

The GnuCOBOL 2.0 Grammar

FOR R1275

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Foreword

This document describes the syntax of COBOL as supported by GnuCOBOL. It is hoped it will complement Gary Cutler's 2013 *GnuCOBOL Programmer's Guide* which does not document recent features added to GnuCOBOL. It 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. Designed to document features the *Programmer's Guide* does not, it strangely lacks a list of these new features. Important syntax rules which cannot be contained in syntax diagrams are missing. There are no definitions of fundamental objects such as conditions and identifiers. If people find this document useful, I will try to fix these shortcomings.

Changelog

From 23 November 2013.

General

- **64-bit numbers:** fixed bugs in handling of 64-bit numbers (e.g. bug #229).
- **C compiler support:** fixed errors in compilers without designated initializers.
- **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.
- **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.
- **Indicators:** invalid indicators no longer cause compilation to immediately terminate (feature request #126).
- **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.
- **Numeric literals:** fixed bug #167 involving overly large numeric literals.
- **Listings:** added complete listing support (-t/-T compiler options), including cross-references.
- **Literals:** fixed heap corruptions caused by uncommon literals (bug #195).
- **Literals:** allow concatenation of literal and Boolean literals.

Changelog

- **Microsoft Visual C++:** output when compiling with cl.exe is now filtered and temporary files are deleted.
- **stdin:** allow COBOL code to come from stdin.
- **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).
- **Warnings:** added -Wpossible-overlap to warn items that *may* overlap (-Woverlap only warns if items definitely overlap).

Configuration options

- **Aliases:** compiler configurations can now specify whether a reserved word is an alias for another reserved word.
- **Deleted compiler configuration options:** cobol85-reserved.
- **New compiler configurations:** acu for ACUCOBOL, cobol2014 for COBOL 2014.
- **New compiler configuration options:** accept-display-extensions, accept-update, accept-auto, acucobol-literals, call-overflow, console-is-crt, hexadecimal-boolean, hexadecimal-national-literals, literal-length, national-literals, no-echo-means-secure, not-exception-before-exception, numeric-boolean, numeric-literal-length, pic-length, program-name-redefinition, program-prototypes, reference-out-of-declaratives (feature request #179), renames-uncommon-levels, reserved, specify-all-reserved, use-for-debugging, word-length (feature request #43).
- **Renamed compiler configuration options:** relaxed-syntax-check to relax-syntax-checks.
- **Reserved words:** compiler configurations can now specify all the reserved words and context-sensitive words permitted.
- **Runtime configuration:** added ability to configure programs at runtime.

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.
- **New constants:** GCCOMP, GNUCOBOL.
- **New directives:** >>LISTING, >>PAGE.
- **New >>SET phrase:** SOURCEFORMAT.

Changelog

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).
- **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 PRINT and PRINTER-1 mnemonics.
- **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.
- **FUNCTION phrase:** added checks for redefinition of function-(prototype-)names.
- **Locales:** user-defined LOCALEDIR now supported.
- **LOCK MODE clause:** fixed combination of LOCK MODE IS AUTOMATIC/MANUAL with LOCK ON MULTIPLE.
- **Order of configuration section paragraphs:** configuration section paragraphs are no longer allowed in any order (bug #224).
- **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").

Changelog

Data division

- **78-level items:** strengthened syntax checks.
- **88-level items:** strengthened syntax checks.
- **ANY LENGTH clause:** ANY LENGTH items may no longer be BY VALUE parameters (see bug #219).
- **BLANK clause:** fixed bug #143, where BLANK LINE/SCREEN did not color line/screen.
- **BLANK WHEN ZERO clause:** added checks that BLANK WHEN ZERO is not specified with PICTURE clauses containing S.
- **Data description:** sizes may no longer exceed the maximum permitted size.
- **ERASE clause:** fixed bug #186, where ERASE EOL and ERASE EOS could be specified simultaneously.
- **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 (depending):** require the minimum length to be less than the maximum length (feature request #99).
- **OCCURS clause (screen-section):** require relative LINE/COLUMN clauses in OCCURS entries (bug #83).
- **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.
- **Variable records:** added checks that the minimum size of a variable record is large enough to contain the record key.

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 (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.
- **ADD statement (corresponding):** restricted to numeric items (bug #235).
- **Addition of COMP-3 numbers:** fixed bug where COMP-3 addition failed.
- **Addition of floating-point numbers:** fixed incorrect addition of floating-point numbers.
- **CALL statement:** implemented feature request #101, allowing more arguments to be provided.
- **CALL statement:** corrected CALL to 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.
- **CANCEL statement:** fixed crash caused by cancelling a cancelled module.

Changelog

- **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.
- **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.
- **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.
- **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 bugs #89 and #110.
- **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).
- **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.

Changelog

- **Procedure division header:** added RETURNING OMITTED.
- **Reference modification:** fixed bug #146.
- **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.) and permitted TAB and NO-ECHO in screen descriptions.
- **SEARCH statement (ALL):** fixed bug #314, where SEARCH ALL with an empty OCCURS DEPENDING table did not exit as soon as possible.
- **SET statement (attribute):** made HIGHLIGHT ON imply LOWLIGHT OFF and vice-versa.
- **SET statement (exception):** added.
- **STOP statement (literal):** fixed segfault.
- **STRING statement:** strengthened syntax checks (bug #259).
- **SUBTRACT statement (corresponding):** restricted to numeric items (bug #235).
- **Tracing:** fixed bug #216.
- **UNSTRING statement:** fixed bug #54 involving delimiter longer than one character.

Intrinsic functions

- **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.
- **RANDOM function:** fixed non-random number generation.

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.
<u>OPTIONAL-RESERVED-WORD</u> <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.
Unimplemented element	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

2. *Language fundamentals*

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. Language fundamentals

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

3. Compiler directives

3.1. D directive

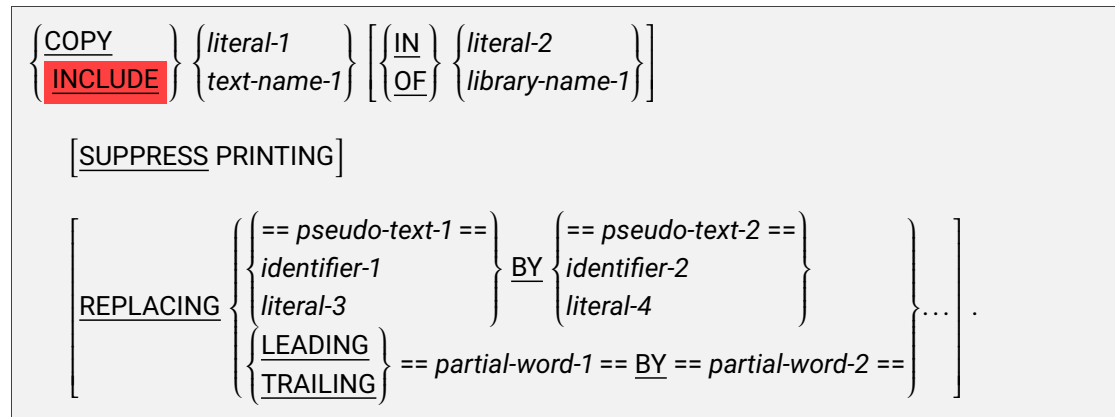
```
>>D source-text-1
```

Syntax rules

General rules

3. Compiler directives

3.2. COPY statement



Syntax rules

General rules

3. Compiler directives

3.3. DEFINE directive

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

Syntax rules

General rules

3. Compiler directives

3.4. DISPLAY directive

$$\left. \begin{array}{l} \{ > \} \\ \{ \$ \} \end{array} \right\} \underline{\text{DISPLAY}} \text{ source-text-1}$$

Syntax rules

General rules

3. Compiler directives

3.5. EJECT statement

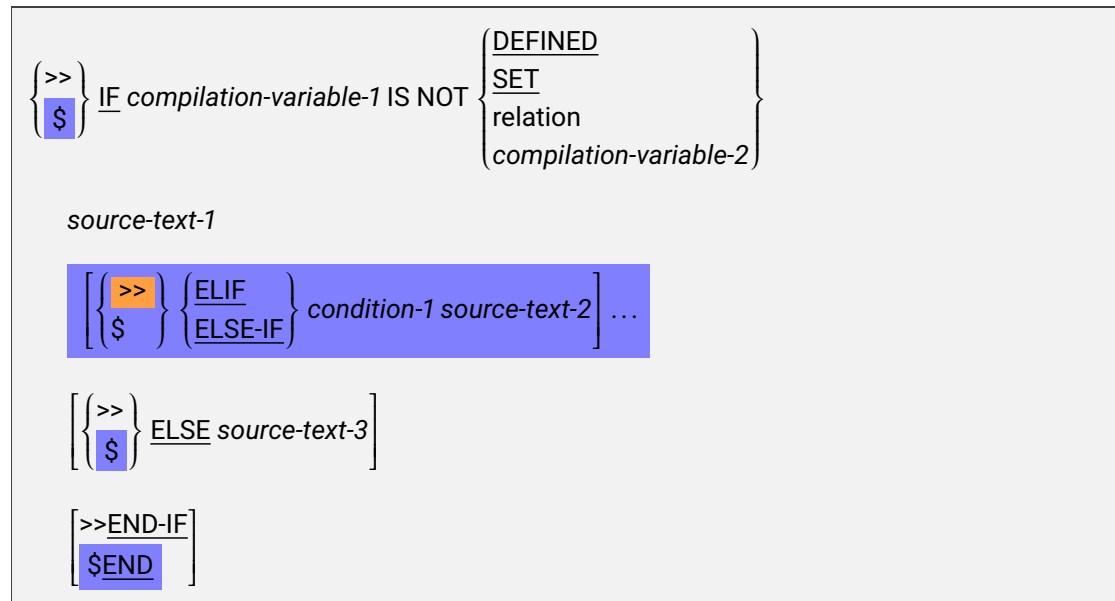
EJECT

Syntax rules

General rules

3. Compiler directives

3.6. IF directive



Syntax rules

General rules

3. Compiler directives

3.7. LEAP-SECOND directive

```
>>LEAP-SECOND
```

Syntax rules

General rules

3. Compiler directives

3.8. LISTING directive

$$\gg \underline{\text{LISTING}} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \end{array} \right\}$$

Syntax rules

General rules

3. Compiler directives

3.9. PAGE directive

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

Syntax rules

General rules

3. Compiler directives

3.10. PROCESS statement

PROCESS

Syntax rules

General rules

3.11. REPLACE statement

Format 1 (on)

```
REPLACE [ALSO] { { == pseudo-text-1 == } BY { == pseudo-text-2 == }  
                { LEADING } == partial-word-1 == BY == partial-word-2 == } ...  
                { TRAILING }
```

Format 2 (off)

