

PRINTCBL

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

Set up and Usage Manual



Copyright © Applewood Computers 2011-2019 and later – Authors & Programmers.

Under FSF GPL v3 -



This document and the source code of the program known as 'printcbl' is copyright © 2011 - 2019 and may NOT be supplied or any part thereof, embedded or as a separate element, in any programming language or form, with any Cobol Compiler other than GnuCOBOL ® without the express authority of the copyright holder.

It's usage in conjunction with the Cobol Compiler known as GnuCOBOL is herewith granted to all users of said product unconditionally.

Documentation Copyright © Applewood Computers 2011-2019 and later – Vincent B Coen.

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.3 or later version published by the Free Software Foundation; with no Invariant Sections, Front-Cover Texts, and no Back-Cover Texts other than originally supplied.

A copy of the license is included in the section entitled "GNU Free Documentation License".

Applewood Computers
17 Stag Green Avenue
Hatfield
Hertfordshire
AL9 5EB
United Kingdom

Phone: 44-(0)1707-263712

Support email: vbcoen@gmail.com

Author:	Vincent B Coen
Document update:	15 January 2019
Revision:	32
Software Version Date:	15th January, 2019
Software Version	2.01.18
Word Processor:	LibreOffice 6.0. or later

✖ ✖ ✖ 7 9 ✖ ✖ ✖ 6 8

Contents

Support for Printcbl.....	4
Why is this program needed ?.....	5
Copy Support (v2.01.10+).....	6
Pre usage actions on first install:.....	7
Program Source code Set up.....	7
Printcbl: Program Usage:.....	9
Print format Commands.....	10
Full listing:.....	10
/ or EJECT.....	10
NOLIST.....	10
LIST.....	10
Special case command.....	11
NOPRINT.....	11
Compiler Requirements.....	12
TODO List.....	13
Future Updates:.....	13
Noticeable changes from v1.01.....	13
Literal Treatment.....	14
Messages used.....	15
Listings:.....	15
Displays:.....	15
Message Explanations:.....	15
Appendix A.....	16
Regression test samples.....	16
Appendix B.....	19
Copy statement formats.....	19
Appendix C.....	24
GNU Free Documentation License.....	24
Appendix D.....	30
GNU General Public License.....	30

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 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.

This is the only list used to notify of updates and/or also include the newly released files.

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 (v2.01.10+):

Case is not sensitive, so ' COPY ' ' copy ' and any variation is OK, same as in GnuCOBOL.

1: COPY foo.

2: COPY "foo".

3: COPY foo (or "foo") IN/OF "../par".

4: COPY foo + .EXT different .ext **NOT** searched for

5: COPY filename.ext | IN | OF path | "relative path" SUPPRESS | SUPPRESS PRINTING.

6. 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==
= ==text-3==	by ==text-4==

Cases 1 through 3 (if not found, then searched with .extensions of .CPY, .CBL, .COB (and lower case))

All cases searched in current directory and all search paths in order supplied

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

Note: In 1 through 5) 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.

Warnings:

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).

Pre usage actions on first install:

Program Source code Set up

1. Change settings in variable Print-Report:

- A. Change field PSN to your normal Cups Print Spool Name currently set to "[Officejet_Pro_8600](#)"
- B. Change variable PR-Name size from x(32) if your 'output file' names are longer. (A)
Along with variables WS-Print-File-Name and if needed the input file name area:
WS-Input-File-Name.
- C. The current setting for the lpr command is set to keep output file after printing, If you want it deleted, uncomment next line starting with *> "-r " &
- D..The variable Print-It-Out is set to zero and this will force no printing and this has been set during testing, however if you wish that the program output is normally printed then set it to 1 (one).
This can be overridden with the use of NOPRINT in line one of the source file OR used as the P4 parameter. See the sections **Program Usage** and **Print Format Commands** for more information.
- E. 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.
This should give 99 lines per page and the variable 'WS-Page-Lines' that has this value, should be changed if your printout is wrong, e.g., too much space left on page not printed on or it prints on next page before a heading is printed.
- F. 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.

