



ACS 8600 Computer System

Magnetic Tape Unit Upgrade Kit Supplement

November 1982

**ACS 8600 COMPUTER SYSTEM
MAGNETIC TAPE UNIT UPGRADE KIT SUPPLEMENT**

NOVEMBER 1982

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ALTOS MAGNETIC TAPE UNIT

SECTION 1.

INTRODUCTION

GENERAL INFORMATION

These procedures allow you to upgrade your existing Altos 8600 computer system to include one stand-alone magnetic tape unit subsystem (hereafter known as MTU-3). The MTU-3 provides efficient backup and restore capabilities for program and data files.

The unit consists of a CMTD-3400S2 tape drive from Data Electronics Inc. packaged with power supply and controller. The MTU-3 is easily connected to any ACS 8600 computer system and only requires some simple cabling changes and inclusion of a magnetic tape controller to the ACS 8600.

This manual is divided into four sections. The remainder of Section 1 provides an overview of the MTU-3 subsystem; this includes hardware features, tape formats, and software requirements. Section 2 provides installation procedures. This includes computer modifications, cabling instructions and diagnostic testing. Section 3 provides an overview of tape unit operation and maintenance. Section 4 covers file backup and restoration procedures.

TAPE UNIT HARDWARE FEATURES

The tape unit provides high density tape cartridge storage of up to 13.4 MBytes of data on a single 1/4", 450-foot magnetic tape cartridge, using four tracks. Data is written at 6400 bits/inch in Modified Frequency Modulation (MFM) format at a data transfer rate of 192 Kilo-bits/second. A bit serial recording format is used.

The tape unit operates at two speeds depending on the operation being performed:

- a. READ and WRITE operations are performed at a tape speed of 30 inches/second.
- b. Bidirectional search and rewind operations are performed at a tape speed of 90 inches/second.

The use of an integral DC motor tachometer that drives the cartridge directly (no pulleys, belts or right angle friction drives) allows the drive to sustain a start/stop time of 25-26 msec at a tape speed of 30 inches/second and 71-74 msec at a tape speed of 90 inches/second.

All code conversions (NRZ/MFM and MFM/NRZ) are done in the tape control unit thus reducing the amount of processing required by the CPU of the ACS 8600.

The tape unit contains several standard features designed to improve system reliability:

- a. An integral tape cleaner which continually cleans the tape while it is moving.
- b. The dual gap, read-while-write tape head ensures that all written data can be read back from the tape. It also ensures data reliability of the tape unit to less than 1 error per 100 Mega-bits read by the drive.
- c. A separate erase head.

DATA FORMAT ON TAPE

The tape unit records data in serial fashion on each of four tracks of the cartridge. When data is written to the tape unit it is written first to track 1. When that track is full, the tape rewinds and data is then written to track 2. This process is repeated for each subsequent track until track 4 is full. There is an early warning indicator near the end of each track. The sensing of that indicator will cause the tape to rewind.

ERROR RECOGNITION AND CORRECTION

The design of the tape unit provides exceptional reliability. The provision of reading all data immediately after it is written is the key element to this reliability.

The tape head on the unit has a READ/WRITE head designed so that as the data is written to the tape by the WRITE head, it is immediately read by the trailing READ head. If no errors are detected during this process the data has been properly written to the tape.

If an error is detected by the trailing READ head during a write operation, the tape unit attempts to re-write the block as many as 16 times. After the 16th attempt the tape unit will signal an aborted read operation. Before each attempt the unit rewinds the tape to the point at which the block begins and the unit will then advance the tape 3 inches erasing old data and attempt to write the block again. It will do this each time an error is detected up to a maximum of 16 attempts. If an attempt is successful, no further attempts will be made. This forward movement of the tape 3 inches from the beginning of the block each time an attempt is made ensures that the portion of tape used for 2500 bytes of data or less is bypassed.

The incidence of permanent read errors is very slight because of the movement of the tape past the tape cleaner and read head 16 times. This action removes many of the contaminants that cause permanent read errors. If the 16 re-tries still result in a permanent read error it is likely that the tape has physical damage or is of poor quality and should be discarded.

The tape unit has another feature to increase reliability. The built-in tape cleaner will remove contaminants from the tape media prior to passing the read/write heads. The tape unit generates a rewind of the tape each time the cartridge is inserted into the unit and at the end of most data operations. This procedure ensures that only the 36 inches of tape between the beginning of tape indicator and the load point, at which data recording begins, is exposed to possible contamination by smoke, finger prints, or other foreign matter.

MAGNETIC TAPE CARTRIDGE MEDIA

The tape unit subsystem utilizes 1/4" tape cartridges that meet the ANSI X 3.55-1977 standard.

Note:

Altos recommends that all cartridges be certified at 6400 bsi by the manufacturer: Scotch DC-300A, Scotch DC-300XL and Verbatim TC-4430 tape cartridges are examples of acceptable media.

The tape unit has built-in sensors that identify beginning of tape, end of tape, load point and early warning location. The tape unit controller automatically recognizes these sensor indicators and ensures that data is written 6 inches beyond the loading point and will continue no more than 36 inches beyond the

early warning location indicator. In order to take advantage of these sensor indicators, the selected media cartridges should incorporate these features as per the ANSI compatibility specifications.

Tape cartridges of both 300 and 450 feet will be accepted by the tape unit. The storage capacity of these cartridges depends upon the length of the records being written. The longer the records, the fewer the number of inter-record gaps (IRGs) and, hence, the greater the efficiency of the unit. Table 1-1 lists formatted storage capacities of tape cartridges versus differing block lengths.

Table 1-1. Formatted Storage Capacities -- Tape Cartridges

Block Size (Bytes)	Block LTH (Inches)	300' Tape (Records)	(Mbytes)	450' Tape (Records)	(Mbytes)
125	0.2	7000	3.5	10500	5.3
1024	1.3	5110	5.3	7664	7.9
2048	2.5	3349	6.8	5024	10.3
*4096	5.0	1983	8.1	2975	12.2
8192	10.0	1092	8.9	1638	13.4

* Note: CP/M-86, MP/M-86, and XENIX all require a block size of 4096 bytes.

Handling and storage of tape cartridges are critical to the reliability and overall performance of the tape unit subsystem. Excessive heat, humidity or exposure to magnetic fields will cause substantial increases in the rate of both temporary and permanent tape media errors. The user is cautioned to follow the handling and storage recommendations of the tape manufacturer to ensure satisfactory performance of the tape unit subsystem.

TAPE UNIT SOFTWARE AND PROGRAMMING

Depending on the operating system, special configuration software for the MTU-3 may be required. In addition, utilities to use MTU-3 are required. Under CP/M-86 and MP/M-86, the BACKUP utility is required to perform restore and backup functions; while under XENIX, standard utilities such as TAR and DD are sufficient to perform these same functions. See section 4. FILE BACKUP AND RECOVERY for more information.

SECTION 2.

TAPE UNIT INSTALLATION

UPGRADE KIT DESCRIPTION

Components

Your upgrade kit (UK-MTU-3, Part No: 540-12301-001) provides all the components necessary to incorporate one magnetic tape unit subsystem (MTU-3) into an Altos 8600 computer system.

