

GnuCOBOL Quick Reference

For Version 3.2 - Final [3 June 2024 at 18:40 GMT.], for 3.3 and 4.0 (partial & tentative only).

Gary L. Cutler (cutlergl@gmail.com).
Vincent B. Coen (vbcoen@gmail.com) for all updates.

This manual documents GnuCOBOL 3.2 - Final, 3 June 2024 at 18:40 GMT. build.
Document Copyright 2009-2014 Gary L. Cutler, FSF (Free Software Foundation).
Updates: Copyright 2014-2024 Vincent B. Coen, Gary L. Cutler & FSF.

The authors and copyright holders of the COBOL programming language itself used herein:

FLOW-MATIC (trademark for Sperry Rand Corporation) Programming for the Univac(R) I & II. Data Automation Systems copyrighted 1958, 1959, by Sperry Rand Corporation; IBM commercial translator form F28-8013, copyrighted 1959 by IBM; FACT DSI27A5260-2760, copyrighted 1960 by Minneapolis-Honeywell, have specifically authorised the use of this material in whole or in part of the COBOL specifications. Such authorisation extends to the reproduction & use of COBOL specifications in programming manuals or similar publications.

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License [FDL], Version 1.3 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the section entitled "GNU Free Documentation License".

Permission is granted to make and distribute verbatim copies of this manual provided the copyright notice and this permission notice are preserved on all copies.

Permission is granted to copy and distribute modified versions of this manual under the conditions for verbatim copying, provided that the entire resulting derived work is distributed under the terms of a permission notice identical to this one.

Permission is granted to copy and distribute translations of this manual into another language, under the above conditions for modified versions, except that this permission notice may be stated in a translation approved by the Free Software Foundation.

Table of Contents

1	CDF	1
2	IDENTIFICATION DIVISION Syntax.....	9
3	ENVIRONMENT DIVISION Syntax	11
4	DATA DIVISION Syntax	21
5	PROCEDURE DIVISION Syntax.....	35
6	Intrinsic Functions Syntax	79
7	Built-In Subroutines Syntax	93
8	GNU Free Documentation License	101

1 CDF

When the compiler is operating in Fixed Format Mode, all CDF statements must begin in column eight (8) or beyond.

There are two types of supported CDF statements in GnuCOBOL — Text Manipulation Statements and Compiler Directives.

The CDF text manipulation statements COPY and REPLACE are used to introduce new code into programs either with or without changes, or may be used to modify existing statements already in the program. Text manipulation statements are always terminated with a period.

CDF directives, denoted by the presence of a ">>" character sequence as part of the statement name itself, are used to influence the process of program compilation.

Compiler directives are never terminated with a period.

CDF CALL-CONVENTION Statement Syntax

```
>>CALL-CONVENTION  { COBOL  }
~~~~~               { EXTERN }
                    { STDCALL }
                    { STATIC  }
```

CDF COPY Statement Syntax

```
COPY copybook-name
~~~~
[ IN|OF library-name ]
  ~ ~ ~
[ SUPPRESS PRINTING ]
  ~~~~~
[ REPLACING { Phrase-Clause | String-Clause }... ] .
  ~~~~~
```

CDF COPY Phrase-Clause Syntax

```
{ ==pseudo-text-1== } BY { ==pseudo-text-2== }
{ identifier-1       } ~ { identifier-2       }
{ literal-1          }   { literal-2          }
{ word-1             }   { word-2             }
```

CDF COPY String-Clause Syntax

```
[ LEADING|TRAILING ] ==partial-word-1== BY ==partial-word-2==
~~~~~ ~~~~~ ~~~~~
```

CDF REPLACE Statement (Format 1) Syntax

```
REPLACE [ ALSO ] { Phrase-Clause | String-Clause }... .
~~~~~      ~~~~~
```

CDF REPLACE Statement (Format 2) Syntax

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

CDF REPLACE Phrase-Clause Syntax

```
{ ==pseudo-text-1== } BY { ==pseudo-text-2== }
                        ~~
```

CDF REPLACE String-Clause Syntax

```
[ LEADING|TRAILING ] ==partial-word-1== BY ==partial-word-2==
~~~~~      ~~~~~~      ~~~
```

CDF >>DEFINE Directive Syntax

```

>>DEFINE [ CONSTANT ] cdf-variable-1 AS { OFF                      }
~~~~~      ~~~~~~
                                   { ~~~                      }
                                   { literal-1 [ OVERRIDE ] }
                                   { ~~~~~~                      }
                                   { PARAMETER [ OVERRIDE ] }
                                   ~~~~~~      ~~~~~~

```

CDF >>IF Directive Syntax

```

>>IF CDF-Conditional-Expression-1
~~~~~      [ Program-Source-Lines-1 ]

[ >>ELIF CDF-Conditional-Expression-2
~~~~~      [ Program-Source-Lines-2 ] ]...

[ >>ELSE
~~~~~      [ Program-Source-Lines-3 ] ]

>>END-IF
~~~~~

```

CDF-Conditional-Expression Syntax

```

{ cdf-variable-1 } IS [ NOT ] { DEFINED                      }
{ literal-1      }      ~~~ { ~~~~~~                      }
                                   { SET                      }
                                   { ~~~                      }
                                   { CDF-RelOp { cdf-variable-2 } }
                                   {      { literal-2      } }

```

CDF-RelOp Syntax

```

>=      or      GREATER THAN OR EQUAL TO
~~~~~      ~~~ ~~~~~~

>      or      GREATER THAN
~~~~~

<=      or      LESS THAN OR EQUAL TO
~~~~~      ~~~ ~~~~~~

<      or      LESS THAN
~~~~~

=      or      EQUAL TO
~~~~~

<>      or      EQUAL TO (with "NOT")
~~~~~

```

CDF >>SET Directive Syntax

```

>>SET { [ CONSTANT ] cdf-variable-1 literal-1 ] }
~~~~~ { ~~~~~~ }
      { SOURCEFORMAT AS FIXED|FREE|VARIABLE|XOPEN|XCARD|CRT|TERMINAL|COBOLX }
      { ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ }
      { NOFOLDCOPYNAME }
      { ~~~~~~ }
      { FOLDCOPYNAME AS UPPER|LOWER }
      { ~~~~~~ ~~~~~~ }

```

CDF >>SOURCE Directive Syntax

```

>>SOURCE FORMAT IS { FIXED|FREE|VARIABLE|XOPEN|XCARD|CRT|TERMINAL|COBOLX }
~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~ ~~~~~~

```

CDF >>TURN Directive Syntax

```

>>TURN { exception-name-1 [ file-name-1 ]... }...
~~~~~
      { OFF }
      { ~~~ }
      { CHECKING ON [ WITH LOCATION ] }
      ~~~~~~ ~~~~~~

```


CDF >>D Directive Syntax

```
>>D  
~~~
```

CDF >>DISPLAY Directive Syntax

```
>>DISPLAY source-text [ VCS = version-string ]  
~~~~~ ~~~
```

CDF >>PAGE Directive Syntax

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

CDF >>LISTING Directive Syntax

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

CDF >>LEAP-SECONDS Directive Syntax

```
>>LEAP-SECONDS  
~~~~~
```

The >>LEAP-SECONDS CDF directive is syntactically recognized but is otherwise non-functional.

CDF \$ Directives Syntax

\$ (Dollar) Directives - Active.

These directives are active and have the same function as ones starting with >>:

```
$DEFINE
$DISPLAY ON|OFF
$IF
$ELIF
$ELSE
$ELSE-IF
$END
$SET
```

It is recommended to use the standard directives only instead of the MF directives (when possible) as these have a higher chance for being portable.

\$ (Dollar) Directives - Not Active.

These are NOT active and will produce a warning message:

```
$DISPLAY VCS ...
```

Recognised but otherwise ignored.

```
@OPTIONS options-text
```

Additional Micro-Focus directives accepted :

```
ADDRSV | ADD-RSV literal-1
ADDSYN | ADD-SYN literal-1 = literal-2
ASSIGN "EXTERNAL" | "DYNAMIC"
BOUND
CALLFH literal-1
COMP1 | COMP-1 "BINARY" | "FLOAT"
FOLDCOPYNAME | FOLD-COPY-NAME AS "UPPER" | "LOWER"
MAKESYN | MAKE-SYN
NOBOUND | NO-BOUND
NOFOLDCOPYNAME | NOFOLD-COPY-NAME | NO-FOLD-COPY-NAME
OVERRIDE literal-1 = literal-2
REMOVE literal-1
SOURCEFORMAT | SOURCE-FORMAT "FIXED" | "FREE" | "VARIABLE"
SSRANGE "2"
NOSSRANGE | NO-SSRANGE
```

CDF Predefined Compilation Variables Syntax

GnuCOBOL defines compilation variables when various conditions are true.

If the condition associated with a variable is false, the variable is not defined.

DEBUG	The -d debug flag is specified.
EXECUTABLE	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"> 1 - 2, item = 1 byte 3 - 4, item = 2 bytes 5 - 9, item = 4 bytes 10 - 18, item = 8 bytes.
GNUCOBOL	GnuCOBOL is compiling the source unit.
HOSTSIGNS	A signed packed decimal item's value may be considered NUMERIC if sign = 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"> 1 - 4, item = 2 bytes 5 - 9, item = 4 bytes 10 - 18, item = 8 bytes.
MODULE	The element being compiled does not contain the main program.
NOHOSTSIGNS	A signed packed decimal item's value may NOT be considered NUMERIC if sign = 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 active.
NOTRUNC	Numeric data items are truncated according to their internal representation.
P64	Pointers are greater than 32 bits.
STICKY-LINKAGE	Sticky linkage (linkage section items remaining allocated between invocations) is active.
TRUNC	Numeric data items are truncated according to their PICTURE clauses.

These, while still supported may well be removed in the future and should not be used. See GCCOMP and GNUCOBOL instead:

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"> 1 - 2, item = 1 byte 3 - 4, item = 2 bytes 5 - 9, item = 4 bytes 10 - 18, item = 8 bytes.
--------	--

2 IDENTIFICATION DIVISION Syntax

IDENTIFICATION DIVISION Syntax

```
[{ IDENTIFICATION } DIVISION. ]
{ ~~~~~~ } ~~~~~~
{ ID
  ~~

{ PROGRAM-ID. } { program name } .
{ ~~~~~~ } { literal-1 } [ AS { literal-2 } ] [ Type-clause ] .
{ FUNCTION-ID. } { literal-3 } [ AS literal-4 ] .
  ~~~~~~ { function-name } .
{ OPTIONS. }
  ~~~~~~

[ DEFAULT ROUNDED MODE IS {AWAY-FROM-ZERO      }
  ~~~~~~ ~~~~~~ {NEAREST-AWAY-FROM-ZERO }
                  {NEAREST-EVEN        }
                  {NEAREST-TOWARDS-ZERO }
                  {PROHIBITED           }
                  {TOWARDS-GREATER      }
                  {TOWARDS-LESSER       }
                  {TRUNCATION            }]]

[ ENTRY-CONVENTION IS {COBOL   }
  ~~~~~~ ~~~~~~ {EXTERN  }
                  {STDCALL }]]

[ AUTHOR.      comment-1. ]
  ~~~~~~

[ DATE-COMPILED. comment-2. ]
  ~~~~~~

[ DATE-MODIFIED. comment-3. ]
  ~~~~~~

[ DATE-WRITTEN.  comment-4. ]
  ~~~~~~

[ INSTALLATION.  comment-5. ]
  ~~~~~~

[ REMARKS.       comment-6. ]
  ~~~~~~

[ SECURITY.      comment-7. ]
  ~~~~~~
```

The AUTHOR, DATE-COMPILED, DATE-MODIFIED, DATE-WRITTEN, INSTALLATION, REMARKS and SECURITY paragraphs are supported by GnuCOBOL only to provide compatibility with programs written for the ANS1974 (or earlier) standards. As of the ANS1985 standard, these clauses have become obsolete and should not be used in new programs.

PROGRAM-ID Type Clause Syntax

```
IS [ COMMON ] [ INITIAL|RECURSIVE PROGRAM ]
   ~~~~~~ ~~~~~~ ~~~~~~
```


3 ENVIRONMENT DIVISION Syntax

ENVIRONMENT DIVISION Syntax

```

ENVIRONMENT DIVISION.
~~~~~

[ CONFIGURATION SECTION. ]
~~~~~

[ SOURCE-COMPUTER.          Compilation-Computer-Specification . ]
~~~~~

[ OBJECT-COMPUTER.          Execution-Computer-Specification . ]
~~~~~

[ SPECIAL-NAMES.            Program-Configuration-Specification . ]
~~~~~

[ REPOSITORY.                Prototype-Specification ... . ]
~~~~~

[ INPUT-OUTPUT SECTION. ]
~~~~~

[ FILE-CONTROL.              General-File-Description ... . ]
~~~~~

[ I-O-CONTROL.               File-Buffering Specification ... . ]
~~~~~

```

CONFIGURATION SECTION Syntax

```

CONFIGURATION SECTION.
~~~~~

[ SOURCE-COMPUTER. Compilation-Computer-Specification . ]
~~~~~

[ OBJECT-COMPUTER. Execution-Computer-Specification . ]
~~~~~

[ SPECIAL-NAMES.    Program-Configuration-Specification . ]
~~~~~

[ REPOSITORY.        Prototype-Specification... . ]
~~~~~

```

SOURCE-COMPUTER Syntax

```

SOURCE-COMPUTER. computer-name [ WITH DEBUGGING MODE ] .
~~~~~

```

OBJECT-COMPUTER Syntax

```

OBJECT-COMPUTER.  [ computer-name ]
~~~~~

[ MEMORY SIZE IS integer-1 WORDS|CHARACTERS ]
~~~~~

[ PROGRAM COLLATING SEQUENCE IS alphabet-name-1 ]
~~~~~

[ SEGMENT-LIMIT IS integer-2 ]
~~~~~

[ CHARACTER CLASSIFICATION IS { locale-name-1  } ]
~~~~~
                                { LOCALE          }
                                { ~~~~~          }
                                { USER-DEFAULT    }
                                { ~~~~~          }
                                { SYSTEM-DEFAULT   }
                                { ~~~~~          }

```

.

The MEMORY SIZE and SEGMENT-LIMIT clauses are syntactically recognized but are otherwise non-functional.

SPECIAL-NAMES Syntax

SPECIAL-NAMES.

~~~~~

[ CALL-CONVENTION integer-1 IS mnemonic-name-1 ]

~~~~~

[CONSOLE IS CRT]

~~~~~      ~~~

[ CRT STATUS IS identifier-1 ]

~~~      ~~~~~

[CURRENCY SIGN IS literal-1]

~~~~~      ~~~~~

[ CURSOR IS identifier-2 ]

~~~~~

[DECIMAL-POINT IS COMMA]

~~~~~      ~~~~~

[ EVENT STATUS IS identifier-3 ]

~~~~~      ~~~~~

[LOCALE locale-name-1 IS literal-2]...

~~~~~

[ NUMERIC SIGN IS TRAILING SEPARATE ]

~~~~~      ~~~~~      ~~~~~      ~~~~~

[SCREEN CONTROL IS identifier-4]

~~~~~      ~~~~~

[ device-name-1 IS mnemonic-name-2 ]...

[ feature-name-1 IS mnemonic-name-3 ]...

[ Alphabet-Clause ]...

[ Class-Definition-Clause ]...

[ Switch-Definition-Clause ]...

[ Symbolic-Characters-Clause ]...

.

The EVENT STATUS and SCREEN CONTROL clauses are syntactically recognized but are otherwise non-functional.

