TSV05
Tape Transport Subsystem

Installation Manual

digital

TSV05
Tape Transport Subsystem

Installation Manual

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FIGURES

TABLES

1.1 PURPOSE AND SCOPE

This manual describes how to unpack, install, and check out the TSV05 Tape Transport Subsystem. It also describes the capabilities and basic functions of the subsystem. An overview of the functional characteristics and the physical specifications appears in Chapter 1, while Chapter 2 is devoted to the installation procedures. Readers interested in only the installation procedures should bypass Chapter 1 and go directly to Chapter 2. For further information, refer to the documents listed in Section 1.4.

1.2 GENERAL DESCRIPTION

The TSV05 Tape Transport Subsystem provides magnetic tape storage capabilities to computer systems using quad-sized LSI-11 bus backplanes. The subsystem reads or writes up to 160,000 bytes per second in ANSI standard format. Data is recorded by phase encoding 1600 bits per inch on nine-track tape. Reading and writing are performed at either 25 or 100 inches per second.* The TSV05 subsystem is hardware compatible with 18- and 22-bit addressing versions of the LSI-11 bus quad backplane. It is software compatible with system and application programs written for the TS11 tape transport subsystem (as long as such programs use the DEC-supplied device handler). Tape formatting, error detection and correction, and self-test diagnostics are included as integral components of the TSV05 subsystem.

The TSV05 hardware consists of four items:

1. TS05 tape transport

2. M7196 LSI-11 bus interface/controller module

3. H9642-series cabinet, including 874 power controller and remote power control cable

4. Pair of 7016855 bus cables for connecting tape transport input and output to the bus interface/controller module.

The bus interface/controller module plugs into the LSI-11 bus (see Figure 1-1). The two cables connect the module with the tape transport.

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*100 IPS operating speed requires enabling special features and the appropriate software.

LSI-11 BUS

M7196
INTERFACE/CONTROLLER
MODULE

TRANSPORT
BUS

TS05
TAPE TRANSPORT

CS-2428

M7196

J1   J2

RED STRIPE
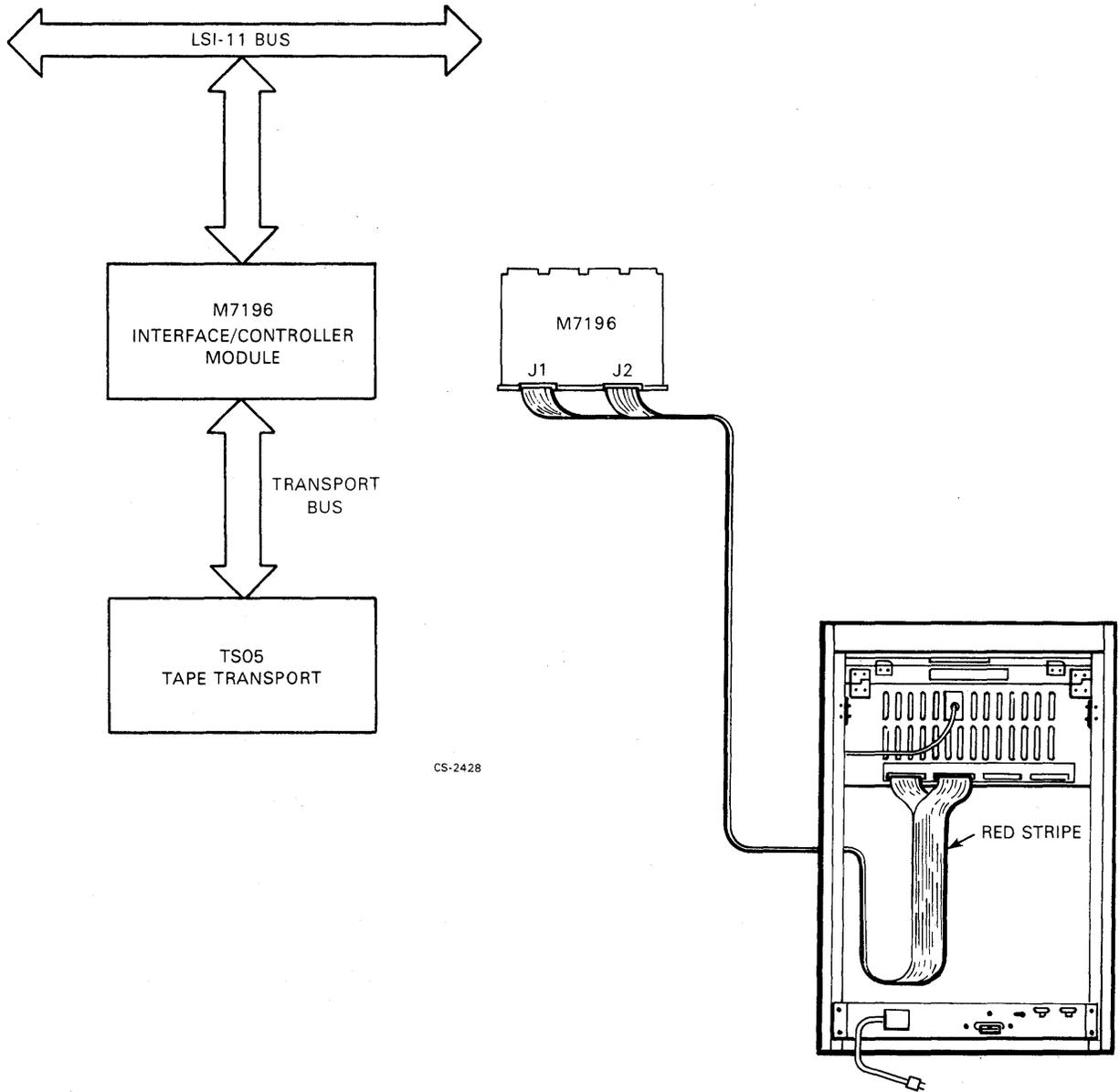
CS-2448

Figure 1-1 TSVØ5 Subsystem Components

1.2.1 Features and Capabilities

The TSV05 Tape Transport Subsystem offers the following:

- Bidirectional reading capability

- 3.5K bytes of RAM in controller for buffering tape data

- Streaming, or reel-to-reel, technology (meaning that the tape is not required to stop in the interrecord gap)

- Automatic tape loading (threading)

- Microprocessor control in both the controller and the tape transport

- Microcoded diagnostic and maintenance features

- Tape formatting and error detection following ANSI X 3.39-1973 Standard

- Both ANSI and IBM tape mark detection

- Industry standard bus between controller and tape transport

- On-line diagnostics that verify data path integrity during idle periods

- Uses media conforming to ANSI X 3.40-1976 Standard

- Automatic read after write verification

- Small form factor with low power consumptions.

The tape handling characteristics and parameters are as follows:

Tape Characteristics

Type:	Mylar base, iron-oxide coated
Length:	731 m (2400 ft) maximum
Width:	1.3 cm (0.5 in)
Thickness:	1.5 mil (industry compatible)
Reel Diameter:	26.7 cm (10.5 in) 2400 ft 21.6 cm (8.5 in) 1200 ft 17.8 cm (7.0 in) 600 ft
Capacity/Tape Reel:	46 million bytes (10.5 in reel, unformatted)

Tape Motion

Handling: Bidirectional reel-to-reel, with compliance arm

Tape Tension: 212.6 g (7.5 oz) nominal

Read/Write Speed: 64 cm/sec (25 in/sec) (using TS11 software)

                             64 or 254 cm/sec (25 or 100 in/sec) (program selectable using special software)

Rewind Speed: 330 to 457 cm/sec (130 to 180 in/sec) (nominal), depending on reel size

                             445 cm/sec (175 in/sec) (average), using 26.7 cm (10.5 in) reel

Rewind Time:

Reel Size, cm (in)	Minutes, maximum
17.8 (7.0)	0.9
21.6 (8.5)	1.6
26.7 (10.5)	2.8

Auto Loading

Reliability: An average of 96% of attempted loads will be successful, with automatic retries, assuming a properly maintained transport and tape library.

Retries: Three automatically provided.

Times: 30 sec typical with no retry
30 sec maximum for each additional retry

Unloading

Time: 15 sec maximum with tape located at BOT

Tape Speed Variation:

Long Term: $\pm$ 1% of nominal
Instantaneous: $\pm$ 4% of long term

Data Access Times:

	64 cm/sec (25 in/sec)	254 cm/sec (100 in/sec)
Tape at Rest:	40 ms	260 ms
Worst Case:	140 ms	1040 ms

1-4

Data Transfer Rate: 40K bytes/sec at 64 cm/sec (25 in/sec)

                       160K bytes/sec at 254 cm/sec (100 in/sec)

Data Organization

Number of Tracks: Nine (eight data; one parity)

Recording Density: 1600 bits/in (nonselectable)

Interrecord Gap: 1.3 cm (0.5 in) minimum, 1.65 cm (0.65 in) typical at 64 cm/sec (25 in/sec)

Recording Method: Phase encoded (PE)

Error Rates: Recoverable Write: 1 error in 10^8 bits transferred

                       Recoverable Read: 1 error in 10^9 bits transferred

                       Unrecoverable Read: 1 error in 10^{10} bits transferred

The LSI-11 bus interface characteristics are as follows:

Address Space Required:	772520/772522	1st	unit
	772524/772526	2nd	unit
	772530/772532	3rd	unit
	772534/772536	4th	unit
Vectors Required:	224	1st	unit
	*	2nd	unit
	*	3rd	unit
	*	4th	unit

1.2.2 Functional Overview
Tape loading is automatic. There are no vacuum columns, retaining clips, or multiple tension arms. When the tape transport is powered up, sets of internal diagnostics are run by the microprocessors in the tape transport electronics package and the bus interface/controller module. The subsystem is then ready for loading. Once the tape has been inserted and the door closed, the TS05 tape transport automatically seats and locks the tape reel on the spindle, and threads the tape through the correct path to the takeup reel. The threading operation is accomplished by precisely directed air flows that blow the tape along the path to the takeup reel. When this power up and load sequence is complete, control of the tape transport switches to the controller module.

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*Rank of 37 in the floating vector area starting at 300.

The TSVØ5 subsystem operates under the control of a microprocessor on the M7196 bus interface/controller module. The module is a direct memory access (DMA) device in that it transfers data directly into or out of the LSI-11 memory without requiring the control of the LSI-11 CPU. To perform a data transaction with the TSVØ5 subsystem, the LSI-11 first builds a "packet" of command words in main memory. Next, it passes the starting address of the command packet to the M7196 module. Using this address, the M7196 module performs a DMA transfer to bring the command packet out to the controller memory. The command packet tells the controller what type of operation is to be performed and where the data is to come from or go to. The module then controls the movement of data from LSI-11 memory to the tape, or from tape to memory. It buffers this data so that DMA transfers can be handled independently of the mechanical movements of the tape. Additionally, it generates interrupts when necessary to provide the LSI-11 with status information.

The TSØ5 tape transport has an internal formatter that controls tape motion, formatting and writing of data on tape, reading of data from tape, and tape transport status monitoring. Commands from the M7196 module are latched into registers and then processed by a microprocessor in the formatter electronics. The formatter creates the identification (ID) burst, preamble, post amble, and file mark during a write operation, and it interprets these during a read operation. The formatter also oversees the handling of error conditions.

1.2.3 Controls and Indicators

The M7196 bus interface/controller module has jumpers, DIP switchpacks, and LED indicators. The jumpers and switchpacks are preset to the normal configuration and do not need to be changed unless there is an address conflict with an existing device. The LED indicators are provided as maintainability features, and are not exposed to view during normal operation.

The TSØ5 tape transport has an ON/OFF (1/Ø) power switch and five tactile switches, each with an LED indicator. (Refer to Figure 1-2.) The functions of these controls and indicators are described in Table 1-1. The TSØ5 tape transport also has internal switches for selecting tape units and enabling certain features, but these are preset and normally not changed. It also has an LED fault indicator. This LED is not exposed to view during normal operation.
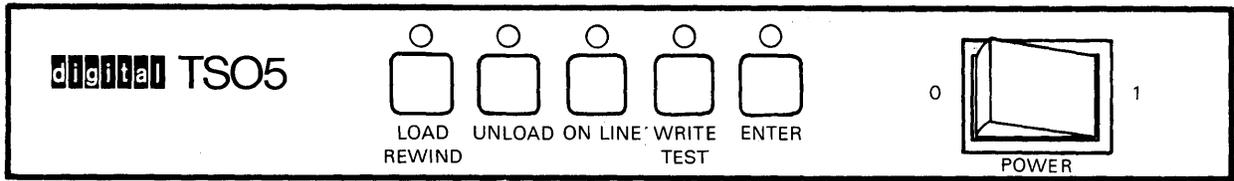
Figure 1-2 Operator Front Panel

Table 1-1 Controls and Indicators

Control/Indicator	Type	Function
POWER	On/off rocker switch and indicator	Switches line power on and off.

LOAD REWIND	Tactile switch and indicator	1. Blinks when the tape drive is executing a load or rewind sequence.
		
		2. Lit continuously when the beginning of tape (BOT) marker is sensed.
		
		3. Pressing the switch:
		
		    a. Initiates load sequence and advances tape to load point.
		
		    b. Rewinds the tape to load point.

UNLOAD	Tactile switch and indicator	1. Pressing the switch causes the tape to be unloaded regardless of tape position. 2. Blinks when the tape drive is executing an unload sequence.

Table 1-1 Controls and Indicators (Cont)

Control/ Indicator	Type	Function
		3. Lit continuously when the tape drive has completed its unload sequence and the front access door is unlocked. At this time, the tape may be removed and another tape inserted into the drive.
		4. Lit continuously after a successful power up, indicating a tape may be loaded.
ON-LINE	Tactile switch and Indicator	1. Lit when drive is ready and on-line.
		2. Pressing the switch:
		a. Takes the tape drive off-line and extinguishes the indicator.
		b. Puts the tape drive on-line and lights the indicators.

NOTE

Pressing the switch during a load sequence puts the tape drive on-line when the BOT marker is sensed.

Control/ Indicator	Type	Function
TEST	Tactile switch	Operational only in the test mode. Selects alternative operational mode for other switches.
WRITE	Indicator	1. Lit when the write ring is installed and data may be written on tape.
		2. When indicator is off, write ring is not installed and tape is file protected.
ENTER	Tactile switch	This control is used for manual loading, and controlling the test mode.

1.3 PHYSICAL DESCRIPTION

1.3.1 Mechanical Characteristics

Tape Transport Cabinet

Height:	111.13 cm (43.75 in)
Width:	59.69 cm (23.50 in)
Depth:	83.82 cm (33.00 in)
Weight:	121 kg (265 lb)

M7196 Bus Interface/Controller Module

Length:	(From contact fingers to handles): 228.6 mm (9.0 in)
Width:	266.7 mm (10.5 in)
Thickness:	12.7 mm (0.5 in)
Weight:	0.51 kg (1.13 lb)

Formatter Bus Cables

Connectors:	50-pin, right-angle, flat cable header connectors at controller end; industry standard formatter connectors at tape transport end.
Length:	2.4 m (8.0 ft)

1.3.2 Electrical Requirements

Tape Transport Cabinet

Power Consumption: 220 W average
270 W maximum

Voltage (+7% or -15%):

	Nominal, Vdc	Low Limit, Vdc	High Limit, Vdc
TSV05-BA	120	102	128
TSV05-BB	240	204	256
TSV05-BD	220	187	235

Frequency: ± 1 Hz

Nominal, Hz	Low Limit, Hz	High Limit, Hz
50 or 60	49	61

Frequency Rate of Change: 1.5 Hz/sec maximum

M7196 Controller

Power Consumption: 5 Vdc ± 5% at 6.5 A (maximum)

LSI-11 Bus Loading: DC: One load
                     AC: Three loads (maximum)

1.3.3 Environmental Considerations

1.3.3.1 Operating Conditions -- The TSVØ5 subsystem is designed to operate under the following conditions:

Temperature

15°C to 32°C

Temperature Shock: 20° C change/hr maximum

Relative Humidity

20% to 80% noncondensing

Altitude

Sea level to 3 km (1Ø,ØØØ ft)

Vibration

Frequency Range: 5 to 5ØØ Hz

Peak Acceleration: Ø.25 g, 22 to 5ØØ Hz, Ø.Ø1 in DA5-22 Hz

Application: Each of three orthogonal axes

Shock

+1Ø g peak, Halfsine, 1Ø ms

Pollutants

Atmospheric Particulates: 6Ø mg/1ØØØ cu ft air by weight of
                           particle (5 micron diameter)

Electrostatic Discharge

1Ø kV through 1ØØ ohms from 35Ø pF

1.3.3.2 Nonoperating Conditions -- The TSVØ5 subsystem is designed to withstand the following conditions during nonoperating periods (e.g., shipping):

<u>Temperature</u>

-40° C to 66° C

<u>Relative Humidity</u>

95% maximum, noncondensing

<u>Altitude</u>

Sea level to 15 km (49,000 ft)

NOTE
Magtape media typically has more restricting nonoperating environmental considerations.

