



**Maintenance Library**

**3274**

**Control Unit  
Models 21A, 21B, 21C, 21D, 31A, 31C and 31D  
Maintenance Information**

## Preface

This manual contains the information needed by the Product Field Engineering (FE) Customer Engineer to maintain the 3274 Control Unit Models 21A, 21B, 21C, 21D, 31A, 31C, and 31D. Some information in this manual pertains only to certain of these models. Throughout this manual, model numbers are expressed in abbreviated form as:

- 3274 — All Models (21 and 31)
- Model 21 — Models 21A, 21B, 21C, 21D
- Model A — Models 21A, 31A

The maintenance procedures described in this manual and performed by the Product Customer Engineer represent a part of the overall support structure for the 3274 Control Unit. This support structure begins at the 3274 operator level and is briefly described as follows:

- *3274 Operator* — Performs initial problem isolation and recording of 3274 status indications by following the procedure in the *3274 Problem Determination Guide*, GA27-2850. If the problem involves other than a customer operating procedure or customer-supplied power, the operator completes the *3274 Problem Report Form* and requests IBM service.

- *Product Customer Engineer* — Performs the maintenance procedures described in this manual to isolate the problem to a field replaceable unit (FRU). The *3274 Problem Report Form* prepared by the operator gives the 3274 indications necessary for performing these procedures. If the problem cannot be isolated and corrected, the Product Customer Engineer will request assistance from the next level of the support structure.
- *Support Customer Engineer* — Verifies the results obtained by the Product Customer Engineer and thoroughly analyzes the problem by means of the following:
  - Tests
  - Log Information
  - Error Code Definitions
  - Result of Host Test Routines
  - Special Tools and Test Equipment

If the problem cannot be isolated and repaired using these service aids, the Support Customer Engineer records the problem indications and supporting information on the 3274 Problem Checklist and requests assistance from the next level of the support structure.

## Organization

This manual is organized as follows:

- Chapter 1 — Introduction
- Chapter 2 — Subsystem Problem Isolation
- Chapter 3 — Maintenance Analysis Procedures
- Chapter 4 — Maintenance Procedures
- Chapter 5 — Communications Reference Data
- Chapter 6 — 3274 Encrypt/Decrypt Feature (Model C Only)
- Appendix A — Locations
- Appendix B — Power Supplies
- Appendix C — Connector, Board, and Card Locations
- Appendix D — Interface Connectors, Cables, and Terminators
- Appendix E — Operator Panel
- Appendix F — Installation Instructions — Models A, B, and D Local Attached Interface
- Appendix G — 33FD Diskette Drive Theory and Maintenance
- Appendix P — 3274 Models 21 and 31 Parts Catalog

### Second Edition (May 1981)

This is a revision of and supersedes SY27-2530-0. Incorporated in this edition are corrections of technical inaccuracies, more current information on Integrated Modems, and updated Maintenance Analysis Procedures (MAPs).

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## Safety Notices

The safety notices that appear in this manual are **DANGER** statements. Read these statements carefully to understand fully the risks involved and the instructions.

- **DANGER:** Indicates the possibility of personal injury.

The following **DANGER** notices appear in the applicable procedures in Chapter 4.

### DANGER

Safety glasses must be worn when performing any removal or replacement procedures.

### DANGER

Verify that the AC power cord has been disconnected before attempting to service any primary power components.

### DANGER

The ferrotransformer filter capacitor carries a stored charge after the control unit is powered down. Avoid hand contact until the capacitor is discharged.

### DANGER

Verify that the AC power cord is disconnected.

### DANGER

Leads going to the primary power box rear terminal strip must be replaced in the same order. Note, or make a drawing of, the lead positions, tagging as necessary, before removal.

### DANGER

If the EPO jumper/plug is used, power for this 3274 cannot be turned off by the system EPO.

### DANGER

Verify that the AC power cord has been disconnected before removing the operator panel assembly.

Model C – AC line voltage is present at the power-on switch even with the switch in the off position.

Models A, B, D – Relay switching is used for local and and remote power-on (+24 volts at the power-on switch).

## CE Safety Practices

All Customer Engineers are expected to take every safety precaution possible and observe the following safety practices while maintaining IBM equipment:

- Do not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if you **MUST** work alone.
- Remove all AC and DC power when removing or assembling major components, working in immediate area of power supplies, performing mechanical inspection of power supplies and installing changes in machine circuitry.
- Wall box power switch, when turned off, should be locked or tagged in off position. "Do not Operate" tags, form 229-1266, should be affixed when applicable. Pull power supply cord whenever possible.
- When it is absolutely necessary to work on equipment having exposed operating mechanical parts or exposed live electrical circuitry anywhere in the machine, the following precautions must be followed:
  - Another person familiar with power-off controls must be in the immediate vicinity.
  - Never wear rings, wristwatches, chains, bracelets, metal cuff links, etc.
  - Use only insulated pliers and screwdrivers.
  - Keep one hand in pocket.
  - When using test instruments, be certain they are of proper capacity and controls are set correctly. Use only insulated probes.
  - Avoid contacting ground potential (metal floor strips, machine frames, etc.); use suitable rubber mats, purchased locally if necessary.
- Safety glasses must be worn when:
  - Using a hammer to drive pins, riveting, staking, etc.
  - Power hand drilling, reaming, grinding, etc.
  - Using spring hooks, attaching springs.
  - Soldering, wire cutting, removing steel bands.
  - Using solvents, sprays, cleaners, chemicals, etc., to clean parts.
  - All other conditions that may be hazardous to your eyes. **REMEMBER, THEY ARE YOUR EYES.**
- Special safety instructions, such as handling Cathode Ray Tubes and extreme high voltages, must be followed as outlined in CEMs and Safety Section of the Maintenance Manuals.
- Do not use solvents, chemicals, greases or oils that have not been approved by IBM.
- Avoid using tools or test equipment that have not been approved by IBM.
- Replace worn or broken tools and test equipment.
- The maximum load to be lifted is that which in your opinion and that of management does not jeopardize your own health or well-being or that of other employees.
- All safety devices such as guards, shields, signs, ground wires, etc., shall be restored after maintenance.
- Each Customer Engineer is responsible to ensure that no action on his part renders a product unsafe or exposes hazards to customer personnel.
- Place removed machine covers in a safe, inaccessible place where no one can trip over them.
- All machine covers must be in place before machine is returned to customer.
- Always place CE tool kit away from walk areas (i.e., under desk or table) where no one can trip over it.
- Avoid touching mechanical moving parts (when lubricating, checking for play, etc.).
- When using stroboscope, do not touch ANYTHING – it may be moving.
- Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must remain buttoned or rolled above the elbow.
- Ties must be tucked in shirt or held by a tie clasp (preferably nonconductive) approximately 3 inches from end. Tie chains are not recommended.
- Before starting equipment, ensure other CEs and customer personnel are not in a hazardous position.
- Maintain good housekeeping in area of machines while performing and after completing maintenance.

## Artificial Respiration

### General Considerations

- Start immediately – seconds count  
Do not remove victim unless absolutely necessary to remove from danger. Do not wait or look for help or stop to loosen clothing; warm the victim or apply stimulants.
- Check mouth for obstructions  
Remove foreign objects – pull tongue forward.
- Loosen clothing – keep warm  
Take care of these items after victim is breathing by himself or when help is available.
- Remain in position – After victim revives, be ready to resume respiration if necessary.
- Call a Doctor – Have someone summon medical aid.
- Don't give up – Continue without interruption until victim is breathing without help or is certainly dead.

### Rescue Breathing for Adults

#### Victim on His Back Immediately

- Clear throat of water, food, or foreign matter.
- Tilt head back to open air passage.
- Lift jaw up to keep tongue out of air passage.
- Pinch nostrils to prevent air leakage when you blow.
- Blow until you see chest rise.
- Remove your lips and allow lungs to empty.
- Listen for snoring and gurglings, signs of throat obstruction.
- Repeat mouth-to-mouth breathings 10-20 times a minute.



Thumb and finger positions



Final mouth-to-mouth position

Continue rescue breathing until he breathes for himself.

Reprint Courtesy Mine Safety Appliances Co.

## Chapter 1. Introduction

### 1.1 GENERAL

This manual provides the information needed by the Product Customer Engineer to maintain the 3274 Control Unit Models 21A, 21B, 21C, 21D, 31A, 31C and 31D, as follows:

- 3274-21A Local SNA Attachment — 64K storage
- 3274-21B Local 3272 Attachment — 64K storage
- 3274-21C SDLC/BSC Attachment — 64K storage
- 3274-21D Local 3272 Attachment with Configuration Support C — 64K storage
- 3274-31A Local SNA Attachment — 128K storage
- 3274-31C SDLC/BSC Attachment — 128K storage
- 3274-31D Local 3272 Attachment with Configuration Support C — 128K storage

Entry to and use of the MAPs and Maintenance Procedures should result *only* from performing the sequential steps of the Subsystem Problem Isolation Procedure.

All Subsystem Problem Isolation information starts on page 2-1. Specific procedures are listed in the left column; supplementary notes to individual procedures are given in the second column; and other applicable reference material is presented in the right column.

In most cases, the information supplied isolates a problem to a defective or loose field replaceable unit (FRU), cable, or connector. If the problem cannot be isolated and repaired by performing the Subsystem Problem Isolation Procedure and associated MAPs and Maintenance Procedures, request assistance from the next level of the support structure.

### 1.2 MAINTENANCE APPROACH

The maintenance approach to 3274 problems is illustrated in Figure 1-1. This approach involves performing the sequential steps of the Subsystem Problem Isolation Procedure. These steps are:

#### Step 1

Obtain the 3274 Problem Report Form from the operator. Figure 1-2 shows a sample form. This form is used by the operator to record the status (indications) of the 3274 when a problem is encountered. If the form has not been completed, perform the procedure described in the *Problem Determination Guide (PDG)*, GA27-2850, and record the necessary information.

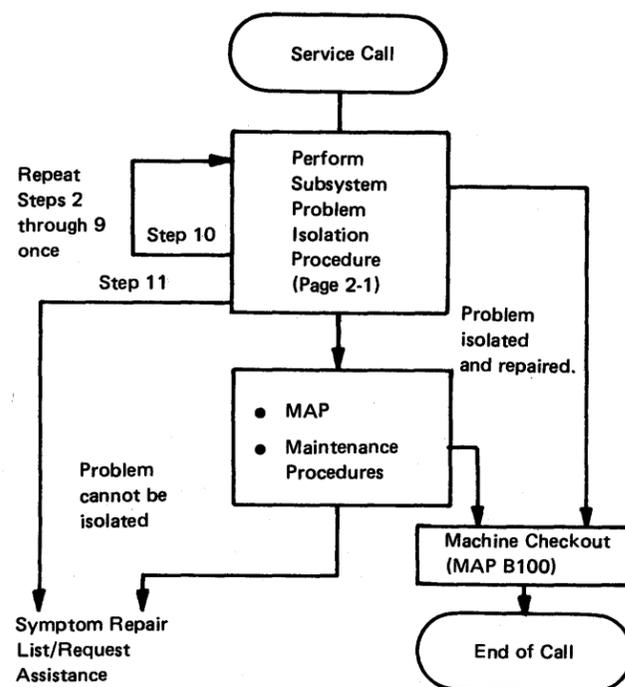


Figure 1-1. Maintenance Approach

#### Steps 2 through 9

Steps 2 through 9 must be performed sequentially. If the problem is encountered during these steps, you will be directed to an FRU replacement figure (chart), a MAP, or a Maintenance Procedure. When the problem has been isolated and repaired, the Machine Checkout MAP must be used to verify correct operation. Steps 2 through 9 include the following tests and checks:

- Step 2 — Verification that the DC power light is on
- Step 3 — Bus Test
- Step 4 — Internal tests/IML load
- Step 5 — Device driver/receiver check
- Step 6 — Display symbol/error suffix check
- Step 7 — Operational indicator check
- Step 8 — Host tests
- Step 9 — Voltage checks

#### Step 10

If the problem was not encountered during Steps 2 through 9, this step directs you to repeat Steps 2 through 9. If the problem is not encountered while Steps 2 through 9 are being repeated, Step 11 is performed.

#### Step 11

Step 11 first directs you to the Symptom Repair List. If this list cannot assist in isolating and repairing the problem, Step 11 directs you to request assistance. The assistance should be the support structure and/or local assistance. The assistance may consist of data searches, diagnostic assistance, and/or on-site assistance.

The first step will normally be a data search, if available. Diagnostic assistance may be performed by the support structure and/or locally. The method used should be that which will result in the most rapid resolution of the problem.

Initial on-site assistance will usually be local.

**IBM 3274 Control Unit**  
**Problem Report Form**

Please fill out this form before requesting service.

- Are all attached terminals failing? YES NO  
If "NO" is checked, please identify all failing terminals:
- Check any of the following symbols that are displayed in the operator information area of any failing display station:
 

Subsystem Ready	<input checked="" type="checkbox"/>
Host Connection	<input type="checkbox"/> A or B
Communication Problem	<input type="checkbox"/>
Machine Check Problem	<input checked="" type="checkbox"/>
Program Error	<input type="checkbox"/> PROG

If one of these three symbols is displayed, please insert the 3-digit code following the symbol.
- Record the status of the 8 4 2 1 indicators before initializing the 3274. (Check which indicators are on; if all are off, check "All Off.")
 

	8	4	2	1
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	All Off			
- If the 3274 has the Loop Attachment, record the status of the Loop Indicators (check which indicators are on).
 

	External	Machine
	OK	Check
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
- Do all the 8 4 2 1 indicators light while the IML pushbutton is pressed and held? (If the 3274 is attached to a loop, the Line Ready, External, and Machine Check indicators should also light.)
 

	YES	NO
	<input type="checkbox"/>	<input type="checkbox"/>
- Record the status of the 8 4 2 1 indicators after initializing the 3274. (Check which indicators are on; if all are off, check "All Off.") When requesting service, please report which of the indicators (step 5) are on.
 

	8	4	2	1
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	All Off			
	Never Flashed			
- Comments (record any other symptom):  
\_\_\_\_\_  
\_\_\_\_\_

Address comments concerning this form to IBM Corporation, Department 52Q, Neighborhood Road, Kingston, New York 12401. Printed in U.S.A. GX23-0203-1

Figure 1-2. Sample 3274 Problem Report Form

### 1.3 3274 CONTROL UNIT OPERATOR PANEL

The 3274 Control Panel is shown in Figure 1-3. Note that the controls in the shaded portions of the panel are on the local models (A, B, and D) only. That portion of the panel is blank on remote models (C) without the Integrated Modem feature, and is as shown in the shaded insert for the same remote models having the Integrated Modem feature.

The four lights (8 4 2 1) on the panel are the operational indicators. These indicators first serve as Bus and Lamp Test indicators: all indicators on while the IML pushbutton is pressed indicates a successful Bus and Lamp Test. When the IML pushbutton is released, all lights go out and the 3274 executes the IML tests. During IML these lights indicate IML Test failures. Test segments are run sequentially, and the particular segment running is indicated by the lights in 8 4 2 1 code. When a failure is detected, the test stops and the failing test number is displayed in the operational indicators (8 4 2 1).

While Operational Code is running, the lights indicate the last recoverable error encountered. The problem-isolation sequence uses this data, both from IML tests and from operational tests.

### 1.4 IML OPTIONS

Three IML options are made available by the ALT switch, a three-position pushbutton switch. The three positions are 0 (normal), ALT 1, and ALT 2. When IML is pressed, the position of ALT determines the IML control-storage entry point. The operation is variable, depending on which diskette is installed. The following describes the operation with the system diskette installed.

#### 1.4.1 Normal

With ALT in the normal (not depressed) position, pressing and holding IML will cause a Bus Test to be performed. Releasing IML after a Bus Test will cause the IML Test to run. At the successful completion of the IML tests, Operational Code is loaded. The IML tests require approximately 1 minute to execute. Successful completion is indicated when all indicators are on. All indicators remain on while the Operational Code is being loaded (approximately 45 seconds), and all will turn off upon completion of this load.

#### 1.4.2 ALT 1

Momentarily pressing IML while holding the ALT switch in ALT 1 permits the Operational Code to be loaded directly (bypassing IML Tests). This load procedure should be used only following a normal IML attempt, and is intended for those situations where the normal IML fails but useful work can still be performed by the Operational Code.

**Note:** A normal IML attempt is required to initialize storage and bring up the 3274. Press IML with ALT in the normal position before any other startup method is attempted.

#### 1.4.3 ALT 2

On Model C, the ALT switch can be used to invoke adapter and cable-wrap test functions for the following adapters:

- High-Performance Communications Adapter (HPCA)
- Common Communications Adapter (CCA)
- X.21
- EIA
- Digital Data Service (DDS) Adapter
- CCITT V.35
- Integrated Modem

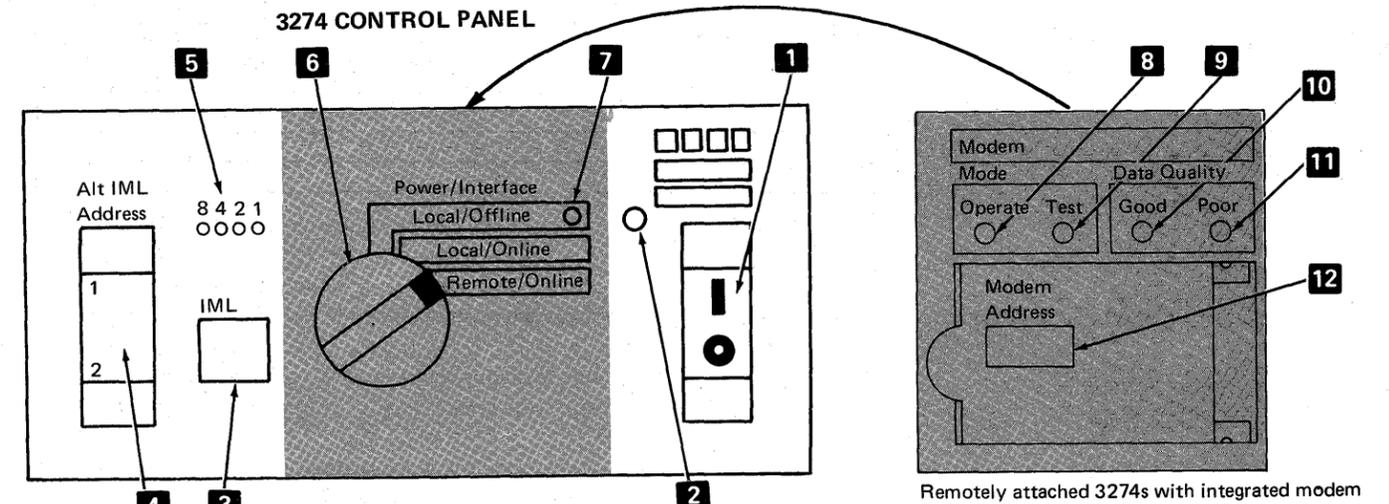
##### 1.4.3.1 ALT 2 without Integrated Modem Feature

The Modem Wrap Test can be initiated by using the ALT 2 function as well as the normal IML Test (with wrappable modem). Momentarily pressing the IML pushbutton while holding the ALT switch in the ALT 2 position invokes an extended Modem Wrap Test. Some types of modems require manual intervention to set up for wrap testing. For a wrappable modem, the test checks the transmission path (Transmit and Receive Data lines) to and from the modem. Modem clocking is required to run this test successfully; a missing or defective modem clock, or a Wrap Test failure, indicates a flashing 0111 failure code. For a nonwrappable modem, the data wrap path is to and from the Test/Operate switch at the end of the communication cable. The Modem Wrap Test requires approximately 1 minute to complete. The Wrap Test functions and procedures are described in 5.4.1 through 5.4.4.

The ALT 2 function is also used during the installation procedure for the locally attached Models A, B, and D.

##### 1.4.3.2 ALT 2 with Integrated Modem Feature

See 5.6.5.3 and 5.6.5.4 for descriptions of the ALT 2 functions and procedures.



**Legend:**

- Common to All 3274s
- Locally attached 3274s only (as shown above)
  - This area is blank on remotely attached 3274s without the Integrated Modem feature
  - This area is as shown at the right for remotely attached 3274s with the Integrated Modem feature.

#### Control Panel Switches and Indicators Common to All 3274s (Unshaded Area)

Ref	Description
<b>1</b>	<b>On/Off switch:</b>   = On; O = Off.
<b>2</b>	<b>On indicator:</b> Indicates the 3274 is on.
<b>3</b>	<b>IML (Initial Machine Load) pushbutton:</b> Pressing and holding causes a basic test to run. When the pushbutton is released, IML tests start. With Integrated Modem feature, the Integrated Modem Self-Test requires a POR to run. At completion, the machine is loaded.
<b>4</b>	<b>Alt IML Address Switch:</b> <ul style="list-style-type: none"> <li>• 1: Holding, while momentarily pressing, the IML pushbutton bypasses the test and loads the machine directly. Use only after normal IML fails.</li> <li>• 2: Holding, while pressing, the IML pushbutton causes extended remote interface tests to run on remote models. (Used for another purpose in the CE installation procedure on local models.)</li> </ul> With Integrated Modem feature, pressing and holding causes the Integrated Modem Self-Test to run and to repeat approximately every 4 seconds until the switch is released.
<b>5</b>	<b>8 4 2 1 indicators:</b> These are lit while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.

#### Local Models (Shaded Area)

Ref	Description
<b>6</b>	<b>Power/Interface switch</b> (on locally attached 3274s only): <ul style="list-style-type: none"> <li>• Local/Offline: Set to this position, and wait for the Local/Offline indicator to light before turning the 3274 off or performing a manual IML.</li> <li>• Local/Online: Permits turning the 3274 on regardless of the host system power state.</li> <li>• Remote/Online: 3274 power is controlled by the host system power state.</li> </ul>
<b>7</b>	<b>Local/Offline indicator:</b> Indicates the 3274 is in Local/Offline mode.

#### Remote Models with Integrated Modem (Shaded Area)

Ref	Description																		
<b>8</b>	<b>Modem Operate Mode Indicator:</b> Indicates the Integrated Modem is ready to exchange data with the attached communication network.																		
<b>9</b>	<b>Modem Test Mode Indicator:</b> Indicates the Integrated Modem is in test mode.																		
<b>10</b>	<b>Good Data Quality Indicator:</b> } Indicate the quality of received data <b>Poor Data Quality Indicator:</b> } as follows:																		
<b>11</b>																			
	<table border="1"> <thead> <tr> <th>Good</th> <th>Poor</th> <th>Quality of Received Data</th> </tr> </thead> <tbody> <tr> <td>On</td> <td>Off</td> <td>Good (No errors)</td> </tr> <tr> <td>Flashing</td> <td>Off or Flashing</td> <td>Marginal (Approx. 3 bit errors/sec.)</td> </tr> <tr> <td>Off</td> <td>On or Flashing</td> <td>Poor (Approx. 6 bit errors/sec. or more)</td> </tr> <tr> <td>Off</td> <td>Off</td> <td>No signal received</td> </tr> <tr> <td>On</td> <td>On</td> <td>Temporary condition (1 sec. or less) — ignore</td> </tr> </tbody> </table>	Good	Poor	Quality of Received Data	On	Off	Good (No errors)	Flashing	Off or Flashing	Marginal (Approx. 3 bit errors/sec.)	Off	On or Flashing	Poor (Approx. 6 bit errors/sec. or more)	Off	Off	No signal received	On	On	Temporary condition (1 sec. or less) — ignore
Good	Poor	Quality of Received Data																	
On	Off	Good (No errors)																	
Flashing	Off or Flashing	Marginal (Approx. 3 bit errors/sec.)																	
Off	On or Flashing	Poor (Approx. 6 bit errors/sec. or more)																	
Off	Off	No signal received																	
On	On	Temporary condition (1 sec. or less) — ignore																	
<b>12</b>	<b>Modem Address Switches (8):</b> These switches should be set to the same address used to customize the 3274. This address is used for diagnostic tests (Link Problem Determination Aid).																		

Figure 1-3. 3274 Control Panel

## Chapter 2. Subsystem Problem Isolation

### Procedure

START HERE

#### Step 1 – Start

- 1.1 Become thoroughly familiar with the information listed in the Notes column before proceeding.
- 1.2 If a problem is encountered during installation or customizing, or after installing a Miscellaneous Equipment Specification (MES), go to MAP B150.
- 1.3 Obtain the 3274 Problem Report Form from the customer.
- 1.4 If one or more devices fail within a coax port group (0–7, 8–15, etc.), go directly to Step 5.

#### Step 2 – Power Test

- 2.1 If the 3274 is off, turn it on.
- 2.2 If the On indicator is off, go directly to MAP B120.
- 2.3 If all the operational indicators (8 4 2 1) are on:
  - 2.3.1. Check all fuses on the low-voltage power supply (LVPS) card. (Always remove fuses when testing them for continuity.) If a fuse continues to blow, go to Power MAP B123, entry point A.
  - 2.3.2. Check for loose plugs on the low-voltage power supply board.
  - 2.3.3. Check for loose cables in the operator panel assembly.
  - 2.3.4. Replace the operator panel indicator card.

### Notes

Follow this problem isolation flow *sequentially* until you have fixed the problem, or have gone through this procedure twice. Go to the next step if the step you are performing does not fix the problem or does not apply. If you have not corrected the problem or are in a repetitive loop, request assistance from the next level of the support structure. Go to Machine Checkout MAP B100 to verify any fix.

- Safety Notices on page vi.
- Current CE Safety practices.
- Card/Cable Removal and Replacement procedures in Figure 2-1.
- If this is a locally attached 3274 (Model A, B, or D), the Warning notices in Figure 2-1.

Installation and customizing cannot be considered completed until the 3274 has operated successfully online.

A sample 3274 Problem Report Form is shown in Figure 1-2. If the form has not been completed, perform the procedure described in the Problem Determination Guide (PDG), GA27-2850, and record the necessary information.

The On indicator and the 8 4 2 1 indicators are shown in Figure 1-3.

Appendix A shows the location of the low-voltage power supply board.

See Figure E-3, Appendix E, for operator panel assembly.

See Figure E-2, Appendix E, for operator panel indicator card.

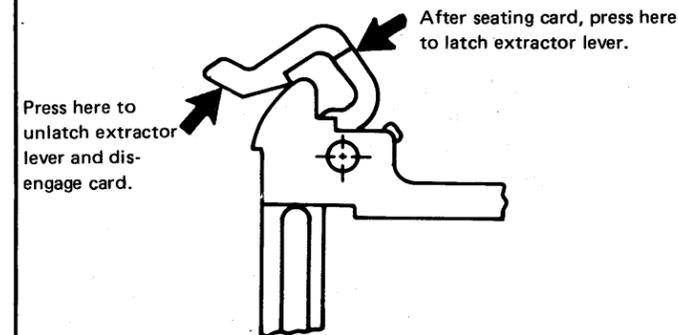
### Reference

#### Card/Cable Removal and Replacement

##### 1. Cards

If this is a local machine (Model A, B, or D) and you are going to remove or replace the local attachment cards (A1N2, P2, Q2, or Y4), observe the **Caution** shown at the right before proceeding.

- (a) Removal – Unlock and rotate the extractor levers simultaneously at the top and bottom until the card disengages (as shown below).



- (b) Replacement – Open both extractor levers fully. Insert the card holder tracks into the front guide fingers (card components toward right). *Do not use the extractor levers to reseat the card.* Apply firm finger pressure to the card holder (or connector housing for double-ended cards) to ensure proper contact seating. After reseating, press firmly on the indicated surface of both extractor levers and rotate them simultaneously until latched.

##### 2. Internal Cables/Connectors

If this is a local machine and you are going to remove or replace the Bus or Tag cables from the I/O panel or cables from locations Z3, Z4, Z5, or Z6 in board A1, observe the **Caution** shown at the right before proceeding.

- (a) Removal – Push in the wire spring cable retainer to disengage it from the slot in the gate, and pull the connector free from the pins (shown in 5.2.3).
- (b) Replacement – Reseat the connector, and ensure that the cable retainer is latched in the slot in the gate.

See 4.2.3, Chapter 4, for details.

##### 3. Local Attachment Card-Cable Removal

**Caution:** If this is a local machine, follow the instructions below before removing local attachment cards (A1N2, P2, Q2, or Y4) and Bus, Tag, and I/O panel cables, to prevent host system failures.

- 3.1 Set the Power/Interface switch to the Local/Offline position. Wait for the Offline indicator to light, and set power to Off. (The Offline indicator should turn on in 3 seconds, unless attached printers are printing. Wait 3 minutes; then ask the console operator to vary the 3274 offline.)

**Note:** If the Offline indicator does not light, see symptom 2, Figure 2-10, Symptom Repair List.

- 3.2 For A1N2, P2, Q2, and Y4 card removal, use procedure A, B, C, or D, whichever is applicable. For cable removal, use procedure E.

##### A. Cards A1P2, Q2

Remove the local attachment cards A1P2, Q2.

**Note:** Do not turn on power while these cards are removed from the 3274.

##### B. Card A1N2

- (a) Place a jumper between A1N2S02 and A1N2G09. Note that board A1 is inverted. Be sure you have selected the correct pins.

- (b) Remove the driver-receiver card A1N2.

**Note:** Do not turn on power while this card is removed from the 3274.

- (c) Remove the jumper after card A1N2 is reinstalled.

##### C. Card A1Y4 (Card A1N2 can also be removed with this procedure)

- (a) Place jumpers between:

A1H6D04 and A1Q6C04  
A1H6C02 and A1Q6B02

Note that board A1 is inverted. Be sure you have selected the correct pins.

Figure 2-1 (Part 1 of 2). Card/Cable Removal and Replacement, and Cautions

Procedure

Notes

Reference

- (b) Remove the switch card A1Y4 (and/or A1N2 if desired).

**Note:** Do not turn on power while either of these cards is removed.

- (c) Remove the jumpers after card A1Y4 (and/or A1N2) is reinstalled.

D. Cards A1N2, P2, Q2, and Y4 as a group

- (a) Place jumpers between:

A1H6D04 and A1Q6C04  
A1H6C02 and A1Q6B02

Note that board A1 is inverted. Be sure you have selected the correct pins.

- (b) Remove cards A1N2, P2, Q2, and Y4.

**Note:** Power can be turned on while all the cards A1N2, P2, Q2, and Y4 are removed.

- (c) Remove the jumpers after cards A1N2, P2, Q2, and Y4 are reinstalled.

E. Cable Removal

**Caution:** If this is a local machine, do either of the following steps before removing the Bus and Tag cables in the I/O panel, or removing cables from location Z3, Z4, Z5, or Z6 in board A1, to prevent host system failures:

- (a) Turn off power as described in the **Caution** preceding step 3.1, above, and make sure that the host system remains in the stop state while the cables are disconnected.

- (b) Disconnect the 3274 from the host system interface (see 4.3.2, Chapter 4).

Figure 2-1 (Part 2 of 2). Card/Cable Removal and Replacement, and Cautions

**Procedure**

**Step 3— Bus Test**

3.1 Run the Bus Test (IML pushbutton held).

3.2 If the Bus Test fails, go directly to MAP B10 (Bus Test).

**Step 4 — IML Tests**

4.1 Run the IML tests [IML pushbutton released: Models A, B, D, and C without Integrated Modem feature cards (see Figure C-5, Part 2)]. (If Model C with Integrated Modem feature cards, turn power off; then on.)

4.2 If the IML tests were successful, go to Step 5 (page 2-5).

4.3 If the IML tests failed, try card swapping in numerical sequence as shown in Figure 2-3. (Figure 2-2 can be used to determine the failing area.)

**Notes**

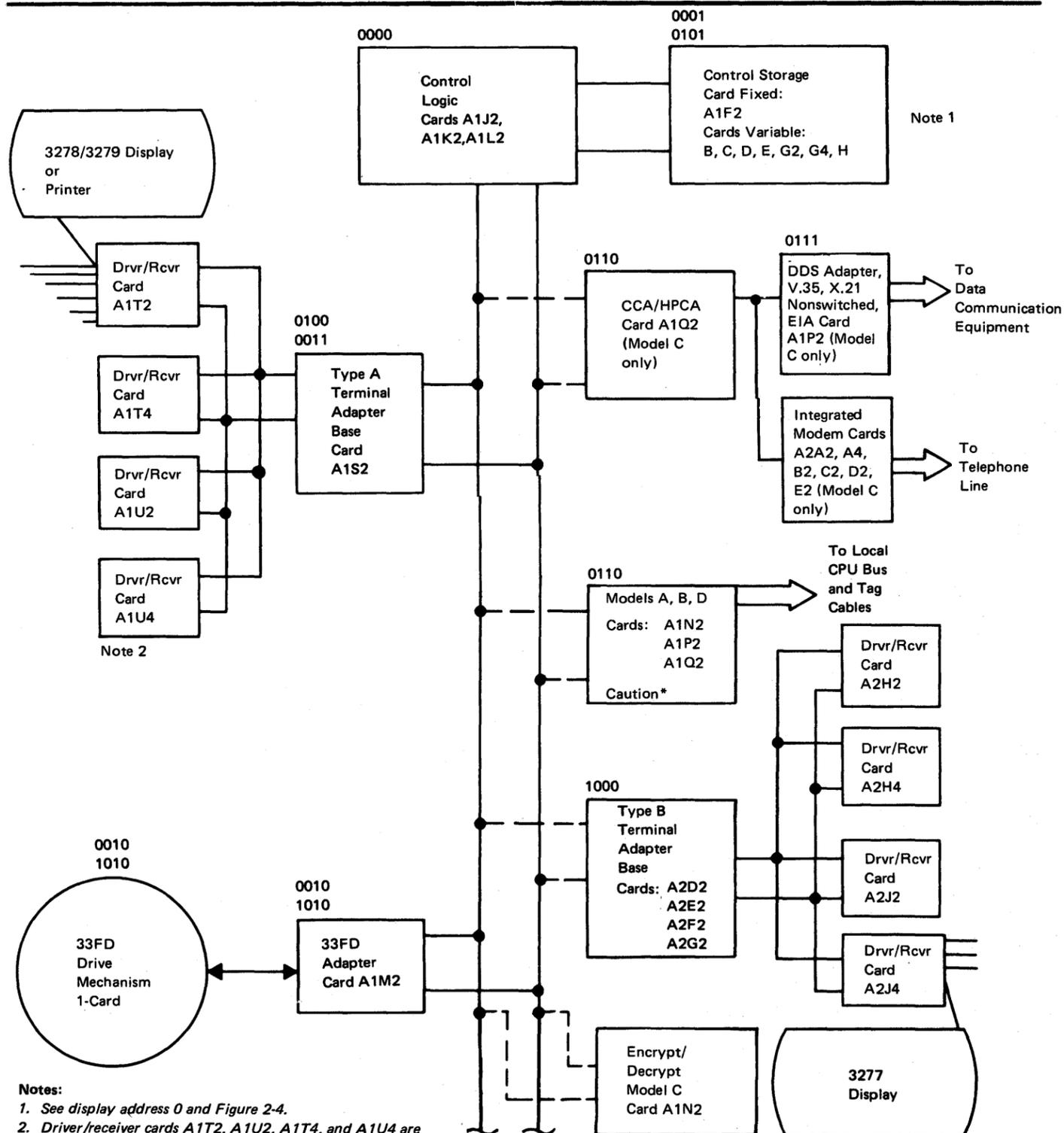
See 1.4.1 for procedure. (If this is a Model A, B, or D, the Power/Interface switch must be in the Offline position and the Offline indicator must be on.)

A successful Bus Test is indicated if all operational indicators (8 4 2 1) are on while the IML pushbutton is pressed and held.

The IML tests run automatically when the 3274 is powered on and when the IML pushbutton is pressed and released. During the tests the operational (8 4 2 1) indicators should sequence 0001, 0010, 0011, etc., ending with all operational indicators off if the tests are successful. (The IML tests do not test the driver/receiver cards.)

A failure in the IML tests is indicated if the operational indicators flash or display the same count continuously.

**Reference**



- Notes:**
1. See display address 0 and Figure 2-4.
  2. Driver/receiver cards A1T2, A1U2, A1T4, and A1U4 are referred to as base terminal adapters and adapter types A1, A2, and A3, respectively, in the 3274 Control Unit Sales Pages and in the SRL documents. In addition, the driver/receiver cards are referred to as terminal adapter types B1, B2, B3, and B4, in these documents.

\*Caution: Before pulling any local attachment cards see Caution in Figure 2-1.

Figure 2-2. 3274 Hardware Block Diagram  
 TNL SN31-0775 (22 Jan 82)  
 SY27-2530-1



Reference

Fail Code	A	B	C	D	E	F	G	Note 1 H	J	K	L	M	N	P	Q	R	S	T	U	V	Repair Action (other than card swapping on boards A1 and A2)	
0000					2,5*	1	3,7*	3	1	1	1	6	6***	7	5		4				8 Check fuse 7 (+12V) and use MAP B129. 9 Go to MAP B20 if card swapping did not fix problem or if not all cards are available.	
0001						1						2									3 Check diskette drive for proper diskette.	
0010				5*	2*	3*						1		5	4		4				6 Check fuse F2 (+5V) and use MAP B124, if required. 7 Check fuse F5 (+24V) and use MAP B128, if required. 8 Change 33FD file control card. Go to MAP B40 if problem still exists.	
0011						2*								2	2		1	3	3		4 Go to MAP B50.	
0100															2		1	3	3		4 Go to MAP B50.	
0101					2	3	3	4 >	Do this first >										1 Do Steps 4.4 through 4.7 of Subsystem Problem Isolation Procedure (next page).			
0110				4*	4*		4*							3	2	1					5 ● If recustomized (Model B or D), check for correct range address (see Appendix F). 6 ● If Models A, B, or D, verify card to card connectors from A1P2 to A1Q2 (see Figures C-5 and C-8). 7 ● If Model D, reseal card A1-Y3. 8 ● See Step 8, Chapter 2, and Communications Reference Data, and 5.4 (Wrap Test) Chapter 5.	
0111	(without Integrated Modem)														1	2						3 See 5.4 (Wrap Test).
0111	(with Integrated Modem)																					1 See 5.6.5.6, if Integrated Modem is present.
1000				1*	1*	1*	1*	2*	2*												3 Go to MAP B90.	
1001													1								The customer security administrator must reload the master key after the card is removed and replaced. This procedure and the associated Encrypt/Decrypt information are contained in Chapter 6.	
1010					2							2			2** >	Do this first >				1 Change 33FD file control card and system diskette. (This code can occur during an IML sequence or after the IML Tests.)		
1101	>																				1 Check for an uncustomized diskette.	
1111	>																				1 Operational Code failed to load correctly. Try spare system diskette.	

Board	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
	A1 (Lower)					Control Storage	Control Storage	Storage Feedthrough/Jumper; G2/G4	Storage Feedthrough/Logic; H2	Control Logic	Control Logic	Control Logic	Diskette Adapter	Mods A, B, D - or Mod C Encrypt/Decrypt Feature	Mods A, B, D - or Mod C	Mods A, B, D - or Mod C CCA, HPCA	Spare	Type A Adapter	Type A Drvr/Rcvr	Type A Drvr/Rcvr
A2 (Upper)	A D†	B E†	C F†	D G†	E H†	F J†	G K†	H L†	J M†	K N†										
			Type B Adapter 3	Type B Adapter 4	Type B Adapter 1	Type B Adapter 2	Type B Drvr/Rcvr	Type B Drvr/Rcvr	Drvr/Rcvr Cables											

Note 2

- \* Indicates cards located on feature board (A2).
- \*\* If HPCA is present.
- \*\*\* Model C only.
- † If board A2 has sockets A through N.

This figure shows error codes that can occur during IML Tests correlated to the appropriate repair actions in the numerical sequence in which they should be done. Possible card failures are indicated on the board layout by location.

Notes:

1. If card A1H2 is PN 8517087, it is possible to insert it backward (see Figure C-14).
2. If this is a local 3274 (Model A, B, or D), see the Caution notice in Figure 2-1 before removing these cards.

CAREFULLY OBSERVE BOARD POSITIONS

Board A2 - Upper Board  
Board A1 - Lower Board

Figure 2-3. Failure Code to Repair Action (for IML Tests Only)

**Procedure**

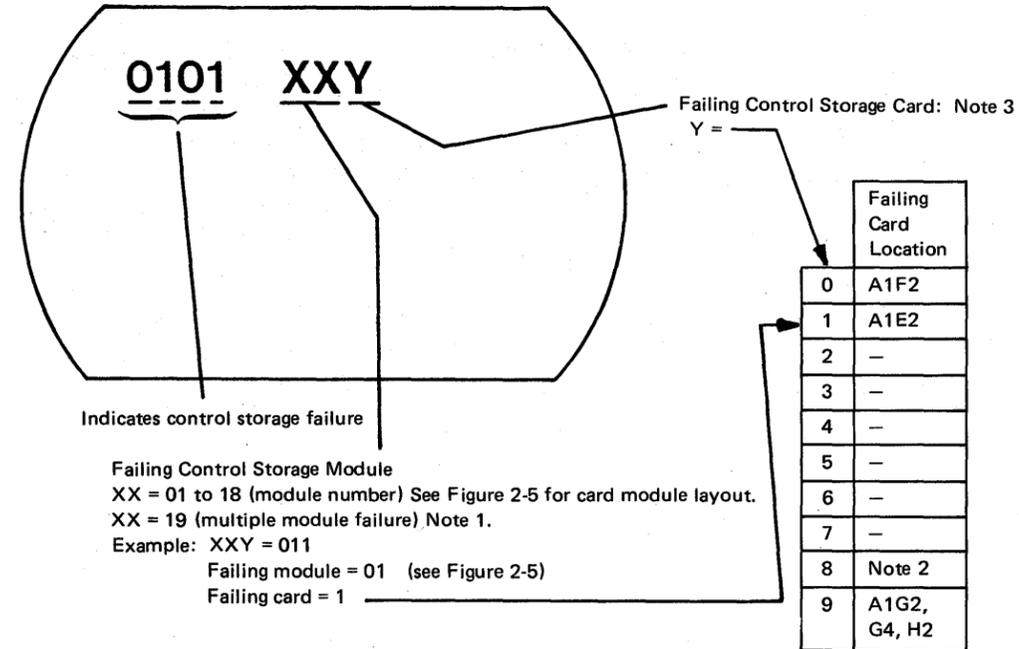
- 4.4 If the IML tests failed with a 0101 code, do Steps 4.5 through 4.8; otherwise, go directly to Step 4.8.
- 4.5 Check the display screen on display A0 for the indication of a control storage card failure.
- 4.6 If a failing control storage card is indicated, swap the failing card (Figures 2-4 and 2-5).
- 4.7 Verify that 3274 configuration response number 113 agrees with the configuration data card and with the actual 3274 storage capacity (see Figure 2-4). If this does not resolve the problem, go to MAP B123 (Power), entry point A.
- 4.8 Do *not* go to the next step unless the IML tests run successfully. If card swapping did not fix the problem, go to MAP B123 (Power) entry point A.

**Notes**

- Code 0101 indicates a control storage failure.
- Code 0101 followed by *XXY* indicates a control storage failure and the failing storage card and module. See Figure 2-4.
- Isolate the control storage failure to a specific control storage card or cards by using the code that appears on display A0 and the information in Figures 2-4 and 2-5.
- The configuration data card is stored in the 3274 access door pocket.

**Reference**

Display 0 (Type A)



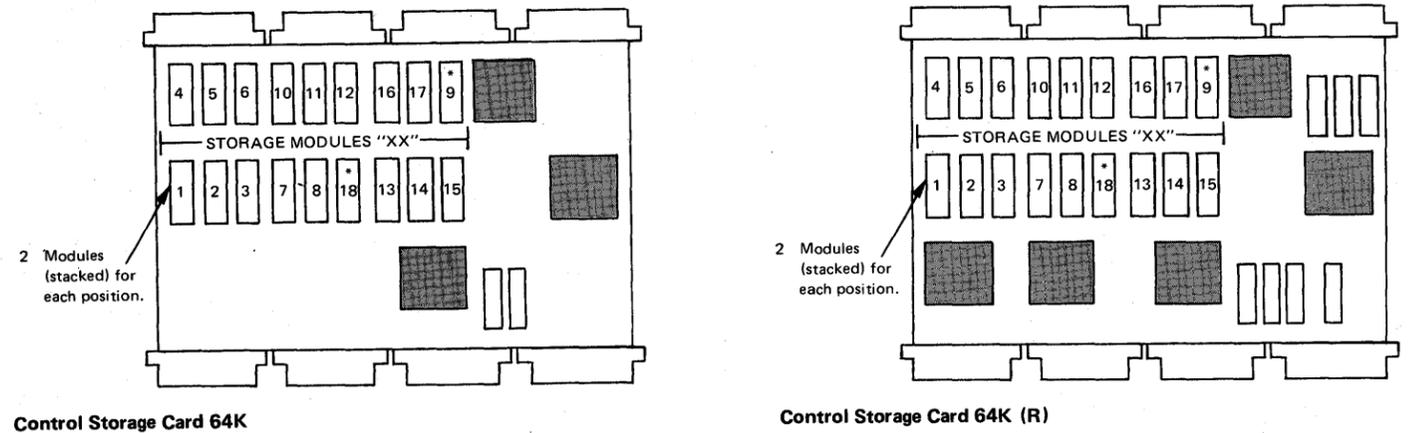
**Notes:**

- XX = 19 (multiple modules) — This code does not indicate the failing module.
- Y = 8 — Customizing or undetermined storage error. Reseat/replace cards A1H2 and A1G2.
- If card indicated by "Y" does not exist in the 3274, reseat/replace card A1H2 and A1G4.

Configuration	Volume								
Response 113	Location	B2	C2	D2	E2	F2	G2	G4	H2
A000	64 Base (Mod 21)					64R	**		**
D000	128K (Mod 31)				64	64R	*	*	*

\*Storage jumper cards and storage logic card are required (Mod 31).  
 \*\*Storage feedthrough cards are required (Mod 21).  
 See Figure C-3 for card part numbers.

**Figure 2-4. Control Storage Error Codes/Card Locations**



\*When XX = 9 or 18, the failing module could be either number 9 or 18.

**Figure 2-5. Control Storage Card Layouts**

**Procedure**



**Step 5 – Device Adapters—Driver/Receiver**

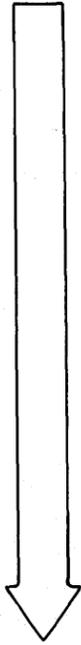
5.1 Analyze attached device failures.

**5.2 Category A Device Failure**

- All devices fail: replace type A adapter control card A1S2.
- One or more devices fail within a coax port group (0–7, 8–15, etc.): see Figure 2-6 and replace A1T2, A1U2, A1T4, or A1U4.
- Single device fails: see Figure 2-6 and follow the instructions below.

**5.3 Category B Device Failure**

- All devices fail: replace the four type B adapter control cards. This failure can also be caused by a disabled category B device. To identify a disabled device, perform Test 3 (Step 5.5) and examine line 2 (device status). If any of the category B devices are disabled, as indicated by a dash (–) in line 2, the failure may be associated with that device.
- One or more devices fail within a coax port group (0–3, 3–7, etc.): see Figure 2-6, and use the proper table for your machine for card replacement.
- Single device fails: see Figure 2-6; follow Instructions for Using Figure 2-6 (in the Notes column).



**Notes**

The information concerning failing attached devices should be available on the 3274 Problem Report Form.

For a single-device failure it is assumed that the maintenance procedure for that device has been performed.

See Figure 2-6 for the locations of the type B adapter control cards (with or without the Integrated Modem feature).

For a single-device failure, it is assumed that the maintenance procedure for that device has been performed.

**Instructions for Using Figure 2-6.**

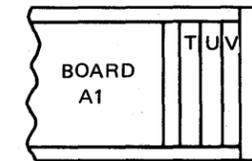
1. Determine the I/O panel coax port location for the failing device or devices. (See the Customer Device Cable Attachment Form.)
2. Select the proper table corresponding to the type A or type B driver/receiver card.
  - Change the driver/receiver card
  - Reseat the flat cable
  - Check the flat cable for defects. See Figure C-6, Parts 7, 8, and 9.
  - Check the coax for defects. See Figure C-6.

Coax cables to the same type of device can be interchanged (3278 for 3278, 3287 for 3287, etc.) to assist in problem isolation. For control unit recognition of the change, a device POR is required after the cables are interchanged.

**Reference**

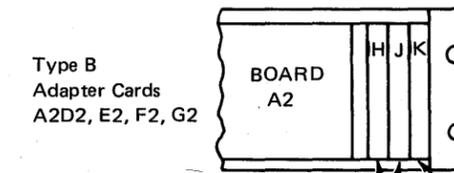
Type A Basic Board A1 with Sockets A through V

Coax Port	Card	Cable
0–7	A1T2	A1V2
8–15	A1U2	A1V3
16–23	A1T4	A1V4
24–31	A1U4	A1V5



Type B Feature Board A2 with Sockets A through K

Coax Port	Card	Cable
0–3	A2H2	A2K4
4–7	A2J2	A2K4
8–11	A2H4	A2K5
12–15	A2J4	A2K5

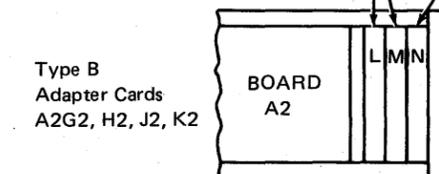


Type B Adapter Cards A2D2, E2, F2, G2

Driver/Receivers  
Cable

Type B Feature Board A2 with Sockets A through N

Coax Port	Card	Cable
0–3	A2L2	A2N4
4–7	A2M2	A2N4
8–11	A2L4	A2N5
12–15	A2M4	A2N5



Type B Adapter Cards A2G2, H2, J2, K2

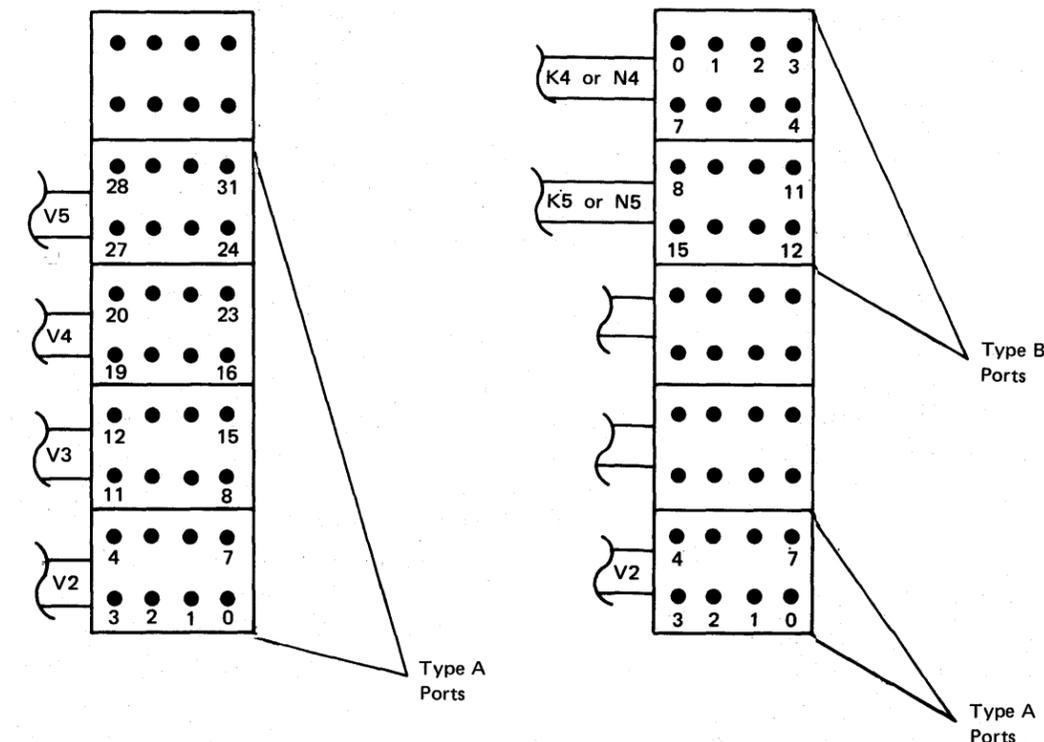


Figure 2-6. Device Driver/Receiver Card and Cable Locations

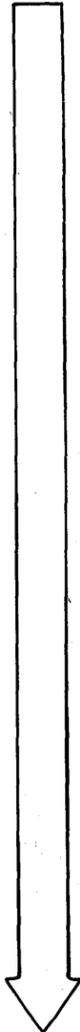
**Procedure**



5.4 The Device Summary Status Test (Test 3) may aid in isolating the problem. If you wish to do Test 3, go to Step 5.5; if not, go to Step 6.

5.5 If a summary of the status of all attached devices would be helpful, do the following at any category A display:

- While holding the ALT key, press the TEST REQUEST key.
- Key in /3.
- Press the ENTER key.
- Examine and interpret the display, which should be similar to Example A, B, or C (see Figure 2-7).



**Notes**

Device Summary Status Test (Test 3) causes the display (for each configured device) of status, such as: power on, power off, or disabled. If supported on your system, additional information is displayed, such as coaxial errors, device errors, device type, etc.

Invokes test mode.

Selects Test 3.

Enters the keyed information.

Figure 2-7 gives examples of the types of display that can be expected and helps to interpret the display.

**Reference**

**Example A:**

**Machine Configured for 32 Devices (Category A)**  
 Line 1: 01234567890123456789012345678901  
 Line 2: 11111111111111111111111111111100- - -  
 Line 3: 0000 0000 0000 0000 0000

**Machine Configured for 12 Devices (8 Category A and 4 Category B)**

```

    Category A Device 0
    |
    v
    01234567 8901
    00000000 1111
    0000 0000 0000 0000 0000
    
```

Category B Device 0

1. For the purposes of this display, devices include both category A and B devices and are numbered consecutively from 0 to 31. Category A devices are always shown first, followed by category B devices (separated by two spaces).
2. Line 2 shows the status of each device, where:  
 1 = device powered on  
 0 = device recognized as powered off  
 - = device recognized as disabled because of control-unit-detected errors
3. Line 3 consists of control unit statistical summaries. See the *3274 Control Unit Models 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C and 31D Maintenance Concepts* manual, SY27-2512, for details.

**Example B:**

**Machine Configured for 16 Devices (8 Category A and 8 Category B)**

```

    Category A Device 0
    |
    v
    01234567 89012345
    11111111 1111- - - -
    0000 0000 0000 0000 0000
    
```

Total of 16 devices configured  
(Categories A and B combined)

In the preceding example the machine has one type A and two type B driver/receiver cards installed in sockets A through K of board A2. The indications from line 2 are: category A devices 0-7 are powered on; category B devices 0-3 are powered on; category B devices 4-7 are disabled. The most likely repair action would be to replace the driver/receiver card for category B devices 4-7 (A2J2).

**Figure 2-7. Device Summary Status Test (Test 3) Examples**

**Example C:**

**Machine Configured for 32 Devices (24 Category A and 8 Category B)**

```

    Category A Device 0
    |
    v
    012345678901234567890123 45678901
    101111111110111111111111 11011001
    dddddddddd_dddddddddd pppppppp
    Line 4: .....|.....|.....| .....*...
    Line 5: .....|.....|.....| .....*.....
    Line 6: ++++++++ ++++++++ ++++++++
    Line 7:
    Line 8: 0000 0001 0000 0000 0000
    
```

Category B Device 0  
(Display/Printers)

Line 1 shows coax port addresses (0-31). In this example, the 3274 is configured for 32 devices (24 category A displays and 8 category B printers). Category A devices are always shown first, followed by printer and category B devices (separated by two spaces).

Line 2 shows the status of each device, where:

- 1 = device powered on
- 0 = device recognized as powered off
- = device recognized as disabled because of control-unit-detected errors

Line 3 shows the type of device attached, where:

- d = display
- p = printer
- 1 = other
- = never initialized

Line 4 shows a summary of coax errors, where:

- . = no errors
- : = 1-10 errors
- | = 10-20 errors
- \* = 20 or more errors

Line 5 shows a summary of device errors, where:

- . = no errors
- : = 1-10 errors
- | = 10-20 errors
- \* = 20 or more errors

Line 6 shows a summary of sessions bound (this line will appear only for SNA attachments), where:

- + = session bound
- Blank = no session bound

Line 7 is not used.

Line 8 consists of control unit statistical summaries. (See *3274 Control Unit Models 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C and 31D Maintenance Concepts*, SY27-2512, for details.)

**Procedure**



**Step 6 – Display Symbols (Category A Only)**

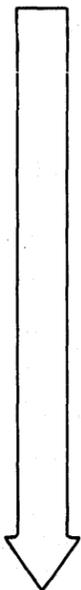
6.1 See Figure 2-8 when the following display symbols are on the screen (in the operator information area).

- Communication reminder: Communication check:
- Communication check: For Model C, use the ALT 2 communication-wrap procedure if subsystem communication failure is suspected. See Step 8 in this chapter and 5.4 in Chapter 5.
- Machine check: The four operational indicators (8 4 2 1) should be checked to further define the error. See Figure 2-9.
- Program check: PROGRAM

6.2 If Subsystem Ready ( ) is off and the device is disabled, go back to Step 5.

6.3 If host connection ( or ) is off, see Figure 2-8 or change cards A1N2, P2, and Q2. (See Caution in Figure 2-1 if this is a local machine (Model A, B, or D).)

6.4 Check switch settings on card A1Y4. (See Caution in Figure 2-1 if this is a local machine (Model A, B, or D).)



**Notes**

Communication with the host system is being inhibited. If the terminal operator uses any host communication key, the communication check symbol is displayed.

Communication check appears if the terminal operator uses any host communication key while a communication error exists.

An error has occurred within the CU or device that is nonrecoverable by the subsystem. The CU will attempt to display the error suffix.

A host protocol error or other error has been detected in the contents of the data stream.

Switch settings are described in Appendix F.

**Reference**

Error Suffix (nnn)	Associated Function	Card/Fix
20x/21x/22x	Category A device failure	Swap Type A adapter driver/receiver card, check cables, and use device Maintenance Information manual.
27x	Category B device failure	Swap Type B adapter driver/receiver card, check cables, and use device Maintenance Information manual.
29x	Terminal adapter failure	Replace A1S2.
31x/32x	CCA or HPCA failure	Replace A1Q2.
33x	HPCA failure	Replace A1Q2.
34x	Model A failure	Replace A1N2, P2, Q2. <sup>1</sup>
35x	Model B failure	Replace A1N2, P2, Q2. <sup>1</sup>
36x	Model D failure	Replace A1N2, P2, Q2. <sup>1</sup>
381/390/391	Control Logic and Storage	Replace control logic and storage cards. See Figure C-5.
397/398/399	Encrypt/Decrypt failure	See 6.1.3 in Chapter 6.
40x/41x	Data stream program check	Request PSR assistance if problem persists.
42x–45x/49x	Protocol program checks	Request PSR assistance if problem persists.
501 Model C	Data Set Ready not present <sup>2</sup>	Check external communication cables and run ALT 2 test. If Integrated Modem feature, replace cards A2E2, A2A2, and A1Q2.
501 Models <sup>3</sup> A, B, D	Channel Interface not enabled	Call host operator. Check Power/Interface switch.
502	Clear to Send not present	Verify correct TP operation; replace A1P2 (A2E2 if Integrated Modem feature is present) and check fuse F4 (-8.5V); then go to MAP B127.
505	Local-Connect required, normal operation after System Reset, or Remote-SNRM required	Possible card failures A1N2, P2, Q2 <sup>1</sup> (A2E2 if Integrated Modem feature). Check 3274 CU Address Switch settings on card A1Y4 <sup>1</sup> (see Appendix F-Models A, B, and D).
521	Idle Timeout-Model C	Host did not respond, or communication cable Test/Operate switch in Test position.
51x/53x	CCA/HPCA data link error	Replace A1P2 and A1Q2 (A2E2 and A1Q2 if Integrated Modem feature) and verify that data link is operational.
54x/55x	Model A, Model B, Model D communication error	Replace A1N2, P2, Q2. <sup>1</sup> Check operational indicators to further define the error.

<sup>1</sup>Before pulling these cards, see Caution in Figure 2-1. A host system problem may result if the procedure is not followed.

<sup>2</sup>If DDS Adapter (Figure 5-5) or Integrated Modem (Figure 5-8), Data Set Ready is generated within the 3274.

<sup>3</sup>Caution: If the problem recorded by the customer indicates this 3274 causes host CPU failures, replace/reset N2, P2, and Q2 (see Caution in Figure 2-1) and reset A1Y4 before going back on line.

Figure 2-8. Display Symbol Indications

Procedure



**Step 7 – Operational Indicators (8 4 2 1)**

7.1 Do not do this step until you have completed Steps 1 through 6.

7.2 Enter Figure 2-9 with the indicator status from the 3274 Problem Report Form, item 3.



**Step 8 – Host Attachment**

8.1 If you have reached this step and the IML diagnostics have not detected a failure, but the host CPU site is recording errors for the 3274:

- If the 3274 is a Model C and the CPU is recording timeouts, control checks, data checks, or operational checks, do one of the following (a or b):
  - a. If the 3274 has the Integrated Modem feature, go to MAP B130.
  - b. If the 3274 does not have the Integrated Modem feature, perform the following (1, 2, 3, and 4):
    1. See 5.4 (Wrap Test).
    2. Request that the 3274 Online Tests (OLTs) be run.
    3. If OLTs indicate a failure, or are unavailable, replace cards A1P2 and A1Q2.
    4. Verify correct jumpering on card A1P2 (see Figures C-10, C-11, and C-12).
- If the 3274 is a Model A, B, or D and the CPU is recording unit checks, command rejects, bus out checks, data checks, operational checks, or interface control checks, or CC = 3 is not operational, do the following (1 through 5):
  1. If the 3274 is a Model A and the CPU is recording interface control checks, Customization Response 201 (CU Address) may not match the switch setting: See paragraph F.2, Appendix F.
  2. Request that the 3274 Online Tests (OLTs) be run.
  3. If OLTs indicate a failure or are unavailable, replace these cards in the order shown: A1N2, P2, and Q2 (see Caution in Figure 2-1).
  4. Check switch settings on card A1Y4 (see Caution in Figure 2-1).
  5. See 5.1.4 in Chapter 5.

Notes

These indicators represent control unit failures. They should be used in conjunction with any indicators displayed in Step 6. Figure 2-9 correlates the four indicators to possible failing cards. Do not change cards unless the failure is solid or the frequency is such that a fix can be verified.

USE FOR ERRORS AFTER IML →

Switch settings are described in Appendix F.

**DO NOT USE THIS FIGURE UNTIL YOU HAVE COMPLETED STEPS 1 THROUGH 6**

If the IML tests run successfully, all four operational indicators (8 4 2 1) will be on. After the operational code is loaded successfully, all indicators will be off. Any machine checks detected by the operational code will turn on the operational indicators (8 4 2 1) with the following bit patterns.

Error Code	Failure	Action <sup>1</sup> /Information
0000, <sup>2</sup> but problem exists	Operational hang condition	Not necessarily a 3274 problem. A trace may help to diagnose.
0001 <sup>2</sup>	Control storage parity error—cannot be isolated to specific card	Indicator does not provide fault isolation (microcode-detected error).
0010 <sup>2</sup>	Invalid instruction or invalid address detected	Indicator does not provide fault isolation (microcode-detected error).
0011 <sup>2</sup>	Control storage parity error—base storage card 1	Replace A1F2.
0100 <sup>2</sup>	Control storage parity error—base storage card 2	Replace A1E2.
0101 <sup>2</sup>	Reserved	
0110 <sup>2</sup>	Reserved	
0111 <sup>2</sup>	Reserved	
1000 <sup>2</sup>	Type A adapter machine check	Replace A1S2, T2, U2, T4, and U4 (see footnote 3).
Alternating 1000/0001 <sup>4</sup>	Type A adapter hang	Replace A1T2; then replace A1S2.
1000/0010 <sup>4</sup>	Type A adapter hang	Replace A1U2; then replace A1S2.
1000/0011 <sup>4</sup>	Type A adapter hang	Replace A1T4; then replace A1S2.
1000/0100 <sup>4</sup>	Type A adapter hang	Replace A1U4; then replace A1S2.
1000/0101 <sup>4</sup>	Type A adapter hang	Replace A1S2; then see footnote 3.
1001 <sup>2</sup>	Any host attachment machine check	<ul style="list-style-type: none"> <li>• Model A Customization Response 201 may not match card A1Y4 switch settings for the CU address. See paragraph F.2, Appendix F.</li> <li>• Models A, B, and D: replace A1N2, P2, Q2 (see Caution in Figure 2-1).</li> <li>Model C: replace A1Q2, A1P2, (A2E2, A1Q2, if Integrated Modem).</li> </ul>
1010 <sup>2</sup>	Type B adapter machine check	Replace Type B adapter cards (see Figure C-5, Parts 1 and 2).
1011 <sup>2</sup>	Cycle-sharing error	Replace A1M2, Q2, S2. Replace Type B adapter cards (see Figure C-5, Parts 1 and 2).
1100 <sup>2</sup>	33FD error/machine check	Replace diskette, A1M2, 33FD file control card.
1101 <sup>2</sup>	Control logic failure	Replace A1J2, K2, L2.
1110 <sup>2</sup>	Encrypt/Decrypt	Replace A1N2 (Model C).

<sup>1</sup> Replace cards only when the frequency of error is such that a fix can be verified.

<sup>2</sup> The 8 4 2 1 indicators are displaying this code continuously.

<sup>3</sup> The problem can be caused by any attached category A device coax cable. If the problem can be duplicated, disconnect category A device cables at the 3274 ports to isolate.

<sup>4</sup> These two codes are alternating on and off.

Figure 2-9. Operational Indicators

**Procedure**



**Step 9 – Voltage Checks**

9.1 If a problem still exists after this step is reached, measure all voltages. Use Power MAP B123.

9.2 Go to the next step if this step did not fix the problem or does not apply.



**Step 10 – Verification Test**

10.1 Repeat the procedure (go to Step 2) to isolate intermittent and multiple problems. Run IML tests using both the IML pushbutton and Power-On Reset.

10.2 Do not go to Step 11 until you have performed Steps 2 through 10 twice.



**Step 11 – Last Option**

11.1 See the Symptom Repair List, Figure 2-10.

11.2 Note to product-trained CE:

If you wish to attempt problem determination, use:

- Appendix B of *3274 Control Unit Models 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C and 31D Maintenance Concepts, SY27-2512.*
- The diagnostic test provided by FERS, DEMF, or a similar program product (if available) to assist in problem determination.

11.3 If this fails to result in problem isolation and repair, or you choose not to attempt problem determination, request assistance from the next level of the support structure.

**Notes**

Certain error conditions are defined as nonrecoverable either by the application program or by the access method. If the subsystem will not go online, call the PSR or the CE at the host system location. Check the fans for proper operation, and replace if defective.

**Reference**

Symptom	Action
<p>1. Alternate IML address 1 or 2 function fails.</p>	<p>1. a. See Figure B-1 for Model A, B, or D.                      b. See Figure B-2 for Model C.                      c. Reseat cables in operator panel assembly.                      d. Reseat/swap card A1S2.                      e. Replace operator panel assembly (remove indicator card for use in the new assembly).                      f. Go to Machine Checkout MAP B100, entry point A.</p>
<p>2. The 3274 Model A, B, or D fails to go offline or online.</p> <p><i>Note: The channel can cause this condition.</i></p>	<p>2. Follow procedure A or B and procedure C.</p> <p><b>A. Procedure to Force 3274 Offline with Power Off</b></p> <p>a. Notify the system console that the system must be placed in the stopped state in order to perform this procedure.                      b. Turn 3274 power off.                      c. Set the system to start state.                      d. Set the 3274 Power/Interface switch to the Local/Offline position.                      e. Turn 3274 power on. (Local/Offline indicator should light.)</p> <p><b>B. Procedure to Force 3274 Offline without Power Off</b>                      Perform the procedure given in 5.1.4.</p> <p><b>C. Repair Procedure</b></p> <p>a. See Figure B-1.                      b. Reseat cables in operator panel assembly.                      c. Reseat/swap cards A1N2, A1P2, A1Q2, and A1Y4.                      See Caution in Figure 2-1.                      d. Replace operator panel indicator card.                      e. Replace operator panel assembly.                      f. Go to Machine Checkout MAP B100, entry point A.</p>
<p>3. 8 4 2 1 indicator code is 1101.</p>	<p>3. This code (1101) appears when an uncustomized system diskette is used.</p>

Figure 2-10. Symptom Repair List



## **Chapter 3. Maintenance Analysis Procedures**

### **3.1 GENERAL**

This chapter contains the Maintenance Analysis Procedures (MAPs) required to support the Subsystem Problem Isolation steps in the preceding chapter. You will have been directed to a specific MAP by some statement or reference in the sequence. The MAPs are presented in numeric sequence. In performing any MAP, you must follow the procedure exactly as given. Remember to perform the Machine Check MAP after fixing the problem.

### **3.2 MAPs**

Map B10 BUS TEST.

PAGE 1 OF 4

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B20	A	1	001

001  
(Entry Point A)

\*\*\*\*\*MAP SUMMARY\*\*\*\*\*

Maintenance concepts for Bus Test

Bus test tests the Control logic Bus for 'hot bits' (active lines on the bus) when the IML switch is pressed and held. It also functions as a lamp test for the four IML indicator lights on the operators panel. This MAP will isolate a bus failure to one of the following FRUs or card groups: Adapter cards, Control logic and Adapter Control (Type A, B) cards, cables that connect to the Control logic bus, and the operator panel and cable assembly.

Note 1: Bus test will not run on a 3274 local attach machine Model A, B, D unless it is in the 'local offline' switch position and the offline indicator is on.

Note 2: Bus test will run with only Control logic card (A1-J2) and the adapter control type A, (A1-S2) card installed in the machine.

**CAUTION**

Before removing cards or cables switch power off.

Did any indicator fail to light when the IML switch was pressed and held? See \*A\*

Y N

002  
You are in the wrong MAP. Go back to Subsystem Problem Isolation start. (Chapter 2)

003  
Verify fuse F3 (+8.5V) on LVPS board. See figure B-7. NOTE: Remove fuse when testing for continuity.  
Is fuse F3 blown?

Y N

4 2  
A B

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
4	021	B126	A

- \*A\*
- A successful Bus Test is indicated if all the operational indicators (8 4 2 1) are on while the IML pushbutton is pressed and held, and if all the indicators go off when IML is released.
  - If one or two IML indicators fails to light during bus test,
    - Replace card A1-S2.
    - Verify for good cable continuity for - LED indicator on 1, 2, 4, 8 lines from A1 board to operator panel card plug P1. See Figure B-1 or B-2.
    - Replace the operator panel indicator card.

Map B10 BUS TEST.

PAGE 2 OF 4

004

- If board A1 was replaced, verify for the proper installation of the bus bars on pins D03 and D08. See Figure 4-11.
- Remove the following cards from the A1 board as a group K2, L2, B2, C2, D2, E2, F2, M2, and then run Bus test.

Did Bus test fail?

Y N

005

- Reinstall the cards removed in step 004 one at a time and run Bus test after you install each card. Bus test should fail again when you install one of these cards. Replace the failing card. Run Bus test to verify the repair. Go to Machine Checkout Map B100, Entry Point A.

006

- Remove the following cards from the A1 board as a group T2, T4, U2, U4, H2, G2, G4, N2, P2, Q2, Y4, and then run Bus test. Note: removing card A1-N2 (encrypt-decrypt) model C destroys the master key. See para. 6.1.3. For local interface machine model A, B, D. See \*B\*.

\*B\*

**CAUTION**

- Use the following procedure when removing cards A1-N2, A1-P2, A1-Q2, A1-Y4 for local interface Model A, B, D
- You should already be in the local off line condition.
  - Switch power off.
  - Place a jumper between A1-N2 S02 and N2 G09 (bypass Sel out).
  - Now any local adapter card N2, P2, Q2 can be removed. Note: Never power machine on with N2 (DRIVER- RECEIVER) plugged into board without Q2, P2 and Y4 plugged in.

Did Bus test fail?

Y N

007

- Reinstall the cards removed in step 006 one at a time and run Bus test after you install each card. Bus test should fail again when you install one of these cards. Replace the failing card. Run Bus test again to verify the repair. For local interface model A, B, D. See \*C\*.
- Reinstall the cards removed in step 004.
- Remove jumper if installed in Step 006 and then run Bus test. Go to Machine Checkout Map B100, Entry Point A.

\*C\*

**CAUTION**

FOR MODEL A, B, D.

- Install these cards in the following sequence, Q2, P2, Y4, then N2.
- Remove jumper after card N2 is installed.

008

Does the 3274 contain device adapter type B feature? \*E\*

Y N

009

Go to step 012, Entry Point B.

3  
C

## Map B10 BUS TEST.

PAGE 3 OF 4

## 010

- Unseat the following cables from the A1 board as a group: Y5, and Y6 See figure C-5. \*D\*.
- Run Bus test.

Did bus test fail?

Y N

## 011

- Reinstall cables Y5 and Y6.
  - Replace the type B adapter cards from the A2 board one at a time and run Bus test each time you replace a card. Bus test should stop failing when one of these cards is replaced. \*E\*.
  - Verify all voltages in the A2 board. See Figure C-2. Note: Use the voltage D.C. limits in MAP 123.
  - Reinstall the cards, card crossover connectors removed in steps 004 and 006 and then run Bus test. For local interface models A, B, D. See \*C\*.
- Go to Machine Checkout Map B100, Entry Point A.

## 012

(Entry Point B)

- Reinstall cables Y5 and Y6 if removed in step 010.
- Replace the following cards from the A1 board one at a time: J2, S2, and run Bus test each time you replace a card. Bus test should stop failing when one of these cards are replaced.

Does Bus test still fail?

Y N

## 013

- Reinstall the cards, card crossover connectors removed in steps 004 and 006 and then run Bus test. For all local interface models. See \*C\*.
- Go to Machine Checkout Map B100, Entry Point A.

## 014

- Reinstall the cards removed in steps 004 and 006.

For all local interface Models A, B, D. See \*C\*.

- Measure +5V D.C. at LVPS PC board pins E15(+) and E12(-). \*F\*.

Is +5V present? (If +5V is below +4.6V go to Power Map B123, Entry Point A).

Y N

## 015

- Inspect for loose cables in OPS panel assembly.
- When 3274 is Model A, B, D. Verify for good connection at pins 12 and 8 on the prime power box J3 socket and plug J3. See Fig. B-1 Part 1
- Switch power off. (For Model C disconnect power cable from outlet).
- Replace the operator panel assembly. NOTE: Remove indicator card for use in new assembly. DANGER \*G\*.
- Go to Machine Checkout Map B100, Entry Point A.

## \*D\*

The disconnected cables will determine if Bus test failure is caused by feature board A2.

## \*E\*

When board A2 includes only sockets A through K, device adapter type B cards are D2, E2, F2, G2. When board A2 includes sockets A through N, cards are G2, H2, J2, K2.

## \*F\*

The +5V goes through the power on switch and is the supply for the power on reset circuit. See figure B-1 or B-2 and B-7.

## \*G\*

**DANGER**

For model C input AC voltage is present at power on switch terminals when power is off.

## Map B10 BUS TEST.

PAGE 4 OF 4

## 016

- Remove wire (#19 push pin E1) from LVPS PC board.
- Use jumper and momentary ground pin A1-S2J06. \*H\*.
- Run Bus test.

Did Bus test fail?

Y N

## 017

- Verify connection from LVPS PC board pin E1 (wire#19) to board A1 connector block pin 8 wire #19 See Figure C-1.
  - Reinstall wire #19.
  - Replace the pluggable 14 pin module (location Z1) on LVPS PC board and then run Bus test. See figure B-7.
  - Replace the LVPS PC board assembly and then run Bus test.
- Go to Machine Checkout Map B100, Entry Point A.

## 018

- Reinstall wire #19.
  - Inspect for loose and not correctly installed board A1 card to card crossover connectors. See Figure C-5.
  - If 3274 is a model A, B, or D, inspect for loose model type card in board A1-Y3.
  - Inspect for loose crossover cable (feature) from board A1-Y5 to board A2. See figure C-5.
  - Inspect for loose operator panel cable in board A1-Z1. See figure C-5.
  - Inspect for loose cables in Operator's panel assembly.
  - Switch power off. (Disconnect power cable from outlet).
  - Replace the operator panel assembly.
- NOTE: Remove indicator card for use in new assembly.  
DANGER \*G\*.

- Run Bus test.

Did Bus test fail?

Y N

## 019

- Go to Machine Checkout Map B100, Entry Point A.

## 020

- Go through this map once more.
- Go to power Map B123, Entry Point A

## 021

- Switch power off.
  - Replace blown fuse F3 and if fuse still blows.
- Go To Map B126, Entry Point A.

## \*H\*

This procedure isolates a power on reset problem.

## Map B20 Control Logic Failure

Code 0000

PAGE 1 OF 4

001

(Entry Point A)

\*\*\*\*\*MAP SUMMARY\*\*\*\*\*

Maintenance concepts for MAP B20

This map was entered because of a failure while testing the operation of the 3 control logic cards: A1J2, A1K2, A1L2. The type A adapter card (A1-S2), control storage card (A1-F2), and the storage feed thru, jumper cards (A1-H2, G2, G4). This test can run with only these cards and all other cards removed from the machine.

**CAUTION**

Before removing cards or cables switch power off.

Did IML control logic test fail? \*A\*

Y N

002

You are in the wrong Map, go back to subsystem isolation start. (Chapter 2)

003

Were all cards replaced as instructed in Chapter 2, Figure 2-3 (Error Code 0000)?

Y N

004

- Remove the following cards from the A1 board as a group: B2, C2, D2, E2, M2 and file control card in the 33FD. NOTE: Remove only those cards that were not replaced in Chapter 2. \*B\*

- Run control logic test.

Did control logic test fail?

Y N

005

- Reinstall the cards removed in step 004 one at a time and run control logic test after you install each card. Control logic test should fail again when you install one of these cards.
- Replace the failing card.

Go to Machine Checkout Map B100, Entry Point A.

\*A\*

The first IML test has failed if all IML led indicators are off.

\*B\*

These cards can interact causing control logic test to fail.

## Map B20 Control Logic Failure

Code 0000

PAGE 2 OF 4

006

- Disconnect the following cards from the A1 board as a group: N2, P2, Q2. NOTE: remove only those cards that were not replaced in Chapter 2. NOTE: removing card A1-N2 (encrypt-decrypt) model C destroys the master key. See para. 6.1.3. \*B\* and caution \*C\*.
- Run control logic test.

Did control logic test fail?

Y N

007

- Reinstall the cards removed in step 006 one at a time and run control logic test after you install each card. Control logic test should fail again when you install one of these cards. For local interface model A, B, D. See \*D\*.
- Replace the failing card.

- Reinstall the cards removed in step 004 and run control logic test.

Go to Machine Checkout Map B100, Entry Point A.

008

Does the 3274 contain device adapter type B feature? \*E\*

Y N

009

Go to Page 3, Step 012, Entry Point B.

010

- Disconnect the following feature cables from the A1 board as a group: Y5 and Y6 Ref. See Figure C-5 \*F\*.
- Run control logic test.

Did control logic test fail?

Y N

3 3  
C D

\*C\*

**CAUTION**

Use the following procedure when removing cards N2, P2, Q2, Y4, for local interface model A, B, D.

- See that power interface switch is set to local/off line and indicator is on (interface disabled).
- Switch power off.
- Place a jumper between N2-S02 and N2-G09. (bypass sel. out).
- Now any local adapter card N2, P2, Q2 can be removed. Note: Never power machine on with N2 (Driver/Receiver) plugged into board without Q2, P2 and Y4 plugged in.

\*D\*

**CAUTION**

- Install these cards in the following sequence: Q2, P2, Y4, then N2.
- Remove jumper after card N2 is installed.

\*E\*

When board A2 only includes sockets A through K, device type B adapter cards are D2, E2, F2, G2. When board A2 includes sockets A through N, cards are G2, H2, J2, K2.

\*F\*

Isolate the control logic test failure to feature board A2.

4 2  
A B

C D  
2 2

**Map B20 Control Logic Failure**

**Code 0000**

PAGE 3 OF 4

**011**

- Reinstall cables Y5 and Y6.
- Replace the device adapter (type B) cards from the A2 board one at a time and run control logic test after you install each card. Control logic test should stop failing when you install one of these cards. \*E\*

NOTE: Replace only those cards that were not replaced in Chapter 2, Figure 2-3.

- Reinstall the cards removed in steps 004 and 006. For local interface model A, B, D. See \*D\*.
  - Run control logic test.
- Go to Machine Checkout MAP B100, Entry Point A.

**012**

(Entry Point B)

- Reinstall cables Y5 and Y6 if removed in step 010.
- Replace the following cards from the A1 board one at a time: L2, J2, K2, F2, S2, H2, G2, G4 and run control logic test each time you replace a card. Control logic test should stop failing when one of these cards is replaced.

NOTE: Replace only those cards that were not replaced in Chapter 2, Figure 2-3.

**Does control logic test still fail?**

Y N

**013**

- Reinstall the cards removed in step 004 and 006. For local interface model A, B, D. See \*D\*.
  - Run control logic test.
- Go to Machine Checkout MAP B100, Entry Point A.

**014**

- Reinstall the cards removed in steps 004 and 006. For local interface model A, B, D. See \*D\*.

(Entry Point C)

- Check for loose or not correctly installed board A1 card to card crossover connectors. See Figure C-5.
- If 3274 is a model A, inspect for loose model type card in board A1-Y3.
- If card A1-H2 is P/N 8517087 it is possible to plug card into board backwards. See Figure C-14.
- If machine storage is equal to 64K (see Figure 2-4), then verify for a board wire from A1G2-G02 to G2-G12.

**Does control logic test still fail?**

Y N

**015**

Go to Machine Checkout MAP B100, Entry Point A.

4  
E

A E  
1 3

**Map B20 Control Logic Failure**

**Code 0000**

PAGE 4 OF 4

**016**

- Switch power off.
- At logic board A1 attach meter leads to points S2-J06 (+) and any D08 pin (-). \*G\*
- Switch power on and check that meter starts moving after a slight delay and then goes to approximately +5V D.C.

**Did meter measure approximately +5 volts?**

Y N

**017**

- Replace the pluggable 14 pin module (location Z1) on the LVPS PC board. See Figure B-7.
- Run control logic test.
- Replace the LVPS PC board and then run control logic test.
- Go to Machine Checkout MAP B100, Entry Point A.

**018**

- Go through this MAP once more.
  - Verify that bus test still runs (If necessary go to Map B10 Entry Point A).
- Go to Power MAP B123, Entry Point A

**019**

Go to Page 3, Step 014, Entry Point C.

**\*G\***

This point is the power on reset signal and leaves from LVPS PC board pin E1 (wire No. 19) and goes to board A1-E6E04. After power on, this line should be approximately +5VDC and there should be no pulses present.



D  
2

**Map B40, 33FD Disk Failure**

**Code 0010**

PAGE 3 OF 5

**009**

- Inspect for loose crossover cable from board A1-Y5 to feature board A2. See figure C-5.
- Reseat the two cables located under the 33FD file control card socket.
- Reseat cable A1Z2.
- Run IML tests.

**Does IML test code (0010) still fail?**

Y N

**010**

Go to Machine Checkout MAP B100, Entry Point A.

**011**

- Measure the +24 volts D.C. at 33FD diskette drive card test point with reference to ground (D08). See VTL card +24V. Test point on page G-15.

**Is the voltage within the limits of +22V to +26v?**

Y N

**012**

- Verify fuse F5 (+24V) on LVPS board. See Figure B-7. NOTE: Remove fuse when testing for continuity. If fuse is blown, go to MAP 128, Entry Point A.
- Measure the +24 Volts D.C. at location A1-M2B13 with reference to ground (D08). See secondary power distribution figure B-6.

**Is the voltage within the limits of +22V to +26V?**

Y N

**013**

- Verify that wire No. 18 is good between LVPC PC board plug P2-11 to location A1-F6C02.
- Verify that board pin continuity is good between location A1-F6C02 to M2B13.

**Are board connections good?**

Y N

**014**

- Repair or replace wire.
- Go To Machine Checkout Map B100, Entry Point A

**015**

- Measure all voltages.
- Go to power Map B123, Entry Point A

**016**

**(Entry Point B)**

- Verify cable continuity for the failing voltage point from board A1-Z2 to disk drive cable socket. See Figure C-6 part 1 of 6.
- Reseat 33FD file adapter card.

4  
E

F  
3

**Map B40, 33FD Disk Failure**

**Code 0010**

PAGE 4 OF 5

**017**

- Measure the +5 volts D.C. At 33FD diskette drive card test point with reference to ground (D08). See VTL card +5V. Test point on page G-15.

**Is the voltage within the limits of +4.6 to +5.5V?**

Y N

**018**

- Verify fuse F2 (+5V) on LVPS board. See Figure B-7. Note: remove fuse when testing continuity. If fuse is blown go to MAP B124, Entry Point A.
- Measure the +5 Volts D.C. at location A1-E6A02 wire no. 21 with reference to ground (D08).

**Is the voltage within the limits of +4.6V to +5.5V?**

Y N

**019**

- Verify that wire no. 21 is good between LVPS PC board push pin E14 to location A1-E6A02.

**Is wire no. 21 good?**

Y N

**020**

- Repair or replace wire.
- Go to Machine Checkout Map B100, Entry point A.

**021**

Go to Power Map B123, Entry Point A.

**022**

Go to Page 3, Step 016, Entry Point B.

**023**

- Measure the -5 volts D.C. At 33FD diskette drive card test point with reference to ground (D08). See VTL card -5V. Test point on page G-15.

**Is the voltage within the limits of -4.6 to -5.5V?**

Y N

**024**

- Measure the -5 Volts D.C. at location A1-E6D04 with reference to ground (D08).

**Is the voltage within the limits of -4.6 to -5.5V?**

Y N

**025**

- Verify that board pin continuity is good between location A1-E6D04 to A1-E5B06.

**Is board continuity good?**

Y N

**026**

- Add wire between A1-E6D04 to E5B06.
- Go to Machine Checkout Map B100, Entry Point A.

5 5 5  
F G H

A C F G H  
1 2 4 4 4    **Map B40, 33FD Disk Failure****Code 0010**

PAGE 5 OF 5

**027**

Go to Power Map B123, Entry Point A.

**028**

Go to Page 3, Step 016, Entry Point B.

**029**

- Obtain the backup customized system diskette.
- Run IML tests.

**Does IML test code (0010) still fail?**

Y N

**030**

Go to Machine Checkout Map B100, Entry Point A.

**031**

- Replace the 33FD disk drive unit.
- Run IML tests if any repair action was performed.

**Does IML test code (0010) still fail?**

Y N

**032**

Go to Machine Checkout Map B100, Entry Point A.

**033**

- Verify cable continuity from board A1 socket Z2 to disk drive cable socket. (See cable chart Figure C-6) part 1 of 6.

**Did cable test good?**

Y N

**034**

- Repair or replace as needed.

Go to Machine Checkout Map B100, Entry Point A.

**035**

- Go through this MAP once more.
- Use your support structure for aid if problem is not corrected.

**036**

- Use repair kit, p/n 2200750 and replace red felt pad.

Go to Machine Checkout Map B100, Entry Point A.

**037**

- Install a new belt and adjust. See Appendix G-8.

Go to Machine Checkout Map B100, Entry Point A.

**Map B50 TYPE A ADAPTER FAILURE CODE**

**0011 or 0100**

PAGE 1 OF 2

**001**  
(Entry Point A)

\*\*\*\*\*MAP SUMMARY\*\*\*\*\*

Maintenance concepts for type A adapter failure.

This MAP is entered from Chapter 2, Step 4, Figure 2-3 (Failure code to card replacement) After cards that can cause TYPE A ADAPTER failure codes 0011 or 0100 were replaced, this MAP is used to isolate a failing device that can also cause a TYPE A ADAPTER failure code.

**CAUTION**

Before removing cards or cables switch power off.

Is the IML test failing with error code 0011 or 0100?

Y N

**002**  
You are in the wrong MAP, go back to subsystem isolation start. (Chapter 2).

**003**  
• At the 3274 device coax panel, disconnect coax cable at address port A0. \*A\*  
• Run the IML tests. \*B\*

Does TYPE A ADAPTER test 0011 or 0100 still fail?

Y N

**004**  
• Connect another display (type A) to address port A0 by moving a coax cable from another type A port location. \*C\*  
• Run the IML tests.

Does TYPE A ADAPTER test fail again with error code 0011 or 0100?

Y N

**005**  
• Problem is in the display or coax cable that was disconnected from port A0. Use the display maintenance information manual.  
Go to Machine Checkout, MAP B100, Entry Point A.

2 2  
A B

**Map B50 TYPE A ADAPTER FAILURE**

**CODE 0011 or 0100**

PAGE 2 OF 2

**006**  
(Entry Point B)

- Check again all cards from step 4, Figure 2-3 that could cause TYPE A ADAPTER error code 0011 or 0100.
  - If 3274 is Model C inspect for loose CCA/HPCA jumper card in board A1-Y3. NOTE: the card part number must match the machine CCA or HPCA feature Ref. Figure C-4 for part number.
- Go to Machine Checkout MAP B100, Entry Point A.

**007**  
Go to Step 006, Entry Point B.

\*A\* Display station at address port A0 is the only location used for the IML/TYPE A ADAPTER test. NOTE: Only 3278/3279 display can be attached to port A0.

\*B\* Determine if TYPE A ADAPTER failure is caused by interaction with attached display.

\*C\* To get the status for all 3274 attached devices, i.e. device powered on, off or disabled, run device summary status (test 3). See Chapter 2, Step 5. NOTE: test 3 will not run if IML tests are failing. If failing, perform an ALT 1 switch function. The ALT 1 will allow the operational code to be loaded.

Map B90, Device Adapter Type B

Failure Code 1000

PAGE 1 OF 2

001  
(Entry Point A)

\*\*\*\*\*MAP SUMMARY\*\*\*\*\*

Maintenance Concepts for Type B Adapter Failure

This MAP is entered from Chapter 2, Step 4, Figure 2-3 (failure code to card replacement). After cards that can cause Device Adapter Type B failure code 1000 were replaced this MAP is used to isolate a failing 3277 display or printer that can also cause this failure code. First the device adapter IML tests are run without using the attached display or printer and then the devices are tested for readiness. The first to be found ready is used for additional device testing, if no device is ready the remaining device tests are bypassed. NOTE: The same IML testing is performed when attached device is a printer or display.

CAUTION: Before removing cards or cables switch power off.

Is the IML test failing with error code 1000?

Y N

- 002
  - You are in the wrong MAP, Go back to Subsystem isolation start (Chapter 2).

- 003
  - At the 3274 device coax panel, (Type B) disconnect the coax cable for the device that is failing. See note \*A\*.
  - Run the IML tests \*B\*

Does IML test 1000 still fail?

Y N

- 004
  - Connect another device (Type B) to the disconnected address port by moving a coax cable from another Type B port location. \*C\*
  - Run the IML tests.

Does IML test fail again with error code 1000?

Y N

2 2 2  
A B C

- \*A\*
  - Get the status for all 3274 attached devices, I.E. Device powered on, off or disabled, run device summary status (test 3). See Chapter 2, Step 5. NOTE: test 3 will not run if IML tests are failing. If failing, perform an ALT 1 switch function. The ALT 1 will allow the operational code to be loaded.
  - To determine the failing type B port location use the summary status and select the lowest port number (Type B) display that is powered on.
  - List any device type B power on display location (Could be used in next step).

\*B\*  
Determine if device failure is caused by interaction with attached device.

\*C\* Use powered on device.

A B C

Map B90, Device Adapter Type B

Failure Code 1000

PAGE 2 OF 2

- 005
  - Problem is in the device that was disconnected from failing port location. Use device troubleshooting guide.
  - Go to Machine Checkout MAP B100, Entry Point A.
- 006  
(Entry Point B)
  - On feature board 01-A2, measure +5V dc at any card D03 pin. Is +5V inside the limits of +4.6V to +5.5V?
  - Y N
  - 007
    - Go to Power MAP B123, Entry Point A.
  - 008
    - Verify for loose or defective crossover cable between board location A1-Y5, A1-Y6 and the feature board A2 See Figure C-5.
    - Verify again all cards from chapter 2, step 4, Figure 2-3 that could cause device type B error code 1000.
    - Go to Machine Checkout MAP B100, Entry Point A.
  - 009  
Go to Step 006, Entry Point B.

**Map B100 Machine Checkout**

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**ENTRY POINTS**

FROM		ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER	
B10	A	1	001	
B120	A	1	001	
B122	A	1	001	
B123	A	1	001	
B124	A	1	001	
B125	A	1	001	
B126	A	1	001	
B127	A	1	001	
B128	A	1	001	
B20	A	1	001	
B40	A	1	001	
B50	A	1	001	
B90	A	1	001	

**001**  
(Entry Point A)

**Maintenance Concepts for Map B100**

This Map is entered after a repair action is performed. MAP 100 will verify the repair or send you back to subsystem isolation checkout in Chapter 2.

Switch power on if not on.

Is the power on indicator lighted?

Y N

**002**

Go to Power Map B120, Entry Point A.

**003**

Perform bus test (press and hold the IML switch).

Did the 4 IML indicators light?

Y N

**004**

Go to Bus Test MAP B10, Entry Point A.

2  
A

**Map B100 Machine Checkout**

PAGE 2 OF 2

**005**

- Place system diskette in 33FD drive.
- Run IML tests with the IML switch and again by switching power off and then on. \*A\*

\*A\* For local interface machine model A, B, D power/interface switch is set to off line.

\*B\* While the IML tests are running the IML indicators are stepped until all the operational indicators go on (operational code has loaded). When the operational code has taken control all the operational indicators are turned off, and the ready symbol '4' is lit on the bottom line of display port A0.

Did IML tests run correctly? \*B\*

Y N

**006**

Is the same IML test code failing?

Y N

**007**

- Determine if bus test is intermittent. Run bus test and repeat as needed. If failure occurs, go to Map B10.
- Repeat IML test as needed to check for more than one problem. Record the IML indicator failure codes.
- Use the lowest IML indicator failure code and go back to subsystem isolation, Chapter 2, Step 4.

**008**

- Problem not corrected by repair action.
- Go back to Chapter 2 and continue subsystem isolation.

**009**

Is the subsystem ready symbol lit on the display that is attached to address port zero? \*C\*

Y N

**010**

Go back to subsystem problem isolation (Chapter 2) and use step 5 device driver receiver and test 3 (device summary status).

**011**

End of call or continue subsystem isolation checkout in Chapter 2.

\*C\* Indicator turns on after the operational code has taken control.

**Map B120, Power on Indicator**

is Off

PAGE 1 OF 7

**ENTRY POINTS**

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B100	A	1	001

001

(Entry Point A)

Maintenance Concepts for MAP B120

The Power On indicator can be off because of a primary power problem or missing +5 volts dc at the output side of secondary fuse F1. When the fans are not running ac input voltage is not supplied to the ferro transformer input and fan assembly. If the fans are running and the +5 voltage is not within limits, MAP 123('+5 Volts in board A1 not within limits') is used. For locally attached machines (Model A, B, D) most of the remote online primary power problems are tested in the Local/Offline switch position.

- Refer to Appendix B for power supply diagrams.
- Switch Power On.

Are the fans located under the 01A1 board running?

Y N

002

(Entry Point B)

Verify primary fuse F1 on primary power box.

Is the fuse blown?

Y N

003

Is this machine a local attached 3274 (Model A, B, D)?

\*A\*

Y N

7 7 2 2  
A B C D

**EXIT POINTS**

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
7	040	B122	A

\*A\*

DANGER

- For Model C input A.C. voltage is present at power on switch terminals when power is off.
- Model A, B, D, relay switching is used for local or remote power on (+24v. through power on switch).

C D

**Map B120, Power on Indicator**

is Off

PAGE 2 OF 7

004

DANGER \*A\*

- Measure for the correct input A.C. voltage for your machine at prime power box plug P3 between pins 1 and 2. See input voltage figure B-3.

Is correct ac voltage present? \*B\*

Y N

005

- Verify that power cable is connected to an active outlet.
  - Disconnect the power cable from power outlet.
  - Remove prime power box and replace line cord.
- Go to Machine Checkout Map B100, Entry Point A.

006

Is the 33FD drive motor running?

Y N

007

- Switch power off.

DANGER \*A\*

- Verify for loose or defective cable from prime power box plug P3 to power on switch. See cable prime power box to operator panel (Mod C) Figure E-1, sheet 2 of 2.
- Repair or replace operator's panel assembly, (power on switch is defective). Note: Remove indicator card for use in new assembly.

Go to Machine Checkout Map B100, Entry Point A.

008

- Repair or replace the cable between prime power box plug P1 and TB-1 on top of the ferro transformer.

Go to Machine Checkout Map B100, Entry Point A.

009

Is the power/interface rotary switch on the operators panel in the remote online position?

Y N

010

(Entry Point C)

Is the 33FD drive motor running?

Y N

6 6 3  
E F G

\*B\*

Isolate problem to the input power cable or operator's panel assembly.

G  
2

Map B120, Power on Indicator

is Off

PAGE 3 OF 7

011

- Set power interface switch to local off-line.
- Measure +24V dc at operator's panel switch SW1 pin A1(Wire#9)(+) and test point P3-10(-) on the prime power box. Note: Without the EPO cable J4 connected to host system the voltage will be approximately +32 volts.

Is +24V dc present? \*C\*

Y N

012

(Entry Point D)

Is switch S1 on the prime power box on?

Y N

013

- Set switch S1 on.
- Go to Step 012, Entry Point D.

014

Measure +24V dc at prime power box plug P4-2(+) and P3-10(-).

Is +24V dc present? \*D\*

Y N

015

- Measure +24V dc at prime power box plug P4-1(+) and P3-10(-).

Is +24V dc present? \*E\*

Y N

016

Verify primary fuse F2 on primary power box.

Is the fuse blown? \*F\*

Y N

5 5 4 4 4  
H J K L M

\*C\*

If present; indicates that +24v dc from prime power box was sent as unit source to system and returned as EPO control through the power interface switch and power on switch. Note: Without system EPO cable (J4) unit source pin 1, EPO pin 2, and pin 5 are jumpered together.

\*D\*

If present; indicates that +24v dc from prime power box was sent as unit source to system and returned as EPO control. NOTE: If EPO cable is not plugged, pin 1 (unit source) must be jumpered to pin 2 (EPO control) and pin 2 to pin 5 or power will not cycle on.

\*E\*

Test the prime power box +24V dc power supply.

\*F\*

Fuse F2 protects the +24v dc supply for any overload condition.

K L M  
3 3 3

Map B120, Power on Indicator

is Off

PAGE 4 OF 7

017

- Verify for good connection at pins 1 and 2 on prime power box J4 socket and plug J4.
  - Disconnect power cable from outlet.
  - Remove the prime power box assembly and check power cable plug for open connection.
  - Replace the prime power box assembly.
- Go to Machine Checkout Map B100, Entry Point A.

018

Replace fuse F2.

Does fuse still blow?

Y N

019

Go to Machine Checkout Map B100, Entry Point A.

020

Does prime power box contain EPO cable in location J4?

Y N

021

Go to Step 024, Entry Point E.

022

- Replace blown fuse F2.
- Disconnect EPO cable and jumper plug socket J4-1 to J4-2 on the prime power box. \*G\*

Does fuse still blow?

Y N

023

- Failure is associated with the EPO cable.
  - The channel could be causing overload condition.
  - Replace or repair EPO cable.
  - Use your support structure for aid if problem is not corrected.
- Go to Machine Checkout Map B100, Entry Point A.

024

(Entry Point E)

- Switch power off.
  - Disconnect power cable from outlet.
  - Replace the prime power box assembly.
- Go to Machine Checkout Map B100, Entry Point A.

025

- Reseat the EPO cable and/or the EPO jumper wire between socket J4-1 and J4-2 on the prime power box. \*H\*
- Contact HOST CE, problem is external to the 3274.
- Go to Machine Checkout MAP B100, Entry Point A.

\*G\*

Isolate blowing fuse to channel or 3274 overload condition.

\*H\*

The +24 voltage sent to system host as unit source is not returned (+24V) as EPO control. NOTE: Without system EPO cable (J4) unit source pin 1 and EPO pin 2 and pin 2 to pin 5 are jumpered together.

H J  
3 3  
**Map B120, Power on Indicator  
is Off**  
PAGE 5 OF 7

- 026**
- Test for failing connection between plug P3-3 on the prime power box and power on switch pin A1(Wire#9) on the operator's panel assembly.
  - Repair or replace connector and/or cable.
  - Go to Machine Checkout MAP B100, Entry Point A.
- Is +24V. d.c. present now?  
Y N

- 027**
- Verify for good connection at pin 3 on prime power box J3 receptacle and plug J3.
  - Disconnect power cable from outlet.
  - Replace the prime power box assembly.
- Go to Machine Checkout Map B100, Entry Point A.

- 028**
- Go to Machine Checkout MAP B100, Entry Point A.

- 029**
- Measure +24V.D.C. test point (relay K2 pick) P3-11(+) on the prime power box and point P3-10(-) as you press and hold power on switch on the OPS panel.

Is +24V.D.C. present? \*J\*  
Y N

- 030**
- Measure +24V.D.C. at plug P3-6(+) on the prime power box and test point P3-10(-) as you press and hold power on switch on the operator's panel.

Is +24V.D.C. present? \*K\*  
Y N

- 031**
- Measure +24v.d.c. at power on switch pin B2(+) wire no. 7 and test point P3-10(-) as you press and hold power on switch on the operators panel.

Is +24v.d.c present?  
Y N

- 032**
- Inspect for loose cables in operator panel assembly.
  - Verify for good continuity from power on switch pin B1 (wire no. 10, 6) to OPS panel connector S2/P1-pin 9.
  - Verify for good continuity from power on switch pin A2 (wire no. 11) to operator panel connector S2/P1 pin 7.
  - Replace operator panel assembly. NOTE: remove indicator card for use in new assembly.
- Go to Machine Checkout MAP B100, Entry Point A.

6 6 6  
N P Q

\*J\*  
When +24 volts d.c. is present at the test points, pluggable relay K2 has picked and relay K1 on the prime power box should have picked and held, connecting prime power to the ferro transformer.

\*K\*  
When present +24 volts has switched through power interface switch and power on switch. This point is used for picking relay coil K2.

E F N P Q  
2 2 5 5 5  
**Map B120, Power on Indicator  
is Off**  
PAGE 6 OF 7

- 033**
- Verify for good connection from power on switch pin B2 (wire no. 7) to prime power box plug pin 6.
  - Verify for good connection at pin 6 on prime power box J3 socket and plug P3.
  - Replace operator panel assembly. NOTE: remove indicator card for use in new assembly.
- Go to Machine Checkout MAP B100, Entry Point A.

- 034**
- Verify for good continuity from power on switch pin B1 (wire no. 10, 6) to prime power box plug P3 pin 9.
  - Verify for good connection at pin 9 on prime power box J3 socket and plug J3.
  - Replace the pluggable relay (K2) on the prime power box.
- Go to Machine Checkout MAP B100, Entry Point A.

- 035**
- Remove the line cord from power outlet.
  - Replace the prime power box assembly.
- Go to Machine Checkout MAP B100, Entry Point A.

- 036**
- Verify the cable between prime power box plug P1 and TB-1 on top of the ferro transformer. (See Figure B-3)

**DANGER**

Input A. C. voltage goes to TB-1 terminals.

Go to Machine Checkout MAP B100, Entry Point A.

- 037**
- Set the power/interface switch to the local/off line position and press power on switch. \*L\*

Is the power indicator on?  
Y N

- 038**
- Go to Page 2, Step 010, Entry Point C.

- 039**
- When the 3274 will power up in the local/online position a failure to receive a pick or hold line from the HOST is indicated.
  - Verify for good connection at pin 5, 6, 3, on prime power box J4 socket and plug J4.
  - Use your support structure for aid if problem is not corrected.
  - If your 3274 is failing to forward a power complete signal, replace the pluggable K2 relay on the prime power box.
- Go to Machine Checkout MAP B100, Entry Point A.

\*L\*  
Use local off line power up to find 3274 power sequencing problems.

A B

**Map B120, Power on Indicator**

**is Off**

PAGE 7 OF 7

**040**

Go To Map B122, Entry Point A.

**041**

- Measure the +5 volts D.C. at any card A1-D03 pin with reference to ground (D08).

**Is the voltage within the limits of +4.6 to +5.5?**

Y N

**042**

Go to Power Map B123, Entry Point A.

**043**

- Measure +5V. D.C. at board A1-C6C02 wire #26 and C6C04 wire #27 located on 32 pin connector block. See Figure C-3.

**\*M\***

- Inspect for loose cable in board A1-Z1. See Figure C-5.
- Inspect for loose cables in operator's panel assembly.
- Replace operator's panel indicator card.
- Go to Machine Checkout MAP B100, Entry Point A.

