-8 } ]
[ TYPE [ IS ] { identifier-18 } ]
[ = { literal-9 } ]
[ ICON [ IS ] { identifier-19 } ]
[ = { literal-10 } ] ...
[ DEFAULT [ IS ] { identifier-20 } ]
[ = { literal-11 } ]
[ { RETURNING } { identifier-21 } ]
[ { GIVING } { literal-12 } ]

[ END-DISPLAY ]
    
```

where *position-clauses* is

```

( ( ( LINE NUMBER { identifier-22 }
      { literal-13 }
      ( AT { COLUMN }
        { COL } NUMBER { identifier-23 }
        { POSITION } { literal-14 } ) ) )
  ( AT { identifier-24 }
    { literal-15 } ) )
    
```

where *appearance-attribute-clauses* is

|      |                            |                          |                                    |                      |
|------|----------------------------|--------------------------|------------------------------------|----------------------|
| WITH | {                          | <u>BELL</u>              | }                                  |                      |
|      |                            | <u>BEEP</u>              | }                                  |                      |
| WITH | <u>BLANK</u>               | {                        | <u>LINE</u>                        | }                    |
|      |                            |                          | <u>SCREEN</u>                      | }                    |
| WITH | {                          | <u>BLINK</u>             | }                                  |                      |
|      |                            | <u>BLINKING</u>          | }                                  |                      |
| WITH | {                          | <u>CONVERSION</u>        | }                                  |                      |
|      |                            | <u>CONVERT</u>           | }                                  |                      |
| WITH | <u>ERASE</u>               | {                        | <u>EOL</u>                         | }                    |
|      |                            |                          | <u>EOS</u>                         | }                    |
|      |                            |                          | [ <u>TO</u> <u>END</u> <u>OF</u> ] | {                    |
|      |                            |                          | <u>LINE</u>                        | }                    |
|      |                            |                          | <u>SCREEN</u>                      | }                    |
| WITH | {                          | <u>HIGHLIGHT</u>         | }                                  |                      |
|      |                            | <u>HIGH</u>              | }                                  |                      |
|      |                            | <u>BOLD</u>              | }                                  |                      |
|      |                            | <u>LOWLIGHT</u>          | }                                  |                      |
|      |                            | <u>LOW</u>               | }                                  |                      |
| WITH | <u>STANDARD</u>            |                          |                                    |                      |
| WITH | <u>BACKGROUND-HIGH</u>     |                          |                                    |                      |
| WITH | <u>BACKGROUND-STANDARD</u> |                          |                                    |                      |
| WITH | <u>BACKGROUND-LOW</u>      |                          |                                    |                      |
| WITH | <u>OVERLINE</u>            |                          |                                    |                      |
| WITH | {                          | <u>REVERSE-VIDEO</u>     | }                                  |                      |
|      |                            | <u>REVERSED</u>          | }                                  |                      |
|      |                            | <u>REVERSE</u>           | }                                  |                      |
| WITH | <u>SIZE</u> IS             | {                        | <i>identifier-25</i>               | }                    |
|      |                            |                          | <i>literal-16</i>                  | }                    |
| WITH | {                          | <u>UNDERLINE</u>         | }                                  |                      |
|      |                            | <u>UNDERLINED</u>        | }                                  |                      |
| WITH | {                          | <u>FOREGROUND-COLOR</u>  | IS                                 | {                    |
|      |                            | <u>FOREGROUND-COLOUR</u> |                                    | <i>identifier-26</i> |
|      |                            |                          |                                    | <i>integer-4</i>     |
| WITH | {                          | <u>BACKGROUND-COLOR</u>  | IS                                 | {                    |
|      |                            | <u>BACKGROUND-COLOUR</u> |                                    | <i>identifier-27</i> |
|      |                            |                          |                                    | <i>integer-5</i>     |
| WITH | {                          | <u>COLOR</u>             | IS                                 | {                    |
|      |                            | <u>COLOUR</u>            |                                    | <i>identifier-28</i> |
|      |                            |                          |                                    | <i>integer-6</i>     |
| WITH | <u>SCROLL</u>              | {                        | <u>UP</u>                          | }                    |
|      |                            |                          | <u>DOWN</u>                        | }                    |
|      |                            |                          | [                                  | {                    |
|      |                            |                          | <i>identifier-29</i>               | }                    |
|      |                            |                          | <i>integer-7</i>                   | }                    |
|      |                            |                          | [                                  | {                    |
|      |                            |                          | <u>LINE</u>                        | }                    |
|      |                            |                          | <u>LINES</u>                       | }                    |
|      |                            |                          | ]                                  | ]                    |

**Syntax rules**

**General rules**

## 8.18 DIVIDE statement

The DIVIDE statement divides one or more numbers by another and stores the results.

### Format 1 (into)

$$\underline{\text{DIVIDE}} \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \end{array} \right\} \underline{\text{INTO}} \left\{ \begin{array}{l} \text{identifier-2} \\ \text{literal-2} \end{array} \right\} [\text{rounded-phrase}] \dots$$

$$\left[ \begin{array}{l} \text{ON SIZE ERROR imperative-statement-1} \\ \text{NOT ON SIZE ERROR imperative-statement-2} \end{array} \right]$$

$$[\underline{\text{END-DIVIDE}}]$$

### Format 2 (giving)

$$\underline{\text{DIVIDE}} \left\{ \begin{array}{l} \text{identifier-3} \\ \text{literal-3} \end{array} \right\} \left\{ \begin{array}{l} \underline{\text{BY}} \\ \underline{\text{INTO}} \end{array} \right\} \left\{ \begin{array}{l} \text{identifier-4} \\ \text{literal-4} \end{array} \right\}$$

$$\underline{\text{GIVING}} \left\{ \left\{ \begin{array}{l} \text{identifier-5} \\ \text{literal-5} \end{array} \right\} [\text{rounded-phrase}] \right\} \dots$$

$$\left[ \underline{\text{REMAINDER}} \left\{ \begin{array}{l} \text{identifier-6} \\ \text{literal-6} \end{array} \right\} \right]$$

$$\left[ \begin{array}{l} \text{ON SIZE ERROR imperative-statement-3} \\ \text{NOT ON SIZE ERROR imperative-statement-4} \end{array} \right]$$

$$[\underline{\text{END-DIVIDE}}]$$

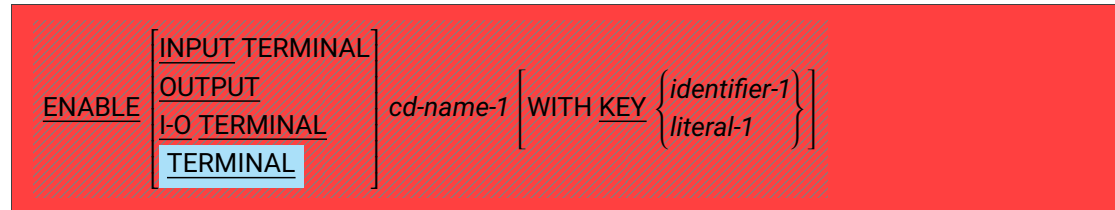
### Syntax rules

### General rules



## 8.19 ENABLE statement

The ENABLE statement allows the program to access and modify a communication descriptor.



**Syntax rules**

**General rules**

## 8.20 ENTRY statement

The ENTRY statement indicates an alternative point of entry into the program.

```

ENTRY [mnemonic-name-1] literal-1
[ USING { BY { REFERENCE } { OMITTED } }
  { CONTENT }
  { VALUE } { [size-phrase] { identifier-1 } } ... ] ] ]

```

**Syntax rules**

**General rules**

## 8.21 EVALUATE statement

The EVALUATE statement evaluates one or more conditions and execute the statements corresponding to the first true condition.

```

EVALUATE { expression-1
           { TRUE
             { FALSE
           }
         }
         [ ALSO { expression-2
                   { TRUE
                     { FALSE
                   }
                 }
         ] ...

         { WHEN selection-object [ ALSO selection-object ] ... imperative-statement-1 } ...

         [ WHEN OTHER imperative-statement-2 ]

         [ END-EVALUATE ]

```

where *selection-object* is

```

{ partial-expression-1 [ { THROUGH
                           { THRU
                         }
                         expression-3
                       ]
  { ANY
    { TRUE
      { FALSE
    }
  }
}

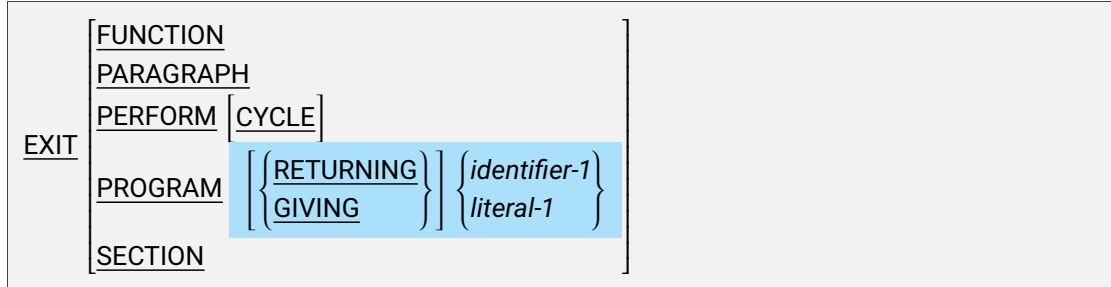
```

### Syntax rules

### General rules

## 8.22 EXIT statement

The EXIT statement indicates the end of a path of execution.



**Syntax rules**

**General rules**

## 8.23 FREE statement

The FREE statement returns memory to the operating system.

```
FREE {identifier-1} ...
```

**Syntax rules**

**General rules**

## 8.24 GENERATE statement

The GENERATE statement a specified report entry.

```
GENERATE report-name-1
```

**Syntax rules**

**General rules**

## 8.25 GO TO statement

The GO TO statement transfer execution to another part of the program.

