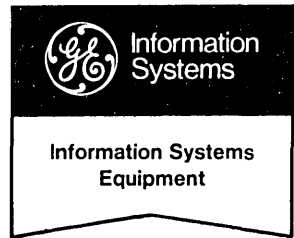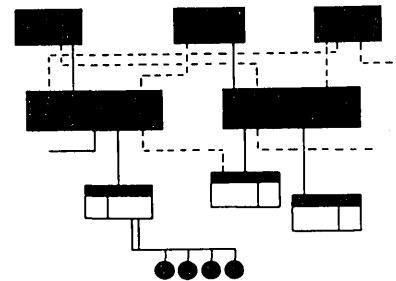# GE-625/635 GECOS-III Exception Processing

SOFTWARE MAINTENANCE DOCUMENT

GENERAL ELECTRIC

GE-625/635 GECOS-III

Exception Processing

SOFTWARE MAINTENANCE DOCUMENT

May 1968

INFORMATION SYSTEMS

GENERAL ELECTRIC

PREFACE

This manual describes the implementation of exception processing for the GE-625/635 Comprehensive Operating Supervisor (GECOS).

Additional software maintenance documents are as follows:

GE-625/635 GECOS-III Introduction and System Tables, CPB-1488

GE-625/635 GECOS-III Startup, CPB-1489

GE-625/635 GECOS-III System Input, CPB-1490

GE-625/635 GECOS-III Dispatcher and Peripheral Allocation, CPB-1491

GE-625/635 GECOS-III Rollcall, Core Allocation, Operator Interface, CPB-1492

GE-625/635 GECOS-III Fault Processing and Service MME's, CPB-1493

GE-625/635 GECOS-III I/O Supervision, CPB-1494

GE-625/635 GECOS-III Termination and System Output, CPB-1496

GE-625/635 GECOS-III File System Maintenance, CPB-1497

GE-625/635 GECOS-III Utility Routines, CPB-1498

GE-625/635 GECOS-III Comprehensive Index and Glossary, CPB-1499

GE-625/635 GECOS-III Flowcharts, CPB-1500

GE-625/635 GECOS-III Time-Sharing System, CPB-1501

This manual was produced using the General Electric Remote Access Editing System (RAES). RAES is a time-shared, disc-resident storage and retrieval system with text-editing and manuscript formatting capabilities. The contents of the manual were entered into RAES from a remote terminal keyboard, edited using the system editing language, and formatted by RAES on reproduction masters.

The index was produced using a computer-assisted remote access indexing system. This system produces an index using source strings delimited at manuscript input time.

Suggestions and criticisms relative to form, content, purpose, or use of this manual are invited. Comments may be sent on the Document Review Sheet in the back of this manual or may be addressed directly to Documentation Standards and Publications, B-90, Computer Equipment Department, General Electric Company, 13430 North Black Canyon Highway, Phoenix, Arizona 85029.

(1.5M 4-68)

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CONTENTS

1. INTRODUCTION TO EXCEPTION PROCESSING

Exception processing in GECOS-III is accomplished with a reentrant executive module residing in the hard core monitor,

    o   .MGEPR   GEPR Executive

special purpose modules residing in the hard core monitor,

    o   .MGP01   Process Illegal Major Status
    o   .MGP22   Console Recovery

special purpose slave service area modules residing on system storage,

    o   .MGP02   Exchange Nonmagnetic Tape Device
    o   .MGP03   Exchange Magnetic Tape
    o   .MGP05   Type Threshold/GESPEC Messages

and device-dependent slave service area modules also residing on system storage:

    o   .MGP04   Magnetic Tape Spacing Parity Recovery
    o   .MGP09   Card Reader Recovery 1
    o   .MGP10   Card Reader Recovery 2
    o   .MGP11   Paper Tape Recovery
    o   .MGP13   Printer Recovery 1
    o   .MGP14   Printer Recovery 2
    o   .MGP15   Card Punch Recovery
    o   .MGP17   DSU200 Recovery 1
    o   .MGP18   DSU200 Recovery 2
    o   .MGP20   MDS200 Recovery 1
    o   .MGP21   MDS200 Recovery 2
    o   .MGP30   Magnetic Tape Recovery
    o   .MGP31   Magnetic Tape EOF/Parity on Spacing Recovery
    o   .MGP32   Reposition Magnetic Tape
    o   .MGP33   Magnetic Tape Data Alert Recovery
    o   .MGP34   Magnetic Tape EOF/Parity on Read Recovery
    o   .MGP35   Magnetic Tape Parity on Write Recovery

If I/O recovery action is required, a request is made for exception processing by the Interrupt Handler (IOTRM in .MIOS). Specifically, IOTRM sets a bit in the program state word (.STATE) indicating GEPR needed. The two status words resulting from the interrupt are stored in the 11-word I/O entry for the GEPR Executive (.MGEPR) to examine.

The Dispatcher (.MDISP) determines when the program can be interrupted, sets a bit in the program .STATE word to indicate GEPR in control and calls the GEPR Executive (.MGEPR). .MGEPR examines each 11-word I/O entry of the interrupted program. An I/O entry may have all or any combination of the following statuses.

    THRESHOLD (word 0, bit 30=1)   Type warning message informing
                                           the operator of an error
                                           threshold condition on the
                                           device referenced by the entry.

EXCHANGE (word 0, bit 32=1)   An operator initiated message
                               has requested an exchange of the
                               device referenced by the I/O
                               entry.

GEPR ACTION (word 0, bits   The I/O request in the I/O entry
       33-35=4)   encountered an error status
                               requiring GEPR recovery action.

An entry with threshold or exchange status is processed before an entry that requires GEPR action. Special purpose SSA modules process threshold and exchange status. Special purpose HCM modules may be called for specific errors. However, if device-dependent action is required, .MGEPR calls the appropriate channel module which loads the first device-dependent SSA module by executing a .GOTO macro. If required, a device-dependent SSA module can continue the error processing by executing a .GOTO macro which loads the next module needed over the current module. A device-dependent SSA module can also .CALL a special purpose module and regain control when the called routine performs a .EXIT; control finally returns to the .MGEPR transfer vector from the last device-dependent SSA module via a .EXIT macro.

2. HARD CORE MONITOR MODULES

Exception processing modules residing in the hard core monitor include the GEPR Executive (.MGEPR), and two special purpose modules: Process Illegal Major Status (.MGP01) and Console Recovery (.MGP22).