**\*M\*** these wires supply the +5 voltage to the operator's panel assembly.

**Map B122 Fans not operating and primary fuse F1 is blown**

PAGE 1 OF 3

**ENTRY POINTS**

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B120	A	1	001
B155	A	1	001

**001 (Entry Point A)**

Maintenance concepts for map B122

Entry to this map is from map 120 'POWER ON INDICATOR IS OFF' where a check indicated that the primary power fuse F1 is blown. The fuse can be blowing because of a short circuit in input (fuse) side of ferro transformer or too much current is flowing in secondary output side of ferro. The map concept is to replace blowing fuses and disconnect components until over load condition is found.

**DANGER**

For model C input A.C. voltage is present at power on switch terminals when power is off.

- Switch power off.
- Replace blown fuse F1 on primary power box. See Figure B-11
- Switch power on.

Did primary fuse F1 blow again?

Y N

**002**

Go to Machine Checkout Map B100, Entry Point A.

**003**

- Switch power off.
- Replace primary fuse F1.
- Disconnect plug J1 from the prime power box.
- Switch power on. \*A\*

Does fuse still blow?

Y N

**004**

- Switch power off.
- Reinstall plug J1 on prime power box.
- Remove push pins from LVPS points E5 and E7. \*B\*
- Switch power on.

Does fuse still blow?

Y N

3 2 2  
A B C

**Map B122 Fans not operating and primary fuse F1 is blown**

PAGE 2 OF 3

**005**

- Switch power off.
  - Replace the heat sink assembly.
- Go To Machine Checkout Map B100, Entry Point A.

**006**

- Switch power off.
- Remove LVPS plug J1 from the PC board. \*C\*
- Replace primary fuse F1.

Does fuse still blow?

Y N

**007**

- Switch power off.
  - Replace the LVPS PC board assembly.
- Go To Machine Checkout Map B100, Entry Point A.

**008**

- Switch power off.
- Reinstall LVPS plug J1.
- Reinstall LVPS wires at push pins E5 and E7. Note: wire 5 to E5 and wire 7 to E7.
- Disconnect one red wire from ferro capacitor (ferro capacitor is attached to ferro transformer). SEE DANGER \*D\*.
- Replace primary fuse F1.
- Switch power on.

Does fuse still blow?

Y N

**009**

- Switch power off.
  - Replace A.C. capacitor. \*D\*
- Go to Machine Checkout MAP B100, Entry Point A.

**010**

- Switch power off.
- Reconnect red wire to ferro capacitor. SEE DANGER \*D\*.
- Disconnect the fan assembly from TB-1 on top of the ferro transformer. See Figure B-3. \*E\*
- Replace primary fuse F1.
- Switch power on.

Does fuse still blow?

Y N

**011**

- Check fan assembly for short circuits.
  - Replace fan assembly.
- Go To Machine Checkout Map B100, Entry Point A.

3  
D

\*C\* Isolate primary overload by removing -5, +8.5, -8.5 and +24 volt power supply PC board from ferro transformer secondary.

\*D\*

**DANGER**

• 550 volts at A.C. capacitor when power is on.

• The ferro transformer filter capacitor may carry a stored charge after the control unit is powered down. Avoid hand contact until the capacitor is discharged.

\*E\* Remove a.c. power connection from TB-1 to board A1 fan assembly.

A D  
1 2

**Map B122 Fans not operating and  
primary fuse F1 is blown**

PAGE 3 OF 3

**012**

- Switch power off.
- Disconnect power cable from power source.
- Replace primary fuse F1.
- Replace the ferro transformer \*F\*.
- Reconnect the fan assembly.
- Go to Machine Checkout MAP B100, Entry Point A.

- \*F\* Other possible causes of blowing fuse.
- Fuse rating (AMP) is wrong. See Figure B-11.
  - Ferro transformer input voltage jumpering is wrong for supplied input A.C. power. See Figure B-3.

**013**

- Switch power off.
- Reinstall plug J1 on prime power box.
- Disconnect plug J2 from the prime power box.
- Replace primary fuse F1. \*G\*
- Switch power on.

- \*G\* Disconnecting cable removes A.C. power from primary fuse F1 to the 33FD drive motor.

**Does fuse still blow?**

Y N

**014**

- Switch power off.
- Test 33Fd drive motor for short or binding condition.
- Reinstall plug J2 on prime power box.
- Go to Machine Checkout Map B100, Entry Point A.

**015**

- Switch power off.
- Reinstall plug J2 on the prime power box.
- Replace primary fuse F1.
- Go through MAP procedure once more.
- Use the support structure for assistance.

Map B123, Sec.Volt. Check & +5V in Bd A1

Not Within Limits

PAGE 1 OF 7

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B10	A	1	001
B120	A	1	001
B155	A	1	001
B90	A	1	001

001  
(Entry Point A)

Maintenance Concepts for MAP B123

Entry to this Map may be from another Map or from the subsystem problem isolation Chapter 2. The objective of this Map is to measure all voltages to specification at the logic board; identify a missing/wrong voltage or blowing fuse problem; and then isolate those problems to failing Ferro Transformer outputs, dc Power Supply outputs, or secondary load FRU or FRU groups.

**CAUTION**

Before removing cards or cables, switch power off.

- Measure all secondary voltages in the following sequence using a CE meter. Go to the table on the following page for measurements and use 'Go To Map' if voltage is not within limits.
- Insure that all power supply screws such as E9, E10, and E11 are properly tightened. (See Figure 4-6) Also check that capacitor to heat sink mounting screws are properly tightened.

**DANGER**

Insure power is off while checking screws.

(Entry Point B)

(Step 001 continues)

Map B123, Sec.Volt. Check & +5V

in Bd A1 Not Within Limits

PAGE 2 OF 7

(Step 001 continued)

Voltage	Location	Gnd	DC Limits	Go To Map
+ 5 (F1)	Any card A1-D03 pin	D08	+4.6 to +5.5	B123, Entry Point D
+ 5 (F2)	NOTE 1 Any card A2-D03 pin	D08	+4.6 to +5.5	B124, Entry Point A
+ 5 (F2)	NOTE 2 A1E6A02 (wire #21)	D08	+4.6 to +5.5	B124, Entry Point A
- 5 (F6)	Any card A1-B06 pin	D08	-4.6 to -5.5	B125, Entry Point A
+ 8.5 (F3)	Any card A1-B11 pin	D08	+7.8 to +9.3	B126, Entry Point A
- 8.5 (F4)	* A1P2D07	D08	-7.8 to -9.3	B127, Entry Point A
+12 (F1)	NOTE 3	D08	+11.0 to +13.0	B129, Entry Point C
+24 (F5)	A1M2B13	D08	+22.0 to +26.0	B128, Entry Point A
Continue with MAP for additional voltage check, etc.				B123, Entry Point C

Voltage	Ripple P-P (MV)	NOTE: If excess ripple is measured, check for loose capacitors or screws on either LVPS board or the heat sink assembly before replacing these components. See Figure 4-6
+5	150	
-5	150	
+8.5	250	
-8.5	250	
+12	240	
+24	360	

\*only used for model C.

- NOTES
- 1 Measure this point when machine contains feature board A2.
  - 2 Measure this point when machine does not contain feature board. (This point is located on 32 pin connector block. See figure C-3).
  - 3 Measure at any card socket B through F Board A1 pin M13 or S13.

(Step 001 continues)

MapB123,Sec.Volt.Check & +5V  
in Bd A1 Not Within Limits

PAGE 3 OF 7

(Step 001 continued)  
(Entry Point C)

Were all measured D.C. voltages within limits?

Y N

002  
(Entry Point D)

Is +5V dc measured at any card A1-D03 pin within limits?

Y N

003

- Verify fuse F1 on LVPS board. See Figure B-7. NOTE: Remove fuse when testing for continuity.

• Is secondary fuse F1 blown?

Y N

004

Is +5V dc at any card A1-D03 pin missing?

Y N

005

Is +5V dc at any card A1-D03 pin low?

Y N

6 6 5 4 4 4  
A B C D E F

D E F  
3 3 3

MapB123,Sec.Volt.Check & +5V  
in Bd A1 Not Within Limits

PAGE 4 OF 7

006

Is +5V dc at any card A1-D03 pin high?

Y N

007

Go to Page 3, Step 002, Entry Point D.

008

- Verify the ferro transformer input voltage connections. See Figure B-3.
  - Switch power off and disconnect the power cable from power source.
  - Replace ferro transformer.
- Go to Machine Checkout MAP B100, Entry Point A.

009

Go to Step 010, Entry Point E.

010

(Entry Point E)

- Measure +5V dc at secondary power supply (LVPS) PC board points E12(-) and E13(+). See Figure B-7.

Is +5V dc within limits?

Y N

011

- Set CE Meter to 15V ac scale.
- Measure the ac output voltage from the ferro transformer at secondary power supply (LVPS) points E6 and E8.

Is the AC meter reading between the limits of 10.5V ac to 14.5V ac? \*A\*

Y N

5 5 5  
G H J

- \*A\* A short circuited power supply diode can also cause a low ac meter reading.
- At LVPS PC board remove push pin wires from E5 and E7 going to +5V heat sink assembly.
  - Test heat sink assembly diodes with an ohmmeter; a good diode has infinite or high resistance in one direction and low resistance in the other direction.
  - Reinstall removed push pin wires.

C G H J  
3 4 4 4

## MapB123,Sec.Volt.Check &amp; +5V

in Bd A1 Not Within Limits

PAGE 5 OF 7

## 012

- Switch power off.
- Test that the heat sink assembly (HS-1) is not shorted to frame ground. Problem can occur at LVPS board. (Nut and insulating washer). See Figure 4-6.

Replace in the following sequence and verify repair after each action.

- Switch power off.
- Replace the A.C. capacitor that is attached to the ferro transformer. \*B\*
- Switch power off and disconnect the power cable from power source.
- Replace the ferro transformer.

Go to Machine Checkout MAP B100, Entry Point A.

## 013

- Switch power off.
  - Replace the heat sink assembly (HS-1).
- Go To Machine Checkout Map B100, Entry Point A.

## 014

- Inspect for loose plug J4 on the secondary power supply PC board.
  - Verify for open wires between LVPS point E3 and O1A1 board bus bars on pin D03.
  - Verify for open cable between plug J4 on the LVPS and the voltage distribution connectors on the O1A1 board.
  - Repair or replace cable as needed.
- Go To Machine Checkout Map B100, Entry Point A.

## 015

- Switch power off.
- Replace blown fuse F1. See Figure B-11.
- Switch power on.

Does fuse still blow?

Y N

## 016

Go To Machine Checkout Map B100, Entry Point A

## 017

- Switch power off.
- Disconnect cable Z1 from board A1. See Figure C-5. \*D\*
- Replace blown fuse F1.
- Switch power on.

Does fuse still blow?

Y N

## 018

- Reconnect cable A1-Z1.
  - Replace indicator card in OPS panel assembly.
- Go To Machine Checkout Map B100, Entry Point A.

6  
K

\*B\*

## DANGER

- 550 volts at A.C. capacitor when power is on.
- The ferro transformer filter capacitor may carry a stored charge after the control unit is powered down. Avoid hand contact until the capacitor is discharged.

\*D\*

Disconnecting cable removes +5 volts from operator panel assembly.

A B K  
3 3 5

## MapB123,Sec.Volt.Check &amp; +5V

in Bd A1 Not Within Limits

PAGE 6 OF 7

## 019

- Switch power off.
- Remove LVPS plug J4 and all wire connectors at LVPS point E3. \*E\*
- Reconnect cable A1-Z1.
- Replace fuse F1.
- Switch power on.

Does fuse still blow?

Y N

## 020

- Reinstall LVPS plug J4 and all wires at point E3 (wire #23 and 25).
  - A cable or bus bar short is possible.
  - Verify the cable between LVPS plug P4 and the O1A1 board and the wire(s) between LVPS point E3 and the O1A1 board bus bars Ref. Figure B6.
- Go to Machine Checkout MAP B100, Entry Point A.

Does fuse still blow?

Y N

## 021

Go to Machine Checkout Map B100, Entry Point A

## 022

- Isolate blowing fuse F1 problem to cards on the O1A1 board - observe cautions for local attached interface. \*F\*
- Go to Machine Checkout MAP B100, Entry Point A.

## 023

- Replace the secondary power supply assembly (LVPS).
- Go To Machine Checkout Map B100, Entry Point A.

## 024

Go To Entry Point B. \*G\*

## 025

Is this machine a local attached 3274 (Model A, B, or D)?

Y N

## 026

Go to Page 7, Step 029, Entry Point F.

## 027

- Switch power off.
- At logic board A1 attach meter leads to points N2-S13 (+) and any D08 pin (-). \*H\*
- Switch power on and check that meter starts moving after a slight delay and then goes to approximately +5V.D.C.

Did meter measure approximately +5 volts?

Y N

7 7  
L M

\*E\*

All loads from fuse F1 +5V output are now disconnected. (board A1 bus bars and voltage connectors).

\*F\* For +5V fuse problem do not remove more than 50% of the cards at one time. This is to prevent unloading the ferro transformer.

\*G\* If voltage was within limits, go to the next voltage measurement.

\*H\*

This point is the +5V. special and is used to deactivate the local interface drivers in the N2 card, when the 3274 is powered up and down.

**028**

- Verify for open connection between LVPS point E2 (wire 20) and the A1 board 32 pin connector block pin F6-B02. See Figure C-3.
  - Replace the pluggable 14 pin module (location Z1) on the LVPS PC board and verify repair. See Figure B-7.
  - Replace the LVPS PC board assembly and verify repair.
- Go to Machine Checkout MAP B100, Entry Point A.

**029**

**(Entry Point F)**

- Verify all (LVPS) voltages once more.
- If you entered this MAP from another MAP, use your support structure for aid.
- Go back to Chapter 2 and continue subsystem isolation.

**Map B124, +5v Fuse F2 Load Not**

**Within Limits**

PAGE 1 OF 3

**ENTRY POINTS**

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B123	A	1	001

**001  
(Entry Point A)**

Maintenance Concepts for MAP B124

This MAP is used to isolate a +5 voltage problem that is associated with secondary fuse F2. The fuse output is used for feature board A2 and the file control card in the 33FD. The +5 voltage is a source for fuse F1, F2 and +5V. Power supply problems are isolated with Power MAP 123.

**CAUTION**

Before removing cards or cables switch power off.

Is +5V dc measured at any card A2-D03 Pin or A1-E6A02 (w/o board A2) within limits of +4.6V to +5.5V?

Y N

**002**  
• Verify fuse F2 on LVPS board. See Figure B-7. NOTE: Remove fuse when testing for continuity.

Is secondary fuse F2 blown?

Y N

**003**  
Is +5V dc at any card A2-D03 Pin or A1-E6A02 low or missing?

Y N

**004**  
Go to Step 001, Entry Point A.

**005**  
• Measure +5V dc at LVPS point E11(+) and E10(-).  
Is +5V within limits? See Figure B-11.

Y N

**006**  
• Replace the secondary power supply (LVPS).  
• Go to Machine Checkout MAP B100, Entry Point A.

3 2 2  
A B C

B C

**Map B124, +5V Fuse F2 Load**

**Not Within Limits**

PAGE 2 OF 3

**007**  
• Verify for loose or failing plug P3 on the LVPS PC board.  
• Verify for open wire between LVPS point E14 (wire #9) and bus bar on the O1A2 board.  
• Replace or repair as needed.  
Go to Machine Checkout Map B100, Entry Point A.

**008**  
• Switch power off.  
• Replace blown fuse F2. See Figure B-11.  
• Switch power on.

Does fuse still blow?

Y N

**009**  
Go to Machine Checkout Map B100, Entry Point A.

**010**  
• Switch power off.  
• Verify that resistor R18 on the LVPS heat sink is not present on machines with an A2 feature board. (See Figure B1 or B2).  
• Disconnect LVPS PC board plug P3 and all wires from LVPS PC board point E14. \*C\*  
• Replace fuse F2.  
• Switch power on.

Does fuse still blow?

Y N

**011**  
• Switch power off.  
• Reinstall only wire #21 on LVPS PC board point E14. \*D\*  
• Switch power on.

Does fuse still blow?

Y N

**012**  
• Reinstall wire #9 on LVPS PC board point E14.  
• Reinstall LVPS plug P3.  
• Isolate blowing fuse F2 problem to the O1A2 cards.  
Go to Machine Checkout Map B100, Entry Point A.

Does fuse still blow?

Y N

**013**  
Go to Machine Checkout Map B100, Entry Point A.

**014**  
• A cable or bus bar short circuit to ground is indicated.  
• Verify the cable between LVPS PC board plug P3 pins 3, 5 and 6 and the O1A2 board volt connectors.  
• Verify the wire (#9) from LVPS point E14 to board A2 +5V Bus Bar.  
Go to Machine Checkout Map B100, Entry Point A.

3 3  
D E

\*C\*  
All loads from fuse F2 output are disconnected (board A2 bus bar, volt connectors and File 33FD).

\*D\*  
Connect only the 33FD load to fuse F2 output.

A D E  
1 2 2

**Map B124, +5V Fuse F2 Load**

**Not Within Limits**

PAGE 3 OF 3

**015**

- Switch power off.
  - Replace fuse F2.
  - Reinstall the LVPS plug P3.
  - Reinstall wire #9 on the LVPS board pin E14.
  - Replace the file control card in the 33FD.
- Go to Machine Checkout MAP B100, Entry Point A.

**016**

Replace the secondary power supply assembly (LVPS).  
Go to Machine Checkout Map B100, Entry Point A.

**017**

Go to Map B123, Entry Point B. \*F\*.

**\*F\***

If voltage was within limits perform to the next voltage measurement.

Map B125, -5v Not Within

Limits

PAGE 1 OF 3

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B123	A	1	001

001  
(Entry Point A)

CAUTION

Before removing cards or cables switch power off.

Is -5V dc measured at any card A1-B06 Pin within limits of -4.6V to -5.5V?

Y N

002  
• Verify fuse F6 on LVPS board. See Figure B-7. NOTE: Remove fuse when testing for continuity.

• Is secondary fuse F6 blown?

Y N

003  
Is -5V dc measured at any card A1-B06 Pin missing?

Y N

004  
Is -5V dc measured at any card A1-B06 Pin low?

Y N

005  
Is -5V dc measured at any card A1-B06 Pin high?

Y N

006  
Go to Step 001, Entry Point A.

007  
• Verify the ferro transformer input voltage connections See Figure B-3.  
• Switch power off and disconnect power cable from outlet.  
• Replace ferro transformer.  
Go to Machine Checkout MAP B100, Entry Point A.

008  
Go to Page 2, Step 009, Entry Point B.

3 2 2  
A B C

Map B125, -5v Not Within

Limits

PAGE 2 OF 3

009  
(Entry Point B)  
• Set CE meter to 15V ac scale.  
• Measure the AC output voltage at LVPS PC board plug points P1-4 and P1-5.

• Is the ac meter reading between the limits of 10.5V ac to 14.5V ac? \*A\*

Y N

010  
• Replace in the following order and verify repair after each action.  
• Switch power off.  
• Replace the A.C. capacitor that is attached to the ferro transformer \*B\*.  
• Switch power off and disconnect.  
• Replace the ferro transformer.  
Go to Machine Checkout MAP B100, Entry Point A.

011  
• Measure -5V dc at LVPS PC board plug points P2-7(-) and P2-1(+).  
• Is the meter reading within limits?

Y N

012  
• Replace the LVPS PC board assembly.  
Go to Machine Checkout MAP B100, Entry Point A.

013  
• Verify the cable assembly between LVPS plug P2 and the O1A1 board voltage connectors.  
Go To Machine Checkout Map B100, Entry Point A

014  
• Switch power off.  
• Replace blown fuse F6. See Figure B-11.  
• Switch power on.  
• Does fuse F6 still blow?

Y N

015  
Go To Machine Checkout Map B100, Entry Point A

3  
D

- \*A\* Short circuited power supply diode can also cause a low ac meter reading.
- Disconnect plug P1 from LVPS PC board.
- Test LVPS PC diodes CR-5 and CR-6. (See appendix figure B-7) with an ohmmeter, a good diode has infinite or high resistance in one direction and low resistance in the other direction.
- Reinstall LVPS PC Plug P1.

\*B\* **DANGER**

- 550 volts at A.C. capacitor when power is on.
- The ferro transformer filter capacitor may carry a stored charge after the control unit is powered down. Avoid hand contact until the capacitor is discharged.

A D  
1 2

## Map B125, -5v Not Within

### Limits

PAGE 3 OF 3

#### 016

- Switch power off.
- Remove LVPS plug P2 and P3. \*C\*
- Replace fuse F6.
- Switch power on.

#### • Does fuse F6 still blow?

Y N

#### 017

- Switch power off.
- Reinstall LVPS plug P2. \*D\*
- Switch power on.

#### • Did fuse F6 blow?

Y N

#### 018

- Switch power off.
- Reinstall plug P3.
- Isolate blowing fuse F6 problem to the 01A2 cards, A2 board or 33FD file control card.

Go to Machine Checkout MAP B100, Entry Point A.

#### 019

- Switch power off.
- Reinstall plug P3.
- Isolate blowing fuse F6 problem to the 01A1 cards or A1 board.

Go To Machine Checkout Map B100, Entry Point A

#### 020

- Replace the LVPS PC board assembly.
- Go to Machine Checkout Map B100, Entry Point A.

#### 021

Go to MAP B123, Entry Point B. \*E\*

\*C\* All loads from fuse F6 output are disconnected (board A1 and A2 voltage connectors).

\*D\*

- Plug P2 goes to board A1.
- Plug P3 goes to board A2.

\*E\* If voltage was within limits perform the next voltage measurement.

Map B126, +8.5V Not Within

Limits

PAGE 1 OF 3

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B123	A	1	001

001  
(Entry Point A)

**CAUTION**

Before removing cards or cables switch power off.

Is +8.5V dc measured at any card A1-B11 Pin within limits of +7.8V to +9.3V?

Y N

002  
• Verify fuse F3 on LVPS board. See Figure B-7. NOTE: Remove fuse when testing for continuity.  
Is secondary fuse F3 blown?

Y N

003  
Is +8.5V dc at any card A1-B11 Pin missing?

Y N

004  
Is +8.5V dc at any card A1-B11 Pin low?

Y N

005  
Is +8.5V dc at any card A1-B11 Pin high?

Y N

006  
Go to Step 001, Entry Point A.

007  
Verify the ferro input voltage connections. See figure B-3.

- Switch power off and disconnect power cable from outlet.
  - Replace the ferro transformer.
- Go to Machine Checkout MAP B100, Entry Point A.

3 2 2 2  
A B C D

B C D

Map B126, +8.5V Not Within

Limits

PAGE 2 OF 3

008  
(Entry Point B)  
• Set CE meter to 50V ac scale.  
• Measure the ac output voltage from the ferro transformer at LVPS plug P1-7 and P1-8.  
• Is the ac meter reading between the limits of 14V ac to 22.5V ac? \*A\*

Y N

009  
• Replace in the following sequence and verify repair after each action.  
• Switch power off.  
• Replace the A.C. capacitor that is attached to the ferro transformer \*B\*.  
• Switch power off and disconnect power cable from outlet.  
• Replace the ferro transformer.  
Go to Machine Checkout MAP B100, Entry Point A.

- \*A\* Short circuited power supply diode can also cause a low ac meter reading.
- Disconnect Plug P1 from LVPS pc board.
  - Test LVPS pc diodes CR-7 and CR-8 (see Appendix Fig. B-7) with an ohmmeter, a good diode has infinite or high resistance in one direction and low resistance in the other direction.
  - Reinstall plug P1.

\*B\*

**DANGER**

- 550 volts at A.C. capacitor when power is on.
- The ferro transformer filter capacitor may carry a stored charge after the control unit is powered down. Avoid hand contact until the capacitor is discharged.

010  
• Measure +8.5V dc at LVPS PC board plug points P2-3(-) and P2-8(+).  
• Is the meter reading within limits?

Y N

011  
• Replace the LVPS PC board assembly.  
Go to Machine Checkout MAP B100, Entry Point A.

012  
• Verify the cable assembly between LVPS PC board plug P2 and the voltage distribution connectors on the 01A1 board.  
• Verify for poor plug or cable connections.  
Go to Machine Checkout MAP B100, Entry Point A.

013  
Go to Step 008, Entry Point B.

014  
• Switch power off.  
• Replace blown fuse F3. See Figure B-11.  
• Switch power on.  
• Does fuse still blow?

Y N

3 3  
E F

A E F  
1 2 2

**Map B126, +8.5V Not Within**

**Limits**

PAGE 3 OF 3

**015**

Go to Machine Checkout MAP B100, Entry Point A.

**016**

- Switch power off.
- Disconnect LVPS PC board plugs P2 and P3 from the LVPS PC board.\*C\*
- Replace fuse F3.
- Switch power on.
- Does fuse F3 still blow?

\*C\* All loads from fuse F3 output are disconnected (board A1 and A2 voltage connectors).

Y N

**017**

- Switch power off.
- Reinstall LVPS PC board plug P2. \*D\*
- Switch power on.
- Does fuse still blow?

\*D\* • Plug P2 goes to board A1.  
• Plug P3 goes to board A2.

Y N

**018**

- Switch power off.
- Reinstall plug P3.
- Isolate blowing fuse F3 to 01A2 cards or A2 board.

**019**

- Reinstall plug P3.
  - Replace blown fuse.
  - Isolate blowing fuse F3 to 01A1 cards or A1 board.
- Go to Machine Checkout Map B100, Entry Point A.

**020**

- Replace the LVPS PC board assembly.
- Go to Machine Checkout MAP B100, Entry Point A.

**021**

Go to MAP B123, Entry Point B. \*E\*

\*E\* If voltage was within limits, perform the next voltage measurement.

Map B127, -8.5v not within limits (3274 mod C)

PAGE 1 OF 3

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B123	A	1	001

001  
(Entry Point A)

CAUTION

Before removing cards or cables switch power off.

Is -8.5v DC measured at point 01A1P2D07 within limits of -7.8V to -9.3V?

Y N

002  
(Entry Point B)

- Verify fuse F4 on LVPS board. See Figure B-7. NOTE: Remove fuse when testing for continuity.
- Is secondary fuse F4 blown?

Y N

003  
Is -8.5v DC at point 01A1P2D07 missing?

Y N

004  
Is -8.5v DC at point 01A1P2D07 low?

Y N

005  
Is -8.5v DC at point 01A1P2D07 high?

Y N

006  
Go to Step 001, Entry Point A.

007  
• Verify the ferro transformer input voltage connections See figure B-3.  
• Switch power off and disconnect power cable from outlet.  
• Replace ferro transformer.  
Go to Machine Checkout MAP B100, Entry Point A.

3 3 2 2  
A B C D

C D

Map B127, -8.5v not within limits (3274 mod f).

PAGE 2 OF 3

008

(Entry Point C)

- Set CE meter to 50V ac scale.
- Measure the AC output voltage at LVPS PC board plug P1-7 and P1-8.

Is the meter reading between the limits of 14VAC to 22.5V.V.C. \*A\*

Y N

009

- Replace in the following order and verify repair after each action.
- Switch power off.
- Replace the A.C. capacitor that is attached to the ferro transformer \*B\*.
- Switch power off and disconnect power cable from outlet.
- Replace the ferro transformer.

Go to Machine Checkout MAP B100, Entry Point A.

\*A\*

Short Circuited power supply diode can also cause a low A.C. meter reading.

- Disconnect plug P1 from LVPS PC board.
- Test LVPS PC diodes CR-1 and CR-2 (Appendix figure B-7) with an ohmmeter; a good diode has infinite or high resistance in one direction and low resistance in the other direction.
- Reinstall LVPS plug P1.

\*B\*

DANGER

- 550 volts at A.C. capacitor when power is on.
- The ferro transformer filter capacitor may carry a stored charge after the control unit is powered down. Avoid hand contact until the capacitor is discharged.

010

Measure -8.5V DC at LVPS PC board plug P2-12(-) and P2-3(+). See Figure B-7.

Is the meter reading within limits?

Y N

011

- Switch power off.
  - Replace the LVPS PC board assembly.
- Go to Machine Checkout MAP B100, Entry Point A.

012

• Verify the wire from LVPS plug P2-12 to A1-P2D07 (wire #17).

\*C\*

Go to Machine Checkout MAP B100, Entry Point A.

\*C\* The -8.5 voltage goes to Board A1 with push pin jumper.

013

Go to Step 008, Entry Point C.

A B

**Map B127, -8.5v not within  
limits (3274 mod f).**

PAGE 3 OF 3

**014**

- Switch power off.
- Replace blown fuse F4. See Figure B-11.
- Switch power on.

**Does fuse still blow?**

Y N

**015**

Go to Machine Checkout MAP B100, Entry Point A.

**016**

- Switch power off.
- Replace blown fuse F4.
- Remove card A1-P2. \*D\*
- Switch power on.

**Does fuse F4 still blow?**

Y N

**017**

- Switch power off.
  - Replace the A1-P2 card.
- Go to Machine Checkout MAP B100, Entry Point A.

**018**

- Check that wire #17 goes to A1P2D07.
  - Reinstall card A1P2.
  - Replace the LVPS PC board assembly.
- Go to Machine Checkout Map B100, Entry Point A

**019**

Go to MAP B123, Entry Point B. \*E\*

\*D\* Card is the only load at fuse F4 output.

\*E\* If voltage was within limits perform the next voltage measurement.

Map B128, +24v not within limits.

PAGE 1 OF 3

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B123	A	1	001

001  
(Entry Point A)

CAUTION

Before removing cards or cables switch power off.

Is +24v DC measured at 01A1M2B13 within limits of +22V to +26V?

Y N

002  
• Verify fuse F5 on LVPS board. See Figure B7. NOTE: Remove fuse when testing for continuity.

Is secondary fuse F5 blown?

Y N

003  
Is +24v DC measured at point 01A1M2B13 missing?

Y N

004  
Is +24v DC measured at point 01A1M2B13 low?

Y N

005  
Is +24v DC measured at point 01A1M2B13 high?

Y N

006  
Go to Step 001, Entry Point A.

007  
• Verify the ferro transformer input voltage connections. See Figure B-3.  
• Switch power off and disconnect power cable from outlet.  
• Replace ferro transformer.  
Go to Machine Checkout MAP B100, Entry Point A.

008  
Go to Page 2, Step 009, Entry Point B.

3 2 2  
A B C

B C

Map B128, +24v not within limits.

PAGE 2 OF 3

009  
(Entry Point B)

- Set CE meter to 150VAC scale.
- Measure the AC output voltage at LVPS PC board plug points P1-1 and P1-2.

Is the AC meter reading between the limits of 39VAC to 63VAC? \*A\*

Y N

010  
Replace in the following order and verify repair after each action.

- Switch power off.
- Replace the A.C. capacitor that is attached to the ferro transformer \*B\*.
- Switch power off and disconnect power cable from outlet.
- Replace the ferro transformer.

Go to Machine Checkout MAP B100, Entry Point A.

- \*A\*
- Short circuited power supply diode can also cause a low A.C. meter reading.
- Disconnect plug P1 from LVPS PC board.
  - Test LVPS PC diodes CR-3 and CR-4 (see Appendix figure B-7) with an ohmmeter; a good diode has infinite or high resistance in one direction and low resistance in the other direction.
  - Reinstall LVPS plug P1.

\*B\*

DANGER

- 550 volts at A.C. capacitor when power is on.
- The ferro transformer filter capacitor may carry a stored charge after the control unit is powered down. Avoid hand contact until the capacitor is discharged.

011  
• Measure +24V DC at LVPS PC board plug points P2-11(+) and P2-3(-).

Is the meter reading within limits?

Y N

012  
• Replace the LVPS PC board assembly.  
Go to Machine Checkout MAP B100, Entry Point A.

013  
Verify the wire from LVPS PC board plug P2-11 to 32 pin connector block on board A1 point F6C02 wire 18 (+24 volts to cable Z2). See Figure C-3.  
Go to Machine Checkout MAP B100, Entry Point A.

014  
• Turn power off.  
• Replace blown fuse F5. See figure B-11.  
• Switch power on.

Does fuse still blow?

Y N

015  
Go to Machine Checkout MAP B100, Entry Point A.

3  
D

A D  
1 2

Map B128, +24v not within limits.

PAGE 3 OF 3

**016**

- Switch power off.
- Replace blown fuse F5.
- Disconnect cable Z2 from the 01A1 board. See Figure C-5.
- Turn power on.

Does the fuse still blow?

Y N

**017**

- Switch power off.
- Remove the file control card from the 33FD disk drive.
- Reinstall cable Z2 in the 01A1 board.
- Switch power on.

Did the fuse blow?

Y N

**018**

- Replace the 33FD file control card.
- Go to Machine Checkout MAP B100, Entry Point A.

**019**

- Use ohmmeter to test for short circuit between cable Z2-D10 and Z2-D08.
  - Replace the 33FD drive unit assembly.
- Go to Machine Checkout MAP B100, Entry Point A.

**020**

- Replace blown fuse F5.
- Replace the A1M2 card.
- Go to machine checkout MAP B100, Entry Point A.

**021**

Go to MAP B123, Entry Point B \*D\*

\*C\* Disconnected cable disables +24V going to 33FD. The file adapter card (A1M2) is the only load on fuse F5.

\*D\*  
If voltage was within limits, perform the next voltage measurement.

Map B129 +12V Not Within Limits

PAGE 1 OF 3

001  
(Entry Point A)

\*\*\*\*\*MAP SUMMARY\*\*\*\*\*

Maintenance Concepts for MAP B129

Entry to this MAP is from MAP B123 if the measured +12 volts is not within limits. The +12 volt power supply transformer receives its a.c. input from the ferro transformer +5v secondary output. This voltage supplies +12v for the control storage cards. This MAP procedure isolates the +12v problem to +12v pc board assembly or the load in the A1 board.

**CAUTION**

Before removing cards or cables switch power off.

Is +12V dc measured at A1-F2 M13 or F2 S13 within limits of +11V to +13V? \*A\*

Y N

002  
• Verify fuse F7 on 12V pc board (LVPS). See Figure 4-6.  
Note: Remove fuse when testing for continuity.

Is secondary fuse F7 blown?

Y N

003  
Is the measured +12V point missing?

Y N

004  
Is the measured +12V point low?

Y N

005  
Is the measured +12V point high?

Y N

006  
Go to Step 001, Entry Point A.

007  
• Verify that the 12V transformer is set to the proper tap connection. See Adjustment Procedure Chapter 4.  
• Replace the 12 volt power supply assembly. \*C\*  
Go to Machine Checkout MAP B100, Entry Point A

008  
Go to Page 2, Step 009, Entry Point B.

3 2 2  
A B C

\*A\*  
The +12 voltage is also supplied to card sockets B thru E, pins M13 and S13.

B C  
1 1

Map B129 +12V Not Within Limits

PAGE 2 OF 3

009  
(Entry Point B)

- Switch power off.
- Disconnect cable P5 on 12 volt pc board.
- Switch power on.
- Measure 12V dc output voltage at 12 volt pc board receptacle J5-1(+) and J5-3(-). Ref. Figure 4-7.

Is the meter reading within limits?

Y N

010  
• Verify that the 12V transformer is set to the proper tap connection. See adjustment procedure Chapter 4.  
• Replace the 12 volt power supply assembly. \*C\*  
Go to Machine Checkout MAP B100, Entry Point A.

011  
• Reconnect cable P5 and verify its plug pins (1 and 3) for good connection to its receptacle pins.  
• Verify +12V pc board cable P5 that goes to board A1 +12V connector. Ref. Figure C-1.  
Go to Machine Checkout MAP B100, Entry Point A.

012  
• Switch power off.  
• Replace blown fuse F7. See Figure B-11.  
• Switch power on.

Does fuse still blow?

Y N

013  
Go to Machine Checkout MAP B100, Entry Point A.

014  
• Switch power off.  
• Replace blown fuse.  
• Disconnect cable plug P5 from the LVPS 12V pc board. Ref. Figure 4-7.  
• Switch power on.

Does fuse still blow?

Y N

015  
• A cable short is possible. Verify cable P5 on +12V pc board that goes to board A1 connector. Ref. Figure C-1 +12V connector.  
• Reconnect cable plug P5.  
• Isolate blowing fuse F7 problem to cards A1-B thru F or the A1 board.  
• Go to Machine Checkout MAP B100, Entry Point A.

\*B\*  
The 12V load is removed from the A1 board.

3  
D

A D  
1 2

**Map B129 +12V Not Within Limits**

PAGE 3 OF 3

**016**

- Replace the 12 volt power supply assembly. \*B\*
- Go to Machine Checkout MAP B100, Entry Point A.

**\*C\***

If the 12 volt power supply is replaced, see +12 volt adjustment procedure Chapter 4.

**017**

- End of voltage measurements.
- If entered this MAP from another MAP, use your support structure for aid.
- Go back to Chapter 2 and continue subsystem problem isolation.

MAP B130 I.M. 2400, 4800,

9600 Failure

PAGE 1 OF 5

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER

No entries in this table

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
3	016	A100	A
4	017	A100	A
2	003	B100	A
3	008	B100	A
3	011	B100	A
4	019	B100	A
4	024	B100	A
5	027	B100	A
5	028	B127	B

001

(Entry Point A)

\*\*\*\*\*MAP SUMMARY\*\*\*\*\*

Maintenance Concepts For Modem Failure

This MAP is entered from Chapter 5 after the most probable cards were replaced and the IML test 0111 is still failing. The MAP is also entered from Chapter 2, step 8, Host Attachment Problem. The Maintenance Concept is to run the resident integrated modem self test whenever a flashing 3274 0111 code and display code of 0111 016 is indicated. If the self test fails, the failing card is indicated via the led indicators on the A2-B2 card. The self test and wrap test description and procedure is described in Chapter 5, Integrated Modem Section. The Host attachment and IML test 0111 MAP decisions will aid you in isolating other problems that can cause an integrated modem failure, such as: internal external cables, option wiring, incorrect card type, switch setting, power, etc.

Is the IML test stopping at Code 0111?

Y N

4 2  
A B

B

MAP B130 I.M. 2400,4800,

9600 Failure

PAGE 2 OF 5

002

- Perform and repeat the self test by depressing and holding the ALT switch in position 2.
- Wait about 10 seconds, the correct operator panel indicators are:

1. Test indicator on.
2. Good indicator flashes once (every 4 seconds) for each self test.
3. Poor indicator off.

- Release the ALT switch.

Are indicators correct? \*A\*

Y N

003

(Entry Point B)

- Replace the front end card A2-E2 (Set Card Switches, para. 5.6.7).
- Replace the TAC card A2-A2. (Set card switches para. 5.6.8)
- Replace the processor card. See \*B\*
- Inspect for loose operator panel cable in board A2, location Y3 or Y4. See Figure C-5 part 2 for cable location.
- Inspect for loose cable plug P3, on operator panel indicator card. See Figure E-2 part 2 of 2.
- If you have a failing led indicator, verify cable continuity indicator line from operator panel plug P3 to board A2, location Y3 or Y4. See Figure B-2 part 3 of 3.
- Replace operator panel card.

Go To Map B100, Entry Point A.

004

Is the operate indicator on and the test indicator off?

Y N

005

Go to Step 003, Entry Point B.

006

When connected to the T.P. Network are the data quality indicators as expected (good led on, poor led off)? \*C\*

Y N

007

- Verify for loose internal I/O cable connector in board A2 row Y2 or Y3. See Figure C-5 part 2 of 2 for cable location.
- Check that communication cable on back of machine is securely connected.
- Check that communication cable is going to the correct phone line socket.

Is the good indicator still off?

Y N

3 3 3  
C D E

\*A\*

Releasing the ALT 2 switch stops the self test from running.

\*B\*

When integrated modem is 2400, 4800 BPS, processor card location is A2-B2 or A2-C2 when 9600 BPS. See Figure C-5 part 2 of 2.

\*C\*

When the 3274 phone line is connected to the master modem and the carrier detect signal is being received the good indicator goes on.

C D E  
2 2 2

MAP B130 I.M. 2400,4800,

9600 Failure

PAGE 3 OF 5

008  
Go To Map B100, Entry Point A.

009  
• Perform the ALT 2 wrap test 0111 function by momentarily pressing IML, while holding ALT switch in position 2. (Ref. 5.6.5.4).

After about 1 minute, does the wrap test end with a code of 1111? \*D\*

Y N

010  
• Replace front end card A2-E2. (Set card switches, para. 5.6.7).  
• Replace card A1-Q2.  
• Replace the receiver card A2-D2.  
• The problem is the 3274 is not receiving a carrier signal from the stand alone control modem. If possible use control modem off line procedures. See appropriate M.I.M.

011  
• Replace front end card A2-E2. (Set card switches para. 5.6.7)

Go To Map B100, Entry Point A.

012  
Is the problem when communicating with the host system and the data quality indicators are not as expected? (Good LED on, poor LED off)

Y N

013  
Does the problem occur when communicating or failing to communicate with the host system?

Y N

014  
• Go through MAP again.  
Go to Page 1, Step 001, Entry Point A.

015  
• Verify that board option wiring is correct when point-to-point or multi-point attachment. See Figure 5-21.  
• Verify that integrated modem card code function and transmission speed is correct for your machine attachment to control modem model. See Figure 5-22 and check card code function and see para. 5.6 through 5.6.3.

Was board option wiring and card code function correct for machine features?

Y N

016  
Modify as needed.  
Go To Map A100, Entry Point A.

4 4  
F G

\*D\*  
When the carrier signal is being received from the control modem the end code is 1111.

A F G  
1 3 3

MAP B130 I.M. 2400,4800,

9600 Failure

PAGE 4 OF 5

017  
• Replace the front end card A2-E2. (Set Card Switches, para 5.6.7).  
• Replace the TAC card A2-A2. (Set Card Switches para. 5.6.8).  
• Replace the processor card. See \*B\*.  
• Replace HPCA card A1-Q2.  
• Check the internal I/O cable in board position A2-Y2 or A2-Y3, and external I/O communication cable for defects. See line flow Fig. 5-8.  
Go To Map A100, Entry Point A.

018  
• Check that transmit level switches are properly set on the front end card A2-E2. See para. 5.6.7.  
• Replace front end card A2-E2. (Set card switches, para. 5.6.7).

Are the quality indicators still not as expected?

Y N

019  
Go To Map B100, Entry Point A.

020  
• If possible try running at half the operating speed until T.P. line is repaired. NOTE: A reduction to half speed can only be set at the master modem. See para. 5.6.4 line attachments.  
• If problem still exists use your support structure for aid.

021  
Were the cards replaced as instructed in Chapter 5, failing 0111 code card chart?

Y N

022  
• See Chapter 5 paragraph 5.6.5.6 and perform procedure.

023  
• Inspect for loose I.M. crossover cable from board A1-Y4 to board A2. See Figure C-5 part 2 of 2.  
• Replace other functional integrated modem cards that were not indicated to be replaced in Chapter 5 card failure chart. See Figure C-5 for HPCA and integrated modem card locations. Cards are: A1-Q2, A2-A4, A2-A2, A2-B2, A2-C2, A2-E2, A2-D2.  
• Verify for correct card/board plugging for machine integrated modem operating speed. See Figure 5-22 and verify card function and code on card connector.  
• Check integrated modem for loose, not correctly installed or damaged top card crossover connectors.

Does IML test 0111 still fail?

Y N

024  
Go To Map B100, Entry Point A.

5  
H

H  
4

MAP B130 I.M. 2400,4800,

9600 Failure

PAGE 5 OF 5

025

- Measure for -8.5 V.D.C. at pin A2-A2 D07.

Is the voltage within the limits of -7.8V to -9.3V?

Y N

026

- Verify that cable wire No. 10 goes to A2-E2 D07.
- Measure for -8.5V at E2 D07. \*E\*

Is -8.5V missing?

Y N

027

Switch power off.

Test for continuity from A2-E2 D07 to A2-A2 D07.

Go To Map B100, Entry Point A.

028

Go To Map B127, Entry Point B.

029

- Use your support structure for aid.

\*E\*

The -8.5 voltage goes to board A2 with push pin jumper (wire 10).

**Map B150, Installation/  
Customization Problems**

PAGE 1 OF 10

**ENTRY POINTS**

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
B01	A	1	001

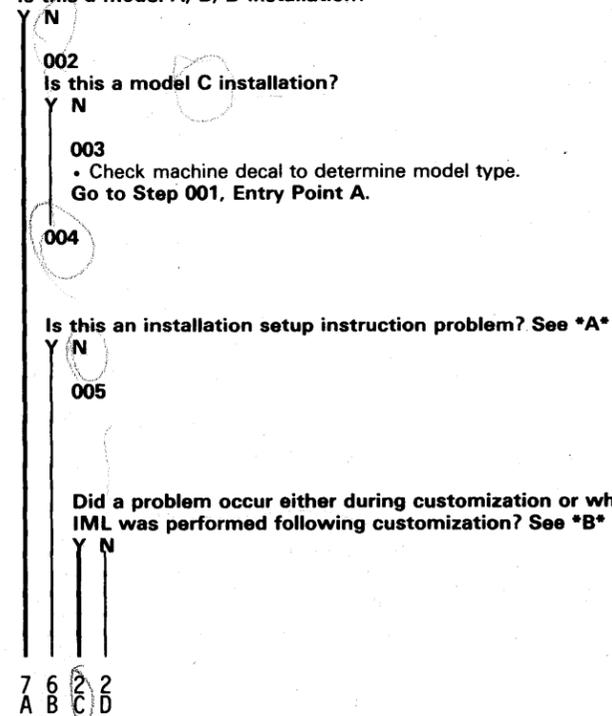
**001  
(Entry Point A)**

Maintenance Concepts For MAP B150

This map flow is developed to follow the sequence steps used in model C setup instruction form, Models A, B, D setup installation procedure in appendix F and customizing procedure form. When a sequence step does not provide the proper results, a map path can be taken to provide a fix, perform a procedure to help isolate the problem or duplicate the procedure steps to generate the problem. When an error condition occurs the map may provide a repair procedure or you are directed to use subsystem problem isolation in chapter 2 to isolate the error condition.

**CAUTION**

Before removing cards or cables switch power off.  
Is this a model A, B, D installation?



**\*A\***  
Form GA27-2855 is used by the customer for performing 3274 Model C set up procedures before customization.

**\*B\***  
• The procedures that the customer uses to perform customization is contained in the IBM 3270 Information Display System 3274 Control Unit Planning Set up and Customizing Guide GA27-2827.

**Map B150, Installation/  
Customization Problems**

PAGE 2 OF 10

**006  
Is the problem a failure to communicate with the Host System after a successful customization and IML?**  
Y N

**007**  
Go to subsystem problem isolation Chapter 2, step 2.

**008  
(Entry Point B)**  
• It is possible that the diskette configuration information is incorrect and is causing the Host System to fail. Perform the modification procedure of the System 3274 Customizing Guide for displaying the configuration information and verify against 3274 customizing procedure form. See \*B\*  
• Perform 'concurrent test/2' procedure for displaying configuration table from the system diskette. This table contains the configuration options and if necessary use table to verify that system attachment is correct. SEE CE reference card SY23-0207 or M.C.M. SY27-2512 for /2 test information.  
• Go to subsystem problem isolation Chapter 2, Step 4.

**009  
(Entry Point C)**

Does the problem occur after diskette customization when an IML is performed? See \*C\*

Y N  
**010**  
After the IML of the feature diskette, do the 8421 indicators display a code of 0001? See \*C\*

Y N  
**011**  
• See figures in the initial customizing procedure of the System 3274 Customizing Guide and look up the 8421 indicator code. Verify that the correct meaning/action fix was performed. See \*B\*  
• Replace the feature diskette with the system diskette. Perform IML and verify diagnostic tests ending code. See \*D\*. If error occurs go to step 035, Entry Point J.  
• Obtain another feature diskette and perform customization (IML) once more.  
• Use your support structure for aid if problem is not found.

**012**  
Does the 3278/3279 display the proper starting customization screen format of sequence number 001 and XXXXXXXXXXXXXXXXXXXX? SEE \*C\*



**\*C\***  
This question refers to a step procedure when performing the initial customizing procedure in the Planning Set-up and Customizing Guide.

**\*D\***  
• When a POR or IML with an 'uncustomized system' diskette is performed diagnostic tests 0000, 0001, 0010, and 0011 are run and complete with a 1101 code. If a display is attached to Port AO test 0100 will also run.  
• Code 0000 is the normal end with a previously 'customized system' diskette.

F G  
2 2**Map B150, Installation/  
Customization Problems**

PAGE 3 OF 10

013

- If 3274 is Model C with CCA feature card, verify that wire A1-S2B10 to A1-M2S10 is installed.
- When the 8421 indicators display a code of 0100, it indicates that the 3274 is having a communication problem with the display or the display is failing to display data being received from the 3274.
- Go to subsystem problem isolation Chapter 2, Step 4.
- If problem still exists, obtain another feature diskette and perform customization once more.
- Use your support structure for aid if problem is not corrected.

014

- Perform the next customizing step after the starting screen format is displayed. See \*C\*
- (Entry Point G)

Does a new sequence number appear on the display screen when Enter key was pressed? See \*C\*

Y N

015

Does the entered response cause a 1 or 2 digit operator code displayed on the upper center of the display screen? See \*C\*

Y N

016

- Swap keyboard with another display.

017

- See figure in the initial customizing procedure of the System 3274 Customizing Guide and look up the 1 or 2 digit operator code. Verify that the correct meaning/action fix was performed.
- Use your support structure for aid if problem is not found.

018

Is the verification response listing displayed with sequence number 900? See \*C\*

Y N

019

- Enter another sequence response and go to step 014 Entry Point G. keep returning to Entry Point G until verification listing with sequence number 900 is displayed.

4  
HH  
3**Map B150, Installation/  
Customization Problems**

PAGE 4 OF 10

020

- Verify that all entries on display screen compare with customizing procedure form.
- Change the entry for sequence 900 to a '1' and press the Enter key.

Does the verification listing contain any responses that are intensified? See \*C\*

Y N

021

After 2 minutes or less, do the 8421 operational indicators flash either 1011 or 1101? See \*C\*

Y N

022

- See figures in the initial customizing procedure of the System 3274 Customizing Guide and look up 8421 indicator code. Verify that the correct meaning/action fix was performed.
- Verify that the configuration information was correctly entered. Perform the modification procedure of the System 3274 Customizing Guide for displaying the configuration information and verify against 3274 customizing procedure form. See \*B\*
- If an uncustomized system diskette is being customized the following cards in the A1 board can be loose or defective: E2, F2, D2, C2, B2, H2, G2, G4. See \*E\*.
- Obtain another feature diskette and perform customization once more.
- Use your support structure for aid if problem is not corrected.

023

- Follow the initial customized procedure, replacing the feature diskette with the system or language or RPQ diskette.

When performing procedures without feature diskette, did the 8421 indicators display the proper code/codes? See \*C\*

Y N

024

- See figures in the initial customized procedure of the System 3274 Customizing Guide and look up the 8421 indicator code. Verify that the correct meaning/action fix was performed.
- If an 'uncustomized system' diskette is being customized the following cards in the A1 board can be loose or defective: E2, F2, D2, C2, B2, H2, G2, G4. See \*E\*.
- Obtain another system diskette and perform customization once more.
- Use your support structure for aid if problem is not corrected.

025

- Perform an IML startup.

Go to Page 5, Step 027, Entry Point H.

5  
J

\*E\*

These cards were not tested when the 'uncustomized' system diskette was run. See \*D\*. The cards can only be tested after a successful customization when then an IML startup is performed. At this time a diagnostic test will test these cards.

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Customization Problems

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## 026

- If a 1 or 2 digit operator code is displayed on the upper center of the display screen, then see Figures in the initial customizing procedure of the System 3274 Customizing Guide and look up the operator code. Verify that the correct meaning/action fix was performed.
- The intensified response/responses are caused whenever invalid feature combinations were entered. Call planner or project leader and indicate which sequence numbers are intensified. Note: The System 3274 Customizing Guide GA23-0065 describes sequence number function.
- Use your support structure for aid if problem is not corrected.

## 027

(Entry Point H)

Do the IML diagnostic tests fail with a flashing 8421 code value of 0101, 0110, 0111, 1000 or 1001? See \*C\*

Y N

## 028

Do the IML diagnostic tests fail with any other 8421 code?

See \*C\*

Y N

## 029

After the IML diagnostic tests run successfully, does the loading of the operational code cause an ending 8421 code value of 0000? \*G\*. See \*C\*

Y N

## 030

- An error was detected while the operational code was loaded. Go to Chapter 2 and see Step 6 'display symbols' and Step 7 'operational indicators'.

## 031

- Successful IML end.

## 032

- Go to subsystem problem isolation Chapter 2, Step 1C.

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## 033

See \*H\*

- A wrong customization entry for some sequence numbers will cause a flashing 8421 error indication when an IML is attempted. Perform the modification procedure of the System 3274 Customizing Guide, for displaying the configuration information. SEE FIGURE in the initial customizing procedure and look up the 8421 indicator code caused during IML. Verify the correct meaning/ action fix was performed.
- The 3274 can be failing due to the additional IML diagnostic testing after customization.
- Go to subsystem problem isolation Chapter 2, Step 4.

## 034

(Entry Point J)

After power on, are the 8421 indicators 'ending' with a value of 1101? \*D\*.

Y N

## 035

After power on, are the 8421 indicators 'ending' with a value 0000? \*D\*

Y N

## 036

After power on, are the 8421 indicators 'ending' with a flashing 0100?

Y N

## 037

- Verify that the 3274 has the proper system diskette.
- Go to subsystem problem isolation Chapter 2, Step 4.

## 038

- This can occur if a display is attached to port A0 and the 3274 or the display is failing.
- Go to subsystem problem isolation Chapter 2, Step 4.
- If problem still exists obtain another system diskette and perform installation setup once more.

## 039

- System diskette is already customized and 3274 is now ready for recustomizing.

## 040

- System diskette is uncustomized. Set up is complete. If preparation for customizing is complete the 3274 is now ready for customizing.

## \*H\*

- When a flashing 0110 for a Model C, verify that the response to customization sequence number 351 (HPCA or CCA) matches the feature installed. Check A1-Q2 card part number. See Figure C-4.
- When a flashing 0110 code for a model B or D, verify that the card A1-Y4 address range switches are valid and that the CU address P bit is set off. See Appendix F.
- When a flashing 0101 code, verify that sequence number 113 and 151 match the 3274 features.

## \*G\*

As the IML diagnostic tests run, the operational indicators sequence and when successful, all the indicators go on. The indicators remain on as the operational code is loaded and when successful all the indicators go off.

**Map B150, Installation/  
Customization Problems**

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041

- Is this a C.E. installation problem that occurred in M.I.M. Appendix F procedure?

Y N

042

- Did a problem occur either during customization or when IML was performed following customization?

Y N

043

- Is the problem a failure to communicate with the Host system after a successful customization and IML?

Y N

044

- Successful customization end.

045

- It is possible that the diskette configuration information is incorrect and is causing the Host System to fail. Perform the modification procedure of the System 3274 Customizing Guide for displaying the configuration information and verify against 3274 customization procedure form. See \*B\*.
- For Model A machines, if on-line failure occurs with a 0010 indicated in the 3274 then: verify that customization sequence No. 201 (control unit address) is correct and matches the control unit address switches. See Appendix F for card A1-Y4 card switches.
- Request that all 3274 on line tests (OLT's) be run. If OLT's indicate a failure or are unavailable, Replace/Reseat cards A1-N2, P2, Q2 and reseat A1-Y4. CAUTION - Use removal procedure for these cards, See \*J\*.
- Inspect bus and tag interface connector cable blocks and mating sockets (01S-B1, B2, B3, B4) for broken or damaged pins. See CAUTION \*M\*.
- Inspect for solder shorts, broken wires on bus and tag cable connectors in board A1-Z3, Z4, Z5, Z6. See Figure C-5. CAUTION \*M\*.
- Verify continuity for internal bus and tag cables, See Figure C-6. CAUTION \*M\*.
- Use your support structure for aid if problem is not corrected.

(Step 045 continues)

8 8  
L M

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(Step 045 continued)

046

- Go to Page 2, Step 009, Entry Point C.

047

- After the first 3274 power on (without system diskette), do the 8421 indicators stop at 0010? \*K\*.

Y N

048

- Go to subsystem problem isolation Chapter 2, Step 4.

049

- Does the 3274 contain an uncustomized system diskette?

Y N

050

- After power on with a previously customized diskette, do the 8421 indicators stop at 0000? \*D\*.

Y N

051

- See IML flashing codes item \*H\*.
- Go to Page 2, Step 008, Entry Point B.

052

- After running OLT's did all test routines run correctly?

Y N

053

- Verify again the card A1-Y4 switches that were set during installation procedure.
- Reseat/Replace cards A1-Q2, P2, N2 and run OLT's after each card replacement. CAUTION- use removal procedure for these cards. See \*J\*.
- Inspect bus and tag interface connector cable blocks and mating sockets (01S-B1, B2, B3, B4) for broken or damaged pins. See CAUTION \*M\*.
- Inspect for solder shorts, broken wires on bus and tag cable connectors in board A1-Z3, Z4, Z5, Z6. See Figure C-5. CAUTION \*M\*.
- Verify continuity for internal bus and tag cables. See Figure C-6. CAUTION \*M\*.
- Use your support structure for aid if problem is not corrected.

054

- Successful installation set up end.

9  
N

(Step 045 continued)

1. Install these cards in the following sequence:  
Q2, P2, Y4, then N2
2. Remove jumper after card N2 is installed.

\*K\*

When a POR or IML is performed without a diskette installed internal control storage runs IML diagnostic tests 0000 and 0001.

\*J\*

**CAUTION**

Use the following procedure when removing cards A1-N2, A1-P2, A1-Q2, A1-Y4 for local interface Model A, B, D.

1. You should already be in the local off line condition.
2. Switch power off.
3. Place a jumper between A1-N2 S02 and N2 G09 (bypass Sel out).
4. Now any local adapter card N2, P2, Q2, Y4 can be removed.  
NOTE: Never power machine on with N2 (DRIVER-RECEIVER) plugged into board without Q2, P2, and Y4 plugged in.

**CAUTION**

For Model A, B, D.  
(Step 045 continues)

055  
After power on with an uncustomized diskette, do the 8421 indicators stop at 1101? \*D\*.

Y N

- 056
- Verify that system diskette is correct for 3274.
  - Use spare system diskette and perform IML once more.
  - Go to subsystem isolation Chapter 2, Step 4.

057  
After performing the ALT 2 IML Step, did the 8421 indicators stop at 0010 (model A) or 0001 (model B) or 0101 (MODEL D)?

Y N

- 058
- Use spare system diskette and repeat installation steps.
  - It is possible that the ALT 2 function is failing see Chapter 2, Step 11 figure 2-9 symptom 1.

059  
After switching to local on-line, did the off-line indicators go out and the 8421 indicators stop at 0100 (model A) or 0011 (MODEL B or 0010 (MODEL D)?

Y N

- 060
- Go to subsystem isolation Chapter 2, Step 11 Figure 2-9 Symptom 2.

061  
After running OLT's did test routine 1 run correctly?

Y N

- 062
- See (Table A) and verify the 8421 indicators for the various error codes.
  - Code 1011 or 1100 can occur for a model A or B if other OLT's test routines (not 1) are run. Note: code 1100 (model A) will cause the 3274 to go off line. To go on line see \*L\*.
  - Reseat/Replace A1-Q2, P2, N2, reseat A1-Y4 and run OLT's test routine 1 after each card replacement. Caution-Use removal procedure for these cards. See \*J\*.
  - Verify again the card switches that were set during installation procedure.
  - Inspect bus and tag interface connector cable blocks and mating sockets (O1S-B1, B2, B3, B4) for broken or damaged pins. See Caution \*M\*.
  - Inspect for solder shorts, broken wires on bus and tag cable connectors in board A1-Z3, Z4, Z5, Z6. See Figure C-5. CAUTION \*M\*.
  - Verify continuity for internal bus and tag cables, See Figure C-6. CAUTION \*M\*.
  - Use your support structure for aid if problem is not corrected.

(Step 062 continues)

TABLE A

Verify the 8421 indicators for the following codes:

1011 - Indicates a Model B received a channel command other than test I/O or NOP. The control unit is functionally removed from the channel interface.
1100 - Indicates that a Model A received a channel command other than test I/O or NOP. The control unit will respond with 'UNIT CHECK COMMAND REJECT' to the host.
1010 - Indicates a Model D received a channel command other than test I/O, NOP or sense. The control unit

(Step 062 continues)

(Step 062 continued)

(Step 062 continued)

1101 - Indicates the local attachment did not respond to the control logic interface.
---

\*L\*

- To enable the 3274 on-line (uncustomized diskette)
- Switch to off line.
- Press and hold the ALT 2 switch and press and then release the IML switch. The indicators will stop at 0010, 0001, or 0101.
- Set switch to on-line (ind goes off).

\*M\*

CAUTION

- Before removing bus and tag cables from 3274 insure the CPU/channel is in the 'STOP' state.
- To allow customer to operate Host System, see Section 4.3.2 'Disconnect Local 3274 from Host System Interface.'

063

After a successful OLT's run, did the off-line indicator turn on as directed in installation step?

Y N

064

- Go to subsystem isolation Chapter 2, Step 11 Figure 2-9 Symptom 2.

065

- Successful CE installation end.



## Chapter 4. Maintenance Procedures

### 4.1 GENERAL

#### DANGER

Safety glasses must be worn when performing any removal or replacement procedures.

The maintenance procedures for the 3274 Control Unit (CU) are limited to removal and replacement of field replaceable units (FRUs) and adjustments by the CE. Before starting any procedure, ensure that the control unit is completely powered down. The first procedure describes getting access to the serviceable areas of the 3274. Succeeding paragraphs cover removal and replacement of the FRUs. See Figure A-1.

### 4.2 REMOVAL, REPLACEMENT AND ADJUSTMENT PROCEDURES

#### 4.2.1 Access (Figure 4-1)

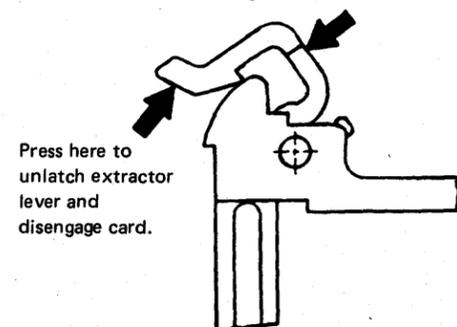
1. Open the customer access door.
2. Ensure that power is off.
3. Open the CE access area door by inserting a hex key actuator, PN 6834390 or a number 4 metric (number 156 U.S.) Allen wrench near the right edge of the door. Turn the actuator or wrench to release the latch.
4. To lower the logic gate, release the stop on the left side and pull the top of the gate forward.
5. To close the logic gate, raise the gate and push in on the gate stop spring, allowing the gate to close completely.

#### 4.2.2 Card Removal and Replacement

##### 4.2.2.1 Removal

Unlock and rotate the extractor levers simultaneously at the top and bottom until the card disengages (as shown below).

After seating card, press here to latch extractor lever.



##### 4.2.2.2 Replacement

Open both extractor levers fully. Insert the card holder tracks into the front guide fingers (card components

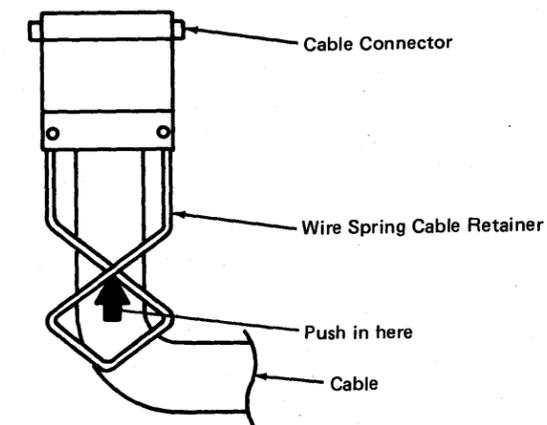
towards right). Do not use the extractor levers to reseat the card. Apply firm finger pressure to the card holder (or connector housing for double ended cards) to ensure proper contact seating.

After reseating, press firmly on the indicated extractor levers and rotate them simultaneously until latched.

#### 4.2.3 Internal Cable/Connector Removal and Replacement

##### 4.2.3.1 Board Socket Connector Removal

Push in the wire spring cable retainer to disengage it from the slot in the gate, and pull the connector free from the pins.

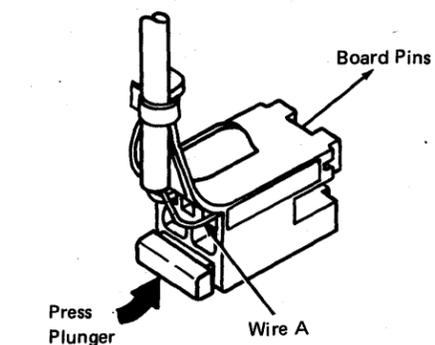


##### 4.2.3.2 Board Socket Connector Replacement

Reseat the connector and push in the wire spring cable retainer until the end of the retainer is latched into the slot in the gate.

##### 4.2.3.3 Locking Connector (Pin Side) Removal

While pressing in the connector plunger, rock the connector from side to side while pulling on the connector.



##### 4.2.3.4 Locking Connector Replacement

Reseat the connector, ensuring that wire A on the connector engages board pin U2 B11. Refer to Figure 4-11.

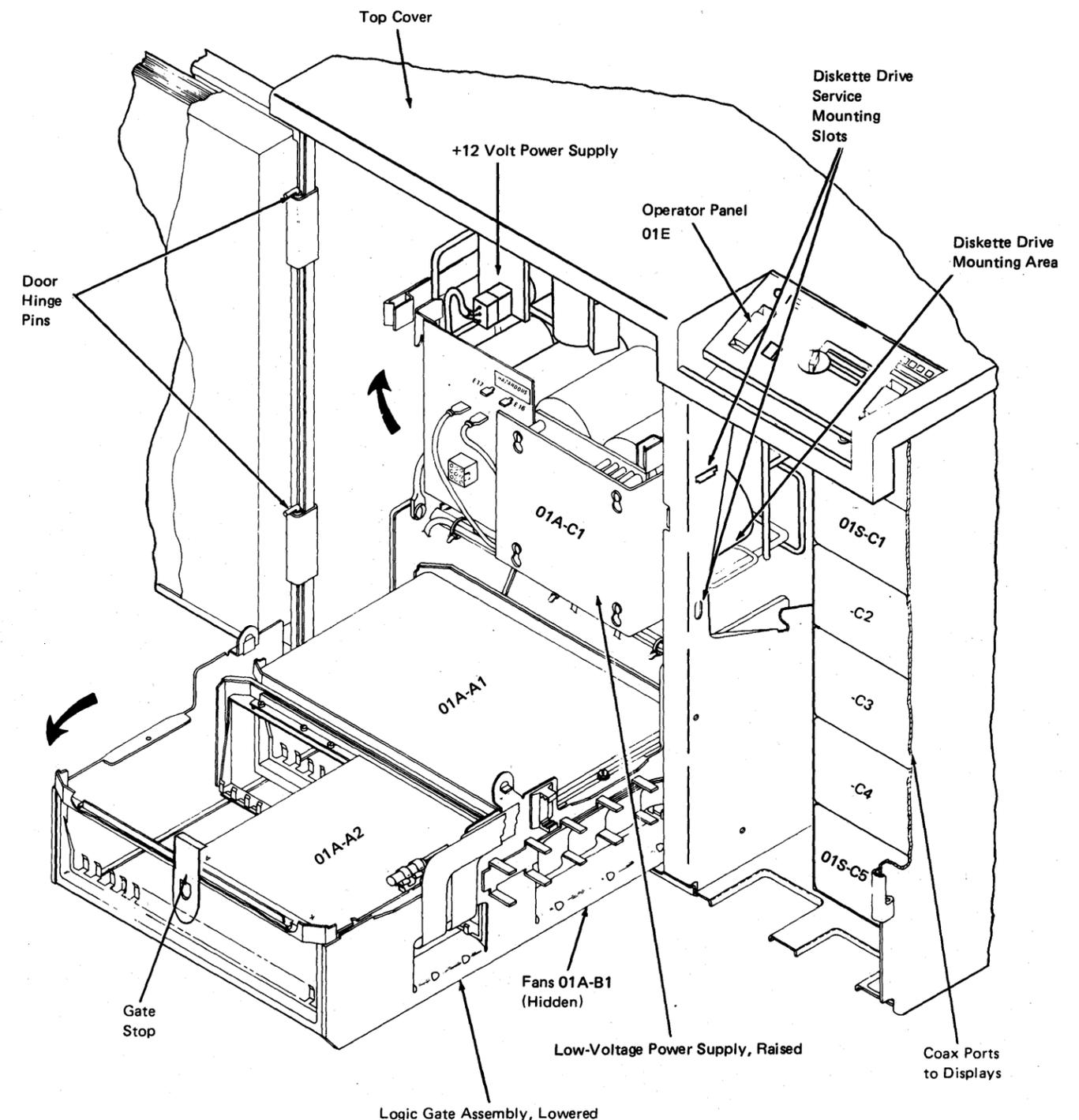


Figure 4-1. 3274 Field Replacement Unit Locations

**4.2.4 33FD Diskette Drive (Figure 4-2)**

1. Perform Procedure 4.2.1 to get access.
2. At the rear wall, over the primary power box, release the cables from the raceway, and extend.
3. Remove the wingnut at the top center of the diskette drive motor.
4. Tilt the top edge to the left to free it from the stud; then lift and remove.
5. Hang the diskette drive by its service mounting tabs into the slots on the right side of the partition between the CE access area and the customer access area. Close the logic gate. See Figures 4-1 and 4-2.
6. To completely remove, disconnect the power cable, signal cable, and ground wire from the diskette drive motor.

**Note:** *Inspect the replacement 33FD diskette drive to see that the mounting frame is installed. If the mounting frame is not installed, it will be necessary to remove the frame from the old unit and install it on the replacement. To replace the diskette drive, reverse the sequence (be sure to reconnect the three green and yellow ground wires at the diskette drive motor as shown in Figure 4-2). See Appendix G for 33FD maintenance.*

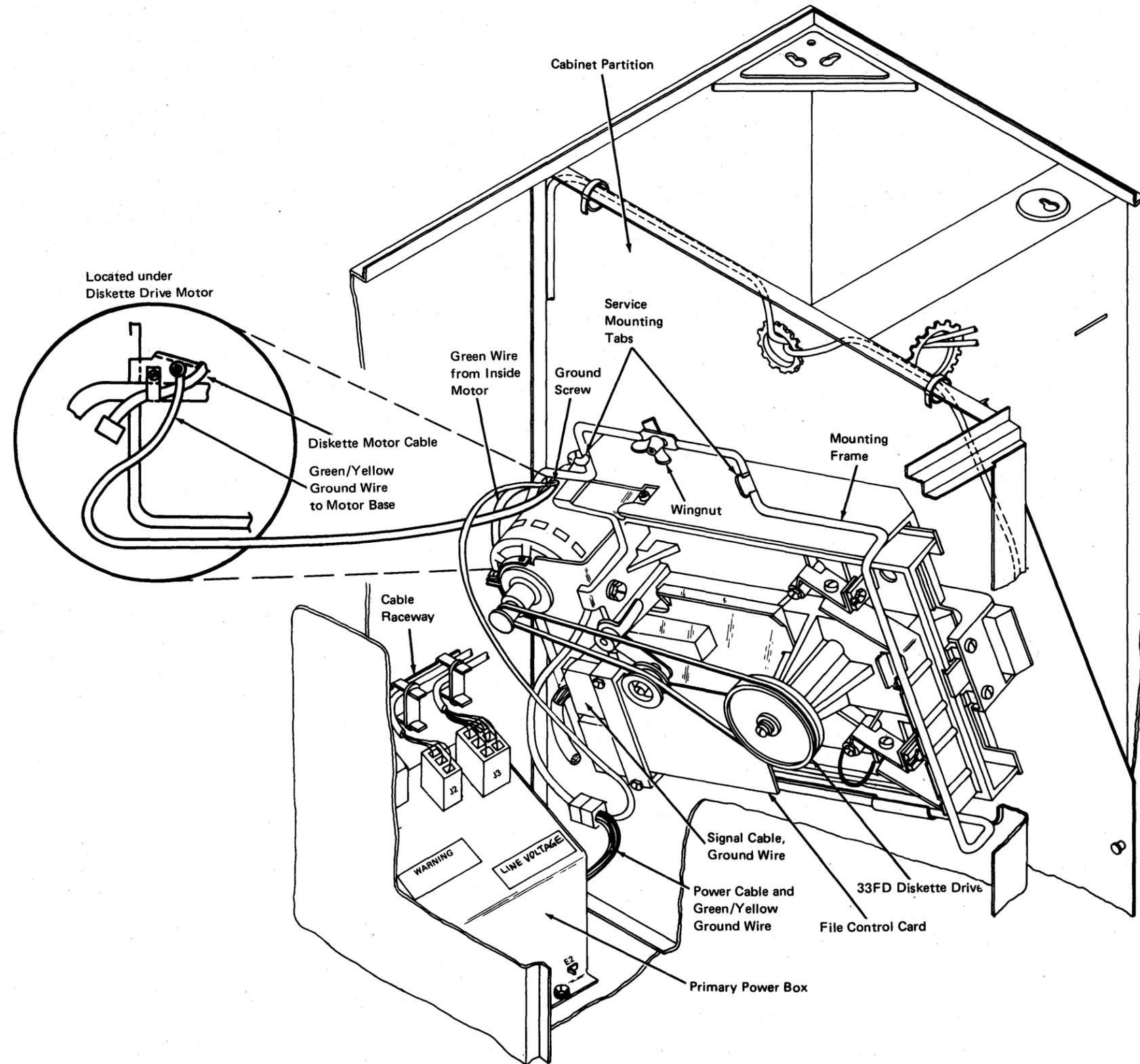


Figure 4-2. 33FD Physical Locations

#### 4.2.5 Ferrotransformer (Figure 4-3)

##### DANGER

Verify that the AC power cord has been disconnected before attempting to service any primary power components.

1. Perform Procedure 4.2.1 to get access.
2. Remove the top cover if necessary (Procedure 4.2.12).
3. Remove all leads from the terminal strip (TB-1) and ground screw above the ferrotransformer. Note the location of the wires for use in reassembly.
4. Remove wires from terminals E6, E8, and E10 and the 9-pin connector (J1) from the low-voltage power supply card. See Figure 4-6.
5. Cut the plastic cable strap (if present) that holds the fan cable to the wiring harness. When replacing the unit, wrap the fan cable around the ferrotransformer cable.
6. Loosen but do not remove the two rear mounting nuts.\*
7. Remove the two front mounting nuts.\*
8. Pull the ferrotransformer forward to disengage; then remove it.

##### DANGER

The ferrotransformer filter capacitor carries a stored charge after the control unit is powered down. Avoid hand contact until the capacitor is discharged.

9. Carefully remove the rubber boot over the capacitor. Using a tool with an insulated handle (or a piece of insulated wire with the ends bared), short the capacitor terminals to discharge.
10. Unplug the capacitor leads.
11. Release the retaining spring, and remove the capacitor. If previous troubleshooting procedures have verified that the capacitor is still good, retain for installation on the replacement ferrotransformer.
12. Unpack and inspect the new transformer to verify that the strapping configuration is identical with the old. If not, correct before proceeding.
13. Mount a new or verified good capacitor on the ferrotransformer by reversing the procedure in Steps 11 through 9 above.
14. Replace the ferrotransformer by reversing the procedure in Steps 8 through 1 above. Inspect all wiring and cable connections before powering up. Ensure that any previously blown fuses have been replaced. Reconnect the frame ground wires (Gr/Yel) near TB1. See Figure 4-3.

\*On some machines the ferrotransformer is held in place with screws.

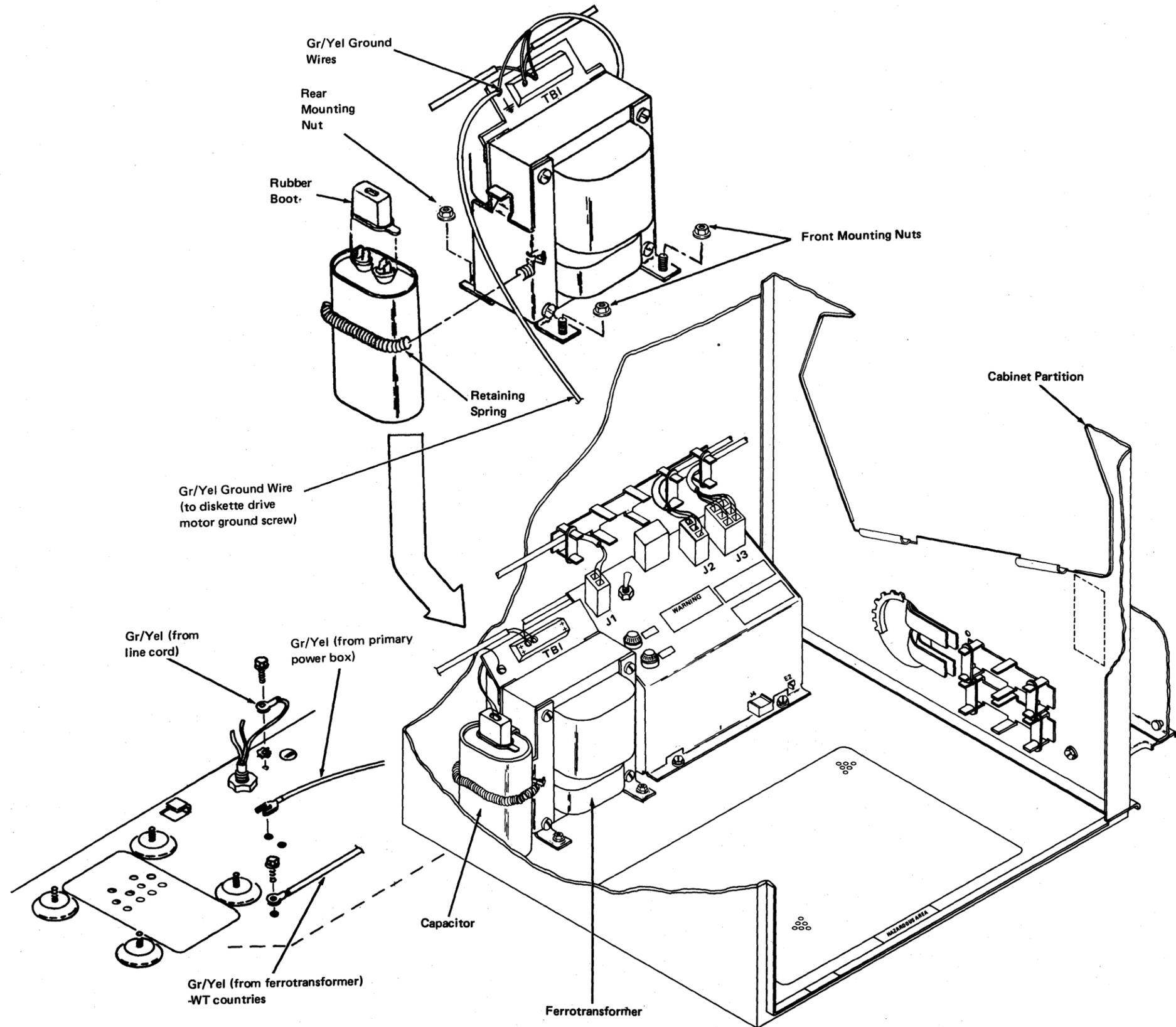


Figure 4-3. Primary Power Locations

#### 4.2.6 Primary Power Box (Figure 4-4)

##### DANGER

■ Verify that the AC power cord is disconnected.

1. Perform Procedure 4.2.1 to get access.
2. Remove the top cover if necessary (Procedure 4.2.12).
3. Disconnect all cables from the primary power box: J1, J2, and J3 on Model C; J1, J2, J3, and J4 on Models A, B, and D.
4. Loosen but do not remove the two mounting screws at the front edge of the box. On some machines, it may be necessary to remove the two mounting screws.
5. Pull the primary power box forward evenly to disengage from the mounting slots.
6. Tip the box forward to expose the primary power box terminal strip (TB-1).

##### DANGER

■ Leads going to the primary power box terminal strip (TB-1) must be replaced in the same order. Note or make a drawing of the lead configuration, tagging as required, before removal.

7. After noting wire order, remove all leads from the primary power box terminal strip (TB-1).
8. Remove the ground wire from the primary power box to the machine frame at the machine frame end.
9. Remove the primary power box. To replace, perform the procedure in reverse. Be sure to reconnect the frame ground wires (green/yellow) as shown in Figure 4-3.

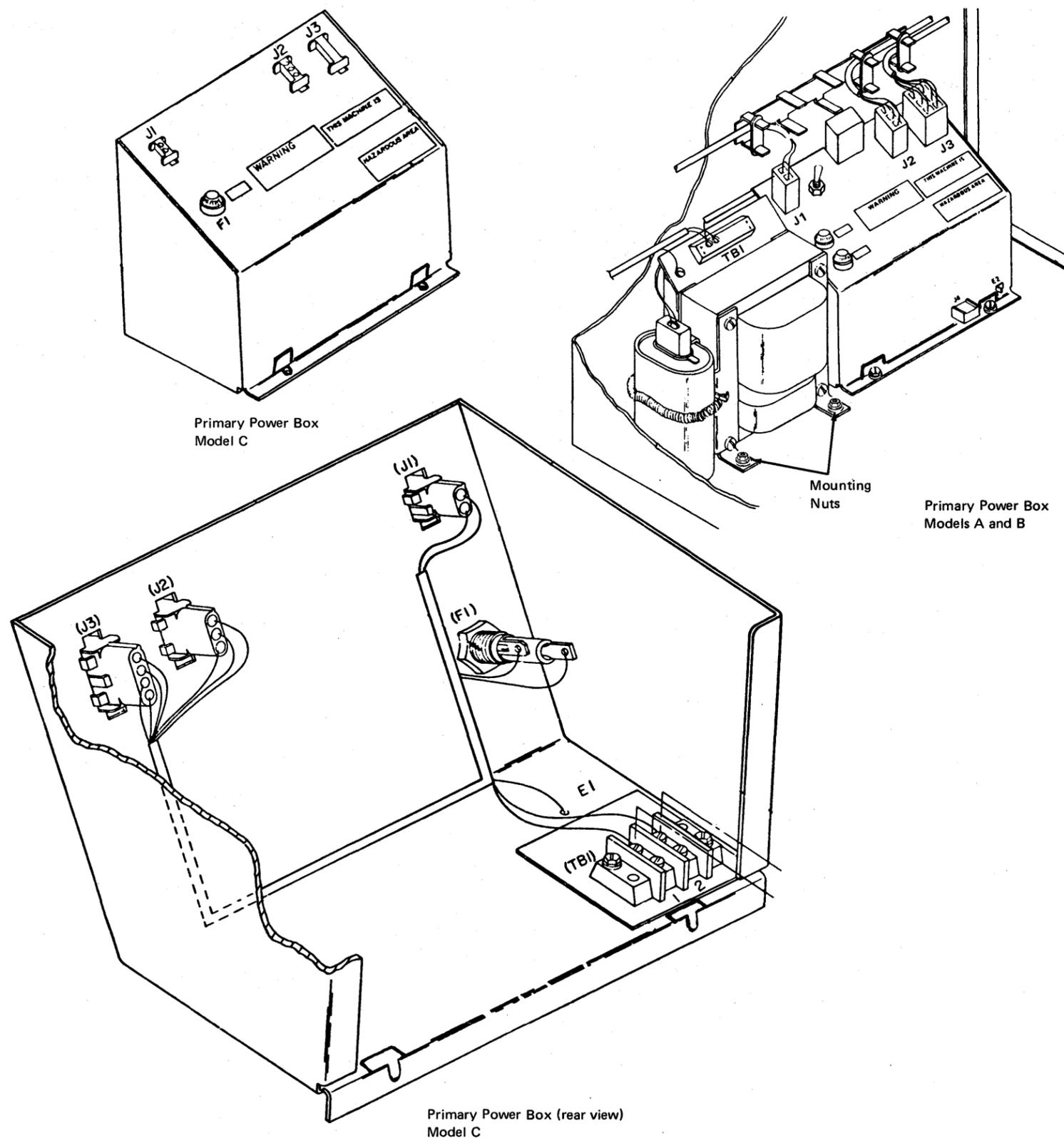


Figure 4-4. Primary Power Box

#### 4.2.7 Fan Assembly (Figure 4-5)

1. Perform Procedure 4.2.1 to get access.
2. Remove the fan power leads from the ferrotransformer terminal strip (TB-1) and the green and yellow wire (wire number 1) from the ground screw. See Figure B-3 for proper AC voltage terminal connections.
3. Remove the two hex-headed screws at the rear of the gate.
4. Disconnect the cable from the cable clamp (Figure 4-5).
5. While holding the fan assembly at the front edge, raise the gate assembly and slip the fan assembly out of its slot.

**Note:** The remainder of the procedure is optional. Removal of individual fans is described.

6. Remove the power lead(s) from the fan motor tabs.
7. Remove the four screws securing the individual fan. Remove the fan. To replace the fan and the fan assembly, perform the procedure in reverse.

**Caution:** During reassembly, when sliding the fan assembly into position, use care not to damage the cables that enter the lower right portion of the gate.

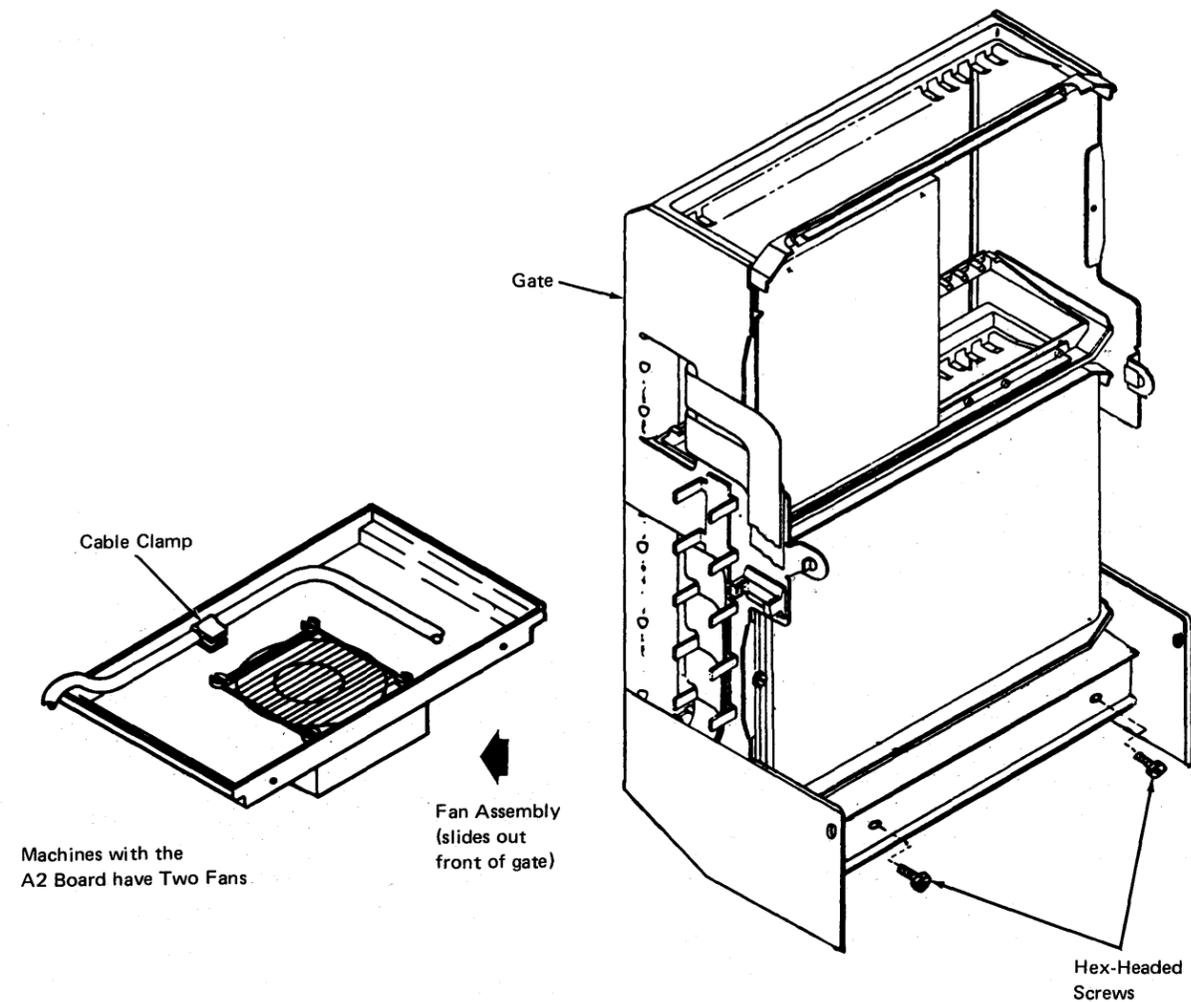


Figure 4-5. Gate and Fan Assembly

#### 4.2.8 Low-Voltage Power Supply (LVPS) — Heat Sink Assembly

**Caution:** When replacing either the heat sink or the low-voltage card, exercise extreme care in placing the heat-sink groundplane tab in proper mechanical and electrical contact with the +5 VDC return (E10) on the low-voltage card. Do not allow it to become distorted or damaged. See Figure 4-6.

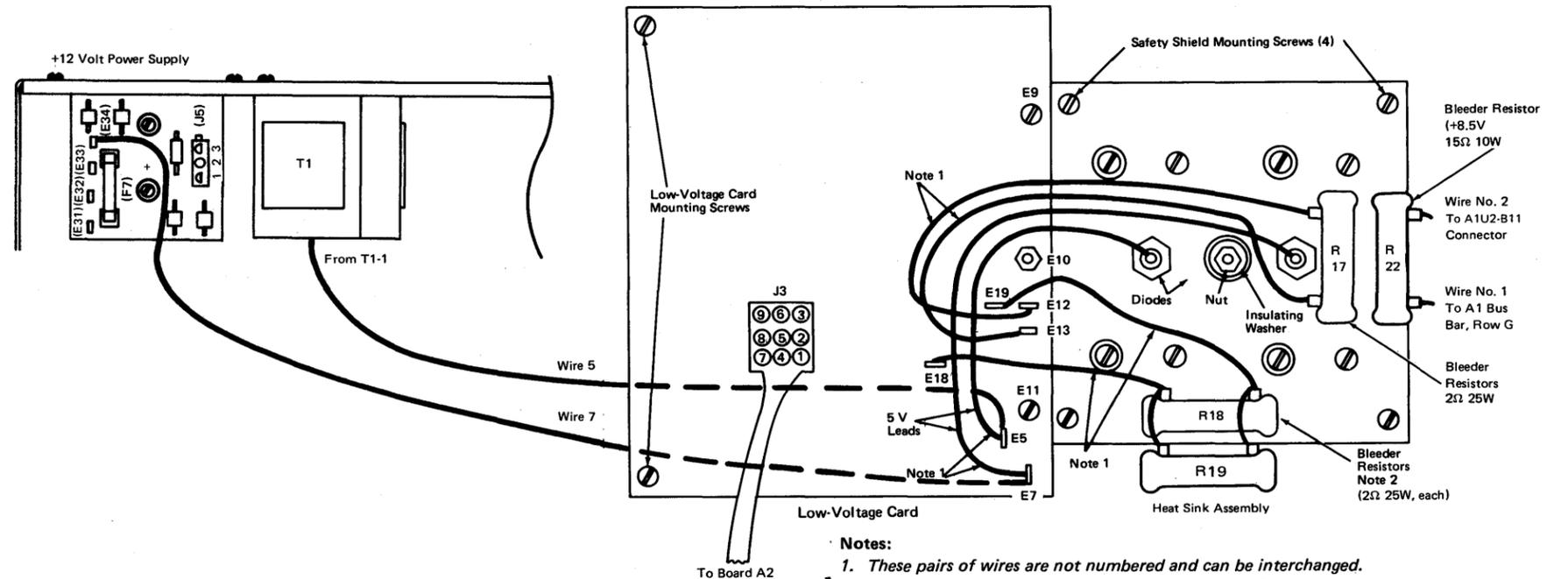
1. Perform Procedure 4.2.1 to get access.
2. Remove the attached +12 volt power supply assembly. Use Procedure 4.2.9.1. Reuse the +12 volt assembly on the new low-voltage power supply (LVPS).
3. Remove the capacitor retaining strap from the heat-sink assembly. See Figure B-13 for capacitor/buckle strapping.
4. Release the spring catches at either side of the low-voltage power supply assembly. Raise the assembly off the logic gate. See Figure 4-1.
5. Loosen the four screws holding the plastic safety shield. Remove the shield.
6. Remove the cap screw serving as +5 VDC return common point (E10). (One lead is secured under the screw head located on the back side of the low-voltage card.)
7. Disconnect the +5V leads (originating at the heat-sink diodes) from tabs E5 and E7 on the low-voltage card. Note the position of the bleeder resistors and their leads, for the next step.
8. Remove the bleeder resistor leads from tabs E12, E13, E18, and E19 on the low-voltage card (Figure 4-6A, Note 2).
9. Disconnect the two wires connected to R22 (Figure 4-6A) from the A1 board end. Remove the two wires from the cable clamp on the logic gate.
10. Remove the two screws E9 and E11 securing the heat sink to the low-voltage card.
11. Remove the nut and insulated washer in the center of the heat-sink assembly.
12. Remove the two screws located at the upper and lower left corners of the low-voltage card that hold the card to the frame.
13. Move the low-voltage card to the left, and lift slightly to allow the heat-sink assembly to be removed.
14. To replace the heat-sink assembly, reverse the procedure.

#### 4.2.9 Low-Voltage Power Supply (LVPS) — Low-Voltage Card

1. Perform Procedure 4.2.1 to get access.
2. Perform Steps 1 through 9 of the heat-sink assembly removal procedure (4.2.8).
3. Remove the capacitor retaining strap from the low-voltage power supply assembly. See Figure B-13 for capacitor-buckle strapping.
4. Disconnect all push-on leads (front and rear) from the low-voltage card, and remove plugs P1, P2, P3, and P4 if present.
5. Perform Steps 10 and 11 of the heat-sink assembly removal procedure (Procedure 4.2.8).
6. Remove the card.
7. To replace the low-voltage card, reverse the procedure.

**Note:** Wire 20 is terminated at E2 on Models A, B, and D. It is not functional on Model C.

B — Low-Voltage Card (Rear View, Gate Open)



**Notes:**

1. These pairs of wires are not numbered and can be interchanged.
2. The bleeder resistors are always present when the 3274 is a Model A, B, or D. The bleeder resistors are present for Model C when both the Type B adapter and an integrated modem are installed.

A — Low-Voltage Card/Heat-Sink Assembly (Front View, Gate Open)

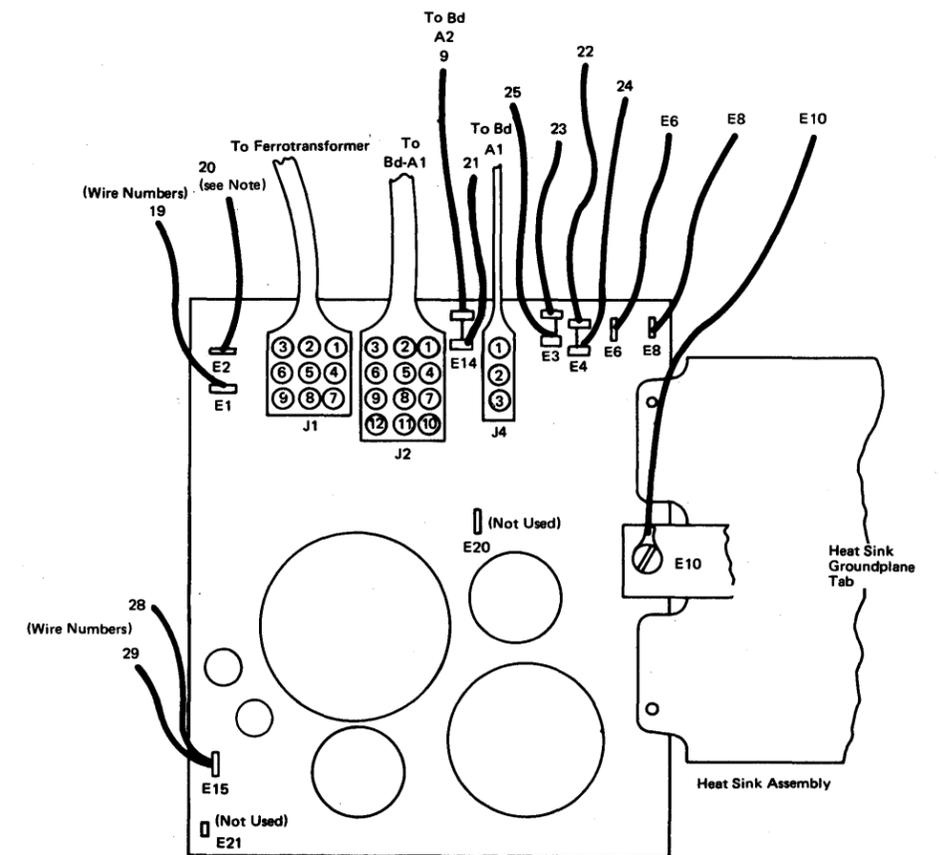


Figure 4-6. Low-Voltage Power Supply (LVPS)

#### 4.2.10 +12 Volt Power Supply Assembly

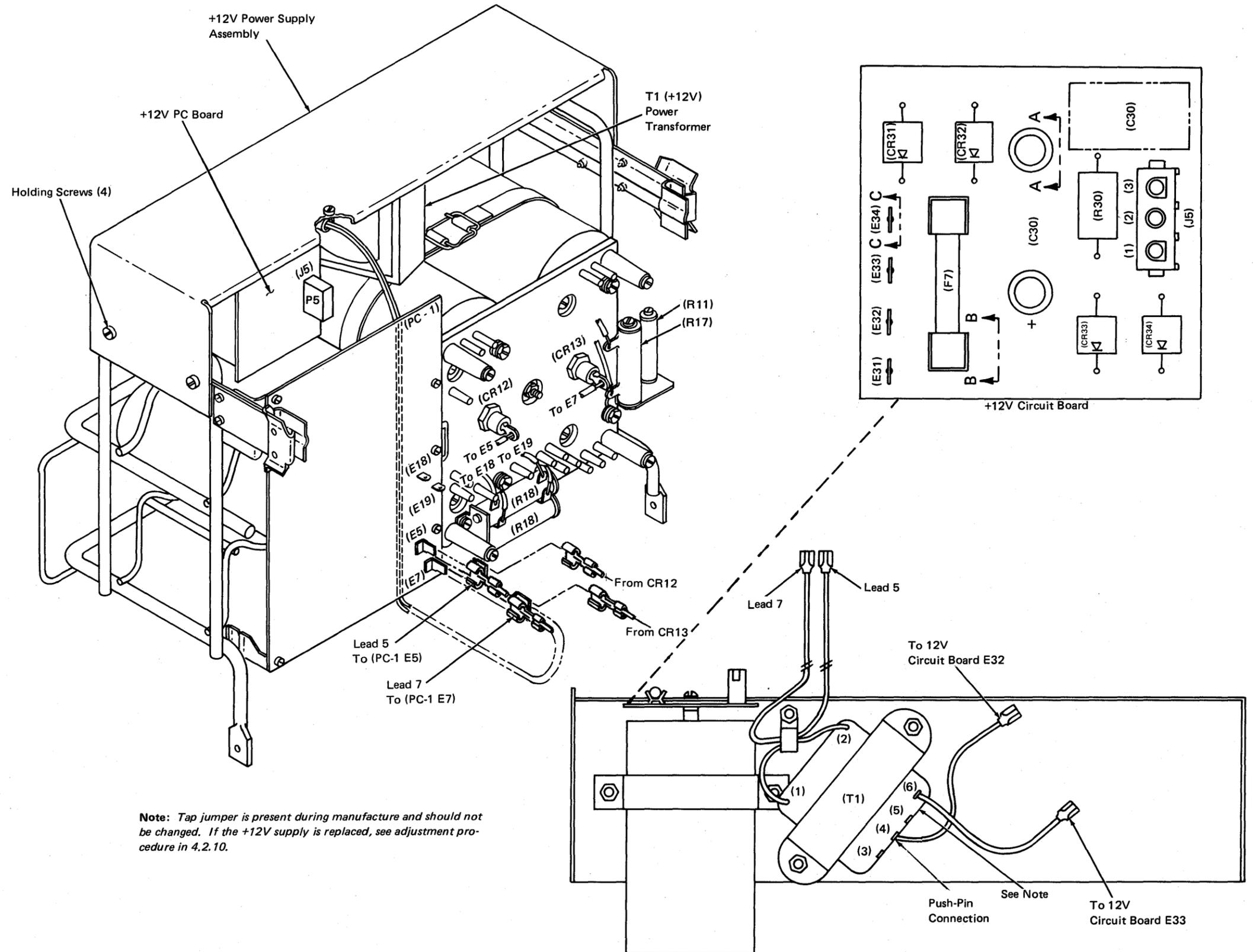
1. Perform Procedure 4.2.1 to get access.
2. Release the spring catches at both sides of the low-voltage power supply (Figure 4-1).
3. Disconnect cable connector P5 from the +12 volt power supply (Figure 4-7).
4. Disconnect the leads (No. 5 and No. 7) at the LVPS pins E5 and E7 (Figure 4-6). Then separate the terminal-to-terminal connectors as shown in Figure 4-7.
5. Remove the four screws that hold the +12 volt power supply assembly to the LVPS assembly (Figure 4-7).

**Caution:** Support the +12 volt power supply to prevent it from falling on the logic gate.

6. To replace the +12 volt power supply assembly, reverse the procedure.
7. Adjust the +12 volt power supply using Procedure 4.2.11.

#### 4.2.11 +12 Volt Power Supply Adjustment

1. Turn 3274 power off.
2. At logic board A1, attach the CE meter leads to the +12 volt bus bar (+ lead) and any D08 pin (- lead). See Figure C-1.
3. Turn 3274 power on.
4. The CE meter should indicate  $12.5 \pm .5$  volts.
5. Turn 3274 power off.
6. If the voltage measured in Step 4 was not correct, change taps (3, 4, and 5) on the +12 volt power supply transformer (T1, shown in Figure 4-7) and try again.
7. If the voltage is correct, disconnect the CE meter leads.



**Note:** Tap jumper is present during manufacture and should not be changed. If the +12V supply is replaced, see adjustment procedure in 4.2.10.

Figure 4-7. +12 Volt Power Supply Assembly

#### 4.2.12 Operator Panel and Printed Circuit Card (Figure 4-8)

##### DANGER

Verify that the AC power cord has been disconnected before removing the operator panel assembly.

**Model C** – AC line voltage is present at the Power On switch even with the switch in the off position.

**Models A, B, D** – Relay switching is used for local and remote power on (+24 volts at the Power On switch).

1. Perform Procedure 4.2.1 to get access.
2. Remove one screw securing the lower cover (under the operator panel), and remove the cover.
3. Push up on the four posts at the bottom of the operator panel to separate and remove the overlay bezel.
4. Disconnect the connectors from the printed circuit board. See Figure E-2.
5. To remove the indicator printed circuit card: disconnect the connectors, remove the securing hardware, and remove the printed circuit card.
6. Disconnect the large cable connector from the rotary switch (Models A, B, and D only). See Figure E-1, Part 1.
7. Remove the two mounting screws, and lower the panel through the machine frame.
8. Remove the wires from the On/Off switch. See Figure E-1.
9. To replace the operator panel or any of its components, perform this procedure in reverse.

#### 4.2.13 Top Cover

1. Remove the screw holding the lower cover of the operator panel. Remove the cover.
2. Using a nut driver, remove the cap screw at the left front underside of the cover.
3. Pull the entire cover forward evenly to disengage it from the cabinet keyholes.
4. If the cover is to be completely removed, perform Steps 3 and 7 of the operator panel removal procedure (4.2.11).
5. Lift the cover evenly, rotate 90 degrees clockwise, and set it on the top right portion of the machine.
6. To replace the top cover, perform this procedure in reverse.