```
GO TO {procedure-name-1} ... [DEPENDING ON identifier-1]
```

**Syntax rules**

**General rules**

## 8.26 GOBACK statement

The GOBACK statement terminates execution in the program, returning control to the calling program or, if no such program exists, to the operating system.

|  |
|--|
| $\text{GOBACK} \left[ \left\{ \begin{array}{l} \text{RETURNING} \\ \text{GIVING} \end{array} \right\} \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \end{array} \right\} \right]$ |
|--|

**Syntax rules**

**General rules**



## 8.27 IF statement

The IF statement evaluates a condition and executes statements depending on whether the condition was true or false.

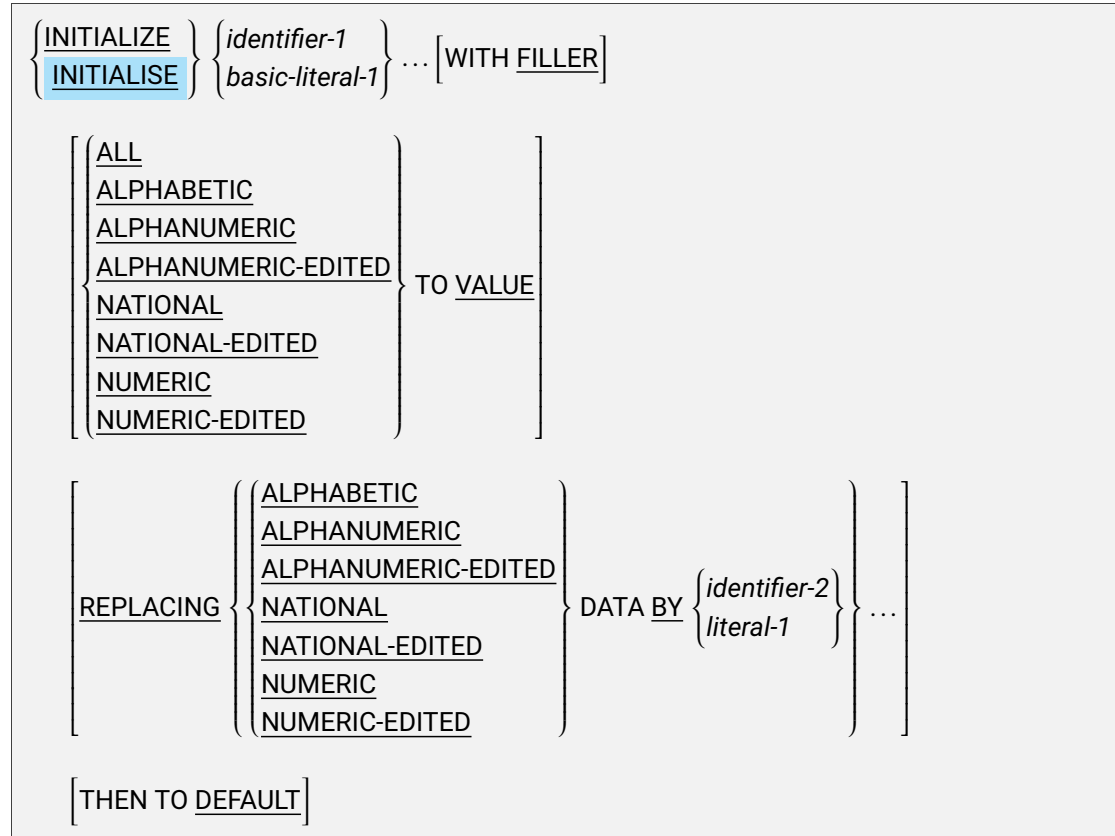
```
IF condition THEN { imperative-statement-1 }  
                   { ELSE imperative-statement-2 } ...  
  
[ END-IF ]
```

**Syntax rules**

**General rules**

## 8.28 INITIALIZE statement

The INITIALIZE statement sets data items to their default values.



**Syntax rules**

**General rules**

## 8.29 INITIATE statement

The INITIATE statement allows the program to begin generating the specified report.

```
INITIATE {report-name-1} ...
```

**Syntax rules**

**General rules**

### 8.30 INSPECT statement

The INSPECT statement counts the number of occurrences of a character string, replaces occurrences or both.

$$\text{INSPECT} \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \\ \text{function-name-1} \end{array} \right\} \left\{ \begin{array}{l} \text{tallying-phrase} [\text{replacing-phrase}] \\ \text{replacing-phrase} \\ \text{converting-phrase} \end{array} \right\}$$

where *tallying-phrase* is

$$\text{TALLYING} \left\{ \left\{ \begin{array}{l} \text{identifier-2} \\ \text{literal-2} \end{array} \right\} \text{FOR} \left\{ \begin{array}{l} \text{CHARACTERS} \\ \text{ALL} \\ \text{LEADING} \\ \text{TRAILING} \end{array} \right\} \left\{ \begin{array}{l} \text{identifier-3} \\ \text{literal-3} \end{array} \right\} \right\} \dots [\text{before-after-phrase}] \dots$$

where *replacing-phrase* is

$$\text{REPLACING} \left\{ \left\{ \begin{array}{l} \text{CHARACTERS} \\ \text{ALL} \\ \text{LEADING} \\ \text{FIRST} \\ \text{TRAILING} \end{array} \right\} \left\{ \begin{array}{l} \text{identifier-4} \\ \text{literal-4} \end{array} \right\} \text{BY} \left\{ \begin{array}{l} \text{identifier-5} \\ \text{literal-5} \end{array} \right\} [\text{before-after-phrase}] \dots \right\}$$

where *converting-phrase* is

$$\text{CONVERTING} \left\{ \begin{array}{l} \text{identifier-6} \\ \text{literal-6} \end{array} \right\} \text{TO} \left\{ \begin{array}{l} \text{identifier-7} \\ \text{literal-7} \end{array} \right\} [\text{before-after-phrase}]$$

where *before-after-phrase* is

$$\left[ \left[ \text{BEFORE INITIAL} \left\{ \begin{array}{l} \text{identifier-8} \\ \text{literal-8} \end{array} \right\} \right] \left[ \text{AFTER INITIAL} \left\{ \begin{array}{l} \text{identifier-9} \\ \text{literal-9} \end{array} \right\} \right] \right]$$

#### Syntax rules

#### General rules

### 8.31 MERGE statement

The MERGE statements reads multiple files with the same record description, combines their records and sorts them.

```

MERGE identifier-1 [ ON { ASCENDING } KEY [ identifier-2 ] ... ] ...
    [ WITH DUPLICATES [ IN ORDER ] ]
    [ COLLATING SEQUENCE IS identifier-3 ]
    [ USING { file-name-1 } ... ]
    [ GIVING { file-name-2 } ...
      [ OUTPUT PROCEDURE IS procedure-name-1 [ { THROUGH } procedure-name-2 ] ] ]

```

**Syntax rules**

**General rules**

### 8.32 MOVE statement

The MOVE statement sets the value of one or more data items.

|  |
|--|
| $\text{MOVE} \left[ \begin{array}{l} \text{CORRESPONDING} \\ \text{CORR} \end{array} \right] \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \end{array} \right\} \text{TO} \left\{ \text{identifier-2} \right\} \dots$ |
|--|

**Syntax rules**

**General rules**

### 8.33 MULTIPLY statement

The MULTIPLY statement multiplies multiple numbers and stores the result.

#### Format 1 (simple)

```

MULTIPLY { identifier-1 } BY { { identifier-2 } [ rounded-phrase ] } ...
        { literal-1 }      { literal-2 }
    [ ON SIZE ERROR imperative-statement-1 ]
    [ NOT ON SIZE ERROR imperative-statement-2 ]
    [ END-MULTIPLY ]
  
```

#### Format 2 (giving)