GEPR EXECUTIVE MODULE

The .MGEPR module contains three entry points:

- o GEPRE (EP1)   Exception Processing Control
- o OPCOM (EP2)   Operator Communication
- o RELNK (EP3)   Relink I/O Entry

SPECIAL PURPOSE HCM MODULES

The two special purpose modules contain only one entry point each:

- o GP01 (.MGP01) Process Illegal Major Status
- o GP22 (.MGP22) Console Recovery

```
┌─────────────┐
│ GEPRE (EP1) │
│  .MGEPR     │
└─────────────┘
```

EXCEPTION PROCESSING CONTROL

GEPRE (EP1 of .MGEPR) receives control from the Dispatcher when exception processing is required. GEPR action is performed under the identity of the interrupted program. The I/O entries are searched to determine GEPR, threshold, and exchange status entries. When an entry is found, applicable routines are called into the SSA of the interrupted program to process the entry status. When all entries are processed, control is returned to the Dispatcher and the interrupted program can be dispatched again.

PRECALLING SEQUENCE

The Interrupt Handler (EP1 to the channel modules) identifies I/O entries requiring GEPR exception processing, sets and stores the appropriate status within the entry, and sets the program state bit to indicate exception processing required.

The Dispatcher determines when control should be given to GEPR and, prior to giving control, sets the following registers.

    X5 LAL for program
    X6 Program number
    X7 Processor number

CALLING SEQUENCE

GEPRE is called from the Dispatcher (EP1 of .MDISP).

```
    8          16
  ┌──────────┬──────────────
  │          │
  │ .GOTO    │ .MGEPR,1
  │          │
  │          │
```
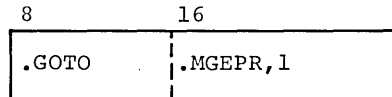
OPERATING SYSTEM INTERACTION

Stack entries are used for intermediate storage. When an additional module is called, the IC and I of the call is saved in the stack.

No .STEMP storage is used.

The .CRGPG gate is shut while interrogating I/O entry status.

ROUTINE RETURNS

When all exception processing is complete, return is made to the Dispatcher by performing a:

```
    8          16
  ┌──────────┬──────────────
  │          │
  │ .GOTO    │ .MDISP,10
  │          │
  │          │
```
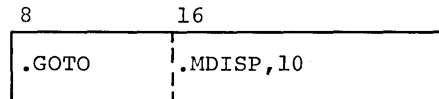
POSTCALLING SEQUENCE

When return has been made to the Dispatcher, the interrupted program is eligible for execution.

SUPPORTING INFORMATION

Programming Method

GEPRE is reentrant and written in floatable code.

Interrupts are inhibited while gates are shut and while storing and retrieving from the stack.

Storage

Internal temporary storage may be used when a gate is shut.

GEPRE occupies approximately 340 core storage locations in the HCM.

Other Routines Used

Applicable channel modules (EP4 of .MCPIO, .MDR20, .MDS20, .MGPIO, .MDNET, .MMTAP, .MPRIO, .MTYPE, and .MPTAP).

Exchange Nonmagnetic Tape Device GP02 (EP1 of .MGP02)
Exchange Magnetic Tape Device GP03 (EP1 of .MGP03)
Type Threshold/GESPEC Message GP05 (EP1 of .MGP05)
Format I/O Status Words and Return Status GSTRT (EP10 of .MIOS)
Resume I/O on Channel RSMCH (EP12 of .MIOS)
Activity Compression ABREQ (EP5 of .MBRT1)

Calling Sequence to Channel Module (EP4) — Prior to entering EP4, the registers listed must contain the data indicated.

    X2   Logical primary channel index
    X3   Absolute I/O entry address
    X5   LAL for program
    X6   Program Number
    X7   Processor Number

```
8              16
|
LDA           |4,DU
STC1          |.SSTAK,5*        simulated .CALL
TRA           |.CRCT4,2*
return 0      |
return 1      |                 (.EXIT through .EXIT 2)
return 2      |
              |
```

```
┌─────────────┐
│ GEPRE(EP1)  │
│  .MGEPR     │
└─────────────┘
```

Returns from Channel Module (EP4) When the the I/O entry status has been processed (this may require calling several SSA modules), the final return is made from the last module used to the initial caller (.MGEPR) via one of the returns listed below.

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area of interrupted program. Registers contain:

                        X3 I/O entry address
                        X5 LAL for program
                        X6 Program number
                        X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the I/O entry area of the interrupted program. Register contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue searching the I/O entry area of interrupted program. Register contents are the same as for return 0.

OPERATOR COMMUNICATION

OPCOM (EP2 of .MGEPR) formats and issues GEPR error messages to the console typewriter. If a reply is requested, the routine validates the reply and processes the normal options in the order:

        D Set device unassignable
        T Test
        X Exchange devices
        A Abort current activity
        Z Rollback to first user checkpoint or restart the activity

If GEPR encounters persistent errors on a console typewriter and another console is configured, an error message is typed. The message allows the operator to request GEPR to retry the I/O on the original console or to move all system names on that console to the new console.

PRECALLING SEQUENCE

Prior to entering OPCOM, the registers listed must contain the data indicated:

        X0 Absolute address of calling sequence for ITYM (EP7 of .MIOS)
        X3 I/O entry address in error
        X5 LAL for program
        X6 Program number
        X7 Processor number

The calling sequence referenced by X0 is as follows:

		8	16	
	-2	ZERO	OPTION	Options to type
	-1	ZERO	.SSYIO,MESG	I/O entry to use, absolute address of message
X0		DEC	code	Message code
	+1	ZERO	**,**	Write DCWP offset, read DCWP offset
	+2	ZERO	SRP,0	Status return pointer
	+3	ZERO	**,**	Working storage

CALLING SEQUENCE

OPCOM is called from either a GEPR SSA or HCM module with proper gating.

