

# **PRINTCBL**

v2.01.31

A program to print Cobol Source code with all Copy statements included in  
along with all comments.

## **Set up and Usage Manual**



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Document update:	9 March 2019
Revision:	43
Software Version Date:	26th January, 2019
Software Version	2.01.31
Word Processor:	LibreOffice 6.0. or later

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## Support for Printcbl

Please read all of these notes before use along with the Changelog file and ensure that the later latest entry matches the current source file version number!!!

Latest version at <http://sourceforge.net/p/open-cobol/code/HEAD/tree/trunk/contrib/tools/printcbl>  
or <http://applewood.linkpc.net/files/printcbl-latest.zip>  
or via anonymous ftp at applewood.linkpc.net : cd pub & get printcbl-latest.zip

If using ftp you may find (but unlikely) Alpha releases present, that is under initial testing.  
One's marked Beta are somewhat safer to use for production purposes.

Suggestions for updates to vbcoen at gmail.com

Message subject must be 'printcbl requests' or 'printcbl bugs' subject to the issue or problem.  
And of course you can use the GnuCOBOL website bug reporting tool for all tools.

If you wish to be on an update & bug report email list for: Printcbl, Cobxref, Profiler (Cobol), Dectrans and anything else related to my/our Cobol development tools, send your details to above address with subject: 'Update lists' and you will be added to my address list for such purposes.

Better still, you should also be registered on the Sourceforge website for the above products for email and updated file notifications.

## **Why is this program needed ?**

Simply if you have a need to supply program sources to another for which you do not wish to also supply all of your copy book libraries etc then using Printcbl you can auto include them in to your source program creating a new file that can be sent, complete.

I use it for examples of usage for other Cobol Tools developed and distributed via sourceforge and other websites as O/S (Open Source) with only the FSF license for re-use.

As examples see cobxref, dectrans as well as the Accounting software package ACAS that includes General and IRS (abbreviated version of same), Purchase,& Sales Ledgers and Stock Control with support for Cobol files or Mysql rdbms tables (other might be added later).

The program can also produce a printed listing of the Cobol program source that was used as input with all COPYs added, up to a depth of 9.

## Copy Support (v2.00)

Case is not sensitive, so ' COPY ' ' copy ' and any variation is OK, same as in GnuCOBOL. Both types of quotes (single and double but not mixed)

- 1: COPY foo.
  - 2: COPY "foo" (or 'foo').
  - 3: COPY "foo.ext"                      different .ext **NOT** searched for
  - 4: COPY foo.ext                        different .ext **NOT** searched for (same as in 3).
  - 5: for any COPY options adding IN | OF "../par" fully supported.
  - 6: COPY filename.ext | IN | OF path | "relative path" | SUPPRESS | SUPPRESS PRINTING  
The SUPPRESS options only used for a report otherwise ignored.
  - 7: Support for REPLACING sub clause
- |           |                   |                      |
|-----------|-------------------|----------------------|
| Form 1A:: | Word              | by word              |
| 1B::      | Literal           | by literal           |
| 1C::      | Identifier        | by Identifier        |
| 1D::      | ==pseudo-text-1== | by ==pseudo-text-2== |
| 1E::      | ==text-3==        | by ==text-4==        |

Cases 1 and 2 (if not found, then searched with extensions of .CPY, .CBL, .COB (as well as lower case version of the same). This is not done if the extension is provided.

For all cases, searched in current directory and then all search paths in order supplied up to a maximum of 10 paths only.

If both GnuCobol environment variables (COBCPY and COB\_COPY\_DIR) are set and they are the same, only one will be used otherwise search paths are added in read order with COBCPY first.

As per the Cobol standards **ALL COPY** statements **MUST** be followed directly with '.' (period).

**Note:** In 1 through 6) the copy file name and the copy library is **case sensitive**.

**Replacing** all, *other* than literals are **NOT** case sensitive.

Literals must be on same line. There is no support for continuation on the COPY statements or the source target but this allows for partial, line by line replacement.

### **Warning:**

1.. When using fixed format source it is the programmers **responsibility** to ensure that the replacing clause element fits within the area available and does NOT exceed column 72. The same applies to the compiler. (See the Cobol standards manual).

This means the result of a replace that exceeds column 72 is undefined but could extend beyond the Form B area.

# Pre usage actions on first install

## Program Source code Set up

As of version 2.01.20 these system setting changes happen at the start of the source file and within the section marked as CONFIGURATION SETTINGS.

### 1. Printing

#### A. C-Print-Out AS 0

Set to AS 1, if you want Printcbl to send your report file to the printer at end of processing (EOJ). Otherwise you do it manually such as creating a .pdf file using the supplied script prtpdf.sh which you can modify to match your requirements. Also see options B through D.

