

**Basic Four[®]
Magnetic Tape Utilities
Reference Manual**

BFISD 5052B

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BASIC FOUR
MAGNETIC TAPE UTILITIES
REFERENCE MANUAL

BFISD 5052

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SECTION 1 - INTRODUCTION TO THE MAGNETIC TAPE UTILITY

OVERVIEW

Equipment manufactured by MAI's Basic Four Information Systems Division that does not have removable disc packs or that has only one disc drive is sold with a magnetic tape cartridge unit for backing up files onto tape. Systems with removable disc packs may use either the magnetic tape cartridge or reel-to-reel magnetic tape unit. This manual describes the Basic Four Magnetic Tape Utility and the set of programs called "*MTC" which govern its use.

This section gives an overview of the *MTC utility. The next three subsections explain the contents, scope and conventions of the manual. The following subsections explain the purpose of the *MTC utility and describe its features and benefits as well as the logic of the system.

For information on how to operate and maintain the magnetic tape unit, consult the following guides:

- o Model 64xx Series Magnetic Tape Cartridge Drive Operator's Guide, BFISD 5096
- o Model 651x Series Magnetic Tape Drive Operator's Guide, BFISD 5095

SCOPE

The information in this manual applies generally to systems at a 3.7A release or later, including level 4.2. Screen displays are those introduced with the Level 4 utilities. Alternate load procedures for levels 3.6E and earlier are also described. This manual contains information on how to run the *MTC Utilities, but also contains more detailed information that the average user may not need. The user who wishes only the information required to label tapes and run pre-defined backup and restore procedures should consult the Magnetic Tape Utilities Quick Reference Guide, BFISD 5086.

CONTENTS

This manual is organized in the following sections:

- o Section 2 - "ENVIRONMENT, INSTALLATION AND START-UP PROCEDURES" - contains information on the hardware and software requirements for the *MTC Utility, instructions for installing the utility, and start-up procedures.

- o Section 3 - "RECOMMENDATIONS FOR USING *MTC UTILITIES" - contains hints on how to use the features of *MTC, including how to coordinate tape labeling and cataloging when creating custom procedures.
- o Section 4 - "EXECUTE A PROCEDURE" - explains the steps to take to run an existing procedure and provides information on the pre-defined procedures as supplied by BFISD.
- o Section 5 - "DEFINING A PROCEDURE" - describes how to create a new procedure or modify existing procedures.
- o Section 6 - "REPORT FUNCTIONS" - describes the reporting options of *MTC and how to use them.
- o Section 7 - "MAINTENANCE FUNCTIONS" - includes information on how to label tapes, create and maintain filelists, and copy and delete procedures.
- o Section 8 - "ERROR HANDLING" - contains information on how the system processes errors, including a listing of error messages and their meanings.

The next four sections of the manual are appendices listing details that the average user may sometime find useful but probably does not need for most uses.

- o APPENDIX A provides a listing of the pre-defined procedures and their default parameters.
- o APPENDIX B describes CRITICAL AND *MTC FILES and explains how they are handled by the *MTC Utility.
- o APPENDIX C contains detailed layouts of the tape and disc files and tape labels used by the utility.
- o APPENDIX D contains information on PROGRAMMING MAGNETIC TAPE DEVICES, including error codes and tape layouts.
- o The last appendix, APPENDIX E, contains a GLOSSARY of terms appearing frequently in the manual.

CONVENTIONS

This subsection describes the conventions used in this manual for representing data to be entered at the terminal. In references to information to be entered at the terminal in this guide, "Press" indicates that a function or control key is to be pressed. "Enter" indicates that something is to be typed and frequently a Control Key (Carriage Return, Control Bar, etc.) is to be pressed to signal that the "entering" process is completed.

Keys to be pressed are indicated in caps and underlined, without any quotation marks, such as:

CTL-IV (for Control Bar IV) and

RETURN or CR (for Carriage Return)

Information to be typed in is surrounded by single quotes, which are not themselves to be typed, as in:

'm' (for the letter m) 'YES' (for the word YES).

RELATED PUBLICATIONS

The following Basic Four publications contain additional information on the Level 4 Operating System:

- o Reference Manual for Business BASIC Levels 3 and 4, BFISD 5085
- o Operator's Guide System 610/730, BFISD 5042
- o Operator's Training Guide 200/410, BFISD 5045
- o Level 4 Utilities User's Guide, BFISD 5084
- o Magnetic Tape Utilities Quick Reference Guide, BFISD 5086
- o Model 64xx Series Magnetic Tape Cartridge Drive Operator's Guide, BFISD 5096
- o Model 651x Series Magnetic Tape Drive Operator's Guide, BFISD 5095

PURPOSE OF *MTC

This subsection explains the purpose and history of the *MTC Utility.

THE PROBLEM

Most users of small business computer systems do not have a staff trained to handle complicated data processing procedures. Application programs are usually written for untrained operators, with prompts for entering data correctly and procedures for validating the data before files are updated. The weakest part of small business systems has always been the method for backing up files and transferring files to and from disc. When files on disc are being copied, it is easy to copy in the wrong direction or to the wrong disc. These mistakes may destroy the latest data base.

THE SOLUTION

The *MTC Utilities provide procedures for copying files from disc to tape or from tape to disc, which can be run by a minimally-trained operator with a reduced chance of serious operator error. In addition, the Basic Four tape/disc copying utility has been expanded so that the user can create a set of customized procedures to suit specific needs. In this way, the *MTC Utility retains the efficiency and flexibility of a conventional utility, while providing the capacity to "lock in" the steps that an untrained operator must take during backup or restore operations.

HISTORY OF THE *MTC UTILITY

The first version of the *MTC Utility used only a fixed-tape cartridge and did not have an option for multiple disc drives. The 3.6F release of the operating system was the foundation for the current utility, adding multiple drive options, tape labels and catalogs and the ability to create custom procedures. Level 3.7A added the on-line utility. The reel-to-reel tape became available with level 3.7A.

FEATURES AND BENEFITS

The Basic Four *MTC Utility has been redesigned to provide more security for the user in performing backup and restore operations, and to reduce the time it takes to locate files on tape. The main features of the new *MTC Utility are tape labels, tape catalogs, pre-defined procedures and the capability to create custom procedures.

TAPE LABELS

One major concept introduced in this utility is the tape label. A tape label consists of a record written on the tape after the loader, providing the following identification:

1. Tape-set name and ID
2. Tape volume sequence number
3. System serial number
4. Date the tape was labeled
5. Date and time the tape was last written to
6. Name of the disc backed up on tape
7. Cartridge serial number

In general, tape labels make it less likely that the wrong tape will be used to back up and restore files. Specifically, tape labels provide the following benefits:

1. They allow the user to keep a record of the files maintained on tape.
2. They allow the user to restrict a given procedure to a specified tape.
3. They allow the user to specify that a particular tape is not to be used unless the procedure specifies it by name.

See SECTION 3 for RECOMMENDATIONS on how to use tape labeling, and SECTION 7 - MAINTENANCE FUNCTIONS for the actual steps required to label a tape.

TAPE CATALOGS

A second major feature of the revised *MTC Utility is the tape catalog. A tape catalog is comprised of two files on disc consisting of a label catalog and a file catalog. The label catalog is a directory of the labels of all tapes used for backing up files. The file catalog is a listing of the files backed up on cataloged tapes, including the location of the file on tape and the date the file was last backed up. To "catalog" a tape is to record it in the tape catalog; to remove the record of a tape from the tape catalog is to "decatalog" a tape. A tape may be recorded in the label catalog without being recorded in the file catalog. In that case, the tape is "cataloged". A tape is "fully cataloged" when the file information is also cataloged. The catalog can be created automatically during a backup operation.

Tape catalogs, like tape labels, allow the user to keep track of the files stored on tape and the dates of their backup. The following information in the catalog can be printed or displayed:

1. A list of files on a tape
2. The names of tapes containing specific files
3. Information contained in the tape label
4. A list of generation tapes in the order of their last backup.

Catalogs eliminate unnecessary searches for files on tape. They also make it possible to back up over the oldest tape in a set of generation tapes, and to restore from the most recently backed up version or a version created on a particular date. See SECTION 3 for RECOMMENDATIONS on cataloging tapes.

PRE-DEFINED PROCEDURES

The *MTC Utility has eleven pre-defined procedures which supply simple methods for performing both full and selective backup and restore operations. The user can also verify the correct copy of files from disc to tape after a backup operation. These standardized procedures eliminate the need to enter control parameters for operations performed repeatedly, and reduce the possibility of mistakes by minimizing the effort required to carry out a procedure. See SECTION 4 - EXECUTING A PROCEDURE for information on how to use pre-defined procedures.

CUSTOM PROCEDURES

In addition to supplying defined procedures, the *MTC Utility permits the user to create custom procedures for copying files from disc to tape or from tape to disc. These procedures may be as simple or as complex as desired. If properly designed, a procedure can be run by a minimally-trained operator with only a slight possibility of operator error. Procedures can be designed to require the use of specific tapes and to reject any other tape the operator may attempt to use. For information on how to create new procedures and modify existing procedures, see SECTION 5 - DEFINING A PROCEDURE.

ADDITIONAL FEATURES

Other features available on the *MTC Utility are:

1. An extensive capability for selecting files to be backed up or restored.
2. An option for verifying the error-free copying of files after a backup.
3. The option to erase files from a disc after they have been backed up on tape, allowing the user to restore a different data base or set of application programs in their place.
4. The capability to control the location to which files are restored from tape to disc.
5. Extensive warning messages before any operation that could destroy a file is performed.

For detailed recommendations on how to use the *MTC Utility for the greatest benefit, read SECTION 3 carefully.

SYSTEM DESCRIPTION AND LOGIC

The *MTC Utility performs all backup, restore, catalog, decatalog and call operations under the control of procedure steps contained in the Procedures Step File (*MTCPC), using files listed in the Filelist File (*MTCFL), supported by the Tape Label Catalog File (*MTCTC) and the Tape Files Catalog File (*MTCFC). Detailed descriptions of these files are in APPENDIX C - DATA STRUCTURES.

PROCEDURES

A procedure consists of from 1 to 99 steps that back up or restore a file or range of files, catalog or decatalog a tape, or call another procedure. Each procedure is stored in the disc file *MTCPC. A new procedure may be given either a user-specified name or, for a temporary procedure, the reserved name TEMPORARY.

PROCEDURE EXECUTION

A procedure is executed (1) when the operator requests procedure execution from the main menu, (2) immediately after the definition of the procedure TEMPORARY, or (3) if the system has on-line *MTC capability, when the operator runs the procedure execution program *MTCEX.

While a procedure is being executed, the operator is asked to supply any information that is not included in the definition of the procedure. Each step of a procedure is logged as it is completed. If a procedure ends prematurely, the step number that was not completed is displayed when the procedure is called up for execution again. The operator may choose to restart the procedure at the step that was not completed or to begin from the first step.

A procedure can CALL another procedure. When all steps in a CALLED procedure have been executed, program control returns to the next step in the calling procedure. Calls may be nested within calls to four levels.

CRITICAL FILES

Files required by the system to operate or to perform special functions (i.e., diagnostics) are designated as "critical files". These files must be on disc for normal operations, so they have additional protection under this utility. They are restricted to track 0 of a tape cartridge or the first reel of a reel-to-reel tape. They must also be present for system updates or installation. Normal restore operations skip these files unless they are specified in the procedure. For detailed information on critical files, see APPENDIX B - CRITICAL AND *MTC FILES.

SECTION 2 - ENVIRONMENT, INSTALLATION AND START-UP PROCEDURES

OVERVIEW

This section gives the following information about the *MTC Utility: the hardware and software required to run Levels 3.6F and later of the Magnetic Tape Utility; procedures for installing the utility on systems which do not have *MTC as well as for upgrading an existing version of the utility to Levels 3.6F and later; and general start-up and menu procedures, including normal and alternate load procedures.

ENVIRONMENT

Systems with enough memory to have the *MTC Utility programs incorporated within the standard operating system are said to have "on-line" *MTC. Although it is recommended that no other users be on these systems during backup operations, it is not mandatory. Other operators may continue to use files and programs which are not included in that particular backup procedure. (If a file to be backed up is in use, it will not be backed up.) Systems which do not have "on-line" *MTC do not have the *MTC driver programs included in their standard operating system. In addition to the standard operating system, these systems have an "alternate operating system" which includes the *MTC programs. Other users may not be on these systems during *MTC backup and restore operations since only those programs required for the backup or restore operations are then available.

The following paragraphs describe the hardware and software environment of the *MTC Utility.

HARDWARE REQUIREMENTS

The *MTC Utility executes on any Basic Four system that supports the tape cartridge or reel-to-reel tape as a backup and restore device. For systems at 3.6F and later the utility supports a one-track or four-track magnetic tape cartridge. Beginning with Level 3.7A the *MTC Utility functions with 800/1600 BPI reel-to-reel magnetic tape, model 6500.

The tape labels used on this utility do not require a significant amount of tape, but the logical grouping of files (for example, inventory files or payroll files) permitted by the utility may result in the

need for additional tapes. The disc files necessary to support the utility are described in APPENDIX C - DATA STRUCTURES. The utility provided to move files can be used to expand files as necessary.

SOFTWARE REQUIREMENTS

A minimum system for versions of *MTC before Level 4 requires 32K total memory, and at least Level 3.6F of the operating system. For Level 4 a system with *MTC must have 64K memory.

Compatibility

The utility is supplied with all Business BASIC Level 3.6F (and later) software systems requiring magnetic tape support. Existing tape cartridges generated by earlier versions of the *MTC Utility are compatible with this utility, but such tapes must be labeled before they can be used for backups by this utility. No backward compability exists, however; cartridge tapes written by this utility are not compatible with *MTC Utilities using language levels earlier than BASIC Level 3.6F (although systems at level 3.6C and later can read labeled tapes).

Restrictions

The following restrictions apply to the *MTC Utility:

- 1) Systems with only 32K memory must always run the backup and restore options of the *MTC Utility under the alternate operating system, BBIITC.
- 2) The reporting options of the utility must be run under the standard operating system if printed output is required.
- 3) All applications programs backed up and restored by the utility must be in Business BASIC.
- 4) During system recovery, a specific procedure is executed which does not allow other options of the utility to run.

Supporting Utilities

A utility to copy or move files, which does not require the use of the *MTC Utility, allows the user to expand a disc file "in place." A utility to compact disc files is provided to collect the free space at either end of the disc.

INSTALLING THE
*MTC UTILITY AND
SYSTEM UPGRADES

This subsection describes procedures for installing the *MTC Utility on systems which contain an earlier version of the utility, as well as installing the utility on systems which do not have an existing or operating version. System upgrades to Levels 3.7A and later, including Level 4.2, are also described.

SYSTEM UPGRADES
WITH EXISTING *MTC

This subsection describes procedures for upgrading a system which already has the *MTC Utility. The first set of procedures explains how to upgrade a system to Levels 3.7A and later but not including Level 4.2. Next is a table summarizing upgrade procedures for systems of levels before 3.7A to Levels 3.7A through 4.1. The last part gives procedures for upgrading a system to Level 4.2.

Upgrading to
Level 3.7A
and Later

Note that the default number of directory entries has increased from 1050 to 1890 with the 3.6F version and later for Systems 200 and 410. If you use the full restore or install system options of an earlier version of the *MTC utility, the utility automatically increases the size of your directory by restoring the new directory and moving the starting position of the first file. A selective restore or update to the system, however, does not affect the size of the directory. Because of this change, you may wish to contact your systems analyst to expand your directory, especially if you exceed the capacity of the directory as described in step 2 below.

Take the following steps to upgrade a system with an existing *MTC Utility to Levels 3.7A and later:

1. Run the "*L" utility, specifying the "AVAILABLE SECTORS" option. If the total number of free sectors is less than 410, call your Basic Four representative for assistance. The new utility requires 403 sectors to accommodate its programs and files. If these 403 sectors are not contiguous, file placement is random and may require additional sectors.
2. Run "*A", the disc directory listing utility, to determine the number of available directory entries. Use any of the options (UNSORTED/NAME/LOCATION). Subtract the "NO. OF FILES" shown at the end of the listing from the "NO. OF FILES DEFINED IN DIRECTORY". If the result is less than 40, call your Basic Four representative. You must have 39 available entries to install the new utility successfully, but you should also have a few entries available for files you may need in the future.

3. Perform a full backup of your disc using the full backup option (#1) of the older version of the utility (i.e., Level 3.6E and earlier). Perform an alternate load, and use the update option (#7) of the older version of *MTC to restore the contents of the supplied tape to the disc. Restore both program and data files.
4. Perform another alternate load before attempting to use the new version of the utility (Levels 3.6F and later) or you will receive ERROR=37. When the update in step 3 is finished, the screen display is cleared and you are asked to enter the date. If you do not perform an alternate load, the old alternate operating system still resides in memory and cannot execute the new programs.

NOTE

Although you can restore from a tape created with the previous release of *MTC using this new version, you must label a tape before using it for backups with this later version of the utility. See SECTION 7 for details on labeling tapes.

Table 2-1 gives a summary of procedures to follow for upgrading a system to Levels 3.7A through 4.1.

Table 2-1. Procedures for Upgrading a System

LEVEL CURRENTLY ON DISC	PROCEDURES FOR UPGRADING TO LEVEL 3.7A OR LATER (NOT INCLUDING LEVEL 4.2)
3.5G	LOAD <code>"*MTCR4"</code> EDIT 2200 C["N"] [OR H=96] SAVE <code>"*MTCR4"</code> Do an alternate load of <code>*MTC</code> Specify option 7: UPDATE SYSTEM Re-load the operating system when the restore is completed.
3.6C, 3.6E	Do an alternate load of <code>*MTC</code> Specify option 7: UPDATE SYSTEM When the restore is completed you will receive a message: "OPERATING SYSTEM NOT COMPATIBLE WITH THIS UTILITY. NEED LEVEL 7 OR ABOVE." Re-load the operating system.
3.6F	Do an alternate load of <code>*MTC</code> Execute the procedure UPDATE Re-load the operating system when the restore is completed.
3.7A or later	Do an alternate load or RUN <code>"*MTC"</code> Execute the procedure UPDATE Re-load the operating system when the restore is completed.

Upgrading to Level 4.2

The information below explains how to upgrade a system from Level 3.6F and later to Level 4.2, both for removable-disc systems and for fixed-disc systems. The Level 4.2 system contains a new version of the system bootstrap and loader. This bootstrap and loader are compatible with previous systems provided they are used together.

NOTE

Mixing a pre-Level 4.2 bootstrap and a Level 4.2 loader or, conversely, a 4.2 bootstrap and a pre-Level 4.2 loader causes the system to halt or hang during the initial system load. Any pre-Level 4.2 bootstrap and loader cannot load successfully a 4.2 operating system, but a 4.2 bootstrap and loader can load a pre-Level 4.2 operating system.

Upgrading Removable Disc Systems

All removable-disc systems require a "new" system disc for a successful upgrade. All pre-Level 4.2 system discs which do not contain the correct bootstrap cannot successfully load a 4.2 operating system. The following are procedures for upgrading a removable-disc system to Level 4.2:

Single-Drive Systems

1. Perform a complete verified backup before every system upgrade, using the supplied *MTC procedure BACKVERF. Keep this tape for use in step 3 below. (See SECTION 4 - EXECUTING A PROCEDURE for details.)
2. Mount the new Level 4.2 system disc, and then perform a normal system load.
3. With the tape created in step 1, execute the *MTC procedure 4.2UPDAT. This restores all the programs and data files that are not currently residing on the disc.

Multiple-Drive Systems

1. Mount the Level 4.2 system disc in drive 0.
2. Mount the "old" system disc in drive 1.
3. Load the system from drive 0.
4. Run the Level 4 Utilities main menu, "***" (that is, enter the command 'RUN "***'). The Level 4.2 system contains all new utilities which are menu-driven.
5. When the main menu is displayed, select option 5 for SYSTEM utilities. When the SYSTEM utilities menu is displayed, select option 5 for BOSS UPDATE.
6. When the BOSS UPDATE UTILITY option screen is displayed, press '1' once and then press RETURN to have the output sent to the line printer.

7. The program displays the message:

THIS UTILITY WILL UPDATE ONLY THOSE FILES
FROM discname (1) TO discname (0) WHICH ARE
NOT ALREADY PRESENT.

WARNING

THE ESCAPE KEY WILL BE DISABLED DURING THE
TRANSFER.

OK TO PROCEED? (YES/NO):

Enter 'YES' and the utility transfers all the
programs and data files from disc 1 (the old
BOSS) to disc 0 (the new BOSS) that are not
currently residing on disc 0.

Upgrading Fixed Disc Systems

These are the steps to take to upgrade a fixed-disc
system to Level 4.2. Contact your field service
representative or Sorbus representative for
assistance.

1. Perform a complete verified backup before every
system upgrading using the supplied *MTC
procedure BACKVERF. Keep this tape for use in
step 9 below.
2. Set all the sense (toggle) switches on the back
of the CPU cabinet to the "ON" position (all to
the left).
3. From the Level 4.2 system tape, perform an
alternate load of the program "FORMP" from tape.
4. After the "FORMP" program is loaded, the screen
display is cleared and the following message is
displayed:

FORMP REV / x.x - x.x

IS (n) THE CORRECT NUMBER OF HEADS IN THIS
DRIVE (Y/N) ?

where (n) is the actual head count of the drive.
Enter 'Y' if the head count is correct.

5. Enter the System Serial Number (SSN) in the
format XXX-XXXXX, when the message appears:

ENTER MODEL-SERIAL NUMBER:

6. Every time a 200/210/400 system is formatted with the program FORMP, an AUTHORIZATION CODE is required to execute the formatting routine. The code is based on the System Serial Number and a random four-byte code called an AUTHORIZATION LOCK. This code must be obtained through an authorized department or location. If the code you receive does not match the FORMP code, the initialization process cannot take place. When the following message is displayed, the LOCK may be obtained:

ENTER AUTHORIZATION CODE LOCK = System
Serial Number #####

where ##### equals the four-byte lock.

You are required to provide the following information each time an authorization code is requested:

- System Serial Number
- Customer Name
- Service Representative's Name
- Branch Number
- Field Service Location Number
- Authorization LOCK

After this information is relayed to the authorized department or location, a six-byte authorization KEY is given and must be entered correctly before formatting can begin.

It takes approximately 12 minutes to format each 25 megabytes of the disc (this is independent of the system configuration). When formatting is completed the FORMP program recovers sector zero and re-displays the FORMP main menu.

7. From the Level 4.2 system tape, perform an alternate load of the program "*SRCFL". The message TRANSFER COMPLETE is displayed after the system recovery module has been transferred to the fixed disc.
8. From the Level 4.2 system tape, perform an alternate load of the operating system "OSBBII"

(note that the operating system "BBIITC" has been deleted from the Level 4.2 BOSS). The *MTC Utilities install the new BOSS automatically to the fixed-disc after an affirmative response to the prompt "IS THIS THE CORRECT TAPE?"

9. Reset all sense switches on the back of the CPU to the "OFF" position (to the right) and perform a normal disc load. Using the tape(s) created in step 1, execute the *MTC procedure 4.2UPDAT to restore all files not currently residing on the fixed disc.

NOTE

This is a special procedure that is required only the first time a Level 4.2 or later BOSS is installed.

Subsequent upgrades can be performed using step 1 and the following steps:

- a. Perform a normal disc load and RUN the *MTC utility (that is, enter the command 'RUN "*MTC"').
- b. Execute the procedure UPDATE, which catalogs and restores the new BOSS tape to the fixed disc. All user programs and data files currently residing on the disc remain intact. Note that the tape(s) created in step 1 do not need to be restored; they are used only as a precaution.

INSTALLING THE UTILITY ON SYSTEMS WITHOUT *MTC

This subsection describes the steps to take to install a basic version of the *MTC Utility on systems which do not contain a previous version of the utility or which contain a utility that does not function for some reason. The procedure to use depends on whether the system has fixed or removable discs.

Fixed-Disc Systems

For fixed-disc systems, a basic version of the *MTC Utility can be installed by means of the program *SRCFL. The procedure involves loading a new operating system and a minimal version of the *MTC Utility. This procedure in effect erases the entire disc.

These are the steps to take to load a minimal *MTC Utility on a fixed-disc system (contact your field service representative for assistance):

1. Perform an alternate tape load according to the following steps:
 - a. Insert the system tape into the tape drive and allow the tape to rewind.
 - b. Set the CPU PCB sense switches on the back of the CPU for alternate load as follows:
 - 1) For tape cartridges, switches 1-4 are all set to ON.
 - 2) For reel-to-reel tapes, switch 2 is ON and switches 1, 3 and 4 are set to OFF.
 - c. Press and release the LOAD switch on the front of the CPU.
 - d. In response to the prompt: "MAKE ENTRY TO OVERRIDE DEFAULT", press RETURN.
2. In response to the prompt "ENTER PROGRAM NAME" type *SRCFL and press RETURN. The program "*SRCFL" causes the tape to be reloaded and tells the user which operating system to specify when prompted during the next alternate load: BBIITC for magnetic tape cartridges (for levels before 4.2) or OSBBII for reel-to-reel tapes.
3. After the tape has wound to the end, press the LOAD switch on the front of the CPU again. The system rewinds the tape to the beginning.
4. In response to the prompt "ENTER PROGRAM NAME", enter BBIITC for loading from tape cartridges, or OSBBII for reel-to-reel tapes (for systems 3.7E and later).
5. When the system next prompts "ENTER PGM NAME (*MTC OR BASS)", enter *MTC.

At this point the program goes through the automatic system recovery procedure created by *SRCFL. It verifies the presence of critical files and transfers the files from tape to disc.

Removable-Disc
Systems

Although the utility *RETUD was designed to give the single-disc 610 user the means to REstore the Tape Utilities to Disc, it can be used on any system with removable discs to restore the *MTC Utility files from a system tape onto a user's disc pack not currently containing the *MTC Utility files. These are the steps to take to restore the *MTC Utility to removable-disc systems:

1. Type 'RUN "*RETUD"' and press RETURN. The system returns the prompt:

MOUNT TAPE, DEPRESS 'CR' WHEN READY

(MB-IV TO ABORT)-

2. If more than one tape device is configured, you are asked to specify which one is to be used. For systems with MTR the prompt appears:

ENTER TAPE DEVICE NAME OR 'CR' FOR RO--

For systems with MTC the prompt is:

ENTER TAPE DEVICE NAME OR 'CR' FOR CO--

3. The tape is then read for a label. Unlabeled tapes are not accepted. Once a labeled tape is mounted, the label is displayed as shown in Figure 2-1 and you are asked to verify that it is the correct tape:

TAPE-SET NAME	XXXXXXXXXX
TAPE-ID NAME	XXXXXXXXXX
VOLUME SEQUENCE NUMBER	1
LAST BACKUP DATE	MM/DD/YY
IS THIS THE CORRECT TAPE? (YES/NO) ---	

Figure 2-1. Tape Label Information.

4. The program automatically restores the files to Disc 0. Once you have verified the tape selection, you are prompted to change discs:

MOUNT DISC ONTO WHICH THE TAPE UTILITIES ARE
TO BE RESTORED.

ENTER 'CR' WHEN DISC IS READY (MBIV TO
ABORT)-

Once the correct tape and disc are mounted, the
restore process begins.

5. Since the *MTC Utility files are located first on
the tape, every file is restored until the first
non-tape utility file is found. Files considered
tape utility files are the drivers, (>MR and
>TC, all *MTC files, and BBIITC (before level
4.2) or OSBBII. The tape is written so that all
these files are contiguous. This makes it easy
to restore all files until a file other than an
*MTC Utility file is found. Files are restored
only from the first track of the first tape; when
the end-of-track is found, no further files are
restored, and the program displays the message:

END OF TRACK (TAPE) FOUND. RESTORE
TERMINATED.

Files are restored to the first available sector.
Once the first non-*MTC Utility file is found,
the program notifies you:

RESTORE COMPLETE.

START-UP PROCEDURES

This subsection describes procedures for loading the *MTC Utility. Systems limited to 32K of memory must use the alternate operating system BBIITC, and under these circumstances the report-printing capabilities of the *MTC Utility are not available. Normal load procedures apply only to systems with the "on-line" MTC capability (Level 3.6F or later). Systems without this capability must use the alternate load procedure.

NORMAL LOAD PROCEDURES

The normal load procedure for running the *MTC utility is as follows:

1. Apply power by pressing POWER momentarily.
2. Load the operating system by pressing LOAD momentarily. The green indicator lights when the load has been successful. If it does not light, press LOAD again.
3. On the VDT, a proprietary message is then displayed, followed by initialization prompts, followed by the READY prompt.

