# 1   Drawbacks of the resident GCCLIB in VM/370 SixPack 1.2

The native C library GCCLIB, which is part of VM/370 SixPack 1.2, can be loaded as resident library, allowing for small MODULEs. For this, the SYSPROF profile loads the GCCLIB into the resident memory with RESLIB and uses the DOSTRANS field in the NUCON area to store the base pointer to the dispatch table of the resident library. The pointer is fetched by the GCCLIB-stubs (CL\*-modules) linked into the programs to reference the corresponding real function implementation in the resident GCCLIB.

This leads to problems (i.e. addressing errors and very likely to ABENDs) if the DOSTRANS field is needed for its original purpose, i.e. when running DOS/VSAM accessing programs like KICKS, as the DOSTRANS field then no longer points to the dispatch table of the resident library when a GCCLIB based program is started afterwards.

Furthermore, the memory cleanup portion of the ABEND handler in CMS (DMSABN, invoked after a program ABEND or after issuing a HX immediate command) will assume that additional memory was allocated by an aborted DOS/VSAM program if DOSTRANS is not zero. This will lead to a wrong computation of the memory size to be free-ed, which generally results in a warning or in halting CMS execution, requiring to re-IPL CMS. Issuing the HX command with the original resident GCCLIB will usually result in the following message when entering the next command to CMS:

```
DMSABN149T 175 (HEX 0000AF) DOUBLEWORDS OF SYSTEM STORAGE HAVE BEEN DESTROYED. RE-IPL CMS.
CP ENTERED; DISABLED WAIT PSW '00020000 6001F0CE'
```

# 2   Modified functionality in GCCLIB

To resolve these problems, the addressing mechanism for the dispatch table of the resident library has been modified as follows:

- The resident library's base address is fetched early in the startup phase of the C program (GCCLIB-module CMSENTRY) and stored in a new ENTRY variable.
- The CL\*-stubs now use this variable to load the base address to the dispatch table of the resident library.

So the DOSTRANS field is no longer needed for the resident GCCLIB and can serve again its original purpose.

After the modified resident GCCLIB is installed, all MODULEs using GCCLIB created under SixPack 1.2 must be re-linked against this new version, as the DOSTRANS field no longer holds the address of the dispatch table and programs with the old stubs will therefore crash.

Programs loaded from TEXT or TXTLIB files need not to be modified, as loading them with the new GCCLIB TXTLIB will automatically use the new stubs to access the resident GCCLIB. This is also valid for the bREXX interpreter, which can be used unmodified and is loaded by the system profile into resident memory using the modified GCCLIB.

## 3   Tape contents

The tape `GCCLIB-without-DOSTRANS-libs+sysprof.aws` has the modified library and resident files for GCCLIB as well as a new system profile to load the resident library without modifying the DOSTRANS field:

```
SCANNING....
GCCLIB   MACLIB   S2
GCCLIB   TEXT     S2
GCCLIB   TXTLIB   S2
GCCLIB_S TXTLIB   S2
END-OF-FILE OR END-OF-TAPE
SYSPROF  EXEC     S2
END-OF-FILE OR END-OF-TAPE
END-OF-FILE OR END-OF-TAPE
```

These files are intended to replace the SixPack 1.2 files on disk S. The system profile on the tape also has the system profile extension feature introduced with MECAFF 1.1.0 (invoke a `SYSPROFX EXEC` if one is found on disk Y, allowing to modify the system profile without having to regenerate the CMS shared segments).

The tape `GCCLIB-without-DOSTRANS-modified-src.aws` contains the files modified from the original GCCLIB sources of SixPack 1.2 which were used to build the GCCLIB files on the first tape. To recreate the modified GCCLIB binaries, the files of the tape have to replace the files on minidisk D of user GCCCMS before rebuilding the library files with `MKGCCLIB`.

If the MECAFF-tools are installed with the dynamically linked MODULEs, these programs will no longer work after the new resident GCCLIB is installed and active.
The tape `GCCLIB-without-DOSTRANS-mecaff-tools-bin-1.2.5.aws` has the 3 dynamically linked programs of MECAFF-tools version 1.2.5 linked against the new resident GCCLIB, intended to replace the files from the original version 1.2.5 tape:

```
SCANNING....
EE$D     MODULE   A2
FSHELP$D MODULE   A2
IND$FILD MODULE   A2
END-OF-FILE OR END-OF-TAPE
END-OF-FILE OR END-OF-TAPE
```

The existing MECAFF-tool files should be overwritten with the files of this tape.


## 4   Installing and using the native C runtime libraries

The following sections will discuss 2 installation variants for the modified GCCLIB files, one variant being a test installation for a single VM user (e.g. CMSUSER), the other variant being the system-wide installation on disk S (replacing the original setup of a SixPack 1.2).

It is assumed that the first tape was already mounted on the Hercules console with:

`devinit 480 GCCLIB-without-DOSTRANS-libs+sysprof.aws`

(commands entered in VM/370 are given as **command**s in the following transcripts)

## 4.1   Local (test) installation for a VM

Installing the new GCCLIB files for a single VM simply requires to copy the files to the users A minidisk (191). The files on the A disk will have priority over the system-wide files at IPL time and the new GCCLIB will be loaded.