[ As set (to zero) will force no printing and this has been set during testing, however if you wish that the program output is normally printed when NOPRINT was **not** used then set it to 1 (one). ]

#### B. C-PR-2 AS 0

Retains the report file. To always delete the report file after sending to the print spooler, change to 'AS 1'.  
Currently it is set for lpr to keep it. [ This is the command to print in Linux.]

#### C. PSN-1 AS "Officejet-Pro-8600"

Change to the name of your normal Printer Spool name as set up in CUPS or Windows etc, [ Currently set to use printer ["Officejet\\_Pro\\_8600"](#) ]

#### D. Change PAGE-LINES AS 54

Change here only if when printing, you do not fill a page or go over to a new one without a heading line.

### 2. Operating system set up

#### A. C-OS-Delimiter AS "/"

This is set up for use in \*nix environments which includes Linux and MSYS/MinGW etc

Change it for "\" if and **only** if, you are using a native version of the Cobol compiler built by Microsoft Visual Studio.

### 3. Testing settings Only

#### A. C-Testing-1 AS 0

Not testing. Only change this to 1 if requested by the programmer.  
It can produce a lot of output.

Note that there are other testing settings within the source but these are only used during testing by the PrintCbl programmers or support. These may well be removed after all testing has completed.

### 4. Change settings in the source code variable Print-Report:

#### A. Change variable PR-Name size from x(32) if your 'output file' names are longer. along with variables WS-Print-File-Name and if needed the input file name area: WS-Input-File-Name.

Settings for 4.A can be left as they are, for most circumstances. Note that these are the file names used as input and output to PrintCbl as Parameters 1 and 2.

*Information on additional data that is set up is:*

Print font size at (cpi) 16.6 chars per inch and (lpi) 9 lines per inch, double sided (if your printer can't it should be ignored) 1/4 inch or 6mm margins top, left and right edge.

You still need to change the source code for this one if needed BUT only change one at a time and test it.

Note that the variable 'WS-Page-Lines' is set from PAGE-LINES as in (1.D) above., and should be only be changed if your printout is wrong, e.g., too much space left on page before a change of page or it prints on next page before a heading is printed indicating a printing overflow.

If you need to place prints into a ring binder you might want increase the value 'page-left=24' to a larger number. note that this is in pixels and there are 72 per inch/26mm, so say to 48.

Note that these settings may not be the same in a given version of the source code or more or less may be present.

5. You must still provide the value in PSN as parameter P4 when running just in case you decide to use another printer but in any event it is still a mandatory parameter. as I have no easy way to recognise P5 instead of it. If you don't have it set to print, just use any characters, e.g., abc.

This will also result in no printing from the output file if using a value as P4 that is not a printer name.

6. The program will examine the Environment Variable LC\_TIME for values :

en\_GB to set to UK format (1) - DD/MM/YYYY

en\_US to set to USA format (2) - MM/DD/YYYY

anything else it is left as 3 = International (Unix) format - YYYY/MM/DD.

You can add a check for other value/s for your country/region but please let the programmer know [by email with subject Printcbl] so it can be added to the main source files held at the SF website areas.

If you do not normally use these two you can also run printcbl within a script that sets the LC\_TIME value up using an 'export LC\_TIME before running.

In all cases, this along with the time as hh:mm:ss:nn is printed in the headings.

Note that in the first heading page, the program parameters are also printed for reference purposes. As supplied it also displays the same information, however if you wish this to be stopped change the value of Testing to zero. [Testing2 through to Testing4 are set off but are used within the code during, yep, you have it, testing ] !

Note that the time is updated for each heading printed as it acts as a simple way of seeing just how long it takes in milliseconds to run looking at the first and last heading times.

7. You are now ready to compile as:

```
cobc -x printcbl.cbl-fmissing-statement=ok
```

```
chmod +x printcbl
```

```
mv printcbl ~/bin or whatever other bin directory that is in your environment path variable.
```

The program has been tested with GC v2 but all current testing is with v3.

6. You can now use it from any working directory.

7. Read the following notes on requirements and usage.



## Printcbl: Program Usage

Caution: This program has only been tested against source files that have gone through the GnuCOBOL compiler with **no** reported errors and I recommend that you do the same.

Printcbl P1 P2 P3 P4 P5

where: (P1 to P4 are Mandatory)

P1: Cobol source file

P2: Output Print File

P3: Source format = -free or -FREE or -fixed or -FIXED (You can omit the '-')

P4: Name of cups Spool/printer (If not needed just use any name 'e.g., fred').

### **From v2.01.16**

Can be NOPRINT | noprint to produce an updated source file without any headings etc.

This is the same action as using the optional NOPRINT directive, see Print Format Commands.

P5: Temporary path to copy library, in or out of quotes e.g., './foo' or "../foo:../foo/bar" or for just one ../foo. Multiple paths should be in quotes if running under windows, e.g., "foo:bar:wag:moo". There is a maximum of ten (10) copy library paths allowed, including the ones detailed below under COBCPY and COB\_COPY\_DIR.

