

B

13F5765

13F5765

### PUBLICATIONS REFERENCE DRAWING

MACHINE TYPE/MODEL NO. TA90

MACHINE NAME - Magnetic Tape Subsystem

| E C NO. | DESCRIPTION / COMMENTS       |
|---------|------------------------------|
| C04824  | VOL. A02 - Maintenance Guide |
| C13764  | VOL. A02 - Maintenance Guide |

|                |                   |                |                          |                |        |             |         |  |
|----------------|-------------------|----------------|--------------------------|----------------|--------|-------------|---------|--|
| <b>digital</b> |                   |                | DATE                     | CHANGE NO      | DATE   | CHANGE NO   | 13F5765 |  |
| NAME:          | PUB REF DWG (PRD) |                | REL                      | 4/28/89        | C04824 |             |         |  |
|                |                   |                |                          | 3/15/90        | C13764 |             |         |  |
| DESIGN         |                   | SHT OF         |                          |                |        |             |         |  |
| DETAIL         |                   |                |                          |                |        |             |         |  |
| CHECK          |                   | CLASSIFICATION | MUST CONFORM TO ENG SPEC | DEVELOPMENT NO |        | LOGIC PG NO |         |  |
| APPRO          |                   |                |                          |                |        | RD002       | B       |  |

**digital**

# Maintenance Guide

|  |   |   |  |   |
|--|---|---|--|---|
| <p>TA90/E<br/>S/N<br/><b>MG</b><br/>MAINTENANCE<br/>GUIDE</p> <p>GLOSS<br/>PLAN<br/>INTRO<br/>START<br/>CART<br/>PNEU<br/>MSG<br/>INST<br/>INSP<br/>INDEX</p> <p><b>digital</b><br/>VOL. A01</p> | <p>TA90/E<br/>S/N<br/><b>MG</b><br/>MAINTENANCE<br/>GUIDE</p> <p>PWR<br/>SENSE<br/>PANEL<br/>CE/HSC<br/>LOC<br/>CARR-TCU</p> <p><b>digital</b><br/>VOL. A02</p> | <p>TA90/E<br/>S/N<br/><b>MG</b><br/>MAINTENANCE<br/>GUIDE</p> <p>CARR-DR</p> <p><b>digital</b><br/>VOL. A03</p> | <p>TA90/E<br/>S/N<br/><b>MG</b><br/>MAINTENANCE<br/>GUIDE</p> <p>LGND<br/>SPROC<br/>MD/SDISK<br/>DIAG<br/>DF<br/>OPER</p> <p><b>digital</b><br/>VOL. A04</p> | <p>TA90/E<br/>S/N<br/><b>MG</b><br/>MAINTENANCE<br/>GUIDE</p> <p>FSI<br/>EAD</p> <p><b>digital</b><br/>VOL. A05</p> |
|--|---|---|--|---|

TA90EA02

## Maintenance Library

Maintenance Guide

Vols. A01 to A05

Logic Diagrams

Vols. C01 and D01

# TA90/E Magnetic Tape Subsystem

EK-PTA90-MG-002

This manual contains maintenance information about the Digital TA90 Magnetic Tape Subsystem and is intended for customer engineers responsible for servicing the TA90 tape subsystem.

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**Prerequisite Knowledge**

It is assumed that you have a background in data processing concepts and that you are familiar with the hexadecimal numbering system, stored program concepts, and have a basic understanding of tape subsystems and their relationship within a system/cluster.

**Related Documents**

*TA90 Operator's Manual*, EK-OTA90-OM.

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| DIBOL   |              |         | Work Processor |

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**Tab List**

**Volume A01**

**GLOSS** Glossary  
**PLAN** Maintenance Plan  
**INTRO** TA90 Introduction  
**START** Start Maintenance  
**CART** Cartridge Analysis  
**PNEU** Pneumatic Analysis  
**MSG** Errorlog messages  
**INST** Installation/Removal  
**INSP** Safety Check Procedures  
**INDEX** Index

**Volume A02**

**PWR** Power Maps  
**SENSE** Sense/Status  
**PANEL** Panel  
**CE/HSC** Customer Engineering Panel/HSC Diagnostics  
**LOC** Locations  
**CARR-TCU** Tape Control Unit  
 Checks/Adjustments/Removal/Replacement

**Volume A03**

**CARR-DR** Drive Checks/Adjustments/Removal/Replacement

**Volume A04**

**LGND** Legend  
**SPROC** Support Procedures  
**MD/SDISK** Maintenance Device/MD Support Diskette  
 Procedures  
**DIAG** Support Diagnostic Descriptions  
**DF** Data Fields and Registers  
**OPER** Theory of Operation

**Volume A05**

**FSI** Fault Symptom Index  
**EAD** Error Analysis Diagrams





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**PWR Purpose**

This section contains the maps and procedures that will enable you to repair power related problems in the TA90 tape subsystem. A description of the DC test card and how it is used in both the control unit and tape transport unit is presented.

You will be sent into the PWR maps from either the START page or from the CE Panel.

### How to Use the DC Test Tool with the Tape Control Unit

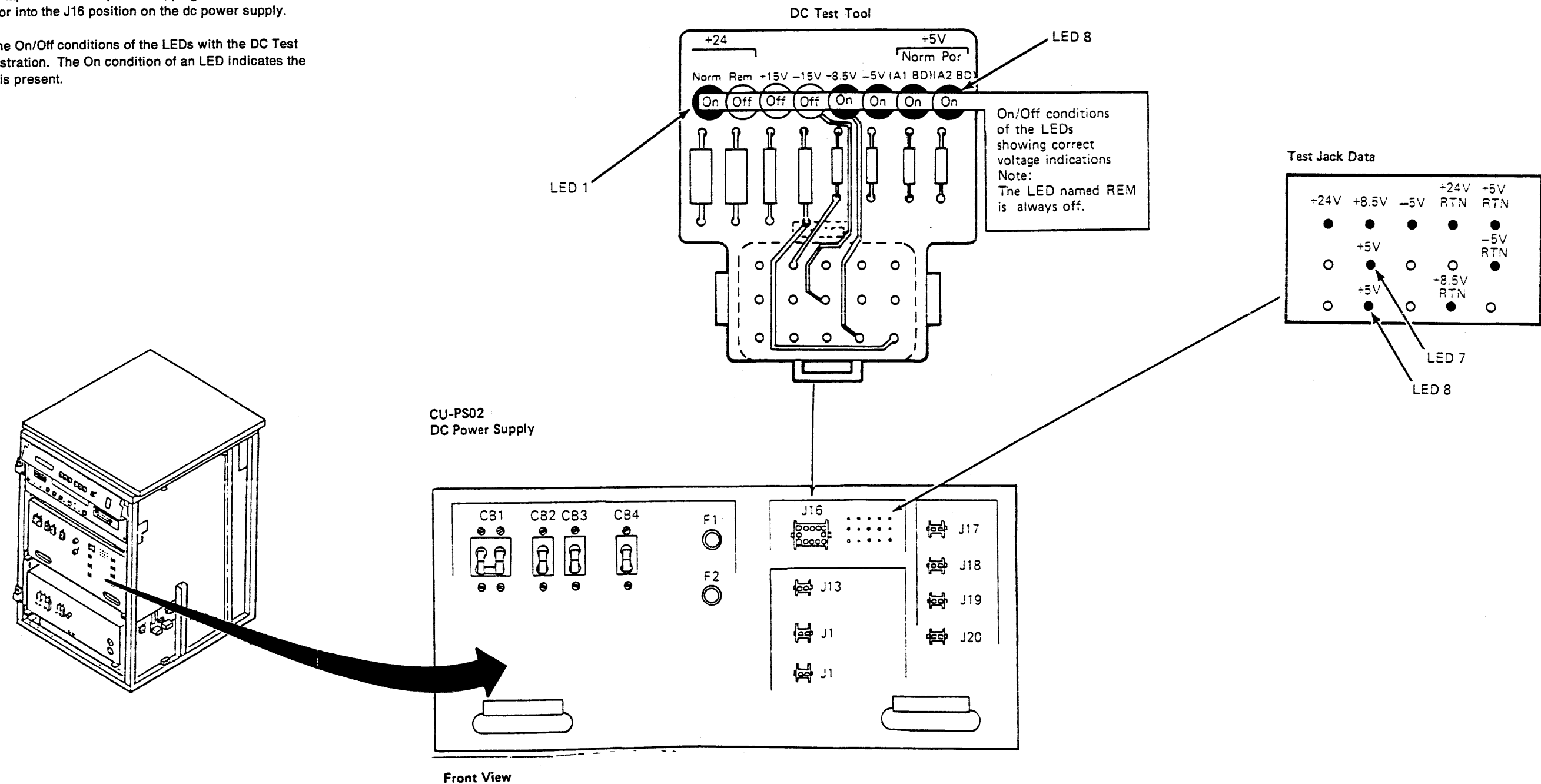
The dc test tool is used to determine if all of the dc voltages are present at the output of the dc power supply. However, the tool only determines that a voltage is present or absent. It does not determine whether or not the voltages are in specifications.

Perform the following steps to determine if all the voltages are present:

1. Open the front cover of the tape control unit and remove the safety cover (see CARR-TCU 2-1).
2. With the tape control unit power on, plug the test tool connector into the J16 position on the dc power supply.
3. Match the On/Off conditions of the LEDs with the DC Test Tool illustration. The On condition of an LED indicates the voltage is present.

### Verification Procedure (Optional)

Should an LED fail to light, determine if the DC Test Tool is at fault or if the voltage is missing. Using a voltmeter, measure the voltage at the test jack J16. Measure between the voltage pin and the voltage return pin (RTN) using the Test Jack Data illustration as a reference. If the voltage is present at the test jack pins, the dc test tool is defective. If the voltage is not present, the dc supply is missing a voltage. Return to the procedure that sent you here.



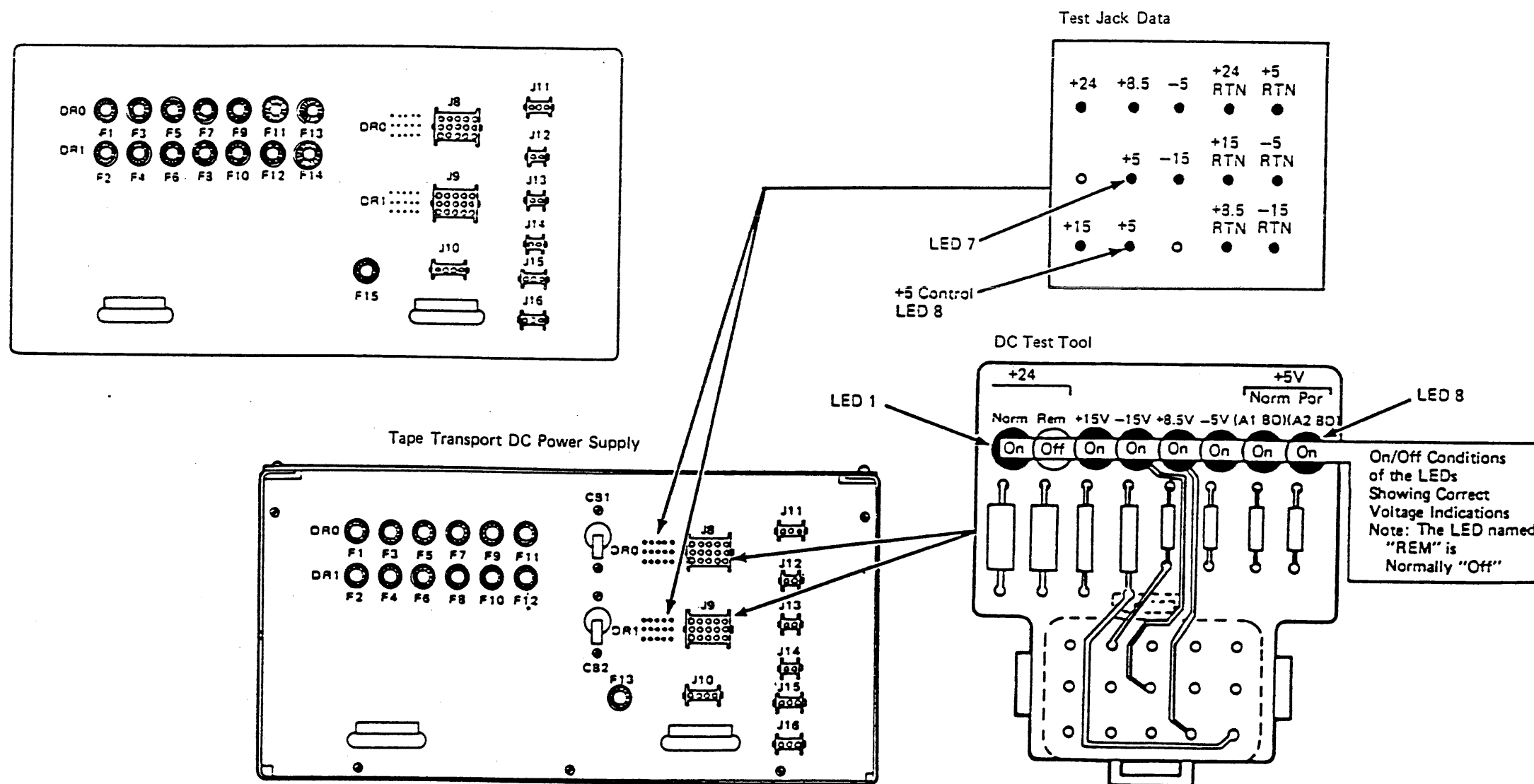
The dc test tool is used to determine if all of the dc voltages are present at the output of the dc power supply. However, the tool only determines that a voltage is present or absent. It does not determine whether or not the voltages are within specifications.

Perform the following steps to determine if all the voltages are present:

1. Open the front cover and remove the front safety cover (see CARR-TCU 2-1 or CARR-DR 2-5).
2. With the tape transport unit power on, plug the test tool into the J8 (drive 0) or J9 (drive 1) position on the dc power supply.
3. Match the On/Off conditions of the LEDs with the DC Test Tool illustration. The On condition of a LED indicates the voltage is present.

Verification Procedure (Optional)

Should a LED fail to light, determine if the dc test tool is at fault or if the voltage is missing. Using a voltmeter, measure the voltage at test jack J8 (drive 0) or J9 (drive 1). Measure between the voltage pin and the voltage return pin (RTN) using the Test Jack Data illustration as a reference. If the voltage is present at the test jack pins, the dc test tool is defective. If the voltage is not present, the dc supply is missing a voltage. Return to the procedure that sent you here.



## Tape Control Unit Power Supply Jumpers

Use one of the following two tables to check the voltage settings. Ensure the jumpers are installed correctly for the voltage being used.

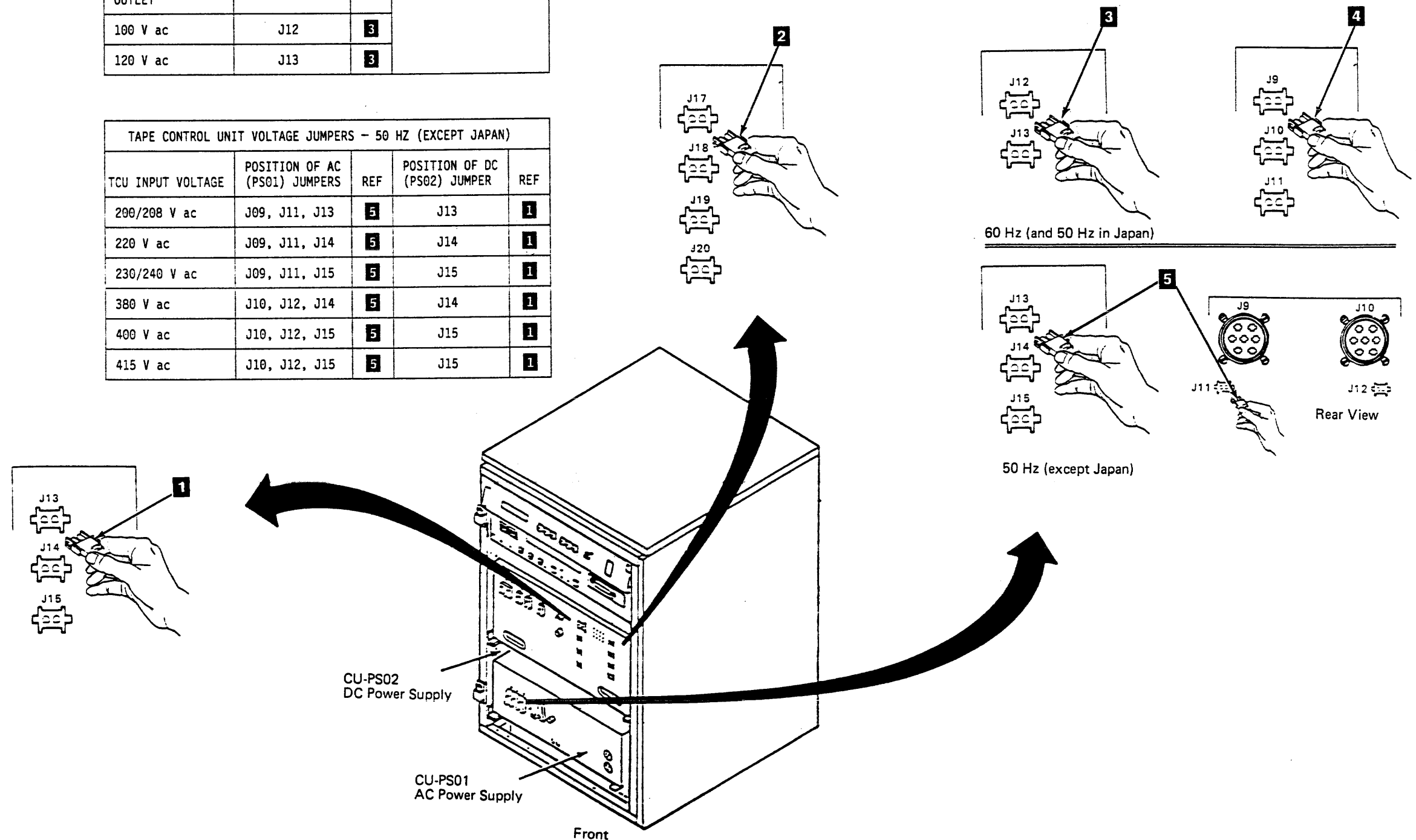
**Note:** For 50 Hz (except Japan) machines, if the Delta/Wye jumper has to be changed (J09 and J10 on CU-PS01), ensure that the cap is reinstated on the empty socket.

| TAPE CONTROL UNIT VOLTAGE JUMPERS - 60 HZ AND 50 HZ JAPAN |                              |     |                              |     |
|---|------------------------------|-----|------------------------------|-----|
| TCU INPUT VOLTAGE   | POSITION OF AC (PS01) JUMPER | REF | POSITION OF DC (PS02) JUMPER | REF |
| 200/208 V ac  | J09                          | 4   | J13                          | 1   |
| 220 V ac  | J10                          | 4   | J14                          | 1   |
| 230/240 V ac  | J11                          | 4   | J15                          | 1   |
| CONVENIENCE OUTLET  |                              |     |                              |     |
| 100 V ac  | J12                          | 3   |                              |     |
| 120 V ac  | J13                          | 3   |                              |     |

| TAPE CONTROL UNIT VOLTAGE JUMPERS - 50 HZ (EXCEPT JAPAN) |                               |     |                              |     |
|--|-------------------------------|-----|------------------------------|-----|
| TCU INPUT VOLTAGE  | POSITION OF AC (PS01) JUMPERS | REF | POSITION OF DC (PS02) JUMPER | REF |
| 200/208 V ac   | J09, J11, J13                 | 5   | J13                          | 1   |
| 220 V ac   | J09, J11, J14                 | 5   | J14                          | 1   |
| 230/240 V ac   | J09, J11, J15                 | 5   | J15                          | 1   |
| 380 V ac   | J10, J12, J14                 | 5   | J14                          | 1   |
| 400 V ac   | J10, J12, J15                 | 5   | J15                          | 1   |
| 415 V ac   | J10, J12, J15                 | 5   | J15                          | 1   |

A tape control unit has two channel adapters. Use the following table to ensure that the tape control unit is jumpered for the correct number of channel adapters.

| TAPE CONTROL UNIT CHANNEL JUMPERS |                              |     |
|-----------------------------------|------------------------------|-----|
| NUMBER OF CHANNEL ADAPTERS        | POSITION OF DC (PS02) JUMPER | REF |
| 2                                 | J18                          | 2   |



## Tape Control Unit AC Power Supply Panel

In addition to supplying ac power to the tape control unit, the control unit ac power supply distributes ac power to all the tape transport units attached to it. The figure shows the control panel for the tape control unit ac power supply. Note that this control panel is behind a safety shield.

### 1 Mainline Circuit Breaker

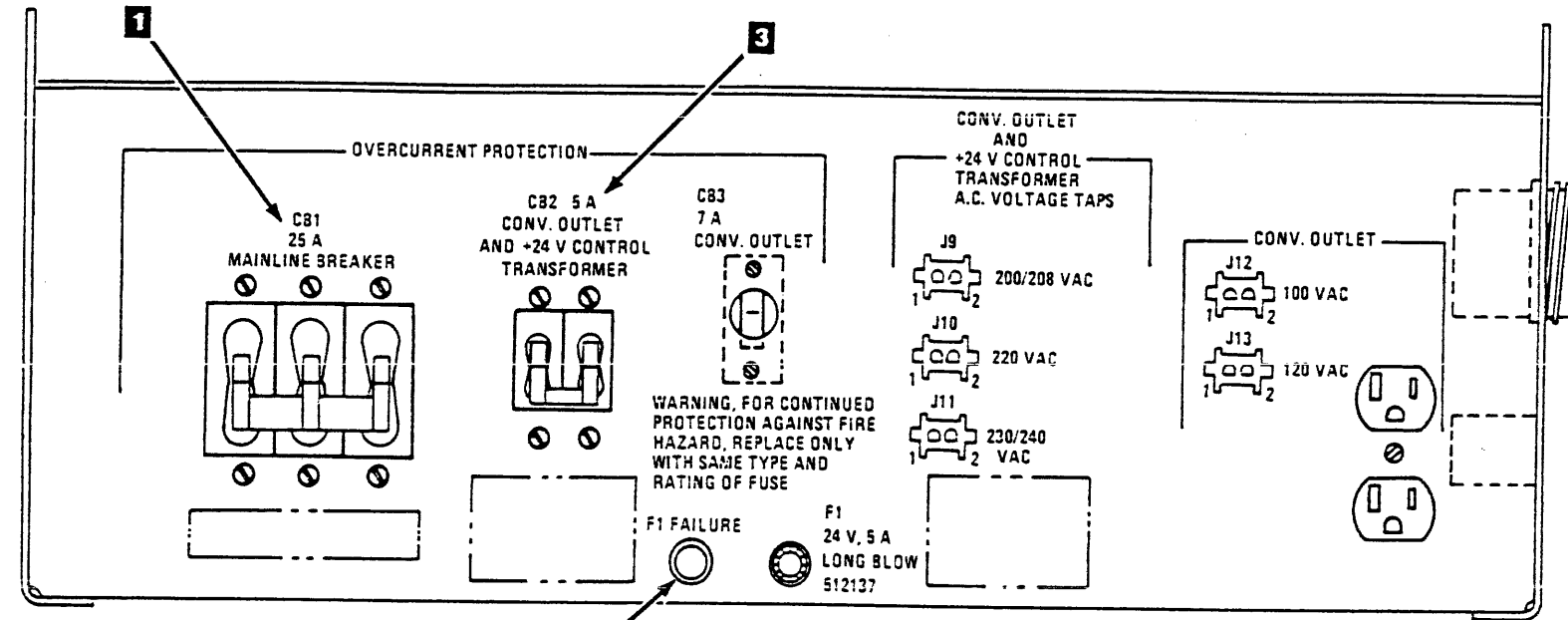
- CB1 is the ac power mainline circuit breaker in the tape control unit. This switch trips automatically if the circuit is overloaded. CB1 can also be tripped by hand to remove ac power from the tape control unit and from all the tape transport units physically connected to that tape control unit.

### 2 F1 Failure

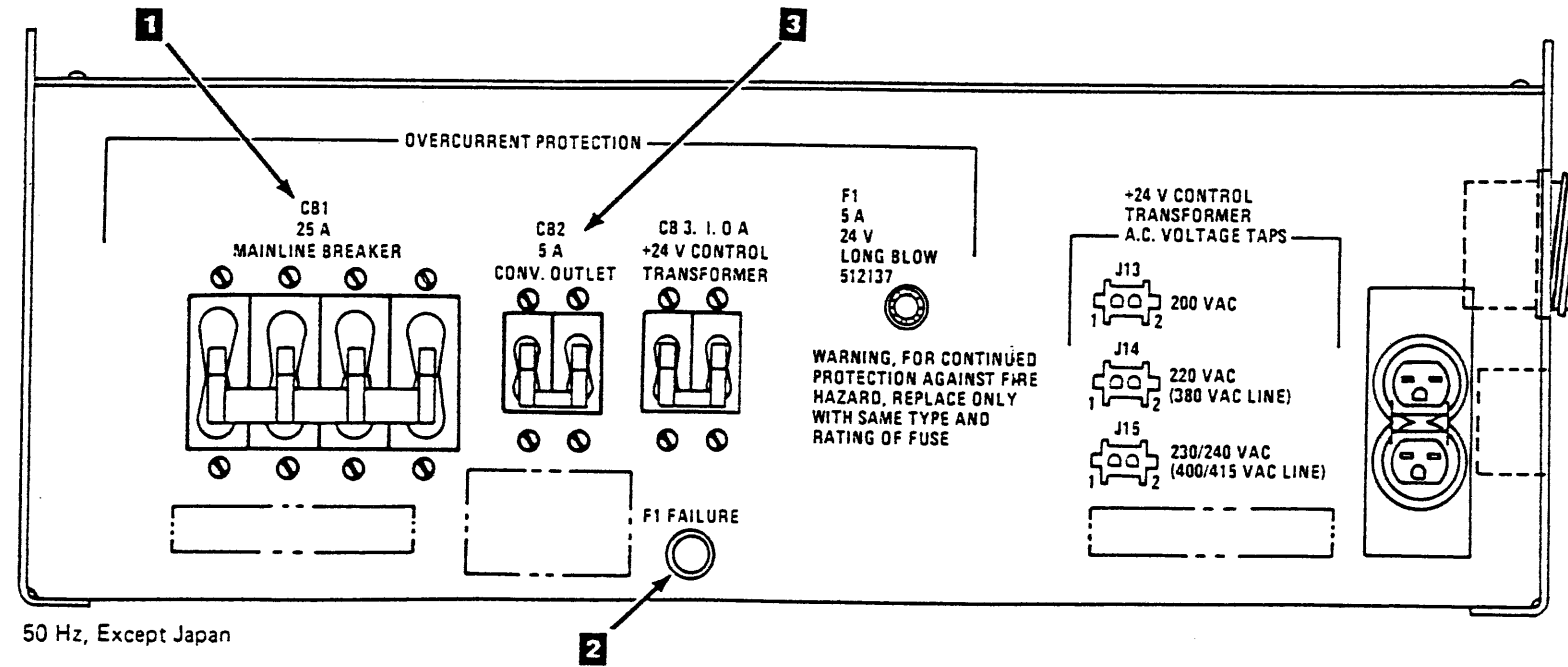
- This LED shows that fuse 1 on the ac power supply has blown. Fuse 1 controls the 24 V control voltage for activating the power supplies sequentially.

### 3 Convenience Outlet CB

- The convenience outlet circuit breaker removes power from the convenience outlet when it is tripped.



60 Hz and 50 Hz, Japan



50 Hz, Except Japan

## Voltage Tolerance Tables

### AC Power 60 Hz and 50 Hz Japan

| Voltage | Maximum | Minimum |
|---------|---------|---------|
| 200/208 | 220     | 180     |
| 220     | 238     | 193     |
| 230/240 | 259     | 202     |

### AC Power 50 Hz Except Japan

| Voltage | Maximum | Minimum |
|---------|---------|---------|
| 200     | 220     | 180     |
| 220     | 238     | 193     |
| 230/240 | 259     | 202     |
| 380     | 410     | 333     |
| 400     | 432     | 350     |
| 415     | 448     | 363     |

Note: See tape control unit or tape transport unit field wire net list and voltage distribution list for actual measuring points at each FRU for the voltages.

### Tape Control Unit DC Voltages 50 Hz and 60 Hz

#### Measured at Power Supply

| Voltage | Maximum | Minimum |
|---------|---------|---------|
| -5.0    | -5.50   | -4.70   |
| +5.0    | +5.60   | +4.90   |
| +8.5    | +9.20   | +7.80   |
| +24     | +32     | +19     |

#### Measured at Logic Board

| Voltage | Maximum | Minimum |
|---------|---------|---------|
| -5.0    | -5.45   | -4.55   |
| +1.70   | +1.75   | +1.65   |
| +5.0    | +5.45   | +4.55   |
| +8.5    | +9.27   | +7.74   |
| +12.0   | +12.36  | +11.64  |
| +24     | +30.0   | +18.0   |

#### Measuring Points

| Voltage | From               | To                 |
|---------|--------------------|--------------------|
| -5      | A1E2M06<br>A2R2B06 | A1K2J08<br>A2K2J08 |
| +1.7    | A1T2B03            | A1K2J08            |
| +5      | A1L2U03<br>A2R2U03 | A1K2J08<br>A2K2J08 |
| +8.5    | A1E2M11<br>A2R2B11 | A1K2J08<br>A2K2J08 |
| +12     | A1T2B11            | A1K2J08            |
| +24     | A1T2S06            | A1K2J08            |

### Power Supply Ripple Check (Tape Control Unit Only)

1. Using a voltmeter, measure the DC voltage at the desired point and record the reading.
2. Using an oscilloscope, measure the peak to peak AC ripple at the same voltage point selected in step 1.
3. Divide the peak to peak reading taken in step 2 by 2.
4. Add the DC voltage reading taken in step 1 to the result of step 3.
5. The result of step 4 must fall within the mini/max voltage range.

## Voltage Tolerance Tables PWR 20

### Tape Transport Unit DC Voltages 50 Hz and 60 Hz

#### Measured at Power Supply

| Voltage | Maximum | Minimum | Maximum Ripple (Peak-to-Peak) |
|---------|---------|---------|-------------------------------|
| -15.0   | -16.5   | -13.52  | .300v                         |
| -5.0    | -5.51   | -4.55   | .250v                         |
| +5.0    | +5.51   | +4.59   | .250v                         |
| +8.5    | +9.35   | +7.67   | .250v                         |
| +15.0   | +16.50  | +13.75  | .300v                         |
| +24.0   | +30.01  | +22.88  | 2.4v                          |

Note: If the drives are operating, there will be additional ripple generated by the starting and stopping of the drive motors. Therefore, this check should be done with the drives not moving tape.

#### Measured at Logic Board (or Load)

| Voltage | Maximum | Minimum |
|---------|---------|---------|
| -15.0   | -16.50  | -13.5   |
| -5.0    | -5.5    | -4.5    |
| +5.0    | +5.5    | +4.5    |
| +8.5    | +9.35   | +7.65   |
| +15.0   | +16.5   | +13.5   |
| +24.0   | +30.0   | +22.0   |

#### Measuring Points

| Voltage | See ALD  |
|---------|----------|
| -15     | PA00/001 |
| -5      | RP000    |
| +5      | RP000    |
| +8.5    | RP000    |
| +15     | VP000    |
| +24     | PA00/001 |

Note: The +15 volts are present only when the file protect switch is transferred.



## Tape Transport Unit Fuses Continue to Blow

If an exchanged fuse continues to blow or a circuit breaker continues to trip, disconnect the cable(s) associated with the fuse or circuit breaker to isolate the problem. If the fuse or circuit breaker continues to fail with the load removed, the power supply is suspect. If the fuse or circuit breaker no longer fails (with the load removed), reconnect the cable(s) associated with the fuse or circuit breaker.

Disconnect the loader cable J3 and power up. If there are no problems exchange the loader control card and/or the loader power cable. If the problem still exists then exchange the FRUs in the following table.

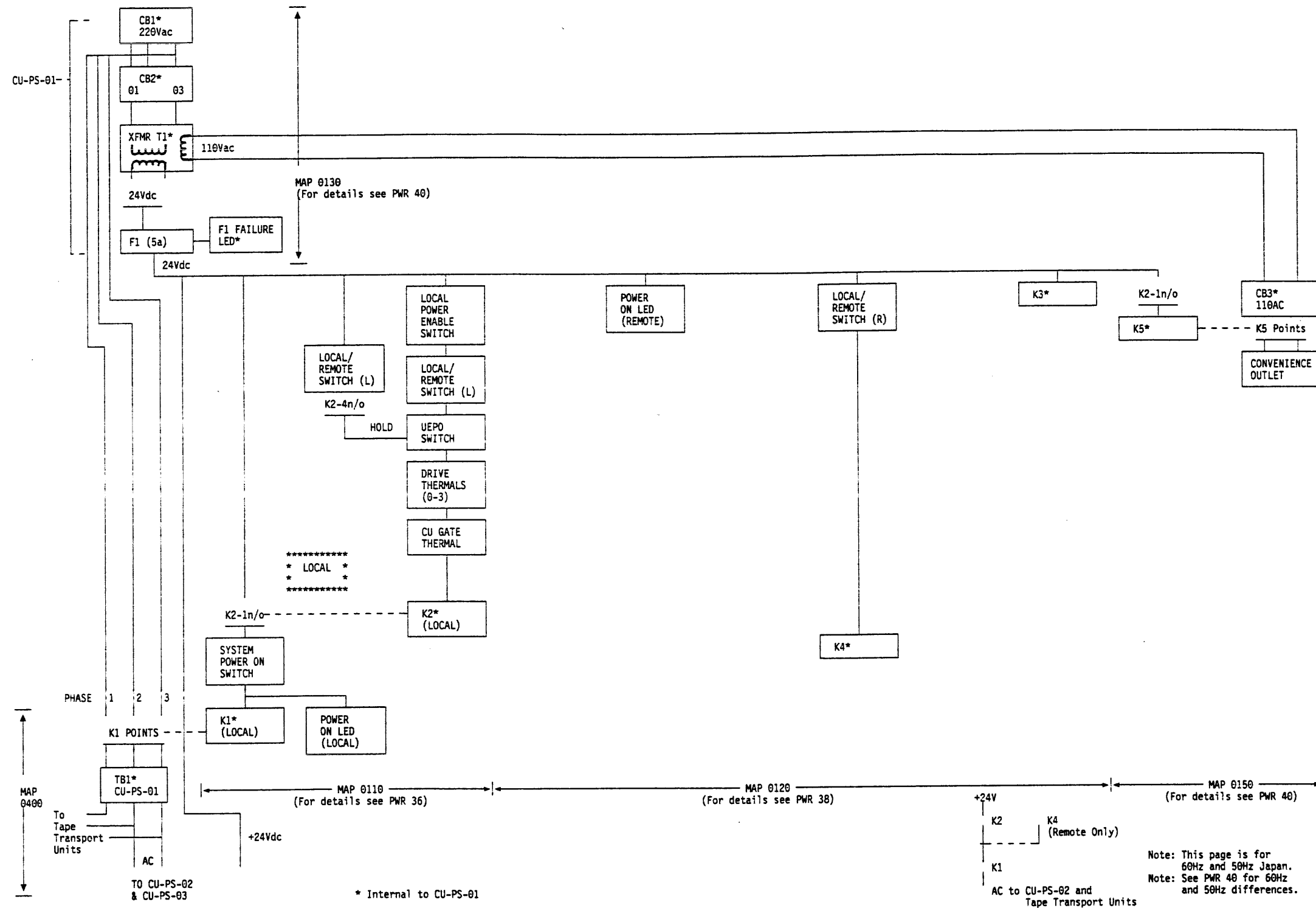
Reconnect the cables previously removed.

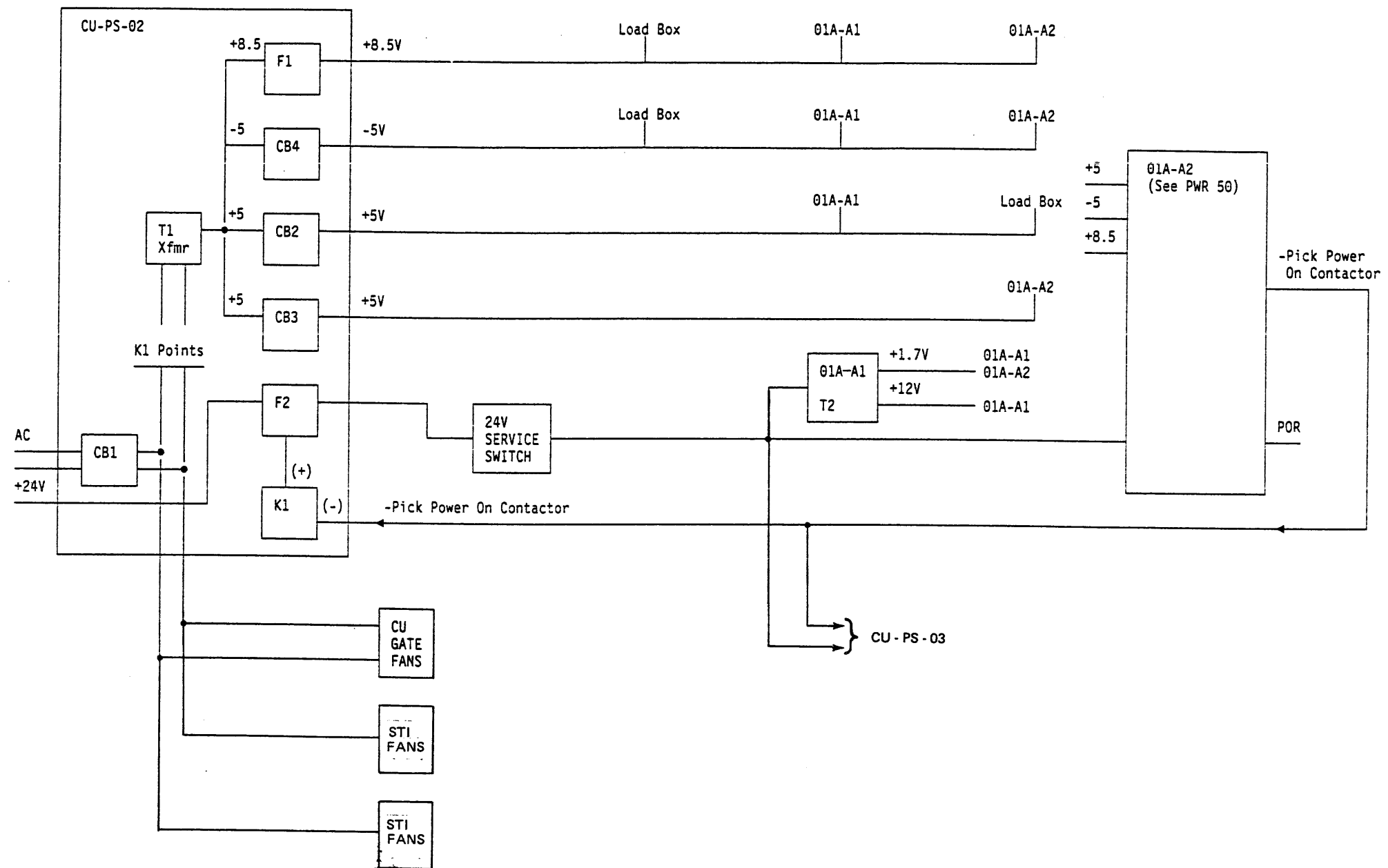
If the repair is successful, set the drive Online/Offline switch to Online (see LOC 1). Refer to the CE/HSC section and run GMP.

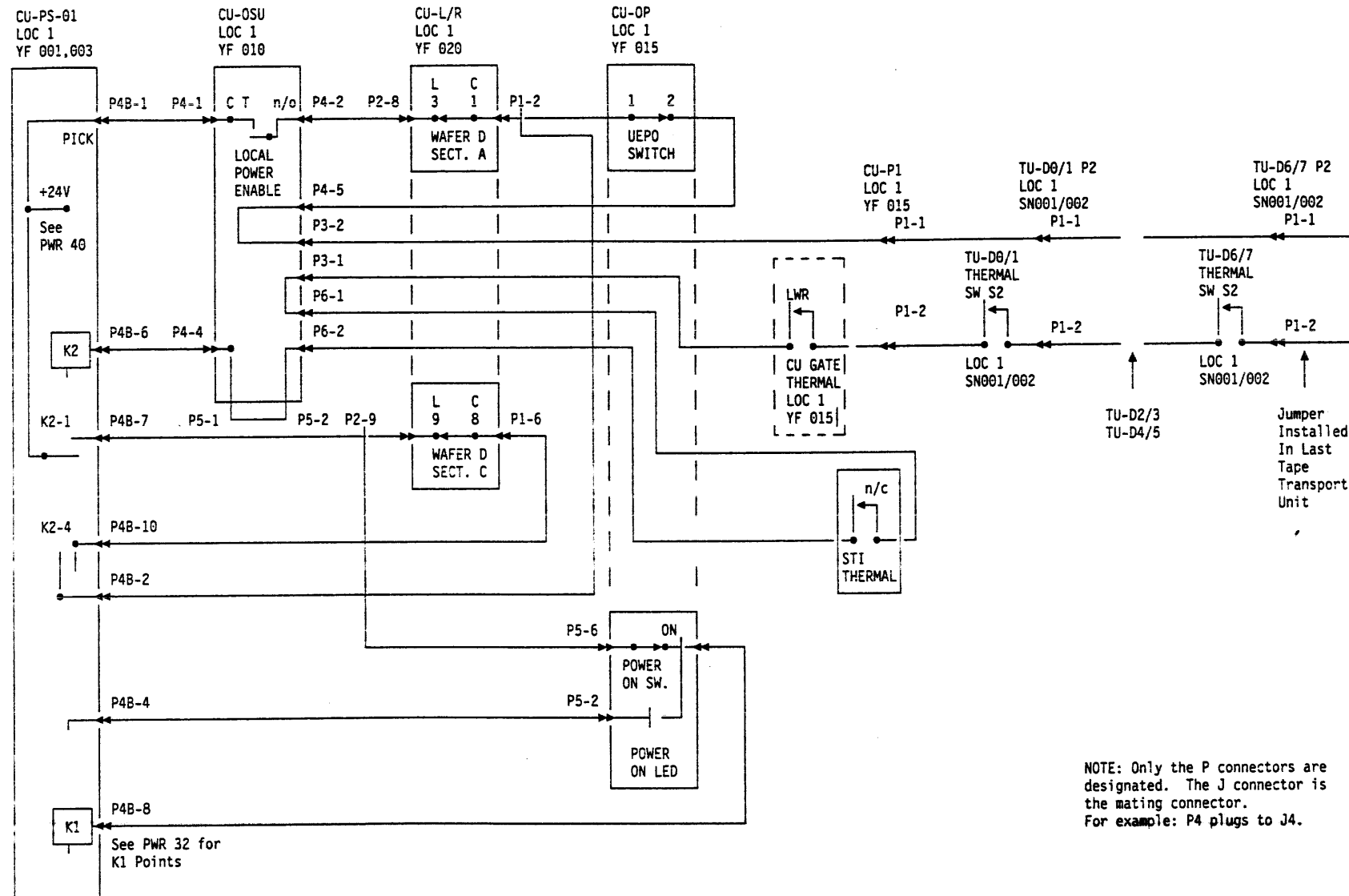
If the repair is not successful, request the assistance of your next level of support.

Cable locations are described on LOC 1.

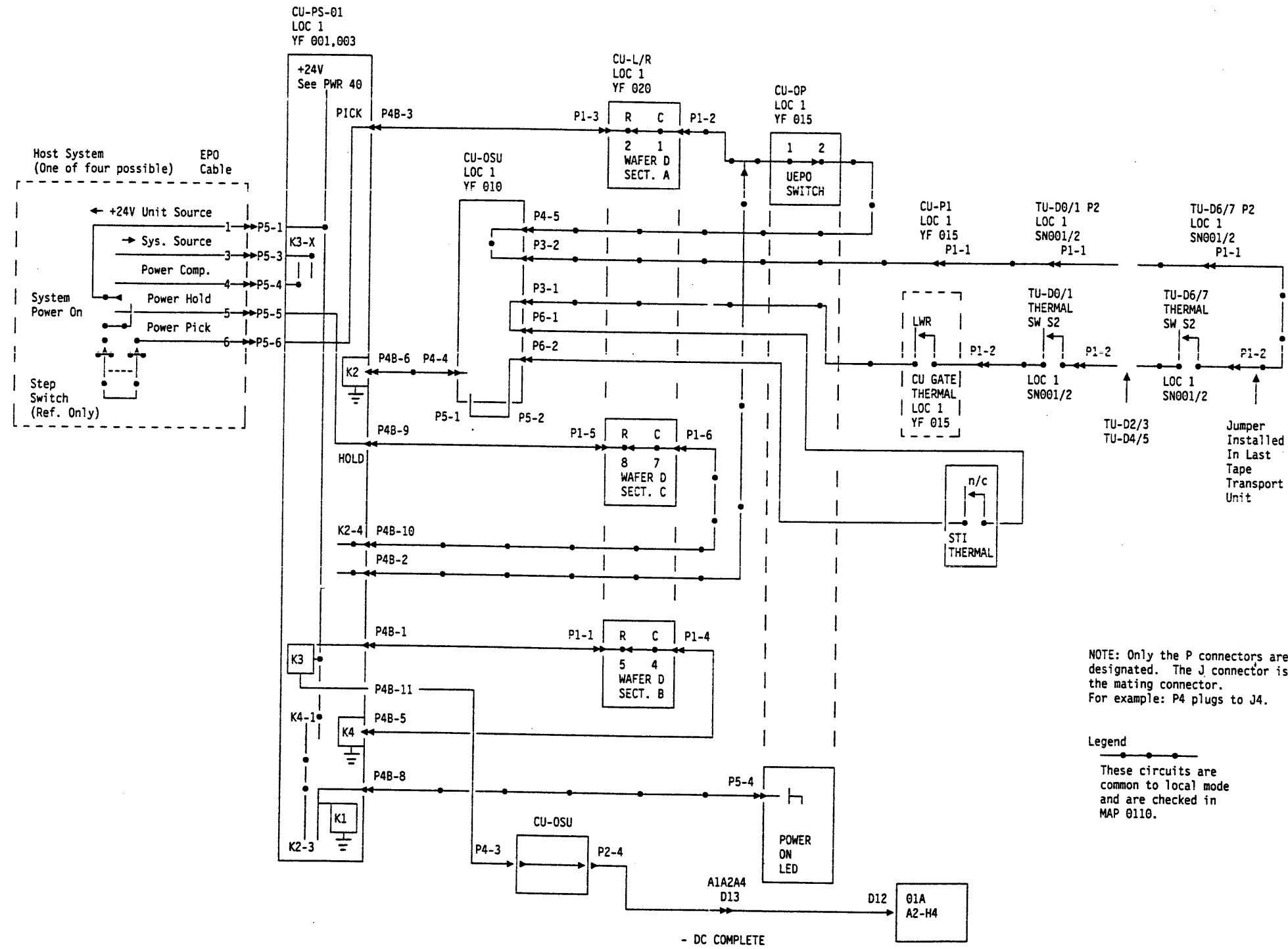
| Fuse or CB                      | Drive | Associated Cables | FRU   |
|---------------------------------|-------|-------------------|---|
| F1 (+24 V dc)                   | 0     | J5                | 059 – Power amplifier board   |
| F2 (+24 V dc)                   | 1     | J1                | 059 – Power amplifier board   |
| F3 (+15 V dc)                   | 0     | J5                | 064 – Write power card<br>059 – Power amplifier board<br>058 – Logic board (02A-A1)   |
| F4 (+15 V dc)                   | 1     | J1                | 064 – Write power card<br>059 – Power amplifier board<br>058 – Logic board (02A-A1)   |
| F5 (–15 V dc)                   | 0     | J5                | 059 – Power amplifier board   |
| F6 (–15 V dc)                   | 1     | J1                | 059 – Power amplifier board   |
| F7 (+8.5 V dc)                  | 0     | J5, J7            | 060 – Message display board<br>085 – Drive control card<br>058 – Logic board (02A-A1)   |
| F8 (+8.5 V dc)                  | 1     | J1, J3            | 060 – Message display board<br>085 – Drive control card<br>058 – Logic board (2A-A1)  |
| F9 (–5 V dc)                    | 0     | J5, J7            | 059 – Power amplifier board<br>058 – Logic board (02A-A1)   |
| F10 (–5 V dc)                   | 1     | J1, J3            | 059 – Power amplifier board<br>058 – Logic board (02A-A1)   |
| F11 (+5 V dc ctrl)              | 0     | J5                | 059 – Power amplifier board<br>060 – Message display board<br>079 – DC distribution cable   |
| F12 (+5 V dc ctrl)              | 1     | J2                | 059 – Power amplifier board<br>060 – Message display board<br>079 – DC distribution cable   |
| CB1 (+5 V dc)<br>F13 (+5 V dc)  | 0     | J6, J7            | 059 – Power amplifier board<br>060 – Message display board<br>079 – DC pwr distribution cable<br>080 – DC pwr distribution cable<br>058 – Logic board (02A-A1)<br>281 – Loader control card<br>287 – Loader power cable |
| CB2 (+5 V dc)<br>F14 (+5 V dc)  | 1     | J2, J3            | 059 – Power amplifier board<br>060 – Message display board<br>079 – DC pwr distribution cable<br>080 – DC pwr distribution cable<br>058 – Logic board (02A-A1)<br>281 – Loader control card<br>287 – Loader power cable |
| Tape transport unit power ac CB | 0, 1  | J4, J15, J16      | 020 – Drive 0 blower<br>020 – Drive 1 blower<br>030 – Pneumatic pump/motor  |
| Auto loader fuse (+5 V dc)      | 0, 1  | J2, J6            | 281 – Loader control card   |
| Auto loader fuse (+24 V dc)     | 0, 1  | J2, J6            | 281 – Loader control card   |





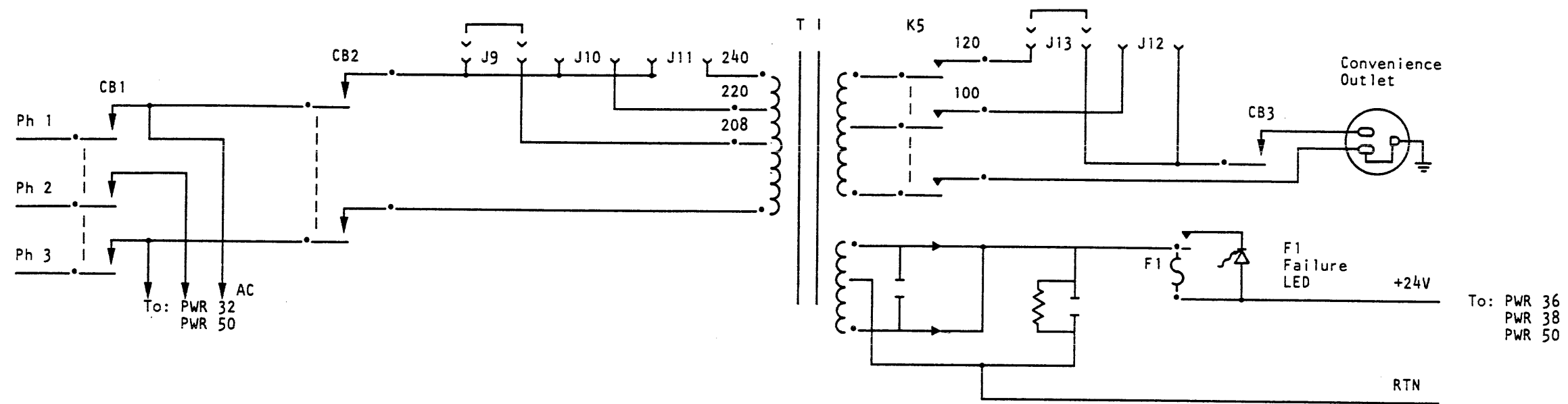


NOTE: Only the P connectors are designated. The J connector is the mating connector. For example: P4 plugs to J4.

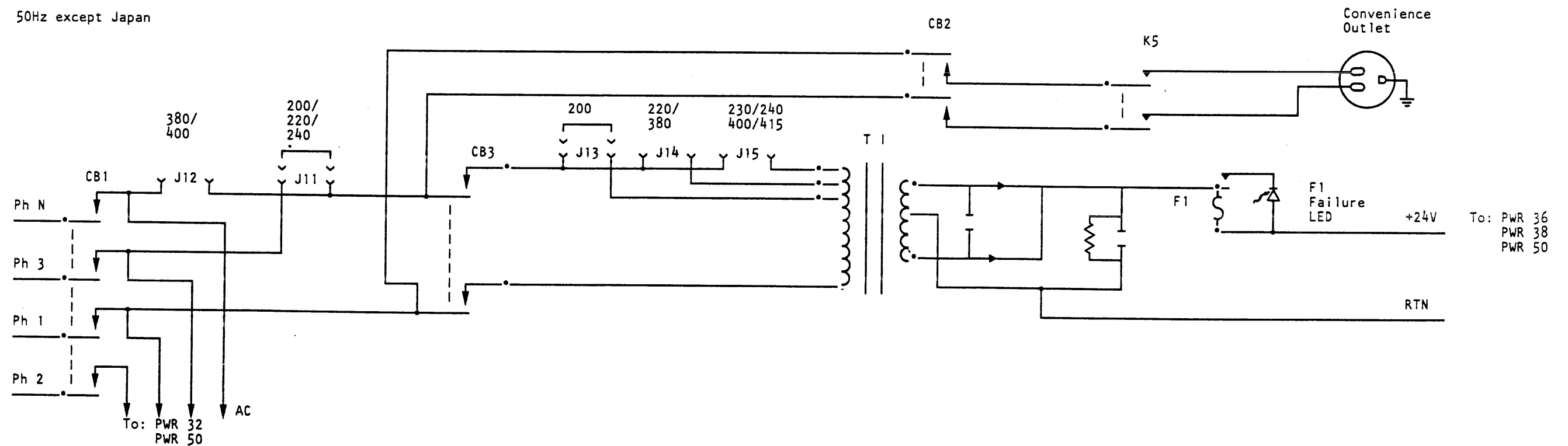


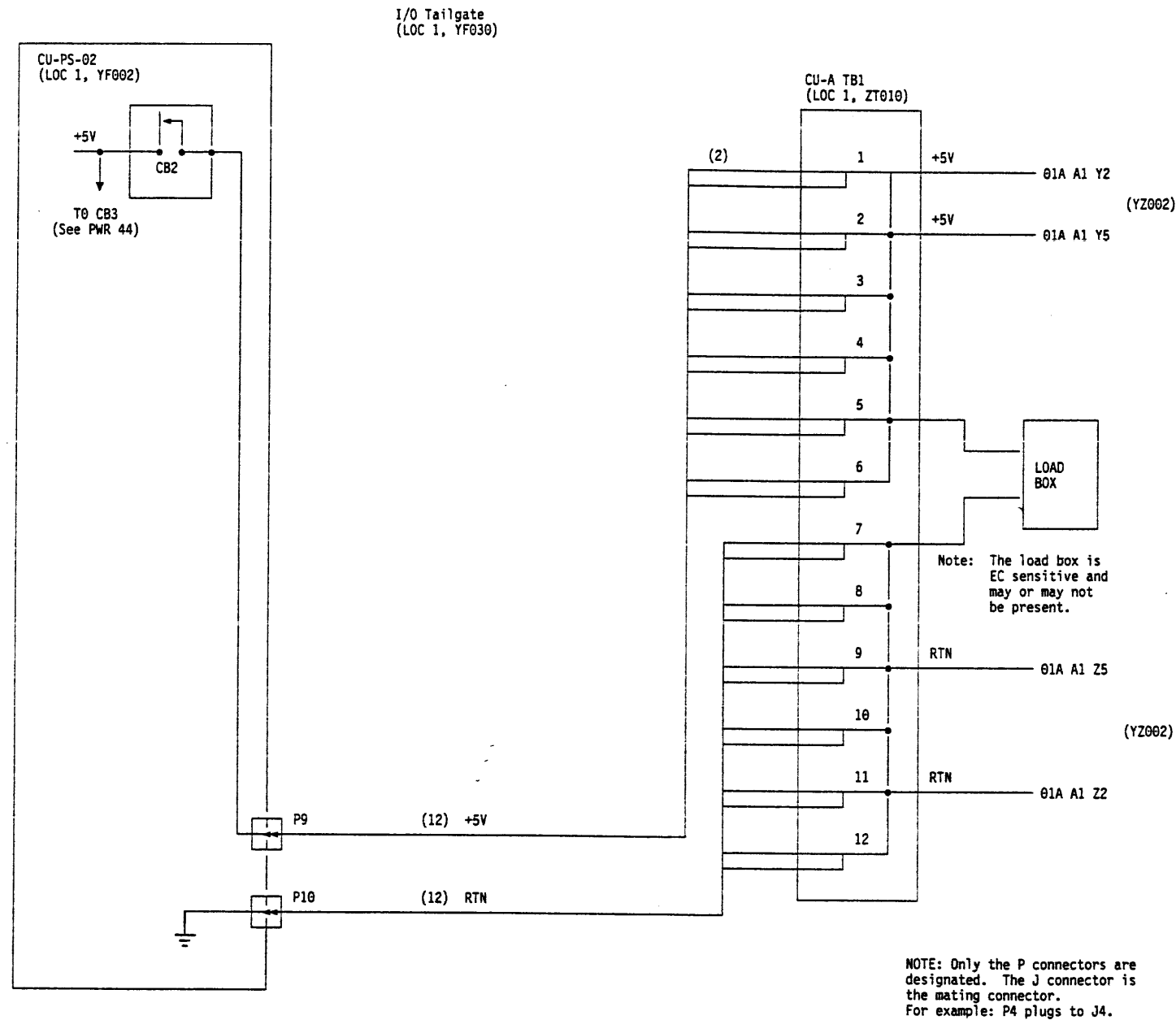
+24 Volt Control Voltage Diagram

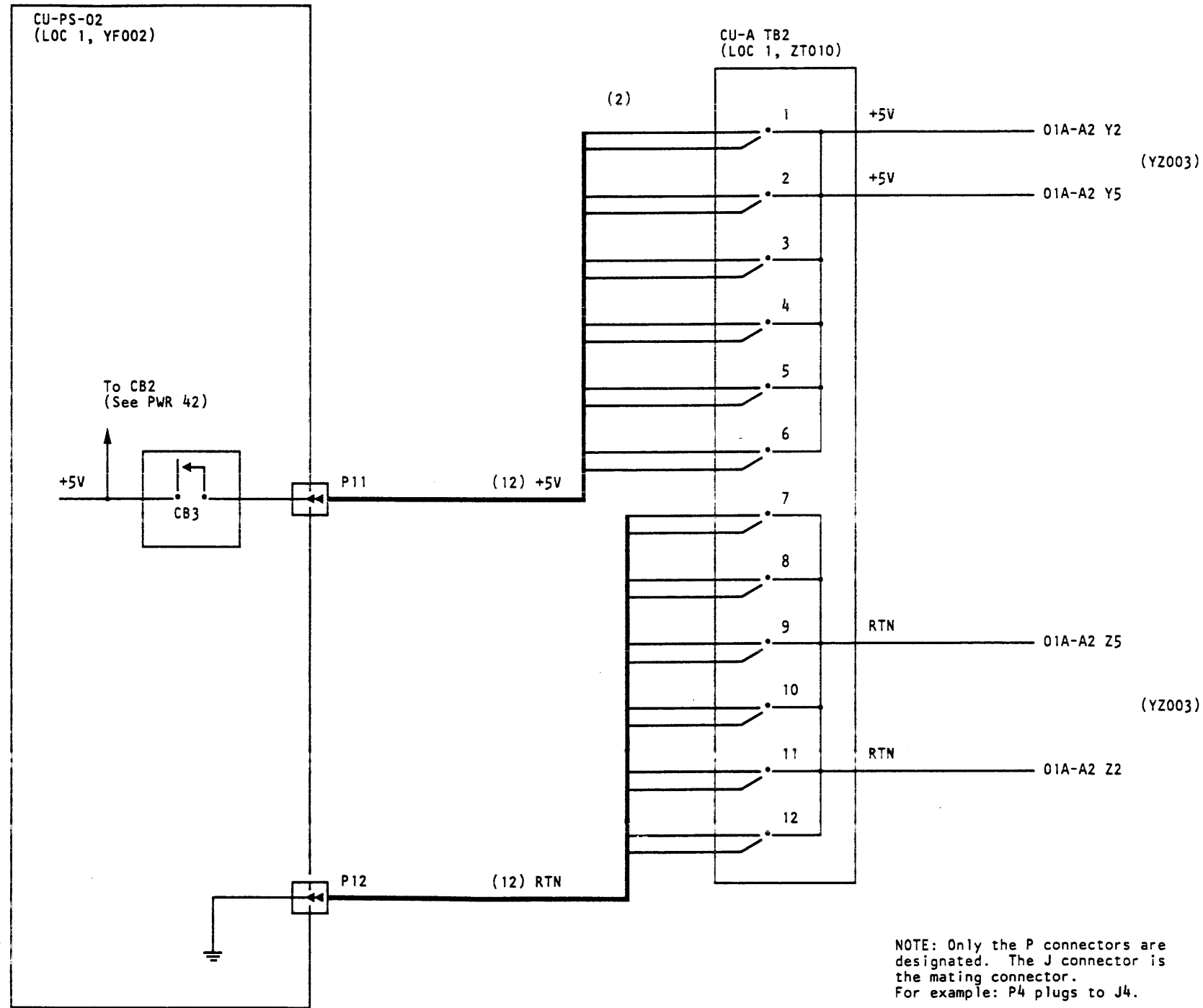
+24 Volt Control Voltage Diagram PWR 40



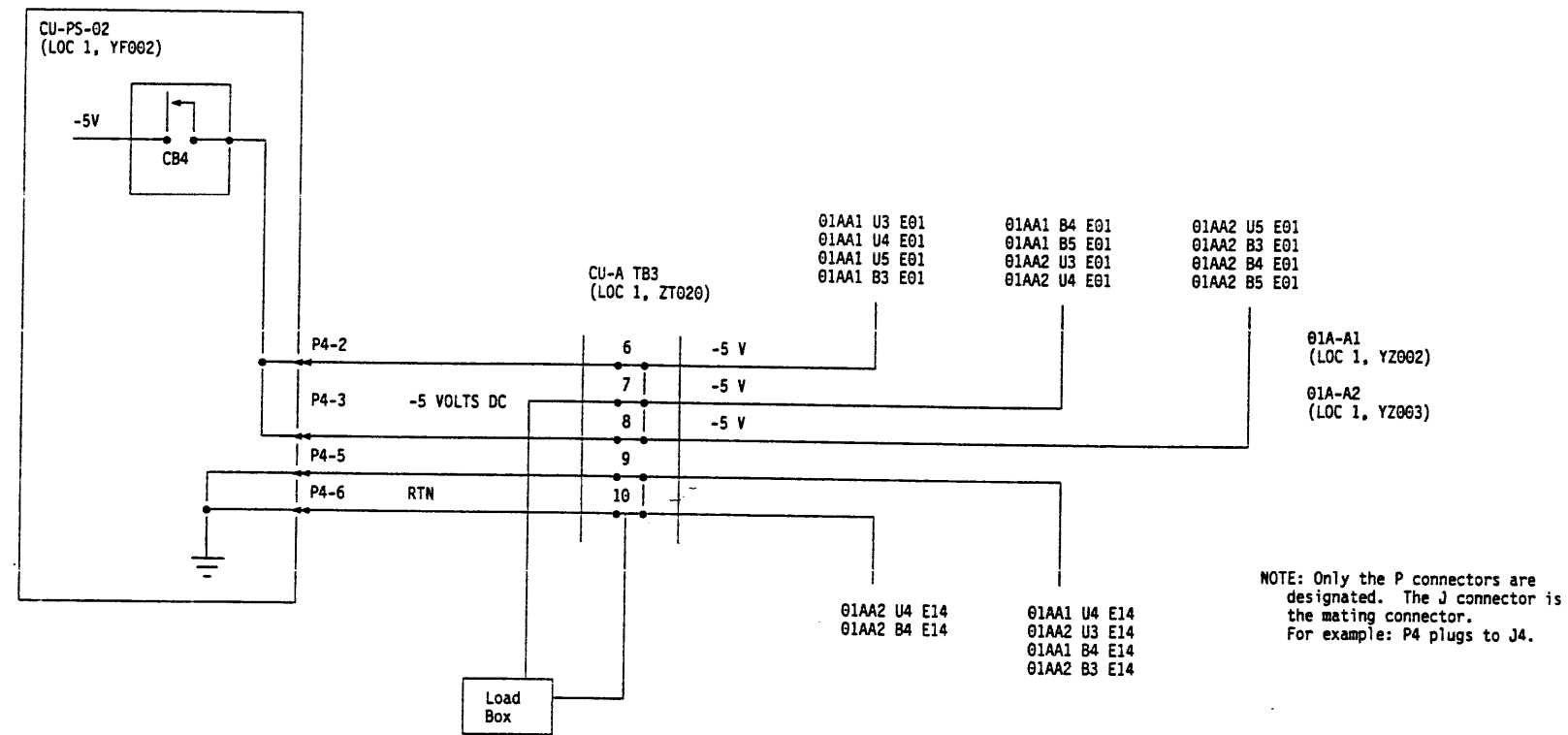
50Hz except Japan



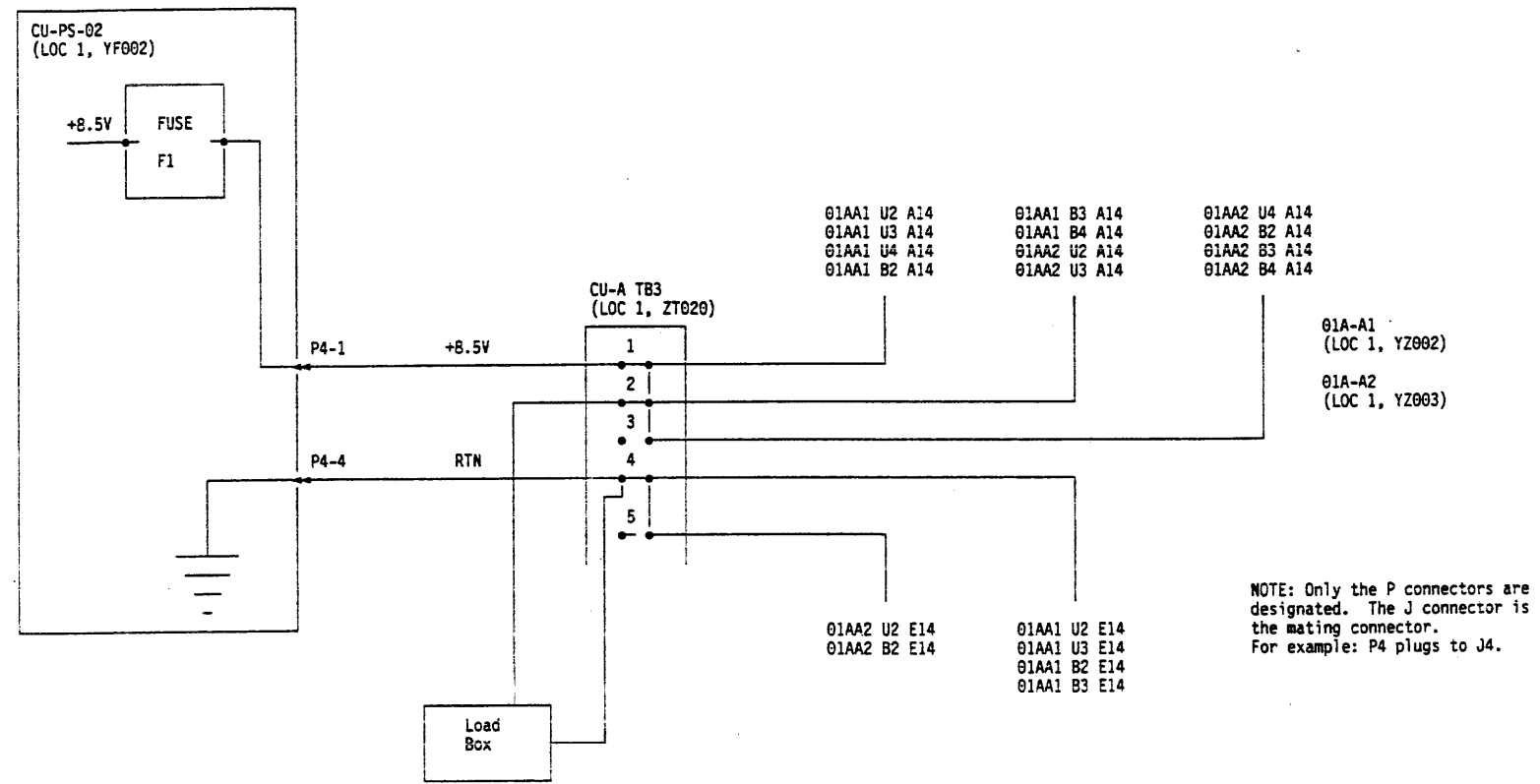


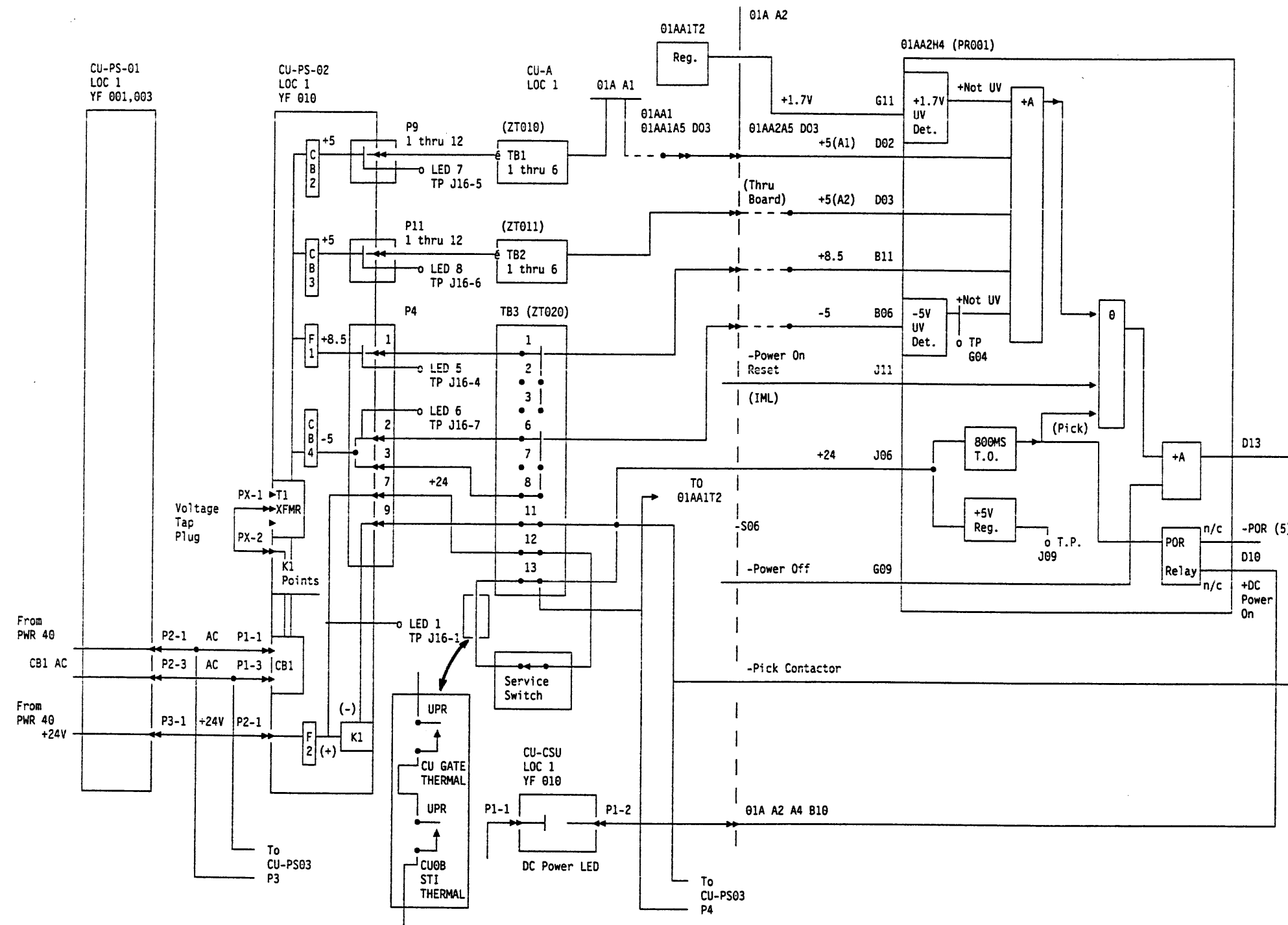






**+8.5 V dc Distribution Diagram**





MAP 0100—Power Start

POWER START

PAGE 1 OF 12

ENTRY POINTS

| ENTER THIS MAP |             |             |             |
|----------------|-------------|-------------|-------------|
| FROM           | ENTRY POINT | PAGE NUMBER | STEP NUMBER |
| 0000           | A           | 1           | 001         |
| 0101           | B           | 3           | 009         |
| 0101           | C           | 9           | 055         |
| 0101           | D           | 10          | 062         |
| 0101           | E           | 6           | 038         |

EXIT POINTS

| EXIT THIS MAP |             | TO         |             |
|---------------|-------------|------------|-------------|
| PAGE NUMBER   | STEP NUMBER | MAP NUMBER | ENTRY POINT |
| 6             | 041         | 0110       | A           |
| 6             | 043         | 0110       | D           |
| 8             | 052         | 0120       | A           |
| 9             | 058         | 0120       | A           |
| 7             | 050         | 0120       | B           |
| 9             | 056         | 0120       | D           |
| 6             | 040         | 0130       | A           |
| 3             | 010         | 0130       | B           |
| 3             | 016         | 0130       | C           |
| 4             | 023         | 0130       | D           |
| 5             | 030         | 0130       | E           |
| 5             | 037         | 0150       | A           |
| 5             | 035         | 0200       | A           |
| 12            | 075         | 0200       | A           |
| 5             | 036         | 0210       | A           |
| 12            | 075         | 0210       | A           |
| 10            | 066         | 0300       | A           |
| 10            | 064         | 0400       | A           |
| 11            | 068         | 0410       | A           |
| 11            | 070         | 0410       | B           |
| 12            | 077         | 190        | A           |

001  
(ENTRY POINT A)

DANGER

LETHAL VOLTAGES ARE PRESENT IN THE POWER SERVICE AREA. SAFETY IS MOST IMPORTANT. TREAT ALL CIRCUITS AS LIVE UNTIL MEASURED.

CAPACITORS ARE POSSIBLE EXPLODING DEVICES. WEAR SAFETY GLASSES WHEN WORKING IN THE POWER AREA.

ALWAYS REINSTALL ALL SAFETY COVERS BEFORE POWERING ON THE MACHINE.

ARE YOU HERE BECAUSE YOU HAVE A CONVENIENCE OUTLET ONLY PROBLEM?

Y N

002

ARE YOU HERE FOR DRIVE POWER PROBLEMS?

Y N

003

OBSERVE THE TAPE CONTROL UNIT POWER ON LED (LOC 1).

IS THE TAPE CONTROL UNIT POWER ON LED ON?

Y N

5 5 5 2  
A B C D

MAP DESCRIPTION: THIS MAP IS USED TO DETERMINE THE GENERAL AREA OF POWER PROBLEMS.

START CONDITIONS: YOU WERE DIRECTED TO THIS MAP BECAUSE OF SUSPECTED POWER PROBLEMS.

ADDITIONAL SERVICE AIDS:  
-TAPE CONTROL UNIT AC POWER DISTRIBUTION DIAGRAM ON PWR 32.  
-TAPE CONTROL UNIT DC POWER DISTRIBUTION DIAGRAM ON PWR 34.

D POWER START  
1

PAGE 2 OF 12

004

OBSERVE THE TAPE CONTROL UNIT  
DC POWER LED (LOC 1).

NO INDICATION OF AC POWER

IS THE TAPE CONTROL UNIT DC POWER  
LED ON?

Y N

005

PERFORM THE TAPE CONTROL UNIT  
DISMOUNT PROCEDURE ON CARR-TCU 5.

OBSERVE THE POSITION OF THE UNIT  
EMERGENCY POWER SWITCH (LOC 1).

SEE IF UEPO HAS BEEN ACTIVATED

IS THE UNIT EMERGENCY POWER  
SWITCH SET TO THE POWER ENABLE  
POSITION?

Y N

006

CAUTION

FIND OUT WHY THE UNIT EMERGENCY  
POWER SWITCH WAS SET TO THE  
POWER OFF POSITION.

CAUTION

SET THE UNIT EMERGENCY POWER  
SWITCH TO THE POWER ENABLE  
POSITION.  
(Step 006 continues)

RECOVER FROM UEPO

(Step 006 continued)

POWER ON (LOC 1).  
-SET THE LOCAL REMOTE  
SWITCH TO LOCAL.  
-SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO ON.  
-PRESS THE LOCAL  
POWER ENABLE SWITCH.

OBSERVE THE TAPE CONTROL UNIT POWER  
ON LED (LOC 1).

IS THE TAPE CONTROL UNIT  
POWER ON LED ON?

Y N

007  
PERFORM THE TAPE CONTROL UNIT  
DISMOUNT PROCEDURE ON CARR-TCU 5.

GO TO PAGE 3, STEP 009,  
ENTRY POINT B.

STILL NO POWER AFTER RESETTING UEPO

008

THE UNIT EMERGENCY POWER SWITCH WAS  
SET TO THE POWER OFF POSITION.

REFER TO THE CE/HSC SECTION AND RUN  
GMP.

5 3  
E F

MAP 0100—Power Start

F POWER START  
2

PAGE 3 OF 12

009  
(ENTRY POINT B)

OPEN THE FRONT DOOR OF THE TAPE CONTROL UNIT AND REMOVE THE SUB COVER.

OBSERVE THE F1 FAILURE LED (LOC 1).

IS THE F1 FAILURE LED OFF?  
Y N

010

GO TO MAP 0130, ENTRY POINT B.

THE CU-PS-01 +24 V DC FUSE F1 IS BLOWN.

011

OBSERVE THE POSITION OF THE CU-PS-01 CB1 (LOC 1).

IS CU-PS-01 CB1 SET TO THE ON POSITION?  
Y N

012

SET CU-PS-01 CB1 TO THE ON POSITION.

RECOVER FROM TRIPPED CB-1.

POWER ON (LOC 1).  
-SET THE LOCAL REMOTE SWITCH TO LOCAL.  
-SET THE TAPE CONTROL UNIT POWER ON/OFF SWITCH TO ON.  
-PRESS THE LOCAL POWER ENABLE SWITCH.

WAIT 20 SECONDS.  
(Step 012 continues)

G

G

(Step 012 continued)

DID CU-PS-01 CB1 TRIP?  
Y N

013

OBSERVE THE TAPE CONTROL UNIT POWER ON LED (LOC 1).

RECHECK AFTER RESETTING CB-1.

IS THE TAPE CONTROL UNIT POWER ON LED ON?  
Y N

014

GO TO STEP 009, ENTRY POINT B.

CU-PS-01 CB1 WAS TRIPPED. THERE SEEMS TO BE A SECOND PROBLEM.

015

THE CU-PS-01 CB1 WAS TURNED OFF.

REFER TO THE CE/HSC SECTION AND RUN GMP.

016

GO TO MAP 0130, ENTRY POINT C.

CU-PS-01 CB1 IS TRIPPING.

017

IS THIS A 50HZ MACHINE (EXCEPT JAPAN)?  
Y N

Y N

4 4  
H J

J  
3 POWER START

PAGE 4 OF 12

018

OBSERVE THE POSITION OF THE  
CU-PS-01 CB2 (LOC 1).

IS CU-PS-01 CB2 SET TO THE ON  
POSITION?

Y N

019

SET CU-PS-01 CB2 TO THE ON  
POSITION.

RECOVER FROM TRIPPED CB-2.

POWER ON (LOC 1).  
-SET THE LOCAL REMOTE  
SWITCH TO LOCAL.  
-SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO ON.  
-PRESS THE LOCAL  
POWER ENABLE SWITCH.

WAIT 20 SECONDS.

DID CU-PS-01 CB2 TRIP?

Y N

020

OBSERVE THE TAPE CONTROL UNIT  
POWER ON LED (LOC 1).

RECHECK AFTER RESETTING CB-2.

IS THE TAPE CONTROL UNIT  
POWER ON LED ON?

Y N

021

GO TO PAGE 3, STEP 009,  
ENTRY POINT B.

CU-PS-01 CB2 WAS TRIPPED. THERE  
SEEMS TO BE A SECOND PROBLEM.

K L M

H K L M  
3

022

THE CU-PS-01 CB2 WAS TURNED  
OFF.

REFER TO THE CE/HSC SECTION  
AND RUN GMP.

023

GO TO MAP 0130, ENTRY POINT D.

CU-PS-01 CB2 IS TRIPPING.

024

GO TO PAGE 6, STEP 038,  
ENTRY POINT E.

025

OBSERVE THE POSITION OF THE  
CU-PS-01 CB3 (LOC 1).

IS CU-PS-01 CB3 SET TO THE ON  
POSITION?

Y N

026

SET CU-PS-01 CB3 TO THE ON  
POSITION.

RECOVER FROM TRIPPED CB-3.

POWER ON (LOC 1).  
-SET THE LOCAL REMOTE  
SWITCH TO LOCAL.  
-SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO ON.  
-PRESS THE LOCAL  
POWER ENABLE SWITCH.

WAIT 20 SECONDS.  
(Step 026 continues)

5  
N

E N POWER START  
2 4

PAGE 5 OF 12

(Step 026 continued)

DID CU-PS-01 CB3 TRIP?

Y N

027

OBSERVE THE TAPE CONTROL UNIT  
POWER ON LED (LOC 1).

RECHECK AFTER RESETTING CB-3

IS THE TAPE CONTROL UNIT  
POWER ON LED ON?

Y N

028

GO TO PAGE 3,  
STEP 009,  
ENTRY POINT B.

CU-PS-01 CB3 WAS TRIPPED. THERE  
SEEMS TO BE A SECOND PROBLEM.

029

THE CU-PS-01 CB3 WAS TURNED  
OFF.

REFER TO THE CE/HSC SECTION  
AND RUN GMP.

030

GO TO MAP 0130, ENTRY POINT E.

CU-PS-01 CB3 IS TRIPPING.

031

GO TO PAGE 6, STEP 038,  
ENTRY POINT E.

032

THE OP PANEL (FRU142) IS FAILING,  
EXCHANGE FRU142.  
REFER TO THE CE/HSC SECTION AND RUN  
GMP.

THE AC POWER ON LED IS BAD  
SEE CARR-TCU 1-1

A B C  
1 1 1

033

AC POWER IS ON  
GO TO PAGE 10, STEP 062,  
ENTRY POINT D.

034

ARE BOTH DRIVES OF ONE TAPE  
TRANSPORT UNIT FAILING?  
(DR0 AND DR1, OR DR2 AND DR3,  
ETC.)

Y N

035

SINGLE DRIVE POWER PROBLEM  
GO TO MAP 0200, ENTRY POINT A.

036

TWO DRIVE POWER PROBLEM  
GO TO MAP 0210, ENTRY POINT A.

037

CONVENIENCE OUTLET PROBLEM  
PERFORM THE TAPE CONTROL UNIT  
DISMOUNT PROCEDURE ON CARR-TCU 5.  
GO TO MAP 0150, ENTRY POINT A.



POWER START

PAGE 6 OF 12

038  
(ENTRY POINT E)

RECORD THE POSITION OF THE LOCAL  
REMOTE SWITCH (LOC 1).

SET THE LOCAL REMOTE SWITCH TO THE  
LOCAL POSITION (LOC 1).

SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO THE ON POSITION  
(LOC 1).

PRESS AND HOLD THE LOCAL POWER  
ENABLE SWITCH (LOC 1) UNTIL  
DIRECTED TO RELEASE IT

OBSERVE THE TAPE CONTROL UNIT POWER  
ON LED (LOC 1).

IS THE TAPE CONTROL UNIT  
POWER ON LED ON?

Y N

039

RELEASE THE LOCAL POWER ENABLE  
SWITCH.

REMOVE CU-PS-01 FUSE F1 (LOC 1).

OBSERVE THE F1 FAILURE LED  
(LOC 1).

IS THE F1 FAILURE LED NOW ON?

Y N

|||  
|||  
|||

P Q R

CU-PS-01 CB1, CB2, FUSE F1, AND THE  
UNIT EMERGENCY POWER SWITCH APPEAR  
TO BE OK, BUT THE TAPE CONTROL UNIT  
IS NOT POWERED ON. THIS SECTION  
ATTEMPTS TO POWER ON IN LOCAL MODE.

IF THE F1 FAILURE LED IS ON, +24 V DC  
IS AVAILABLE.

P Q R

|||  
|||  
|||

040

REINSTALL FUSE F1.

GO TO MAP 0130, ENTRY POINT A.

041

REINSTALL FUSE F1.

GO TO MAP 0110, ENTRY POINT A.

042

RELEASE THE LOCAL POWER ENABLE  
SWITCH.

043

GO TO MAP 0110, ENTRY POINT D.

044

WAS THE ORIGINAL POSITION OF THE  
LOCAL REMOTE SWITCH, AS RECORDED,  
SET TO THE REMOTE POSITION?

Y N

|||  
|||  
|||

7 7

S T

THE +24 V DC CONTROL VOLTAGE IS  
MISSING.

THE +24 V DC CONTROL VOLTAGE IS OK,  
BUT THE TAPE CONTROL UNIT DID NOT  
POWER ON.

THE LOCAL PICK CIRCUIT IS OK. THIS  
SECTION CHECKS THE HOLD CIRCUIT.

THE LOCAL HOLD CIRCUIT IS FAILING.

THE TAPE CONTROL UNIT POWERS UP OK  
IN LOCAL MODE.

S T POWER START  
6 6

PAGE 7 OF 12

045

THE ORIGINAL FAILURE (POWER ON LED WAS OFF) HAS DISAPPEARED.

POSSIBLE CAUSES FOR INTERMITTENT OR UNEXPLAINED POWER DROP ARE:  
AC POWER SUPPLY (FRU144)  
TCU GATE LOWER THERMAL SWITCHES  
STI GATE LOWER THERMAL SWITCHES  
TTU THERMAL SWITCH (FRU082)

REFER TO THE CE/HSC SECTION AND RUN GMP.

REFER TO PWR 36 FOR AN OVERVIEW OF THE LOCAL PICK/HOLD CIRCUITS.

046

TO USE THE REMOTE MODE, THE TAPE CONTROL UNIT MUST BE ATTACHED TO A HOST SYSTEM WITH AN EPO CABLE AND THE HOST SYSTEM MUST BE POWERED ON.

IS AN EPO CABLE INSTALLED AND THE SYSTEM POWERED ON?

Y N

047

DO YOU WANT TO TEST THE REMOTE MODE?

Y N

8  
U V W

V W

048

THE TAPE CONTROL UNIT WAS SET TO REMOTE AND THE HOST SYSTEM WAS NOT POWERED ON, OR AN EPO CABLE WAS NOT INSTALLED.

INFORM THE SYSTEM FE.

REFER TO THE CE/HSC SECTION AND RUN GMP.

049

CAUTION

+24 V DC IS PRESENT.

INSTALL A JUMPER FROM CU-PS-01 J5-1 TO J5-5 (LOC 1).

SET THE LOCAL REMOTE SWITCH TO THE REMOTE POSITION (LOC 1).

OBSERVE THE TAPE CONTROL UNIT POWER ON LED (LOC 1).

IS THE TAPE CONTROL UNIT POWER ON LED ON?

Y N

050

GO TO MAP 0120, ENTRY POINT B.

THE TAPE CONTROL UNIT POWERS UP OK IN LOCAL MODE. THIS SECTION WILL CHECK THE REMOTE HOLD CIRCUIT BY USING A JUMPER TO SIMULATE AN EPO CABLE.

THE REMOTE HOLD CIRCUIT IS FAILING.

8  
X

X POWER START  
7

PAGE 8 OF 12

051

REMOVE THE JUMPER.

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CBI TO THE OFF POSITION (LOC 1).

INSTALL THE JUMPER FROM CU-PS-01 J5-1 TO J5-6 (LOC 1).

CAUTION

THE TAPE CONTROL UNIT IS EXPECTED TO POWER ON DURING THE NEXT STEP.

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CBI TO THE ON POSITION (LOC 1).

OBSERVE THE TAPE CONTROL UNIT POWER ON LED (LOC 1).

IS THE TAPE CONTROL UNIT POWER ON LED ON?

Y N

052

GO TO MAP 0120, ENTRY POINT A.

THE REMOTE HOLD IS OK. THE PROBLEM MAY BE A FAILURE IN THE REMOTE PICK CIRCUIT.

THE REMOTE PICK CIRCUIT IS FAILING.

U Y  
7

053

THE TAPE CONTROL UNIT REMOTE CIRCUITS ARE OK.  
THE TAPE CONTROL UNIT LOCAL REMOTE SWITCH WAS SET TO REMOTE AND THE HOST SYSTEM WAS NOT POWERED ON OR AN EPO CABLE WAS NOT INSTALLED.

SEE OVERVIEW DIAGRAM ON PWR 32.

INFORM THE SYSTEM FE.

REFER TO THE CE/HSC SECTION AND RUN GMP.

054

GO TO PAGE 9, STEP 055, ENTRY POINT C.

Y

POWER START

PAGE 9 OF 12

055  
(ENTRY POINT C)

SET THE LOCAL REMOTE SWITCH TO THE  
REMOTE POSITION (LOC 1).

OBSERVE THE TAPE CONTROL UNIT POWER  
ON LED (LOC 1).

IS THE TAPE CONTROL UNIT  
POWER ON LED ON?

Y N

056

GO TO MAP 0120, ENTRY POINT D.

057

THE REMOTE HOLD IS OK. THE PROBLEM  
MAY BE A FAILURE TO POWER ON FROM  
THE SYSTEM (REMOTE POWER PICK). A  
JUMPER WILL BE USED TO SIMULATE THE  
EPO CABLE.

SET THE LOCAL REMOTE SWITCH TO THE  
LOCAL POSITION (LOC 1).

SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO THE OFF POSITION  
(LOC 1).

DISCONNECT THE CABLE  
CU-PS-01 P5, IF INSTALLED (LOC 1).

INSTALL A JUMPER FROM CU-PS-01 J5-1  
TO J5-6 (LOC 1).  
(Step 057 continues)

THIS SECTION CHECKS THE REMOTE HOLD  
CIRCUIT.

THE REMOTE HOLD CIRCUIT IS FAILING.

(Step 057 continued)

CAUTION

THE TAPE CONTROL UNIT IS EXPECTED  
TO POWER ON DURING THE NEXT STEP.

SET THE LOCAL REMOTE SWITCH TO THE  
REMOTE POSITION (LOC 1).

OBSERVE THE TAPE CONTROL UNIT POWER  
ON LED (LOC 1).

IS THE TAPE CONTROL UNIT  
POWER ON LED ON?

Y N

058

GO TO MAP 0120, ENTRY POINT A.

059

ALL CIRCUITS APPEAR TO BE  
FUNCTIONING NORMALLY. THE POWER  
COMPLETE RELAY K3 MAY BE STUCK OR  
ITS PICK CIRCUIT MAY BE  
MALFUNCTIONING. THIS WOULD CAUSE A  
PREMATURE POWER COMPLETE TO BE SENT  
TO THE HOST ADVANCING THE STEPPER  
BEFORE THE TA90 ACTUALLY COMPLETED  
ITS POWER ON SEQUENCE.

SET THE SERVICE SWITCH TO OFF.

CONTINUITY CHECK  
CU PS01 P5-3 TO CU PS01 P5-4

DID YOU READ CONTINUITY ?

Y N

1

1 0

0 A

THE REMOTE PICK CIRCUIT IS FAILING.

SEE PWR38, YF001 AND YF020.

Z A  
Z A POWER START  
9 A  
9

PAGE 10 OF 12

060

RECONNECT THE CABLE  
CU-PS-01 P5 (IF IT WAS PREVIOUSLY  
INSTALLED).

THE TAPE CONTROL UNIT POWER ON  
CIRCUITS APPEAR TO BE OK.

POSSIBLE CAUSES FOR INTERMITTENT  
OR UNEXPLAINED POWER DROP ARE:  
AC POWER SUPPLY (FRU144)  
TCU GATE LOWER THERMAL SWITCHES  
STI GATE LOWER THERMAL SWITCHES  
TTU THERMAL SWITCH (FRU082).

REFER TO THE CE/HSC SECTION AND  
RUN GMP.

061  
POWER COMPLETE IS STUCK ACTIVE!

ISOLATE PROBLEM AND REPAIR USING  
PWR 38 AND LOGIC YF001 AND YF020.  
AFTER REPAIR  
REFER TO THE CE/HSC SECTION AND RUN  
GMP.

REFER TO PWR 38 FOR AN OVERVIEW  
OF THE REMOTE PICK/HOLD CIRCUITS.

062  
(ENTRY POINT D)  
THE TAPE CONTROL UNIT POWER ON LED  
IS LIT  
ARE YOU HERE FOR A UEPO CHECK?  
Y N

063

OBSERVE THE TAPE CONTROL UNIT  
DC POWER LED (LOC 1).

IS THE TAPE CONTROL UNIT DC POWER  
LED ON?

Y N

064

GO TO MAP 0400, ENTRY POINT A.

THERE IS A CU-PS-02 DC VOLTAGE  
FAILURE.

065

OPEN THE REAR DOOR OF THE TAPE  
CONTROL UNIT AND REMOVE THE SUB  
COVER.

CHECK CHANNEL ATTACHMENT DC POWER.

OBSERVE THE LEDS ON BOTH STI  
CARDS

SEE LOC-1 FOR LOCATION OF THE LEDS.

ARE ANY OF THE LEDS (6) ON OR  
BLINKING?

Y N

066

THERE MAY BE A FAILURE OF  
CU-PS03  
OR THE CABLING TO THE STI GATE  
GO TO MAP 0300, ENTRY POINT A.

1 1  
2 1  
A A  
B C

A  
C  
1  
0  
POWER START  
PAGE 11 OF 12

067

OBSERVE THE LEDS ON THE TAPE CONTROL UNIT REGULATOR CARD, 01A-A1T2 (LOC 1).

ARE ALL THE LEDS (4) OFF?

Y N

068

GO TO MAP 0410, ENTRY POINT A.

THERE IS A REGULATOR VOLTAGE FAILURE.

069

SET THE MULTIMETER TO MEASURE +1.7 V DC.

MEASURE THE +1.7 V DC REGULATOR OUTPUT FROM 01A-A1T2-B03(+) TO 01A-A1T2-D08(-).

DOES THE METER INDICATE GREATER THAN 1.65 V DC?

Y N

070

GO TO MAP 0410, ENTRY POINT B.

THE 1.7 V DC REGULATED VOLTAGE IS FAILING.

A  
D

A  
D

071

CONNECT METER TO MEASURE +12 V DC

MEASURE THE +12 V DC REGULATOR OUTPUT FROM 01A-A1T2-B11(+) TO 01A-A1T2-D08(-).

IS THE VOLTAGE BETWEEN +11 AND +13 V DC?

Y N

072

THE +12 V DC REGULATOR IS FAILING. EXCHANGE FRU138

SEE CARR-TCU 1-1.

REFER TO THE CE/HSC SECTION AND RUN GMP.

073

MEASURE THE AC RIPPLE ON THE DC VOLTAGES.

SEE PWR 20.

IS THE RIPPLE VOLTAGE IN TOLERANCE?

Y N

074

TOO MUCH RIPPLE ON THE DC VOLTAGE. EXCHANGE FRU145.

SEE CARR-TCU 1-1.

REFER TO THE CE/HSC SECTION AND RUN GMP.

1  
2  
A  
E

A A POWER START  
 B E  
 1 1  
 0 1

PAGE 12 OF 12

075

THE TAPE CONTROL UNIT POWER SEEMS TO BE OK.

SEE OVERVIEW DIAGRAM ON PWR 32.

FOR SINGLE DRIVE POWER PROBLEMS, GO TO MAP 0200, ENTRY POINT A.

FOR MULTIPLE DRIVE POWER PROBLEMS, GO TO MAP 0210, ENTRY POINT A.

IF YOU ENTERED THIS MAP FROM THE START SECTION OF THE MG, REFER BACK TO THE CE/HSC SECTION AND RUN GMP.

IF YOU ENTERED THIS MAP FROM ANY OTHER SECTION OF THE MG, RETURN TO THAT SECTION AND CONTINUE WITH THE NEXT STEP.

076

SET THE UEPO SWITCH TO "OFF". OBSERVE THE TAPE CONTROL UNIT POWER ON LED (LOC 1). IS THE TAPE CONTROL UNIT POWER ON LED ON?

UEPO FUNCTION CHECK.

Y N

077

UEPO CIRCUITS CHECK OKAY

SET THE UEPO SWITCH TO "ON" GO TO MAP 190, ENTRY POINT A.

A  
 F

A  
 F

078

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CBI TO THE OFF POSITION (LOC 1). REMOVE WIRES FROM THE UEPO SWITCH.

AC POWER SUPPLY OR UEPO SWITCH FAILURE.

SET UEPO SWITCH TO "OFF" POSITION

CONTINUITY CHECK UEPO SWITCH. DO YOU READ CONTINUITY ACROSS THE SWITCH?

Y N

079

THE AC PS (FRU144) IS FAILING EXCHANGE FRU144

SEE CARR-TCU 1-1.

REFER TO THE CE/HSC SECTION AND RUN GMP.

080

THE UEPO SWITCH (FRU198) IS FAILING EXCHANGE FRU198

SEE CARR-TCU 1-1.

REFER TO THE CE/HSC SECTION AND RUN GMP.

**MAP 0110 — Power On (Local Mode)**

POWER ON, LOCAL MODE

PAGE 1 OF 13

ENTRY POINTS

| FROM       | ENTER THIS MAP |             |             |
|------------|----------------|-------------|-------------|
| MAP NUMBER | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| 0100       | A              | 1           | 001         |
| 0100       | D              | 11          | 064         |
| 0111       | B              | 12          | 071         |
| 0111       | C              | 13          | 072         |
| 0111       | E              | 4           | 020         |
| 0111       | F              | 5           | 025         |
| 0111       | G              | 9           | 052         |
| 0111       | H              | 10          | 057         |

EXIT POINTS

| EXIT THIS MAP |             | TO         |             |
|---------------|-------------|------------|-------------|
| PAGE NUMBER   | STEP NUMBER | MAP NUMBER | ENTRY POINT |
| 13            | 073         | 0100       | A           |
| 13            | 075         | 0100       | A           |
| 4             | 022         | 0190       | A           |
| 5             | 024         | 0190       | A           |
| 2             | 003         | 190        | A           |
| 6             | 032         | 190        | A           |
| 7             | 038         | 190        | A           |
| 7             | 041         | 190        | A           |
| 8             | 046         | 190        | A           |
| 8             | 050         | 190        | A           |
| 9             | 056         | 190        | A           |
| 11            | 062         | 190        | A           |
| 4             | 016         | 190        | A           |
| 2             | 006         | 190        | A           |

001  
(ENTRY POINT A)  
  
(THE LOCAL POWER PICK CIRCUIT IS FAILING.)

MAP DESCRIPTION: MAP 0100 SENT YOU HERE WHEN THE TAPE CONTROL UNIT CANNOT POWER UP IN LOCAL MODE.

START CONDITIONS:  
-POWER ON LED IS OFF  
-LOCAL REMOTE SW SET TO LOCAL  
-POWER ON SW SET TO ON  
-UNIT EMERGENCY POWER SW SET TO ON.

FRUS DIAGNOSED:  
-TAPE CONTROL UNIT AC SUPPLY CU-PS-01  
-UNIT EMERGENCY POWER SW  
-LOCAL REMOTE SW  
-LOCAL POWER ENABLE SW  
-TAPE CONTROL UNIT LOWER THERMAL  
(Step 001 continues)

(Step 001 continues)

(Step 001 continued)

(Step 001 continued)  
-STI LOWER THERMAL  
-TAPE TRANSPORT UNIT THERMALS S2  
-CU-OSU PANEL  
-CU GATE FANS  
-STI GATE FANS.

ADDITIONAL SERVICE AIDS:  
-TAPE CONTROL UNIT AC POWER DISTRIBUTION DIAGRAM ON PWR 32.  
-TAPE CONTROL UNIT AC POWER ON-LOCAL MODE DIAGRAM ON PWR 36.

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CB1 TO THE OFF POSITION (LOC-1).

DISCONNECT THE CABLE CU-PS-01 P48 (LOC-1).

CONNECT THE MULTIMETER TO P48-1 AND P48-6.  
(THE P CONNECTOR IS ON THE CABLE).

PRESS AND HOLD THE LOCAL POWER ENABLE SWITCH WHILE MAKING THE FOLLOWING MEASUREMENT (LOC-1).

CHECK FOR CONTINUITY FROM P48-1 TO P48-6.

DOES THE METER INDICATE CONTINUITY?

Y N  
||  
||

3 2  
A B

STANDARD RELAY PROBES ARE USEFUL IN PROBING CONNECTORS.



B  
1 'POWER ON, LOCAL MODE

PAGE 2 OF 13

002

A JUMPER PLUG SHOULD BE  
INSTALLED IN THE THERMAL  
CIRCUIT OF THE LAST DRIVE.

THE +24V PICK CIRCUIT (K2 PICK) IS  
OPEN.

SEE DETAILED DIAGRAM ON PWR 36.

IS THE JUMPER INSTALLED IN  
CONNECTOR TU-DX/X-P2 J1 (LOC-1)?

Y N

003

INSTALL THE JUMPER.

SEE DETAILED DIAGRAM ON PWR 36.

RECONNECT THE CABLE

CU-PS-01 P4B.

GO TO MAP 190, ENTRY POINT A.

004

PROBLEM MAY BE IN THE HOLD CIRCUITS  
WHICH PASS THROUGH EACH TAPE  
TRANSPORT UNIT.

GO TO THE TAPE TRANSPORT UNIT  
IMMEDIATELY ADJACENT TO THE TAPE  
CONTROL UNIT. OPEN THE LOWER  
COVERS TO GAIN ACCESS TO THE  
THERMAL CONNECTOR P1.

DISCONNECT THERMAL CONNECTOR P1.

CONTINUITY CHECK THERMAL CONNECTOR  
P1-1 TO P1-2.

THIS CHECKS THE INTERLOCK THROUGH  
ALL TAPE TRANSPORT UNITS.

DOES THE METER INDICATE CONTINUITY?

Y N

3  
C D

D

005

OPEN SOMEWHERE IN THE STRING.

REFERENCE LOC 1 AND PWR 36.

IN EACH OF THE ATTACHED TAPE  
TRANSPORT UNIT S, MEASURE FOR  
CONTINUITY ACROSS THE TTU THERMAL  
CONNECTOR P1-1 TO P1-2.

DO YOU READ CONTINUITY ACROSS P1?

Y N

006

MOVE METER TO NEXT TAPE TRANSPORT  
UNIT AND REPEAT

THE CONTINUITY CHECK ACROSS P1.

(IF YOU ARE ON THE LAST TAPE  
TRANSPORT UNIT, THERE IS AN OPEN  
IN THE CABLE OR THE JUMPER PLUG.)  
-----

REPAIR OPEN IN THE CABLE.

GO TO MAP 190, ENTRY POINT A.

007

GO TO PAGE 4, STEP 020,  
ENTRY POINT E.

MAP 0110 — Power On (Local Mode)

C POWER ON, LOCAL MODE  
2

PAGE 3 OF 13

008

OPEN SOMEWHERE IN THE TAPE CONTROL UNIT.

REFERENCE LOC 1 AND PWR 36.

MEASURE FOR CONTINUITY BETWEEN CU-PS01 P4B-6 AND CU-PIJ1-2 (THERMAL CONNECTOR BETWEEN TCU AND TAPE TRANSPORT UNIT)

DOES THE METER INDICATE CONTINUITY?

Y N

009  
LEAVE METER CONNECTED  
GO TO PAGE 5, STEP 025,  
ENTRY POINT F.

010

MEASURE FOR CONTINUITY BETWEEN CU-PS01 P4B-2 AND CU-PIJ1-1 (THERMAL CONNECTOR BETWEEN TCU AND TAPE TRANSPORT UNIT)

REFERENCE LOC 1 AND PWR 36.

DOES THE METER INDICATE CONTINUITY?

Y N

011  
GO TO PAGE 9, STEP 052,  
ENTRY POINT G.

012

GO TO PAGE 10, STEP 057,  
ENTRY POINT H.

MAP 0110 — Power On (Local Mode) PWR 110-3

A  
1

013

CHECK FOR CONTINUITY FROM CU-PS-01 P4B-7 TO P4B-8 (LOC-1).

DOES THE METER INDICATE CONTINUITY?

Y N

014

THE TAPE CONTROL UNIT POWER ON SWITCH (FR142) IS FAILING (LOC-1).

---OR---

THERE IS AN OPEN WIRE FROM CU-PS-01 P4B-7 TO CU-L/R P2-9 (LOC-1).

---OR---

THERE IS AN OPEN WIRE FROM CU-L/R P2-9 TO CU-OP P5-6 (LOC-1).

---OR---

THERE IS AN OPEN WIRE FROM CU-OP P5-4 TO CU-PS-01 P4B-8 (LOC-1).

DISCONNECT CABLE FROM CU-OP J5

CONTINUITY CHECK FROM CU-OP J5-6 TO J5-4.

DOES THE METER INDICATE CONTINUITY?

Y N

4 4 4  
E F G

E F G POWER ON, LOCAL MODE  
3 3 3

PAGE 4 OF 13

015

EXCHANGE CU-OP PANEL FRU142.  
GO TO PAGE 13, STEP 072,  
ENTRY POINT C.

SEE CARR-TCU 1420.

016

REPAIR OPEN IN THE CABLE.  
GO TO MAP 190, ENTRY POINT A.

017

OBSERVE THE CORRECT POLARITY IN THE  
FOLLOWING MEASUREMENT.

CHECK FOR CONTINUITY FROM  
CU-PS-01 P4B-4 (-) TO P4B-8 (+).

DOES THE METER INDICATE CONTINUITY?

Y N

018

THE POWER ON LED IS FAILING.

----OR----

THERE IS AN OPEN WIRE FROM  
CU-PS-01 P4B-4 TO CU-OP P5-2.

019

THE TAPE CONTROL UNIT AC SUPPLY,  
CU-PS-01, IS FAILING (LOC-1).

THE 24V PICK CIRCUIT IS OK BUT THE  
POWER ON LED WILL NOT TURN ON.  
THIS MUST BE A FAILURE INTERNAL TO  
THE AC SUPPLY.

SEE DETAILED DIAGRAM ON PWR 36.

020  
(ENTRY POINT E)  
THE FAILURE IS IN THE TAPE  
TRANSPORT UNIT.

CONTINUITY CHECK ACROSS THE THERMAL  
SWITCH AT THE SWITCH.

DO YOU READ CONTINUITY ACROSS THE  
THERMAL SWITCH?

Y N

021

RESET THE OPEN THERMAL SWITCH.

DOES THE THERMAL SWITCH NOW  
INDICATE CONTINUITY?

Y N

022

THE THERMAL SWITCH S2 (FRU082)  
IS FAILING (LOC-1).

EXCHANGE THE THERMAL SWITCH .  
GO TO MAP 0190, ENTRY POINT A.

023

RECONNECT THE CABLE  
CU-PS-01 P4B.

THE THERMAL WAS TRIPPED.

SET CU-PS-01 CB1 TO THE ON  
POSITION (LOC-1).

PRESS AND HOLD THE LOCAL POWER  
ENABLE SWITCH FOR SEVERAL SECONDS  
(LOC-1).  
(Step 023 continues)

5  
H

MAP 0110 - Power On (Local Mode)

H POWER ON, LOCAL MODE  
4

PAGE 5 OF 13

(Step 023 continued)

THE TAPE CONTROL UNIT POWER ON  
LED SHOULD NOW BE ON.  
IF IT IS NOT ON, GO TO MAP 0100  
E.P.A.

CHECK FOR ANY OBSTRUCTION TO THE  
AIR FLOW.  
REFER TO THE CE/HSC SECTION OF  
THE MG AND RUN GMP.

024

REPAIR THE CABLE BETWEEN THERMAL  
CONNECTOR J1 AND P1.  
GO TO MAP 0190, ENTRY POINT A.

025  
(ENTRY POINT F)  
CHECK FOR POPPED THERMALS  
ON THE TCU GATE AND THE STI GATE.

RESET THE TAPE CONTROL UNIT GATE  
LOWER THERMAL (LOC-1).

THE THERMALS HAVE A RESET PLUNGER  
LOCATED IN THE CENTER OF THE  
SWITCH.

DOES THE METER INDICATE CONTINUITY?  
Y N

026  
RESET THE STI GATE LOWER THERMAL.

DOES THE METER INDICATE  
CONTINUITY?  
Y N

027  
CHECK CIRCUIT FROM PS THRU OSU  
BOARD.

DISCONNECT THE CABLE CU-OSU P6  
(LOC-1).

CHECK FOR CONTINUITY FROM  
CU-OSU J6-2 TO PS01 P48-6.

DOES THE METER INDICATE  
CONTINUITY?  
Y N

8 7 6 6  
J K L M

M POWER ON, LOCAL MODE  
5

PAGE 6 OF 13

028

ISOLATE TO CABLE OR BOARD.

DISCONNECT THE CABLE CU-OSU P4 (LOC-1).

CHECK FOR CONTINUITY FROM CU-OSU J6-2 TO J4-4 (LOC-1).

DOES THE METER INDICATE CONTINUITY?

Y N

029

THERE IS AN OPEN LAND PATTERN ON THE CU-OSU OR IN P5 JUMPER PLUG. IS THE P5 JUMPER PLUG ON THE OSU BOARD OPEN OR MISSING?

Y N

030

EXCHANGE FRU141. GO TO PAGE 13, STEP 072, ENTRY POINT C.

SEE CARR-TCU 1-1.

031

INSTALL OR REPAIR P5 JUMPER PLUG. GO TO PAGE 13, STEP 072, ENTRY POINT C.

N

L N  
5

032

THERE IS AN OPEN WIRE FROM CU-PS-01 P4B-6 TO CU-OSU P4-4 (LOC-1).

REPAIR OPEN IN CABLE. GO TO MAP 190, ENTRY POINT A.

033

DISCONNECT THE CABLE CU-OSU P3 (LOC-1).

CHECK FOR CONTINUITY FROM CU-OSU J6-1 TO J3-1 (LOC-1), AND CU-OSU J3-2 TO J4-5 (LOC-1).