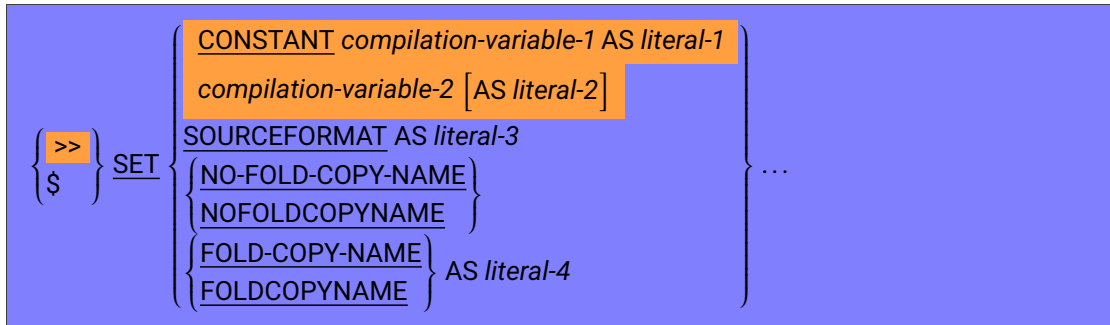
```
REPLACE [LAST] OFF.
```

Syntax rules

General rules

3. Compiler directives

3.12. SET directive



Syntax rules

General rules

3. Compiler directives

3.13. SKIP1 statement

SKIP1

Syntax rules

General rules

3. Compiler directives

3.14. SKIP2 statement

SKIP2

Syntax rules

General rules

3. Compiler directives

3.15. SKIP3 statement

SKIP3

Syntax rules

General rules

3.16. SOURCE directive

>>SOURCE FORMAT IS {
 FIXED
 FREE
 VARIABLE }

Syntax rules

General rules

3. Compiler directives

3.17. TURN directive

```
>>TURN {exception-name-1} ...  $\left[ \begin{array}{c} \text{ON} \\ \text{OFF} \end{array} \right]$  [WITH LOCATION]
```

Syntax rules

General rules

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 } } { EXTERNAL } PROGRAM.

[*comment-paragraphs*]

[*environment-division*]

[*data-division*]

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

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

where *function-definition* is

[{ IDENTIFICATION } DIVISION.]
[ID]

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

[*comment-paragraphs*]

[*environment-division*]

[*data-division*]

[*procedure-division*]

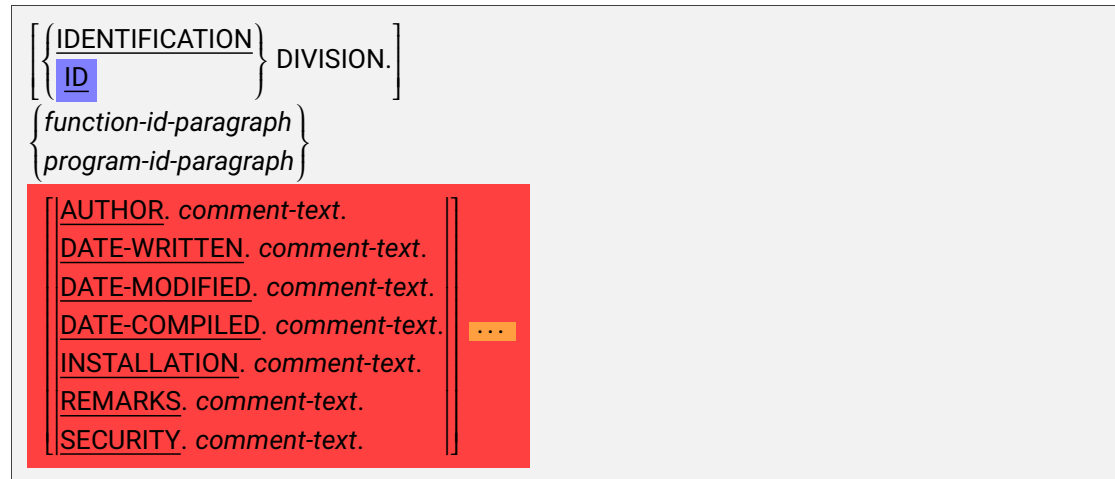
[END FUNCTION { *function-name-1* }]

4. *Compilation group*

Syntax rules

General rules

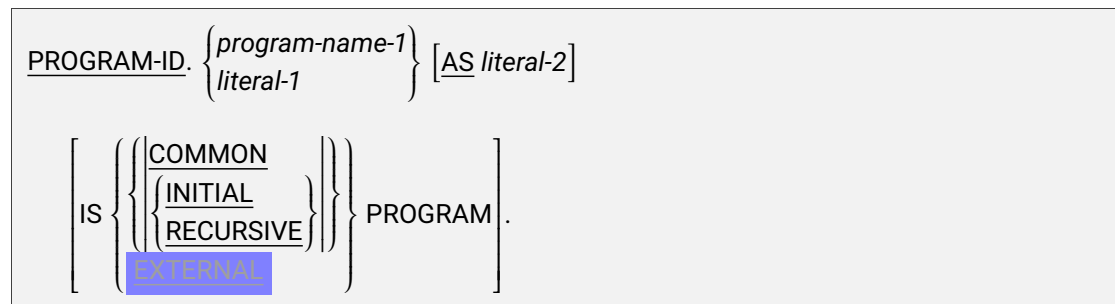
5. Identification division



Syntax rules

General rules

5.1. PROGRAM-ID paragraph



Syntax rules

General rules

5.2. FUNCTION-ID paragraph

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

Syntax rules

General rules

6. Environment division

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

Syntax rules

General rules

6.1. Configuration section

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

Syntax rules

General rules

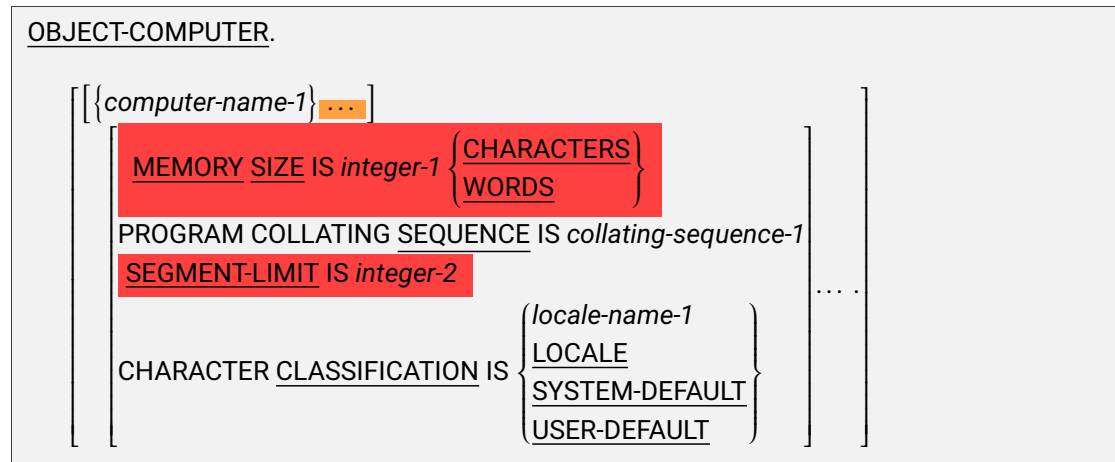
6.1.1. SOURCE-COMPUTER paragraph

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

Syntax rules

General rules

6.1.2. OBJECT-COMPUTER paragraph



Syntax rules

General rules

6. Environment division

6.1.3. SPECIAL-NAMES paragraph

[SPECIAL-NAMES.]

$\left\{ \begin{array}{l} \text{mnemonic-name-clause} \\ \text{alphabet-name-clause} \\ \text{symbolic-characters-clause} \\ \text{LOCALE } \text{locale-name-1} \text{ IS } \text{literal-1} \\ \text{CLASS } \text{class-name-1} \text{ IS } \left\{ \text{literal-2} \left[\left\{ \begin{array}{l} \text{THRU} \\ \text{THROUGH} \end{array} \right\} \text{literal-3} \right] \right\} \dots \\ \text{CURRENCY SIGN IS } \text{literal-4} \left[\text{WITH } \text{PICTURE-SYMBOL } \text{literal-5} \right] \dots \dots \\ \text{DECIMAL-POINT IS COMMA} \\ \text{NUMERIC SIGN IS TRAILING SEPARATE} \\ \text{CURSOR IS } \text{identifier-1} \\ \text{CRT STATUS IS } \text{identifier-2} \\ \text{SCREEN-CONTROL IS } \text{identifier-3} \\ \text{EVENT-STATUS IS } \text{identifier-4} \end{array} \right\}$	$\left. \begin{array}{l} \dots \dots \dots \end{array} \right\}$
--	--

where *mnemonic-name-clause* is

$\text{mnemonic-name-1} \left\{ \begin{array}{l} \text{IS CRT} \\ \text{integer-1 IS system-name-1} \\ \left[\text{IS } \text{switch-name-1} \right] \left\{ \begin{array}{l} \text{ON STATUS IS } \text{switch-status-name-1} \\ \text{OFF STATUS IS } \text{switch-status-name-2} \end{array} \right\} \end{array} \right\}$

where *alphabet-name-clause* is

$\text{ALPHABET } \text{alphabet-name-1} \text{ IS } \left\{ \begin{array}{l} \text{ASCII} \\ \text{EBCDIC} \\ \text{NATIVE} \\ \text{STANDARD-1} \\ \text{STANDARD-2} \\ \left\{ \text{literal-6} \left[\left\{ \begin{array}{l} \text{THROUGH} \\ \text{THRU} \end{array} \right\} \text{literal-7} \right] \right\} \dots \\ \left\{ \text{ALSO } \text{literal-8} \right\} \dots \end{array} \right\}$

where *symbolic-characters-clause* is

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

6. *Environment division*

Syntax rules

General rules

6.1.4. REPOSITORY paragraph

REPOSITORY.

