

Honeywell



LEVELS 66 & 68

HARDWARE

**MTU0610
MAGNETIC TAPE
UNIT OPERATION**

**SERIES 60 (LEVELS 66 & 68)
MTU0610 MAGNETIC TAPE
UNIT OPERATION**

SUBJECT

**Description, Functional Description, Operation, and Preventive Maintenance
Procedures for the MTU0610 Magnetic Tape Unit and the MTP0601 Magnetic
Tape Processor**

ORDER NUMBER

CB64, Rev. 0

June 1978

Honeywell

PREFACE

This reference document provides hardware-oriented descriptive and instructive material for the user of the MTU0610 Magnetic Tape Units and for others concerned with their technical aspects, application, or use.

Divided into four sections and an appendix, this manual contains a general description of the hardware used in the subsystem, including performance specifications, capabilities, features, and options (Section 1); a functional description (Section 2); a description of the operator-accessible controls and indicators (Section 3); the procedures necessary to enable operating personnel to operate and maintain the tape unit (Section 4); and magnetic tape processor information (Appendix).

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SECTION 1

INTRODUCTION

The MTU0610 Magnetic Tape Unit (see Figure 1-1) combines established design techniques with state-of-the-art advances to help meet user needs in several different tape processing environments. The MTU0610 is a 9-track, dual-density (800/1600 bpi), 200-ips tape unit.

The MTU0610 connects to and is controlled by a magnetic tape processor (MTP). The MTP controls the writing on and reading from magnetic tape recorded in nonreturn-to-zero-inverted (NRZI) at 800 bpi, or Phase-Encoded (PE) at 1600 bpi. The MTP0601 is described in the appendix.

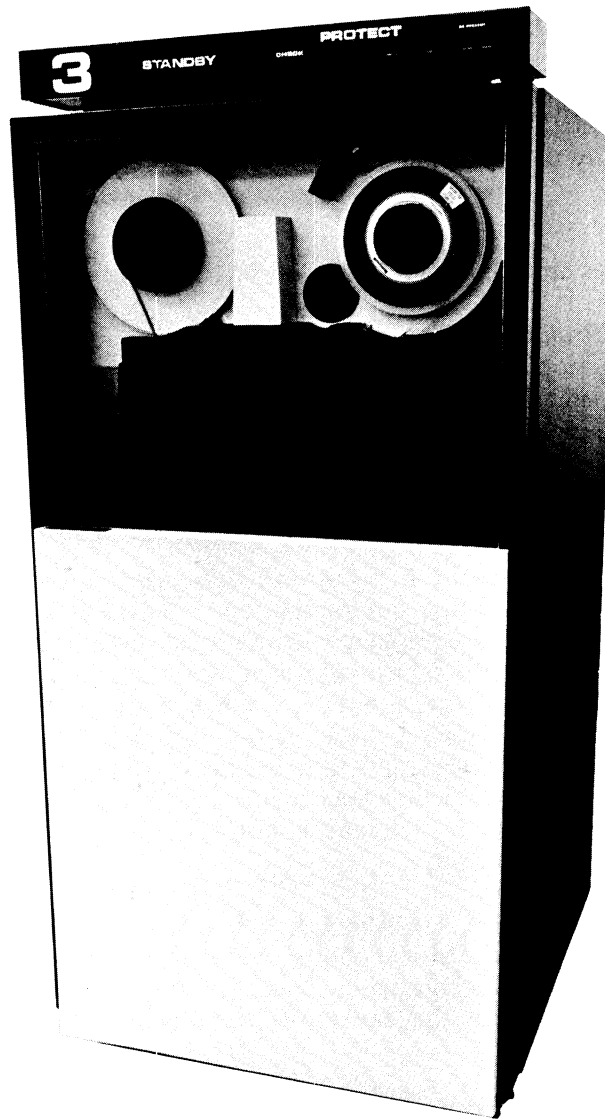


Figure 1-1. MTU0610 Magnetic Tape Unit

PROGRAMMED OPERATIONS

A single tape write command causes the central processor to transfer data from a specified output area in main memory, on a byte-by-byte basis, to the MTP, which in turn directs the performance of the write operation to the tape unit specified in the command. MTP logic provides the ability to write in BCD format and binary format. Writing is terminated when all the data in the output area has been transferred to tape.

Similarly, a tape read command causes the MTP to direct a specified tape unit in reading data from tape into a programmer-defined input area. The tape processor transfers the data recorded on the tape in either BCD character format or binary format. Reading is terminated when either the input area is filled, or the MTP senses the end of the record, whichever occurs first.

Other commands cause a specified tape unit to backspace or forward space one record/file, to rewind tape, to erase data from a section of tape or to the physical end-of-tape, to load and unload tape, to set permit/protect mode, and to set density.

DATA CHECKING

All information written is immediately read and checked. An extensive checking scheme is used throughout the tape units and MTP. In NRZI data recording at 800 bpi on 9-track tape, Longitudinal Redundancy Check (LRC) and the Cyclic Redundancy Check (CRC) characters are generated when writing and checked during reading in order to detect bit errors. In PE recording at 1600 bpi, the MTP detects and corrects single-track errors and electronically corrects any tape skewing during operation.

FEATURES

The following features are standard on the MTU0610:

- *Automatic Tape Cleaning:* Each tape unit incorporates precision tape cleaners that are positioned to function whenever the tape is in motion and in contact with the read/write head. Dust and foreign matter are removed from the tape by a combination vacuum and sweeping action. A blade presses the tape path, gently separating any particles of dirt or dust lodged on the tape surface. The particles are then swept up and away by a flow of air. The cleaning process is gentle and harmless to the tape and reduces the possibility of data errors due to the presence of foreign matter.
- *Automatic Tape Head Cleaner:* In addition to the conventional vacuum assisted tape scraper that is provided on one side of the tape head to clean the oxide side of the tape, the MTU0610 is also equipped with a special tape head cleaner as a standard feature. This cleaner utilizes a lint-free cleaning ribbon that when activated is positioned perpendicular to the tape reference edge, between the tape and head. The ribbon moves slowly across the tape head gaps to ensure a continuous supply of clean, unused ribbon wiping the head and tape media to remove any oxide residue. This cleaner is activated during rewind, load tape, and rewind/unload operations. During other tape operations it is inactive and is positioned so as not to interfere with the normal tape path configuration.
- *Automatic Tape Threading:* An automatic threading capability eliminates the need for manual tape threading. This capability, which functions with or without a protective cartridge, results in a substantial decrease in setup time when mounting tapes and, more importantly, reduces the possibility of tape damage due to operator mishandling.
- *Power Window:* The area of the tape unit containing the tape reels is protected from outside contamination by means of an automatically controlled power window that is lowered when mounting or demounting tapes, and raised at all other times. The power window capability eliminates manual window positioning.

OPTION

Table 1-1 lists the only option available for the MTU0610. This is a required option that must be specified for each unit.

TABLE 1-1. MAGNETIC TAPE UNIT OPTION

Option Number	Description
MTF0607	Nine-Track, 200 ips, 800/1600 bpi, NRZI/PE

CHARACTERISTICS

Table 1-2 lists the characteristics of the MTU0610 with the required option installed.

TABLE 1-2. MAGNETIC TAPE UNIT CHARACTERISTICS

Characteristics/With Option	MTF0607
Transport Speeds:	
Forward (ips)	200
Rewind Time (seconds)	45
Number of Tracks:	9
Interrecord Gap (inches):	
800/1600 bpi	.6
Data Transfer Rates:	
800 bpi	
Characters/second	213,333
Bytes/second	160,000
1600 bpi	
Characters/second	426,666
Bytes/second	320,000

SPECIFICATIONS

Dimensions:

Width – 30.5 inches (77.5 cm)

Depth – 30 inches (76.2 cm)

Height – 65.25 inches (165.7 cm) – to top of operator's panel

Installed Weight:

900 pounds (409 kg)

Operational Environment:

Temperature – 68° - 85° F (20° - 29°C)

Humidity – 40 - 60%

SUPPLIES AND ACCESSORIES

Honeywell markets a complete line of computer tape, tape-packaging options, and accessories. For more information, refer to the *Honeywell Computer Supplies Catalog* (Order No. BY62) or contact your Honeywell Marketing Representative.



SECTION 2

FUNCTIONAL DESCRIPTION

This section provides a functional description of the tape transport mechanism, the layout of magnetic tape, and a brief description of the various recording modes.

TAPE TRANSPORT OPERATION

The tape transport system is composed of supply and take-up reels, a magnetic read/write head, self-cleaning tape cleaners, a tape head cleaner, a single capstan, two loop chambers, automatic tape threading, a transport window, self-loading cartridge capability, and vacuum pressure sensors that sense the position of the tape within the loop chamber columns. The Honeywell tape transport mechanism (see Figure 2-1) utilizes the single capstan concept for tape motion. The capstan is positioned directly to the left of the read/write head.

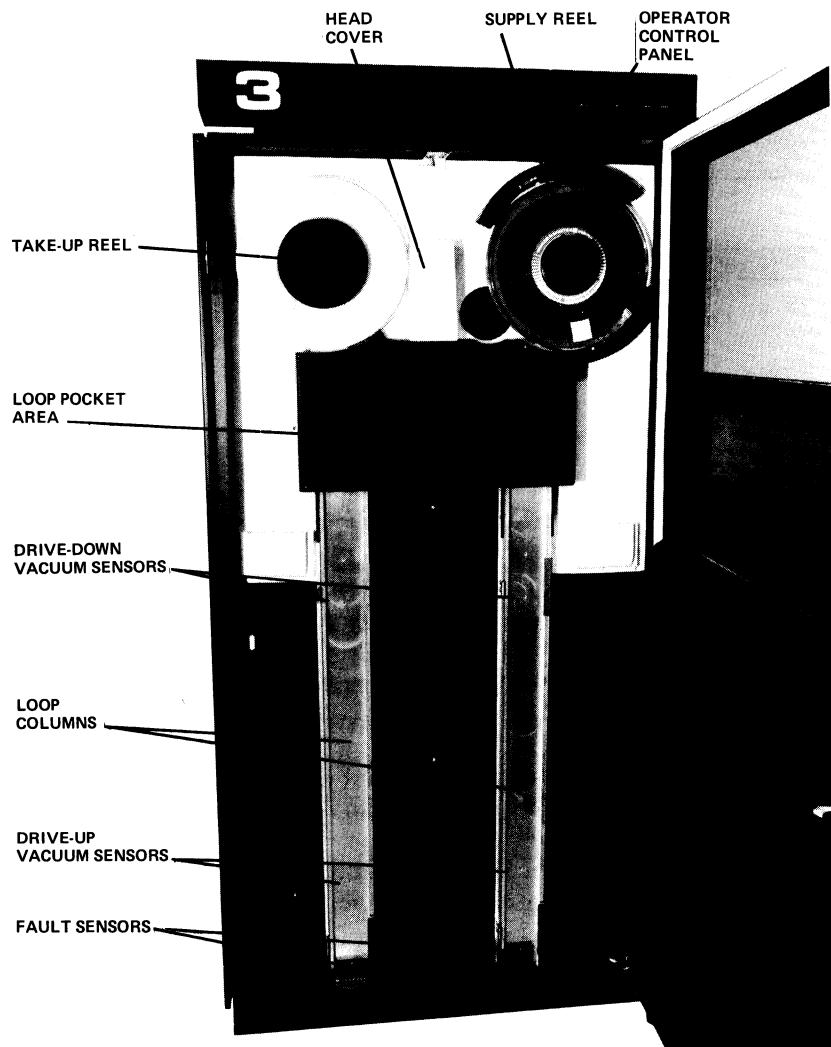


Figure 2-1. Tape Transport System

During a tape load operation, the supply reel (tape reel to be accessed) is placed on the reel hub. The hub automatically locks the supply reel in place and the tape automatically feeds and threads itself through the tape head assembly onto the take-up reel (see Figure 2-1). Some of the tape drops into the two narrow vertical chambers located below the tape head assembly. These are the vacuum loop chambers. Vacuum sensors are positioned in each chamber to control reel rotation and braking action by sensing the position of the tape loop in the chamber columns. They also ensure that each chamber contains sufficient slack to prevent tape damage. Vacuum in the loop chambers pulls the tape onto the capstan and continuously maintains a constant tension on the tape as it passes across the read/write head. Tape direction and speed are determined by the capstan, which moves the tape in the direction specified by the device-oriented electronics that receives its commands from either the tape processor or from manually operated local controls within the tape unit.