**REPOSITORY Syntax**

REPOSITORY.  
~~~~~

```
FUNCTION { { intrinsic-function-name-1 } ... } INTRINSIC
~~~~~ {   ALL INTRINSIC                      } ~~~~~
      {   function-prototype-name-1 [ AS literal-1 ] } ...
      ~~
PROGRAM {   program-prototype-name-1  [ AS literal-2 ] } ... .
~~~~~ ~~
```

SPECIAL-NAMES Alphabet-Clause Syntax

```
ALPHABET alphabet-name-1 IS { ASCII           }
~~~~~ { ~~~~~ }
      { EBCDIC           }
      { ~~~~~ }
      { NATIVE           }
      { ~~~~~ }
      { STANDARD-1       }
      { ~~~~~ }
      { STANDARD-2       }
      { ~~~~~ }
      { Literal-Clause... }
```

SPECIAL-NAMES ALPHABET Literal-Clause Syntax

```
literal-1 [ { THRU|THROUGH literal-2 } ]
          { ~~~~ ~~~~~ }
          { {ALSO literal-3}... }
          ~~~~
```

SPECIAL-NAMES Class-Definition-Clause Syntax

```
CLASS class-name-1 IS { literal-1 [ THRU|THROUGH literal-2 ] }...
~~~~~ ~~~~~
```

SPECIAL-NAMES Switch-Definition-Clause Syntax

```
switch-name-1 [ IS mnemonic-name-1 ]

[ ON STATUS IS condition-name-1 ]
~~
[ OFF STATUS IS condition-name-2 ]
~~~
```

SPECIAL-NAMES-Symbolic-Characters-Clause Syntax

SYMBOLIC CHARACTERS

~~~~~

{ symbolic-character-1... IS|ARE integer-1... }...

[ IN alphabet-name-1 ]

~~

### INPUT-OUTPUT SECTION Syntax

```
[ INPUT-OUTPUT SECTION. ]
~~~~~
[FILE-CONTROL.]
~~~~~
    [ SELECT-Statement... ]

[ I-O-CONTROL. ]
~~~~~
 [MULTIPLE-FILE-Statement]

 [SAME-RECORD-Statement]
```

### I-O-CONTROL MULTIPLE FILE Syntax

```
MULTIPLE FILE TAPE CONTAINS
~~~~~
    { file-name-1 [ POSITION integer-1 ] }...
      ~~~~~
```

The MULTIPLE FILE TAPE clause is obsolete and is therefore recognized but not functional.

### I-O-CONTROL SAME AREA Syntax

```
SAME { SORT-MERGE } AREA FOR file-name-1... .
~~~~ { ~~~~~ }
      { SORT      }
      { ~~~~~     }
      { RECORD    }
      ~~~~~
```

The SAME SORT-MERGE and SAME SORT clauses are syntactically recognized but are otherwise non-functional.

## SELECT Statement Syntax

```

SELECT [[NOT] OPTIONAL] file-name-1
~~~~~
[ ASSIGN { TO      } [{ EXTERNAL }] [{ DISC|DISK      }] [{ identifier-1 }] ]
  ~~~~~ { USING } { ~~~~~ } { ~~~~~ } { word-1      }
 { DYNAMIC } { DISPLAY } { literal-1 }
          ~~~~~    { ~~~~~ }
                  { KEYBOARD      }
                  { ~~~~~ }
                  { LINE ADVANCING }
                  { ~~~~~ }
                  { PRINTER        }
                  { ~~~~~ }
                  { RANDOM          }
                  { ~~~~~ }
                  { TAPE            }
                    ~~~~~

[COLLATING SEQUENCE IS alphabet-name-1]
~~~~~

[ FILE|SORT ] STATUS IS identifier-2 [ identifier-3 ] ]
~~~~ ~~~~~ ~~~~~

[LOCK MODE IS { MANUAL|AUTOMATIC }]
~~~~~ { ~~~~~ }
      { EXCLUSIVE [ WITH { LOCK ON MULTIPLE RECORDS } ] }
      ~~~~~ { ~~~~~ }
 { LOCK ON RECORD }
 { ~~~~~ }
 { ROLLBACK }
 { ~~~~~ }

[ORGANIZATION Clause]
~~~~~

[ ORGANISATION Clause ]
~~~~~

[RECORD DELIMITER IS STANDARD-1]
~~~~~ ~~~~~ ~~~~~

[ RESERVE integer-1 AREAS ]
~~~~~

[SHARING WITH { ALL OTHER }]
~~~~~ { ~~~ }
      { NO OTHER }
      { ~~~ }
      { READ ONLY }
      ~~~~~ ~~~~~

```

The COLLATING SEQUENCE, RECORD DELIMITER, RESERVE and ALL OTHER clauses are syntactically recognized but are otherwise non-functional.

**ORGANIZATION SEQUENTIAL Clause Syntax**

```
[ORGANIZATION|ORGANISATION IS] RECORD BINARY SEQUENTIAL
~~~~~          ~~~~~
[ ACCESS MODE IS SEQUENTIAL ]
~~~~~          ~~~~~
```

**ORGANIZATION LINE SEQUENTIAL Clause Syntax**

```
[ORGANIZATION|ORGANISATION IS] LINE SEQUENTIAL
~~~~~          ~~~~~
[ ACCESS MODE IS SEQUENTIAL ]
~~~~~          ~~~~~
[PADDING CHARACTER IS literal-1 | identifier-1]
~~~~~
```

The PADDING CHARACTER clause is syntactically recognized but is otherwise non-functional.

**ORGANIZATION RELATIVE Clause Syntax**

```
[ ORGANIZATION|ORGANISATION IS ] RELATIVE
~~~~~          ~~~~~
[ACCESS MODE IS { SEQUENTIAL }]
~~~~~          { ~~~~~ }
                  { DYNAMIC   }
                  { ~~~~~     }
                  { RANDOM     }
                  ~~~~~
[RELATIVE KEY IS identifier-1]
~~~~~
```

|                                           |
|-------------------------------------------|
| <b>ORGANIZATION INDEXED Clause Syntax</b> |
|-------------------------------------------|

```
[ ORGANIZATION|ORGANISATION IS ] INDEXED
~~~~~

[ACCESS MODE IS { SEQUENTIAL }]
~~~~~
      { ~~~~~~ }
      { DYNAMIC   }
      { ~~~~~~ }
      { RANDOM     }
      { ~~~~~~ }

[ RECORD KEY IS { [ data-name-1          ]
~~~~~
 { [record-key-name-1]
 [=|{SOURCE IS} data-name-2] ...] }
                    ~~~~~~

[ ALTERNATE RECORD KEY IS { [ data-name-3          ]
~~~~~ ~~~~~~
 { [record-key-name-2]
 [=|{SOURCE IS} data-name-4] ...] }
                             ~~~~~~

                           [ WITH DUPLICATES ] ...
                           ~~~~~~

 [SUPPRESS WHEN ALL literal]
                           ~~~~~~

                           [ SUPPRESS WHEN SPACES | ZEROES ]
                           ~~~~~~ ~~~~~~
```





## 4 DATA DIVISION Syntax

### DATA DIVISION Syntax

```

DATA DIVISION.
~~~~~

[ FILE SECTION.
~~~~~

 { File/Sort-Description [{ FILE-SECTION-Data-Item }]... }...]
 { { 01-Level-Constant } }
 { { 78-Level-Constant } }
 { 01-Level-Constant }
 { 78-Level-Constant }
[WORKING-STORAGE SECTION.
~~~~~

  [ { WORKING-STORAGE-SECTION-Data-Item } ]... ]
  { 01-Level-Constant                      }
  { 78-Level-Constant                      }
[ LOCAL-STORAGE SECTION.
~~~~~

 [{ LOCAL-STORAGE-SECTION-Data-Item }]...]
 { 01-Level-Constant }
 { 78-Level-Constant }
[LINKAGE SECTION.
~~~~~

  [ { LINKAGE-SECTION-Data-Item } ]... ]
  { 01-Level-Constant                      }
  { 78-Level-Constant                      }
[ REPORT SECTION.
~~~~~

 { Report-Description [{ Report-Group-Definition }]... }...]
 { { 01-Level-Constant } }
 { { 78-Level-Constant } }
 { 01-Level-Constant }
 { 78-Level-Constant }
[SCREEN SECTION.
~~~~~

  [ { SCREEN-SECTION-Data-Item } ]... ]
  { 01-Level-Constant                      }
  { 78-Level-Constant                      }

```

## File/Sort-Description Syntax

```

FD|SD file-name-1 [ IS EXTERNAL|GLOBAL ]
~~ ~~~~ ~~~~~~ ~~~~~~

[ BLOCK CONTAINS [ integer-1 TO ] integer-2 CHARACTERS|RECORDS ]
~~~~~ ~~~~~~ ~~~~~~ ~~~~~~

[CODE-SET IS alphabet-name-1]
~~~~~

[ DATA { RECORD IS      } identifier-1... ]
~~~~ { ~~~~~~          }
 { RECORDS ARE }
      ~~~~~~

[ LABEL { RECORD IS      } OMITTED|STANDARD ]
~~~~~ { ~~~~~~          } ~~~~~~ ~~~~~~
 { RECORDS ARE }
      ~~~~~~

[ LINAGE IS integer-3 | identifier-2 LINES
~~~~~

 [LINES AT BOTTOM integer-4 | identifier-3]
        ~~~~~~

      [ LINES AT TOP integer-5 | identifier-4 ]
        ~~~

 [WITH FOOTING AT integer-6 | identifier-5]]
        ~~~~~~

[ RECORD { CONTAINS [ integer-7 TO ] integer-8 CHARACTERS      } ]
~~~~~ { ~~~~~~          ~~~~~~          }
 { IS VARYING IN SIZE }
 { ~~~~~~ }
 { [FROM [integer-7 TO] integer-8 CHARACTERS }
 { ~~~~~~ ~~~~~~ }
 { DEPENDING ON identifier-6] }
        ~~~~~~

[ RECORDING MODE IS recording-mode ]
~~~~~

[{ REPORT IS } report-name-1...]
 { ~~~~~~ }
 { REPORTS ARE }
  ~~~~~~

[ VALUE OF implementor-name-1 IS literal-1 | identifier-7 ] .
~~~~~ ~~~

```

The BLOCK CONTAINS, DATA RECORD, LABEL RECORD, RECORDING MODE and VALUE OF clauses are syntactically recognized but are obsolete and non-functional. These clauses should not be coded in new programs.

## FILE-SECTION-Data-Item Syntax

```

level-number [identifier-1 | FILLER] [IS GLOBAL|EXTERNAL]
               ~~~~~~                ~~~~~~ ~~~~~~

[ BLANK WHEN ZERO ]
  ~~~~~~      ~~~~~~

[JUSTIFIED RIGHT]
  ~~~~~~

[ OCCURS [ integer-1 TO ] integer-2 TIMES
  ~~~~~~      ~~~~~~

 [DEPENDING ON identifier-2]
      ~~~~~~

    [ STEP identifier-6 ]
    [ ASCENDING|DESCENDING KEY IS identifier-3 ]
      ~~~~~~ ~~~~~~

 [INDEXED BY identifier-4]]
      ~~~~~~

[ PICTURE IS picture-string ]
  ~~~~

[REDEFINES identifier-5]
  ~~~~~~

[ SIGN IS LEADING|TRAILING [ SEPARATE [CHARACTER] ] ]
  ~~~~      ~~~~~~ ~~~~~~ ~~~~~~

[SYNCHRONIZED|SYNCHRONISED [LEFT|RIGHT]]
  ~~~~~~      ~~~~~~      ~~~~~~ ~~~~~~

[ USAGE IS data-item-usage ] . [ FILE-SECTION-Data-Item ]...
  ~~~~~~

```

The LEFT and RIGHT (SYNCHRONIZED) clauses are syntactically recognized but are otherwise non-functional.

**WORKING-STORAGE-SECTION-Data-Item Syntax**

```

level-number [identifier-1 | FILLER] [IS GLOBAL | EXTERNAL]
               ~~~~~~                ~~~~~~      ~~~~~~

[ BASED ]
  ~~~~~

[BLANK WHEN ZERO]
  ~~~~~      ~~~~~

[ JUSTIFIED RIGHT ]
  ~~~~~

[OCCURS [integer-1 TO] integer-2 TIMES
  ~~~~~~                ~~
    [ DEPENDING ON identifier-2 ]
      ~~~~~~
 [ASCENDING|DESCENDING KEY IS identifier-3]
      ~~~~~~      ~~~~~~
    [ INDEXED BY identifier-4 ] ]
      ~~~~~~

[PICTURE IS picture-string]
  ~~~

[ REDEFINES identifier-5 ]
  ~~~~~~

[SIGN IS LEADING|TRAILING [SEPARATE CHARACTER]]
  ~~~~      ~~~~~~      ~~~~~~      ~~~~~~

[ SYNCHRONIZED|SYNCHRONISED [ LEFT|RIGHT ] ]
  ~~~~      ~~~~~      ~~~~      ~~~~~

[USAGE IS data-item-usage]
  ~~~~~

[ VALUE IS [ ALL ] literal-1 ] . [ WORKING-STORAGE-SECTION-Data-Item ]...
```

The LEFT and RIGHT (SYNCHRONIZED) clauses are syntactically recognized but are otherwise non-functional.

## LOCAL-STORAGE-SECTION-Data-Item Syntax

```

level-number [ identifier-1 | FILLER ] [ IS GLOBAL|EXTERNAL ]
               ~~~~~~                ~~~~~~ ~~~~~~

[BASED]
  ~~~~~

[ BLANK WHEN ZERO ]
  ~~~~~ ~~~~~

[JUSTIFIED RIGHT]
  ~~~~~

[ OCCURS [ integer-1 TO ] integer-2 TIMES
  ~~~~~~ ~~~~~
 [DEPENDING ON identifier-2]
      ~~~~~~
    [ ASCENDING|DESCENDING KEY IS identifier-3 ]
      ~~~~~~ ~~~~~~
 [INDEXED BY identifier-4]]
      ~~~~~~

[ PICTURE IS picture-string ]
  ~~~

[REDEFINES identifier-5]
  ~~~~~~

[ SIGN IS LEADING|TRAILING [ SEPARATE CHARACTER ] ]
  ~~~~ ~~~~~~ ~~~~~~ ~~~~~~

[SYNCHRONIZED|SYNCHRONISED [LEFT|RIGHT]]
  ~~~~ ~~~~~ ~~~~~ ~~~~~

[ USAGE IS data-item-usage ]
  ~~~~~

[VALUE IS [ALL] literal-1] . [LOCAL-STORAGE-SECTION-Data-Item]...
  ~~~~~ ~~~~~ ~~~~~

```

The LEFT and RIGHT (SYNCHRONIZED) clauses are syntactically recognized but are otherwise non-functional.

**LINKAGE-SECTION-Data-Item Syntax**

```

level-number [ identifier-1 | FILLER ] [ IS GLOBAL|EXTERNAL ]
               ~~~~~~                ~~~~~~ ~~~~~~

[ANY LENGTH]
  ~~~ ~~~~~~

[ ANY NUMERIC ]
  ~~~ ~~~~~~

[BASED]
  ~~~~~

[ BLANK WHEN ZERO ]
  ~~~~~ ~~~~~

[JUSTIFIED RIGHT]
  ~~~~~

[ OCCURS [ integer-1 TO ] integer-2 TIMES
  ~~~~~~      ~~      UNBOUNDED
                   ~~~~~~

    [ DEPENDING ON identifier-3 ]
      ~~~~~~

 [ASCENDING|DESCENDING KEY IS identifier-4]
      ~~~~~~ ~~~~~~

    [ INDEXED BY identifier-5 ] ]
      ~~~~~~

[PICTURE IS picture-string]
  ~~~

[ REDEFINES identifier-6 ]
  ~~~~~~

[SIGN IS LEADING|TRAILING [SEPARATE CHARACTER]]
  ~~~~ ~~~~~~ ~~~~~~ ~~~~~~

[ SYNCHRONIZED|SYNCHRONISED [ LEFT|RIGHT ] ]
  ~~~~ ~~~~~~ ~~~~~~ ~~~~~~

[USAGE IS data-item-usage] . [LINKAGE-SECTION-Data-Item]...
  ~~~~~~

```

The LEFT and RIGHT (SYNCHRONIZED) clauses are syntactically recognized but are otherwise non-functional.