<u>Vibration</u> (in shipping container)

Frequency Range: 10 to 300 Hz

Peak Acceleration: 1.4 g rms vertical axis

0.68 g rms longitudinal and lateral axis
200 Hz maximum

<u>Shock</u> (in shipping container)

Peak Acceleration: 20 g

Duration: 30 ± 10 ms

Waveshape: 1/2 sine

1.3.3.3 Emissions -- During normal operation, the TSVØ5 subsystem is designed to emit no more than the following levels:

<u>Heat</u>

1100 Btu/hr maximum

<u>Acoustic Noise</u>

Standby (blower on):   57 dB A scale

Operating Conditions: 60 dB A scale

Electromagnetic Interference (EMI)

Complies with FCC Part 15, Subpart J, Class A.

Designed to comply with VDE 0871 B requirements.

NOTE
The TSV05 subsystem has been designed
and tested to meet Digital standards in-
cluding FCC requirements. The specifi-
cations in this chapter are based on
this testing. Digital cannot guarantee
the TSV05 subsystem will meet these
specifications if nontested equipment is
installed into the TSV05 cabinet or the
TSV05 cabinet is installed in nontested
configurations.

1.4   RELATED DOCUMENTS

Title	Order Number
TSV05 Tape Transport Pocket Service Guide	EK-TSV05-PS
Operation and Maintenance Instructions for Model F880 Tape Transport	799816-000*
TSV05 Tape Transport Subsystem Installation Guide	EK-TSV05-IN
XXDP User Guide	AC-90931-MC
DEC/X11 User Document	AC-8240Z-MC
TS05 Tape Transport Operation and Acceptance Preventive Maintanance Remove/Replace	EY-D3142-PS
TSV05 Field Print Set	MP-01157
TSV05 Subsystem Technical Manual	EK-TSV05-TM
Microcomputers and Memories	EB-18451-20
Microcomputer Interfaces Handbook	EB-17723-20

CAUTION
Reference the appropriate TSV05 Manual
for installation, operation, and mainte-
nance information.

*Available from Cipher Data Products, 10225 Willow Creek Road, San
Diego, California 92131. This document contains detailed
drawings of the TS05 formatter and power supply.

This chapter explains the TSV05 Tape Transport Subsystem installation. A section is devoted to each of the following:

1. Site preparation

2. Unpacking and inspection

3. Installing the tape transport cabinet

4. Checking out the tape transport

5. Installing the bus interface/controller module

6. Installing the interconnecting cables

7. Checking out the TSV05 subsystem.

> NOTE
> BEFORE YOU UNPACK the cartons, inspect
> for signs of shipping damage. If the
> shipment has been damaged, call the
> dealer from whom the equipment was pur-
> chased. If the equipment is covered
> under "Digital Transit Insurance", the
> Digital representative will estimate the
> damage and put in a claim. If the
> equipment is not insured by "Digital
> Transit Insurance" contact the carrier
> who handled the equipment and your own
> insurance company. Digital Field Ser-
> vice is available on a per-call basis to
> make estimates of damage for any result-
> ing insurance claims.

2.1 SITE PREPARATION

The TSV05 Tape Transport Subsystem mounts to the left side of the existing computer cabinet. It requires a 59.7 centimeter (23.5 inch) wide by 83.8 centimeter (33.0 inch) deep area of floor space that is capable of supporting, as a minimum, 121 kilograms (265 pounds). The cabinet is capable of supporting up to 205 kilograms (450 pounds).

Beyond this mounting space, the TSV05 subsystem also requires room for access to the cabinet, the correct power receptable, and an adequate flow of cooling air.

2.1.1 Accessibility
The cabinet requires sufficient space behind it for opening the rear door. If any expansion is anticipated, room in front of the cabinet will be required to allow future equipment to be pulled out of the cabinet for maintenance. Refer to Figure 2-1 for the required dimensions.

2.1.2 Power Receptacles
Ensure that the correct power receptacle is available (refer to Table 2-1). It should be capable of handling at least the 270 watts required by the tape transport.

Table 2-1   Power Line Connections

MODEL	PLUG	RECEPTACLE	CIRCUIT RATING
TSV05-BA	SILVER → BRASS → NEMA #L5-30P DEC #12-11193	L5-30R 12-11194	120 V 24 A
TSV05-BB -BD	BRASS 2 BRASS 1 NEMA #6-15P DEC #90-08853	6-15R 12-11204	220/240 V 12A
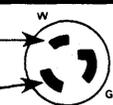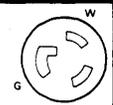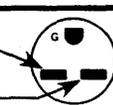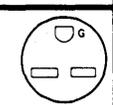
CS-2431

Power Cord Color Code

Color	Function	Pin Connection L5-30P	6-15P
Brown	Hot	Brass	Brass 1
Blue	Neutral	Silver	Brass 2
Green/yellow	Ground	Ground	Ground

2.1.3 Cooling
The TSV05 subsystem requires 1100 Btu per hour of cooling to be provided by the movement of room air through the cabinet.

TOP VIEW

534 mm
(21 in)

838 mm
(33 in)

TSV05-B MUST BE
BOLTED TO ADJACENT
CABINET

FRONT VIEW

TS05

SPACER

1111 mm
(43 ¾"in)

FILLER
PANELS

H9642
CABINET

597 mm
(23 ½ in)
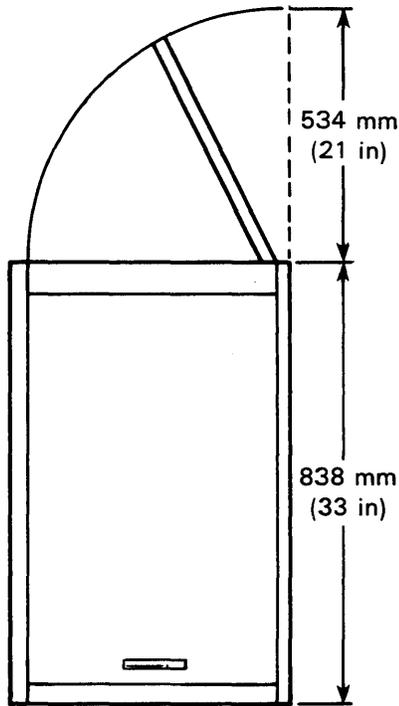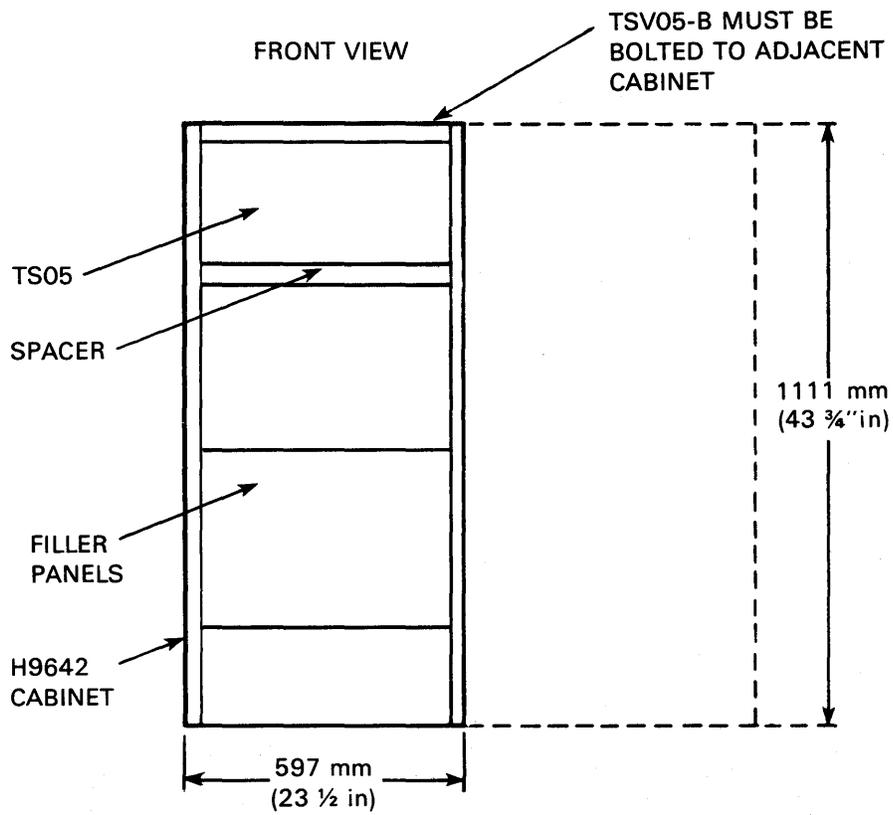
CS-2430

Figure 2-1   Cabinet Access Requirements

2.1.4 Air Purity

The tape transport is equipped with internal filters to prevent dust from accumulating on the tape and tape heads. Nevertheless, it is good practice to avoid placing the cabinet in the path of a dust-laden current of air (such as beside a door).

2.2 UNPACKING AND INSPECTION

The TSVØ5 is shipped as one skid-mounted carton and one or more smaller cartons. The carton on the skid contains the TSØ5 tape transport cabinet. The smaller carton(s) contain the M7196 controller, the documentation and accessories, and two individually packaged cables. These smaller items may be shipped in one carton or two, depending on shipping requirements. Check the shipping documents to ensure that the correct model has been shipped. If anything is missing, damaged, or incorrect, contact the dealer from whom the equipment was ordered.

2.2.1 Tools and Working Space

The following tools are required for unpacking the TSVØ5 subsystem:

1. Scissors

2. 9/16 inch wrench

3. 3/4 inch wrench

4. Hammer

5. 5/32 inch hex key

Also, an area of approximately 3 meters (1Ø feet) square is required for moving the cabinet off the shipping skid.

2.2.2 Unpacking the Cabinet

1. Cut the nylon straps and remove the cardboard pieces of the cabinet carton as shown in Figure 2-2. Remove the plastic bag.

2. Using a 9/16 inch wrench, remove the four bolts that hold the cabinet to the skid.

3. Slide the wooden blocks out from under the cabinet (see Figure 2-3).

> CAUTION
> Once the blocks have been removed, the cabinet is free to roll on its casters. The cabinet is top-heavy and must be handled with care.

The blocks may require a few taps with a hammer to move them out from under the cabinet. It may be helpful to tilt the cabinet slightly while removing the blocks.

REMOVE

LIFT AND REMOVE

Cover

Cardboard Tube

Plastic Bag
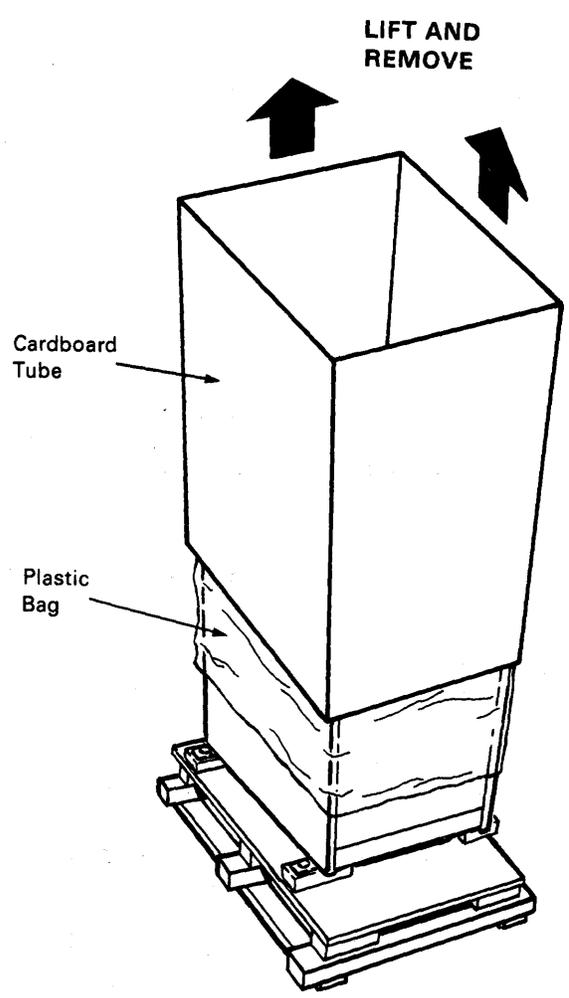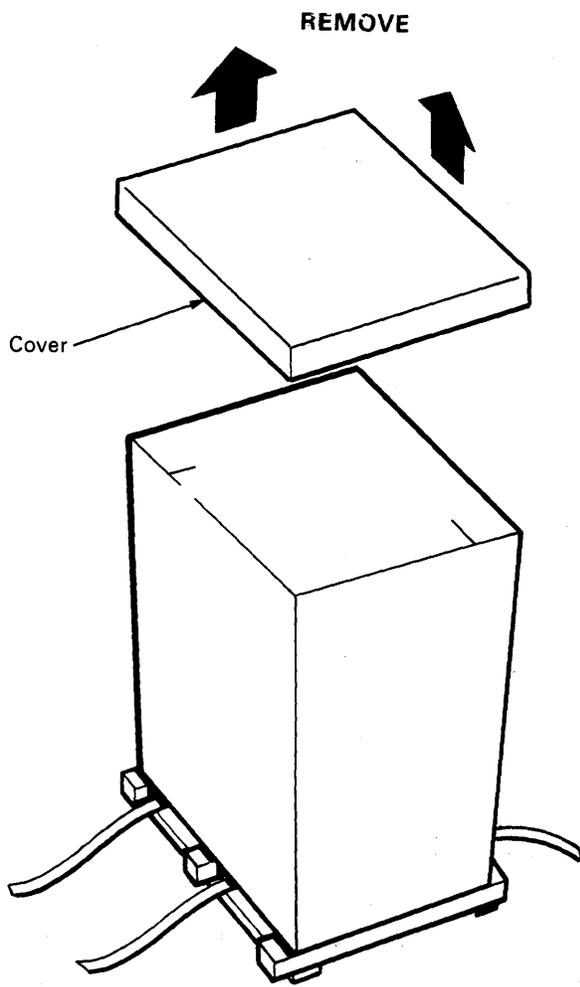
CS-2432

Figure 2-2   Cabinet Carton Removal

REMOVE SHIPPING
BOLTS (4)

RED METAL
SHIPPING BRACKETS (4)

SLIDE SHIPPING
BLOCKS OUT (4)
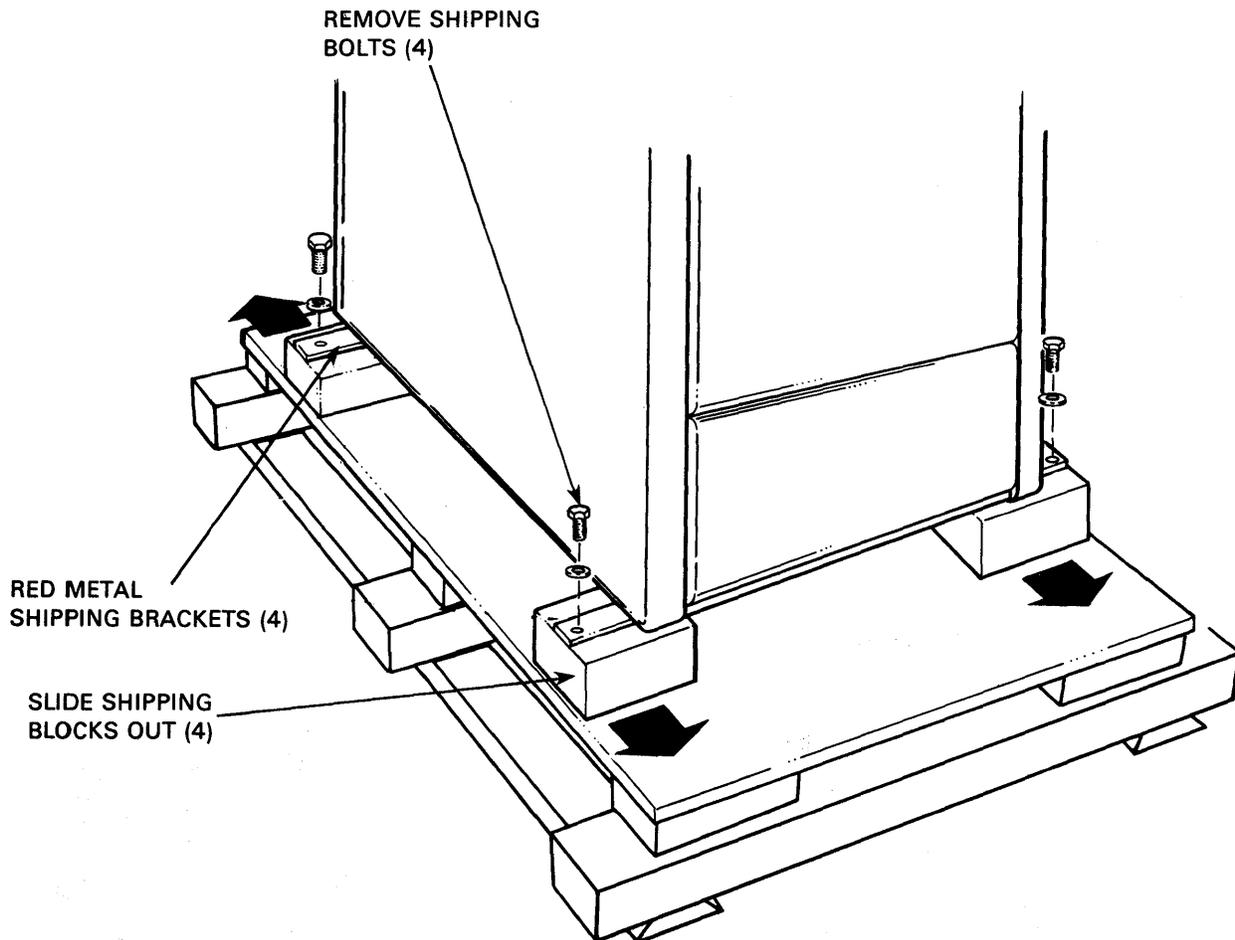
CS-2433

Figure 2-3 Removing Shipping Bolts

2.2.3 Deskidding the Cabinet

WARNING
Two people are required for moving the cabinet off the skid.