NOTE

MTC needs 40 pages to run in Level 3 and 62 pages to run in Level 4. Before running the *MTC Utility, assign memory by entering the command 'START 40' or 'START 62'. The assignment of additional memory may cause the *MTC Utility to run faster in particular circumstances.

4. To enter the *MTC Utility through its main menu type 'RUN "*MTC"' and press RETURN. For information on *MTC Utility menu procedures, see the subsection titled MAIN MENU at the end of this section.
5. Set the date and time as described below.

ALTERNATE LOAD PROCEDURES

The alternate load procedure for running the *MTC utility is described here. This does not apply to Level 4.2 and later.

1. Apply power by pressing POWER momentarily.
2. Invoke the alternate load mode by pressing TEST continuously. Do not release the TEST switch until step 4.

3. Load the operating system by pressing LOAD momentarily.
4. On the VDT, a proprietary message is displayed, followed by the prompt: MAKE ENTRY TO OVERRIDE DEFAULT. At this point, TEST can be released and RETURN pressed, but RETURN must be pressed within twenty seconds after the first line of the proprietary message is displayed. If a RETURN is not entered within the time limit, the message appears:

CANNOT FIND ALTLOAD
PLEASE RELOAD.

You must then repeat the loading procedure by holding down the TEST switch and pressing the LOAD switch as described in steps 2 and 3.

5. In response to the prompt ENTER PROGRAM NAME, type BBIITC and press RETURN. The VDT screen then clears. (If "BBIITC" is not typed correctly, the alternate load sequence must be performed again.)
6. In response to the prompt ENTER PGM NAME(BASS OR *MTC), type *MTC and press RETURN. The date and time must be set in the format indicated. The main menu of the *MTC Utility is then displayed.

SETTING THE DATE AND TIME

The user must verify the date and time before performing any MTC functions.

1. The system first presents the prompt:

DATE: MM/DD/YY
IS THE DATE CORRECT? (Y/N) -

2. If the user enters 'N', the program presents the prompt:

ENTER DATE: MM/DD/YY

Enter the correct information.

3. If 'Y' is entered, the user must then respond to the following prompt:

TIME: HH:MM XM
IS THE TIME CORRECT? (Y/N) -

To change the time, enter 'N'. The program then presents the prompt:

ENTER TIME: XXXX

Enter the correct information. The system prompts: ENTER 'AM' OR 'PM':XM. Enter the correct information.

MAIN MENU

The main menu is displayed after the user enters 'RUN *MTC' (or performs an Alternate Load Procedure as described above and sets the date and time). It appears as follows:

```
MAGNETIC TAPE UTILITY SYSTEM

0 - END
1 - EXECUTE A PROCEDURE
2 - DEFINE A PROCEDURE
3 - REPORTS
4 - MAINTENANCE

ENTER SELECTION OR ? FOR HELP -
```

Figure 2-2. *MTC Utility Main Menu.

Option 1 allows the user to execute an existing procedure. Option 2 provides a means for creating new procedures and modifying existing procedures. The user can enter '3' to produce reports on the *MTC Utility. Option 4 allows the user to maintain filelists, label tapes, and to list, copy and delete procedures. To exit from the utility, enter 0 or press RETURN. To see a HELP screen on the *MTC Utility functions, type a question mark and press RETURN.

The next section provides detailed recommendations for using the *MTC Utility. We recommend that you read it carefully before attempting to use the utility.

SECTION 3 - RECOMMENDATIONS FOR USING THE MAGNETIC TAPE UTILITIES

OVERVIEW

This section of the manual explains how to use the *MTC Utility to the greatest benefit. We suggest you read this section carefully before running the utilities. Following some general remarks, recommendations appear on the following topics: tape labeling, tape cataloging, multi-tape backups, specifying restrictions on using tapes, creating procedures, verification, multiple backups on the same tape, and using the ERASE option.

GENERAL RECOMMENDATIONS

Software vendors are generally in the best position to recommend detailed backup procedures to computer users. BFISD always recommends that you never use the same tape for backups every day. If the tape became damaged or if hardware malfunctions caused an unsuccessful backup, you would have no backup at all. You should probably perform daily backups of data files, and at least once a week you should do a backup which verifies the correct transfer of files. This tape should be stored separately from the normal daily backup tapes. At least once a month, remove a verified tape from the premises, preferably to an off-site safe or vault. This offers additional protection in the event of a fire or other disaster.

CAUTION

Clean the read/write heads of the tape unit daily, using the cleaning kit available from BFISD. If you need assistance, ask your Field Service representative for help.

TAPE LABELING

Except for the two cases explained below under SCRATCH TAPES, tapes should always be labeled and cataloged. This subsection gives some information and hints about labeling tapes.

TAPE-SETS

Tapes not labeled SCRATCH are identified by a two-part name. The first part of the name is the TAPE-SET. The second part is the TAPE ID. The system keeps track of tape-sets as if they were one tape. A single TAPE-SET and ID may have multiple reels or cartridges. The different reels or cartridges are distinguished by the VOLUME SEQUENCE NUMBER (and SERIAL NUMBER). Generation tapes always belong to the same TAPE-SET but have different IDs. Archive tapes can also be labeled as belonging to the same TAPE-SET with different IDs.

SCRATCH TAPES

There are only two circumstances under which tapes should be labeled SCRATCH, since SCRATCH tapes used by themselves are not cataloged:

1. As continuation tapes for backups requiring more than one tape. During the backup procedure the utility automatically labels continuation tapes with the TAPE-SET name and ID and the appropriate VOLUME SEQUENCE NUMBER only if they were not previously labeled or were labeled SCRATCH. For this reason it is good to have some SCRATCH tapes available.
2. For the quick transfer of files from one disc to another or from one system to another, when the tape is not to be maintained as a backup.

SPECIFYING CATALOGING

When a tape is labeled, it should also be labeled as a FULLY CATALOGED tape (either ARCHIVE or GENERATION). When full cataloging is specified, a tape is fully cataloged, even by backup procedures which do not otherwise catalog tapes automatically (viz., FULLBACK and SELBACK).

TAPE SERIAL NUMBER

When a tape is being labeled, the utility allows an operator to enter a SERIAL NUMBER for the tape. This can be any combination of alphanumeric characters, and it is used only to help identify the physical tape. The system does not use the serial number in processing tapes.

TAPE CATALOGING

We recommend that you always fully catalog all tapes to be maintained as backups. It takes less than a minute to catalog a tape fully, that is, to write the label and files information into the proper catalog files. Tapes must be labeled to be cataloged. See the previous subsection on TAPE LABELING for hints on the use of tape labels.

ADVANTAGES

The main advantages of cataloging are to keep a history of files backed up, with their backup dates, and to save time when files are restored from tape, since the files catalog contains a listing of the files on each tape. This listing can be displayed so that the operator knows which tapes contain which files. In this way it is less likely that the wrong tape is read during a RESTORE operation.

The catalog also allows you to restore selected files from a tape without having to read through all files on tape up to the files to be restored, as would be the case with an uncataloged tape. So, for example, if you wanted to restore files located after files with errors, the catalog allows the program to by-pass the files with errors in them and goes directly to the files to be restored.

The full catalog also allows you to use the FILELIST options to specify files to be backed up and restored.

CAUTION

You can use a FILELIST to back up files on an uncataloged tape, but you cannot use the FILELIST to restore files from an uncataloged tape. If you use a FILELIST to back up files on an uncataloged tape, you must use the procedure RESTALL (or RESTSEL if not all files are to be restored) to restore from the tape.

VENDORS AND DEALERS

The *MTC Utility cataloging function also permits vendors and dealers to catalog tapes which were not created on their systems without restoring the files to their systems, as long as the tape is labeled other than SCRATCH. The vendor or dealer can create a procedure consisting only of the CATALOG operation (perhaps by creating a new TEMPORARY procedure), and can run this procedure on the tape. This operation adds the information from the tape label, as well as the file names and their locations on the disc from which they were backed up, to the catalog files on the dealer's or vendor's system. This is especially useful for keeping records of modules or programs used by various customers, and for maintaining a file layout of a customer's disc for disc analysis.

MULTI-TAPE BACKUPS

Continuation tapes for multi-tape backups must be labeled either SCRATCH or as succeeding VOLUMES of the TAPE-SET and ID. If SCRATCH tapes are used, the utility automatically labels the continuation tapes with the proper TAPE-SET name and ID and VOLUME SEQUENCE NUMBER during the backup procedure.

RESTRICTIONS ON USE

The *MTC Utility provides two means of restricting the use of tapes to avoid using the wrong tapes, one during tape labeling, the other when a procedure is being defined. If restrictions are set on tape labels, they must be coordinated with restrictions on TAPE SELECTION in the definition of the procedure.

WHEN LABELING TAPES

The first means is the TAPE USE RESTRICTIONS field on the tape label. When the tape is being labeled an operator can select one of three options:

1. The NO RESTRICTIONS option allows a tape to be used by any procedure. This option is required if a tape is to be used with pre-defined procedures as supplied by BFISD. (These pre-defined procedures can be changed, however, to specify particular tapes or tape-sets.)
2. The PROCEDURE SELECTS TAPE SET option entails that the tape can be used only if the TAPE-SET is specified by the procedure. If a procedure specifies only the TAPE-SET, it accepts any tape ID within that specified TAPE-SET. If your procedure uses generation tapes, this is the restriction to put into the tape label, since generation tapes use the same TAPE-SET but different tape IDs. If this restriction is included in the tape label, procedures using these tapes must specify the TAPE-SET. This option precludes the use of option 1 below of the TAPE SELECTION parameter in the definition of the procedure.
3. The most narrow restriction is provided by the PROCEDURE SELECTS TAPE NAME option, since the tape is accepted only by procedures specifying both the TAPE-SET and ID. This restriction is useful when a procedure is using archive tapes. This option precludes the use of options 1 and 2 of TAPE SELECTION in the definition of the procedure.

WHEN DEFINING A PROCEDURE

Restrictions on tape use can also be specified in the definition of a procedure. When a procedure is being defined, one parameter is TAPE SELECTION, which gives an operator four options:

1. The USE ANY TAPE option sets no restrictions on which tapes the procedure accepts. If this option is in use, the program reads the tape

label and the operator is asked to verify that the tape is to be used for the procedure. Procedures with this option do not accept tapes whose labels include restrictions 2 or 3 above.

2. The USE TAPE WITH A SPECIFIED TAPE-SET NAME option restricts the procedure to tapes within a specific TAPE-SET, and also allows the operator to specify whether the least recent or most recent generation tape is to be used. If the operator does not select the least recent/most recent option, the procedure accepts any tape within the specified TAPE-SET regardless of the tape ID. Procedures with this option do not accept tapes whose labels include restriction 3 above.
3. The USE SELECTED TAPE option restricts the procedure to a specific TAPE-SET and ID. The procedure accepts no other tape. This restriction is required for tapes labeled with option 3 above.
4. The last option, USE TAPE USED LAST STEP, is available for procedures with more than one step.

Keep in mind that pre-defined procedures can be modified by restricting the TAPE SELECTION parameter in one of the ways explained above. Such modifications decrease the likelihood of restoring the wrong files and destroying a data base or set of programs.

We recommend that for routine backups you incorporate some restriction on TAPE SELECTION, but you should also provide an alternate procedure (e.g., "EMERGENCY") without restrictions in case the tape named in the routine procedure is not available for some reason.

CREATING PROCEDURES

This subsection includes suggestions for creating custom procedures to do routine backups.

ROUTINE BACKUPS

There are several ways to create procedures to perform routine backups. The following are examples of different ways to back up files.

Example 1:

One method is to create procedures named for the frequency of the backup. For example, suppose that your applications programs are fairly stable and that you need only infrequent backups of program files. Create a procedure MONTHLY to back up all program and data files. Suppose also that you need to do a weekly backup with verification of your data files. Create a procedure named WEEKLY using archive tapes with the same TAPE-SET name but different tape IDs. For more frequent backups you can create the procedure DAILY which uses generation tapes and backs up only data files without verification. You can maintain as many generations as you want and can define the procedure to use (or at least display) the oldest for backups and the newest for restores.

CAUTION

There is a problem with generation tapes if a backup fails. Suppose you have three generations of tapes and are using the oldest on backups. Suppose you have performed successful backups on Monday, Tuesday and Wednesday. On Thursday you attempt a backup with the Monday tape. If the program encounters an error and aborts the process, the system now records the Tuesday tape as the oldest successful backup and when you attempt to RESTART the backup, the system requires the Tuesday tape. If that attempt also fails, the system records the Wednesday tape as the oldest successful backup. In this way you can destroy the entire set of generation tapes. SOLUTION: Use the alternate backup procedure which does not require the oldest tape for backup. Run this procedure using Monday's tape (now labeled Thursday--Unsuccessful). Or you could decatalog the Monday/Thursday tape, label a replacement and run the procedure again.

As a variation of the example, if your programs are still undergoing modification, have MONTHLY perform a full backup with verification, WEEKLY back up only program files and DAILY back up only data files. Or suppose you have several data entry files which are frequently used, and other master data files which are updated once or twice a week. You could create two backup procedures, one for the data entry files, the other for the less frequently used master files.

Example 2:

Another possibility is to create procedures named for the different applications subsystems, such as ACCOUNTS, ORDERS, SALES, etc. These procedures specify the particular files being backed up, and can use generation tapes.

USING CALL

One feature of the *MTC Utility often overlooked is the CALL operation. Procedures can be designed to CALL other procedures, and in this way less operator intervention is required.

Example 1:

For example, suppose you have three procedures, DAILY, WEEKLY and MONTHLY as described in the first example. Define MONTHLY and WEEKLY as procedures consisting of two steps: a BACKUP and a CALL. Thus when MONTHLY has finished backing up files, it CALLS the procedure WEEKLY. Likewise, when WEEKLY finishes backing up files, it CALLS the procedure DAILY. Thus at the end of a week the operator only needs to run WEEKLY, and at the end of the month only the procedure MONTHLY needs to be run. This reduces some of the operator intervention required to run two or three procedures, although the operator will have to be present to mount the correct tapes.

Example 2:

An alternative to the method described above is to design a procedure which consists entirely of a series of CALLS. So, for example, if you have procedures for different applications, such as ACCOUNTS, ORDERS, SALES, and so on, define a procedure named ALL which CALLS each of these procedures one at a time. Again, this cuts down the amount of operator intervention.

VERIFICATION

The VERIFICATION procedure during backups is useful to assure the correct transfer of files from disc to tape. This procedure can be somewhat time-consuming, however, especially if a backup requires more than one tape. (As a general rule a backup takes about 20 minutes per cartridge with a four-track system; adding the VERIFICATION process doubles the time.)

One way to perform a partial VERIFICATION without actually going through the entire procedure is the following: Suppose you have just backed up a series of files. If you restore two of the files just backed up, one at either end of the tape, and if no error is detected during the restoration process, you have in effect "verified" the correct transfer of files. Be sure to select files which are short and fairly near either end of the tape. Any errors detected are reported during the RESTORE operation.

MULTIPLE BACKUPS ON THE SAME TAPE

Using MULTIPLE BACKUPS on the same tape saves time and allows you to keep a history of a file. The best use of multiple backups is for programs under development. From such a tape you can restore the first backup or the last backup or a specific backup as long as you know how many backups are on the tape. This can be determined through the REPORT FUNCTIONS if the tape is cataloged.

USING THE ERASE OPTION

The main benefit of the option to ERASE files from disc during a backup procedure is to provide more space on disc. If this option is used correctly it can make a fixed-disc system more like a removable-disc system. The option can also be used to compact files on a disc.

SWAPPING FILES

If you are lacking space on disc, you can back up working files with a cataloged tape, verify the backup and ERASE the files from the disc. Suppose you have a tape with some data files that are rarely used, such as for annual reports. Restore these files to the disc, make updates to the files, then back up the files on tape and ERASE them. Now you can restore your working files to the disc. This procedure can be useful to companies using identical programs to process separate data files. They can restore the files to be processed, process them and then remove them from the disc by doing a BACKUP using the ERASE option. In this way files can be moved off and on a system.

COMPACTING THE DISC

The ERASE option can also be used to compact a disc and to reorder files without restoring a system tape. To do this, perform a full backup by location of the files in the area to be compacted, using the ERASE option. (Make sure that no critical files are contained in this area.) Then do a restore with the procedure RESTALL, modified to restore files AT THE FIRST AVAILABLE LOCATION. This will relocate the files in a more compact area.

GENERAL HINTS

The following points are reminders about some general features of the *MTC Utility:

1. The *MTC Utility after Level 3.6E can read tapes created by the utility at Level 3.6E and earlier, but the levels before 3.6C of the *MTC Utility cannot read labeled tapes.
2. If you perform an unsuccessful backup of files including the tape catalog file, and if you repeat this backup successfully, the copy of the tape catalog file on tape will still indicate the unsuccessful attempt. Normally these catalog files are never restored. But if this file is ever restored, it will be incorrect. To remedy this situation, you can decatalog and then recatalog the tape. Be advised that decataloging and recataloging a truly unsuccessful backup could retrieve garbage in the files for which the backup failed, as well as retrieving old files on the tape, because no end-of-tape mark is written on an unsuccessful backup.
3. If you upgrade from a 1-track tape cartridge system to a 4-track system, be advised that you will not be able to read your old 1-track tape cartridges without additional corrective action. See BOSS Report #6 for a method of converting 1-track tapes to 4-track tapes (essentially writing End-of-Track records on the 1-track tape). You should immediately back up your disc in any case after the upgrade is completed.

SECTION 4 - EXECUTING A PROCEDURE

OVERVIEW

By entering '1' from the *MTC Main menu, the user can execute an existing procedure. Existing procedures include those supplied by BFISD, whether they have been modified by the user or not, as well as those created and stored by the user. Procedures can also be stored under the name TEMPORARY. This section describes the steps to take to execute an existing procedure. The next subsection contains a listing of pre-defined procedures and recommendations for their use. The subsection following that describes the steps required to execute a procedure. The last subsection consists of tables showing the main features of the pre-defined backup and restore procedures.

RECOMMENDED USES OF PRE-DEFINED PROCEDURES

BFISD supplies pre-defined procedures to provide a way to back up and restore files. Once familiar with these procedures, the user may either modify them or create custom procedures to provide more security or to meet more specific needs. Below are brief descriptions of pre-defined procedures as supplied to the user and recommendations for using them. For a complete listing of the parameters of pre-defined procedures as supplied, see APPENDIX A.

BACKUP PROCEDURES

This subsection describes the features of the pre-defined backup procedures and recommendations for using them.

Full Backup

Three full backup procedures are supplied to the user. They are BACKVERF, BACKNOV and FULLBACK. All three procedures back up all files, including critical files, on disc 0 only.

Backverf

BACKVERF is the only full backup procedure which fully catalogs the tape and verifies the copy of files from disc to tape to make sure that data was accurately transferred. This procedure takes longer than other backup procedures but should be used at least once a week in a typical user environment. The procedure requires a labeled tape, and fully catalogs the tape as a generation tape.

Backnov

BACKNOV is a full backup procedure which fully catalogs the tape but does not verify the correct copy of files. It could be used for more frequent backups since it takes less time. Like BACKVERF, it requires a labeled tape and catalogs the tape fully as a generation tape.

Fullback

FULLBACK is the least secure of the full backup procedures. It does not catalog the tape nor does it verify the copy. This procedure is not recommended.

Selective Backup

The *MTC Utility includes three pre-defined procedures for backing up selected files. They are the procedures SELBACK (4.2 systems only), BACKPROG and BACKDATA.

Selback

SELBACK is available only on 4.2 systems. It is the only pre-defined backup procedure which permits the operator to specify the disc from which files are to be backed up. (The disc selection parameter is easily changed on the other procedures, however.) During the execution of the procedure, the program prompts the operator for the names of files to be backed up. The procedure accepts any tape but a SCRATCH tape, and although it does not automatically catalog the tape, if the tape is labeled as a catalog tape the SELBACK procedure catalogs it. It is recommended that you use a cataloged tape with this procedure, since you may want to use the SELREST procedure to restore files backed up by this procedure, and the SELREST procedure requires a fully-cataloged tape.

Backprog

BACKPROG backs up all program files from disc 0, including critical program files, but no data files. BACKPROG fully catalogs the tape as a generation tape but does not verify the copy of files. The procedure accepts any tape but a SCRATCH tape. This procedure allows the user to perform a final backup of all program files once program development has been completed. This should be used in conjunction with BACKDATA.

Backdata

BACKDATA backs up all data files from disc 0, including critical data files, but no program files. It accepts any tape but a SCRATCH tape, fully catalogs the tape as a generation tape, but does not verify the correct copy of files from disc to tape. Used in conjunction with BACKPROG, this is the procedure to use once program development is finished and only data files are subject to change.

RESTORE PROCEDURES

This subsection describes the pre-defined procedures supplied for restoring files from tape to disc. The FULLREST procedure erases the disc directory before the restore process takes place. As supplied, all other restore procedures write over only the files being restored from tape to disc. All other files on the disc are not affected by the procedure. (This parameter can be changed so that the system will skip a file if it already exists on disc.)

Full Restore

Two procedures are provided for fully restoring the contents of a tape to disc 0. They are the FULLREST and RESTALL procedures.

Fullrest

FULLREST restores the entire contents of a tape, including critical files, to disc 0. It executes only in stand-alone mode. This procedure verifies that all required files are present on tape before the restore process begins. The tape need not be cataloged.

NOTE

The FULLREST procedure erases the disc directory before the restore takes place. Consequently, if the procedure aborts before all files on tape are restored, you may have lost files that were previously on the disc. It is best to make a copy of the files on disc before running the FULLREST procedure.

Restall

RESTALL restores all files on tape except exempt files to disc 0. Only files being restored from the tape are replaced on disc. Files which exist on disc but not on tape are not erased or altered. RESTALL does not require a cataloged tape.

Selective Restore

The *MTC Utility provides four procedures for restoring selected files from tape to disc, two of which perform system updates. The UPDATE procedure is used to update a system from Levels 3.6F and later to Levels 3.7A and later. The 4.2UPDAT procedure updates a system to level 4.2. For information on performing system updates, see SECTION 2. The two procedures for restoring selected files without updating the system are the RESTSEL and SELREST procedures.

Restsel

RESTSEL allows the user to specify which files from a tape are to be restored to disc 0 by presenting each file name on the tape. The tape need not be cataloged. As each file name is presented, if the user chooses to restore the file, the file is immediately restored. The procedure requires operator intervention for each file on tape, so the process could be lengthy if the tape contains many files.

Selrest

SELREST is available only on 4.2 systems. It allows the user to specify which files are to be restored from tape without being prompted one file name at a time, by specifying the file names before the restore process takes place. As the procedures are supplied, this is the only option which allows the user to specify the disc to which files are to be restored. The tape must be fully cataloged.

Update

UPDATE is used to update a system disc to a new BOSS level. The tape is automatically cataloged by the UPDATE procedure before the restore procedure takes place. All files on a system tape are restored to disc 0 except *MTC data files.

4.2Updat

The 4.2UPDAT procedure updates a system disc to level 4.2. See SECTION 2 for information on how to use this procedure.

EXECUTE A PROCEDURE

This subsection outlines the major steps involved in executing an existing procedure, whether pre-defined or not.

1. After you have entered '1' from the main menu or the command 'RUN"*MTCEX"' from console mode, the screen displays the following prompt:

```
ENTER A PROCEDURE NAME OR 'CR' TO EXIT OR ?  
FOR HELP -----
```

2. Enter the name of the desired procedure in the spaces indicated by the dashes. If you enter a question mark on systems at level 4.2 and later, the screen gives a listing of all existing procedures and their features. If you press RETURN the utility returns you to the main menu or to console mode, depending on how the program was called.
3. If the procedure does not exist, the program displays the message PROCEDURE NOT FOUND and returns the prompt from step 1. If the procedure exists, the program displays the following prompt to verify your choice:

```
IS THIS THE CORRECT PROCEDURE? (Y/N) -
```

If you enter 'N', the program returns to the prompt in step 1. If you have correctly identified the procedure you desire, enter 'Y'.

4. If the procedure was aborted during its last execution, the following message is next displayed:

```
PROCEDURE ABORTED DURING STEP n.  
RESTART AT THIS STEP? (Y/N)...
```

If the user enters 'Y', the first step that previously aborted is executed. If the operator enters 'N', procedure execution begins at Step 1. The procedure name, step number, and date are displayed at the top of the screen, along with the procedure step number being executed. If the step being executed is a CALL, the CALLED procedure name is displayed on the second line.

5. The following message may next appear temporarily depending on the number of files to be backed up or restored:

DEFINING TEMPORARY WORK FILE

6. If the user has more than one tape unit configured, the prompt appears:

ENTER TAPE DEVICE NAME OR CR FOR RO:

7. When the work file has been defined, the prompt appears:

MOUNT TAPE, DEPRESS 'CR' WHEN READY (CTL-IV TO ABORT) -

8. Put the tape into the drive unit and press RETURN. If the tape label matches the tape or TAPE-SET name specified in the procedure, the label is not displayed. If no tape or TAPE-SET name is specified, the tape label is then displayed as follows with a prompt to verify the selection:

TAPE-SET NAME	XXXXXXXX
TAPE-ID NAME	XXXXXXXX
VOLUME SEQUENCE NUMBER	XX
LAST BACKUP DATE	mm/dd/yy
CATALOG TYPE	XXXXXXXXXXXXXX
IS THIS THE CORRECT TAPE? (Y/N) -	

Figure 4-1. The Tape Label.

Entering 'N' returns you to step 6. If you enter 'Y' and the procedure allows you to specify the disc from which files are to be backed up or to which they are to be restored, the following prompt is displayed:

ENTER DISC NAME OR NUMBER (CTL-IV TO ABORT)

For single-disc systems, specify disc 0. For multiple-disc systems, the program then presents this prompt until the user presses RETURN:

ENTER NEXT DISC NUMBER, 'CR' TO END DISC SELECTION, CTL-IV TO ABORT -

9. If the procedure allows you to select the files to be backed up or restored, one of two displays occurs.

- a) For the procedure RESTSEL, the program presents this prompt for each file on the tape below the tape label display:

RESTORE OR SKIP file1 ? (R/S/END) -

If you enter 'R' and the tape is not cataloged, the file is immediately restored. If the tape is cataloged, all files to be restored are restored after the question is asked for the last file. If you enter 'S', the file is skipped and the next file name is presented. When you enter 'END' or when the last file name has been presented, the restore process is ended.

- b) For the SELBACK and SELREST procedures, the display shown in Figure 4-2 occurs:

PROCEDURE: SELBACK	SELECTED FILE ENTRY	NUMBER OF FILES: 0
+++++		
	+ MOTOR BAR CONTROL	
1 - ADD FILES	+ I	
2 - DELETE FILES	+ II DISPLAY NEXT 100 FILES	
ENTER SELECTION -	+ III DISPLAY PREVIOUS 100 FILES	
	+ IV FILE ENTRY COMPLETE	

Figure 4-2. Selecting Files for a Backup or Restore Procedure

If you enter '1', the following prompt is displayed in the lower left-hand corner:

ENTER FILES TO BE ADDED - ENTER 'CR'
AFTER EACH FILE, 'CR' 'CR' TO END

After you have entered some file names (in groups of five or less), if you wish to delete some files from the filelist, press Motor Bar IV and then enter '2'. The program displays the prompt:

ENTER FILES TO BE DELETED - ENTER 'CR'
AFTER EACH FILE, 'CR' 'CR' TO END

When you have finished editing the filelist, press Motor Bar IV and the program returns the following display:

```

PROCEDURE:  SELREST          SELECTED FILE ENTRY          NUMBER OF FILES: nnn
file #1  file #2  file #3  file #4 ..... file #10
file #11 file #12 file #13 file #14..... file #20
file #21
.....
.....
.....
file #91..... file #100
+++++
+           MOTOR BAR CONTROL
+
+ I
+ II  DISPLAY NEXT 100 FILES
+ III DISPLAY PREVIOUS 100 FILES
+ IV  EXIT

1 - ABORT PROCEDURE
2 - EXECUTE PROCEDURE

ENTER SELECTION -

```

Figure 4-3. Completing the File Selection Process

If you wish to execute the procedure, enter '2'. If you wish to abort the procedure, enter '1'.

CAUTION

For FULLREST, all files on the disc are erased from the disc directory before the restore process actually begins. Consequently, if the restore procedure aborts before it has been completed, you may have lost some of the files that were to be transferred to the disc. For a selective restore, each individual file on the tape that also exists on the disc is erased from the disc just before it is restored.

10. Once the files are selected, the screen briefly displays the message:

PREPARING LIST OF FILES TO TRANSFER

above the tape ID. The program then displays the file names briefly on the screen.

