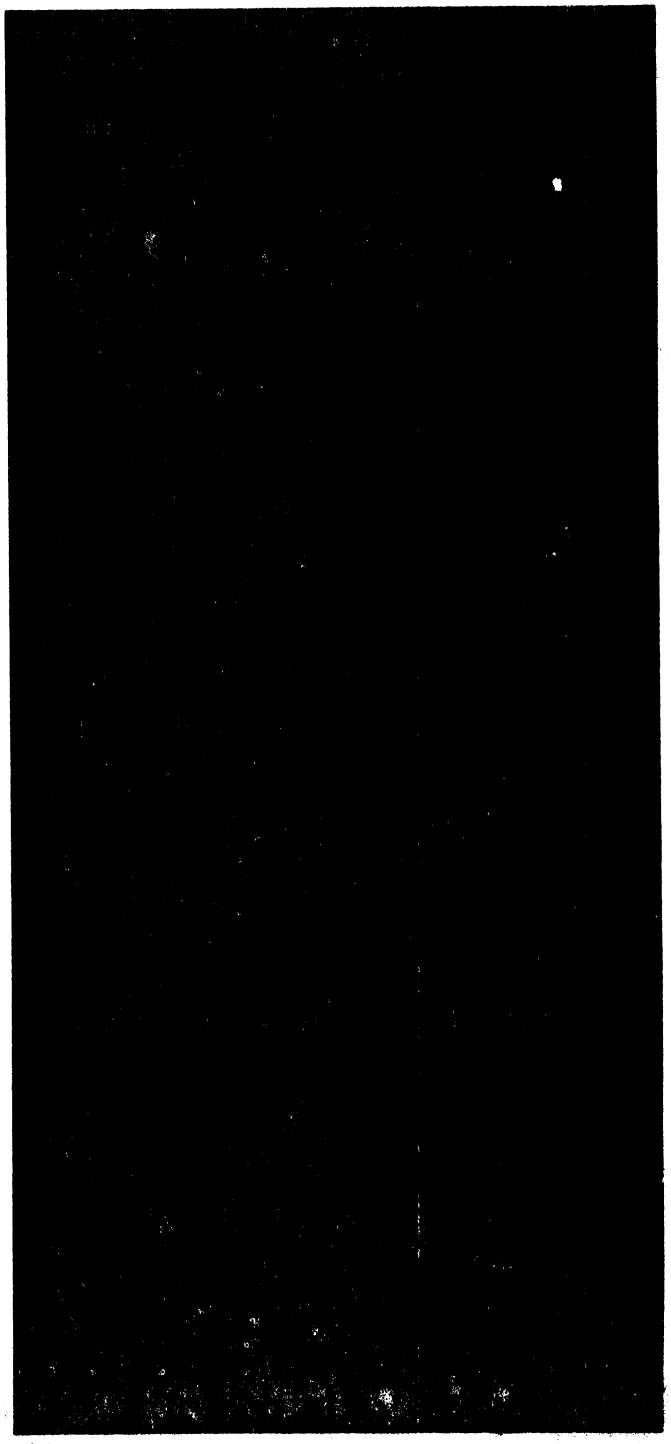
Honeywell

TIME-SHARING SYSTEM GENERAL INFORMATION MANUAL

SERIES 600/6000

GCOS

SOFTWARE



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SERIES 600/6000

GCOS

SUBJECT:

General Description of the Time-Sharing System Including the Command Language, Files, Terminal Usage and Service Subsystems.

SPECIAL INSTRUCTIONS:

This manual, Order Number BS01 Revision 1, supersedes Revision 0, dated January 1972, Addendum A dated July 1972, and Addendum B dated December 1972. Technical changes and additions from the previous edition are indicated by change bars in the margins; deletions are indicated by asterisks.

SOFTWARE SUPPORTED:

Series 600 Software Release 8.0
Series 6000 Software Release F

DATE:

July 1973

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BS01, Rev. 1

PREFACE

This manual provides overall information on the Honeywell Series 6000 Time-Sharing System. Included in this document are command definitions, time-sharing file descriptions, terminal operations, error message definitions, and service/utility subsystem descriptions.

The Time-Sharing System described in this manual is also available on the Honeywell Series 600 Information Processing System.

GCOS is a comprehensive, supervisory software system designed to provide all elements of Series 600/6000 system operations control. It is supported by comprehensive documentation and training; periodic maintenance and, where feasible, improvements are furnished for the current version of the system, provided it is not modified by the user.

File No.: 1613, 1713

BS01

FUNCTIONAL LISTING OF PUBLICATIONS
for
SERIES 600 SYSTEM

FUNCTION	APPLICABLE REFERENCE MANUAL TITLE	FORMER PUB. NO.	ORDER NO.
Series 600:			
Hardware reference:			
Series 600	System Manual	371	BM78
DATANET 355	DATANET 355 Systems Manual	1645	BS03
Operating system:			
Basic Operating System	General Comprehensive Operating Supervisor (GCOS)	1518	BR43
Control Card Formats	Control Cards Reference Manual	1688	BS19
System initialization:			
GCOS Startup	System Operating Techniques	DA10	DA10
Communications System	GRTS/355 Startup Procedures Reference Manual	1715	BJ70
Storage Subsystem Startup	DSS180 Disk Storage Subsystem Startup Procedures	DA11	DA11
Data management:			
File System	File Management Supervisor	DB54	DB54
Integrated Data Store (I-D-S)	Integrated Data Store	1565	BR69
File Processing	Indexed Sequential Processor	DA37	DA37
Multi-Access I-D-S	Multi-Access I-D-S Implementation Guide	DA80	DA80
File Input/Output	File and Record Control	1003	BN85
I-D-S Data Query System	I-D-S Data Query System Installation	DB57	DB57
I-D-S Data Query System	I-D-S Data Query System User's Guide	DB56	DB56
Program maintenance:			
Object Program	Source and Object Library Editor	1723	BJ71
System Editing	System Library Editor	1687	BS18
Test system:			
On-Line Peripheral testing	GCOS On-Line Peripheral Test System (OPTS-600)	1573	BR76
Total On-Line testing	Total On-Line Test System (TOLTS)	DA49	DA49
Language processors:			
Macro Assembly Language	Macro Assembler Program	1004	BN86
COBOL Language	COBOL Compiler	1652	BS08
COBOL Usage	COBOL User's Guide	1653	BS09
ALGOL Language	ALGOL	1657	BS11
JOVIAL Language	JOVIAL	1650	BS06
FORTRAN Language	FORTRAN	1686	BJ67
FORTRAN IV Language	FORTRAN IV	1006	BN88
DATANET 355	DATANET 355 Macro-Assembler Program	1660	BB98
Generators:			
Sorting	Sort/Merge Program	1005	BN87
Merging	Sort/Merge Program	1005	BN87
Simulators:			
DATANET 355 Simulation	DATANET 355 Simulator Reference Manual	1663	BW23

FUNCTION	APPLICABLE REFERENCE MANUAL TITLE	FORMER PUB. NO.	ORDER NO.
Series 600:			
Remote terminal system:			
DATANET 30	NPS/30 Programming Reference Manual	1558	BR68
DATANET 30/305/355	GRTS Programming Reference	DA79	DA79
Service and utility routines:			
Loader	General Loader	1008	BN90
Utility Programs	Utility	1422	BQ66
Conversion	Bulk Media Conversion	1096	BP30
System Accounting	GCOS Accounting Summary Edit Programs	1651	BS07
FORTRAN	FORTRAN Subroutine Libraries Reference Manual	1620	BR95
Controller Loader	Relocatable Loader	DA12	DA12
Service Routines	Service Routines	DA97	DA97
Software Debugging	Trace and Debug Routines	DB20	DB20
Time-sharing systems:			
Operating System	GCOS Time-Sharing System General Information	1643	BS01
System Programming	GCOS Time-Sharing Terminal/Batch Interface Facility	1642	BR99
System Programming	GCOS Time-Sharing System Programmers' Reference Manual	1514	BR39
BASIC Language	Time-Sharing BASIC	1510	BR36
FORTRAN Language	Time-Sharing FORTRAN	1566	BR70
Text Editing	Time-Sharing Text Editor	1515	BR40
Transaction processing:			
User's Procedures	Transaction Processing System User's Guide	DA82	DA82
Handbooks:			
Console Messages	Console Typewriter Messages	1477	BR09
Index	Comprehensive Index	1499	BR28
Pocket guides:			
Time-Sharing Programming	GCOS Time-Sharing System	1661	BS12
Macro Assembly Language	GMAP	1673	BS16
COBOL Language	COBOL	1689	BJ68
Control Card Formats	GCOS Control Cards & Abort Codes	1691	BJ69
Software maintenance (SMD):			
Table Definitions	GCOS Introduction & System Tables SMD	1488	BR17
Startup program	Startup (INIT) SMD	1489	BR18
Input System	System Input SMD	1490	BR19
Peripheral Allocation	Dispatcher and Peripheral Allocation SMD	1491	BR20
Core Allocation/Rollcall	Rollcall, Core Allocation and Operator Interface SMD	1492	BR21
Fault Processing	Fault Processing SMD	1493	BR22
Channel Modules	I/O Supervisor (IOS) SMD	1494	BR23
Error Processing	GCOS Exception Processing SMD	1495	BR24
Output System	Termination and System Output SMD	1496	BR25
File System Modules	File System Maintenance SMD	1497	BR26
Utility Programs	GCOS Utility Routines SMD	1498	BR27
Time-Sharing System	Time-Sharing Executive SMD	1501	BR29

Rev. 7303

FUNCTIONAL LISTING OF PUBLICATIONS
for
SERIES 6000 SYSTEM

FUNCTION	APPLICABLE REFERENCE MANUAL TITLE	FORMER PUB. NO.	ORDER NO.
	Series 6000:		
Hardware reference:			
Series 6000	Series 6000 Summary Description	DA48	DA48
DATANET 355	DATANET 355 Systems Manual	1645	BS03
Operating system:			
Basic Operating System	General Comprehensive Operating Supervisor (GCOS)	1518	BR43
Control Card Formats	Control Cards Reference Manual	1688	BS19
System initialization:			
GCOS Startup	System Startup and Operation	DA06	DA06
Communications System	GRTS/355 Startup Procedures Reference Manual	1715	BJ70
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Total On-Line Testing	Total On-Line Test System (TOLTS)	DA49	DA49
Error Analysis and Logging	Honeywell Error Analysis and Logging System	DB50	DB50
Language processors:			
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DATANET 355 Simulation	DATANET 355 Simulator Reference Manual	1663	BW23
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Control Card Formats	GCOS Control Cards and Abort Codes	1691	BJ69

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SECTION I

TIME-SHARING SYSTEM

SYSTEM DESCRIPTION

The Series 6000[1] Time-Sharing System operates under the direction of the Comprehensive Operating Supervisor (GCOS), and constitutes one dimension of an integrated, multi-dimension Series 6000 Information Processing System . Under GCOS, the multi-processing dimensions carry on their activities simultaneously, with intercommunication existing between all processing dimensions. This intercommunication feature has considerable significance for the user of a time-sharing terminal.

The Time-Sharing System (TSS) consists of a Time-Sharing Executive, a number of independent processing subsystems which operate under the Executive, and a common command language. The major subsystems of the Time-Sharing System include the following:

- ABACUS -- A desk calculator facility featuring complex algebraic capabilities such as functions, summation operations, and remembered variables.
- BASIC -- An algebraic-language compiler/executor designed for the user with numerical calculations involving relatively small quantities of data.
- CARDIN -- A facility for submitting a punch card format job at a time-sharing terminal for processing as a batch job. Job status is available on request. The SCAN subsystem complements CARDIN by providing the capability to scan the job output.
- TEXT EDITOR (and RUNOFF) -- A facility for building, maintaining, and reformatting text files.
- TSS ALGOL -- An ALGOL subsystem that gives the time-sharing user the capabilities of the ALGOL language. ALGOL is an international algorithmic language for computation, effective for stating a broad class of algorithms for numerical mathematics and for some logic processes.
- TSS JOVIAL -- A JOVIAL subsystem that provides the time-sharing user with the capabilities of the JOVIAL language processor.

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[1]The Time-Sharing System is also available on the Honeywell Series 600 Information Processing System.

- TSS FORT -- A time-sharing based Series 6000 FORTRAN subsystem. Refer to the Series 600/6000 FORTRAN manual.

- ~~TSS YFORT~~ -- A batch-based Series 6000 FORTRAN subsystem. Refer to the Series 600/6000 FORTRAN manual.

- ~~TSS TFORT~~ -- A time-sharing FORTRAN subsystem as described in the Series 600 Time-Sharing FORTRAN manual.

The following subsystems provide service and utility functions for the Time-Sharing System:

- ACCESS -- is a file system manipulation subsystem that allows the user to create, delete, and modify file system catalogs, subcatalogs, and named files. The file space, not file content, is manipulated with ACCESS.

- Command Loader -- is a default subsystem which will be invoked whenever an unrecognized command is given, either at system-selection level or in line numbered build mode. The input is assumed to be a cat/file description of an H* file and an attempt will be made to load and execute the associated program.

- FDUMP -- is a remote-terminal, word-oriented file inspection and maintenance facility for permanent files, regardless of their format. The files may have been generated in either batch, remote batch, or time-sharing environments.

- File and Record Control (TSS) -- provides File and Record Control subroutines needed for Series 6000 FORTRAN, TSS ALGOL, and TSS JOVIAL. These subroutines may also be used in COBOL or may be called directly by programs written in GMAP. These subroutines also provide automatic functions for dealing with the variety of file and device types available on the system.

- FORTRAN Translator -- permits the user to translate a Time-Sharing FORTRAN file into batch FORTRAN. The user may design and debug a program in Time-Sharing FORTRAN and then optimize its processing by converting it to batch FORTRAN.

- HELP -- permits a terminal user to obtain a detailed explanation of any system error message.

- JOUT -- provides a means for inspecting output from batch jobs. The batch job could be a CARDIN job with a disposition code of J or JOUT, a remote terminal batch job (GRTS), or a job submitted at the central site.

- Library Editor (LIBED) -- permits editing of Series 6000 FORTRAN and Time-Sharing FORTRAN subroutine library files, such files to be subsequently processed by the Time-Sharing Library Generator (TSLG) program.

- Library Generator (TSLG) -- permits a user to produce his own library file of Time-Sharing FORTRAN subroutines, complete with directory, in a form that is acceptable to the FORTRAN loader.

- LODS -- provides a debugging environment for a specified Time-Sharing subsystem by loading the Debug Trace Package with the subsystem.

- LODT -- similar to LODS, except the debugging environment is provided for a user program resident on an H* file.

- LODX -- allows the user to load and execute a program resident on an H* file.

- Media Conversion Program -- is a batch-world program that may be run either at the central computer site or entered through a remote batch terminal. It generates a standard format, time-sharing text file from a suitable card deck, or conversely, to produce a card deck from such a file.

- RBUG -- is a conversational debug routine that can be used in conjunction with CARDIN. RBUG has all of the capabilities of the DEBUG routine of the batch world, permitting the user to monitor execution of his program, insert and remove breakpoints, and alter contents of memory locations and registers dynamically, all in an interactive manner.

- SABT -- retrieves specific locations of the ABRT file for printing at the user's terminal or optionally on the central site printer. The file named ABRT must have been created by the user and entered into his Available File Table (AFT). When the system aborts the user's program, the core storage area containing the program is written to the ABRT file.

- SCAN -- provides a means of examining output of a batch job from a time-sharing terminal; the batch job may have been submitted through CARDIN, remote batch, or as a central site job with the output placed into the file system.

The primary functions of the time-sharing command language are as follows:

- Initiation of processing within a subsystem (e.g., LIST and RUN commands)
- Storage, retrieval, and purge of permanent files (e.g., SAVE and OLD commands)
- Request for operations on temporary time-sharing files (e.g., NEW and RESEQUENCE commands)
- Request for pertinent operating information (e.g., HELP and STATUS commands)
- Direction of flow of control within the subsystem (e.g., DONE and BYE commands)

The command language is described in Section II along with an explanation of time-sharing file usage.

In addition to the usual time-sharing facilities at his disposal, the Time-Sharing System user also has access to remote batch facilities. This capability is provided by a group of functionally interrelated subsystems called the Terminal/Batch Interface Facility. The time-sharing terminal user can perform the following operations:

- Access and modify a file of information created in the batch or remote batch dimension.
- Submit a job, such as a GMAP assembly and execution, to the batch dimension and inspect the output directly from a terminal.
- Establish conversational communication between a batch program and the user's terminal.
- Use an adjacent remote batch terminal as a high volume, hard copy output device, and, indirectly, as a high volume input device.

The basis for this communication between the several processing dimensions is the GCOS File System, which provides a common data base for all users of the system, and the common interface provided by GCOS. The file system provides automatic storage and retrieval of symbolically named permanent files on high capacity storage devices. These files are readily accessible in any processing mode. As a byproduct, the use of physical file volumes, such as card decks and tape reels, actually handled and stored by the user is considerably de-emphasized.

Considerable effort has been made to standardize error messages and comments for all subsystems in the Time-Sharing System, and to have error message explanations immediately available at the terminal. Identical error or exception conditions arising in different subsystems are identified by the same error message text. Those messages that are not fully self-explanatory are prefixed with a message number enclosed by carets (i.e.,<nn>), in almost all cases. This message number relates to a message explanation as given by the HELP subsystem. Upon encountering an error message that he does not fully understand, the user can call the HELP subsystem and give the error message number when the number is requested. He will then receive an explanation of the error condition and suggestions as to possible courses of remedial action.

The Time-Sharing System is completely modular and open-ended in that it is explicitly designed to allow user implemented subsystems, tailored for a specific application, to be added to the Honeywell-supplied subsystems. This implementation of subsystems can be done readily, with no disturbance to the system. Specialized debugging facilities are provided for the checkout of new subsystems simultaneous with normal time-sharing operation.

SECTION II

COMMAND LANGUAGE AND FILE USAGE

The command language controls the operation of various time-sharing subsystems. By using the command language, the user communicates with the computer throughout his session at the terminal. Some of these commands are in response to questions, e.g., NEW OR OLD; others are initiated by the user, e.g., RUN, LIST, CATALOG.

Some of the commands are recognized by all of the time-sharing subsystems. Conversely, some subsystems have a unique command language which is recognized only after the subsystem has been called into operation. The relationship between subsystems and commands is summarized in Figure 2-1.

The user's response to SYSTEM? (See Section IV) calls the specified subsystems into operation. At this level, the user can be in the build mode or the Direct Access (DAC) mode depending upon the subsystem and the command. In the build mode, the user is building or adding to a file. In the DAC mode, the command either activates specialized subsystems or initiates a conversational question/answer sequence (as in CARDIN). The RUN command, where applicable, always implies a change to the DAC mode. A number of minor subsystems have no build mode phase and go into DAC immediately upon selection. Therefore they recognize no command language.

DEFINITIONS

- Line Numbers

  Line numbers are required by the BASIC, TSS ALGOL, TSS JOVIAL, TSS FORTRAN, and CARDIN subsystems for line sequencing purposes. In the case of BASIC, line numbers are also used as statement numbers. A line number consists of one to eight numeric characters (including leading blanks). A line number may be terminated by any nonnumeric character (including a blank). The pound sign (#) is not part of the line number, although like other nonnumeric characters, it can be used to terminate a line number. It also has a variety of other uses associated with line numbers.

- Manual Mode

  In manual mode, the user must provide (type) the line numbers for each line.

- Automatic Mode

  In automatic mode, the system provides the line numbers. They are printed as the build mode request for input (asterisk) is issued. The number is written onto the collector file as a part of the statement.

- New File

  A new file is a temporary file created for the user when the NEW command is given. It is assumed the user will build a file which then may be saved, thus creating an old file. A new file is created by a (destructive) reinitialization of the current file.

- Old File

  An old file is a previously built and saved file which the user selects with the OLD command or response, naming the desired file. The old file is copied onto the current file where it is available to the user for processing or modification.

- Current File

  The current file (*SRC) is a temporary file assigned to the user, on which a new file is built or on which the selected old file is copied. Regardless of the intervening commands or subsystem selections, the current file contains the last NEW or OLD selection, with whatever modifications that may have been entered. The modifications are, therefore, temporary until the file is saved by means of the command SAVE, or RESAVE.

- Collector File

The collector file (SY**) is a temporary file assigned to each user when he logs on. All input which is not a recognizable command is gathered onto this file -- for example, numbered statements. Then, when the file becomes full or a command is typed, depending upon the subsystem, the collector file is merged with the current file and the entire current file is edited and sorted if necessary. For example, when the commands RUN, LIST, or SAVE are encountered in the BASIC subsystem, and data exists in the collector file, it is merged with the current file in sort order. (The collector file is normally transparent to the user.)

- Available File Table

An Available File Table (AFT) is provided for each Time-Sharing System user. This table holds a finite number of file names (currently set at 20 including SY** which always remains in the AFT) which are entered in the AFT when the files are initially accessed (opened). The advantages of the AFT are:

1. Files requiring passwords or long catalog/file descriptions may be referenced by file name alone, once they have been entered in the table.

2. Files used repeatedly remain readily available, thus reducing the overhead time and cost of accessing the file each time.

The following commands cause the named permanent files to be placed in the AFT.

RUN	filename(s)
LIST	filename(s)
OLD	filename(s)
SAVE/RESAVE	filename(s)
GET	filename(s)
PRINT	filename(s)
PERM	tempfile, filename

Because the AFT is of finite length, it can become full. If this happens and a command is given which requires a new filename to be placed in the AFT, the command subsystem will print an error message indicating that the AFT is full. At this point, the user must remove any unneeded files from the AFT in order to continue. The STATUS FILES command produces a listing of all of the user's files in the AFT. The REMOVE command can be used to remove specified files from the AFT. The files are not purged or altered in any way; only the name is removed from the AFT and the file is set not-busy. All files (except SY** and *SRC) may be removed by a REMOVE CLEARFILES.

FILE DESIGNATION

The designation of permanent files in the following discussion of commands is specified in the following formats:

1. filename — where the filename only is required.
2. filedescr — where the full file description may be used, in any of the following formats:
   a. filename
   b. filename$password
   c. userid/catalog$password...
      /catalog$password/filename$password

If a required password is stored incorrectly or not given, the system will explicitly ask for the proper password.

*

If the file was previously opened (e.g., with a GET), only the filename need be given regardless of its full description. If the requested file is not already open, it must emanate directly from the user's master catalog (quick-access type file) in order for format a to be applicable.

As a general rule, use of formats b or c will result in removing the file from the Available File Table (AFT) before attempting to access it, if necessary.

Where desired permissions and/or alternate name are applicable, they are specified in the following format:

filedescr,permissions

or

filedescr"altname",permissions

Where: Altname may be a valid file name (one to eight characters), enclosed in double quote signs.

permissions may be any one of the following:

READ (R)

WRITE (W)

EXECUTE (E)

APPEND (A)

READ,WRITE (R,W)

READ,APPEND (R,A)

Where a desired permissions specification is applicable, a null permissions field implies READ and WRITE permissions; i.e., the default interpretation for desired permissions is R,W.

If a file segment specification, of the form (i,j) where i and j are line numbers, is given in addition to desired permissions and/or alternate name, it must appear last in the specification string; e.g.:

filedescr,permissions(i,j)

or

filedescr"altname",permissions(i,j)

Examples:

```
OLD     FIL1$GOGO,R

SAVE    /CAT1/CAT2$MAYI/FIL0$HERE

LIST    FILE2$HOHO(1,100)

PURGE   FIL3$ARIZ;FIL4;FIL5$SUN

GET     JJONES/DATACAT/BATCHWRLDFIL"INFILE"
```

FILE NAMES, CATALOG NAMES, AND PASSWORDS

File names for time-sharing usage must be eight characters or less in length, and may be composed of alphanumerics, periods, and minus signs. Catalog names and passwords may be up to 12 characters in length, and composed of the same characters as file names.

If a batch file with a name longer than eight characters (12 characters maximum) is to be accessed, it must be given an alternate name (altname) from one to eight characters in length. The renaming is local and temporary. An altname may also be used to temporarily rename one or more of several duplicately named time-sharing files the user wishes to have accessed concurrently. Permanent files may be duplicately named so long as they emanate from different catalogs or subcatalogs, but if they are used, they must be appended with an altname.

COMMANDS

Following is a description of the Time-Sharing System commands. Although the command words are spelled out completely in the following descriptions, in general usage those exceeding four characters may be shortened to the first four characters (e.g., RESEQUENCE or RESE). Refer to Figure 2-1, Command Applicability by Subsystem, for applications of the commands to particular subsystems.

- ABC

  Calls the ABACUS subsystem for algebraic-expression evaluation.

- ACCESS

  Calls the ACCESS subsystem for time-sharing interface with the file system.

- APRINT

  Calls the APRINT subsystem for printing either standard time-sharing ASCII files or files resulting from a RUNOFF/REFORM process on printers equipped with an ASCII print train.

- ASCASC filedescr 1; filedescr 2

  This command, issued under Series 6000 FORTRAN and other time-sharing language systems, causes the translation of a time-sharing format ASCII file to a standard system format ASCII file or vice versa. In both translations, file 1 is converted to the format required in file 2. If file 1 is in time-sharing ASCII format record media code 5), the characters of the file are read and converted to the word-oriented standard system ASCII format for file 2. File 2 may then be used as input data for the language system. If file 1 is in standard system ASCII format (record media code 6), the words in the file are read and converted to the character-oriented time-sharing ASCII format for file 2. File 2 may then be listed at a terminal. The question and answer sequences for this command depend on the format of the file to be converted. For information about record media codes see the Series 600/6000 Time-Sharing System Programmers' Reference Manual, Section VI.

- ASCBCD ascfil;bcdfil

  Under CARDIN, the ASCII time-sharing file specified by ascfil is converted to a standard-system-format BCD file on the permanent file specified by bcdfil, following the question/answer sequence that is initiated by this command if the former file does not contain first line reformatting information. Both ascfil and bcdfil may be simply a file name or a full file description, as required. The ascfil field may specify also the current file by an asterisk.