Unpack the upgrade kit and verify that it includes the following:

- a. This Installation Procedure (Part No: 690-12327-001).
- b. One MTU-3 Chassis (Part No: 530-12300-001).
- c. One PC Assembly Magnetic Tape Controller (Part No: 630-11380-001).
- d. One 72-inch 50-pin External Interconnect Cable (Part No: 510-11458-001).

Used to connect the MTU-3 to the ACS 8600 Computer rear panel.

- e. One 7-inch 50-pin Internal Interconnect Cable (Part No: 510-11411-001).

Used to connect tape controller to CPU No. 1.

- f. One 7-inch 26-pin Internal Interconnect Cable (Part No: 510-11412-001).

Used to connect tape controller to CPU No. 2.

- g. One 11-inch 50-pin Internal Rear Panel Interconnect Cable (Part No: 510-11446-002-A2)

Used to connect the tape controller to the rear panel.

- h. One Diskette containing ADX-86 Software Package, Version 1.4F0 (Part No: 583-12119-005).
- i. One Magnetic Tape Cartridge (Part No: 180-10267-001).
- j. One Power Cord (Part No: 230-11223-001).
- k. One Hardware Kit (Part No: 540-11727-002).

Contains plastic stand-offs to mount PCB to CPU.

TOOLS REQUIRED

The following tools are required to install your magnetic tape unit.

- a. A 3/16-inch nut driver for the nuts attaching the cable connectors to the computer inside rear panel and for the plastic standoffs that support the MTU controller.
- b. Medium-sized flat-blade screwdriver.
- c. Number 2 Phillips-head screwdriver.
- d. Needlenose pliers.

COMPUTER MODIFICATION PROCEDURES

This section describes the procedures used to disassembly, modify, and reassemble your system to accommodate the upgrade kit.

1. Back up your system files. Refer to the ACS 8600 User Manual.
2. Remove floppy disk from the disk drive.
3. Turn OFF power to the display terminal and printer.
4. Turn OFF power to the computer.
5. Unplug the computer power cord from the power source (wall plug, etc.) and from the computer.
6. Remove the computer top cover by loosening the six side panel screws with the flat-blade screwdriver (note that it is not necessary to remove them). Carefully lift off the top cover and set it aside.
7. Screw the four plastic standoffs that came in your upgrade kit (they are contained in the Hardware Kit - Part No: 540-11727-002) to the nuts at locations 1 through 4, figure 2-1.
8. Connect the 7-inch 50-pin tape controller cable (Part No: 510-11411-001) to the magnetic tape controller board (Part No: 615-11380-001) at location 5, Figure 2-1. It is labeled J3 on the controller board. See figure 2-2.
9. Connect the 26-pin tape controller cable (Part No: 510-11412-001) to the magnetic tape controller (Part No: 615-11380-001) at location 6, figure 2-1. It is labeled J2 on the controller board. See figure 2-2.
10. Connect the unused 6-pin DC connector located at 7, figure 2-1 (this is part of the assembly harness) to the magnetic tape controller board at location 8, figure 2-1. This connector is labeled J1 on the controller board. See figure 2-2. When making the connection, be certain that the lip of the connector is face up.
11. Connect the remaining end of the 50-pin tape controller cable to the CPU board at location 9, figure 2-1. This is labeled J8 on the CPU board. See figure 2-3. There are four jumper pins that must be removed from the 50-pin connector on the CPU board before connection can be made.