	8	16
	.CALL	.MGEPR,2
	return 0	
	return 1	

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```
┌─────────────┐
│ OPCOM (EP2) │
│   .MGEPR    │
└─────────────┘
```

OPERATING SYSTEM INTERACTION

The stack is used to contain the location of the call and for intermediate storage.

No .STEMP storage is used.

The .CRTDQ and .CRPOQ gates are used while processing a T reply.
The .CRSCT gate and an internal gate is used in typewriter recovery.

ROUTINE RETURNS

Return 0 (.EXIT)   Typewriter I/O complete and reply, if requested, is
                    validated. Registers contain:

                    X0 Absolute address of calling sequence
                    X3 Address of I/O entry in error
                    X5 LAL for program
                    X6 Program number
                    X7 Processor number

Word 3 (3,0) of the calling sequence contains nonnormal operator option, right justified, with leading zeros.

Return 1 (.EXIT 1) Typewriter I/O complete and operator requests abort or
                    rollback. Register contents are the same as for return 0.

If rollback is requested, bits 30-35 of error I/O entry contains 77 octal.

POSTCALLING SEQUENCE

If return 0, check operator reply if more than one possible.

If return 1, execute a .EXIT 1 to complete abort/rollback action.

SUPPORTING INFORMATION

Programming Method

OPCOM is reentrant and written in floatable code. All intermediate storage and message manipulation is performed using the program stack or storage provided in the calling routine.

Interrupts are inhibited while a gate is shut.

Storage

OPCOM occupies approximately 620 core storage locations in the HCM.

Internal temporary storage is used while a gate is shut.

Other Routines Used

Master Message Processor ITYM (EP7 of .MIOS)
Relink I/O Entry RELNK (EP3 of .MGEPR)
Exchange Nonmagnetic Tape Device GP02 (EP1 of .MGP02)
Exchange Magnetic Tape Device GP03 (EP1 of .MGP03)
GEPR Rollback Termination RDLRQ (EP6 of .MBRT1)

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```
┌─────────────┐
│ RELNK (EP3) │
│  . MGEPR    │
└─────────────┘
```

RELINK I/O ENTRY

RELNK (EP3 of .MGEPR) relinks an I/O entry and relinquishes control waiting for the I/O to complete. The entry is then interrogated to see if the I/O has completed without error or if further recovery action is required.

The threshold/exchange entry status is also checked and processed. If the I/O entry relinked is GESPECed, the Set Alarm (.MDISP,13) routine is . called to set an alarm clock. If the GESPECed I/O is not initiated within a specified time period, the alarm rings and the .MGP05 module (EP2) is called to type a reminder message to the operator.

PRECALLING SEQUENCE

Prior to calling RELNK, the registers listed must contain the data indicated.

            X3   I/O entry address
            X5   LAL for program
            X6   Program number
            X7   Processor number

CALLING SEQUENCE

RELNK is called from a GEPR module either in the SSA of the program or in the HCM.

```
 8            16
┌──────────────┬──────────────────────────────────────────────┐
│ .CALL        │ .MGEPR,3                                      
│ return 0     │                                               
│ return 1     │  .                                            
│              │                                               
```

OPERATING SYSTEM INTERACTION

The stack contains the location of the call.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

Return 0 (.EXIT)   I/O has completed without error, no further recovery is
                      required. Registers contain:

                      X3   I/O entry address
                      X5   LAL for program
                      X6   Program number
                      X7   Processor number

Return 1 (.EXIT 1)   I/O has completed with error status.   Register contents
are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

RELNK is reentrant and written in floatable code.

Interrupts are not inhibited.

Storage

No internal temporary storage is used.

RELNK occupies approximately 50 core storage locations.

Other Routines Used

Link Reissued I/O to Front of Queue LINKR (EP3 of .MIOS)
Set Alarm SCK (EP13 of .MDISP)
Exchange Nonmagnetic Tape Device GP02 (EP1 of .MGP02)
Exchange Magnetic Tape Device GP03 (EP1 of .MGP03)
Type Threshold/GESPEC Message GP05 (EP1 of .MGP05)

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```
┌──────────────┐
│  GP01        │
│ .MGP01       │
└──────────────┘
```

PROCESS ILLEGAL MAJOR STATUS

GP01 (.MGP01) is a HCM module with one entry point. It processes illegal major statuses for all devices.

PRECALLING SEQUENCE

Prior to entering GP01, the registers listed must contain the data indicated.

        X3 I/O entry address
        X5 LAL for program
        X6 Program number
        X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP01 is called from the .MGEPR and .MDISP modules to perform device-independent recovery.

```
    8              16
   ┌──────────────────────────────────────────────
   │.CALL        │.MGP01,1
   │return 0     │
   │return 1     │
   │return 2     │
   │             │
```

GP01 is called from any GEPR SSA module to perform device-independent recovery.

```
   ┌──────────────────────────────────────────────
   │.GOTO        │.MGP01,1
   │             │
   │             │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No system gates are used, but an internal gate is used while typing.

ROUTINE RETURNS

All three returns provided in the original .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
                      area of interrupted program. Registers contain:

                      X3 I/O entry address
                      X5 LAL for program
                      X6 Program number
                      X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                      I/O entry area of interrupted program. Register
                      contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                      searching the I/O entry area of interrupted
                      program. Register contents are the same as for
                      return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP01 is reentrant and written in floatable code. An internal gate is used to
control access to Operator Communication OPCOM (EP2 of .MGEPR).

Interrupts are not inhibited.

Storage

Internal temporary storage is used while the internal gate is shut.

GP01 occupies approximately 190 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
Set Alarm SCK (EP13 of .MDISP)
Relinquish Control Until Program Enabled DSCNT (EP11 of .MDISP)
Reposition Magnetic Tape GP32 (EP1 of .MGP32)

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```
┌─────────────┐
│   GP22      │
│  . MGP22    │
└─────────────┘
```

CONSOLE RECOVERY

GP22 (.MGP22) is an HCM module with one entry point. It processes non-GEPR console I/O errors.

PRECALLING SEQUENCE

Prior to entering GP22, the registers listed must contain the data indicated.

        X3 I/O entry address
        X5 LAL for program
        X6 Program number
        X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP22 is called from the Typewriter channel module (EP4 of .MTYPE).
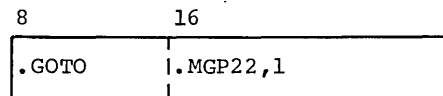
```
  8            16
 ┌──────────┬────────────
 │ .GOTO    │ I.MGP22,1
 │          │ I
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and 1 of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No system gates are used, but an internal gate is used while typing an error message.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used.

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area of
                   interrupted program. Registers contain:

                   X3 I/O entry address
                   X5 LAL for program
                   X6 Program number
                   X7 Processor number

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Return 1 (.EXIT 1)   Abort the program and then continue searching the
                     I/O entry area of interrupted program. Register
                     contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                     searching the I/O entry area of interrupted program.
                     Register contents are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP22 is reentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used when an internal gate is shut.