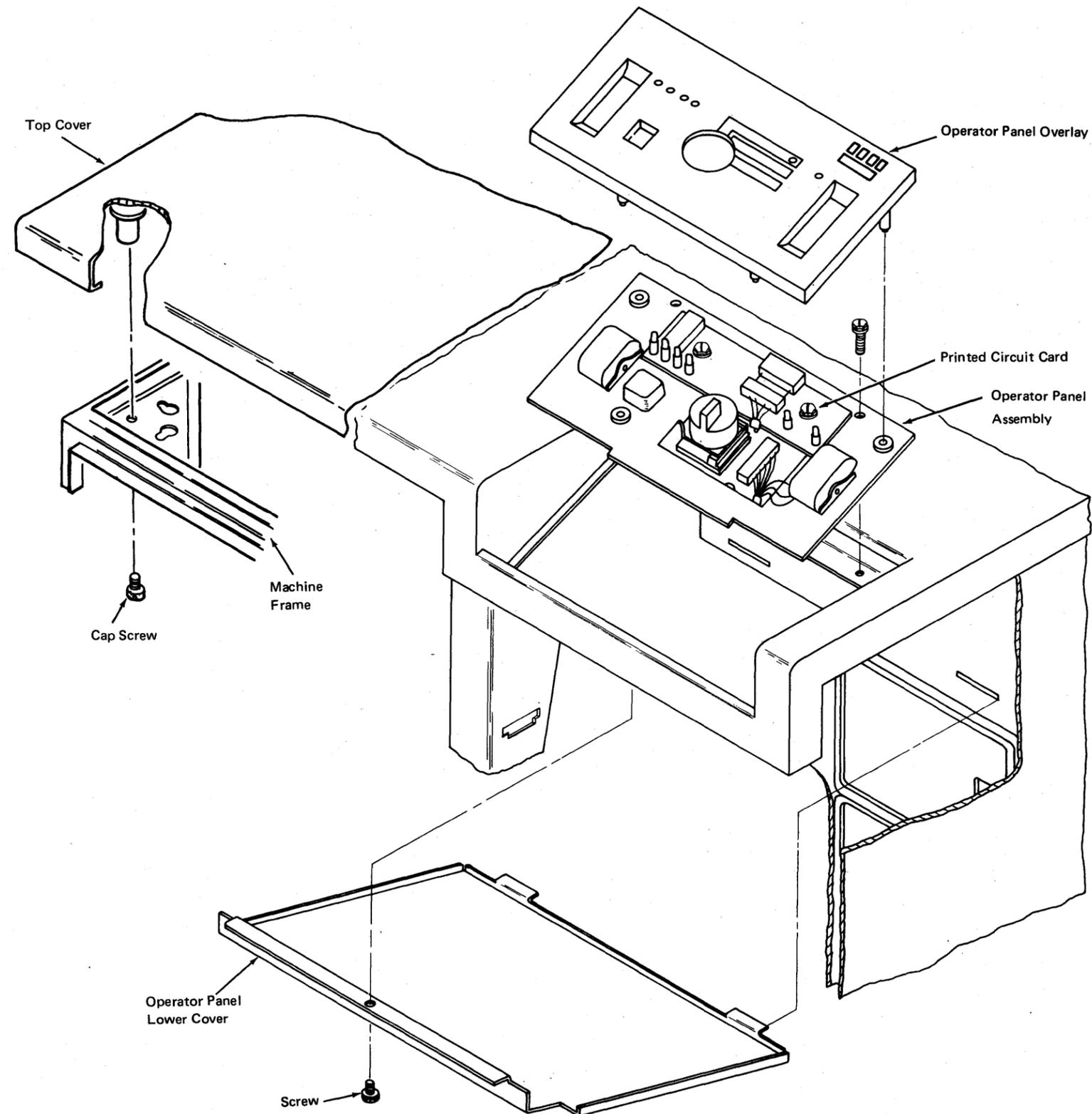


Figure 4-8. Operator Panel and Cover

### 4.3 BUS AND TAG CABLE HOUSING COVER (FIGURE 4-9)

#### 4.3.1 Removal

1. Open customer and CE access area doors.
2. Using a short screwdriver, remove the screw(s) on the lower left portion of the cabinet partition (see Figure 4-9).
3. Lift out the Bus and Tag housing cover to remove.

#### 4.3.2 Disconnecting Local 3274 from Host System Interface

1. Set the Power/Interface switch to the Local/Offline position. Wait for the Offline indicator to light, and then turn power off.
2. Remove the Bus and Tag housing cover (Procedure 4.3.1).
3. Ensure the host system is in the stop state.
4. Disconnect the Tag Out cable or Tag terminator from the 3274.
5. Disconnect the Tag In cable from the 3274, and attach it to the Tag Out cable or Tag terminator previously removed. See Figure 4-9.
6. Perform the same procedure with the Bus Out cable and the Bus In cable or Bus terminator.
7. Set the host system to the start state.
8. The 3274 can now be powered back up or serviced without interference to the host system.

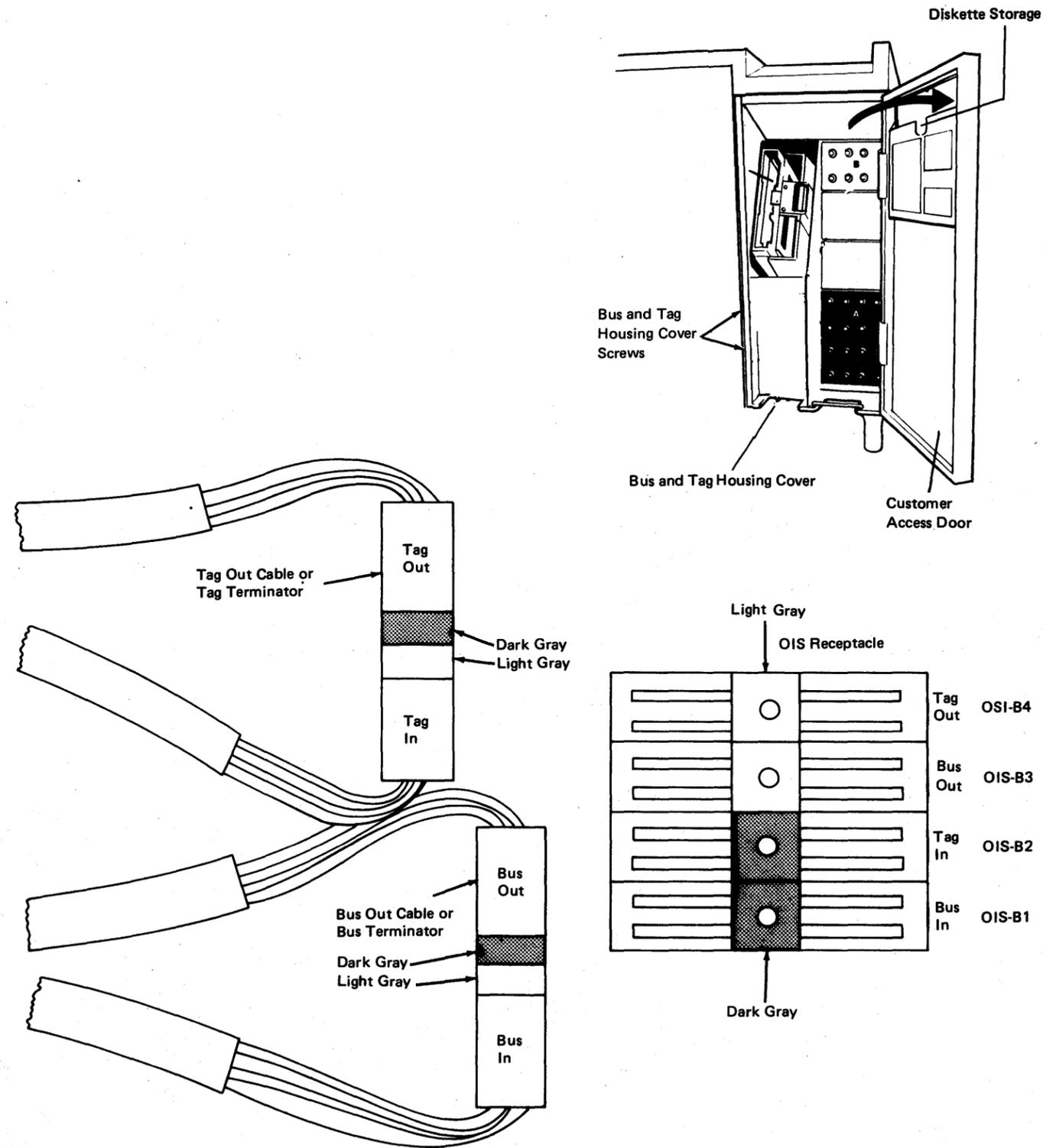


Figure 4-9. Bus and Tag Cables

SY27-2530-1

#### 4.4 LOGIC BOARD A1 REMOVAL AND REPLACEMENT

**Caution:** The Models A, B, and D host system interface must be disabled before power is turned off.

**Note:** Step 4.4.11 may require wrap and unwrap tools.

- 4.4.1. Perform Procedure 4.2.1 to gain access.
- 4.4.2. If this is a local 3274 (Model A, B, or D) disconnect the 3274 from the host system interface (Procedure 4.3.2).
- 4.4.3. If necessary, remove the CE access door by pulling out the hinge pin (shown in Figure 4-1). If present, remove the card retainer (used for shipping only). See Figure 4-10.
- 4.4.4. Remove the logic cards from the board. See Figure 4-10.
- 4.4.5. Remove the connectors in positions Z1 through Z6 and cards A1Y3 and A1Y4.

**Caution:** The cable connectors and cards A1Y3 and A1Y4 have locking tabs that fit into the retainer bar behind the cables. To remove these cables, gently push the wire spring cable retainer to disengage it from the slot in the gate. The cable connector can then be removed. See Figure 4-10 and Procedure 4.2.3.1.

- 4.4.6. Remove the crossover cables to board A2. Remove any cables installed in A1V2 to A1V5.
- 4.4.7. Lower the logic gate. Release the spring catches at either side of the low-voltage power supply assembly, and raise the assembly off the logic gate.
- 4.4.8. Remove the screws at the top of the board and loosen the screws at the bottom of the board. (The screws and the back of the board are shown in Figure 5 of Appendix P.)

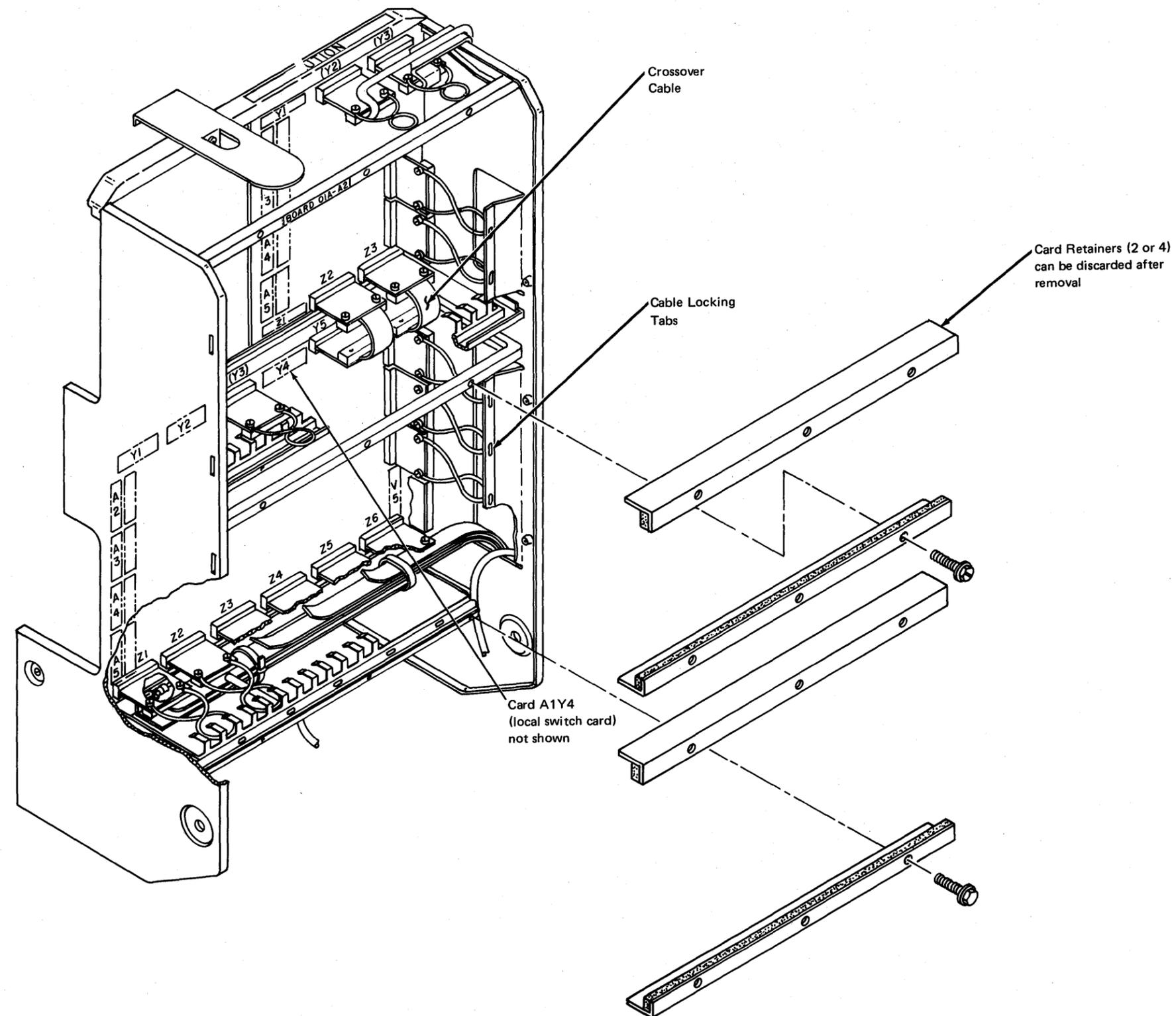


Figure 4-10. Logic Gate Assembly

4.4.9. Disconnect all cables, bus bars, bus bar retainers and insulators, and wires from the pin side of the board. Note in Figure 4-11 where each was connected, including plug P1 (32 pins), shown in Figure C-1, Part 1. Remove the screws at the sides of the board.

4.4.10. Carefully slide the logic board out of the gate.

4.4.11. Wire the replacement board according to the machine features, as follows:

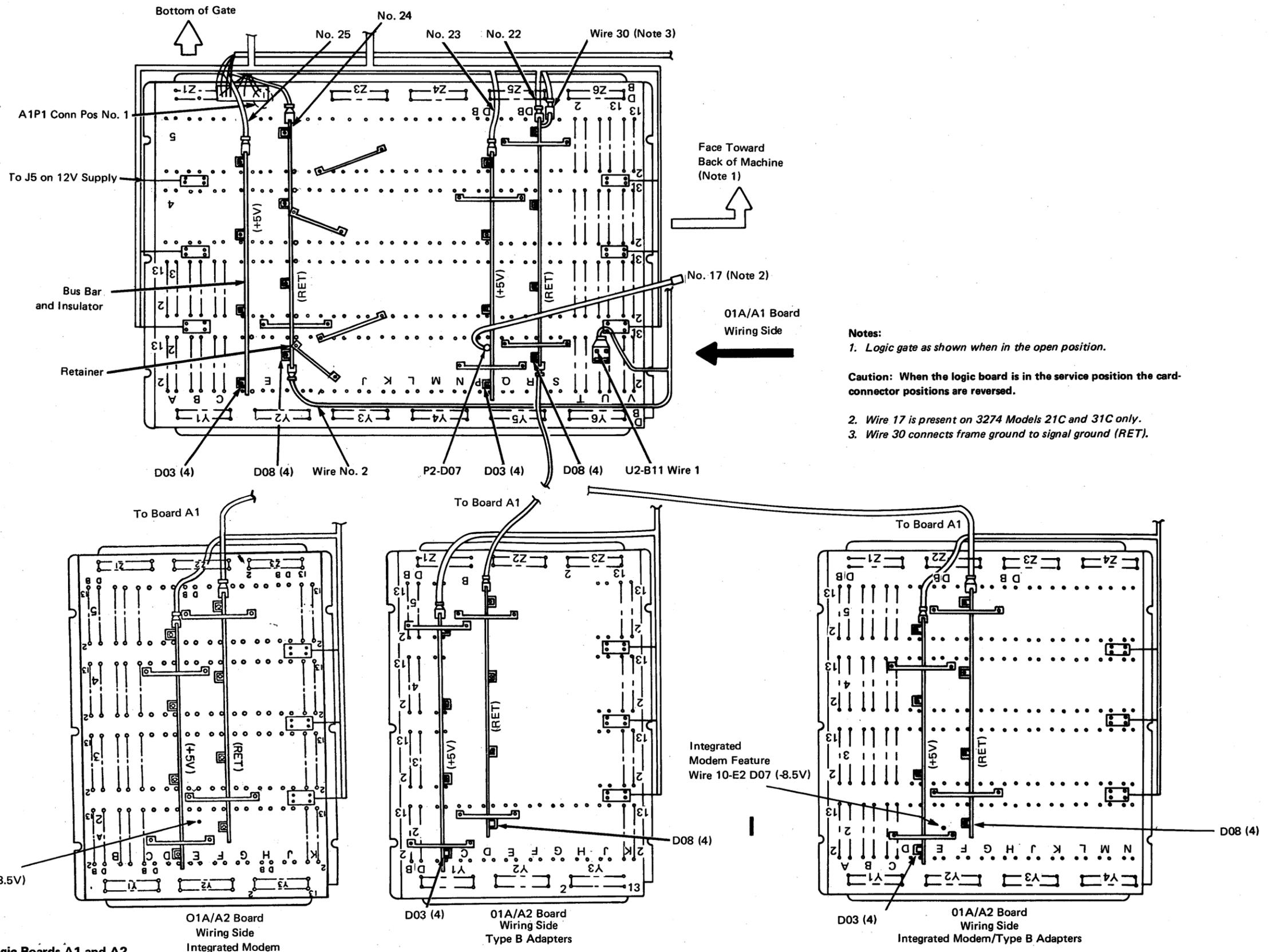
- If the 3274 has 64K storage (Figure 2-4), add a yellow wire from A1G2-G02 to A1G2-G12.
- If the 3274 does not have the B type adapter, add a yellow wire from A1R1-B11 to A1R1-E11.

4.4.12. Install the board by reversing the procedure. Be extremely careful to attach the wires, cables, and bus bar retainers and insulators in the correct locations. Replace the cards, cables, and card-to-card crossovers in the proper sockets (see Figures C-4 and C-5). On Models A, B, and D, be careful not to disturb the switch settings on card A1Y4.

**Logic Board A2 Replacement Wiring:**

- If the 3274 has one of the integrated modems (2400, 4800, or 9600 bps), see 5.6.9.1 for the point-to-point or multipoint wiring required for the particular Integrated Modem feature.

See 5.6.9.2 through 5.6.9.4 for other A2 board-wiring that is normally not wired at the factory.



**Notes:**  
 1. Logic gate as shown when in the open position.  
 Caution: When the logic board is in the service position the card-connector positions are reversed.  
 2. Wire 17 is present on 3274 Models 21C and 31C only.  
 3. Wire 30 connects frame ground to signal ground (RET).

Figure 4-11. Logic Boards A1 and A2.



## Chapter 5. Communications Reference Data

### 5.1 CHANNEL COMMUNICATIONS FACILITIES

#### 5.1.1 3274 Model A

The 3274 Model A communicates with host S/370 Models 115 through 195 and the 3031, 3032, 3033, 4331, and 4341 processors via a byte multiplexer, selector, or block multiplexer channel. The 3274 Model A uses System Network Architecture (SNA) protocol operation. See Figure 5-1.

#### 5.1.2 3274 Model B

The 3274 Model B communicates with host S/370 Models 115 through 195 and the 3031, 3032, and 3033 processors and with S/360 Models 30, 40, 50, 65, 67 (in 65 mode), 75, and 195 via a byte multiplexer, selector, or block multiplexer channel.

**Note:** Attachment to a non-DCC (Disconnect Command Chaining) subchannel or a selector channel is not recommended, because of performance considerations that may yield less than maximum throughput. See Figure 5-1.

#### 5.1.3 3274 Model D

The 3274 Model D communicates with the host S/370 Models 115 through 168MP and the 3031, 3032, 3033, 4331, and 4341 processors via a byte multiplexer, selector, or block multiplexer channel.

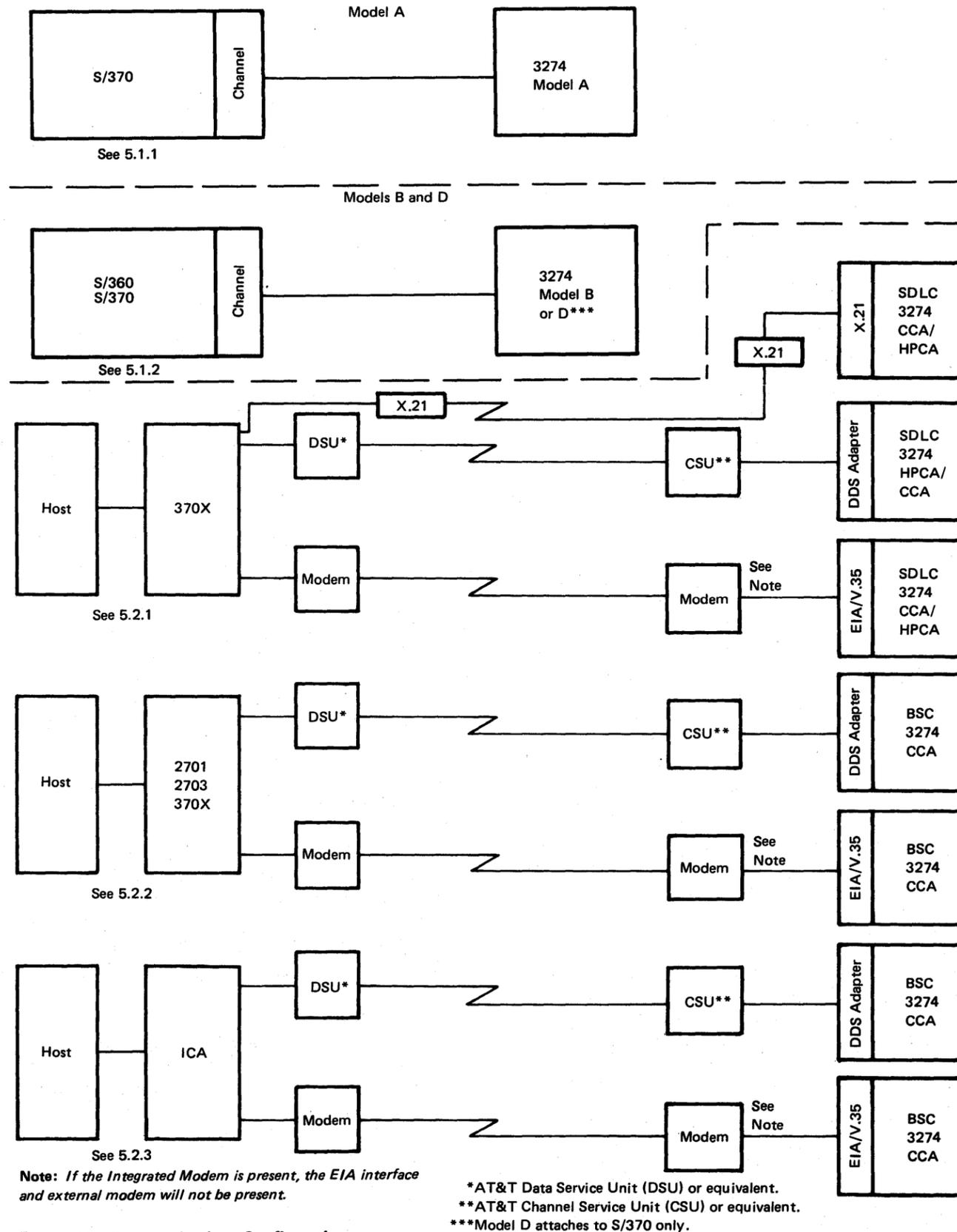


Figure 5-1. Communications Configurations

### 5.1.4 Possible Causes of Local Attachment Failures

Possible causes of local attachment failures are identified as either internal or external to the 3274 in Figures 5-2 and 5-3, respectively.

Cause	Comments
Results of installation, customizing, recustomizing, or MES installation	Review installation procedures in Appendix F, and use MAP B150.
Logic card failure: <ul style="list-style-type: none"> <li>• Cards A1N2*, P2, Q2, and Y4</li> <li>• Card A1Y4</li> </ul>	Online failure may be indicated by error codes 340 to 364 on the bottom line of any display. Isolate to failing card.  Check switch settings on Card A1Y4, as shown in Appendix F.
Cables—Z3, Z4, Z5, and Z6, connectors, or board wiring	Use Figure C-6, Parts 2, 3, 4, and 5, and check continuity at I/O interface connector.  <b>Caution: Refer to 4.3.2 before disconnecting Bus and Tag cables.</b>
Power — K1 and K2 relays, rotary switch, and associated wiring	See Figure B-1.

\*Observe the Caution in Figure 2-1.

Figure 5-2. Internal Possible Causes of Local Attachment Failures

Cause	Comments
Bus and Tag cables to and from next unit or host	Usually associated with other attachment failures. Scope the Bus and Tag line for signal quality.
Host program failures	May be associated with 400 Series error codes.

Figure 5-3. External Possible Causes of Local Attachment Failures

If the problem cannot be isolated, follow your support structure. The support procedure may require using the dump diskette, PN 5614626, for further problem determination.

On Models A, B, and D the Offline indicator must be on to obtain the dump. Turn the Power/Interface switch to the Offline position. If the indicator fails to come on, momentarily ground one of the following pins:

Model	Pin
A	01AA1-P2D10
B	01AA1-Q2B07
D	01AA1-Q2G05

If it is necessary for the customer to perform the dump procedure, the customer can ground the preceding pins by using a special tool, PN 5718026. (This tool is a pushbutton switch assembly with slip-on connectors attached.) Place the switch in the customer access area with the slip-on connectors attached to the appropriate pins.

### 5.1.5 Interface Timeout Indicator

3274 Control Unit Models A, B, and D are shipped with a driver/receiver card (N2) that contains a special I/O timeout function. This function prevents certain 3274 and system malfunctions from affecting the host channel I/O interface.

If the OPL IN tag from the 3274 has been active for 16 consecutive seconds, the DISC IN Tag line is activated to notify the host channel of a problem. (The host CPU has probably received an interface control check.) This turns on an indicator on the N2 card which identifies the 3274 that detected the malfunction. Following channel recovery, the 3274 is gated offline by the N2 card and rejects any selection attempts (CC = 3).

**Note:** *The Offline/Online indicator may not reflect the true state of the 3274 interface in this case.*

Switching the Offline/Online switch to the Offline position resets the N2 card I/O timeout and turns off the N2 indicator.

If the I/O interface is manually single-stepped, disable the I/O timeout function on the N2 card by jumpering N2Y10 to N2Z30.

### 5.1.6 System Grounding

For 3274 system requirements, see Figure C-9.

## 5.2 REMOTE COMMUNICATION FACILITIES

### 5.2.1 3274 Model C SNA/SDLC

The 3274 Model C communicates with the following, using synchronous data link control (SDLC) over full or half-duplex communication facilities:

- S/370 Models 115 through 168 MP (via a 370X TCU) at data rates up to 9600 bps.
- 3031, 3032, 3033 and 4341 (via a 370X TCU) at data rates up to 9600 bps.

- S/811 (via the Integrated Communication Adapter or an appropriate TCU).
- Series 1
- 4331 processor (via the Integrated Communication Adapter) at data rates up to 9600 bps.

### 5.2.2 3274 Model C BSC

The 3274 Model C communicates with the following, using binary synchronous communications (BSC) over duplex or half-duplex communication facilities:

- S/370 Models 115 through 195 (via a 270X or 370X TCU) at data rates up to 9600 bps.
- 3031, 3032, 3033 and 4341 (via a 370X TCU) at data rates up to 9600 bps.
- S/360 Models 30, 40, 50, 65, 67 (in 65 mode), and 75 (via a 270X or 370X TCU) at data rates up to 9600 bps.
- S/3 Models 4, 8, 10, 12, and 15 at data rates up to 8000 bps.
- Series 1

### 5.2.3 3274 Model C Communication Facilities

The 3274 Model C operates in half-duplex/point-to-point mode or half-duplex/multipoint mode on either half-duplex or duplex facilities. Transmission speeds are 2000, 2400, 4800, 7200, and 9600 bps on nonswitched facilities.

### 5.2.4 Communication Adapters

- CCA — The Common Communications Adapter (CCA) is used with SNA/SDLC or BSC facilities. The data rate can be up to 9600 bps, depending upon the attached communication equipment. Clocking must be provided by the modem or communication facility.
- HPCA — The High-Performance Communications Adapter (HPCA) is used with SNA/SDLC facilities. It is required with data rates greater than 9600 bps (V.35 or DDS Adapter at 56,000 bps).

## 5.3 REMOTE COMMUNICATION ATTACHMENTS

### 5.3.1 EIA or V.35

An external modem, or equivalent device, with its own clocking must be attached to a 3274 Model C. The 3274 must have the external modem interface (EIA) and either a Common Communications Adapter (CCA) or a High-Performance Communications Adapter (HPCA) installed. Switched network backup is available with auto answer/manual call on IBM modems. A determination should be made as to the wrap capabilities of the modem being used. The 3274 communications line flow for modems is shown in Figures 5-4 through 5-7.

### 5.3.2 DDS Adapter

The Digital Data Service (DDS) Adapter connects the 3274 Control Unit Model C to the AT&T nonswitched Dataphone<sup>1</sup> digital data service network. The DDS Adapter is an integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800, 9600, or 56,000 bps. [If the DDS Adapter card (Figure C-12) is jumpered for the incorrect speed, the diagnostic tests will not indicate the failure; nnn codes of 521 or 532 may indicate this problem.] Access to the DDS network is provided by the AT&T Channel Service Unit (CSU), which is the DDS network termination point at the customer site. See Figure 5-1.

The 3274 must have either the CCA or the HPCA installed. The DDS Adapter can be used in point-to-point or multipoint configurations. The Wrap Test capability of the DDS Adapter allows testing of the adapter only, or of the adapter and the communication cable. The 3274 communications line flow for the DDS Adapter is shown in Figure 5-5.

### 5.3.3 X.21 Public Data Network Adapter

The X.21 adapter provides for the connection of the 3274 Control Unit Model C to nonswitched public data networks.

The X.21 adapter is an integrated adapter for SDLC data transmission at speeds of 2400, 4800, 9600 or 48,000 bps. Access to the nonswitched public data networks is provided by the data circuit terminating equipment (DCTE), which is supplied to the customer by the X.21 network authority [usually the country's Postal Telephone and Telegraph (PTT) Administration]. The DCTE provides clocking to the 3274. See Figure 5-1.

The 3274 must have either the CCA or the HPCA installed. The X.21 adapter can be used in either point-to-point or multipoint configurations. The 3274 communications line flow for the X.21 adapter is shown in Figure 5-8.

### 5.3.4 Integrated Modems

For information on the Integrated Modems (2400, 4800, and 9600 bps) see 5.6.

<sup>1</sup> Trademark of American Telephone and Telegraph Co.

CCA/HPCA (without clock)  
A1 Q2

EIA Dvr/Rev  
A1 P2

Board Conn  
A1 Z6 (Note 2)

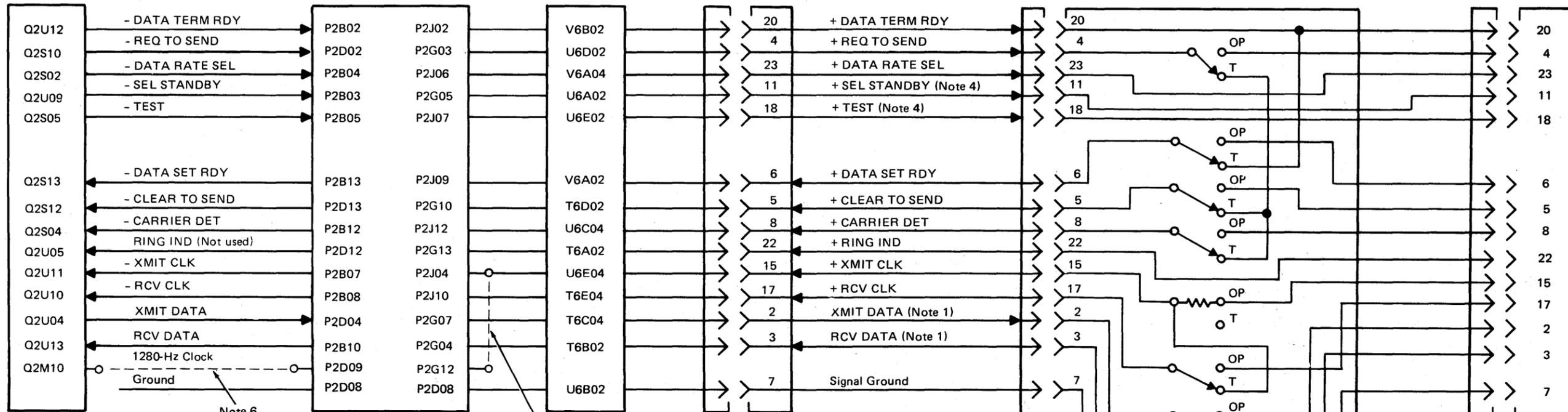
I/O Conn  
(Note 3)

External  
Cable

Wrap Switch

Wrap  
Cable

Modem  
Conn



Line	DC Voltage	DC Voltage Range
Active	0 V	0 to +0.4 V
Inactive	+5 V	+2.4 to +5.5 V
Open	+1.5 V	+1 to +2 V

Use P2D08 for ground reference

Line	DC Voltage	DC Voltage Range
Active	+8 V	+3 to +9 V
Inactive	-8 V	-3 to -9 V

Use P2D08 for ground reference

Cable Continuity with Wrap Switch in Test			
Driver		Receiver	
DATA TERM RDY	P2J02 to	DATA SET RDY	P2J09
REQ TO SEND	P2G03 to	CLEAR TO SEND	P2G10
		CARRIER DET	P2J12
+XMIT DATA	P2G02 to	+RCV DATA	P2G09
-XMIT DATA	P2J05 to	-RCV DATA	P2J13

- Notes:**
- XMIT/RCV DATA ACTIVE VOLTAGE IS MARK or DATA Bit ON.  
*Inactive voltage or data bit off.*
  - See Figure C-1 for board pin locations.
  - See Figure C-6 for EIA pin locations.
  - Lines 11 and 18 are missing in the following short wire cables:  
  
PN 1714804 EIA for Germany  
PN 2722069 EIA for U.K.
  - Connector (to modem) is physically different on PN 2722069 from one shown in drawing.
  - Jumper for Wrap Test without Attached Modem (5.4.2).
  - Jackscrews for plug are non-metric.
  - Jackscrews for plug are metric.
  - Special — for those where a long hood (connector end) does not fit in modem.

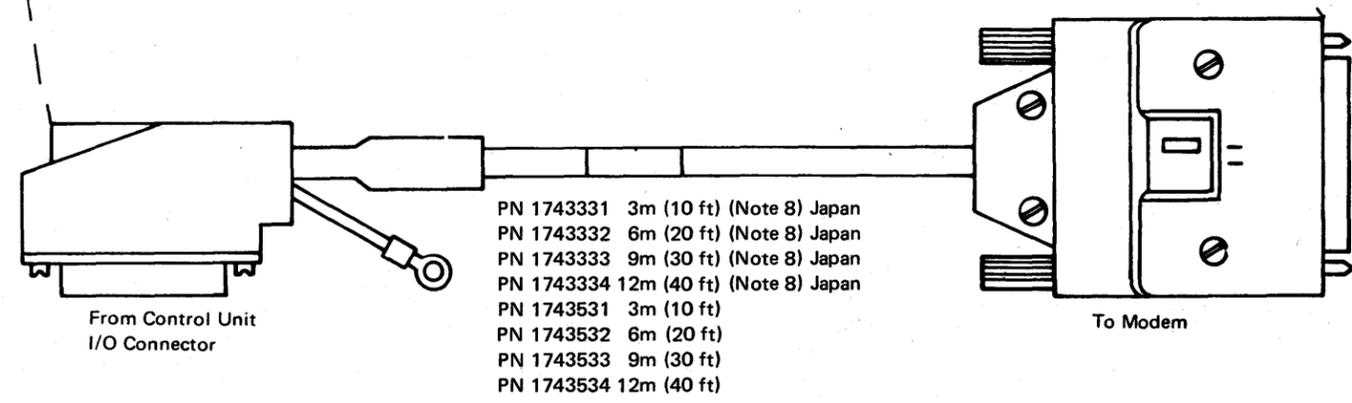


Figure 5-4. EIA Communications Line Flow for Modems

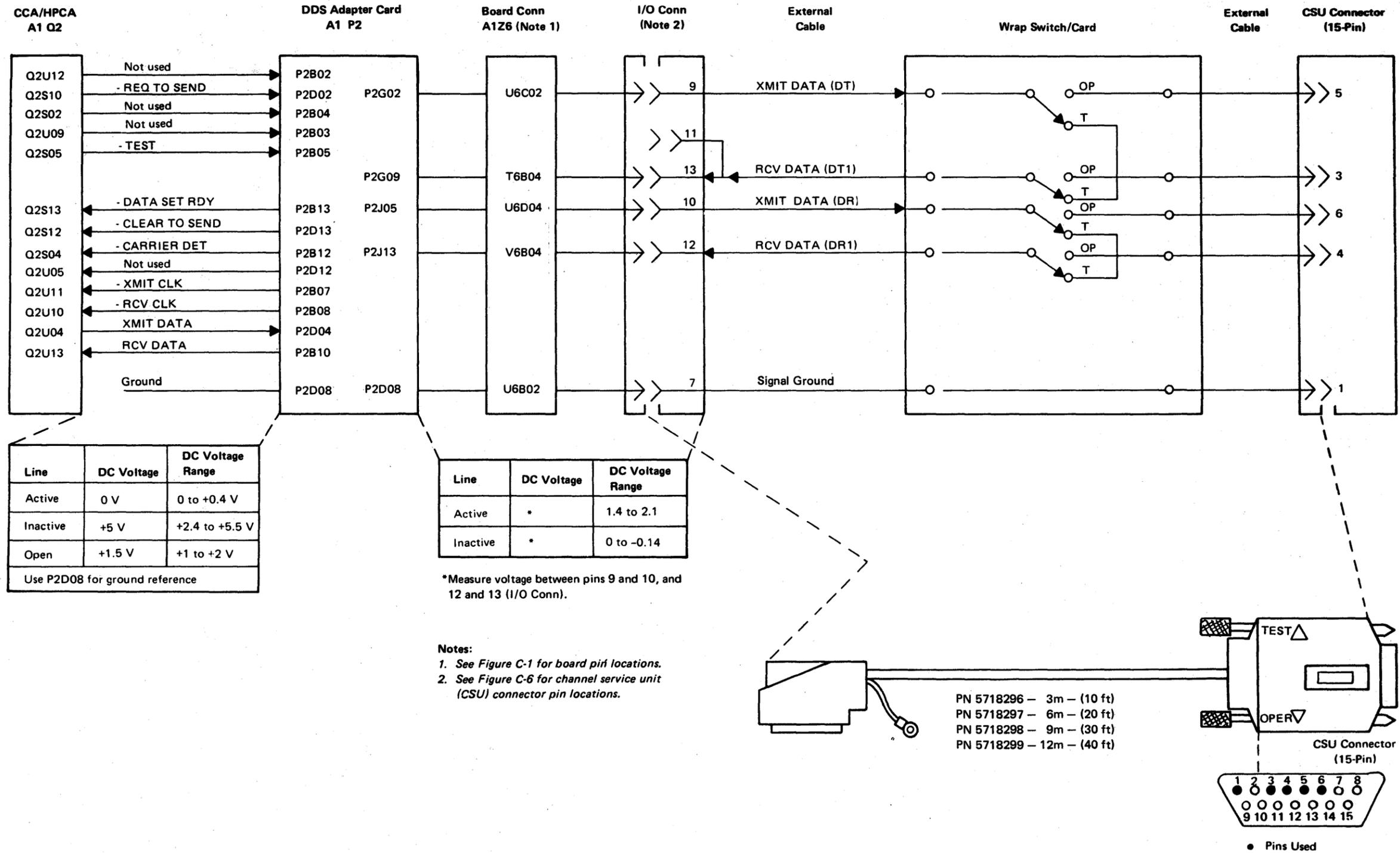


Figure 5-5. DDS Adapter Communications Line Flow

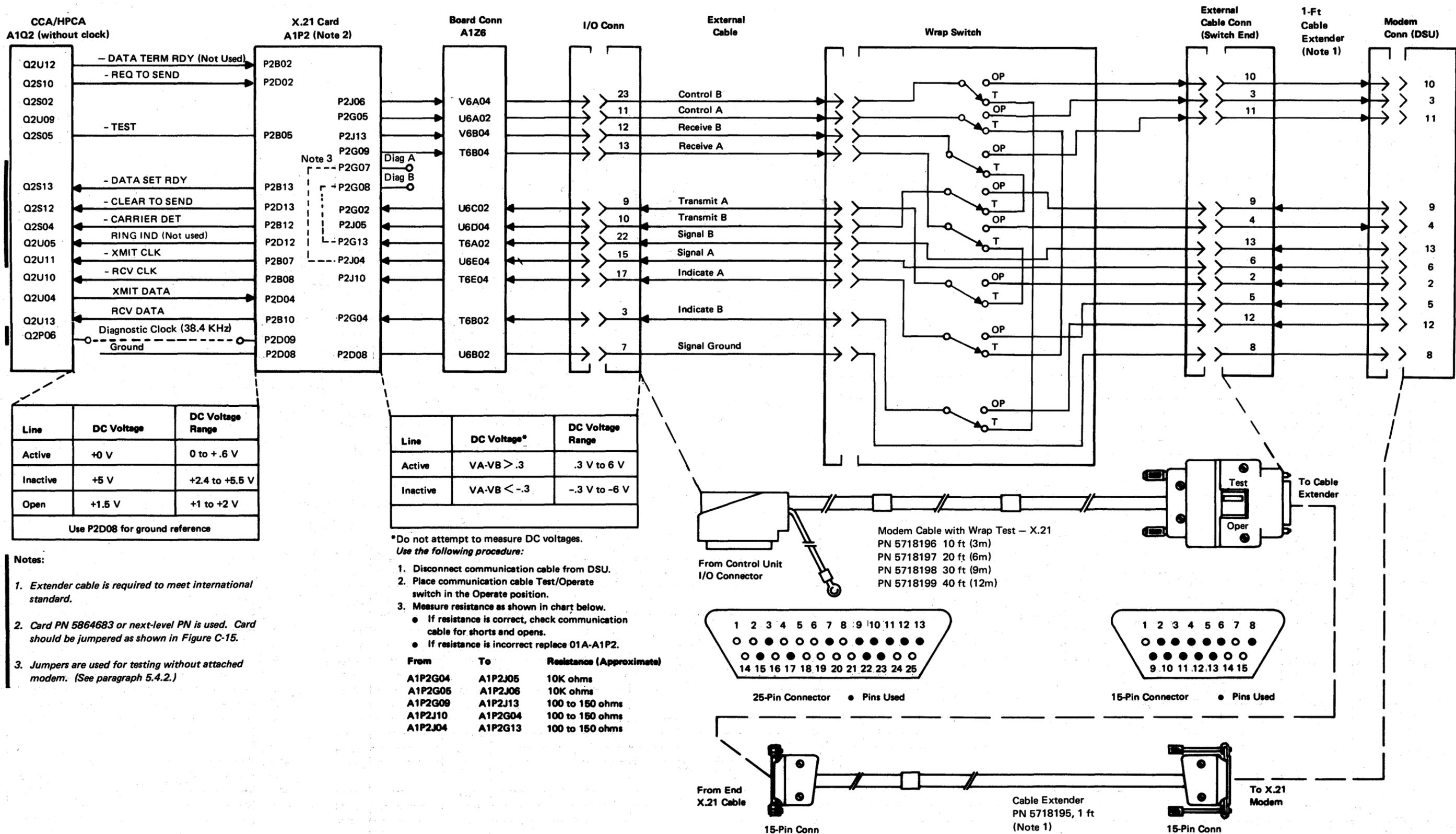


Figure 5-6. X.21 (Card PN 5864683) Nonswitched Communications Line Flow-Domestic and World Trade

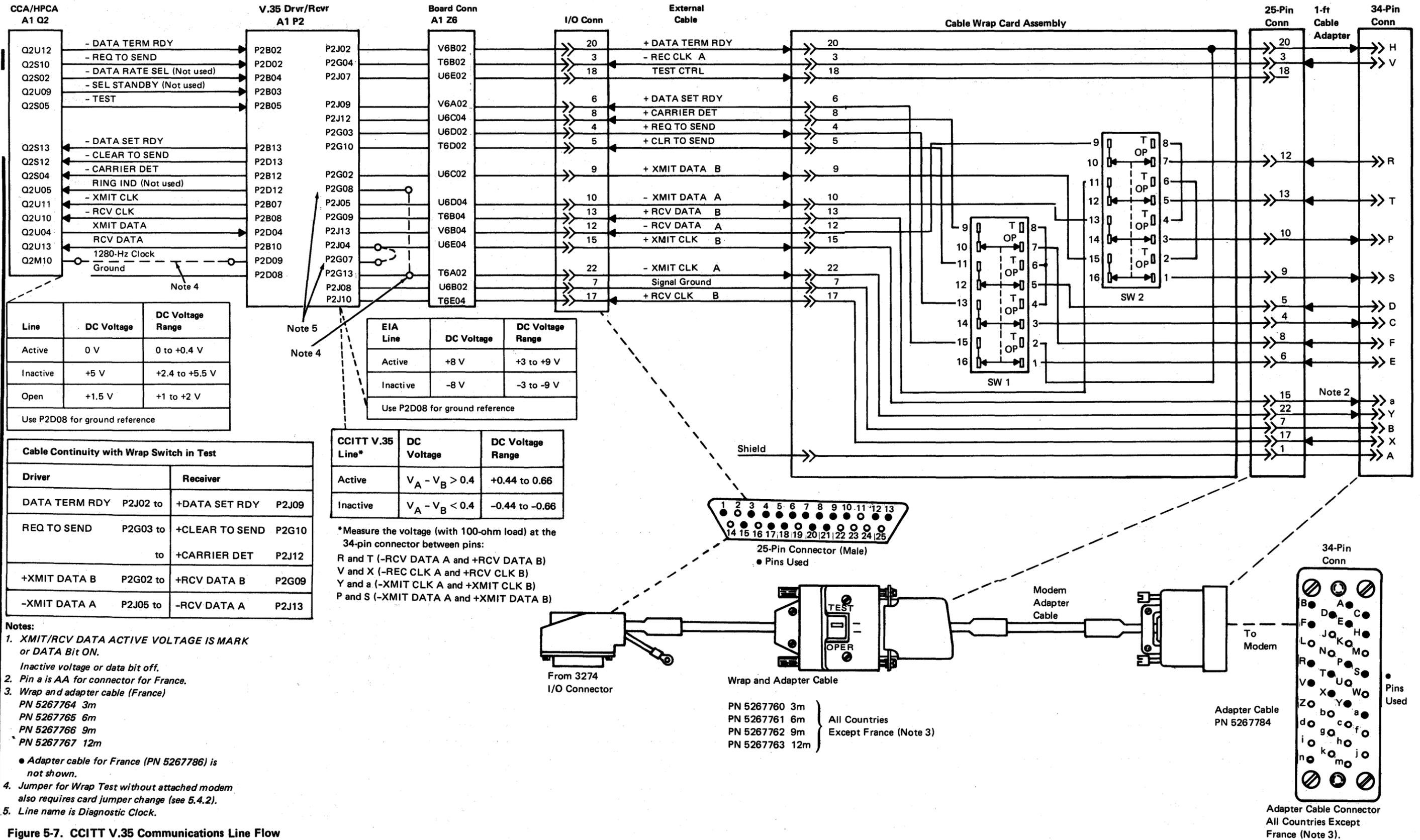


Figure 5-7. CCITT V.35 Communications Line Flow

## 5.4 WRAP TEST (WITHOUT INTEGRATED MODEM)

For Integrated Modems, see 5.6.

### 5.4.1 Modem Wrap Test

- EIA
- V.35
- DDS Adapter
- X.21

The Modem Wrap Test can be initiated by one of two IML functions (normal IML, ALT 2 IML). For the wrappable modem, the normal IML and the ALT 2 IML can initiate the Wrap Test. For the nonwrappable modem, the ALT 2 IML is used. A modem is considered wrappable if its circuitry allows it to be wrapped from the DTE.

#### 5.4.1.1 Normal IML (Wrappable Modem)

If the modem is wrappable, the customer should configure the system diskette as "wrappable modem installed." After configuration, each time a normal IML is performed, a modem wrap will be attempted by the IML tests. (For the DDS Adapter and X.21, only the adapter and the communication cable are tested.) If the Wrap Test fails, a blinking 0111 will be indicated on the operator panel. At the display station attached to port A0 (3278 or 3279) additional information is provided in the following format: 0111 013 or 0111 021 or 0111 016. An indication of 013, 021 (X.21 switched) means "general modem wrap failure." An indication of 016 means "modem failed to set Clear to Send." The EIA cable Test/Operate switch should be left in the Operate position if the modem is wrappable. If, during a normal IML, a failure indication of 0110 005 or 0110 009 appears on the display, the adapter has failed. If the Wrap Test failed, see Note in 5.4.1.2.

#### 5.4.1.2 ALT 2 IML (Wrappable/Nonwrappable Modem)

Pressing the IML pushbutton while holding the ALT switch in position 2 initiates the Wrap Test for wrappable and nonwrappable modems. (For the DDS and X.21 Adapters, only the adapter and the communication cable are tested.) The EIA cable Test/Operate switch should be set to Test. The EIA cable should also be left plugged into the modem (clocking is supplied by the modem). If the Wrap Test fails, the only indication will be a flashing 0111 on the operator panel operational indicators. The modem Wrap Test takes approximately 1 minute to complete.

If the Modem Wrap Test is successful, a test is initiated to check for Carrier Detect by setting the Test/Operate switch to Operate (does not apply to the DDS and X.21).

If Carrier Detect is not present, the operational indicators (8 4 2 1) will display 1000. This indication will remain until Carrier Detect is detected, at which time the lights will change to 1111.

**Note:** *If the Wrap Test fails:*

1. Check that the modem power and communication cable connectors are secure and that the modem is in the normal operating mode.
2. Check that the modem feature options in the modem are activated for DTE control modem wrap function.
3. Check fuse F4 (-8.5 V). If blown, go to Power MAP B127.
4. Check the voltage at pin A1-P2 D07 for -8.5V. If voltage is not within the limits of -7.8 V to -9.3 V, go to MAP B127.
5. Change cards A1Q2, P2.
6. Check the internal I/O cable in board position Z6 and the external I/O communication cable for defects. See line flow Figures 5-4 through 5-7.
7. See the procedure for running the Wrap Test without the attached modem (5.4.2).

### 5.4.2 Wrap Test without Attached Modem (EIA or V.35 without Clock)

This procedure can be used to further isolate the problem to the CCA/HPCA or to the modem when the Modem Wrap Test has failed. In this procedure the modem is not attached and the 1280-Hz internal clock signal in the CCA/HPCA is used in place of the modem clock signal. A successful Wrap Test indicates that the problem is associated with the modem; a failing Wrap Test indicates that the problem is associated with the CCA/HPCA.

1. Turn power off on the 3274 Model C.
2. Place the communication cable Test/Operate switch in the Test position.
3. Disconnect the communication cable from the modem.
4. Place jumpers on the 01A-A1 board as follows:
  - a. If the 3274 has the EIA, install two jumpers:  
Q2M10 to P2D09  
P2G12 to P2J04
  - b. If the 3274 has the V.35 Adapter, install three jumpers:  
Q2M10 to P2D09  
P2G07 to P2J04  
P2G13 to P2G08

Move jumper on card A1P2 from F to E (Figure C-15).

5. Turn on the Model C.
6. Run the Wrap Test by performing an ALT 2 IML. Successful completion of the Wrap Test is indicated by the operational indicator (8 4 2 1) display of 1000.

**Caution:** Remove the jumpers that were placed on the 01A-A1 board before reconnecting the communication cable to the modem. If the 3274 has the V.35 Adapter, move the jumper on card A1P2 from E to F.

## 5.5 3274 SYSTEM GROUNDING

For 3274 system grounding requirements, see Figure C-9.

## 5.6 2400-, 4800-, AND 9600-bps INTEGRATED MODEMS

The 2400-, 4800-, and 9600-bps Integrated Modems provide for the connection of the 3274 Control Unit Model C to nonswitched telephone lines. These modems operate in either BSC or SDLC; the 3274 Model C must be equipped with CCA or HPCA. Figure 5-8 shows the communications line flow. Figure 5-9 shows communication cable plugs for various countries.

### 5.6.1 2400-bps Integrated Modem (Feature Code 5640)

- Microprocessor based
- Half speed of 1200 bps
- Operates in duplex mode over a nonswitched four-wire communication channel in either point-to-point or multipoint attachment
- Central site must provide an IBM 3863 Model 1 modem

### 5.6.2 4800-bps Integrated Modem (Feature Code 5740)

- Microprocessor based
- Half speed of 2400 bps
- Operates in duplex mode over a nonswitched four-wire communication channel in either point-to-point or multipoint attachment
- Central site must provide an IBM 3864 Model 1 modem

### 5.6.3 9600-bps Integrated Modem (Feature Codes 5840 and 5842)

- Microprocessor based
- Half speed of 4800 bps
- Point-to-point (Feature Code 5840)  
This attachment operates in duplex mode over a non-switched four-wire communication channel. The central site must provide an IBM 3865 Model 1 modem
- Multipoint (Feature Code 5842)  
This attachment operates in duplex mode over a non-switched four-wire communication channel. The central site must provide an IBM 3865 Model 2 modem.

## 5.6.4 Line Attachments

### 5.6.4.1 Multipoint Network

In a multipoint nonswitched network, the operator, at the master modem or through host programming, can cause the 3274 Integrated Modem to adjust its operating speed to halfspeed. However, a reduction to halfspeed cannot be done by the 3274.

### 5.6.4.2 Point-to-Point Network

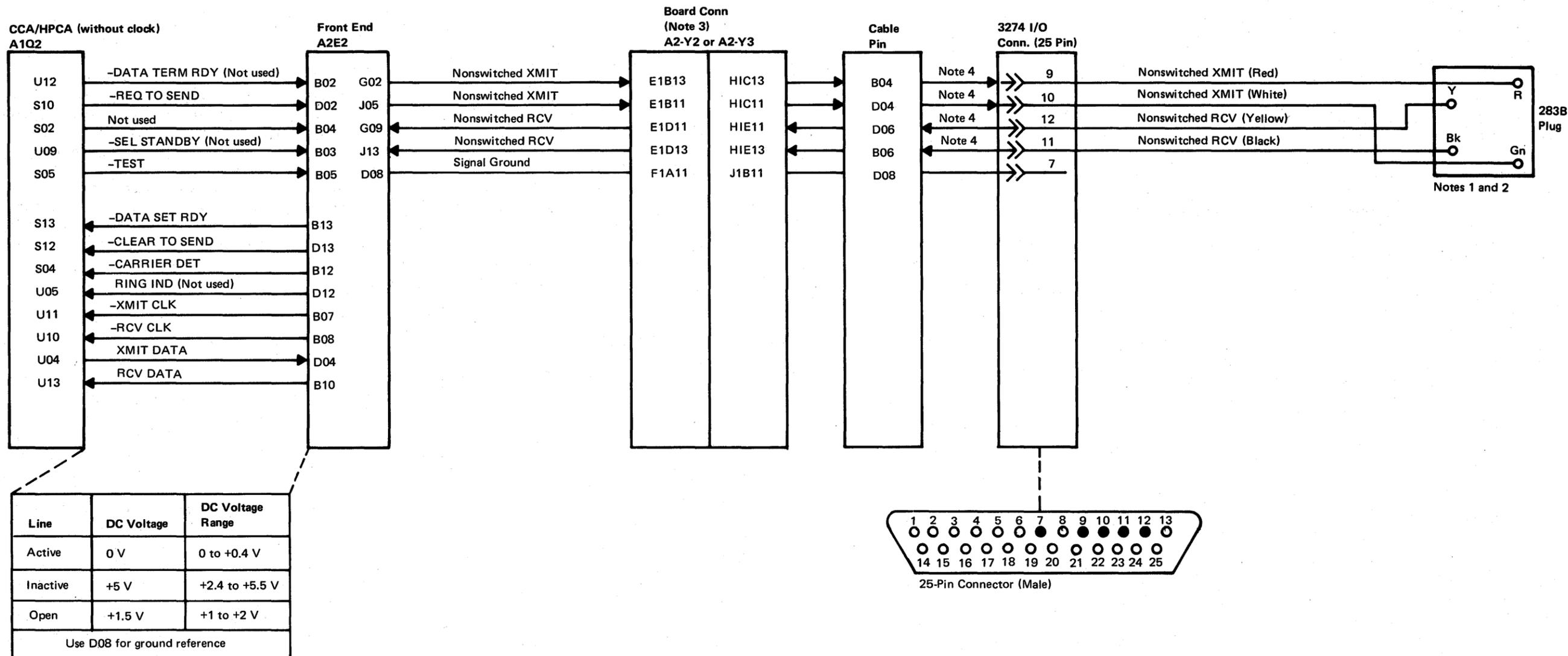
In a point-to-point nonswitched network, the operating speed is controlled by the speed switch at the master modem.

### 5.6.4.3 Signal Quality

The Data Quality indicators (Good and Poor) located on the operator panel of the 3274 Model C reflect the quality of the line signal during line tests and during data transmission, and also when data is not being received. When the Good indicator is "on," signal quality is good. The Good and Poor indicators in combination give an indication of the number of line hits occurring during a particular monitoring period of 256 baud as follows:

Signal Quality	Good	Poor	Hits
Good	On	Off	0
Marginal	Flashing	Off	1
Poor	Off	On	2 or more
No Signal	Off	Off	-

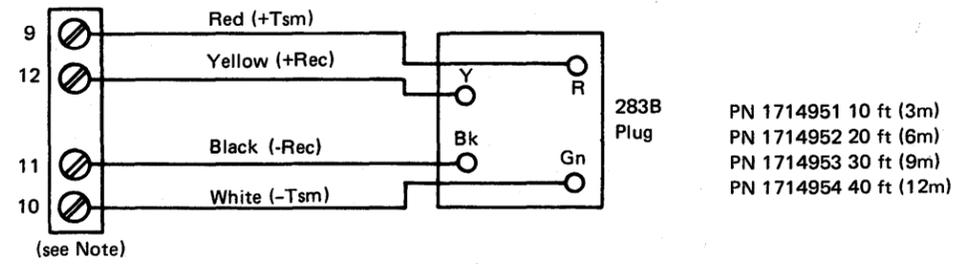
**Note:** Both data quality indicators may be on at the same time; this is a temporary state lasting less than 1 second.



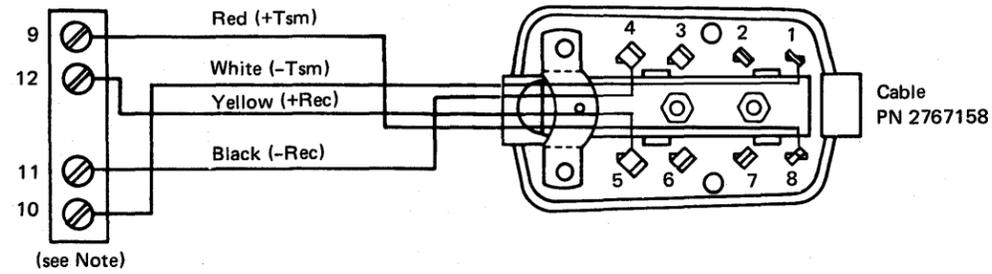
- Notes:**
1. Plug as shown – U.S. and Canada.
  2. World Trade countries – can be spade lugs or World Trade plug.
  3. Board cable location is A2Y3 when type B adapter feature is installed with Integrated Modem 2400, 4800, 9600. Cable A2Y2 is used without type B feature and Integrated Modem installed.
  4. Varistor is installed from pins 9, 10, 11, and 12 to ground.

Figure 5-8. Integrated Modem Communications Line Flow

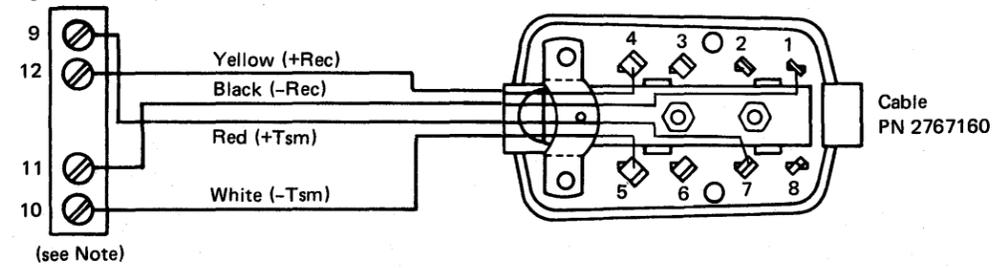
U.S. and Canada



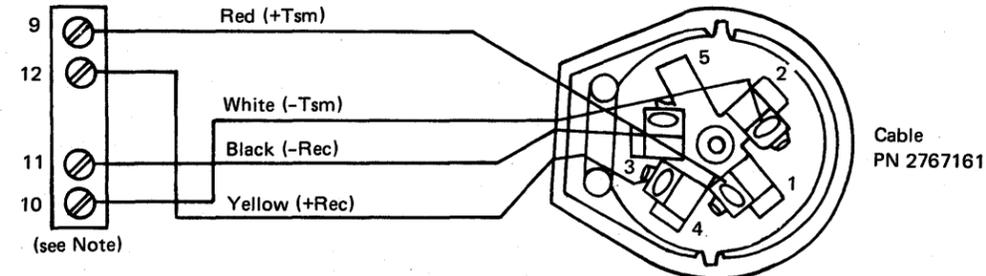
Austria



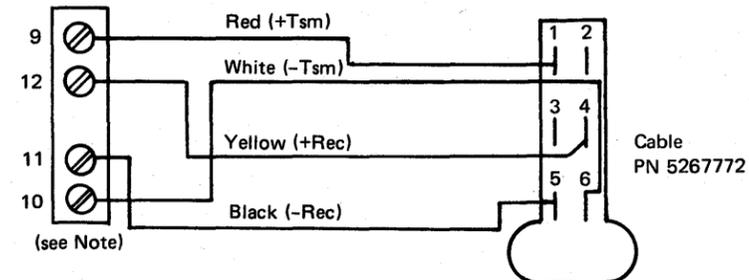
Belgium/Germany



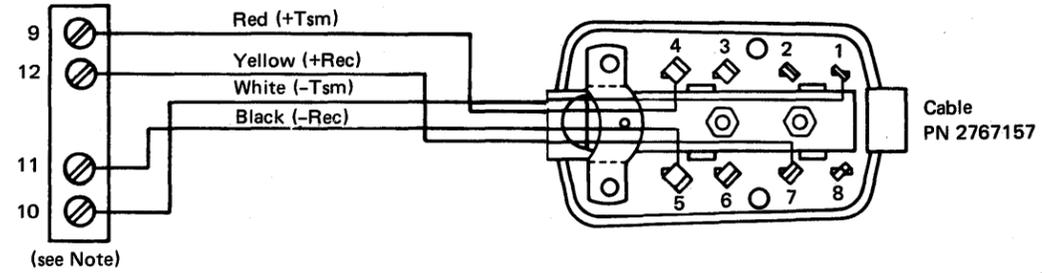
Finland



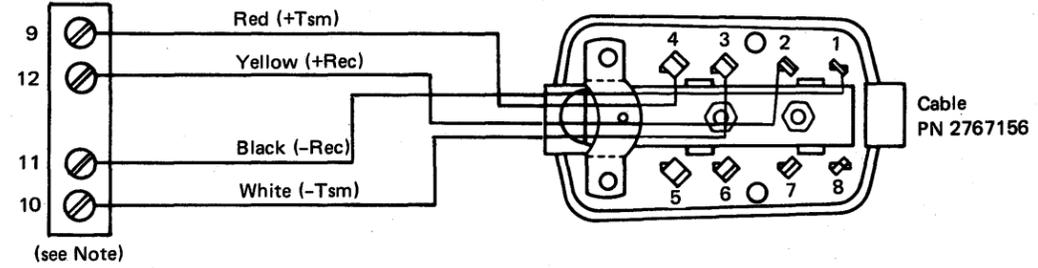
France



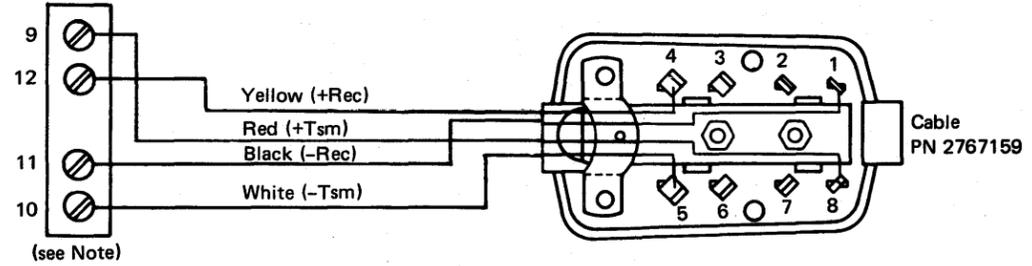
Israel



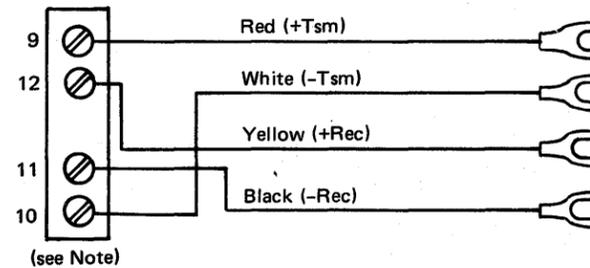
Netherlands



Switzerland



All Other Countries



Note: 3274 25-Pin I/O Connector (Male)

Figure 5-9. Communication Cable Plugs – Four-Wire, Nonswitched

5.6.4.4 Speed Control Backup

When poor lines cause data quality problems at full (normal) data speed, the Integrated Modem can be operated at halfspeed (halfspeed operation can be initiated only at the master modem). Degraded line quality is indicated by the Data Quality – Poor indicator turning on frequently, or by messages from the host DTE indicating data errors.

5.6.4.5 Operate Indicator

The Operate indicator turns off when the Integrated Modem detects a malfunction in the processor card. When this occurs, the processor causes a modem power-on reset in the Integrated Modem, which then initiates the Self-Test. The Self-Test repeats every 4 seconds until the malfunction is corrected.

5.6.5 2400-, 4800-, and 9600-bps Integrated Modem Diagnostics

A Self-Test program resident in the Integrated Modem runs when the 3274 is powered on. The Self-Test also runs when the Alt IML Address switch is held in the ALT 2 position. After a power-on, self-contained diagnostics are run in conjunction with the IML diagnostics. In addition, an integrated Modem Wrap Test is run as part of the IML diagnostics. The Wrap Test can also be initiated by momentarily pressing the IML pushbutton while holding the Alt IML Address switch in position 2.

5.6.5.1 Self-Test/Wrap Test

When either a Self-Test or a Wrap Test locates a failure, a flashing 0111 code appears in the 8 4 2 1 indicators of the 3274 operator panel after a power-on. The Self-Test, if successful, stops. If an error occurs, the Self-Test repeats every 4 seconds. The Wrap Test, if successful, causes a 1111 code to appear in the 8 4 2 1 indicators. If the Wrap Test fails, the 0111 code flashes continuously in the 8 4 2 1 indicators. The Self-Test checks the Integrated Modem cards; the Wrap Test checks the CCA/HPCA Adapter up to the front-end card A2E2.

5.6.5.2 Integrated Modem Failure

If either the Wrap Test, or the Self-Test running in conjunction with Test 7 of the IML diagnostics, fails, the IML tests stop, and a 0111 code will appear in the 8 4 2 1 indicators. After approximately 30 seconds the 0111 code will start flashing. Further, when the Self-Test fails, the LEDs located on the A2B2 card will indicate the failing logic card. The category A device attached to the port 0 displays one of the following:

- 0111 013 – indicating a Modem Wrap Test failure
- 0111 016 – indicating a Self-Test, Clear-to-Send, or a Data Set Ready failure

5.6.5.3 ALT 2 Self-Test

Holding the Alt IML Address switch in position 2 causes the Self-Test to cycle every 4 seconds. If there are no failures, the LEDs located on card A2B2 and the Data Quality—Good indicator will flash each time the Self-Test runs. However, if the Self-Test fails, the LEDs located on the A2B2 card will indicate the failing card. Releasing the Alt IML Address switch returns the modem to the Operate mode, regardless of success or failure.

5.6.5.4 ALT 2/IML Modem Wrap Test

Holding the ALT switch in position 2 and momentarily pressing the IML pushbutton initiates the Modem Wrap Test. If the Wrap Test is successful, the 0110 code indicated in the 8 4 2 1 indicators will change to an end code of 1111 (Carrier Detect present) after approximately 3 seconds.

**Note:** *If the modem is not attached to an active teleprocessing line, the end code will be 1000 (Carrier Detect not present).*

If the Wrap Test fails, the 0110 code will change to a continuous 0111 code for approximately 26 seconds and then start flashing.

5.6.5.5 Test Alarm Card (TAC) Extended Diagnostics

The TAC (card A2A2) allows the central site modem, via a 350-Hz tone, to initiate internal diagnostics to all modems on the telecommunications line. The TAC also sends a power-off warning to the host by transmitting a 350-Hz tone when the 3274 is either deliberately powered down or loses power.

5.6.5.6 Procedure to Follow if IML Test 0111 is Flashing

1. Switch 3274 power off and then on, to initiate the IML test and the Integrated Modem Self-Test.
2. While the 0111 code is flashing, check the attached display at port A0 for a failing code of 0111 013 (Integrated Modem Wrap Test failure) or 0111 016 (Self-Test, Clear-to-Send, or Data Set Ready failure).
3. If the failing code is 0111 013, see Figure 5-10 for a 2400-bps modem, Figure 5-11 for a 4800-bps modem, or Figure 5-12 for a 9600-bps modem. Refer to code 013 for the replacement of cards.
4. If the failing code is 0111 016, hold the ALT switch in position 2 (stop on error) and let the Self-Test cycle several times. The Poor indicator should turn on if the Self-Test fails. Also, observe the LED indicators on the card located in A2B2.
5. Release the ALT switch.

6. Compare the LED failure indications with the appropriate chart located in Figures 5-10, 5-11, or 5-12. Isolate the failing card.
7. Turn power on to initiate the IML Test and the Self-Test. Verify that the failure has been repaired.
8. If the failure is not repaired, go to the Integrated Modem entry MAP B130.

Test Function Failure	Display Code	Processor Card B2 LEDs				Failing Card (Note 1)	Notes
		Feat.	Front End	Proc.	Poor		
No Failure	—	☉	☉	☉	○	—	Card LEDs flash once during each Self-Test
Processor	0111 016	○	○	○	●*	A2B2, E2, A4	Self-Test failed to start
Processor	0111 016	☉	☉	☉	●*	A2B2, E2, A4	Self-Test failed to end
Processor	0111 016	●	●	●	●*	A2B2, E2, A4	Self-Test failed to end
TAC	0111 016	●	○	○	●	A2A2, E2, B2	Self-Test stops on error
Front End	0111 016	○	●	○	●	A2E2, B2	Self-Test stops on error
Processor	0111 016	○	○	●	●	A2B2, E2, A4	Self-Test stops on error
Modem Wrap	0111 013	—	—	—	—	A1Q2, A2E2	Modem-to-Adapter stops on error

Legend:

- = off
- ☉ = flashing
- = continuously lighted
- = not used

\*Not always on or flashing

Notes:

1. Listed in order of probability
2. If two or more card LEDs are on, replace cards for all symptoms.

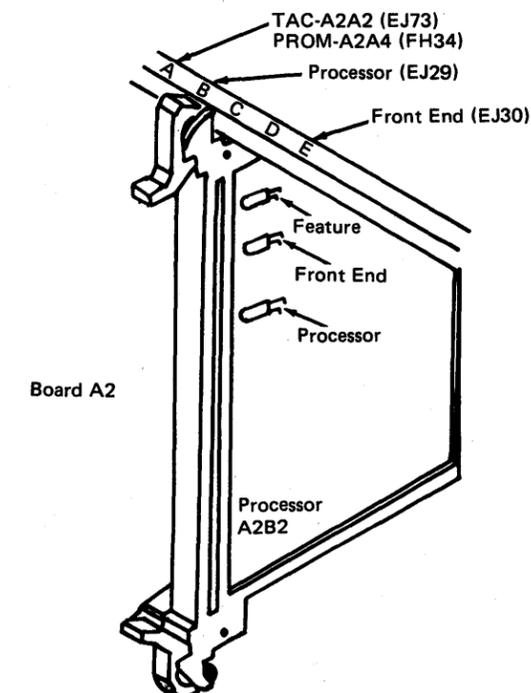


Figure 5-10. 2400-bps Integrated Modem Card LED Locations and Test Results

Test Function Failure	Display Code	Processor Card B2 LEDs					Operator Panel LED	Failing Card (Note 1)	Notes
		Feat.	Rec.	Front End	Proc.	Poor			
No Failure	—	☼	☼	☼	☼	○	—	—	Card LEDs flash once during each Self-Test
Processor	0111 016	○	○	○	○	● *	A2B2, E2, A4	Self-Test failed to start	
Processor	0111 016	☼	☼	☼	☼	● *	A2B2, E2, D2, A4	Self-Test failed to end	
Processor	0111 016	●	●	●	●	● *	A2B2, D2, E2, A4	Self-Test failed to end	
TAC	0111 016	●	○	○	○	●	A2A2, E2, B2	Self-Test stops on error	
Receiver	0111 016	○	●	○	○	●	A2D2, B2, E2	Self-Test stops on error	
Front End	0111 016	○	○	●	○	●	A2E2, D2, B2	Self-Test stops on error	
Processor	0111 016	○	○	○	●	●	A2B2, D2, E2, A4	Self-Test stops on error	
Modem Wrap	0111 013	—	—	—	—	—	A1Q2, A2E2	Modem-to-Adapter stops on error	

**Legend:**  
○ = off  
☼ = flashing  
● = continuously lighted  
— = not used

\*Not always on or flashing

**Notes:**  
1. Listed in order of probability  
2. If two or more card LEDs are on, replace cards for all symptoms.

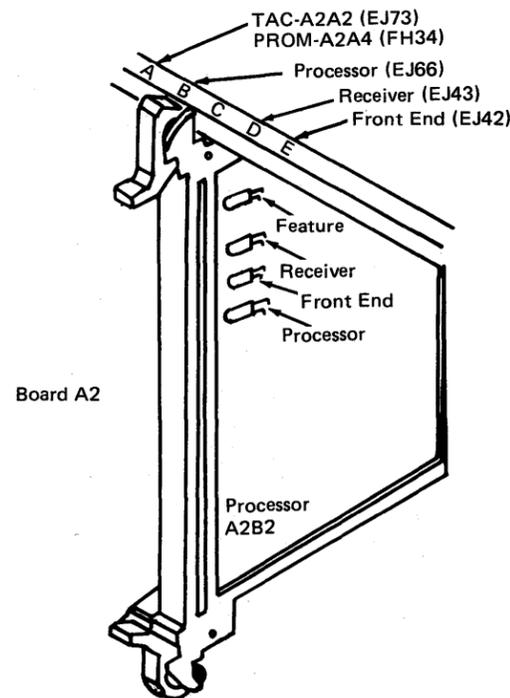


Figure 5-11. 4800-bps Integrated Modem Card LED Locations and Test Results

Test Function Failure	Display Code	Receiver Ext. Card B2 LEDs					Operator Panel LED	Failing Card (See Note)	Notes
		Rec. Ext.	Rec.	Front End	Proc.	Poor			
No Failure	—	☼	☼	☼	☼	○	—	—	Card LEDs flash once during each Self-Test
Processor	0111 016	○	○	○	○	● *	A2C2, E2, A2, A4	Self-Test failed to start	
Processor	0111 016	☼	☼	☼	☼	● *	A2C2, E2, D2, B2, A4	Self-Test failed to end	
Processor	0111 016	●	●	●	●	● *	A2C2, B2, D2, E2, A4	Self-Test failed to end	
Receiver Ext.	0111 016	●	○	○	○	●	A2B2, D2, C2	Self-Test stops on error	
Receiver	0111 016	○	●	○	○	●	A2D2, B2, C2, E2	Self-Test stops on error	
Front End	0111 016	○	○	●	○	●	A2E2, C2, D2, B2	Self-Test stops on error	
Processor	0111 016	○	○	○	●	●	A2C2, D2, E2, B2	Self-Test stops on error	
TAC	0111 016	○	○	○	○	●	A2A2, E2, C2, B2	Self-Test stops on error	
Modem Wrap	0111 013	—	—	—	—	—	A1Q2, A2E2	Modem-to-Adapter stops on error	

**Legend:**  
○ = off  
☼ = flashing  
● = continuously lighted  
— = not used

\*Not always on or flashing

**Notes:**  
1. Listed in order of probability  
2. If two or more card LEDs are on, replace cards for all symptoms.

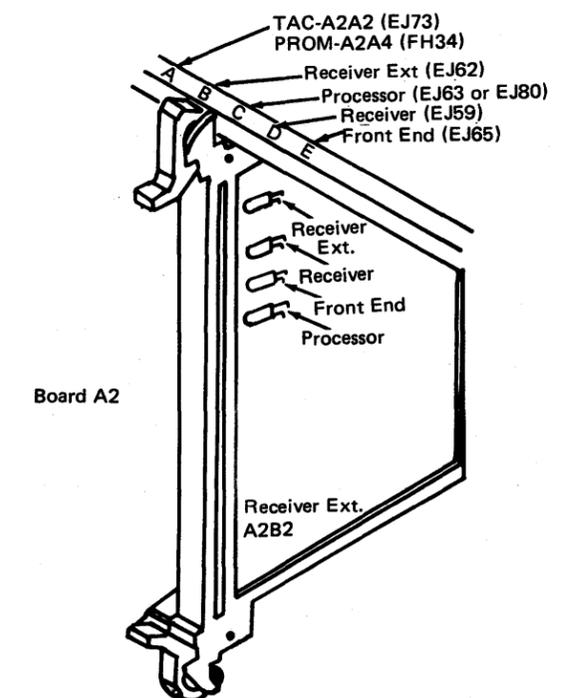


Figure 5-12. 9600-bps Integrated Modem Card LED Locations and Test Results

5.6.6 Transmit Level Adjustment

5.6.6.1 U.S. and Canada

The transmit level for Integrated Modems operating over nonswitched lines in the U.S. and Canada is preset to 0 dBm on the front-end card (A2E2) during manufacture. This setting should not be changed. However, if the front-end card must be replaced, ensure that the transmit level switches on the new card are set for 0 dBm. (See 5.6.7.)

5.6.6.2 Other Countries

The transmit level for Integrated Modems operating over nonswitched lines in countries other than the U.S. and Canada varies according to country PTT regulations. The required transmit level for each country is preset on the front-end card (A2E2) during manufacture. Usually this setting will not have to be changed. However, the card must be replaced or the transmit level changed occasionally to compensate for local loop losses. If either becomes necessary, set the transmit level switches according to the Front-End Card Replacement and Adjustment (5.6.7) below.

Transmit Level	Switch			
	1	2	3	4
0	On	On	On	On
-1	Off	On	On	On
-2	On	Off	On	On
-3	Off	Off	On	On
-4	On	On	Off	On
-5	Off	On	Off	On
-6	On	Off	Off	On
-7	Off	Off	Off	On
-8	On	On	On	Off
-9	Off	On	On	Off
-10	On	Off	On	Off
-11	Off	Off	On	Off
-12	On	On	Off	Off
-13	Off	On	Off	Off
-14	On	Off	Off	Off
-15	Off	Off	Off	Off

Figure 5-14. Transmit Level Switch Settings

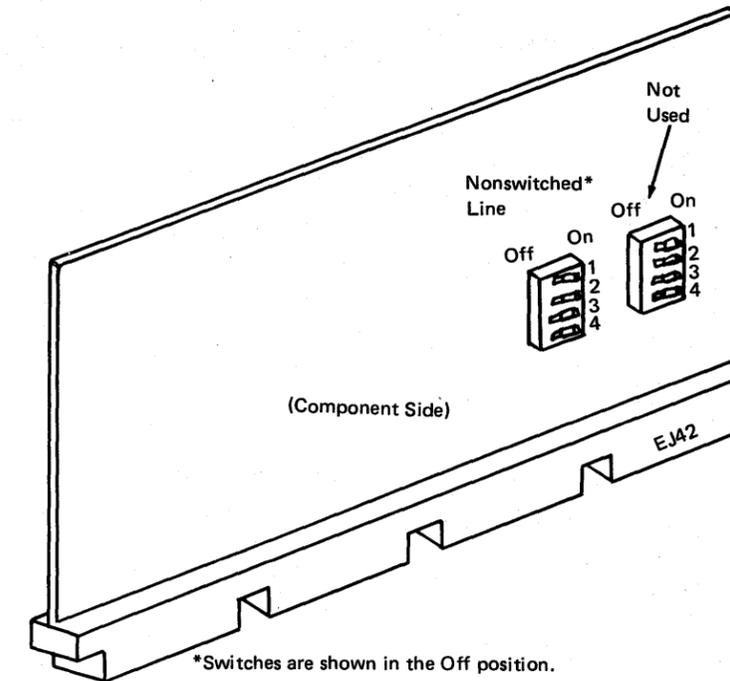


Figure 5-16. 4800-bps Integrated Modem Front-End Card (A2E2)

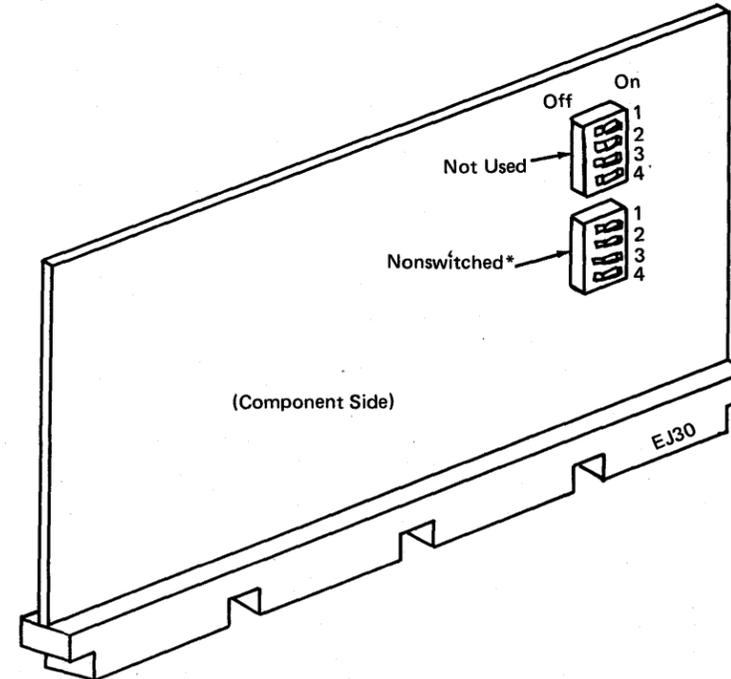
5.6.7 Front-End Card Replacement and Adjustment

If the transmit level switches on the front-end card A2E2 must be changed, refer to Figure 5-13 for the transmit level for your country. Refer to Figure 5-14 for the associated transmit level switch settings. The locations of the switches on the A2E2 card for 2400, 4800, and 9600 bps are shown in Figures 5-15, 5-16 and 5-17, respectively. Use only the switches indicated as Nonswitched.

Figure 5-17 shows the locations of the jumpers required for proper operation of the 9600-bps modem. Figure 5-18 shows a jumper required for proper operation of the 9600-bps modem receiver extension card.

Country (AFE)	Setting (dBm)	Country (EMEA)	Setting (dBm)
Australia	-13	France	-15
Chile	-6	Italy	-10
Japan	-8	Switzerland	-9
		United Kingdom	-13
Other AFE Countries	0	Other EMEA Countries	-6

Figure 5-13. Transmit Levels (Nonswitched) for AFE and EMEA Countries



\*Switches are shown in the Off position.

Figure 5-15. 2400-bps Integrated Modem Front-End Card (A2E2)

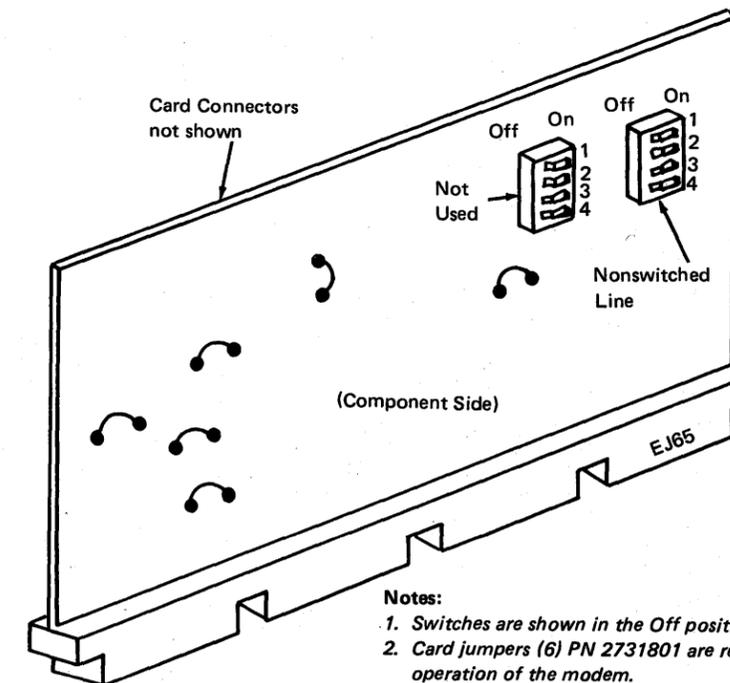
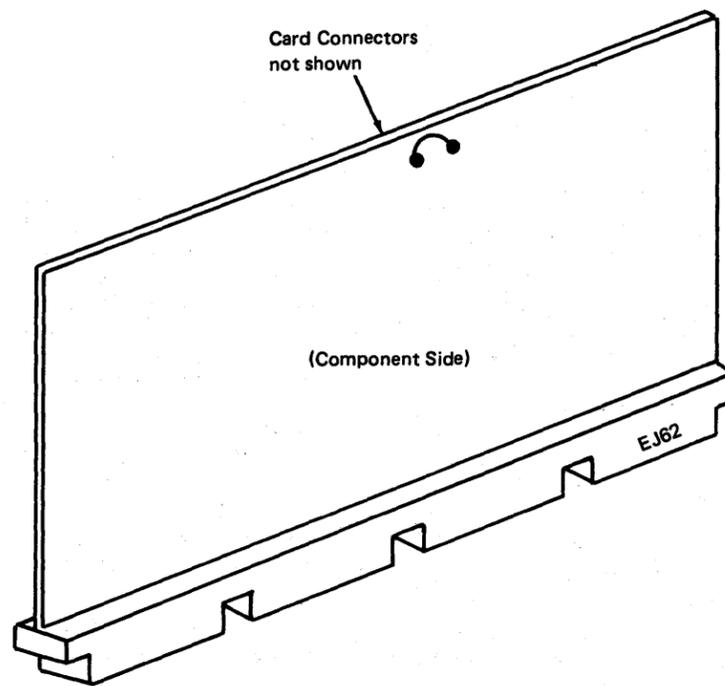


Figure 5-17. 9600-bps Integrated Modem Front-End Card (A2E2)



Note: Card Jumper (1) PN 2731801 is required for proper operation of the modem.

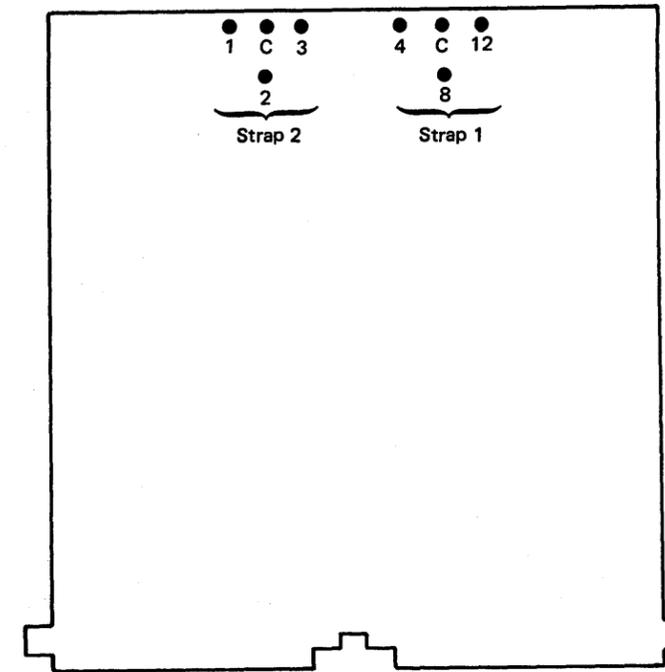
Figure 5-18. 9600-bps Integrated Modem Receiver Extension Card (A2B2)

### 5.6.8 Test Alarm Card (TAC) Transmit Tone Adjustment

The TAC, located in A2A2, contains jumper pins used to set the transmit tone required for World Trade countries. The tone level for Integrated Modems manufactured for use in the U.S. and Canada is set at 0 dBm and, thus, no jumpers are required. The tone level for World Trade countries, however, varies according to PTT regulations and is set during manufacture according to codes specified at the time the orders are placed. Figure 5-19 shows the TAC tone levels required for the various AFE and EMEA countries. Figure 5-20 shows the necessary jumpering to change or verify the TAC transmit tone level.

Country (AFE)	Setting (dBm)	Country (EMEA)	Setting (dBm)
Australia	-13	France	-15
Chile	-6	Italy	-10
Japan	-8	Switzerland	-9
		United Kingdom	-13
Other AFE Countries	0	Other EMEA Countries	-6

Figure 5-19. TAC Tone Levels for AFE and EMEA Countries



**Notes:**

1. No jumpers – 0 dB for U.S.
2. Install jumper PN 2731801 for World Trade countries as shown in the above table for the correct attenuation
3. C = Common

Figure 5-20. Test Alarm Card (TAC) (A2A2) Transmit Tone Level Jumpering

Straps positions		Attenuation (dB)
Strap 1	Strap 2	
No strap	No strap	0
No strap	C to 1	1
No strap	C to 2	2
No strap	C to 3	3
C to 4	No strap	4
C to 4	C to 1	5
C to 4	C to 2	6
C to 4	C to 3	7
C to 8	No strap	8
C to 8	C to 1	9
C to 8	C to 2	10
C to 8	C to 3	11
C to 12	No strap	12
C to 12	C to 1	13
C to 12	C to 2	14
C to 12	C to 3	15

5.6.9 Board Wiring Options

5.6.9.1 Teleprocessing Attachment

The Integrated Modem can be configured either point-to-point or as a multipoint tributary in which the master modem (at the CPU end) controls the line speed. Board wiring to accommodate the teleprocessing attachment selected is done during manufacturing. This is shown in Figure 5-21.

Attachment	Line Speed	Board Wiring
Point-to-Point	2400 bps 4800 bps 9600 bps	No extra wiring No extra wiring No extra wiring
Multipoint	2400 bps 4800 bps 9600 bps	Add A2E2P07 to A2E2P09 Add A2E2P07 to A2E2P09 Add A2E2P07 to A2E2P09

Figure 5-21. Board Wiring for the Various Teleprocessing Attachment Configurations

5.6.9.2 Clear-to-Send Delay (Normally Not Adjusted)

The modem is set (no board wire required) for a normal (short) Clear-to-Send during manufacturing. Although it is normally not adjusted, if telecommunication line problems occur, a longer Clear-to-Send delay can be effected by adding a board wire from A2E2P11 to A2E2P08. This will improve data transmission during the Ready-for-Sending delay and improve equalization over the degraded lines.

After the line problem is corrected, the wire from A2E2P11 to A2E2P08 should be removed. The Clear-to-Send delay values are:

Speed	Delay
2400 bps (Normal) 2400 bps (Long)	8.5 ms 25 ms
4800 bps (Normal) 4800 bps (Long)	24 ms 50 ms
9600 bps (Normal) 9600 bps (Long)	253 ms } Model 1 1753 ms } = (point-to-point) 24 ms } Model 2 60 ms } = (multipoint)

5.6.9.3 Carrier Detect Sensitivity (Normally Not Adjusted)

In the 2400- and 4800-bps modems, carrier detect sensitivity can be adjusted according to signal strength. A low sensitivity is used when there is an excessive amount of noise on the telephone lines. Modems are set for normal (no board wiring required) sensitivity (-0 to -43 dB) during manufacture. Low sensitivity (-0 to -32 dB) can be achieved by adding a wire from A2E2P13 to A2E2P08. In the 9600-bps Integrated Modem, no adjustment is required.

5.6.9.4 Continuous/Noncontinuous Carrier (Normally Not Adjusted)

A 9600-bps point-to-point modem (Model 1) is set (no board wiring required) during manufacture for continuous carrier (normal) operation. Continuous carrier means that the modem will maintain a carrier signal over the transmission line regardless of the Request-to-Send signal. Noncontinuous carrier means that the modem will cease to maintain a carrier signal over the transmission line when the Request-to-Send signal is off. The central site modem must match the Integrated Modem. To operate in non-continuous carrier, a board wire must be added from A2E2P13 to A2E2P08.

5.6.9.5 Indicator Test

To verify that the Integrated Modem panel indicators can be lit, perform the following:

1. Switch 3274 power on and observe that all four of the Integrated Modem indicators flash on and then off.
2. Observe that the Operate, Test, and Good indicators sequence on and off during the time the IML tests are running.

Use Figure B-2, Part 3, to isolate an indicator problem. A jumper from an indicator signal (jackplug 3) to ground can be used to test that indicator.

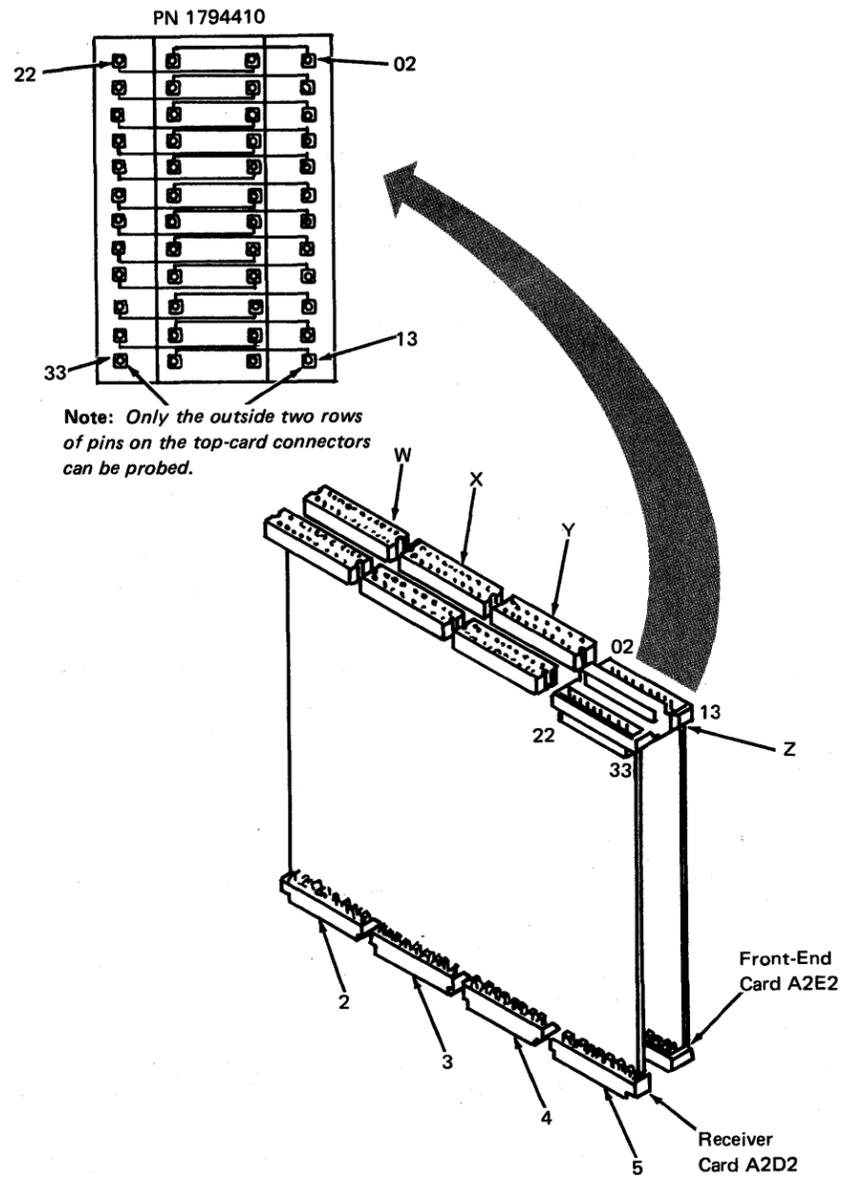
5.6.10 2400-, 4800-, and 9600-bps Integrated Modem Reference Information

The following figures contain information relating to 2400-, 4800-, and 9600-bps Integrated Modem cards. Figure 5-22 indicates card functions, locations, and card codes. Although the part number of a particular card may be revised because of engineering changes, the card code will remain the same. This will facilitate the ordering of replacement cards. Figure 5-23, which shows top-card connector pin locations, will aid in probing top-card connector pins. Figure 5-24 describes the cabling between the EPROM card and the processor card. Figure 5-25 shows the removal of the ROS module and the removal tool.

IM Speed	Card Function	TP Network Attachment				
			Non-Sw	Point-to-Point	Multipoint	Card Code <sup>1</sup>
2400 bps	Front End	A2E2	Yes	Yes	Yes	EJ30
2400 bps	Processor	A2B2	Yes	Yes	Yes	EJ29
4800 bps	Front End	A2E2	Yes	Yes	Yes	EJ42
4800 bps	Receiver	A2D2	Yes	Yes	Yes	EJ43
4800 bps	Processor	A2B2	Yes	Yes	Yes	EJ66
9600 bps	Front End	A2E2	Yes	Yes	Yes	EJ65
9600 bps	Receiver	A2D2	Yes	Yes	Yes	EJ59
9600 bps	Receiver Ext	A2B2	Yes	Yes	Yes	EJ62
9600 bps	Processor	A2C2	Yes	Yes	—	EJ63
9600 bps	Processor	A2C2	Yes	—	Yes	EJ80
2400, 4800, 9600 bps	TAC	A2A2	Yes	Yes	Yes	EJ73
2400, 4800, 9600 bps	PROM	A2A4	NA <sup>2</sup>	NA <sup>2</sup>	NA <sup>2</sup>	FH34

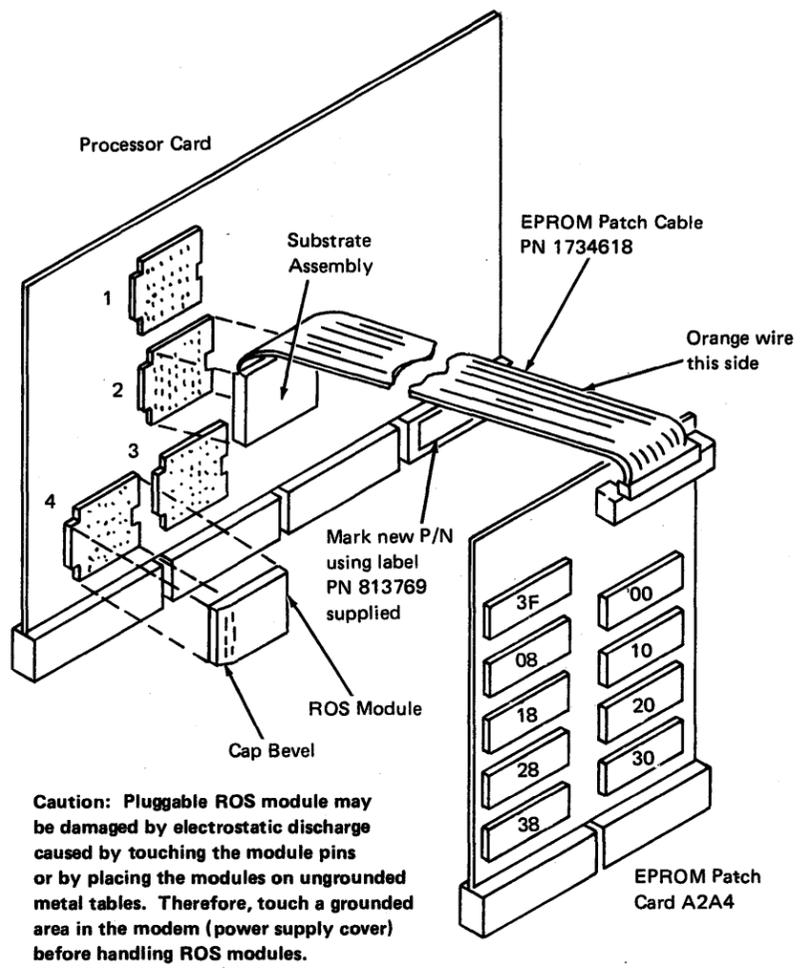
<sup>1</sup> Located on card connector.  
<sup>2</sup> NA = not applicable.

Figure 5-22. 2400-, 4800-, and 9600-bps Card Functions, Locations, and Codes



Note: Cards are shown for a 4800-bps Integrated Modem.

Figure 5-23. Top-Card Connector Pin Locations



Caution: Pluggable ROS module may be damaged by electrostatic discharge caused by touching the module pins or by placing the modules on ungrounded metal tables. Therefore, touch a grounded area in the modem (power supply cover) before handling ROS modules.

Note: The PROM patch card is used when functional changes are required for the Integrated Modem. The PROM card connects via a cable to the processor card module socket. All pluggable ROS modules removed from the processor card are stored in a plastic box in the 3274. Some of these modules may be used again when the field change updates the processor card with the released level part numbers.

Figure 5-24. EPROM-Card-to-Processor-Card Cabling

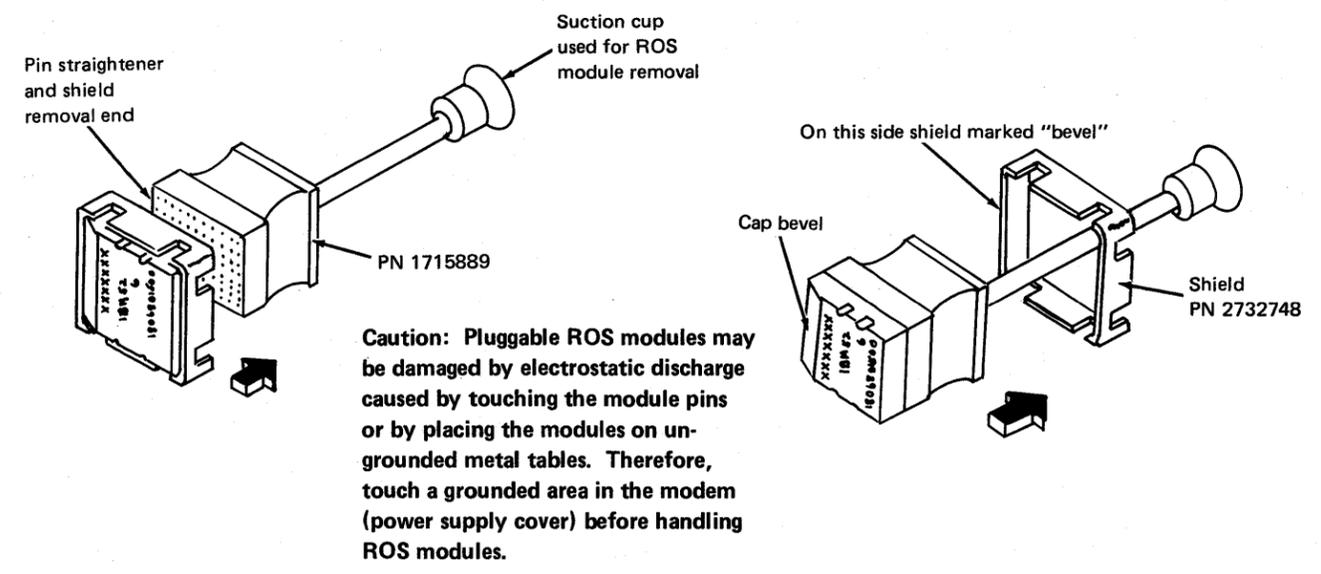
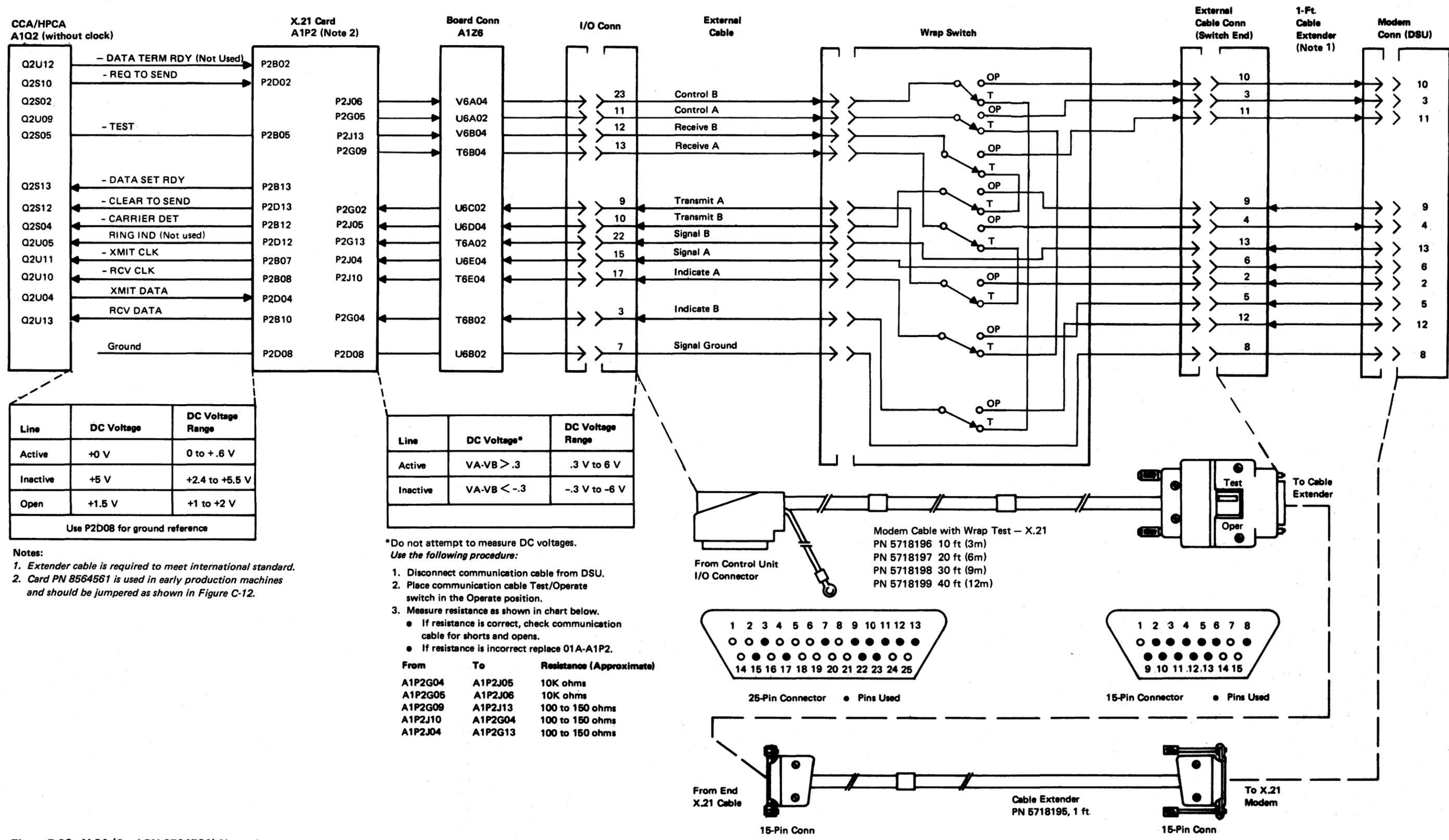


Figure 5-25. Pluggable ROS Removal and Removal Tool



Line	DC Voltage	DC Voltage Range
Active	+0 V	0 to +.6 V
Inactive	+5 V	+2.4 to +5.5 V
Open	+1.5 V	+1 to +2 V

Use P2D08 for ground reference

Line	DC Voltage*	DC Voltage Range
Active	VA-VB > .3	.3 V to 6 V
Inactive	VA-VB < -.3	-.3 V to -6 V

Notes:  
 1. Extender cable is required to meet international standard.  
 2. Card PN 8564561 is used in early production machines and should be jumpered as shown in Figure C-12.