If this field is omitted (blank) then the current directory is used as P5.

This will be placed first in search list over that in GnuCOBOL environment variables:  
COBCPY and COB\_COPY\_DIR

You may need to set this, if you are using copy book sources in the same directory as the program source.

Note that if both env. vars. are found and have the same contents just one is used, otherwise they are searched in order of P5 (if present), COBCPY then COB\_COPY\_DIR

Warning: There is a total of 10 paths allowed including P5 So only the first 10 are used.

e.g., if both envs are used and you have:

COBCPY=a:b:c:d:e:f

COB\_COPY\_DIR=g:h:i:j:k:l:m

Only a through j are search and one less if P5 is used with one path (or has been omitted), which is searched first.

If parameters (are less than four e.g., P1 P2 P3 P4) are not supplied at execution time then the program will request:

[P1]: Input File,

[P2]: Output File,

[P3]: Source Format (fixed | -fixed | free | -free),

[P4]: PSN (Print Spool Name) or (for v2.01.16 and later) NOPRINT | noprint.

There will **NOT** be a request for temp search paths and therefore the current directory will not be searched unless specified in the environment variables.

## Printcbl Typical usage Scenarios

All make use of environment variables COBCPY and COB\_COPY\_DIR which contain lists of where all copy books are:

1. To Produce a new source file with all copy libraries included.
  - A - Fixed Format source. All copy libs within environment variables.  
`printcbl sfncbl sfncob -fixed noprint`
  - B. Free Format source. Copy lib in env. vars and active local directory.  
`printcbl sfncbl sfncob -free noprint`
  - C. Same as B but with extra copy book in for search  
`printcbl sfncbl sfncob FREE NOPRINT /home/vince/pdse-A-cbl-Pan-Libarian`

Note the search path used here is always searched first before going to any in the COBCPY and COB\_COPY\_DIR paths.

2. To Produce a report listing file for output to printer (using examples as in 1.)
  - A. `printcbl sfncbl sfncob -fixed officejet-Pro-8600-Duplex`
  - B. Same as 1B but do not automatically send file to printer, just leave it.  
`printcbl sfncbl sfncob -free abcd` Here abcd is dummy file. It is not created.

Same as for 1.C but copy books are in current directory which is search first

- C. `printcbl sfncbl sfncob -FREE officejet-Pro-8600-Duplex`

Note the usage of NOPRINT | noprint as P4 avoids the need for using it as a command within the source file.

## Optional print format Commands

### Full listing

/	Fixed format sources only
EJECT	Both formats but different pretext { ** or *> }
NOLIST	Both formats but different pretext
LIST	Both formats but different pretext
NOPRINT	Both formats but different pretext

Other than for the fixed format / (in cc 7), all of them can be used in both formats however, if using in fixed format (**starting** in column 7), they must be preceded by '\*\*' e.g.

'\*\*EJECT', '\*\*NOLIST', '\*\*LIST', '\*\*NOPRINT'.

and for free format (**starting** in column 1) must be preceded by '\*>' e.g.,

'\*>EJECT', '\*>NOLIST', '\*>LIST', '\*>NOPRINT'.

**Note:** The starting columns are **mandatory** and the case is immaterial .e.g., upper or lower or a mixture of the two.

### / or EJECT

Will print new headings before any more source.

### NOLIST

Will stop listing the source from this point.

### LIST

Will start listing the source at this point

**Notes** These commands will be listed so you can see why listings have stopped, started or new page started in common with many mainframe compilers.

The usage of \*\* or \*> are to avoid issues if these are present when compiling with GnuCOBOL or any other compiler. as they will be ignored by the compiler **but** if using the output from printcbl as input to GnuCOBOL you must specify the source format of this line even if line 2 contains a >>source statement if not in the default GC. form.

Lines starting with the following are **ignored** but still listed:

Free formats: '\$', '#', '\*>' in column one.

Fixed formats: '\$', '#', '\*' in column seven [ In case of MF or IBM code from a listing or other generated file

also anything after the floating '\*>' in both formats as well as blank lines

## Special case command

### NOPRINT

Coded as **\*\*NOPRINT** or **\*>NOPRINT** for fixed / free (same as above commands)

This command, if on the **first source line only**, will turn off the formatted listings including headings etc. and just produce a new source file which includes all COPY statement contents. This will allow you to create a stand-alone source file without the need to also provide the copy library contents when passing on such files to others. Note that all COPY statements are remarked out and the first line omitted.

This function is also available using program parameter 4 set to NOPRINT or noprint in place of a print spool name as of version 2.01.16.