```

MULTIPLY { identifier-3 } BY { identifier-4 }
        { literal-3 }      { literal-4 }
    GIVING { { identifier-5 } [ rounded-phrase ] } ...
          { literal-5 }
    [ ON SIZE ERROR imperative-statement-3 ]
    [ NOT ON SIZE ERROR imperative-statement-4 ]
    [ END-MULTIPLY ]
  
```

#### Syntax rules

#### General rules

### 8.34 NEXT SENTENCE statement

The NEXT SENTENCE statement transfers execution to the first statement following the current sentence.

NEXT SENTENCE

**Syntax rules**

**General rules**



### 8.35 OPEN statement

The OPEN statement allows the program to access or modify specified files.

$$\text{OPEN} \left\{ \begin{array}{l} \text{INPUT} \\ \text{OUTPUT} \\ \text{I-O} \\ \text{EXTEND} \end{array} \right\} [\textit{sharing-mode}] [\textit{retry-phrase}] \{ \textit{file-name-1} \} \dots \left[ \begin{array}{l} \text{WITH NO REWIND} \\ \text{WITH LOCK} \\ \text{REVERSED} \end{array} \right] \dots$$

where *sharing-mode* is

$$\text{SHARING WITH} \left\{ \begin{array}{l} \text{ALL OTHER} \\ \text{NO OTHER} \\ \text{READ ONLY} \end{array} \right\}$$

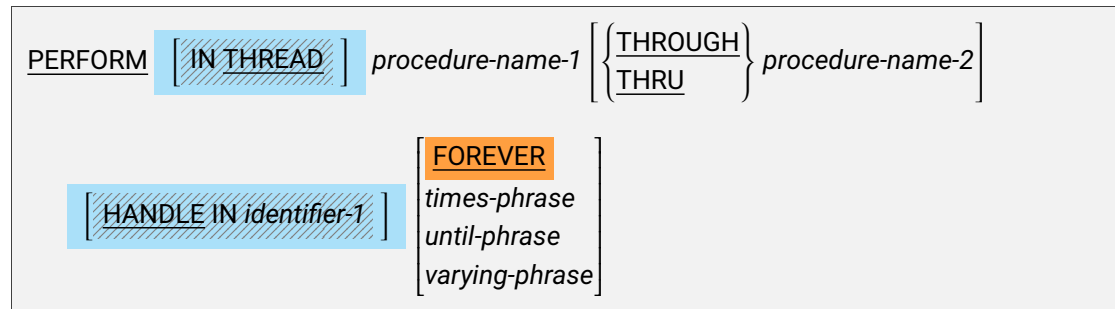
**Syntax rules**

**General rules**

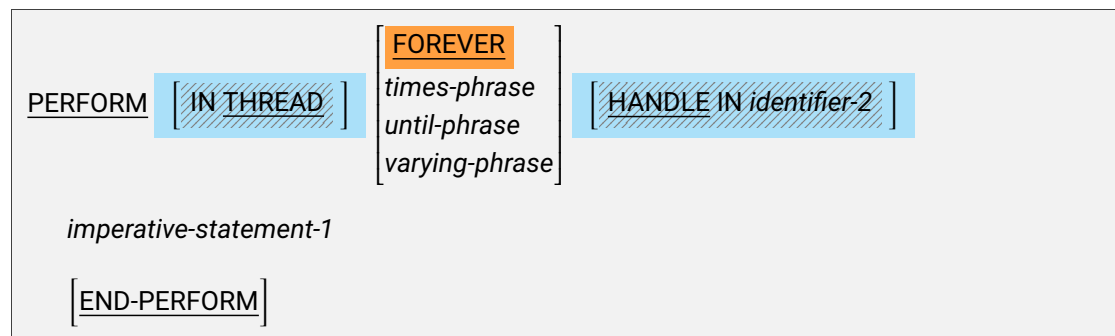
### 8.36 PERFORM statement

The PERFORM statement executes the specified procedures or statements one or more times.

#### Format 1 (procedure)



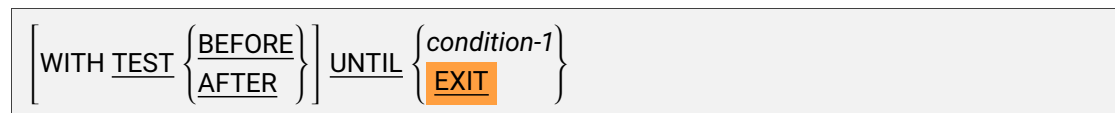
#### Format 2 (inline)



where *times-phrase* is



where *until-phrase* is



## 8 Procedure division

and where *varying-phrase* is

$$\left[ \text{WITH } \underline{\text{TEST}} \left\{ \begin{array}{l} \underline{\text{BEFORE}} \\ \underline{\text{AFTER}} \end{array} \right\} \right]$$
$$\underline{\text{VARYING}} \text{ identifier-4 } \underline{\text{FROM}} \left\{ \begin{array}{l} \text{identifier-5} \\ \text{literal-2} \end{array} \right\} \underline{\text{BY}} \left\{ \begin{array}{l} \text{identifier-6} \\ \text{literal-3} \end{array} \right\} \underline{\text{UNTIL}} \text{ condition-2}$$
$$\left[ \underline{\text{AFTER}} \text{ identifier-7 } \underline{\text{FROM}} \left\{ \begin{array}{l} \text{identifier-8} \\ \text{literal-4} \end{array} \right\} \underline{\text{BY}} \left\{ \begin{array}{l} \text{identifier-9} \\ \text{literal-5} \end{array} \right\} \underline{\text{UNTIL}} \text{ condition-3} \right] \dots$$

**Syntax rules**

**General rules**

## 8.37 PURGE statement

The PURGE statement

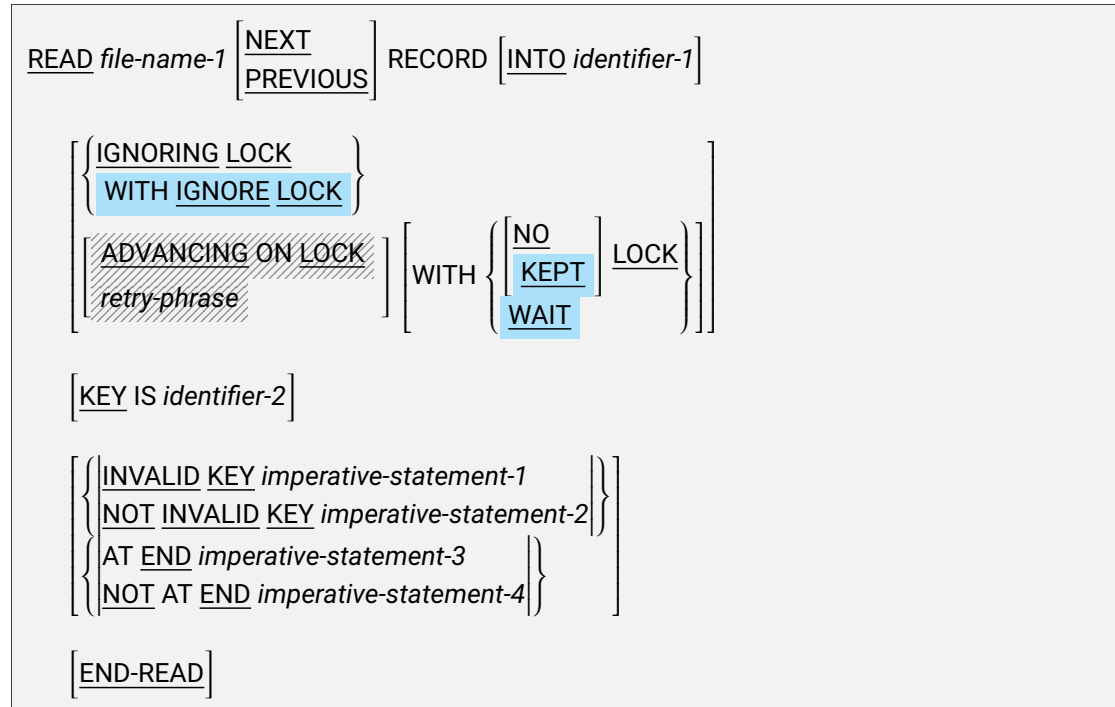
```
PURGE cd-name-1
```

**Syntax rules**

**General rules**

### 8.38 READ statement

The READ statement transfer data from a file to the file's record or to a data item.



**Syntax rules**

**General rules**

### 8.39 READY statement

The READY TRACE statement causes the name of procedures reached by execution to be displayed.

READY TRACE

**Syntax rules**

**General rules**

## 8.40 RECEIVE statement

The RECEIVE statement transfers data from a communication descriptor to a data item.

```
RECEIVE cd-name-1 { MESSAGE  
                   SEGMENT } INTO identifier-1
```

```
[ WITH DATA imperative-statement-1 ]  
[ NO DATA imperative-statement-2 ]
```

```
[ END-RECEIVE ]
```

**Syntax rules**

**General rules**

## 8.41 RELEASE statement

The RELEASE statement provides a record for sorting.

|   |
|---|
| $\underline{\text{RELEASE}} \text{ identifier-1 } \left[ \underline{\text{FROM}} \left\{ \begin{array}{l} \text{identifier-2} \\ \text{literal-1} \\ \text{function-call-1} \end{array} \right\} \right]$ |
|---|

**Syntax rules**

**General rules**



## 8.42 RESET statement

The RESET TRACE stops the names of procedures reached by execution being displayed.

```
RESET TRACE
```

**Syntax rules**

**General rules**

### 8.43 RETURN statement

The RETURN statement retrieves records from the sorting process in order.

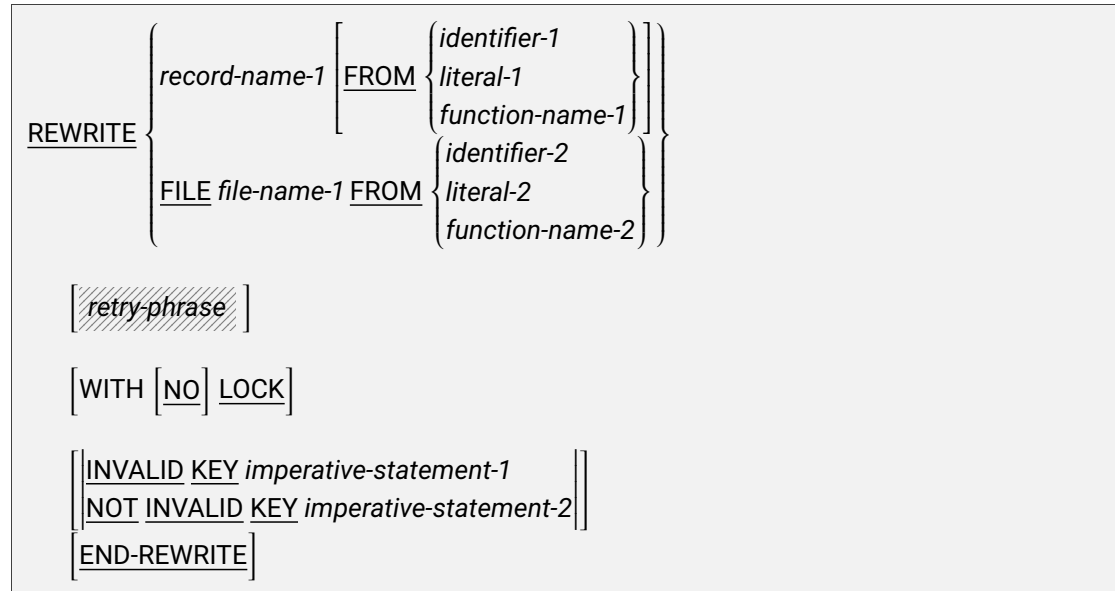
```
RETURN file-name-1 RECORD [INTO identifier-1]  
  
AT END imperative-statement-1  
  
[NOT AT END imperative-statement-2]  
  
[END-RETURN]
```

#### Syntax rules

#### General rules

## 8.44 REWRITE statement

The REWRITE statement replaces an existing record in the file with one provided by the program.



**Syntax rules**

**General rules**

## 8.45 ROLLBACK statement

The ROLLBACK statement deletes any pending file writes.

ROLLBACK

**Syntax rules**

**General rules**

## 8.46 SEARCH statement

The SEARCH statement iterates through a table to find a record satisfying a condition.

### Format 1 (simple)

```
SEARCH identifier-1 [VARYING identifier-2]  
  
    [AT END imperative-statement-1]  
  
    {WHEN condition-1 imperative-statement-2} ...  
  