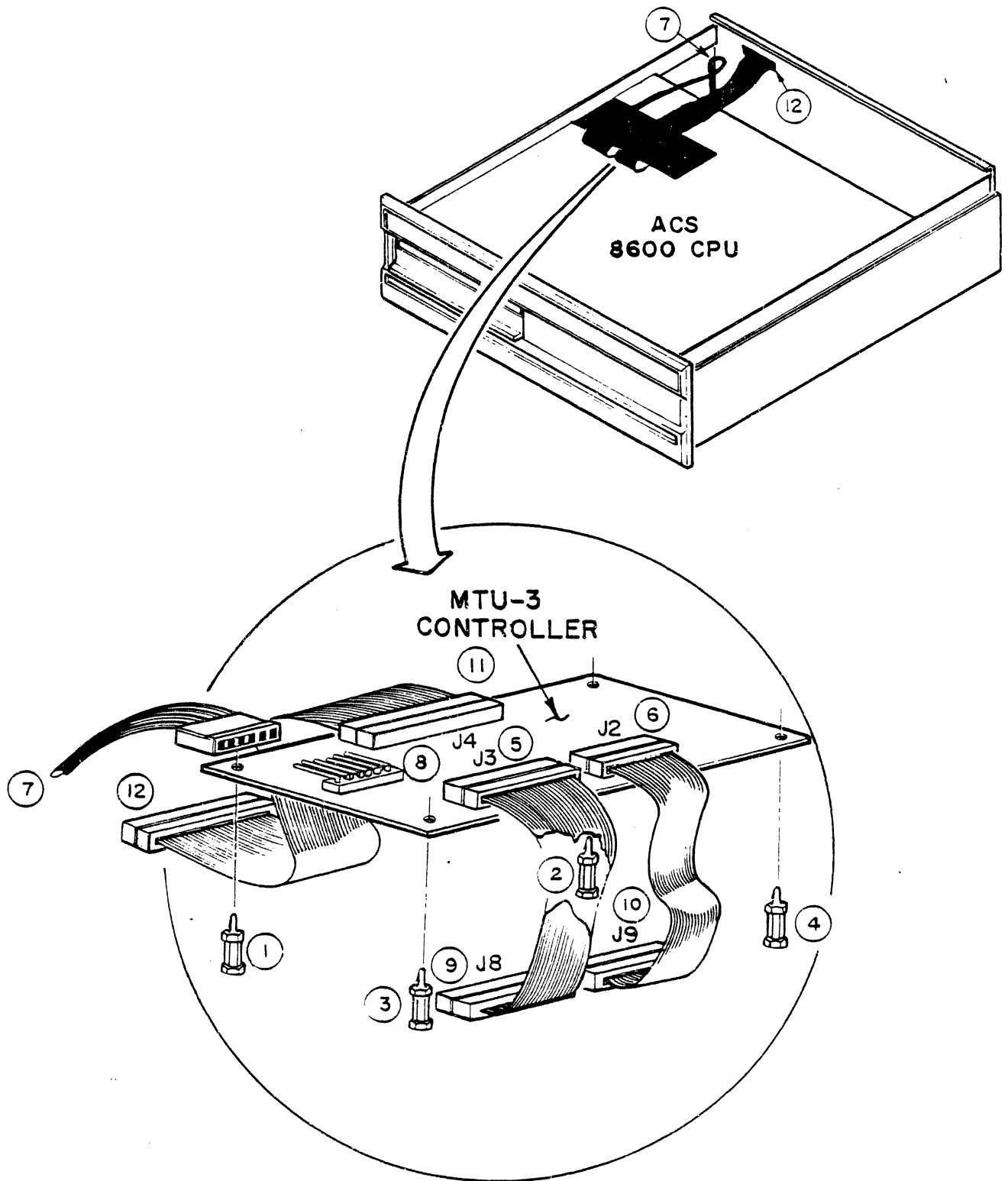


Figure 2-1 ACS 8600 Computer System Reconfiguration

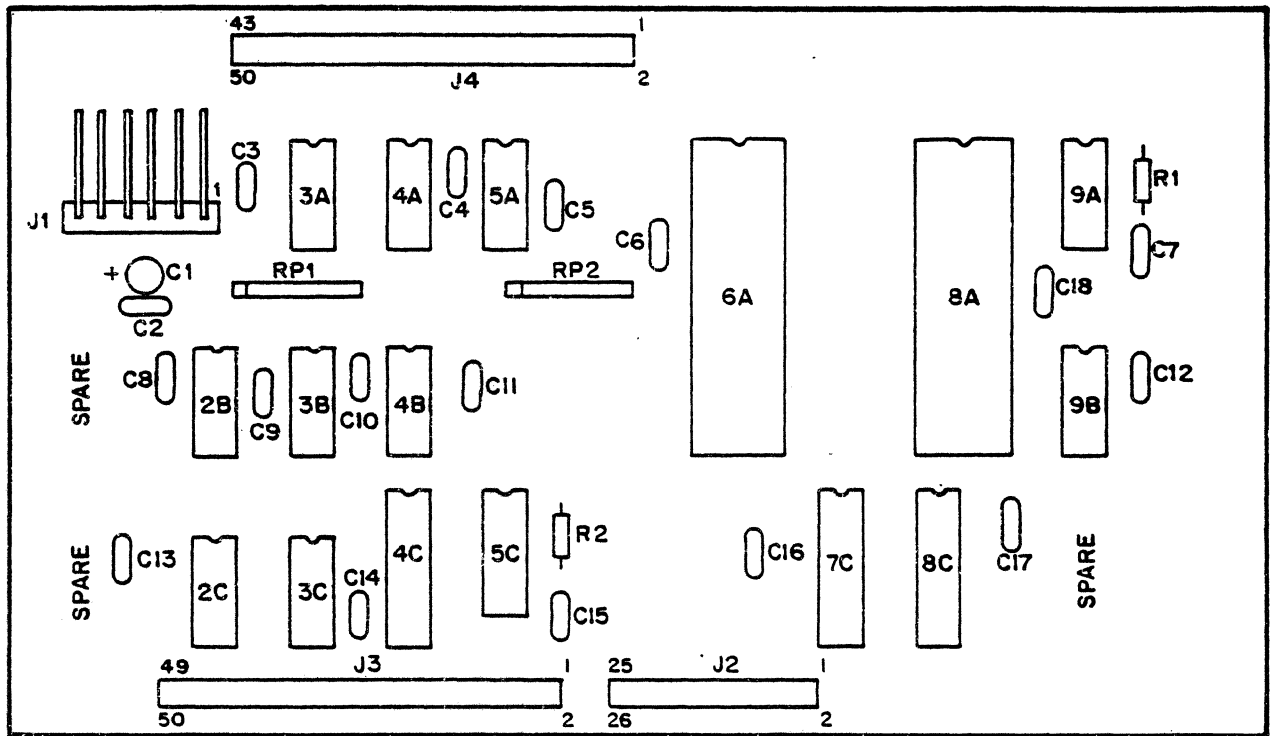


Figure 2-2 ACS MTU-3 Matrix Map

12. Connect the remaining end of the 26-pin tape controller cable to the CPU board at location 10, figure 2-1. This is labeled J9 on the CPU board. See figure 2-3.
13. Connect the rear panel cable (Part No: 510-11446-002) to the rear of the magnetic tape controller at location 11, figure 2-1. It is labeled J4 on the controller board. See figure 2-2.
14. Place the magnetic tape controller onto the four standoffs (locations 1-4, figure 2-1). The board is in place when all standoffs have snapped into place.
15. Remove the plastic panel from the magnetic tape unit connector slot located on your ACS 8600 rear panel. See figure 2-4. This is done by breaking the ends of the two screws located on the inside of the panel. Needlenose pliers could be used.
16. Insert the remaining end of the rear panel cable (see Step 13 above) into the MTU connector slot (location 12, figure 2-1). Use a 3/16-inch nut driver and needlenose pliers to insert and secure the connector screws into place.
17. Replace the top cover of the computer, and tighten the six screws located on the sides of the cover.

COMPLETING EXTERNAL CONNECTIONS

1. Connect one end of the 50-pin external interconnect cable to the magnetic tape unit connector of the ACS 8600 and the other end to the tape connector located on the rear panel of the magnetic tape unit subsystem. The two ends of the cable are interchangeable.
2. Reconnect the three-pronged power cord to the computer rear panel and plug the other end into a power source (wall plug, etc.).
3. Install the fuse holder assembly (with 115V fuse - Part No: 140-10732-001) in the rear of the MTU unit. Location of the fuse for the MTU is shown in figure 2-4.
4. Connect the three-pronged power cord (Part No: 230-11223-001) to the MTU chassis rear panel and plug the other end into a power source (wall plug, etc.). See figure 2-4.