|                                       |
|---------------------------------------|
| <b>Report-Description (RD) Syntax</b> |
|---------------------------------------|

```

RD report-name [ IS GLOBAL ]
~~
[ CODE IS literal-1 | identifier-1 ]
~~~~
[{ CONTROL IS } { FINAL }...]
 { ~~~~~~ } { ~~~~~~ }
 { CONTROLS ARE } { identifier-2 }
    ~~~~~~
[ PAGE [ { LIMIT IS      } ] [ { literal-2      } LINES ]
  ~~~~ { ~~~~~          } { identifier-3 } ~~~~
 { LIMITS ARE }
          ~~~~~~
      [ literal-3 | identifier-4 COLUMNS|COLS ]
        ~~~~~~ ~~~~~
[HEADING IS literal-4 | identifier-5]
  ~~~~~~
[ FIRST DE|DETAIL IS literal-5 | identifier-6 ]
  ~~~~~ ~ ~ ~~~~~
[LAST CH|{CONTROL HEADING} IS literal-6 | identifier-7]
  ~~~~~ ~ ~ ~~~~~ ~~~~~
[ LAST DE|DETAIL IS literal-7 | identifier-8 ]
  ~~~~~ ~ ~ ~~~~~
[FOOTING IS literal-8 | identifier-9]] .
  ~~~~~~

```

|                                       |
|---------------------------------------|
| <b>Report-Group-Definition Syntax</b> |
|---------------------------------------|

```

01 [ identifier-1 ]

[ LINE NUMBER IS { integer-1 [ [ ON NEXT PAGE ] } ]
  ~~~~          {      ~~~~ ~~~~      }
 { +|PLUS integer-1 }
 { ~~~~ }
 { ON NEXT PAGE }
 { ~~~~ ~~~~ }

[NEXT GROUP IS { [+|PLUS] integer-2 }]
  ~~~~ ~~~~~~   {      ~~~~              }
                { NEXT|{NEXT PAGE}|PAGE }
                {      ~~~~ ~~~~ ~~~~ ~~~~ }

[ TYPE IS { RH|{REPORT HEADING}          } ]
  ~~~~   { ~ ~ ~~~~~~ ~~~~~~              }
 { PH|{PAGE HEADING} }
 { ~ ~ ~~~~~~ ~~~~~~ }
 { CH|{CONTROL HEADING} FINAL|identifier-2 }
 { ~ ~ ~~~~~~ ~~~~~~ ~~~~~~ }
 { DE|DETAIL }
 { ~ ~ ~~~~~~ }
 { CF|{CONTROL FOOTING} FINAL|identifier-2 }
 { ~ ~ ~~~~~~ ~~~~~~ ~~~~~~ }
 { PF|{PAGE FOOTING} }
 { ~ ~ ~~~~~~ ~~~~~~ }
 { RF|{REPORT FOOTING} }
 { ~ ~ ~~~~~~ ~~~~~~ }

. [REPORT-SECTION-Data-Item]...
```



## REPORT-SECTION-Data-Item Syntax

```

level-number [identifier-1]

[BLANK WHEN ZERO]
~~~~~

[ COLUMN [ { NUMBER IS   } ] [ +|PLUS ] integer-1 ]
~~~~~ { ~~~~~~ } ~~~~~
 { NUMBERS ARE }
      ~~~~~~

[ GROUP INDICATE ]
~~~~~ ~~~~~~

[JUSTIFIED RIGHT]
~~~~~

[ LINE NUMBER IS { integer-2 [ [ ON NEXT PAGE ] } ]
~~~~~          { +|PLUS integer-2 ~~~~ ~~~~ }
 { ~~~~~ }
 { ON NEXT PAGE }
              ~~~~~ ~~~~~

[ OCCURS [ integer-3 TO ] integer-4 TIMES
~~~~~ ~~~
 [DEPENDING ON identifier-2]
    ~~~~~~
    [ STEP integer-5 ]
    ~~~~~
 [VARYING identifier-3 FROM { identifier-4 } BY { identifier-5 }]
    ~~~~~~ ~~~~~ { integer-6 } ~~ { integer-7 }

[ PICTURE IS picture-string ]
~~~

[PRESENT WHEN condition-name]
~~~~~ ~~~~~

[ SIGN IS LEADING|TRAILING [ SEPARATE CHARACTER ] ]
~~~~~ ~~~~~~ ~~~~~~ ~~~~~~

[{ SOURCE IS literal-1|identifier-6 [ROUNDED] }]
{ ~~~~~~ ~~~~~~ }
{ SUM OF { identifier-7 }... [{ RESET ON FINAL|identifier-8 }] }
{ ~~~ { literal-2 } { ~~~~~ ~~~~~ } }
{ VALUE IS [ALL] literal-3 { UPON identifier-9 } }
~~~~~ ~~~ ~~~~~

. [ REPORT-SECTION-Data-Item ]...

```

## SCREEN-SECTION-Data-Item Syntax

```

level-number [ identifier-1 | FILLER ]
               ~~~~~

[AUTO | AUTO-SKIP | AUTOTERMINATE] [BELL | BEEP]
  ~~~~  ~~~~~~  ~~~~~~  ~~~~  ~~~~

[ BACKGROUND-COLOR|BACKGROUND-COLOUR IS integer-1 | identifier-2 ]
  ~~~~~~  ~~~~~~

[BEFORE TIME | BASED]
  ~~~~~~  ~~~~  ~~~~~~

[ BLANK LINE|SCREEN ] [ ERASE EOL|EOS ]
  ~~~~~  ~~~~  ~~~~~~  ~~~~~  ~~~~  ~~~~

[BLANK WHEN ZERO] [JUSTIFIED RIGHT]
  ~~~~~~  ~~~~~  ~~~~~~

[ BLINK ] [ HIGHLIGHT | LOWLIGHT ] [ REVERSE-VIDEO ]
  ~~~~~  ~~~~~~  ~~~~~~  ~~~~~~

[COLUMN NUMBER IS [+|PLUS] integer-2 | identifier-3]
  ~~~~  ~~~~~~

[ CONSTANT | EMPTY CHECK ]
  ~~~~~~  ~~~~~~  ~~~~~~

[CURSOR { identifier 10 }]
  ~~~~~~

[ FOREGROUND-COLOR|FOREGROUND-COLOUR IS integer-3 | identifier-4 ]
  ~~~~~~  ~~~~~~

[{ FROM literal-1 | identifier-5 }]
 { ~~~~~ }
 { TO identifier-5 }
 { ~~~ }
 { USING identifier-5 }
 { ~~~~~ }
 { VALUE IS [ALL] literal-1 }
    ~~~~~~  ~~~~

[ FULL | LENGTH-CHECK ] [ REQUIRED | EMPTY-CHECK ] [ SECURE | NO-ECHO ]
  ~~~~  ~~~~~~  ~~~~~~  ~~~~~~  ~~~~~~  ~~~~~~

[LEFTLINE] [OVERLINE] [UNDERLINE]
  ~~~~~~  ~~~~~~  ~~~~~~

[ LINE NUMBER IS [ +|PLUS ] integer-4 | identifier-6 ]
  ~~~~  ~~~~~~

[NO-ECHO | NO UPDATE]
  ~~~~~~  ~~~~  ~~~~~~

[ OCCURS integer-5 TIMES ]
  ~~~~~~

[PICTURE IS picture-string]
  ~~~~

[ PROMPT [ CHARACTER IS literal-2 | identifier-7 ]
  ~~~~~~  ~~~~~~

[SCROLL DOWN | SCROLL UP | SIZE | TIME OUT]
  ~~~~~~  ~~~~~~  ~~~~~~  ~~~~  ~~~~~~  ~~~~~~

```

```
[ SIGN IS LEADING|TRAILING [ SEPARATE CHARACTER ] ]  
~~~~ ~~~~~~ ~~~~~~ ~~~~~~
```

```
[UPDATE]
~~~~~
```

```
. [ SCREEN-SECTION-Data-Item ]...
```

## 01-Level-Constant Syntax

```

01 constant-name-1 CONSTANT [ IS GLOBAL ]
    ~~~~~
 { AS { literal-1 } }
 { { arithmetic-expression-1 } }
 { { { BYTE-LENGTH } OF { identifier-1 } } }
 { { { ~~~~~ } { usage-name } } }
 { { { LENGTH } } }
 { { ~~~~~ } }
 { FROM CDF-variable-name-1 }
    ~~~~

```

## 66-Level-Data-Item Syntax

```

66 identifier-1 RENAMES identifier-2 [ THRU|THROUGH identifier-3 ] .
    ~~~~~

```

## 77-Level-Data-Item Syntax

```

77 identifier-1 [IS GLOBAL|EXTERNAL]
    ~~~~~
[ BASED ]
    ~~~~~
[BLANK WHEN ZERO]
    ~~~~~
[ JUSTIFIED RIGHT ]
    ~~~~~
[PICTURE IS picture-string]
    ~~~
[ REDEFINES identifier-5 ]
    ~~~~~
[SIGN IS LEADING|TRAILING [SEPARATE CHARACTER]]
    ~~~~~
[ SYNCHRONIZED|SYNCHRONISED [ LEFT|RIGHT ] ]
    ~~~~~
[USAGE IS data-item-usage]
    ~~~~~
[ VALUE IS [ ALL ] literal-1 ] .
    ~~~~~

```

The LEFT and RIGHT (SYNCHRONIZED) clauses are syntactically recognized but are otherwise non-functional.

## 78-Level-Constant Syntax

```

78 constant-name-1 VALUE IS (literal-1
    ~~~~~
                                { arithmetic-expression-1
                                }

```

**88-Level-Data-Item Syntax**

```
88 condition-name-1 { VALUE IS      } {literal-1 [ THRU|THROUGH literal-2 ]}...  
    { ~~~~~          }          ~~~~ ~~~~~~  
    { VALUES ARE }  
    ~~~~~~  

[WHEN SET TO FALSE IS literal-3] .
    ~~~~~~
```



## 5 PROCEDURE DIVISION Syntax

### PROCEDURE DIVISION Syntax

```

PROCEDURE DIVISION [ { USING Subprogram-Argument ...      } ]
~~~~~ { ~~~~~ }
 { CHAINING Main-Program-Argument... }
               ~~~~~

               [ RETURNING identifier-1 ] .
               ~~~~~

[DECLARATIVES.]
~~~~~

[ Event-Handler-Routine... . ]

[ END DECLARATIVES. ]
~~~ ~~~~~

General-Program-Logic

[Nested-Subprogram...]

[END PROGRAM|FUNCTION name-1]
~~~ ~~~~~

```

### PROCEDURE DIVISION Subprogram-Argument Syntax

```

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

```

### PROCEDURE DIVISION Main-Program-Argument Syntax

```

[BY REFERENCE] [OPTIONAL] identifier-1
~~~~~ ~~~~~

```

### PROCEDURE DIVISION RETURNING Syntax

```

RETURNING identifier-1
~~~~~

```

## DECLARATIVES Syntax

section-name-1 SECTION.

```

USE { [GLOBAL] AFTER STANDARD { EXCEPTION } PROCEDURE ON { INPUT } }
~~~ {      ~~~~~~                { ~~~~~~                } }
    {                          { ERROR      }              { OUTPUT    } }
    {                          ~~~~~~                { ~~~~~~                } }
    {                          { I-O          }              { ~~~~          } }
    { FOR DEBUGGING ON { procedure-name-1      }              { ~~~~          } }
    {      ~~~~~~      { ALL PROCEDURES      }              { EXTEND        } }
    {                  { ~~~ ~~~~~~          }              { ~~~~~~        } }
    {                  { REFERENCES OF identifier-1 }          { file-name-1 } }
    {                  }
    { [ GLOBAL ] BEFORE REPORTING identifier-2      }
    { ~~~~~~ ~~~~~~ ~~~~~~ }
    { }
    { AFTER EC|{EXCEPTION CONDITION} }
      ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

```

The AFTER EXCEPTION CONDITION and AFTER EC clauses are syntactically recognized but are otherwise non-functional.

## LENGTH OF Syntax

```

LENGTH OF numeric-literal-1 | identifier-1
~~~~~

```

## Reference Modifier (Format 1) Syntax

```

identifier-1 [OF|IN identifier-2] [(subscript...)] (start:[length])
~~ ~~

```

## Reference Modifier (Format 2) Syntax

```

intrinsic-function-reference (start:[length])

```

## Arithmetic-Expression Syntax

```

Unary-Expression-1 { **|^ } Unary-Expression-2
 { *// }
 { +|- }

```



## Unary-Expression Syntax

```

{ [+|-] { (Arithmetic-Expression-1) } }
{ { [LENGTH OF] { identifier-1 } } }
{ { ~~~~~~ ~~~ { literal-1 } } }
{ { { Function-Reference } } }
{ Arithmetic-Expression-2 }

```

## Class-Condition Syntax

```

identifier-1 IS [NOT] { NUMERIC }
 { ~~~~~~ }
 { ALPHABETIC }
 { ~~~~~~ }
 { ALPHABETIC-LOWER }
 { ~~~~~~ }
 { ALPHABETIC-UPPER }
 { ~~~~~~ }
 { OMITTED }
 { ~~~~~~ }
 { class-name-1 }

```

## Sign-Condition Syntax

```

identifier-1 IS [NOT] { POSITIVE }
 { ~~~~~~ }
 { NEGATIVE }
 { ~~~~~~ }
 { ZERO }
 { ~~~~~~ }

```

## Relation-Condition Syntax

```

{ identifier-1 } IS [NOT] RelOp { identifier-2 }
{ literal-1 } ~~~~ { literal-2 }
{ arithmetic-expression-1 } { arithmetic-expression-2 }
{ index-name-1 } { index-name-2 }

```

**Boolean-Expression Syntax**
**General Boolean-Expression Syntax**

```
[Operand-1] { Boolean-Operator } Operand-2
```

```
B-NOT operand-3
```

| Boolean Operators        | Meaning                                                |
|--------------------------|--------------------------------------------------------|
| B-SHIFT-L                | LEFT operation                                         |
| B-SHIFT-LC               | Circular Shift Left operation                          |
| B-SHIFT-R                | Shift Right operation                                  |
| B-SHIFT-RC               | Circular Shift Right operation                         |
|                          |                                                        |
| Binary boolean operators | Meaning                                                |
| B-AND                    | AND operation (boolean conjunction)                    |
| B-OR                     | Inclusive OR operation (boolean inclusive disjunction) |
| B-XOR                    | Exclusive OR operation (boolean exclusive disjunction) |
|                          |                                                        |
| Unary boolean operator   | Meaning                                                |
| B-NOT                    | Negation operation                                     |

RelOp Syntax

|                            |   |
|----------------------------|---|
| { EQUAL TO                 | } |
| { ~~~~~                    | } |
| { EQUALS                   | } |
| { ~~~~~~                   | } |
| { GREATER THAN             | } |
| { ~~~~~~                   | } |
| { GREATER THAN OR EQUAL TO | } |
| { ~~~~~~        ~ ~ ~~~~~  | } |
| { LESS THAN                | } |
| { ~~~~~                    | } |
| { LESS THAN OR EQUAL TO    | } |
| { ~~~~~        ~ ~ ~~~~~   | } |
| { =                        | } |
| { >                        | } |
| { >=                       | } |
| { <                        | } |
| { <=                       | } |
| { <>                       | } |

Combined Condition Syntax

|                                                         |
|---------------------------------------------------------|
| [ ( ] Condition-1 [ ) ] { AND } [ ( ] Condition-2 [ ) ] |
| { ~~~ }                                                 |
| { OR }                                                  |
| { ~ ~ }                                                 |

Negated Condition Syntax

|                 |
|-----------------|
| NOT Condition-1 |
| ~~~~            |

ACCEPT FROM CONSOLE Syntax

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

## ACCEPT FROM COMMAND-LINE Syntax

```

ACCEPT identifier-1
~~~~~

      FROM { COMMAND-LINE                                }
      ~~~~ { ~~~~~~                                     }
 { ARGUMENT-NUMBER }
 { ~~~~~~ }
 { ARGUMENT-VALUE }
 { ~~~~~~ }
 [ON EXCEPTION imperative-statement-1]
              ~~~~~~
            [ NOT ON EXCEPTION imperative-statement-2 ]
              ~~~~      ~~~~~~

[END-ACCEPT]
~~~~~

```

## ACCEPT FROM ENVIRONMENT Syntax

```

ACCEPT identifier-1
~~~~~

 FROM { ENVIRONMENT-VALUE }
      ~~~~ { ~~~~~~                                     }
            { ENVIRONMENT { literal-1      } }
            { ~~~~~~ { identifier-1 } }
            [ ON EXCEPTION imperative-statement-1 ]
              ~~~~~~
 [NOT ON EXCEPTION imperative-statement-2]
              ~~~~      ~~~~~~

[ END-ACCEPT ]
~~~~~

```

## ACCEPT Data-Item Syntax

```

ACCEPT { identifier-1 }
~~~~~

    { OMITTED          }
    ~~~~~

 [{ FROM EXCEPTION-STATUS }]
        ~~~~ ~~~~~

        [{ FROM CRT ] [ MODE IS BLOCK ]]
        ~~~~ ~~~ ~~~~~ ~~~~~

[AT { | LINE NUMBER { integer-1 } | }]
~~ { | ~~~~ { identifier-2 } | }
 { | COLUMN|COL|POSITION|POS NUMBER { integer-2 }
 { | ~~~~~~ ~~~ ~~~~~~ ~~~ { identifier-3 }
 { }
 { { integer-3 } }
 { { identifier-4 } }

[WITH [Attribute-Specification]...
~~~~~

    [ LOWER|UPPER ]
    ~~~~~ ~~~~~

 [SCROLL { UP } [{ integer-4 } LINE|LINES]]
    ~~~~~~ { ~~      } { identifier-5 }
            { DOWN }
            ~~~~~

 [TIMEOUT|TIME-OUT AFTER { integer-5 }]
    ~~~~~~ ~~~~~~ { identifier-6 }

    [ CONVERSION ]
    ~~~~~~

 [UPDATE]
    ~~~~~~

    [ SIZE { integer-6      } ]
    ~~~~ { identifier-7 }

 [CONTROL { literal-8 }]
    ~~~~~~ { identifier-8 }

    [ { COLOUR } IS { integer-9      } ]
    { COLOR } { identifier-9 }
    ~~~~~~

 [CURSOR { identifier-10 }]
    ~~~~~~

[ ON EXCEPTION imperative-statement-1 ]
~~~~~

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

[ END-ACCEPT ]
~~~~~

```

The FROM CRT, MODE IS BLOCK and CONVERSION clauses are syntactically recognized but are otherwise non-functional.