    [END-SEARCH]
```

### Format 2 (all)

```
SEARCH ALL identifier-3  
  
    [AT END imperative-statement-3]  
  
    WHEN expression-1 imperative-statement-4  
  
    [END-SEARCH]
```

### Syntax rules

### General rules

## 8.47 SEND statement

The SEND statement provides data to a communication descriptor.

### Format 1 (from)

```
SEND cd-name-1 FROM identifier-1
```

### Format 2 (with indicator)

```
SEND cd-name-2 [FROM identifier-2] WITH { identifier-3  

ESI  

EMI  

EGI }
```

```
{ BEFORE  

AFTER } ADVANCING { { identifier-4 } { LINE  

literal-1 } { LINES } }  

mnemonic-name-1  

PAGE }
```

```
[REPLACING LINE]
```

### Syntax rules

### General rules

## 8.48 SET statement

The SET statement sets the value or properties of a data item.

### Format 1 (simple)

$$\underline{\text{SET}} \underline{\text{identifier-1}} \underline{\text{TO}} \left\{ \begin{array}{l} \underline{\text{identifier-2}} \\ \underline{\text{literal-1}} \\ \underline{\text{arithmetic-expression-1}} \end{array} \right\}$$

### Format 2 (entry)

$$\underline{\text{SET}} \underline{\text{identifier-3}} \underline{\text{TO}} \underline{\text{ENTRY}} \left\{ \begin{array}{l} \underline{\text{identifier-4}} \\ \underline{\text{literal-2}} \end{array} \right\}$$

### Format 3 (environment)

$$\underline{\text{SET}} \underline{\text{ENVIRONMENT}} \left\{ \begin{array}{l} \underline{\text{identifier-5}} \\ \underline{\text{literal-3}} \end{array} \right\} \underline{\text{TO}} \left\{ \begin{array}{l} \underline{\text{identifier-6}} \\ \underline{\text{literal-4}} \end{array} \right\}$$

### Format 4 (attribute)

$$\underline{\text{SET}} \underline{\text{identifier-7}} \underline{\text{ATTRIBUTE}} \left\{ \begin{array}{l} \left\{ \begin{array}{l} \underline{\text{BELL}} \\ \underline{\text{BEEP}} \end{array} \right\} \\ \underline{\text{BLINK}} \\ \underline{\text{HIGHLIGHT}} \\ \underline{\text{LOWLIGHT}} \\ \underline{\text{REVERSE-VIDEO}} \\ \underline{\text{UNDERLINE}} \\ \underline{\text{LEFTLINE}} \\ \underline{\text{OVERLINE}} \end{array} \right\} \left\{ \begin{array}{l} \underline{\text{ON}} \\ \underline{\text{OFF}} \end{array} \right\} \dots$$

**Format 5 (arithmetic)**

SET { *index-name-1* } ... { UP / DOWN } BY *arithmetic-expression-2*

**Format 6 (on/off)**

SET { { *mnemonic-name-1* } ... TO { ON / OFF } } ...

**Format 7 (true/false)**

SET { { *condition-name-1* } ... TO { TRUE / FALSE } } ...

**Format 8 (exception)**

SET LAST EXCEPTION TO OFF

**Format 9 (thread)**

SET THREAD { *identifier-8* } PRIORITY TO { { *identifier-9* } / *integer-1* }

**Syntax rules**

**General rules**



## 8.49 SORT statement

The SORT statement sorts the record of a file.

```

SORT identifier-1 [ ON { ASCENDING }
                   { DESCENDING } KEY [ identifier-2 ] ... ] ...

[ WITH DUPLICATES [ IN ORDER ] ]

[ COLLATING SEQUENCE IS identifier-3 ]

[ USING { file-name-1 } ...
  INPUT PROCEDURE IS procedure-name-1 { { THROUGH }
                                           { THRU } procedure-name-2 } ] ]

[ GIVING { file-name-2 } ...
  OUTPUT PROCEDURE IS procedure-name-3 { { THROUGH }
                                              { THRU } procedure-name-4 } ] ]

```

**Syntax rules**

**General rules**

## 8.50 START statement

The START statement changes the record currently being considered. It may also change the order in which records are accessed.

```

START file-name-1 [ FIRST
                    KEY IS relational-operator identifier-1
                    LAST ]
    [ WITH { SIZE
            LENGTH } arithmetic-expression-1 ]
    [ [ INVALID KEY imperative-statement-1
      [ NOT INVALID KEY imperative-statement-2 ] ] ]
    [ END-START ]

```

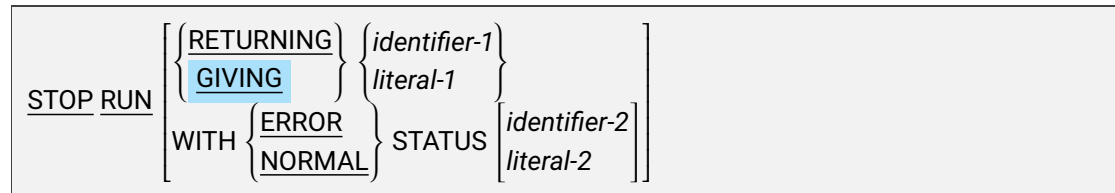
### Syntax rules

### General rules

## 8.51 STOP statement

The STOP statement terminates the run unit and returns control to the operating system.

### Format 1 (standard)



### Format 2 (literal)

STOP literal-3

### Format 3 (identifier)

STOP identifier-3

### Format 4 (ACUCOBOL)

STOP RUN { identifier-4 }  
                  { literal-4 }

### Format 5 (thread)

STOP THREAD { identifier-5 }

**Syntax rules**

**General rules**

## 8.52 STRING statement

The STRING statement appends multiples character strings and stores the result.

$$\text{STRING} \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \end{array} \right\} \left[ \text{DELIMITED BY} \left\{ \begin{array}{l} \text{SIZE} \\ \text{identifier-2} \\ \text{literal-2} \end{array} \right\} \right] \dots \text{INTO identifier-3}$$

[ WITH POINTER IS identifier-4 ]

[ [ ON OVERFLOW imperative-statement-1  
[ NOT ON OVERFLOW imperative-statement-2 ] ] ]

**Syntax rules**

**General rules**

### 8.53 SUBTRACT statement

The SUBTRACT statement subtracts one set of numbers from another set of numbers and stores the results.

#### Format 1 (simple)

```

SUBTRACT { identifier-1
          literal-1 } ... FROM { identifier-2
                                literal-2 } [ rounded-phrase ] ...

    [ ON SIZE ERROR imperative-statement-1
      NOT ON SIZE ERROR imperative-statement-2 ]

[ END-SUBTRACT ]

```

#### Format 2 (giving)

```

SUBTRACT { identifier-3
          literal-3 } ... FROM { identifier-4
                                literal-4 }

    GIVING { { identifier-5
              literal-5 } [ rounded-phrase ] } ...

    [ ON SIZE ERROR imperative-statement-3
      NOT ON SIZE ERROR imperative-statement-4 ]

[ END-SUBTRACT ]

```

#### Format 3 (corresponding)

## 8 Procedure division

```
SUBTRACT { CORR  
          CORRESPONDING } identifier-6 FROM identifier-7 [rounded-phrase]  
  
    | ON SIZE ERROR imperative-statement-5 |  
    | NOT ON SIZE ERROR imperative-statement-6 |  
  
    | END-SUBTRACT |
```

### Format 4 (table)

```
SUBTRACT TABLE identifier-8 TO identifier-9 [rounded-phrase]  
  
    | FROM INDEX integer-1 TO integer-2 |  
  
    | DESTINATION INDEX integer-3 |  
  
    | ON SIZE ERROR imperative-statement-7 |  
    | NOT ON SIZE ERROR imperative-statement-8 |  
  
    | END-SUBTRACT |
```

### Syntax rules

### General rules

## 8.54 SUPPRESS statement

The SUPPRESS statement suppresses the writing of a report group.

```
SUPPRESS PRINTING
```

**Syntax rules**

**General rules**



## 8.55 TERMINATE statement

The TERMINATE statement prevents further writing of a report.

```
TERMINATE {report-name-1}...
```

**Syntax rules**

**General rules**

## 8.56 TRANSFORM statement

The TRANSFORM statement replaces instances of character with another character.

```
TRANSFORM identifier-1 FROM { identifier-2 } TO { identifier-3 }  
                                  { literal-1 }            { literal-2 }
```

**Syntax rules**

**General rules**

## 8.57 UNLOCK statement

The UNLOCK statement releases all currently held locks on a file.

```
UNLOCK file-name-1 [RECORD  
RECORDS]
```

### Syntax rules

### General rules

## 8.58 UNSTRING statement

The UNSTRING statement extracts substrings from a string and copies the substrings to specified data items.

```

UNSTRING { identifier-1
           literal-1 }

[ DELIMITED BY [ ALL ] { identifier-2
                          literal-2 } { OR [ ALL ] { identifier-3
                                                        literal-3 } } ... ]

INTO { identifier-4 [ DELIMITER IN identifier-5 ] [ COUNT IN identifier-6 ] } ...