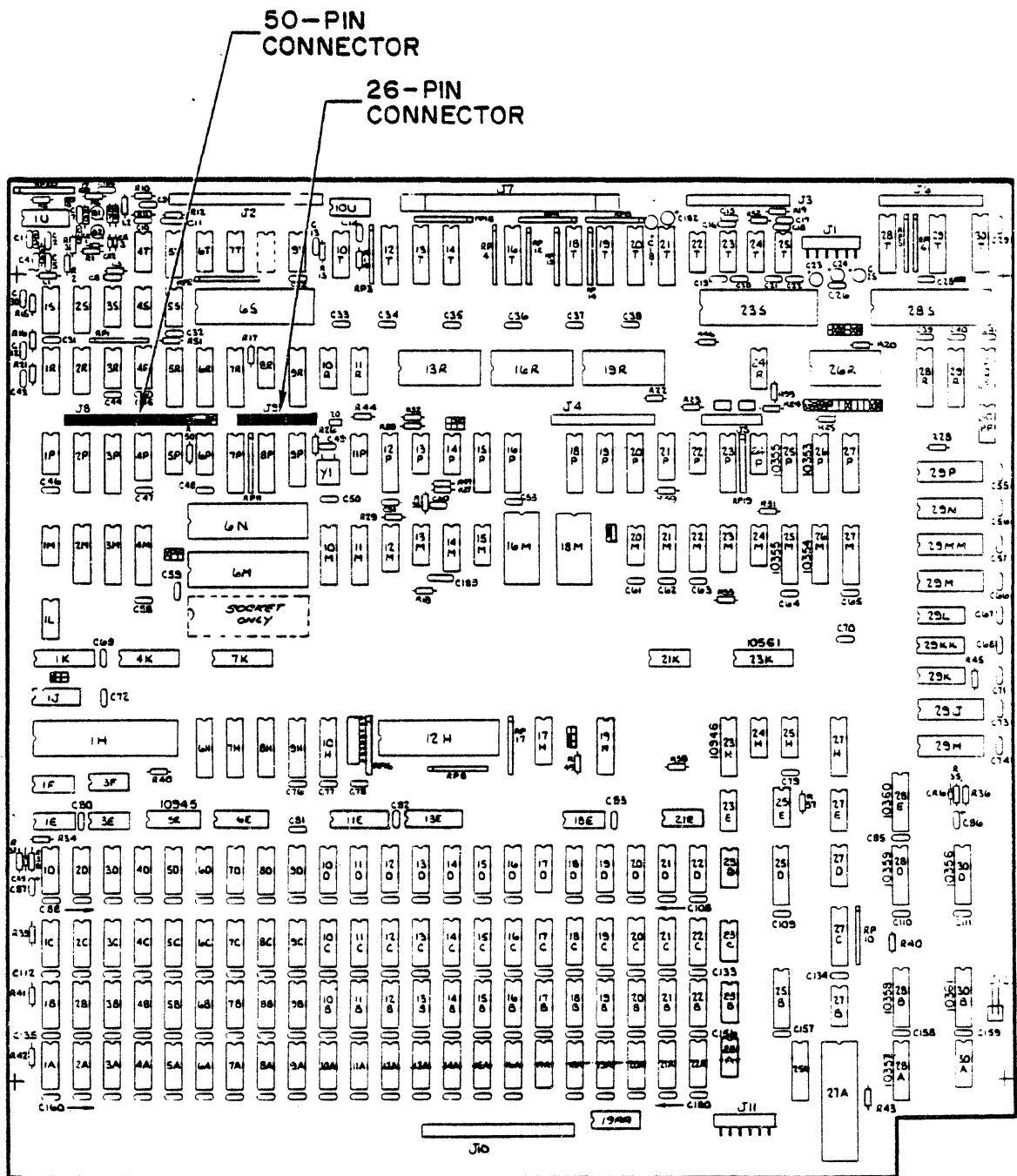


Figure 2-3 ACS 8600 CPU Matrix Map

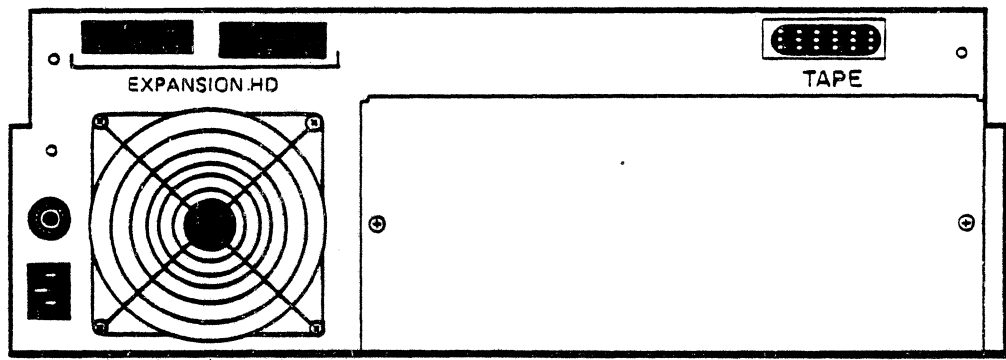
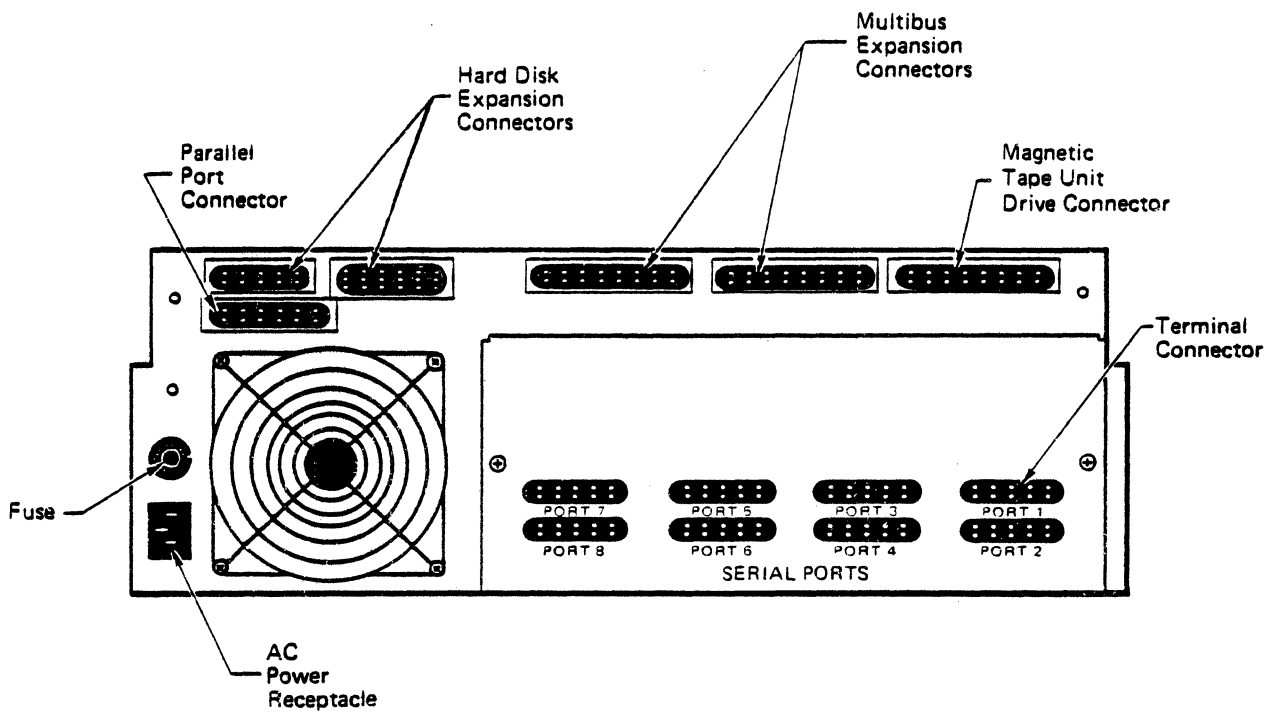


Figure 2-4 Rear Panel Connections

5. Reconnect the interface cables from display terminals and printers connected to the computer system.
6. Power up the computer, terminal, and the MTU subsystem. All front panel power lights should all be lit. Power up the printer.
7. Refer to the computer system User Manual for instructions related to performing system checkout.
8. Load the Altos Diagnostics Executive (ADX) diskette and specify the TAP86 test. This test is a collection of menu driven routines which validate that the tape unit is operating properly both from a hardware and software point of view. The tests are performed on: the tape hardware controller, tape drive, communication interfaces to the ACS 8600, magnetic tapes and software. See the ADX Supplement to the User Manual for information on running this test.

SECTION 3.

TAPE UNIT OPERATION AND MAINTENANCE

TAPE CARTRIDGE INSERTION AND REMOVAL

Note:

Be certain that no tape cartridge is in the tape unit when the tape unit, or system, is powered-on or powered-off. This will protect the tape cartridge from damage caused by electrical transients.

The tape cartridge can only be inserted into the tape unit one way. A keylock prevents insertion of the cartridge upside-down. Position the cartridge at the entry opening of the tape unit and slide the cartridge forward until the first detent is felt, then slide the cartridge forward until it is fully engaged.

When the cartridge is inserted it will automatically be rewound and then advanced forward to the load point. If the tape has been set to the "safe" position (a form of write protect) this will be sensed when the cartridge is inserted into the tape unit.

Note:

Donot attempt to remove the tape cartridge while any type of tape motion is underway.

PERIODIC TAPE UNIT MAINTENANCE

Three components of the tape unit require periodic

maintenance in order to ensure overall system reliability. The cleaning removes contaminants from the tape unit components which come into direct contact with the tape media. Cleaning ensures that there will be adequate direct contact between the read/write head of the tape unit and the tape itself.

The READ/WRITE head, Tape Cleaner Component, and Motor Capstan should all be cleaned daily if the tape unit is in regular use.