DOES METER INDICATE CONTINUITY FOR BOTH CIRCUITS?

Y N

034

EXCHANGE FRU141. GO TO PAGE 13, STEP 072, ENTRY POINT C.

SEE CARR-TCU 1-1.

035

CHECK FOR CONTINUITY FROM CU-OSU P6-1 TO P6-2 (LOC-1).

DOES THE METER INDICATE CONTINUITY?

Y N

7 7  
P Q

MAP 0110 - Power On (Local Mode)

Q POWER ON, LOCAL MODE  
6

PAGE 7 OF 13

036

THERE IS AN OPEN WIRE FROM  
CU-OSU J6-1 TO STI GATE LOWER  
THERMAL.

SEE PWR 36

---OR---

THE STI GATE LOWER THERMAL IS  
FAILING.

CONTINUITY CHECK THE LOWER STI GATE  
THERMAL SWITCH.

DOES THE METER INDICATE CONTINUITY?

Y N

037

EXCHANGE THE STI GATE LOWER  
THERMAL SWITCH.  
GO TO PAGE 13, STEP 072,  
ENTRY POINT C.

038

REPAIR OPEN IN CABLE  
GO TO MAP 190, ENTRY POINT A.

K P  
5 6

039

THERE IS AN OPEN WIRE FROM  
CU-OSU P3-1 TO TAPE CONTROL UNIT  
GATE LOWER THERMAL (LOC-1)

SEE PWR 36.

---OR---

A TAPE CONTROL UNIT GATE THERMAL  
(FRU143) IS FAILING (LOC-1).

CONTINUITY CHECK THE LOWER GATE  
THERMAL SWITCH.

DOES THE METER INDICATE  
CONTINUITY?

Y N

040

EXCHANGE FRU143.  
GO TO PAGE 13, STEP 072,  
ENTRY POINT C.

SEE CARR-TCU 1.

041

REPAIR OPEN IN CABLE.  
GO TO MAP 190, ENTRY POINT A.

042

RESETTING THERMAL CLEARED PROBLEM  
RECONNECT ALL CABLES ON THE CU-OSU  
BOARD.  
GO TO PAGE 8, STEP 043,  
ENTRY POINT J.

J POWER ON, LOCAL MODE  
5

PAGE 8 OF 13

043  
(ENTRY POINT J)  
RECONNECT THE CABLE  
CU-PS-01 P48.

PRESS AND HOLD THE LOCAL POWER  
ENABLE SWITCH UNTIL POWER IS ON  
(LOC-1).

CHECK THE TAPE CONTROL UNIT GATE  
AND STI GATE FANS FOR PROPER  
OPERATION (LOC-1).

ARE THE CU GATE FANS OPERATING  
CORRECTLY?

Y N

044

ARE BOTH FANS FAILING?

Y N

045

THE TAPE CONTROL UNIT GATE FAN  
IS FAILING.

EXCHANGE FRU150  
GO TO PAGE 13, STEP 072,  
ENTRY POINT C.

SEE CARR-TCU 1-1.

R S

R S

046

SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO THE OFF POSITION  
(LOC-1).

ON THE AC SUPPLY, SET CIRCUIT  
BREAKER CU-PS-01 CB1 TO THE OFF  
POSITION (LOC-1).

THERE IS AN OPEN WIRE FROM  
CU1A P1-1 TO CU-PS-02 P3-1  
(YF005)(LOC-1).

---0R---

THERE IS AN OPEN WIRE FROM  
CU1A P1-3 TO CU-PS-02 P3-3  
(LOC-1).

REPAIR OPEN IN CABLE.  
GO TO MAP 190, ENTRY POINT A.

047

ARE THE STI GATE FANS OPERATING  
CORRECTLY?

Y N

048

ARE BOTH FANS FAILING?

Y N

T U V

T U V

049

STI GATE FAN IS FAILING.

EXCHANGE DEFECTIVE FAN.  
GO TO PAGE 13, STEP 072,  
ENTRY POINT C.

050

REPAIR OPEN IN CABLE.  
GO TO MAP 190, ENTRY POINT A.

051

CHECK FOR ANY OBSTRUCTION  
TO THE AIR FLOW.

REFER TO THE CE/HSC SECTION OF THE  
MG AND RUN GMP.

MAP 0110 - Power On (Local Mode)

POWER ON, LOCAL MODE

PAGE 9 OF 13

052  
(ENTRY POINT G)  
CHECK THE UNIT EMERGENCY POWER  
SWITCH FOR CONTINUITY (LOC-1).

DOES THE METER INDICATE CONTINUITY?  
Y N

053  
THE UNIT EMERGENCY POWER SWITCH  
(FRU198) IS FAILING.

SEE DETAILED DIAGRAM ON PWR 36.

EXCHANGE FRU198)  
GO TO PAGE 13, STEP 072,  
ENTRY POINT C.

SEE CARR-TCU 1-1.

054  
DISCONNECT THE CABLE  
CU-OSU P4 (LOC-1).

DISCONNECT THE CABLE  
CU-OSU P3 (LOC-1).

CHECK FOR CONTINUITY FROM  
CU-OSU J4-5 TO CU-OSU J3-2 (LOC-1).

DOES THE METER INDICATE CONTINUITY?  
Y N

W X

W X

055  
THERE IS AN OPEN LAND  
PATTERN ON THE CU-OSU  
BETWEEN J4-5 AND J3-2.

SEE DETAILED DIAGRAM ON PWR 36.

EXCHANGE FRU141.  
GO TO PAGE 13, STEP 072,  
ENTRY POINT C.

SEE CARR-TCU 1-1.

056  
THERE IS AN OPEN WIRE FROM  
THE UNIT EMERGENCY POWER SWITCH TAB  
2 TO CU-OSU P4-5 (LOC-1).

SEE DETAILED DIAGRAM ON PWR 36.

---OR---

THERE IS AN OPEN WIRE FROM  
CU-OSU P3-2 TO CU-P1 J1-1 (LOC-1).

REPAIR OPEN IN THE CABLE.  
GO TO MAP 190, ENTRY POINT A.



POWER ON, LOCAL MODE

PAGE 10 OF 13

057  
(ENTRY POINT H)  
PRESS AND HOLD THE LOCAL POWER  
ENABLE SWITCH WHILE MAKING THE  
FOLLOWING MEASUREMENT (LOC-1).

CHECK FOR CONTINUITY FROM  
CU-PS-01 P4B-1 TO THE UNIT  
EMERGENCY POWER SWITCH TAB 1  
(LOC-1).

DOES THE METER INDICATE CONTINUITY?

Y N

058

DISCONNECT THE CABLE  
CU-OSU P4 (LOC-1).

PRESS AND HOLD THE LOCAL POWER  
ENABLE SWITCH WHILE MAKING THE  
FOLLOWING MEASUREMENT (LOC-1).

CHECK FOR CONTINUITY FROM  
CU-OSU J4-1 TO J4-2 (LOC-1).

DOES THE METER INDICATE  
CONTINUITY?

Y N

059

THE LOCAL POWER ENABLE SWITCH  
IS FAILING (LOC-1).

SEE DETAILED DIAGRAM ON PWR 36.

EXCHANGE FRU141.  
GO TO PAGE 12, STEP 071,  
ENTRY POINT B.

SEE CARR-TCU 1-1.

1  
1  
Y Z

Z

060

RECONNECT THE CABLE  
CU-OSU P4 (LOC-1).

DISCONNECT THE CABLE  
CU-L/R P1 (LOC-1).

DISCONNECT THE CABLE  
CU-L/R P2 (LOC-1).

CHECK FOR CONTINUITY FROM  
CU-L/R J2-8 TO CU-L/R J1-2 (LOC-1).

DOES THE METER INDICATE CONTINUITY?

Y N

061

THE LOCAL REMOTE SWITCH (FRU084)  
IS FAILING (LOC-1).

SEE DETAILED DIAGRAM ON PWR 36.

EXCHANGE FRU084  
GO TO PAGE 12, STEP 071,  
ENTRY POINT B.

SEE CARR-TCU 1-1.

062

THERE IS AN OPEN WIRE FROM  
CU-PS-01 P4B-1 TO CU-OSU P4-1  
(LOC-1)

SEE DETAILED DIAGRAM ON PWR 36.

---OR---

THERE IS AN OPEN WIRE FROM  
CU-OSU P4-2 TO CU-L/R P2-8 (LOC-1).

---OR---

THERE IS AN OPEN WIRE FROM  
(Step 062 continues)

MAP 0110—Power On (Local Mode)

Y POWER ON, LOCAL MODE  
1  
0

PAGE 11 OF 13

(Step 062 continued)  
CU-L/R P1-2 TO THE  
UNIT EMERGENCY POWER SWITCH TAB 1  
(LOC-1).  
-----

REPAIR OPEN IN THE CABLE.  
GO TO MAP 190, ENTRY POINT A.

063

THE PROBLEM HAS DISAPPEARED.

REFER TO THE CE/HSC SECTION OF THE  
MG AND RUN GMP.

---OR---

IF AN INTERMITTENT PROBLEM IS  
SUSPECTED, SEE DETAILED DIAGRAM ON  
PWR 36.

MAP 0110—Power On (Local Mode) PWR 110-11

064  
(ENTRY POINT D)

(THE +24V HOLD CIRCUIT IS FAILING  
IN LOCAL MODE.)

ON THE AC SUPPLY, SET CIRCUIT  
BREAKER CU-PS-01 CB1 TO THE OFF  
POSITION (LOC-1).

DISCONNECT THE CABLE  
CU-PS-01 P4B (LOC-1).

CHECK FOR CONTINUITY FROM  
CU-PS-01 P4B-7 TO P4B-10.  
(THE P CONNECTOR IS ON THE CABLE).

DOES THE METER INDICATE CONTINUITY?

Y N

065

DISCONNECT THE CABLE  
CU-L/R P2 (LOC-1).

DISCONNECT THE CABLE  
CU-L/R P1 (LOC-1).

CHECK FOR CONTINUITY FROM  
CU-L/R J2-9 TO J1-6 (LOC-1).

DOES THE METER INDICATE  
CONTINUITY?

Y N

066

THE LOCAL REMOTE SWITCH IS  
FAILING (LOC-1).

THE K2 HOLD CIRCUIT IS OPEN.

SEE DETAILED DIAGRAM ON PWR 36.

1 1  
2 2  
A A  
A B

A A POWER ON, LOCAL MODE  
A B  
1 1  
1 1

PAGE 12 OF 13

067

THERE IS AN OPEN WIRE FROM  
CU-L/R P1-6 TO CU-PS-01 P4B-10  
(LOC-1).

THE K2 HOLD CIRCUIT IS OPEN.  
SEE DETAILED DIAGRAM ON PWR 36.

068

CHECK FOR CONTINUITY FROM  
CU-PS-01 P4B-2 TO UNIT EMERGENCY  
POWER SWITCH TAB 1 (LOC-1).

DOES THE METER INDICATE CONTINUITY?

Y N

069

THERE IS AN OPEN WIRE FROM  
CU-PS-01 P4B-2 TO UNIT EMERGENCY  
POWER SWITCH TAB 1 (LOC-1).

THE K2 HOLD CIRCUIT IS OPEN.  
SEE DETAILED DIAGRAM ON PWR 36.

070

THE TAPE CONTROL UNIT AC  
SUPPLY, CU-PS-01, IS FAILING (LOC-1).

THE +24V LOCAL HOLD CIRCUIT (K2  
HOLD) IS OK, BUT THE POWER ON LED  
WILL NOT STAY ON. THIS MUST BE A  
FAILURE INTERNAL TO THE AC SUPPLY.

SEE DETAILED DIAGRAM ON PWR 36.

071  
(ENTRY POINT B)  
SET THE DRIVE ONLINE/OFFLINE SWITCH  
TO ONLINE.

REFER TO THE CE/HSC SECTION OF THE  
MG AND RUN GMP.

MAP 0110—Power On (Local Mode)

MAP 0110—Power On (Local Mode) PWR 110-13

POWER ON, LOCAL MODE

PAGE 13 OF 13

072  
(ENTRY POINT C)  
PREPARE TO EXIT AFTER FRU EXCHANGE.  
OBSERVE THE TAPE CONTROL UNIT POWER  
ON LED. SEE LOC 1.  
IS THE TAPE CONTROL UNIT POWER ON  
LED ON?  
Y N

073  
TAPE CONTROL UNIT AC POWER NOT  
ON.  
GO TO MAP 0100, ENTRY POINT A.

074  
OBSERVE THE TAPE CONTROL UNIT DC  
POWER LED. SEE LOC 1.  
IS THE TAPE CONTROL UNIT POWER ON  
LED ON?  
Y N

075  
TAPE CONTROL UNIT DC POWER NOT  
ON.  
GO TO MAP 0100, ENTRY POINT A.

076  
REFER TO THE CE/HSC SECTION OF THE  
MG AND RUN GMP.

POWER ON, REMOTE MODE

PAGE 1 OF 3

ENTRY POINTS

| FROM       |             | ENTER THIS MAP |             |
|------------|-------------|----------------|-------------|
| MAP NUMBER | ENTRY POINT | PAGE NUMBER    | STEP NUMBER |
| 0100       | A           | 1              | 001         |
| 0100       | B           | 2              | 004         |
| 0100       | D           | 3              | 009         |

001  
(ENTRY POINT A)

(THE REMOTE POWER PICK CIRCUIT IS FAILING.)

MAP DESCRIPTION: MAP 0100 SENT YOU HERE WHEN THE TAPE CONTROL UNIT CANNOT POWER UP IN REMOTE MODE.

START CONDITIONS:  
 -POWER ON LED IS OFF  
 -LOCAL REMOTE SW SET TO REMOTE  
 -UNIT EMERGENCY POWER SW SET TO ON  
 -TAPE CONTROL UNIT POWERS ON OK IN LOCAL.

FRUS DIAGNOSED:  
 -TAPE CONTROL UNIT AC SUPPLY CU-PS-01  
 -UNIT EMERGENCY POWER SW  
 -LOCAL REMOTE SW.

ADDITIONAL SERVICE AIDS:  
 -TAPE CONTROL UNIT AC POWER DISTRIBUTION DIAGRAM ON PWR 32  
 -TAPE CONTROL UNIT AC POWER ON-REMOTE MODE DIAGRAM ON PWR 38.

(Step 001 continues)

(Step 001 continued)

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CBI TO THE OFF POSITION (LOC-1).

OPEN THE REAR DOOR OF THE TAPE CONTROL UNIT AND REMOVE THE SUB COVER.

DISCONNECT THE CABLE CU-PS01-P48.

SEE LOC 1

CHECK FOR CONTINUITY FROM P48-3 TO P48-2.

THE P CONNECTOR IS ON THE CABLE.

DOES THE METER INDICATE CONTINUITY?  
 Y N

002

THE LOCAL REMOTE SWITCH IS FAILING.

-----OR-----

THERE IS AN OPEN WIRE FROM CU-PS01-P48-3 TO P48-2.

003

THE TAPE CONTROL UNIT AC POWER SUPPLY (PS01) IS FAILING.

THE K2 PICK CIRCUIT WHICH IS UNIQUE TO THE REMOTE MODE IS OK. SINCE THE LOCAL PICK AND HOLD AND THE REMOTE HOLD CHECKED OUT OK, THE FAILURE MUST BE INTERNAL TO THE AC POWER SUPPLY.

SEE DETAILED DIAGRAM ON PWR38.

POWER ON, REMOTE MODE

PAGE 2 OF 3

004  
(ENTRY POINT B)  
THE REMOTE HOLD CIRCUIT FAILED  
USING A JUMPER.

ON THE AC POWER SUPPLY, SET CIRCUIT  
BREAKER CU-PS01-CB1 TO THE OFF  
POSITION.

OPEN THE REAR DOOR OF THE TAPE  
CONTROL UNIT AND REMOVE  
THE SUB COVER.

DISCONNECT CABLE CU-PS01-P4B.

CHECK FOR CONTINUITY FROM  
CU-PS01-P4B-1 TO CU-PS01-P4B-5.

THE P CONNECTOR IS ON THE CABLE.

DOES THE METER INDICATE CONTINUITY?

Y N

005

THE LOCAL REMOTE SWITCH IS  
FAILING.

THE K2 REMOTE HOLD CIRCUIT IS OPEN.

SEE DETAILED DIAGRAM ON PWR 38.

-----OR-----

THERE IS AN OPEN WIRE FROM  
CU-PS01-P4B-1 TO CU-L/R P1-1.

-----OR-----

THERE IS AN OPEN WIRE FROM  
CU-L/R P1-4 TO CU-PS01-P4B-5.

A

006

CHECK FOR CONTINUITY FROM  
CU-PS01-P4B-9 TO CU-PS01-P4B-10.

DOES THE METER INDICATE CONTINUITY?

Y N

007

THE LOCAL REMOTE SWITCH IS  
FAILING.

THE K2 REMOTE HOLD CIRCUIT IS OPEN.

SEE DETAILED DIAGRAM ON PWR 38.

-----OR-----

THERE IS AN OPEN WIRE FROM  
CU-PS01-P4B-9 TO CU-L/R P1-5.

008

THE TAPE CONTROL UNIT AC POWER  
SUPPLY (PS01) IS FAILING.

THE K2 PICK CIRCUIT WHICH IS UNIQUE  
TO THE REMOTE MODE IS OK. SINCE  
THE LOCAL PICK AND HOLD AND THE  
REMOTE HOLD CHECKED OUT OK, THE  
FAILURE MUST BE INTERNAL TO THE AC  
POWER SUPPLY.

SEE DETAILED DIAGRAM ON PWR38.

A

POWER ON, REMOTE MODE

PAGE 3 OF 3

009  
(ENTRY POINT D)  
THE REMOTE HOLD CIRCUIT FAILED WITH  
THE EPO CABLE INSTALLED.

OPEN THE REAR DOOR OF THE TAPE  
CONTROL UNIT AND REMOVE THE SUB  
COVER.

DISCONNECT CABLE CU-PS01-P5 (IF  
INSTALLED).

SEE LOC-1.

CAUTION

+24 V DC IS PRESENT.

INSTALL A JUMPER FROM CU-PS01-J5-1  
TO CU-PS01-J5-5.

JUMPERS 24 V DC TO THE REMOTE HOLD  
CIRCUIT.

SET THE TAPE CONTROL UNIT POWER ON  
SWITCH TO THE ON POSITION.

POWER ON AGAIN IN THE LOCAL MODE.

SET THE LOCAL-REMOTE SWITCH TO THE  
LOCAL POSITION.

PRESS THE LOCAL POWER ENABLE SWITCH  
UNTIL POWER IS ON.

NOW SET THE LOCAL-REMOTE SWITCH TO  
REMOTE.

NOW CHECK THE REMOTE HOLD CIRCUITS.

OBSERVE THE TAPE CONTROL UNIT POWER  
ON LED.

IS THE TAPE CONTROL UNIT POWER ON  
LED ON?

Y N

B C

B C

010  
THE EPO CABLE IS FAILING

THE REMOTE HOLD CIRCUITS CHECK OK  
WHEN +24 V DC IS JUMPED TO THE  
CIRCUIT.

-----OR-----

THERE IS A SYSTEM PROBLEM.

CONTACT THE SYSTEM FE.

011  
THE REMOTE HOLD CIRCUIT FAILS WITH  
+24 V DC JUMPED TO IT.  
GO TO PAGE 2, STEP 004,  
ENTRY POINT B.

MAP 0130—+24 Volt Control Voltage

+24 V DC CONTROL VOLTAGE

PAGE 1 OF 9

| ENTRY POINTS |                |             |             |
|--------------|----------------|-------------|-------------|
| FROM         | ENTER THIS MAP |             |             |
| MAP NUMBER   | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| 0100         | A              | 1           | 001         |
| 0100         | B              | 5           | 021         |
| 0100         | C              | 3           | 012         |
| 0100         | D              | 4           | 015         |
| 0100         | E              | 4           | 018         |
| 9999         | F              | 9           | 046         |

| EXIT POINTS   |             |            |             |
|---------------|-------------|------------|-------------|
| EXIT THIS MAP |             | TO         |             |
| PAGE NUMBER   | STEP NUMBER | MAP NUMBER | ENTRY POINT |
| 1             | 002         | 0190       | A           |
| 3             | 013         | 0190       | A           |
| 4             | 016         | 0190       | A           |
| 4             | 019         | 0190       | A           |
| 2             | 009         | 0190       | A           |
| 5             | 022         | 0190       | A           |
| 9             | 046         | 0190       | A           |

001  
(ENTRY POINT A)  
(THE +24 V DC CONTROL VOLTAGE IS MISSING).

MAP DESCRIPTION: MAP 0100 DIRECTED YOU HERE BECAUSE OF PROBLEMS IN THE +24 V DC CONTROL VOLTAGE CIRCUIT.

START CONDITIONS:  
-POWER ON LED IS OFF.

FRUS DIAGNOSED:  
-AC POWER SUPPLY, CU-PS-01  
-DC POWER SUPPLY, CU-PS-02  
-AC POWER SUPPLY VOLTAGE TAP PLUG  
-AC POWER SUPPLY FUSE F1  
-AC LINE CORD.

ADDITIONAL SERVICE AIDS:  
-TAPE CONTROL UNIT AC POWER DISTRIBUTION DIAGRAM ON PWR 32  
-+24 V CONTROL VOLTAGE DIAGRAM ON PWR 40.

DANGER  
LETHAL VOLTAGES ARE PRESENT IN THE POWER SERVICING AREA. SAFETY IS MOST IMPORTANT. TREAT ALL CIRCUITS AS LIVE UNTIL MEASURED.  
CAPACITORS ARE POSSIBLE EXPLODING DEVICES. WEAR SAFETY GLASSES WHEN WORKING IN THE POWER AREA.  
ALWAYS REINSTALL ALL SAFETY COVERS BEFORE POWERING ON THE MACHINE.  
(Step 001 continues)

(Step 001 continued)

IS THE LINE CORD CONNECTED TO CUSTOMER AC POWER?

Y N

002

DANGER

PERFORM FE POWER SAFETY CHECK FOUND ON INST 6 BEFORE CONNECTING LINE CORD.

CONNECT THE LINE CORD TO CUSTOMER AC POWER.  
GO TO MAP 0190, ENTRY POINT A.

003

A VOLTAGE TAP PLUG MUST BE USED TO SELECT THE PROPER OUTPUT BASED ON THE INPUT AC VOLTAGE.  
SEE CHART ON RIGHT.----->

| TCU INPUT AC | PLUG LOCATION ON CU-PS-01 (USE 60HZ FOR JAPAN) |             |
|--------------|--|-------------|
|              | 60HZ   | 50HZ        |
| 200/208 V AC | J9   | J11 AND J13 |
| 220 V AC     | J10  | J11 AND J14 |
| 230/240 V AC | J11  | J11 AND J15 |
| 380 V AC     |  | J12 AND J14 |
| 400/415 V AC |  | J12 AND J15 |

IS THE VOLTAGE TAP PLUG MISSING?

Y N

3 2  
A B



B +24 V DC CONTROL VOLTAGE  
1

PAGE 2 OF 9

004

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

REMOVE THE VOLTAGE TAP PLUG FROM THE TAPE CONTROL UNIT AC POWER SUPPLY.

CONTINUITY CHECK THE VOLTAGE TAP PLUG.

CONTINUITY GOOD TO ALL POINTS?

Y N

005

REPAIR THE OPEN IN THE VOLTAGE TAP PLUG.

WHEN THE PROBLEM IS CORRECTED GO TO PAGE 9, STEP 046, ENTRY POINT F.

006

DANGER

180 TO 450 V AC IS PRESENT.

REMOVE THE AC INPUT FILTER COVER FROM THE TAPE CONTROL UNIT AC POWER SUPPLY (LOC-1).

SEE CARR-TCU 1440.

METER THE AC VOLTAGE AT THE INPUT FILTERS OF THE TAPE CONTROL UNIT AC POWER SUPPLY.

(Step 006 continues)

SEE VOLTAGE TOLERANCE TABLES ON PWR20.

(Step 006 continued)

IS CORRECT AC VOLTAGE PRESENT AT ALL POINTS?

Y N

007

DANGER

METER AC VOLTAGE AT THE CUSTOMER OUTLET.

IS CORRECT AC VOLTAGE PRESENT AT ALL POINTS?

Y N

008

INFORM CUSTOMER THAT AC POWER IS NOT AVAILABLE

009

DANGER

THE AC LINE CORD IS FAILING.

PERFORM FE SAFETY CHECK FOUND ON INSP 15 BEFORE REMOVING THE AC LINE CORD.

EXCHANGE LINECORD (FRU149) GO TO MAP 0190, ENTRY POINT A.

SEE CARR-TCU 1490.

3  
C

MAP 0130—+24 Volt Control Voltage

A C +24 V DC CONTROL VOLTAGE  
1 2

PAGE 3 OF 9

010

THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE THE AC POWER SUPPLY FRU144.

SEE CARR-TCU 1440.

011

INSTALL THE VOLTAGE TAP PLUG AT PROPER LOCATION.  
SEE CHART ON RIGHT.----->

| TCU<br>INPUT AC | PLUG LOCATION<br>ON CU-PS-01<br>(USE 60HZ FOR JAPAN) |             |
|-----------------|--|-------------|
|                 | 60HZ   | 50HZ        |
| 200/208 V AC    | J9   | J11 AND J13 |
| 220 V AC        | J10  | J11 AND J14 |
| 230/240 V AC    | J11  | J11 AND J15 |
| 380 V AC        |  | J12 AND J14 |
| 400/415 V AC    |  | J12 AND J15 |

WHEN THE PROBLEM IS CORRECTED  
GO TO PAGE 9, STEP 046,  
ENTRY POINT F.

MAP 0130—+24 Volt Control Voltage PWR 130-3

012

(ENTRY POINT C)

RESET CU-PS-01 CB1 (LOC 1).

DID CB1 TRIP AGAIN?

Y N

013

GO TO MAP 0190, ENTRY POINT A.

014

THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE THE AC POWER SUPPLY FRU144.

GO TO PAGE 9, STEP 046,  
ENTRY POINT F.

SEE CARR-TCU 1440.

+24 V DC CONTROL VOLTAGE

PAGE 4 OF 9

015

(ENTRY POINT D)

(CB2 ON A 60HZ OR 50HZ JAPAN MACHINE IS TRIPPING).

RESET CU-PS-01 CB2.

DID CB2 TRIP AGAIN?

Y N

016

GO TO MAP 0190, ENTRY POINT A.

017

THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE THE AC POWER SUPPLY FRU144.  
GO TO PAGE 9, STEP 046,  
ENTRY POINT F.

SEE CARR-TCU 1440.

018

(ENTRY POINT E)

(CB3 ON A 50HZ MACHINE, EXCEPT JAPAN, IS TRIPPING).

RESET CU-PS-01 CB3.

DID CB3 TRIP AGAIN?

Y N

019

GO TO MAP 0190, ENTRY POINT A.

020

THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE THE AC POWER SUPPLY FRU144.  
GO TO PAGE 9, STEP 046,  
ENTRY POINT F.

SEE CARR-TCU 1440.

+24 V DC CONTROL VOLTAGE

PAGE 5 OF 9

021

(ENTRY POINT B)

CU-PS-01 FUSE F1 IS BLOWN.

REPLACE CU-PS-01 FUSE F1. SEE LOC 1.

OBSERVE THE F1 FAILURE LED (LOC 1).

IS THE F1 FAILURE LED ON?

Y N

022

GO TO MAP 0190, ENTRY POINT A.

023

SET THE LOCAL REMOTE SWITCH TO THE LOCAL POSITION (LOC 1). FUSE F1 BLOWS AFTER BEING REPLACED.

SET THE TAPE CONTROL UNIT POWER ON/OFF SWITCH TO THE ON POSITION (LOC 1).

DISCONNECT THE CABLE CU-PS-01 P4B (LOC-1).

CHECK FOR CONTINUITY FROM P4B-1 TO FRAME GROUND (LOC-1).

DOES THE METER INDICATE CONTINUITY?

Y N

9 D E

E

024

CONNECT THE METER TO P4B-2 AND FRAME GROUND.

CHECK FOR CONTINUITY FROM P4B-2 TO FRAME GROUND.

DOES THE METER INDICATE CONTINUITY?

Y N

025

CHECK FOR CONTINUITY FROM P4B-3 TO FRAME GROUND.

DOES THE METER INDICATE CONTINUITY?

Y N

026

CHECK FOR CONTINUITY FROM P4B-5 TO FRAME GROUND.

DOES THE METER INDICATE CONTINUITY?

Y N

027

CHECK FOR CONTINUITY FROM P4B-7 TO FRAME GROUND.

DOES THE METER INDICATE CONTINUITY?

Y N

7 7 7 7 6 F G H J K

K +24 V DC CONTROL VOLTAGE  
5

PAGE 6 OF 9

028

CHECK FOR CONTINUITY FROM  
P4B-9 TO FRAME GROUND.

DOES THE METER INDICATE CONTINUITY?

Y N

029

RECONNECT THE CABLE  
CU-PS-01 P4B.

DISCONNECT THE SYSTEM EPO CABLES  
(LOC-1).  
SEE CHART ON RIGHT.----->

J5 FOR CPU 1.  
J6 FOR CPU 2.  
J7 FOR CPU 3.  
J8 FOR CPU 4.

REPLACE CU-PS-01 FUSE F1.

IS THE F1 FAILURE LED ON?

Y N

030

PROBLEM IS IN THE SYSTEM EPO  
CIRCUITRY.

CALL THE SYSTEM FE TO ISOLATE  
THE PROBLEM.

WHEN THE PROBLEM IS CORRECTED  
GO TO PAGE 9, STEP 046,  
ENTRY POINT F.

7  
L M

M

031

DISCONNECT THE CABLE  
CU-PS-01 P3 (LOC-1).

EXCHANGE FUSE F1.

IS THE F1 FAILURE LED ON?

Y N

032

REMOVE CABLE CU-PS-02 P2 FROM THE  
DC POWER SUPPLY.

CHECK THE CABLE FOR PIN TO PIN  
SHORT CIRCUITS.

WERE ANY SHORT CIRCUITS FOUND IN  
THE CABLE?

Y N

033

THE DC POWER SUPPLY, CU-PS-02,  
IS FAILING.

SEE CARR-TCU 1450.

EXCHANGE THE DC POWER SUPPLY  
FRU145.  
GO TO PAGE 9, STEP 046,  
ENTRY POINT F.

034

REPAIR THE SHORT CIRCUIT IN THE  
CABLE.

WHEN THE PROBLEM IS CORRECTED  
GO TO PAGE 9, STEP 046,  
ENTRY POINT F.

7  
N

J L N +24 V DC CONTROL VOLTAGE  
5 6 6

F G H  
5 5 5

PAGE 7 OF 9

035

THE AC POWER SUPPLY, CU-PS-01,  
IS FAILING.

EXCHANGE THE AC POWER SUPPLY  
FRU144.  
GO TO PAGE 9, STEP 046,  
ENTRY POINT F.

SEE CARR-TCU 1440.

036

THERE IS A SHORT CIRCUIT TO  
GROUND ON THE +24V NET.

ISOLATE THE SHORT CIRCUIT ON THE  
+24V NET.

SEE DETAILED DIAGRAM ON PWR 38.

NET:  
-CU-PS-01 P4B-9 TO  
-CU-L/R P1-5.

037

THERE IS A SHORT CIRCUIT TO GROUND  
ON THE +24V NET.

ISOLATE THE SHORT CIRCUIT ON THE  
+24V NET.

SEE DETAILED DIAGRAM ON PWR 36.

NET:  
-CU-PS-01 P4B-7 TO  
-CU-L/R P2-9 TO  
-CU-OP P5-6.  
OR  
-CU-OP P5-4 TO  
-CU-PS-01 P4B-8.  
OR  
-CU-L/R P1-6 TO  
-CU-PS-01 P4B-10.

038

THERE IS A SHORT CIRCUIT TO  
GROUND ON THE +24V NET.

ISOLATE THE SHORT CIRCUIT ON  
THE +24V NET.

SEE DETAILED DIAGRAM ON PWR 38.

NET:  
-CU-PS-01 P4B-5 TO  
-CU-L/R P1-4.

039

THERE IS A SHORT CIRCUIT TO  
GROUND ON THE +24V NET.

ISOLATE THE SHORT CIRCUIT ON THE  
+24V NET.

SEE DETAILED DIAGRAM ON PWR 38.

NET:  
-CU-PS-01 P4B-3 TO  
-CU-L/R P1-3.

040

LEAVE THE METER CONNECTED TO P4B-2  
AND GROUND.

SET THE UNIT EMERGENCY POWER SWITCH  
TO OFF.

DOES THE METER INDICATE CONTINUITY?

Y N

8 8  
P Q

Q +24 V DC CONTROL VOLTAGE

7

PAGE 8 OF 9

041

LEAVE THE METER CONNECTED TO P4B-2 AND GROUND.

IN THE LAST ATTACHED TAPE TRANSPORT UNIT, REMOVE THE JUMPER PLUG FROM TU-DX/X-P2 P1 (LOC-1).

SET THE UNIT EMERGENCY POWER SWITCH TO ON.

DOES THE METER INDICATE CONTINUITY?

Y N

042

CONNECT THE METER TO P4B-6 AND FRAME GROUND WHILE ISOLATING THE SHORT CIRCUIT.

SEE DETAILED DIAGRAM ON PWR 36.

THE METER SHOULD BE INDICATING CONTINUITY.  
(P4B-6 IS THE OTHER END OF THE SHORTED NET).

ISOLATE THE SHORT CIRCUIT ON THE +24 V NET.

NET:

- CU-PS-01 P4B-6 TO
- CU-CSU P4-4.
- OR
- CU-CSU P3-1 TO
- CU GATE THERMAL LOWER TO
- CU-P1 P1-2 TO
- TU-D0/1 THERMAL SW S2 TO
- TU-D0/1-P2 P1-2 TO
- NEXT TAPE TRANSPORT UNIT, ETC.

CHECK PARTICULARLY FOR PINCHED  
(Step 042 continues)

R

P R

7

(Step 042 continued)  
THERMAL SW S2 CABLES BETWEEN THE TAPE TRANSPORT UNITS.

043

THERE IS A SHORT CIRCUIT TO GROUND ON THE +24 V NET.

SEE DETAILED DIAGRAM ON PWR 36.

ISOLATE THE SHORT CIRCUIT ON THE +24 V NET.

NET:

- UNIT EMERGENCY POWER SW TAB 2 TO
- CU-CSU P4-12.
- OR
- CU-CSU P3-2 TO
- CU-P1 P1-1 TO
- TU-D0/1-P2 P1-1 TO
- NEXT TAPE TRANSPORT UNIT, ETC.

CHECK PARTICULARLY FOR PINCHED THERMAL SW S2 CABLES BETWEEN THE TAPE TRANSPORT UNITS.

044

THERE IS A SHORT CIRCUIT TO GROUND ON THE +24 V NET.

SEE DETAILED DIAGRAM ON PWR 36.

ISOLATE THE SHORT CIRCUIT ON THE +24 V NET.

NET:

- CU-CSU P4-2 TO
- CU-L/R P2-8.
- OR
- CU-L/R P1-2 TO
- UNIT EMERGENCY POWER SW TAB 1 AND
- CU-PS-01 P4B-2.

MAP 0130—+24 Volt Control Voltage

D +24 V DC CONTROL VOLTAGE  
5

PAGE 9 OF 9

045

THERE IS A SHORT CIRCUIT TO GROUND  
ON THE +24 V NET.

ISOLATE THE SHORT CIRCUIT ON THE  
+24 V NET.

NET:  
-P4B-1 TO  
-CU-CSU P4-1.

SEE DETAILED DIAGRAM ON PWR 36.

MAP 0130—+24 Volt Control Voltage PWR 130-9

046  
(ENTRY POINT F)

CLEANUP AFTER REPAIR.

SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO THE OFF POSITION  
(LOC 1).

RECONNECT ANY CABLES REMOVED FOR  
TROUBLESHOOTING.

REMOVE ANY JUMPERS USED FOR  
TROUBLESHOOTING.  
GO TO MAP 0190, ENTRY POINT A.





MAP 0150 – Convenience Outlet

CONVENIENCE OUTLET

PAGE 1 OF 5

ENTRY POINTS

| -----                 |       |        |        |
|-----------------------|-------|--------|--------|
| FROM   ENTER THIS MAP |       |        |        |
| MAP                   | ENTRY | PAGE   | STEP   |
| NUMBER                | POINT | NUMBER | NUMBER |
| -----                 |       |        |        |
| 0000                  | A     | 1      | 001    |
| 0100                  | A     | 1      | 001    |
| 0151                  | B     | 5      | 044    |

EXIT POINTS

| -----         |        |        |       |
|---------------|--------|--------|-------|
| EXIT THIS MAP |        | TO     |       |
| PAGE          | STEP   | MAP    | ENTRY |
| NUMBER        | NUMBER | NUMBER | POINT |
| -----         |        |        |       |
| 4             | 030    | 0100   | A     |
| 1             | 005    | 0190   | A     |
| 2             | 011    | 0190   | A     |
| 2             | 017    | 0190   | A     |

001  
(ENTRY POINT A)

IMPORTANT! READ NOTE!

NOTE: 50-HZ MACHINES IN JAPAN USE THE SAME POWER SUPPLIES AS 60-HZ MACHINES. TAKE THE YES LEG BELOW.

MAP DESCRIPTION: THIS MAP IS USED TO ISOLATE FAILURES IN THE CONVENIENCE OUTLET CIRCUIT.

START CONDITIONS: THE TAPE CONTROL UNIT POWERS ON OK.

FRUS DIAGNOSED:  
- AC POWER SUPPLY, CU-PS-01  
- AC POWER SUPPLY VOLTAGE PLUG, P12.

ADDITIONAL SERVICE AIDS:  
- TAPE CONTROL UNIT AC POWER DISTRIBUTION DIAGRAM ON PWR 32.  
- +24 V CONTROL VOLTAGE DIAGRAM ON PWR 40.

IS THIS A 60-HZ TAPE CONTROL UNIT?

Y N

Y  
N

3  
A B

B

002  
OBSERVE CU-PS-01 CB2 (LOC 1).

50 HZ MACHINE (EXCEPT JAPAN)

IS CU-PS-01 CB2 TRIPPED?  
Y N

003  
MEASURE THE VOLTAGE AT THE CONVENIENCE OUTLET.

50 HZ MACHINE (EXCEPT JAPAN)

WAS APPROXIMATELY 220/240 VAC MEASURED AT THE OUTLET?

Y N

004  
THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

SEE CARR-TCU 1440.

EXCHANGE FRU144  
GO TO PAGE 5, STEP 044,  
ENTRY POINT B.

005  
THE CONVENIENCE OUTLET IS OK.  
GO TO MAP 0190, ENTRY POINT A.

006

IS ANYTHING PLUGGED INTO THE CONVENIENCE OUTLET?

Y N

007  
RESET CB2

DID CB2 RESET WITHOUT TRIPPING AGAIN?

Y N

Y  
N

2 2 2  
C D E

C D E CONVENIENCE OUTLET  
1 1 1

PAGE 2 OF 5

008  
THE TAPE CONTROL UNIT AC POWER  
SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144. SEE CARR-TCU 1440.  
GO TO PAGE 5, STEP 044,  
ENTRY POINT B.

009  
MEASURE THE VOLTAGE AT THE  
CONVENIENCE OUTLET.

WAS APPROXIMATELY 220/240 VAC  
MEASURED AT THE OUTLET? 50 HZ MACHINE (EXCEPT JAPAN)

Y N

010  
THE TAPE CONTROL UNIT AC POWER  
SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144. SEE CARR-TCU 1440.  
GO TO PAGE 5, STEP 044,  
ENTRY POINT B.

011  
RESETTING CB2 RESOLVED THE  
PROBLEM.  
GO TO MAP 0190, ENTRY POINT A.

012  
REMOVE ALL PLUGS CONNECTED TO THE  
OUTLETS.

RESET CB2.

DID CB2 RESET WITHOUT TRIPPING  
AGAIN?

Y N

F G

F G

013  
THE TAPE CONTROL UNIT AC POWER  
SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144. SEE CARR-TCU 1440.  
GO TO PAGE 5, STEP 044,  
ENTRY POINT B.

014  
MEASURE THE VOLTAGE AT THE  
CONVENIENCE OUTLET.

WAS APPROXIMATELY 220/240 VAC  
MEASURED AT THE OUTLET? 50-HZ MACHINE (EXCEPT JAPAN)

Y N

015  
THE TAPE CONTROL UNIT AC POWER  
SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144. SEE CARR-TCU 1440.  
GO TO PAGE 5, STEP 044,  
ENTRY POINT B.

016  
THE DEVICE(S) THAT WERE PLUGGED  
INTO THE OUTLET MAY HAVE BEEN THE  
CAUSE OF THE OVERLOAD CONDITION.

PLUG THE DEVICE(S) PREVIOUSLY  
CONNECTED BACK INTO THE OUTLET.

DID CB2 TRIP AGAIN?

Y N

017  
RESETTING CB2 RESOLVED THE  
PROBLEM  
GO TO MAP 0190, ENTRY POINT A.

3

H

A H CONVENIENCE OUTLET  
1 2

PAGE 3 OF 5

018  
THE OVERLOAD CONDITION IS BEING CAUSED BY ONE OF THE DEVICES THAT WAS PLUGGED INTO THE CONVENIENCE OUTLET.  
GO TO PAGE 5, STEP 044, ENTRY POINT B.

019  
60 HZ OR 50HZ JAPAN MACHINES OBSERVE CU-PS-01 CB3 (LOC 1).

IS CU-PS-01 CB3 TRIPPED?  
Y N

020  
A VOLTAGE TAP PLUG MUST BE USED TO SELECT THE PROPER CONVENIENCE OUTLET VOLTAGE.  
SEE CHART AT RIGHT.----->

|                           |         |
|---------------------------|---------|
| AC OUTPUT * PLUG LOCATION |         |
| 100 VAC                   | PS1-J12 |
| 120 VAC                   | PS1-J13 |

IS THE VOLTAGE TAP PLUG INSTALLED AND IN THE PROPER POSITION?  
Y N

021  
SET CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

INSTALL THE VOLTAGE TAP PLUG ON THE TAPE CONTROL UNIT AC POWER SUPPLY (PS1).  
SEE CHART AT RIGHT.----->

|                           |         |
|---------------------------|---------|
| AC OUTPUT * PLUG LOCATION |         |
| 100 VAC                   | PS1-J12 |
| 120 VAC                   | PS1-J13 |

SET CIRCUIT BREAKER CU-PS-01 CB1 TO THE ON POSITION (LOC 1)

MEASURE THE VOLTAGE AT THE CONVENIENCE OUTLET.  
(Step 021 continues)

(Step 021 continued)

DID THE OUTPUT OF THE CONVENIENCE OUTLET EQUAL THE DESIRED VOLTAGE? (APPROXIMATELY)  
Y N

022  
SET CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

REMOVE THE VOLTAGE TAP PLUG FROM THE TAPE CONTROL UNIT AC POWER SUPPLY (PS1).  
SEE CHART AT RIGHT.----->

|                           |         |
|---------------------------|---------|
| AC OUTPUT * PLUG LOCATION |         |
| 100 VAC                   | PS1-J12 |
| 120 VAC                   | PS1-J13 |

CONTINUITY CHECK THE VOLTAGE TAP PLUG.

CONTINUITY GOOD?  
Y N

023  
REPAIR THE OPEN ON THE PLUG.  
GO TO PAGE 5, STEP 044, ENTRY POINT B.

024  
THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

SEE CARR-TCU 1440.

EXCHANGE FRU144  
GO TO PAGE 5, STEP 044, ENTRY POINT B.

025  
PLUGGING THE VOLTAGE TAP PLUG FIXED THE PROBLEM.  
GO TO PAGE 5, STEP 044, ENTRY POINT B.

4 4  
J K

K CONVENIENCE OUTLET  
3

PAGE 4 OF 5

026

MEASURE THE VOLTAGE AT THE CONVENIENCE OUTLET.

DID THE OUTPUT OF THE CONVENIENCE OUTLET EQUAL THE DESIRED VOLTAGE? (APPROXIMATELY)

Y N

027

SET CU-PS-01 CBI TO THE OFF POSITION (LOC 1).

REMOVE THE VOLTAGE TAP PLUG FROM THE TAPE CONTROL UNIT AC POWER SUPPLY (PS1).  
SEE CHART AT RIGHT.---->

| AC OUTPUT * PLUG LOCATION |
|---------------------------|
| 100 VAC PS1-J12           |
| 120 VAC PS1-J13           |

CONTINUITY CHECK THE VOLTAGE TAP PLUG.

CONTINUITY GOOD?

Y N

028  
REPAIR THE OPEN ON THE PLUG. WHEN THE PROBLEM IS CORRECTED, GO TO THE CLEANUP MAP. GO TO PAGE 5, STEP 044, ENTRY POINT B.

029  
THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144  
GO TO PAGE 5, STEP 044, ENTRY POINT B.

SEE CARR-TCU 1440.

L

J L  
3

030  
THE CONVENIENCE OUTLET IS OK. GO TO MAP 0100, ENTRY POINT A.

031

IS ANYTHING PLUGGED INTO THE CONVENIENCE OUTLET?

Y N

032  
RESET CB3

DID CB3 RESET WITHOUT TRIPPING AGAIN?

Y N

033  
THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144  
GO TO PAGE 5, STEP 044, ENTRY POINT B.

SEE CARR-TCU 1440.

034

MEASURE THE VOLTAGE AT THE CONVENIENCE OUTLET.

WAS APPROXIMATELY 120 VAC MEASURED AT THE OUTLET?

Y N

035  
THE TAPE CONTROL UNIT AC POWER SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144  
GO TO PAGE 5, STEP 044, ENTRY POINT B.

SEE CARR-TCU 1440.

5 5  
M N

MAP 0150 - Convenience Outlet

M N CONVENIENCE OUTLET  
4 4

PAGE 5 OF 5

036  
RESETTING CB3 RESOLVED THE  
PROBLEM  
GO TO STEP 044,  
ENTRY POINT B.

037  
REMOVE ALL PLUGS CONNECTED TO THE  
OUTLETS.

RESET CB3.

DID CB3 RESET WITHOUT TRIPPING  
AGAIN?

Y N

038  
THE TAPE CONTROL UNIT AC POWER  
SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144  
GO TO STEP 044,  
ENTRY POINT B.

SEE CARR-TCU 1440.

039  
MEASURE THE VOLTAGE AT THE  
CONVENIENCE OUTLET.

WAS APPROXIMATELY 120 VAC MEASURED  
AT THE OUTLET?

Y N

040  
THE TAPE CONTROL UNIT AC POWER  
SUPPLY, CU-PS-01, IS FAILING.

EXCHANGE FRU144  
GO TO STEP 044,  
ENTRY POINT B.

SEE CARR-TCU 1440.

P

P

041  
THE DEVICE(S) THAT WERE PLUGGED  
INTO THE OUTLET MAY HAVE BEEN THE  
CAUSE OF THE OVERLOAD CONDITION.

PLUG THE DEVICE(S) PREVIOUSLY  
CONNECTED BACK INTO THE OUTLET.

DID CB3 TRIP AGAIN?

Y N

042  
RESETTING CB3 RESOLVED THE  
PROBLEM  
GO TO STEP 044,  
ENTRY POINT B.

043  
THE OVERLOAD CONDITION IS BEING  
CAUSED BY ONE OF THE DEVICES THAT  
WAS PLUGGED INTO THE CONVENIENCE  
OUTLET.  
GO TO STEP 044,  
ENTRY POINT B.

044  
(ENTRY POINT B)  
CONVENIENCE OUTLET PROBLEM  
RESOLVED.

REPLACE ALL COVERS REMOVED

PERFORM END OF CALL DUTIES.

POWER RESTART

PAGE 1 OF 1

ENTRY POINTS

| FROM   ENTER THIS MAP |             |             |             |
|-----------------------|-------------|-------------|-------------|
| MAP NUMBER            | ENTRY POINT | PAGE NUMBER | STEP NUMBER |
| 0100                  | A           | 1           | 001         |
| 0120                  | A           | 1           | 001         |
| 0400                  | A           | 1           | 001         |

EXIT POINTS

| EXIT THIS MAP |             | TO         |             |
|---------------|-------------|------------|-------------|
| PAGE NUMBER   | STEP NUMBER | MAP NUMBER | ENTRY POINT |
| 1             | 006         | 0100       | A           |
| 1             | 007         | 0100       | A           |
| 1             | 004         | 0400       | A           |

001  
(ENTRY POINT A)  
SET THE LOCAL-REMOTE SWITCH TO THE LOCAL POSITION.

SEE LOC-1

SET THE TAPE CONTROL UNIT POWER ON/OFF SWITCH TO THE ON POSITION.

PRESS AND HOLD THE LOCAL POWER ENABLE SWITCH.

IS THE TAPE CONTROL UNIT POWER ON LED OFF?

Y N

002

RELEASE THE LOCAL POWER ENABLE SWITCH.

OBSERVE THE TAPE CONTROL UNIT POWER ON LED.  
IS THE TAPE CONTROL UNIT POWER ON LED OFF?

Y N

A B C

003

OBSERVE THE TAPE CONTROL UNIT DC POWER ON LED.  
IS THE TAPE CONTROL UNIT DC POWER ON LED ON?

Y N

004

CHECK TAPE CONTROL UNIT DC POWER.  
GO TO MAP 0400, ENTRY POINT A.

005

THE TAPE CONTROL UNIT POWER SEEMS TO BE GOOD.  
GO TO THE CE/HSC SECTION OF THE MG AND RUN GMP

006

LOCAL HOLD PROBLEM.  
GO TO MAP 0100, ENTRY POINT A.

007

LOCAL PICK PROBLEM.  
GO TO MAP 0100, ENTRY POINT A.

A B C

MAP 0200—Drive DC Power (Single Drive)

SINGLE DRIVE POWER ANALYSIS

PAGE 1 OF 5

ENTRY POINTS

| FROM       | ENTER THIS MAP |             |             |
|------------|----------------|-------------|-------------|
| MAP NUMBER | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| 0100       | A              | 1           | 001         |
| 0201       | B              | 2           | 016         |
| 0202       | C              | 4           | 032         |
| 0203       | D              | 5           | 033         |

001  
(ENTRY POINT A)  
THE PROBLEM HAS BEEN ISOLATED TO A SINGLE DRIVE FAILURE. EITHER THE DRIVE WILL NOT POWER DOWN WITH THE DRIVE POWER SWITCH SET TO OFF, OR ONE OR MORE VOLTAGES ARE MISSING AS VERIFIED BY METERING AT THE POWER SUPPLY TEST TOOL JACK.

ASSISTANCE MAY BE REQUIRED TO PERFORM SOME OF THE PROCEDURES FOUND IN THIS MAP.

DANGER  
LETHAL VOLTAGES ARE PRESENT IN THE POWER SERVICE AREA. SAFETY IS MOST IMPORTANT. TREAT ALL CIRCUITS AS LIVE UNTIL MEASURED.  
BECAUSE THIS FAILURE HAS BEEN IDENTIFIED AS A SINGLE DRIVE PROBLEM (THE OTHER DRIVE IN THE TAPE TRANSPORT UNIT IS OPERATIONAL), NO ANALYSIS OF AC INPUT VOLTAGES WILL BE MADE.

ANALYSIS PROCEDURE

ON THE FAILING DRIVE, SET THE ONLINE/OFFLINE SWITCH TO OFFLINE.  
(Step 001 continues)

SEE LOC 1.

(Step 001 continued)

ARE YOU HERE BECAUSE THE DRIVE WILL NOT POWER DOWN WHEN THE DRIVE POWER OFF SWITCH IS SET TO OFF?

Y N

002

IF YOU HAVE NOT ALREADY DONE SO, PLUG THE DC POWER TEST TOOL INTO THE FAILING DRIVE TEST JACK (J8 IF PROBLEM IS ON DRIVE 0, OR J9 IF PROBLEM IS ON DRIVE 1).

SEE PWR 12 FOR INFORMATION ABOUT THE DC POWER TEST TOOL.

IGNORE THE STATUS OF LED 2 WHEN ANSWERING QUESTIONS ABOUT LEDS THROUGHOUT THIS MAP.

ARE ANY LEDS ON?

Y N

003

SET THE DRIVE POWER SWITCH ON THE FAILING DRIVE TO OFF.  
CONTINUITY CHECK FUSE 11 (DRIVE 0) OR FUSE 12 (DRIVE 1).

NO LEDS ON. +5 V CONTROL VOLTAGE MISSING.

SEE CARR-DR 1-1.

DOES THE FUSE CHECK O.K.?

Y N

004

EXCHANGE THE FUSE; SET THE DRIVE POWER SWITCH TO ON.

NOTE: IF FUSE CONTINUES TO BLOW, GO TO PWR 30.

GO TO PAGE 4, STEP 032, ENTRY POINT C.

5 2 2  
A B C



B C PWR 200  
1 1

PAGE 2 OF 5

005  
EXCHANGE THE DC POWER SUPPLY (FRU095).  
GO TO PAGE 4, STEP 032, ENTRY POINT C. SEE CARR-DR 1-1.

006  
DISREGARD STATUS OF LED 2. ARE ALL LEDS ON?

Y N

007  
IS LED 8 THE ONLY LED ON? CHECKING FOR +5 VOLTS.

Y N

008  
IS LED 5 ON? CHECKING FOR +8.5 VOLTS.

Y N

009  
GO TO STEP 016, ENTRY POINT B.

010  
IS LED 7 ON? CHECKING FOR +5 VOLTS.

Y N

011  
GO TO STEP 016, ENTRY POINT B.

012  
REQUEST YOUR NEXT LEVEL OF SUPPORT.

5  
D E

E

013  
PRESS AND HOLD THE BLUE RESET BUTTON AND OBSERVE THE DC TEST TOOL. RELEASE THE BLUE RESET BUTTON. SEE LOC 1.

WAS LED 8 THE ONLY LED THAT WAS ON?

Y N

014  
DID YOU OBSERVE ANY LEDS OFF OTHER THAN LED 2?

Y N

015  
EXCHANGE THE POWER AMP BOARD (FRU059).  
GO TO PAGE 4, STEP 032, ENTRY POINT C. VOLTAGE DETECTOR CIRCUIT FAILURE.

016  
(ENTRY POINT B)  
REFER TO TABLE ONE AND CHECK OR EXCHANGE THE FUSE, OR RESET THE CB IN THE FAILING CIRCUIT. PRESS THE BLUE RESET BUTTON.

(THE LEDS ON THE DC TEST TOOL ARE NUMBERED LEFT TO RIGHT.)

| TABLE 1 |       |              |    |
|---------|-------|--------------|----|
| LED     | VOLTS | FUSE         | CB |
| 1       | +24   | 1,2          |    |
| 3       | +15   | 3,4          |    |
| 4       | -15   | 5,6          |    |
| 5       | +8.5  | 7,8          |    |
| 6       | -5    | 9,10         |    |
| 7       | +5    | 13,14 OR 1,2 |    |
| 8       | +5    | 11,12        |    |

NOTES:  
1) IGNORE LED 2.  
2) F13 AND F14 USED ON POWER SUPPLY PART NUMBERS 6177166 OR 6177167.

ARE ALL LEDS ON?

Y N

3 3 3  
F G H

MAP 0200—Drive DC Power (Single Drive)

G H PWR 200  
2 2

PAGE 3 OF 5

017  
IS THE FUSE BLOWN OR CB TRIPPED  
AGAIN?  
Y N

018  
GO TO PAGE 5, STEP 033,  
ENTRY POINT D.

019  
GO TO PWR 30.

020  
ATTEMPT SEVERAL LOAD/UNLOAD  
CARTRIDGE OPERATIONS.  
DID A FUSE BLOW DURING THE  
LOAD/UNLOAD OPERATION?  
Y N

021  
NOTE: FOR INTERMITTENT PROBLEMS,  
REFER TO PWR 30 FRU LIST FOR  
POSSIBLE CAUSES.  
GO TO PAGE 4, STEP 032,  
ENTRY POINT C.

022  
EXCHANGE THE POWER AMP BOARD  
(FRU059).  
GO TO PAGE 4, STEP 032,  
ENTRY POINT C.

SEE CARR-DR 1-1.

MAP 0200—Drive DC Power (Single Drive) PWR 200-3

F  
2

023  
IF DRIVE 0 IS THE FAILING DRIVE,  
DISCONNECT J5 AND J6 FROM THE POWER  
SUPPLY. JUMPER J5-11 TO J5-7. IF  
DRIVE 1 IS THE FAILING DRIVE,  
DISCONNECT J1 AND J2. JUMPER J1-11  
to J1-7.

SEE LOC 1.  
FORCE POWER ON USING A JUMPER.

IS LED 8 THE ONLY LED ON?  
Y N

024  
PROBLEM MAY BE IN THE  
"-PICK" LINE.

FORCING POWER ON WITH JUMPER WAS  
SUCCESSFUL.

REMOVE THE JUMPER FROM PS J1 OR  
J5.

CONTINUITY CHECK THE  
"-PICK" LINE.  
DR0 PS01-J5-11 TO TUD0 PAJ8-7.  
DR1 PS01-J1-11 TO TUD1 PAJ8-7.

SEE LOC 1.

CONTINUITY OKAY?  
Y N

025

REPAIR OPEN IN "-PICK" LINE.

USE THE FOLLOWING REFERENCE  
DRAWINGS:  
YF100, ZZ20 OR ZZ220, AND PA 000/001

RECONNECT ALL CABLES  
DISCONNECTED  
WHILE TROUBLESHOOTING.  
GO TO PAGE 4, STEP 032,  
ENTRY POINT C.

5 4  
J K

K PWR 200  
3

PAGE 4 OF 5

026  
EXCHANGE THE POWER AMPLIFIER BOARD (FRU059). SET THE DRIVE POWER SWITCH TO ON. SEE CARR-DR 1-1.

ARE ALL LEADS ON?  
Y N

027  
PREPARE TO REMOVE THE OPERATIONAL DRIVE FROM SERVICE.

HAVE THE CUSTOMER VARY THE DRIVE OFFLINE. SET THE DRIVE ONLINE/OFFLINE SWITCH TO OFFLINE. SET THE TAPE TRANSPORT UNIT AC POWER CB TO OFF. SEE LOC 1.

USING AN OHMMETER, VERIFY THE PROPER OPERATION OF THE DRIVE POWER SWITCH (FRU104).

DOES THE DRIVE POWER SWITCH (FRU104) FUNCTION PROPERLY?  
Y N

028  
EXCHANGE THE DRIVE POWER SWITCH (FRU104). SEE CARR-DR 1-1.  
GO TO STEP 032,  
ENTRY POINT C.

L M

029  
CONTINUITY CHECK THE FOLLOWING CABLES:  
ADDRESS SWITCH CABLE TO J4 (FRU106)  
DC POWER DISTRIBUTION CABLE (FRU080)  
DC DISTRIBUTION (FRU079)  
TACHOMETER SENSOR (FRU081)  
POWER AMPLIFIER J2 (FRU049).

REPAIR ANY OPENS FOUND IN THE CABLES.

WERE ANY OPENS FOUND IN THE CABLES?  
Y N

030  
REQUEST YOUR NEXT LEVEL OF SUPPORT.

031  
GO TO STEP 032,  
ENTRY POINT C.

032  
(ENTRY POINT C)  
SET THE DRIVE ONLINE/OFFLINE SWITCH TO ONLINE.  
REFER TO THE CE/HSC SECTION OF THE MG AND RUN GMP.

L M

MAP 0200—Drive DC Power (Single Drive)

MAP 0200—Drive DC Power (Single Drive) PWR 200-5

D J PWR 200  
2 3

PAGE 5 OF 5

033  
(ENTRY POINT D)  
PREPARE TO REMOVE THE OPERATIONAL  
DRIVE FROM SERVICE.

SEE LOC 1.

HAVE THE CUSTOMER VARY THE DRIVE  
OFFLINE. SET THE DRIVE  
ONLINE/OFFLINE SWITCH TO OFFLINE.  
SET THE TAPE TRANSPORT UNIT AC  
POWER CB TO OFF.

EXCHANGE THE DC POWER SUPPLY  
FRU095).

SEE CARR-DR 1-1.

ARE ALL LEDS ON?  
Y N

034  
REQUEST YOUR NEXT LEVEL OF  
SUPPORT.

035

GO TO PAGE 4, STEP 032,  
ENTRY POINT C.

036  
NOTE: IF YOU HAVE MADE NO REPAIRS  
PERFORM THE POWER SUPPLY RIPPLE  
CHECK FOUND ON PWR 20.  
-----

SET THE DRIVE ONLINE/OFFLINE SWITCH  
TO ONLINE.  
REFER TO THE CE/HSC SECTION OF THE  
MG AND RUN GMP.  
-----

NOTE: FOR INTERMITTENT PROBLEMS,  
REFER TO PWR 30 FRU LIST FOR  
POSSIBLE CAUSES.

A  
1

037  
EXCHANGE THE FOLLOWING FRU'S:  
POWER AMPLIFIER BOARD (FRU059)  
DRIVE POWER SWITCH (FRU104)  
DC POWER DISTRIBUTION CABLE (FRU079)  
DC POWER DISTRIBUTION CABLE (FRU080).

SEE CARR-DR 1-1.

DOES THE DRIVE POWER OFF NOW?  
Y N

038  
REQUEST YOUR NEXT LEVEL OF  
SUPPORT.

039

GO TO PAGE 4, STEP 032,  
ENTRY POINT C.



MAP 0210 – Drive DC Power (Same Symptom Both Drives)

F G PWR 210  
1 1

PAGE 2 OF 4

007

GO TO STEP 010,  
ENTRY POINT D.

008

IS THE PUMP MOTOR OR BLOWER MOTOR  
RUNNING IN THE PRECEEDING TAPE  
TRANSPORT UNIT?

Y N

009

POWER MAY BE MISSING IN  
PRECEEDING TAPE TRANSPORT UNIT.  
RESTART THIS MAP IN PRECEEDING  
UNIT.

010

(ENTRY POINT D)  
VERIFY THAT ALL DRIVES THAT ARE  
ATTACHED, AND RECEIVE POWER FROM  
THIS TAPE CONTROL UNIT ARE  
DISMOUNTED.

SET THE TAPE CONTROL UNIT SUPPLYING  
AC POWER TO THIS STRING OF DRIVES  
TO OFFLINE TEST.

SET THE TAPE CONTROL UNIT POWER  
SWITCH TO OFF.

REMOVE CABLE FROM AC CONNECTOR J1.

SET THE TAPE CONTROL UNIT POWER  
SWITCH TO ON.

SEE LOC 1.

MEASURE THE VOLTAGES AT TAPE  
TRANSPORT UNIT AC CONNECTOR J1.  
THEY SHOULD MEASURE BETWEEN 180 AND  
259 VOLTS AC.  
(Step 010 continues)

MAP 0210 – Drive DC Power (Same Symptom Both Drives) PWR 210-2

(Step 010 continued)

| 50 HZ EXCEPT<br>JAPAN | 60 HZ OR 50HZ<br>JAPAN |
|-----------------------|------------------------|
| J1-1 TO J1-6          | J1-1 TO J1-2           |
| J1-2 TO J1-7          | J1-1 TO J1-3           |
| J1-3 TO J1-5          | J1-2 TO J1-3           |

DO ALL VOLTAGES MEASURE OK?

Y N

011

SET THE TAPE CONTROL UNIT  
SUPPLYING AC POWER TO THIS STRING  
OF DRIVES TO OFFLINE/TEST.  
SET THE TAPE CONTROL UNIT POWER  
SWITCH TO OFF.  
CONTINUITY CHECK THE INPUT AC  
CABLE . EXCHANGE FRU075 IF OPEN.

REFER TO YF060 FOR 60 HZ  
AND 50 HZ JAPAN MACHINES.  
REFER TO YF050 FOR ALL  
OTHER 50 HZ MACHINES.  
SEE CARR-DR 1-1

IF NO PROBLEM IS FOUND WITH THE  
CABLE THE PROBLEM IS MOST LIKELY  
LOCATED IN A PRIOR TAPE TRANSPORT  
UNIT IN THE STRING OR IN THE TAPE  
CONTROL UNIT.

AFTER LOCATING AND CORRECTING THE  
PROBLEM IN THE AC DISTRIBUTION  
NET, SET THE TAPE CONTROL UNIT  
POWER ON SWITCH TO ON.  
GO TO PAGE 4, STEP 026,  
ENTRY POINT C.

3  
H

D E H PWR 210  
1 1 2

PAGE 3 OF 4

012  
PROBLEM IS WITH CB1 OR THE  
CABLE FROM  
CB1 TO PS P11.  
SET THE TAPE CONTROL UNIT POWER  
SWITCH TO OFF.  
EXCHANGE FRU218.  
GO TO PAGE 4, STEP 026,  
ENTRY POINT C.

013  
EXCHANGE THE DC POWER SUPPLY  
(FRU095).  
GO TO PAGE 4, STEP 026,  
ENTRY POINT C.

014  
PROBLEM MAY BE DUE TO OPEN OR  
MISSING.  
JUMPER PLUG ON J12,J13 OR J14.  
IS A JUMPER PLUG INSTALLED ON  
J12,J13 OR J14?  
Y N

015  
INSTALL JUMPER AT PROPER  
LOCATION.  
INSTALL FRU095, REFER TO  
CARR-DR 1.  
GO TO PAGE 4, STEP 026,  
ENTRY POINT C.

016  
CONTINUITY CHECK THE JUMPER.  
CONTINUITY OF THE JUMPER OK?  
Y N

017  
REPAIR JUMPER  
GO TO PAGE 4, STEP 026,  
ENTRY POINT C.

J

C J  
1

018  
EXCHANGE THE DC POWER SUPPLY  
(FRU095).  
GO TO PAGE 4, STEP 026,  
ENTRY POINT C.

019  
RESET THE CB.

DOES THE CB TRIP AGAIN?  
Y N

020  
RESETTING THE AC CB HAS CLEARED  
THE ORIGINAL PROBLEM.

FOR INTERMITTENT AC CB TRIPPING  
SUSPECT:

AC CB (FRU218)  
POWER SUPPLY (FRU095)  
BLOWER ASSEMBLY (FRU020)  
PUMP MOTOR (FRU030)  
GO TO PAGE 4, STEP 026,  
ENTRY POINT C.

021  
THE AC POWER CB TRIPS AFTER BEING  
RESET.

DISCONNECT P15 FROM THE DC POWER  
SUPPLY. SEE LOC 1.

RESET THE AC POWER CB.

DOES THE AC POWER CB STILL TRIP?  
Y N

4 4  
K L

MAP 0210 – Drive DC Power (Same Symptom Both Drives)

K L PWR 210  
3 3

PAGE 4 OF 4

022  
REPLACE BLOWER ASSEMBLY (FRU020).  
GO TO STEP 026,  
ENTRY POINT C.

023

RECONNECT P15 TO THE DC POWER  
SUPPLY.

DISCONNECT P4 FROM THE DC POWER  
SUPPLY.

RESET THE AC POWER CB.

DOES THE AC POWER CB STILL TRIP?  
Y N

024  
EXCHANGE THE PUMP MOTOR (FRU030).  
GO TO STEP 026,  
ENTRY POINT C.

SEE CARR-DR 1-1.

025  
EXCHANGE THE DC POWER SUPPLY  
(FRU095).  
GO TO STEP 026,  
ENTRY POINT C.

MAP 0210 – Drive DC Power (Same Symptom Both Drives) PWR 210-4

026  
(ENTRY POINT C)  
IF NOT ALREADY ON, SET THE AC POWER  
CB TO ON.

SET THE THE DRIVE POWER ON SWITCHES  
TO ON.

IF NECESSARY, PLUG THE DC POWER  
TEST TOOL INTO THE TEST JACK (J8 ON  
DRIVE 0 OR J9 ON DRIVE 1).  
OBSERVE THE LEDS ON THE DC TEST  
TOOL.  
IGNORE LED 2 WHEN RESPONDING TO  
QUESTIONS.  
ARE ALL THE LEDS ON?  
Y N

027  
REQUEST YOUR NEXT LEVEL OF  
SUPPORT.

028  
SET THE DRIVE ONLINE/OFFLINE SWITCH  
TO ONLINE.

REFER TO THE CE/HSC SECTION OF  
THE MG AND RUN GMP.



T  
4  
PWR 210  
PAGE 5 OF 7

034  
INPUT AC POWER MAY BE MISSING.  
IS THE PRECEDING UNIT ANOTHER TAPE TRANSPORT UNIT?  
Y N

035  
Go to Step 038, Entry Point D.

036  
IS THE PUMP MOTOR OR BLOWER MOTOR  
RUNNING IN THE PRECEDING TAPE TRANSPORT UNIT?  
Y N

037  
POWER MAY BE MISSING IN PRECEDING TAPE  
TRANSPORT UNIT.  
RESTART THIS MAP IN PRECEDING UNIT.

038  
(Entry Point D)  
VERIFY THAT ALL DRIVES THAT ARE ATTACHED,  
AND RECEIVE POWER FROM THIS TAPE CONTROL  
UNIT ARE DISMOUNTED.

SET THE TAPE CONTROL UNIT SUPPLYING AC POWER TO  
THIS STRING OF DRIVES TO OFFLINE/TEST.

SET THE TAPE CONTROL UNIT POWER SWITCH TO OFF.

REMOVE CABLE FROM AC CONNECTOR J1.

SET THE TAPE CONTROL UNIT POWER SWITCH TO ON.  
(Step 038 continues)

(Step 038 continues)

MEASURE THE VOLTAGES AT TAPE TRANSPORT UNIT AC  
CONNECTOR J1. THEY SHOULD MEASURE BETWEEN  
180 AND 259 VOLTS AC.

| 50 HZ EXCEPT<br>JAPAN | 60 HZ OR 50 HZ<br>JAPAN |
|-----------------------|-------------------------|
| J1-1 TO J1-6          | J1-1 TO J1-2            |
| J1-2 TO J1-7          | J1-1 TO J1-3            |
| J1-3 TO J1-5          | J1-2 TO J1-3            |

DO ALL VOLTAGES MEASURE OK?  
Y N

039

SET THE TAPE CONTROL UNIT SUPPLYING AC POWER TO  
THIS STRING OF DRIVES TO OFFLINE/TEST.  
SET THE TAPE CONTROL UNIT POWER SWITCH TO OFF.  
CONTINUITY CHECK THE INPUT AC CABLE.  
EXCHANGE FRU218 IF OPEN.

IF NO PROBLEM IS FOUND WITH THE CABLE THE  
PROBLEM IS MOST LIKELY LOCATED IN A PRIOR  
TAPE TRANSPORT UNIT IN THE STRING OR IN THE  
TAPE CONTROL UNIT.

AFTER LOCATING AND CORRECTING THE PROBLEM  
IN THE AC DISTRIBUTION NET, SET THE TAPE CONTROL  
UNIT POWER SWITCH TO ON.  
Go to Page 7, Step 054, Entry Point C.

040

PROBLEM IS WITH CB1 OR THE CABLE FROM  
CB1 TO PS P11.  
SET THE TAPE CONTROL UNIT POWER SWITCH TO OFF.  
EXCHANGE FRU 218.  
Go to Page 7, Step 054, Entry Point C.

REFER TO YF060 FOR 60 HZ  
AND 50HZ JAPAN MACHINES.  
REFER TO YF050 FOR ALL  
OTHER 50HZ MACHINES.  
SEE CARR-DR 1-1.

MAP 0210 – Drive DC Power (Same Symptom Both Drives)

Q R S PWR 210  
 4 4 4  
 PAGE 6 OF 7  
 041  
 EXCHANGE THE DC POWER SUPPLY (FRU095)  
 Go to Page 7, Step 054, Entry Point C.  
 042  
 PROBLEM MAY BE DUE TO OPEN OR MISSING  
 JUMPER PLUG ON J12, J13 OR J14.  
 IS A JUMPER PLUG INSTALLED ON J12, J13  
 OR J14?  
 Y N  
 043  
 INSTALL JUMPER AT PROPER LOCATION.  
 REFER TO CARR-DR 1 FOR FRU095 INSTALL.  
 Go to Page 7, Step 054, Entry Point C.  
 044  
 CONTINUITY CHECK THE JUMPER.  
 CONTINUITY OF THE JUMPER OK?  
 Y N  
 045  
 REPAIR JUMPER  
 Go to Page 7, Step 054, Entry Point C.  
 046  
 EXCHANGE THE DC POWER SUPPLY (FRU095).  
 Go to Page 7, Step 054, Entry Point C.  
 047  
 RESET THE CB.  
 DOES THE CB TRIP AGAIN?  
 Y N  
 U V

U V  
 048  
 RESETTING THE AC CB HAS CLEARED THE ORIGINAL  
 PROBLEM.  
 FOR INTERMITTENT AC CB TRIPPING SUSPECT:  
 AC CB (FRU218)  
 POWER SUPPLY (FRU095)  
 BLOWER ASSEMBLY (FRU020)  
 PUMP MOTOR (FRU030)  
 Go to Page 7, Step 054, Entry Point C.  
 049  
 THE AC POWER CB TRIPS AFTER BEING RESET.  
 DISCONNECT P15 FROM THE DC POWER SUPPLY.  
 RESET THE AC POWER CB.  
 DOES THE AC POWER CB STILL TRIP?  
 Y N  
 050  
 REPLACE BLOWER ASSEMBLY (FRU020).  
 Go to Page 7, Step 054, Entry Point C.  
 051  
 RECONNECT P15 TO THE DC POWER SUPPLY.  
 DISCONNECT P4 FROM THE DC POWER SUPPLY.  
 RESET THE AC POWER CB.  
 DOES THE AC POWER CB STILL TRIP?  
 Y N  
 052  
 EXCHANGE THE PUMP MOTOR (FRU030).  
 Go to Page 7, Step 054, Entry Point C.  
 W

SEE LOC 1.

SEE CARR-DR 1-1.

MAP 0210 – Drive DC Power (Same Symptom Both Drives) PWR 210-6

W  
 053  
 EXCHANGE THE DC POWER SUPPLY (FRU095)  
 Go to Page 7, Step 054, Entry Point C.

PWR 210

PAGE 7 OF 7

054

(Entry Point C)  
IF NOT ALREADY ON, SET THE AC POWER CB TO ON.

SET THE DRIVE POWER ON SWITCHES TO ON.

IF NECESSARY, PLUG THE DC POWER TEST TOOL INTO  
THE TEST JACK (J8 ON DRIVE 0 OR J9 ON DRIVE 1).  
OBSERVE THE LEDS ON THE DC TEST TOOL.  
IGNORE LED 2 WHEN RESPONDING TO QUESTIONS.  
ARE ALL LEDS ON?

Y N

055  
REQUEST YOUR NEXT LEVEL OF SUPPORT.

056

SET THE DRIVE ONLINE/OFFLINE SWITCH TO ONLINE.

REFER TO THE START SECTION OF  
THE MG, AND RUN GMP.

**MAP 0300—STI Power Check**

STI POWER CHECK

PAGE 1 OF 2

ENTRY POINTS

| FROM       | ENTER THIS MAP |             |             |
|------------|----------------|-------------|-------------|
| MAP NUMBER | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| 0100       | A              | 1           | 001         |

001  
(ENTRY POINT A)

(NONE OF THE STI LEDS ARE ON OR BLINKING.)

MAP DESCRIPTION: MAP 0100 SENT YOU HERE WHEN YOU OBSERVED THAT THE STI LEDS WERE NOT ON.  
START CONDITIONS:  
- POWER ON LED IS ON

FRUS DIAGNOSED:  
- CU STI DC SUPPLY CU-PS-03

ADDITIONAL SERVICE AIDS:  
- TAPE CONTROL UNIT LOGIC YF004

THIS STEP REQUIRES YOU TO MEASURE EACH VOLTAGE AT BOTH STI BOARD CONNECTORS. A SINGLE VOLTAGE MISSING AT 1 BOARD ONLY INDICATES A CABLING PROBLEM. A SINGLE VOLTAGE MISSING AT BOTH BOARDS INDICATES A POWER SUPPLY PROBLEM WHILE ALL VOLTAGES MISSING MAY BE CAUSED BY THE POWER SUPPLY OR THE AC INPUT TO THE SUPPLY.  
(Step 001 continues)

(Step 001 continued)

MEASURE DC VOLTAGES AT THE STI BOARD CONNECTORS.

REFERENCE LOGIC ST001 AND ST002

P/J3

|    |    |     |      |
|----|----|-----|------|
| 10 | 20 | +5  | -5.2 |
| 9  | 19 | +5  | +5   |
| 8  | 18 |     | +5   |
| 7  | 17 | -12 |      |
| 6  | 16 | +12 |      |
| 5  | 15 |     |      |
| 4  | 14 |     |      |
| 3  | 13 | GND | GND  |
| 2  | 12 | GND | GND  |
| 1  | 11 | GND | GND  |

VOLTAGE(S) MISSING AT ONLY 1 BOARD?  
Y N

002

VOLTAGE(S) MISSING AT BOTH BOARDS?

Y N

003

DC VOLTAGES TO THE STI CARDS ARE OKAY. LED PROBLEM PROBABLY DUE TO CARD FAILURE.

004

VOLTAGE(S) MISSING AT 2 BOARDS.

ARE ALL OF THE VOLTAGES MISSING?

Y N

005

EXCHANGE POWER SUPPLY CU-PS-03.

.2 2  
A B

A B STI POWER CHECK  
1 1

PAGE 2 OF 2

006

ALL VOLTAGES MISSING MAY BE DUE TO MISSING AC INPUT CAUSED BY DEFECTIVE CABLE FROM CU-PS-01 TO CU-PS-03.

SEE LOGIC YF004.

SET THE TAPE CONTROL UNIT POWER ON/OFF SWITCH TO THE OFF POSITION.

SEE LOC 1.

CONTINUITY CHECK THE AC INPUT CABLE BETWEEN CU-PS-01 AND CU-PS-03.

DOES THE METER INDICATE CONTINUITY?

Y N

007

REPLACE OR REPAIR OPEN IN THE CABLE.

008

EXCHANGE POWER SUPPLY CU-PS-03.

009

VOLTAGES MISSING AT 1 BOARD PROBABLY DUE TO CABLING PROBLEMS BUT COULD BE DUE TO INTERNAL POWER SUPPLY PROBLEMS.

REFER TO LOGIC YF004.

TURN THE SERVICE SWITCH TO THE SERVICE POSITION.  
CONTINUITY CHECK THE CABLE FROM CU-PS-03 TO THE STI BOARD CONNECTOR.  
(Step 009 continues)

SEE LOC 1.

(Step 009 continued)

CONTINUITY CHECK OKAY?

Y N

010

REPLACE OR REPAIR OPEN IN THE CABLE.

011

EXCHANGE POWER SUPPLY CU-PS-03.

**MAP 0400—Tape Control Unit DC Power**

TAPE CONTROL UNIT DC POWER MAP

PAGE 1 OF 19

ENTRY POINTS

| FROM       | ENTER THIS MAP |             |             |
|------------|----------------|-------------|-------------|
| MAP NUMBER | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| 0100       | A              | 001         |             |
| 0190       | A              | 001         |             |
| 0401       | B 7            | 108         |             |
| 0401       | C 9            | 135         |             |
| 0401       | E 3            | 077         |             |

EXIT POINTS

| EXIT THIS MAP |             | TO         |             |
|---------------|-------------|------------|-------------|
| PAGE NUMBER   | STEP NUMBER | MAP NUMBER | ENTRY POINT |
| 7             | 040         | 0100       | A           |
| 2             | 007         | 0100       | B           |
| 3             | 012         | 0100       | B           |
| 19            | 135         | 0190       | A           |
| 13            | 076         | 410        | B           |
| 18            | 124         | 420        | A           |
| 18            | 119         | 420        | B           |
| 19            | 129         | 430        | A           |
| 19            | 134         | 440        | A           |

001  
(ENTRY POINT A)  
**DANGER**  
LETHAL VOLTAGES ARE PRESENT IN THE POWER SERVICE AREA. SAFETY IS MOST IMPORTANT. TREAT ALL CIRCUITS AS LIVE UNTIL MEASURED.

CAPACITORS ARE POSSIBLE EXPLODING DEVICES. WEAR SAFETY GLASSES WHEN WORKING IN THE POWER AREA.

ALWAYS REINSTALL ALL SAFETY COVERS BEFORE POWERING ON THE MACHINE.

THE DC TEST TOOL IS NEEDED FOR THIS MAP. SEE PWR 10 FOR INFORMATION REGARDING USE, LAYOUT AND FUNCTION OF THE TOOL.

CAUTION

THE TAPE CONTROL UNIT SHOULD BE OFFLINE AND THE TAPE TRANSPORT UNIT DISMOUNTED AND (Step 001 continues)

MAP DESCRIPTION: MAP 0100 DIRECTED YOU TO THIS MAP BECAUSE THE DC POWER LED IS OFF.

START CONDITIONS:  
-DC POWER LED OFF  
-POWER ON LED IS ON.

FRUS DIAGNOSED:  
-AC POWER SUPPLY, CU-PS-01  
-DC POWER SUPPLY, CU-PS-02  
-DC POWER SUPPLY FUSE F1  
-DC POWER SUPPLY FUSE F2  
-CU-CSU PANEL  
-POR CARD, 01A-A2H4  
-DC VOLTAGE DISTRIBUTION CABLES  
-CU-PS-01 TO TCU-PS-02 CABLES  
-AC VOLTAGE TAP PLUG  
-CU GATE FANS  
-CU GATE  
UPPER THERMAL

ADDITIONAL SERVICE AIDS:  
(Step 001 continues)

**MAP 0400—Tape Control Unit DC Power PWR 400-1**

(Step 001 continued)  
UNLOADED.

OPEN THE FRONT DOOR OF THE CU AND REMOVE THE SUB COVER

(Step 001 continued)  
-CU AC POWER DISTRIBUTION DIAGRAM ON PWR 32.  
-CU DC POWER DISTRIBUTION DIAGRAM ON PWR 34.  
-CU DC DISTRIBUTION DIAGRAMS:  
PWR 42 (+5 V DC, CB2),  
PWR 44 (+5 V DC, CB3),  
PWR 46 (-5 V DC),  
PWR 48 (+8.5 V DC)  
-CU DC POWER DC CONTROL DIAGRAM ON PWR 50.

CONNECT THE DC TEST TOOL TO THE CU DC SUPPLY TCU-PS-02 J16 (LOC 1).

COMPARE THE LEDS ON THE DC TEST TOOL TO THE CHART ON THE RIGHT. (THE LEDS ON THE DC TEST TOOL ARE NUMBERED LEFT TO RIGHT).

| LED | ON/OFF | V DC  | FUSE/CB |
|-----|--------|-------|---------|
| 1   | ON     | 24CTL | F2      |
| 2   | OFF    |       | N/A     |
| 3   | OFF    |       | N/A     |
| 4   | OFF    |       | N/A     |
| 5   | ON     | +8.5  | F1      |
| 6   | ON     | -5    | CB4     |
| 7   | ON     | +5    | CB2     |
| 8   | ON     | +5    | CB3     |

DOES THE CHART AND DC TEST TOOL AGREE?

Y N  
002  
IS LED 1 ON?  
Y N  
1  
5 5 2  
A B C

C DC POWER MAP

1

PAGE 2 OF 19

003

SET THE LOCAL REMOTE SWITCH TO THE LOCAL POSITION (LOC 1).

THE +24 V DC IS MISSING. IT IS DEVELOPED IN CU-PS-01.

SET THE CU POWER ON/OFF SWITCH TO THE OFF POSITION (LOC 1).

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

REMOVE CU-PS-02 FUSE F2 AND CONTINUITY CHECK THE FUSE (LOC 1).

IS FUSE F2 BLOWN?

Y N

004

REINSTALL FUSE F2

OPEN THE REAR DOOR OF THE CU AND REMOVE THE SUBCOVER

ON THE DC POWER SUPPLY, DISCONNECT THE CABLE CU-PS-02 P2 (LOC 1).

ON THE AC POWER SUPPLY, DISCONNECT THE CABLE CU-PS-01 P3 (LOC 1).

CHECK FOR CONTINUITY FROM CU-PS-01 P3-1 TO CU-PS-02 P2-1 AND FROM CU-PS-01 P3-2 TO CU-PS-02 P2-2

DOES THE METER INDICATE CONTINUITY?

Y N

3 D E F

E F

005

THERE IS AN OPEN WIRE FROM CU-PS-01 P3-1 TO CU-PS-02 P2-1

OR CU-PS-01 P3-2 TO CU-PS-02 P2-2 (YF001)(YF002).

REPAIR THE OPEN CIRCUIT.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

006

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CB1 TO THE ON POSITION (LOC 1).

SET THE CU POWER ON/OFF SWITCH TO THE ON POSITION (LOC 1).

PRESS AND HOLD THE LOCAL POWER ENABLE SWITCH FOR SEVERAL SECONDS AND THEN RELEASE IT.

OBSERVE THE CU POWER ON LED (LOC 1).

IS THE CU POWER ON LED ON?

Y N

007 AC POWER FAILED TO COME UP. GO TO MAP 0100, ENTRY POINT B.

3 G

24 V DC MISSING AT DC POWER SUPPLY. SEE DETAILED DIAGRAM ON PWR 50.

MAP 0400—Tape Control Unit DC Power

D G DC POWER MAP  
2 2

PAGE 3 OF 19

008

SET THE MULTIMETER TO MEASURE +24 V DC.

MEASURE THE VOLTAGE BETWEEN CU-PS-01  
J3-1(+) AND CU-PS-01 J3-2(-) (LOC 1).

SEE PWR20 FOR VOLTAGE TOLERANCES

DOES THE MULTIMETER INDICATE  
GREATER THAN +19 V DC?

Y N

009

THE AC POWER SUPPLY, CU-PS-01, IS FAILING  
(LOC 1).  
EXCHANGE FRU144.

THE +24 V DC IS MISSING.  
SEE DETAILED DIAGRAM ON PWR 50.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

010

THE DC POWER SUPPLY, CU-PS-02, IS FAILING  
(LOC 1).

THE +24 V DC IS OK FROM CU-PS-01.  
SEE DETAILED DIAGRAM ON PWR 50.

RECONNECT CABLE CU-PS-01-P3  
EXCHANGE FRU145.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

011

EXCHANGE FUSE F2.

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE ON POSITION (LOC 1).

SET THE CU POWER ON/OFF SWITCH TO THE ON  
POSITION (LOC 1).

PRESS AND HOLD THE LOCAL POWER ENABLE SWITCH  
FOR SEVERAL SECONDS AND THEN RELEASE IT.  
(Step 011 continues)

MAP 0400—Tape Control Unit DC Power PWR 400-3

(Step 011 continued)

OBSERVE THE CU POWER ON LED (LOC 1).

IS THE CU  
POWER ON LED ON?

Y N

012

AC POWER FAILED TO COME UP.

GO TO MAP 0100, ENTRY POINT B.

013

IS LED 1 ON?

Y N

014

SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

OVERLOAD CONDITION MAY BE  
CAUSED BY FRU126 OR FRU138.

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

ON THE DC SUPPLY, REMOVE CU-PS-02 FUSE F2  
AND CONTINUITY CHECK IT. INSTALL A GOOD  
FUSE F2.

OPEN THE REAR DOOR OF THE CU AND REMOVE THE  
SUBCOVER.

DISCONNECT THE CABLE  
CU-PS-02 P4.  
(Step 014 continues)

THIS ISOLATES THE LOAD FROM THE 24 V DC SOURCE.

5  
H



DC POWER MAP

PAGE 4 OF 19

(Step 014 continued)

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE ON POSITION (LOC 1).

PRESS AND HOLD THE LOCAL POWER ENABLE SWITCH  
FOR SEVERAL SECONDS AND THEN RELEASE IT.

OBSERVE THE LEDS ON THE DC TEST TOOL.

IS LED 1 ON ?

Y N

015

THE CU DC POWER SUPPLY, TCU-PS-02, IS  
FAILING.

EXCHANGE FRU145  
GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

016

SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

RECONNECT THE CABLE  
CU-PS-02 P4 (LOC 1).

REMOVE THE POR CARD, 01A-A2H4 (LOC 1).

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE ON POSITION (LOC 1).

PRESS AND HOLD THE LOCAL POWER ENABLE SWITCH  
FOR SEVERAL SECONDS AND THEN RELEASE IT.

OBSERVE THE LEDS ON THE DC TEST TOOL.

(Step 016 continues)

LED 1 STILL OFF AFTER THE LOAD WAS REMOVED.  
SEE DETAILED DIAGRAM ON PWR 50.

SEE IF OVERLOAD IS  
CAUSED BY FRU126.

(Step 016 continued)

IS LED 1 ON?

Y N

017

SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

RECONNECT THE CABLE  
CU-PS-02 P4 (LOC 1).

REMOVE THE REG CARD, 01A-A1T2 (LOC 1).

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE ON POSITION (LOC 1).

PRESS AND HOLD THE LOCAL POWER ENABLE  
SWITCH FOR SEVERAL SECONDS AND THEN RELEASE  
IT.

OBSERVE THE LEDS ON THE DC TEST TOOL.

IS LED 1 ON?

Y N

018

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

EXCHANGE FUSE F2.

REPAIR CABLE BETWEEN LOGIC GATE TB3 AND  
01A-A2H4 OR 01A-A1T2.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

SEE IF OVERLOAD IS  
CAUSED BY FRU138.

SEE DETAILED DIAGRAM ON PWR 50.

5 5  
J K

MAP 0400—Tape Control Unit DC Power

H J K DC POWER MAP  
3 4 4

PAGE 5 OF 19

019

THE REG CARD, 01A-A1T2, IS FAILING.

SET THE SERVICE SWITCH TO OFF (LOC 1).

EXCHANGE FRU138

SEE CARR-TCU 1-1

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

020

THE POR CARD, 01A-A2H4, IS FAILING.

SET THE SERVICE SWITCH TO OFF (LOC 1).

EXCHANGE FRU126

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

021

IS LED 1 THE ONLY LED ON?

Y N

022

FUSE FIXED THE PROBLEM.

REFER TO THE CE/HSC SECTION AND RUN GMP.

023

GO TO STEP 024, ENTRY POINT G.

MAP 0400—Tape Control Unit DC Power PWR 400-5

B  
1

024

(ENTRY POINT G)  
PRESS AND HOLD THE IML SWITCH (LOC 1).

OBSERVE THE LEDS ON THE DC TEST TOOL.

THE ONLINE TEST/OFFLINE TEST SWITCH MUST BE  
SET TO OFFLINE TEST TO ENABLE IML.

| LED | ON/OFF | V DC  | FUSE/CB |
|-----|--------|-------|---------|
| 1   | ON     | 24CTL | F2      |
| 2   | OFF    |       | N/A     |
| 3   | OFF    |       | N/A     |
| 4   | OFF    |       | N/A     |
| 5   | ON     | +8.5  | F1      |
| 6   | ON     | -5    | CB4     |
| 7   | ON     | +5    | CB2     |
| 8   | ON     | +5    | CB3     |

DUE TO BACK CIRCUITS, LED 5 MAY  
GLOW WHEN FUSE 1 IS BLOWN.  
COMPARE INTENSITY WITH LED 1.

DOES THE CHART AND DC TEST TOOL AGREE?

Y N

025

IS LED 1 THE ONLY LED ON?

Y N

026

GO TO PAGE 17, STEP 108,  
ENTRY POINT B.

027

RELEASE THE IML SWITCH.

+24 V DC IS AVAILABLE, BUT ONE OR MORE OF THE  
THE DC VOLTAGES ARE NOT ON.

CHECK THE POSITION OF THE SERVICE SWITCH  
(LOC 1).

IS THE SERVICE SWITCH IN THE ON POSITION?

Y N

1  
2 6 6  
L M N

M N DC POWER MAP  
5 5

PAGE 6 OF 19

028

SERVICE SWITCH LEFT IN THE OFF POSITION  
SET SERVICE SWITCH TO THE ON POSITION.  
REFER TO THE CE/HSC SECTION AND RUN GMP.

029

CAUTION

ONLY VOLTAGE UP IS +24 V DC CONTROL.

IF THE CU GATE UPPER THERMAL IS TRIPPED,  
RESETTING IT WILL CAUSE DC POWER TO TURN ON.  
RESET THE CU GATE UPPER THERMAL (LOC 1).

IS THE CU DC POWER LED ON?

Y N

030

CAUTION

ONLY VOLTAGE UP IS +24 V DC CONTROL.

IF THE STI GATE THERMAL IS TRIPPED,  
RESETTING IT WILL CAUSE DC POWER TO TURN  
ON.

RESET THE STI GATE THERMAL.

IS THE CU DC POWER LED ON?

Y N

1 1  
2 1  
P Q R

R

031

CHECK THE VOLTAGE TAP PLUG(S) FOR PROPER  
INSTALLATION (LOC 1).

SEE THE CHART ON PAGE PWR 14.

IS THE VOLTAGE TAP PLUG(S) PROPERLY  
CONNECTED?

Y N

032

SET CU-PS-02 CB1 TO THE OFF POSITION (LOC  
1).

CONNECT THE VOLTAGE TAP PLUG(S) AS SHOWN IN  
THE CHART ON PAGE PWR 14.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

033

OBSERVE THE CU GATE FANS (LOC 1).

ARE THE FANS RUNNING?

Y N

034

OBSERVE CU-PS-02 CB1 (LOC 1).

THE AC CIRCUIT IS FAILING.

IS CB1 TRIPPED?

Y N

9 8 7  
S T U

MAP 0400—Tape Control Unit DC Power

U DC POWER MAP  
6

PAGE 7 OF 19

035  
SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

DISCONNECT THE VOLTAGE TAP PLUG(S) AS SHOWN  
IN THE CHART ON PAGE PWR 14.

CONTINUITY CHECK THE JUMPER PLUG(S).

DOES THE METER INDICATE CONTINUITY?  
Y N

036  
REPAIR THE VOLTAGE TAP PLUG.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

037

ON THE AC SUPPLY,  
DISCONNECT THE CABLE  
CU-PS-01 P2 (LOC 1).

CHECK AC CABLE BETWEEN AC PS AND DC PS

ON THE DC SUPPLY,  
DISCONNECT THE CABLE  
CU-PS-02 P1 (LOC 1).

CHECK FOR CONTINUITY FROM  
CU-PS-01 P2-1 TO TCU-PS-02 P1-1 AND FROM  
CU-PS-01 P2-3 TO TCU-PS-02 P1-3.

DOES THE METER INDICATE CONTINUITY?  
Y N

V W

V W

038

THERE IS AN OPEN WIRE FROM  
CU-PS-01 P2-1 TO TCU-PS-02 P1-1  
(YF001)(YF002)

OR

CU-PS-01 P2-3 TO TCU-PS-02 P1-3.

REPAIR OPEN IN CABLE.

SEE DETAILED DIAGRAM ON PWR 50.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

039

SET THE CU POWER ON/OFF SWITCH TO THE ON  
POSITION (LOC 1).

PRESS AND HOLD THE LOCAL POWER ENABLE SWITCH  
FOR SEVERAL SECONDS AND THEN RELEASE IT.

OBSERVE THE CU POWER ON LED (LOC 1).

IS THE CU  
POWER ON LED ON?  
Y N

040  
AC POWER FAILED TO COME UP.  
GO TO MAP 0100, ENTRY POINT A.

8  
X

T X DC POWER MAP  
6 7

PAGE 8 OF 19

041  
SET THE MULTIMETER TO MEASURE 220VAC. MEASURE OUTPUT OF THE AC PS.

DANGER  
HIGH VOLTAGE IS PRESENT.

MEASURE THE VOLTAGE BETWEEN CU-PS-01 J2-1 AND J2-3.

IS THE VOLTAGE BETWEEN 180V AC AND 240 V AC?  
Y N

042  
THE CU AC POWER SUPPLY, TCU-PS-01, IS FAILING.

EXCHANGE FRU144. SEE CARR-TCU 1440.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

043  
THE CU DC POWER SUPPLY, TCU-PS-02, IS FAILING.

EXCHANGE FRU145. SEE CARR-TCU 1450.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

044  
RESET CB1.

PRESS AND HOLD THE IML SWITCH (LOC 1).  
RELEASE THE IML SWITCH.

DID CB1 TRIP AGAIN?  
Y N

Y Z

Y Z

045  
RESETTING CB1 CORRECTED THE PROBLEM.  
REFER TO THE CE/HSC SECTION AND RUN GMP.

046  
DISCONNECT THE CU GATE FAN 1 (LOC 1).  
RESET CB1.

SEE CARR-TCU 1500.

THE AC FOR THE GATE FANS GO THROUGH CU-PS-02  
CB1.  
SEE OVERVIEW DIAGRAM ON PWR 34.

DID CB1 TRIP ?  
Y N

047  
THE CU GATE FAN 1 IS FAILING.

EXCHANGE FRU150. SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

048  
DISCONNECT THE CU GATE FAN 2 (LOC 1).  
RESET CB1.

SEE CARR-TCU 1500.

DID CB1 TRIP ?  
Y N

9 9  
A A  
A B

S A A DC POWER MAP  
6 A B  
8 8

PAGE 9 OF 19

049

THE CU GATE FAN 2 IS FAILING.

EXCHANGE FRU150.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

050

THE CU DC POWER SUPPLY, TCU-PS-02, IS  
FAILING.

EXCHANGE FRU145

SEE CARR-TCU 1-1

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

051

CONNECT METER TO MEASURE  
+24 V DC BETWEEN 01A-A2H4 J06(+)  
AND 01A-A2H4 D08(-) (LOC 1).

+24 V DC AND AC IS AVAILABLE TO THE DC SUPPLY,  
BUT THE DC VOLTAGES ARE NOT ON.  
THIS SECTION CHECKS THE DC TURN ON CIRCUITS.

SEE DETAILED DIAGRAM ON PWR 50.

THE +24 V DC CHECKS THAT FOLLOW ARE  
NOT INTENDED TO BE TOLERANCE CHECKS  
BUT AS CHECKPOINTS FOR PROBLEM  
ANALYSIS. YOU WILL FIND TOLERANCE  
TABLES ON PWR20.

DID THE METER READ GREATER THAN +18 V DC ?

Y N

1  
0  
A A  
C D

A  
D

052

ON THE CU GATE, METER TB3-12 (+) TO TB3-10  
(-) FOR +24 V DC (LOC 1).

THE +24 V DC IS MISSING AT THE POR CARD.

DID THE METER READ GREATER THAN +19 V DC ?

Y N

053

SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

DISCONNECT THE CABLE  
CU-PS-02 P4 (LOC 1).

CHECK FOR CONTINUITY FROM  
CU-PS-02 P4-7 TO 01A-TB3-12 AND FROM  
CU-PS-02 P4-8 TO 01A-TB3-10

DOES THE METER INDICATE CONTINUITY?

Y N

054

REPAIR CABLE FROM CU-PS-02 P4 TO 01A-TB3

THE +24 V DC IS MISSING AT TB3.

SEE DETAILED DIAGRAM ON PWR 50.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

055

THE CU DC POWER SUPPLY, TCU-PS-02, IS  
FAILING.

EXCHANGE FRU145.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

1  
0  
A A  
E

A DC POWER MAP  
E  
9

PAGE 10 OF 19

056

ON THE CU GATE, METER TB3-13 (+) TO TB3-10 (-) FOR 24 V DC (LOC 1).

DID THE METER READ GREATER THAN +19 V DC ?

Y N

057

THE CU GATE UPPER THERMAL IS FAILING.

OR

THE STI GATE THERMAL IS FAILING.

OR

THE SERVICE SWITCH IS FAILING.

USING THE DIAGRAM ON PWR 50, ISOLATE TO THE FAILING COMPONENT. THEN.....

EXCHANGE FAILING COMPONENT.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

058

THERE IS AN OPEN WIRE FROM 01A-TB3-13 TO 01A-A2H4 J06.

SEE ALD ZT020.

REPAIR OPEN IN CABLE.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

A  
C  
9

059

ON THE DC POWER SUPPLY, SET CU-PS-02 CB1 TO OFF.

DISCONNECT THE CABLE CU-PS-02 P4 (LOC 1).

INSTALL A JUMPER FROM CU-PS-02 J4-8 TO J4-9 (LOC 1).

SET CU-PS-02 CB1 TO ON.

OBSERVE THE LEDS ON THE DC TEST TOOL.

IS LED 1 ONLY LED ON?

Y N

060

REMOVE JUMPER FROM CU-PS-02 J4-8 TO J4-9 (LOC 1).

CHECK FOR CONTINUITY FROM CU-PS-02 P4-9 TO 01A-A2H4 D13.

DOES THE METER INDICATE CONTINUITY?

Y N

061

THERE IS AN OPEN WIRE FROM CU-PS-02 P4-9 TO 01A-TB3-11.

SEE ALD ZT020.

-----OR-----

THERE IS AN OPEN WIRE FROM 01A-TB3-11 TO 01A-A2H4 D13.

REPAIR OPEN IN CABLE.

(Step 061 continues)

1 1  
1 1  
A A  
F G

THE 24 V DC IS OK TO THE POR CARD.

THIS JUMPER BYPASSES THE TURN ON CIRCUITRY.

Q A A DC POWER MAP  
6 F G  
1 1  
0 0

PAGE 11 OF 19

(Step 061 continued)  
GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

062

THE POR CARD, 01A-A2H4, IS FAILING.

THE DC SUPPLY TURNS ON OK WITH THE BYPASS  
JUMPER. THE 24 V DC TO THE POR CARD AND THE  
'PICK POWER ON CONTACTOR' NET FROM THE POR  
CARD ARE OK.

SEE CARR-TCU 1-1.

EXCHANGE FRU126.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

063

THE CU DC POWER SUPPLY, TCU-PS-02, IS  
FAILING.

SEE CARR-TCU 1-1.

EXCHANGE FRU145.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

064

CHECK THE STI GATE FANS FOR PROPER OPERATION.

ARE THE FANS OPERATING CORRECTLY?

Y N

065

ARE BOTH FANS FAILING?

Y N

A A A  
H J K

A A A  
H J K

066

THE STI GATE FAN IS FAILING.

SEE CARR-TCU 1-1

EXCHANGE THE FAILING GATE FAN (FRU904)

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

067

SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

ON THE AC SUPPLY, SET CIRCUIT BREAKER  
CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

THERE IS AN OPEN WIRE FROM  
CU1A P1-1 TO TCU-PS-02 P3-1 (YF005)(LOC 1)

---0R---

THERE IS AN OPEN WIRE FROM  
CU1A P1-3 TO TCU-PS-02 P3-3 (LOC19)

REPAIR THE OPEN CIRCUIT.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

068

CHECK FOR ANY OBSTRUCTION  
TO THE AIR FLOW.

GO TO PAGE 19, STEP 135, ENTRY POINT C.



P DC POWER MAP  
6

PAGE 12 OF 19

069

CHECK THE CU GATE FANS FOR PROPER OPERATION (LOC 1).

ARE THE FANS OPERATING CORRECTLY?

Y N

070

ARE BOTH FANS FAILING?

Y N

071

THE CU GATE FAN IS FAILING.

EXCHANGE THE FAILING GATE FAN (FRU150)

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

072

SET THE CU POWER ON/OFF SWITCH TO THE OFF POSITION (LOC 1).

ON THE AC SUPPLY, SET CIRCUIT BREAKER CU-PS-01 CB1 TO THE OFF POSITION (LOC 1).

THERE IS AN OPEN WIRE FROM CUIA P1-1 TO TCU-PS-02 P3-1 (YF005)(LOC 1)

---0R---

THERE IS AN OPEN WIRE FROM CUIA P1-3 TO TCU-PS-02 P3-3 (LOC19)

REPAIR THE OPEN CIRCUIT.

(Step 072 continues)

A  
L

L A  
5 L

(Step 072 continued)  
GO TO PAGE 19, STEP 135, ENTRY POINT C.

073

CHECK FOR ANY OBSTRUCTION TO THE AIR FLOW.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

074

RELEASE THE IML SWITCH.

OBSERVE THE LEDS ON THE DC TEST TOOL.

| LED | ON/OFF | V DC  | FUSE/CB |
|-----|--------|-------|---------|
| 1   | ON     | 24CTL | F2      |
| 2   | OFF    |       | N/A     |
| 3   | OFF    |       | N/A     |
| 4   | OFF    |       | N/A     |
| 5   | ON     | +8.5  | F1      |
| 6   | ON     | -5    | CB4     |
| 7   | ON     | +5    | CB2     |
| 8   | ON     | +5    | CB3     |

DOES THE CHART AND DC TEST TOOL AGREE?

Y N

075

CONNECT METER TO MEASURE +1.7 V DC BETWEEN 01A-A1T2 B03(+) AND 01A-A1T2 D00(-).

CHECK FOR MISSING VOLTAGE AT THE REGULATOR CARD.

OBSERVE THE METER WHILE PRESSING THE IML SWITCH.

DID THE METER READ ABOVE +1.6 V DC?

Y N

1 1 1  
5 3 3  
A A A  
M N P

MAP 0400—Tape Control Unit DC Power

A A DC POWER MAP  
N P  
1 1  
2 2

PAGE 13 OF 19

076

MISSING 1.7 V DC AT THE POR CARD.  
GO TO MAP 410, ENTRY POINT B.

077

(ENTRY POINT E)

CONNECT METER TO MEASURE  
+1.7 V DC BETWEEN 01A-A2H4 G11(+)  
AND 01A-A2H4 D08(-).

CHECK FOR MISSING VOLTAGE AT POR CARD.

OBSERVE THE METER WHILE PRESSING THE IML  
SWITCH.

DID THE METER READ ABOVE +1.6 V DC?

Y N

078

THE 1.7 V DC NET IS OPEN.

LOCATE AND REPAIR THE OPEN.

REFERENCE LOGIC PAGE RG001.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

A  
Q

MAP 0400—Tape Control Unit DC Power PWR 400-13

A  
Q

079

CONNECT METER TO MEASURE  
-5 V DC BETWEEN 01A-A2H4 D08(+)  
AND 01A-A2H4 B06(-).

MISSING VOLTAGE AT POR CARD OR DEFECTIVE  
CARD.

OBSERVE THE METER WHILE PRESSING THE IML  
SWITCH.

DID THE METER READ BETWEEN -4.5 V DC AND  
-5.5 V DC?

Y N

080

DID THE METER READ GREATER THAN 0 V?

Y N

081

THE -5 V DC NET IS OPEN.

REFERENCE ALDS YF002 AND ZT020.

SEE DETAILED DIAGRAM ON PWR 50.

REPAIR OPEN IN THE -5 V DC NET

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

082

THE DC POWER SUPPLY, CU-PS-02, IS FAILING.

EXCHANGE FRU145.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

1  
4  
A  
R

A DC POWER MAP

R  
1  
3

PAGE 14 OF 19

083

CONNECT METER TO MEASURE  
+5 V DC BETWEEN 01A-A2H4 D02(+)  
AND 01A-A2H4 D08(-).

OBSERVE METER WHILE PRESSING THE IML SWITCH.

DID THE METER READ +5 V DC?

Y N

084

THE 01A-A1 +5 V NET IS OPEN.

REFERENCE ALDS YF002 AND ZT010.

SEE DETAILED DIAGRAM ON PWR 50.

REPAIR OPEN IN THE +5 V DC NET

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

085

CONNECT METER TO MEASURE  
+5 V DC BETWEEN 01A-A2H4 D03(+)  
AND 01A-A2H4 D08(-).

OBSERVE THE METER WHILE PRESSING THE IML  
SWITCH.

DID THE METER READ +5 V DC?

Y N

A A  
S T

A A  
S T

086

THE 01A-A2 +5 V NET IS OPEN.

REFERENCE ALDS YF002 AND ZT011.

SEE DETAILED DIAGRAM ON PWR 50.

REPAIR OPEN IN THE +5 V DC NET

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

087

CONNECT METER TO MEASURE  
+8.5 V DC BETWEEN 01A-A2H4 B11(+)  
AND 01A-A2H4 D08(-).

OBSERVE THE METER WHILE PRESSING THE IML  
SWITCH.

DID THE METER READ +8.5 V DC?

Y N

088

THE +8.5 V DC NET IS OPEN.

REFERENCE ALDS YF002 AND ZT020.

SEE DETAILED DIAGRAM ON PWR 50.

REPAIR OPEN IN THE +8.5 V DC NET

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

1  
5  
A  
U

A A DC POWER MAP  
M U  
1 1  
2 4

PAGE 15 OF 19

089

CONNECT METER TO MEASURE  
+24 V DC BETWEEN 01A-A2H4 J06(+)  
AND 01A-A2H4 D08(-).

OBSERVE THE METER WHILE PRESSING THE IML  
SWITCH.

DID THE METER READ +24 V DC?  
Y N

090

THE +24 V DC NET IS OPEN.

REFERENCE ALDS YF002 AND ZT020.

SEE DETAILED DIAGRAM ON PWR 50.

REPAIR OPEN IN +24 V DC NET.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

091

SET THE SERVICE SWITCH TO OFF (LOC 1).

THE POR CARD, 01A-A2H4, IS FAILING.

EXCHANGE FRU126

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

092

SUSPECT INTERMITTENT PROBLEM ON THE POR CARD.

EXCHANGE FRU126

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

A  
1

093

CONNECT METER TO MEASURE  
+5 V DC BETWEEN 01A-A2H4 J11(+)  
AND 01A-A2H4 D08(-).

DID THE METER READ BETWEEN +4 V DC AND +5 V DC ?  
Y N

094

SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

CHECK FOR CONTINUITY FROM  
01A-A2H4 J11 TO 01A-A2 H4 D08.

DOES THE METER INDICATE CONTINUITY?  
Y N

095

SET THE SERVICE SWITCH TO OFF (LOC 1).

THE POR CARD, 01A-A2H4, IS FAILING.  
EXCHANGE FRU126.

SEE CARR-TCU 1 FOR.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

096

SET THE SERVICE SWITCH TO OFF (LOC 1).

REMOVE THE POR CARD AT 01A-A2H4.

CHECK FOR CONTINUITY FROM  
01A-A2H4 J11 TO 01A-A2 H4 D08.

DOES THE METER INDICATE CONTINUITY?  
Y N

1 1 1  
6 6 6  
A A A  
V W X

A A DC POWER MAP  
W X  
1 1  
5 5

PAGE 16 OF 19

097

THE POR CARD, 01A-A2H4, IS FAILING.

EXCHANGE FRU126.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

098

DISCONNECT THE CABLE  
CU-OSU P1 (LOC 1).

CHECK FOR CONTINUITY FROM  
01A-A2H4 J11 TO 01A-A2 H4 D08.

DOES THE METER INDICATE CONTINUITY?

Y N

099

THE CU-OSU BOARD IS FAILING.

EXCHANGE FRU141.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

100

THE '+DC POWER ON' NET IS SHORT CIRCUITED TO  
GROUND.

SEE DETAILED DIAGRAM ON PWR 50.

REPAIR SHORT TO GROUND.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

A  
V  
1  
5

101

CONNECT METER TO MEASURE  
+8.5 V DC BETWEEN 01A-A2H4 B04(+)  
AND 01A-A2H4 D08(-).

DID THE METER READ BETWEEN +5 V DC AND +10 V DC ?