## ACCEPT FROM DATE/TIME Syntax

```

ACCEPT identifier-1 FROM { DATE [YYYYMMDD] }
~~~~~ { ~~~~ ~~~~~~ }
              { DAY [ YYYYDDD ] }
              { ~~~ ~~~~~~ }
              { DAY-OF-WEEK }
              { ~~~~~~ }
              { TIME }
              { ~~~~ }
              { MICROSECOND-TIME }
              { ~~~~~~ }

[ END-ACCEPT ]
~~~~~

```

## ACCEPT FROM Screen-Info Syntax

```

ACCEPT identifier-1
~~~~~

      FROM { LINES|LINE-NUMBER }
      ~~~~ { ~~~~~ ~~~~~~ }
 { COLS|COLUMNS }
 { ~~~~ ~~~~~~ }
 { ESCAPE KEY }
            ~~~~~ ~~~

[ END-ACCEPT ]
~~~~~

```

## ACCEPT FROM Runtime-Info Syntax

```

ACCEPT identifier-1
~~~~~

      FROM { EXCEPTION STATUS }
      ~~~~ { ~~~~~~ ~~~~~~ }
 { USER NAME }
            ~~~~~ ~~~~~

[ END-ACCEPT ]
~~~~~

```

## ACCEPT OMITTED Syntax

```

ACCEPT OMITTED
~~~~~

```

1. For console : See 6.17.1.1 (ACCEPT FROM CONSOLE Syntax)
2. For Screen : See 6.17.1.4 (ACCEPT screen-data-item Syntax)

```

[ END-ACCEPT ]
~~~~~

```

## ACCEPT FROM EXCEPTION STATUS Syntax

```
ACCEPT exception-status-pic-9-4 FROM EXCEPTION STATUS
~~~~~
```

```
[ END-ACCEPT ]
~~~~~
```

## ADD TO Syntax

```
ADD { literal-1 }...
~~~ { identifier-1 }
```

```
TO { identifier-2
~~
```

```
    [ ROUNDED [ MODE IS { AWAY-FROM-ZERO          } ] ] }...
      ~~~~~~      ~~~~      { ~~~~~~ }
 { NEAREST-AWAY-FROM-ZERO }
 { ~~~~~~ }
 { NEAREST-EVEN }
 { ~~~~~~ }
 { NEAREST-TOWARD-ZERO }
 { ~~~~~~ }
 { PROHIBITED }
 { ~~~~~~ }
 { TOWARD-GREATER }
 { ~~~~~~ }
 { TOWARD-LESSER }
 { ~~~~~~ }
 { TRUNCATION }
                                ~~~~~~
```

```
    [ ON SIZE ERROR imperative-statement-1 ]
      ~~~~ ~~~~~~
```

```
 [NOT ON SIZE ERROR imperative-statement-2]
      ~~~~ ~~~~~~
```

```
[ END-ADD ]
~~~~~
```

**ADD GIVING Syntax**

```

ADD { literal-1 }...
~~~ { identifier-1 }

[ TO identifier-2 ]
~~

GIVING { identifier-3
~~~~~

 [ROUNDED [MODE IS { AWAY-FROM-ZERO }]] }...
      ~~~~~~      ~~~~ { ~~~~~~ }
                        { NEAREST-AWAY-FROM-ZERO }
                        { ~~~~~~ }
                        { NEAREST-EVEN          }
                        { ~~~~~~ }
                        { NEAREST-TOWARD-ZERO    }
                        { ~~~~~~ }
                        { PROHIBITED              }
                        { ~~~~~~ }
                        { TOWARD-GREATER          }
                        { ~~~~~~ }
                        { TOWARD-LESSER          }
                        { ~~~~~~ }
                        { TRUNCATION              }
                        ~~~~~~

[ON SIZE ERROR imperative-statement-1]
~~~~~ ~~~~~~

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

[END-ADD]
~~~~~

```



### ADD CORRESPONDING Syntax

```

ADD CORRESPONDING identifier-1
~~~
 TO identifier-2
 ~~
 [ROUNDED [MODE IS { AWAY-FROM-ZERO }]]
      ~~~~~~      ~~~~      { ~~~~~~ }
                              { NEAREST-AWAY-FROM-ZERO }
                              { ~~~~~~ }
                              { NEAREST-EVEN          }
                              { ~~~~~~ }
                              { NEAREST-TOWARD-ZERO    }
                              { ~~~~~~ }
                              { PROHIBITED             }
                              { ~~~~~~ }
                              { TOWARD-GREATER         }
                              { ~~~~~~ }
                              { TOWARD-LESSER          }
                              { ~~~~~~ }
                              { TRUNCATION             }
                              ~~~~~~

 [ON SIZE ERROR imperative-statement-1]
      ~~~~ ~~~~~~

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

[END-ADD]
~~~~~

```

### ALLOCATE Syntax

FORMAT 1. ALLOCATE a "BASED" ITEM.

```

ALLOCATE identifier-1
~~~~~
 [{ INITIALIZED }] [RETURNING identifier-3]
 [{ ~~~~~~ }] ~~~~~~
 [{ INITIALISED }]
 [{ ~~~~~~ }]

```

FORMAT 2. ALLOCATE a memory block.

```

ALLOCATE arithmetic-expression-1 CHARACTERS
~~~~~
    [{ INITIALIZED } [ TO { identifier-2} ] ] RETURNING identifier-3
    [{ ~~~~~~ } [ ~ {          } ] ] ~~~~~~
    [{ INITIALISED } [ { literal-1 } ] ]
    [{ ~~~~~~ } ]

```

**ALTER Syntax**

```
ALTER procedure-name-1 TO PROCEED TO procedure-name-2
~~~~~                ~~
```

## CALL Syntax

```

CALL [{ STDCALL }] { literal-1 }
~~~~ { ~~~~~~            } { identifier-1 }
      { STATIC            }
      { ~~~~~~            }
      { mnemonic-name-1  }

[ USING CALL-Argument... ]
~~~~~

[RETURNING|GIVING identifier-2]
~~~~~

[ ON OVERFLOW|EXCEPTION imperative-statement-1 ]
~~~~~

[NOT ON OVERFLOW|EXCEPTION imperative-statement-2]
~~~ ~~~~~~

[ END-CALL ]
~~~~~

```

## CALL Argument Syntax

```

[BY { REFERENCE }]
 { ~~~~~~ }
 { CONTENT }
 { ~~~~~~ }
 { VALUE }
  ~~~~~~

  { OMITTED                                     }
  { ~~~~~~                                     }
  { [ UNSIGNED ] [ SIZE IS { AUTO           } ] [ { literal-2   } ] }
    ~~~~~~      ~~~~      { ~~~~           } { identifier-2 }
 { DEFAULT }
 { ~~~~~~ }
 { integer-1 }

```

## CANCEL Syntax

```

CANCEL { literal-1 }...
~~~~~ { identifier-1 }

```

**CLOSE Syntax**

```

CLOSE { file-name-1 [ { REEL|UNIT [ FOR REMOVAL ] } ] }...
~~~~~
 { ~~~~ ~~~~ ~~~~~~ }
 { WITH LOCK }
 { ~~~~ }
 { WITH NO REWIND }
 ~ ~ ~~~~~~

```

The REEL, LOCK and NO REWIND clauses are syntactically recognized but are otherwise non-functional, except for the CLOSE...NO REWIND statement, which will generate a file status of 07 rather than the usual 00 (but take no other action).

**COMMIT Syntax**

```

COMMIT
~~~~~

```

**COMPUTE Syntax**

```

COMPUTE { identifier-1
~~~~~
 [ROUNDED [MODE IS { AWAY-FROM-ZERO }] }...
      ~~~~~~ ~~~~ { ~~~~~~ }
                  { NEAREST-AWAY-FROM-ZERO }
                  { ~~~~~~ }
                  { NEAREST-EVEN          }
                  { ~~~~~~ }
                  { NEAREST-TOWARD-ZERO    }
                  { ~~~~~~ }
                  { PROHIBITED              }
                  { ~~~~~~ }
                  { TOWARD-GREATER          }
                  { ~~~~~~ }
                  { TOWARD-LESSER           }
                  { ~~~~~~ }
                  { TRUNCATION              }
                  ~~~~~~

 = | EQUAL arithmetic-expression-1
      ~~~~~

      [ ON SIZE ERROR imperative-statement-1 ]
      ~~~~ ~~~~~

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

[ END-COMPUTE ]
~~~~~

```

**CONTINUE Syntax**

CONTINUE  
~~~~~

```

 { identifier-1 }
CONTINUE AFTER { literal-1 } SECONDS
~~~~~ ~~~~~ { arithmetic-expression-1 } ~~~~~

```

**DELETE Syntax**

```

DELETE file-name-1 RECORD
~~~~~
 [INVALID KEY imperative-statement-1]
      ~~~~~
    [ NOT INVALID KEY imperative-statement-2 ]
      ~~~ ~~~~~
[END-DELETE]
~~~~~

```

**DISPLAY UPON Device Syntax**

```

DISPLAY { literal-1    }...
~~~~~ { identifier-1 }
 [UPON mnemonic-name-1]
      ~~~~
    [ WITH NO ADVANCING ]
      ~ ~~~~~
    [ ON EXCEPTION imperative-statement-1 ]
      ~~~~~
 [NOT ON EXCEPTION imperative-statement-2]
      ~~~ ~~~~~
[ END-DISPLAY ]
~~~~~

```

**DISPLAY UPON COMMAND-LINE Syntax**

```

DISPLAY { literal-1 }...
~~~~~ { identifier-1 }
    UPON { ARGUMENT-NUMBER|COMMAND-LINE }
      ~~~ { ~~~~~ }
 [ON EXCEPTION imperative-statement-1]
      ~~~~~
    [ NOT ON EXCEPTION imperative-statement-2 ]
      ~~~ ~~~~~
[END-DISPLAY]
~~~~~

```

**DISPLAY UPON ENVIRONMENT-NAME Syntax**

```

DISPLAY { literal-1      }... UPON { ENVIRONMENT-VALUE }
~~~~~ { identifier-1 }    ~~~~ { ~~~~~~ }
 { ENVIRONMENT-NAME }
                                   ~~~~~~

[ ON EXCEPTION imperative-statement-1 ]
  ~~~~~~

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

[ END-DISPLAY ]
  ~~~~~~

```

**DISPLAY Data-Item Syntax**

```

DISPLAY identifier-1 [UPON CRT|CRT-UNDER]
~~~~~              ~~~~ ~~~~ ~~~~~~

      OMITTED
      ~~~~~~

[AT { | LINE NUMBER { integer-1 } | }]
~~ { | ~~~~ { identifier-2 } | }
 { | COLUMN|COL|POSITION|POS NUMBER { integer-2 }
 { | ~~~~~~ ~~~ ~~~~~~ ~~~ { identifier-3 }
 { }
 { { integer-3 } }
 { { identifier-4 } }

[WITH [Attribute-Specification]...
~~~~~

      [ SCROLL { UP      } [ { integer-4      } LINE|LINES ] ]
      ~~~~~~ { ~~~      } { identifier-5 }
 { DOWN }
              ~~~~~~

      [ SIZE { integer-5      }
      ~~~~ { identifier-6 } ]
 [CONTROL { literal-7 }]
      ~~~~~~ { identifier-7 }
      [ COLOUR { IS } { integer-8      } ]
      COLOUR { IS } { identifier-8 } ]
      ~~~~~~

 [NO ADVANCING]
      ~~~~~~

[ ON EXCEPTION imperative-statement-1 ]
  ~~~~~~

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

[ END-DISPLAY ]
  ~~~~~~

```

The UPON CRT, UPON CRT-UNDER and CONVERSION clauses are syntactically recognized but are otherwise non-functional. They are supported to provide compatibility with COBOL source written for other COBOL implementations.

## DISPLAY data-item (Microsoft format) Syntax

```
DISPLAY [position-spec] {identifier-2 | literal-1} ...
~~~~~
```

```
[ WITH [ Attribute-Specification ] ...
  ~~~~
```

```
 [ERASE { SCREEN|LINE }]
 [SCROLL { UP } [{ integer-3 } LINE|LINES]]
      ~~~~~ { ~~      } { identifier-3 }
                          { DOWN }
                          ~~~~~
```

```
 [SIZE { integer-4 }
      ~~~~ { identifier-4 } ]
```

```
[ END-DISPLAY ]
~~~~~
```

where position-spec is

```
{ (position-spec-num, position-spec-num) }
{ (,position-spec-num) }
{ (position-spec-num,) }
```

where position-spec-num is

```
{ identifier-1 } [{ + } integer-1]
{ integer-2 } [{ - }]
```

**DIVIDE INTO Syntax**

```
DIVIDE { literal-1 } INTO { literal-2 } GIVING { identifier-3
~~~~~ { identifier-1 } ~~~~ { identifier-2 } ~~~~~~
```

```
      [ ROUNDED [ MODE IS { AWAY-FROM-ZERO          } ] ] }...
      ~~~~~~      ~~~~      { ~~~~~~              }
 { NEAREST-AWAY-FROM-ZERO }
 { ~~~~~~ }
 { NEAREST-EVEN }
 { ~~~~~~ }
 { NEAREST-TOWARD-ZERO }
 { ~~~~~~ }
 { PROHIBITED }
 { ~~~~~~ }
 { TOWARD-GREATER }
 { ~~~~~~ }
 { TOWARD-LESSER }
 { ~~~~~~ }
 { TRUNCATION }
                                ~~~~~~
```

```
      [ REMAINDER identifier-4 ]
      ~~~~~~
```

```
 [ON SIZE ERROR imperative-statement-1]
      ~~~~ ~~~~~~
```

```
      [ NOT ON SIZE ERROR imperative-statement-2 ]
      ~~~~ ~~~~~~ ~~~~~~
```

```
 [END-DIVIDE]
      ~~~~~~
```

For further clarification, the following examples are provided to be used with the various flavours of the DIVIDE statement when using BY, INTO and GIVING.

| DIVIDE Operation                     | A | B   | C            | D                 |
|--------------------------------------|---|-----|--------------|-------------------|
| DIVIDE A INTO B                      | A | B/A |              |                   |
| DIVIDE A INTO B GIVING C             | A | B   | B/A          |                   |
| DIVIDE A BY B GIVING C               | A | B   | A/B          |                   |
| DIVIDE A INTO B GIVING C REMAINDER D | A | B   | Integer(B/A) | Integer remainder |