The location of the components which require cleaning are shown in Figure 3-1. The unit should be turned off before any cleaning is done. The components to be cleaned are accessed through the cartridge loading slot. A flashlight should be used to better view the components.

READ/WRITE HEAD CLEANING

Dirty heads may cause data dropouts and error conditions during read or write operations. Use a non-residue, non-corrosive cleaning agent such as Dupont Freon TF or isopropyl alcohol, and a cotton swab to clean the head assembly. Be sure to wipe off any excess and allow the heads to dry completely before operating the unit.

TAPE CLEANER COMPONENT CLEANING

The tape cleaner removes loose tape oxide and other foreign material from the tape before it contacts the head. This foreign material accumulates in and around the tape cleaner and must be removed to ensure that the tape cleaner will continue to work effectively.

To clean the tape cleaner component insert a folded sheet of paper in the bottom of the cleaning slot of the tape cleaner and lift up. This will lift out the foreign material gathered around the tape cleaner. Compressed air or an air brush can also be used. During alternate cleaning periods the same materials used to clean the heads can be used.

Caution:

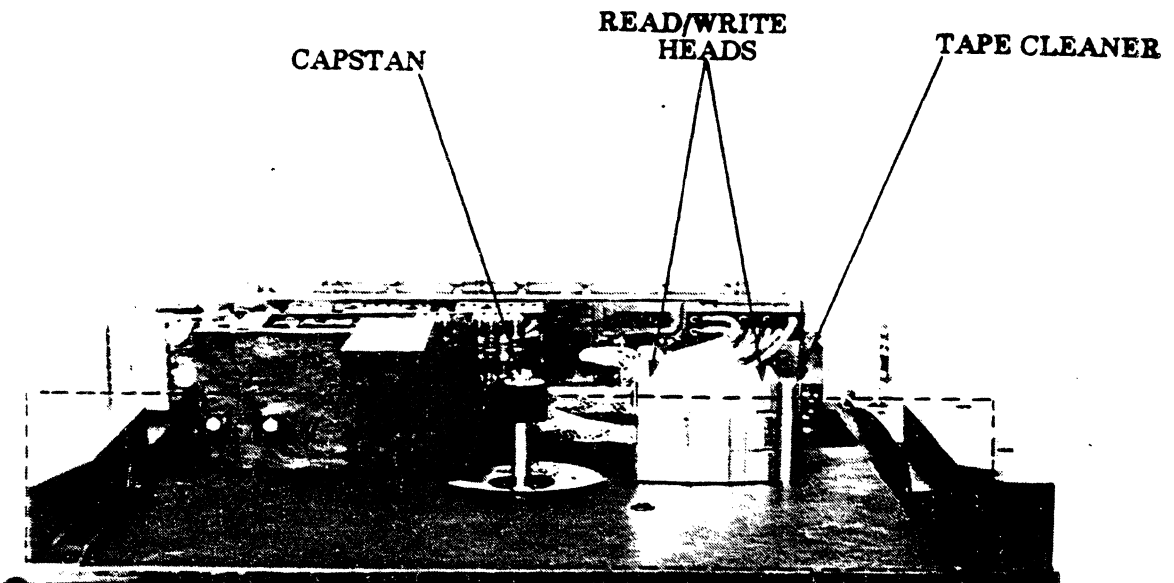
Do not use any hard objects to clean the tape cleaner. If the tape cleaner should become chipped, it could scratch the tape surface resulting in lost data and/or permanent damage.

MOTOR CAPSTAN CLEANING

The drive capstan is composed of hard polyurethane and must be cleaned after foreign material has built up. Clean the capstan using isopropyl alcohol and a cotton swab.

Caution:

Be very careful not to permit cleaning solvent to contaminate the drive motor bearing.



(Area within dotted line is seen from front panel)

Figure 3-1. Tape Unit Components Requiring Cleaning

SECTION 4.

FILE BACKUP AND RECOVERY

INTRODUCTION

This section describes the procedures that are required 1) to define the MTU-3 to your operating system and, once this accomplished, 2) to perform normal backup and restore operations under your operating system.

INTERFACING MTU-3 TO OPERATING SYSTEMS

When the MTU-3 has been successfully installed and checked out with the ADX diagnostic test, TAP86, it may be necessary to interface it to the Operating System. Check the following information under the operating system that pertains to your system.

XENIX

The MTU-3 is interfaced to the operating system as a device. Consult the XENIX Supplement to the User's Manual for information. This supplement describes a utility program which is run to connect the magnetic tape to the operating system as a supported device, and describes a system utility program which makes use of the magnetic tape for dumping and restoring hard-disk files. The introductory section of the XENIX supplement will refer you to information concerning the magnetic tape unit.

CP/M-86 or MP/M-86

The MTU-3 is not interfaced to the operating system as a device. It is accessed only by the BACKUP utility, which has its own software driver. For information on using BACKUP, see the

next section entitled "The BACKUP Utility for CP/M and MP/M."

THE BACKUP UTILITY FOR CP/M AND MP/M

Introduction

The Altos Backup Utility, BACKUP, transfers files from a hard disk to one or more floppy diskettes or tapes, and restores hard disk files from those diskettes or tapes. The restore function can be for all files or selected files. BACKUP runs under either CP/M-86 version 1.1 or higher operating system, or an MP/M-86 (Multiple Program Monitor) operating system. Under MP/M-86, BACKUP should be run while in single-user mode.

Description

Features

The BACKUP Utility Program has many useful features that give it more power and flexibility than the PIP and COPY system utilities.

1. Backup can use tapes.
2. BACKUP uses the same disk file name conventions as PIP, the standard utility used for copying disk files. With either PIP or BACKUP it is possible to select files by name, or by categories of files using ambiguous file names (names using ? or *), or by user number, or by a combination of these.
3. BACKUP automatically verifies every read and write operation.
4. BACKUP condenses file space. CP/M-86 and MP/M-86 allocate hard disk file space in fixed sizes, such as one kilobyte or four kilobytes. BACKUP removes unused space at the end of disk files.
3
5. BACKUP can save a file which is too large to fit on a single diskette or tape. Files that do not fit on one diskette or tape are automatically partitioned to fit onto as many diskettes or tapes as are needed.
6. BACKUP informs you how many diskettes you will need, after you have specified the files to be saved and before you begin operation.
7. BACKUP can back-up from more than one drive in a single invocation.
8. When restoring files, BACKUP checks with you before

writing over existing files.

9. BACKUP has intelligent mechanisms for consistency checking and error recovery.

Current Limitations

Currently, BACKUP has the following limitations:

1. The maximum number of name patterns that can be specified after the prompt "Enter files to be backed up" is 200.
2. The maximum number of files that can be backed up in one session is 700. A session lasts from the time the backup, menu function (B), is invoked until the quit function (Q) is entered.
3. The most data that can be backed up in one session is 64 megabytes. Note that if more than 64 Megabytes of data needs to be backed up, it can be done in more than one session as discussed in point 2 above.

Diskette File Concepts in BACKUP

Each backup floppy has two files, named MAP and DATA. The MAP file has a user-defined label, and a list of all files backed up and the diskette where each file resides. The MAP file for a BACKUP session is duplicated onto each diskette used in that session.

The DATA file contains backed-up data files from the hard disk, treated as one long file. Original files within the data file are carried across diskette boundaries when necessary.

