TO: Distribution

FROM: Joan Scott

DATE   13 May 76

RE: Multics Change Requests (Phoenix)

Enclosed are copies of Multics Change Requests from Phoenix
which were approved from 1 June 1975 through 30 February 1976.

TITLE:	Install Removable Disk I/O Module	STATUS	DATE
AUTHOR:	J.A. Weeldreyer	Written	5/23/75
		Status	A 05/29/75
		Expires	11/29/75

- Coded in: [X] PL/I [ ] AIM [ ] other-
  explain in DETAILED PROPOSAL
- Planned for System MR _____
- Fixes Bug Number(s) _____
- Documented in MTB ___162___
- User/Operations-visible
  Interface change? [X] yes [ ] no
- Incompatible change? [ ] yes [X] no
- Performance: [ ] Better [X] Same
  [ ] Worse
- Replaces MCR _____

Category (Check One)	
	Lib. Maint. Tools
	Sys. Anal. Tools
	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
X	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MFM (Vol, Sect.)	IV
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	X
Other (Name)	
None (Reason)	

Objections/Comments:

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY: The Unstructured Removable Disk I/O Module (rdisk_) provides
the capability for users to perform explicit input/output
operations from/to a disk pack, treating it as a removable
medium.

REASONS: This fulfills a contractual committment.

IMPLICATIONS:

Users will now be able to access a disk in the same fashion
that they can currently utilize other peripherals.

DETAILED PROPOSAL:

See MTB-162.

Name: rdisk_

The rdisk_ I/O module supports I/O from/to removable disk packs. Only
direct modes are supported.

Entries in this module are not called directly by users; rather, the
module is accessed through the I/O system. See the "Multics Input/Output
System," for a general description of the I/O system, and "File Input/Output,"
for a discussion of files, both in Section IV of the MPM Reference Guide.

Attach Description

The attach description has the following form:

rdisk_ device_id pack_id -control_args-

where:

1. device_id   is a character string identifying the model number of the
                   required disk device. Currently, only the DSS191 is
                   supported. The device_id, D191, is used for the DSS191.

2. pack_id   is a character string identifying the disk pack to be
                   mounted.

3. control_args   may be chosen from the following:

    -write   indicates that the disk pack is to be written. If omitted,
                   the operator is instructed to mount the pack with the
                   PROTECT button pressed so that writing is inhibited.

    -size n   indicates that the value of n is to override the value of
                   the buff_len parameter as a record size limit for the
                   read_record operation. (See "Notes" below.)

    -priv   indicates that the attachment is being made by a system
                   process and that a disk drive reserved for system functions
                   is to be assigned.

The attachment causes the specified disk pack to be mounted on a drive of
the specified type.

Opening

The only opening modes supported are direct_input and direct_update. If an
I/O switch attached through rdisk_ is to be opened for update, the -write
control argument must occur in the attach description. This operation has no
effect on the physical device.

Delete Record Operation

This operation is not supported.

Read Length Operation

This operation is not supported.

Read Record Operation

If the amount of data to be read does not terminate on a sector boundary, the excess portion of the last sector is discarded. A code of 0 is returned in this case. (See "Notes" below.)

Rewrite Record Operation

This operation is the only output operation supported. If the amount of data to be written does not terminate on a sector boundary, the remaining portion of the last sector is filled with binary zeros. A code of 0 is returned in this case. (See "Notes" below.)

Seek Key Operation

This operation returns a status code of 0 for any key that is a valid sector number. The record length returned is always 256 (current physical sector size in characters) for any valid key. The specified key must be a character string that could have been produced by editing through a PL/I picture of "(8)9". (See "Notes" below.)

Control Operation

The following orders are supported when the I/O switch is open, except for getbounds, which is supported while the switch is attached.

changepack   causes the current pack to be dismounted and another pack to be mounted in its place. The info_ptr should point to a variable length character string (maximum of 32 characters) containing the identifier of the pack to be mounted.

getbounds   causes the lowest and highest sector numbers accessible
                   by the caller under the current modes to be returned.
                   The info_ptr should point to a structure of the
                   following form:

                        dcl 1 bounds,
                             2 low   fixed bin(35),
                             2 high   fixed bin(35);

setsize   causes the value of the record size override setting to
                   be reset. The info_ptr should point to an aligned
                   fixed binary(35) quantity containing the new override
                   value.

Modes Operation

The modes operation is supported when the I/O switch is attached. The
recognized modes are listed below. Each mode has a complement indicated by the
circumflex character (^) that turns the mode off.

label, ^label   specifies that a system-defined number of sectors at
                   the beginning of the pack are reserved for a pack
                   label, and that a seek_key operation is to treat any
                   key within this area as an invalid key. (The default
                   is on.)

alttrk, ^alttrk   specifies that the pack has been formatted with the
                   assignment of alternate tracks, so that a
                   system-defined number of sectors at the end of the pack
                   are reserved for an alternate track area. Therefore, a
                   seek_key operation is to treat any key within that area
                   as an invalid key. (The default is off.)

wrtcmp, ^wrtcmp   specifies that the write-and-compare instruction,
                   rather than the write instruction, is used for the
                   rewrite_record operation. This causes all data written
                   to be read back and compared to the data as it was
                   prior to being written. This mode should be used with
                   discretion, since it doubles the data transfer time of
                   every write. (The default is off.)

Write Record Operation

This operation is not supported.

Closing

The closing has no effect on the physical device.

Detaching

The detachment causes the disk pack to be dismounted.

Notes

This I/O module is a very elementary, physical-device-oriented I/O facility, providing the basic user-level interface to a disk device. All operations are performed through calls to various I/O interfacer (IOI) mechanisms and resource control package (RCP) entries. Certain conditions must be satisfied before a user process can make use of this facility:

1. The system must be configured with one or more disk drives available as I/O disks.

2. The user must have access to assign the disk drive with RCP and access to the IOI gates.

This I/O module allows the user to read or write a caller-specified number of characters to or from a disk pack, beginning at a caller-specified sector number. Currently, the DSS191 is the only device type supported.

The entire disk pack is treated as a keyed direct file, with keys interpreted literally as physical sector numbers. Hence, the only allowable keys are those that can be converted into fixed binary integers that fall within the range of valid sector numbers for the given disk device under the current modes, as returned by the getbounds control operation.

If an attempt is made to read or write beyond the end of the user-accessible area on disk, the code error_table_$device_end is returned. If a defective track is encountered or if any other unrecoverable data transmission error is encountered, the code error_table_$device_parity is returned.

The record length is specified through the buff_len parameter in the read_record operation, and through the rec_len parameter for the rewrite operation, unless overridden by a -size control argument in the attach description. (Since by definition the file consists of the entire pack, the write operation has no meaning in this I/O module.)

The following items must be considered when using this I/O module with language input/output:

1.   Device Attachment and File Opening:

   a.   PL/I: A file can be attached to a disk pack in PL/I by specifying the appropriate attach description in the title option of an open statement. The open statement should also specify the record and direct attributes plus either the input or update attribute, as is appropriate. After opening, the desired modes should be set, and the current sector bounds should be obtained, through direct calls to iox_$find_iocb, iox_$modes, and iox_$control. These iox_ subroutine entry points are described in Section II.

   b.   FORTRAN: It is not possible to attach a file to a disk pack within FORTRAN. Here, the attachment must be made external to the FORTRAN program, e.g., through the io_call command (described in the MPM Commands) or through use of a PL/I subroutine. FORTRAN automatically opens the file with the appropriate attributes. Also, it is impossible to set modes or obtain sector bounds from within FORTRAN. This should be done through use of a PL/I subroutine prior to the first FORTRAN reference to the file.

2.   Input:

   a.   PL/I: The PL/I read statement with the into and key options is used to read data from a disk pack. The input record length (buff_len) is determined by the size of the variable specified in the into option. The set option should not be used. The key should be a character string containing the character representation of the desired sector number.

   b.   FORTRAN: The unformatted, keyed version of the FORTRAN read statement is used. The key must be an integer, whose value is the desired sector number. In FORTRAN, buff_len has no relationship to input variable size. Hence, the -size control argument must be specified in the attach description if the disk pack is to be read through FORTRAN. The size should be set to the length of the longest expected record.

3.   Output:

    a.   PL/I: To perform output operations to a disk pack, the PL/I
        rewrite statement must be used with the from and key options
        specified. The size of the variable referenced in the from
        option determines the length of the record written to disk. The
        key should be a character string containing the character
        representation of the desired sector number.

    b.   FORTRAN: The unformatted, keyed version of the   FORTRAN write
        statement must be used to perform output operations to a disk
        pack. The size of the output record is determined by the amount
        of data specified in the write list. The key must be an integer
        whose value is the desired sector number.

Multics Change Request

TITLE:	TOLTS 2.2 UPDATE		STATUS	DATE
AUTHOR:	JOHN K. RHODES		Written	75/05/27

-Coded in: [X] PL/I [ ] ALM [ ] other-
explain in DETAILED PROPOSAL
-Planned for System MR 2.2
-Fixes Bug Number(s) _____
-Documented in MTB _____
-User/Operations-visible
Interface change? [ ] yes [X] no
-Incompatible change? [ ] yes [X] no
-Performance: [X] Better [ ] Same
[ ] Worse
-Replaces MCR _____

Category (Check One)	
	Lib. Maint. Tools
	Sys. Anal. Tools
X	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
	User Cmmd/Subr.

Status	A 05/29/75
Expires	11/29/75

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	

Objections/Comments:

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY:

TOLTS requires updating to meet new IOI_ interface for release 2.2. Also 4 problems required correction:

1. The TOLTS printer train image for the PRT300 was wrong.

2. The wrong test page was called for the entry model console.

3. A power off condition was not explicitly reported in an error message.

4. A conflict with the name of a system segment required the change of ALLOC.PL1 to TOLTS_ALLOC.PL1.

Multics Change Request

	STATUS	DATE
	Written	75/05/30
	Status	A 07/21/75
	Expires	01/21/76

TITLE: Fix bug in the maxflow.fortran program in the TSS Fortran Library

AUTHOR: R. D. Lackey

-Coded in: ☐PL/I ☐ALM [X]other-
explain in DETAILED PROPOSAL
-Planned for System MR _____
-Fixes Bug Number(s) ____1____
-Documented in MTB _____
-User/Operations-visible
  Interface change? ☐yes [X]no
-Incompatible change? ☐yes [X]no
-Performance: ☐Better [X]Same
  ☐ Worse
-Replaces MCR _____

Category (Check One)

	Category
	Lib. Maint. Tools
	. Anal. Tools
	Sic. Prog. Tools
	355
	POS
	Salvager
	Ring Zero
	Ring One
	Sys Daemon/Admin.
	Runtime
	User Cmmd/Subr.
X	Unbundled

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	Bug fix

Objections/Comments:

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY: Fix maxflow.fortran to recognize the second line of input data properly.

REASONS: When maxflow.fortran was modified to run under Multics an incorrect format statement was included.

IMPLICATIONS: The maxflow.fortran program will now recognize the second line of input data properly.

DETAILED PROPOSAL: The correction was applied to the fortran source program maxflow.fortran.