The recommended procedure for removing the tape transport cabinet from the skid is as follows:

1. One person stands in front of the cabinet while the other person stands behind it.

2. Grasp the cabinet by right top and by the left center, as shown in Figure 2-4.

3. Roll the cabinet off the side of the skid, taking care to prevent it from toppling over.

4. When the casters on the left side of the cabinet are on the floor, push the skid out from under the right side of the cabinet. Take care to prevent the cabinet from hitting the floor hard or toppling.
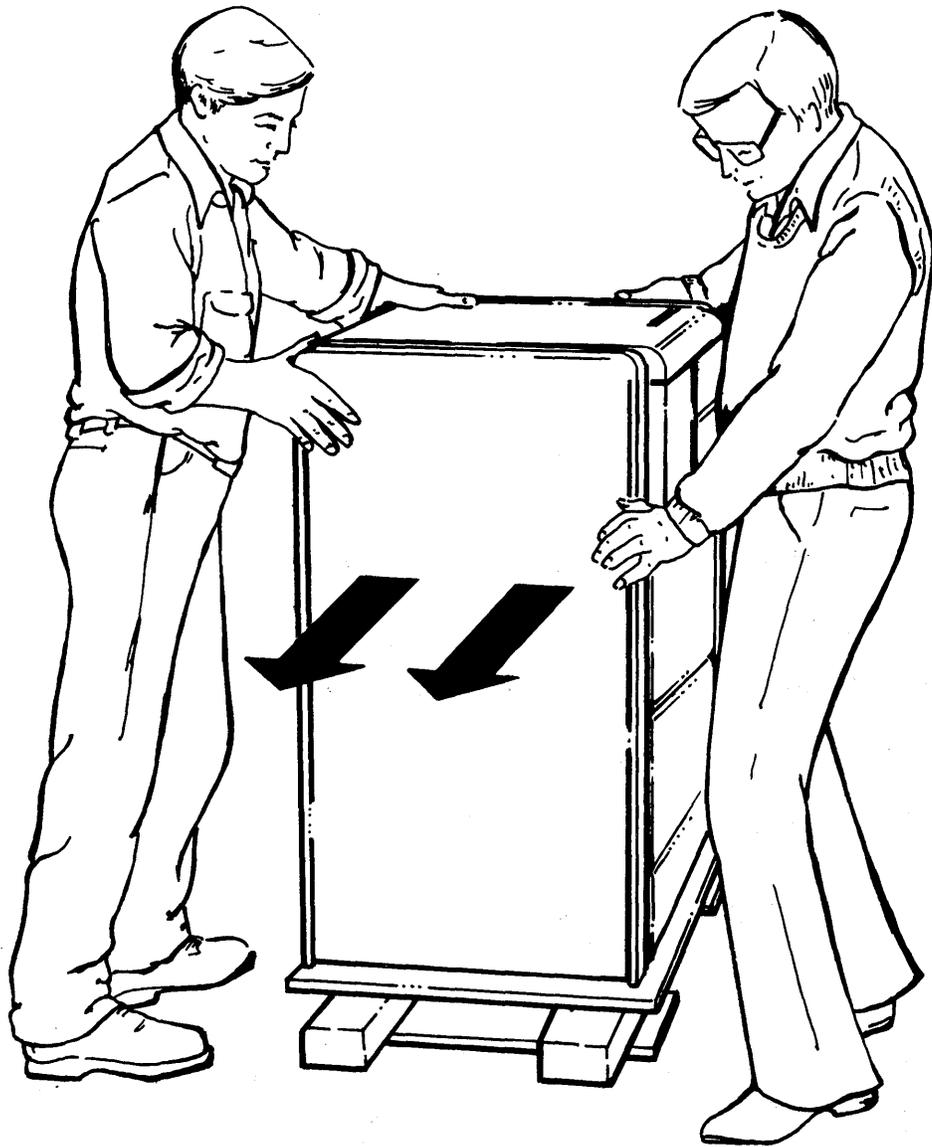
CS-2435

Figure 2-4   Deskidding the Cabinet

5. With the cabinet standing on the floor, use a 3/4 inch wrench to remove the red metal shipping brackets from the bottom. After they are loosened, the brackets slide outward.

6. Open the rear door using a 5/32 inch hex key (see Figure 2-6) and verify that the envelope taped to the bottom of the cabinet contains:

    a. 7008288-8F remote cable

    b. H9544-HB leveler feet and hardware

    c. 7422224/7422225 intercabinet hardware

2.2.4 Unpacking the Smaller Cartons
Open the smaller cartons and check that they contain the following:

1. M7196 bus interface/controller module

2. Two interconnection cables (part number 7016855-08)

3. TSV05 Tape Transport Installation Manual (EK-TSV05-IN) (this manual)

4. TSV05 Tape Transport User's Guide (EK-TSV05-UG)

5. TSV05 Pocket Service Guide (EK-TSV05-PS)

6. 26.7 centimeter (10.5 inch) magtape number 30-18709-08

7. Tape cleaning kit part number TUC02

8. MP01157 field print set.

Visually inspect each item. If any item is damaged, missing, or incorrect, contact the dealer from whom the system was purchased.

2.3 TAPE TRANSPORT CABINET INSTALLATION
The TSV05 subsystem is designed to be connected to the left side of an H9642 cabinet that contains a PDP-11/23 computer. Older LSI-11 computer systems that use H9612 cabinetry require alternative installation procedures. These procedures are defined in the MP01157 print set. The tape transport cabinet is shipped with no side panels, but with an expansion ring on the right side of the cabinet. (Refer to Figure 2-5.) The left side panel of the computer cabinet is moved to the left side of the tape transport cabinet. Then the right side of the tape transport cabinet is bolted to the left side of the computer cabinet.

SIDE PANEL

EXPANSION RING
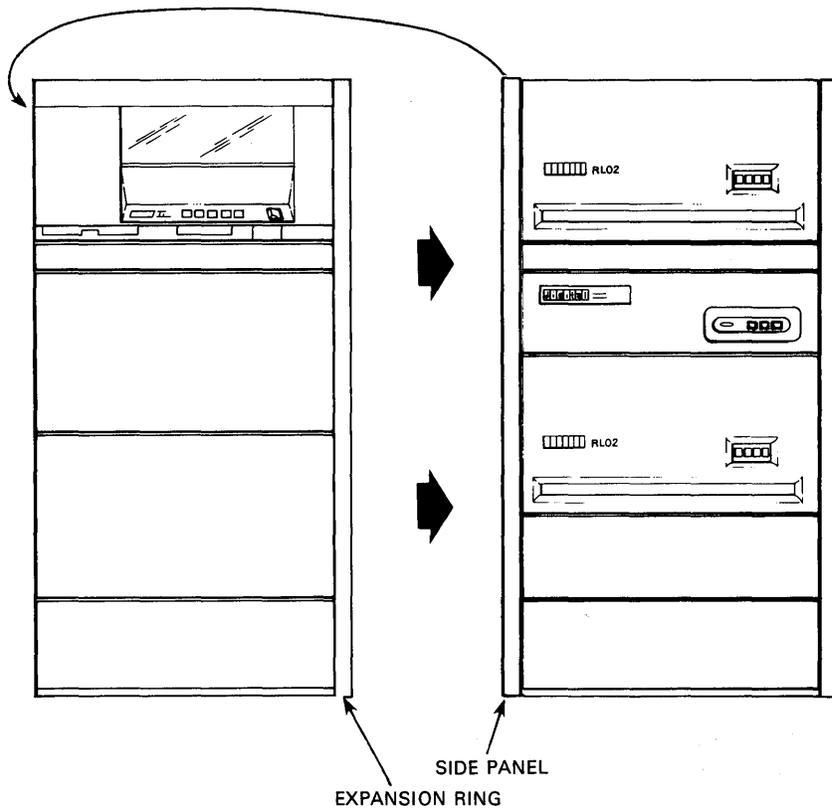
TAPE TRANSPORT
CABINET

EXISTING LSI-11
COMPUTER CABINET
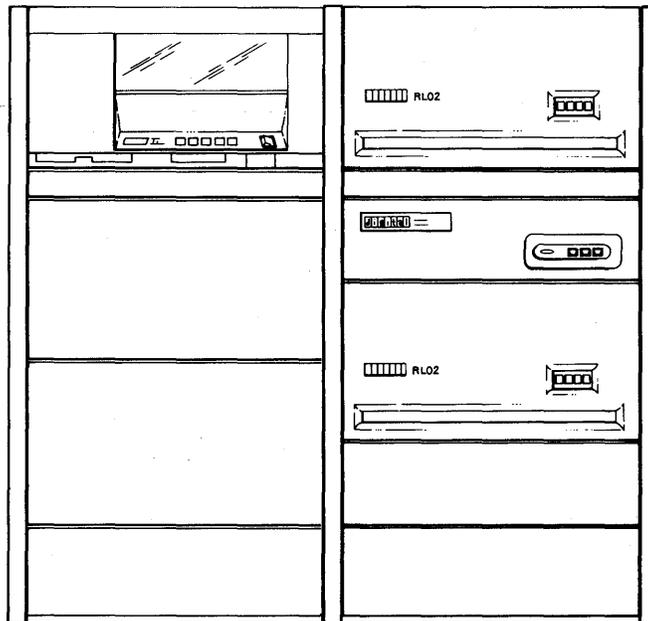
EXPANDED SYSTEM

CS-2436

Figure 2-5 Tape Transport Cabinet Connection

This configuration has been tested for compliance with FCC requirements. Installing the TSVØ5 subsystem in other configurations may result in higher levels of EMI radiation.

2.3.1 Tools Required
Cabinet installation requires the following tools:

1. 9/16 and 11/16 inch wrench (for leveling feet)

2. 5/32 inch hex key (for door)

3. 7/16 inch wrench (for bolting cabinet together)

4. Screwdriver or nut driver, as applicable, for connecting ground cable.

2.3.2 Moving the Side Panel
Install the TSØ5 cabinet levelers and move the side panel as follows:

1. Install the four leveling feet on the bottom of the TSØ5 cabinet (Refer to Figure 2-6.) The leveling feet are screwed into the holes previously used by the red shipping brackets. The cabinet must be tilted to the left to provide clearance for installing the feet on the right side, and tilted to the right while installing the feet on the left side.

> ### CAUTION
> Do not tilt cabinet more than necessary.
> Approximately 5 centimeters (2 inches)
> of clearance is necessary to insert the
> leveling feet.

2. Open the rear door of the TSØ5 cabinet and the CPU cabinet. Typically, this requires inserting the hex key into the latch and turning it 1/4 turn counterclockwise. (See Figure 2-7.)

3. Remove the locking bracket located at the rear bottom, right-hand side of both cabinets. Each bracket is held by two bolts. Loosen but DO NOT remove the bolts.

4. Lift the side panel straight up and remove it from the CPU cabinet left side (see Figure 2-8). Disconnect the side panel ground wire from the cabinet frame.

5. Place the side panel removed in step 4 next to the TSØ5 cabinet left side. Connect the side panel ground strap to the TSØ5 cabinet using the hardware supplied on the left rear cabinet rail.

WARNING
CABINET MUST BE
HANDLED WITH CARE
TO AVOID INJURY.

1. REMOVE LEVELING FEET
   FROM SHIPPING BAG.

2. ENSURE THAT NUT, LOCK
   WASHER AND FLAT WASHER
   ARE ON EACH FOOT.

3. TURN NUT DOWN TO BOTTOM.

4. SCREW FOOT INTO THREADED
   HOLE IN BOTTOM OF CABINET
   FAR ENOUGH TO PERMIT THE
   CABINET TO BE ROLLED ON
   ITS CASTERS.
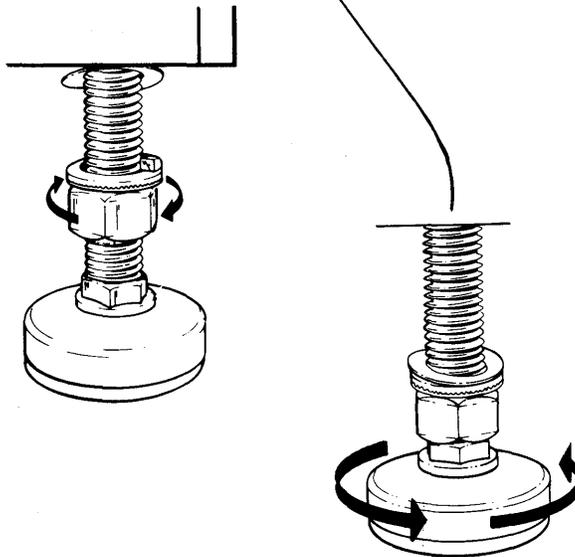
CS-2443

Figure 2-6   Installing Leveling Feet

UNLOCK

¼ TURN

REAR DOOR

GROUND WIRE
(GREEN/YELLOW)