11. Before a backup procedure actually takes place, the following messages are displayed in this sequence:

INITIALIZING ALL TRACKS

NOW BACKING UP LOADER

NOW WRITING TAPE LABEL

As the backup or restore procedure takes place, the screen displays the information shown in Figure 4-4 below on the files being backed up or restored:

PROCEDURE NAME: XXXXXXXX	*BACKUP*	STEP: 01	MM/DD/YY
TAPE-SET NAME		XXXXXXXXX	
TAPE-ID NAME		XXXXXXXXX	
TAPE VOLUME SEQUENCE NUMBER		XX	
STARTING TRACK NUMBER		XX	
FILE NUMBER ON TRACK		XXX	
FILE NAME		XXXXXX	
STARTING SECTOR NUMBER (CURRENT)		XXXXXX	(XXXXXX)
ENDING SECTOR NUMBER		XXXXXX	

Figure 4-4. Screen Display During Procedure Execution

For SELREST, if the file is not on the tape, the message appears:

FILE filename NOT FOUND.
SKIP OR ABORT? (S/A) -

12. For backup procedures, if the tape is to be cataloged, the message CATALOGING FILES appears after the files have been copied.
13. If a file you are attempting to back up is in use, the program displays the following message:

```
FILE ----- IS OPENED BY ANOTHER TASK

1. ABORT
2. SKIP FILE
3. RETRY

ENTER OPTION -
```

Figure 4-5. Options for File in Use.

14. For BACKVERF, when the backup has been completed, the procedure begins to verify the transfer of files. The following message is added to the screen display:

TAPE NOW BEING VERIFIED

If the backup requires more than one tape, the first tape is written and verified before the backup continues on the second tape.

15. When the entire backup or restore procedure has been completed, the tape winds to the end and the message from step 1 is displayed to select another procedure:

PROCEDURE SUCCESSFULLY COMPLETED

ENTER A PROCEDURE NAME OR 'CR' TO EXIT OR ?
FOR HELP -----

Pressing RETURN brings back the *MTC main menu.

PRE-DEFINED PROCEDURES

This subsection consists of tables showing the main features of the pre-defined backup and restore procedures as supplied by BFISD. For this table and the table on the following page, select the options desired under the column headings, reading from left to right. The far right-hand column contains the name of the pre-defined procedure corresponding to these options.

Table 4-1. Backup Procedures (As Supplied)

FULL OR SELECTIVE	FROM DISC	TO TAPE	FILE TYPES	WILL TAPE BE CATALOGED?	WILL BACKUP BE VERIFIED?	PROCEDURE NAME TO BE ENTERED
FULL	0	ANY	ALL,	FULLY, AS	YES	BACKVERF
		LABELED TAPE	INCL.	GENERATION	NO	BACKNOV
		ANY LABELED OR SCRATCH TAPE	OS FILES	NO	NO	FULLBACK
SELECTIVE	0	ANY TAPE	ALL DATA INCL. OS	FULLY, AS GENERATION	NO	BACKDATA
		BUT SCRATCH	ALL PROG. INCL. OS	FULLY, AS GENERATION	NO	BACKPROG
		SPEC-IFIED INCL. SCRATCH	SPEC-IFIED (INCL. OS)	NO**	NO	SELBACK

** = It is recommended that you label the tape to be fully cataloged, however, since the SELREST procedure requires a fully-cataloged tape.

Table 4-2. Restore Procedures (As Supplied)

FULL OR SELECTIVE	TO DISC	FILE TYPES	MUST TAPE BE CATALOGED?	WILL DISC BE ERASED?	PROCEDURE NAME TO BE ENTERED
FULL	0	ALL FILES ON TAPE	NO	DISC DIRECT. IS ERASED BEFORE EXECUTION	FULLREST
		ALL BUT EXEMPT FILES	NO	ONLY FILES BEING RESTORED ARE REPLACED	RESTALL
SELECTIVE	0	SPECIFIED FILES; SYSTEM PROMPTS USER ONE FILE NAME AT A TIME	NO	ONLY FILES BEING RESTORED ARE REPLACED	RESTSEL
	SPECIFIED	SPECIFIED FILES; USER ENTERS NAMES WITHOUT PROMPTS	YES-- FULLY	ONLY FILES BEING RESTORED ARE REPLACED	SELREST
SELECTIVE; SYSTEM UPDATE	0	ALL FILES ON SYSTEM TAPE BUT *MTC DATA FILES	UPDATE PROCEDURE AUTOMATICALLY CATALOGS TAPE	ONLY FILES BEING RESTORED ARE REPLACED	UPDATE

OVERVIEW

The *MTC Utility allows the user to create new procedures and to modify existing procedures under the DEFINING A PROCEDURE function. Because the user is provided so many options, the steps involved in creating and modifying procedures can appear complicated. Once the user becomes familiar with the general procedures, however, this function is fairly easy to execute.

This section of the manual describes the steps to take when defining a new or existing procedure. Because the three options listed under DEFINING A PROCEDURE generally follow the same steps, these different options are not described separately in detail. The next subsection describes the DEFINING A PROCEDURE MENU and briefly gives an overview of the three options. Following that is a description of the STEP SELECTION process. Under the next subsection, titled OPERATION DEFINITION, are instructions for creating and modifying procedures, including a description of the default parameters, Motor Bar functions, the parameter selection process and how to complete a procedure step. Finally, the last subsection contains recommendations for using the DEFINING A PROCEDURE function.

THE DEFINING A PROCEDURE MENU

The DEFINING A PROCEDURE function of the *MTC Utility allows the user to create new procedures and to modify existing procedures, including the procedure stored under the reserved name "TEMPORARY". If the user selects option 2 from the *MTC main menu, the program returns the following display:

```

PROCEDURE DEFINITION

0 - EXIT
1 - CREATE A NEW TEMPORARY PROCEDURE
2 - CREATE A NEW PERMANENT PROCEDURE
3 - MODIFY AN EXISTING PROCEDURE

ENTER SELECTION OR ? FOR HELP -

```

Figure 5-1. The Defining a Procedure Menu.

To return to the *MTC main menu, enter '0'. For an overview of the other options, read the paragraphs immediately following.

CREATING A NEW
TEMPORARY PROCEDURE

The *MTC Utility reserves the name "TEMPORARY" for a procedure which is not intended to be used permanently. To create a procedure under the name "TEMPORARY", select option 1 from the PROCEDURE DEFINITION menu shown above. The steps for creating a procedure under the name TEMPORARY are identical to those for creating permanent procedures except that the user is not prompted for the name of the procedure, and once the procedure named "TEMPORARY" is defined and saved, it is executed immediately.

CREATING A NEW
PERMANENT PROCEDURE

Option 2 of the PROCEDURE DEFINITION menu allows the *MTC user to create a permanent procedure under a name assigned by the user. This procedure is stored and can be modified at any time. When the user enters '2' from the menu, the program displays the prompt:

ENTER PROCEDURE NAME (CTL-IV TO ABORT): -----

The user can now enter the name of the new procedure to be created. The name can contain up to 8 characters. If the procedure name already exists, the program returns the message DUPLICATE PROCEDURE NAME and presents the prompt shown above again. When a name is entered which does not already exist, the program prompts for verification:

IS THIS CORRECT? (Y/N) -

The steps which follow are described in the next subsection, titled STEP SELECTION.

MODIFYING AN
EXISTING PROCEDURE

If the user selects option 3 from the PROCEDURE DEFINITION menu, the program presents the same prompts as those displayed for CREATING A NEW PERMANENT PROCEDURE. The user now may enter the name of an existing procedure or 'TEMPORARY' to retrieve the desired procedure. The program returns the message PROCEDURE NOT FOUND if the named procedure does not exist. If the procedure exists, the program presents the prompt to verify the selection. The steps which follow are described in the next subsection, STEP SELECTION.

STEP SELECTION

This subsection describes how to select steps when defining a procedure.

PROCEDURE STEPS

Each step of a procedure performs one operation: a BACKUP, RESTORE, CATALOG, DECATALOG or CALL. The program stores procedure steps numbered sequentially from 1 to 99. Steps can be selected in any order during PROCEDURE DEFINITION. At this time, the operator may number steps in the range from .1 to 99.1 to insert new steps between existing steps. Once the procedure is defined and stored, the program renumbers steps from 1 to the highest step number in increments of 1.

Existing procedures are altered after each step is defined and the user confirms that the step is complete. (See COMPLETING A PROCEDURE STEP for the details of this process.) Each step is stored as a record in the procedure file and as each record is completed it is written to the file.

MOTOR BAR CONTROL OPTIONS

For STEP SELECTION, the Motor Bar control options in the lower right-hand corner of the screen are shown as in Figure 5-2 below:

```
MOTOR BAR CONTROL
I   ACTS AS 'CR'
II  DELETE STEP
III ABORT EDITS
IV  PROC COMPLETE
```

Figure 5-2. Motor Bar Control for Step Selection.

Carriage Return and Motor Bar I

To edit or define the step displayed, press either RETURN or Motor Bar I. To define a new step, enter the step number followed by either a RETURN or Motor Bar I.

Motor Bar II

Motor Bar II is used to delete existing steps. When the user presses Motor Bar II after having entered a step number, the program displays the prompt:

```
DO YOU WISH TO DELETE STEP n.n? (Y/N) -
```

Whether or not the deletion is performed, control returns to the STEP SELECTION prompt.

Motor Bar III

Motor Bar III aborts the process and causes the program to return to the PROCEDURE DEFINITION menu.

Motor Bar IV

Motor Bar IV is used to signal that the selected procedure has been completely defined. When the user presses Motor Bar IV, the program displays the following prompt:

SAVE PROCEDURE? (Y/N)

Entering 'Y' causes a permanent procedure or the procedure reserved under the name "TEMPORARY" to be saved. When a permanent procedure has been saved, the *MTC Utility returns to the PROCEDURE DEFINITION menu. When a TEMPORARY procedure has been saved it is executed immediately.

SELECTING A
STEP NUMBER

In all cases, after the name of a new or existing procedure has been entered and verified, the program presents the following screen display:

```
STEP SELECTION

ENTER 'CR' TO EDIT STEP nn.n OR ENTER A STEP NUMBER
OR ? FOR HELP -----

DEFINED STEPS: (Listing of numbers of steps already
defined.)
```

Figure 5-3. Selecting a Step Number.

The STEP SELECTION prompt shown above is displayed after each step is defined. All step numbers previously defined are also displayed for reference. When the number of an existing step is entered, the parameters of the step are displayed. If the step does not exist, the OPERATION SELECTION menu appears. See the next subsection, OPERATION DEFINITION, for information on this menu and its options.

OPERATION
DEFINITION

This subsection describes how to define the operation contained in the procedure. Information includes selecting an operation, default parameters for operations, the parameter pointer and Motor Bar control for defining an operation.

SELECTING A
PROCEDURE STEP
OPERATION

When a new procedure step is selected, the menu shown below is displayed to allow the user to select the operation to be performed by the step:

PROCEDURE NAME: XXXXXXXX	OPERATION SELECTION	STEP n
0 - SELECT ANOTHER STEP		
1 - BACKUP: TRANSFER DISC TO TAPE		
2 - RESTORE: TRANSFER TAPE TO DISC		
3 - CATALOG		
4 - DE-CATALOG		
5 - CALL ANOTHER PROCEDURE		
ENTER SELECTION OR ? FOR HELP -		

Figure 5-4. The OPERATION SELECTION Menu.

In the upper left-hand corner of the screen the name assigned to the procedure is displayed. The number of the step being defined is displayed in the upper right-hand corner of the screen. To return to the STEP SELECTION prompt, enter '0'. To select the operation to be performed by the step, enter the number corresponding to the operation. When the number of an operation is entered, the program displays the default parameters for that operation, and the user can then modify the parameters as desired. These parameters are described in the following subsections.

DEFAULT PARAMETERS
FOR OPERATIONS

All operations except the CALL operation have default values for most of their parameters. When a new step is being created, the default parameters for the chosen operation are displayed so that the user can either accept or modify them. For example, if in defining a step the user selects the BACKUP operation, the program returns a display of default parameters as shown in Figure 5-5 below.

```
PROCEDURE NAME: XXXXXXXX      *BACKUP*      STEP: n      03/01/81
-----FILE SELECTION-----
##

-----OPTIONAL PARAMETERS-----

USE DISC NUMBER: 0
USE ANY TAPE DO NOT RETENSION
NO CATALOGING REQUIRED
IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT
DO NOT VERIFY FILES TRANSFERED
BEGIN BACKUP AT START OF TAPE

-----FILE SELECTION-----

1 - PROCEDURE SPECIFIES FILES      + MOTOR BAR CONTROL
2 - OPERATOR SPECIFIES FILES      +
                                   + I ACTS AS 'CR'
                                   + II NEXT FIELD
                                   + III PREVIOUS FIELD
                                   + IV STEP COMPLETE

ENTER SELECTION OR ? FOR HELP -
```

Figure 5-5. Display of Default Parameters for the BACKUP Operation.

Required and
Optional Parameters

Required parameters are those for which there are no default values. The user must specify these parameters in order for the procedure to run. For BACKUP and RESTORE operations, the only required parameter is FILE SELECTION. For the CALL operation, the required parameter is the name of the procedure being called. Optional parameters are those which have default values, which are listed in the middle of the screen. The number of control parameters displayed varies with the operation being defined.

Modifying Default Parameters

The *MTC Utility treats the set of "initial" default parameters for each procedure as a special procedure, called a "default procedure." Each default procedure comprises only one step and has a special nine-character name consisting of eight spaces, followed by a single letter, as shown below:

<u>DEFAULT PROCEDURE</u>	<u>NAME</u>
BACKUP -	-----B
RESTORE -	-----R
CATALOG -	-----C
DECATALOG -	-----D
CALL -	-----P

The user can change the system-supplied default parameters for an operation by selecting the MODIFY AN EXISTING PROCEDURE function of *MTC and entering the name of the default procedure, as listed above. If default parameters are modified in this way, each time the user creates a new procedure the parameters for the chosen operation are displayed as modified. The *MTC utility does not, however, allow the user to delete default procedures.

Table 5-1 lists the default parameters for each operation as BFISD supplies the *MTC utility.

Table 5-1. Default Parameters for Operations.

OPERATION	OPTIONAL PARAMETER	DEFAULT VALUE
BACKUP	Disc Selection	USE DISC NUMBER 0
	Tape Selection	USE ANY TAPE. DO NOT RETENSION
	Cataloged Tape Use	NO CATALOGING REQUIRED
	File-Not-Found	IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.
	Verify Files	DO NOT VERIFY FILES TRANSFERRED
	Multiple Backup	BEGIN BACKUP AT START OF TAPE
RESTORE	Disc Selection	USE DISC NUMBER 0
	Tape Selection	USE ANY TAPE. DO NOT RETENSION.
	Cataloged Tape Use	CATALOGED TAPES ARE NOT REQUIRED
	File-Not-Found	IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT
	File Precedence	IF A FILE ALREADY EXISTS ON DISC, REPLACE THE FILE ON DISC.
	File Placement	FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR AT THE FIRST AVAILABLE SECTOR
	Disc Space	IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.
	Backup Selection	RESTORE FROM FIRST BACKUP ON TAPE
CATALOG	Tape Selection	USE ANY TAPE. DO NOT RETENSION
	Catalog Type	CATALOG LABEL AND FILES (FULL CATALOG) - ARCHIVE TAPE.
DECATALOG	Tape Selection	USE ANY TAPE.
CALL	Call has no optional parameters.	

PARAMETER POINTER

A pointer that appears as ## is displayed on the screen to the left of a parameter to indicate which parameter is being defined. Movement is based on the Motor Bar controls as described below. When the pointer appears next to the desired parameter, options for that parameter are displayed in the lower left-hand corner of the screen in either a menu or data entry format. When the user has finished defining a control parameter, the message stating the user's selection appears on the line to the right of the pointer and the pointer moves to the next parameter to be defined.

MOTOR BAR CONTROL FOR DEFINING AN OPERATION

While an operation is being defined, prompts for Motor Bar control appear in the lower right-hand corner of the screen, as shown below:

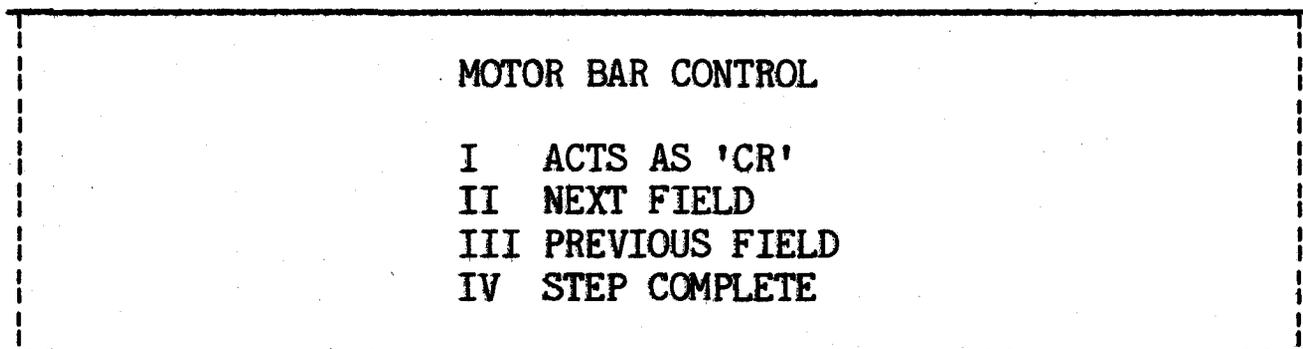


Figure 5-6. Motor Bar Control for Defining an Operation.

The function of each Motor Bar is as follows:

Motor Bar I

Pressing Motor Bar I or RETURN causes the value typed in a field to be entered.

Motor Bar II

Motor Bar II is used to advance the parameter pointer to the next parameter. Any data entered in the current field is discarded.

Motor Bar III

The function of Motor Bar III is to move the parameter pointer up the screen to the previous parameter. Any data entered in the current field is discarded.

Motor Bar IV

Motor Bar IV is used to end the process of defining an operation. When the user presses Motor Bar IV, the program presents a prompt allowing the user to save the step as defined and to select another step. See the paragraphs titled COMPLETING A PROCEDURE STEP below for details.

SELECTING PARAMETERS

This subsection describes the steps to take when defining parameters for each operation. Because they have many of the same parameters the BACKUP and RESTORE procedures are discussed together.

DEFINING PARAMETERS FOR BACKUP AND RESTORE OPERATIONS

The control parameters for BACKUP and RESTORE operations include: file selection, disc selection, tape selection, cataloged tape use, file-not-found handling, verify files (BACKUP only), multiple backup (BACKUP only), file precedence (RESTORE only), file placement (RESTORE only), disc space (RESTORE only), and backup number selection (RESTORE only). The procedures for defining each parameter are described below.

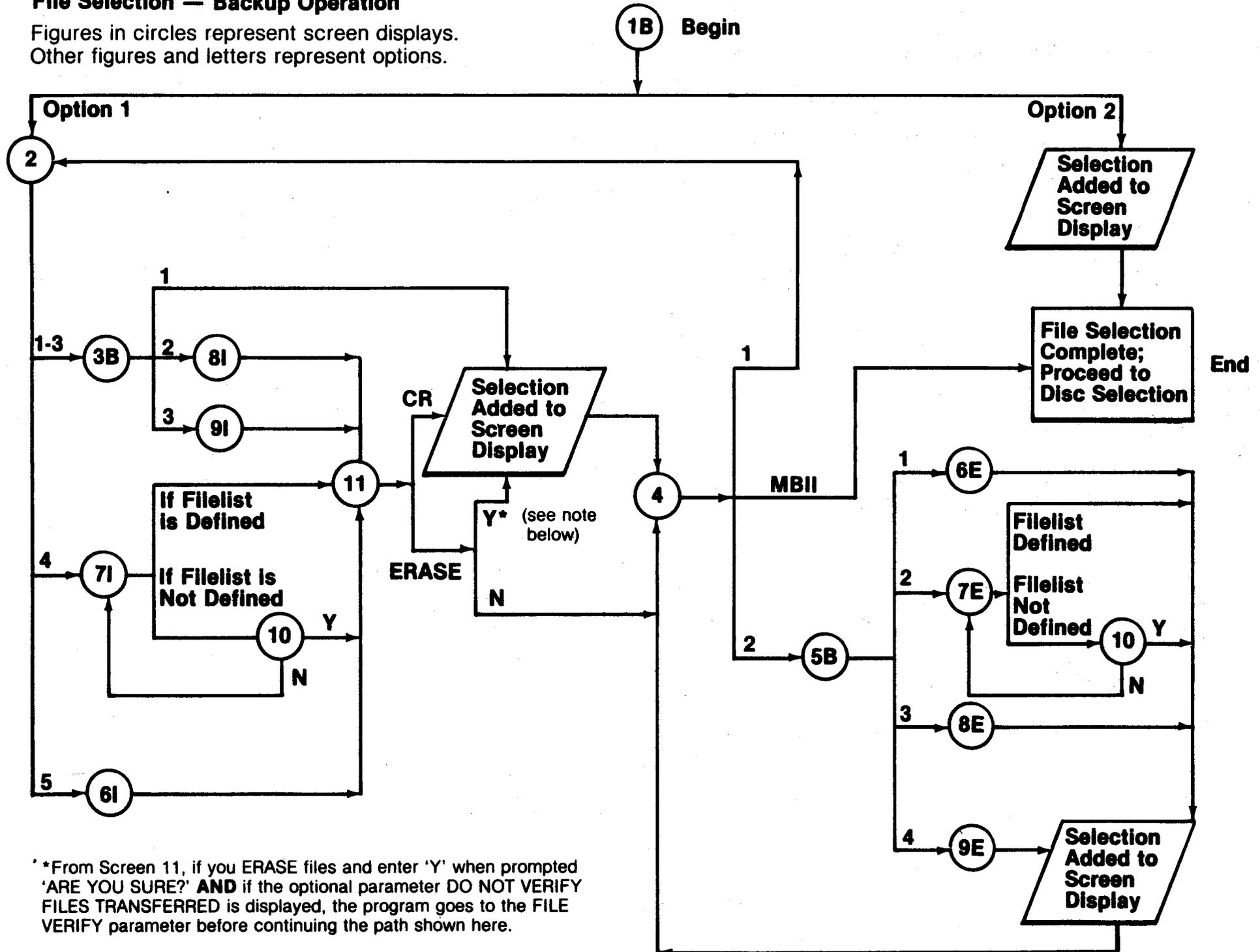
File Selection

This parameter is used to specify the files to be backed up or restored. It is by far the most complicated of the parameters to be defined. To aid the user in getting a sense of the options allowed and the procedures involved in file selection, two flow charts are provided. The first flow chart, shown in Figure 5-7, shows the paths provided when the user is selecting files for a BACKUP operation. The following chart, shown in Figure 5-8, shows the paths involved in selecting files for a RESTORE operation. On the flow charts, screen displays are represented by circles with numbers in them. The options provided by the display are represented by numbers or other characters not contained in circles. Following these flow charts is a listing of each of the numbered screens and a description of the effects of each option.

Figure 5-7. Flowchart for FILE SELECTION for the BACKUP operation

File Selection — Backup Operation

Figures in circles represent screen displays.
Other figures and letters represent options.



File Selection — Restore Operation

Figures in circles represent screen displays.
Other figures and letters represent options.

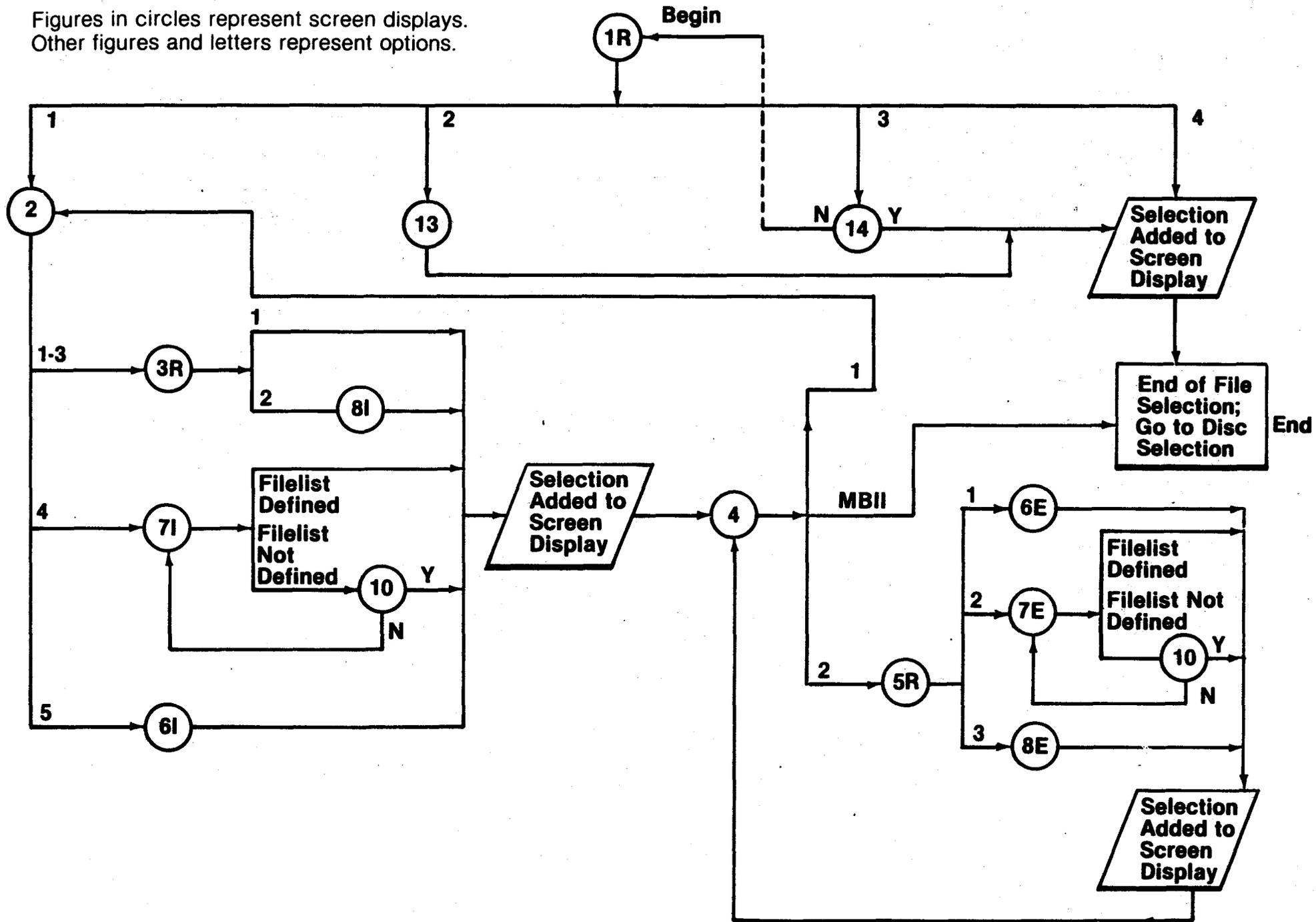


Figure 5-8. Flowchart for FILE SELECTION for the RESTORE operation.

In general the procedures for selecting files for BACKUP and RESTORE operations are identical except that RESTORE operations do not permit a range of files to be selected by location. Each screen that appears during FILE SELECTION for BACKUP and RESTORE operations is shown below. The letter 'B' following a number indicates that the screen appears only during BACKUP operations; the letter 'R' designates a screen displayed only during RESTORE operations. The letter 'I' is used with screens used to specify files to be included in a BACKUP or RESTORE operation; the letter 'E' is used for screens used to specify files to be excluded from a procedure. Slashes are used to separate different versions of the same screen; those screens do not appear to the user exactly as shown here.

NOTE

You cannot restore specified files or ranges of files from an uncataloged tape. Your only options with an uncataloged tape are to restore all files (as in the supplied procedure RESTALL) or to restore selected files, to be indicated during the execution of a procedure as in RESTSEL.

Screen 1B

This is the first screen displayed when the user selects files for a BACKUP operation.

```
-----FILE SELECTION-----  
  
1 - PROCEDURE SPECIFIES FILES  
2 - OPERATOR SPECIFIES FILES  
  
ENTER SELECTION OR ? FOR HELP -  
-----
```

1. If the user enters '1', the program next displays screen 2.
2. If '2' is entered, the message OPERATOR SPECIFIES FILES is added to the screen under FILE SELECTION, and the program goes to the DISC SELECTION parameter.

Screen 1R

If the user is selecting files for a RESTORE operation, this is the first screen displayed.