GP22 occupies approximately 225 core storage locations.

Other Routines Used

Relink I/O Entry RELNK (EP3 of .MGEPR)
Operator Communication OPCOM (EP3 of .MGEPR)

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3. SLAVE SERVICE AREA MODULES

Exception processing modules residing on system storage are classified into two groups: special purpose modules and device-dependent modules.

SPECIAL PURPOSE SSA MODULES

- o GP02 (.MGP02) Exchange nonmagnetic Tape Device
- o GP03 (.MGP03) Exchange Magnetic Tape
- o GP05 (.MGP05) Type Threshold/GESPEC Messages

DEVICE DEPENDENT SSA MODULES

- o GP04 (.MGP04) Magnetic Tape Spacing Parity Recovery
- o GP09 (.MGP09) Card Reader Recovery 1
- o GP10 (.MGP10) Card Reader Recovery 2
- o GP11 (.MGP11) Paper Tape Recovery
- o GP13 (.MGP13) Printer Recovery 1
- o GP14 (.MGP14) Printer Recovery 2
- o GP15 (.MGP15) Card Punch Recovery
- o GP17 (.MGP17) DSU200 Recovery 1
- o GP18 (.MGP18) DSU200 Recovery 2
- o GP20 (.MGP20) MDS200 Recovery 1
- o GP21 (.MGP21) MDS200 Recovery 2
- o GP30 (.MGP30) Magnetic Tape Recovery
- o GP31 (.MGP31) Magnetic Tape EOF/Parity on Spacing Recovery
- o GP32 (.MGP32) Reposition Magnetic Tape
- o GP33 (.MGP33) Magnetic Tape Data Alert Recovery
- o GP34 (.MGP34) Magnetic Tape EOF/Parity on Read Recovery
- o GP35 (.MGP35) Magnetic Tape Parity on Write Recovery

These modules perform the recovery action required and return to the GEPR Executive (.MGEPR). Multiple copies of these modules can be in execution at one time since several programs may be requiring the same recovery action.

```
┌─────────────┐
│   GP02      │
│ . MGP22     │
└─────────────┘
```

EXCHANGE NONMAGNETIC TAPE DEVICE

GP02 (.MGP02) is an SSA module with one entry point. It processes requests to exchange nonmagnetic tape devices. If another device of the same type can be assigned by the Peripheral Dispenser (.MALC2), pertinent information in the two device SCTs are exchanged. The SCT referenced by the I/O entry contains the new physical device address, corresponding indexing, and assigned status. The other SCT contains the original physical device address, corresponding indexing, and unassigned status. Shared devices cannot be exchanged. A console message informs the operator whether or not the exchange was successful.

PRECALLING SEQUENCE

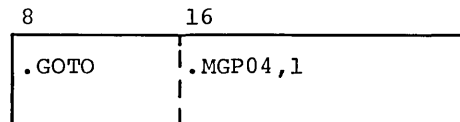Prior to entering GP02, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP02 is called from the .MGEPR module.
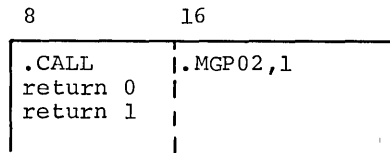
```
      8            16
      ┌──────────────────────────
      │ .CALL     │.MGP02,1
      │ return 0  │
      │ return 1  │
      │           │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

The .CRSCT gate is shut while performing the actual exchange alterations in the SCTs.

ROUTINE RETURNS

Return 0 (.EXIT)   Exchange successful.

                     X3   I/O entry address
                     X5   LAL for program
                     X6   Program number
                     X7   Processor number
                     X0, X1, and X4 are restored.

Return 1 (.EXIT 1)   Exchange unsuccessful. Register contents are the
                     same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP02 is nonreentrant and written in floatable code.

Interrupts are inhibited while the .CRSCT gate is shut.

Storage

Internal temporary storage is used.

GP02 occupies approximately 225 core storage locations.

Other Routines Used

Process Specific Device Request ENTRY (EP1 of .MALC2)
Master Message Processor ITYM (EP7 of .MIOS)

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```
┌─────────────┐
│    GP03     │
│  . MGP03    │
└─────────────┘
```

EXCHANGE MAGNETIC TAPE DEVICE

GP03 (.MGP03) is an SSA module with one entry point. It processes requests to exchange magnetic tape devices. If another device on the same logical channel can be assigned by the Peripheral Dispenser (.MALC2), the physical device numbers in the two device SCTs are exchanged. The device SCT referenced by the I/O entry contains the new device number and assigned status. The other SCT contains the original device number and unassigned status. A console message informs the operator whether or not the exchange was successful.

PRECALLING SEQUENCE

Prior to entering GP03, the registers listed must contain the data indicated.

    X3 I/O entry address
    X5 LAL for program
    X6 Program number
    X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP03 is called from the .MGEPR module.

```
8              16
├──────────────┬──────────────
│ .CALL        │ .MGP03,1
│ return 0     │
│ return 1     │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

The .CRSCT gate is shut while performing the actual exchange alteration in the SCTs.

ROUTINE RETURNS

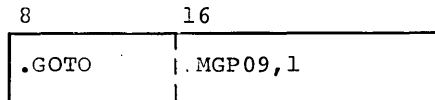Return 0 (.EXIT)   Exchange successful.

                    X3   I/O entry address
                    X5   LAL for program
                    X6   Program number
                    X7   Processor number
                    X0, X1 and X4 are restored.

Return 1 (.EXIT 1) Exchange unsuccessful. Register contents are the
same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP03 is nonreentrant and written in floatable code.

Interrupts are inhibited while the .CRSCT gate is shut.

Storage

Internal temporary storage is used.

GP03 occupies approximately 240 core storage locations.

Other Routines Used

Process Specific Device Request ENTRY (EP1 of .MALC2)
Master Message Processor ITYM (EP7 of .MIOS)

```
┌──────────────┐
│  GP04        │
│  . MGP04     │
└──────────────┘
```

MAGNETIC TAPE SPACING PARITY RECOVERY

GP04 (.MGP04) is an SSA module with one entry point. It performs recovery for Data Alert parity statuses on nondata transfer commands to magnetic tape. Other GEPR modules may be called to complete recovery.

PRECALLING SEQUENCE

Prior to entering GP04, the registers listed must contain the data indicated.

   X3 I/O entry address
   X5 LAL for program
   X6 Program number
   X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP04 is called from the .MGP33 module.