SWING OPEN

LOOSEN BEFORE
REMOVING SIDE
PANEL. TIGHTEN
AFTER SIDE PANEL
IS INSTALLED.
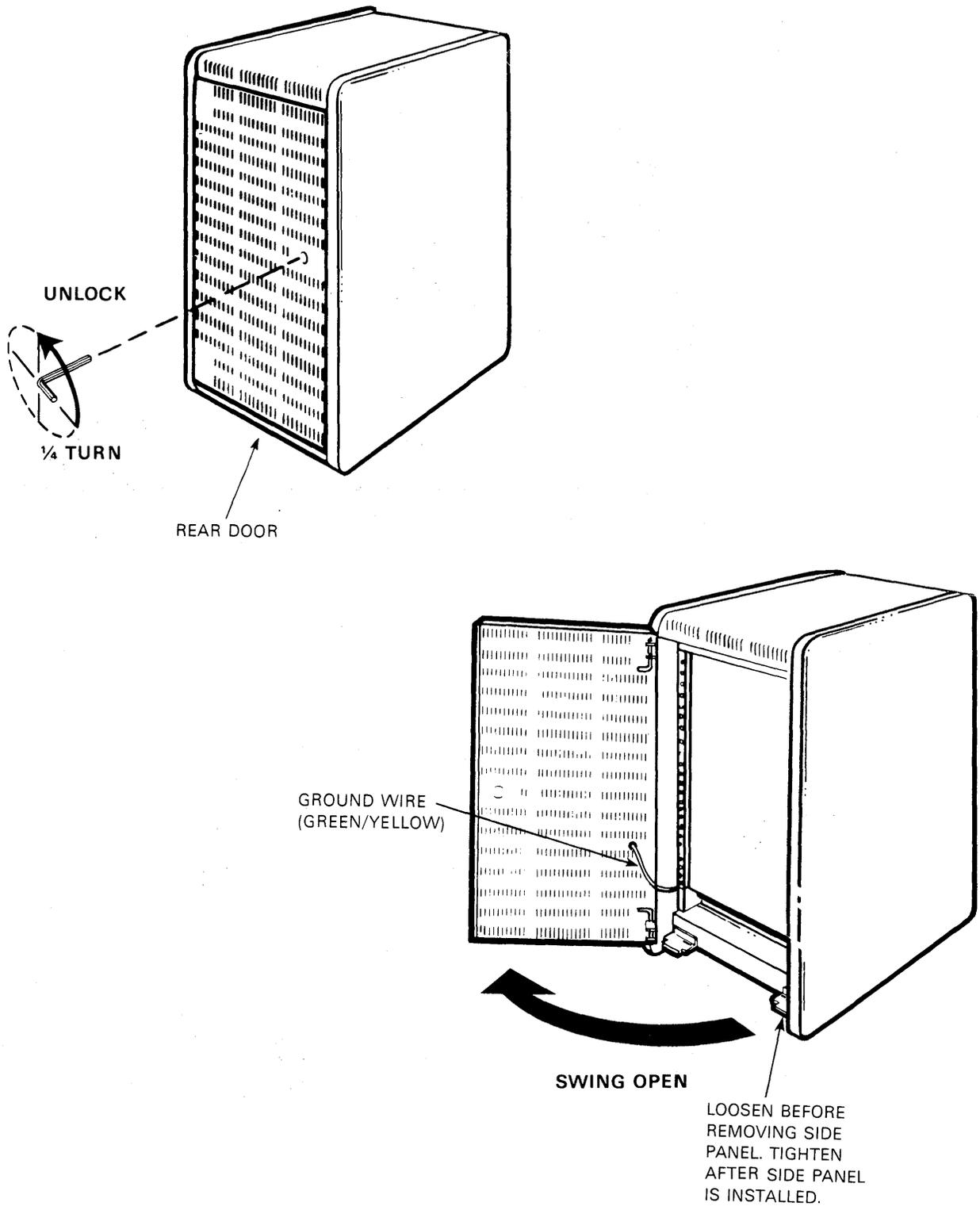
CS-2439

Figure 2-7 Computer Cabinet Ground Connection

LOOSEN
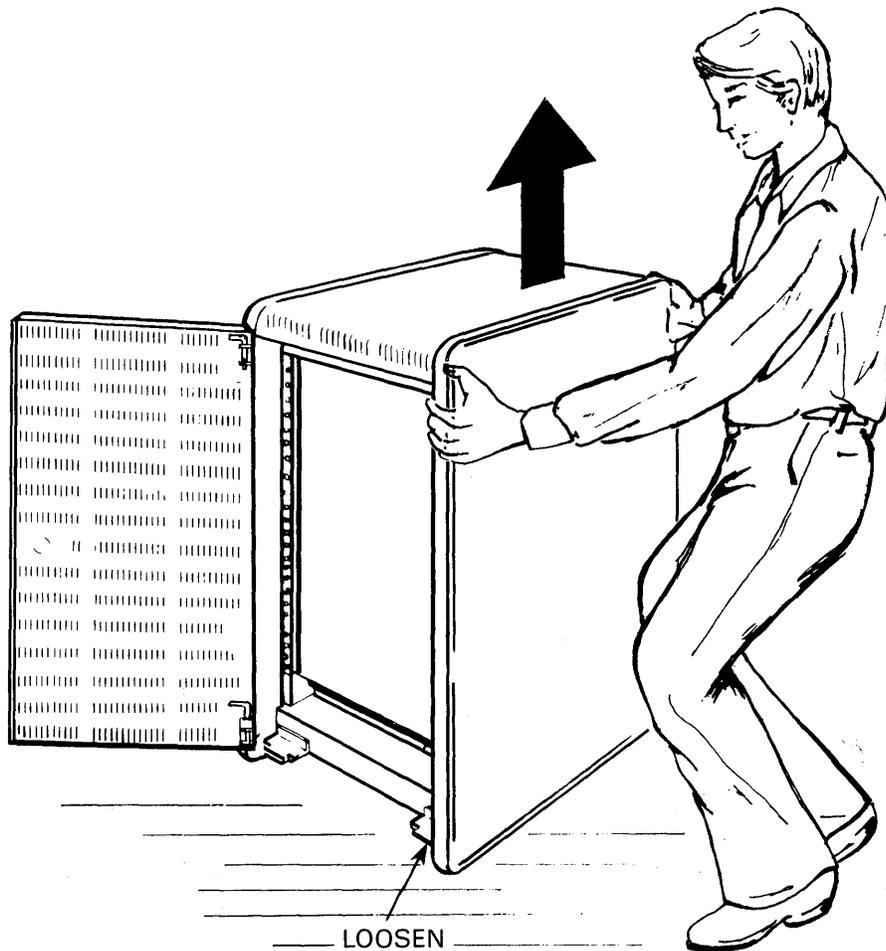
CS-2441

Figure 2-8   Removing Side Panel

6.   Position the side panel against the TS05 cabinet such that
     the slots align with the pins. (Refer to Figure 2-9.)
     Hold the side panel a few inches above its mounted
     position until it is even with the front and rear of the
     cabinet. Slide the panel straight down such that the four
     pins engage the four slots.

7.   Reinstall and tighten the bracket located on the TS05
     cabinet at the rear bottom right side. This was one of
     the brackets removed in step 3.
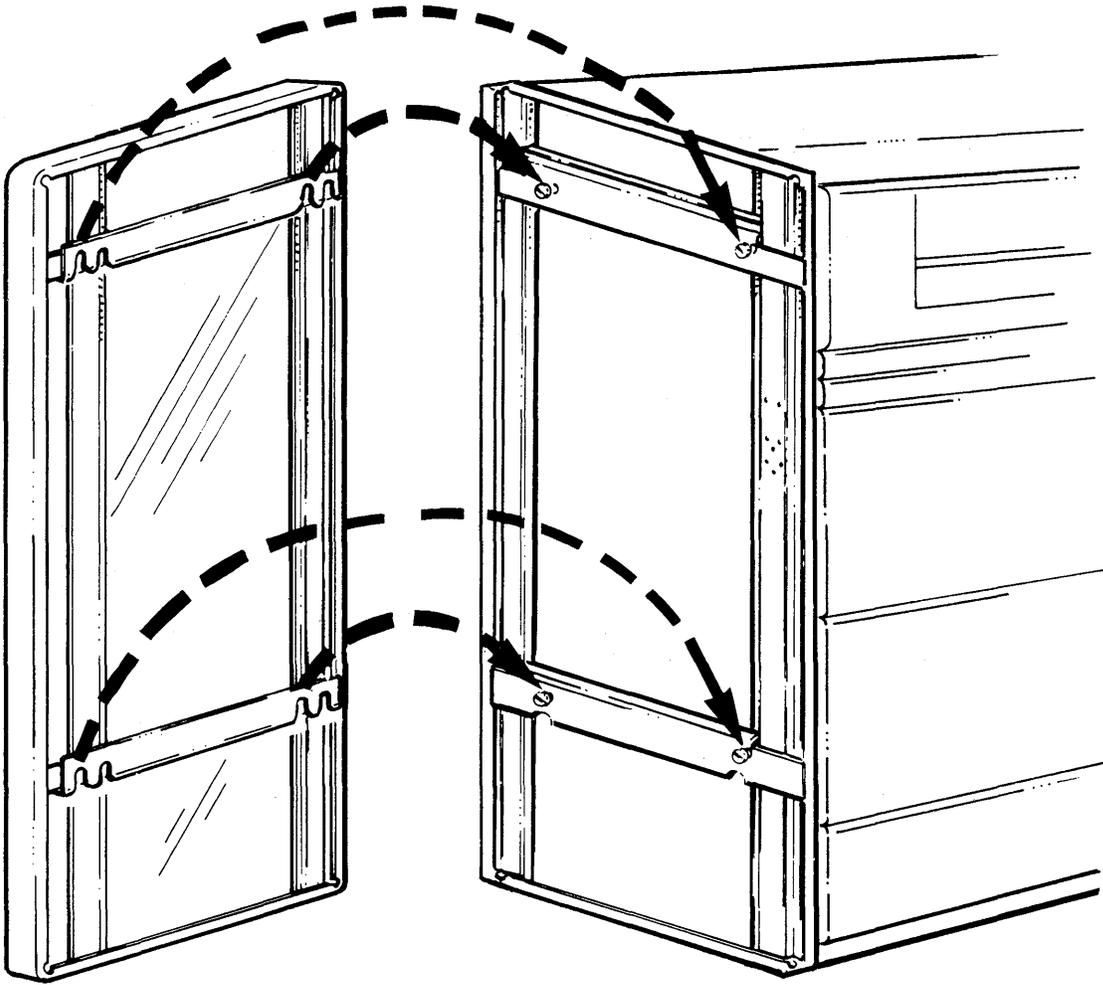
Figure 2-9   Mounting the Side Panel

CS-2442

2.3.3 Connecting the Cabinets

The two cabinets must be connected together both mechanically and electrically. The mechanical connection is made as follows:

1. Roll the TSØ5 cabinet, with side panel attached, next to the CPU cabinet left side. Place the TSØ5 cabinet 1 inch forward of the CPU cabinet such that the pins in the CPU cabinet align with the cutouts in the trim panel. To obtain this alignment, adjust the TSØ5 leveling feet until the top of the TSØ5 cabinet is level with the top of the CPU cabinet.

2. Push the TSØ5 cabinet sideways so that it is against the computer cabinet. Push the TSØ5 cabinet backwards until it is even with the CPU cabinet. Check that all the pins are engaged properly into the trim panel. (Refer to Figure 2-1Ø.)

3. Reinstall the second locking bracket that was removed in Section 2.3.2, step 3. Do not tighten it. This bracket is located on the CPU cabinet bottom rear, right-hand side. (Refer to Figure 2-11.)

4. Loosen, but DO NOT REMOVE, the TSØ5 locking bracket that holds the rear door bottom pivot pin. This is easier if you partially remove the TSØ5 rear door by pushing down on the top pivot pin and raising the rear door out of the bottom pivot hole.

5. Install the rear intercab bracket as shown in Figure 2-11. Tighten the four screws, ensuring all brackets are fully down. Reinstall the TSØ5 rear door if it was removed in step 4.

6. Remove the bottom trim panels located on the CPU and TSØ5 cabinets. Typically, this panel is held in place by two phillips head screws.

7. Remove the four center-most bolts and two center-most trim panel brackets from the cabinetry.

8. Refer to Figure 2-11 and install the front intercab bracket. Reinstall the two trim panel brackets and tighten the four bolts, and then reinstall both bottom trim panels.

9. Recheck the cabinetry leveling. Adjust the leveling feet of both cabinets, if necessary, to ensure that the system is properly leveled and all leveling feet are properly supporting the system.

BACK

TOP
VIEW

TAPE
TRANSPORT
CABINET

COMPUTER
CABINET

FRONT

TRIM PANEL
SCREW

TRIM PANEL
SCREW
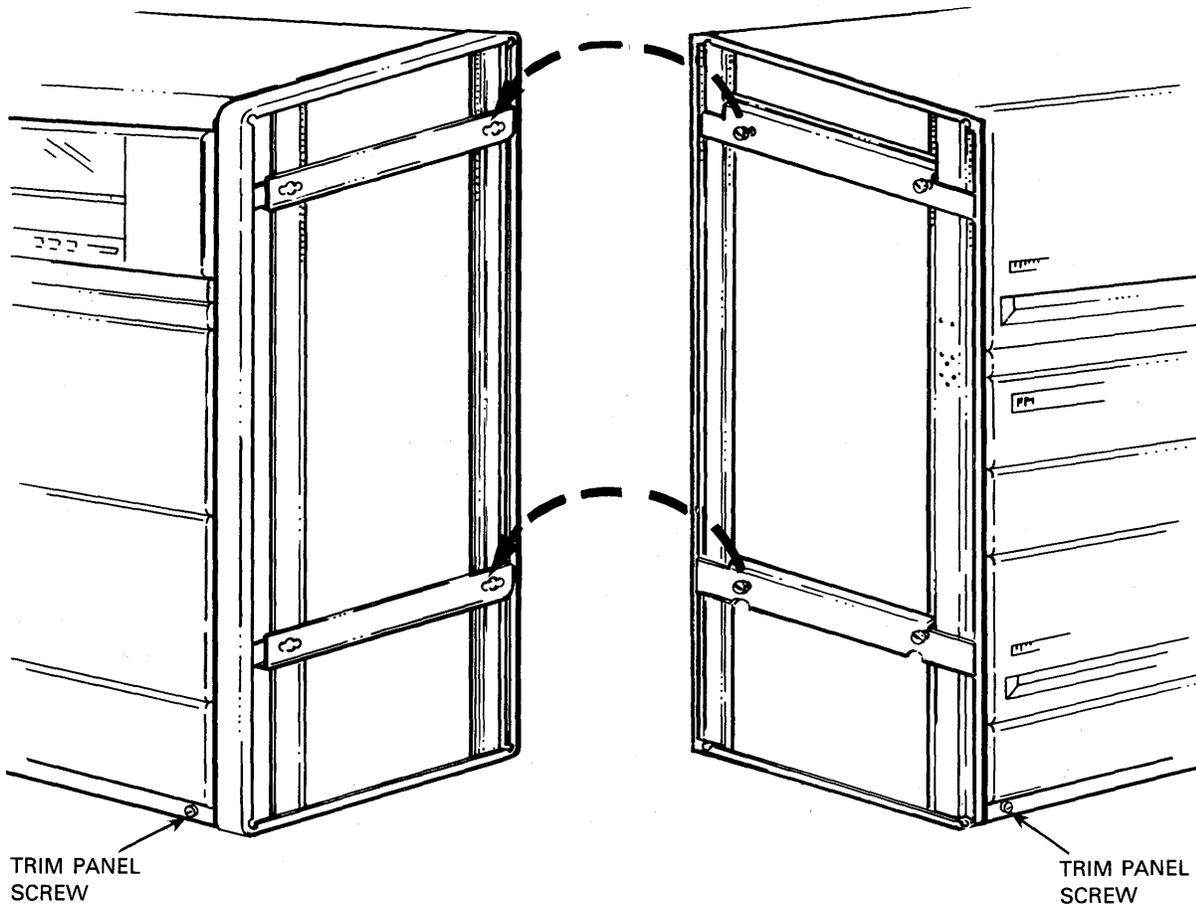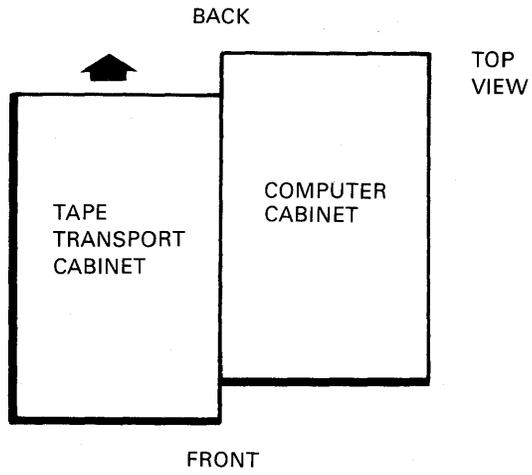
CS-2437

Figure 2-10   Cabinet Alignment

2-16

LOCKING
BRACKET

REAR INTERCAB
BRACKET
(PART NUMBER
7422225)