# Compiler Requirements for building Printcbl

Any version that supports:

## *Functions:*

1. SUBSTITUTE
2. SUBSTITUTE-CASE
3. CURRENT-DATE
4. UPPER-CASE
5. LOWER-CASE

## *Called Procedures:*

6. SYSTEM
7. CBL\_CHECK\_FILE\_EXIST
8. CBL\_CLOSE\_FILE
9. CBL\_DELETE\_FILE
10. CBL\_GET\_CURRENT\_DIR
11. CBL\_OPEN\_FILE
12. CBL\_READ\_FILE

## 13. Environment variable capture e.g.:

accept Cobcpy	from Environment "COBCPY".
accept Cob_Copy_Dir	from Environment "COB_COPY_DIR"
accept Arg-Number	from argument-number.
accept Arg-Value (4)	from argument-value

As far as I know all versions (v2) do so, but not tested against older ones. There may be a problem with v1.1 and Substitute if you do not have the patches installed.

It is recommended that you upgrade your compiler to version 2.2 or later.

All development and testing is with v3.

If this is a problem let me know and I will look at recoding it to replace this.

In any event I may have to do so sometime, to ensure the LEADING and TRAILING sub-clauses are correctly honoured if I can work out how to.

# TODO List

1. Support for REPLACING LEADING, TRAILING sub-clauses, see Future Updates for more info.  
These are processed by the program but have no special treatment.

## *Future Updates*

1. LEADING (1D)  
(means only the first occurrence of the character string).
2. TRAILING (1D)  
(means only the last occurrence of the character string).

## Noticeable changes from v1.01

For more details see the file Changelog included with the program and this manual.

1. Support for multiple depths for copy statements instead of 1, i.e., copy within a copy is depth 2. It will now go to a depth of 9, e.g., source with nine copy within copy.

According to the Cobol standards, GnuCOBOL should go to 5 levels at least. which when last checked it does but that was some versions ago.

2. Support for up to 50 REPLACING sub-clauses per COPY, but LEADING, TRAILING is ignored.  
(This is a result of the usage of the function substitute that has no support for such).  
I may have to re-look at this subject if support of substitute in v1.1 of GC has been retro included by patch.  
However SUBSTITUTE does not have any options it is a From / To tool only.
2. Produce a file as P2 (parameter 2) as an updated source file instead of a print report by specifying P4 contains NOPRINT or noprint (the recommended way).  
or  
for free format ">>NOPRINT" column 1 or  
fixed format "\*">NOPRINT" column 7  
in line **ONE** of the source file.

This create a new source file as P2 with all copy libraries added and all COPY statements remarked out e.g., for fixed cc7 has '\*' and for free cc1 has '\*>'.

This way the file will go through GnuCOBOL without any errors.

4. Support for up to 50 REPLACING sub-clauses per COPY, but LEADING, TRAILING is ignored.  
(This is a result of the usage of the function substitute that has no support for such).  
I may have to re-look at this subject if support of substitute in v1.1 of GC has been retro included by patch.  
However SUBSTITUTE does not have any options it is a From / To tool only.  
May have to look at combination of INSPECT and SUBSTITUTE or do it the hard way.
5. Limitations for current version based on tables sizes etc.:
  - A. Total number of copy's with copy's within original source file 10, e.g., depth 9.
  - B. Maximum number of REPLACING clauses with a COPY: 50.
  - C. Maximum size of a Replacing Source or Target field: 2048 bytes/Chars.
  - D. Maximum size of complete COPY statement: 1 MB (1024 \* 1024).
  - E. Maximum file buffer size: 1 MB. [Source files are read in 1 MB blocks].

- F.** Warning, Error, Caution messages held in table currently 10 in English.  
[ This can be added to for other languages, please supply translations].
- G.** Maximum size of a free format source line: 255 Chars [as per Cobol standards].
- H.** Maximum number of source file extensions: 7 [.cpy.CPY.cbl.CBL.cob.COB,] and space.

Special source changes now mostly done at the source file beginning in GnuCOBOL CDF section.  
See Program Source code Set up page 7.

## Literal Treatment

Please note the way (or not) literals are processed.

No processing takes place of continuation of literals both in the COPY clause or the source code as such.

So if you need to change one line of literal you only need to specify the content of that one line in a COPY statement.

E.g., copy library source code:

03 filler pic x any length value "This is an example of left hand heads"

03 filler pic x any length value " but this is an extension line of more rubbish" &  
" as such makes absolutely no sense".

COPY foo.bar replacing

"This is an example of left hand heads" by "Top form for Fred"

" but this is an extension line of more rubbish" by "Centre heading 1"

" as such makes absolutely no sense" by "Page number ".

Also if in line 3 of source, started in fixed form as:

- " as such makes absolutely no sense".

It should also work.

NOTE that it has always been the responsibility of the programmer that when using fixed format sources to ensure that replacing clauses will result in the same limitations of no line exceeding column 72. This applies to the compiler as well as per the Cobol standards.