```
 8            16
┌──────────────────────────
│          │
│ .GOTO    │ .MGP04,1
│          │
│          │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area
                       of interrupted program. Registers contain:

                       X3 I/O entry address
                       X5 LAL for program
                       X6 Program number
                       X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                       I/O entry area of interrupted program. Register
                       contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                       searching the I/O entry area of interrupted program.
                       Register contents are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP04 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP04 occupies approximately 195 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
Reposition Magnetic Tape GP32 (EP1 of .MGP32)
Magnetic Tape Recovery GP30 (EP1 of .MGP30)

```
┌─────────────┐
│   GP05      │
│  . MGP05    │
└─────────────┘
```

TYPE THRESHOLD/GESPEC MESSAGES

GP05 (.MGP05) is an SSA module with two entry points. EP1 processes an entry with threshold status. A warning message is typed and the threshold status in the I/O entry is reset. EP2 is called when the alarm clock set by RELNK (EP3 of .MGEPR) rings. A console message instructs the operator to ready the device.
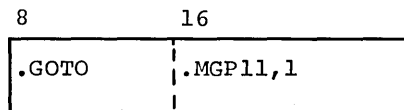
PRECALLING SEQUENCE

Prior to entering GP05, the registers listed must contain the data indicated.

    X3 I/O entry address
    X5 LAL for program
    X6 Program number
    X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP05, EP1 and EP2 are called from the .MGEPR module.

	8	16
EP1	.CALL return 0	.MGP05,1
EP2	.CALL return 0	.MGP05,2

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.
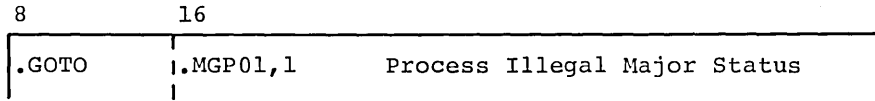
No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

One return is provided from each entry point.

Return 0 (.EXIT)   Processing complete.

                      X3 I/O entry address
                      X5 LAL for program
                      X6 Program number
                      X7 Processor number
                      Other registers are destroyed.

POSTCALLING SEQUENCE

EP1 - Check remaining entry status.

EP2 - Check entry status again, if still GESPECed, set alarm clock and
      relinquish control.

SUPPORTING INFORMATION

Programming Method

GP05 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP05 occupies approximately 210 core storage locations.

Other Routines Used

Master Message Processor ITYM (EP7 of .MIOS)

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CARD READER RECOVERY 1

GP09 (.MGP09) is an SSA module with one entry point. It is the card reader module called first to recover from an I/O error condition. Power Off, IOC Error, Data Alert, and Instruction Rejected statuses are processed. Other GEPR modules may be called to continue processing an Attention or an illegal major status.

PRECALLING SEQUENCE

Prior to entering GP09, the registers listed must contain the data indicated.

       X3 I/O entry address
       X5 LAL for program
       X6 Program number
       X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP09 is called from the Card Reader channel module (EP4 of .MGPIO).

```
8           16
 ┌─────────────────────────
 │ .GOTO      │ .MGP09,1
 │            │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

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ROUTINE RETURNS

Three of the returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area
                        of interrupted program. Registers contain:

                        X3 I/O entry address
                        X5 LAL for program
                        X6 Program number
                        X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the I/O
                        entry area of interrupted program. Register contents
                        are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue searching
                        the I/O entry area of interrupted program. Register
                        contents are the same as for return 0.

The .MGP09 module provides two additional returns which cause other GEPR
modules to be loaded to continue the recovery process.

8	16	
.GOTO	.MGP10,1	Card Reader Recovery 2
.GOTO	.MGP01,1	Process Illegal Major Status

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP09 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP09 occupies approximately 195 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
MME GESPEC Processor SPEC (EP6 of .MIOS)

```
┌─────────────┐
│    GP10     │
│  . MGP10    │
└─────────────┘
```

CARD READER RECOVERY 2

GP10 (.MGP10) is an SSA module with one entry point. It continues processing an Attention major status on a card reader.
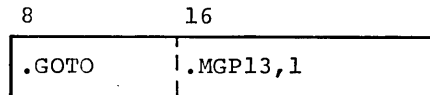
PRECALLING SEQUENCE

Prior to entering GP10, the registers listed must contain the data indicated.

    X3 I/O entry address
    X5 LAL for program
    X6 Program number
    X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP10 is called from the .MGP09 module.

```
     8              16
    ┌──────────────────────────────
    │.GOTO       |.MGP10,1
    │            |
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
                        area of interrupted program. Registers contain:

                        X3 I/O entry address
                        X5 LAL for program
                        X6 Program number
                        X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                        I/O entry area of interrupted program. Register
                        contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                        searching the I/O entry area of interrupted program.
                        Register contents are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP10 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP10 occupies approximately 220 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
MME GESPEC Processor SPEC (EP6 of .MIOS)

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```
┌─────────────┐
│   GP11      │
│  .MGP11     │
└─────────────┘
```

<center>PAPER TAPE RECOVERY</center>

GP11 (.MGP11) is an SSA module with one entry point. It processes I/O error conditions occurring on paper tape. All statuses except illegal major status are processed within this module.

PRECALLING SEQUENCE

Prior to entering GP11, the registers listed must contain the data indicated.

        X3 I/O entry address
        X5 LAL for program
        X6 Program number
        X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP11 is called from the Paper Tape channel module, (EP4 of .MPTAP).

```
 8           16
┌──────────┬──────────────
│.GOTO     │.MGP11,1
│          │
│          │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
area of interrupted program. Registers contain:

                       X3   I/O entry address
                       X5   LAL for program
                       X6   Program number
                       X7   Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
I/O entry area of interrupted program. Register
contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
searching the I/O entry area of interrupted program.
Register contents are the same as for return 0.

The .MGP11 module provides one additional return by calling another GEPR
module to continue the recovery process.