Y N

102

CONNECT METER TO MEASURE  
+5 V DC BETWEEN 01A-A2H4 D10(+)  
AND 01A-A2H4 D08(-).

DID THE METER READ BETWEEN +1 V DC AND +5 V DC ?

Y N

103

THE POR CARD, 01A-A2H4, IS FAILING.

EXCHANGE FRU126.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

104

SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

DISCONNECT THE CABLE  
CU-OSU P1 (LOC 1).

CHECK FOR CONTINUITY FROM  
01A-A2H4 D10 TO CU-OSU P1-2.  
(Step 104 continues)

1  
7  
A  
Y

MAP 0400—Tape Control Unit DC Power

A DC POWER MAP  
Y  
1  
6

PAGE 17 OF 19

(Step 104 continued)

DOES THE METER INDICATE CONTINUITY?

Y N

105

THE '+DC POWER ON' NET IS OPEN.

SEE DETAILED DIAGRAM ON PWR 50.

REPAIR OPEN IN NET.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

106

(THE DC POWER LED IS FAILING.)

EXCHANGE FRU141.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

107

SET THE SERVICE SWITCH TO OFF (LOC 1).

THE POR CARD, 01A-A2H4, IS FAILING.

EXCHANGE FRU126.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135, ENTRY POINT C.

MAP 0400—Tape Control Unit DC Power PWR 400-17

DUE TO BACK CIRCUITS, LED 5 MAY  
GLOW WHEN FUSE 1 IS BLOWN.  
COMPARE INTENSITY WITH LED 1.

108  
(ENTRY POINT B)  
IS LED 5 OFF OR DIM?  
Y N

109  
IS LED 6 OFF?  
Y N

110  
IS LED 7 OFF?  
Y N

111  
IS LED 8 OFF?  
Y N

112  
RELEASE THE IML SWITCH.

IS LED 1 THE ONLY LED ON?  
Y N

113  
GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

114  
SET THE SERVICE SWITCH TO OFF (LOC 1).

THE POR CARD, 01A-A2H4, IS FAILING.

EXCHANGE FRU126.

SEE CARR-TCU 1-1.

GO TO PAGE 19, STEP 135,  
ENTRY POINT C.

1 1 1 1  
9 8 8 8  
A B B B  
Z A B C

B B DC POWER MAP  
 B C  
 1 1  
 7 7

PAGE 18 OF 19

115  
 IS CB3 TRIPPED?  
 Y N

116  
 EXCHANGE FRU145.  
 GO TO PAGE 19, STEP 135,  
 ENTRY POINT C.

SEE CARR-TCU 1-1.

117  
 RESET CB3.  
 PRESS AND HOLD THE IML SWITCH (LOC 1).  
 RELEASE THE IML SWITCH.

DID CB3 TRIP AGAIN?  
 Y N

118  
 RESETTING CB3 CORRECTED THE PROBLEM.  
 REFER TO THE CE/HSC SECTION AND RUN GMP.

119  
 ISOLATE CAUSE FOR CB3 TRIPPING.  
 GO TO MAP 420, ENTRY POINT B.

120  
 IS CB2 TRIPPED?  
 Y N

121  
 EXCHANGE FRU145.  
 GO TO PAGE 19, STEP 135,  
 ENTRY POINT C.

SEE CARR-TCU 1-1.

B  
 D  
 B B

A D  
 1  
 7

122  
 RESET CB2.  
 PRESS AND HOLD THE IML SWITCH (LOC 1).  
 RELEASE THE IML SWITCH.

DID CB2 TRIP AGAIN?  
 Y N

123  
 RESETTING CB2 CORRECTED THE PROBLEM.  
 REFER TO THE CE/HSC SECTION AND RUN GMP.

124  
 ISOLATE CAUSE OF CB2 TRIPPING.  
 GO TO MAP 420, ENTRY POINT A.

125  
 IS CB4 TRIPPED?  
 Y N

126  
 EXCHANGE FRU145.  
 GO TO PAGE 19, STEP 135,  
 ENTRY POINT C.

SEE CARR-TCU 1-1.

1  
 9  
 B  
 E

MAP 0400—Tape Control Unit DC Power

A B DC POWER MAP  
Z E  
1 1  
7 8

PAGE 19 OF 19

127

RESET CB4.

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.

DID CB4 TRIP AGAIN?

Y N

128

RESETTING CB4 CORRECTED THE PROBLEM.

REFER TO THE CE/HSC SECTION AND RUN GMP.

129

ISOLATE CAUSE FOR CB4 TRIPPING.

GO TO MAP 430, ENTRY POINT A.

130

CHECK CU-PS-02 FUSE F1.

IS FUSE F1 BLOWN?

Y N

131

THE 8.5 LED IS OFF AND FUSE F1 IS OK.

EXCHANGE FRU145.

SEE CARR-TCU 1-1.

GO TO STEP 135,  
ENTRY POINT C.

B  
F

B  
F

132

EXCHANGE FUSE F1.

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.

DID FUSE F1 BLOW AGAIN?

Y N

133

EXCHANGING FUSE F1 CORRECTED PROBLEM.

REFER TO THE CE/HSC SECTION AND RUN GMP.

134

ISOLATE CAUSE OF F1 BLOWING.

GO TO MAP 440, ENTRY POINT A.

(ENTRY POINT C)  
CLEANUP AFTER REPAIR.

SET THE CU POWER ON/OFF SWITCH TO THE OFF  
POSITION (LOC 1).

RECONNECT ANY CABLES REMOVED FOR  
TROUBLESHOOTING.

REPLACE ANY FUSES REMOVED FOR  
TROUBLESHOOTING.

RESET ANY CB TRIPPED FOR TROUBLESHOOTING.

REMOVE ANY JUMPERS USED FOR TROUBLESHOOTING.

GO TO MAP 0190, ENTRY POINT A.





MAP 0410—Tape Control Unit DC Power

MAP 0410—7 Volt DC Regulator PWR 410-1

+1.7 V DC REGULATOR

PAGE 1 OF 4

ENTRY POINTS

| -----      |                |             |             |
|------------|----------------|-------------|-------------|
| FROM       | ENTER THIS MAP |             |             |
| -----      |                |             |             |
| MAP NUMBER | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| -----      |                |             |             |
| 0100       | A              | 1           | 001         |
| 0100       | B              | 3           | 010         |
| 0411       | C              | 4           | 017         |

001  
(ENTRY POINT A)

MAP DESCRIPTION: MAP 0100 DIRECTED YOU TO THIS MAP TO ISOLATE A FAILURE OF THE ON BOARD REGULATOR CARD, 01A-A1T2 .

START CONDITIONS:  
-POWER ON LED ON  
-AN 01A-A1T2 LED ON OR MISSING VOTAGE.

FRUS DIAGNOSED:  
-REGULATOR CARD, 01A-A1T2  
-REGULATOR CARD, 01A-A1T2 FUSES.

ADDITIONAL SERVICE AIDS:  
-TAPE CONTROL UNIT DC POWER DISTRIBUTION DIAGRAM ON PWR 34.

SEE LOC 1.

RESET THE VOLTAGE REGULATOR BY SETTING THE TAPE CONTROL UNIT SERVICE SWITCH TO OFF FOR FIVE SECONDS AND THEN BY SETTING THE TAPE CONTROL UNIT SERVICE SWITCH TO ON.

OBSERVE THE LEADS LOCATED ON THE CU REGULATOR CARD, 01A-A1T2.  
(Step 001 continues)

(Step 001 continued)

ARE ANY LEADS ON?

Y N

002  
RECYCLING POWER CORRECTED THE PROBLEM.

SUSPECT AN INTERMITTENT REGULATOR CARD.  
GO TO PAGE 4, STEP 017, ENTRY POINT C.

003

MEASURE +24 V DC BETWEEN 01A-A1T2 S06(+) AND 01A-A1T2 D08 (-).

USE ALD RG001 AS A REFERENCE.

+24 V DC GOOD?

Y N

004  
OPEN CIRCUIT BETWEEN 01A-A1T2 S06 AND 01A TB3-13.

REPAIR OPEN CKT.

USE ALD RG001 AS A REFERENCE.

REFER TO THE CE/HSC SECTION AND RUN GMP.

2  
A

A +1.7 V DC REGULATOR  
1

PAGE 2 OF 4

005

SET THE SERVICE SWITCH TO OFF (LOC 1).

REMOVE CARD 01A-A1T2 FROM THE GATE.

CHECK THE +24 V DC FUSE ON THE REGULATOR CARD.

24 V DC FUSE IS THE LOWER FUSE (F1).

NOTE: SOME MODELS OF THE REGULATOR CARD DO NOT HAVE AN F1 FUSE. IF FUSE F1 IS NOT PRESENT ON THE CARD YOU JUST REMOVED, ANSWER "YES" TO THE FOLLOWING QUESTION.

IS THE FUSE GOOD?

Y N

006  
EXCHANGE +24 V DC FUSE ON CARD 01A-A1T2.

REINSTALL CARD 01A-A1T2.

SET THE SERVICE SWITCH TO ON (LOC 1).

OBSERVE THE LEDS ON THE REGULATOR CARD.

ARE THE LEDS OFF?

Y N

007

GO TO PAGE 4, STEP 017, ENTRY POINT C.

B C

008  
EXCHANGING FUSE CORRECTED PROBLEM.

REFER TO THE CE/HSC SECTION AND RUN GMP.

009

GO TO PAGE 4, STEP 017, ENTRY POINT C.

B C

+1.7 V DC REGULATOR

PAGE 3 OF 4

010  
(ENTRY POINT B)  
CHECK +5 V DC INPUT TO THE REGULATOR  
CARD.

CONNECT METER TO MEASURE  
+5 V DC BETWEEN 01A-A1T2 D03(+)  
AND 01A-A1T2 D08(-).

OBSERVE THE METER WHILE PRESSING  
THE IML SWITCH.

IS +5 V DC INPUT VOLTAGE MISSING?  
Y N

011

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

REMOVE CARD 01A-A1T2 FROM THE  
GATE.

CHECK THE +5 V DC FUSE.

+5 V DC FUSE IS THE UPPER FUSE (F2).

NOTE: SOME MODELS OF THE  
REGULATOR  
CARD DO NOT HAVE AN F2 FUSE.  
IF FUSE F2 IS NOT PRESENT ON  
THE CARD YOU JUST REMOVED,  
ANSWER "YES" TO THE FOLLOWING  
QUESTION.

IS THE FUSE OKAY?

Y N

4  
D E F

E F

012  
EXCHANGE FUSE ON CARD 01A-A1T2.

REINSTALL CARD 01A-A1T2.

SET THE SERVICE SWITCH TO ON (LOC  
1).

MEASURE REGULATOR +1.7 V DC OUTPUT.  
01A-A1T2 B03(+) TO 01A-A1T2  
D08(-).

IS THE 1.7 V DC MISSING?  
Y N

013  
EXCHANGING FUSE CORRECTED  
PROBLEM.

REFER TO THE CE/HSC SECTION AND  
RUN GMP.

014

GO TO PAGE 4, STEP 017,  
ENTRY POINT C.

015

GO TO PAGE 4, STEP 017,  
ENTRY POINT C.

D +1.7 V DC REGULATOR  
3

PAGE 4 OF 4

016

SET THE SERVICE SWITCH TO OFF (LOC 1).

EXCHANGE BOARD 01A-A1 (FRU139). SEE CARR-TCU 1-1.

REFER TO THE CE/HSC SECTION AND RUN GMP.

017  
(ENTRY POINT C)  
REGULATOR CARD FAILURE.  
EXCHANGE 01A-A1T2 (FRU138).

SEE CARR-TCU 1-1.

REFER TO THE CE/HSC SECTION AND RUN GMP.

MAP 0420—+ 5 Volt CB Tripped

TCU +5 VOLT CB TRIPPED

PAGE 1 OF 6

ENTRY POINTS

| FROM       | ENTER THIS MAP |             |             |
|------------|----------------|-------------|-------------|
| MAP NUMBER | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| 0400       | A              | 1           | 001         |
| 0400       | B              | 4           | 012         |
| 0421       | D              | 6           | 020         |
| 0421       | E              | 6           | 019         |

EXIT POINTS

| EXIT THIS MAP |             | TO         |             |
|---------------|-------------|------------|-------------|
| PAGE NUMBER   | STEP NUMBER | MAP NUMBER | ENTRY POINT |
| 6             | 019         | 0190       | A           |

001  
(ENTRY POINT A)

MAP DESCRIPTION: MAP 0400 DIRECTED YOU TO THIS MAP BECAUSE CB2 WILL NOT STAY RESET.

THERE IS AN OVERLOAD ON THE +5 V CIRCUIT TO THE 01A-A1 LOGIC BOARD

THIS SECTION ISOLATES THE SHORT CIRCUIT.

SEE DETAILED DIAGRAM ON PWR 42.

REMOVE THE +0.5 V DC FUSE, CU-PS-02 F1.

REMOVING THE FUSE PREVENTS THE DC POWER FROM HOLDING DURING THIS SECTION.

OPEN THE REAR DOOR OF THE TAPE CONTROL UNIT AND REMOVE THE SUB COVER.

ISOLATES THE POWER SUPPLY FROM ALL LOADS.

DISCONNECT THE CABLE CU-PS-02 P9 (LOC 1).

RESET CB2.

PRESS AND HOLD THE IML SWITCH (LOC 1).  
(Step 001 continues)

(Step 001 continued)

RELEASE THE IML SWITCH.

DID CB2 TRIP?

Y N

002

RECONNECT THE CABLE CU-PS-02 P9 (LOC 1).

OVERLOAD MAY BE DUE TO A1 BOARD, ITS CARDS OR THE RESISTIVE PRELOAD DEVICE.

SET THE SERVICE SWITCH TO OFF (LOC 1).

DISCONNECT THE 01A-A1 +5 V BUSS CABLES FROM 01A-A1 Y2 AND Y5 (LOC 1).  
(SEE ALD PAGE YZ002).

REMOVES BOARD A1 AND ITS CARDS FROM LOAD.

SET THE SERVICE SWITCH TO ON (LOC 1).

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.

DID CB2 TRIP?

Y N

3 2 2  
A B C

C +5 VOLT CB TRIPPED  
1

PAGE 2 OF 6

003

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

THIS REMOVES THE +24 V DC FROM THE  
LOGIC BOARDS.

RECONNECT 01A-A1 Y2 AND Y5 (YZ002)  
(LOC 1).

REMOVE ALL CARDS FROM THE 01A-A1  
BOARD (LOC 1).  
(SEE ALD PAGE AA000).

SET THE SERVICE SWITCH TO ON  
(LOC 1).

PRESS AND HOLD THE IML SWITCH  
(LOC 1).

RELEASE THE IML SWITCH.

DID CB2 TRIP?

Y N

004

SET THE SERVICE SWITCH TO OFF  
(LOC 1).  
REINSTALL THE CARDS, ONE AT A  
TIME. DO NOT INSTALL THE TOP  
CARD CONNECTORS (TCC).

A LOGIC CARD IS CAUSING THE CB TO  
TRIP.

EACH TIME A CARD IS INSTALLED;  
-SET THE SERVICE SWITCH TO ON.  
-PRESS AND HOLD THE IML  
SWITCH FOR SEVERAL SECONDS.  
-SET THE SERVICE SWITCH TO OFF.  
-CHECK IF CB2 IS TRIPPED.

REPEAT THIS STEP UNTIL THE  
FAILING CARD IS LOCATED.  
THEN.....  
(Step 004 continues)

D  
B D

1

(Step 004 continued)  
-----

REINSTALL FUSE F1.

EXCHANGE THE FAILING CARD.

GO TO PAGE 6, STEP 020,  
ENTRY POINT D.

005

THE 01A-A1 BOARD IS FAILING.

REINSTALL FUSE F1.

EXCHANGE FRU139.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 020,  
ENTRY POINT D.

006

POWER SUPPLY REGULATION IS  
MAINTAINED BY USING A RESISTIVE  
PRELOAD. THE RESISTIVE PRELOAD MAY  
BE LOCATED IN CARD SLOT A2P2 OR IN  
A LOAD BOX MOUNTED TO THE FRAME.

IS THERE A CARD LOCATED IN THE A2P2  
SLOT?

Y N

3 3  
E F

F +5 VOLT CB TRIPPED  
2

PAGE 3 OF 6

007

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

RECONNECT 01A-A1 Y2 AND Y5 (YZ002)  
(LOC 1).

DISCONNECT THE LOAD BOX +5 V CABLE  
FROM TB1-5  
(SEE ALD PAGE ZT010).

RESET CB2.

SET THE SERVICE SWITCH TO ON  
(LOC 1).

PRESS AND HOLD THE IML SWITCH  
(LOC 1).

RELEASE THE IML SWITCH.

DID CB2 TRIP?

Y N

008

THE LOAD BOX IS FAILING.

REINSTALL FUSE F1.

EXCHANGE FRU279.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 020,  
ENTRY POINT D.

G

A E G  
1 2

009

THERE IS A SHORT CIRCUIT FROM  
CU-PS-02 P9-1 TO FRAME GROUND.

LOCATE AND REPAIR THE SHORT  
CIRCUIT USING PWR 42 AS A  
TROUBLESHOOTING AID.

GO TO PAGE 6, STEP 019,  
ENTRY POINT E.

010

THERE IS A SHORT CIRCUIT FROM  
CU-PS-02 P9-1 TO FRAME GROUND.

LOCATE AND REPAIR THE SHORT  
CIRCUIT USING PWR 42 AS A  
TROUBLESHOOTING AID.

GO TO PAGE 6, STEP 019,  
ENTRY POINT E.

011

THE TAPE CONTROL UNIT DC SUPPLY,  
CU-PS-02, IS FAILING (LOC 1).

EXCHANGE FRU145.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 020,  
ENTRY POINT D.



+5 VOLT CB TRIPPED

PAGE 4 OF 6

012  
(ENTRY POINT B)

MAP DESCRIPTION: MAP 0400 DIRECTED YOU TO THIS MAP BECAUSE CB3 WILL NOT STAY RESET.

THERE IS AN OVERLOAD ON THE +5 V CIRCUIT TO THE 01A-A2 LOGIC BOARD.

THIS SECTION ISOLATES THE SHORT CIRCUIT.

SEE DETAILED DIAGRAM ON PWR 42.

REMOVE THE +8.5 V DC FUSE, CU-PS-02 F1.

REMOVING THE FUSE PREVENTS THE DC POWER FROM HOLDING DURING THIS SECTION.

OPEN THE REAR DOOR OF THE TAPE CONTROL UNIT AND REMOVE THE SUB COVER.

ISOLATES THE POWER SUPPLY FROM ALL LOADS.

DISCONNECT THE CABLE CU-PS-02 P11 (LOC 1).

RESET CB3 (LOC 1).

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.  
(THE DC POWER WILL GO OFF SINCE F1 FUSE IS REMOVED.)

DID CB3 TRIP?

Y N

Y  
N

5  
H J

J

013

RECONNECT THE CABLE CU-PS-02 P11 (LOC 1).

OVERLOAD MAY BE DUE TO A2 BOARD OR ITS CARDS.

DISCONNECT THE 01A-A2 +5V BUSS CABLES FROM 01A-A2 Y2 AND Y5 (LOC 1).  
(SEE ALD PAGE YZ003).

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.

DID CB3 TRIP?

Y N

Y  
N

014

RECONNECT 01A-A2 Y2 AND Y5 (YZ003) (LOC 1).

THIS REMOVES THE +24 V DC FROM THE LOGIC BOARDS.

SET THE SERVICE SWITCH TO OFF (LOC 1).

REMOVE ALL CARDS FROM THE 01A-A2 BOARD (LOC 1)  
(SEE ALD PAGE AA001).

SET THE SERVICE SWITCH TO ON (LOC 1).

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.

DID CB3 TRIP?

Y N

Y  
N

5 5 5  
K L M

MAP 0420—+ 5 Volt CB Tripped

L M +5 VOLT CB TRIPPED  
4 4

PAGE 5 OF 6

015

SET THE SERVICE SWITCH TO OFF  
(LOC 1).  
REINSTALL THE CARDS, ONE AT A  
TIME. DO NOT INSTALL THE TOP  
CARD CONNECTORS (TCC).

EACH TIME A CARD IS INSTALLED;  
-SET THE SERVICE SWITCH TO ON.  
-PRESS AND HOLD THE IML  
SWITCH FOR SEVERAL SECONDS.  
-SET THE SERVICE SWITCH TO OFF.  
-CHECK IF CB3 IS TRIPPED.

REPEAT THIS STEP UNTIL THE  
FAILING CARD IS LOCATED.  
THEN.....  
-----

REINSTALL FUSE F1.

EXCHANGE THE FAILING CARD.

GO TO PAGE 6, STEP 020,  
ENTRY POINT D.

016

THE 01A-A2 BOARD IS FAILING.

REINSTALL FUSE F1.

EXCHANGE FRU140.

GO TO PAGE 6, STEP 020,  
ENTRY POINT D.

A LOGIC CARD IS CAUSING THE CB TO  
TRIP.

SEE CARR-TCU 1-1.

MAP 0420—+ 5 Volt CB Tripped PWR 420-5

H K  
4 4

017

THERE IS A SHORT CIRCUIT FROM  
CU-PS-02 P11-1 TO FRAME GROUND.

LOCATE AND REPAIR THE SHORT  
CIRCUIT USING PWR 42 AS A  
TROUBLESHOOTING AID.

GO TO PAGE 6, STEP 019,  
ENTRY POINT E.

018

THE TAPE CONTROL UNIT DC SUPPLY,  
CU-PS-02, IS FAILING (LOC 1).

EXCHANGE FRU145.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 020,  
ENTRY POINT D.

+5 VOLT CB TRIPPED

PAGE 6 OF 6

019  
(ENTRY POINT E)  
CLEANUP AFTER REPAIR.

SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO THE OFF POSITION  
(LOC 1).

REMOVE ANY JUMPERS USED FOR  
TROUBLESHOOTING.

RECONNECT ANY CABLES REMOVED FOR  
TROUBLESHOOTING.

RE-INSTALL ANY FUSES REMOVED FOR  
TROUBLESHOOTING.

RESET ANY CB TRIPPED FOR  
TROUBLESHOOTING.

GO TO MAP 0190, ENTRY POINT A.

020  
(ENTRY POINT D)  
RETURN AFTER REPAIR.

REFER TO THE CE/HSC SECTION OF THE  
MG AND RUN GMP.

MAP 0430—Tape Control Unit DC Power

TCU -5 VOLT CB TRIPPED

PAGE 1 OF 6

ENTRY POINTS

| FROM   ENTER THIS MAP |                |                |                |
|-----------------------|----------------|----------------|----------------|
| MAP<br>NUMBER         | ENTRY<br>POINT | PAGE<br>NUMBER | STEP<br>NUMBER |
| 0400                  | A              | 1              | 001            |
| 0431                  | D              | 6              | 021            |
| 0431                  | E              | 6              | 020            |

EXIT POINTS

| EXIT THIS MAP  |                | TO            |                |
|----------------|----------------|---------------|----------------|
| PAGE<br>NUMBER | STEP<br>NUMBER | MAP<br>NUMBER | ENTRY<br>POINT |
| 6              | 020            | 0190          | A              |

001  
(ENTRY POINT A)

MAP DESCRIPTION: MAP 0400 DIRECTED YOU TO THIS MAP BECAUSE CB4 WILL NOT STAY RESET.

THERE IS AN OVERLOAD ON THE -5 V DC CIRCUIT.

THIS SECTION ISOLATES THE SHORT CIRCUIT.

SEE DETAILED DIAGRAM ON PWR 46.

REMOVE THE +8.5 V DC FUSE, CU-PS-02 F1.

REMOVING THE FUSE PREVENTS THE DC POWER FROM HOLDING DURING THIS SECTION.

RESET CB4 (LOC 1).

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.  
(THE DC POWER WILL GO OFF SINCE F1 FUSE IS REMOVED.)

DID CB4 TRIP?

Y N  
| |

A B

MAP 0430—Tape Control Unit -5 Volt CB Tripped PWR 430-1

A B

002

THE TROUBLE HAS DISAPPEARED.

REINSTALL FUSE F1.  
GO TO PAGE 6, STEP 020,  
ENTRY POINT E.

003

SET THE SERVICE SWITCH TO OFF (LOC 1).

DISCONNECT THE 01A-A1 VOLTAGE CROSSOVERS (6):  
B3 E01, B4 E01, B5 E01  
U3 E01, U4 E01, U5 E01  
(SEE AID PAGE YZ002).

SET THE SERVICE SWITCH TO ON (LOC 1).  
RESET CB4.

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.

DID CB4 TRIP?

Y N  
| |

2 2  
C D

D -5 VOLT CB TRIPPED  
1

PAGE 2 OF 6

004

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

RECONNECT THE 01A-A1 VOLTAGE  
CROSSOVERS (6).  
B3 E01, B4 E01, B5 E01  
U3 E01, U4 E01, U5 E01  
(SEE ALD PAGE YZ002).

REMOVE ALL CARDS FROM THE 01A-A1  
BOARD (LOC 1)  
(SEE ALD PAGE AA000).

SET THE SERVICE SWITCH TO ON  
(LOC 1).

PRESS AND HOLD THE IML SWITCH  
(LOC 1).

RELEASE THE IML SWITCH.

DID CB4 TRIP?

Y N

005

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

REINSTALL THE CARDS, ONE AT A  
TIME. DO NOT INSTALL THE TOP  
CARD CONNECTORS (TCC).

EACH TIME A CARD IS INSTALLED;  
-SET THE SERVICE SWITCH TO ON.  
-PRESS AND HOLD THE IML  
SWITCH FOR SEVERAL SECONDS.  
-SET THE SERVICE SWITCH TO OFF.  
-CHECK IF CB4 IS TRIPPED.  
(Step 005 continues)

A LOGIC CARD IS CAUSING THE CB TO  
TRIP.

E

C E

1

(Step 005 continued)

REPEAT THIS STEP UNTIL THE  
FAILING CARD IS LOCATED.  
THEN.....

REINSTALL FUSE F1.

EXCHANGE THE FAILING CARD.

GO TO PAGE 6, STEP 021,  
ENTRY POINT D.

006

THE 01A-A1 BOARD IS FAILING.

REINSTALL FUSE F1.

EXCHANGE FRU139.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 021,  
ENTRY POINT D.

007

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

RECONNECT THE 01A-A1 VOLTAGE  
CROSSOVERS (6).  
B3 E01, B4 E01, B5 E01  
U3 E01, U4 E01, U5 E01  
(SEE ALD PAGE YZ002).

DISCONNECT THE 01A-A2 VOLTAGE  
CROSSOVERS (6):  
B3 E01, B4 E01, B5 E01  
U3 E01, U4 E01, U5 E01  
(SEE ALD PAGE YZ003).  
(Step 007 continues)

MAP 0430—Tape Control Unit DC Power

-5 VOLT CB TRIPPED

PAGE 3 OF 6

(Step 007 continued)

RESET CB2.

SET THE SERVICE SWITCH TO ON  
(LOC 1).

PRESS AND HOLD THE IML SWITCH  
(LOC 1).

RELEASE THE IML SWITCH.

DID CB4 TRIP?  
Y N

008

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

RECONNECT 01A-A2 VOLTAGE  
CROSSOVERS.  
B3 E01, B4 E01, B5 E01  
U3 E01, U4 E01, U5 E01  
(SEE ALD PAGE YZ003).

REMOVE ALL CARDS FROM THE 01A-A2  
BOARD (LOC 1)  
(SEE ALD PAGE AA002).

SET THE SERVICE SWITCH TO ON  
(LOC 1).

PRESS AND HOLD THE IML SWITCH  
(LOC 1).

RELEASE THE IML SWITCH.

DID CB4 TRIP?

Y N

4  
F G H

MAP 0430—Tape Control Unit -5 Volt CB Tripped PWR 430-3

G H

009

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

A LOGIC CARD IS CAUSING THE CB TO  
TRIP.

REINSTALL THE CARDS, ONE AT A  
TIME. DO NOT INSTALL THE TOP  
CARD CONNECTORS (TCC).

EACH TIME A CARD IS INSTALLED;  
-SET THE SERVICE SWITCH TO ON.  
-PRESS AND HOLD THE IML  
SWITCH FOR SEVERAL SECONDS.  
-SET THE SERVICE SWITCH TO OFF.  
-CHECK IF CB4 IS TRIPPED.

REPEAT THIS STEP UNTIL THE  
FAILING CARD IS LOCATED.  
THEN.....

REINSTALL FUSE F1.

EXCHANGE THE FAILING CARD.

GO TO PAGE 6, STEP 021,  
ENTRY POINT D.

010

THE 01A-A2 BOARD IS FAILING.

REINSTALL FUSE F1.

EXCHANGE FRU140.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 021,  
ENTRY POINT D.

F -5 VOLT CB TRIPPED  
3

PAGE 4 OF 6

011

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

RECONNECT 01A-A2 VOLTAGE  
CROSSOVERS.

B3 E01, B4 E01, B5 E01  
U3 E01, U4 E01, U5 E01  
(SEE ALD PAGE YZ003).

POWER SUPPLY REGULATION IS  
MAINTAINED BY USING A RESISTIVE  
PRELOAD. THE RESISTIVE PRELOAD MAY  
BE LOCATED IN CARD SLOT A2P2 OR IN  
A LOAD BOX MOUNTED TO THE FRAME.

IS THERE A CARD LOCATED IN THE A2P2  
SLOT?

Y N

012

DISCONNECT THE LOAD BOX -5 V CABLE  
FROM TB3-7  
(SEE ALD PAGE ZT020).

CHECK FOR A DEFECTIVE LOAD BOX.

RESET CB4.

SET THE SERVICE SWITCH TO ON  
(LOC 1).

PRESS AND HOLD THE IML SWITCH  
(LOC 1).

RELEASE THE IML SWITCH.

DID CB4 TRIP?

Y N

5  
J K L

K L

013

THE LOAD BOX IS FAILING.

EXCHANGE FRU279.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 021,  
ENTRY POINT D.

014

SET THE SERVICE SWITCH TO OFF  
(LOC 1).

RECONNECT THE LOAD BOX -5 V CABLE.

DISCONNECT THE CABLE  
CU-PS-02 P4 (LOC 1).

CHECK FOR CONTINUITY FROM CU-PS-02  
P4-2 TO FRAME GROUND. THE METER  
SHOULD INDICATE AN OPEN CIRCUIT.

DOES THE METER INDICATE AN OPEN  
CIRCUIT?

Y N

015

THERE IS A SHORT CIRCUIT FROM  
CU-PS-02 P4-2 TO FRAME GROUND.

LOCATE AND REPAIR THE SHORT  
CIRCUIT USING PWR 46 AS A  
TROUBLESHOOTING AID.

GO TO PAGE 6, STEP 020,  
ENTRY POINT E.

5  
M

MAP 0430—Tape Control Unit DC Power

J M -5 VOLT CB TRIPPED  
4 4

PAGE 5 OF 6

016

THE TAPE CONTROL UNIT DC SUPPLY,  
CU-PS-02, IS FAILING (LOC 1).

EXCHANGE FRU145.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 021,  
ENTRY POINT D.

017

DISCONNECT THE CABLE  
CU-PS-02 P4 (LOC 1).

CHECK FOR CONTINUITY FROM CU-PS-02  
P4-2 TO FRAME GROUND. THE METER  
SHOULD INDICATE AN OPEN CIRCUIT.

DOES THE METER INDICATE AN OPEN  
CIRCUIT?

Y N

018

THERE IS A SHORT CIRCUIT FROM  
CU-PS-02 P4-2 TO FRAME GROUND.

LOCATE AND REPAIR THE SHORT  
CIRCUIT USING PWR 46 AS A  
TROUBLESHOOTING AID.

GO TO PAGE 6, STEP 020,  
ENTRY POINT E.

N

MAP 0430—Tape Control Unit -5 Volt CB Tripped PWR 430-5

N

019

THE TAPE CONTROL UNIT DC SUPPLY,  
CU-PS-02, IS FAILING (LOC 1).

EXCHANGE FRU145.

SEE CARR-TCU 1-1.

GO TO PAGE 6, STEP 021,  
ENTRY POINT D.



-5 VOLT CB TRIPPED

PAGE 6 OF 6

020  
(ENTRY POINT E)  
CLEANUP AFTER REPAIR.

SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO THE OFF POSITION  
(LOC 1).

REMOVE ANY JUMPERS USED FOR  
TROUBLESHOOTING.

RECONNECT ANY CABLES REMOVED FOR  
TROUBLESHOOTING.

RE-INSTALL ANY FUSES REMOVED FOR  
TROUBLESHOOTING.

RESET ANY CB TRIPPED FOR  
TROUBLESHOOTING.

GO TO MAP 0190, ENTRY POINT A.

021  
(ENTRY POINT D)  
RETURN AFTER REPAIR.

REFER TO THE CE/HSC SECTION OF THE  
MG AND RUN GMP.

MAP 0440—Tape Control Unit DC Power

TCU +8.5 VOLT FUSE BLOWS

PAGE 1 OF 5

ENTRY POINTS

| FROM       | ENTER THIS MAP |             |             |
|------------|----------------|-------------|-------------|
| MAP NUMBER | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| 0400       | A              | 1           | 001         |
| 0401       | C              | 5           | 020         |
| 0401       | D              | 5           | 021         |

EXIT POINTS

| EXIT THIS MAP |             | TO         |             |
|---------------|-------------|------------|-------------|
| PAGE NUMBER   | STEP NUMBER | MAP NUMBER | ENTRY POINT |
| 5             | 020         | 0190       | A           |

001  
(ENTRY POINT A)

MAP DESCRIPTION: MAP 0400 DIRECTED YOU TO THIS MAP BECAUSE FUSE F1 BLOWS REPEATEDLY

THERE IS AN OVERLOAD ON THE +8.5 V CIRCUIT.

THIS SECTION ISOLATES THE SHORT CIRCUIT.

SEE DETAILED DIAGRAM ON PWR 48.

SET CU-PS-02 CB4 TO THE OFF POSITION (LOC 1).

TRIPPING THE CB PREVENTS THE DC POWER FROM HOLDING DURING THIS SECTION.

OPEN THE REAR DOOR OF THE TAPE CONTROL UNIT AND REMOVE THE SUB COVER.

EXCHANGE FUSE F1.  
(SEVERAL FUSES MAY BE NEEDED).

PRESS AND HOLD THE IML SWITCH (LOC 1).  
(Step 001 continues)

(Step 001 continued)

RELEASE THE IML SWITCH.  
(THE DC POWER WILL GO OFF SINCE CB4 IS TRIPPED.)

IS FUSE F1 BLOWN?

Y N

002

THE TROUBLE HAS DISAPPEARED.

RESET CB4  
GO TO PAGE 5, STEP 020,  
ENTRY POINT C.

003

SET THE SERVICE SWITCH TO OFF (LOC 1).

DISCONNECT THE 01A-A1 VOLTAGE CROSSOVERS (6):  
B2 A14, B3 A14, B4 A14  
U2 A14, U3 A14, U4 A14  
(SEE ALD PAGE YZ002).

EXCHANGE FUSE F1.

SET THE SERVICE SWITCH TO ON (LOC 1).

PRESS AND HOLD THE IML SWITCH FOR SEVERAL SECONDS.

RELEASE THE IML SWITCH.

IS FUSE F1 BLOWN?

Y N

2 2  
A B

B +8.5 VOLT FUSE BLOWS

1

PAGE 2 OF 5

004

SET THE SERVICE SWITCH TO OFF (LOC 1).

RECONNECT THE 01A-A1 VOLTAGE CROSSOVERS (6).  
B2 A14, B3 A14, B4 A14  
U2 A14, U3 A14, U4 A14  
(SEE ALD PAGE YZ002).

REMOVE ALL CARDS FROM THE 01A-A1 BOARD (LOC 7) (LOC 1).  
(SEE ALD PAGE AA000).

SET THE SERVICE SWITCH TO ON (LOC 1).

PRESS AND HOLD THE IML SWITCH FOR SEVERAL SECONDS.

RELEASE THE IML SWITCH.

IS FUSE F1 BLOWN?

Y N

005

SET THE SERVICE SWITCH TO OFF (LOC 1).

A LOGIC CARD IS CAUSING THE CB TO TRIP.

REINSTALL THE CARDS, ONE AT A TIME. DO NOT INSTALL THE TOP CARD CONNECTORS (TCC).

EACH TIME A CARD IS INSTALLED;  
-SET THE SERVICE SWITCH TO ON.  
-PRESS AND HOLD THE IML SWITCH FOR SEVERAL SECONDS.  
-SET THE SERVICE SWITCH TO OFF.  
-CHECK IF F1 IS BLOWN.  
(Step 005 continues)

C

A C

1

(Step 005 continued)

REPEAT THIS STEP UNTIL THE FAILING CARD IS LOCATED.  
THEN.....

-----  
RESET CB4.

EXCHANGE THE FAILING CARD.

GO TO PAGE 5, STEP 021, ENTRY POINT D.

006

THE 01A-A1 BOARD IS FAILING.

EXCHANGE FRU139.

SEE CARR-TCU 1-1.

GO TO PAGE 5, STEP 021, ENTRY POINT D.

007

SET THE SERVICE SWITCH TO OFF (LOC 1).

DISCONNECT THE 01A-A2 VOLTAGE CROSSOVERS (6):  
B2 A14, B3 A14, B4 A14  
U2 A14, U3 A14, U4 A14  
(SEE ALD PAGE YZ003).

EXCHANGE FUSE F1.

SET THE SERVICE SWITCH TO ON (LOC 1).

PRESS AND HOLD THE IML SWITCH (LOC 1).  
(Step 007 continues)

MAP 0440—Tape Control Unit DC Power

+8.5 VOLT FUSE BLOWS

PAGE 3 OF 5

(Step 007 continued)

RELEASE THE IML SWITCH.

IS FUSE F1 BLOWN?

Y N

008

SET THE SERVICE SWITCH TO OFF (LOC 1).

RECONNECT 01A-A2 VOLTAGE CROSSOVERS (6).  
B2 A14, B3 A14, B4 A14  
U2 A14, U3 A14, U4 A14  
(SEE ALD PAGE YZ003).

REMOVE ALL CARDS FROM THE 01A-A2 BOARD (LOC 7) (LOC 1).  
(SEE ALD PAGE AA002).

SET THE SERVICE SWITCH TO ON (LOC 1).

PRESS AND HOLD THE IML SWITCH FOR SEVERAL SECONDS.

RELEASE THE IML SWITCH.

IS FUSE F1 BLOWN?

Y N

D E F

MAP 0440—Tape Control Unit + 8.5 Volt Fuse Blows PWR 440-3

E F

009

SET THE SERVICE SWITCH TO OFF (LOC 1).

A LOGIC CARD IS CAUSING THE FUSE TO BLOW.

REINSTALL THE CARDS, ONE AT A TIME. DO NOT INSTALL THE TOP CARD CONNECTORS (TCC).

EACH TIME A CARD IS INSTALLED;  
-SET THE SERVICE SWITCH TO ON.  
-PRESS AND HOLD THE IML SWITCH FOR SEVERAL SECONDS.  
-SET THE SERVICE SWITCH TO OFF.  
-CHECK IF F1 IS BLOWN.

REPEAT THIS STEP UNTIL THE FAILING CARD IS LOCATED.  
THEN.....  
-----

RESET CB4.

EXCHANGE THE FAILING CARD.

GO TO PAGE 5, STEP 021, ENTRY POINT D.

010

THE 01A-A2 BOARD IS FAILING.

EXCHANGE FRU140

GO TO PAGE 5, STEP 021, ENTRY POINT D.

011

POWER SUPPLY REGULATION IS MAINTAINED BY USING A RESISTIVE PRELOAD. THE RESISTIVE PRELOAD MAY BE LOCATED IN CARD SLOT A2P2 OR IN A LOAD BOX MOUNTED TO THE FRAME.

IS THERE A CARD LOCATED IN THE A2P2 SLOT?

Y N

012

SET THE SERVICE SWITCH TO OFF (LOC 1).

DISCONNECT THE LOAD BOX +8.5 V CABLE FROM TB3-2  
(SEE ALD PAGE ZT020).

EXCHANGE FUSE F1.

SET THE SERVICE SWITCH TO ON (LOC 1).

PRESS AND HOLD THE IML SWITCH (LOC 1).

RELEASE THE IML SWITCH.

IS FUSE F1 BLOWN?

Y N

4 4 4  
6 H J

H J +8.5 VOLT FUSE BLOWS  
3 3

PAGE 4 OF 5

013

THE LOAD BOX IS FAILING.

EXCHANGE FRU279

SEE CARR-TCU 1-1

GO TO PAGE 5, STEP 021,  
ENTRY POINT D.

014

DISCONNECT THE CABLE  
CU-PS-02 P4 (LOC 1).

CHECK FOR CONTINUITY FROM CU-PS-02  
P4-1 TO FRAME GROUND. THE METER  
SHOULD INDICATE AN OPEN CIRCUIT.

DOES THE METER INDICATE AN OPEN  
CIRCUIT?

Y N

015

THERE IS A SHORT CIRCUIT FROM  
CU-PS-02 P4-1 TO FRAME GROUND.

SEE PWR 48 TO HELP ISOLATE THE  
SHORT CIRCUIT.

WHEN THE PROBLEM IS CORRECTED,  
RECONNECT THE VOLTAGE CROSSOVERS  
TO THE 01A-A1 AND 01A-A2 BOARDS  
(YZ002) (YZ003).

GO TO PAGE 5, STEP 020,  
ENTRY POINT C.

K

G K  
3

016

THE TAPE CONTROL UNIT DC SUPPLY,  
CU-PS-02, IS FAILING (LOC 1).

SEE CARR-TCU 1-1

EXCHANGE FRU145

GO TO PAGE 5, STEP 021,  
ENTRY POINT D.

017

DISCONNECT THE CABLE  
CU-PS-02 P4 (LOC 1).

CHECK FOR CONTINUITY FROM CU-PS-02  
P4-1 TO FRAME GROUND. THE METER  
SHOULD INDICATE AN OPEN CIRCUIT.

DOES THE METER INDICATE AN OPEN  
CIRCUIT?

Y N

018

THERE IS A SHORT CIRCUIT FROM  
CU-PS-02 P4-1 TO FRAME GROUND.

SEE PWR 48 TO HELP ISOLATE THE  
SHORT CIRCUIT.

WHEN THE PROBLEM IS CORRECTED,  
RECONNECT THE VOLTAGE CROSSOVERS  
TO THE 01A-A1 AND 01A-A2 BOARDS  
(YZ002) (YZ003).

GO TO PAGE 5, STEP 020,  
ENTRY POINT C.

5  
L

**MAP 0440—Tape Control Unit DC Power**

L +8.5 VOLT FUSE BLOWS  
4

PAGE 5 OF 5

019

THE TAPE CONTROL UNIT DC SUPPLY,  
CU-PS-02, IS FAILING (LOC 1).

SEE CARR-TCU 1-1

EXCHANGE FRU145

GO TO STEP 021,  
ENTRY POINT D.

**MAP 0440—Tape Control Unit +8.5 Volt Fuse Blows PWR 440-5**

020  
(ENTRY POINT C)  
CLEANUP AFTER REPAIR.

SET THE TAPE CONTROL UNIT POWER  
ON/OFF SWITCH TO THE OFF POSITION  
(LOC 1).

REMOVE ANY JUMPERS USED FOR  
TROUBLESHOOTING.

RECONNECT ANY CABLES REMOVED FOR  
TROUBLESHOOTING.

RE-INSTALL ANY FUSES USED FOR  
TROUBLESHOOTING.

RESET ANY CB'S TRIPPED FOR  
TROUBLESHOOTING.

GO TO MAP 0190, ENTRY POINT A.

021  
(ENTRY POINT D)  
RETURN AFTER REPAIR.

REFER TO THE CE/HSC SECTION OF THE  
MG AND RUN GMP.

AUTOMATIC CARTRIDGE LOADER PROCEDURE

PAGE 1 OF 6

ENTRY POINTS

| FROM       | ENTER THIS MAP |             |             |
|------------|----------------|-------------|-------------|
| MAP NUMBER | ENTRY POINT    | PAGE NUMBER | STEP NUMBER |
| 0000       | A              | 1           | 001         |

EXIT POINTS

| EXIT THIS MAP |             | TO         |             |
|---------------|-------------|------------|-------------|
| PAGE NUMBER   | STEP NUMBER | MAP NUMBER | ENTRY POINT |
| 3             | 024         | 0200       | A           |
| 4             | 030         | 0200       | A           |

001  
(ENTRY POINT A)

YOU ARE HERE BECAUSE THE POWER-ON LED AT THE OPERATOR PANEL OF THE AUTOMATIC CARTRIDGE LOADER IS NOT ON.

DANGER

LETHAL VOLTAGES ARE PRESENT IN THE POWER SERVICE AREA. SAFETY IS MOST IMPORTANT. TREAT ALL CIRCUITS AS LIVE UNTIL MEASURED.

BECAUSE THIS FAILURE HAS BEEN IDENTIFIED AS A SINGLE DRIVE PROBLEM (THE OTHER DRIVE IN THE TAPE TRANSPORT UNIT IS OPERATIONAL) NO ANALYSIS OF AC INPUT VOLTAGES WILL BE MADE.

ON THE FAILING DRIVE, SET THE ONLINE/OFFLINE SWITCH TO OFFLINE. POWER OFF THE FAILING DRIVE.

CONTINUITY CHECK THE +5 V LOADER FUSE.

(Step 001 continues)

+5 V FUSE IS THE LOWER FUSE ON THE LOADER.  
REFER TO MG LOC 1 FOR LOCATION.

(Step 001 continued)

IS THE FUSE OK?

Y N

002

HAS THE FUSE BEEN EXCHANGED BEFORE?

Y N

003

EXCHANGE THE +5 V LOADER FUSE.

POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?

Y N

004

GO TO STEP 001,  
ENTRY POINT A.

005

GO TO PAGE 5, STEP 030,  
ENTRY POINT C.

006

EXCHANGE THE LOADER CONTROL CARD.

SEE CARR-DR 1-1.  
FRU 281, ALD AL001

EXCHANGE THE +5 V LOADER FUSE.  
POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?

Y N

2 2 2  
A B C

MAP 0900 - Automatic Cartridge Loader Procedure

A B C PWR 0900  
1 1 1

PAGE 2 OF 6

007  
EXCHANGE THE LOADER OPERATOR PANEL.

SEE CARR-DR 1-1.  
FRU 298, ALD AL002

EXCHANGE THE +5 V LOADER FUSE.  
POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?  
Y N

008  
GO TO POWER 30.

009  
GO TO PAGE 5, STEP 038,  
ENTRY POINT C.

010  
GO TO PAGE 5, STEP 038,  
ENTRY POINT C.

011  
CONTINUITY CHECK THE +24 V LOADER FUSE.

+24 V FUSE IS THE UPPER FUSE ON THE  
LOADER.  
REFER TO MG LOC 1 FOR LOCATION.

IS THE FUSE OK?  
Y N

012  
HAS THE FUSE BEEN EXCHANGED BEFORE?  
Y N

3  
D E F

E F

013  
EXCHANGE THE +24 V LOADER FUSE.  
POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?  
Y N

014  
GO TO PAGE 1, STEP 001,  
ENTRY POINT A.

015  
GO TO PAGE 5, STEP 038,  
ENTRY POINT C.

016  
EXCHANGE THE LOADER CONTROL CARD. SEE CARR-DR 1-1.  
FRU 281, ALD AL001

EXCHANGE THE +24 V LOADER FUSE.  
POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?  
Y N

017  
EXCHANGE THE LOADER OPERATOR PANEL. SEE CARR-DR 1-1.  
FRU 298, ALD AL002

EXCHANGE THE +24 V LOADER FUSE.  
POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?  
Y N

018  
GO TO POWER 30.

3 3  
G H



D G H PWR 0900  
2 2 2

PAGE 3 OF 6

019  
GO TO PAGE 5, STEP 038,  
ENTRY POINT C.

020  
GO TO PAGE 5, STEP 038,  
ENTRY POINT C.

021  
VERIFY THAT THE CONNECTIONS FROM THE  
LOADER POWER CABLE TO THE FUSE HOLDERS  
ARE GOOD.  
POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?  
Y N

022  
DISCONNECT LOADER POWER CABLE  
(CONNECTOR J3) FROM LOADER CONTROL  
CARD.

REFER TO MG LOC 1 FOR CONNECTOR  
DIAGRAM.

POWER ON THE DRIVE AND MEASURE  
VOLTAGE ACROSS AL-D0/1-CC-P3-4 (+5V)  
AND AL-D0/1-CC-P3-3 (COM) WITH A  
VOLTMETER.

IS VOLTAGE WITHIN LIMIT +4.5 AND +5.5  
V DC?  
Y N

6 4  
J K L

L

023

POWER OFF THE DRIVE AND DISCONNECT THE  
INTERPOSER CABLE AND CONNECTOR FROM THE  
POWER DISTRIBUTION CABLE CONNECTOR.

REFER TO MG LOC 1 FOR CONNECTOR  
DIAGRAM.

POWER ON THE DRIVE AND MEASURE VOLTAGE  
ACROSS TU-D0/1-P1-P1-3 (+5 V) AND  
TU-D0/1-P1-P1-9 (COM) WITH A VOLTMETER.

SEE ALD ZZ020 OR ALD ZZ120

IS VOLTAGE WITHIN LIMIT +4.5 AND +5.5  
V DC?

Y N

024

GO TO MAP 0200, ENTRY POINT A.

025

POWER OFF THE DRIVE.  
RE-CONNECT THE INTERPOSER CABLE AND  
CONNECTOR TO THE POWER DISTRIBUTION  
CABLE CONNECTOR.

REMOVE THE LOADER MECHANICAL ASSEMBLY.

SEE CARR-DR 1-1,  
FRU 285.

POWER ON THE DRIVE AND MEASURE THE  
VOLTAGE ACROSS TU-D0/1-P1-J6-1 (+5 V)  
AND TU-D0/1-P1-J6-2 (COM).

IS VOLTAGE WITHIN LIMIT +4.5 AND +5.5  
V DC?

Y N

4 4  
M N

K M N PWR 0900  
3 3 3

PAGE 4 OF 6

026

THE INTERPOSER CABLE AND CONNECTOR IS DEFECTIVE.

EXCHANGE THE INTERPOSER CABLE AND CONNECTOR.  
GO TO PAGE 5, STEP 038, ENTRY POINT C.

SEE CARR-DR 1-1.  
FRU 269, ALD ZZ020/120.

027

THE LOADER POWER CABLE IS DEFECTIVE.

EXCHANGE THE LOADER POWER CABLE.

GO TO PAGE 5, STEP 038, ENTRY POINT C.

SEE CARR-DR 1-1.  
FRU 287, ALD ZZ020/120.

028

MEASURE VOLTAGE ACROSS CC-P3-2 (+24 V) AND CC-P3-1 (COM) WITH A VOLTMETER.

REFER TO MG LOC 1 FOR CONNECTOR DIAGRAM.

IS VOLTAGE WITHIN LIMIT +21.6 AND +26.4 V DC?

Y N

5  
P Q

Q

029

POWER OFF THE DRIVE AND DISCONNECT THE INTERPOSER CABLE AND CONNECTOR FROM THE POWER DISTRIBUTION CABLE CONNECTOR.

REFER TO MG LOC 1 FOR CONNECTOR DIAGRAM.

POWER ON THE DRIVE AND MEASURE VOLTAGE ACROSS TU-D0/1-P1-P2-1 (+24 V) AND TU-D0/1-P1-P2-7 (COM) WITH A VOLTMETER.

ALD ZZ020 OR ALD ZZ120.

IS VOLTAGE WITHIN LIMIT +21.6 AND +26.4 V DC?

Y N

030

GO TO MAP 0200, ENTRY POINT A.

031

POWER OFF THE DRIVE.  
RE-CONNECT THE INTERPOSER CABLE AND CONNECTOR TO THE POWER DISTRIBUTION CABLE CONNECTOR.

REMOVE THE LOADER MECHANICAL ASSEMBLY.

SEE CARR-DR 1-1,  
FRU 285.

POWER ON THE DRIVE AND MEASURE THE VOLTAGE ACROSS TU-D0/1-P1-J6-3 (+24 V) AND TU-D0/1-P1-J6-2 (COM).

IS VOLTAGE WITHIN LIMIT +21.6 AND +26.4 V DC?

Y N

5 5  
R S

P R S PWR 0900  
4 4 4

PAGE 5 OF 6

032

THE INTERPOSER CABLE AND CONNECTOR IS DEFECTIVE.

EXCHANGE THE INTERPOSER CABLE AND CONNECTOR.  
GO TO STEP 038,  
ENTRY POINT C.

SEE CARR-DR 1-1.  
FRU 269, ALD ZZ020/120.

033

THE LOADER POWER CABLE IS DEFECTIVE.

EXCHANGE THE LOADER POWER CABLE.

GO TO STEP 038,  
ENTRY POINT C.

SEE CARR-DR 1-1.  
FRU 287, ALD ZZ020/120.

034

POWER OFF THE DRIVE.

RE-CONNECT CONNECTOR J3 AND MAKE CERTAIN THAT THE CONNECTION IS GOOD.

POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?

Y N

T U

T U

035

EXCHANGE THE LOADER OPERATOR PANEL.

SEE CARR-DR 1-1.  
FRU 298, ALD AL002.

POWER ON THE DRIVE.

IS THE LOADER POWER-ON LED ON?

Y N

036

EXCHANGE THE LOADER CONTROL CARD.

SEE CARR-DR 1-1.  
FRU 281, ALD AL001.

GO TO STEP 038,  
ENTRY POINT C.

037

GO TO STEP 038,  
ENTRY POINT C.

038

(ENTRY POINT C)

RECONNECT ANY CABLES REMOVED FOR TROUBLESHOOTING.  
REPLACE ANY FUSES REMOVED FOR TROUBLESHOOTING.  
REPLACE ANY FRUS REMOVED FOR TROUBLESHOOTING.

SET THE ONLINE/OFFLINE SWITCH TO ONLINE.

REFER TO THE CE/HSC SECTION AND RUN GMP.

J PWR 0900  
3

PAGE 6 OF 6

039  
GO TO PAGE 5, STEP 038,  
ENTRY POINT C.

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| Byte 31 - Data Byte Count .....                                     | 160 |
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|  |     |
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| Byte 9 - Read Backward Data Checks .....                 | 170 |
| Byte 10 - Write Data Checks .....                        | 170 |
| Byte 11 - Read Blocks Corrected .....                    | 170 |
| Byte 12 - Write Blocks Corrected .....                   | 170 |
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| Bytes 14 and 15 - Read Bytes Processed .....             | 170 |
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| Bytes 28 and 29 - Tape Control Unit Serial Number .....  | 190 |
| Byte 30 - Read Recovery Retry Count .....                | 190 |
| Byte 31 - Drive Address .....                            | 190 |
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| Byte 9 - Device Write Forward Data Checks .....          | 220 |
| Byte 10 - Device Read Backward Data Checks .....         | 220 |
| Byte 11 - Reserved .....                                 | 220 |
| Byte 12 - Device Read Criteria Data Checks .....         | 220 |
| Byte 13 - Device Write Criteria Data Checks .....        | 220 |
| Byte 14 - Device Read Recovery Erase Gaps .....          | 220 |
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|  |     |
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| Bytes 28-29 - Tape Control Unit Serial Number .....    | 240 |
| Byte 30 - Drive Address .....                          | 240 |
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## Sense Description

The TA90 subsystem tape control unit and tape drive microprocessors repeatedly check all subsystem operations for errors. Some errors can be corrected by the subsystem microcode and error correction circuits. These errors are recorded for later analysis if necessary. Other errors that cannot be corrected cause an interruption in subsystem operation. All available information about the error is recorded as sense data to aid in finding the subsystem problem that caused the error.

Sense data is recorded in four formats—19, 20, 21, and 30. Each tape drive has sense data stored in the tape control unit. Each tape drive has 32 bytes of sense data in each format stored in the TA90 Model AD2 tape control unit. A Sense command causes Formats 19 and 20 data to be transferred to the STI-FIPS Adapter. A Read Buffered Log command causes Format 21 or 30 to be sent to the STI-FIPS adapter.

### How to Determine the Sense Data Format

Sense bytes 0 through 7 are common to the five sense formats. See SENSE 105 through SENSE 130 for a detailed description of these eight bytes. The format of bytes 8 through 31 is indicated in sense byte 7.

**Note:** The bits in the sense bytes are numbered 0 through 7, starting on the left.

- Sense byte 7 = hexadecimal 19 or 20 (format 19 or 20).

Bytes 8 to 31 of both formats contain drive and tape control unit error information. However, when Format 19 is indicated, the Force Error Logging bit has been set by the system and the sense data is also logged in an Error Log Report.

**Note:** Format 19 data is only present when forced logging has been enabled by the CE panel. Forced logging is used by field service as a troubleshooting tool.

- Sense byte 7 = hexadecimal 21 (format 21).

Bytes 8 to 31 contain statistical information about subsystem operations.

- Sense byte 7 = hexadecimal 30 (format 30).

Bytes 8 to 63 contain statistical information about subsystem operations.

### Formats 19 and 20

Formats 19 and 20 consist of drive and tape control unit error information. The formats are given when a Sense command is received by the selected drive.

Sense data in formats 19 and 20 are not valid for a drive after the following operations:

- System reset
- Selective reset
- Power on reset
- Any I/O command other than Test I/O or NOP after a contingent connection
- A temporary error that has been recovered.

See SENSE 135 through SENSE 160 for a detailed description of the formats 19 and 20 sense bytes.

### Format 21

Format 21 consists of 32 bytes of command when the Improved Data Recording Capability feature is not installed or allowed.

Format 21 is also given when:

- A Sense command is received and one or more of the statistical error counters has an overflow.

Buffered log (format 21) data is reset to zero after a:

- Read Buffered Log command
- System reset
- Selective reset
- Power on reset.

If a unit check occurs, the tape control unit keeps a contingent connection to the selected drive on the same channel path as the original unit check was received. This contingent connection is kept until a command other than Test I/O or NOP is received by that drive. The STI-FIPS Adapter usually sends a Sense command to get the failure information.

See SENSE 165 through SENSE 190 for a detailed description of the format 21 sense bytes.

**Note:** The bits in the sense bytes are numbered 0 through 7, starting on the left.

### Format 30

Format 30 consists of 64 bytes of buffered log data and is obtained by a Read Buffered Log command when the Improved Data Recording Capability feature is installed and allowed.

See SENSE 215 through 275 for a detailed description of Format 30 sense bytes.

**Sense Byte Summary**

| BYTE/BIT (COMMON) | MEANING   | PAGE |
|-------------------|---|------|
| Byte 0            |   |      |
| Bit 0             | Command reject  | 110  |
| Bit 1             | Intervention required   | 110  |
| Bit 2             | Bus out check   | 110  |
| Bit 3             | Equipment check   | 110  |
| Bit 4             | Data check  | 110  |
| Bit 5             | Overrun   | 110  |
| Bit 6             | Deferred Unit Check   | 110  |
| Bit 7             | Assigned elsewhere  | 110  |
| Byte 1            |   |      |
| Bit 0             | Locate failure  | 110  |
| Bit 1             | Drive online to tape control unit   | 110  |
| Bit 2             | Reserved  |      |
| Bit 3             | Record sequence error   | 110  |
| Bit 4             | Beginning of tape (BOT)   | 110  |
| Bit 5             | Write mode  | 110  |
| Bit 6             | Write protect   | 110  |
| Bit 7             | Not capable   | 110  |
| Byte 2            |   |      |
| Bits 0-3          | Reporting channel path  | 110  |
| Bit 4             | Reporting tape control unit   | 110  |
| Bit 4             | Tape control unit ID  | 110  |
| Bit 5             | Automatic cartridge loader active   | 110  |
| Bit 6             | Tape synchronous mode   | 110  |
| Bit 7             | Tape positioning  | 110  |
| Byte 3            | Error Recovery Action (ERA) code  | 115  |
| Byte 4            |   |      |
| Bits 0-1          | Format indication<br>00 = Standard TA90 format<br>01 = Reserved<br>10 = TA90 Improved Data Recording Capability<br>11 = Special Marks | 130  |
| Bits 2-7          | High-order channel logical block number   | 130  |
| Bytes 5 and 6     | Low-order channel logical block number  | 130  |
| Byte 7            | Format of bytes 8-31  | 130  |

| BYTE/BIT (FORMATS 19 AND 20) | MEANING                                      | PAGE |
|------------------------------|--|------|
| Byte 8                       | Drive Error Recovery Action (ERA) code       | 140  |
| Byte 9                       | First TCU microcode error flags              | 140  |
| Bytes 10 and 11              | First TCU microcode error code               | 140  |
| Bytes 12 and 13              | Second TCU microcode error code              | 140  |
| Bytes 14 and 15              | Last TCU microcode error code                | 140  |
| Bytes 16 and 17              | TCU hardware error code                      | 150  |
| Byte 18                      | Drive flag 1                                 | 150  |
| Byte 19                      |  | 150  |
| Bits 0-5                     | Reserved                                     |      |
| Bit 6                        | Drive Model BDx                              |      |
| Bit 7                        | Reserved                                     |      |
| Byte 20                      | Drive command code 1                         | 150  |
| Byte 21                      | Drive error code 1                           | 150  |
| Byte 22                      | Drive command code 2                         | 150  |
| Byte 23                      | Drive error code 2                           | 150  |
| Byte 24                      |  |      |
| Bits 0-3                     | Channel adapters installed                   | 160  |
| Bits 4-7                     | Data transfer mode                           | 160  |
| Byte 24                      | Tape control unit channel adapters installed | 160  |
| Byte 25                      | Tape control unit feature                    | 160  |
| Bit 0                        | Two tape control units feature               | 160  |
| Bit 1-3                      | Reserved                                     | 160  |
| Bit 4                        | Improved Data Recording Capability Allowed   | 160  |
| Bit 5                        | Improved Data Recording Capability Installed | 160  |
| Bit 6                        | Upgraded buffer                              | 160  |
| Bit 7                        | Automatic cartridge loader installed         | 160  |
| Byte 26                      | Tape control unit microcode EC level         | 160  |

| BYTE/BIT (FORMATS 19 AND 20) | MEANING   | PAGE |
|------------------------------|---|------|
| Byte 27                      | Hardware tape control unit information                        | 160  |
| Bit 0                        | Tape control unit EC switch 0                                 | 160  |
| Bit 1                        | Tape control unit EC switch 1                                 | 160  |
| Bits 0 and 1                 | Tape control unit hardware flags                              | 160  |
| Bit 2                        | 1 = Tape control unit has only Model BDx tape transport units | 160  |
| Bit 3                        | Tape control unit EC switch 2                                 | 160  |
| Bits 4-7                     | Tape control unit serial number (high-order digit)            | 160  |
| Bytes 28 and 29              | Tape control unit serial number (low-order digit)             | 160  |
| Byte 30                      | Drive address   | 160  |
| Bits 0-3                     | Logical drive address   | 160  |
| Bits 4-7                     | Physical drive address  | 160  |
| Byte 31                      | Buffered data bytes   | 160  |
| BYTE/BIT (FORMAT 21)         | MEANING   | PAGE |
| Byte 8                       | Read forward data checks                                      | 170  |
| Byte 9                       | Read backward data checks                                     | 170  |
| Byte 10                      | Write data checks   | 170  |
| Byte 11                      | Read blocks corrected   | 170  |
| Byte 12                      | Write blocks corrected  | 170  |
| Byte 13                      | Tape control unit equipment checks                            | 170  |
| Bytes 14 and 15              | Read bytes processed  | 170  |
| Bytes 16 and 17              | Write bytes processed   | 180  |
| Byte 18                      | Read blocks processed   | 180  |
| Byte 19                      | Write blocks processed  | 180  |
| Byte 20                      | Write transient conditions                                    | 180  |
| Byte 21                      | Read transient conditions                                     | 180  |
| Byte 22                      | Criteria write data checks                                    | 180  |
| Byte 23                      | Criteria read data checks                                     | 180  |
| Byte 24                      | Write recovery erase gap count                                | 190  |
| Byte 25                      | Drive detected errors   | 190  |
| Byte 26                      | Low order of read or write blocks processed                   | 190  |

**Sense Byte Summary SENSE 102**

|                 |   |     |
|-----------------|---|-----|
| Byte 27         | Hardware tape control unit information                        | 190 |
| Bit 0           | Not defined   |     |
| Bit 1           | 0 = Digital model TA90  |     |
| Bit 2           | 0 = Reserved  | 190 |
|                 | 1 = Tape control unit has only Model BDx tape transport units | 190 |
| Bit 3           | Tape control unit hardware flag                               | 190 |
| Bits 4-7        | Tape control unit serial number (high-order digit)            | 190 |
| Bytes 28 and 29 | Tape control unit serial number (low-order digit)             | 190 |
| Byte 30         | Read recovery retry count                                     | 190 |
| Byte 31         | Drive address   | 190 |
| Bits 0-3        | Logical drive address   | 190 |
| Bits 4-7        | Physical drive address  | 190 |



Sense Byte Summary (Continued)

| BYTE/BIT (Format 30)<br>(COMMON) | MEANING   | PAGE |
|----------------------------------|---|------|
| Byte 8                           | Device read forward data checks   | 220  |
| Byte 9                           | Device write forward data data checks                                   | 220  |
| Byte 10                          | Device read backward data checks  | 220  |
| Byte 11                          | Reserved  | 220  |
| Byte 12                          | Device read criteria data checks  | 220  |
| Byte 13                          | Device write criteria data checks                                       | 220  |
| Byte 14                          | Device read recovery retries  | 220  |
| Byte 15                          | Device write recovery erase gaps  | 220  |
| Byte 16                          | Device read transient conditions  | 230  |
| Byte 17                          | Device write transient conditions                                       | 230  |
| Byte 18                          | Device read blocks corrected  | 230  |
| Byte 19                          | Device write blocks corrected   | 230  |
| Bytes 20-21                      | Reserved  | 230  |
| Byte 22                          | Channel read data request timeouts                                      | 230  |
| Byte 23                          | Channel write data request timeouts                                     | 230  |
| Byte 24                          | Channel transfer equipment checks                                       | 240  |
| Byte 25                          | Drive detected errors   | 240  |
| Byte 26                          | Device and/or Cartridge Action  | 240  |
| Byte 27                          | Hardware tape control unit information                                  | 240  |
| Bit 0                            | Tape control unit EC switch 0   | 240  |
| Bit 1                            | Tape control unit EC switch 1   | 240  |
| Bit 2                            | 0 = Reserved<br>1 = Tape Control unit has only Model BDX tape transport |      |
| units                            |   |      |
| Bit 3                            | Tape control unit EC switch 2   | 240  |
| Bits 4-7                         | Tape control unit serial number (high order digit)                      | 240  |
| Bytes 28-29                      | Tape control unit serial number (low order digit)                       | 240  |
| Byte 30                          |   |      |
| Bits 0-3                         | Logical drive address   | 240  |
| Bits 4-7                         | Physical drive address  | 240  |
| Byte 31                          | Reserved  | 240  |

Sense Byte Summary (Continued) SENSE 103

| BYTE/BIT (Format 30)<br>(COMMON) | MEANING                        | PAGE |
|----------------------------------|--------------------------------|------|
| Bytes 32-34                      | Channel read bytes processed   | 250  |
| Bytes 35-37                      | Channel write bytes processed  | 250  |
| Bytes 38-40                      | Device read bytes processed    | 250  |
| Bytes 41-43                      | Device write bytes processed   | 260  |
| Bytes 44-46                      | Channel read blocks processed  | 260  |
| Bytes 47-49                      | Channel write blocks processed | 260  |
| Bytes 50-52                      | Device read block processed    | 270  |
| Bytes 53-55                      | Device write blocks processed  | 270  |
| Bytes 56-63                      | Reserved                       | 270  |

| FORMATS 19, 20, 21, and 30 BYTES 0-2 |                      |                       |               |                       |                         |                                   |                                    |                             |
|--------------------------------------|----------------------|-----------------------|---------------|-----------------------|-------------------------|-----------------------------------|------------------------------------|-----------------------------|
| BYTE                                 | BIT 0                | BIT 1                 | BIT 2         | BIT 3                 | BIT 4                   | BIT 5                             | BIT 6                              | BIT 7                       |
| 0                                    | Command Reject       | Intervention Required | Bus Out Check | Equipment Check       | Data Check              | Overrun                           | Deferred Unit Check                | Assigned Elsewhere          |
| 1                                    | Locate Failure       | Device Online to TCU  | Reserved      | Record Sequence Error | Beginning-of-Tape (BOT) | Write Mode                        | Write Protect                      | Not Capable                 |
| 2                                    | Channel Adapter Code |                       |               | Channel Assignment    | Tape Control Unit ID    | Automatic Cartridge Loader Active | Drive In Synchronous Data Transfer | Block ID Position Indicator |

## Formats 19, 20, 21, and 30 Sense Bytes 0-2 Description

Sense bytes 0-7 are common to all formats. Bytes 0-2 have the following meaning:

### Byte 0

**Bit 0 - Command Reject:** Bit 0 is set when:

- A Write, Write Tape Mark, Erase Gap, or Data Security Erase command is sent to a tape that is file protected.
- The tape control unit receives a not valid command.
- A Data Security Erase command is sent that is not command-chained to an Erase Gap command.
- The subsystem received an inhibited supervisor channel command.
- The subsystem senses a not valid channel program sequence.
- A not valid argument is specified in a command.

**Bit 1 - Intervention Required:** Bit 1 is set when the addressed drive is not ready or does not exist.

**Bit 2 - Bus Out Check:** Bit 2 is set when the channel bus out has wrong parity during a command or flag byte movement.

**Bit 3 - Equipment Check:** Bit 3 is set when:

- An error is sensed during a read operation in read buffered mode.
- No other bit is set in sense bytes 0 and 1 and there is an error for the drive.

**Bit 4 - Data Check:** Bit 4 is set when an error is sensed during an operation in which data is being written on or read from the tape.

**Bit 5 - Overrun:** Bit 5 is set when a data movement in tape synchronous mode finds the tape control unit buffer full during a read operation or finds the tape control unit buffer empty during a write operation. The subsystem attempts error recovery procedures before this bit is set. Data overrun is the only type of overrun from which the subsystem attempts to recover, and the data overrun condition is not sent to the STI-FIPS Adapter.

**Bit 6 - Unit Check Timing:** Bit 6 is set to 1 when a preceding unit check, to which this sense data is connected, is a deferred unit check or a postponed unit check. This bit is set to 0 when the unit check is connected to the channel command that the Channel Status Word indicates. If the STI-FIPS Adapter sent a Sense command and no waiting contingent connection is in effect, the content of the bit can not be relied on.

**Bit 7 - Assigned Elsewhere:** This bit is set to 1 if the data is associated with unit check status which is generated because the device is disabled by dynamic partitioning on the selected channel path.

## Formats 19, 20, 21, and 30 Sense Bytes 0-2 SENSE 110

### Byte 2

**Bits 0, 1, 2, and 3 - Channel Adapter Code:** Bits 0, 1, 2, and 3 identify the channel adapter that reported this sense record.

| BIT<br>0 1 2 3 | MEANING                     |
|----------------|-----------------------------|
| 0 0 0 0        | No Channel Command Received |
| 0 0 1 0        | TCU0 Channel Interface A    |
| 0 1 0 0        | TCU0 Channel Interface B    |
| 0 0 1 1        | TCU1 Channel Interface A    |
| 0 1 0 1        | TCU1 Channel Interface B    |

**Bit 4 - Reporting Tape Control Unit:** Bit 4 indicates the tape control unit that detected and generated the sense data. If bit 4 equals 0, the sense data was assembled in tape control unit 0. If bit 4 equals 1, the sense data was assembled in tape control unit 1. In a single tape control unit configuration, this bit is always 0.

**Bit 5:** The automatic cartridge loader is in system or automatic mode; there are more cartridges in the input stack and the automatic cartridge loader is capable of indexing at least one cartridge into the drive.

**Bit 6 - Tape Synchronous Mode:** This bit is set when the tape control unit places the drive in tape synchronous mode.

**Bit 7 - Tape Positioning:** This bit is active if channel block ID needs to be adjusted to obtain the channel block ID associated with the failing block.

### Byte 1

**Bit 0 - Locate Failure:** This bit is set to 1 if the data is associated with unit check status which is generated because the block requested by a Locate command could not be found.

**Bit 1 - Device Online to Control Unit:** This bit is set to 1 if the device state in the control unit is "online".

**Bit 2 - Reserved:** Bit 2 is always 0.

**Bit 3 - Record Sequence Error:** Bit 3 is set if an out-of-sequence record is detected while reading the block ID.

**Bit 4 - Beginning-of-Tape (BOT):** Bit 4 is set when the tape is at the beginning-of-tape (BOT) position.

**Bit 5 - Write Mode:** Bit 5 is set when the latest command sent to the drive was a write-type command.

**Bit 6 - Write Protect:** Bit 6 is set when the cartridge in the selected drive is protected against write operations. This bit is valid only when byte 1 bit 1, device online is also set to 1.

**Bit 7 - Not Capable:** Bit 7 is set when the data on the cartridge cannot be read because the format is not correct.

| FORMATS 19, 20, 21, and 30 BYTE 3 |  |       |       |       |       |       |       |       |
|-----------------------------------|--|-------|-------|-------|-------|-------|-------|-------|
| BYTE                              | BIT 0                                      | BIT 1 | BIT 2 | BIT 3 | BIT 4 | BIT 5 | BIT 6 | BIT 7 |
| 3                                 | Subsystem Error Recovery Action (ERA) Code |       |       |       |       |       |       |       |

Formats 19, 20, 21, and 30 Sense Byte 3 Description

Byte 3

Byte 3 contains the subsystem Error Recovery Action (ERA) code. It describes the action that the STI-FIPS Adapter should take to recover from an error in the subsystem.

Note: See SENSE 120 for a description of the recovery action.

| ERA CODE (HEX) | DESCRIPTION OF ERROR                                     | ACTION   |
|----------------|--|--|
| 00             | Unsolicited sense  | If in response to unit check status logs permanent errors, else no action. |
| 01-20          | Reserved   |  |
| 21             | Data streaming not operational                           | Retry  |
| 22             | Path equipment check                                     |  |
| 23             | Read data check  |  |
| 24             | Load display command to prior CHK message                | Resume   |
| 25             | Write data check   |  |
| 26             | Read data check *  | Retry  |
| 27             | Command reject   | Permanent error  |
| 28             | Write ID mark check                                      |  |
| 29             | Reserved   |  |
| 2A             | Unsolicited environmental data (error counter overflow)  | Retry  |
| 2B             | Environmental data present after a rewind unload command | Resume   |
| 2C             | Permanent equipment check                                | Permanent error  |
| 2D             | Date security erase failure                              | Permanent error  |
| 2E             | Not capable (BOT error)                                  |  |
| 2F             | Reserved   |  |
| 30             | Write protected  | Operator intervention  |
| 31             | Tape void  |  |
| 32             | Lost tape tension  | Permanent error  |
| 33             | Load failure   | Operator intervention  |
| 34             | Unload failure   | Operator intervention  |
| 35             | Drive equipment check                                    | Permanent error  |
| 36             | Reserved   |  |

| ERA CODE (HEX)   | DESCRIPTION OF ERROR           | ACTION   |
|--|--------------------------------|--|
| 37   | Tape length check error        | Permanent error  |
| 38   | Physical end of tape           | Permanent error  |
| 39   | Backward at Beginning-of-Tape  | Permanent error if block ID not = 0, else job terminated |
| 3A   | Drive switched not ready       | Operator intervention                                    |
| 3B   | Manual Rewind or Unload        |  |
| 3C-3F  | Reserved                       |  |
| 40   | Overrun                        |  |
| 41   | Record sequence error          | Permanent error  |
| 42   | Degraded mode errors           | Retry  |
| 43   | Drive not ready                | Operator intervention                                    |
| 44   | Locate block unsuccessful      | Permanent error  |
| 45   | Drive assigned elsewhere       | Permanent error  |
| 46   | Drive not online               | Permanent error  |
| 47   | Volume fenced                  | Permanent error  |
| 48   | Unsolicited informational data | Retry  |
| 49   | Bus Out check                  | Permanent error  |
| 4C   | Recovered CK1 failure          | Retry  |
| 50   | Read buffered log (overflow)   | Resume   |
| 51   | Read buffered log (EOV)        | Resume   |
| 52   | End of volume complete         | Resume   |
| Note: * Same error as ERA 23, but the error occurred again when reading in the opposite direction. |                                |  |

**Formats 19, 20, 21, and 30 Sense Byte 3 Description (Continued)**

Formats 19, 20, 21, and 30 Sense Byte 3 **SENSE 120**

***Permanent Error***

The STI-FIPS Adapter should send a permanent error signal to the access method or user program.

***Operator Intervention***

The operator must perform some manual action, such as moving a tape, to continue processing on the subsystem.

***Resume***

The channel program continues processing at the point of interruption after the system control program has performed any needed action. No error signal is sent to the user.

| FORMATS 19, 20, 21, AND 30 BYTES 4-7 |  |       |   |       |       |       |       |       |
|--------------------------------------|--|-------|---|-------|-------|-------|-------|-------|
| BYTE                                 | BIT 0                                  | BIT 1 | BIT 2                                   | BIT 3 | BIT 4 | BIT 5 | BIT 6 | BIT 7 |
| 4                                    | Format Mode                            |       | High-order channel logical block number |       |       |       |       |       |
| 5                                    | Mid-Order channel logical block number |       |   |       |       |       |       |       |
| 6                                    | Low-Order channel logical block number |       |   |       |       |       |       |       |
| 7                                    | Sense Byte Format                      |       |   |       |       |       |       |       |

## Formats 19, 20, 21, and 30 Sense Bytes 4-7 Description

### Byte 4

#### Bits 0-1 - Format Mode:

These two bits indicate the format mode at the time the error occurred. A TA90 Improved Data Recording Capability indicates that the data was processed with Improved Data Recording Capability enabled by the tape control unit.

00 = TA90 Format  
01 = Reserved  
10 = TA90 Improved Data Recording Capability  
11 = Special Marks

#### Bits 2-7 - High-Order Channel Logical Block Number:

These bits contain the high-order bits of the channel logical block number which would be accessed in the forward direction from the control program's perspective.

### Bytes 5 and 6

These bytes contain the low-order bits of the channel logical block number which would be accessed in the forward direction from the control program's perspective.

### Byte 7

The contents of byte 7 determine the format of bytes 8 through 31. If byte 7 contains 19 or 20 (hexadecimal), the format represents subsystem error sense data. If byte 7 contains 21 or 30 (hexadecimal), the format represents operating condition data (media statistics). Only 19, 20, 21, or 30 is valid in sense byte 7.

| FORMATS 19 and 20 BYTES 8-15 |       |       |  |       |       |       |       |       |  |
|------------------------------|-------|-------|--|-------|-------|-------|-------|-------|--|
| BYTE                         | BIT 0 | BIT 1 | BIT 2                                  | BIT 3 | BIT 4 | BIT 5 | BIT 6 | BIT 7 |  |
| 8                            |       |       | Drive Error Recovery Action (ERA) Code |       |       |       |       |       |  |
| 9                            |       |       | First TCU Microcode Error Flags Byte   |       |       |       |       |       |  |
| 10                           |       |       | First TCU Microcode Error Code         |       |       |       |       |       |  |
| 11                           |       |       | First TCU Microcode Error Code         |       |       |       |       |       |  |
| 12                           |       |       | Second TCU Microcode Error Code        |       |       |       |       |       |  |
| 13                           |       |       | Second TCU Microcode Error Code        |       |       |       |       |       |  |
| 14                           |       |       | Last TCU Microcode Error Code          |       |       |       |       |       |  |
| 15                           |       |       | Last TCU Microcode Error Code          |       |       |       |       |       |  |



## Formats 19 and 20 Sense Bytes 8-15 Description

### Byte 8 - Drive Error Recovery Action (ERA) Code

Byte 8 contains the ERA code when a drive has asked for action from the error recovery procedures. The ERA codes and tape control unit actions are described in the following table:

| ERA CODE (HEX) | TAPE CONTROL UNIT ACTION   |
|----------------|--|
| 4D or CD       | Backspace and write block again  |
| 4F or CF       | If a write operation, reposition tape and issue the failing command again. If a read operation, do nothing unless it is a tape control unit failure. |
| 5B or DB       | Give the last (failing) command again.<br><br>The drive has automatically returned the tape to the preceding position after a failure.               |
| 5F or DF       | Give the preceding serial command.<br><br>The serial command was not processed.  |
| 61 or E1       | Give a RESETA command and continue.  |
| 63 or E3       | If the BLKID=0, this is a permanent error. If not, give a Locate command and attempt again.  |
| 66 or E6       | Load the drive patch area.   |

| ERA CODE (HEX) | TAPE CONTROL UNIT ACTION   |
|----------------|--|
| 69 or E9       | Manual action needed. Operator can remove any slack in the tape by pressing the Rewind switch to reload the tape.  |
| 6B or EB       | Give a RESETB command, find block where error occurred, and continue operation.  |
| 6C or EC       | Manual action needed. Equipment check bit is set.  |
| 6D or ED       | If a data path transfer error occurred, return the tape to its preceding position and attempt the command again.   |
| 6E or EE       | Give a Locate command to Segment 55, followed by a rewind operation to the BOT.  |
| 70 or F0       | Manual action needed. Operator must unload the tape, change the position of the file protect switch on the cartridge, and load the cartridge again.<br><br>A write command was given to a file-protected tape. |
| 71 or F1       | Forward command at PEOT, stop-lock, on moving forward into PEOT during a read operation, or moving forward into PEOT during a write operation.   |
| 72 or F2       | Sends an equipment check message to the console.<br><br>DSE failed (write RAS not valid)   |

## Formats 19 and 20 Sense Bytes 8-15 SENSE 140

### Byte 9 - Tape Control Unit Flags

Byte 9 contains more information about the first tape control unit microcode error code (bytes 10 and 11), if available. See the error code in the FSI section for byte 9's meaning.

### Bytes 10 and 11 - First TCU Microcode Error Code

Bytes 10 and 11 contain the tape control unit microcode detected error code for the first error of the tape control unit or drive. See the FSI section for the meaning of the error codes.

### Bytes 12 and 13 - Second TCU Microcode Error Code

Bytes 12 and 13 contain the tape control unit microcode detected error code for the second error of the tape control unit or drive. See the FSI section for the meaning of the error codes.

### Bytes 14 and 15 - Last TCU Microcode Error Code

Bytes 14 and 15 contain the tape control unit microcode detected error code for the last error of the tape control unit or drive. See the FSI section for the meaning of the error codes.

| ERA CODE (HEX) | TAPE CONTROL UNIT ACTION  |
|----------------|---|
| 73 or F3       | Manual action needed. The equipment check bit is set. The operator must load or unload the tape.                            |
| 75 or F5       | Sends an equipment check message to the console. Send a Load Display command to the failing drive.                          |
| 76 or F6       | Give a Rewind Unload command from the host. If the tape does not unload, tape damage can result.                            |
| 78 or F8       | Manual Rewind command has been initiated. The operator pressed the Not Ready and Rewind switches.                           |
| 79 or F9       | Request tape control unit issue a Rewind Unload command.  |
| 7D or FD       | Log temporary error to host.  |
| 8F             | Read one block to identify a tape position reference, then continue.  |
| EF             | If a data path transfer error occurred, inhibit autospace operations on this block. If not, no tape control unit is needed. |

| FORMATS 19 AND 20 BYTES 16-23 |       |       |       |                         |       |       |          |                        |  |
|-------------------------------|-------|-------|-------|-------------------------|-------|-------|----------|------------------------|--|
| BYTE                          | BIT 0 | BIT 1 | BIT 2 | BIT 3                   | BIT 4 | BIT 5 | BIT 6    | BIT 7                  |  |
| 16                            |       |       |       | TCU Hardware Error Code |       |       |          |                        |  |
| 17                            |       |       |       | TCU Hardware Error Code |       |       |          |                        |  |
| 18                            |       |       |       | Drive Flag - 1          |       |       |          |                        |  |
| 19                            |       |       |       | Reserved                |       |       | Reserved | Drive Model Number BOX |  |
| 20                            |       |       |       | Drive Command Code - 1  |       |       |          |                        |  |
| 21                            |       |       |       | Drive Error Code - 1    |       |       |          |                        |  |
| 22                            |       |       |       | Drive Command Code - 2  |       |       |          |                        |  |
| 23                            |       |       |       | Drive Error Code - 2    |       |       |          |                        |  |

## Formats 19 and 20 Sense Bytes 16-23 Description

### Bytes 16 and 17 - TCU Hardware Error Code

Bytes 16 and 17 contain the Tape Control Unit Hardware Detected Error Code. For a specific error code, see the EAD section for the meaning of that code.

### Byte 18 - Drive Flag 1

Byte 18 contains engineering information. See the specific error code in the FSI section for the meaning of byte 18, if available.

### Byte 19 - Drive Model Number

|     |           |
|-----|-----------|
| 0-5 | Reserved  |
| 6   | Model BDX |
| 7   | Reserved  |

### Byte 20 - Drive Command Code 1

The command active or last given at the time that drive error code 1 occurred. See the "Drive Command Codes" list on this page.

### Byte 21 - Drive Error Code 1

Byte 21 contains the first error detected since the last device sense command. For a specific error code, see the FSI section for the meaning of that code. The error code number is the same as the CHK number.

### Byte 22 - Drive Command Code 2

The command active or last given at the time that drive error code 2 was detected. See the "Drive Command Codes" list on this page.

### Byte 23 - Drive Error Code 2

Byte 23 contains the last error that occurred, whether or not more than two errors occurred since the last drive sense command was sent. For a specific error code, see the FSI section for the meaning of that code. The error code number is the same as the CHK number.

### Drive Command Codes

| Command Code | Description                            |
|--------------|--|
| 00           | Test I/O                               |
| 02           | Read Forward                           |
| 03           | Read Backward                          |
| 04           | Sense                                  |
| 05           | Patch Load                             |
| 06           | Clamp                                  |
| 07           | Unclamp                                |
| 08           | Reset A                                |
| 09           | Reset B                                |
| 0A           | Write or Erase Gap                     |
| 0C           | Set Diagnostic                         |
| 0D           | Load Display                           |
| 10           | Read Control Store                     |
| 11           | Write Control Store                    |
| 12           | Data Security Erase                    |
| 15           | Autospace Backward                     |
| 16           | Autospace Forward                      |
| 18           | Rewind                                 |
| 19           | Rewind/Unload                          |
| 1A           | Locate                                 |
| 1B           | Read LSRs                              |
| 1C           | Read X-Regs                            |
| 1D           | Write X-Regs                           |
| 1E           | Load Automatic Cartridge Loader code   |
| EE*          | Bus Parity error when loading commands |
| FF*          | Load/Unload and unloaded drive         |

\* Not actual command codes. These codes are used when no command is being executed.

| FORMATS 19 AND 20 BYTES 24-31 |   |   |                                  |  |  |                 |                                      |       |
|-------------------------------|---|---|----------------------------------|--|--|-----------------|--------------------------------------|-------|
| BYTE                          | BIT 0                                       | BIT 1                                   | BIT 2                            | BIT 3                                  | BIT 4  | BIT 5           | BIT 6                                | BIT 7 |
| 24                            | Channel adapter installed                   |   | Reserved                         | Reserved                               | Data transfer mode                           |                 |                                      |       |
| 25                            | Two Tape Control Unit Communication Feature | Reserved                                |                                  | Extended Data Recording Format Allowed | Extended Data Recording Format Installed     | Upgraded Buffer | Automatic Cartridge Loader Installed |       |
| 26                            | Tape Control Unit Microcode EC Level        |   |                                  |  |  |                 |                                      |       |
| 27                            | Tape Control Unit EC Switch 0               | Tape Control Unit EC Switch 1<br>0=TA98 | Tape Control Unit Mode!<br>1=ADX | Tape Control Unit EC Switch 2          | Tape Control Unit Serial Number (High Order) |                 |                                      |       |
| 28                            | Tape Control Unit Serial Number (Mid Order) |   |                                  |  |  |                 |                                      |       |
| 29                            | Tape Control Unit Serial Number (Low Order) |   |                                  |  |  |                 |                                      |       |
| 30                            | Logical Drive Address                       |   |                                  |  | Physical Drive Address                       |                 |                                      |       |
| 31                            | Buffered Data Bytes                         |   |                                  |  |  |                 |                                      |       |

## Formats 19 and 20 Sense Bytes 24-31 Description

Formats 19 and 20 Sense Bytes 24-31 **SENSE 160**

### Byte 24 - Tape Control Unit Channel Adapters Installed

Byte 24 indicates the channel adapters that are installed on the tape control unit and the mode to which the active channel adapter is set on the tape control unit panel. Bits 0 through 3 are relative to the subsystem path described in sense byte 2.

Bit 0 - Channel Adapter A

Bit 1 - Channel Adapter B

Bit 2 - Reserved

Bit 3 - Reserved

Bits 4 5 6 7

Bits 0 0 0 0 Reserved

Bits 0 0 0 1 Reserved

Bits 0 1 0 1 Reserved

Bits 0 1 1 0 3 Megabyte Streaming

### Byte 25 - Tape Control Unit/Drive Features

**Bit 0 - Two Tape Control Unit Feature:** This bit indicates that a two Tape Control Unit communication feature is installed.

**Bits 1 through 3 - Reserved:** Bits 1 through 3 are reserved and are always 0.

**Bit 4 - Improved Data Recording Capability Allowed:** This bit on indicates that data can be processed with Improved Data Recording Capability enabled as it is received from the channel adapter.

**Bit 5 - Improved Data Recording Capability Installed:** This bit on indicates that the Improved Data Recording Capability feature is installed.

**Bit 6 - Upgraded Buffer**

**Bit 7 - Automatic Cartridge Loader Installed**

### Byte 26 - Tape Control Unit Microcode EC Level

The bits in byte 26 vary when new versions of microcode are used on the subsystem.

### Byte 27 - Hardware Tape Control Unit Information

The bits in byte 27 are set by the switches under the covers of the tape control unit. Usually, they are changed only by maintenance personnel during service or by plant personnel during manufacture.

**Bit 0 - Tape Control Unit EC Switch 0:**

0 = Two board tape control unit  
1 = Reserved

**Bit 1 = Tape Control Unit EC Switch 1: Reserved**

**Bit 2 = Tape Control Unit Model:**

0 = Model Reserved  
1 = Model ADX

**Bit 3 = Tape Control Unit EC Switch 2: Reserved**

**Bits 4 through 7 - Tape Control Unit Serial Number (High-Order Digit)**

### Bytes 28 and 29 - Tape Control Unit Serial Number (Low Order)

Bytes 28 and 29 contain the low-order digits of the tape control unit serial number. Usually, they are changed only by maintenance personnel during service or by plant personnel during assembly.

### Byte 30 - Drive Address

**Bits 0 through 3 - Logical Drive Address:** Bits 0 through 3 are the low-order bits of the external drive address. This field contains the value that the drive responds to upon receipt of a command from the host.

**Bits 4 through 7 - Physical Drive Address:** Bits 4 through 7 contain a number that cannot be modified by the operator. It is set at installation of the drive by the Service Representative. (No duplicate numbers should be set on any drives in this subsystem.)

### Byte 31 - Data Byte Count

Byte 31 contains a count of the blocks of data in the buffer. The count is specified in 4K blocks. For example, a 3,456-byte block of data is given as a count of '01', and a 5,678-byte block of data is given as a count of '02'.

| FORMAT 21 BYTES 8-15 |       |       |       |                                    |       |       |       |       |  |
|----------------------|-------|-------|-------|------------------------------------|-------|-------|-------|-------|--|
| BYTE                 | BIT 0 | BIT 1 | BIT 2 | BIT 3                              | BIT 4 | BIT 5 | BIT 6 | BIT 7 |  |
| 8                    |       |       |       | Read Forward Data Checks           |       |       |       |       |  |
| 9                    |       |       |       | Read Backward Data Checks          |       |       |       |       |  |
| 10                   |       |       |       | Write Data Checks                  |       |       |       |       |  |
| 11                   |       |       |       | Read Blocks Corrected              |       |       |       |       |  |
| 12                   |       |       |       | Write Blocks Corrected             |       |       |       |       |  |
| 13                   |       |       |       | Tape Control Unit Equipment Checks |       |       |       |       |  |
| 14                   |       |       |       | Read Bytes Processed               |       |       |       |       |  |
| 15                   |       |       |       | Read Bytes Processed               |       |       |       |       |  |

## **Format 21 Sense Bytes 8-15 Description**

**Format 21 Sense Bytes 8-15 SENSE 170**

### **Byte 8 - Read Forward Data Checks**

Byte 8 contains a count of the temporary read errors that needed ERP action.

### **Byte 9 - Read Backward Data Checks**

Byte 9 contains a count of the temporary read backward errors that needed ERP action.

### **Byte 10 - Write Data Checks**

Byte 10 contains a count of the temporary write errors that needed ERP action.

### **Byte 11 - Read Blocks Corrected**

Byte 11 contains a count of the read errors corrected without needing ERP action.

### **Byte 12 - Write Blocks Corrected**

Byte 12 contains a count of the write errors corrected without needing ERP action.

### **Byte 13 - Tape Control Unit Equipment Checks**

Byte 13 contains a count of the recoverable errors that were found during uses of the external registers.

### **Bytes 14 and 15 - Read Bytes Processed**

Bytes 14 and 15 contain a count of the bytes read from the drive to the channel. Each count has a value of 4K bytes.

| FORMAT 21 BYTES 16-23 |       |       |       |                            |       |       |       |       |
|-----------------------|-------|-------|-------|----------------------------|-------|-------|-------|-------|
| BYTE                  | BIT 0 | BIT 1 | BIT 2 | BIT 3                      | BIT 4 | BIT 5 | BIT 6 | BIT 7 |
| 16                    |       |       |       | Write Bytes Processed      |       |       |       |       |
| 17                    |       |       |       | Write Bytes Processed      |       |       |       |       |
| 18                    |       |       |       | Read Blocks Processed      |       |       |       |       |
| 19                    |       |       |       | Write Blocks Processed     |       |       |       |       |
| 20                    |       |       |       | Write Transient Conditions |       |       |       |       |
| 21                    |       |       |       | Read Transient Conditions  |       |       |       |       |
| 22                    |       |       |       | Criteria Write Data Checks |       |       |       |       |
| 23                    |       |       |       | Criteria Read Data Checks  |       |       |       |       |



## Format 21 Sense Bytes 16-23 Description

Format 21 Sense Bytes 16-23 **SENSE 180**

### Bytes 16 and 17 - Write Bytes Processed

Bytes 16 and 17 contain a count of the bytes written from the channel to the drive. Each count is equal to 4K bytes.

### Byte 18 - Read Blocks Processed

Byte 18 contains a count of the blocks read forward and backward for this volume. Each count has a value of 256 read blocks.

### Byte 19 - Write Blocks Processed

Byte 19 contains a count of the blocks written on this volume. Each count is equal to 256 write blocks, and a maximum value of 65,536 write blocks can be counted.

### Byte 20 - Write Transient Conditions

Cartridge stress conditions such as exposure to extreme heat or cold can cause short-term velocity changes to occur while writing the tape. This condition is detected and the event is recorded in this sense byte as a temporary, recoverable event.

### Byte 21 - Read Transient Conditions

Cartridge stress conditions such as exposure to extreme heat or cold can cause short-term velocity changes to occur while reading the tape. This condition is detected and the event is recorded in this sense byte as a temporary, recoverable event.

### Bytes 22 - Criteria Write Data Checks

A count of temporary data checks that occurred with no hardware FRU indicators. These counts are a subset of the count contained in sense byte 10 and are included in sense byte 10.

### Bytes 23 - Criteria Read Data Checks

A count of temporary read data checks that occurred with no hardware FRU indicators. These counts are a subset of the count contained in sense bytes 8 and 9 and are included in sense bytes 8 and 9.

| FORMAT 21 BYTES 24-31 |  |                               |  |                               |  |       |       |       |
|-----------------------|--|-------------------------------|--|-------------------------------|--|-------|-------|-------|
| BYTE                  | BIT 0  | BIT 1                         | BIT 2  | BIT 3                         | BIT 4  | BIT 5 | BIT 6 | BIT 7 |
| 24                    | Write Recovery Erase Gape Count                      |                               |  |                               |  |       |       |       |
| 25                    | Drive Detected Errors                                |                               |  |                               |  |       |       |       |
| 26                    | Low-Order Read Blocks Processed                      |                               |  |                               | Low-Order Write Blocks Processed             |       |       |       |
| 27                    | Tape Control Unit EC Switch 0                        | Tape Control Unit EC Switch 1 | Tape Control Unit Model<br>0 = Reserved<br>1 = ADX | Tape Control Unit EC Switch 2 | Tape Control Unit Serial Number (High Order) |       |       |       |
| 28                    | Tape Control Unit Serial Number (Mid-Order 4 Digits) |                               |  |                               |  |       |       |       |
| 29                    | Tape Control Unit Serial Number (Low-Order 4 Digits) |                               |  |                               |  |       |       |       |
| 30                    | Read Recovery Retry Count                            |                               |  |                               |  |       |       |       |
| 31                    | Logical Drive Address                                |                               |  |                               | Physical Drive Address                       |       |       |       |

**Format 21 Sense Bytes 24-31 Description****Byte 24 - Write Recovery Erase Gap Check**

Tape Control Unit error recovery procedure was required to erase and rewrite a block or tape mark.

**Byte 25 - Drive Detected Errors**

Byte 25 contains a count of unit checks set by the drive.

**Byte 26 - Low-Order Read or Write Blocks Processed**

Bits 0 through 3 contain a low-order count of the blocks read forward and backward for this volume; see byte 18 for the high-order count. Each count has a value of 16 read blocks.

Bits 4 through 7 contain a low-order count of the blocks written on this volume; see byte 19 for the high-order count. Each count has a value of 16 write blocks.

**Byte 27 - Hardware Tape Control Unit Information**

The bits in byte 27 are set from switches under the covers of the tape control unit. Usually, they are changed only by maintenance personnel during service or by plant personnel during assembly.

**Bit 0 - Tape Control Unit EC Switch 0**

0 = Two board tape control unit  
1 = Reserved

**Bit 1 - Tape Control Unit EC Switch 1**

0 = Digital Model TA98  
1 = Reserved

**Bit 2 - Tape Control Unit model**

0 = Model Reserved  
1 = Model ADX

**Bit 3 - Tape Control Unit EC Switch 2**

Reserved

**Bits 4 through 7 - Tape Control Unit Serial Number (High-Order Digit)****Bytes 28 and 29 - Tape Control Unit Serial Number**

Bytes 28 and 29 contain the low-order 4 digits of the tape control unit serial number. The serial number is set by switches on the drive adapter card (01A-A1Q2). The serial number must match the base casting serial number.

**Byte 30 - Read Recovery Retry Count**

Byte 30 contains a count of the times the tape control unit attempted consecutive read recovery actions for the same block.

**Byte 31 - Drive Address**

**Bits 0 through 3 - Logical Drive Address:** Bits 0 through 3 are the low-order bits of the external drive address. This field contains the value that the drive responds to upon receipt of a command from the host.

**Bits 4 through 7 - Physical Drive Address:** Bits 4 through 7 contain a number that cannot be modified by the operator. It is set at installation of the drive by the Field Engineer. (No duplicate numbers should be set on any drives in this subsystem.)

| FORMAT 30 BYTES 8 - 15 |       |       |       |                                   |       |       |       |       |  |
|------------------------|-------|-------|-------|-----------------------------------|-------|-------|-------|-------|--|
| BYTE                   | BIT 0 | BIT 1 | BIT 2 | BIT 3                             | BIT 4 | BIT 5 | BIT 6 | BIT 7 |  |
| 8                      |       |       |       | Device read forward data checks   |       |       |       |       |  |
| 9                      |       |       |       | Device write forward data checks  |       |       |       |       |  |
| 10                     |       |       |       | Device read backward data checks  |       |       |       |       |  |
| 11                     |       |       |       | Reserved                          |       |       |       |       |  |
| 12                     |       |       |       | Device read criteria data checks  |       |       |       |       |  |
| 13                     |       |       |       | Device write criteria data checks |       |       |       |       |  |
| 14                     |       |       |       | Device read recovery retries      |       |       |       |       |  |
| 15                     |       |       |       | Device write recovery erase gaps  |       |       |       |       |  |

**Format 30 Sense Bytes 8-15 Description**

**Byte 8 - Device Read Forward Data Checks**

Byte 8 contains a count of the temporary read errors that needed ERP action.

**Byte 9 - Device Write Forward Data Checks**

Byte 9 contains a count of the temporary write errors that needed ERP action.

**Byte 10 - Device Read Backward Data Checks**

Byte 10 contains a count of the temporary read backward errors that needed ERP action.

**Byte 11 - Reserved**

**Byte 12 - Device Read Criteria Data Checks**

Byte 12 contains a count of temporary read data checks that occurred with no hardware error indications. These counts are a subset of the count contained in log bytes 8 and 10 and are included in log bytes 8 and 10.

**Byte 13 - Device Write Criteria Data Checks**

Byte 13 contains a count of temporary write data checks that occurred with no hardware error indications. These counts are a subset of the count contained in sense byte 9 and are included in sense byte 9.

**Byte 14 - Device Read Recovery Retry Count**

Byte 14 contains a count of the times the tape control unit attempted consecutive read recovery actions for the same block.

**Byte 15 - Device Write Recovery Erase Gaps**

Byte 15 contains a count of the times a block is erase and written again during error recovery for the addressed drive.

Format 30 Sense Bytes 16-23 Table

| FORMAT 30 BYTES 16-23 |       |       |       |                                     |       |       |       |       |  |
|-----------------------|-------|-------|-------|-------------------------------------|-------|-------|-------|-------|--|
| BYTE                  | BIT 0 | BIT 1 | BIT 2 | BIT 3                               | BIT 4 | BIT 5 | BIT 6 | BIT 7 |  |
| 16                    |       |       |       | Device read transient conditions    |       |       |       |       |  |
| 17                    |       |       |       | Device write transient conditions   |       |       |       |       |  |
| 18                    |       |       |       | Device read blocks corrected        |       |       |       |       |  |
| 19                    |       |       |       | Device write blocks corrected       |       |       |       |       |  |
| 20                    |       |       |       | Reserved                            |       |       |       |       |  |
| 21                    |       |       |       | Reserved                            |       |       |       |       |  |
| 22                    |       |       |       | Channel read data request timeouts  |       |       |       |       |  |
| 23                    |       |       |       | Channel write data request timeouts |       |       |       |       |  |

**Byte 16 - Device Read Transient Conditions**

Cartridge stress conditions such as exposure to extreme heat or cold can cause short-term velocity changes to occur while reading the tape. This condition is detected and the event is recorded in this sense byte as a temporary, recoverable event.

**Byte 17 - Device Write Transient Conditions**

Cartridge stress conditions such as exposure to extreme heat or cold can cause short-term velocity changes to occur while writing to the tape. This condition is detected and the event is recorded in this sense byte as a temporary, recoverable event.

**Byte 18 - Device Read Blocks Corrected**

Byte 18 contains a count of the blocks that had read errors corrected without needing ERA action.

**Byte 19 - Device Write Blocks Corrected**

Byte 19 contains a count of the blocks that had write errors corrected without needing ERA action.

**Bytes 20 and 21 - Reserved**

**Byte 22 - Channel Read Data Request Timeouts**

Byte 22 contains a count of the data request timeouts detected during data transfers from the tape control unit buffer to the STI-FIPS adapter.

**Byte 23 - Channel Write Data Request Timeouts**

Byte 23 contains a count of the data request timeouts detected during data transfers from the STI-FIPS adapter to the tape control unit.

Format 30 Sense Bytes 24-31 Table

| FORMAT 30 BYTES 24 - 31 |  |                               |   |                               |  |       |  |       |
|-------------------------|--|-------------------------------|---|-------------------------------|--|-------|--|-------|
| BYTE                    | BIT 0  | BIT 1                         | BIT 2   | BIT 3                         | BIT 4  | BIT 5 | BIT 6  | BIT 7 |
| 24                      | Channel transfer equipment checks                    |                               |   |                               |  |       |  |       |
| 25                      | Drive detected errors                                |                               |   |                               |  |       |  |       |
| 26                      | Clean Device   | Reserved                      |   |                               |  |       | 01 = Rewrite Cartridge<br>11 = Replace Cartridge |       |
| 27                      | Tape Control Unit EC Switch 0                        | Tape Control Unit EC Switch 1 | Tape Control Unit Mode<br>0 = Reserved<br>1 = ADX | Tape Control Unit EC Switch 2 | Tape Control Unit Serial Number (High order) |       |  |       |
| 28                      | Tape Control Unit Serial Number (Mid order 4 digits) |                               |   |                               |  |       |  |       |
| 29                      | Tape Control Unit Serial Number (Low order 4 digits) |                               |   |                               |  |       |  |       |
| 30                      | Logical Drive Address                                |                               |   |                               | Physical Drive Address                       |       |  |       |
| 31                      | Reserved   |                               |   |                               |  |       |  |       |



## Format 30 Sense Bytes 24-31 Description

Format 30 Sense Bytes 24-31 **SENSE 240**

### Byte 24 - Channel Transfer Equipment Checks

Byte 24 contains a count of the number of errors, excluding data request timeouts, detected during data transfer between the host channel and the tape control unit buffer.

Bits 4 through 7 contain a number that cannot be modified by the operator. It is set by the Field Engineer during installation. No duplicate numbers should be set on any drives in this subsystem.

### Byte 25 - Drive Detected Errors

Byte 25 contains a count of unit checks set by the drive.

### Byte 31 - Reserved

### Byte 26 - Device and/or Cartridge Action

Bit 0 - Clean Device

Bit 1 through 5 - Reserved

Bits 6 and 7 - Cartridge Action:

01 = Rewrite Cartridge  
11 = Replace Cartridge

### Byte 27 - Hardware Tape Control Unit Information

Bit 0 - Tape Control Unit EC Switch 0:

0 = Two board tape control unit  
1 = Reserved

Bit 1 - Tape Control Unit EC Switch 1: Reserved

Bit 2 - Tape Control Unit Model:

0 = Reserved  
1 = ADX

Bit 3 - Tape Control Unit EC Switch 2: Reserved

Bits 4 through 7 - Tape Control Unit Serial Number (High order digit)

### Bytes 28 and 29 - Tape Control Unit Serial Number

Bytes 28 and 29 contain the low order 4 digits of the tape control unit serial number. The serial number is set by switches on the drive adapter card (01A-A1Q2). The serial number must match the base casting serial number.

### Byte 30 - Drive Address

Bits 0 through 3 - Logical Drive Address:

Bits 0 through 3 are the low order bits of the external drive address. This field contains the value that the drive responds to upon receipt of a command from the host.

Bits 4 through 7 - Physical Drive Address:

Format 30 Sense Bytes 32-40 Table

| FORMAT 30 BYTES 32-40 |       |       |       |  |       |       |       |       |  |
|-----------------------|-------|-------|-------|--|-------|-------|-------|-------|--|
| BYTE                  | BIT 0 | BIT 1 | BIT 2 | BIT 3                                    | BIT 4 | BIT 5 | BIT 6 | BIT 7 |  |
| 32                    |       |       |       | Channel read bytes processed hi (4096)   |       |       |       |       |  |
| 33                    |       |       |       | Channel read bytes processed mid (4096)  |       |       |       |       |  |
| 34                    |       |       |       | Channel read bytes processed lo (4096)   |       |       |       |       |  |
| 35                    |       |       |       | Channel write bytes processed hi (4096)  |       |       |       |       |  |
| 36                    |       |       |       | Channel write bytes processed mid (4096) |       |       |       |       |  |
| 37                    |       |       |       | Channel write bytes processed lo (4096)  |       |       |       |       |  |
| 38                    |       |       |       | Device read bytes processed hi           |       |       |       |       |  |
| 39                    |       |       |       | Device read bytes processed mid          |       |       |       |       |  |
| 40                    |       |       |       | Device read bytes processed lo           |       |       |       |       |  |

**Bytes 32 - 34 - Channel Bytes Processed**

Bytes 32 through 34 contain a count of the number of bytes read from the tape control unit buffer to the channel.

This count includes:

- Formatted data block
- Data block trailer
- Pad bytes
- Residual count
- Cyclical redundancy check (RCR).

Bytes 32, 33, and 34 are combined to form a 24 bit binary counter of write bytes processed. Each count is equal to 4096 ( $1000_{16}$ ) and the counter has a maximum value of 256 gigabytes.

When each tape synchronous mode read block is processed, the true byte count is not known, therefore a number is added to the Read Bytes Processed counter equal to the current segment size.

**Bytes 35 - 37 - Channel Write Bytes Processed**

Bytes 35 through 37 contain a count of the number of bytes written from the channel to the tape control unit buffer.

This count includes:

- Formatted data block
- Data block trailer.

Bytes 35, 36, and 37 are combined to form a 24 bit binary counter of write bytes processed. Each count is equal to 4096 ( $1000_{16}$ ) and the counter has a maximum value of 256 gigabytes.

**Bytes 38 - 40 - Device Read Bytes Processed**

Bytes 38 through 40 contain a count of the blocks read forward and backward for this volume from the device to the tape control unit buffer.

Bytes 38, 39, and 40 are combined to form a 24 bit binary counter of read and read backward blocks processed. Each count is equal to one block. The maximum value of the counter is 16 megablocks.

Format 30 Sense Bytes 41-49 Table

| FORMAT 30 BYTES 41-49 |       |       |       |                                    |       |       |       |       |  |
|-----------------------|-------|-------|-------|------------------------------------|-------|-------|-------|-------|--|
| BYTE                  | BIT 0 | BIT 1 | BIT 2 | BIT 3                              | BIT 4 | BIT 5 | BIT 6 | BIT 7 |  |
| 41                    |       |       |       | Device write bytes processed hi    |       |       |       |       |  |
| 42                    |       |       |       | Device write bytes processed mid   |       |       |       |       |  |
| 43                    |       |       |       | Device write bytes processed lo    |       |       |       |       |  |
| 44                    |       |       |       | Channel read blocks processed hi   |       |       |       |       |  |
| 45                    |       |       |       | Channel read blocks processed mid  |       |       |       |       |  |
| 46                    |       |       |       | Channel read blocks processed lo   |       |       |       |       |  |
| 47                    |       |       |       | Channel write blocks processed hi  |       |       |       |       |  |
| 48                    |       |       |       | Channel write blocks processed mid |       |       |       |       |  |
| 49                    |       |       |       | Channel write blocks processed lo  |       |       |       |       |  |

## **Format 30 Sense Bytes 41-49 Description**

**Format 30 Sense Bytes 41-49 SENSE 260**

### **Byte 41 - 43 - Device Write Bytes Processed**

Bytes 41 through 43 contain a count of the blocks written on this volume from the tape control unit buffer to the device.

Bytes 41, 42, and 43 are combined to form a 24 bit binary counter of write blocks processed. Each count is equal to one block. The maximum value of the counter is 16 megablocks.

### **Byte 44 - 46 - Channel Read Blocks Processed**

Bytes 44 through 46 contain the number of logical blocks which were successfully read by the channel.