MAGNETIC TAPE

The physical layout of half-inch magnetic tape is illustrated in Figure 2-2. A full reel of tape has a nominal recording length of 2400 feet (732 m); the entire length of the tape is oxide coated. Beginning-of-tape and end-of-tape sensing is controlled by reflective markers affixed to the Mylar base side of the tape. The beginning-of-tape (BOT) spot is attached approximately 16 feet (4.87 m) from the physical beginning of the tape, and the end-of-tape (EOT) spot is attached approximately 25 feet (7.62 m) from the physical end of the tape.

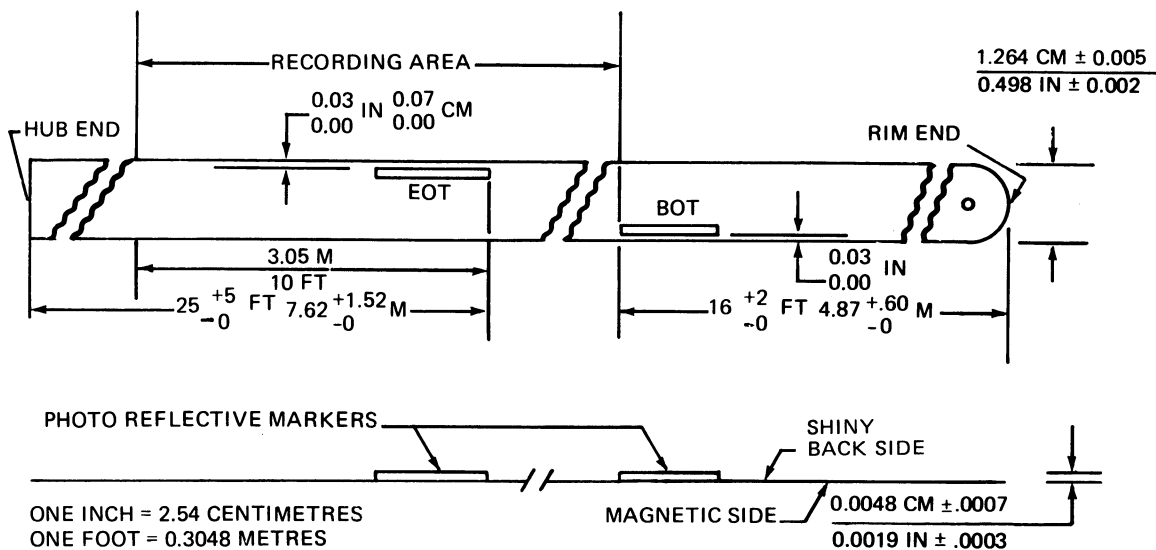


Figure 2-2. Magnetic Tape Layout

MEDIA REQUIREMENTS AND INTERCHANGEABILITY

Tapes generated by these units are compatible and exchangeable with tapes generated by units of other equipment suppliers if they comply with American National Standards Institute recording standards.

A tape that degrades the performance of a tape unit such that unsatisfactory operation is experienced or causes an otherwise satisfactory tape mounted on that unit in subsequent passes to have difficulty is known as an "inhibitor" tape. Inhibitor tape characteristics include poor edge conditions, excessive tape wear products, interlayer slippage, tendency for oxide coating to transfer to the back of reel's next layer, as well as any tendency for tape constituents to separate and cause deposits leading to tape stick or to inhibiting proper performance of other tapes. Tapes that exhibit these characteristics may not give satisfactory performance and may result in excessive errors, therefore, magnetic tapes used on Honeywell magnetic tape subsystems must meet the following ANSI standards:

- X3.40-1976, Unrecorded tape for Information Interchange (9-Track, 200 and 800 bpi, NRZI and 1600 bpi, PE)
- X3.39-1973, Recorded Magnetic Tape for Information Interchange (1600 bpi, NRZI)
- X3.22-1973, Recorded Magnetic Tape for Information Interchange (800 bpi, NRZI)

Failure to meet these standards may result in unsatisfactory performance and interchange. It should be noted that 1.0 mil tape is not allowed by ANSI X3.40-1976.

Magnetic tapes purchased from Honeywell meets ANSI standards and are recommended for use on Honeywell magnetic tape subsystems. ANSI standards are available from: American National Standards Institute Inc., 1430 Broadway, New York, NY 10018.

RECORDING MODES

For the MTU0610, data can be recorded and read in NRZI mode at 800 bpi, or in the PE mode at 1600 bpi. The two recording modes are explained in the following paragraphs.

Nonreturn-to-Zero Inverted

The NRZI or Nonreturn-to-Zero-Inverted (also called Nonreturn to Zero, Change on Ones) recording technique has a flux reversal for each 1, with no flux reversal on a 0 (see Figure 2-3).

Data formats are generally arranged so that at least one flux reversal occurs for every frame (even parity in BCD mode and odd parity in binary mode). Thus a clock is provided without assigning a separate track.

Phase-Encoded

The PE or Phase-Encoded recording technique combines the clock and data to provide at least one flux reversal for each bit cell, thus achieving self-clocking (see Figure 2-3).

A "1" is a flux change to the polarity of the interrecord gap; a "0" is a flux change to the polarity opposite that of the interrecord gap, when reading in the forward direction. With PE, single-track errors are correctable.

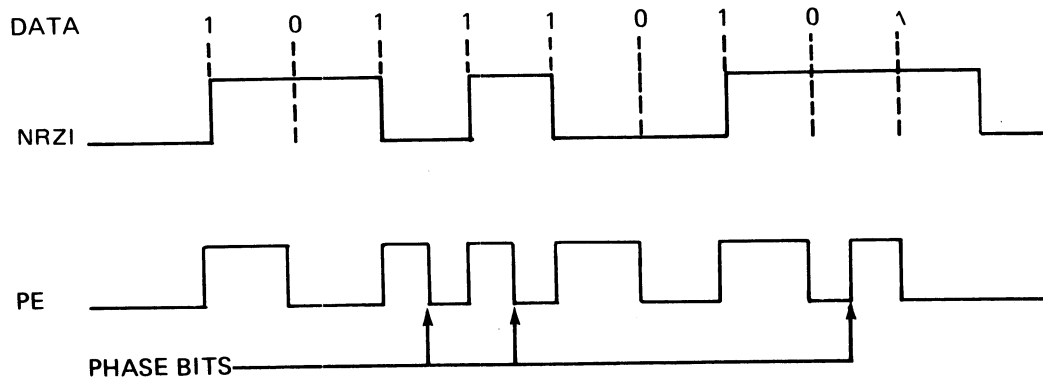


Figure 2-3. Recording Techniques



SECTION 3

CONTROLS AND INDICATORS

MAGNETIC TAPE UNIT CONTROL PANEL

The controls and indicators on the control panel for the MTU0610 are shown in Figure 3-1. A description of the function of each indicator and control follows the figure. Indicators are visible only when lighted.

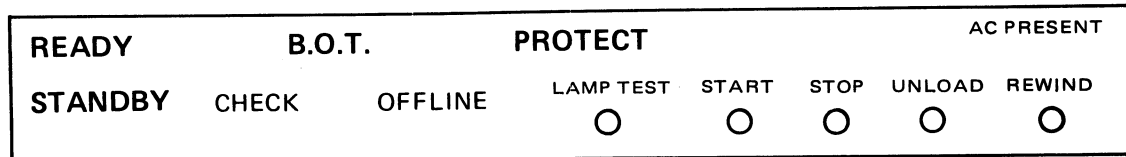


Figure 3-1. MTU0610 Control Panel

READY (Indicator)

Lights when the unit is not in the offline or standby state and is available for read/write operations. This condition exists as a result of the successful completion of a load tape command, or upon pressing the START button following completion of a rewind operation.

B.O.T. (Indicator)

Lights when the beginning of tape marker is detected. It does not light upon detection of multiple reflective markers. If a BOT marker is located more than 26 feet from the physical beginning of tape, it will not be detected.

PROTECT (Indicator)

Lights as a result of any of the following conditions:

- No tape reel is mounted on the unit.
- A tape reel without a write-permit ring is mounted on the unit.
- A write protect command has been executed on the unit.

STANDBY (Indicator)

Lights when the unit is not offline, not ready, and not available for read/write operations as a result of any one of the following conditions:

- A tape is not loaded.
- A tape load or unload operation is being executed.
- A malfunction has occurred in the unit.
- The STOP button was pressed.

AC PRESENT
(Indicator)

Lights when ac power is applied to the unit via the ac circuit breaker located behind the rear door.

CHECK
(Indicator)

Lights when a fault condition is detected in the unit, dc power is initially applied, or whenever the SEMI/AUTO switch is set to SEMI.

OFF LINE
(Indicator)

Lights when the unit has been placed in the offline state by setting the ON LINE/OFF LINE switch to OFF LINE. This switch is located behind the rear door. The unit is not available to the system while the unit is in the OFF LINE mode.

LAMP TEST
(Push Button)

Used to light all operator visible indicators to check for defective bulbs.

START
(Push Button)

Used to initiate a function corresponding with the following:

- If in STANDBY with an unloaded unit and AUTO mode, START initiates an automatic tape load operation.
- If in STANDBY with an unloaded unit and SEMI mode, START engages the file reel and starts vacuum for manual tape load.
- If in STANDBY with a loaded unit not at BOT and AUTO mode, START initiates a rewind operation to BOT.
- If in STANDBY with a loaded unit at BOT, not OFF LINE and AUTO mode, START causes unit to go READY.
- If in READY, START has no effect.

STOP
(Push Button)

Used to initiate a function corresponding with the following:

- If in READY, STOP halts tape motion and lights STANDBY.
- If in STANDBY with a load in progress but prior to rewinding, STOP halts the load operation and shuts off vacuum.
- If in STANDBY with a load in progress during a rewind, STOP halts tape motion.
- If in STANDBY with an unload in progress and tape moving, STOP halts the unload operation and shuts off vacuum.
- If in STANDBY with an unloaded unit, STOP raises the power window.

REWIND
(Push Button)

Used to initiate a rewind operation when in STANDBY or OFF LINE.

NOTE: The unit does not go READY upon detecting BOT.

UNLOAD (Push Button)

Used to initiate a function corresponding with the following:

- If in STANDBY with an unloaded unit, UNLOAD lowers the power window.
- If in STANDBY with a loaded unit and SEMI mode, UNLOAD shuts off vacuum and disengages the file reel hub.
- If in STANDBY or OFF LINE, with a loaded unit and AUTO mode, UNLOAD initiates a rewind/unload operation.
- If in READY, UNLOAD has no effect.

POWER

Power is controlled by a circuit breaker located behind the rear door and in the lower right-hand area (see Figure 3-2). When the circuit breaker is set to the ON position, an indicator above the switch lights as well as various indicators (including AC PRESENT) on the operator control panel.