- AUTOMATIC

  1. AUTOMATIC

     Causes the automatic creation of line numbers, by the system, at the point at which the automatic mode is entered (or re-entered), with line numbers initially starting at 010 and incrementing by 10 (or, on re-entry, resuming where the previous automatic numbering left off). These line numbers appear in the terminal copy, and are written in the file, just as though the user had typed them.

  2. AUTOMATIC n,m

     Causes the automatic creation of line numbers, as above, but starting with line number n and incrementing by m.

3. AUTOMATIC ,m
   AUTOMATIC n,

   Causes automatic creation of line numbers beginning at 10 and incrementing by m, or beginning at n and incrementing by 10 (on re-entry, the line numbering resumes where it left off).

Normally the line number will be followed by a blank. Any nonblank, nonnumeric character affixed to the end of the command AUTOMATIC will cause the blank to be suppressed. For example: AUTONB or AUTOMATICX.

No commands are recognized while in the automatic mode. The automatic mode is cancelled by giving a carriage return immediately following the issuance of an asterisk and line number by the system. The user may not use character delete (@) or line delete (CTRL X) to delete characters associated with the generated line number or its associated blank.

- BCDASC bcdfil; ascfil

Under CARDIN, the standard-system-format BCD file (permanent) specified by bcdfil is converted to an ASCII time-sharing file on the permanent file specified by ascfil, following the question/answer sequence that is initiated by this command. Both bcdfil and ascfil may be simply a file name or a full file description, as required. The ascfil field may also specify the current file by an asterisk.

- BPUNCH ascfil
- BPRINT ascfil

Under CARDIN, the contents of the ASCII time-sharing file specified by ascfil are converted to BCD and is punched or printed, respectively, at the central computer site, following a question/answer sequence initiated by these commands if the file does not contain first line reformatting information. These commands allow the user to create hard copy backup (cards) for his TSS files, and to list long files on a high speed printer. Ascfil may be simply a file name or a full file description, as required. The ascfil field may also specify the current file by an asterisk.

Since a batch BMC job is spawned by these commands, the batch $ IDENT card information is requested by the subsystem. These jobs cannot be aborted by the JABT command.

- BYE

Causes the computation of the user's system usage charges during the session and disconnects the terminal.

Depending upon the last selected subsystem, the AFT may first be scanned for user's temporary files. A message is issued as to the number of temporary files, then the user is queried as to the disposition. Each filename is printed followed by a question mark. The user may respond as follows:

1. carriage return - implies the file is to be released; pass to next file.

2. NONE - implies all of the succeeding files are to be released.

3. SAVE filedescr - specifies that the file is to be saved on the permanent file described by filedescr. (Refer to the PERM command.)

- CATALOG

1. CATALOG

   Lists all catalog and file names which emanate from the user's own master catalog.

2. CATALOG #LIB

   Lists all file names in the library.

3. CATALOG #CMD

   Lists catalog and file names emanating from the command library (CMDLIB).

4. CATALOG filename

   Prints a list of the attributes of the file specified. The file must emanate from the user's catalog.

5. CATALOG,x(date,n,R),FIRST/name/
   or
   CATALOG,x(date)n,R,FIRST/name/

   Allows limited listing of catalog and file names. Optional fields are:

   x, to specify whether the date is date created (C), date of last access (A), or last date the file was changed (L)
   date, in the form mm-dd-yy is required when C, A, or L is requested.
   n, number of files to be listed, starting from the most recent to oldest
   R, reverse the list before printing.

   Any option may be omitted and the order given is immaterial. The FIRST/name/ allows the cat/file list to start at the specified name.

6. CATALOG /catalog1/catalog2

   Prints a list of all catalog and file names which emanate from the specified catalog (catalog2 in this case).

7. CATALOG /catalog1/catalog2,x(date,n,R),FIRST/name/

   Permits specifying a starting date from which to begin printing catalog and file names from a specific catalog. As with CATALOG,x(date,n,R), x may be C, A, or L; date in the form mm-dd-yy; n, number to print; and R to reverse the order of printing. The FIRST/name/ allows the cat/file list to start at the specified name.

8. CATALOG /catalog1/catalog2*

   Prints a detailed list of catalog2's attributes.

Passwords need not be given in these catalog commands. However, CATALOG applies only to strings which originate from the user's (own) master catalog, the library (#LIB) or the command library (#CMD).

- DELETE

1. DELETE a,b,c,d,...

2. DELETE a-b,c-d

   Lines numbered a through b and c through d are deleted from the current file.

3. DELETE a,b,c-d,e,f-g,...

   Lines numbered a,b,c through d,e, and f through g are deleted from the current file.

4. DELETE -n

   Acceptable only as first argument, since it implies deletion of lines from beginning of current file to line n.

5. DELETE n-

   Acceptable only as last argument, since it implies deletion of lines n through end of current file.

6. DELETE;*

   Causes deletion of all lines in current file.

- DONE

Causes return from the selected subsystem to the SYSTEM? level.

- EDITOR

  Causes the Text Editor subsystem to be called into use. Following the READY message, the user may exercise any of the text editing capabilities available in the Text Editor subsystem. The current file is the recipient of any modification.

- ERASE filedescr 1;filedescr 2;...;filedescr n

  Erases (overwrites with zeros) the file space associated with the specified file(s), but does not release the file(s) from the file system. (Refer to PURGE and RELEASE commands.)

- FDUMP

  Calls the FDUMP subsystem for file dumping and correction.

- GET filedescr 1;filedescr 2;...;filedescr n
  (permissions and altname applicable)

  The permanent file(s) designated by filedescr i will be accessed and the filename(s) placed in the AFT. This is a simple means by which common data files emanating from other users' master catalogs may be opened. A linked file can be accessed in random mode by specifying MODE/RANDOM/, or more simply, M/R/ following the file description.

- HELP

  Calls the HELP subsystem to obtain an error message explanation. For example, if the error message

  009-SYSTEM UNKNOWN

  were issued, the user could call HELP and respond to the request

  PLEASE ENTER MESSAGE NUMBER-

  with 9, if he desired an error message explanation.

- HOLD

  Prevents any console or master user issued warning or information message from appearing at the terminal, either in printer or paper tape output, until a subsequent SEND command is given. The user assumes responsibility for any warnings he may miss while the HOLD is in effect. This command is used primarily during output of listings for display or reproduction purposes. (Refer to the SEND command.)

- JABT snumb (Job Abort)

  Under CARDIN, causes the batch job specified by snumb (and submitted from the same terminal) to be aborted, with an X1 abort code assigned. Only jobs containing a $USERID control card belonging to the requesting user can be aborted. Also jobs spawned by either BPRINT or BPUNCH cannot be aborted.

- JDAC name (Job Direct Access)

  Under CARDIN or at the subsystem level, allows a time-sharing terminal user to establish Direct Access Communication (DAC) with a slave program running in the system. The DAC is initiated at the subsystem level by

  ```
  SYSTEM? JDAC name
  ```

  Under the CARDIN subsystem JDAC is initiated at the command level by

  ```
  SYSTEM? CARDIN
  OLD OR NEW-NEW
  READY
  *JDAC name
  ```

  Name refers to the name of a user supplied DAC slave program (e.g., the Time-Sharing System is a DAC slave program). If the program name is not provided in the initial call to JDAC, the system will request a program name. When the direct access program terminates, the return is to the appropriate level (SYSTEM? or build input mode).

- JOUT snumb

  Permits manipulation, from a time-sharing terminal (via a call to JOUT subsystem), of the output of certain types of batch jobs.

- JSTS snumb (Job Status)

  Under CARDIN, BASIC, and FORTRAN, causes the current batch processing status of the job specified by snumb (e.g., 0005T) to be printed at the terminal, in plain text.

- LEADER
- LEADER title

Causes a title to be punched in bold, block letters in the paper tape and then list the current file. If the first form is used, the title will be requested. In either form, the date in the international standard format will be punched in block letters after the title has been punched. Although only upper case characters are punched, the title can be composed of upper or lower case alphabetics, numerics and special characters except the commercial at sign. After the title and date has been punched, a carriage return, line feed and eight rub-outs will be punched before the contents of current file (*SRC) are listed. After listing the current file, another carriage return, line feed, an X-OFF character and eight rub-outs will be punched.

- LENGTH

1. LENGTH

   Generates a report of the content length of the current file, in terms of 320-word blocks.

2. LENGTH filedescr

   Generates a report of the type, current size, and content length of the permanent file specified by filedescr. Size and content length are given in units of 320-word blocks (LLINKS). If the file is sequential and not ASCII, the media code is given and will be that of the first record of the first LLINK.

- LIB filename

File filename from the library becomes the current file.

- LINELENGTHn

Used to increase the length of an input line from a terminal. Where n may be 80 through 160.

NOTE: LINE or LINELENGTH followed by a carriage return will set the linelength to 80 characters.

- LIST

1. LIST

   Lists the current file on the terminal.

2. LIST i,j

Lists all lines of the current file whose line numbers are greater than or equal to i and less than or equal to j. In the case of concatenated files where no sort or resequence has been performed, multiple sets of lines numbered between i and j may or may not be listed, if such exist. Either i or j may be omitted. Line numbers 1 or 99999999 respectively will be assumed. If j is omitted, the comma may also be omitted.

3. LIST filedescr (permissions and altname applicable)

Lists the file specified by filedescr on the terminal, without altering the current file. Filedescr must include at least one alpha character if it consists of filename only.

4. LIST filedescr(i,j) 1;...;filedescr(i,j) n
(permissions and altname applicable)

Adjoins and lists the specified files or file-segments on the terminal. The current file is not altered. The current file may be included in the list under the name *. If the list is greater than one line in length, it may be continued on the next line provided the last nonblank character on the first line is a (leading) delimiter.

5. LISTH

Lists the file with a header (date and time) printed at the top of the listing. LIST formats (1), (2), (3), and (4) may all use the LISTH form instead of LIST.

6. LISTEnnn (no intervening blanks allowed)

List the file(s) as specified by the operand; but with all lines to be "broken" or "folded" at the character position (nnn) specified. Listing of the line will be continued on succeeding line(s). If nnn is omitted, the value 72 is assumed. LIST formats (2) through (4) may also use the LISTEnnn form in place of LIST. Files containing overlength lines (records) may be listed in this manner.

7. LISTS $n_1,n_2,n_3,\ldots,n_i$

List only the specified line(s) n from the current file.

8. LIST 99999999

If LIST is given with a line number greater than the last line number on the current file, then the last line number of the current file will be printed.

9. LISTL

   List the last line number of the current file. A short form of LIST 99999999. Does not require a line number.

- LUCID

  This is used instead of the TAPE command for non-ASCII paper tape input. The input is stored on the time-sharing TAP* file as unaltered eight-bit codes. The TAP* file is left open (unedited in the user's AFT). When a pause greater than one second stops the tape read, the system returns to the subsystem selection (SYSTEM?) level. This command does not function when data communication is via a Low Speed Line Adapter (LSLA) on a DATANET 355 Front-End Network Processor. In the EDITOR subsystem, this command takes the form #LUCID. Return is to SYSTEM? level.

- NEW

  1. NEW

     A new file (empty current file) is started. (The system will return to the BUILD mode.) The current file is cleared of any prior content.

  2. NEWP filedescr (permissions applicable)

     The named file is created by the NEWP command with the attributes specified and is opened with an alternate name of *SRC. If the named file already exists, an error message is sent to the user. This file remains the user's current file until another form of the OLD or the NEW command is given.

  3. NEWP# filedescr (permission applicable)

     Execution is the same as for NEWP except that the created file remains the user's current file until log-off, or until another OLDP, OLDP#, NEWP, or NEWP# command is given. The normal OLD or NEW commands use this file (i.e. the file specified by OLDP# or NEWP#) as the current file.

- NEWUSER

  1. NEWUSER

     Causes the computation of the user's system usage charges during the session and initiates a new log-on sequence.

2. NEWUSER account number

Causes the computation of charges for user's previous account number, this account number to be closed, and the new account number specified to replace the old. Accounting data is reinitialized as for a new user but the log-on sequence is bypassed; i.e., the previous user-id and password are assumed.

- OLD

1. OLD filedescr (permissions and altname applicable)

File filedescr becomes the current file.

2. OLD filedescr(i,j) (permissions and altname applicable)

Lines i and j of file filedescr become the current file. Filedescr must be a line-numbered file.

3. OLD $f(i,j)_1$;...;$f(i,j)_n$ (permissions and altname applicable)

The n files or file segments are adjoined in the order listed and become the current file, where f is a filedescr. Adjoining of BASIC files should be done with caution (sequence numbers are also statement numbers). The asterisk designating the contents of the current file (or segment thereof) may appear as a filedescr anywhere in the file list.

Note that these files or segments are concatenated on the current file and resequencing may be required for satisfactory operation in line-number dependent systems. Sorting or resequencing is not automatic.

4. OLD $f(i,j)_1$:$f(i,j)_2$:...:$f(i,j)_n$ (permissions and altname applicable)

The n files or file segments are merged by line numbers, and become the current file, where f is a filedescr (colon-separated). If duplicately numbered statements appear in two or more files, each such statement appears in the order specified by the file list. The asterisk designating the contents of the current file (or segment thereof) may appear as a filedescr anywhere in the file list.

5. OLD $f(i,j)_1$;$f(i,j)_2$:$f(i,j)_3$;...:$f(i,j)_n$ (permissions and altname applicable)

A combination of forms (3) and (4). Concatenation or merging is performed in the order (from left to right) indicated by the file list.

If the file list is too long for one line, the OLD subsystem will request more input when a delimiter is the last nonblank character before the carriage return.

6. OLDP filedescr (permissions applicable)

   The specified permanent file is accessed with an alternate name of *SRC and becomes the current file. This file is the user's current file until another form of the OLD or NEW command is given. The contents of the file will always be checked or verified for Time-Sharing System format.

7. OLDP# filedescr (permissions applicable)

   Execution is the same as for the OLDP command, except that this file remains the user's current file until log-off, or until another OLDP, OLDP#, NEWP, or NEWP# command is given. The normal OLD or NEW commands use this file (i.e. the file specified by OLDP# or NEWP#) as the current file. OLDP# can be cancelled by REMOVE *SRC.

NOTE: The OLDN subsystem is called in when the commands OLD, NEW or LIB (normal forms) are given by the user. If a NEWP or OLDP command was issued and then one of the normal forms was typed in, OLDN will deaccess the permanent *SRC file and assign a new temporary *SRC file to the user. The permanent file remains in the user's catalog until he releases it.

If a NEWP# or OLDP# command was issued and then one of the normal forms was typed in, OLDN will retain the permanent file as *SRC. If a NEWP or OLDP was typed in instead of the normal form, the permanent *SRC will be deaccessed, and a new permanent file with the alternate name *SRC will be created and/or accessed.

If a NEWP# or OLDP# command was issued and then followed by another NEWP# or OLDP# command, the OLDN subsystem will deaccess the present *SRC file and then create and/or access the newly specified *SRC file.

Merging and concatenation are not allowed with OLDP, NEWP, OLDP#, and NEWP#.

- PARITY/NOPARITY

  1. PARITY

     The data sent from the computer system to a terminal in direct access mode is normally in seven-bit, even parity code. The PARITY command is only used to return to this mode of operation from a NOPARITY mode of operation.

2. When the NOPARITY (NOPA) command is given, subsystem output sent from the computer system to a terminal in direct access mode is in eight-bit, parity independent code. This command may be used at the system level or at the command level in BASIC, FORTRAN and CARDIN. The NOPARITY (NOPA) command can only be used with a Type 4 terminal (teleprinter).

   Note: Error messages and messages sent by the TSS Executive will be sent with even-parity even though the command NOPARITY was issued by the terminal operator.

- PERM tempfile;filedescr

  The temporary file tempfile is copied onto the permanent file described by filedescr. If the file does not already exist, it will be created with the permissions and/or password accompanying the file description. The temporary file name is removed from the AFT; however the permanent file will not be accessed.

- PRINT

  Under CARDIN, print at the terminal all or any part of a source file or concatenation of source files, reformatting the file by use of format options and/or tab characters, if desired.

  1. PRINT

     The entire current file is reformatted and printed.

  2. PRINT filedescr(i,j)$_1$;filedescr(i,j)$_2$;...; filedescr(i,j)$_n$

     The specified file(s) or file-segment(s) are adjoined, reformatted, and printed. The current file may be included in the string of files by the name *. The current file, however, is not affected. If the list is longer than one line in length, it may be continued on the next line if the last nonblank character of the line is a leading delimiter.

     Following a PRINT command, if the named file does not carry reformatting information, a series of questions are asked of the terminal user. Responses to CARD FORMAT? are:

     MOVE - implies line numbers are present and are to be moved to the sequence number field and printed.

     STRIP - implies line numbers are present and are not to be printed.

     ASIS - implies line numbers are not present in the file, or that the file is to be printed "as is", except for tab spacing.

NORM - implies MOVE option and the standard tab character and settings:

:,8,16,32,73

If the response was not NORM, the question TAB CHARACTER AND SETTINGS? is asked. Responses are NORM or a series of tab characters and settings of the form:

tab ,setting ,setting ...;tab ,setting ,setting ...

- PURGE filedescr-1;filedescr-2;...;filedescr-n

  Releases the specified file(s) from the file system and overwrites the released file space. (Refer to RELEASE and ERASE COMMANDS.)

- RECOVER filedescr

  The permanent file designated by filename is created and/or accessed, and it becomes the input collector file emanating from the user's master catalog. Permissions may be specified and will be attached to the created file. They are not permitted if the file already exists. (The command is #RECOVER when given in the EDITOR subsystem.)

- #RECOVER filedescr

  The permanent file designated by filename is created and/or accessed, and it becomes the input collector file emanating from the user's master catalog. This command is only applicable to the EDITOR subsystem.

- RELEASE filedescr-1;filedescr-2;...;filedescr-n

  Releases the specified file(s) from the file system, but without overwriting the associated file space. (Refer to PURGE and ERASE commands.)

- REMOVE filename-1;filename-2;...;filename-n

  Removes the specified file name(s) from the AFT, i.e., deaccesses the named file(s). Names may include system files (e.g., *SRC, *ED1, etc.).

- REMOVE CLEARFILES (PERMFILES or TEMPFILES)

  The CLEARFILES option removes all files from the AFT. The PERMFILES or TEMPFILES may be used to remove all permanent or temporary files from the AFT, respectively. The *SRC (current file) and SY** (collector file) files are never removed by any of the three selections.

- RESAVE filedescr-1; filedescr-2;...;filedescr-n

  The contents of the current file are saved on the previously existing permanent file(s) specified by filedescr i, replacing any prior content thereof. Sorting by line number is or is not done according to subsystem requirements. (Refer to the SAVE command.)

- RESEQUENCE

  1. RESEQUENCE

     The line numbers of the current file are resequenced. The resequencing begins with line number 10 and continues in increments of 10. If BASIC is the selected subsystem, the file is resequenced and statement number references in the program are modified correspondingly (GOTO, GOSUB, IF, ON, Print USING). If FORTRAN or CARDIN was selected, statement number references are not affected.

  2. RESEQUENCE n,m,x-y

     The line numbers of the current file are resequenced and modifications made according to the subsystem selection. The resequencing begins with line number n and continues in increments of m.

     x and y are specified only if partial resequencing is desired. x gives the starting point and y the ending point of resequencing, inclusive. A null x field (i.e., -y) specifies from beginning of file to line y, and a null y field (i.e., x-) specifies from line x to the end of file.

     In general, any blanks preceding a line number are stripped off. Unnumbered lines are accepted, except under the BASIC subsystem, and will have line numbers added, as implied or specified in the command. Care should be taken in resequencing concatenated BASIC files as line numbers are also statement numbers, and statement references, after resequencing, may become invalid.

  3. RESEX n,m

     Line numbers are inserted at the beginning of each line in the current file, regardless of whether or not line numbers already exist. The numbering begins with n and increments by m, or optionally, begins with 10 and increments by 10, if n,m are not specified. If the first character of the existing line is a numeric, a blank is inserted following the generated line number. If the first character of the existing line is not numeric, no such blank is inserted.

  4. RESE# n,m

     Line numbers are inserted at the beginning of each line in the current file, even if line numbers already exist. This numbering begins with n and increments by m, or optionally begins with 10 and increments by 10 if n, m are not specified. If the first character of the existing line is a numeric, a pound sign (#) is inserted following the generated line number. If the first character of the existing line is not numeric, the pound sign is not inserted.

CAUTION: When resequencing, or performing a partial resequence, it is possible to produce files with line numbers out of order. This may be caused by incorrect parameters on partial resequence or when new line numbers exceed eight digits (in non BASIC files). When line numbers are too large, a warning is given. In either case, recovery may be made by resequencing the total file using a smaller beginning line number or a smaller increment.

- ROLLBACK filedescr

  The named permanent file is accessed with read and write permission and becomes the input collector file for the user. Any data lines previously collected on the file will be merged with the current file at this time and the first and last such lines of recovered data will be shown to the user.

- #ROLLBACK filedescr

  Same as ROLLBACK, but applicable only in Text Editor build mode. Note that the recovered data will be appended to the current file, instead of merged.

- RUN

  1. RUN

     Executes the selected subsystem. The source input is the current file. (If BASIC is the subsystem selection and any variation of the RUN command is given, only the current file is executed; i.e., any information appended after the RUN command is ignored.)

  2. Series 6000 FORTRAN Run Command

     Under the FORT system, the current file is compiled and executed by the time-sharing based Series 6000 FORTRAN; under the YFORT system, it is the batch-based Series 6000 FORTRAN. Refer to the Series 6000 FORTRAN manual for further FORTRAN RUN options.

  3. Time-Sharing FORTRAN Run Command

     Time-Sharing FORTRAN (TFORT) source files are maintained in type 6 ASCII format. The RUN command causes the automatic conversion to type 5 for compilation only. For complete details, refer to the Series 600 Time-Sharing FORTRAN manual.

  4. RUNH

     Executes the selected subsystem and prints a header (date and time) at the top of the program execution report.

- SABT

  The Scan Abort (SABT) subsystem allows the user to scan the ABRT file by snapping portions of the file at the terminal. This file is established by the user so that a subsystem that is aborted may be copied on it. The abort may be caused by a uncorrectable fault in a subsystem or by execution of a DRL ABORT.

- SAVE filedescr-1,permissions,size;
  filedescr-2,permissions,size,....filedescr-n

  The current file is saved on one or more new permanent file(s) defined by filedescr i. Sorting by line number is or is not done, according to subsystem requirements. The file(s) specified are created with no general permissions or with the permissions specified in the SAVE command. A maximum size can be specified in the command by typing in the word SIZE or the letter S followed by the numeric size value. If no size is specified, the subsystem will determine an initial size based on the program size. Size and permissions may be interchanged.

- SCAN filedescr (permissions and altname applicable)

  Under CARDIN, the SCAN subsystem -- batch-output scanner -- is initiated to scan the file described by filedescr. The desired functions are defined by the question/answer sequence that follows the use of this command.

- SEND

  Cancels the effect of a previous HOLD command, and causes the last message previously withheld to appear at the terminal. (Refer to the HOLD command.)

- STATUS

  1. STATUS

     Gives station code followed by a list of the user's status as to processor time used, number of file I/O's, and characters output to the terminal; and lists the files that are open.

  2. STATUS FILES

     Lists only the names of the user's open files.

- SYSTEM name

  Exits from the current subsystem and calls the named subsystem, or, if no name is given, returns control to the subsystem-selection level (SYSTEM?). This command permits the user to bypass the normal DONE--SYSTEM? sequence.

- TAPE

  Builds or extends a current file with input from paper tape. Neither line feeds nor rubouts are supplied by the Time-Sharing System. (The command is #TAPE when given in the EDITOR subsystem.)

- #TAPE

  Builds or extends a current file with input from paper tape. Neither line feeds nor rubouts are supplied by the Time-Sharing System. This command is only applicable to the EDITOR subsystem.

Command	BASIC	FORTRAN	CARDIN	EDITOR	JOVIAL	ALGOL
ABC	Yes	Yes	Yes	Yes*	Yes	Yes
ACCESS	Yes	Yes	Yes	Yes*	Yes	Yes
APRINT		Yes	Yes	Yes*	Yes	Yes
ASCASC	Yes	Yes	Yes	Yes*	Yes	Yes
ASCBCD		Yes	Yes	Yes*	Yes	Yes
**AUTOMATIC	Yes	Yes	Yes	Yes*	Yes	Yes
BCDASC		Yes	Yes	Yes*	Yes	Yes
BPRINT		Yes	Yes	Yes*	Yes	Yes
BPUNCH		Yes	Yes	Yes*	Yes	Yes
BYE	Yes	Yes	Yes	Yes*	Yes	Yes
CATALOG	Yes	Yes	Yes	Yes*	Yes	Yes
DELETE	Yes	Yes	Yes	Yes*	Yes	Yes
**DONE	Yes	Yes	Yes	Yes*	Yes	Yes
EDIT	Yes	Yes	Yes		Yes	Yes
ERASE	Yes	Yes	Yes	Yes*	Yes	Yes
FDUMP		Yes	Yes	Yes*	Yes	Yes
GET	Yes	Yes	Yes	Yes*	Yes	Yes
HELP	Yes	Yes	Yes	Yes*	Yes	Yes
HOLD	Yes	Yes	Yes	Yes*	Yes	Yes
JABT		Yes	Yes	Yes*	Yes	Yes
JDAC			Yes	Yes*		
JOUT		Yes	Yes	Yes*	Yes	Yes
JSTS	Yes	Yes	Yes	Yes*	Yes	Yes
LEADER	Yes	Yes	Yes	Yes*	Yes	Yes
LENGTH	Yes	Yes	Yes	Yes*	Yes	Yes
**LIB	Yes	Yes	Yes	Yes*	Yes	Yes
LINELENGTH	Yes	Yes	Yes	Yes*	Yes	Yes
LIST	Yes	Yes	Yes	Yes*	Yes	Yes
**LUCID	Yes	Yes	Yes	Yes*	Yes	Yes
**#LUCID				Yes		
**NEW	Yes	Yes	Yes		Yes	Yes
NEWUSER	Yes	Yes	Yes	Yes*	Yes	Yes
NOPARITY	Yes	Yes	Yes	Yes*	Yes	Yes
**OLD	Yes	Yes	Yes	Yes*	Yes	Yes
PARITY	Yes	Yes	Yes	Yes*	Yes	Yes
PERM	Yes	Yes	Yes	Yes*	Yes	Yes
PRINT		Yes	Yes	Yes*	Yes	Yes
PURGE	Yes	Yes	Yes	Yes*	Yes	Yes
RECOVER	Yes	Yes	Yes	Yes*	Yes	Yes
**#RECOVER				Yes		
RELEASE	Yes	Yes	Yes	Yes*	Yes	Yes
REMOVE	Yes	Yes	Yes	Yes*	Yes	Yes
RESAVE	Yes	Yes	Yes	Yes*	Yes	Yes
**RESEQUENCE	Yes	Yes	Yes		Yes	Yes
**ROLLBACK	Yes	Yes	Yes	Yes*	Yes	Yes
**#ROLLBACK				Yes		
**RUN	Yes	Yes	Yes		Yes	Yes
RUNOFF						
SAVE	Yes	Yes	Yes	Yes*	Yes	Yes
SCAN		Yes	Yes	Yes*	Yes	Yes
SEND	Yes	Yes	Yes	Yes*	Yes	Yes
STATUS	Yes	Yes	Yes	Yes*	Yes	Yes
**SYSTEM	Yes	Yes	Yes		Yes	Yes
**TAPE	Yes	Yes	Yes		Yes	Yes
**#TAPE				Yes		

* Command is in direct-mode.
** Not applicable at SYSTEM level.