Therefore PrintCbl does not check it under all circumstances however the replacing clauses are checked and correct sizing maintained, where ever possible.



## Messages used

### Listings

1. Msg21 Error: Too many levels (9) of COPY
3. Msg22 Error: Copy File Not Found
4. Msg27 Error: Cannot Find File, & tried six different .Exts
5. Msg28 Error: Abnormal end of input
6. Msg29 Caution: One or more replacing sources not found
7. Msg25 (P): On Read. Ret.code = nn
8. Info: Total Copy Depth Used = nn
9. Caution messages issued = nn
15. Msg32 Error: Recursive Copy File Name = CFN - Above is IGNORED

### Displays

1. Msg21 Error: Too many levels (9) of COPY
2. Msg23 Error: File Not Found
5. Msg28 Error: Abnormal end of input
7. Msg25 (P): On Read. Ret.code = nn
11. Msg24 (P): File Not Closed? = xxx.yyy
12. Msg26 Error: When opening I/P file got = nn
13. Msg31 (P): Bad RT on Get-Directory
14. Errors: Note and Hit return to quit
16. Msg33 Error: Input and output file have same names - Aborted

### Message Explanations

1. Your program exceeded nine levels of copy e.g., source file copy calls copy that calls 9+.
2. Source file not found, program will request parameters one at a time.
3. Cannot find the file specified in the Copy statement that has an extension in the name.
4. Cannot find the file specified in the Copy statement that does not have an extension.
5. Unexpected end of file. You did *NOT* terminate a copy statement with a full stop / period!
6. Listed after a copy statement when one or more replacing sources NOT found in the copy file.
7. Possible program issue, file terminated with unexpected error condition. Please report this to the lead programmer listed on inside front cover via email with any other helpful details.
8. Information: As it says. Printed at end of a listing along with number of copy files not found (see line after each copy statement and warning if any Caution (see 6.) messages listed.
9. Warning that one or more message 6. listed. Also see (8).
10. Unused.
11. Possible program issue, unexpected error value when closing file. Please report this to the lead programmer listed on inside front cover via email with any other helpful details.
12. Possible program issue, unexpected error value when opening file but was tested present. Please report this to the lead programmer listed on inside front cover via email with any other helpful details.
13. Failure when trying to get the current directory. This would be caused by a compiler error.
14. As it says and process will abort, issued after some of the above messages.
15. Copy file name is used recursively - it is ignored.
16. Both input and output files have same name. The run is aborted for you to fix the issue.

Messages in the listing will be prefixed by \*>>, \*>>>, \*>C, \*>>E or \*>>P so that they stand out. The prefix ">C" is for the original COPY statement that is remarked out in Free format and for fixed just an asterisk in cc7.

There is always an ">>> Info" message as the last entry in the source listing element giving totals. This is ignored by the GnuCobol compiler.

## Appendix A - Update Log

### ***Since v2.01.16***

1. Clean up help screen.
2. Add to manual regarding default copy libs are from COBCPY and COB\_COPY\_DIR as well as current source directory.
3. Website address updated for linkpc.net.
4. Updated copyright notices and replaced references to GnuCobol.
5. Documentation clean ups.
6. Printcbl now uses CDF facilities for preset user site variables. See start of source code.
7. Debug lines copy statements now ignored both formats.
8. Renamed warning and error messages to tie up with Cobxref.
9. Code brought in to line with Cobxref version.
10. Various bugs fixed regarding fixed format and CB (copy book) processing with non literal CB's and one's without extension specified.
11. Minor listing tidy ups.
12. More bug fixes when using various combinations of copy names and multi-line replacing statements but there is an over all limit of the maximum size of a replacing sub clause and it is 248 characters.
13. Comment lines contained within copy books are ignored - they are skipped.  
Like wise if they are subject to a replacing clause.

## Appendix B - Copy statement Formats

**WARNING:** This does NOT mean that all variants are implemented in a given version of GnuCOBOL.

With definitions as per ISO/IEC 1989:2014 CD 1.1 (E)

### 7.2.1.2 Source text and library text

Source text is the primary input to the compiler for a single compilation group. Library text is secondary input to the compiler as a result of processing a COPY statement.

The source text and library text processed by text manipulation consists of indicators, character-strings, comments, and separators. A character-string is either a text-word or the word 'COPY'.

### 7.2.1.3 Pseudo-text

Pseudo-text is an operand in the REPLACE statement and in the REPLACING phrase of the COPY statement.

Pseudo-text may be any sequence of zero or more text-words, comments, and the separator space bounded by, but not including, pseudo-text delimiters. The opening pseudo-text delimiter and the closing pseudo-text delimiter consist of the two contiguous COBOL characters '=='.