Both MAP and DATA files are CP/M-86 and MP/M-86 compatible. The TYPE command can be used with the MAP file to display the user label. For example:

```
A>TYPE MAP<CR>
```

Tape File Concepts in BACKUP

For backup tapes, the MAP file is only written to the first tape in a series. In addition, it is not possible to calculate the number of tapes needed before they are written.

Backing Up and Restoring Random Files

BACKUP can back up and restore random files. BACKUP determines the maximum size of the file and backs up from the first sector to the last, including undefined blocks. Caution must be used for that reason:

NOTE

If a random file has undefined blocks within its maximum allocation, those blocks will appear to have E5's when restored. BACKUP will provide sectors of E5's when backing up to floppy diskette, and those sectors will be restored to the hard disk.

Documentation Conventions

The system prompts are shown as A> for CP/M-86 and ØA> for MP/M-86. The actual system prompt may be different.

When user input is shown with system generated information, user input is in bold (darker face) print. In this example, ØA> stands for the MP/M-86 system prompt and the rest of the line is entered by the user:

```
ØA>BACKUP -L User #3 Files, July 7, 82<CR>
```

A lowercase (small) a is used to represent any alpha character (letter), a small n to represent any numeric character (number), and a small x to stand for an alphanumeric character (which can be either a letter or a number).

For example:

```
Drive a           File xxxxxxxx.xxx           Diskette n of n
```

<CR> stands for Carriage Return, and means pressing that key. Keys are referred to with a leading capital letter, as in "Space Bar" or "Reply Y or N", or shown within angle brackets (< >) where convenient.

Control-A means to hold down the control key (CTRL on most keyboards) while pressing the A key. In general, any combination of the Control key and another key means to hold down the control key while pressing the other key.

Left and right brackets, "[" and "]", are actual entry keys and displays. For example, "[Default is B]" is an actual display and "[G*]" is an actual entry.

The term "E5's" used in this document is a hexadecimal bit pattern. It is equivalent to the binary pattern "1110 0101". In the CP/M-86 and MP/M-86 operating systems, a disk or diskette sector filled with this pattern is considered to be unused.

OPERATING INSTRUCTIONS

Installation of BACKUP

If the BACKUP program was supplied to you on a separate diskette, Altos recommends that you copy it to the hard disk or another floppy diskette, using the PIP utility. Save the original diskette to make duplicates from and use only the copied diskettes to run the program.

Operation of BACKUP

BACKUP is run by entering the name followed by a Carriage Return. It displays the menu shown below.

A>BACKUP<CR> (CP/M-86 Prompt)

ØA>BACKUP<CR> (MP/M-86 Prompt)

ALTOS Hard Disk Backup Utility -- Version x.x

Copyright 1982 Altos Computer Systems
Licensed by Altos for use on Altos systems only

Functions:

- B- Backup files from hard disk to floppy diskettes or tape
- R - Restore files from floppy diskettes or tape to hard disk
- L - List filenames from a backup floppy diskette or tape
- P - Print filenames from a backup floppy diskette or tape (must be preceded by B, R, or L function)
- Q - Quit

Please select a function: [default is B]

Respond by entering the letter, in upper case or lower case, and pressing Return. For example, to select Restore:

Please select a function: [default is B] R<CR>

Backup includes the following functions which are described later in this section under the heading INDIVIDUAL FUNCTIONS.

Backup Restore List Print Quit

After performing a backup, restore, list, or print function, the program displays the menu again and allows another function to be executed.

Aborting from within a Function

Control-A aborts the current command and returns to the program menu.

Control-C aborts the BACKUP program and returns to the operating system.

Individual Functions

Q THE QUIT FUNCTION

This gives the message "Normal Exit" and returns to the operating system.

B THE BACKUP FUNCTION

Back Up Files From Hard Disk To Floppy Diskettes or Tapes

Before running the Backup function, be sure to have sufficient scratch diskettes or tapes on hand. Diskettes must be formatted and empty of files. Either a freshly formatted diskette, or a used diskette on which all files have been erased by the ERA command, is suitable. The diskette may have a system on the system tracks (boot tracks), and may have an MP/M-86 diskette label. In addition, the diskette must be write-enabled. Tapes may be uninitialized or may contain data and must be write-enabled.

Hard disk files which are password read-protected, or locked, cannot be written to a floppy diskette by the Backup operation. If it is to be backed up, the condition must be changed.

The first prompt is

Destination diskette or T for tape? [default is B]

Enter the logical drive identification, A-P, of the floppy diskette destination drive or T if backing up to tape.

The next prompt is

Enter label:

Enter the information label you will use to identify these diskettes or tapes. The maximum number of characters is 80. Although this field is optional, it is a good idea to provide a meaningful identification and the date. For example,

User 7 Files, August 3

Accounts Payable, 08/03/82

The next prompt is

Enter Files to be backed up:

The BACKUP program will then ask you to enter the names of files that you want backed up. You can enter a list of names, or specify groups of files using ambiguous file names. File name specification ends when you enter a Carriage Return by itself.

Filenames and ambiguous filename specification, "afn," is discussed in the CP/M-86 or MP/M-86 manuals provided with your system. Further examples are given in these manuals under the PIP utility. In general, the information given on PIP which pertains to disk file operations also pertains to BACKUP. The PIP options used within brackets, such as [V], do not pertain except for the G option. In addition, if a filename does not include a drive identifier, the current drive is assumed.

For convenient reference, here is some information on ambiguous filename specification. Consult the CP/M-86 or MP/M-86 manuals for details.

? means match any character in this position. For example, JACK?.TXT specifies files such as JACK4.TXT and JACKV.TXT.

* is the equivalent of filling the rest of the field with a variable number of ?s. For example, *.FOR specifies every filename withan extension of FOR, and Q*.PAY specifies every file beginning with Q and having PAY as its extension, such as QUERY.PAY and QR3.PAY. *.* specifies every filename.

G refers to user number. ("Get files from user n.") G can be followed by a user number (0 to 15) or * (all users). User numbers are implicit in MP/M-86 file handling, and may be used in CP/M file handling, to categorize files as belonging to a particular user. If G is not used, the current user is assumed to be specified. "G" by itself is equivalent to "G0".

Examples of file specification:

JACK4.COB, JACK4.DOC<CR> The two files named.

A:*. *[g*]<CR> Every file of every user from drive A.

B:*.c<CR> All .c files from current user from drive B.

*.prl[g3]<CR>

All .prl files of user 3.

<CR>

End of specifications.

BACKUP accepts file specifications until a line that contains only a Carriage Return is entered. The maximum number of file specifications is 200. After receiving the terminating Carriage Return the program scans the directory of the logical hard disk drive and creates an internal list of all the files that match the specifications. This list is in alphabetical order. If a file has been specified more than once, the duplication is removed. Only one copy of a file will be backed up. A file must have contents; zero-length files are not backed up.

When the internal map is prepared, the screen displays it. Here are two examples.

Projected MAP of Diskette on Drive B:

User#	Filename.ext	Records	On Disk
0	A:ASM .PRL	156	1
0	A:DSKRESET.PRL	167	1
0	A:PIP .PRL	157	1

3 files, 61 1K byte blocks, 1 diskette,

Projected MAP of Tape

User#	Filename.ext	Records
0	A:ASM .PRL	156
0	A:DSKRESET.PRL	167
0	A:PIP .PRL	157

3 files, 16 4K byte blocks.