LOCKING
BRACKET

TRIM PANEL
BRACKET

TRIM PANEL
BRACKET

FRONT INTERCAB
BRACKET
(PART NUMBER
7422224)
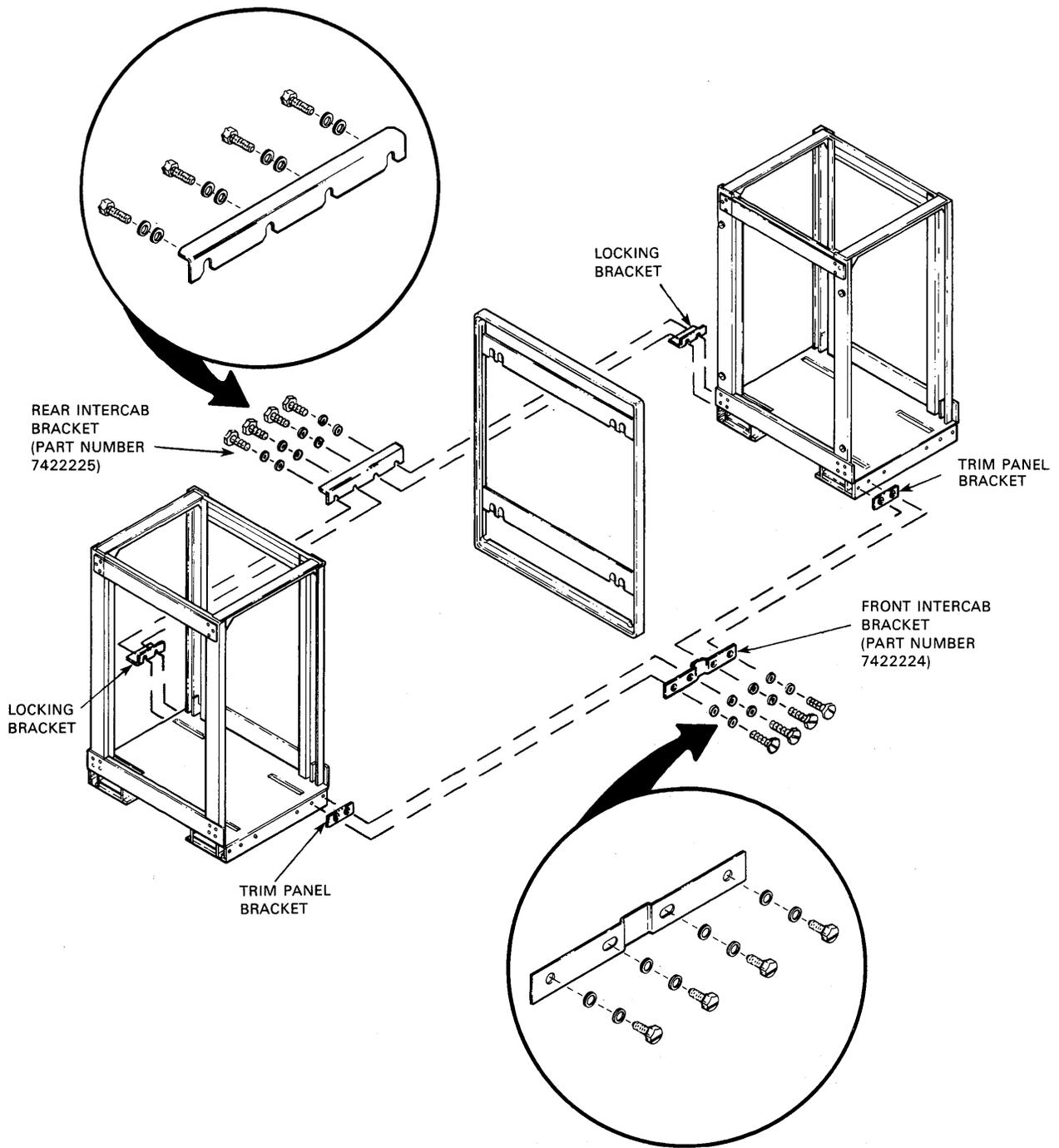
CS-2440

Figure 2-11 Cabinet Interconnection Hardware

2.3.4 Removing Shipping Foam
The tape transport is shipped with foam cushions protecting the takeup hub and blower motor. These cushions must be removed before the unit is powered up. This requires opening the tape transport to the operator maintenance access position to remove the foam from around the takeup hub, and opening it to the service access position to remove two other pieces of foam.

2.3.4.1 Removing the Top Foam Pieces

1. Raise the top of the cabinet by grasping the handle on the top cover and lifting. When the top cover is raised far enough, the support arm latches to keep the cover up. (Refer to Figure 2-12.)

2. Raise the top cover of the tape transport unit by reaching in through the front door and pushing upward on the front of the top cover. Prop the cover up using the nylon support that hangs from the left side of the cover. (Refer to Figure 2-13.)

3. Refer to Figure 2-14. Gently move the tachometer assembly away from the takeup hub. Remove the foam cushion. Carefully place the tachometer assembly back on the takeup hub.

4. Inspect and ensure that the tape path area is free of any foreign matter. With the cover still in the operator maintenance access position, proceed to Section 2.3.4.2.

2.3.4.2 Removing the Bottom Foam Pieces

1. Loosen the two spring-loaded captive screws, located on each side (as viewed from the top of the TS05 tape transport unit), that secure the TS05 unit to the top rail assembly. (See Figure 2-15.)

2. Lower the top cover of the tape transport unit.

3. With both hands, grasp the lower front of the TS05 unit and lift the entire assembly to its maximum upright position. (This engages the locking mechanism automatically.)

WARNING
Keep hands clear of the corners of the tape unit while lifting. This is important to avoid brushing the mounting rails with your hands while lifting the unit.

HANDLE
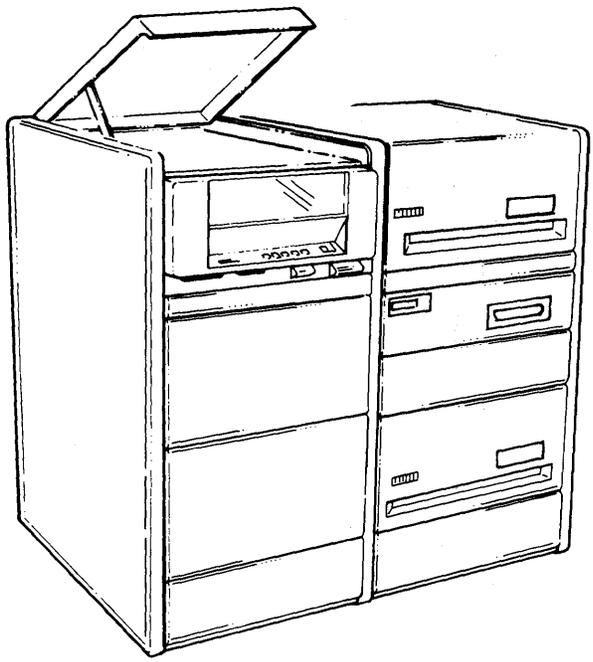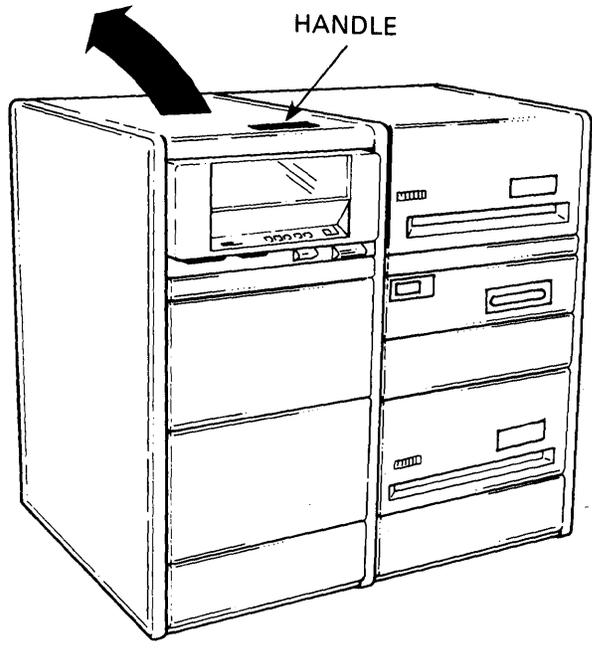
CS-2438