\*Do not attempt to measure DC voltages. Use the following procedure:  
 1. Disconnect communication cable from DSU.  
 2. Place communication cable Test/Operate switch in the Operate position.  
 3. Measure resistance as shown in chart below.  
 • If resistance is correct, check communication cable for shorts and opens.  
 • If resistance is incorrect replace 01A-A1P2.

From	To	Resistance (Approximate)
A1P2G04	A1P2J05	10K ohms
A1P2G05	A1P2J06	10K ohms
A1P2G09	A1P2J13	100 to 150 ohms
A1P2J10	A1P2G04	100 to 150 ohms
A1P2J04	A1P2G13	100 to 150 ohms

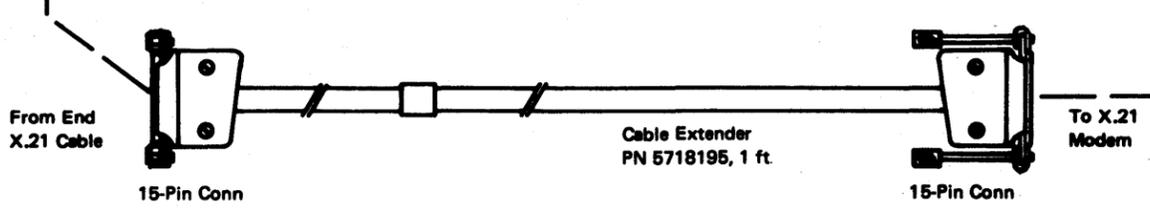


Figure 5-26. X.21 (Card PN 8564561) Nonswitched Communications Line Flow - World Trade Only

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## Chapter 6. 3274 Encrypt/Decrypt Feature (Model C Only)

### 6.1 FEATURE DESCRIPTION

The 3274 Encrypt/Decrypt feature can be installed on the 3274 Model C. An organization using the Encrypt/Decrypt feature has the ability to protect from unauthorized disclosure the information transmitted and received through the communication network. The Encrypt/Decrypt feature accomplishes this data protection by encrypting (encoding) messages sent to the host system and decrypting (decoding) messages received from the host system. Messages from the host system to the 3274 (or its attached units) that have been encrypted are decrypted before being displayed or printed. Messages from the 3274 (or its attached units) are encrypted before being sent over the communication line to the host system.

A 16-character Terminal Master Key and an 8-character control unit identification (CID) must be entered into the 3274 (by using the 3278 Display Station attached to the 3274 port A0) before the Encrypt/Decrypt feature can be used. When the 3274 is turned off, the Terminal Master Key is maintained by a mercury battery in the 3274. The procedures in this section for replacing the Encrypt/Decrypt feature battery, entering the Terminal Master Key, verifying the Terminal Master Key, and testing the Encrypt/Decrypt feature are also contained in the customer's *3274 Control Unit Operator's Guide*, GA23-0023.

#### 6.1.1 IML Display Indications

When the 3274 contains the Encrypt/Decrypt feature and a normal IML is performed, containing the system diskette, a functional test of the Encrypt/Decrypt card (A1N2) will be performed by the IML tests. If these tests fail, a blinking 1001 will be displayed on the operator panel.

When the 3274 is loaded with the Encrypt/Decrypt feature diskette and the master key procedure is entered, and verified or tested, the error codes 397, 398, and 399 may be displayed. When this occurs, the customer is directed by the *Problem Determination Guide* to replace the customer-accessible mercury battery.

#### 6.1.2 Feature Components

The Encrypt/Decrypt feature components are the control logic card A1N2, a customer replaceable +4 V mercury battery (PN 1655387), a Write Enable master key switch, and a cable assembly. The cable assembly is connected from the 32-pin connector on board A1 to the switch key lock and battery. The component locations are shown in Figure 6-1; the cable connections and wiring diagrams are shown in Figures 6-2 and 6-3.

### 6.1.3 Encrypt/Decrypt Failures

**Note:** Removing the Encrypt/Decrypt card A1N2, interrupting the battery voltage to the Encrypt/Decrypt card, or disconnecting the 32-pin connector destroys the master key. If this should occur, the customer security administrator must reload the master key.

If crypto IML tests fail (a blinking 1001 code is displayed), reset and/or replace card A1N2.

If display error codes 397, 398, or 399 appear at the bottom of the display screen, verify that the battery voltage on board A1 is correct. (See 6.2.) If the battery voltage is correct, perform the following additional checks:

1. Reseat and/or replace the A1N2 card.
2. Check to see that the 32-pin connector is making good contact.
3. Check the cable assembly connections.
4. Check for proper operation of the crypto switch.

Verify successful repair by performing the Encrypt/Decrypt feature test procedure outlined in 6.6.

### 6.2 BATTERY POWER SUPPLY CHECK

The customer-replaceable mercury battery is located below the Encrypt/Decrypt security keylock. The battery voltage can be measured at board A1, pins N2G09(+) and N2D08 (-). The voltage level should be between +3.5 V and +4.5 V while the 3274 power is off.

#### DANGER

The battery may explode if recharged or disposed of in fire. For recycling the battery, follow local procedures or return it to IBM.

### 6.3 CUSTOMER PROCEDURE FOR ENCRYPT/DECRYPT BATTERY REPLACEMENT

1. If any terminal attached to the 3274 is in use, notify all terminal operators that the 3274 is going to be turned off; then wait until all operations are completed.
2. Do not turn 3274 power off while replacing the battery.

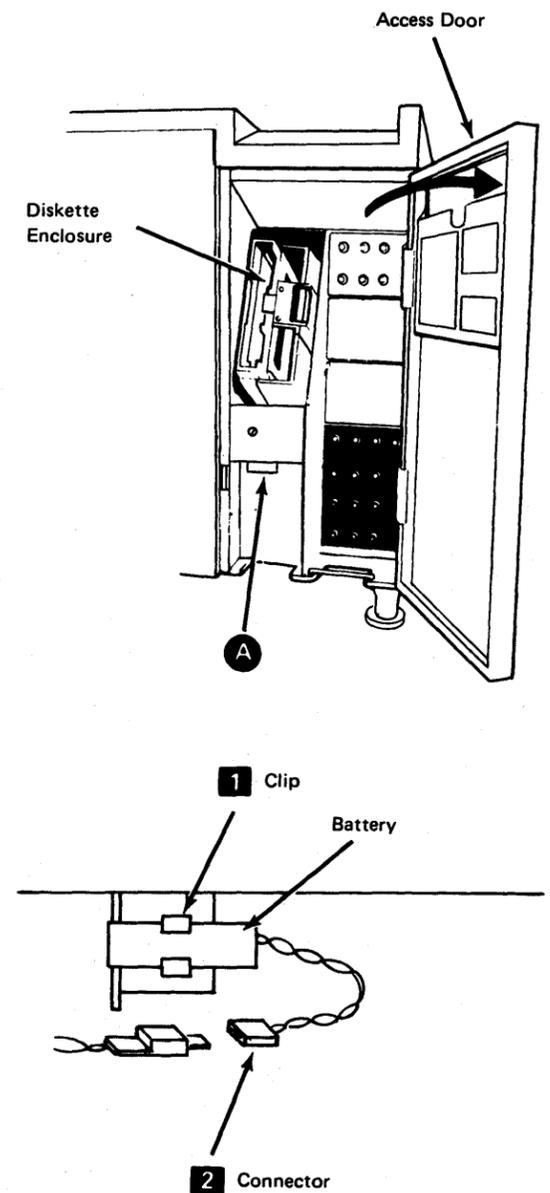
**Note:** If 3274 power is off while the battery is being replaced, enter the Terminal Master Key by performing the Terminal Master Key procedure (6.4).

3. Open the customer access door (see the diagram to the right).
4. The Encrypt/Decrypt battery is located in area A below the 3274 diskette enclosure.
5. Remove the old battery from the clip in the bracket 1 and disconnect the battery connector 2.
6. Connect the battery connector to the new battery (can be connected only one way), and insert the new battery into the clip on the bracket.
7. Close the customer access door.

**Note:** The replaced mercury battery should be disposed of according to the manufacturer's instructions or the disposal instructions printed on the battery, or returned to IBM.

#### DANGER

The battery may explode if recharged or disposed of in fire.



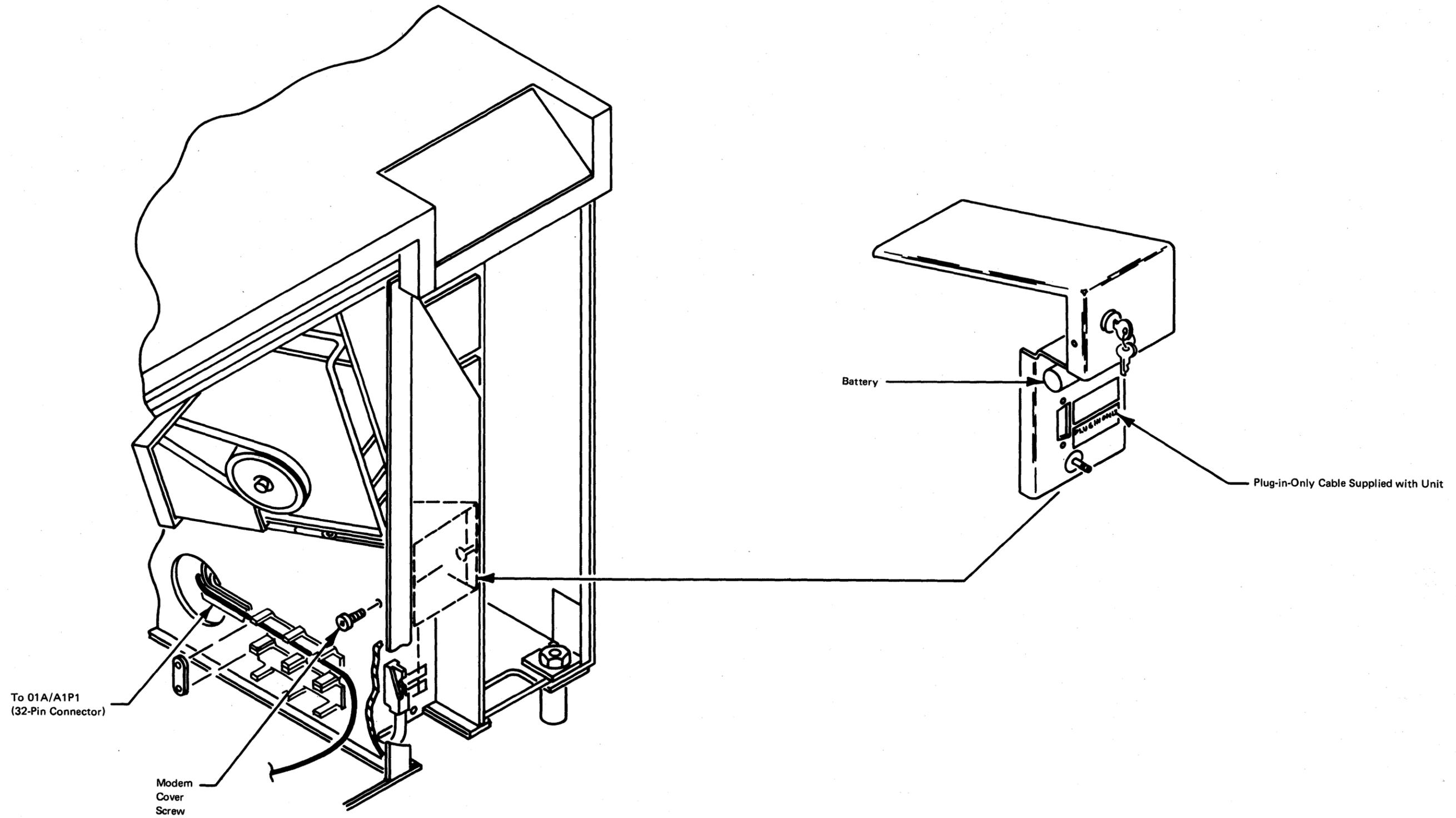
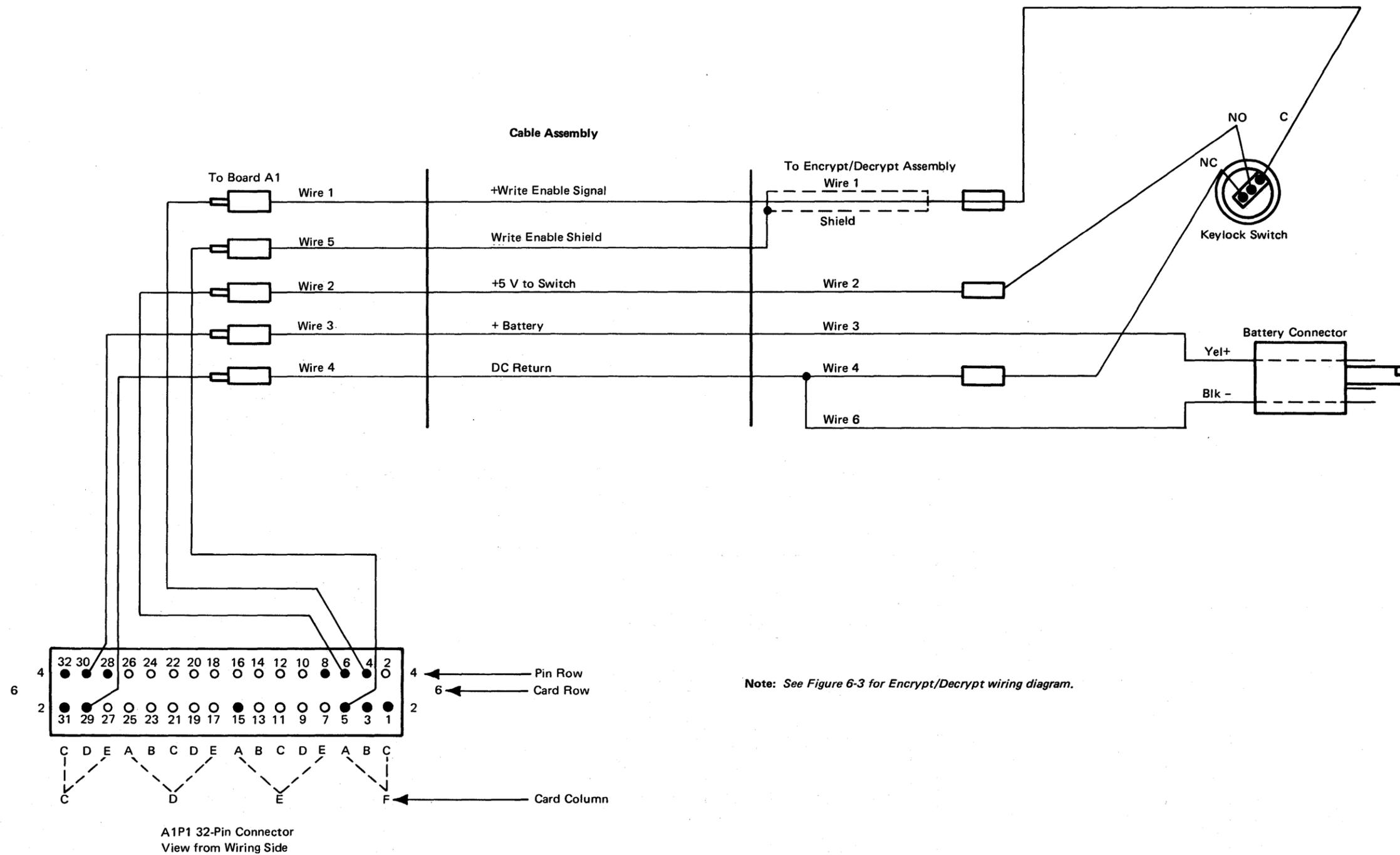
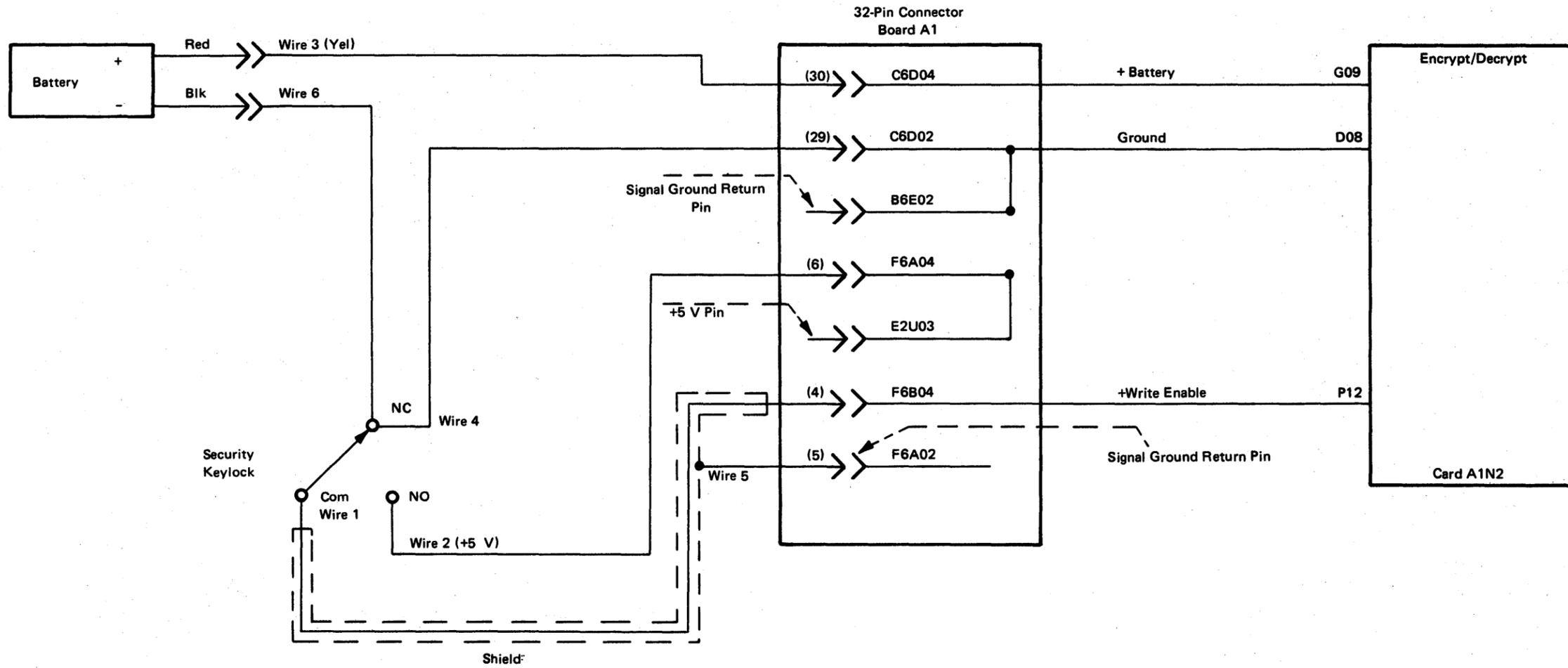


Figure 6-1. Encrypt/Decrypt Feature Component Locations



Note: See Figure 6-3 for Encrypt/Decrypt wiring diagram.

Figure 6-2. Encrypt/Decrypt Cable Connections



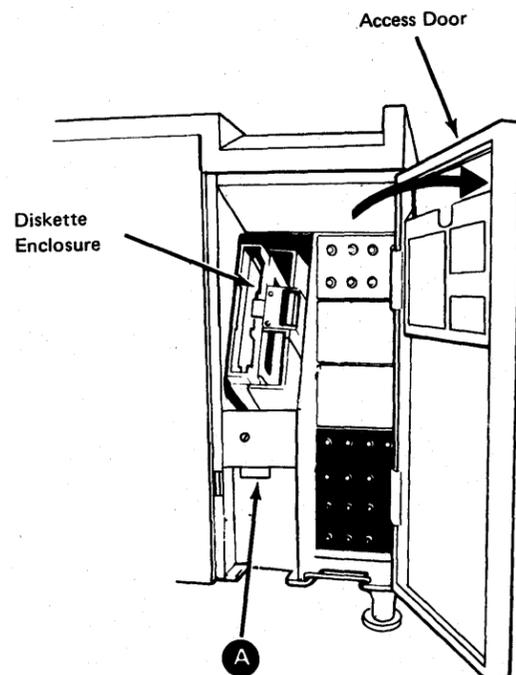
Note: See Figure 6-2 for Encrypt/Decrypt cable connections.

Figure 6-3. Encrypt/Decrypt Wiring Diagram

## 6.4 ENTERING THE TERMINAL MASTER KEY

Perform this procedure only if authorized to enter the Terminal Master Key. Obtain the Terminal Master Key, the Terminal Master Key verification value (if available), and the control unit ID (CID) from the appropriate person.

1. If any terminal attached to the 3274 is in use, notify all terminal operators that the 3274 operation is going to be interrupted; then wait until all operations are completed.
2. Use the display attached to 3274 port A0 to perform this procedure. Locate the 3278 attached to 3274 port A0; then ensure it has a keyboard and is turned on.
3. An **X** **397**, **X** **398**, or **X** **399** code appearing in the operator information area during this procedure indicates an Encrypt/Decrypt failure. Refer to the display station problem determination guide for the recovery procedure.
4. Open the diskette enclosure and remove the diskette (if installed). Insert the Encrypt/Decrypt diskette into the diskette enclosure (as shown on the inner door panel on the 3274); then close the diskette enclosure door by pushing the enclosure door to the left until it latches with a noticeable snap.
5. If the 3274 is turned on, press the IML pushbutton on the 3274 control panel; if the 3274 is turned off, press the 1 portion of the 3274 On/Offline switch.



6. If the security key is not inserted in the 3274 security keylock (located below the diskette enclosure), obtain the security key from the appropriate person in your organization and insert the key into the security keylock.
7. Ensure the key is in the fully clockwise (horizontal) position; if it is not, turn the key clockwise to the horizontal position.
8. Go to the display station attached to 3274 port A0. The top two rows of the screen should contain:
 

```
001
XXXXXXXXXXXXXXXXXX
```
9. Use the keyboard to enter the characters 1234567890 ABCDEF into the character positions occupied by the Xs. If you miskey any characters, use the cursor-move keys (← and →) on the right side of the keyboard to move the cursor to the character position(s) to be corrected.
10. Press the ENTER key. The top two rows of the display screen should change to:
 

```
EMKV
-----
```
11. EMKV is a prompt message meaning "enter master key value." Use the keyboard to enter (without spaces) the 16 characters of the Terminal Master Key into the position occupied by the hyphens; the valid characters that can be entered are the numbers 0 through 9 and the letters A, B, C, D, E, and F. As each character is entered, the corresponding hyphen is replaced by an asterisk (\*). If you miskey a character, press the RESET key and enter all 16 characters of the Terminal Master Key again.
12. Press the ENTER key. The top two rows of the display screen should change to:
 

```
CID
-----
```

**Note:** If CID is not displayed and a Do Not Enter symbol (X) is displayed in the operator information area, you did not enter the correct Terminal Master Key in Step 11. The meaning of the operator information area symbols is explained in the 3278 Problem Determination Guide. To recover, press the RESET key, enter the correct Terminal Master Key, and press the ENTER key.

13. Use the keyboard to enter the CID into the positions occupied by the underscores. If the CID is less than eight characters, enter only as many characters as you have and the remainder of the field will be filled with zeros. As each character is entered, the corresponding underscore is replaced by an asterisk (\*). If you miskey a character, press the RESET key and enter the CID again.
14. Press the ENTER key. The top two rows of the display screen should change to:
 

```
VP                               99
YYYYYYYYYYYYYYYYYY
```

The VP message means "verification pattern," and the Y characters represent the Terminal Master Key verification value. If you have the Terminal Master Key verification value for the Terminal Master Key just entered, ensure the verification value displayed is correct; if it is not, press the RESET key, return to Step 5, and try to enter the Terminal Master Key again.
15. Record the verification value for future reference because it can be used to verify the Terminal Master Key just entered. (Refer to the Verifying the Terminal Master Key procedure, 6.5.)
16. Press the ENTER key. When the ENTER key is pressed (second time), the top two rows of the display screen should change to:
 

```
VP                               99
XXXXXXXXXXXXXXXXXX
```

The keyboard is now disabled and cannot be reset until an IML operation is performed. To continue operation, turn the 3274 Encrypt/Decrypt security keylock to the counterclockwise (vertical) position, remove the security key from the lock, remove the Encrypt/Decrypt diskette, perform an IML operation with the proper diskette loaded, and proceed with normal operation.

## 6.5 VERIFYING THE TERMINAL MASTER KEY

Use the following procedure to verify that the Terminal Master Key has not been changed; this procedure will not alter the Terminal Master Key. This procedure causes an indication of whether the Terminal Master Key has been changed (99, if the Terminal Master Key has not been changed; 44, if the Terminal Master Key has been changed) to be displayed at the top center of the display screen on the 3278/3279 Display Station attached to 3274 port A0.

1. If any terminal attached to the 3274 is in use, notify all terminal operators that the 3274 operation is going to be interrupted; then wait until all operations are ended.

2. Use the 3278/3279 attached to 3274 port A0 to perform this procedure. Locate the 3278/3279 attached to 3274 port A0; then ensure it has a keyboard and is turned on.
3. An **X** **397**, **X** **398**, or **X** **399** code appearing in the operator information area during this procedure indicates an Encrypt/Decrypt failure. Refer to the 3274 Problem Determination Guide for the recovery procedure.
4. Load the Encrypt/Decrypt diskette.
5. If the 3274 is turned on, press the IML pushbutton on the 3274 control panel; if the 3274 is turned off, press the **1** portion of the 3274 On/Off switch. IML is complete when the 8 4 2 1 indicators are all off.
6. Ensure the security keylock is in the fully counterclockwise (vertical) position; if it is not, turn the key counterclockwise to the vertical position.
7. Go to the 3278/3279 display station that is attached to the 3274 port A0. The top two rows of the screen should contain:
 

```
001
XXXXXXXXXXXXXXXXXX
```
8. Use the keyboard to enter the characters 1234567890ABCDEF into the character positions occupied by the Xs. If you miskey any characters, use the cursor-move keys (← and →) on the right side of the keyboard to move the cursor to the character position(s) to be corrected.
9. Press the ENTER key. The top two rows of the display screen should change to:
 

```
EMKV
-----
```

**Note:** If a 1 or a 2 appears at the top center of the screen and EMKV does not appear, you entered the 1 through F characters incorrectly at Step 8. To recover, enter the 1 through F characters correctly and press the ENTER key again.
10. Press the ENTER key. If the Terminal Master Key is as expected, 99 will appear at the top center of the screen; if it is not as expected, 44 will appear at the top center of the screen.
11. To continue operation, remove the Encrypt/Decrypt diskette and proceed with normal operation.

## 6.6 ENCRYPT/DECRYPT FEATURE TEST

The *3274 Problem Determination Guide* may instruct you to perform this test procedure during problems operating with the Encrypt/Decrypt feature. This test modifies the Terminal Master Key currently being used by the 3274.

This test involves entering a Terminal Master Key of 0123456789ABCDEF; when this Terminal Master Key is entered, a verification value of F188 D850 4894 139E is displayed if the Encrypt/Decrypt feature is operating properly.

1. If any terminal attached to the 3274 is in use, notify all terminal operators that the 3274 operation is going to be interrupted; then wait until all operations are ended.
2. Use the 3278/3279 attached to 3274 port A0 to perform this procedure. Locate the display station attached to 3274 port A0; then ensure it has a keyboard and is turned on.
3. An **X** **?** **397**, **X** **?** **398**, or **X** **?** **399** code appearing in the operator information area during this procedure indicates an Encrypt/Decrypt failure. Refer to the *3274 Problem Determination Guide* for the recovery procedure.
4. Load the Encrypt/Decrypt diskette.
5. If the 3274 is turned on, press the IML pushbutton on the 3274 control panel; if the 3274 is turned off, press the  $\square$  portion of the 3274 On/Off switch. IML is complete when the 8 4 2 1 indicators are all off.
6. If the security key is not inserted into the 3274 security keylock, obtain the security key from the appropriate person in your organization and insert the key into the security keylock.
7. Verify that the security keylock is in the fully clockwise (horizontal) position; if it is not, turn the key clockwise to the horizontal position.
8. Go to the 3278/3279 display station that is attached to 3274 port A0. The top two rows of the screen should contain:
 

```
001
XXXXXXXXXXXXXXXXXX
```
9. Use the keyboard to enter the characters 1234567890ABCDEF into the character positions occupied by the Xs. If you miskey any characters, use the cursor-move keys ( $\leftarrow$  and  $\rightarrow$ ) on the right side of the keyboard to move the cursor to the character position(s) to be corrected.

10. Press the ENTER key. The top two rows of the display screen should change to:

```
EMKV
-----
```

**Note:** *If a 1 or a 2 appears at the top center of the screen, you entered the 1 through F characters incorrectly at Step 9. To recover, enter the 1 through F characters correctly and press the ENTER key again.*

11. **Note:** *The following sequence of characters is different from that used in the previous procedures.*

Use the keyboard to enter (without spaces) the characters 0123456789ABCDEF into the positions occupied by the hypens. As each character is entered, the corresponding hyphen will be replaced by an asterisk(\*). The **X** **?** symbols in the operator information area or a keyboard lock are an indication of miskeyed characters. If you miskey a character, press the RESET key and enter the 0 through F characters again.

12. Press the ENTER key. The top two rows of the display screen should change to (*do not enter a CID*):

```
CID
-----
```

**Note:** *If CID is not displayed and a Do Not Enter symbol (X) is displayed in the operator information area, you did not enter the correct Terminal Master Key in Step 11. The meanings of the operator information area symbols are explained in the display station Problem Determination Guide. To recover, press the RESET key, enter the correct Terminal Master Key, and press the ENTER key.*

13. Press the ENTER key. The top two rows of the display screen should change to:

```
VP          99
F188D8504894139E
```

If the above characters are not displayed, the Encrypt/Decrypt feature is not operating correctly.

14. To continue operation, enter your organization's Terminal Master Key into the 3274 by performing the Entering the Terminal Master Key procedure (6.4), beginning at Step 5.

## Appendixes A through G, and P

Appendixes A through G contain the diagrams and drawings referred to in the isolation procedures and MAPs. Appendix P is the Parts Catalog.

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Appendix A. Locations

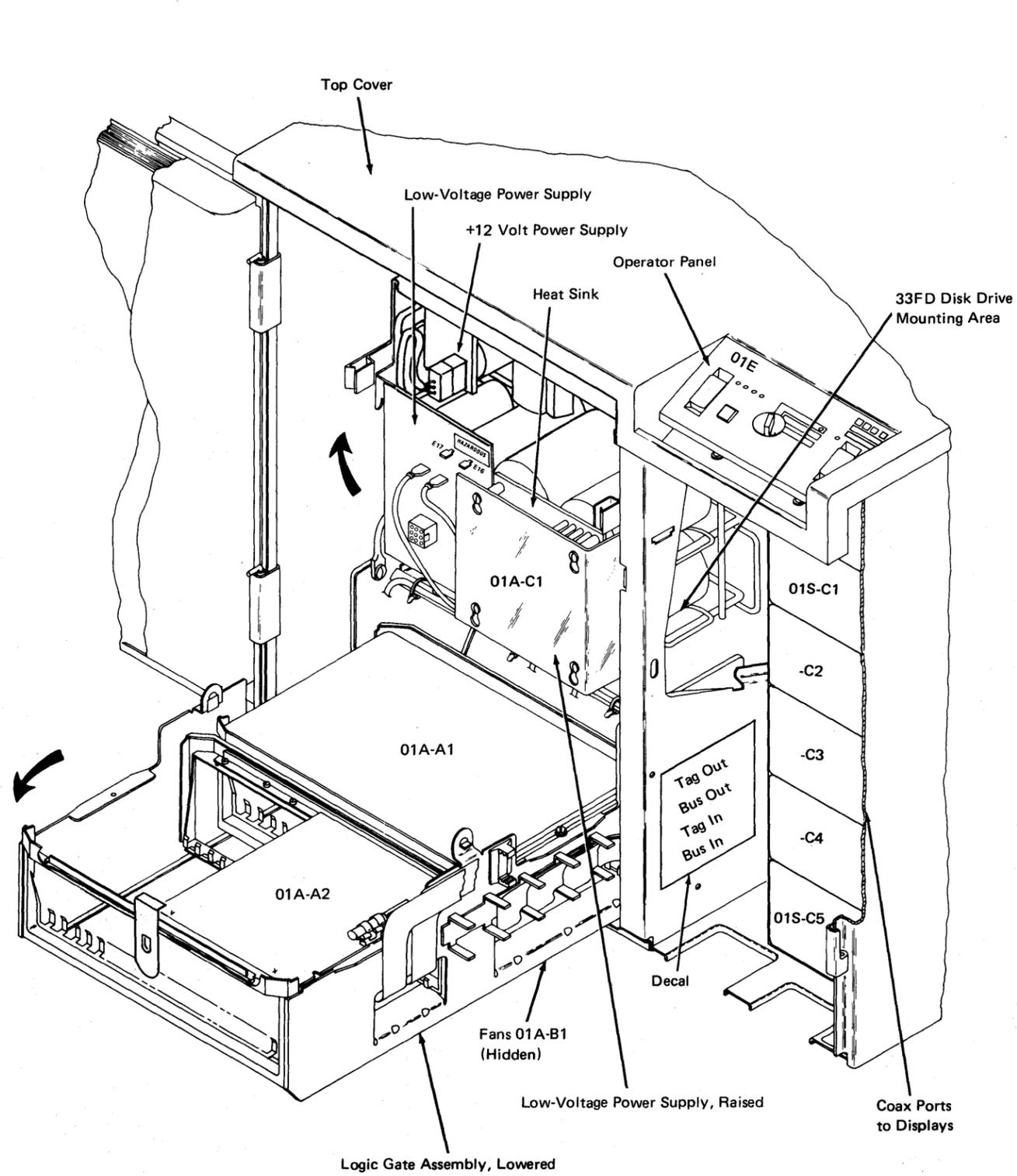


Figure A-1. Field Replaceable Unit Locations - Logic Gate Lowered

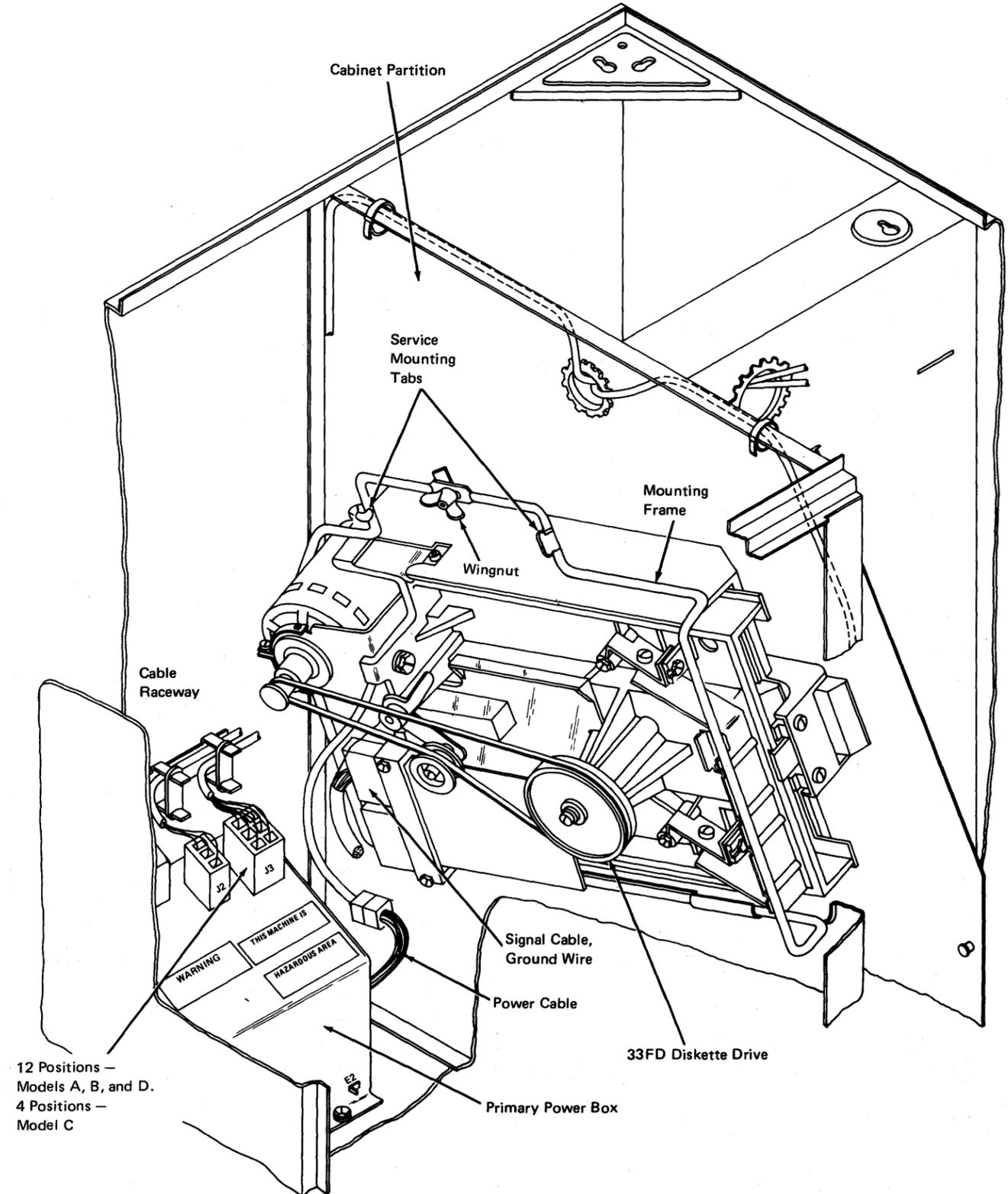


Figure A-2. Field Replaceable Unit Location - Diskette Drive

Configuration Data		CE Data	
021 0 1 Printer Auth. Matrix	314 0 Multipt 1 Point-to-Point	201 Local Channel CU Address _____	
022 _____ (see reverse side)	317 0 Normal 1 Switched Network Backup	Master Terminal Operator Phone _____	
031 _____ No. of RPQ Diskettes	318 0 Normal 1 Half Speed	Host CPU _____	
111 _____ No. of Category B Terminals	321 0 EBCDIC 1 ASCII	Application Program _____	
112 _____ No. of Category A Terminals	331 0 BSC 1 SDLC Line Control		
113 _____ Extended Function Store	342 0 1 RTS Control	Remote TP Line BSC SDLC	
121 _____ Keyboard Language	343 0 1 2 3 4 5 6 7 8 9 A B C D E F Host	Logical Line No. _____	
131 0 1 Typewriter Keyboard	345 0 Ans Tone 1 No Answer Tone	Logical CID _____	
132 0 1 Data Entry Keyboard	347 0 <38.4KB 1 38.4KB (Loop)	Line Speed _____	
133 0 1 Data Entry Keypunch Keyboard	351 0 CCA 1 HPCA	Host _____	
134 0 1 APL Keyboard	352 0 1 Encrypt/Decrypt	Application _____	
135 0 1 Text Keyboard	360 _____ Number of Retries (X.21)	Diskette No. _____	
141 A B C D Magnetic Slot Reader	361 _____ Time Between Retries (X.21)		
143 0 1 Host-Load Printer Auth. Matrix	362 _____ Key Support (X.21)		
145 0 1 3289 Text Print Control			
147 0 1 Local Copy			
151 A B C D E Model Designation			
161 0 No Color 1 Color			
162 0 1 SFAP			
163 _____ No. of Ext. Char. Set Terminals			
164 0 1 PS Terminals			
165 0 1 Compressed PS Data			
166 A B C Advanced Function Keyboard			
201 See CE Data			
211 0 1 SCS Support			
213 0 1 Between Brkt Printer Sharing			
215 _____ Physical Unit ID			
301 _____ BSC Control Unit Number			
302 _____ SDLC Station Address			
305 0 Gen Poll 1 Specific Poll			
310 0 RTS/CTS 1 CDSTL			
311 0 Non-Wrap 1 Wrappable			
313 0 NRZ 1 NRZ1			

PN 5718491  
EC 876393

Figure A-3. Configuration and CE Data Card (Stored in Customer Access Door Pocket)

Printer Authorization Matrix Form

Printer Port Address	Mode	Class				Source Device List													
		X 70 71 72 73	X 74 75 76 77	X 78 79 80 81	X 82 83 84 85	Y 0 1 2 3	Y 4 5 6 7	Y 8 9 10 11	Y 12 13 14 15	Y 16 17 18 19	Y 20 21 22 23	Y 24 25 26 27	Y 28 29 30 31						
A A	M																		
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Mode:  
0 = System  
1 = Local  
2 = Shared

Figure A-4. Printer Authorization Matrix Form (Reverse Side of Configuration and CE Data Card)

Appendix B. Power Supplies

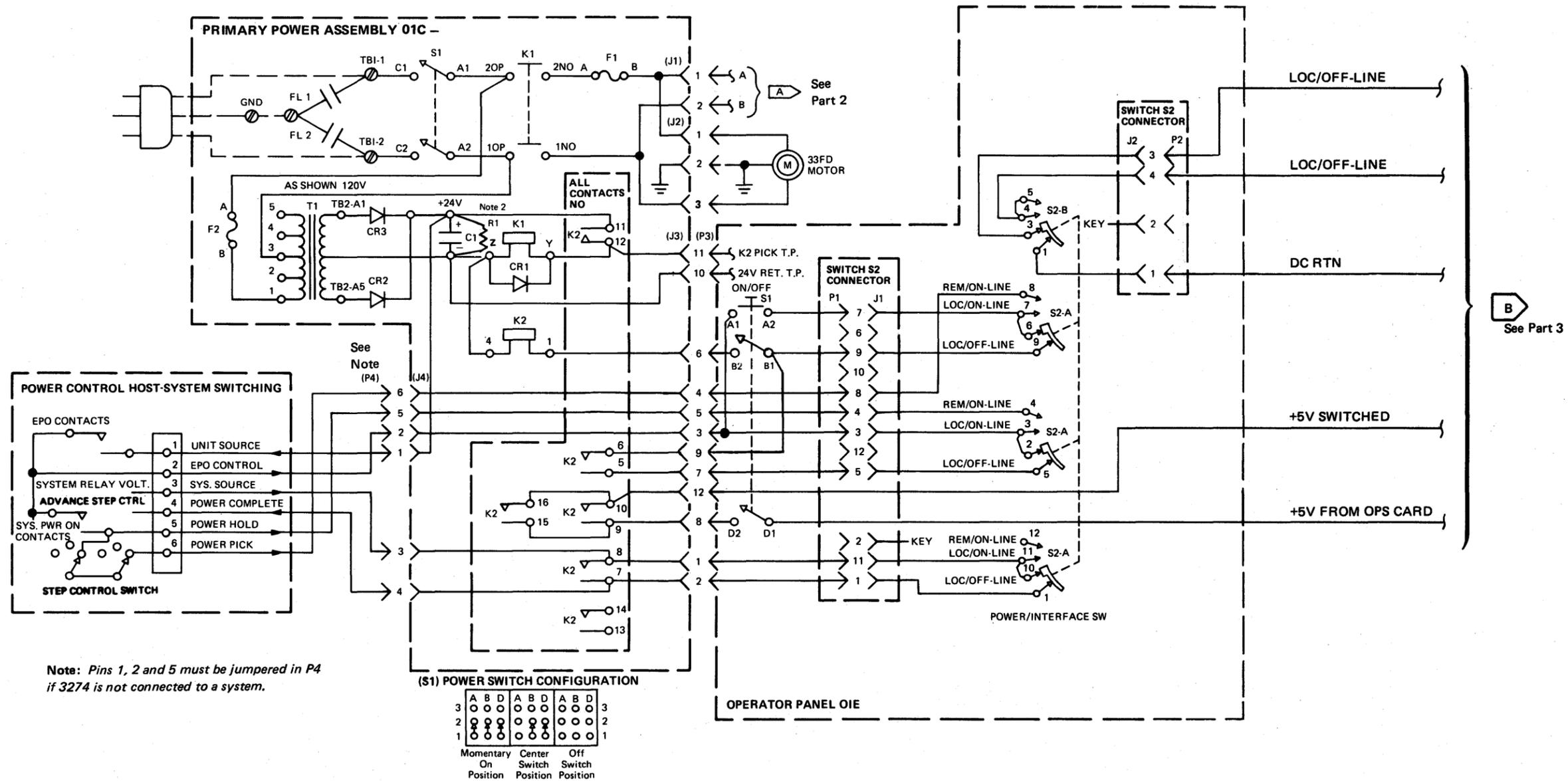


Figure B-1 (Part 1 of 3). Power Supply and Operator Panel – Models A, B, and D

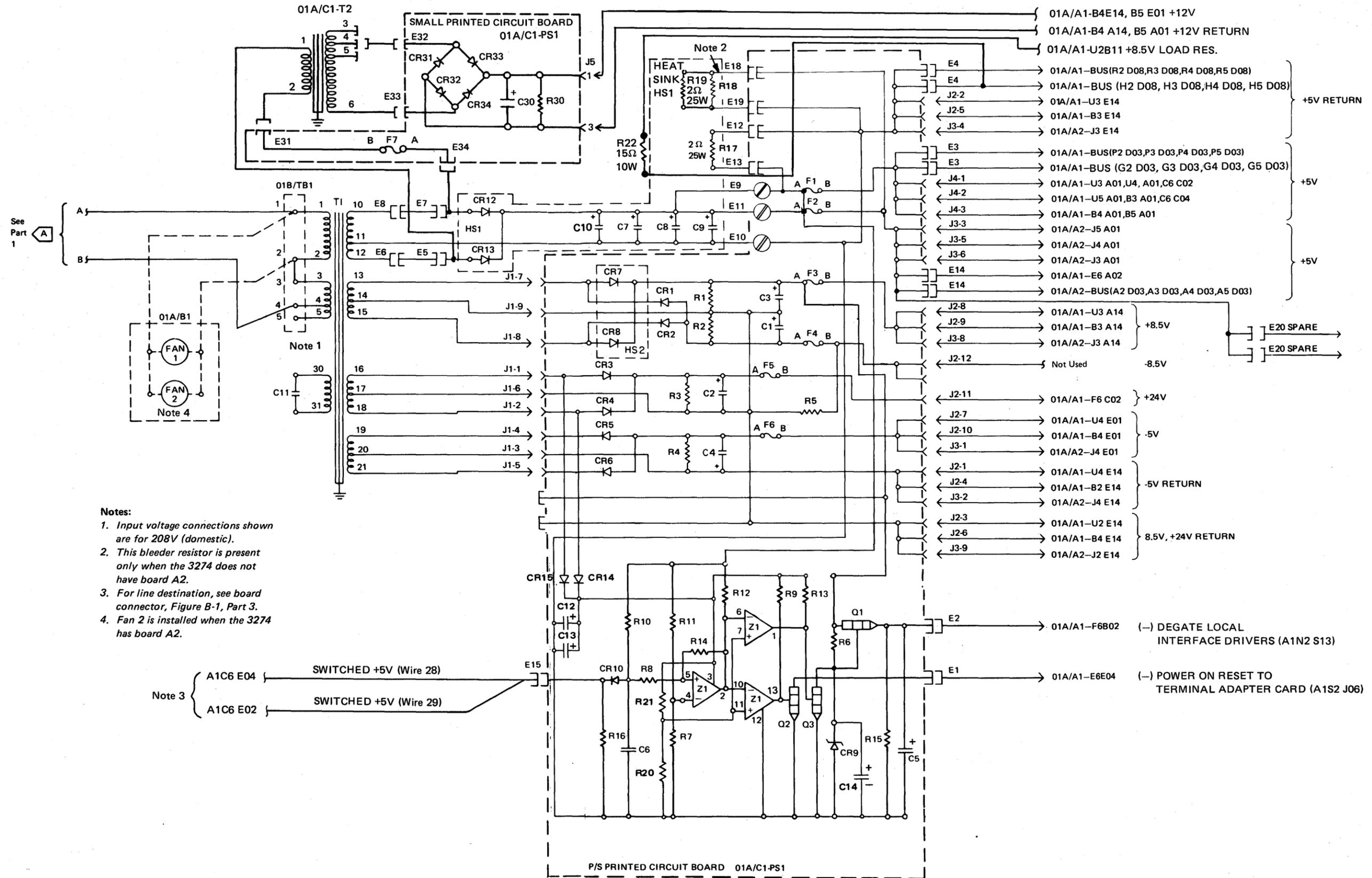


Figure B-1 (Part 2 of 3). Power Supply and Operator Panel – Models A, B, and D

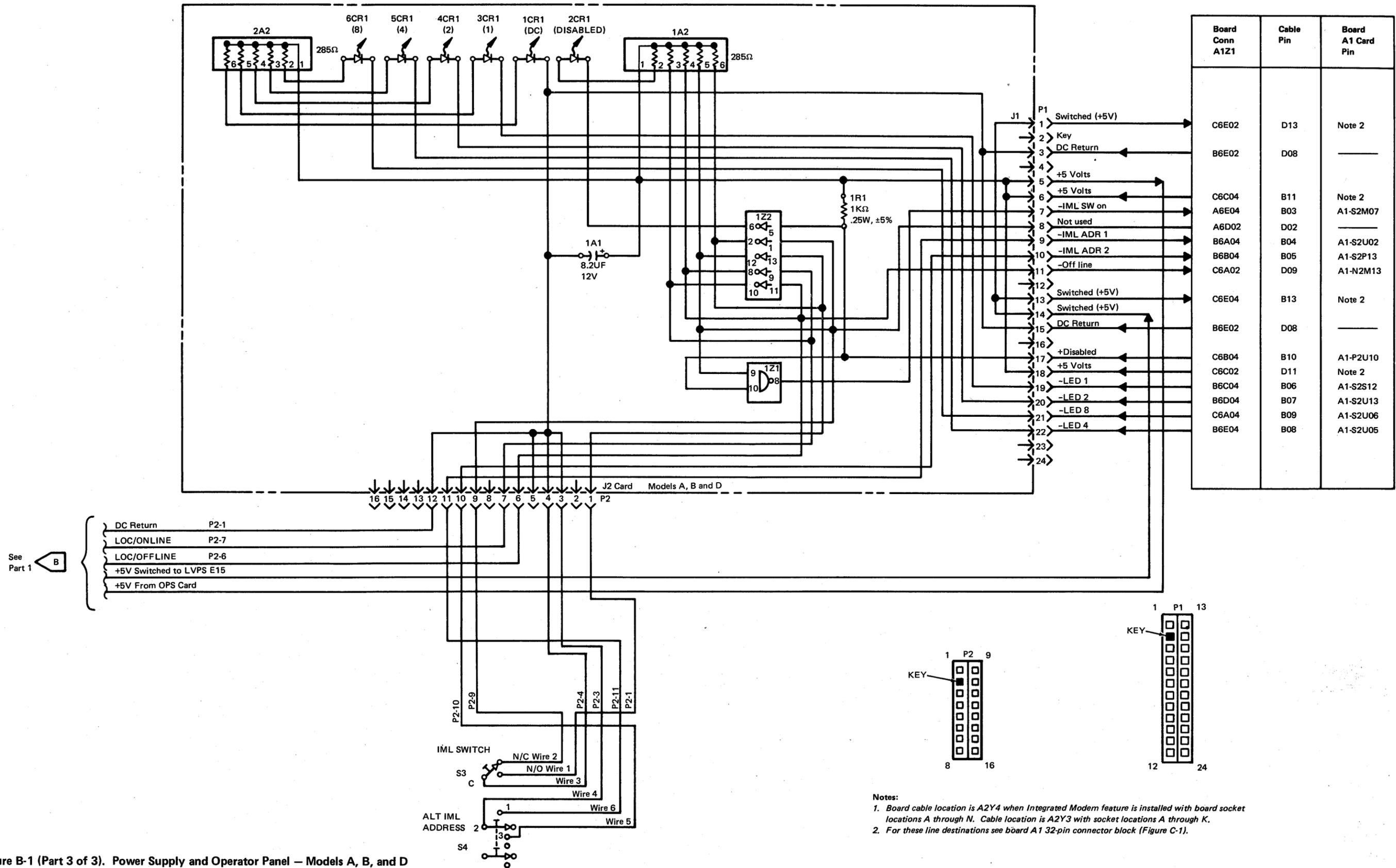


Figure B-1 (Part 3 of 3). Power Supply and Operator Panel – Models A, B, and D

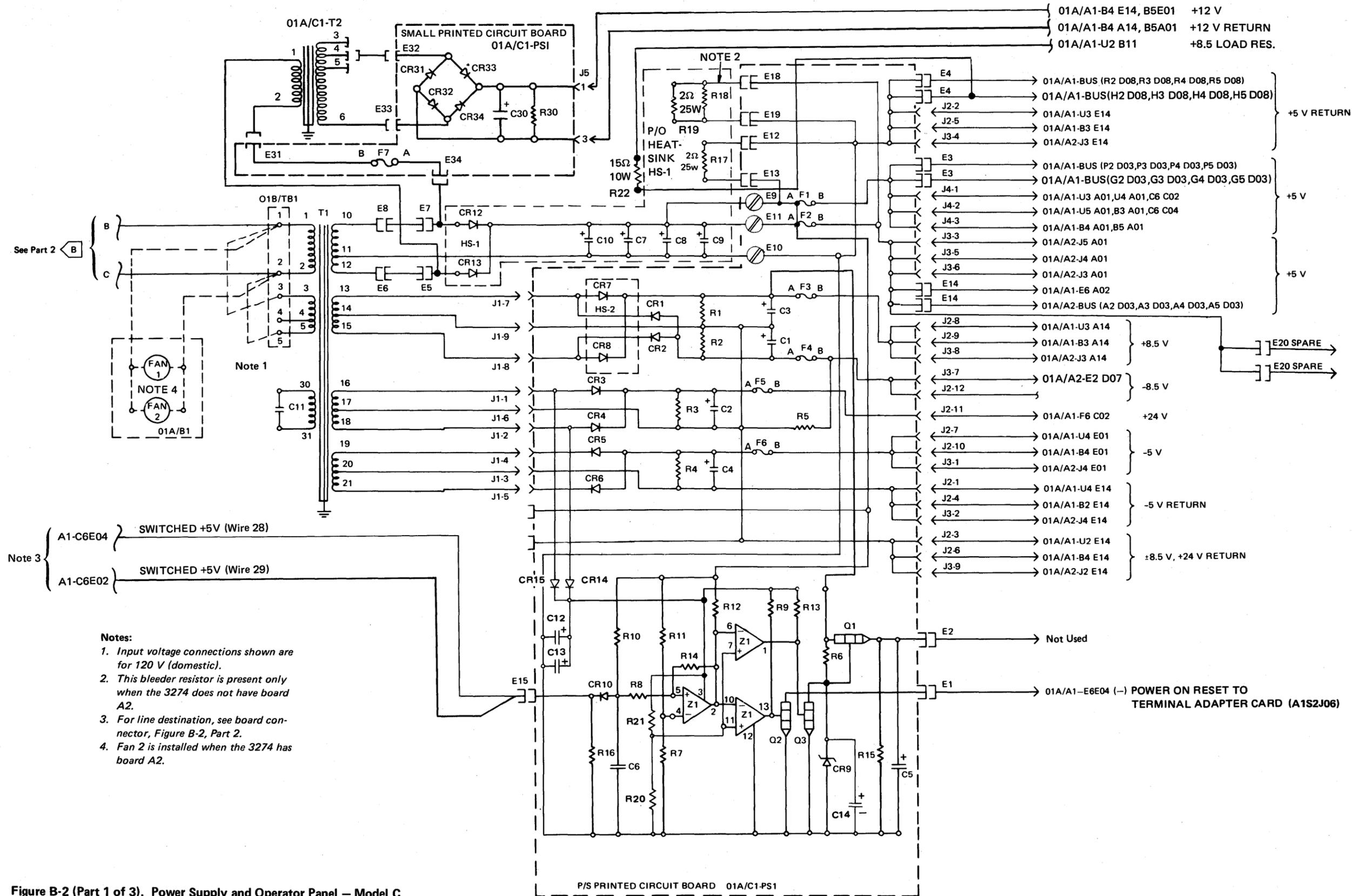


Figure B-2 (Part 1 of 3). Power Supply and Operator Panel - Model C

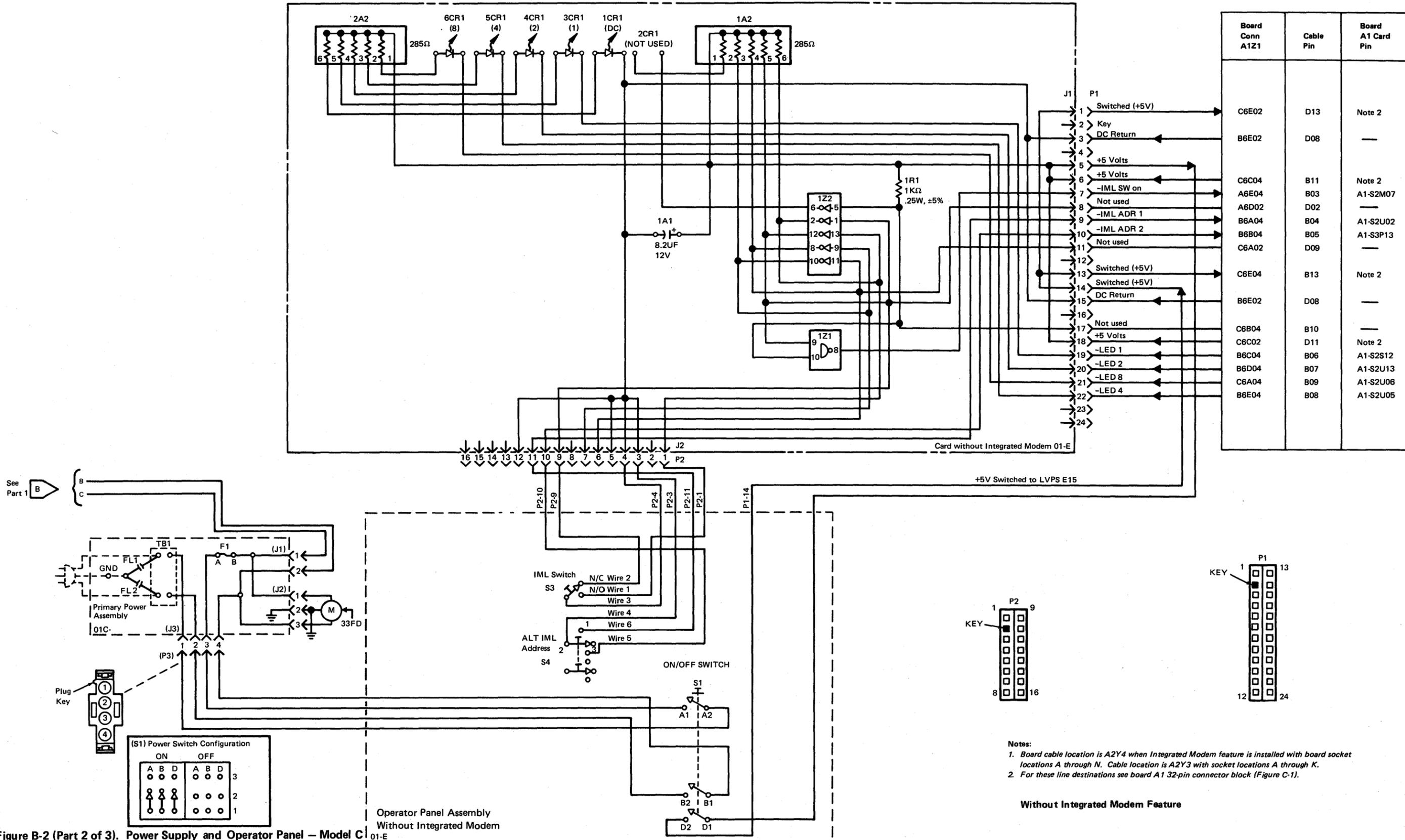


Figure B-2 (Part 2 of 3). Power Supply and Operator Panel – Model C01-E

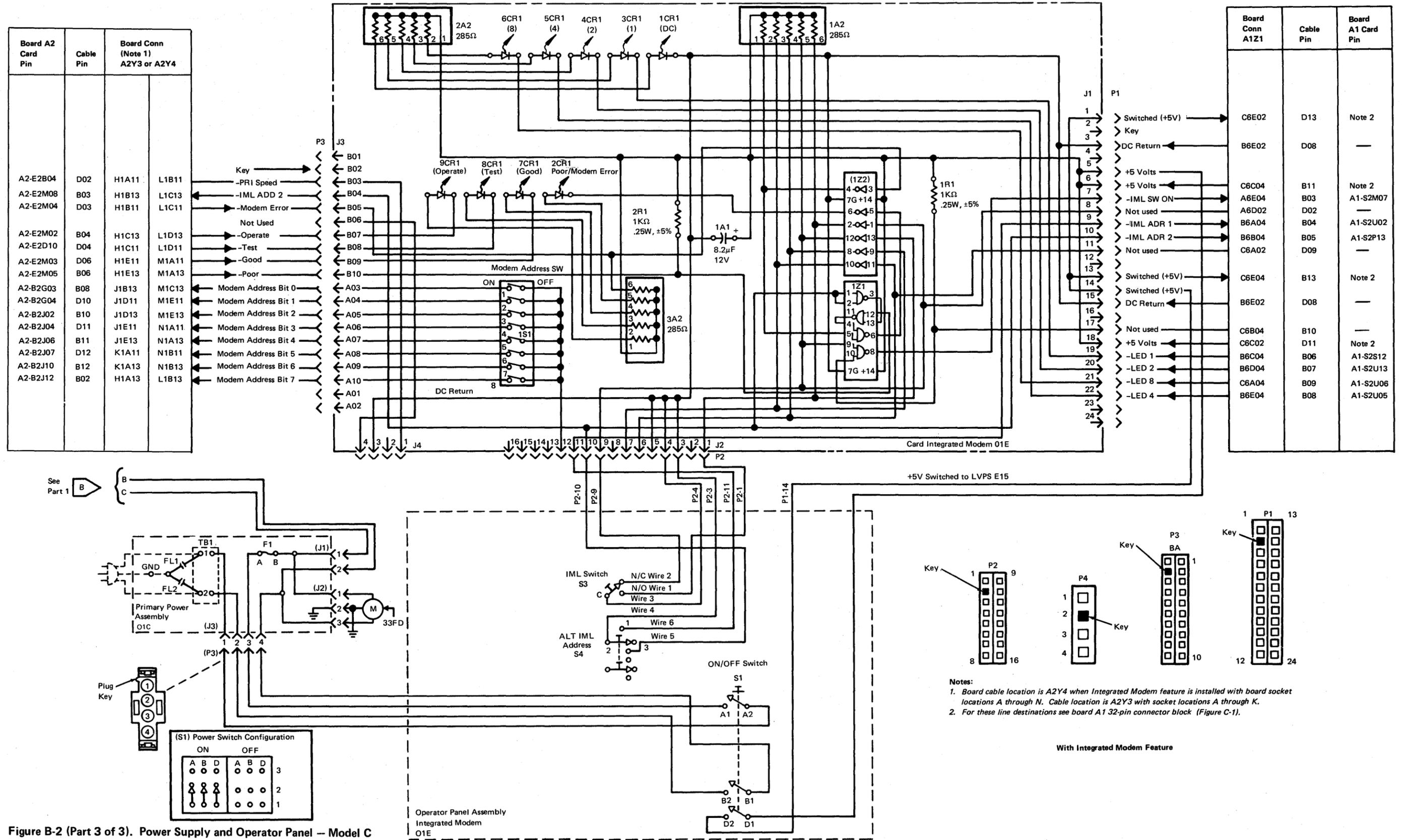


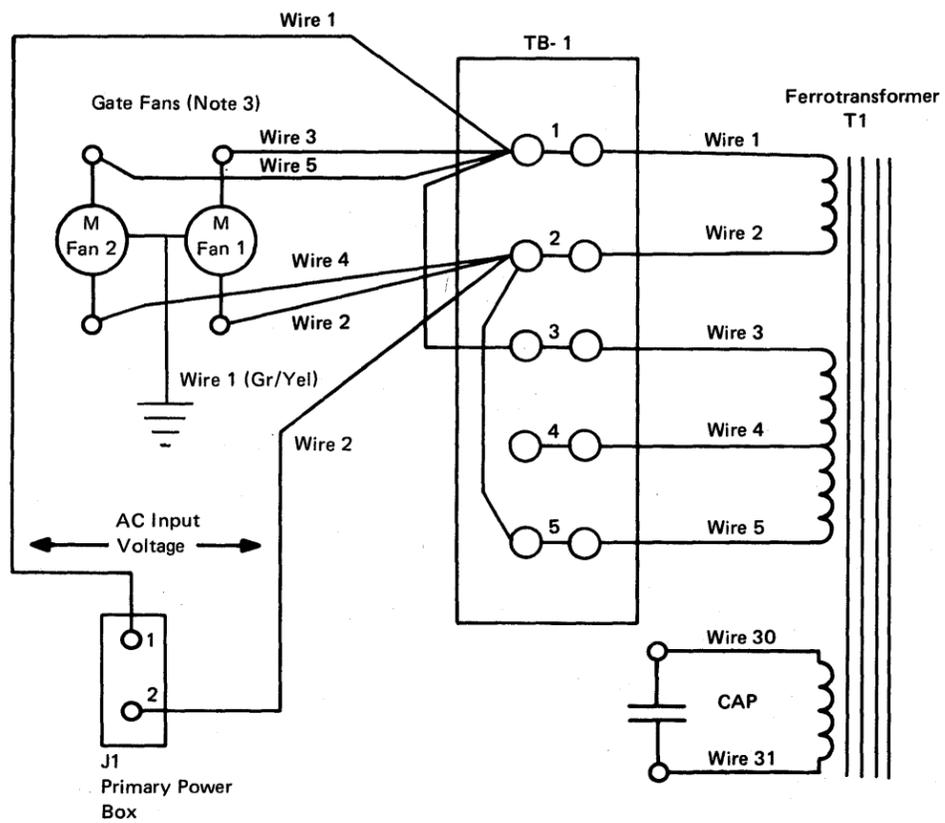
Figure B-2 (Part 3 of 3). Power Supply and Operator Panel – Model C

Board A2 Card Pin	Cable Pin	Board Conn (Note 1) A2Y3 or A2Y4
A2-E2B04	D02	H1A11
A2-E2M08	B03	H1B13
A2-E2M04	D03	H1B11
A2-E2M02	B04	H1C13
A2-E2D10	D04	H1C11
A2-E2M03	D06	H1E11
A2-E2M05	B06	H1E13
A2-B2G03	B08	J1B13
A2-B2G04	D10	J1D11
A2-B2J02	B10	J1D13
A2-B2J04	D11	J1E11
A2-B2J06	B11	J1E13
A2-B2J07	D12	K1A11
A2-B2J10	B12	K1A13
A2-B2J12	B02	H1A13

Board Conn A1Z1	Cable Pin	Board A1 Card Pin
C6E02	D13	Note 2
B6E02	D08	—
C6C04	B11	Note 2
A6E04	B03	A1-S2M07
A6D04	D02	—
B6A04	B04	A1-S2U02
B6B04	B05	A1-S2P13
C6A02	D09	—
C6E04	B13	Note 2
B6E02	D08	—
C6B04	B10	—
C6C02	D11	Note 2
B6C04	B06	A1-S2S12
B6D04	B07	A1-S2U13
C6A04	B09	A1-S2U06
B6E04	B08	A1-S2U05

Notes:  
 1. Board cable location is A2Y4 when Integrated Modem feature is installed with board socket locations A through N. Cable location is A2Y3 with socket locations A through K.  
 2. For these line destinations see board A1 32-pin connector block (Figure C-1).

With Integrated Modem Feature

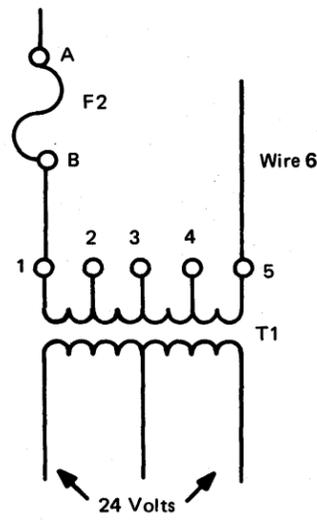


**Notes:**

1. As illustrated, input voltage is for 120 V domestic Model C.
2. When AC power voltages are being changed, the 33FD motor, ferrotransformer, fuse, and 24 V transformer wiring (Models A, B, and D) may also change.
3. Fan 2 is installed when the 3274 has board A2.

**Figure B-3. Ferrotransformer Input Voltage Wiring**

Where Used	Ferro PN	Input Connection		Fan		Input Voltage			MH Freq
		Term	Jumper	Term	Voltage	Nom	Min	Max	
DOM	1655365	1-2	1-3, 2-5	1-2	120	120	104	127	60
DOM	1655365	1-4	2-3	1-2	120	208	180	220	60
DOM	1655365	1-5	2-3	1-2	120	240	208	254	60
EMEA	4119638	1-2	-	1-2	220	220	193	238	50
EMEA	4119638	1-3	-	1-2	220	240	210	259	50
AFE	5893806	1-2	-	1-4	120	100	90	110	60
AFE	5893806	1-3	-	1-4	120	110	96.5	119	60
AFE	5893806	1-4	-	1-4	120	120	104	127	60
AFE	5893806	1-5	-	1-4	120	127	111	137	60
AFE	5893807	1-2	-	1-4	120	100	90	110	50
AFE	5893807	1-3	-	1-4	120	110	96.5	119	50
AFE	5893808	1-2	-	1-3	220	200	180	220	50
AFE	5893808	1-3	-	1-3	220	220	193	238	50
AFE	5893808	1-4	-	1-3	220	230	202	249	50
AFE	5893808	1-5	-	1-3	220	240	210	259	50
AFE	5893809	1-2	-	1-4	220	200	180	220	60
AFE	5893809	1-3	-	1-4	220	208	180	220	60
AFE	5893809	1-4	-	1-4	220	220	193	238	60
AFE	5893809	1-5	-	1-4	220	240	208	254	60



Primary Power Box 24 V Transformer Wiring	
3274 Models A, B, and D Input Volts	Wire 6 to T1
100 or 110 (World Trade only)	2
120 or 127 (World Trade only)	3
200 or 240	5

Line Cord Wiring	
Wire Color 50/60 Hz	Location
Black White Gr / Yel	TB1-1 TB1-2 Ground

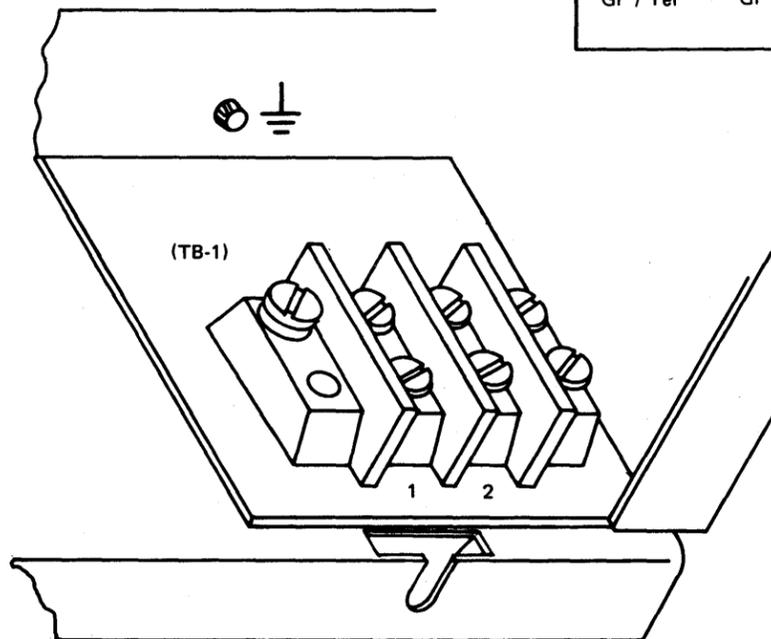


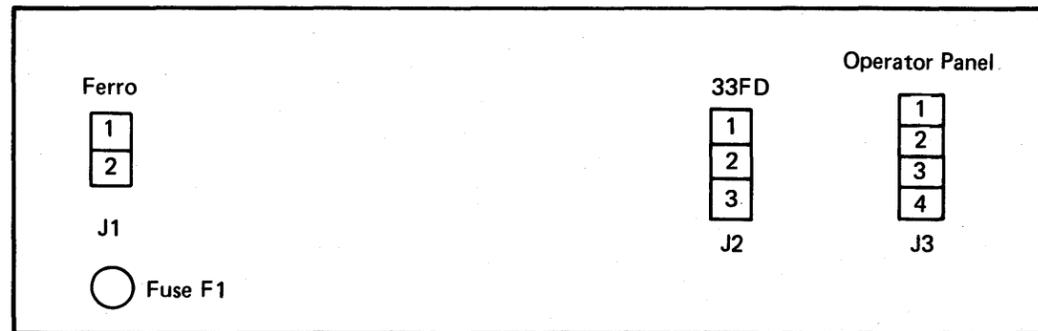
Figure B-4. Primary Power Box, -24 V Transformer Wiring and Line Cord Connections

Primary Power Box Plug Destination (Remote 3274 Model C)

Plug/ Pin	Wire Number	Destination	Function
P1-1 P1-2	1 2	Ferrotransformer TB1 (Figure B-3)	Line voltage to ferrotransformer primary input
P2-1 P2-2 P2-3	1 3 2	33FD Disk Motor — 33FD Disk Motor	Line voltage to motor — Line voltage to motor
P3-1 * P3-2 * P3-3 * P3-4 *	1 2 3 4	Pwr Switch, Wire 1 Pwr Switch, Wire 2 Pwr Switch, Wire 3 Pwr Switch, Wire 4	Line voltage to Power On switch Line voltage to Power On switch Line voltage through Power On switch Line voltage through Power On switch

\*See Operator Panel Connections (Figure E-1, Part 2) for wire and pin designations.

Primary Power Box - Model C

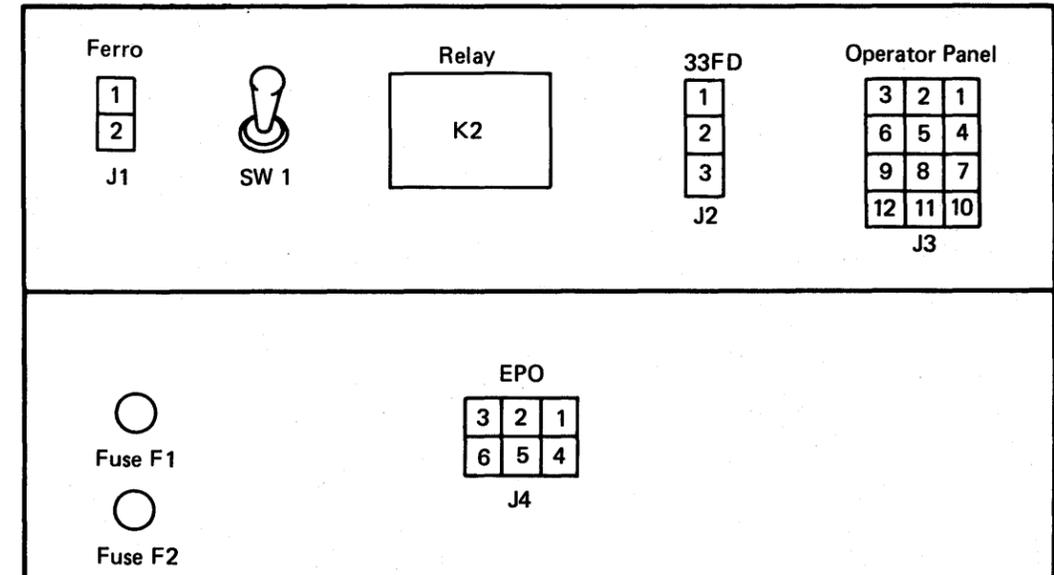


Primary Power Box Plug Destination (Local 3274 Models A, B, and D)

Plug/ Pin	Wire Number	Destination	Function
P1-1 P1-2	1 2	Ferrotransformer TB1 (Figure B-3)	Line voltage to ferrotransformer primary input
P2-1 P2-2 P2-3	1 3 2	33FD Disk Motor — 33FD Disk Motor	Line voltage to motor — Line voltage to motor
P3-1 * P3-2 * P3-3 * P3-4 * P3-5 * P3-6 * P3-7 * P3-8 * P3-9 * P3-10 * P3-11 * P3-12 *	1 2 3 4 5 6 7 8 9 — — 12	P/I Sw S2-P1-11 Deck A P/I Sw S2-P1- 1 Deck A P/I Sw S2-P1- 3 Deck A P/I Sw S2-P1- 8 Deck A P/I Sw S2-P1- 4 Deck A P/I Sw S2-P1- 9 Deck A Pwr Switch, Wire 7 Pwr Switch, Wire 8 Pwr Switch, Wire 9 — — Ind. Card Conn. 1-P1-14	System Source +24 VDC Power Complete (+24 VDC) EPO +24 VDC from system Power PICK +24 VDC from system Power HOLD +24 VDC from system +24 VDC via Ops Panel to PICK relay K2 +24 VDC via Ops Panel to HOLD relay K2 +5 VDC switched by operator On/Off switch EPO control (+24 VDC) -24 VDC supply test point Relay K2 selected test point +5 VDC switched to low-voltage power supply
P4-1 P4-2 P4-3 P4-4 P4-5 P4-6	1 2 3 4 5 6	3274 to Host Host to 3274 Host to 3274 3274 to Host Host to 3274 Host to 3274	Unit Source +24 VDC to system EPO +24 VDC from system System Source +24 VDC from system Power Complete to system (+24 VDC) Power HOLD from system (+24 VDC) Power PICK from system (+24 VDC)

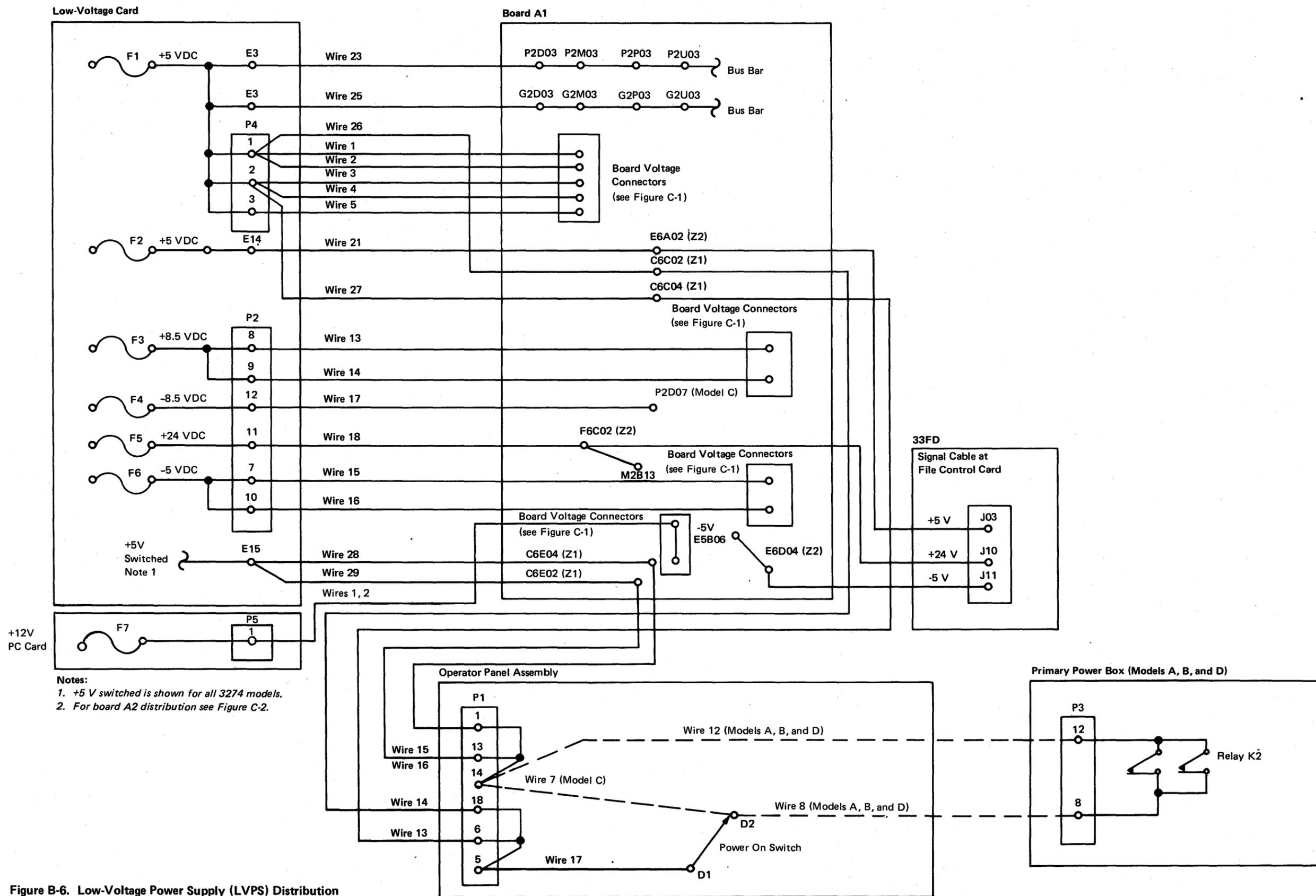
\*See Operator Panel Connections (Figure E-1, Part 2) for wire and pin designations.

Primary Power Box, Local Attach Models A, B, and D



Note: If EPO cable (P4) is not installed, P4-1 to P4-2 and P4-2 to P4-5 must be jumpered to allow local power up.

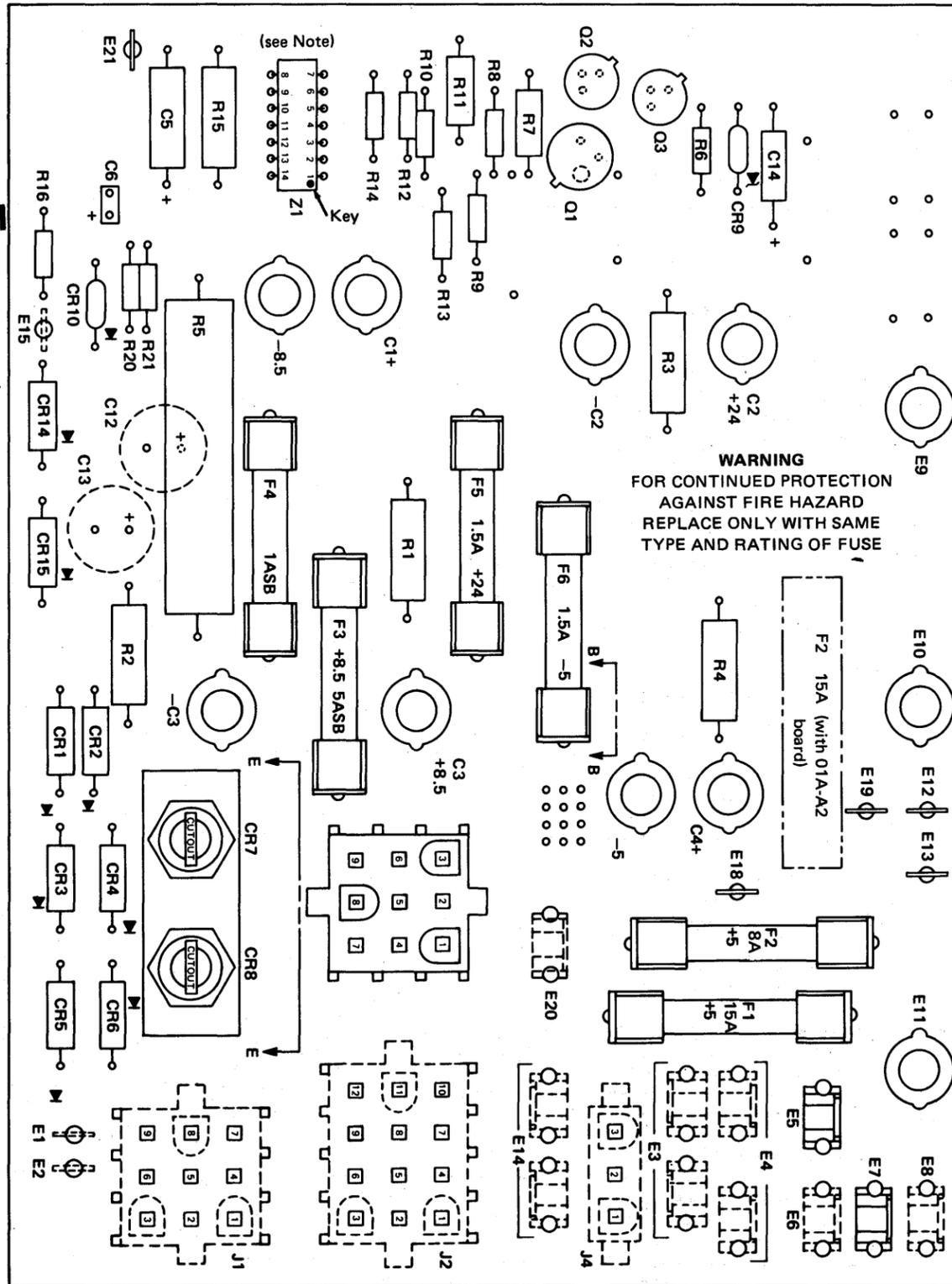
Figure B-5. Primary Power Box Connections



Notes:  
 1. +5 V switched is shown for all 3274 models.  
 2. For board A2 distribution see Figure C-2.

Figure B-6. Low-Voltage Power Supply (LVPS) Distribution

LVPS Card



Note: See Figure B-12 for Z1 part number.

Figure B-7 (Part 1 of 2). Low-Voltage Power Supply (LVPS) Card and Connections

LVPS Card Destinations and Locations

LVPS Card Pin	Wire No.	Destination	Function
E1 E2 E3	19 20 23	A1-E6E04 A1-F6B02 A1-P Row, pin D03	Power-on reset to terminal adapter card Degate local interface drivers Board A1 bus bar +5 V
E3 E4 E4	25 22 24	A1 - Row G, pin D03 A1 - Row R A1 - Row F	Board A1 bus bar +5 V Ground return from board A1 Ground return from board A1
E5 E5 E6 E7 E7	None* 5 E6 None* 7	HS-1 diode input +12 V transformer Ferro secondary HS-1 diode input +12 V transformer	LVPS card to heat-sink assembly +5 VAC to 12 V transformer (T1) LVPS card to ferro secondary LVPS card to heat-sink assembly +5 VAC to 12 V transformer (T1)
Resistor R-22	1	A1-U2B11	Board A1 +8.5 V load
Resistor R-22	2	A1-K Row, pin D08	Board A1 +8.5 V load return
E8 E9 E10	E8 None* E10	Ferro secondary Heat-sink assembly Ferro sec. (5 V CT)	LVPS card to ferro secondary Heat sink +5 V supply to fuse F1 and F2 cap screw +5 V return test point cap screw
E11 E12 E13 E14 E14	None* None* None* 9 21	Heat-sink assembly Heat-sink assembly Heat-sink assembly A2-B or D Row, pin D03 A1-E6A02	Heat sink +5 V supply to fuse F1 and F2 cap screw +5 V load resistor 2Ω 25 W +5 V load resistor 2Ω 25 W Board A2 bus bar +5 V +5 V to 33FD diskette drive cable
E15 E15	28 29	A1-C6E04 A1-C6E02	+5 V through operator panel switches +5 V through operator panel switches
E18 E19	None* None*	Heat-sink assembly Heat-sink assembly	+5 V load resistor 2Ω 25 W (see Note) +5 V load resistor 2Ω 25 W (see Note)
E20 E21	None None	Spare Spare	+5 V DC return

\*See Figure 4-6

Note: The load resistors are present under one of the following conditions:

- The 3274 is a Model A, B, or D.
- The 3274 is a Model C with both a Type B adapter and an integrated modem installed.

LVPS Card Connector Destination

Plug Pin	Wire Number	Function
P1-1 P1-2 P1-3	16 18 20	+24 V supply to ferro secondary +24 V supply to ferro secondary -5 V supply to ferro secondary center tap
P1-4 P1-5 P1-6	19 21 17	-5 V supply to ferro secondary -5 V supply to ferro secondary +24 V supply to ferro secondary center tap
P1-7 P1-8 P1-9	13 15 14	±8.5 V supply to ferro secondary ±8.5 V supply to ferro secondary ±8.5 V supply to ferro secondary center tap
P2-1 P2-2 P2-3	11 9 7	-5 V return from board A1 +5 V return from board A1 Ground return from board A1
P2-4 P2-5 P2-6	12 10 -	-5 V return from board A1 +5 V return from board A1 Not used
P2-7 P2-8 P2-9	15 13 14	-5 V to board A1 +8.5 V to board A1 +8.5 V to board A1
P2-10 P2-11 P2-12	16 18 17	-5 V to board A1 +24 V to board A1 -8.5 V to board A1-P2D07 (remote 3274 Model C)
P3-1 P3-2 P3-3	1 2 3	-5 V to board A2 -5 V return from board A2 +5 V to board A2
P3-4 P3-5 P3-6	4 5 6	+5 V return from board A2 +5 V to board A2 +5 V to board A2
P3-7 P3-8 P3-9	7 8	Not used +8.5 V to board A2 Ground return from board A2
P4-1 P4-1 P4-2 P4-2 P4-3	26 1 and 2 27 3 and 4 5	+5 V to A1-C6C02 (+5 V to operation panel assembly) +5 V to board A1 +5 V to A1-C6C04 (+5 V to operation panel assembly) +5 V to board A1 +5 V to board A1

+12 V Card Connector Destination

Plug Pin	Wire Number(s)	Function
P5-1 P5-3	1, 2 3, 4	+12 VDC to board A1 +12 VDC return from board A1

Figure B-7 (Part 2 of 2). Low-Voltage Power Supply (LVPS) Card and Connections

DC Voltages

Refer to MAP B123 for DC voltage checks.

AC Voltages from Ferro Secondary

Volts Used	Min AC	Max AC	Measure at LVPS Card	Set CE Meter to Scale =
+5	10.5	14.5	Pins E8 to E6	15 VAC
-5	9	13	P1-4 to P1-5	15 VAC
±8.5	14	22.5	P1-7 to P1-8	50 VAC
+24	39	63	P1-1 to P1-2	150 VAC

AC Voltages from +12 V Card

Volts Used	Min AC	Max AC	Measure at +12 V Card	Set CE Meter to Scale =
+12	+12	+14.5	E32 to E33	15 VAC

Figure B-8. Power Supply Specifications

Board A1

Card Location	Model	Fuse F1(V)	Fuse F2(V)	Fuse F3(V)	Fuse F4(V)	Fuse F5(V)	Fuse F6(V)	Fuse F7(V)
B2 to E2	All	+5	—	+8.5	—	—	-5	+12
F2	All	+5	—	+8.5	—	—	-5	+12
G2	All	—	—	—	—	—	—	—
G4	Mod 31	—	—	—	—	—	—	—
H2	Mod 21	—	—	—	—	—	—	—
H2	Mod 31	+5	—	—	—	—	-5	—
J2	All	+5	—	+8.5	—	—	-5	—
K2	All	+5	—	+8.5	—	—	-5	—
L2	All	+5	—	—	—	—	—	—
M2	All	+5	—	—	—	+24	—	—
N2	1A, 1B	+5	—	+8.5	—	—	—	—
N2	1C	+5	—	+8.5	—	—	-5	—
P2	1A	+5	—	+8.5	—	—	—	—
P2	1B	+5	—	—	—	—	—	—
P2	1C	+5	—	+8.5	-8.5*	—	—	—
Q2	1A	+5	—	—	—	—	-5	—
Q2	1B, 1C	+5	—	+8.5	—	—	-5	—
S2	All	+5	—	+8.5	—	—	—	—
T2	All	+5	—	—	—	—	—	—
T4	All	+5	—	—	—	—	—	—
U2	All	+5	—	—	—	—	—	—
U4	All	+5	—	—	—	—	—	—
33FD	All	—	+5	—	—	+24	-5	—

\*-8.5V is not used on DDS Adapter or X.21 feature cards.

Board A2 (With Type B Adapter)

Card Locations Sockets A-K	Card Locations Sockets A-N	Model	Fuse F2(V)	Fuse F3(V)	Fuse F6(V)
D2 to G2	G2 to K2	All	+5	—	—
H2	L2	All	+5	+8.5	—
H4	L4	All	+5	+8.5	—
J2	M2	All	+5	+8.5	—
J4	M4	All	+5	+8.5	—

Board A2 (With Integrated Modem)

Card Location	Model	Fuse F2(V)	Fuse F3(V)	Fuse F4(V)	Fuse F6(V)
A2	21C, 31C	+5	+8.5	-8.5	-5
A4	21C, 31C	+5	—	—	—
B2	21C, 31C	+5	+8.5	—	-5
C2	21C, 31C	+5	+8.5	—	-5
D2	21C, 31C	+5	+8.5	—	-5
E2	21C, 31C	+5	+8.5	-8.5	-5

Note: See Figure B-12 for fuse part numbers.

Figure B-9. Card/Fuse Chart

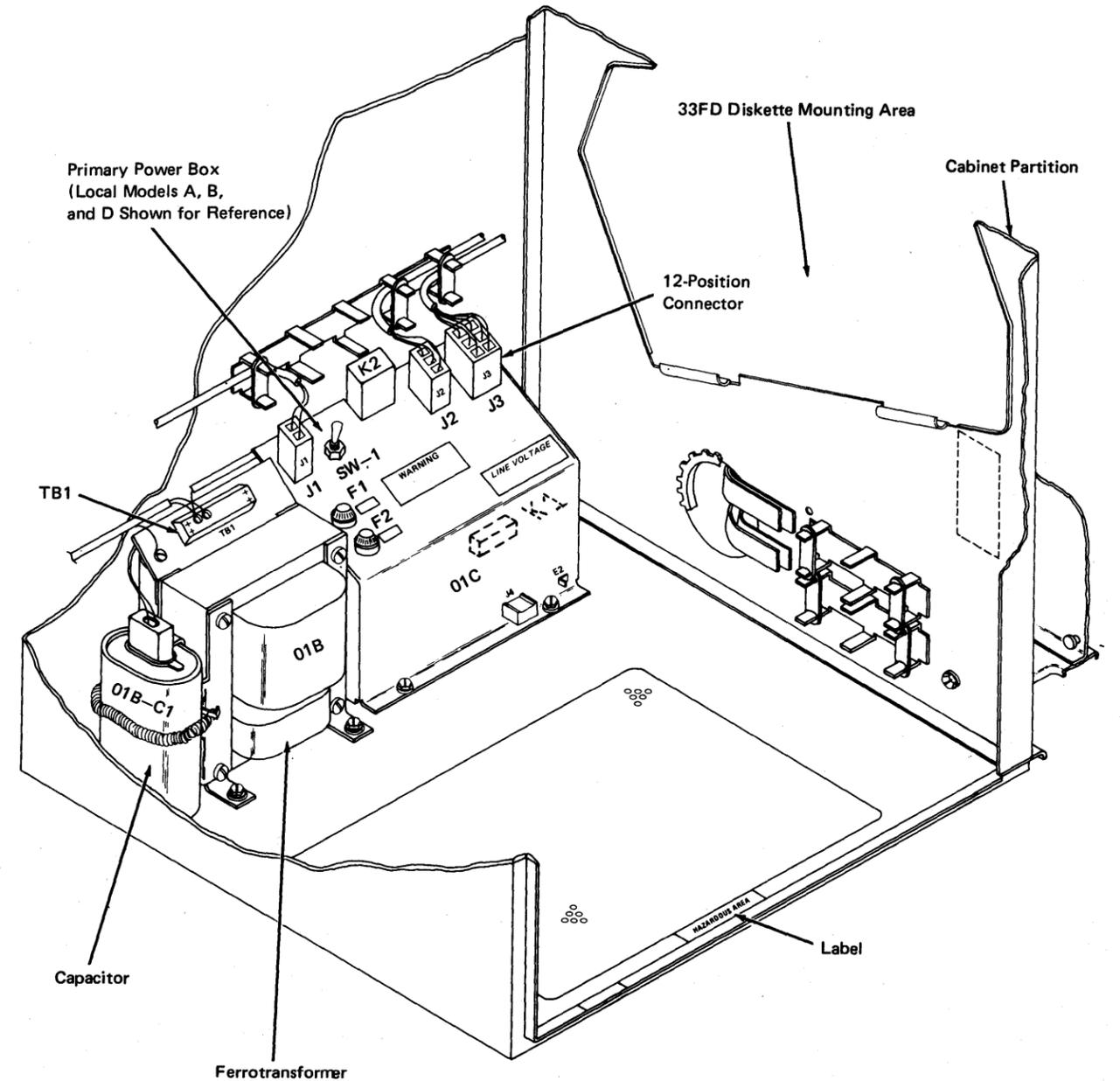
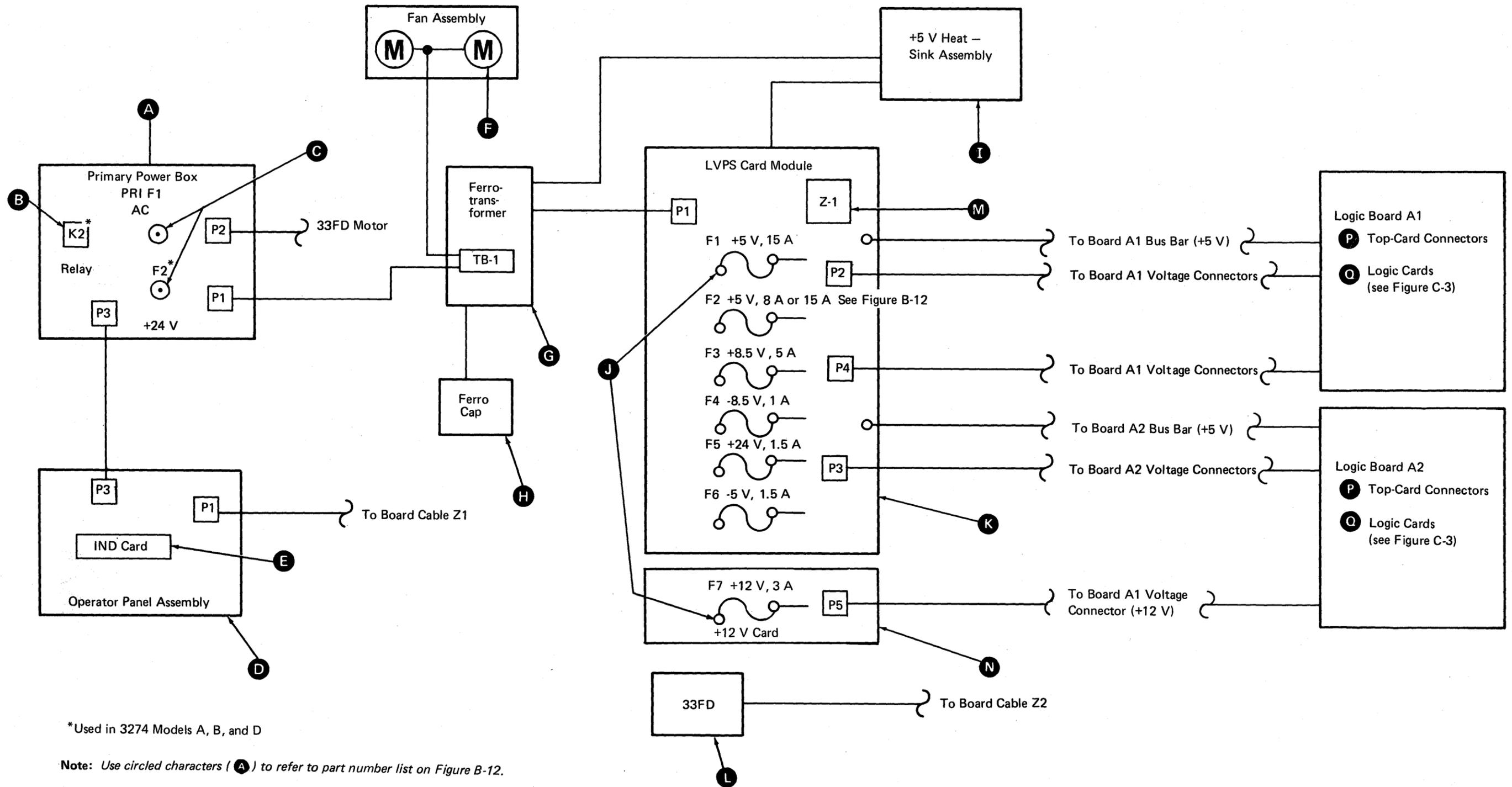


Figure B-10. Field Replaceable Unit — Primary Power Components



\*Used in 3274 Models A, B, and D

Note: Use circled characters (A) to refer to part number list on Figure B-12.