2. With this sorted you must still provide the value in PSN as 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.

3. Change value in WS-Local-Time-Zone to your Time Zone format. This is currently set to Intl (Linux/unix), by setting it to:

For USA format	value 2. e.g.,	mm/dd/ccyy
For UK format	value 1. e.g.,	dd/mm/ccyy
Otherwise leave it for		ccyy/mm/dd

From v2.01.16

The program will examine the Environment Variable LC_TIME for values :

en_GB to set to UK format (1)

en_US to set to USA format (2)

anything else it is left as 3 = International (Unix) format.

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

In all cases, this along with the time 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] !

4. You are now ready to compile as:

```
cobc -x printcbl.cbl
```

```
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.

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

6. 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 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.

From v2.01.16

If this field is omitted (blank) then the current directory is used for 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 current directory will not be searched unless specified in the environment variables.

Print format Commands

Full listing:

/	Fixed only
EJECT	Both, different pretext, ** or *>
NOLIST	Both, different pretext
LIST	Both, different pretext
NOPRINT	Both, 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

Any version that supports:

1. Function upper-case and CBL-READ-FILE etc.
2. Function substitute
3. 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 (v1.1 & v2) do so, but not tested against v1.0 as it has been superseded by v1.1 (Feb 2009) and is classed as redundant. There may be a problem with v1.1 and Substitute if you do not have the patches installed.

All development and testing is with v2 and v3.

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

In any event I will have to do so sometime, to ensure the LEADING and TRAILING sub-clauses are correctly honoured.

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).
2. TRAILING (1D)

Noticeable changes from v1.01

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

1. Added support for SUPPRESS. : Which does **not** print contents of the specified copy library
2. Produce a file as P2 (parameter 2) as an updated source file instead of a print report by specifying 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 '*>' along with the first line that contained the NOPRINT. statement omitted.

The same result will occur if (from version 2.01.16) P4 contains NOPRINT or noprint.

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

3. 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 and nine copy within copy.

According to the Cobol standards, GnuCOBOL should go to 5 levels at least.

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.

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.

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.

Messages used

Listings:

1. Error: Too many levels (9) of COPY
3. Error: Copy File Not Found
4. Error: Cannot Find File, & tried six different .Exts
5. Error: Abnormal end of input
6. Caution: One or more replacing sources not found
7. (P): On Read. Ret.code = nn
8. Info: Total Copy Depth Used = nn
9. Caution messages issued = nn

Displays:

1. Error: Too many levels (9) of COPY
2. Error: File Not Found
5. Error: Abnormal end of input
7. (P): On Read. Ret.code = nn
10. Error: Invalid Format, try again!
11. (P): File Not Closed? = xxx.yyy
12. Error: When opening I/P file got = nn
13. (P): Bad RT on Get-Directory

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.
10. Invalid format specified for P3.[Only accepts in any case; -free | free | -fixed | fixed also see 2.
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.

Appendix A

Regression test samples

Regression Test Pack 1. (testpak1.zip)

Steps used as functionality added.

1, 'File not found':

```
IDENTIFICATION DIVISION.  
PROGRAM-ID.    prog.  
DATA DIVISION  
WORKING-STORAGE SECTION.  
COPY "copy.inx".  
PROCEDURE      DIVISION.  
STOP RUN.  
> 'File not found'
```

1B.. Same again but with copy copy.

1C.. Same again but with copy copy.inx.

1D. -- ditto ---- copy "copy".

1E. --- ditto ----- copy "copy.inx" in "../path".

1F. --- ditto ----- copy "copy.inx" of "../path".

2G. --- ditto ----- copy "copy.inx" in ../path.

When implemented!

2. Replacement order

```
[copy.inc] = [  
01 TEST-VAR PIC X(2) VALUE "OK".  
]
```

```
IDENTIFICATION  DIVISION.  
PROGRAM-ID.    prog.  
DATA          DIVISION.  
WORKING-STORAGE SECTION.  
COPY "copy.inc"  
    REPLACING ==TEST-VAR== BY ==FIRST-MATCH==  
              ==TEST-VAR== BY ==SECOND-MATCH==.  
PROCEDURE      DIVISION.  
    DISPLAY FIRST-MATCH NO ADVANCING  
    END-DISPLAY.  
    STOP RUN.
```

> 'OK'

3. Separators