[ WITH POINTER IS identifier-7 ]

[ TALLYING IN identifier-8 ]

[ [ ON OVERFLOW imperative-statement-1
  [ NOT ON OVERFLOW imperative-statement-2 ] ] ]

[ END-OVERFLOW ]

```

### Syntax rules

### General rules

## 8.59 USE statement

The USE statement indicates when a declarative should be executed.

### Format 1 (file exception)

$$\underline{\text{USE}} \left[ \underline{\text{GLOBAL}} \right] \text{ AFTER STANDARD } \left\{ \begin{array}{l} \underline{\text{EXCEPTION}} \\ \underline{\text{ERROR}} \end{array} \right\} \text{ PROCEDURE ON}$$

$$\left\{ \left\{ \textit{file-name-1} \right\} \dots \left[ \begin{array}{l} \underline{\text{INPUT}} \\ \underline{\text{OUTPUT}} \\ \underline{\text{I-O}} \\ \underline{\text{EXTEND}} \end{array} \right] \dots \right\}$$

### Format 2 (debugging)

$$\underline{\text{USE FOR DEBUGGING ON}} \left\{ \begin{array}{l} \textit{procedure-name-1} \\ \underline{\text{ALL PROCEDURES}} \\ \underline{\text{ALL REFERENCES OF } \textit{identifier-1}} \end{array} \right\} \dots$$

### Format 3 (start/end)

$$\underline{\text{USE AT PROGRAM}} \left\{ \begin{array}{l} \underline{\text{START}} \\ \underline{\text{END}} \end{array} \right\}$$

### Format 4 (reporting)

$$\underline{\text{USE}} \left[ \underline{\text{GLOBAL}} \right] \underline{\text{BEFORE REPORTING}} \textit{identifier-2}$$

**Format 5 (exception)**



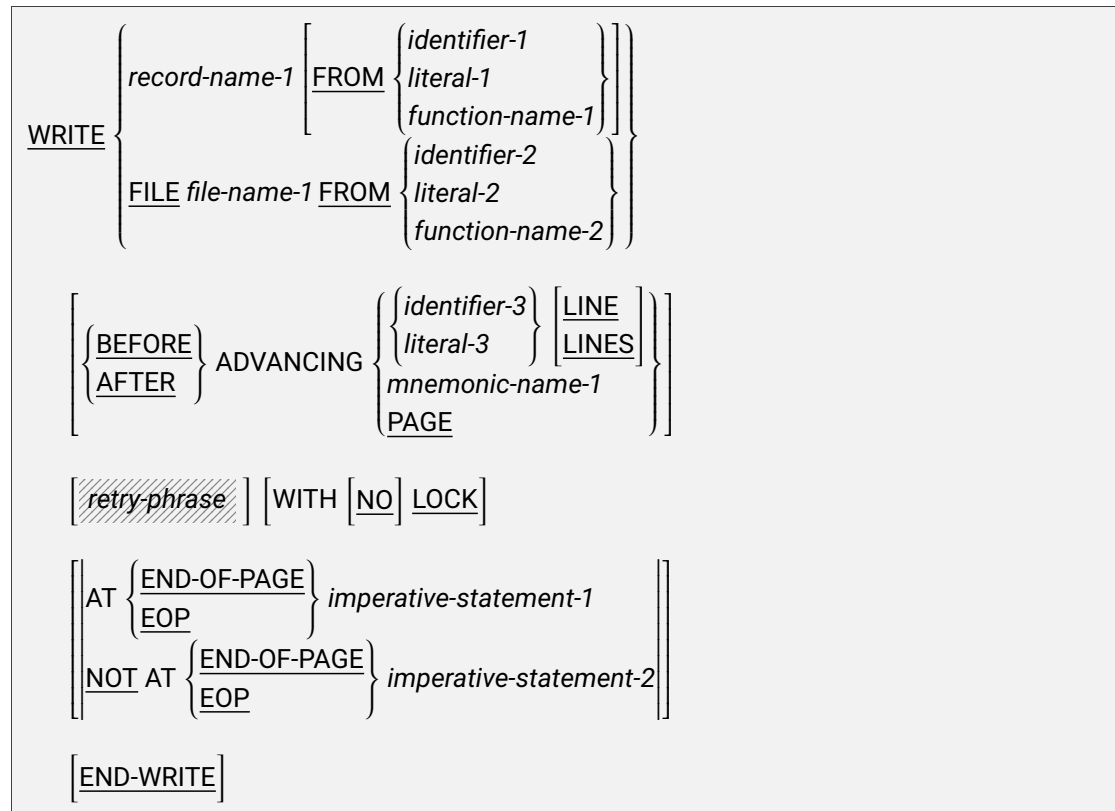
**Syntax rules**

**General rules**

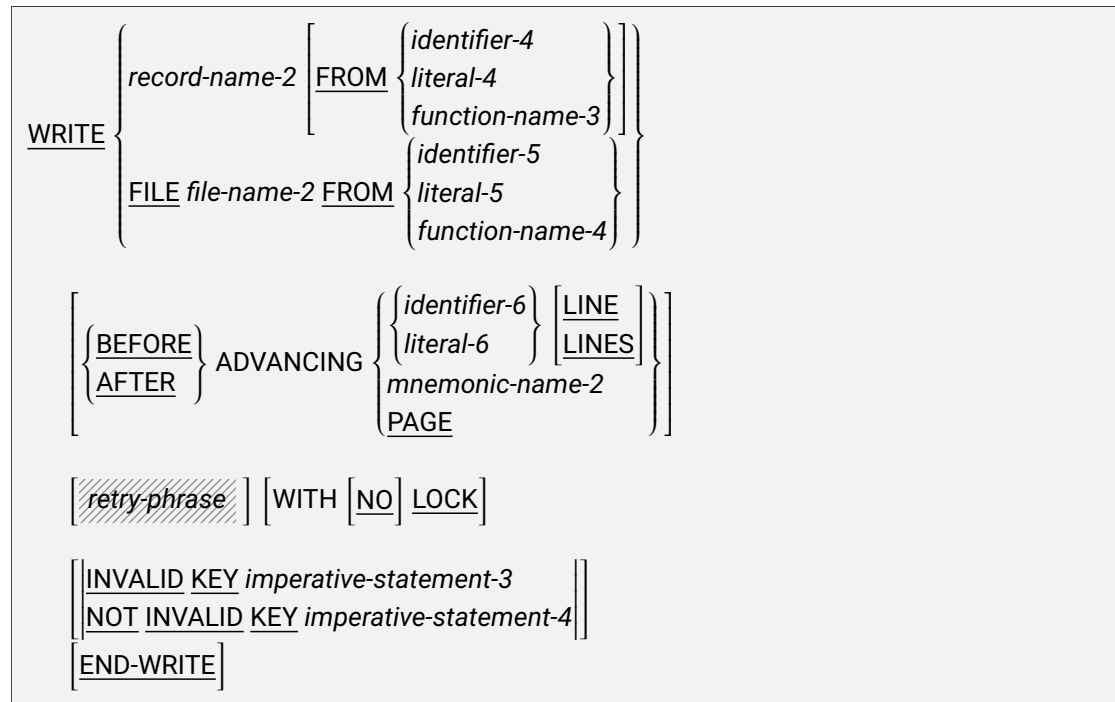
## 8.60 WRITE statement

The WRITE statement provides a new record to the file.

### Format 1 (sequential)



### Format 2 (random)

**Syntax rules****General rules**





# 9 Intrinsic functions

## 9.1 ABS function

FUNCTION { ABS  
ABSOLUTE-VALUE } (*argument-1*)

**Syntax rules**

**General rules**

## 9.2 ACOS function

```
FUNCTION ACOS ( argument-1 )
```

**Syntax rules**

**General rules**

### 9.3 ANNUITY function

FUNCTION ANNUITY ( *argument-1* *argument-2* )

**Syntax rules**

**General rules**

## 9.4 ASIN function

FUNCTION ASIN ( *argument-1* )

**Syntax rules**

**General rules**

## 9.5 ATAN function

```
FUNCTION ATAN (argument-1)
```

**Syntax rules**

**General rules**

## 9.6 **BOOLEAN-OF-INTEGER** function

```
FUNCTION BOOLEAN-OF-INTEGER ( argument-1 argument-2 )
```

**Syntax rules**

**General rules**

## 9.7 BYTE-LENGTH function

FUNCTION BYTE-LENGTH ( *argument-1* )

**Syntax rules**

**General rules**



## 9.8 CHAR function

FUNCTION CHAR (*argument-1*)

**Syntax rules**

**General rules**

## 9.9 CHAR-NATIONAL function

`FUNCTION CHAR-NATIONAL ( argument-1 )`

**Syntax rules**

**General rules**

## 9.10 COMBINED-DATETIME function

FUNCTION COMBINED-DATETIME ( *argument-1* *argument-2* )

**Syntax rules**

**General rules**

## 9.11 CONCATENATE function

FUNCTION CONCATENATE ( {*argument-1*} ... )

**Syntax rules**

**General rules**

## 9.12 COS function

```
FUNCTION COS ( argument-1 )
```

**Syntax rules**

**General rules**

### 9.13 CURRENCY-SYMBOL function

FUNCTION CURRENCY-SYMBOL

**Syntax rules**

**General rules**

## 9.14 CURRENT-DATE function

FUNCTION CURRENT-DATE

**Syntax rules**

**General rules**

## 9.15 DATE-OF-INTEGER function

FUNCTION DATE-OF-INTEGER (*argument-1*)

**Syntax rules**

**General rules**



## 9.16 DATE-TO-YYYYMMDD function