8	16	
.GOTO	.MGP01,1	Process Illegal Major Status

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP11 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP11 occupies approximately 128 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)

```
┌─────────────┐
│    GP13     │
│  . MGP13    │
└─────────────┘
```

PRINTER RECOVERY 1

GP13 (.MGP13) is an SSA module with one entry point. It is the printer module called first to recover from an I/O error condition. Power Off, IOC Error, and Instruction Rejected statuses are processed. Other GEPR modules may be called to continue processing Attention, Data Alert, or illegal major status.
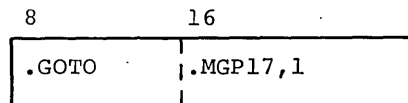
PRECALLING SEQUENCE

Prior to entering GP13, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP13 is called from the Printer channel module (EP4 of .MPRIO).

```
      8            16
    ┌──────────────────────────┐
    │ .GOTO     │ .MGP13,1     
    │           │              
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

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ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
                      area of interrupted program. Registers contain:

                      X3 I/O entry address
                      X5 LAL for program
                      X6 Program number
                      X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                      I/O entry area of interrupted program. Register
                      contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                      searching the I/O entry area of interrupted program.
                      Register contents are the same as for return 0.

The .MGP13 module provides three additional returns which cause other
modules to be loaded to continue the recovery process.

8	16	
.GOTO	.MGP14,1	Printer Recovery 2
.GOTO	.MGP14,2	Printer Recovery 2
.GOTO	.MGP01,1	Process Illegal Major Status

SUPPORTING INFORMATION

Programming Method

GP13 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP13 occupies approximately 200 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
MME GESPEC Processor SPEC (EP6 of .MIOS)

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PRINTER RECOVERY 2

GP14 (.MGP14) is an SSA module with two entry points. It completes processing a printer error status. An Attention status is processed by EP1 and a Data Alert by EP2.
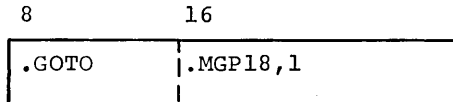
PRECALLING SEQUENCE
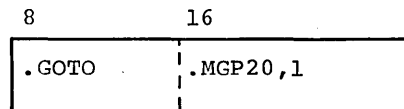
Prior to entering GP14, the registers listed must contain the data indicated.

        X3 I/O entry address
        X5 LAL for program
        X6 Program number
        X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP14 is called from the .MGP13 module.

```
        8           16
EP1    | .GOTO      |.MGP14,1
       |            |
EP2    | .GOTO      |.MGP14,2
       |            |
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

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ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
                     area of interrupted program. Registers contain:

                     X3   I/O entry address
                     X5   LAL for program
                     X6   Program number
                     X7   Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                     I/O entry area of interrupted program. Register
                     contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                     searching the I/O entry area of interrupted
                     program. Register contents are the same as for
                     return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP14 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP14 occupies approximately 190 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)

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```
┌──────────┐
│  GP15    │
│ .MGP15   │
└──────────┘
```

CARD PUNCH RECOVERY

GP15 (.MGP15) is an SSA module with one entry point. All card punch legal major statuses are processed within this module. An additional GEPR module is called to process illegal major status.

PRECALLING SEQUENCE

Prior to entering GP15, the registers listed must contain the data indicated.

    X3 I/O entry address
    X5 LAL for program
    X6 Program number
    X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP15 is called from the Card Punch channel module (EP4 of .MCPIO).

```
 8            16
 ┌─────────────────────────
 │.GOTO     │.MGP15,1
 │          │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

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ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
                      area of interrupted program. Registers contain:

                      X3   I/O entry address
                      X5   LAL for program
                      X6   Program number
                      X7   Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                      I/O entry area of interrupted program. Register
                      contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                      searching the I/O entry area of interrupted program.
                      Register contents are the same as for return 0.

The .MGP15 module provides one additional return which causes another module
to be loaded to continue the recovery process.

8	16	
.GOTO	.MGP01,1	Process Illegal Major Status

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP15 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP15 occupies approximately 215 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
MME GESPEC Processor SPEC (EP6 of .MIOS)

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```
┌─────────────┐
│   GP17      │
│  .MGP17     │
└─────────────┘
```

DSU200 RECOVERY 1

GP17 (.MGP17) is an SSA module with one entry point. It is the DSU200 module called first to recover from an I/O error condition. Power Off, IOC Error, Attention, and Instruction Rejected statuses are processed. Other GEPR modules may be called to continue processing a Data Alert or an illegal major status.

PRECALLING SEQUENCE

Prior to entering GP17, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP17 is called from the DSU200 channel module (EP4 of .MDS20).

```
    8            16
   ┌────────────┬──────────────
   │ .GOTO      │ .MGP17,1
   │            │
   │            │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
                     area of interrupted program. Registers contain:

                     X3   I/O entry address
                     X5   LAL for program
                     X6   Program number
                     X7   Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                     I/O entry area of interrupted program. Register
                     contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                     searching the I/O entry area of interrupted program.
                     Register contents are the same as for return 0.

The .MGP17 module provides two additional returns which cause other modules
to be loaded to continue the recovery process.

8	16	
.GOTO	.MGP18,1	DSU200 Recovery 2
.GOTO	.MGP01,1	Process Illegal Major Status

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP17 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP17 occupies approximately 135 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)

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DSU200 RECOVERY 2

GP18 (.MGP18) is an SSA module with one entry point. It completes processing a Data Alert on a DSU200.

PRECALLING SEQUENCE

Prior to entering GP18, the registers listed must contain the data indicated.

        X3 I/O entry address
        X5 LAL for program
        X6 Program number
        X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP18 is called from the .MGP17 module.

```
8             16
|.GOTO        |.MGP18,1
|             |
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area
                  of interrupted program. Registers contain:

                  X3 I/O entry address
                  X5 LAL for program
                  X6 Program number
                  X7 Processor number

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Return 1 (.EXIT 1)   Abort the program and then continue searching the I/O
                      entry area of interrupted program. Register contents
                      are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue searching
                      the I/O entry area of interrupted program. Register
                      contents are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP18 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP18 occupies approximately 166 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)

MDS200 RECOVERY 1

GP20 (.MGP20) is an SSA module with one entry point. It is the MDS200 module called first to recover from an I/O error condition. Power Off, IOC Error, and Attention statuses are processed. Other GEPR modules may be called to process Data Alert, Instruction Rejected and illegal major statuses.
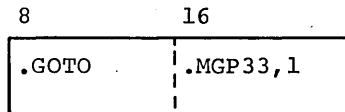
PRECALLING SEQUENCE

Prior to entering GP20, the registers listed must contain the data indicated.

        X3 I/O entry address
        X5 LAL for program
        X6 Program number
        X7 Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP20 is called from the MDS200 channel module (EP4 of .MDR20).