### **Bytes 47 - 49 - Channel Write Blocks Processed**

Bytes 47 through 49 contain the number of logical blocks which were successfully written by the channel.

Format 30 Sense Bytes 50-55 Table

| FORMAT 30 BYTES 50-55 |       |       |       |                                   |       |       |       |       |  |
|-----------------------|-------|-------|-------|-----------------------------------|-------|-------|-------|-------|--|
| BYTE                  | BIT 0 | BIT 1 | BIT 2 | BIT 3                             | BIT 4 | BIT 5 | BIT 6 | BIT 7 |  |
| 50                    |       |       |       | Device read blocks processed hi   |       |       |       |       |  |
| 51                    |       |       |       | Device read blocks processed mid  |       |       |       |       |  |
| 52                    |       |       |       | Device read blocks processed lo   |       |       |       |       |  |
| 53                    |       |       |       | Device write blocks processed hi  |       |       |       |       |  |
| 54                    |       |       |       | Device write blocks processed mid |       |       |       |       |  |
| 55                    |       |       |       | Device write blocks processed lo  |       |       |       |       |  |

**Format 30 Sense Bytes 50-63 Description**

Format 30 Sense Bytes 50-63 **SENSE 275**

**Byte 50 - 52 - Device Read Blocks Processed**

Bytes 50 through 52 contain the number of physical blocks which were read from the device to the tape control unit buffer.

**Byte 53 - 55 - Device Write Blocks Processed**

Bytes 53 through 55 contain the number of physical blocks which were written from the tape control unit buffer to the device.

**Bytes 56 - 63 - Reserved**

## Status Byte Description

Status Byte Description **SENSE 285**

### The Status Byte

The status byte contains information about the current condition of different parts of the subsystem. When the tape control unit needs to present status for an addressed drive, the status is represented in a single byte of data. The status bits are described on SENSE 290.

| Status Byte |                 |                       |       |             |            |            |                |
|-------------|-----------------|-----------------------|-------|-------------|------------|------------|----------------|
| BIT 0       | BIT 1           | BIT 2                 | BIT 3 | BIT 4       | BIT 5      | BIT 6      | BIT 7          |
| Attention   | Status Modifier | Tape Control Unit End | Busy  | Channel End | Device End | Unit Check | Unit Exception |



## Status Byte Bits 0-7 Description

**Bit 0 - Attention:**

Bit 0 is set when the drive is changed from a not-ready to a ready condition. The change of condition is caused by loading a tape in the drive or by the operator changing the drive from offline to online status, but only if the drive has been primed. See device end (bit 5) for a description of primed. Device end (bit 5) and unit exception (bit 7) are also set when the drive is changed to the ready condition.

**Bit 1 - Status Modifier:**

Bit 1 in combination with busy (bit 3) indicates the tape control unit is busy. This bit in combination with channel end (bit 4) and unit check (bit 6) is used to place the channel in retry status. When an immediate retry is requested, device end is set with channel end and unit check bits. If the retry is not immediate, device end is set by a delayed interrupt when the channel is ready to retry.

**Bit 2 - Tape Control Unit End:**

If the tape control unit was busy during initial selection, bit 2 is set when the tape control unit is no longer busy and can perform a command. This bit is set with busy (bit 3) and status modifier (bit 1) when the tape control unit is busy for only a short time.

This bit is always set with device end (bit 5) if channel end (bit 4) was set earlier and unit check or unit exception is set with device end.

**Bit 3 - Busy:**

Bit 3 is set when the drive is busy on another channel path. This bit is set with status modifier (bit 1) when the tape control unit is busy. This bit is always set with status modifier and tape control unit end bits when the tape control unit is busy for only a short time.

If this bit is set during a deferred unit check, the busy status condition is associated with a preceding command. Unit check timing (sense byte 0 bit 6) is set when the status is sent as a result of a deferred unit check.

**Bit 4 - Channel End:**

Bit 4 is set when the data transmit part of an I/O operation is complete or when control information between the channel and the tape control unit or drive is complete and the channel is no longer needed for processing the current command.

**Bit 5 - Device End:**

Bit 5 is set when an I/O command has completed. It is also set with the attention and unit exception bits when a drive is changed from the not-ready to the ready condition and has been primed.

A drive is primed when an operator presses the Rewind Unload push button, when an I/O command is given while the drive is in the not-ready condition, or when the host gives an I/O request and busy (bit 3) is returned. In the last event, the tape control unit sets this bit to indicate the drive-busy condition has cleared.

Primed has a different meaning when a channel path group is operating in multipath mode. In this event, the primed status is associated with the STI-FIPS adapter ID and not with a specific channel path. So, although more than one channel is primed in a channel path group that is operating in multipath mode, any one of the channels in the channel path group is selected to receive the status. Only one device end status condition is supplied to the channel path group, regardless of the number of primed channels in that group. See "Commands" for a description of the Set Path Group ID command.

**Bit 6 - Unit Check:**

Bit 6 is set when one of the following conditions is sensed in the TA90 Magnetic Tape Subsystem:

- The drive is in a not-ready condition and a movement-type command is given to it.
- An error condition prevents an operation from completing successfully.
- A Read Backward, Backspace Block, or Backspace File command is given to a drive that is at the BOT position.
- The drive has received a Rewind Unload command.
- A deferred unit check status occurs.
- A not valid parity occurs on a command.
- A command or command sequence is not valid.
- Chaining occurs to or from a Set Path Group ID command or a Sense Path Group ID command.
- A write-type command is given to a file-protected tape.
- The drive is assigned to exclusive use by another channel path group.
- The buffered log has had an overflow.
- A deferred unit check occurs from an earlier I/O operation.
- A forward-movement command is given to a drive that is at the physical end-of-tape position.

**Note:** The tape must be moved backward to at least the logical end of tape before any forward-movement command can be performed.

In response to a unit check status, the STI-FIPS adapter must give a Sense command to obtain the information necessary to record the error. The tape control unit maintains a contingent connection between the STI-FIPS adapter and the drive when unit check status occurs. Until the STI-FIPS adapter gives a command other than Test I/O or No Operation, the addressed drive is busy to other I/O requests to ensure that the STI-FIPS adapter can obtain the sense information.

**Bit 7 - Unit Exception:**

Bit 7 is set if the logical end of tape is reached during processing of a Write, Write Tape Mark, or Erase Gap command. It is also set if a tape mark is sensed during the processing of a Read, Read Backward, Forward Space Block, or Backspace Block command.

This bit is set with status modifier (bit 1) and device end (bit 5) when a drive is changed from the not-ready to the ready condition.

**Note:** The unit exception status condition should be processed as soon as it occurs to prevent a unit check status condition and a possible loss of data caused by a physical end-of-tape condition during write-forward operations. However, there is enough space left on the tape after the logical end of tape and before the physical end of tape for all of the contents of the buffer to be written on the tape.

Notes

Notes **SENSE 295**

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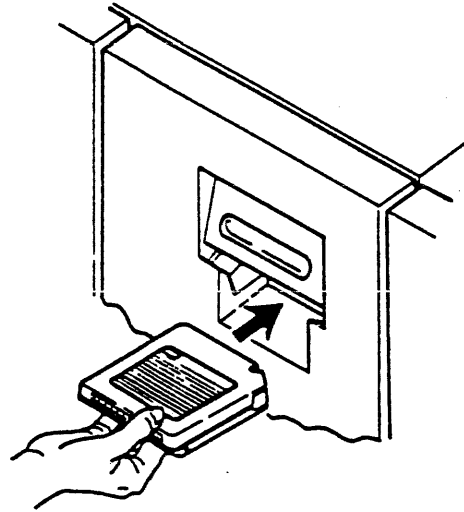
## How to Operate the Drive

### How to Prepare the Drive for Operation

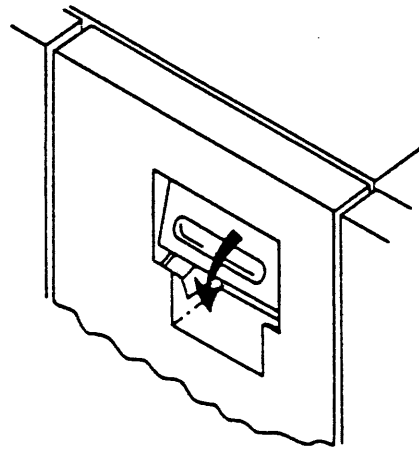
To prepare the drive for operation, perform the following steps:

1. If the tape drive cartridge latch is closed, press the Unload switch **3**.

Hold the cartridge as shown and slide the cartridge into the opening in the front cover.



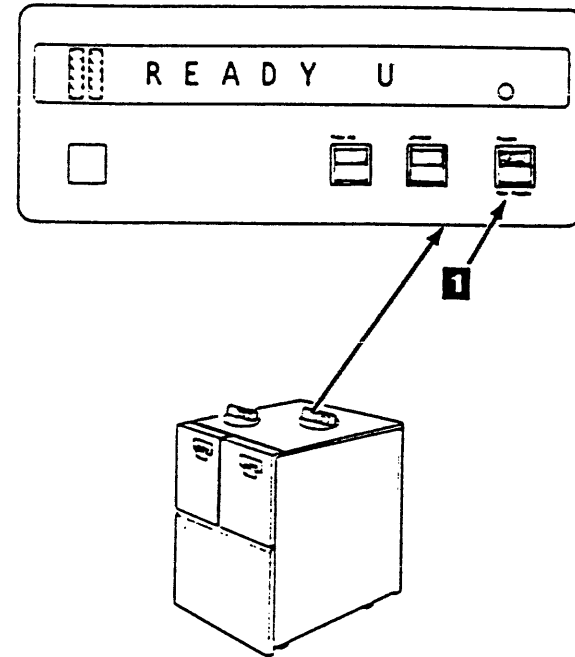
2. Move the latch cover down until it stops.



3. Move the Ready/Not Ready switch **1** to the Ready position.

The Operator Panel message display will show READY F or READY U condition. If the tape is at BOT, the message display will show B.O.T. F or B.O.T. U.

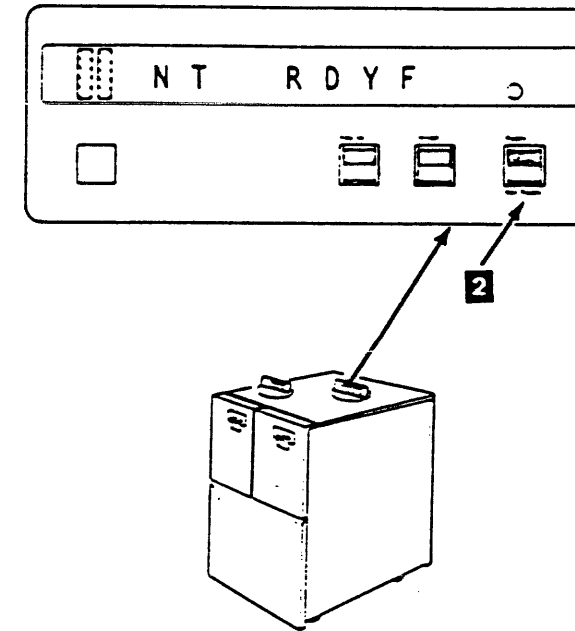
If any other message or indicator is displayed, go to START 10.



### How to End Drive Operation

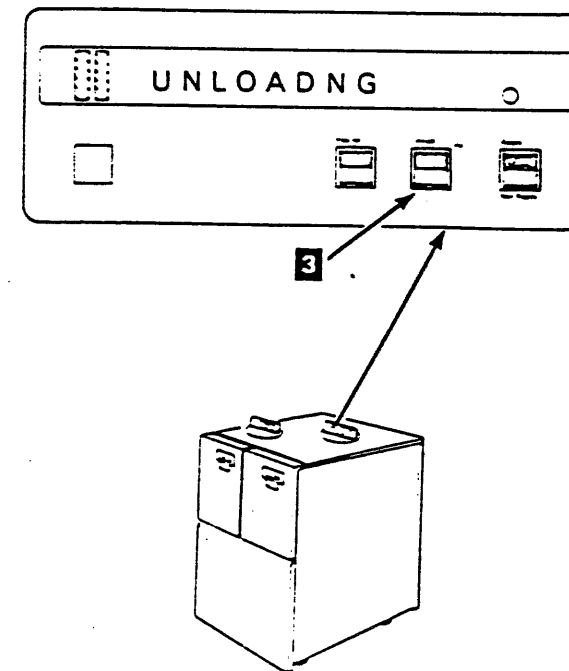
To end drive operation, perform the following steps:

1. Move the Ready/Not Ready switch **2** to the Not Ready position.



2. Press the Unload switch **3**.

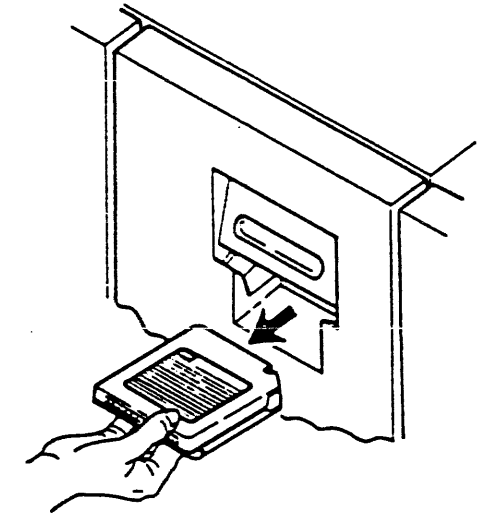
**Note:** Pressing the Unload switch rewinds the tape, opens the latch door, and locates the cartridge for removal.



## How to Operate the Drive PANEL 5

3. Remove the cartridge from the tape unit. If the latch door does not open, go to START 10.

**Note:** The cartridge latch should be closed when the tape drive is not being used. (A cartridge need not be in the drive.) When the tape drive is needed, open the cartridge latch by pressing the Unload switch.



**IML Procedure****IML Procedure**

To IML the tape control unit perform the following:

1. Ensure that the subsystem power is on.
2. Place the tape control unit Online test/Offline test switch in the Offline position.
3. Place the tape control unit Normal/Test switch in the Normal position.
4. Insert the IML diskette into the IML device.
  - a. Push the release button on the IML diskette drive and remove the head protector.
  - b. Insert the IML diskette (label up and toward you) and push until the drive closes.
5. Press the tape control unit IML switch to the IML position.
6. When the IML completes successfully, the "wait" LED comes on.
7. Place the tape control unit Online test/Offline test switch in the Online Test position. The Offline indicator turns off.
8. If the IML is not successful, remove the functional diskette from the tape control unit and IML the support diskette.

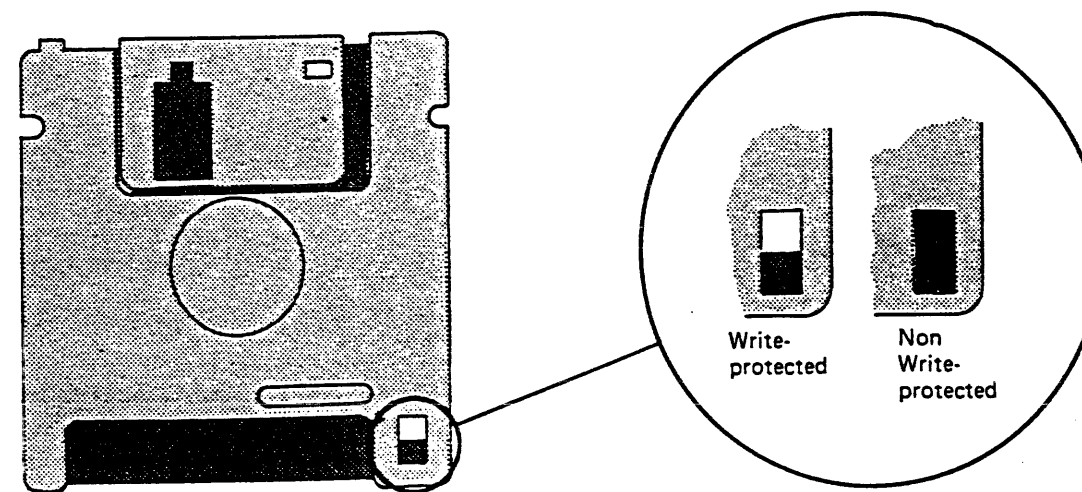
**IML Fail Indication**

An IML Failure is indicated by the "error" LED on the tape control unit switch panel.

**WRITE-PROTECTED DISKETTES**

IML Diskettes used in the TA90 Tape Control Unit should not be write-protected. Diskettes that are write-protected will cause an error during Power On and IML.

- On the reverse side of a 3.5 inch diskette, in the lower corner, there is a write-protect window. When you slide the plastic tab so that the window is open, the diskette is write-protected. When the window is closed, data can be written on the diskette.



## Tape Control Unit Switches and Indicators

The tape control unit has switches that permit the customer and the CE to control specific subsystem functions. The switches are located on the tape control unit panel. The front cover must be open to get access to the tape control unit switches except for the Unit Emergency Power and Power On/Off switches.

**Port Select A/B Fault 1:** When set to the enable (in) position, the Port Select A and B switches allow the HSC to access ports A and B. Under microprogrammed control, the HSC can then cause port A or B to go online. (Until the port goes online, access is limited to very few commands such as retrieving status.)

Placing the Port Select switch in the disabled (out) position with the port online causes the formatter to alert the HSC. After completing the current operation, the HSC disconnects the port from the online state.

**Note:** When Port Select A and B are enabled, the formatter samples each port until one receives a command to go online.

The Port Select light comes on if the port is online or if an error has been detected and Fault has been pressed. The Fault light comes on when a potentially fatal error has been detected in the formatter. (Even though an error has occurred, the formatter still attempts to communicate with the HSC.)

When a fatal error occurs, use Fault to retrieve an error code and try to clear the error. If you press Fault when no fatal error has occurred:

1. All three control panel lights will come on.
2. The Operator Panel will display a message identifying the drives associated with each formatter.

**Power On/Off 2:** The Power On/Off switch is a two-position switch. The Local/Remote switch 17 is set to Local and the Power On/Off switch is placed in the On position to supply ac power to the tape control unit and all attached TTUs. When ac power is supplied, the dc power supplies are started and a Power On Reset is generated. Placing this switch in the Off position removes the ac power from the subsystem.

**Power On Indicator 3:** This is a green LED that lights when the tape control unit Power On switch is placed in the On position to indicate that the tape control unit ac power is on.

**Unit Emergency Power 4:** The Unit Emergency Power switch supplies an emergency disconnect from the ac power source. When the emergency switch is pushed, the ac power is immediately removed from the subsystem without the delay that occurs when the Power On/Off switch is placed in the Off position. The Unit Emergency Power switch must be placed in the Power Enable position and the Local Power Enable pushbutton 6 must be activated to restore power to the subsystem.

**Diskette Drive 5:** The diskette drive contains the Functional diskette and is used in conjunction with the IML switch.

**Local Power Enable 6:** This pushbutton switch resets the ac power supply to allow power in the tape control unit when the Unit Emergency Power switch 4 is in the Power Enable position.

**Wait Indicator 7:** The Wait Indicator blinks or stays on when the microcode is executing. It is off when the microcode is not loaded or not executing correctly.

**Error Indicator 8:** The Error Indicator either blinks or stays on when an error is detected.

**DC Power Indicator 9:** This is an LED that lights when dc power is available to the tape control unit.

**IML 10:** The IML switch is a momentary switch. When the switch is pressed, the tape control unit performs an IML operation.

**TCU Online Test/Offline Test 11:** This switch is placed in the Online position to permit tape control unit communication with the STI-FIPS Adapter. When this switch is placed in the Offline position, the drives are not available to the STI-FIPS Adapter.

**TCU0/TCU1 12:** This switch must be set at the time of installation to a specific value, 0 or 1, to match the subsystem cable configuration. In a single tape control unit subsystem, this switch must be set to 0. In a dual tape control unit subsystem this switch must be set to 0 on the primary tape control unit and set to 1 on the secondary tape control unit.

## Tape Control Unit Switches and Indicators PANEL 10

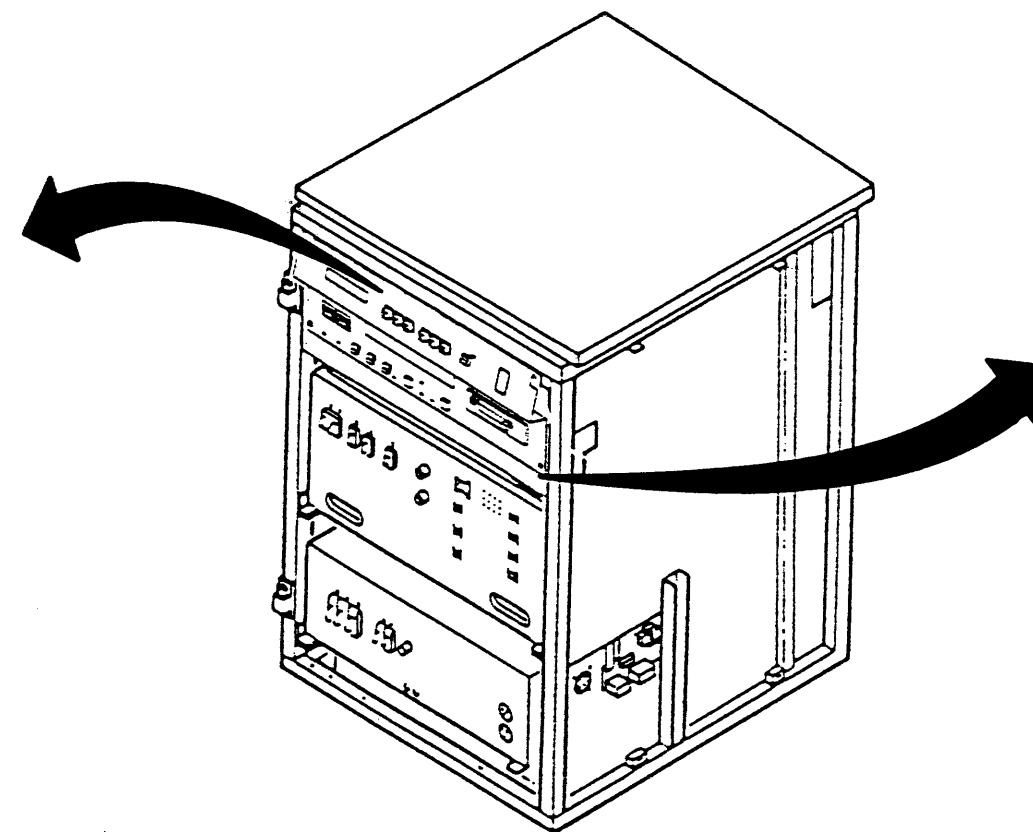
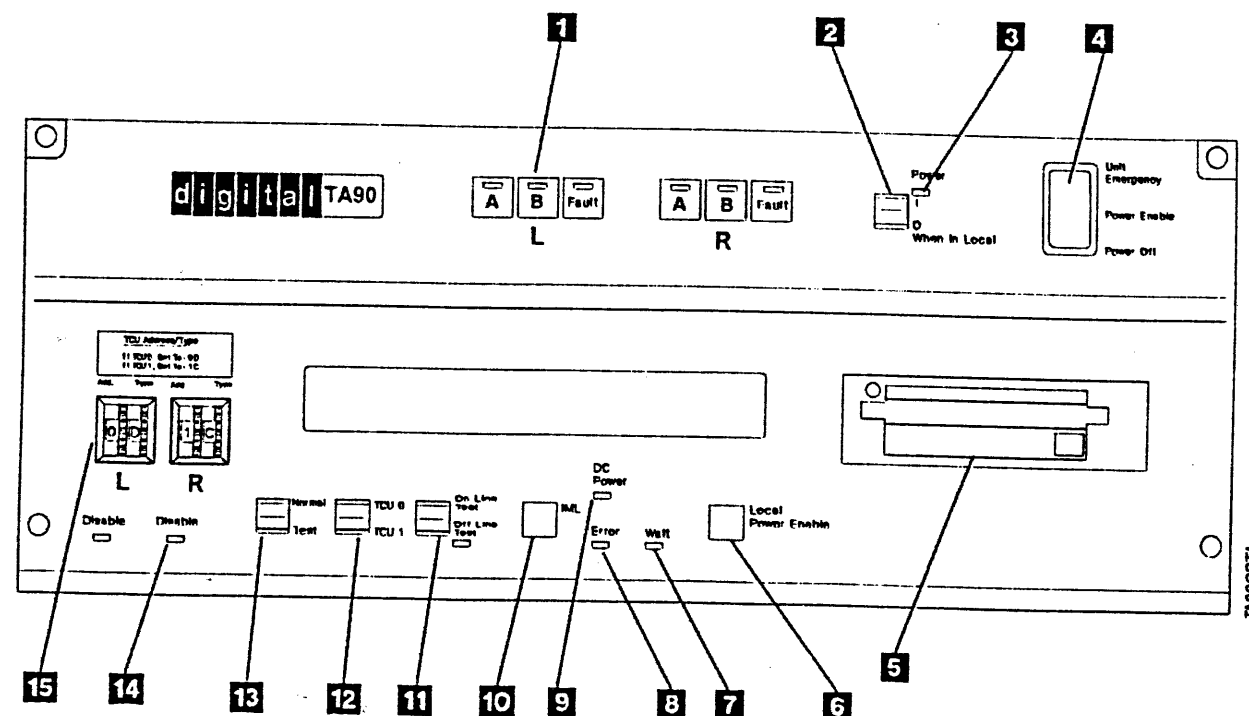
**Normal/Test 13:** This switch is placed in the Normal position for usual tape control unit operations. When the switch is placed in the Test position, the IML switch is placed in the IML position, and the Functional diskette is in the IML device, the tape control unit performs the needed tests to verify subsystem operation.

**Disable 14:** This indicator stays on during power-up and IML, and turns off after a successful power-up and IML. An error in the associated Channel Adapter causes the Disable indicator to come on.

**TCU Address 15:** These four thumbwheel switches represent (in groups of two) the two STI-FIPS Adapters that are installed. The first switch in each group has the hexadecimal value of 0 or 1, and is set to the tape control unit address corresponding to TCU switch 12. The second switch in each group is set to a mode value that relates to the address. See PANEL 12 for the correct setting of these thumbwheel switches.

**MD Connector 16:** This 26 pin connector is used to attach the maintenance device to the tape control unit. (This is only required for the support level utilities described in the MD/SDISK section.)

**Local/Remote 17:** This switch is placed in the Remote position to enable the subsystem to power up when the host system power is switched on and to power down when the host system power is switched off. When this switch is placed in the Local position, subsystem power is controlled by the Power On/Off switch.



### Setting Address Switches

The following procedure is used to set the tape control unit addresses. Each TCU has two pairs of thumbwheel switches. The left switch of each pair is the TCU Address. The right switch is set to a value to be determined by the TCU base address.

These switches should not be changed unless the correct procedure is followed.

**CAUTION:**  
if the TCU0/TCU1 switch is set to TCU0, both left and right thumbwheel switches must be set to 0D. If both thumbwheel switches are not set to 0D, the HSC will not recognize all the drives.

The same condition holds true when the TCU0/TCU1 switch is in the TCU1 position. Both thumbwheel settings must be at 1C.

### Setting the Tape Control Unit Addresses

1. For a single tape control unit subsystem, set the TCU0/TCU1 switch for tape control unit 0 to TCU0. For a dual tape control unit subsystem, set the TCU0/TCU1 switch for tape control unit 0 to TCU0, and set the TCU0/TCU1 switch for tape control unit 1 to TCU1.

**Note:** TCU0 has drive string containing addresses 0-7 physically attached.

2. Start with the switches for channel adapter A (left). Set the left thumbwheel switch to the tape control unit address. If the TCU0/TCU1 switch is in the TCU0 position, set the address to zero. If it is in the TCU1 position, set the address to one.
3. Set the right thumbwheel switch to the value indicated on the panel.
4. Repeat steps 1 through 3 for channel adapter B (right).

### Setting Drive Addresses

On the drives attached to TCU0, set the address switches in the range of 0 through 7. No two drives can have the same address.

On the drives attached to TCU1, set the address switches in the range of 8 through F. No two drives can have the same address.

To set the address switches for drives 10 through 15 use the following table.

| Unit Address | Switch Setting |
|--------------|----------------|
| 10           | A              |
| 11           | B              |
| 12           | C              |
| 13           | D              |
| 14           | E              |
| 15           | F              |

### Changing the Tape Control Unit Address Switch Settings

Use this procedure to change the tape control unit address (STI-FIPS adapter address) after installation:

1. Have the customer dismount all affected devices for that tape transport unit.
2. Set the Enable/Disable switch to Disable.
3. Change the thumbwheel switches to the desired valid settings.
4. Set the Enable/Disable switch to Enable.
5. Have the customer mount all affected devices using the new unit numbers.

## Tape Transport Unit Switches and Indicators

The tape transport unit operator panel switches **4** permit the customer and the service representative to control specific drive functions.

The tape transport unit ac power CB **10** is located at the front of the tape transport unit at the bottom right. The tape transport unit front cover must be open and the safety cover must be removed to get access to this switch. Push the door to open or close.

Switches are also located on a drive switch panel **5** located at the front center of the tape transport unit below the drives. The four switches at the left are used with drive 0, and the four switches at the right are used with drive 1. The tape transport unit front cover must be open for access to the drive switch panel.

### Drive Operator Panel

The drive operator panel switches and indicators are:

**Bar LEDs:** When lighted, the bar LEDs **1** indicate that operator action is needed before the drive can continue operations.

**Message Display:** This is a red eight-character dot matrix LED display **2** that supplies error, service representative information, drive status, and host response messages. (See PANEL 30 for a description of these messages.)

**Selected Indicator:** The selected indicator **3**, when on, indicates that the drive is selected by a tape control unit.

**Ready/Not Ready:** When the Ready/Not Ready switch **11** is placed in the Ready position and tape tension is correct, the drive is placed in a ready condition and READY F or B.O.T. F is displayed on the operator panel if the tape is file protected. If the tape is not file protected, READY U or B.O.T. U is displayed.

When the Ready/Not Ready switch is placed in the Not Ready position, the drive ready condition is removed and NT RDY F or NT RDY U is displayed. This permits the operator to perform a rewind or unload operation.

**Unload:** When the Unload switch **12** is pressed, and the drive is in a not ready condition (Ready Indicator off), the drive rewinds the tape and performs an unload operation.

**Rewind:** When the Rewind switch **13** is pressed, and the drive is in a not ready condition (Ready Indicator off), the drive rewinds the tape to the beginning-of-tape (BOT). In addition, if tape tension is lost and the Rewind switch is pressed, the drive performs a midtape load operation and rewinds the tape to the BOT.

## Tape Transport Unit AC Power CB

The tape transport unit ac power circuit breaker **10** supplies ac voltage to the pump/motor, the blower assemblies, and the dc power supply. Before ac power is removed, both drives in the tape transport unit should be offline.

### Drive Switch Panel

The drive switch panel switches are:

**Drive Power On/Off:** The Drive Power On/Off switch **6** is placed in the On position to supply ac voltage to the fans, and to supply dc voltage to pick the contactors in the power supply. When the switch is placed in the Off position, the ac and dc power is removed from the corresponding drive. The drive should be offline before power is removed.

**Reset:** When the Reset switch **7** is pressed, the drive performs a Power-On Reset.

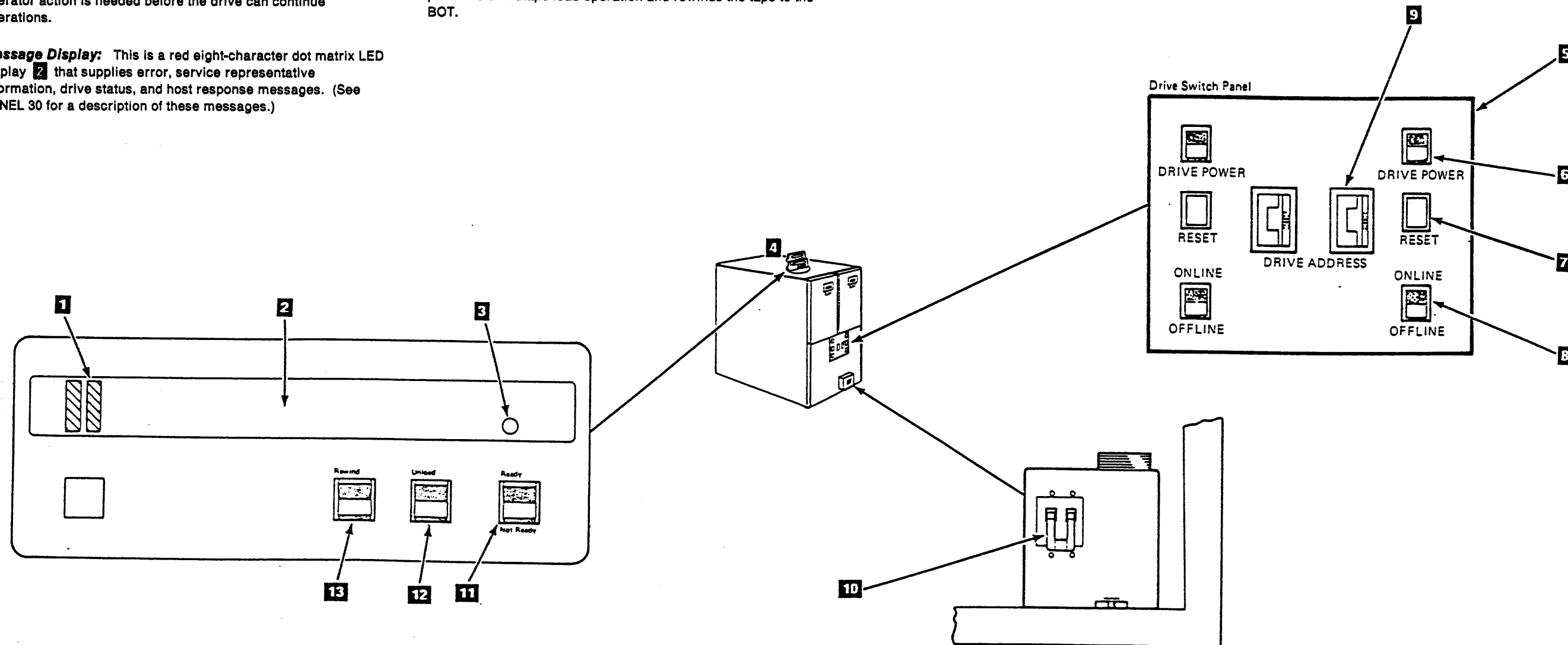
## Tape Transport Unit Switches and Indicators PANEL 15

**Online/Offline:** The Online/Offline switch **8** is placed in the Online position to permit drive communication with the tape control unit. When this switch is placed in the Offline position, the drive is not permitted to communicate with the tape control unit.

**Drive Address:** The Drive Address thumbwheel switch **9** can have the hexadecimal value of 0-F, and is set to the drive address. Drives physically attached to the tape control unit with the TCU0/TCU1 switch set to zero must be addressed in the range of 0-7. Drives physically attached to the tape control unit with the TCU0/TCU1 switch set to one must be addressed in the range of 8-F.

### Notes:

1. No two drives on the same tape control unit can have the same drive address set in their thumbwheel switches.
2. System-wide unit numbers can be established outside the drive address range by changing the basic address through the CE panel.





## Message Display Messages

The following types of messages can be displayed on the message display:

- Error Message
- Customer Engineer Information
- Drive Status
- Drive Status When the Drive Is Offline
- Host Response.

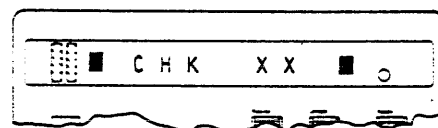
### Message Display Characters

In addition to alphabetic characters, the message display can show two other symbols:

- x. 'rectangle' (all the LEDs that make up a character in one position are lighted)

\* 'asterisk'

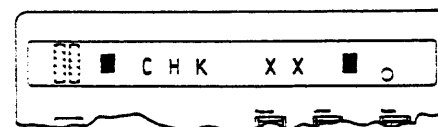
### LED Positions on the Message Display



1 2 3 4 5 6 7 8 position number

### Error Messages

An error message is displayed when a failure is detected in the drive whether it is on-line or off-line. This message has priority over all other types of messages and remains displayed until the failure is corrected.



This is an error code message.

XX = Hexadecimal error code

### Service Representative Information

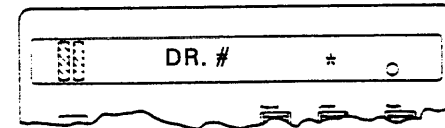
Information messages are diagnostic aids for the service representative who is performing FRU isolation on the TA90. These are not error messages.



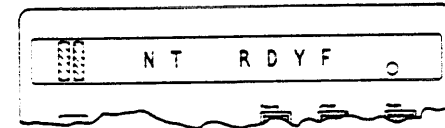
This drive is being tested.

### Drive Status When the Drive is On-line

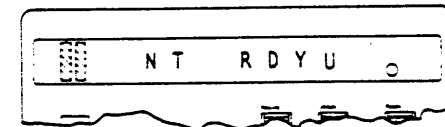
The drive status messages are generated by the TA90 drive to indicate the status of the drive or the operation that is being performed.



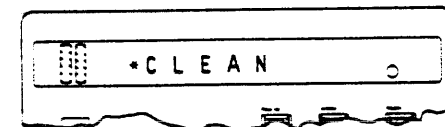
When no cartridge loaded, or both A/B switches are out.



Loaded, not ready, file protected.



Loaded, not ready, not file protected.



Indicates that the cleaning cartridge should be inserted to clean the read/write head.



Loaded, ready, file protected.



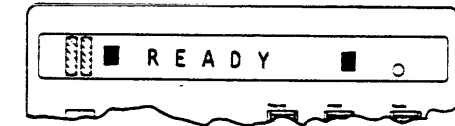
Loaded, ready, not file protected.

## Message Display Messages PANEL 30

### Drive Status When the Drive Is Offline

When the drive is off-line, LED positions 1 and 8 are rectangles. For drive status messages, any characters normally in positions 1 and number 8 are not visible. Any drive status message may be displayed with the drive off-line.

Example:



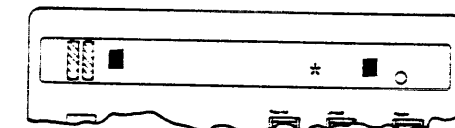
Drive is offline; loaded, ready. Can be file protected or not file protected.

Example:



Drive is offline; loaded, not ready. Can be file protected or not file protected.

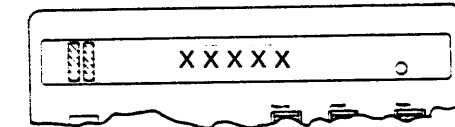
Example:



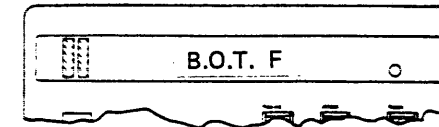
Drive is offline; no cartridge loaded.

### Host Response

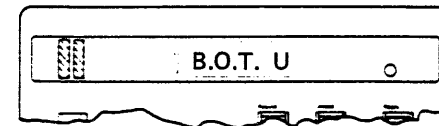
The host response messages are customer programmed messages sent to the drive from the host system by using the Load Display command.



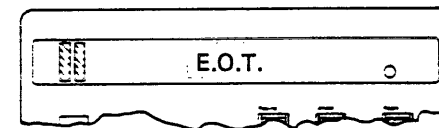
Customer programmed messages.



Loaded, ready, file protected, beginning-of-tape



Loaded, ready, not file protected, beginning-of-tape



Logical End-Of-Tape reached.



High-speed locate in operation.



Data security erase in operation.



Rewind in operation.



Unload in operation.

**Mode Selection Switch**

The mode selection switch **1** is a three position rocker switch.

- Auto
- System
- Manual

You can change the position of the switch at any time. Generally the device switches to the new mode automatically without any action by you. The one exception is when switching to Auto mode. The Start switch must be pressed to activate the new mode.

**Auto Mode:**

In this mode cartridges in the input stack are sequentially loaded into the drive, and upon completion of use by the drive, will be unloaded and positioned in the output stack.

**Manual Mode:**

In this mode you must manually insert the cartridges into the drive, one at a time.

**System Mode:**

System mode is not currently supported by VMS. This switch position should not be used.

**Start Switch**

The Start switch **2** is used by the operator to initialize Auto mode after a Power-On Reset, IML, or switching from Manual to Auto mode.

Reinitialize Auto mode after an input stack empty or output stack full condition. Cartridges must be added to the input stack or removed from the output stack before pressing the Start switch.

Activate each manual cartridge load cycle in Manual mode.

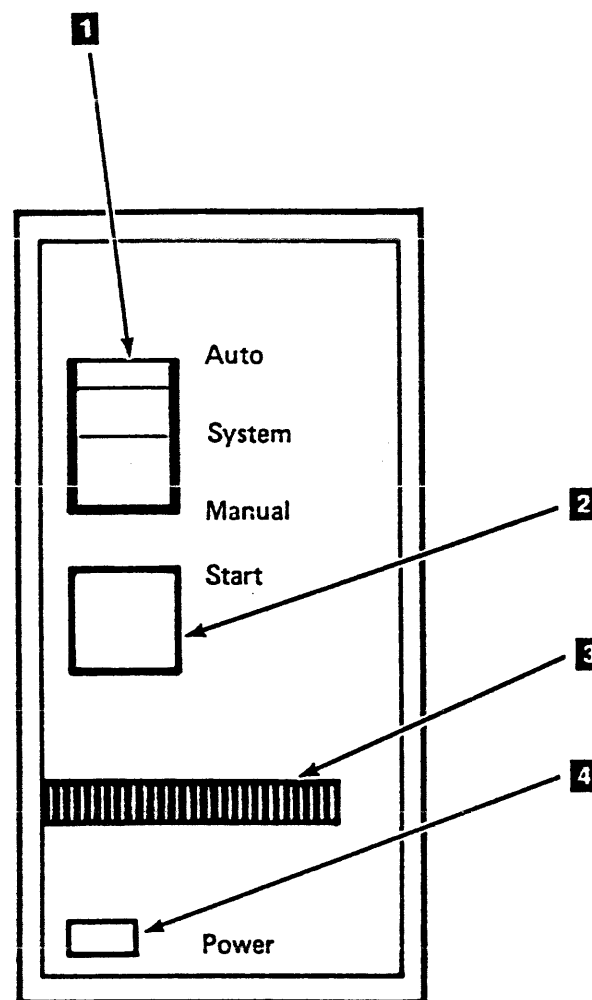
**Attention Indicator**

When the Attention indicator **3** LED is flashing, it indicates to the operator that action is needed before the automatic cartridge loader can continue operation.

When the LED is on solid, indicates an error condition. The indication remains on until a power off or a manual reset/IML of the drive, or the error condition has been cleared by pressing the drive Unload switch.

**Power On Indicator**

The Power On indicator **4** is on when the dc voltages supplied by the drive power supply are on and are regulated.



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Customer Engineering Panel

Customer Engineering Panel Description

The Customer Engineer (CE) Panel is the primary maintenance tool for the TA90 Magnetic Tape Subsystem. It is used to set the subsystem base address and to run diagnostics.

Location of controls and indicators

The Customer Engineer Panel contains the following:

**Panel Ribbon Cable:** The CE ribbon cable is connected to the TA90 tape control unit to supply the communication path between the CE panel and the TA90. The CE connector is located in the back of the TA90 tape control unit.

**Keyboard/Display:** The keyboard/display permits communication with the maintenance procedures.

Display

The display has one row of 20 characters, and messages appear as either fullscreen or half-screen messages. Messages may originate from either adapter. For half-screen messages, the left 10 characters are reserved for the left adapter and the right 10 characters are reserved for the right adapter.

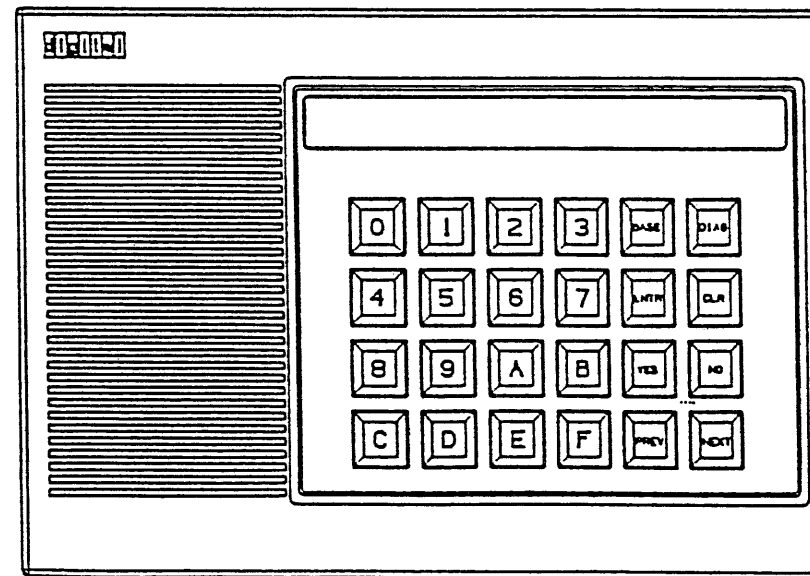
Keypad

The keypad consists of a hexadecimal entry pad (0-F), and eight special function keys. The special function keys are: BASE, DIAG, ENTR, CLR, YES, NO, PREV, and NEXT.

Special function key operations

This section describes the operations that occur when the CE keyboard pushbuttons are pressed.

- BASE** The BASE key is used for setting the base address of the subsystem. It should not be used during diagnostics.
- DIAG** The DIAG key is used to place the subsystem in diagnostic mode and to exit from diagnostic mode.
- ENTR** When pressed, this pushbutton signals the CE to read the data that is displayed on the CE display. The ENTR pushbutton may also be used to advance to the next operation.
- CLR** CLR is used to clear the display should a data entry error be made. You must re-enter all the data, as CLR clears the entire display.
- YES NO** When pressed, these pushbuttons enter an alphabetic Y or N character to supply answers to questions in the current display to guide the CE through setting the base address and running diagnostics.
- NEXT PREV** NEXT and PREV are used to scroll through information that exceeds the 20 character display capacity.
- Data entry keys (0-F)** The data entry keys are used to input diagnostic test numbers and the base address.



CE MESSAGES

Information and direction messages are displayed on the keyboard/ display when the CE is used with the TA90. The following information and examples describe the types of messages that are displayed.

CE Message Types

The TA90 message types are:

- Information
- Question
- Request

Information message

The information messages are used to inform you that the CE is performing a function that takes time and is not idle.

Example of an Information message

**EXECUTING**

Question message

The question message asks a question that must be given a YES or a NO answer, and ends with a question mark (?).

Example of a Question message

**USE LEFT ADAPTER ?**

Request message

When input is needed, you are instructed to enter the data. To respond, enter the requested data and press the ENTR key.

Example of a Request message

**NEW BASE ADDRESS?**

Power-up/Timeout

The CE panel is powered directly by the TCU power supply. The panel ribbon cable should always be connected to the back of the pocket such that when the TCU (and consequently the adapters) are powered up, the panel should also be powered up.

When power-up diagnostics are completed on the CE panel, the hardware and software versions will be displayed. When the adapter diagnostics are complete, the message "PWRUP OK" should appear on both halves of the panel display. If this message does not appear on both halves of the display, the adapter corresponding to the absent message is either not present, or present and not able to communicate with the CE panel.

NOTE:

Any of the following messages indicate that an error has been detected by CE panel diagnostics: "DUART FAILURE", "RAM TEST FAILURE," "ROM TEST FAILURE."

If the panel is not used within one hour of power-up, there is a timeout and the display will show the present base address of the subsystem as follows:

**BASE ADDRESS: #####**

Setting the Base Address

Enter the base address mode by pressing the BASE key. When the BASE key is pressed, "BA IS #####: CHANGE?" appears on the display. (##### is the existing base address). At this prompt, respond with a YES or NO.

If the response is YES, "NEW BASE ADDRESS?" is displayed. Enter a decimal number (0-65520) and press the ENTR key. If a hexadecimal number or a number greater than 65520 is entered, an error message will appear, and the original message "BASE ADDRESS: <#>" will return to the display after 5 seconds. When a legitimate number is entered, the new base address will be displayed with "BASE ADDRESS: <#>".

If the response is NO, the original base address message will appear.

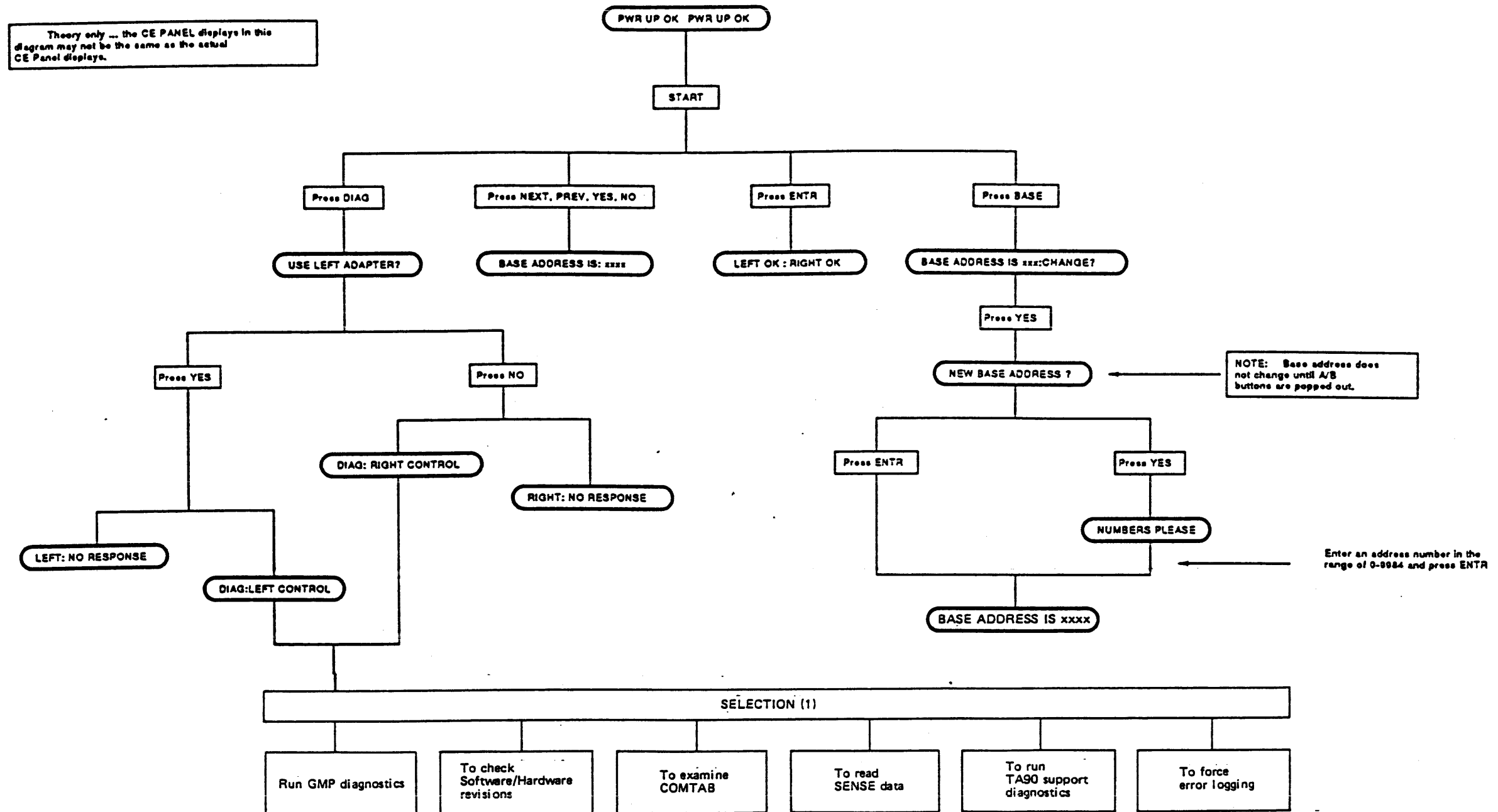
Running Diagnostics

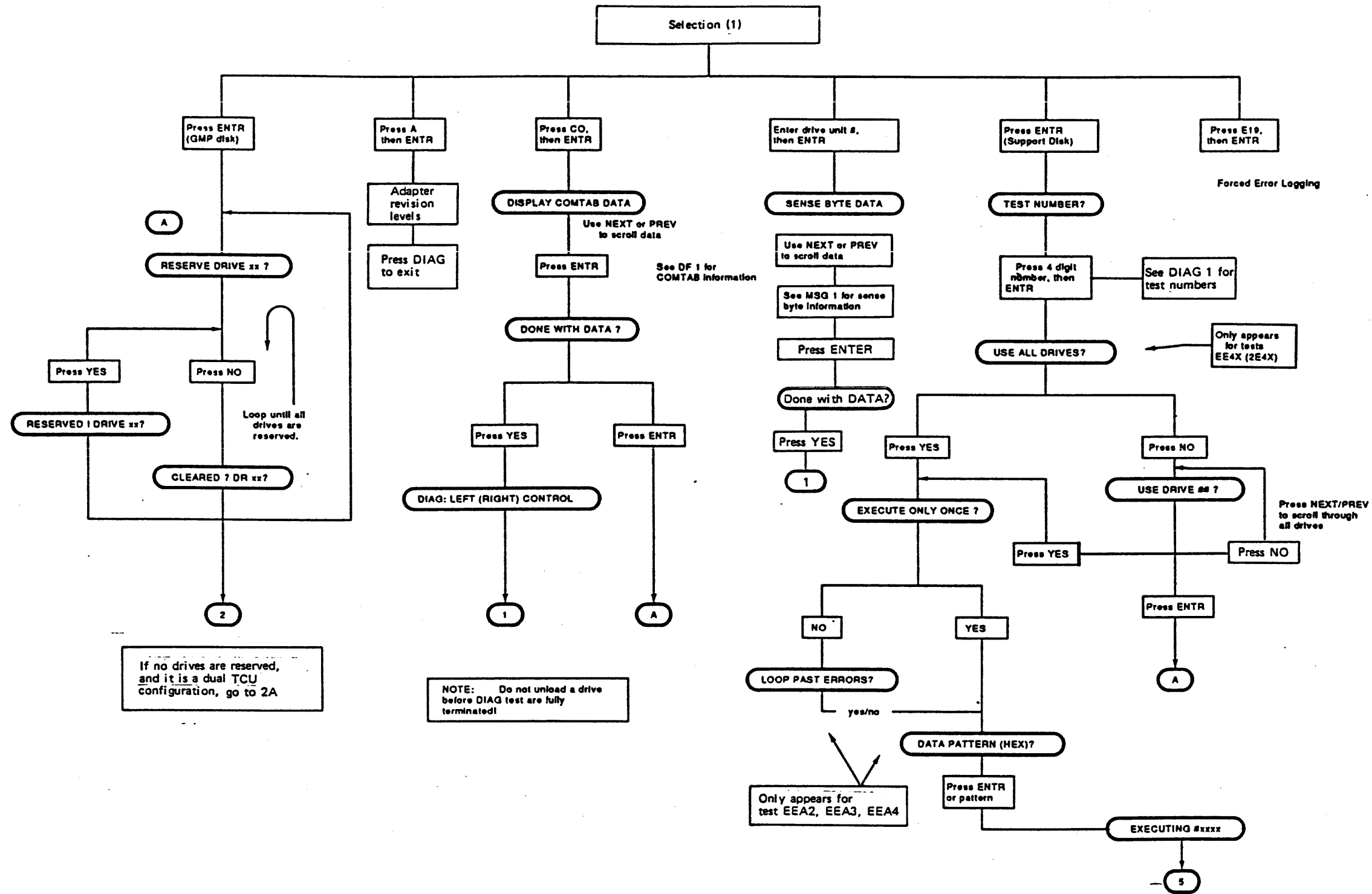
See the CE Panel functional flow diagram (CE/HSC 8).

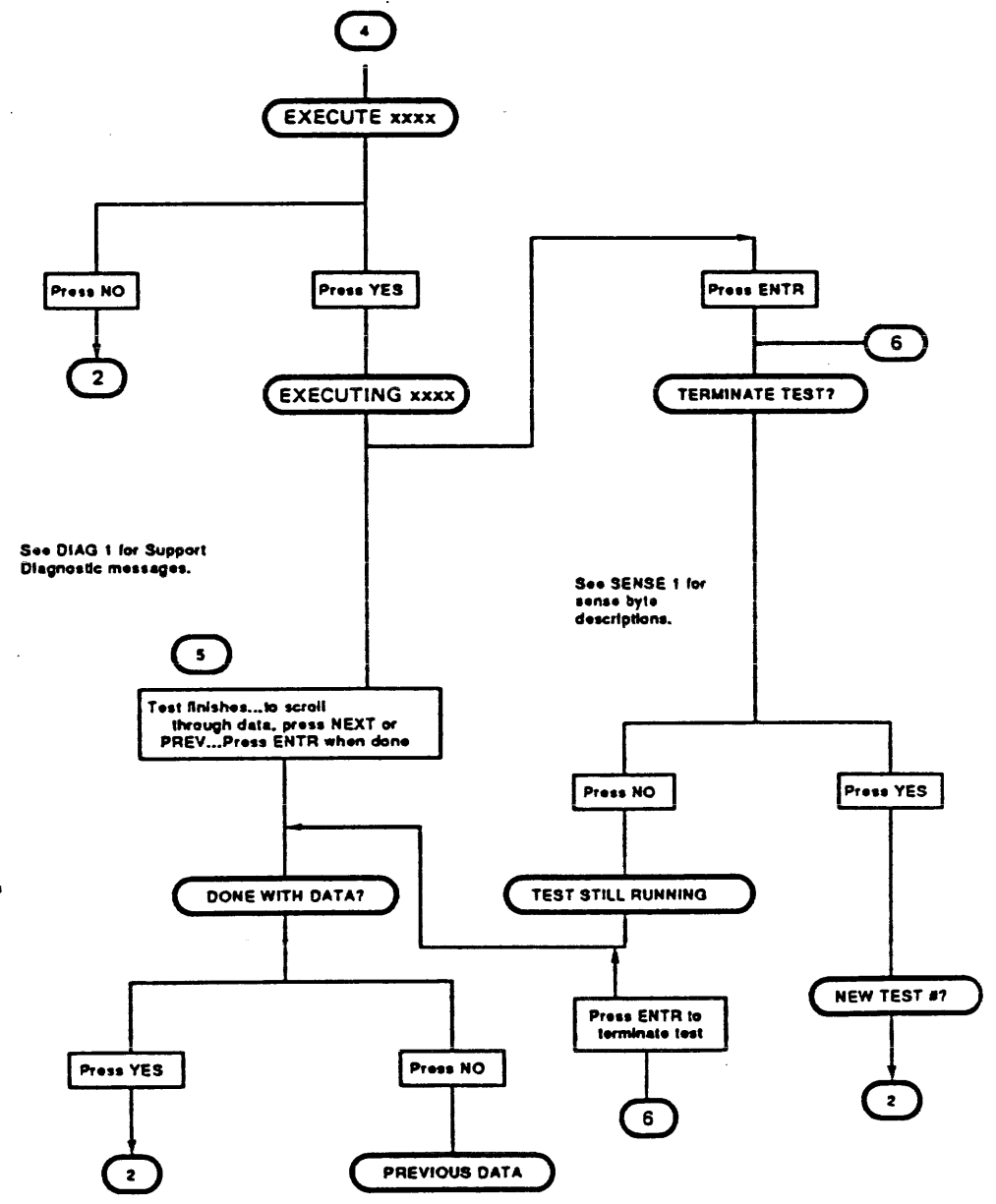
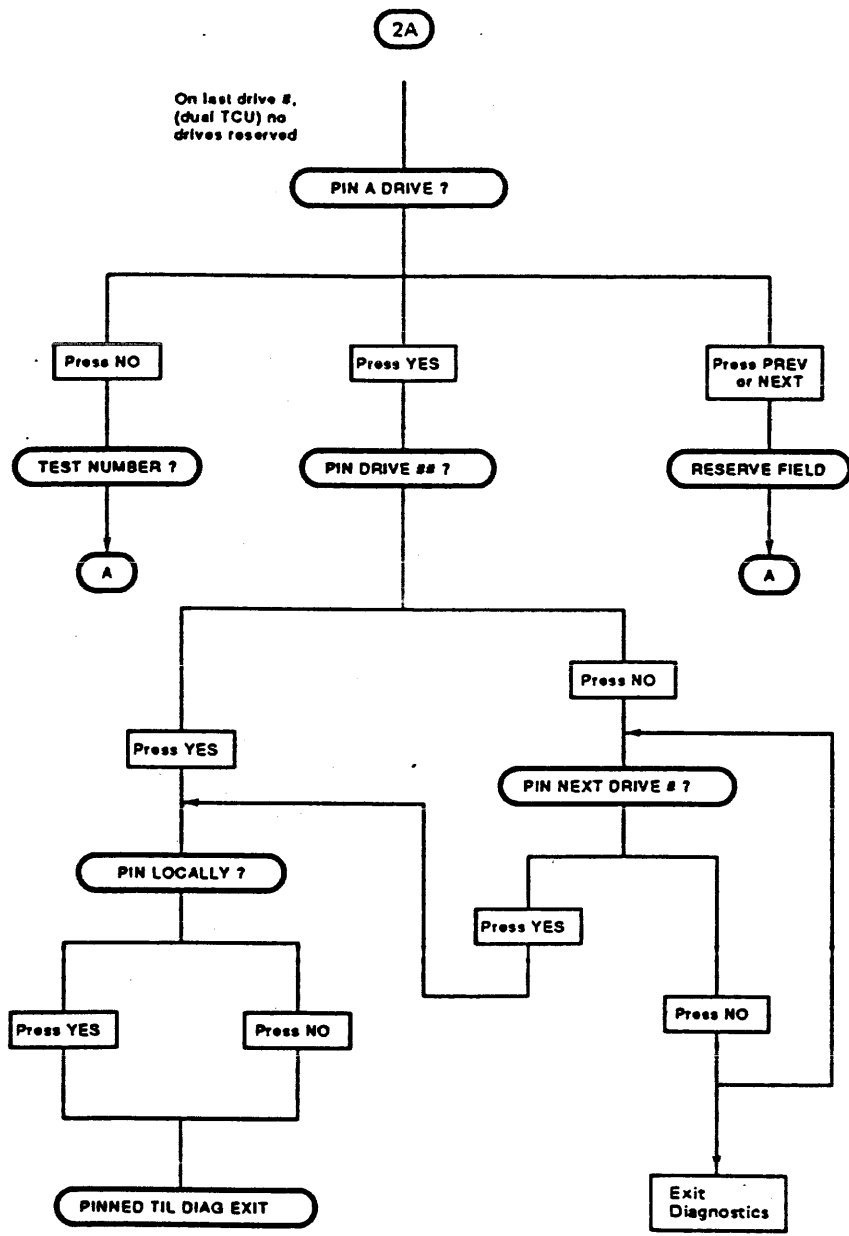
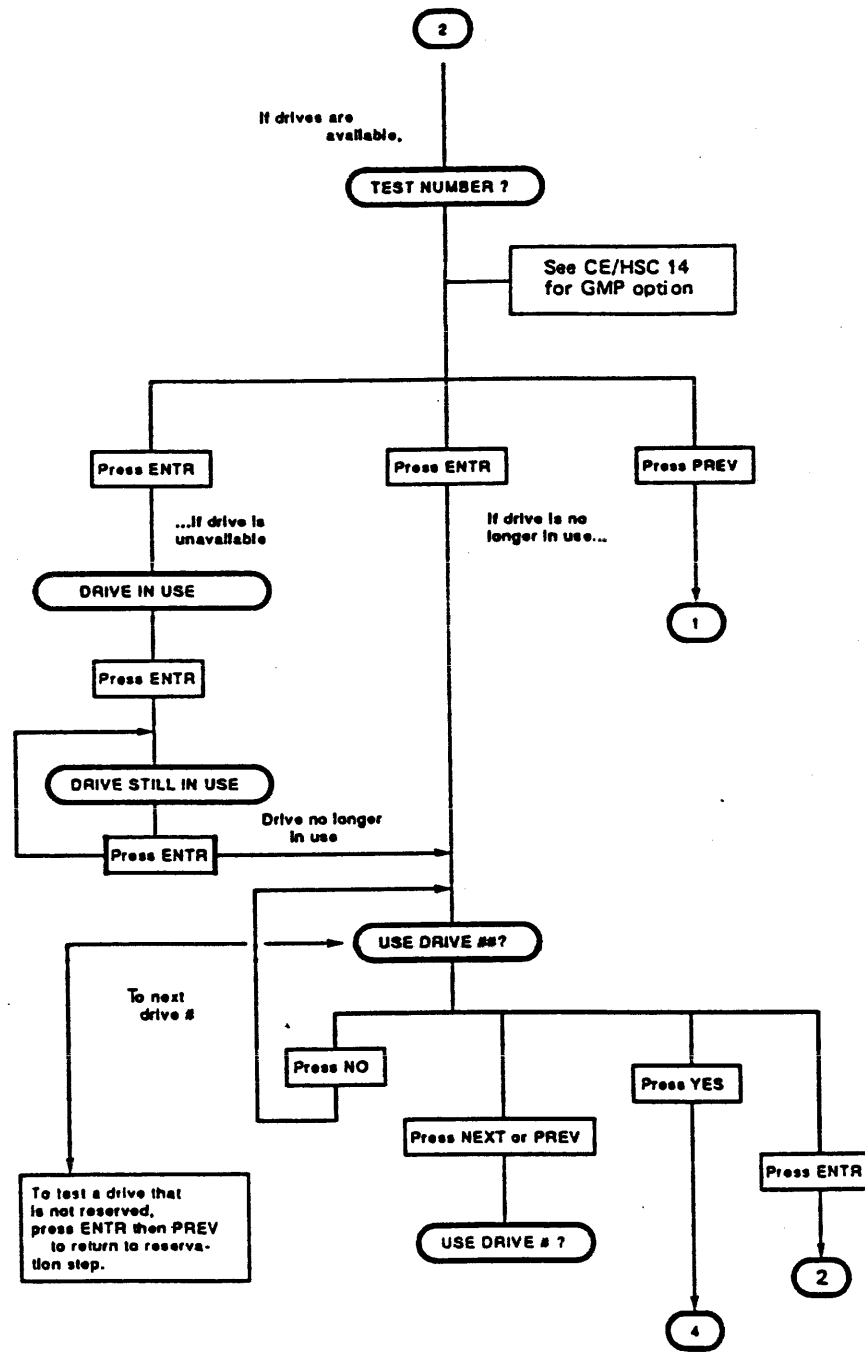
Exiting Diagnostics

The diagnostic mode can be exited in three ways:

1. DIAG is pressed twice (once to enter, the second to exit.)
2. The one hour timeout has expired.
3. The adapters are reset.







GMP Diagnostics

The Good Machine Path (GMP) diagnostics use a building block approach to testing the TA90 subsystem. GMP resides on the functional diskette, and can be used for problem determination and fix verification.

The GMP diagnostics provide the ability to:

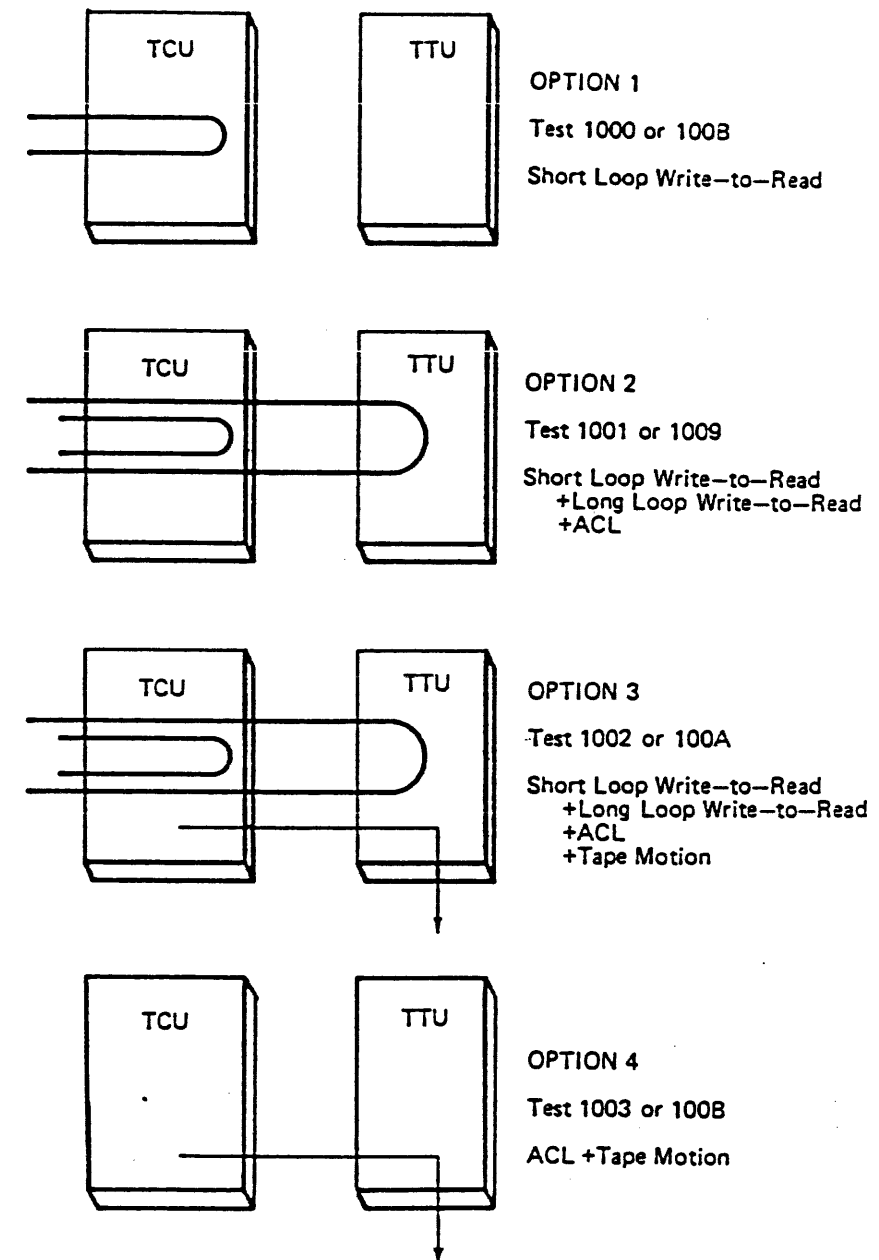
- Concurrently exercise the tape control unit for hardware failures
- Concurrently exercise the tape control unit and a single drive for hardware failures
- Concurrently exercise the tape control unit and a single drive with media for hardware failures
- Force the operation of a given device to a specified tape control unit (Pin and Unpin device).

GMP always runs for a specific drive.

GMP (Good Machine Path) Test Options

| GMP Option     | Basic Test Local | Buffer Override <sup>1</sup> | Test Remote | Test Description <sup>2</sup>   |
|----------------|------------------|------------------------------|-------------|---|
| 1              | 1000             | 1008                         | 1018        | Short Loop Write-to-Read  |
| 2              | 1001             | 1009                         | 1019        | Short Loop Write-to-Read and Long Loop Write-to-Read and ACL Device Interface functions                                 |
| 3              | 1002             | 100A                         | 101A        | Short Loop Write-to-Read and Long Loop Write-to-Read and ACL and Tape Motion Automatic Cartridge Loader and Tape Motion |
| 4 <sup>3</sup> | 1003             | 100B                         | 101B        | ACL and Tape Motion   |

<sup>1</sup>Buffer override is recommend in each option.  
<sup>2</sup>Options 1 and 2 are run with no tape loaded.  
<sup>3</sup>Options 1 and 2 must be run before option 4.





## Pinning a Drive

### Pinning a Drive

There are some TA90 Subsystem functions that can be tested only by pinning a drive to a TCU. The data buffer and status store lines, along with the dual communicator cable is tested by pinning. Normally, drives 0-7 belong to TCU0 while the high bank of drives (8-15) belong to TCU1. When jobs are in process, the information may be processed through either TCU, regardless of which drive is being used.

"Pinning" a drive assigns a drive to a TCU and only that TCU may process data and communicate with the drive. Pinning, therefore may force a TCU error to surface if the TCU was running in a degraded mode. Without pinning, the other TCU would automatically take control and the problem with the degraded TCU would not be seen.

### Pinning a Locally/Remotely

"Pin Locally" pins a drive to its local TCU. For example, pinning drive 0 locally would pin it to TCU0, while pinning drive 9 locally would pin it to TCU1.

"Pin Remotely" pins a drive to the remote TCU. For example, pinning drive 0 remotely would force TCU1 to process information to and from that drive. If ILEXER is run on drive 0, the HSC would send the command to TCU0, where the buffer and status store lines would be used to send commands and data between TCU1 and TCU0. TCU1 would actually be handling the job.

Use the CE Panel to pin drives. See the CE/HSC section.

How to Use HSC Diagnostics

Subsystem Level Diagnostics

Three subsystem level diagnostics, ILTAPE, ILTCOM, and ILEXER, verify proper TA90 operation.

- **Inline Tape Test (ILTAPE)**  
 ILTAPE initiates tape formatter resident diagnostics or a functional test of the tape transport. In addition, the test permits selection of a full test of the K.Si interface.
- **Inline Tape Compatibility Test (ILTCOM)**  
 ILTCOM tests the compatibility of tapes which may have been written on different systems and different drives, with STI-FIPS compatible (TA90) drives connected to an HSC via the STI bus. ILTCOM may generate, modify, read, or list a compatibility tape.  
  
 ILTCOM is not diagnostic in nature, therefore, all of the necessary subsystem hardware is assumed to be working. Errors are detected and reported but fault isolation is not a goal of ILTCOM.
- **Inline Multidrive Exerciser (ILEXER)**  
 The Inline Multidrive Exerciser exercises the various disk and tape drives attached to the HSC subsystem. The exerciser is initiated upon demand. Drives to be tested are selected by the operator. The exerciser will issue random READ, WRITE and COMPARE commands to exercise the drives. The reports given by ILEXER do not provide any analysis of the errors reported nor explicitly call out a specific FRU. This is strictly an exerciser.

Operating Instructions

The following steps outline the procedure for running ILTAPE, ILTCOM, and ILEXER. The tests assume an HSC70 is configured with a terminal and STI interface. If the HSC70 is not booted, start with Step 1. If the HSC70 is already booted, proceed to Step 2 (See diagram).

How to Run ILEXER

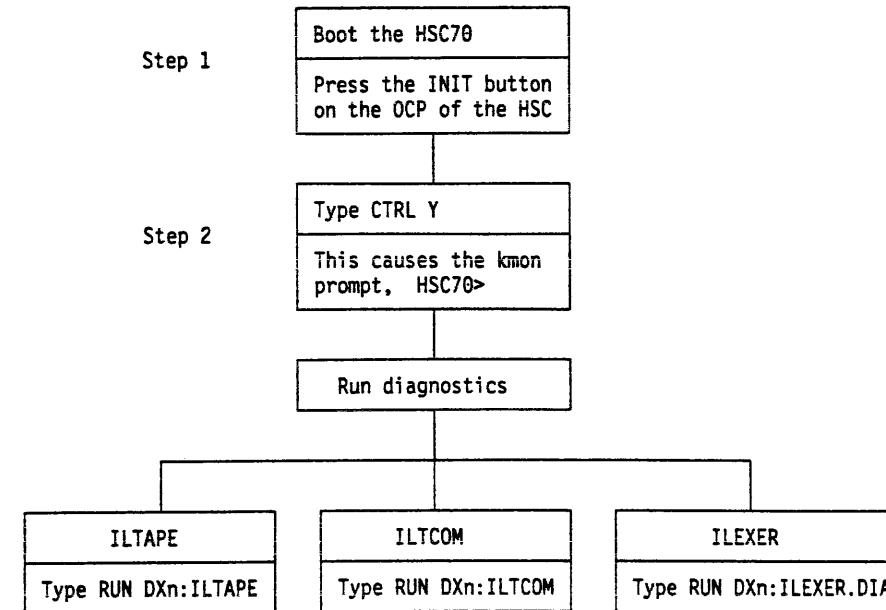
When the ILEXER program is successfully loaded, the following message is displayed:

ILEXER>D>hh:mm Execution Starting  
 where 'hh:mm' is the current time.

ILEXER then prompts for parameters. After all prompts are answered, the execution of the diagnostic proceeds. Error reports and performance summaries are returned from ILEXER.

When ILEXER has run for the specified time interval, reported any errors found, and generated a final performance summary, the exerciser concludes with the following message:

ILEXER>D>hh:mm Execution Complete



ILEXER output translation

| ILEXER      | ACTUAL (TA90)          | VALUE                         |
|-------------|------------------------|-------------------------------|
| Data checks | Write data checks      | Contents of sense byte 10 ÷ 8 |
| Other A     | Read blocks corrected  | Contents of sense byte 11 ÷ 8 |
| Other B     | Write blocks corrected | Contents of sense byte 12 ÷ 8 |
| Other C     | Read recoveries        | Contents of sense byte 30 ÷ 8 |

**ILEXER Test Parameter Entry**

The parameters in ILEXER follow the format:

PROMPT DESCRIPTION (DATATYPE) [DEFAULT]?

- The PROMPT DESCRIPTION explains the type of information ILEXER needs from the operator.
- The DATATYPE is the form ILEXER expects and can be one of the following:  
 Y/N - Yes/No response  
 D - Decimal number  
 U - Unit number (see from below)  
 H - Hexadecimal number
- The DEFAULT is the value used if a carriage return is entered for that particular value. If a default value is not allowed, it appears as [ ].

The next prompt is:

DRIVE UNIT NUMBER (U) [ ]?

Enter the unit number of the drive to be tested. This prompt has no default. Unit numbers are in the form Tnnnn, where nnnn is a decimal number between 0 and 4095, corresponding to the number on the drive's display. Terminate the unit number with a carriage return. ILEXER attempts to acquire the specified unit via the HSC Diagnostic Interface. If the unit is acquired successfully, ILEXER continues with the next prompt. If the unit acquire fails, one of the following conditions was encountered:

1. The specified drive is unavailable. This indicates the drive is connected to the HSC but is currently online to a Host CPU of the HSC utility. ONLINE drives cannot be diagnosed. ILEXER repeats the prompt for the unit number.
2. The specified drive is unknown to the HSC Tape functional software. Drives are unknown for one of the following reasons:
  - The drive and/or K.SI port is broken and cannot communicate with the disk functional software.
  - The drive was previously communicating with the HSC when a serious error occurred and the HSC ceased communicating with the drive.

In either case, ILEXER asks the operator if another drive will be selected. If so, it asks for the unit number. If not, ILEXER begins to exercise the drives selected. ILEXER terminates if no drives are selected.

After a drive is selected and ILEXER has both acquired the drive and brought it online, the following prompts appear. A CTRL Z at any time during parameter input selects the default values for the remaining parameters. If a nondefaultable parameter is encountered, the following message appears and the test prompts for new parameters:

ILEXER>D>hh:mm Nondefaultable Parameter

Select up to 12 drives to be exercised.

IS A SCRATCH TAPE MOUNTED (Y/N) [N]?

An N response results in a reprompt for the drive unit number. A Y response displays the next prompt.

ARE YOU SURE (Y/N) [N]?

If the answer is N the operator is reprompted for the drive unit number. If answered with a Y, the following prompts are displayed.

DATA PATTERN NUMBER (16-22) (D) [21]?

Seven data patterns are available for tape. These data patterns are defined in the HSC70 Service Manual.

RECORD LENGTH IN BYTES (1 to 12288) (D) [8192]?

Response to this prompt specifies the size in bytes of a tape record. Maximum size is 12K bytes. The default value is 8192, the standard record = length size for 32 bit systems. Constraints on the HSC diagnostic interface prohibit selection of the maximum allowable record length of 64K bytes.

DATA COMPARE (Y/N) [N]?

A Y response selects data compares to be performed on every tape read operation. An N response causes data compares to be performed on 15 percent of the tape reads.

ANOTHER DRIVE (Y/N) [ ]?

Answering Y, the prompts beginning with the prompt for DRIVE UNIT NUMBER, are repeated. If answered NO, the following global prompts are presented. This prompt has no default, allowing the operator to default all other prompts and be able to select parameters for another drive for this pass of ILEXER.

**ILEXER Global User Prompts**

The following prompts are presented to the operator when no more drives or drive-specific parameters are to be entered into the testing sequence. These prompts are global in the sense they pertain to all the drives.

RUN TIME IN MINUTES (1 to 32767) [10]?

The minimum time is 1 minute, and the default is 10. After the exerciser has executed for that period of time, all testing terminates and a final performance summary is displayed.

HARD ERROR LIMIT (D) [20]?

You are allowed to specify the number of hard errors allowable for the drives being exercised. When a drive reaches this limit, it is removed from any further exercising on this pass of ILEXER. Hard errors include the following types of errors:

- Tape drive BOT encountered unexpectedly
- Invalid MSCP response received from functional code
- UNKNOWN MSCP status code returned from functional code
- Write on write-protected drive

- Tape formatter returned error
- Read compare error
- Read data EDC error
- Unrecoverable read or write error
- Drive reported error
- Tape mark error (ILEXER does not write tape marks)
- Tape drive truncated data read error
- Tape drive position lost
- Tape drive short transfer occurred on read operation
- Retry limit exceeded for a tape read, write, or read reverse operation
- Drive went OFFLINE or AVAILABLE unexpectedly.

NARROW REPORT (Y/N) [N]?

Answering Y presents a narrow report which displays the performance summaries in 32 columns. The default display, selected by answering N, or carriage return, is 80 columns.

ENABLE SOFT ERROR REPORTS (Y/N) [N]?

This prompt enables soft error reports by answering Y. By default, the operator does not see any soft error reports specific to the number of retries required on a tape I/O operation. A N response results in no soft error report. Soft errors are classified as those errors that eventually complete successfully after retry operations. They include read, write, and read-reverse requested retries.

**How to Run ILTAPE**

The following steps outline the procedure for running ILTAPE.

Type R DXn:ILTAPE

This invokes the inline tape diagnostic program, ILTAPE. The DX is the RX33 device name. The n refers to the unit number of the specific RX33 drive. For example, DX1: refers to RX33 drive number one. The following message should appear at the terminal:

ILTAPE>D>hh:mm Execution Starting

**ILTAPE/User Dialogue**

The following paragraphs describe ILTAPE/user dialogue during execution of ILTAPE. Examples in this section refer to using ILTAPE to invoke GMP or support diagnostics. Refer to the HSC Service Manual (EK-HSC70-SV) to use ILTAPE for other testing.

DRIVE UNIT NUMBER (U) [ ]?

Enter Tnnn, where nnn is the MSCP unit number (such as T316).

EXECUTE FORMATTER DEVICE INTEGRITY TEST?

Enter Y (for yes) to execute formatter diagnostics. This is the default.

MEMORY REGION NUMBER (H) [0]?

This prompt appears only if the response to the previous prompt was Y. For TA90, the memory region number is the diagnostic test number for either GMP or support diagnostics. For example, a GMP response to this question would be 1008. See CE/HSC for a complete description of GMP tests. For support, numbers should be of the form 2EXX. See DIAG and MD/SDISK for a description of support diagnostics. EEXX are translated to 2EXX for ILTAPE.

DO YOU WANT TO ENTER PARAMETERS? (Y/N) [N]

For TA90, you must answer Y (yes) to this question. At least one parameter, the unit number, must be given. The three parameters are as follows:

BYTE 00: Tnn where nn is the drive unit number  
 BYTE 01: ll where ll is the looping option  
           0 - no loop  
           1 - loop till error  
           2 - loop indefinitely  
 BYTE 02: dd for test numbers that support tests  
           on all drives, non-zero indicates  
           "all drives". For tests that take  
           a data pattern, this byte is the  
           data pattern.

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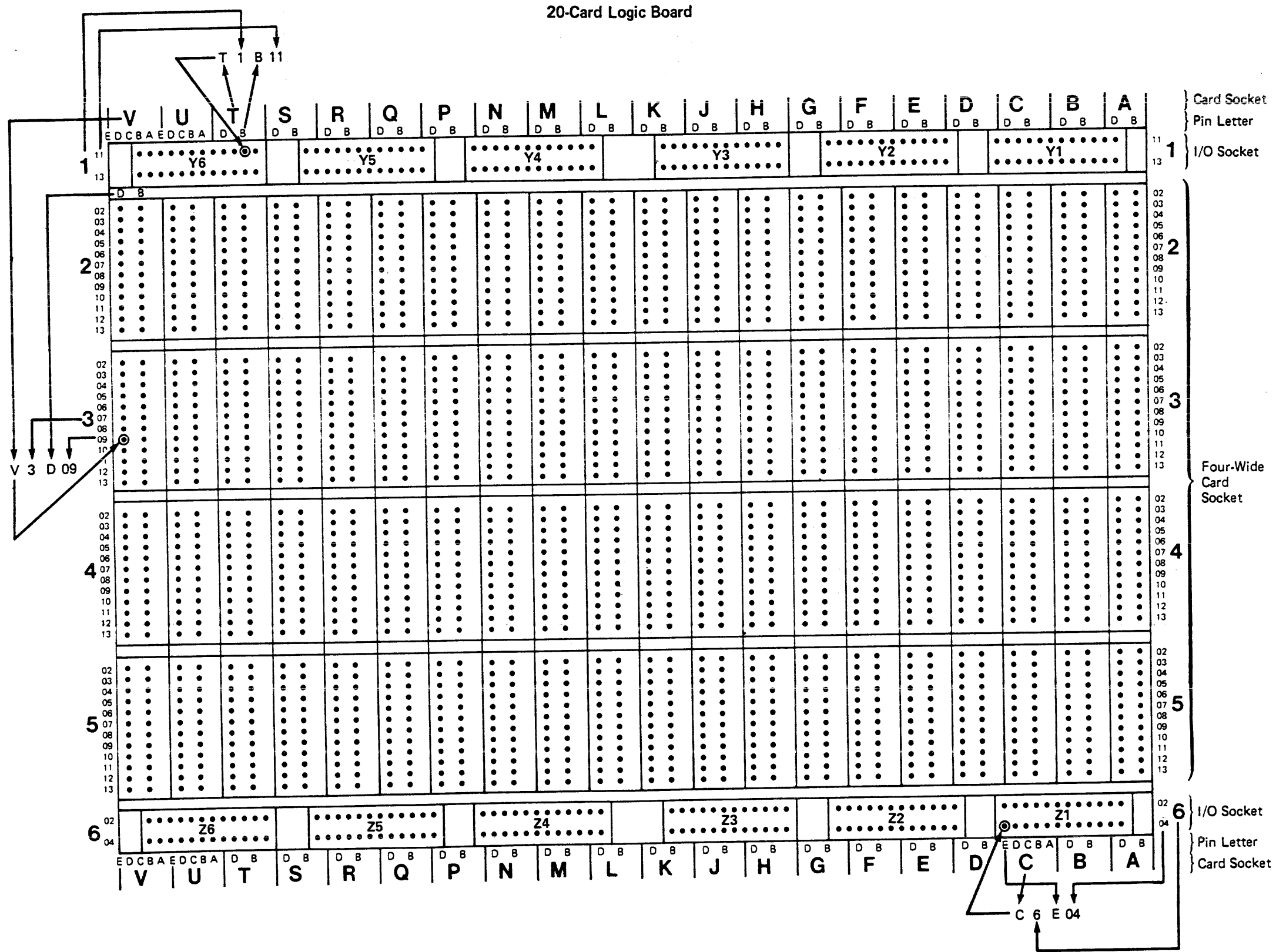
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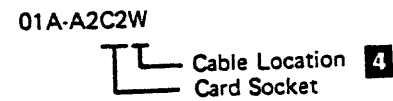
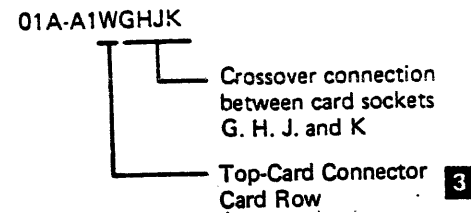
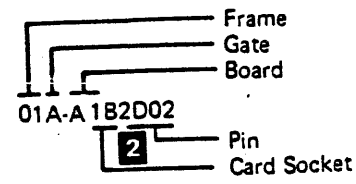
**Tape Control Unit Locations**  
**Logic Board Layout (Pin Side)**

**Tape Control Unit Locations LOC 5**



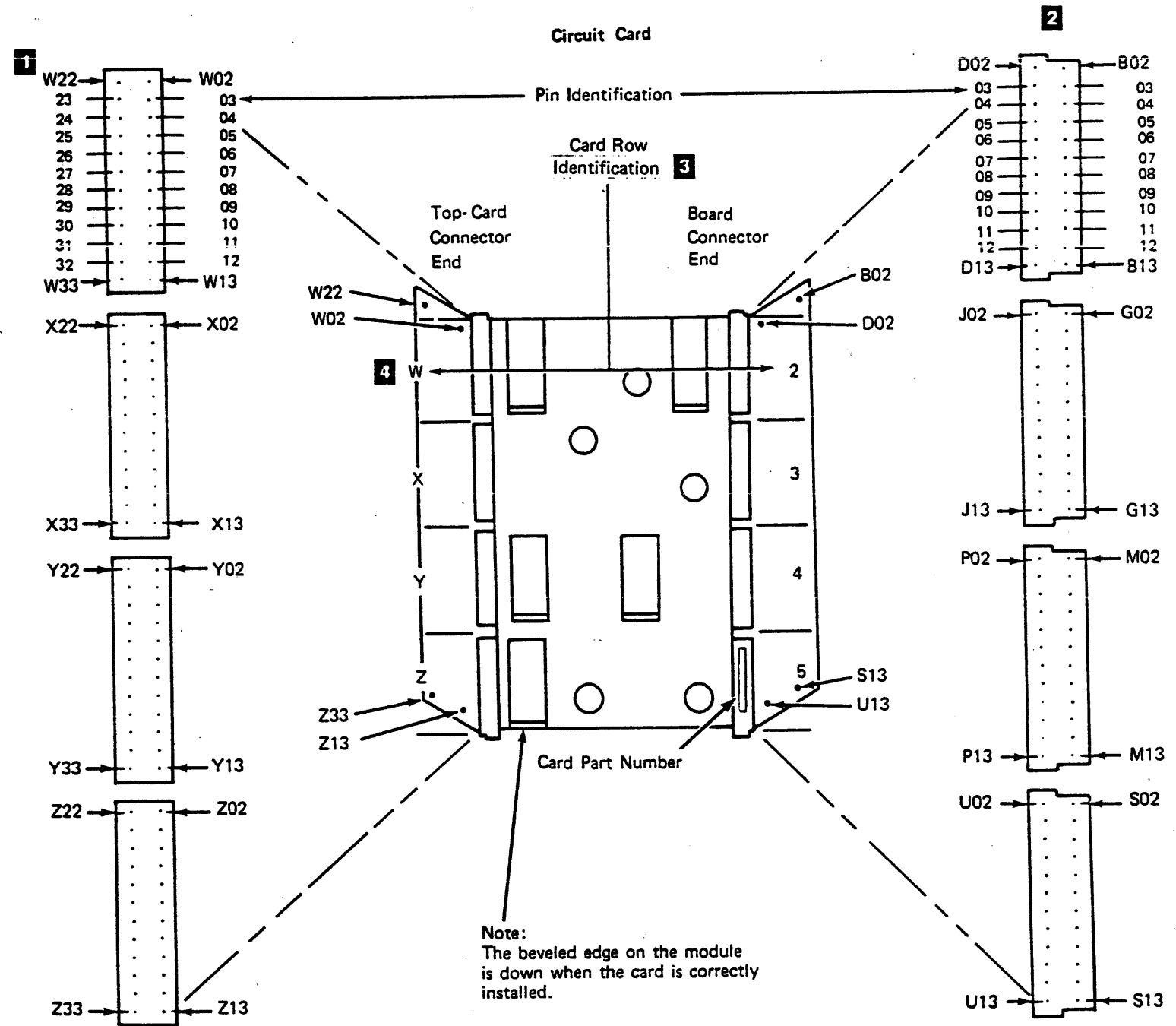
Card Identification

Location Identification Example:



Ground Pins

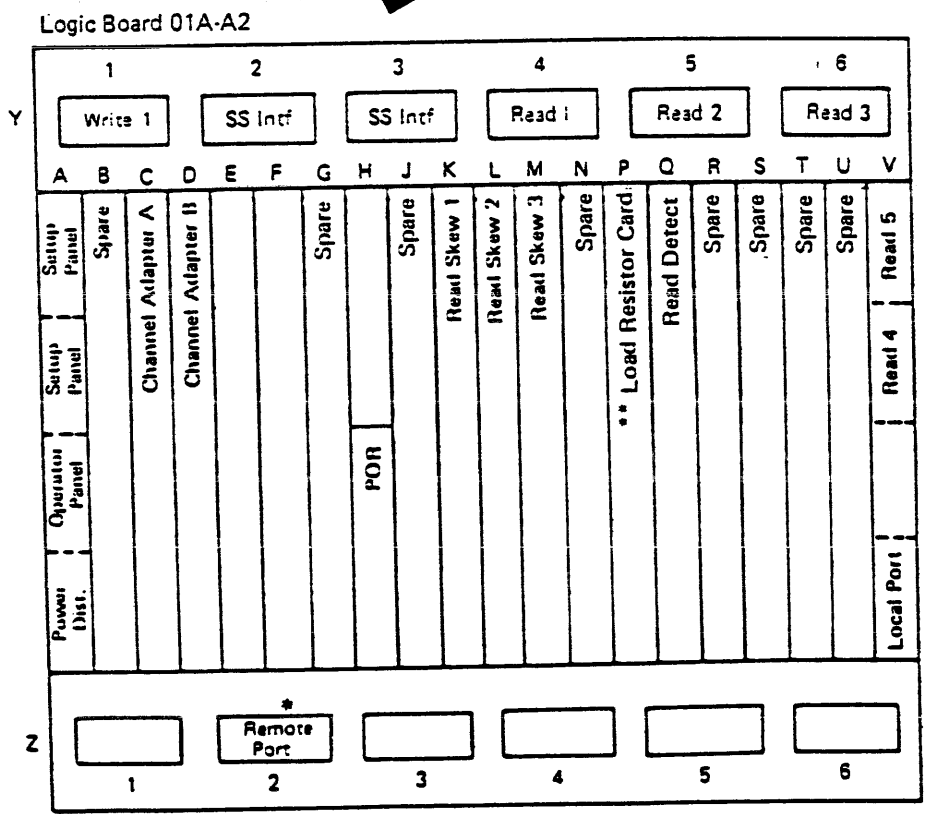
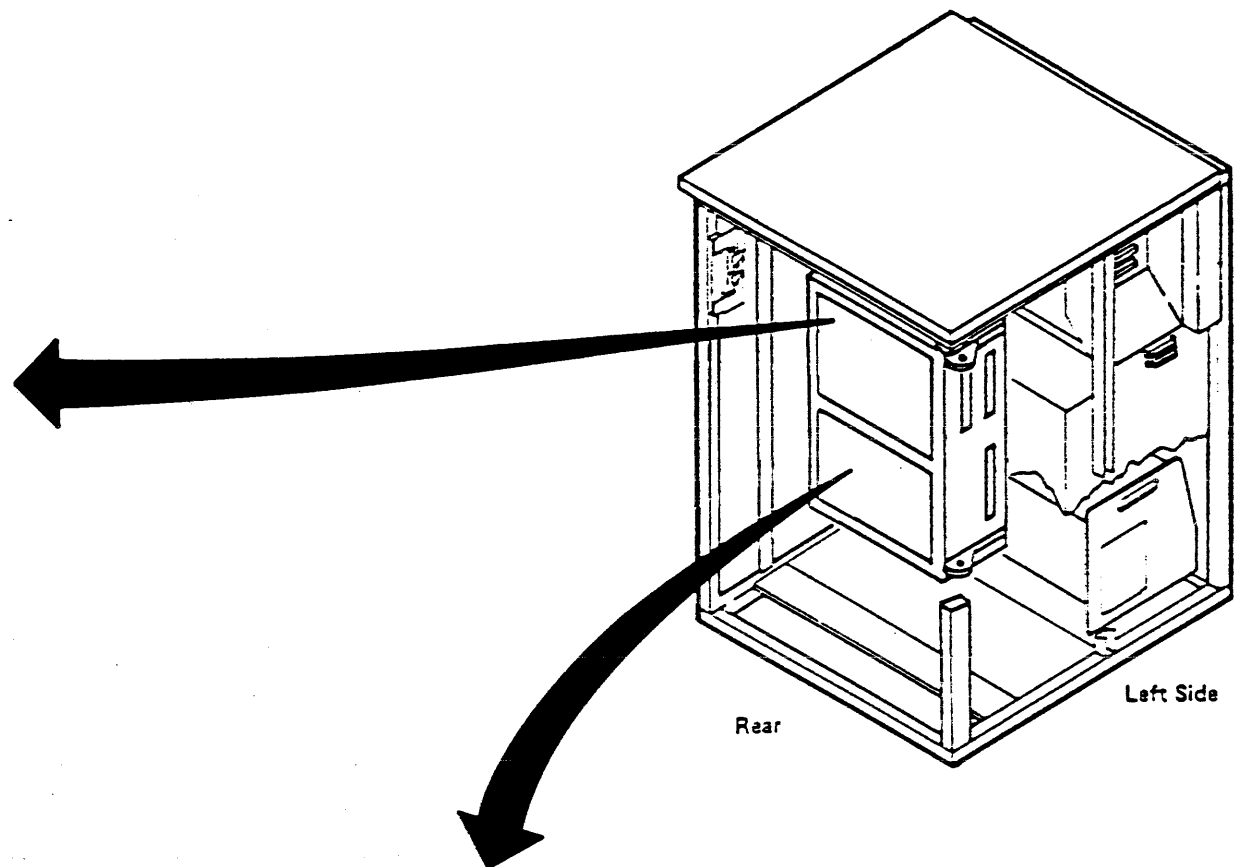
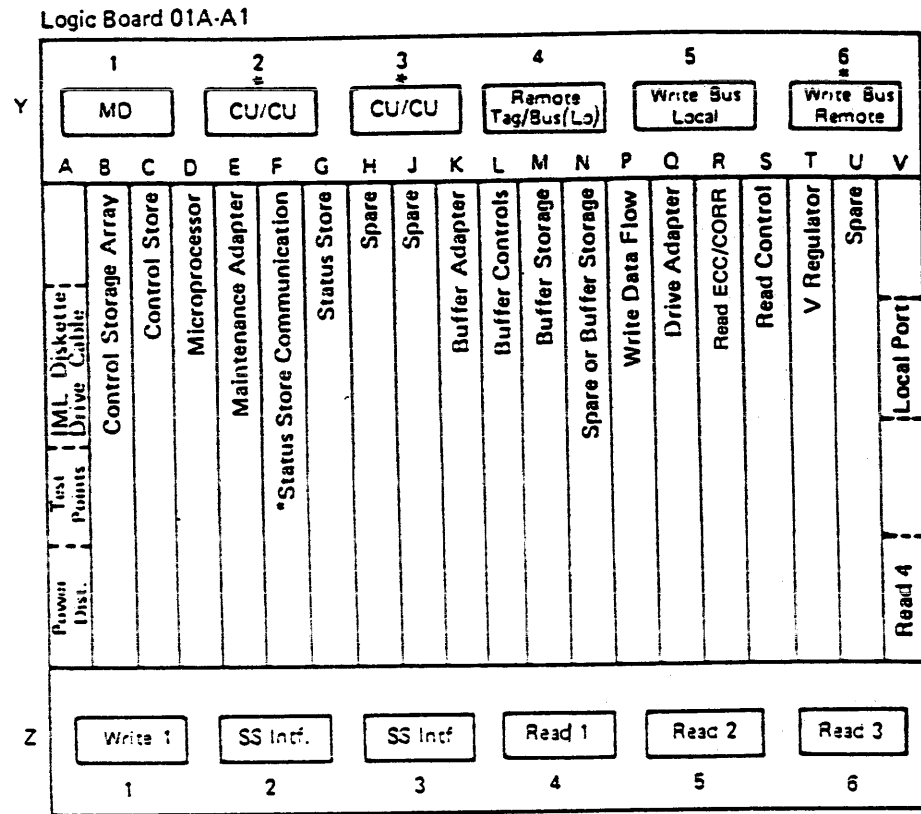
|     |     |
|-----|-----|
| W24 | W06 |
| W29 | W11 |
| X24 | X06 |
| X29 | X11 |
| Y24 | Y06 |
| Y29 | Y11 |
| Z24 | Z06 |
| Z29 | Z11 |



Tape Control Unit Locations (Continued)

Logic Boards (Card Side)

Top-Card Connectors and Cables (see LOC 20)

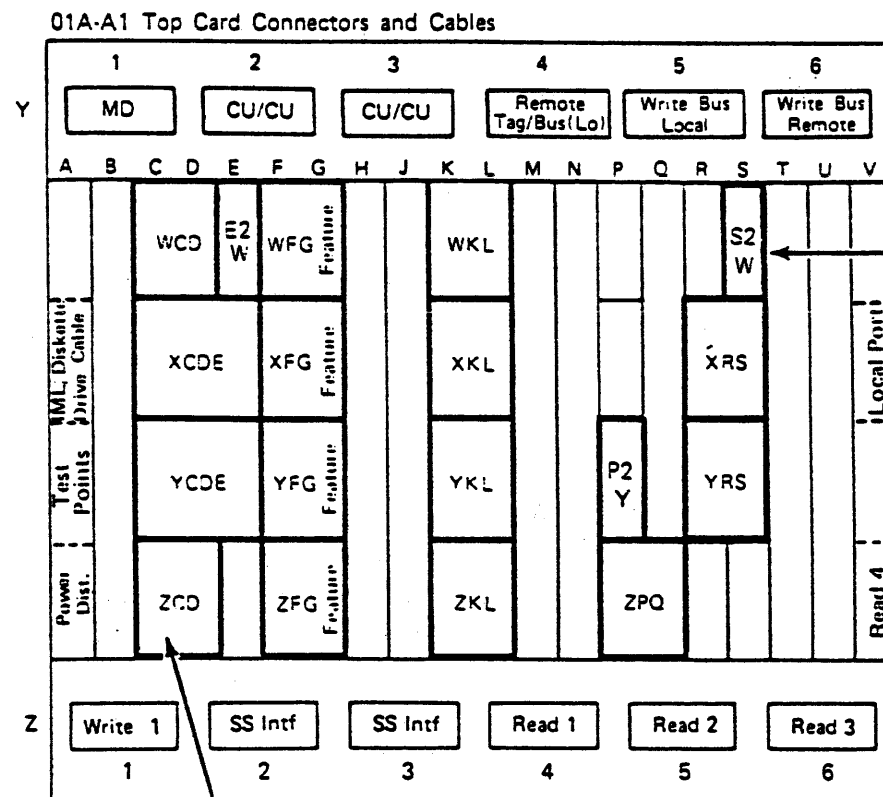




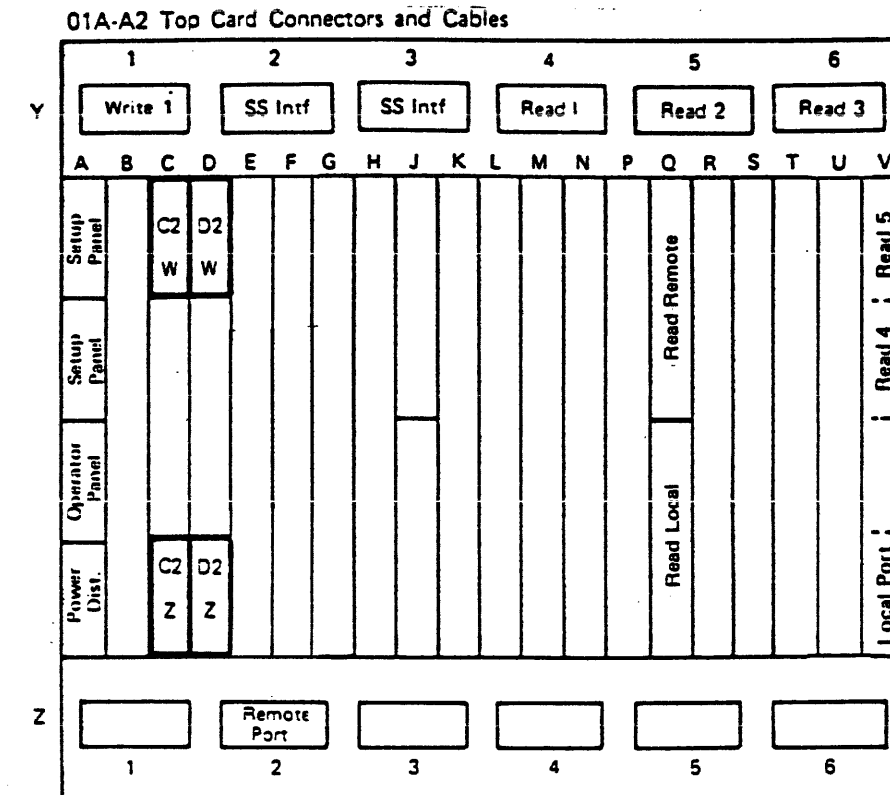
Top-Card Connectors and Cables

Notes:

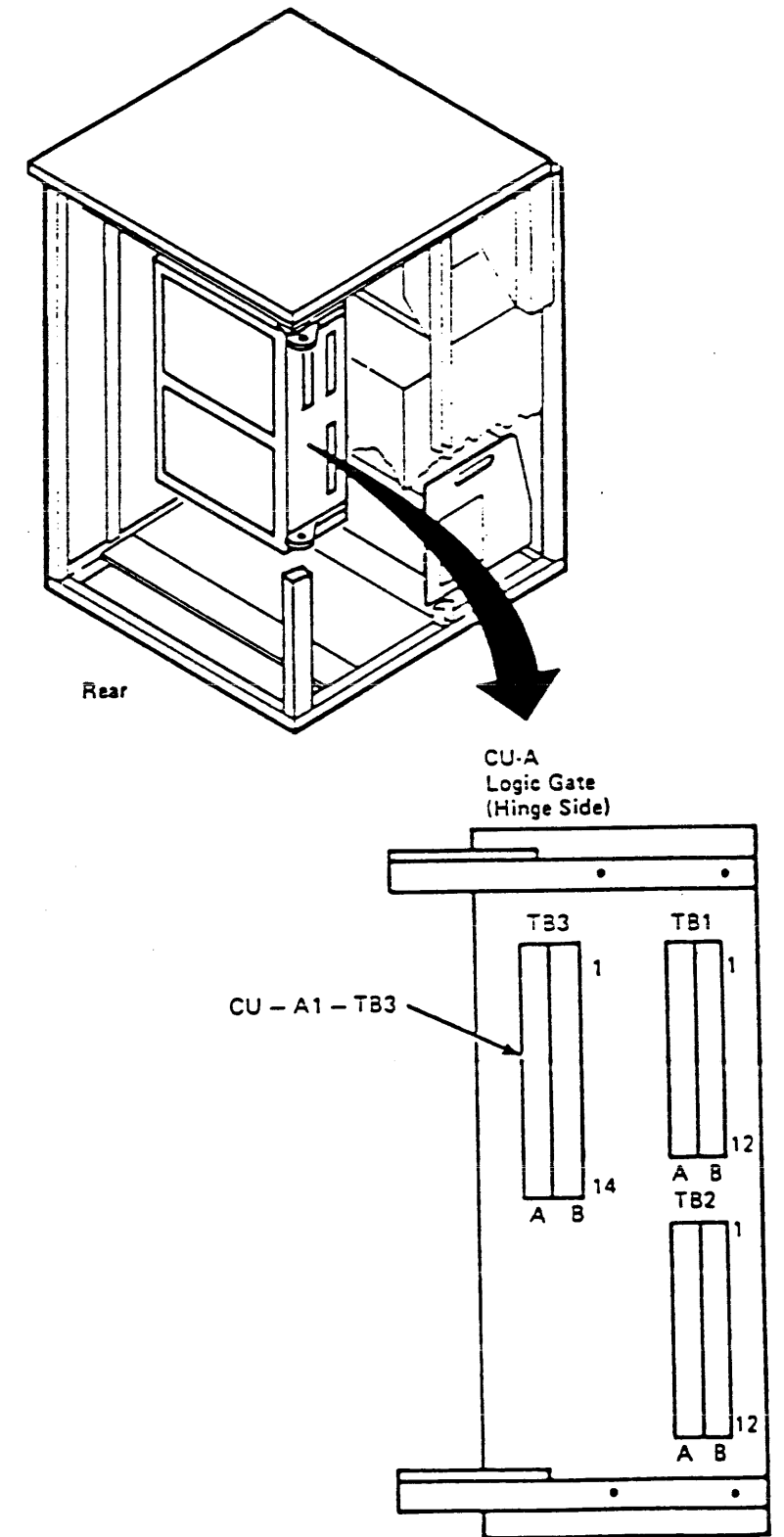
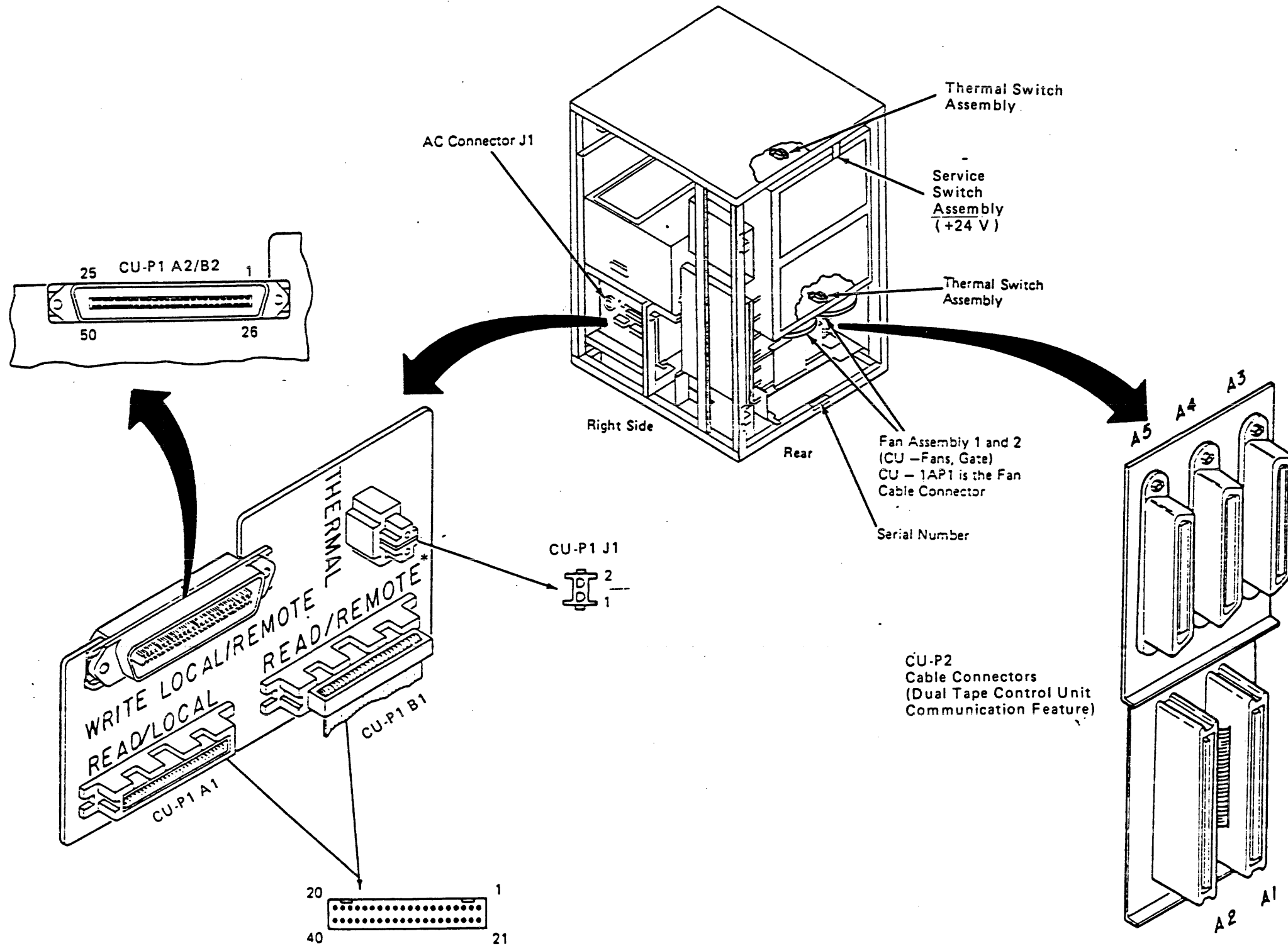
1. The documentation may refer to the same connector in more than one way. For example, 01A-A1S2W may also be referred to as CU-A1S2W.
2. Labeling is different for top-card connectors that mount on a single card, such as 01A-A1S2W, and top-card connectors that mount on multiple cards, such as 01A-A1ZCD. The single-card connectors are labeled with the card given first (S2), then the position of the connector on that card (W). The multiple-card connectors are labeled with the position of the connector given first (Z), then the cards (CD).