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

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

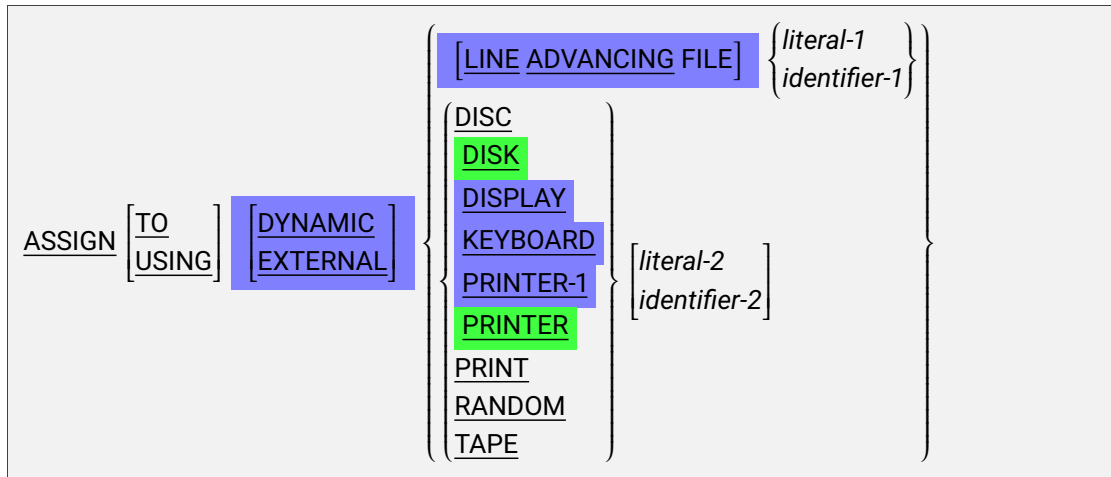
```
[FILE-CONTROL.]  
[file-control-entry] ...
```

where *file-control-entry* is

```
SELECT [OPTIONAL  
NOT OPTIONAL] file-name-1  
[assign-clause  
access-mode-clause  
alternative-record-key-clause  
collating-sequence-clause  
file-status-clause  
lock-mode-clause  
organization-clause  
padding-character-clause  
record-delimiter-clause  
record-key-clause  
relative-key-clause  
reserve-clause  
sharing-clause  
...]
```

where *assign-clause* is

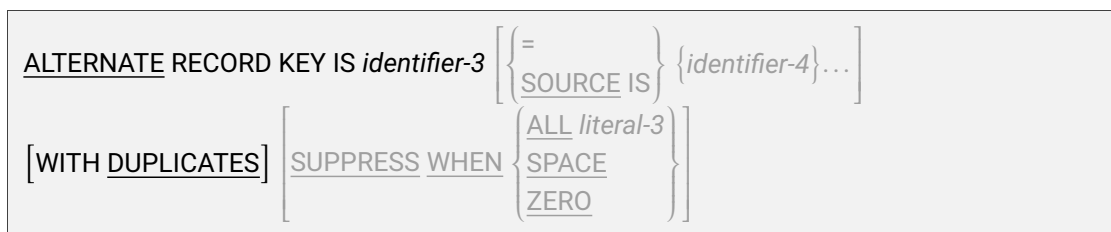
6. Environment division



where *access-mode-clause* is



where *alternative-record-key-clause* is



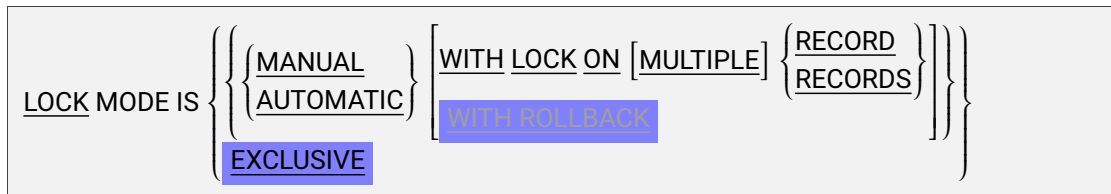
where *collating-sequence-clause* is



where *file-status-clause* is



where *lock-mode-clause* is



where *organization-clause* is

6. Environment division

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

where *padding-character-clause* is

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

where *record-delimiter-clause* is

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

where *record-key-clause* is

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

where *relative-key-clause* is

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

where *reserve-clause* is

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

where *sharing-clause* is

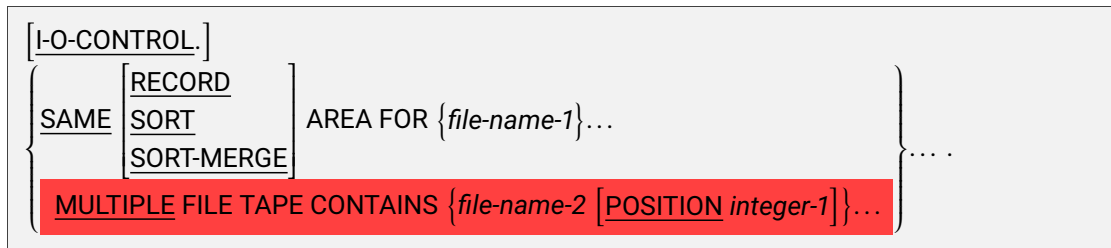
$$\text{SHARING WITH} \left\{ \begin{array}{l} \text{ALL OTHER} \\ \text{NO OTHER} \\ \text{READ ONLY} \end{array} \right\}$$

Syntax rules

General rules

6. Environment division

6.2.2. I-O-CONTROL paragraph



Syntax rules

General rules

7. Data division

```
[DATA DIVISION.]  
[file-section]  
[working-storage-section]  
[communication-section]  
[local-storage-section]  
[report-section]  
[screen-section]
```

Syntax rules

General rules

7.1. File section

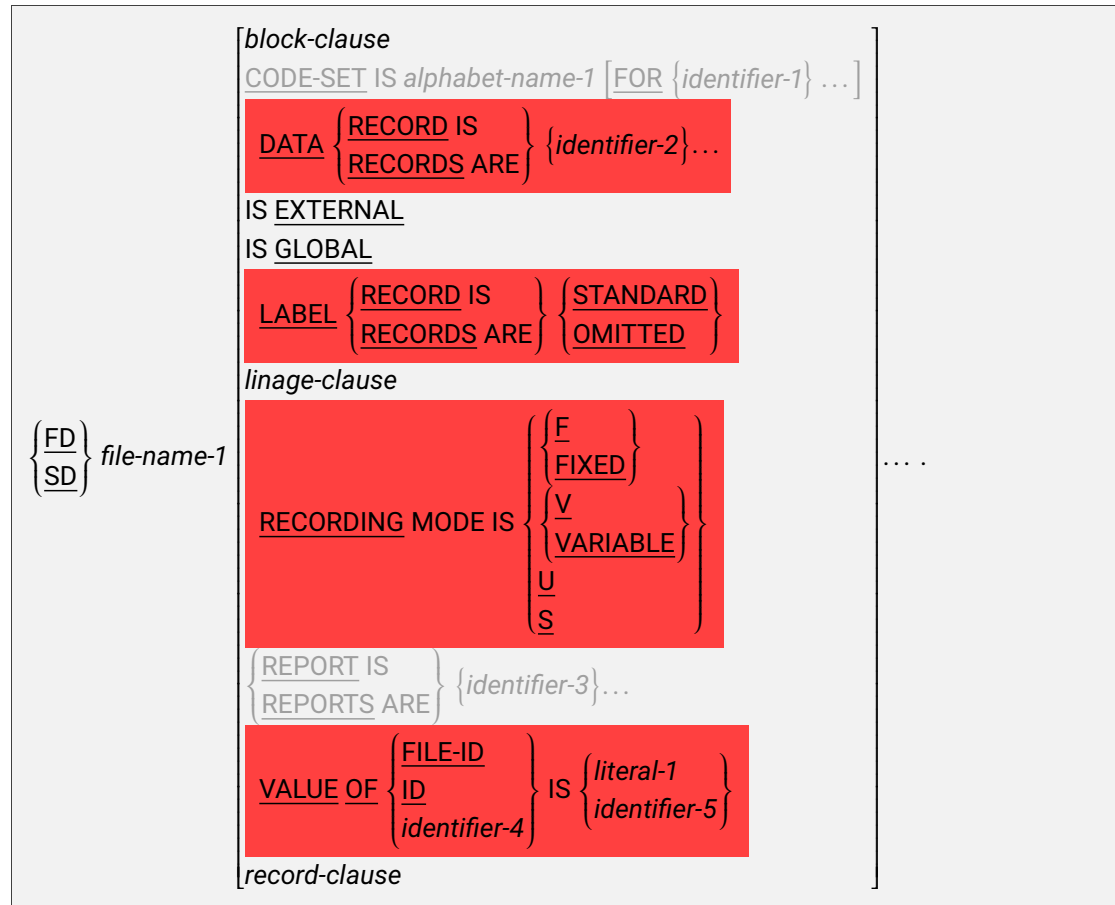
```
[FILE SECTION.]  
{file-description-entry {record-description } ... } ...
```


7. Data division

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)
}
    
```

7. Data division

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

```
REPORT SECTION.
  [constant-definition]
  [report-description] ...
```

Syntax rules

General rules

7.6.1. Report description