### 7.2.1.4 Text-words

A text-word is a character-string in source text or in library text that constitutes an element processed by text manipulation. A text-word may be one of the following:

- 1) a separator, except for: a space; a pseudo-text delimiter; and the opening and closing delimiters for alphanumeric, boolean, and national literals. In determining which character sequences form text-words, the colon, the right parenthesis, and the left parenthesis characters, in any context except within alphanumeric or national literals, are treated as separators;
- 2) an alphanumeric, boolean, or national literal including the opening and closing delimiters that bound the literal;
- 3) any other sequence of contiguous COBOL characters bounded by separators, except for: comments and the word 'COPY'.

### 7.2.2 COPY statement

The COPY statement incorporates library text into a COBOL compilation group.

#### 7.2.2.1 General format

#### 7.2.2.2 Syntax rules

- 1) A COPY statement may be specified anywhere in source text or in library text that a character-string or a separator, other than the closing delimiter of a literal, may appear except that a COPY statement shall not appear within a COPY statement.
- 2) A COPY statement shall be preceded by a space except when it is the first statement in a compilation group.
- 3) Within one COBOL library, each text-name shall be unique.
- 4) A concatenation expression or figurative constant shall not be specified for literal-1, literal-2, literal-3, or literal-4.
- 5) Literal-1 and literal-2 shall be alphanumeric literals. The allowable value of literal-1 and literal-2 is defined by the implementer.
- 6) Pseudo-text-1 shall contain one or more text-words, at least one of which shall be neither a

separator comma nor a separator semicolon.

7) Pseudo-text-2 shall contain zero, one, or more text-words.

8) Character-strings within pseudo-text-1 and pseudo-text-2 may be continued in accordance with the rules of reference format.

9) Text-1 and text-2 shall be one of the following formats of identifiers: function-identifier, qualified-data-name with-subscripts, reference-modification, qualified-linage-counter, or qualified-report-counter.

NOTE Text-1 and text-2 are archaic features and their use should be avoided.

If subscripting is specified, it shall not include any arithmetic expressions as subscripts with the exception of a single literal or identifier, or an identifier plus or minus an integer.