Figure 2-1. Command Applicability by Subsystem.

SECTION III

TIME-SHARING ERROR MESSAGES EXPLANATION

Error messages generated by the various time-sharing subsystems and by the Time-Sharing System Executive program fall into two classes (from the viewpoint of explanations):

- Error messages that are considered self-explanatory.
- Error messages that, due to the need for reasonable conciseness in conversational messages, may require further explanation for a given user the first few times that the message is encountered.

All messages falling into the second class are prefixed by a message number, usually enclosed by carets (i.e., <nn> , or in some cases <nn<). Further explanation of these messages is immediately available at the terminal through the HELP subsystem. HELP may be called for either at the subsystem-selection level (SYSTEM?) or at the command level under most major subsystems.

HELP message explanations are listed below, indexed under the associated error message(s). These error messages, in turn, fall into two categories from the viewpoint of origin and applicability.

- Error messages originating from the time-sharing Executive, most of which can be received only by an implementor of a new, not fully debugged, time-sharing subsystem during its checkout. These messages are numbered 1 through 49.
- Error messages originating from the various time-sharing subsystems, which would be received by a user of the system. These messages indicate faulty system usage or system malfunction, and are numbered beginning with 50.

NOTE: On some types of terminals, the carets enclosing the error message number are reproduced as parentheses.

In the following descriptions, generated error messages and their associated HELP subsystem error message explanations are listed by message numbers.

001 - INCORRECT PRIMITIVE

AN ILLEGAL PRIMITIVE HAS OCCURRED IN A COMMAND LIST. CHECK THE COMMAND LIST POINTER IN THE PROGRAM DESCRIPTOR AND THE COMMAND LIST FORMAT AND PRIMITIVES.

002 - BAD FILE I/O COMMAND

IN THE CALLING SEQUENCE OF A DRL FOR FILE I/O, THE SEEK, READ or WRITE COMMAND IS INCORRECT. CHECK THE SUBSYSTEM CODE.

003 - BAD DCW

IN THE CALLING SEQUENCE OF A DRL FOR FILE I/O, A DCW IS INCORRECT. CHECK THE SUBSYSTEM CODE.

004 - location ADDRESS OUT OF RANGE

THE ADDRESS OF A DRL ARGUMENT IS OUTSIDE THE RANGE OF THE PROGRAM. THE NUMBER GIVEN IN THE COMMENT IS THE RETURN FROM THE DERAIL. CHECK THE SUBSYSTEM CODE FOR IMPROPER INITIALIZATION.

005 - BAD DRL CODE

THE ADDRESS OF A DRL CODE IS OUT OF THE RANGE OF USABLE CODES OR ILLEGAL FOR THIS SUBSYSTEM. CHECK THE SUBSYSTEM CODE.

006 - LEVEL OF CONTROL TOO DEEP

THE MAXIMUM NUMBER OF CALLS IN THE PROGRAM STACK OR THE CALLSS STACK HAS BEEN EXCEEDED. IN THE CASE OF THE PROGRAM STACK, THIS MEANS THAT THE SELECTED SYSTEMS PRIMITIVE LIST CONTAINED A CALLP, AND IN TURN, THAT SUBSYSTEMS PRIMITIVE LIST CONTAINED A CALLP, ETC. UNTIL THE LENGTH OF THE PROGRAM STACK WAS EXCEEDED. LIKEWISE, IN THE CASE OF THE CALLSS STACK OF SUBSYSTEMS CALLING OTHER SUBSYSTEMS BY MEANS OF THE DRL CALLSS, THE TABLE LIMIT WAS EXCEEDED. REVIEW THE SUBSYSTEM AND DEPTH OF CALLS.

007 - BAD PROG. DESCRIPTION

IN THE PROGRAM DESCRIPTOR, THE POINTER TO THE COMMAND LIST IS ZERO OR POINTS TO NON-COMMAND LANGUAGE DATA. CHECK THE PROGRAM DESCRIPTOR AND COMMAND LANGUAGE LIST.

008 - LOOP IN PRIMITIVES

A NUMBER OF THE PRIMITIVES ARE EXECUTED ENTIRELY WITHIN THE TSS SCAN MODULE. A COUNTER IS INITIALIZED AT THE ENTRY TO SCAN AND A COUNT KEPT OF PRIMITIVES EXECUTED. WHEN THE COUNT EXCEEDS A GIVEN MAXIMUM, IT BECOMES OBVIOUS THERE IS A LOOP. CHECK THE SEQUENCE OF THE PRIMITIVES FOR THE SUBSYSTEM.

009 - SYSTEM UNKNOWN

THE REQUESTED SUBSYSTEM IS UNKNOWN TO TSS OR IS NOT INCLUDED IN THE SYSTEM FOR THIS INSTALLATION. CHECK THE NAME FOR SPELLING TOO.

010 - PROGRAM TOO LARGE TO SWAP

A SUBSYSTEM IS SO LARGE THAT THE NUMBER OF DCW'S REQUIRED TO LOAD OR SWAP THE PROGRAM EXCEED THE MAXIMUM NUMBER OF DCW'S WHICH CAN BE BUILT. CHECK THE SIZE OF THE SUBSYSTEM. PERHAPS THE SUBSYSTEM EXPANDS ITS CORE LIMITS WITH A DRL ADDMEM. CHECK ALL DRL ADDMEM REQUESTS. SEE .LADCW DEFINED IN COMMUNICATION REGION FOR MAXIMUM NUMBER OF DCW'S ALLOWED.

011 - INCORRECT CORE FILE USAGE

A REQUEST TO MOVE CORE FILE SPECIFIES MORE THAN TEN WORDS TO BE MOVED. CHECK ALL DRL CORFIL REQUESTS.

012 - PROGRAM NOT ALLOWED USE OF THIS I/O

PRIVILEGED FILE I/O IS RESERVED FOR SUBSYSTEMS WHICH SPECIFICALLY REQUIRE INFORMATION FROM FILES ALLOCATED TO THE TIME-SHARING SYSTEM. PLEASE REVIEW THE NEED FOR PRIVILEGED FILE I/O AND JUSTIFY IT WITH THE COMPUTING CENTER.

013 - DRL ALLOWED ONLY BY LOGON

THE DRL USER ID CAN BE USED ONLY BY THE LOGON SUBSYSTEM. CHECK THE SUBSYSTEM CODE.

014 - NOT CURRENTLY ASSIGNED

015 - CANNOT RESET ID

THE LOGON SUBSYSTEM IS EXECUTING A DRL USER ID, BUT THE ID OF THE SPECIFIED U.S.T. IS NON-ZERO. A TERMINATE MUST BE EXECUTED FOR THAT USER BEFORE THE U.S.T. CAN BE REUSED. TRY TO DETERMINE WHY THE TERMINATE WAS BYPASSED, OR WHY NEW SYSTEM WAS SELECTED AFTER LOGON.

016 - location OVERFLOW FAULT

THE SUBSYSTEM IN EXECUTION ENCOUNTERED AN OVERFLOW CONDITION AT THE DESIGNATED LOCATION AND THE SUBSYSTEM DID NOT SPECIFY A FAULT VECTOR. THE LOCATION IS RELATIVE TO ZERO (SEE EDIT MAP) UNLESS IT IS A MASTER SUBSYSTEM. THEN THE LOCATION IS RELATIVE TO TSS ZERO. DETERMINE THE LOAD ADDRESS OF THE SUBSYSTEM TO DETERMINE THE FAULT LOCATION IN THE MASTER SUBSYSTEM. REVIEW YOUR PROGRAM INPUT FOR INCORRECT DATA BEFORE REQUESTING HELP FROM THE COMPUTING CENTER.

017 - location ILLEGAL OP CODE

THE SUBSYSTEM IN EXECUTION ENCOUNTERED AN ILLEGAL (OR ZERO) OP CODE OR A MME OPERATION AT THE DESIGNATED LOCATION, AND THE SUBSYSTEM DID NOT SPECIFY A FAULT VECTOR.

THE LOCATION IS RELATIVE TO SUBSYSTEM ZERO (SEE EDIT MAP) UNLESS IT IS A MASTER SUBSYSTEM, THEN THE LOCATION IS RELATIVE TO TSS ZERO. DETERMINE THE LOAD ADDRESS OF THE SUBSYSTEM TO DETERMINE THE FAULT LOCATION IN THE MASTER SUBSYSTEM.

REVIEW YOUR PROGRAM CODE AND INPUT FOR INCORRECT DATA BEFORE REQUESTING HELP FROM COMPUTING CENTER.

018 - location MEMORY FAULT

THE SUBSYSTEM IN EXECUTION ENCOUNTERED A MEMORY FAULT AT THE DESIGNATED LOCATION, AND THE SUBSYSTEM DID NOT SPECIFY A FAULT VECTOR.

THE LOCATION IS RELATIVE TO SUBSYSTEM ZERO (SEE EDIT MAP) UNLESS IT IS A MASTER SUBSYSTEM, THEN THE LOCATION IS RELATIVE TO TSS ZERO. DETERMINE THE LOAD ADDRESS OF THE SUBSYSTEM TO DETERMINE THE FAULT LOCATION IN THE MASTER SUBSYSTEM.

REVIEW THE PROGRAM CODE AND INITIALIZATION OF ADDRESS OR INDEX REGISTERS AS WELL AS THE PROGRAM INPUT FOR INCORRECT DATA BEFORE REQUESTING HELP FROM THE COMPUTING CENTER.

019 - location FAULT TAG FAULT

THE SUBSYSTEM IN EXECUTION ENCOUNTERED A FAULT TAG FAULT AT THE DESIGNATED LOCATION, AND THE SUBSYSTEM DID NOT SPECIFY A FAULT VECTOR.

THE LOCATION IS RELATIVE TO SUBSYSTEM ZERO (SEE EDIT MAP) UNLESS IT IS A MASTER SUBSYSTEM, THEN THE LOCATION IS RELATIVE TO TSS ZERO. DETERMINE THE LOAD ADDRESS OF THE SUBSYSTEM TO DETERMINE THE FAULT LOCATION IN THE MASTER SUBSYSTEM.

REVIEW THE PROGRAM CODE AND INITIALIZATION OF ADDRESS OR INDEX REGISTERS AS WELL AS THE PROGRAM INPUT FOR INCORRECT DATA BEFORE REQUESTING HELP FROM THE COMPUTING CENTER.

020 - location DIVIDE CHECK FAULT

THE SUBSYSTEM IN EXECUTION ENCOUNTERED A DIVIDE CHECK FAULT AT THE DESIGNATED LOCATION, AND THE SUBSYSTEM DID NOT SPECIFY A FAULT VECTOR.

THE LOCATION IS RELATIVE TO SUBSYSTEM ZERO (SEE EDIT MAP) UNLESS IT IS A MASTER SUBSYSTEM, THEN THE LOCATION IS RELATIVE TO TSS ZERO. ONE MUST DETERMINE THE LOAD ADDRESS OF THE SUBSYSTEM TO DETERMINE THE FAULT LOCATION IN THE MASTER SUBSYSTEM.

REVIEW YOUR PROGRAM INPUT FOR INCORRECT DATA BEFORE REQUESTING HELP FROM THE COMPUTING CENTER.

021 - BAD STATUS SWAP OUT #S

A BAD I/O STATUS HAS BEEN RECEIVED ON A WRITE DRUM FILE #S, THE SWAP FILE. TRY AGAIN. IF PROBLEM PERSISTS, THE TSS WILL ALERT OPERATIONS. THE PARENTHESIZED NUMBER IS THE STATUS CODE.

022 - BAD STATUS SWAP IN #S

A BAD I/O STATUS HAS BEEN RECEIVED ON A READ DRUM FILE #S, THE SWAP FILE. TRY AGAIN. IF PROBLEM PERSISTS, THE TSS WILL ALERT OPERATIONS. THE PARENTHESIZED NUMBER IS THE STATUS CODE.

023 - BAD STATUS LOAD #P

A BAD I/O STATUS HAS BEEN RECEIVED ON A READ DRUM FILE #P, THE TSS FILE. TRY AGAIN. IF PROBLEM PERSISTS, THE TSS WILL ALERT OPERATIONS. THE PARENTHESIZED NUMBER IS THE STATUS CODE.

024 - BIT POSITION 35

THE DESIGNATED BIT POSITION IN AN IF TRUE OR IF FALSE PRIMITIVE IS GREATER THAN 35. CHECK THE COMMAND LIST AND PRIMITIVES OF THE SUBSYSTEM.

ERROR-CODE 25 NOT CURRENTLY ASSIGNED.

ERROR-CODE 26 NOT CURRENTLY ASSIGNED.

ERROR-CODE 27 NOT CURRENTLY ASSIGNED.

028 - USER TRIED TO SPACE A RANDOM FILE

A RANDOM FILE CANNOT BE SPACED IN THIS MANNER. USAGE OF THE RANDOM FILE IN THE CORRECT MANNER WILL CLEAR UP THE PROBLEM.

029 - ILLEGAL SYSTEM SELECTION

SOME SYSTEMS, NAMELY THE MASTER SUBSYSTEMS, HAVE RESTRICTED THEIR AVAILABILITY TO CERTAIN USERS. YOU DO NOT HAVE PERMISSION TO USE THE SELECTED SUBSYSTEM. SELECT ANOTHER.

ERROR CODES 30-49 NOT CURRENTLY ASSIGNED.

<50> FILE filename -- reason text

<50< FILE filename -- reason text

(The two messages above refer to permanent files.)

<50> CURRENT FILE - (reason text

<50< COLLECTOR FILE -- reason text

(The two messages above refer to the temporary files *SRC and SY**, respectively.)

<50> WORK FILE -- reason-text

(The message above refers to all other temporary files.)

ERROR-MESSAGE 50 EXPLANATION: FILE-SYSTEM ERRORS.

THIS MESSAGE IS ISSUED FOR EITHER ONE OF TWO CASES: (1) THE NAMED PERMANENT FILE COULD NOT BE ACCESSED-- 50 , OR COULD NOT BE CREATED-- 50 OR (2) A REQUIRED TEMPORARY FILE COULD NOT BE OBTAINED OR EXPANDED. THE REASON GIVEN IN THE MESSAGE IS FURTHER EXPLAINED BELOW:

STATUS 01: THE SPECIFIED USER'S-MASTER-CATALOG DOES NOT EXIST. CHECK USER-ID.

I/O ERROR, STATUS 02: THE FILE SYSTEM HAS ENCOUNTERED AN UNRECOVERABLE INTERNAL I/O ERROR. (THIS DOES NOT IMPLY AN ERROR ON YOUR FILE SPACE.) REPORT THE STATUS TO THE CENTRAL COMPUTER SITE. ALSO RETRY.

NO PERMISSION, STATUS 03: THE NAMED FILE COULD NOT BE ACCESSED BECAUSE YOU HAVE NOT BEEN ALLOWED THE PERMISSION(S) REQUESTED. IF THE FILE IS ALREADY OPEN, THE PERMISSIONS REQUESTED DO NOT MATCH THE PERMISSIONS WITH WHICH THE FILE IS ALREADY OPENED. THIS STATUS IS ALSO RETURNED BY THE FILE SYSTEM WHEN AN ATTEMPT IS MADE TO OPEN A "NULL" FILE WITH "READ" PERMISSION.

FILE BUSY, STATUS 04: ANOTHER USER HAS ALREADY ACCESSED THIS FILE WITH AN ACCESS-MODE PERMISSION THAT LOGICALLY EXCLUDES YOUR REQUESTED PERMISSION; I.E., A GRANTED WRITE PERMISSION EXCLUDES ANY OTHER CONCURRENT ACCESSES AND A GRANTED READ PERMISSION EXCLUDES ANY OTHER ACCESS WITH WRITE PERMISSION. THE FILE, THEREFORE, IS TEMPORARILY BUSY TO SOME OR ALL OTHER USERS. (MULTIPLE CONCURRENT ACCESSES OF A FILE WITH READ PERMISSION, ONLY, IS ALLOWED.)

NONEXISTENT FILE, STATUS 05: EITHER THE NAMED FILE DOES NOT EXIST, AT THE CATALOG LEVEL IMPLIED OR SPECIFIED, OR ONE OR MORE NAMES IN THE CATALOG/FILE DESCRIPTION WAS INCORRECTLY GIVEN. CHECK ALL CATALOG/FILE NAMES. THE COMMAND CATALOG MAY BE USED TO LIST ALL OF YOUR CATALOG AND FILE NAMES.

STATUS 06: THE FILE SYSTEM HAS EXHAUSTED ITS SPACE FOR NEW CATALOGS AND FILE DESCRIPTORS. REPORT THE STATUS TO THE CENTRAL COMPUTER SITE, AND TRY AGAIN LATER.

DEVICE TYPE UNDEFINED, STATUS 07: THE DEVICE TYPE THAT YOU SPECIFIED FOR YOUR FILE IS UNDEFINED TO THE SYSTEM.

STATUS 10: THE SYSTEM HAS TEMPORARILY EXHAUSTED THE AVAILABLE FILE SPACE. TRY AGAIN LATER. (ALSO, PURGE ANY UNNEEDED FILES.)

NON-UNIQUE NAME, STATUS 11: THE NEW NAME THAT YOU HAVE SPECIFIED FOR THE CATALOG OR FILE TO BE MODIFIED IS A DUPLICATE OF A CATALOG OR FILE NAME EXISTING AT THE SAME LEVEL.

MAX. SIZE ERROR, STATUS 12: THE NEW MAXIMUM-SIZE SPECIFIED FOR THE FILE TO BE MODIFIED IS LESS THAN ITS CURRENT SIZE. (MAXIMUM SIZE UNCHANGED.)

NO FILE SPACE, STATUS 13: YOU HAVE USED UP ALL THE PHYSICAL SPACE ALLOTTED TO YOU FOR THE CREATION OF FILES. YOU MUST EITHER PURGE ONE OR MORE UNNEEDED FILES, OR OBTAIN A LARGER FILE-SPACE ALLOCATION.

INVALID PASSWORD, STATUS 14: A REQUIRED PASSWORD EITHER HAS BEEN GIVEN INCORRECTLY OR NOT AT ALL. THE GENERAL FORM FOR SUPPLYING PASSWORDS IN A CATALOG/FILE DESCRIPTION IS: NAME$PASSWORD E.G.: /CAT1$ABC/FIL1$XYZ.

STATUS 15: IDS FILE IN ABORT STATUS. IDS HAS SET THE ABORT STATUS BIT ON THIS FILE.

STATUS 16: IDS FILE IN RECOVERY STATUS.

STATUS 17: SEEK ERROR.

STATUS 20: FAILURE IN NAME SCAN.

STATUS 21: UNDEFINED DEVICE.

STATUS 22: DEVICE LINK TABLE CHECKSUM ERROR.

STATUS 23: INCONSISTENT FSW BLOCK COUNT.

STATUS 24: INTERNAL LINK TABLE CHECKSUM ERROR.

STATUS 25: REQUESTED ENTRY NOT ON LINE.

STATUS 26: NON-STRUCTURED FILE ENTRY.

STATUS 27: FILE IN DEFECTIVE STATUS.

STATUS 30: ILLEGAL PACK TYPE.

STATUS 31: ACCESS GRANTED TO IDS FILE.

STATUS 32, 33, 35, 41, 45 AND 50: SYSTEM MALFUNCTION. REPORT THE STATUS TO THE CENTRAL COMPUTER SITE, AND RETRY.

ILLEGAL CHAR., STATUS 34: YOU HAVE GIVEN A CATALOG OR FILE NAME, OR A PASSWORD, CONTAINING A CHARACTER OTHER THAN AN ALPHANUMERIC, PERIOD, OR A DASH, WHICH ARE THE ONLY LEGAL CHARS. FOR IDENTIFIERS.

FILE TABLE FULL, STATUS 36: THE NAMED FILE CANNOT BE ACCESSED BECAUSE YOU PRESENTLY HAVE TOO MANY FILES ALREADY ACCESSED (I.E., OPENED). YOU MUST DEACCESS ONE OR MORE OF THESE OPENED FILES. USE THE COMMANDS STATUS FILES, AND REMOVE.

DUPLICATE NAME, STATUS 37: THE FILE NAME SHOWN DUPLICATES A NAME ALREADY IN YOUR AVAILABLE-FILE-TABLE, I.E., AN ALREADY ACCESSED FILE. IF APPROPRIATE, ASSIGN AN ALTERNATE NAME.

SYSTEM LOADED, STATUS 40: THE SYSTEM IS CURRENTLY AT PEAK CAPACITY IN SOME RESPECT, E.G.: CERTAIN INTERNAL TABLE SPACE EXHAUSTED, ETC.

STATUS 42: INVALID FILE CODE OR PAT POINTER.

STATUS 43: INVALID CATALOG BLOCK ADDRESS.

STATUS 44: PERMISSION DENIED - SHARED FILE.

STATUS 45: INVALID SPACE IDENTIFIER.

STATUS 51: CHECKSUM ERROR ON DEVICE.

STATUS 52: DEVICE RELEASED.

<51> FILE filename -- I/O STATUS yy

<51< FILE filename -- I/O STATUS yy

(The two messages above refer to permanent files.)

<51> CURRENT FILE -- I/O STATUS yy

<51< CURRENT FILE -- I/O STATUS yy

(The two messages above refer to the *SRC file.)

<51> COLLECTOR FILE -- I/O STATUS yy

<51< COLLECTOR FILE -- I/O STATUS yy

(The two messages above refer to the SY** file.)

<51> WORK FILE -- I/O STATUS yy

<51< WORK FILE -- I/O STATUS yy

(The two messages above refer to all other temporary files.)

where yy is the major hardware status returned by IOS. These status codes are described in the General Comprehensive Operating Supervisor reference manual.

ERROR-MESSAGE 51 EXPLANATION: INPUT/OUTPUT ERRORS

AN UNRECOVERABLE READ OR WRITE ERROR HAS OCCURRED ON THE SPECIFIED FILE. AN ERROR IN READING IS INDICATED BY THE MESSAGE NUMBER GIVEN AS 51 ; AN ERROR IN WRITING AS 51 . REPORT THE I/O STATUS NUMBER AND THE READ OR WRITE INDICATION TO THE CENTRAL COMPUTER SITE. ALSO, IN THE CASE OF "CURRENT FILE" or "WORK FILE", LOG OFF AND TRY AGAIN.

<52> CURRENT FILE NOT DEFINED

ERROR-MESSAGE 52 EXPLANATION

THERE IS NO CURRENT (*SRC) FILE DEFINED IN YOUR FILE TABLE. THIS INDICATES EITHER A SYSTEM MALFUNCTION, OR THAT YOU ARRIVED AT THE PRESENT SUBSYSTEM VIA AN ABNORMAL PATH. SUGGEST YOU RESELECT YOUR DESIRED SUBSYSTEM, OR LOG OFF AND RETRY FROM SCRATCH.

<53> LINES IGNORED BY EDIT
....line(s).....

ERROR-MESSAGE 53 EXPLANATION

THE LINE(S) SHOWN WERE NOT MERGED INTO YOUR CURRENT FILE BECAUSE THEY LACKED LINE NUMBERS.

<54> SYSTEM MALFUNCTION--CURRENT FILE ERROR

ERROR-MESSAGE 54 EXPLANATION

THE FORMAT OF YOUR CURRENT FILE WAS FOUND TO BE IN ERROR. REPORT CIRCUMSTANCES TO THE CENTRAL COMPUTER SITE. SUGGEST THAT YOU LOG OFF AND RETRY.

<55> CURRENT FILE TOO LARGE

ERROR-MESSAGE 55 EXPLANATION

THE COMBINED SIZE OF YOUR SOURCE FILE AND MOST RECENT MODIFICATION- OR ADDITION-INPUT IS TOO LARGE TO BE PROCESSED. SUGGEST THAT YOU SPLIT THE TEXT INTO TWO OR MORE FILES, WHICH CAN LATER BE ADJOINED.