TITLE: Fix bugs in tss_ info segment

AUTHOR: Roger D. Lackey

STATUS	DATE
Written	75/06/03
Status	A 07/21/75
Expires	01/21/76

- Coded in: ☐PL/I ☐ALM ☒other- explain in DETAILED PROPOSAL
- Planned for System MR _____
- Fixes Bug Number(s) _____
- Documented in MTB _____
- User/Operations-visible Interface change? ☐ yes ☒ no
- Incompatible change? ☐ yes ☒ no
- Performance: ☐ Better ☒ Same ☐ Worse
- Replaces MCR _____

Category (Check One)

	Lib. Maint. Tools
	. Anal. Tools
	Sys. Prog. Tools
	355
	FOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
	User Cmmd/Subr.
X	Info seg

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	

Objections/Comments:

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY:

Fix bugs in tss_fortran.info and tss_basic.info segments

TITLE:	Add Backup to Disk facility	STATUS	DATE # 1394

AUTHOR: R.G. Luebke

Written 5/22/75

Status A 07/21/75

Expires 01/21/76

-Coded in: [X] PL/I [ ] AIM [ ] other-
explain in DETAILED PROPOSAL

-Planned for System MR 2.2

-Fixes Bug Number(s)

-Documented in MTB -172 rev. 5

-User/Operations-visible
Interface change? [X] yes [ ] no

-Incompatible change? [ ] yes [ ] no

-Performance: [X] Better [ ] Same
[ ] Worse

-Replaces MCR _____

Category (Check One)

	Lib. Maint. Tools
	Sys. Anal. Tools
	Sys. Prog. Tools
	355
	BOS
·	Salvager
	Ring Zero
	Ring One
X	SysDaemon/Admin.
	Runtime
	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MFM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	

Objections/Comments:

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY: Add a feature to the Backup/Reload facility to allow
dumping concurrently to tape and removable disk, at
the sites option. Reloading may then take place from
disk at higher speed than from tape. The proposal is
described in detail in MTB-172 Rev.5.

REASONS: Backup to Disk is need to meet a contractual committment
to GM.

Multics Change Request

	STATUS	DATE
	Written	6/11/75
	Status	A 07/21/75
	Expires	6/2/76

TITLE: GCOS SIMULATOR

AUTHOR: R.H. Morrison

- Coded in: [X] PL/I [ ] ALM [ ] other- explain in DETAILED PROPOSAL
- Planned for System MR
- Fixes Bug Number(s) ⭕
- Documented in MTB
- User/Operations-visible Interface change? [ ] yes [X] no
- Incompatible change? [ ] yes [X] no
- Performance: [X] Better [ ] Same [ ] Worse
- Replaces MCR

Category (Check One)

	Lib. Maint. Tools
	An'l. Tools
	Oss. Prog. Tools
	355
	FOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
	User Cmmd/Subr.
X	GCOS

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	Bug fix

Objections/Comments:

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY: Install corrected version of gcos_set_slave_

REASONS: Fix a bug in the setting of BAR/NOBAR mode.

IMPLICATIONS: BAR/NOBAR modes are reversed so that:

1. Out-of-bounds checks on the gcos slave segment is inoperative.

2. Several 355 tools procedures may not work properly.

Multics Change Request

TITLE: GCOS SIMULATOR

AUTHOR: R. H. MORRISON   CC 2

STATUS	DATE
Written	7/21/75
Status	A 08/04/75
Expires	02/04/76

-Coded in: [X] PL/I [X] ALM [ ] other-
explain in DETAILED PROPOSAL
-Planned for System MR _____
-Fixes Bug Number(s) _____
-Documented in MTB 197
-User/Operations-visible
 Interface change? [X] yes [ ] no
-Incompatible change? [ ] yes [X] no
-Performance: [ ] Better [X] Same
 [ ] Worse
-Replaces MCR _____

Category (Check One)	
	Lib. Maint. Tools
	Sys. Anal. Tools
	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
X	User Cmnd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	AG92-3
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	

Objections/Comments:

Info Segs	gcos.info
Other (Name)	GCOS manual AN05
None (Reason)	

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY: Add a new procedure "gcos_restart" to perform the function of
restarting a GCOS job after a system interruption.

Install modified procedures changed to support the restart
function.

REASONS: Fulfill the requirements of SF-7440 (730010) Task E.

IMPLICATIONS: Absentee GCOS jobs will automatically be restarted.
Interactive jobs will be restarted when the command "gcos" is
repeated for the job.

DETAILED PROPOSAL: See MTB-197.

● In communicating to the File and Record Control program or to the Simulator's Input/Output Supervisor.

The file code designators and their assigned file information block (FIB) are used by the Simulator for peripheral identification and management. The FIB's are similar to the Peripheral Assignment Tables (PAT's) used by native GCOS in that each contains a description of a file and each can be pointed to by one or more filecodes.

File Names

Temporary and output files created by the Simulator are placed in the Multics file system hierarchy. The complete pathname of each file comprises a directory name (the complete pathname of the directory containing the file) and an entry name (the equivalent of a GCOS file name).

Each directory in the hierarchy either has a quota (a limit on the total space occupied by the files it contains) or "borrows" quota from a superior directory. Quota is measured in records. One record equals one Multics page, which is 1024 words.

Jobs that produce a large amount of output or use large temporary files could fail to complete normally if there is not enough quota in the directories being used to hold the files created by the job. The Simulator allows the files to be placed in up to four different directories (three of which can be specified by the user) to help alleviate the quota problem.

The four directories are: pdir (process directory), wdir (working directory), syot_dir (SYSOUT directory), and temp_dir (temporary directory).

The pdir and wdir directories are defined by Multics. Each process is assigned a process directory when it is created (having a quota determined by the system. The current value of this quota is 512 records. Each process has a working directory, which is initially the home directory of the user but can be changed (using the change_wdir command) to any directory to which the user has access.

The syot_dir and temp_dir directories are defined by the Simulator. They are, by default, equal to wdir and pdir respectively, but they can be set to any directories to which the user has access (using the -syot_dir and -temp_dir control arguments on the gcos command line.

Files are placed in directories on the following basis:

Directory	Files
pdir	gcos_slave_area_seg
syot_dir	All GCOS output (print, punch, and SYSOUT files)
wdir	Converted (ASCII or raw) copies of output files
	Saved temporary GCOS files if default temp-dir is used
temp_dir	Not saved temporary GCOS files
	Saved temporary GCOS files if temp_dir is specified by -temp_dir argument

The sysprint generated by the slave programs is in BCD. The execution report produced by the Simulator contains both BCD and ASCII records. ASCII is used for lines that might contain Multics pathnames, since uppercase and lowercase letters are significant and should be preserved. By default, BCD sysout is translated to uppercase ASCII to simulate the appearance of SYSOUT printed by native GCOS. The -lower_case control argument can be used on the gcos command line to cause BCD SYSOUT to be translated to lowercase ASCII.

SYSOUT line limits are:

ALGOL	10,000
CONVER	1,000
COBOL	20,000
EXECUTE	5,000
FILEDIT	10,000
FORTRAN	12,000
6000 FORTRAN	12,000
GMAP	10,000
JOVIAL	10,000
PROGRAM	5,000
UTILITY	10,000

The lines counted include only those supplied by the slave program, including MME GEBORT core dumps and MME GESNAP print lines.

JOB RESTART

A GCOS job interrupted during execution by a system interruption is, by default, restarted by the simulator when a gcos command for the job is repeated in the same working directory or with the same non-default temporary directory (or both). Activity and job restart is performed as directed by the GCOS activity control card options REST/NREST and JREST/ NJREST. However, as in GCOS, activity restart may not be possible depending on internal conditions at the time of the interruption (e.g., temporary files that have been released without SAVE disposition). Job restart will occur in these cases if the JREST option is in effect.

If the interrupted GCOS job was running in an absentee process, the control argument "-restart" must have been used in order for job restart to occur. This option is used by the GCOS Daemon so that jobs submitted by it are restartable.

If job restart is not wanted, regardless of the control card options, the simulator control argument "-nosave" (or "-nosv") may be used.

In Section V for the Control Cards:

ABORT	GMAP
ALGOL	JOVIAL
COBOL	SYSEDIT
CONVER	UTILITY
EXECUTE	355 MAP
FILEDIT	355 SIM
FORTRAN	

add to the description of card options the following:

NJREST   —   Do not restart this job.

NREST   —   Do not restart this job with the current activity.

JREST   —   Enable job restart.

REST   —   Enable activity restart.

NOTE: The activity restart options (NJREST, NREST, JREST, and REST) allow the user to exercise some control over the job/activity restart cycle that occurs following a system interruption.

-dpunch_options "options",   queue the converted punch files for
-dpno "options"   punching by the I/O daemon, but use the
                              dpunch control arguments supplied in the
                              options string. The -raw argument is always
                              used for dpunch, since the converted punch
                              files are not suitable for punching in any
                              other mode. The explanations under
                              -dprint_options above, regarding quotation
                              marks and abbreviations, apply to this
                              argument as well. (The -raw and -dpunch
                              arguments are implied and need not be given.)

-hold, -hd   do not perform the default conversion and
                              daemon output of print and punch files. The
                              default is:

                                   -dpo -dl -dpno "-dl -raw"

                              Since the default for each file type (print
                              or punch) is overridden when any of the above
                              arguments is specified for the given file
                              type, the -hold argument is only required
                              when one of the file types is to be left in
                              GCOS standard system format, with no
                              conversion or daemon output being performed.

Control arguments governing the creation of files by the simulator:

-temp_dir path, -td path   use the pathname of a directory specified by
                              path for temporary GCOS files. By default,
                              the process directory is used for files
                              that are not saved, and the working
                              directory is used for files that are
                              saved.
-syot_dir path, -sd path   use the pathname of a directory specified by
                              path for the GCOS format copies of print,
                              punch, and sysout files. By default, the
                              working directory is used. (The converted
                              copies of these files are always placed in
                              the working directory.)

-job_id id, -id id   use the job identification specified by id in
                              the names of files created by the simulator
                              for this job. See the GCOS Environment
                              Simulator manual for more information on the
                              simulator's naming of files. The id may be
                              any character string, of up to 18 characters,
                              to be used in file names, or it may be one of
                              the following control arguments:

               -unique   use a Multics unique name as
                              the job id. (A unique name is
                              a 15-character string,
                              generated by the unique_chars_
                              subroutine, beginning with an
                              exclamation point and
                              guaranteed to be unique within
                              the system.)

               -jd_seg, -jd   use the entryname of the job
                              deck segment as the job id. If
                              the entryname ends with gcos,
                              that suffix is removed from the
                              id. This is the default.

Other control arguments:

-brief, -bf

suppress the printing of all terminal output produced by the simulator except for fatal error messages. Output from the slave program is not suppressed.

-long, -lg

request that, in addition to the normal terminal output, certain lines from the execution report, including the begin and end activity lines (containing PSW, etc.) also be printed on the terminal.

-continue, -ctu

continue processing the job when a nonfatal error occurs. Unless the -brief control argument is given, a warning message is printed on the user's terminal. If this argument is not given, the first nonfatal error causes the job to be rejected. Nonfatal errors occur mainly in control card processing, and are described in detail in Section V of the GCOS Environment Simulator manual under "Control Cards."

-userlib

enable the use of GCOS slave software libraries supplied by the user, instead of, or in addition to, the copies of the libraries installed in the system. The use of this argument is described in Section II of the GCOS Environment Simulator manual.

-debug, -db

inform the simulator that: 1) it is being run interactively; 2) by a user who is familiar with the Multics debug command, and other Multics error recovery facilities; and 3) the user wishes to be given the opportunity to use these facilities to determine the cause of, and possibly correct, any error that would otherwise cause the simulation of the job to be aborted.