```
RD report-name-1

  [IS GLOBAL
  CODE IS { identifier-1
           literal-1 }
  { CONTROL IS
    CONTROLS ARE } FINAL { identifier-2 } ...
  PAGE [LIMIT IS
        LIMITS ARE] integer-1 [LINE
                                LINES] [integer-2 { COLUMNNS
                                                    COLS }]]
  {report-group-description-1} ...
```

where *report-group-description* is

7. Data division

<i>level-number entry-name</i>	<i>blank-clause</i> <i>column-clause</i> <u>GROUP INDICATE</u> <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> <u>USAGE IS DISPLAY</u> <i>value-clause</i> <i>varying-clause</i>
--------------------------------	--

Syntax rules

General rules

7.7. Screen section

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

Syntax rules

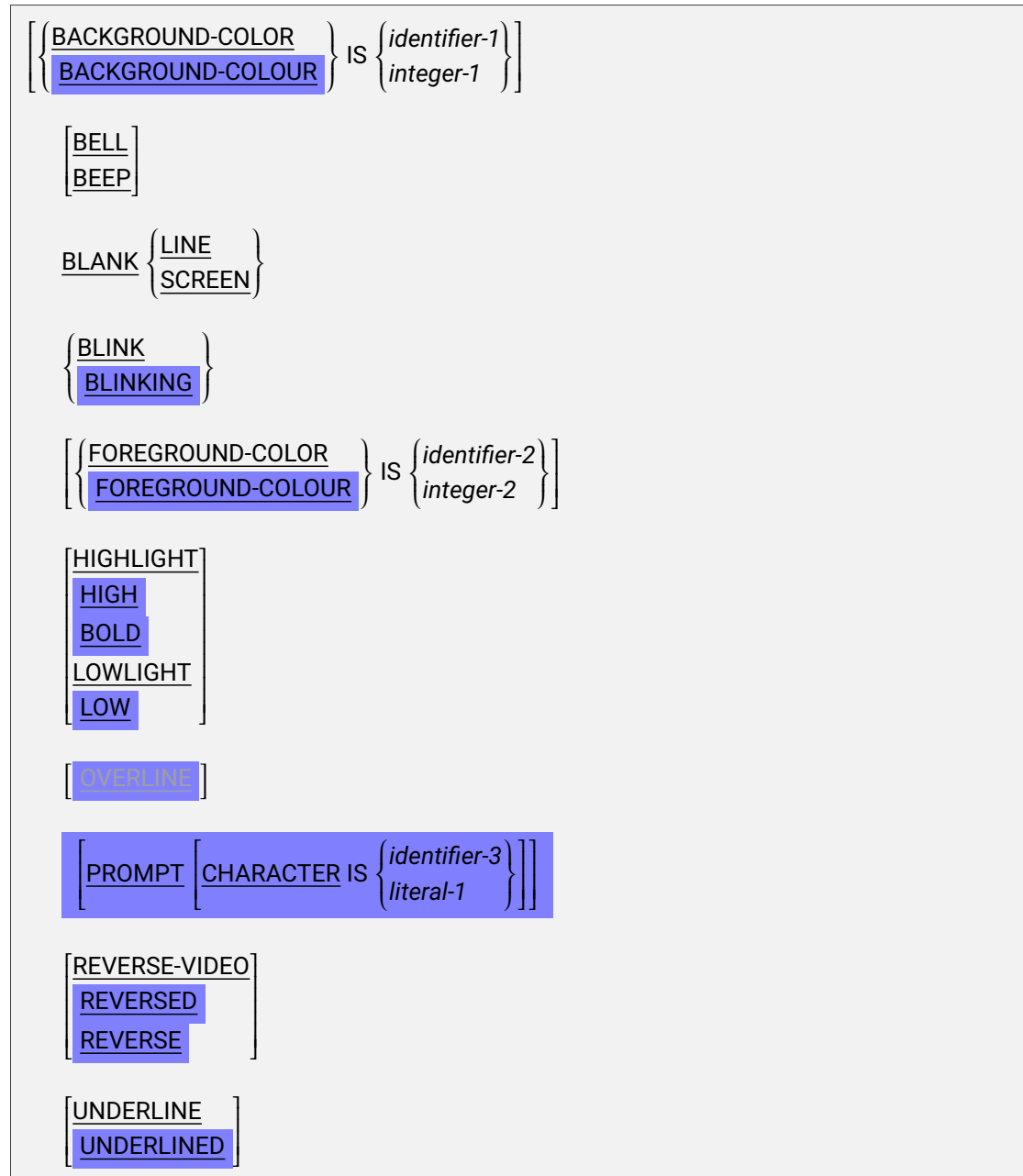
General rules

7.7.1. Screen description



where *appearance-attribute-clauses* is

7. Data division



where *source-destination-clauses* is

7. Data division

[FROM { *identifier-4*
literal-2 }]

[TO *identifier-5*]

[USING *identifier-6*]

Syntax rules

General rules

7.8. Record description

Format 1 (data-description)

<i>level-number entry-name</i>	<p> <u>ANY</u> { <u>LENGTH</u> <u>NUMERIC</u> } <i>blank-clause</i> <u>IS EXTERNAL</u> [<u>AS</u> <i>literal-1</i>] <u>IS GLOBAL</u> <i>justified-clause</i> <i>occurs-clause</i> <u>PICTURE</u> <i>picture-string-1</i> <u>REDEFINES</u> <i>identifier-1</i> <i>sign-clause</i> { <u>SYNCHRONIZED</u> <u>SYNCHRONISED</u> } [<u>LEFT</u> <u>RIGHT</u>] <i>usage-clause</i> <i>value-clause</i> </p>
--------------------------------	--	-------

Format 2 (renames)

66 <i>identifier-2</i> <u>RENAMES</u> <i>identifier-3</i> { { <u>THROUGH</u> <u>THRU</u> } } <i>identifier-4</i> .

Format 3 (condition-name)

88 <i>identifier-5</i> { <u>VALUE</u> <u>VALUES</u> } [<u>IS</u> <u>ARE</u>] { <i>literal-2</i> [{ <u>THROUGH</u> <u>THRU</u> } } <i>literal-3</i>] } ... [<u>WHEN SET TO</u> <u>FALSE</u> <u>IS</u> <i>literal-4</i>].

7. *Data division*

Syntax rules

General rules

7.9. Constant definition

Format 1 (standard)

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

Format 2 (micro-focus)

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

Syntax rules

General rules

7.10. Data division clauses

7.10.1. BLANK WHEN ZERO clause

BLANK WHEN ZERO

Syntax rules

General rules

7. Data division

7.10.2. BLOCK clause

BLOCK CONTAINS *integer-1* [TO *integer-2*] [CHARACTERS
RECORDS]

Syntax rules

General rules

7.10.3. COLUMN clause

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. Data division

7.10.4. Entry name

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

Syntax rules

General rules

7. Data division

7.10.5. JUSTIFIED clause

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

Syntax rules

General rules

7.10.6. LINAGE clause

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

Syntax rules

General rules

7.10.7. LINE clause

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. Data division

7.10.8. 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

7.10.9. NEXT GROUP clause

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

Syntax rules

General rules

7. Data division

7.10.10. OCCURS clause

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)
{ (DESCENDING) } 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

Syntax rules

General rules

7. Data division

7.10.11. PRESENT WHEN clause

PRESENT WHEN *condition-1*

Syntax rules

General rules

7.10.12. RECORD clause

<p><u>RECORD</u> { CONTAINS <i>integer-1</i> [<u>TO</u> <i>integer-2</i>] CHARACTERS IS <u>VARYING</u> in size [FROM <i>integer-3</i>] [<u>TO</u> <i>integer-4</i>] CHARACTERS <u>DEPENDING ON</u> <i>identifier-1</i> }</p>
--

Syntax rules

General rules

7. Data division

7.10.13. SIGN clause

SIGN IS $\left\{ \begin{array}{l} \text{LEADING} \\ \text{TRAILING} \end{array} \right\} [\text{SEPARATE CHARACTER}]$

Syntax rules

General rules

7. Data division

7.10.14. SOURCE clause

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

Syntax rules

General rules

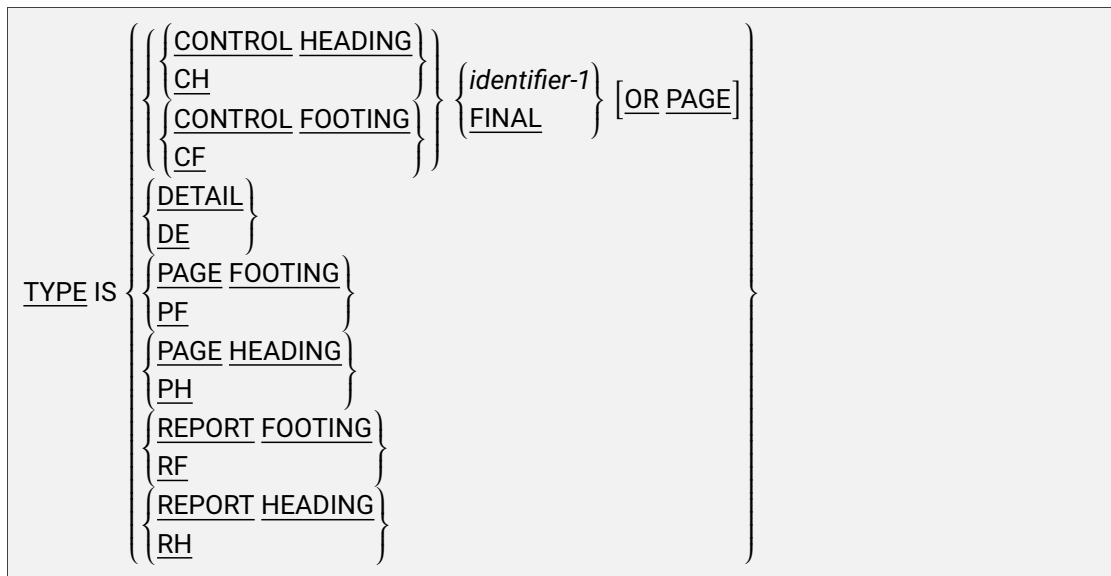
7.10.15. SUM clause

SUM OF {*number-1*}... [RESET ON {*identifier-1*}
FINAL }]

Syntax rules

General rules

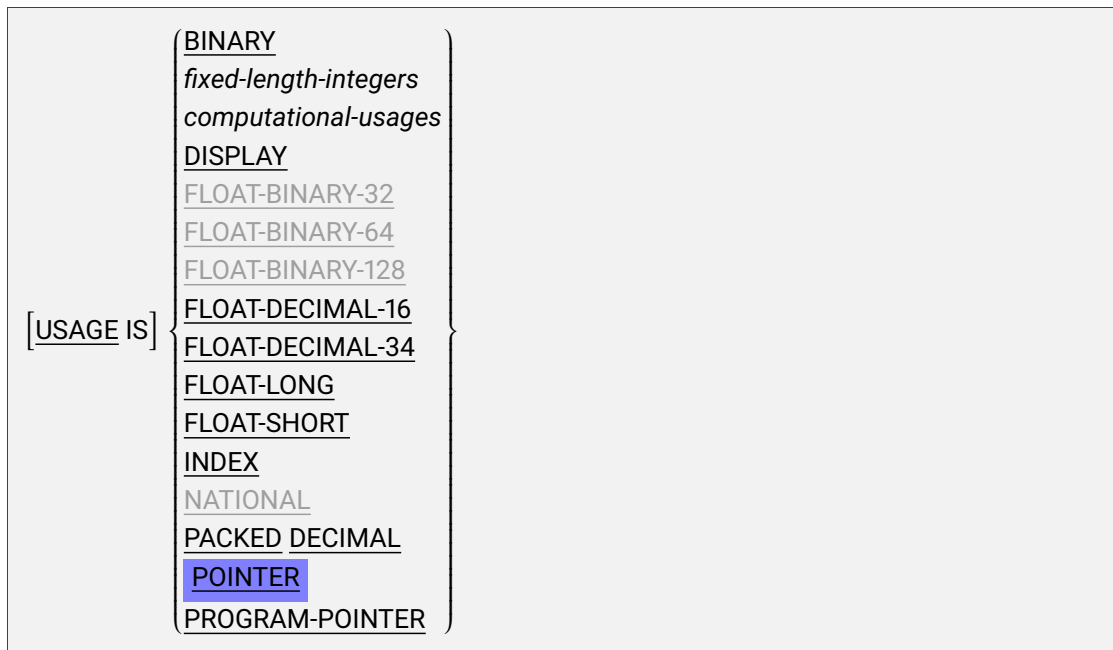
7.10.16. TYPE clause



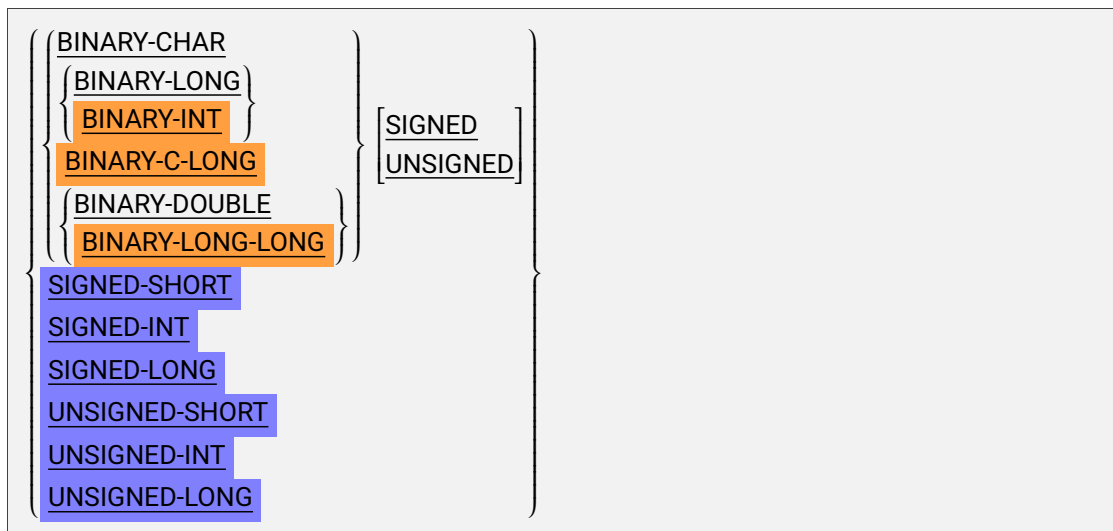
Syntax rules

General rules

7.10.17. USAGE clause

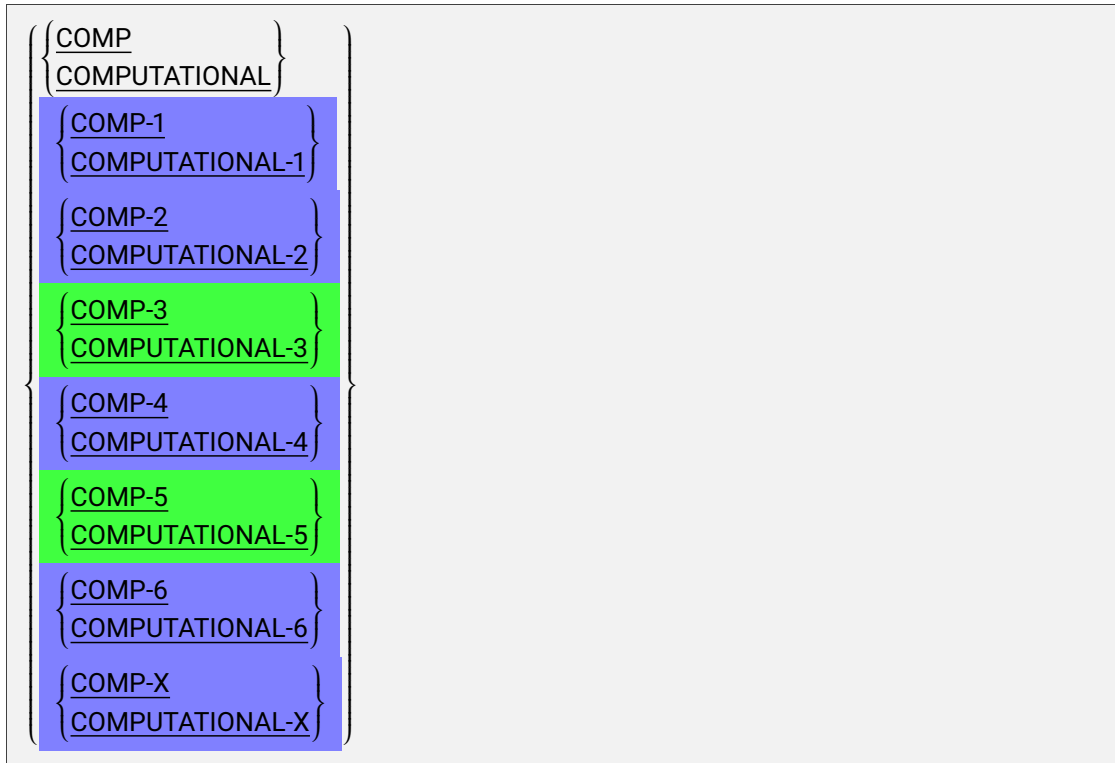


where *fixed-length-integers* is



where *computation-usages* is

7. Data division



Syntax rules

General rules

7.10.18. VALUE clause

Format 1 (initialization)

$\left\{ \begin{array}{l} \underline{\text{VALUE}} \\ \underline{\text{VALUES}} \end{array} \right\} \left[\begin{array}{l} \text{IS} \\ \text{ARE} \end{array} \right] \text{literal-1}$

Format 2 (condition)

$\left\{ \begin{array}{l} \underline{\text{VALUE}} \\ \underline{\text{VALUES}} \end{array} \right\} \left[\begin{array}{l} \text{IS} \\ \text{ARE} \end{array} \right] \left\{ \text{literal-2} \left[\begin{array}{l} \underline{\text{THROUGH}} \\ \underline{\text{THRU}} \end{array} \right] \text{literal-3} \right\} \dots$
[WHEN SET TO FALSE IS *literal-4*]

Syntax rules

General rules

7. Data division

7.10.19. VARYING clause

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

Syntax rules

General rules

8. Procedure division