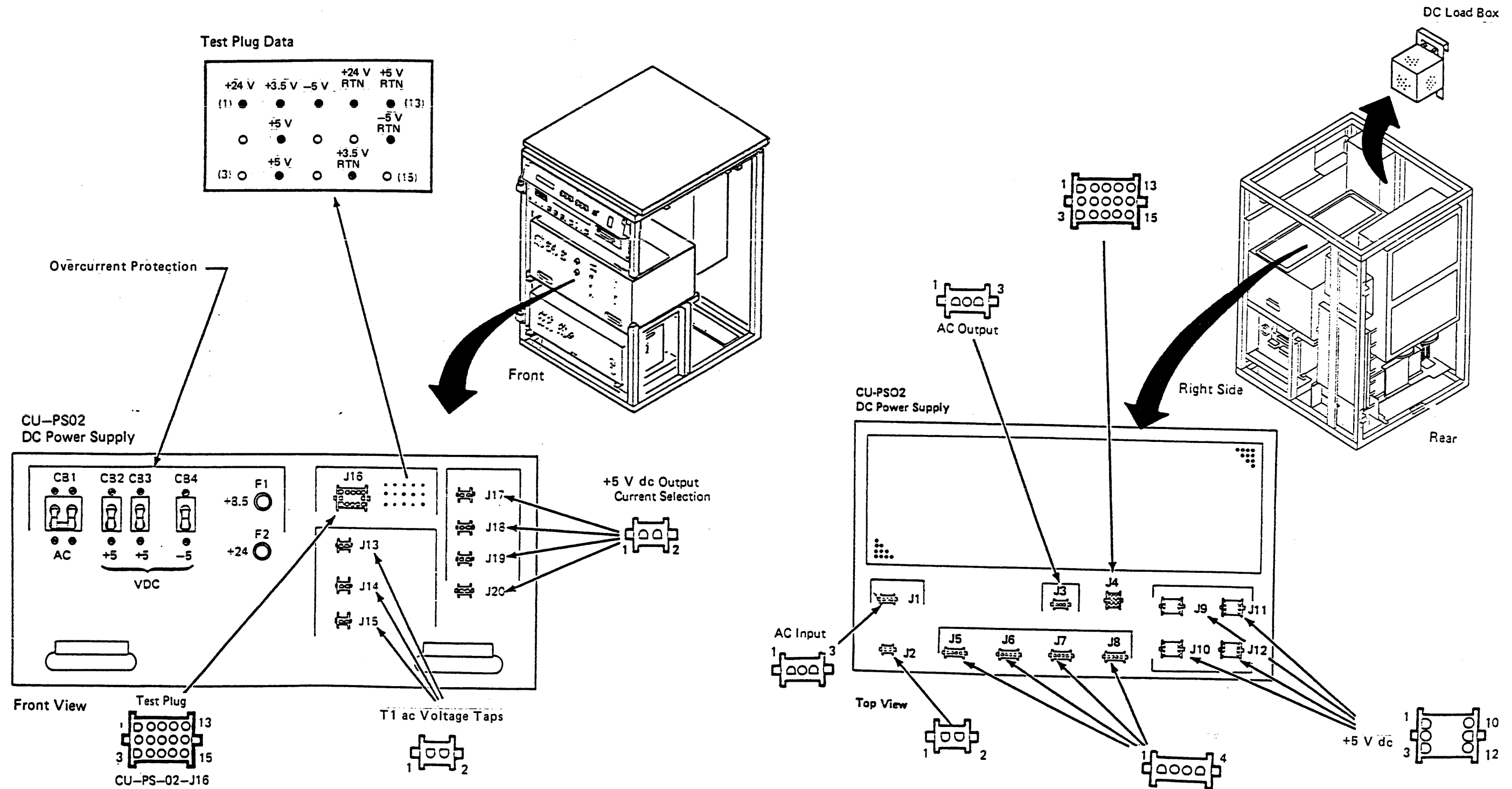


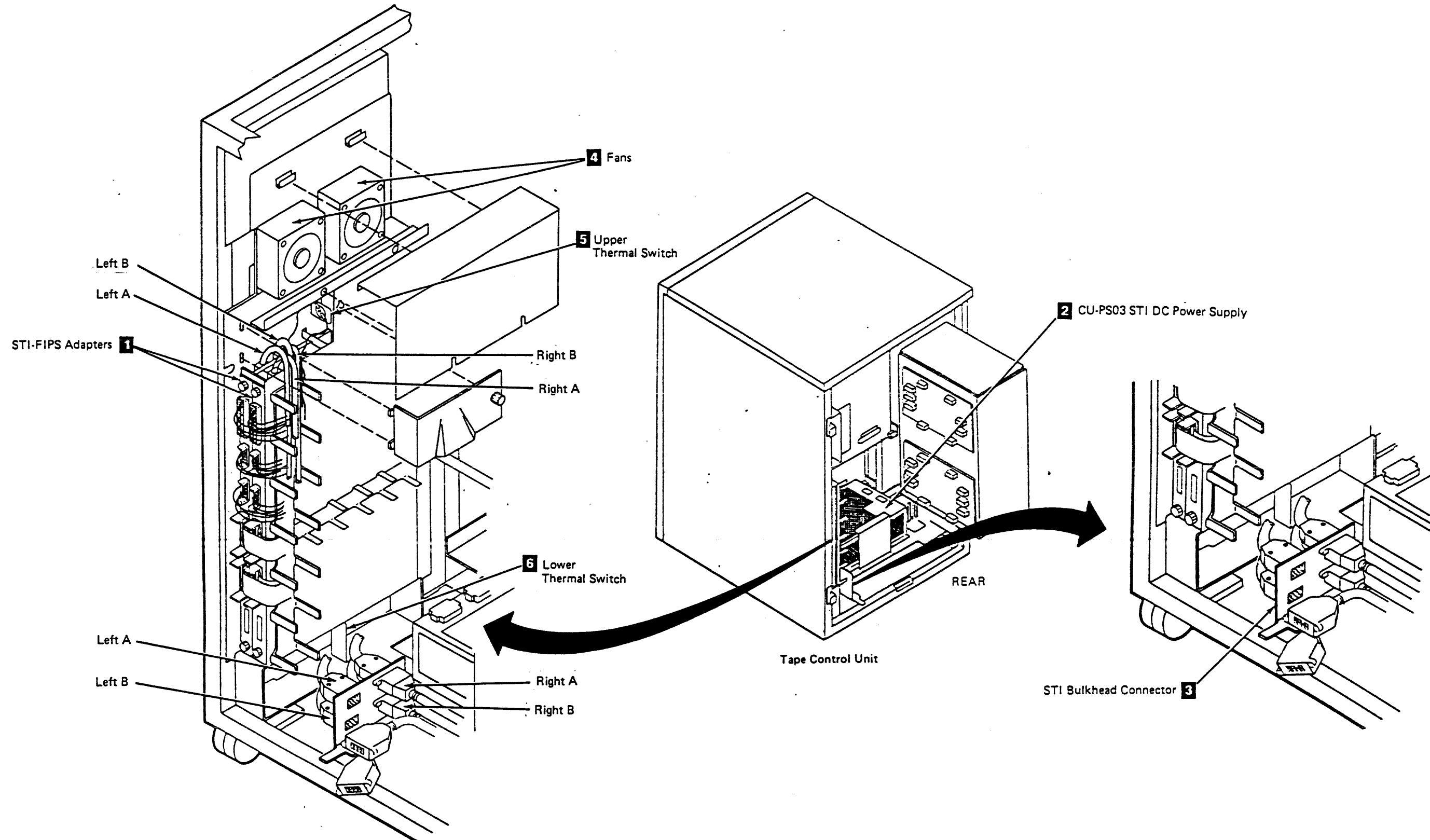
01A-A1ZCD Connector (CU-A1ZCD)

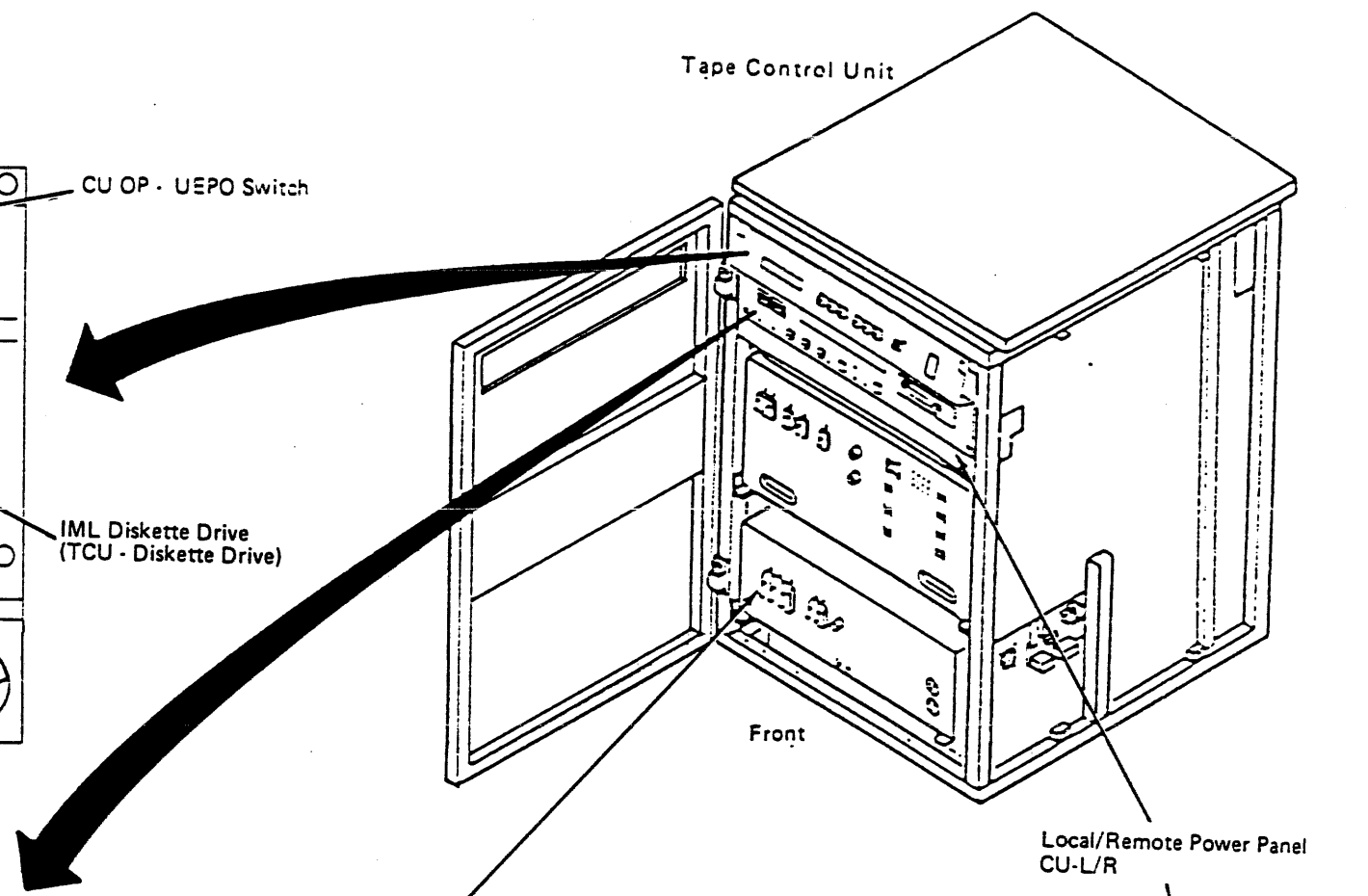
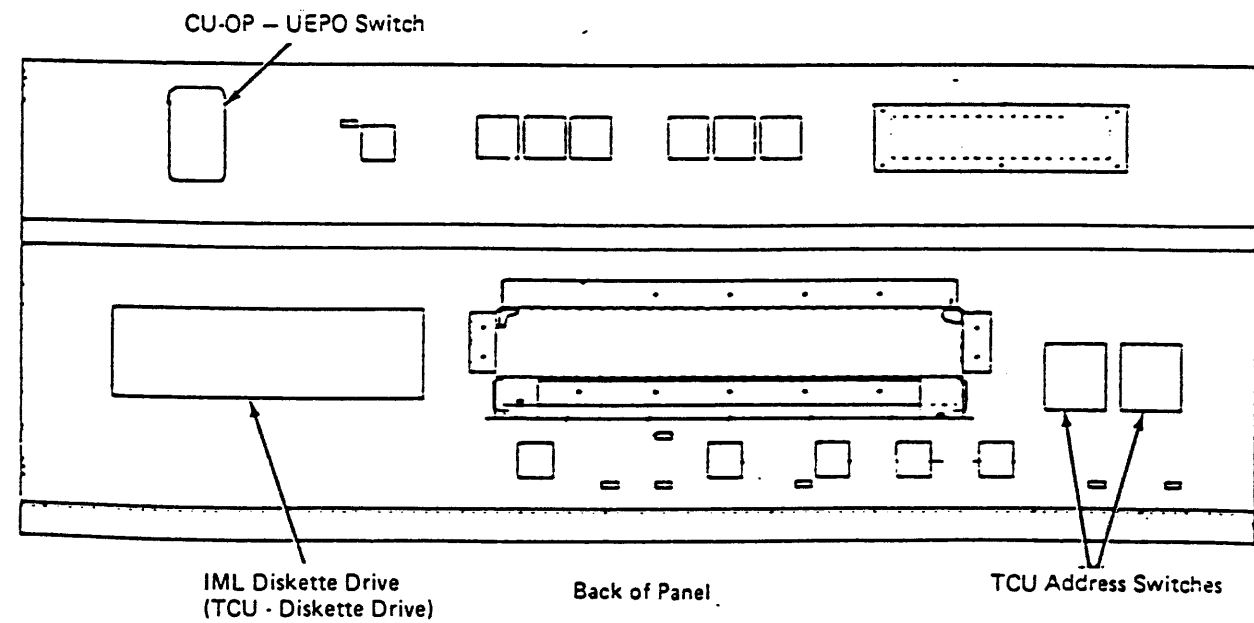
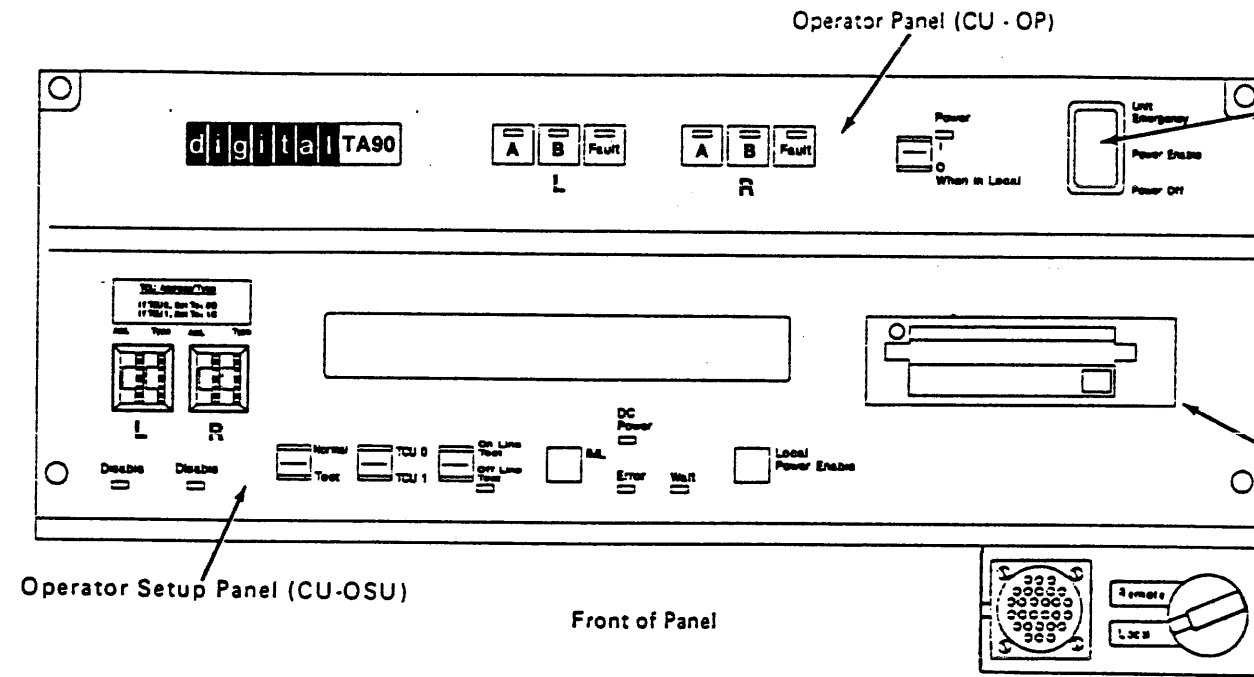


Top-Card Connector Cable 01A-A1S2W (CU-A1S2W)



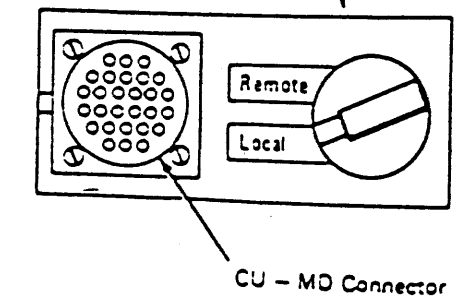
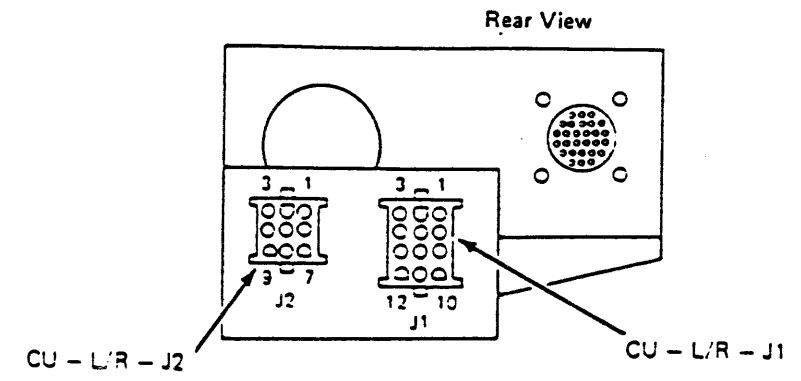






AC Power Supply, 60 Hz and 50 Hz Japan (see LOC 55)

AC Power Supply, 50 Hz, except Japan (see LOC 60)

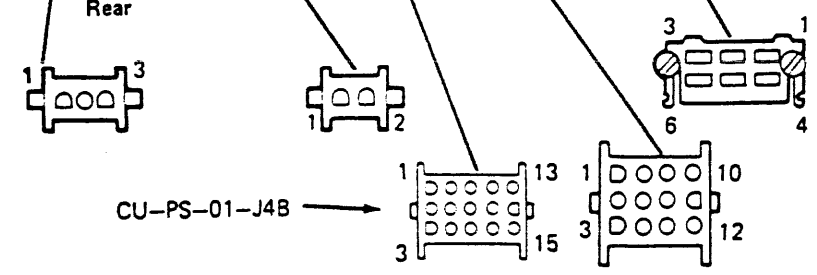
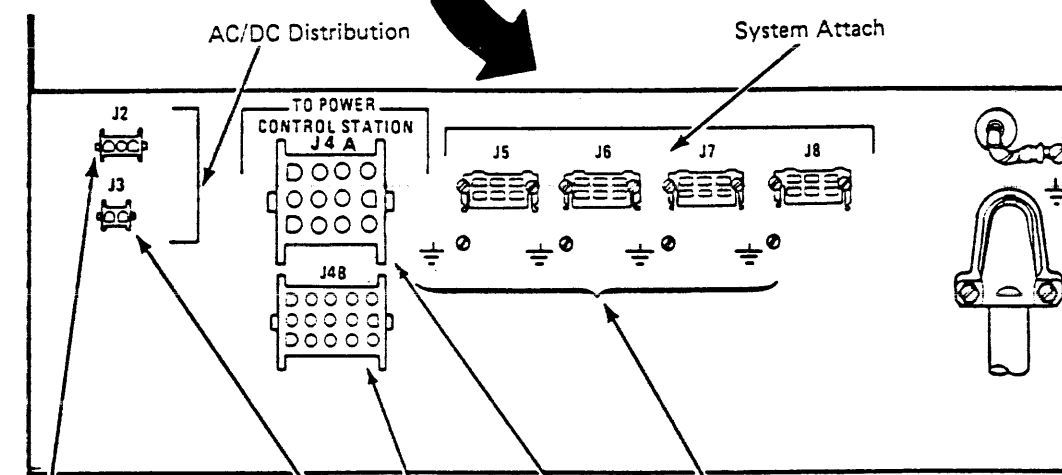
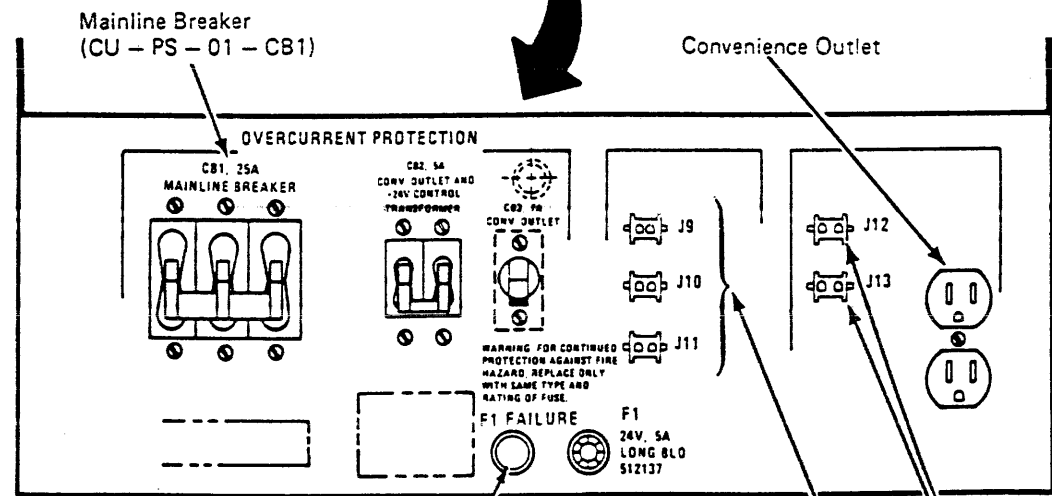
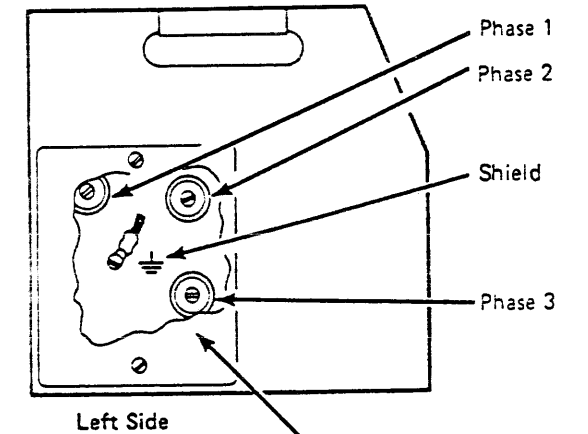
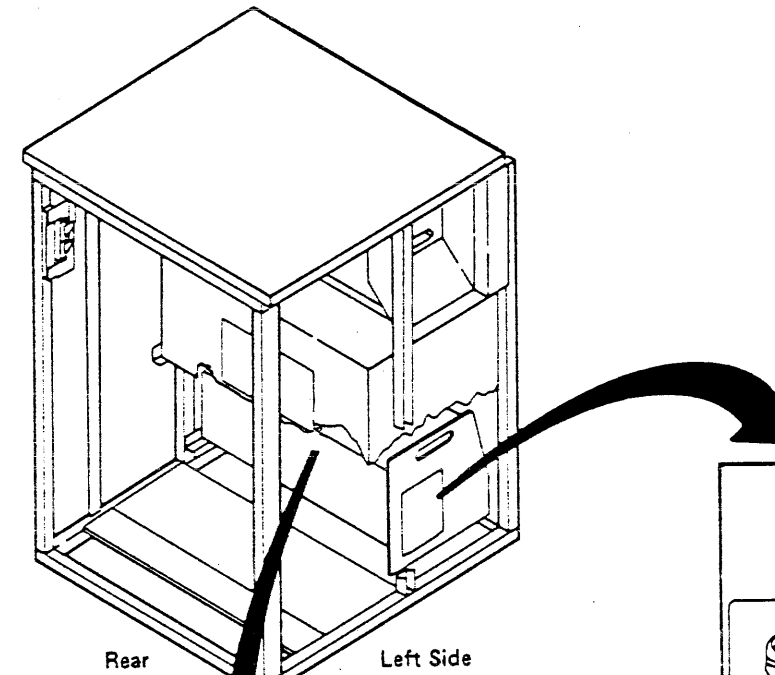
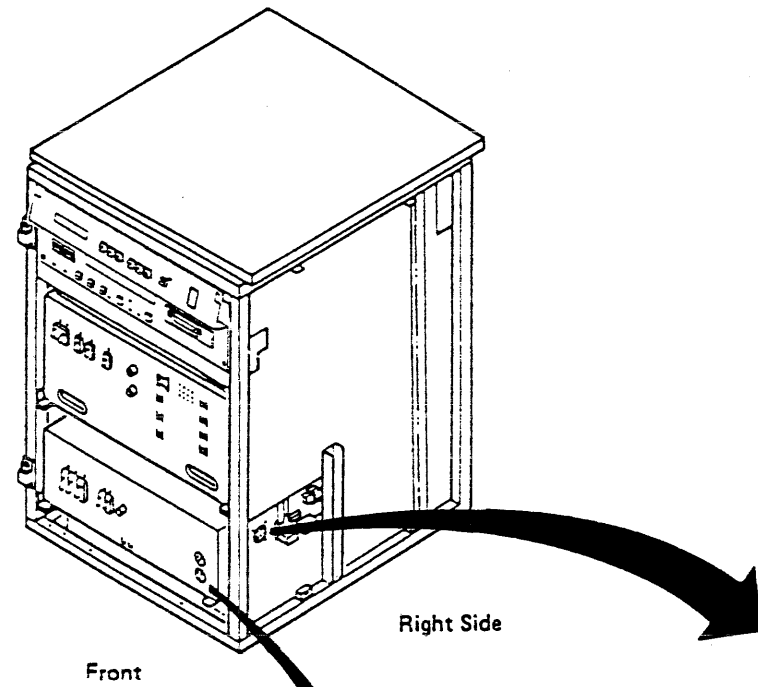
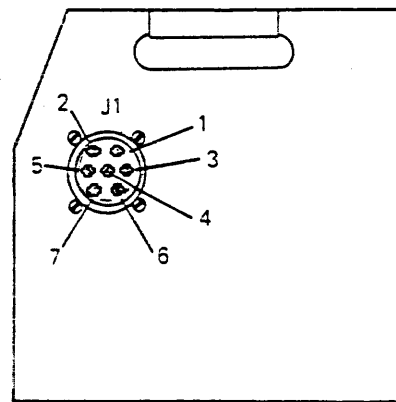


Tape Control Unit Locations (Continued)

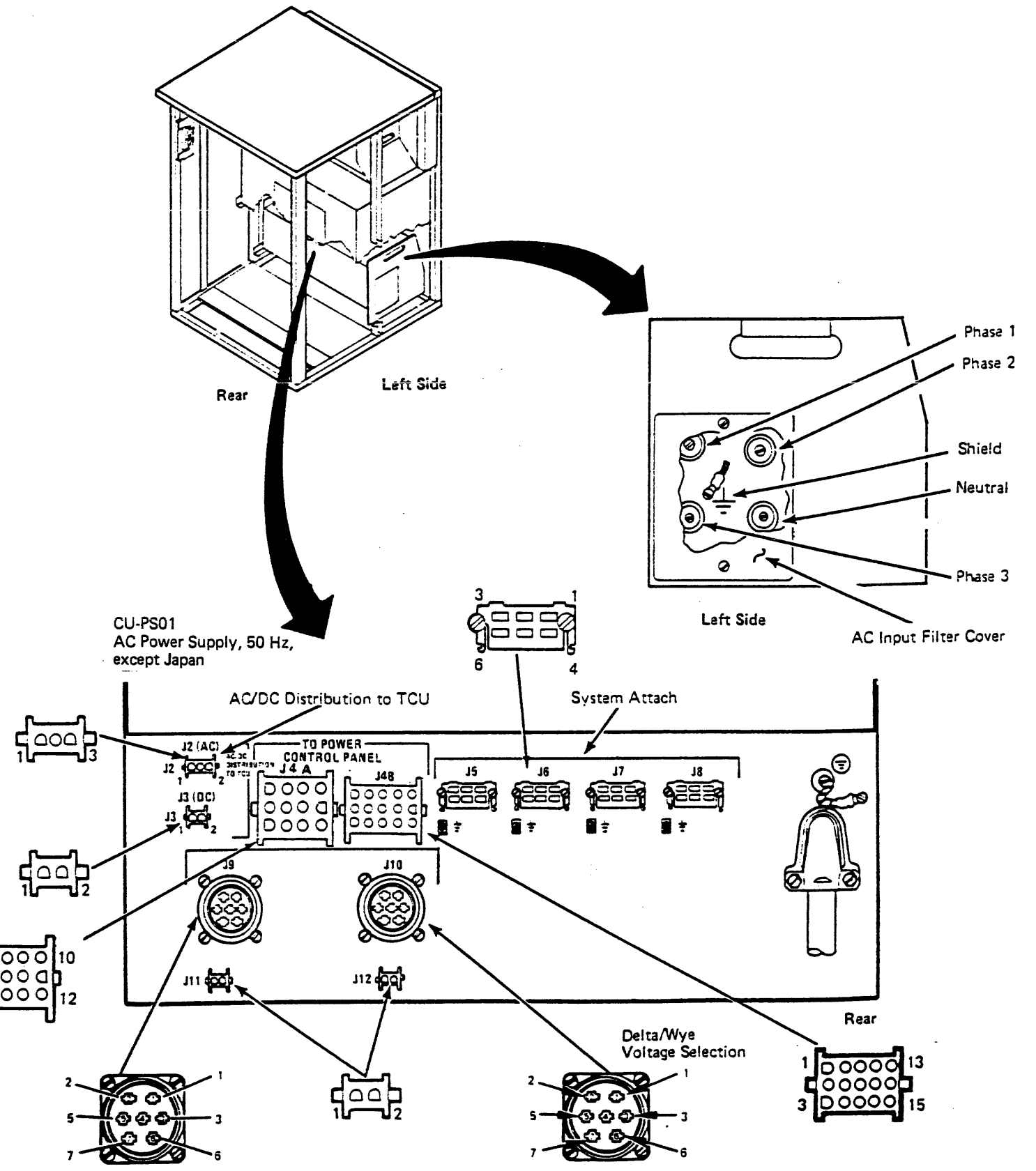
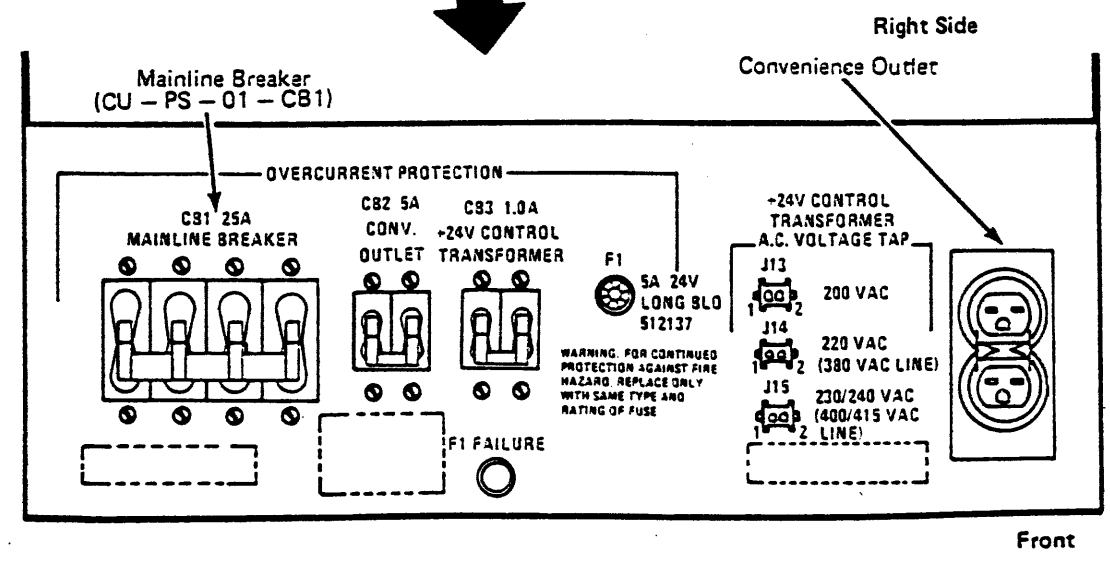
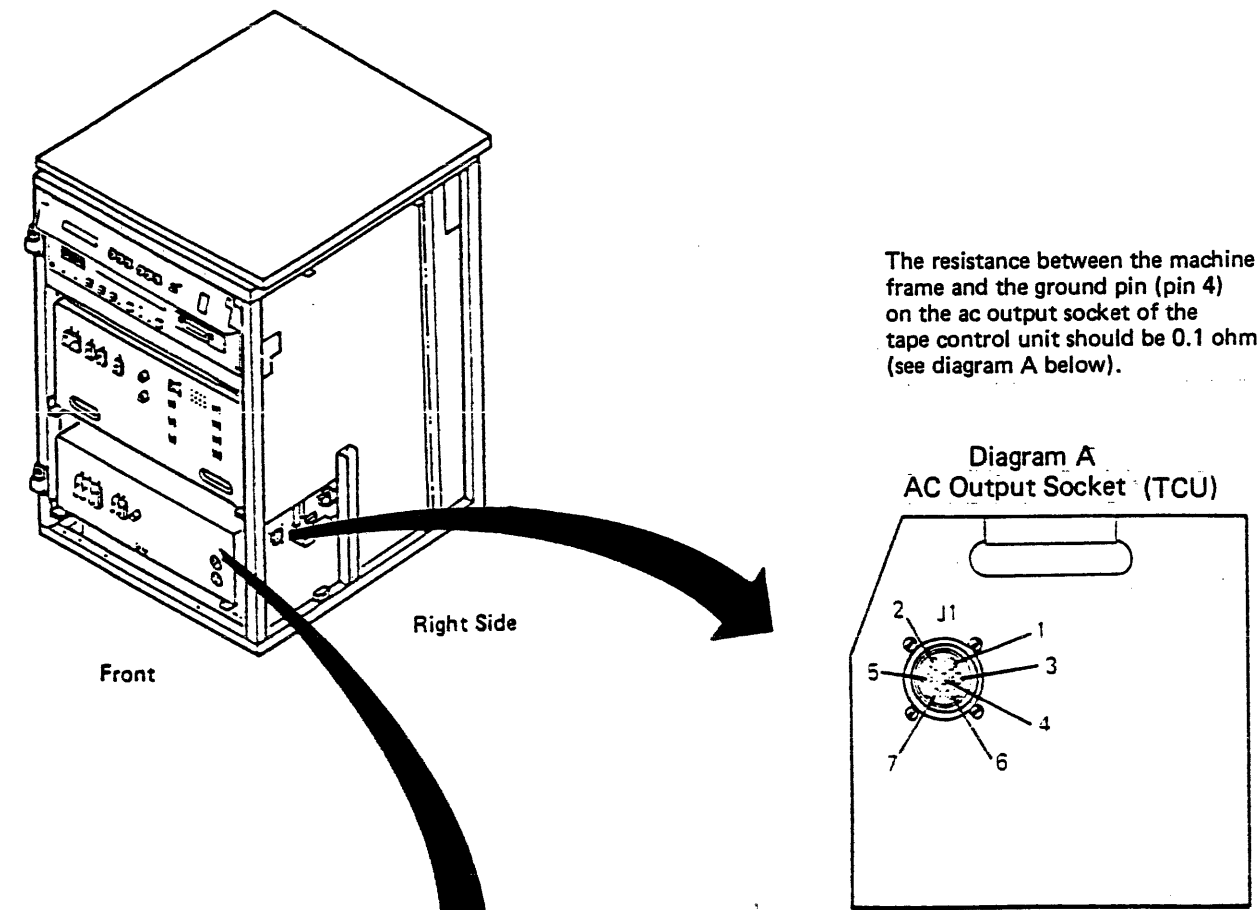
CU-PS01 Tape Control Unit ac Power Supply, 60 Hz and 50 Hz Japan

The resistance between the machine frame and the ground pin (pin 4) on the ac output socket of the tape control unit should be 0.1 ohm (see diagram A below).

Diagram A  
AC Output Socket (TCU)



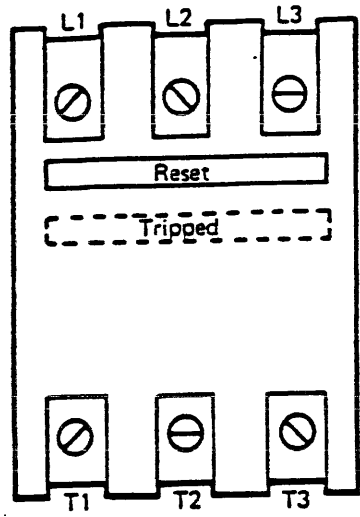
CU-PS01 Tape Control Unit ac Power Supply, 50 Hz, except Japan



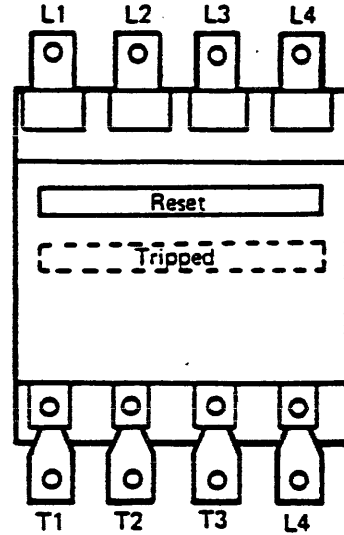
**Tape Control Unit Locations (Continued)**

**Circuit Breaker Terminals**

**CB1, All 60 Hz and 50 Hz Japan**

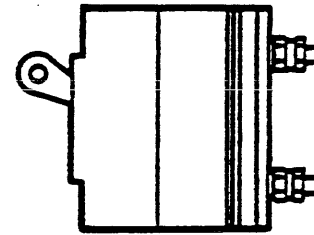


**CB1, 50 Hz, except Japan**



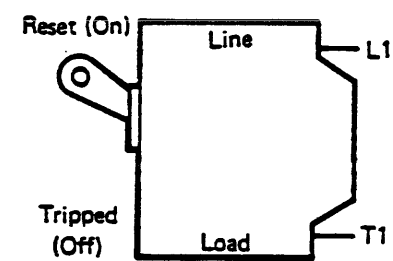
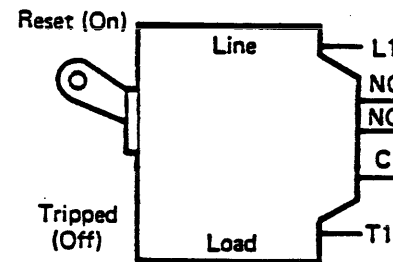
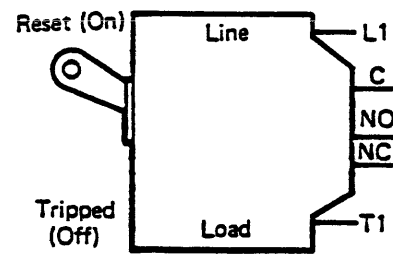
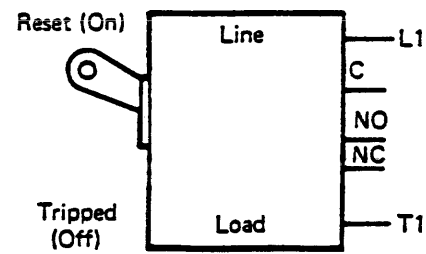
**Tape Control Unit CBs**

CB2, 60 Hz  
CB2 and CB3, 50 Hz

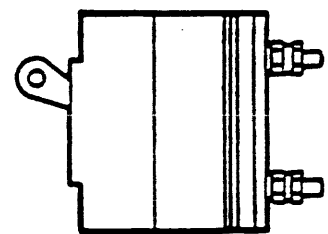


**Subsystem Circuit Breakers**

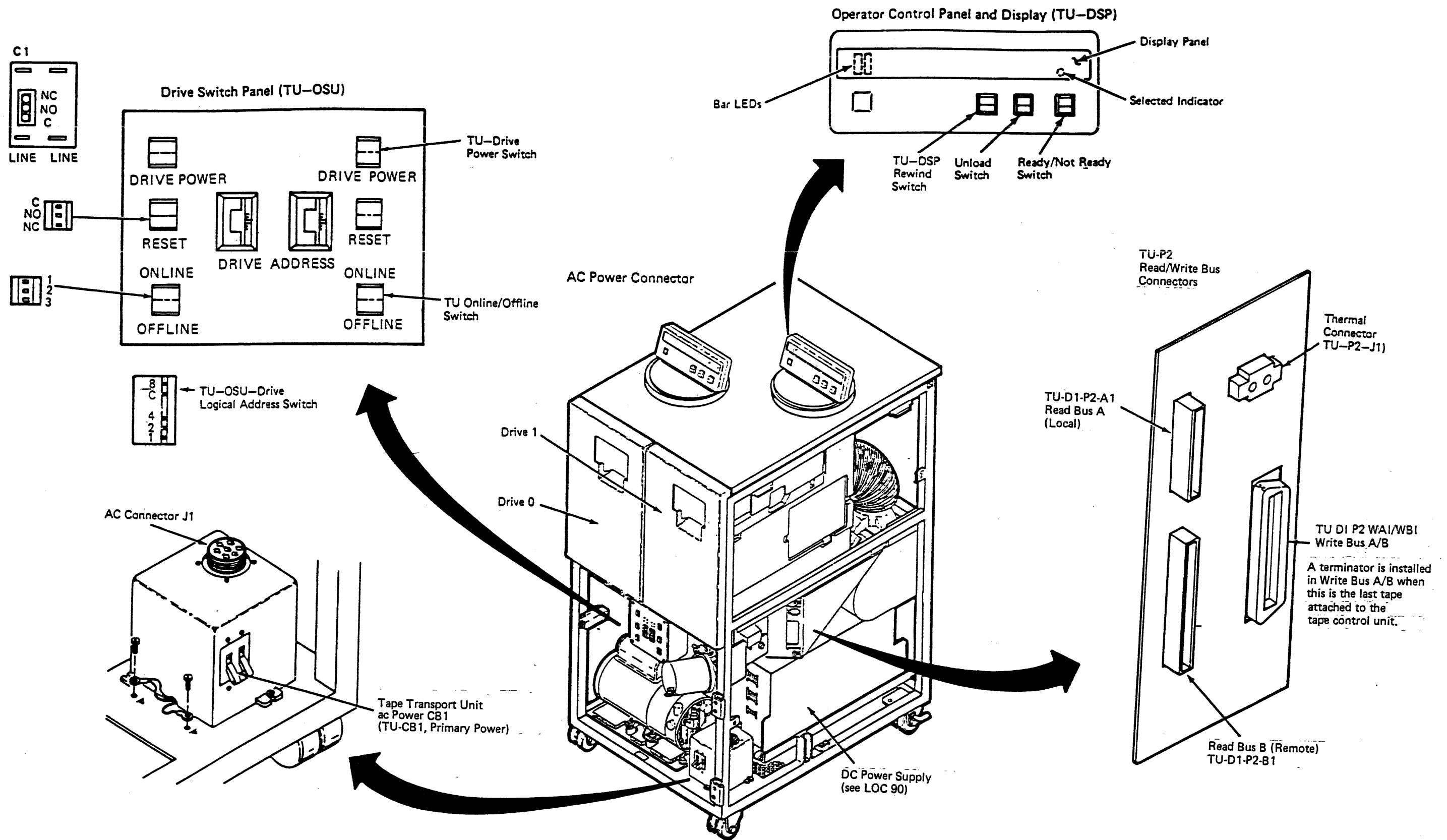
The circuit breakers shown represent typical breakers as found in both the tape control unit and the tape transport unit. The Auxiliary contacts, even if present, are not used.



**Tape Transport Unit ac Power Circuit Breaker, 60 Hz and 50 Hz Japan**

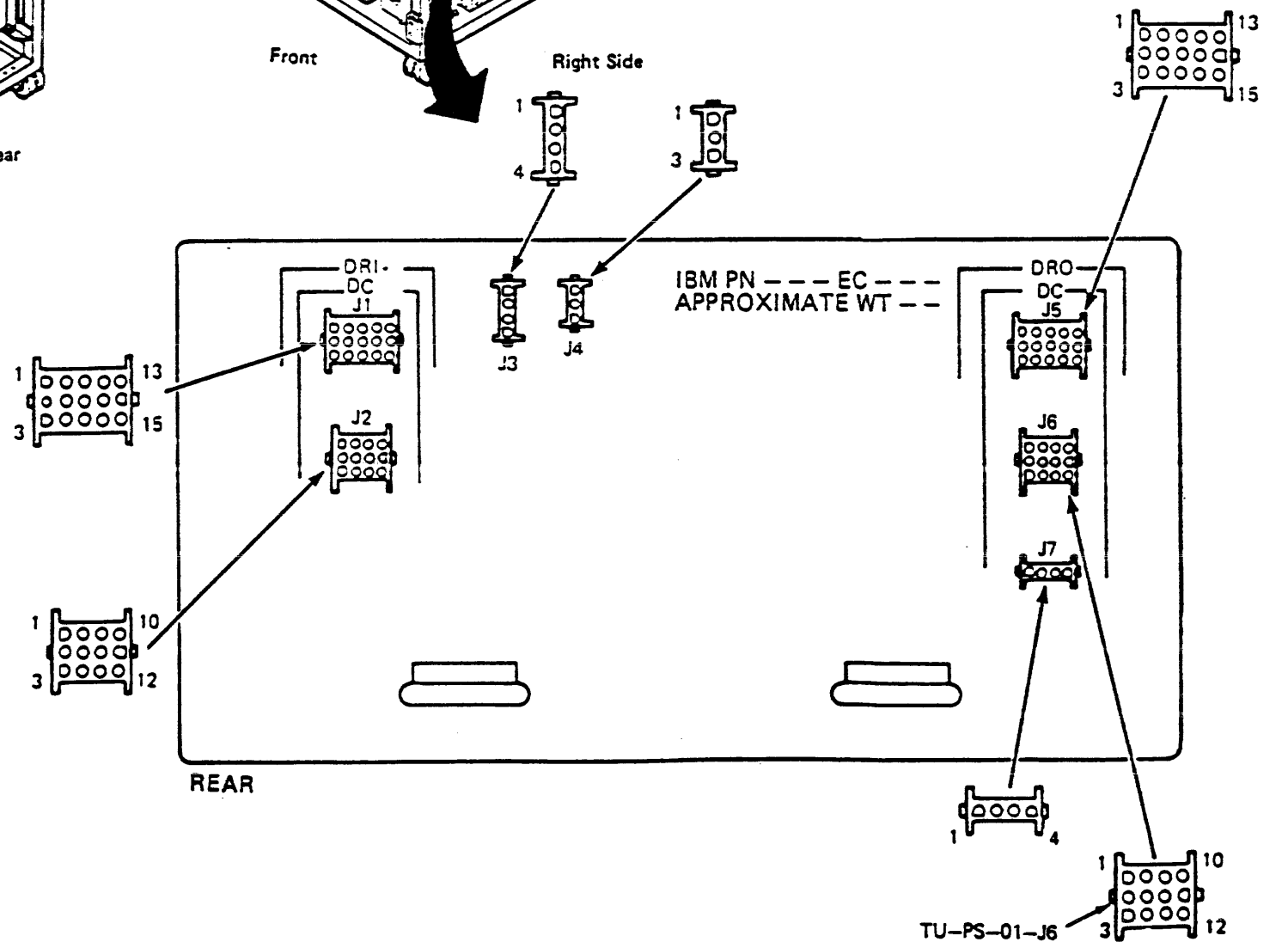
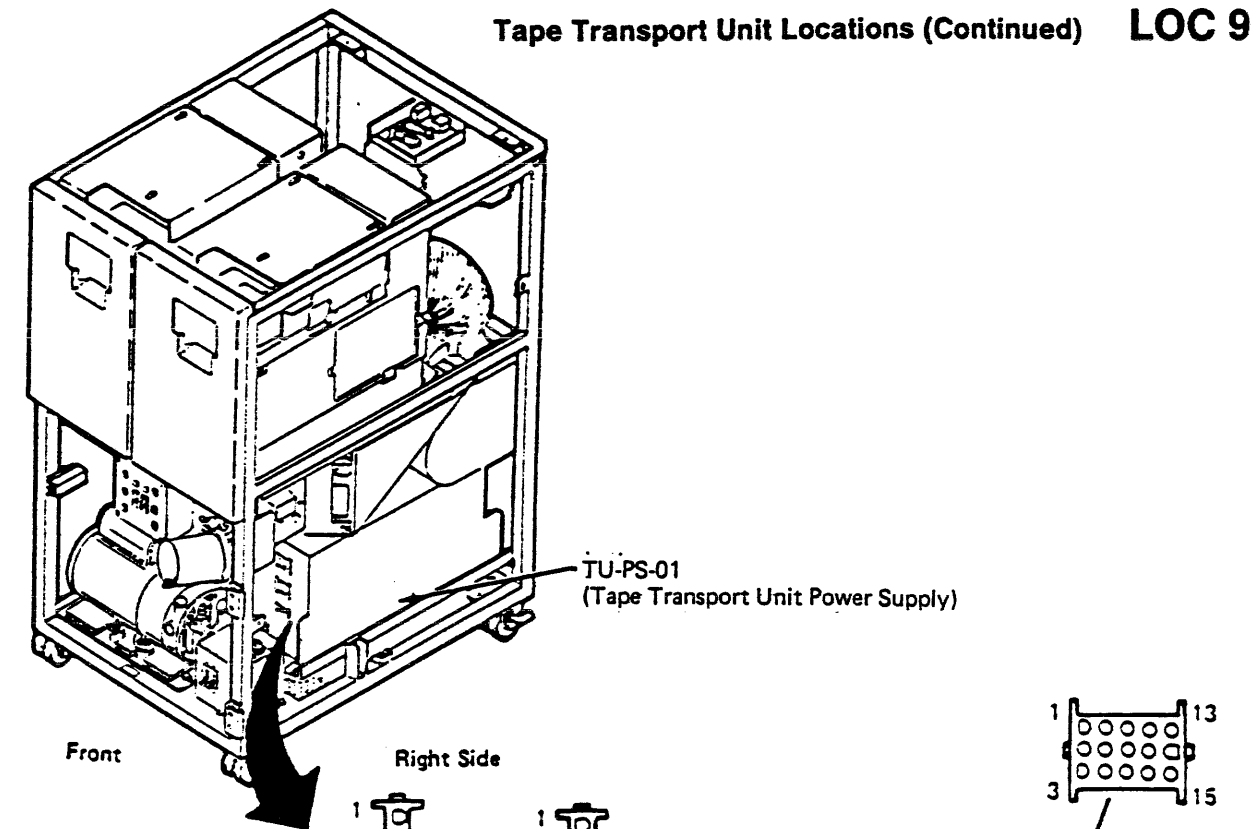
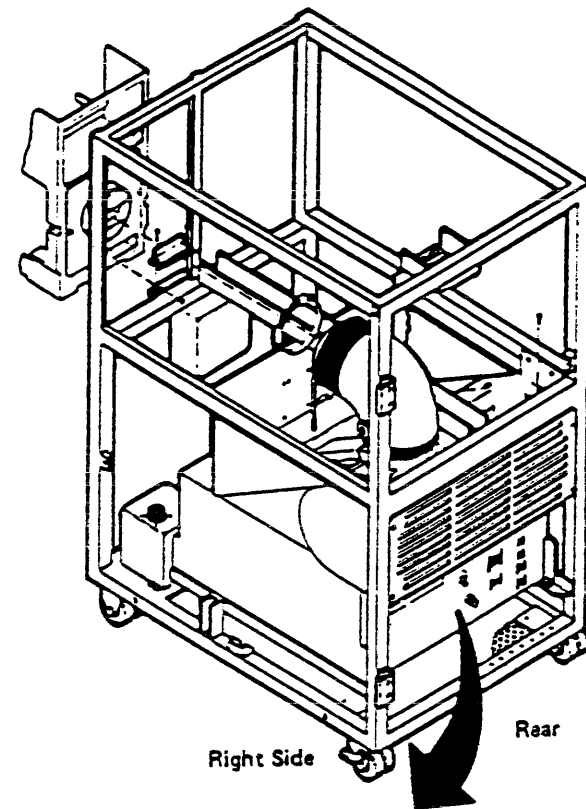
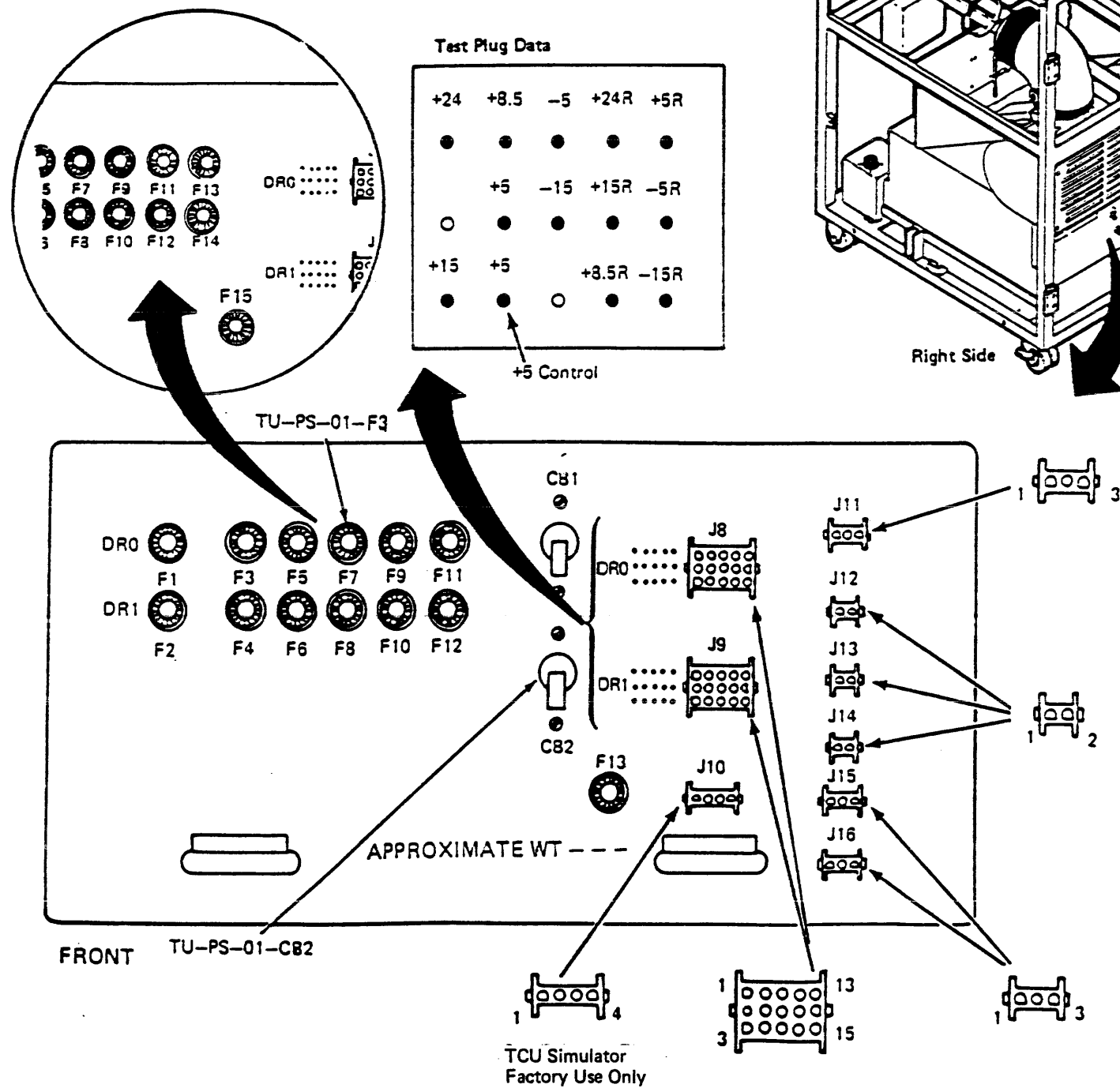




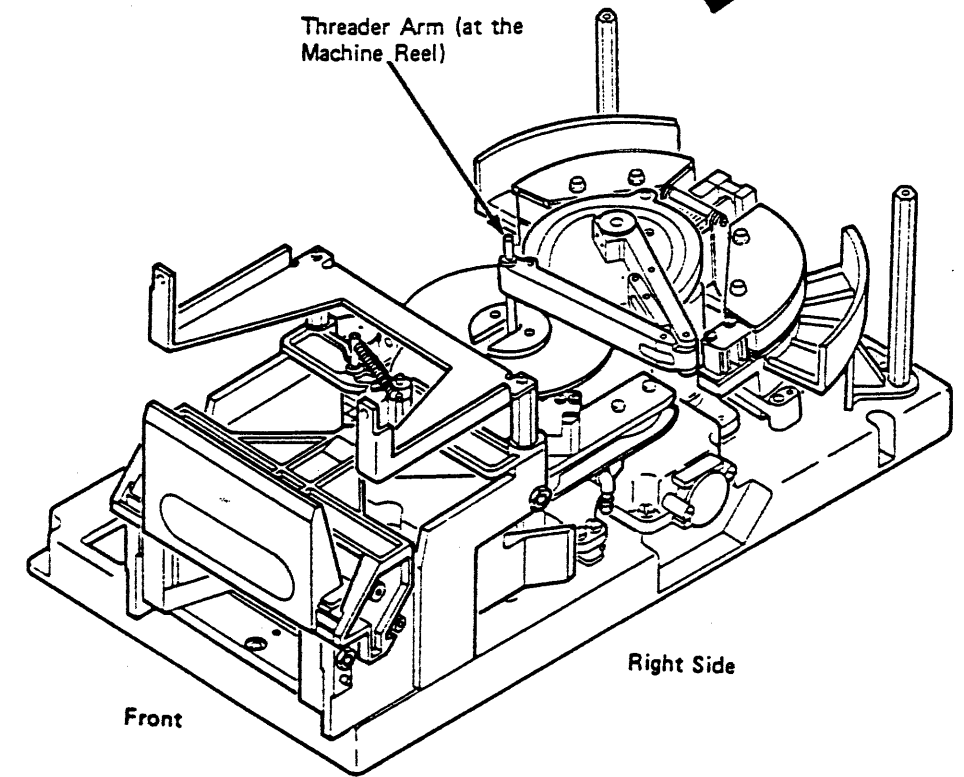
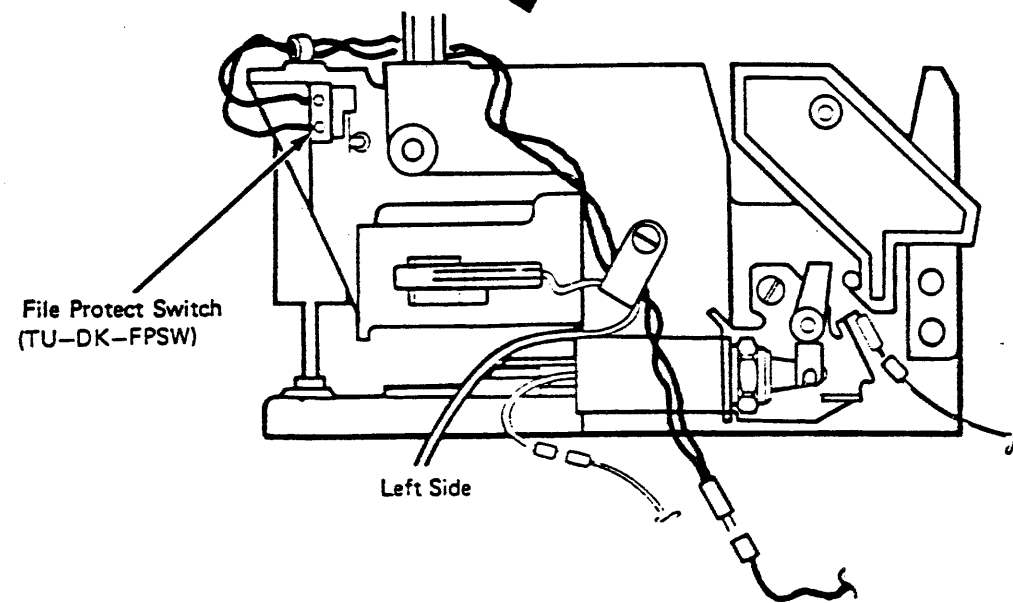
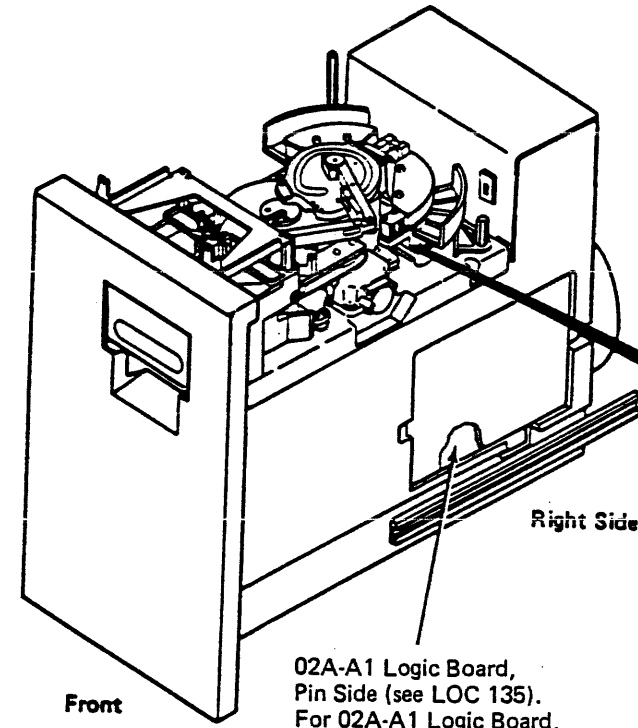
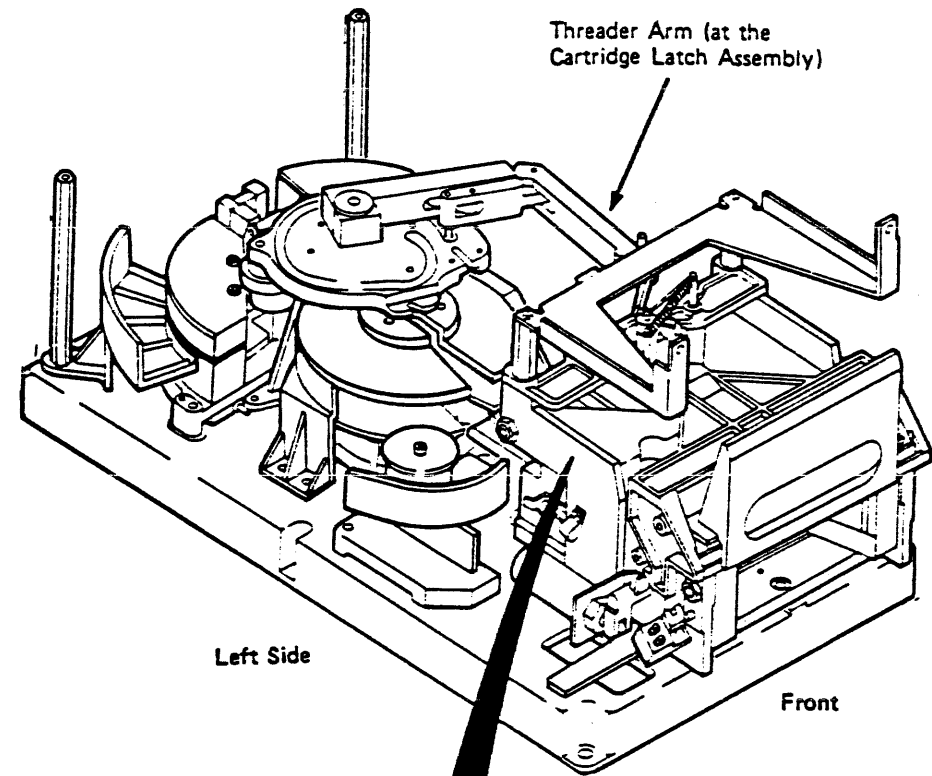


**Tape Transport Unit Locations (Continued)**

DR 0/1 PS01 Tape Transport Unit dc Power Supply

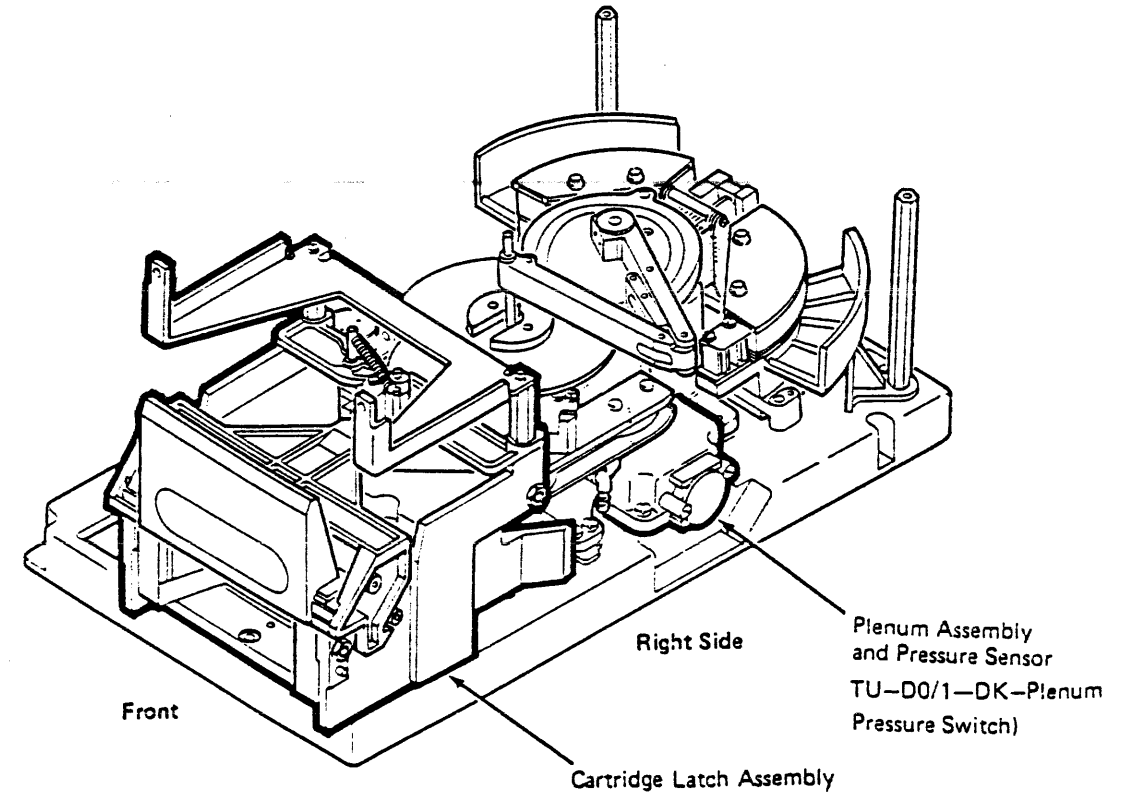
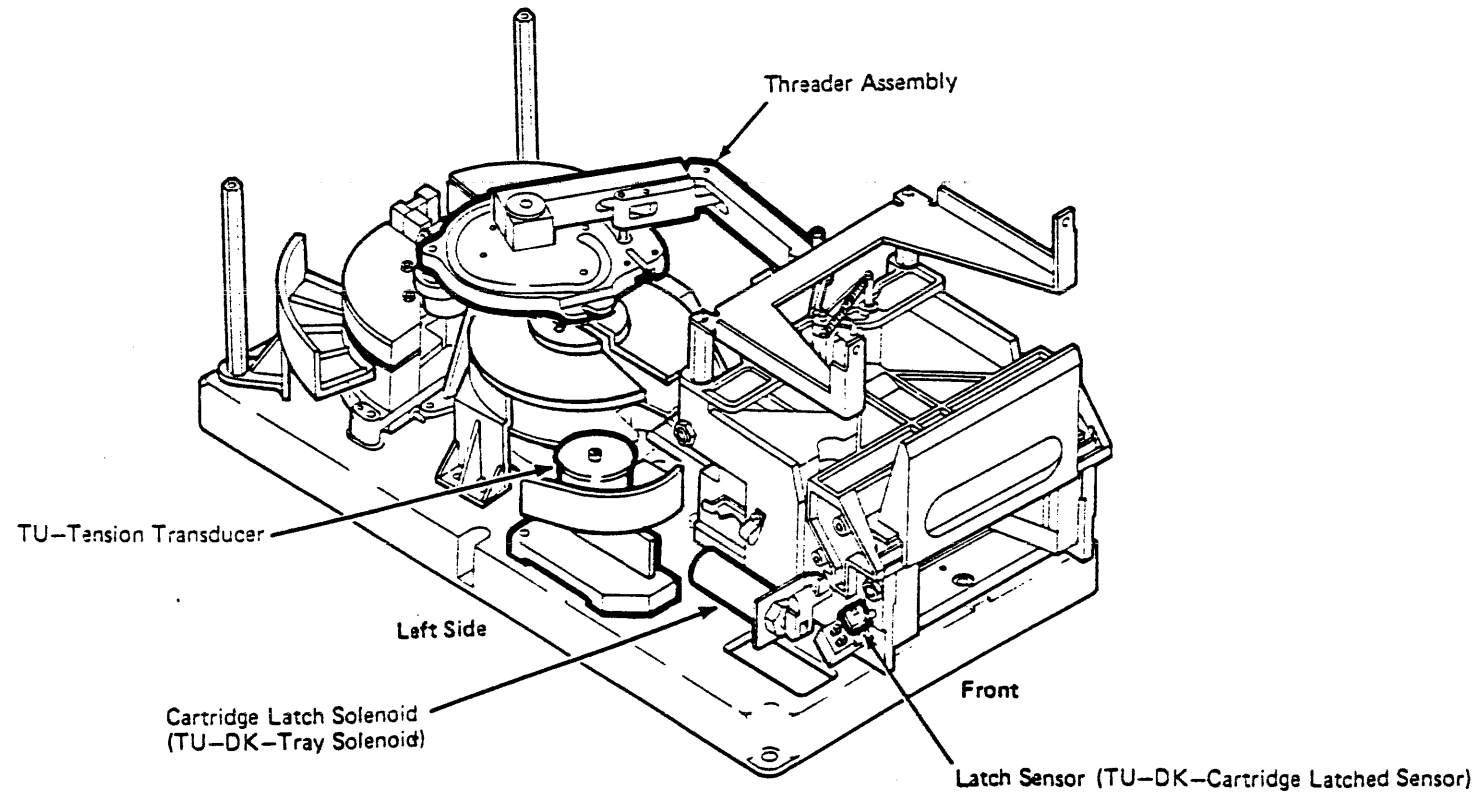
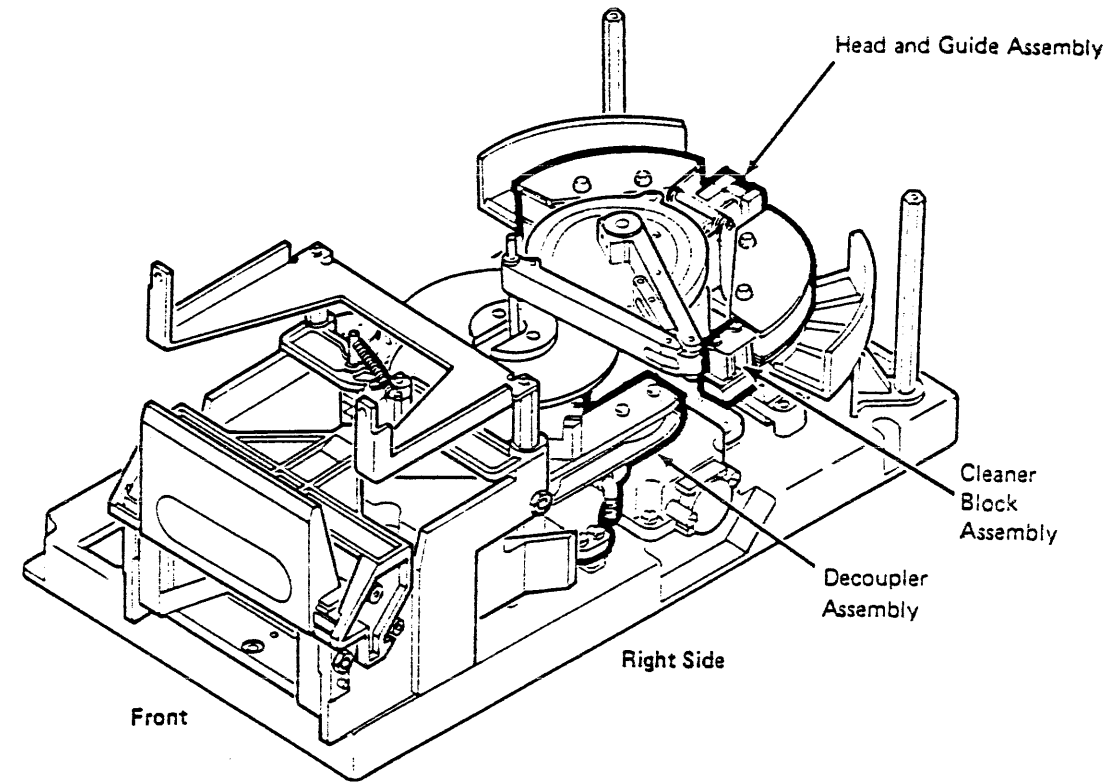
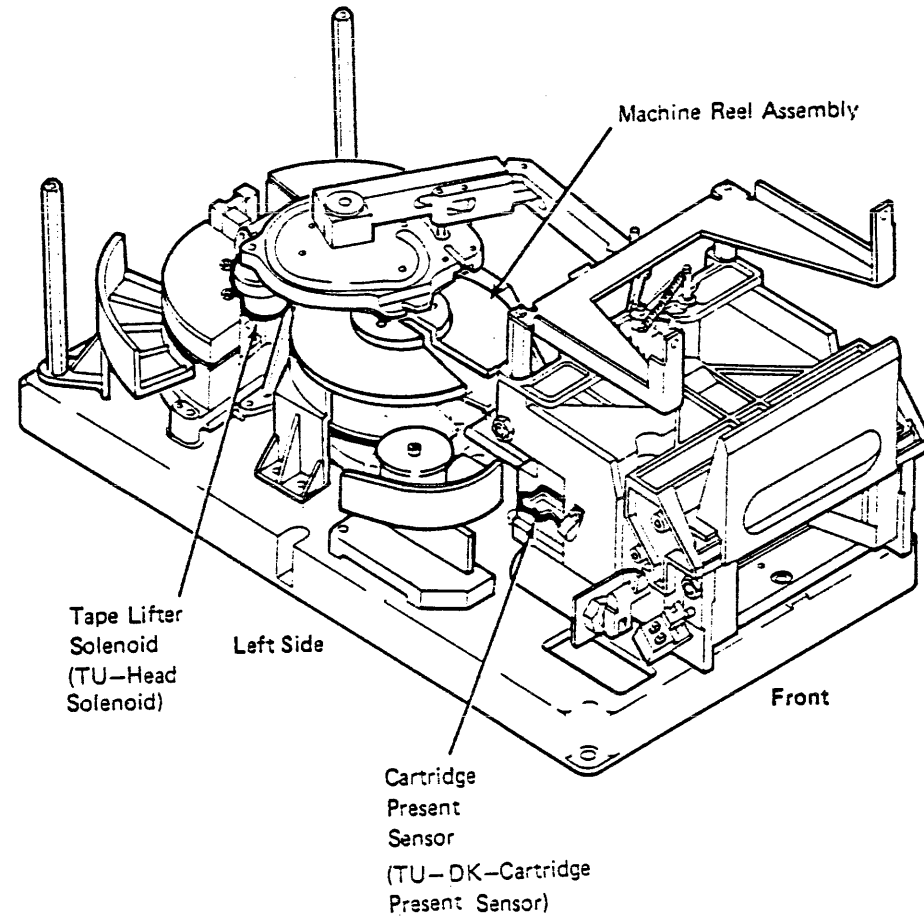


TU-DK, Tape Transport Unit Deck Assembly

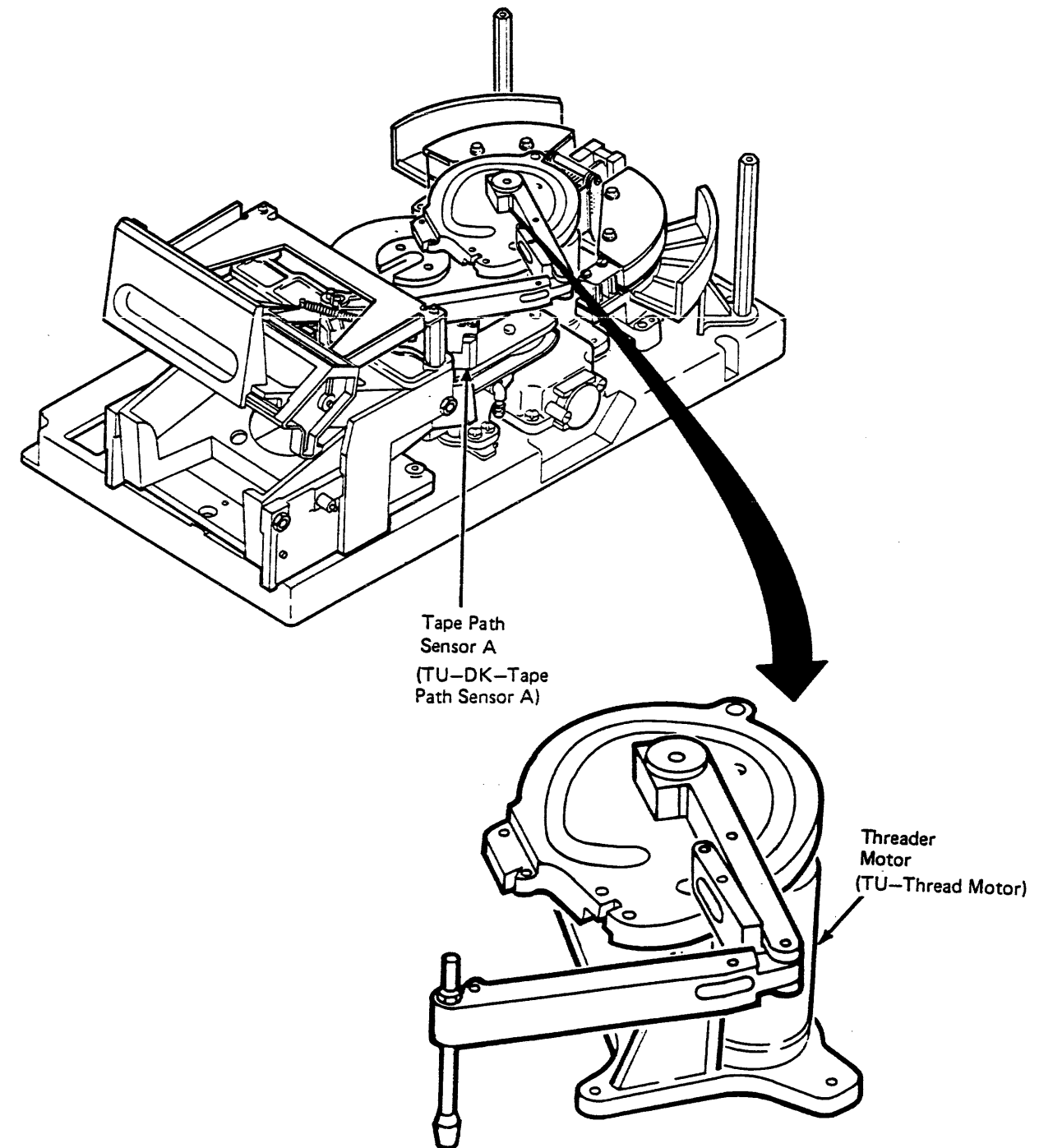
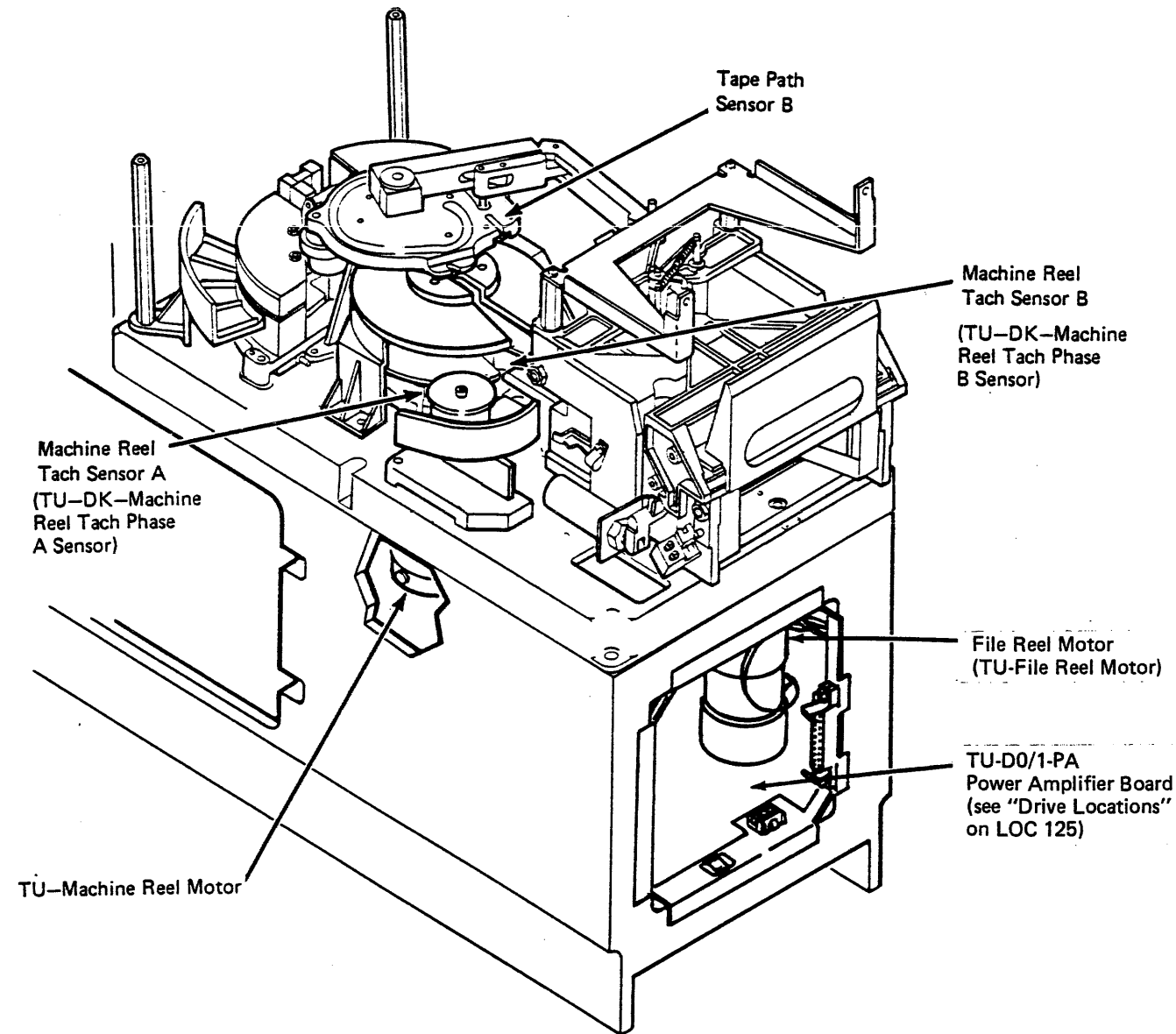


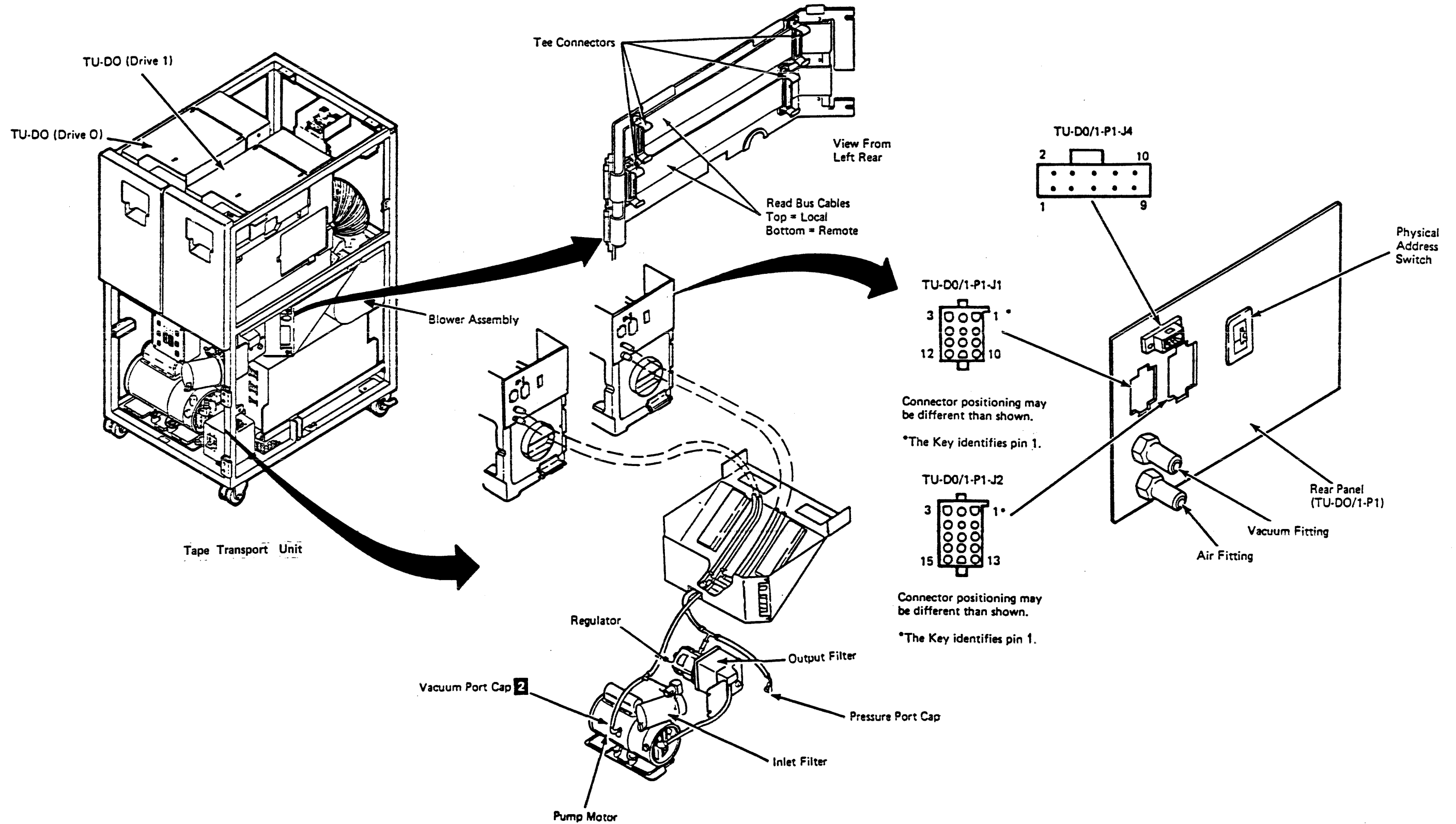
Drive Locations (Continued)

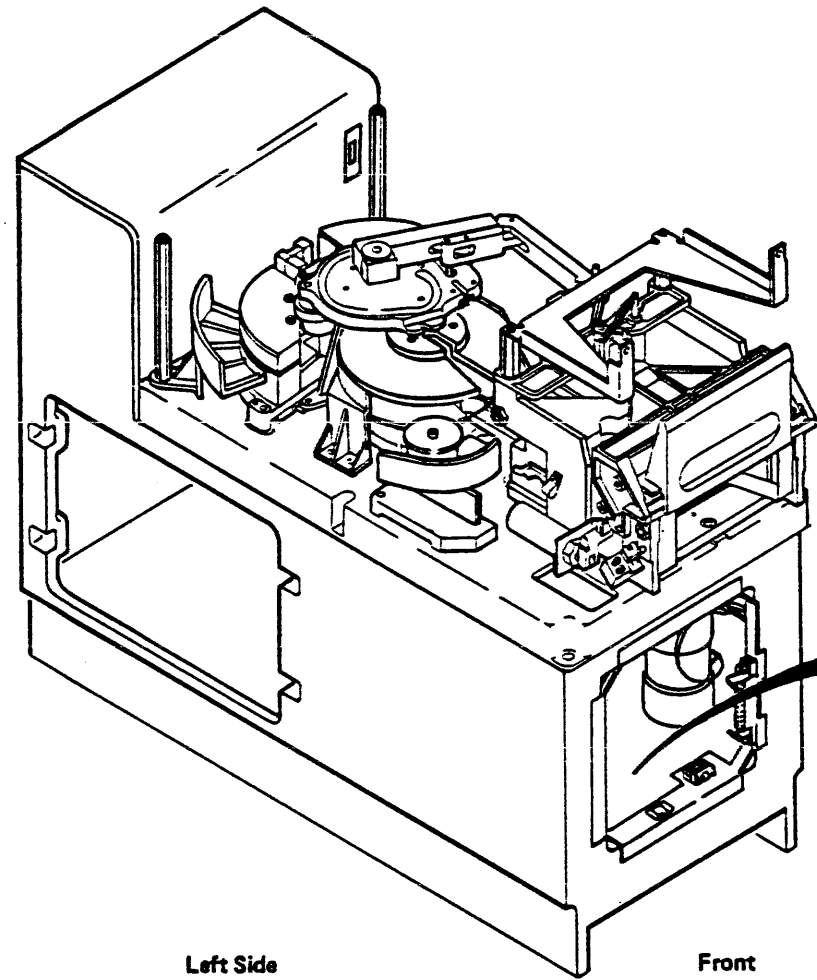
TU-DK, Tape Transport Unit Deck Assembly (Continued)



TU-DK, Tape Transport Unit Deck Assembly (Continued)







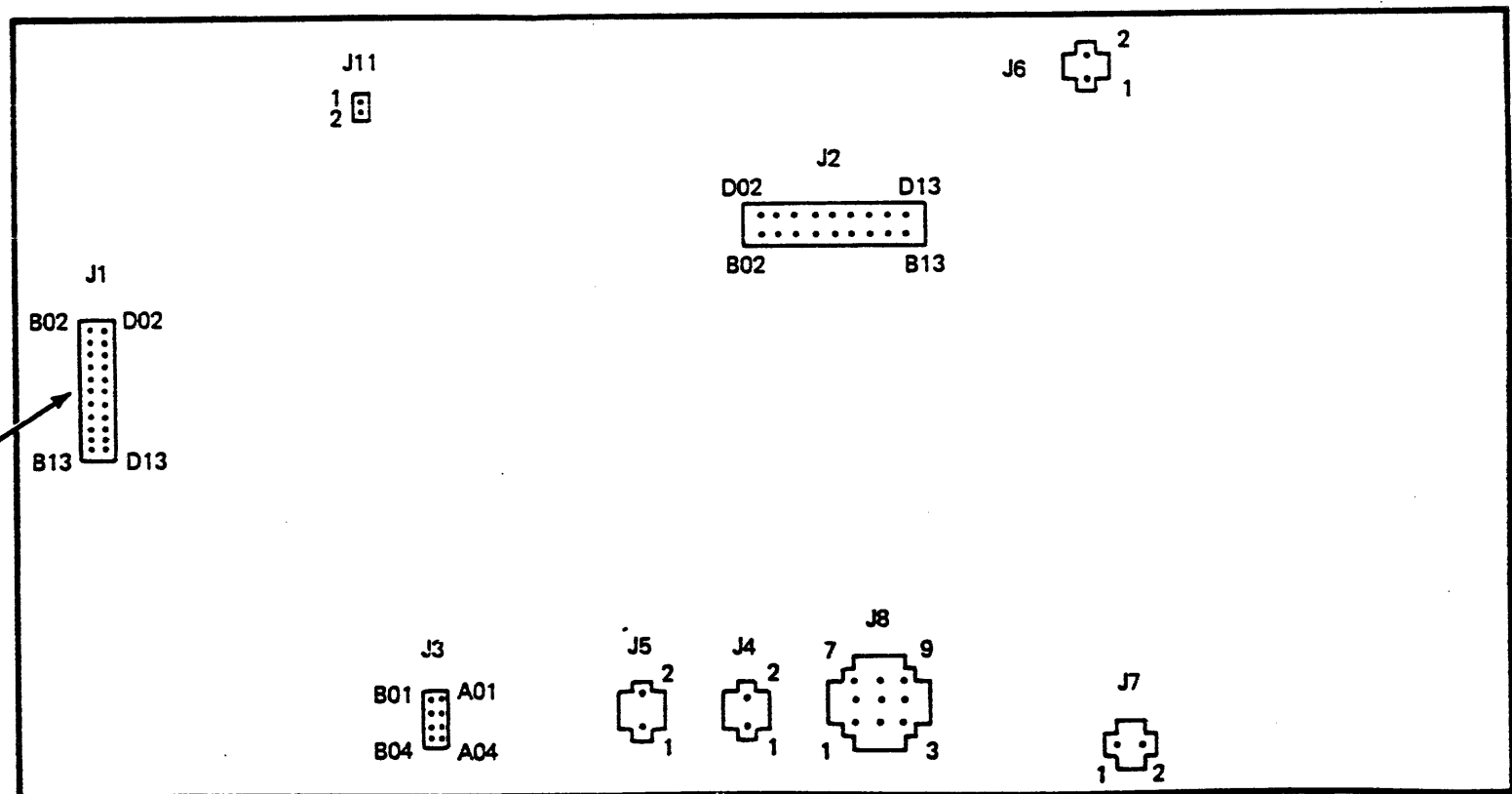
Left Side

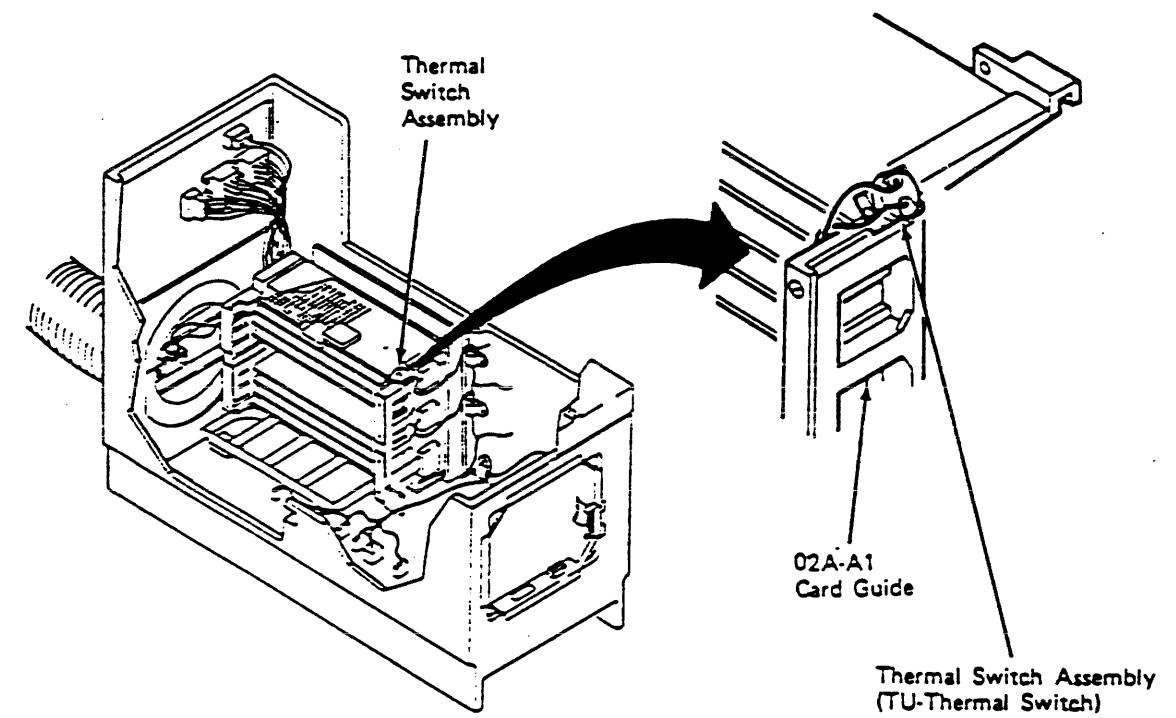
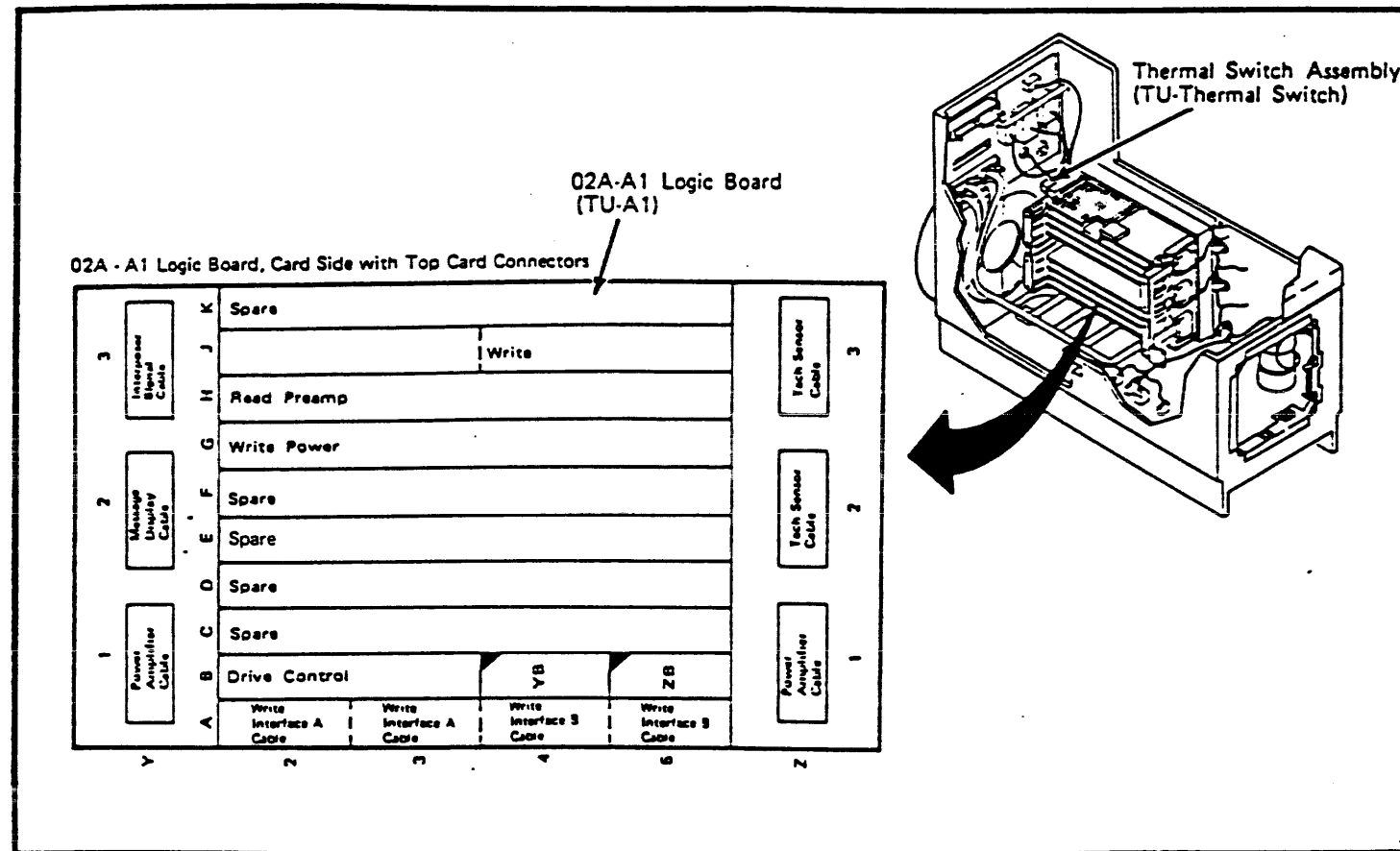
Front

TU-DO/1-PA  
Power Amplifier  
Board

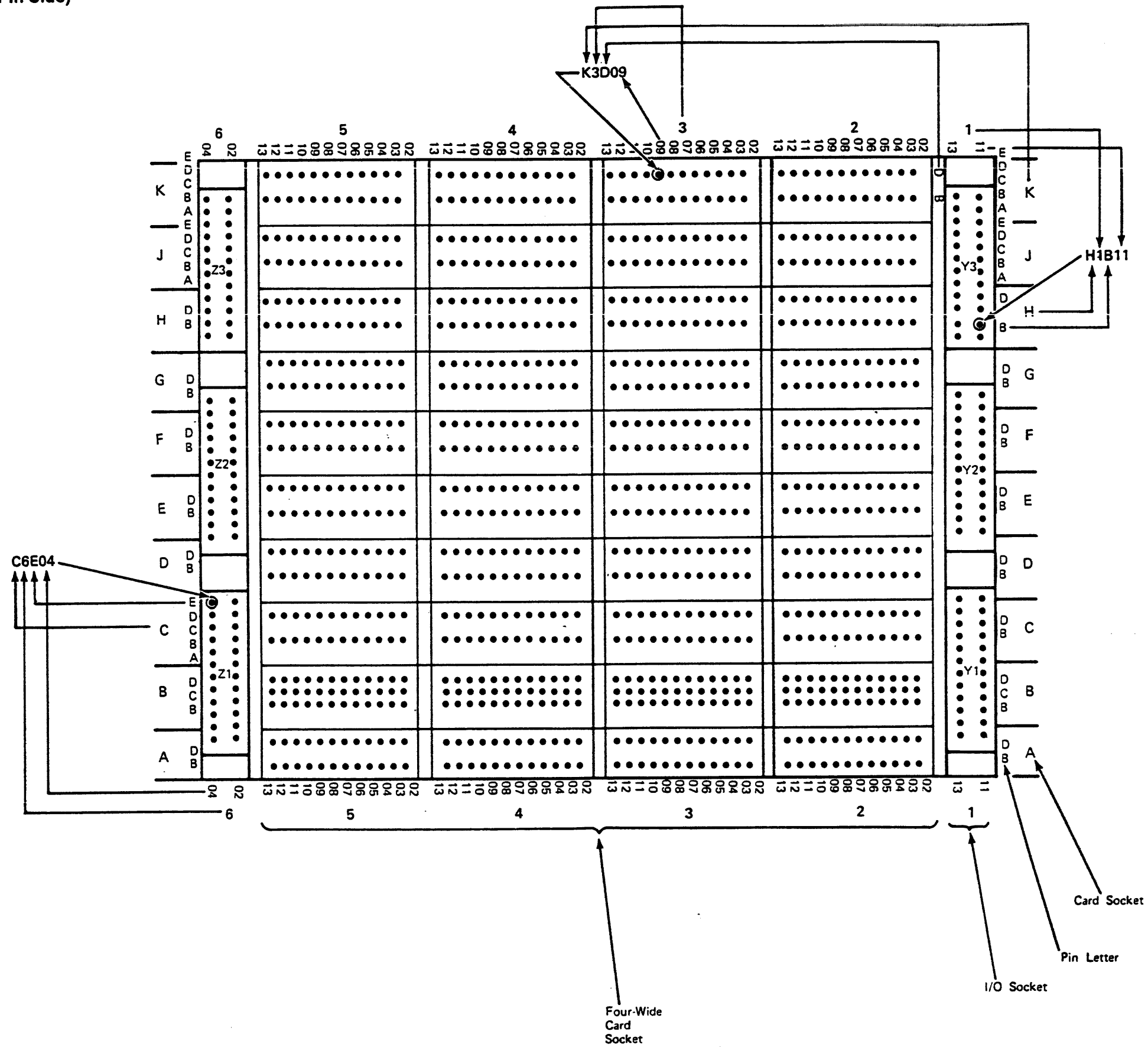
TU-DO/1-PA  
Power Amplifier Board Connectors

TU-DO/1-PA-J1



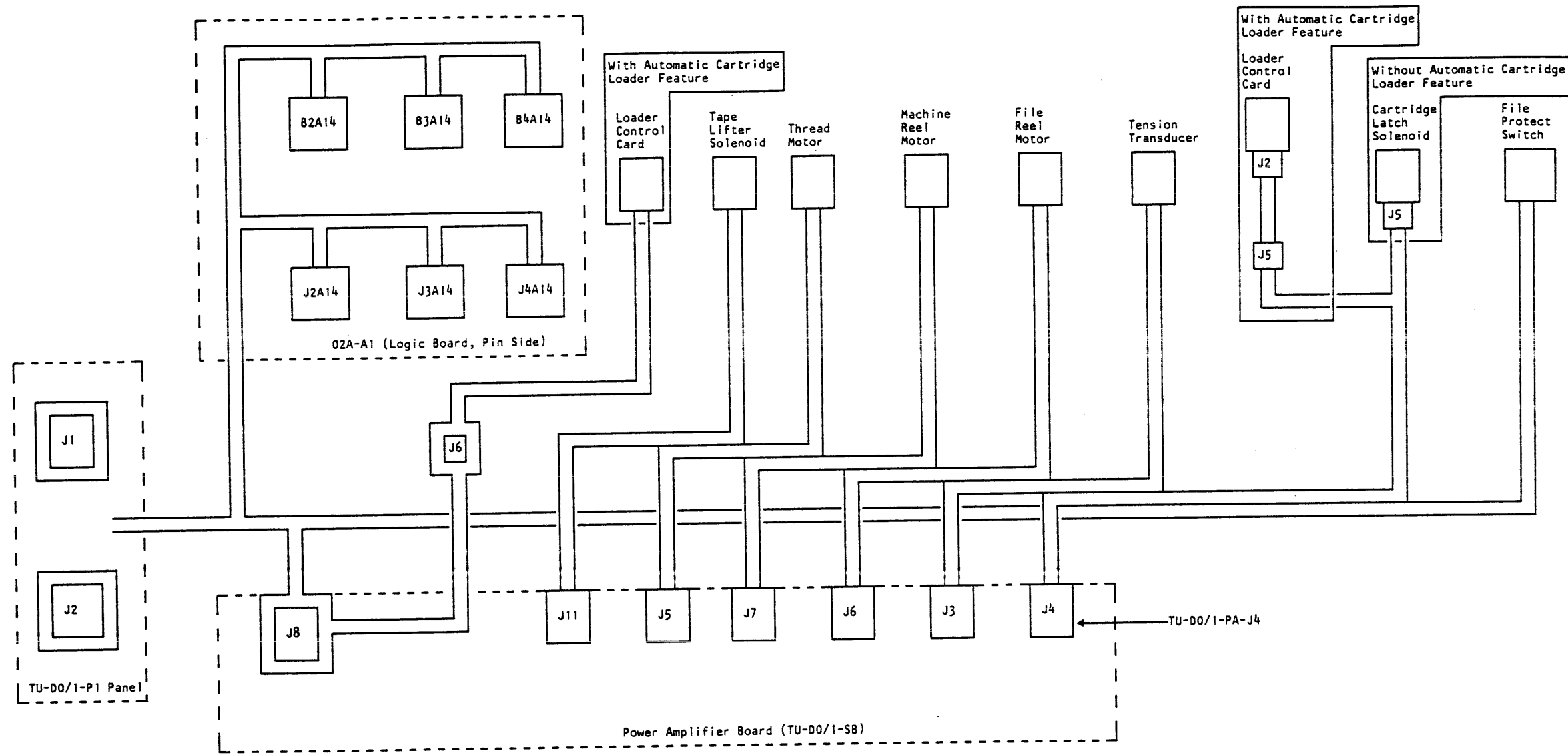


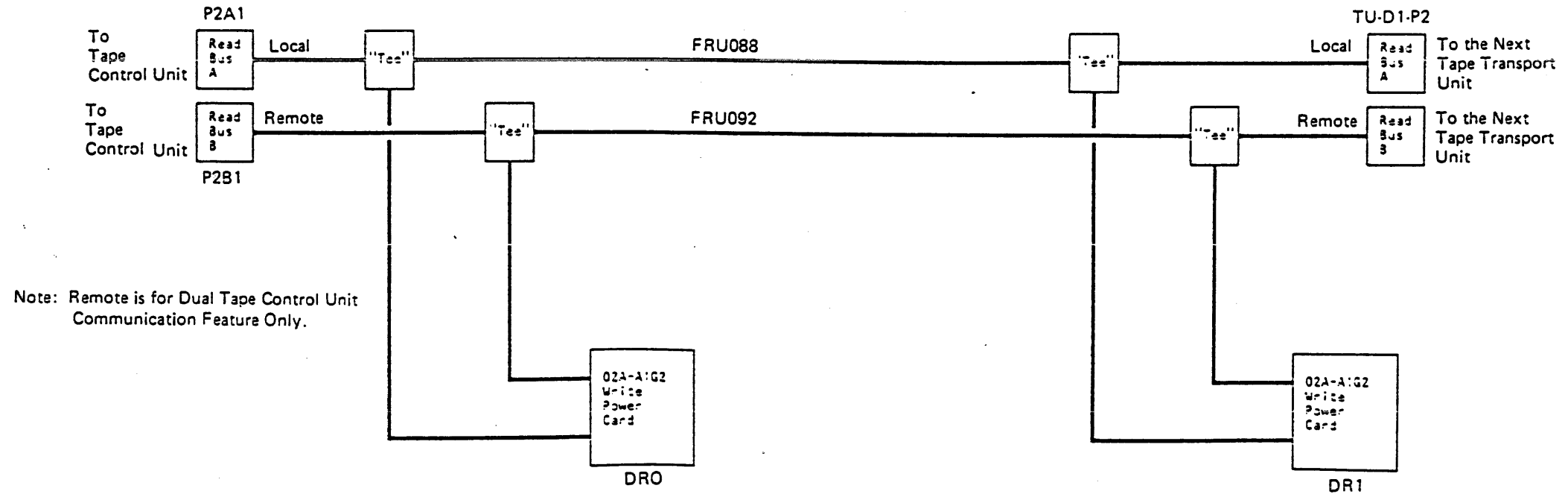




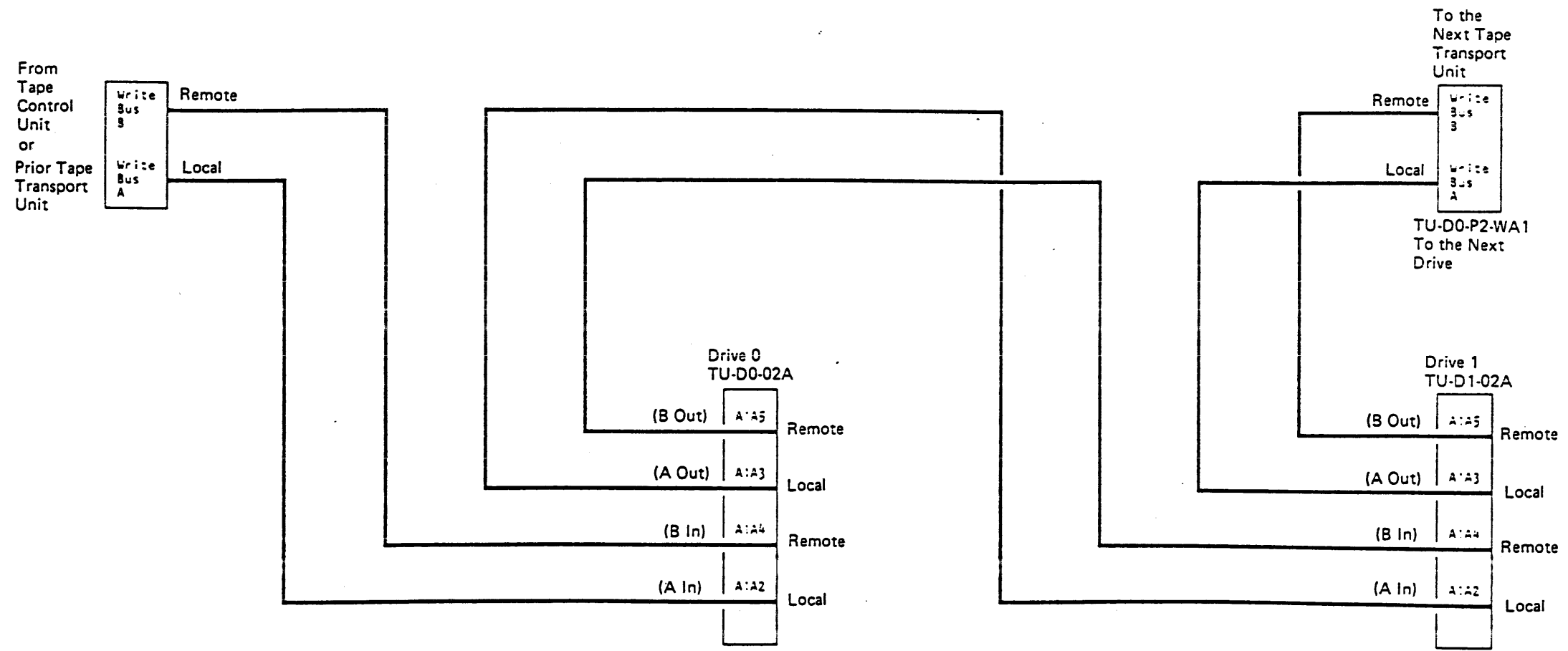
Drive Locations (Continued)

DC Distribution Cable (Internal)

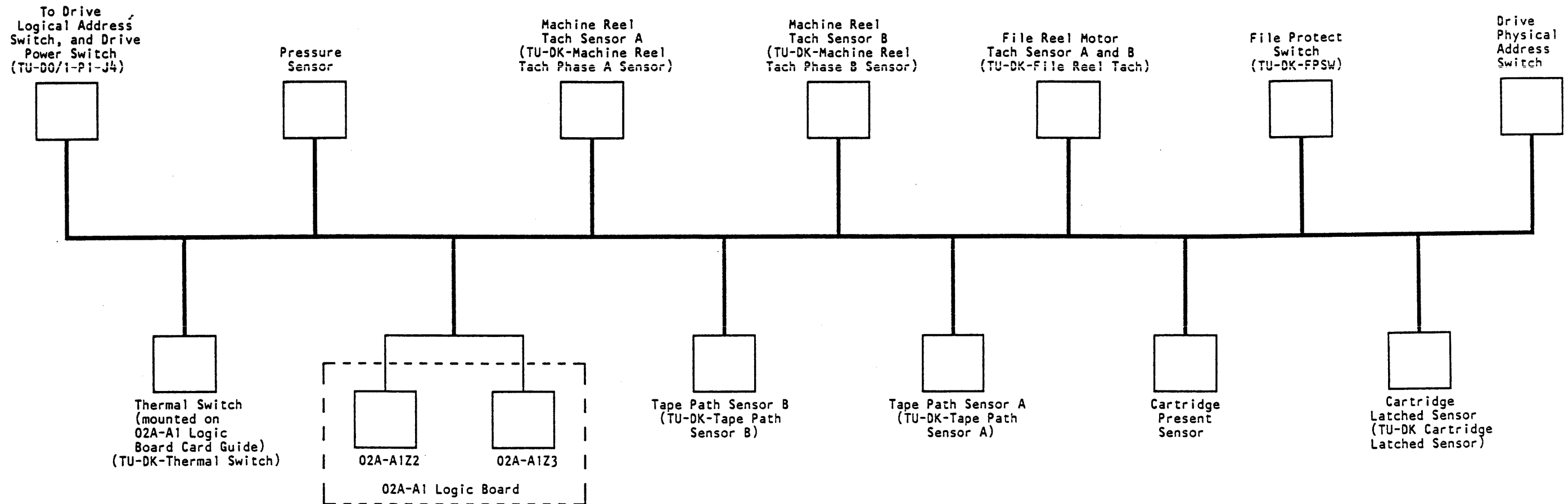


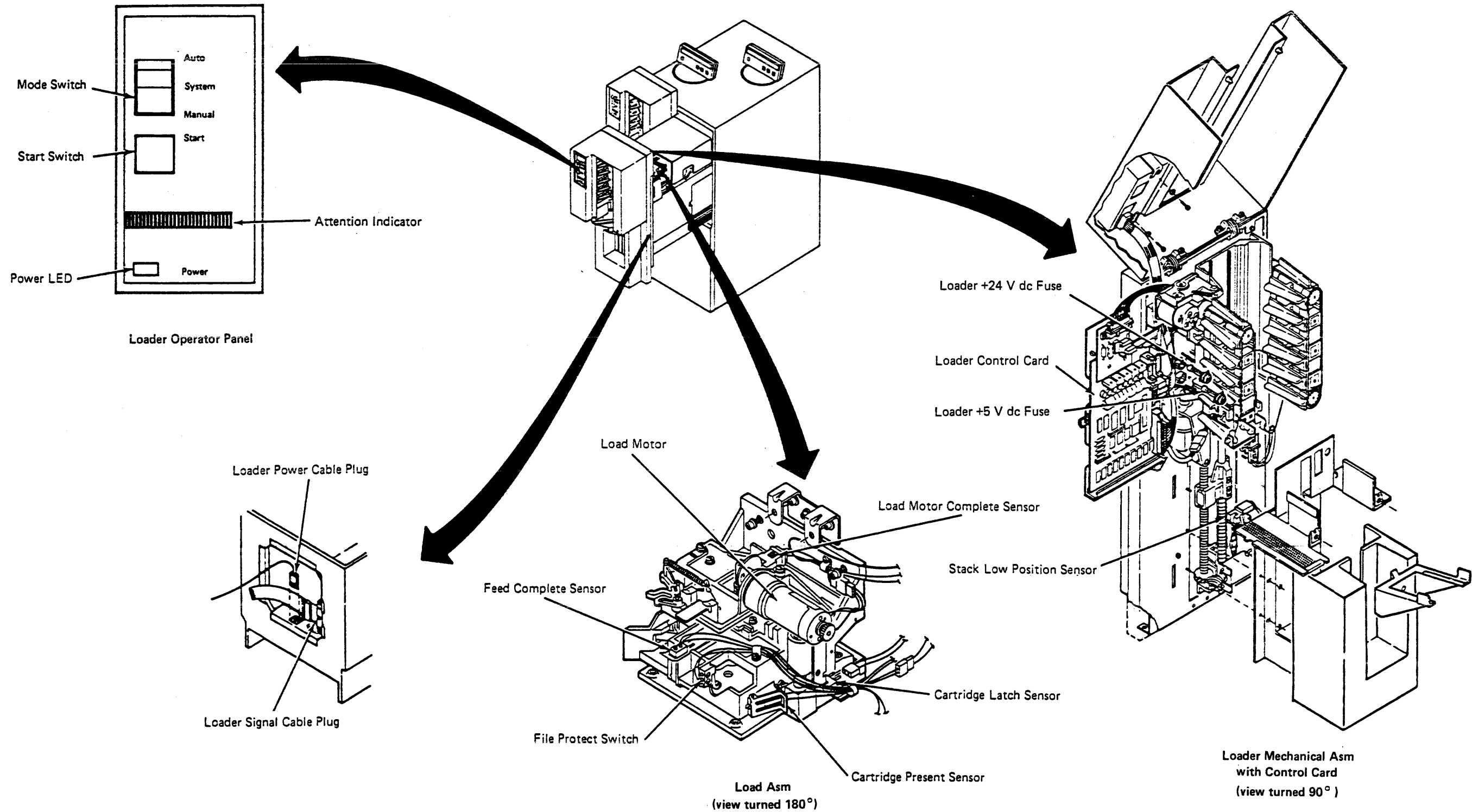


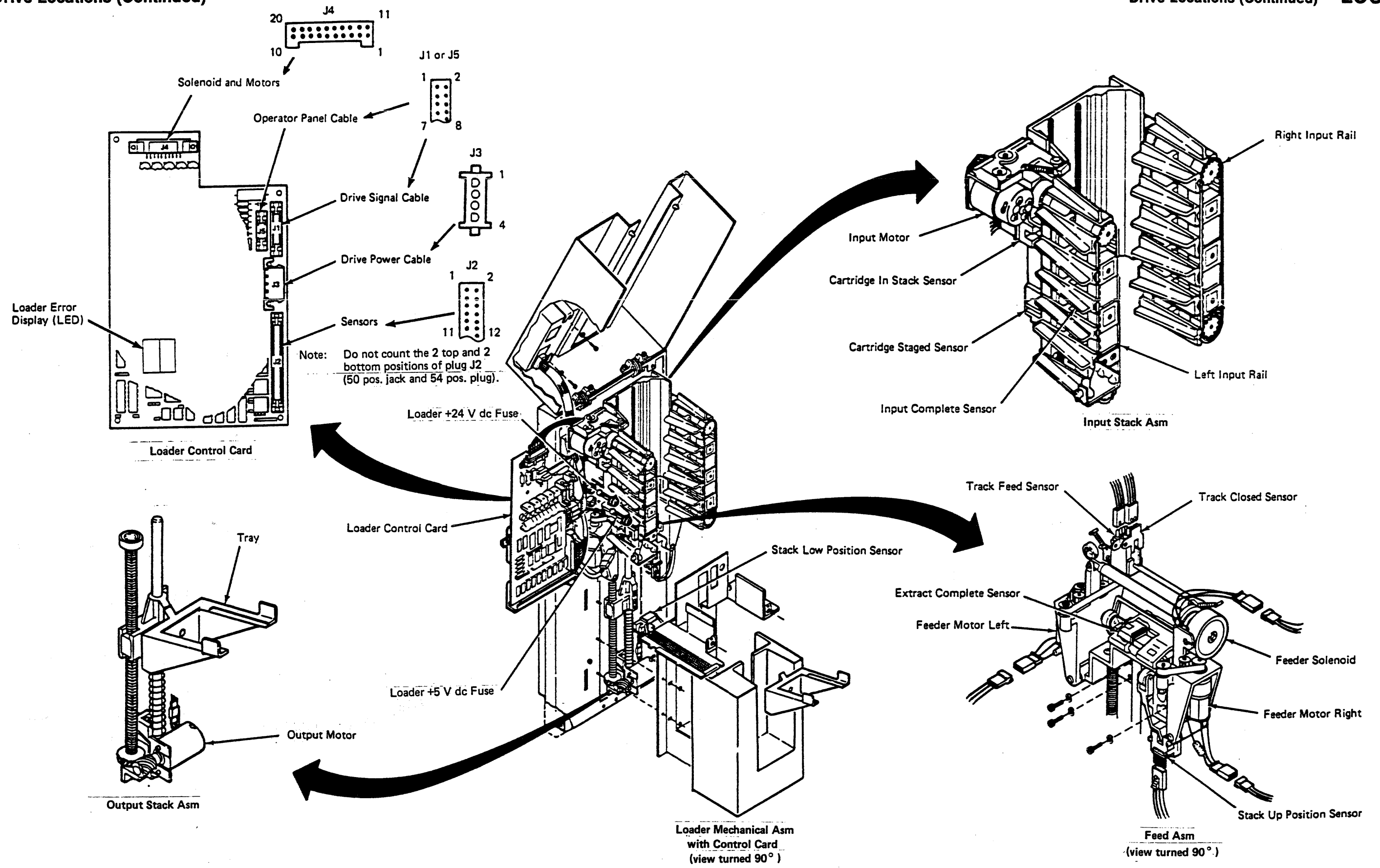
Write Adapter Cables



Tach Sensor Cable







## Remove/Replace Procedures by FRU Number

This directory lists all field-replaceable units (FRUs) for the TA90 Tape Subsystem, and includes all tape control unit and drive assembly FRUs.