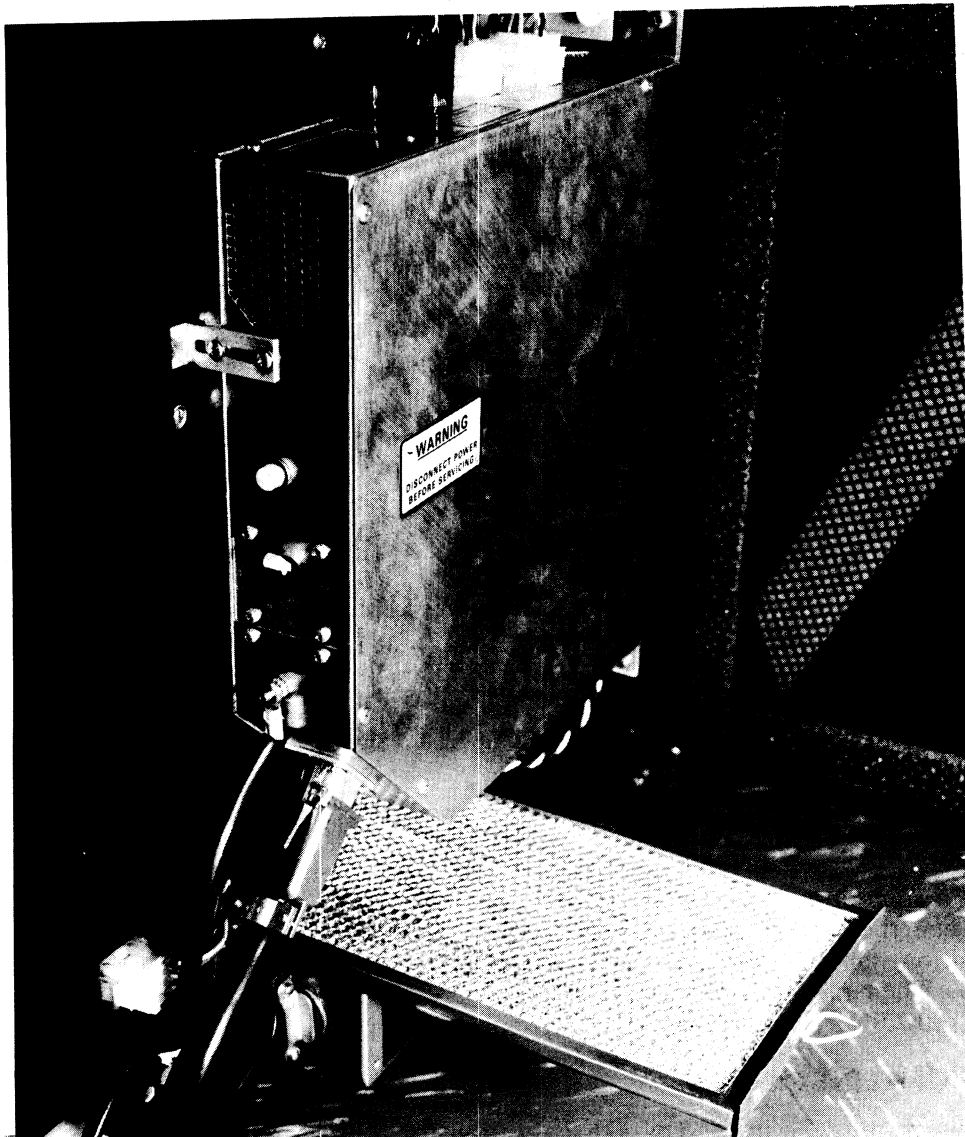


Figure 3-2. Circuit Breaker and Filter

SEMI/AUTO SWITCH

A two-position toggle switch, SEMI/AUTO is located at the top of the tape deck between both hubs (see Figure 3-3). The two-position toggle switch is used only when difficulty has been incurred in the automatic feeding and threading of tape. It is also used with 10-1/2 inch diameter reels having less than 1200 feet of tape or any reel smaller in outside diameter than 10 1/2 inches. Setting the switch to SEMI (semiautomatic) enables the operator to manually feed and thread the tape up to the take-up reel. The unit will not cycle up until the switch is returned to the AUTO position. AUTO (automatic) is the setting of the switch during normal operation.

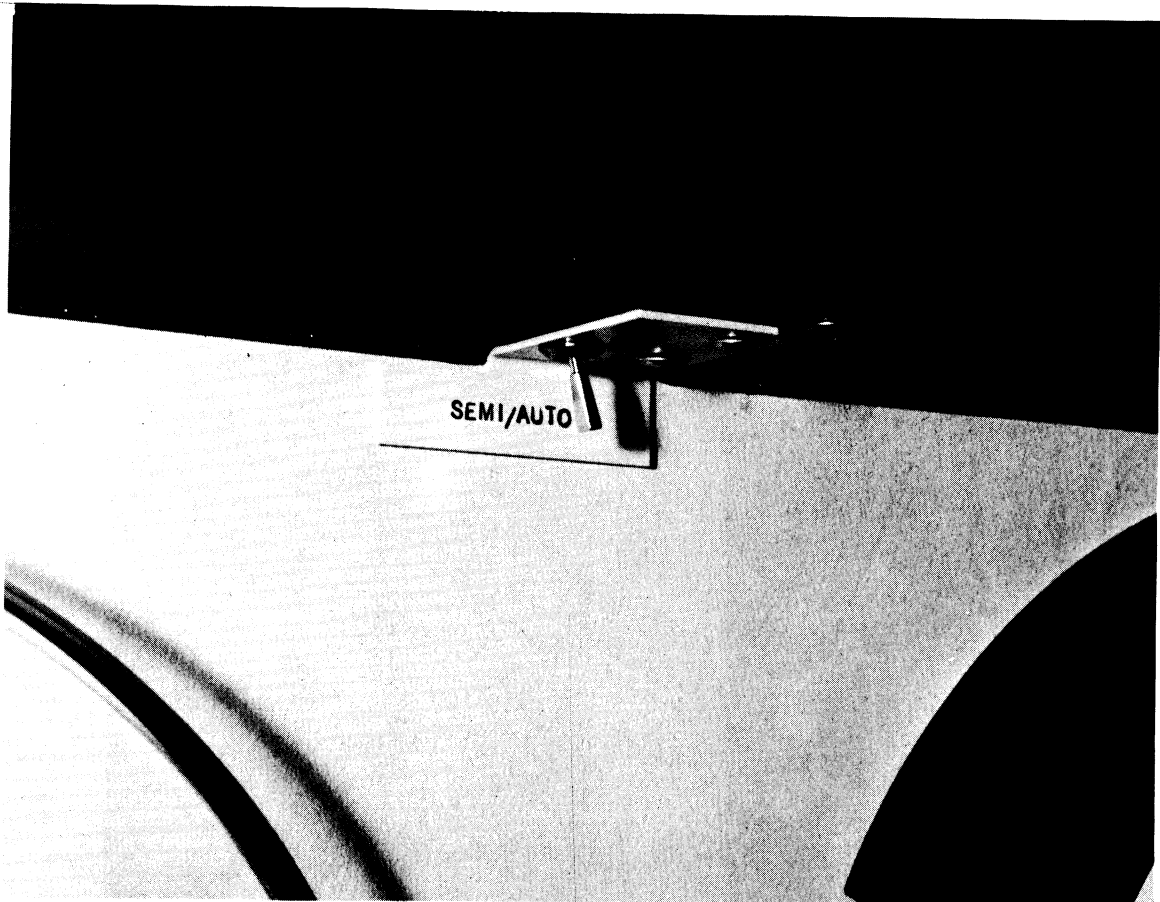


Figure 3-3. SEMI/AUTO Switch

FORWARD/REVERSE SWITCH

The FWD/REV switch is used mainly by the Field Engineer, but may be useful to the operator in some instances. The momentary contact switch is located behind the front door and between the two vacuum columns (see Figure 4-4). When moved momentarily to the FWD position, tape will move in the forward direction until EOT is detected or the STOP is depressed. When moved momentarily to the REV position, tape will move in the reverse direction until BOT is detected or STOP is depressed.

ON LINE/OFF LINE SWITCH

This switch must be in the ON LINE position for normal tape unit operation. The OFF LINE position is used by the Field Engineer. The switch is located behind the rear door and in the lower left-hand area (see Figure 3-4).

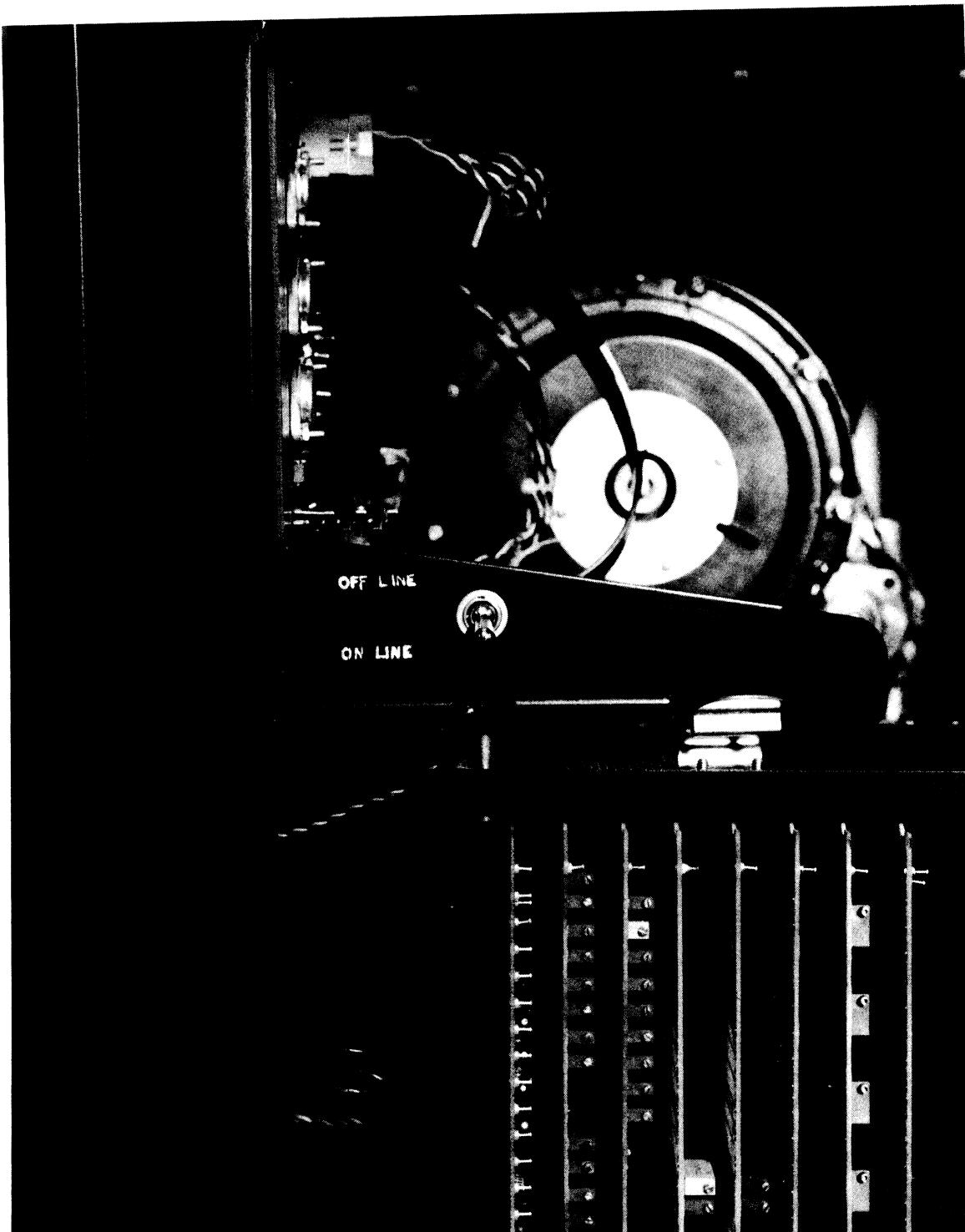


Figure 3-4. OFF LINE/ON LINE Switch

POWER WINDOW SAFETY BAR

The front door contains a safety bar at the top that, if tripped, instantly lowers the window. The safety bar is activated if anything is on top of the window glass during window closure. It is designed into the unit to prevent an operator from getting an arm or hand caught in the window or the glass from breaking if something noncollapsible is in the path of the rising window.