-no_bar, -nobar, -nb

request that the simulator run the slave programs in Multics mode instead of BAR mode. This is used for debugging the simulator. Use of this argument may produce abnormal slave program behavior.

-nosave, -nosv

this argument indicates to the simulator not to save job restart control data, and (therefore) not to attempt job restart after a system interruption. By default, a save_ data segment is created and maintained in the working directory (or the temporary directory if one is specified by -temp_dir). Job restart will be attempted when gcos is invoked again for the job (either by the absentee restart option or by an interactive user).

(6 lines follow)
7/17/75
NAME: gcos, gc
The gcos command invokes the GCOS Environment Simulator to run a single
GCOS job, immediately, in the user's process.

USAGE:

gcos job_deck_pathname -control_arguments-

1.   job_deck_pathname   is the pathname of a file (segment or
multisegment file) containing a GCOS job deck. The file may contain
ASCII lines, (as produced by one of the Multics editors) representing
card images, or it may be a GCOS standard system format file, containing
BCD and binary card images. It is assumed to contain ASCII lines,
unless the GCOS format is specified. One way of specifying GCOS format
is to have the name of the file end with ".gcos". The other way is the
-gcos control argument, described below.

2.   control_arguments may be chosen from the following list. They may
appear in any order, and may preceed or follow the job_deck_pathname.
The remainder of this file is over 200 lines long. The control
arguments are described in the following order:

Input:
      -gcos, -gc
      -ascii, -aci
      -no_canonicalize, -no_can, -no
      -truncate, -tnc
Output:
      -list, -ls
      -lower_case, -lc
      -dprint, -dp
      -dprint_options options, -dpo options
      -raw
      -dpunch, -dpn
      -dpunch_options options, -dpno options
      -hold, -hd
File creation:
      -temp_dir path, -td path
      -syot_dir path, -sd path
      -job_id id, -id id
       -unique
       -jd_seg, -jd
Other
      -brief, -bf
      -long, -lg
      -continue, -ctu
      -userlib
      -debug, -db
      -no_bar, -nobar, -nb
      -nosave, -nosv

If no control arguments are given, the defaults are such that the
command:

gcos path

is equivalent to the command:

gcos path -aci -dpo -dl -dpno "-dl -raw" -id -jd

Control arguments specifying the input supplied to the simulator:

-gcos, -gc
the input file is in GCOS standard system format, containing BCD and
binary card images. Such a file could have been produced as output of a
previous GCOS job, or by the gcos_card_utility command.

-ascii, -aci
the input file contains ASCII lines, as produced by one of the Multics
editors. This is the default, but this argument may be used if the name
of an ASCII file happens to end in ".gcos" to avoid the necessity of
renaming the file.

-no_canonicalize, -no_can, -no
This argument may be used to save processing time, when an ASCII input
file contains no tab characters, and the fields on all the card images
are aligned in the columns required by GCOS. Normally, an ASCII input
file may contain tabs separating the fields on each line. The process
of replacing these tabs by the appropriate number of blanks to align the
fields in the columns required by GCOS is known as canonicalization.
Logical tab stops are known for GCOS $ control cards and for all the
languages supported by the simulator. See AN05 for more information on
canonicalization.

-truncate, -tnc
if any ASCII input file (the job deck file, or any $ SELECTed file)
contains lines longer than 80 characters (after canonicalization), the
extra characters are to be assumed to be part of comments, and discarded
without warnings. If this argument is not given, the first line longer
than 80 characters will cause the job to be rejected.

Control arguments specifying the disposition of output from the
simulator:

-list, -ls
convert print files (both SYSOUT and simulated printer) from BCD to
ASCII, and delete the BCD copy. (This conversion is performed by a call
to the gcos_sysprint command for each file.)

-lower_case, -lc
translate alphabetic BCD characters in print files to lower case ASCII.
The default is upper case.

-dprint, -dp
enqueue the converted print files for printing followed by deletion, by
the Multics I/O Daemon. (The -list argument is implied and need not be
given.)

-dprint_options "options", -dpo "options"
enqueue the converted print files for printing by the I/O Daemon, but
use the dprint control arguments supplied in the options string instead
of the default of "-dl". The options must be enclosed in quotation
marks if they contain blanks or other delimiter characters recognized by
the command processor. Note that the dprint command is called via
cu_$cp so that a user-defined abbreviation for dprint (which supplies
default heading and destination arguments, for example) will be used in
this call. (The -list and -dprint arguments are implied and need not be
given.)

-raw
convert punch files (both sysout and simulated card punch) from BCD (or
binary) to an internal format suitable for punching by the Multics I/O
Daemon in raw mode (960 bits per card image), and delete the BCD copy.
(This conversion is performed by a call to the gcos_syspunch command for
each file.)

-dpunch, -dpn
enqueue the converted punch files for punching by the I/O Daemon in raw
mode, followed by deletion. (The -raw argument is implied and need not
be given.)

-dpunch_options "options", -dpno "options"
enqueue the converted punch files for punching by the I/O Daemon, but
use the dpunch control arguments supplied in the options string. The
-raw argument is always used for dpunch, since the converted punch files
are not suitable for punching in any other mode. The notes under
-dprint_options above (regarding quotation marks and abbreviations),
apply to this argument as well. (The -raw and -dpunch arguments are
implied and need not be given.)

-hold, -hd
do not perform the default conversion and Daemon output of print and
punch files. The default is:
 -dpo -dl -dpno "-dl -raw"

Since the default for each file type (print or punch) is overridden when
any of the above arguments is specified for the given file type, the
-hold argument is only required when one of the file types is to be left
in GCOS standard system format, with no conversion or Daemon output
being performed.

Control arguments governing the creation of files by the simulator:

-temp_dir path, -td path
specifies the pathname of a directory to be used for temporary GCOS
files. By default, the process directory is used for files that are not
saved, and the working directory is used for files that are saved.

-syot_dir path, -sd path
specifies the pathname of a directory to be used for the GCOS format
copies of print, punch, and sysout files. By default, the working
directory is used. (The converted copies of these files are always
placed in the working directory.)

-job_id id, -id id
id is the job identification, to be used in the names of files created
by the simulator for this job. See AN05 for more information on the
simulator's naming of files. id may be any character string, of up to
18 characters, to be used in file names, or it may be one of the
following control arguments:

 -unique
 a Multics unique name will be used as the job id. (A unique
 name is a 15-character string, generated by the unique_chars_
 subroutine, beginning with an exclamation point, and
 guaranteed to be unique within the system.)

 -jd_seg, -jd
 the entry name of the job deck segment will be used as the job
 id. If it ends in ".gcos", that suffix will be removed from
 the id. This is the default.

Other control arguments:

-brief, -bf
this argument suppresses all terminal messages except for fatal error
messages.

-long, -lg
this argument requests that, in addition to the normal terminal output,
the begin and end activity messages (containing PSW, etc.) from the
executution report be printed on the terminal.

-continue, -ctu
continue processing the job when a non-fatal error occurs. Unless the
-brief control argument is given, a warning message will be printed on
the user's terminal. If this argument is not given, the first non-fatal
error will cause the job to be rejected. Non-fatal errors occur mainly
in control card processing, and are described in detail in AN05, Section
V, under "Control Cards".

-userlib
this argument enables the use of GCOS slave software libraries supplied
by the user, instead of, or in addition to, the copies of the libraries
installed in the system. The use of this argument is described in
Section II of AN05.

-debug, -db
this argument indicates to the simulator that: 1) it is being run
interactively; 2) by a user who is familiar with the Multics debug
command, and other Multics error recovery facilities; and 3) the user
wishes to be given the opportunity to use these facilities to determine
the cause of, and possibly correct, any error that would otherwise cause
the simulation of the job to be aborted.

-no_bar, -nobar, -nb
This argument causes the slave programs to be run in Multics mode
instead of BAR mode. This allows the debug command to be used to set

breaks (MME2 instructions, which are illegal opcodes in BAR mode) in the slave program.

-nosave, -nosv
this argument indicates to the simulator not to save job restart control data, and (therefore) not to attempt job restart after a system interruption. By default, a save_data segment is created and maintained in the working directory (or the temporary directory if one is specified by -temp_dir). Job restart will be attempted when gcos is invoked again for the job (either by the absentee restart option or by an interactive user).

Ver. 3 741022	MULTICS CHANGE REQUEST	MCR ╱Y 1397

	STATUS	DATE
TITLE: Modify calc to use EIS arithmetic	Written	07/15/75
AUTHOR: Richard G. Luebke CCZ	Status	A-
	Expires	01/15/76

Planned for System: MR 3.0
Fixes Bug Number(s):   not applicable
Documented in MTB: not applicable
Incompatible Change: no
User/Operations-visible Interface Change: yes
Coded in: (X)PL/I ( )ALM ( )other-see below
Performance: (X)better ( )same ( )worse

DOCUMENTATION CHANGES (specify one or more)
MPM (vol,sect) AG92   MPAM (sect)
MOSN (sect)   MSAM (sect)
PLMs (AN#)
Info Segs   calc_changes.info
Other

CATEGORY (check one)
( )Lib. Maint. Tools
( )Sys. Anal. Tools
( )Sys. Prog. Tools
( )355
( )BOS
( )Salvager
( )Ring Zero
( )Ring One
( )SysDaemon/Admin
( )Runtime
(X)User Command/Subr

OBJECTIONS/COMMENTS:

Headings are: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (optional)

SUMMARY:

Modify calc desk calculator program to use EIS 59 digit precision
arithmetic for calculations. Give user the option to select a result
precision from 8 to 59 digits. Convert calc to iox_.

REASON:

calc does not make use of the full capabilities of the EIS hardware.

IMPLICATIONS:

New variable "prec" . reserved for defining the result precision.

The desk calculator facility calc has been modified to use the higher precision, higher range arithmetic of the extended instruction set decimal arithmetic instructions. The user may specify the desired precision of his results (from 8 to 59 digits) by using the internal variable prec. For example, to set precision to 16 digits the line

        prec = 16

Should be entered. To obtain the current precision the value of prec may be displayed by entering:

        prec

The default precision is set to 8 digits.

Warning:

The internal arithmetic for exponentiation, sin, cos, tan, atan, ln, and log is done with double precision binary arithmetic and therefore results obtained with precision higher than 18 should be truncated to 16 digits.

The internal constants pi and e have been entered internally to 59 digits of precision.

Name: calc

The calc command provides the user with a calculator capable
of evaluating arithmetic expressions with operator precedence, a
set of often-used functions, and a memory that is symbolically
addressable (i.e., by identifier.).

Usage

    calc

initiates the command. The user can then type in expressions,
assignment statements, list requests, or a quit request, separated
from each other by one or more newline characters. All of these
operations are described below.

Expressions

Arithmetic expressions involving real values and the operands
+, -, *, /, and ** (addition, subtraction, multiplication, division,
and exponentiation) can be typed in. A prefix of either plus or minus
is allowed. Parentheses can be used, and blanks between operators and
values are ignored. Calc evaluates the expression according to rules
of precedence and prints out the results.

The order of evaluation is as follows:

1. expressions within parentheses

2. function references

3. prefix +, prefix -

4. **

5. *, /

6. +, -

For example, if the user types:

    2 + 3 * 4

calc responds:

    = 14

Operations of the same level are processed from left to right except for the prefix plus and minus, which are processed from right to left. This means 2**3**4 is evaluated as (2**3)**4.