To locate a specific FRU removal or replacement procedure, perform the following:

1. Locate the FRU number in the FRU NUMBER column.
2. The VOLUME column indicates where the information for the FRU is located. Volume A02 contains the information for the tape control unit. Volume A03 contains the information for the drive. The name of the FRU is listed in the FRU NAME column. The FRU name corresponds to a part number in the TA90 IPB (EK-UTA90-IP-001).
3. Go to the page listed in the REMOVE column to perform the removal procedure.
4. Go to the page listed in the REPLACE column to perform the replacement procedure.

Tape Control Unit cover removals and replacements are described on CARR-TCU 2-1 through 2-2.

Drive cover removals and replacements are described on CARR-DR 2-1 through 2-9.

Plenum supply hose clamping procedures are described on CARR-DR 3-1.

Tape lifter solenoid response time checking procedures are described on MD/SDISK 302.

| FRU NUMBER | VOLUME | FRU NAME                         | REMOVE/REPLACE PAGE | Digital P.N.                               |
|------------|--------|----------------------------------|---------------------|--|
| FRU001     | A03    | Threader Assembly                | 10                  | 29-27056-01                                |
| FRU002     | A03    | Latch Solenoid                   | 20                  | 29-27101-01                                |
| FRU003     | A03    | File Reel Motor                  | 30                  | 29-27170-01                                |
| FRU004     | A03    | Machine Reel Motor and Hub Mount | 40                  | 29-27169-01                                |
| FRU005     | A03    | Lower Flange                     | 50                  | 29-27089-01                                |
| FRU006     | A03    | Tape Path Sensor A               | 60                  | 29-27079-01                                |
| FRU007     | A03    | Tape Path Sensor B               | 70                  | 29-27079-01                                |
| FRU008     | A03    | Cartridge Latch Assembly         | 80                  | 29-27108-01                                |
| FRU009     | A03    | File Protect Switch              | 90                  | 29-27078-01                                |
| FRU010     | A03    | Cartridge Present Sensor         | 100                 | 29-27079-01                                |
| FRU011     | A03    | Cartridge Latched Sensor         | 110                 | 29-27083-01                                |
| FRU012     | A03    | Decoupler Assembly               | 120                 | 29-27071-01                                |
| FRU013     | A03    | Head and Guide Assembly          | 130                 | 29-27110-01                                |
| FRU014     | A03    | Tension Transducer               | 140                 | 29-27100-01                                |
| FRU015     | A02    | A1V5-A2V3 Cable                  | 150                 |  |
| FRU016     | A03    | Latch Spring                     | 160                 | 29-27102-01                                |
| FRU017     | A03    | Plunger Spring                   | 170                 | 29-27107-01                                |
| FRU018     | A03    | Compression Spring               | 180                 | 29-27080-01                                |
| FRU019     | A03    | Interlock Spring                 | 190                 | 29-27084-01                                |
| FRU020     | A03    | Blower Assembly                  | 200                 | 29-27139-01 (60 HZ)<br>29-27138-01 (50 HZ) |
| FRU022     | A02    | Read Bus Cable - Local           | 150                 |  |
| FRU024     | A02    | Read Bus Cable - Remote          | 150                 |  |
| FRU025     | A02    | Read Bus Cable - Remote          | 150                 |  |

## Remove/Replace Procedures by FRU Number CARR-TCU 1-1

| FRU NUMBER | VOLUME | FRU NAME                                    | REMOVE/REPLACE PAGE | Digital P.N. |
|------------|--------|---|---------------------|--------------|
| FRU026     | A02    | Device Data Bus Cable - Remote              | 150                 |              |
| FRU027     | A02    | Device Data Bus Cable - Remote              | 150                 |              |
| FRU029     | A02    | Device Data Bus Cable - Local               | 150                 |              |
| FRU030     | A03    | Pump Motor                                  | 300                 | 29-27105-01  |
| FRU031     | A03    | Regulator (60 Hz)                           | 310                 | 29-27069-01  |
|            | A03    | Regulator (50 Hz)                           | 310                 |              |
| FRU032     | A03    | Output Filter (60 Hz)                       | 320                 | 29-27082-01  |
|            | A03    | Output Filter (50 Hz)                       | 320                 |              |
| FRU033     | A03    | Inlet Filter                                | 330                 | 29-27057-01  |
| FRU034     | A03    | Pressure Hose Assembly (60 Hz)              | 340                 | 29-27142-01  |
|            | A03    | Pressure Hose Assembly (50 Hz)              | 340                 |              |
| FRU035     | A03    | Vacuum Hose Assembly (60 Hz)                | 350                 | 29-27143-01  |
|            | A03    | Vacuum Hose Assembly (50 Hz)                | 350                 |              |
| FRU036     | A03    | -5V dc Resistor Panel (60 Hz)               | 360                 |              |
|            | A03    | -5V dc Resistor Panel (50 Hz)               | 360                 |              |
| FRU037     | A03    | Manifold-In Pressure Hose (60 Hz)           |                     |              |
| FRU039     | A03    | Plenum Supply Hose                          | 390                 | 29-27155-01  |
| FRU040     | A03    | Pressure Sensor                             | 400                 | 29-27068-01  |
| FRU041     | A03    | Plenum Assembly, includes Pressure Sensor   | 410                 | 29-27067-01  |
| FRU042     | A03    | Decoupler Pressure Hose                     | 420                 | 29-27154-01  |
| FRU043     | A03    | Decoupler Vacuum Hose                       | 430                 | 29-27154-01  |
| FRU044     | A03    | Right Guide Bearing Hose                    | 440                 | 29-27141-01  |
| FRU045     | A03    | Left Guide Bearing Hose                     | 450                 | 29-27481-01  |
| FRU046     | A03    | Tension Transducer Hose                     | 460                 | 29-27225-01  |
| FRU047     | A03    | Cleaner Supply Hose                         | 470                 | 29-27153-01  |
| FRU048     | A02    | Power Bus Cable                             | 150                 |              |
| FRU049     | A03    | Logic Board to Power Amplifier J2 Cable     | 490                 |              |
| FRU054     | A03    | Upper Flange                                | 540                 | 29-27140-01  |
| FRU056     | A02    | Status Store Communication Cable - Dual TCU | 150                 |              |
| FRU058     | A03    | Logic Board (02A-A1)                        | 580                 | 29-27116-01  |
| FRU059     | A03    | Power Amplifier Board                       | 590                 | 29-27157-01  |



Remove/Replace Procedures by FRU Number

| FRU NUMBER | VOLUME | FRU NAME   | REMOVE/REPLACE PAGE | Digital P.N.                               |
|------------|--------|--|---------------------|--|
| FRU060     | A03    | Message Display Board                                      | 600                 | 29-27104-01                                |
| FRU061     | A03    | Machine Reel Hub   | 610                 | 29-27088-01                                |
| FRU062     | A03    | Read Preamp 02A-A1H2                                       | 640                 | 29-27135-01                                |
| FRU063     | A03    | Write 02A-A1J4   | 640                 | 29-27134-01                                |
| FRU064     | A03    | Write Power 02A-A1G2                                       | 640                 | 29-27115-01                                |
| FRU065     | A03    | Pump to Output Filter Hose                                 | 650                 |  |
| FRU072     | A03    | AC CB to Power Supply Blower Cable                         | 490                 |  |
| FRU073     | A03    | Logic Board to Power Amplifier J1 Cable                    | 490                 |  |
| FRU074     | A03    | Tape Transport Unit AC Power CB Cable                      | 490                 |  |
| FRU077     | A03    | Blower Assembly AC Power Cable (Tape Unit to both Drives)  | 490                 |  |
| FRU078     | A03    | Blower Assembly AC Power Cable                             | 490                 |  |
| FRU079     | A03    | DC Power Distribution Cable (Drive Internal)               | 790                 |  |
|            | A03    | DC Power Distribution Cable (Drive External)               | 796                 |  |
| FRU080     | A03    | DC Power Distribution Cable                                | 800                 |  |
| FRU081     | A03    | Tachometer Sensor Cable                                    | 810                 |  |
| FRU082     | A03    | Thermal Switch   | 820                 | 29-27483-01                                |
| FRU083     | A03    | Thermal Switch Cable                                       | 830                 |  |
| FRU084     | A02    | Local/Remote Power Panel                                   | 840                 | 29-27151-01                                |
| FRU085     | A03    | Drive Control Card   | 850                 | 29-27162-01                                |
| FRU086     | A02    | IML Diskette Drive   | 860                 | 29-27160-01                                |
| FRU087     | A03    | Read Data Local Cable (02A-A1G2 to TU-D0/1-P1RA1) Internal | 490                 |  |
| FRU088     | A03    | Read Bus Local Adapter Cable to TU-D1-P2A1                 | 880                 |  |
| FRU089     | A03    | Read Adapter Local Cable from Tee to P1RA1                 | 490                 |  |
| FRU090     | A03    | Message Display DC Power Cable                             | 900                 |  |
| FRU091     | A02    | Power Bus Cable  | 150                 |  |
| FRU092     | A03    | Read Bus Remote Adapter to TU-D1-P2B1 Cable                | 880                 |  |
| FRU093     | A03    | Read Adapter Remote Cable from Tee to P1RB1                | 490                 |  |
| FRU094     | A03    | Read Data Remote Cable (02A-A1G2 to TU-D0/1-P1B1)          | 490                 |  |
| FRU095     | A03    | DC Power Supply  | 950                 | 29-27099-01 (60 HZ)<br>29-27098-01 (50 HZ) |
| FRU096     | A03    | Fuse F1 + 24V Drive 0 Fuse F2 + 24V Drive 1                | 960                 |  |
| FRU097     | A02    | Power Bus Cable  | 150                 |  |
| FRU098     | A03    | Fuse F3 + 15V Drive 0 Fuse F4 + 15V Drive 1                | 960                 |  |
| FRU099     | A03    | Fuse F5 -15V Drive 0 Fuse F6 -15V Drive 1                  | 960                 |  |
| FRU100     | A03    | Fuse F7 + 8.5V Drive 0 Fuse F8 + 8.5V Drive 1              | 960                 |  |
| FRU101     | A03    | Fuse F9 -5V Drive 0 Fuse F10 -5V Drive 1                   | 960                 |  |

Remove/Replace Procedures by FRU Number CARR-TCU 1-2

| FRU NUMBER | VOLUME | FRU NAME   | REMOVE/REPLACE PAGE | Digital P.N. |
|------------|--------|--|---------------------|--------------|
| FRU102     | A03    | Fuse F11 + 5V Drive 0 Fuse F12 + 5V Drive 1  | 960                 |              |
| FRU103     | A02    | Power Bus Cable  | 150                 |              |
| FRU104     | A03    | Drive Power Switch   | 1040                | 29-27175-01  |
| FRU105     | A03    | Online/Offline Switch (Drive)  | 1040                | 29-27075-01  |
| FRU106     | A03    | Address Switch Cable to J4 (rear of deck)  | 490                 |              |
| FRU107     | A03    | Reset Switch   | 1040                | 29-27074-01  |
| FRU108     | A03    | Drive Address Switch   | 1040                | 29-27062-01  |
| FRU109     | A03    | Operator Panel Switch Board (contains Rewind Switch Unload Switch, and Ready/Not Ready Switch) | 1090                | 29-27094-01  |
| FRU110     | A03    | Drive Thermal Switch   | 1100                | 29-27483-01  |
| FRU111     | A02    | Read ECC/CORR Card 01A-A1R2  | 1110                | 29-27095-01  |
| FRU113     | A02    | Buffer Storage Card 01A-A1M2   | 1110                | 29-27159-01  |
| FRU114     | A02    | Buffer Control Card 01A-A1L2   | 1110                | 29-27137-01  |
| FRU115     | A02    | Maintenance Adapter Card 01A-A1E2  | 1110                | 29-27148-01  |
| FRU116     | A02    | Write Data Flow Card 01A-A1P2  | 1110                | 29-27133-01  |
| FRU117     | A02    | Microprocessor Card 01A-A1D2   | 1110                | 29-27136-01  |
| FRU118     | A02    | Drive Adapter Card 01A-A1Q2  | 1180                | 29-27163-01  |
| FRU119     | A02    | Read Clock and Format Card 01A-A1S2  | 1110                | 29-27112-01  |
| FRU120     | A02    | Buffer Adapter Card 01A-A1K2   | 1200                | 29-27150-01  |
| FRU121     | A02    | Status Store Basic Card 01A-A1G2   | 1110                | 29-27164-01  |

Remove/Replace Procedures by FRU Number

| FRU NUMBER | VOLUME | FRU NAME   | REMOVE/REPLACE PAGE | Digital P.N.   |
|------------|--------|--|---------------------|--|
| FRU122     | A02    | Status Store Communication Card 01A-A1F2   | 1110                | 29-27147-01  |
| FRU123     | A02    | Read Skew Buffer Card 1 01A-A2K2   | 1110                | 29-27093-01  |
| FRU124     | A02    | Read Skew Buffer Card 2 01A-A2L2   | 1110                | 29-27093-01  |
| FRU125     | A02    | Read Skew Buffer Card 3 01A-A2M2   | 1110                | 29-27093-01  |
| FRU126     | A02    | Power/POR Card 01A-A2H4  | 1260                | 29-27174-01  |
| FRU127     | A03    | Latch Interlock  | 1270                | 29-27081-01  |
| FRU129     | A03    | Physical Address Switch  | 1290                | 29-27062-01  |
| FRU133     | A02    | Channel Adapter Card (Channel A) 01A-A2C2  | 1110                | 29-27166-01  |
| FRU134     | A02    | Control Store Card 01A-A1C2  | 1110                | 29-27165-01  |
| FRU135     | A02    | Control Storage Array Card 01A-A1B2  | 1110                | 29-27168-01  |
| FRU138     | A02    | V Regulator Card 01A-A1T2  | 1260                | 29-27171-01  |
| FRU139     | A02    | Logic Board A1   | 1390                | 29-27113-01  |
| FRU140     | A02    | Logic Board A2   | 1400                | 29-27114-01  |
| FRU141     | A02    | Tape Control Unit Switch Panel Card (includes Offline Indicator, IML Switch, Normal/Test Switch, TCU0/TCU1 Switch, Tape Control Unit Online /Offline Switch) | 1410                | 29-27472-01  |
| FRU142     | A02    | Tape Control Unit Operator Panel Printed Circuit Board (includes Power On/Off Switch, and Power Indicator)   | 1420                | 29-27482-01  |
| FRU143     | A02    | Thermal Switch (TCU Gate) Lower  | 1430                | 29-27076-01  |
| FRU144     | A02    | AC Power Supply  | 1440                | 29-27086-01 (60 HZ / 50 HZ J)<br>29-27087-01 (50 HZ)     |
| FRU145     | A02    | DC Power Supply  | 1450                | 29-27072-01 (50 HZ)<br>29-27073-01 (60 HZ) (50 HZ JAPAN) |
| FRU146     | A02    | AC Fuse F1 +24V  | 1460                |  |
| FRU147     | A02    | DC Fuse F1 +8.5V   | 1470                |  |
| FRU148     | A02    | DC Fuse F2 +24V  | 1470                |  |
| FRU149     | A02    | AC Line Cord   | 1490                |  |
| FRU150     | A02    | Blower Assembly 1  | 1500                | 29-27060-01  |
| FRU151     | A02    | Blower Assembly 2  | 1500                | 29-27060-01  |
| FRU152     | A02    | Channel Adapter Card (Channel B) 01A-A2D2  | 1110                | 29-27166-01  |
| FRU155     | A02    | Thermal Switch Cable   | 150                 |  |
| FRU156     | A02    | Power Bus Cable  | 150                 |  |
| FRU157     | A02    | Top Card Connector WKL   | 1570                |  |
| FRU158     | A02    | Top Card Connector XKL   | 1570                |  |
| FRU159     | A02    | Top Card Connector YKL   | 1570                |  |

Remove/Replace Procedures by FRU Number CARR-TCU 1-3

| FRU NUMBER | VOLUME | FRU NAME                                     | REMOVE/REPLACE PAGE | Digital P.N. |
|------------|--------|--|---------------------|--------------|
| FRU160     | A02    | DC Power Supply to Gate TB Cable             | 1600                |              |
| FRU161     | A03    | Cleaner Block                                | 1610                | 29-27061-01  |
| FRU162     | A02    | Service Switch                               | 1620                | 29-27103-01  |
| FRU164     | A02    | GTE DC Distribution Cable Assembly           | 150                 |              |
| FRU165     | A02    | Gate Fan Cable                               | 1650                |              |
| FRU166     | A02    | AC Power Supply to DC Power Supply Cable     | 150                 |              |
| FRU167     | A02    | Power Bus Cable                              | 150                 |              |
| FRU168     | A02    | Tape Control Unit Switch Panel to Gate Cable | 150                 |              |
| FRU169     | A02    | A1Y1 to MD Connector Cable                   | 150                 |              |
| FRU170     | A02    | STI-FIPS I/O Tag Cable (Channel A)           | 150                 |              |
| FRU171     | A02    | STI-FIPS I/O Bus Cable                       | 150                 |              |
| FRU173     | A02    | Channel A,B Address Cable                    | 150                 |              |
| FRU175     | A02    | Read Bus Cable - Single TCU                  | 150                 |              |
| FRU176     | A02    | TCU AC Control Switch Panel Cable            | 150                 |              |
| FRU177     | A02    | AC Power to Gate Cable                       | 1770                |              |
| FRU178     | A02    | A1S2W to A2V2 Cable                          | 150                 |              |
| FRU179     | A02    | Power Bus Cable                              | 150                 |              |
| FRU180     | A02    | Top Card Connector ZCD                       | 1570                |              |
| FRU181     | A02    | Top Card Connector P2Y                       | 1570                |              |
| FRU182     | A02    | Top Card Connector WE                        | 1570                |              |
| FRU183     | A02    | Top Card Connector WCD                       | 1570                |              |
| FRU184     | A02    | Top Card Connector ZPQ                       | 1570                |              |
| FRU185     | A02    | Top Card Connector XRS                       | 1570                |              |
| FRU186     | A02    | Top Card Connector YRS                       | 1570                |              |

Remove/Replace Procedures by FRU Number

| FRU NUMBER | VOLUME | FRU NAME  | REMOVE/REPLACE PAGE | Digital P.N.   |
|------------|--------|---|---------------------|--|
| FRU187     | A02    | Top Card Connector ZFG                                      | 1570                |  |
| FRU188     | A02    | Top Card Connector ZKL                                      | 1570                |  |
| FRU189     | A02    | Top Card Connector WFG                                      | 1570                |  |
| FRU190     | A02    | Top Card Connector XFG                                      | 1570                |  |
| FRU191     | A02    | Top Card Connector YFG                                      | 1570                |  |
| FRU192     | A02    | Top Card Connector XCDE                                     | 1570                |  |
| FRU193     | A02    | Top Card Connector YCDE                                     | 1570                |  |
| FRU194     | A02    | IML Diskette Drive Cable (Drive to 01A-A1A3)                | 150                 | 29-27160-01  |
| FRU197     | A02    | Channel Address Switch (Channel A, Channel B)               | 1970                | 29-27063-01  |
| FRU198     | A02    | UEPO Switch   | 1980                | 29-27064-01  |
| FRU199     | A02    | Write Bus Terminator  | 1995                | 29-27173-01  |
| FRU200     | A03    | Write Adapter A Cable (TCU to Drive 0 P1WB1)                | 490                 |  |
| FRU201     | A03    | Write Adapter A Cable (Drive 0 P1WB2 to Drive 1 P1WB1)      | 490                 |  |
| FRU202     | A03    | Write Adapter B Cable (TU-D1-P1WB2 to TU-D1-P2B2)           | 490                 |  |
| FRU203     | A03    | Write Adapter B Cable (A1A4 to P1WB1)                       | 490                 |  |
| FRU204     | A03    | Write Adapter A Cable (A1A5 to P1WB2)                       | 490                 |  |
| FRU205     | A03    | Write Adapter A Cable (TCU to Drive 0 P1WA1)                | 490                 |  |
| FRU206     | A03    | Write Adapter A Cable (Drive 0 P1WA2 to Drive 1 P1WA1)      | 490                 |  |
| FRU207     | A03    | Write Adapter A Cable (TU-D1-P1WA2 to TU-D1-P2A2)           | 490                 |  |
| FRU208     | A03    | Write Adapter A Cable (A1A2 to P1WA1)                       | 490                 |  |
| FRU209     | A03    | Write Adapter A Cable (A1A3 to P1WA2)                       | 490                 |  |
| FRU210     | A03    | Message Display Cable                                       | 490                 |  |
| FRU211     | A03    | Message Display Cable                                       | 2110                |  |
| FRU212     | A03    | Vacuum Supply Hose  | 2120                | 29-27156-01  |
| FRU213     | A03    | Message Display Board to Message Display Switch Board Cable | 2130                |  |
| FRU214     | A02    | STI-FIPS I/O Tag Cable (Channel B)                          | 150                 |  |
| FRU215     | A03    | Tape Lifter Solenoid Input Hose                             | 2150                | 29-27097-01  |
| FRU216     | A03    | Tape Lifter Solenoid  | 2160                | 29-27111-01  |
| FRU217     | A02    | A2Z2 to Gate TB2 Cable                                      | 150                 |  |
| FRU218     | A03    | AC Power Circuit Breaker                                    | 2180                | 29-27176-01 (60 HZ / 50 HZ J)<br>29-27178-01 (50 HZ) |
| FRU219     | A03    | Vacuum Distribution Tee                                     | 2190                | 29-27065-01  |
| FRU223     | A03    | Convoluted Bellows  | 2230                | 29-27177-01  |

Remove/Replace Procedures by FRU Number CARR-TCU 1-4

| FRU NUMBER | VOLUME | FRU NAME                           | REMOVE/REPLACE PAGE | Digital P.N. |
|------------|--------|------------------------------------|---------------------|--------------|
| FRU224     | A02    | Thermal Switch (TCU Gate) Upper    | 2240                | 29-27076-01  |
| FRU225     | A03    | Machine Reel Tach Sensor A         | 2250                |              |
| FRU226     | A03    | Machine Reel Tach Sensor B         | 2260                | 29-27096-01  |
| FRU227     | A03    | Machine Reel Tape Guide            | 2270                | 29-27476-01  |
| FRU228     | A03    | Head Tape Guide (Left)             | 2280                | 29-27479-01  |
| FRU229     | A03    | Head Tape Guide (Right)            | 2290                | 29-27477-01  |
| FRU230     | A03    | Tension Transducer Tape Guide      | 2300                | 29-27100-01  |
| FRU231     | A03    | Center Tape Guide                  | 2310                | 29-27478-01  |
| FRU232     | A03    | Cartridge                          | 2320                |              |
| FRU242     | A02    | STI-FIPS I/O Bus Cable (Channel B) | 150                 |              |
| FRU249     | A02    | A1Z1-A2Y1 Cable                    | 158                 |              |

Remove/Replace Procedures by FRU Number

| FRU NUMBER | VOLUME | FRU NAME                                       | REMOVE/REPLACE PAGE | Digital P.N. |
|------------|--------|--|---------------------|--------------|
| FRU250     | A02    | A1Z2-A2Y2 Cable                                | 158                 |              |
| FRU251     | A02    | A1Z3-A2Y3 Cable                                | 158                 |              |
| FRU252     | A02    | A1Z4-A2Y4 Cable                                | 158                 |              |
| FRU253     | A02    | A1Z5-A2Y5 Cable                                | 158                 |              |
| FRU254     | A02    | A1Z6-A2Y6 Cable                                | 158                 |              |
| FRU255     | A02    | A1A5-A2A5 Cable                                | 158                 |              |
| FRU256     | A02    | A1V3-A2V5 Cable                                | 158                 |              |
| FRU258     | A02    | IML Diskette                                   | 2580                |              |
| FRU260     | A02    | TCU to TCU Read Cable - Remote                 | 150                 |              |
| FRU261     | A02    | TCU to TCU Write Cable - Remote                | 150                 |              |
| FRU262     | A03    | Air Pressure Test Port Hose Assembly           | 2620                | 29-27146-01  |
| FRU263     | A03    | Vacuum Test Port Hose Assembly                 | 2630                | 29-27144-01  |
| FRU267     | A03    | Top Card Connector (TCC) B2X                   | 660                 |              |
| FRU268     | A03    | Top Card Connector (TCC) B2Y                   | 660                 |              |
| FRU270     | A03    | Interposer Signal Cable 02A-A1Y3 to P1-J2      | 490                 |              |
| FRU272     | A02    | Load Resistor Card 01A-A2P2                    | 1110                | 29-27471-01  |
| FRU277     | A03    | Head Compliant Guide                           | 2770                | 29-27109-01  |
| FRU278     | A02    | Read Detect Card 01A-A2Q2                      | 1110                | 29-27149-01  |
| FRU279     | A02    | Load Box                                       | 2790                |              |
| FRU280     | A03    | Fuse 13 +5V dc Drive 0, Fuse 14 +5V dc Drive 1 | 960                 |              |
| FRU281     | A03    | Loader Control Card                            | 2810                | 29-27161-01  |
| FRU282     | A03    | Load Assembly                                  | 2820                | 29-27172-01  |
| FRU283     | A03    | Load Motor                                     | 2830                | 29-27091-01  |
| FRU284     | A03    | Load Motor Complete Sensor                     | 2840                | 29-27122-01  |
| FRU285     | A03    | Loader Mechanical Assembly                     | 2850                | 29-27473-01  |
| FRU286     | A03    | Loader Signal Cable                            | 2860                |              |
| FRU287     | A03    | Loader Power Cable                             | 2860                |              |
| FRU288     | A03    | Loader Fuse +24V dc                            | 2880                |              |
| FRU289     | A03    | Stack Low Position Sensor                      | 2890                | 29-27130-01  |
| FRU290     | A03    | Input Stack Assembly                           | 2900                | 29-27092-01  |
| FRU291     | A03    | Cartridge In Stack Sensor                      | 2910                | 29-27122-01  |
| FRU292     | A03    | Cartridge Staged Sensor                        | 2920                | 29-27132-01  |
| FRU293     | A03    | Left Input Rail Assembly                       | 2930                | 29-27128-01  |
| FRU294     | A03    | Right Input Rail Assembly                      | 2940                | 29-27129-01  |
| FRU295     | A03    | Feed Assembly                                  | 2950                | 29-27123-01  |
| FRU296     | A03    | Stack Up Position Sensor                       | 2960                | 29-27122-01  |
| FRU297     | A03    | Output Stack Assembly                          | 2970                | 29-27125-01  |

Remove/Replace Procedures by FRU Number CARR-TCU 1-5

| FRU NUMBER | VOLUME | FRU NAME                 | REMOVE/REPLACE PAGE | Digital P.N. |
|------------|--------|--------------------------|---------------------|--------------|
| FRU298     | A03    | Loader Operator Panel    | 2980                | 29-27126-01  |
| FRU299     | A03    | Loader Fuse +5V dc       | 2880                |              |
| FRU300     | A03    | Feed Assembly Motor      | 3000                |              |
| FRU900     | A02    | STI-FIPS Adapter (L)     | 9000                |              |
| FRU901     | A02    | STI-FIPS Adapter (R)     | 9000                |              |
| FRU903     | A02    | Power Supply STI         | 9030                | 29-27409-01  |
| FRU904     | A02    | STI Gate Fans            | 9040                | 29-27474-01  |
| FRU905     | A02    | STI AC Interlock Thermal | 9050                | 29-27059-01  |
| FRU906     | A02    | STI DC Interlock Thermal | 9060                | 29-27070-01  |

FRU Listing by Alphabetical Sequence - Tape Control Unit

| FRU Name  | FRU No. | Page |
|---|---------|------|
| AC  |         |      |
| Fuse 1 + 24 V ac                                      | 146     | 1460 |
| Line Cord   | 149     | 1490 |
| Power Supply  | 144     | 1440 |
| BOARD   |         |      |
| Tape Control Unit Switch Panel                        | 141     | 1410 |
| Printed Circuit                                       |         |      |
| Logic A1  | 139     | 1390 |
| Logic A2  | 140     | 1400 |
| Op Panel Printed Circuit                              | 142     | 1420 |
| CABLE   |         |      |
| AC Line Cord  | 149     | 1490 |
| AC Power to Gate                                      | 177     | 1770 |
| AC Power Supply to DC Power Supply                    | 166     | 150  |
| A1A5 to A2 A5   | 255     | 150  |
| A1S2W to A2V2   | 178     | 150  |
| A1V3 to A2V5  | 256     | 150  |
| A1V5 to A2V3  | 015     | 150  |
| A1Y1 to MD Connector                                  | 169     | 150  |
| A1Z1 to A2Y1  | 249     | 150  |
| A1Z2 to A2Y2  | 250     | 150  |
| A1Z3 to A2Y3  | 251     | 150  |
| A1Z4 to A2Y4  | 252     | 150  |
| A1Z5 to A2Y5  | 253     | 150  |
| A1Z6 to A2Y6  | 254     | 150  |
| CAF Feature   | 273     | 150  |
| Channel A/B Address                                   | 173     | 150  |
| Tape Control Unit Switch Panel Voltage                | 176     | 150  |
| Tape Control Unit Switch Panel to Gate                | 168     | 150  |
| Tape Control Unit to Tape Control Unit Read - Remote  | 260     | 150  |
| Tape Control Unit to Tape Control Unit Write - Remote | 261     | 150  |
| DC Distribution                                       | 164     | 150  |
| DC Power to Gate TB                                   | 160     | 1600 |
| Device Data Bus - Local                               | 029     | 150  |
| Device Data Bus - Remote                              | 026     | 150  |
| Device Data Bus - Remote                              | 027     | 150  |
| Gate Fan  | 165     | 1650 |
| STI-FIPS I/O Bus (Channel A)                          | 171     | 150  |
| STI-FIPS I/O Bus (Channel B)                          | 242     | 150  |
| STI-FIPS I/O Tag (Channel A)                          | 170     | 150  |
| STI-FIPS I/O Tag (Channel B)                          | 214     | 150  |
| IML Diskette Drive                                    | 194     | 150  |
| Power Bus   | 048     | 150  |
| Power Bus   | 091     | 150  |
| Power Bus   | 097     | 150  |
| Power Bus   | 103     | 150  |
| Power Bus   | 167     | 150  |
| Power Bus   | 179     | 150  |
| Power Bus (UEPO Switch)                               | 156     | 150  |
| Read Bus - Local                                      | 175     | 150  |
| Read Bus - Remote                                     | 022     | 150  |
| Read Bus - Remote                                     | 024     | 150  |
| Read Bus - Remote                                     | 025     | 150  |
| Remote Exit - 2 TCU                                   | 217     | 150  |
| Status Store - 2 TCU                                  | 056     | 150  |
| Thermal Switch  | 155     | 150  |
| CARD  |         |      |
| Buffer Adapter (A1K2)                                 | 120     | 1200 |
| Buffer Control (A1L2)                                 | 114     | 1110 |
| Buffer Memory Reference                               | 276     | 1110 |
| Buffer Memory Card (A1M2)                             | 113     | 1110 |
| Channel A Adapter (A2C2)                              | 133     | 1110 |
| Channel B Adapter (A2D2)                              | 152     | 1110 |
| Control Storage Array Card (A1B2)                     | 135     | 1110 |
| Control Storage (A1C2)                                | 134     | 1110 |

FRU Listing by Alphabetical Sequence - Tape Control Unit CARR-TCU 1-8

| FRU Name                               | FRU No. | Page |
|--|---------|------|
| Drive-Adapter (A1Q2)                   | 118     | 1180 |
| Load Resistor Card (A2P2)              | 272     | 1110 |
| Maintenance Adapter (A1E2)             | 115     | 1110 |
| Microprocessor (A1D2)                  | 117     | 1110 |
| POR (Power On Reset) (A2H4)            | 126     | 1260 |
| Read Clock and Format (A1S2)           | 119     | 1110 |
| Read Detect Card (A2Q2)                | 278     | 1110 |
| Read ECC/Correction (A1R2)             | 111     | 1110 |
| Read Skew Buffer 1 (A2K2)              | 123     | 1110 |
| Read Skew Buffer 2 (A2L2)              | 124     | 1110 |
| Read Skew Buffer 3 (A2M2)              | 125     | 1110 |
| Regulator (A1T2)                       | 138     | 1260 |
| Status Store (A1G2)                    | 121     | 1110 |
| STI-FIPS Adapter (L)                   | 900     | 9000 |
| STI-FIPS Adapter (R)                   | 901     | 9000 |
| Store Status Communicator (A1F2)       | 122     | 1110 |
| Voltage Regulator (A1T2), POR (A2H2)   | 138     | 1260 |
| Write Data Flow (A1P2)                 | 116     | 1110 |
| TCU Address Switch                     | 197     | 1970 |
| TCU Switch Panel Printed Circuit Board | 141     | 1410 |
| DC                                     |         |      |
| Load Box                               | 279     | 2790 |
| Fuse F1 + 8.4 V dc                     | 147     | 1470 |
| Fuse F2 + 24 V dc                      | 148     | 1470 |
| Power Supply                           | 145     | 1450 |
| Diskette Drive - IML                   | 086     | 860  |
| Diskette                               | 258     | 2580 |
| IML Diskette Drive                     | 086     | 860  |
| Local/Remote Power Panel               | 084     | 840  |
| Logic Board A1                         | 139     | 1390 |
| Logic Board A2                         | 140     | 1400 |
| Op Panel Printed Circuit Board         | 142     | 1420 |
| Power Panel - Local/Remote             | 084     | 840  |
| Power Supply - AC                      | 144     | 1440 |
| Power Supply - DC                      | 145     | 1450 |
| Power Supply - STI                     | 903     | 9030 |
| SWITCH                                 |         |      |
| TCU Address                            | 197     | 1970 |
| Local/Remote (Power Panel)             | 084     | 840  |
| Service Assembly                       | 162     | 1620 |
| Thermal (TCU Gate) Lower               | 143     | 1430 |
| Thermal (TCU Gate) Upper               | 224     | 2240 |
| UEPO (Unit Emergency Power Off)        | 198     | 1980 |
| Terminator Write Bus TCU0 (Local)      | 199     | 1995 |
| Terminator Write Bus TCU0 (Remote)     | 248     | 1995 |
| Terminator Write Bus TCU1 (Local)      | 264     | 1995 |
| Terminator Write Bus TCU1 (Remote)     | 265     | 1995 |
| TOP CARD                               |         |      |
| Connector A1WCD                        | 183     | 1570 |
| Connector A1E2W                        | 182     | 1570 |
| Connector A1WFG                        | 189     | 1570 |
| Connector A1WKL                        | 157     | 1570 |
| Connector A1XCDE                       | 192     | 1570 |
| Connector A1XFG                        | 190     | 1570 |
| Connector A1XKL                        | 158     | 1570 |
| Connector A1XRS                        | 185     | 1570 |
| Connector A1YCDE                       | 193     | 1570 |
| Connector A1YFG                        | 191     | 1570 |
| Connector A1YKL                        | 159     | 1570 |
| Connector A1P2Y                        | 181     | 1570 |
| Connector A1YRS                        | 186     | 1570 |
| Connector A1ZCD                        | 180     | 1570 |
| Connector A1ZFG                        | 187     | 1570 |
| Connector A1ZKL                        | 188     | 1570 |
| Connector A1ZPQ                        | 184     | 1570 |
| UEPO (Unit Emergency Power Off) Switch | 198     | 1980 |
| Write Bus Terminator TCU0 (Local)      | 199     | 1995 |

| FRU Name                           | FRU No. | Page |
|------------------------------------|---------|------|
| Write Bus Terminator TCU0 (Remote) | 248     | 1995 |
| Write Bus Terminator TCU1 (Local)  | 264     | 1995 |
| Write Bus Terminator TCU1 (Remote) | 265     | 1995 |

## Introduction

This section contains the removal and replacement procedures for all field-replaceable units (FRUs) in the TA90 Tape Subsystem. Checks and adjustment procedures are also included.

## CARR Layout

CARR-TCU 1-1 through 1-5 contain a complete FRU list for the tape control unit and tape transport unit. An error code or FRU number that is displayed on the CE panel will refer to this FRU list. The corresponding procedure should be performed. The FRU removal procedure is given first and the FRU replacement procedure immediately follows for the same FRU. All procedures are shown in a step-by-step method with keyed reference to views.

## Common Procedures

Procedures for cover removal and replacement are described on CARR-TCU 2-1 and 2-2. You will be sent to these common procedures by the FRU removal and replacement procedures.

Read through the complete procedure before performing it, and give attention to caution and danger notes.

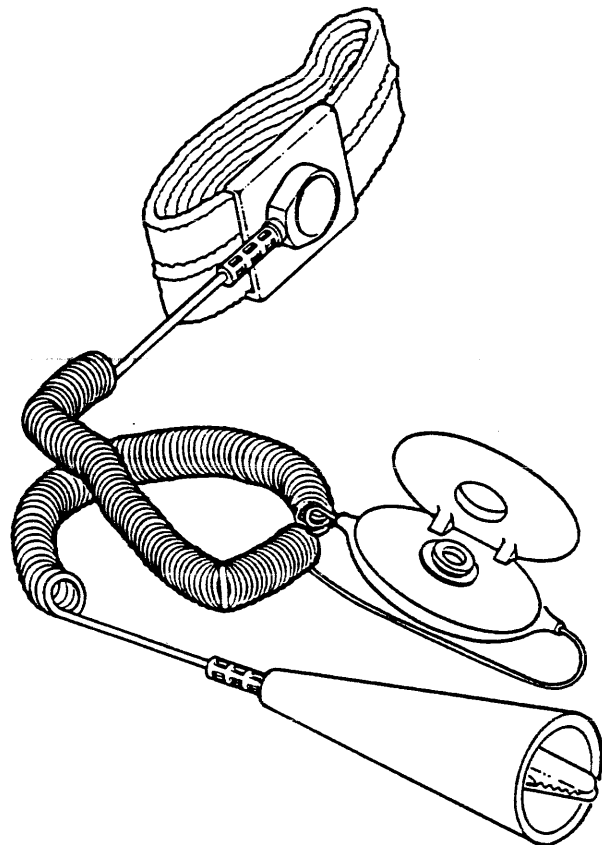


Figure 1. ESD Grounding Wrist Strap

## Instructions for Working with ESD-Sensitive Parts

To prevent damage when you work with electrostatic discharge (ESD) sensitive parts, observe the following instructions. These instructions are in addition to all the usual precautions:

- ESD-sensitive parts that are shipped in a special ESD bag should be left in this bag until you are ready to immediately install them into the machine.
- Before touching the ESD-sensitive part, put on the ESD Grounding Wrist Strap on either wrist. This strap has a high resistance (1 megohm) resistor in series with the grounding clip, so there is no danger to you. It discharges the static electricity from your body. Connect the clip to the flex ground strap of the gate to the frame. Keep the strap on while you are inserting or removing a logic card or handling any ESD-sensitive part.
- Do not place the ESD-sensitive part on the machine cover or on a metal table. If you need to put down the ESD-sensitive part for any reason, first put it into its special bag. (Large metal objects can be discharge paths without being grounded.)
- Prevent ESD-sensitive parts from being touched by other personnel, such as service representatives or customers. Reinstall all covers when you are not working on the machine.
- If possible, keep all ESD-sensitive parts in a grounded metal cabinet (case).
- Be extra careful in working with ESD-sensitive parts when cold-weather heating is used. Heating of cold air lowers the relative humidity, which increases the static electricity.

### CAUTION:

When wearing the ESD Grounding Wrist Strap, ensure that the flex ground strap remains connected. Failure to do this creates a safety exposure in the same manner as wearing jewelry while working on live exposed electrical circuits.

Use the most current Digital part number available for the ESD Grounding Wrist Strap.

The following is a list of the ESD-sensitive parts in the TA90 subsystem:

- All of the logic cards in the tape control unit and the drives
- Message display card in the drives
- Transducer FRU in the drives.

## Tape Control Unit Cover and Safety Cover Removal

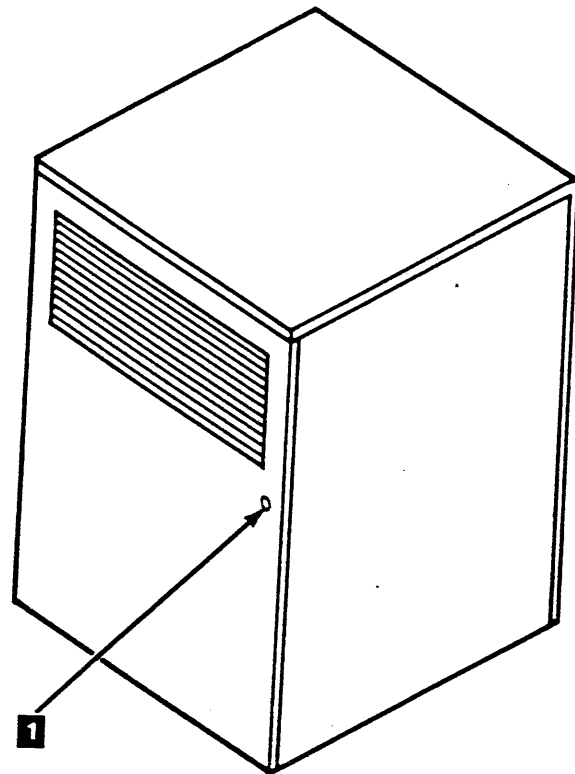
This page contains the steps needed for removing any of the tape control unit covers.

### Tape Control Unit Front or Rear Cover Removal

The tape control unit front and rear covers are held closed by a latch assembly.

To open the front cover, push on the left center to release the latch. To open the rear cover, insert a small screw driver into the slot in the right center of the cover and push to the left to release the latch.

1. Press in on the cover in the area shown **1**.
2. Remove the grounding strap from the cover.
3. Open the cover far enough to get access to the hinge pins **5**.
4. Lift the hinge pins out of the hinges and remove the cover from the tape control unit.
5. Return to the procedure that sent you here.



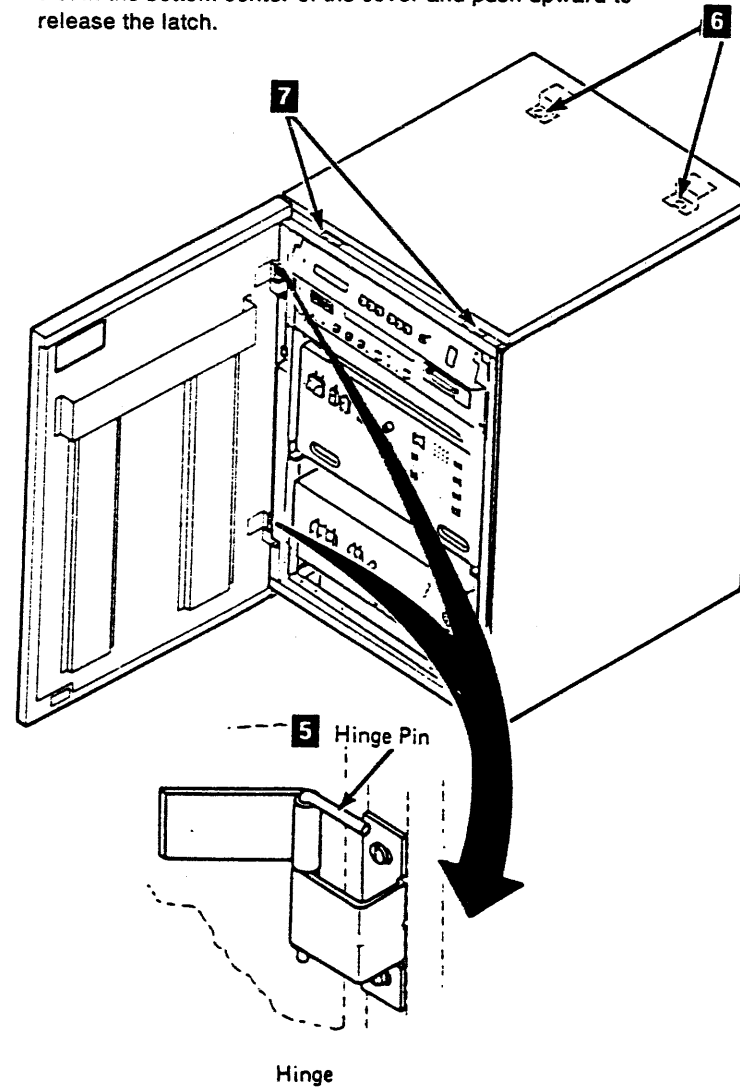
### Tape Control Unit Top Cover Removal

1. Open the rear cover.
2. Release the two rear latch screws **6** (these are captive screws).
3. Pivot the top cover on its front locating tabs and brackets **7** by lifting the cover from the rear of the tape control unit.
4. Lift the front locating tabs from the brackets and remove the top cover from the tape control unit.
5. Return to the procedure that sent you here.

### Tape Control Unit Side Cover Removal

The tape control unit side covers are held at the top by two tabs **2** which slide into slots in the tape control unit frame. The bottom is held in place by a latch assembly.

1. To open the side cover, insert a small screw driver into the slot in the bottom center of the cover and push upward to release the latch.

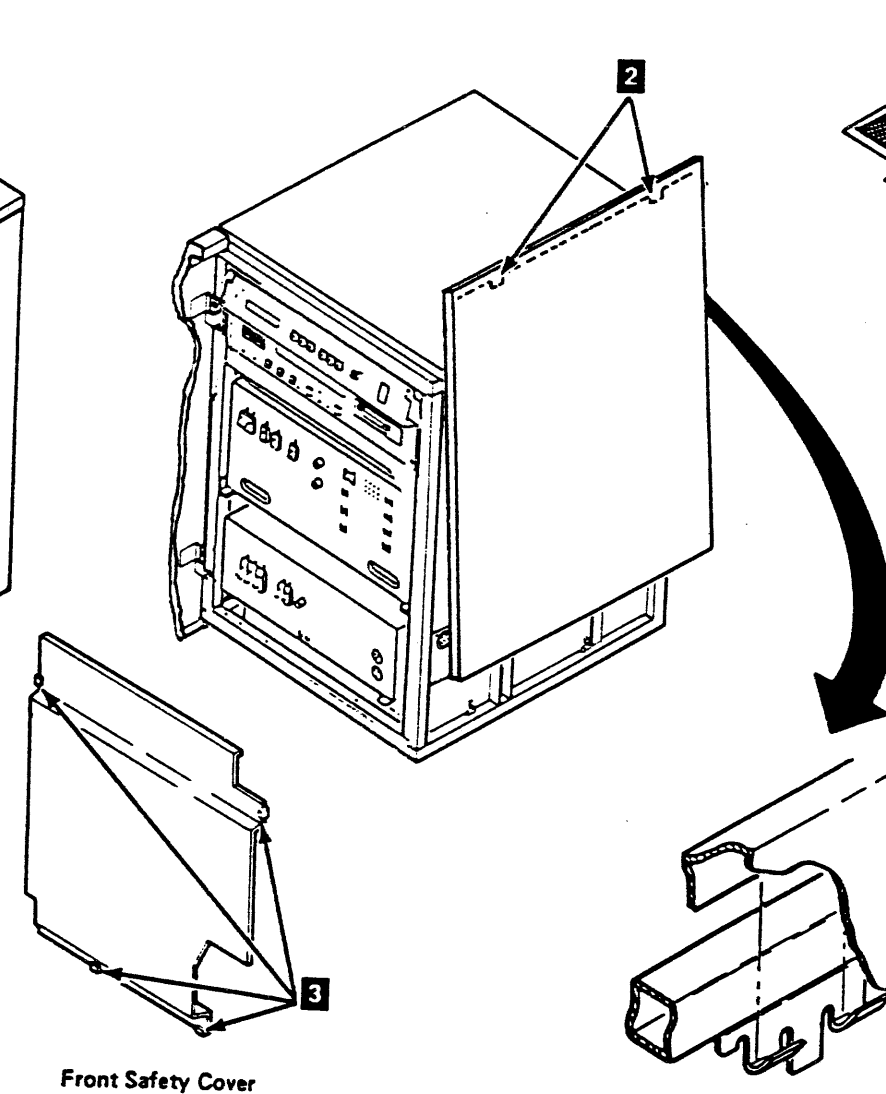


2. Pull the bottom of the cover away from the tape transport unit, then lift the cover straight up and out of the brackets attached to the tape transport unit frame.
3. Return to the procedure that sent you here.

### Tape Control Unit Front Safety Cover Removal

The front safety cover is held in the tape control unit frame with four sliding brackets **3**. It is not necessary to loosen all of them to remove the cover.

1. Loosen the left and right side brackets and slide them toward the inside of the safety cover.
2. Remove the grounding strap from the cover.
3. Lift the safety cover up and out of the tape control unit.
4. Return to the procedure that sent you here.



## Tape Control Unit CARR-TCU 2-1

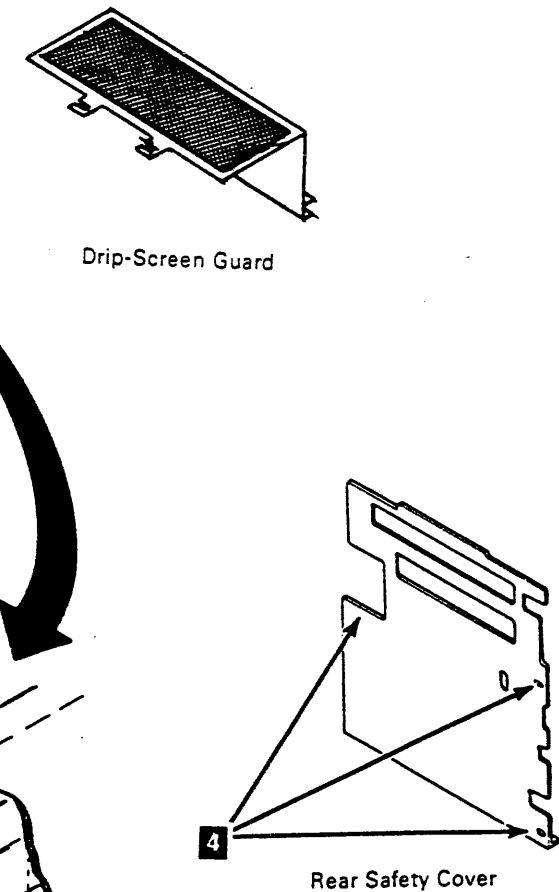
### Tape Control Unit Rear Safety Cover Removal

The rear safety cover is held in the tape control unit frame with three sliding brackets **4**. It is not necessary to loosen all of them to remove the cover.

1. Remove the grounding strap from the cover.
2. Loosen the left bracket bolt, slide the bracket in, and at the same time pull the left side of the safety cover out and away from the tape control unit.
3. Return to the procedure that sent you here.

### Drip-Screen Guard Removal

1. Loosen the two screws that attach the guard to the I/O tailgate. Slide the guard to the left and lift off the rear frame member.
2. Return to the procedure that sent you here.



## Tape Control Unit Cover and Safety Cover Installation

This page contains the steps needed to reinstall any of the tape control unit covers.

### Tape Control Unit Front or Rear Cover Replacement

1. Move the cover into position near the hinges. Align the hinges of the door and the tape control unit **1** and insert the pins one at a time.
2. Reconnect the grounding strap to the cover.
3. Close the cover until it is held by the latch.
4. Return to the procedure that sent you here.

### Tape Control Unit Front Cover Adjustment

**Note:** The tape control unit front cover must be adjusted so that it does not open to the casual or incidental touch. The cover should only open by the use of an intentional force in the proper area.

When the tape control unit front cover is adjusted correctly, the IML diskette drive should be parallel to the front cover and extend through the front cover approximately 2 mm (5/64 inch) (check the parallel adjustment with your six-inch straight edge).

1. As a starting point, loosen the two latch assembly holding screws and position the front of the latch assembly **7** to extend approximately 2 mm (5/64 inch) beyond the front of the side-frame.
2. Partially close the front cover and ensure that the catch mechanism **8** aligns with the latch assembly.
3. Close the front cover to ensure that it will stay closed with the latch assembly in this position (2 mm beyond the front side-frame).
4. Continue the adjustment by changing the 2 mm adjustment (distance from the front side-frame to the latch assembly) until the IML diskette drive is parallel (approximately) to the front cover and extends through the front cover approximately 2 mm (5/64 inch) (check the parallel adjustment with your six-inch straight edge).
5. Tighten the two latch assembly holding screws.
6. Return to the procedure that sent you here.

### Drip-Screen Guard Replacement

1. Slide the guard over the rear frame member and to the right under the two screws on the I/O tailgate. Tighten the two screws.
2. Return to the procedure that sent you here.

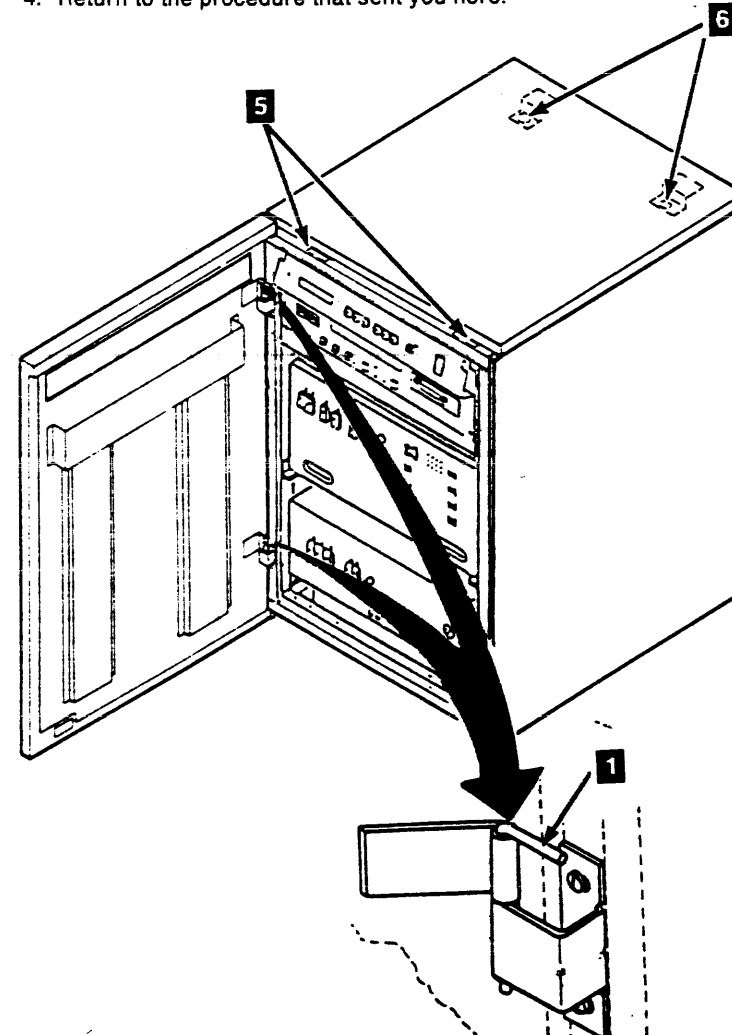
### Tape Control Unit Top Cover Replacement

1. Replace the top cover by inserting the front locating tabs into the brackets **5**.
2. Pivot the rear of the cover down and latch into position with the two captive screws **6**.
3. Return to the procedure that sent you here.

### Tape Control Unit Side Cover Replacement

The side covers are held by two tabs **2** at the top that fit into slots in the tape control unit frame, and by a latch assembly at the bottom.

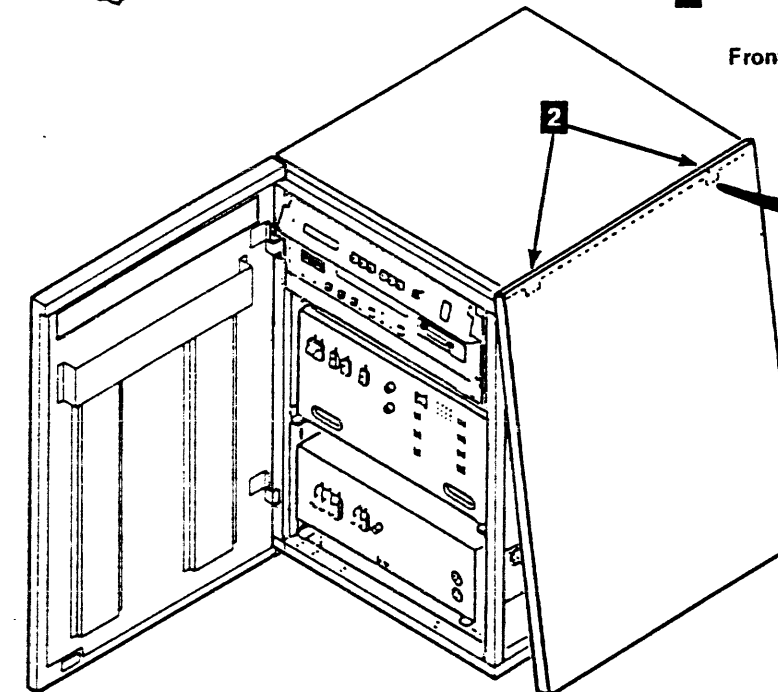
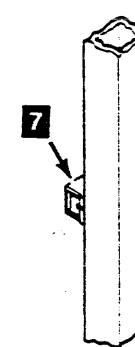
1. Lower the cover onto the tape control unit frame so the two tabs on the cover move into the slots in the tape control unit frame.
2. Reconnect the grounding strap to the cover, if present.
3. Continue to lower the cover, and at the same time move the cover bottom toward the tape control unit until it is held by the latch.
4. Return to the procedure that sent you here.



### Tape Control Unit Front Safety Cover Replacement

It will be easier to install the safety cover if the bottom brackets are extended.

1. Check to see if the bottom brackets **3** are extended as far as possible. If not, loosen the bolts and move the brackets out as far as you can, then tighten the bolts.
2. Lift the cover into the tape control unit, setting the two bottom brackets into the holes in the tape control unit frame.
3. Continue to push the cover into the tape control unit until the left and right brackets are aligned with the holes in the tape control unit.
4. Reconnect the grounding strap to the cover.
5. Loosen the bracket bolts, slide the brackets into the tape control unit frame, and tighten the bracket bolts.
6. Return to the procedure that sent you here.

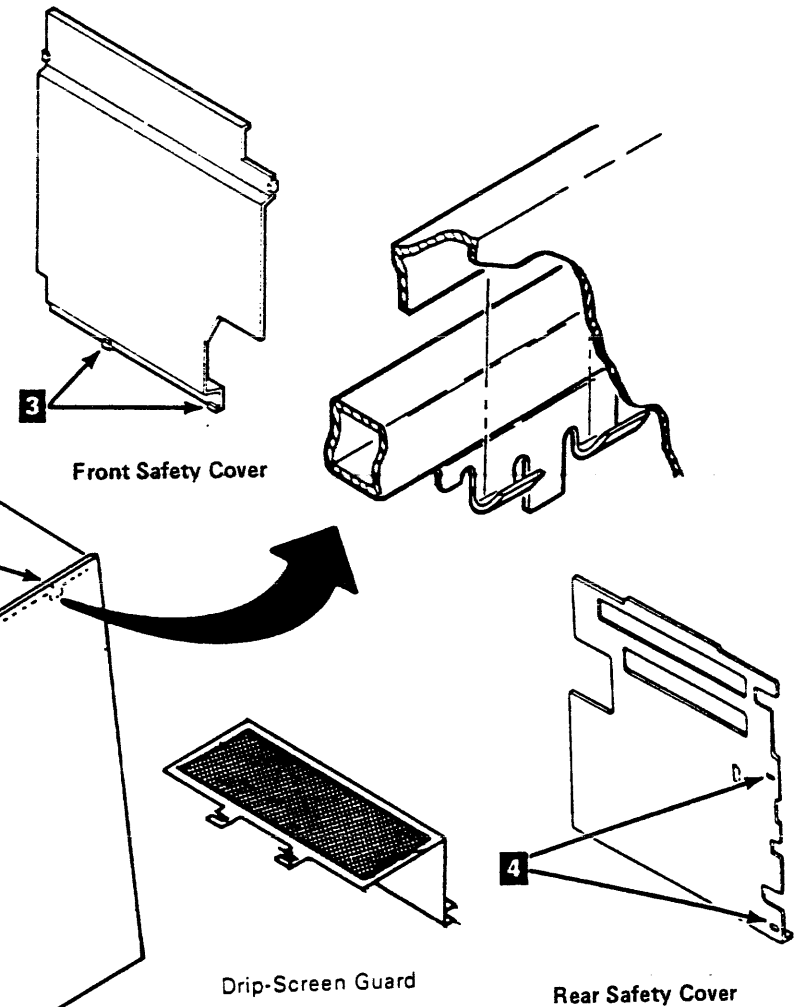


## Tape Control Unit CARR-TCU 2-2

### Tape Control Unit Rear Safety Cover Replacement

It will be easier to install the safety cover if the right side brackets **4** are extended.

1. Check to see if the two right side brackets are extended out as far as possible. If not, loosen the bracket bolts and slide the brackets out as far as you can, then tighten the bolts.
2. Lift the cover into the tape control unit, inserting the two right side brackets into the holes of the tape control unit frame.
3. Continue pushing the cover in until the left side bracket is aligned with the hole in the tape control unit frame.
4. Reconnect the grounding strap to the cover.
5. Loosen the bracket bolt, slide the bracket into the hole in the tape control unit frame, then tighten the bolt.
6. Return to the procedure that sent you here.





## Tape Control Unit Offline Verification Procedure

This page contains the steps needed to verify, and if necessary, to dismount and deallocate all tape control units.

### Getting Started

1. First, if you haven't already done so, try to take the tape control unit offline using the following procedure:
  - a. Set the tape control unit Online Test/Offline Test switch to Offline (see LOC 1).
  - b. Wait (up to a minute) for the tape control unit Offline light to come on (see LOC 1).

If the tape control unit Offline light comes on, return to the procedure that sent you here.

2. If the tape control unit Offline light fails to come on within a minute, proceed as follows:
  - Ensure that none of the adapters are stopped. (The middle LED on both adapters should be blinking.)

If the tape control unit Offline light comes on, return to the procedure that sent you here.

If an adapter has stopped, IML the TCU.

3. If the tape control unit Offline light fails to come on within a minute, and neither adapter has stopped, proceed as follows:

With the meter set on the 10 volt scale, meter the offline light (from - at 01A-A2B2D08 to + at 01A-A2A4D09).

Is the meter reading greater than 1 volt?

YES NO  
|  
| With the meter set on the 10 volt  
| scale, meter the TCU Offline Test  
| switch (from - at 01A-A2B2D08 to +  
| at 01A-A2A4D07).

Does the meter read 5 volts  
+/- .5 volt?

YES NO  
|  
| The TCU Offline Test switch is  
| shorted in the Online position.  
| Proceed to step 4 to put the  
| tape control unit  
| into a serviceable condition.

The TCU Offline switch and light  
are alright. Proceed to step 4.

This tape control unit is actually offline.  
The Offline light is open. Power off the  
tape control unit and replace FRU 141, Control  
Unit Operator Setup Panel (see CARR-TCU 1-1).  
Return to the procedure that sent you here  
and continue with the next step of that  
procedure.

4. Inform the customer that you will need the entire subsystem to complete the repair action.
5. When you have been given the subsystem, verify with the customer that all paths to the subsystem are offline to the host processors.
6. Ignore the status of the Offline light. There is no host activity to this subsystem.
7. If the Offline switch was indicated shorted in step 3 above, power off the tape control unit (see CARR-TCU 6) and replace FRU 141, Tape Control Unit Operator Setup Panel (see CARR-TCU 1-1).
8. Return to the procedure that sent you here and continue with the next step of that procedure.

## Tape Control Unit Power Off and Power On Procedures

This page contains the steps needed to remove and restore power to the tape control unit of the TA90 Tape Subsystem.

**To power Off:** first complete the "Power Off Procedure" on this page, then go to the desired section:

- AC Power Off
- DC Power Off.

**To power On:** go to the desired section:

- AC Power On
- DC Power On.

### Power Off Procedure

1. Verify that all paths to the failing tape control unit are deallocated from the operating systems.
2. Verify that all paths from any other tape control unit to drives on the failing tape control unit are deallocated from the operating systems.
3. Set the failing tape control unit Online Test/Offline Test switch to Offline Test (see LOC 1).
4. Wait (up to a minute) for the tape control unit Offline Test light to come on (see LOC 1). If the light comes on, continue with this procedure.

If the tape control unit Offline Test light fails to come on within a minute, go to CARR-TCU 5 and do the procedure for tape control unit offline verification, return here when finished.

### AC Power Off

**Note:** When the ac power is removed from the tape control unit, the ac power is also removed from all attached drives.

1. Verify that all paths from any other tape control unit to drives on the failing tape control unit are deallocated from the operating system.
2. If there is a cartridge in any drive, remove it using the following three steps:
  - a. Set the drive Ready/Not Ready switch to Not Ready (see LOC 1).
  - b. Press the drive Unload switch (see LOC 1).
  - c. Remove the cartridge from the drive. If the cartridge cannot be removed, go to "Cartridge Removal By Hand" on CART 10, return here after the cartridge has been removed.
3. Disable the ports to the HSC.
4. If the subsystem power is normally controlled by an emergency power off (EPO) cable, set the tape control unit Local/Remote switch (see LOC 1) to the Local position.
5. Set the tape control unit Power On/Off switch (see LOC 1) to the Off position.
6. Open the tape control unit front cover and remove the front safety cover and ground connector, if present (see CARR-TCU 2-1).
7. The next step will remove power from the convenience outlet.

### DANGER

**Electric shock. When setting the tape control unit AC Power circuit breaker Off, hazardous voltages are still present on the AC Power circuit breaker and on the AC Power line cord.**

8. Set CB1 on the tape control unit ac power supply to Off (see LOC 1). There are two CB1s in the tape control unit, so do not confuse CB1 on the ac supply with CB1 on the dc supply.
9. Return to the procedure that sent you here.

### AC Power On

1. Set CB1 on the tape control unit ac power supply (see LOC 1) to On.
2. Press the Local Power switch (see LOC 1).
3. Set the Power On/Off switch (see LOC 1) to the On position.
4. Press the unit emergency power reset switch (see LOC 1).
5. Press the tape control unit IML switch (see LOC 1) to IML and initiate a Power On Reset (POR).
6. If the subsystem power is normally controlled by an emergency power off (EPO) cable, set the Local/Remote switch (see LOC 1) to the remote position.
7. Replace the front safety cover and ground connector, if present (see CARR-TCU 2-2).
8. Close the tape control unit front cover (see CARR-TCU 2-2).
9. Continue by selecting one of the following:
  - If you were sent to this procedure by the CE panel, run GMP.
  - If you were sent to this procedure by the Maintenance Guide, return to the MAP or procedure that sent you here.

## Tape Control Unit CARR-TCU 6

### DC Power Off

1. Disable the ports to the HSC.
2. Open the tape control unit rear cover (see CARR-TCU 2-1).

**Note:** The service switch is a three position switch:  
Top = ON  
Middle = POR (Power On Reset)  
Down = OFF.
3. Set the tape control unit service switch to Off (see LOC 1).
4. Return to the procedure that sent you here.

### DC Power On

**Note:** The service switch is a three position switch:

UP = ON

MID = POR (Power On Reset)

DOWN = OFF.

1. Set the tape control unit service switch (see LOC 1) to the MID position for one second, then to the On position.
2. Close the tape control unit rear cover (see CARR-TCU 2-1).
3. Continue by selecting one of the following:
  - If you were sent to this procedure by the CE panel, run GMP.
  - If you were sent to this procedure by the Maintenance Guide return to the MAP or procedure that sent you here.



## FRU015 Tape Control Unit Cables Removal and Replacement Procedure

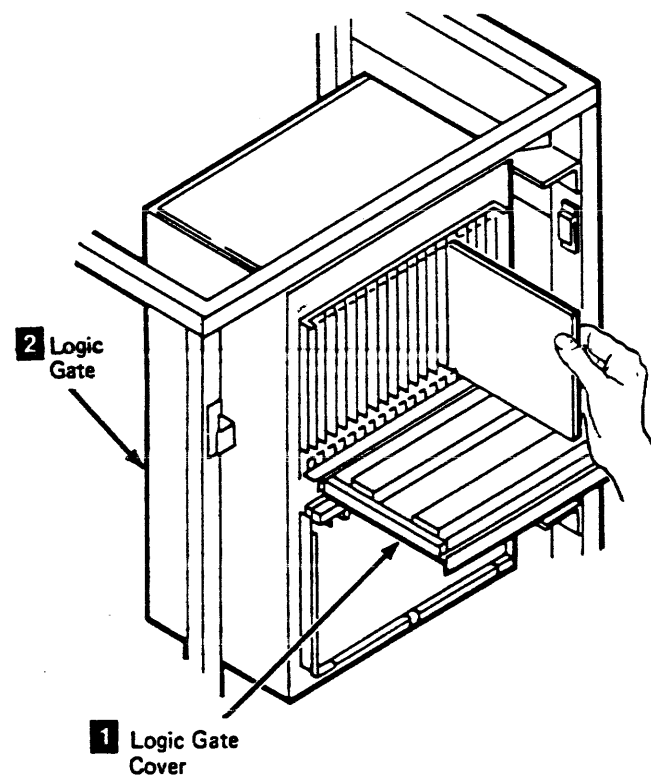
This page is meant only to provide general instructions for removing and replacing tape control unit cables. Any of the cables that are in the tables starting on CARR-TCU 157 can be removed and replaced using these procedures.

**Warning:** Some parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

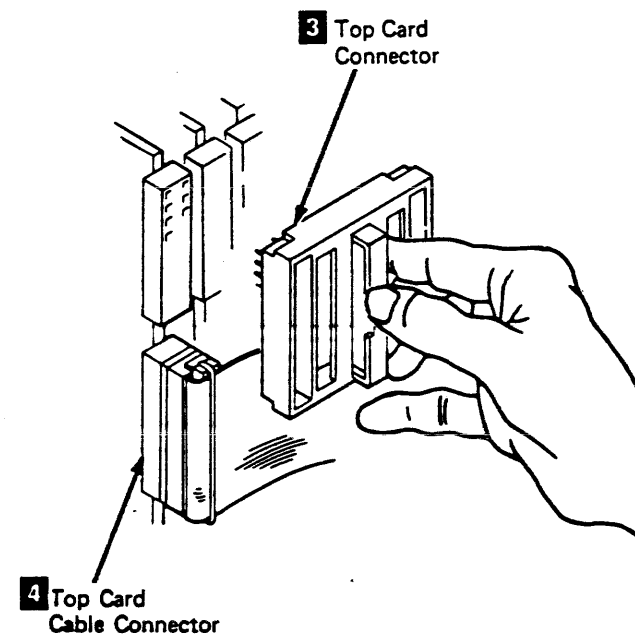
Since this procedure requires the ac power to be removed from the tape control unit, it is necessary to have all the drives attached to the tape control unit available.

### Removing Tape Control Unit Cables

1. Go to CARR-TCU 6 for the procedure to remove *ac power* from the tape control unit.
2. Open the tape control unit rear cover.

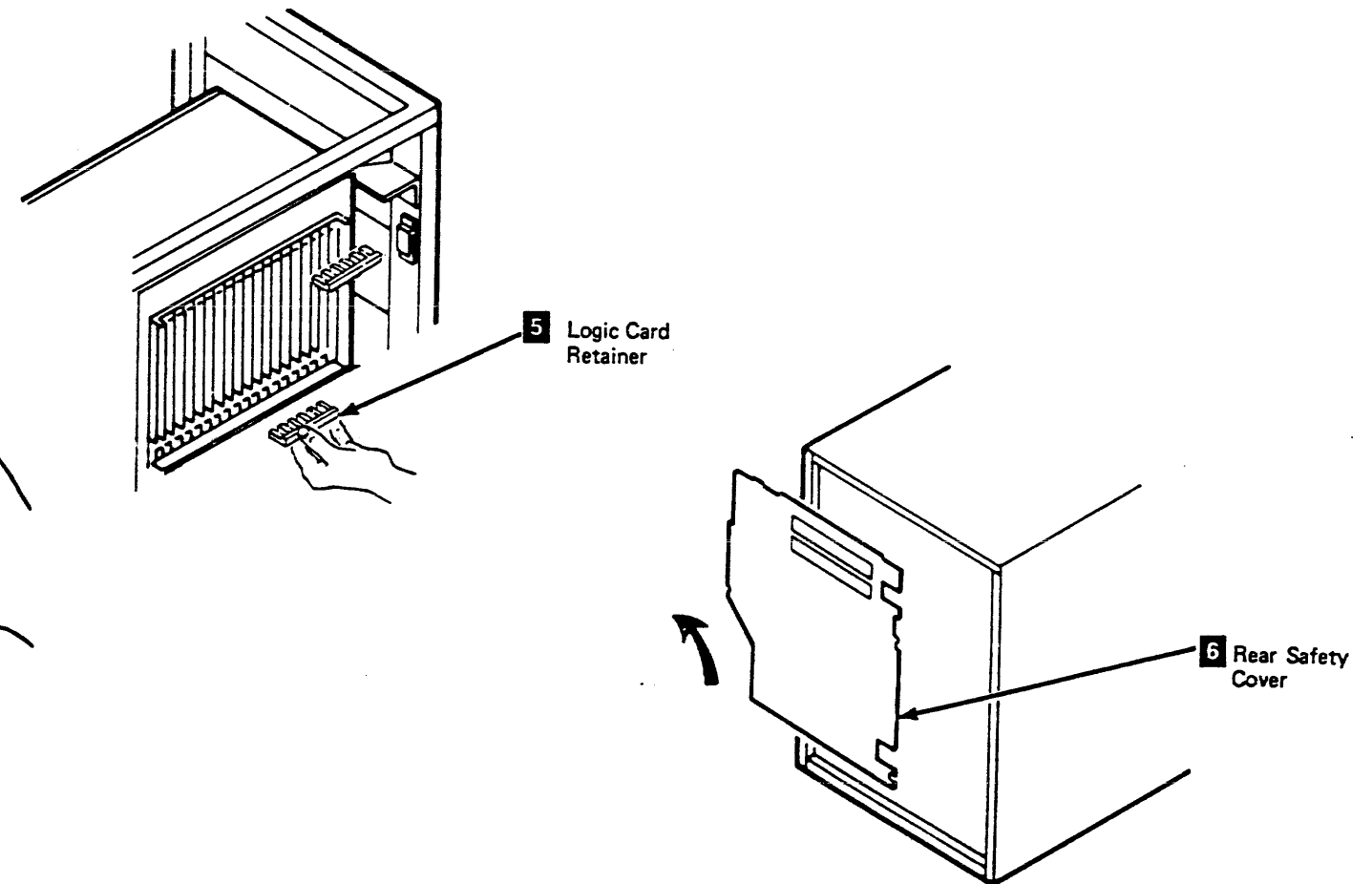


3. Remove the tape control unit rear safety cover **6** (see CARR-TCU 2-1).
4. Open the logic gate **2**.
5. Find the cable "from" and "to" locations using the table beginning on CARR-TCU 157.
6. To remove the cables from the tape control unit, it is necessary to remove some, or all of the following:
  - Logic gate covers **1**
  - Logic card retainers **5**
  - Top card connectors (TCC) **3**
  - Top card cable connectors **4**
  - Logic cards
  - Drip screen guard **7**.
7. Disconnect both ends of the cable to be removed.
8. Remove any cable retention hardware as needed to remove the cable.
9. Remove the cable from the tape control unit.



### Replacing Tape Control Unit Cables

1. Find the cable "from" and "to" locations in the tables starting on CARR-TCU 157.
2. Place the cable in the tape control unit following the same path as the removed cable.  
Install the cable retention (if any) as you install the cable.  
Connect both ends of the cable.



## Tape Control Unit CARR-TCU 150

3. Install any of the following items that have been removed:
  - Logic gate covers **1**
  - Logic card retainers **5**
  - Top card connectors (TCC) **3**
  - Top card cable connectors **4**
  - Logic cards
  - Drip screen guard **7**.
4. Close the logic gate **2**.
5. Install the rear safety cover **6** (see CARR-TCU 2-2).
6. Go to CARR-TCU 6 for the procedure to restore *ac power* to the tape control unit.

## Tape Control Unit Cable Location Listing

This table shows the FROM and TO locations for each cable listed.

| FRU     | FRU NAME                                     | FROM                     | LOC PAGE       | TO   | LOC PAGE |
|---------|--|--------------------------|----------------|--|----------|
| FRU015  | A1V5 to A2V3 Cable                           | 01A-A1V5                 | 15             | 01A-A2V3   | 15       |
| FRU022  | Read Bus Cable - Local                       | 01A-A2U2                 | 15             | CU-P1-A1   | 25       |
| FRU024  | Read Bus Cable - Remote                      | 01A-A2U4                 | 15             | CU-P2-A2   | 25       |
| FRU025* | Read Bus Cable - Remote                      | CU-P2-A1                 | 25             | CU-P1-B1   | 25       |
| FRU026* | Write Adapter Cable - TCU to Remote Drives   | CU-P2-A5                 | 25             | 01A-A1Y6<br>01A-A2Z2                               | 15       |
| FRU027  | Data Bus Cable - Remote                      | CU-P2-A3                 | 25             | 01A-A1Y4<br>01A-A1Y5                               | 15       |
| FRU028  | Write Adapter Cable - TCU Local/Remote       | CU-P1-A/B2               | 25             | 01A-A1Y5<br>01A-P2A3                               | 15       |
| FRU029  | Data Bus Cable - Local                       | CU-P1-A2                 | 25             | 01A-A1Y5   | 15       |
| FRU048  | Power Bus Cable                              | 01A-A1Y2                 | 15             | CU-GTE-TB1   | 25       |
| FRU053  | Write Adapter A/B Cable                      | TU-D1-A1A3<br>TU-D1-A1A5 | 15             | TU-D1-P2-A/B2                                      | 25       |
| FRU056* | Status Store Communication Cable - Dual TCU  | 01A-A1Y3<br>01A-A1Y2     | 25             | CU-P2-A4   | 25       |
| FRU091  | Power Bus Cable                              | 01A-A1Y5                 | 15             | CU-GTE-TB1   | 25       |
| FRU097  | Power Bus Cable                              | 01A-A1Z5                 | 15             | CU-GTE-TB1   | 25       |
| FRU103  | Power Bus Cable                              | 01A-A1Z2                 | 15             | CU-GTE-TB1   | 25       |
| FRU155  | Thermal Switch Cable                         | Gate Thermal             | 25             | CU-CSU-J3  | 50       |
| FRU156  | Power Bus Cable                              | 01A-A2Y5                 | 15             | CU-GTE-TB2   | 25       |
| FRU164  | GTE DC Distribution Cable Assembly           |                          |                |  |          |
| FRU165  | Gate Fan Cable                               | Gate Connector           |                | Gate Fan   | 30       |
| FRU166  | AC Power Supply to DC Power Supply Cable     | CU-PS-01-J3              | 55<br>or<br>60 | CU-PS-02-J2  | 35       |
| FRU167  | Power Bus Cable                              | 01A-A2Y2                 | 20             | CU-GTE-TB2   | 25       |
| FRU168  | Tape Control Unit Switch Panel to Gate Cable | 01A-A2A4                 | 20             | CU-OSU-J2<br>CU-OSU-J1                             | 50       |
| FRU169  | A1Y1 to MD Connector Cable                   | 01A-A1Y1                 | 20             | MD Connector                                       | 50       |
| FRU173  | Channel A, B Address Cable                   | 01A-A2A2                 | 20             | CU-OSU-J8<br>CU-OSU-J9<br>CU-OSU-J10<br>CU-OSU-J11 | 50       |
| FRU175  | Read Bus Cable - Single TCU                  | 01A-A2U2                 | 15             | CU-P1-A1   | 25       |

\* This FRU is a part of the communicator feature.

## Tape Control Unit Cable Location Listing CARR-TCU 157

| FRU    | FRU NAME                                     | FROM                         | LOC PAGE       | TO   | LOC PAGE |
|--------|--|------------------------------|----------------|--|----------|
| FRU176 | Tape Control Unit Switch Panel Voltage Cable | CU-PS-01-J4<br>(J4A and J4B) | 55<br>or<br>60 | CU-OSU-J4,<br>Local/Remote<br>Switch<br>Connectors<br>J1 and J2,<br>TCU OP Panel J5,<br>and TCU<br>UEPO Switch | 50       |
| FRU177 | AC Power to Gate Cable                       | CU-PS-02-J3<br>(J4A and J4B) | 35             | Gate Connector   |          |
| FRU178 | A1S2W to A2V2 Cable                          | 01A-A1S2W                    | 20             | 01A-A2V2   | 15       |
| FRU179 | Power Bus Cable                              | 01A-A2Z5                     | 15             | CU-GTE-TB2   | 25       |
| FRU194 | IML Diskette Drive Cable                     | 01A-A1A3                     | 20             | IML Diskette Drive   | 25       |
| FRU217 | A2Z2 to Gate TB2 Cable                       | 01A-A2Z2                     | 15             | 01A-GTE-TB2  | 25       |

## Tape Control Unit Cable Location Listing (Continued)

This table shows the FROM and TO locations for each cable listed.

| FRU    | FRU NAME                        | FROM   | LOC PAGE    | TO   | LOC PAGE    |
|--------|---------------------------------|--|-------------|--|-------------|
| FRU249 | A1Z1 to A2Y1 Cable              | 01A-A1Z1                                     | 15          | 01A-A2Y1                                     | 15          |
| FRU250 | A1Z2 to A2Y2 Cable              | 01A-A1Z2                                     | 15          | 01A-A2Y2                                     | 15          |
| FRU251 | A1Z3 to A2Y3 Cable              | 01A-A1Z3                                     | 15          | 01A-A2Y3                                     | 15          |
| FRU252 | A1Z4 to A2Y4 Cable              | 01A-A1Z4                                     | 15          | 01A-A2Y4                                     | 15          |
| FRU253 | A1Z5 to A2Y5 Cable              | 01A-A1Z5                                     | 15          | 01A-A2Y5                                     | 15          |
| FRU254 | A1Z6 to A2Y6 Cable              | 01A-A1Z6                                     | 15          | 01A-A2Y6                                     | 15          |
| FRU255 | A1A5 to A2A5 Cable              | 01A-A1A5                                     | 15          | 01A-A2A5                                     | 15          |
| FRU256 | A1V3 to A2V5 Cable              | 01A-A1V3                                     | 15          | 01A-A2V5                                     | 15          |
| FRU260 | TCU to TCU Read Cable - Remote  | CU0-P2A2<br>CU1-P2A2                         | 25 or<br>30 | CU1-P2A1<br>CU0-P2A1                         | 25 or<br>30 |
| FRU261 | TCU to TCU Write Cable - Remote | CU0-P2A3<br>CU0-P2A4<br>CU0-P2A5             | 25 or<br>30 | CU1-P2A5<br>CU1-P2A4<br>CU1-P2A3             | 25 or<br>30 |
| FRU271 | Bus Tag Interposer Cable        | CU-T1A1P<br>CU-T1B1P<br>CU-T1C1P<br>CU-T1D1P | 45          | CU-T1A3P<br>CU-T1B3P<br>CU-T1C3P<br>CU-T1D3P | 45          |

## FRU084 Local/Remote Power Panel Removal and Replacement Procedure

This page contains the steps needed to remove and replace the Local/Remote power panel in the tape control unit.

Since this procedure requires the ac voltage to be switched off, it is necessary to have all tape drives attached to the tape control unit available for service.

### Local/Remote Power Panel Removal Procedure

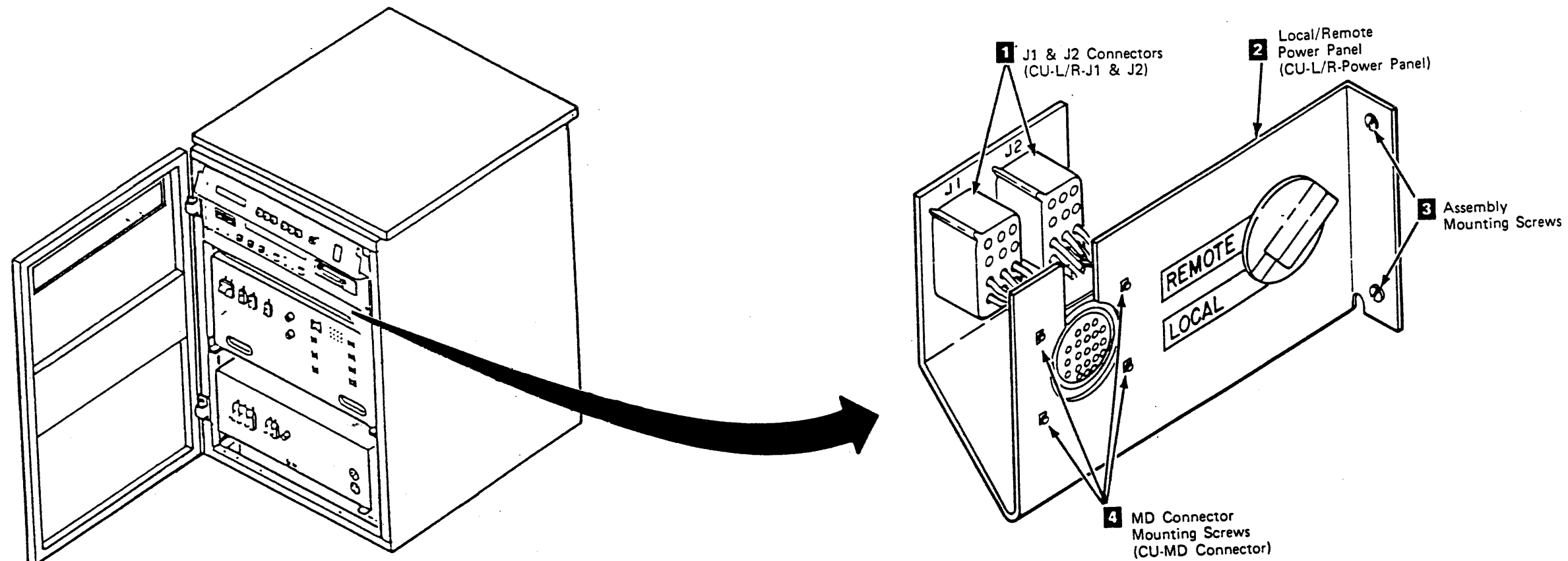
1. Go to CARR-TCU 6 for the procedure to remove the ac power from the tape control unit.
2. Remove the tape control unit front safety cover (see CARR-TCU 2-1).
3. Remove the four mounting screws **4** holding the maintenance device (MD) connector to the Local/Remote power panel **2**. Then remove the connector from the Local/Remote power panel.

4. While holding the Local/Remote power panel, remove the two mounting screws **3** securing the panel to the tape control unit frame.
5. Lower the Local/Remote power panel **2** and remove cable plugs P1 and P2 from the J1 and J2 connectors **1**.
6. Remove the Local/Remote power panel **2** from the tape control unit.
7. Save the mounting screws for the replacement procedure.

## Tape Control Unit CARR-TCU 840

### Local/Remote Power Panel Replacement

1. Install cable plugs P1 and P2 into the J1 and J2 connectors **1** on the Local/Remote power panel **2**.
2. Hold the Local/Remote power panel in position and install the two mounting screws **3** securing the Local/Remote power panel **2** to the tape control unit frame.
3. Install the maintenance device (MD) connector on the Local/Remote power panel **2** with the four mounting screws **4**.
4. Install the tape control unit front safety cover (see CARR-TCU 2-2).
5. Go to CARR-TCU 6 for the procedure to restore ac power to the tape control unit.



## FRU086 IML Diskette Drive Removal and Replacement Procedure

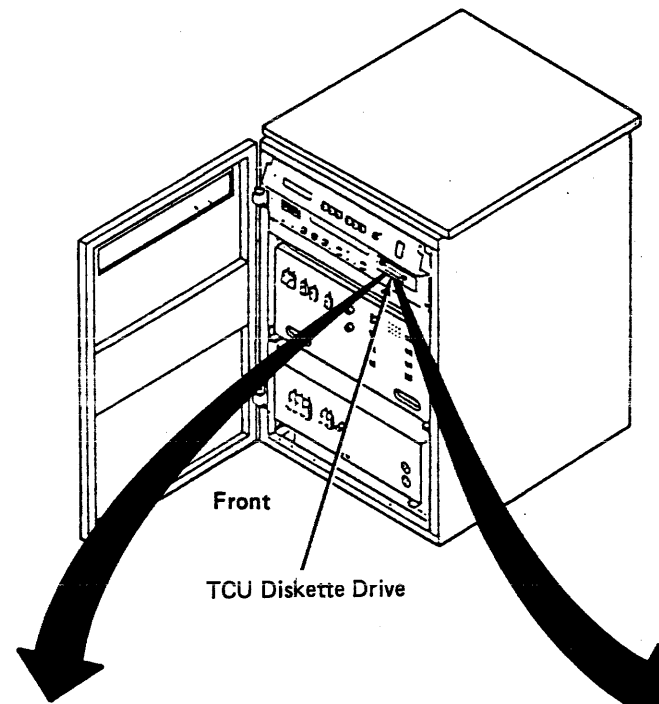
This page contains the steps needed to remove and replace the IML diskette drive in the tape control unit.

**Note:** This FRU can be removed and replaced without affecting the attached tape transport units by removing dc power from the tape control unit with the service switch.

### Removing the IML Diskette Drive

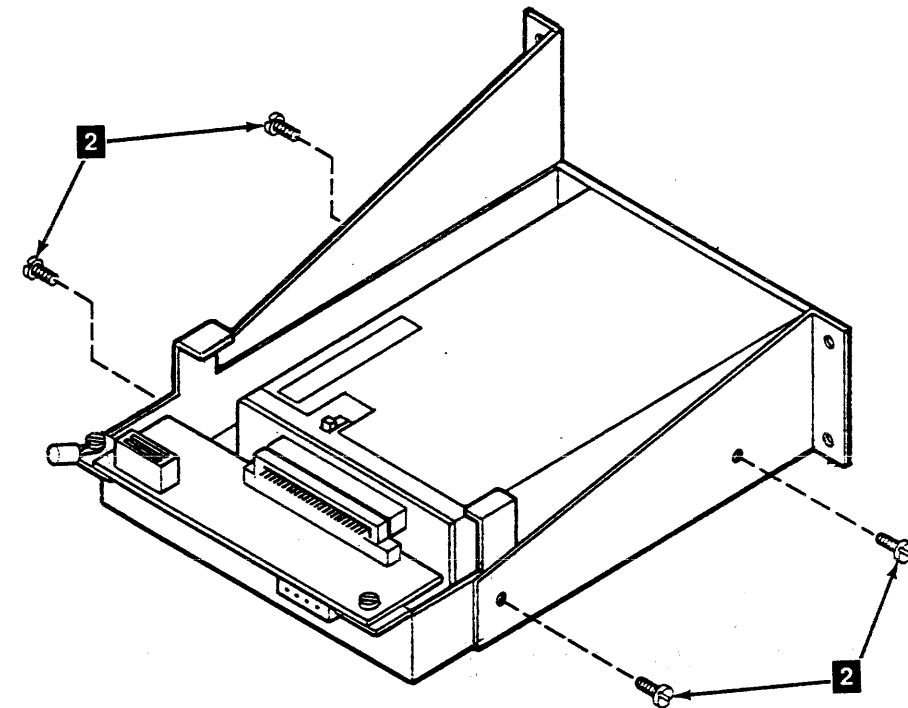
1. Go to CARR-TCU 6 for the procedure to remove *dc power* from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover (see CARR-TCU 2-1).
3. Remove the tape control unit top cover (see CARR-TCU 2-1).

4. Remove cable plugs P1 and P2 **4** from the J1 and J2 connectors (TCU-Diskette Drive J1 and J2) on the rear of the diskette drive **1**.
5. Remove the ground wire **3** attached to the rear of the diskette drive.
6. Remove the four screws that hold the IML diskette drive on the mounting brackets **2**.
7. Remove the diskette drive from the front of the tape control unit switch panel.
8. Save the screws for the replacement procedure.



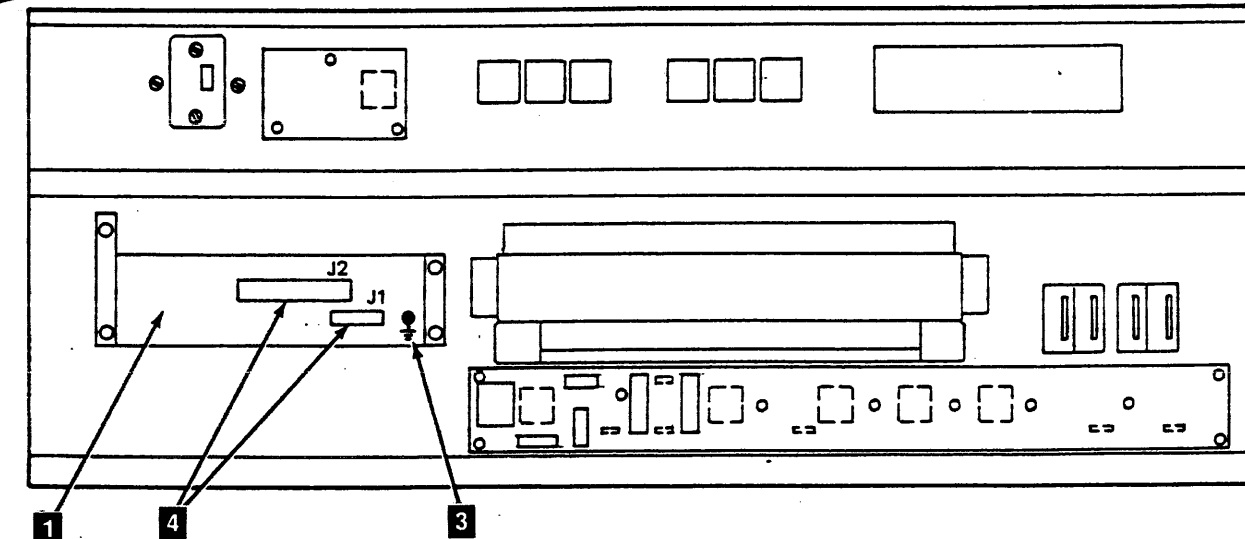
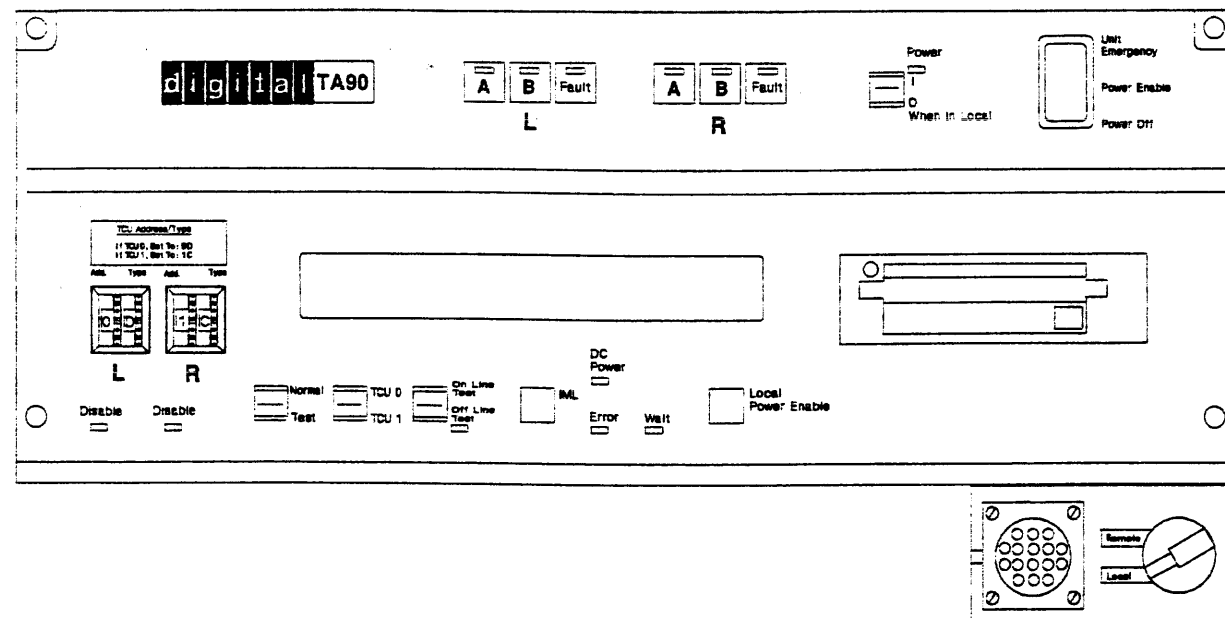
### Replacing the IML Diskette Drive

1. Place the diskette drive in the opening in the tape control unit switch panel from the front of the tape control unit.
2. Install the four screws **2** that hold the diskette drive to the mounting brackets.
3. Replace cable plugs P1 and P2 **4** in the J1 and J2 connectors (TCU-Diskette Drive J1 and J2) on the rear of the diskette drive **1**.