SECTION 4

OPERATION AND MAINTENANCE

This section is separated into two parts: the first part details the routine as well as the exceptional operating procedures; the second part explains the operator's tasks involved in preventive maintenance. To minimize the possibility of error or damage to the tapes, it is important that the operator understand the use and function of the various controls and indicators previously explained in Section 3.

OPERATING PROCEDURES

File Protection

Unintentional writing on magnetic tape is prevented by two methods:

1. Tape unit sensing the absence of a write-permit ring.
2. Tape unit entering the write protect mode via program control (or via the operator's console command language).

The first method is implemented by the operator by simply removing the write-permit ring from a tape reel when operating instructions so dictate; the second method is implemented by the programmer when coding the program.

If a tape unit is to be used for reading (input) only, the write-permit ring should be removed to avoid any possibility of unintentionally writing on the tape mounted on that unit (whether by programmer error, device malfunction, or operator error). The write-permit ring on the tape reel permits writing on that reel of tape.

The write-permit ring is installed in a groove on the back of the tape reel (see Figure 4-1). When the ring is in position, new information can be written onto the tape. To mount the write-permit ring, orient the ring to the correct position and press it firmly into place. No special tools are required. If the ring is not present, the tape unit can only read from that tape.

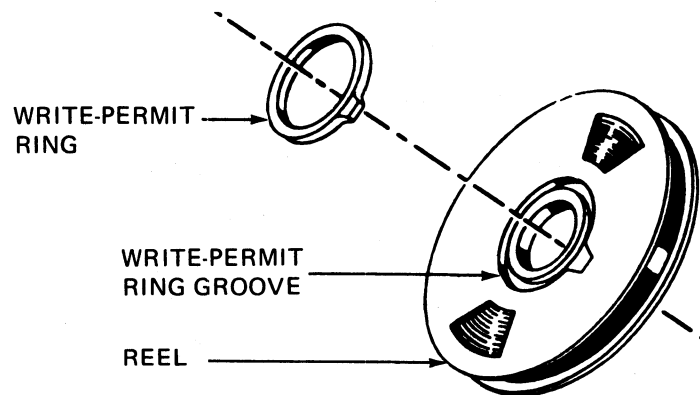


Figure 4-1. Write-Permit Ring

Power-up Sequence

In the following procedure, it is assumed that all cables have been properly connected and secured and that power is applied to the unit(s).

1. Open rear door of each unit.
2. Set the circuit breaker located at the rear of each tape unit (Figure 3-2) to the up or "on" position.
 - AC PRESENT and STANDBY indicators light.

3. Close rear door.
4. Refer to tape loading procedures.

Power-down Sequence

In the following procedure, it is assumed that tape unloading is completed and window raised.

1. Open rear door of each tape unit.
2. Set circuit breaker to the down or "off" position.
 - AC PRESENT and STANDBY indicators extinguish.
3. Close rear door.

Tape Loading and Automatic Tape Threading

NOTE: During a load, unload, and rewind operation, the unit is always in PROTECT.

With Self-Loading Cartridge Reel

1. Press the UNLOAD button to lower the window.
2. Insert or remove write-permit ring in tape reel as appropriate.
3. Place the closed cartridge reel onto the right-hand reel mounting hub.
 - Make sure the index tabs on the cartridge fit into the corresponding receptacles on the tape unit (see Figure 4-2).
4. Set the SEMI/AUTO switch to AUTO.
5. Remove hands from the tape compartment.
6. Press the START button.
 - When the air pressure in the tape unit reaches operating level, the reel automatically locks onto the hub, the window raises, the cartridge is automatically opened, and tape feeds and threads itself onto the take-up reel for several revolutions, then drops tape into the loop chambers, positions to BOT, and stops. BOT and READY indicators light.

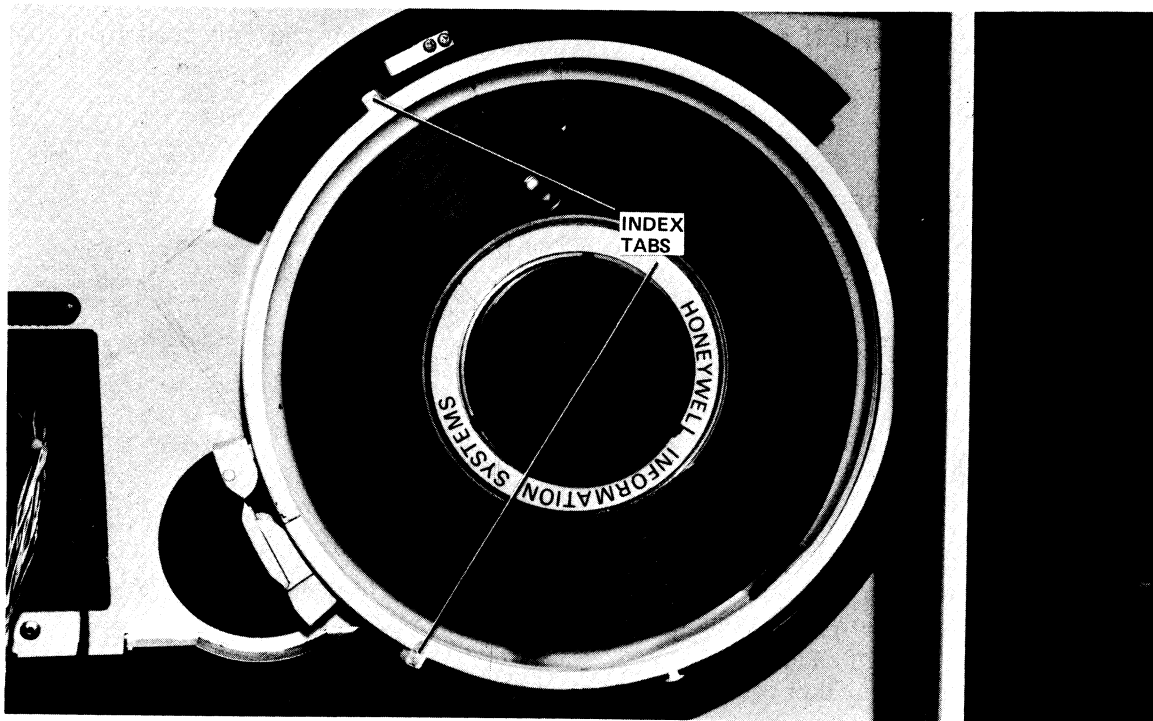


Figure 4-2. Self-Loading Cartridge Mounting

With Standard Reel

1. Press the UNLOAD button to lower the window.
2. Insert or remove write-permit ring in tape reel as appropriate.
3. Place the supply reel onto the right-hand reel mounting hub, ensuring reel is fully seated against the hub face.
 - Handle the reel by the hub and not by the flanges, which are the weakest part of the reel and susceptible to damage.
4. Manually rotate the reel clockwise until the leader tip is extended along the inner surface of the tape chute resting at approximately the 5 o'clock position.
5. Set the SEMI/AUTO switch to AUTO.
6. Remove hands from the tape compartment.
7. Press the START button.
 - When the air pressure in the tape unit reaches operating level, the tape reel automatically locks onto the hub, the window raises, the tape automatically feeds and threads itself onto the take-up reel for several revolutions, then drops into the loop chambers, winds to BOT, and stops. BOT and READY indicators light.

Tape Loading and Manual Tape Threading

1. Press the UNLOAD button to lower the window.
2. Insert or remove write-permit ring in tape reel as appropriate.
3. Place the reel of tape onto the right-hand reel mounting hub.
4. Set the SEMI/AUTO switch to SEMI.
5. Press the START button to lock the reel onto the hub.
6. Manually rotate the supply reel to thread and feed the tape onto the take-up reel.
7. Rotate the take-up reel in a clockwise direction, wrapping two or three turns of tape onto the reel.
8. Set the SEMI/AUTO switch to AUTO.
9. Remove hands from the tape compartment as the window rises; the tape winds onto take-up reel, drops into the loop chambers, positions to BOT, and stops. BOT and READY indicators are illuminated.

Rewinding Tape

1. Press STOP button.
 - STANDBY indicator lights.
2. Press REWIND button.
 - Tape rewinds to BOT and stops, but READY does not light.

Tape Unloading

1. Press the STOP button.
 - STANDBY indicator lights.
2. Press the UNLOAD button.
 - The tape rewinds at high-speed and continues until low tape enables light to be sensed by the reel sensor. At this point, the tape decelerates to the normal read/write speed and continues at this rate until the BOT marker is sensed. The BOT indicator lights and the tape stops momentarily.
 - The supply reel proceeds to pull tape out of the loop chambers. When all the tape has been rewound onto the supply reel, the tape unit shuts down. With pressure removed from the system, the supply reel is released from the hub and the power window automatically lowers.
3. Remove the tape reel from the tape unit.
4. Press STOP button to raise window unless another tape is to be mounted.

NOTE: The transport window should be closed whenever the tape unit is not in use so that the tape transport is kept free of dirt and dust.

Alert Conditions and Recovery Procedures

The following is a list of alert conditions and the corresponding recovery procedures. If the recovery procedures fail to resolve the symptom, where appropriate, replace the tape and/or cartridge and retry. If this also fails, notify the Field Engineer.

Symptom	Possible Cause(s)	Recovery Procedure
Faulty Load	Tape does not exit cartridge.	<ol style="list-style-type: none"> 1. Open front door. 2. Remove cartridge from unit. 3. Open cartridge and remove tape reel. 4. Manually straighten tip of tape and check tape leader for damage. 5. Insert tape reel in cartridge and ensure that tape end is in 3 to 5 o'clock position with reference to the opening on cartridge which is approximately at the 6 o'clock position. 6. Close cartridge. 7. Remount cartridge on unit. 8. Close front door. 9. Retry loading procedure.
	Tape fails to reach left-hand reel and CHECK lights.	<ol style="list-style-type: none"> 1. Open front door. 2. Check tape path for obstruction. 3. Check tape leader for damage. 4. Close front door. 5. Retry loading procedure.
	<p>Tape winds onto take-up reel approx. 26 feet without detecting BOT, tape loops are not set, and CHECK lights due to:</p> <ul style="list-style-type: none"> • Mispositioned BOT marker, i.e., less than 8 ft. or more than 26 ft. from tip. • BOT marker missing. 	<ol style="list-style-type: none"> 1. Open front door. 2. Wind tape back onto supply reel. 3. Remove tape reel from unit. 4. Properly install BOT marker. 5. Check leader length (maximum of 26 feet). 6. Remount tape reel. 7. Close front door. 8. Retry loading procedure.
Cartridge Failures	Fails to open.	<ol style="list-style-type: none"> 1. Press UNLOAD button. 2. Check cartridge opening pin: <ul style="list-style-type: none"> – If pin is visible in counterclockwise (closed) position, remove and remount cartridge ensuring opening pin and opening hole are mated properly. – If pin is in clockwise (open) position, move pin to the counterclockwise (closed) position. 3. Retry loading procedure.

Symptom	Possible Cause(s)	Recovery Procedure
Cartridge Failures (continued)	Fails to close.	<ol style="list-style-type: none"> 1. Press UNLOAD. 2. Manually close cartridge.
	Closes over tape.	<ol style="list-style-type: none"> 1. Press UNLOAD button. 2. Manually open cartridge. 3. Retry loading/unloading procedure.
Loop Faulting	READY extinguishes with tape in loop columns positioned above loop column glass or below fault sensor (see Figure 2-1).	<ol style="list-style-type: none"> 1. Open front door. 2. Manually rotate reels to reposition tape in loop column below the drive-down sensor and above the drive-up sensor. 3. Close front door. 4. Press START button.
	Tape twisted in loop pocket area (see Figure 2-1).	<ol style="list-style-type: none"> 1. Power down tape unit. 2. Open front door. 3. Straighten tape. 4. Power up tape unit. 5. Check for tape damage. 6. Close front door. 7. Press START button.
	Loop column doors are partially open.	<ol style="list-style-type: none"> 1. Open front door. 2. Check that loop column doors are tightly closed. 3. Close front door. 4. Retry procedure.
READY extinguishes	Faulted condition.	<ol style="list-style-type: none"> 1. Open front door. 2. Reposition tape in loop columns. 3. Press STOP button. 4. Close front door. 5. Press START button.
	Front door ajar.	<ol style="list-style-type: none"> 1. Close front door. 2. Press START button.

Failure of Automatic Tape Threading

Should the tape fail to thread automatically onto the take-up reel, the tape unit rewinds the tape back onto the supply reel. If a cartridge is used, one automatic retry is attempted. If unsuccessful, the tape is rewound onto the supply reel and CHECK lights leaving the cartridge mechanism open and hub disengaged. If a cartridge is not used, the retry is not executed.

Failure of automatic tape threading may be due to any one of the following:

- A static condition
- A defective tape leader
- A missing or defective BOT patch
- A tape that has been subjected to abusive treatment in handling and storage
- The use of an old and abused cartridge or reel

To ensure the automatic threading of tape, always check and closely observe the physical condition of reel, cartridge, and tape prior to mounting. If the tape unit fails to thread tape automatically, the operator may be compelled to thread tape manually.

To assure successful tape loading under these conditions:

1. Press the UNLOAD button to lower the window.
2. Remove supply reel from reel mounting hub.
3. Separate clinging leader from reel.
4. Remount supply reel.
5. Preposition the leader into the ramp so that the tip of tape is positioned anywhere in the 4 to 6 o'clock position on the tape ramp.
6. Set SEMI/AUTO switch to AUTO.
7. Remove hands from the tape compartment.
8. Press the START button

Static Conditions

Static conditions can cause the leader to cling to the reel of tape and not separate during the reverse tape motion performed at the start of the tape loading operations.

NOTE: An improper environment in the tape storage and/or the computer room will contribute to static conditions.

Defective Tape Leaders

Damaged tape leaders are usually the cause of tape not threading automatically. The tape can be threaded manually, but not automatically until the leader has been repaired.

1. Remove the damaged part of the leader (folds/creases) by cutting it with a Honeywell Tape End Cutter (M2045) or equivalent.
2. Crimp the tape with a crimping tool or a Honeywell Tape End Cutter, which also performs this function. (See Figure 4-3).
 - The tape crimp or dimple prevents the tape from adhering to itself and the trim renders optimum performance during automatic tape threading.

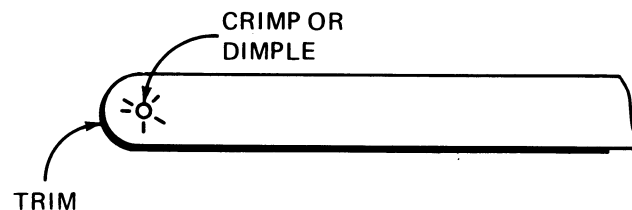


Figure 4-3. End-of-Tape Trimming and Crimping

NOTE: If a tape unit persists in rejecting the automatic load, even after the leaders have been trimmed, call your Honeywell Field Engineer.

Defective BOT Patch

A missing or defective beginning-of-tape (BOT) patch causes the failure to complete the load operation. Sensing this, the tape motion is stopped. Upon observing this, the operator should do the following:

1. Press the STOP button to shut off vacuum.
2. Open front door.
3. Manually rewind all the tape back onto the supply reel.
4. Remove the cartridge or supply reel to inspect the condition and location of the patch.

5. Replace the BOT patch if necessary, and remount the reel.
6. Close door.
7. Resume normal operations (refer to "Tape Loading and Automatic Tape Threading") to load tape.

Defective EOT Patch

A missing or defective end-of-tape (EOT) patch causes reading or writing past the proper end of tape. Sensing this, the tape motion is stopped. Upon observing this, the operator should perform the following:

1. Press STOP button to shut off vacuum.
2. Open front door.
3. Manually wind the remaining tape from the supply reel onto the take-up reel.
4. Inspect the condition and location of the EOT patch.
5. Replace the EOT patch, if necessary.
6. Wind tape onto the empty supply reel several turns past the EOT marker. Tape must be threaded below head and between cleaner guide trough and cleaner ribbon.

NOTE: If the supply reel is a self-loading cartridge reel, remove the cartridge temporarily until step 11.

7. Form loops under each reel.
8. Press START button to start load.
 - Tape will rewind to BOT as soon as load is completed.
9. Press STOP button.
10. Press UNLOAD button.
11. Place supply reel into self-loading cartridge if removed in step 6.
12. Resume normal operations.

BOT/EOT Patch Mounting

The beginning and end of the working storage area on the tape is marked by a small inch-long reflective marker. Marker dimensions are:

Length: 1.1 inch \pm 0.2 inch
Width: 0.19 inch \pm 0.02 inch
Thickness: 0.0008 inch maximum

The BOT and the EOT markers are placed on the Mylar base (shiny) side of the tape. Care must be exercised in placing the markers. They must be within 0.03 inch of but not protrude beyond the reference edge of the tape (see Figure 2-2), and free of wrinkles and excessive adhesive.

Tape Handling and Storage

The following rules are prerequisite for proper magnetic tape handling, storage, and shipping:

1. *Keep tapes clean.* Dust and dirt can reduce the intensity of reading or recording signals by altering the distance between the head and the tape. Therefore:
 - Never touch the tape's oxide coating; body oils on tape attract dust and lint.
 - Keep the tape in its dust-proof container until just prior to use on the tape drive.
 - Keep tape containers clean and dust-free *inside* and *out*. Don't leave containers open when tape is in use.
 - Keep the tape transport window closed when the tape drive is not in use.
 - Avoid dangling the free end of the tape on the floor when changing reels.
 - Don't smoke in the computer room. Smoke and ashes are dirt; hot ashes are destructive to magnetic tape. Food and drink should be prohibited.
 - Identify reels with adhesive stickers, which are easily removed and leave no residue. Eraser particules are dirt. Change the label, don't erase it.

2. *Handle and store tapes with care.* Avoid damaging tapes and reels or placing tapes where temperature, dust, or magnetic fields affect them adversely.
 - When rewinding tape, be sure wind tension is proper (approximately 6 to 8 ounces (168 to 224 grams) for one-half inch (1.27 cm) wide tapes). Loose or tightly wound tape causes wrinkles and creases to appear on the tape, which in time disrupt contact between tape and tape drive head.
 - Make sure that the tape leader is properly wound when tape is returned to its container. This avoids accidental crushing of tape leader edges and possible damage to the tape itself.
 - Avoid dropping reels. If a tape is dropped, the reel may become broken or dirty, resulting in possible damage to the tape. Reel damage can be determined by a visual inspection. Never use a reel that may cause damage to the tape or to the tape drive.
 - Always store tapes in containers in a dust-free cabinet. The containers should be placed on edge so that the reel is in an upright position. Stacking tape reels one on top of the other is not recommended since there is a possibility of damaging the bottom containers from the excessive weight of the stacked reels.
 - Never place reels of tape on top of a tape drive as this exposes them to heat and dust from the cooling system.
 - Never store reels of tape in an area where strong magnetic fields are present or where they may come in contact with magnetic materials.
 - Whenever possible, store tapes in the controlled environment where they are to be used to avoid subjecting the tapes to excessive handling and variations in temperature and humidity. For short-term tape storage, the surrounding atmosphere should be controlled with the following limits:
 - Relative humidity: operational 40% to 60%
 - Temperature: operational 60°F to 80°F (16°C to 27°C)
 - For long-term storage, the reel of tape in its container should be hermetically sealed in a moisture-proof bag. Temperature should be constant somewhere between 60°F and 80°F (16°C to 27°C). Freezing or excessively high temperatures and magnetic fields and materials are to be avoided.
 - When mounting or demounting tapes, handle the tape reels by the hub and not by the flanges. Squeezed or bent flanges result in damaged tape edges and eventual loss of contact with the magnetic head.
 - In manual loading, when mounting a reel onto the tape drive, apply pressure to the hub and not to the flanges.
 - A routine library inspection of tape reels should be put into practice. Check for protruding tape edges. Exposed edges are vulnerable to damage and cause loss of contact with the tape drive head.
3. *Ship tapes properly.* Whenever it is necessary to mail or ship recorded tapes to other locations, certain precautions should be taken to ensure the safety and integrity of the tapes in transit.
 - The outer shipping container into which the canisters are placed must afford the necessary strength and rigidity to protect the tape or tapes from damage caused by dropping or crushing. Wood or cardboard spacing material should be packed between the tapes and the outer shipping container for physical protection as well as for isolation from any magnetic fields that could cause accidental tape erasure. Three inches of this bulk spacing should constitute adequate protection, from stray magnetic fields.
 - While a container that is 100% watertight is not necessary, it must provide a reasonable degree of water resistance. It should, for example, be able to protect the contents from damage if, during shipping, it is left on a loading dock in the rain.
 - Though the free end of a reel of tape should always be secured, it is particularly important when preparing reels for shipping. While in storage, either a hold-down sponge or vinyl strip may be used. During shipping, however, it is advisable to use both.

- Tape in transit may be subjected to temperature extremes. Temperatures as low as -40°F might be encountered in an aircraft cargo hold at high altitudes. A temperature of 120°F could easily be encountered in a motor vehicle in the summer sun. It must again be emphasized that all incoming tape should be allowed to reach environmental equilibrium before being used.

MAINTENANCE PROCEDURES

Operators are expected to perform a limited amount of preventive maintenance which includes tape unit cleaning and changing defective control panel bulbs.

Clean Tape Unit

NOTE: In the following cleaning procedures, note that two different tape transport cleaners are used. These cleaners should only be applied where specifically mentioned and should not be mixed or applied with the same cleaning tools. A cleaning kit with all of the necessary tools and cleaners is available from your Honeywell Computer Supplies Group. This procedure should be performed for every eight hours of operation. Refer to Figures 4-4 and 4-5.

1. Remove tape from unit.
2. Set cabinet circuit breaker to OFF (see Figure 3-2).
3. Open front door.
4. Open loop pocket door and loop column glass doors (see Figure 4-4).

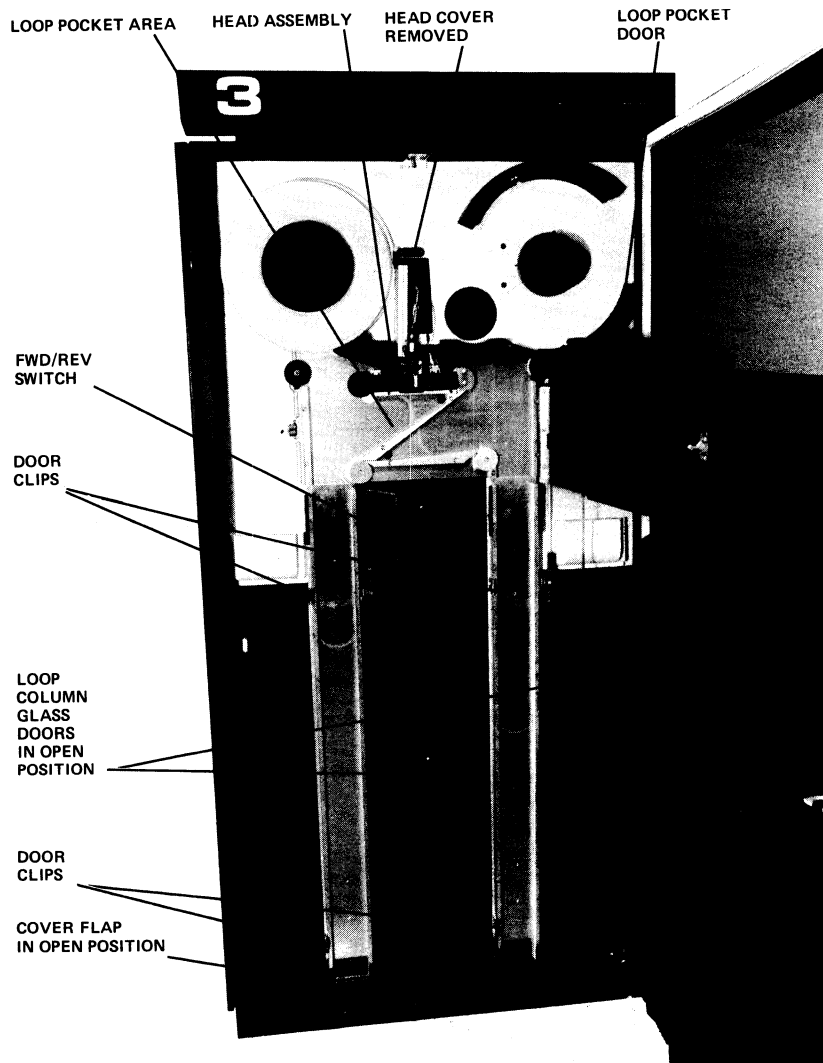


Figure 4-4. Cleaning Areas

5. Using trichloroethane transport cleaner, moisten a seven-tuft brush and foam swabs and clean the following areas (see Figure 4-5):

- Read/Write Head
- Head Assembly

NOTE: When cleaning the head, slide the tape head cleaner (see Figure 4-5) inward to stop; retain tape head cleaner in that position while using the other hand to accomplish the cleaning.

- Left Tape Guide
- Right Air Bearing and Guide Assembly
- Scraper Blade of Tape Cleaner
- Capstan Wheel

CAUTION

To avoid possible skin irritation, do not allow trichloroethane to come in contact with skin. Wear disposable glove and apply it with a brush or foam swab, removing any excess with a dry foam swab.

Do not mix cleaners. Do not use Freon TF (or equivalent) as capstan cleaner, as full cleaning may not result. Also, do not touch the outside diameter (tape contact surface) of capstan with fingers. Use a soft, lint-free cloth when handling the capstan and rotate it while cleaning it with a foam swab dipped in trichloroethane. Allow capstan to dry before loading tape.

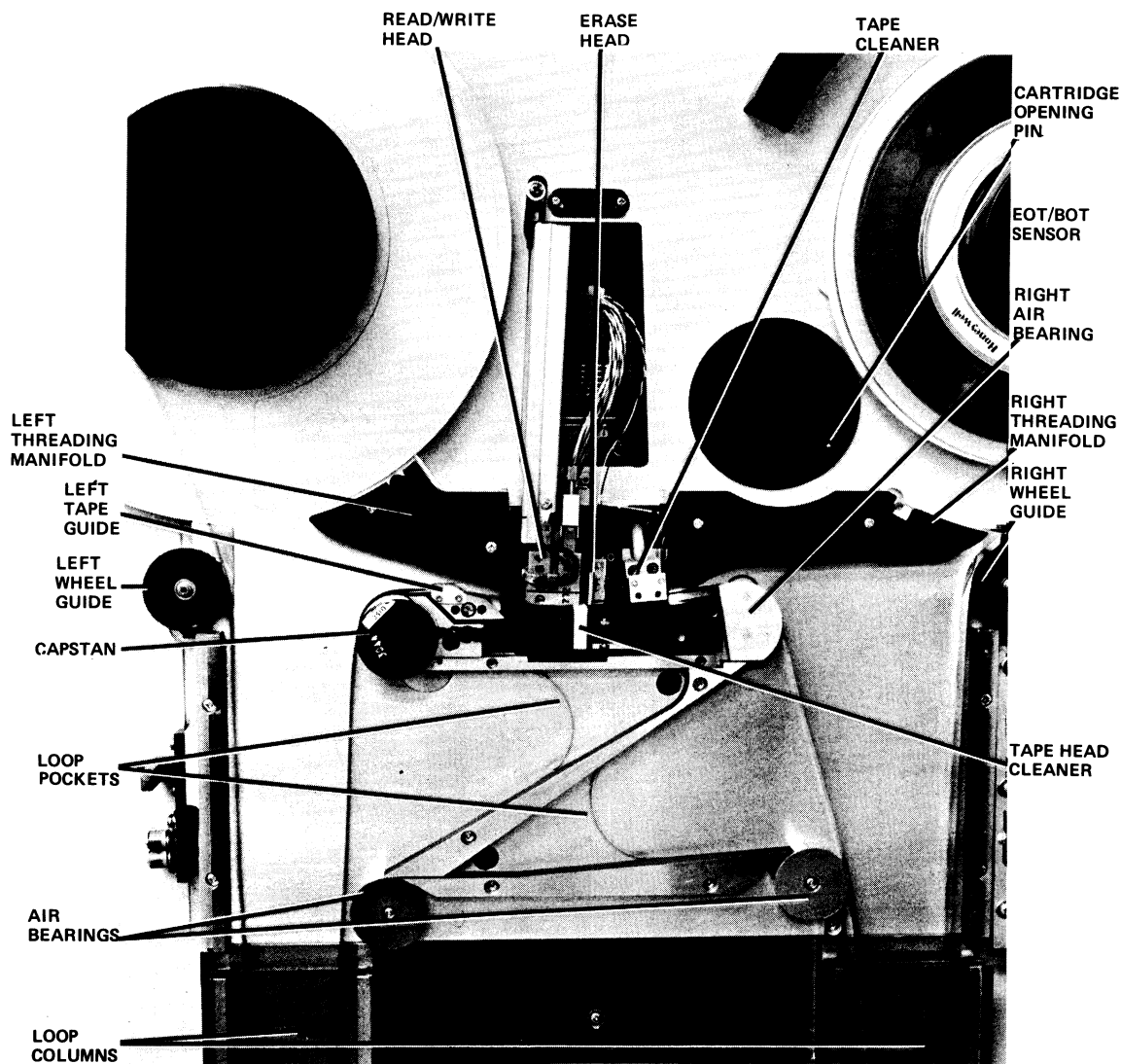


Figure 4-5. Tape Path Components

6. Using Freon TF113, moisten a new brush, foam swabs, and a soft, lint-free cloth and clean the following areas (see Figure 4-5):
 - Threading Manifolds
 - Wheel Guides
 - Air Bearing Surfaces
 - Loop Pockets
 - Loop Columns
 - Loop Column Glass Doors
 - Threading Floating Pads (on Loop Pocket Door)
 - Top of EOT/BOT block.
7. Close loop pocket door, loop column glass doors, and front door.
8. Set cabinet circuit breaker to ON.

Check and Replace Defective Control Panel Bulbs

A lamp test should be performed by the operator at least once during each eight-hour shift.

To change a defective bulb:

1. Set cabinet circuit breaker to OFF.
2. Open control panel (Figure 4-6).
3. Push bulb holder out of the way; bulb should drop out (Figure 4-7).
4. Insert new bulb.
5. Push bulb holder back into position.
6. Close control panel.
7. Set cabinet circuit breaker to ON.
8. Press LAMP TEST to ensure that bulb illuminates.

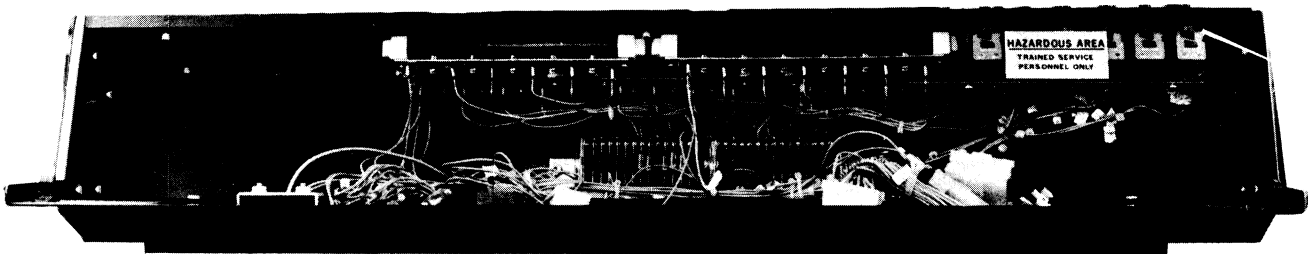


Figure 4-6. Opened Control Panel

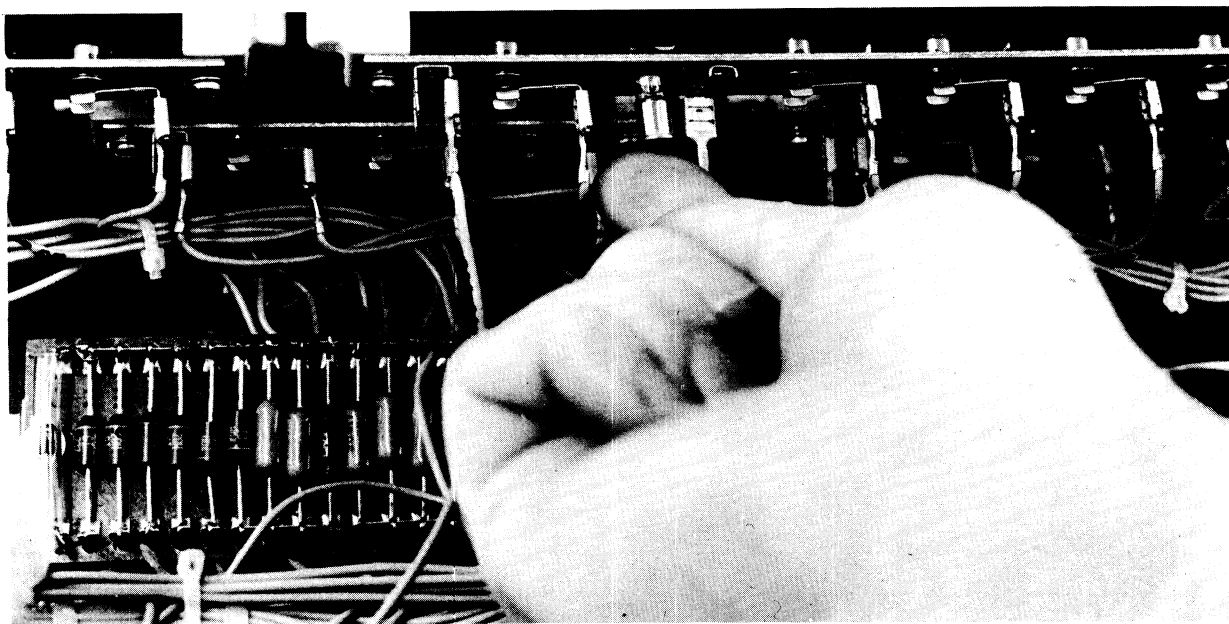


Figure 4-7. Removing Defective Bulb

Clean Air Filter

NOTE: This procedure should be performed quarterly.

1. Open rear door.
2. Remove filter by sliding it out from bottom of blower assembly (Figure 3-2).
3. Tap filter over a bin to remove any loose dirt.
4. Remove dust accumulation from filter with vacuum cleaner.
5. Replace filter with side marked "OUTLET" facing up.
6. Close rear door.

APPENDIX A

MAGNETIC TAPE PROCESSOR

The MTP0601 Magnetic Tape Processor is a microprogrammed peripheral processor that connects to the central processor system via high-speed input/output channels and essentially relieves the central processor system of all magnetic tape-oriented functions.

CONFIGURABILITY

The MTP0601 processor supports the mixture of the following tape units:

- MTU0400
- MTU0410/0411/0412
- MTU0500
- MTU0600
- MTU0610

The MTP0601 processor can be configured in single- or dual-channel subsystems (see Figure A-1). In single-channel subsystems, an MTP controls up to eight tape units (of which a maximum of two can be seven-track tape units). With an optional dual-simultaneous channel, an MTP allows two levels of simultaneity to any two tape units in the subsystem, controlling up to 16 tape units (of which a maximum of four can be seven-track tape units). Each channel can have an optional nonsimultaneous data channel for increased connectability to multiple IOMs and for switching the data transfer path of the single or dual simultaneous channel between IOMs (see OPTIONS).

OPERATIONAL FLEXIBILITY

To meet specific data handling requirements, the MTP0601 offers dynamic code translation (between ASCII and Series 60 six-bit code, EBCDIC and Series 60 six-bit code, and EBCDIC and ASCII). This feature permits different internal and external codes to be used without special programming. Also, an option providing compatibility between Series 60 (Level 66) and Series 2000 tape formats is available.

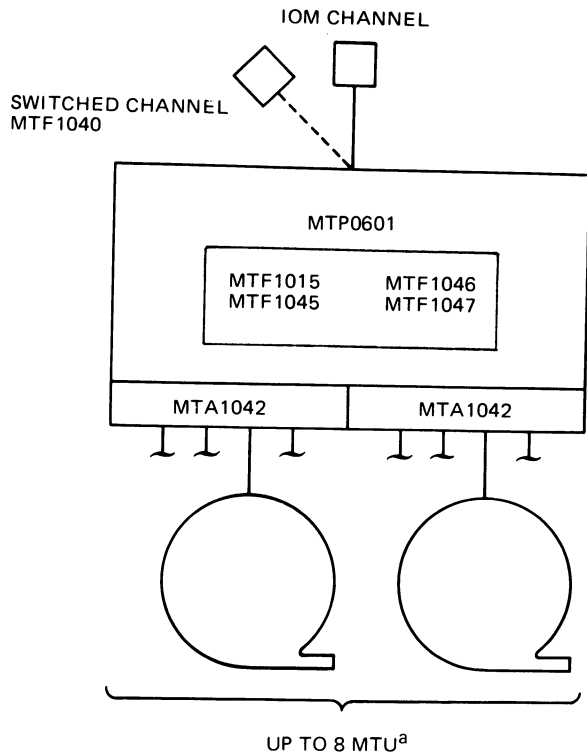
OPTIONS

The options available for the magnetic tape processor are listed in Table A-1.

TABLE A-1. MAGNETIC TAPE PROCESSOR OPTIONS

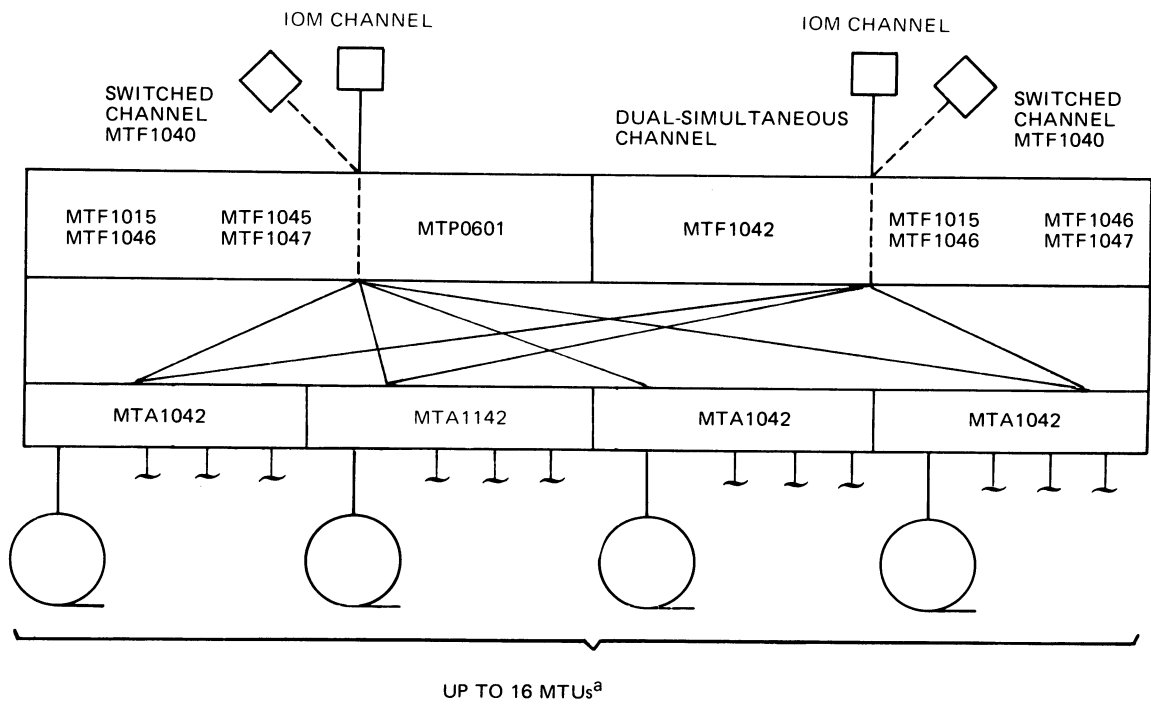
MTP0601	Description
MTF1015	Series 200/2000-to-Level 66 Compatibility Mode
MTF1040	Switched Tape Channel (includes IOM channel)
MTF1042 ^a	Dual Simultaneous Channel for up to 2 x 16 operation (includes IOM channel)
MTF1045	ASCII Code Translator (ASCII/Series 60 six-bit code)
MTF1046	EBCDIC Code Translator (EBCDIC/Series 60 six-bit code)
MTF1047	EBCDIC/ASCII Code Translator
Standard	Seven-Track (556/800 bpi) Capability
Standard	Nine-Track, NRZI (800 bpi) Capability
Standard	Nine-Track, PE (1600 bpi) Capability
MTA1042	Device Addressing (required per 4 tape units)

^aRequires redundant features MTF1015/1045/1046/1047 if these features have been configured into basic MTP0601.



^aMAXIMUM OF TWO 7-TRACK TAPE UNITS

SINGLE-CHANNEL SUBSYSTEM



^aMAXIMUM OF FOUR 7-TRACK TAPE UNITS

DUAL-CHANNEL SUBSYSTEM

Figure A-1. MTP0601 Configurations

COMPONENTS

The magnetic tape processor consists of the following components (also see Figure A-2):

- *Processing Network* – controlling element of the MTP. It sequentially accesses microinstructions from control store and executes the functions indicated in each microinstruction.
- *Control Store* – provides storage for the microinstructions that make up the system communication microprograms and some peripheral unit control microprograms to be run by the MTP. It is a combination read-only store (ROS) in which test and bootload microinstructions are permanently written, and a read/write store that is written into under microprogram control. Capacity is 8192 words.
- *Main Memory* – provides read/write scratchpad storage for data, control tables and words, error logs, special commands, and most peripheral unit control microprograms. Capacity is 4096 words.
- *Link Adapter* – provides the data paths and buffer between the processing network/control store/main memory and the central system software interface and the various tape units. Two physical I/O ports (the second port is an option) can be connected to the central system for the exchange of data. Only one port, however, is selected at any given time. Port selection and switching is under control of the microprograms.
- *Controller Adapter* – connects up to eight magnetic tape units in a single-channel configuration and up to 16 units in a dual-channel configuration. Single-channel operation permits one read or write activity only to be in progress at a time. An optional controller adapter can be added to allow a dual-simultaneous data transfer capability, i.e., any two tape units can transfer data simultaneously with others rewinding, computing, or performing other peripheral operations. Each unit, however, can only be selected by one controller adapter at a time. All operations with the units are controlled by the microprograms.

OPERATION

The magnetic tape processor receives channel commands – control commands, read device commands, write device commands, and diagnostic commands – from the channel buffering unit by way of the peripheral subsystem interface. The magnetic tape processor then transmits device commands, data transfer commands with tape movement (read data, write data), tape movement commands without data transfer (load, unload, rewind), data transfer commands without tape movement (read status), and test and diagnostic commands to the magnetic tape device by way of the device level interface.

CONTROLS AND INDICATORS

Manual control of the operation of the MTP0601 is performed at a highly visible combined operator/maintenance panel (see Figure A-3). The maintenance panel is concealed behind a swing-down cover to prevent easy access to those controls, which are normally used for maintenance by Honeywell service personnel. With the cover closed, only the normal operating switches and controls are visible. Color-coded indicators provide an obvious display of the operating status of the MTP.

A description of the function of each control and indicator follows.

AC BREAKER ON (Indicator)

Lights (red) when the MTP cabinet circuit breaker is ON and ac power is available from the main distribution panel.

POWER ON (Push Button/Indicator)

Applies dc power to the cabinet power supply and lights (yellow).

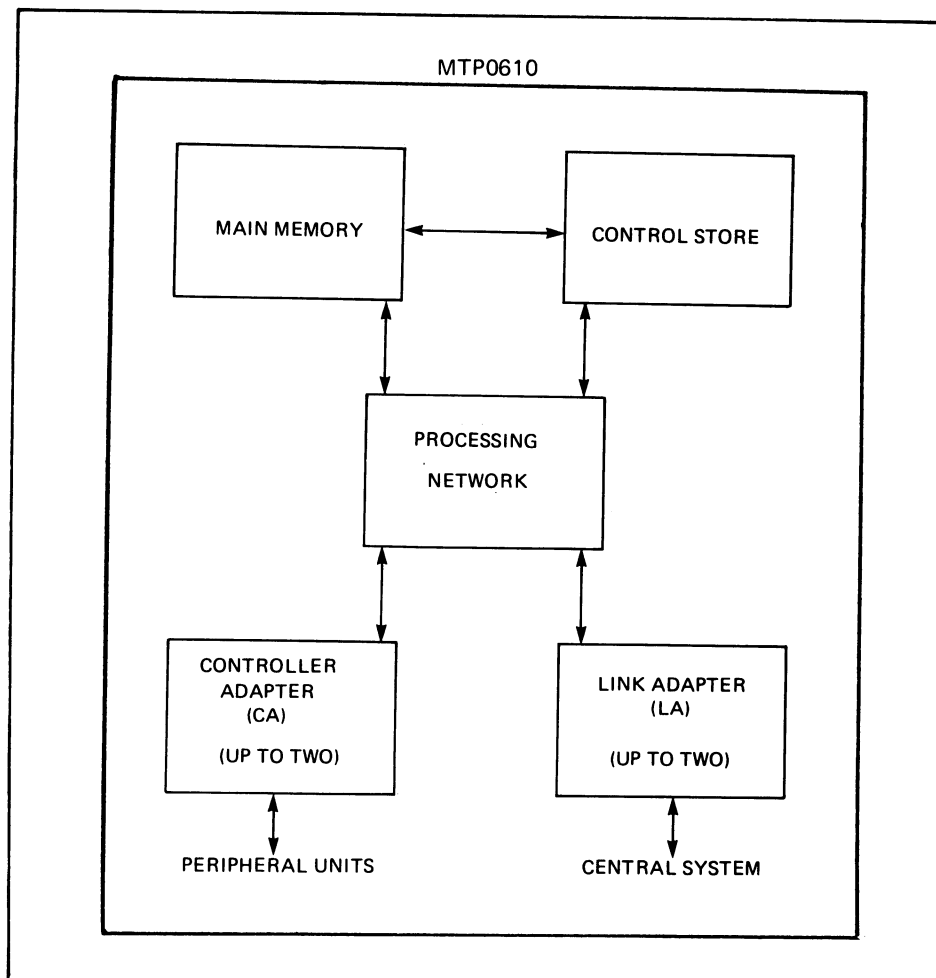


Figure A-2. Magnetic Tape Processor Components

POWER OFF
(Push Button/Indicator)

Removes power from the cabinet power supply and lights (green). When the POWER OFF push button/indicator is pressed, the POWER ON indicator goes off.

NORMAL/TEST
(Indicator)

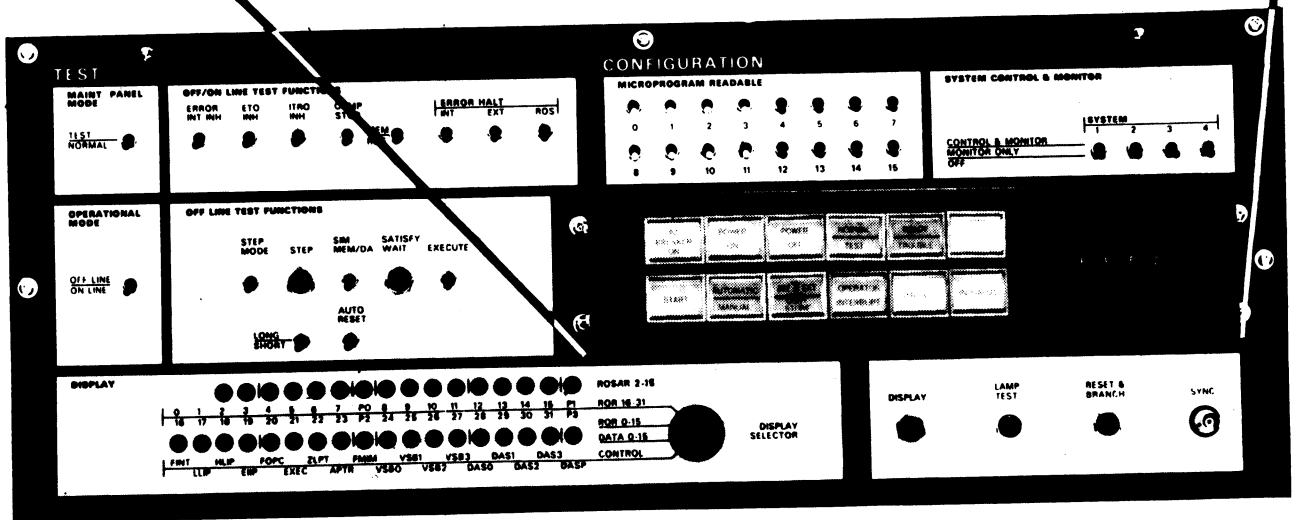
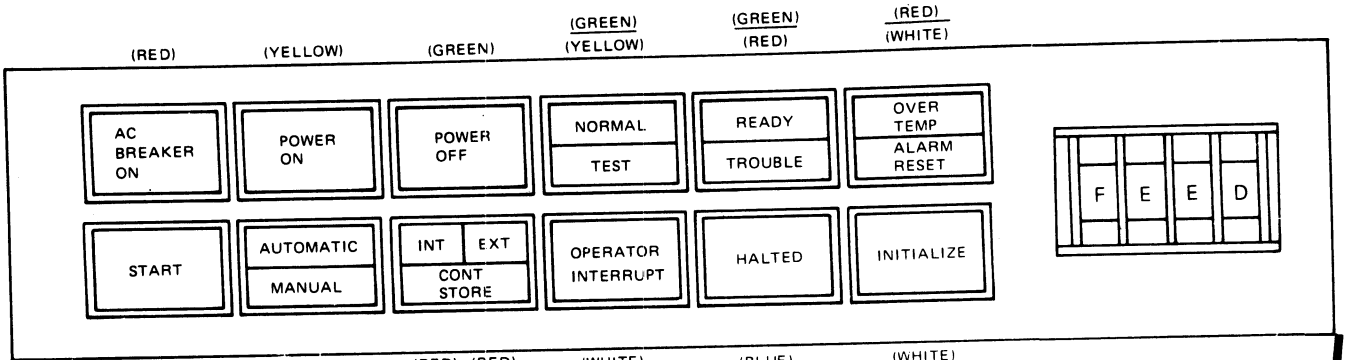
Indicates the state of the MAINT PANEL MODE switch. The upper field lights (green) if the MAINT PANEL MODE switch is in the NORMAL position; the bottom field lights (yellow) if in the TEST position. The switch must be in the NORMAL position for normal processor operation.

NOTE: The MAINT PANEL MODE switch is located behind the cover surrounding the control panel. If the switch is inadvertently left in the TEST position by the Field Engineer, the operator may open the cover and reset it to NORMAL.

READY/TROUBLE
(Indicator)

Indicates the operational state of the MTP; green – READY, red – TROUBLE. The TROUBLE indicator lights when the HALTED indicator is on, when the OPERATIONAL MODE switch is in the OFF LINE position, or when there is a problem within the subsystem.

OPERATOR/MAINTENANCE PANEL
COVER CLOSED



OPERATOR/MAINTENANCE PANEL
COVER OPEN

Figure A-3. Operator/Maintenance Control Panel

If the HALTED indicator is on, the operator can attempt to put the MTP in the READY state by pressing the START push button/indicator. If the MTP does not leave the halt state, the operator can open the maintenance panel cover and reset the OPERATIONAL MODE switch to the ON LINE position.

If the trouble persists or if the OPERATIONAL MODE switch was already in the ON LINE position, the operator should notify the Honeywell Field Engineer.

OVER TEMP/ALARM RESET (Push Button/Indicator)

Lights (red) in the OVER TEMP field and (white) in the ALARM RESET field and the audible alarm sounds to indicate a temperature above 140°F (60°C) within the cabinet. The audible alarm and the ALARM RESET field can be turned off by pressing the push button/indicator. The OVER TEMP field remains lit until the temperature condition dissipates.

If the temperature condition persists, press the POWER OFF push button to remove power from the subsystem and notify the Honeywell Field Engineer.

START (Push Button/Indicator)

Resets the MTP from the TROUBLE to the READY state when the HALTED indicator is lit.

AUTOMATIC/MANUAL (Push Button/Indicator)

Indicates the operational mode of the MTP: green – AUTOMATIC, blue – MANUAL. The push button allows operator control of the execution of the initialize and halt options of the microprogram. These options are inhibited when in the AUTOMATIC mode. The state of the MTP is changed to the alternate state each time the push button is activated.

INT/EXT/CONT STORE (Push Button/Indicator)

Lights (red) in the individual field when an error is detected. Pressing the push button, or executing the error option of the microprogram, should reset the error and turn off the indicator field. If the error persists, the Honeywell Field Engineer should be notified.

The categories of error conditions are as follows:

EXT – error detected during a device adapter interface or main memory operation.

INT – error detected internal to the processing structure of the processor (internal buses, etc.).

STORE – error detected during the access of a microprogram from processor store.

OPERATOR INTERRUPT (Push Button/Indicator)

Initiates execution of the information set in the ADDRESS/SIMULATE thumbwheel switches. The indicator lights (white) when activated and turns off when the OPERATOR INTERRUPT state is reset by the microprogram.

HALTED (Indicator)

Lights (blue) when the MTP goes into the halt state.

INITIALIZE (Push Button/Indicator)

Used to reset the MTP to the initialized state and lights (blue) the HALTED indicator. The INITIALIZE indicator lights (white) when activated.

ADDRESS/SIMULATE
(Thumbwheel Switches)

These four thumbwheel switches are used in conjunction with the OPERATOR INTERRUPT push button to permit the operator to address various functions of the MTP. An error can result if the switches are changed while being sensed by the microprogram.

LAMP TEST
(Push Button)

Located on the maintenance panel, LAMP TEST allows simultaneous checking of a group of indicator lamps for failure. The lamps checked are the READY/TROUBLE, AUTOMATIC/MANUAL, INT/EXT/CONT STORE, OPERATOR INTERRUPT, and HALTED indicators on the operator panel and all of the TEST DISPLAY indicators on the maintenance panel.

POWER

Power is controlled by a circuit breaker panel located behind the right front door at the bottom right of the cabinet marked "CKP" (see Figure A-4).

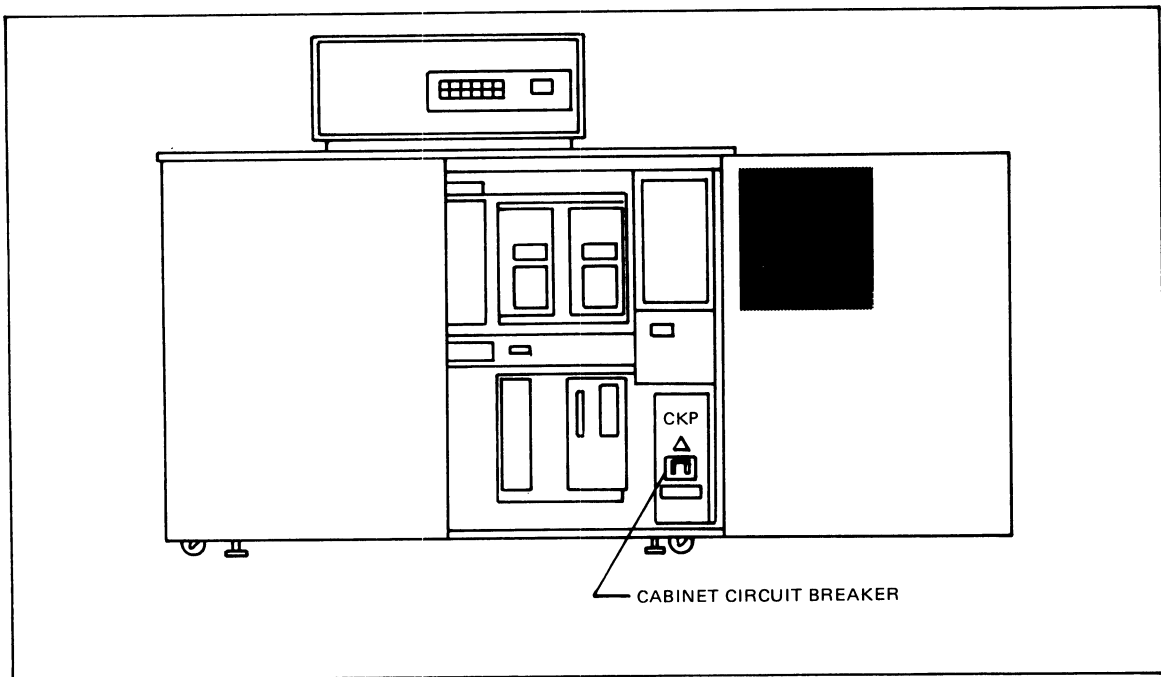


Figure A-4. MTP0601 Cabinet Circuit Breaker Location



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