-----FILE SELECTION-----

- 1 - FILES ARE TO BE INCLUDED
- 2 - SELECTED FILES AS RESTORED
- 3 - FULL RESTORE - ALL FILES ON DISC ERASED
- 4 - OPERATOR SPECIFIES FILES

ENTER SELECTION OR ? FOR HELP -

-
- 1. If the user selects option 1, the program then returns screen 2.
 - 2. If option 2 is selected, the program goes to screen 13.
 - 3. For option 3, the program returns screen 14.
 - 4. If '4' is entered, the message OPERATOR SPECIFIES FILES is displayed on the screen under FILE SELECTION, the CATALOG USE parameter is set to TAPE MUST BE FULLY CATALOGED, and the program proceeds to DISC SELECTION.

Screen 2

-----FILE SELECTION-----

- INCLUDE:
- 1 - BOTH PROGRAM AND DATA FILES
 - 2 - PROGRAM FILES
 - 3 - DATA FILES
 - 4 - FILELIST
 - 5 - SELECTED FILES

ENTER SELECTION OR ? FOR HELP -

-
- 1-3. For BACKUP operations, selecting options 1-3 causes the program to display a version of screen 3B. For RESTORE operations, options 1-3 cause the program to display the appropriate version of screen 3R.
 - 4. For both BACKUP and RESTORE operations, option 4 causes the display shown in screen 7I to appear.
 - 5. Option 5 causes screen 6I to be displayed.

Screen 3B

-----FILE SELECTION-----

INCLUDE: /BOTH PROGRAM AND DATA/PROGRAM/DATA/ FILES

- 1 - ALL /PROGRAM/DATA/ FILES
- 2 - RANGE OF /PROGRAM/DATA/ FILES BY NAME
- 3 - RANGE OF /PROGRAM/DATA/ FILES BY LOCATION

ENTER SELECTION OR ? FOR HELP -

-
1. From screen 3B, if the operator selects option 1, the appropriate message is added to the screen display and the parameter pointer moves down the screen to the next available line. If another line of FILE SELECTION is available, the program displays screen 4. If no further lines of FILE SELECTION are available, the program proceeds to DISC SELECTION.
 2. For option 2 the program next goes to screen 8I.
 3. Option 3 causes the program to display screen 9I.

Screen 3R

-----FILE SELECTION-----

INCLUDE: /BOTH PROGRAM AND DATA/PROGRAM/DATA/ FILES

- 1 - ALL /PROGRAM/DATA/ FILES
- 2 - RANGE OF /PROGRAM/DATA/ FILES BY NAME

ENTER SELECTION OR ? FOR HELP -

-
1. From screen 3R, if the operator selects option 1, the appropriate message is added to the screen display and the parameter pointer moves down the screen to the next available line. If another line of FILE SELECTION is available, the program displays screen 4. If no further lines of FILE SELECTION are available, the program proceeds to DISC SELECTION.
 2. For option 2 the program next goes to screen 8I.

Screen 4

This screen appears every time files are selected for BACKUP or RESTORE, if further FILE SELECTION is possible. To end FILE SELECTION, press Motor Bar II when this screen appears. To continue specifying files to be included or excluded by the procedure, select one of the options shown on the display.

-----FILE SELECTION-----

- 1 - FILES ARE TO BE INCLUDED
- 2 - FILES ARE TO BE EXCLUDED

ENTER SELECTION OR ? FOR HELP -

- 1. To continue specifying files to be included by the procedure, enter '1'. The program then displays screen 2 described above.
- 2. To continue specifying files to be excluded by the procedure, enter '2'. For BACKUP operations, the program then displays screen 5B. For RESTORE operations the program displays screen 5R.

Screen 5B

-----FILE SELECTION-----

EXCLUDE:

- 1 - SELECTED FILE NAMES
- 2 - FILELIST
- 3 - RANGE OF FILES BY NAME
- 4 - RANGE OF FILES BY LOCATION

ENTER SELECTION OR ? FOR HELP -

- 1. To select individual files to be excluded from the process, enter '1'. The program then goes to screen 6E.
- 2. To exclude a filelist, select option 2. The program then displays screen 7E.
- 3. To exclude a range of files by name, select option 3. The program then goes to screen 8E.
- 4. To exclude a range of files by location, select option 4. Screen 9E is then displayed.

Screen 5R

The options for this screen are identical to those for screen 5B except that for RESTORE operations, the user is not permitted to specify a range of files by location.

-----FILE SELECTION-----

EXCLUDE:

- 1 - SELECTED FILE NAMES
- 2 - FILELIST
- 3 - RANGE OF FILES BY NAME

ENTER SELECTION OR ? FOR HELP -

1. If the user selects option 1, the program then displays screen 6E.
2. If the user selects option 2, the program displays screen 7E.
3. For option 3 the program returns the display shown in screen 8E.

Screen 6E

-----FILE SELECTION-----

EXCLUDE:

ENTER UP TO FIVE FILES TO BE EXCLUDED
ENTER 'CR' AFTER EACH FILE, 'CR' 'CR' TO END

Screen 6E allows the user to enter the names of up to five files to be excluded from a BACKUP or RESTORE process. After the names of up to five files have been entered, the message

EXCLUDE FILES file1 file2 file3 file4 file5

is added to the screen display under FILE SELECTION and the program then goes to screen 4.

Screen 6I

-----FILE SELECTION-----

INCLUDE: SELECTED FILES

ENTER UP TO FIVE FILES TO BE INCLUDED
ENTER 'CR' AFTER EACH FILE, 'CR' 'CR' TO END

The procedure for screen 6I is identical to that for 6E above except that the specified files are to be included in the BACKUP or RESTORE operation rather than excluded from it.

NOTE

If a critical file to be conditionally restored is contained in the list of selected files to be restored, the following prompt is displayed and the user is asked to confirm the selection:

WARNING: CRITICAL FILE TO BE RESTORED
ARE YOU SURE? (Y/N)---

If the user enters 'Y', the program goes to screen 11. If 'N' is entered, the file names for that group of five files must be re-entered.

Screen 7E

-----FILE SELECTION-----

EXCLUDE: FILELIST

ENTER FILELIST NAME: -----

Screen 7E allows the user to enter the name of a filelist to be excluded from the BACKUP or RESTORE operation.

Defined. If the filelist has been previously defined, a message stating

EXCLUDE FILELIST filelist

is added to the screen display and the program then goes to Screen 4.

Not Defined. If the filelist has not been previously defined, the program presents the prompt shown in screen 10.

Screen 7I

-----FILE SELECTION-----

INCLUDE: FILELIST

ENTER FILELIST NAME: -----

Defined. When the user enters the name of a filelist, if the filelist is previously defined, the message

INCLUDE FILELIST filelist

is added to the screen display. For BACKUP operations, the program then goes to screen 11. For RESTORE, the program sets the CATALOG USE parameter to TAPE MUST BE FULLY CATALOGED and then displays screen 4.

Not Defined. If the filelist is not defined, for both BACKUP and RESTORE operations, the program displays screen 10.

NOTE

If a critical file to be conditionally restored is contained in the filelist to be restored, the following prompt is displayed and the user is asked to confirm the selection:

WARNING: CRITICAL FILE TO BE RESTORED
ARE YOU SURE? (Y/N)---

If the user enters 'Y', the program goes to screen 11. If 'N' is entered, the name of the filelist must be re-entered.

Screen 8E

-----FILE SELECTION-----

EXCLUDE: RANGE OF FILES BY NAME

ENTER THE NAME OF THE FIRST FILE OR
'CR' FOR THE FIRST NAME: -----

ENTER THE NAME OF THE LAST FILE OR
'CR' FOR THE LAST NAME: -----

For a RESTORE operation the message CRITICAL OS & *MTC FILES IN THIS RANGE WILL NOT BE RESTORED is displayed at the bottom of this screen. After the user has entered the names of the files at the beginning and end of the range, the program then adds a message

EXCLUDE ALL /PROGRAM/DATA/ FILES WITH NAMES FROM
firstname THROUGH lastname.

to the screen display and goes to screen 4.

Screen 8I

-----FILE SELECTION-----

INCLUDE: RANGE OF /PROGRAM/DATA/ FILES BY NAME

ENTER THE NAME OF THE FIRST FILE OR
'CR' FOR THE FIRST NAME: -----

ENTER THE NAME OF THE LAST FILE OR
'CR' FOR THE LAST NAME: -----

For a RESTORE operation, the message CRITICAL OS & *MTC FILES IN THIS RANGE WILL NOT BE RESTORED appears at the bottom of the screen. For a BACKUP operation, once the user has entered the names of files at the beginning and end of the range, the program displays screen 11. For a RESTORE operation, once the entries are made the message

INCLUDE ALL /PROGRAM/DATA/ FILES WITH NAMES FROM
firstname THROUGH lastname.

is added to the screen display and the program goes
to screen 4.

Screen 9E

-----FILE SELECTION-----

EXCLUDE: RANGE OF FILES BY LOCATION

ENTER THE NAME OF THE FIRST FILE OR
'CR' FOR THE FIRST FILE ON DISC: -----

ENTER THE NAME OF THE LAST FILE OR
'CR' FOR THE LAST FILE ON DISC: -----

This screen is displayed only for a BACKUP operation. Once the user enters file names, the message

EXCLUDE ALL /PROGRAM/DATA/ FILES WITH LOCATIONS
FROM firstname TO lastname.

is added to the screen display and the program goes
to screen 4.

Screen 9I

-----FILE SELECTION-----

INCLUDE: RANGE OF /PROGRAM/DATA/ FILES BY
LOCATION

ENTER THE NAME OF THE FIRST FILE OR
'CR' FOR THE FIRST FILE ON DISC: -----

ENTER THE NAME OF THE LAST FILE OR
'CR' FOR THE LAST FILE ON DISC: -----

Like screen 9E, this screen appears only for BACKUP
operations. After the user has entered file names,
the program goes to screen 11.

Screen 10

This screen appears whenever a filelist is selected
to be included or excluded from a BACKUP or RESTORE
operation and the filelist has not been previously
defined.

-----FILE SELECTION-----

FILELIST NOT CURRENTLY DEFINED
DO YOU WISH TO SPECIFY THIS FILELIST? (Y/N) -

'Y'. If the user enters 'Y' and the procedure is
defining a RESTORE operation or if the previous
display was screen 7E for a BACKUP operation,
the selection is added to the screen and screen
4 is then displayed. If the user enters 'Y'
when the previous display was screen 7I for a
BACKUP operation, screen 11 is then displayed.

'N'. In all cases, if the user enters 'N', the
program returns to the screen which was
previously displayed (either 7I or 7E).

Screen 11

For BACKUPS only, this option allows the user to
erase files from disc which were just backed up.
Screen 11 is displayed whenever the user specifies
files, a range of files or a filelist to be included
in a BACKUP operation.

-----FILE SELECTION-----

ENTER "ERASE" TO ERASE THESE FILES AFTER BACKUP OR
'CR' NOT TO ERASE THE FILES ("ERASE"/'CR') -----

Erase. If the user enters ERASE, he is asked to verify the choice:

ARE YOU SURE? (Y/N) -

'Y'. Entering 'Y' causes the selection to be added to the screen with the additional message *ERASE at the right-hand side of the screen on the same line as the FILE SELECTION message. If the FILE VERIFY parameter is set to DO NOT VERIFY FILES TRANSFERRED, the program next goes to the FILE VERIFY parameter before displaying screen 4. For file verification, the prompt is displayed:

VERIFY ERROR FREE TRANSFER OF FILES
AFTER BACKUP?
ENTER ? FOR HELP. (Y/N) -

THIS OPTION IS RECOMENDED FOR USE WITH
THE FILE ERASE OPTION WHICH HAS BEEN
SELECTED.

Entering 'Y' causes the FILE VERIFY parameter to be set to VERIFY FILES TRANSFERRED. Entering 'N' does not change the DO NOT VERIFY FILES TRANSFERED message. The program then goes to screen 4.

'N'. If the user enters 'N' to the prompt to verify erasing files, the program does not add a selection to the screen but goes directly to screen 4.

CR. If at screen 11 the user has pressed RETURN, the selection is added to the screen display and the program goes directly to screen 4.

Screen 12

Screen 12 is displayed whenever the user presses Motor Bar III to return to a previous selection during FILE SELECTION.

-----FILE SELECTION-----

- 1 - FILES ARE TO BE INCLUDED
- 2 - FILES ARE TO BE EXCLUDED
- 3 - DELETE THIS FIELD

ENTER SELECTION OR ? FOR HELP -

1. If '1' is entered, screen 2 is displayed.
2. If '2' is entered, either screen 5B or 5R is displayed depending on whether the user is defining a BACKUP or RESTORE operation.
3. If the user enters '3' to delete the selection, the parameter pointer stays on the line and the program displays screen 4.

Screen 13

-----FILE SELECTION-----

SELECTED FILES AS RESTORED

- 1 - BOTH PROGRAM AND DATA FILES
- 2 - PROGRAM FILES
- 3 - DATA FILES

ENTER SELECTION OR ? FOR HELP -

Screen 13 is displayed whenever the user selects option 2 from screen 1R for a RESTORE operation. For options 1-3 on screen 13, the message SELECTED /PROGRAM/DATA/ FILES AS RESTORED is added to the screen display and FILE SELECTION is ended. The program then proceeds to the DISC SELECTION parameter discussed in the next subsection.

Screen 14

If the user has selected option 3 from screen 1R for a RESTORE operation, screen 14 is next displayed. This screen gives the user a chance to verify that a full restore is to take place.

-----FILE SELECTION-----

FULL RESTORE

WARNING:

THIS OPTION WILL ERASE ALL FILES ON DISC BEFORE
THE RESTORE

IS THIS CORRECT? (Y/N) -

'Y'. If 'Y' is entered from this screen, the message FULL RESTORE is added to the screen display and FILE SELECTION is ended. The program then goes to the DISC SELECTION parameter.

'N'. If the user enters 'N' from screen 14, the program returns to screen 1R.

Disc Selection

This parameter controls the disc(s) to be used for a BACKUP or RESTORE operation. The options vary slightly for BACKUP and RESTORE operations.

For BACKUPS

When the parameter pointer reaches this parameter, the screen displays the menu:

-----DISC SELECTION-----

- 1 - OPERATOR SPECIFIES DISC
- 2 - PROCEDURE SPECIFIES DISC NUMBER
- 3 - PROCEDURE SPECIFIES DISC NAME

ENTER SELECTION OR ? FOR HELP -

1. Selecting option 1 causes the message USE DISC SELECTED BY OPERATOR to be displayed on the screen. The program then goes to the TAPE SELECTION parameter.

2. Selecting option 2 produces the following prompt:

ENTER NEXT DISC NUMBER, 'CR' TO END DISC SELECTION -

Up to four disc numbers may be entered. The system accepts only numbers 0-7 (depending on the level of the operating system) and displays the message USE DISC NUMBERS: n1, n2, n3, n4 on the screen.

3. Selection 3 produces the following prompt:

ENTER NEXT DISC NAME, 'CR' TO END DISC SELECTION

As with the prompt for disc numbers, the user may enter the names of up to four discs. The message USE DISC NAMES: name1 name2 name3 name4 is displayed on the screen. The program then goes to TAPE SELECTION.

For RESTORES

When a RESTORE procedure is being defined, and the parameter pointer reaches this line, the program displays this menu:

-----DISC SELECTION-----

- 1 - OPERATOR SPECIFIES DISC
- 2 - PROCEDURE SPECIFIES DISC NUMBER
- 3 - PROCEDURE SPECIFIES DISC NAME
- 4 - RESTORE FILES TO THE SAME DISC NUMBERS BACKED UP
- 5 - RESTORE FILES TO THE SAME DISC NAMES BACKED UP

ENTER SELECTION OR ? FOR HELP -

1. Selecting option 1 causes the message USE DISC SELECTED BY OPERATOR to be displayed on the screen. The program then goes to the TAPE SELECTION parameter.

2. Selecting option 2 produces the prompt:

ENTER DISC NUMBER:

The user may enter one disc number. The program then displays the message USE DISC NUMBER: n on the screen.

3. Selection 3 produces the following prompt:

ENTER DISC NAME-----

After the user has entered the name of a disc, the program displays the message USE DISC NAME: name on the screen. The program then goes to TAPE SELECTION.

4. If the user selects option 4 the program displays the message USE SAME DISC NUMBERS BACKED UP, sets the BACKUP NUMBER SELECTION parameter for RESTORE FROM FIRST BACKUP ON TAPE and goes to the TAPE SELECTION parameter.

5. Selecting option 5 causes the program to display the message RESTORE FILES TO THE SAME DISC NAMES BACKED UP, to set the BACKUP NUMBER SELECTION parameter to RESTORE FROM FIRST BACKUP ON TAPE, and to proceed to the next parameter.

Tape Selection

This parameter specifies both the tapes that can be used in the BACKUP or RESTORE operation, and whether they should be retensioned before use.

NOTE

The default value for TAPE USE is not updated until a RETENSIONING option is specified.

Specifying the Tape

When the parameter pointer reaches this line, the screen first displays the menu for selecting the tape:

-----TAPE SELECTION-----

- 1 - USE ANY TAPE
- 2 - USE TAPE WITH A SPECIFIED TAPE-SET NAME
- 3 - USE SELECTED TAPE
- 4 - USE TAPE USED LAST STEP

ENTER SELECTION OR ? FOR HELP -

-
1. Option 1 allows the user to mount any tape for the operation. If the user selects option 1, the message USE ANY TAPE is displayed on the screen and the program proceeds to the RETENSIONING menu.
 2. Option 2 requires the operator to mount a tape from a specified tape-set. If the user selects option 2, the prompt appears on the screen:

ENTER TAPE-SET NAME: -----

Once the user has entered the tape-set name, the program next presents the prompts allowing the user to specify whether the least recent (for a BACKUP) or the most recent (for a RESTORE) generation tape is to be used by the procedure. First the prompt appears:

REQUIRE THE LEAST/MOST RECENT GENERATION TAPE? (Y/N)

- 'Y'. If the user enters 'Y', the program goes to the RETENSIONING menu and when the user has completed specifying retensioning, the message

USE TAPE-SET: tape-set name REQUIRE
LEAST/MOST RECENT GENERATION

is added to the screen display.

'N'. If the user enters 'N' to the prompt above, he is asked if the label of the least recent (or most recent) tape should be displayed. The program presents the prompt:

DISPLAY LEAST/MOST RECENT GENERATION TAPE?
(Y/N) -

'Y'. If 'Y' is entered, the program adds the message

USE TAPE-SET: name DISPLAY LEAST/MOST
RECENT GENERATION

is added to the screen after
RETENSIONING has been specified.

'N'. If the user enters 'N', the program proceeds directly to RETENSIONING.

3. Option 3 allows the user to specify that the operation require a particular tape-set and tape ID. The prompts displayed if the user enters '3' are:

ENTER TAPE-SET NAME: -----

ENTER TAPE-ID NAME: -----

When tape-set and tape ID names are entered, the program goes to RETENSIONING. When RETENSIONING has been specified, the message USE TAPE-SET: name TAPE-ID: name appears on the screen.

4. The fourth option, USE TAPE USED LAST STEP, appears only if the step number is greater than 1, and requires no further action. If the user enters '4' to select this option, the program goes directly to the RETENSIONING menu shown below and when retensioning is specified, displays the message USE TAPE FROM PREVIOUS STEP.

Retensioning

This option allows either the procedure or the operator to specify retensioning before BACKUP or RESTORE operations. The program presents the display:

-----TAPE SELECTION-----

- 1 - RETENSION TAPE BEFORE USE
- 2 - DO NOT RETENSION TAPE BEFORE USE
- 3 - OPERATOR SPECIFIES RETENSIONING

ENTER SELECTION OR ? FOR HELP -

-
1. If the user selects option 1, the message RETENSION is added after the tape selection message.
 2. For option 2, the program displays the message DO NOT RETENSION.
 3. Option 3 causes the message OPERATOR MAY RETENSION to appear on the screen.

Cataloged Tape Use

The CATALOGED TAPE USE parameter allows the user to specify whether a BACKUP operation will automatically catalog tapes or a RESTORE procedure will require the use of cataloged tapes. The catalog is created when the tape is labeled during a BACKUP and can be erased by the DECATALOG operation.

NOTE

For BACKUP operations, the option to CATALOG a tape must be coordinated with the options specified when the tape is labeled. Tapes to be cataloged must be labeled as cataloged tapes, either fully or partially.

Backup Catalog Use

When a BACKUP operation is being defined, the program displays the following menu:

-----MINIMUM CATALOGING REQUIRED-----

- 1 - NO CATALOGING REQUIRED
- 2 - CATALOG LABEL IF NOT CATALOGED
- 3 - CATALOG LABEL AND FILES (FULL CATALOG)

ENTER SELECTION OR ? FOR HELP -

1. If the user selects option 1, the message NO CATALOGING REQUIRED is added to the screen and the program goes to the FILE-NOT-FOUND HANDLING parameter.

2-3. For options 2 and 3, the prompt is displayed to catalog the tape as either an archive or generation tape if it is not already cataloged:

-----MINIMUM CATALOGING REQUIRED-----

- 1 - IF A TAPE IS NOT CATALOGED, CATALOG ARCHIVE
- 2 - IF A TAPE IS NOT CATALOGED, CATALOG GENERATION

ENTER SELECTION OR ? FOR HELP -

The appropriate message is added to the screen. For example, if the user has selected the option to catalog the tape label only as an archive tape, the message IF NO CATALOG, CATALOG LABEL-ARCHIVE TAPE is added to the screen display. If the tape used by this procedure step is not already cataloged, it will be cataloged during the BACKUP operation as specified by this procedure.

Restore Catalog Use

If the user has selected option 4 from Screen 1R, fully cataloged tapes are required for the RESTORE operation and the following message is displayed on the screen for CATALOG USE:

PARAMETERS REQUIRE USE OF FULLY CATALOGED TAPES

The program then goes directly to the next parameter to be defined. If the user has selected any other option from screen 1R, he has a choice of catalog options, and the following screen display appears when the parameter pointer reaches the CATALOG USE field:

-----CATALOG USE-----

- 1 - CATALOGED TAPES ARE NOT REQUIRED
- 2 - REQUIRE TAPES WITH CATALOGED LABELS
- 3 - REQUIRE FULLY CATALOGED TAPES

ENTER SELECTION OR ? FOR HELP -

1. If the user selects option 1, the message CATALOGED TAPES ARE NOT REQUIRED is displayed for

the parameter and the program goes to the ERROR HANDLING parameter.

2. Entering '2' causes the message TAPE LABEL MUST BE CATALOGED to be displayed. The program then goes to the next parameter.
3. For option 3 the program displays the message TAPE MUST BE FULLY CATALOGED and the program goes to the next parameter.

Error Handling if
File Not Found

This parameter specifies the action to be taken if a file to be backed up or restored cannot be found on disc or tape. The user is given three options: to have the BACKUP or RESTORE operation aborted, to have the BACKUP or RESTORE continue in spite of the missing file, or to allow the operator to make a decision during the operation. The program presents this display:

-----FILE-NOT-FOUND HANDLING-----

IF A SELECTED FILE DOES NOT EXIST

1 - ABORT THE PROCEDURE

2 - SKIP THE FILE

3 - ASK THE OPERATOR TO SKIP THE FILE OR ABORT

ENTER SELECTION OR ? FOR HELP -

-
1. Option 1 causes the message IF A SELECTED FILE IS NOT FOUND, ABORT THE PROCEDURE to be displayed on the screen. The program then proceeds to the next parameter to be defined.
 2. Entering '2' causes the message IF A SELECTED FILE IS NOT FOUND, SKIP THE FILE to be displayed. The program then goes to the next parameter.
 3. If the user selects option 3, the message displayed is IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT, and the program goes to the next parameter.

File Verify--
BACKUP Only

The FILE VERIFY option is used only for BACKUP operations and allows the user to specify that the transfer of files from disc to tape be verified as part of the operation. The following prompt appears when the parameter pointer reaches this parameter, or when the operator elects to erase files being backed up during FILE SELECTION:

-----FILE VERIFY-----

VERIFY ERROR FREE TRANSFER OF FILES AFTER BACKUP?
ENTER ? FOR HELP (Y/N) -

-
- Y. If the user chooses to have the BACKUP operation verify the correct transfer of files, the message VERIFY FILES TRANSFERED is added to the screen and the program goes to the next parameter.
 - N. If the user chooses not to have the verification process take place, the message DO NOT VERIFY FILES TRANSFERED is displayed and the program proceeds to the LOCATION SELECTION parameter.

Multiple Backups--
BACKUP Only

The MULTIPLE BACKUP parameter allows an operator to choose between using a tape for more than one backup or beginning a backup at the start of a tape. When a BACKUP operation is being defined and the parameter pointer reaches this parameter, the program displays the following menu:

-----MULTIPLE BACKUP SELECTION-----

- 1 - BEGIN BACKUP AT START OF TAPE
- 2 - BEGIN BACKUP FOLLOWING THE LAST FILE ON TAPE

ENTER SELECTION OR ? FOR HELP -

-
- 1. Selecting option 1 causes the message BEGIN BACKUP AT START OF TAPE to be displayed on the screen. If the procedure is defined to the user's satisfaction, pressing Motor Bar IV allows him to store the parameters defined for the step. See the subsection titled COMPLETING A PROCEDURE STEP near the end of this section. If the user wishes to change any parameter, he may use Motor Bar II to go down the screen or Motor Bar III to advance up the screen.

2. If '2' is entered, the program displays the message BEGIN BACKUP FOLLOWING THE LAST FILE ON TAPE. The user has the options described in the above paragraph for completing the step or editing parameters.

File Precedence--
RESTORE Only

This parameter determines the action to be taken if a file to be restored already exists on disc. When the pointer reaches this line, the display appears:

-----FILE PRECEDENCE-----

IF A FILE TO BE RESTORED ALREADY EXISTS ON DISC

- 1 - DO NOT RESTORE THE FILE
- 2 - REPLACE THE FILE ON DISC
- 3 - ABORT THE PROCEDURE
- 4 - OPERATOR SELECTS SKIP, RESTORE, OR ABORT

ENTER SELECTION OR ? FOR HELP -

-
1. Choosing option 1 causes the message IF A FILE ALREADY EXISTS ON DISC, DO NOT RESTORE THE FILE to be displayed on the screen. The program then goes to the LOCATION SELECTION parameter.

2. If option 2 is selected, the user is prompted to verify the selection by the message:

RESTORE FILES ALREADY ON DISC

THIS OPTION MAY ERASE CURRENT FILES
ARE YOU SURE? (Y/N) -

'Y'. Entering 'Y' causes the message IF A FILE ALREADY EXISTS ON DISC, REPLACE THE FILE ON DISC to be displayed on the screen. The program then goes to the next parameter.

'N'. Entering 'N' causes the program to return to the FILE PRECEDENCE menu shown above.

3. Selecting option 3 causes the message IF A FILE ALREADY EXISTS ON DISC, ABORT to appear. The program next proceeds to the LOCATION SELECTION parameter.

4. If the user enters '4', the message IF A FILE ALREADY EXISTS, THE OPERATOR MAY SKIP, RESTORE, OR ABORT is displayed on the screen and the program goes to LOCATION SELECTION.

File Placement--
RESTORE Only

This parameter is used only for RESTORE operations to specify the location to which files are to be restored on disc. When the parameter pointer reaches this line, the following prompt first appears:

-----FILE PLACEMENT-----

FILES ARE TO BE RESTORED TO

- 1 - THE LOCATION FROM WHICH THEY WERE BACKED UP
- 2 - FIRST AVAILABLE OR SELECTED LOCATION
- 3 - THE CURRENT LOCATION OF THE FILE ON DISC

ENTER SELECTION OR ? FOR HELP -

1. If the user enters '1', the program next displays the following prompt:

ENTER THE LOWEST SECTOR TO RESTORE FILES IF
UNABLE TO RESTORE AT THE PREVIOUS LOCATION -----

(ENTER 99999 TO NOT SCAN FOR AVAILABLE SPACE)

If the user enters a number other than 99999, the program displays the message FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR STARTING AT SECTOR #####, and then goes to the next parameter to be defined. If the user enters the number 99999, the message displayed is FILES ARE RESTORED AT THEIR PREVIOUS LOCATION and then goes to the next parameter.

2. Entering '2' to the above prompt causes the program to display the prompt for a sector number at which files are to be restored:

ENTER THE LOWEST SECTOR TO RESTORE FILES -----

When a number is entered, the program then displays the message FILES ARE RESTORED STARTING AT SECTOR nnnnn, and proceeds to the next parameter.