```

PROCEDURE DIVISION [using-chaining-clause] [RETURNING {identifier-1}
{OMITTED}].
[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

8.1. Common phrases

8.1.1. RETRY phrase

```

RETRY { FOR arithmetic-expression-1 TIMES
       FOR arithmetic-expression-2 SECONDS
       FOREVER }

```

8. Procedure division

Syntax rules

General rules

8.1.2. **ROUNDED** phrase

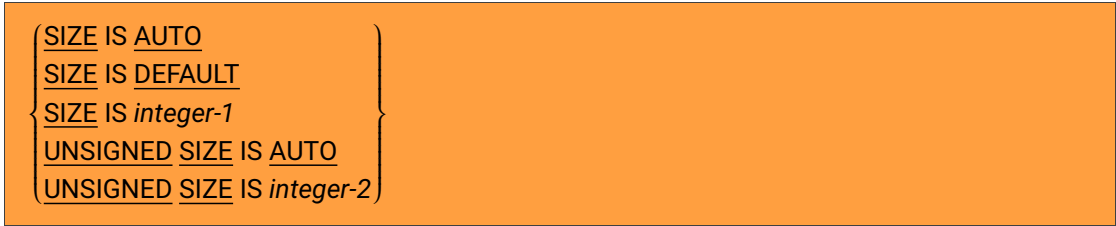
<u>ROUNDED</u>	<u>MODE IS</u>	{ <u>AWAY-FROM-ZERO</u> <u>NEAREST-AWAY-FROM-ZERO</u> <u>NEAREST-EVEN</u> <u>NEAREST-TOWARD-ZERO</u> <u>PROHIBITED</u> <u>TOWARD-GREATER</u> <u>TOWARD-LESSER</u> <u>TRUNCATION</u> }
----------------	----------------	--

Syntax rules

General rules

8. Procedure division

8.1.3. 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

8.2. ACCEPT statement

Format 1 (device)

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

Format 2 (screen)

```
ACCEPT { identifier-2 }
  {
    {
      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

8. Procedure division

[WITH { BELL }
 { BEEP }]

[WITH { BLINK }
 { BLINKING }]

[WITH { HIGHLIGHT }
 { HIGH }
 { BOLD }
 { LOWLIGHT }
 { LOW }]

[WITH LEFTLINE]

[WITH OVERLINE]

[WITH PROMPT [CHARACTER IS { *identifier-6* }
 { *literal-1* }]]

[WITH { REVERSE-VIDEO }
 { REVERSED }
 { REVERSE }]

[WITH PROTECTED SIZE IS { *identifier-7* }
 { *integer-4* }]

[WITH { UNDERLINE }
 { UNDERLINED }]

[WITH { FOREGROUND-COLOR } IS { *identifier-8* }
 { FOREGROUND-COLOUR } IS { *integer-5* }]

[WITH { BACKGROUND-COLOR } IS { *identifier-9* }
 { BACKGROUND-COLOUR } IS { *integer-6* }]

[WITH SCROLL { UP } [{ *identifier-10* } { LINE }]
 { DOWN } [{ *integer-7* } { LINES }]]

where *accept-attribute-clauses* is

8. Procedure division

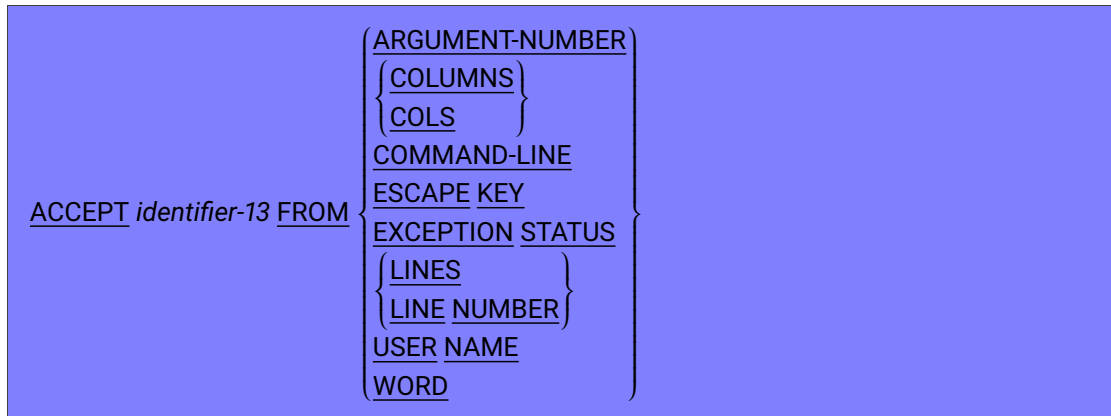
$\left[\text{WITH } \left\{ \begin{array}{l} \text{AUTO} \\ \text{TAB} \end{array} \right\} \right]$
$\left[\text{WITH } \left\{ \begin{array}{l} \text{CONVERSION} \\ \text{CONVERT} \end{array} \right\} \right]$
$\left[\text{WITH } \left\{ \begin{array}{l} \text{FULL} \\ \text{LENGTH-CHECK} \end{array} \right\} \right]$
$\left[\text{WITH } \left\{ \begin{array}{l} \text{LOWER} \\ \text{UPPER} \end{array} \right\} \right]$
$\left[\text{WITH } \left\{ \begin{array}{l} \text{NO-ECHO} \\ \text{NO ECHO} \\ \text{OFF} \end{array} \right\} \right]$
$\left[\text{WITH } \left\{ \begin{array}{l} \text{REQUIRED} \\ \text{EMPTY-CHECK} \end{array} \right\} \right]$
$\left[\text{WITH } \underline{\text{SECURE}} \right]$
$\left[\text{WITH } [\underline{\text{NO}}] \left\{ \begin{array}{l} \text{DEFAULT} \\ \text{UPDATE} \end{array} \right\} \right]$
$\left[\left\{ \begin{array}{l} \text{WITH } \left\{ \begin{array}{l} \text{TIMEOUT} \\ \text{TIME-OUT} \end{array} \right\} \text{ AFTER} \\ \text{BEFORE TIME} \end{array} \right\} \left\{ \begin{array}{l} \text{identifier-11} \\ \text{integer-8} \end{array} \right\} \right]$

Format 3 (temporal)

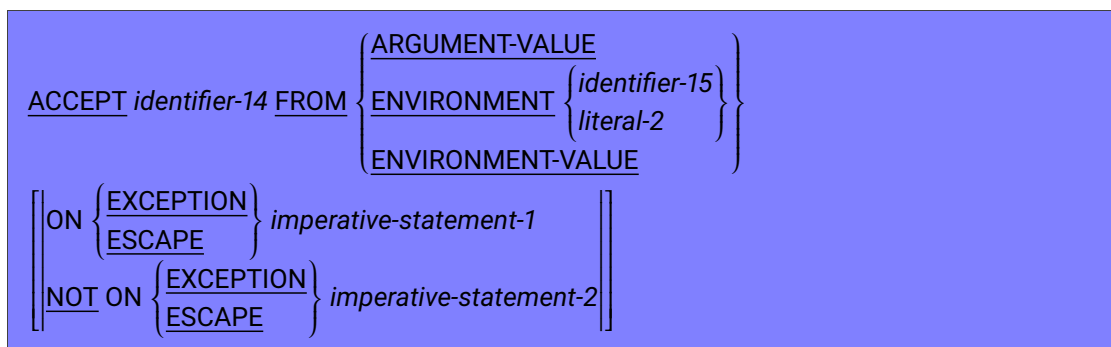
$\underline{\text{ACCEPT}} \text{ identifier-12 } \underline{\text{FROM}} \left\{ \begin{array}{l} \text{DATE } [\underline{\text{YYYYMMDD}}] \\ \text{DAY } [\underline{\text{YYYYDDD}}] \\ \text{DAY-OF-WEEK} \\ \text{TIME} \end{array} \right\}$
--

Format 4 (environment)

8. Procedure division



Format 5 (environment-exception)



Format 6 (message)



Syntax rules

General rules

8.3. ADD statement

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)