## Tape Control Unit CARR-TCU 860

4. Replace the ground wire **3** attached to the rear of the diskette drive.
5. Replace the tape control unit top cover (see CARR-TCU 2-2).
6. Replace the tape control unit rear safety cover (see CARR-TCU 2-2) and close the rear cover.
7. Go to CARR-TCU 6 for the procedure to restore *dc power* to the tape control unit.





## FRU111 Tape Control Unit Logic Card Removal and Replacement Procedure

The page contains the steps needed to remove and replace any of the logic cards in the tape control unit. It is not necessary to power off the tape control unit; however, the dc voltage must be removed from the tape control unit.

See LOC 1 for the card locations.

**Warning:** Some parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

**Warning:** FRU 126 Power/POR card (01A-A2H4) or FRU 138 Voltage Regulator card (01A-A1T2) cannot be removed by this procedure without circuit damage. Go to CARR-TCU 1260 for removal of Power/POR card or Voltage Regulator card.

### Removing the Logic Cards

1. Go to CARR-TCU 6 for the procedure to remove *dc power* from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover (see CARR-TCU 2-1).
3. Open the logic board cover **1**.
4. Remove the top card connectors (TCC) **2** as needed to remove the logic card.
5. Remove the top card cables **3** as needed to remove the logic card.
6. Remove the logic card retainers **4** to remove the logic card.
  - a. Remove the two mounting screws **5** holding each retainer.
  - b. Pull the retainer out of the logic gate.
7. Remove the logic card by pulling it straight out from the logic board.
8. Remove the logic card from the card holder.

### Replacing the Logic Cards

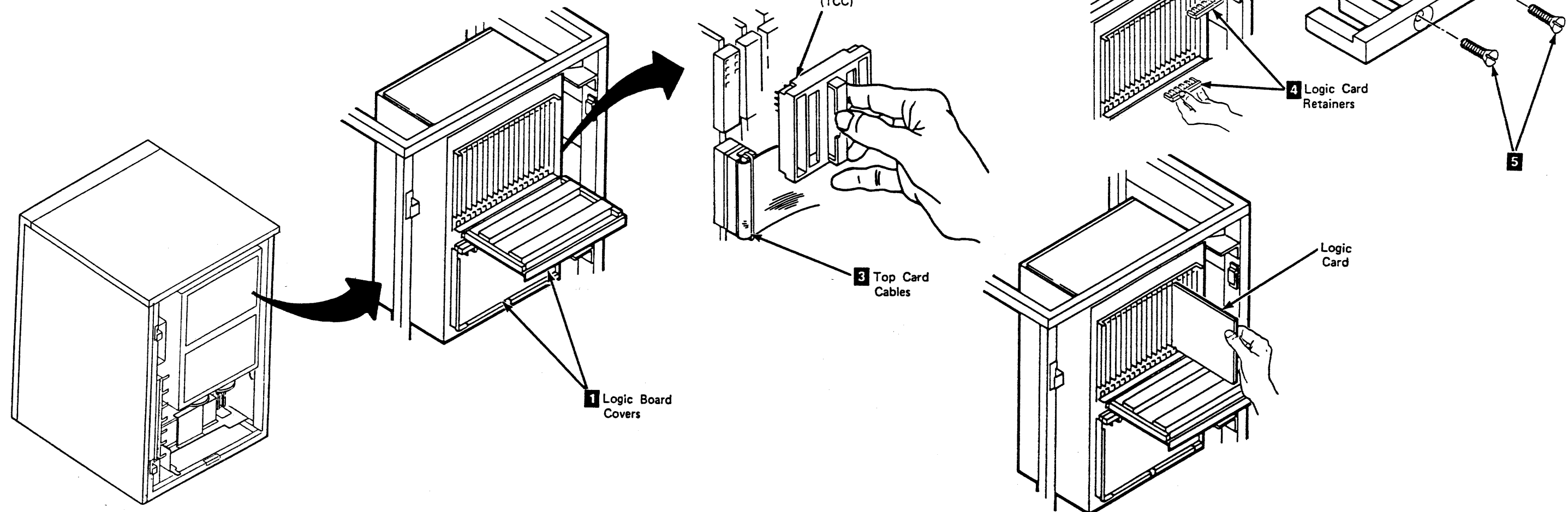
**Warning:** Before installing the tape control unit logic cards, check the logic board for any damaged or bent pins.

**Note:** If you are replacing logic card 01A-A1S2, check the setting of DLR switch position four (see CARR-TCU 1189).

1. Install the logic card in the card holder.
2. Install the logic card on the board being careful not to damage pins or connections. See LOC 1 for card locations.

## Tape Control Unit CARR-TCU 1110

3. Install the top and bottom logic card retainers **4**.
  - a. Slide the card retainers into the logic gate.
  - b. Install the two mounting screws **5** into each retainer.
4. Install the top card connections (TCC) **2**. See LOC 1 for TCC locations.
5. Install the top card cables **3**. See LOC 1 for top card cable locations.
6. Close the logic board cover **1**.
7. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2).
8. Go to CARR-TCU 6 for the procedure to restore *dc power* to the tape control unit.



## FRU118 Drive-Adapter Card (01A-A1Q2) Removal and Replacement Procedure

This page contains the steps needed to remove and replace the drive-adapter card in the tape control unit. It is not necessary to power off the tape control unit; however, the dc voltage must be removed from the tape control unit.

**Warning:** Some parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

### Removing the Drive-Adapter Card

- Go to CARR-TCU 6 for the procedure to remove dc power from the tape control unit.
- Open the tape control unit rear cover and remove the rear safety cover (see CARR-TCU 2-1).
- Open the A1 logic board cover **1**.
- Remove the card retainers **2**.
  - There are two mounting screws in each card retainer.
  - Pull the retainer out of the logic gate.
- Remove the top card connectors on 01A-A1P5 and 01A-A1Q5 (see LOC 1).
- Remove the drive-adapter card by pulling it straight out from the logic board. The drive-adapter card is in location 01A-A1Q2.
- Remove the drive-adapter card from the card holder.
- Place the drive-adapter card so that the switches **3** are positioned as shown. Write down the switch settings for later reference.
- Save the card holder for the replacement procedure.

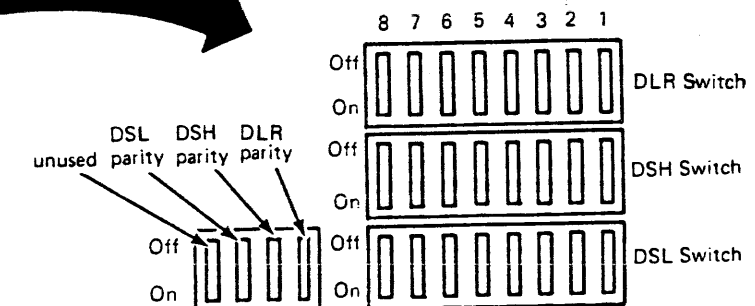
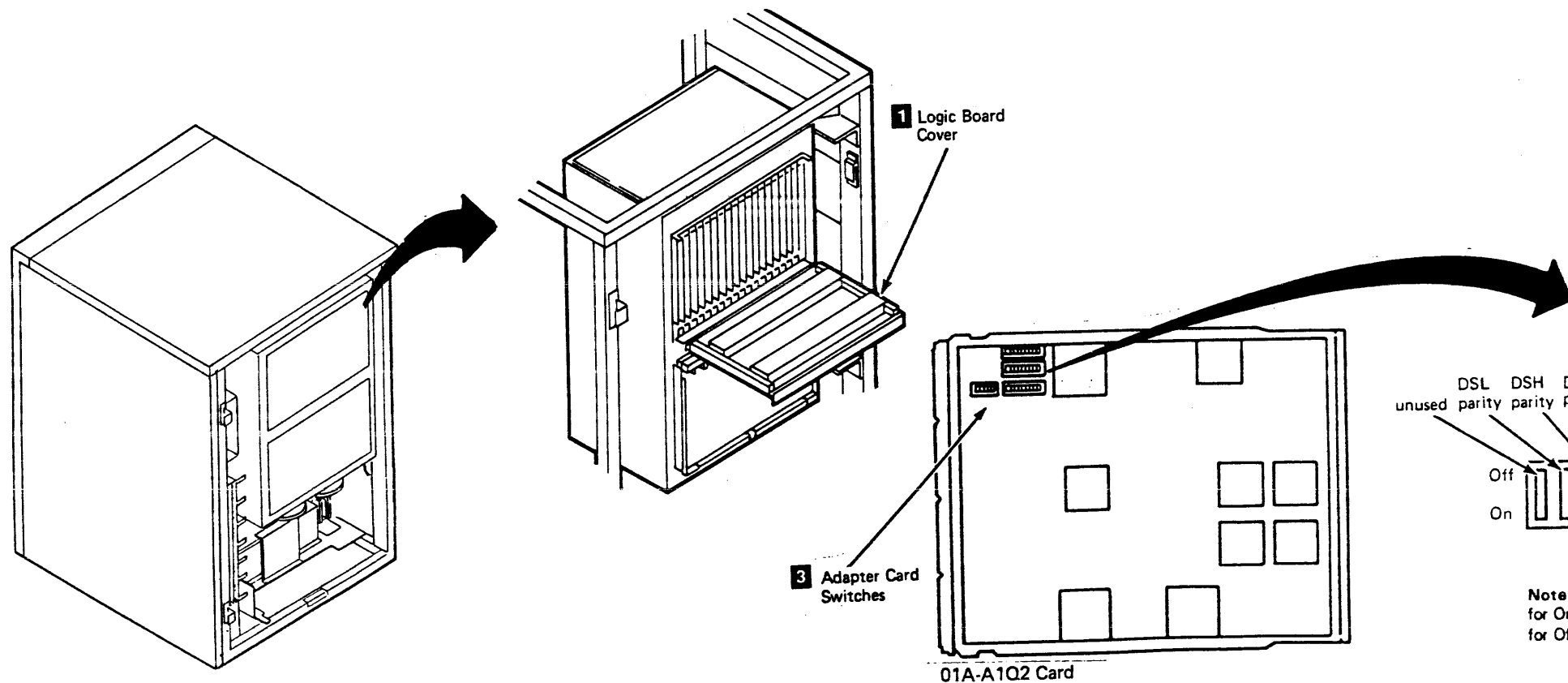
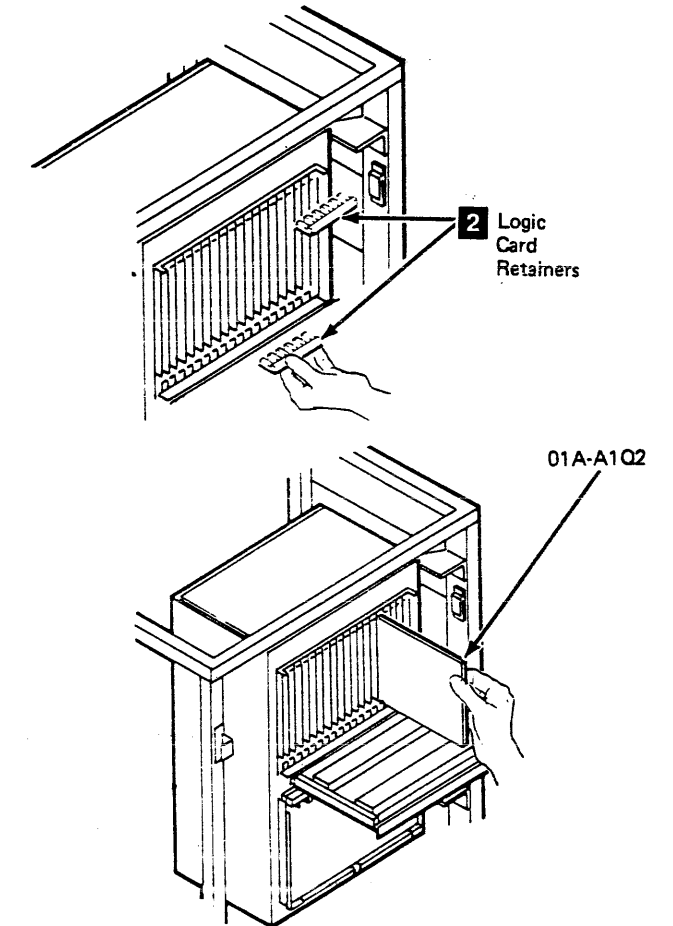
### Replacing the Drive-Adapter Card

**Warning:** Before installing the drive-adapter card, check the logic board for any bent or damaged pins.

- Verify that the drive-adapter card switches **3** are set correctly. Use the information saved from the removal (CARR-TCU 1180) and the information on CARR-TCU 1188 and CARR-TCU 1189 to verify the switch settings.
- Install the drive-adapter card in the card holder.
- Install the drive-adapter card in location 01A-A1Q2.
- Install the top card connectors on 01A-A1P5 and 01A-A1Q5 (see LOC 1).
- Install the top and bottom logic card retainers.
  - Slide the retainers **2** into the logic gate.
  - Install the two retaining screws into each retainer.

## Tape Control Unit CARR-TCU 1180

- Close the logic board cover **1**.
- Install the rear safety cover and close the rear cover (see CARR-TCU 2-2).
- Go to CARR-TCU 6 for the procedure to restore dc power to the tape control unit.



**Note:** Press the rocker arm switch "On" side, down for On. Press the rocker arm switch "Off" side, down for Off. Ignore any dots on the switches.

When replacing the drive-adapter card, or at installation time it may be necessary to set the switches on the drive adapter card. These switches contain the tape control unit serial number, the model designation, the language feature setting, the EC level, and the parity bits.

3. Now that you have the binary equivalent of the tape control unit serial number, see CARR-TCU 1189 for instructions on how to set the Device Serial High (DSH), Device Serial Low (DSL), and Device Level Register (DLR) switches to match this number.

**Switch Setting Procedures**

1. Convert the decimal serial number of the tape control unit to hexadecimal as follows:

- a. Write down the decimal serial number.
- b. Locate the largest decimal value in Table 1 that will fit into the decimal number to be converted (the tape control unit serial number).
- c. Write the hex equivalent of this number in the 'Hexadecimal Equivalent' position labeled the same as the column in Table 1 (where you found the hex number).

*For Example:* If your largest decimal value in Table 1 was 1536; you would write a '6' (the hex equivalent) in the 'Hexadecimal Equivalent' position labeled '2' (from Hexadecimal Column labeled '2').

**Note:** Ensure that the hex equivalent digits from Table 1 are put into positions labeled the same as the columns they came from.

- d. Find the decimal remainder.
- e. Repeat this process to this and subsequent remainders to find any remaining hex digits.

*See the example:* The example shows that the decimal serial number of 10133 converts to the hexadecimal number of 2795.

**Note:** As four digits are required, add leading zero.

*For Example:* If your Hexadecimal Equivalent number is 4A5, add a leading zero to make the number 04A5.

2. Convert the hexadecimal serial number to its binary equivalent.

- a. Convert each number to its binary equivalent and enter this information in the box below each digit.

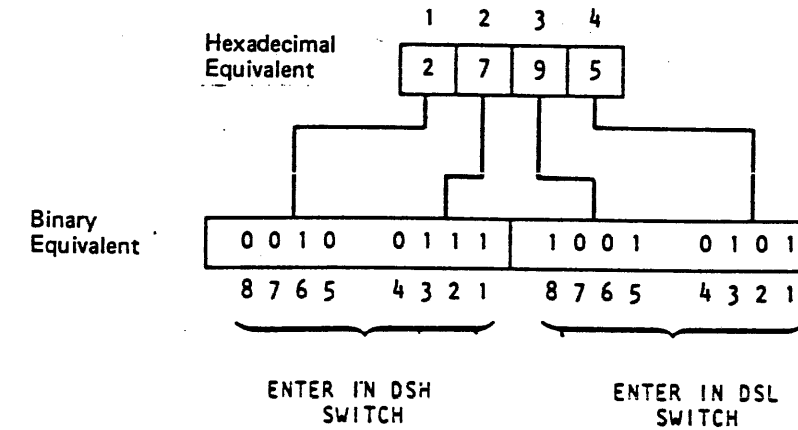
*See the example:* The example shows that the hexadecimal number of 2795 converts to the binary number of 0010 0111 1001 0101.

| HEXADECIMAL COLUMNS |           |           |           |
|---------------------|-----------|-----------|-----------|
| 1                   | 2         | 3         | 4         |
| Hex - Dec           | Hex - Dec | Hex - Dec | Hex - Dec |
| 0 0                 | 0 0       | 0 0       | 0 0       |
| 1 4,096             | 1 256     | 1 16      | 1 1       |
| 2 8,192             | 2 512     | 2 32      | 2 2       |
| 3 12,288            | 3 768     | 3 48      | 3 3       |
| 4 16,384            | 4 1,024   | 4 64      | 4 4       |
| 5 20,480            | 5 1,280   | 5 80      | 5 5       |
| 6 24,576            | 6 1,536   | 6 96      | 6 6       |
| 7 28,672            | 7 1,792   | 7 112     | 7 7       |
| 8 32,768            | 8 2,048   | 8 128     | 8 8       |
| 9 36,864            | 9 2,304   | 9 144     | 9 9       |
| A 40,960            | A 2,560   | A 160     | A 10      |
| B 45,056            | B 2,816   | B 176     | B 11      |
| C 49,152            | C 3,072   | C 192     | C 12      |
| D 53,248            | D 3,328   | D 208     | D 13      |
| E 57,344            | E 3,584   | E 224     | E 14      |
| F 61,440            | F 3,840   | F 240     | F 15      |

TABLE 1

Decimal Serial Number of Tape Control Unit

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 0 | 1 | 3 | 3 |
|---|---|---|---|---|



Example of Decimal to Binary

## FRU118 Drive-Adapter Card Replacement Procedure

**Warning:** Some parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

When replacing the drive-adapter card, or at installation time, it may be necessary to set the switches on the drive-adapter card. These switches contain the tape control unit serial number, the model designation, the language feature setting, the EC level, and the parity bits.

### Switch Setting Procedures

The following procedures are used to set all of the switches on the drive-adapter card.

- Convert the decimal serial number to hexadecimal serial number (see CARR-TCU 1188).
- Convert the hexadecimal number to binary serial number (see CARR-TCU 1188).
- Position the drive-adapter card (01A-A1Q2) with the switches in the upper left corner (see illustration).  
**Note:** The numbers and lettering on the card will now be upside down.
- Set the Device Serial High (DSH) and Device Serial Low (DSL) switches to match the binary serial number (see CARR-TCU 1188).
- Set switch Device Level Register (DLR), positions 1-3, for the desired language (see 'Message Language Setting' chart).
- Set DLR switch position 4 On.
- Set DLR switch position 5 On.
- See the DLR switch position assignments for setting switch position 6.
- See the DLR switch position assignments for setting switch position 7.
- Set DLR switch position 8 Off.

**Note:** When setting 'odd' parity, there should be an 'odd' number of switches set to the 'On' position for each group (DLR, DSH, and DSL). If not, set the parity switch to 'On' to create 'odd' parity.

- Use the DLR parity switch to produce odd parity of the DLR switches. Odd parity is an odd number of switches set On.
- Use the DSH parity switch to produce odd parity of the DSH switches. Odd parity is an odd number of switches set On.
- Use the DSL parity switch to produce odd parity of the DSL switches. Odd parity is an odd number of switches set On.

### Switch Position Assignments

Position assignments of the drive-adapter card switches are as follows:

#### 1. DLR

- Switch position 8 (Reserved). Set switch position 8 to 0 (Off).
- Switch position 7 (TA90 Designator). Set switch position 7 to 0 (Off).
- Switch position 6 (Model Designator). If this is a TCU with BDx drives attached, set switch position 6 to 1 (On).
- Switch position 5 (Reserved). Set switch position 5 to 1 (On).
- Switch position 4 (Reserved). Set switch position 4 to 1 (On).
- Switch position 1-3 (Message Language Setting). Set by using the message language setting table on this page.

#### 2. DSH

- Switch positions 5-8 - Digit 1 of the machine serial number (in binary form).
- Switch positions 1-4 - Digit 2 of the machine serial number (in binary form).

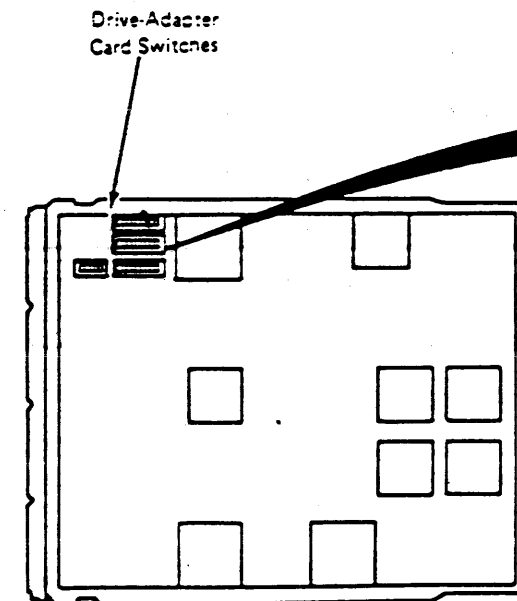
#### 3. DSL

- Switch positions 5-8 - Digit 3 of the machine serial number (in binary form).
- Switch positions 1-4 - Digit 4 of the machine serial number (in binary form).

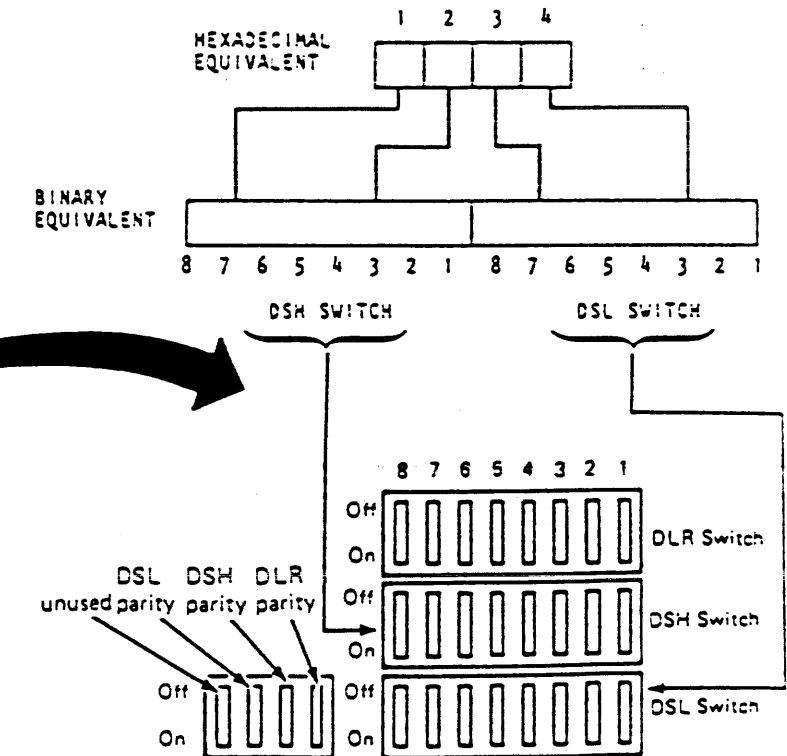
### Message Language Setting

| Language Desired | DLR Switch Positions |     |     | Binary Value |
|------------------|----------------------|-----|-----|--------------|
|                  | 3                    | 2   | 1   |              |
| English          | Off                  | Off | Off | 000          |
| French           | Off                  | Off | On  | 001          |
| German           | Off                  | On  | Off | 010          |
| Spanish          | Off                  | On  | On  | 011          |
| Italian          | On                   | Off | On  | 101          |

**Note:** Press the rocker arm switch "On" side, down for On. Press the rocker arm switch "Off" side, down for Off. Ignore any dots on the switches.



DECIMAL SERIAL NUMBER OF TAPE CONTROL UNIT



**Note:** Press the rocker arm switch "On" side, down for On. Press the rocker arm switch "Off" side, down for Off. Ignore any dots on the switches.

## FRU120 Buffer Adapter Card (01A-A1K2) Replacement Procedure

This page contains the steps needed to remove and replace the buffer adapter card in the tape control unit. It is not necessary to power off the tape control unit; however, the dc voltage must be removed from the tape control unit.

**Warning:** Some parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

### Removing the Buffer Adapter Card

1. Go to CARR-TCU 6 for the procedure to remove dc power.
2. Open the tape control unit rear cover and remove the rear safety cover. See CARR-TCU 2-1.
3. Open the A1 logic board cover **1**.
4. Remove the card retainers **2**.
  - a. There are two mounting screws in each card retainer.
  - b. Pull the retainer out of the logic gate.
5. Remove the top card connectors from 01A-A1K2 through K5, and 01A-A1L2 through L5 (see LOC 1).
6. Remove the buffer adapter card by pulling straight out from the logic board. The buffer adapter card is in location 01A-A1K2.
7. Remove the buffer adapter card from the card holder. Save the card holder for use in the Replacement procedure.

8. Place the buffer adapter card so that the switches **3** are positioned at the bottom of the card as shown. Write down the switch settings for later reference.

### Replacing the Buffer Adapter Card

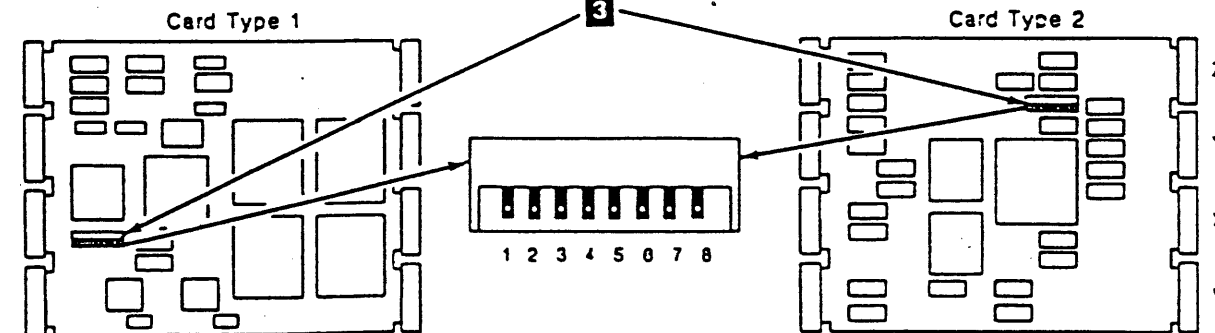
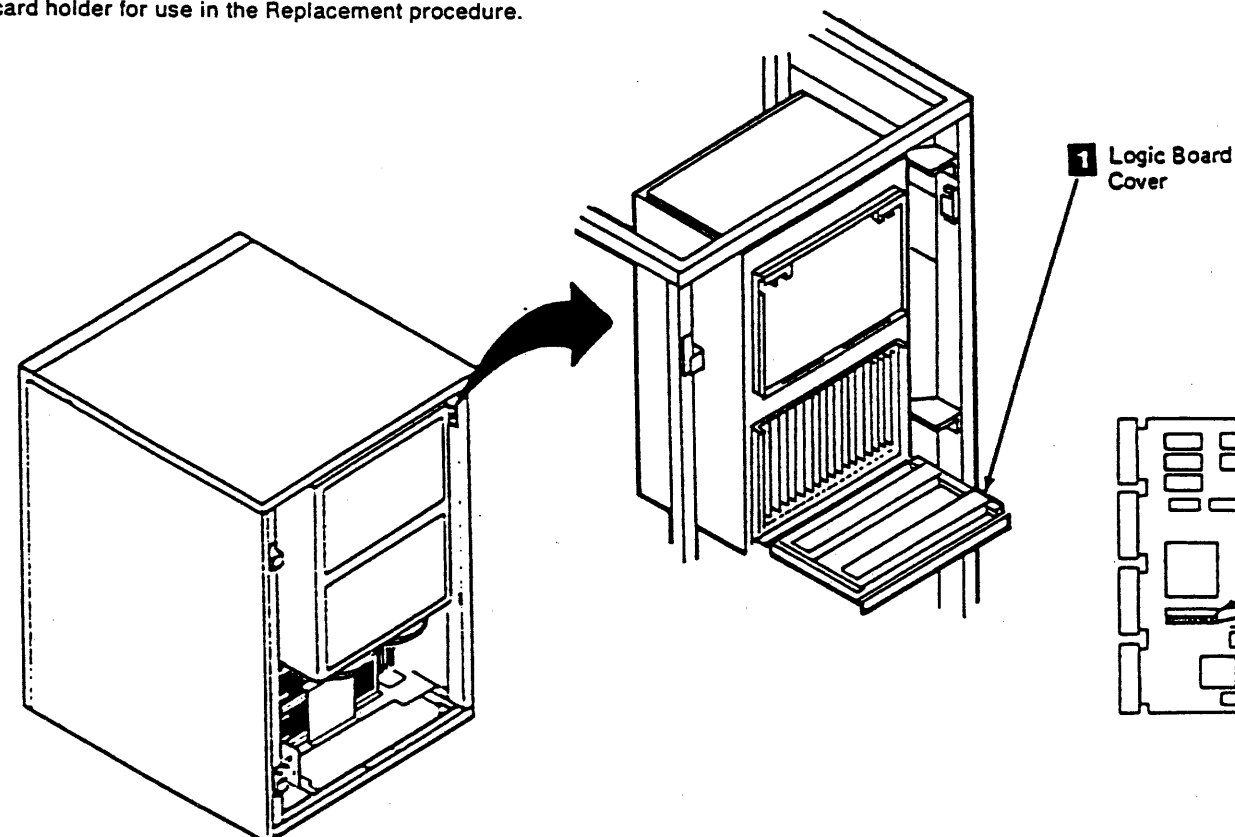
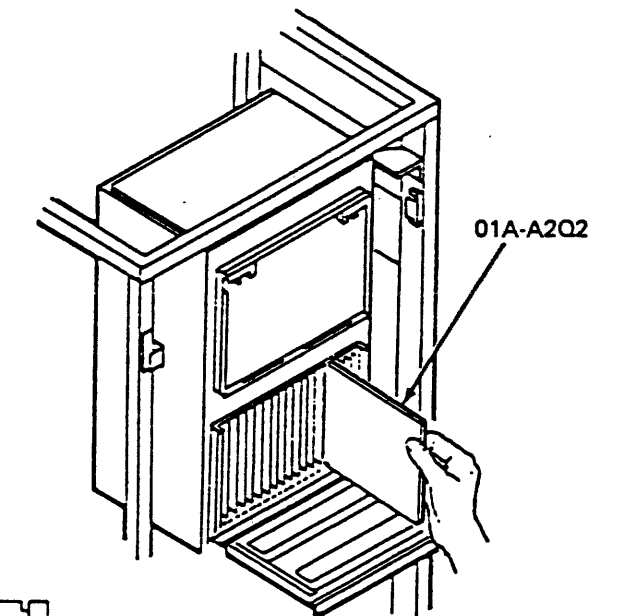
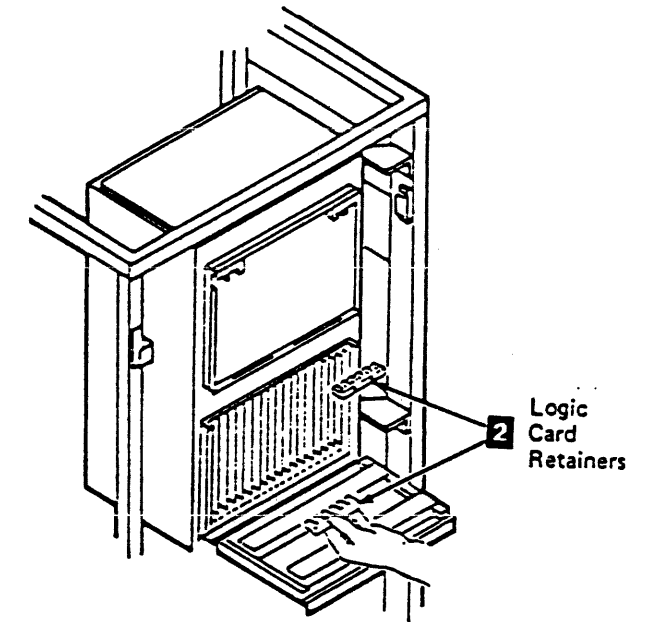
**Warning:** Before installing the buffer adapter card, check the logic board for any bent or damaged pins.

1. Verify that the switches on the buffer adapter card are set correctly. Use the information saved from the removal procedure, and the information in the switch position assignments to verify the switch settings. If no switches are present, continue with step 2.
2. Install the buffer adapter card in the card holder.
3. Install the buffer adapter card in location 01A-A1K2.
4. Install four top card connectors on 01A-A1K2 to L2, 01A-A1K3 to L3, 01A-A1K4 to L4, and 01A-A1K5 to L5.
5. Install the top and bottom logic card retainers.
  - a. Slide the retainers **2** into the logic gate.
  - b. Install the two retaining screws into each retainer.

6. Close the logic board cover **1**.
7. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2 or 2-4).
8. Go to CARR-TCU 6 for the procedure to restore dc power to the tape control unit.

### Switch Position Assignments

1. Switch Position 1. If you have card type 1 **4**, set this switch off. If you have card type 2 **5**, set this switch on.
2. Switch Position 2. If you have card type 1 **4**, set this switch off. If you have card type 2 **5**, set this switch on.
3. Switch Position 3. - Improved Data Recording Capability Allowed - If you have card type 1 **4** and data compaction is allowed, set this switch on. On all others, turn this switch off. Compaction must be allowed on both control units of a dual tape control unit subsystem.
4. Switch Position 4 (Reserved). Turn this switch off.
5. Switch Position 5 (Reserved). Turn this switch off.
6. Switch Position 6 (Reserved). Turn this switch off.
7. Switch Position 7 (Reserved). Turn this switch off.
8. Switch Position 8 - Parity - Use this switch to produce odd parity. Odd parity is an odd number of switches set on.



**NOTE:** Lift the switch up for OFF.  
Press the switch down for ON.

## FRU126 or 138 - Power/POR (01A-A2H4) or Voltage Regulator (01A-A1T2) Card Removal and Replacement Procedure

This page contains the steps needed to remove and replace either the Power/POR card (01A-A2H4) or the Voltage Regulator card (01A-A1T2) in the tape control unit

**Warning:** Some parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

### Removing the Power/POR or Voltage Regulator Card

1. Go to CARR-TCU 6 for the procedure to remove **ac power** from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector (see CARR-TCU 2-1).
3. Open the logic board cover **1**.
4. Remove the logic card retainers **2**.
  - a. Remove the two screws holding each retainer.
  - b. Pull the retainer out of the logic gate.
5. Remove the Power/POR card or the Voltage Regulator card by pulling the card straight out from the logic board. The Power/POR card is in location 01A-A2H4. The Voltage Regulator Card is in location 01A-A1T2.
6. Remove the Power/POR card or the Voltage Regulator card from the card holder.
7. Save the card holder for the replacement procedure.

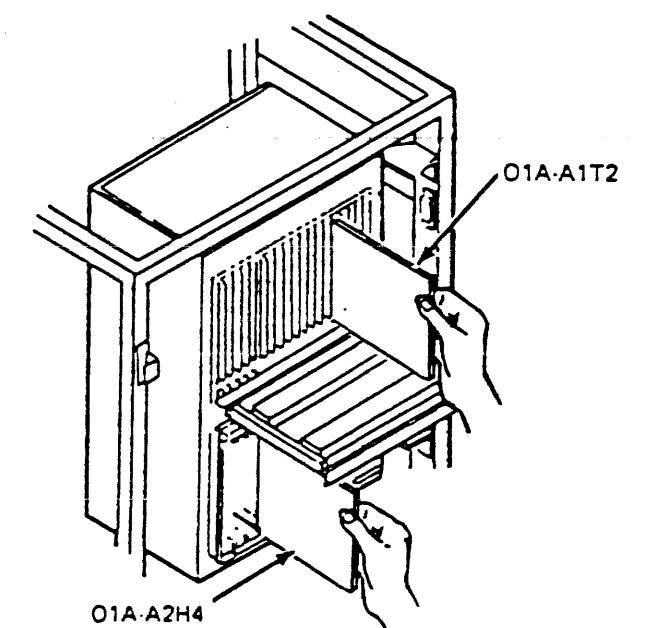
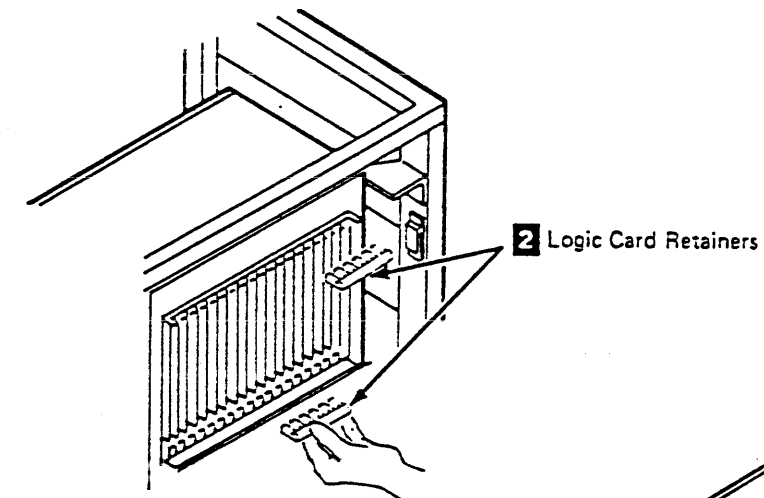
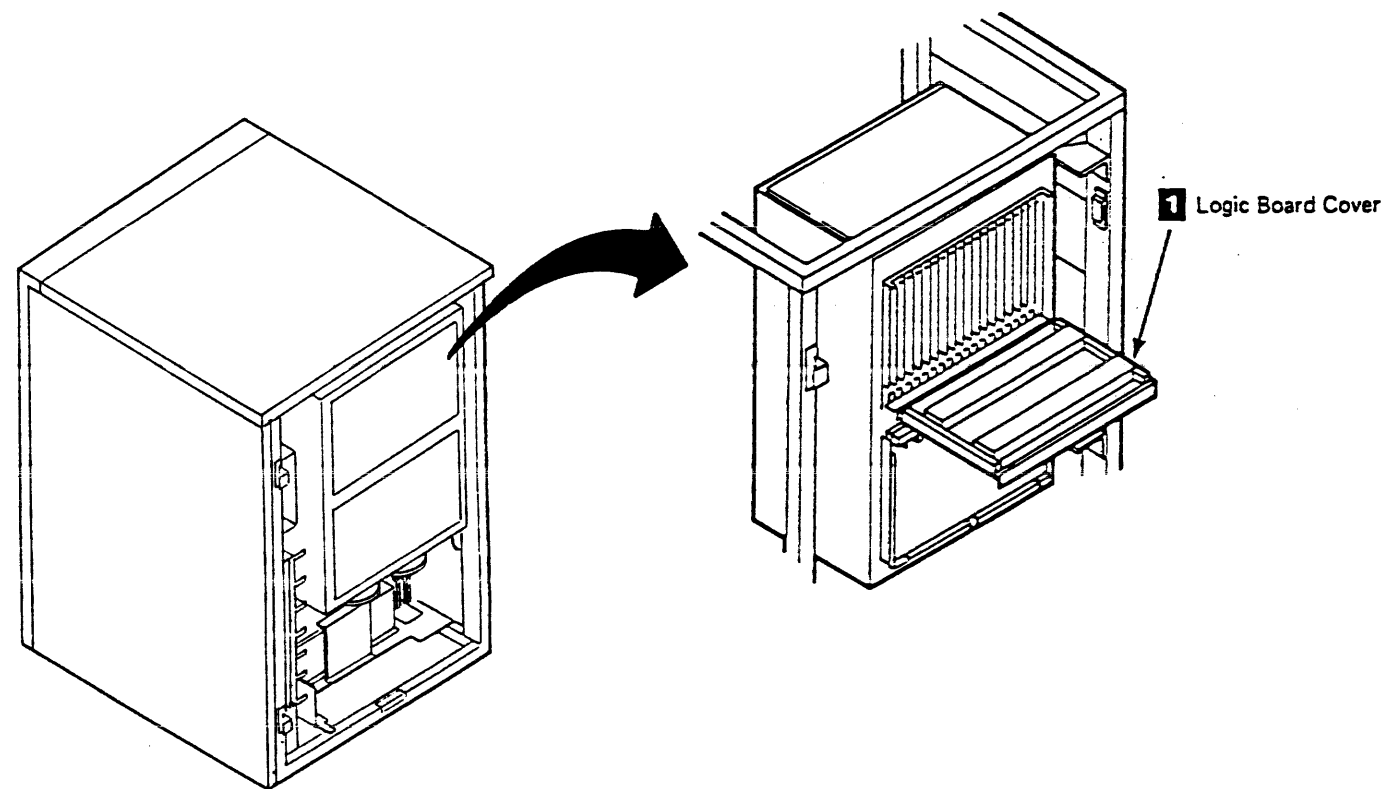
### Replacing the Power/POR or Voltage Regulator Card

**Warning:** Before installing the Power/POR card or the Voltage Regulator card, check the logic board for any bent or damaged pins.

1. Install the Power/POR card or the Voltage Regulator card into the card holder saved from the removal procedure.
2. Install the Power/POR card in location 01A-A2H4. Install the Voltage Regulator card in location 01A-A1T2.
3. Install the top and bottom card retainers.
  - a. Slide the logic card retainers **2** into the logic gate.
  - b. Install the two retaining screws into each retainer.

## Tape Control Unit CARR-TCU 1260

4. Close the logic board cover **1**.
5. Install the rear safety cover and ground connector and close the rear cover (see CARR-TCU 2-2).
6. Go to CARR-TCU 6 for the procedure to restore **ac power** to the tape control unit.



## FRU139 Tape Control Unit Logic Board (01A-A1) Removal and Replacement Procedure

The page contains the steps needed to remove and replace the A1 logic board in the tape control unit. It is not necessary to power off the subsystem to remove the logic board; however, the dc voltage must be removed from the tape control unit.

**Warning:** Some parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

### Removing the A1 Logic Board

1. Go to CARR-TCU 6 for the procedure to remove **dc power** from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the A1 logic card cover.
4. Remove the top card connectors (TCC) **3** by pulling them straight off the logic cards.
5. Remove the top card cable connectors **2**.

6. Remove all of the logic card retainers **8**. There are two mounting screws in each card retainer.
7. Remove the cable retention hardware **7**.
8. Remove the logic cards from the logic board.
9. Disconnect the cables from the Y and Z rows.
10. Disconnect the cables from the A and V columns.
11. Open the logic gate, and remove from the pin side of the logic board the laminar bus connectors **4** from locations Y5, Y2, Z5 and Z2.
12. Disconnect the voltage connections from locations 01A-A1T2G06, M06, and S06.
13. Disconnect the six dc voltage minibus connectors **5** from locations 01A-A1U2E14, U3E14, U4E14, B2A14, B3A14, and B4A14.
14. Remove the twelve logic board mounting screws and board retainers **6**, then remove the logic board **1** from the tape control unit.

**Note:** Be sure to save the mounting hardware for the logic board replacement procedure.

### Replacing the A1 Logic Board

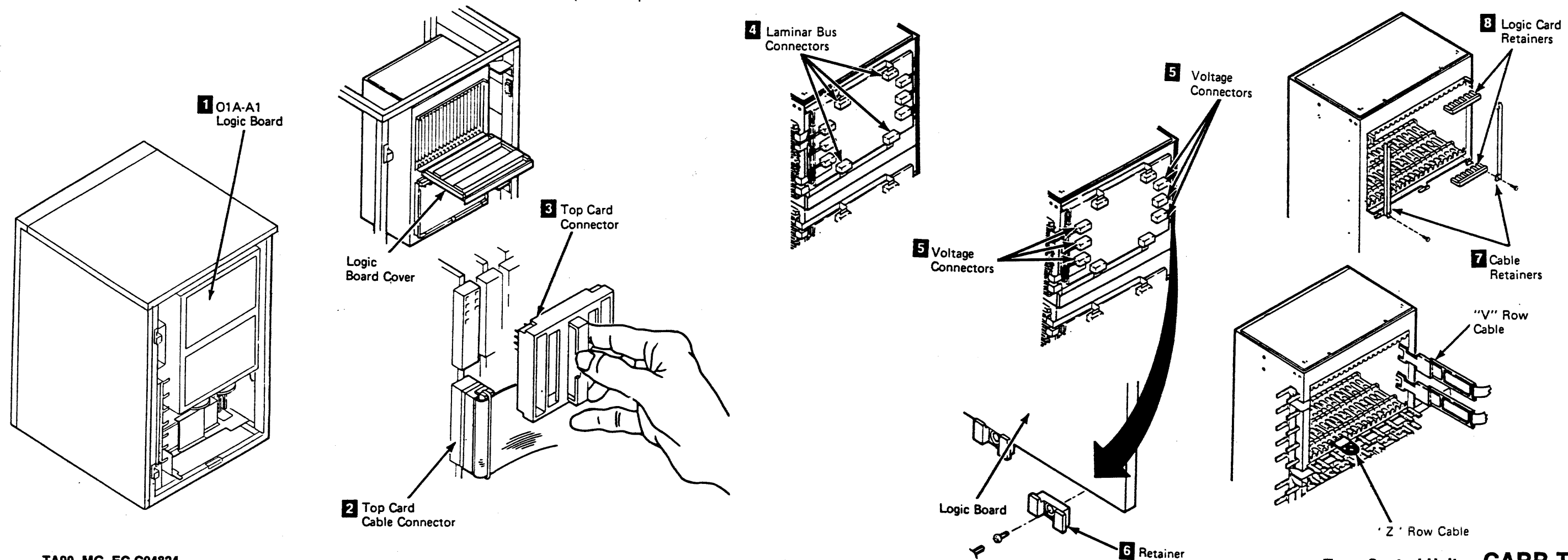
1. Open the logic gate.
2. From the pin side of the logic gate, turn the logic board **1** so the letters on the board can be read correctly, then place the board into position against the logic gate.
3. Install the twelve logic board retainers **6** and mounting screws.
4. Connect the six dc voltage minibus connectors **5** to locations 01A-A1U2E14, U3E14, U4E14, B2A14, B3A14, and B4A14.
5. Connect the three dc voltage connectors to locations 01A-A1T1G06, M06, and S06.
6. Connect the laminar bus connectors **4** to locations 01A-A1Y2, Y5, Z2, and Z5.
7. Close the logic gate.
8. On the card side of the logic board, connect the cables to the Y and Z rows.

## Tape Control Unit CARR-TCU 1390

9. On the card side of the logic board, connect the cables to the A and V columns.
10. Install the cable retention hardware **7**.
11. Inspect the logic pins for damage, then install the logic cards.
 

**Note:** The card locations are shown on LOC 1.
12. Install the logic card retainers **8**.
 

**Note:** The top card connectors and the top card cable locations are shown on LOC 1.
13. Install the top card connectors (TCC) **3**.
14. Install the top card cable connectors **2**.
15. Close the logic card cover.
16. Install the tape control unit rear safety cover and ground connector (if present) and close the tape control unit rear cover (see CARR-TCU 2-2).
17. Go to CARR-TCU 6 for the procedure to restore **dc power** to the tape control unit.



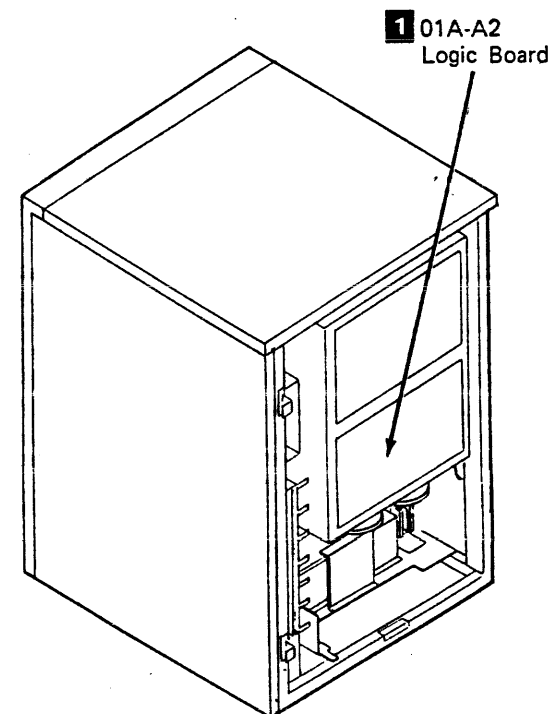
## FRU140 Tape Control Unit Logic Board (01A-A2) Removal and Replacement Procedure

The page contains the steps needed to remove and replace the A2 logic board in the tape control unit. It is not necessary to power off the subsystem to remove the logic board; however, the dc voltage must be removed from the tape control unit.

**Warning:** Some parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

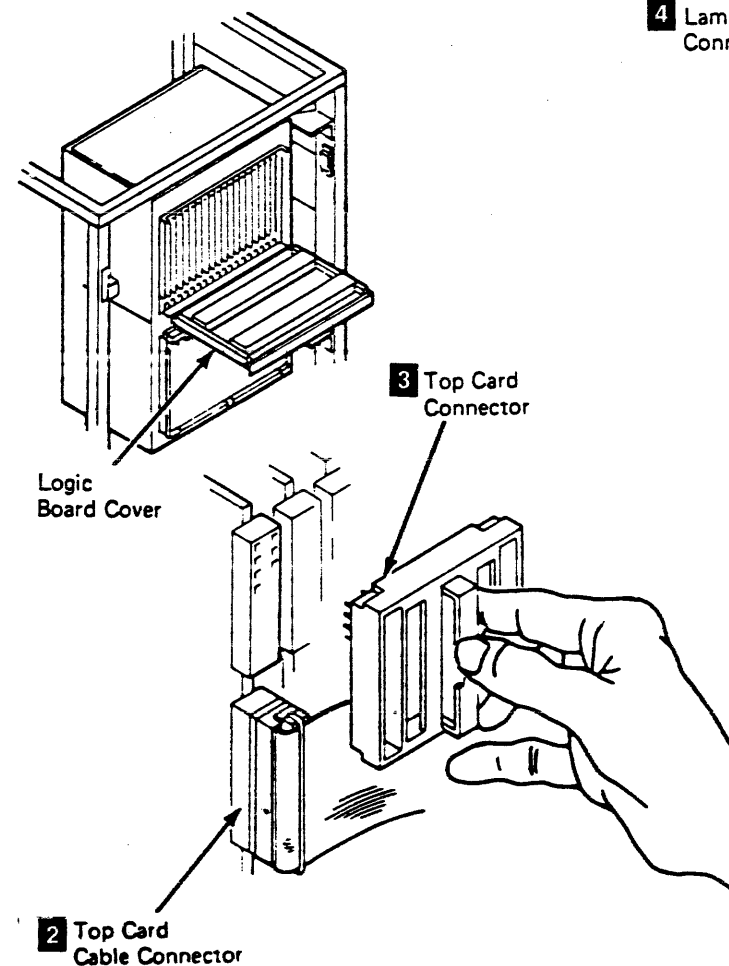
### Removing the A2 Logic Board

1. Go to CARR-TCU 6 for the procedure to remove **dc power** from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the A2 logic board cover.
4. Remove the top card connectors (TCC) **3** by pulling them straight off the logic cards.
5. Remove the top card cable connectors **2**.



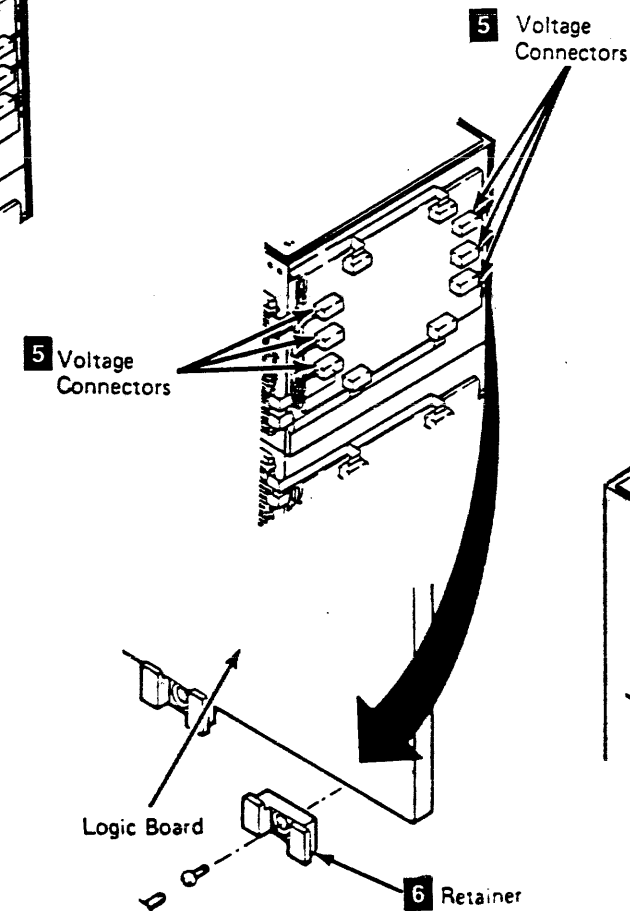
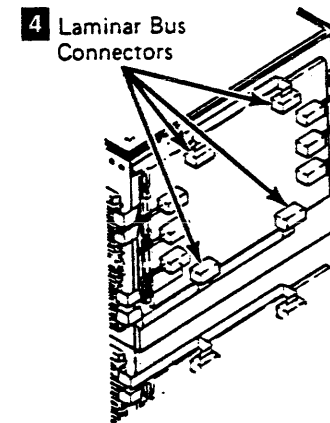
6. Remove all of the logic card retainers **8**. There are two mounting screws in each card retainer.
7. Remove the cable retention hardware **7**.
8. Remove the logic cards from the logic board.
9. Disconnect the cables from the Y and Z rows.
10. Disconnect the cables from the A and V columns.
11. Open the logic gate, and remove from the pin side of the logic board the laminar bus connectors **4** from locations Y5, Y2, Z5 and Z2.
12. Disconnect the voltage connections from locations 01A-A2T2G06, M06, and S06.
13. Disconnect the six dc voltage minibus connectors **5** from locations 01A-A2U2E14, U3E14, U4E14, B2A24, B3A24, and B4A24.
14. Remove the twelve logic board mounting screws and board retainers **6**, then remove the logic board **1** from the tape control unit.

**Note:** Be sure to save the mounting hardware for the logic board replacement procedure.



### Replacing the A2 Logic Board

1. Open the logic gate.
2. From the pin side of the logic gate, turn the logic board **1** so the letters on the board can be read correctly, then place the board into position against the logic gate.
3. Install the twelve logic board retainers **6** and mounting screws.
4. Connect the six dc voltage minibus connectors **5** to locations 01A-A2U2E14, U3E14, U4E14, B2A24, B3A24, and B4A24.
5. Connect the three dc voltage connectors to locations 01A-A2T1G06, M06, and S06.
6. Connect the laminar bus connectors **4** to locations 01A-A2Y2, Y5, Z2, and Z5.
7. Close the logic gate.
8. On the card side of the logic board, connect the cables to Y and Z rows.

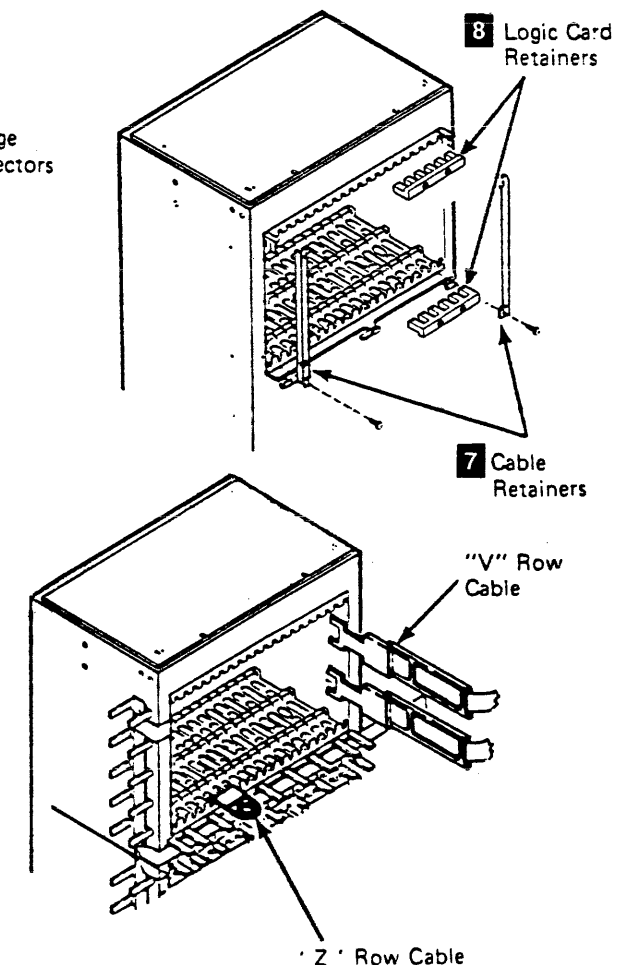


## Tape Control Unit CARR-TCU 1400

9. On the card side of the logic board, connect the cables to the A and V columns.
10. Install the cable retention hardware **7**.
11. Inspect the logic pins for damage, then install the logic cards.
 

**Note:** The card locations are shown on LOC 1.
12. Install the logic card retainers **8**.
 

**Note:** The top card connectors and the top card cable locations are shown on LOC 1.
13. Install the top card connectors (TCC) **3**.
14. Install the top card cable connectors **2**.
15. Close the logic board cover.
16. Install the tape control unit rear safety cover and ground connector and close the tape control unit rear cover (see CARR-TCU 2-2).
17. Go to CARR-TCU 6 for the procedure to restore **dc power** to the tape control unit.





## FRU141 Tape Control Unit Switch Panel Printed Circuit Board Removal and Replacement Procedure

This page contains the steps needed to remove and replace the control unit switch panel circuit board.

All drives attached to the tape control unit must be available for service.

**Note:** This FRU can be removed and replaced in the tape control unit without affecting the attached drives by removing dc power from the control unit with the dc service switch.

### Removing the Tape Control Unit Switch Panel Printed Circuit Board

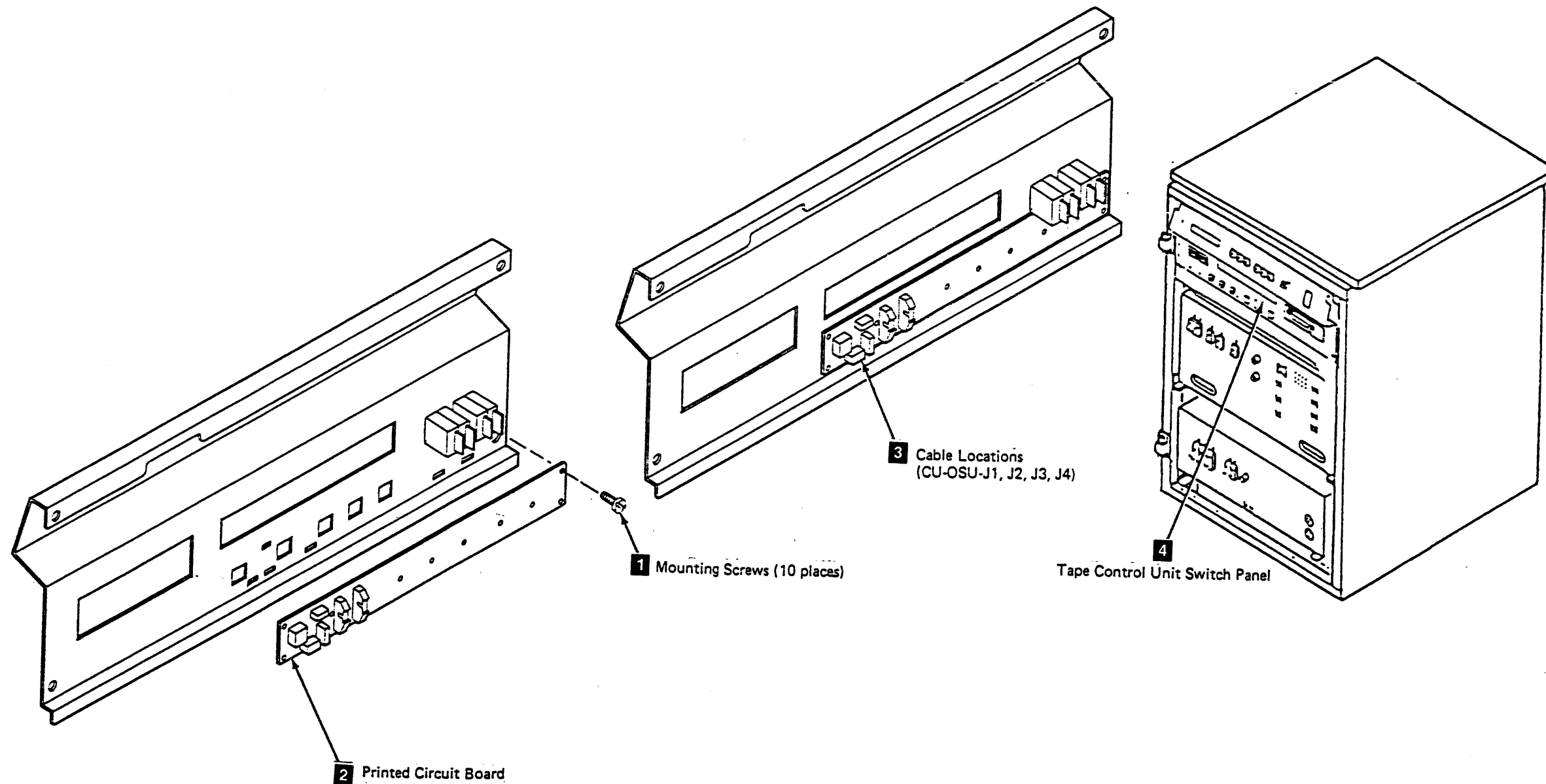
1. Go to CARR-TCU 6 for the procedure to remove **dc power** from the tape control unit.
2. Open the tape control unit rear cover and remove the top cover (see CARR-TCU 2-1).

3. Remove the four cables **3** (CU-OSU-J1, J2, J3, and J4) from the rear of the printed circuit board **2**.
4. Remove the ten mounting screws **1** from the rear of the tape control unit switch panel **4** and remove the printed circuit board **2** from the switch panel.
5. Save all mounting screws for the replacement procedure.

## Tape Control Unit CARR-TCU 1410

### Replacing the Tape Control Unit Switch Panel Printed Circuit Board

1. Place the printed circuit board **2** on the tape control unit switch panel **4** and install the ten mounting screws **1**.
2. Connect the four cables **3** (CU-OSU-J1, J2, J3, and J4) to the rear of the printed circuit board **2**.
3. Replace the tape control unit top cover (see CARR-TCU 2-2) and close the rear cover.
4. Go to CARR-TCU 6 for the procedure to restore **dc power** to the tape control unit.



## FRU142 Operator Panel Printed Circuit Board Removal and Replacement Procedure

This page contains the steps needed to remove and replace the printed circuit board on the operator panel. All drives must be available for service.

**Note:** This FRU can be removed and replaced in the tape control unit without affecting the attached tape units by removing dc power from the control unit with the service switch.

### Removing the Operator Panel Printed Circuit Board

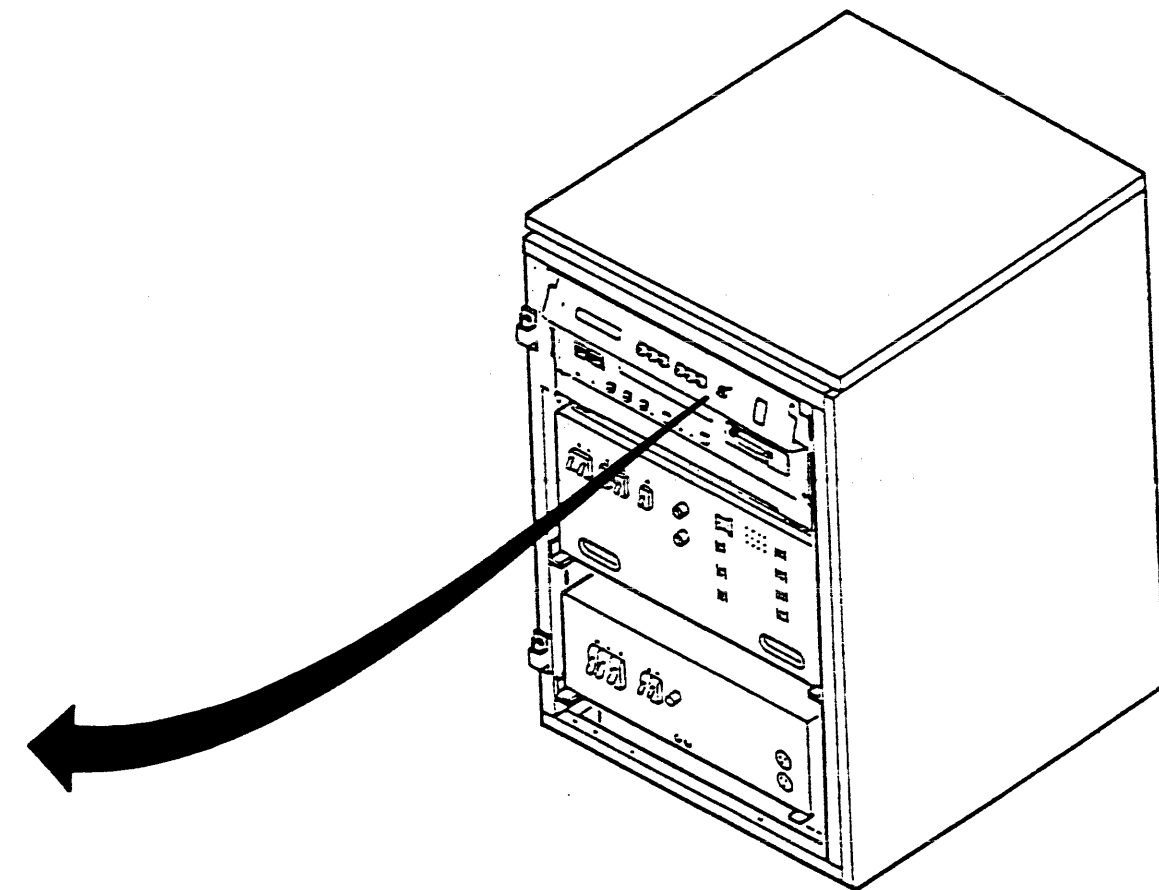
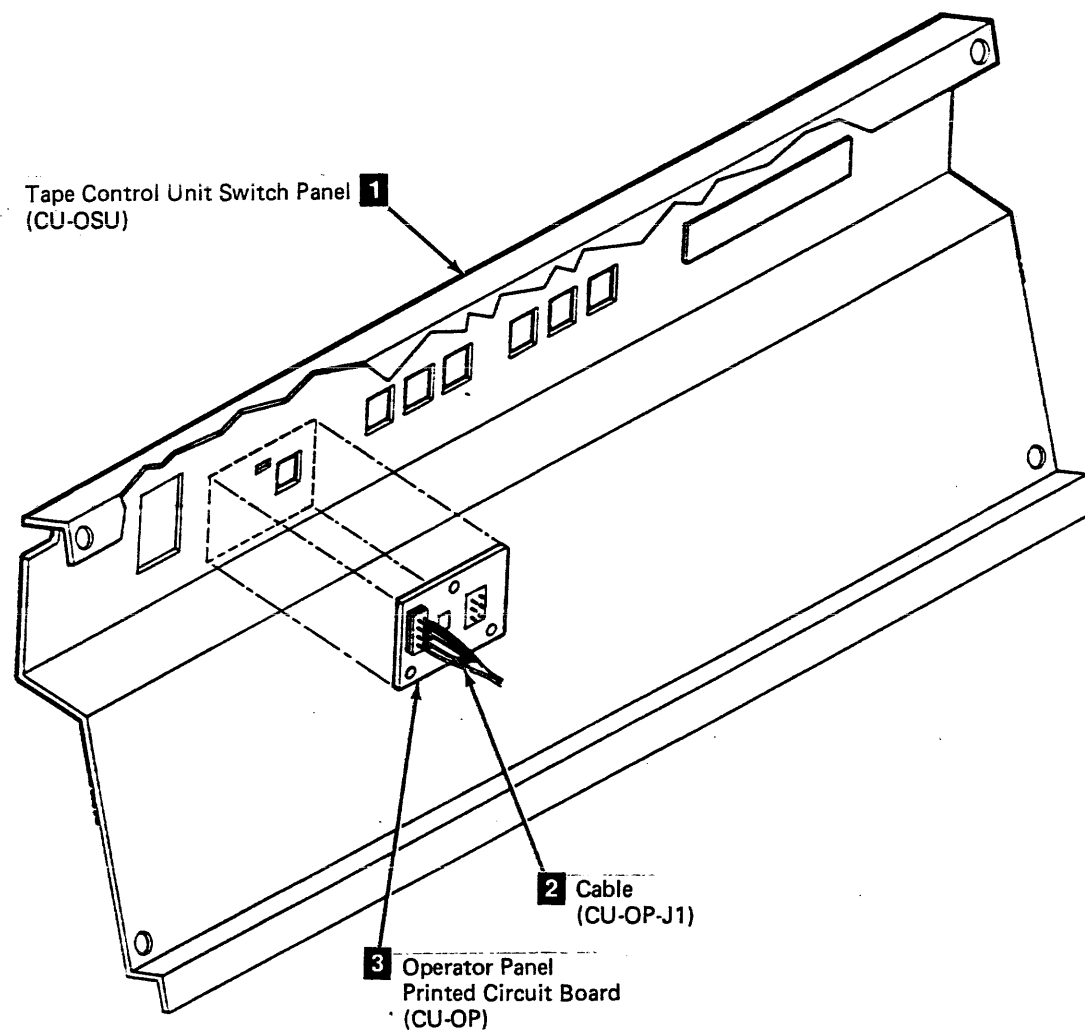
1. Go to CARR-TCU 6 for the procedure to remove *dc power* from the tape control unit.
2. Open the tape control unit rear cover and remove the top cover (see CARR-TCU 2-1).
3. Disconnect the cable **2** (CU-OP-J1) from the operator panel printed circuit board.
4. Remove the three mounting screws that hold the operator panel printed circuit board (CU-OP) **3** to the control unit switch panel (CU-OSU) **1**.
5. Remove the operator panel printed circuit board **3** from the tape control unit.

### Replacing the Operator Panel Printed Circuit Board

1. Place the operator panel printed circuit board **3** on the tape control unit switch panel **1** and install the three mounting screws.
2. Connect the cable **2** (CU-OP-J1) to the rear of the operator panel printed circuit board.

## Tape Control Unit CARR-TCU 1420

3. Install the tape control unit top cover and close the rear cover (see CARR-TCU 2-2).
4. Go to CARR-TCU 6 for the procedure to restore *dc power* to the tape control unit.



# FRU143 Tape Control Unit Lower Thermal Switch Removal and Replacement Procedure

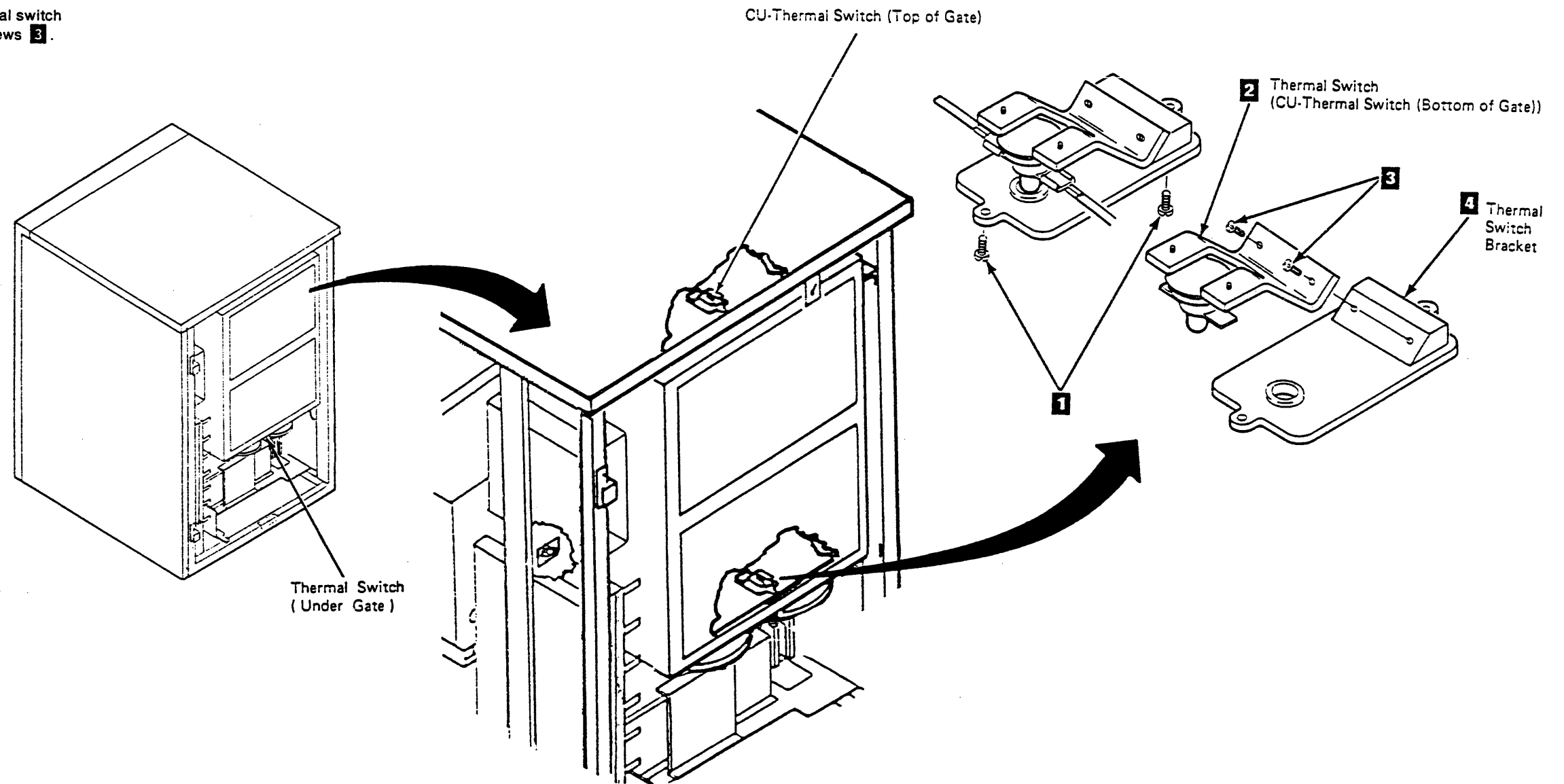
This page contains the steps needed to remove and replace the lower thermal switch in the tape control unit logic gate.

## Removing the Tape Control Unit Thermal Switch

1. Open the rear cover and remove the rear safety cover (see CARR-TCU 2-1 ).
2. Remove the two mounting screws **1** holding the thermal switch assembly to the logic gate.
3. Disconnect the two wires from the thermal switch.
4. Remove the thermal switch assembly from the tape control unit.
5. Remove the thermal switch **2** from the thermal switch bracket **4** by removing the two mounting screws **3**.

## Replacing the Tape Control Unit Thermal Switch

1. Place the thermal switch **2** on the thermal switch bracket **4** and install the two mounting screws **3**.
2. Place the thermal switch in position on the logic gate and install the two wires to the thermal switch.
3. Install the two mounting screws **1**, holding the thermal switch assembly to the logic gate.
4. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2 ).
5. Go to CARR-TCU 6 for the procedure to restore *ac power* to the tape control unit.



## FRU144 AC Power Supply Removal and Replacement Procedure

This page contains the steps needed to remove and replace the ac power supply in the tape control unit. Since ac power is being removed from the tape control unit, all drives attached to the tape control unit must be available for service.

### Removing the AC Power Supply

**Note:** Have the customer turn off the circuit breaker for the tape control unit ac power source.

- Go to CARR-TCU 6 for the procedure to remove **ac power** from the tape control unit.
- Disconnect the ac line cord from the power source.
- Remove the tape control unit front cover (see CARR-TCU 2-1).
- Remove connector J1 (CU-PS01-J1) from the right side of the ac power supply.
- Open the tape control unit rear cover and remove the tape control unit rear safety cover, if present (see CARR-TCU 2-1).
- Disconnect all of the cables from the rear of the ac power supply.
- Remove the cable clamp that holds the ac input cable to the tape control unit frame.
- Remove the mounting bolts **1** from the front of the ac power supply.
- Slide the ac power supply (CU-PS01) forward to get access to the input filter cover screws.
- Remove the cover screws **8** from the input filter cover plate **7** and remove the plate.
- Disconnect the wires from the three filter capacitors in the input filter **4**.
 

**Note:** If you are removing a 50 Hz (except Japan) ac power supply; remove the wire from the neutral filter capacitor **6**.
- Remove the braided ground wire **5** from inside the input filter.
- Remove the green/yellow ground wire **2** from the rear of the ac power supply.
- Loosen and remove the mounting ring **3** from the line cord stress clamp. Be sure to save the mounting ring for later use.
- Remove the two screws holding the line cord stress clamp. Remove the stress clamp and the line cord.

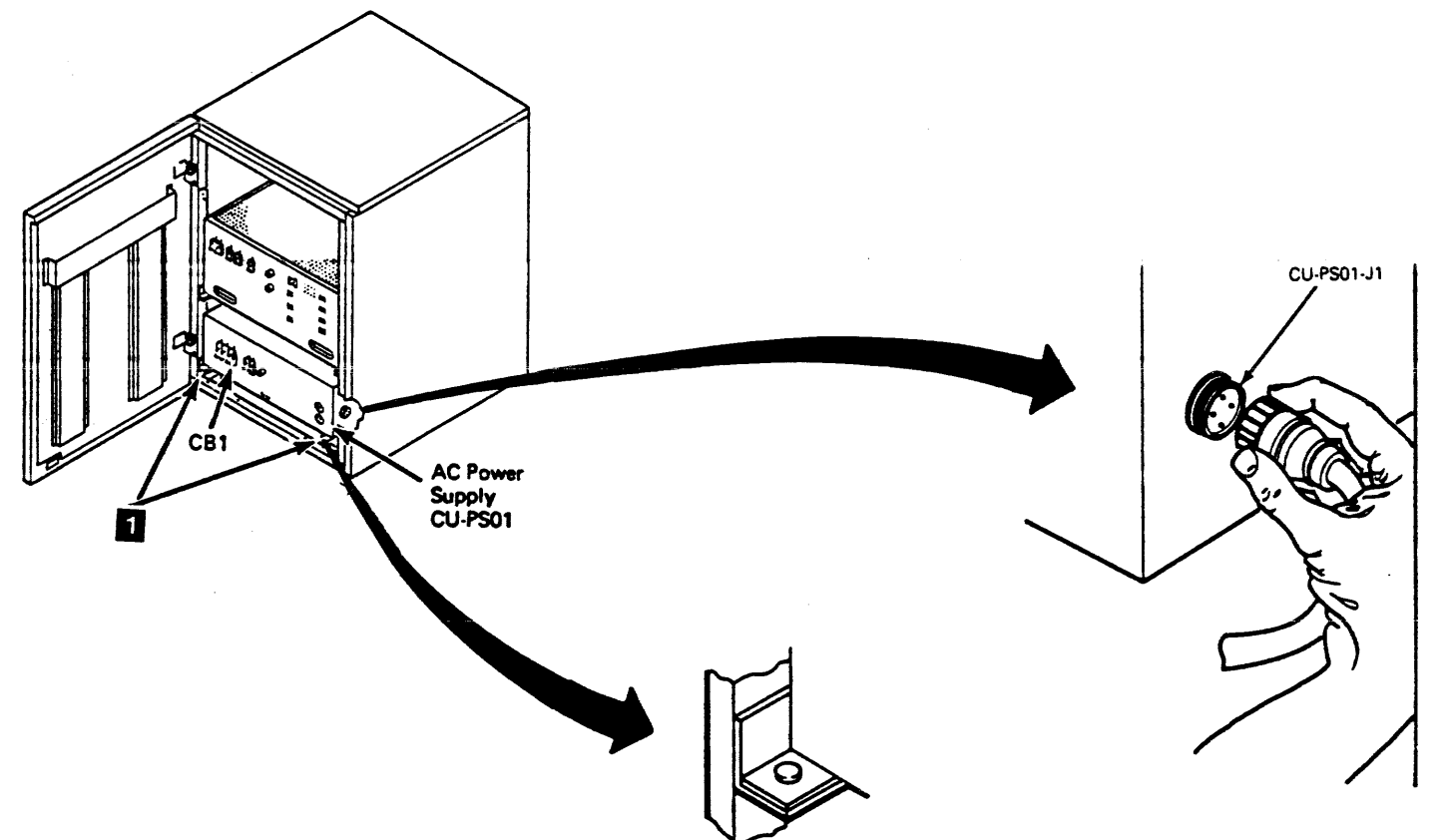
### CAUTION:

The ac power supply weighs about 21 kilograms (45 pounds). Two service representatives should lift the tape control unit ac power supply.

- Slide the ac power supply forward to remove it from the tape control unit.

### Replacing the AC Power Supply

- Slide the tape control unit ac power supply (CU-PS01) into the front of the tape control unit. It will be necessary to get access to the input filter by removing the cover plate **7**.
- Install the line cord and stress clamp and install the mounting ring **3**. Use the mounting ring removed from the old power supply.
- Connect the yellow/green ground wire **2** to the outside rear of the power supply. Be sure to use a star washer between the lug on the wire and the power supply.
- Connect the braided wire **5** to the ground point inside the input filter. Be sure to use a star washer between the lug on the wire and the input filter.
- Connect one wire to each of the filter capacitors **4** in the input filter.



- If you are installing a 50 Hz (except Japan) ac power supply, connect the neutral wire to the neutral capacitor **6**.
- If you are installing a 50 Hz (except Japan) ac power supply, install the Delta/Wye jumper. See "Voltage Jumper Installation" for 50 Hz (except Japan) on this page.
- Install the input filter cover plate **7** and replace the cover screws **8**.
- Slide the ac power supply to the rear of the tape control unit as far as it will go and install and tighten the two mounting bolts **1**.
- Install the cable clamp that holds the ac input cable to the tape control unit frame.
- Connect all of the cables to the rear of the ac power supply.
- Connect the J1 cable (CU-PS01-J1) to the right side of the ac power supply.

### DANGER

**Electric shock. Hazardous voltages can be present in the ac line cord connectors.**

- Connect the ac line cord to the power source.
- Have the customer turn on the circuit breaker for the tape control unit ac power source.

## Tape Control Unit CARR-TCU 1440

### Voltage Jumper Installation

#### 60 Hz (and 50 Hz Japan)

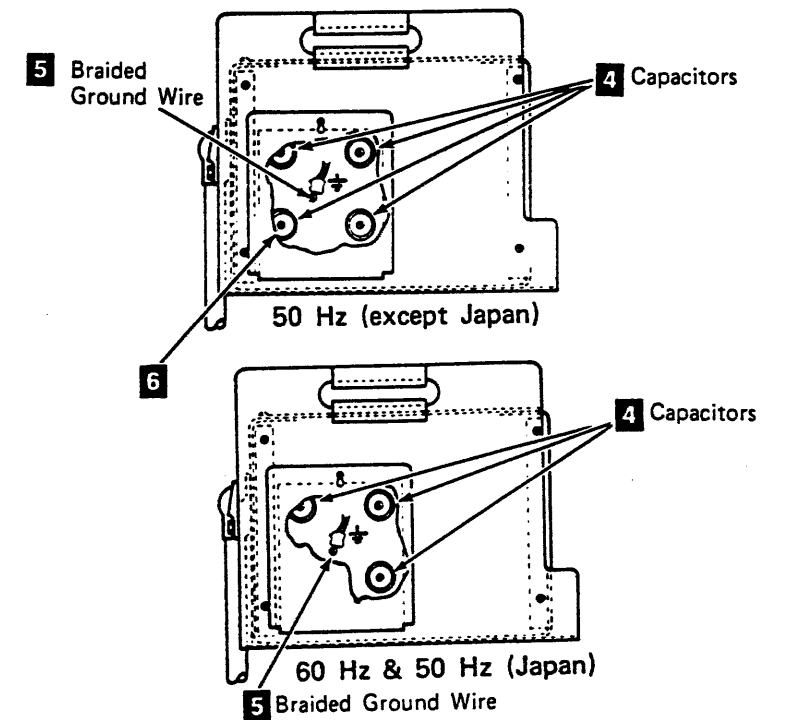
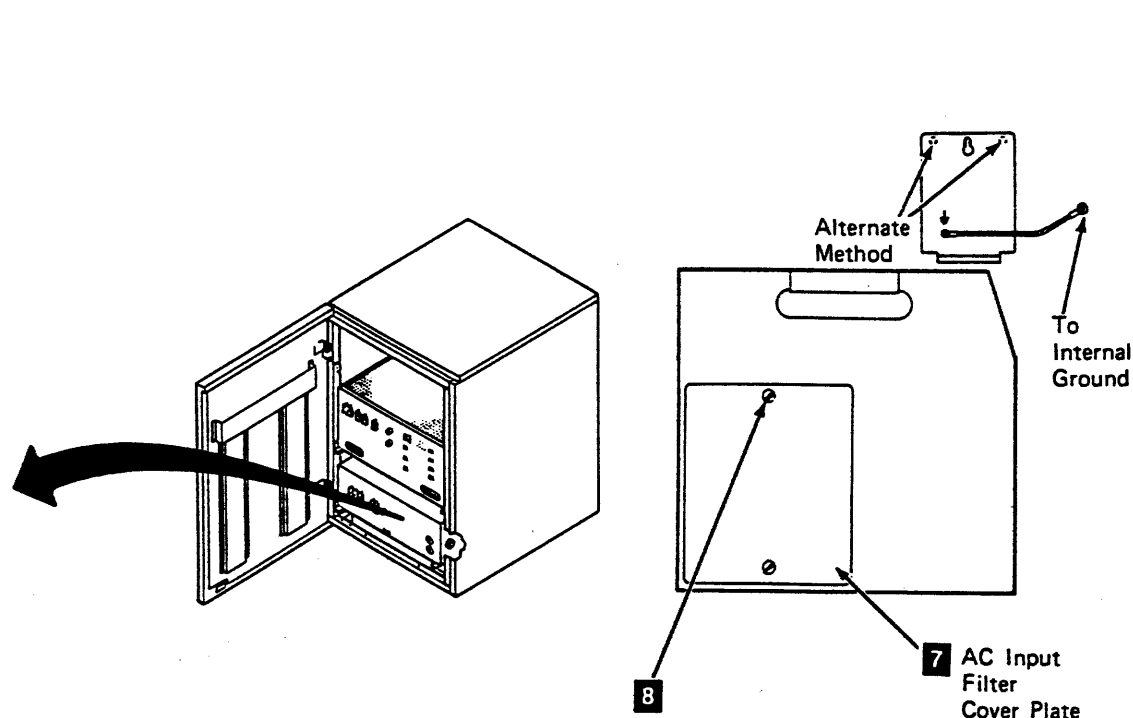
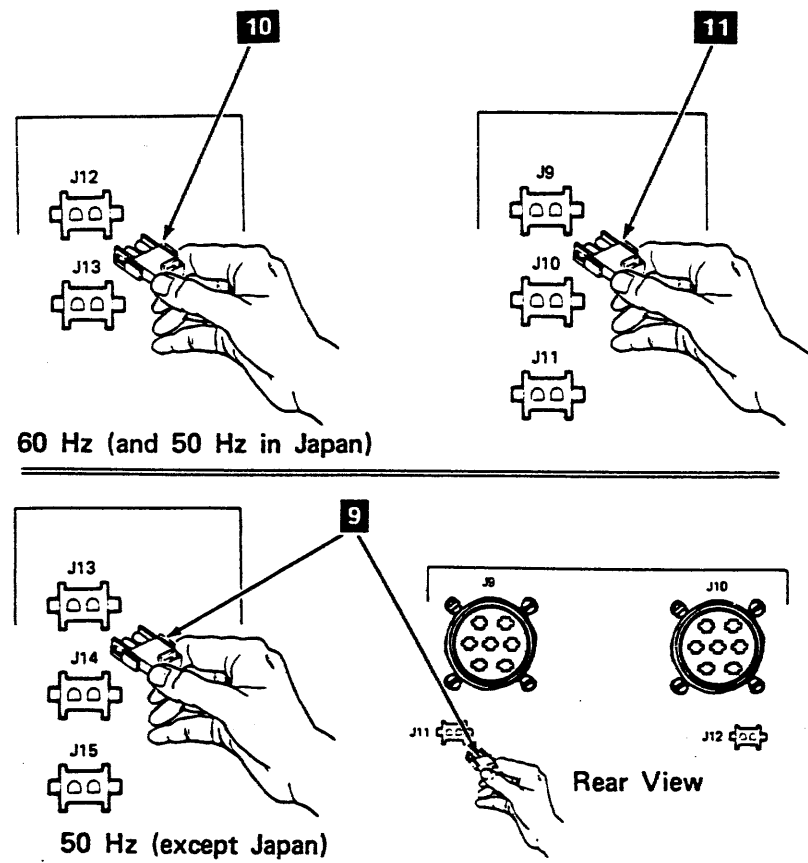
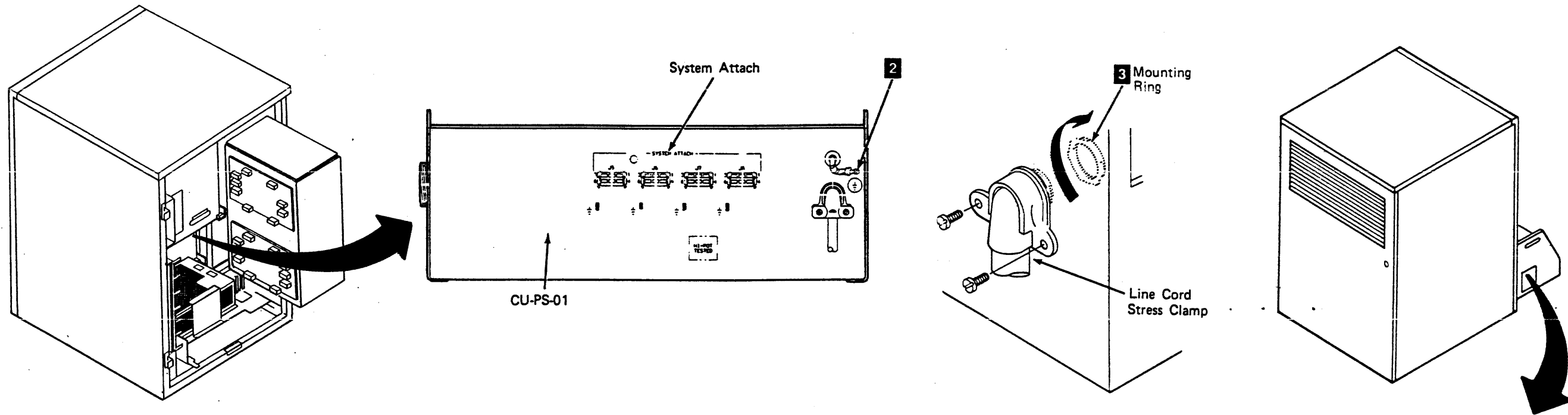
- Set the convenience outlet voltage.
  - To set the convenience outlet voltage to 100 V ac, insert the jumper plug **10** in CU-PS01-J12.
  - To set the convenience outlet voltage to 120 V ac, insert the jumper plug **10** in CU-PS01-J13.
- Set the input voltage.
  - If the ac input voltage is 200 or 208 V ac, plug the voltage jumper **11** in CU-PS01-J9.
  - If the ac input voltage is 220 V ac, plug the voltage jumper **11** in CU-PS01-J10.
  - If the ac input voltage is 230 or 240 V ac, plug the voltage jumper **11** in CU-PS01-J11.

#### 50 Hz (except Japan)

- If the ac input voltage is 200 V ac, plug the Delta/Wye jumper in CU-PS01-J9 and the voltage jumpers **9** in CU-PS01-J11 and J13.
- If the ac input voltage is 220 V ac, plug the Delta/Wye jumper in CU-PS01-J9 and the voltage jumpers **9** in CU-PS01-J11 and J14.
- If the ac input voltage is 230 or 240 V ac, plug the Delta/Wye jumper in CU-PS01-J9 and the voltage jumpers **9** in CU-PS01-J11 and J15.
- If the ac input voltage is 380 V ac, plug the Delta/Wye jumper in CU-PS01-J10 and the voltage jumpers **9** in CU-PS01-J12 and J14.
- If the ac input voltage is 400 or 415 V ac, plug the Delta/Wye jumper in CU-PS01-J10 and the voltage jumpers **9** in CU-PS01-J12 and J15.

**Note:** Should the Delta/Wye jumper (J9-J10) have to be changed, replug the cap in the empty socket.

- Install the tape control unit rear safety cover and ground connector, if present and close the tape control unit rear cover (see CARR-TCU 2-2).
- Install the tape control unit front cover (see CARR-TCU 2-1).
- Go to CARR-TCU 6 for the procedure to restore **ac power** to the tape control unit.



## FRU145 Tape Control Unit DC Power Supply Removal and Replacement Procedure

This page contains the steps needed to remove and replace the dc power supply in the tape control unit. Because ac power must be turned off, all of the drives attached to the tape control unit must be available for service.

### Removing the Tape Control Unit DC Power Supply

1. Go to CARR-TCU 6 for the procedure to remove **ac power** from the tape control unit.
2. Open the tape control unit rear and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the logic gate.
4. Disconnect all of the cables from the top rear of the dc power supply **1** (CU-PS02).

5. Remove the tape control unit front cover (see CARR-TCU 2-1).
6. Remove the two mounting bolts **2** from the tape control unit dc power supply.

#### CAUTION:

The dc power supply weighs about 50 kilograms (110 pounds). Two service representatives should lift the tape control unit dc power supply.

7. Remove the tape control unit dc power supply by sliding it out the front of the tape control unit.

### Replacing the Tape Control Unit DC Power Supply

1. Slide the tape control unit dc power supply (CU-PS02) into the front of the tape control unit as far as it will go.
2. Align the two screw holes in the front on each side and install the two mounting bolts **2**.
3. Install the cables into the top rear of the power supply **1**.
4. Close the logic gate.
5. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2).

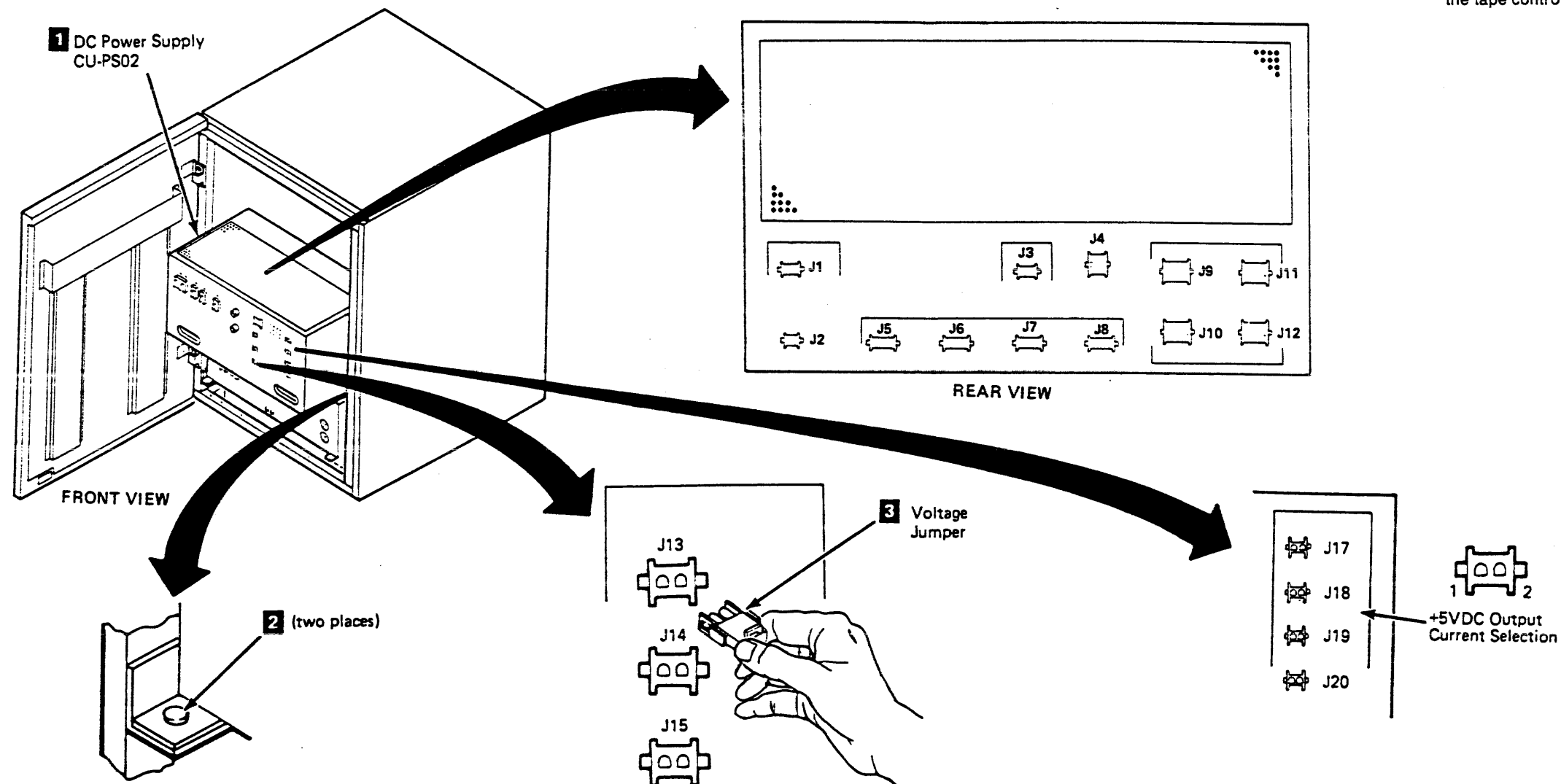
## Tape Control Unit CARR-TCU 1450

### Installing the Power Supply Jumpers

- If the input voltage is 200 or 208 V ac, plug the voltage jumper **3** in CU-PS02-J13.
- If the input voltage is 220 V ac, plug the voltage jumper **3** in CU-PS02-J14.
- If the input voltage is 230 V ac, plug the voltage jumper **3** in CU-PS02-J15.
- If the input voltage is 380 V ac (50 Hz only), plug the voltage jumper **3** in CU-PS02-J14.
- If the input voltage is 400 or 415 V ac (50 Hz only), plug the voltage jumper **3** in CU-PS02-J15.

### Channel Adapters Installed

- Plug the +5 V dc jumper in CU-PS02-J17.
- Install the tape control unit front cover (see CARR-TCU 2-2).
- Go to CARR-TCU 6 for the procedure to restore **ac power** to the tape control unit.



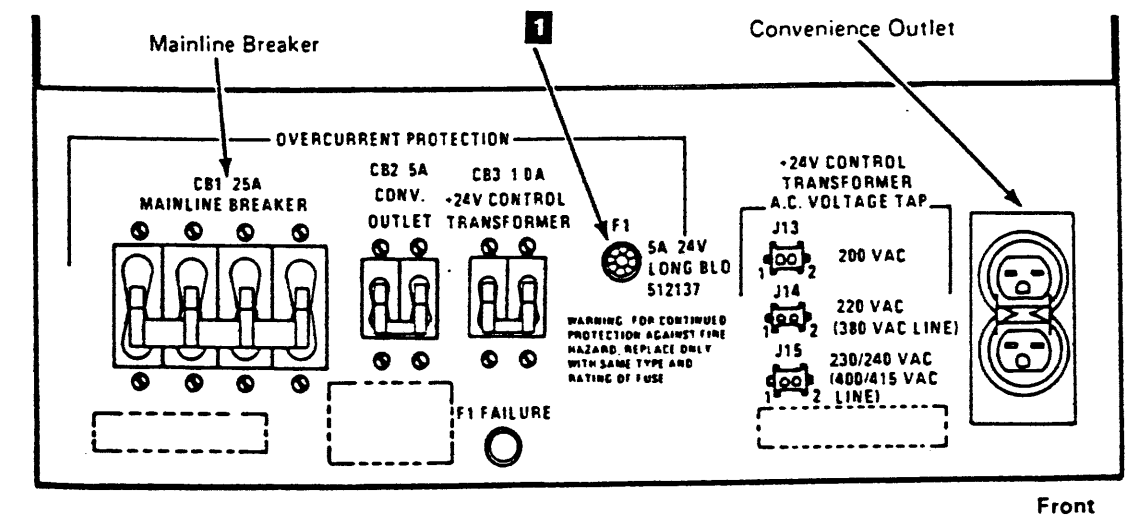
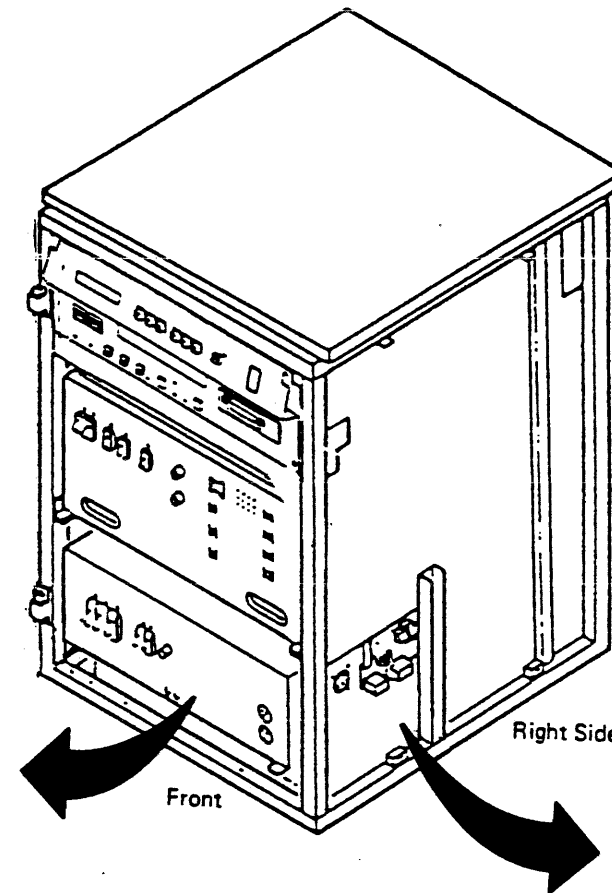
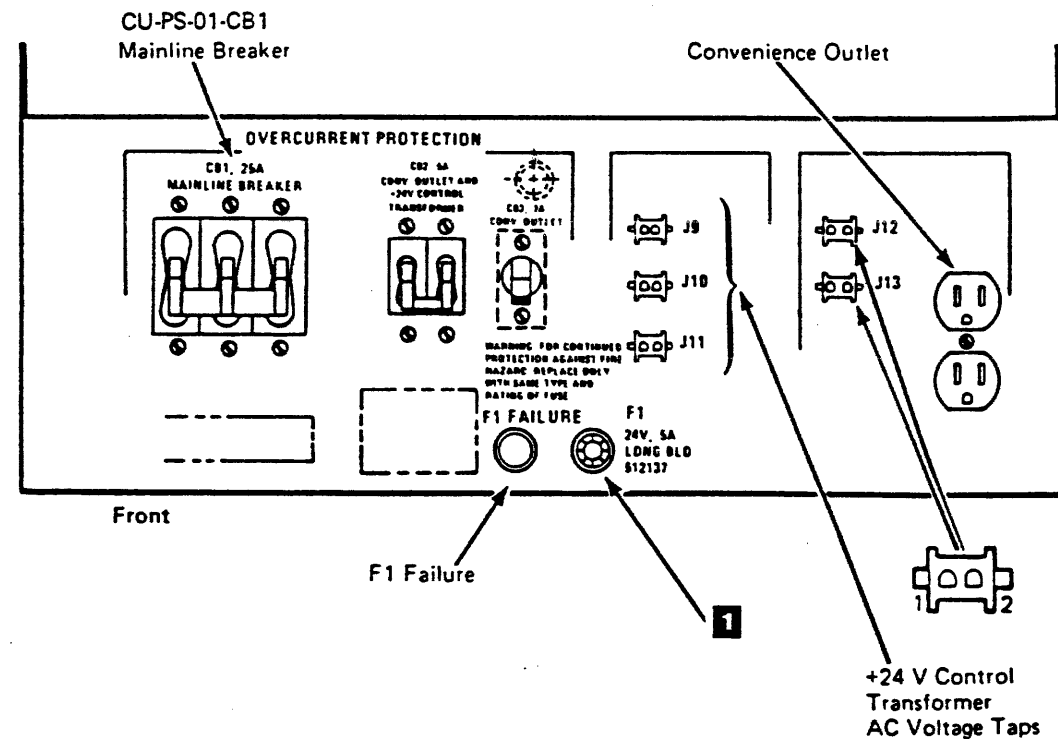
# FRU146 AC Fuse Removal and Replacement Procedure

This page contains the steps needed to remove and replace the ac fuses in the tape control unit ac power supply (CU-PS01).

Since ac power is being removed from the tape control unit, all of the drives attached to the tape control unit must be available for service.

## Fuse Removal and Replacement - AC Power Supply

1. Go to CARR-TCU 6 for the procedure to remove *ac power* from the tape control unit.
2. Remove fuse F1 **1** by turning the fuse holder cap counterclockwise.
3. Place a good fuse in the fuse holder cap and insert the fuse and cap into the power supply by turning the fuse holder cap clockwise.
4. Go to CARR-TCU 6 for the procedure to restore *ac power* to the tape control unit.



## FRU147, 148 DC Fuse Removal and Replacement Procedure

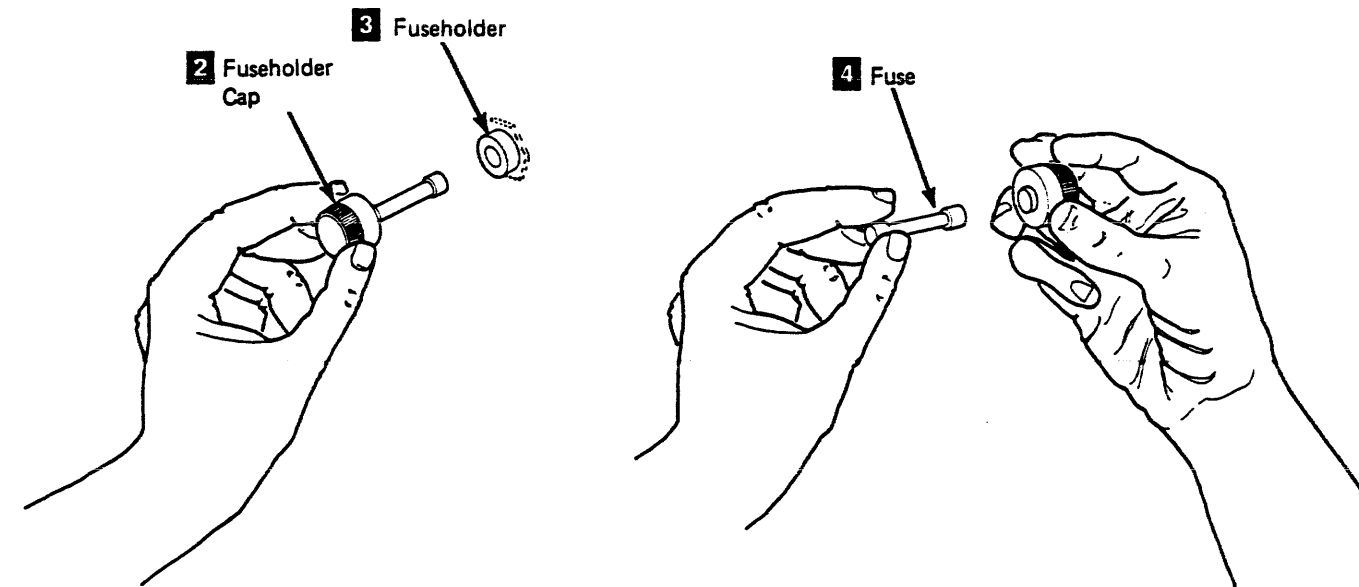
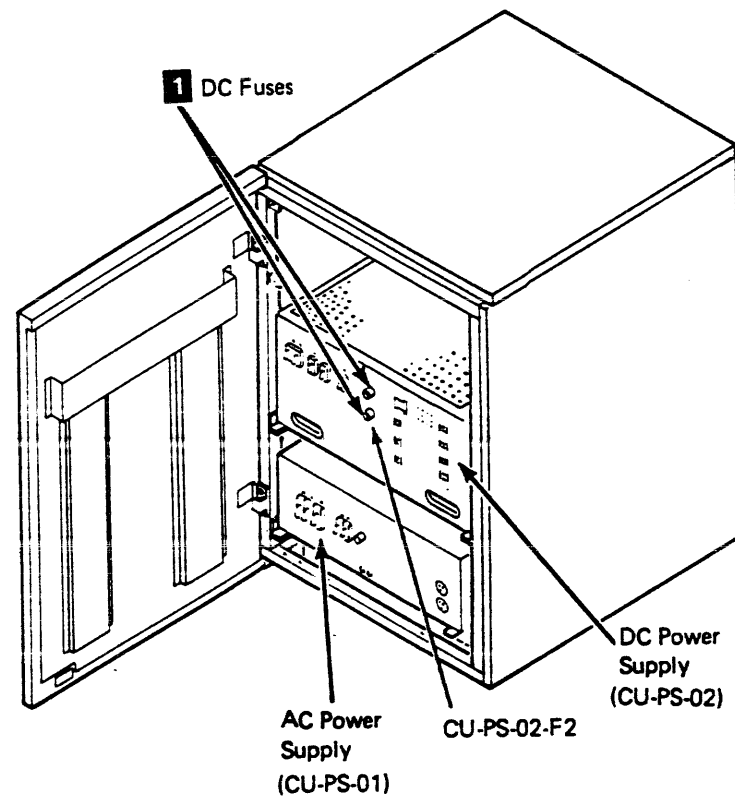
This page contains the steps needed to remove and replace either of the dc fuses **1** in the tape control unit dc power supply (CU-PS02). Removing either of the fuses will not cause the power to be removed from the drives attached to the tape control unit.