Figure B-11. Field Replaceable Unit Power Locations and Connections

Part Name	Description	Part No.
<b>A</b> Primary Power Box Primary Power Box	3274 Models A, B, and D 3274 Model C	5717975 5717970
<b>B</b> K2	Relay, 24 V (Models A, B, and D)	842339
<b>C</b> F1 (Dom) 120 V, 60 Hz F1 (Dom) 208, 240 V, 60 Hz F1 (EMEA) 220, 240 V, 50 Hz F1 (AFE) 100, 110 V, 50 and 60 Hz F1 (AFE) 120, 127 V, 60 Hz F1 (AFE) 200, 220, 230, 240 V, 50 Hz F1 (AFE) 200 V, 60 Hz F1 (AFE) 208, 220, 240 V, 60 Hz	4 A/125 V slow-blow fuse 2 A/250 V slow-blow fuse 2.5 A/250 V slow-blow fuse 5 A/125 V slow-blow fuse 4 A/125 V slow-blow fuse 2.5 A/250 V slow-blow fuse 2.5 A/250 V slow-blow fuse 2 A/250 V slow-blow fuse	1143492 6018398 361755 512137 1143492 361755 361755 6018398
F2 100–127 V F2 200–240 V	0.1A/250 V slow-blow fuse 0.0625A/250 V slow-blow fuse	304883 1655380
<b>D</b> Operator Panel Assembly Operator Panel Assembly Operator Panel Assembly  Operator Panel Assembly Operator Panel Assembly Operator Panel Assembly	3274 Models A, B, and D with card 3274 Model C with card 3274 Model C with card – Integrated Modem Feature  3274 Models A, B, and D without card 3274 Model C without card 3274 Model C without card – Integrated Modem Feature	5718072 5718073 5667120  5717950 5717960 6835754
<b>E</b> Indicator Card Indicator Card Indicator Card	Operator Panel Model C Operator Panel Models A, B, and D Operator Panel Model C – Integrated Modem Feature	5717972 5717951 5667109
<b>F</b> Fan 120 V Fan 240 V (World Trade Countries)	Logic Gate A1 } Two fans if 3274 has Logic Gate A1 } board A2	4406538 1851546
<b>G</b> Ferrotrans (Dom) Ferrotrans (EMEA) Ferrotrans (AFE) Ferrotrans (AFE) Ferrotrans (AFE) Ferrotrans (AFE)	120, 208, 204 V, 60 Hz 220, 240 V, 50 Hz 100, 110, 120, 127 V, 60 Hz 100, 100 V, 50 Hz 200, 220, 230, 240 V, 50 Hz 200, 208, 220, 240 V, 60 Hz	1655365 4119638 5893806 5893807 5893808 5893809
<b>H</b> Ferro Cap (Dom/AFE) Ferro Cap (EMEA)	6 Ufd, 600 VAC 8 Ufd, 600 VAC	6814312 4120826
<b>I</b> HS-1	5 V Heat-Sink Assembly	5717931
<b>J</b> F1 15 A 250 V F2 8 A 250 V F2 15 A 250 V F3 5 A 125 V F4 1 A 250 V F5 1.5 A 250 V F6 1.5 A 250 V F7 3 A 250 V	+5 V to board A1 +5 V without board A2 +5 V with board A2 +8.5 V –8.5 V +24 V –5 V +12 V	5236559 433557 5236559 512137 303549 111256 111256 338165
<b>K</b> Low-Voltage Supply Low-Voltage Supply (complete)	LVPS Card (with caps) (see Note) With 5 V Heat-Sink Assembly (see Note)	5667144 5667060

Note: Replacement LVPS Card contains an 8 A fuse for F2. If board A2 is present, replace the 8A fuse with a 15 A fuse (see **J**).

Figure B-12. Power and Operator Panel Field Replaceable Unit Part Numbers

Part Name	Description	Part No.
<b>L</b> 33FD 33FD 33FD 33FD	100–120 V, 60 Hz 200–240 V, 60 Hz 100–110 V, 50 Hz 200–240 V, 50 Hz	See Parts Catalog See Parts Catalog See Parts Catalog See Parts Catalog
<b>M</b> Z1 Module	14-Pin Pluggable Module (POR) (LVPS)	1582595
<b>N</b> +12 V Power Supply		1835933
<b>P</b> Top-Card Connectors Top-Card Connectors	1 Position 2 Position	1794410 5267787
<b>Q</b> Logic Cards		See Figure C-3

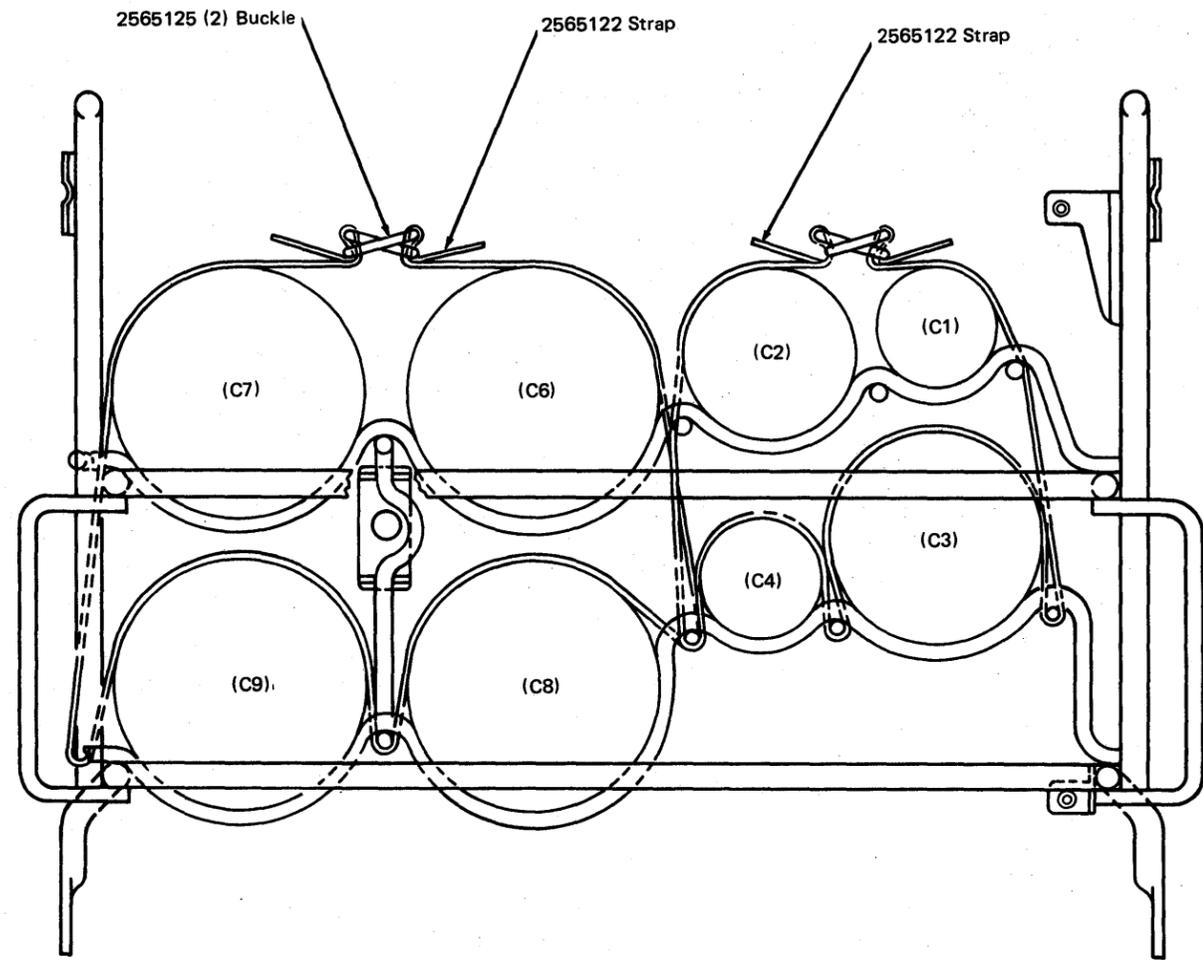
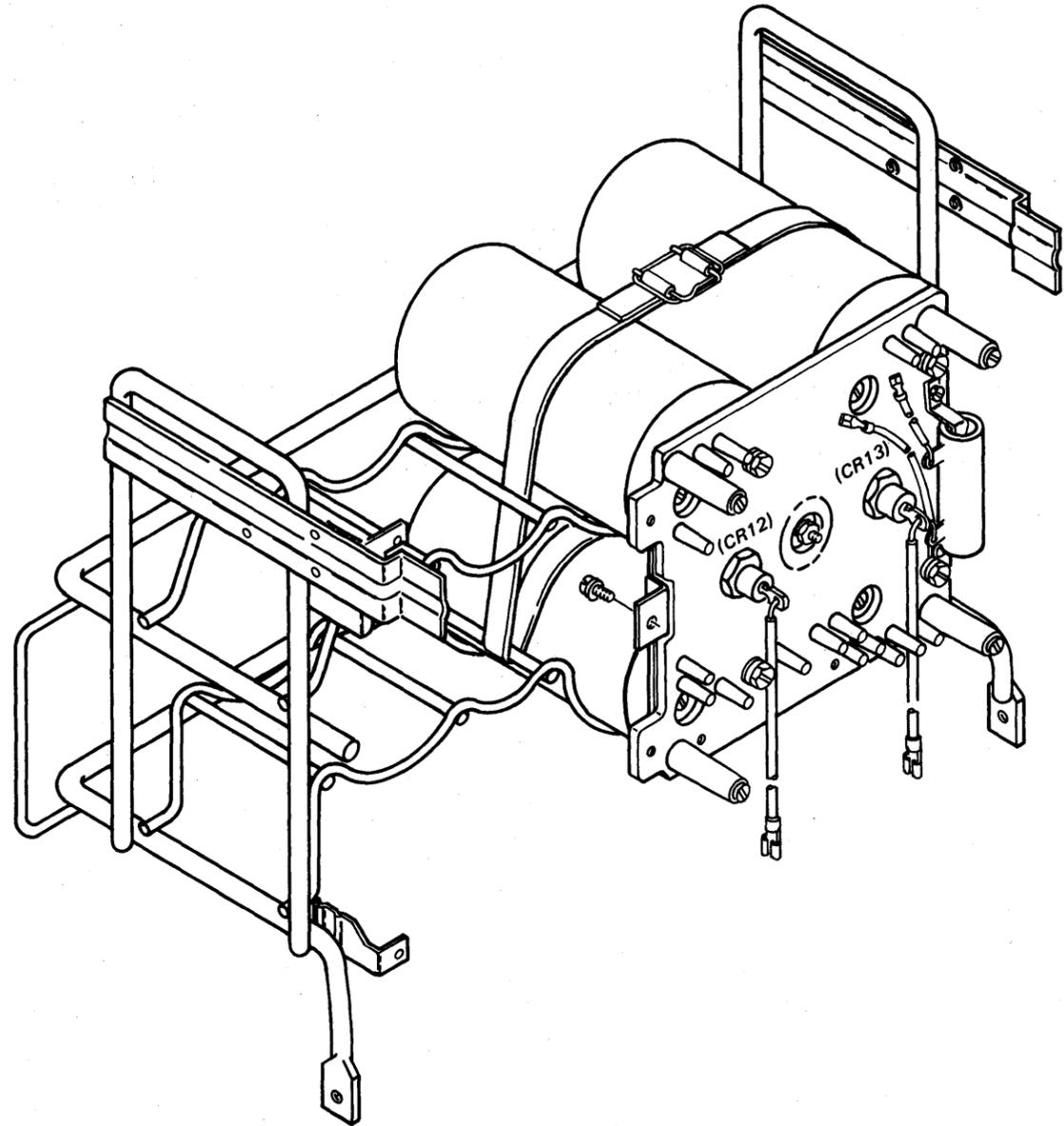


Figure B-13. Capacitor Strapping



## **Appendix C. Connector, Board, and Card Locations**

Figures C-1 through C-15 show the connector, board, and card locations for the 3274 Control Unit.

SY27-2530-1  
TNL SN31-0775 (22 Jan 82)

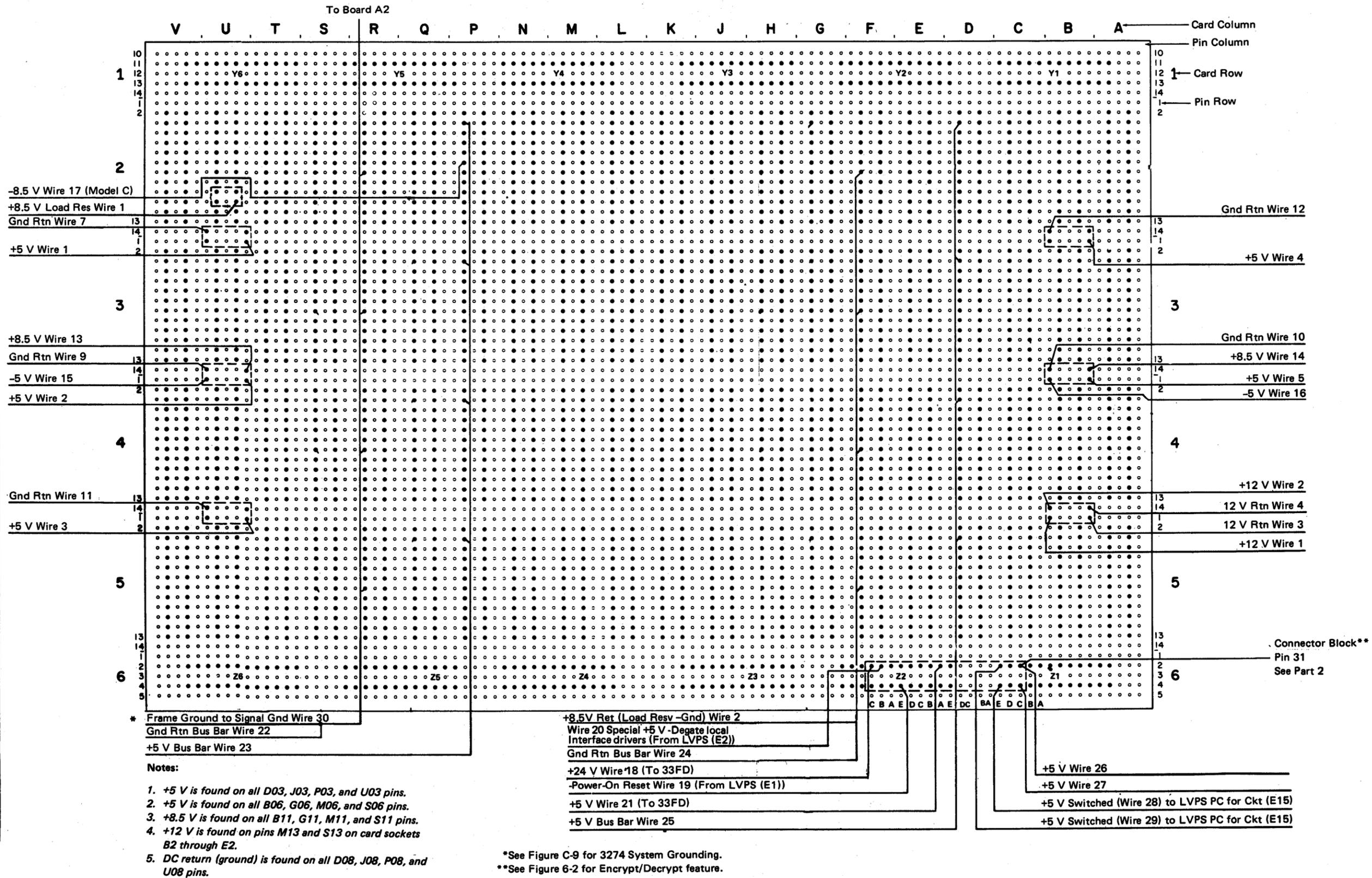
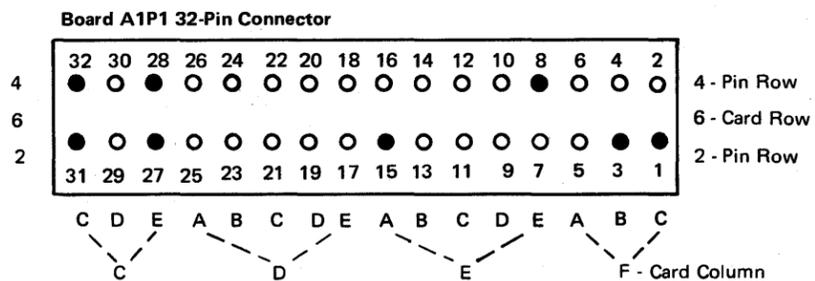


Figure C-1 (Part 1 of 2). Board A1 Connections

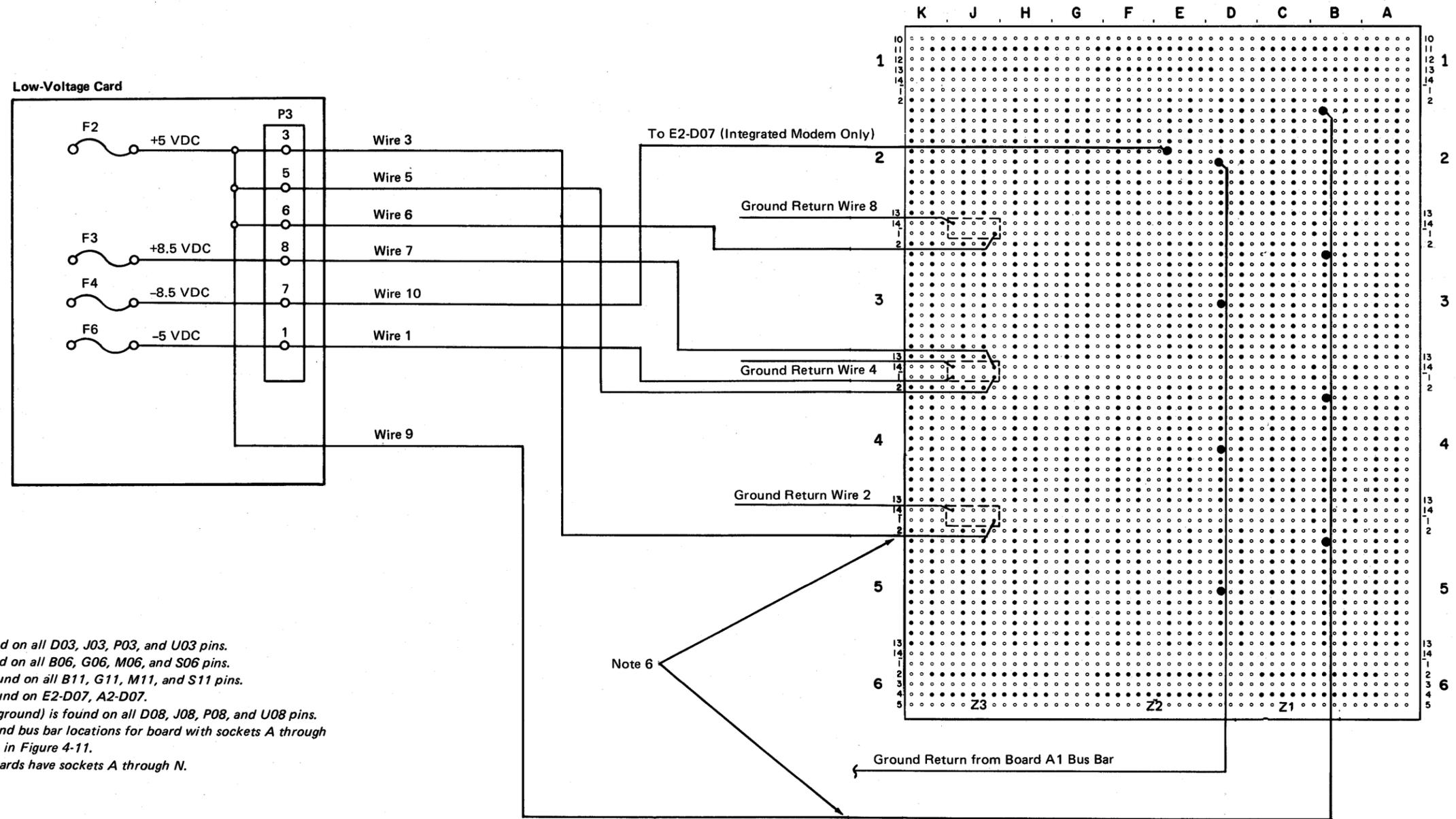
**Board A1P2 32-Pin Connector Destinations**

Board A1 Plug Pin	Wire No.	Board A1 Location	Destination	Function
P1-1	18	F6 C02	P2-11 (LVPS Card)	+24 V to 33FD
P1-3	20	F6 B02	E2 (LVPS Card)	Special +5 V (—Degate local interface drivers)
P1-4*	1	F6 B04	Keylock (C)	Write Enable/Disable
P1-5*	5	F6 A02	Cable Shield	Ground Cable Shield
P1-6*	2	F6 A04	Keylock (NO)	+5 V to Keylock Switch
P1-8	19	E6 E04	E1 (LVPS Card)	Power On reset to Board A1
P1-15	21	E6 A02	E14 (LVPS Card)	+5 V to 33FD
P1-27	29	C6 E02	E15 (LVPS Card)	+5 V Switched, start POR
P1-28	28	C6 E04	E15 (LVPS Card)	+5 V Switched, start POR
P1-29*	4	C6 D02	Keylock (NC)	Battery Return to Card
P1-30*	3	C6 D04	Yellow Wire Battery	+Battery to Card
P1-31	26	C6 C02	P4-1 (LVPS Card)	+5 V to Operator Panel Assembly
P1-32	27	C6 C04	P4-2 (LVPS Card)	+5 V to Operator Panel Assembly

\*Encrypt/Decrypt feature



**Figure C-1 (Part 2 of 2). Board A1 Connections**



Notes:

1. +5 V is found on all D03, J03, P03, and U03 pins.
2. -5 V is found on all B06, G06, M06, and S06 pins.
3. +8.5 V is found on all B11, G11, M11, and S11 pins.
4. -8.5 V is found on E2-D07, A2-D07.
5. DC return (ground) is found on all D08, J08, P08, and U08 pins.
6. Connector and bus bar locations for board with sockets A through N are shown in Figure 4-11.
7. Some A2 boards have sockets A through N.

Figure C-2. Board A2 Connections

Board A2 Cards with Type B Adapter

Card Loc*	Model	Function	Part No.	Part No.	Part No.
A2	A B C D	Not used			
B2	↑	Not used			
C2		Not used			
D2/G2		Type B Adapter No. 3	1588121		
E2/H2		Type B Adapter No. 4	8524590		
F2/J2		Type B Adapter No. 1	1590633		
G2/K2		Type B Adapter No. 2	1590645		
H2/L2		Type B Driver/Receiver No. 1	1590617		
H4/L4		Type B Driver/Receiver No. 3	1590617		
J2/M2		Type B Driver/Receiver No. 2	1590617		
J4/M4	A B C D	Type B Driver/Receiver No. 4	1580617		

\*D2/G2 first position is card location when type B adapter is present by itself; second position is card location when type B adapter is present with Integrated Modem features.

Board A2 Cards with Integrated Modem

Card Loc	Model	Function	Part No.	Part No.	Part No.	Part No.
A2	C	Extended Diagnostic Feature	1734633			
A4	C	Reserved (PROM) Note 5	-			
B2	C	9600 bps IM Rcvr Ext	2682414			
	C	4800 bps IM Processor	1734676	5892782	6056269	
	C	2400 bps IM Processor	1734673	5892781	6056271	
C2	C	9600 bps IM Processor Mod 1	8276992	5892777	6056264	6056822
	C	9600 bps IM Processor Mod 2	8276993	6056767	6056826	
D2	C	9600 bps IM Rcvr	2682448	8276996		
	C	4800 bps IM Rcvr	8276864			
E2	C	9600 bps Front End	1734629	6056835		
	C	4800 bps Front End	1734680	2682457		
	C	2400 bps Front End	2682389			

Logic Board A2

Location	Model	Function	Part No.	EC Level	EC Level	EC Level
01A-A2	A,B,C,D	Type B Adapter Only	4403521	746641		
01A-A2	C	Integrated Modem Only	6835925		867311	874274
01A-A2	C	Type B Adapter and IM	4409891		867312	874275

Figure C-3. Card and Board A2 Part Numbers

Board A1 Cards

Location	Model	Function	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
E2	31	Control Storage 64K			4448766	6016037	6124038	
F2	21, 31	Control Storage R-64K			4448765			
G2	21	Storage Feedthrough (2W)			8514516			
G2	31	Storage Jumper (2W)			2411890			
G4	31	Storage Jumper (2W)			2411890			
H2	21	Storage Feedthrough (4W)			8517087 (Note 3)			
H2	31	Storage Logic (4W)			1588090			
J2	All	Control Logic 3	2411893		6830741			
K2	All	Control Logic 2			2411851			
L2	All	Control Logic 1			2411872			
M2	All	Diskette Adapter	1590648		5619736	6016691		
N2	A, B, D	Local Attachment—Driver/Receiver	1586499		4448773			
N2	C	Encrypt/Decrypt (Note 4)			4402182			
P2	A	Local Channel Adapter	8564633	5167277	5167284			
P2	B	Local Host Adapter			6835887			
P2	D	Local Host Adapter (SLHA)	5675193		6016035	6016036		
P2	C	DDS Adapter			8527032			
P2	C	EIA/CCITT	5864363	5864660	5864668			
P2	C	X.21 (Early Production)			8564561			
P2	C	X.21 (Later Production)			5864683			
P2	C	V.35 Interface			4939893			
Q2	A	Local Channel Adapter			1587906			
Q2	B	Local Host Adapter	5675729	5645730	6835888	6016040		
Q2	D	Local Host Adapter (SLHA)	6813112		5614348			
Q2	C	CCA ( without clock)			8523016			
Q2	C	HPCA			8526518	5167241	6340976	
R2		Not used						
S2	All	Terminal Adapter Card	8715317		6835933	6016034		
T2, T4, U2	All	Driver/Receiver (type A)	1745960	6835919	5699968			
U4								
33 FD	All	File Control	8524194		8528202			
Y3	A, C	Model A or CCA Jumper			5667094*			
Y3	B, C, D	Model B/D or HPCA Jumper			5667093**			
Y4	A, B, D	Switch Card Local			6016029			

\*Card is marked 5667044

\*\*Card is marked 5667043

Logic Board A1

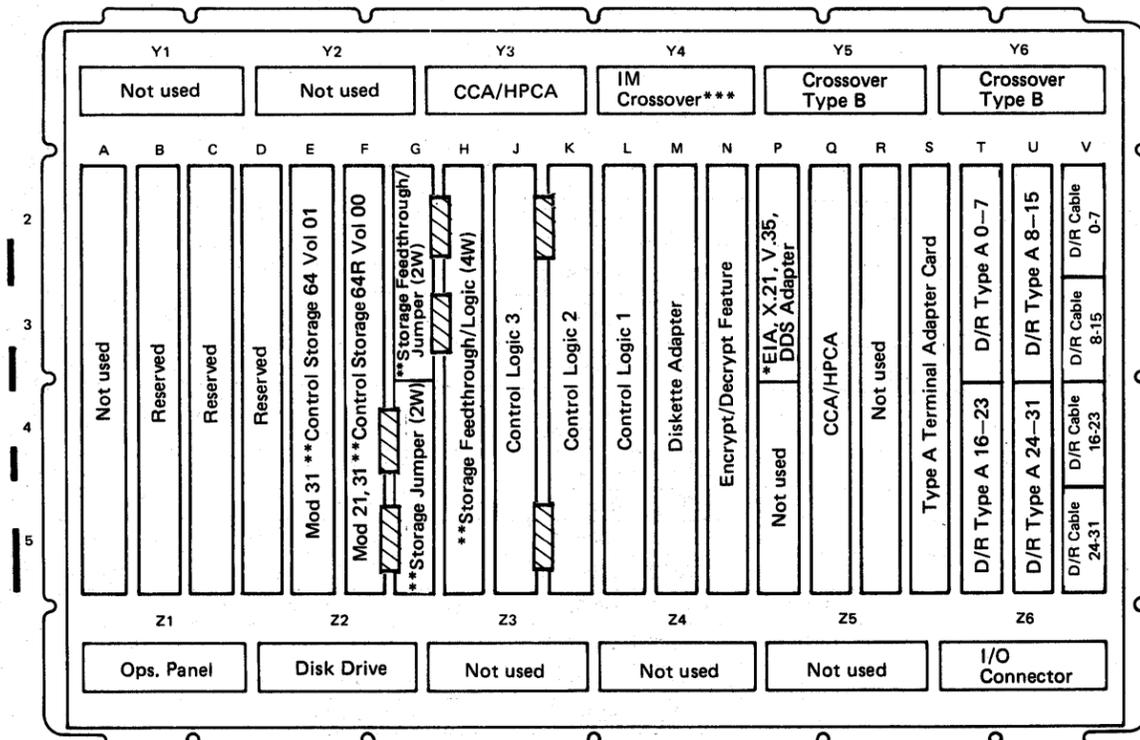
Location	Model	Function	Part No.	EC Level	EC Level	EC Level	EC Level
01A-A1	A, B, D	Base	6835922	748893	876289	867282	867288
01A-A1	C	Base	6835921	748892	867283		

Notes:

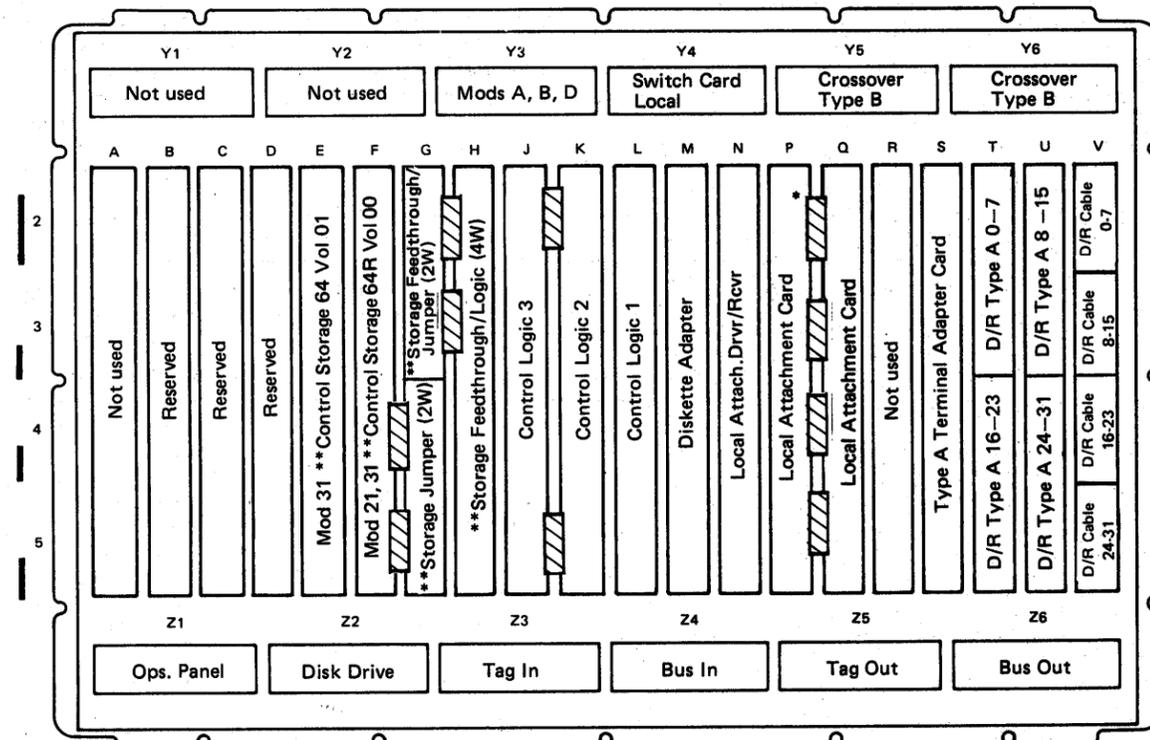
1. This page is EC-controlled. An updated page may be attached to the front cover of this manual when the machine is shipped. Field-installed engineering changes involving card or board updates will include updated pages to be inserted in this manual.
2. This page reflects the machine design as of January 1982.
3. Possible to plug backwards; see Figure C-14.
4. Removing this card will destroy the Encrypt/Decrypt Master Key (see 6.1.3).
5. PROM card is installed for the Integrated Modem EC.

Figure C-4. Card and Board A1 Part Numbers

Board A1 - 3274 Model C Remote Attachment



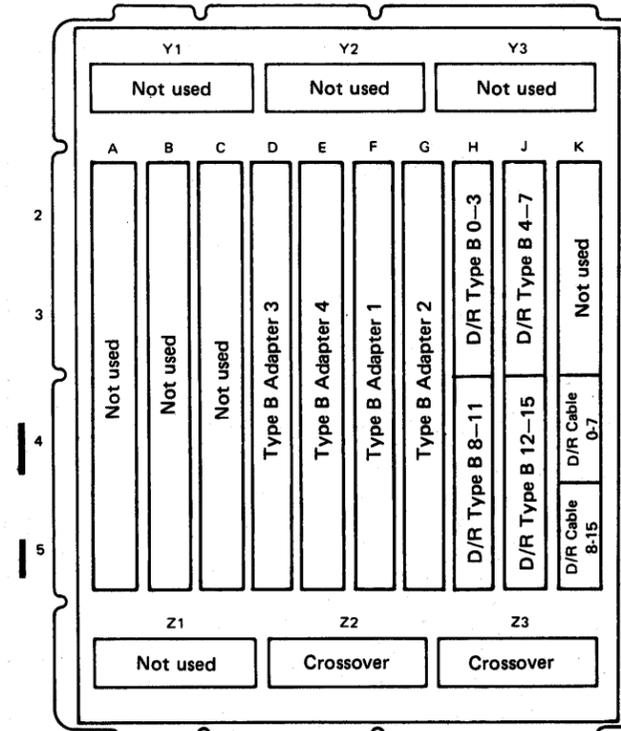
Board A1 - 3274 Models A, B, and D Local Attachment



Card  
 Crossover

- \*Card A1P2 is not present with Integrated Modem Feature.
- \*\*See Figure 2-5 for control storage card types and locations for various control storage capacities.
- \*\*\*Present with Integrated Modem Feature.

Feature Board A2 - Cards A through K  
Type B Adapter

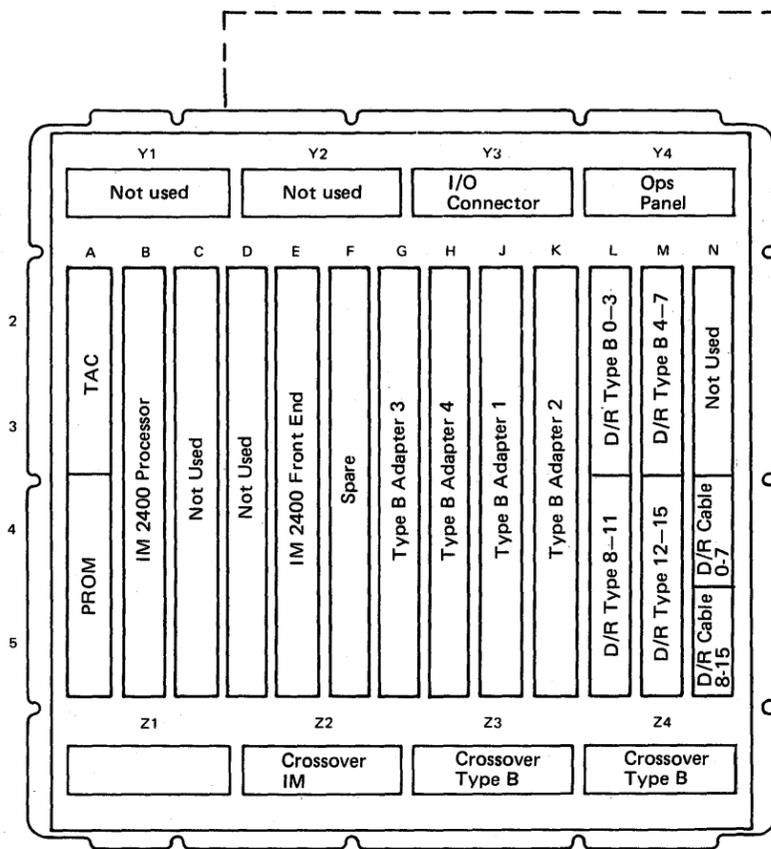


Card  
 Crossover

- \*This card crossover position is not used on Model A.
- \*\*See Figure 2-5 for control storage card types and locations for various control storage capacities.

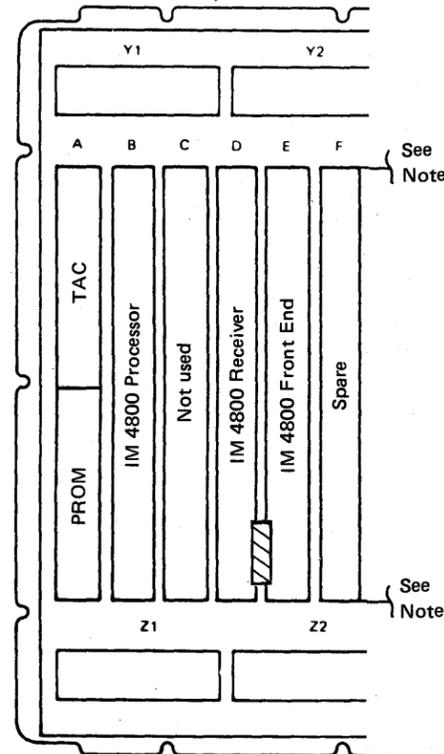
Figure C-5 (Part 1 of 2). Card Locations

2400 IM Cards



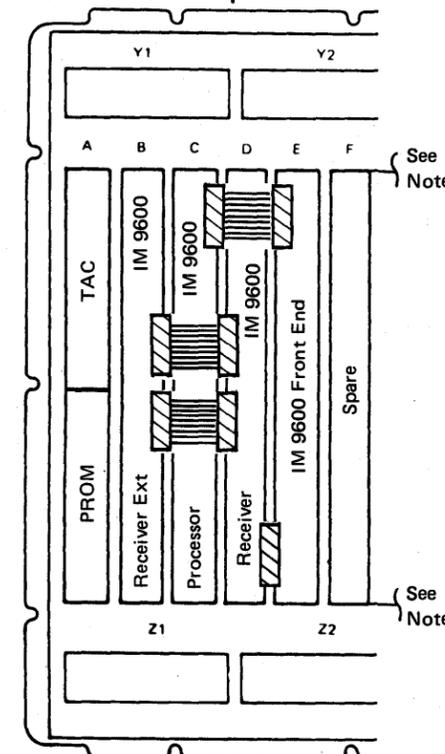
Board A2 Integrated Modem 2400 with Type B Adapter

Or  
4800 IM Cards



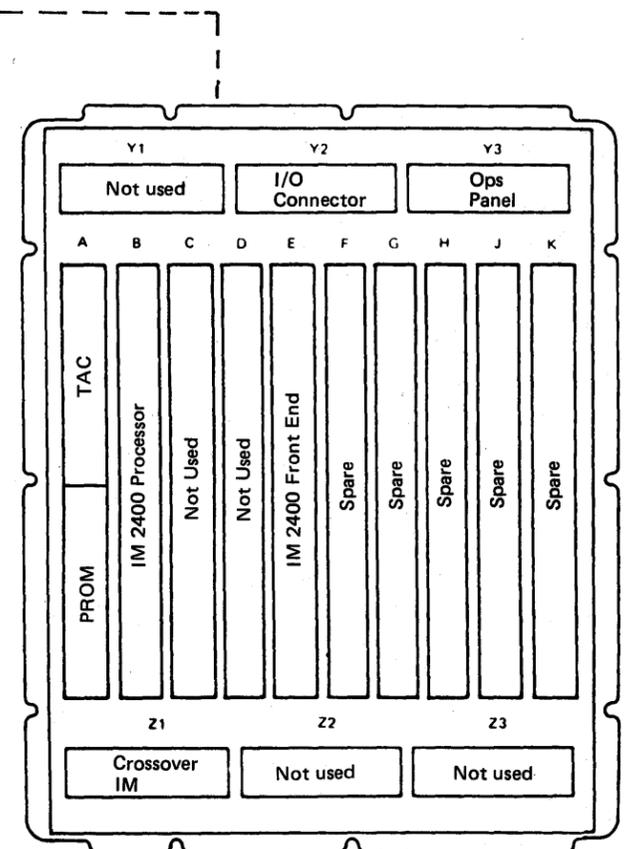
Integrated Modem Card Locations 4800

Or  
9600 IM Cards



Integrated Modem Card Locations 9600

2400 IM Cards



Board A2 Integrated Modem 2400 without Type B Adapter

Note: Depending upon modem speed and features, these cards can go in board with sockets A through N or A through K.

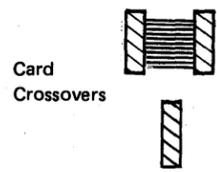


Figure C-5 (Part 2 of 2). Card Locations

Board A1 to Operator Panel

Board A1 Z1	Cable Pin	Wire No.	1-P1 Connector Pin	Function
A6D02 E02 B6A02	D02	1	8	Not used
B02 C02 D02				
E02	D08	11,12	3,15	DC Return
C6A02	D09	9	11	Offline condition
B02 C02 D02	D11	14	18	+5
E02	D13	16	1	Not used
A6D04 E04	B03	2	7	-IML Switch on
B6A04	B04	3	9	IML Address 1 Sw
B04	B05	4	10	IML Address 2 Sw
C04	B06	5	19	Op Ind 1 on
D04	B07	6	20	Op Ind 2 on
E04	B08	7	22	Op Ind 4 on
C6A04	B09	8	21	Op Ind 8 on
B04	B10	10	17	+Disabled
C04	B11	13	6	+5
D04 E04	B13	15	13	Not used

Key

1-P1 Connector

1		13
2	■	14
3		15
4		16
5		17
6		18
7		19
8		20
9		21
10		22
11		23
12		24

Board A1 to 33FD Disk Drive\*

Board A1	Connector Pin Z2 End	33FD Disk Drive Socket	Connector Pin Cable End
D6E02	D02	+Access 0	G02
E6A02	D03	+5 VDC	J03
B02	D04	+Access 2	G04
C02	D05	+Access 3	G05
D02	D06	+Write Current Select	J06
E02	D07	+File Data	G07
F6A02	D08	Ground Bus	J08
B02	D09		
C02	D10	+24 Vdc	J10
D02	D11		
E02	D12		
G6A02	D13	+Index	G13
D6E04	B02	+Write Data	J02
E6A04	B03	+Access 1	G03
B04	B04	+Erase Gate Out	J04
C04	B05	+Write Gate Out	J05
D04	B06	-5 VDC	J11
E04	B07		
F6A04	B08		
B04	B09		
C04	B10	+Head Engaged	G10
D04	B11		
E04	B12		
G6A04	B12		

\*For additional reference, see page G-14.

Figure C-6 (Part 1 of 8). Logic Board Cables

Board A1 to Interface Connector (OIS-B1 to A1Z4)

Board A1 to Interface Connector (OIS-B3 to Z1Z6)

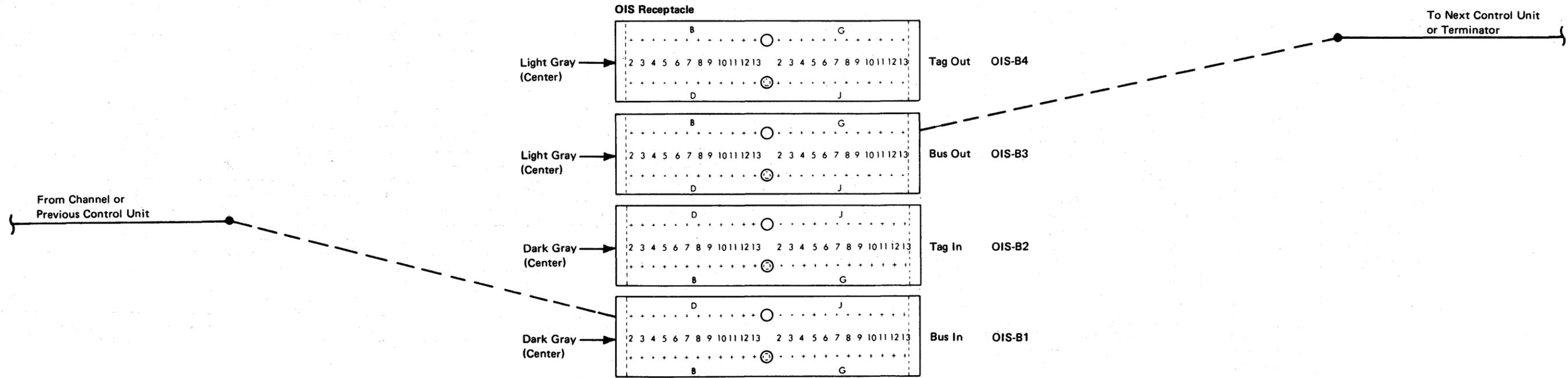
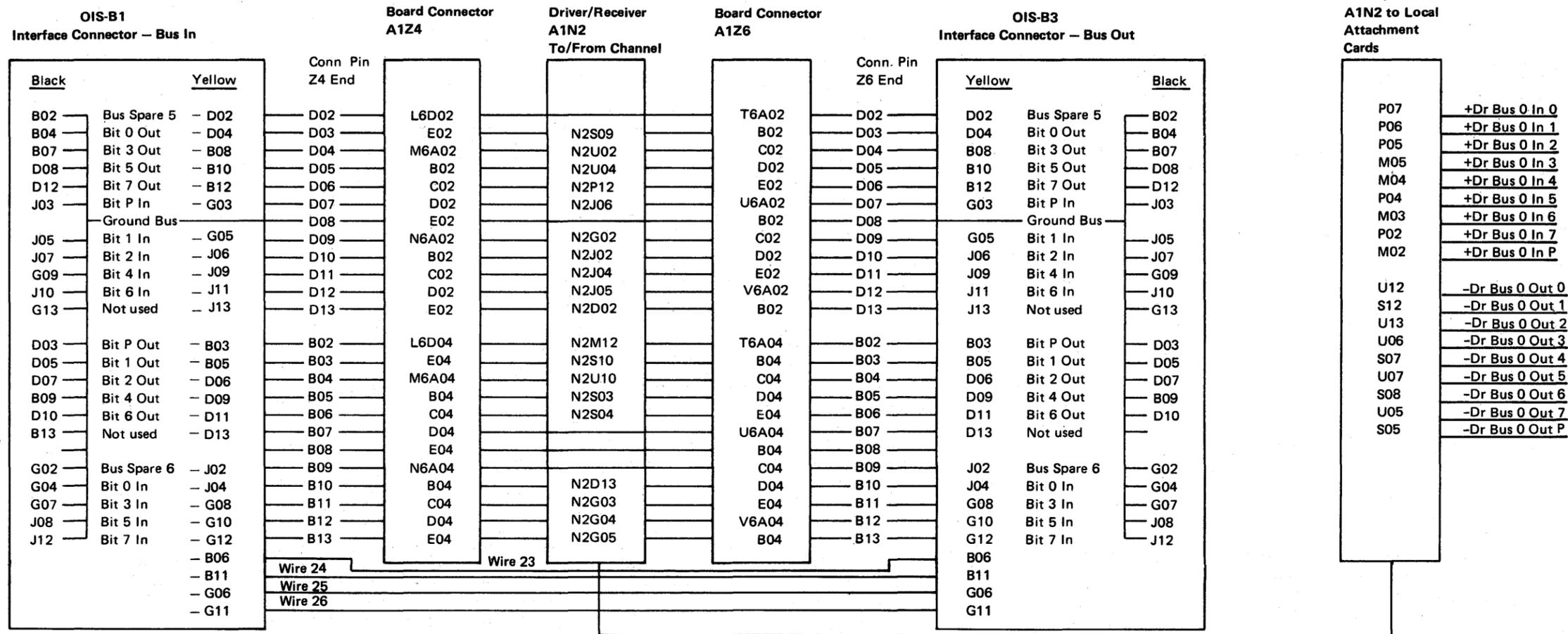
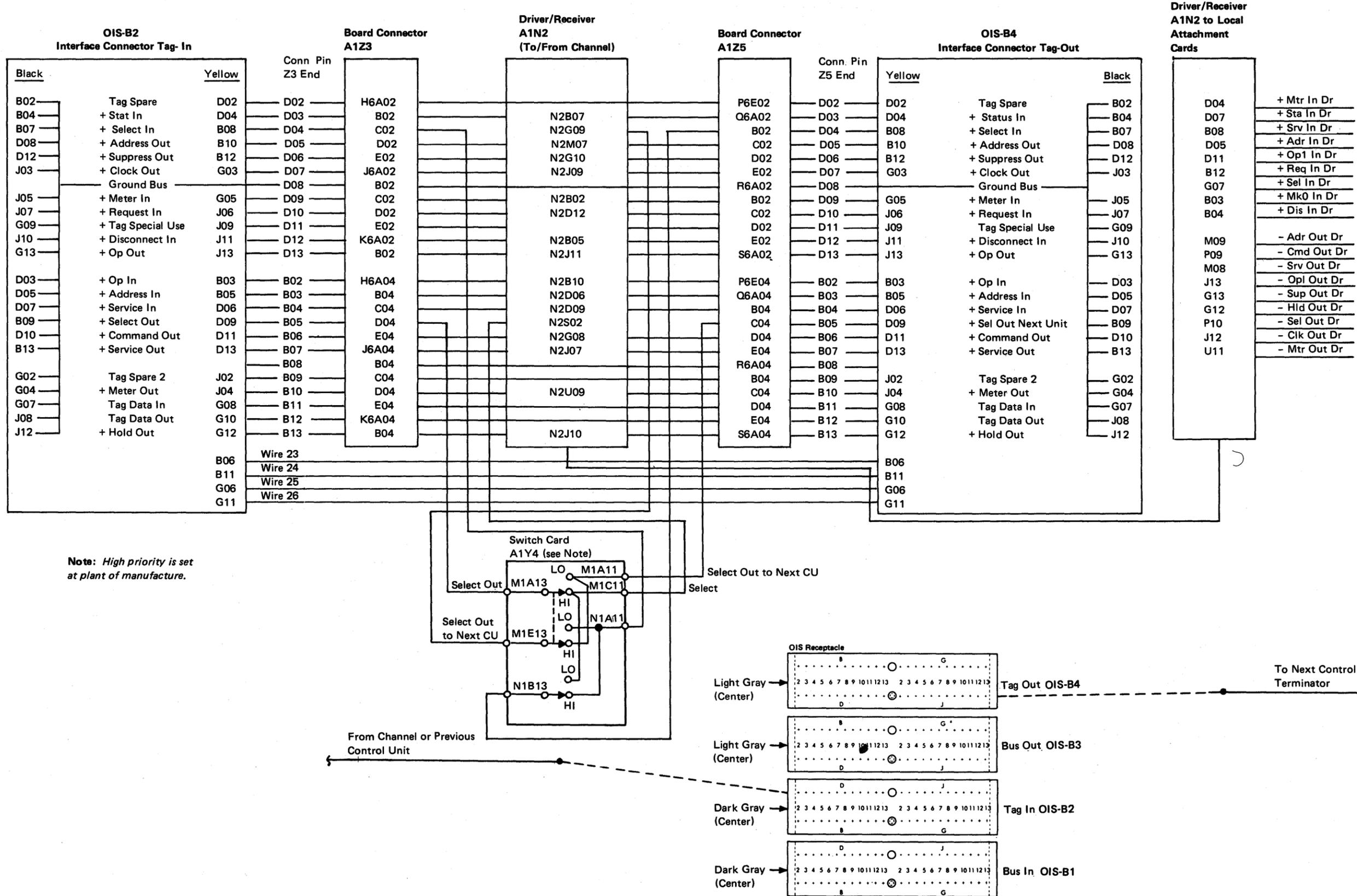


Figure C-6 (Part 2 of 8). Logic Board Cables

TNL SN31-0775 (22 Jan 82)  
SY27-2530-1

Board A1 to Interface Connector (OIS-B2 to A1Z3)

Board A1 to Interface Connector (OIS-B4 to A1Z5)



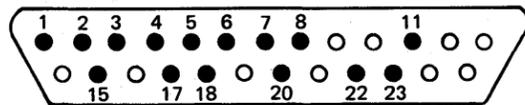
Note: High priority is set at plant of manufacture.

Figure C-6 (Part 3 of 8). Logic Board Cables

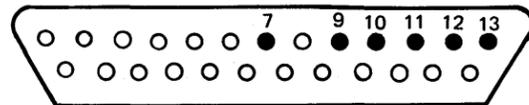
I/O Communication Cable

Board A1 Z6	Connector Pin Z6 End	Board A1 to 25-Pin Connector	25-Pin Connector Pin
T6A02	D02		22
B02	D03		3
C02	D04		14
D02	D05		5
E02	D06		
U6A02	D07		11
B02	D08		7
C02	D09		9
D02	D10		4
E02	D11		18
V6A02	D12		6
B02	D13		20
T6A04	B02		1
B04	B03		13
C04	B04		2
D04	B05		
E04	B06		17
U6A04	B07		
B04	B08		
C04	B09		8
D04	B10		10
E04	B11		15
V6A04	B12		23
B04	B13		12

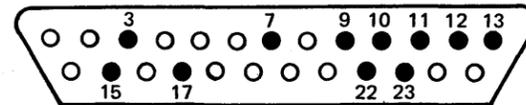
25-Pin Connector (Male)



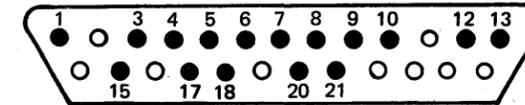
• Pins Used for EIA (See Note)



• Pins Used for DDS Adapter (See Note)



• Pins Used for X.21 (See Note)



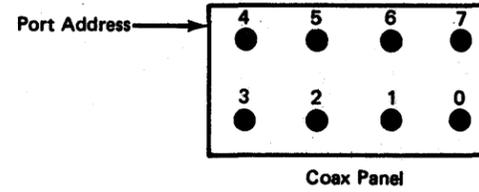
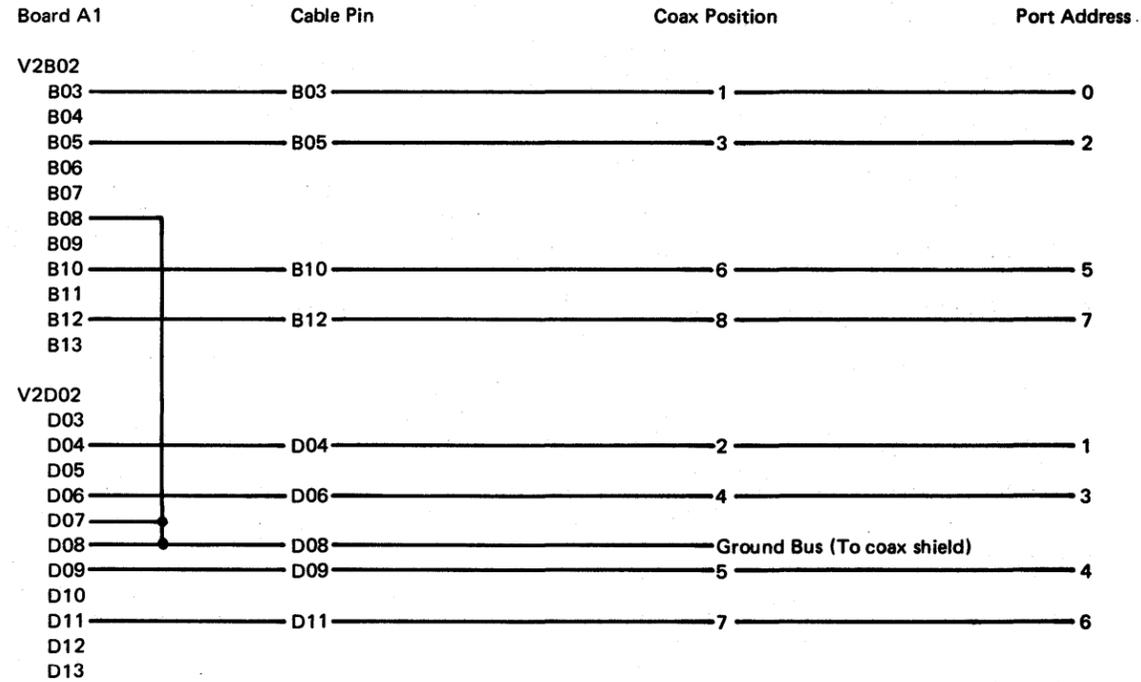
• Pins Used for V.35 (See Note)

DTE – Data Terminal Equipment  
DCE – Data Communication Equipment (Mode)

Note: For line name and communications line flow, see the appropriate illustration in Chapter 5.

Figure C-6 (Part 4 of 8). Logic Board Cables

Board A1 to Coax Panel – Type A Adapter



Board A1 to Coax Panel – Type A Adapter

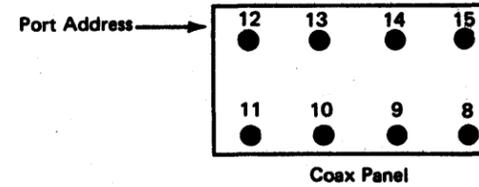
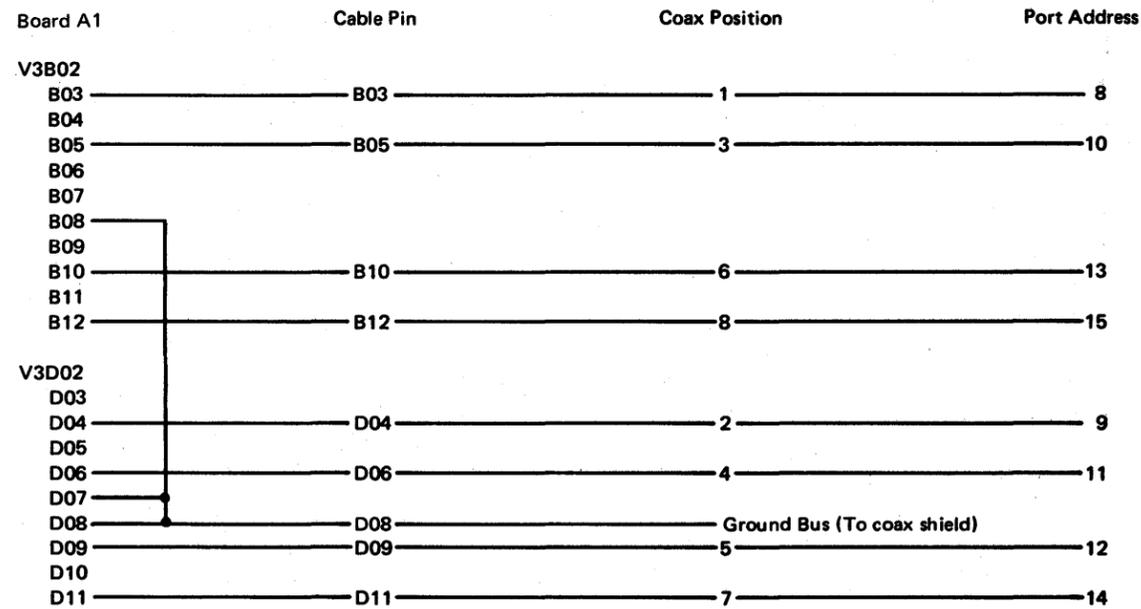
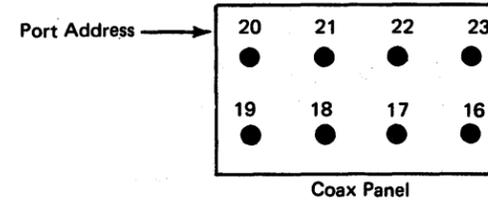
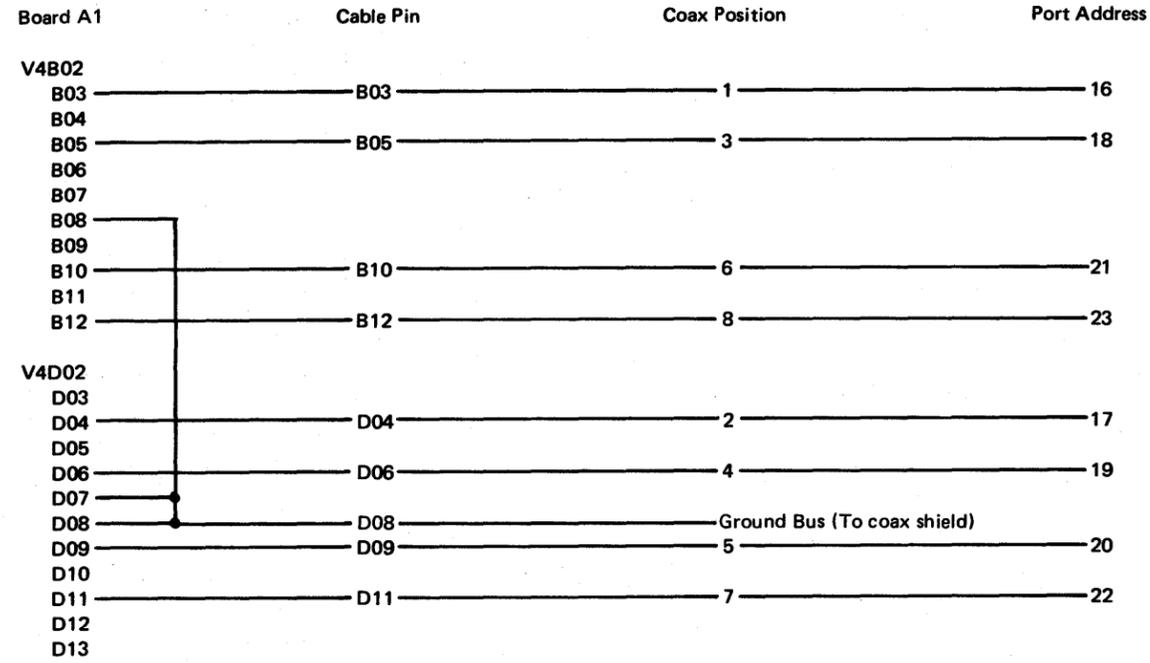


Figure C-6 (Part 5 of 8). Logic Board Cables

Board A1 to Coax Panel – Type A Adapter



Board A1 to Coax Panel – Type A Adapter

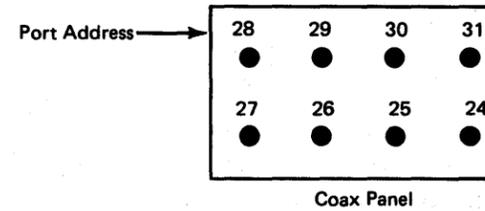
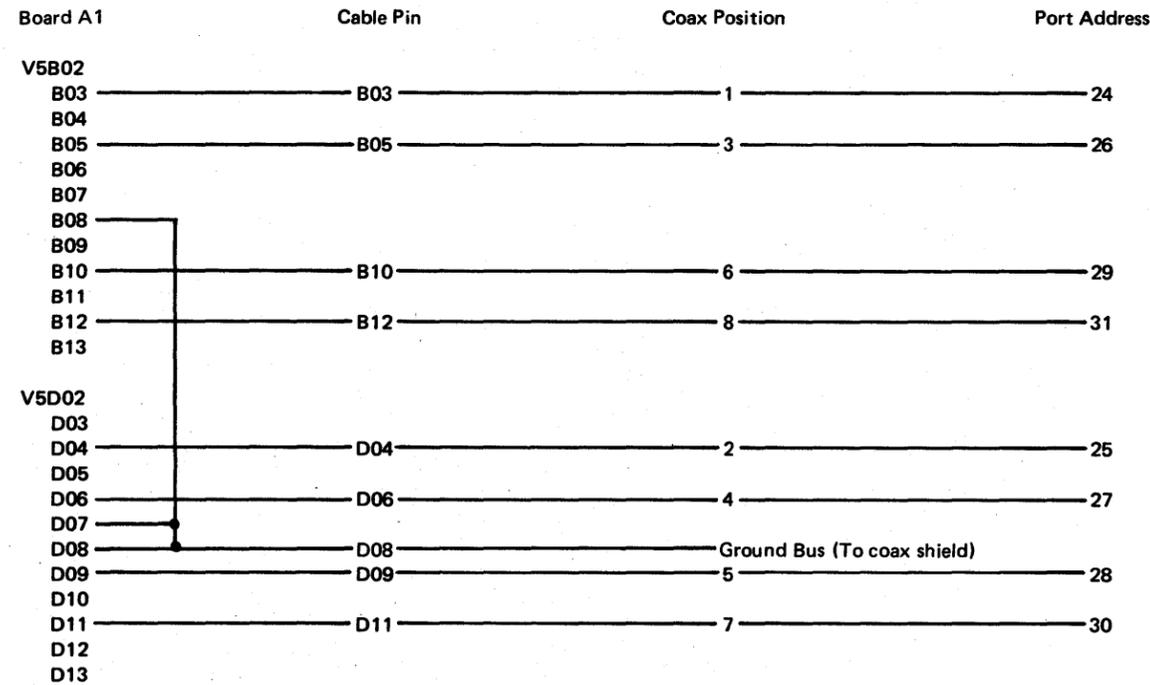
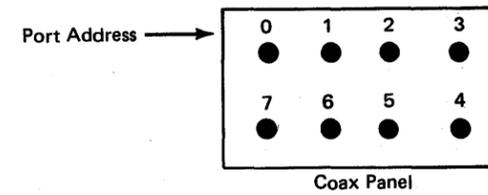
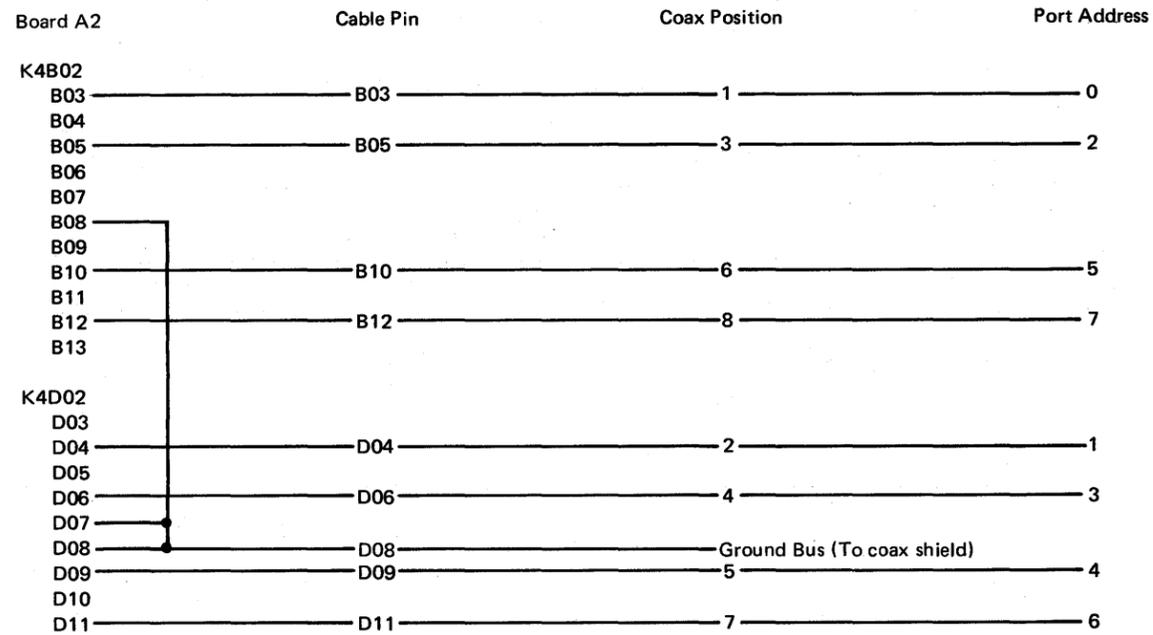


Figure C-6 (Part 6 of 8). Logic Board Cables

Board A2 to Coax Panel – Type B Adapter



Board A2 to Coax Panel – Type B Adapter

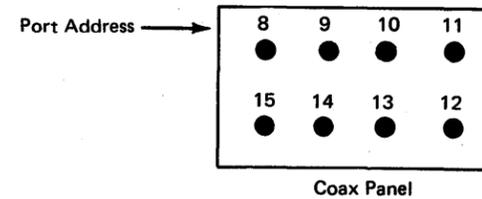
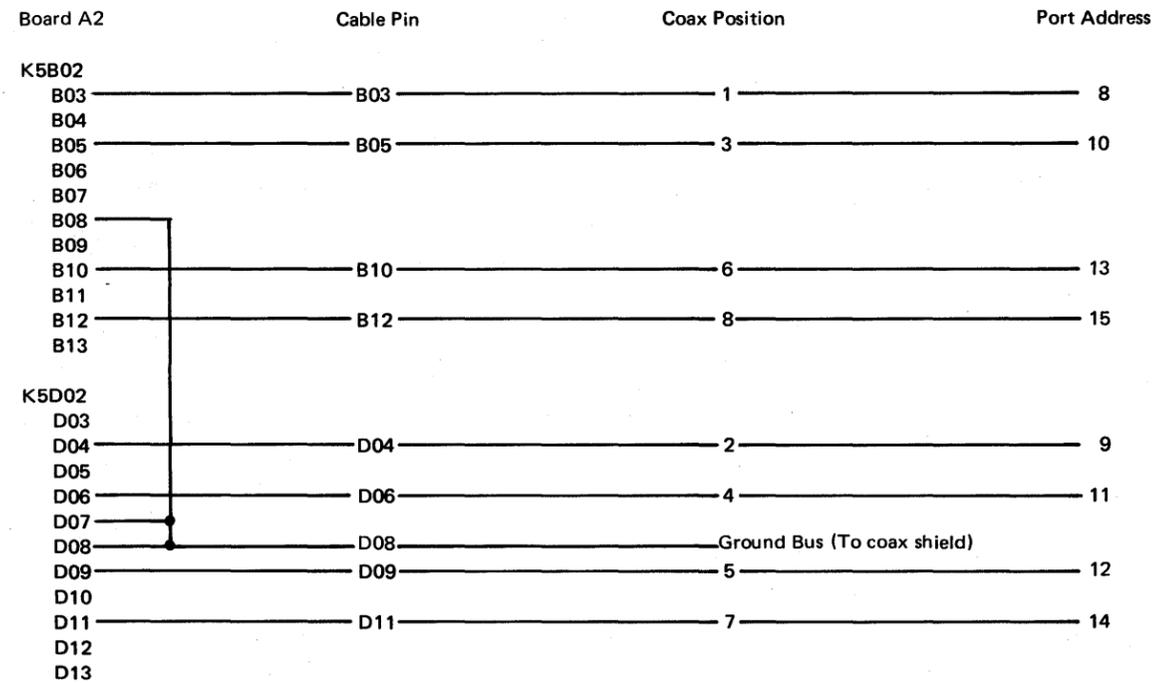


Figure C-6 (Part 7 of 8). Logic Board Cables

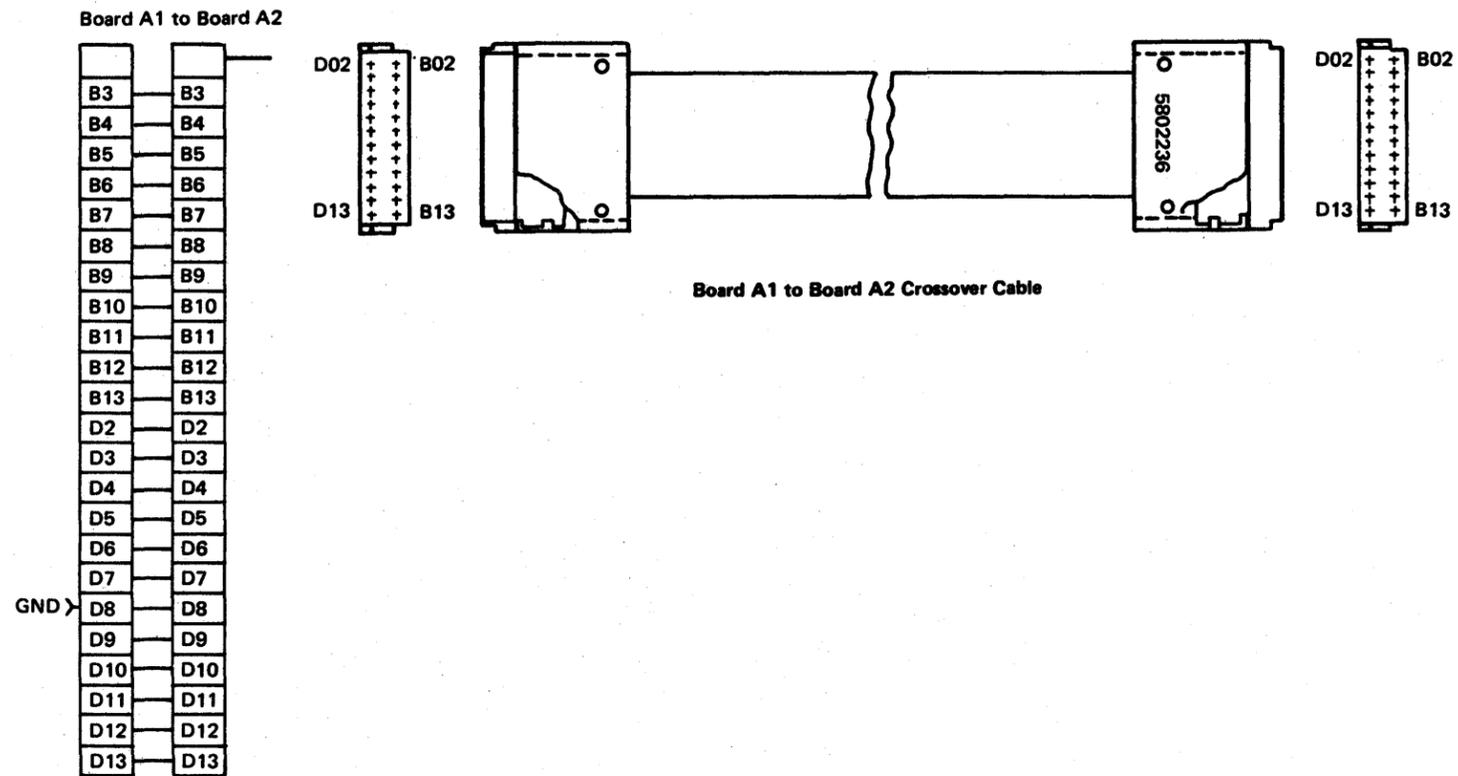
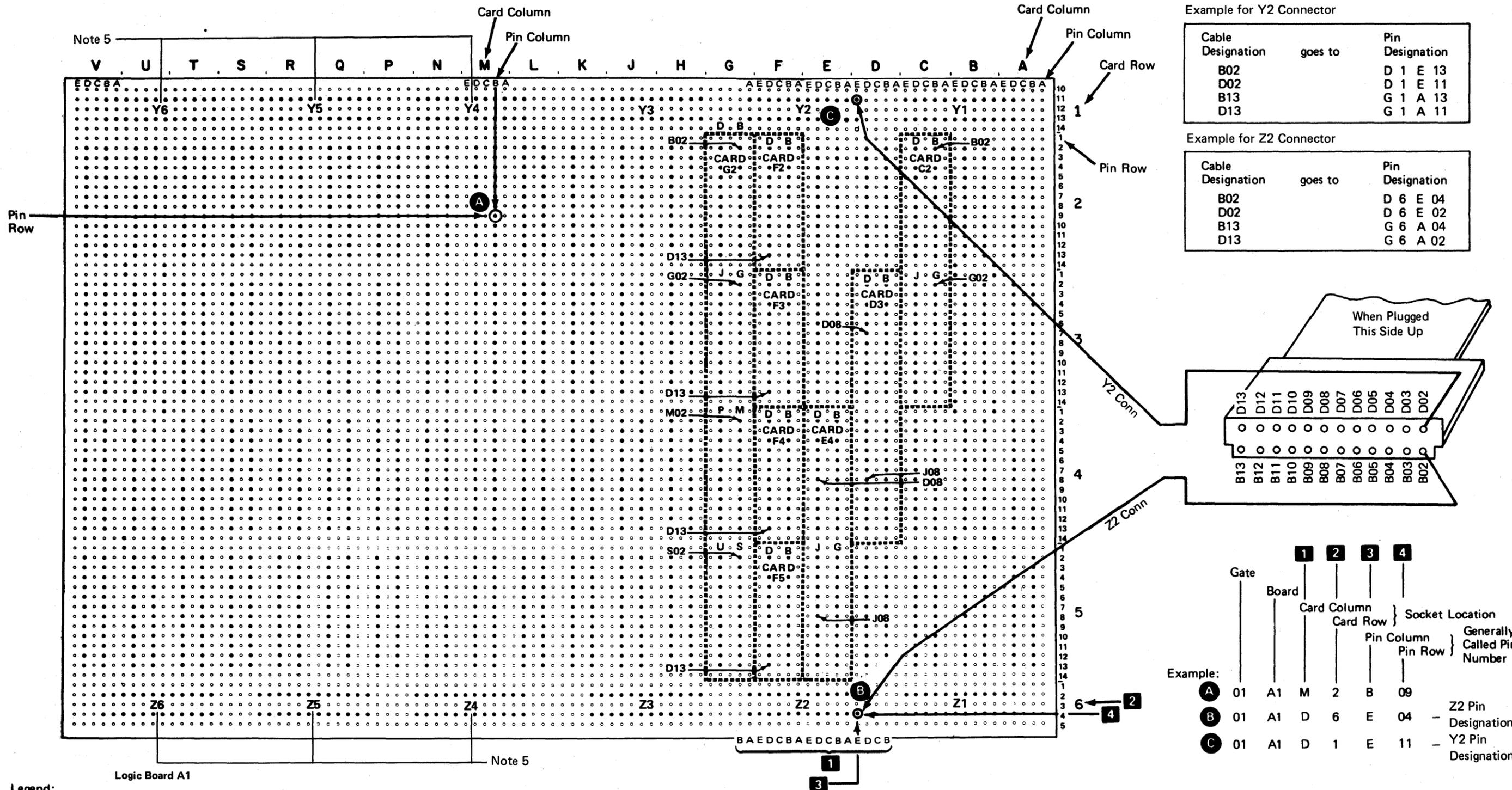


Figure C-6 (Part 8 of 8). Logic Board Cables

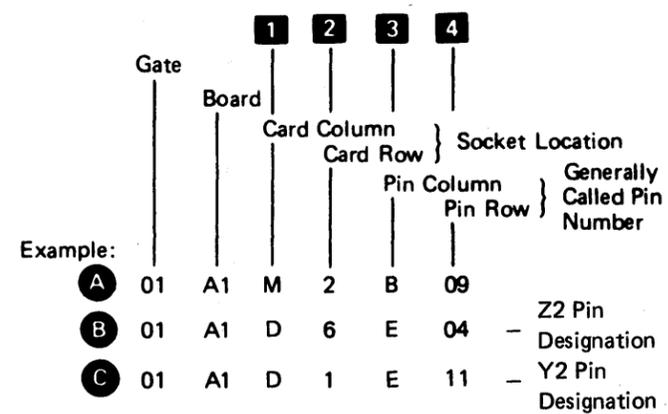


Example for Y2 Connector

Cable Designation	goes to	Pin Designation
B02		D 1 E 13
D02		D 1 E 11
B13		G 1 A 13
D13		G 1 A 11

Example for Z2 Connector

Cable Designation	goes to	Pin Designation
B02		D 6 E 04
D02		D 6 E 02
B13		G 6 A 04
D13		G 6 A 02



Legend:  
● Probe Pin

Notes:  
1. For multiple-socket cards (such as cards G2, E4, D3, and C2 in illustration), card location designation is specified by the uppermost row. Example: The location of card G2 (which actually occupies four sockets) is specified by the uppermost row, G2. If this card is located on board A1, its location is identified as A1G2.

2. Pin - column letter designations are signified by card size (rather than vertical position of card on board), beginning with DB, in the first pin row used. Subsequent designations are JG, PM, and US, which, when required, specify pin columns in the second, third, and fourth card rows, respectively. See examples in the illustration.

3. Ground - any D08, J08, or U08 pin; identified by a square surrounding each ground pin. (The square is not shown.) +5 - any D03, J03, P03, or U03 pin.  
4. Cards are shown for instruction purposes only. See Figure C-5 for actual card locations.

5. When board A2 contains sockets A through N, pin locations for sockets Y4, Y5, Y6, Z4, Z5, and Z6 are different from those shown here. See Figure C-7, Part 2 for pin locations.

Figure C-7 (Part 1 of 2). Logic Board Card, Connector, and Pin Locations

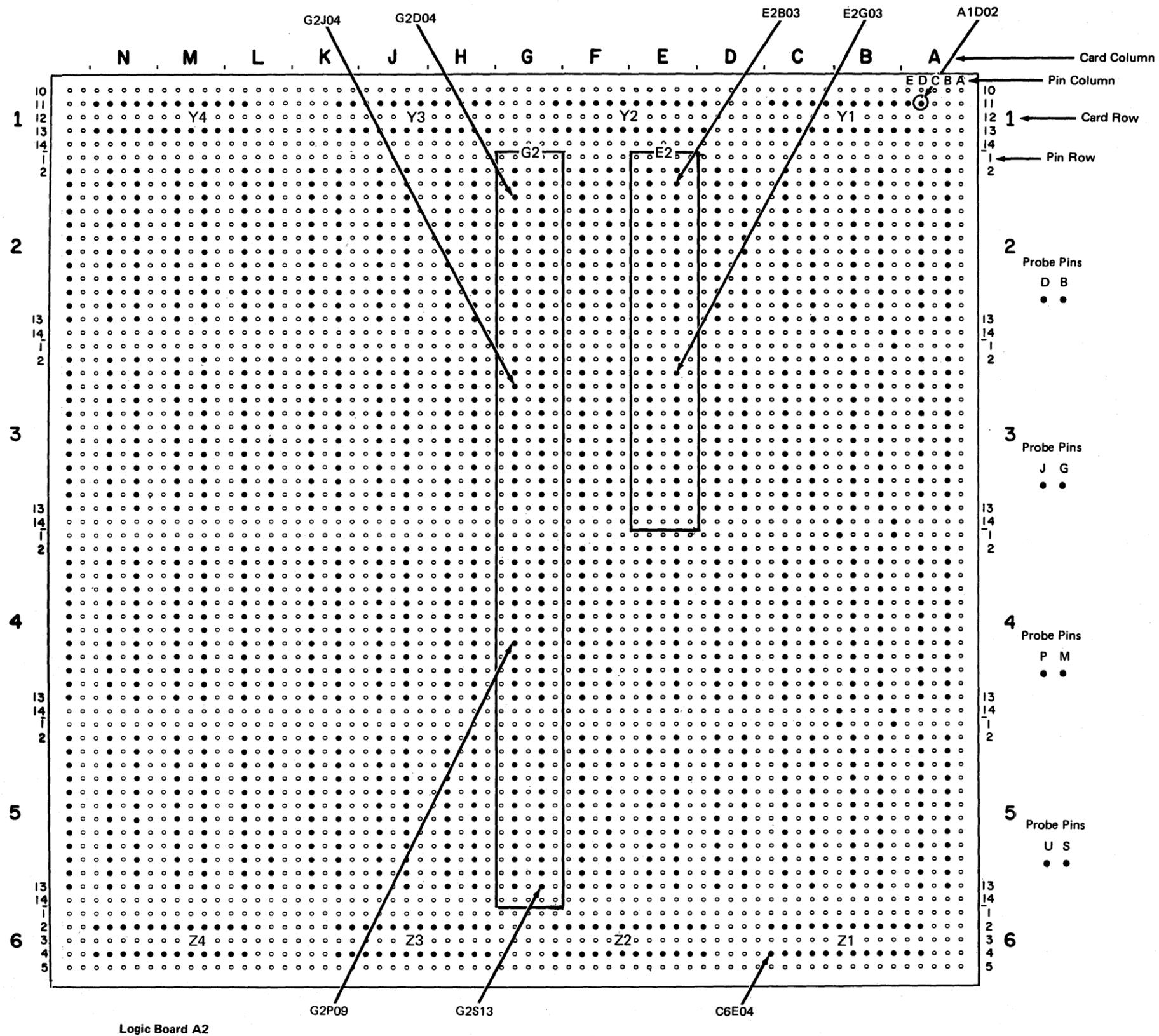
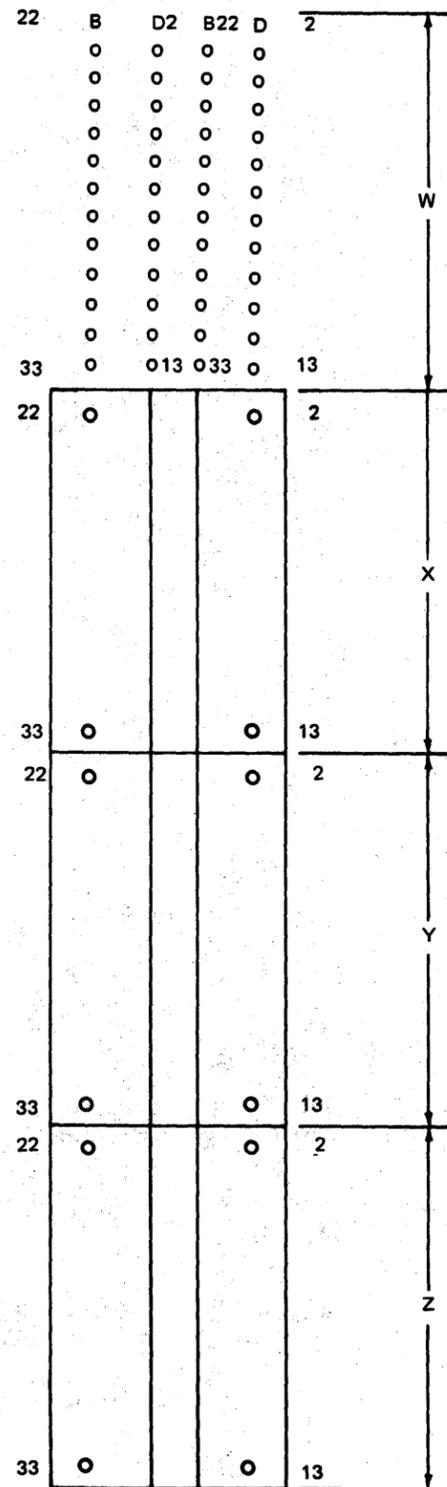
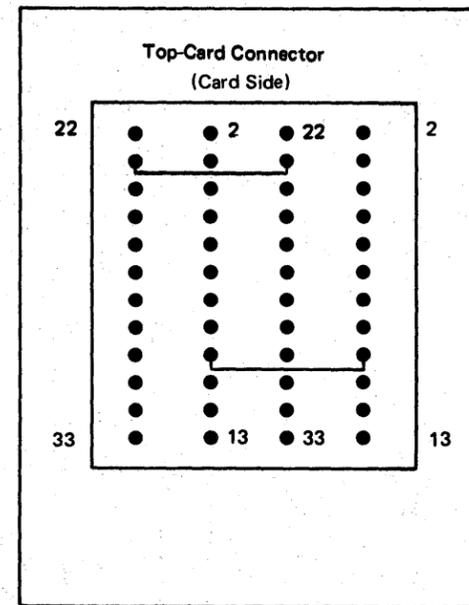


Figure C-7 (Part 2 of 2). Logic Board Card, Connector, and Pin Locations

Board A1  
Card Side



**Top-Card Connector:**  
 One-Card Position – PN 1794410  
 Two-Card Position – PN 5267787



**Note:** See Figure 5-23 for additional information.

Figure C-8. Top-Card Connector Pin Locations

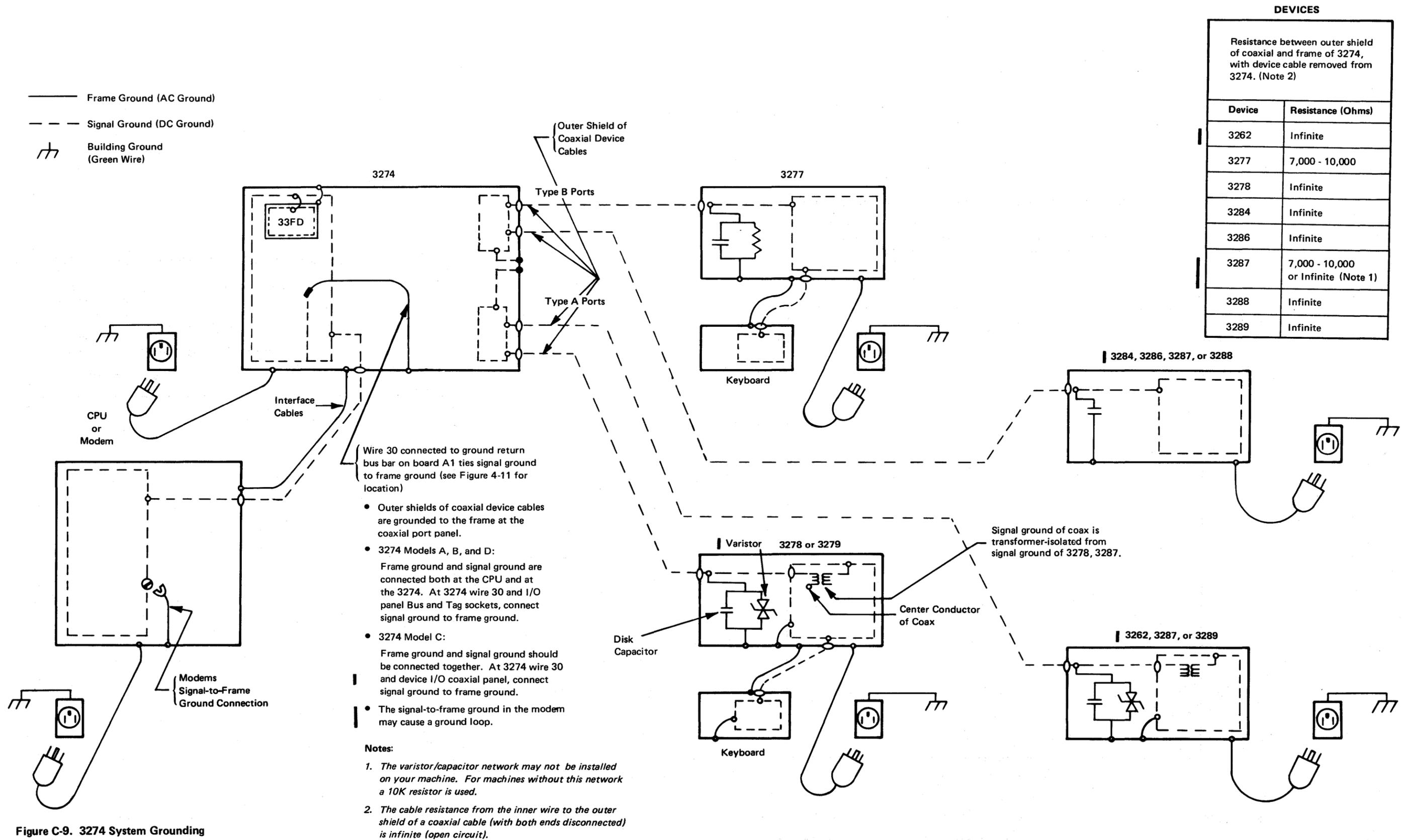
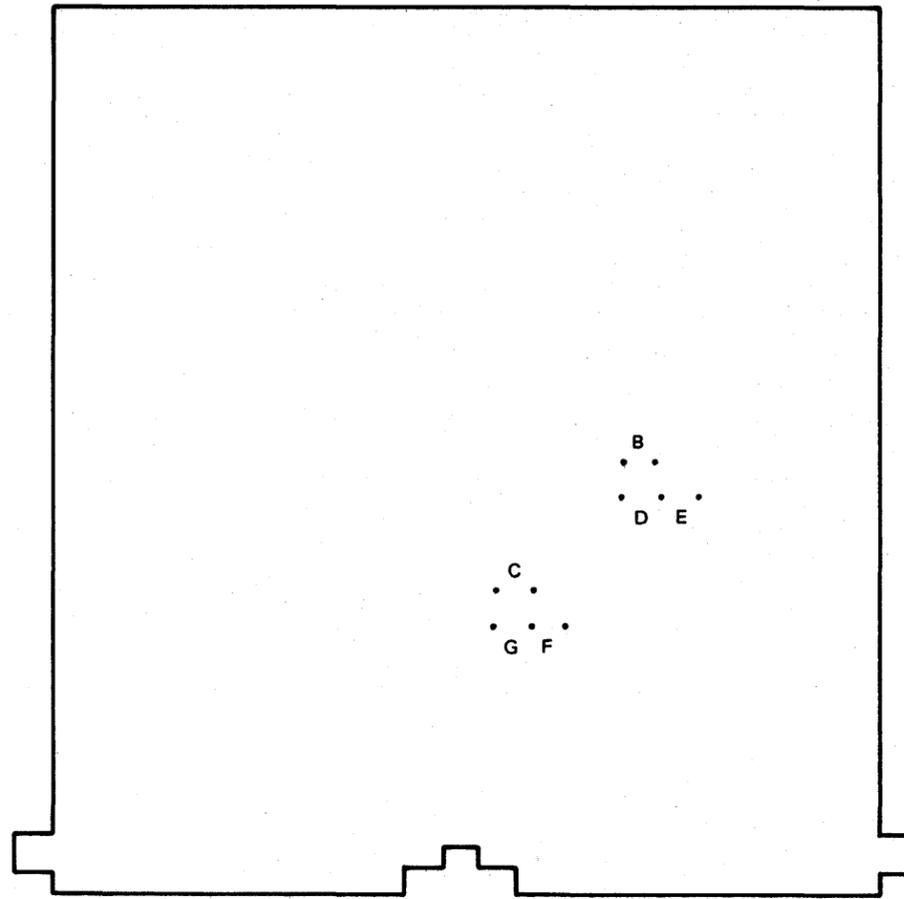


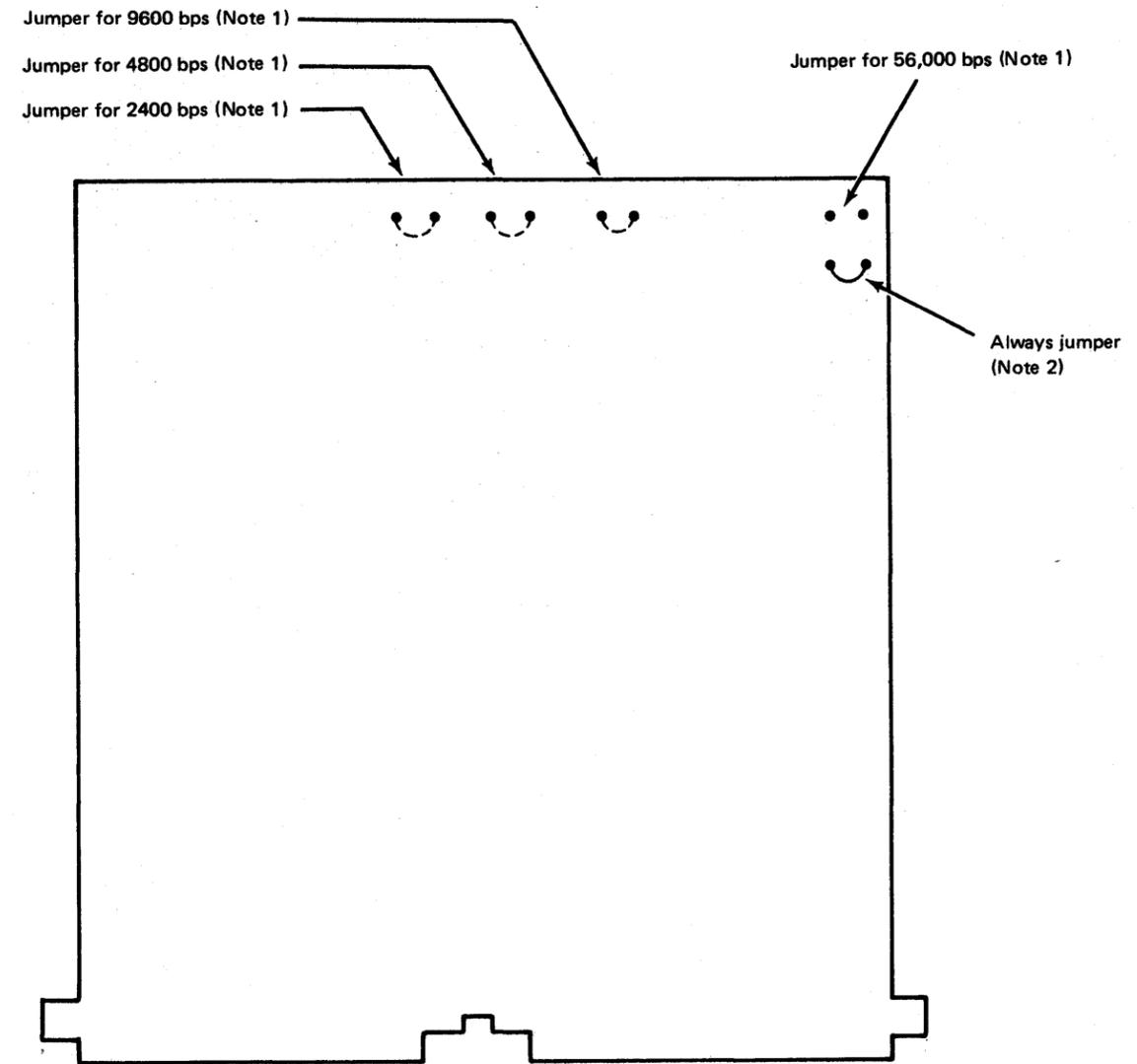
Figure C-9. 3274 System Grounding



Card PN 5864668 A1P2 Model C

1. Positions B and C are for card test purposes and should be removed.
2. Position D enables wrap at VTL interface. It should not be used on 3274 C.
3. Position E is spare.
4. Positions F and G should not be jumpered for 3274 C.

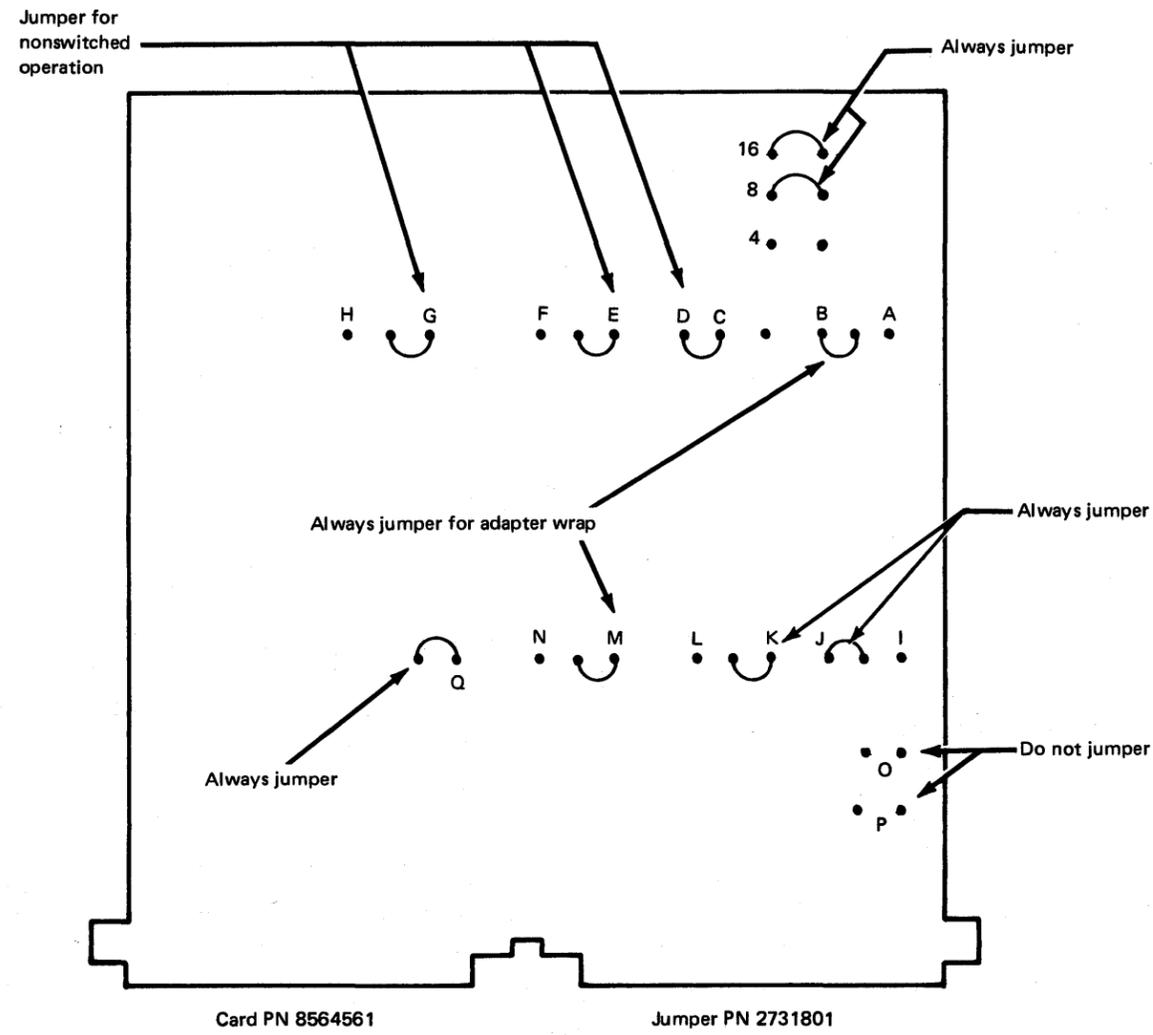
Figure C-10. EIA/CCITT Card Jumpering (A1P2) (PN 5864668)



Notes:

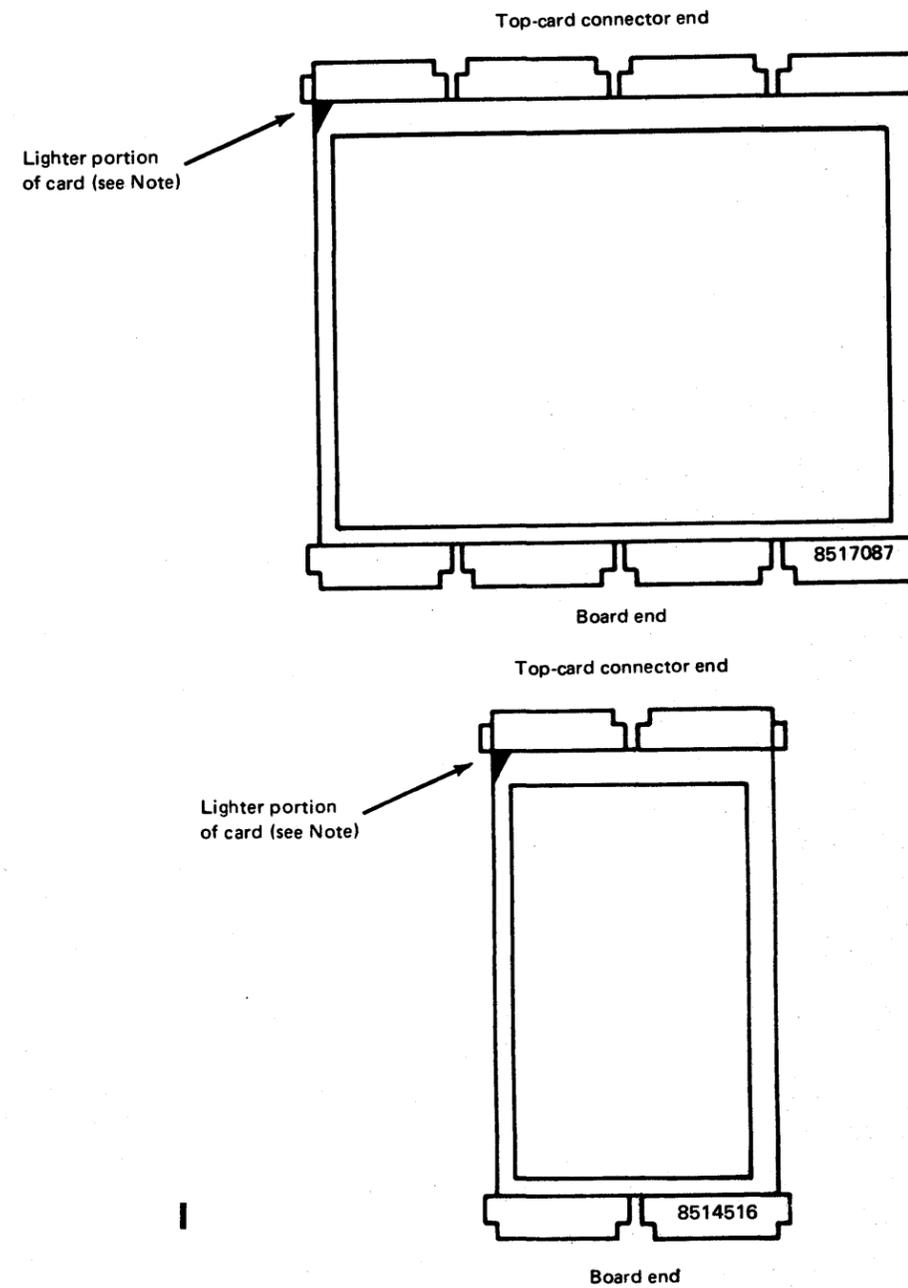
1. Install jumper (PN 2731801) to select 2400 bps, 4800 bps, 9600 bps, or 56,000 bps. Speed selected **MUST** match the speed of service supplied by common carrier.
2. This jumper **MUST ALWAYS** be installed.

Figure C-11. DDS Adapter Card Jumpering (A1P2) (Domestic U.S. Only)



Note: This card is used in early production WT machines.