<56> FORTRAN LOADER CODE = nn

ERROR-MESSAGE 56 EXPLANATION

YOUR OBJECT PROGRAM COULD NOT BE PROPERLY LOADED/EXECUTED, FOR THE REASON INDICATED BY THE CODE NUMBER:

0-31 - THESE CODES, GIVEN IN DECIMAL, CORRESPOND TO THE OCTAL STATUS CODES IN HELP MSG. 50
32 - YOUR SAVE-FILE IS NOT LARGE ENOUGH TO CONTAIN THE WHOLE OBJECT PROG.
33 - BINARY PROGRAM BEING SAVED IS NOT IN PROPER FORMAT. ONE OR MORE OBJECT RTNS IN THE PROGRAM WERE PROBABLY CREATED BY SOME MEANS OTHER THAN TSS-FORTRAN (E.G. GMAP). SYMREFS/SYMDEFS ARE NOT COMPATIBLE FOR LINKING WITH TSS-FORTRAN-PRODUCED CODE
34 - FILE BEING LOADED CONTAINS TOO MANY SUBRTNS. (PRESENT LIMIT IS 64)
35 - FILE BEING LOADED IS NOT IN ABSOLUTE FORMAT. WAS PROB. CREATED BY SOME MEANS OTHER THAN TSS-FORTRAN

36 - CKSUM ERROR IN DATA BLOCK(S) OF FILE BEING LOADED
37 - CKSUM ERROR IN CONTROL BLOCK(S) OF FILE BEING LOADED
38 - NOT USED
39 - USER'S ALLOTTED FILE SPACE HAS BEEN EXHAUSTED
40 - BLOCK-COUNT ERROR WHILE LOADING FILE. DATA BLOCKS ARE OUT OF ORDER OR HAVE BEEN DESTROYED
41 - A FILE REQUESTED FOR LOADING CANNOT BE FOUND AS DESCRIBED
42 - ILLEGAL FORMAT FOR USER LIBRARY FILE

057 - RESTRICTED SUBSYSTEM

THE CENTRAL COMPUTER SITE HAS RESTRICTED THE USE OF THIS SYSTEM. THIS MAY BE A TEMPORARY RESTRICTION BECAUSE OF CURRENT LOAD OR A PERMANENT RESTRICTION. PLEASE NOTIFY THE CENTRAL COMPUTER SITE FOR FURTHER DETAILS.

<58> ENTRY LOC 100

ERROR-MESSAGE 58 EXPLANATION

THE SUBSYSTEM PROGRAM TO BE EXECUTED DOES NOT HAVE THE INITIAL 100-WORD DATA AREA THAT IS REQUIRED OF TSS SUBSYSTEM PROGRAMS.

<59> FILE filename NOT IN TSS FORMAT

ERROR-MESSAGE 59 EXPLANATION

A FORMAT ERROR WAS DETECTED ON THE NAMED FILE. EITHER THE FILE IS NOT A TSS-GENERATED FILE, OR A SYSTEM MALFUNCTION HAS OCCURRED. IN THE LATTER CASE, REPORT THE CIRCUMSTANCES TO THE CENTRAL COMPUTER SITE, AND RETRY THE COMMAND.

<60> NO DATA ON FILE filename

ERROR-MESSAGE 60 EXPLANATION

THE REQUESTED FILE CONTAINS NO USER'S DATA; THE IMPLICATION IS THAT NO DATA HAS BEEN SAVED ON THIS FILE SINCE ITS CREATION.

<61> LAST SAVE/PURGE COMMAND NOT PROCESSED

ERROR-MESSAGE 61 EXPLANATION

YOUR LAST SAVE, RESAVE, PURGE, OR RUN COMMAND HAS BEEN LOST, PROBABLY DUE TO AN INTERVENING EXCEPTION MESSAGE. YOU MAY REISSUE THE COMMAND.

<62> SAVE FILE filename TRUNCATED. NOT BIG ENOUGH

ERROR-MESSAGE 62 EXPLANATION

THE FILE NAMED IN YOUR RESAVE COMMAND IS NOT LARGE ENOUGH (MAX. SIZE) TO CONTAIN ALL OF THE CONTENTS OF THE CURRENT FILE. (SOME OF THE CURRENT FILE HAS BEEN SAVED.) SUGGEST YOU USE THE SAVE COMMAND WITH A 'NEW' FILE NAME, OR MODIFY THE MAXIMUM SIZE OF THE NAMED FILE WITH ACCESS.

<63> TSS FORTRAN CHAIN ERROR, CODE = nn

ERROR-MESSAGE 63 EXPLANATION

YOUR CHAIN LINK COULD NOT BE PROPERLY LOADED. THE REASON CODE GIVEN, IN DECIMAL (1-32), CORRESPONDS TO THE OCTAL STATUS CODES IN HELP MESSAGE 50.

<064> - EXECUTE TIME LIMIT EXCEEDED

THE PROGRAM TIME LIMIT SPECIFIED BY THE USER AND/OR THE INSTALLATION HAS BEEN EXCEEDED BY THE OBJECT PROGRAM.

<065> - OBJECT PROGRAM SIZE LIMIT EXCEEDED

THE SIZE OF THE OBJECT PROGRAM HAS EXCEEDED THE INSTALLATION SPECIFIED LIMIT.

<066> - SPAWN UNSUCCESSFUL -- STATUS N

THE RUN SUBSYSTEM WAS UNABLE TO SPAWN A JOB TO BATCH FOR COMPILATION AND OR LOADING. THE REASON CODE AS SPECIFIED BY "N" DESCRIBES ONE OF THE FOLLOWING:

1 - UNDEFINED FILE (FILE NOT IN AFT)
2 - NO SNUMB
3 - DUPLICATE SNUMB
4 - NO PROGRAM NUMBER AVAILABLE
5 - ACTIVITY NAME UNDEFINED
6 - ILLEGAL USER LIMITS (TIME, SIZE, ETC.)
7 - BAD STATUS (R/W J*)
8 - NO FILE SPACE AVAILABLE FOR PUSH-DOWN FILE
9 - NO *J FILE PROVIDE

134 - BAD FILACT FUNCTION NUMBER

THE DRL FILACT CALLING SEQUENCE CONTAINS AN INVALID FUNCTION NUMBER.

135 - INVALID USE OF SMC

USER CANNOT ACCESS THE SYSTEM MASTER CATALOG.

138 - TAP* FILE UNDEFINED

THE TAP* FILE IS UNDEFINED FOR TAPE INPUT.

139 - WRITE ERROR

AN ERROR OCCURRED WHILE WRITING IN THE TAP* FILE.

SECTION IV

TERMINAL USAGE

GENERAL

This chapter contains general descriptions of and operational procedures for several remote terminals. For complete details pertaining to a particular terminal, the user should refer to the instruction manual accompanying the terminal unit.

TELEPRINTER OPERATION

Terminal Applications

The following types of remote terminals, or their equivalent, may be used to communicate with the Time-Sharing System:

- IBM 2741
- Teletype Models 33, 35 and 37
- GE TermiNet 300

These terminals communicate with the Time-Sharing System via the General Remote Terminal Supervisor (GRTS). This interface is described in the GRTS Programming Reference Manual.

Each time a key is struck the character is transmitted to the system and stored until the carriage return is struck. A carriage return indicates that the line is complete. The number of characters in a line may range up to 160 characters plus a carriage return.

If the terminal is equipped with a paper tape reader/punch, this device may be used for input/output. The input must be formatted the same as for keyboard input, but each line must be terminated with carriage return, line feed, rubout, rubout. The input tape must be terminated with an ASCII X-OFF character.

Editing

Keyboard input is sent to the computer in units of complete lines. A line of terminal input is terminated by a carriage return. Therefore, corrections to a line-in-progress (i.e., a partial line not yet terminated) can be made.

A typing error detected before the line is terminated can be corrected in one of two ways. One or more characters may be deleted from the end of a partial line or the incomplete line and may be canceled. Character or line deletions are effected by means of two special characters designated as control characters. These control characters may differ between terminals.

For teleprinter terminals

character	control function
@(commercial at sign)	character deletion
CTRL plus X keys	line deletion

For other terminals

character	control function
1/4 (or degree symbol)	character deletion
±(for IBM 2741)	line deletion
±(for DATEL)	line deletion

NOTE: Line deletion does not occur until a carriage return is given or ATTN (IBM 2741) or INT (DATEL) is pressed.

The editing rules are as follows:

- Use of the character-delete control deletes from the line the character preceding the deletion character; use of n consecutive deletion characters deletes n preceding characters (including blanks) up to the beginning of the line.

For example:

*ABCDF@E would result in ABCDE being transmitted to the program file.

*ABCØDEF¼¼¼¼DEF would result in ABCDEF being transmitted.

(The characters to be deleted are underlined for illustration.)

- Use of the line-delete control causes all of a line to be deleted. The characters DEL are printed to indicate deletion. For example:

*ACDEFG CTRL/X DEL (all characters deleted; carriage return automatic)

-(ready for new input)

or

*ACDEFG± (carriage return)

DEL (all characters deleted)

-(ready for new input)

NOTE: CTRL/X, ATTN, or INT do not require a carriage return.

The control-character pair for each type of terminal cannot be used for other than the deletion function assigned them.

In AUTOX and AUTO, line numbers and spaces are not deleted.

Log-On Procedure

To initiate communication with the Time-Sharing System, the user performs the following steps:

- Turns on the terminal
- Obtains a dial-tone on the associated phone-set
- Dials one of the numbers of his time-sharing center

The user will then receive either a busy signal to indicate that the line is not presently available or a high-pitched tone -- a "beep" -- to indicate that his terminal has been connected to the computer.

The Time-Sharing System is then prepared to output a log-on message; either automatically (no terminal action required) or following a carriage return from the terminal. The following is a sample of the automatic log-on message:

HIS SERIES 6000 ON date AT time CHANNEL nnnn

where time is given in hours and thousanths of hours (hh.hhh), and nnnn is the user's channel number. This is the standard message, however the user site may put in a message of its own.

The following is a sample of the log-on message when a carriage return is required:

110601
HIS SERIES 6000 on date AT time CHANNEL nnnn

The number "110601" identifies the type of channel to which the terminal is connected. For a detailed explanation the meaning of this number, refer to the GRTS Programming Reference manual.

Following this message, the system asks for the user's identification:

USER ID -

The user responds, on the same line, with the user-id assigned to him by the time-sharing installation management. This user-ID uniquely identifies a particular user already known to the system. This ID is used to locate his programs and files, and accounting for his usage of the time-sharing resources allocated to him. An example request and response might be:

USER ID -J.P.JONES

NOTE: User's responses are underlined for illustrative purposes.

A carriage return must be given following any complete response, command, or line of information typed by the user. If a charge number is also required for accounting purposes, the user can supply it as follows:

USER ID -J.P.JONES;1234567E

The charge number may consist of from 1 to 12 alphanumeric characters, separated from the user-ID by a semicolon. (Refer to NEWUSER command description in Section II.)

After the user responds with his user-ID, the system asks for the sign-on password that was assigned to him along with his user-ID as follows:

PASSWORD--
PASSWORDPASS

The user should type his password directly on the "strikeover" mask provided below the PASSWORD request. The password is used by the system as a check on the legitimacy of the named user. (In the event that either the user-ID or password is given incorrectly two consecutive times, the user's terminal is immediately disconnected from the system.)

At this point, if the accumulated charges for the user's past time-sharing usage equals or exceeds one hundred percent of his current resource allocation, he will receive a warning message:

```
RESOURCES OVERDRAWN n
```

If his accumulated charges exceeds one hundred and ten percent of his current resources, he receives the following message and is immediately disconnected.

```
RESOURCES EXHAUSTED - CANNOT ACCEPT YOU
```

If the user's file space is greater than 88 percent used, he receives the following information message:

```
n BLOCKS FILE SPACE AVAILABLE
```

The number n specifies the number of 320-word blocks of unused file space for this user. This does not affect the log-on procedure, and the user is permitted to continue.

When the user has been validated, the Time-Sharing System asks him to select the subsystem that he wants. This is called the subsystem-selection request, and is done by the system sending the following inquiry to the terminal:

```
SYSTEM?
```

The terminal user must respond with the name of the desired subsystem.

Major subsystems -- i.e., BASIC, FORTRAN, EDITOR, and CARDIN -- all provide a file-building facility, called build mode. In build mode, the user is free to enter either file-building input or control commands, as he chooses. All other subsystems begin directly with a question/response dialogue between the subsystem and the user that is unique for each subsystem.

For example, suppose the user decides to work with the BASIC subsystem (the subsequent log-on sequence is representative for any of the major subsystems):

SYSTEM? BASIC

NOTE: A carriage return terminating each separate user response is assumed to be understood. The underlining indicates the user's response.

Having selected the BASIC subsystem, the user is asked whether he now wants to start a new file -- i.e., a new program in the case of BASIC -- or wants to retrieve and work with a previously entered and saved file or program. The request message is

OLD OR NEW -

If the user wishes to start a new program (i.e., build a new source file), he responds simply with

NEW or N

If, on the other hand, he wants to recall an old source file, he responds with

OLD filename or O filename

where filename is the name of the file on which the old program was saved during a previous session at the terminal (refer to the SAVE and RESAVE command descriptions in Section II). It is also possible to include the "OLD" or "NEW" response on the same line as the system selection, separating the latter from the former with a space; e.g.,

SYSTEM? BASIC OLD filename

If the user wishes to retain the current file previously established, respond

SAME or S

If a named file with read-only permission from the installation LIBRARY user master catalog is to be accessed, respond

LIB filename or L filename

After copying it to the current file, the file is deaccessed.

Following either response, the subsystem types the message READY and returns the carriage. If the subsystem to be used is BASIC, FORTRAN or CARDIN, an asterisk is printed in the first character position of the next line. If Text Editor is the subsystem to be used, one of the following may occur:

1. If the user starts with a new program, the READY message is given, then the message ENTER is printed, followed by an asterisk in the first character position of the next line.

2. If the user recalls an old source file, only the READY message and carriage return are given, and the user is in the EDIT mode of Text Editor. To go to the BUILD mode, the user must respond with the command BUILD. Then the ENTER message is typed, the carriage is returned, and the asterisk is typed.

The following is an example of a complete log-on procedure, up to the point where the BASIC subsystem is ready to accept file building, correction input, or control commands:

```
HIS SERIES 6000, SERIES 600 ON 07/26/69 AT 14.768 CHANNEL 0012

USER ID -J.P. JONES
PASSWORD
**********
SYSTEM ?BASIC
OLD or NEW-NEW (NEW is shown arbitrarily for illustration)
READY
*              - (the user begins entering input on this line)
```

Entering Build Mode Input

After the message READY, (for Text Editor ENTER) the subsystem is in build mode (as indicated by the initial asterisk). It is ready to accept program statement or text input, depending upon the selected subsystem and/or command language. All lines of input other than commands are accumulated on the user's current file. This is normally the file that contains the program or text he wants to work with. If he is building a new file (NEW or N response to OLD OR NEW-), his current file will initially be empty.

If he has recalled an old file (OLD or O filename) the content of the named old file will initially be on his current file. Any input (except control commands) will, in a line number dependent subsystem, either be added to, merged into, or replace lines in the current file, depending upon the relative line numbering of the lines in the file and the new input. (Refer to Correction or Modification of Line Numbered Files). In a nonline-number dependent subsystem (Text EDITOR for example) any new input is appended to the file.

Following each line of noncommand-language input and terminating carriage return, the subsystem supplies an initial asterisk, indicating that it is ready to accept more input. In the case of command language input, the subsystem normally returns to build mode following execution of the process requested by the command.

In line-number dependent subsystems (BASIC, FORTRAN, CARDIN), a line of file building input must begin with a line number of up to eight decimal digits. This number may optionally be preceded by one or more initial blanks. The line number facilitates correction and modification of the source program. The line number is always terminated, (i.e., immediately followed) by a non-numeric character, which may be a blank.

In nonline-number dependent subsystems, a line of file building input may begin with any sequence of characters that is not defined as command language for the subsystem being used.

Correction or Modification of Line-Numbered Files

The correction or modification of the current file in line-number dependent subsystems proceeds according to the following rules:

- Replacement: a numbered line will replace any identically numbered line that was previously typed or already contained on the current file; i.e., the last entered line numbered nnn will be the only line numbered nnn in the file.
- Deletion: a line consisting of a line number only, (i.e., nnn), will cause the deletion of any identically numbered line that was previously typed or is already contained on the current file.
- Insertion: a line with a line number value that falls between the line number values of two existing lines will be inserted in the file between those two lines.

At any point in the process of entering file building input in line-numbered subsystems, the LIST command may be given, which results in a clean, up-to-date copy of the current file being printed. In this way, the results of any previous corrections or modifications can be verified visually. (The several forms of the LIST command are described in detail in Section II.) Following the command OLD filename, the LIST command can be used initially to inspect the contents of the current source file, i.e., the "old" program.

Automatic Terminal Disconnections

Once communication with the Time-Sharing System has been established, any question or request must be answered within ten minutes. If these time limits are exceeded, the user's terminal will be disconnected.

Log-Off Procedure

To terminate one's current session with the Time-Sharing System and disconnect the terminal, the BYE command may be given either in build mode or at the subsystem-selection level:

```
*BYE
 or
SYSTEM?BYE
 or
SYSTEM?LOGOFF
```

In either case, a report of the user's time-sharing usage charges is given, as illustrated by the following example, and the terminal is disconnected:

```
**RESOURCES USED $ 4.47, USED TO DATE $ 919.02= 92%
**TIME SHARING OFF AT 12.655 ON 11/04/69
```

When operating under a subsystem that does not have a build mode and does not recognize BYE as a response, the response DONE may be used. BYE may then be given at the resulting subsystem-selection level.

To terminate the current session without disconnecting the terminal, the command NEWUSER may be given in place of BYE. This procedure allows another user to log-on immediately following. The current user's log-off report is then printed and a new log-on sequence is initiated. NEWUSER may also be used to change the charge number, but without going through the log-off/log-on procedure.

CAUTION: Failure to follow log-off procedures as described above may result in unpredictable problems (lines or files remaining busy, etc.). Certain data sets do not automatically disconnect after log-off from the terminal. In such cases, it is necessary to manually disconnect the data set by lifting the handset, pressing the talk button, and hanging up the handset when the dial tone is heard.

Terminating an Output Process

A lengthy listing or other output of information at the terminal, initiated for example by a LIST command, may be prematurely terminated by the use of the interrupt control peculiar to the type of terminal in use. This interrupt control is as follows:

- For teleprinter terminals -- the BREAK key
- For typewriter-like terminals -- the ATTN or INT key

This control can also be used for abnormal termination of a program execution. However, the user is cautioned against indiscriminate use of this control since the results of its use are in some cases unpredicatable (in regard to the status of files, for example). The subsystem will normally return to build mode or to the subsystem selection level following the use of an interrupt control.

Paper Tape Input in Build Mode

In order to supply file-building input from paper tape, the user gives the command TAPE (#TAP if the subsystem is Text Editor). The subsystem responds with READY. If the tape reader is ready, it will be turned on automatically. If it is not ready, the user should position his tape in the tape reader and start the device. Input is terminated when an X-OFF character is read by the paper tape reader, or the tape is stopped and the user types X-OFF.

The tape may be prepared off-line from the keyboard, or it may be the result of previous output punched by the paper tape unit. If prepared off-line, it should include carriage returns to terminate each line, just as if entering data on-line, plus explicit line feeds to obtain legibility on the terminal printer during preparation and transmission. The carriage return and line feed must be followed by two rubout characters for terminal timing considerations.

Command language may not be included on the tape. The input should be preceded by several rubout characters and terminated by an X-OFF followed by several rubout characters. Neither the X-OFF nor the rubout characters will appear in the file.

As with keyboard input, a maximum of 160 characters is permitted per line of paper tape input. Excessive lines will be truncated at 160 characters, with the remaining data placed in the next line. A maximum of two disk links (7680 words) of paper tape input will be collected during a single input procedure, except in LUCID mode, which has a limit of six links. All data in excess of two disk links will be lost.

Building File from Non-ASCII Paper Tape

In order to supply file building input from non-ASCII paper tape (unaltered eight-bit codes), the user gives the command LUCID instead of TAPE. The system will read in the tape and store the data on a file without editing or parity modifications. The system does not delete or act on any characters in the data stream, such as DEL, X-OFF, CR, etc. The input will be terminated when a pause of over one second occurs in the data transmission. Termination does not require an X-OFF character, as does normal paper tape input via a DATANET 355 Front-End Network Processor.

NOTE: LUCID cannot be used if data communication is via a Low Speed Line Adapter (LSLA) on a DATANET 355 processor.

During paper tape input via a DATANET 355 processor, the paper tape input will stop when an error message is to be sent to the terminal.

Automatic Paper Tape Input

At any point during the operation of the Time-Sharing System and at a time when the user must supply keyboard input, a previously prepared paper tape in special format may be used to simulate a sequence of responses, one line at a time. The system need not be in build mode and direct (i.e., conversational) responses, file building input, and/or commands may be entered.

This feature allows the preparation of a paper tape for input to the Time-Sharing System and/or subsystem(s) prior to connection with the system and allows terminal operation without supervision during the connection. Such paper tape input may be for a specific subsystem or production program execution only, or may include anything from log-on through log-off procedures. Obviously such a tape must be error free.

The required format for each input line is as follows:

data string (up to 80 characters)
carriage return
X-OFF
RUBOUT (may be multiple, but one is minimum requirement)

Character-delete control characters may be used. Line-delete controls must be used as follows:

data string (to be deleted)
(line-delete control) character
X-OFF
RUBOUT (one is minimum)
corrected data string
carriage return
X-OFF
RUBOUT

NOTE: Parity errors encountered during paper tape input may cause the terminal to be disconnected.

It is suggested that extraneous line feeds not be included in the tape. If, however, the user desires line feeds for terminal printer legibility, they should be either between the data string and carriage return, or one line feed immediately following X-OFF.

To initiate automatic paper tape input, the user should position the tape and start the reader at any time that keyboard input is required.

The terminal is automatically disconnected if no input is received within 10 minutes of the request for such input, whether via paper tape or keyboard.

KEYBOARD/DISPLAY TERMINAL OPERATION

The keyboard/display terminals are cathode-ray tube display devices which are similar in operation to the teleprinter terminals. This section describes operation of some of the types of display devices commonly used with Series 6000 systems, these are:

- DATANET 760
- Visual Information Projection (VIP) types 765, 775, 785 and 7700

The keyboard for VIP types 775 and 785 is shown in Figure 4-1. Most of the display devices have a similar keyboard. Some of the keys and their function are discussed here, but for a complete description, the user should refer to the manual for the specific device.

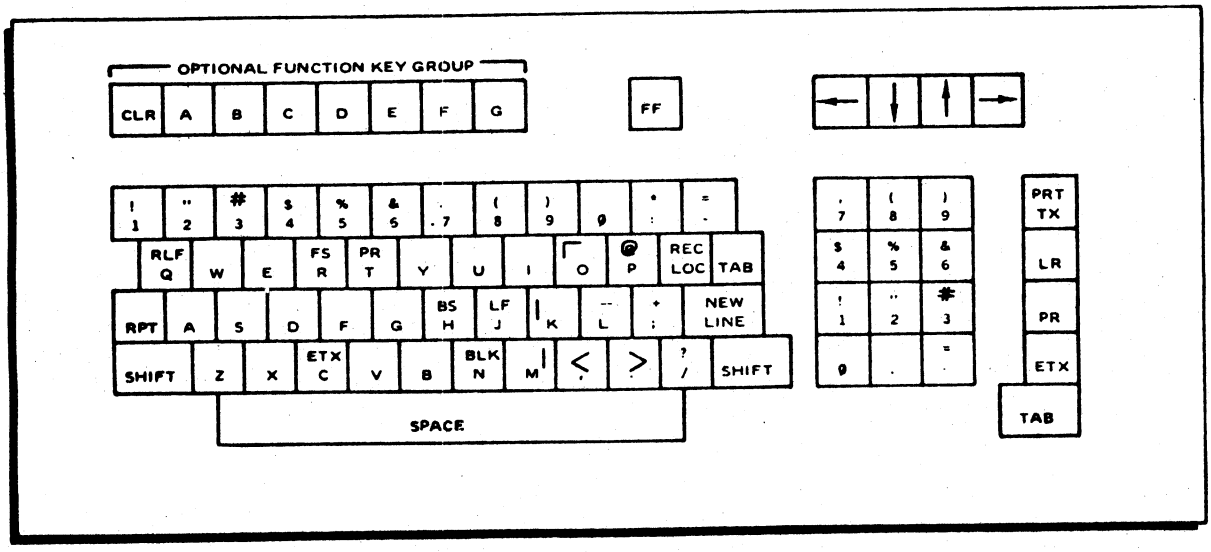


Figure 4-1. Type 775 and 785 VIP Keyboard

General Characteristics

The Time-Sharing System can interface with the DATANET 760 and VIP types 765, 775, 785 and 7700. Both synchronous and asynchronous units are available, with line speeds of 1200, 2000, 2400 or 4800 bits per second. A complete page of input may be composed before transmission to the Time-Sharing System, and a complete page of output may be displayed. The page consists of 26 or 22 lines, depending on the model. (See the chart below.) Note that a complete page may display up to 2024 characters (VIP 785).

NOTE: The number of characters transmitted or received is subject to limitations of the terminal. Also the user should reference the manuals, NPS/30 Programming Reference and GRTS Programming Reference.

DATANET 760	VIP 765	VIP 775	VIP 785	VIP 7700	
46	46	46	92	46	Char/line
26	22	22	22	22	Max. lines/page
1196	1012	1012	2024	1012	Max. Char/page
C	||	||	||	||	End of text (ETX) symbol
T	none	none	none	none	Transmit indicator
P	none	none	none	none	Print indicator
R	none	none	none	none	Receive indicator

The keyboard/display terminals differ significantly from the keyboard/printer terminals in entering data. As mentioned above a complete page can be entered by one transmission; also while the user is composing his input from the keyboard, the terminal is in effect off-line since no data is transmitted until the user initiates the proper transmit procedure.

CAUTION: The system automatically disconnects any terminal which does not input (transmit from the terminal) within ten minutes.