To install for user CMSUSER, logon as CMSUSER and enter the command

```
/attach 480 to cmsuser 181
```

on the Hercules console. As CMSUSER, load the tape to disk A and test the new GCCLIB, for example:

```
TAPE 181 ATTACHED
```

**tape load * * a**                 *(load GCCLIB binary files to disk A)*
```
 LOADING.....
 GCCLIB   MACLIB    A2
 GCCLIB   TEXT      A2
 GCCLIB   TXTLIB    A2
 GCCLIB_S TXTLIB    A2
 END-OF-FILE OR END-OF-TAPE
Ready; T=0.02/0.11 20:31:26
```

**tape load * * a**                 *(load SYSPROF EXEC as override to system wide profile to disk A)*
```
LOADING.....
 SYSPROF  EXEC      A2
 END-OF-FILE OR END-OF-TAPE
Ready; T=0.01/0.01 20:31:43
```

**detach 181**
```
TAPE 181 DETACHED
Ready; T=0.01/0.01 20:31:59
```

**ipl cms**                 *(load the new GCCLIB and REXX into resident memory)*
```
CMS VERSION 6.0 – 09/30/10 21:03


Y (19E) R/O
U (19D) R/O
FILE 'PDPCLIB MACLIB' NOT FOUND.
'19D' REPLACES ' U (19D) '
U (19D) R/O


+-------------------------------------------------------------------------+
|          Welcome to VM/370 and VM/380 "SixPack" version 1.2!            |
+-------------------------------------------------------------------------+

For a list of CMS commands, type HELP CMSCMDS.  For a list of CP commands, type
HELP CPCMDS.

Other useful documentation and sample programs can be found on MAINT 19D,
accessed as your U disk.

For more details, type HELP WELCOME ( MORE

Ready; T=0.04/0.11 20:32:18
```

**rexxtry**                 *(play a little with REXX)*
```
REXX interpreter running (bREXX 2.1.8 Aug  6 2010)
Enter any valid REXX instruction... type EXIT to quit.
Rexxtry;
```

**say 'testing GCCLIB'**
```
testing GCCLIB
Rexxtry;
```

**exit**
```
Ready; T=0.08/0.16 20:34:50
```

## 4.2 System-wide installation

For a system-wide installation, the modified files of the tape must replace the GCCLIB files on the S minidisk (CMS system disk 190).

**WARNINGS:**

- Changing files on the S minidisk is a (small) system-modification, as the CMSSEG and CMS shared segments must be regenerated.
- Before doing this modification, it is advisable to backup the system (for example by backing up the Hercules shadow-files for the disk packs of the VM/370 installation).
- The following command sequences are based on the file `SYSPROG MEMO` of user MAINT under SixPack 1.2. The exact commands to use for other systems with a SYSPROF-like functionality may differ.

The installation of the modified GCCLIB on disk S can be done as user MAINT with the following commands:

```
attach 480 to * 181
TAPE 480 ATTACH TO MAINT    181
Ready; T=0.01/0.01 19:49:14

tape scan ( eot
 SCANNING....
 GCCLIB    MACLIB    S2
 GCCLIB    TEXT      S2
 GCCLIB    TXTLIB    S2
 GCCLIB_S  TXTLIB    S2
 END-OF-FILE OR END-OF-TAPE
 SYSPROF   EXEC      S2
 END-OF-FILE OR END-OF-TAPE
 END-OF-FILE OR END-OF-TAPE
Ready; T=0.01/0.08 19:49:19

tape rew
Ready; T=0.01/0.01 19:49:22

access 190 z              (access disk S in R/W mode, not possible via: acc 190 s)
190 ALSO = S-DISK
Ready; T=0.01/0.01 19:49:43

tape load * * z           (load GCCLIB binary files to disk S)
 LOADING.....
 GCCLIB    MACLIB    Z2
 GCCLIB    TEXT      Z2
 GCCLIB    TXTLIB    Z2
 GCCLIB_S  TXTLIB    Z2
 END-OF-FILE OR END-OF-TAPE
Ready; T=0.02/0.13 19:49:54

tape load * * z           (load SYSPROF EXEC to disk S)
LOADING.....
 SYSPROF   EXEC      Z2
 END-OF-FILE OR END-OF-TAPE
Ready; T=0.01/0.01 19:49:57

detach 181
TAPE 181 DETACHED
Ready; T=0.01/0.01 19:50:02

release z                 (release R/W access to disk S)
Ready; T=0.01/0.01 19:50:10

define storage 16m        (regenerate the CMSSEG and CMS shared segments)
STORAGE = 16384K
CP ENTERED; DISABLED WAIT PSW '00020000 00000000'
```

**ipl 190**
```
CMS VERSION 6.0 - 09/30/10 21:03
```

**access ( noprof**          *(don't run the profile)*
```
Y (19E) R/O
CMSSEG system name 'CMSSEG' not available.
Ready; T=0.01/0.01 19:50:29
```

**access 093 b**
```
Ready; T=0.01/0.01 19:50:37
```

**access 193 c**
```
Ready; T=0.01/0.01 19:50:42
```

**cmsxgen f00000 cmsseg**
```
PRT FILE 1151  TO  MAINT    COPY 01 NOHOLD
SYSTEM SAVED
CMSXGEN COMPLETE
Ready; T=0.02/0.04 19:50:59
```

**ipl 190**
```
CMS VERSION 6.0 - 09/30/10 21:03
```

**savesys cms**          *(must be entered directly after IPL instead running the profile)*
```
SYSTEM SAVED
CMS VERSION 6.0 - 09/30/10 21:03
```

**#cp logoff**