Numbers can be integers (123), fixed point (1.23) and floating point (1,23e+2, 1.23e2, 1.23E2, or 1230E-1). All are stored as float dec (59). A precision of 59 digits is maintained. Variables (see below) can be used in place of constants, e.g., $pi * r ** 2$.

Seven functions are provided: sin, cos, tan, atan, abs, ln, and log (ln is base e, log is base 10). They can be nexted to any level, e.g., sin(ln(var).5*pi/180).

Assignment Statement

The value of an expression can be assigned to a variable. The name of the variable must be from one to eight characters in length and must be made up of letters (uppercase and/or lowercase) and the underscore character (_). The form is:

    <variable>=<expression>

For example, the following are legal assignment statements:

    x = 2

    Rho = sin(2*theta)

The calc command does not print any response to assignment statements. The variables "pi" and "e" have preassigned values accurate to 59 digits.

Precision

The user may specify the desired precision of his results (from 8 to 59 digits) by using the internal variable prec. For example, to set precision to 16 digits the line

        prec =16

should be entered. To obtain the current precision the value of prec may be displayed by entering:

        prec

The default precision is set to 8 digits.

Warning:

The internal arithmetic for exponentiation, sin, cos, tan, atan, ln, and log is done with double precision binary arithmetic and therefore results obtained with precisions higher than 18 should be truncated to 16 digits.

List Request

If "list" is typed, calc prints out the names and values of all the variables that have been declared so far. The value of any individual variable can be displayed by typing the name of the variable followed by a newline.

Quit Request

Typing "q" causes calc to return to the calling program, i.e., to command level.

Examples

The lines typed by the user are preceded by an exclamation mark (!).

    ! calc

    ! 2+2

       = 4

    ! r = 1.5

    ! pi*r**2

       = 7.068583

    ! sin(0.01)

       = 9.999832E-3

    ! 143e11+(12e13

       too few)

    ! 143e11+(12e13)

       = 1.343E+14

    ! list

       r = 1.5
       e = 2.718282
       pi = 3.141592

    ! q

Multics Change Request

TITLE: Change GCOS DAEMON ABSENTEE JOBS to default restartable

AUTHOR: R. H. Morrison   CCZ

STATUS	DATE
Written	07/25/75
Status	A 08/11/75
Expires	01/25/76

-Coded in: [x] PL/I [ ] ALM [ ] other-
 explain in DETAILED PROPOSAL
-Planned for System MR 3.0
-Fixes Bug Number(s)_____
-Documented in MTB _____
-User/Operations-visible
 Interface change? [ ] yes [X] no
-Incompatible change? [ ] yes [X] no
-Performance: [ ] Better [X] Same
    [ ] Worse
-Replaces MCR_____

Category (Check One)

	Lib. Maint. Tools
	Sys. Anal. Tools
	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
x	SysDaemon/Admin.
	Runtime
	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	GCOS Simulator manual AN05
None (Reason)	

Objections/Comments:

Use these headings: Summary of Proposal, Reasons for Proposal, Implications,
                       Detailed Proposal.

SUMMARY:

   Change the absenttee request to specify "restartable".

REASON:

   To support the restart function of the GCOS Simulator.

IMPLICATIONS:

   Absentee GCOS jobs from the GCOS DAEMON will be restarted
   after a system interruption.

DETAILED PROPOSAL:

   Replace gcos_queue_job.pl1.
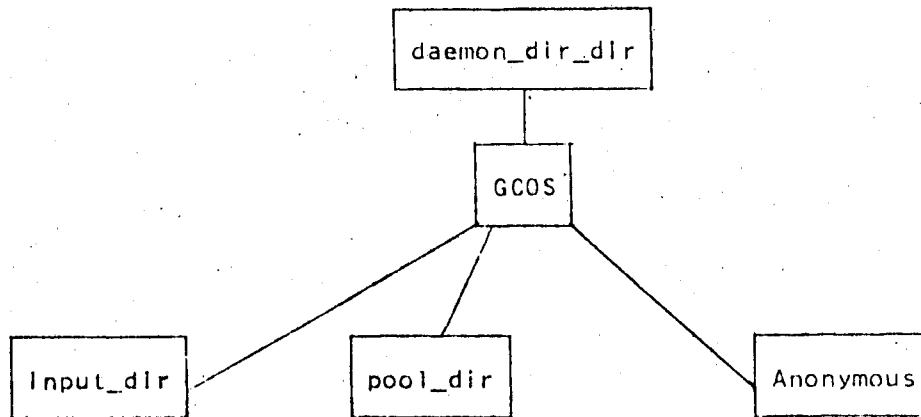
- If input is via an IMCV magnetic tape, the operator enters the command "imcv reel_id" (if this is a nine-track tape) or "imcv7 reel_id" (if this is a seven-track tape). This command is followed by an argument or arguments specifying the jobs on the tape to be executed.

  The daemon attaches an appropriate tape drive, reads the tape, automatically detaches the tape drive, and processes the appropriate jobs.

  The operator logs out the daemon by entering "logout" via the daemon console.

  NOTE: Jobs on magnetic tape can be read in while the card reader is not attached.

DIRECTORY STRUCTURE

```
              ┌───────────────────┐
              │  daemon_dir_dir   │
              └─────────┬─────────┘
                        │
                  ┌─────┴─────┐
                  │   GCOS    │
                  └─────┬─────┘
          ┌────────────┼────────────┐
   ┌──────┴─────┐  ┌───┴──────┐  ┌──┴─────────┐
   │ Input_dir  │  │ pool_dir │  │ Anonymous  │
   └────────────┘  └──────────┘  └────────────┘
```

FLOW OF INPUT AND OUTPUT

NOTE: The term "segment" refers to either a segment or a multisegment file, as needed. A segment is a collection of instructions and/or data that is associated with a particular segment name (i.e., a file).

The Simulator job stream is read into a segment named snumb.gcos in the directory input_dir. The Snumb is taken from the $ SNUMB control card. When a $ IDENT card is encountered in the input stream, the account number field is used to do a table lookup of a person.project for which the daemon will request an absentee job be submitted.

The daemon creates an absentee file in the directory gdd>Project>Person with the file name snumb.absin, where the Snumb is taken from the $ SNUMB card. When the absentee job is executed, two output files are created: snumb.absout from the absentee job and output files from the GCOS job. Both of these output files are created in the user directories. The snumb.absout file is printed via the dprint option. The job output files are printed via the dprint option or punched on punched cards via the dpunch option, as specified by the GCOS job, for snumb.gcos.

The absentee job created by the daemon is restartable. Following a system interruption, the job will be restarted as specified by the GCOS control card restart options and the Simulator control argument "-nosave".

```
----------------------------------------------------------------
I Ver. 3                                              I    MCR  1399 (P10)
I 741022           MULTICS CHANGE REQUEST            I  Rewritten 10/23/75
I-----------------------------------------------------I------------------------
I TITLE:  FIX BUG IN GCOS_CARD_UTILITY               I _STATUS__I _DATE_____
I                                                     I _Written_I 07/25/75
I AUTHOR: R.H. MORRISON                       CC 2    I _Status__I A (V10) 75
I-----------------------------------------------------I _Expires_I 01/25/76
I Planned for  System:    MR 3.0                      I-----------------------
I Fixes Bug Number(s):    gcs00068                    I _CATEGORY_(check_one)
I Documented  in  MTB:    not applicable              I( )Lib. Maint. Tools I
I Incompatible Change:    no                          I( )Sys. Anal. Tools  I
I User/Operations-visible Interface Change:  no       I( )Sys. Prog. Tools  I
I Coded in: (@)PL/I ( )ALM ( )other-see below         I( )355               I
I Performance: ( )better (@)same ( )worse             I( )BOS               I
I                                                     I( )Salvager          I
I-----------------------------------------------------I( )Ring Zero         I
I_DOCUMENTATION_CHANGES_(specify_one_or_more)_____I( )Ring One          I
I MPM (vol,sect)              MPAM (sect)             I( )SysDaemon/Admin   I
I MOSN (sect)                 MSAM (sect)             I( )Runtime           I
I PLMs (AN#)                                          I(@)User Command/Subr I
I Info Segs                                           I
I Other                                               I
I_None_(reason)__bug_fix_____I-----------------------
I OBJECTIONS/COMMENTS:                                I
I                                                     I
I                                                     I
I----------------------------------------------------------------
```

Headings are: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (optional)

SUMMARY: Add character count to record control word.
           Add header record to file.
           Correct several typo's and errors in gcu.info

REASONS: Conform to GCOS system standard format.

IMPLICATIONS: Bugs noted above will be fixed.

DETAILED PROPOSAL:Install the following segments:
        gcos_card_utility.pl1
        gcos_card_utility_.pl1
        gcos_card_utility.info

Comparison of gcos_card_utility.info to installed version on 10/24/75 at 11:24.

A1   9/12/74
Changed to:
B1   9/15/75

A67   -truncate, -tnc I/0
Changed to:
B67   -truncate, -tc I/0

A184   -truncate, -tnc ASCII input:
Changed to:
B184   -truncate, -tc ASCII input:

A203   (media codes 1 or 2).
Changed to:
B203   or ASCII lines (media codes 1, 2, or 6).

B268   Only one of the arguments -imcv and -library may be used in an I/0
B269   specification.
B270
Inserted before:
A268   -library, -lib list Input only:

A295   below.)
A296   Multi-file reels are supported, but only as described below.
Changed to:
B298   below.) Multi-file reels are supported, but only as described below.

A314   Only GCOS format files can be read from or written onto tape; the -gcos
A315   control argument is implied and need not be given.
A316
A317   -retain, -ret
A318   This argument specifies that the tape is to remain attached when the
A319   command finishes. It will then be available to subsequent uses of this
A320   command without requiring the operator to mount and dismount it
A321   repeatedly. This argument must be given in each use of the command
A322   except the last, to keep the tape mounted.
Changed to:
B316   -retain, -ret
B317   This argument specifies that the tape is to remain attached, and
B318   positioned at the end of the file read or written, when the command
B319   finishes. It will then be available to subsequent uses of this command
B320   without requiring the operator to mount and dismount it repeatedly.
B321   This argument must be given in each use of the command except the last,
B322   to keep the tape mounted.

```
B352        (The -label argument should not be giben for a retained input tape that
B353        is positioned correctly, since it causes the tape to be rewound and
B354        searched from the beginning for the specified position or file name. An
33⌒        output tape will remain positioned if only the file name is given, but
33.◡       will be rewound and re-positioned if the position is given.)
Inserted before:
A352
A353        If both n and file_name are given on input, and file_name does not match


B368        Only GCOS format files can be read from or written onto tape; the -gcos
B369        control argument is implied and need not be given.
B370
Inserted before:
A363        If a tape file is specified for input (or output), it must be the only


Comparison finished.
```

eb gcs

next available bug number is -- 72
Bug count is 16
eb: f -b 00068

bug#	date	version	sts	log#	/s	fixed/vers	resp
gcs00068	750227	2.0	a		/	/	

S. The gcu option "-gcos_ascii results in a gcos
format that is not GCOS TSS system standard ascii
format.
D. The character count is missing in the RCW, and the
header record is incorrect.

eb: q

Multics Change Request

TITLE: GCOS TOOLS INFO SEGMENTS

AUTHOR: R. H. Morrison   CCZ

STATUS	DATE
Written	07/25/75
Status	A 09/22/75
Expires	01/25/76

-Coded in: ☐ PL/I ☐ AIM ☒ other—
 explain in DETAILED PROPOSAL
-Planned for System MR   3.0
-Fixes Bug Number(s)_____
-Documented in MTB_____
-User/Operations-visible
 Interface change? ☐ yes ☒ no
-Incompatible change? ☐ yes ☒ no
-Performance: ☐ Better ☒ Same
 ☐ Worse
-Replaces MCR_____

Category (Check One)	
	Lib. Maint. Tools
	Sys. Anal. Tools
X	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	

Objections/Comments:	
	Info Segs see below
	Other (Name)
	None (Reason)

Use these headings: Summary of Proposal, Reasons for Proposal, Implications,
                       Detailed Proposal.