Figure 2-12   Cabinet Top Cover

TAPE TRANSPORT
TOP COVER SUPPORT

CABINET TOP
COVER SUPPORT
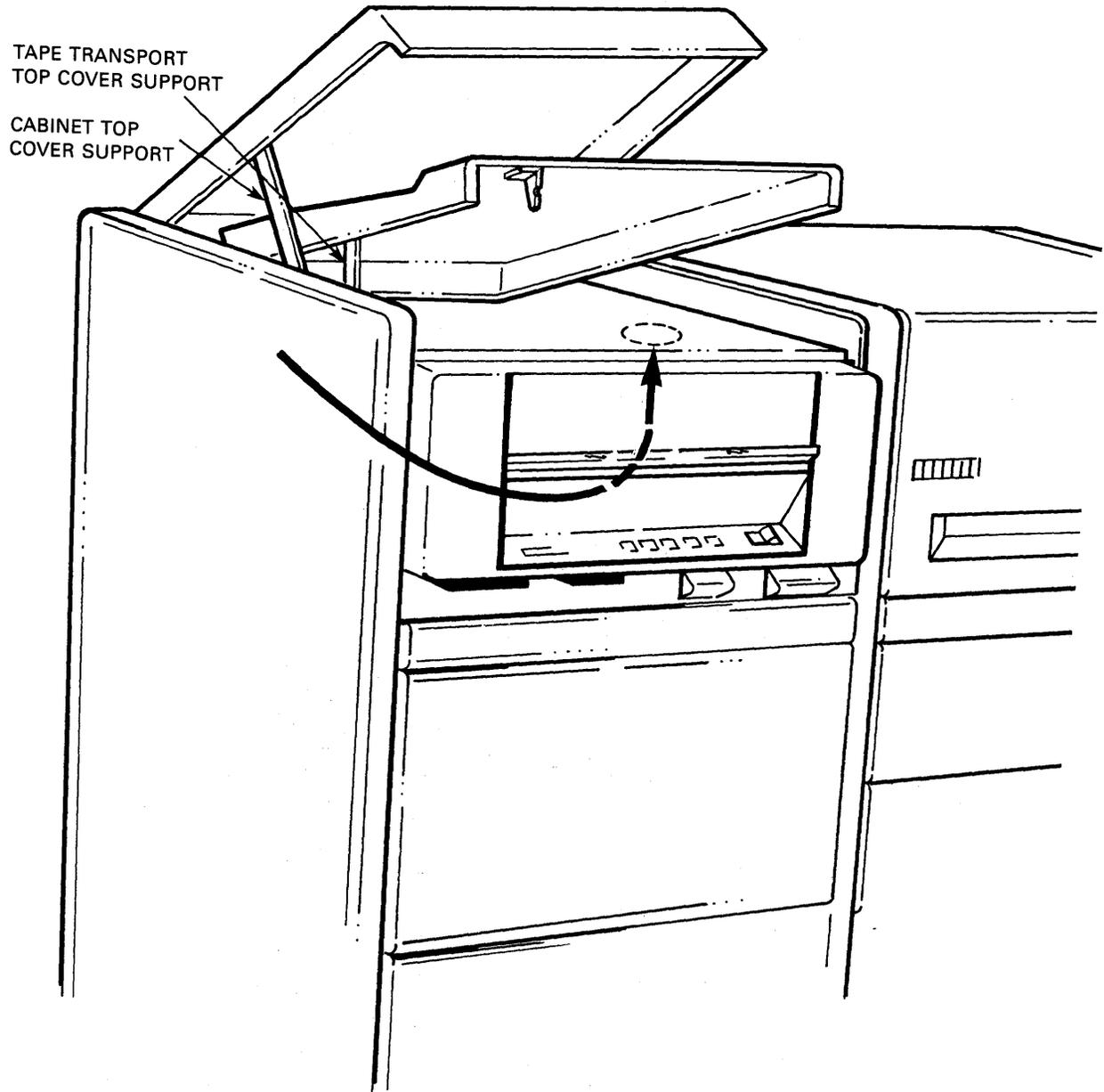
CS-2444

Figure 2-13   Tape Transport Top Cover

TAKEUP HUB

TACHOMETER

TAPE CLEANER

TAPE ROLLER GUIDE

COMPLIANCE ARM
ROLLER GUIDE

TAPE-IN-
PATH
SENSOR

TAPE ROLLER GUIDE

HEAD

REEL HUB PAD

TAPE

SUPPLY REEL
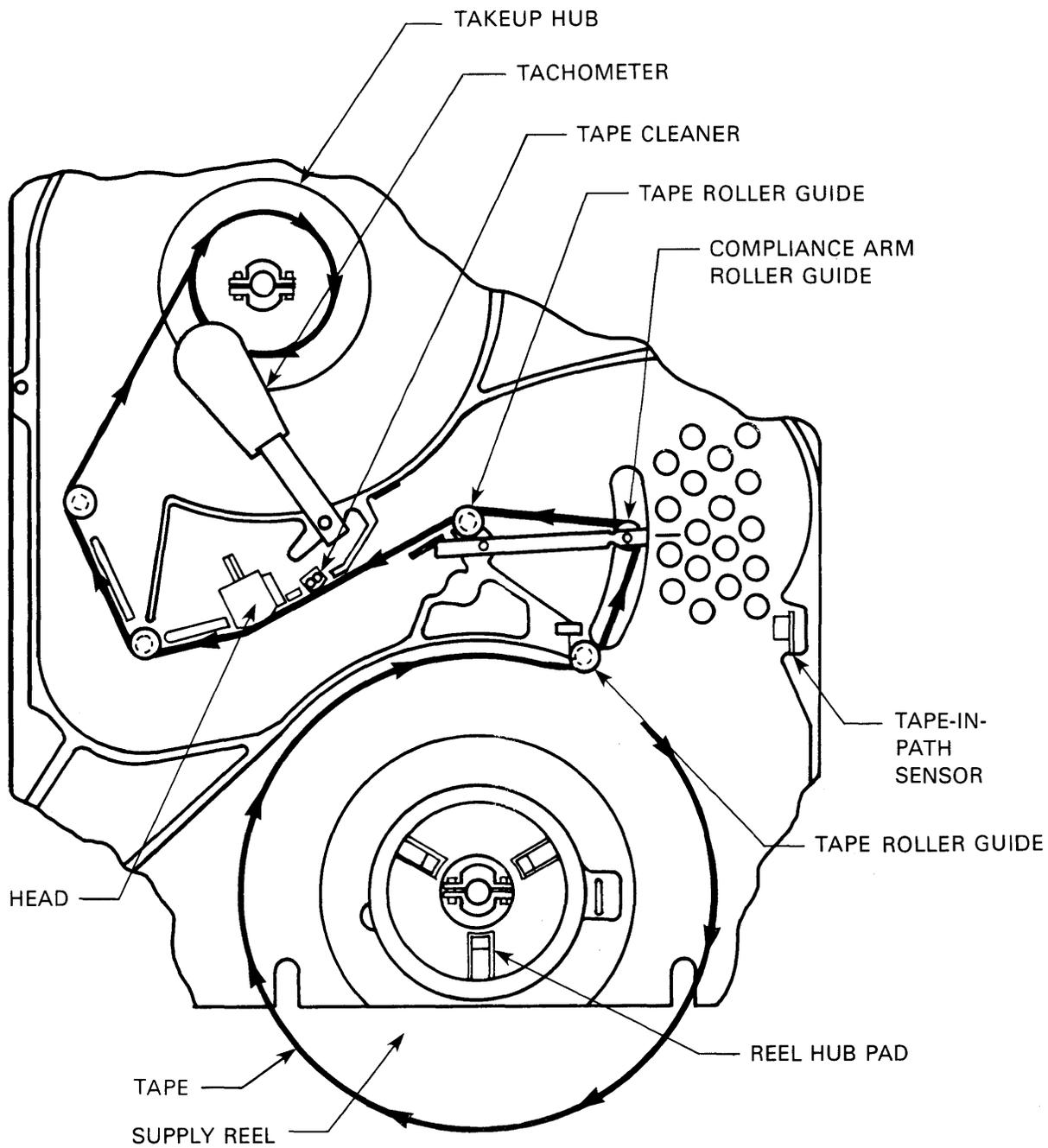
CS-2466

Figure 2-14   Tachometer and Takeup Hub
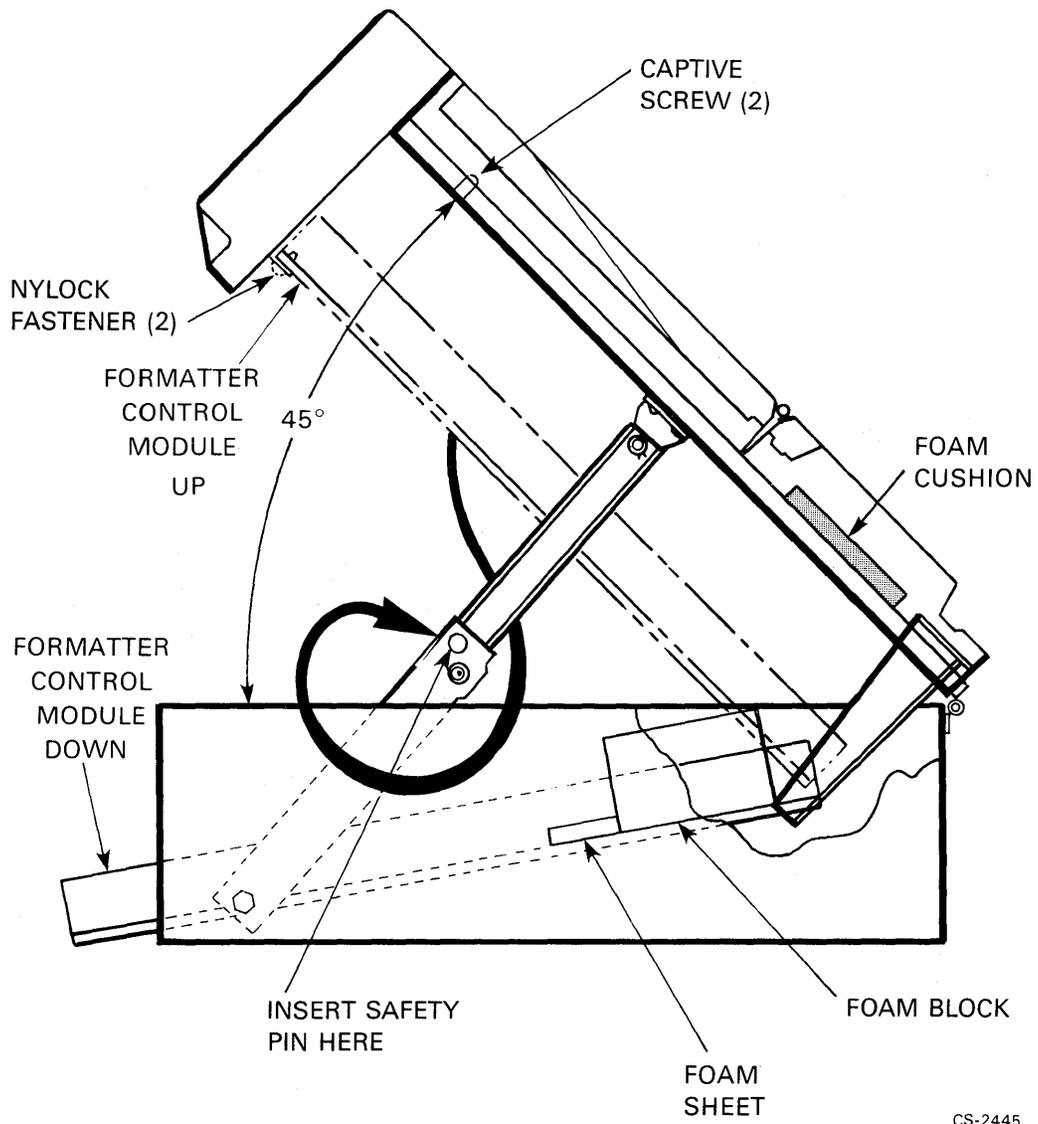
Figure 2-15   Service Access Position

The figure contains the following labels:

CAPTIVE SCREW (2)

NYLOCK FASTENER (2)

FORMATTER CONTROL MODULE UP

45°

FOAM CUSHION

FORMATTER CONTROL MODULE DOWN

INSERT SAFETY PIN HERE

FOAM SHEET

FOAM BLOCK

CS-2445

4. Carefully lower the TS05 unit approximately 2.5 centimeters (1.0 inch). (This will activate the locking mechanism automatically.)

WARNING
To eliminate the possibility of the tape unit dropping due to a failure in the locking mechanism, insert the supplied safety pin into the hole provided [2.5 centimeters (1.0 inch)] above the locking mechanism on the top plate supporting slide. Route the safety pin behind the supporting slide and across in front, and install it from left to right.

5. Release the drive/formatter module by pulling down on the two Ny-Lok fasteners that secure it to the bottom of the top plate assembly. When the Ny-Lok fasteners are released, carefully lower the drive/formatter module as far as it will go.

6. Remove the sheet and block of foam from the unit.

7. Place the TS05 unit back to the operating position by reversing steps 1 through 5.

8. Close the top cover of the tape unit and the top cover of the cabinet.

NOTE
To release the cabinet top cover support arm, it is necessary to raise the top cover slightly and move the top of the arm forward.

2.3.5 Connecting Line Power
Before connecting the line power, perform the following checks:

1. Power switch on the front panel of the tape transport is in the 0 (OFF) position.

2. Power controller voltage rating is correct for your system.

3. Power controller circuit breaker switches are in the OFF position.

4. Power controller LOCAL/REMOTE switch is in the LOCAL position.

With the switches in these positions, unwind the power cable and plug it into the receptacle.

2.4 TAPE TRANSPORT CHECKOUT

The tape transport is tested by itself before being cabled to the bus interface/controller module. This standalone testing is performed with the line power controlled locally at the cabinet power controller. After standalone operation has been verified, operation with the computer system is tested. At that point, the tape transport cabinet power is placed under the control of computer cabinet power controller by connecting the remote control cable. For the tests in this section, however, the remote control cable remains unconnected.

2.4.1 Power Up Test

1. Switch the circuit breaker switches on the cabinet power to the ON position. Observe that the power controller pilot lamp lights. Close the cabinet rear door.

2. On the tape transport front panel (Figure 2-16), press the power switch to the 1 (ON) position. Observe that all indicators light for approximately 2 seconds.

3. Observe that after 2 seconds all the indicators extinguish, and then the UNLOAD indicator lights.

If these indications have occurred, the tape transport unit has successfully completed the internal verification checks that it performs automatically at power up. If the indications were different, there is a problem. Refer to the TSVØ5 Pocket Service Guide or call your local Digital representative.
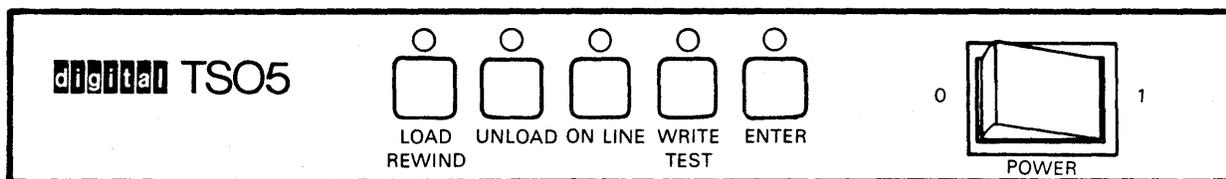
CS-2429

Figure 2-16   Front Panel Controls and Indicators

2.4.2 Tape Loading Test

This test verifies the ability of the TSVØ5 subsystem to automatically load a tape. It requires a tape that is blank except for the beginning-of-tape (BOT) and end-of-tape (EOT) markers. Refer to Figure 2-17 and proceed as follows:

1. Ensure that the tape is wound completely onto the reel and that the end has been properly crimped.

2. Open the front panel door by gently pressing down on the top center area of the door.

3. Hold the tape with the file-protect ring side down, and insert it into the transport unit, centering it on the hub.

4. Close the door.

CAUTION
Both the tape transport top cover and the front panel door are locked when a tape is loaded. Any attempt to force open either the cover or the door before the tape is unloaded will result in mechanical damage to the locking mechanism.

5. Press the LOAD switch. This locks the cover and the door and begins the loading sequence.

6. Observe the LOAD indicator. It blinks while the tape is being loaded. After a maximum of 135 seconds, it stops blinking and remains lit. This indicates that the tape loading sequence is complete.

    If the LOAD indicator does not stop blinking, or if the other indicators begin to blink, there is a problem. Unload the tape, check for a proper crimp, and retry the test. If the tape does not load, refer to the TSVØ5 Pocket Service Guide or to the manual loading instructions in Appendix B.
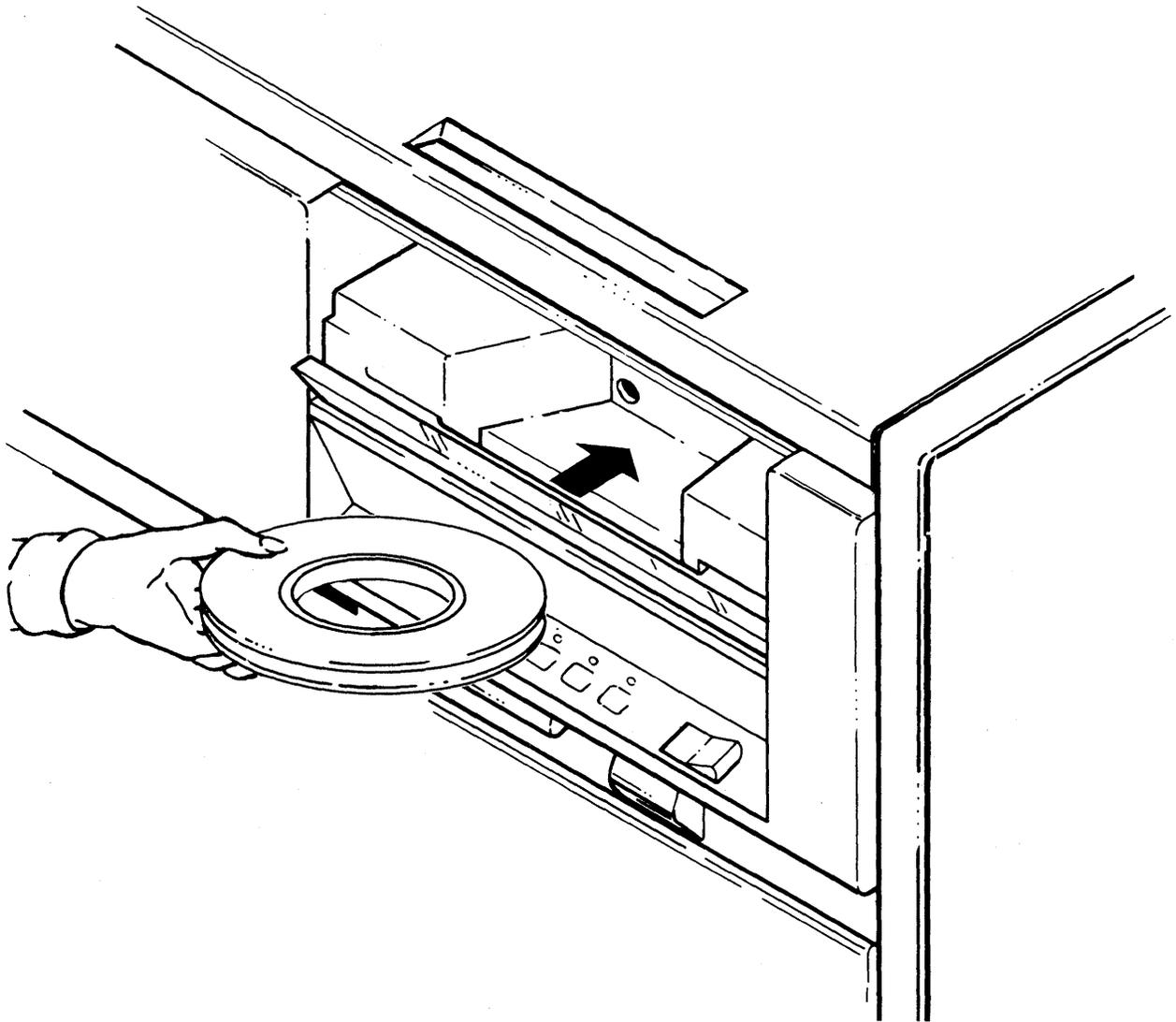
Figure 2-17   Inserting Tape

2.4.3 Tape Movement Test

This test exercises the tape drive in both forward and reverse directions and at both high and low speeds.

> **NOTE**
> If you make an error and enter an illegal test sequence, or if you stop during the sequence and permit more than 2 seconds to pass before pressing the next switch in the sequence, the system aborts the test instruction and you must start the sequence from the beginning. An erroneous or aborted test instruction results in an expanding pattern of blinking.

1. Start the test by pressing the front panel control switches in the following sequence:

    a. TEST

    b. ENTER

    c. UNLOAD

    d. UNLOAD

    e. ENTER

2. The tape should begin to move after step e.

3. Observe the indicators. If, over a period of 2 minutes, they change their blinking value substantially, there is a problem. If the blinking remains about the same, the test is progressing successfully.

4. After 2 minutes, terminate the test by pressing the TEST key. This causes the tape to rewind (which may take several minutes) and the LOAD indicator to light.

If problems are encountered, refer to the TSVØ5 Pocket Service Guide.

2.4.4 Tape Unloading Test

This test verifies the ability of the tape unit to unload the tape automatically.

1. Press the UNLOAD switch.

2. Observe the UNLOAD indicator. It blinks to indicate that the tape is being unloaded. When the unloading process is complete, the UNLOAD indicator lights continuously, and the front panel door and top cover are unlocked. This should take a maximum of 15 seconds.

3. Open the front panel door and lift the tape reel out of the tape transport.

4. Close the door.

5. Press the tape transport power switch to the 0 (OFF) position.

6. Switch the circuit breaker switches on the cabinet power controller to the OFF position.

2.5 BUS INTERFACE/CONTROLLER MODULE INSTALLATION

The M7196 bus interface/controller module plugs into a quad slot in the LSI-11 backplane. It connects to the LSI-11 bus on the A and B sets of edge connectors (module fingers). It is shipped with the DIP switches set for an interrupt vector of 224 and for addresses of 772520 and 772522. If your system already uses any of these addresses, the M7196 module must be switched to other addresses. Refer to Appendix A for information on switching the DIP switchpacks on the M7196 module. Refer to the Microcomputers and Memories Handbook or your system configurator for guidance in selecting new addresses.

For guidance in choosing the best backplane slot in which to install the M7196 module, refer to your system documentation or to the Microcomputers and Memories Handbook.

Install the M7196 module as follows:

1. Test the computer system to verify that it is functioning properly.

2. Power down the computer system.

3. Remove the cover to gain access to the backplane. (Which panel must be removed depends on which system you have. Earlier systems accept modules in the front, while in more recent models the modules are inserted in the back. Refer to your system documentation.)

4. Insert the module into the LSI-11 backplane. Do not fully seat the module until the cables have been installed.

2.6 CABLE INSTALLATION

Cable installation involves connecting the M7196 module to the tape transport unit and connecting the tape transport cabinet power controller to the computer cabinet power controller.

2.6.1 M7196 Module and Tape Transport Interconnection

Each of the two flat interconnection cables has a large connector on one end and a small connector on the other end. The large connectors go to the tape transport unit and the small connectors to the M7196 module. Refer to Figure 2-18 and proceed as follows:

1. Take a cable and position it so that pin 1 of the smaller, "low profile" connector lines up with pin 1 of connector J1 on the M7196 module. Pin 1 on the cable connector is indicated by a red stripe on the cable.

2. Gently push the cable connector into the J1 module connector until it is seated.

3. Route the cable to the rear of the cabinet. Cable routing depends on the model and configuration of the computer system, however, try to avoid blocking ventilation or running the cable where it may get caught on other equipment when a chassis is pulled out. Refer to drawing UA-TSVØ5-B for typical cable routing.

4. Pass the cable through the open side of the computer cabinet and into the tape transport cabinet. Do not route the cables outside the cabinetry.

5. Refer to Figure 2-19. Line up pin 1 of the cable connector with pin 1 of connector P1 on the tape transport unit. There are two sets of connectors on the back of the tape transport unit. The TSVØ5 subsystem uses the left-hand set of connectors.

6. Gently press the cable connector onto the P1 edge connector in the back of the tape transport cabinet.

7. Repeat this procedure to cable J2 of the M7196 module to P2 of the tape transport unit. Ensure that pin 1 of J2 connects to pin 1 of P2.