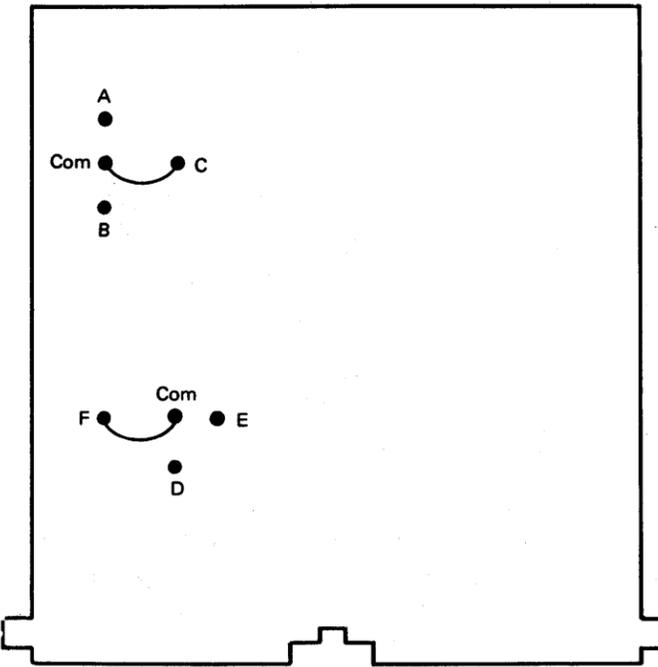
Figure C-12. X.21 Adapter Card Jumpering



Notes:

1. To identify the top-card connector end, locate the lighter portion of the card.
2. Card A1G2 is PN 8514516.  
Card A1H2 is PN 8517087.

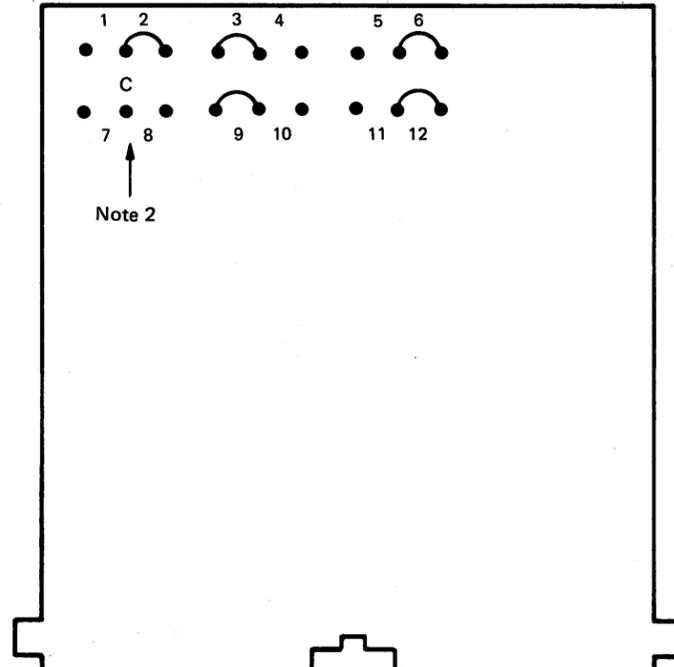
Figure C-13. Cards A1G2 and A1H2 (Storage Feedthrough) — Card Plugging Cautions



Notes:

1. Positions A, D – Manufacturing test jumpers; removed for field operations.
2. Position B – Storage position for card wrap jumper; should not be used on 3274.
3. Position C – Install for wrap on card.
4. Position E – 3274 diagnostic test mode; removed for field operations.
5. Position F – Modem mode; clock supplied by DCE; this jumper
6. Use jumper PN 2731801.

Figure C-14. V.35 Card Jumpering (A1P2) (PN 4939893)



Notes:

1. Use jumper PN 2731801.
2. Place jumper from C to position 7 for CCA. Place jumper from C to position 8 for HPCA.

Card 5864683

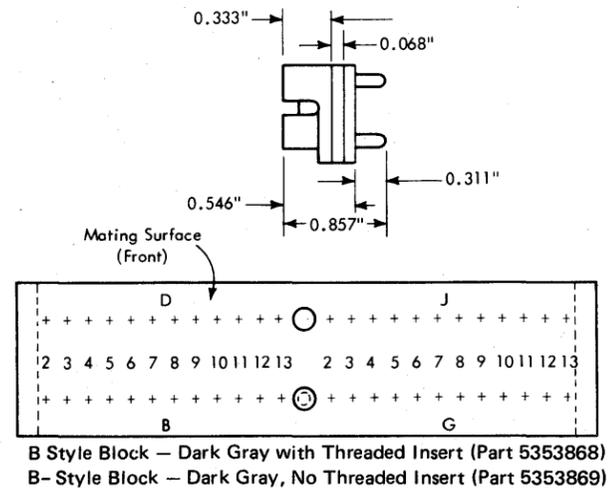
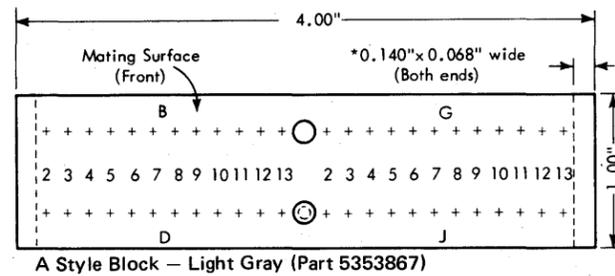
Figure C-15. X.21 Adapter Card Jumpering

## Appendix D. Interface Connectors, Cables, and Terminators

### D.1 S/370 I/O INTERFACE CONNECTORS

#### D.1.1 Connector Blocks

Three styles of connector blocks are available: A, B, and B-. The A and B designations are used to identify proper mating arrangements, since the physical hardware is identical. The two styles are differentiated by the color coding of the blocks: the A style is light gray and the B style is dark gray.

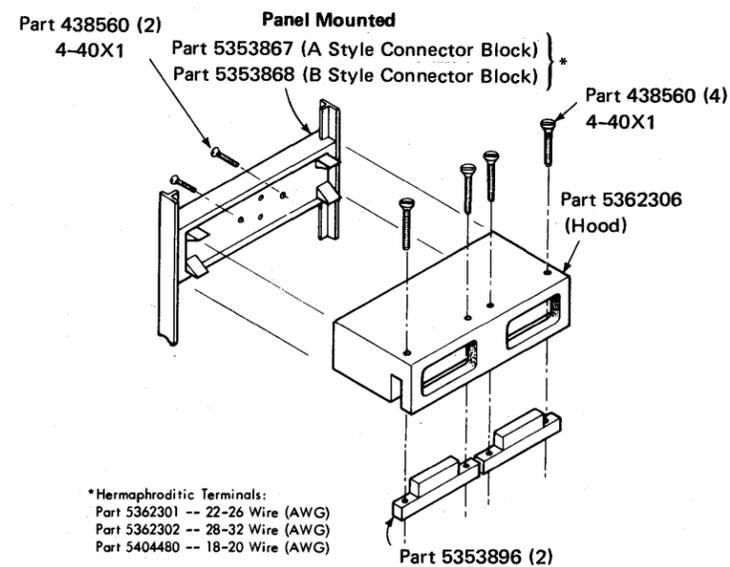
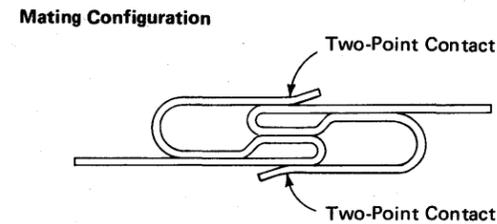
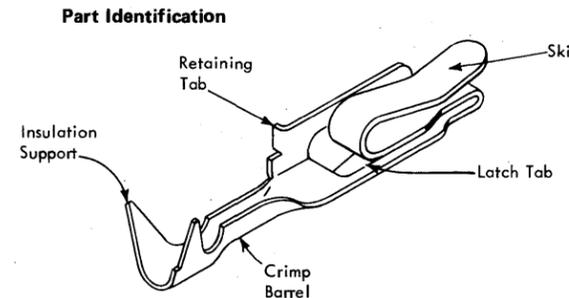


\*Mounting Slots

The B- style block is the same as the B style, but does not have a threaded insert.

When mating connectors, care should be taken to prevent accidental mismatching of two A or two B style connectors, since letter positions would then be transposed. Connectors of the same color must never be mated.

Both the A and the B style blocks are used for panel mounts. The A style may also be used for a cable end. The B- style is used only as a cable end.



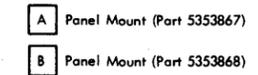
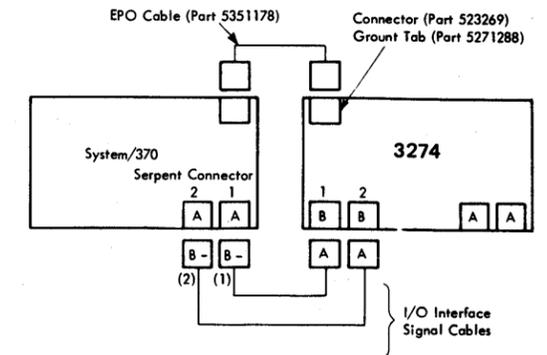
#### D.1.2 Capacity

Forty-eight individual positions (serpent contacts) are provided for in the connector blocks. Application of the connector is limited only by the number of coaxial wires (shielded wires or twisted pairs) used and the method used to ground the shields of the coaxial wires. In the I/O interface, for connectors (1) and (2), 40 serpent contacts are required on each connector to individually terminate the shield and signal wires of 20 coaxial wires.

### D.2 S/370 I/O INTERFACE CABLES

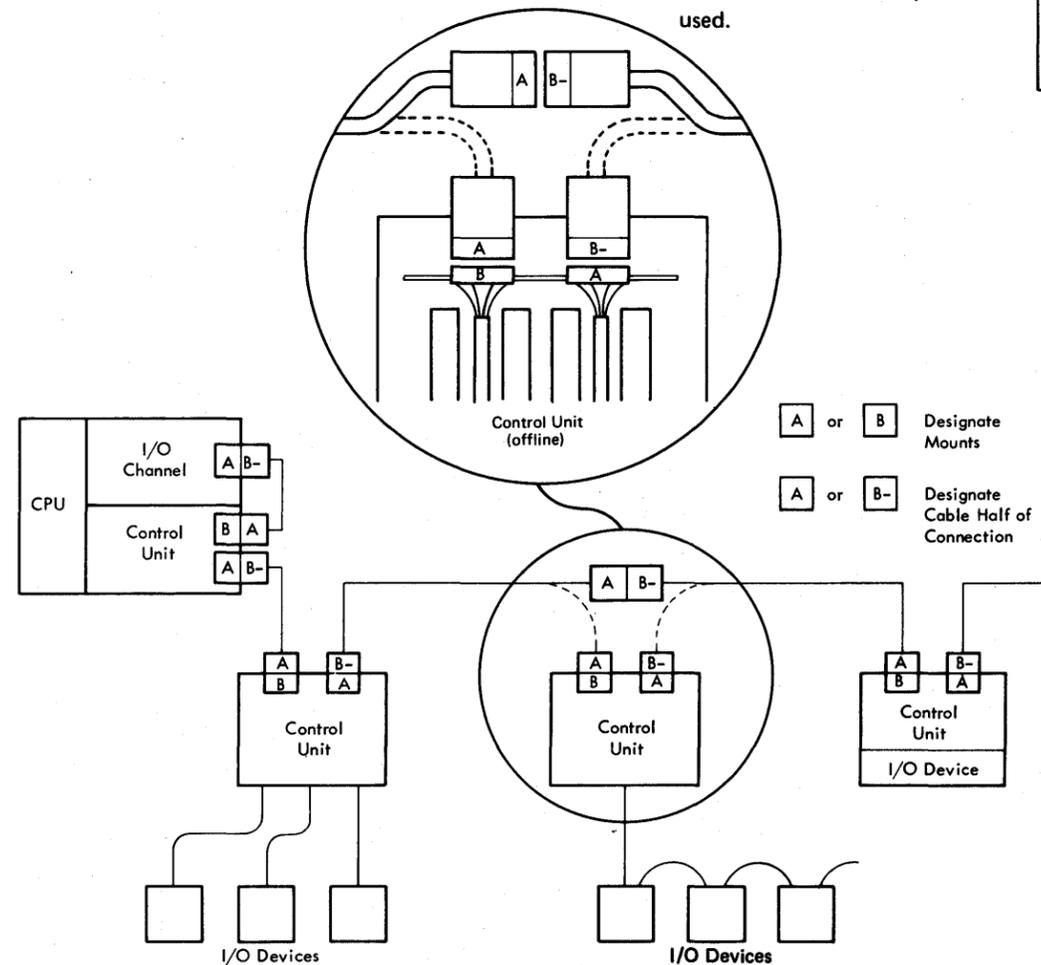
#### D.2.1 Cable Halves

A screwdriver is required to join the cable halves. The connecting screw is spring-loaded to prevent damage to mating block contacts. Blocks should be aligned to ensure proper parallel contact mating. After the blocks are keyed, push the screw forward to engage the insert; then tighten securely. To remove individual contacts, field personnel should use Tool, Part 450540 (available from IBM Field Engineering) or a No. 12 crochet needle.



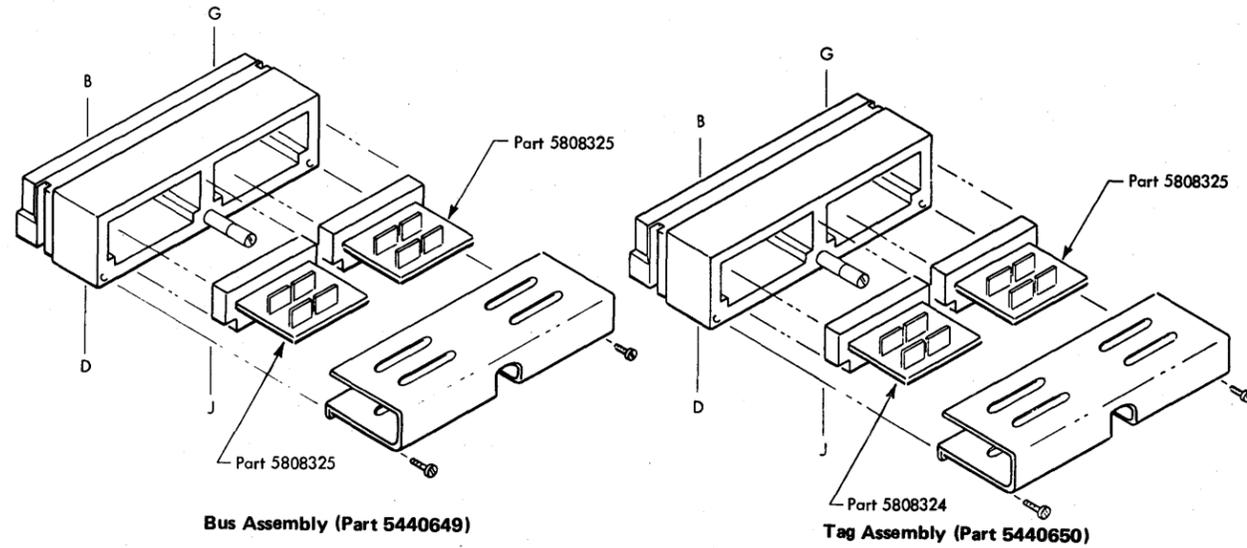
Cables (1) and (2) are 48-position cables PN 5466456; 40-position cables PN 5353920 may also be used.

Terminals:	EPO Cable	14-18 AWG -- Part 523267
	Connector (6 Required)	20-22 AWG -- Part 5351177
	Signal Cable	22-26 AWG -- Part 5362301
	Panel	28-32 AWG -- Part 5362302
	Mount (40 Required per Connector for Cable 5353920; 48 Required per Connector for Cable 5466456)	18-20 AWG -- Part 5404480

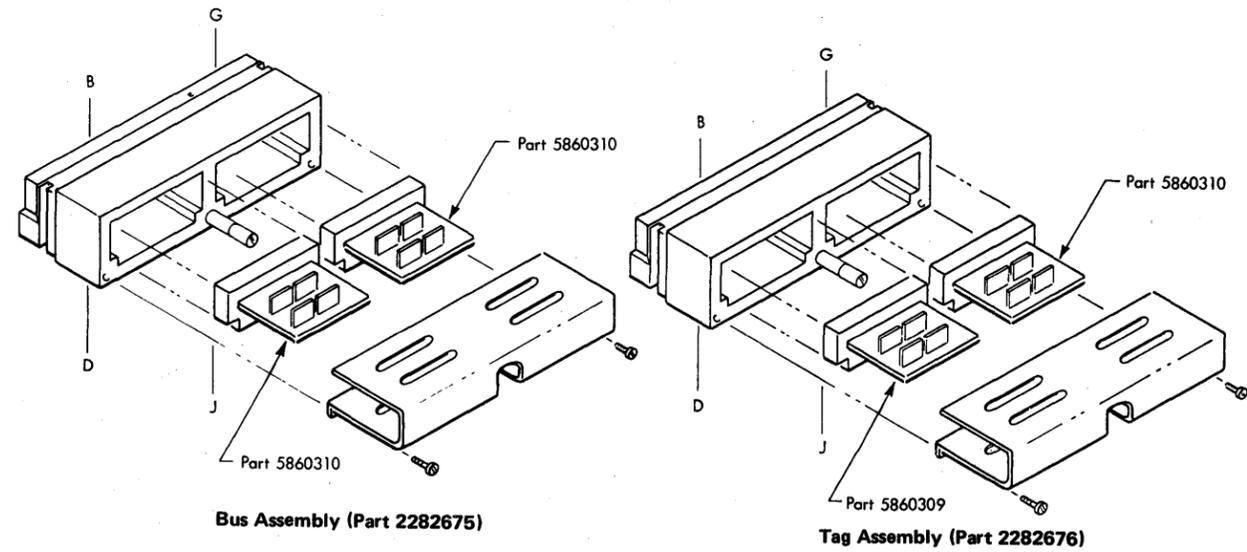


D.3 S/370 I/O INTERFACE TERMINATORS

The System/370 I/O Interface line termination is provided by the assemblies shown. Terminators are used in the Bus out and Tag out positions when the 3274 is the last unit in the S/370 I/O stream.



These assemblies are used with cable Part 5353920.



These assemblies are used with cable Part 5466456.

Appendix E. Operator Panel

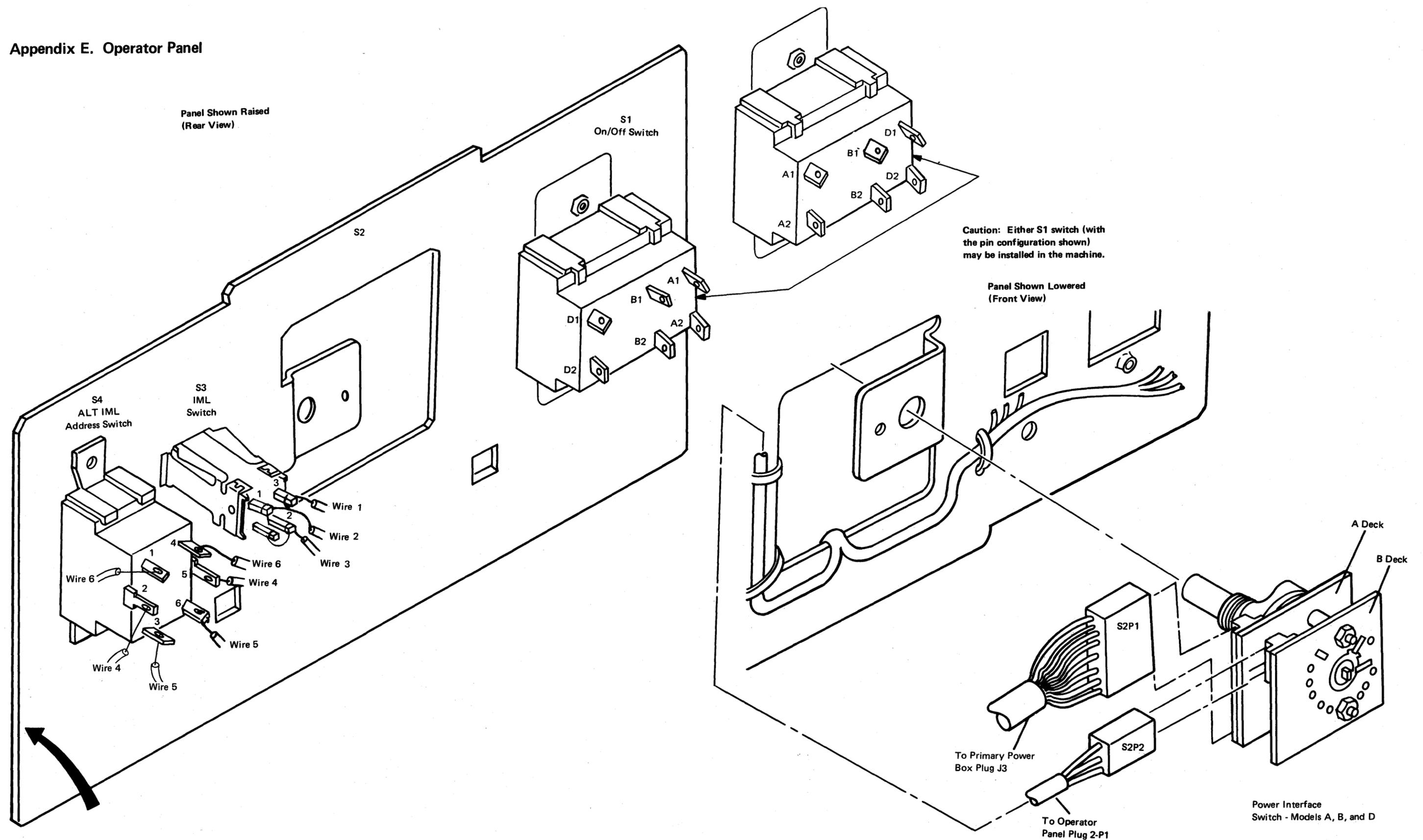


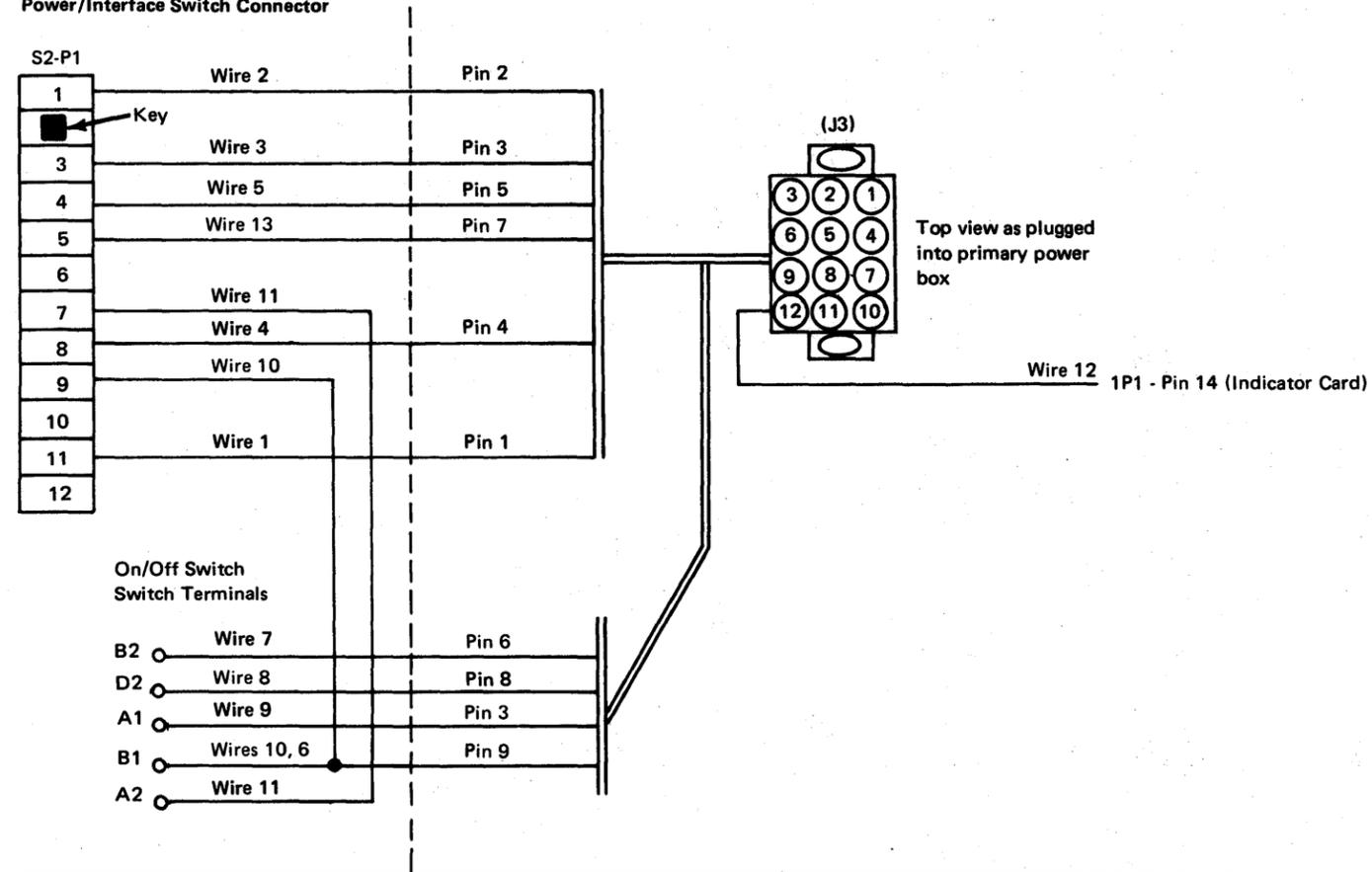
Figure E-1 (Part 1 of 2). Operator Panel Connections

On/Off-Switch  
Terminal Wire Nos.

Terminal	Models A, B, and D Wire No.	Model C Wire No.
A1	9	3
A2	11	1
B1	10, 6	4
B2	7	2
D1	17	17
D2	8	7

Cable — Primary Power Box to Operator Panel (Models A, B, and D)

Power/Interface Switch Connector



Cable — Primary Power Box to Operator Panel (Model C)

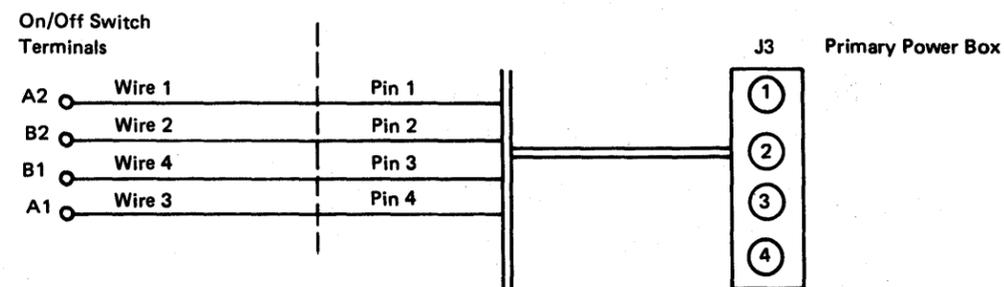
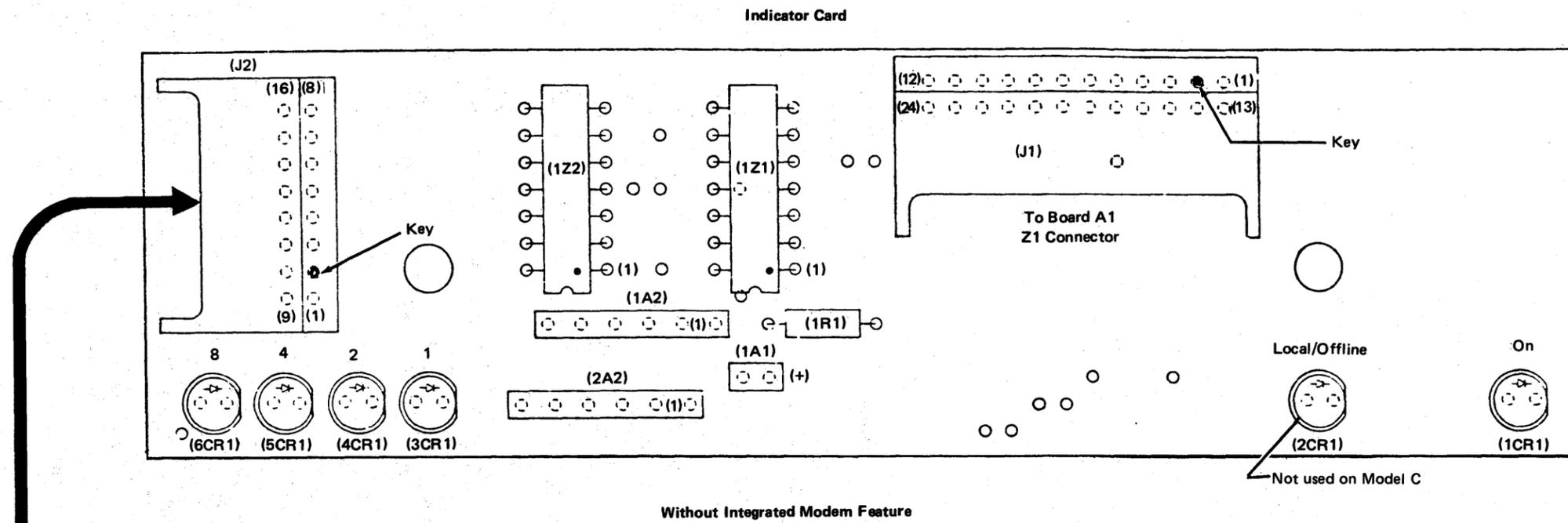


Figure E-1 (Part 2 of 2). Operator Panel Connections



Without Integrated Modem Feature

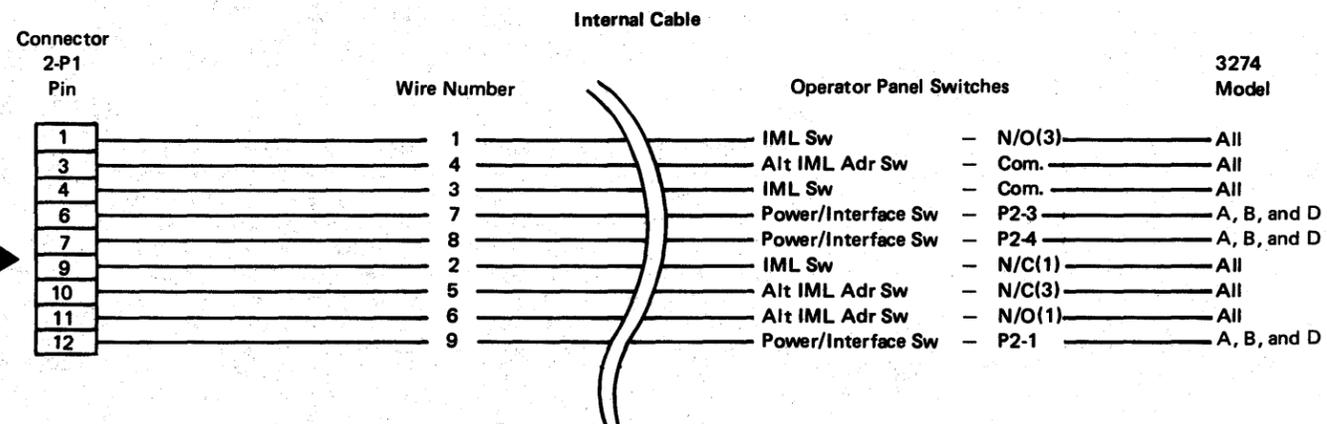


Figure E-2 (Part 1 of 2). Operator Panel Indicator Card

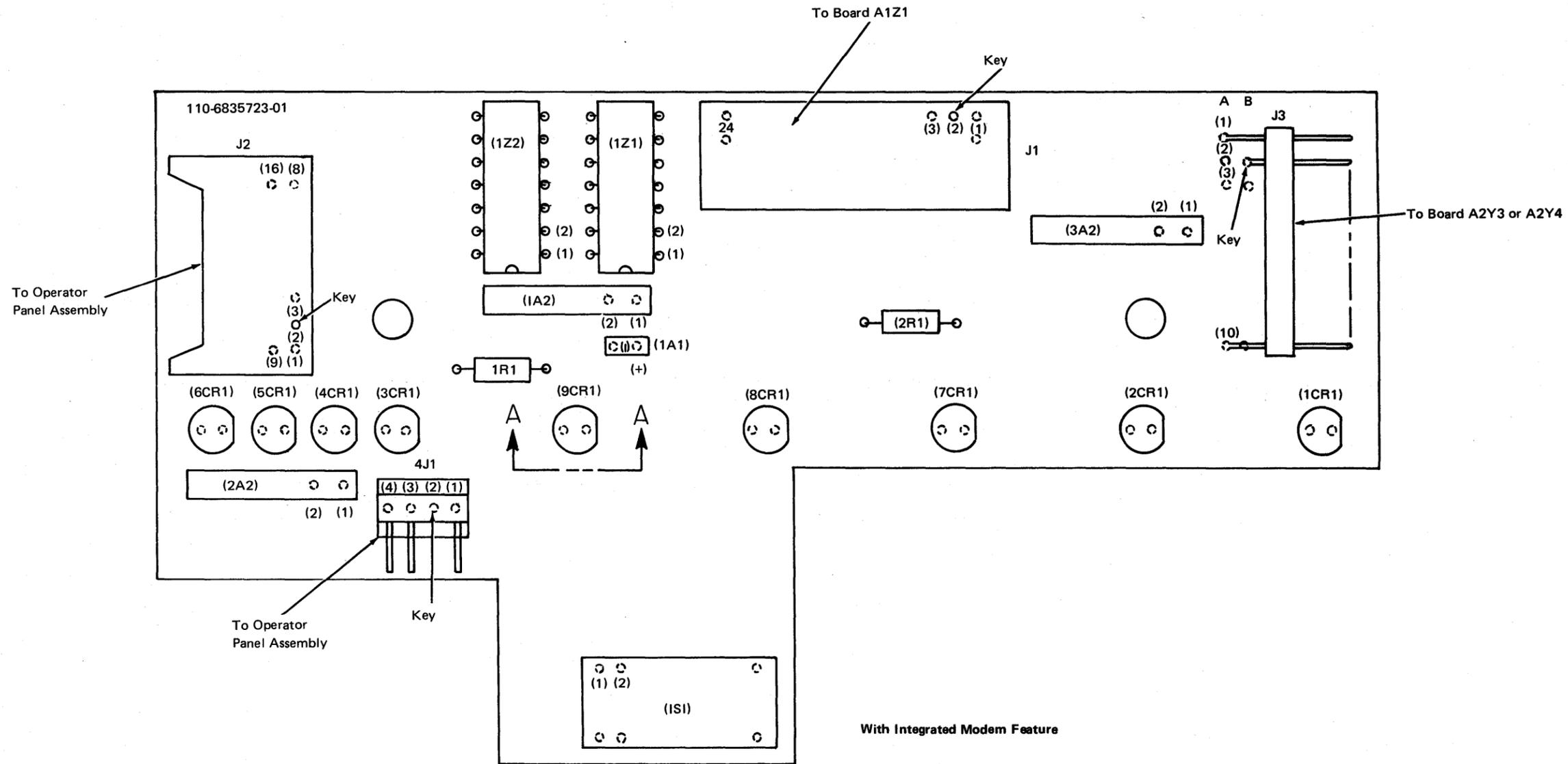


Figure E-2 (Part 2 of 2). Operator Panel Indicator Card

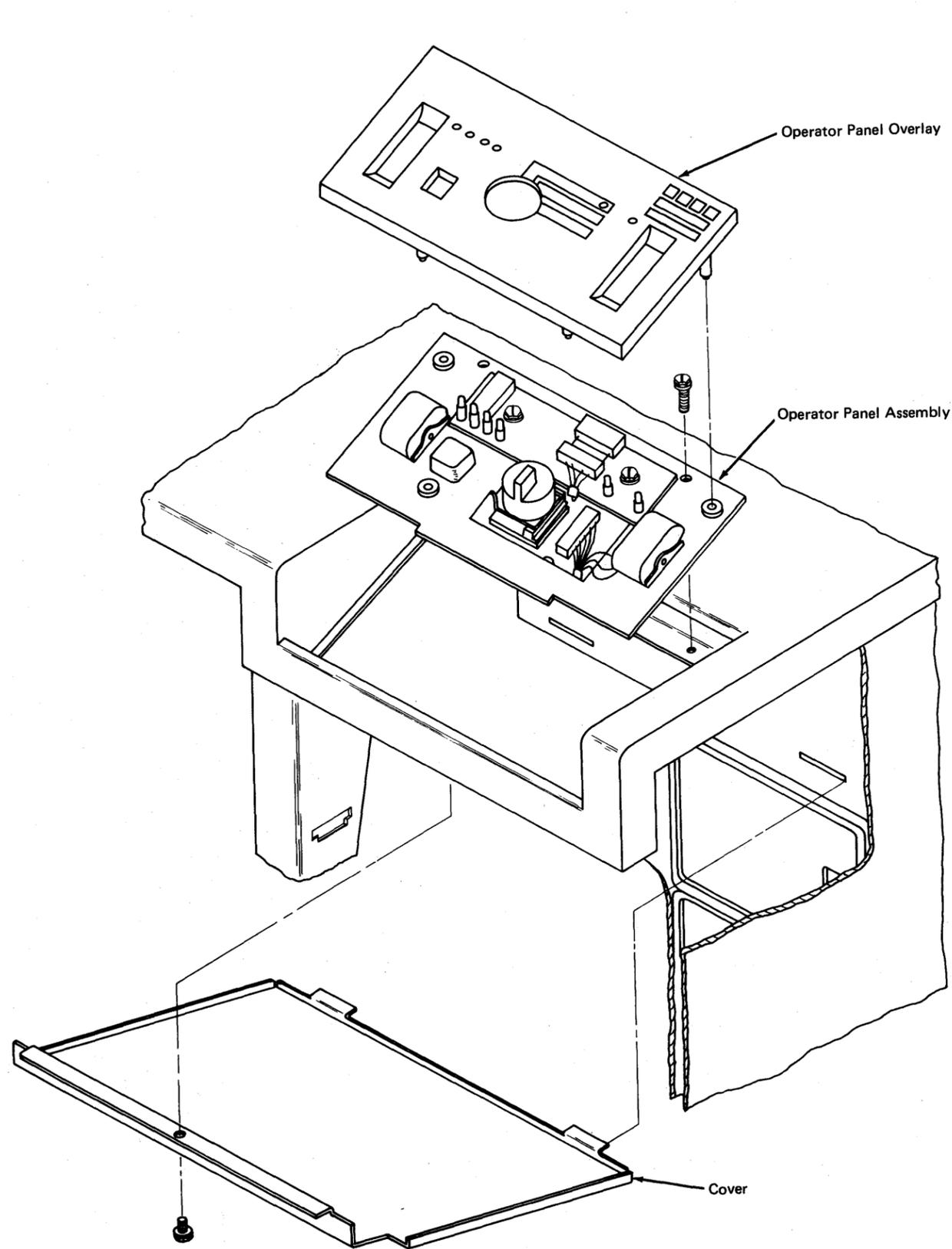
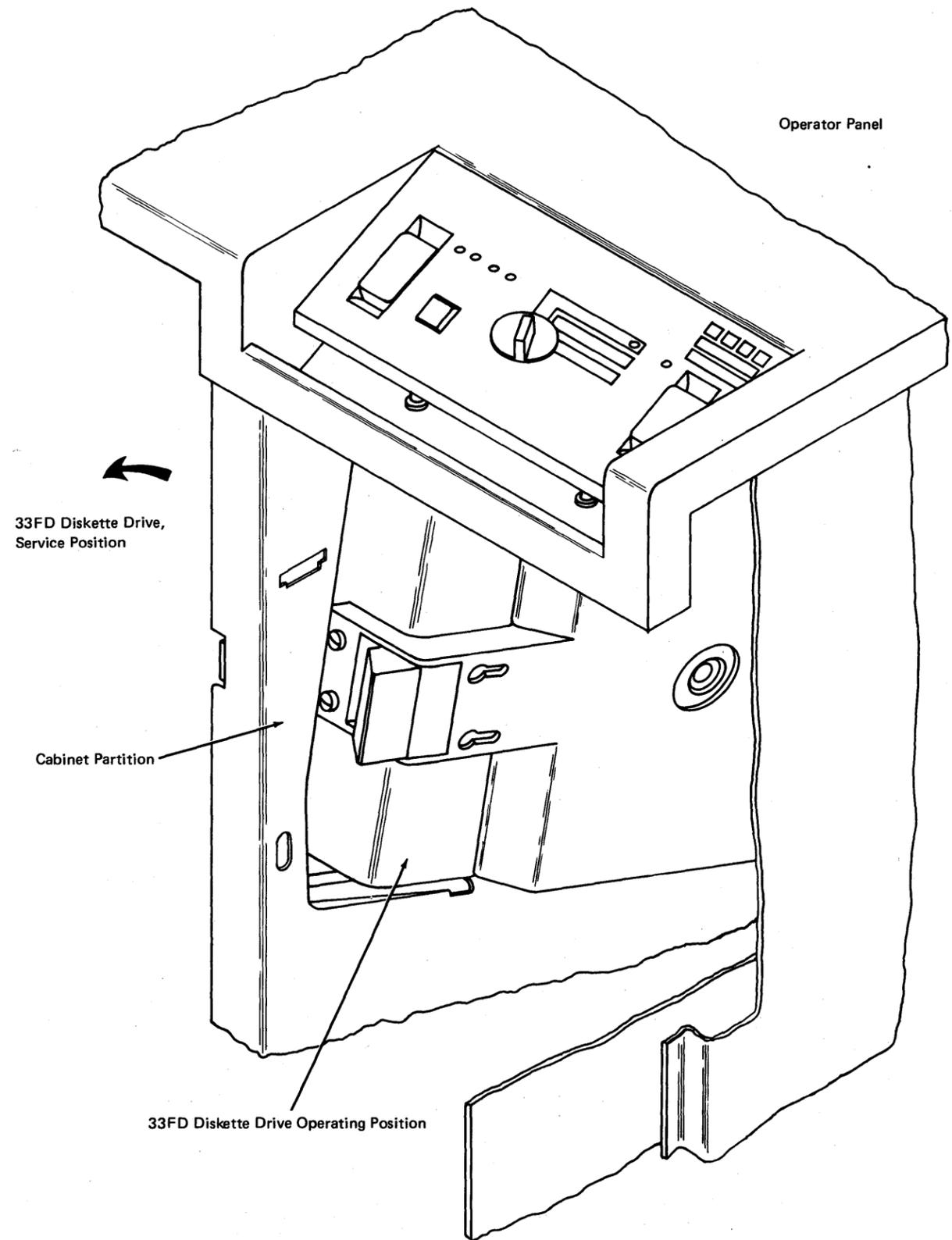


Figure E-3. Operator Panel Locations





## Appendix F. Installation Instructions — Models A, B, and D Local Attached Interface

### F.1 PREREQUISITES

Before the installation procedures are started, all of the following must have been accomplished or verified:

1. Ensure that the machine has been unpacked and moved to its assigned location. See the packing/unpacking instructions for 3274 Models A, B, and D.
2. Verify that customer power is available and the proper power receptacle has been supplied.
3. Verify that all external cables required for installation are available (Bus and Tag cables, EPO and coaxial cables, and terminator blocks).
4. Verify that an EPO plug with jumpers is available if the EPO cable is not going to be installed.
5. Verify that the power plug type (watertight connector, twist lock, etc.) matches the customer power receptacle.
6. Obtain the following information from the customer:
  - Control unit address in hexadecimal \_\_\_\_\_
  - Type of channel that 3274 is to be attached to \_\_\_\_\_
  - Whether the 3274 is to be the last control unit on this channel \_\_\_\_\_
  - Channel priority (high or low) \_\_\_\_\_
  - Channel data rate (Model A only)
    - 100 kB \_\_\_\_\_
    - 20 kB \_\_\_\_\_
    - 10 kB \_\_\_\_\_
7. Verify that T3274A or T3274B OLTs have been included in the system OLT library and that the configuration data sets (CDSs) are up to date. If OLTs are not yet available, ask the customer if display on port A0 is available for subsystem testing.
8. Verify that the *IBM 3274 Control Unit Customizing Procedures Form* has been filled out and is available at installation time. (This form is in Chapter 4 of the *IBM 3270 Information Display System: 3274 Control Unit Planning, Setup, and Customizing Guide, GA27-2827*.)
9. Verify that the feature diskette and the system diskette have been shipped with the machine and are available.
10. Verify that the proper unit control word (UCW) (subchannel) assignment for the 3274 has been made in the host. (Consult with the host CE if necessary.) The 3274 will operate with shared or unshared UCWs and will support disconnect command chaining (DCC). (Block multiplexer channels on some host systems do not support DCC with shared UCWs.) For Models B and D, shared with disconnect, command chaining is recommended. For Model A, an unshared UCW is recommended. Several factors, such as other control units on the channel, availability of UCWs, and priority, should be considered when assigning UCWs. In some cases a deviation from the above recommendations will improve system performance.

11. Match the following features to the machine history card:

Model A01 (A) \_\_\_\_\_

Model B01 (B) \_\_\_\_\_

Model D01 (D) \_\_\_\_\_

#### Attachable Terminals

Base Machine — 8 Category A Terminals \_\_\_\_\_

Terminal Adapter Type A1 — 8 Category A Terminals \_\_\_\_\_

Terminal Adapter Type A2 — 8 Category A Terminals \_\_\_\_\_

Terminal Adapter Type A3 — 8 Category A Terminals \_\_\_\_\_

Terminal Adapter Type B1 — 4 Category B Terminals \_\_\_\_\_

Terminal Adapter Type B2 — 4 Category B Terminals \_\_\_\_\_

Terminal Adapter Type B3 — 4 Category B Terminals \_\_\_\_\_

Terminal Adapter Type B4 — 4 Category B Terminals \_\_\_\_\_

#### Power

Single Phase \_\_\_\_\_ 3 Wire \_\_\_\_\_ 50 Hz \_\_\_\_\_

60 Hz \_\_\_\_\_ 208 V \_\_\_\_\_ 220 V \_\_\_\_\_

240 V \_\_\_\_\_ Locking Plug \_\_\_\_\_

Nonlocking Plug \_\_\_\_\_ Watertight Connector \_\_\_\_\_

12. Open CE and customer access doors. Turn the door latch by using a hex key actuator (IBM PN 6834390) or a number 4 metric Allen wrench (number 156 U.S.).

13. Remove tape from the top of the 33FD drive unit.

**Caution:** The following steps will require the removal of card A1Y4 to set the switches located on that card. If the 3274 is attached to an operating host system, perform the Caution procedure in Figure 2-1 before removing card A1Y4. Failure to do so will cause a host system problem.

14. If installing a 3274 Model A, go to page F-2 (next page).

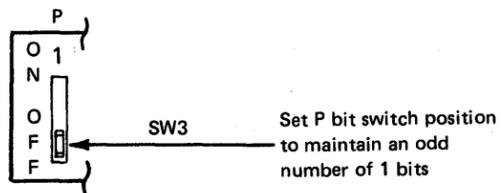
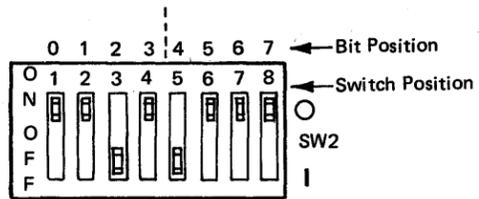
If installing a 3274 Model B or D, go to page F-3.

**F.2 3274 MODEL A INSTALLATION PROCEDURE**

1. **Control Unit Address Switch Settings.** Set the control unit address switches on card A1Y4 to the hexadecimal address obtained from the customer (F.1, Step 6) using Figure F-1 as a guide. Use Figure F-2 to convert the hexadecimal address to binary. Be sure to maintain odd parity. Switch position is Off for a binary 1 bit, On for a binary 0 bit.

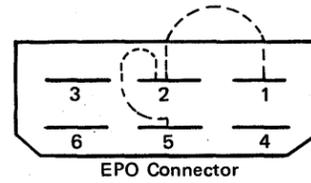
Example:

Control Unit Address for hex 28  
(obtained from Figure F-2)  
Hex 28 = 0010 1000 P



2. **Range Address.** It is not necessary to set the range address on a 3274 Model A.
3. **Mode (burst or byte).** Determine the type of channel to which your 3274 is attached, and set switch 3, position 5 for burst or byte mode using Figure F-1 as a guide.
4. **Priority Selection.** Set switch 1 (both positions) for the priority established by the customer (F.1, Step 6) using Figure F-1 as a guide. (High priority is set at the factory.)
5. Turn the Power/Interface (rotary) switch to Local/Offline.

6. Install EPO jumper/plug between EPO receptacle pins 1 and 2 and 2 and 5 (located on the primary power box). See the following figure.



7. Ensure all safety shields and panels are in place.
8. Plug the 3274 power cord into the AC power source.
9. Power on. Verify that the logic gate fans and the 33FD drive motor are operating. If they are not operating, go to Subsystem Problem Isolation, Chapter 2, Step 1.
10. The 8 4 2 1 indicators should advance to 0010. If the 8 4 2 1 indicators do not advance to 0010, go to MAP B150. If the 8 4 2 1 indicators are correct, go to Step 11.
11. Turn power off.
12. Remove the two capscrews securing the black shield that covers the 3274 Bus and Tag cable receptacles (located below the 33FD drive), and then remove the shield. See Figure 4-9 for locations.
13. Determine Bus and Tag cabling requirements. See cable installation diagrams (Figures F-4, F-5, and F-6) for specific instructions.
14. Inspect the Bus and Tag cable plugs and receptacles for any obvious damage. If necessary, verify the internal board and cable wiring from Bus In to Bus Out connectors and from Tag In to Tag Out connectors. Use Figure C-6, Parts 2, 3, 4, and 5.
15. Turn the AC Power switch located on the primary power box to the off position.

Control Unit Address Examples

CU Address Decimal	CU Address Hex	Switch →	Switch 2								Switch 3
		Switch Pos	Pos 1	Pos 2	Pos 3	Pos 4	Pos 5	Pos 6	Pos 7	Pos 8	Pos 1
		Binary Bits →	0	1	2	3	4	5	6	7	p
02	02		0	0	0	0	0	0	1	0	0
38	26		0	0	1	0	0	1	1	0	0
40	28		0 (ON)	0 (ON)	1 (OFF)	0 (ON)	1 (OFF)	0 (ON)	0 (ON)	0 (ON)	1 (OFF)

Legend:  
Switch Off = Binary 1  
Switch On = Binary 0  
← Switch settings for Hex 28

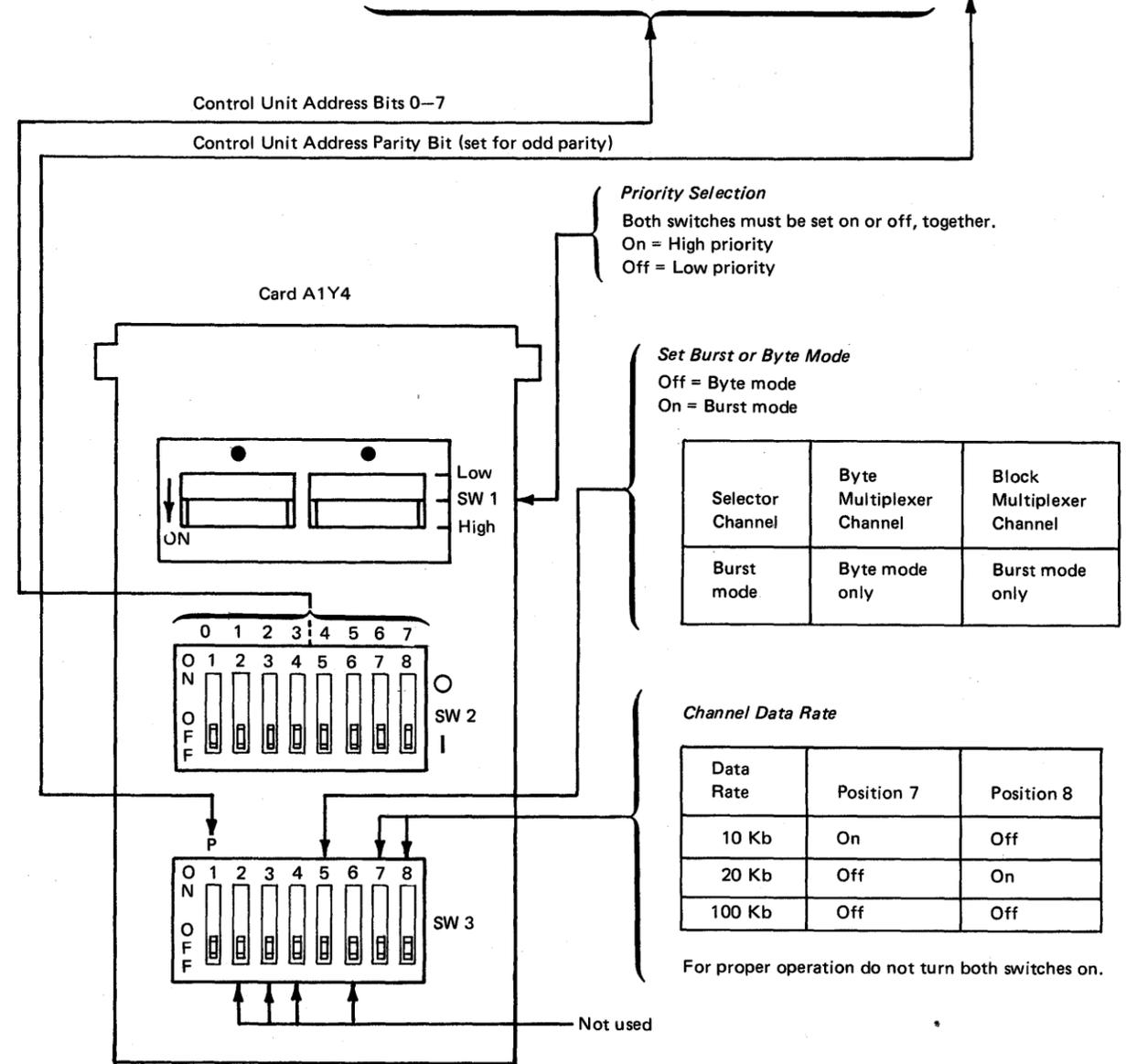


Figure F-1. Switch Settings on Card A1Y4 – Model A Only

**Caution:** Before removing any EPO cable from any control unit, turn its Interface Enable/Disable switch to the disable position (Offline). Turn power off, and remove the cable.

**Caution:** Removing or installing an EPO cable or plug in the CPU or CU may destroy information in the CPU or I/O. Check with the system CE before attempting any changes to the EPO cables or jumpers.

16. Remove the EPO plug/jumper installed in Step 6 if an EPO cable is to be installed. Skip Steps 17 and 18 if an EPO cable is not to be used.

**DANGER**

If the EPO jumper/plug is used, power for this 3274 cannot be turned off by the system EPO.

17. If replacing an existing 3272 and the EPO cable is used, remove the EPO cable from the 3272 unit and install it in the 3274.

18. If installing a 3274 at the end of the channel interface or inserting a 3274 in the channel interface, a new EPO cable, if required, should be installed in the 3274.

19. Replace the black Bus and Tag cable shield and cap-screws removed in Step 12.

20. Turn the AC Power switch located on the *primary power box* to the on position.

21. Insert an *uncustomized* system diskette into the 33FD drive.

22. Close the 33FD drive cover.

23. The Power/Interface (rotary) switch should still be in the Local /Offline position at this time. Power-on the machine by pressing the spring-loaded mainline switch on the *operator panel*.

24. Observe the 8 4 2 1 indicators. The indicators should sequence through 1111 and then stop at 1101 (if this does not occur, go to MAP B150). Press and hold ALT 2, and then press and release IML. Observe the indicators again. The indicators will stop at 0010 (if this does not occur, go to MAP B150), indicating that this is a 3274 Model A.

25. Turn the Power/Interface (rotary) switch to Local/Online. The Offline indicator should go out, and the 8 4 2 1 indicators should change to 0100 (if this does not occur, go to MAP B150). The S/370 interface is now enabled.

26. If OLTs are available, go to Step 27. If OLTs are not available, remove the system diskette, turn the Power/Interface switch to Local/Offline, wait for the Offline indicator to come on (if this does not occur, go to MAP B150), and turn power off. The installation is now complete. Notify the customer that the 3274 is ready for device cable attachment and diskette customizing.

27. Request that OLT T3274B, routine 1, be run. (See User Guide D99-3274D). Go to MAP B150 if OLT fails to run correctly.

28. Upon a successful OLT run, remove the system diskette, turn the Power/Interface (rotary) switch to Local/Offline, wait for the Offline indicator to come on (if this does not occur, go to MAP B150), and turn power off. The installation is now completed. Notify the customer that the 3274 is ready for device cable attachment and diskette customizing.

Dec.	Hex	Binary									
0	00	0000 0000 P	64	40	0100 0000 P	128	80	1000 0000 P	192	C0	1100 0000 P
1	01	0000 0001 P	65	41	0100 0001 P	129	81	1000 0001 P	193	C1	1100 0001 P
2	02	0000 0010 P	66	42	0100 0010 P	130	82	1000 0010 P	194	C2	1100 0010 P
3	03	0000 0011 P	67	43	0100 0011 P	131	83	1000 0011 P	195	C3	1100 0011 P
4	04	0000 0100 P	68	44	0100 0100 P	132	84	1000 0100 P	196	C4	1100 0100 P
5	05	0000 0101 P	69	45	0100 0101 P	133	85	1000 0101 P	197	C5	1100 0101 P
6	06	0000 0110 P	70	46	0100 0110 P	134	86	1000 0110 P	198	C6	1100 0110 P
7	07	0000 0111 P	71	47	0100 0111 P	135	87	1000 0111 P	199	C7	1100 0111 P
8	08	0000 1000 P	72	48	0100 1000 P	136	88	1000 1000 P	200	C8	1100 1000 P
9	09	0000 1001 P	73	49	0100 1001 P	137	89	1000 1001 P	201	C9	1100 1001 P
10	0A	0000 1010 P	74	4A	0100 1010 P	138	8A	1000 1010 P	202	CA	1100 1010 P
11	0B	0000 1011 P	75	4B	0100 1011 P	139	8B	1000 1011 P	203	CB	1100 1011 P
12	0C	0000 1100 P	76	4C	0100 1100 P	140	8C	1000 1100 P	204	CC	1100 1100 P
13	0D	0000 1101 P	77	4D	0100 1101 P	141	8D	1000 1101 P	205	CD	1100 1101 P
14	0E	0000 1110 P	78	4E	0100 1110 P	142	8E	1000 1110 P	206	CE	1100 1110 P
15	0F	0000 1111 P	79	4F	0100 1111 P	143	8F	1000 1111 P	207	CF	1100 1111 P
16	10	0001 0000 P	80	50	0101 0000 P	144	90	1001 0000 P	208	D0	1101 0000 P
17	11	0001 0001 P	81	51	0101 0001 P	145	91	1001 0001 P	209	D1	1101 0001 P
18	12	0001 0010 P	82	52	0101 0010 P	146	92	1001 0010 P	210	D2	1101 0010 P
19	13	0001 0011 P	83	53	0101 0011 P	147	93	1001 0011 P	211	D3	1101 0011 P
20	14	0001 0100 P	84	54	0101 0100 P	148	94	1001 0100 P	212	D4	1101 0100 P
21	15	0001 0101 P	85	55	0101 0101 P	149	95	1001 0101 P	213	D5	1101 0101 P
22	16	0001 0110 P	86	56	0101 0110 P	150	96	1001 0110 P	214	D6	1101 0110 P
23	17	0001 0111 P	87	57	0101 0111 P	151	97	1001 0111 P	215	D7	1101 0111 P
24	18	0001 1000 P	88	58	0101 1000 P	152	98	1001 1000 P	216	D8	1101 1000 P
25	19	0001 1001 P	89	59	0101 1001 P	153	99	1001 1001 P	217	D9	1101 1001 P
26	1A	0001 1010 P	90	5A	0101 1010 P	154	9A	1001 1010 P	218	DA	1101 1010 P
27	1B	0001 1011 P	91	5B	0101 1011 P	155	9B	1001 1011 P	219	DB	1101 1011 P
28	1C	0001 1100 P	92	5C	0101 1100 P	156	9C	1001 1100 P	220	DC	1101 1100 P
29	1D	0001 1101 P	93	5D	0101 1101 P	157	9D	1001 1101 P	221	DD	1101 1101 P
30	1E	0001 1110 P	94	5E	0101 1110 P	158	9E	1001 1110 P	222	DE	1101 1110 P
31	1F	0001 1111 P	95	5F	0101 1111 P	159	9F	1001 1111 P	223	DF	1101 1111 P
32	20	0010 0000 P	96	60	0110 0000 P	160	A0	1010 0000 P	224	E0	1110 0000 P
33	21	0010 0001 P	97	61	0110 0001 P	161	A1	1010 0001 P	225	E1	1110 0001 P
34	22	0010 0010 P	98	62	0110 0010 P	162	A2	1010 0010 P	226	E2	1110 0010 P
35	23	0010 0011 P	99	63	0110 0011 P	163	A3	1010 0011 P	227	E3	1110 0011 P
36	24	0010 0100 P	100	64	0110 0100 P	164	A4	1010 0100 P	228	E4	1110 0100 P
37	25	0010 0101 P	101	65	0110 0101 P	165	A5	1010 0101 P	229	E5	1110 0101 P
38	26	0010 0110 P	102	66	0110 0110 P	166	A6	1010 0110 P	230	E6	1110 0110 P
39	27	0010 0111 P	103	67	0110 0111 P	167	A7	1010 0111 P	231	E7	1110 0111 P
40	28	0010 1000 P	104	68	0110 1000 P	168	A8	1010 1000 P	232	E8	1110 1000 P
41	29	0010 1001 P	105	69	0110 1001 P	169	A9	1010 1001 P	233	E9	1110 1001 P
42	2A	0010 1010 P	106	6A	0110 1010 P	170	AA	1010 1010 P	234	EA	1110 1010 P
43	2B	0010 1011 P	107	6B	0110 1011 P	171	AB	1010 1011 P	235	EB	1110 1011 P
44	2C	0010 1100 P	108	6C	0110 1100 P	172	AC	1010 1100 P	236	EC	1110 1100 P
45	2D	0010 1101 P	109	6D	0110 1101 P	173	AD	1010 1101 P	237	ED	1110 1101 P
46	2E	0010 1110 P	110	6E	0110 1110 P	174	AE	1010 1110 P	238	EE	1110 1110 P
47	2F	0010 1111 P	111	6F	0110 1111 P	175	AF	1010 1111 P	239	EF	1110 1111 P
48	30	0011 0000 P	112	70	0111 0000 P	176	B0	1011 0000 P	240	F0	1111 0000 P
49	31	0011 0001 P	113	71	0111 0001 P	177	B1	1011 0001 P	241	F1	1111 0001 P
50	32	0011 0010 P	114	72	0111 0010 P	178	B2	1011 0010 P	242	F2	1111 0010 P
51	33	0011 0011 P	115	73	0111 0011 P	179	B3	1011 0011 P	243	F3	1111 0011 P
52	34	0011 0100 P	116	74	0111 0100 P	180	B4	1011 0100 P	244	F4	1111 0100 P
53	35	0011 0101 P	117	75	0111 0101 P	181	B5	1011 0101 P	245	F5	1111 0101 P
54	36	0011 0110 P	118	76	0111 0110 P	182	B6	1011 0110 P	246	F6	1111 0110 P
55	37	0011 0111 P	119	77	0111 0111 P	183	B7	1011 0111 P	247	F7	1111 0111 P
56	38	0011 1000 P	120	78	0111 1000 P	184	B8	1011 1000 P	248	F8	1111 1000 P
57	39	0011 1001 P	121	79	0111 1001 P	185	B9	1011 1001 P	249	F9	1111 1001 P
58	3A	0011 1010 P	122	7A	0111 1010 P	186	BA	1011 1010 P	250	FA	1111 1010 P
59	3B	0011 1011 P	123	7B	0111 1011 P	187	BB	1011 1011 P	251	FB	1111 1011 P
60	3C	0011 1100 P	124	7C	0111 1100 P	188	BC	1011 1100 P	252	FC	1111 1100 P
61	3D	0011 1101 P	125	7D	0111 1101 P	189	BD	1011 1101 P	253	FD	1111 1101 P
62	3E	0011 1110 P	126	7E	0111 1110 P	190	BE	1011 1110 P	254	FE	1111 1110 P
63	3F	0011 1111 P	127	7F	0111 1111 P	191	BF	1011 1111 P	255	FF	1111 1111 P

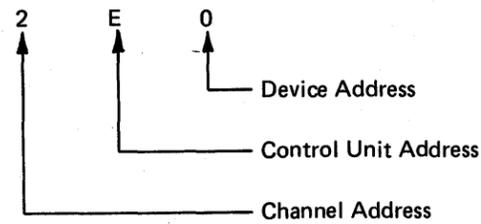
Note: Odd parity must be maintained. Set the P (parity) bit (as required) for an odd number of 1's in the binary number.

Figure F-2. Model A Control Unit Addresses

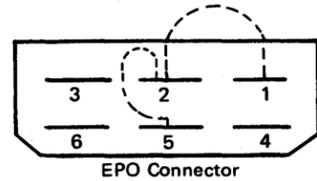
**F.3 3274 MODELS B AND D INSTALLATION PROCEDURE**

1. **Control Unit Address Switch Settings.** Set the control unit address switches on card A1Y4 to the hexadecimal address obtained from the customer (F. 1, Step 6) using Figure F-3 as a guide. Switch position is Off for a binary 1 bit, and On for a binary 0 bit. (Switch 2, positions 5, 6, 7, and 8 are not used and can be on or off. Switch 3, position 1 is the parity bit and must always be off.)

*Typical Channel Address*



4. **Priority Selection.** Set switch 1 (both positions) for the priority established by the customer (F. 1, Step 6) using Figure F-3 as a guide. (High priority is set at the factory.)
5. Turn the Power/Interface (rotary) switch to Local/Offline.
6. Install the EPO jumper/plug between EPO receptacle pins 1 and 2 and 2 and 5 (located on the primary power box). See the following figure.



2. **Range Address.** The range address is the number of possible device addresses that are valid for your machine. This is based on the total number of category A and B adapters installed in your machine. See the example below to calculate the range address. (The range is set at the plant of manufacture.) Verify, using Figure F-3.

Example: Base Category A Adapter = 8 devices  
 A1 Adapter = 8 devices  
 B1 Adapter = 4 devices

Total = 20 devices

20 Devices Total = The device addresses valid for devices 0-19. The range address is 0-19.

3. **Byte/Burst Mode.** Forced burst mode for the 3274 Models B and D is recommended only when the 3274 is the only control unit attached to the byte multiplex channel. Set switch 3, position 5, using Figure F-3. Switch 3, positions 6, 7, and 8 are not used and can be on or off.

7. Ensure all safety shields and panels are in place.
8. Plug the 3274 power cord into the AC power source.
9. Turn power on. Verify that the logic gate fans and the 33FD drive motor are operating. If they are not operating, go to Subsystem Problem Isolation, Chapter 2, and refer to the Notes preceding Step 1.
10. The 8 4 2 1 indicators should advance to 0010. If the 8 4 2 1 indicators do not advance to 0010, go to MAP B150. If the 8 4 2 1 indicators are correct, go to Step 15.
11. Turn power off.
12. Remove the two capscrews securing the black shield that covers the 3274 Bus and Tag cable receptacles (located below the 33FD drive), and then remove the shield. See Figure 4-9 for locations.

**Control Unit Addresses with More Than 16 Devices**

CU Address Decimal	CU Address Hex	Switch Pos.	Pos 1	Pos 2	Pos 3	Pos 4
		Binary Bits	0	1	2	3
0	00		ON	ON	ON	ON
2	20		ON	ON	OFF	ON
4	40		ON	OFF	ON	ON
6	60		ON	OFF	OFF	ON
8	80		OFF	ON	ON	ON
10	A0		OFF	ON	OFF	ON
12	C0		OFF	OFF	ON	ON
14	E0		OFF	OFF	OFF	ON

**Control Unit Addresses with 16 or Fewer Devices**

CU Address Decimal	CU Address Hex	Switch Pos.	Pos 1	Pos 2	Pos 3	Pos 4
		Binary Bits	0	1	2	3
0	00		ON	ON	ON	ON
1	10		ON	ON	ON	OFF
2	20		ON	ON	OFF	ON
3	30		ON	ON	OFF	OFF
4	40		ON	OFF	ON	ON
5	50		ON	OFF	ON	OFF
6	60		ON	OFF	OFF	ON
7	70		ON	OFF	OFF	OFF
8	80		OFF	ON	ON	ON
9	90		OFF	ON	ON	OFF
10	A0		OFF	ON	OFF	ON
11	B0		OFF	ON	OFF	OFF
12	C0		OFF	OFF	ON	ON
13	D0		OFF	OFF	ON	OFF
14	E0		OFF	OFF	OFF	ON
15	F0		OFF	OFF	OFF	OFF

Note: CU numbers 1, 3, 5, 7, 9, 11, 13, and 15 cannot be assigned to control units with 17 or more devices attached.

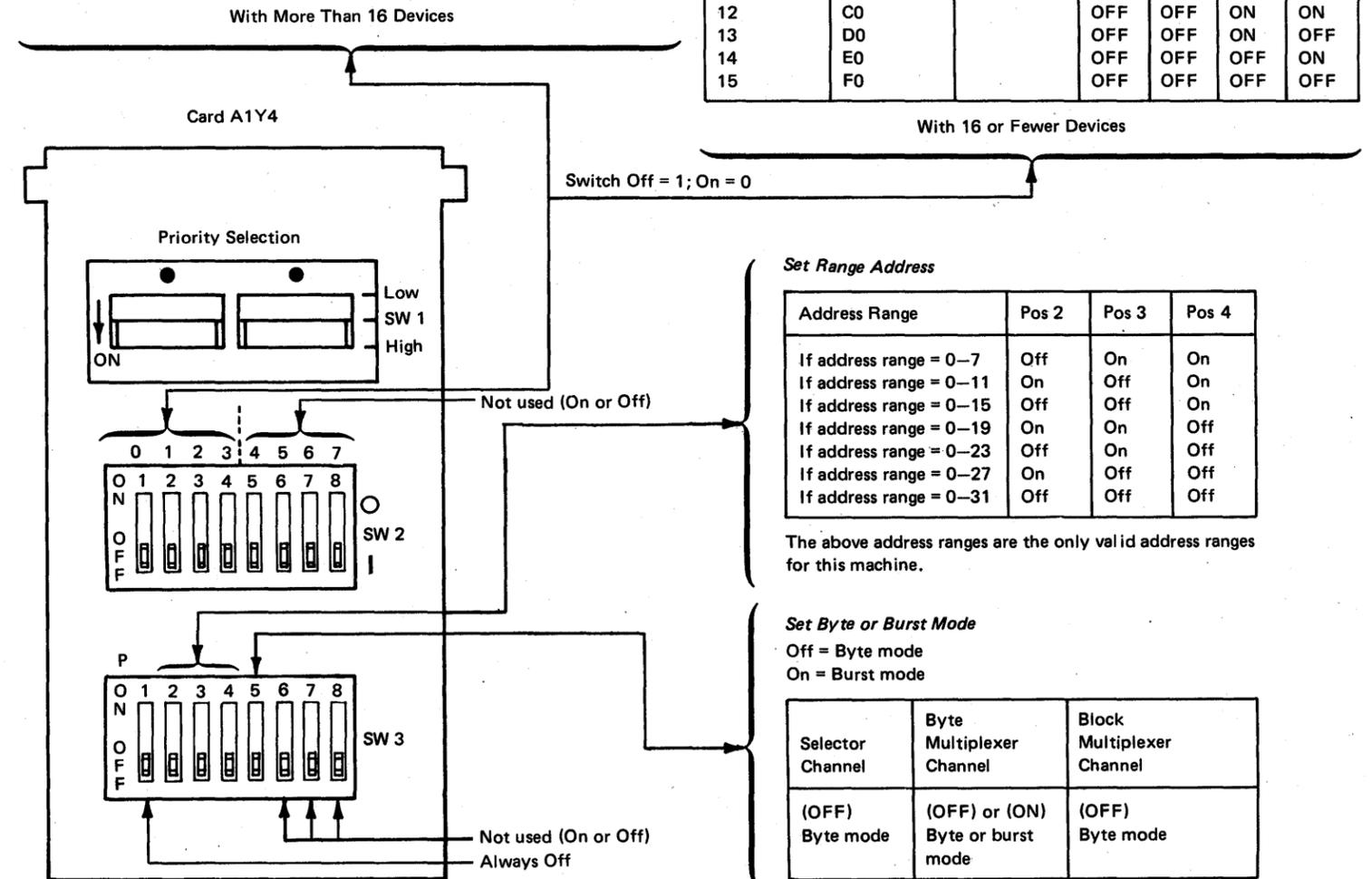


Figure F-3. Switch Settings on Card A1Y4 – Models B and D Only

13. Determine Bus and Tag cabling requirements. See cable installation diagrams (Figures F-4, F-5, and F-6) for specific instructions.
14. Inspect the Bus and Tag cable plugs and receptacles for any obvious damage. To verify the internal board and cable wiring from Bus In to Bus Out connectors and Tag In to Tag Out connectors, use Figure C-6, Parts 2, 3, 4, and 5.
15. Turn the AC Power switch located on the primary power box to the off position.
16. Remove the EPO plug/jumper installed in Step 6 if an EPO cable is to be installed. Skip Steps 17 and 18 if an EPO cable is not to be used.

**DANGER**

If the EPO jumper/plug is used, power for this 3274 cannot be turned off by the system EPO.

**Caution:** Before removing any EPO cable from a control unit, turn its Interface Enable/Disable switch to the disable position (Offline). Turn power off, and then remove the cable.

**Caution:** Removing or installing an EPO cable or plug in the CPU or CU may destroy information in the CPU or I/O. Check with the system CE before attempting any changes to the EPO cables or jumpers.

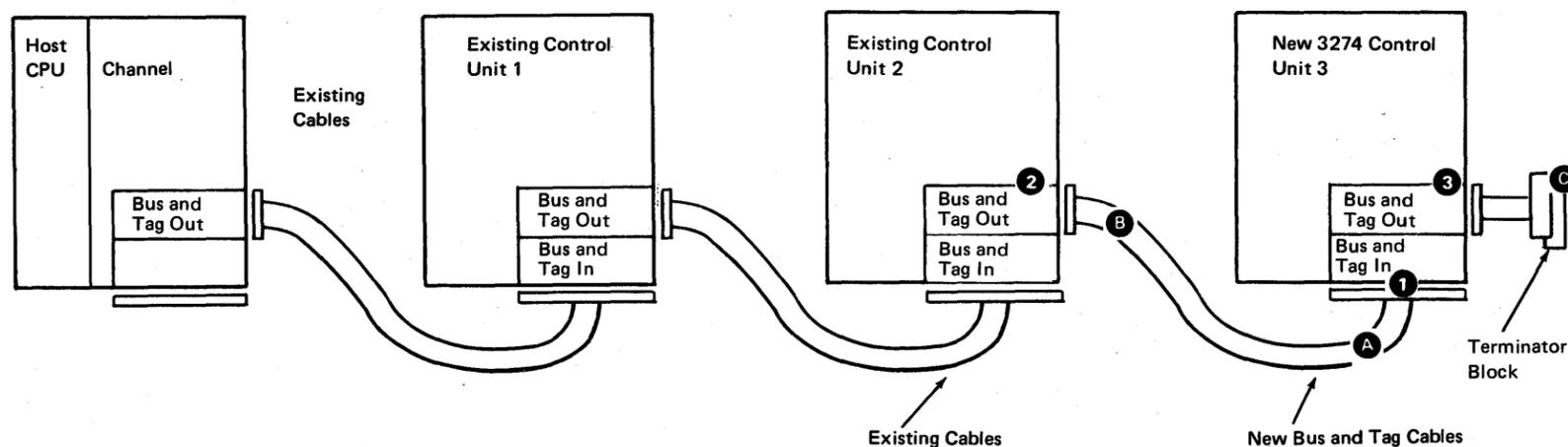
17. If replacing an existing 3272 and the EPO cable is used, remove the EPO cable from the 3272 unit and install it in the 3274.
18. If installing a 3274 at the end of the channel interface or inserting a 3274 in the channel interface, a new EPO cable, if required, should be installed in the 3274.
19. Replace the black Bus and Tag cable shield and cap-screws removed in Step 12.
20. Turn the AC Power switch located on the primary power box to the on position.
21. Insert an uncustomized system diskette into the 33FD diskette drive.
22. Close the 33FD diskette drive cover.

23. The Power/Interface (rotary) switch should still be in the Local/Offline position at this time. Power-on the machine by pressing the spring-loaded mainline switch on the operator panel.
24. Observe the 8 4 2 1 indicators. The indicators should advance through 1111 and stop at 1101 (if this does not occur, go to MAP B150). Press and hold ALT 2; then press and release IML. Observe the 8 4 2 1 indicators again. The indicators will stop at 0001 for Model B, and at 0101 for Model D (if this does not occur, go to MAP B150).
25. Turn the Power/Interface (rotary) switch to Local/Online. The Offline indicator should go out, and the 8 4 2 1 indicators should change to 0011 for Model B and to 0110 for Model D (if this does not occur, go to MAP B150). The S/370 interface is now enabled.

26. If OLTs are available, go to Step 27. If OLTs are not available, remove the system diskette, turn the Power/Interface switch to Local/Offline, wait for the Offline indicator to turn on (if this does not occur, go to MAP B150), and switch power off. The installation is now completed. Notify the customer that the 3274 is ready for device cable attachment and diskette customizing.
27. Request that OLT T3274A, routine 1, be run. (See User Guide D99-3274A.) Go to MAP B150 if OLT fails to run correctly.

28. Upon successful OLT run, remove the system diskette, turn the Power/Interface (rotary) switch to Local/Offline, wait for the Offline indicator to turn on (if this does not occur, go to MAP B150), and turn power off. The installation is now completed. Notify the customer that the 3274 is ready for device cable attachment and diskette customizing.

**Note:** The same cable connector colors should never be connected together. For example: light gray cable end goes to dark gray receptacle in 3274; dark gray cable end goes to light gray receptacle in 3274.



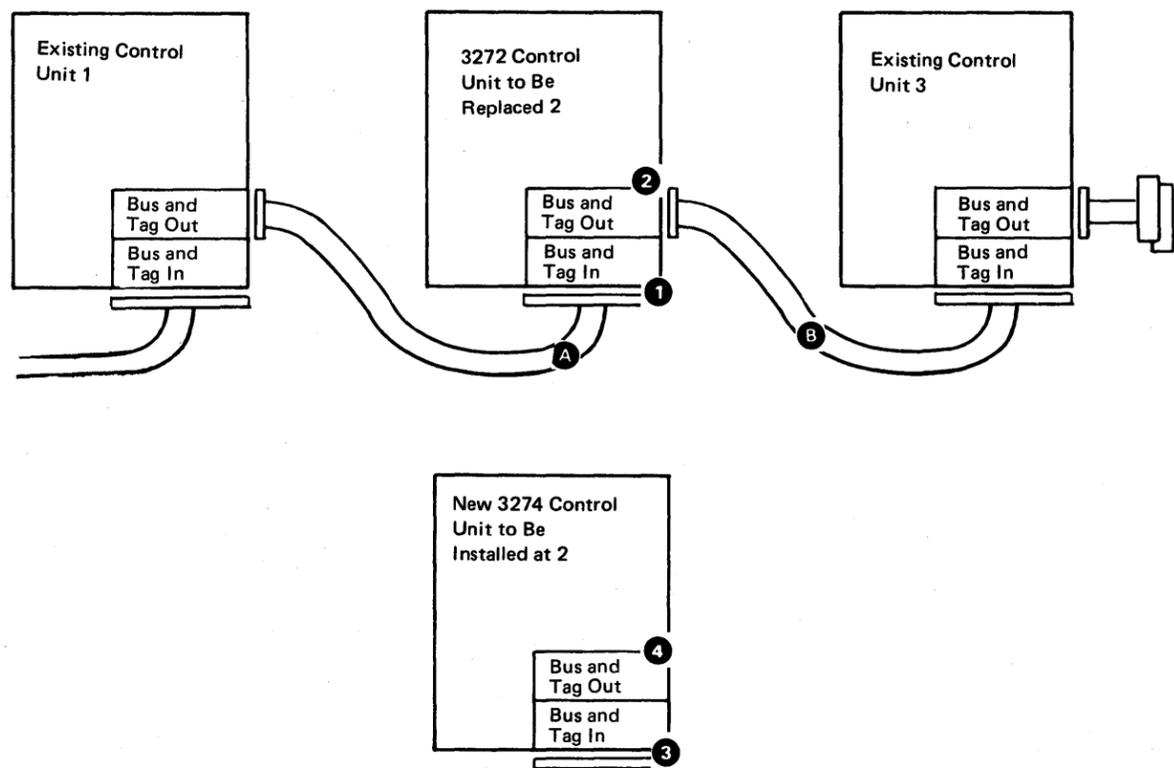
**Caution:** Before removing any terminator block from an existing control unit, ensure that the CPU/channel state will permit removal of the block with no adverse effect.

1. Connect *new* Bus and Tag cable ends **A** (light gray) to 3274 Bus and Tag receptacles **1** (dark gray).
2. Remove terminator blocks **C** from existing control unit Bus and Tag receptacles **2** (light gray), if installed.
3. Connect *new* Bus and Tag cable ends **B** (dark gray) to existing control unit Bus and Tag receptacles **2** (light gray).
4. Connect terminator blocks **C** to 3274 Bus and Tag receptacles **3** (light gray).
5. Return to local attach installation procedures.

**Note:** Bus and Tag Out and Bus and Tag In receptacle locations may vary from control unit to control unit.

**Figure F-4. Cable Installation Diagram — Installing a 3274 on End-of-Channel Interface**





**Caution:** Before removing any Bus and Tag cables from an existing control unit, ensure that the CPU/channel state will permit removal of the cables.

1. Remove existing Bus and Tag cable ends **A** (light gray) from 3272 Bus and Tag receptacles **1** (dark gray).
2. Remove existing Bus and Tag cable ends **B** (dark gray) from 3272 Bus and Tag receptacles **2** (light gray).
3. Move the 3272 away from the opening in the raised floor and position the 3274 near enough to the opening to connect the cables in the following steps.

**Note:** The same cable connector colors should never be connected together. For example: a light gray cable end goes to a dark gray receptacle in the 3274, a dark gray cable end goes to a light gray receptacle in the 3274.

4. Connect existing Bus and Tag cable ends **A** (light gray) to the 3274 Bus and Tag receptacles **3** (dark gray).
5. Connect existing Bus and Tag cable ends **B** (dark gray) to the 3274 Bus and Tag receptacles **4** (light gray).
6. Return to local attach installation procedures.

**Note:** Bus and Tag Out and Bus and Tag In receptacle locations may vary from control unit to control unit.

**Figure F-6. Cable Installation Diagram – Replacing an Existing 3272 on Channel Interface**

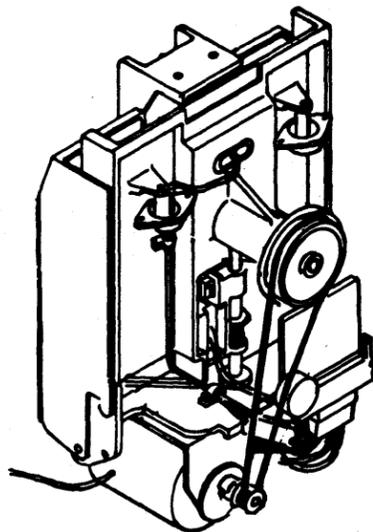


## Appendix G. 33FD Diskette Drive Theory and Maintenance

### G.1 INTRODUCTION

The 33FD diskette drive reads and writes data on the magnetic surface of a diskette 1 in the following applications:

- Initial control program load.
- Microprogram storage backup.
- Diagnostic microprogram storage.
- Any location where data-interchange media (cards, tapes, etc.) are presently used by the data processing industry.
- Data entry.
- Data exchange.
- Data storage.



#### G.1.1 Machine Characteristics

- Weight  
12 lb (5.44 kg)
- Power and supply voltages  
From system control unit
- Connecting cables  
One signal and DC power  
One AC power
- Disk rotational speed  
360 rpm clockwise, viewed from the front

#### G.1.2 Power Requirements

All power required by the 33FD diskette drive is obtained from the using system.

The 33FD diskette drive is available in the following versions:

- 60 Hz, single-phase AC power (for one of two drive motors):  
200V ( $\pm 10\%$ ), 208V ( $\pm 10\%$ ), 230V ( $\pm 10\%$ ); or  
100V ( $\pm 10\%$ ), 115V ( $\pm 10\%$ )

Average operating current:  
0.55 amp for 200 to 230 volt motor  
1.0 amp for 100 to 115 volt motor

- 50 Hz, single-phase AC power (for one of two drive motors):  
200V ( $\pm 10\%$ ), 220V ( $\pm 10\%$ ), 235V ( $\pm 10\%$ ); or  
100V ( $\pm 10\%$ ), 110V ( $\pm 10\%$ ), 112.5V ( $\pm 10\%$ ),  
123.5V ( $\pm 10\%$ )

Average operating current:  
0.55 amp for 200 to 235 volt motor  
1.0 amp for 100 to 123.5 volt motor

- MST (DC power)  
+24V ( $\pm 12\%$ ), maximum current 0.75 amp  
+6V ( $\pm 10\%$ ), maximum current 0.16 amp  
-4V ( $\pm 10\%$ ), maximum current 0.8 amp
- VTL (DC power)  
+24V ( $\pm 12\%$ ), maximum current 0.60 amp  
+5V ( $\pm 10\%$ ), maximum current 1.0 amp  
-5V ( $\pm 10\%$ ), maximum current 0.40 amp

#### G.1.3 Maintenance Approach

The 33FD diskette drive requires no scheduled maintenance. Success of this maintenance approach depends upon proper care of diskettes and head/carriage assemblies.

##### Offline Servicing

Maintenance of the 33FD diskette drive includes:

- Diagnosis.
- Offline repair, checkout, and adjustment.
- Online verification.

Refer to maintenance manuals of the using system for methods of offline/online servicing.

#### G.1.4 Tools

##### CE Alignment Tool Kit (PN 2200698)

The CE alignment tool is used for:

- Alignment of the read/write head by adjusting the read head to track 0.
- Adjustment of the phototransistor assembly by mechanical alignment.

##### Head Cleaning Tools (see page G-9)

- Brush (PN 2200106)
- Isopropyl alcohol (PN 2200200)
- Cloth (PN 2108930)

#### G.1.5 Personal Safety

Because the 33FD obtains its AC and DC power from the using system, voltage is present on 33FD terminals and connectors when the 33FD drive motor is energized.

Motor case temperature may exceed safe handling limits.

*Danger* notices in this manual warn of personal safety hazards.

#### G.1.6 Machine Safety

The 33FD diskette drive can be damaged by improper operation or incorrect repair actions. *Caution* notices in this manual warn against actions that could damage the machine or diskette.

The 33FD diskette drive contains plastic materials that are subject to the effects of a wide variety of chemicals, including IBM cleaning fluid.

To avoid serious damage to leadscrew and carriage:

- Lubricate leadscrew only with IBM No. 6 oil when head carriage is replaced.

To avoid serious damage to the read/write head:

- Clean head only with isopropyl alcohol and clean cloth after removing diskette (see page G-9).

#### G.1.7 Diskette Safety

To avoid diskette damage, observe recommended diskette handling and storage procedures (see page G-7).

G.2 DISKETTE DRIVE COMPONENTS

**Diskette Cover**

The diskette cover permits insertion and removal of the diskette.

**Disk Collet Assembly**

When the diskette cover is closed, the spring-loaded collet centers and clamps the disk to the disk drive hub.

**Head Load Actuator Assembly**

The head load actuator assembly consists of a magnet and an armature. During a read or write operation, the head load actuator is energized and allows the head pressure pad arm to push the disk against the read/write head. At the same time, the head load actuator armature compresses the diskette to locate and clean the disk. While not reading or writing, the head load actuator is de-energized and holds the head pressure pad assembly away from the disk to reduce wear to the disk surface and the read/write head.

**Preload Spring**

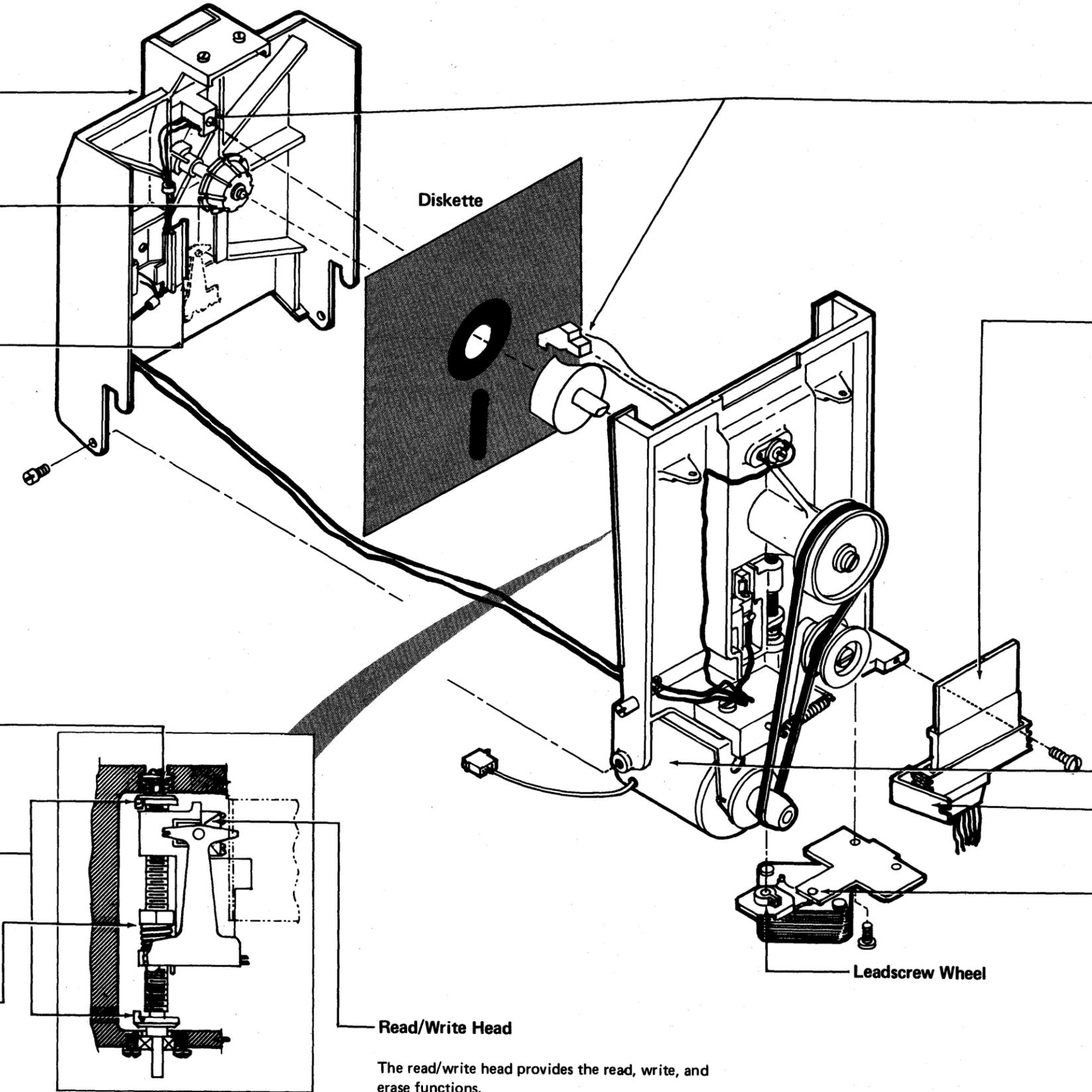
The preload spring loads the leadscrew to ensure head alignment with the disk.

**Limit Stops**

The upper and lower limit stops restrict head/carriage motion on the leadscrew.

**Leadscrew Nut and Spring**

The leadscrew nut and spring load the head/carriage assembly to ensure head alignment with the disk.



**Light-Emitting Diode (LED) and Phototransistor**

When the diskette cover is closed, the continuous light emitted by the LED is directed towards the phototransistor. Once every revolution, the index hole in the disk allows light from the LED to reach the phototransistor. The phototransistor sends index pulses to the diskette drive attachment.

**File Control Card**

The file control card provides drive circuits for the stepper motor, head load actuator, and the write and erase coils in the head. It also provides the amplifiers for the phototransistor and read head.

- On diskette drives with serial numbers below 22000, the file control card is mounted with components and test pins facing inward. Use the bracket provided to hold the card for servicing.
- On diskette drives with serial numbers 22000 and above, the file control card is mounted with components and test points facing outward for servicing. No bracket is furnished on these drives.

**Motor and Drive**

The motor rotates the disk at a speed of 360 rpm.

**Stepper Motor Assembly**

The stepper motor wheel is permanently mounted on the end of the stepper motor shaft. The stepper motor shaft turns in increments of 90 degrees in either direction under the control of access pulses from the using system. The stepper motor wheel engages the leadscrew wheel. When the stepper motor rotates 90 degrees, it causes the leadscrew to rotate 90 degrees. The head carriage assembly then moves up or down one track on the disk.

**Read/Write Head**

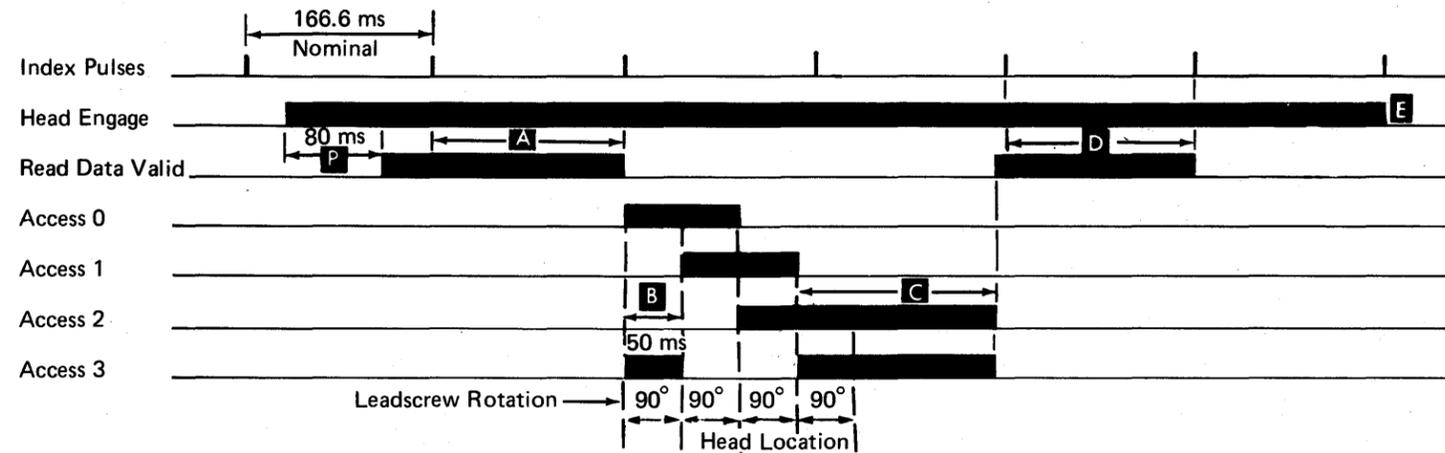
The read/write head provides the read, write, and erase functions.

**Leadscrew Wheel**

### G.3 OPERATING SEQUENCE

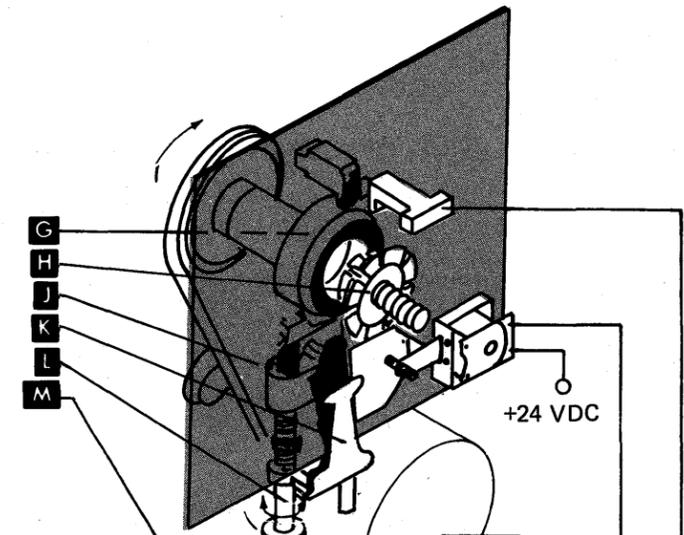
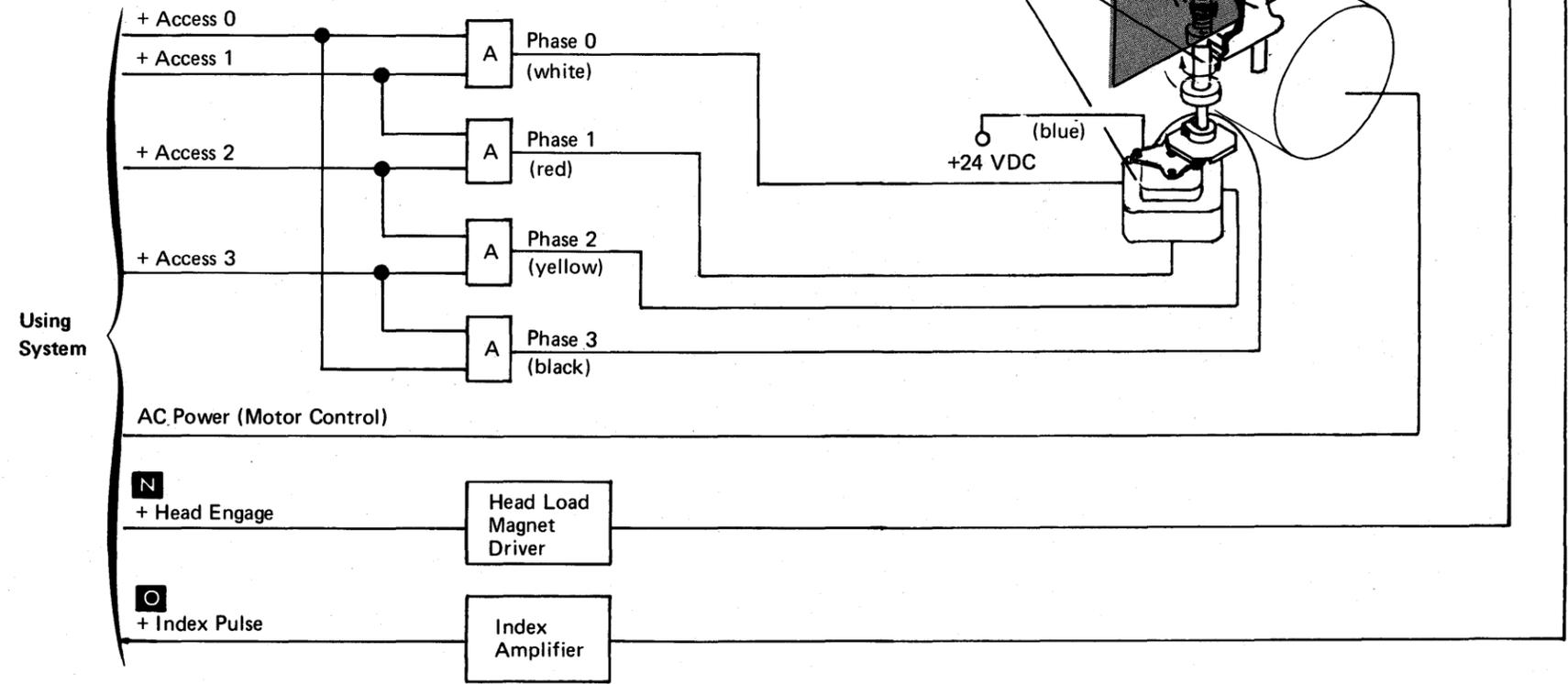
- 1 Using system activates AC Power (Motor Control) line. The drive motor starts turning.
- 2 Insert diskette and close cover. (Diskettes can be inserted or removed with power up.)  
  
Closing the cover engages the disk collet assembly **H** in the drive hub **G**, clamping the disk in place. With power up, the disk starts turning.
- 3 Index pulses **O** are read every 166.6 ms (nominal) after a 10-second delay from power on.
- 4 Using system activates the Head Engage line **N**. This causes the head pressure pad **K** to push the flexible disk against the read head **J**. After 80 ms settling delay **P**, data is valid for the using system. Head location is determined by reading track **A** or by returning the read/write head to track 0.
- 5 For each access command, the stepper motor **M** rotates the leadscrew **L** 90 degrees clockwise or counterclockwise. This moves the read head one track position. (Clockwise rotation of leadscrew, looking down on unit, moves the carriage up.)  
  
Two adjacent signal lines must be energized simultaneously when accessing **F**. Overlap must be no less than 50 ms **B**. Prior to read or write operations, the two lines for the selected track must be energized for 150 ms minimum **C** (50 ms for travel and 100 ms to stabilize).
- 6 Reading occurs **D**.
- 7 Using system should deactivate the Head Engage line upon completion of the last read, write, or access operation. The pressure pad is then lifted, to reduce disk and head wear.

### Typical Timing Sequence



Track	0	1	2	3	4	5	6	74	75	76
Access 0	X			X	X				X	X
Access 1	X	X			X	X				X
Access 2		X	X			X	X	X	X	
Access 3			X	X			X		X	

Motor is at phase 0 when read head is at track 0 and every physical track number divisible by 4.



G.4 READ/WRITE CIRCUIT PRINCIPLES

Write Data

For each transition in the Write Data line, current is switched in the read/write head causing a flux change on the disk.

Raw Read Data

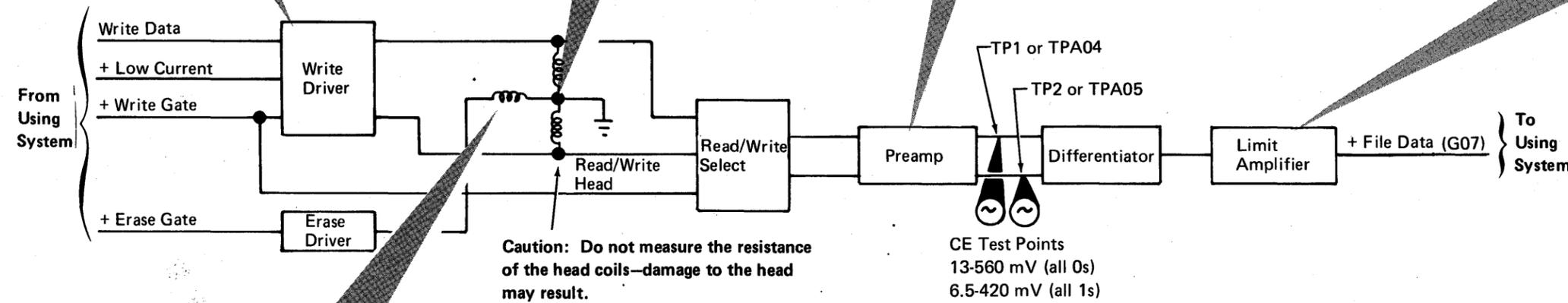
- Sine wave signal:  
125 kHz (all 0s)  
250 kHz (all 1s)
- Higher voltage at outer track because of higher disk speed and lower bit density.
- All-0s pattern gives higher voltage amplitude than all 1s.