SUMMARY:

        Install info segments for the bound_gcos_tools_procedures.

REASONS:

        The info segments were not previously installed.

IMPLICATIONS:

        Info segments for the tools will be easily available to the
        maintainer of the GCOS Simulator.

DETAILED PROPOSAL:

        Install the following info segments.

                gcos_build_library.info
                gcos_extract_module.info
                gcos_library_summary.info
                gcos_pull_tapefile.info
                gcos_reformat_syslib.info
                dump_gcos.info

Multics Change Request

TITLE:	Modify the GCOS Simulator to track changes in restart_fault_
AUTHOR:	R. H. Morrison

STATUS	DATE
Written	08/28/75
Status	A 09/15/75
Expires	02/15/76

-Coded in: [X] PL/I [ ] ALM [ ] other-
 explain in DETAILED PROPOSAL
-Planned for System MR __3.0__
-Fixes Bug Number(s) gcs 00067
-Documented in MTB _____
-User/Operations-visible
 Interface change? [ ] yes [X] no
-Incompatible change? [ ] yes [X] no
-Performance: [ ] Better [X] Same
 [ ] Worse
-Replaces MCR _____

Category (Check One)

	Lib. Maint. Tools
	Sys. Anal. Tools
	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
X	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	fixes bug

Objections/Comments:

Use these headings: Summary of Proposal, Reasons for Proposal, Implications, Detailed Proposal.

SUMMARY:

Install modified procedures:

        gcos_fault_processor_
        gcos_mme_processor_

REASONS:

Modifications of machine conditions after a fault or MME are illegal by the current standards.

IMPLICATIONS:

GCOS programs will not be aborted after a fault or MME.

Multics Change Request

TITLE: Modify rdisk_ to use RCP

AUTHOR: J. A. Weeldreyer   CCZ

STATUS	DATE
Written	09/04/75
Status A	09/22/75
Expires	03/22/76

-Coded in ☒ PL/I ☐ AIM ☐ other-
  explain in DETAILED PROPOSAL
-Planned for System MR   3.0
-Fixes Bug Number(s)_____
-Documented in MTB_____
-User/Operations-visible
  Interface change? ☐ yes ☒ no
-Incompatible change? ☐ yes ☒ no
-Performance: ☒ Better ☐ Same
  ☐ Worse
-Replaces MCR_____

Category (Check One)	
	Lib. Maint. Tools
	Sys. Anal. Tools
	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
X	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	

Objections/Comments:

Use these headings: Summary of Proposal, Reasons for Proposal, Implications,
                        Detailed Proposal.

SUMMARY:

   Modify rdisk_ to use RCP and to implement a more efficient key
   conversion method.

REASON:

   The RCP interface is required for rdisk_ to work in MR 3.0. The
   new key conversion method will provide a very slight performance
   improvement.

IMPLICATIONS:

   The already documented restriction that a key must be in a format
   suitable for encoding through a pic "(8)9" will be enforced.

DETAILED PROPOSAL:

   1.   Calls to ioi_$io_disk_attach and ioi_$io_disk_detach are
        replaced by calls to rcp_$attach, rcp_$check_attach, and
        rcp_$detach. Also, rdisk_ will no longer power down the disk
        drive for a pack change, but will rely on RCP to perform this
        function. However, rdisk_ will continue to power down the
        drive at detach time.

   2.   In key conversion, the call to cv_dec_check_ is replaced by
        code which results in the performance of the conversion in line.

TITLE: Multics COBOL Compiler

AUTHOR: W. K. O'Neill   (CEO-B)

STATUS	DATE
Written	09/03/75
Status A	09/22/75
Expires	03/03/76

-Coded in: [X] PL/I [ ] ALM [ ] other-
explain in DETAILED PROPOSAL
-Planned for System MR   3.0
-Fixes Bug Number(s)_____
-Documented in MTB_____
-User/Operations-visible
  Interface change? [ ] yes [X] no
-Incompatible change? [ ] yes [X] no
-Performance: [ ] Better [X] Same
  [ ] Worse
-Replaces MCR ___ submitted ___
    on May 27, 1975

Category (Check One)

	Lib. Maint. Tools
	Sys. Anal. Tools
	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
	SysDaemon/Admin.
	Runtime
X	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	X
PLMS (AN #)	Planned
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	X
Other (Name)	Multic's COBOL Users Guide, Multics COBOL
None (Reason)	Reference Manual

Objections/Comments:

Use these headings: Summary of Proposal, Reasons for Proposal, Implications, Detailed Proposal.

SUMMARY:

    This fixes bugs in the COBOL compiler currently installed in Phoenix on system M.

REASONS:

    Several serious bugs have been uncovered by the running of the ANSI-74 audit routines, by USL, and by testing in Billerica.

IMPLICATIONS:

    1.   The bugs are of sufficient importance that the changes should be installed before COBOL is released as a product.

    2.   No documentation changes are required.

    3.   No changes are required to the commands that support the COBOL object time environment.

Multics Change Request

			STATUS	DATE
TITLE: FIX BUG IN GCOS_DAEMON				
AUTHOR: R. H. MORRISON		CCZ	Written	09/15/75

TITLE: FIX BUG IN GCOS_DAEMON

AUTHOR: R. H. MORRISON   CCZ

STATUS	DATE
Written	09/15/75
Status	A 09/29/75
Expires	03/15/76

-Coded in: [X] PL/I [ ] AIM [ ] other-
 explain in DETAILED PROPOSAL
-Planned for System MR 3.0
-Fixes Bug Number(s) gcs00069
-Documented in MTB
-User/Operations-visible
 Interface change? [ ] yes [X] no
-Incompatible change? [ ] yes [ ] no
-Performance: [ ] Better [x] Same
 [ ] Worse
-Replaces MCR

Category (Check One)

	Category (Check One)
	Lib. Maint. Tools
	Sys. Anal. Tools
	Sys. Prog. Tools
	355
	BOS
	Salvager
	Ring Zero
	Ring One
X	SysDaemon/Admin.
	Runtime
	User Cmnd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	bug fix

Objections/Comments:

Use these headings: Summary of Proposal, Reasons for Proposal, Implications,
                        Detailed Proposal.

SUMMARY:

Fix bug in gcos_read_tape_.

REASON:

Because of the bug, if the option "-all" is given for
the daemon request "imcy", then the last program on the
tape is not put in >ddd>GCOS>input_dir where the GCOS
Simulator expects to find it.

IMPLICATIONS:

Bug will be fixed.

DETAILED PROPOSAL:

Replace gcos_read_tape_.pl1.

Ver. 3 741022	MULTICS CHANGE REQUEST	MCR 1430

		STATUS	DATE
TITLE: FIX BUGS IN GCOS SIMULATOR		Written	09/22/75
		Status	A 10/06/75
AUTHOR: RH MORRISON		Expires	03/22/76

Planned for System: MR 3.0
Fixes Bug Number(s): gcs00070,gcs00071
Documented in MTB: not applicable
Incompatible Change: no
User/Operations-visible Interface Change: no
Coded In: (X)PL/I (X)ALM ( )other-see below
Performance: ( )better (X)same ( )worse

CATEGORY (check one)
( )Lib. Maint. Tools
( )Sys. Anal. Tools
( )Sys. Prog. Tools
( )355
( )BUS
( )Salvager
( )Ring Zero
( )Ring One
( )SysDaemon/Admin
( )Runtime
(X)User Command/Subr

DOCUMENTATION CHANGES (specify one or more)
MPM (vol,sect)   MPAM (sect)
MOSN (sect)   MSAM (sect)
PLMs (AN#)
Info Segs
Other
None (reason) bug fix

OBJECTIONS/COMMENTS:

Headings are: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (optional)

SUMMARY: 1. Change declaration of "remaining_len" in gcos_gein_pass1_
            from "fixed bin" to "fixed bin (35)". 2)
            2. Add "*1" file to FORTRAN implicit file allocations in
            forty_vib in gcos_control_tables_

REASON: 1. gcos_gein_pass1_ does not properly handle segments with
            greater than 256K Characters.
            2. GCOS FORTRAN compilations with the "deck" option will not
            produce object decks or a C* file.

IMPLICATIONS: Bugs noted above will be fixed.

DETAILED PROPOSAL: Replace:
                      gcos_control_tables_.alm
                      gcos_gein_pass1_.pl1

TITLE: Changes to bound_graphic_system and related standalone segments. (nee #1546)		STATUS	DATE
AUTHOR: C. D. Tavares 202-695-2478		Written	12/03/75, upd. 12/16

-Coded in: [X]PL/I [X]ALM [ ]other-	Status	P. 12/8/75
plain in DETAILED PROPOSAL	Expires	06/19/76

Category (Check One)

Lib. Maint. Tools	
Sys. Anal. Tools	
Sys. Prog. Tools	
355	
BOS	
Salvager	
Ring Zero	
Ring One	
SysDaemon/Admin.	
Runtime	
XX	User Cmd/Subr.

-Planned for System MR 3.1
-Fixes Bug Number(s) ____
-Documented in MTB ____
-User/Operations-visible
 Interface change? [X] yes [ ] no
-Incompatible change? [ ] yes [XX] no
-Performance: [ ] Better [X] Same
 [ ] Worse
-Replaces MCR 1546

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	

Objections/Comments:
Approved conditional to submission of GUS changes (with Installation Request).

Info Segs	graphics changes
Other (Name)	GUS
None (Reason)	

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY: Fixes all known bugs in graphic system proper, adds a few new features and extensions to certain modules.

REASONS: MPRF's, TR's, local reports, user requests.

IMPLICATIONS: Cleans up known bug list

DETAILED PROPOSAL:

Bug fixes are detailed in the submitted copy of graphics_changes.info which also includes detailed descriptions of additions. This file should be inspected at Phoenix; only that copy of the file correctly documents the submitted version of the system. (Local improvements have been made since.) _attached._

Add new entrypoint, $init_table, to graphic_chars_, allowing for future use of multiple user- or system-defined multiple graphic character sets.

New command, list_pgs_contents (lpc); does for permanent graphic segments as "archive t" does for archives.

Change GSP tektronix_401X_ to work on dialed terminals.

Modify a few character definitions in graphic_char_table_ for aesthetic reasons. Programs using graphic_char_tabls_ will automatically work with the new definitions. (i.e., changes were made to the character descriptions themselves, not the structure of the character descriptions, which these programs honor.)

Rename calcomp_compatible_subrs_ (.pgs .ge) to ccs_special_symbols_.= to avoid naming confusion by lib. maint. personnel (requested by PHX). Users should not be using this package - also, it is currently not documented in the published GUS. If it is felt that the old name should be retained for a while, and this is OK with the library maint.

(over)

personnel, it is OK with me.