```
FUNCTION DATE-TO-YYYYMMDD ( argument-1 [ argument-2 [ argument-3 ] ] )
```

**Syntax rules**

**General rules**

## 9.17 DAY-OF-INTEGER function

FUNCTION DAY-OF-INTEGER ( *argument-1* )

**Syntax rules**

**General rules**

## 9.18 DAY-TO-YYYYDDD function

`FUNCTION DAY-TO-YYYYDDD ( argument-1 [ argument-2 [ argument-3 ] ] )`

**Syntax rules**

**General rules**

## 9.19 DISPLAY-OF function

`FUNCTION DISPLAY-OF (argument-1)`

**Syntax rules**

**General rules**

## 9.20 E function

FUNCTION E

**Syntax rules**

**General rules**

## 9.21 EXCEPTION-FILE function

FUNCTION EXCEPTION-FILE

**Syntax rules**

**General rules**

## 9.22 EXCEPTION-FILE-N function

FUNCTION EXCEPTION-FILE-N

**Syntax rules**

**General rules**

## 9.23 EXCEPTION-LOCATION function

|   |
|---|
| <u>FUNCTION</u> <u>EXCEPTION-LOCATION</u> |
|---|

**Syntax rules**

**General rules**



## 9.24 EXCEPTION-LOCATION-N function

FUNCTION EXCEPTION-LOCATION-N

**Syntax rules**

**General rules**

## 9.25 EXCEPTION-STATEMENT function

FUNCTION EXCEPTION-STATEMENT

**Syntax rules**

**General rules**

## 9.26 EXCEPTION-STATUS function

FUNCTION EXCEPTION-STATUS

**Syntax rules**

**General rules**

## 9.27 EXP function

FUNCTION EXP (*argument-1*)

**Syntax rules**

**General rules**

## 9.28 EXP10 function

FUNCTION EXP10 (*argument-1*)

**Syntax rules**

**General rules**

## 9.29 FACTORIAL function

FUNCTION FACTORIAL ( *argument-1* )

**Syntax rules**

**General rules**

### 9.30 FORMATTED-CURRENT-DATE function

FUNCTION FORMATTED-CURRENT-DATE ( *argument-1* )

**Syntax rules**

**General rules**

### 9.31 FORMATTED-DATE function

FUNCTION FORMATTED-DATE ( *argument-1* *argument-2* )

**Syntax rules**

**General rules**



## 9.32 FORMATTED-DATETIME function

FUNCTION FORMATTED-DATETIME

( *argument-1* *argument-2* *argument-3* [ *argument-4*  
SYSTEM-OFFSET ] )

**Syntax rules**

**General rules**

### 9.33 FORMATTED-TIME function

`FUNCTION FORMATTED-TIME ( argument-1 argument-2 [ argument-3  
SYSTEM-OFFSET ] )`

**Syntax rules**

**General rules**

### 9.34 FRACTION-PART function

FUNCTION FRACTION-PART (*argument-1*)

**Syntax rules**

**General rules**

### 9.35 HIGHEST-ALGEBRAIC function

FUNCTION HIGHEST-ALGEBRAIC (*argument-1*)

**Syntax rules**

**General rules**

### 9.36 INTEGER function

FUNCTION INTEGER (*argument-1*)

**Syntax rules**

**General rules**

### 9.37 INTEGER-OF-BOOLEAN function

FUNCTION INTEGER-OF-BOOLEAN (argument-1)

**Syntax rules**

**General rules**

### 9.38 INTEGER-OF-DATE function

FUNCTION INTEGER-OF-DATE ( *argument-1* )

**Syntax rules**

**General rules**

### 9.39 INTEGER-OF-DAY function

FUNCTION INTEGER-OF-DAY ( *argument-1* )

**Syntax rules**

**General rules**



## 9.40 INTEGER-OF-FORMATTED-DATE function

FUNCTION INTEGER-OF-FORMATTED-DATE ( *argument-1* *argument-2* )

**Syntax rules**

**General rules**

## 9.41 INTEGER-PART function

FUNCTION INTEGER-PART (*argument-1*)

**Syntax rules**

**General rules**

## 9.42 LENGTH function

FUNCTION LENGTH ( *argument-1* [ PHYSICAL ] )

**Syntax rules**

**General rules**

### 9.43 LENGTH-AN function

FUNCTION LENGTH-AN ( *argument-1* )

**Syntax rules**

**General rules**

## 9.44 LOCALE-COMPARE function

```
FUNCTION LOCALE-COMPARE ( argument-1 argument-2 [ argument-3 ] )
```

**Syntax rules**

**General rules**

## 9.45 LOCALE-DATE function

```
FUNCTION LOCALE-DATE ( argument-1 [ argument-2 ] )
```

**Syntax rules**

**General rules**

## 9.46 LOCALE-TIME function

`FUNCTION LOCALE-TIME ( argument-1 [ argument-2 ] )`

**Syntax rules**

**General rules**

## 9.47 LOCALE-TIME-FROM-SECONDS function

`FUNCTION LOCALE-TIME-FROM-SECONDS ( argument-1 [ argument-2 ] )`

**Syntax rules**

**General rules**



## 9.48 LOG function

FUNCTION LOG (*argument-1*)

**Syntax rules**

**General rules**

## 9.49 LOG10 function

FUNCTION LOG10 ( *argument-1* )

**Syntax rules**

**General rules**

## 9.50 LOWER-CASE function

FUNCTION LOWER-CASE ( *argument-1* )

**Syntax rules**

**General rules**

## 9.51 LOWEST-ALGEBRAIC function

FUNCTION LOWEST-ALGEBRAIC ( *argument-1* )

**Syntax rules**

**General rules**

## 9.52 MAX function

FUNCTION MAX ( {*argument-1*}... )

**Syntax rules**

**General rules**

### 9.53 MEAN function

FUNCTION MEAN ( {*argument-1*}... )

**Syntax rules**

**General rules**

## 9.54 MEDIAN function

```
FUNCTION MEDIAN ( {argument-1}... )
```

**Syntax rules**

**General rules**

## 9.55 MIDRANGE function

```
FUNCTION MIDRANGE ( {argument-1}... )
```

**Syntax rules**

**General rules**



## 9.56 MIN function

```
FUNCTION MIN ( {argument-1}... )
```

**Syntax rules**

**General rules**

## 9.57 MOD function

`FUNCTION MOD ( argument-1 argument-2 )`

**Syntax rules**

**General rules**

## 9.58 MODULE-CALLER-ID function

FUNCTION MODULE-CALLER-ID

**Syntax rules**

**General rules**

## 9.59 MODULE-DATE function

FUNCTION MODULE-DATE

**Syntax rules**

**General rules**

## 9.60 **MODULE-FORMATTED-DATE** function

FUNCTION MODULE-FORMATTED-DATE

**Syntax rules**

**General rules**

## 9.61 MODULE-ID function

FUNCTION MODULE-ID

**Syntax rules**

**General rules**

## 9.62 MODULE-PATH function

FUNCTION MODULE-PATH

**Syntax rules**

**General rules**

## 9.63 MODULE-SOURCE function

FUNCTION MODULE-SOURCE

**Syntax rules**

**General rules**



## 9.64 MODULE-TIME function

FUNCTION MODULE-TIME

**Syntax rules**

**General rules**

## 9.65 MONETARY-DECIMAL-POINT function

FUNCTION MONETARY-DECIMAL-POINT

**Syntax rules**

**General rules**

## 9.66 MONETARY-THOUSANDS-SEPARATOR function

FUNCTION MONETARY-THOUSANDS-SEPARATOR

**Syntax rules**

**General rules**

## 9.67 NATIONAL-OF function

`FUNCTION NATIONAL-OF ( argument-1 [argument-2] )`

**Syntax rules**

**General rules**

## 9.68 NUMERIC-DECIMAL-POINT function

FUNCTION NUMERIC-DECIMAL-POINT

**Syntax rules**

**General rules**

## 9.69 NUMERIC-THOUSANDS-SEPARATOR function

FUNCTION NUMERIC-THOUSANDS-SEPARATOR

**Syntax rules**

**General rules**

## 9.70 NUMVAL function

FUNCTION NUMVAL (*argument-1*)

**Syntax rules**

**General rules**

## 9.71 NUMVAL-C function

```
FUNCTION NUMVAL-C ( argument-1 [ argument-2 ] )
```

**Syntax rules**

**General rules**



## 9.72 NUMVAL-F function

FUNCTION NUMVAL-F (*argument-1*)

**Syntax rules**

**General rules**

### 9.73 ORD function

FUNCTION ORD (*argument-1*)

**Syntax rules**

**General rules**

## 9.74 ORD-MAX function

FUNCTION ORD-MAX ( {*argument-1*} ... )

**Syntax rules**

**General rules**

## 9.75 ORD-MIN function

```
FUNCTION ORD-MIN ( {argument-1} ... )
```

**Syntax rules**

**General rules**

## 9.76 PI function

FUNCTION PI

**Syntax rules**

**General rules**

## 9.77 PRESENT-VALUE function

FUNCTION PRESENT-VALUE ( {*argument-1*} ... )

**Syntax rules**

**General rules**

## 9.78 RANDOM function

```
FUNCTION RANDOM ( ( argument-1 ... ) )
```

**Syntax rules**

**General rules**

## 9.79 RANGE function

FUNCTION RANGE ( {*argument-1*}... )

**Syntax rules**

**General rules**



## 9.80 REM function

FUNCTION REM ( *argument-1* *argument-2* )

**Syntax rules**

**General rules**

## 9.81 REVERSE function

FUNCTION REVERSE ( *argument-1* )

**Syntax rules**

**General rules**

## 9.82 SECONDS-FROM-FORMATTED-TIME function

FUNCTION SECONDS-FROM-FORMATTED-TIME ( *argument-1* *argument-2* )

**Syntax rules**

**General rules**

### 9.83 SECONDS-PAST-MIDNIGHT function

FUNCTION SECONDS-PAST-MIDNIGHT (*argument-1*)

**Syntax rules**

**General rules**

## 9.84 SIGN function

FUNCTION SIGN ( *argument-1* )

**Syntax rules**

**General rules**

## 9.85 SIN function

FUNCTION SIN ( *argument-1* )

**Syntax rules**

**General rules**

## 9.86 SQRT function

```
FUNCTION SQRT (argument-1)
```

**Syntax rules**

**General rules**

## 9.87 STANDARD-COMPARE function

FUNCTION STANDARD-COMPARE

( argument-1 argument-2 [ argument-3 ] [ argument-4 ] )

**Syntax rules**

**General rules**



## 9.88 STANDARD-DEVIATION function

FUNCTION STANDARD-DEVIATION ( {*argument-1*}... )

**Syntax rules**

**General rules**

## 9.89 STORED-CHAR-LENGTH function

FUNCTION STORED-CHAR-LENGTH ( *argument-1* )

**Syntax rules**

**General rules**

## 9.90 SUBSTITUTE function

```
FUNCTION SUBSTITUTE ( argument-1 { argument-2 argument-3 } ... )
```

**Syntax rules**

**General rules**

## 9.91 SUBSTITUTE-CASE function

```
FUNCTION SUBSTITUTE-CASE ( argument-1 { argument-2 argument-3 } ... )
```

**Syntax rules**

**General rules**

## 9.92 SUM function