8. After both interconnection cables have been installed, fully seat the module.

M7196 MODULE

PIN 1

PIN 1

J1   J2

PIN 1

LOW PROFILE
CONNECTOR

RED STRIPE
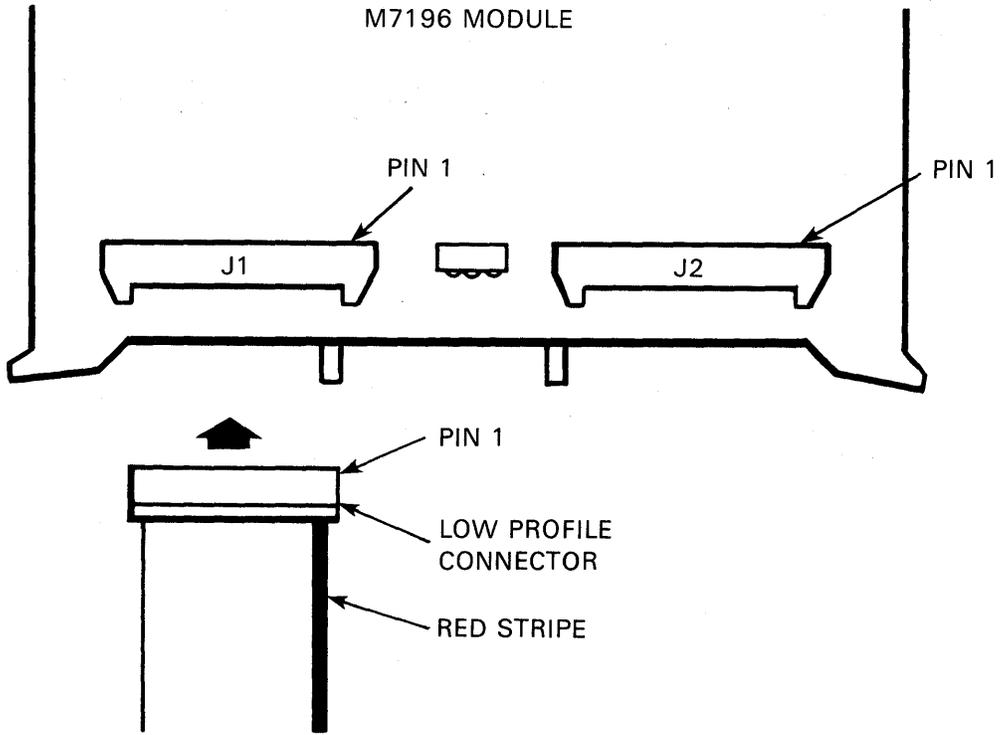
CS-2447

Figure 2-18   Cabling the M7196 Module

TAPE TRANSPORT UNIT

| 50 | P1 | 1 | 50 | P2 | 1 | 50 | P1 | 1 | 50 | P2 | 1 |

PIN 1

RED STRIPE
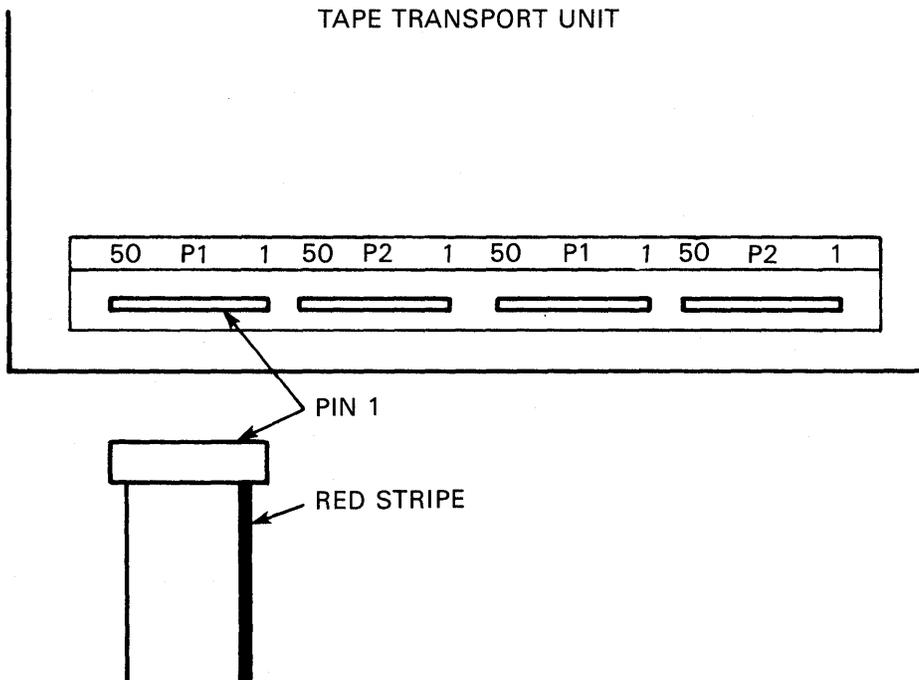
Figure 2-19   Cabling the Tape Transport

2.6.2 Power Controller Interconnection

The power controllers in the two cabinets are to be interconnected by a remote control cable. This enables the computer cabinet power to switch on the tape transport cabinet power automatically whenever the computer is powered up.

The remote control cable, part number 7008288-8F, has a three-pin connector on each end. The cable connectors are the same, and they are keyed to plug in only one way. Refer to Figure 2-20 and install the remote control cable as follows:

1. In the computer cabinet, plug one end of the cable into the power controller connector labeled DEC POWER CONTROL BUS.

2. Route the remote control cable through the open side of the computer cabinet and into the tape transport cabinet. Do not route the cable outside the cabinetry.

3. In the tape transport cabinet, plug the cable into the power controller connector labeled DEC POWER CONTROL BUS.

4. Place the LOCAL/REMOTE switch in the REMOTE position.

5. Switch the circuit breaker switches to the ON position.

The tape transport cabinet power is now fully interconnected with the computer cabinet.
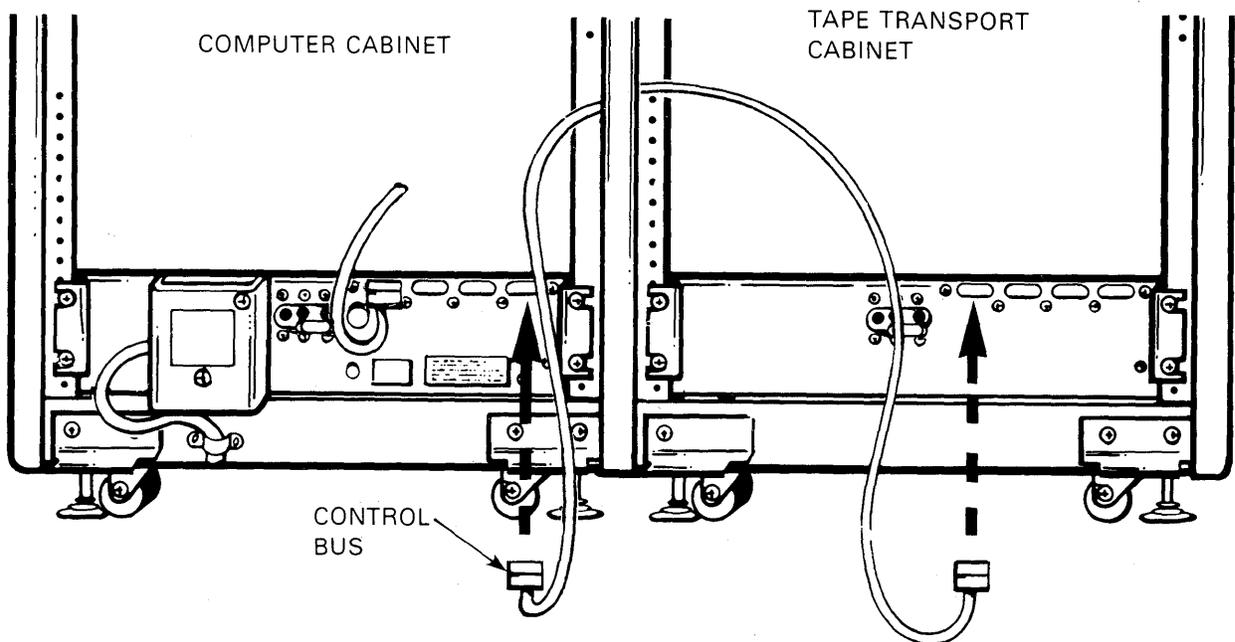
CS-2434

Figure 2-20 Remote Power Control Connections

2.7 TSVØ5 SUBSYSTEM CHECKOUT

The TSVØ5 subsystem is tested by checking the M7196 LED indicators and voltage supply, and by running the diagnostic programs listed in Table 2-2. These programs are available on the XXDP+ diagnostic software package that is shipped with the computer system. If your system is an earlier model and has the XXDP package instead of the XXDP+, contact your local Digital representative for ordering information.

2.7.1 Power Up Checks

1. Set the power switch on the tape transport unit to the ON position.

2. Switch on the computer system power and observe that the tape unit powers up with the system.

3. After a few seconds, all the tape unit indicators should be extinguished except for the the UNLOAD indicator.

4. Verify that the +5 V power to the M7196 module is within specification. Typically, the additional load of the M7196 module lowers the power supply voltage slightly. Adjust if necessary.

5. On the M7196 module, verify that the center LED (D2) is blinking. This indicates that the M7196 module self-test diagnostics are running. If other indications occur, there is a problem. Refer to the TSVØ5 Pocket Service Guide or contact your local Digital representative.

6. Replace the access panel on the computer and close the rear doors of the cabinets.

Table 2-2 TSVØ5 Subsystem Diagnostics

Program Title	File Name
Logic Test	CVTSAA
Advanced Logic Test	CVTSBA
Transport Test	CVTSCA
Advanced Transport Test	CVTSDA
Data Reliability Test	CVTSEA
DEC-X11	XTSAAØ

2.7.2 System Setup

1. To prevent erroneous error indications, ensure the tape transport is clean and the blank tape is of known good quality.

2. Load the blank tape into the tape transport by:

   a. Opening the front panel access door.

   b. Inserting the tape reel, with the file-protect ring side down, and centering it on the hub.

   c. Closing the door.

   d. Pressing the LOAD switch.

   e. Waiting for the LOAD indicator to stop blinking and stay on continuously.

   f. Pressing the ON-LINE switch.

3. Load the computer system diagnostic diskpack or floppy.

4. Before running the tape subsystem diagnostics, run the system exerciser or diagnostics to verify that the computer is operating properly. For instructions on running the computer system tests, refer to the documentation for the system.

> NOTE
> The logic test and the advanced logic test (CVTSAA and CVTSBA) do not require a tape to be loaded in order to run. The other diagnostics, however, require the tape to be loaded and the tape subsystem to be ON-LINE.

2.7.3 TSV05 Logic Test

This program tests the logic on the M7196 bus interface/controller module. It checks the microprocessor, RAM, and various registers. It verifies that the computer can move data out to the module and receive status in from the module. After you have booted the XXDP+ disk (DL, DX, or DY) and answered the questions about the date, the processor, and the power line frequency, start the logic test as follows (operator responses are underlined):

    .R VTSA?? <CR>

The system responds with a display similar to the following:

```
DIAG. RUN-TIME SERVICES
CVTSA-A-0
****TSV05 LOGIC DIAGNOSTIC****
UNIT IS TSV05
DR>
```

At this point, type in the following commands:

```
DR> START/FLAG:PNT:HOE <CR>
```

This instructs the program to start the test, display the test number as each of its 11 tests are executed, and halt it if an error is detected. The computer now asks:

```
CHANGE HW (L) ?
```

Type in a "Y" for yes:

```
CHANGE HW (L)? Y <CR>
```

The computer then asks:

```
# UNITS (D) ?
```

Type in a "1" to indicate that there is one tape unit:

```
# UNITS (D) ? 1 <CR>
```

The computer than displays the device address, the interrupt vector, and the interrupt priority. If you have left the M7196 module in the configuration in which it was shipped, respond to these queries by typing a carriage return:

```
UNIT 0
DEVICE ADDRESS (TSBA/TSDB) (O) 172520? <CR>
INTERRUPT VECTOR (O) 224? <CR>
```

If, on the other hand, you have changed the DIP switchpack settings on the M7196 module, then you must type in the parameters you selected.

The computer then asks if you wish to change the software parameters:

```
CHANGE SW (L) ?
```

For the subsystem checkout, the answer to this question is no:

```
CHANGE SW (L) ? N <CR>
```

After you have responded to these questions, the program starts testing the subsystem. The program runs continuously, repeating itself until it detects an error or until you halt it. If the program halts because of an error, refer to the CVTSAA TSV05 MAGTAPE Diagnostic User's Document for a detailed description of the tests. For assistance, contact your local Digital Field Service office.

After the program has made one pass through all the tests, halt it by pressing CONTROL C. This passes control of the system back to the diagnostic supervisor program. Then type "EXIT" to get back to the system monitor:

        ^C
        DR> EXIT <CR>
        .

2.7.4 Advanced Logic Test

This program verifies that the M7196 module can get status and write characteristics from the computer memory, and that it can deposit message packets in the computer memory. It tests error detection circuits and verifies that the computer can ititialize and write into the controller RAM memory. It checks the internal timers, buffers, and status and control logic. Also, it verifies that the controller can move signals to and from the cables that connect it to the tape transport unit.

Load this program as follows:

        .R VTSB?? <CR>

After the program title is displayed and the diagnostic supervisor returns the DR prompt, enter the command line:

        DR> START/FLAG:PNT:HOE:UAM <CR>

The program responds by asking the same questions about hardware and software parameters as were asked by the logic test. Type in the same answers. After the last question is answered, the program starts running its tests (this one has 12 tests, with the last 3 not executed). It runs continuously until there is an error or until you halt it. After one pass, halt the program by typing CONTROL C, and type "EXIT" to return to the system monitor:

        ^C
        DR> EXIT <CR>
        .

2.7.5 Tape Transport Test

This program verifies correct tape motion command decoding. It checks the basic operation of the rewind positioning command, the write data command, and the read forward and read reverse commands. It verifies that the system can space over records forward and in reverse direction, and that it can reread records. The

ability of the subsystem to respond to error conditions is also tested. The program checks the commands for retrying to write data and tape marks. It also tests the skipping of tape marks in forward and reverse directions.

Load the program as follows:

.R VTSC?? <CR>

After the system displays the program title, enter the same command line and answers to the parameter questions as for the previous program (described in Section 2.7.4). After one successful pass of the eight tests in this program, halt the program and exit to the system monitor.

2.7.6 Advanced Tape Transport Test
This program verifies the funtioning of the No-Op, Initialize, and Erase commands. It checks that errors are indicated when no data is found on the tape and it tests the data parity checking circuitry in both the controller and the tape transport electronics. It checks for the proper handling of the EOT status and tests the record buffering functions. It also checks that records and gaps written on the tape are the correct length.

Load the program as follows:

.R VTSD?? <CR>

After the title is displayed, enter the commands:

DR> START/FLAG:PNT:HOE <CR>

The program starts and runs its nine tests. After one successful pass, halt the program and exit to the system monitor.

2.7.7 Data Reliability Test
This program exercises and verifies the correct completion of all tape transport functions. It executes read and write commands a random number of times, with records of random length and data, for the entire tape.

Load the program by typing:

.R VTSE?? <CR>

and then, after the title is displayed, enter:

DR> START/FLAG:PNT:HOE <CR>

2-36

NOTE
Magtape media typically will have sever-
al flaws per reel that will cause this
diagnostic to indicate write errors or
write retries due to bad tape spots.
These types of errors do not indicate a
problem with the subsystem.

The program then asks:

SELECT DRIVE 0-1 (0)?

Answer by typing 0 and a carriage return:

. 0<CR>

2.7.8 Additional Testing

The tests described in the preceding sections provide a high con-
fidence level that the TSV05 subsystem is functioning correctly.
More exhaustive checks are available by allowing the diagnostic
programs to run for more than one pass. The second pass of the
program is more comprehensive than the first pass. All iterations
after the first pass are the same, however, they are substantially
longer than the first one. Running tests that cause tape motion
for extended periods will require transport cleaning to prevent
erronous error reports. The logic type tape motion tests, when
run continuously, can cause high tape wear to occur in the first
few feet of tape. In these cases, errors due to faulty or worn
tape do not indicate a failure.