```

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]

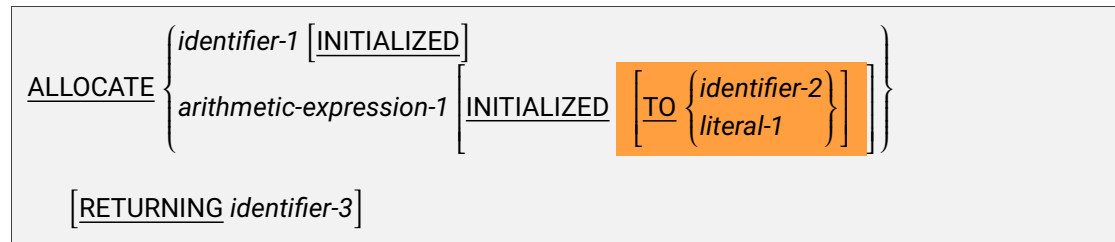
```

8. Procedure division

Syntax rules

General rules

8.4. ALLOCATE statement



Syntax rules

General rules

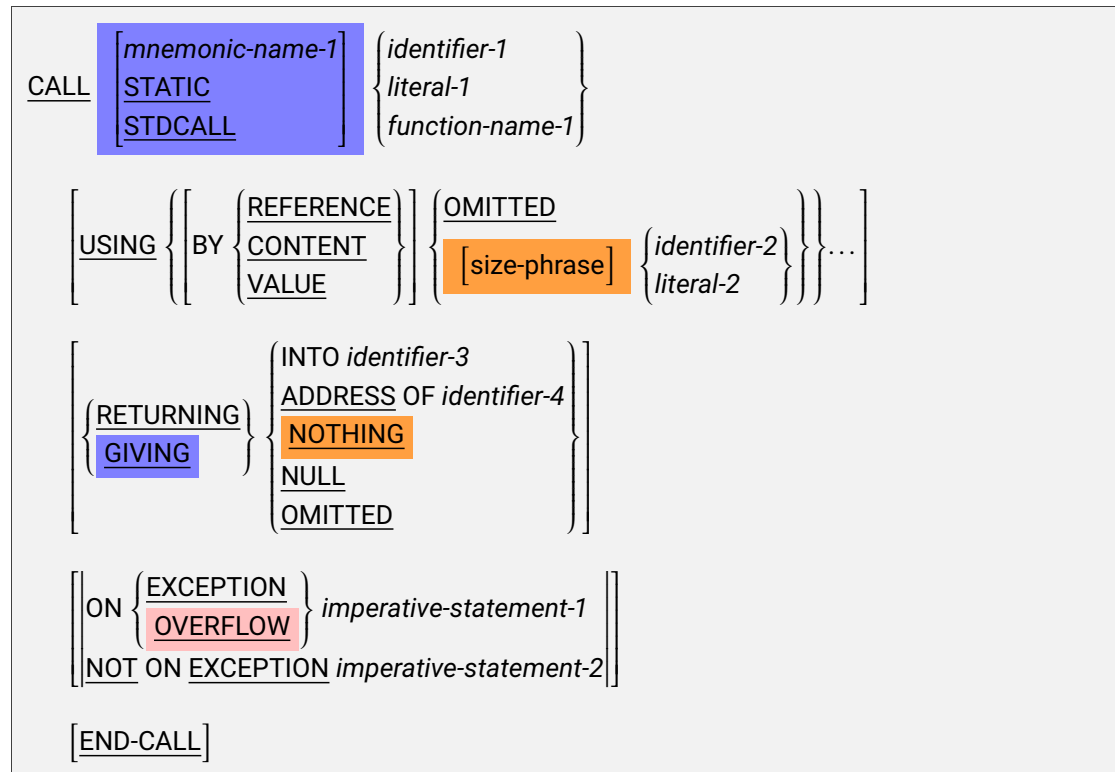
8.5. ALTER statement

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

Syntax rules

General rules

8.6. CALL statement



Syntax rules

General rules

8.7. CANCEL statement

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

Syntax rules

General rules

8.8. CLOSE statement

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

Syntax rules

General rules

8.9. COMMIT statement

COMMIT

Syntax rules

General rules

8.10. COMPUTE statement

COMPUTE {*identifier-1* [*rounded-phrase*]} ... {
= EQUAL
EQUALS } *arithmetic-expression-1*

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

[END-COMPUTE]

Syntax rules

General rules

8.11. CONTINUE statement

CONTINUE

Syntax rules

General rules

8.12. DELETE statement

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

8.13. DISABLE statement



Syntax rules

General rules

8.14. DISPLAY statement

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)

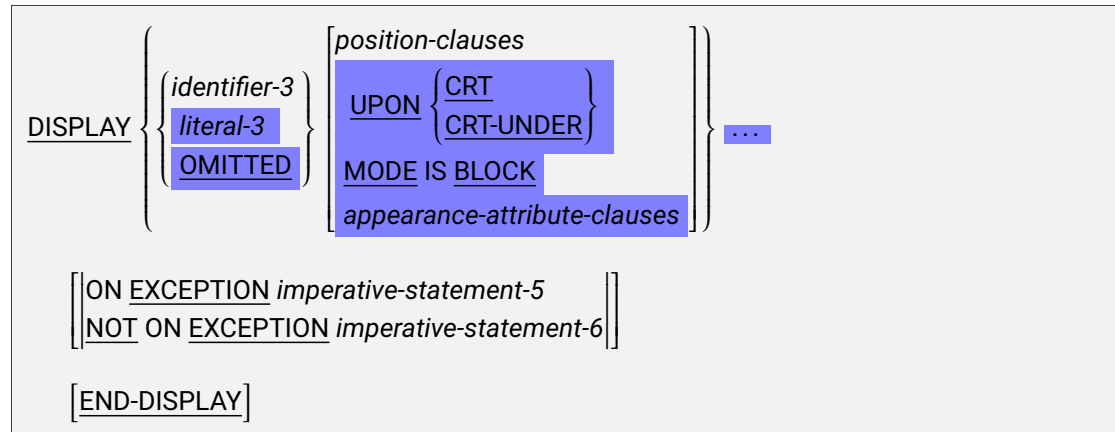
```

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 ]