Also when a user requests output (e.g., LIST), only a full page is sent even though the file could be longer. The remainder of a file may be displayed, a page at a time, by continued requests for transmissions until the end-of-file is reached.

NOTE: When a file exceeds one page, continued requests for more output (PR) will not clear the screen, and the second and succeeding pages will overlay the current display. The Form Feed (FF) key is convenient for clearing the screen after displaying a page.

Data Display and Transmission

The keyboard is similar to that used with hard-copy type terminals. Most of the keys are in the same physical location on the keyboard. Although the user should depend upon the instruction manual accompanying the unit for the function of special keys, some of those special keys are discussed here.

After the unit is turned on and allowed time to warm up, an entry marker should appear in the upper left-hand corner of display unit. This entry marker is the position on the display where the next character or space will be entered. As a key or space is struck the entry marker advances to the next position. When the end of a line is reached, the entry marker will move to first character position (left side) of the next line. When the end of the last line on the page is reached, the entry marker moves to the top of the screen, first character position.

NOTE: The entry marker can be positioned by the use of special keys without changing or clearing the display. The most obvious are the four arrow keys. Some devices, see Figure 5-1, have line return (LR), page return (PR), new line, backspace (BS), forward space (FS), keys which also position the entry marker without changing the display.

The entry marker also marks the point where transmission to the computer is to begin. For example to enter one line, possibly a one-word command, the steps are as follows:

1. Type the word or words: LIST
   The entry marker will now appear at the space following the "T" in LIST.

2. Depress ETX, end of text. The ETX symbol is two vertical lines (||) or C.

3. The entry marker moves another space and must be moved to the first letter to be sent, "L" in this case. LR, line return, will return the marker to the beginning of the line or with the backspace key (←).

4. Depressing TX (transmit) will send the line, LIST, to the system.

On some keyboard/display terminals the transmit sequence (ETX, LR, TX) is generated by depressing a single function key.

In general, a transmission is bracketed by the position of the entry marker, and end of text which may be one or more lines.

Log-On

After turning on the unit, the user should allow time for it to warm up. Some units require approximately 30 seconds to warm up. The entry marker should appear on the screen before continuing.

When the keyboard/display unit is ready, the user dials the number of his time-sharing center. The following is a typical log-on procedure (user responses are underlined; comments in parentheses):

```
$*$SC PASSWD,NN,TSS
(screen is cleared by the system)
112501
HIS SERIES 6000 ON DATE AT TIME CHANNEL NNNN

USER ID -
UR-IDENT
PASSWORD - -
TWXCKLMEPURD      (mask for password)
URPASWRD          (cannot hide password)
SYSTEM?           (Form Feed could be used to clear the screen)
BASIC
(Screen cleared by system)
```

Where: SC - user selected station code

PASSWD - password

NN - number of lines per page: 04, 08, 16, 22, or 26

The initial log-on input:

$*$SC PASSWD,NN,TSS

is a requirement of the particular system configuration and may vary. The users should be notified by their computer operations group as to the exact format required at the site. The message:

TERMINAL DISCONNECT ISP

is displayed to notify the user that the log-on was incorrectly entered. Since the terminal is still on-line, the user may attempt to enter a corrected log-on message. It is not necessary to re-dial.

Since it is not possible to enter and conceal a password on a keyboard/display device, the user may elect to depress Form Feed (FF) after transmitting the password. It is not necessary to wait for the SYSTEM? response.

Log off

Logging off and the log-off message is identical to that for the teleprinter. However, in addition to the BYE command the display units may be disconnected with the command, "$*$DIS".

Unique Features

In addition to the log-on procedure, the following features are unique to the keyboard/display terminals.

- The AUTOMATIC command cannot be used.
- More than one line of data may be transmitted to or received from the system at one time.
- Special character-delete and line-delete control characters are not applicable, as all errors may be corrected by positioning the entry marker over the erroneous character and typing the correct one.

- A LIST or other output commands will display only one page, up to 2024 characters. If a file is longer than one page, the remainder of the file may be displayed by either depressing the print (PRT) key or repeating the output command.

- A "BREAK" (interrupt) signal is transmitted to the system by means of the following control message:

  $*$BRK

  This message can be used to interrupt some lengthy output process, such as the unwanted remainder of a long listing, or to interrupt execution of a user's program.

- With the use of algebraic subsystems BASIC and ABACUS, the up-arrow (↑) symbol used as the exponentiation operator is replaced by a BLK (blink) character preceding the exponent. The blink character itself is displayed as a blank, and causes the exponent character(s) following the blank, in turn, to blink.

SECTION V

SERVICE SUBSYSTEMS AND PROGRAMS

ABACUS SUBSYSTEM

The ABACUS (ABC) subsystem is an algebraic-expression evaluator that may be called either at the subsystem selection level or at the command language level. The function of ABACUS is that of a powerful desk calculator, with the ability to calculate and remember the value of symbolic variables. It also features summation operation and employs commonly used mathematical constants and functions.

Use of ABACUS

SYSTEM ?ABC (if at subsystem selection level)

or

*ABC (if at command level)

The initial call (SYSTEM? or command level) may contain, on the same line, the expression to be evaluated; e.g., *ABC 1.379↑2. Otherwise, ABACUS issues a question mark (?) as a request for input. The possible forms of input are:

? expression	
? x = expression	where x is a variable
? FOR x = a,b,c; expression in x	where a,b,c specify a range of values for x
? FOR x = a,b,c; y = expression in x	where y is also a variable

From one to three FOR specifications may be employed before the expression, separated by semicolons; i.e., FOR x = ...; FOR y = ...; FOR z = ...;.

The results of each expression evaluation are printed immediately. ABACUS then issues another request for input (?). A null response (.i.e., carriage return only) or DONE causes an exit from the subsystem.

An expression is composed of operators, numbers and/or variables, and/or constants and functions, conforming to ordinary arithmetic and algebraic rules. The permissible operators are:

```
+ (addition)
- (subtraction)
* (multiplication)
/ (division)
↑ (exponentiation)
& (summation)
```

Parentheses may be used to indicate grouping of operations, according to standard usage.

Numbers

Numbers may be written as:

```
Integers:  e.g., 1, -25, 7063
Fractions:  e.g., .1, -.0005, .3681400
Mixed numbers:  e.g., 1.5, 812.764
Scientific notation:  e.g., 1E10, 2.41E-3, -3215E7
```

Numeric operands may contain up to 18 significant digits. Printed result values are limited to a maximum of seven places in the fractional part. Precision is kept internally to 18 places, however.

Variables

Variables (names to which numeric values can be assigned) are composed of one to eight alphanumeric characters, the first of which must be alphabetic; e.g., A, B5, SUMSQUAR. There are two types of variables, according to usage: (1) FOR variables, i.e., those defined in a FOR specification, and (2) label variables; these appear on the left of an equal sign but not preceded by FOR. In input of the form "X = expression", X is a label variable. The distinction to be noted between the two types is that label variable values are remembered between expression evaluations. The values assigned to a FOR variable hold only for the expression associated with the FOR specification(s); they are not remembered for a subsequent expression. For example:

```
? X = SIN (30/RADIAN)          (X is a label variable)
X = +0.5                     - (answer)
? X ↑ 2*27.9
+6.975                       - (answer)
```

Constants and Functions

Constants and functions available in ABACUS are:

Constant Name	Predefined Value
PI	3.14159... } internal precision to 18 significant digits
RADIAN	57.295..... } internal precision to 18 significant digits
E	2.71828... } internal precision to 18 significant digits

Function Name	Meaning
ABS (x)	Absolute value of x
ATN (x)	Arctangent of x
COS (x)	Cosine of x
EXP (x)	e to the power of x
LOG (x)	Natural logarithm of x
SIN (x)	Sine of x
SQR (x) or SQT (x)	Square root of x
TAN (x)	Tangent of x

For trigonometric functions, x denotes an angle measured in radians.

Function names are reserved words; i.e., they cannot be used as variable names. Constant names are not reserved; actually they are remembered variables with preset values. Their value may be changed by using the name as a label variable.

Summation Operator and FOR Variables

The summation operator, &, may only appear at the beginning of an expression, and the entire portion of the expression following it is assumed to be the argument to be summed (regardless of the use of parentheses). From one to three variables may be given a range of values for the summation by means of FOR statements.

The FOR statement(s) must precede the associated expression in the same line of input, separated by semicolons. The form of the FOR statement is:

```
FOR x = a, b, c;
```

Where: a - Initial value of x.
b - Limiting value of x.
c - Step value or increment (optional).

If the step value, c, is not specified, 1 is assumed. Substitutions for a, b, and c may be positive or negative integers, expressions, or predefined variables.

For example:

```
? FOR X = 1, 5;  FOR Y = 7, 50,9;  Z = &(X+Y)*PI
Z = 2199.1149
```

In summations, all FOR variables are treated as summation indices and in the case of summations over two or three FOR variables, the indicated summations are nested. Each summation variable takes on the values a, a+c, a+2c,...up to but not exceeding the value b. Thus the expression above would expand as follows:

$$Z = \sum_{X=1,2,\ldots}^{5} \quad \sum_{Y=7,16,\ldots}^{43} (X+Y)$$

$$Z = ((1+7)\pi + (1+16)\pi + (1+25)\pi + \ldots + (5+34)\pi + (5+43)\pi)$$

Although an expression containing a summation operator must be preceded by one or more FOR specifications (in order to be meaningful), FOR variables may also be used in expressions that do not contain the & operator. For example:

```
? FOR A = 3,11,2;  FOR B = 1,3;  X = A ↑ B
```

In these cases, the expression will be evaluated separately for each possible combination of FOR values (as is done in FORTRAN). The output from the example expression just above would appear as:

A	B	X
3	1	3
3	2	9
3	3	27
5	1	5
5	2	25
5	3	125
7	1	7
7	2	49
7	3	343
9	1	9
9	2	81
9	3	729
11	1	11
11	2	121
11	3	1331

If a label variable is used, as in the above example (X), the last determined value is remembered for the variable.

Continuation Lines

ABACUS accepts only one expression at a time, with or without associated FOR specifications. Normally, this is represented on one line of terminal input. If, however, the expression (with any preceding FOR specifications) requires more than one line, the first line can be terminated with a $ plus carriage return combination--rather than a carriage return only. This denotes the next line to be continuation of the first, and ABACUS responds with another input request (?).

Order of Evaluation and Use of Parentheses

Expressions are evaluated from left to right, with operations performed in the following order:

1. functions
2. ↑
3. * and /
4. + and -
5. &

Care must be exercised, especially with regard to successive exponentiation, to ensure that the order of evaluation implied by the above rules is the order intended. If the intention is otherwise, parentheses must be used to force the desired order of evaluation.

All operations within a subexpression enclosed in parentheses will be performed before any operations to the right of that subexpression. Grouping of operations to any depth may be indicated by means of nested sets of parentheses. An exception is the summation operator, &, which may not be enclosed in parentheses.

Implicit multiplication is allowed preceding a parenthesized subexpression, but not between two such subexpressions. For example: 3(x) is equivalent to 3*(x); but (x) (y) is illegal, and must be written as (x) * (y).

The argument of a function, which may be any expression, must be enclosed in parentheses.

Mode and Precision of Calculation

All calculations are performed in double precision floating-point, with consequent precision (but not accuracy, necessarily) to 18 places. Displayed results are limited to a maximum of seven places in the fractional part (rounded), but 18 significant digits are carried internally. This may result in a small discrepancy between displayed intermediate and final results, in a sequence of related evaluations.

ASCII-TO-ASCII CONVERSION SUBSYSTEM

ASCASC Subsystem/Command

The Series 6000 FORTRAN, TSS ALGOL and TSS JOVIAL language systems require the following translations between the time-sharing format ASCII data files media code 5 and the standard system format ASCII data files media code 6: ASCII media codes are described in the Series 600/6000 Time-Sharing System Programmer's Reference Manual, in Section VI.

- Time-sharing format ASCII files may be converted to standard system format ASCII files to be used as input data for Series 6000 FORTRAN, TSS ALGOL, and TSS JOVIAL.
- Standard system format ASCII files must be converted to time-sharing format ASCII files which can be listed at a terminal.

The ASCASC subsystem performs these translations. ASCASC may be called at the subsystem selection level or at the command level at the build input level of the language system requiring the translation. The format of ASCASC is as follows:

ASCASC filedescr 1; filedescr 2

Where: filedescr 1 - Input file to be converted

filedescr 2 - Output file to be created

Execution

In the execution of the ASCASC command, the input file is read and converted to the format required for the output file. The input file's record control word is checked to determine the format of the file. If the record media code is 5, the file is in time-sharing ASCII format. If the record media code is 6, the file is in standard system ASCII format. Based on this determination, one of the following translations is performed:

1. If the input file is in time-sharing ASCII format (character-oriented file), the characters in the file are read and converted to the word-oriented standard system ASCII format for the output file.

2. If the input file is in standard system ASCII format, the words in the file are read and converted to the time-sharing ASCII format for the output file. Up to 72 characters will be converted.

If neither record media code 5 or 6 is found in the record control word, a message is sent to the user to tell him that the file he specified is not an ASCII file.

FILE SYSTEM

The Series 6000 Time-Sharing System utilizes the capabilities of the GCOS file system, which is a logical mechanism for storing and retrieving permanent files and is common to all system programs operating under the Comprehensive Operating Supervisor (GCOS). A file system can store many files on many unspecified external, background storage devices, and the user normally need not be concerned with the device his file is on nor with the characteristics of the device.

File System Structure

The file system is described in detail in the GCOS File System reference manual. However, the main features of interest to the time-sharing user are repeated here.

The file system is a tree structure whose origin is the system master catalog. The primary nodes of the tree are user's master catalogs; the lower level nodes are subcatalogs created by the user. The terminal points of the structure are the files themselves. The file system has a limit of seven levels for either building or accessing files. Figure 5-1 shows the file system's hierarchical structure.

Catalogs and Files

A catalog consists of a definition containing a catalog name, password, and permissions. Since it contains no user data, a catalog can be neither read nor written except by the file system itself. An ACCESS function is provided, however, to direct the file system in the creation and modification of subcatalogs.

A file, as known to the GCOS file system, consists of a definition containing file name, file size, password, permissions, and a description of the physical file space. The file definition is distinct from the physical file space which may contain user data and can be read or written.

Passwords

Passwords may be attached to any catalog or file. A password allows a user to traverse a catalog/file string. A user can get to a given catalog or file only if he can give the passwords for all higher level catalogs in the string. (When traversing a string, a password must not be given if none has been attached.) The originator of a given string is required to give the necessary passwords when traversing a string.

Permissions

When a file or catalog is created or modified, the creator or modifier may specify what actions are permitted on the file, catalog, or subordinate files or catalogs by what users. Permissions may be specified for anyone, in general, or for specific named users. Specific permissions replace, not extend, general permissions. Both general and specific permissions may be specified for a catalog to apply to subordinate files or catalogs. When there are several levels of subordination, the permissions at each level are accumulated.

Permitted Actions

The actions listed below are permitted. Some actions apply only to a file, and if the permission is given for a catalog, it implies permission to perform the action for subordinate files. Other actions apply either to a file or catalog. One action - create - applies only to a catalog.

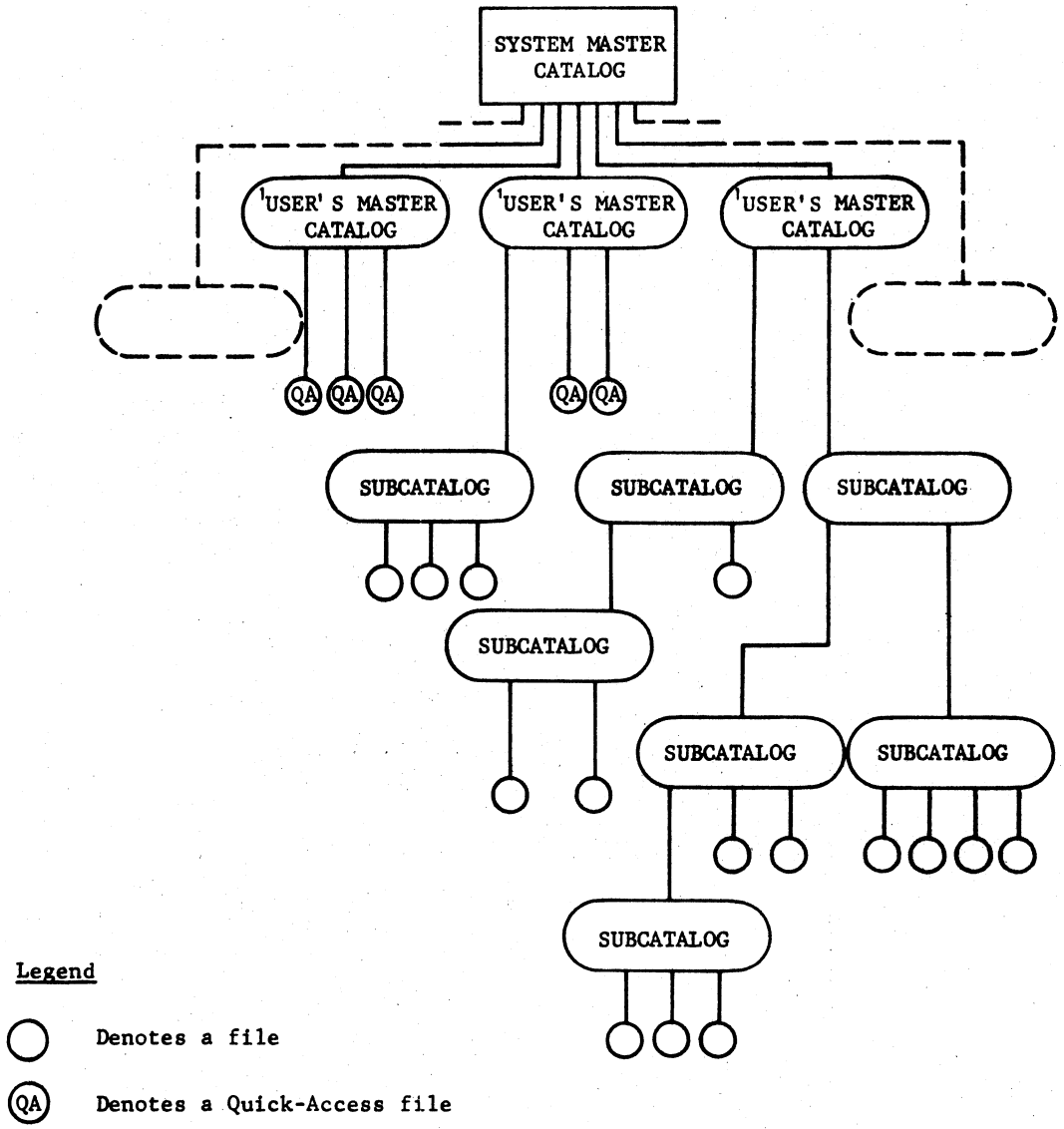
READ or R	Allow transfer of information from file to program but not from program to file.
WRITE or W	Allow transfer of information both from file to program and program to file. Anyone with WRITE permission, thus, has READ permission.
APPEND or A	Allow transfer of information only from program to file and then only to the part of the file identified as its current end. Anyone with WRITE permission has APPEND permission.
EXECUTE or E	Allow transfer of information from file to program but only for a compiler or loader. Once these have done their work, do not allow any transfer between program and file. Anyone with READ permission (or WRITE since it indicates READ) has EXECUTE permission.
RECOVERY or REC	Allow WRITE when file is abort locked or has defective space. Anyone with RECOVERY permission is also given permission to WRITE and hence READ.
PURGE or P	Allow file to be deleted (file description to be deleted and file space to be returned with or without prior overwrite of space) or catalog to be deleted and all subordinate files to be deleted. Anyone permitted to PURGE can also perform any of the actions permitted by RECOVERY, including WRITE and hence READ.
CREATE or C	Allow files and catalogs to be entered as subordinate to this catalog.
LOCK or L	Allow a user to security lock the file or catalog (which security locks subordinate files) or to remove an existing security lock. A security lock does not apply to a user with LOCK permission (since they are able to remove the lock).
MODIFY or M	Allow catalog or file description to be modified and allow entries to be made in catalog for subordinate files or catalogs. Anyone permitted to MODIFY is allowed to perform any actions since he could change permissions to give himself permission to perform these. Hence MODIFY includes CREATE, LOCK, and PURGE, which in turn includes RECOVERY and hence WRITE and READ.

General, Specific, and EXCLUDE Permission

A permission given to everyone is called a general permission; one given only to a named user is called a specific permission. If a file or catalog has both general and specific permissions specified for it, the general permissions applies to everyone except those users named in specific permission specifications. A general permission to WRITE, for example, can be restricted to a READ permission for a particular user by naming the user with a specific READ permission.

A user never has both the permissions specified for everyone and also those specified specifically for him. The user has only those permissions specified specifically for him, or if there are none, then those specified for everyone.

In order to restrict a user from all general permissions without at the same time giving him some permission, the user can be named in an EXCLUDE permission. The EXCLUDE, which is only a specific permission, withdraws general permissions from the named users without giving them any specific permission.



All user-ID's must be unique within the system; all subcatalog and file names are automatically qualified by the user's master catalog name and the names of any intermediate subcatalogs. The system master catalog cannot be accessed by the normal user.

---

[1]Identified by the user-ID.

Figure 5-1. Logical Structure of the File System

When operating under the Time-Sharing System, each file requested by a NEW or OLD command is a temporary working file, called the current file, that will disappear at the end of a user's session at the terminal unless he saves it. In the case of OLD, the current file is effectively a scratch copy of the named permanent file, allowing modifications to be made and tested without changing the original OLD file, unless the user explicitly resaves on that file.

File content is written (i.e., stored) on a permanent file only by means of the SAVE or RESAVE commands. In addition, the SAVE command implicitly causes the file to be created. If the file named by the SAVE command does not already exist, the system automatically creates a permanent, external file and writes the contents of the current working file onto it. If the SAVE operand consists simply of a file name, the file created will be of the quick-access type. This type file emanates directly from a user's master catalog without intervening subcatalogs (see Figure 5-1). If a catalog-string precedes the file name in the SAVE operand, the subcatalog(s) named was previously created via the ACCESS subsystem.

If the file to be written on already exists (whether created by a prior SAVE, by ACCESS, or by a batch activity), a RESAVE command causes the contents of the current file to be written to the named permanent file, replacing whatever contents existed in the named file.

If the characteristics of the quick-access type of file are suitable to the user's requirements, the command language facilities offered by the system are sufficient; ACCESS need not be used. The OLD and GET commands, for example, offer full retrieval capabilities for files of any type or level.

ACCESS SUBSYSTEM

Capabilities

For users who wish to utilize some or all of the capabilities of the file system, the ACCESS subsystem provides an interface. This interface allows the user to perform the following:

- Create hierarchical structures of subcatalogs and files.
- Attach passwords to his subcatalogs and files.
- Give general permission to all other users to access his files in specified ways.

- Give specific permissions, by user-ID.
- Protect a given file or set of files against any mode of access.
- Gain the permitted types of access to another user's files.
- Gain the permitted types of access to files created in the batch-processing environment.
- Modify catalog name, password, and/or permissions on an existing catalog.
- Modify file name, size, password, and/or permissions on an existing file.
- Purge or release an existing file or catalog/file string.
- List all catalogs and files which emanate from a given catalog.
- Rename files temporarily for a given job.
- Create a random file with a logical-record-size attribute, if such a requirement exists.

Use of ACCESS

ACCESS consists of a number of functions which provide a conversational facility for the following:

- Creating and purging/releasing catalogs and files.
- Modifying catalog and file attributes (name, size, password, permissions).
- Accessing and deaccessing files.
- Listing catalogs and files.

The operation of ACCESS consists of responses, via the terminal, to a sequence of English language questions. All of the standard vocabulary associated with the user's responses may be abbreviated for convenience in input. A nonconversational short form of input is also provided for more experienced users and users with batch FILSYS experience.

ACCESS is not a means of reading or writing permanent file content. OLD and SAVE/RESAVE perform these functions. ACCESS is selected before proceeding to a desired processing subsystem; it is used for example to create a file (i.e., the file definition and the file space), before the substantive file is built under another subsystem. The OLD/NEW sequence and the SAVE/RESAVE commands of the succeeding subsystem(s) are still applicable.

Using the ACCESS subsystem, a file may be created at the system level by specifying the ACCESS subsystem name, the create command short form (CF), and the file description in one string in response to SYSTEM?. For example:

```
SYSTEM?ACCE CF,/CAT1$PASSWD1/CAT2$PASSWD2/FIL1$PASSWD3,B/1,3/,R,
```

The creation of the file is performed as in the conventional question-response sequence in the ACCESS subsystem. After this function is performed by ACCESS, the user is returned to the function selection level.

NOTE: If (1) the ACCESS command and the function to be performed are entered on a single line, (2) no error is encountered while processing the function, (3) continuation input does not have to be requested, and (4) the input line is not terminated by the delimiter * or **, the user will be immediately returned to the calling level (SYSTEM? or build mode) upon completion of performing the function. Neither the "SUCCESSFUL" message nor the request for a new function will be issued. For example:

SYSTEM? ACCE CF,NEWFIL,B/4/

would result in the SYSTEM? question being reissued with no intervening output.

If a nonconversational ACCESS request is terminated by the delimiter "*", ACCESS will perform the indicated function and automatically switch to conversational mode, retaining the catalog structure of the nonconversational request. If "**" delimits the request, the FUNCTION? message will be issued. Although this is normally done in nonconversational mode after performing a function, the "**" delimiter provides a means of cancelling the effect of the above. For example:

SYSTEM? ACCE CF,NEWFIL,B/4/**

would result in issuing the FUNCTION? request upon completion of performing the CF function.

Some general rules can be cited for the use of ACCESS.

1. The ability of a user to access files and otherwise manipulate catalog/file structures (e.g. modifying and purging) depends upon his knowing the necessary file definitions. Beyond this, the file system has two file and catalog protection features--passwords and permissions.