## DIVIDE INTO GIVING Syntax

```
DIVIDE { literal-1      } INTO { literal-2      } GIVING { identifier-3
~~~~~ { identifier-1 } ~~~~ { identifier-2 } ~~~~~~
```

```
 [ROUNDED [MODE IS { AWAY-FROM-ZERO }]] }...
      ~~~~~~      ~~~~ { ~~~~~~ }
                        { NEAREST-AWAY-FROM-ZERO }
                        { ~~~~~~ }
                        { NEAREST-EVEN          }
                        { ~~~~~~ }
                        { NEAREST-TOWARD-ZERO    }
                        { ~~~~~~ }
                        { PROHIBITED             }
                        { ~~~~~~ }
                        { TOWARD-GREATER         }
                        { ~~~~~~ }
                        { TOWARD-LESSER          }
                        { ~~~~~~ }
                        { TRUNCATION             }
                        ~~~~~~
```

```
 [REMAINDER identifier-4]
      ~~~~~~
```

```
      [ ON SIZE ERROR imperative-statement-1 ]
      ~~~~ ~~~~~~
```

```
 [NOT ON SIZE ERROR imperative-statement-2]
      ~~~~ ~~~~~~ ~~~~~~
```

```
[ END-DIVIDE ]
~~~~~
```

**DIVIDE BY GIVING Syntax**

```

DIVIDE { literal-1 } BY { literal-2 } GIVING { identifier-3
~~~~~ { identifier-1 } ~ { identifier-2 } ~~~~~

      [ ROUNDED [ MODE IS { AWAY-FROM-ZERO          } ] ] }...
      ~~~~~ ~~~~ { ~~~~~~ }
 { NEAREST-AWAY-FROM-ZERO }
 { ~~~~~~ }
 { NEAREST-EVEN }
 { ~~~~~~ }
 { NEAREST-TOWARD-ZERO }
 { ~~~~~~ }
 { PROHIBITED }
 { ~~~~~~ }
 { TOWARD-GREATER }
 { ~~~~~~ }
 { TOWARD-LESSER }
 { ~~~~~~ }
 { TRUNCATION }
                  ~~~~~~

[ REMAINDER identifier-4 ]
~~~~~

[ON SIZE ERROR imperative-statement-1]
~~~~~ ~~~~~

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

[END-DIVIDE]
~~~~~

```

**ENTRY Syntax**

```
ENTRY [ call-convention-phrase ] literal-1
```

```
~~~~~
```

```
 [linkage-phrase]
```

```
 [USING ENTRY-Argument ...]
```

```
~~~~~
```

Format 2 (Special purpose and for GO TO )

```
ENTRY FOR GO TO literal-3
```

```
~~~~~ ~~~ ~ ~
```

**ENTRY-Argument Syntax**

```
[BY { REFERENCE }] { OMITTED }
```

```
 { ~~~~~~ }
```

```
 { CONTENT }] { [size-phrase] { identifier-1 } }
```

```
 { ~~~~~~ } { literal-2 } }
```

```
 { VALUE }] { [size-phrase] { identifier-1 } }
```

```
 { ~~~~~~ } { literal-2 } }
```

**EVALUATE Syntax**

```

EVALUATE Selection-Subject-1 [ALSO Selection-Subject-2]...
~~~~~
{ { WHEN Selection-Object-1 [ ALSO Selection-Object-2 ] }...
  ~~~~~
 [imperative-statement-1] }...
 [WHEN OTHER
    ~~~~~
    imperative-statement-other ]

[ END-EVALUATE ]
~~~~~

```

**EVALUATE Selection Subject Syntax**

```

{ TRUE }
{ ~~~~~ }
{ FALSE }
{ ~~~~~ }
{ expression-1 }
{ identifier-1 }
{ literal-1 }

```

**EVALUATE Selection Object Syntax**

```

{ ANY }
{ ~~~ }
{ TRUE }
{ ~~~ }
{ FALSE }
{ ~~~ }
{ partial-expression-1 }
{ }
{ { expression-2 } [THRU|THROUGH { expression-3 }] }
{ { identifier-2 } ~~~~ ~~~~~~ { identifier-3 } }
{ { literal-2 } { literal-3 } }

```

**EXAMINE Syntax**

```

EXAMINE { identifier } TALLYING
~~~~~
      { ALL|LEADING|UNTIL FIRST } literal-1 REPLACING BY literal-2
      ~~~ ~~~~~ ~~~~~~
      ~~~~~

EXAMINE { identifier } REPLACING { ALL|FIRST|LEADING|UNTIL FIRST }
~~~~~
 literal-3 BY literal-4
      ~~~

```

## EXHIBIT Syntax

```
EXHIBIT [CHANGED] [NAMED] [position-spec] [ERASE] {identifier-1 | literal-1} ...
~~~~~      ~~~~~~      ~~~~~~      ~~~~~~
```

```
 [UPON mnemonic-name-1]
      ~~~~
```

where position-spec is

```
{(position-spec-num, position-spec-num)}
{ (, position-spec-num)                }
{(position-spec-num, )                  }
```

where position-spec-num is

```
{identifier-2} [{+} integer-2]
{integer-1   } [{-}           ]
```

**EXIT Syntax**

```

EXIT [ { PROGRAM          } [ { RETURNING } ] { identifier-1 } ]
~~~~~ [ { GIVING      } ] { literal-1   } ]

 { FUNCTION }]
 { ~~~~~~ }]
 { PERFORM [CYCLE] }]
 { ~~~~~~ ~~~~~~ }]
 { SECTION }]
 { ~~~~~~ }]
 { PARAGRAPH }]
      ~~~~~~

```

**FREE Syntax**

```

FREE { [ ADDRESS OF ] identifier-1 }...
~~~~~ ~~~~~~

```

**GENERATE Syntax**

```

GENERATE { report-name-1 }
~~~~~ { identifier-1 }

```

**GOBACK Syntax**

```

GOBACK [ { RETURNING|GIVING { literal-1   } ]
~~~~~ { ~~~~~~ ~~~~~~ { identifier-1 } }

```

**Simple GO TO Syntax**

```

GO TO procedure-name-1
~~
GO TO ENTRY literal-3
~~ ~~~~~

```

**GO TO DEPENDING ON Syntax**

```

GO TO {procedure-name-1} ...
~~
 DEPENDING ON identifier-1
                                ~~~~~~

GO TO ENTRY {literal-3} ...
~~ ~~~~~
                                DEPENDING ON identifier-1
                                ~~~~~~

```

**IF Syntax**

```

IF conditional-expression
~~
THEN { imperative-statement-1 }
 { NEXT SENTENCE }
    ~~~~ ~~~~~
[ ELSE { imperative-statement-2 } ]
    ~~~~ { NEXT SENTENCE       }
    ~~~~ ~~~~~
[ END-IF ]
~~~~~

```

**INITIALIZE Syntax**

```

INITIALIZE|INITIALISE identifier-1...
~~~~~
[ WITH FILLER ]
    ~~~~~
[{ category-name-1 } TO VALUE]
 { ALL } ~~~~~
    ~~~
[ THEN REPLACING { category-name-2 DATA BY
    ~~~~~~ ~~~
 [LENGTH OF] { literal-1 } }...]
    ~~~~~~ { identifier-1 }
[ THEN TO DEFAULT ]
    ~~~~~~

```

**INITIATE Syntax**

```

INITIATE report-name-1
~~~~~

```

## INSPECT Syntax

```

INSPECT { literal-1          }
~~~~~ { identifier-1        }
 { function-reference-1 }

[TALLYING { identifier-2 FOR { ALL|LEADING|TRAILING { literal-2 } }
~~~~~      ~~~ { ~~~ ~~~~~~ ~~~~~~ { identifier-3 } }
              { CHARACTERS      }
              ~~~~~~
 [| { AFTER|BEFORE } INITIAL { literal-3 } |] }...]
 | ~~~~~ ~~~~~~ { identifier-4 } |

[REPLACING { { { ALL|FIRST|LEADING|TRAILING { literal-4 } }
~~~~~      { { ~~~ ~~~~~ ~~~~~~ ~~~~~~ { identifier-5 } }
            { CHARACTERS                      }
            { ~~~~~~                          }
            }

          BY { [ ALL ] literal-5 }
          ~~ { ~~~              }
            { identifier-6      }

          [ | { AFTER|BEFORE } INITIAL { literal-6    } | ] }... ]
          | ~~~~~ ~~~~~~              { identifier-7 } |

[ CONVERTING { { literal-7    } TO { literal-8    }
~~~~~      { identifier-8 } ~~ { identifier-9 }

 [| { AFTER|BEFORE } INITIAL { literal-9 } |]]
 | ~~~~~ ~~~~~~ { identifier-10 } |

```



## JSON GENERATE Syntax

```

JSON GENERATE identier-1 FROM identier-2
~~~~ ~~~~~~ ~~~~~
    [COUNT IN identier-3]
    ~~~~~
 NAME OF {identier-4 IS literal-1} . . .]
    ~~~~~
    SUPPRESS {identier-5} . . .]
    ~~~~~
 [ON EXCEPTION imperative-statement-1
 ~ ~ ~~~~~~
 NOT ON EXCEPTION imperative-statement-2]
    ~~~ ~~~~~~
    END-JSON
    ~~~~~~

```

## JSON PARSE Syntax

```

JSON PARSE identier-1 INTO identier-2
~~~~ ~~~~~~ ~~~~~
    [WITH DETAIL]
    ~~~~~
 [NAME OF {identier-3 IS literal-1} . . .]
    ~~~~~
    [SUPPRESS {identier-4} . . .]
    ~~~~~
 [ON EXCEPTION imperative-statement-1
    ~~~~~~
    NOT ON EXCEPTION imperative-statement-2 ]
    ~~~ ~~~~~~
 END-JSON
    ~~~~~~

```

**MERGE Syntax**

```

MERGE sort-file-1
~~~~~
{ ON { ASCENDING } KEY identifier-1... }...
 { ~~~~~~ }
 { DESCENDING }
    ~~~~~~

[ WITH DUPLICATES IN ORDER ]
  ~~~~~~

[COLLATING SEQUENCE IS alphabet-name-1]
  ~~~~~~

USING file-name-1 file-name-2...
~~~~~

{ OUTPUT PROCEDURE IS procedure-name-1 }
{ ~~~~~~ ~~~~~~ }
{ [THRU|THROUGH procedure-name-2] }
{ ~~~~~~ }
{ GIVING file-name-3... }
{ ~~~~~~ }

```

The DUPLICATES clause is syntactically recognized but is otherwise non-functional.

**Simple MOVE Syntax**

```

MOVE { literal-1 } TO identifier-2...
~~~~ { identifier-1 } ~~

```

**MOVE CORRESPONDING Syntax**

```

MOVE CORRESPONDING identifier-1 TO identifier-2...
~~~~ ~~~~~~

```

## MULTIPLY BY Syntax

```

MULTIPLY { literal-1 } BY { identifier-2
~~~~~ { identifier-1 } ~~

    [ ROUNDED [ MODE IS { AWAY-FROM-ZERO          } ] ] }...
      ~~~~~ ~~~~~ { ~~~~~~ }
 { NEAREST-AWAY-FROM-ZERO }
 { ~~~~~~ }
 { NEAREST-EVEN }
 { ~~~~~~ }
 { NEAREST-TOWARD-ZERO }
 { ~~~~~~ }
 { PROHIBITED }
 { ~~~~~~ }
 { TOWARD-GREATER }
 { ~~~~~~ }
 { TOWARD-LESSER }
 { ~~~~~~ }
 { TRUNCATION }
 { ~~~~~~ }

 [ON SIZE ERROR imperative-statement-1]
      ~~~ ~~~~~

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

[END-MULTIPLY]
~~~~~

```

## MULTIPLY GIVING Syntax

```
MULTIPLY { literal-1      } BY { literal-2      } GIVING { identifier-3
~~~~~ { identifier-1 } ~ { identifier-2 } ~~~~~
```

```

[ROUNDED [MODE IS { AWAY-FROM-ZERO }]] }...
  ~~~~~ ~~~~ { ~~~~~~ }
               { NEAREST-AWAY-FROM-ZERO }
               { ~~~~~~ }
               { NEAREST-EVEN          }
               { ~~~~~~ }
               { NEAREST-TOWARD-ZERO    }
               { ~~~~~~ }
               { PROHIBITED             }
               { ~~~~~~ }
               { TOWARD-GREATER         }
               { ~~~~~~ }
               { TOWARD-LESSER          }
               { ~~~~~~ }
               { TRUNCATION              }
               ~~~~~~
```

```
[ON SIZE ERROR imperative-statement-1]
  ~~~~ ~~~~~
```

```
[ NOT ON SIZE ERROR imperative-statement-2 ]
  ~~~~ ~~~~~ ~~~~~
```

```
[END-MULTIPLY]
  ~~~~~~
```

## OPEN Syntax

```

OPEN { { INPUT  } [ SHARING WITH { ALL OTHER } ] file-name-1
~~~~ { ~~~~~ } ~~~~~~ { ~~~ }
 { OUTPUT } { NO OTHER }
 { ~~~~~ } { ~ }
 { I-O } { READ ONLY }
 { ~~~ } ~~~~~ ~~~~~
 { EXTEND }
      ~~~~~

[ { REVERSED          } ] }...
  { ~~~~~~ }
  { WITH { NO REWIND } }
  {      { ~ ~~~~~ } }
  {      { LOCK      } }
          ~~~~~
```

The NO REWIND, and REVERSED clauses are syntactically recognized but are otherwise non-functional.

## Procedural PERFORM Syntax

```

PERFORM procedure-name-1 [THRU|THROUGH procedure-name-2]
~~~~~
[ { [ WITH TEST { BEFORE } ] { VARYING-Clause } } ]
{      ~~~~ { ~~~~~ } { UNTIL conditional-expression-1 } }
{      { AFTER }      ~~~~~ }
{      ~~~~~ }
{ UNTIL EXIT|FOREVER }
{ ~~~~~ ~~~~~ ~~~~~ }
{ { literal-1 } TIMES }
{ { identifier-1 } ~~~~~ }

```

## Inline PERFORM Syntax

```

PERFORM
~~~~~
[{ [WITH TEST { BEFORE }] { VARYING-Clause } }]
{ ~~~~ { ~~~~~ } { UNTIL conditional-expression-1 } }
{ { AFTER } ~~~~~ }
{ ~~~~~ }
{ UNTIL EXIT|FOREVER }
{ ~~~~~ ~~~~~ ~~~~~ }
{ { literal-1 } TIMES }
{ { identifier-1 } ~~~~~ }

imperative-statement-1

END-PERFORM
~~~~~

```

## VARYING Syntax

```

VARYING identifier-2 FROM { literal-2 } [ BY { literal-3 } ]
~~~~~      ~~~~ { identifier-3 }  ~~ { identifier-4 }
[UNTIL conditional-expression-1]
~~~~~

[ AFTER identifier-5 FROM { literal-4 } [ BY { literal-5 } ]
~~~~~      ~~~~ { identifier-6 }  ~~ { identifier-7 }
[UNTIL conditional-expression-2]]...
~~~~~

```

## Sequential READ Syntax

```

READ file-name-1 [ { NEXT|PREVIOUS } ] RECORD [ INTO identifier-1 ]
~~~~~          { ~~~~~ ~~~~~~ }          ~~~~~
[{ IGNORING LOCK }]
 { ~~~~~~ ~~~~~ }
 { WITH [NO] LOCK }
 { ~~~ ~~~~~ }
 { WITH KEPT LOCK }
 { ~~~~~ ~~~~~ }
 { WITH IGNORE LOCK }
 { ~~~~~~ ~~~~~ }
 { WITH WAIT }
      ~~~~~

[ AT END imperative-statement-1 ]
  ~~~

[NOT AT END imperative-statement-2]
  ~~~ ~~~~~

[ END-READ ]
~~~~~

```

## Random READ Syntax

```

READ file-name-1 RECORD [INTO identifier-1]
~~~~~          ~~~~~
[ { IGNORING LOCK      } ]
  { ~~~~~~ ~~~~~ }
  { WITH [ NO ] LOCK }
  {      ~~~ ~~~~~ }
  { WITH KEPT LOCK    }
  {      ~~~~~ ~~~~~ }
  { WITH IGNORE LOCK  }
  {      ~~~~~~ ~~~~~ }
  { WITH WAIT          }
      ~~~~~

[KEY IS identifier-2]
  ~~~