3. Selecting option 3 causes the prompt from option 1 to appear. When a number or 99999 is entered, the message FILES ARE RESTORED AT THEIR CURRENT LOCATION OR STARTING AT SECTOR ##### is displayed. If the user presses RETURN instead of entering a number, the message displayed is: FILES ARE RESTORED AT THEIR CURRENT LOCATION OR AT THE FIRST AVAILABLE SECTOR. The program then goes to the next parameter to be defined.

Error Handling if
Insufficient Disc
Space--RESTORE Only

This parameter is used for RESTORE operations to specify the action to be taken if a file cannot be restored at the location specified by the FILE LOCATION parameter described above. The user has the options to abort the procedure, to skip the file, or to allow the operator to make a decision while the RESTORE operation is taking place. When the parameter pointer reaches this line, the program displays the menu:

-----INSUFFICIENT DISC SPACE HANDLING-----

IF UNABLE TO FIND SPACE TO RESTORE A FILE

1 - ABORT THE PROCEDURE

2 - SKIP THE FILE

3 - ASK THE OPERATOR TO SKIP THE FILE OR ABORT

ENTER SELECTION OR ? FOR HELP -

1. If option 1 is selected, the message IF INSUFFICIENT DISC SPACE IS FOUND, ABORT is displayed. The program then goes to the BACKUP NUMBER SELECTION parameter.
2. Selecting option 2 causes the message IF INSUFFICIENT DISC SPACE IS FOUND, DO NOT RESTORE THE FILE to be displayed for this parameter. The program goes to the next parameter to be defined.
3. When the user enters '3', the program displays the message IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT. The program then goes to the BACKUP NUMBER SELECTION parameter.

Backup Number
Selection--
RESTORE Only

The BACKUP NUMBER SELECTION parameter provides a way of indicating which set of files is to be restored from a tape containing more than one BACKUP. If for DISC SELECTION the user has chosen options 4 or 5 (RESTORE FILES TO THE SAME DISC NUMERS/NAME BACKED UP), the program automatically selects option 1 for this parameter, FIRST BACKUP ON TAPE. The screen display for this parameter is the following:

-----BACKUP NUMBER SELECTION-----

RESTORE FILES FROM

- 1 - FIRST BACKUP ON TAPE
- 2 - MOST RECENT COPY OF EACH FILE ON TAPE
- 3 - FROM A SPECIFIED BACKUP NUMBER

ENTER SELECTION OR ? FOR HELP -

1. Option 1 causes the message RESTORE FROM FIRST BACKUP ON TAPE to appear on the screen. If the procedure is defined to the user's satisfaction, pressing Motor Bar IV allows him to store the parameters defined for the step. See the subsection titled COMPLETING A PROCEDURE STEP near the end of this section. If the user wishes to change any parameter he may use Motor Bar II to go down the screen or Motor Bar III to return up the screen.

2. If the user selects option 2, the message RESTORE MOST RECENT COPY OF EACH FILE is displayed, and the user then has the options described in the preceding paragraph for completing the procedure step or editing parameters.

3. Entering '3' causes the program to display the prompt:

ENTER BACKUP NUMBER OR 'CR' FOR THE LAST BACKUP.

#. If the user enters a number, the program adds the message RESTORE FROM BACKUP NUMBER # to the screen.

CR. If the user presses RETURN the message added to the screen display is RESTORE FROM LAST BACKUP.

For both options 2 and 3, CATALOGED TAPE USE is set to TAPE MUST BE FULLY CATALOGED. In either case the step can be edited as explained above or completed according to the instructions under option 1.

DEFINING THE CATALOG OPERATION

The CATALOG operation has two control parameters:
tape selection and catalog type.

Tape Selection

The tape selection parameter, including retensioning, is defined as for BACKUP and RESTORE operations. See the previous subsection for a description of the procedures to follow in defining tape selection and retensioning.

Catalog Type

This parameter allows the user to catalog only the tape label or both the label and files, and to catalog the tape as either an archive or generation tape. When the parameter pointer reaches this parameter, the options are displayed as shown below:

-----CATALOG TAPE-----

- 1 - CATALOG LABEL - ARCHIVE TAPE
- 2 - CATALOG LABEL - GENERATION TAPE
- 3 - CATALOG LABEL AND FILES - ARCHIVE TAPE
- 4 - CATALOG LABEL AND FILES - GENERATION TYPE

ENTER SELECTION OR ? FOR HELP -

-
1. For option 1, the message CATALOG LABEL- ARCHIVE TAPE is displayed on the screen. The user can either edit the parameters as defined or complete the procedure step by pressing Motor Bar IV.
 2. Selecting option 2 causes the message CATALOG LABEL - GENERATION TAPE to be displayed. The user has the options listed in the preceding paragraph.
 3. If option 3 is selected, the message displayed is CATALOG LABEL AND FILES (FULL CATALOG) - ARCHIVE TAPE, and the user can then edit or complete the step.
 4. Selecting option 4 causes the message CATALOG LABEL AND FILES (FULL CATALOG) - GENERATION TAPE to appear on the screen.

DEFINING THE
DECATALOG OPERATION

A DECATALOG step has only the tape selection parameter. It is defined as for a BACKUP or RESTORE operation. See the description of tape selection listed under DEFINING PARAMETERS FOR BACKUP AND RESTORE OPERATIONS.

DEFINING THE CALL
OPERATION

The CALL procedure has only one control parameter, with no defaults. The user must enter the name of the procedure to be called. When the user selects the CALL operation, the prompt appears:

ENTER CALL PROCEDURE NAME: -----

After the name is entered, the program displays the message: CALL PROCEDURE name. The user can then complete the step by pressing Motor Bar IV.

COMPLETING A
PROCEDURE STEP

When all the parameters for an operation have been defined to the user's satisfaction, he may then end the process by pressing Motor Bar IV. The program allows the user to continue editing the procedure step, or to select another step without storing the step as edited, or to select another step and to store the step that was just defined. The options are displayed at the bottom left-hand corner of the screen:

```
STEP COMPLETE

  1 - STEP NOT COMPLETE, RETURN TO THE NEXT LINE
  2 - SELECT ANOTHER STEP, DO NOT STORE STEP CHANGES
  3 - SELECT ANOTHER STEP, STORE STEP CHANGES

ENTER SELECTION OR ? FOR HELP -
```

Figure 5-9. Menu for Completing a Procedure Step.

1. If the user enters '1', the parameter pointer goes back to the last parameter and the prompts for that parameter are displayed.
2. For option 2, the program returns the STEP SELECTION prompt and does not store the step that was just defined. The user can then select another step to be defined or can exit the program by pressing Motor Bar III.
3. If option 3 is selected, the program stores the procedure step as defined, returns the user to the STEP SELECTION prompt and displays the number of the newly-defined step under DEFINED STEPS. The user has the options described in the preceding paragraph.

SAVING A PROCEDURE

From the STEP SELECTION prompt the user can end procedure definition by pressing Motor Bar IV. The program presents the prompt:

SAVE PROCEDURE? (Y/N) -

Entering 'Y' causes the procedure to be saved. When a procedure has been saved, the program rennumbers the procedure steps and copies the procedure into the procedure file. If the procedure is stored under the name TEMPORARY, it is executed immediately. Otherwise, the program returns to the DEFINE A PROCEDURE main menu. If 'N' is entered, the procedure is not saved, and the program returns to the STEP SELECTION prompt.

OVERVIEW

The *MTC Utility allows the user to print or display information about the contents of a cataloged tape, tapes containing specified files, tape labels and procedures. This section describes the REPORT FUNCTIONS of the *MTC Utility.

THE REPORTS
MAIN MENU

When an operator selects option 3 from the *MTC utility Main Menu, the following REPORTS MENU is displayed:

```

                                REPORTS

0 - EXIT
1 - LIST CATALOGED TAPE CONTENTS
2 - LIST TAPES CONTAINING A SPECIFIED FILE
3 - DISPLAY A TAPE LABEL
4 - LIST PROCEDURES

ENTER SELECTION OR ? FOR HELP -

```

Figure 6-1. REPORTS Menu.

To return to the main menu, enter '0'. To use any of the reports functions, enter the appropriate number.

LIST CATALOGED
TAPE CONTENTS

Selection 1 allows the user to list information on tapes which have been partially or fully cataloged. The report may be displayed at the VDT or printed at a specified printer. When the user enters '1' from the REPORTS menu, the system displays the following menu:

- ```

 LIST CATALOGED TAPES
 (ENTER CTL-IV TO EXIT)

1. TAPE SELECTION -
 A. LIST ALL TAPES
 B. LIST TAPES IN TAPE-SET
 C. LIST SPECIFIC TAPE
 D. LIST ALL TAPE SEQUENCES NOT USED

2. ORDER OF DISPLAY -
 A. TAPE NAME
 B. BACKUP DATE

3. DISPLAY TAPE LABEL INFORMATION? (Y/N) -

4. FILE DISPLAY -
 A. NO FILE DISPLAY
 B. DISPLAY FILE NAMES ONLY
 C. DISPLAY ALL FILE INFORMATION

5. OUTPUT DEVICE -
 A. VDT
 B. LINE PRINTER
```

Figure 6-2. List Cataloged Tapes Menu.

The cursor then proceeds through each of the five parts of the menu.

1. The TAPE SELECTION prompt allows the user to choose whether to list all tapes which have been cataloged, only tapes from a specific tape-set or range of tape-sets, a specific tape, or tapes which have been cataloged but "not used." "Not used" tapes are any tapes that were labeled but never used, including those labeled with a sequence number that was not required for the last backup. If you choose to list tapes in a tape-set (option 1B) or to list a specific tape (option 1C), the system displays a prompt for the tape-set name or the tape-set and tape-id names. If you select option 1C, the program goes directly to step 3 below. If you select option 1D, the program goes directly to step 5 below.

2. Under the heading ORDER OF DISPLAY, the user can specify whether to list tapes in order by tape-set name or by the last backup date. For either option the program prompts the user for a range of names or dates: RANGE? (Y/N) - If you respond 'Y', the prompts for option 2A appear:

STARTING NAME, 'CR' FOR FIRST IN CATALOG:  
-----

ENDING NAME, 'CR' FOR LAST IN CATALOG:  
-----

The prompts for option 2B are:

STARTING DATE OR 'CR': MMDDYY

ENDING DATE OR 'CR': MMDDYY

3. Under selection 3 the user can specify whether to display the information about the tape label.
4. The FILE DISPLAY option allows the user to choose to display no information on files contained on the tape, only the file names, or complete file information.
5. Under the heading OUTPUT DEVICE the user can choose whether to have the information displayed at the VDT or at the line printer. If option 5B is chosen and multiple line printers are configured, the system requests the name of the printer:

ENTER PRINTER NAME OR 'CR' FOR LP --

If the printer specified is not configured, the message PRINTER NOT CONFIGURED is displayed and the selection is not accepted. If the printer is not "on-line", the message PRINTER NOT READY appears.

6. After the user has proceeded through all the headings, the program displays the following prompt to confirm the selections:

IS THIS CORRECT? (Y/N) -

If you enter 'Y', the program displays or prints the information, and then returns the REPORTS menu. If you enter 'N', the system prompts:

DO YOU WANT TO EXIT? (Y/N) -

If you enter 'Y', the program returns to the REPORTS menu. If you enter 'N', the program returns to the beginning of the LIST CATALOGED TAPES selection process.

LIST TAPES  
CONTAINING A  
SPECIFIED FILE

This report function is accessed by entering '2' from the REPORTS menu. This function displays at the VDT information on all fully-cataloged tapes containing the requested file: the tape name, tape ID, serial number, catalog type (generation or archive), backup date and time. The system notifies the user if the file is not found on a fully-cataloged tape.

1. After you have entered '2' from the REPORTS menu, the system presents the following prompt:

ENTER FILE NAME OR 'CR' TO EXIT: -----

2. If the file is contained on a fully-cataloged tape, the following display appears at the VDT:

| LIST FULLY CATALOGED TAPES CONTAINING SPECIFIED FILES |         |       |                    |              |             |             |
|-------------------------------------------------------|---------|-------|--------------------|--------------|-------------|-------------|
| ENTER FILE NAME OR 'CR' TO EXIT: NAME1-               |         |       |                    |              |             |             |
| TAPE SET                                              | TAPE ID | SEQ # | TAPE SERIAL NUMBER | CATALOG TYPE | BACKUP DATE | BACKUP TIME |
| NAME1                                                 | ID1     | XX    | XXXXXXX            | XXXXXXXXXX   | MM/DD/YY    | HH:MM AM    |
| ENTER 'CR' TO CONTINUE -                              |         |       |                    |              |             |             |

Figure 6-3. Display of Tapes Containing a Specified File

If you press RETURN, the prompt from step 1 appears again.

3. If the file has not been backed up on a fully-cataloged tape, the system displays the message FILE NOT FOUND ON ANY FULLY CATALOGED TAPE below the headings shown above.

DISPLAY A TAPE LABEL The DISPLAY A TAPE LABEL function allows the user to display information contained on a tape label at the VDT.

1. When the user enters '3' from the REPORTS menu, the system presents the following display:

```
DISPLAY A TAPE LABEL
MOUNT TAPE, DEPRESS 'CR' WHEN READY (CTL-IV TO ABORT)
```

Figure 6-4. Prompt to Mount a Tape.

2. When you have mounted the tape and pressed RETURN, the program displays the label information:

```
DISPLAY A TAPE LABEL

1. TAPE SET NAME
2. TAPE ID
3. VOLUME SEQUENCE NUMBER
4. TAPE SERIAL NUMBER
5. DATE LABELED
6. TAPE USE RESTRICTIONS
7. DATE, TIME LAST WRITTEN
8. SYSTEM SERIAL NUMBER
9. DISC NUMBER, NAME

DO YOU WISH TO DISPLAY ANOTHER TAPE LABEL (Y/N) -
```

Figure 6-5. Tape Label Display.

3. If you enter 'Y' in response to the prompt above, the message from step 1 is displayed. If you enter 'N', the program returns you to the REPORTS menu.

## LIST PROCEDURES

The LIST PROCEDURES function provides a display at the VDT or a printed listing of the names and parameters of existing procedures, including those which are created by the user. Each procedure starts a new page when printed on the line printer or a new screen on the VDT. Up to three procedure steps may be printed on a page.

1. When the user enters '4' from the REPORTS menu, the following display appears at the VDT:

```
DISPLAY PROCEDURES

ENTER PROCEDURES TO BE DISPLAYED OR 'CR' TO LIST
ALL PROCEDURES

ENTER 'CR' AFTER EACH PROCEDURE, 'CR' 'CR' TO
TERMINATE INPUT
```

Figure 6-6. Display Procedures Prompts.

As procedure names are entered they appear below the prompts on the screen.

2. If you press RETURN to list all procedures, the program presents the prompt:

```
DISPLAY PROCEDURE NAMES ONLY? (Y/CR) -
```

If you enter 'Y' you are given only a listing of procedure names without the parameters defining the procedure. After entering 'Y' or pressing RETURN the program goes to step 3.

3. After all the names of procedures have been entered, or you have responded to the prompt in step 2 above, the following prompt appears for you to select the output device:

```
1 - DISPLAY ON VDT
2 - DISPLAY ON PRINTER

ENTER SELECTION (CTL-IV TO EXIT) -
```

Figure 6-7. Selecting Output Device.

4. Once the selection is entered the display begins. (See SECTION 4 for the listing of supplied procedures.) To return to the REPORTS menu during the display at the VDT, press Control Bar IV.

## SECTION 7 - MAINTENANCE FUNCTIONS

### OVERVIEW

This section describes the MAINTENANCE FUNCTIONS provided by the \*MTC Utility. These functions include maintaining filelists, labeling tapes, and copying and deleting procedures.

### THE MAINTENANCE MENU

The following menu is displayed when the operator selects the MAINTENANCE option, option 4, from the main menu.

```

 MAINTENANCE

 0 - EXIT
 1 - FILELIST MAINTENANCE
 2 - LABEL A TAPE
 3 - COPY A PROCEDURE
 4 - DELETE A PROCEDURE

 ENTER SELECTION OR ? FOR HELP -

```

Figure 7-1. The Maintenance Menu.

To return to the main menu, enter '0'. To use any of the maintenance functions, enter the appropriate number. The following subsections describe these utilities.

**FILELIST**  
**MAINTENANCE**

The purpose of the FILELIST MAINTENANCE function is to allow the user to create and maintain lists of files to be backed up and restored within the \*MTC Utility. This utility may be run without loading a tape.

**THE FILELIST**  
**MAINTENANCE MENU**

When the operator enters '1' from the MAINTENANCE menu, the menu shown in Figure 7-2 is displayed:

```
FILELIST MAINTENANCE

0 - EXIT
1 - CREATE A NEW FILELIST
2 - MODIFY A FILELIST
3 - COPY A FILELIST
4 - DELETE A FILELIST
5 - LIST FILELISTS

ENTER SELECTION -
```

Figure 7-2. The Filelist Maintenance Menu.

To use any of the FILELIST MAINTENANCE utilities, enter the number of the utility.

**CREATE A NEW**  
**FILELIST**

These are the steps to take to CREATE A NEW FILELIST:

1. Once you have entered '1' from the FILELIST MAINTENANCE menu, the program first prompts for the name of the filelist to be created:

```
ENTER FILELIST NAME-----
```

If the filelist name already exists, the message DUPLICATE FILELIST NAME is displayed, and the user must enter a different filelist name.

2. Once a unique name is entered, the system returns the following prompt to verify the name:

```
IS THIS CORRECT? (Y/N) -
```

If the user enters 'N', the previous prompt to enter a name is displayed. If the user enters 'Y', the following screen is displayed to allow the operator to add file names to the filelist.

```

FILELIST: xxxxxxxx CREATE A NEW FILELIST NUMBER OF FILES: 0

1 - ADD FILES + MOTOR BAR CONTROL
2 - DELETE FILES +
ENTER SELECTION - + I
 + II DISPLAY NEXT 100 FILES
 + III DISPLAY PREVIOUS 100 FILES
 + IV EXIT

```

Figure 7-3. Create a New Filelist: Define Filelist

3. To create a new filelist, enter '1' to add names of the files to be contained in the filelist. The system returns the following prompt:

ENTER FILES TO BE ADDED - ENTER 'CR'  
AFTER EACH FILE, 'CR' 'CR' TO END

As you add names to the list, they appear in the lower left-hand corner of the screen. After you have entered 6 names the system automatically adds them to the display in the upper portion of the screen. If you add a name which already exists in the list, the program presents the message DUPLICATE FILE NAME and prompts you for another name. When you have entered all the file names press RETURN twice, and the names are displayed in the upper portion of the screen. You may continue to add names, up to 680 names. If the list contains several screens worth of names, Motor Bar II allows you to view the next 100 files and Motor Bar III allows you to view the previous 100 file names.

4. If you wish to modify the list as displayed, press Motor Bar IV to display the prompt shown in step 2. Enter '2' to delete names from the filelist. The system then returns the following prompt:

ENTER FILES TO BE DELETED - ENTER 'CR'  
AFTER EACH FILE, 'CR' 'CR' TO END

The process for deleting file names from the filelist is similar to the process for adding names, except that when you have completed listing the file names to be deleted, they are removed from the upper portion of the screen. If a file name to be deleted is not contained in the list, the program returns the message \*FILE NOT FOUND\* and continues the process.

5. A filelist can contain up to 680 file names. When you have finished adding file names to the filelist, press Motor Bar IV and the program returns the following display:

```

FILELIST: xxxxxxxx CREATE A NEW FILELIST NUMBER OF FILES: nnn

file #1 file #2 file #3 file #4 file #10
file #11 file #12 file #13 file #14..... file #20
file #21
.....
.....
.....

file #91..... file #100
+++++
+ MOTOR BAR CONTROL
+
1 - ABORT, DO NOT STORE EDITS + I
2 - STORE EDITS + II DISPLAY NEXT 100 FILES
 + III DISPLAY PREVIOUS 100 FILES
 + IV EXIT

ENTER SELECTION -

```

Figure 7-4. Create a New Filelist: Store Edits

If you wish to store the filelist as displayed on the screen, enter '2'. If you do not wish to store the filelist as displayed, enter '1'. In both cases the program then returns the FILELIST MAINTENANCE menu.

#### MODIFY A FILELIST

These are the steps to take to MODIFY A FILELIST:

1. After you have entered '2' to select the MODIFY A FILELIST option the system displays the prompt:

ENTER FILELIST NAME-----

If the filelist name does not exist, a FILELIST NOT FOUND message is displayed, and the user must enter another filelist name.

- When an existing name is entered the message SORTING FILELIST appears briefly, and all files contained in the filelist are displayed in alphabetical order. The user may then add or delete files. The display is as follows:

```

FILELIST: xxxxxxxx MODIFY A FILELIST NUMBER OF FILES: nnn
file #1 file #2 file #3 file #4 file #10
file #11 file #12 file #13 file #14..... file #20
file #21
.....
.....
.....

file #91..... file #100
+++++
 + MOTOR BAR CONTROL
1 - ADD FILES +
2 - DELETE FILES + I
ENTER SELECTION - + II DISPLAY NEXT 100 FILES
 + III DISPLAY PREVIOUS 100 FILES
 + IV EXIT

```

Figure 7-5. Modify a Filelist: Re-define A Filelist

- If you wish to add files to the filelist, enter '1'. The following instructions are displayed at the bottom of the screen.

ENTER FILES TO BE ADDED - ENTER 'CR'  
AFTER EACH FILE, 'CR' 'CR' TO END

If you wish to delete files from the filelist, enter '2'. The program displays the prompt:

ENTER FILES TO BE DELETED - ENTER 'CR'  
AFTER EACH FILE, 'CR' 'CR' TO END

You may then enter the file names to be added to or deleted from the filelist, according to the procedures described under CREATE A FILELIST. No files may be added after the filelist contains the names of 680 files. As described earlier, if a file name to be added already exists in the filelist, the program displays the message DUPLICATE FILE NAME. If a file name to be deleted does not exist in the filelist, the message FILE NOT FOUND appears. You are then requested to enter another file name. When 680 file names are contained in the filelist, any attempt to add more file names causes a FILELIST FULL message to be displayed. The additional names have to be put into another filelist.

- When you have finished editing the filelist, press Motor Bar IV and the program returns the following display:

```

FILELIST: xxxxxxxx MODIFY A FILELIST NUMBER OF FILES: nnn
file #1 file #2 file #3 file #4 file #10
file #11 file #12 file #13 file #14..... file #20
file #21
.....
.....
.....

file #91..... file #100
+++++
1 - ABORT, DO NOT STORE EDITS + MOTOR BAR CONTROL
2 - STORE EDITS +
 + I
ENTER SELECTION - + II DISPLAY NEXT 100 FILES
 + III DISPLAY PREVIOUS 100 FILES
 + IV EXIT

```

Figure 7-6. Modify a Filelist: Store Edits

If you wish to store the filelist as displayed on the screen, enter '2'. If you do not wish to store the filelist as displayed, enter '1'. In both cases the program then returns the FILELIST MAINTENANCE menu.

#### COPY A FILELIST

These are the steps to take to copy a filelist under a new name:

- After you have selected option 3 from the FILELIST MAINTENANCE menu, the screen displays the prompt:

ENTER FILELIST NAME TO COPY -----

- If you enter the name of a filelist that does not exist, the message appears:

FILELIST NOT FOUND

and the cursor returns to the prompt in step one.

- Once you have entered the name of an existing filelist, the prompt for the name under which the filelist is to be copied appears:

ENTER NEW FILELIST NAME: -----

If the name you have entered is the name of an existing filelist, the program displays the message DUPLICATE FILELIST NAME. The utility will not allow you to copy a filelist over an existing filelist.

4. When you have entered the new filelist name the program presents a prompt to verify the copy:

COPY FILELIST? (Y/N) -

5. If you enter 'N', the copy does not take place. If you enter 'Y', the filelist is copied under the new name. In both cases the program returns the FILELIST MAINTENANCE Menu.

## DELETE A FILELIST

Below are listed the steps to take to delete a filelist.

### CAUTION

Be sure that the filelist you are deleting is not used by any procedure, since this utility does not check to see whether any procedures use filelists before deleting them.

1. After you have selected number 4 from the FILELIST MAINTENANCE menu, the program returns the following screen display:

DELETE A FILELIST

ENTER FILELIST NAME -----

2. If the filelist name entered does not exist, a FILELIST NOT FOUND message is displayed and the user is prompted to enter another name. If the filelist exists, the prompt is returned:

DELETE FILELIST? (Y/N) -

3. If the user enters 'Y', the filelist is deleted. If the response is 'N', the filelist is not deleted. In both cases the program returns the FILELIST MAINTENANCE menu.

## LIST FILELISTS

These are the steps to take to display filelists and the file names they contain to either the VDT or the line printer.

1. From selection 5 of the FILELIST MAINTENANCE menu, the following screen is displayed:

```
DISPLAY FILELISTS

ENTER FILELISTS TO BE DISPLAYED OR 'CR' TO LIST ALL FILELISTS
ENTER 'CR' AFTER EACH FILELIST, 'CR' 'CR' TO TERMINATE INPUT
```

Figure 7-7. Display Filelists: Enter Filelist Names

2. As you enter filelist names they are displayed on the screen. As the names of individual filelists are entered they are verified. If no filelist exists under an entered name, the program returns the message FILELIST NOT FOUND.
3. If you choose to list all filelists, just press RETURN and the following prompt is displayed to specify whether the file names contained in the filelists are to be displayed:

```
DISPLAY FILELIST NAMES ONLY? (Y/CR) -
```

4. When you have finished entering all the filelist names or have responded to the prompt in step 3, the program returns this prompt for you to choose whether to have the listing displayed at the VDT or printed at the line printer:

```
1 - DISPLAY ON VDT
2 - DISPLAY ON PRINTER

ENTER SELECTION (CTL-IV TO EXIT) -
```

Figure 7-8. Selecting an Output Device.

If a line printer is selected for display and multiple line printers are configured, the user is requested to enter the name of a printer.

5. Before the listings are displayed, the program briefly displays the message NOW SORTING (filelist name). If all filelists are displayed, they appear in alphabetical order. If selected filelists are displayed the listing occurs in the order the filelist names were entered.
6. The display for each filelist, when file names are also listed, is as shown in Figure 7-9:

```

FILELIST: xxxxxxxx DISPLAY FILELISTS NUMBER OF FILES: nnn

file #1 file #2 file #3 file #4 file #10
file #11 file #12 file #13 file #14..... file #20
file #21
.....
.....
.....

file #91..... file #100

 'CR' TO CONTINUE, CTL-IV TO EXIT -

```

Figure 7-9. Display Filelists: The Display

7. When more than one screen of information is displayed, press RETURN to view the next screen or Motor Bar IV to end the program. When the process is completed the program returns you to the FILELIST MAINTENANCE menu.

LABEL A TAPE

This function allows the user to label an unlabeled tape or to relabel a tape which has already been labeled. It can also be used to display the label and catalog information of any tape.

NOTE

Although on the newer version of \*MTC you can restore from an unlabeled tape (i.e., one that was created with the version of \*MTC before 3.7F), you must label a tape before using it for backups with the later version of the \*MTC Utility. Labeling an existing tape erases all files on it. If more than one tape is necessary for a backup procedure, only the first tape must be labeled unless the other tapes were previously labeled.

SELECTING A TAPE

1. When option 2 is selected from the MAINTENANCE menu the program returns the following prompt:

```

 LABEL A TAPE

MOUNT TAPE, DEPRESS 'CR' WHEN READY (CTL-IV TO EXIT) -
```

Figure 7-10. Prompt to Mount Tape.

After mounting the tape, press RETURN.

2. When the tape is ready the program displays the tape label as shown below:

```

 LABEL A TAPE

 CURRENT LABEL NEW LABEL
TAPE SET NAME xxxxxxxx
TAPE ID xxxxxxxx
VOLUME SEQUENCE NUMBER n
TAPE SERIAL NUMBER xxxxxxxx
DATE LABELED MM/DD/YY
TAPE USE RESTRICTIONS restriction
CATALOG TYPE type

LABEL THIS TAPE? (Y/N) -
```

Figure 7-11. Label a Tape: Label Information

If the tape has previously been cataloged, additional information appears giving the backup status of the tape:

|                           |                      |
|---------------------------|----------------------|
| SEQ. COUNT; BACKUP STATUS | n; XXXXXXXXXXXXXXXXX |
| TAPE SERIAL NUMBERS:      | 1: 2:                |
|                           | 3: 4:                |
|                           | 5: 6:                |
|                           | 7: 8:                |
|                           | 9: 10:               |
|                           | 11: 12:              |

Figure 7-12. Backup Status of Tape.

NOTE

The main function of the TAPE SERIAL NUMBER is to give the user a way to identify the physical tape. Except for not allowing you to duplicate the serial number within a tape-set, the system does not use the TAPE SERIAL NUMBER.