Another test that may be run is the DEC/X11 runtime system exer-
ciser. This test exercises the entire system to verify that there
are no spurious interactions between various subsystems and com-
ponents. There is an exerciser program module for each major sys-
tem component, and these are linked together to create a system
exerciser that is tailored to your system. The DEC/X11 module for
the TSV05 subsystem is XTSAA0. Although this exerciser can be run
by itself, its full value is not realized unless it is linked to
and run with the system exerciser. For information about building
a system exerciser to include the TSV05 subsystem, refer to
DEC/X11 User's Manual, AC-8240Z-MC.

THESE 14 ROMS ARE FACTORY
INSTALLED AND SHOULD NOT
BE REMOVED.
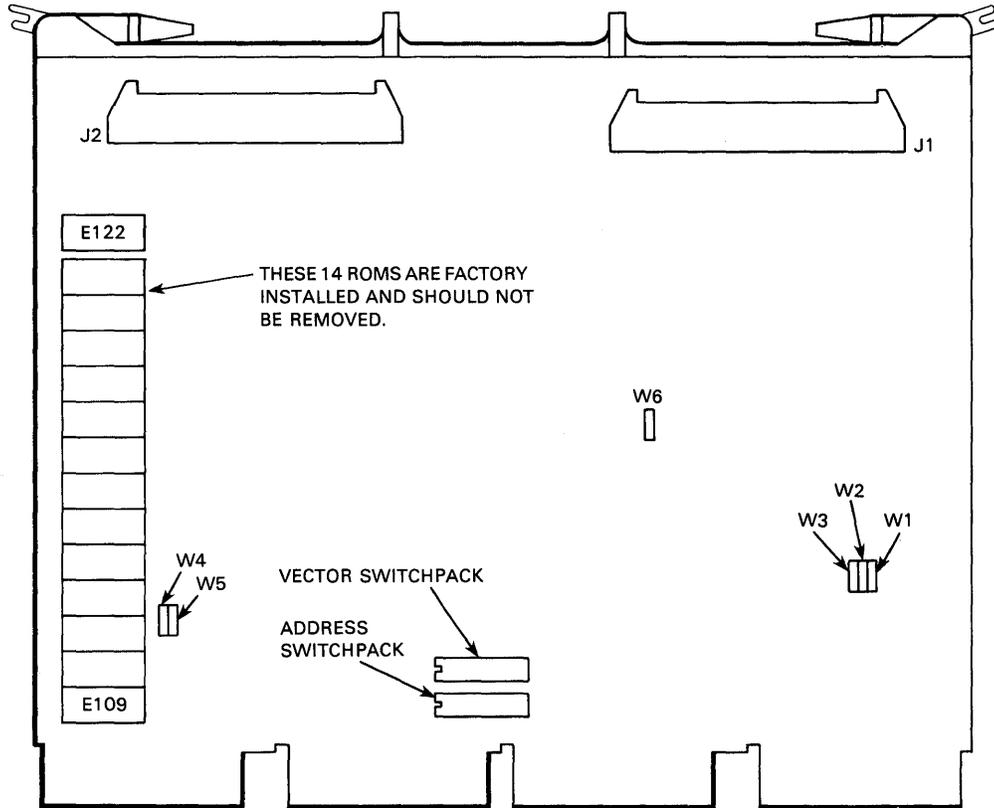
CS-2449

VECTOR SWITCHPACK

	1	2	3	4	5	6	7	8	9	10	
ON	V8	V7	V6	V5	V4	V3	V2	S1	S0	A12	E58
OFF											

ADDRESS SWITCHPACK

	1	2	3	4	5	6	7	8	9	10	
ON	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	E57
OFF											

V = VECTOR BIT   S1 = BUFFERING
A = ADDRESS BIT   S0 = EXTENDED FEATURES

JUMPERS		AS SHIPPED
W1	BIRQ5	OUT
W2	BIRQ7	OUT
W3	BIRQ6	OUT
W4	BUS GRANT CONTINUITY	IN
W5	BUS GRANT CONTINUITY	IN
W6	SCLOCK ENABLE (USED DURING FACTORY REPAIR ONLY)	IN

CS-2450

Figure A-1   M7196 Switch and Jumper Identification

M7196 VECTOR AND ADDRESS SWITCHES

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	BDAL BIT POSITION
0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	

STANDARD VECTOR
CONFIGURATION
(224)

→ S1
→ SO

OFF ON OFF OFF ON OFF ON OFF OFF

VECTOR SWITCH E58	1	2	3	4	5	6	7	8	9	10

ON

STANDARD ADDRESS
CONFIGURATION
(172520)

1	2	3	4	5	6	7	8	9	10	ADDRESS SWITCH E57

OFF ON OFF ON OFF ON OFF ON OFF OFF

1	1	1	1	0	1	0	1	0	1	0	1	0	0	0	0	BDAL BIT POSITION
15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	

SO = EXTENDED FEATURES
S1 = BUFFERING

CS-2468

Figure A-2   M7196 Vector and Address Switches

TAPE TRANSPORT
UNIT SELECT
SWITCH

TERMINATOR*
SOCKET

TERMINATOR*
SOCKET

*NOTE: THE LAST (OR ONLY) TRANSPORT ON THE
BUS MUST HAVE THESE TWO DIP RESISTOR
PACKS INSTALLED. OTHER JUMPERS WITHIN
THE TRANSPORT ARE FACTORY-CONFIGURED
AND SHOULD NOT BE CHANGED. JUMPER
CONFIGURATION VARIES FROM BOARD TO
BOARD, DEPENDING ON THE EPROM TYPES IN
USE. HOWEVER, THIS DOES NOT AFFECT THE
INTERCHANGEABILITY OF THE BOARD.

CS-2451

TAPE TRANSPORT UNIT SELECT SWITCH

	OFF	ON	
1		■	UNIT SEL 0
2		■	UNIT SEL 1
3	■		SPECIAL IRG
4		■	UNIT SEL 2
5		■	EXT PARITY SEL
6	■		INT PARITY GEN
7			RESERVED
8	■		RESERVED

220/330Ω

U10W

U8W

220/330Ω

U3W

Figure A-3 Transport Switch and Terminator Identification

A-3

If the autoloading routine does not successfully load the tape, the manual loading procedure may be used. Refer to Figure B-1 and proceed as follows:

1. Switch off the tape transport power.

2. Raise the cabinet top cover by grasping the handle on the top cover and lifting. When the top cover is raised far enough, the support arm latches to keep the cover up.

3. Raise the top cover of the tape transport unit by reaching in through the front panel door and pushing upward on the front of the top cover.

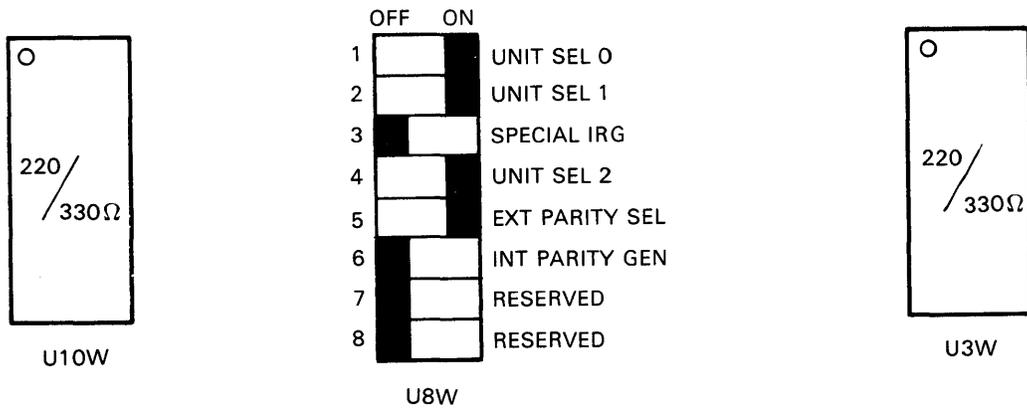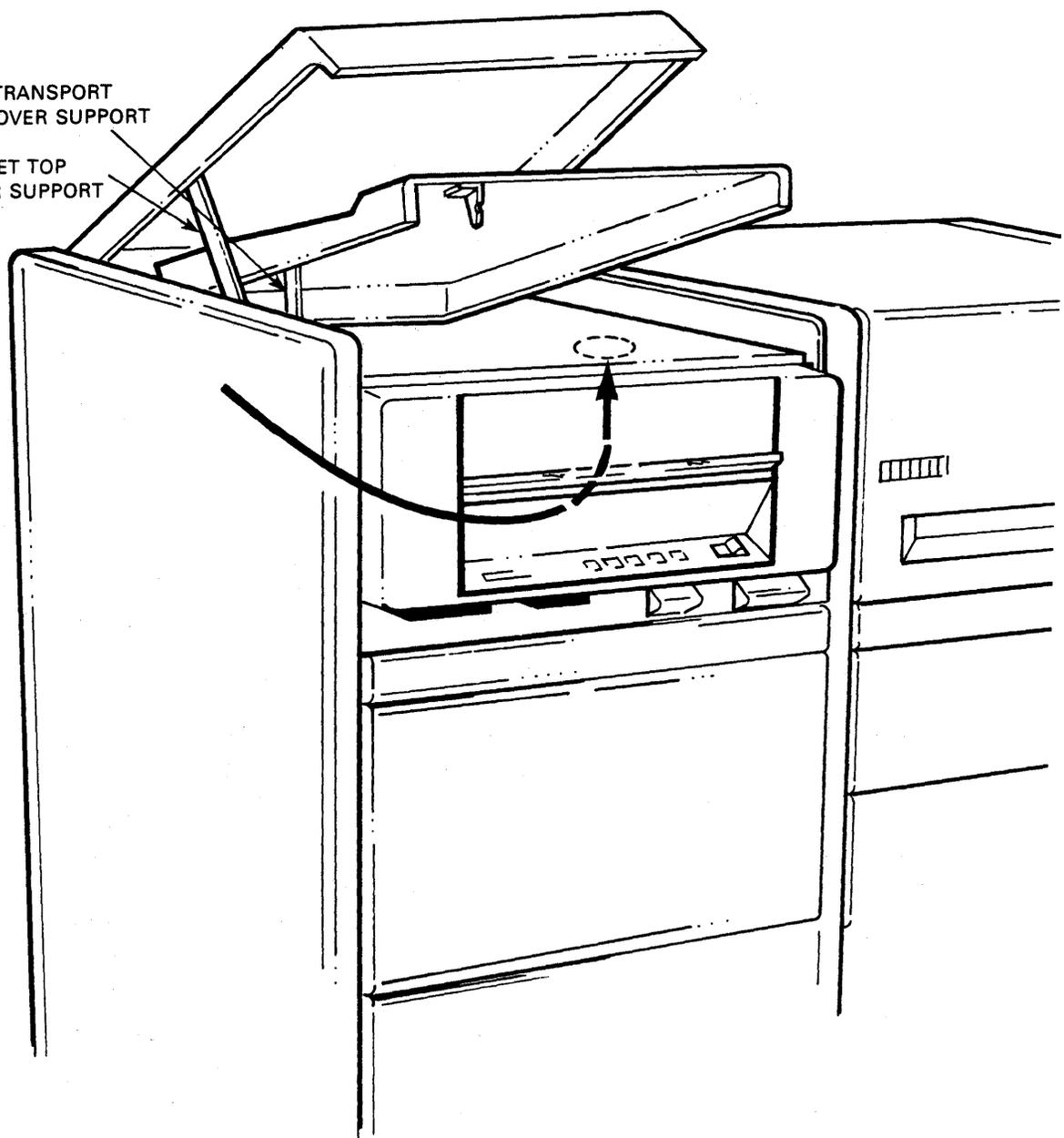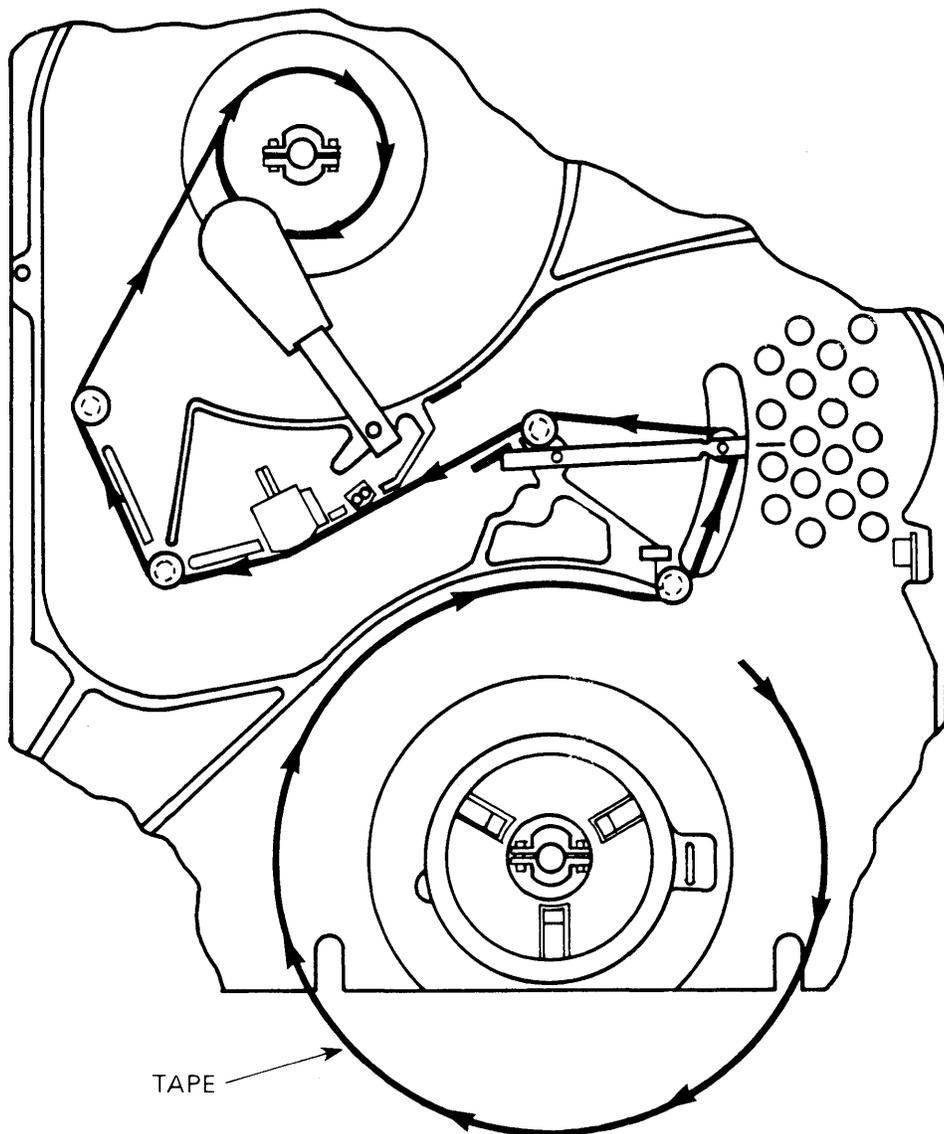4. Ensure that there are no foreign objects in the tape path.

5. Place the reel of tape on the supply hub. Ensure that it is evenly seated on the hub, and then close the front door.

6. Thread the tape along the tape path as shown in Figure B-2. Carefully move the tachometer assembly away from the takeup hub and wrap the tape clockwise around the hub. Wrap the tape just short of one complete turn. Note that the tape should not overwind at this point (i.e., there should be a short section of the takeup hub that has no tape on it yet).

7. Gently move the tachometer assembly back against the hub. (The tape should pass between the tachometer and the takeup hub.)

8. Check that the tape is seated correctly on the guides and threaded properly over the head assembly. Remove any excess slack by gently turning the supply reel counterclockwise.

9. Turn the takeup hub clockwise to wrap two additional turns of tape on the hub. Ensure that the tape does not ride up and extend over the top surface of the hub.

10. Close the top covers of the tape transport and the cabinet.

11. Switch on the tape transport power.

12. Press ENTER, with ENTER depressed, press LOAD. When the LOAD indicator stops blinking, the tape is loaded and ready to be switched on-line.

TAPE TRANSPORT
TOP COVER SUPPORT

CABINET TOP
COVER SUPPORT

CS-2444

Figure B-1 Accessing the Tape Path Area

TAPE

CS-2467

Figure B-2   Tape Threading Path

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