The format of any identifier specified in

```

COPY          literal-1
{             text-name-1 }
{ }          [ ] OF/IN
              literal-2
              library-name-1 ]

[ ] [ SUPPRESS PRINTING ]
    REPLACING
              == pseudo-text-1 ==
              text-1
              literal-3
              word-1
              BY
              == pseudo-text-2 ==
              text-2
              literal-4
              word-2

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

Subscripts, reference modifiers, or function arguments shall be: a function-identifier, qualified-data-name with- subscripts, reference-modification, qualified-linage-counter, or qualified-report-counter. Function identifiers in text-1 or text-2 shall be intrinsic function references only.

10) Word-1 or word-2 may be any single COBOL word except 'COPY', the compiler directive indicator, or the comment indicator.

11) The length of a text-word within pseudo-text and within library text shall be from 1 through 65,535 character positions.

12) Compiler directive lines shall not be specified within pseudo-text-1, pseudo-text-2, partial-word-1, or partial-word-2.

13) Partial-word-1 shall consist of one text-word.

14) Partial-word-2 shall consist of zero or one text-word.

15) An alphanumeric, boolean, or national literal shall not be specified as partial-word-1 or partial-

word-2.

### 7.2.2.3 General rules

- 1) Text-name-1 or literal-1 identifies the library text to be processed by the COPY statement.
- 2) Library-name-1 names a resource that shall be available to the compiler and shall provide access to the library text referenced by text name-1.
- 3) The implementer shall define the rules for locating the library text referenced by text-name-1 or literal-1. When neither library-name-1 nor literal-2 is specified, a default COBOL library is used. The implementer defines the mechanism for identifying the default COBOL library.
- 4) If the SUPPRESS phrase is specified, library text incorporated as a result of COPY statement processing is not listed. If a listing is being produced, the COPY statement itself is listed.
- 5) At the completion of copying the library text into the compilation group, the LISTING directive that is in effect for the COPY statement itself is considered to be in effect, regardless of any LISTING directives in the library text.
- 6) The effect of processing a COPY statement is that the library text associated with text-name-1 or the value of literal-1 is copied into the compilation group, logically replacing the entire COPY statement beginning with the reserved word COPY and ending with the separator period, inclusive.
- 7) If the REPLACING phrase is not specified, the library text is included in the resultant text unchanged.
- 8) If the REPLACING phrase is specified, library text is modified during creation of the structured compilation group that is described in 7.2, Text manipulation. Each matched occurrence of pseudo-text-1, text-1, word-1, literal-3, or partial-word-1 in the library text is replaced by the corresponding pseudo-text-2, text-2, word-2, literal-4, or partial-word-2 in accordance with subsequent rules of the COPY statement.
- 9) For purposes of matching, text-1, word-1, and literal-3 are treated as pseudo-text containing only text-1, word-1, or literal-3, respectively.
- 10) The comparison operation to determine text replacement occurs in the following manner:
  - a) The leftmost library text-word that is not a separator comma or a separator semicolon is the first text-word used for comparison. Any text-word or space preceding this text-word is copied into the resultant text.

Starting with the first text-word for comparison and first pseudo-text-1, text-1, word-1, literal-3, or partial-word-1 that was specified in the REPLACING phrase, the entire REPLACING phrase operand that precedes the reserved word BY is compared to an equivalent number of contiguous library text-words.
  - b) Pseudo-text-1, text-1, word-1, or literal-3 match the library text only if the ordered sequence of text-words that forms pseudo-text-1, text-1, word-1, or literal-3 is equal, character for character, to the ordered sequence of library text-words. When the LEADING phrase is specified, partial-word-1 matches the library text only if the contiguous sequence of characters that forms partial-word-1 is equal, character for character, to an equal number of contiguous characters starting with the leftmost character position of a library text-word. When the TRAILING phrase is specified, partial-word-1 matches the library text only if the contiguous sequence of characters that forms partial-word-1 is equal, character for character, to an equal number of contiguous characters ending with the rightmost character position of a library text-word.
  - c) The following rules apply for the purpose of matching:
    1. Each occurrence of a separator comma, semicolon, or space in pseudo-text-1 or in the library text is considered to be a single space. Each sequence of one or more space separators is considered to

be a single space.

2. Each operand and operator of a concatenation expression is a separate text-word.

3. Except when used in the non-hexadecimal formats of alphanumeric and national literals, each alphanumeric character is equivalent to its corresponding national character and each lower case letter

is equivalent to its corresponding upper case letter, as specified for the COBOL character repertoire in the COBOL character repertoire.

4. For alphanumeric, boolean and national literals:

a. The two representations of the quotation symbol match when specified in the opening and closing delimiters of the literal.

NOTE The opening and closing delimiters are required to be in the same representation.

b. In the content of the literal, two contiguous occurrences of the character used as the quotation symbol in the opening delimiter are treated as a single occurrence of that character.

5. Each occurrence of a compiler directive line is treated as a single space.

6. Comments, if any, are treated as a single space.

NOTE Because comments are removed during logical conversion, none are expected.

d) If no match occurs, the comparison is repeated with each next successive pseudo-text-1, text-1, word-1, literal-3, or partial-word-1, if any, in the REPLACING phrase until either a match is found or there is no next successive REPLACING operand.

e) When all the REPLACING phrase operands have been compared and no match has occurred, the leftmost library text-word is copied into the resultant text. The next successive library text-word is then considered as the leftmost library text-word, and the comparison cycle starts again with the first pseudo-text-1, text-1, word-1, literal-3, or partial-word-1 specified in the REPLACING phrase.

f) When a match occurs between pseudo-text-1, text-1, word-1, or literal-3 and the library text, the corresponding pseudo-text-2, text-2, word-2, or literal-4 is placed into the resultant text. When a match occurs between partial-word-1 and the library text-word, the library text-word is placed into the resultant text with the matched characters either replaced by partial-word-2 or deleted when partial-word-2 consists of zero text-words. The library text-word immediately following the rightmost text-word that participated in the match is then considered as the leftmost text-word. The comparison cycle starts again with the first pseudo-text-1, text-1, word-1, literal-3, or partial-word-1 specified in the REPLACING phrase.