   Permissions provide the file creator with a positive protection feature. If permissions are not explicity granted, his catalogs and files are completely protected by default. The user must assign to others any degree of access he wishes them to have. But, since specific permissions for a given user do not add to, but replace, any general permission that may have been given, specific permissions may be used to exclude a given set of users from one or more types of access.

Passwords provide an additional level of protection. If passwords are assigned by the creator of a catalog/file string, they must be supplied in order to pass through the string.

The creator of a catalog/file string is exempt from any ACCESS mode restrictions he imposes (i.e., he implicitly has all permissions for his own catalogs and files), but he must give all passwords.

The MODIFY permission, which allows another user to change file names, catalog names, file size, passwords, and/or permissions, also implies the ability of this other user to create catalogs and/or files emanating from the master catalog.

2. The definition of a particular catalog or file must include the names of all higher level catalogs that must be traversed to arrive at that point. The catalog string would include at least the user's master catalog. A file definition, then, is the complete catalog string plus the file name.

3. Each user's master catalog must be created for him before he can use the system. It has no password or permissions associated with it, and is unalterable. The installation usually controls the generation of this catalog.

4. If a delimiter immediately precedes the carriage return for an input line, the question MORE? is issued to the user requesting continuation input.

Identifiers and Delimiters in User Responses

User responses are composed of the following:

- Identifiers
- Keywords
- Word delimiters
- Line delimiters

Identifiers consist of file names, catalog names, user-IDs and passwords. They can be composed of alphabetics, numerics, periods, and minus signs. Each identifier can be up to 12 characters in length except for file names, specified with the Create File and Deaccess File functions, which are limited in length to eight characters.

In response to the question FILE NAME?, issued by the Access File function, a file name of up to 12 characters may be specified (i.e., the name of a batch-environment file), if followed by an alternate name of eight characters or less, enclosed in quotation marks. In response to FILE TO BE PURGED?, a file name of up to 12 characters could be specified, if the file to be purged were not created in the Time-Sharing System environment.

Keywords consist of function names, access types (permissions), and several file type parameters, of limited interest. Keywords are used in responses to questions. All keywords, except EXCLUDE, DELETE and GEN'L, can always be abbreviated to the initial character, or a two-character acronym in the case of function name (e.g., R for READ permission or CC for Create Catalog function).

The file size specification in the response to FILE NAME, SIZE (IN LLINKS), MAX SIZE, MODE? (Create File function), is a decimal number denoting the number of blocks required. This may be considered a special case of a keyword. MAX SIZE may be omitted, in which case the maximum size will be as specified for the initial size. If the MAX SIZE is to be unlimited, the letter "U" may be given.

Word delimiters are the slant or virgule (/), the dollar sign, and the comma. Blanks may be used freely in responses except within function names; they are in no sense delimiters and are ignored.

WORD DELIMITERS

The / delimiter has two functions:

1. In catalog-strings, / indicates that a subcatalog name follows and is concatenated to the preceding catalog in the string. An initial / indicates that the following subcatalog-string (if any) is concatenated to the user's master catalog. A response to CATALOG STRUCTURE TO WORKING LEVEL? of / and carriage return is equivalent to the user's own user-ID; i.e., it positions the user to his own master catalog.

2. In specific permissions, a / indicates that a user-ID follows.

The $ delimiter is used only to concatenate a password to a catalog or file name.

The , delimiter is used as a general separator for keywords; i.e., for separating access types and sizes, and separating file names from following keywords or sizes.

LINE DELIMITERS

The line delimiters are a carriage return, an asterisk plus carriage return, or a double asterisk plus a carriage return. Each of these serves to terminate a response, but with a different effect.

1. A carriage return following a response generally signifies that the user wishes to remain at the same catalog position (if relevant), and proceed to the next question in logical sequence. This may be the next question in a set, or the initial question again.

   When only a carriage return is given, (i.e., a null response) however, it has several possible meanings:

   - In response to the question CATALOG STRUCTURE TO WORKING LEVEL? a carriage return only is equivalent to the user's own user-ID or a / and carriage return. Any of these responses requests that the user be positioned to his own master catalog.

   - A carriage-return only following a question that logically requires a response (e.g., NEW CATALOG NAME?), causes an immediate return to the question FUNCTION?.

   - The question SPECIFIC PERMISSIONS? recurs each time a response is given (delimited by a carriage return), since only one set of specific permissions can be given in each. If only a carriage return is given, the information received so far is processed, and the first question below CATALOG STRUCTURE TO WORKING LEVEL? is reissued (i.e., NEW CATALOG NAME? or FILE NAME,SIZE(IN LLINKS),MAX SIZE,MODE? allowing a new catalog or file to be created at the same catalog level.

   - A carriage-return only or the response DONE to FUNCTION? causes the subsystem to terminate.

2. If a single asterisk plus a carriage return is given in reply to a question, either with or without a substantive response, ACCESS processes the information it has and returns to the first question at the same catalog level (e.g., to skip any further questions in the set). ACCESS, of course, must have sufficient information to process.

3. If a double asterisk plus a carriage return is given, either with or without a substantive response, ACCESS processes the information it has and returns to the question FUNCTION?. It implies that the user is finished with the current function. ACCESS, of course, must have sufficient information to process.

4. Multiple operations for a function can be specified on the same line (delimited by semicolons) for any nonconversational ACCESS function. For example, to create two files, FILA and FILB, subordinate to CAT1, the following input could be entered:

```
CF,/CAT1/FILA,B/1,12/,R;/CAT1/FILB,B/1,12/
```

ACCESS Functions

The initial communication from ACCESS, following subsytem selection, is a request for a choice of function; i.e., FUNCTION?.

The functions that may be requested and the effect produced by each function are as follows (function may be spelled out or abbreviated as indicated by the underlining):

CREATE CATALOG	- Creates a subcatalog.
CREATE FILE	- Defines file space and attributes for a given file name.
ACCESS FILE	- Brings a file into the Available File Table.
DEACCESS FILE	- Takes a file out of the Available File Table.
MODIFY CATALOG	- Modifies the name, password, and/or permissions associated with a given catalog.
MODIFY FILE	- Modifies the name, maximum size, password, and/or permissions associated with a given file.
PURGE CATALOG	- Deletes a catalog from the system along with any subcatalogs and files which are subordinate to it. All released file space is overwritten.
PURGE FILE	- Deletes a file from the system, overwriting the released file space.
RELEASE CATALOG	- Deletes a catalog from the system, along with any subcatalogs and files which are subordinate to it. Any released file space is not overwritten.
RELEASE FILE	- Deletes a file from the system, but without overwriting the released file space.
LIST CATALOG	- Lists the names of the catalogs and files which emanate from this catalog.
LIST SPECIFIC	- Lists in detail the description of the catalog or file specified.

Following the response to FUNCTION?, ACCESS asks the user to describe the catalog-string, catalog, or file. Each function has a fixed set of questions, with several of the questions common to each set. Some of the questions do not logically require a response; e.g., PASSWORD? (there may be none). If no response is applicable, only a carriage return is given.

All the functions, except DEACCESS FILE, first request a definition of the existing catalog-string. Then the name of the catalog or file to be processed is next, along with size attributes in the case of a file. Passwords and permissions are then requested, as appropriate.

SHORT-FORM USAGE OF ACCESS FUNCTIONS

Once the user has become familiar with the conversational, or question/response sequence, form of ACCESS, he may use a short form of function specification which effectively eliminates questions normally asked. In this short form, the function name (e.g., CREATE FILE) is followed directly by all the user-entered information needed to complete the function specification, usually all on one line. Each item of information is separated from other items by commas.

The information entered in this short form is much the same as that given as responses in the conversational mode, but with additional keywords. The format is similiar to that of the batch file system (FILSYS) input.

The general format, in response to the initial question FUNCTION?, is:

function-name, catalog/file string, option, ..., option

Where: catalog/file string is the same as in conversational responses, and options are:

Form	Function
PASSWORD PASS } /password/	password assignment
access-type	general permissions
access-type/ user-ID,...,user-ID/	specific permissions
BLOCKS LLINKS SIZE LINKS } /x,y/	size assignment
MODE/mode/	mode assignment
LRS/SIZE/	logical record size
DEVICE/name or type/	request a specific device name or type and must be specified as follows: DSS200 MDS200 DSS167 DSS170 DSS180 DSS181 DSS190 DSS191 DSS270 MSS800
AF OPEN }	access file after creating it
CLEAR	zero (erase) file space after creating and accessing it

Access type and mode are defined under each applicable function description. Options may appear, comma separated, in any order. The keywords BLOCKS and LINKS may be abbreviated to the first letter, as may the access-type and mode options. Options unique to the Modify Catalog and Modify File functions are described along with those functions.

All replies may be extended to two or more typing lines by terminating a line with a word delimiter (slant, comma, or dollar sign plus carriage return), at a convenient point, implying that the input is not complete but is to be carried over to the next line or lines.

QUESTIONS AND RESPONSES

Sets of questions associated with each function follow, along with the general form of the response to each question. The minimum required user response is underlined for illustrative purposes. Each set is followed by illustrative examples.

CREATE CATALOG

FUNCTION? CC

CATALOG STRUCTURE TO WORKING LEVEL?

user-ID/cat-name$password/.../cat-name$password

NEW CATALOG NAME? cat-name

PASSWORD?
XXXXXXXXXXXX

GENERAL PERMISSIONS? access-type,...,access-type

SPECIFIC PERMISSIONS? access-type,...,access-type/used-ID/user-ID/...

The access-types follow; all may be spelled out, or abbreviated as underlined; except for EXCLUDE and LOCK, which must be spelled out:

PERMISSION	ACCEPTABLE ABBREVIATION	ATTACHES PERMISSION(S)
READ	R	R,E
WRITE	W	R,W,A,E
APPEND	A	A
EXECUTE	E	E
PURGE	P	R,W,A,E,P,REC
MODIFY	M	R,W,A,E,P,M,L,C,REC
LOCK	(none)	LOCK
CREATE	C	C
RECOVERY	REC	R,W,A,E,REC
EXCLUDE	(none)	EXCLUDE (specific permission only)

If no response to the question SPECIFIC PERMISSION? is given, (i.e., only a carriage return), the catalog is created and the question NEW CATALOG NAME? is reissued.

Example replies (user responses are underlined):

FUNCTION? CC

CATALOG STRUCTURE TO WORKING LEVEL?

JDOE/CAT1$ABC

This response states that there is a subcatalog named CAT1 that is concatenated directly to the user's master catalog identified by the user-ID JDOE, and that it is desired to create a new catalog from this level. The password ABC was attached to catalog CAT1 when it was created.

NEW CATALOG NAME? CAT2

This response indicates the name of the catalog, CAT2, created at this point.

PASSWORD?

A carriage return alone would indicate that no password is to be assigned.

GENERAL PERMISSIONS?

The lack of a response here indicates that general permission is not granted at this level. A response of READ would indicate that any unspecified user has permission to read and execute (if meaningful) any file that emanates from this catalog.

SPECIFIC PERMISSION? READ/BJONES/ASMITH

SPECIFIC PERMISSION? WRITE/ALLONG

This combination of responses states that the users who have logged onto the system under the names BJONES and ASMITH can pass through this level with read or execute permission for any files below, and that the user ALLONG can pass through with read, write, execute, and append permissions.

SPECIFIC PERMISSION?

The carriage return alone means that no further specific permissions are to be given; the catalog is now created and the question

NEW CATALOG NAME?

is reissued, allowing the user to create another catalog at the same level (i.e., also emanating from CAT1).

Alternative forms of the response to CATALOG STRUCTURE TO WORKING LEVEL? are as follows:

/CAT1$ABC

Assuming the user to be JDOE, this response is equivalent to the one given above, JDOE/CAT1$ABC. The initial slant indicates the user's own master catalog.

A response of / indicates that the user desires to create directly from his master catalog. This response is equivalent to his user-ID alone.

Example of short form reply:

FUNCTION? CC,/CAT1$ABC/CAT2,PASSWORD/AOK/,READ/BJONES,
MORE? ASMITH/,WRITE/ALLONG/

CREATE FILE

FUNCTION? CF

CATALOG STRUCTURE TO WORKING LEVEL?

user-ID/cat-name$password/.../cat-name$password

FILE NAME,SIZE(IN LLINKS),MAX SIZE,MODE?

file name, initial size (LLINKS), maximum size (LLINKS), mode(R or L)

PASSWORD?
[illegible]

GENERAL PERMISSIONS? access-type,...,access-type

The access types are the same as those for Create Catalog.

SPECIFIC PERMISSION?

access-type,...,access-type/user-ID.../user-ID

Random File Specification: If required, a file can be created with a random-access-treatment indication, by responding to the FILE NAME,SIZE(IN LLINKS),MAX SIZE,MODE? question as follows:

file name, initial size, max. size, R

If random (R) is specified, a further question will be asked:

LOGICAL RECORD SIZE? record size in words

Random-I/O files for Time-Sharing FORTRAN may have a logical record size attribute; if use of random files does not require this attribute, a response with a carriage return only is required.

ACCESS FILE? YES, Y, CLEAR,or C

This option allows the user to access (open) a file at the time it is created. If CLEAR or C is specified, the file space will be zeroed.

Example replies (user responses are underlined):

FUNCTION? CF

CATALOG STRUCTURE TO WORKING LEVEL?

/CAT1$ABC/CAT2$AOK

This response defines user-ID/CAT1/CAT2 as the catalog-string from which the file is to emanate. The initial slant indicates that the succeeding string is concatenated to the user's own master catalog.

FILE NAME,SIZE(IN LLINKS),MAX SIZE,MODE? FIL1,4,12

This response asks for a file space of four LLINKS initially, with a maximum eventual size limit of 12 LLINKS, named FIL1. Since mode is not specified, the file will be created for sequential (linked) usage.

PASSWORD?
[illegible] (null response given)

No password is assigned to this individual file.

GENERAL PERMISSIONS? READ

SPECIFIC PERMISSION?

None are granted at this level, but those granted at the level of CAT2 (CREATE CATALOG in the previous example) apply to this file.

ACCESS FILE? YES

This option allows the user to access (open) a file at the time it is created.

FILE NAME,SIZE(IN LLINKS),MAX SIZE,MODE?

This permits creation of other files at the same level.

Example of short form reply:

FUNCTION? CF,/CAT1$ABC/CAT2$AOK/FIL1,B/4,12/,R,AF

NOTE: File mode by default is linked (sequential); i.e., MODE/LINKED/.

ACCESS FILE

FUNCTION? AF

CATALOG STRUCTURE TO WORKING LEVEL?

user-ID/cat-name$password/.../cat-name$password

FILE NAME? filename $password"altname"

PERMISSIONS DESIRED?

access-type,...,access-type

The following table summarizes the legal permissions and permission combinations:

Type of Allocation Word	Abbrev.	Allowable Operations on File Content	File Conditions Required	Permissions Required
READ	R	read	no writers, not abort locked	READ
WRITE READ,WRITE	W R,W	read and write	no other writers, not abort locked	WRITE
APPEND	A	append	no writers, not abort locked	APPEND
EXECUTE	E	execute	no writers, not abort locked	EXECUTE
READ,APPEND	R,A	read and append	no writers, not abort locked	READ and APPEND
RECOVERY	REC	read and write	no other writers	RECOVERY
QUERY	Q	read	none	READ
READ, CHANGING	R,C	read	not abort locked	READ
TEST	T	read and write to scratch file	no writers, not abort locked	READ
TEST, CHANGING	T,C	read and write to scratch file	not abort locked	READ
WRITE,C READ,WRITE,C	W,C R,W,C	read and write	not abort locked	WRITE

Random File Specification: A file can be accessed for random treatment, whether created as random or linked, by responding to the FILE NAME? question with:

filename$password,R

or

filename$password"altname",R

If the file was created as linked, the random treatment indication is temporary; i.e., for the current access only. If the file was created as random, the ,R specification is superfluous.

Example replies (user responses are underlined):

FUNCTION? AF

CATALOG STRUCTURE TO WORKING LEVEL?

JDOE/CAT1$ABC/CAT2$AOK

The user in this case is not the creator of the file to be accessed, so he must define the user's master catalog (e.g., JDOE) from which the file emanates, along with any required subcatalogs and passwords.

FILE NAME? FIL1

If a password were required, it could be concatenated to the name with a dollar sign; i.e., FIL1$ABC. Otherwise, it will be requested.

PERMISSIONS DESIRED? READ

General Read permission was granted for this file. (Several specific Read permissions were also granted at the level immediately above CAT2.) Termination of this response with only a carriage return causes the file to be accessed and the request

FILE NAME?

to be reissued.

Example of short form reply:

FUNCTION? AF,JDOE/CAT1$ABC/CAT2$AOK/FIL1,R

DEACCESS FILE

FUNCTION? DF

FILE NAME? filename (or CLEARFILES, PERMFILES, or TEMPFILES)

The response for this function is the name of the file to be deaccessed. The name supplied is always the name under which the file was accessed, whether this was the actual name or a temporary alternate name. If CLEARFILES is used, all of the user's available files (except SY** and *SRC) are deaccessed, including his temporary files. PERMFILES or TEMPFILES may be used to remove all permanent or temporary files (except *SRC) from the AFT, respectively. Note that the input collector file (SY**) will never be deaccessed.

Example of short form reply:

FUNCTION? DF,FIL1

PURGE CATALOG

FUNCTION? PC

CATALOG STRUCTURE TO WORKING LEVEL?

user-ID/cat-name$password/.../cat-name$password

CATALOG TO BE PURGED? cat-name$password

The dollar sign is used only when the password is concatenated directly to a file or catalog name.

Example replies (user responses are underlined):

FUNCTION? PC

CATALOG STRUCTURE TO WORKING LEVEL?

/CAT1$ABC

This response defines the subcatalog CAT1 concatenated to the user's own master catalog.

CATALOG TO BE PURGED? CAT2$AOK

(The catalog and all catalogs and files subordinate to it is now purged.)

CATALOG TO BE PURGED?

is reissued.

Example of short form reply:

FUNCTION? PC,/CAT1$ABC/CAT2$AOK

PURGE FILE

FUNCTION? PF

CATALOG STRUCTURE TO WORKING LEVEL?

user-ID/cat-name$password/.../cat-name$password

FILE TO BE PURGED? file name$password

Password request will be issued if incorrectly given or omitted.

Example replies (user responses are underlined):

FUNCTION? PF

CATALOG STRUCTURE TO WORKING LEVEL?

JDOE/CAT1$ABC/CAT2$AOK

The user in this case is ALLONG, not the file creator.

FILE TO BE PURGED? FIL1

(The file is now purged.)

The request

FILE TO BE PURGED?

is reissued.

Example of short form reply:

FUNCTION? PF,JDOE/CAT1$ABC/CAT2$AOK/FIL1

RELEASE CATALOG

FUNCTION? RC

The question/response sequence and the short form reply for this function are completely analogous to those for the Purge Catalog function. The Release Catalog function would normally be used in preference to Purge Catalog -- as it is more economical -- unless the user has a very stringent file-security requirement.

RELEASE FILE

FUNCTION? RF

The question/response sequence and the short form reply for this function are completely analogous to those for the Purge File function. The Release File function would normally be used in preference to Purge File -- as it is more economical -- unless the user has a very stringent file-security requirement.

MODIFY CATALOG

FUNCTION? MC

CATALOG STRUCTURE TO WORKING LEVEL?

user-ID/cat-name$password/.../cat-name$password

CATALOG TO BE MODIFIED?

NEW NAME? new cat-name

NEW PASSWORD? { new password / DELETE }

GENERAL PERMISSIONS? { access-type,...,access-type / DELETE }

SPECIFIC PERMISSION? { access-type,...,access-type/user-ID.../user-ID / DELETE/user-ID/.../user-ID }

Example replies (user responses are underlined):

FUNCTION? MC

CATALOG STRUCTURE TO WORKING LEVEL?

?CAT1$ABC

CATALOG TO BE MODIFIED? CAT2$AOK

NEW NAME?

A carriage return only response means that the catalog name is to remain unchanged.

NEW PASSWORD?
XXXXXXXXXXXXXX (response "XYZ" given)

The original password AOK is replaced by XYZ.

GENERAL PERMISSIONS? READ

As originally created, general permissions were not assigned at this level. This response replaces this null set with READ and EXECUTE permission.

SPECIFIC PERMISSION? W/BJONES

This response replaces the original specific READ permission for BJONES with READ, WRITE, EXECUTE and APPEND permission.

SPECIFIC PERMISSION? DELETE/ASMITH

This response cancels any permissions for ASMITH that previously existed.

SPECIFIC PERMISSION? P,LOCK/ALLONG

This response replaces the original set of permissions for ALLONG with PURGE and LOCK.

SPECIFIC PERMISSION?

The carriage return implies that no further modifications are to be made; the changes are now processed and the question

CATALOG TO BE MODIFIED?

is reissued.

Special Short Form Option Formats

To rename a catalog:

NEWNAME/catalog/ or N/catalog/

To exclude, by user-ID, from any general permissions:

EXCLUDE/user-ID,..., user-ID/

To delete specific permissions, by user-ID:

DELETE/user-ID,...,user-ID/

To delete all general permissions:

DELETE/GEN'L/(or simply DELETE)

Note: EXCLUDE and DELETE may not be abbreviated.

Example of short form reply:

FUNCTION?
MC,/CAT1$ABC/CAT2$AOK,PASSWORD/XYZ/,W/BJONES/,DELETE/ASMITH/,

P/ALLONG/,LOCK/ALLONG

MODIFY FILE

FUNCTION? MF

CATALOG STRUCTURE TO WORKING LEVEL?

user-ID/cat-name$password/.../cat-name$password/file name$password

FILE TO BE MODIFIED?

NEW NAME? new file name

NEW MAX SIZE? new maximum size (in blocks)

NEW PASSWORD? [redacted] {new password / DELETE}

GENERAL PERMISSIONS? { access-type,...,access-type / DELETE }

SPECIFIC PERMISSION? { access-type/user-ID/.../user-ID / DELETE/user-ID/.../user-ID }

Example replies (user responses are underlined):

FUNCTION? MF

CATALOG STRUCTURE TO WORKING LEVEL?

/CAT1$ABC/CAT2$XYZ

FILE TO BE MODIFIED? FIL1

NEW NAME? MASTER1

NEW MAX SIZE? 20

This response increases the maximum file size to 20 blocks (originally 12).

NEW PASSWORD?
[illegible] (response "DEPT37" given)

This response attaches the password DEPT37 (which would be in the strikeover area) to this file (none originally assigned).

GENERAL PERMISSION? DELETE

The original general READ permission is deleted.

SPECIFIC PERMISSION? P/BJONES

PURGE permission for user BJONES is added at this level. This permission applies to this file only.

Special of short form option formats:

To rename a file:

NEWNAME/file name/or N/file name/

To exclude, by user-ID, from any general permissions:

EXCLUDE/user-ID,...,user-ID/

To delete, by user-ID, specific permissions:

DELETE/user-ID,...,user-ID/

To delete all general permissions:

DELETE/GEN'L/

or

DELETE

Note: EXCLUDE and DELETE may not be abbreviated.

Example of short form reply:

FUNCTION? MF,/CAT1$ABC/CAT2$XYZ/FIL1,N/

MORE? MASTER1/,B/20/,PASS/DEPT37/,DELETE,P/BJONES/

LIST CATALOG

FUNCTION? LC or LIST CATALOG

CATALOG STRUCTURE INCLUDING CATALOG TO BE LISTED?

user-ID/cat-name,...,cat-name,x(mm-dd-yy,n,R),FIRST/name/

Example replies (user responses are underlined):

FUNCTION? LC

CATALOG STRUCTURE INCLUDING CATALOG TO BE LISTED?

/CAT1

Passwords need not be given in the catalog structure. A user is permitted to list only his own catalogs or the Library catalog (#LIB) or the command library catalog (#CMD).

A list of the catalogs and files emanating from CAT1 would now be listed.

The List Catalog provides limited listing of catalog and file names by the use of the optional field ",x(mm-dd-yy,n,R)" where:

x specifies whether date is date created (C), date of last access (A), or last date the file contents were changed (L)

mm-yy-dd, starting date for C, A, or L option

n, number of files to be listed

R, reverse the order of printing

FIRST/name/ starts the catalog listing at the specified cat/file name.

Any field may be omitted and the last two (n and R) may be reversed. Note that n and R need not be inside the parentheses.

Examples (user responses are underscored):

FUNCTION? LC

CATALOG STRUCTURE INCLUDING CATALOG TO BE LISTED?

catdescr,C(01-01-72)

Requests a list of all catalog and file names created since January 1, 1972.

catdescr,A(07-01-72,R)

Requests a list of all catalog and file names which were accessed since July 1, 1972 and in reverse order (most recent to oldest).

catdescr,L(06-01-72,10)

Requests a list of the first ten catalog and file names whose contents were changed since June 1, 1972.

catdescr,R,10

Requests a list of the ten most recently created catalog and file names.

catdescr,10

Requests a list of the ten oldest catalog and file names.

catdescr,FIRST/FILX/

Requests a list of catalog and file names starting at FILX.

LIST SPECIFIC

FUNCTION? LS

CATALOG STRUCTURE TO WORKING LEVEL?

user-ID/cat-name,...,cat-name(or)file name

CATALOG OR FILE TO BE LISTED?

Example replies (user responses are underlined):

FUNCTION? LS

CATALOG STRUCTURE TO WORKING LEVEL?

/CAT1

CATALOG OR FILE TO BE LISTED? FIL1

Passwords need not be given in the catalog structure and will not be included in the catalog or file description which is output. A user can list only his own or library (#LIB) or #CMD catalogs and files.

The description of FIL1 would now be listed.