[ INVALID KEY imperative-statement-1 ]
  ~~~~~~

[NOT INVALID KEY imperative-statement-2]
  ~~~ ~~~~~~

[ END-READ ]
~~~~~

```

**READY TRACE Syntax**

```
READY TRACE
~~~~~
```

**RELEASE Syntax**

```
RELEASE record-name-1 [ FROM { literal-1    } ]
~~~~~                ~~~~ { identifier-1 }
```

**RESET TRACE Syntax**

```
RESET TRACE
~~~~~
```

**RETURN Syntax**

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

**REWRITE Syntax**

```
REWRITE record-name-1
~~~~~
  [ FROM { literal-1    } ]
    ~~~~ { identifier-1 }

 [WITH [NO] LOCK]
    ~~~ ~~~~

  [ INVALID KEY imperative-statement-1 ]
    ~~~~~~

 [NOT INVALID KEY imperative-statement-2]
    ~~~ ~~~~~~

[ END-REWRITE ]
~~~~~
```

**ROLLBACK Syntax**

```
ROLLBACK
~~~~~
```

**SEARCH Syntax**

```
SEARCH table-name-1
~~~~~
 [VARYING index-name-1]
      ~~~~~
    [ AT END imperative-statement-1 ]
      ~~~
 { WHEN conditional-expression-1 imperative-statement-2 }...
      ~~~~
[ END-SEARCH ]
~~~~~
```

**SEARCH ALL Syntax**

```
SEARCH ALL table-name-1
~~~~~ ~~~
    [ AT END imperative-statement-1 ]
      ~~~
 WHEN conditional-expression-1 imperative-statement-2
      ~~~~
[ END-SEARCH ]
~~~~~
```

**SET ENVIRONMENT Syntax**

```
SET ENVIRONMENT { literal-1 } TO { literal-2 }
~~~ ~~~~~ { identifier-1 } ~~ { identifier-2 }
```

**SET Program-Pointer Syntax**

```
SET program-pointer-1 TO ENTRY { literal-1    }
~~~          ~~~ ~~~~~ { identifier-1 }
```

**SET ADDRESS Syntax**

```
SET [ADDRESS OF] { pointer-name-1 }...
~~~ ~~~~~ ~~~ { identifier-1   }

    TO [ ADDRESS OF ] { pointer-name-2 }
    ~~ ~~~~~ ~~~ { identifier-2   }
```



**SET Index Syntax**

```
SET index-name-1 TO { literal-1    }
~~~                ~~ { identifier-2 }
```

**SET UP/DOWN Syntax**

```
SET identifier-1 { UP } BY [LENGTH OF] { literal-1 }
~~~                { ~~    } ~~  ~~~~~~  ~~  { identifier-2 }
                  { DOWN }
                  ~~~~~
```

**SET Condition Name Syntax**

```
SET condition-name-1... TO { TRUE }
~~~                        ~~ { ~~~~ }
                          { FALSE }
                          ~~~~~
```

**SET Switch Syntax**

```
SET mnemonic-name-1... TO { ON }
~~~                        ~~ { ~~ }
                          { OFF }
                          ~~~
```

**SET ATTRIBUTE Syntax**

```
SET identifier-1 ATTRIBUTE { { BELL } { ON }...
~~~                ~~~~~~ { ~~~~          } { ~~  }
                          { BLINK          } { OFF }
                          { ~~~~~~          } ~~~
                          { HIGHLIGHT       }
                          { ~~~~~~          }
                          { LEFTLINE        }
                          { ~~~~~~          }
                          { LOWLIGHT        }
                          { ~~~~~~          }
                          { OVERLINE        }
                          { ~~~~~~          }
                          { REVERSE-VIDEO   }
                          { ~~~~~~          }
                          { UNDERLINE       }
                          ~~~~~
```

**SET LAST EXCEPTION Syntax**

```
SET LAST EXCEPTION TO { OFF }
~~~ ~~~~ ~~~~~~ ~~~ ~~~
```

### File-Based SORT Syntax

```

SORT sort-file-1
~~~~
 { ON { ASCENDING } KEY identifier-1... }...
 { ~~~~~~ }
 { DESCENDING }
      ~~~~~~

  [ WITH DUPLICATES IN ORDER ]
    ~~~~~~

 [COLLATING SEQUENCE IS alphabet-name-1]
    ~~~~~~


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


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

```

The `DUPLICATES` clause is syntactically recognized but is otherwise non-functional.

### Table SORT Syntax

```

SORT table-name-1
~~~~
 { ON { ASCENDING } KEY identifier-1... }...
 { ~~~~~~ }
 { DESCENDING }
      ~~~~~~

  [ WITH DUPLICATES IN ORDER ]
    ~~~~~~

 [COLLATING SEQUENCE IS alphabet-name-1]
    ~~~~~~

```

The `DUPLICATES` clause is syntactically recognized but is otherwise non-functional.

## START Syntax

```

START file-name-1
~~~~~

[{ FIRST }]
{ ~~~~~ }
{ LAST }
{ ~~~~~ }
{ KEY { IS EQUAL TO | IS = | EQUALS } identifier-1 }
  ~~~ { ~~~~~ ~~~~~ }
      { IS GREATER THAN | IS >              }
      { ~~~~~~ }
      { IS GREATER THAN OR EQUAL TO | IS >= }
      { ~~~~~~ ~ ~~~~~ }
      { IS NOT LESS THAN                    }
      { ~~~ ~~~~ }
      { IS LESS THAN | IS <                 }
      { ~~~~~ }
      { IS LESS THAN OR EQUAL TO | IS <=    }
      { ~~~~~ ~ ~~~~~ }
      { IS NOT GREATER THAN                 }
      ~~~ ~~~~~~

[WITH {SIZE} arithmetic-expression]
  ~~~~

[      {LENGTH} arithmetic-expression ]
  ~~~~~~

[INVALID KEY imperative-statement-1]
~~~~~

[ NOT INVALID KEY imperative-statement-2 ]
~~~ ~~~~~~

[END-START]
~~~~~

```

## STOP Syntax

```

STOP { RUN [ { RETURNING|GIVING { literal-1    }          } ] }
~~~~ { ~~~ { ~~~~~~ ~~~~~ { identifier-1 }          } }
 { { { WITH { ERROR } STATUS [{ literal-2 }] } } }
 { { { ~~~~~ } { identifier-2 } } } }
 { { { NORMAL } } } }
 { ~~~~~ }
 { literal-3 }

```

### STRING Syntax

#### STRING

~~~~~

```
{ { literal-1 } [DELIMITED BY { SIZE }] }...
 { identifier-1 } ~~~~~~ { ~~~~~ }
 { literal-2 }
 { identifier-2 }

```

```
 INTO identifier-3
    ~~~~~

```

```
[ WITH POINTER identifier-4 ]
    ~~~~~~

```

```
[ON OVERFLOW imperative-statement-1]
    ~~~~~~

```

```
[ NOT ON OVERFLOW imperative-statement-2 ]
    ~~~ ~~~~~~

```

```
[END-STRING]
    ~~~~~~

```

### SUBTRACT FROM Syntax

```
SUBTRACT { literal-1      }... FROM { identifier-2
~~~~~ { identifier-1 }  ~~~~

```

```
 [ROUNDED [MODE IS { AWAY-FROM-ZERO }]] }...
      ~~~~~ ~~~~ { ~~~~~~
                  { NEAREST-AWAY-FROM-ZERO }
                  { ~~~~~~
                  { NEAREST-EVEN          }
                  { ~~~~~~
                  { NEAREST-TOWARD-ZERO    }
                  { ~~~~~~
                  { PROHIBITED              }
                  { ~~~~~~
                  { TOWARD-GREATER          }
                  { ~~~~~~
                  { TOWARD-LESSER           }
                  { ~~~~~~
                  { TRUNCATION              }
                  ~~~~~~

```

```
 [ON SIZE ERROR imperative-statement-1]
      ~~~ ~~~~~

```

```
    [ NOT ON SIZE ERROR imperative-statement-2 ]
      ~~~ ~~~~~ ~~~~~

```

```
[END-SUBTRACT]
    ~~~~~~

```

## SUBTRACT GIVING Syntax

```

SUBTRACT { literal-1      }... FROM identifier-2
~~~~~ { identifier-1 } ~~~~

GIVING { identifier-3
~~~~~
      [ ROUNDED [ MODE IS { AWAY-FROM-ZERO          } ] ] }...
          ~~~~~ ~~~~ { ~~~~~~ }
 { NEAREST-AWAY-FROM-ZERO }
 { ~~~~~~ }
 { NEAREST-EVEN }
 { ~~~~~~ }
 { NEAREST-TOWARD-ZERO }
 { ~~~~~~ }
 { PROHIBITED }
 { ~~~~~~ }
 { TOWARD-GREATER }
 { ~~~~~~ }
 { TOWARD-LESSER }
 { ~~~~~~ }
 { TRUNCATION }
                      ~~~~~~

[ ON SIZE ERROR imperative-statement-1 ]
~~~~~ ~~~~~~

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

[ END-SUBTRACT ]
~~~~~

```



## UNSTRING Syntax

```

UNSTRING identifier-1
~~~~~

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

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

[WITH POINTER identifier-7]
      ~~~~~

[ TALLYING IN identifier-8 ]
      ~~~~~

[ON OVERFLOW imperative-statement-1]
      ~~~~~

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

[END-UNSTRING]
      ~~~~~

```

## WRITE Syntax

```

WRITE record-name-1
~~~~~

[FROM { literal-1 }]
      ~~~~ { identifier-1 }

[ WITH [ NO ] LOCK ]
      ~~~ ~~~~~

[{ BEFORE } ADVANCING { { literal-2 } LINE|LINES }]
 { ~~~~~ } { { identifier-2 } }
 { AFTER } { PAGE }
  ~~~~~           { ~~~~                      }
                  { mnemonic-name-1          }

[ AT END-OF-PAGE|EOP imperative-statement-1 ]
      ~~~~~ ~~~

[NOT AT END-OF-PAGE|EOP imperative-statement-2]
      ~~~ ~~~~~ ~~~

[ INVALID KEY imperative-statement-3 ]
      ~~~~~

[NOT INVALID KEY imperative-statement-4]
      ~~~ ~~~~~

[ END-WRITE ]
      ~~~~~

```

## XML GENERATE Syntax

```

XML GENERATE identifier-1 FROM identifier-2
~~~ ~~~~~~ ~~~~~
    [COUNT IN identifier-3]
    ~~~~~
 [WITH ENCODING codepage]
    ~~~~~
    [ WITH XML-DECLARATION ]
    ~~~~~
 [WITH ATTRIBUTES]
    ~~~~~
    [NAMESPACE IS {identifier-4 }[ NAMESPACE-PREFIX IS {identifier-5 }]]
    ~~~~~ {literal-4 } ~~~~~ {literal-5 }]]

 [NAME OF {identifier-6 IS literal-6 } ...]
    ~~~~~

    [TYPE OF {identifier-7 IS {ATTRIBUTE|ELEMENT|CONTENT}} ... ]
    ~~~~~ ~~~~~ ~~~~~

 [SUPPRESS {identifier-8 [when-phrase] } ...]
    ~~~~~ {generic-suppression-phrase }

    [ ON EXCEPTION imperative-statement-1 ]
    ~~~~~

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

[ END-XML ]
~~~~~

```

## when-phraseFormat

```

WHEN { ZERO } [[OR] { ZERO }] ...
~~~~ { ZEROES } { ZEROES }
      { ZEROS } { ZEROS }
      { SPACE } { SPACE }
      { SPACES } { SPACES }
      { LOW-VALUE } { LOW-VALUE }
      { LOW-VALUES } { LOW-VALUES }
      { HIGH-VALUE } { HIGH-VALUE }
      { HIGH-VALUES } { HIGH-VALUES }

```

## Generic-suppression-phraseFormat

```

[[EVERY {NUMERIC [ATTRIBUTE|ELEMENT|CONTENT] } ] when-phrase ]
      {NONNUMERIC [ATTRIBUTE|ELEMENT|CONTENT] }
      {ATTRIBUTE }
      {CONTENT }
      {ELEMENT }

```



## XML PARSE Syntax

XML PARSE identier-1

~~~ ~~~~~

WITH ENCODING identier-2

~~~~~

literal-1

RETURNING NATIONAL

~~~~~

VALIDATING WITH identier-3

~~~~~

PROCESSING PROCEDURE IS procedure-name-1 { THROUGH }

~~~~~

{ THRU } procedure-name-2

ON EXCEPTION imperative-statement-1

~~~~~

NOT ON EXCEPTION imperative-statement-2

~~~ ~~~~~

END-XML

~~~~~



## 6 Intrinsic Functions Syntax

### ABS Function Syntax

ABS(number)  
~~~

ACOS Function Syntax

ACOS(cosine)
~~~~

### ANNUITY Function Syntax

ANNUITY(interest-rate, number-of-periods)  
~~~~~

ASIN Function Syntax

ASIN(sine)
~~~~

### ATAN Function Syntax

ATAN(tangent)  
~~~~

BIT-OF Function Syntax

BIT-OF (argument-1)
~~~~~

### BIT-TO-CHAR Function Syntax

BIT-TO-CHAR {argument-1}  
~~~~~

BYTE-LENGTH Function Syntax

BYTE-LENGTH(string)
~~~~~

### CHAR Function Syntax

CHAR(integer)  
~~~~

COMBINED-DATETIME Function Syntax

COMBINED-DATETIME(days, seconds)
~~~~~

**CONCATENATE Function Syntax**

CONCAT | CONCATENATE (argument-1 [, argument-2 ]...)  
~~~~~

CONTENT-LENGTH Function Syntax

CONTENT-LENGTH argument-1
~~~~~

**CONTENT-OF Function Syntax**

CONTENT-OF pointer-1 { length }  
~~~~~

COS Function Syntax

COS(angle)
~~~

**CURRENCY-SYMBOL Function Syntax**

CURRENCY-SYMBOL  
~~~~~

CURRENT-DATE Function Syntax

CURRENT-DATE
~~~~~

**DATE-OF-INTEGERS Function Syntax**

DATE-OF-INTEGERS(integer)  
~~~~~

DATE-TO-YYYYMMDD Function Syntax

DATE-TO-YYYYMMDD(yymmdd [, yy-cutoff [, yy-execution-time]])
~~~~~

**DAY-OF-INTEGERS Function Syntax**

DAY-OF-INTEGERS(integer)  
~~~~~

DAY-TO-YYYYDDD Function Syntax

DAY-TO-YYYYDDD(yyddd [, yy-cutoff [, yy-execution-time]])
 ~~~~~

**E Function Syntax**

E  
 ~

**EXCEPTION-FILE Function Syntax**

EXCEPTION-FILE  
 ~~~~~

EXCEPTION-LOCATION Function Syntax

EXCEPTION-LOCATION
 ~~~~~

**EXCEPTION-STATEMENT Function Syntax**

EXCEPTION-STATEMENT  
 ~~~~~

EXCEPTION-STATUS Function Syntax

EXCEPTION-STATUS
 ~~~~~

**EXP Function Syntax**

EXP(number)  
 ~~~

EXP10 Function Syntax

EXP10(number)
 ~~~~~

**FACTORIAL Function Syntax**

FACTORIAL(number)  
 ~~~~~

FORMATTED-CURRENT-DATE Function Syntax

FORMATTED-CURRENT-DATE (argument-1)
 ~~~~~

**FORMATTED-DATE Function Syntax**

```
FORMATTED-DATE ( argument-1, argument-2 )
~~~~~
```

**FORMATTED-DATETIME Function Syntax**

```
FORMATTED-DATETIME (argument-1, argument-2, argument-3, argument-4)
~~~~~
```

**FORMATTED-TIME Function Syntax**