```
FUNCTION SUM ( {argument-1}... )
```

**Syntax rules**

**General rules**

### 9.93 TAN function

FUNCTION TAN (*argument-1*)

**Syntax rules**

**General rules**

## 9.94 TEST-DATE-YYYYMMDD function

FUNCTION TEST-DATE-YYYYMMDD (*argument-1*)

**Syntax rules**

**General rules**

## 9.95 TEST-DAY-YYYYDDD function

FUNCTION TEST-DAY-YYYYDDD ( *argument-1* )

**Syntax rules**

**General rules**



## 9.96 TEST-FORMATTED-DATETIME function

```
FUNCTION TEST-FORMATTED-DATETIME ( argument-1 argument-2 )
```

**Syntax rules**

**General rules**

## 9.97 TEST-NUMVAL function

FUNCTION TEST-NUMVAL (*argument-1*)

**Syntax rules**

**General rules**

## 9.98 TEST-NUMVAL-C function

FUNCTION TEST-NUMVAL-C ( *argument-1* *argument-2* )

**Syntax rules**

**General rules**

## 9.99 TEST-NUMVAL-F function

FUNCTION TEST-NUMVAL-F (*argument-1*)

**Syntax rules**

**General rules**

## 9.100 TRIM function

|  |
|--|
| $\text{FUNCTION TRIM} ( \textit{argument-1} \left[ \begin{array}{l} \text{LEADING} \\ \text{TRAILING} \end{array} \right] )$ |
|--|

**Syntax rules**

**General rules**

## 9.101 UPPER-CASE function

FUNCTION UPPER-CASE ( *argument-1* )

**Syntax rules**

**General rules**

## 9.102 VARIANCE function

FUNCTION VARIANCE ( {*argument-1*}... )

**Syntax rules**

**General rules**

### **9.103 WHEN-COMPILED function**

FUNCTION WHEN-COMPILED

**Syntax rules**

**General rules**



### 9.104 YEAR-TO-YYYY function

`FUNCTION YEAR-TO-YYYY ( argument-1 [ argument-2 [ argument-3 ] ] )`

**Syntax rules**

**General rules**



## 9 *Intrinsic functions*



# Appendices



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## B Language element lists

This appendix is required for conformance to the COBOL standard.

### B.1 Implementor-defined language element list

1. **ACCEPT statement (conversion of data):**
2. **ACCEPT statement (device used when FROM is unspecified):**
3. **ACCEPT statement, screen format (result when screen items overlap):**
4. **ACCEPT statement, screen format (when data is verified, behavior for inconsistent data):**
5. **ACCEPT statement (size of data transfer):**
6. **Alignment of alphanumeric group items (relative to first elementary item):**
7. **Alignment of data for increased efficiency (special or automatic alignment: interpretation, implicit filler, semantics of statements):**
8. **ALPHABET clause (ordinal number of characters in the native coded character sets):**
9. **Alphanumeric literals (number of hexadecimal digits that map to an alphanumeric character):**
10. **ASSIGN clause, USING phrase (meaning and rules for operands; consistency rules):**
11. **BACKGROUND-COLOR clause (the background color when the clause is not specified or the value specified is not in the range 0 to 7):**
12. **Byte (number of bits in):**
13. **CALL statement (rules for program-name formation for a non-COBOL program):**
14. **CALL statement (runtime resources that are checked):**
15. **CALL statement (rules for locating a non-COBOL program):**
16. **CALL statement (calling a non-COBOL program):**

17. **CALL statement (other effects of the CALL statement):**
18. **CANCEL statement (result of canceling an active program when EC-PROGRAM-CANCEL-ACTIVE is not enabled):**
19. **CANCEL statement (result of canceling a non-COBOL program):**
20. **Case mapping:**
21. **CHAR function (which one of the multiple characters is returned):**
22. **CHAR-NATIONAL function (which one of the multiple characters is returned):**
23. **Characters prohibited from use in text-words in COPY ... REPLACING and REPLACE statements:**
24. **CLOSE statement (closing operations):**
25. **COBOL character repertoire (encoding of, mapping of, substitute graphics):**
26. **COBOL character repertoire (if more than one encoding in a compilation group, control functions if any):**
27. **Color number (for a monochrome terminal, the mapping of the color attributes onto other attributes):**
28. **Compiler directives, compiler directive IMP (syntax rules and general rules):**
29. **Computer's coded character set (characters in and encoding of computer's alphanumeric coded character set and computer's national coded character set, encoding for usage DISPLAY and usage NATIONAL):**
30. **Computer's coded character set (coded character values for certain COBOL items):**
31. **Computer's coded character set (correspondence between alphanumeric and national characters):**
32. **Computer's coded character set (for literals, correspondence between compile-time and runtime character sets, when conversion takes place):**
33. **Computer's coded character set (correspondence between lowercase and uppercase letters when a locale is not in effect):**
34. **Computer's coded character set (when composite alphanumeric and national, mapping of characters to each):**
35. **Computer's coded character set (when more than one encoding, the mechanism for selecting encoding for runtime):**



36. **Computer's coded character set (whether UTF-8 or mixed alphanumeric and national characters recognized in class alphanumeric; applicable syntax and general rules):**
37. **COPY statement (rules for identifying and locating default library text):**
38. **CRT status 9xxx (the value of xxx for unsuccessful completion with implementor-defined conditions):**
39. **Cultural ordering table (allowable content of literal defines a cultural ordering table):**
40. **Currency symbol (equivalence of non-COBOL characters):**
41. **Currency symbol (implementor-defined prohibition of non-COBOL characters):**
42. **Cursor (the cursor movement if keys are defined that change the cursor position):**
43. **Data storage (possible representations when implementation provides multiple ways of storing data):**
44. **Default encoding specifications (for standard decimal floating-point usages):**
45. **Default endianness specifications (for standard floating-point usages):**
46. **DEFINE directive (mechanism for providing value of a compilation-variable-name from the operating environment):**
47. **Devices that allow concurrent access:**
48. **DISPLAY statement (data conversion):**
49. **DISPLAY statement (format for display of a variable-length group):**
50. **DISPLAY statement (size of data transfer):**
51. **DISPLAY statement (standard display device):**
52. **Dynamic-capacity table (determination of highest permissible occurrence number):**
53. **Dynamic-capacity table (physical allocation):**
54. **Dynamic-length elementary items (maximum length):**
55. **Dynamic-length elementary items (structure if dynamic-length-structure-name-1 is not specified):**
56. **ENTRY-CONVENTION clause (entry-convention-names, their meanings and the default when not specified):**

57. **EXIT and GOBACK statements (execution continuation in a non-COBOL runtime element):**
58. **Exponentiation (results for certain operand values):**
59. **External repository (mechanism for specifying whether checking and updating occur):**
60. **External repository information (other information beyond the required information):**
61. **Externalized names (formation and mapping rules):**
62. **Fatal exception condition (whether detected at compile time, circumstances under which detected):**
63. **Fatal exception condition (whether or not execution will continue, how it will continue, and how any receiving operands are affected when events that would cause a fatal exception to exist occur but checking for that condition is not enabled):**
64. **FILE-CONTROL entry, ASSIGN clause (TO phrase meaning and rules):**
65. **FILE-CONTROL entry, ASSIGN clause (consistency rules for external file connectors):**
66. **FILE-CONTROL entry, ASSIGN clause (USING phrase meaning and rules):**
67. **Figurative constant values (representation of zero, space, and quote):**
68. **File sharing (interaction with other facilities and languages):**
69. **File sharing (which devices allow concurrent access to the file):**
70. **File sharing (default mode when unspecified):**
71. **Fixed file attribute (whether the ability to share a file is a fixed file attribute):**
72. **FLAG-02 directive (warning mechanism):**
73. **FLAG-85 directive (warning mechanism):**
74. **Floating-point numeric item (alignment when used as a receiving operand):**
75. **Floating-point numeric literals (maximum permitted value and minimum permitted value of the exponent):**
76. **BACKGROUND-COLOR clause (the foreground color when the clause is not specified or the value specified is not in the range 0 to 7):**
77. **FORMAT clause (representation produced):**

*B Language element lists*

78. **FORMAT clause (exclusions on restoring to same internal representation):**
79. **Format validation (rules for checking items of usages other than display or national):**
80. **FORMATTED-CURRENT-DATE (accuracy of returned time):**
81. **Function-identifier (execution of a non-COBOL function when a function-prototype-name is specified):**
82. **Function-identifier (object time resources that are checked):**
83. **Function-identifier (result when argument rules are violated and checking for the EC-ARGUMENT-FUNCTION exception condition is not enabled):**
84. **Function keys (context-dependent keys, function number, and method for enabling and disabling):**
85. **Function returned values (characteristics, representation, and returned value for native arithmetic):**
86. **Hexadecimal alphanumeric literals (mapping for non-existing corresponding character):**
87. **Hexadecimal alphanumeric literals (mapping when characters not multiples of four bits):**
88. **Hexadecimal national literals (mapping for non-existing corresponding character):**
89. **Hexadecimal national literals (mapping when characters not multiples of four bits):**
90. **Implementor-defined exception conditions, EC-IMP-xxx (specification and meaning of xxx):**
91. **Implementor-defined level-2 exception conditions, EC-level-2-IMP (specification and meaning of the specified level-2 exception condition):**
92. **INVOKE statement (behavior when invoking a non-COBOL method):**
93. **INVOKE statement (runtime resources that are checked):**
94. **I-O status (action taken for fatal exception conditions):**
95. **I-O status (if more than one value applies):**
96. **I-O status, permanent error (technique for error correction):**
97. **I-O status 0x (value of x):**

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98. **I-O status 24** (manner in which the boundaries of a file are defined):
99. **I-O status 34** (manner in which the boundaries of a file are defined):
100. **I-O status 52** (conditions under which deadlock is detected):
101. **I-O status 9x** (value of x):
102. **LEAP-SECOND directive** (whether a value greater than 59 seconds may be reported and, if so, the maximum number of seconds that may be reported):
103. **LEAP-SECOND directive** (whether standard numeric time form values greater than or equal to 86,400 may be reported):
104. **Life cycle for objects** (timing and algorithm for taking part in continued execution):
105. **Linkage section** (whether access to linkage section items is meaningful when called from a non-COBOL program):
106. **Listings** (whether and when produced by the compiler, effect of logical conversion):