g) The comparison operation continues until the rightmost text-word in the library text has either participated in a match or been considered as a leftmost library text-word and participated in a complete comparison cycle.

11) If the REPLACING phrase is specified, the library text shall not contain a COPY statement.

12) The resultant text after replacement shall be in logical free-form reference format. When copying text-words into the resultant text, additional spaces may be introduced only between text-words where there already exists a space or where a space is assumed.

NOTE A space is assumed at the end of a source line.

13) If the REPLACING phrase is not specified, the library text may contain a COPY statement that does not include a REPLACING phrase. The implementation shall support nesting of at least 5 levels, including the first COPY statement in the sequence. The library text being copied shall not cause the processing of a COPY statement that directly or indirectly copies itself.

14) The replacing action of a COPY statement shall not introduce a COPY statement, a SOURCE FORMAT directive, a comment, or a blank line.

### 7.2.3 REPLACE statement

The REPLACE statement modifies text in a compilation group.

#### 7.2.3.1 General format

Format 1 (replacing):

Format 2 (off):

#### 7.2.3.2 Syntax rules

1) A REPLACE statement may be specified anywhere in source text or in library text that a character-string or a separator, other than the closing delimiter of a literal, may appear.

2) A REPLACE statement shall be preceded by a space except when it is the first statement in a compilation group.

3) Pseudo-text-1 shall contain one or more text-words, at least one of which shall be neither a separator comma nor a separator semicolon.

4) Pseudo-text-2 shall contain zero, one, or more text-words.

5) Partial-word-1 shall consist of one text-word.

6) Partial-word-2 shall consist of zero or one text-word.

7) An alphanumeric, boolean, or national literal shall not be specified as partial-word-1 or partial-word-2.

8) Character-strings within pseudo-text-1 and pseudo-text-2 may be continued in accordance with the rules of reference format.

9) The length of a text-word within pseudo-text shall be from 1 through 65,535 characters.

10) Compiler directive lines shall not be specified within pseudo-text-1, pseudo-text-2, partial-word-1, or partial-word-2.

#### 7.2.3.3 General Rules

1) In subsequent general rules of the REPLACE statement, 'source text' refers to the conditionally-processed compilation group.

2) Pseudo-text-1 specifies the text to be replaced by pseudo-text-2.

3) Partial-word-1 specifies the text to be replaced by partial-word-2.

4) Once encountered, a format 1 REPLACE statement has one of three states:

REPLACE [ ALSO ]

== pseudo-text-1 == BY == pseudo-text-2 ==

LEADING/TRAILING

== partial-word-1 == BY == partial-word-2 ==

... .

REPLACE [ LAST ] OFF .

a) active, meaning it is the current statement in use for replace processing for the compilation group;

b) inactive, meaning it is not currently in use for replace processing but is held in a last-in first-out

queue, from which it may be popped and made active or cancelled in accordance with the rules for subsequent REPLACE statements encountered in the compilation group;

c) cancelled, meaning it is removed from use for replace processing for the remainder of the compilation group or, if inactive, it is removed from the queue of inactive statements for the remainder of the compilation group.

5) A REPLACE statement that is placed in the active state remains active until it is placed in the inactive state, it is cancelled, or the end of the compilation group is reached, whichever occurs first.

6) When there is no REPLACE statement in the active state:

a) A format 1 REPLACE statement is placed in the active state at the point at which it is encountered in the compilation group. The ALSO phrase, if specified, has no effect.

b) A format 2 REPLACE statement has no effect.

7) When there is a REPLACE statement in the active state:

a) A format 1 REPLACE statement with the ALSO phrase results in the following:

1. the active REPLACE statement is made inactive and is pushed into the queue of inactive REPLACE statements.

2. The current REPLACE statement is expanded into a single REPLACE statement, without the ALSO phrase, having as its operands all the operands of the current statement followed by the operands of the most recent statement pushed into the queue of inactive REPLACE statements. The expanded REPLACE statement is placed in the active state.

b) A format 1 REPLACE statement without the ALSO phrase cancels the active REPLACE statement and cancels any REPLACE statements in the queue of inactive REPLACE statements. Then the current REPLACE statement is placed in the active state.

c) A format 2 REPLACE statement with the LAST phrase cancels the active REPLACE statement and pops the last statement that was pushed into the queue of inactive REPLACE statements, if any. The popped statement, if any, is placed in the active state.

d) A format 2 REPLACE statement without the LAST phrase cancels the active REPLACE statement and cancels all REPLACE statements in the queue of inactive REPLACE statements, if any.

8) The comparison operation to determine text replacement begins with the text immediately following the REPLACE statement and occurs in the following manner:

a) Starting with the leftmost source text-word and the first pseudo-text-1 or partial-word-1, pseudo-text-1 or partial-word-1 is compared to an equivalent number of contiguous source text-words.

b) Pseudo-text-1 matches the source text if, and only if, the ordered sequence of text-words that forms pseudo-text-1 is equal, character for character, to the ordered sequence of source text-words. When the LEADING phrase is specified, partial-word-1 matches the source text-word only if the contiguous sequence of characters that forms partial-word-1 is equal, character for character, to an equal number of contiguous characters starting with the leftmost character position of that source text-word. When the TRAILING phrase is specified, partial-word-1 matches the source text-word only if the contiguous sequence of characters that forms partial-word-1 is equal, character for character, to an equal number of contiguous characters ending with the rightmost character position of that source text-word.

c) The following rules apply for the purpose of matching:

1. Each occurrence of a separator comma, semicolon, or space in pseudo-text-1 or in the source text is considered to be a single space. Each sequence of one or more space separators is considered to be a single space.



Well, that was well explained. You might want to read it again.

**WARNING:** Regardless of the above text, it does ***not*** mean that these procedures have been implemented into this program, or for that matter the GnuCOBOL compiler.

What it does show is that when processing literals or text that goes over one line that this program may well adopt the free source format for the COPY libraries that are called for inclusion in order to expand said literals correctly and this format may well be used in the listings in a similar manner to GnuCOBOL (see the .i file when produced by various GC parameters including '--save-temps' , -E etc).

See the other parts of this manual for what exactly, ***is*** implemented for any specific version of the program.

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Version 1.3, 3 November 2008

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Version 3, 29 June 2007

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