```
[copy.inc], [  
01 TEST-VAR PIC X(2) VALUE "OK".  
]  
IDENTIFICATION  DIVISION.  
PROGRAM-ID.    prog.  
DATA          DIVISION.
```


WORKING-STORAGE SECTION.

COPY "copy.inc"

REPLACING ==TEST-VAR==, BY ==FIRST-MATCH==,
 , ==TEST-VAR==; BY ==SECOND-MATCH==;
 ; ==TEST-VAR== , BY ==THIRD-MATCH==
 ==TEST-VAR== ; BY ==FOURTH-MATCH==.

PROCEDURE DIVISION.

DISPLAY FIRST-MATCH NO ADVANCING

STOP RUN.

> 'OK'

4: partial replacement

[copy.inx], [

01 :TEST:-VAR PIC X(2) VALUE "OK".

01 (TEST)-VAR PIC X(2) VALUE "OK".

]

IDENTIFICATION DIVISION.

PROGRAM-ID. prog.

DATA DIVISION.

WORKING-STORAGE SECTION.

COPY "copy.inx"

REPLACING ==:TEST:== BY ==COLON==
 ==(TEST)== BY ==PAREN==.

PROCEDURE DIVISION.

DISPLAY COLON-VAR NO ADVANCING

END-DISPLAY.

DISPLAY PAREN-VAR NO ADVANCING

END-DISPLAY.

STOP RUN.

> 'OKOK'

5: LEADING replacement

[copy.inc], [

01 TEST-VAR PIC X(2) VALUE "OK".

01 NORM-VAR PIC X(2) VALUE "OK".

]

IDENTIFICATION DIVISION.

PROGRAM-ID. prog.

DATA DIVISION.

WORKING-STORAGE SECTION.

COPY "copy.inc"

REPLACING LEADING ==TEST== BY ==FIRST==
 LEADING ==NORM== BY ==SECOND==.

PROCEDURE DIVISION.

DISPLAY FIRST-VAR NO ADVANCING

END-DISPLAY.

DISPLAY SECOND-VAR NO ADVANCING

END-DISPLAY.

STOP RUN.

> 'OKOK'

6: TRAILING replacement

[copy.ina], [

01 TEST-FIRST PIC X(2) VALUE "OK".

01 TEST-SECOND PIC X(2) VALUE "OK".

]

```

IDENTIFICATION DIVISION.
PROGRAM-ID.    prog.
DATA          DIVISION.
WORKING-STORAGE SECTION.
COPY "copy.ina"
    REPLACING TRAILING ==FIRST== BY ==VAR1==
        TRAILING ==SECOND== BY ==VAR2==.
PROCEDURE      DIVISION.
    DISPLAY TEST-VAR1 NO ADVANCING
    END-DISPLAY.
    DISPLAY TEST-VAR2 NO ADVANCING
    END-DISPLAY.
    STOP RUN.
> 'OKOK'

```

7: recursive replacement

```

[copy-2.inc], [
    01 TEST-VAR PIC X(2) VALUE "OK".
]

```

```

[copy-1.inc], [
    COPY "copy-2.inc".
]
    IDENTIFICATION DIVISION.
    PROGRAM-ID.    prog.
    DATA          DIVISION.
    WORKING-STORAGE SECTION.
    COPY "copy-1.inc"
        REPLACING ==TEST-VAR== BY ==COPY-VAR==.
    PROCEDURE      DIVISION.
        DISPLAY COPY-VAR NO ADVANCING
        END-DISPLAY.
        STOP RUN.
> 'OK'

```

8: fixed/free format comp as -free