```
FORMATTED-TIME ( argument-1, argument-2, argument-3 )
~~~~~
```

**FRACTION-PART Function Syntax**

```
FRACTION-PART(number)
~~~~~
```

**HEX-OF Function Syntax**

```
HEX-OF {argument-1}
~~~~~
```

**HEX-TO-CHAR Function Syntax**

```
HEX-TO-CHAR {argument-1}
~~~~~
```

**HIGHEST-ALGEBRAIC Function Syntax**

```
HIGHEST-ALGEBRAIC(numeric-identifier)
~~~~~
```

**INTEGER Function Syntax**

```
INTEGER(number)
~~~~~
```

**INTEGER-OF-DATE Function Syntax**

```
INTEGER-OF-DATE(date)
~~~~~
```

**INTEGER-OF-DAY Function Syntax**

```
INTEGER-OF-DAY(date)
~~~~~
```

**INTEGER-OF-FORMATTED-DATE Function Syntax**

INTEGER-OF-FORMATTED-DATE ( argument-1, argument-2 )  
 ~~~~~

INTEGER-PART Function Syntax

INTEGER-PART(number)
 ~~~~~

**LENGTH Function Syntax**

LENGTH(string)  
 ~~~~~

LENGTH-AN Function Syntax

LENGTH-AN(string)
 ~~~~~

**LOCALE-COMPARE Function Syntax**

LOCALE-COMPARE(argument-1, argument-2 [ , locale ])  
 ~~~~~

LOCALE-DATE Function Syntax

LOCALE-DATE(date [, locale])
 ~~~~~

**LOCALE-TIME Function Syntax**

LOCALE-TIME(time [, locale ])  
 ~~~~~

LOCALE-TIME-FROM-SECONDS Function Syntax

LOCALE-TIME-FROM-SECONDS(seconds [, locale])
 ~~~~~

**LOG Function Syntax**

LOG(number)  
 ~~~

LOG10 Function Syntax

LOG10(number)
 ~~~~~

**LOWER-CASE Function Syntax**

```
LOWER-CASE(string)
~~~~~
```

**LOWEST-ALGEBRAIC Function Syntax**

```
LOWEST-ALGEBRAIC(numeric-identifier)
~~~~~
```

**MAX Function Syntax**

```
MAX(number-1 [, number-2 ]...)
~~~
```

**MEAN Function Syntax**

```
MEAN(number-1 [, number-2]...)
~~~
```

**MEDIAN Function Syntax**

```
MEDIAN(number-1 [, number-2 ]...)
~~~~~
```

**MIDRANGE Function Syntax**

```
MIDRANGE(number-1 [, number-2]...)
~~~~~
```

**MIN Function Syntax**

```
MIN(number-1 [, number-2 ]...)
~~~
```

**MOD Function Syntax**

```
MOD(value, modulus)
~~~
```

**MODULE-CALLER-ID Function Syntax**

```
MODULE-CALLER-ID
~~~~~
```

**MODULE-DATE Function Syntax**

```
MODULE-DATE
~~~~~
```



**MODULE-FORMATTED-DATE Function Syntax**

MODULE-FORMATTED-DATE  
~~~~~

MODULE-ID Function Syntax

MODULE-ID
~~~~~

**MODULE-PATH Function Syntax**

MODULE-PATH  
~~~~~

MODULE-SOURCE Function Syntax

MODULE-SOURCE
~~~~~

**MODULE-TIME Function Syntax**

MODULE-TIME  
~~~~~

MONETARY-DECIMAL-POINT Function Syntax

MONETARY-DECIMAL-POINT
~~~~~

**MONETARY-THOUSANDS-SEPARATOR Function Syntax**

MONETARY-THOUSANDS-SEPARATOR  
~~~~~

NUMERIC-DECIMAL-POINT Function Syntax

NUMERIC-DECIMAL-POINT
~~~~~

**NUMERIC-THOUSANDS-SEPARATOR Function Syntax**

NUMERIC-THOUSANDS-SEPARATOR  
~~~~~

NUMVAL Function Syntax

NUMVAL(string)
~~~~~

**NUMVAL-C Function Syntax**

```
NUMVAL-C (string [, symbol
~~~~~
 [, LOCALE locale-name-1] [, ANYCASE])
```

**NUMVAL-F Function Syntax**

```
NUMVAL-F(char)
~~~~~
```

**ORD Function Syntax**

```
ORD(char)
~~~
```

**ORD-MAX Function Syntax**

```
ORD-MAX(char-1 [, char-2]...)
~~~~~
```

**ORD-MIN Function Syntax**

```
ORD-MIN(char-1 [, char-2 ]...)
~~~~~
```

**PI Function Syntax**

```
PI
~~
```

**PRESENT-VALUE Function Syntax**

```
PRESENT-VALUE(rate, value-1 [, value-2])
~~~~~
```

**RANDOM Function Syntax**

```
RANDOM[(seed)]
~~~~~
```

**RANGE Function Syntax**

```
RANGE(number-1 [, number-2]...)
~~~~~
```

**REM Function Syntax**

```
REM(number,divisor)
~~~
```

**REVERSE Function Syntax**

```
REVERSE(string)
~~~~~
```

**SECONDS-FROM-FORMATTED-TIME Function Syntax**

```
SECONDS-FROM-FORMATTED-TIME(format,time)
~~~~~
```

**SECONDS-PAST-MIDNIGHT Function Syntax**

```
SECONDS-PAST-MIDNIGHT
~~~~~
```

**SIGN Function Syntax**

```
SIGN(number)
~~~~
```

**SIN Function Syntax**

```
SIN(angle)
~~~
```

**SQRT Function Syntax**

```
SQRT(number)
~~~~
```

**STANDARD-DEVIATION Function Syntax**

```
STANDARD-DEVIATION(number-1 [, number-2]...)
~~~~~
```

**STORED-CHAR-LENGTH Function Syntax**

```
STORED-CHAR-LENGTH(string)
~~~~~
```

**SUBSTITUTE Function Syntax**

```
SUBSTITUTE(string, from-1, to-1 [, from-n, to-n]...)
~~~~~
```

**SUBSTITUTE-CASE Function Syntax**

```
SUBSTITUTE-CASE(string, from-1, to-1 [, from-n, to-n ]...)
```

~~~~~

SUM Function Syntax

```
SUM(number-1 [, number-2 ]...)
```

~~~

**TAN Function Syntax**

```
TAN(angle)
```

~~~

TEST-DATE-YYYYMMDD Function Syntax

```
TEST-DATE-YYYYMMDD(date)
```

~~~~~

**TEST-DAY-YYYYDDD Function Syntax**

```
TEST-DATE-YYYYDDD(date)
```

~~~~~

TEST-FORMATTED-DATETIME Function Syntax

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

~~~~~

**TEST-NUMVAL Function Syntax**

```
TEST-NUMVAL(string)
```

~~~~~

TEST-NUMVAL-C Function Syntax

```
TEST-NUMVAL-C(string[,symbol])
```

~~~~~

**TEST-NUMVAL-F Function Syntax**

```
TEST-NUMVAL-F(string)
```

~~~~~

TRIM Function Syntax

```
TRIM(string [, LEADING|TRAILING ])
```

~~~~~

**UPPER-CASE Function Syntax**

```
UPPER-CASE(string)
~~~~~
```

**VARIANCE Function Syntax**

```
VARIANCE(number-1 [, number-2]...)
~~~~~
```

**WHEN-COMPILED Function Syntax**

```
WHEN-COMPILED
~~~~~
```

**YEAR-TO-YYYY Function Syntax**

```
YEAR-TO-YYYY(yy [, yy-cutoff [, yy-execution-time]])
~~~~~
```

**BOOLEAN-OF-INTEGER function Syntax**

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

This option is not yet implemented.

The included file NEWS will indicate when it is.

**CHAR-NATIONAL Function Syntax**

```
CHAR-NATIONAL(argument-1)
~~~~~
```

This option is not yet implemented.

The included file NEWS will indicate when it is.

**DISPLAY-OF Function Syntax**

```
DISPLAY-OF(argument-1 [ argument-2] )
~~~~~
```

This option is not yet implemented.

The included file NEWS will indicate when it is.

**EXCEPTION-FILE-N Function Syntax**

```
EXCEPTION-FILE-N
~~~~~
```

This option is not yet implemented.

The included file NEWS will indicate when it is.

**EXCEPTION-LOCATION-N Function Syntax**

```
EXCEPTION-LOCATION-N
~~~~~
```

This option is not yet implemented.

The included file NEWS will indicate when it is.

**INTEGER-OF-BOOLEAN Function Syntax**

```
INTEGER-OF-BOOLEAN(argument-1)
~~~~~
```

This option is not yet implemented.

The included file NEWS will indicate when it is.

**NATIONAL-OF Function Syntax**

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

This option is not yet implemented.

The included file NEWS will indicate when it is.

**STANDARD-COMPARE Function Syntax**

```
STANDARD-COMPARE(argument-1 argument-2 [ordering-name-1] [argument-4])
~~~~~
```

This option is not yet implemented.

The included file NEWS will indicate when it is.





## 7 Built-In Subroutines Syntax

### C\$CALLEDDBY Built-In Subroutine Syntax

```
CALL "C$CALLEDDBY" USING prog-name-area
~~~~~
```

### C\$CHDIR Built-In Subroutine Syntax

```
CALL "C$CHDIR" USING directory-path, result
~~~~~
```

### C\$COPY Built-In Subroutine Syntax

```
CALL "C$COPY" USING src-file-path, dest-file-path, 0
~~~~~
```

### C\$DELETE Built-In Subroutine Syntax

```
CALL "C$DELETE" USING file-path, 0
~~~~~
```

### C\$FILEINFO Built-In Subroutine Syntax

```
CALL "C$FILEINFO" USING file-path, file-info
~~~~~
```

### C\$GETPID Built-In Subroutine Syntax

```
CALL "C$GETPID"
~~~~~
```

### C\$JUSTIFY Built-In Subroutine Syntax

```
CALL "C$JUSTIFY" USING data-item, "justification-type"
~~~~~
```

### C\$MAKEDIR Built-In Subroutine Syntax

```
CALL "C$MAKEDIR" USING dir-path
~~~~~
```

**C\$NARG Built-In Subroutine Syntax**

```
CALL "C$NARG" USING arg-count-result
~~~~~          ~~~~~~
```

**C\$PARAMSIZE Built-In Subroutine Syntax**

```
CALL "C$PARAMSIZE" USING argument-number
~~~~~          ~~~~~~
```

**C\$PRINTABLE Built-In Subroutine Syntax**

```
CALL "C$PRINTABLE" USING data-item [ , char ]
~~~~~          ~~~~~~
```

**C\$SLEEP Built-In Subroutine Syntax**

```
CALL "C$SLEEP" USING seconds-to-sleep
~~~~~          ~~~~~~
```

**C\$TOLOWER Built-In Subroutine Syntax**

```
CALL "C$TOLOWER" USING data-item, BY VALUE convert-length
~~~~~          ~~~~~~          ~~~~~~
```

**C\$TOUPPER Built-In Subroutine Syntax**

```
CALL "C$TOUPPER" USING data-item, BY VALUE convert-length
~~~~~          ~~~~~~          ~~~~~~
```

**CBL.ALARM\_SOUND Built-In Subroutine Syntax**

```
CALL "CBL_ALARM_SOUND" USING ???
~~~~~          ~~~~~~
```

??? More information needed from compiler developers. ???

**CBL.AND Built-In Subroutine Syntax**

```
CALL "CBL_AND" USING item-1, item-2, BY VALUE byte-length
~~~~~          ~~~~~~          ~~~~~~
```

**CBL.BELL\_SOUND Built-In Subroutine Syntax**

```
CALL "CBL_BELL_SOUND" USING ???
~~~~~          ~~~~~~
```

??? More information needed from compiler developers. ???

**CBL\_CHANGE\_DIR Built-In Subroutine Syntax**

```
CALL "CBL_CHANGE_DIR" USING directory-path
~~~~~
```

**CBL\_CHECK\_FILE\_EXIST Built-In Subroutine Syntax**

```
CALL "CBL_CHECK_FILE_EXIST" USING file-path, file-info
~~~~~
```

**CBL\_CLOSE\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_CLOSE_FILE" USING file-handle
~~~~~
```

**CBL\_COPY\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_COPY_FILE" USING src-file-path, dest-file-path
~~~~~
```

**CBL\_CREATE\_DIR Built-In Subroutine Syntax**

```
CALL "CBL_CREATE_DIR" USING dir-path
~~~~~
```

**CBL\_CREATE\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_CREATE_FILE" USING file-path, 2, 0, 0, file-handle
~~~~~
```

**CBL\_DELETE\_DIR Built-In Subroutine Syntax**

```
CALL "CBL_DELETE_DIR" USING dir-path
~~~~~
```

**CBL\_DELETE\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_DELETE_FILE" USING file-path
~~~~~
```

**CBL\_EQ Built-In Subroutine Syntax**

```
CALL "CBL_EQ" USING item-1, item-2, BY VALUE byte-length
~~~~~
```

**CBL\_ERROR\_PROC Built-In Subroutine Syntax**

```
CALL "CBL_ERROR_PROC" USING function, program-pointer
~~~~~
```

**CBL\_EXIT\_PROC Built-In Subroutine Syntax**

```
CALL "CBL_EXIT_PROC" USING function, program-pointer
~~~~~
```

**CBL\_FLUSH\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_FLUSH_FILE" USING file-handle
~~~~~
```

**CBL\_GC\_FORK Built-In Subroute Syntax**

```
CALL "CBL_GC_FORK" USING Child-PID
~~~~~
```

**CBL\_GC\_GETOPT Built-In Subroutine Syntax**

```
CALL "CBL_GC_GETOPT" USING BY REFERENCE SHORTOPTIONS LONGOPTIONS LONGIND
~~~~~
 BY VALUE LONG-ONLY
 BY REFERENCE RETURN-CHAR OPT-VAL
```

**CBL\_GC\_HOSTED Built-In Subroutine Syntax**

```
CALL "CBL_GC_HOSTED" USING ARG-1 ARG-2
~~~~~
```

Note replaces CBL\_OC\_HOSTED which is kept as a legacy item.

**CBL\_GC\_NANOSLEEP Built-In Subroutine Syntax**

```
CALL "CBL_GC_NANOSLEEP" USING nanoseconds-to-sleep
~~~~~
```

Note replaces CBL\_OC\_NANOSLEEP which is kept as a legacy item.

**CBL\_GC\_PRINTABLE Built-In Subroutine Syntax**

```
CALL "CBL_GC_PRINTABLE" USING data-item [, char]
~~~~~
```

Note replaces C\$PRINTABLE which is kept as a legacy item.