Expand the segment ccs_special_symbols_.pgs from the basic 14 CalComp
symbols to the full 139-symbol standard set. These represent additional
capability, and will present no problems to any programs who happen
to be using the database. (i.e. you only get what you ask for.)

Rather than cycle this MCR back to Washington D.C., I would rather
discuss any comments you might have by phone at your convenience.
My number is 202-695-2478.

This file exists to keep graphics users informed of changes to the Multics Graphics System.

Information on the latest changes follows.

11/25/75 Module graphic_matrix_util_ was altered to fix a problem with entrypoint decode_matrix. A simple error resulted in an incorrect X rotation component being returned in some cases.

11/03/75 Subroutine graphic_compiler_ was replaced today to fix a problem which was causing "Unrecognized graphic effector encountered" error messages. The graphic compiler was receiving spurious "hits" on its associative memory due to its omitting to clear the memory between invocations of the compiler.

The GSP tektronix_401X_ was fixed to use the correct number of characters for a 1200-baud line as a default if the baud rate of the device is unavailable for any reason.

10/31/75 Many changes were installed today to both the graphic editor and the graphic system. In detail:

System PGS calcomp_compatible_subrs_.pgs has been replaced by ccs_special_symbols_.pgs. The new PGS contains 139 special CalComp symbols, which are used by camcomp_compatible_subrs_.

A new entry, graphic_chars_$init_table, exists to allow the user to specify a graphic character set table other than the system default (graphic_char_table_).

The graphic_compiler_ was fixed to output null nodes when they are encountered in lists. Null nodes in arrays are still elided.

The graphic_dim_ was repaired to check for a returned error code when asking a GSP to prepare for graphic mode.

A new command, "list_pgs_contents" ("lpc") was installed. Type "help lpc" for details.

Module lsm_ was altered to keep future versions of the PL/I compiler happy.

Subroutine lms_fs_ was extensively modified to fix problems with putting and getting symbols containing subsymbols, and to eliminate the cause of a fatal process error on some structure moves.

A bug in lsm_sym_ which sometimes caused gm_$examine_symtab to return a false value for the number of symbols in a graphic segment was repaired.

Command setup_graphics was modified to attempt to restore the attach table and internal state variables to a consistent state when it encounters an error.

GSP tektronix_401X_ was modified to work correctly on "dialed" (offline) terminals. In addition, a small problem with the text_4014 entry which was causing characters of the wrong size to be used was repaired.

The input parsing rules for the graphic_editor were changed slightly. Specifically, these changes affect how input lines may be terminated. (Modification was to ge_parse_ and ge_aval_.) Type "help graphic_editor" for details.

The "list" command in the graphic editor now accepts the star convention. Symbols listed are now also alphabetized. The "quit" command has the added alias "q", and checks to make sure that it is the only input on its line. The "remove" command will now remove macros also. Output from the "replay" command uses tabs instead of spaces wherever possible, and no longer prints trailing zeroes, as space-conserving measures. Changes were made to ge_environment.incl.pl1 to effect some of these improvements.

Several character decriptions in graphic_char_table_ were modified for aesthetic reasons.

09/29/75 Module calcomp_915_ was replaced today to regress from earlier changes (09/18/75) made on the basis of faulty information, and to insert a fix for the real cause of the problem described. Missing parts of plots were due to the fact that a pen_select code (implementation of "color" effector) always raises the pen and leaves it raised. (This is undocumented and is contrary to the operation of other CalComp plotters.)

09/18/75 Changes to bound_graphic_editor_ today include:

Module ge_interpret_ was modified to use tabs in its output instead of spaces, wherever possible. This should result in some storage savings in cases where structures are replayed into segments for safekeeping.

A bug which was causing strange "Symbol X undefined" messages
in ge_eval_ was fixed. This bug occurred whenever many nested
assignments caused ge_eval_ to grow its symbol list within a
recursive invocation -- the parent invocations would lose track
of the list's location.

Two fixes were inserted into GSP's today. They were:

Component tektronix_401X_ was changed to remove the occurrence
of an annoying little dot at the upper left-hand corner of
the screen which was displayed whenever the terminal was taken
out of graphic mode.

Due to a bug in the CalComp 915 controller, module calcomp_915_
was modified to ignore repeated requests to select a pen which is
already the pen being used. The bug caused whole plot records to
be ignored if the controller encountered two immediately adjacent
requests to "pen select" the same pen.

08/15/75 The graphic editor was replaced today to write around
an extremely hairy PL/I compiler problem which was causing certain
arcane recursions to behave entirely incorrectly. The symptom
which this fix repairs was the returning of "Node out of bounds"
errors on replays.

08/14/75 Several small problems with the graphic editor were
repaired today. In particular:

Module ge_eval_ was modified to strip quotes off datablocks
before creating them. Module ge_interpret_ was similarly modified
so that quotes are printed correctly when datablocks are "shown" or
"replayed".

Module ge_parse_ was modified to circumvent a bug in the
PL/I optimizer.

Fixes to bound_graphic_system_ today include:

Correction of lsm_sym_ to prevent new graphic symbols whose
names are superstrings of existing graphic symbols from clobbering
the existing symbol;

Modification of lsm_fs_ to correct a problem with "putting"
and "getting" symbols containing arrays of arrays;

A change to graphic_manipulator_$add_element which assures that the element to be added is added at the desired point (after, not before, the indicated node.)

08/11/75 The graphic editor was changed today to incorporate new features and to repair a few bugs.

The "replay" command now optionally takes the control argument "-all" (or "-a"). This control argument (which must be the only argument, if given)' causes "replay" to replay all user-defined symbols. Also, "replay" now places semicolons after each replayed symbol requested (if more than one symbol is requested per invocation) instead of just the last symbol. In addition, "replay" has been modified to suppress multiple replaying of the same symbol within one command invocation.

The syntax "x....5", where the number of periods given exceeds the actual number of levels in the structure is now correctly diagnosed and rejected.

Invocation of the "remove" command will no longer cause spurious "malformed macro" diagnostics to be generated after the next line of input.

A few explicit allocations were made into implicit storage allocations, for speed.

08/08/75 Two small changes were made to bound_graphic_system_ today.

Command setup_graphics (and remove_graphics) were changed to save and restore the modes on switch "user_i/o" when it is necessary to detach and reattach it. Although MCS saves most of the modes across detaches, this was done to assist the Network and user-specific IO modules.

IO module graphic_dim_ was modified to prevent illegal modifier faults caused by assignation of an unset pointer in the attach entry.

Entries below this point document changes to the graphic system which were released in system MR3.0

				1547
TITLE:	Changes to bound_graphic_editor_		STATUS	DATE
	(nee #1547)		Written	12/03/75, upd. 12/16
AUTHOR:	C. D. Tavares		Status	P 12/8/75 ADI/09/76
			Expires	06/19/76

	Category (Check One)	
~ed in: [X]PL/I [ ]ALM [ ]other- explain in DETAILED PROPOSAL	Lib. Maint. Tools	
-Planned for System MR 3.1	Sys. Anal. Tools	
-Fixes Bug Number(s) _____	Sys. Prog. Tools	
-Documented in MTB _____	355	
-User/Operations-visible	BOS	
Interface change? [X] yes [ ] no	Salvager	
-Incompatible change? [ ] yes [X] no	Ring Zero	
-Performance: [ ] Better [X] Same	Ring One	
[ ] Worse	SysDaemon/Admin.	
-Replaces MCR 1547	Runtime	
	XX	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
~~XXXXkXXxxxx~~ ~~graphics_changes.info~~	
Info Segs graphic_editor.info	
Other (Name) GUS	
None (Reason)	

Objections/Comments:

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY: Fixes all known bugs in graphic_editor, cleans up confusing input
line parsing rules, adds new features as described below.

REASONS: User requests, local MPRF's

IMPLICATIONS: Cleans up known bug list, eases use of package.

DETAILED PROPOSAL:
Bug fixes are detailed in the submitted copy of graphics_changes.info
which also includes detailed descriptions of additions. This file
should be inspected at Phoenix; only that copy of the file correctly
documents the submitted version of the system. (Local improvements
have been made since.) *attached*

The input parsing rules for the graphic editor have been made more
consistent and more intuitive. Details are available in graphic_editor
info seg. Speicifically, the graphic editor now assumes less (is
a bit smarter) about when a newline (rather than a semicolon) is meant
to end an input line. All syntaxes which previously worked will also
work in the new editor; but some syntaxes which would have resulted
in an implicit termination (and an error message) in the old editor
will now be accepted, and valid results produced.

Module ge_interpret_ was changed to elide trailing zeroes in components
and to use tabs in output formatting to save space when its output
is directed to a file (as well as time... to a terminal.)

The list command in the graphic editor was changed to sort its output
and to honor the star convention.

The replay command takes a control argument, "-all", which causes
the entire contents of the working graphic segment (the "buffer")
to be replayed, to allow the user to dump all his graphic structures
in an understandable ASCII source form to a file for study or
safekeeping. (over)

Rather than cycle this MCR back to Washington D.C., I would rather discuss any comments you might have by phone at your convenience. My number is 202-695-2478.

```
----------------------------------------------------------------------
|                                              |                       |
|             MULTICS CHANGE REQUEST           | MCR /585__            |
|                                              |                       |
|----------------------------------------------|-----------------------|
| TITLE:  Modify rdisk_ to implement raw mode  | STATUS   |  DATE      |
|         and 3 new control orders to support  |----------|------------|
|         disk pack formatting operations      |_Written__|12/15/75|   |
| AUTHOR: James A. Bush MSS Phoenix            |_Approved_|08/19/7&|   |
|                                              |_Rejected_|_____|   |
|----------------------------------------------|-----------|-----------|
| SOURCE: (if external; e.g., "User", "Marketing") |_Postponed_|_____|
|                                              |_Withdrawn_|_____|   |
|                                              |_Expires___|07/19/76|   |
|-------------------------------------------------------------|---------|
```

CLASSIFICATION	JUSTIFICATION	
		Replaced_by_proposal_MCR
Incompatible	Marketing	
Change	Requirement	Implemented_in_System
X	Conformance	
Extension	to_Standard	Objections/Comments:
	Increased	
Restriction	Consistency	
Performance		Addition to current documentation to
Improvement	Simplification	be part of Subsystem Writers' Guide.
Reliability		
Improvement	Generalization	
	(Unreported)	
	Bug_Fix	

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally
                     DETAILED PROPOSAL

REASONS: 1. Implement a raw mode that will allow a user to access
                   the entire disk pack, including the T & D cylinder which
                   takes a special seek command.
                2. Implement a device_info control order that will allow a
                   user to get access to device specific data (sect per
                   track, sect per device, etc) without the user having to
                   know what type of disk device he is using.
                3. Implement a rd_trk_header control order that will allow
                   a user to obtain data relating to the specfic condition
                   of a track, (ie, if the track was formatted defective,
                   alternate or good).
                4. **Implement** a format_trk control order that will allow a
                   user to specify the track condition that is wished to be
                   formatted, the condition of the header bypass switch and
                   if the track is to be formatted alternate or defective,
                   the respective defective or alternate track address.

SUMMARY: The modifications described above have already   been
                implemented and checked out on System M.   Updated
                documentation for rdisk_ is included with this MCR.

IMPLICATIONS: Current users of rdisk_ will not be affected.

Name: rdisk_

The rdisk_ I/O module supports I/O from/to removable disk packs. Only direct modes are supported.