```

[copy.ind], [
    >>SOURCE FIXED
    01 TEST-VAR PIC X(2) VALUE "OK".
]
    IDENTIFICATION DIVISION.
    PROGRAM-ID.    prog.
    DATA          DIVISION.
    WORKING-STORAGE SECTION.
    COPY "copy.ind".
    PROCEDURE      DIVISION.
        DISPLAY TEST-VAR NO ADVANCING
        END-DISPLAY.
        STOP RUN.
> 'OK'

```

End Test Pack. (So far)

Test pack 2 covers (Internal use only, not supplied):

Copy statements to a depth of three.

Copy statements with extra variations of REPLACING.

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 1989:20xx 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-lineage-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.

And now, the Copyright notices.

Appendix C

GNU Free Documentation License

Version 1.3, 3 November 2008

Copyright © 2000, 2001, 2002, 2007, 2008 Free Software Foundation, Inc. <<http://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 non-commercially. 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 non-commercially, 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, sub-license, or distribute the Document except as expressly provided under this License. Any attempt otherwise to copy, modify, sub-license, 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 <http://www.gnu.org/copyleft/>.

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. RE-LICENSING

"Massive Multi-author 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 Multi-author 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 re-licensing" 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 re-licensing.

Appendix D

GNU General Public License

Version 3, 29 June 2007

Copyright © 2007 Free Software Foundation, Inc. <<http://fsf.org/>>

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

Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program--to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

“This License” refers to version 3 of the GNU General Public License.

“Copyright” also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

“The Program” refers to any copyrightable work licensed under this License. Each licensee is addressed as “you”. “Licensees” and “recipients” may be individuals or organizations.

To “modify” a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a “modified version” of the earlier work or a work “based on” the earlier work.

A “covered work” means either the unmodified Program or a work based on the Program.

To “propagate” a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To “convey” a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays “Appropriate Legal Notices” to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The “source code” for a work means the preferred form of the work for making modifications to it. “Object code” means any non-source form of a work.

A “Standard Interface” means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The “System Libraries” of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A “Major Component”, in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The “Corresponding Source” for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked sub-programs that the work is specifically designed to require, such as by intimate data communication or control flow between those sub-programs and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sub-licensing is not allowed; section 10 makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.

4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

- a) The work must carry prominent notices stating that you modified it, and giving a relevant date.
- b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".
- c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.
- d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an “aggregate” if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

- a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.
- b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.
- c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and non-commercially, and only if you received the object code with such an offer, in accord with subsection 6b.
- d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.
- e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A “User Product” is either (1) a “consumer product”, which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favour of coverage. For a particular product received by a particular user, “normally used” refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

“Installation Information” for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

7. Additional Terms.

“Additional permissions” are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law. If additional permissions apply only to part of the Program, that part may be used separately under those permissions, but the entire Program remains governed by this License without regard to the additional permissions.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

- a) Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or
- b) Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or
- c) Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or
- d) Limiting the use for publicity purposes of names of licensor's or authors of the material; or
- e) Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or
- f) Requiring indemnification of licensor's and authors of that material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those licensor's and authors.

All other non-permissive additional terms are considered “further restrictions” within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits re-licensing or conveying under this License, you may add to a covered work material governed by the terms of that license document, provided that the further restriction does not survive such re-licensing or conveying.

If you add terms to a covered work in accord with this section, you must place, in the relevant source files, a statement of the additional terms that apply to those files, or a notice indicating where to find the applicable terms.

Additional terms, permissive or non-permissive, may be stated in the form of a separately written license, or stated as exceptions; the above requirements apply either way.

8. Termination.

You may not propagate or modify a covered work except as expressly provided under this License. Any attempt otherwise to propagate or modify it is void, and will automatically terminate your rights under this License (including any patent licenses granted under the third paragraph of section 11).

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, you do not qualify to receive new licenses for the same material under section 10.

9. Acceptance Not Required for Having Copies.

You are not required to accept this License in order to receive or run a copy of the Program. Ancillary propagation of a covered work occurring solely as a consequence of using peer-to-peer transmission to receive a copy likewise does not require acceptance. However, nothing other than this License grants you permission to propagate or modify any covered work. These actions infringe copyright if you do not accept this License. Therefore, by modifying or propagating a covered work, you indicate your acceptance of this License to do so.

10. Automatic Licensing of Downstream Recipients.

Each time you convey a covered work, the recipient automatically receives a license from the original licensor's, to run, modify and propagate that work, subject to this License. You are not responsible for enforcing compliance by third parties with this License.

An “entity transaction” is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever licenses to the work the party's predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counter-claim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it.

11. Patents.

A “contributor” is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor's “contributor version”.

A contributor's “essential patent claims” are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that

would be infringed only as a consequence of further modification of the contributor version. For purposes of this definition, “control” includes the right to grant patent sub-licenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor's essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a “patent license” is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To “grant” such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either

- (1) cause the Corresponding Source to be so available, or
- (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or
- (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. “Knowingly relying” means you have actual knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient's use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.

If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is “discriminatory” if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defences to infringement that may otherwise be available to you under applicable patent law.

12. No Surrender of Others' Freedom.

If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that obligate you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program.

13. Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work, but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as

such.

14. Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public 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.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License “or any later version” applies to it, you have the option of following the terms and conditions either of that numbered version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version.

15. Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

17. Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal effect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.