**CBL\_SET\_GC\_SCR\_SIZE Built-In Subroutine Syntax**

```
CALL "CBL_GC_SET_SCR_SIZE" USING no-of-lines, no-of-cols
~~~~~
```

**CBL\_GC\_WAITPID Built-In Subroutine Syntax**

```
CALL "CBL_GC_WAITPID" USING ARG-1
~~~~~
RETURNING RET-STATUS
~~~~~
```

**CBL\_GET\_CSR\_POS Built-In Subroutine Syntax**

```
CALL "CBL_GET_CSR_POS" USING cursor-locn-buffer
~~~~~
```

**CBL\_GET\_CURRENT\_DIR Built-In Subroutine Syntax**

```
CALL "CBL_GET_CURRENT_DIR" USING BY VALUE 0,
~~~~~
BY VALUE length,
~~~~~
BY REFERENCE buffer
~~~~~
```

**CBL\_GET\_SCR\_SIZE Built-In Subroutine Syntax**

```
CALL "CBL_GET_SCR_SIZE" USING no-of-lines, no-of-cols
~~~~~
```

**CBL\_IMP Built-In Subroutine Syntax**

```
CALL "CBL_IMP" USING item-1, item-2, BY VALUE byte-length
~~~~~
```

**CBL\_NIMP Built-In Subroutine Syntax**

```
CALL "CBL_NIMP" USING item-1, item-2, BY VALUE byte-length
~~~~~
```

**CBL\_NOR Built-In Subroutine Syntax**

```
CALL "CBL_NOR" USING item-1, item-2, BY VALUE byte-length
~~~~~
```

**CBL\_NOT Built-In Subroutine Syntax**

```
CALL "CBL_NOT" USING item-1, BY VALUE byte-length
~~~~~
```

**CBL\_OPEN\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_OPEN_FILE" USING file-path, access-mode, 0, 0, handle
~~~~~
```

**CBL\_OR Built-In Subroutine Syntax**

```
CALL "CBL_OR" USING item-1, item-2, BY VALUE byte-length
~~~~~          ~~~~~~          ~~~~~~
```

**CBL\_READ\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_READ_FILE" USING handle, offset, nbytes, flag, buffer
~~~~~          ~~~~~~
```

**CBL\_READ\_KBD\_CHAR Built-In Subroutine Syntax**

```
CALL "CBL_READ_KBD_CHAR" USING char RETURNING status-code.
~~~~~          ~~~~~~          ~~~~~~
```

**CBL\_RENAME\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_RENAME_FILE" USING old-file-path, new-file-path
~~~~~          ~~~~~~
```

**CBL\_RUNTIME\_ERROR Built-In Subroutine Syntax**

```
CALL "CBL_RUNTIME_ERROR" USING ???
~~~~~          ~~~~~~
```

??? More information needed from compiler developers. ???

**CBL\_SET\_CSR\_POS Built-In Subroutine Syntax**

```
CALL "CBL_SET_CSR_POS" USING cursor-locn-buffer
~~~~~          ~~~~~~
```

**CBL\_TOLOWER Built-In Subroutine Syntax**

```
CALL "CBL_TOLOWER" USING data-item, BY VALUE convert-length
~~~~~          ~~~~~~          ~~~~~~
```

**CBL\_Toupper Built-In Subroutine Syntax**

```
CALL "CBL_Toupper" USING data-item, BY VALUE convert-length
~~~~~          ~~~~~~          ~~~~~~
```

**CBL\_WRITE\_FILE Built-In Subroutine Syntax**

```
CALL "CBL_WRITE_FILE" USING handle, offset, nbytes, 0, buffer
~~~~~          ~~~~~~
```

**CBL\_XOR Built-In Subroutine Syntax**

```
CALL "CBL_XOR" USING item-1, item-2, BY VALUE byte-length
~~~~~          ~~~~~~          ~~~~~~
```

**EXTFH Built-In Subroutine Syntax**

```
CALL "EXTFH" USING opcode fcd
~~~~ ~~~~~
```

**SYSTEM Built-In Subroutine Syntax**

```
CALL "SYSTEM" USING command  
~~~~ ~~~~~
```

**X"91" Built-In Subroutine Syntax**

```
CALL X"91" USING return-code, function-code, binary-variable-arg
~~~~ ~~~~~
```

**X"E4" Built-In Subroutine Syntax**

```
CALL X"E4"  
~~~~
```

**X"E5" Built-In Subroutine Syntax**

```
CALL X"E5"
~~~~
```

**X"F4" Built-In Subroutine Syntax**

```
CALL X"F4" USING byte, table  
~~~~ ~~~~~
```

**X"F5" Built-In Subroutine Syntax**

```
CALL X"F5" USING byte, table
~~~~ ~~~~~
```





## 8 GNU Free Documentation License

Version 1.3, 3 November 2008

Copyright © 2000, 2001, 2002, 2007, 2008 Free Software Foundation, Inc.  
<https://fsf.org/>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

### 0. PREAMBLE

The purpose of this License is to make a manual, textbook, or other functional and useful document *free* in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or noncommercially. Secondly, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of “copyleft”, which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software.

We have designed this License in order to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference.

### 1. APPLICABILITY AND DEFINITIONS

This License applies to any manual or other work, in any medium, that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. Such a notice grants a world-wide, royalty-free license, unlimited in duration, to use that work under the conditions stated herein. The “Document”, below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as “you”. You accept the license if you copy, modify or distribute the work in a way requiring permission under copyright law.

A “Modified Version” of the Document means any work containing the Document or a portion of it, either copied verbatim, or with modifications and/or translated into another language.

A “Secondary Section” is a named appendix or a front-matter section of the Document that deals exclusively with the relationship of the publishers or authors of the Document to the Document’s overall subject (or to related matters) and contains nothing that could fall directly within that overall subject. (Thus, if the Document is in part a textbook of mathematics, a Secondary Section may not explain any mathematics.) The relationship could be a matter of historical connection with the subject or with related matters, or of legal, commercial, philosophical, ethical or political position regarding them.

The “Invariant Sections” are certain Secondary Sections whose titles are designated, as being those of Invariant Sections, in the notice that says that the Document is released under this License. If a section does not fit the above definition of Secondary then it is not allowed to be designated as Invariant. The Document may contain zero Invariant Sections. If the Document does not identify any Invariant Sections then there are none.

The “Cover Texts” are certain short passages of text that are listed, as Front-Cover Texts or Back-Cover Texts, in the notice that says that the Document is released under this License.

A Front-Cover Text may be at most 5 words, and a Back-Cover Text may be at most 25 words.

A “Transparent” copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, that is suitable for revising the document straightforwardly with generic text editors or (for images composed of pixels) generic paint programs or (for drawings) some widely available drawing editor, and that is suitable for input to text formatters or for automatic translation to a variety of formats suitable for input to text formatters. A copy made in an otherwise Transparent file format whose markup, or absence of markup, has been arranged to thwart or discourage subsequent modification by readers is not Transparent. An image format is not Transparent if used for any substantial amount of text. A copy that is not “Transparent” is called “Opaque”.

Examples of suitable formats for Transparent copies include plain ASCII without markup, Texinfo input format, LaTeX input format, SGML or XML using a publicly available DTD, and standard-conforming simple HTML, PostScript or PDF designed for human modification. Examples of transparent image formats include PNG, XCF and JPG. Opaque formats include proprietary formats that can be read and edited only by proprietary word processors, SGML or XML for which the DTD and/or processing tools are not generally available, and the machine-generated HTML, PostScript or PDF produced by some word processors for output purposes only.

The “Title Page” means, for a printed book, the title page itself, plus such following pages as are needed to hold, legibly, the material this License requires to appear in the title page. For works in formats which do not have any title page as such, “Title Page” means the text near the most prominent appearance of the work’s title, preceding the beginning of the body of the text.

The “publisher” means any person or entity that distributes copies of the Document to the public.

A section “Entitled XYZ” means a named subunit of the Document whose title either is precisely XYZ or contains XYZ in parentheses following text that translates XYZ in another language. (Here XYZ stands for a specific section name mentioned below, such as “Acknowledgements”, “Dedications”, “Endorsements”, or “History”.) To “Preserve the Title” of such a section when you modify the Document means that it remains a section “Entitled XYZ” according to this definition.

The Document may include Warranty Disclaimers next to the notice which states that this License applies to the Document. These Warranty Disclaimers are considered to be included by reference in this License, but only as regards disclaiming warranties: any other implication that these Warranty Disclaimers may have is void and has no effect on the meaning of this License.

## 2. VERBATIM COPYING

You may copy and distribute the Document in any medium, either commercially or noncommercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute. However, you may accept compensation in exchange for copies. If you distribute a large enough number of copies you must also follow the conditions in section 3.

You may also lend copies, under the same conditions stated above, and you may publicly display copies.

## 3. COPYING IN QUANTITY

If you publish printed copies (or copies in media that commonly have printed covers) of the Document, numbering more than 100, and the Document's license notice requires Cover Texts, you must enclose the copies in covers that carry, clearly and legibly, all these Cover Texts: Front-Cover Texts on the front cover, and Back-Cover Texts on the back cover. Both covers must also clearly and legibly identify you as the publisher of these copies. The front cover must present the full title with all words of the title equally prominent and visible. You may add other material on the covers in addition. Copying with changes limited to the covers, as long as they preserve the title of the Document and satisfy these conditions, can be treated as verbatim copying in other respects.

If the required texts for either cover are too voluminous to fit legibly, you should put the first ones listed (as many as fit reasonably) on the actual cover, and continue the rest onto adjacent pages.

If you publish or distribute Opaque copies of the Document numbering more than 100, you must either include a machine-readable Transparent copy along with each Opaque copy, or state in or with each Opaque copy a computer-network location from which the general network-using public has access to download using public-standard network protocols a complete Transparent copy of the Document, free of added material. If you use the latter option, you must take reasonably prudent steps, when you begin distribution of Opaque copies in quantity, to ensure that this Transparent copy will remain thus accessible at the stated location until at least one year after the last time you distribute an Opaque copy (directly or through your agents or retailers) of that edition to the public.

It is requested, but not required, that you contact the authors of the Document well before redistributing any large number of copies, to give them a chance to provide you with an updated version of the Document.

#### 4. MODIFICATIONS

You may copy and distribute a Modified Version of the Document under the conditions of sections 2 and 3 above, provided that you release the Modified Version under precisely this License, with the Modified Version filling the role of the Document, thus licensing distribution and modification of the Modified Version to whoever possesses a copy of it. In addition, you must do these things in the Modified Version:

- A. Use in the Title Page (and on the covers, if any) a title distinct from that of the Document, and from those of previous versions (which should, if there were any, be listed in the History section of the Document). You may use the same title as a previous version if the original publisher of that version gives permission.
- B. List on the Title Page, as authors, one or more persons or entities responsible for authorship of the modifications in the Modified Version, together with at least five of the principal authors of the Document (all of its principal authors, if it has fewer than five), unless they release you from this requirement.
- C. State on the Title page the name of the publisher of the Modified Version, as the publisher.
- D. Preserve all the copyright notices of the Document.
- E. Add an appropriate copyright notice for your modifications adjacent to the other copyright notices.
- F. Include, immediately after the copyright notices, a license notice giving the public permission to use the Modified Version under the terms of this License, in the form shown in the Addendum below.
- G. Preserve in that license notice the full lists of Invariant Sections and required Cover Texts given in the Document's license notice.

- H. Include an unaltered copy of this License.
- I. Preserve the section Entitled “History”, Preserve its Title, and add to it an item stating at least the title, year, new authors, and publisher of the Modified Version as given on the Title Page. If there is no section Entitled “History” in the Document, create one stating the title, year, authors, and publisher of the Document as given on its Title Page, then add an item describing the Modified Version as stated in the previous sentence.
- J. Preserve the network location, if any, given in the Document for public access to a Transparent copy of the Document, and likewise the network locations given in the Document for previous versions it was based on. These may be placed in the “History” section. You may omit a network location for a work that was published at least four years before the Document itself, or if the original publisher of the version it refers to gives permission.
- K. For any section Entitled “Acknowledgements” or “Dedications”, Preserve the Title of the section, and preserve in the section all the substance and tone of each of the contributor acknowledgements and/or dedications given therein.
- L. Preserve all the Invariant Sections of the Document, unaltered in their text and in their titles. Section numbers or the equivalent are not considered part of the section titles.
- M. Delete any section Entitled “Endorsements”. Such a section may not be included in the Modified Version.
- N. Do not retitle any existing section to be Entitled “Endorsements” or to conflict in title with any Invariant Section.
- O. Preserve any Warranty Disclaimers.

If the Modified Version includes new front-matter sections or appendices that qualify as Secondary Sections and contain no material copied from the Document, you may at your option designate some or all of these sections as invariant. To do this, add their titles to the list of Invariant Sections in the Modified Version’s license notice. These titles must be distinct from any other section titles.

You may add a section Entitled “Endorsements”, provided it contains nothing but endorsements of your Modified Version by various parties—for example, statements of peer review or that the text has been approved by an organization as the authoritative definition of a standard.

You may add a passage of up to five words as a Front-Cover Text, and a passage of up to 25 words as a Back-Cover Text, to the end of the list of Cover Texts in the Modified Version. Only one passage of Front-Cover Text and one of Back-Cover Text may be added by (or through arrangements made by) any one entity. If the Document already includes a cover text for the same cover, previously added by you or by arrangement made by the same entity you are acting on behalf of, you may not add another; but you may replace the old one, on explicit permission from the previous publisher that added the old one.

The author(s) and publisher(s) of the Document do not by this License give permission to use their names for publicity for or to assert or imply endorsement of any Modified Version.

## 5. COMBINING DOCUMENTS

You may combine the Document with other documents released under this License, under the terms defined in section 4 above for modified versions, provided that you include in the combination all of the Invariant Sections of all of the original documents, unmodified, and list them all as Invariant Sections of your combined work in its license notice, and that you preserve all their Warranty Disclaimers.

The combined work need only contain one copy of this License, and multiple identical Invariant Sections may be replaced with a single copy. If there are multiple Invariant Sections with the same name but different contents, make the title of each such section unique by adding at the end of it, in parentheses, the name of the original author or publisher of that section if known, or else a unique number. Make the same adjustment to the section titles in the list of Invariant Sections in the license notice of the combined work. In the combination, you must combine any sections Entitled “History” in the various original documents, forming one section Entitled “History”; likewise combine any sections Entitled “Acknowledgements”, and any sections Entitled “Dedications”. You must delete all sections Entitled “Endorsements.”

## 6. COLLECTIONS OF DOCUMENTS

You may make a collection consisting of the Document and other documents released under this License, and replace the individual copies of this License in the various documents with a single copy that is included in the collection, provided that you follow the rules of this License for verbatim copying of each of the documents in all other respects.

You may extract a single document from such a collection, and distribute it individually under this License, provided you insert a copy of this License into the extracted document, and follow this License in all other respects regarding verbatim copying of that document.

## 7. AGGREGATION WITH INDEPENDENT WORKS

A compilation of the Document or its derivatives with other separate and independent documents or works, in or on a volume of a storage or distribution medium, is called an “aggregate” if the copyright resulting from the compilation is not used to limit the legal rights of the compilation’s users beyond what the individual works permit. When the Document is included in an aggregate, this License does not apply to the other works in the aggregate which are not themselves derivative works of the Document.

If the Cover Text requirement of section 3 is applicable to these copies of the Document, then if the Document is less than one half of the entire aggregate, the Document’s Cover Texts may be placed on covers that bracket the Document within the aggregate, or the electronic equivalent of covers if the Document is in electronic form. Otherwise they must appear on printed covers that bracket the whole aggregate.

## 8. TRANSLATION

Translation is considered a kind of modification, so you may distribute translations of the Document under the terms of section 4. Replacing Invariant Sections with translations requires special permission from their copyright holders, but you may include translations of some or all Invariant Sections in addition to the original versions of these Invariant Sections. You may include a translation of this License, and all the license notices in the Document, and any Warranty Disclaimers, provided that you also include the original English version of this License and the original versions of those notices and disclaimers. In case of a disagreement between the translation and the original version of this License or a notice or disclaimer, the original version will prevail.

If a section in the Document is Entitled “Acknowledgements”, “Dedications”, or “History”, the requirement (section 4) to Preserve its Title (section 1) will typically require changing the actual title.

## 9. TERMINATION

You may not copy, modify, sublicense, or distribute the Document except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, or distribute it is void, and will automatically terminate your rights under this License.

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly

and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, receipt of a copy of some or all of the same material does not give you any rights to use it.

## 10. FUTURE REVISIONS OF THIS LICENSE

The Free Software Foundation may publish new, revised versions of the GNU Free Documentation License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. See <https://www.gnu.org/licenses/>.

Each version of the License is given a distinguishing version number. If the Document specifies that a particular numbered version of this License “or any later version” applies to it, you have the option of following the terms and conditions either of that specified version or of any later version that has been published (not as a draft) by the Free Software Foundation. If the Document does not specify a version number of this License, you may choose any version ever published (not as a draft) by the Free Software Foundation. If the Document specifies that a proxy can decide which future versions of this License can be used, that proxy’s public statement of acceptance of a version permanently authorizes you to choose that version for the Document.

## 11. RELICENSING

“Massive Multiauthor Collaboration Site” (or “MMC Site”) means any World Wide Web server that publishes copyrightable works and also provides prominent facilities for anybody to edit those works. A public wiki that anybody can edit is an example of such a server. A “Massive Multiauthor Collaboration” (or “MMC”) contained in the site means any set of copyrightable works thus published on the MMC site.

“CC-BY-SA” means the Creative Commons Attribution-Share Alike 3.0 license published by Creative Commons Corporation, a not-for-profit corporation with a principal place of business in San Francisco, California, as well as future copyleft versions of that license published by that same organization.

“Incorporate” means to publish or republish a Document, in whole or in part, as part of another Document.

An MMC is “eligible for relicensing” if it is licensed under this License, and if all works that were first published under this License somewhere other than this MMC, and subsequently incorporated in whole or in part into the MMC, (1) had no cover texts or invariant sections, and (2) were thus incorporated prior to November 1, 2008.

The operator of an MMC Site may republish an MMC contained in the site under CC-BY-SA on the same site at any time before August 1, 2009, provided the MMC is eligible for relicensing.