Entries in this module are not called directly by users; rather, the module is accessed through the I/O system. See the "Multics Input/Output System," for a general description of the I/O system, and "File Input/Output," for a discussion of files, both in Section IV of the MPM Reference Guide.

Attach Description

The attach description has the following form:

rdisk_ device_id pack_id -control_args-

where:

1. device_id   is a character string identifying the model number of the required disk device. Currently, only the DSS191 is supported. The device_id, D191, is used for the DSS191.

2. pack_id   is a character string identifying the disk pack to be mounted.

3. control_args may be chosen from the following: may occur only once.

     -write   indicates that the disk pack is to be written. If omitted, the operator is instructed to mount the pack with the PROTECT button pressed so that writing is inhibited.

-size n   indicates that the value of n is to override
                the value of the buff_len parameter as a
                record size limit for the read_record
                operation. (See "Notes" below.)

-priv   indicates that the attachment is being made
                by a system process and that a disk drive
                reserved for system functions is to be
                assigned.

The attachment causes the specified disk pack to be mounted
on a drive of the specified type.

Opening

The only opening modes supported are direct_input and
direct_update. If an I/O switch attached through rdisk_ is to be
opened for update, the -write control argument must occur in the
attach description. This operation has no effect on the physical
device.

Delete_Record_Operation

This operation is not supported.

Read_Length_Operation

This operation is not supported.

Read_Record_Operation

If the amount of data to be read does not terminate on a sector boundary, the excess portion of the last sector is discarded. A code of 0 is returned in this case. (See "Notes" below.)

Rewrite_Record_Operation

This operation is the only output operation supported. If the amount of data to be written does not terminate on a sector boundary, the remaining portion of the last sector is filled with binary zeros. A code of 0 is returned in this case. (See "Notes" below.)

Seek_Key_Operation

This operation returns a status code of 0 for any key that is a valid sector number. The record length returned is always 256 (current physical sector size in characters) for any valid key. The specified key must be a character string that could have been produced by editing through a PL/I picture of "(8)9". (See "Notes" below.)

Control_Operation

The following orders are supported when the I/O switch is open, except for getbounds, which is supported while the switch is attached.

changepack   causes the current pack to be dismounted
                  and another pack to be mounted in its
                  place. The info_ptr should point to a
                  variable length character string
                  (maximum of 32 characters) containing
                  the identifier of the pack to be
                  mounted.

getbounds   causes the lowest and highest sector
                  numbers accessible by the caller under
                  the current modes to be returned. The
                  info_ptr should point to a structure of
                  the following form:

                      dcl 1 bounds,
                          2 low   fixed bin(35),
                          2 high   fixed bin(35);

setsize   causes the value of the record size
                  override setting to be reset. The
                  info_ptr should point to an aligned
                  fixed binary(35) quantity containing the
                  new override value.

device_info   causes information pertaining to the
                  attached disk device to be returned to
                  the user. The info_ptr should point to
                  a structure of the following form:

                      dcl 1 device_info_table aligned,
                          2 subsystem_name char (4),
                          2 device_name char (8),
                          2 sect_per_dev fixed bin (35),
                          2 cyl_per_dev fixed bin,
                          2 sect_per_cyl fixed bin,
                          2 sect_per_track fixed bin,
                          2 num_label_sect fixed bin,
                          2 num_alt_sect fixed bin,
                          2 sect_size fixed bin (12);

                  where:

1. subsystem_name is the name of the Disk subsystem in use (i.e. "D191").

2. device_name is the name of the disk device in use (i.e. "disk_04").

3. sect_per_dev is the total number of non-T&D sectors on the disk pack.

4. cyl_per_dev is the total number of non-T&D cylinders on the disk pack.

5. sect_per_cyl is the number of data sectors on each cylinder of a disk pack.

6. sect_per_track is the number of data sectors on each track.

7. num_label_sect is the number of data sectors to reserve for label information.

8. num_alt_sect is the number of data sectors to reserve for alternate track area.

9. sect_size is the number of 36 bit words in each data sector.

format_trk   causes a format track command to be issued to the track that was indicated by a preceeding seek_key operation. The info_ptr should point to a user supplied structure of the following form:

```
dcl 1 format_trk_info aligned,
   (2 hz bit (2),
    2 ti bit (2),
    2 adcyl fixed bin (16),
    2 adhd fixed bin (16)) unaligned;
```

where:

1. hz is a bit pattern indicating the state of the header bypass switch. The hz bits are defined as follows:

h z	bit pattern meaning
0 0	format home address and all data records
0 1	verify home address and record one, format home address and all data records
1 0	skip home address, format all data records
1 1	verify home address and data record one, skip home address and format all data records

2. ti is a bit pattern indicating the state of the track indicator bits. The ti bits are defined as follows:

t i	bit pattern meaning
0 0	format trk good
0 1	format trk alternate
1 0	format trk defective with alternate trk assigned
1 1	format trk defective with no alternate trk

assigned

3. adcyl and adhd are the alternate
   or defective cylinder and head
   numbers used when the track
   indicator bits equal "01"b or
   "10"b. These two fields are
   defined as follows:

   If the track indicator bits are
   set to "01"b (alternate trk),
   then adcyl and adhd should be
   equal to the defective cylinder
   and head number for which the
   alternate track is being
   formatted.

   If the track indicator bits are
   set to "10"b (defective with
   alternate assigned), then adcyl
   and adhd should be equal to the
   cylinder and head number of the
   alternate track.

rd_trk_header   causes a read track header command to be
                       issued to the track that was indicated
                       by a preceeding seek_key operation. The
                       raw track header information is passed
                       to the user in a structure (pointed to
                       by info_ptr) of the following form:

                           dcl 1 trk_header_info aligned,
                               (2 ha_cyl bit (16),
                                2 ha_head bit (16),
                                2 pad1 bit (2),
                                2 ha_ti bit (2),
                                2 pad2 bit (10),
                                2 rcd_0_ti bit (2),
                                2 rcd_0_cyl bit (16),
                                2 rcd_0_head bit (16),
                                2 rcd_0_rn bit (8),
                                2 pad3 bit (24),

```
2 rcd_0_data (8), bit (8),
2 pad4 bit (4)) unaligned;
```

where:

1. ha_cyl is the cylinder number read from the track home address.

2. ha_head is the head number read from the track home address.

3. ha_ti is the track indicator bits (defined above in the format_trk order) read from the track home address.

4. rcd_0_ti is the track indicator bits read from record zero. If the ha_ti bits indicate "10"b, then rcd_0_ti should equal "01"b for alternate track. If ha_ti indicates "01"b, then rcd_0_ti should equal "10"b for defective track. Otherwise rcd_0_ti will equal ha_ti.

5. rcd_0_cyl and rcd_0_head are the cylinder and head number read from record zero. If ha_ti indicates "10"b, then rcd_0_cyl and rcd_0_head will equal the cylinder and head number of the alternate track. If ha_ti indicates "01"b, then rcd_0_cyl and rcd_0_head will contain the cylinder and head number of the defective track. Otherwise rcd_0_cyl and rcd_0_head will equal ha_cyl and ha_head.

6. rcd_0_rn is the record number
   for record zero (normally equal
   to zero).

7. rcd_0_data is the eight data
   bytes in record zero (not a
   normal data record) and will
   normally be equal to zero.

8. padn are unused bits which will
   be returned as "0"b.

Modes_Operation

The modes operation is supported when the I/O switch is
attached. The recognized modes are listed below. Each mode has
a complement indicated by the circumflex character (^) that turns
the mode off.

label, ^label   specifies that a system-defined number
                       of sectors at the beginning of the pack
                       are reserved for a pack label, and that
                       a seek_key operation is to treat any key
                       within this area as an invalid key.
                       (The default is on.)

alttrk, ^alttrk   specifies that the pack has been
                       formatted with the assignment of
                       alternate tracks, so that a
                       system-defined number of sectors at the
                       end of the pack are reserved for an
                       alternate track area. Therefore, a
                       seek_key operation is to treat any key
                       within that area as an invalid key.
                       (The default is off.)

wrtcmp, ^wrtcmp   specifies that the write-and-compare
                       instruction, rather than the write

instruction, is used for the rewrite_record operation. This causes all data written to be read back and compared to the data as it was prior to being written. This mode should be used with discretion, since it doubles the data transfer time of every write. (The default is off.)

raw, ^raw   specifies that the entire disk pack is available to the user, including the T & D cylinder (the last cylinder on the disk pack). (The default is off.)

Write_Record_Operation

This operation is not supported.

Closing

The closing has no effect on the physical device.

Detaching

The detachment causes the disk pack to be dismounted.

Notes

This I/O module is a very elementary, physical-device-oriented I/O facility, providing the basic

user-level interface to a disk device. All operations are performed through calls to various I/O interfacer (IOI) mechanisms and resource control package (RCP) entries. Certain conditions must be satisfied before a user process can make use of this facility:

1. The system must be configured with one or more disk drives available as I/O disks.

2. The user must have access to assign the disk drive with RCP and access to the IOI gates.

This I/O module allows the user to read or write a caller-specified number of characters to or from a disk pack, beginning at a caller-specified sector number. Currently, the DSS191 is the only device type supported.

The entire disk pack is treated as a keyed direct file, with keys interpreted literally as physical sector numbers. Hence, the only allowable keys are those that can be converted into fixed binary integers that fall within the range of valid sector numbers for the given disk device under the current modes, as returned by the getbounds control operation.

If an attempt is made to read or write beyond the end of the user-accessible area on disk, the code error_table_$device_end is returned. If a defective track is encountered or if any other unrecoverable data transmission error is encountered, the code error_table_$device_parity is returned.

The record length is specified through the buff_len parameter in the read_record operation, and through the rec_len parameter for the rewrite operation, unless overridden by a -size control argument in the attach description. (Since by definition the file consists of the entire pack, the write operation has no meaning in this I/O module.)

The following items must be considered when using this I/O module with language input/output:

1. Device Attachment and File Opening:

    a. PL/I: A file can be attached to a disk pack in PL/I by specifying the appropriate attach description in the title option of an open statement. The open statement should also specify the record and direct attributes plus either the input or update attribute, as is appropriate. After opening, the desired modes should be set, and the current sector bounds should be obtained, through direct calls to iox_$find_iocb, iox_$modes, and iox_$control. These iox_ subroutine entry points are described in Section II.

    b. FORTRAN: It is not possible to attach a file to a disk pack within FORTRAN. Here, the attachment must be made external to the FORTRAN program, e.g., through the io_call command (described in the MPM Commands) or through use of a PL/I subroutine. FORTRAN automatically opens the file with the appropriate attributes. Also, it is impossible to set modes or obtain sector bounds from within FORTRAN. This should be done through use of a PL/I subroutine prior to the first FORTRAN reference to the file.

2. Input:

    a. PL/I: The PL/I read statement with the into and key options is used to read data from a disk pack. The input record length (buff_len) is determined by the size of the variable specified in the into option. The set option should not be used. The

key should be a character string containing the character representation of the desired sector number.

b. FORTRAN: The unformatted, keyed version of the FORTRAN read statement is used. The key must be an integer, whose value is the desired sector number. In FORTRAN, buff_len has no relationship to input variable size. Hence, the -size control argument must be specified in the attach description if the disk pack is to be read through FORTRAN. The size should be set to the length of the longest expected record.