3. If you enter 'N' in response to the prompt LABEL THIS TAPE? the system displays the prompt:

LABEL ANOTHER TAPE? (Y/N) -

If you respond 'Y' to this prompt, the prompt from step 1 to mount the tape to be labeled is displayed. If you enter 'N', the program returns the MAINTENANCE menu.

DECATALOGING  
A TAPE

4. When you have mounted the tape you wish to label, if it has been previously cataloged, the program returns a prompt to decatalog the tape before it can be cataloged (decataloging removes the tape information from the label and files catalog):

DEPRESS 'D' TO DE-CATALOG; 'A' TO ABORT -  
TAPE IS CATALOGED -

If you enter 'A', the program returns to step 3 above.

5. If you decatalog the tape by entering 'D' after the prompt in step 4, the program displays the following prompt:

LABEL TAPE SCRATCH? (Y/N) -

There are only two reasons for labeling a tape SCRATCH. First, continuation tapes for multi-tape backups must be labeled either SCRATCH or as succeeding VOLUMES of the TAPE-SET and ID. If SCRATCH tapes are used, the utility automatically labels the continuation tapes with the proper TAPE-SET and ID and VOLUME SEQUENCE NUMBER during the backup procedure. The only other reason for labeling a tape SCRATCH is when it is used for the quick transfer of files from one system to another. For these reasons you may want to keep some tapes labeled SCRATCH available.

For backups, it is not a good idea to label tapes 'SCRATCH'. A 'SCRATCH' label precludes you from using certain options with the \*MTC Utility which provide greater security and more control over tapes. In particular, 'SCRATCH' tapes cannot be cataloged, so for all practical purposes they are unlabeled tapes. If, however, you wish to label the tape scratch, enter 'Y'. The system puts the word 'SCRATCH' under TAPE SET NAME and skips to TAPE SERIAL NUMBER. The labeling process then proceeds to step 10 below.

#### LABELING THE TAPE

6. If you elect not to label the tape 'SCRATCH', the cursor first moves to the TAPE SET NAME field under the NEW LABEL column and the following prompt appears:

ENTER FIELD, 'CR' TO COPY CURRENT VALUE

If the tape has been previously labeled, you may duplicate any of the current values except the last two fields by merely pressing RETURN.

7. For the TAPE USE RESTRICTIONS field, the following prompts are displayed in the lower left-hand portion of the screen:

ENTER SELECTION -

- 1 - NO RESTRICTION
- 2 - PROC. SELECTS TAPE SET
- 3 - PROC. SELECTS TAPE NAME

Figure 7-13. Options for TAPE USE RESTRICTIONS.

When you have entered your choice, the value appears in the TAPE USE RESTRICTIONS field.

NOTE

It is important to know how you plan to use the tape before you label it. For one thing, if you opt for options 2 or 3 of TAPE USE RESTRICTIONS, you cannot use any of the pre-defined procedures with the tape. For another, when you define your own procedures, you must coordinate TAPE USE RESTRICTIONS with the CATALOG TYPE. See SECTION 3 for hints on how to restrict the use of tapes.

8. When the cursor reaches the CATALOG TYPE field, the following prompts are displayed in the lower left-hand corner of the screen:

```
ENTER SELECTION -

1 - NO CATALOG ENTRY
2 - LABEL CATALOG, ARCHIVE
3 - LABEL CATALOG, GENERATION
4 - FULL CATALOG, ARCHIVE
5 - FULL CATALOG, GENERATION
```

Figure 7-14. Options for CATALOG TYPE.

See Section 3 for recommendations on cataloging tapes.

9. After the value for CATALOG TYPE has been entered, the cursor returns to the VOLUME SEQUENCE NUMBER field. The system always assigns a VOLUME SEQUENCE NUMBER to the tape. If the tape set name and tape ID do not already exist, the number 01 is assigned. If the tape set name and tape ID already exist, the system assigns the next VOLUME SEQUENCE NUMBER.
10. After all values are entered, the user is asked to verify the choices:

PARAMETERS CORRECT? (Y/N) -

If you respond 'N' the program returns the prompt from step 3. If you respond 'Y', the program returns the prompt:

LABEL TAPE? (Y/N) -  
(ALL FILES NOW ON TAPE WILL BE LOST)

If you respond 'N', the program returns the prompt from step 3. If you respond 'Y', the tape is labeled. The program then returns the MAINTENANCE MENU.

## COPY A PROCEDURE

These are the steps to take to COPY an existing procedure:

1. After you have selected option 3 from the MAINTENANCE menu, the program returns the following display:

ENTER PROCEDURE NAME TO COPY -----

If you enter the name of a procedure which does not exist, the message is returned: PROCEDURE NOT FOUND, and you are prompted to enter another name.

2. When the name of an existing procedure has been entered, the next prompt appears for the name of the procedure to which the existing procedure is to be copied.

ENTER NEW PROCEDURE NAME -----

If this name is already in use, the message DUPLICATE PROCEDURE NAME is displayed. You may use the name TEMPORARY and then edit the procedure according to the steps described in Section 5 - DEFINING A PROCEDURE.

3. After the new procedure name has been entered, the system prompts you to verify that the copy should take place:

COPY PROCEDURE? (Y/N) -

If you respond 'N', copying does not take place. If you respond 'Y', the procedure is copied under the new name. The original procedure remains intact. In both cases the program returns you to the MAINTENANCE menu.

## DELETE A PROCEDURE

These are the steps to take to DELETE an existing procedure:

1. After option 4 is selected from the MAINTENANCE menu, the program returns the prompt:

ENTER PROCEDURE NAME TO DELETE -----

If you enter the name of a procedure which does not exist, the PROCEDURE NOT FOUND message is displayed and you are prompted for another name.

2. When the name of an existing procedure is entered, the program prompts:

DELETE PROCEDURE? (Y/N) -

If you enter 'N', the procedure is not deleted. If you enter 'Y', the procedure is deleted. In both cases the program returns you to the MAINTENANCE menu.

OVERVIEW

This section of the manual describes procedures for handling errors on \*MTC Utilities. Error handling is the method by which the system reports unexpected error conditions and verifies operator inputs. When operator intervention might lead to successful resolution of an error condition, the system usually allows the options to REPLY or EXIT processing. For those errors determined to be unresolvable by the operator, the system reports the error and returns to the beginning of the current process. The majority of errors which can be retried are Input/Output errors. Errors which are resolvable by the system are not reported.

This section provides an overview of error types, procedures for handling the different errors which can occur, and a summary of the most common errors and their meanings. For more information on system errors, see the section on ERROR PROCESSING in the Reference Manual for Business BASIC Levels 3 and 4, BFISD 5085.

ERROR TYPES

Error conditions are classified into two types: those resolvable by the operator and those which are not. The \*MTC Utilities use standardized procedures for each type of error. This subsection describes these standard procedures.

NON-RESOLVABLE  
ERRORS

Non-resolvable errors are those which are not anticipated, and for which there is no automatic method of resolution. Examples are ERROR=41 (INVALID INTEGER RANGE) and ERROR=27 (RETURN WITHOUT GOSUB). On \*MTC Utilities the system displays an error message giving the number of the error, the program name, and the statement at which the error condition occurred. The utility allows the operator to exit the program by pressing RETURN. An example of such a message is the following:

ERROR=n HAS OCCURRED: PROGRAM=prgm1, STMT=stno

CR TO EXIT:

If the error occurs during procedure execution, the prompt to execute a procedure is displayed after you press RETURN. If the error occurs during a cataloged

backup, the backup status is set to ERROR TERMINATION in the catalog. If the error did not occur during procedure execution, the \*MTC Utility menu is displayed. Errors which are not trapped by the \*MTC Utility cause the system to go into console mode. The operating system at level 4.2 and later displays the number and a brief description of the error.

## RESOLVABLE ERRORS

Errors which might be resolvable are reported to the terminal. The system displays a description of the error and frequently the operator is given the options to SKIP the file or to ABORT the procedure. In some cases, for example, when multiple files are being processed, the program displays a menu allowing the operator to choose between ABORT, SKIP FILE and RETRY:

```
FILE 'filename' NOT FOUND ON DISC n

 1 - ABORT
 2 - SKIP FILE
 3 - RETRY

ENTER ERROR HANDLING OPTION:
```

Figure 8-1. Menu for Resolving Common File Errors.

To resolve the error, enter the number of the desired option.

## ERROR HANDLING PROCEDURES

The following are common resolvable errors which occur 1) when an attempt is made to access a disc, write to or restore from a bad or protected tape, access a file, or to define a procedure, 2) during data entry or 3) when the operator presses the ESCAPE key.

## DISC ERRORS

When a disc access error occurs during procedure execution, the utility program generally displays the following message and options to RETRY, SKIP the file or ABORT the process:

```
DISC ERROR N, DISC # x, SECTOR xxxxx, STATUS xxxx

1 - RETRY
2 - SUBSTITUTE SECTOR OF B'S
3 - ABORT PROCEDURE

ENTER ERROR HANDLING OPTION:
```

Figure 8-2. Options for Handling Disc Errors.

Selecting option 1 causes the program to RETRY the disc operation. Option 3 causes the program to ABORT the procedure, to set the backup status in the tape catalog to NOT SUCCESSFUL DUE TO DISC ERROR, and to display the prompt to execute a procedure.

If you select option 2, the program writes a sector of B's on tape in place of the sector of data that would have been written there. On a RESTORE, the bad sector is skipped and all other data is restored.

TAPE ERRORS

The \*MTC Utility uses the following procedures when tape errors occur.

During BACKUPS

The \*MTC Utility uses the following procedures for handling tape errors during BACKUP procedures.

ERROR=5

The utility displays an unrecoverable ERROR=5 (BAD SPOT ON THE TAPE) with the following message:

TAPE ERROR 5 WRITING file name or tape label name.

The utility then "closes out" that track at the beginning of the last record successfully written by overwriting the last successful record on the track with an End-of-Track flag, and rewriting the record on the next available track. If no End-of-Track record can be written, the backup is aborted.

No operator intervention is necessary unless a change of tape is required to continue processing. A tape change is always necessary if the label cannot be written. The VDT display leaves the last error message on the screen until the procedure is completed.

Write-Protected  
Tape Errors

An error on an attempt to write to a tape that is "write-protected" results in the following display:

```
TAPE WRITE PROTECTED
ENTER 'CR' WHEN READY OR "A" TO ABORT
```

The operator can then reset the protect switch and can continue, or can abort the procedure. On tape cartridges, the protect switch is a circular area at the upper left-hand corner of the front of the cartridge, to the left of the word "SAFE". When the arrow is turned facing the word "SAFE", the tape is write-protected. When the arrow is turned away from the word "SAFE", the tape is not write-protected. The arrow can be turned with a coin or a screwdriver. On reel-to-reel tapes, when the write ring is removed the tape is write-protected.

During RESTORES

When the utility diagnoses an ERROR=5 while trying to restore files from tape, the following message is displayed:

```
TAPE ERROR 5 READING file name

1 - RETRY
2 - RETENSION/RETRY
3 - SUBSTITUTE RECORD OF R'S
4 - ABORT

ENTER ERROR HANDLING OPTION:
```

Figure 8-3. Options for Handling Tape Errors.

If the operator chooses option 1, the utility attempts to reread the bad record on tape. If the operator chooses option 2 to RETENSION/RETRY, the utility positions the tape to the end of tape (EOT), then rewinds to the start of the file and begins the RESTORE process again. The operator controls the number of retries. If the operator chooses option 3, the utility writes four sectors of R's to disc in place of the bad tape record. The rest of the tape records are restored as normal. The ABORT option causes the utility to abort the procedure and to display the prompt to execute a procedure.

FILE ERRORS

The \*MTC Utility uses the following procedures to handle errors which occur when an attempt is made to access a file.

### Files Not Found

The utility checks to see that files selected for backup or restore procedures are present on tape or disc before the transfer, except for restores from uncataloged tapes. If the procedure does not specify how to proceed when selected files are not found, the operator is asked, for each file not found, whether to skip the file or to abort.

FILE XXXXXX NOT FOUND

ENTER "S" TO SKIP THE FILE, OR "A" TO ABORT -

### Insufficient Space on Disc

If the procedure as defined allows the operator to specify the action taken when insufficient space exists on disc to restore a file from tape, the following message is displayed:

FILE XXXXXX CANNOT BE RESTORED DUE TO  
INSUFFICIENT DISC FREE SPACE

ENTER "S" TO SKIP THE FILE, OR "A" TO ABORT -

### Critical Files Restriction During Reload

If the files required by the procedure for a reload are not present on tape, the following message is displayed:

CRITICAL FILES XXXXXXXX(, ..., XXXXXX) NOT PRESENT  
\*ABORT\* RELOAD TERMINATED  
ENTER 'CR' TO EXIT

The procedure step is aborted, and no files on disc are altered.

### ERRORS DURING PROCEDURE DEFINITION

If a filelist is not found, the following message is displayed:

FILELIST xxxxxxxx NOT CURRENTLY DEFINED  
DO YOU WISH TO SPECIFY THIS FILELIST (Y/N)?

The operator then can either enter 'Y' to have the filelist specified or can enter 'N' not to have it specified.

### ESCAPE KEY

If the ESCAPE key is pressed at any time, the system goes into console mode.

## COMMON ERRORS

The following are explanations of errors that commonly occur on the \*MTC Utility.

### ERROR=5 READ/WRITE ERROR

ERROR=5 occurs during an attempt to READ from or WRITE to a worn tape. If the attempt is to WRITE to the tape, you should use a new tape. If you are attempting to READ the tape, try to skip the file. On level 4.2 systems you are allowed the option of skipping just a block or two rather than having to drop the whole file. This error could be an indication of a hardware problem.

### ERROR=6, MISSING CERTIFICATION RECORD

ERROR=6 indicates that the tape is a non-Basic Four tape or that the system cannot recognize the certification of the tape on either the tape or the hardware.

### ERROR=12 MISSING FILE

An ERROR=12 indicates that one or more of the \*MTC Utility files is missing. (Usually it is the driver file "(>TC)" or "(>MR".)

### ERROR=31, NOT ENOUGH MEMORY

An ERROR=31 indicates that not enough memory has been assigned to the task attempting to run the program. If you are running off-line, modify "OSMONR" at statement 510 to give the program more pages of memory. If you are running on-line, from console mode assign a larger number of pages with the START command to your task.

### ERROR=47 SUBSTRING REFERENCE OUT OF RANGE

Although an ERROR=47 in Business BASIC indicates a substring reference out of range, it has an additional meaning for the \*MTC Utility. Here an ERROR=47 may also indicate that an attempt has been made to OPEN a device which is already OPENed or to back up files which have the same name as a device (e.g., "T0", "R0", "C0", "G0", etc.). Although on-line \*MTC does not permit the user to give files the same name as a device, the version of the utility that operates under the alternate operating system BBIITC may encounter such files.

### TAPE FORMAT ERRORS

These errors usually indicate that the data read from tape is not what was expected.

#### NOTE

If old and new \*MTC programs become mixed together, false errors are likely to occur and can have almost any error number.

APPENDIX A - LISTING OF SUPPLIED PROCEDURES

This Appendix lists the parameters of pre-defined procedures as supplied by BFISD. The procedures are listed in alphabetical order. These are the listings as they appear when printed using the REPORTS function of the \*MTC Utility, except that each procedure is printed on a separate page or displayed on a new screen on the VDT.

---

PROCEDURE NAME: BACKDATA           \*BACKUP\*           STEP: 1           12/12/80

-----FILE SELECTION-----  
INCLUDE ALL DATA FILES

-----OPTIONAL PARAMETERS-----  
USE DISC NUMBER: 0  
USE ANY TAPE. DO NOT RETENSION.  
ALWAYS CATALOG LABEL AND FILES. IF NO CATALOG, CATALOG GENERATION.  
IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.  
DO NOT VERIFY FILES TRANSFERRED.  
BEGIN BACKUP AT START OF TAPE

---

PROCEDURE NAME: BACKNOV           \*BACKUP\*           STEP: 1           12/12/80

-----FILE SELECTION-----  
INCLUDE ALL FILES

-----OPTIONAL PARAMETERS-----  
USE DISC NUMBER: 0  
USE ANY TAPE. DO NOT RETENSION.  
ALWAYS CATALOG LABEL AND FILES. IF NO CATALOG, CATALOG GENERATION.  
IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.  
DO NOT VERIFY FILES TRANSFERRED  
BEGIN BACKUP AT START OF TAPE

---

---

PROCEDURE NAME: BACKPROG           \*BACKUP\*           STEP: 1           12/12/80

-----FILE SELECTION-----  
INCLUDE ALL PROGRAM FILES

-----OPTIONAL PARAMETERS-----  
USE DISC NUMBER: 0  
USE ANY TAPE. DO NOT RETENSION.  
ALWAYS CATALOG LABEL AND FILES. IF NO CATALOG, CATALOG GENERATION.  
IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.  
DO NOT VERIFY FILES TRANSFERRED.  
BEGIN BACKUP AT START OF TAPE

---

PROCEDURE NAME: BACKVERF           \*BACKUP\*           STEP: 1           12/12/80

-----FILE SELECTION-----  
INCLUDE ALL FILES

-----OPTIONAL PARAMETERS-----  
USE DISC NUMBER: 0  
USE ANY TAPE. DO NOT RETENSION.  
ALWAYS CATALOG LABEL AND FILES. IF NO CATALOG, CATALOG GENERATION.  
IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.  
VERIFY FILES TRANSFERRED  
BEGIN BACKUP AT START OF TAPE

---

PROCEDURE NAME: FULLBACK           \*BACKUP\*           STEP: 1           12/12/80

-----FILE SELECTION-----  
INCLUDE ALL FILES

-----OPTIONAL PARAMETERS-----  
USE DISC NUMBER: 0  
USE ANY TAPE. DO NOT RETENSION.  
NO CATALOGING REQUIRED.  
IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.  
DO NOT VERIFY FILES TRANSFERRED.  
BEGIN BACKUP AT START OF TAPE.

---

PROCEDURE NAME: FULLREST            \*RESTORE\*            STEP: 1            12/12/80

-----FILE SELECTION-----  
FULL RESTORE

-----OPTIONAL PARAMETERS-----

USE DISC NUMBER: 0  
USE ANY TAPE. DO NOT RETENSION.  
CATALOGED TAPES ARE NOT REQUIRED.  
IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.  
IF A FILE ALREADY EXISTS ON DISC, REPLACE THE FILE ON DISC.  
FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR AT THE FIRST AVAILABLE  
SECTOR.  
IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR  
ABORT  
RESTORE FROM FIRST BACKUP ON TAPE.

---

PROCEDURE NAME: RESTALL            \*RESTORE\*            STEP: 1            12/12/80

-----FILE SELECTION-----  
INCLUDE ALL FILES

-----OPTIONAL PARAMETERS-----

USE DISC NUMBER: 0  
USE ANY TAPE. DO NOT RETENSION.  
CATALOGED TAPES ARE NOT REQUIRED.  
IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.  
IF A FILE ALREADY EXISTS ON DISC, REPLACE THE FILE ON DISC.  
FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR AT THE FIRST AVAILABLE  
SECTOR.  
IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR  
ABORT  
RESTORE FROM FIRST BACKUP ON TAPE

---

---

PROCEDURE NAME: RESTSEL                   \*RESTORE\*                   STEP: 1                   12/12/80

-----FILE SELECTION-----

SELECTED FILES AS RESTORED

-----OPTIONAL PARAMETERS-----

USE DISC NUMBER: 0

USE ANY TAPE. DO NOT RETENSION.

CATALOGED TAPES ARE NOT REQUIRED.

IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.

IF A FILE ALREADY EXISTS ON DISC, REPLACE THE FILE ON DISC.

FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR AT THE FIRST AVAILABLE SECTOR.

IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.

RESTORE FROM FIRST BACKUP ON TAPE

---

PROCEDURE NAME: SELBACK                   \*BACKUP\*                   STEP: 1                   12/12/80

-----FILE SELECTION-----

OPERATOR SPECIFIES FILES

-----OPTIONAL PARAMETERS-----

USE DISC SELECTED BY OPERATOR

USE ANY TAPE. DO NOT RETENSION.

NO CATALOGING REQUIRED

IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.

DO NOT VERIFY FILES TRANSFERRED

BEGIN BACKUP AT START OF TAPE

---

PROCEDURE NAME: SELREST                   \*RESTORE\*                   STEP: 1                   12/12/80

-----FILE SELECTION-----

OPERATOR SPECIFIES FILES

-----OPTIONAL PARAMETERS-----

USE DISC SELECTED BY OPERATOR

USE ANY TAPE. DO NOT RETENSION.

TAPE MUST BE FULLY CATALOGED

IF A SELECTED FILE IS NOT FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT.

IF A FILE ALREADY EXISTS ON DISC, REPLACE THE FILE ON DISC.

FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR AT THE FIRST AVAILABLE SECTOR.

IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT

RESTORE FROM FIRST BACKUP ON TAPE

---

PROCEDURE NAME: UPDATE                    \*CATALOG\*                    STEP: 1                    12/12/80

USE ANY TAPE. DO NOT RETENSION.  
CATALOG LABEL AND FILES (FULL CATALOG) - ARCHIVE TAPE.

---

PROCEDURE NAME: UPDATE                    \*RESTORE\*                    STEP: 2                    12/12/80

-----FILE SELECTION-----

INCLUDE ALL FILES.  
INCLUDE FILES OSBBII OSESCP OSINIT OSMONR OSSTRT  
INCLUDE FILES (>MR (>TC \*DMPFL \*SRCFL BBIITC  
EXCLUDE FILES \$brief \$conf \$form \$oper \$queue  
EXCLUDE FILES \*MTCFC \*MTCFL \*MTCPC \*MTCTC  
EXCLUDE FILES \*PARM

-----OPTIONAL PARAMETERS-----

USE DISC NUMBER: 0  
USE TAPE FROM PREVIOUS STEP. DO NOT RETENSION.  
TAPE MUST BE FULLY CATALOGED.  
IF A SELECTED FILE IS NOT FOUND, SKIP THE FILE.  
IF A FILE ALREADY EXISTS ON DISC, REPLACE THE FILE ON DISC.  
FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR AT THE FIRST AVAILABLE SECTOR.  
IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT  
RESTORE FROM FIRST BACKUP ON TAPE

---

PROCEDURE NAME: UPDATE                    \*RESTORE\*                    STEP: 3                    12/12/80

-----FILE SELECTION-----

INCLUDE FILES \$brief \$conf \$form \$oper \$queue  
INCLUDE FILES \*PARM

-----OPTIONAL PARAMETERS-----

USE DISC NUMBER: 0  
USE TAPE FROM PREVIOUS STEP. DO NOT RETENSION.  
TAPE MUST BE FULLY CATALOGED.  
IF A SELECTED FILE IS NOT FOUND, SKIP THE FILE.  
IF A FILE ALREADY EXISTS ON DISC, DO NOT RESTORE THE FILE.  
FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR AT THE FIRST AVAILABLE SECTOR.  
IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT  
RESTORE FROM FIRST BACKUP ON TAPE

---

---

PROCEDURE NAME: 4.2UPDAT

\*RESTORE\*

STEP: 1

12/12/80

-----FILE SELECTION-----

INCLUDE ALL FILES.

-----OPTIONAL PARAMETERS-----

USE DISC NUMBER: 0

USE ANY TAPE. DO NOT RETENSION.

CATALOGED TAPES ARE NOT REQUIRED.

IF A SELECTED FILE IS NOT FOUND, SKIP THE FILE.

IF A FILE ALREADY EXISTS ON DISC, DO NOT RESTORE THE FILE.

FILES ARE RESTORED AT THEIR PREVIOUS LOCATION OR AT THE FIRST AVAILABLE SECTOR.

IF INSUFFICIENT DISC SPACE IS FOUND, THE OPERATOR MAY SKIP THE FILE OR ABORT

RESTORE FROM FIRST BACKUP ON TAPE

---

## APPENDIX B - MTC AND CRITICAL FILES

### OVERVIEW

This appendix describes the files required by the \*MTC Utility and the "Critical" files which make up the operating system. Procedures for handling critical files during BACKUP and RESTORE operations are explained.

### MTC FILES

The \*MTC Utility requires 37 program files and up to seven data files. This subsection gives a brief description of each of the data files and lists the program files.

#### TAPE LABEL CATALOG FILE, \*MTCTC

Each record in this file contains information for one tape label, including all volume sequences for that tape label. The file is configured to handle 50 tape labels (50 records) for a total size of 12 sectors. If the user needs to expand this file, one record should be added for each tape label to be added to the catalog.

#### TAPE FILES CATALOG FILE, \*MTCFC

Each tape volume sequence that is fully cataloged uses at least one record in this file. Each record can contain up to 23 files, and it is estimated that there is an average use of 18 files per record. For example, a tape with 50 files requires three records in the tape files catalog. Assuming an average of 100 files per tape volume sequence, the original Tape Files Catalog provides for 80 tapes, 5 records per tape (23 files per record), for a total of 400 records and 212 sectors.

#### PROCEDURE STEP FILE, \*MTCPC

Each record in this file contains one procedure step, with a maximum of 80 procedure steps requiring 23 sectors.

#### FILELIST FILE, \*MTCFL

Each record in this file contains a maximum of 30 file names. A maximum of 76 records (2280 file names) has been provided for, which requires 21 sectors.

#### TEMPORARY FILELIST FILE, -MTCFS

This file is created before a backup or restore operation. Its size is based on the number of files transferred, and it is estimated that 15 sectors are adequate for the average number of files transferred.

The file is erased at the end of backup and restore operations.

TEMPORARY FILELIST  
SORT FILE, -MTCFD

This file is used to sort files into -MTCFS. It is created only if all file names cannot be sorted in memory. Its size is dependent on the number of records involved. This file is erased at the end of the backup or restore operation.

TEMPORARY PROCEDURE  
EXECUTION FILE,  
-MTCFU

This file is used to save information that must be retrievable when a procedure is executed. It consists of one record 768 bytes long and it is erased when the procedure is completed.

MTC PROGRAM FILES

The MTC program files and their contents are as follows:

|        |                                      |
|--------|--------------------------------------|
| *MTC   | Main Menu                            |
| *MTCA1 | Reports Menu and Setup               |
| *MTCA2 | Second Overlay For Reports           |
| *MTCA3 | Find Tape Containing Specified Files |
| *MTCBA | Backup Setup                         |
| *MTCBB | Backup Setup Overlay                 |
| *MTCBD | Backup Overlay                       |
| *MTCBE | Backup Overlay                       |
| *MTCBF | Backup Overlay                       |
| *MTCBH | Backup Overlay                       |
| *MTCCA | Catalog Tape Module                  |
| *MTCD1 | Procedure Definition                 |
| *MTCD2 | Procedure Definition Overlay         |
| *MTCD3 | Procedure Definition Overlay         |
| *MTCEA | Tape Verification Module             |
| *MTCEB | Disc Verification Module             |
| *MTCEC | Decatalog Module                     |
| *MTCEX | Procedure Execution                  |
| *MTCHE | Help Messages                        |
| *MTCLP | List Procedures                      |
| *MTCM1 | Maintenance Menu                     |
| *MTCM2 | Maintenance Overlay                  |
| *MTCM3 | Label A Tape                         |
| *MTCRA | Restore Setup                        |
| *MTCRB | Restore Overlay                      |
| *MTCRC | Restore Overlay                      |
| *MTCRD | Restore From An Uncataloged Tape     |
| *MTCRE | Restore From A Cataloged Tape        |
| *MTCRF | Full Restore Module                  |
| *MTCRG | Full Restore Overlay                 |
| *MTCRJ | Filelist Setup                       |
| *MTCRK | Restore Overlay                      |
| *MTCRL | Selected Files As Restored           |

Originally configured as described above, the total contribution to overhead by the \*MTC Utility is 403 sectors. There is also a total of 41 file names.

## CRITICAL FILES

Certain files are designated as "critical files". These files are recorded in alphabetical order on track 0 of the tape and contain the operating system files, \*MTC Utility files and diagnostic files. Two overlapping subsets of critical files are recognized by the system and handled in a special way to avoid reloading a system tape that does not contain an operating system or the \*MTC Utility, or restoring an invalid (or out-of-date) operating system or \*MTC Utility. Either action could make it impossible to use the system, and a system recovery would be required to make the system operational.

For Level 4.2 systems and above, the special file "osCRIT" contains the names of all critical files. It is included in all BACKUP procedures whether the user specifies it or not and is used to denote the end of the critical file area on tape.