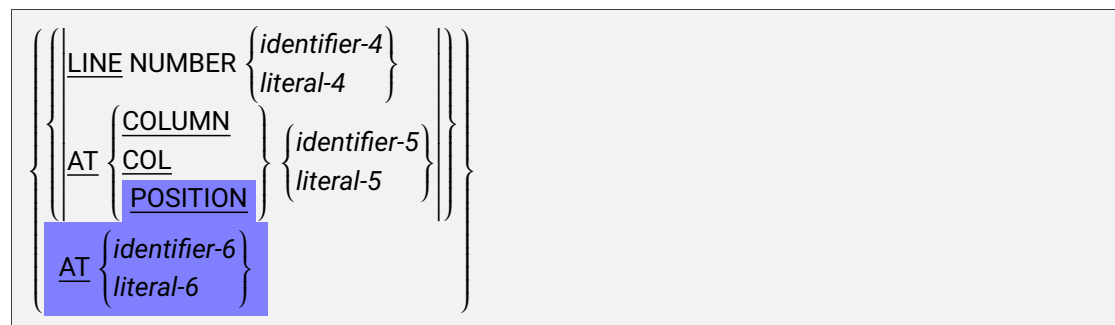
```

Format 3 (screen)

8. Procedure division

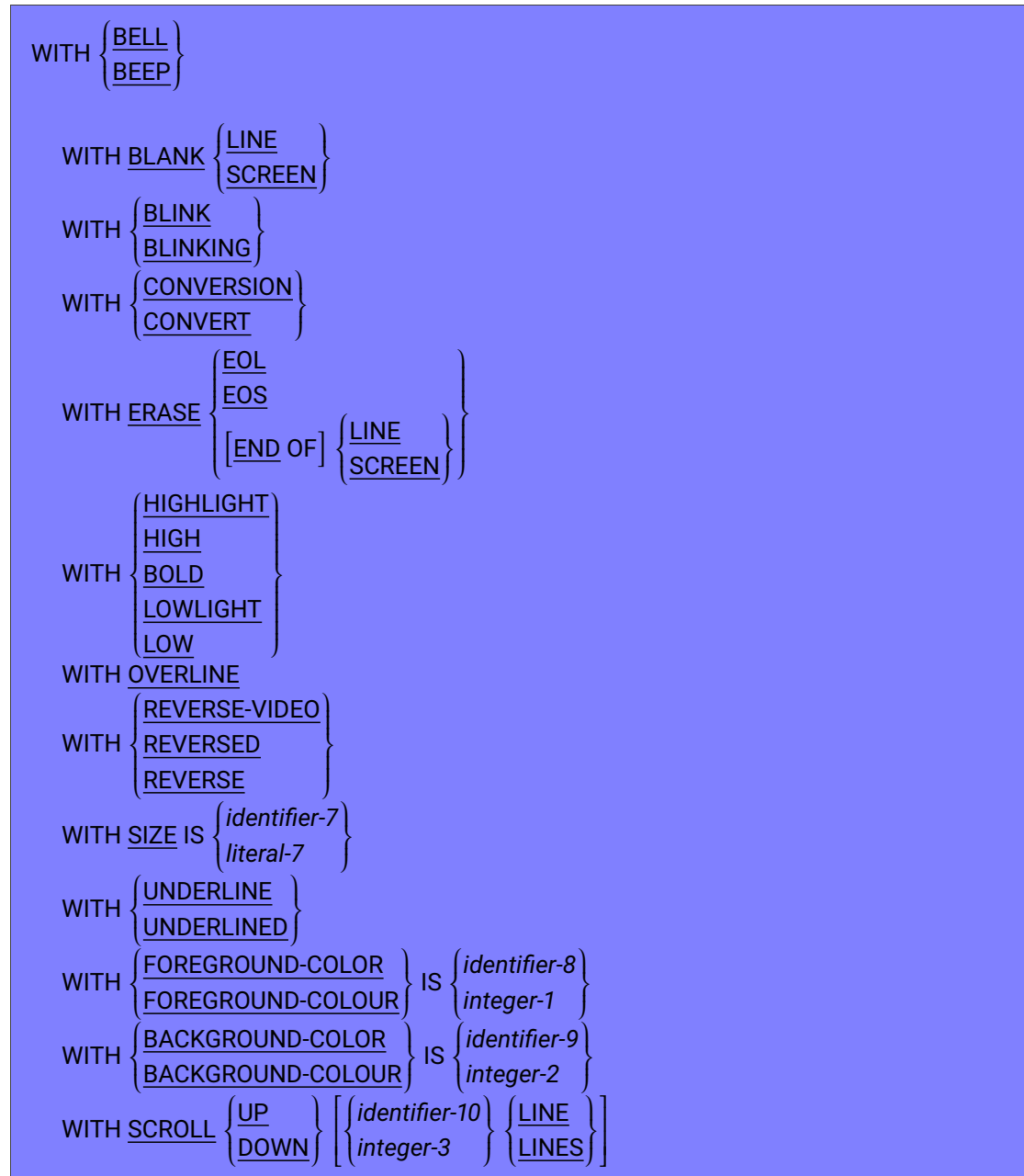


where *position-clauses* is



where *appearance-attribute-clauses* is

8. Procedure division



Syntax rules

General rules

8.15. DIVIDE statement

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)

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

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

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

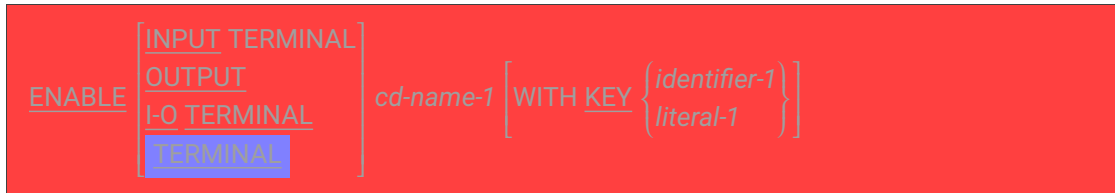
$$\left[\begin{array}{l} \text{ON SIZE ERROR imperative-statement-3} \\ \text{NOT ON SIZE ERROR imperative-statement-4} \end{array} \right]$$

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

Syntax rules

General rules

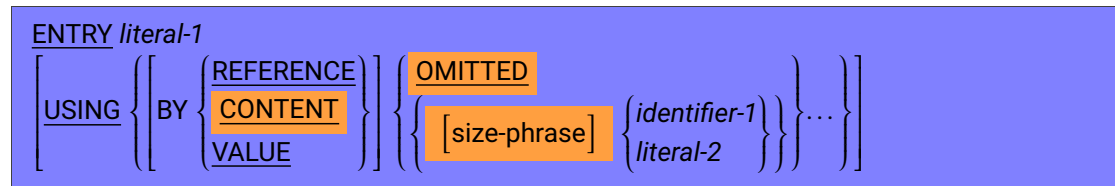
8.16. ENABLE statement



Syntax rules

General rules

8.17. ENTRY statement



Syntax rules

General rules

8.18. EVALUATE statement

$$\text{EVALUATE } \left\{ \begin{array}{l} \text{expression-1} \\ \text{TRUE} \\ \text{FALSE} \end{array} \right\} \left[\text{ALSO } \left\{ \begin{array}{l} \text{expression-2} \\ \text{TRUE} \\ \text{FALSE} \end{array} \right\} \right] \dots$$

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

[WHEN OTHER *imperative-statement-2*]

[END-EVALUATE]

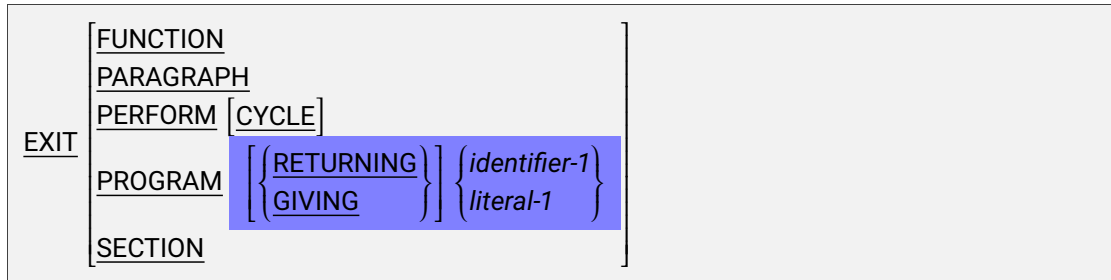
where *selection-object* is

$$\left\{ \begin{array}{l} \text{partial-expression-1 } \left\{ \begin{array}{l} \text{THROUGH} \\ \text{THRU} \end{array} \right\} \text{expression-3} \\ \text{ANY} \\ \text{TRUE} \\ \text{FALSE} \end{array} \right\}$$

Syntax rules

General rules

8.19. EXIT statement



Syntax rules

General rules

8.20. FREE statement

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

Syntax rules

General rules

8.21. GENERATE statement

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

Syntax rules

General rules

8.22. GO TO statement

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

Syntax rules

General rules

8.23. GOBACK statement

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

Syntax rules

General rules

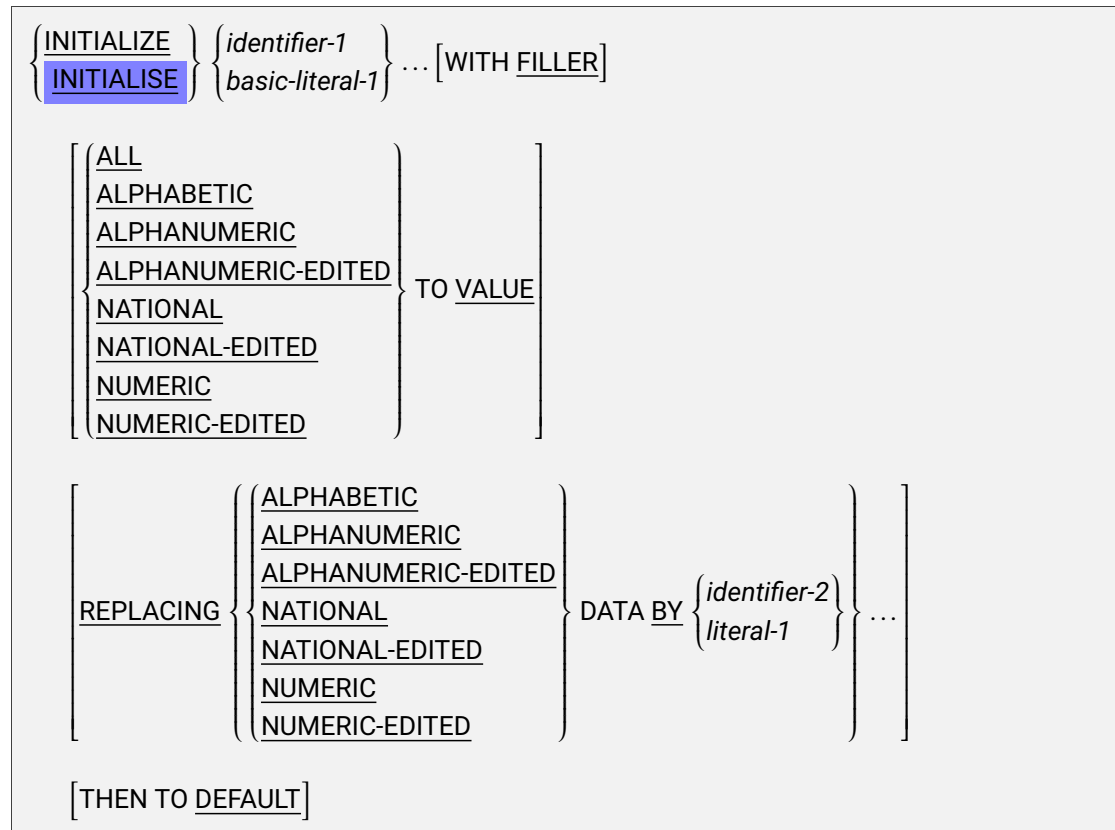
8.24. IF statement

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

Syntax rules

General rules

8.25. INITIALIZE statement



Syntax rules

General rules

8.26. INITIATE statement

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

Syntax rules

General rules

8.27. INSPECT statement

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

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

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

8.28. MERGE statement