Read Amplifier

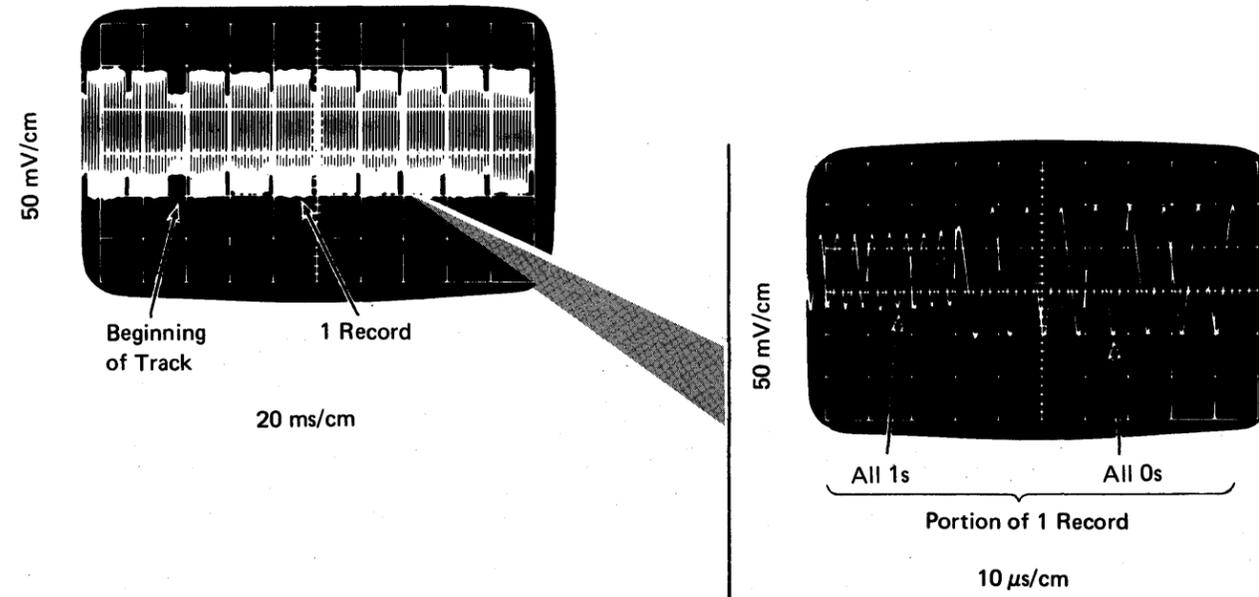
Preamp and differentiator input:  
1.0 to 20 mV (all 0s)  
0.5 to 15 mV (all 1s)

Limit Amplifier

- High gain differential amplifier amplifies signal so one of amplifier transistors is cut off. Outputs of limiter are two out-of-phase square waves.
- Differential rectifier RC network differentiates square waves. Resulting positive- and negative-going pulses (180 degrees out of phase) are input to an OR circuit. Output is a train of positive pulses. Positive leading edges of output pulses correspond to peaks in read signal delayed by a constant amount.
- File data is a string of 150 ns pulses (+File Data) fed to the VFO in the using system.

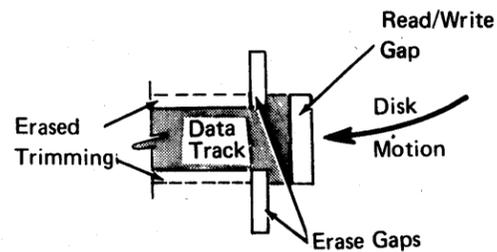


Full Track Differential Read Signal at CE Test Points



Erase

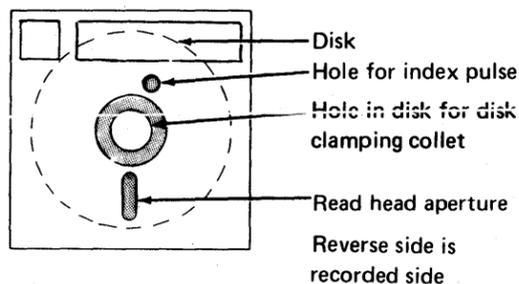
The edges of the data track are erased to prevent reading of adjacent tracks during disk interchange.



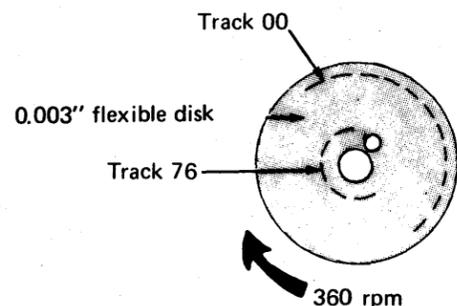
## G.5 DISKETTE

### Characteristics

#### Diskette 1



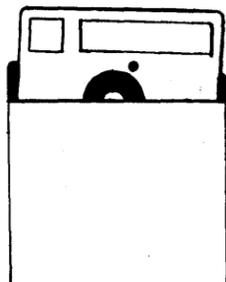
#### Disk



- The diskette is interchangeable with any other diskette written in the same format.
- The diskette can be mailed.
- Data areas on the diskette may be reached in random sequence.
- Data format on the diskette is determined by the requirements of the using system.

### Handling

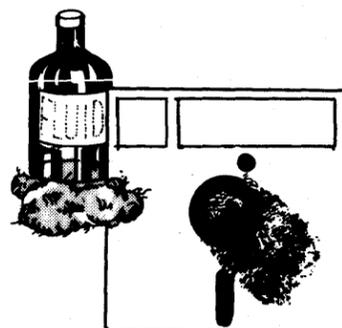
- Do not attempt to insert damaged diskettes in the diskette drive. Diskettes that are physically damaged (torn, creased, warped) or contaminated with foreign materials (eraser dust, fingerprints, cleaning fluid, etc.) may cause the disk to lift from the head, resulting in operation errors, equipment errors, or head damage.
- Placing a heavy object on a diskette may damage the diskette.
- Return a diskette to its envelope when it is removed from the diskette drive.



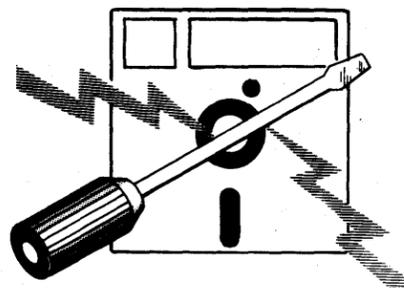
- Do not use clips. Never write on diskette with erasable pencil.



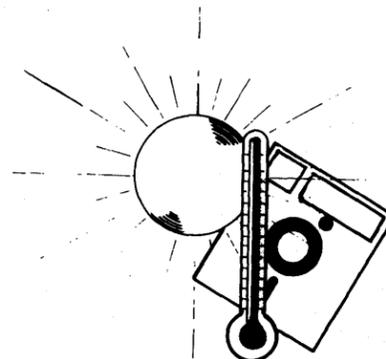
- Do not touch or clean the disk surface. Contaminated disks must be discarded.



- Keep diskette away from magnetic fields and from materials that might be magnetized. Any diskette exposed to a magnetic field may lose information.



- Do not expose diskette to excessive heat (125° F or 51.5° C) or direct sunlight.



### Long-Term Storage

Place diskettes in their envelopes and store in the following environment:

- Temperature: 50° to 125° F (10.0° to 51.5° C)
- Relative humidity: 8% to 80%
- Maximum wet bulb: 85° F (29.4° C)

If a diskette has been exposed to temperatures outside the environmental range of the machine, allow 5 minutes acclimation time before use. Remove the diskette from its shipping container, but leave it in its envelope during this time.

### Shipping and Receiving

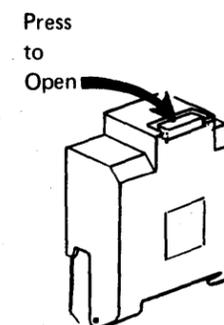
Ship diskette inside the original shipping carton. *An ordinary mailing envelope does not provide sufficient protection.*

Be sure to label the package: **DO NOT EXPOSE TO HEAT OR SUNLIGHT.**

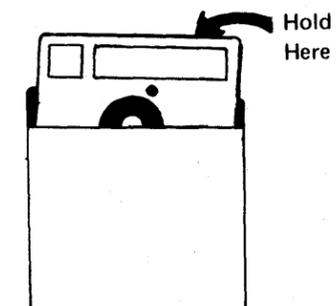
Upon receiving diskettes, check for carton and diskette damage. Save the carton for storing the diskette and for shipment later.

### Insertion

- 1 Open diskette cover.



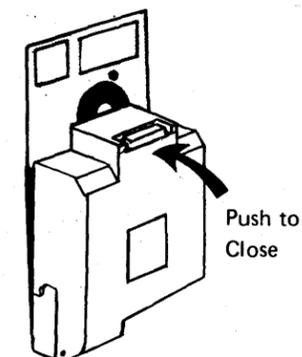
- 2 Remove diskette from envelope. Grasp diskette by upper edge.



- 3 Lower diskette squarely into the drive.

**Caution: Do not insert damaged diskettes.**

- 4 Close cover only after diskette is fully inserted.



- 5 Place the empty envelope in a clean storage area.

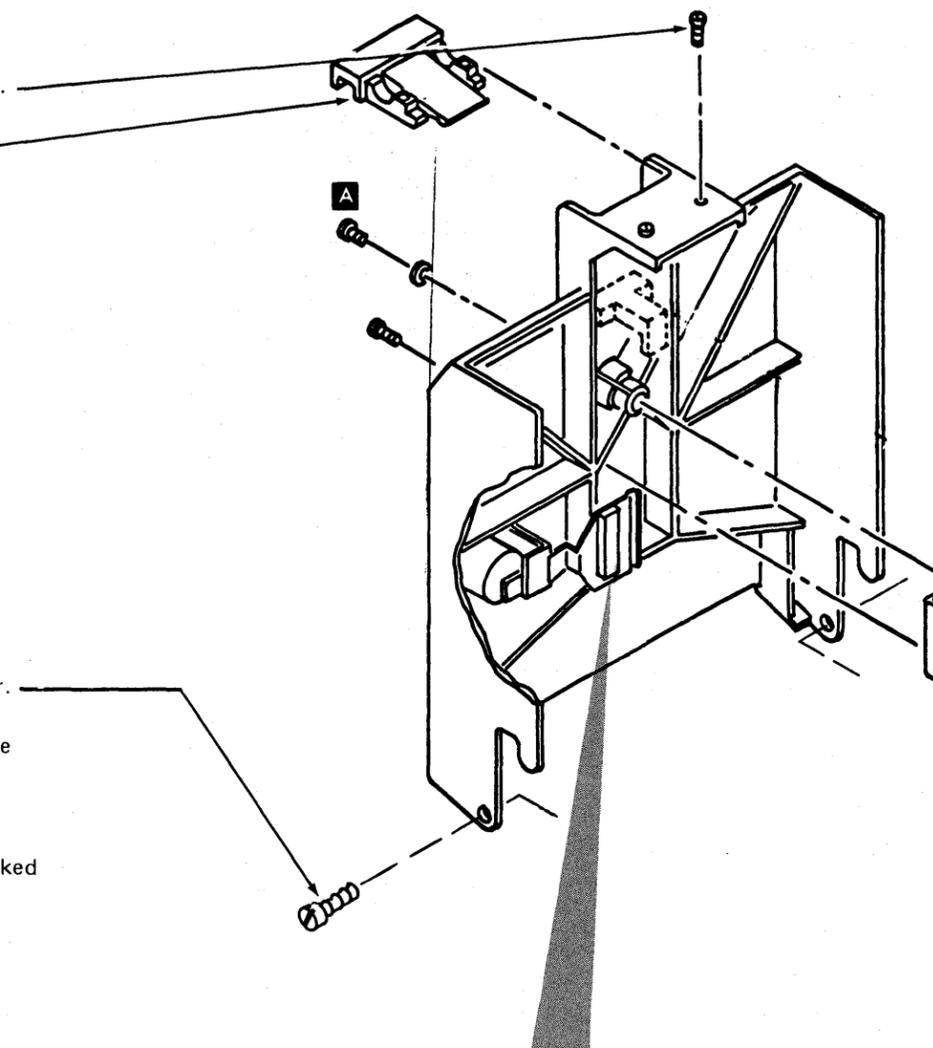
### Removal

Reverse above procedure.

**G.6 LATCH ASSEMBLY**

**Removal and Replacement**

- 1 Open cover.
- 2 Remove the two latch mounting screws.
- 3 Pull latch out toward front of cover.
- 4 To replace, reverse above procedure.



**G.7 DISKETTE COVER**

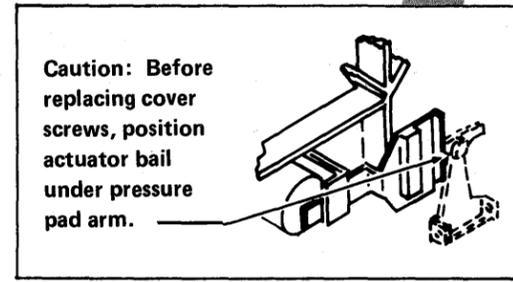
**Removal and Replacement**

**Caution:** Do not allow pressure pad arm to snap against head.

- 1 Remove two screws while holding cover.
- 2 Remove cover carefully to avoid damage to wires.
- 3 Remove wires from LED and actuator. (Yellow wire goes to LED terminal marked Y.)
- 4 Remove wires from clips on cover.

**Caution:** Before replacing cover screws, position actuator bail under pressure pad arm.

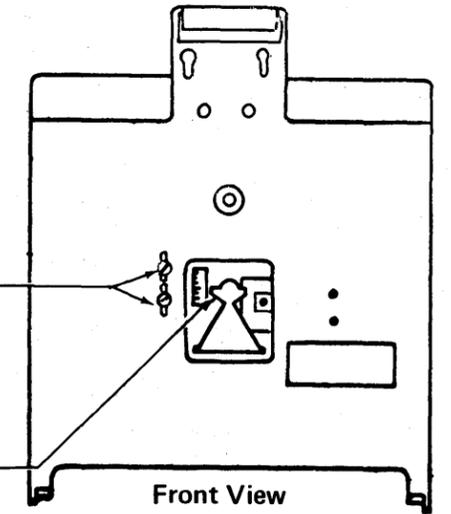
- 5 To replace, reverse above procedure.



**G.9 TRACK INDICATOR**

**Adjustment**

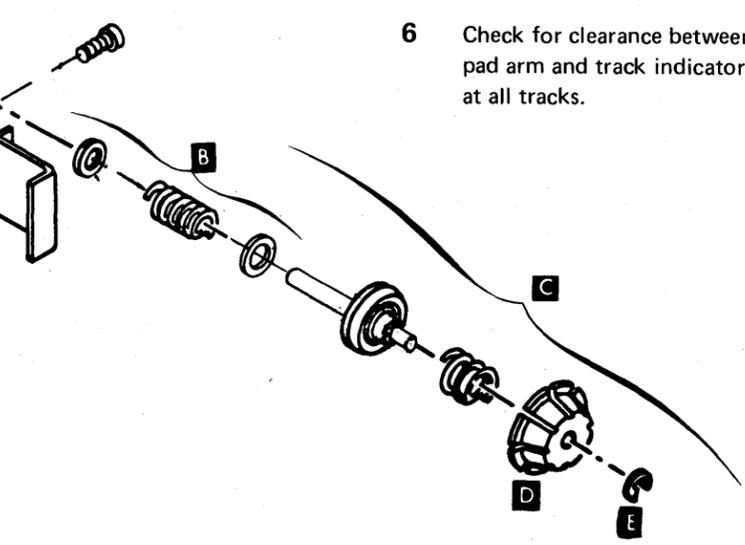
- 1 Access carriage assembly to track 0.
- 2 Energize coil by installing a jumper between the following pins on the file control card:
  - VTL card: '- head load' (pin B05) and ground (pin B08).
  - MST card: '+ head engage' (pin G10) and ground (pin D08).
- 3 Loosen two screws.
- 4 Adjust track indicator scale so that zero line is centered on pressure pad arm pointer.
- 5 Tighten screws.
- 6 Check for clearance between pressure pad arm and track indicator bracket at all tracks.



**G.8 COLLET**

**Removal and Replacement**

- 1 Remove cover.
- 2 Remove mounting screw **A**.
- 3 Remove collet assembly **C**, spring, and washers **B**.
- 4 Remove collet **D** by removing clip **E**.
- 5 To replace, reverse above procedure.



## G.10 DRIVE MOTOR

### Removal

#### DANGER

Disconnect primary power at using system.

- 1 Unplug cable leading to drive motor **A**.
- 2 Remove belt.

#### DANGER

Motor case temperature may exceed safe handling limits.

- 3 Loosen two motor mounting clamps and remove drive motor **B**.
- 4 Remove drive pulley **D**.

### Replacement

- 1 Replace drive pulley. (Align setscrew with flat surface on shaft.)
- 2 Clamp motor to mounting bracket.

#### DANGER (60-Hz motors)

To prevent personal injury, position two large holes in motor frame to top and under bracket **K**.

- 3 Replace belt.
- 4 Plug in cable leading to motor.
- 5 Check belt tracking and adjust if necessary.

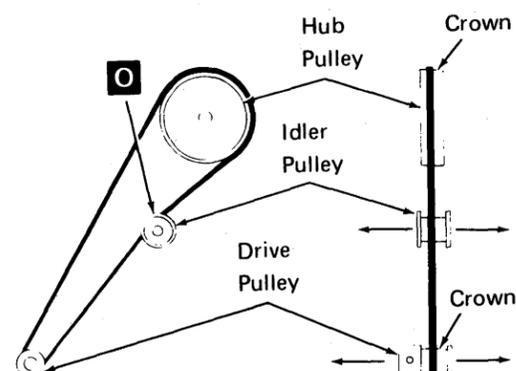
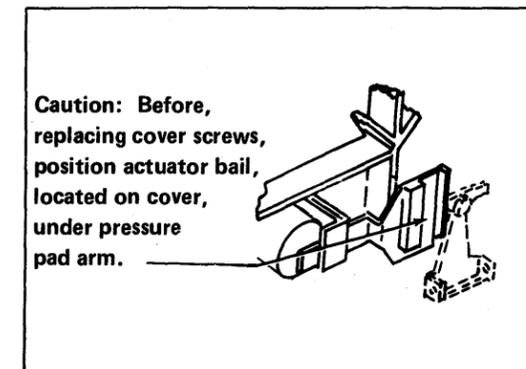
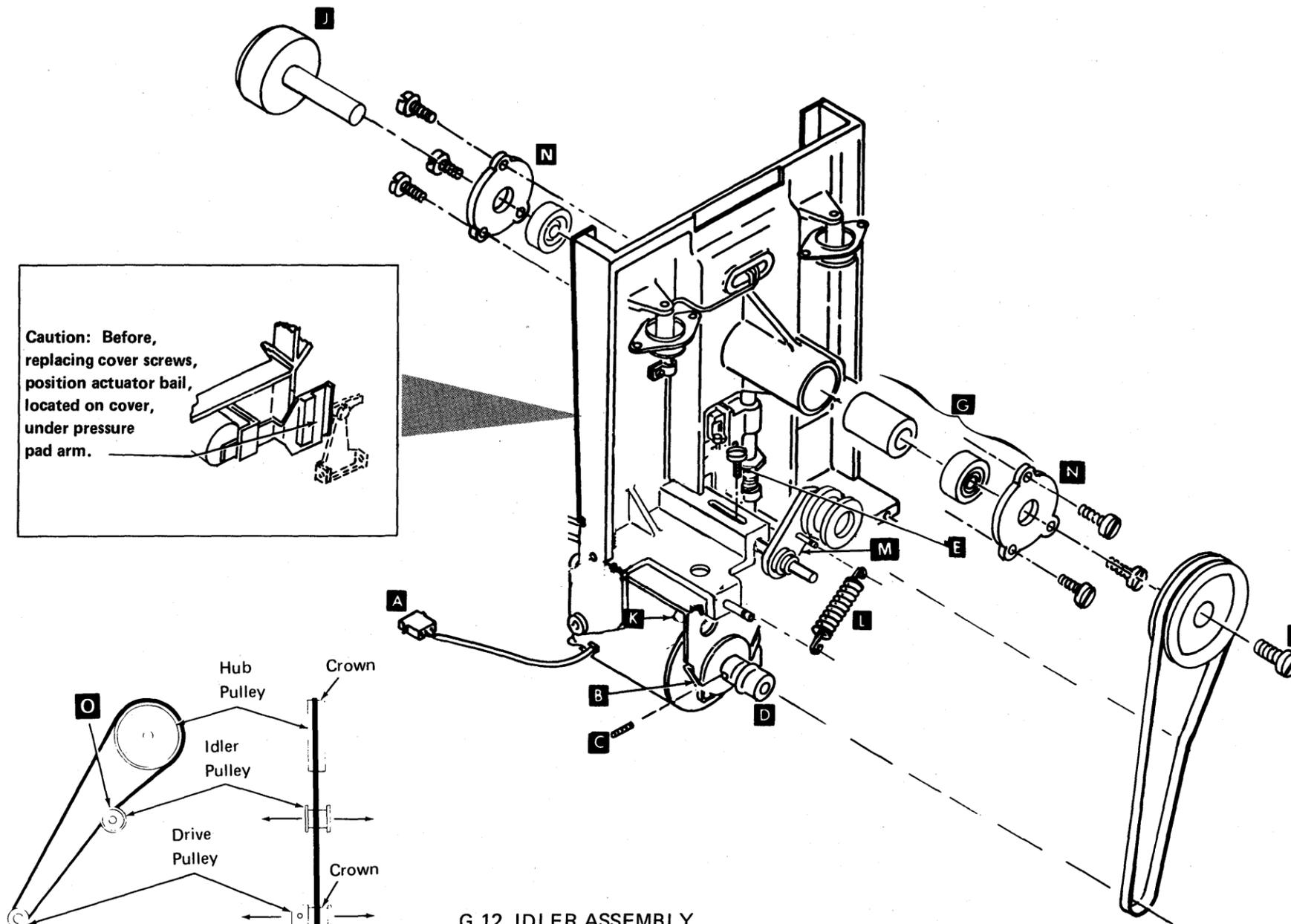
## G.11 BELT TRACKING

Belt must be riding in center of drive pulley and hub pulley when drive pulley is rotated counterclockwise viewed from the pulley side. The idler pulley must be on the outside of the belt **O**.

### Adjustment

**Caution:** Drive pulley setscrew must be aligned with flat on motor shaft.

Adjust drive pulley and idler position so belt rides on center of drive pulley and hub pulley. Forming of the idler pulley arm **M** may be required.



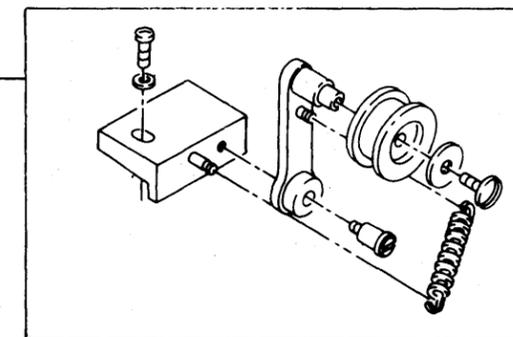
**Note:** Late-model diskette drives have an idler pulley with a narrow groove. To adjust belt tracking, loosen screw **E** and slide idler until belt rides in center of hub pulley. Since the drive pulley does not have a crown, the belt does not have to be centered exactly on the drive pulley on these drives.

## G.12 IDLER ASSEMBLY

**Note:** Diskette drive units with serial numbers below 22000 have this type idler assembly.

### Removal

- 1 Remove belt and spring **L**.
- 2 Remove screw **E** and idler assembly **M**.
- 3 To replace, reverse above procedure and check belt tracking.



## G.13 HUB ASSEMBLY

### Removal and Replacement

- 1 Remove cover.
- 2 Remove drive belt.
- 3 Remove screw **F** and remove pulley.
- 4 Remove hub **J**.
- 5 Remove bearing retaining screws and bearing **H**.  
**Note:** Late-model diskette drives have bearing retainer plates **N** between bearing retaining screws and bearings.
- 6 Remove bearing retaining screws, bearing, and spacers **G**.
- 7 To replace, reverse above procedure. Check belt tracking and adjust if necessary (this page).

**Caution:** The front bearing must be flush with front surface of baseplate. To meet this requirement, tighten front bearing retaining screws first. Seal on bearings should face outside.

## G.14 DRIVE PULLEY

### Removal

- 1 Remove belt.
- 2 Loosen setscrew **C** and remove pulley **D**.

### Replacement

- 1 Position pulley on shaft.
- 2 Align setscrew with flat surface of shaft and tighten.
- 3 Replace belt.
- 4 Check belt tracking and adjust if necessary (this page).

G.15 PRESSURE PAD ACTUATOR

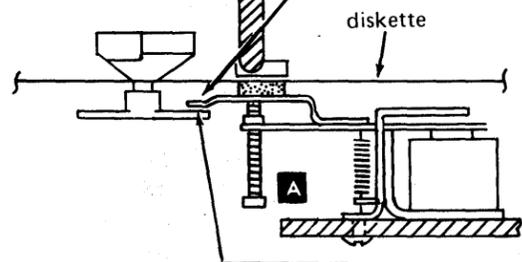
Removal and Replacement

- 1 Remove cover.
- 2 Remove two screws.
- 3 Remove leads.
- 4 To replace, reverse above procedure and perform the following adjustment.

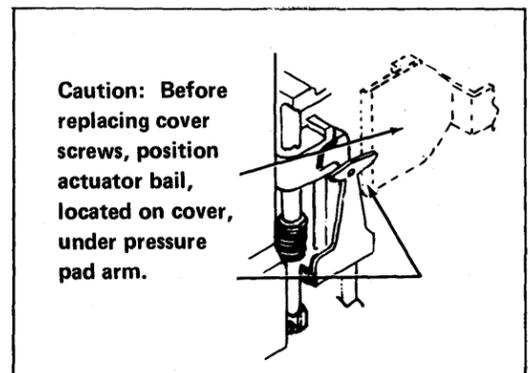
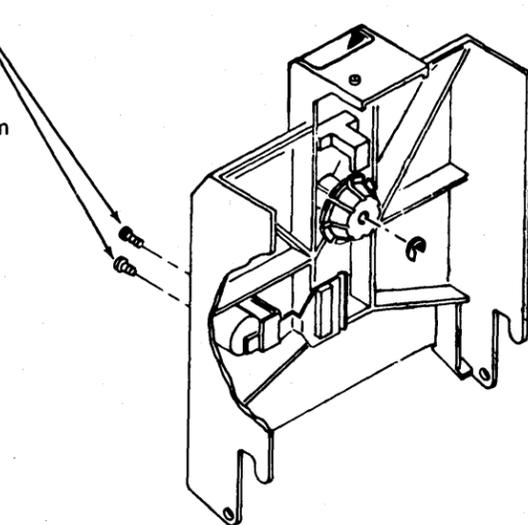
Adjustment

- 1 Install diskette.
- 2 Energize coil by installing a jumper between the following pins on the file control card:
  - VTL card: '- head load' (pin B05) and ground (pin B08).
  - MST card: '+ head engage' (pin G10) and ground (pin D08).

- 3 Adjust screw **A** until the pressure pad arm and bail just touch.



- 4 Rotate adjusting screw clockwise 1/2 to 3/4 turn and check for clearance between arm and bail at all tracks.

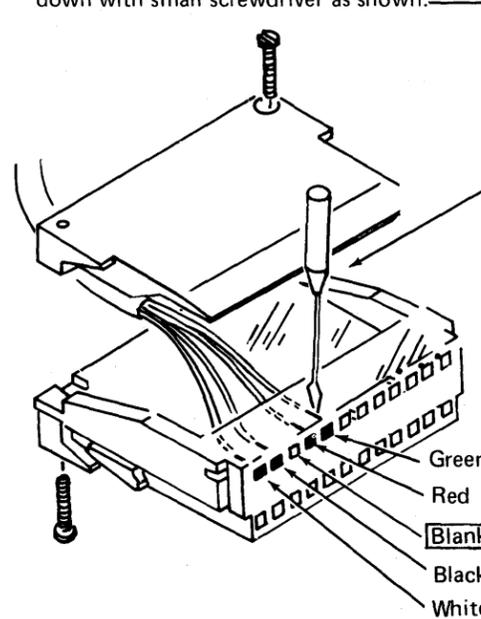


Caution: Before replacing cover screws, position actuator bail, located on cover, under pressure pad arm.

G.16 LEADSCREW AND HEAD CARRIAGE ASSEMBLY

Removal

- 1 Note routing of head cable.
- 2 Remove wires from connector by pushing down with small screwdriver as shown.



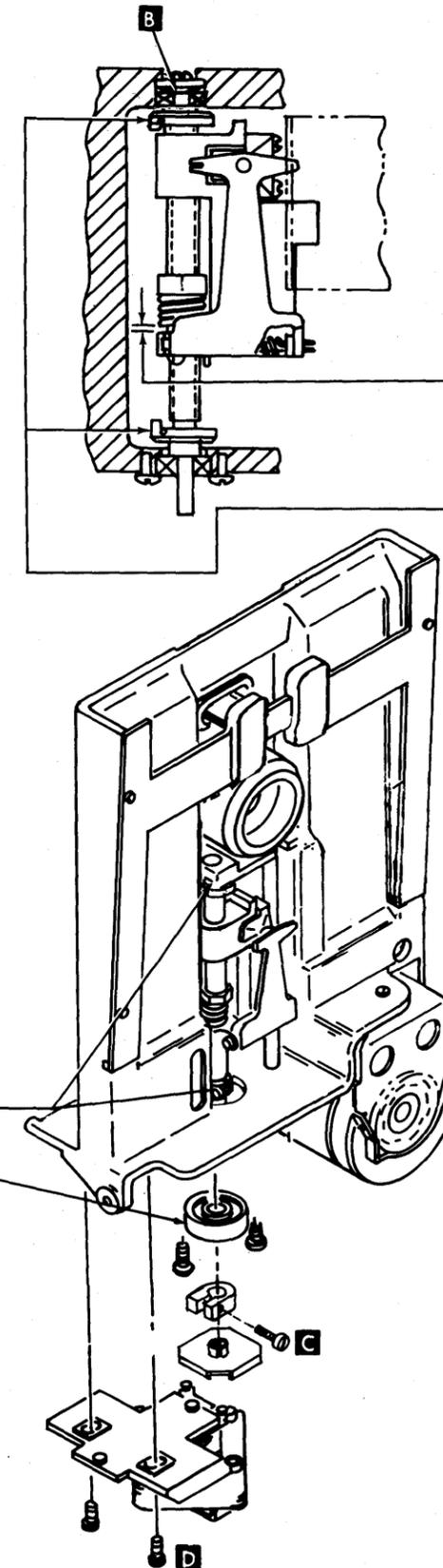
- 3 Center carriage on leadscrew by turning stepper motor wheel.
- 4 Remove stepper motor **D** and leadscrew wheel **C**.
- 5 Remove cover.
- 6 Loosen clamping screws on upper and lower stops.
- 7 Remove bottom bearing.

Caution: Early model diskette drives do not have a spacer to retain the upper preload spring **B**; be careful not to lose the upper preload spring when removing leadscrew and carriage assembly on these drives.

- 8 Slide leadscrew assembly down until top clears baseplate; then slide assembly out.

Caution: Do not allow pressure pad arm to snap against head.

- 9 Remove top bearing, upper preload spring **B** (wave washer), and both stops from leadscrew.



Replacement

Note: If the leadscrew and the carriage are disassembled, replace by threading the leadscrew into the bottom portion of the carriage assembly and into the carriage nut and lower preload spring. There should be approximately 0.020" (0.51 mm) here.

- 1 Center carriage assembly on leadscrew and install upper and lower limit stops, positioned as shown.

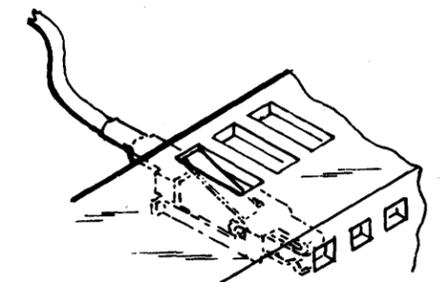
- 2 Replace top bearing and upper preload spring **B** (wave washer) concave side up.
- 3 Replace assembly in baseplate, bottom end first.
- 4 Replace bottom bearing and check for about 0.030" (0.76 mm) up and down movement of leadscrew against preload spring.

- 5 Replace leadscrew wheel, leadscrew wheel clamp, and stepper motor.

Note: Route head cable as noted under Removal.

- 6 Connect wires (see removal for wire locations). Check that wire terminals are securely seated in connector.

Caution: Ensure that the locking tabs on the terminals engage in the connector slot to prevent the leads from pushing out when plugged in.



- 7 Perform stepper motor adjustment (page G-11) and read/write head adjustment (page G-9).

- 8 Replace cover.

## G.17 HEAD CARRIAGE ASSEMBLY

A correctly adjusted head carriage must meet three conditions simultaneously:

- Correct head-to-CE-tool clearance.
- Correct relationship between the stepper motor and leadscrew wheels **S**.
- Correct clearance between the stepper motor and leadscrew wheels.

### Adjustment

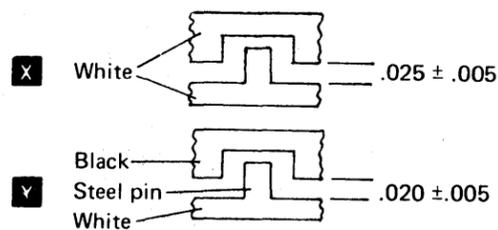
- 1 Access head to track 0 (stepper wheels should line up as in view **S**).
- 2 Remove cover.
- 3 Loosen mounting screw and move photo-transistor assembly **A** to the left.

**Caution:** If phototransistor assembly is not moved, the accuracy of the head adjustment may be affected.

- 4 Loosen clamping screws on lower limit stop **H** and leadscrew wheel **J**.

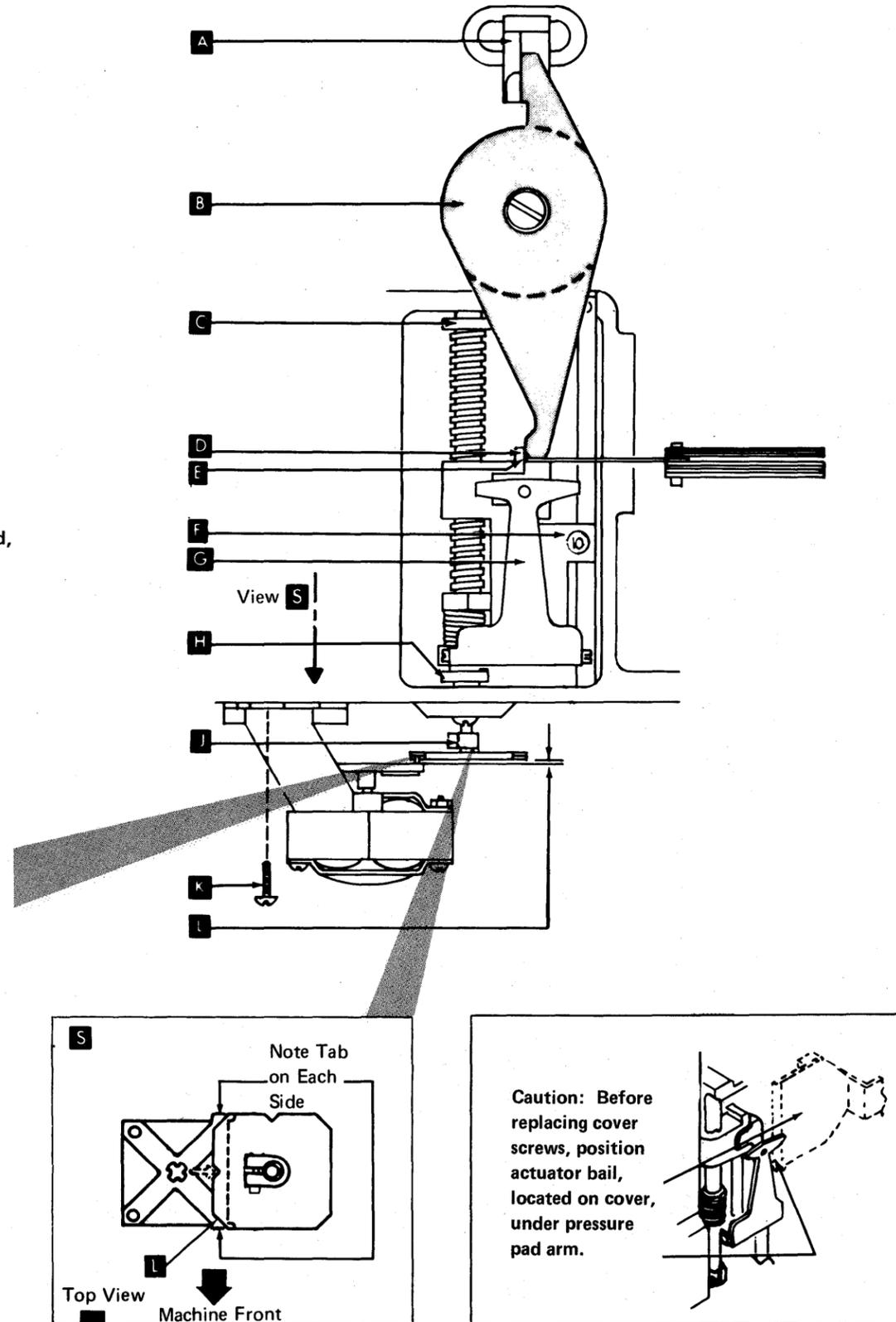
**Note:** Steps 5 and 6 ensure maximum stepper motor to leadscrew wheel pin penetration with no binds.

- 5 Determine type of stepper assembly, below:



**Note:** When the stepper motor is replaced, ensure that the leadscrew wheel is the new style (black). The old style leadscrew wheel (white) will wear excessively if used with the new steel pin stepper motor drive.

- 6 With stepper motor and leadscrew wheel oriented as in view **S**, insert feeler gage corresponding to gap setting in **X** or **Y** above, between the wheels as shown by **L** in view **S**. Gage may be left in place.



- 7 Locate the white dot label or indentation on the outer circumference of disk drive hub. If hub has both, always use white dot. Rotate hub to position this mark up.

**Note:** This step ensures that any hub eccentricity appears at the same spot each time the head carriage assembly is adjusted, and that all head adjustments use the same reference point.

- 8 **Caution:** Do not allow the CE tool to touch the highly polished surface of the head.

Install CE tool on hub **B**. Clamp into place with thumbscrew.

- 9 Rotate CE tool so it contacts surface **D**.
- 10 Rotate leadscrew by gripping upper limit stop **C**, adjust for gap **E**. This gap is a number found on the front of the read head assembly **F**. This number represents thousandths. Example: 3 equals 0.003" (0.076 mm). Adjust for a very light drag on a 0.003" (0.076 mm) gage. A 0.002" gage (0.051 mm) must be free.

**Caution:** Ensure stepper motor and leadscrew wheel remain oriented as in **S**.

- 11 Securely tighten leadscrew wheel clamping screw **J**. The top of the clamping collar should be approximately even with the top of the metal clamping surface of leadscrew wheel.

**Caution:** If clamping collar is not securely tightened, the head may lose its adjustment during diskette drive operation.

- 12 Adjust phototransistor so that raised edge is in contact with tool **A** and tighten mounting screw.
- 13 Recheck gap **E** setting.
- 14 Remove CE tool and adjust lower limit stop (page G-10).

- 15 Rotate stepper motor at least one full revolution and check for binds.
- 16 Adjust upper limit stop (page G-10).
- 17 If a new leadscrew wheel was installed, fill the slot 25 to 40 percent full of IBM no. 23 grease.
- 18 Replace cover and adjust track indicator (page G-7).

## G.18 LEADSCREW WHEEL

### Removal and Replacement

- 1 Remove stepper motor **K** (page G-11).
- 2 Loosen clamping screw and remove leadscrew wheel **J**.
- 3 To replace, reverse above procedure. Adjust stepper motor (page G-11), and head carriage (this page).

## G.19 HEAD AND PRESSURE PAD CLEANING

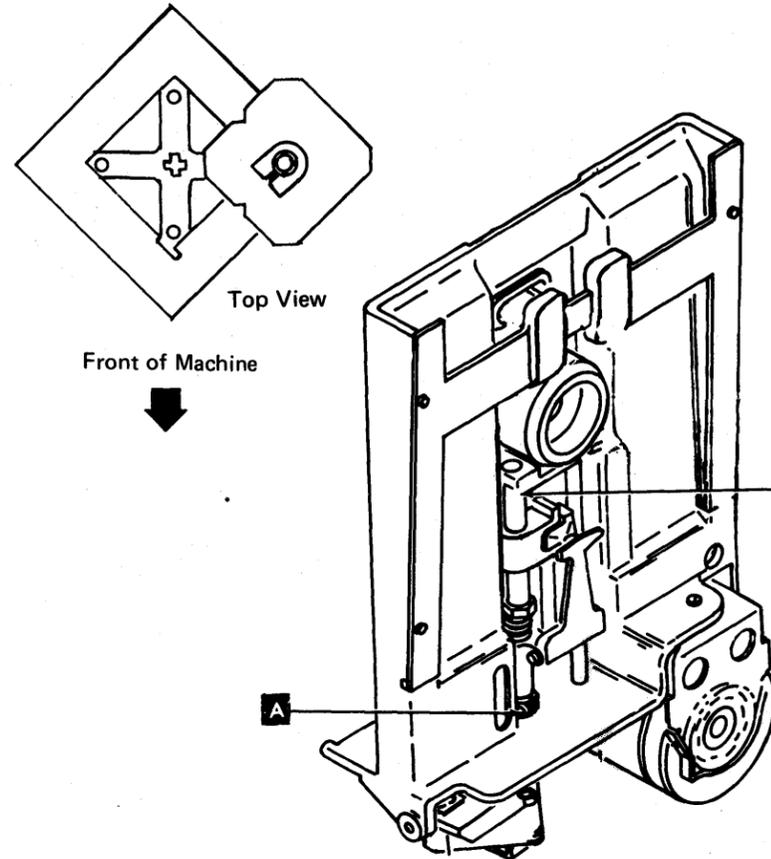
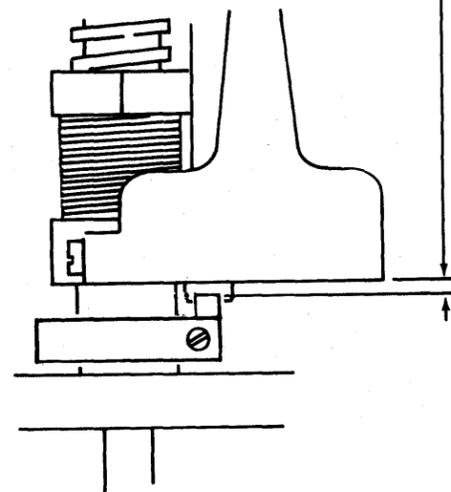
**Caution:** Use only the materials listed below to clean head and pressure pad.

- 1 With diskette cover open, manually rotate stepper motor wheel until carriage assembly is at the upper limit stop.
- Caution:** Do not allow pressure pad arm to snap against head.
- 2 Pivot pressure pad arm **G** away from head and check pad for contamination. If contaminated, use dry brush (PN 2200106) to remove caked deposits and to fluff pad.
- Caution:** Do not allow cloth moistened with isopropyl alcohol to touch the pressure pad.
- 3 While holding pressure pad arm out, clean polished head surface with isopropyl alcohol (PN 2200200) applied to a clean cloth (PN 2108930)

G.20 LOWER LIMIT STOP

Adjustment (With Cover Removed)

- 1 Loosen clamp screw **A**. Ensure that leadscrew is  $45^\circ \pm 15^\circ$  beyond track 0 in downward direction. Wheels must be in position shown.
- 2 Position limit stop so projection on limit stop is in front of and against the projection on head carriage.
- 3 Adjust for 0.012" to 0.018" (0.3 mm to 0.46 mm) between top of projection on limit stop and bottom of head carriage.
- 4 Tighten screw.

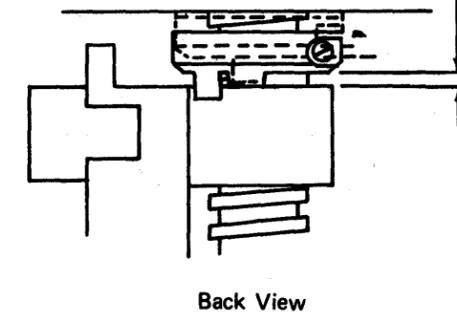


G.21 UPPER LIMIT STOP

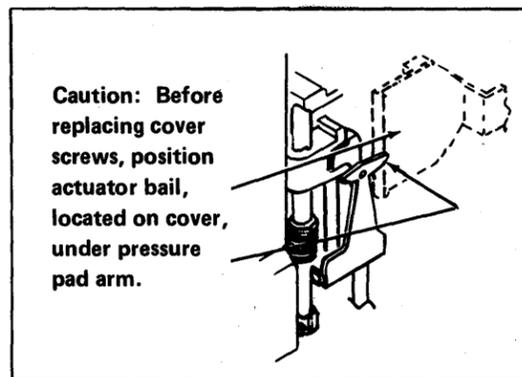
Adjustment

- 1 Loosen clamp screw and slide stop up as far as possible.
- 2 Starting at track 0, rotate stepper motor wheel 19 full revolutions, moving head carriage up to track 76. Rotate stepper motor wheel an additional 45 degrees.
- 3 With projection on limit stop against carriage, adjust stop for 0.025" to 0.035" (0.64 mm to 0.89 mm)
- 4 Tighten screw.

Caution: Do not overtighten.



Note: Doing the lower and upper limit stop adjustments ensures that the head carriage can always access tracks 0 and 76, but will not overtravel.

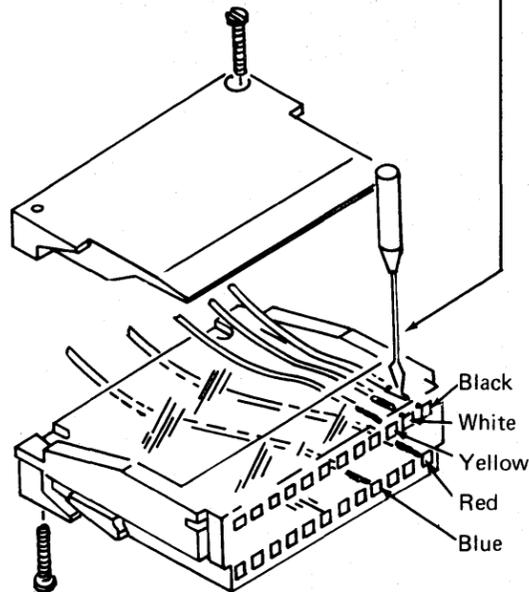


Caution: Before replacing cover screws, position actuator bail, located on cover, under pressure pad arm.

## G.22 STEPPER MOTOR

### Removal and Replacement

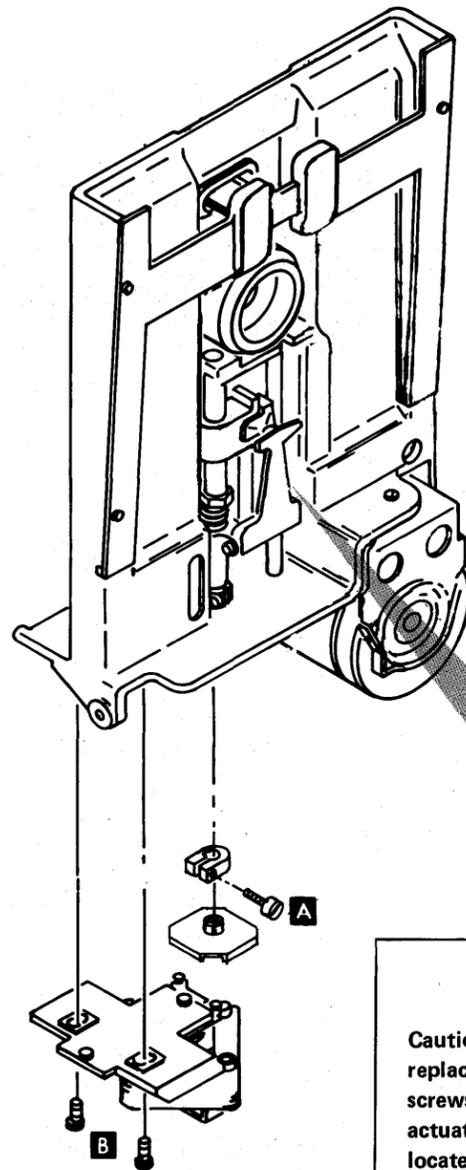
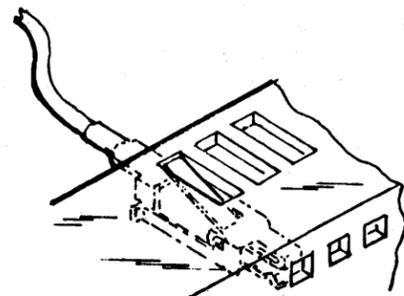
- 1 Remove the five leads from connector.
- 2 Remove two screws **B**.



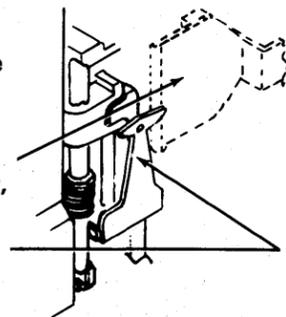
**Caution:** Ensure pins are in slots of lead-screw wheel when replacing stepper motor to avoid breaking parts.

- 3 To replace, reverse above procedure and adjust stepper motor (this page).

**Caution:** Ensure the locking tabs on the terminals engage in the connector slot to prevent the leads from pushing out when plugged in.

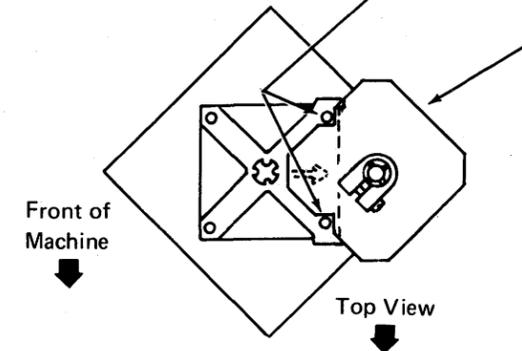


**Caution:** Before replacing cover screws, position actuator bail, located on cover, under pressure pad arm.



### Adjustment

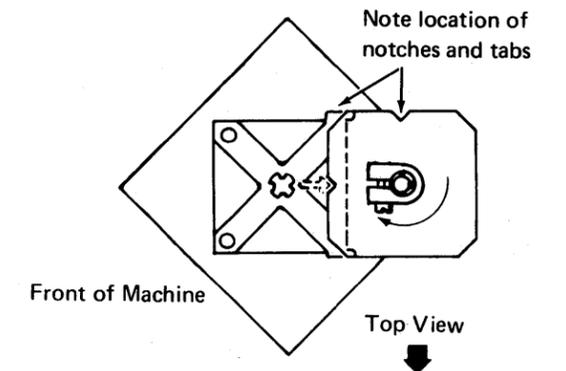
- 1 Loosen two screws **B**.
- 2 Move stepper motor away from leadscrew.
- 3 Loosen clamping screw **A** and move leadscrew wheel up so it rotates freely.
- 4 Position wheel as shown.
- 5 Pull leadscrew wheel down until pins on stepper motor drive wheel fit into notches on leadscrew wheel.



- 6 Slide stepper motor toward leadscrew until pins contact notches. No clearance is allowed.

**Caution:** Do not force stepper motor against leadscrew wheel.

- 7 Tighten two stepper motor mounting screws **B**.
- 8 Move leadscrew wheel up until it rotates freely.
- 9 Rotate leadscrew wheel and slide down on drive pins in the position shown below.



- 10 Adjust head carriage (page G-9).

SY27-2530-1

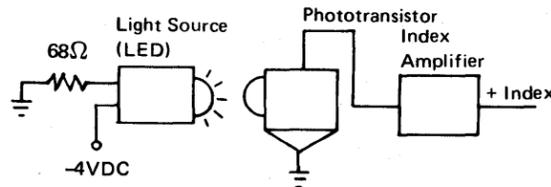
G.23 PHOTOTRANSISTOR (PTX)

2 X 2 VTL

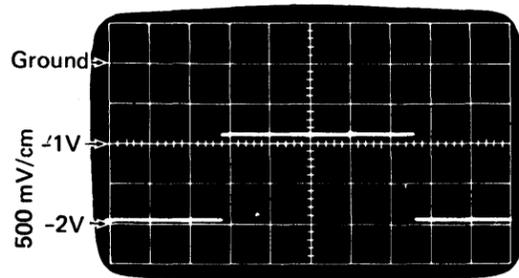
Service Check

MST

- 1 Disconnect the drive motor power plug to remove AC power from the 33FD.
- 2 Attach the positive probe of the CE meter (15 VDC scale) to the +6.0 VDC test point (G11) on the file control card.
- 3 Attach the negative probe to the amplifier input B08.
- 4 Close the 33FD cover and apply DC power. (Do not insert a diskette.) The CE meter should read more than 1.8 VDC.
- 5 Open the cover, insert a diskette backwards; then close the cover. The CE meter should read less than 1.2 VDC.
- 6 Remove the diskette and reconnect the drive motor plug. Restore AC power.



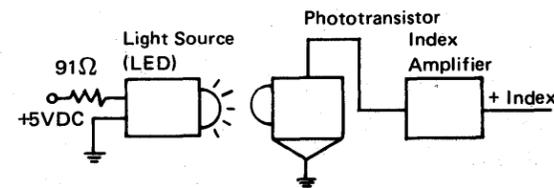
- 7 If a scope is available, turn AC power on and check for an index pulsewidth of 2 ms.



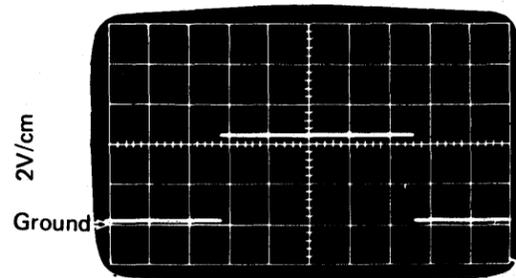
500 μs/cm

VTL

- 1 Disconnect the drive motor power plug to remove AC power from the 33FD.
- 2 Attach the positive probe of the CE meter (15 VDC scale) to the +5.0 VDC test point (J03) on the file control card.
- 3 Attach the negative probe to the amplifier input B08.
- 4 Close the 33FD cover and apply power. (Do not insert a diskette.) The CE meter should read more than 3.5 VDC.
- 5 Open the cover, insert a diskette backwards; then close the cover. The CE meter should read less than 0.5 VDC.
- 6 Remove the diskette and reconnect the drive motor plug. Restore AC power.



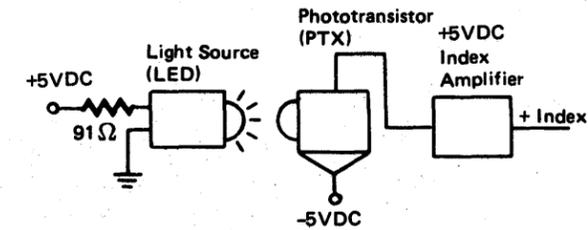
- 7 If a scope is available, turn AC power on and check for an index pulsewidth of 1.7 to 8.0 ms.



500 μs/cm

**Note:** Always do this service check with a diskette loaded; otherwise, ambient light will cause incorrect CE meter readings.

- 1 Disconnect the drive motor power plug to remove ac power from the 33FD.
- 2 Attach the positive probe of the CE meter (15 VDC scale) to TPB05 (amplifier input, B08) on the file control card.
- 3 Attach the negative probe of the CE meter to TPA03 or TPA10 (ground, D08) on the file control card.
- 4 Insert a diskette, close the cover; then turn power on.
- 5 With the head unloaded, rotate the hub until the index hole causes the phototransistor amplifier to switch off. (Index holes not aligned.) The CE meter should read 1.0 to 5.5 VDC with the index hole not aligned. If the CE meter reads less than 1.0 VDC, shine-through may exist. Should this condition exist, read the *Phototransistor Threshold Level Adjustment Information, Note, page G-15*.
- 6 Reverse the CE meter leads.
- 7 With the heads unloaded, rotate the hub until the index hole causes the phototransistor amplifier to switch on. (Index holes aligned.) The CE meter should read 4.5 to 5.5 VDC when the index is aligned. If the CE meter reads less than 4.5 VDC, the phototransistor assembly could be misaligned or faulty, or the LED assembly could be faulty. See page G-13 for the PTX adjustment procedure and LED service check.
- 8 Remove the diskette and reconnect the drive motor plug.



- 9 If a scope is available, turn AC power on and check for an index pulse width of 1.7 to 8.0 ms.

## G.23 PHOTOTRANSISTOR (PTX) (continued)

### Removal

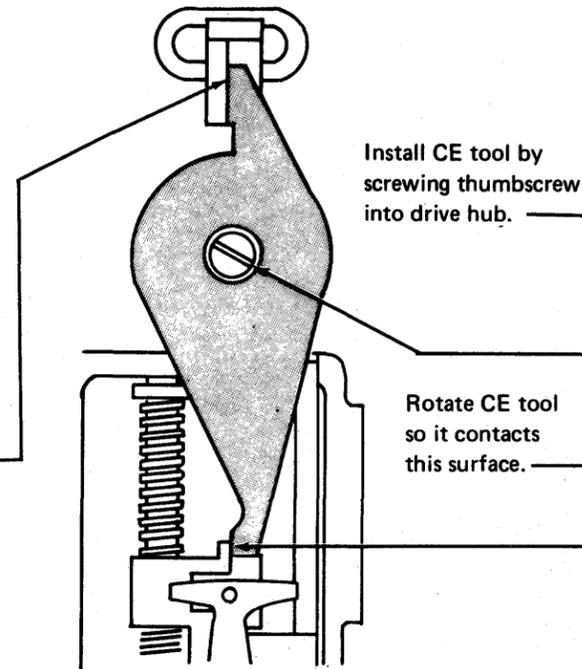
- 1 Access to track 0.
- 2 Power down.
- 3 Remove cover.
- 4 Remove mounting screw **C**.
- 5 Remove leads.

### Replacement

- 1 Replace leads. (Yellow wire goes to terminal marked Y.)
- 2 Replace mounting screw, but do not tighten.
- 3 Do adjustment starting at Step 4.

### Adjustment

- 1 Access to track 0.
- 2 Remove cover.
- 3 Loosen mounting screw **C**, and move phototransistor to left.
- 4 Install CE tool **B** as shown at right.
- 5 Adjust phototransistor so that raised edge is in contact with tool.
- 6 Tighten mounting screw.
- 7 Remove CE tool.
- 8 Replace cover.



## G.24 LIGHT-EMITTING DIODE (LED)

### Service Check

#### MST

Attach positive probe of CE meter to LED current test pin, D07 on FC card, and negative probe to -4.0 VDC test pin, G06 on FC card.

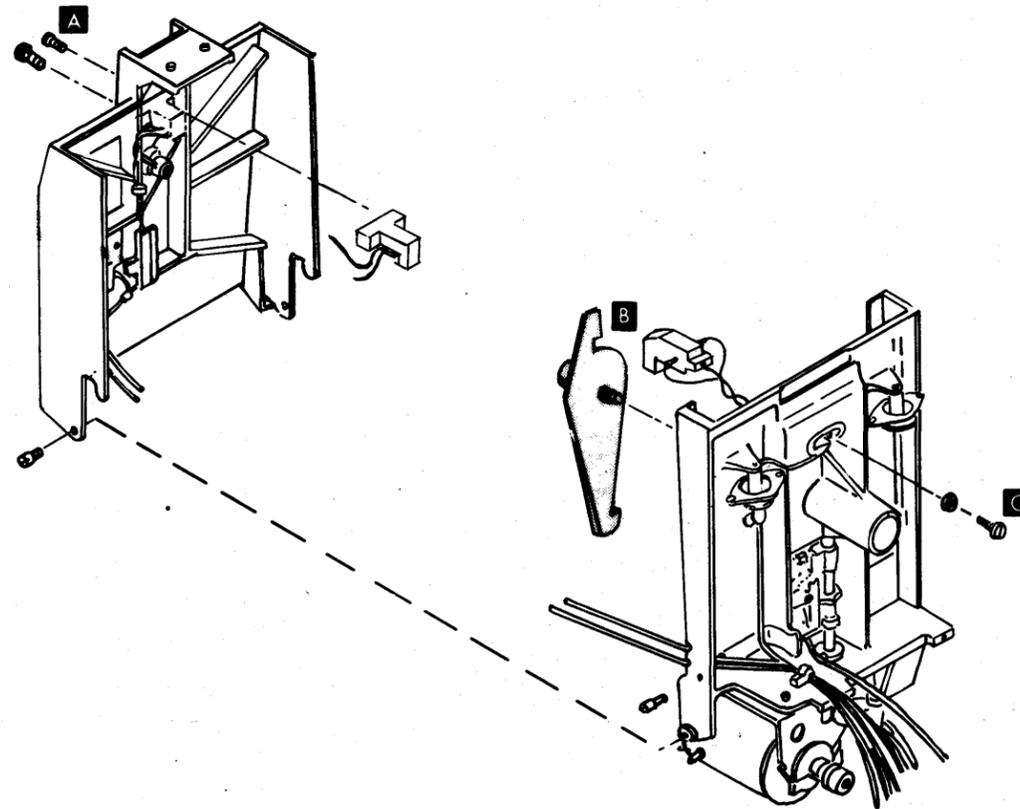
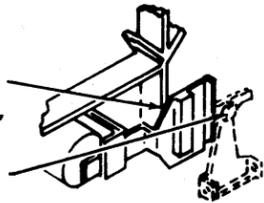
#### VTL

Attach positive probe of VOM to LED current test pin, D07 on FC card, and negative probe to ground test pin, D08 on FC card. Reading should be between +1 VDC and +2 VDC.

### Removal and Replacement

- 1 Remove cover.
- 2 Remove two mounting screws **A**.
- 3 Remove leads. (Yellow wire goes to terminal marked Y.)
- 4 To replace, reverse above procedure.

Caution: Before replacing cover screws, position actuator bail, located on cover, under pressure pad arm.

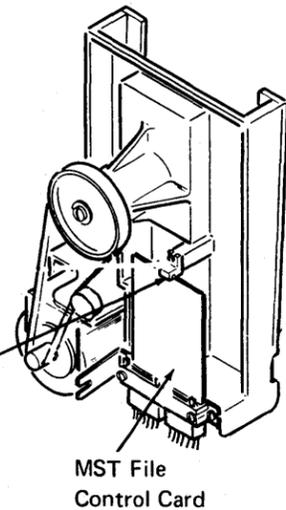


**G.25 MST FILE CONTROL CARD**

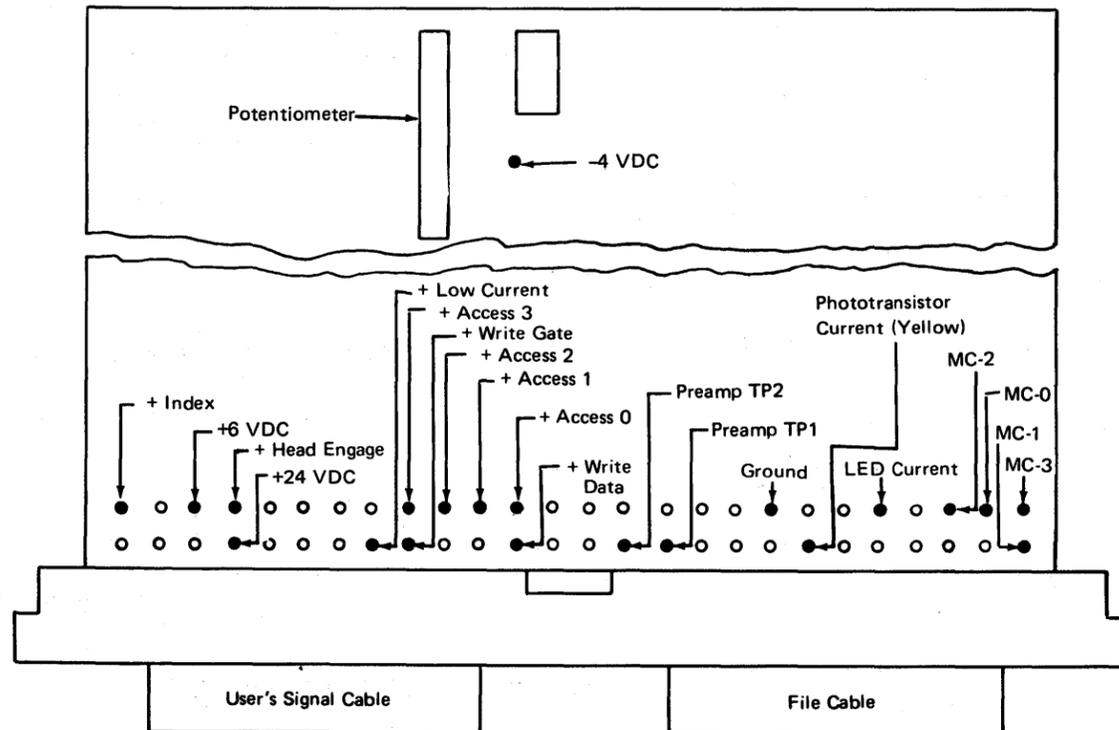
- On diskette drives with serial numbers below 22000, the file control card is mounted with components and test pins facing inward. Use the bracket provided to hold the card for servicing.
- On diskette drives with serial numbers 22000 and above, the file control card is mounted with components and test points facing outward for servicing. No bracket is furnished on these drives.

**Removal and Replacement**

- 1 Power off.
- 2 Loosen screw and turn bracket 90 degrees (where present). Tighten screw.
- 3 Remove card.
- 4 To replace, reverse above procedure. Ensure card is properly seated in socket and retaining bracket.



**MST Test Points**



**Card Pin Assignment**

Name	Color	MST	VTL
Stepper Motor MC-0 (Phase 0)	White	B03	B03
Stepper Motor MC-1 (Phase 1)	Red	D02	D02
Stepper Motor MC-2 (Phase 2)	Yellow	B04	B04
Stepper Motor MC-3 (Phase 3)	Black	B02	B02
Stepper Common +24 VDC	Blue	D05	D05
Head Magnet +24 VDC	Yellow	D04	D04
- Head Load	Black	B05	B05
LED Return	Black	D06	D06
LED Current	Yellow	D07	D07
Phototransistor Return	Black	D09	D09
Phototransistor Current	Yellow	B08	B08
Head Input	Black	B12	B12
Head Input	White	B13	B13
Erase Current	Red	B10	B10
Head Ground and Shield	Green	B09	B09
Preamp TP1		D12	D12
Preamp TP2		D13	D13
Ground	Black	D08	D08
+ Access 0		G02	G02
+ Access 1		G03	G03
+ Access 2		G04	G04
+ Access 3		G05	G05
+ File Data		G07	G07
+ Head Engage		G10	G10
+ Write Data		J02	J02
+ Erase Gate		J04	J04
+ Write Gate		J05	J05
+ Low Current		J06	J06
+ Index		G13	G13
+24 VDC		J10	J10
+6 VDC		G11	
+5 VDC			J03
-4 VDC		G06	
-5 VDC			J11
Ground		J08	J08

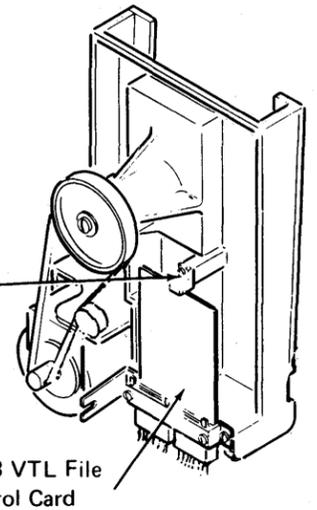
**G.26 2 X 3 VTL FILE CONTROL CARD**

- On diskette drives with serial numbers below 22000, the file control card is mounted with components and test pins facing inward. Use the bracket provided to hold the card for servicing.
- On diskette drives with serial numbers 22000 and above, the file control card is mounted with components and test points facing outward for servicing. No bracket is furnished on these drives.

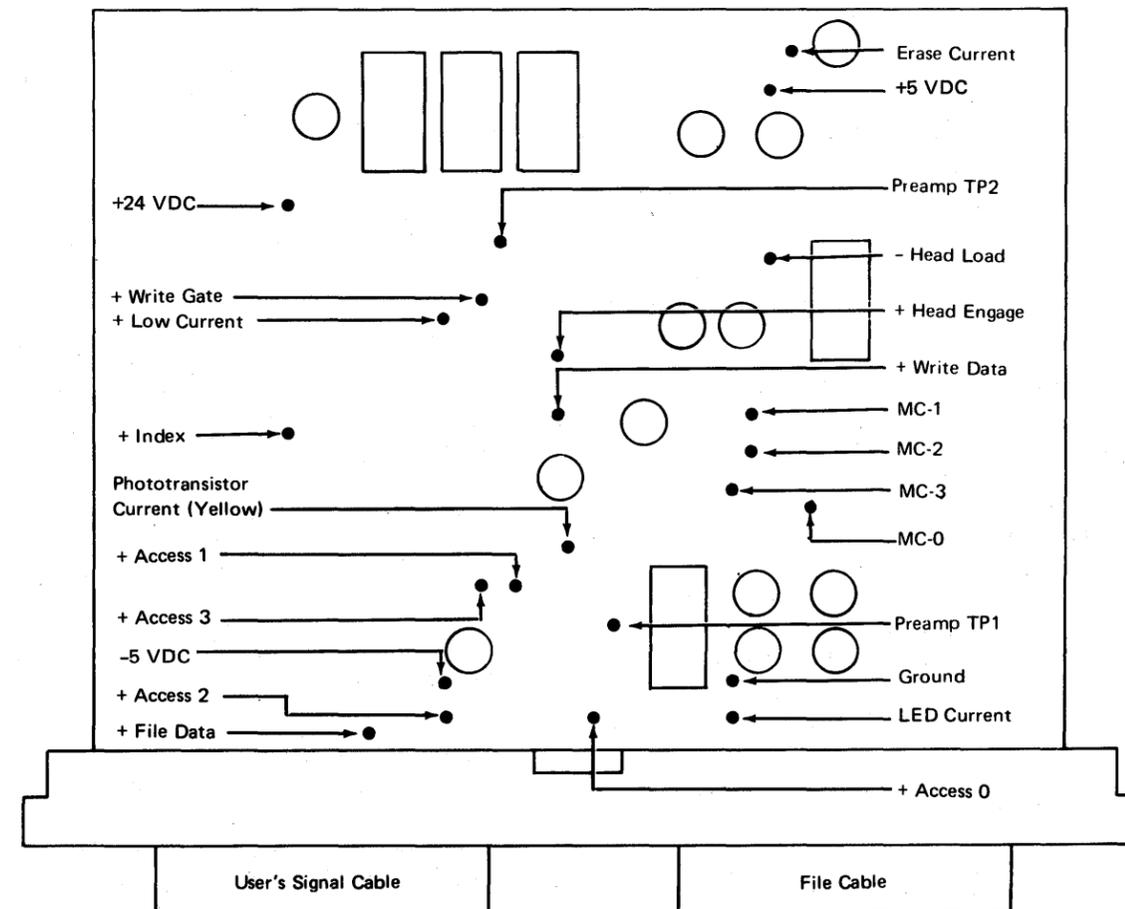
**Removal and Replacement**

- 1 Power off.
- 2 Loosen screw and turn bracket 90 degrees (where present). Tighten screw.

- 3 Remove card.
- 4 To replace, reverse above procedure. Ensure card is properly seated in socket and retaining bracket.



**2 X 3 VTL Test Points** (only the major components are shown, as an aid in locating pins)



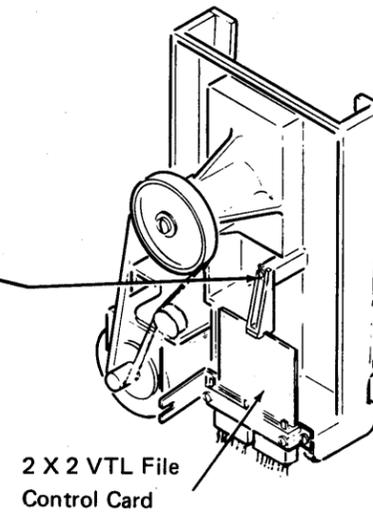
### Card Pin Assignment and Test Points

Name	Color	TPs	VTL
Stepper Motor MC-0 (Phase 0)	White	TPB02	B03
Stepper Motor MC-1 (Phase 1)	Red	TPA01	D02
Stepper Motor MC-2 (Phase 2)	Yellow	TPB03	B04
Stepper Motor MC-3 (Phase 3)	Black	TPB01	B02
Stepper Common +24 VDC	Blue	TPA11	D05
Head Magnet +24 VDC	Yellow	TPA11	D04
- Head Load	Black	TPB04	B05
LED Return	Black	TPA03	D06
LED Current	Yellow	TPA02	D07
Phototransistor Return	Black	TPA12	D09
Phototransistor Current	Yellow	TPB05	B08
Head Input	Black		B12
Head Input	White		B13
Erase Current	Red		B10
Head Ground and Shield	Green		B09
Preamp TP1		TPA04	D12
Preamp TP2		TPA05	D13
Ground	Black	TPA03	D08
+ Access 0		TPB08	G02
+ Access 1		TPB09	G03
+ Access 2		TPB10	G04
+ Access 3		TPB11	G05
+ File Data		TPB12	G07
+ Head Engage		TPB13	G10
+ Write Data		TPA06	J02
+ Erase Gate		TPA07	J04
+ Write Gate		TPA08	J05
+ Low Current		TPA09	J06
+ Index		TPB14	G13
+24 VDC		TPA11	J10
+6 VDC			
+5 VDC		TPB07	J03
-4 VDC			
-5 VDC		TPA12	J11
Ground		TPA10	J08
+18 VDC		TPB06	

### G.27 2 X 2 VTL FILE CONTROL CARD

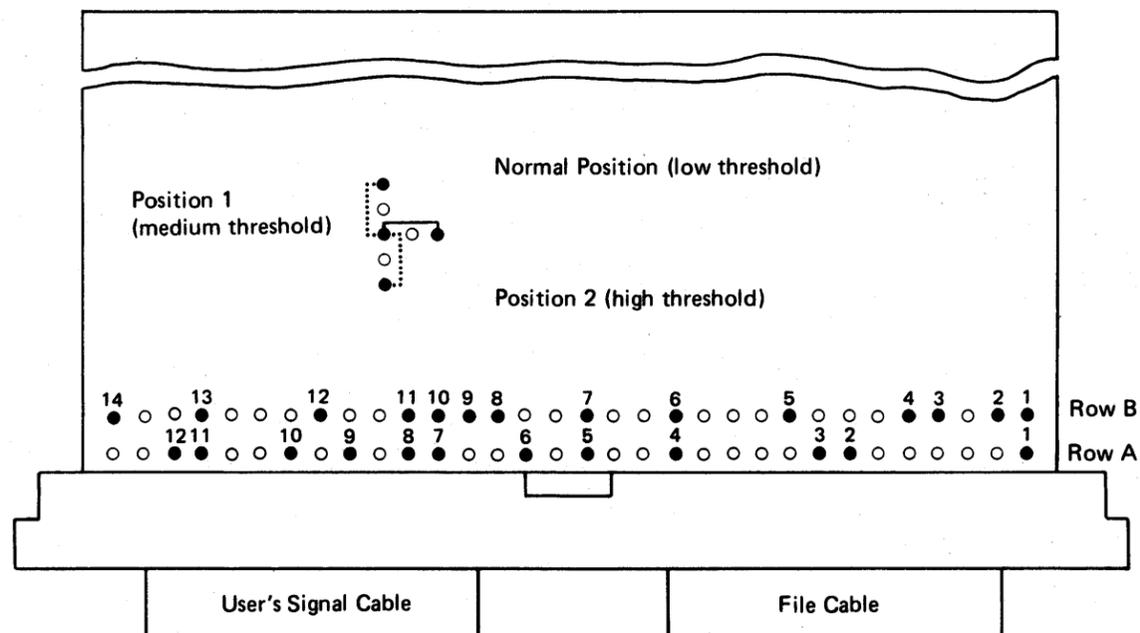
#### Removal and Replacement

- 1 Power off.
- 2 Loosen the screw and turn the bracket 90 degrees (where present). Tighten screw.
- 3 Remove the card.
- 4 To replace, reverse above procedure. Ensure the card is properly seated in the socket and the retaining bracket.



#### 2 X 2 VTL Test Points

**Note:** If there is no index pulse or multiple index pulses exist because of shine-through, raise the threshold level of the index amplifier by moving the jumper to position 1. Raise the threshold level again by moving the jumper to position 2. With the jumper in the high threshold position, more LED light is required to switch the PTX amplifier than when the jumper is in the medium or low threshold positions. Do not increase the threshold level more than necessary to ensure proper operation.

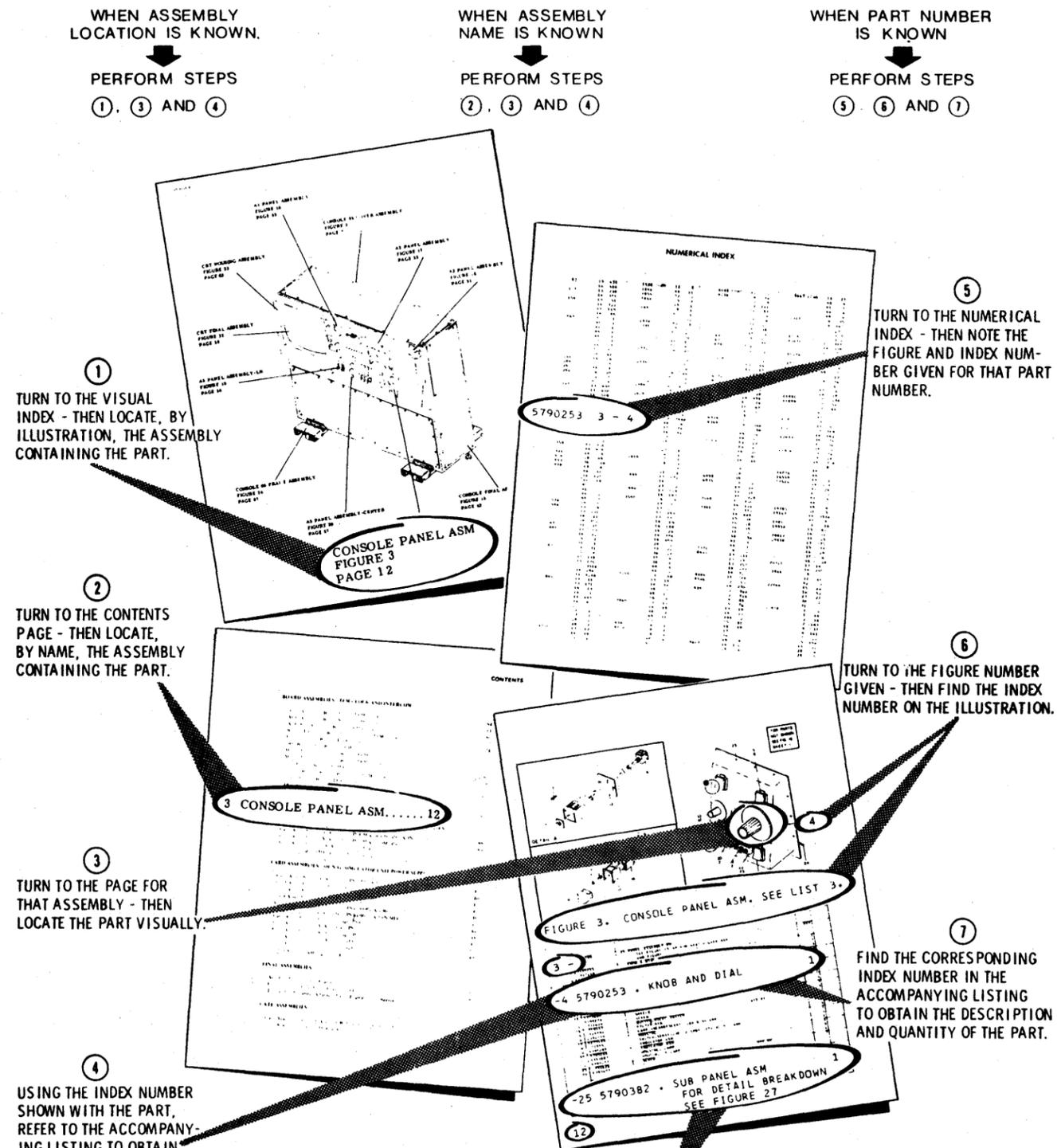




# Appendix P. 3274 Control Unit Models 21 and 31 Parts Catalog

## HOW TO USE THIS PARTS CATALOG

### HOW TO FIND PART INFORMATION:



**NOTE:**  
IF THE DESIRED ITEM IS PART OF A SUBASSEMBLY NOT BROKEN DOWN WITHIN THAT FIGURE, REFER TO THE FIGURE ASSIGNED TO THE SUB-ASSEMBLY, LOCATE THE PART VISUALLY AND OBTAIN THE PART NUMBER, DESCRIPTION AND QUANTITY FROM THE ACCOMPANYING LISTING.

## GLOSSARY

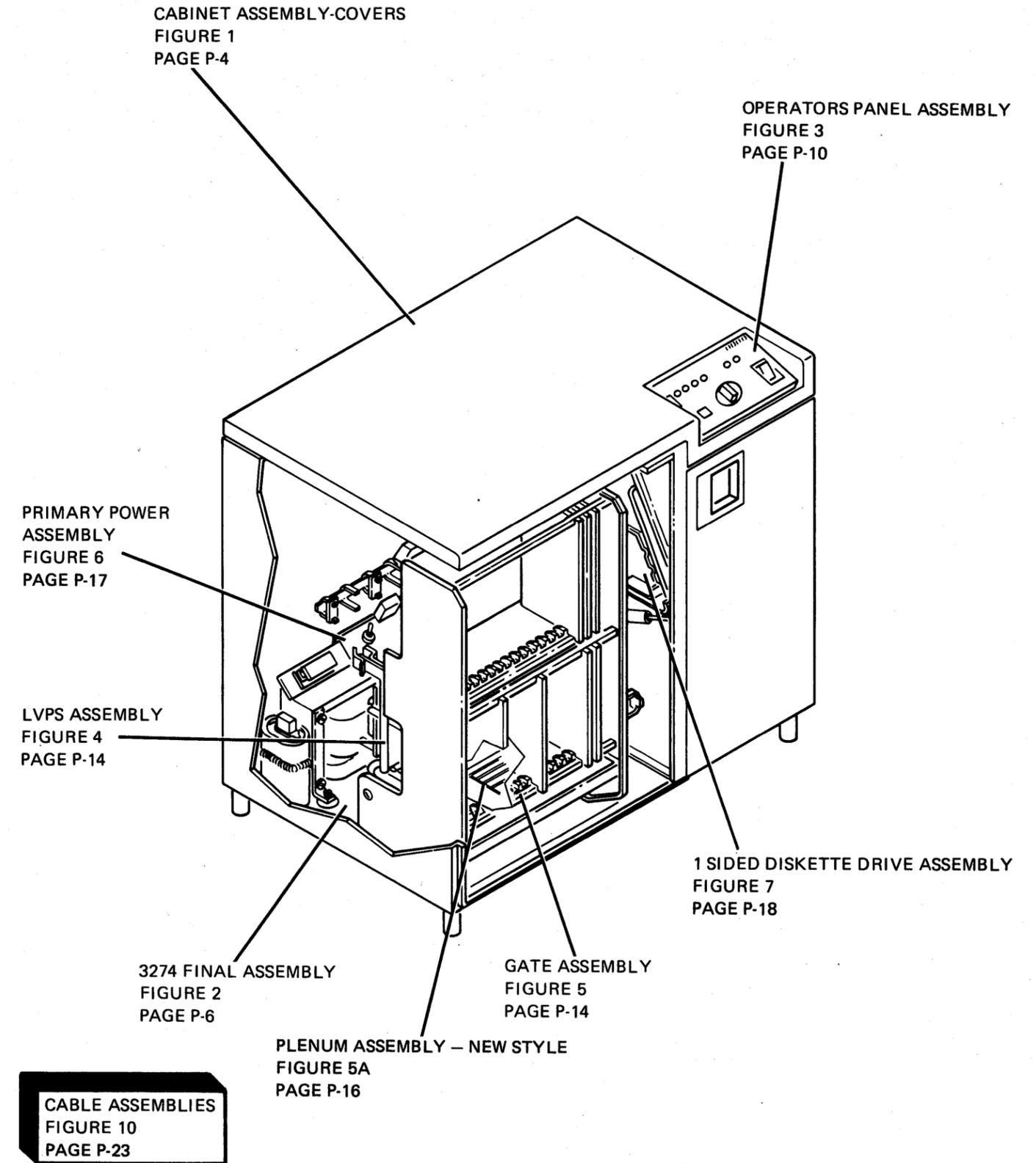
- ① **NO NO.** - When this notation appears in the Part No. column, it denotes a part or group of parts that have not been assigned a part number or which are not recommended for field replacement.
- ② **NR** - This notation in the Part No. column denotes a part not recommended for field replacement.
- ③ **NP** - This notation in the Part No. or Description column indicates parts that are non-procurable. In these cases the next higher assembly should be ordered.
- ④ **AR** - The notation AR in the Units Per Asm. column indicates that the quantity of the part is used as required.
- ⑤ **SIMILAR ASSEMBLIES** - If two or more assemblies contain a majority of identical parts, they are combined in the same listing. Parts common to assemblies are illustrated and listed by one index number. Parts peculiar to one or the other of the assemblies are listed separately and identified either in the description of the part, or by a descriptive trailer line.
- ⑥ **REF** - The notation REF in the Units Per Asm. column indicates that the listing of the assembly is repeated and reference should be made to its previous listing for the quantity required.
- ⑦ **INDENTURE** - The indentation of items under the numerals 1 through 4 at the head of the Description column shows the relationship between assemblies, subassemblies and detail parts. For example:  

1	2	3	4
(No dot)	<b>MAIN ASSEMBLY</b>		
(One dot)	●	Detail parts of main assembly	
(One dot)	● ●	Assembly within main assembly	
(Two dot)	● ● ●	Detail part of one dot assembly	
(Two dot)	● ● ● ●	Assembly within one dot assembly	
(Three dot)	● ● ● ● ●	Detail parts of two dot assembly	
- ⑧ **ATT PT** - This notation in the Description column is used to denote hardware that attaches assemblies, subassemblies and detail parts to the next higher assembly. The attaching hardware is listed immediately following the part to be attached.

FIGURE - INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
22 -	NO NO.	REF	TRANSPORT AND VACUUM ASSEMBLY			
①		⑥	THIS ASSEMBLY CANNOT BE ORDERED FOR REPLACEMENT, SEE LIST 2-252 FOR NEXT HIGHER ASM			
- 1	1846187	1	● DOOR ASSEMBLY, VACUUM COLUMN - MODS 6, 8			
- 1	1846188	1	● DOOR ASSEMBLY, VACUUM COLUMN - MOD 4			
		⑦	FOR DETAIL BREAKDOWN, SEE FIGURE 23A			
- 2	55918	5	● SCREW, MACH BD HD - 10-32 X 0.625 LG ATT PT			
- 3	45690	5	● WASHER, FL - 0.203 ID X 0.408 OD ATT PT			
- 4	2512946	AR	● SHIM, DOOR VAC COLUMN 0.015 THK			
- 4	2512948	AR	● SHIM, DOOR VAC COLUMN 0.030 THK			
- 5	1846100	AR	● PNEUMATIC HOSES TRANSPORT ASSEMBLY			
		③	FOR DETAIL BREAKDOWN, SEE FIGURE 24			
- 9	2523727	NP	● DISC, DECORATIVE			
- 10	1767707	1	● COVER			
- 11	322562	3	● SCREW, BD HD - 10-32 X 2.000 INCHES LG ATT PT			
- 12	1767705	1	● CAM			
- 13	1766920	1	● SPRING, COMP 1.190 OD X 2.750 LG			
- 14	1767720	1	● HUB ASM			
- 15	356742	3	● ● CLAMP, 0.375 ID X 0.173 MTG HOLE			
- 16	5489002	3	● ● SCREW, MACH BD HD - 6-32 X 0.250 LG ATT PT			
- 17	1090873	6	● ● LOCKWASHER, SPLIT - 0.168 ID X 0.296 OD ATT PT			
- 18	1767703	NR	● ● ROLLER, TRIPLE			
- 19	1767711	NR	● ● ROLLER, SINGLE			

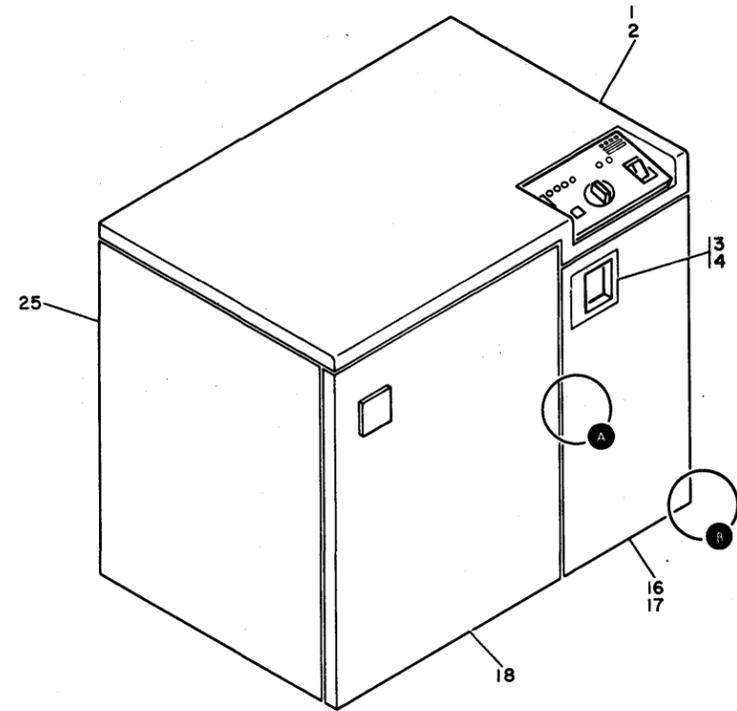
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Visual Index. 3274 Control Unit

## **CATALOG SECTION**



CABINET ASSEMBLY AND COVERS

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
1 -	5862290	REF	CABINET ASSEMBLY-COVERS FOR ILLUSTRATION SEE FIGURE 1			
- 1	5717920	1	COVER			
- 2	32042	1	SCREW,MACH BD HD- 10-32 X 3/8 LG			
- 3	5718381	1	HANDLE ASM			
- 4	79778	2	SCREW-SELF TAPPING NO. 6-32 X 5/16 LG			
- 5	5718399	1	LABEL-ENGLISH			
- 5	5718394	1	LABEL-CANADIAN FRENCH			
- 5	5718395	1	LABEL-FRENCH			
- 5	5718397	1	LABEL-GERMAN			
- 5	5718396	1	LABEL-SPANISH			
- 5	5718392	1	LABEL-ITALIAN			
- 5	5718393	1	LABEL-PORTUGUESE			
- 6	513668	1	CATCH, FRICTION LATCH			
- 7	5350006	2	SCREW, SELF TAPPING, 6-32 X .250 LONG			
- 8	5718345	1	BRACKET			
- 9	55726	AR	SCREW,MACH-BIND HD 6-32 X .188 LG			
- 10	56722	AR	WASHER, LOCK-EXT TEETH NO. 6			
- 11	5717467	1	PLATE, LATCH			
- 12	251970	2	SCREW-MACH BD. HD. 4-40 X 1/4 LG			
- 13	5718282	2	FINGER STOCK			
- 14	5717963	1	SPRING			
- 15	369207	1	LABEL,VOLTAGE			
- 15	1743548	1	LABEL			
- 15	6185182	1	LABEL,VOLTAGE-FRENCH			
- 15	6185193	1	LABEL,VOLTAGE-GERMAN			
- 15	6185180	1	LABEL,VOLTAGE-SPANISH			
- 15	6185181	1	LABEL,VOLTAGE-ITALIAN			
- 15	6185183	1	LABEL,VOLTAGE-PORTUGUESE			
- 16	5717922	1	COVER			
- 17	475465	AR	SEAL-COVER			
- 18	5717988	1	COVER			
- 19	5717991	4	PIN-HINGE			
- 21	5718365	1	JUMPER ASM			
- 22	5717993	1	BRACKET			
- 23	7340265	2	SCREW-CARD HANDLER			
- 24	5717999	4	FOOT			
- 25	5667218	1	CABINET ASM			

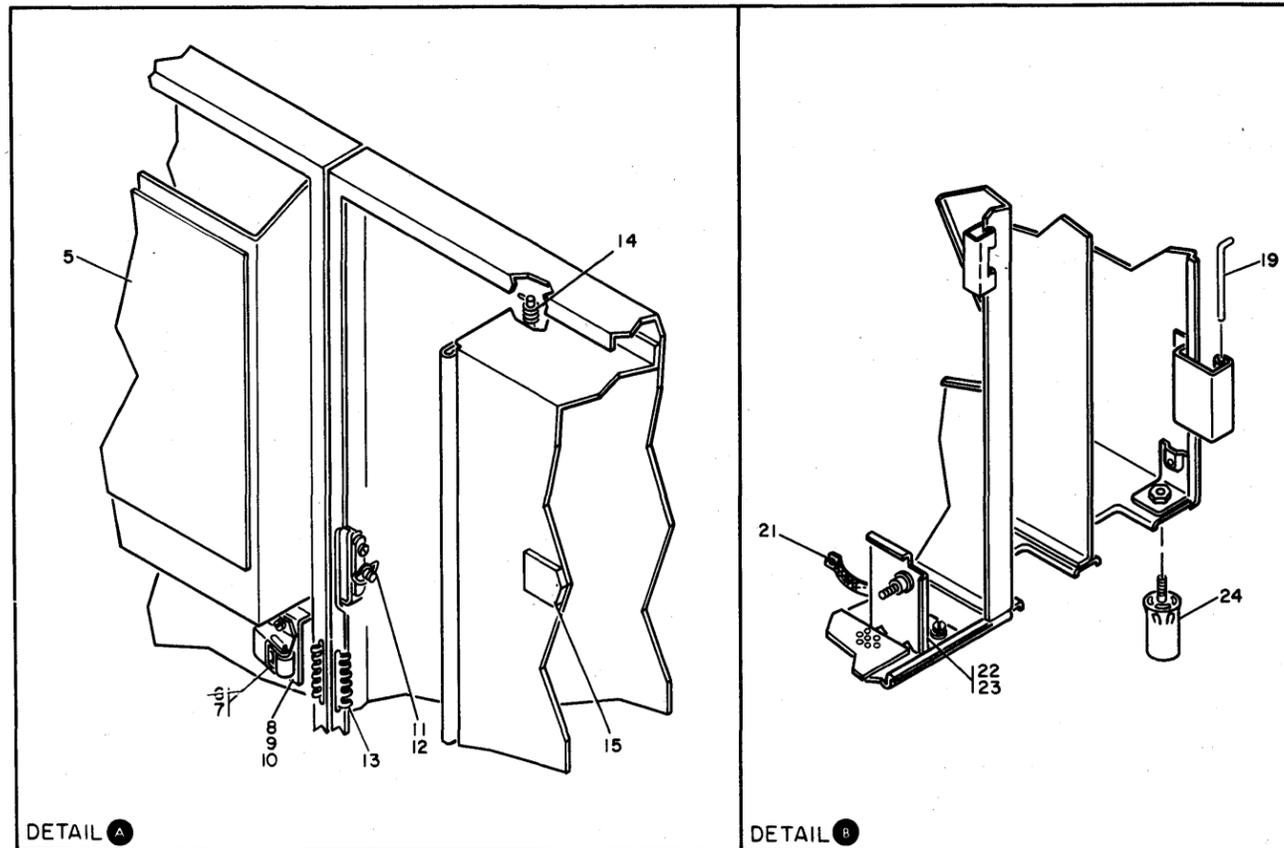


FIGURE 1. CABINET ASSEMBLY AND COVERS. SEE LIST 1.

NOTES

NOTES

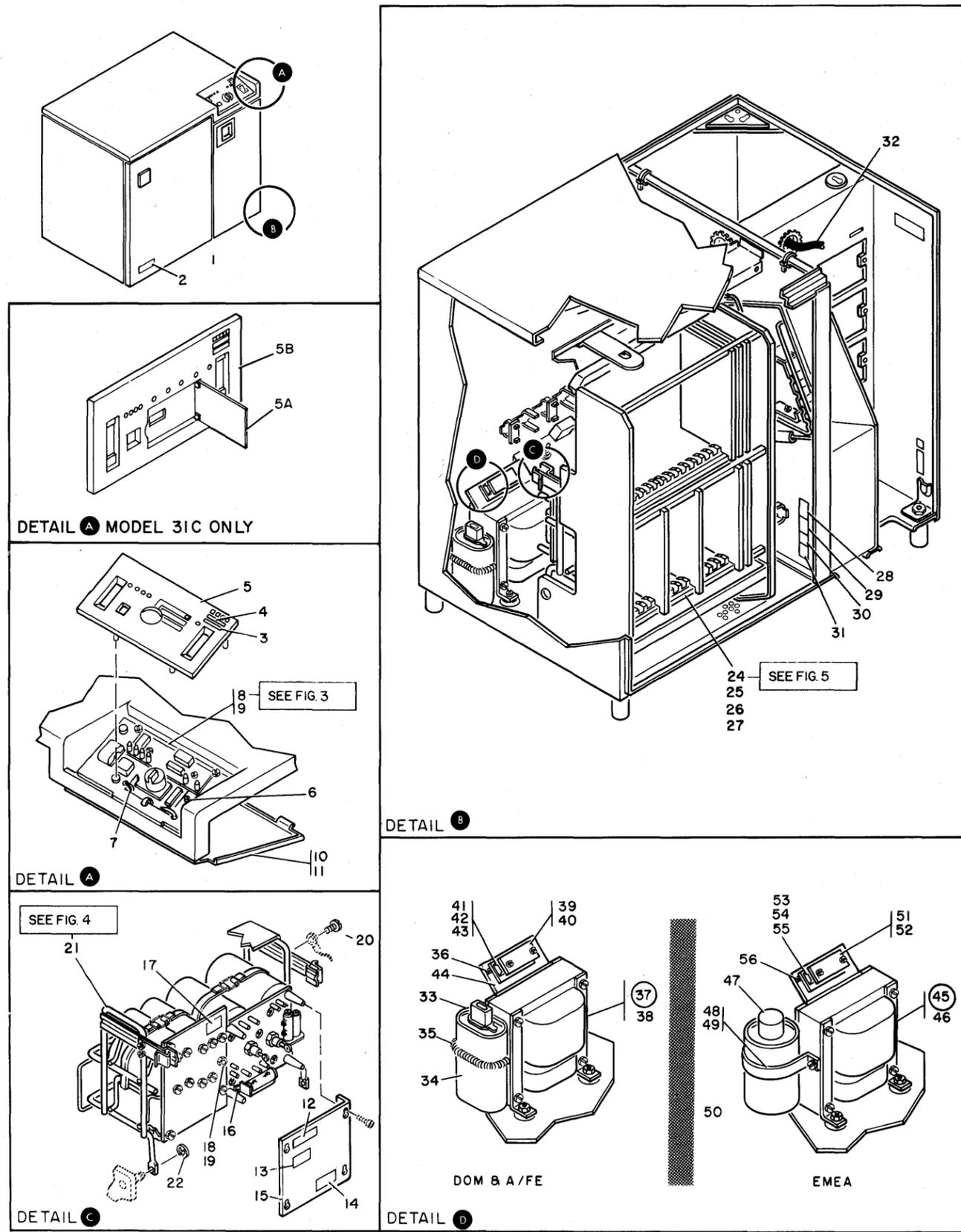


FIGURE 2. FINAL ASSEMBLY. SHEET 1 OF 2. INDEX NOS. 1-56. SEE LIST 2.