The prompt is

Is this correct? [default is Y]

If you reply Y, the backup operation proceeds.

If you reply N to this query, you can re-specify the files. At this stage, you can also verify that you have enough diskettes to hold the specified files and take appropriate action if you do not. That is, you can obtain more diskettes or use Control-C to abort.

After you reply Y, you are prompted

Backing up disk 1.
Please place empty diskette in Drive x; hit RETURN
to continue...

or

Caution: tape will be overwritten
Insert backup tape #1. Hit RETURN
to continue...

Place a scratch diskette or tape in the designated drive and press the Return key when ready. This prompt will be repeated for each diskette or tape needed.

If the diskette is not empty, the program says

Diskette not empty, please use empty diskette

If this happens, place an empty diskette in the drive and press Carriage Return.

Tapes, however, are over-written even if they contain files.

BACKUP writes the user label information and the MAP file onto each diskette or the first tape. Then it writes the data files in the order shown on the MAP.

Writing MAP file onto Floppy Diskette.

Backing up file: a:xxxxxxxx.xxx User n

The program will continue to back up each file in the order shown on the MAP. If necessary, it will prompt you to insert new diskettes or tapes.

As you remove each diskette or tape, write the user label information and the diskette or tape number on it, and any other useful information. Use a felt-tip pen on the diskettes to avoid harming the disk surface.

When the backup is finished, it advises

Backup complete.

When all specified files have been written successfully, the program returns to the menu to do another operation or quit. At this point you may wish to use the P function to print a MAP of what you have saved.

R THE RESTORE FUNCTION

Restore Files From Floppy Diskettes Or Tape To Hard Disk

Before starting this operation, ensure that all floppy diskettes or tapes to be used are available. This operation can restore all or selected files. If a file of the same name exists on the hard disk, you are prompted as to whether you wish to replace it or not with the floppy diskette or tape file. An option allows you to have this choice for all files, whether or not the file is already on the hard disk. See the Command Line Option information.

The first prompt is:

Backup diskette or T for tape? [default is B]

Specify the floppy disk drive identification, A-P or T for tape.

The next prompt is:

Destination hard disk or S for same? [default is S]

Specify the logical hard disk drive, A-P or S. S means restore to the drive from which the file was originally backed up.

The next prompt is:

Please place a diskette to be restored in Drive A; Hit RETURN to continue...

or

Insert backup tape #1; hit RETURN to continue...

When the diskette or tape has been inserted, the program will read its MAP file and display information as shown in this example.

Diskette on Drive B is number 1 of 4:
Label: User 7 Files, August 3

The program will then list all files saved on the set of diskettes. It gives the file sizes and user number for each file. For example:

Projected MAP of Diskette on Drive B:

User#	Filename.ext	Records	On Disk
0	B:ASM .PRL	156	1
0	B:DSKRESET.PRL	167	1
0	B:PIP .PRL	157	1

or

Projected MAP of Tape

User#	Filename.ext	Records
Ø	B:ASM .PRL	156
Ø	B:DSKRESET.PRL	167
Ø	B:PIF .PRL	157

If there are additional files to be displayed, the prompt will be:

MORE

Hit RETURN to continue...

The file display is followed by a summary

nn files, nnn 1K byte blocks, 1 diskette.

The program then asks:

Is this the correct disk? [default is Y]

or

Is this the correct tape? [default is Y]

If you reply N, you can place a different diskette or tape in the drive.

After a Y response, the next prompt is:

Enter files to be restored:

Each file is entered either by explicitly naming it or by using the ambiguous filename conventions, (* or ?), followed by a <Carriage Return>. The program will continue to ask for files to be restored with the following prompt:

More (hit RETURN when done):

Specifying *.*[g*]<CR> will ask for all files to be restored.

If no explicit drive specifier is included, then files which match on any drive are restored. If you specify the same file more than once, no harm is done. Only one copy will be restored.

When only a <Carriage Return> is given to the MORE prompt, the program gives the following messages:

Restoration will begin.

Restoring file: a:xxxxxxx.xxx User n

If the old file already exists on the hard disk, the program will warn you with the following message:

```
CAUTION file already on hard disk,  
Type Y to erase old file and continue, N to skip this  
file: [default is Y]
```

When all files have been transferred back from the diskette or tape to the hard disk, the message will be given that:

Restoration is complete.

Finally, the program will return to the menu to allow you to choose another function or to quit the program.

L THE LIST FUNCTION

List Filenames From A Backup Floppy Diskette Or Tape

The list function reads the MAP file from a diskette or tape and displays its contents on the screen. The contents include the user label, which number the diskette or tape is in its set, and the file names for all diskettes or tapes in the set. The diskette location of each file is shown.

If desired, you can use the Control-P facility of the operating system to print a copy of what you see on the screen. However, the Print function shown next gives a more concise copy.

When you start this function by indicating L for List, the prompt you will get is:

Which diskette or T for tape? [default is B]

If you choose a disk, the next prompt will be:

Please place the diskette to be listed in Drive x; hit RETURN to continue...

or

If you choose tape, the next prompt will be:

Insert backup tape #1; Hit RETURN to continue...

When the diskette or tape has been inserted and the Return hit, the program will give the information as shown in the following two examples:

Diskette on Drive B is number 1 of 1
Label: User 7 Files, August 3

User#	Filename.ext	Records	On Disk(s)
0	A:ASM .PRL	156	1
0	A:DSKRESET.PRL	167	1
0	A:PIP .PRL	157	1

3 files, 61 1K byte blocks, 1 diskette.

Tape

Label: User 7 files, August 3

User#	Filename.ext	Records
0	A:ASM .PRL	156
0	A:DSKRESET.PRL	167
0	A:PIP .PRL	157

43 files, 16 4K byte blocks.

If the information cannot be displayed entirely on the screen, it is shown a page at a time. You are prompted with:

MORE?

Press Carriage Return when you wish to see the next page.

When all the contents have been listed, the program will return to the menu to choose another function or quit the program.

P THE PRINT FUNCTION

Print Filenames From A Backup Floppy Diskette Or Tape

This function must be preceded by a Backup, Restore, or List function, because it lists the MAP file currently in memory from a prior operation.

It allows the printing of a list of file names in a more concise manner than the List operation. Rather than printing directly on the printer, it is meant to be used with the Control-P facility. (Entering Control-P causes the operating system to print whatever is shown on the screen.)

After hitting the P key, the prompt given is:

Please type Control-P and ready printer, then hit RETURN to continue...

The program then displays and prints the MAP information. File identifications are shown in a concise form, as user number, file name, extension. Four identifications fit on each line.

Diskette number n:

or

Tape:

n x:xxxxxxxx.xxx n x:xxxxxxxx.xxx n x:xxxxxxxx.xxx ...

When the display and print is finished, the program asks you to stop printing with

Type Control-P again, then hit RETURN to continue.

A warning message is printed if either the first or last file is not on one complete diskette.

ERROR HANDLING

The error messages discussed below are generated by the BACKUP program. You may also encounter error messages from your CP/M-86 or MP/M-86 operating system. In some cases, you will see both system error messages and BACKUP error messages. Note that when a CP/M-86 message, such as a BDOS Error, is displayed, the system pauses, requiring a Carriage Return to proceed. With MP/M-86, no operator response is required. For information on system errors, consult your CP/M-86 or MP/M-86 manuals.