The system will provide the following information (but not the password) about the catalog or file:

FILE NAME-
ORIGINATOR-
DATE CREATED-
DATE CHANGED-(month/day/year plus T.O.D. in parenthesis)
LAST DATE ACCESSED-
NUMBER OF ACCESSES-
MAX FILE SIZE-
CURRENT FILE SIZE-
FILE TYPE-RANDOM,LINKED or I-D-S
DEVICE-
GENERAL PERMISSIONS-
SPECIFIC PERMISSIONS-

EXAMPLES OF LINE DELIMITER USE

The line delimiters can be used in several ways to either shorten the question/response sequence, or terminate a function at any given point.

Examples of the effect of different response terminations are as follows:

FUNCTION? CC

The carriage return alone implies a master catalog.

NEW CATALOG NAME? 001*

Passwords or permissions are not wanted for this catalog and no further questions are wanted. Return is to NEW CATALOG NAME? level.

NEW CATALOG NAME? 002

PASSWORD?
[illegible] (PASS2**)

No permissions are to be assigned to this catalog, and creation of catalogs at this position is finished. Return is to function level.

FUNCTION? CF

CATALOG STRUCTURE TO WORKING LEVEL?

/002$PASS2

FILE NAME,SIZE(IN LLINKS),MAX SIZE,MODE? 02.1,1,3

GENERAL PERMISSIONS? READ

SPECIFIC PERMISSION? W/RJJONES**

Creation of files at this level has been completed.

FUNCTION? carriage return (or DONE)

Finished with ACCESS.

SYSTEM?

Return to the subsystem selection level.

SPECIAL FEATURES

Files created by means of the Create File function are not necessarily contiguous; i.e., successive links of a multilink file are not necessarily in physical sequence on the storage device. Furthermore, both the Create File and Access File functions assume that the file will be treated as a linked file. For the standard subsystems provided with the Time-Sharing System, these file characteristics are suitable because linked files are required.

If, however, in the use of a given subsystem, it would be advantageous to have contiguous files, this characteristic can be specified in response to FILE NAME,SIZE(IN LLINKS),MAX SIZE,MODE?. The form of this response is:

file name, initial size C

The parameter C indicates, in Create File only, that a contiguous file is desired. No maximum size may be specified.

Similarly, if random treatment of files is required in a given user-written subsystem, a file can either be created as a random file or accessed as a random file. If created as such, it is always treated by the GCOS I/O Supervisor as a random file. If it is created as a linked file, it can be accessed as a random file, but in that case, the random treatment indication is temporary; i.e., it applies to that access only.

The forms of the random specification are as follows:

For CF, the response to FILE NAME,SIZE(IN LLINKS),MAX SIZE,MODE? is:

file name,initial size,maximum size,R

or

file name,initial size C,R

For Access File, the response to FILE NAME? is:

filename$password,R

In both responses, the parameter R (always preceded by a comma) indicates that the named file is to be treated as a random file.

In the case of Create File only, the additional question LOGICAL RECORD SIZE? is asked, allowing the user to specify a fixed logical record size attribute as required of random files by TSS FORTRAN. If this attribute is not needed, the user may respond with simply a carriage return.

In the short form response, random files can be specified by:

MODE/RAND/ or MODE/R/

Linked files can be specified explicitly, either by:

MODE/LINKED/ or MODE/L/

or

MODE/SEQ/ or MODE/S/

or, more simply, by default.

Contiguity can also be specified in the short form response.

The following extended File System options may be exercised with nonconversational ACCESS functions CF or MF. For a detailed description of these options refer to the File System manual.

ABORT / { LOCK / DELAY / ROLLBACK / NONE } / (What to do when writing job aborts?)

ACCESS / { NORMAL / RWW / CONCURRENT / MONITOR } / (What to do when requested file is being written by another?)

VERIFY / { YES / NO } / (Should writes be turned into write-verify instructions?)

AUDIT / { ALL / DENIED / NONE } / (What allocation requests to audit?)

INCRSAVE/ { YES / NO } / (Should file be saved if it has changed since last save?)

PAGESIZE/#WORDS/ 40 ≤ # ≤ 3840 (320 assumed)

RDERR/DUP/ (What to do to recover from read error?)

RECOVERY SUBSYSTEM

The RECOVERY subsystem gives the terminal user the ability to make his collector file permanent and to catalog it under his User Master Catalog (UMC). Thus a user has the ability to recover his last input lines in any situation where an accidental or unexpected disconnect occurs.

The collector file will contain the lines of data entered via the terminal which have not yet been edited into the current file (see Definition, Section I, for definition of current file). The number of lines in the collector file may vary because of line length and the amount of data entered since the last edit of the collector file to the current file. In general, it will contain up to the last 70 lines. The RECOVERY subsystem, when used with the OLDP and NEWP functions provides the terminal user with the ability to recover the entire file when a disconnect occurs.

The RECOVERY subsystem is initiated through the common command language of the following systems:

BASIC

Time-Sharing FORTRAN

Text EDITOR

CARDIN

The terminal user can request the RECOVER command at any level; that is, at the subsystem selection level or at the command level.

The RECOVERY subsystem also permits the use of the ROLLBACK command to recover the collector file at the user's next terminal session. The ROLLBACK command can be issued only at the command level.

Recovery Operation

In its basic operation, the RECOVERY subsystem dumps data currently on the temporary input collector file to the current file and creates and/or accesses a permanent file specified in the command (by filename) with an alternate name. If this permanent file already exists in the user's master catalog, the file is checked to assure that it conforms to the minimum requirements for an input collector file. The requirements for an input collector file are that the file must be a random permanent file and it must be at least 640 words (two blocks) long. A longer file will be accepted, but only 640 words will be used.

If the filename is not in the specified UMC, a file will be created and given predefined attributes. It will then be accessed by an alternate name. Accessing the file by the alternate name puts the alternate name in the Available File Table (AFT). The RECOVERY subsystem then switches the two file names; one representing the temporary input collector file and the other representing the permanent recovery file. Thus, all reference to the input collector file now points to the AFT entry describing the permanent recovery file. Even if this is not a random file, it will be accessed as a random file.

The procedure for termination, user log-off, or disconnect is the reverse of the procedure described above. The Available File Table (AFT) will contain at least two entries (assuming that recovery was requested). The names associated with these entries will be switched and the files will be deallocated by the TERM module of the Time-Sharing System.

When the terminal user issues the ROLLBACK command, the RECOVERY subsystem will again copy any data currently on the temporary input collector file to the current working file. It will then access the file specified in the command. When accessed, the permanent recovery file is read and any data in this file is also copied on the current working file. The first and last lines of good data on this file, preceded by an identifying message, is printed out on the terminal. Thus, when the user receives the RECOVERY NOW IN EFFECT message following a ROLLBACK command, he is ready to type into an empty 640-word collector file.

A terminal user may issue any number of RECOVERY and/or ROLLBACK commands during his session at the terminal. These commands must be given as #RECO and #ROLL if the user is in EDIT build mode. When subsequent commands are issued, the previous RECOVERY file is deaccessed, and a new RECOVERY file is created and/or accessed. The permanent file remains in the user's catalog until he specifically releases it.

If an error occurs during the creation and/or accessing of the new RECOVERY file, the terminal user will be working with a temporary input collector file and not his RECOVERY file. The data on the RECOVERY file may be unrecoverable (because of a missing end-of-file) if the terminal user tries to access this file through any other subsystem.

QUESTIONS AND RESPONSES

The following paragraphs describe sets of questions and general responses associated with the RECOVER and ROLLBACK commands. In these descriptions, the general response to each question is underlined to set it apart.

```
SYSTEM ?RECO FIL1$ABC
RECOVERY NOW IN EFFECT
```

The RECOVERY subsystem is called to create and/or access FIL1. Control is then returned to the subsystem selection level SYSTEM?.

```
SYSTEM ?BASIC
OLD OR NEW - OLD FIL2
READY
*RECO FIL3
RECOVERY NOW IN EFFECT
```

The user has specified that FIL2 be copied to his current working file. RECOVERY subsystem is then called to create and/or access FIL3. Control is returned to the previous calling level.

```
SYSTEM ?EDIT
OLD OR NEW-NEW
READY
*#REC FIL4
RECOVERY NOW IN EFFECT
```

The user requests the EDIT subsystem and a current working file. At the command level, the user calls for RECOVERY to create and/or access FIL4. Control is returned to the previous calling level.

```
SYSTEM ?BASIC
OLD OR NEW-NEW
READY
*10 PRINT
*20 PRINT
*RECO FIL5$BCA
RECOVERY NOW IN EFFECT
```

The BASIC Editor is called to sort and merge lines 10 and 20 onto the current working file. RECOVERY subsystem is then called to create and/or access FIL5. Control is returned to the previous calling level.

```
SYSTEM ?BASIC
OLD OR NEW-NEW
READY
*RECO FIL6$CAB
*10 PRINT "THIS IS LINE #10"
*20 PRINT "THIS IS LINE #20"
*30 PRINT "THIS IS LINE #30"
*40 PRINT "THIS IS LINE #40"
*50 PRINT "THIS IS LINE #50"
*60 PRINT "THIS IS LINE #60"
*70 PRINT "THIS IS LINE #70"
```

Assume that at this point the computer system disconnects. The user will do the following to recover his last input lines.

```
SYSTEM ?BASIC
OLD OR NEW-NEW
READY
*ROLL FIL6$CAB
FIRST AND LAST LINES OF SAVED DATA ARE:
10 PRINT "THIS IS LINE #10"
50 PRINT "THIS IS LINE #50"
RECOVERY NOW IN EFFECT
```

When the system is restarted after the disconnect, the user calls in the RECOVERY subsystem by issuing the ROLLBACK command. The RECOVERY subsystem will access FIL6 and sort and merge the data onto the current working file. When the RECOVERY NOW IN EFFECT message is issued, the user is ready to type into an empty collector file. Return is to the previous calling level.

Note that lines 60 and 70 were lost. This is due to internal buffering of build-mode input; i.e., at the time of disconnect these lines had not yet been written to the collector file (SY**).

TIME-SHARING MEDIA CONVERSION PROGRAM

The Time-Sharing Media Conversion Program is a batch program that may be run either at the central computer site or through a remote/batch (GRTS) terminal. It generates a standard format, time-sharing text file from a suitable card deck, or conversely, produces a card deck from such a file, however generated, to save the file in card form.

Operational Description

The media conversion program performs the following functions:

- INPUT - create a standard format, time-sharing text file from cards. If the INSERT or MOVE option is used, # signs are inserted between the line number and the first character of numeric data.
- OUTPUT - create a card deck from a standard format, time-sharing text file. # signs between the line number and the text are deleted.

The control record (card) will be printed on the execution report.

INPUT identifies the control card requesting the file creating function and takes the following mutually exclusive options:

Option	Result
ASIS,i,j	The text file is generated from the input cards, from the columns specified by i to j. Standard columns (default option) for i to j are 1 to 80.
MOVE,i,j,m,n	The text file is generated from the input cards, from the columns specified by i to j. Line numbers are taken from columns specified by m to n. Standard columns for i to j are 1 to 72, and for m to n are 73 to 80.
INSERT,i,j,m,n	The text file is generated from the input cards and from the columns specified by i to j. Lines are sequence numbered, starting with m and incremented by n. Standard columns for i to j are 1 to 72. Standard values for both m and n are 10.
ASCII	The text file is generated from input cards, using a binary deck previously punched from this program.
COMDK,option	The text file is generated from input cards consisting of a COMDK (compressed source deck). This option is used in conjunction with the ASIS, MOVE, or INSERT options. If ALTER's are to be made at the time the file is generated, a $ DATA I*,,COPY and a $ ENDCOPY card must be employed.

Sample INPUT Control Cards

```
INPUT,MOVE,1,60,73,80
```

Text file data is to be taken from columns 1 to 60 of the punched cards and line numbers are to be taken from columns 73 to 80.

```
INPUT,COMDK,ASIS,1,80
```

Text file data is to be taken from columns 1 to 80 of the input cards (a COMDK).

INPUT can start in any column of the control card but no imbedded blanks are allowed.

OUTPUT identifies the control card requesting the card-deck producing function, and takes the following mutually exclusive options:

Option	Result
ASIS,i,j	The text file is read and a BCD card deck is punched in the columns specified by i to j. Standard columns (default option) for i to j are 1 to 80.
MOVE,i,j,m,n,1	The text file is read and a BCD card deck is punched, moving data to columns specified by i to j. Line numbers are moved to columns specified by m to n, right-justified. The 1 specifies the label to be punched starting in column 73, left-justified. Standard columns for i to j are 1 to 72 and for m to n, 73 to 80.
STRIP,i,j	The text file is read and a card deck is punched, stripping off line numbers, with data moved to the columns specified by i to j. Standard columns for i to j are 1 to 80.
	NOTE: With the above output options, data is converted from ASCII to BCD before punching.
ASCII	The text file is read and a binary deck containing the file text is punched. (See "Binary Card Format" below.)

Sample OUTPUT Control Card

```
OUTPUT,ASIS,1,56
```

The text file is punched into columns 1 to 56 of the card deck.

OUTPUT can start in any column of the control card but no imbedded blanks are allowed.

Definitions

- Each line is punched on a separate card, starting in the column specified (OUTPUT function).

- A line number is an initial string of numeric characters which terminate with a nonnumeric character. Blank is considered a nonnumeric character.

- In the case of the MOVE option, the line numbers are stored right-justified in the columns specified.

- The format of a line in a text file is as follows:

  (nnn) dddd....d (carriage return character)

  Where: nnn - Line number (numeric; must terminate with non-numeric character).
  dd..d - Data.
  Carriage return terminates the data line.

Errors

SE ABORT - A binary card is out of sequence. Card number is printed out.

CK ABORT - Checksum of card does not agree with the computed checksum.

NB ABORT - First data card is not binary, but ASCII was specified on control card.

CP ABORT - No control card found (keyword may be misspelled).

DATA LINE TOO LONG FOR I,J FIELD

...portion of the line specified by i to j...

- Occurs on OUTPUT only. If a line of the file is too long for the specified i to j field (i.e., nonblank characters are being discarded), this warning message is issued along with the portion of the line specified by i, j. A maximum of 20 such messages may be given. The complete file is punched, as specified by the i to j field options.

Binary Card Format

Word 1	7/9 punch and number of data words (maximum=21)
Word 2	Checksum
Word 3	Card number, starting at 0
Words 4-24	Text

Sample Deck Setups

A sample deck setup to accomplish media conversion is as follows:

```
$  SNUMB    XXXXX
$  IDENT    account number,name
$  USERID   name$password
$  PROGRAM  TSCONV
$  PRMFL    OT,R/W,L,userid/filename
INPUT,ASIS
     .
(Data deck)
     .
$  ENDJOB
***EOF
```

A sample deck setup to accomplish media conversion in the case of a COMDK plus ALTER cards is as follows:

```
$  SNUMB    XXXXX
$  IDENT    account number
$  USERID   name$password
$  PROGRAM  TSCONV
$  PRMFL    OT,R/W,L,userid/filename
$  DATA     I*,,COPY
INPUT,COMDK,ASIS,1,80
     .
(Data cards -- COMDK)
     .

$  ENDCOPY
$  UPDATE
     .
(ALTER deck)
     .

$  ENDJOB
***EOF
```

The following is a sample deck setup for an OUTPUT run:

```
$  SNUMB    XXXXX
$  IDENT    account number,name
$  USERID   name$password
$  PROGRAM  TSCONV
$  PRMFL    OT,R/W,L,userid/filename
OUTPUT,ASIS
$  ENDJOB
***EOF
```

FORTRAN TRANSLATOR SUBSYSTEM

The FORTRAN Translator (TRAN) is a time-sharing subsystem that allows the user to translate a Time-Sharing FORTRAN source program into a batch FORTRAN source program, with little or no hand recoding. TRAN will also produce input acceptable to Series 6000 FORTRAN. The translator substitutes, wherever possible, one or more batch-acceptable statements for each noncompatible Time-Sharing FORTRAN statement.

Translation occurs in the input/output and data-specification statement categories. Several statement forms, primarily in the I/O area, are not automatically translatable. In these cases, the translator issues a message noting the untranslatable statement and pauses to allow the terminal user to enter a replacement statement. Thus, all noncompatible statements are detected by the subsystem and a large majority are automatically translated.

The user has the option of saving the translation either in BCD (batch S*) form, in ASCII (time-sharing) form, or in both. A BCD file of the final translated program is provided for batch processing and is available to the batch dimension via the file system. Batch compiler input can be called directly from the BCD permanent file with a $ SELECT or a $ PRMFL S* card in the batch job control deck. For example, if the control deck was submitted by means of the CARDIN subsystem, it would appear as follows:

```
0010$:IDENT:JDOE
0020$:USERID:JDOE$PASSWORD
0030$:FORTRAN
0040$:SELECT:JDOE/BCD
0050$:ENDJOB
```

In this input, BCD is the name of a BCD translation file from the FORTRAN Translator.

The ASCII form is useful for obtaining a listing at the terminal; the listing may then be further updated or modified and passed directly to the GCOS System Input Program via CARDIN:

```
**0001$:IDENT:JDOE
**0002$:FORTRAN
  0008 (Comment inserted by Translator)
  0009  LOGICAL KK001  (Inserted by Translator)
    .
    .     ASCII translation data
    .
  0990
**1000$:ENDJOB
```

Lines marked ** are inserted by the user in CARDIN BUILD mode and lines 0008 through 0990 represent an ASCII translation file from the FORTRAN Translator, named (in this example, ASCII).

For both examples above, the CARDIN sequence is as follows (user responses underlined):

```
SYSTEM ?CARDIN
OLD OR NEW-NEW       (for BCD example)
      (or) OLD ASCII (for ASCII example)
READY
*
.   (enter control cards as per examples above)
.
*RUN
CARD FORMAT AND DISPOSITION? NORM
```

The NORM response implies MOVE and standard tab character and settings:

```
:,8,16,32,73
```

General Usage

The translator takes its program input from the user's current file (as do most other time-sharing subsystems).

The user selects the FORTRAN Translator with the name TRAN at the SYSTEM? selection level. Then respond OLD filename to the OLD OR NEW question, naming the time-sharing (ASCII) file that contains the program to be translated. If, however, the current file already contains the desired program, the user may respond SAME to the OLD OR NEW question.

Since the translator may replace a single Time-Sharing FORTRAN statement with one or more batch statements, the user should insure that his input file is line ordered and that his line numbering has an origin of ten or greater, with increments of at least 10.

The translator uses FORTRAN statement numbers, or statement label numbers (not line numbers), of 32000 and subsequent for created format statements that replace quoted data in PRINT statements. Therefore, the user must replace any statement numbers in this range to avoid duplicate reference.

Following the response to OLD OR NEW -, the translator issues a series of questions which permit the user a number of program options:

- Choose a BCD or ASCII save file, or both, as explained above.
- Choose to have line numbers either stripped, moved to the label field (cols. 73-80) of the batch-statement card, or moved with a constant prefix. (Applies to the BCD save file only.)
- Choose to have a listing of the translation in progress.
- Control the assignment of file codes, including a save, recall, and modification of a file code table.

Detailed Usage

The conversation between the system and the user, beginning with the selection of the translator, is as follows:

SYSTEM ?TRANS

OLD OR NEW-OLD *filename*

BCD SAVE FILE NAME? { *filename* / carriage return }

If the user wishes a translation file in BCD form, for batch input, he specifies the name of a file, previously defined or not, upon which the translated program is to be saved. If he does not want a BCD save file, he responds with a carriage return.

The following question is asked only if the user has responded *filename* to the question above:

LABELS? { MOVE or carriage return only / STRIP / $abcde_1(i,j)$; $abcde_2(i,j)$... }

This question requests information about what is to be placed in the label field (columns 73-80) of the source statement on the BCD file. The meaning of the responses shown is as follows:

MOVE or carriage return only -- move the line numbers found in the input file into the label field of the BCD file.

STRIP -- ignore the line numbers and leave the BCD label field blank.

abcde (i,j)... -- move the line numbers to the label field prefixed by the specified alphanumeric characters.

abcde - Alphanumeric label prefix.

i - Starting line number.

j - Final line number to which this prefix is to be added.

Multiple sequences of line numbers, with different prefixes can be specified. If an interval of line numbers is found that has not been specified by the user, only the line number is placed in the label field.

Note that: abcde (i,j) = abcde (j,i)

abcde (,j) = abcde (0, j)

abcde (i,) = abcde (i, 99...9)

ASCII SAVE FILE NAME? {filename / carriage return}

If the user wishes to save a time-sharing version of his translation file so that it may be updated or modified from a terminal, he may designate a new or previously defined file upon which to save the translated data. A carriage return only indicates that an ASCII file is not desired.

NOTE: The user must designate either a BCD or an ASCII translation file, or both. If he fails to do so, the following message is issued:

NO TRANSLATION FILE REQUESTED

The user is returned to the SYSTEM? level.

LIST? {YES or Y / carriage return}

The user is asked if he wants an on-line listing of the translation while it is in progress. A carriage return indicates no listing is desired and only the fatal errors are printed at the terminal. If a listing is desired, the original Time-Sharing FORTRAN statement is printed, immediately followed by its translation. The translation may consist of a reproduction of the original statement, if no change is necessary, or of one or more substituted statement(s).

COMMENT? {any data / carriage return}

In order to allow the user to distinguish one translation from another, he is asked for a comment card (on a BCD file, it appears as a label preceding each page of his listing). A carriage return indicates that no comment is desired; otherwise, the user may type any data that he desires and it will be inserted as the first record in the BCD file or line number 8 of his ASCII translation file.

FILE TABLE FILE? {filename / carriage return}

A major portion of the time-sharing to batch translation is the replacement of permanent time-sharing file names by numeric file codes. The translator builds a table of these associations, which the user may save on a permanent file from one execution of the translator to the next. In response to this query, the user may type the name of a file-table file previously generated by this subsystem. Refer to the SAVE FILE TABLE? question below. A carriage return indicates no previous file-table file for this program.

MODIFY FILE TABLE? {YES or Y / carriage return}

The user is allowed to specify which file names in his time-sharing program are to be associated with particular file codes for this translation (whether or not he indicated a prior file-table file), as follows.

The following pair of questions are conditional upon a YES or Y response to the question MODIFY FILE TABLE?.

FILE CODE? {1 through 43 / carriage return}

FILE NAME? {filename / carriage return}

If a positive response was given to the modification query, the user is asked to type the numeric file code and the file name referenced in the time-sharing program to be associated with it. The file code/file name questions are repeated until the user responds with a carriage return only to either question. If the user types an illegal file code, the subsystem issues the following message:

INVALID FILE CODE (1 TO 43 ONLY)

and repeat the file code question. When modifying a previously existing file-table entry gotten from a prior file-table file, the old file code/file name association must be either explicitly replaced or blanked out; otherwise duplication occurs. For example, if the prior file table contains the association:

FILE CODE	FILE NAME
07	XYZ

and the user wishes to switch the name XYZ to file code 10, he must respond as follows (user responses underlined):

```
FILE CODE? 07
NAME? carriage return
FILE CODE? 10
NAME? XYZ
```

Otherwise, the file table appears as:

FILE CODE	FILE NAME
07	XYZ
10	XYZ

LIST FILE TABLE? {YES or Y / carriage return}

The user may choose to list the content of his file table which resulted from this execution, after the input file has been translated. A sample file table list is as follows:

FILE CODE	FILE NAME
01	AFILNAM
07	XFILE
.	.
.	.
41	LASTFIL

SAVE FILE TABLE? {filename / carriage return}

The user may save the content of the file table from this execution for a later execution of the translator. The named file may or may not be a previously defined permanent file.

Fatal Errors During Translation

Each Time-Sharing FORTRAN statement is examined to see if it is an acceptable batch statement. There are four possible results of this examination:

- No data change -- statement is batch compatible.
- A single translated statement.
- Multiple translation statements.
- A fatal error--no translation possible. In this case, the subsystem prints the fatal statement and issues the following message:

  FATAL ERROR, REPLACE BY:

  The user may type in a statement to replace the original. He should not reenter either the line number or formula number of the statement, but only the statement itself. The line number and formula number, if they existed, will be carried over from the original statement.

If the user does not wish to replace the statement, he may change it into a comment by giving a carriage return only in response to the message. Alternatively, if he does not want to replace the statement and wants it converted to BCD "as is," he may indicate this by responding with a pound sign and carriage return. This is useful where the target compiler may contain extended implementations; e.g., ENCODE/DECODE.

Sample Translated Statements

The following are sample translations:

1. 9 LOGICAL KK001.

   This statement is inserted into each translation to provide for EOF processing.

2. 100 ASCII ABC,NAME,XYZ
   100 INTEGER ABC,NAME,XYZ

3. 200 FILENAME FILE1,FILE2,FILE3,X
   200 INTEGER FILE1,FILE2,FILE3,X

   All file name variables are saved in a table, so that if equated in a quoted expression, the appropriate file code will be substituted.

4. 300 X = "FILNAM"
   300 X = 07

   The file code substituted is the first available one, or one provided by a previous file table file, or one designated by the file table modification.

5. 400 BACKSPACE "FILNAM"
   400 BACKSPACE 07

6. 500 ENDFILE "FILNAM"
   500 ENDFILE 07

7. 600 BEGINFILE "FILNAM"
   600 REWIND 07

   There may exist some differences in REWIND processing in time-sharing and batch execution.

```
 8.   700     CLOSEFILE "FILNAM"
      700     REWIND 07

 9.   800     CALL SUBR (A,B,"QUOTES",X,Y)
      800     CALL SUBR (A,B,6HQUOTES,X,Y)

10.   900     DATA ABC/"QUOTES"/
      900     DATA ABC/6HQUOTES/

11.   1000#   120 FORMAT (2F6.2,"QUOTES",E12.5)
      1000#   120 FORMAT (2F6.2,6HQUOTES,E12.5)

12.   1200    IF (A.NOT.B) REWIND "FILNAM"
      1200    IF (A.NOT.B)
      1201   1REWIND 07

13.   1300    PRINT:"QUOTED DATA"
      1300    PRINT 32000
      1301#   32000 FORMAT (12H QUOTED DATA)

14.   1400    READ("FILNAM",150,END=500)A,B,C
      1400    CALL FLGEOF (07,KK001)
      1401    READ (07,150)A,B,C
      1402    IF (KK001) GO TO 500

15.   1500    WRITE ("FILNAM",250)A,B,C
      1500    WRITE (07,250)A,B,C

16.   1600    X=Y;PRINT:"DATA";A=B
      1600    X=Y
      1601    PRINT 32001
      1602#   32001 FORMAT(5H DATA)
      1603    A=B
```

Sample Non-Translatable Statements

The following statements are flagged by the translator as fatal errors:

1. 100 A="QUOTES" where A has not been defined as a file name variable.