```
     8          16
    ┌─────────┬──────────────
    │ .GOTO   │ .MGP20,1
    │         │
    │         │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
                        area of interrupted program. Registers contain:

                        X3   I/O entry address
                        X5   LAL for program
                        X6   Program number
                        X7   Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                        I/O entry area of interrupted program. Register
                        values are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                        searching the I/O entry area of interrupted program.
                        Register values are the same as for return 0.

The .MGP20 module provides three additional returns which cause other modules
to be loaded to continue the recovery process.

8	16	
.GOTO	.MGP21,1	MDS200 Recovery 2
.GOTO	.MGP21,2	MDS200 Recovery 2
.GOTO	.MGP01,1	Process Illegal Major Status

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP20 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP20 occupies approximately 120 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)

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```
┌──────────┐
│  GP21    │
│ .MGP21   │
└──────────┘
```

MDS200 RECOVERY 2

GP21 (.MGP21) is an SSA module with two entry points. It completes processing an MDS200 error status. A Data Alert is processed by EP1 and an Instruction Rejected by EP2.

PRECALLING SEQUENCE

Prior to entering GP21, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP21 is called from the .MGP20 module.

```
         8            16
        ┌────────────┬──────────────
EP1     │ .GOTO      │ .MGP21,1
        │            │
EP2     │ .GOTO      │ .MGP21,2
        │            │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the original .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area
                       of interrupted program. Registers contain:

                       X3 I/O entry address
                       X5 LAL for program
                       X6 Program number
                       X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the I/O
                       entry area of interrupted program. Register contents
                       are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue searching
                       the I/O entry area of interrupted program. Register
                       contents are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP21 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP21 occupies approximately 135 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)

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MAGNETIC TAPE RECOVERY

GP30 (.MGP30) is an SSA module with one entry point. It is the magnetic tape module called first to recover from an I/O error condition. Power Off, Attention, and Instruction Rejected statuses are processed. Other GEPR modules may be called to complete this processing and to begin processing other error status conditions.

PRECALLING SEQUENCE

Prior to entering GP30, the registers listed must contain the data indicated.

    X3   I/O entry address
    X5   LAL for program
    X6   Program number
    X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP30 is called from the Magnetic Tape channel module (EP4 of .MMTAP).

```
8             16
+-------------------------+
| .GOTO      | .MGP30,1   |
|            |            |
```

It is also called from the .MGP04, .MGP31, .MGP34 and .MGP35 SSA modules to recover from errors encountered by GEPR in processing another error.

```
+-------------------------+
| .CALL      | .MGP30,1   |
| return 0   |            |
| return 1   |            |
| return 2   |            |
|            |            |
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry
                        area of interrupted program. Registers contain:

                        X3 I/O entry address
                        X5 LAL for program
                        X6 Program number
                        X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                        I/O entry area of interrupted program. Register
                        contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                        searching the I/O entry area of interrupted program.
                        Register contents are the same as for return 0.

The .GP30 module provides additional returns which cause other modules to be
loaded to continue the recovery process.

8	16	
.GOTO	.MGP01,1	Process Illegal Major Status
.GOTO	.MGP31,1	Magnetic Tape EOF/Parity on Spacing Recovery
.GOTO	.MGP33,1	Magnetic Tape Data Alert Recovery
.GOTO	.MGP34,2	Magnetic Tape EOF/Parity on Read Recovery

SUPPORTING INFORMATION

Programming Method

GP30 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP30 occupies approximately 220 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
Reposition Magnetic Tape GP32 (EP1 of .MGP32)

```
┌─────────┐
│  GP31   │
│ .MGP31  │
└─────────┘
```

MAGNETIC TAPE EOF/PARITY ON SPACING RECOVERY

GP31 (.MGP31) is an SSA module with one entry point. It processes an End of File major status with parity substatus encountered on a nondata transfer command to magnetic tape.

PRECALLING SEQUENCE

Prior to entering GP31, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP31 is called from the .MGP30 module.

```
  8          16
 ┌──────────┬──────────────┐
 │.GOTO     │.MGP31,1      │
 │          │              │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

Two of the returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area
                    of interrupted program. Registers contain:

                    X3 I/O entry address
                    X5 LAL for program
                    X6 Program number
                    X7 Processor number

Return 2 (.EXIT 2) Return status to the program and then continue
                    searching the I/O entry area of interrupted program.
                    Register contents are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP31 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP31 occupies approximately 185 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
Magnetic Tape Recovery GP30 (EP1 of .MGP30)

```
┌─────────────┐
│   GP32      │
│  .MGP32     │
└─────────────┘
```

REPOSITION MAGNETIC TAPE

GP32 (.MGP32) is an SSA module with one entry point. It is called by other GEPR magnetic tape SSA modules to reposition a magnetic tape. The positioning information in the device secondary SCT is used.

PRECALLING SEQUENCE

Prior to entering GP32, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP32 is called from the .MGP01, .MGP03, .MGP04, .MGP30, and .MGP34 modules.
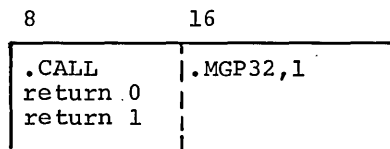
```
    8           16
   ┌──────────┬─────────────
   │ .CALL    │ .MGP32,1
   │ return 0 │
   │ return 1 │
   │          │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

Return 0 (.EXIT)   Positioning not successful. Registers contain:

                  X3 I/O entry address
                  X5 LAL for program
                  X6 Program number
                  X7 Processor number

Return 1 (.EXIT 1)   Positioning successful. Register contents are the
                  same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP32 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP32 occupies approximately 190 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)

```
┌─────────┐
│  GP33   │
│ .MGP33  │
└─────────┘
```

MAGNETIC TAPE DATA ALERT RECOVERY

GP33 (.MGP33) is an SSA module with one entry point. It is called to begin recovery of a Data Alert status on magnetic tape. Transfer Timing Alert, Transmission Parity Alert, Blank Tape on Read, Bit Detected During Erase, and End of Tape substatuses are processed. Other GEPR modules may be called to complete this processing and to process parity substatus.

PRECALLING SEQUENCE

Prior to entering GP33, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP33 is called from the .MGP30 module.