## REQUIRED FILES

The files listed below and the system loader must be contained on tape before a full restore is begun. The system scans the first track of the tape; if all the required files are not found, the restore procedure is aborted before the disc directory is erased. The configurator and the MTC backup programs transfer these files to tape first to minimize search time. Required files include:

### 1. operating system files:

OSBBII, OSMONR, BBIITC (not on systems 4.2 and above), \*SRCFL (latter on Systems 200/410 only), (>TC (MTC driver), (>MR (MTR driver),

### 2. \*MTC program files:

|         |        |        |
|---------|--------|--------|
| *MTC    | *MTCEX | *MTCRD |
| *MTC D1 | *MTCLP | *MTCRE |
| *MTC D2 | *MTCRA | *MTCRF |
| *MTCEA  | *MTCRB | *MTCRG |
| *MTCEB  | *MTCRC |        |

### 3. \*MTC data files:

\*MTCTC (tape label catalog file)  
\*MTCFC (tape files catalog file)  
\*MTCPC (procedure definition file)  
\*MTCFL (filelist file)

## EXEMPT FILES

Exempt files are the operating system files and the four \*MTC data files listed above. They are overwritten on disc during a restore operation only if they are explicitly specified during file selection or if they are contained in a specified filelist. If the file is contained in a specified range of files or if the user chooses to restore all files, exempt files are not restored. Appropriate warning messages are given to inform the operator of these actions.

## FILES NOT BACKED UP

The MTC temporary work files -MTCFS, -MTCFD, and -MTCFU are never backed up.

## ORDER OF BACKUP

During a full backup, files are backed up on tape in alphabetical order to guarantee that critical files are contained at the start of the tape: SYSTEM LOADER, (>TC, (>MR \*SRCFL (on Systems 200/410 only), BBIITC (not present on levels 4.2 and above), \*MTC program files, OSBBII, OSMNTC, and OSMONR. All other files follow in alphabetical order.

OVERVIEW

This section describes the layouts of the \*MTC utility files and tapes. The first subsection contains information on the \*MTC data files maintained on disc, \*MTCTC, \*MTCFC, \*MTCPC, \*MTCFL, -MTCFS, -MTCFD and -MTCFU. The second subsection describes the layouts of tape cartridges, reel-to-reel tapes, files on tape and data records.

\*MTC FILES

This subsection contains information on the layouts of the \*MTC utility data files.

TAPE LABEL CATALOG FILE, \*MTCTC

The \*MTC utility file \*MTCTC on disc is a direct file containing the tape label catalog. The file has the structure shown below:

Key

The key is composed of 16 bytes:

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u> |
|--------------|-------------------------------------------|
| 1-8          | Tape set name                             |
| 9-16         | Tape ID                                   |

Record

Each record is composed of 192 bytes with the following format:

Format

| <u>Bytes</u> | <u>Length</u> | <u>Contents</u>                                                                                        |
|--------------|---------------|--------------------------------------------------------------------------------------------------------|
| 1-96         | 96            | Tape label                                                                                             |
| 97           | 1             | Catalog type                                                                                           |
| 98           | 1             | Backup status                                                                                          |
| 99           | 1             | Verify status                                                                                          |
| 100          | 1             | Backup volume sequence count                                                                           |
| 101-102      | 2             | Number of files backed up                                                                              |
| 103-104      | 2             | Reserved                                                                                               |
| 105-192      | 88            | Tape serial numbers of each tape sequence except first tape. (\$FF\$ for each cartridge not cataloged) |

Contents

The contents of these fields are described on the following pages.

Tape Label. Bytes 1-96.

The tape label is ASCII data in a contiguous block with no field terminator. It appears on the tape at the first sequence after the loader (if there is one). On levels 4.2 and above the tape label has the following structure:

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                                  |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-6          | "VOL 00"                                                                                                                                                   |
| 7-14         | Tape set name                                                                                                                                              |
| 15-22        | Tape ID                                                                                                                                                    |
| 23-24        | Tape volume sequence number                                                                                                                                |
| 25-27        | Reserved                                                                                                                                                   |
| 28-36        | System serial number                                                                                                                                       |
| 37-42        | Date labeled (Format = MMDDYY)                                                                                                                             |
| 43-48        | Date last written (Format = MMDDYY)                                                                                                                        |
| 49-52        | Time last written (Format = HHMM)                                                                                                                          |
| 53           | Reserved                                                                                                                                                   |
| 54-57        | Disc numbers (byte 54 = number of disc named in bytes 58-63, byte 55 = number of disc named in bytes 64-69, etc.)                                          |
| 58-81        | Disc name (disc 0=bytes 58-63, disc 1=bytes 64-69, etc.)                                                                                                   |
| 82           | Procedure use restriction<br>L = This label must be specified by the procedure<br>S = This tape-set must be specified by the procedure<br>U = Unrestricted |
| 83           | Track count                                                                                                                                                |
| 84-88        | Reserved                                                                                                                                                   |
| 89-96        | Tape serial number                                                                                                                                         |

Catalog Type. Byte 97.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                |
|--------------|--------------------------------------------------------------------------------------------------------------------------|
| 97           | 2 = Label only, archive<br>3 = Label only, generation<br>4 = Label and files, archive<br>5 = Label and files, generation |

Backup Status. Byte 98.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                                                                                                                                                                                                                                                 |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 98           | 1 = This tape has not been backed up since it was cataloged.<br>2 = The last backup was successful.<br>3 = The last backup was not successful due to a tape error.<br>4 = The last backup was not successful due to a disc error.<br>5 = The operator terminated the backup before it was complete.<br>6 = The utility was shut down for unknown reasons during a backup. |

Verify Status. Byte 99.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                               |
|--------------|-----------------------------------------------------------------------------------------|
| 99           | 1 = No verification performed<br>2 = Verification successful<br>3 = Verification failed |

Backup Volume Sequence Count. Byte 100.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                       |
|--------------|---------------------------------------------------------------------------------|
| 100          | Contains the binary value of number of physical tapes used for the last backup. |

Number of Files Backed Up. Bytes 101-102.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>   |
|--------------|---------------------------------------------|
| 101-102      | The number of files contained on this tape. |

Tape Serial Numbers. Bytes 105-192.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                                       |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 105-192      | The serial numbers of each tape in the sequence (11 numbers @ 8 bytes each) except the first tape, whose serial number is found in the tape label, bytes 89-96. |

TAPE FILES CATALOG  
FILE, \*MTCFC

The file containing the catalog of files kept on tape, \*MTCFC, is also a direct file. It has the following structure:

Key

The key is composed of 18 bytes.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u> |
|--------------|-------------------------------------------|
| 1-8          | Tape set name                             |
| 9-16         | Tape ID                                   |
| 17           | Tape volume sequence number               |
| 18           | Index                                     |

Record

Each record in the file is composed of 512 bytes with the following structure:

| <u>Bytes</u> | <u>Length</u> | <u>Contents</u>                                                                             |
|--------------|---------------|---------------------------------------------------------------------------------------------|
| 1-8          | 8             | Tape set name                                                                               |
| 9-16         | 8             | Tape ID                                                                                     |
| 17           | 1             | Tape volume sequence number                                                                 |
| 18           | 1             | Index                                                                                       |
| 19           | 1             | Track number of first file                                                                  |
| 20           | 1             | Sequence number of first file                                                               |
| 21-29        | 9             | Reserved                                                                                    |
| 30-512       | 483           | FID of each file on tape plus 1 reserved byte following each FID (23 files @ 21 bytes each) |

PROCEDURE STEP FILE,  
\*MTCPC--BACKUP AND  
RESTORE

The \*MTCPC file is a direct file containing information on a procedure step. For BACKUP and RESTORE operations it has the following structure:

Key

The key is composed of 10 bytes:

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u> |
|--------------|-------------------------------------------|
| 1-9          | Procedure name                            |
| 10           | Step number (binary)                      |

Record

Each record consists of 256 bytes and has the following structure:

Format

| <u>Bytes</u> | <u>Length</u> | <u>Contents</u>                           |
|--------------|---------------|-------------------------------------------|
| 1            | 1             | Step type                                 |
| 2            | 1             | Last step complete (or 0 if all complete) |
| 3            | 1             | Reserved for status                       |
| 4            | 1             | Backup number selection (Restore only)    |
| 5-202        | 198           | File selection                            |
| 203-209      | 7             | Disc selection                            |
| 210-227      | 18            | Reserved                                  |
| 228-245      | 18            | Tape selection                            |
| 246          | 1             | Catalog option                            |
| 247          | 1             | File not found option                     |
| 248-255      | 8             | Backup or restore options                 |
| 256          | 1             | Reserved                                  |

Contents

The contents of each field is described below:

Step Type. Byte 1.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u> |
|--------------|-------------------------------------------|
| 1            | B = Backup<br>R = Restore                 |

Backup Number Selection. Byte 4.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                             |
|--------------|-----------------------------------------------------------------------------------------------------------------------|
| 4            | blank = selection not required in this procedure<br>\$00\$-\$FF\$ = number of backup to select for use in the RESTORE |

File Selection. Bytes 5-202 divided into 6 fields @ 33 bytes each. Each field has the following structure (byte locations are given only for the first field):

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5            | Transfer type<br>\$00\$ = Field not used<br>\$01\$ = Include all files<br>\$02\$ = Include filelist<br>\$03\$ = Exclude filelist<br>\$04\$ = Include range by location<br>\$05\$ = Exclude range by location<br>\$06\$ = Include range by name<br>\$07\$ = Exclude range by name<br>\$08\$ = Include selected files<br>\$09\$ = Exclude selected files<br>\$0A\$ = Selected files as restored<br>\$0B\$ = Full reload |
| 6            | File type (This option does not apply if byte 5 = \$02\$, \$03\$ or \$0A\$)<br>B = Both program and data files<br>D = Data files only<br>P = Program files only                                                                                                                                                                                                                                                       |
| 7            | Erase files option<br>E = Erase files after backup<br>blank = Do not erase                                                                                                                                                                                                                                                                                                                                            |
| 8-37         | If a filelist = First 8 bytes are file list name, remaining bytes are not used.<br>If a range = First 6 bytes are starting file name, second 6 bytes are ending file name, remaining bytes are not used.<br>If selected files = Up to 5 file names at 6 bytes each. Otherwise, the field is not used.                                                                                                                 |

Disc Selection. Bytes 203-209.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                |
|--------------|--------------------------------------------------------------------------|
| 203          | 1 = Ask operator<br>2 = Disc number specified<br>3 = Disc name specified |
| 204-209      | Disc number or name (if 2 or 3 in byte 203).                             |

Reserved. Bytes 210-227 are reserved for future multiple disc backups.

Tape Selection. Bytes 228-245.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                                                                                                                                                                                                                                                                                |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 228          | A = Any tape<br>L = Tape used for last procedure step<br>S = Specified tape-set<br>D = Specified tape-set, display generation<br>R = Specified tape-set, require generation<br>(least recent/backup, most recent/<br>restore)<br>T = Selected tape                                                                                                                                                       |
| 229          | R = Retension tape<br>O = Operator specifies retensioning<br>blank = Do not retension tape                                                                                                                                                                                                                                                                                                               |
| 230-245      | If byte 1 = A or L then these bytes are<br>not used.<br>If byte 1 = L and this step was aborted<br>then the tape name used in the previous<br>step is stored in this field.<br>If byte 1 = S, D, or R then the first 8<br>bytes are the tape-set name and the<br>remaining bytes are not used.<br>If byte 1 = T then the first 8 bytes are<br>the tape-set name and the next 8 bytes<br>are the tape ID. |

Cataloged Tape Use. Byte 246.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 246          | Backup minimum cataloging<br>1 = No cataloging required.<br>2 = Catalog label only as archive.<br>(Unlabeled tape to be labeled as<br>generation).<br>3 = Catalog label only as generation.<br>(Unlabeled tape to be labeled as<br>generation).<br>4 = Catalog label and files. (Unlabeled<br>tape to be labeled as archive).<br>5 = Catalog label and files. (Unlabeled<br>tape to be labeled as generation). |
| 246          | Restore catalog requirements<br>L = Require label cataloged tape<br>F = Require fully cataloged tape<br>blank = Tape need not be cataloged                                                                                                                                                                                                                                                                     |

File Not Found Option. Byte 247.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                         |
|--------------|-----------------------------------------------------------------------------------|
| 247          | A = Abort procedure<br>S = Skip file<br>O = Ask operator whether to abort or skip |

File Verification (BACKUP only). Byte 248.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                          |
|--------------|------------------------------------------------------------------------------------|
| 248          | V = Verify error-free transfer of files<br>blank = do not verify transfer of files |

File Precedence (RESTORE only). Byte 248.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                                             |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 248          | A = Abort procedure<br>S = Skip file<br>W = Write over existing file with file from tape<br>O = Ask operator whether to abort, skip file, or write over existing file |

Multiple Backup Selection (BACKUP only). Byte 249.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                             |
|--------------|---------------------------------------------------------------------------------------|
| 249          | 1 = Begin backup at start of tape<br>2 = Begin backup following the last file on tape |

File Placement (RESTORE only). Bytes 249-254.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                       |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 249          | F = Use location FID found on tape<br>blank = FID is not to be used                                                                             |
| 250-254      | Sector at which to begin looking for space if the FID option is not used or if the file cannot be written to the location specified by the FID. |

Insufficient Disc Space Handling (RESTORE only).

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                           |
|--------------|-------------------------------------------------------------------------------------|
| 255          | A = Abort the procedure<br>S = Skip the file<br>0 = Ask the operator for assistance |

PROCEDURE STEP FILE,  
\*MTCPC--CALL ANOTHER  
PROCEDURE

The \*MTCPC file for CALL operations is a direct file containing the following information:

Key

The key consists of 10 bytes:

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u> |
|--------------|-------------------------------------------|
| 1-9          | Procedure name                            |
| 10           | Step number                               |

Record

Each record is composed of 256 bytes with the following structure:

| <u>Bytes</u> | <u>Length</u> | <u>Contents</u>                            |
|--------------|---------------|--------------------------------------------|
| 1            | 1             | Step type (=P)                             |
| 2            | 1             | Last step completed (or 0 if all complete) |
| 3-4          | 2             | Reserved for status                        |
| 5-13         | 9             | Procedure name                             |
| 14-256       | 243           | Not used                                   |

PROCEDURE STEP FILE  
\*MTCPC--CATALOG OR  
DECATALOG A TAPE

The \*MTCPC file for CATALOG and DECATALOG operations is a direct file with the following structure:

Key

The key consists of 10 bytes:

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u> |
|--------------|-------------------------------------------|
| 1-9          | Procedure name                            |
| 10           | Step number (Binary)                      |

Record

Each record is composed of 256 bytes and contains the following information:

Format

| <u>Bytes</u> | <u>Length</u> | <u>Contents</u>                            |
|--------------|---------------|--------------------------------------------|
| 1            | 1             | Step type                                  |
| 2            | 1             | Last step completed (or 0 if all complete) |
| 3-4          | 2             | Reserved for status                        |
| 5-227        | 223           | Not used                                   |
| 228-245      | 18            | Tape selection                             |
| 246          | 1             | Catalog type                               |
| 247-256      | 10            | Reserved                                   |

Contents

The contents of each field are detailed below:

Step Type. Byte 1.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>  |
|--------------|--------------------------------------------|
| 1            | C = Catalog a tape<br>D = Decatalog a tape |

Tape Selection. Bytes 228-245.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                                                                                                                                            |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 228          | A = Any tape<br>L = Tape used for last procedure step<br>S = Specified tape-set<br>D = Specified tape-set, display generation<br>R = Specified tape-set, require generation (least recent/backup, most recent/restore)<br>T = Selected tape          |
| 229          | R = Retension tape<br>blank = Do not retension tape<br>O = Operator specifies retensioning                                                                                                                                                           |
| 230-245      | If byte 228 = A or L these bytes are not used.<br>If byte 228 = S, D or R, the first 8 bytes are the tape-set name, the remaining bytes are not used.<br>If byte 228 = T, the first 8 bytes are the tape-set name, the next 8 bytes are the tape ID. |

Catalog type. Byte 246.

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u>                                                                                |
|--------------|--------------------------------------------------------------------------------------------------------------------------|
| 246          | 2 = Label only, archive<br>3 = Label only, generation<br>4 = Label and files, archive<br>5 = Label and files, generation |

FILELIST FILE,  
\*MTCFL

The filelist file \*MTCFL is a permanent file containing all defined filelists used by \*MTC or the level 4.2 utility set. When the OPERATOR SPECIFIES FILES option is chosen a temporary record is written to \*MTCFL. This record is given the name "tempTn"+\$00\$ (where Tn represents the number of the task). Once the list of files is prepared, the process continues as if the procedure had requested the filelist "tempTn"+\$00\$. The filelist file, \*MTCFL, is a direct file with the following structure:

Key

The key consists of 9 bytes:

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u> |
|--------------|-------------------------------------------|
| 1-8          | Filelist name                             |
| 9            | Index (Binary)                            |

Record

Each record consists of 128 bytes with the following structure:

| <u>Bytes</u> | <u>Length</u> | <u>Contents</u>                      |
|--------------|---------------|--------------------------------------|
| 1-2          | 2             | Number of critical files (Binary)    |
| 3-4          | 2             | Total number of files (Binary)       |
| 5-8          | 4             | Reserved                             |
| 9-128        | 120           | File names (20 files @ 6 bytes each) |

TEMPORARY FILELIST FILES, -MTCFS AND -MTCFD

These files are created at the time of a BACKUP or RESTORE operation, using the lists of files to be included and excluded. They are erased when the BACKUP or RESTORE process is complete.

Backup Files

The BACKUP operation may use both temporary files, -MTCFS and -MTCFD.

-MTCFS

-MTCFS is an indexed file containing the names of files to be backed up that were sorted in memory. Each record consists of 7 bytes with the following structure:

| <u>Bytes</u> | <u>Length</u> | <u>Contents</u>         |
|--------------|---------------|-------------------------|
| 1-6          | 6             | File name               |
| 7            | 1             | Erase flag (E or blank) |

-MTCFD

-MTCFD is a direct file used to sort files into -MTCFS. The file is created only if all file names cannot be sorted in memory.

The key consists of 6 bytes with the following structure:

| <u>Bytes</u> | <u>Possible Values and Their Meanings</u> |
|--------------|-------------------------------------------|
| 1-6          | File name                                 |

The record consists of 7 bytes with the same structure as the -MTCFS file.

### Restore Files

The RESTORE operation uses only the temporary file -MTCFS. It is created when files are included during file selection for a RESTORE operation and is erased when the RESTORE operation is completed. The -MTCFS file for RESTORE operations is an indexed file composed of 24 bytes with the following structure:

| <u>Bytes</u> | <u>Length</u> | <u>Contents</u>             |
|--------------|---------------|-----------------------------|
| 1-20         | 20            | FID                         |
| 21           | 1             | Tape volume sequence number |
| 22           | 1             | Track number                |
| 23-24        | 2             | File sequence number        |

PROCEDURE EXECUTION,  
-MTCFU

The file -MTCFU is an indexed file used to save information that must be retrievable during procedure execution. It is erased when the procedure is complete. The record consists of 768 bytes.

TAPE LAYOUTS

This subsection describes the layouts of tape cartridges and reel-to-reel tapes and of the files on tape as well as the physical dimensions and format of data records on tape.

LAYOUTS

Files are stored on tape in 4K records. Figure C-1 shows the physical layout of files on a tape cartridge, while Figure C-2 shows the layout of files on reel-to-reel magnetic tape. Following these figures is an explanation of the layouts.

| TRACK | LOAD POINT |        |             |             |             |     |             |            |             |             |             | PHYSICAL END OF TAPE |  |
|-------|------------|--------|-------------|-------------|-------------|-----|-------------|------------|-------------|-------------|-------------|----------------------|--|
|       | ↓          |        |             |             |             |     |             |            |             |             |             | ↓                    |  |
| 0     | (1)        | (2)    | E<br>O<br>F | (3)         | E<br>O<br>F | (4) | E<br>O<br>F | FILE A     | E<br>O<br>F | FILE B      | E<br>O<br>F | E<br>O<br>F          |  |
| 1     |            | FILE C |             | E<br>O<br>F | FILE D      |     | E<br>O<br>F | FILE E (5) |             | E<br>O<br>F | E<br>O<br>F | **<br>(SEE<br>NOTE)  |  |
| 2     |            | FILE E |             | E<br>O<br>F | FILE F      |     | E<br>O<br>F | (6)        | E<br>O<br>F | E<br>O<br>F |             |                      |  |
| 3     |            | (6)    | E<br>O<br>F | E<br>O<br>F |             |     |             |            |             |             |             |                      |  |

Figure C-1. Tape Cartridge Layout

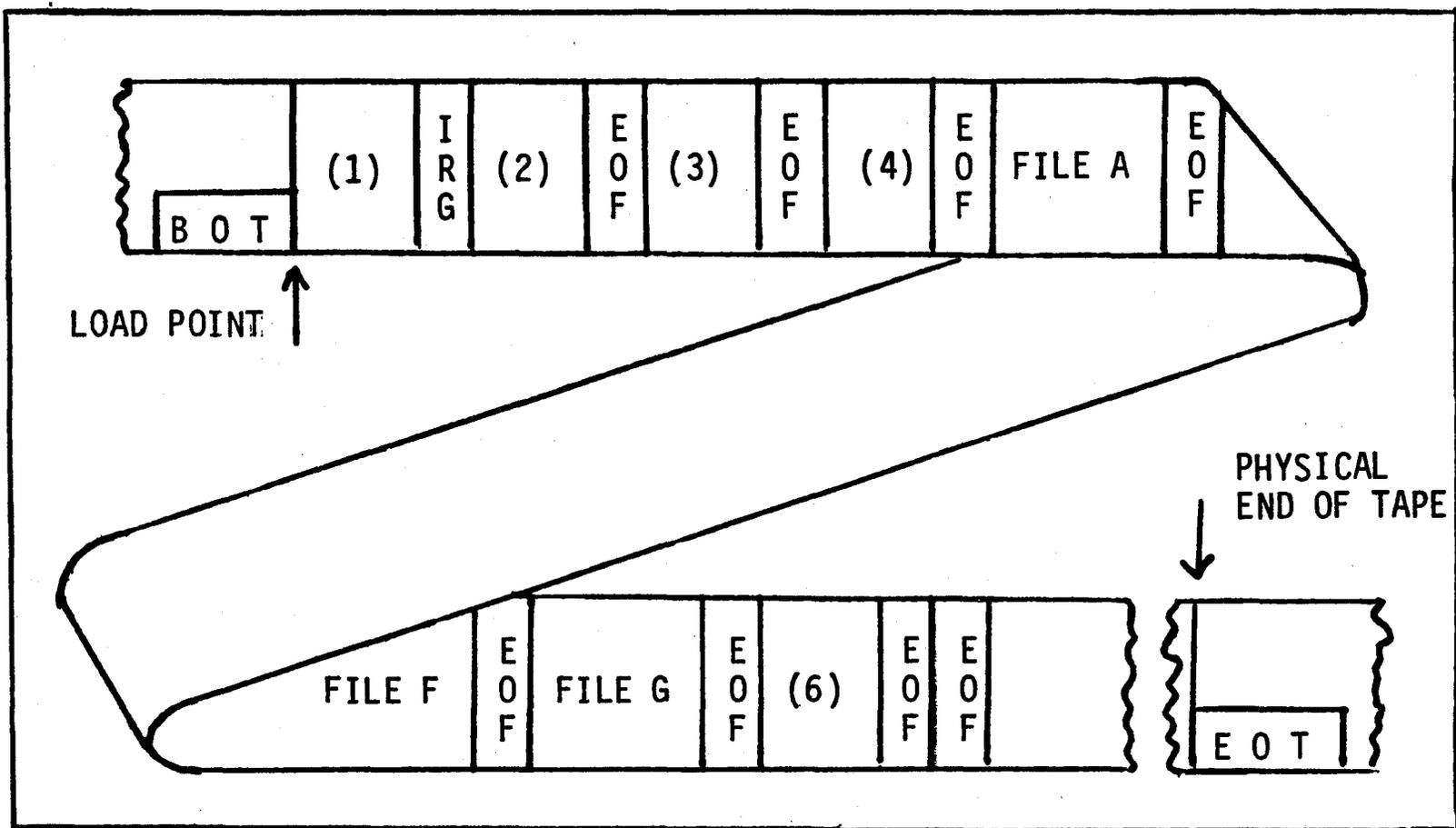


Figure C-2. Reel-to-reel Tape Layout.

Where:

- EOF: End of file mark (also known as "Tape mark" or "File mark")
- IRG: Inter-record GAP
- (1): Initial Program Load (IPL) record - only on system tapes. On tape cartridges, the IPL and the loader are separate files; on reel-to-reel tapes they are the same file.
- (2): The loader file - 5K bytes, if present
- (3): Tape label - 96 bytes, always present
- (4): Disc header - Sector 1 on backup disc present only on volume sequence 1. \*MTC reads only the first 256 bytes of every sector 1 of each disc backed up.
- (5): File E (tape cartridge layout) crosses track boundaries. See "Tape File Layout" below for interfile formats.
- (6): End of Information (EOI) file - written after the last record of the last file on the tape and at the beginning of each unused track.

There are two EOF's after the last file on each track of the tape, denoting the logical end of tape. Note also that IRG's separate each record written on tape. That is, after each record is written, there is an IRG. Thus, there is an IRG before each EOF.

NOTE

If the physical end of tape is detected during a WRITE, the record in process is written in its entirety. All WRITERECORDS begun after the physical EOT cause an ERROR=72, although data is processed in its entirety. The logical EOT is written when a CLOSE is issued.

In the event that a file on a tape cartridge crosses track boundaries (as File E in Figure C-2), the layout of individual files changes. Figure C-3 shows the specific case of File E on the tape cartridge, and also shows the contents of each file on either cartridge or reel.

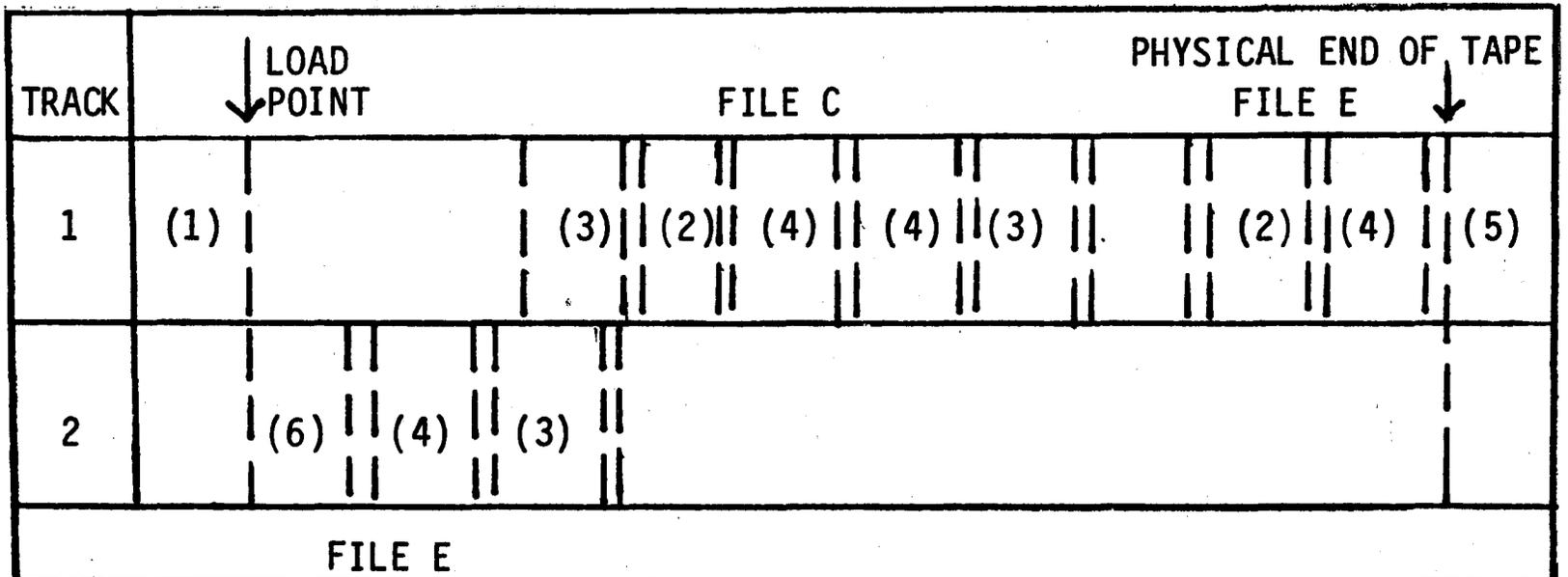


Figure C-3. Tape File Layout (Tape Cartridge Example Shown)

Where:

- EOF: End of file mark (also known as "Tape Mark" or "File Mark").
- IRG: Inter-record gap
- (1): Initial Program Load (IPL) record - only on system tapes
- (2): File identification (FID) record - 20 bytes as follows:

| <u>Byte</u> | <u>Contents</u> |
|-------------|-----------------|
| 1-3         | Starting Sector |
| 4-9         | File Name       |

- |       |                                          |
|-------|------------------------------------------|
| 10    | File Type (in bits 0-3)                  |
|       | \$00\$ = INDEXED file                    |
|       | \$01\$ = SERIAL file                     |
|       | \$02\$ = DIRECT or SORT file             |
|       | \$04\$ = PROGRAM file                    |
|       | \$08\$ = unsorted DIRECT or SORT<br>file |
|       | \$0A\$ = DIRECTORY file                  |
| 11    | Key size plus pointers                   |
| 12-14 | Number of records                        |
| 15-16 | Number of bytes per record               |
| 17-19 | Ending sector +1                         |
| 20    | Disc number                              |
- (3): End of File mark.
- (4): Data blocks, as copied from disc. These are in 4096-byte blocks.
- (5): End of Tape record.
- (6): File continuation record - 21 bytes containing the 20-byte FID of the file continued from the previous track, plus a 1-byte continuation flag.