3. Output:

a. PL/I: To perform output operations to a disk pack, the PL/I rewrite statement must be used with the from and key options specified. The size of the variable referenced in the from option determines the length of the record written to disk. The key should be a character string containing the character representation of the desired sector number.

b. FORTRAN: The unformatted, keyed version of the FORTRAN write statement must be used to perform output operations to a disk pack. The size of the output record is determined by the amount of data specified in the write list. The key must be an integer whose value is the desired sector number.

Multics Change Request

TITLE: Implement a program to allow disk pack formatting and related operations online under Multics	
AUTHOR: J. Bush ˙ (Phx)	

STATUS	DATE
Written	02/27/76
Status	A 04/12/76
Expires	10/12/76

- Coded in: ☐ PL/I ☐ ALM ☐ other—explain in DETAILED PROPOSAL
- Planned for System MR _____
- Fixes Bug Number(s) _____
- Documented in MTB _____
- User/Operations-visible Interface change? ☐ yes ☐ no
- Incompatible change? ☐ yes ☐ no
- Performance: ☐ Better ☐ Same ☐ Worse
- Replaces MCR _____

Category (Check One)

Lib. Maint. Tools
Sys. Anal. Tools
Sys. Prog. Tools
355
BOS
Salvager
Ring Zero
Ring One
SysDaemon/Admin.
Runtime
User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	

Objections/Comments:

Recommended installation in tools –
Documentation in System Tools PLM.

Use these headings: Summary of Proposal, Reasons for Proposal, Implications, Detailed Proposal.

REASONS:

Operations has needed a facility for formatting disk packs under Multics for some time. At present time all disk pack formatting must be done under the control of BOS or offline T&D. This implies that this utility function must be done when the system is not up and running Multics.

SUMMARY:

A disk pack formatting facility, called format_disk_pack, has been implemented and tested on System M. Documentation is included with this MCR.

IMPLICATIONS:

Operations will now be able to perform the utility function of disk pack formatting online under Multics.

This is a resubmittion of an earlier MCR which was postponed.

Name: format_disk_pack

        The format_disk_pack command provides a means of formatting
disk packs, on line under Multics. Operations will no longer have
to resort to BOS to format system packs. A removable spindle
must be available in the configuration to allow this command to
operate.

Usage

            format_disk_pack vol_id operation -control_args

where:

1. vol_id   is the volume name of the disk pack to be
                            formatted.

2. operation   is one of the following operations to be
                            performed on the specified disk pack:

        read_pack   In this mode of operation, each track
                            header of a disk pack is read. Data is
                            accumulated on all tracks that are formatted
                            "defective". After all disk pack headers
                            are read, a summary of the defective tracks
                            is displayed on the user's terminal. This
                            operation may be performed either interactively
                            or absentee.

        format_pack   In this mode of operation, each track
                            header is read and the track condition is
                            interregated. A format_track command is
                            then issued, using the information from the
                            previous track condition in the following
                            manner:

                            If the track had previously been formatted
                            "good" or "alternate", then the track is
                            reformatted "good".

                            If the track had previously been formatted
                            as "defective alternate track assigned" or
                            "defective no alternate track assigned",
                            then the track is reformatted "defective no
                            alternate track assigned" (if the "-nodef"
                            control argument was not specified).

Data on the original track condition (as
determined by reading the track header) is
retained and displayed, after the entire
disk pack has been formatted. This opera-
tion may be performed either interactively
or absentee.

read_track
In this mode of operation, a request loop
is entered and the user will be asked to
type in the cylinder and head address of
a particular track. A read track header
is then issued to the requested track and the
track condition will be displayed on the
user's terminal. The program will remain in
the request loop until the user types "quit".
This operation may only be performed by an
interactive user.

format_track
In this mode of operation, a request loop
is entered and the user will be asked to
enter the track address and the desired
track condition, a format track will then
be issued to the requested track address,
formatting the track with the user
specified track condition. If the requested
track condition is defective with alternate
assigned, the program will search for the
next available alternate track, format this
track as alternate and display the alternate
track address to the user. If the requested
track condition is alternate, the user must
also supply the defective track address for
which the alternate track is being assigned.
The program will remain in the request loop
until the user types "quit". This operation
may only be performed by an interactive user.

3. control_args
can be one or more of the following control
arguments.

-nodef
will force all tracks to be formatted as
"good" regardless of the previous track
condition. This control argument will be in
effect only for the format_pack operation.

-hold   will allow the user (interactive user
                   only) to go into an option loop after
                   the current operation is complete so that he
                   may select another operation without releasing
                   the disk pack. The user may exit from the
                   option loop by typing "quit" instead of the
                   operations described above.

-list   will produce a segment in the user's working
                   directory with the name of "volume_id.pad_trks".
                   This segment will contain an array of the
                   binary seek address's of all defective tracks
                   found on the current disk pack. This segment
                   may be defined by the following pl1 structure
                   declaration:

                   dcl 1 pad_trks based (bad_trk_ptr),
                        2 count fixed bin
                        2 def_trks fixed bin(35);(,xx)

TITLE:	Multics Sort/Merge, Phase	STATUS	DATE

AUTHOR: J. Berson (CEO-Boston/SEC)

	STATUS	DATE
Written		Jan. 26, 1976
Status		A 02/23/76
Expires		08/23/76

-Coded in ☒PL/I ☒ALM ☐other-
explain in DETAILED PROPOSAL
-Planned for System MR 4.0
-Fixes Bug Number(s) _____
-Documented in MTB 253
-User/Operations-visible
 Interface change? ☒yes ☐no
-Incompatible change? ☒yes ☐no
-Performance: ☒Better ☐Same
 ☐Worse
-Replaces MCR _____

Category (Check One)

Category
Lib. Maint. Tools
Sys. Anal. Tools
Sys. Prog. Tools
355
BOS
Salvager
Ring Zero
Ring One
SysDaemon/Admin.
Runtime
X User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	Commands, Sub-routine
PLM (AN #) (planned)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	(planned)
Other (Name)	
None (Reason)	

Objections/Comments:

Use these headings: SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

SUMMARY:

The sort command was first released with Multics Release 3.0. Additional
functions proposed for Multics Release 4.0 are:

1. A subroutine interface for the Sort is added (sort_).

2. A Merge, or file collation, function is added. Input to the
   Merge is two or more ordered files; output is one ordered, merged
   file. The Merge can be invoked either as a command (merge) or
   as a subroutine (merge_).

3. Support for the SORT portion of the ANSI COBOL Sort/Merge module,
   Level 2, is added.

4. Additional data types for keys and multiple key fields are supported.
   Release 3.0 supported only the character string data type and only
   a single key field.

5. Additional storage media and file organizations are supported for
   the input and output files. Any file can be supported which can
   be read or written sequentially via iox_ using any I/O module
   available at the Multics installation. The file is described by
   an attached description. Release 3.0 supported only sequential
   files in the Multics storage system, using vfile_.

Additional Interfaces: The following user visible names are introduced.

1.   Command

     merge

2.   Subroutine Entry Points

     sort   merge_

     sort_$release

     sort_$return

     sort_$initiate ⎫
     sort_$commence ⎬   (for COBOL only)
     sort$terminate ⎭

Control Arguments for Command:

-attach, -at   ⎫
-sort_description, -sd   ⎪
-merge_description, -md   ⎬
-file_size   ⎪   (Not registered at present, according
-merge_order   ⎪   to Draft Programming and Documentation
-string size   ⎭   Guide)

Status Code and Message

The following message must be installed as a status code in the system
error_table_:

     data_seq_err   "Data sequence error."

DOCUMENTATION:

     sort and merge commands, MPM Commands

     sort_ and merge_ subroutines, MPM Subroutines

     Sort/Merge PLM (planned)

6. The following additional user exit points are provided:

   input_record exit: Permits the user to alter, delete, or
                      insert records before they enter the
                      sorting process. (This exit is not pro-
                      vided for the Merge.)

   Output_record exit: Permits the user to alter, delete, insert,
                       or summarize records coming out of the
                       sorting or merging process before they
                       are written to the output file.

7. Sequence checking of the output file is added.

8. The ability for the user to estimate the total amount of data
   to be sorted is added (file_size argument).

9. Command arguments for testing and performance measurement are
   added (-time, -merge_order, -string_size, -debug).

REASONS:

Required by Marketing for a "viable commerical system", and for
certain contracts. See:

1. Multics Sort/Merge Product Functional Specification, #58004067,
   R. H. Hill, November 6, 1974.

2. Multics Sort/Merge Project Summary and Authorization. PSA 224AD.

3. Product Calendar Item 2B0901A.

IMPLICATIONS:

Changed Interface: The keyword -sort_desc (-sd) must precede the
pathname of the Sort Description when the Sort Description is supplied
as a segment. In Release 3.0, the pathname of the Sort Description
must be the first argument of the sort command and is not preceded by
a keyword.

Multics Change Request

TITLE: FIX BUGS IN GCOS SIMULATOR	STATUS	DATE
AUTHOR: R. H. Morrison CCZ		

STATUS	DATE
Written	02/06/76
Status	A 02/23/76
Expires	08/06/76

-Coded in: [X] PL/I [X] ALM [ ] other-
  explain in DETAILED PROPOSAL
-Planned for System MR 3.1
-Fixes Bug Number(s) 76,78,82,
-~~Documentation~~ 85,87
-User/Operations-visible
  Interface change? [ ] yes [X] no
-Incompatible change? [ ] yes [X] no
-Performance: [ ] Better [X] Same
  [ ] Worse
-Replaces MCR _____

Category (Check One)

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X	User Cmmd/Subr.

DOCUMENTATION CHANGES

Document	Specify One or More
MPM (Vol, Sect.)	
PLMS (AN #)	
MOSN (Sect.)	
MPAM (Sect.)	
MSAM (Sect.)	
Info Segs	
Other (Name)	
None (Reason)	BUG FIXES

Objections/Comments:

Use these headings: Summary of Proposal, Reasons for Proposal, Implications,
                         Detailed Proposal.

SUMMARY:

1. Change control tables to add implicit files and tab
    stop for column 73.
2. Change total restoration of machine conditions in
    gcos_mme_endc_ to partial restoration.
3. Recognize blank file codes.

REASON:

Fix bugs.

IMPLICATIONS:

Bugs will be fixed.

DETAILED PROPOSAL:

Replace:

    gcos_control_tables_.alm
    gcos_mme_inos_.pl1
    gcos_mme_fcon_.pl1
    gcos_mme_fadd_.pl1

edit_bugfile: list output @ 02/06/76   1452.2 mst Fri

bug#	date	version	sts	log# /s	fixed/vers	resp
gcs00076	751105	3.0	x	/p	760204/	

    S.   Linked GCOS jobs abort because no implicit H*
        file was allocated. Similarly, FILEDII aborts
        because of a* and s* files.

| gcs00078 | 751110 | 3.0 | x | /p | 760204/ | |

    S.   Tab settings for GCOS cards do not include "73"
        for the label field.

| gcs00082 | 751112 | 3.0 | x | /p | 760204/ | |

    S.   The tape reel sequence number check reports
        non-existent discrepancies to the terminal and
        requires a response (one of "n", "a", "c", or
        "i").
    R.   Type "i".

| gcs00085 | 751119 | 3.0 | x | /p | 760204/ | |

    S.   gcos_mme_endc restores all of the previous machine
        conditions saved from entering a courtesy call
        which causes Multics faults.

| gcs00087 | 751120 | 3.0 | x | /p | 760204/ | |

    S.   Blank file codes are not recognized as invalid.

eb: