

M243XL

Magnetic Tape Subsystem Installation Manual

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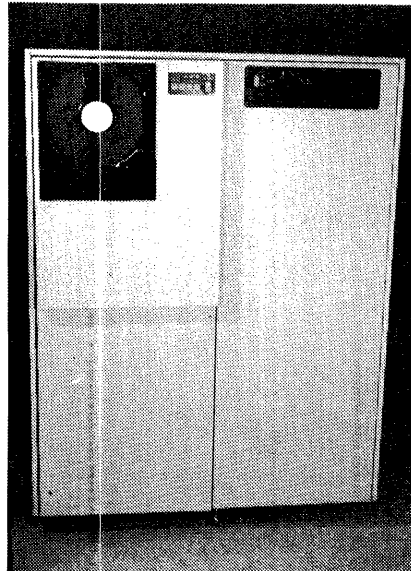
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M243XL MAGNETIC TAPE SUBSYSTEM
INSTALLATION INSTRUCTIONS

OVERVIEW

This manual contains installation instructions and requirements for all configurations of the Magnetic Tape Unit (MTU), Formatter (FMT), and field tester. An MTU master unit consists of one tape drive and either one formatter (FMT #0) or two formatters (FMT #0 and FMT #1). A Magnetic Tape Subsystem (MTS) may include up to seven additional MTU slave units.

The instructions provide step-by-step procedures for initial inspection and placement of equipment; selecting input voltage, frequency, and cabling; cleaning, checking and adjusting the MTU; and performing a self-test internal diagnostic routine on the FMT. The last section provides a final checklist of all required tasks and a listing of the locations within the Installation Instructions where pertinent information can be found. A glossary of commonly used terms and acronyms is provided in Appendix A. The location of printed circuit assemblies (PCAs) is contained in Appendix B. A list of optional shorting plugs is given in Appendix C.



1. EQUIPMENT INSPECTION AND PLACEMENT

1.1 INTRODUCTION

Installation instructions and requirements in Section 1 include:

- (1) Receiving and inspection procedures
- (2) Preparing for physical placement
- (3) Special and common tools and test equipment
- (4) Physical installation procedures.

1.2 RECEIVING AND INSPECTION PROCEDURES

The MTU and FMT are shipped via commercial carrier. Each device is packed and crated in compliance with industrial standards and recommendations of the carrier.

Condensation may occur when the cabinet is transferred from a cold to a warm environment. To avoid condensation, the cabinet should remain in an environment at the ambient temperature for at least three hours before unpacking.

Visually inspect the shipping container for external damage. Remove the shipping container and visually inspect the front, rear, and sides of each unit for shipping damage. Ensure that frames are not bent or damaged. Do not remove supporting blocks until each unit has been moved to its assigned location.

Check received equipment against the packing list. Six reference documents are included in the shipping group: these Installation Instructions, a Maintenance Manual, Engineering Specifications, an MTU Theory of Operation, an FMT Theory of Operation, and an Illustrated Parts Catalog.

1.3 PREPARING FOR PHYSICAL PLACEMENT

Exercise caution when moving heavy equipment to its assigned location. A forklift or its equivalent will be required. Dimensions and weight of the units are shown in Table 1-1.

Table 1-1. External dimensions and weights of MTUs and FMT.

Unit	Height	Width	Depth	Weight
Stand-alone MTU/FMT (Master Unit)	1400 mm	1000 mm	755 mm	390 kg with 1 FMT (860 lbs)
	55.1 in	39.4 in	29.7 in	430 kg with 2 FMTs (948 lbs)
Stand-alone MTU (Slave Unit)	1400 mm	492 mm	752 mm	250 kg (551 lbs)
	55.1 in	19.4 in	29.7 in	
Rack-mounted MTU	663 mm	482 mm	755 mm	170 kg (375 lbs)
	26.1 in	19.0 in	29.6 in	
Rack-mounted FMT	308 mm	482 mm	590 mm	40 kg (88 lbs)
	12.1 in	19.0 in	23.2 in	

Complete the following steps before final placement of equipment:

- (1) Ensure that the designated space is sufficient to meet installation clearances shown in Figure 1-1.
- (2) Ensure that the cable length from the host controller is sufficient to reach the connecting point(s) on the FMT.
- (3) Verify that the size and position of floor openings are in accordance with dimensions shown in Figure 1-2 when using under-floor wiring.
- (4) Open the rear door of the unit(s) with a flat-head screwdriver. Perform a final check of all received equipment for damage, dents, deformation, corrosion, condensation, and other abnormalities.
- (5) Visually inspect the air hoses and tubes within the MTU. Ensure that there are no cracks and that joints and hose bands are tight.

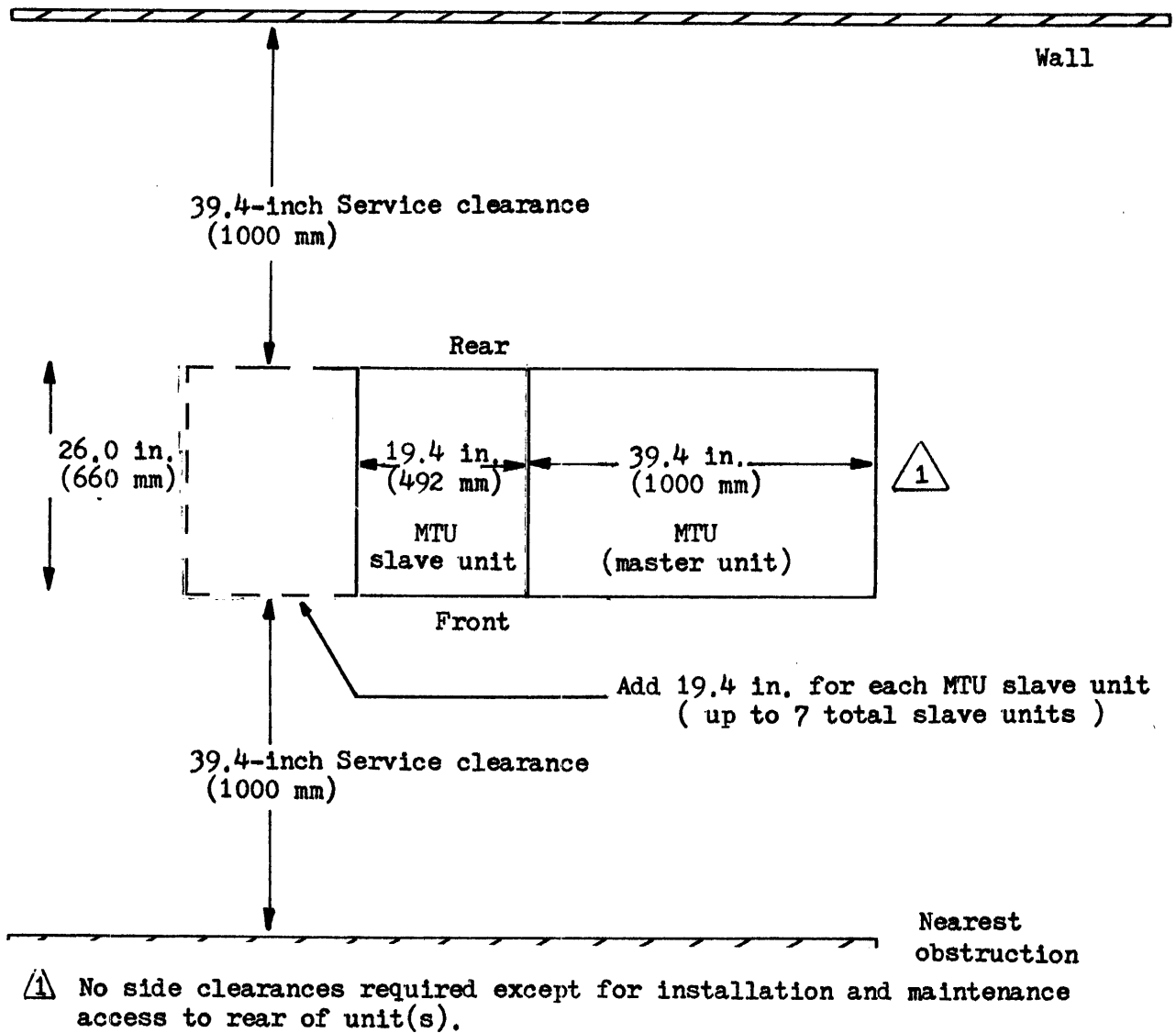


Figure 1-1. Installation clearances. Plan view.

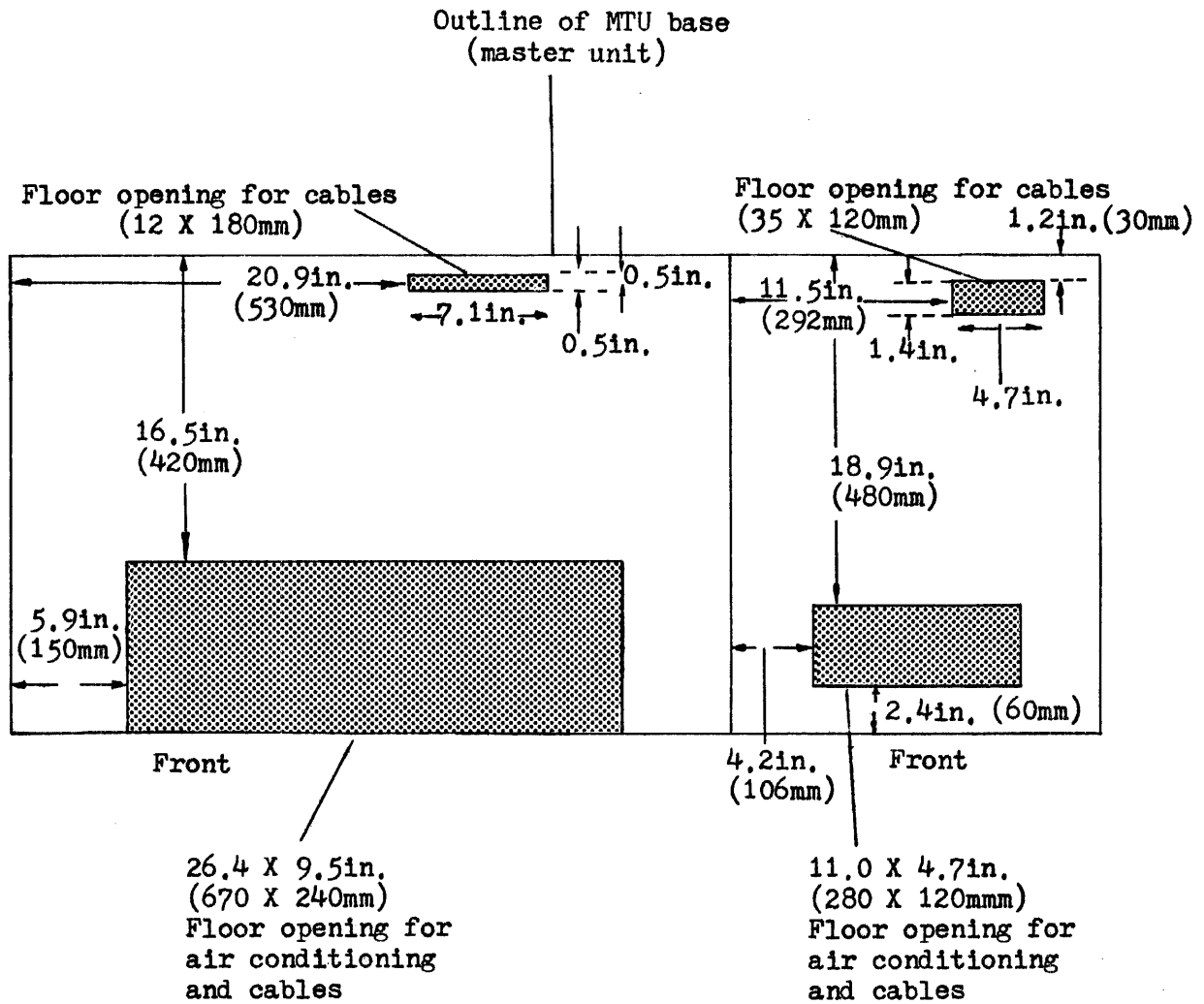


Figure 1-2. Floor openings for MTUs.

1.4 SPECIAL TEST EQUIPMENT AND TOOLS

Special test equipment, common test equipment, and common tools required for installation, turn-on, and initial checkout are listed below. Specifications and descriptions of test equipment are also provided. When ordering Fujitsu or equivalent test equipment, verify that items received conform to the following specifications:

Special Tools and Test Equipment

Specification

- Restraint pressure tool* B960-0110-T0Z6A
- Pressure gauge B91L-0020-0001A
4000 mm H₂O full scale (157.5 in.)
- Vacuum gauge EMZ 198a
1000 mm H₂O full scale (39.37 in.)
- Field tester* B13B-0110-B101A
- Head eraser CT-HE-3-AC117V-60HZ-SONY
- Master skew tape EM. Bv Mt 351d
- Good quality tape SRM3200 or equivalent
- Tension meter B96L-0110-004A
- Reel adjustment tool* B960-0110-T015A
- PCA removal tool * C960-0300-T001
- Cleaner kit* B960-0110-T016A

Common Test Equipment

- Digital voltmeter 30 V DC voltage range (minimum)
- Oscilloscope 50 MHz frequency range (minimum)

Common Tools

- Adjustable wrench 30 mm width (1.18 in.) minimum
- Hexagonal wrench key 8 mm width (0.32 in.) minimum

* Equipment designated with an asterik must be ordered from Fujitsu.

1.5 PHYSICAL INSTALLATION PROCEDURES

When two or more MTUs are installed side by side, remove covers from the sides that will be adjacent to one another. Only the end units require side covers. Refer to Figures 1-3 through 1-6, and follow these steps:

- (1) Remove the two screws shown in Figure 1-3 to loosen side cover from top of frame.
- (2) Lift side cover to detach from bottom of frame.
- (3) Place the MTU(s) in the installation position.
- (4) Level each unit by adjusting the four leveling pads.
- (5) Ensure that the distance between the floor and the bottom of the MTU(s) is 50 mm (approximately 2 inches).
- (6) Continue leveling until bolt holes are aligned on adjacent MTUs.
- (7) Bolt two MTUs together using two bolts in holes shown in Figures 1-3 through 1-5.
- (8) Ensure that all units are stable, level, and free of vibration after bolting.
- (9) Refer to Figure 1-6 for final configuration of up to eight units.

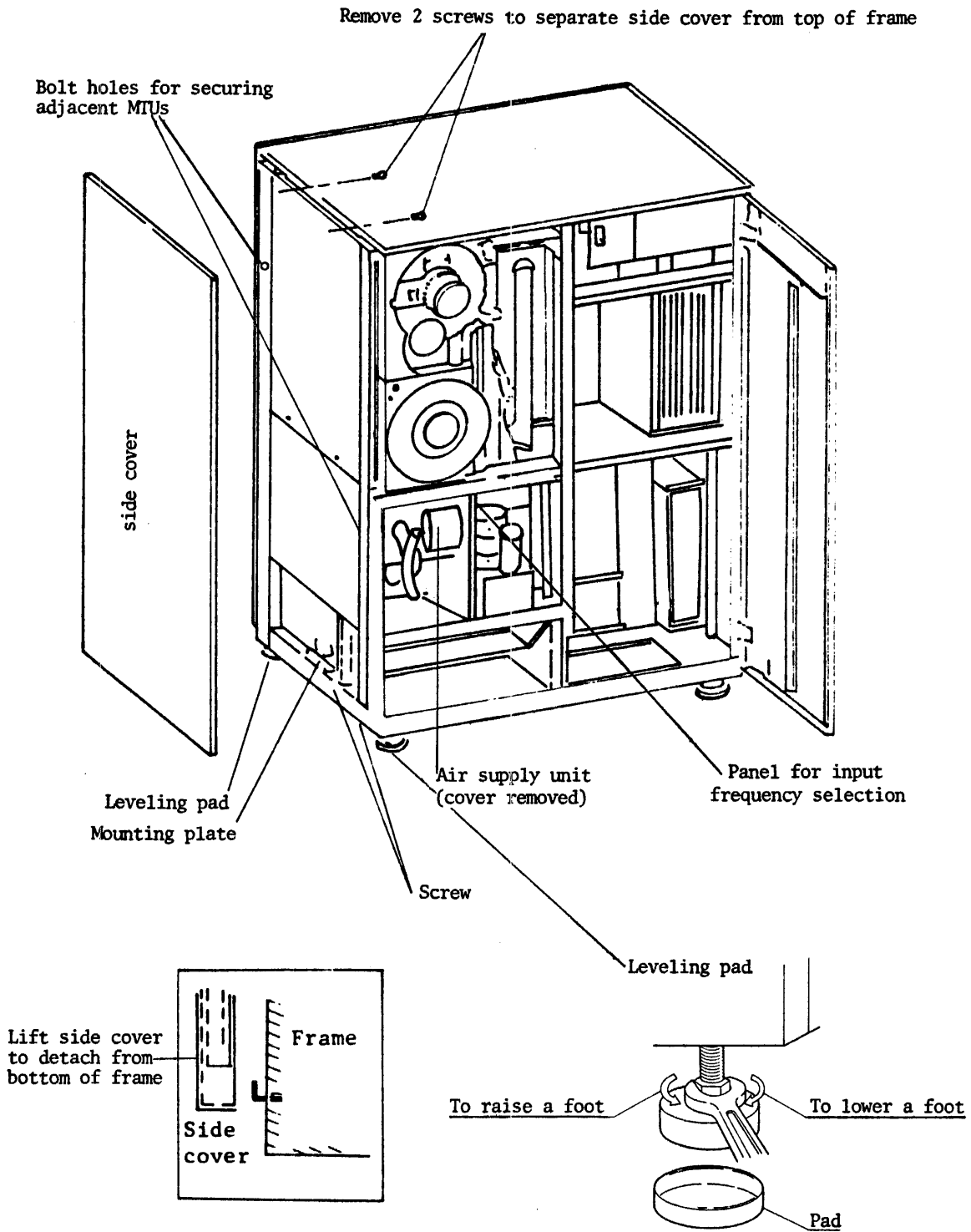


Figure 1-3. Master unit (front view).

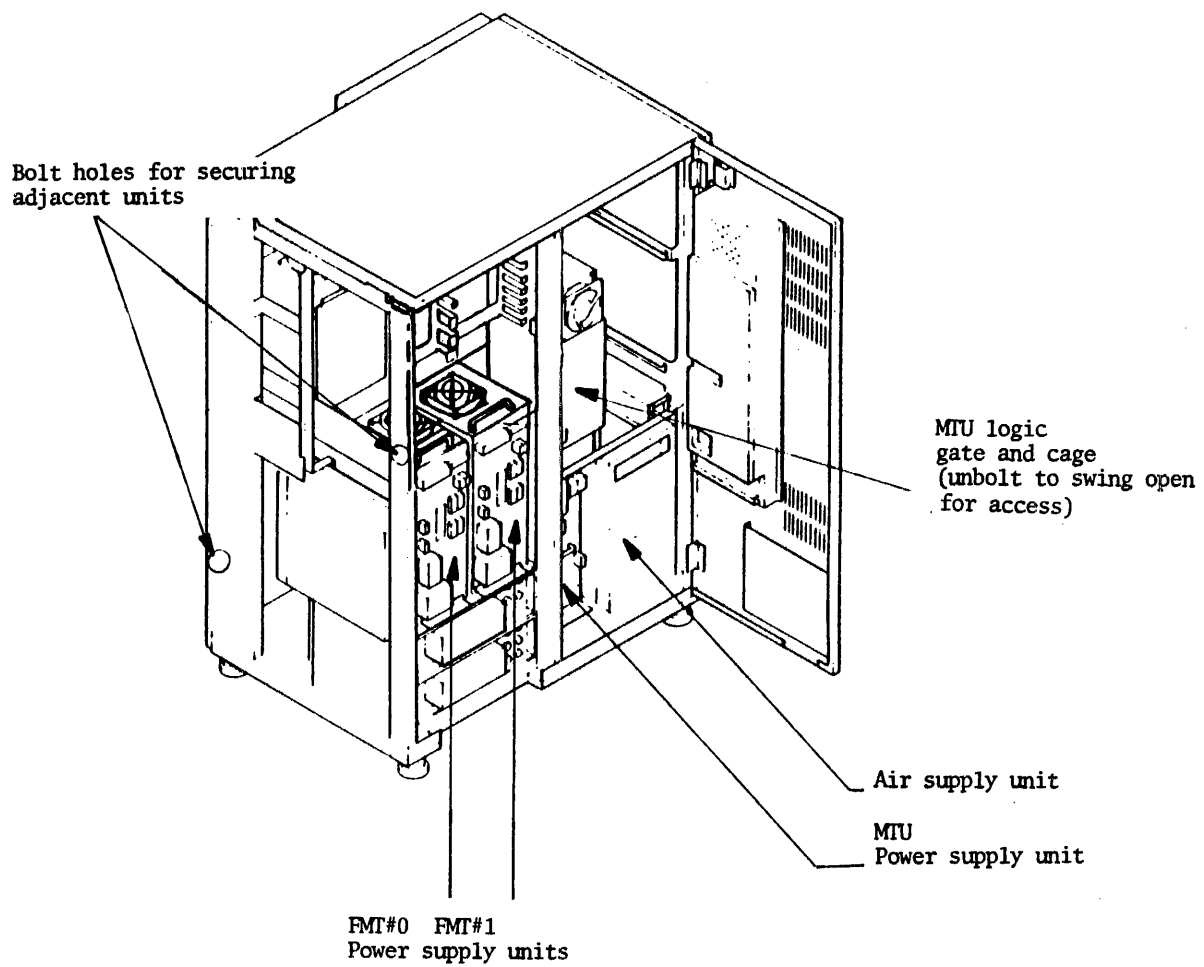


Figure 1-4. Master unit (rear view).

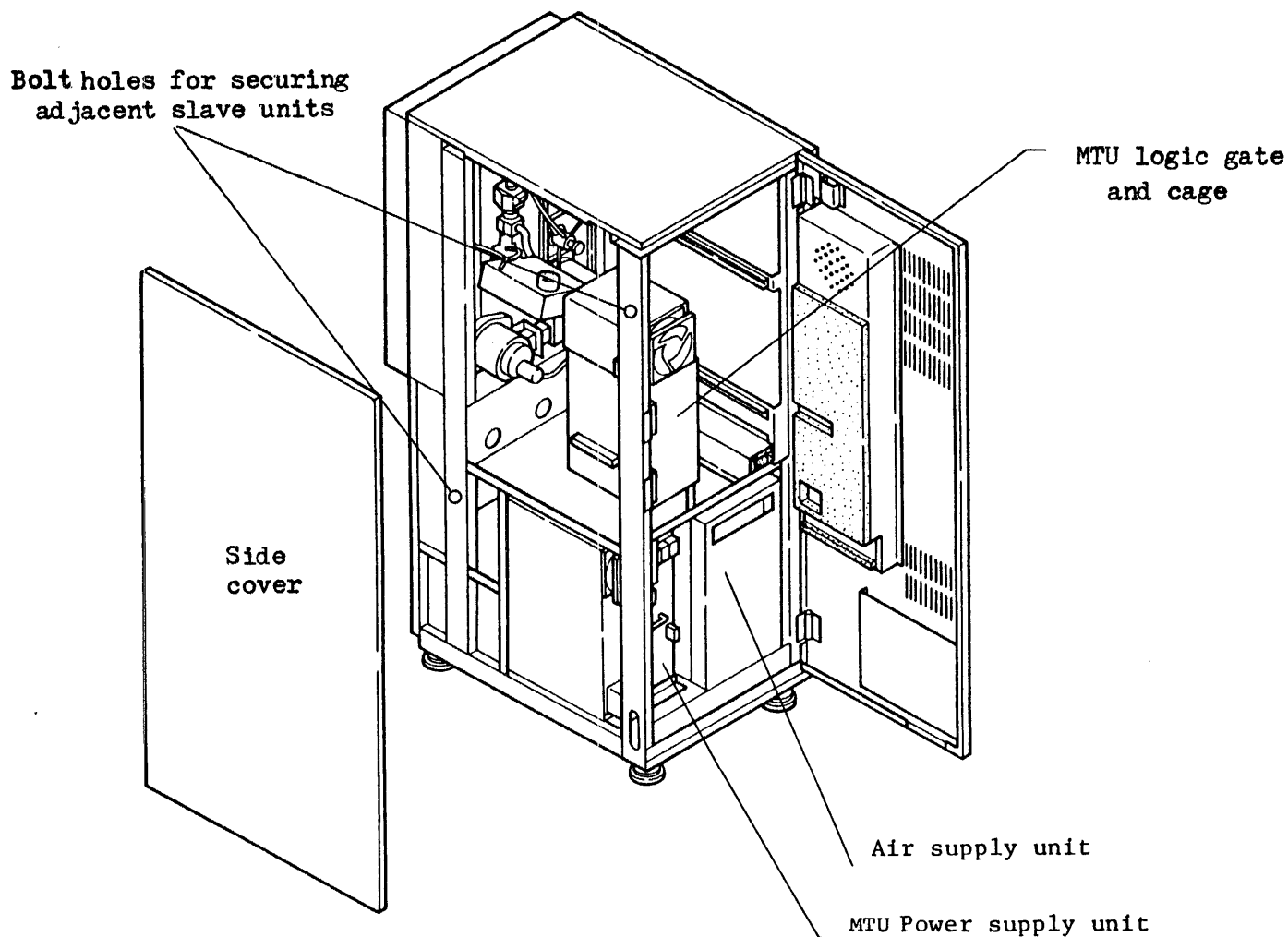
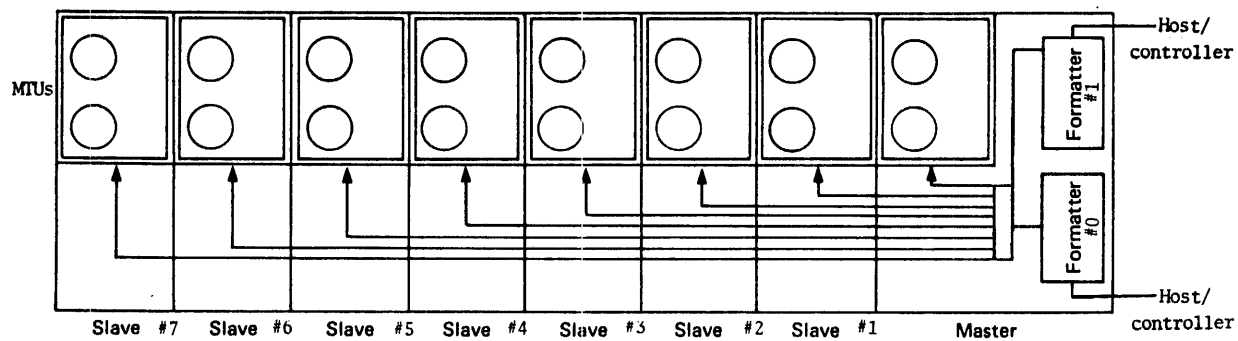


Figure 1-5. Slave unit (rear view).



Note: actual cables are routed in cable trays located on the upper rear of the cabinet.

Figure 1-6. Configuration for stand-alone units. One formatter controls up to eight drives.

2. VOLTAGE SELECTION, FREQUENCY SELECTION, AND CABLING

2.1 INTRODUCTION

Section 2 contains instructions and facility requirements leading to equipment turn-on. The following topics are described:

- (1) Input voltage selection
- (2) Frequency selection
 - Air supply unit adjustment
- (3) Altitude adjustment
- (4) Interface cabling
 - Controller/FMT
 - FMT/MTU
- (5) Power control cabling
- (6) Input power cabling.

2.2 INPUT VOLTAGE SELECTION

The M243XL Magnetic Tape System (MTS) can operate from 200, 208, 220, 230, or 240 VAC input, as shown in Figure 2-1. Do not connect the main input power cable to facility power until instructed to do so by the procedures in Section 4. Select the input voltage as follows:

Warning: Dangerous voltage is present on the input voltage selector terminals after facility power has been connected to the MTU. Be certain the main input power cable is disconnected.

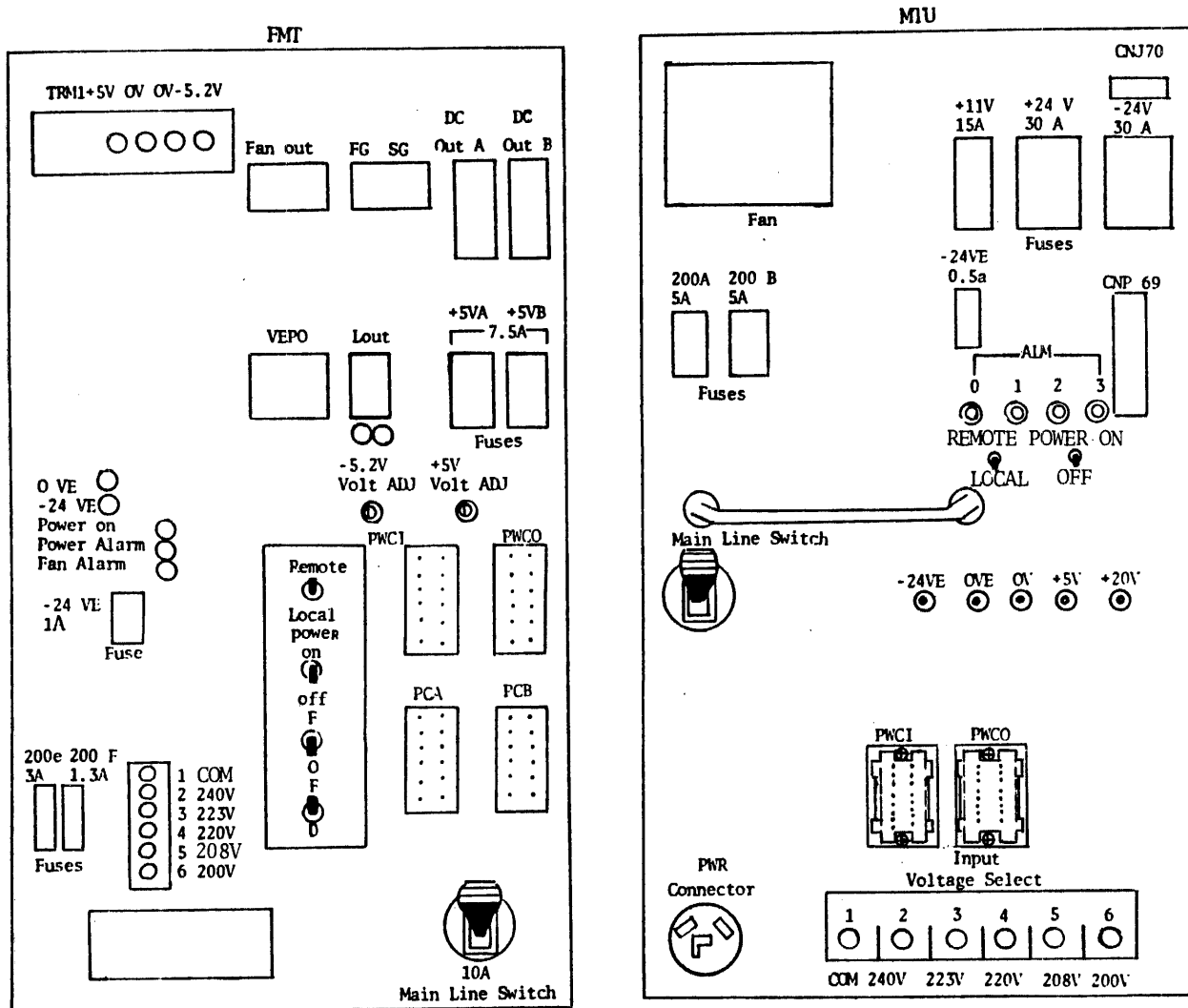


Figure 2-1. FMT and MTU power supply units.

- (1) Remove the covers of the input selection terminals of the FMT and MTU power supplies. The location of MTU and FMT power supply units are shown in Figure 1-4. These covers are located at the rear of the MTU and FMT and are labeled INPUT VOLTAGE SELECTION.
- (2) Select the FMT terminal that corresponds to the voltage label, and connect a jumper between that terminal and COM.
- (3) Select the MTU terminal that corresponds to the voltage label, and connect the red lead to that terminal and the black lead to COM.
- (4) Reinstall the covers on the FMT and MTU power supplies.

2.3 INPUT POWER FREQUENCY SELECTION

- (1) Confirm whether facility input frequency is 50 or 60 Hz.
- (2) Remove the cover of the air supply unit. This cover is located on the front of the MTU, as shown in Figure 1-3. The label on the cover specifies whether the unit is set for 50 or 60 Hz input.
- (3) For 60-Hz input, verify that CNP66 is connected to CNJ66B and that CNP66C is connected to CNJ66A. These connections are shown in Figure 2-2.

or

For 50-Hz input, verify that CNP66 is connected to CNJ66A and that CNP66C is connected to CNJ66B. These connections are also shown in Figure 2-2.

- (4) Do not reattach the cover of the air supply unit until the remaining frequency and altitude checks are completed. These checks are described in the next paragraph.

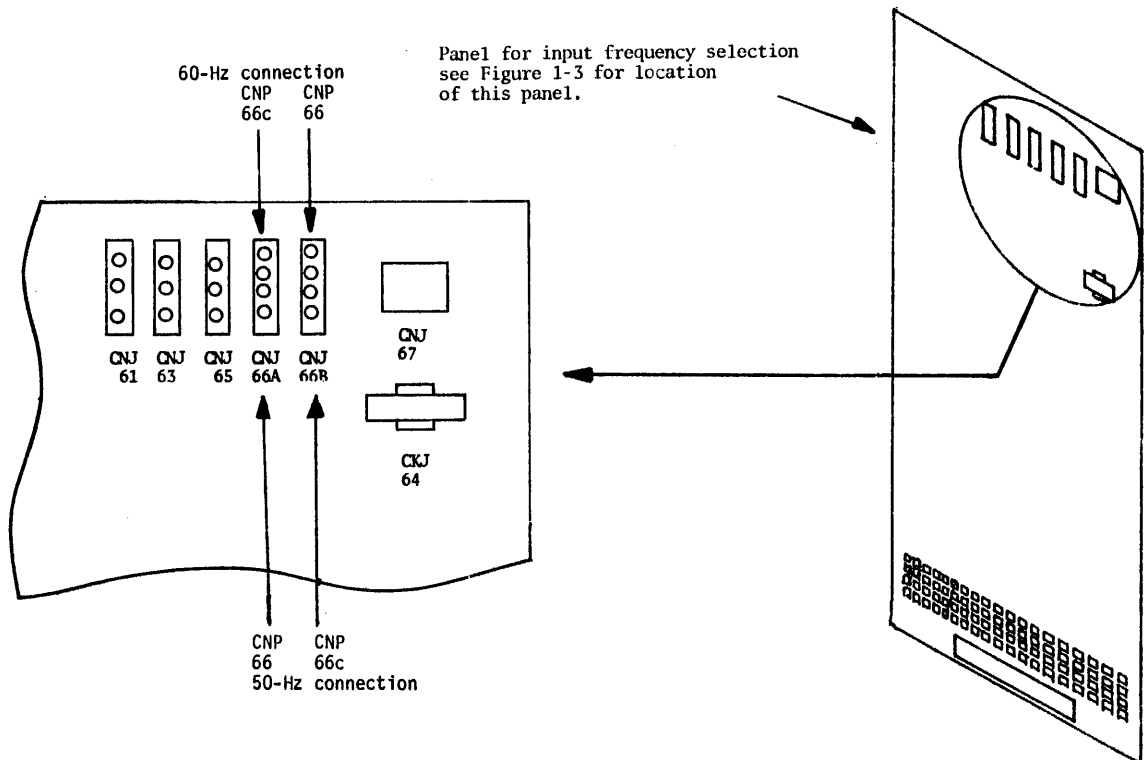


Figure 2-2. Input power frequency setting.

2.4 AIR SUPPLY UNIT FREQUENCY SELECTION

Figure 2-3 (a through c) shows the location of pulleys for the vacuum blower and the air-pressure pump on the air supply unit. These pulleys are dependent on input-power frequency (50 or 60 Hz). The vacuum blower pulley is also dependent on altitude.

Caution: Do not remove or install belts by prying with shop tools. Use the adjustment screws on the air supply unit to loosen pulleys and belts. Use tension tool (B96L-0110-004A) to adjust belt tension.

2.4.1 Vacuum Blower Pulley

- (1) Verify that the correct frequency-dependent pulley has been installed in accordance with Table 2-1. When delivered, the device is pre-set for either 50 Hz or 60 Hz input. For 50-Hz input, use P/N B30L-1940-0101A; for 60-Hz input, use P/N B30L-1940-0102A.
- (2) Verify that the correct altitude-dependent pulley has been installed. If the unit operates at an altitude above 3000 feet, install the vacuum blower pulley in accordance with Figure 2-3 (e) and Table 2-1. Remove the pulley and reverse its orientation.

Table 2-1. Input-frequency and altitude adjustment.

Installation condition	Vacuum blower pulley	Motor pulley
50 Hz input frequency	Use P/N B30L-1940-0101A	Large-diam. pulley
60 Hz input frequency	Use P/N B30L-1940-0102A	Small-diam. pulley
Low altitude (<3000 ft)	Large-diam. pulley	No adjustment
High altitude (>3000 ft)	Small-diam. pulley	No adjustment

(a) Rear view of slave unit

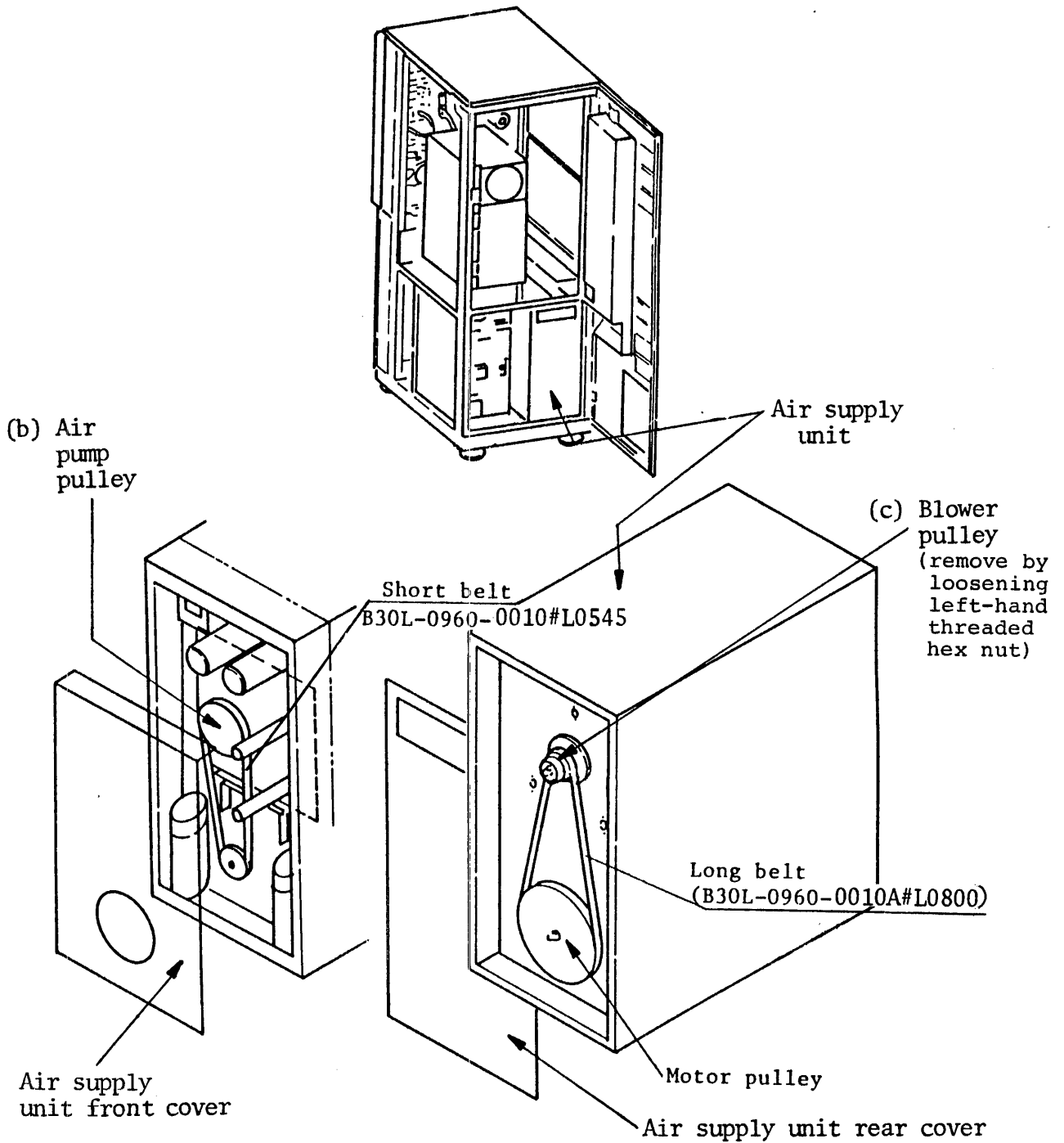


Figure 2-3. Air supply unit: vacuum blower and motor pulleys (sheet 1 of 2).

2.4.2 Motor Pulley

The motor pulley driving the air pump can be oriented for operation at either 50 or 60 Hz, as shown in Figure 2-3 (d) and Table 2-1. If the MTU operates on 50 Hz, connect the belt to the large diameter pulley. If the MTU operates on 60 Hz, connect the belt to the small diameter pulley.

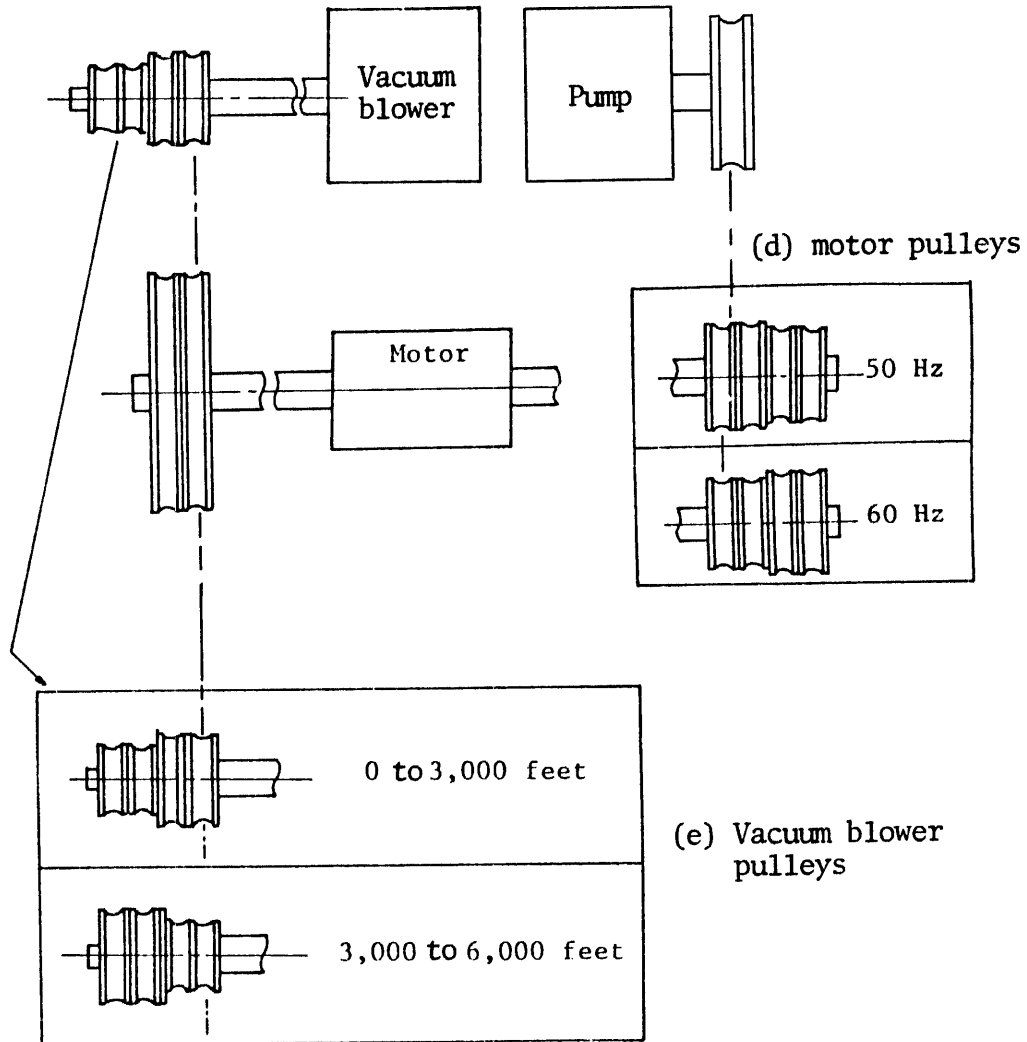


Figure 2-3. Air supply unit: vacuum blower and motor pulleys
(sheet 2 of 2).

2.5 INTERFACE CABLING

2.5.1 Controller/FMT Interface Cabling

The connections of the controller/FMT interface cables to the FMT Logic Gates are shown in Figure 2-4. Perform controller/FMT interface cabling as follows:

- (1) Confirm that the FMT is not connected to facility power.
- (2) Route the host controller cables through the opening in the bottom of the MTU (shown as point 1 in Figure 2-4).
- (3) Route the cables to the FMT Logic Gates through point shown in Figure 2-4.
- (4) Connect each host controller interface cable (4 cables) to the FMT Logic Gates, as shown in Figure 2-4.
- (5) Secure cables using tie wraps on the side of FMT #0 (point 3 in Figure 2-4).
- (6) Provide cable strain relief for the host/controller interface cables (point 4 in Figure 2-4).

Front view of MTU with two FMTs installed.

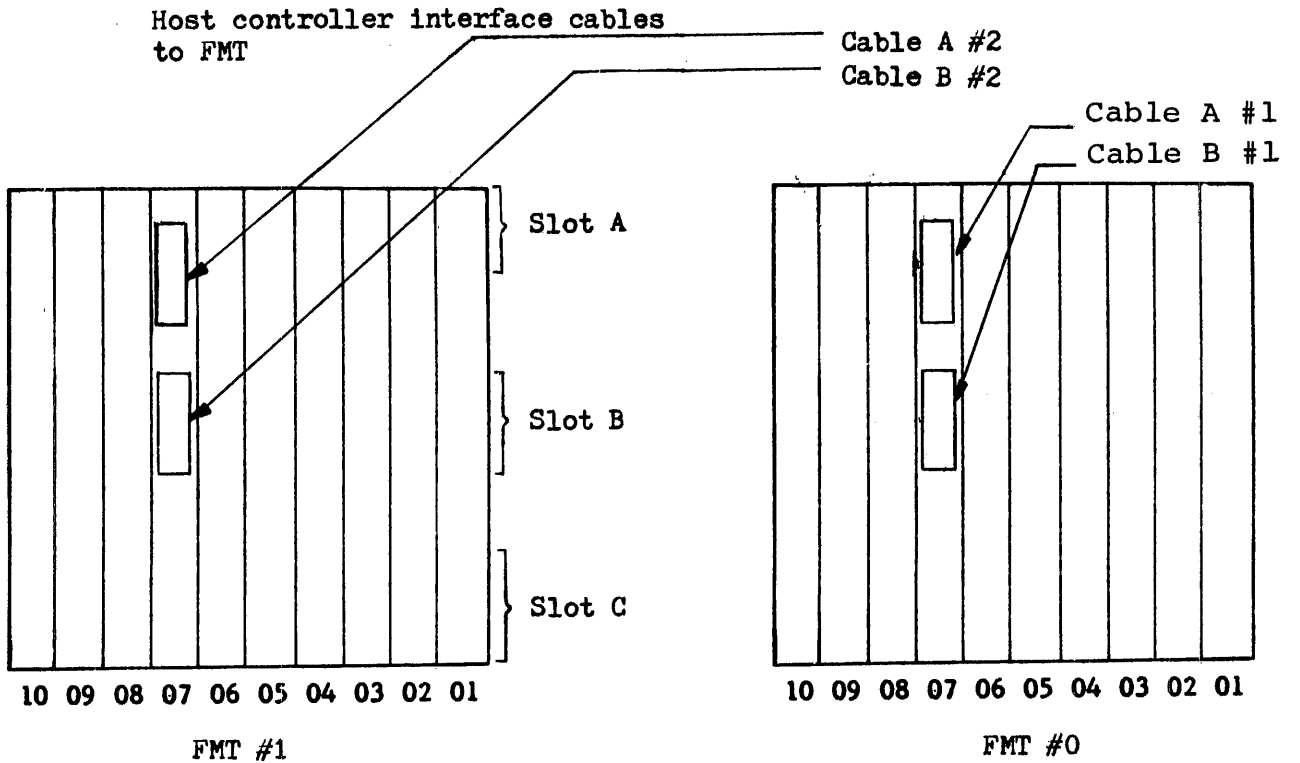
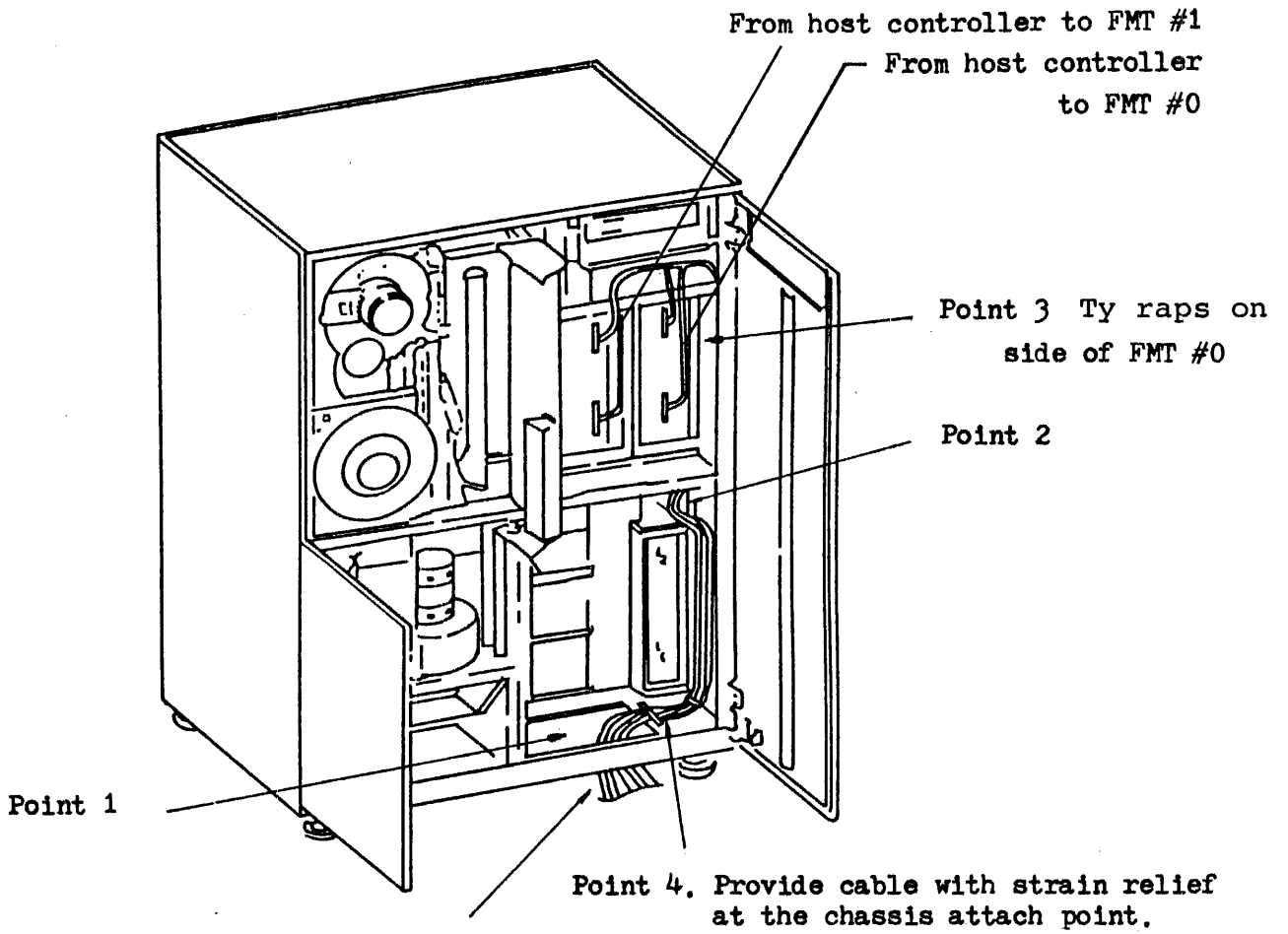


Figure 2-4. Host controller/FMT interface cabling.

2.5.2 FMT/MTU Interface Cabling

Part numbers for the cable connecting the FMT to the MTU(s) are as follows:

- o Master FMT to MTU #0 B03B-5280-0912A# T05
- o Master FMT to slave MTU #1 thru #7 B03B-5280-0913A# T07

The physical connection is between the formatter distribution board shown in Figure 2-5 and the MTU 1C06 shown in Figure 2-6.

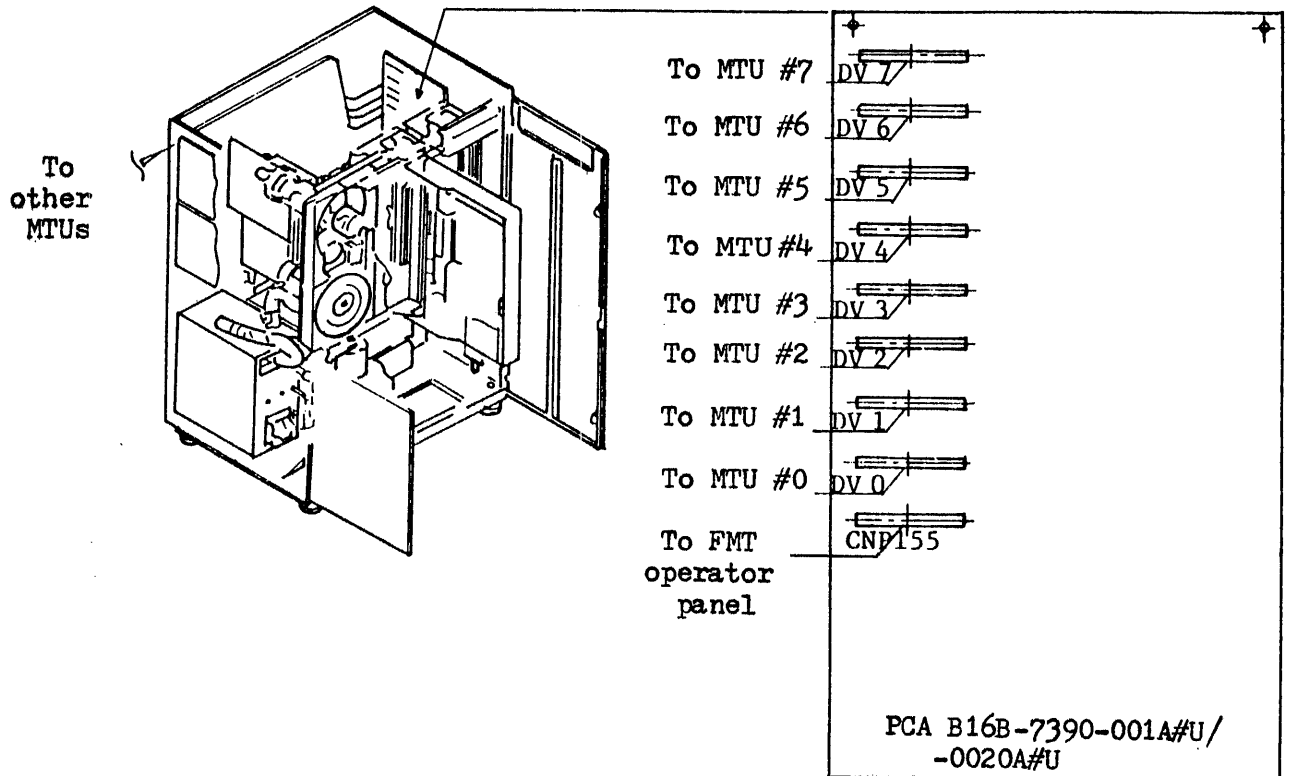


Figure 2-5. FMT/MTU interface cabling.

2.5.3 FMT/MTU #0 Interface Cabling

FMT/MTU #0 interface cabling is completed when the unit is delivered. Verify FMT/MTU #0 interface cabling as a guide for performing FMT/MTU slave interface cabling described in paragraph 2.5.4.

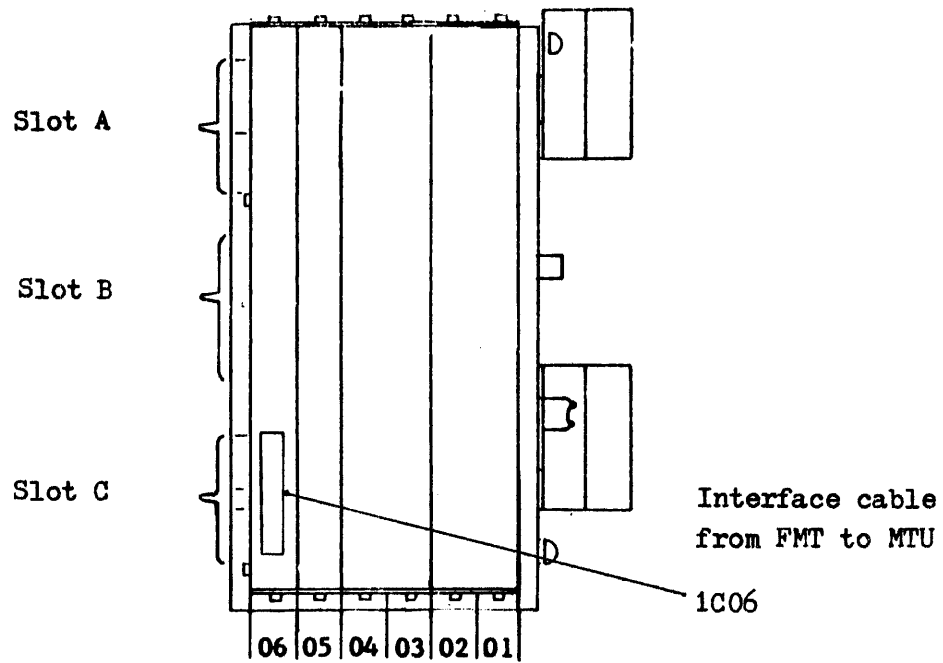


Figure 2-6. MTU PCA location.

- (1) Confirm that the FMT and MTU are not connected to facility power.
- (2) Unbolt the MTU logic gate and card cage assembly of MTU #0 as shown in Figure 2-7.
- (3) Locate interface cable (B03B-5280-0912A) at 1C06, as shown in Figure 2-6.
- (4) Locate the route for the cable through attach Points #1 through #3 on the MTU logic gate, through attach Point #4 on the upper channel provided inside the MTU cabinet, and then to the FMT, as shown in Figure 2-7.
- (5) Locate the connection of the cable onto DV #0 on the interface distribution board (B16B-7390-0010A) in the formatter, as shown in Figure 2-5.

2.5.4 FMT/MTU #1 Through #7 Interface Cabling

Perform FMT/MTU #1 through #7 interface cabling as follows:

- (1) Confirm that the slave MTU(s) are not connected to facility power.
- (2) Unbolt the card cage of slave MTU #1 and swing open.

- (3) Install cable (B03B-5280-0913A) at 1C06 on slave MTU #1 as shown in Figures 2-6 and 2-7.
- (4) Route cable in the same manner as step 4, above.
- (5) Wind excess cable around the cable hangers located just below the top shelf on the rear of the master MTU, shown in Figure 2-7.
- (6) Install cable onto DV #1 for MTU #1 on the interface distribution board (B16B-7390-0010A) of the FMT. This connection is shown in Figure 2-5.
- (7) Repeat steps 1 through 6 to complete FMT/MTU #2 through #7 interface cabling.

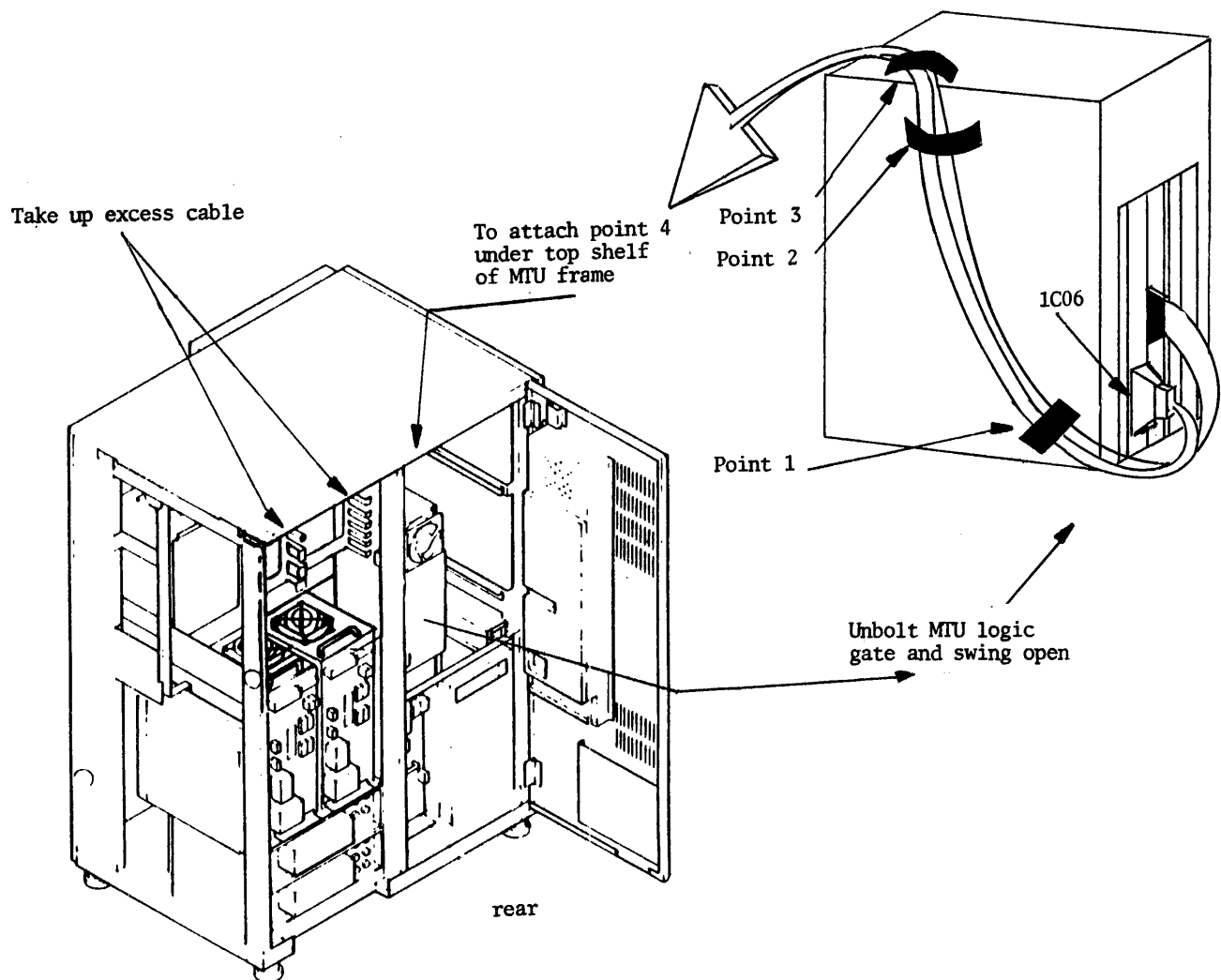


Figure 2-7. FMT/MTU interface cable routing.

2.6 POWER CONTROL CABLE INTERCONNECTIONS

Ensure that power control cable C660-9215-T002 interconnects FMT #0 and FMT #1 for Model M243XL2 (which includes two formatters) in accordance with Figure 2-8. Use cable C660-5235-T001 to interconnect FMT #1 and all MTU slave units in accordance with Figure 2-8.

2.7 INPUT POWER CABLING

Before connecting the input power cables:

- (1) Verify that the voltage and frequency selection procedures described in sections 2.2 through 2.4, above, have been completed.
- (2) Ensure that the circuit breakers (MAIN LINE SWITCH) on the FMT power supplies and on the MTU master unit power supply are set to OFF.
- (3) Ensure that the circuit breakers on the slave unit power supplies are set to OFF.

Refer to Figure 2-8 for input power cabling. Attach the main input power cable of the unit to the branch circuit receptacle (lugs on FMT power supply unit). Use the metal restraint on bottom shelf at rear of the master MTU to secure input power cables.

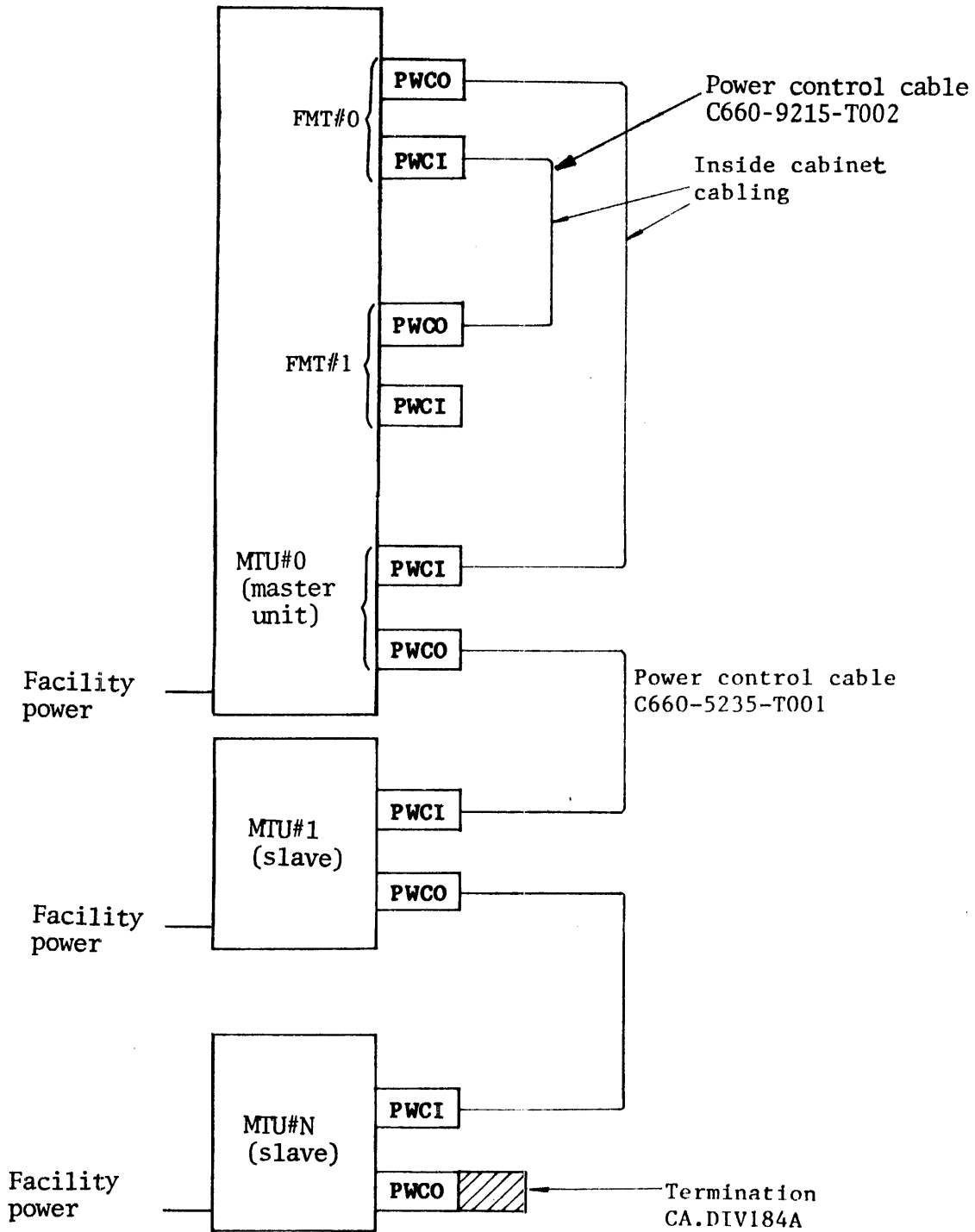


Figure 2-8. Power control cable interconnections.

3. CLEANING

3.1 INTRODUCTION

This section contains instructions for MTU cleaning prior to system checkout. Use the cleaning agent (solvent) that is supplied with the cleaner kit (B960-0110-T016A). In general, never apply rough or abrasive material or hard tools, such as metal bars, when cleaning MTU components. Clean the surfaces shown in Figure 3-1 and listed below with a gauze cloth soaked in solvent.

3.2 READ/WRITE AND ERASE HEADS

To clean Read/Write and Erase heads:

- (1) Open the front door of the MTU.
- (2) Lift autocleaner to access the lower part of the read/write head.
- (3) Use a circular motion while applying a gauze cloth soaked in solvent to the heads.
- (4) Inspect the heads after cleaning.
- (5) Remove adhering gauze thread with a cotton swab or clean cloth.

3.3 CAPSTAN ROLLER

To clean the capstan roller:

- (1) Wear clean gloves or cover hands with a gauze cloth. Do not touch the capstan surface with uncovered hands.
- (2) Manually turn the capstan and clean carefully with a gauze cloth soaked in solvent.
- (3) Inspect the capstan for gauze threads and remove with a clean cloth.

3.4 TAPE CLEANER

Clean the edges of the tape cleaner with a cotton swab or gauze soaked in solvent.

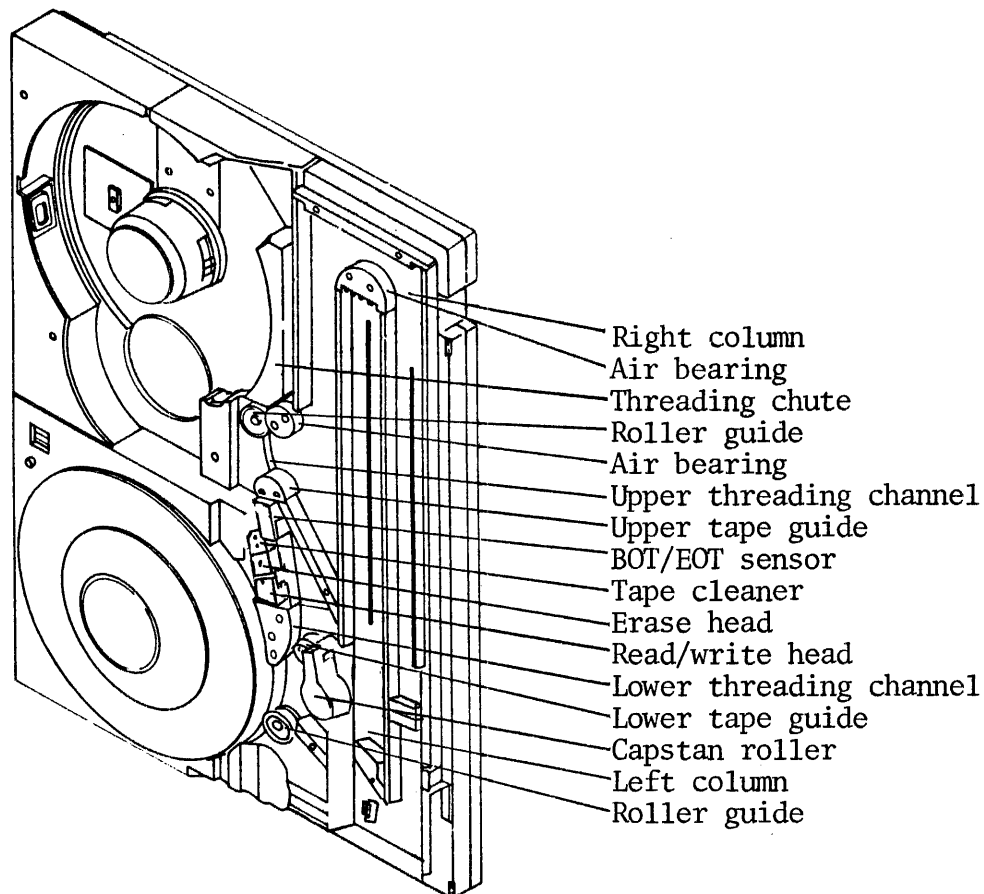


Figure 3-1. MTU components requiring cleaning.

3.5 OTHER MTU COMPONENTS

Clean each of the following items with a gauze cloth or cotton swab containing solvent. To remove dirt from more inaccessible locations, use a brush dipped in solvent. After brushing, apply a gauze cloth or cotton swab soaked in solvent to these surfaces.

- (1) Tape guide (upper and lower)
- (2) Air bearing (see two locations in Figure 3-1)
- (3) Threading chute
- (4) Roller guide
- (5) Upper threading channel
- (6) Lower threading channel
- (7) Column interior
- (8) Glass cover
- (9) Photo sensor (beginning of tape and end of tape sensor).

4. MTU CHECKOUT AND ADJUSTMENT

4.1 INTRODUCTION

This section provides detailed instructions for checking and adjusting the MTU prior to data applications. Procedures are given for:

- Initial MTU installation checkout
- Connecting the field tester
- Powering on the MTS
- Power supply adjustment
- BOT and EOT checks and adjustments
- Air system checks and adjustments
 - Column vacuum
 - Air-bearing pressure
 - Restraint pressure
- Tape-loop position check
- Azimuth check
- Read signal check.

It is important to perform the MTU installation checks and adjustments in the sequence given above. If any error codes or malfunctions occur during MTU checks, refer to the Maintenance Manual for corrective action.

4.2 INITIAL MTU INSTALLATION CHECKOUT

After physical installation of the MTS has been completed, perform the following initial installation checks:

- (1) Verify that input voltage (see Section 2.2), frequency selection (see Sections 2.3 and 2.4), and cabling (see Sections 2.5 through 2.7) have been completed correctly.
- (2) Ensure that MTU cleaning (see Section 3) has been completed.

4.3 CONNECTING THE FIELD TESTER

Connect the field tester (B13B-0110-B101A) to slot 1C05 on the MTU logic gate assembly (see Figure 4-1).

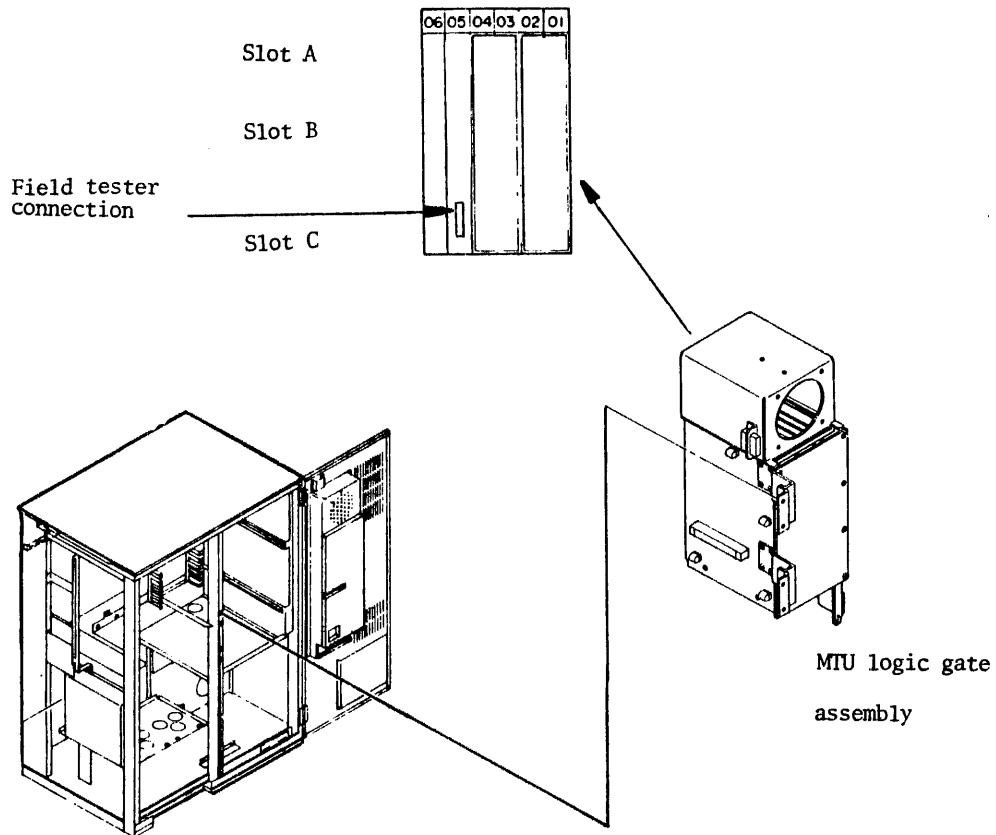


Figure 4-1. Field tester connection to 1C05 on MTU logic gate.

4.4 POWERING ON THE MTS

Perform the following power-on steps:

- (1) Set the FMT #0 power supply unit LOCAL/REMOTE switch to LOCAL. For a dual-FMT system, set the FMT #1 power supply unit LOCAL/REMOTE switch to LOCAL.
- (2) Set the MTU #0 power supply unit LOCAL/REMOTE switch to REMOTE.
- (3) Press the FMT front panel POWER ON switch to ON.

- (4) Verify that:
 - POWER ON light is on and that no alarm indicators are lit on the MTU power supply unit.
 - POWER ON light is on and that no alarm indicators are lit on the FMT(s) power supply unit(s).
 - Power alarm light on the FMT front panel is OFF.
 - The two-digit display on the MTU operator panel, shown in Figure 4-2, is 00.
- (5) If any indicators are incorrect or the MTU display is not 00, refer to the error codes and corrective actions in the Maintenance Manual.

If the system does not include slave units, go to step 12.

If the system includes slave units, continue the power-on sequence as follows:

- (6) Set the FMT front panel POWER ON switch(es) to OFF.
- (7) Set the slave #1 power supply unit LOCAL/REMOTE switch to LOCAL.
- (8) Toggle the power supply unit ON/OFF switch to ON. Power should come on, and the POWER ON light should be lit.
- (9) Verify that no alarm indicators on the slave #1 power supply unit are lit.
- (10) Verify that the POWER ON indicator on the front panel is ON, that the check unit lamp is OFF, and that the operator panel display is 00.
- (11) Repeat steps 7 through 10 for each slave unit #2 through #7.

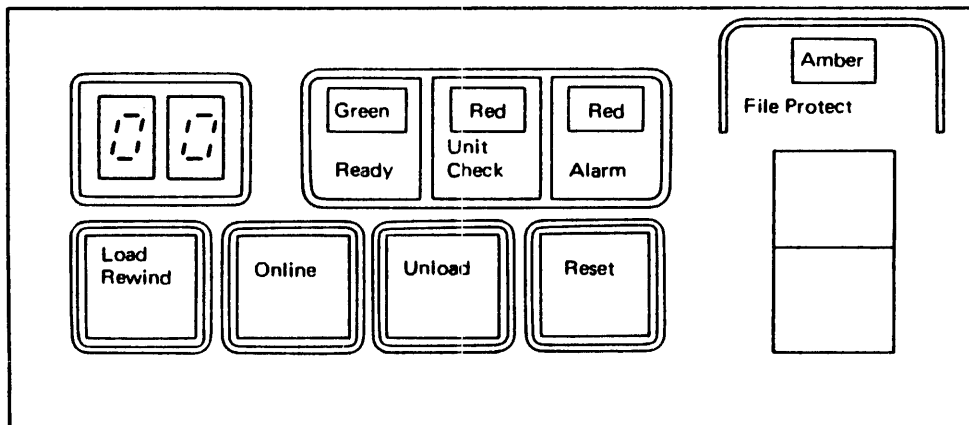


Figure 4-2. MTU operator panel.

- (12) Set all power supplies to OFF. Set slave power supplies to REMOTE.
- (13) Set FMT front panel POWER ON switch to ON, and verify that all units come on sequentially.
- (14) Verify that all fans listed below are operating. See Figure 4-3 for location of fans. (The FMT power supply fan is located on

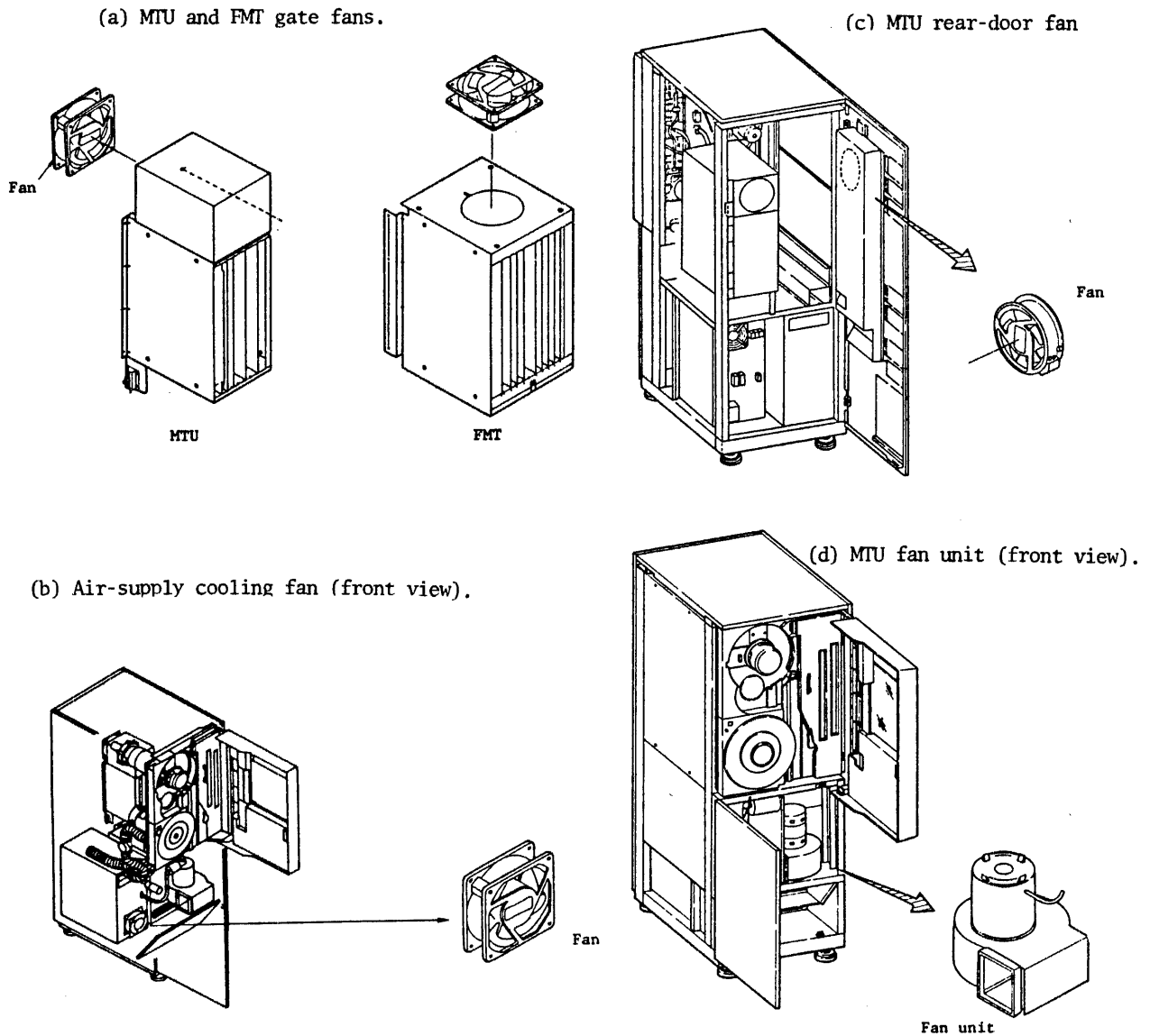


Figure 4-3. Location of fans.

the top of each power supply unit; the MTU power supply fan is located on the rear of the power supply unit.) If fans are not on, check fuses and power supplies and refer to the Maintenance Manual.

- FMT and MTU logic gate fans (2)
- Air-supply cooling fan
- MTU rear-door fan
- MTU fan unit
- FMT power supply fan (one for each FMT)
- MTU power supply fan.

To power on a slave unit by itself (when a slave is not interconnected to a master unit) proceed as follows:

- (1) Connect a jumper to pins 3 and 4 of PWCI/PWCO on the power supply unit.
- (2) Set the slave power supply unit LOCAL/REMOTE switch to LOCAL.
- (3) Toggle the Power On switch.

4.5 POWER SUPPLY CHECKOUT AND ADJUSTMENT

- (1) Use a digital voltmeter to check and adjust the following DC voltage levels on the FMT #0 power supply unit.

Voltage	Range
+5 V	+4.75 to +5.25 V. Adjust the +5 V ADJ on the power supply unit as required.
-5.2 V	-5.46 to -4.94 V. Adjust the -5.2V ADJ on the Power supply unit as required.

- (2) Check FMT #1 power supply unit for a dual FMT system. Adjust DC voltage levels, if necessary, to the same range as that for FMT #0.

- (3) Use a digital voltmeter to check the following DC voltage levels on the MTU power supply unit(s).

Voltage	Range
+5 V	+ 4.75 to 5.25 V
+20 V	+16 to 24 V
-24 V	-18 to -28.8 V

4.6 BOT AND EOT DETECTION CIRCUITS

- (1) Obtain a magnetic tape and install two new reflective markers as shown in Figure 4-4.

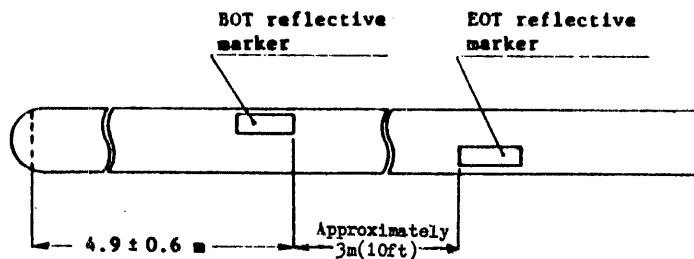


Figure 4-4. Beginning of tape and end of tape reflective markers.

- (2) Before loading tape, check the voltage levels at terminals BOT/GND and EOT/GND (See Figure 4-5) with a digital voltmeter. The readings should be +2.0 V.
- (3) If voltage is not +2.0 V, adjust potentiometers for BOT and EOT, respectively, on the MTU PCA. See Figures 4-1 and 4-5 for location of this card and BOT & EOT potentiometers.

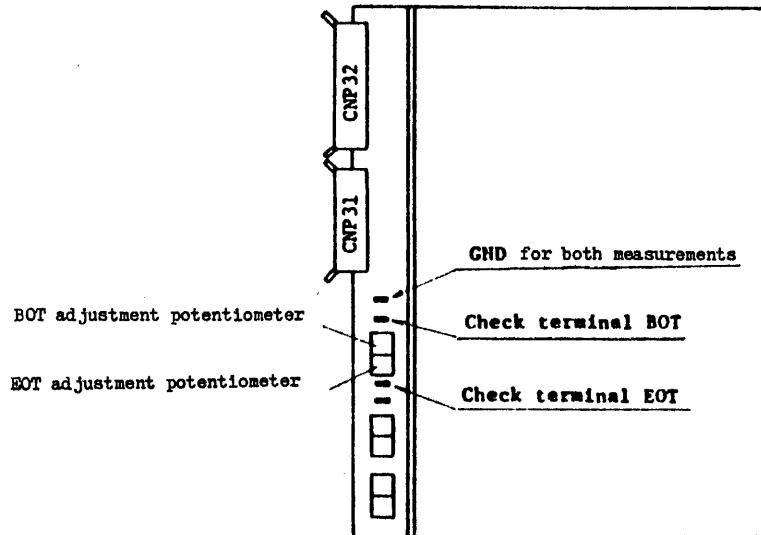


Figure 4-5. PCA 1A04 located in the MTU logic gate assembly.

- (4) Mount the tape and press LOAD/REWIND on the MTU front panel.
- (5) After the tape automatically stops at BOT, measure the voltage at the BOT terminal.
- (6) If the level is lower than +2.0 V, adjust the level to +2.0 V using BOT potentiometer.
- (7) Set the field tester switch to \$01.

\$01	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	dn	dn	dn	dn	up

- (8) Toggle the SSS switch to run the tape forward. Tape automatically stops at EOT.
- (9) Measure the voltage level at the BOT terminal and adjust voltage to lower than +0.3 V.
- (10) Measure the EOT level.
- (11) If EOT level is lower than +2.0 V, adjust the level to +2.0 V using potentiometer EOT.

(12) Set the field tester switches to \$41.

\$41	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	up	dn	dn	dn	dn	dn	up

(13) After the tape automatically stops at BOT, check that the EOT level is lower than +0.3 V.

(14) Repeat these steps for each MTU in the system.

4.7 AIR SYSTEM

Load an SRM3200 tape or a tape of equivalent quality as follows:

- (1) Install the reel of tape on the file (upper) reel.
- (2) Position the tape leader between the two white scribe marks on the upper restraint. (For a cartridge, omit this step.)
- (3) Close the door.
- (4) Press the LOAD/REWIND button on the MTU front panel.

The air system (pneumatics) should now come on, the window will close, and the file reel will rotate clockwise (CW) to feed the tape. Tape will load into columns, search forward, search backward, and stop at beginning of tape (BOT). If the 2-digit display on the MTU operator panel is other than 00, refer to the error codes in the Maintenance Manual.

To allow for thermal stabilization, the pneumatics assembly must operate for at least 30 minutes before adjustment. Use pressure gauge B91L-0020-0001A and vacuum gauge BMz 198a for the following checks. Repeat the procedures in the following sequence for each MTU and whenever vacuum/pressure adjustment is made.

4.7.1 Column Vacuum

- (1) Remove the white nylon screw from the column vacuum measuring port shown in Figure 4-6.
- (2) Connect the vacuum gauge to the column vacuum measuring port.
- (3) Refer to the pressure check level in Table 4-1 for column vacuum.
- (4) If necessary, adjust the vacuum restrictor so that vacuum pressure is within air pressure adjustment level listed.

Table 4-1. Air pressure specifications.

Check point	Air pressure check levels (mm H ₂ O)	Air pressure adjustment levels (mm H ₂ O)
Column vacuum	950 ± 100	950 ± 50
Air bearing pressure	2600 ± 100	2600 ± 50
Restraint pressure	450 ± 50	450 ± 20

4.7.2 Air-Bearing Pressure

The air-bearing pressure check requires tape to be fully loaded into columns.

- (1) Ensure that field tester ONL/OFL switch is set to OFL. Set field tester switches S0 through S7 to S01 and toggle the SSS switch.

S01	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	dn	dn	dn	dn	up

- (2) Remove the white nylon fitting and connect the pressure gauge to the air-bearing measuring port.
- (3) Refer to the pressure check specification in Table 4-1 for air bearing pressure.
- (4) If necessary, adjust the pressure-relief valve shown in Figure 4-6 until the pressure is within the air bearing pressure adjustment level listed.

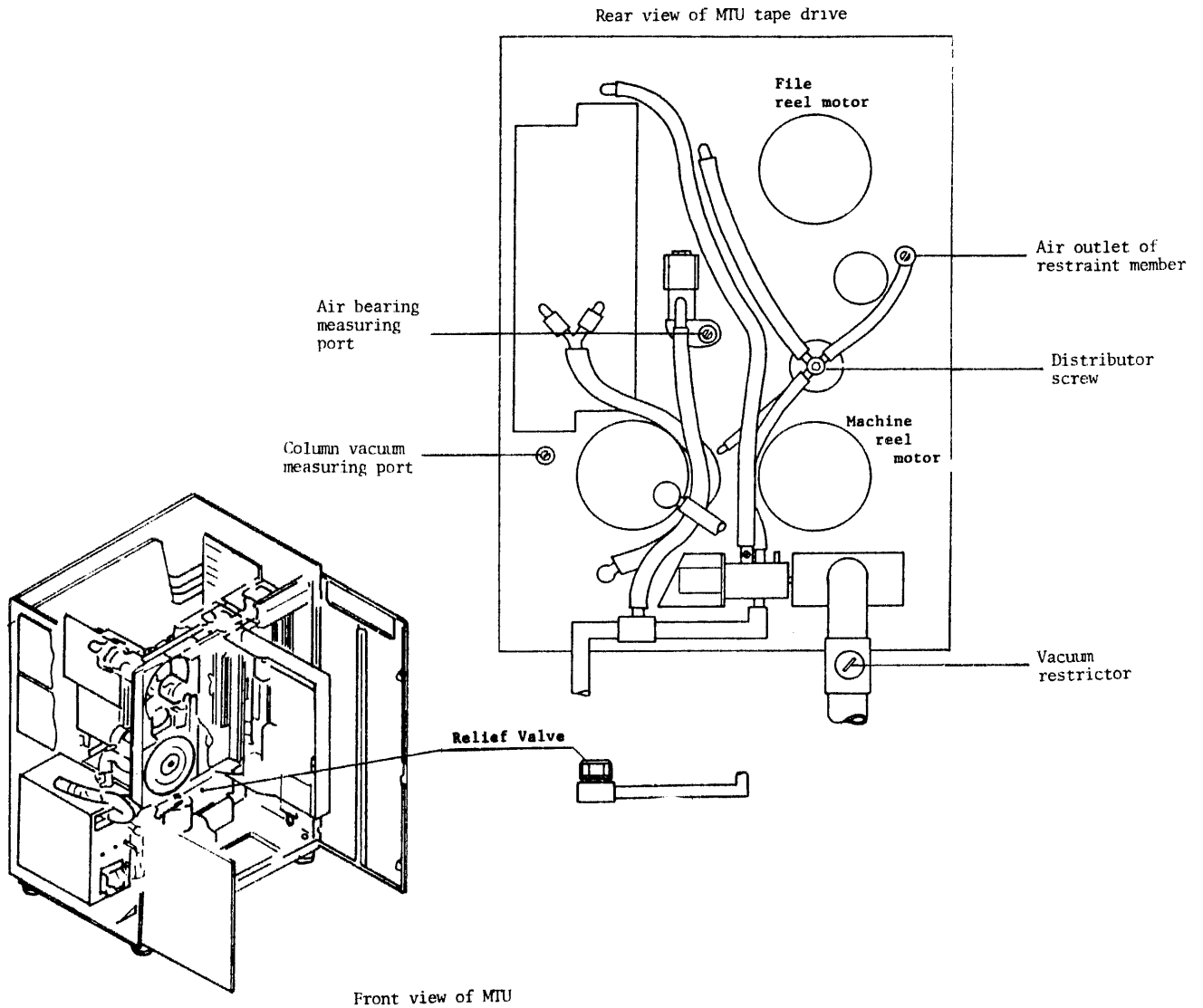


Figure 4-6. Pressure check and adjustment points.

4.7.3 Restraint Pressure

- (1) Press the UNLOAD button on the MTU front panel.
- (2) When unloading is complete, remove the tape from the file reel hub.
- (3) Mount the pressure-adjustment tool (B960-0110-T026A) on the air outlet of restraint member.
- (4) Connect pressure gauge (B91L-0020-0001A) to the restraint member pressure port E.
- (5) Set field tester switches to \$A5 and toggle the SSS switch.

\$A5	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	up	dn	dn	up	dn	up

- (6) Refer to the pressure check specification in Table 4-1.
- (7) If necessary, adjust the distribution screw until pressure is within restraint pressure adjustment specification.
- (8) Toggle the SSS switch on the field tester to turn the air system off.

4.8 TAPE-LOOP-POSITION DETECTION CIRCUITS

- (1) IF tape is loaded, press the UNLOAD button on the MTU front panel. If air pressure is not on, set field tester S0 through S7 to \$A8 and toggle SSS switch.
- (2) Manually feed the tape inside the column, and adjust the tape loop to positions F0 and M0 shown in Figure 4-7. (Hold the file reel in position by taping the reel to the column door.)

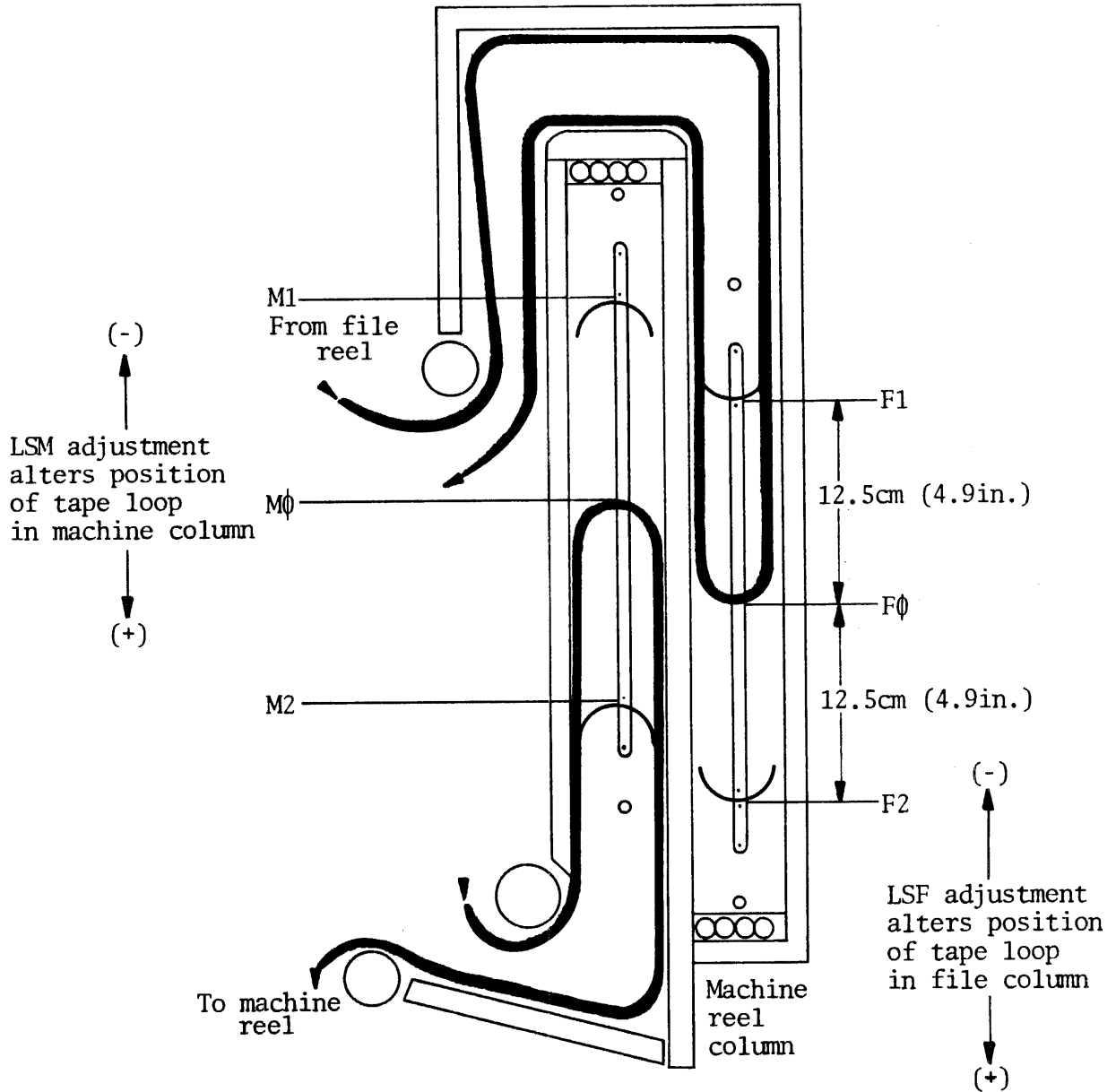


Figure 4-7. Tape loop positions. Tape is shown at positions F0 and M0.

- (3) Ensure that the column vacuum and the air-bearing pressure have been adjusted to 950 mm H₂O \pm 100 and 2600 mm H₂O \pm 100, respectively. (Refer to Section 4.7 for adjustment instructions.)

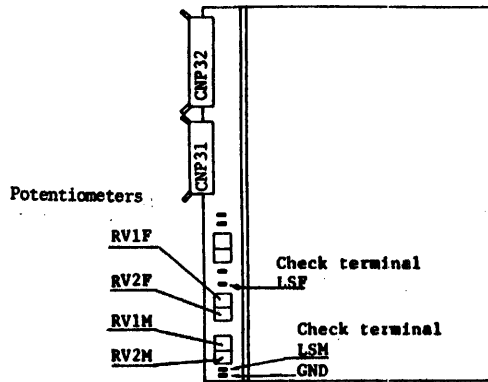


Figure 4-8. PCA 1A04 located in the MTU logic gate assembly.

- (4) Adjust potentiometers RV1F and RV1M shown in Figure 4-8 so that the output voltage is 0 ± 0.2 V.
- (5) Set the field tester switches to Command code \$AA.

\$AA	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	up	dn	up	dn	up	dn

Toggle the SSS switch to start the capstan moving forward. Toggle the SSS switch again when the loop of magnetic tape is at positions F1 and M1 in Figure 4-7. The tape will stop.

- (6) Adjust RV2F and RV2M so that the voltage at LSF and LSM is 6.5 ± 0.2 V.
- (7) Set the field tester switches to Command code \$AB.

\$AB	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	up	dn	up	dn	up	up

Toggle the SSS switch to start the capstan moving backward. Toggle the SSS switch when the tape is at positions F2 and M2 in Figure 4-7. The tape will stop.

- (8) Adjust RV2F and RV2M so that the voltage is no lower than 6.5 V and no higher than 8.5 V.
- (9) Toggle the SSS switch to terminate the test.

4.9 AZIMUTH CHECKOUT

- (1) Press the UNLOAD/REWIND button on the MTU front panel and remove the tape from the reel.
- (2) Demagnetize the read/write (R/W) head with the head eraser (P/N CT-HE-3-AC117 V-60 Hz-Sony).
- (3) Install master skew tape (P/N BM.BvMt 351d) and press LOAD/REWIND on the MTU control panel.
- (4) Connect a dual-trace oscilloscope to the Write/Read amplifier PCA, tracks 1 and 9, as shown in Figure 4-9. The designations on the write/read amplifier PCA for tracks 1 through 9 are shown in Figure 4-10. Five pins are associated with each track on the PCA. Connect the oscilloscope to pin #5 as shown in Figure 4-11.
- (5) Set the field tester ONL/OFL switch to OFL.
After setting the switches, toggle the SSS switch.
- (6) Set the field tester switches for forward (FWD) read using Command code \$01. Toggle the SSS switch.

\$01	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	dn	dn	dn	dn	up

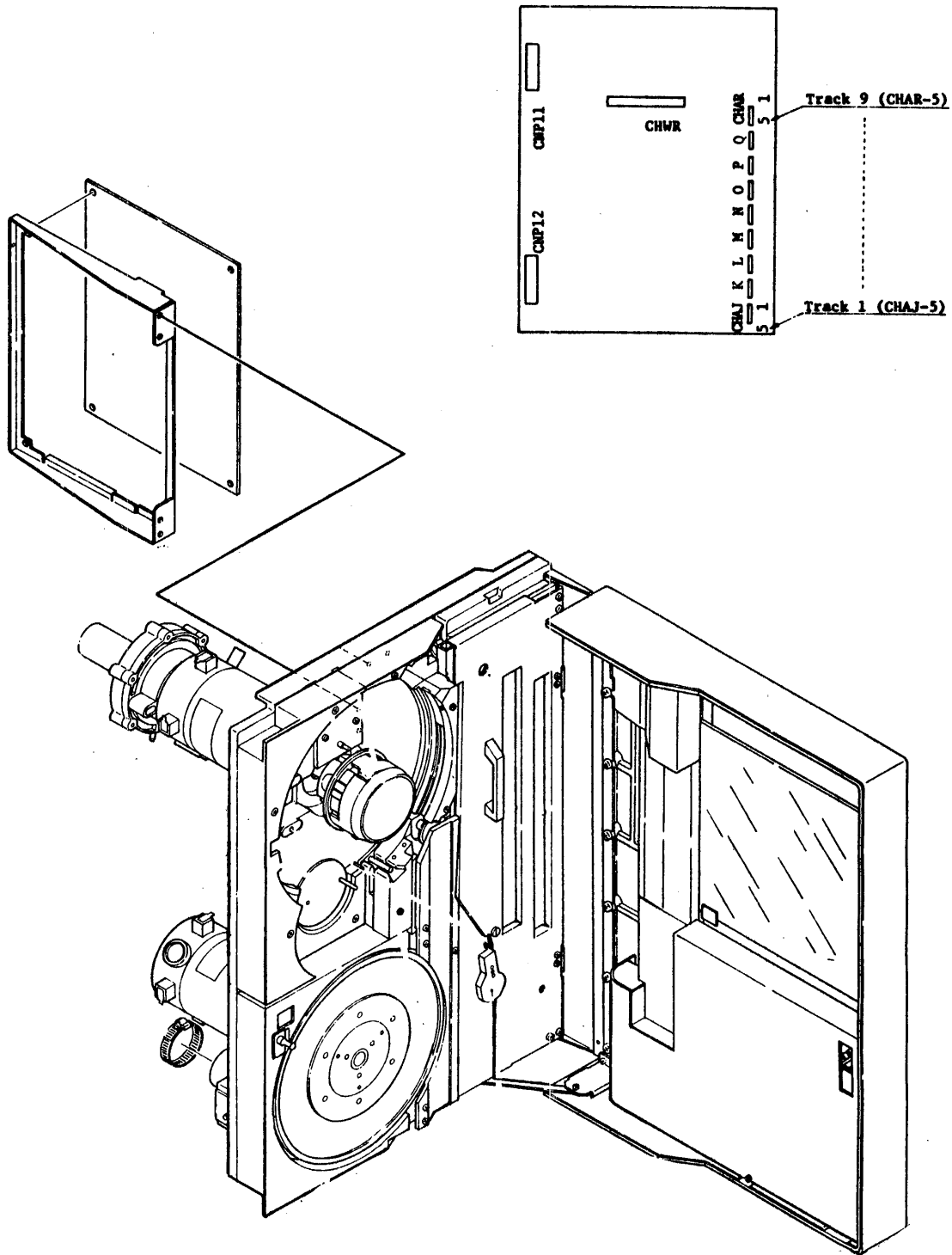
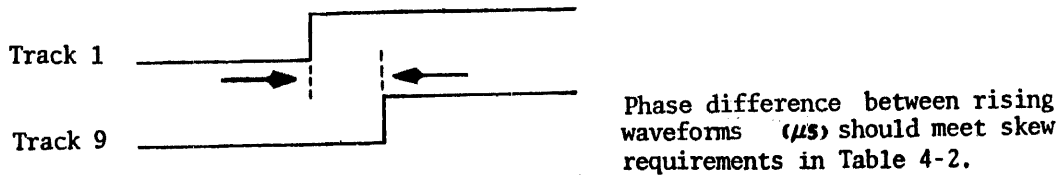


Figure 4-9. Read/Write amplifier PCA.

- (7) Check that the phase difference with the read output of tracks 1 and 9 shown in Figure 4-10 satisfies the requirements of FWD skew in Table 4-2.
- (8) Check the FWD skew of tracks 2 through 8 against track 1. Verify that skew is within the values shown in Table 4-2.



<u>Track Number</u>	<u>Designation on write/read amplifier PCA</u>
1	CHAJ
2	CHAK
3	CHAL
4	CHAM
5	CHAN
6	CHAO
7	CHAP
8	CHAQ
9	CHAR

Figure 4-10. Phase difference of tracks 1 and 9.

Table 4-2. FWD and BWD skew requirements. To use this table, verify model number of unit to be tested. Use skew requirement for FWD and BWD directions (shown in right-hand column) for that model.

Model Number	Specification (write/read PCA)	Check between	Requirement: skew must be within
M2435L1/L2 M2432L	125 ips 6250/1600 bpi	Track 1 versus 2 through 9	FWD 0.6 μ s BWD 1.0 μ s
M2434L1/L2 M2430L	75 ips 6250/1600 bpi	Track 1 versus 2 through 9	FWD 1.0 μ s BWD 1.6 μ s
M2433L	125 ips 1600/800 bpi	Track 1 versus 2 through 9	FWD 0.4 μ s BWD 0.4 μ s
M2431L	75 ips 1600/800 bpi	Track 1 versus 2 through 9	FWD 0.7 μ s BWD 0.7 μ s
M2436L1/L2 & L8	200 ips 6250/1600 bpi	Track 1 versus 2 through 9	FWD 0.4 μ s BWD 0.6 μ s

- (9) Initiate the backward (BWD) operation by setting field tester switches to \$41.

\$41	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	up	dn	dn	dn	dn	dn	up

- (10) Verify that skew is within the values shown in Table 4-2 for BWD operation. Check the BWD skew of tracks 2 through 9 against track 1.
- (11) If either FWD or BWD operations do not satisfy the requirements in Table 4-2, adjust the azimuth according to instructions in the Maintenance Manual.

4.10 READ-SIGNAL CHECKOUT

This section provides instructions for checking and adjusting the read-signal levels for the following modes:

- Low-speed phase encode
- High-speed phase encode
- Low-speed group code recording (GCR)
- High-speed GCR.

Ensure that the conditions listed below have been satisfied before initiating read-signal checkout:

- (1) Clean the read/write and erase heads.
 - (2) Install an SRM3200 tape or a tape of equivalent quality. Push the LOAD/REWIND button on the MTU front panel.
 - (3) Verify that the column vacuum level is adjusted to Table 4-1 specifications.
 - (4) Ensure that capstan alignment is normal.
- If any problems are encountered during read-signal checkout and adjustment, refer to the Maintenance Manual.

4.10.1 Low-Speed Phase Encode Checkout

- (1) Set field tester switches S0 through S7 to \$1E, and toggle the CNT switch to select the register address.

\$1E	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	up	up	up	up	dn

- (2) Set the field tester switches S0 through S7 to \$EA, and toggle the SSS switch to set the read mode, tape speed, and density. (For models M2431L and M2433L, use \$E8.)

\$EA	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	dn	up	dn	up	dn

- (3) Set the field tester switches S0 through S7 to \$FA, and toggle the SSS switch to set the slice level to 100%.

\$FA	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	up	dn	up	dn

- (4) Set the field tester switches S0 through S7 to \$89, and toggle the SSS switch to set the write, low-speed, phase encode mode.

\$89	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	dn	up

Lamps 0 through 8 will come on and should be semi-luminous (barely glowing).

- (5) Adjust the corresponding potentiometers (RV1R through RV1J) in Figure 4-11, if necessary, to obtain semi-luminous status for lamps 0 through 8. Toggle the SSS switch to stop the tape.

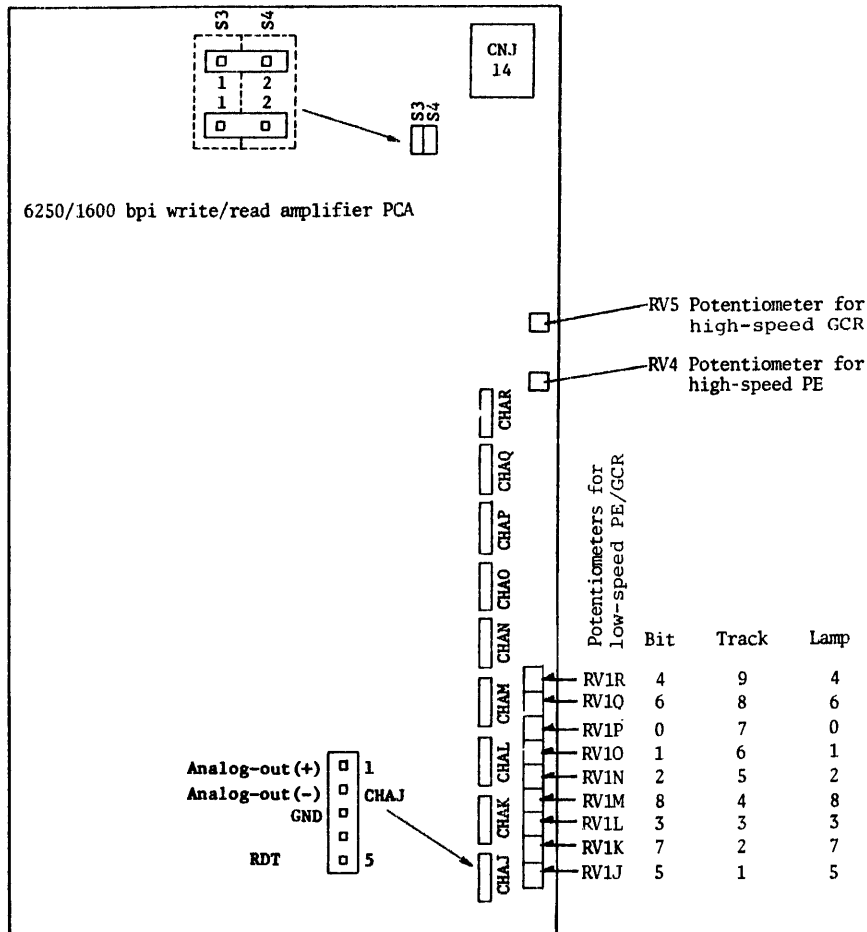


Figure 4-11. Potentiometers and check terminals for lamps 0 through 8 on write/read amplifier PCA.

- (6) Set the field tester switches S0 through S7 to \$F9, and toggle the SSS switch to set the slice level to 90%.

\$F9	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	up	dn	dn	up

- (7) Set the field tester switches S0 through S7 to \$89, and toggle the SSS switch to set the write, low-speed, phase encode mode.

\$89	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	dn	up

Lamps 0 through 8 should be brightly lit.

- (8) Adjust the corresponding potentiometers shown in Figure 4-11, if necessary. Toggle the SSS switch to stop the tape.
- (9) Set the field tester switches S0 through S7 to \$FB, and toggle the SSS switch to set the slice level to 110%.

\$FB	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	up	dn	up	up

- (10) Set the field tester switches S0 through S7 to \$89, and toggle the SSS switch.

\$89	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	dn	up

Lamps 0 through 8 should be off.

- (11) Adjust the corresponding potentiometers shown in Figure 4-11, if necessary. Toggle the SSS switch to stop the tape.

4.10.2 High-Speed Phase Encode Checkout

- (1) Set the field tester switches S0 through S7 to \$1E, and toggle the CNT switch to select the register address.

\$1E	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	up	up	up	up	dn

- (2) Set the field tester switches S0 through S7 to \$EC, and toggle the SSS switch to set the tape to the high-speed mode.

\$ED	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	dn	up	up	dn	dn

- (3) Set the field tester switches S0 through S7 to \$FA, and toggle the SSS switch to set the slice level to 100%.

\$FA	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	up	dn	up	dn

- (4) Set the field tester switches S0 through S7 to \$89, and toggle the SSS switch for write, high-speed, phase encode mode.

\$89	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	dn	up

- (5) Adjust potentiometer RV4 shown in Figure 4-11 so that four or more of lamps 0 through 8 are lit. After adjustment, toggle the SSS switch to stop the tape.
- (6) Set the field tester switches S0 through S7 to \$F5, and toggle the SSS switch to set the slice level to 80%.

\$F5	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	up	dn	up

- (7) Set the field tester switches S0 through S7 to \$89, and toggle the SSS switch for write, high-speed, phase encode mode.

\$89	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	dn	up

Lamps 0 through 8 should be lit.

- (8) Adjust potentiometer RV4 if necessary. Toggle the SSS switch to stop the tape.
- (9) Set the field tester switches S0 through S7 to \$F7, and toggle the SSS switch to set the slice level to 125%.

\$F7	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	up	up	up

- (10) Set the field tester switches S0 through S7 to \$89, and toggle the SSS switch for write, high-speed, phase encode mode.

\$89	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	dn	up

Lamps 0 through 8 should be off.

- (11) Adjust potentiometer RV4 if necessary. Toggle the SSS switch to stop the tape.

4.10.3 Low-Speed GCR Checkout

- (1) Set the field tester switches S0 through S7 to \$1E, and toggle the CNT switch to set the register address.

\$1E	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	up	up	up	up	dn

- (2) Set the field tester switches S0 through S7 to \$EA, and toggle the SSS switch to set the tape to the low-speed mode.

\$EA	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	dn	up	dn	up	dn

- (3) Set the field tester switches S0 through S7 to \$F3, and toggle the SSS switch to set the slice level to 51%.

\$F3	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	dn	up	up

- (4) Set the field tester switches S0 through S7 to \$C6, and toggle the SSS switch to set the DGC amplifier.

\$C6	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	dn	dn	dn	up	up	dn

Toggle the SSS switch again to stop the tape.

- (5) Set the field tester switches S0 through S7 to \$8B, and toggle the SSS switch for write, low-speed GCR mode.

\$8B	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	up	up

Lamps 0 through 8 should be on.

- (6) If the lamps are not on, refer to the Maintenance Manual. Toggle the SSS switch to stop the mode.
- (7) Set the field tester switches S0 through S7 to \$F5, and toggle the SSS switch to set the slice level to 80%.

\$F5	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	up	dn	up

- (8) Set the field tester switches S0 through S7 to \$8F, and toggle the SSS switch to perform SAGC operation in write, low-speed, GCR mode.

\$8F	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	up	up	up

Lamps 0 through 8 should be on.

- (9) If lamps are not on, refer to the Maintenance Manual. Toggle the SSS switch.
- (10) Set the field tester switches S0 through S7 to \$F7, and toggle the SSS switch to set the slice level to 125%.

\$F7	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	up	up	up

- (11) Set the field tester switches S0 through S7 to \$8B, and toggle the SSS switch for write, low-speed, GCR mode.

\$8B	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	up	up

Lamps 0 through 8 should be off.

- (12) If lamps are not off, refer to the Maintenance Manual. Toggle the SSS switch.

- (13) Set the field tester switches S0 through S7 to \$F3, and toggle the SSS switch to set the slice level to 51%.

\$F3	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	dn	up	up

- (14) Set the field tester switches S0 through S7 to \$41, and toggle the SSS switch for read backward in the low-speed, GCR mode.

\$41	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	up	dn	dn	dn	dn	dn	up

Lamps 0 through 8 should be on.

- (15) Toggle the SSS switch.

4.10.4 High-Speed GCR Checkout

- (1) Set the field tester switches S0 through S7 to \$1E, and toggle the CNT switch to set the register address.

\$1E	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	up	up	up	up	dn

- (2) Set the field tester switches S0 through S7 to \$EA, and toggle the SSS switch to set the tape to the low-speed mode.

\$EA	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	dn	up	dn	up	dn

- (3) Set the field tester switches S0 through S7 to \$8F, and toggle the SSS switch for write, low-speed GCR mode.

\$8F	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	up	up	up

After a few seconds, toggle the SSS switch again to stop the tape.

- (4) Set the field tester switches S0 through S7 to \$EE, and toggle the SSS switch to set the tape to high-speed mode.

\$EE	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	dn	up	up	up	dn

- (5) Set the field tester switches S0 through S7 to \$FA, and toggle the SSS switch to set the slice level to 100%.

\$FA	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	up	dn	up	dn

- (6) Set the field tester switches S0 through S7 to \$8B, and toggle the SSS switch for write, high-speed GCR mode.

\$8B	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	up	up

- (7) Adjust potentiometer RV5 in Figure 4-11 so that four or more of lamps 0 through 8 are on. Toggle the SSS switch after adjustment to stop the tape.
- (8) Set the field tester switches S0 through S7 to \$F4, and toggle the SSS switch to set the slice level to 64%.

\$F4	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	up	dn	dn

- (9) Set the field tester switches S0 through S7 to \$8B, and toggle the SSS switch for write, high-speed, GCR mode.

\$8B	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	up	up

Lamps 0 through 8 should be lit.

- (10) Adjust potentiometer RV5, if necessary, so that lamps 0 through 8 are lit. Toggle the SSS switch to stop the tape.

- (11) Set the field tester switches S0 through S7 to \$F7, and toggle the SSS switch to set the slice level to 125%.

\$F7	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	up	up	up

- (12) Set the field tester switches S0 through S7 to \$8B, and toggle the SSS switch for write, high-speed, GCR mode.

\$8B	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	dn	dn	up	dn	up	up

Lamps 0 through 8 should be off.

- (13) Adjust potentiometer RV5, if necessary, so that lamps 0 through 8 are off, and then toggle the SSS switch to stop the tape.
- (14) Set the field tester switches S0 through S7 to \$F3, and toggle the SSS switch to set the slice level to 51%.

\$F3	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	dn	up	up

- (15) Set the field tester switches S0 through S7 to \$42, and toggle the SSS switch to read backward, high-speed, GCR mode.

\$42	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	up	dn	dn	dn	dn	up	dn

Lamps 0 through 8 should be off.

- (16) Adjust potentiometer RV5, if necessary, until lamps 0 through 8 are off.
- (17) When read-signal checks and adjustment are completed, toggle the SSS switch to teff.
- (18) Press the LOAD/REWIND button on MTU front panel to rewind the tape.

5. FORMATTER CHECKOUT

The FMT checkout consists of issuing commands from the field tester to initiate a self-test internal diagnostic routine. The FMT internal diagnostics run continuously for approximately 6 minutes, unless interrupted by some other command or an error is found.

- (1) If the MTU is Model L2, (dual FMT) set all ENABLE/DISABLE switches on the FMT operator panel to ENABLE.
- (2) With the power turned off, connect the field tester to slot 1A08 of the FMT (See Figure 2-4 for location of FMT logic gates).
- (3) Verify that the lamps are operating properly by setting field tester switches to \$F0. All lamps should be on. If not, replace the field tester.

\$F0	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	up	up	up	dn	dn	dn	dn

- (4) Turn power on and set the OFL/ONL switch on the field tester to OFL. Ensure the two-digit display on the MTU is "00" and that the Check Unit light is off. If incorrect, refer to the Maintenance Manual.
- (5) Set the field tester switches S0 through S7 to \$B2 and toggle the CNT (register contents display) switch.

\$B2	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	up	up	dn	dn	up	dn

- (6) Set the field tester switches to \$00 and toggle the SSS switch.

\$00	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	dn	dn	dn	dn	dn

- (7) Set the field tester switches to \$39 and toggle the SSS switch.

\$39	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	up	up	up	dn	dn	up

- (8) Set the field tester switches to \$B2 and toggle the CNT switch.
 (9) Set the field tester switches to \$00 and toggle the SSS switch.
 (10) Set the field tester switches to \$3E and toggle the SSS switch.

\$3E	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	up	up	up	up	up	dn

- (11) Set the field tester switches to \$B2 and toggle the CNT switch.
 (12) Set the field tester switches to \$03 and toggle the SSS switch.

\$03	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	dn	dn	dn	dn	up	up

- (13) Set the field tester switches to \$3C and toggle the SSS switch.

\$3C	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	up	up	up	up	dn	dn

- (14) Set the field tester switches to \$A8 and toggle the CNT switch to start the diagnostic routine. Lamp L1 on the field tester will go ON.

\$A8	Switch number	0	1	2	3	4	5	6	7
	Switch setting	up	dn	up	dn	up	dn	dn	dn

- (15) When the diagnostic routine terminates or is complete, lamp L1 will go OFF. Check lamps L8 and L11. If they are off, no error exists and FMT checkout is complete.
- (16) If either lamp L8 or L11 is on, set the field tester switches to \$35 and toggle the CNT switch to display the routine number.

\$35	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	up	up	dn	up	dn	up

- (17) Set the field tester switches to \$36 to display the error code.

\$36	Switch number	0	1	2	3	4	5	6	7
	Switch setting	dn	dn	up	up	dn	up	up	dn

- (18) Refer to Maintenance Manual Section C for description of routine numbers and error codes. Refer to Section C.4 for corrective actions.

6. M243XL INSTALLATION CHECK LIST

Installation of the MTS is complete when the tasks listed below have been successfully performed. Ensure that individual adjustments conform to the requirements provided in each section of the Installation Instructions.

Task	Refer to
● Visual inspection for damage is complete.	Section 1
● Equipment received conforms with packing list.	Section 1
● Installation clearances and floor openings are adequate.	Figures 1-1 and 1-2
● Special equipment and tools are available.	Section 1.4
● Side covers on adjacent MTUs are removed.	Figure 1-3
● MTS is set for correct input voltage.	Figure 2-1
● MTS is set for correct input frequency.	Figure 2-2
● Air supply unit (pulleys) are adjusted for input frequency and altitude.	Table 2-1
● Controller-to-FMT interface cabling is complete.	Section 2.5.1
● FMT-to-MTU interface cabling for all MTU(s) is complete.	Section 2.5.2
● Power control cable interconnections are complete.	Figure 2-7
● Input power cable is attached and secure.	Section 2.7
● MTU cleaning is accomplished.	Section 3
● MTU operator panel display is 00 during power on	Section 4.2
-- All fans operate	Section 4.2
-- Power-on indicators are ON	Section 4.2
-- No alarms are activated.	Section 4.2
● DC voltage levels on all FMTs meet specifications.	Section 4.3
● DC voltage levels on the MTU meet specifications.	Section 4.3
● Vacuum, air-bearing, and restraint pressure meet specifications.	Table 4-1
● BOT and EOT detection circuits have been checked.	Section 4.6
● Tape loop position detection circuits have been checked.	Section 4.8
● Azimuth check meets specification.	Table 4-2
● Read signal is checked.	Section 4.10
● FMT diagnostics routine has been run and no errors occur.	Section 5

APPENDIX A: GLOSSARY

ADJ	DC voltage adjustment control on FMT power supply unit.
BOT	Beginning of tape.
bpi	Bits per inch.
BWD	Backward. Refers to direction of magnetic tape.
CNT	Switch on the field tester used to set modes and to display contents of the internal register.
CW	Clockwise. Refers to rotation of tape reel.
DV	Device.
Errorcode	Two-digit error code indicating a malfunction (01-99) or normal operation.
EOT	End of tape.
FMT	Formatter.
FWD	Forward. Refers to direction of magnetic tape.
GCR	Group code recording.
Model L1	MTU model with one formatter.
Model L2	MTU model with two formatters.
Master Unit	MTU and formatter(s).
MIS	Magnetic tape subsystem. Includes MTU, formatter(s), and slave units.
MTU	Magnetic tape unit.
ONL	Online.
OFL	Offline.
PCA	Printed circuit assembly.
PE	Phase encode.

P/N Part number. Fujitsu specification.
PWCI Power control cable input.
PWCO Power control cable output.

REW Rewind.
R/W Read/write head.

Slave unit Tape drives #1 through #7 associated with an MTS.
SSS Toggle switch on field tester used to set data necessary to control the internal register, to start a command execution, and to step the microprogram for various control functions.

TB Terminal block.
TRM Terminal.

\$ Hex code notation for field tester switches S0 through S7.

APPENDIX B: PCA LOCATION

Throughout the Installation Instructions, printed circuit assemblies are identified by slot number in the MTU or FMT logic gates or by their common names, such as write/read PCA. Use Figure B-1 and Table B-1 to locate PCAs in the MTU. First, identify in the left-hand column of Table B-1 the correct model number of the unit to be installed. For example, in model M2434L1 (master unit), slot 1A05 of the MTU logic gate contains the PCA identified as:

- 512648U
- or
- P/N C16B-5126-048#U

This PCA is referred to as "1A05 in the MTU" throughout the Installation Instructions. Similarly, use Figure B-2 and Table B-2 to locate PCAs in the FMT.

When removing a PCA from logic gate, do not use shop tools. Always use the PCA removal tool (P/N C960-0300-T001).

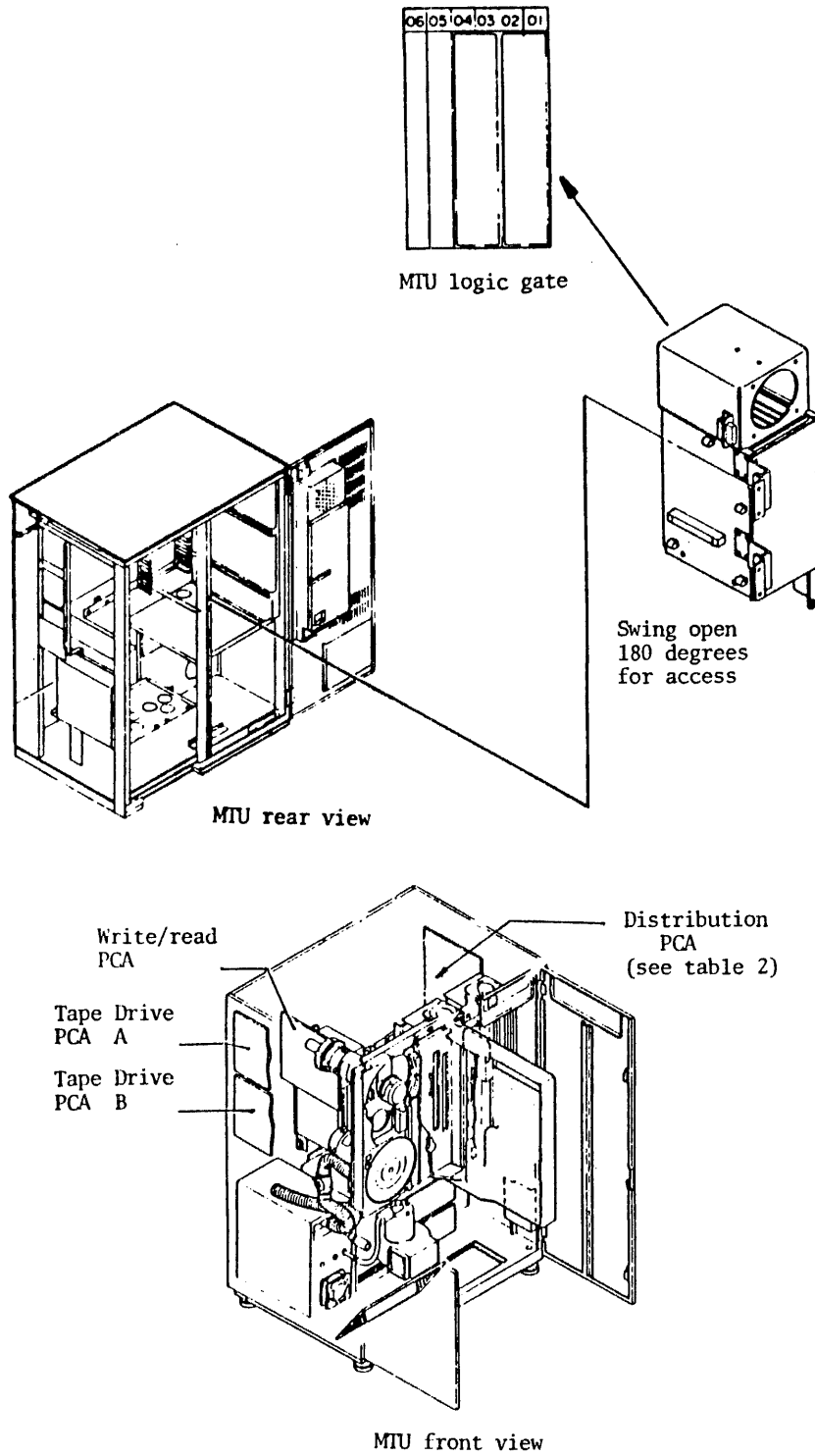


Figure B-1. MTU PCA location diagram.

Table B-1. MTU PCA location.

Model number	MTU PCA logic gate				Tape drive	Tape drive	Write/read
	1A01/1A02	1A03/1A04	1A05	1A06	A PCA	B PCA	PCA
M2430L (slave to M2434L)	P/N B16B-7220-0020 A#U Power unit VQJMU	P/N B16B-7190-0020 A#U TKBMU	P/N C16B-5126-0480 #U 512648U	P/N C16B-5126-0490 #U 512649U	P/N B16B-7210-0200 A#U Tape drive TVAMU	P/N B16B-7210-0200 A#U Tape drive TVBMU	P/N B16B-7240-0030 A#U WRIMU
M2431L (slave to M2434L)							P/N B16B-7260-0020 A#U WRKMU
M2432L (slave to M2435L/6L)							P/N B16B-7230-0030 A#U WRHMU
M2433L (slave to M2435L)							P/N B16B-7250-0020 A#U WRJMU
M2434L1							P/N B16B-7240-0030 A#U WRIMU
M2434L2							
M2435L1							P/N B16B-7230-0030 A#U WRHMU
M2435L2							P/N B16B-7190-0100 A#U TKHMU
M2436L1							P/N C16B-5325-021 #U 532521U
M2436L2							
M2436L8							

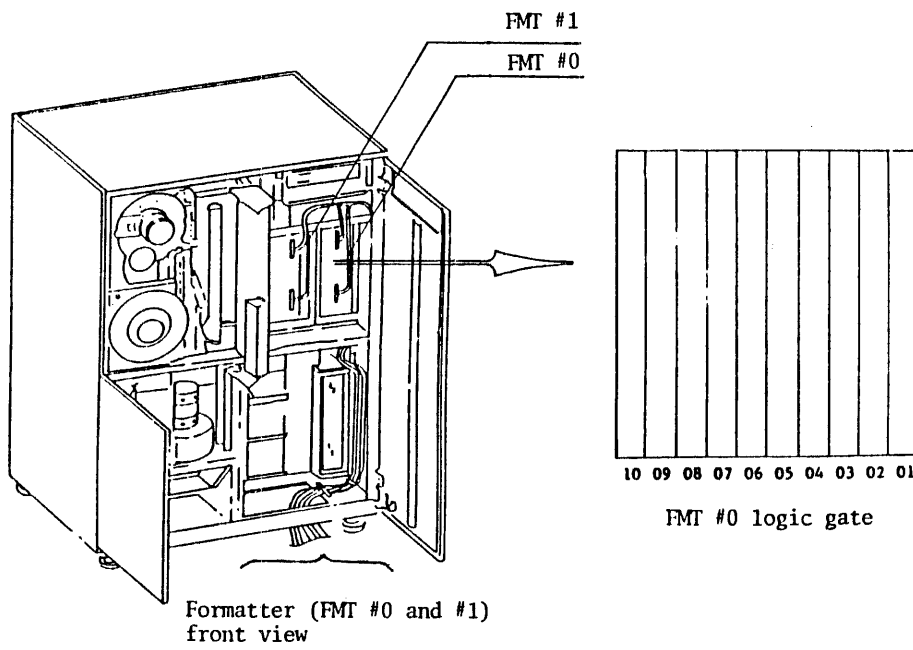


Figure B-2. FMT PCA location diagram.

Table B-2. FMT PCA location.

Model number	FMT PCA logic gate								Distribution board					
	1A01	1A02	1A03	1A04	1A05	1A06	1A07	1A08						
M2430L (slave to M2434L)	None	None	None	None	None	None	None	None	None					
M2431L (slave to M2434L)														
M2432L (slave to M2435L/6L)														
M2433L (slave to M2435L)														
M2434L1	P/N C16B-5121-0890 #U 512189U (read) (800 bpi)	P/N C16B-5121-0880 #U 512188U (read)	None	P/N C16B-5500-0880 #U 550088U (VFO)	P/N C16B-5126-0360 #U 512636U (DV INT)	P/N C16B-5121-0860 #U 512186U (write)	P/N C16B-5127-0920 #U 512792U	P/N C16B-5125-0670 #U 512567U	P/N B16B-7390-0010A 739001 DGAMJ					
M2434L2				P/N B16B-7390-0020A 739002										
M2435L1				P/N B16B-7390-0010A 739001 DGAMJ										
M2435L2				P/N B16B-7390-0020A 739002										
M2436L1				None	None	None			None	None	None	P/N C16B-5326-0610 #U 532661U	None	P/N B16B-7390-0010A 739002 DGAMJ
M2436L2														P/N B16B-7390-0020A 739002
M2436L8	None	None	None	None	None	None	None	None	None					

APPENDIX C: MIU/FMT SHORTING PLUGS

Some printed circuit assemblies in the MTU and FMT have short-circuit options for setting contents, such as tape drive serial number or density. If a PCA is replaced, check and set short circuits as described below.

EXPLANATION OF THE SHORTING PLUG/TERMINALS

The positions (Figure C-1) in which the shorting plugs are installed on the shorting terminals represent a binary code.

Short-terminal

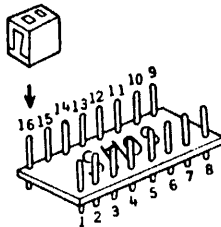


Figure C-1. Short-circuit location on PCA 1A06.

Example: In Table C-1, below, when the shorting plug is installed between pins 3 and 4, a logical "1" is set. When the plug is installed between pins 2 and 3, a logical "0" is set. This sets the extended interface function.

Table C-1. MTU PCA 1A06, mounting position AG4.

	Extended interface	File Search feature
Setting of '1'	3 - 4	6 - 7
Setting of '0'	(2 - 3)	(5 - 6)

Table C-2 summarizes the shorting plug settings for both the MTU and FMT.
 MTU shorting plugs.

PCA	Mounting position	Level '0' (not enable)	Level '1' (enable)	Setting (see notes)	Contents
1A02				(b)	
1A05	BG7	02 - 03	03 - 04	'0' (b)	
		05 - 06	06 - 07	'0' (b)	
		09 - 10	10 - 11	'0' (a)	APR is supported
		12 - 13	13 - 14	'0' (b)	
1A06	AF4	02 - 03	03 - 04	'0' (a)	Reserved Reserved Reserved APR installed
		05 - 06	06 - 07	'0' (a)	
		09 - 10	10 - 11	'0' (a)	
		12 - 13	13 - 14	'0' (a)	
	AG4	02 - 03	03 - 04	'1' (b)	Extended interface File search by tape drive Tape drive serial number
		05 - 06	06 - 07	'1' (b)	
		09 - 10	10 - 11	'0' (b)	
AG5	12 - 13	13 - 14	(a)		
	02 - 03	03 - 04	(a)	Tape drive serial number	
	05 - 06	06 - 07	(a)		
	09 - 10	10 - 11	(a)	Tape drive serial number	
AG6	09 - 10	10 - 11	(a)	Tape drive serial number	
AG7	12 - 13	13 - 14	(a)	Tape drive serial number	
AJ6	02 - 03	03 - 04	(a)	Optional density- select panel Threshold gain step for switching read slice level Tri-or dual density tape unit	
	05 - 06 (Step C)	06 - 07 (Step A)	'0' (a)		
	12 - 13	13 - 14	'1' (b)		
Read/ write PCA		S3 S4		(b) (b)	S3 = 200 ips S4 = 125 or 200 ips

- (a) Setting is determined by factory but can be changed.
 (b) Factory set. Do not change.

Table C-2. (continued) FMT shorting plugs.

PCA	Mounting position	Level '0' (not enable)	Level '1' (enable)	Setting (see notes)	Contents
1A04	AQ7			(b)	
1A05	AF1 AF2 AF3 AG4 AF5 AF6 AF7			(b)	
	AG7	02 - 03 05 - 06 09 - 10 12 - 13	03 - 04 06 - 07 10 - 11 13 - 14	'0' (a) '0' (a) '0' (a) '0' (a)	20 - meter check
	AH7	02 - 03 05 - 06 09 - 10 12 - 13	03 - 04 06 - 07 10 - 11 13 - 14	'0' (a) '0' (a) '0' (a) '0' (a)	Reserved
1A07	AJ7	02 - 03 (c) 05 - 06 09 - 10 (c)	03 - 04 (d) 06 - 07 10 - 11 (d)	'0' (a) '0' (a) '0' (a)	CMDE is supported APR is supported Address line 2 is supported

- (a) Setting is determined by factory but can be changed.
- (b) Factory set. Do not change.
- (c) Valid when '0'.
- (d) Invalid when '1'.

Procedure 1: Setting the Serial Number

Read the serial number of the right lower side at the back of MTU, and convert the number to 13 bit binary code.

Example: If the serial number is 538 (or 0538), install shorting plugs on the shorting terminals at locations AG4, AG5, AG6, and AG7 as follows:

	AG4	AG6				AG5				AG7			
Setting of '1'	13-14	3-4	6-7	10-11	13-14	3-4	6-7	10-11	13-14	3-4	6-7	10-11	13-14
Setting of '0'	12-13	2-3	5-6	9-10	12-13	2-3	5-6	9-10	12-13	2-3	5-6	9-10	12-13

Set short

plug across 12-13 2-3 6-7 9-10 13-14 2-3 5-6 10-11 13-14 3-4 5-6 9-10 12-13

to produce 0 5 3 8

Procedure 2: Setting the Engineering Change Level

Convert the engineering change level to 4 bit binary code, and set SH09 (AF4) in the MTU as follows:

Correspondence of each bit and connected Pin No.

Setting of '1'	3-4	6-7	10-11	13-14
Setting of '0'	2-3	5-6	9-10	12-13

Connected pin No.

Note: If the engineering change level is not changed, the PCA setting is the same as that for the previous PCA.

Example: When the engineering change level is 05

Setting { Binary code 0 1 0 1
 { Connected pin No. 2-3 6-7 9-10 13-14

Procedure 3: Setting the Function (AJ6) in the MTU

	Optional density	Gain step feature	Tri- or dual density
Setting of '1'	3 - 4	(6 - 7)	13 - 14
Setting of '0'	2 - 3	5 - 6	12 - 13

Note: Gain step If the read slice level changes when the SAGC step is greater than C, set it to 0.

Tri- or dual density Always 1. Do not change.

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