107. **Locale specification** (how user and system defaults defined; at least one user and one system default):
108. **Locale specification** (manner of implementation):
109. **Locale switch** (whether a switch by a non-COBOL runtime module is recognized by COBOL):
110. **METHOD-ID paragraph** (actual method-name used when PROPERTY phrase is specified):
111. **National literals** (number of hexadecimal digits that map to a national character):
112. **Native arithmetic** (techniques used, intermediate data item):
113. **Native arithmetic** (when an operand or arithmetic expression is an integer):
114. **NULL** (value of NULL):
115. **OBJECT-COMPUTER paragraph** (default object computer):
116. **OBJECT-COMPUTER paragraph** (computer-name and implied equipment configuration):
117. **OCCURS clause** (range of values allowed in the index):
118. **OPEN statement** (validation of fixed file attributes):

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119. **OPEN statement with OUTPUT phrase (positioning of the output file with regard to physical page boundaries):**
120. **OPEN statement without the SHARING phrase and no SHARING clause in the file control entry (definition of sharing mode established for each file connector):**
121. **Parameterized classes and interfaces (when expanded):**
122. **Procedure division header rules when either the activating or the activated runtime element is not a COBOL element (restrictions and mechanisms for all supported language products with details such as the matching of parameters, data type representation, returning of a value, and omission of parameters):**
123. **Program-address identifier (relation between address and non-COBOL program):**
124. **Program-name (formation rules for a non-COBOL program):**
125. **RANDOM function (seed value when no argument on first reference):**
126. **RANDOM function (subset of the domain of argument-1):**
127. **RECORD clause (calculations to derive size of records on storage medium):**
128. **RECORD clause (implicit RECORD clause if RECORD clause is not specified):**
129. **RECORD clause (whether fixed or variable records produced for fixed-or-variable-length format):**
130. **RECORD DELIMITER clause (consistency rules when used with external file connectors):**
131. **RECORD DELIMITER clause (feature-name and associated method for determining length of variable-length records):**
132. **RECORD DELIMITER clause (if not specified, method for determining length of variable-length records):**
133. **Record locking (circumstances other than a locked logical record that return a locked record status):**
134. **Record locking (default mode when unspecified by user):**
135. **Record locking (maximum number allowed for a run unit):**
136. **Record locks (maximum number allowed for a file connector):**
137. **Reference format (control characters in a free-form line):**
138. **Reference format (meaning of lines and character positions in free-form and fixed-form format):**

*B Language element lists*

139. **Reference format (rightmost character position of program-text area):**
140. **Report file (record structure):**
141. **Report writer printable item (fixed correspondence between columns and national characters):**
142. **REPOSITORY paragraph (how external repository and class-specifier determine which class is used):**
143. **REPOSITORY paragraph, INTERFACE phrase (how interface specifier and external repository determine which interface is used):**
144. **REPOSITORY paragraph (when the AS phrase is required):**
145. **RESERVE clause (number of input-output areas, if not specified):**
146. **RETRY phrase (interval between attempts to obtain access to a locked file or record):**
147. **RETRY phrase (maximum meaningful time-out value and internal representation; technique for determining frequency of retries):**
148. **Run unit (relationship and interaction with non-COBOL components):**
149. **Run unit termination (whether locale reset):**
150. **SAME SORT/SORT-MERGE AREA clause (extent of allocation):**
151. **SEARCH ALL statement (varying of the search index during the search operation):**
152. **SECONDS-PAST-MIDNIGHT function returned value (precision):**
153. **SECURE clause (cursor movement when data is entered into a field for which the SECURE clause is specified):**
154. **SELECT WHEN clause (whether a SELECT WHEN takes effect for READ statements and REWRITE or WRITE statements with the FILE phrase in the absence of a CODE-SET clause or a FORMAT clause):**
155. **SET statement (effect of SET on function whose address is being stored in a function-pointer):**
156. **SET statement (effect of SET on program whose address is being stored in a program-pointer):**
157. **SET statement (value in NaN payload):**
158. **SIGN clause (representation when PICTURE contains character 'S' with no optional SIGN clause):**

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159. **SIGN** clause (valid sign when **SEPARATE CHARACTER** phrase not present):
160. **Size error condition** (whether or not range of values allowed for the intermediate data item is to be checked):
161. **SPECIAL-NAMES** paragraph (allowable locale-names and literal values):
162. **SPECIAL-NAMES** paragraph, **ALPHABET** clause (coded character set referenced by **STANDARD-2** phrase):
163. **SPECIAL-NAMES** paragraph, **ALPHABET** clause, **code-name-1** (alphanumeric coded character set and collating sequence; ordinal number of characters; correspondence with native alphanumeric character set):
164. **SPECIAL-NAMES** paragraph, **ALPHABET** clause, **code-name-1** and **code-name-2** (the names supported for **code-name-1** and **code-name-2**):
165. **SPECIAL-NAMES** paragraph, **ALPHABET** clause, **code-name-2** (national coded character set and collating sequence; ordinal number of characters; correspondence with native national character set):
166. **SPECIAL-NAMES** paragraph, **ALPHABET** clause, literal phrase (ordinal number of characters not specified):
167. **SPECIAL-NAMES** paragraph, **ALPHABET** clause, **STANDARD-1** and **STANDARD-2** phrases (correspondence with native character set):
168. **SPECIAL-NAMES** paragraph, **ALPHABET** clause, **UCS-4**, **UTF-8**, and **UTF-16** phrases (correspondence with native character set):
169. **SPECIAL-NAMES** paragraph, **device-name** (names available, restrictions on use):
170. **SPECIAL-NAMES** paragraph, **feature-name** (names available, any positioning rules, any restrictions on use):
171. **SPECIAL-NAMES** paragraph, **switch-name** (names available, which switches may be referenced by the **SET** statement, scope of, and external facility for modification):
172. **Standard intermediate data item** (representation):
173. **STOP** statement (constraints on the value of the **STATUS** literal or on the contents of the data item referenced by the **STATUS** identifier):
174. **STOP** statement (mechanism for error termination):
175. **Subscripts** (mapping indexes to occurrence numbers):
176. **Switch-name** (identifies an external switch):

*B Language element lists*

177. **SYNCHRONIZED** clause (effect on elementary items and containing records or groups; implicit filler generation):
178. **SYNCHRONIZED** clause (how records of a file are handled):
179. **SYNCHRONIZED** clause (positioning when neither **RIGHT** or **LEFT** is specified):
180. **System-names** (rules for formation of a system-name):
181. **Terminal screen** (correspondence of a column and a character in the computer's national coded character set):
182. **Text manipulation** (stage of processing the **LISTING** and **PAGE** directives and the **SUPPRESS** phrase of **COPY**):
183. **Text manipulation** (stage of processing parameterized class expansion):
184. **Time formats and corresponding function values** (maximum precision not less than nine fractional digits):
185. **THROUGH** phrase in **VALUE** clause and **EVALUATE** statement (collating sequence used for determining range of values when no alphabet-name is specified):
186. **TURN** directive (whether location information is available when the **LOCATION** phrase is not specified):
187. **USAGE BINARY** clause (computer storage allocation, alignment and representation of data):
188. **USAGE BINARY-CHAR, BINARY-SHORT, BINARY-LONG, BINARY-DOUBLE** (allow wider range than minimum specified):
189. **USAGE BINARY-SHORT, BINARY-LONG, BINARY-DOUBLE, FLOAT-SHORT, FLOAT-LONG, FLOAT-EXTENDED** (representation and length of data item associated with):
190. **USAGE COMPUTATIONAL** clause (alignment and representation of data):
191. **USAGE DISPLAY** (size and representation of characters):
192. **USAGE FLOAT-SHORT, FLOAT-LONG, FLOAT-EXTENDED** (size and permitted range of value):
193. **USAGE FUNCTION-POINTER** clause (alignment, size, and representation of data; and allowable languages):
194. **USAGE INDEX** clause (alignment and representation of data):
195. **USAGE NATIONAL** (size and representation of characters):
196. **USAGE OBJECT REFERENCE** clause (amount of storage allocated):



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197. **USAGE PACKED-DECIMAL** clause (computer storage allocation, alignment and representation of data):
198. **USAGE POINTER** clause (alignment, size, representation, and range of values):
199. **USAGE PROGRAM-POINTER** clause (alignment, size, and representation of data; and allowable languages):
200. **USE** statement (action taken following execution of the USE procedure when I-O status value indicates a fatal exception condition):
201. **User-defined words** (whether extended letters may be specified in user-defined words externalized to the operating environment):
202. **Variable-length data items** (actual time when the resources used are freed):
203. **WRITE** statement (mnemonic-name-1):
204. **WRITE** statement (page advance when mnemonic-name-1 specified):

## **B.2 Optional language element list**

1. **ACCEPT and DISPLAY screen handling:** Complete support is claimed with the exception of OCCURS items.
2. **ARITHMETIC IS STANDARD:** No support is claimed.
3. **Dynamic capacity tables:** The syntax is recognised, but no functionality is claimed.
4. **DYNAMIC LENGTH elementary items:** No support is claimed.
5. **Extended letters:** No support is claimed.
6. **File sharing and record locking:** Support is claimed, but the level of support is processor-dependent.
7. **FORMAT and SELECT WHEN file handling:** No support is claimed.
8. **Locale support and related functions:** The syntax is recognised, but no functionality is claimed.
9. **Object orientation:** No support is claimed.
10. **Report writer:** The syntax is recognised, but no functionality is claimed.
11. **RESUME statement:** No support is claimed.
12. **REWRITE FILE and WRITE FILE:** Complete support is claimed.
13. **VALIDATE:** No support is claimed.

### **B.3 Non-standard extension list**

Many extensions found in other compilers. Some own extensions.

**Note: Flagging syntax extensions** You can flag many syntax extensions when compiling with `-std=cobol2014` or one of the other strict COBOL syntax definitions.