```
      8          16
     ┌────────────────────────
     │        │
     │ .GOTO  │ .MGP33,1
     │        │
     │        │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

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ROUTINE RETURNS

All three returns provided in the original .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area
                        of interrupted program. Registers contain:

                        X3 I/O entry address
                        X5 LAL for program
                        X6 Program number
                        X7 Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the
                        I/O entry area of interrupted program. Register
                        contents are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue
                        searching the I/O entry area of interrupted
                        program. Register contents are the same as for
                        return 0.

The .GP33 module provides additional returns which cause other slave service
area modules to be loaded to continue the recovery process.

8	16	
.GOTO	.MGP04,1	Magnetic Tape Spacing Parity Recovery
.GOTO	.MGP34,1	Magnetic Tape EOF/Parity on Read Recovery
.GOTO	.MGP34,3	Magnetic Tape EOF/Parity on Read Recovery
.GOTO	.MGP35,1	Magnetic Tape Parity on Write Recovery

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP33 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP33 occupies approximately 245 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
Magnetic Tape Recovery GP30 (EP1 of .MGP30)

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```
┌─────────────┐
│   GP34      │
│  .MGP34     │
└─────────────┘
```

MAGNETIC TAPE EOF/PARITY ON READ RECOVERY

GP34 (.MGP34) is an SSA module with three entry points. It recovers from a Data Alert parity status on a read command to magnetic tape. EP1 does a noise check, then regular recovery. EP2 recovers from an End of File parity status. EP3 bypasses the noise check, then performs regular recovery. Other GEPR modules may be called to complete the recovery process.

PRECALLING SEQUENCE

Prior to entering GP34, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP34, EP1 and EP3, are called from .MGP33; EP2 is called from .MGP30.

	8	16
EP1	.GOTO	.MGP34,1
EP2	.GOTO	.MGP34,2
EP3	.GOTO	.MGP34,3

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

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ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used:

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area
                      of interrupted program. Registers contain:

                      X3   I/O entry address
                      X5   LAL for program
                      X6   Program number
                      X7   Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the I/O
                      entry area of interrupted program. Register contents
                      are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue searching
                      the I/O entry area of interrupted program. Register
                      contents are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP34 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP34 occupies approximately 246 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
Magnetic Tape Recovery GP30 (EP1 of .MGP30)
Reposition Magnetic Tape GP32 (EP1 of .MGP32)

```
┌─────────────┐
│    GP35     │
│  . MGP35    │
└─────────────┘
```

MAGNETIC TAPE PARITY ON WRITE RECOVERY

GP35 (.MGP35) is an SSA module with one entry point. It processes recovery action for a Data Alert parity status on a write command to magnetic tape. Other GEPR modules may be called to complete recovery.

PRECALLING SEQUENCE

Prior to entering GP35, the registers listed must contain the data indicated.

        X3   I/O entry address
        X5   LAL for program
        X6   Program number
        X7   Processor number

Status word 1 (bits 0-35) is stored in word 1 of the 11-word I/O entry. Bits 0-17 of status word 2 are stored in word 0, and bits 18-35 are stored in word 8.

CALLING SEQUENCE

GP35 is called from the .MGP33 SSA module.

```
    8            16
   ┌──────────────────────────────
   │.GOTO     │.MGP35,1
   │          │
```

OPERATING SYSTEM INTERACTION

The top entry in the stack is the IC and I of the last .CALL performed by GEPR. Any .EXIT references the transfer vector associated with this .CALL.

No .STEMP storage is used.

No gates are used.

ROUTINE RETURNS

All three returns provided in the previous .CALL transfer vector are used.

Return 0 (.EXIT)   Processing complete, continue searching I/O entry area
                       of interrupted program. Registers contain:

                       X3   I/O entry address
                       X5   LAL for program
                       X6   Program number
                       X7   Processor number

Return 1 (.EXIT 1)   Abort the program and then continue searching the I/O
                       entry area of interrupted program. Register contents
                       are the same as for return 0.

Return 2 (.EXIT 2)   Return status to the program and then continue searching
                       the I/O entry area of interrupted program. Register
                       contents are the same as for return 0.

POSTCALLING SEQUENCE

None.

SUPPORTING INFORMATION

Programming Method

GP35 is nonreentrant and written in floatable code.

Interrupts are not inhibited.

Storage

Internal temporary storage is used.

GP35 occupies approximately 240 core storage locations.

Other Routines Used

Operator Communication OPCOM (EP2 of .MGEPR)
Relink I/O Entry RELNK (EP3 of .MGEPR)
Magnetic Tape Recovery GP30 (EP1 of .MGP03)

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GLOSSARY

EOF	End of File
EP	Entry Point
GEPRE	Exception Processing Control (EP1 of .MGEPR)
GP01	Process Illegal Major Status module
GP02	Exchange Nonmagnetic Tape Device module
GP03	Exchange Magnetic Tape Device module
GP04	Magnetic Tape Spacing Parity Recovery module
GP05	Type Threshold/GESPEC Messages module
GP09	Card Reader Recovery 1 module
GP10	Card Reader Recovery 2 module
GP11	Paper Tape Recovery module
GP13	Printer Recovery 1 module
GP14	Printer Recovery 2 module
GP15	Card Punch Recovery
GP17	DSU200 Recovery 1 module
GP18	DSU200 Recovery 2 module
GP20	MDS200 Recovery 1 module
GP21	MDS200 Recovery 2 module
GP22	Console Recovery
GP30	Magnetic Tape Recovery
GP31	Magnetic Tape EOF/Parity on Spacing Recovery module
GP32	Reposition Magnetic Tape module
GP33	Magnetic Tape Data Alert Recovery module
GP34	Magnetic Tape EOF/Parity on Read Recovery module
GP35	Magnetic Tape Parity on Write Recovery module
HCM	Hard Core Monitor
I/O	Input/Output
IOS	Input/Output Supervisor
LAL	Lower Address Limit
MGEPR	Main GEPR module
OPCOM	Operator Communication (EP2 of .MGEPR)
RELNK	Relink I/O Entry (EP3 of .MGEPR)
SCT	System Configuration Table
SSA	Slave Service Area
STEMP	Temporary core storage

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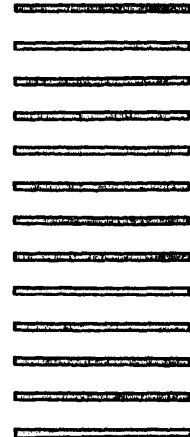Fold on two lines shown on reverse
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