```
MERGE identifier-1 [ ON { ASCENDING }  
                   { DESCENDING } 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 }  
        { THRU } procedure-name-2 ] ] ]
```

Syntax rules

General rules

8.29. MOVE statement

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

Syntax rules

General rules

8.30. MULTIPLY statement

Format 1 (simple)

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

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

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

Format 2 (giving)

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

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

$$\left[\left[\text{ON SIZE ERROR imperative-statement-3} \right. \right. \\ \left. \left. \text{NOT ON SIZE ERROR imperative-statement-4} \right] \right]$$

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

Syntax rules

General rules

8.31. NEXT SENTENCE statement

NEXT SENTENCE

Syntax rules

General rules

8.32. OPEN statement

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

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

8.33. PERFORM statement

Format 1 (procedure)

$$\underline{\text{PERFORM}} \text{ procedure-name-1 } \left[\left\{ \begin{array}{l} \underline{\text{THROUGH}} \\ \underline{\text{THRU}} \end{array} \right\} \text{ procedure-name-2} \right] \left[\begin{array}{l} \underline{\text{FOREVER}} \\ \text{times-phrase} \\ \text{until-phrase} \\ \text{varying-phrase} \end{array} \right]$$

Format 2 (inline)

$$\underline{\text{PERFORM}} \left[\begin{array}{l} \underline{\text{FOREVER}} \\ \text{times-phrase} \\ \text{until-phrase} \\ \text{varying-phrase} \end{array} \right] \text{ imperative-statement-1 } \left[\underline{\text{END-PERFORM}} \right]$$

where *times-phrase* is

$$\left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \\ \text{function-name-1} \end{array} \right\} \underline{\text{TIMES}}$$

where *until-phrase* is

$$\left[\underline{\text{WITH TEST}} \left\{ \begin{array}{l} \underline{\text{BEFORE}} \\ \underline{\text{AFTER}} \end{array} \right\} \right] \underline{\text{UNTIL}} \left\{ \begin{array}{l} \text{condition-1} \\ \underline{\text{EXIT}} \end{array} \right\}$$

and where *varying-phrase* is

$$\left[\underline{\text{WITH TEST}} \left\{ \begin{array}{l} \underline{\text{BEFORE}} \\ \underline{\text{AFTER}} \end{array} \right\} \right]$$

$$\underline{\text{VARYING}} \text{ identifier-2 } \underline{\text{FROM}} \left\{ \begin{array}{l} \text{identifier-3} \\ \text{literal-2} \end{array} \right\} \underline{\text{BY}} \left\{ \begin{array}{l} \text{identifier-4} \\ \text{literal-3} \end{array} \right\} \underline{\text{UNTIL}} \text{ condition-2}$$

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

8. Procedure division

Syntax rules

General rules

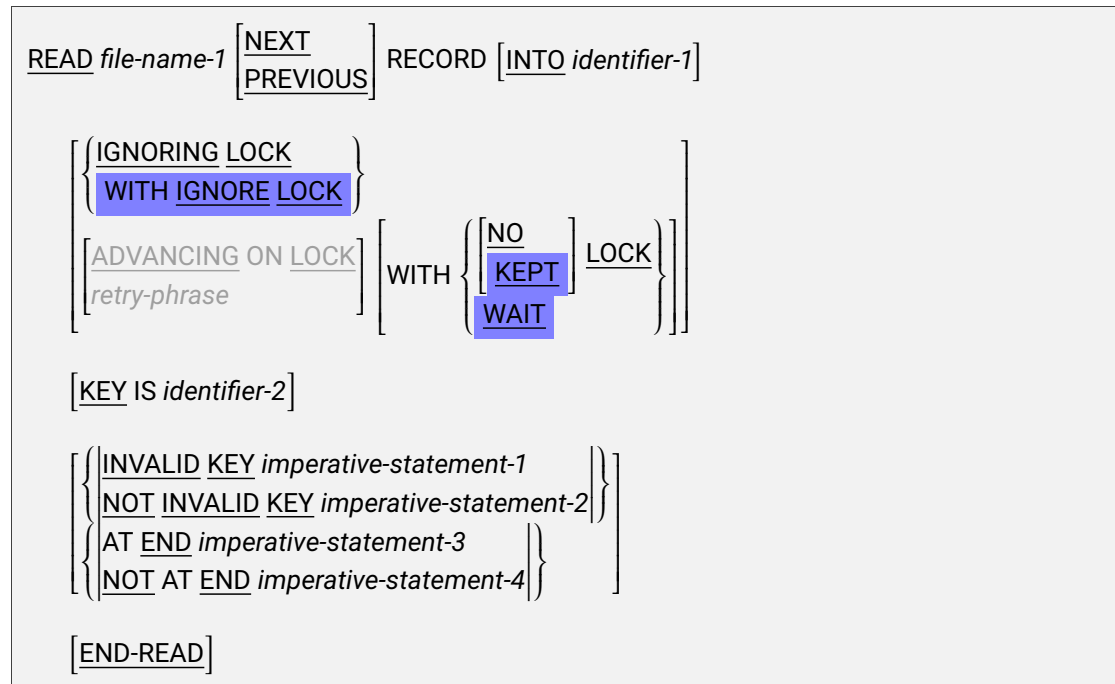
8.34. PURGE statement

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

Syntax rules

General rules

8.35. READ statement



Syntax rules

General rules

8.36. READY statement

READY TRACE

Syntax rules

General rules

8.37. RECEIVE statement

```
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

8.38. RELEASE statement

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

Syntax rules

General rules

8.39. RESET statement

RESET TRACE

Syntax rules

General rules

8.40. RETURN statement

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

8.41. REWRITE statement

```
REWRITE record-name-1 [ FROM { identifier-1  
                                literal-1  
                                function-name-1 } ] [retry-phrase] [ WITH [ NO ] LOCK ]  
  
[[ INVALID KEY imperative-statement-1  
  NOT INVALID KEY imperative-statement-2 ]]  
[ END-REWRITE ]
```

Syntax rules

General rules

8.42. ROLLBACK statement

ROLLBACK

Syntax rules

General rules

8.43. SEARCH statement

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

8.44. SEND statement

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 }
      { { identifier-4 } [ LINE ]
        { literal-1 } [ LINES ]
        mnemonic-name-1
        PAGE }
      [REPLACING LINE]
```

Syntax rules

General rules

8.45. SET statement

Format 1 (simple)

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

Format 2 (entry)

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

Format 3 (environment)

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

Format 4 (attribute)

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

8. Procedure division

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

Syntax rules

General rules

8.46. SORT statement

```

SORT identifier-1 [ ON { ASCENDING } KEY [identifier-2]... ] ...
    [ WITH DUPLICATES [ IN ORDER ] ]
    [ COLLATING SEQUENCE IS identifier-3 ]
    [ USING { file-name-1 }...
      [ INPUT PROCEDURE IS procedure-name-1 [ { THROUGH } procedure-name-2 ] ] ]
    [ GIVING { file-name-2 }...
      [ OUTPUT PROCEDURE IS procedure-name-3 [ { THROUGH } procedure-name-4 ] ] ]

```

Syntax rules**General rules**

8.47. START statement

```
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

8.48. STOP statement

Format 1 (standard)

<u>STOP RUN</u>	$\left\{ \begin{array}{l} \text{RETURNING} \\ \text{GIVING} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \end{array} \right\}$	
	<u>WITH</u>	$\left\{ \begin{array}{l} \text{ERROR} \\ \text{NORMAL} \end{array} \right\}$	<u>STATUS</u> $\left[\begin{array}{l} \text{identifier-2} \\ \text{literal-2} \end{array} \right]$

Format 2 (literal)

STOP *literal-3*

Format 3 (ACUCOBOL)

STOP RUN $\left\{ \begin{array}{l} \text{identifier-3} \\ \text{literal-4} \end{array} \right\}$

Syntax rules

General rules

8.49. STRING statement

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

[WITH POINTER IS *identifier-4*]

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

Syntax rules

General rules

8.50. SUBTRACT statement**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)

```

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]

```

8. Procedure division

Syntax rules

General rules

8.51. SUPPRESS statement

```
SUPPRESS PRINTING
```

Syntax rules

General rules

8.52. TERMINATE statement

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

Syntax rules

General rules

8.53. TRANSFORM statement

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

Syntax rules

General rules

8.54. UNLOCK statement

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

Syntax rules

General rules

8.55. UNSTRING statement

UNSTRING *identifier-1*

[DELIMITED BY [ALL] {*identifier-2*} {*literal-1*} } {OR [ALL] {*identifier-3*} {*literal-2*} } } ...]

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

8.56. USE statement

Format 1 (file exception)

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

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

Format 2 (debugging)

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

Format 3 (start/end)

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

Format 4 (reporting)

USE [GLOBAL] BEFORE REPORTING *identifier-2*

Format 5 (exception)

8. Procedure division

USE { EXCEPTION-CONDITION }
 { EC }

Syntax rules

General rules

8.57. WRITE statement**Format 1 (sequential)**

$$\begin{array}{l}
 \underline{\text{WRITE}} \text{ record-name-1 } \left[\underline{\text{FROM}} \left\{ \begin{array}{l} \text{identifier-1} \\ \text{literal-1} \\ \text{function-name-1} \end{array} \right\} \right] \\
 \\
 \left[\left\{ \begin{array}{l} \underline{\text{BEFORE}} \\ \underline{\text{AFTER}} \end{array} \right\} \text{ ADVANCING } \left\{ \begin{array}{l} \left\{ \begin{array}{l} \text{identifier-2} \\ \text{literal-2} \end{array} \right\} \left[\begin{array}{l} \underline{\text{LINE}} \\ \underline{\text{LINES}} \end{array} \right] \\ \text{mnemonic-name-1} \\ \underline{\text{PAGE}} \end{array} \right\} \right] \\
 \\
 [\text{retry-phrase}] [\text{WITH } [\underline{\text{NO}}] \underline{\text{LOCK}}] \\
 \\
 \left[\left[\begin{array}{l} \underline{\text{AT}} \left\{ \begin{array}{l} \underline{\text{END-OF-PAGE}} \\ \underline{\text{EOP}} \end{array} \right\} \text{imperative-statement-1} \\ \underline{\text{NOT AT}} \left\{ \begin{array}{l} \underline{\text{END-OF-PAGE}} \\ \underline{\text{EOP}} \end{array} \right\} \text{imperative-statement-2} \end{array} \right] \right] \\
 \\
 [\underline{\text{END-WRITE}}]
 \end{array}$$
Format 2 (random)

8. Procedure division

```
WRITE record-name-2 [ FROM { identifier-3  
                           literal-3  
                           function-name-2 } ]  
  
[ { BEFORE  
  AFTER } ADVANCING { { identifier-4 } [ LINE  
                           literal-4 } [ LINES ] ] ]  
                        mnemonic-name-2  
                        PAGE  
  
[ retry-phrase ] [ WITH [ NO ] LOCK ]  
  
[ [ INVALID KEY imperative-statement-3  
  NOT INVALID KEY imperative-statement-4 ] ]  
[ END-WRITE ]
```

Syntax rules

General rules

9. Intrinsic functions

9.1. ABS function

```
FUNCTION ABS (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

FUNCTION EXCEPTION-LOCATION

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)`

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

`FUNCTION TRIM (argument-1 [LEADING] [TRAILING])`

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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