### Removing the DC Fuses

1. Go to CARR-TCU 6 for the procedure to remove **dc power** from the tape control unit.
2. Remove the fuse holder cap **2** from the fuse holder **3** by pushing in and turning counterclockwise until it stops. Pull the fuse holder cap and the fuse out of the fuse holder.
3. Remove the defective fuse **4** from the fuse holder cap.

### Replacing the DC Fuses

1. Insert the replacement fuse **4** into the fuse holder cap **2**.
2. Insert the fuse holder cap and fuse into the fuse holder **3**.
3. Push in on the fuse holder cap and at the same time turn clockwise until it stops.
4. Go to CARR-TCU 6 for the procedure to restore **dc power** to the tape control unit.





## FRU149 AC Line Cord Removal and Replacement Procedure

This page contains the steps needed to remove and replace the ac line cord in the tape control unit. Since ac power is being removed from the tape control unit, all drives attached to the tape control unit must be available for service.

### Removing the AC Line Cord

**Note:** Have the customer turn off the circuit breaker for the tape control unit ac power source.

1. Go to CARR-TCU 6 for the procedure to remove **ac power** from the tape control unit.
2. Disconnect the ac line cord from the power source.
3. Remove the tape control unit front cover (see CARR-TCU 2-1).
4. Remove connector J1 (CU-PS01-J1) from the right side of the ac power supply (CU-PS01).
5. Open the tape control unit rear cover and remove the tape control unit rear safety cover and ground connector, if present (see CARR-TCU 2-1).
6. Remove the cable clamp which holds the ac input cable to the tape control unit frame.
7. Disconnect all of the cables from the rear of the ac power supply.

8. Remove the mounting bolts **2** from the front of the ac power supply.
9. Slide the ac power supply **1** forward to gain access to the input filter cover screw.
10. Remove the screw **9** from the input filter cover plate **8** and remove the plate.
11. Disconnect the wires from the three filter capacitors **5** in the input filter.  
**Note:** If you are removing a 50 Hz, except Japan, ac line cord; remove the wire from the filter capacitor **7**.
12. Remove the braided ground wire **6** from inside the input filter.
13. Remove the green/yellow ground wire **3** from the rear of the ac power supply.
14. Loosen and remove the mounting ring **4** from the line cord stress clamp. Be sure to save the mounting ring for later use.
15. Remove the two screws and remove the line cord stress clamp **10** from the line cord.
16. Remove the ac line cord.

### Replacing the AC Line Cord

Use the stress clamp removed from the previous line cord for the next step.

1. Install the line cord stress clamp **10**. Tighten the two stress clamp screws.
2. Install the line cord and stress clamp into the input filter and install the mounting ring **4**. Use the the mounting ring removed from the old line cord.
3. Connect the green/yellow ground wire **3** to the outside rear of the power supply. Be sure to use a star washer between the lug on the wire and the power supply.
4. Connect the braided ground wire **6** to the ground point inside the input filter. Be sure to use a star washer between the lug on the wire and the input filter.
5. Connect the one wire to each of the filter capacitors **5** in the input filter.  
**Note:** If you are installing a 50 Hz (except Japan) ac line cord, connect the wire to the filter capacitor **7**.
6. Install the input filter cover plate **8** and screw **9**.

## Tape Control Unit CARR-TCU 1490

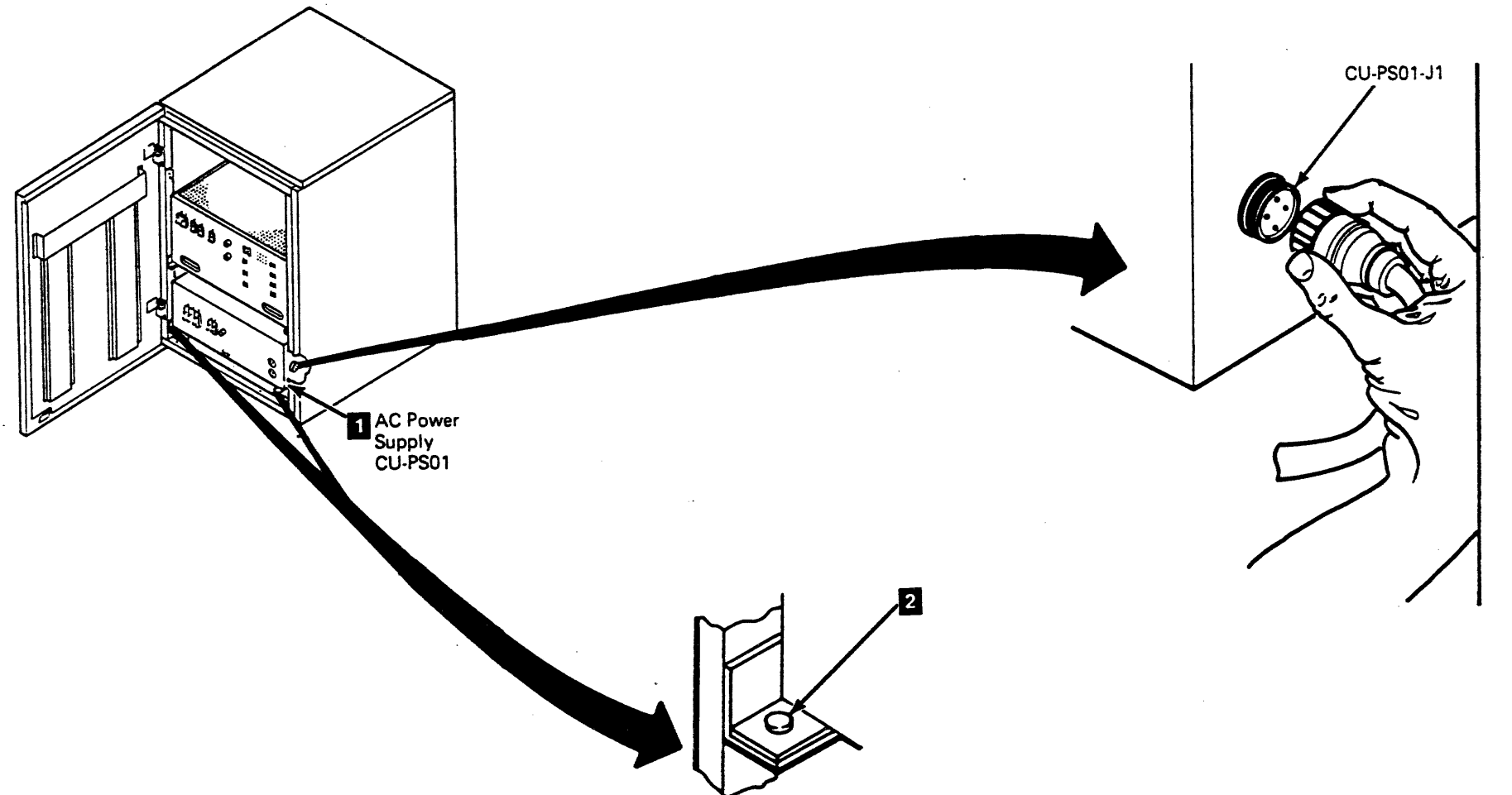
7. Slide the ac power supply to the rear of the tape control unit as far as it will go and install the two mounting bolts **2**.  
**Note:** There may not be any system cables to attach in the next step.

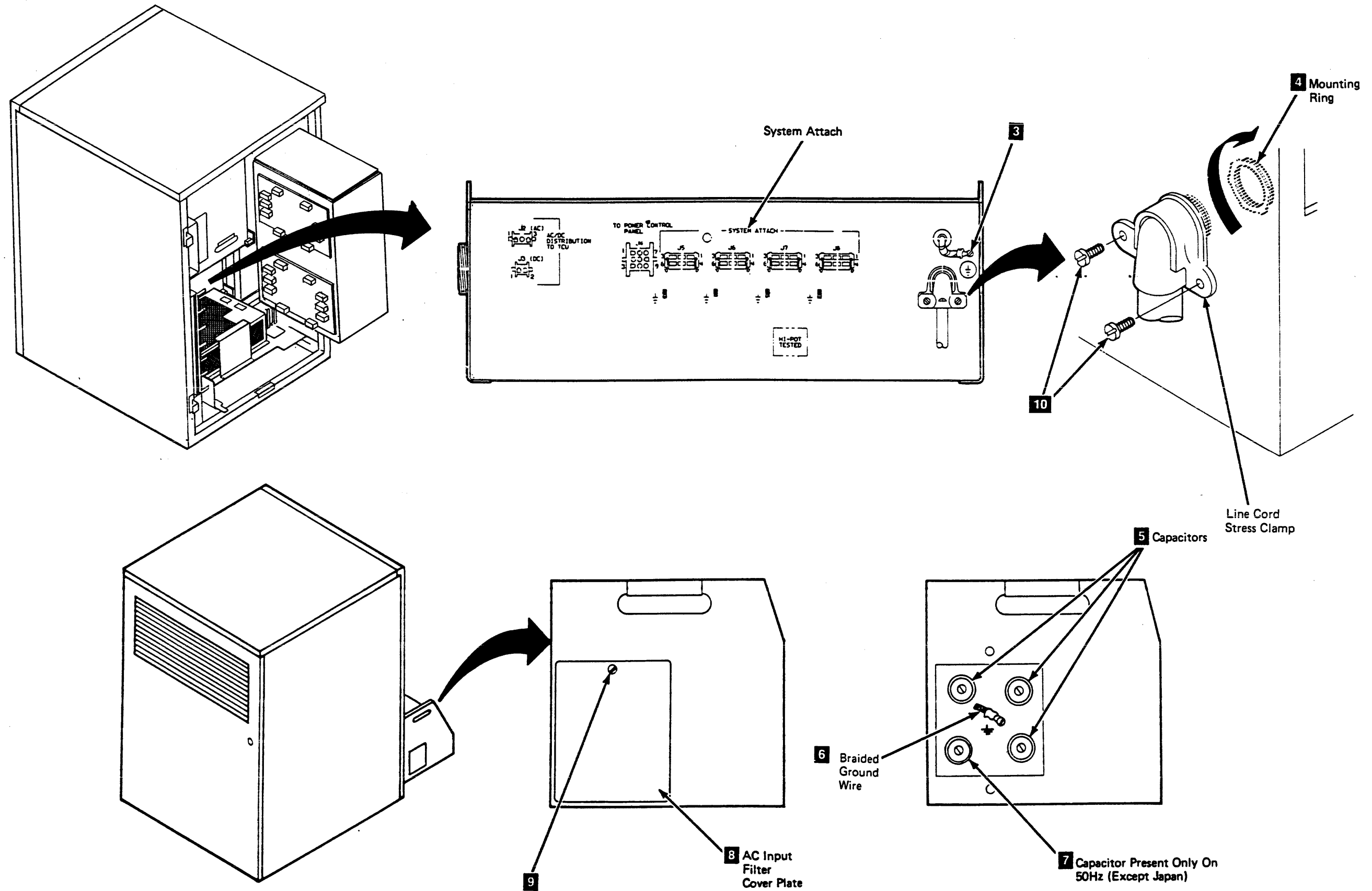
8. Install the cable clamp that holds the ac input cable to the tape control unit frame.
9. Connect all of the cables to the rear of the ac power supply **1**.
10. Connect the J1 (CU-PS01-J1) cable on the right side of the ac power supply.

#### DANGER

**Electrical shock. Hazardous voltages can be present in the ac line cord connectors.**

11. Connect the ac line cord to the power source.
12. Have the customer turn on the circuit breaker for the tape control unit ac power source.
13. Install the tape control unit rear safety cover and ground connector, if present and close the tape control unit rear cover (see CARR-TCU 2-2).
14. Install the tape control unit front cover (see CARR-TCU 2-1).
15. Go to CARR-TCU 6 for the procedure to restore **ac power** to the tape control unit.





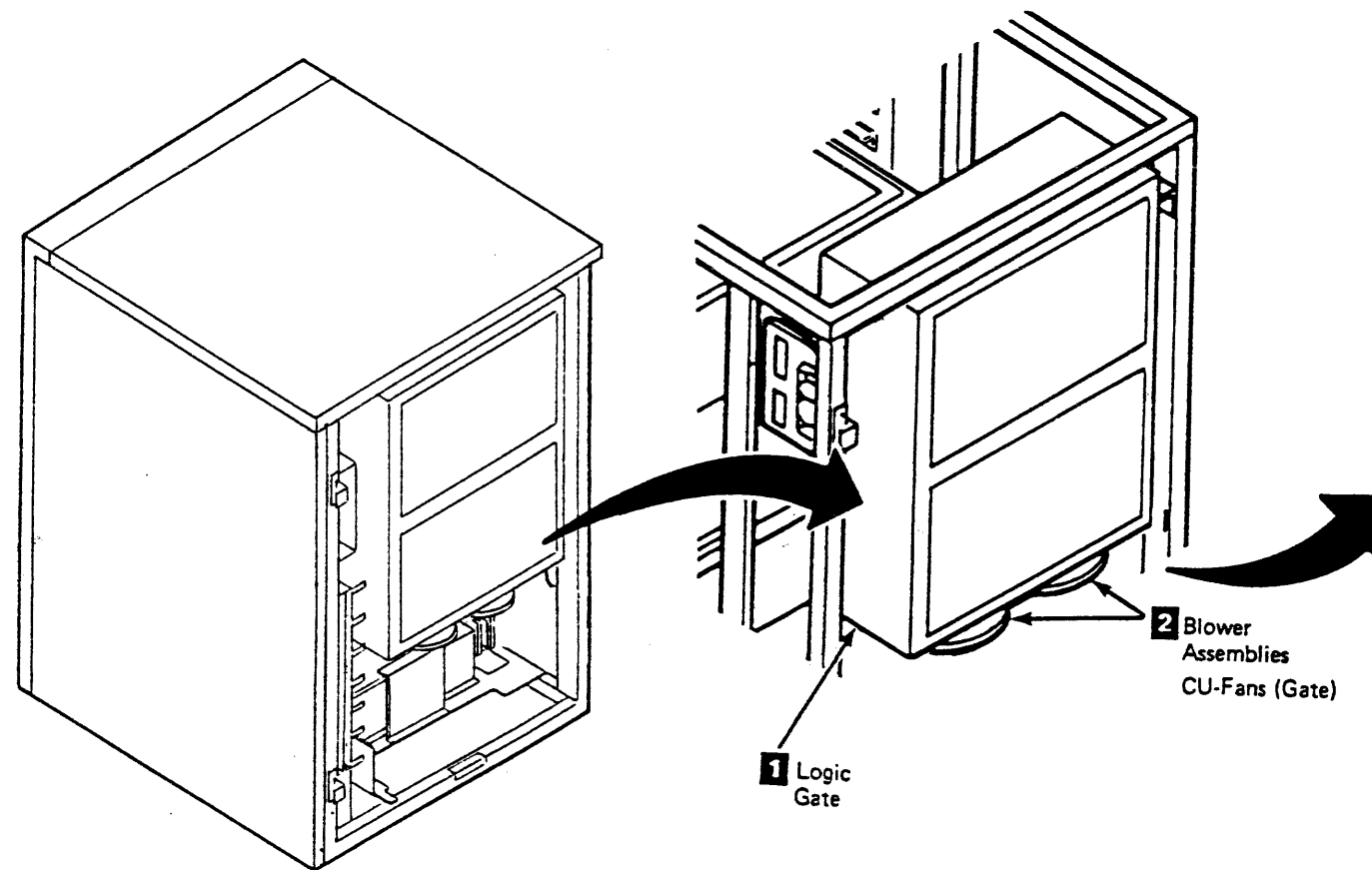
## FRU150 and 151 Blower Assembly Removal and Replacement Procedure

This page contains the steps needed to remove and replace either of the blower assemblies in the tape control unit logic gate. It is not necessary to remove the ac power from the tape control unit to remove either of the blower assemblies.

### Removing the Blower Assembly

1. Go to CARR-TCU 6 for the procedure to remove **dc power** from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the tape control unit logic gate **1** and find which of the two blowers **2** you want to replace.
4. Unplug the ac power plug **7** from the blower assembly **8**.

5. Remove the green/yellow ground connector **4** wire by removing the screw **5** and lockwasher **6**.
  6. Remove the blower mounting screws **3** and at the same time, support the blower to keep it from falling.
  7. Lift the blower assembly **8** away from the tape control unit.
  8. Remove the finger guard mounting screw **9** from the blower assembly. Be careful not to lose the lockwashers **11** and nuts **12**. Remove the finger guard **10**.
- Save the finger guard for use with the replacement blower.

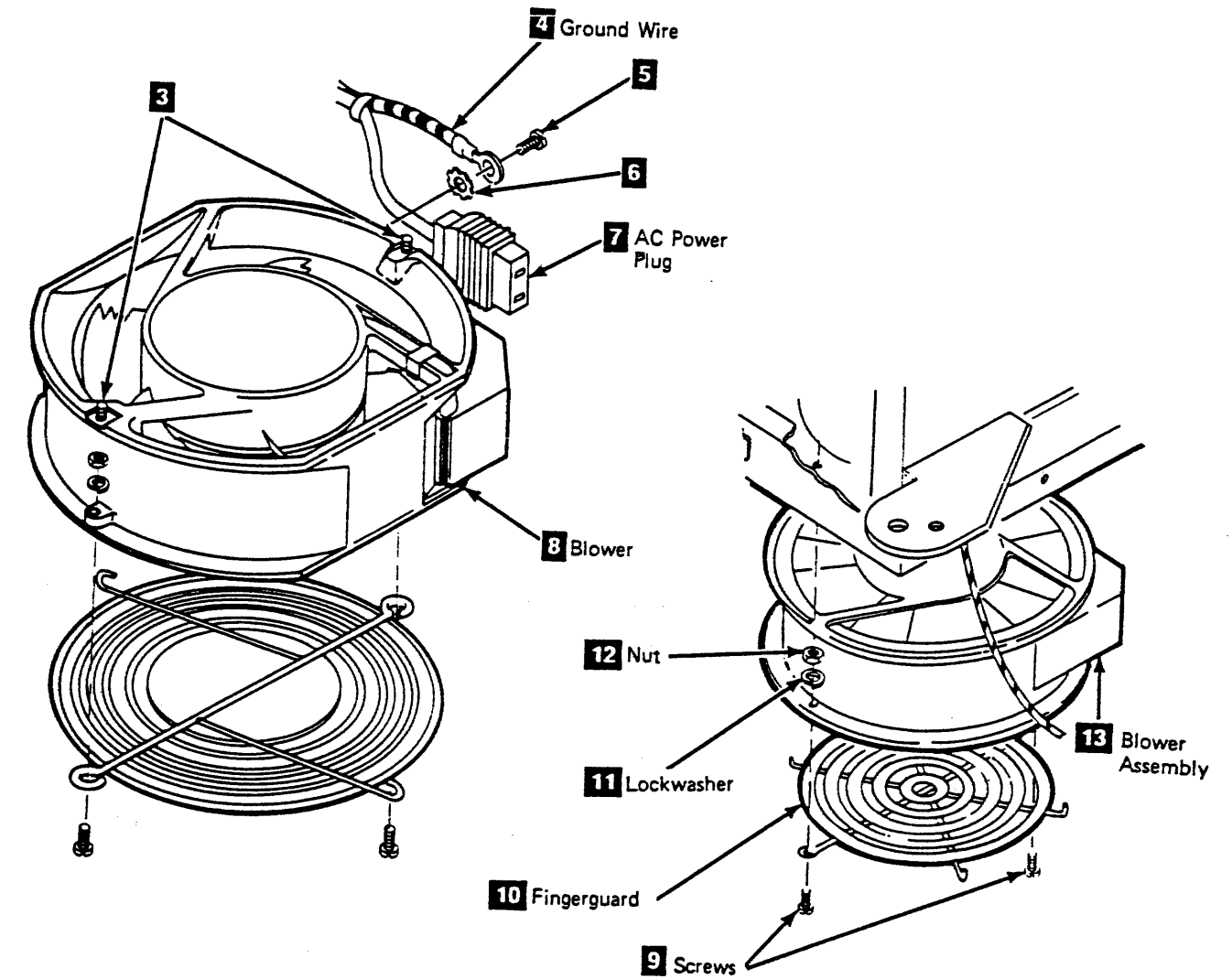


### Replacing the Blower Assembly

1. Place the finger guard **10** on the blower assembly **8** and install the mounting screws **9**, lockwashers **11** and nuts **12**.
2. Place the blower assembly **8** in position against the tape control unit logic gate **1** and install the mounting screws **3**.

## Tape Control Unit CARR-TCU 1500

3. Install the green/yellow ground connector **4**, the lockwasher **6** and the mounting screw **5** to the blower assembly **8**.
4. Connect the blower ac power plug **7** to the blower assembly. Make sure the blower plug is seated correctly on the blower.
5. Install the rear safety cover and ground connector, if present and close the rear cover (see CARR-TCU 2-2).
6. Go to CARR-TCU 6 for the procedure to restore **dc power** to the tape control unit.



## FRU157 Top Card Connector Removal and Replacement Procedure

This page contains the steps needed to remove and replace any of the top card connectors (TCC) in the tape control unit.

It is not necessary to power off the tape control unit; however, dc voltage must be removed from the tape control unit.

### Removing the Top Card Connectors (TCC)

1. Go to CARR-TCU 6 for the procedure to remove *dc power* from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the logic board cover **1** needed to remove the TCC.
4. Remove the TCC **2** from the logic card by pulling it straight away from the card.

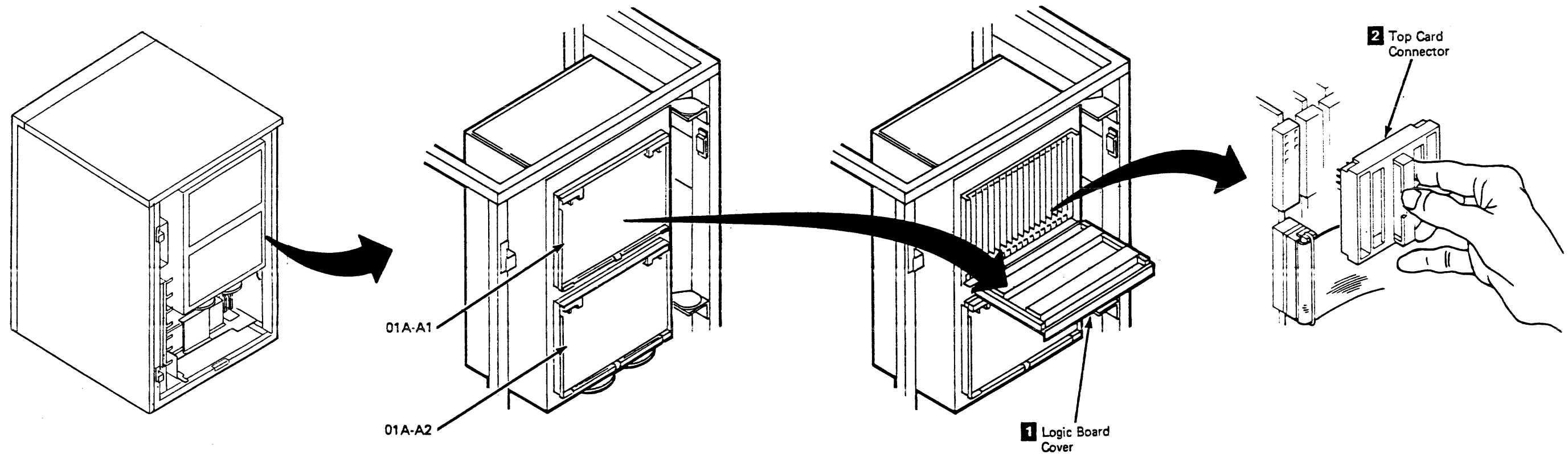
### Replacing the Top Card Connectors (TCC)

**Note:** For the logic card locations see LOC 1. For the top card connector and top card cable locations see LOC 1.

1. Insert the TCC **2** onto the logic card. Push the top card connector straight toward the logic card.
2. Close the logic board cover **1**.

## Tape Control Unit CARR-TCU 1570

3. Install the rear safety cover and ground connector, if present and close the rear cover (see CARR-TCU 2-2).
4. Go to CARR-TCU 6 for the procedure to restore *dc power* to the tape control unit.



## FRU160 Power Supply to Gate TB Cable Removal and Replacement Procedure

This page contains the steps needed to remove and replace the dc power supply to gate TB cable in the tape control unit. Since it is necessary to remove the ac power, all of the drives attached to the tape control unit should be available for service.

### Removing the DC Power Supply to Gate TB Cable

1. Go to CARR-TCU 6 for the procedure to remove **ac power** from the tape control unit.
2. Open the rear cover and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the logic gate **1**.
4. Unplug connectors CU-PS02-P4, P9, P11, P10 and P12 **6**.

5. Remove the cable retention hardware as you remove the cable to the logic gate.
  6. Remove the plastic safety covers **2** from the three terminal blocks (TBs), setting the covers to the side.
- Note:** It is not necessary to label each wire before removal because the wires on the new cable are laced to line up with the TB screws.
7. Remove the wires from TB2 **5** (CU-A1-TB2) and set the screws to the side for later use.
  8. Remove the wires from TB1 **4** (CU-A1-TB1) and set the screws to the side for later use.
  9. Remove the wires from TB3 **3** (CU-A1-TB3) and set the screws to the side for later use.
  10. Remove the cable from the tape control unit.

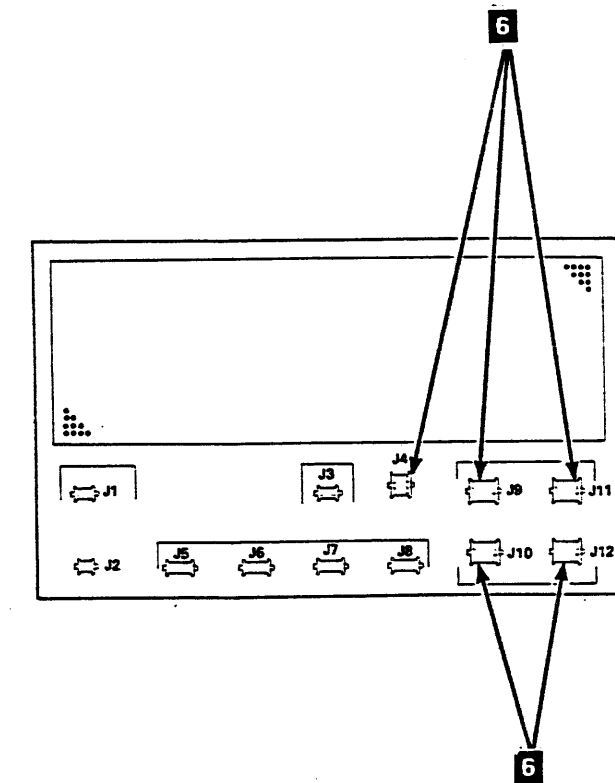
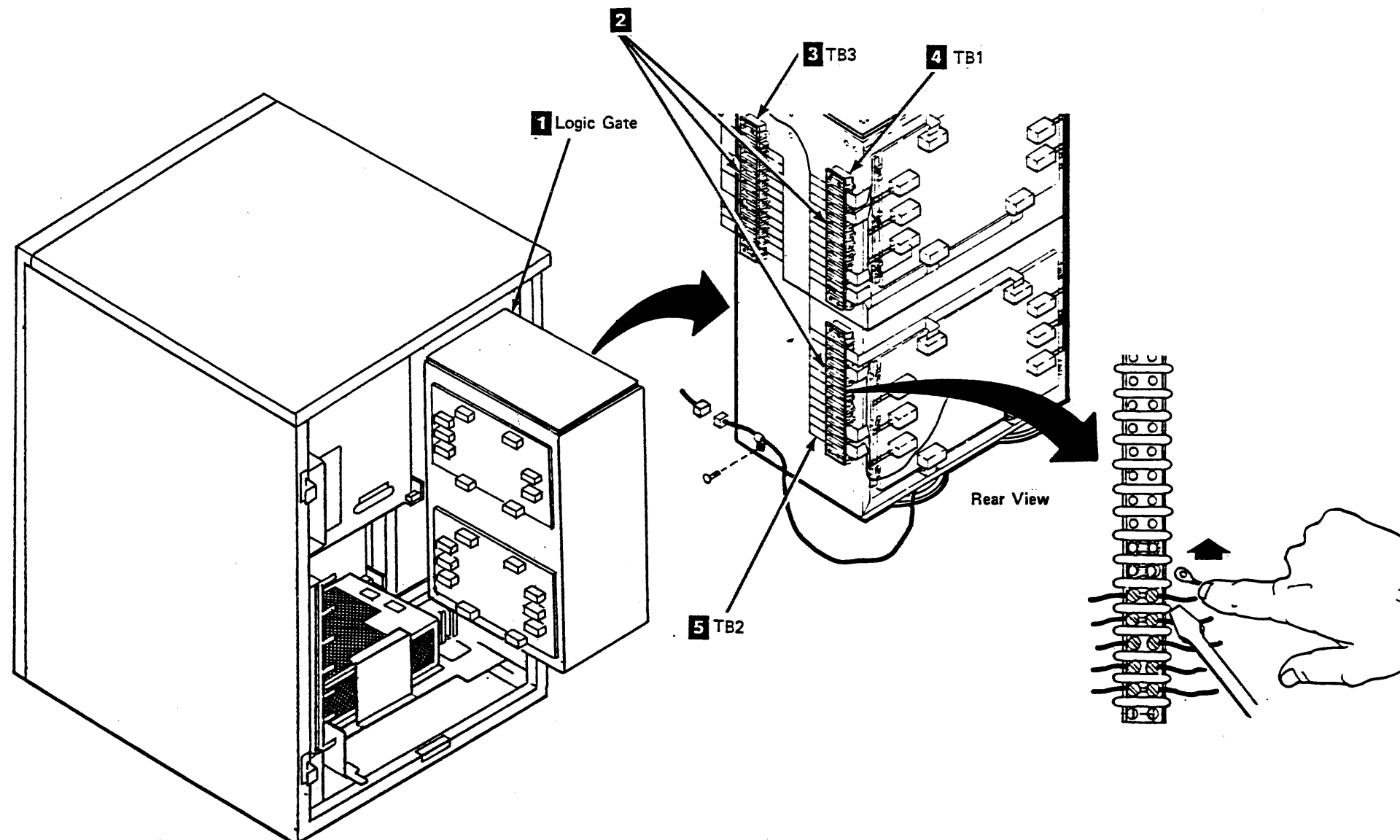
### Replacing the DC Power Supply to Gate TB Cable

**Note:** The cable is laced so that the wires line up with the TB screws.

1. Install the wires and screws to TB3 **3** (CU-A1-TB3). There are no wires connected to TB3-2, TB3-3, TB3-7, and TB3-14.
2. Install the wires and screws to TB1 **4** (CU-A1-TB1).
3. Install the wires and screws to TB2 **5** (CU-A1-TB2).
4. Place the cable in the same position as the cable removed and install the cable retention hardware.

## Tape Control Unit CARR-TCU 1600

5. Install the connectors at the top rear of the dc power supply. The connectors are installed at CU-PS02-J12, J10, J11, J9 and J4 **6**.
6. Install the three plastic safety covers **2** onto the three TBs.
7. Close the logic gate **1**.
8. Install the rear safety cover and ground connector, if present and close the rear cover (see CARR-TCU 2-2).
9. Go to CARR-TCU 6 for the procedure to restore **ac power** to the tape control unit.



## FRU162 Service Switch Assembly Removal and Replacement Procedure

This page contains the steps needed to remove and replace the service switch assembly from the tape control unit. It is necessary to remove the ac voltage from the tape control unit. All drives attached to the tape control unit must be available for service.

### Removing the Service Switch Assembly

1. Go to CARR-TCU 6 for the procedure to remove ac power from the tape control unit.
2. Open the rear cover of the tape control unit and remove the safety cover and ground connector, if present (see CARR-TCU 2-1 or 2-3).
3. Swing out the logic gate and locate TB3 (see LOC 1).
4. Remove the plastic cover from TB3.
5. Open the 01A logic board cover and remove the bottom screw from the right cable retention bar. Loosen the top screw from the right cable retention bar. (This step is necessary to provide space to remove the switch assembly wires.)

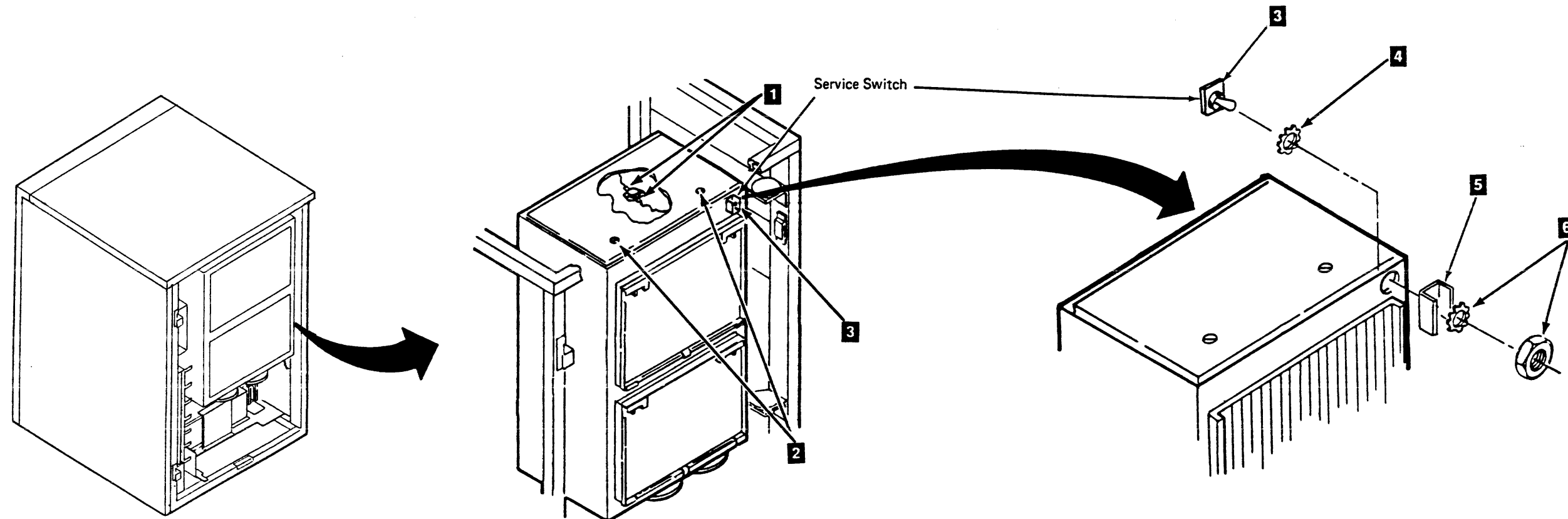
6. Disconnect the wires from TB3 positions 5A, 12A, 13A, and 14A.
7. Note the wire routing, then remove the wires from any retention hardware.
8. Loosen the two screws **2** that hold the top cover on the gate by turning the fasteners one-quarter turn counterclockwise.
9. If the thermal switch is mounted on the top cover, lift the cover up far enough to disconnect the two thermal wires **1**.
10. Lift the cover off.
11. While holding onto the service switch assembly **3**, remove the mounting nut, lock washer **6** and the guard bracket **5**, if it is removable, from the outside of the logic gate. Remove the switch assembly from inside the gate, being careful not to lose the lock washer **4**.
12. Save the mounting nut and washers for the service switch assembly replacement procedure.

### Replacing the Service Switch and Cable Assembly

1. Route the four-lead branch of the switch assembly along the same path as the old switch assembly and out the card side of the gate to TB3. Ensure the cable is routed under the 01A board right cable retention bar. This will prevent the cable being pinched when the board cover is closed.
2. Place a lock-washer **4** on the front of the service switch assembly, and with the key-way up mount it on the rear of the logic gate with the operating toggle through the gate mounting hole.
3. If removed previously, install the guard bracket **5** (with the ON label up), lock-washer, and nut **6** on the outside of the logic gate.
4. Tighten the nut to hold the assembly in place.
5. Connect the four wires to TB3 positions 5A, 12A, 13A, and 14A.

## Tape Control Unit CARR-TCU 1620

6. Place the logic gate top cover into position.
7. If you removed them previously, connect the two slip-on connectors **1** to the thermal switch.
8. Close the top logic gate cover and then tighten by turning the fasteners **2** one-quarter turn clockwise.
9. Replace the plastic cover on TB3.
10. Replace the bottom screw for the right cable retention bar for 01A logic board.  
**Note:** Ensure all cable retentions are under the cable retention bar before doing the next step.
11. Tighten the top screw for the right cable retention bar, then close the 01A logic board cover.
12. Ensure that the service switch is in the On position, then close the logic gate.
13. Replace the rear safety cover and ground connector, if present, and close the rear tape control unit cover (see CARR-TCU 2-2 or 2-4).
14. Go to CARR-TCU 6 for the procedure to restore ac power to the tape control unit.



## FRU165 Gate Fan Cable Removal and Replacement Procedure

This page contains the steps needed to remove and replace the gate fan cable from the tape control unit logic gate. It is not necessary to remove ac power to remove this cable.

### Removing the Gate Fan Cable

1. Go to CARR-TCU 6 for the procedure to remove *dc power* from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector (see CARR-TCU 2-1).
3. Open the tape control unit logic gate **1** and find the gate fan cable **3** at the bottom of the logic gate.

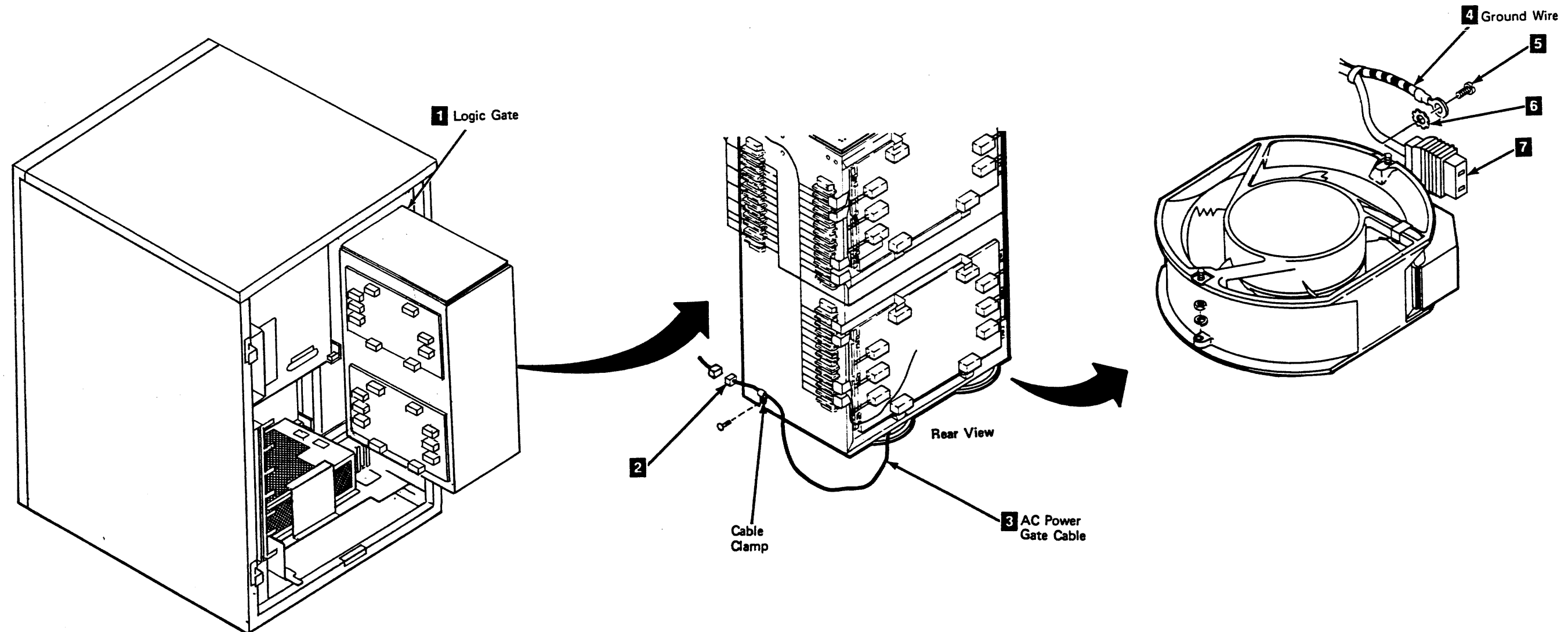
4. Unplug the connector **2** (CU-A1-P1) near the bottom hinge.
5. Unplug the connectors **7** from each of the blowers.
6. Remove the green/yellow ground wire **4**, the star washer **6** and the mounting screw **5** from each of the blowers.
7. Remove the cable clamp and remove the cable from the logic gate.

### Replacing the Gate Fan Cable

1. Place the gate fan cable **3** in position on the bottom of the logic gate and plug each connector **7** onto the blower assemblies.
2. Install the green/yellow ground wire **4** and mounting screw **5** to each of the blowers. Be sure to use the star washer **6** on each blower.

## Tape Control Unit CARR-TCU 1650

3. Install the cable clamp to the logic gate.
4. Plug the connector **2** (CU-A1-P1) into the cable near the bottom hinge of the logic gate.
5. Close the logic gate **1**.
6. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2).
7. Go to CARR-TCU 6 for the procedure to restore *dc power* to the tape control unit.



## FRU177 AC Power to Gate Cable Removal and Replacement Procedure

This page contains the steps needed to remove and replace the ac power to gate cable from the tape control unit. The ac power does not need to be removed from the tape control unit to remove the gate fan cable.

### Removing the AC Power to Gate Cable

1. Go to CARR-TCU 6 for the procedure to remove *dc power* from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).

3. Open the logic gate.

The ac power to gate cable is located near the bottom hinge of the logic gate and travels to the top rear of the dc power supply.

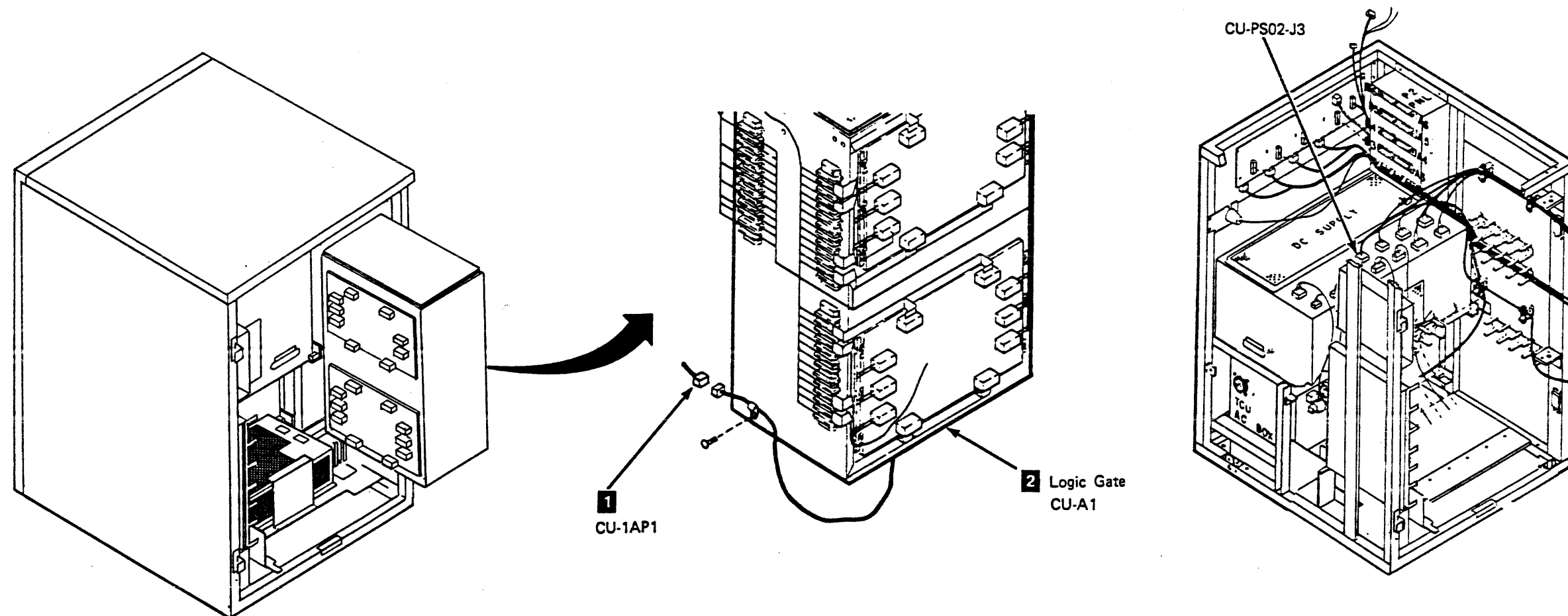
4. Unplug the connector from CU-PS02-J3.
5. Remove the cable retainers as you remove the cable from the tape control unit.
6. Disconnect the cable plug at the connector **1** (CU-A1-P1) near the bottom hinge of the logic gate **2**.
7. Remove the cable from the tape control unit.

### Replacing the AC Power to Gate Cable

1. Connect the cable plug to the connector **1** (CU-A1-P1) located near the bottom hinge of the logic gate **2**.
2. Place the cable in the path shown and install the cable retention hardware as you install the cable.

## Tape Control Unit CARR-TCU 1770

3. Connect the cable to CU-PS02-J3.
4. Close the logic gate.
5. Install the rear safety cover and ground connector, if present and close the rear cover (see CARR-TCU 2-2).
6. Go to CARR-TCU 6 for the procedure to restore *dc power* to the tape control unit.





## FRU197 TCU Address Switch Removal and Replacement Procedure

This page contains the steps needed to remove and replace either of the TCU address switches **1** from the tape control unit operator setup panel **2**.

All of the drives attached to the tape control unit must be available for service.

**Note:** This FRU can be removed and replaced without affecting the attached tape transport units by removing dc power from the tape control unit with the service switch.

### Removing the TCU Address Switch

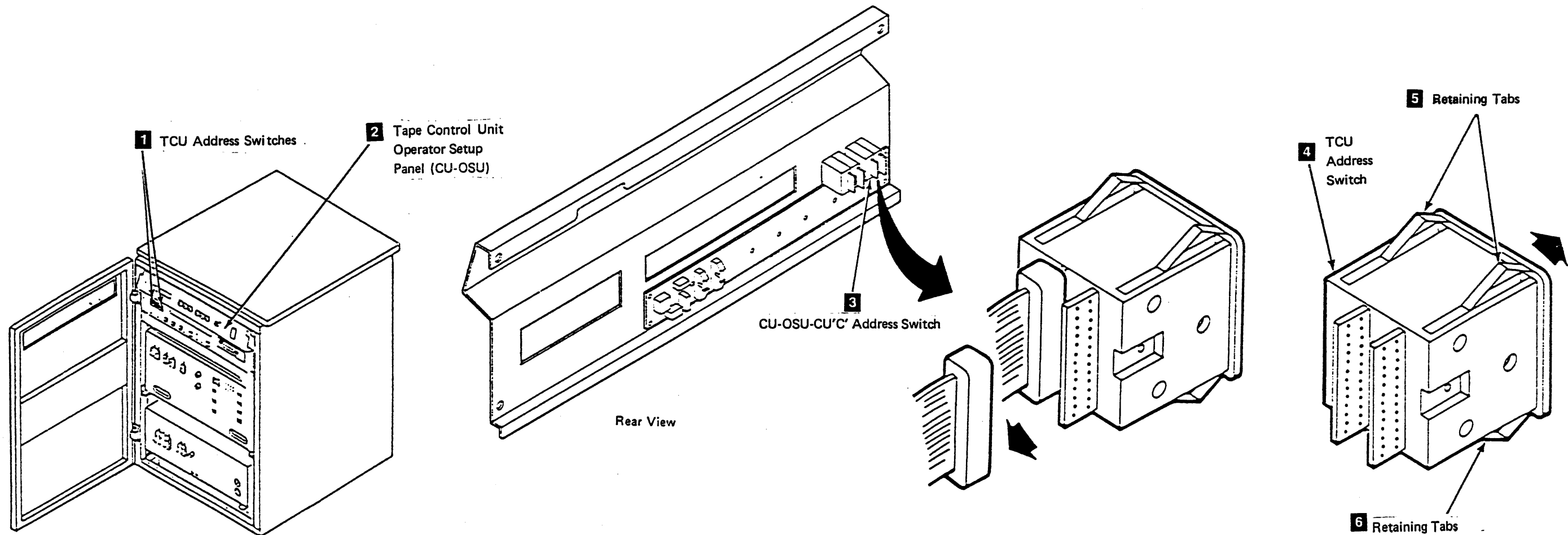
1. Go to CARR-TCU 6 for the procedure to remove *dc power* from the tape control unit.
2. Open the tape control unit rear cover and remove the top cover (see CARR-TCU 2-1).
3. Remove the two cables **3** (CU-OSU-J12 and J13) from the rear of the TCU address switch you are replacing.
4. Push the TCU address switch **1**, **4** out from the rear of the tape control unit operator setup panel **2** by squeezing the retaining tabs **5** and **6** together, and at the same time pushing the switch toward the front of the tape control unit.

### Replacing the TCU Address Switch

1. Place the TCU address switch **1**, **4** in the proper position so the numbers can be read correctly. Push the switch into the tape control unit operator setup panel **2** as far as it will go.
2. Connect the two cables **3** (CU-OSU-J12 and J13) to the switch.

## Tape Control Unit CARR-TCU 1970

3. Replace the tape control unit top cover and close the rear cover (see CARR-TCU 2-2).
4. Go to CARR-TCU 6 for the procedure to restore *dc power* to the tape control unit.



## FRU198 UEPO Switch Removal and Replacement Procedure

This page contains the steps needed to remove and replace the UEPO switch from the tape control unit operator panel. Because ac power must be switched off, it is necessary to have all drives attached to the tape control unit available for service.

### Removing the UEPO Switch

1. Go to CARR-TCU 6 for the procedure to remove *ac power* from the tape control unit.
2. Open the tape control unit rear cover and remove the top cover (see CARR-TCU 2-1 or 2-3).

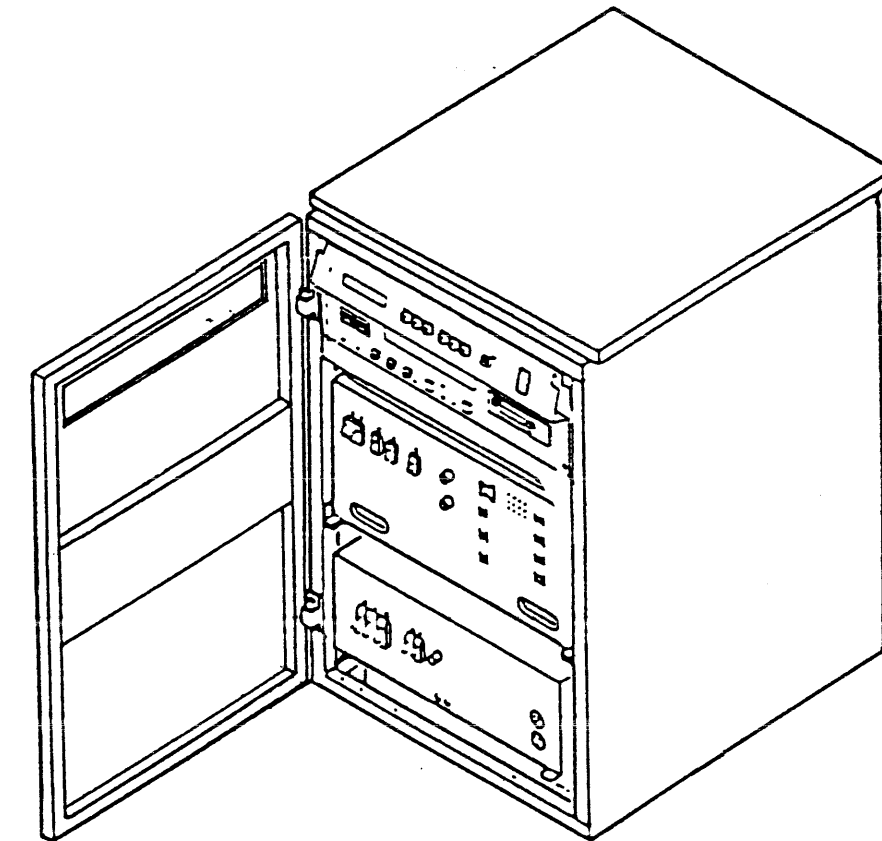
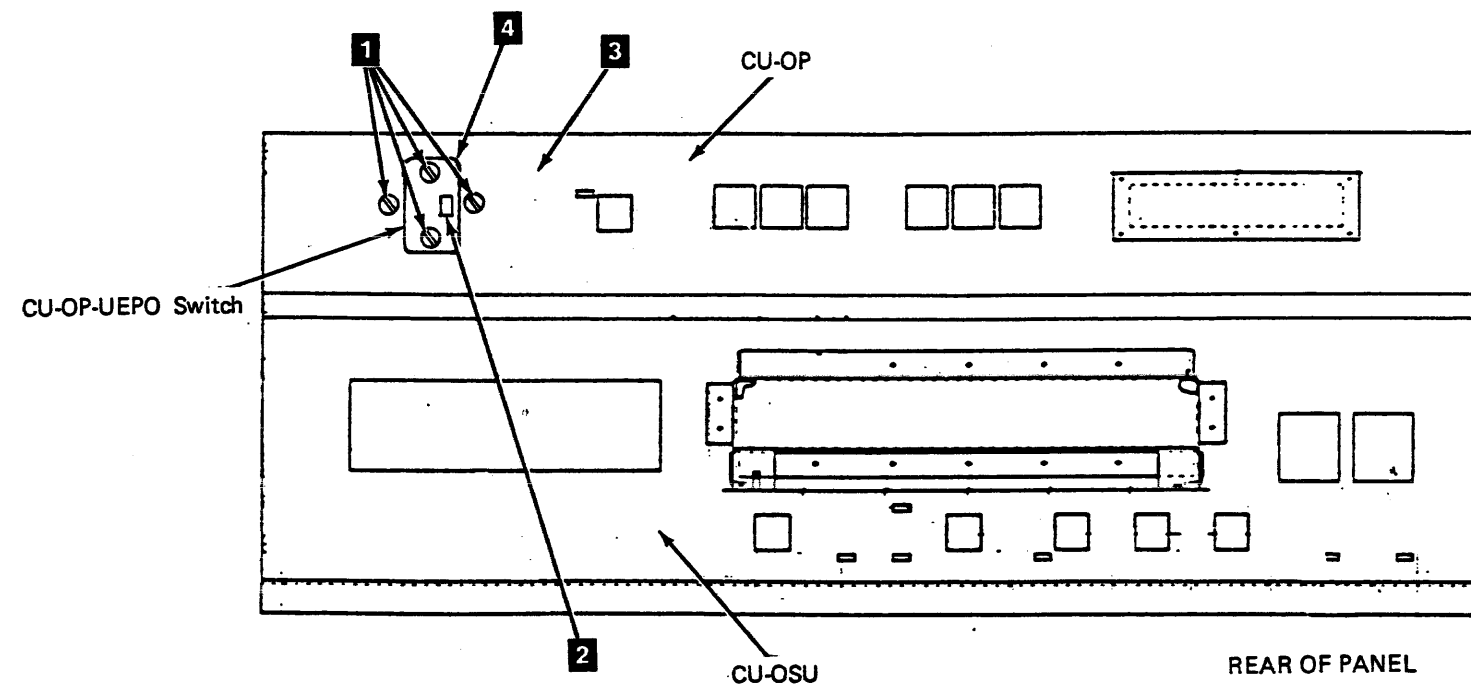
3. Remove the EPO switch cable **2**.
4. Remove the four mounting screws **1** holding UEPO switch **4** and remove the switch from the tape control unit switch panel **3** (CU-OP).

### Replacing the UEPO Switch

1. Place the UEPO switch **4** into position on the tape control unit switch panel **3** (CU-OP), and install the four mounting screws **1**.

## Tape Control Unit CARR-TCU 1980

2. Attach the UEPO switch cable **2** to the connector on the rear of the UEPO switch.
3. Replace the tape control unit top cover and close the rear cover (see CARR-TCU 2-2 or 2-4).
4. Go to CARR-TCU 6 for the procedure to restore *ac power* to the tape control unit.



## FRU 199 Write Terminator Removal and Replacement Procedure

This page contains the steps needed to remove and replace the write bus terminator. Depending on the subsystem configuration, the terminator can be in the tape control unit, or in the end drive attached to the tape control unit. The terminator will be in the tape control unit only when there are no drives physically attached to the tape control unit. It is not necessary to remove the ac or dc power from the tape control unit to exchange the terminator; however, it is necessary to have all the drives attached to the tape control unit available for service.

### Removing the Write Bus Terminator

1. Find the terminator to be removed.

There is one write bus terminator **3** for each tape control unit. This terminator will be either in the tape control unit or the end tape transport unit attached to the tape control unit, depending on your subsystem configuration.

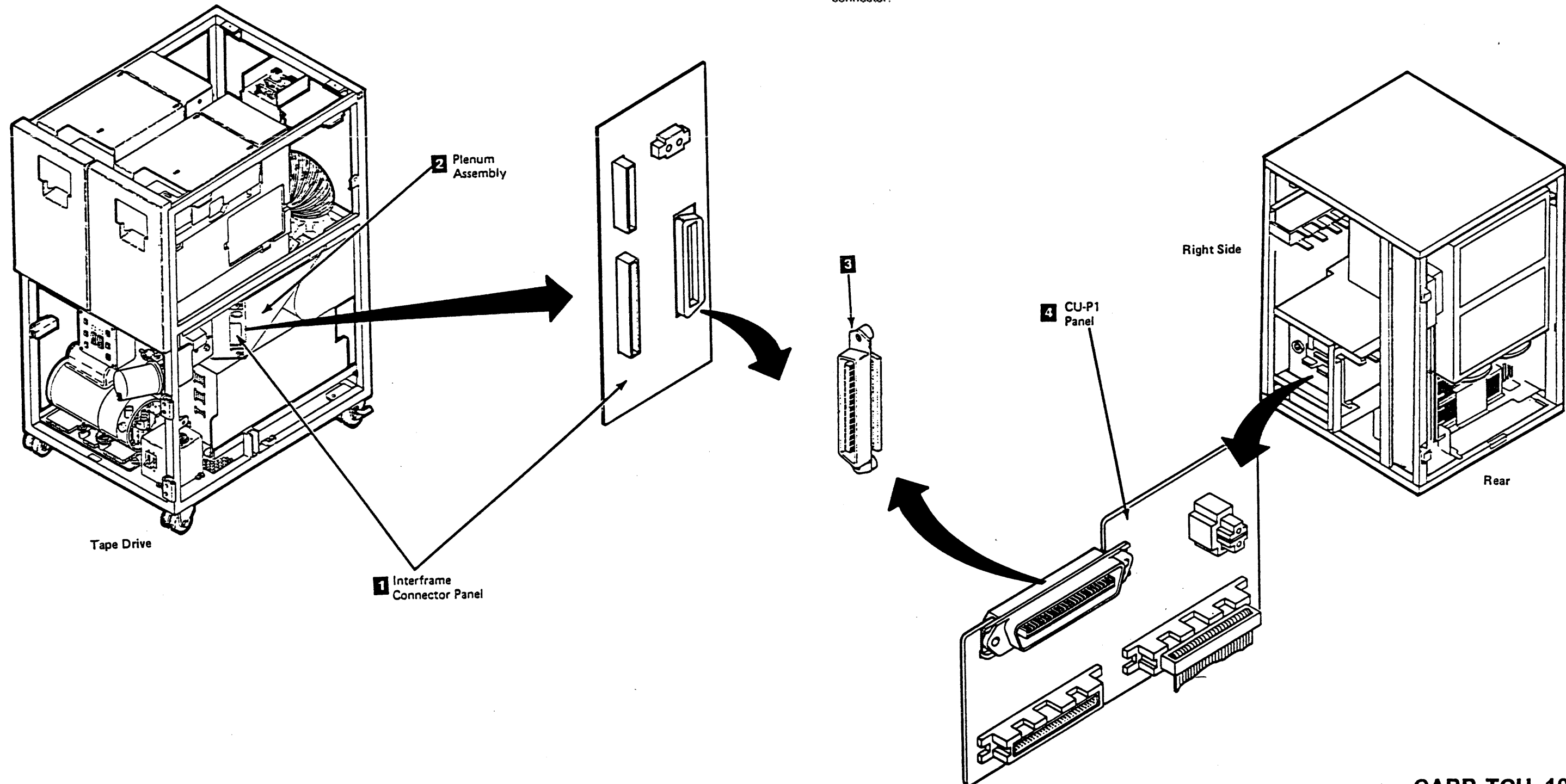
If the terminator is in the end tape unit, open the right cover (see CARR-DR 2-1) on the end tape unit. The terminator is located in the interframe connector panel **1** (attached to the right-front of the plenum assembly **2**).

2. If the terminator is in the tape control unit, open the right cover (see CARR-TCU 2-1). The terminator is located in the CU-P1 panel **4**.
3. Remove the terminator by removing the two mounting screws and pulling the terminator straight out of the connector.

## Tape Control Unit CARR-TCU 1995

### Replacing the Write Bus Terminator

1. Replace the write bus terminator **3** by pushing it straight into the connector (in the tape control unit or tape transport unit, depending on your subsystem configuration) and then replace the two mounting screws.
2. Close all covers on the tape control unit (see CARR-TCU 2-2) and tape transport units (see CARR-DR 2-2).



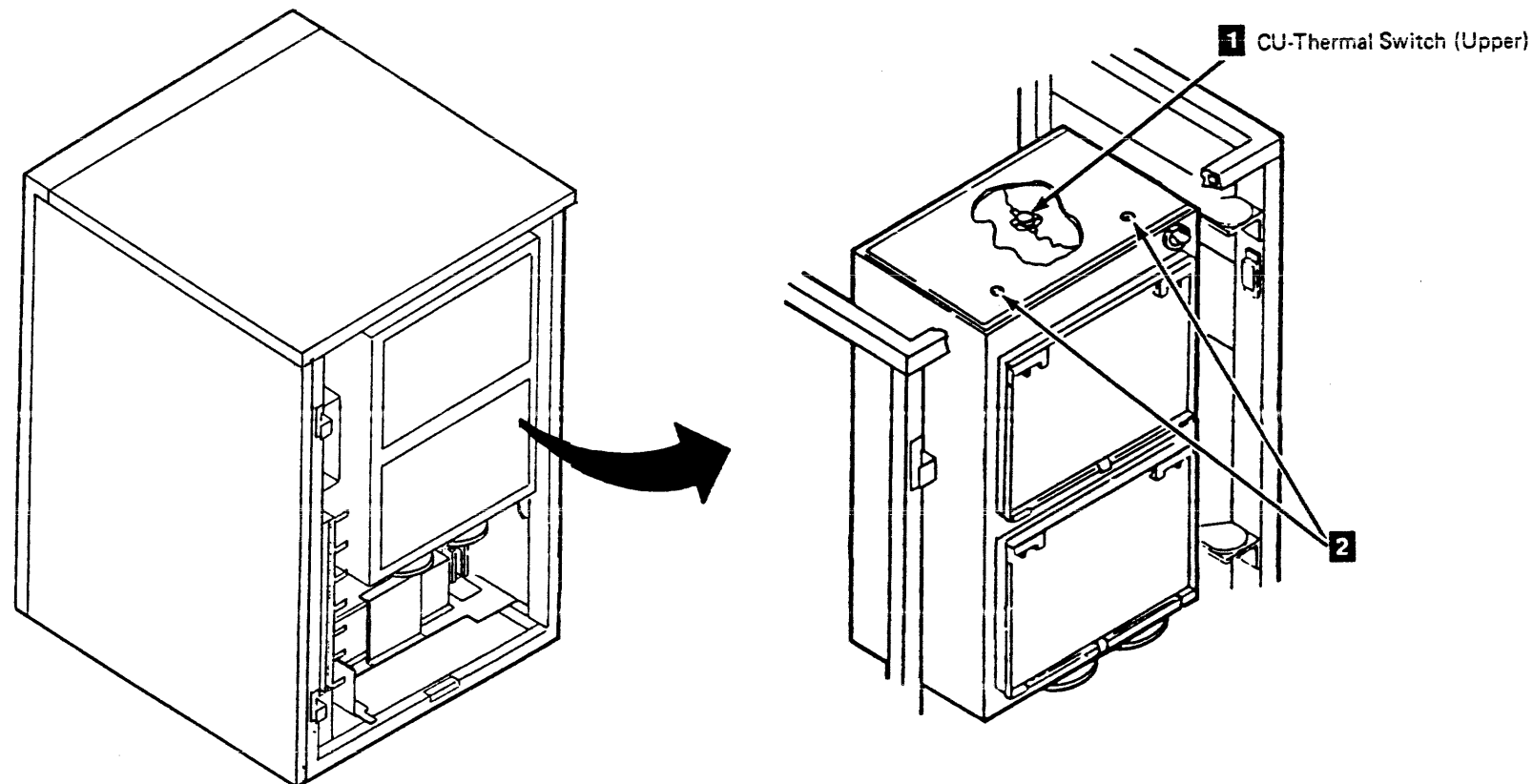
## FRU224 Tape Control Unit Gate Upper Thermal Switch Removal and Replacement Procedure

The page contains the steps needed to remove and replace the upper thermal switch in the tape control unit logic gate. It is necessary to remove the ac voltage from the tape control unit. All drives attached to the tape control unit must be available for service.

### Removing the Tape Control Unit Gate Upper Thermal Switch

1. Go to CARR-TCU 6 for the procedure to remove *ac power* from the tape control unit.
2. Open the rear cover of the tape control unit and remove the safety cover (see CARR-TCU 2-1 ).

3. Swing out the logic gate and locate the two top cover mounting screws **2**, loosen the screws.
4. Raise the cover and disconnect the two wires **3** on the thermal switch, then remove the cover.
5. Remove the two thermal switch mounting bracket screws **4**, and remove the thermal switch **1**. Save the mounting bracket hardware for the replacement procedure.

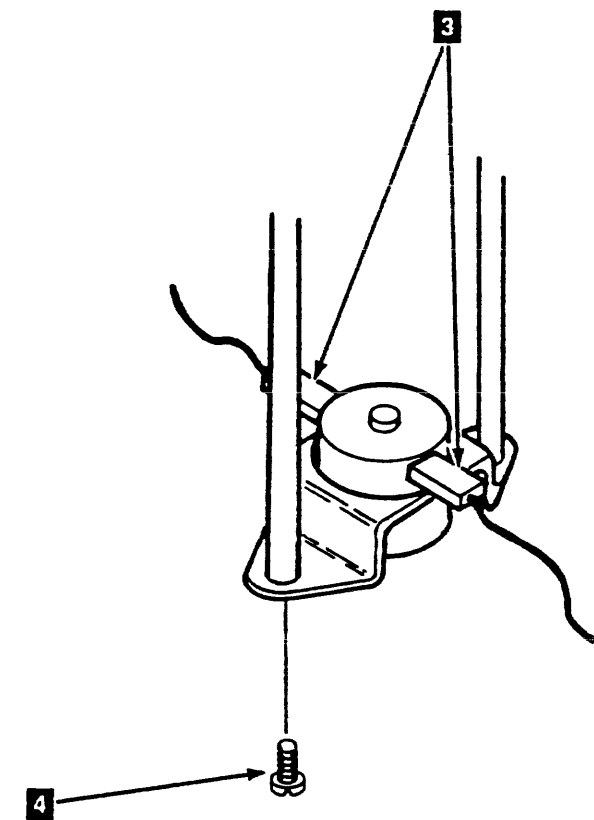


### Replacing the Tape Control Unit Gate Upper Thermal Switch

1. Place the thermal switch **1** in the mounting bracket and attach it to the gate top cover with the two mounting screws **4**.
2. Connect the two wires **3** to the thermal switch.
3. Place the cover on top of the logic gate, and tighten the two mounting screws **2**.

## Tape Control Unit CARR-TCU 2240

4. Close the gate, replace the rear safety cover, and close the rear tape control unit door (see CARR-TCU 2-2 ).
5. Go to CARR-TCU 6 for the procedure to restore *ac power* to the tape control unit.



## FRU258 IML Diskette

Tape Control Unit **CARR-TCU 2580**

### About the Initial Program Load (IML Functional Diskette)

The functional diskette is a 3.5" diskette that is used to load the microcode into the control unit for the TA90 subsystem.

**Note:** The functional diskette has a serial number written on it and on its label.

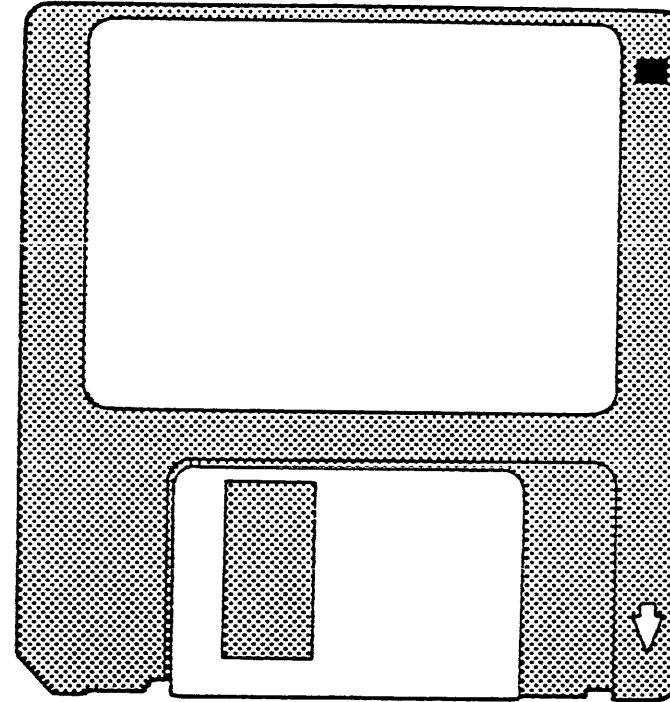
If a functional diskette problem is suspected, use the backup functional diskette for that tape control unit.

A defective functional diskette cannot be repaired. If the functional backup diskette is used, a new one at the correct EC level must be ordered to replace it.

When the new functional diskette is received, it must be IML'ed in the tape control unit that does not have a backup functional diskette. See PANEL 7 for IML'ing the TA90. Using the functional diskette causes the tape control unit serial number to be written on the diskette.

Once the serial number is written on the functional diskette:

1. Remove it from the tape control unit.
2. Write the tape control unit's serial number on the new functional diskette label using a felt-tip pen.
3. Save the new functional diskette to use as a backup for that tape control unit.



## FRU279 DC Load Box Removal and Replacement Procedure

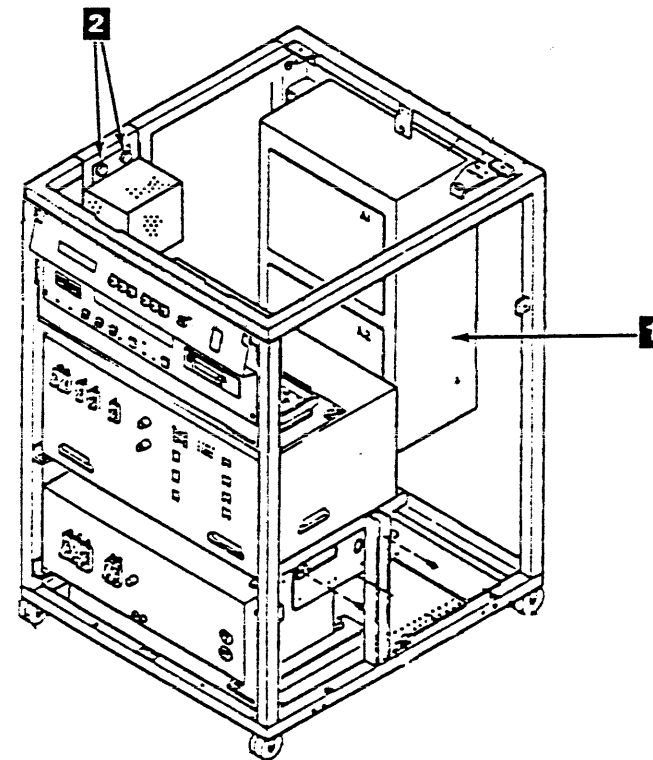
This page contains the steps needed to remove and replace the Load Box in the tape control unit. It is not necessary to power off the subsystem to remove the load box; however, the dc voltage must be removed from the tape control unit.

### Removing the Load Box

1. Go to CARR-TCU 6 for the procedure to remove dc power from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Remove the tape control unit top cover (see CARR-TCU 2-1).
4. Open the logic gate **1**.
5. Disconnect the load box cable from TB1 and TB3 (see ZT010 and ZT020 in Volume C01).
6. Remove the two screws **2** from the load box.
7. Lift the load box up and out of the tape control unit.

### Replacing the Load Box

1. Set the load box over the top side rail on the tape control unit.
2. Install the two screws **2**.
3. Install the load box cable on TB1 and TB3 (see ZT010 and ZT020 in Volume C01).
4. Close the logic gate.
5. Install the tape control unit top cover (see CARR-TCU 2-2).
6. Install the rear safety cover and ground connector, if present and close the tape control unit rear cover (see CARR-TCU 2-2).
7. Go to CARR-TCU 6 for the procedure to restore dc power to the tape control unit.



The page contains the steps needed to remove and replace the STI-FIPS Adapters in the tape control unit. It is not necessary to power off the tape control unit; however, the dc voltage must be removed from the tape control unit.

See LOC 1 for the location of the STI-FIPS adapter chassis.

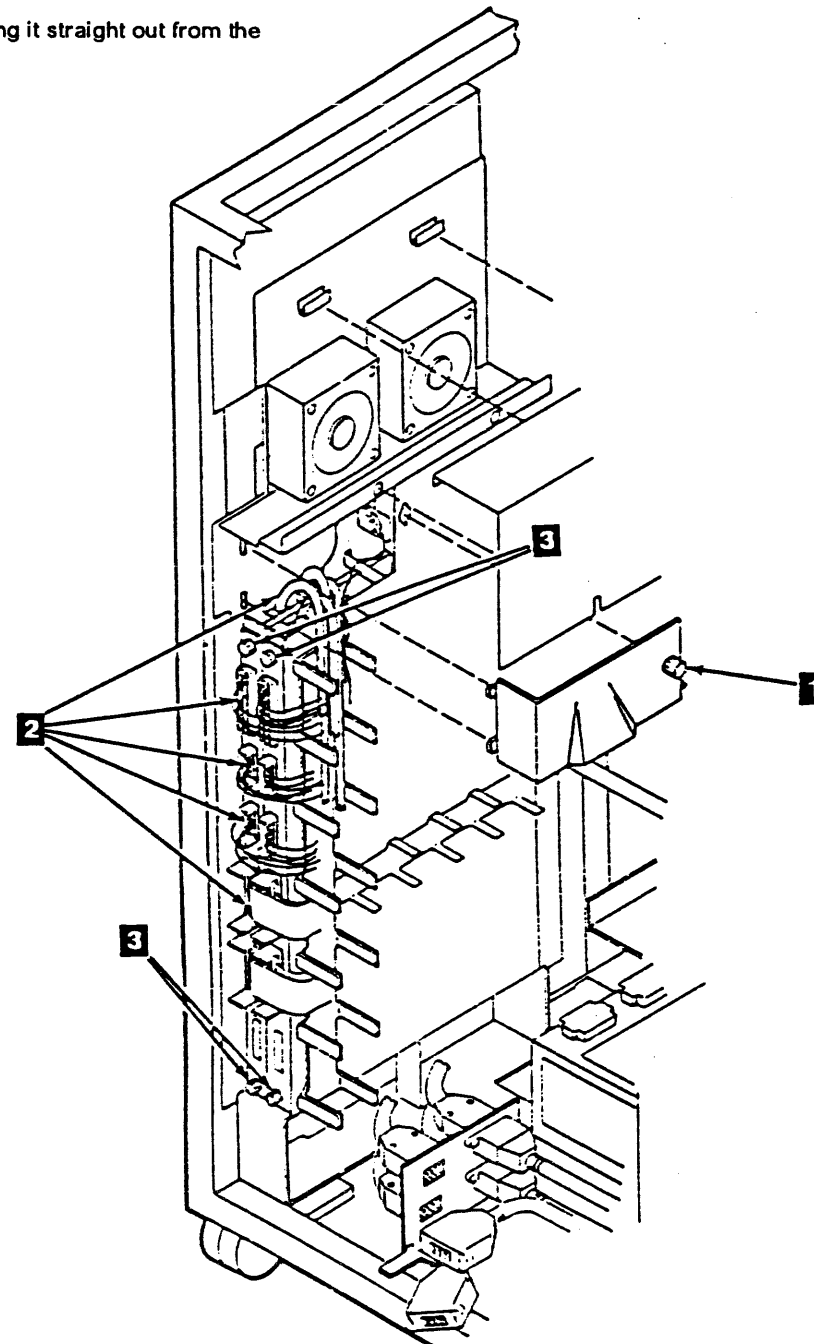
**Warning:** Parts handled during this procedure are sensitive to electrostatic discharge (ESD). See CARR-TCU 1-9 for "Instructions For Working With ESD-Sensitive Parts."

**Removing the STI-FIPS Adapter**

1. Go to CARR-TCU 6 for the procedure to remove *dc power* from the tape control unit.
2. Open the tape control unit rear cover door and remove the rear safety cover **1** (see CARR-TCU 2-1). Remove the STI-FIPS cable cover by removing the retainer thumbnut **1**.
3. Remove the card cables **2** as needed to remove the logic card.
4. Loosen the STI-FIPS adapter logic card retainer hexbolts **3** to remove the logic card. **CAUTION:** Before removing either STI-FIPS adapter card, ensure that the card cables **2** are removed.
5. Remove the logic card by pulling it straight out from the gate.

**Replacing the STI-FIPS Adapter**

1. Install the STI-FIPS adapter in the gate.
2. Tighten the STI-FIPS adapter card retainer hexbolts **3**.
3. Install the card cables **2**.
4. Install the STI-FIPS cable cover and tighten the retainer thumbnut **1** finger tight.
5. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2).
6. Go to CARR-TCU 6 for the procedure to restore *dc power* to the tape control unit.



### FRU903 STI DC Power Supply Removal and Replacement Procedure

If the replacement power supply is a different P/N than the one being replaced see CARR-TCU 9035.

This page contains the steps needed to remove and replace the dc power supply in the tape control unit. Because ac power must be turned off, all of the drives attached to the tape control unit must be available for service.

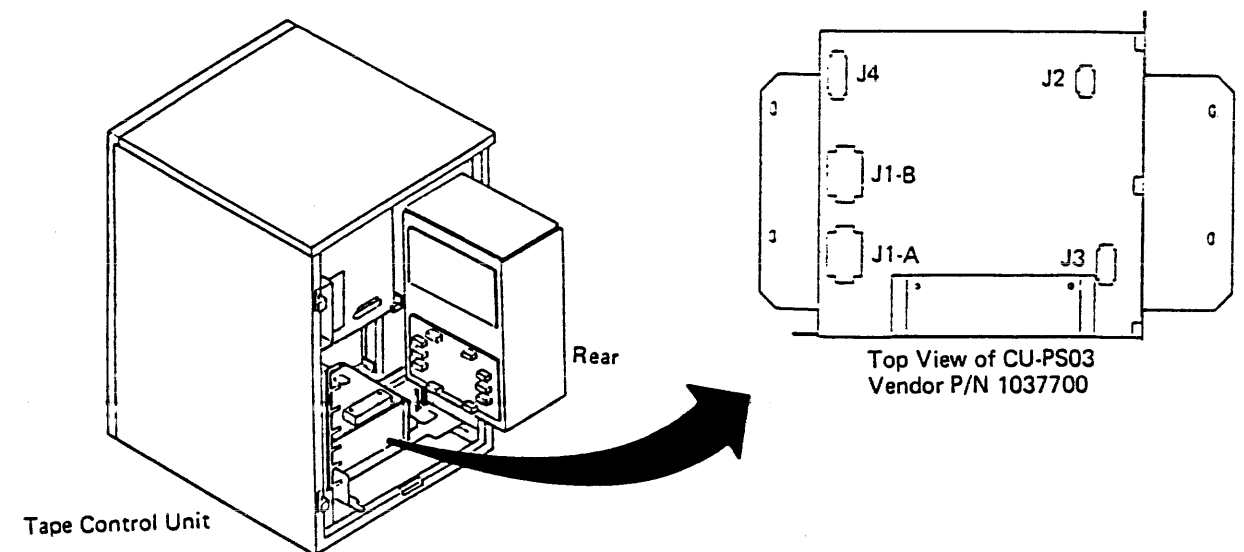
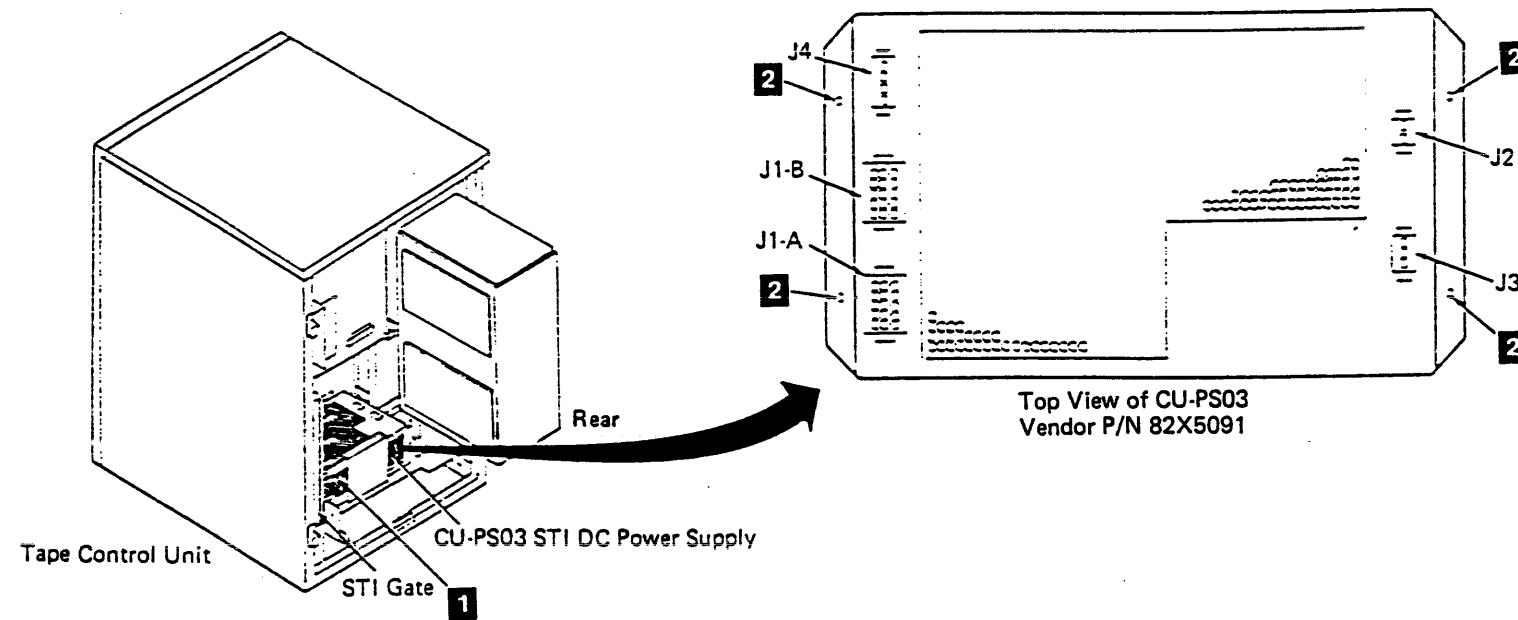
#### Removing the STI DC Power Supply

1. Go to CARR-TCU 6 for the procedure to remove *ac power* from the tape control unit.
2. Open the tape control unit rear and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the logic gate.
4. Remove the drip screen (see CARR-TCU 2-1).

5. Disconnect all of the cables from the top of the dc power supply **1** (CU-PS03).
6. Remove the four mounting bolts **2** from the STI dc power supply.
7. Remove the STI dc power supply by lifting it out the rear of the tape control unit.

#### Replacing the STI DC Power Supply

1. Place the STI dc power supply (CU-PS03) into position in the rear of the tape control unit.
2. Align the four screw holes in the flange base of the STI supply and install the four mounting screws **2**.
3. Install the cables into the top of the power supply **1**.
4. Close the logic gate.
5. Install the drip screen (see CARR-TCU 2-2).
6. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2).





## FRU903 STI DC Power Supply Removal and Replacement Procedure

From P/N 82X5091 to P/N 1037700

This page contains the steps needed to remove and replace the dc power supply in the tape control unit. Because ac power must be turned off, all of the drives attached to the tape control unit must be available for service.

### Removing the STI DC Power Supply - P/N 82X5091

1. Go to CARR-TCU 6 for the procedure to remove ac power from the tape control unit.
2. Open the tape control unit rear and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the logic gate.
4. Remove the drip screen (see CARR-TCU 2-1).
5. Remove the drip screen mounting bracket **3** and discard, save the screws and tighten to the baseplate.
6. Disconnect all of the cables from the top of the dc power supply **1** (CU-PS03).
7. Remove the four mounting bolts **2** from the STI dc power supply.
8. Remove the STI dc power supply by lifting it out the rear of the tape control unit.

### Replacing the STI DC Power Supply - P/N 1037700

1. Place the STI dc power supply (CU-PS03) into position in the rear of the tape control unit.
2. Align the four screw holes in the flange base of the STI supply and install the four mounting screws **2**.
3. Install the cables into the top of the power supply **1**.
4. Close the logic gate.
5. Install the drip screen (see CARR-TCU 2-2).
6. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2).

From P/N 1037700 to P/N 82X5091

This page contains the steps needed to remove and replace the dc power supply in the tape control unit. Because ac power must be turned off, all of the drives attached to the tape control unit must be available for service.

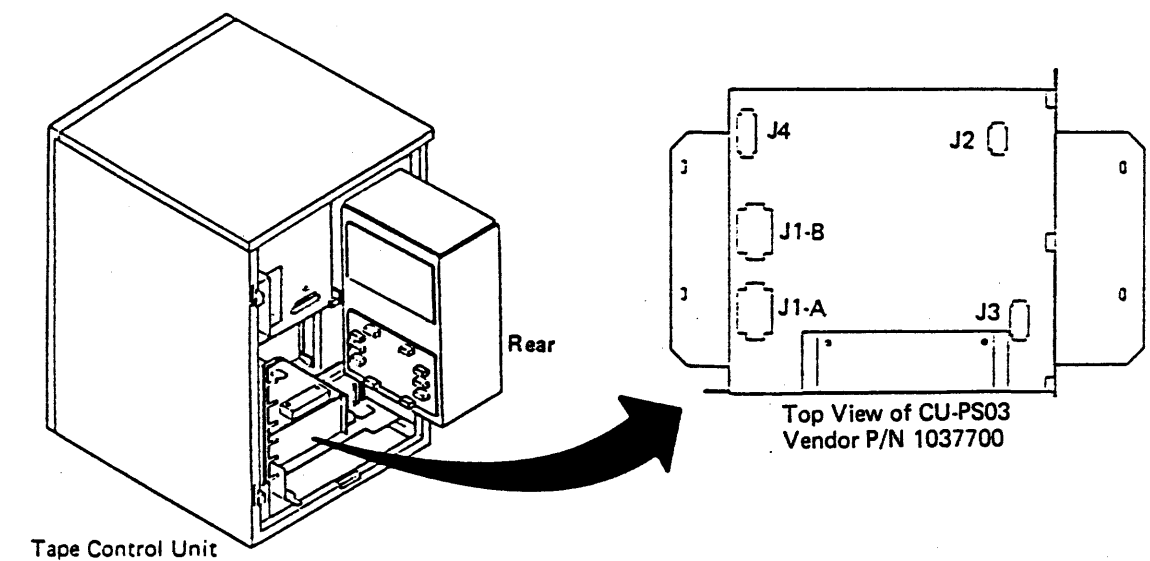
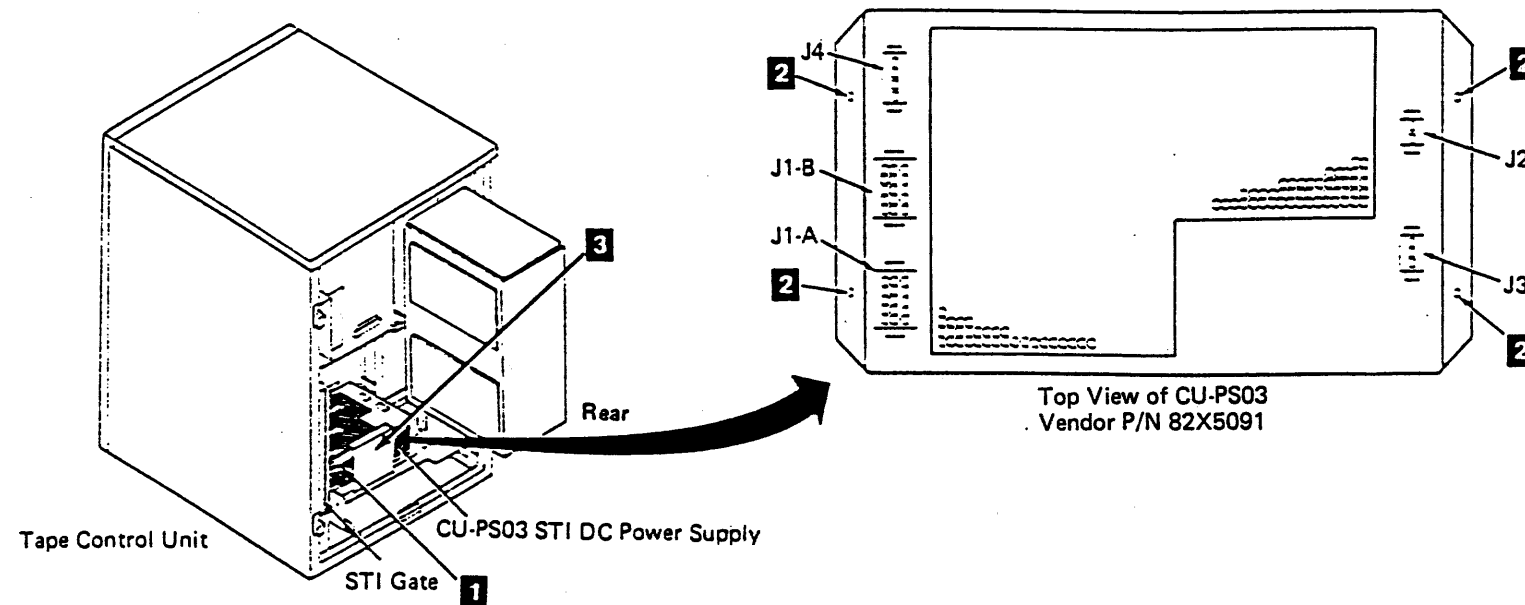
### Removing the STI DC Power Supply - P/N 1037700

1. Go to CARR-TCU 6 for the procedure to remove ac power from the tape control unit.
2. Open the tape control unit rear and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the logic gate.
4. Disconnect all of the cables from the top of the dc power supply **1** (CU-PS03).
5. Remove the drip screen (see CARR-TCU 2-1).
6. Remove the four mounting bolts **2** from the STI dc power supply.
7. Remove the STI dc power supply by lifting it out the rear of the tape control unit.

Tape Control Unit CARR-TCU 9035

### Replacing the STI DC Power Supply - P/N 82X5091

1. Place the STI dc power supply (CU-PS03) into position in the rear of the tape control unit.
2. Align the four screw holes in the flange base of the STI supply and install the four mounting screws **2**.
3. Install the cables into the top of the power supply **1**.
4. Close the logic gate.
5. Install the drip screen mounting bracket **3** supplied with this power supply to the baseplate with the screws supplied with the bracket.
6. Install the drip screen (see CARR-TCU 2-2).
7. Install the rear safety cover and close the rear cover (see CARR-TCU 2-2).



## FRU904 STI Gate Fans Removal and Replacement Procedure

This page contains the steps needed to remove and replace either of the fan assemblies in the tape control unit STI logic gate. It is not necessary to remove the ac power from the tape control unit to remove either of the fan assemblies.

### Removing the Fan Assembly

1. Go to CARR-TCU 6 for the procedure to remove **dc power** from the tape control unit.
2. Open the tape control unit rear cover and remove the rear safety cover and ground connector, if present (see CARR-TCU 2-1).
3. Open the tape control unit logic gate.

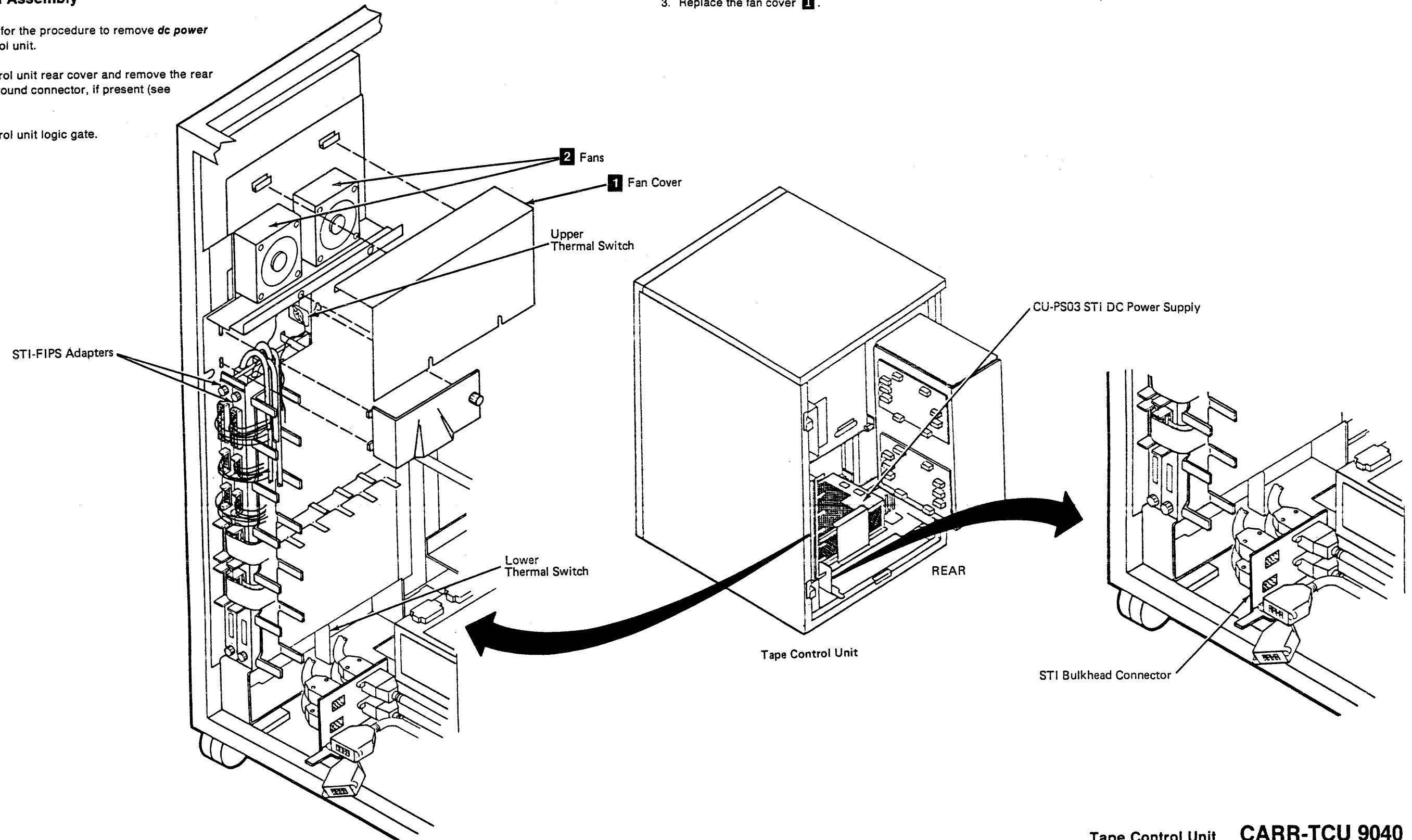
4. Remove the fan cover **1**.
5. Remove the fan cables.
6. Loosen the screws holding the fan **2** in place and remove the fan.

### Replacing the Fan Assembly

1. Mount the fan **2** with the screws previously removed.
2. Install the fan cables.
3. Replace the fan cover **1**.

## Tape Control Unit CARR-TCU 9040

4. Close the tape control unit logic gate.
5. Install the rear safety cover and ground connector, if present, and close the rear cover (see CARR-TCU 2-2).
6. Go to CARR-TCU 6 for the procedure to restore **dc power** to the tape control unit.



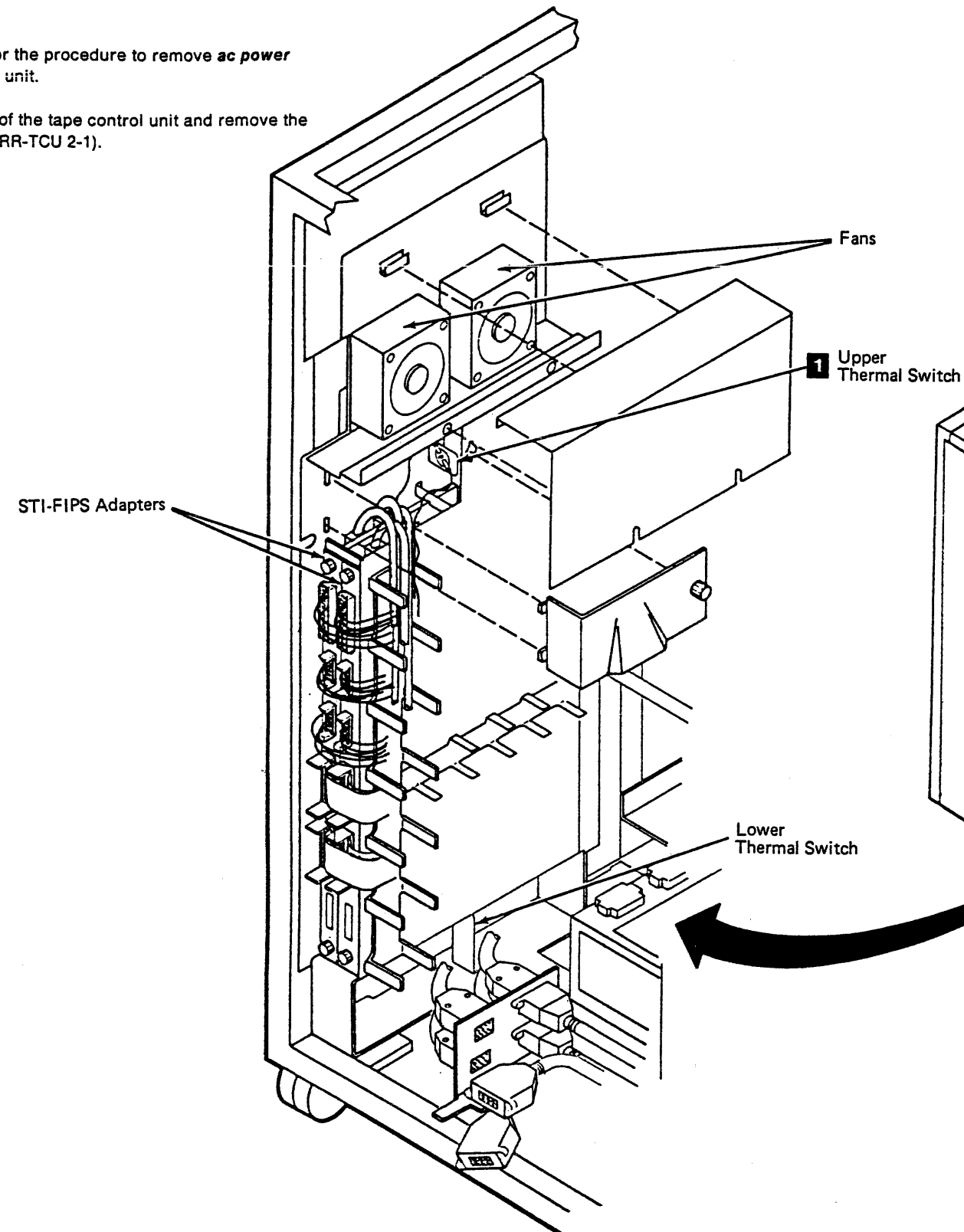
## FRU905 Tape Control Unit STI Gate Upper Thermal Switch Removal and Replacement Procedure

The page contains the steps needed to remove and replace the upper thermal switch in the tape control unit STI logic gate. It is necessary to remove the ac voltage from the tape control unit. All drives attached to the tape control unit must be available for service.

### Removing the Tape Control Unit STI Gate Upper Thermal Switch

1. Go to CARR-TCU 6 for the procedure to remove *ac power* from the tape control unit.
2. Open the rear cover of the tape control unit and remove the safety cover (see CARR-TCU 2-1).

3. Swing out the logic gate.
4. Remove the two wires from the upper thermal switch **1**.
5. Remove the thermal switch from the mounting bracket.

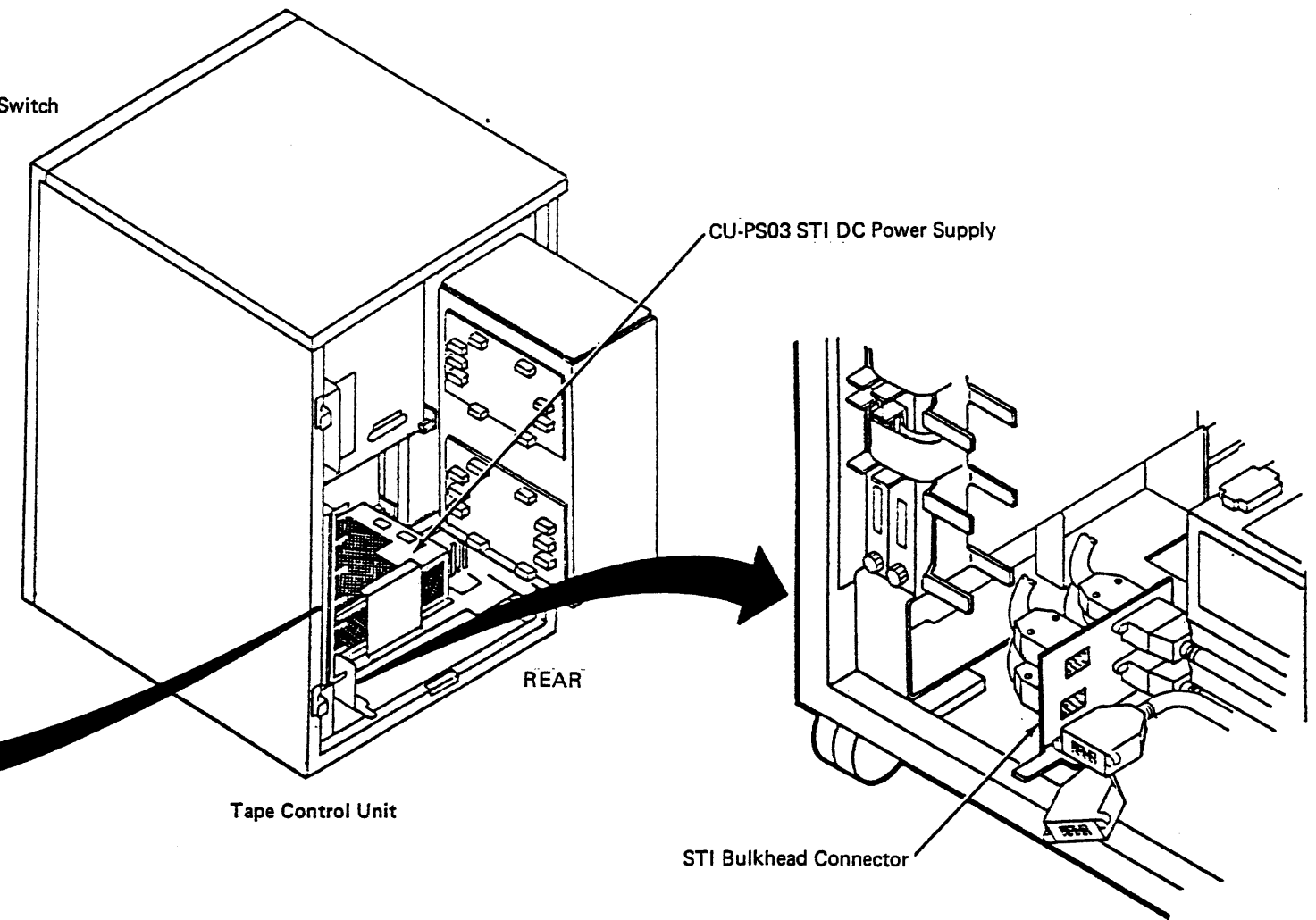


### Replacing the Tape Control Unit STI Gate Upper Thermal Switch

1. Place the thermal switch **1** in the mounting bracket and attach it to the gate.
2. Connect the two wires to the thermal switch.

## Tape Control Unit CARR-TCU 9050

3. Close the gate, replace the rear safety cover, and close the rear tape control unit door (see CARR-TCU 2-2).
4. Go to CARR-TCU 6 for the procedure to restore *ac power* to the tape control unit.



## FRU906 Tape Control Unit STI Gate Lower Thermal Switch Removal and Replacement Procedure

The page contains the steps needed to remove and replace the lower thermal switch in the tape control unit STI logic gate. It is necessary to remove the ac voltage from the tape control unit. All drives attached to the tape control unit must be available for service.

3. Swing out the logic gate.
4. Remove the two wires from the lower thermal switch **1**.
5. Remove the thermal switch from the mounting bracket.

### Replacing the Tape Control Unit STI Gate Lower Thermal Switch

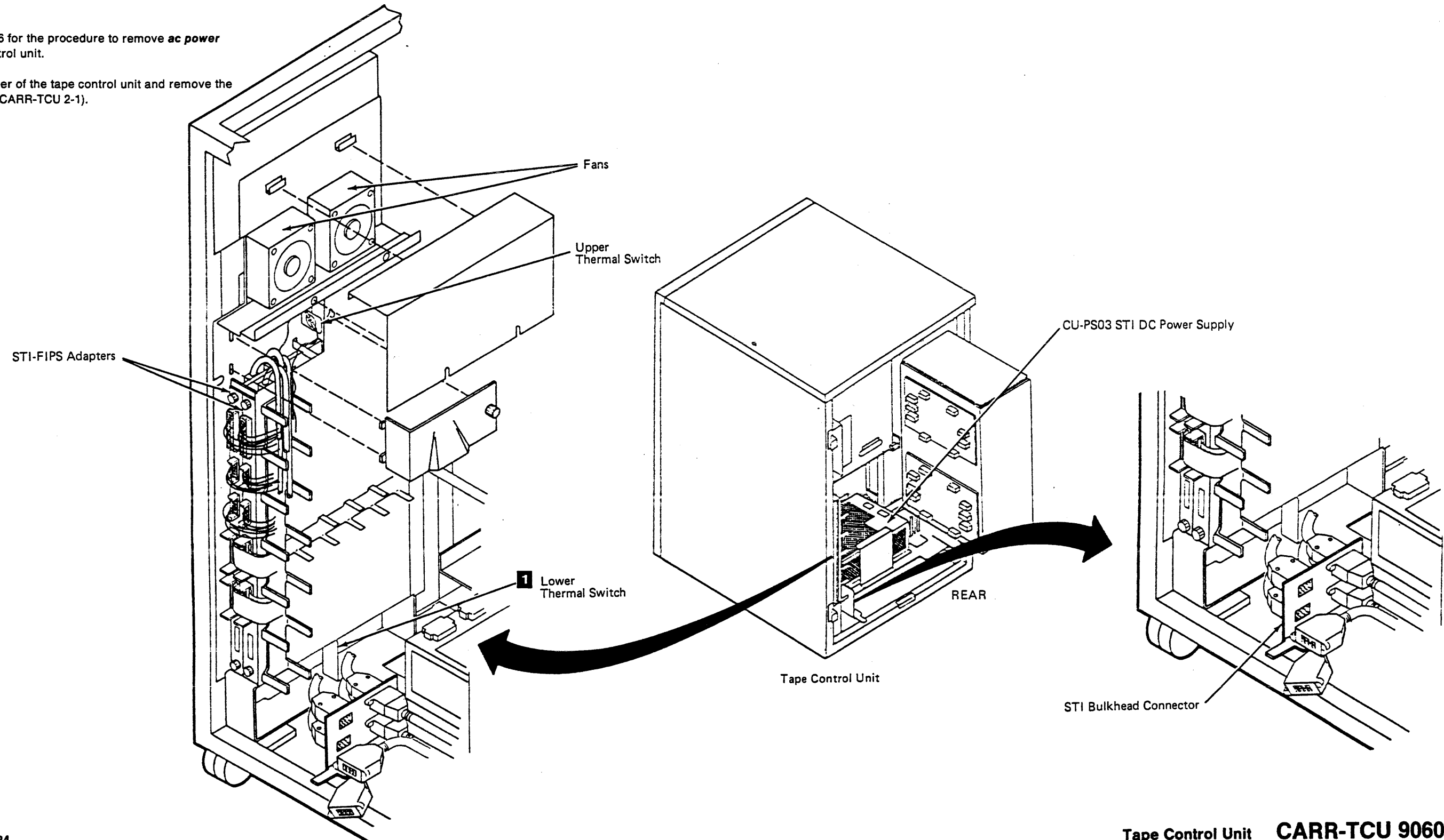
1. Place the thermal switch **1** in the mounting bracket and attach it to the gate.
2. Connect the two wires to the thermal switch.

## Tape Control Unit CARR-TCU 9060

3. Close the gate, replace the rear safety cover, and close the rear tape control unit door (see CARR-TCU 2-2).
4. Go to CARR-TCU 6 for the procedure to restore *ac power* to the tape control unit.

### Removing the Tape Control Unit STI Gate Lower Thermal Switch

1. Go to CARR-TCU 6 for the procedure to remove *ac power* from the tape control unit.
2. Open the rear cover of the tape control unit and remove the safety cover (see CARR-TCU 2-1).



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| Clarity                  | 5         | 4    | 3    | 2    | 1            |
| Completeness             | 5         | 4    | 3    | 2    | 1            |
| Table of Contents, Index | 5         | 4    | 3    | 2    | 1            |
| Illustrations, examples  | 5         | 4    | 3    | 2    | 1            |
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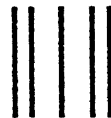
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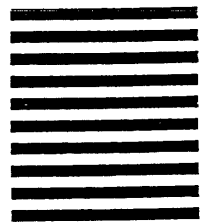
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