2. 200 120 FORMAT (V)

3. 300 ENCODE (a,n) list

4. 400 DECODE (a,n) list

5. 500 PRINT:A,B,C

6. 600 PRINT:"QUOTED DATA",X,Y,Z

7. 700 READ:A,B,C

8. 800 READ ("FILNAM"'100)A,B,C--random file processing

9. 900 WRITE ("FILNAM"'5)A,B,C--random file processing

The translator does not check the syntax of the input statements. Thus, the user should insure that his parentheses are balanced, expressions are not in mixed mode, etc. Translation terminates when either an EOF is found on the input file or an END statement has been encountered.

TIME-SHARING FORTRAN LIBRARY GENERATOR/LIBRARY EDITOR

The Time-Sharing FORTRAN Library Generator program and the Time-Sharing FORTRAN Library Editor subsystem, together, provide the capability to produce a load time library of Time-Sharing FORTRAN subroutines. Such libraries are collections of independent object subroutines either written in Time-Sharing FORTRAN or in GMAP language, the coding of the latter conforms to special Time-Sharing FORTRAN standards with respect to floatability and linkage conventions.

The Library Generator produces the Time-Sharing FORTRAN loadable library file from one or more files of subroutines in GESAVE or General Loader format.

The Library Editor allows the user to edit his file(s) of library subroutines in GESAVE format, prior to the use of the Library Generator program. The user can add, delete, replace, or copy individual subroutines on a master file.

Library Generator Program

The Time-Sharing FORTRAN Library Generator (TSLG) Program is a batch program that is distributed on the System Software Library. It may be called via a $ PROGRAM card.

TSLG permits a user to produce his own library file of Time-Sharing FORTRAN subroutines, complete with directory, in a form that is acceptable to the Time-Sharing FORTRAN loader. TSLG accepts collections of floatable subroutines, in one or both of the following formats:

- GESAVE format, as produced by a loader activity (H* file) and saved on a random permanent file, or as produced by Time-Sharing FORTRAN compiler (savefile).

- General Loader format, as produced by the Object Library Editor on a magnetic tape file.

TSLG processes these subroutines so as to produce one or both of the following:

- A random mass storage file to be used as an individual user's own Time-Sharing FORTRAN library, accessible by the Time-Sharing FORTRAN loader from the permanent file system.

- A magnetic tape file (Q*) to be loaded at system startup time as the installation's standard Time-Sharing FORTRAN library.

The user normally should not be concerned with the production of the latter. (TSLG may also be used by the installation for maintenance of the standard Time-Sharing FORTRAN subroutine library.)

The user's own library is stored on a permanent file named by the user on one of his TSLG job $ PRMFL cards. At FORTRAN run time, he identifies this library to the subsystem via the ULIB option in the RUN command.

SUBROUTINE CODING REQUIREMENTS

Library routines may be coded in either Time-Sharing FORTRAN or GMAP. The individual library subroutines, when coded in GMAP language, must conform to Time-Sharing FORTRAN coding conventions; i.e., they must be compatible with the code produced by the Time-Sharing FORTRAN compiler. The conventions concern:

- Special linkage (global reference) symbols, which replace the normal SYMREF/SYMDEF symbols.

- Floatable, or self-relative, coding -- all location references IC-modified.

- Intra-subroutine communication, argument passing, etc.

The subroutines written in Time-Sharing FORTRAN language are compiled and saved on a permanent file, as are the GMAP assemblies. Compiler-saved output is automatically in GESAVE, or system loadable, format.

Instructions for writing subroutines in GMAP to Time-Sharing FORTRAN standards, using special GMAP macros developed for this purpose, and on obtaining system loadable (GESAVE) format on a permanent file, are described in the Writing Subprograms in Assembly Language paragraph.

INPUT AND OUTPUT FILES

Figure 5-2 illustrates the files utilized by TSLG. Descriptions of the files follow.

The principal inputs to TSLG, from the normal user's viewpoint, are as follows:

- UI, a disk (or drum in Series 600), permanent file of user's subroutines in GESAVE format.
- I*, a $ DATA file of control cards, on disk (or drum).

Additional inputs are:

- R*, a labeled magnetic tape file which contains the standard Time-Sharing FORTRAN library subroutines distributed with the system, in Loader object library format, as produced by the Source/Object Editor (a component of the System Editor).
- *Z, a magnetic tape file identical in format to R*, containing installation-written subroutines additional to the standard subroutines on R*, or containing an edited selection of R*.

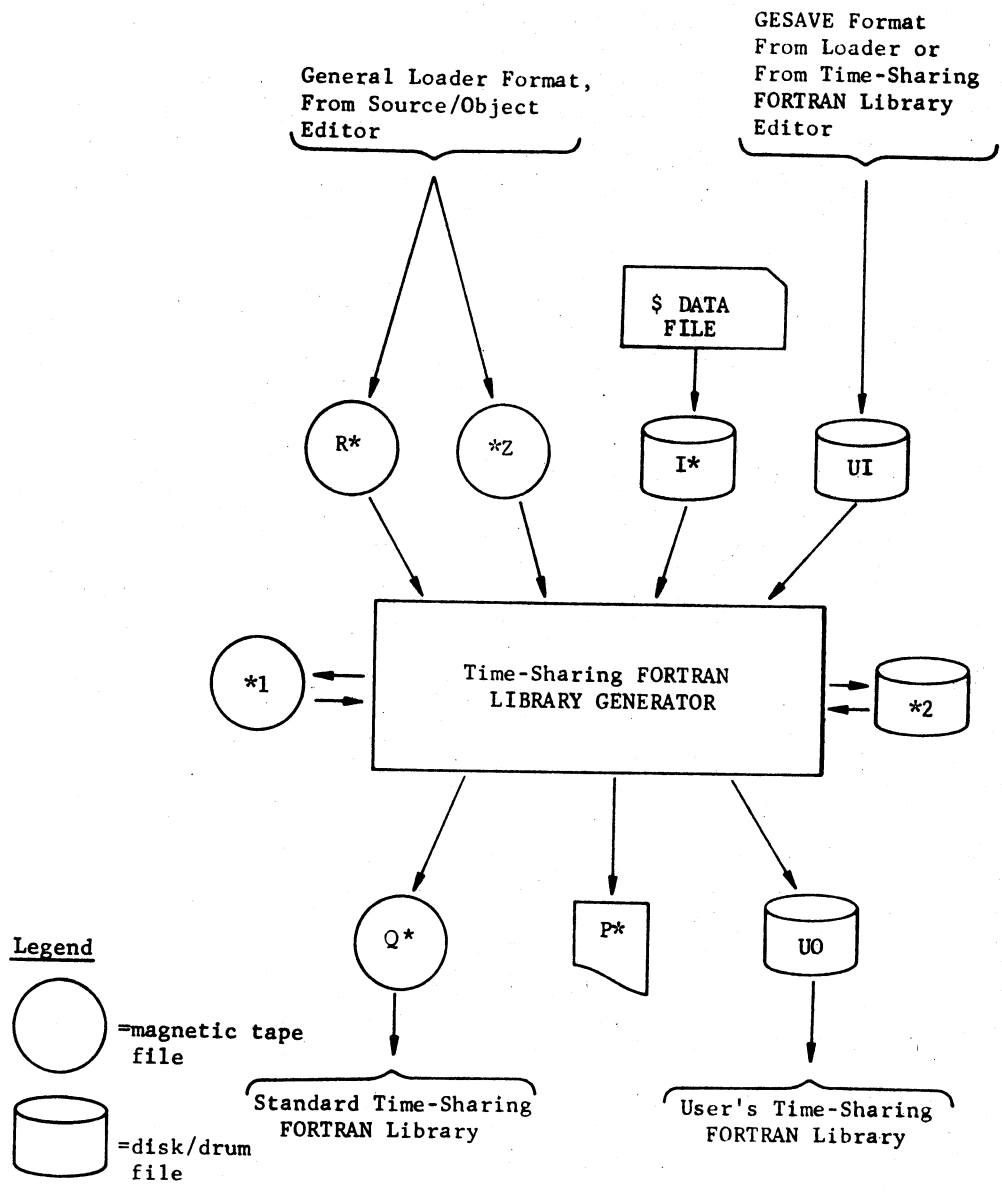


Figure 5-2. Files Used by Time-Sharing FORTRAN Library Generator

Each of the inputs described above are optional, except that the I* file (IN control card) must exist if either UI or *Z (or both) exist, or if output file UO is to be produced (OUT control card). The user will not normally be concerned with the R* input or Q* output. The I* file is the file generally required.

Two intermediate work files must be provided:

- *1, a magnetic tape file.
- *2, a temporary disk/drum file used for error messages, to be written subsequently on the output file P* (SYSOUT).

The possible output files are:

- UO, a disk/drum, permanent file containing the user's Time-Sharing FORTRAN library, accessible from the permanent file system by the FORTRAN loader.
- P*, a SYSOUT file containing a library storage map and error messages. The map and messages are described below.
- Q*, a labeled magnetic tape file containing the standard Time-Sharing FORTRAN library, to be loaded by the startup routine at system initialization time.

Either UO or Q*, or both, may be produced. It is assumed herein that only the UO file is to be produced; therefore it must be specified on an OUT control card (I* file). P* must always be provided.

The output file (Q*) is not rewound on open or close. All other magnetic tape files are rewound when opened.

Either or both of the file codes, UI and UO, may be replaced by file codes of the user's choice, on his job control cards and on IN/OUT control cards.

CONTROL CARD AND FILE USAGE

Two control cards may appear on the I* ($ DATA) file -- an IN card and/or an OUT card. The IN card is used to specify which input file(s) -- of the set UI, *Z, and R* -- are to be processed and also, implicitly, the order in which they are to be processed. The OUT card is used simply to specify which output file(s) -- of the set UO, Q* -- are to be produced.

If no IN card is present, the presence of R* only is assumed by TSLG. If multiple IN cards are present, only the last one is acknowledged. If no OUT card is present, the presence of Q* only is assumed by TSLG. If multiple OUT cards are present, only the last one is acknowledged.

If more than one input file is specified (e.g., UI and *Z), the content of each input file is processed and written on the output file in the order in which the input file codes appear on the IN card. Thus, all routines on the input file corresponding to the first-specified file code will appear on the output file before those on the second input file, etc.

In general, TSLG processes entire input files only. Selective editing of UI files may be performed with LIBED; selective editing of a *Z file may be performed during the required Object Library Editor processing. See the Source/Object Editor Reference Manual, for information pertaining to the Object Library Editor.

Input from R* and/or *Z is normally used by the installation to produce a modified Time-Sharing FORTRAN library file, on Q*. Input from UI is normally used to produce a user's Time-Sharing FORTRAN library file, on UO. However, subroutines from any of the possible input files, or any combination thereof in any order, can be written to UO (or Q*).

The essential differences between the two libraries are that the standard library, on Q*, is initialized as a permanent file by the Startup routine at a subsequent system-startup time, and is automatically searched by the Time-Sharing FORTRAN loader if no user's library (ULIB) is specified at FORTRAN run time. If one or more ULIB's are specified, the loader searches the standard library last in attempting to satisfy any subroutine calls still outstanding. Thus, the standard library is referenced implicitly, and a user's library is referenced explicitly, with the latter having priority.

Control Card Formats

The control field of the IN/OUT control cards starts in column 8, and the variable field starts in column 16; multiple file codes are comma separated.

- IN Control Card

```
1       8       16
        IN      fc , fc , fc
```

Where fc is one of the set (UI, *Z, R*), normally only UI. File code UI may be replaced by a code of the user's choice. At least one file code must appear.

- OUT Control Card

```
1       8       16
        OUT     fc , fc
```

Where fc is one of the set (UO, Q*), normally UO. File code UO may be replaced by a code of the user's choice. At least one file code must appear.

Any card type other than IN or OUT, as defined above, appearing on I* causes TSLG to be aborted.

PROGRAM DESCRIPTION

The following general deck setup illustrates a user's execution of TSLG. It is assumed that UI and UO are permanent files previously created (e.g., via the ACCESS subsystem) and that the user specified on the $ USERID card has permission to read UI and to write UO.

```
$       SNUMB
$       IDENT
$       USERID      user-id$password
$       PROGRAM     TSLG
$       LIMITS      30,32K,0,5000
$       TAPE[1]     *Z,X1D
$       PRMFL       UI,R,R,catalog$password/filename
$       PRMFL       UO,W,R,catalog$password/filename
$       TAPE        *1,X2R
$       FILE        *2,X3R,1R
$       SYSOUT      P*
$       DATA        I*
        IN[2]       UI (or UI,*Z or *Z,UI)
        OUT         UO
$       ENDJOB
```

[1]Include only if applicable.
[2]Variable field specified as applicable.

STORAGE MAP AND ERROR MESSAGES

The FORTRAN library storage map is printed by the SYSOUT Report Writer. It contains the following information for each routine in the library:

- The sector address at which the routine is stored.
- The identification (name) of each SYMDEF/.SDEF. in the routine and an indication of its type (primary or secondary).
- The sector address contained in the directory entry corresponding to each SYMDEF/.SDEF.. (This address appears only if it differs from that of the current routine.)
- The identification and corresponding sector address of SYMDEF/.SDEF. referred to by each .SREF.. (Undefined .SREF.'s are flagged with a U.)

Appended to the storage map are any applicable error or warning messages, as follows:

1. PROGRAM identity ABORTED FOR INSUFFICIENT BUFFER SPACE.
2. RERUN WITH MORE CORE SPECIFIED ON $ LIMITS CARD.
3. SYMDEF'S DEFINED IN WRONG ORDER:
4. SYMREF'S UNDEFINED:
5. NO OBJECT CARD BEFORE card type CARD card identity DECK BYPASSED, PREVIOUS COMPLETE DECK identity of previous deck.
6. NO DKEND CARD IN DECK identity of current deck DECK BYPASSED PREVIOUS COMPLETE DECK identity of previous deck.
7. card type CARD card identity OUT OF ORDER IN DECK identity of current deck.
8. NO TEXT CARDS IN DECK identity of current deck DECK BYPASSED. PREVIOUS COMPLETE DECK identity of previous deck.
9. card type CARD card identity IN DECK identity of current deck. DECK BYPASSED. PREVIOUS COMPLETE DECK identity of previous deck (something wrong with the card)

10. NONZERO RELOCATION BITS IN card type
    CARD card identity
    DECK BYPASSED. PREVIOUS COMPLETE DECK
    identity of previous deck.

11. CHECKSUM ERROR IGNORED IN card type
    CARD card identity.

12. OCTAL CARD FORMAT ERROR IN DECK
    identity of current deck
    DECK BYPASSED. PREVIOUS COMPLETE DECK
    identity of previous deck

13. CHECKSUM ERROR IGNORED IN WORD 0 OF CONTROL BLOCK
    FOR ROUTINE routine.

PROGRAM ABORTS

Execution of TSLG may be aborted for the following reasons:

Reason Code	Meaning
0	Specified input or output file not present.
1	Premature EOF on input file R* or *Z.
2	Wrong routine read from *1.
3	Previously defined SYMDEF not found in directory.
4	Premature EOF on *S.
5	Insufficient buffer area provided. (Rerun with larger core specification on $ LIMITS card.)
6	Invalid device code specified in file control block for UI or UO.
7	Name of routine in UI control block does not agree with name in catalog.
8	Number of sectors specified in UI control block is inconsistent with total DCW word count.
9	Invalid control card in I*.

Library Editor Subsystem

The Time-Sharing FORTRAN Library Editor (LIBED) is a time-sharing subsystem that may be called at the subsystem selection level (SYSTEM?) by the name LIBED. It allows the user to manipulate collections of independent subroutines or subprograms stored on permanent files in GESAVE (H*) format. The user can combine several collections into one file, to delete elements from such a collection, or to extract (copy) selected elements.

LIBED is specifically intended for the editing of subroutine library files. These files are to be subsequently processed by the Library Generator (TSLG) program. However, the LIBED functions are equally applicable to any collection of object programs, subprograms, or subroutines in GESAVE format.

The LIBED subsystem provides for three processing functions -- LIST, APPEND, and DELETE -- and utilizes the control command DONE. The subsystem operates on any of the following combinations of files:

- Old master file (only)
- Old master file and update file
- Old master file and new master file
- Old master file, update file, and new master file.

Each of these files must be previously created permanent files, and must be accessed explicitly prior to the use of LIBED.

A convenient means of pre-accessing these files is by the GET command, which may be given at the subsystem selection level. The old master and update files must be random files in GESAVE format. The new master must be defined (or accessed) as a random file. The new master file may be a newly created, empty file (created most conveniently via the ACCESS subsystem), or it may contain previously stored data which will be overwritten.

If all three files are specified, processing results in a modified new master file, and neither the old master file nor the update file is changed. If a new master file is not specified, all modifications take place on the old master file.

Following selection of LIBED, at the subsystem selection level, the user is asked the question:

FILES?

Possible user responses to this question are as follows:

- old-master-name
- old-master-name, update-name
- old-master-name, new-master-name
- old-master-name, update-name, new-master-name

Having received a valid reply to the FILES? question, the subsystem responds with the message READY. In response to READY, the terminal user may type in one of the following commands:

- LIST filename

  The filename is the name of one of files specified in response to the FILES? question.

  The subsystem lists the names of all routines on the designated file along with the number of blocks required to contain each routine. The list terminates with a report of the total number of blocks used on that file.

  Example of LIST format:

  LIST OLDMAS

ROUTINE NAME	NO. OF BLOCKS
XROUTN	5
YROUTN	7
ZROUTN	6
TOTAL NO. OF BLOCKS USED	18

- APPEND subr 1, subr 2,...,subr n

  The subr i is the name of a routine on the update file to be appended to the old master file to generate either a modified old master file or a new master file. When no routine name is supplied, the entire contents of the update file is appended as above.

- DELETE subr 1, subr 2,....,subr n

  The subr i is the name of a routine to be deleted from the current master file (old master file, if no new file is designated, or new master file, if it were created prior to this command). If DELETE is given with a nonexistent routine name specified, a copy of old-master to new-master takes place.

- DONE

  This command terminates the subsystem, releases all files involved, and returns control to the subsystem-selection level.

EXAMPLE OF COMBINED LIBED AND TSLG USAGE

Time-Sharing FORTRAN subroutines to be used as input to LIBED (optional), and then to TSLG, may be written originally in Time-Sharing FORTRAN and compiled or may be written in GMAP (observing special coding restrictions). Therefore, hypothetical Time-Sharing FORTRAN generated subroutines are used for the purpose of the following example. Text within brackets is not part of the printout, but is added to explain features of the program.

1. To create user library subroutines via Time-Sharing FORTRAN:

```
SYSTEM ?ACCESS --- (Subsystem selection to create file
                        space)
FUNCTION?  CF
    CATALOG STRUCTURE TO WORKING LEVEL?

    FILE NAME,SIZE(IN BLCKS),MAX SIZE?  A1,3,3,R
    PASSWORD?
    GENERAL PERMISSIONS?
    SPECIFIC PERMISSION?
    LOGICAL RECORD SIZE?
SUCCESSFUL!
    FILE NAME,SIZE(IN BLCKS),MAX SIZE?  A2,2,3,R
    PASSWORD?
    GENERAL PERMISSIONS?
    SPECIFIC PERMISSION?
    LOGICAL RECORD SIZE?
SUCCESSFUL!
    FILE NAME,SIZE(IN BLCKS),MAX SIZE?  A3,6,6,R
    PASSWORD?
    GENERAL PERMISSIONS?
    SPECIFIC PERMISSION?
    LOGICAL RECORD SIZE?
    FILE NAME,SIZE(IN BLCKS),MAX SIZE?
SUCCESSFUL!


FUNCTION?
SYSTEM ?FORTRAN --- (Subsystem selection to create
OLD OR NEW-NEW        subroutines QUAD and NTRS)
READY
*010  SUBROUTINE QUAD(X,Y,Z)
*020  READ:A,B,C
*030  RR=B**2-4.0*A*C
*040  DD=SQRT(RR)
*050  X1=(-B+DD)/2.0*A
*060  X2=(-B-DD)/2.0*A
*070  PRINT:X1,X2
*080  RETURN
*090  END
*100  SUBROUTINE NTRS
*110  X=1.0
*120  2EX=EXP(X)
*130  EMX=1.0/EX
*140  XNEW=X+((EX+EMX)/2.0+COS(X)-3.0)/((EX-EMX)/2.0-SIN(X))
*150  PRINT:XNEW
*160  IF (ABS(X-XNEW) .LT. 1.E-6) STOP
*170  XNEW=X
*180  GO TO 2
*190  END
*RUN =A1(NOGO) -- (Place QUAD and NTRS in file A1)
*NEW --- (Create Subroutine FACT and AREA)
```

```
READY
*010  SUBROUTINE FACT(K,J,N)
*020  READ:K,J,N
*030  PRINT 88,K
*040 88FORMAT(1H0,I5," FACTORIAL IS")
*050  DO 99 I=1,N
*060  J=J-1
*070  K=K*J
*080 99CONTINUE
*090  PRINT:K
*100  RETURN
*110  END
*120  SUBROUTINE AREA(X,Y,Z)
*130  READ:A,B,C
*140  S=(A+B+C)/2.0
*150  AREA=SQRT(S*(S-A)*(S-B)*(S-C))
*160  PRINT:A,B,C,AREA
*170  RETURN
*180  END
*RUN =A2(NOGO) --- (Place FACT AND AREA in file A2)
*DONE
```

2. To merge subroutines on files A1 and A2 onto file A3:

```
SYSTEM ?ACCESS --- (Subsystem selection to determine
                       permissions)

FUNCTION?  AF
    CATALOG STRUCTURE TO WORKING LEVEL?

    FILE NAME?  A1
    PERMISSIONS DESIRED?  R,W
SUCCESSFUL!
    FILE NAME?  A2
    PERMISSIONS DESIRED?  R,W
SUCCESSFUL!
    FILE NAME?  A3
    PERMISSIONS DESIRED?  R,W
SUCCESSFUL!
    FILE NAME?


SYSTEM ?LIBED -- (Subsystem selection to edit files)
FILES?  A1,A2,A3 --- (old-master-name,update-name,
READY                     new-master-name)
LIST A1
ROUTINE NAME    # BLOCKS --- (Blocks refers to device block
    QUAD         0003              size)
    NTRS         0004

TOTAL # OF BLKS 0007
# BLKS AVAIL.   0006

READY
```

```
LIST A2
ROUTINE NAME    # BLOCKS
    FACT         0003
    AREA         0003

TOTAL # OF BLKS 0006

READY
LIST A3
NO DATA ON NEW FILE

READY
APPEND FACT --- (Append FACT from A2 to A1 and create
                  data for A3)


READY
LIST A3
ROUTINE NAME    # BLOCKS
    QUAD         0003
    NTRS         0004
    FACT         0003

TOTAL # OF BLKS 0010
# BLKS AVAIL.   0018

READY
DONE
```

The file A3 now contains all the routines that the user desires to be on his own library, when it is created. File A3 can now be processed by TSLG, creating another permanent file in actual subroutine library format.

3. To convert file A3 into a user's subroutine library the following deck setup may be used:

```
$  SNUMB          ...
$  IDENT          ...
$  FILEDIT        OBJECT,INITIALIZE
$  TAPE           R*,X1S
$  DATA           *C,,COPY
$  ENDCOPY
$  PROGRAM        TSLG
$  USERID         user-id$password
$  LIMITS         30,32K,0,10000
$  PRMFL          UI,R,R,catalog/A3
$  PRMFL          UO,W,R,catalog/A4
$  TAPE           *Z,X1R
$  TAPE           *1,X2R
$  FILE           *2,X3R,1R
$  SYSOUT         P*
$  DATA           I*
   IN             UI,*Z
   OUT            UO
$  ENDJOB
```

A4 can now be specified as a user's library with the Time-Sharing FORTRAN RUN command; e.g.:

```
*RUN =(ULIB)A4
```

ERROR MESSAGES

Possible error messages are as follows:

NO OLD FILE NAMED

User did not designate an old master file name. Control is returned to the subsystem selection level.

FILE NOT RETRIEVED

One of files specified by the user has not been placed in the AFT table.

ILLEGAL COMMAND

Response to READY was not a valid command.

INVALID FILE NAMED

User designated a file that was not previously defined for the subsystem.

NO DATA ON NEW FILE

User requested a list of the new master file which had not been created yet in this subsystem.

ROUTINE xxxxxx NOT FOUND

In use of the DELETE or APPEND command, the user designated a routine name that could not be found on the appropriate file.

NO MORE ROOM ON CURRENT MASTER

The new master file (or the old master file if no new file was specified) has no more disk/drum space. Current master contains all information up to the point where this condition was found.

NO UPDATE FILE NAMED

The APPEND command was issued but no update file was specified.

DISC/DRUM ERROR

An unrecoverable error occurred while reading or writing subsystem files.

FILE IS NOT A RANDOM FILE

One of the files designated by the user is not a random file.

SYSTEM ERROR

Invalid condition occurred within subsystem.

FILE TOO LARGE FOR SUBSYSTEM

Table overflow in subsystem. The subsystem can handle a file of 320 links, with 180 routines on it, if the block size is 64 words. With a block size of 40 words, a file of 216 links containing 108 routines is the maximum.

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ORDER No.: BS01, REV. 1

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ERRORS IN PUBLICATION:

SUGGESTIONS FOR IMPROVEMENT TO PUBLICATION:

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