#### PHYSICAL DIMENSIONS

The following dimensions are approximations to aid in estimating the length of files when they are stored on tape reels.

IRG = .6 inch

$$4KB = \frac{4096 \text{ Bytes}}{1600 \text{ Bytes/Inch}} = 2.56 \text{ inch} + .6 \text{ IRG}$$

$$= 3.16 \text{ inch}$$

## APPENDIX D - PROGRAMMING MAGNETIC TAPE DEVICES

### OVERVIEW

This section describes how to program the Basic Four reel-to-reel magnetic tape drive or magnetic tape cartridge. The information in this Appendix includes software requirements for the \*MTC Utility, how to program magnetic tape devices, error codes and their meanings and standard tape layouts and formats.

### SOFTWARE REQUIREMENTS

The memory requirements of the \*MTC Utility are as follows:

#### BANK 0 Magnetic Tape Charges:

2 pages for "Dynamic Loader"  
1 page for each MTC or MTR configured

#### User Area Charges:

8 pages for driver

#### NOTE

In addition to the memory required for the \*MTC Utility, eight (8) pages of memory are required to access the driver.

The "Dynamic Loader" is a program resident in Bank 0. When a tape drive is OPENed, the Dynamic Loader loads the driver into user memory.

### PROGRAMMING CAPABILITIES

The \*MTC Utility can be programmed by users to provide solutions to problems requiring reel-to-reel tape or magnetic tape cartridges.

### CAPABILITIES

Operational capabilities of the \*MTC Utility include:

1. Selecting a tape unit and positioning the tape to a given file.
2. Reading the next sequential record in a file.
3. Positioning to, and reading, a given record in a file.
4. Writing the next sequential record to a file.

5. Releasing a tape unit and rewinding the tape or placing the unit in an off-line status. (In off-line status, a tape unit is not accessible by a user program. Operator intervention is required to make the unit accessible.)

## OPERATING SYSTEM DIRECTIVES

The following operating system directives are available to control the drive:

1. OPEN
2. CLOSE
3. WRITERECORD
4. READRECORD

If any other input/output directive is used or if an invalid option is specified for these directives, an ERROR=17 occurs.

Note that the first or only tape drive on a system has the device name "R0" or "C0" depending on whether it is a reel-to-reel drive or a cartridge drive. The second reel-to-reel drive is named "R1". Note also that tape files are handled as INDEXED files in the read mode and as SERIAL files in the write mode.

The following paragraphs describe how the operating system directives can be used by an application program to read and write data using the magnetic tape unit.

### OPEN Directive

The OPEN directive assigns a tape unit to a user and can be used to position the tape on that unit to a given file. This directive causes the driver to be loaded into eight (8) pages of user memory. The I/O option "SEQ=" is used as a file index to designate the file to which the tape is to be positioned. File indexing is relative to the beginning of tape (BOT) marker on tape and begins at zero.

Therefore,

1. If "SEQ=" has a value of zero, the tape is rewound to the load point.
2. If "SEQ=" is not specified and the tape is not located at the first record of the current file, the tape is positioned to the next sequential file and this file is opened.

3. If "SEQ=" is not specified and the tape is located at the first record on the current file, the current file is opened.
4. The logical end of tape (EOT) is denoted by an error returned during an attempt to READ or WRITE beyond the physical end of tape. Either an ERROR=72 or an ERROR=2 occurs.
  - a) During the WRITE process, an ERROR=72 is returned when a successful WRITE occurs past the physical EOT, and an attempt is made to OPEN the next file.
  - b) During the READ process, if you have successfully OPENed a file at the logical EOT, an ERROR=2 occurs when an attempt is made to READ the first record of the file. An ERROR=72 is returned if you cannot OPEN the file.

The format of the OPEN directive is as follows:

```
Stno OPEN (N,ERR=Z,TRK=T,SEQ=X) U$
```

Where:

```
Stno = Statement number (optional)
N = Device number (1-8)
T = Track number to access (cartridge only)
Z = Error return statement number (optional)
X = Index number of file to be positioned to
 (maximum is 32,767). If X is zero, rewind
 the tape (optional)
U$ = Name of magnetic tape unit ("R0", "C0",
 "R1", "C1", etc.)
```

#### NOTE

The driver file ">MR" or ">TC" must exist on the disc to allow access to the tape unit. If the driver file is not present, an ERROR=12 occurs.

To append a file to a tape, do the following:

1. Issue an OPEN directive using a value for "SEQ=" that is larger than the number of files already on the tape. The tape will be positioned so that the read/write head is between the two file marks that constitute logical EOT. Also, an END-OF-FILE error (ERROR=02) is returned to the user.

2. Issue a second OPEN directive without specifying a value for "SEQ=" (for example, STNO OPEN (N) "U"). The specified tape is now opened and ready for writing.

### CLOSE Directive

The CLOSE directive releases a tape unit previously assigned to a user via the OPEN directive. It can also rewind the tape and place the tape unit in an off-line status. The I/O option "IND=" is used to indicate the type of rewind. If "IND=" is not specified, the tape is not rewound.

A file mark is written on tape before the tape unit is released, if the directive given before the CLOSE was a WRITERECORD. If no rewind option is specified, the tape is positioned between the two file marks written when the CLOSE is completed.

The format of the CLOSE directive is as follows:

```
Stno CLOSE (N,ERR=Z,IND=Y)
```

Where:

Stno = Statement number (optional)

N = Device number (1-7)

Z = Error return statement number (optional)

Y = Rewind option

0 = Retension/rewind to load point (MTC only)

1 = Rewind to load point; take unit off-line

2 = Rewind to load point

9 = Write double file marks; do not reposition tape.

Any other value results in an ERROR=17.

WRITERECORD  
Directive

The WRITERECORD directive transfers data from a user-specified string area to tape. Before issuing WRITERECORD, the user can define the size of the tape record. To define the size, use the DIM statement rather than the "BLK=" option; otherwise, an error is returned (ERR=20). The data is always written to the next sequential record location on magnetic tape and no pre-positioning of tape is permitted.

After WRITE operations have been performed on a file, READ operations may not be performed without first closing and reopening that file. Any attempt to perform a READ after a WRITE operation without going through the close/reopen procedure results in an ERROR=14.

The format of the WRITERECORD directive is as follows:

Stno WRITERECORD (N,ERR=Z,TBL=Q,RTY=R)A\$

Where:

Stno = Statement number (optional)  
N = Device number (1-7)  
Z = Error return statement number (optional)  
Q = Statement number of translation table (optional)  
R = Number of times to retry a WRITE before reporting the error (default is 15)  
A\$ = Name of user string to be transferred to tape (maximum size of string is 32K bytes)

NOTE

Writing beyond the EOT marker is allowed. Each successful write, however, results in an EOT error (ERROR=72) to warn the user.

If the "TBL=" option is used with a WRITERECORD, the original output string data is overlaid by the results of the table conversion. See the Reference Manual for Business BASIC Levels 3 and 4, BFISD 5085, for more information on the TBL= option.

READRECORD  
Directive

The READRECORD directive transfers data from a record in a given file to a user-specified string area. The I/O option "IND=" may be used, as a record index, to position the tape to a given record in a file before reading. Record indexing is relative to a given file mark or BOT marker for the first file on tape, and begins with an index value of zero. Before issuing a READRECORD directive, the user must define the size of the string variable that will hold the tape record to at least the size of the record to be read. To define size, use the DIM statement rather than the "BLK=" option; otherwise, an ERROR=20 occurs. If the string variable is not defined or is not large enough, an error is returned to the user when the READRECORD is issued.

READ operations that detect a difference between the size of a tape record and the specified string area are handled as follows:

1. If the tape record is smaller than the string size, then all tape data are transferred to the string area and the current size of the string is set to the tape record size. If the user is expecting tape records larger than the one just read, a "DIM" statement containing the expected size should be issued before the next READRECORD.
2. If the tape record is larger than the string size, then only data up to the string size are transferred to the string area. In addition, an ERROR=01 occurs.

When a file mark is read on tape (END-OF-FILE), the tape is positioned to the BOT side of that file mark, prohibiting the tape from moving beyond the opened file, and an END-OF-FILE error occurs (ERROR=02).

The format of the READRECORD directive is as follows:

```
Stno READRECORD (N,ERR=Z,END=S,IND=Y,TBL=Q,
RTY=R)A$
```

Where:

Stno = Statement number (optional)  
N = Device number (1-7)  
Z = Error return statement number (optional)

- S = END-OF-FILE return statement number (optional) (The "END=" option has priority over the "ERR=" option).
- Y = Index number of record to position to and read (optional - maximum is 32,767)
- Q = Statement number of translation table (optional)
- R = Number of times to retry a read operation before reporting the error (default is 15). Three rereads and a tape cleaner action (backspace 5 records, then forward space 4 records) are done for each retry value specified.
- A\$ = Name of user string area to be filled from tape (maximum size of string is 32K bytes).

#### NOTE

Reading a record that has been written beyond the EOT marker is permitted. No indication that the tape is beyond the EOT, however, is given. If the "TBL=" option is used with a READRECORD, the original data input from the tape is overlaid by the results of the table conversion.

Summary

Table D-1 summarizes the options available with the preceding directives.

Table D-1. Input/Output Options for Directives

| OPTIONS | DIRECTIVES |       |            |             |
|---------|------------|-------|------------|-------------|
|         | OPEN       | CLOSE | READRECORD | WRITERECORD |
| ERR=    | YES        | YES   | YES        | YES         |
| SEQ=    | YES        | NO    | NO         | NO          |
| IND=    | NO         | YES   | YES        | NO          |
| END=    | NO         | NO    | YES        | YES*        |
| IOL=    | NO         | NO    | NO         | NO          |
| KEY=    | NO         | NO    | NO         | NO          |
| SIZ=    | NO         | NO    | NO         | NO          |
| BLK=    | NO         | NO    | NO         | NO          |
| ISZ=    | NO         | NO    | NO         | NO          |
| TBL=    | NO         | NO    | YES        | YES         |
| DOM=    | NO         | NO    | NO         | NO          |
| *RTY=   | NO         | NO    | YES        | YES         |
| TRK=    | YES**      | NO    | NO         | NO          |

\*RTY=: If not specified, the default value is 15.  
YES\*: Accepted but ignored.  
YES\*\*: Required on MTC, accepted but ignored on MTR.

## ERROR CODES

Errors arising from the magnetic tape I/O directives cause the system variable "ERR" to be set to one of the error codes listed below. Information for other error codes is available in the Reference Manual for Business Basic Levels 3 and 4 BFISD 5085.

ERROR 0 = Device not ready, off-line, or busy.

ERROR 1 = End of Record: Record read from tape was larger than specified string area.

ERROR 2 = End of File: File mark read on tape. (The tape head is positioned at the BOT side of the file mark read).

\*ERROR 5 = Device Handler Error: Unable to recover from a read or write error, or a device timeout error has occurred.

ERROR 13 = File/Device Access: Attempted to write to a tape that has no write ring, or specified an I/O option which is illegal.

ERROR 14 = File/Device Usage: Issued an illegal I/O directive for this device.

ERROR 17 = Invalid Parameter: Specified an I/O option with an illegal value, or specified an undefined string variable.

ERROR 20 = Syntax Error: In addition to the normal syntax errors, an Error 20 results if a "SEQ=" option is specified with a READRECORD, WRITERECORD, or CLOSE directive, or if an "IND=" option is specified with an OPEN directive.

ERROR 72 = End of Tape: An attempt was made to position, read, or write past the EOT mark.

\* If an irrecoverable error occurs, all further tape directives except CLOSE are rejected. In addition, when the CLOSE directive is issued with the IND= option, the tape is automatically rewound. If the irrecoverable error occurs on a WRITERECORD, an ERROR=5 occurs on the CLOSE that follows, indicating that no file marks were written.

Information on the status of the tape for MTR only is included in the ERROR=0 and ERROR=5 messages as follows:

!ERROR = 0 STS = X<sub>1</sub> X<sub>2</sub> Y<sub>1</sub> Y<sub>2</sub>  
 or  
 !ERROR = 5 STS = X<sub>1</sub> X<sub>2</sub> Y<sub>1</sub> Y<sub>2</sub>

Where X<sub>1</sub>X<sub>2</sub> = Main Status in Hex  
 and Y<sub>1</sub>Y<sub>2</sub> = Alternate Status in Hex

Table D-2. Main and Alternate Status Codes.

|                | MAIN STATUS                |  | ALTERNATE STATUS                     |
|----------------|----------------------------|--|--------------------------------------|
|                | Bit 7 - Controller Busy    |  | Bit 7 - Unit Ready                   |
| X <sub>1</sub> | Bit 6 - Tape Rewinding     |  | Bit 6 - Selected Unit Y <sub>1</sub> |
|                | Bit 5 - File Mark Read     |  | Bit 5 - No Write Ring                |
|                | Bit 4 - End of Tape        |  | Bit 4 - Unit Not On-Line             |
|                | Bit 3 - Beginning of Tape  |  | Bit 3 - Test Mode                    |
| X <sub>2</sub> | Bit 2 - CRC Check Error    |  | Bit 2 - Soft Error Y <sub>2</sub>    |
|                | Bit 1 - Command Rejected   |  | Bit 1 - DMA Count Error              |
|                | Bit 0 - Abnormal Condition |  | Bit 0 - Rate Error                   |

Example 1. !ERROR = 0 STS = 0830

ERROR=0 means that the device is busy or not ready. The main status code "08" has bit 3 on ("beginning of tape"). The alternate status code "30" has bits 4 and 5 on ("unit not on-line" and "no write ring").

Example 2. !ERROR = 5 STS = FFFF

ERROR=5 and the Status code "FFFF" mean that the device has a timeout error.

## TAPE LAYOUTS AND FORMATS

This subsection describes the layouts and formats of the magnetic tape and its labels. Tables are provided showing the ANSI standard label format.

### INDUSTRY COMPATIBILITY

Most tape drives marketed by computer manufacturers, including BFISD, offer "industry compatibility". This is an attempt to provide a way to write tapes that can be read by systems manufactured by other vendors. "Industry compatibility" implies physical and format compatibility and standardized tape labels defining the content of each tape.

Writing tapes that adhere to these standards, however, does not guarantee that tapes can be read on a non-Basic Four system. Furthermore, the \*MTC Utilities provided with Basic Four systems do not contain any label structure. Therefore, BFISD uses the tape layout for "unlabeled" tapes.

### CAUTION

Be sure you know what "standard" will be reading your tapes before you create them!

### STANDARD MAGNETIC TAPE LAYOUTS

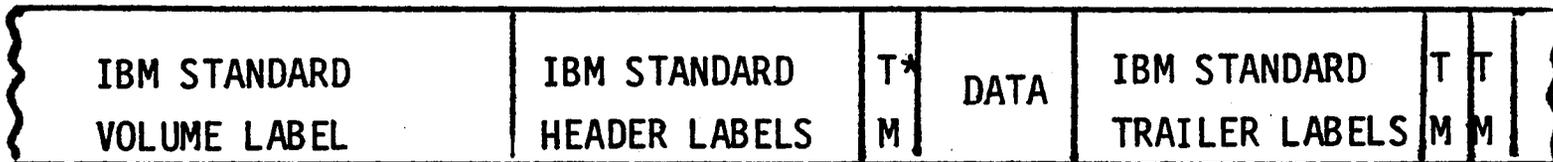
Magnetic tape layouts are described as "labeled" or "unlabeled". Labels identify individual tape reels as "volumes" and the data on the reel as "data sets". Labels that precede data are "header labels". Labels that follow data are "trailer labels".

The four common magnetic tape layouts are:

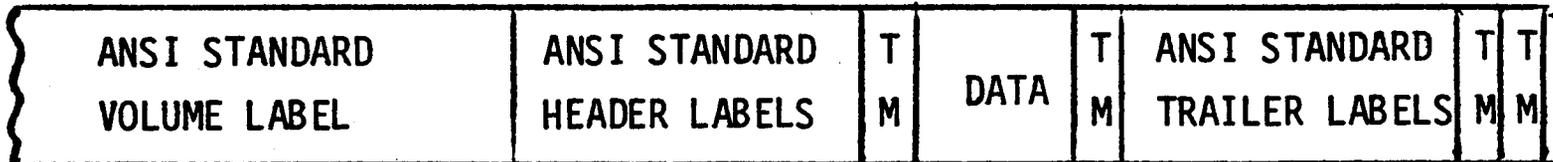
1. IBM Standard Labels
2. ANSI Standard Labels
3. Non-Standard Labels
4. Unlabeled

Figure D-1 illustrates the four common magnetic tape layouts.

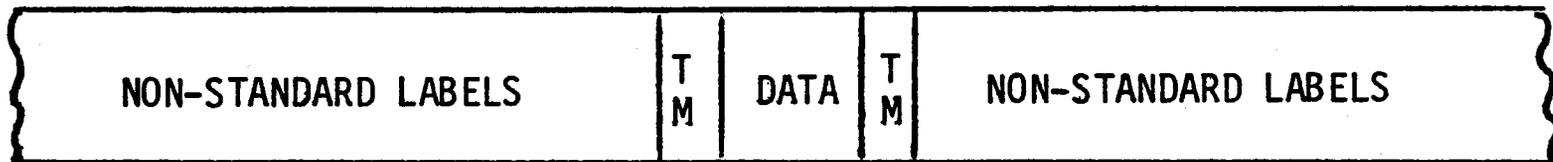
1. IBM STANDARD LABELS



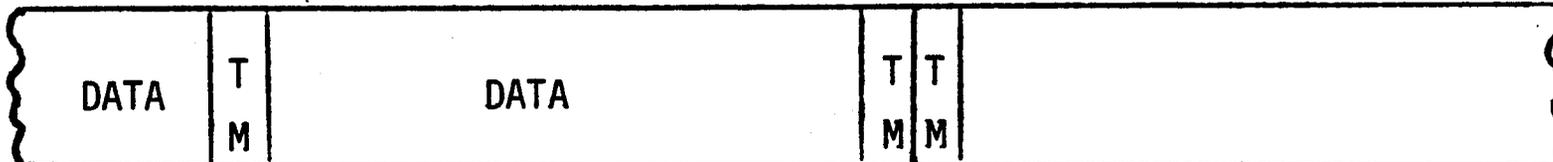
2. ANSI STANDARD LABELS\*\*



3. NON-STANDARD LABELS



4. UNLABELED TAPE



\* = TAPE MARK

\*\* = ANSI-LABELED TAPES ARE CODED IN ASCII; IBM TAPES ARE CODED EITHER IN EBCDIC OR BCD.

Figure D-1. Standard Magnetic Tape Layouts.

ANSI LABEL  
SPECIFICATIONS

Only the ANSI tape label standard is described here. All ANSI labels are 80 bytes long. Each label type can be identified by its first three characters.

VOL - Volume: which reel is being used

HDR - Header: file information at the beginning of the file

EOF - End of file: file information at the end of the file

The fourth character of each label defines the sequence of the label within its group. For example, the first and second header labels are HDR1 and HDR2. Tables D-3 through D-7 below describe the contents of the various labels.

Table D-3. Volume Label Format

| CHARACTER POSITION | FIELD NAME             | CONTENTS                                                   |
|--------------------|------------------------|------------------------------------------------------------|
| 1 - 3              | Label Identifier       | VOL                                                        |
| 4                  | Label Number           | 1                                                          |
| 5 - 10             | Volume Identifier      | Volume label: 1 to 6 alphanumeric characters, blank padded |
| 11                 | Accessibility          | A space means no restrictions                              |
| 12 - 37            | Reserved               | Spaces                                                     |
| 38 - 51            | Owner Identifier       | Contents are used for volume protection                    |
| 52 - 79            | Reserved               | Spaces                                                     |
| 80                 | Label Standard Version | 1                                                          |

Table D-4. Header 1 (HDR1) Label Format

| CHARACTER POSITION | FIELD NAME                                                    | CONTENTS                                                                    |
|--------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1 - 3              | Label Identifier                                              | HDR                                                                         |
| 4                  | Label Number                                                  | 1                                                                           |
| 5 - 21             | File Identifier                                               | Any alphanumeric or special character in the ASCII code table, blank filled |
| 22 - 27            | File Set Identifier (volume identifier field from VOL1 label) | Volume ID of first volume in the volume set                                 |
| 28 - 31            | File Section Number                                           | Numeric characters, starting at 0001                                        |
| 32 - 35            | File Sequence Number                                          | File number within volume set for this file. Starts at 0001                 |
| 36 - 39            | Generation Number                                             | Numeric characters, starting at 0001                                        |
| 40 - 41            | Generation Version                                            | Numeric characters 00                                                       |
| 42 - 47            | Creation Date                                                 | (space) YYDDD if today's date or (space) 00000 if no date                   |
| 48 - 53            | Expiration Date                                               | (space) YYDDD for date or (space) 00000 if expired                          |
| 54                 | Accessibility                                                 | Space                                                                       |
| 55 - 60            | Block Count                                                   | 000000                                                                      |
| 61 - 73            | System Code                                                   | Name of system which produced the volume, padded by spaces                  |
| 74 - 80            | Reserved                                                      | Spaces                                                                      |

Table D-5. Header 2 (HDR2) Label Format

| CHARACTER POSITION | FIELD NAME       | CONTENTS                                                                                                                                                                                                                                                        |
|--------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 - 3              | Label Identifier | HDR                                                                                                                                                                                                                                                             |
| 4                  | Label Number     | 2                                                                                                                                                                                                                                                               |
| 5                  | Record Format    | F = Fixed<br>D = Variable<br>S = Spanned (unsupported)<br>U = Undefined (default)                                                                                                                                                                               |
| 6 - 10             | Block Length     | Numeric Characters (512 is default)                                                                                                                                                                                                                             |
| 11 - 15            | Record Length    | Numeric Characters                                                                                                                                                                                                                                              |
| 16 - 50            | System Dependent | 16 - 36: Spaces<br>37: A = first byte of record contains FORTRAN control character<br>Space = LF character precedes and CR character follows each record<br>M = record contains all form control information. This is the default condition.<br>38 - 50: Spaces |
| 51 - 52            | Buffer Offset    | Numeric Characters                                                                                                                                                                                                                                              |
| 53 - 80            | Reserved         | Spaces                                                                                                                                                                                                                                                          |

The End-of-File record (EOF1) is identical to the HDR1 label (Table D-4) except for the positions shown in Table D-6.

Table D-6. End-of-file (EOF1) Record Format

| CHARACTER POSITION | FIELD NAME       | CONTENTS                                               |
|--------------------|------------------|--------------------------------------------------------|
| 1 - 3              | Label Identifier | EOF                                                    |
| 55 - 60            | Block Count      | File Size in blocks of 512 bytes or as defined in HDR2 |

The End-of-File record (EOF2) is identical to the HDR2 label (Table D-5) except as shown in Table D-7.

Table D-7. End-of-file (EOF2) Record Format

| CHARACTER<br>POSITION | FIELD NAME       | CONTENTS |
|-----------------------|------------------|----------|
| 1 - 3                 | Label Identifier | EOF      |

DEFINITIONS  
OF TERMS

The following terms appear frequently in this manual and are defined as follows:

Archive Tape - A cataloged tape not designated as a generation tape. The system does not distinguish archive tapes by date of the last backup.

Backup - To copy files from disc to tape. A full backup copies all files from disc, including critical files, to tape. A selective backup allows the operator to specify which files are to be backed up.

BBIITC - The alternate operating system supporting the magnetic tape cartridge driver, for systems without on-line \*MTC. This system does not exist on levels 4.2 and later.

Cartridge Certification - The process by which BFISD maintains the quality of its tape cartridges. This process writes a certification code on a secure area of the tape. Only certified tapes may be used on Basic Four computer systems.

Catalog - See Tape Catalog.

Critical Files - Files required for normal system operations, containing the operating system and the \*MTC Utility programs. They are handled in a special manner to avoid reloading a system tape that does not have an operating system or \*MTC Utility (or reloading an out-of-date operating system or \*MTC Utility). See APPENDIX B for detailed information on critical and \*MTC files.

Decatalog - See Tape Catalog.

Disc Overhead - Areas of disc occupied by Basic Four-supplied utilities and system files.

Filelist - A list of files, stored within the \*MTCFL file, used to specify the files a procedure backs up or restores.

Generation Tape - A set of cataloged tapes with a common tape-set name but unique tape IDs. They are used to provide multiple backups for a group of files. If a tape is designated as a generation tape during labeling, a flag is set in the tape catalog indicating this status. The least recently recorded tape may be automatically selected for backups, and the most recently recorded tapes for restores.

Generation tape sets allow the user to maintain backups recorded at different times so that several versions of files exist on tape.

MTC - Abbreviation for Magnetic Tape Cartridge, used for storing data and program files.

MTR - Abbreviation for Magnetic Tape Reel, used for storing data and program files. Applies only to the 1600 BPI model.

\*MTC Utility - A set of programs for copying files from disc onto magnetic tape cartridges or reels and restoring them from tape onto disc. Systems with enough memory to have these programs incorporated in the standard operating system are said to have "on-line" \*MTC. Systems which do not have "on-line" \*MTC must use an alternate load procedure to execute the \*MTC Utility. When the utility is invoked in this fashion, other users may not be on the system.

Procedure - A collection of steps executed sequentially. Each step performs one operation: a backup, restore, catalog, decatalog, or call.

Recovery - A restore procedure that uses the most recently recorded set of generation tapes. See also System Recovery.

Restore - To copy files from tape to disc. A "full restore" transfers from tape to disc a complete operating system and its utilities, along with user programs and data files. Because a full restore writes over all existing programs and files on the disc, the process should be performed only during recovery, or when creating a new or upgraded user disc.

Retensioning - The process of winding or rewinding a tape cartridge to adjust the tension of the tape. Improper tensioning can cause tape errors.

Scratch Tape - Tapes labeled "Scratch" cannot be cataloged. Scratch tapes can be used only in procedures which do not require a particular tape or do not specify selected files to be restored. Scratch tapes are used for general purposes, such as continuation volumes of multi-sequence backup tapes. The backup operation automatically relabels scratch tapes with an appropriate tape label.

System Recovery - The process of installing a new operating system or recreating one that was damaged.

System Tape - A tape containing a bootstrap and the operating system files. This bootstrap may be written only at the Basic Four factory. It permits loading an operating system from tape when certain temporary hardware changes have been made in the CPU.

Tape - Either a tape cartridge or a reel of tape. Tapes may be cataloged or uncataloged. Cataloged tapes can be one of two kinds, generation or archive. Tapes which cannot be cataloged are labeled "Scratch" tapes. See Archive Tape, Generation Tape and Scratch Tape for more information.

Tape Catalog - Two files on disc consisting of two catalogs: one a directory of the labels of tapes that have been used for backup, the other a file catalog containing a list of the files backed up on those tapes. A tape is "cataloged" if the tape label is entered into the label catalog. A tape is "fully cataloged" if the location and date of files backed up on the tape are recorded in the files catalog. To "catalog" a tape is to enter it in the tape catalog, and to "decatalog" a tape is to remove it from the tape catalog.

Tape Label - A record written on a tape following the loader to identify the tape uniquely.

Verify - To read back what was just written to a tape during backup to ensure that the data was copied correctly. Because of time considerations, a character-by-character comparison is not made.

Volume Sequence Number - The sequence number of a multiple tape backup. The first tape of a backup has a volume sequence number of 1. The next tape (the first continuation tape) has a volume sequence number of 2. The highest volume sequence number possible is 99.