ERRORS WHILE BACKING UP

1. Permanent Error. Disk is bad.

BACKUP has detected a floppy diskette error while backing up files, and could not recover. This warns of a potentially hazardous error. The backup should be redone on another diskette.

2. Can't open hard disk file.

The hard disk file is password read-protected or locked. BACKUP aborts. Turn off password protection, or set a default password, and retry the Backup function.

3. ERROR on hard disk, file is marked.

A read error has occurred on the hard disk. BACKUP will skip the hard disk sector and fill the corresponding floppy disk sector with E5's. On the MAP file list for this backup session, the error will be noted alongside the file name. When this file is restored, the error sector will have E5's.

4. (System error message.)
Will restart backup from beginning of this diskette.

This message follows an error message caused by a floppy-disk failure during reading or verifying the backup files. The operator is then instructed to place another diskette into the floppy drive and press Return to continue the backup operation. The contents of the diskette with errors on it will be rewritten.

ERRORS WHILE RESTORING

1. Please insert PROPER diskette.

BACKUP reads the label of every diskette before restoring files from it. This message occurs for two reasons. A). A diskette within a set does not have the same label as the first diskette in the set. B). The diskette has the wrong number

within its set.

2. Diskette is not a backup diskette.

There are three possible causes of this message. A). The BACKUP program cannot find either the MAP or the DATA file on the floppy diskette because one or both were erased. B). The diskette has neither MAP nor DATA file because it is not a backup diskette. Use the system command DIR to check these two possibilities. C). The MAP and DATA files on the diskette were created under a different user number. This can be corrected by using the -U option described under "Command Line Options" in this document.

3. Sector will be skipped.

A data error has occurred while writing on the hard disk, or a verify error while reading from the hard disk. The error sector is skipped and its address of is displayed. The operator should insert that sector into the bad sector table.

4. No more room on hard disk.

The hard disk has been filled by restore files before the end of the restore operation. To recover, erase hard disk files that are not essential and selectively restore only essential files. By selectively restoring some files and then using the system operation STAT, it is possible to see how much hard disk capacity remains.

5. Bad MAP file (permanent), try another diskette or tape.

A data error occurred when BACKUP read the MAP file. At this point you should mount a different diskette from the backup set. Only ONE diskette from the backup set need have a MAP file that is completely error free. After one MAP file has been successfully read, the BACKUP program only reads the label from the MAP files of the other floppy diskettes. (The label is the first MAP record.) If a data error occurs while reading one of these labels, BACKUP will ask if you wish to override the label test process. Therefore, even if an error occurs while reading MAP files or labels, all files can still be restored.

6. Floppy disk has permanent error.

A data error occurred when BACKUP read the DATA file. The corresponding sector on the hard disk is filled with E5's and the sector on the floppy diskette is skipped.

7. Floppy disk or tape is inconsistent.

The files on the floppy diskette have been tampered with. This message occurs during the restoration of a particular hard

disk file; that file is not usable because BACKUP fills part or all of the file with null sectors (sectors with E5's) in order to resolve the discrepancy.

8. Tape is not ready.

The tape drive is returning a not ready status. The drive could be turned off or the tape may not be fully inserted. Insert tape and hit RETURN.

9. Tape is write protected.

Tapes have a write protect slot which can be turned with a dime or a small screw driver. After ensuring that the tape is really a scratch tape, remove the tape, twist the slot until the arrow points to NOT SAFE, return tape to drive and hit RETURN.

10. Tape is not a backup tape.

The tape was not created by backup or was not the first tape of a backup.

11. Input/Output error on tape.

The tape cannot be read or written. The job will abort.

SYSTEM ERROR

The following error may occur under MP/M-86. It should never occur under CP/M-86.

System
Fatal error -- Aborting

This means the system environment is incorrect. It is not a recoverable error. Possible causes are that the number of locks in the lock list was exceeded, that another user has custody on a disk drive, and so forth.

COMMAND-LINE OPTIONS (SUBMIT FILE FACILITIES)

BACKUP includes provisions for entering answers to questions on the command line at the time BACKUP is invoked. This facility can be used whenever BACKUP is run, but is especially useful when constructing SUBMIT files.

A SUBMIT file is a text file containing commands for the operating system to execute. Entering one command will execute all commands in the file. This is useful for developing a simple approach to handle a complicated procedure which must be done often. See your CP/M-86 or MP/M-86 manuals for information on how to construct and execute a SUBMIT file.

Command-line options are preceded with a "-", as with "-L". Here is a list and explanation of the command-line options, followed by some examples. The options may be in capital or small letters. When a string or value follows an option, there must be a blank between.

Erase -E

This erases prior backup files on the floppy diskette, if present, before writing new backup files. It is the equivalent of "ERA MAP" and "ERA DATA" on the diskette.

Label -L "string"

The string which follows becomes the user label when backing up. Because the string is on the command line, lower-case characters are changed to upper-case. Quotation marks, which are optional, allow placing blanks in the string. Either single or double quotation marks can be used.

More Suppress -M

Suppresses the MORE prompt during listing of MAP file.

Output Suppress -O

This option is used with MP/M-86 to suppress output during backup. It allows the console to be detached by using the MP/M-86 function, Control-D.

Prompt Response -P "string"

The string which follows is presented to the program as responses to questions normally requiring operator answers. It cannot be used to provide a label. See the examples below. The quotation marks are optional, and either single or double quote marks can be used.

Query -Q

Causes the program to ask Y/N, that is, whether or not to write, for each file being restored. Normally only files that are already on the hard disk are queried Y/N.

User Number -U n

Provides a user number n, (0-15), for the MAP and DATA files written on the floppy diskette. If no number follows -U, 0 is assumed.

Filename name name name...

One or more names of files to back up. Any number of these names may appear on a line, separated by a space between names.

Examples

Here are some examples. The general form is that command options follow "BACKUP" and precede any file specifications. When a string or number follows an option, there is a space between.

```
0A>BACKUP -P "LB"<CR>
```

This specifies a prompt response of L and B, that is, List for drive B. It will display (list) the MAP file of the diskette on drive B. The quotation marks are optional. When the list is finished, the user will be within the BACKUP program. Specifying "LBQ" would list and quit.

```
0A>BACKUP -P BABYQ *.*[G*]<CR>
```

The prompt response is B, A, B, Y, and Q. It asks for a Backup from disk A to disk B, gives a reply of Yes to "Is this OK?", and at the end says to Quit. The Backup file specification is for all the files of all users, specified by "*.*[G*]". These command line options provide all responses except the label, which will be entered by the operator during execution.

```
0A>BACKUP -P BABYQ -L "MAY PAYABLES" *.PAY<CR>
```

The prompt response specifies a Backup from disk A to disk B, a Yes reply, and to Quit at the end. The user label "MAY PAYABLES" is provided. The backup file specification is for all files with an extension of .PAY, specified by "*.PAY".

Command options can be grouped. For instance, the last example could have been:

```
0A>BACKUP -PL BABYQ "MAY PAYABLES" *.PAY<CR>
```

When options are grouped, the appropriate information follows in order, in separate groups, with any file specification information at the end. In the example above, "BABYQ" pertains to -P, and "MAY PAYABLES" pertains to L.