FINAL ASSEMBLY

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
2 -	5667091	REF	3274 FINAL ASSEMBLY-MODELS 21A,21B,21D, 31A AND 31D			
-	5667101		3274 FINAL ASSEMBLY-MODEL 21C AND 31C FOR ILLUSTRATION SEE FIGURE 2			
- 1	5667039	1	• NAMEPLATE-MODEL 3274 A			
- 1	5667040	1	• NAMEPLATE-MODEL 3274 B			
- 1	5667041	1	• NAMEPLATE-MODEL 3274 C			
- 1	5667042	1	• NAMEPLATE-MODEL 3274 D			
- 2	855285	1	• NAMEPLATE			
- 2	8112301	1	• PLATE, TRADEMARK-GUATEMALA			
- 2	8112302	1	• PLATE, TRADEMARK-CHILE/MEXICO/PERU			
- 3	1743062	1	• LABEL, SERIAL NO.			
- 3	1743063	1	• LABEL, SERIAL NO.			
- 3	1743064	1	• LABEL, SERIAL NO.			
- 3	1743065	1	• LABEL SERIAL NO.			
- 4	5718217	1	• LABEL, WRITE-IN			
- 5	5717954	1	• OVERLAY OPS PANEL-MODS A, B # D-CAN/ENGLI			
- 5	5717904	1	• OVERLAY OPS PANEL-MODS A, B #D,CANADIAN F			
- 5	5717956	1	• OVERLAY OPS PANEL-MODS A, B # D-GERMAN			
- 5	5717957	1	• OVERLAY OPS PANEL-MODS A, B # D-ITALIAN			
- 5	5717959	1	• OVERLAY OPS PANEL-MODS A, B # D-SPANISH			
- 5	5717980	1	• OVERLAY OPS PANEL-MODS A, B # D-BRAZIL			
- 5	5717964	1	• OVERLAY OPS PANEL-MODEL C-ENGLISH/US/UK			
- 5	5717965	1	• OVERLAY OPS PANEL-MODEL C-FRENCH			
- 5	5717966	1	• OVERLAY OPS PANEL-MODEL C-GERMAN			
- 5	5717967	1	• OVERLAY OPS PANEL-MODEL C-ITALIAN			
- 5	5717969	1	• OVERLAY OPS PANEL-MODEL C-SPANISH			
- 5	5717981	1	• OVERLAY OPS PANEL-MODEL C-BRAZILIAN			
- 5	5717909	1	• OVERLAY OPS PANEL-MODEL C,CANADIAN FRENC			
- 5A	5667118	1	• DOOR, PANEL USED ON INTEGRATED MODEM ONLY			
- 5B	5862274	1	• OVERLAY, OPS PANEL-MODEL 31C ENGLISH USED ON INTEGRATED MODEM ONLY			
- 5B	5862275	1	• OVERLAY, OPS PANEL-MODEL 31C PORTUGUESE USED ON INTEGRATED MODEM ONLY			
- 5B	5862276	1	• OVERLAY, OPS PANEL-MODEL 31C FRENCH USED ON INTEGRATED MODEM ONLY			
- 5B	5862277	1	• OVERLAY, OPS PANEL-MODEL 31C GERMAN USED ON INTEGRATED MODEM ONLY			
- 5B	5862278	1	• OVERLAY, OPS PANEL-MODEL 31C ITALIAN USED ON INTEGRATED MODEM ONLY			
- 5B	5862279	1	• OVERLAY, OPS PANEL-MODEL 31C SPANISH USED ON INTEGRATED MODEM ONLY			
- 5B	5862280	1	• OVERLAY, OPS PANEL-MODEL 31C CAN. FRENCH USED ON INTEGRATED MODEM ONLY			
- 6	2181005	1	• SCREW, SELF TAPPING, 6-32 X .375 LG.			
- 7	5420242	3	• TY-MINIATURE			
- 8	5718073	1	• OPERATORS PANEL ASSEMBLY-MODEL C WITH PRINTED CIRCUIT CARD			
- 8	5718072	1	• OPERATORS PANEL ASSEMBLY-MODS A,B,D WITHOUT PRINTED CIRCUIT CARD			
- 8	5667120	1	• OPERATORS PANEL ASSEMBLY-MODEL 31C ONLY FOR DETAIL BREAKDOWN SEE FIGURE 3			
- 9	2181005	2	• SCREW, SELF TAPPING, 6-32 X .375 LG. ATT PT			
- 10	5717986	1	• COVER			
- 11	2181005	1	• SCREW, SELF TAPPING, 6-32 X .375 LG. ATT PT			
- 12	1743548	1	• LABEL			
- 12	6815182	1	• LABEL, HAZARDOUS ZONE-FRENCH			
- 12	6815193	1	• LABEL, HAZARDOUS ZONE-GERMAN			
- 12	6815180	1	• LABEL, HAZARDOUS ZONE-SPANISH			
- 12	6815181	1	• LABEL, HAZARDOUS ZONE-ITALIAN			
- 12	6815183	1	• LABEL, HAZARDOUS ZONE-PORTUGUESE			
- 13	1671693	1	• LABEL			
- 14	5718483	1	• LABEL- FUSE WARNING ENGLISH- CDN/FRENCH			
- 14	4406240	1	• LABEL- FUSE WARNING- FRENCH			
- 14	4406241	1	• LABEL- FUSE WARNING- GERMAN			
- 14	4406242	1	• LABEL- FUSE WARNING- SPANISH			
- 14	4406243	1	• LABEL- FUSE WARNING- ITALIAN			
- 14	4406245	1	• LABEL- FUSE WARNING- PORTUGUESE			
- 15	5667079	1	• SHIELD			
- 16	5350006	2	• SCREW, SELF TAPPING, 6-32 X .250 LONG ATT PT			
- 17	1743129	1	• LABEL			
- 18	332620	1	• SCREW, MACH-BIND HD 10-32 X 1/2 LG			
- 19	2577706	1	• NUT AND WASHER, PRE ASSEMBLED			
- 20	2181005	1	• SCREW, SELF TAPPING, 6-32 X .375 LG.			
- 21	5667060	1	• LVPS ASSEMBLY FOR DETAIL BREAKDOWN SEE FIGURE 4			

FINAL ASSEMBLY

NOTES

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
2 - 22	1092125	2	. RING-RETAINING			ATT PT
- 24	5667102	1	. GATE ASSEMBLY			
			FOR DETAIL BREAKDOWN SEE FIGURE 5			
- 25	118997	2	. NUT, SELF LKG, HEX, 5/16-18 X 1/2 FL W			ATT PT
- 26	5717913	4	. WASHER-METAL			ATT PT
- 27	5717912	4	. WASHER-FIBER			
- 28	855284	1	. PLATE- MANUFACTURING EXPORT			
- 29	855262	1	. PLATE- PROPERTY OF IBM			
- 29	855263	1	. PLATE- PROPERTY OF IBM WT			
- 29	960746	1	. PLATE,PROP OF IBM CANADA			
- 29	855264	1	. PLATE- MANUFACTURED BY USA			
- 29	855265	1	. PLATE- MANUFACTURED BY			
- 29	855266	1	. PLATE- MANUFACTURED BY WT			
- 29	855267	1	. PLATE- MANUFACTURED FOR USA			
- 29	855268	1	. PLATE- MANUFACTURED FOR			
- 29	855269	1	. PLATE- MANUFACTURED FOR WT			
- 29	855270	1	. PLATE- RECONDITIONED BY USA			
- 29	855272	1	. PLATE- RECONDITIONED BY WT			
- 29	855273	1	. PLATE- RENOVATED BY USA			
- 29	855275	1	. PLATE- RENOVATED BY WT			
- 29	855276	1	. PLATE- RECONDITIONED FOR USA			
- 29	855278	1	. PLATE- RECONDITIONED FOR WT			
- 29	855279	1	. PLATE- RENOVATED FOR USA			
- 29	855281	1	. PLATE- RENOVATED FOR WT			
- 30	855283	1	. PLATE- SERIAL NO. RIGHT			
- 31	855282	1	. PLATE- SERIAL NO. LEFT			
- 32	5718303	1	. CABLE ASM-REMOTE POWER ON SWITCH MOD			
- 32	5718306	1	. CABLE ASM-OPS PANEL TO LOGIC BOARD			
- 32	5718314	1	. CABLE ASM-P/P BOX TO OPS PANEL			
- 32	5667116	1	. CABLE ASM-UCH			
			FOR COMPONENT PARTS,SEE FIGURE 10			
- 33	363001	1	. INSULATOR,CAPACITOR			
- 34	6814312	1	. CAPACITOR,AC-PAPER			
- 35	2565091	1	. SPRING			
- 36	2181005	1	. SCREW, SELF TAPPING, 6-32 X .375 LG.			ATT PT
- 37	1655365	1	. TRANSFORMER ASM-120/208/240V,60HZ DOMESTIC			
- 37	5893806	1	. TRANSFORMER ASM-100/110/120/127V,60HZ WT ONLY.			
- 37	5893809	1	. TRANSFORMER ASM-200/208/220/240V,60HZ WT ONLY			
- 37	5893807	1	. TRANSFORMER ASM-100/110V,50HZ WT ONLY			
- 37	5893808	1	. TRANSFORMER ASM-200/220/230/240V,50HZ WT ONLY			
- 38	2565265	4	. NUT			ATT PT
- 39	5236656	1	. SHIELD, 5 POSTION			
- 40	10170	2	. SCREW,MACH-BIND HD 6-32 X 1/4 LG			ATT PT
- 41	317310	1	. TERMINAL BOARD- 5 DBL SCREW TERMINALS			
- 42	210883	2	. STUD-SHIELD MTG,TAPPED,NO. 6-32			ATT PT
- 43	56079	2	. WASHER,LOCK-EXT T .195 ID .410 OD			ATT PT
- 44	4120303	1	. STRIP,MARKER- 5 POSITION			
- 45	4119638	1	. TRANSFORMER ASM- 220/240V,50HZ (EMEA)			
- 46	2565265	4	. NUT			ATT PT
- 47	2722507	1	. INSULATOR CAP			
- 48	4120493	1	. CLAMP			
- 49	55726	2	. SCREW,MACH-BIND HD 6-32 X .188 LG			ATT PT
- 50	4120826	1	. CAPACITOR			
- 51	5790504	1	. COVER			
- 52	10170	2	. SCREW,MACH-BIND HD 6-32 X 1/4 LG			ATT PT
- 53	323838	1	. BLOCK,TERMINAL- 4 DOUBLE SCREWS			
- 54	5261627	2	. STUD,EXTENSION			ATT PT
- 55	35739	2	. SCREW,MACH-BIND HD 6-32 X 15/16 LG			ATT PT
- 56	4120483	1	. STRIP,MARKER			

FINAL ASSEMBLY

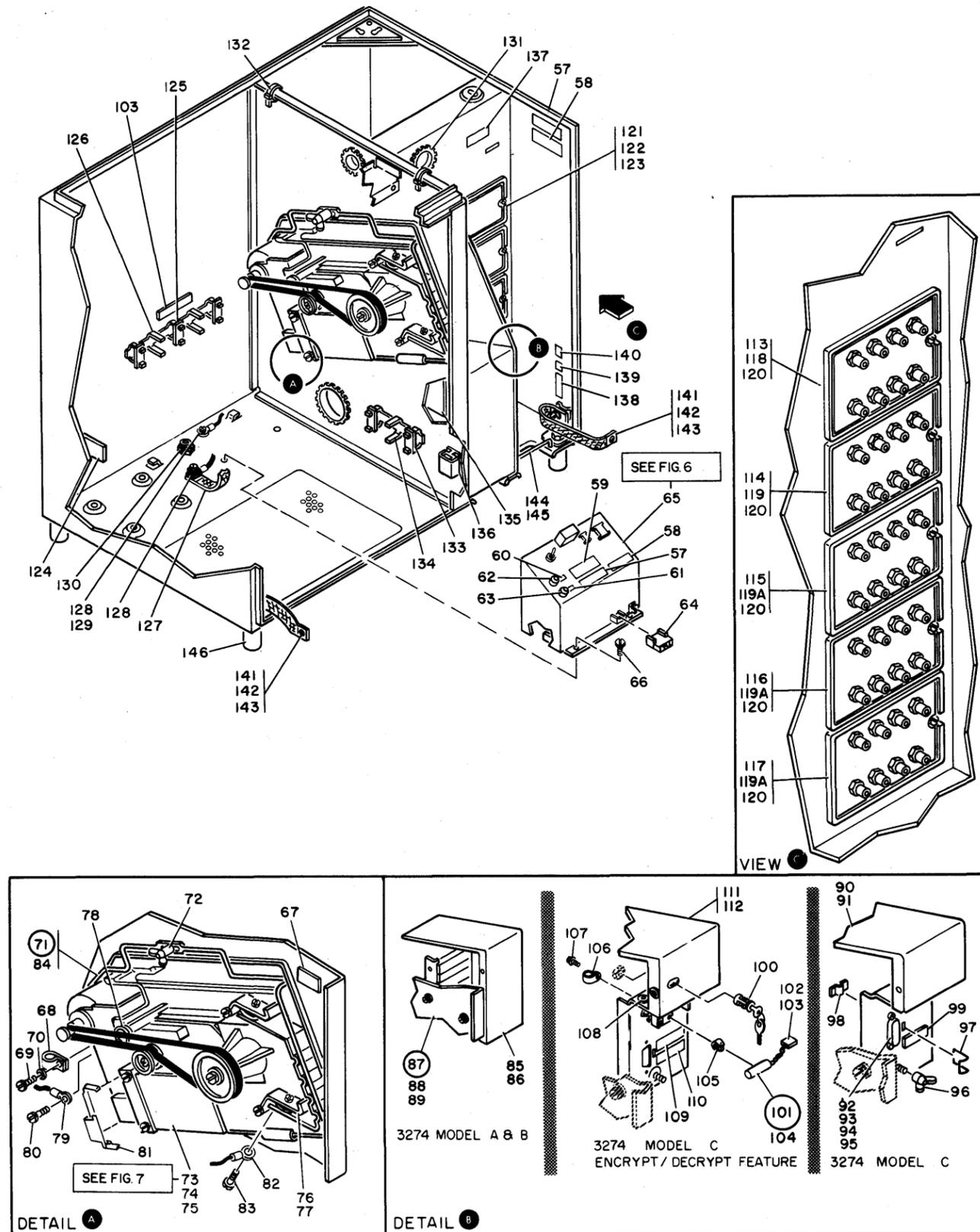


FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
2 - 57	6812831	3	• LABEL, LINE VOLTAGE-CANADIAN FRENCH			
- 58	138754	3	• LABEL			
- 58	6812828	3	• LABEL- VOLTAGE PRESENT FRENCH			
- 58	6812832	3	• LABEL- VOLTAGE PRESENT GERMAN			
- 58	6812829	3	• LABEL- VOLTAGE PRESENT SPANISH			
- 58	6812830	3	• LABEL- VOLTAGE PRESENT ITALIAN			
- 58	6815188	3	• LABEL- VOLTAGE, PORTUGUESE			
- 59	4942502	1	• LABEL, WARNING			
- 59	5718483	1	• LABEL- FUSE WARNING ENGLISH- CDN/FRENCH			
- 59	4406240	1	• LABEL- FUSE WARNING- FRENCH			
- 59	4406241	1	• LABEL- FUSE WARNING- GERMAN			
- 59	4406242	1	• LABEL- FUSE WARNING- SPANISH			
- 59	4406243	1	• LABEL- FUSE WARNING- ITALIAN			
- 59	4406245	1	• LABEL- FUSE WARNING- PORTUGUESE			
- 60	5718312	1	• LABEL-FUSE RATING, 6 ASB			
- 60	5718191	1	• LABEL-FUSE RATING, 4A, 125V SB			
- 60	5718192	1	• LABEL-FUSE RATING, 2A, 250V SB			
- 60	5718193	1	• LABEL-FUSE RATING, 2.5A, 250V SB			
- 60	5718194	1	• LABEL-FUSE RATING, 5A, 125V SB			
- 61	5718313	1	• LABEL-FUSE RATING, 1/10 ASB USED ON MODELS A, B AND D			
- 62	6018398	1	• FUSE CARTRIDGE, 2A 250V- SB USED ON 208/240V 60HZ DOMESTIC			
- 62	6018398	1	• FUSE CARTRIDGE, 2A 250V- SB USED ON 208/220/240V 60HZ AFE			
- 62	1143492	1	• FUSE CARTRIDGE, 4A 125V- SB USED ON 120V 60HZ DOMESTIC			
- 62	1143492	1	• FUSE CARTRIDGE, 4A 125V- SB USED ON 120/127V 60HZ AFE			
- 62	361755	1	• FUSE CARTRIDGE, 2.5A 250V- SB USED ON 220/240V 50HZ EMEA			
- 62	361755	1	• FUSE CARTRIDGE, 2.5A 250V- SB USED ON 200/220/230/240V 50HZ AFE			
- 62	361755	1	• FUSE CARTRIDGE, 2.5A 250V- SB USED ON 200V 60HZ AFE			
- 62	512137	1	• FUSE CARTRIDGE, 5A 125V- SB USED ON 100/110V 50/60HZ AFE			
- 62	5718366	1	• FUSE, CARTRIDGE- 4.5A 250V			
- 62	5718367	1	• FUSE, CARTRIDGE- 3.0A 250V			
- 63	304883	1	• FUSE, CARTRIDGE-0.1 AMP 250 VOLTS			
- 63	1655380	1	• FUSE-CARTRIDGE, .062 AMP, MODELS A AND B			
- 64	5718088	1	• JUMPER, EPO-MODELS A, B AND D			
- 65	5717975	1	• PRIMARY POWER ASSEMBLY USED ON MODELS A, B AND D			
- 65	5717970	1	• PRIMARY POWER ASSEMBLY USED ON MODEL C FOR DETAIL BREAKDOWN SEE FIGURE 6			
- 66	2181005	2	• SCREW, SELF TAPPING, 6-32 X .375 LG. ATT PT			
- 67	5718343	1	• LABEL-SAFETY			
- 67	5718477	1	• LABEL, SAFETY-CANADIAN FRENCH			
- 67	5718478	1	• LABEL, SAFETY-FRENCH			
- 67	5718479	1	• LABEL, SAFETY-GERMAN			
- 67	5718481	1	• LABEL, SAFETY-SPANISH			
- 67	5718480	1	• LABEL, SAFETY-ITALIAN			
- 67	5718482	1	• LABEL, SAFETY-PORTUGUESE			
- 68	166668	1	• CLAMP			
- 69	34512	1	• SCREW, BIND. HD 8-32 X .375 LG ATT PT			
- 70	45690	1	• WASHER, FL - NO.10 X 7/16 OD X 1/32 THK ATT PT			
- 71	5717905	NR	• FRAME ASM- 100/110/120/127V, 60HZ			
- 71	5717906	NR	• FRAME ASM- 200/208/220/240V, 60HZ			
- 71	5717907	NR	• FRAME ASM- 100/110V, 50HZ			
- 71	5717908	NR	• FRAME ASM- 200/220/230/240V, 50HZ			
- 72	2565117	1	• WING NUT			
- 73	2305487	1	• 1 SIDED DISKETTE DRIVE ASSEMBLY 100/110/120/127 VOLTS, 60 HZ			
- 73	2305486	1	• 1 SIDED DISKETTE DRIVE ASSEMBLY 200/208/220/240 VOLTS, 60 HZ			
- 73	2305489	1	• 1 SIDED DISKETTE DRIVE ASSEMBLY 100/110 VOLTS, 50 HZ			
- 73	2305488	1	• 1 SIDED DISKETTE DRIVE ASSEMBLY 200/220/230/240 VOLTS, 50 HZ FOR DETAIL BREAKDOWN, SEE FIGURE 7			
- 74	322552	3	• SCREW ATT PT			
- 75	344015	3	• NUT, SELF LKG, HEX- 6-32 X 5/16 FL W ATT PT			
- 76	2455575	2	• SHOCK MOUNT			
- 76	2455576	1	• SHOCK MOUNT			
- 77	10170	4	• SCREW, MACH-BIND HD 6-32 X 1/4 LG ATT PT			

FIGURE 2. FINAL ASSEMBLY. SHEET 2 OF 2. INDEX NOS. 57-146. SEE LIST 2.

FINAL ASSEMBLY

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
2 - 78	5718084	1	•	•	STOP	
- 79	5704693	1	•	•	JUMPER ASSEMBLY	
- 80	58207	1	•	•	SCREW, MACH-UNDRCT BIND HD 8-32 X 1/4 LG	ATT PT
- 81	5718188	1	•	•	RETAINER, CARD	
- 82	5759499	1	•	•	JUMPER ASM, NO. 16 WIRE	
- 83	10170	1	•	•	SCREW, MACH-BIND HD 6-32 X 1/4 LG	ATT PT
- 84	5717901	1	•	•	FRAME	
- 85	5717987	1	•	•	COVER	
- 86	2181005	2	•	•	SCREW, SELF TAPPING, 6-32 X .375 LG.	ATT PT
- 87	5718064	1	•	•	I/O ASM-BUS/TAG	
- 88	2181005	2	•	•	SCREW, SELF TAPPING, 6-32 X .375 LG.	ATT PT
- 89	5718284	1	•	•	BRACKET	
- 89	5717993	1	•	•	BRACKET	
- 90	5717985	1	•	•	COVER	
- 91	2181005	2	•	•	SCREW, SELF TAPPING, 6-32 X .375 LG.	ATT PT
- 92	5718309	1	•	•	CABLE ASM	
- 92	5667119	1	•	•	CABLE ASM	
					FOR CABLE COMPONENT PARTS, SEE FIGURE 10	
- 93	38264	2	•	•	SCREW, MACH-FIL H 4-40 X 3/8 LG	ATT PT
- 94	338169	2	•	•	WASHER, LOCK-EXT TEETH NO. 4 X .260 OD	ATT PT
- 95	37913	2	•	•	NUT-HEX 4-40 X .250 ID	ATT PT
- 96	2565117	1	•	•	WING NUT	
- 97	5718360	1	•	•	BAIL	
- 98	5718361	1	•	•	CLIP	
- 99	5718362	1	•	•	LABEL, PLUG IN ONLY-ENGLISH	
- 99	5718374	1	•	•	LABEL, PLUG IN ONLY-CANADIAN FRENCH	
- 99	5718375	1	•	•	LABEL, PLUG IN ONLY-FRENCH	
- 99	5718377	1	•	•	LABEL, LUG IN ONLY-GERMAN	
- 99	5718376	1	•	•	LABEL, PLUG IN ONLY-ITALIAN	
- 99	5718371	1	•	•	LABEL, PLUG IN ONLY-SPANISH	
- 99	5718373	1	•	•	LABEL, PLUG IN ONLY-PORTUGUESE	
-100	6814398	1	•	•	SWITCH LOCK ASM	
-101	1743456	1	•	•	BATTERY ASM	
-102	2637682	2	•	•	CONNECTOR - DISCRETE	
-103	2731835	1	•	•	HOUSING	
-104	1655387	1	•	•	BATTERY- 4.14 VOLT MERCURY	
-105	1743455	1	•	•	CLIP- CAPACITOR	
-106	357433	1	•	•	CLAMP, CABLE	
-107	2181005	1	•	•	SCREW, SELF TAPPING, 6-32 X .375 LG.	ATT PT
-108	123074	1	•	•	GROMMET, RUBBER	
-109	6815211	1	•	•	LABEL, BAT. DISP. - ENGLISH/JAPAN	
-109	6815262	1	•	•	LABEL, BAT. DISP. - FRENCH CANADIAN	
-109	6815210	1	•	•	LABEL, BAT. DISP. - FRANCE	
-109	6815266	1	•	•	LABEL, BAT. DISP. - GERMAN	
-109	6815265	1	•	•	LABEL, BAT. DISP. - ITALIAN	
-109	6815263	1	•	•	LABEL, BAT. DISP. - SPANISH	
-109	6815209	1	•	•	LABEL, BAT. DISP. - PORTUGAL	
-110	5718362	1	•	•	LABEL, PLUG IN ONLY-ENGLISH	
-110	5718374	1	•	•	LABEL, PLUG IN ONLY-CANADIAN FRENCH	
-110	5718375	1	•	•	LABEL, PLUG IN ONLY-FRENCH	
-110	5718377	1	•	•	LABEL, LUG IN ONLY-GERMAN	
-110	5718376	1	•	•	LABEL, PLUG IN ONLY-ITALIAN	
-110	5718371	1	•	•	LABEL, PLUG IN ONLY-SPANISH	
-110	5718373	1	•	•	LABEL, PLUG IN ONLY-PORTUGUESE	
-111	5717992	1	•	•	COVER	
-112	2181005	1	•	•	SCREW, SELF TAPPING, 6-32 X .375 LG.	ATT PT
-113	5718336	1	•	•	OVERLAY-TYPE B, 0-7	
-114	5718335	1	•	•	OVERLAY-TYPE A, 24-31	
-114	5718337	1	•	•	OVERLAY-TYPE B, 8-15	
-115	5718334	1	•	•	OVERLAY-TYPE A, 16-23	
-116	5718333	1	•	•	OVERLAY-TYPE A, 8-15	
-117	5718332	1	•	•	OVERLAY-TYPE A, 0-7	
-118	5862292	1	•	•	CABLE ASM-DEVICE ADAPTER, 3270 TYPE B1	
-118	5862293	1	•	•	CABLE ASM-DEVICE ADAPTER, 3270-TYPE A3	
-119	5862292	1	•	•	CABLE ASM-DEVICE ADAPTER, 3270-TYPE B2	
-119A	5862293	1	•	•	CABLE ASM-DEVICE ADAPTER, 3270-TYPE A3	
					FOR CABLE COMPONENT PARTS, SEE FIGURE 10	
-120	5350006	1	•	•	SCREW, SELF TAPPING, 6-32 X .250 LONG	ATT PT
-121	5718330	AR	•	•	PLATE-FILLER	
-122	5862294	AR	•	•	PANEL	
-123	5350006	AR	•	•	SCREW, SELF TAPPING, 6-32 X .250 LONG	ATT PT
-124	2582954	1	•	•	LABEL	
-124	5718485	1	•	•	LABEL-GERMAN	
-124	5718486	1	•	•	LABEL-SPANISH	
-124	5718487	1	•	•	LABEL-ITALIAN	
-124	5718488	1	•	•	LABEL-PORTUGUESE	
-125	811427	3	•	•	STRAP, CABLE	

FINAL ASSEMBLY

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
2 -126	2590010	1	•	•	TROUGH, CABLE	
-127	5240500	1	•	•	STRAP, BONDING	
-128	2181005	3	•	•	SCREW, SELF TAPPING, 6-32 X .375 LG.	ATT PT
-130	5718499	1	•	•	BUSHING	ATT PT
-131	473442	2	•	•	GROMMET - CATERPILLAR	
-132	5420242	2	•	•	TY-MINIATURE	
-133	811427	4	•	•	STRAP, CABLE	
-134	2588303	2	•	•	TROUGH-FLAT	
-135	5718364	1	•	•	LABEL-MODELS A, B AND D	
-136	2596293	1	•	•	CABLE CLAMP	
-137	369207	2	•	•	LABEL, VOLTAGE	
-137	1743548	2	•	•	LABEL	
-137	6185182	2	•	•	LABEL, VOLTAGE-FRENCH	
-137	6185193	2	•	•	LABEL, VOLTAGE-GERMAN	
-137	6185180	2	•	•	LABEL, VOLTAGE-SPANISH	
-137	6185181	2	•	•	LABEL, VOLTAGE-ITALIAN	
-137	6185183	2	•	•	LABEL, VOLTAGE-PORTUGUESE	
-138	5718055	1	•	•	POWER RATING PLATE- 100V, 60HZ AFE	
-138	5718049	1	•	•	POWER RATING PLATE- 100V, 50HZ AFE	
-138	5718057	1	•	•	POWER RATING PLATE- 120V, 60HZ AFE	
-138	5718048	1	•	•	POWER RATING PLATE- 120V, 60HZ DOM	
-138	5718058	1	•	•	POWER RATING PLATE- 127V, 60HZ AFE	
-138	5718059	1	•	•	POWER RATING PLATE- 200V, 60HZ AFE	
-138	5718369	1	•	•	POWER RATING PLATE- 208V, 60HZ DOM	
-138	5718060	1	•	•	POWER RATING PLATE- 208V, 60HZ AFE	
-138	5718061	1	•	•	POWER RATING PLATE- 220V, 60HZ AFE	
-138	5718370	1	•	•	POWER RATING PLATE- 240V, 60HZ DOM	
-138	5718062	1	•	•	POWER RATING PLATE- 240V, 60HZ AFE	
-138	5718050	1	•	•	POWER RATING PLATE- 110V, 50HZ AFE	
-138	5718051	1	•	•	POWER RATING PLATE- 200V, 50HZ AFE	
-138	5718052	1	•	•	POWER RATING PLATE- 220V, 50HZ AFE/EMEA	
-138	5718053	1	•	•	POWER RATING PLATE- 230V, 50HZ AFE	
-138	5718054	1	•	•	POWER RATING PLATE- 240V, 50HZ AFE/EMEA	
-139	960766	1	•	•	PLATE	
-139	899641	1	•	•	PLATE, CSA APPROVED	
-140	855286	1	•	•	LABEL	
-141	5718286	2	•	•	JUMPER ASM	
-142	5350006	3	•	•	SCREW, SELF TAPPING, 6-32 X .250 LONG	ATT PT
-143	56722	4	•	•	WASHER, LOCK-EXT TEETH NO. 6	ATT PT
-144	5718357	1	•	•	BAR, RETAINER	
-145	5717989	1	•	•	CLIP-TUBULAR	
-146	5717999	4	•	•	FOOT	

OPERATORS PANEL ASSEMBLY

FOR PARTS  
NOT SHOWN  
SEE FIG. 2  
SHEET 1

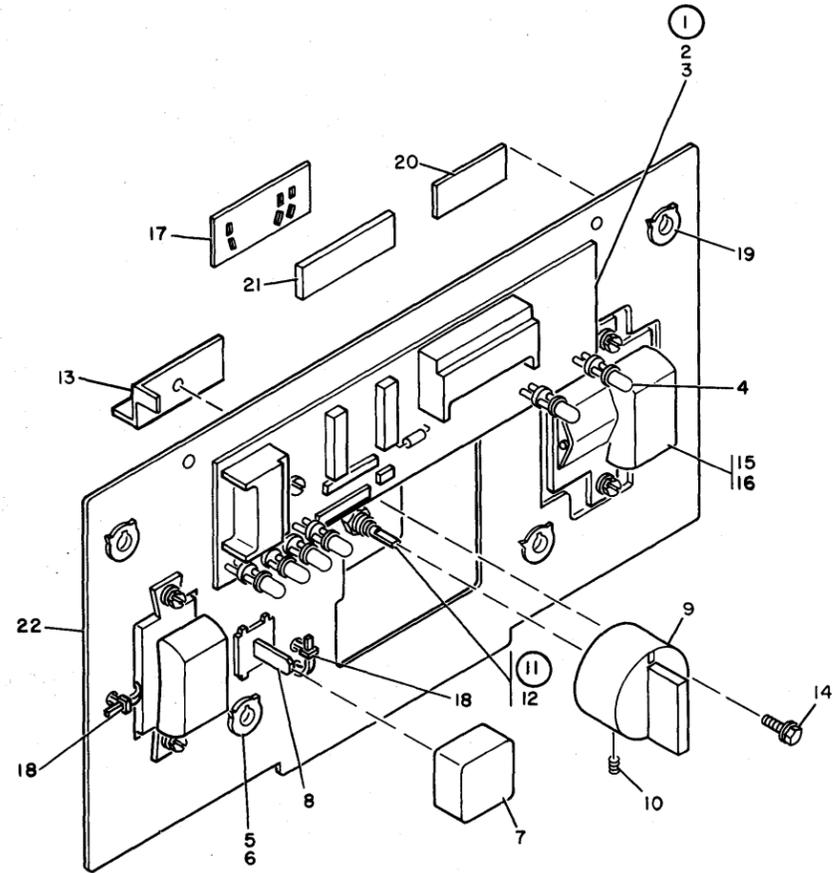


FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
3 -	5718073	REF	OPERATORS PANEL ASSEMBLY-MODEL C WITH PRINTED CIRCUIT CARD			
-	5718072	REF	OPERATORS PANEL ASSEMBLY-MODS A,B,D WITH PRINTED CIRCUIT CARD			
-	5667120	REF	OPERATORS PANEL ASSEMBLY-MODEL 31C ONLY			
-	6835754	REF	OPERATOR PANEL ASSEMBLY - MODEL 31C ONLY USED ON INTEGRATED MODEM ONLY FOR NEXT HIGHER ASSEMBLY, SEE FIGURE 2-8 AND FOR ILLUSTRATION, SEE FIGURE 3			
- 1	5717951	1	• CARD ASM USED ON MODELS A, B AND D			
- 1	5717972	1	• CARD ASM USED ON MODEL C			
- 1	6835723	1	• CARD ASM USED ON MODEL 31C ONLY			
- 2	5349929	2	• SCREW, TMD FORMING- 8-32 X 0.500 LG ATT PT			
- 3	5717979	2	• NUT, STAND-OFF EXPANSION ATT PT			
- 4	1589880	AR	• L.E.D.			
- 5	4406539	1	• SWITCH, ROCKER			
- 6	5700484	2	• SCREW, SELF TAPPING, 4-40 X .375 LG. ATT PT			
- 7	1831799	1	• BUTTON, BLANK-BLUE			
- 8	5184238	1	• SWITCH, RESET			
- 9	1842106	1	• KNOB USED ON MODELS A, B AND D			
- 10	257977	1	• SCREW ATT PT			
- 11	4406540	1	• SWITCH, ROTARY-PRINTED CIRCUIT USED ON MODELS A, B AND D			
- 12	2181005	1	• SCREW, SELF TAPPING, 6-32 X .375 LG. ATT PT			
- 13	5717498	1	• BRACKET USED ON MOD. 31C INTEGRATED MODEM ONLY			
- 14	2181005	1	• SCREW, SELF TAPPING, 6-32 X .375 LG. ATT PT			
- 15	4406537	1	• SWITCH, ROCKER- 3P SPECIAL USED ON MODELS A, B AND D			
- 15	5718372	1	• SWITCH-ROCKER USED ON MODEL C AND 31C			
- 16	5700484	2	• SCREW, SELF TAPPING, 4-40 X .375 LG. ATT PT			
- 17	5420406	1	• INSULATOR ATT PT			
- 18	5420242	2	• TY-MINIATURE			
- 19	5717989	4	• CLIP-TUBULAR			
- 20	138754	1	• LABEL			
- 20	6812828	1	• LABEL- VOLTAGE PRESENT FRENCH			
- 20	6812832	1	• LABEL- VOLTAGE PRESENT GERMAN			
- 20	6812829	1	• LABEL- VOLTAGE PRESENT SPANISH			
- 20	6812830	1	• LABEL- VOLTAGE PRESENT ITALIAN			
- 20	6815188	1	• LABEL- VOLTAGE, PORTUGUESE			
- 21	6812831	1	• LABEL, LINE VOLTAGE-CANADIAN FRENCH			
- 22	5717953	1	• PLATE-MOUNTING			

FIGURE 3. OPERATORS PANEL ASSEMBLY. SEE LIST 3.

NOTES

NOTES

FOR PARTS  
NOT SHOWN  
SEE FIG. 2  
SHEET 1

LVPS ASSEMBLY

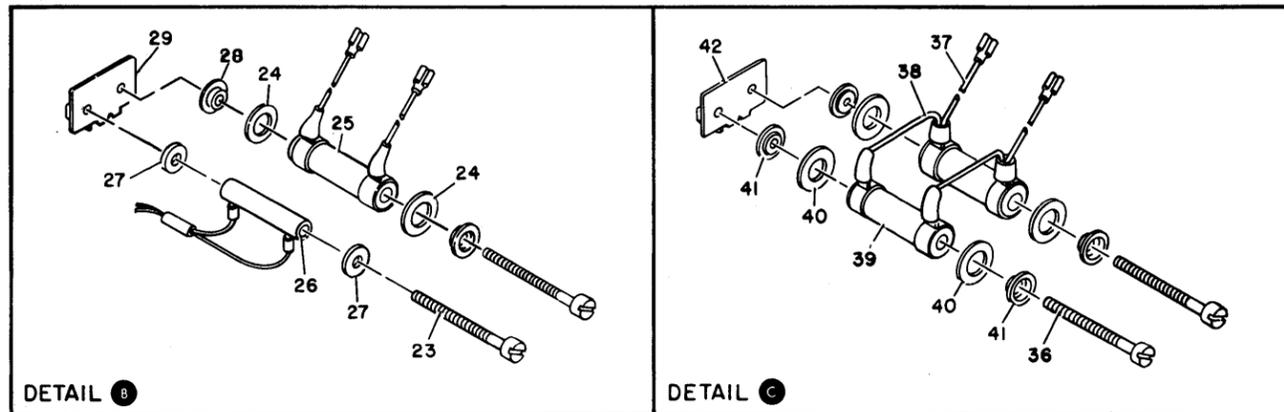
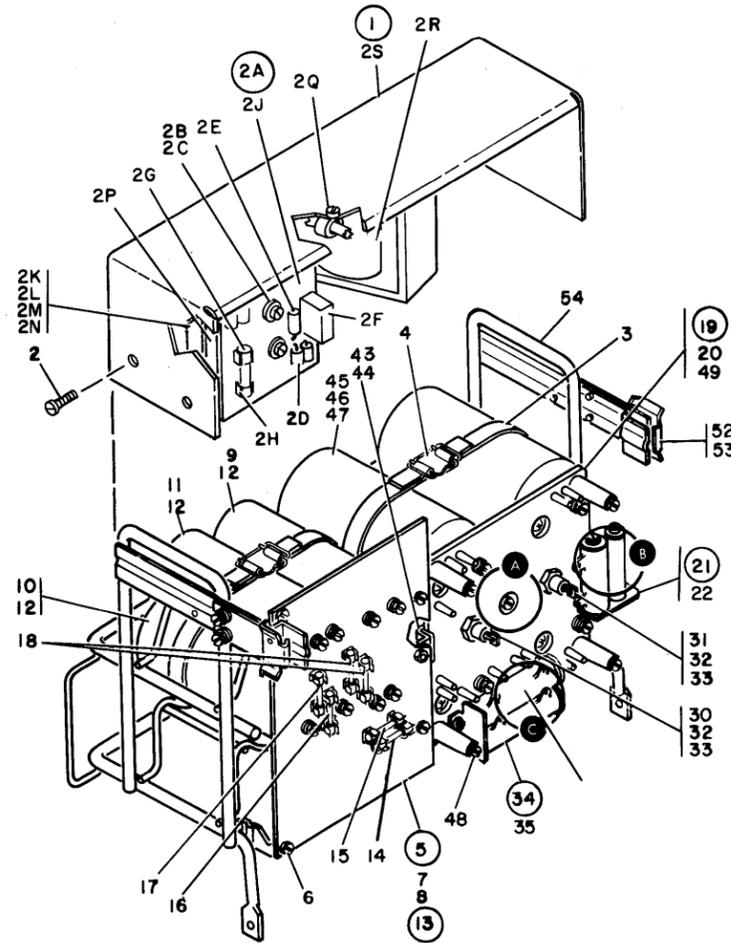
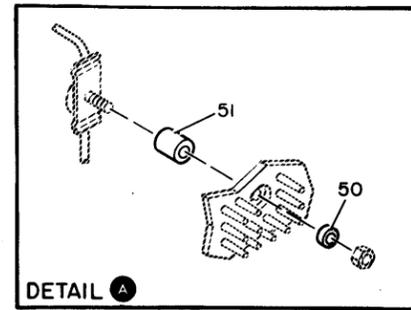


FIGURE 4. LVPS ASSEMBLY. SEE LIST 4.

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
4 -	5718213	REF	LVPS ASSEMBLY FOR NEXT HIGHER ASSEMBLY SEE FIGURE 2-21 AND FOR ILLUSTRATION SEE FIGURE 4			
- 1	6226834	1	POWER SUPPLY, 12V			
- 2	10170	4	SCREW, MACH-BIND HD 6-32 X 1/4 LG			
- 2A	1835934	1	CARD ASSEMBLY			
- 2B	38383	2	SCREW			
- 2C	56121	2	WASHER, LOCK			
- 2D	2397065	4	RECTIFIER			
- 2E	335017	1	RESISTOR, 240 OHM 1W			
- 2F	1295114	1	CONNECTOR			
- 2G	338165	1	FUSE, 125V 3A			
- 2H	5252689	2	CLIP, FUSE			
- 2J	1835938	1	CARD, RAM			
- 2K	1835941	1	CLAMP			
- 2L	34512	4	SCREW, BIND-HD 8-32 X .375 LG			
- 2M	55901	6	WASHER, LOCK-EXT TEETH NO. 8 X 0.381 OD			
- 2N	257189	4	NUT, HEX- 8-32			
- 2P	5760613	1	CAPACITOR			
- 2Q	356742	1	CLAMP			
- 2R	6226833	1	TRANSFORMER 12V			
- 2S	1835936	1	BRACKET			
- 3	2565122	2	STRAP			
- 4	2565125	2	BUCKLE			
- 5	5667144	1	CARD ASM			
- 6	5350006	2	SCREW, SELF TAPPING, 6-32 X .250 LONG			
- 7	1743126	3	SCREW			
- 8	11598	1	NUT, PLAIN-HEX 10-32 X 3/8 FL W			
- 9	1655382	1	CAPACITOR, CAN STYLE			
- 10	1655419	1	CAPACITOR, ELECTROLYTIC POLAR CAN-ALUMINU			
- 11	5615358	2	CAPACITOR-ELECTROLYTIC POLAR CAN, ALUMINU			
- 12	1743126	8	SCREW			
- 13	5667141	1	CARD ASM			
- 14	5236559	1	FUSE, SB- 15A 125V			
- 15	433557	1	FUSE, CARTRIDGE-8 AMP			
- 16	512137	1	FUSE			
- 17	303549	1	FUSE, CARTRIDGE-SLOW BLOW 1.0 AMP 250V			
- 18	111256	2	FUSE-1.5 AMP			
- 19	5667142	1	HEATSINK ASM, 5V			
- 20	72828	1	NUT, SELF LKG, HEX- 8-32 X 0.334 FL W			
- 21	5667143	1	RESISTOR ASM			
- 22	5350006	1	SCREW, SELF TAPPING, 6-32 X .250 LONG			
- 23	438592	2	SCREW, MACH-BIND HD 8-32 X 2-1/4 LG USED ON RESISTOR ASSEMBLY 5667143			
- 24	442958	2	INSULATOR, WASH- 7/16 ID 3/4 OD 1/32 THK USED ON RESISTOR ASSEMBLY 5667143			
- 25	5718339	1	RESISTOR ASM- 5V 2 OHM, 25W USED ON RESISTOR ASSEMBLY 5667143			
- 26	5667058	1	CABLE ASM USED ON RESISTOR ASSEMBLY 5667143 FOR COMPONENT PARTS SEE FIGURE 10			
- 27	300606	2	WASHER, INSULATOR USED ON RESISTOR ASSEMBLY 5667143			
- 28	507144	2	WASHER-CENTERING 0.173 ID X 5/8 OD USED ON RESISTOR ASSEMBLY 5667143			
- 29	5667057	1	BRACKET USED ON RESISTOR ASSEMBLY 5667143			
- 30	5718320	2	JUMPER ASM			
- 31	5615478	2	RECTIFIER			
- 32	160017	2	NUT, PLAIN, HEX- 1/4-28 X 7/16 FL W			
- 33	65756	2	WASHER, LOCK-INT TEETH 0.267 ID X 0.478 OD			
- 34	5667059	1	RESISTOR ASM			
- 35	5350006	1	SCREW, SELF TAPPING, 6-32 X .250 LONG			
- 36	438592	2	SCREW, MACH-BIND HD 8-32 X 2-1/4 LG USED ON RESISTOR ASSEMBLY 5667059			
- 37	5667067	2	JUMPER ASM USED ON RESISTOR ASSEMBLY 5667059			
- 38	5667068	2	JUMPER USED ON RESISTOR ASSEMBLY 5667059			
- 39	528458	2	RESISTOR, FXD PMR WW- 2 OHMS P/M 50 25W USED ON RESISTOR ASSEMBLY 5667059			
- 40	442958	4	INSULATOR, WASH- 7/16 ID 3/4 OD 1/32 THK USED ON RESISTOR ASSEMBLY 5667059			
- 41	507144	4	WASHER-CENTERING 0.173 ID X 5/8 OD USED ON RESISTOR ASSEMBLY 5667059			
- 42	5667057	1	BRACKET USED ON RESISTOR ASSEMBLY 5667059			

LVPS ASSEMBLY

NOTES

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
4 - 43	5717933	1	. .	PLATE-GROUND		
- 44	1743126	4	. .	SCREW	ATT PT	
- 45	1646686	4	. .	CAPACITOR		
- 46	55918	4	. .	SCREW,MACH-BIND HD 10-32 X 5/8 LG	ATT PT	
- 47	56079	4	. .	WASHER,LOCK-EXT T .195 ID .410 OD	ATT PT	
- 48	480654	4	. .	SCREW,MACH RD HD- 10-32 X 1/2 LG		
- 49	5717932	1	. .	HEATSINK		
- 50	5718027	1	. .	INSULATOR		
- 51	5718347	1	. .	SPACER		
- 52	5717983	2	. .	LATCH ASM		
- 53	5350006	4	. .	SCREW, SELF TAPPING, 6-32 X .250 LONG	ATT PT	
- 54	5717939	1	. .	BRACKET,WIRE FORM		

GATE ASSEMBLY

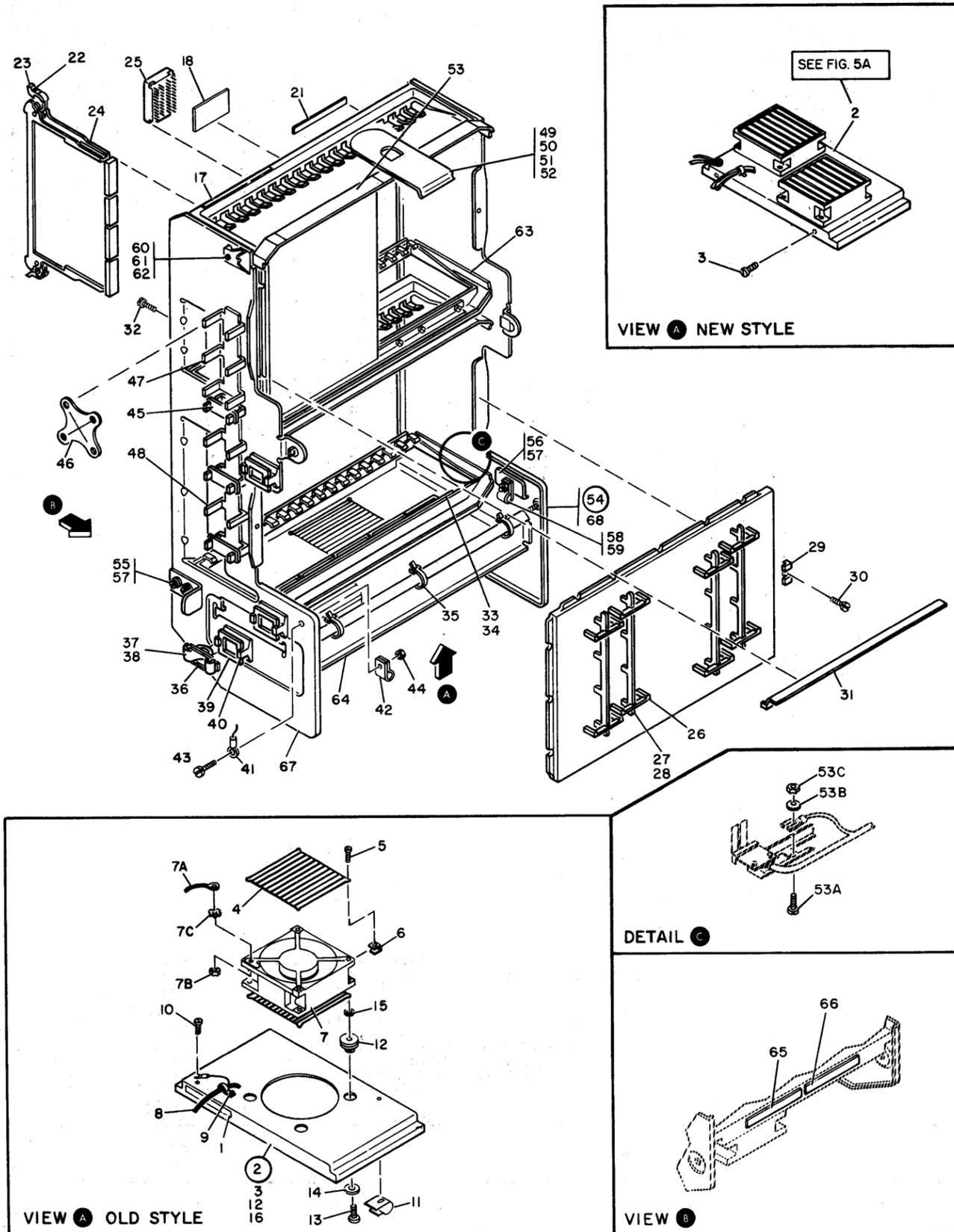


FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
5 -	5667102 NP	REF	GATE ASSEMBLY FOR NEXT HIGHER ASSEMBLY SEE FIGURE 2-24 AND FOR ILLUSTRATION SEE FIGURE 5			
- 1	5718093	1	• LABEL, WARNING-ENGLISH			
- 1	5718469	1	• LABEL, WARNING-SPANISH			
- 1	5718468	1	• LABEL, WARNING-ITALIAN			
- 1	5718470	1	• LABEL, WARNING-PORTUGUESE			
- 2	5718137	1	• PLENUM ASSEMBLY-NEW STYLE USED ON 100-127V 50/60HZ			
- 2	5718138	1	• PLENUM ASSEMBLY-NEW STYLE USED ON 200-240V 50/60HZ WT ONLY FOR DETAIL BREAKDOWN SEE FIGURE 5A			
- 2	5667076	1	• PLENUM ASSEMBLY-OLD STYLE USED ON 100-127V 50/60HZ			
- 2	5667077	1	• PLENUM ASSEMBLY-OLD STYLE USED ON 200-240V 50/60HZ WT ONLY			
- 3	5319854	4	• SCREW, THD CUTTING-HEX HD 8-32 X 0.375 LG			
- 4	177946	4	• GUARD-FAN			
- 5	322551	4	• SCREW, MACH-BIND HD 6-32X3/4 LG			
- 6	4407057	8	• MOUNTING CLIP			
- 7	4406538	1	• FAN- 100-127V, 50/60HZ			
- 7	1851546	1	• FAN- 200/240V, 50/60HZ WT ONLY			
- 7A	5704693	1	• JUMPER USED ON WTC ONLY			
- 7B	257187	1	• NUT, PLAIN, HEX- 6-32 X 3/8 FL W			
- 7C	56722	1	• WASHER, LOCK-EXT TEETH NO. 6			
- 8	5667078	1	• CABLE ASM FOR COMPONENT PARTS SEE FIGURE 10			
- 9	534768	1	• CLAMP, CABLE			
- 10	5319854	2	• SCREW, THD CUTTING-HEX HD 8-32 X 0.375 LG			
- 11	5718092	1	• CLIP, CABLE			
- 12	5717483	4	• ISOLATOR			
- 13	438568	4	• SCREW, MACH-UNDRCT BIND HD 6-32 X 1-1/8			
- 14	5717473	4	• WASHER, SNUBBER			
- 15	510810	1	• WASHER, FL 0.187 ID X 0.437 OD			
- 16	5667069	1	• PLENUM			
- 17	5718378	1	• LABEL			
- 18	5718383	1	• LABEL-A THRU K			
- 21	5718368	1	• STRIP, IDENTIFICATION-BLANK			
- 22	1743001	AR	• LABEL A			
- 22	1743002	AR	• LABEL B			
- 22	1743003	AR	• LABEL C			
- 22	1743004	AR	• LABEL D			
- 22	1743005	AR	• LABEL E			
- 22	1743006	AR	• LABEL F			
- 22	1743007	AR	• LABEL G			
- 22	1743008	AR	• LABEL H			
- 22	1743009	AR	• LABEL J			
- 22	1743010	AR	• LABEL K			
- 22	1743011	AR	• LABEL L			
- 22	1743012	AR	• LABEL M			
- 22	1743013	AR	• LABEL N			
- 22	1743014	AR	• LABEL-P			
- 22	1743015	AR	• LABEL-Q			
- 22	1743016	AR	• LABEL-R			
- 22	1743017	AR	• LABEL-S			
- 22	1743018	AR	• LABEL-T			
- 22	1743019	AR	• LABEL-U			
- 22	1743020	AR	• LABEL-V			
- 23	1743149	AR	• EAR, LOCKING			
- 24	1743141	1	• HOLDER ASM, CARD 2 X 2 WIDE 3 HI TCC			
- 24	1743142	3	• HOLDER ASM, CARD 4 WIDE 3 HI TCC			
- 24	1743143	6	• HOLDER ASM, CARD 2 X 2 WIDE 3 HI			
- 24	1743144	12	• HOLDER ASM, 4W W/O TCC			
- 25	1794410	8	• ASM- CROSSOVER CONNECTOR			
- 25	2732453	8	• I/C CONNECTOR			
- 26	4943956	12	• RETAINER			
- 27	5718322	6	• BUS STRIP ASM			
- 28	4944020	6	• INSULATOR			
- 29	813179	3	• CLAMP-BOARD			
- 30	811417	3	• SCREW, HEX SOCKET H- 6-32 X 1/2 LG			
- 31	5267824	4	• RETAINER- BOARD			
- 32	811417	11	• SCREW, HEX SOCKET H- 6-32 X 1/2 LG			
- 33	5862291	1	• RACEWAY, CABLE			
- 34	811417	5	• SCREW, HEX SOCKET H- 6-32 X 1/2 LG			
- 35	5420242	7	• TY-MINIATURE			
- 36	2114680	AR	• CLIP, CABLE			

GATE ASSEMBLY

NOTES

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
5 - 36	6000170	AR	.	.	.	.
- 37	2114681	1	.	.	.	.
- 38	5319854	1	.	.	.	ATT PT
- 39	2565254	3	.	.	.	.
- 40	2565252	3	.	.	.	.
- 41	5759479	1	.	.	.	.
- 42	533289	1	.	.	.	.
- 42	327922	1	.	.	.	.
- 43	5349929	1	.	.	.	ATT PT
- 44	72828	1	.	.	.	ATT PT
- 45	811427	3	.	.	.	.
- 46	813159	1	.	.	.	.
- 47	2588303	1	.	.	.	.
- 48	2590010	1	.	.	.	.
- 49	5862285	1	.	.	.	.
- 50	55726	2	.	.	.	ATT PT
- 51	6364	2	.	.	.	ATT PT
- 52	257187	2	.	.	.	ATT PT
- 53	5718344	1	.	.	.	.
- 53	5718472	1	.	.	.	.
- 53	5718471	1	.	.	.	.
- 53	5718473	1	.	.	.	.
- 53	5718475	1	.	.	.	.
- 53	5718474	1	.	.	.	.
- 53	5718476	1	.	.	.	.
- 53A	338238	1	.	.	.	.
- 53B	257985	1	.	.	.	.
- 53C	37913	1	.	.	.	.
- 54	5667117	1	.	.	.	.
- 55	5717977	1	.	.	.	.
- 56	5717978	1	.	.	.	.
- 57	5350012	2	.	.	.	ATT PT
- 58	533289	1	.	.	.	.
- 59	72828	1	.	.	.	ATT PT
- 60	5718202	1	.	.	.	.
- 61	5718203	1	.	.	.	.
- 62	5350012	22	.	.	.	ATT PT
- 63	5267949	4	.	.	.	.
- 64	5717915	1	.	.	.	.
- 65	5718465	1	.	.	.	.
- 66	5718093	1	.	.	.	.
- 66	5718469	1	.	.	.	.
- 66	5718468	1	.	.	.	.
- 66	5718470	1	.	.	.	.
- 67	5717942	1	.	.	.	.
- 68	5717943	1	.	.	.	.

FOR PARTS  
NOT SHOWN  
SEE FIG.5

GATE ASSEMBLY

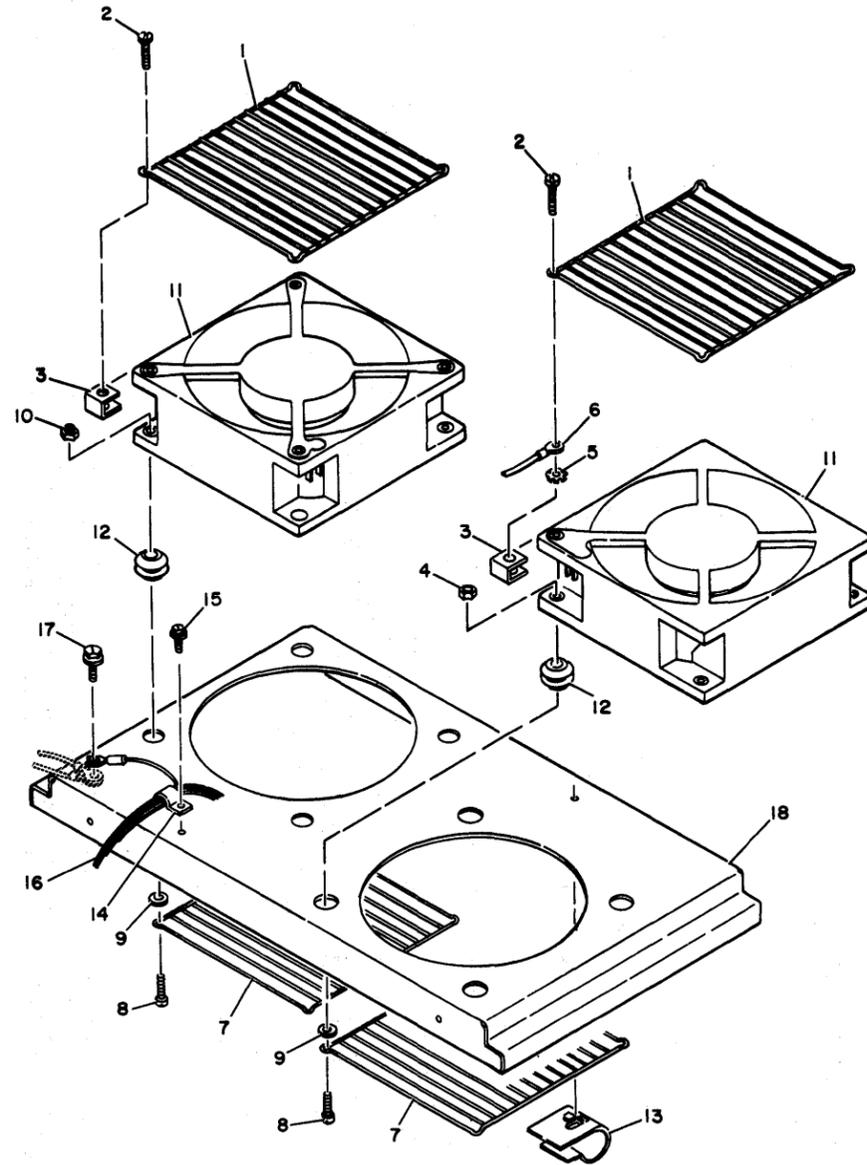
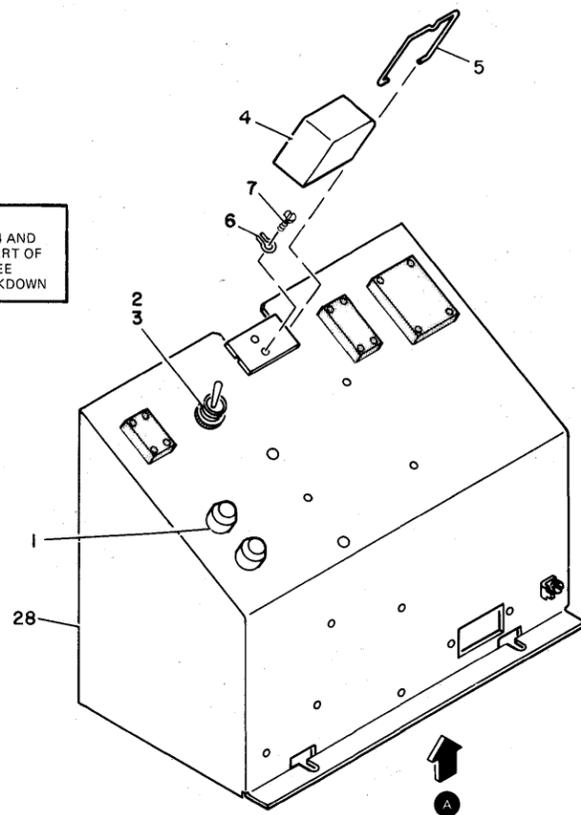


FIGURE 5A. PLENUM ASSEMBLY - NEW STYLE

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
5A-	5718137	REF	PLENUM ASSEMBLY, GATE USED ON 100-127V ONLY			
-	5718138	REF	PLENUM ASSEMBLY, GATE USED ON 200-240V WT ONLY FOR NEXT HIGHER ASM, SEE FIGURE 5-2 FOR ILLUSTRATION SEE FIGURE 5A			
-	1	2	• GUARD-FAN			
-	2	8	• SCREW, MACH-BIND HD 6-32 X 5/8 LG			
-	3	8	• MOUNTING CLIP			
-	4	2	• NUT, PLAIN, HEX- 6-32 X 3/8 FL W			
-	5	2	• WASHER, LOCK-EXT TEETH NO. 6			
-	6	2	• JUMPER ASSEMBLY			
-	7	2	• GUARD-FAN			
-	8	8	• SCREW			
-	9	8	• WASHER, FLAT NO. 6			
-	10	8	• NUT, SELF LKG, HEX- 6-32 X 5/16 FL W			
-	11	1	• FAN- 100-127V, 50/60HZ			
-	11	1	• FAN- 200/240V, 50/60HZ			
-	12	8	• GROMMET-RUBBER			
-	13	1	• CLIP, CABLE			
-	14	1	• CLAMP, CABLE			
-	15	1	• SCREW, THD CUTTING-HEX HD 8-32 X 0.375 LG			
-	16	1	• CABLE ASM, FAN			
-	17	1	• SCREW, THD CUTTING-HEX HD 8-32 X 0.375 LG			
-	18	1	• PLENUM			

FOR PARTS  
NOT SHOWN  
SEE FIG. 2  
SHEET 1

NOTE  
CONNECTORS J1 J4 AND  
RELAY SOCKET PART OF  
CABLE 5718310. SEE  
FIG. 10 FOR BREAKDOWN



NOTE:  
WHEN ORDERING PRIMARY POWER ASM  
ORDER LABELS SEPARATELY SEE FIG. 2  
SHEET 1 FOR LABELS

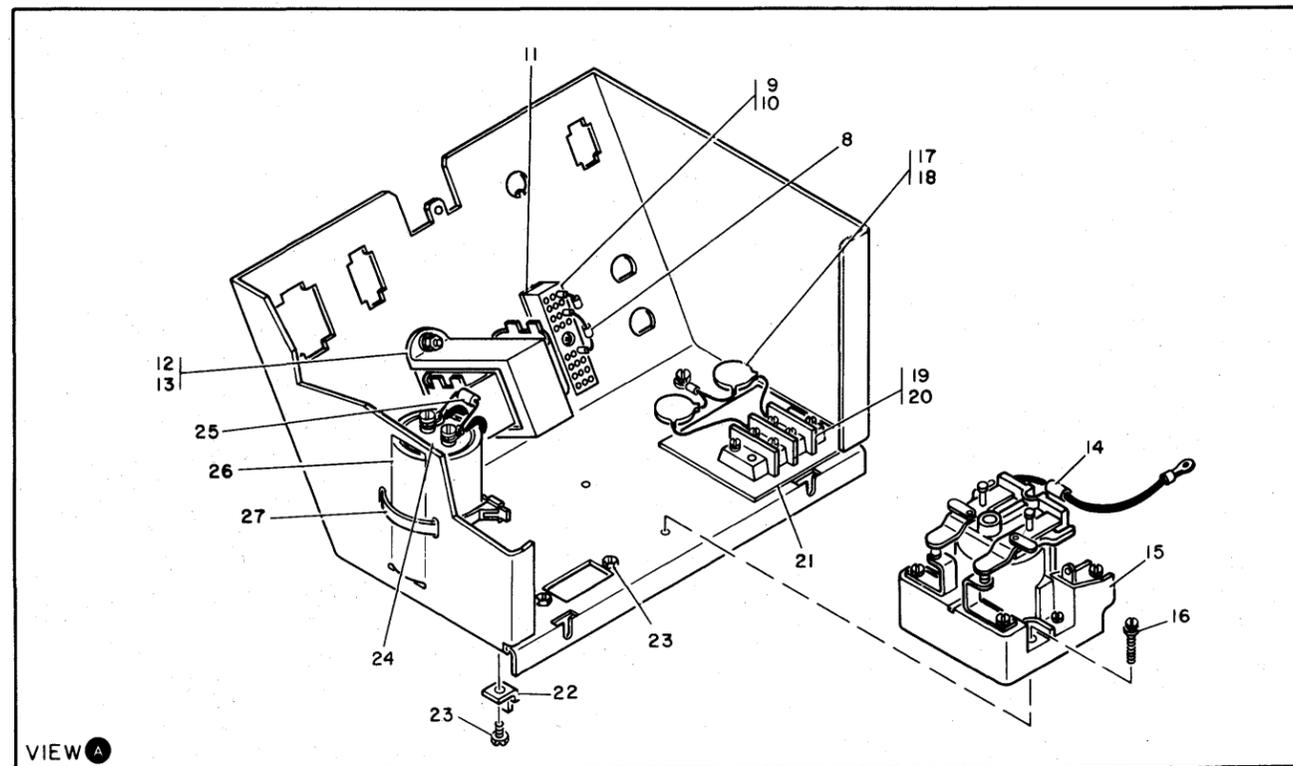


FIGURE 6. PRIMARY POWER ASSEMBLY. SEE LIST 6.

PRIMARY POWER ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
6 -	5717975	REF	PRIMARY POWER ASSEMBLY USED ON MODELS A, B AND D			
-	5717970	REF	PRIMARY POWER ASSEMBLY USED ON MODEL C FOR NEXT HIGHER ASSEMBLY SEE FIGURE 2-65 AND FOR ILLUSTRATION SEE FIGURE 6			
- 1	4201819	2	• FUSEHOLDER			
- 2	835273	1	• SWITCH, TOGGLE- 2 POLE 2 POSITION			
- 3	5489034	1	• NUT-HEX			
- 4	824339	1	• RELAY- 5 N/O 5 AMP 24 VDC			
- 5	5318966	1	• RETAINER, RELAY, 4 POS			
- 6	5364197	1	• GROUND-RELAY			
- 7	338238	1	• SCREW, MACH-BD HD 4-40 NC X .3125 LG			
- 8	5718326	1	• DIODE ASM			
- 9	302090	1	• CONNECTOR, RECP, ELEC- 24 FEMALE CONTACTS			
- 10	2191846	1	• SCREW, PAN HD- 4-40 X 1/2 LG			
- 11	302131	1	• INSULATOR, TERMINAL BLOCK			
- 12	5718327	1	• TRANSFORMER ASM- 24V			
- 13	5350012	2	• SCREW, THD FORMING HEX WSR HD 8-32 X .25			
- 14	5718106	1	• DIODE ASM			
- 15	1589254	1	• RELAY			
- 16	2195400	2	• SCREW			
- 17	5718346	1	• FILTER ASM-LINE			
- 18	5350012	1	• SCREW, THD FORMING HEX WSR HD 8-32 X .25			
- 19	323840	1	• TERMINAL BOARD- 2 DBL SCREW TERMINALS			
- 20	2181011	2	• SCREW, SELF-TAPPING- 6-32 X 0.500 LG			
- 21	5717974	1	• MARKER STRIP			
- 22	5271288	1	• TERMINAL, FIXED TAB			
- 23	5700484	3	• SCREW, SELF TAPPING, 4-40 X .375 LG.			
- 24	361503	1	• COVER-CAPACITOR			
- 25	5718467	1	• RESISTOR ASM- 3K OHMS, 2W			
- 26	5213798	1	• CAPACITOR			
- 27	524519	1	• CLAMP			
- 28	5717976	1	• CHASSIS			
- 28	5717971	1	• CHASSIS USED ON LOCAL POWER ASM ONLY USED ON REMOTE POWER ASM ONLY			

1 SIDED DISKETTE DRIVE ASSEMBLY

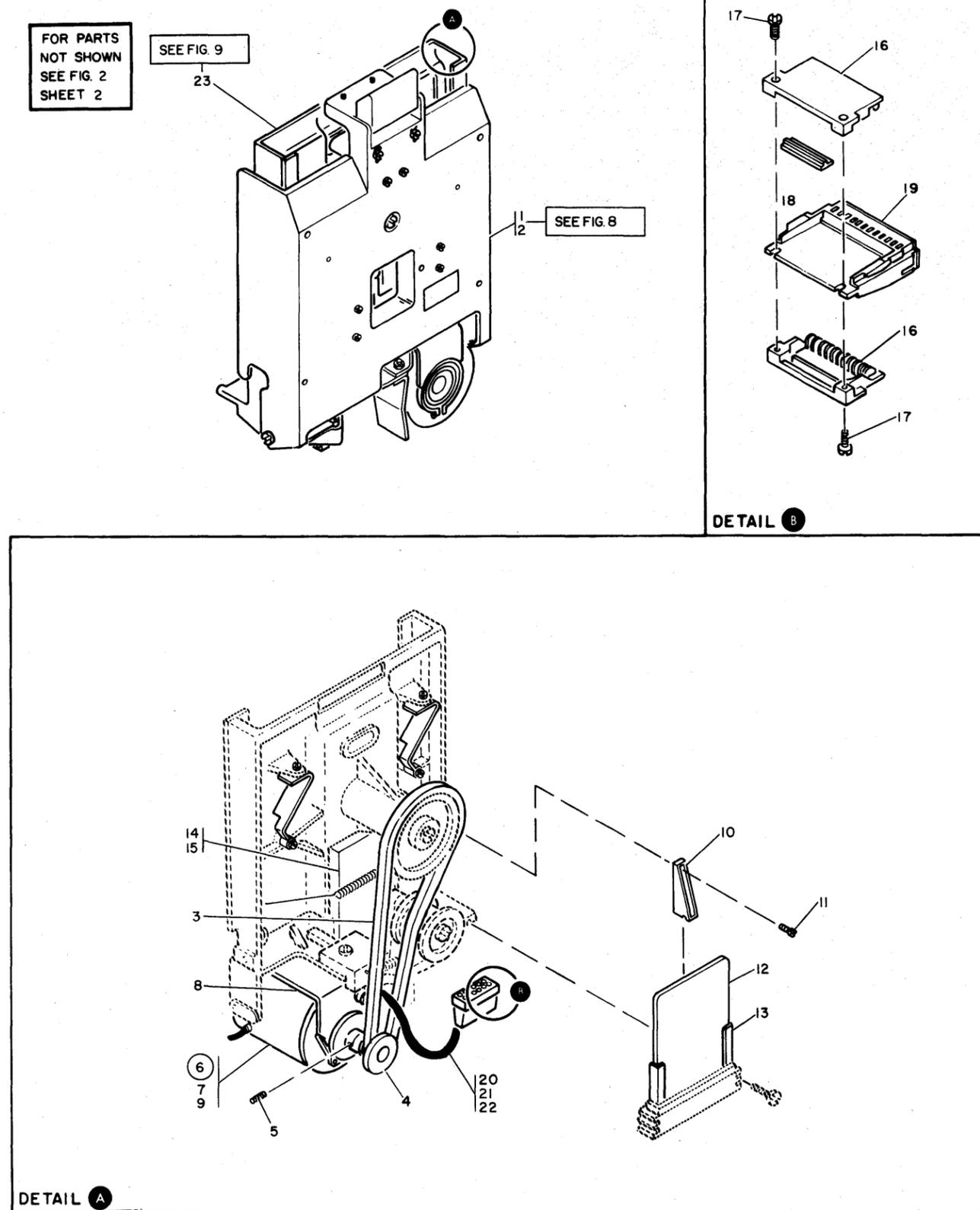


FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
7 -	2305487	REF	1 SIDED DISKETTE DRIVE ASSEMBLY 100/110/120/127 VOLTS, 60 HZ			
-	2305486	REF	1 SIDED DISKETTE DRIVE ASSEMBLY 200/208/220/240 VOLTS, 60 HZ			
-	2305489	REF	1 SIDED DISKETTE DRIVE ASSEMBLY 100/110 VOLTS, 50 HZ			
-	2305488	REF	1 SIDED DISKETTE DRIVE ASSEMBLY 200/220/230/240 VOLTS, 50 HZ FOR NEXT HIGHER ASSEMBLY, SEE FIGURE 2-73 AND FOR ILLUSTRATION, SEE FIGURE 7			
- 1	2305569	1	• CLAMPING PLATE ASSEMBLY-ANGLE MOUNT FOR DETAIL BREAKDOWN SEE FIGURE 8			
- 2	2305649	2	• PIN, PIVOT			
- 3	5562034	1	• BELT-50HZ			
- 3	2462593	1	• BELT- 60HZ			
- 4	2305631	1	• PULLEY - 60HZ			
- 4	2305708	1	• PULLEY- 100-123.5/208V, 50HZ			
- 5	257970	1	• SETSCREW-SPLINE DR FP 6-32 X 1/4 LG			
- 6	4178051	1	• MOTOR AND BRACKET ASM- 115V, 60HZ			
- 6	4178053	1	• MOTOR/BRACKET ASM, 200/240V-60HZ			
- 6	4178055	1	• MOTOR AND BRACKET ASM- 100-123.5V, 50HZ			
- 6	4178057	1	• MOTOR/BRACKET ASM, 200/240V-50HZ			
- 7	234341	2	• SCREW, ASMD WASHER-FIL HD 1/4-20 X 5/8 LG			
- 8	2305632	1	• BRACKET			
- 9	4178050	1	• MOTOR ASM- 115V, 60HZ			
- 9	4178052	1	• MOTOR ASM, 200-230V, 60HZ, NEW STYLE CON			
- 9	4178054	1	• MOTOR ASM- 100-123.5V, 50HZ			
- 9	4178056	1	• MOTOR ASM, 200-230V, 60HZ, NEW STYLE CON			
- 10	2305474	1	• HOLDER, CARD			
- 11	2181005	1	• SCREW, SELF TAPPING, 6-32 X .375 LG.			
- 12	8528202	1	• CARD ASM-LOGIC			
- 13	811804	1	• GUIDE, CARD			
- 14	2594695	1	• SHIELD ASM			
- 15	2772892	1	• SPRING			
- 16	5466397	2	• STRAIN RELIEF			
- 17	109918	2	• SCREW, THD CUTTING-FLAT HD 4-40 X 1/2 LG			
- 18	5466393	2	• CLAMP, STRAIN RELIEF			
- 19	5447741	1	• HOUSING, SINGLE HI			
- 20	2305598	1	• JUMPER ASM			
- 21	5350006	1	• SCREW, SELF TAPPING, 6-32 X .250 LONG			
- 22	56722	1	• WASHER, LOCK-EXT TEETH NO. 6			
- 23	2305570	1	• BASE PLATE ASSEMBLY-ANGLE MOUNT FOR DETAIL BREAKDOWN SEE FIGURE 9			

FIGURE 7. 1 SIDED DISKETTE DRIVE ASSEMBLY. SEE LIST 7.

CLAMPING PLATE ASSEMBLY—ANGLE MOUNT

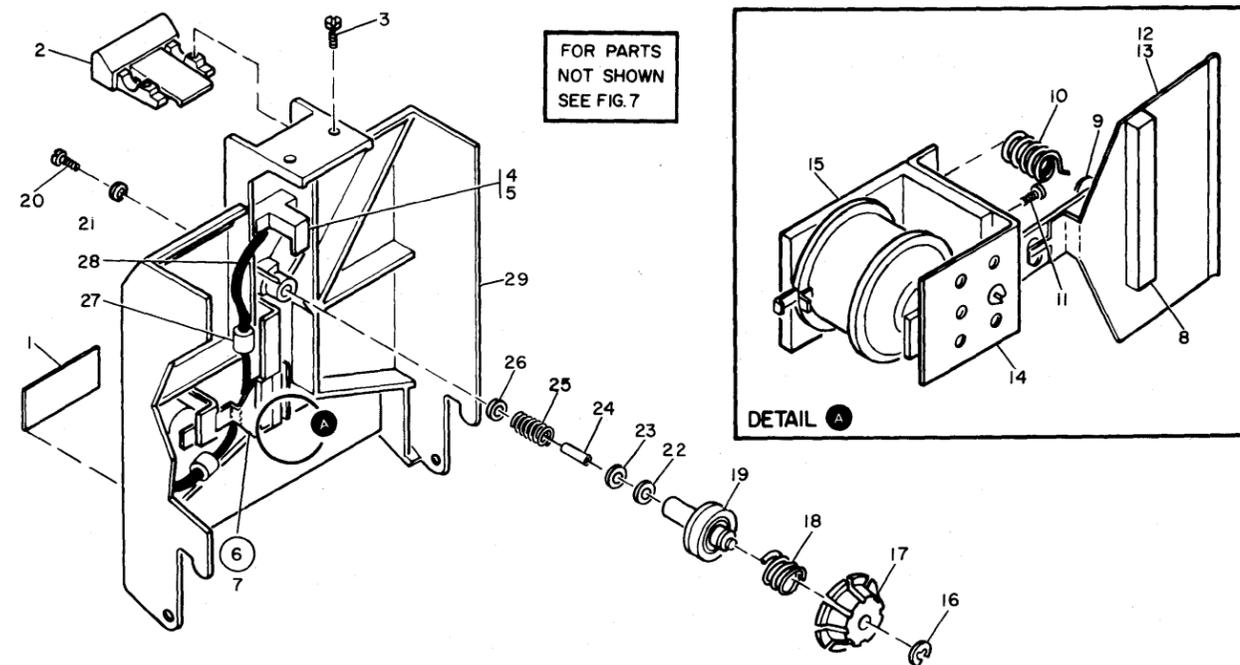


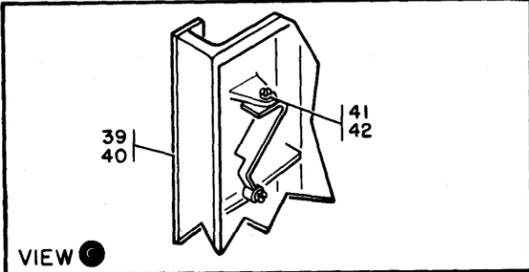
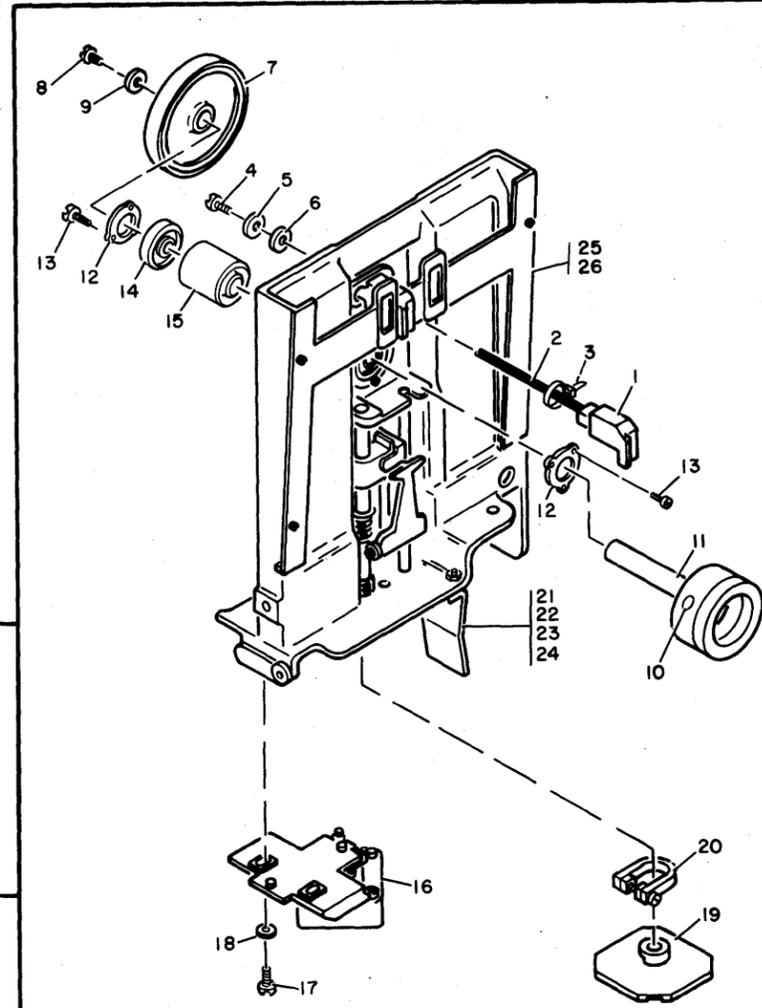
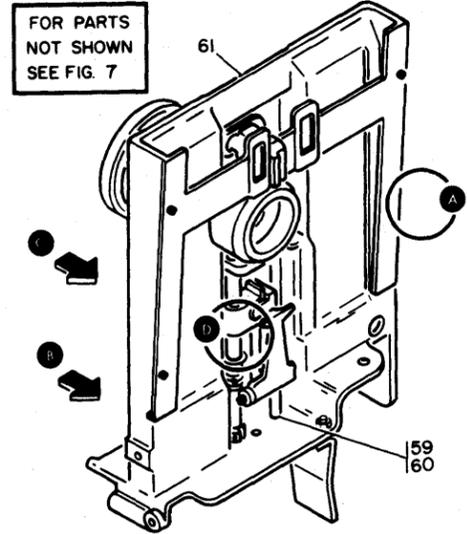
FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
8 -	2305569	REF	CLAMPING PLATE ASSEMBLY—ANGLE MOUNT FOR NEXT HIGHER ASSEMBLY SEE FIGURE 7-1 AND FOR ILLUSTRATION SEE FIGURE 8			
- 1	2305693	1	• LABEL			
- 2	2546692	1	• LATCH			
- 3	322550	2	• SCREW, MACH, BD HD 6-32 X .5 LG			
- 4	2305656	1	• LED ASSEMBLY			
- 5	81693	2	• SCREW, MACH-BIND HD 6-32 X 3/8 LG			
- 6	2305609	1	• LOAD ASSEMBLY, HEAD			
- 7	10170	2	• SCREW, MACH-BIND HD 6-32 X 1/4 LG			
- 8	2305653	1	• SEAL			
- 9	186926	1	• SCREW			
- 10	340002	1	• SPRING			
- 11	186636	1	• SCREW			
- 12	2305610	1	• ARMATURE			
- 13	15887	1	• SCREW, MACH-BIND HD 2-56 X 1/8 LG			
- 14	2278172	1	• BRACKET			
- 15	2305542	1	• COIL			
- 16	332747	1	• RING, RETAINING-EXT 0.207 ID X 0.025 THK			
- 17	2305644	1	• COILET			
- 18	2305647	1	• SPRING, COMPRESSION			
- 19	2305526	1	• CONE AND SHAFT ASM			
- 20	34512	1	• SCREW, BIND, HD 8-32 X .375 LG			
- 21	2903	1	• WASHER, FLAT NO.6- .50 OD X .03125 THK			
- 22	555427	1	• SHIM			
- 23	25018	2	• WASHER, 0.255 ID X 0.50 OD X 0.046 THK			
- 24	2305462	1	• SLEEVE			
- 25	2305646	1	• SPRING, COMPRESSION			
- 26	120571	1	• WASHER, FL- 1/4 X 5/8 OD X 1/16 THK			
- 27	2596275	1	• CLIP			
- 28	2305599	1	• CABLE ASM			
- 29	5562062	1	• COVER			
- 29	2305648	1	• PLATE			

FIGURE 8. CLAMPING PLATE ASSEMBLY—ANGLE MOUNT. SEE LIST 8.

BASE PLATE ASSEMBLY--ANGLE MOUNT

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
9 -	2305570	REF	BASE PLATE ASSEMBLY--ANGLE MOUNT FOR NEXT HIGHER ASSEMBLY SEE FIGURE 7-23 AND FOR ILLUSTRATION SEE FIGURE 9			
- 1	2305604	1	• PHOTO TRANSISTOR ASSEMBLY			
- 2	2596275	1	• CABLE ASM			
- 3	2305554	1	• CLAMP			
- 4	344299	1	• SCREW			
- 5	6364	1	• WASHER, LOCK-SPLIT NO. 6 X 1/4 OD			
- 6	2130285	1	• WASHER, FLAT			
- 7	2305621	1	• PULLEY			
- 8	234331	1	• SCREW, ASMD WASHER-FIL H 10-32 X 1/2 LG			
- 9	600395	1	• WASHER, FL- 0.203 ID X 3/4 OD X 3/32 THK			
- 10	2305572	1	• LABEL			
- 11	2305619	1	• HUB, DISC DRIVE			
- 12	2305546	2	• RETAINER			
- 13	2305547	6	• SCREW, FLT HD- 8-32 X 0.44 LG			
- 14	5344991	1	• BEARING			
- 15	2305620	1	• SPACER			
- 16	2305545	1	• MOTOR ASM			
- 17	2195400	2	• SCREW			
- 18	22478	2	• WASHER, FL- 0.170 ID 0.375 OD 0.32 THK			
- 19	2305544	1	• WHEEL, LEADSCREW			
- 20	2305493	1	• CLAMP			
- 21	2546689	1	• BRACKET-ANGLE			
- 22	438586	2	• SCREW, MACH-UNDRCT BIND HD 8-32 X 7/8 LG			
- 23	22478	2	• WASHER, FL- 0.170 ID 0.375 OD 0.32 THK			
- 24	257189	2	• NUT, HEX- 8-32			
- 25	5562061	1	• GUIDE-POST			
- 25	2305659	1	• GUIDE			
- 26	5700484	4	• SCREW, SELF TAPPING, 4-40 X .375 LG.			
- 27	2305504	1	• SPRING, LOOP-EXTENSION			
- 28	5562020	1	• IDLER ASM, BELT			
- 29	81693	1	• SCREW, MACH-BIND HD 6-32 X 3/8 LG			
- 30	2305720	1	• ROLL ASM			
- 31	58207	1	• SCREW, MACH-UNDRCT BIND HD 8-32 X 1/4 LG			
- 32	22478	1	• WASHER, FL- 0.170 ID 0.375 OD 0.32 THK			
- 33	257982	2	• CLIP			
- 34	2305725	1	• SHAFT			
- 35	5562022	1	• ARM ASM			
- 36	2305555	1	• GUIDE			
- 37	2181006	2	• SCREW, HEX HD, SELF TAP- 6-32 X 1.000 LG			
- 38	2274833	1	• CONNECTOR			
- 39	2546687	2	• BRACKET-ANGLE			
- 40	5372859	2	• SCREW, HEX HD THD FORM- 10-32 X 1.40 LG			
- 41	81693	2	• SCREW, MACH-BIND HD 6-32 X 3/8 LG			
- 42	257986	2	• WASHER, FLAT NO. 6			
- 43	2305537	1	• BEARING			
- 44	2305548	2	• SCREW			
- 45	338238	1	• SCREW, MACH-BD HD 4-40 NC X .3125 LG			
- 46	2305530	1	• SPACER			
- 47	2305663	1	• WASHER			
- 48	2305538	1	• BEARING			
- 49	2305618	1	• STOP			
- 50	38250	1	• SCREW			
- 51	2305559	1	• SHIELD			
- 52	2305528	1	• STOP			
- 53	52523	1	• SCREW, MACH-FIL H 4-40 X 5/8 LG			
- 54	2305627	1	• NUT			
- 55	2305628	1	• SPRING			
- 56	2200751	1	• PAD			
- 57	2743540	1	• HEAD ASM			
- 58	2305626	1	• LEADSCREW			
- 59	2305629	1	• SHAFT			
- 60	2305564	1	• SCREW			
- 61	2305549	1	• BASEPLATE ASM			

FOR PARTS NOT SHOWN SEE FIG. 7



DETAIL A

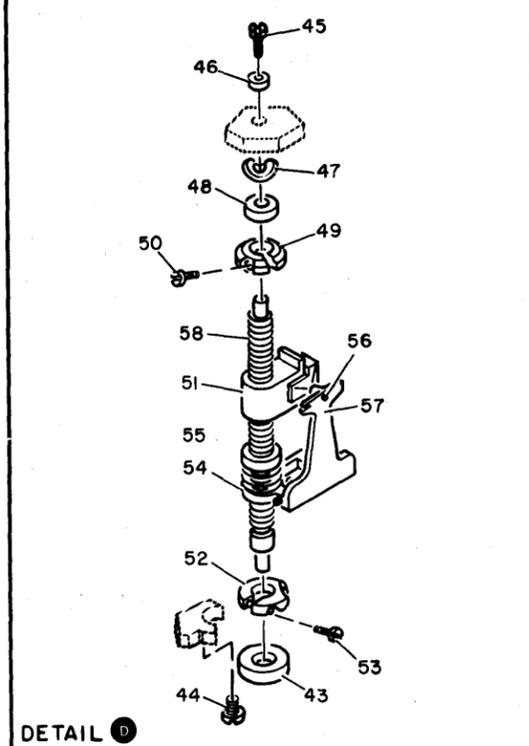
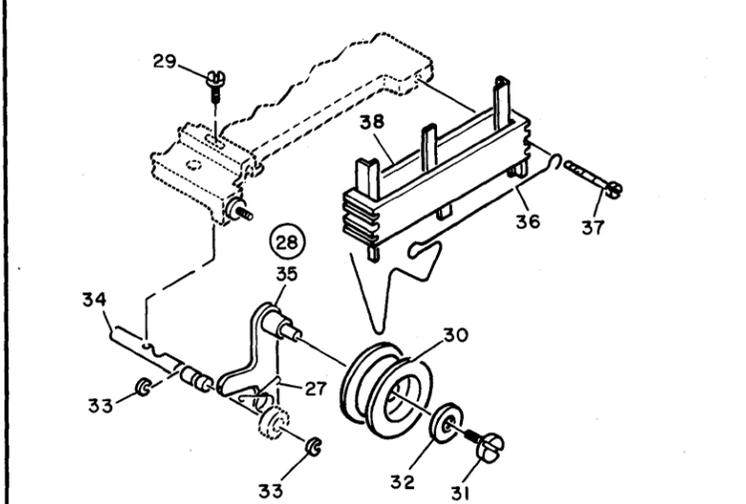


FIGURE 9. BASE PLATE ASSEMBLY--ANGLE MOUNT. SEE LIST 9.

CABLE ASSEMBLIES WITH COMPONENT PARTS

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10			ATTACHMENT CORD ASSEMBLIES			
- A	4408852	1	ATTACHMENT CORD-HOSPITAL GRADE,12 FT FOR MOLDED PLUG,SEE INDEX 83 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	4408853	1	ATTACHMENT CORD-HOSPITAL GRADE,6 FT FOR MOLDED PLUG,SEE INDEX 83 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718139	1	ATTACHMENT CORD- 16A 250V USED ON ISRAEL ONLY FOR MOLDED PLUG,SEE INDEX 109 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718140	1	ATTACHMENT CORD-250V,10A - EMEA ONLY FOR MOLDED PLUG,SEE INDEX 84 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718141	1	ATTACHMENT CORD-250V,10A,12 FT-EMEA ONLY FOR MOLDED PLUG,SEE INDEX 82 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718142	1	ATTACHMENT CORD-TWIST LOCK,UNDER 200V - A/FE ONLY FOR MOLDED PLUG,SEE INDEX 81 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718143	1	ATTACHMENT CORD- 250V,16A,14 FT - EMEA ONLY FOR MOLDED PLUG,SEE INDEX 11 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718144	1	ATTACHMENT CORD- 250V,13A,14 FT USED ON A/FE AND EMEA ONLY FOR MOLDED PLUG,SEE INDEX 9 FOR COMPONENT PARTS,SEE 14F,20,20C			
- A	5718145	1	ATTACHMENT CORD- 250V,6A,14 FT - EMEA ONLY FOR MOLDED PLUG,SEE INDEX 5 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718146	1	ATTACHMENT CORD- 250V,10A,14 FT - A/FE ONLY FOR MOLDED PLUG,SEE INDEX 5 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718147	1	ATTACHMENT CORD- 250V,10A,14 FT - EMEA ONLY FOR MOLDED PLUG,SEE INDEX 5 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718148	1	ATTACHMENT CORD- 250V,13A,14 FT - EMEA ONLY FOR MOLDED PLUG,SEE INDEX 10 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718149	1	ATTACHMENT CORD-WHITE,BLACK,GREEN,YELLOW - A/FE ONLY FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718150	1	ATTACHMENT CORD-TWIST LOCK,125V,14 FT USED ON USA/CANADA ONLY FOR MOLDED PLUG SEE INDEX 100 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718152	1	ATTACHMENT CORD- 125V,14 FT USED ON USA/CANADA/EMEA/A/FE FOR MOLDED PLUG,SEE INDEX 1 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718154	1	ATTACHMENT CORD-TWIST LOCK,250V,14 FT USED ON USA/CANADA ONLY FOR MOLDED PLUG SEE INDEX 101 FOR COMPONENT PARTS,SEE INDEXES 22B,22C			
- A	5718155	1	ATTACHMENT CORD-TWIST LOCK,208/240V USED ON USA/CANADA ONLY FOR MOLDED PLUG,SEE INDEX 4 FOR COMPONENT PARTS,SEE INDEXES 22B,22C			
- A	5718156	1	ATTACHMENT CORD- 14 FT USED ON USA/CANADA ONLY FOR MOLDED PLUG,SEE INDEX 3 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718157	1	ATTACHMENT CORD- 6 FT USED ON USA/CANADA ONLY FOR MOLDED PLUG,SEE INDEX 3 FOR COMPONENT PARTS,SEE INDEXES 20,22C			
- A	5718158	1	ATTACHMENT CORD-WATERTIGHT, 14 FT USED ON USA/CANADA ONLY FOR MOLDED PLUG,SEE INDEX 5 FOR COMPONENT PARTS,SEE INDEXES 20,20A 20B AND 22C			
- A	5718159	1	ATTACHMENT CORD-WATERTIGHT, 6 FT USED ON USA/CANADA ONLY FOR MOLDED PLUG,SEE INDEX 5 FOR COMPONENT PARTS,SEE INDEXES 20,20A 20B AND 22C			

CABLE ASSEMBLIES WITH COMPONENT PARTS

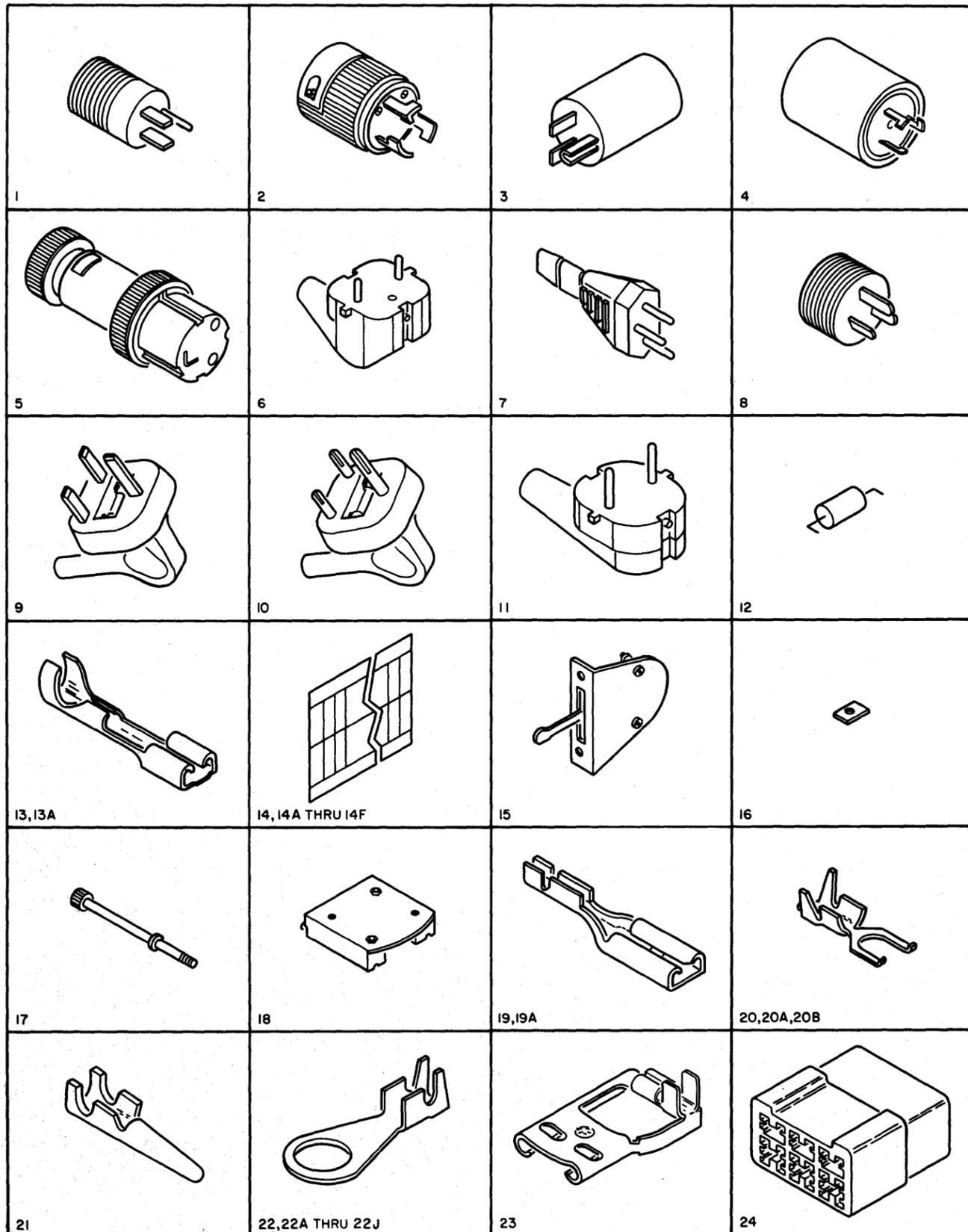
FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 - A	5718160	1	ATTACHMENT CORD-BLUE,BROWN,GREEN/YELLOW - A/FE ONLY FOR COMPONENT PARTS,SEE 14F,20,20C			
			CABLE ASSEMBLIES			
- B	1714804	1	CABLE ASM-EIA EXTERNAL,GERMANY FOR COMPONENT PARTS,SEE INDEXES 12,14B,14C,14D,15,16,17, 18,39A,39B,57,60 AND 61			
- B	1714964	1	CABLE ASM-EXTERNAL,MODEM- 10 FT FOR COMPONENT PARTS,SEE INDEXES 14,22G,39,40A,41A,57 AND 72			
- B	1714965	1	CABLE ASM-EXTERNAL,MODEM- 20 FT FOR COMPONENT PARTS,SEE INDEXES 14,22G,39,40A,41A,57 AND 72			
- B	1714966	1	CABLE ASM-EXTERNAL,MODEM- 30 FT FOR COMPONENT PARTS,SEE INDEXES 14,22G,39,40A,41A,57 AND 72			
- B	1794951	1	CABLE ASM,EXTERNAL LEASED LINE- 3,05M USED ON USA/CANADA ONLY			
- B	1794952	1	CABLE ASM,EXTERNAL LEASED LINE- 6,1M USED ON USA/CANADA ONLY			
- B	1794953	1	CABLE ASM,EXTERNAL LEASED LINE- 9,14M USED ON USA/CANADA ONLY			
- B	1794954	1	CABLE ASM,EXTERNAL LEASED LINE- 12,19M USED ON USA/CANADA ONLY FOR COMPONENT PARTS,SEE INDEXES 14D,22G, 39,40,72 AND 110			
- B	1714988	1	CABLE ASM,EXTERNAL LEASED LINE- 3,05M USED ON WTC ONLY			
- B	1714989	1	CABLE ASM,EXTERNAL LEASED LINE- 6,1M USED ON WTC ONLY			
- B	1714990	1	CABLE ASM,EXTERNAL LEASED LINE- 9,14M USED ON WTC ONLY			
- B	1714991	1	CABLE ASM,EXTERNAL LEASED LINE- 12,19M USED ON WTC ONLY FOR COMPONENT PARTS,SEE INDEXES 14D,22G, 39,40 AND 72			
- B	1743584	1	CABLE ASM,ADAPTER- U.K. DATEL MODEM FOR COMPONENT PARTS SEE INDEXES 14E,39, 40,41,42,78,116A AND 117			
- C	1714967	1	CABLE ASM-EXTERNAL,MODEM- 40 FT FOR COMPONENT PARTS,SEE INDEXES 14,22G,39,40A,41A,57 AND 72			
- C	2564941	1	CABLE ASM-EXTERNAL,DATA SET FOR COMPONENT PARTS,SEE INDEXES 14D,28,39,40,41,42,54 AND 66C			
- C	2621412	1	CABLE ASM-JUMPER,C.E. TOOL FOR COMPONENT PARTS,SEE INDEX 43			
- C	2722064	1	CABLE ASM-EIA EXTERNAL,US AND CANADA FOR COMPONENT PARTS,SEE INDEXES 12,14B,14C,14D,15,16,17, 18,39A,41A,57,60 AND 61			
- D	2722069	1	CABLE ASM-EIA EXTERNAL,WRAP,UK FOR COMPONENT PARTS,SEE INDEXES 14B,14C,14D,15,16,17, 18,39A,39B,60,61 AND 78			
- D	5351178	1	CABLE ASM-ADAPTER,POWER ON/OFF,EPO FOR COMPONENT PARTS,SEE INDEXES 14D,24,34,36			
- D	5466456	1	CABLE ASM-SIF LARGE COAX,24 COND FOR COMPONENT PARTS,SEE INDEXES 14D,35,66,66A,69 AND 71			
- D	5718097	1	CABLE ASM-P/P TO FANS FOR COMPONENT PARTS,SEE INDEXES 14,20A,22B,22C,37 AND 38C			
- D	5718296	1	CABLE ASM-EXT DDSA,10 FT FOR COMPONENT PARTS,SEE INDEXES 14D,22H,39,40,72,86 THRU 90			
- D	5718297	1	CABLE ASM-EXT DDSA,20 FT FOR COMPONENT PARTS,SEE INDEXES 14D,22G,39,40,72,74C,86,87,88,89 AND 90			
- D	5718298	1	CABLE ASM-EXT DDSA,30 FT FOR COMPONENT PARTS,SEE INDEXES 14D,22G,39,40,72,74C,86,87,88,89 AND 90			
- D	5718299	1	CABLE ASM-EXT DDSA,40 FT FOR COMPONENT PARTS,SEE INDEXES 14D, 22G, 39, 40, 72, 74C, 86, 87, 88, 89 AND 90			

## CABLE ASSEMBLIES WITH COMPONENT PARTS

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 - D	6835760	1	CABLE ASM PWR SUPPLY TO BOARD- PS2-D07 FOR COMPONENT PARTS,SEE INDEXES 36A,36B,36C,38A,38C,46,51 AND 59A			
- D	5718195	1	CABLE ASM, X21 EXTENDER FOR COMPONENT PARTS,SEE INDEXES 14E,40, 40A,41B,41C,116,117A AND 123			
- D	5718196	1	CABLE ASM,EXT X21- 3,05M			
- D	5718197	1	CABLE ASM,EXT X21- 6,1M			
- D	5718198	1	CABLE ASM,EXT X21- 9,14M			
- D	5718199	1	CABLE ASM,EXT X21- 12,19M FOR COMPONENT PARTS,SEE INDEXES 14D,22J, 39,40A,72,74D,87,88,89 AND 111			
- E	5718301	1	CABLE ASM-POWER DIST FEA BD FOR COMPONENT PARTS,SEE INDEXES 14,30,31,32,36,38A AND 50			
- E	5718305	1	CABLE ASM-P/P TO DISC FILE- 125V FOR COMPONENT PARTS,SEE INDEXES 14E,38A,46 AND 80			
- F	5718306	1	CABLE ASM-DPS PANEL TO LOG BOARD FOR COMPONENT PARTS,SEE INDEXES 14E,19,53,70,74,94,95,96			
- F	5718307	1	CABLE ASM-SIG AND D/C TO FILE FOR COMPONENT PARTS,SEE INDEXES 14E,22D,29,63,63A,70,74B,94,95			
- F	5718302	1	CABLE ASM-DEVICE ADAPTERS FOR COMPONENT PARTS,SEE INDEX 36A			
- F	5718309	1	CABLE ASM-INTERFACE REMOTE FOR COMPONENT PARTS,SEE INDEXES 14E,41,42,70,74,94,95			
- G	5718310	1	CABLE ASM-LOCAL INTERFACE,BUS/TAG-IN FOR COMPONENT PARTS,SEE INDEXES 14,14E,66C,67,68,70,74,94,95			
- G	5718311	1	CABLE ASM-LOCAL INTERFACE,BUS/TAG-OUT FOR COMPONENT PARTS,SEE INDEXES 14E,66B,68,70,74,94,95			
- G	5718314	1	CABLE ASM-P/P BOX TO OPS PNL-M1A,M1B,M1D FOR COMPONENT PARTS,SEE INDEXES 14,14E,19,38E,51,55,55A,58			
- G	5718315	1	CABLE ASM-DPS PANEL FOR COMPONENT PARTS,SEE INDEXES 13A,14,14E,55A,59,97			
- H	5718316	1	CABLE ASM-LOCAL PRI/POWER BOX FOR COMPONENT PARTS,SEE INDEXES 13,14,14A,14E,20,21,22,22A,22B,22D,22E, 22F,23,25,38,38B,38D,45,47,52,64 AND 65			
- H	5718317	1	CABLE ASM-P/P TO FERRO FOR COMPONENT PARTS,SEE INDEXES 14,22B,38A AND 44			
- H	5718319	1	CABLE ASM-REMOTE PRI/POWER BOX FOR COMPONENT PARTS,SEE INDEXES 14,14E,20,22B,22E,38,38B,45,47,49			
- J	5718324	1	CABLE ASM-DPS PANEL FOR COMPONENT PARTS,SEE INDEXES 13A,14,14E,19,55A,59			
- J	5718325	1	CABLE ASM-A1/P1 TO BATTERY FOR COMPONENT PARTS,SEE INDEXES 14,14E,33A,33B,58B,91,92,93			
- J	5718328	1	CABLE ASM-P/P TO DISC FILE- 125V FOR COMPONENT PARTS,SEE INDEXES 14E,38A,46 AND 80			
- J	5718196	1	CABLE ASM-EXT-21 FOR COMPONENT PARTS,SEE INDEXES 14D,39,40A,74D,72,87,88,89			
- K	6835761	1	CABLE ASM, PWR SUPPLY TO BOARD- O1A/A1 FOR COMPONENT PARTS, SEE INDEXES 14,14E,38A,46,65A,106			
- K	5667058	1	CABLE ASSEMBLY- +8.5V BLEEDER RESISTOR FOR COMPONENT PARTS, SEE INDEXES 14E,65,93,102,103,107			
- K	5667078	1	CABLE ASM, FAN FOR COMPONENT PARTS, SEE INDEXES 14E,20,20A,93,105			
- K	5667116	1	CABLE ASM-DPS PANEL TO LOGIC BOARD FOR COMPONENT PARTS, SEE INDEXES 14E,55A,-59,-70,-74,-94,-95			

## CABLE ASSEMBLIES WITH COMPONENT PARTS

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 - K	5667119	1	CABLE ASM-A2-Y2/Y3 TO I/O -P1 FOR COMPONENT PARTS, SEE INDEXES 14,14E,22J,41,42,70,74,94,95,108 FOR COMPONENT PARTS, SEE INDEXES 74E,104,104A			
- L	5862292	1	CABLE ASM-DEVICE ADAPTER- B FOR COMPONENT PARTS, SEE INDEXES 14E,62,74A,94,95			
- L	5862293	1	CABLE ASM-DEVICE ADAPTER- A FOR COMPONENT PARTS, SEE INDEXES 14E,62,74A,94,95			
- L	5862313	1	CABLE ASM-POWER DIST FEA BD FOR COMPONENT PARTS, SEE INDEXES 14,14E,30,31,32,33,36A,38A,50			
- L	5862310	1	CABLE ASM, SIGNAL AND DC TO FILE FOR COMPONENT PARTS,SEE INDEXES 14E,22D, 29,63A,70,74,74B,94 AND 95			
- L	5267772	1	CABLE ASM, EXT L/LINE CNTRL FRANCE- 3M			
- L	5267773	1	CABLE ASM, EXT L/LINE CNTRL FRANCE- 6M			
- L	5267774	1	CABLE ASM, EXT L/LINE CNTRL FRANCE- 9M			
- L	5267775	1	CABLE ASM, EXT L/LINE CNTRL FRANCE- 12M FOR COMPONENT PARTS,SEE INDEXES 14D,20C, 22G,39,40 AND 120			
- L	5267784	1	CABLE ASM, EXT ATTACH V35 MODEM ADAPTER FOR COMPONENT PARTS SEE INDEXES 14E,39, 40,40A,116A,117,121 AND 122			
- L	5267786	1	CABLE ASM, EXT ATTACH V35 MODEM-FRANCE FOR COMPONENT PARTS SEE INDEXES 14E,39, 40,40A,112,113,114,115,116A,117,118,119 AND 119A			



CABLE ASSEMBLIES WITH COMPONENT PARTS

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 - 1	1655424 NP	AR	• PLUG, MOULDED			
- 2	1652410	AR	• CONNECTOR, 2 POLE- 3 WIRE GRND			
- 3	256342	AR	• PLUG, GROUNDED COMMERCIAL-15A 250V			
- 4	2590278	AR	• PLUG, TREE WIRE 250V			
- 5	4406509	AR	• CONNECTOR-PLUG, 2W, 3P, 15A, 250V			
- 6	4406525 NP	AR	• PLUG, MOULDED			
- 7	4406531 NP	AR	• PLUG, MOULDED			
- 8	4406528 NP	AR	• PLUG, MOULDED			
- 9	1655430 NP	AR	• PLUG, MOULDED			
- 10	4406534 NP	AR	• PLUG, MOULDED			
- 11	4406536 NP	AR	• PLUG, MOULDED			
- 12	216450	AR	• RESISTOR, FXD 1.6K 1/4W			
- 13	236915	AR	• TERMINAL, SLIP ON-20-18 AWG			
- 13A	236916	AR	• TERMINAL-CONTACT FEMALE 24-22 AWG			
- 14	317296	AR	• LABEL-NUMBERING L TO R 1 THRU 33			
- 14A	317297	AR	• LABEL-NUMBERING L TO R 34 THRU 66			
- 14B	347746	AR	• LABEL, OPER TEST			
- 14C	347748	AR	• LABEL, TEST OPER			
- 14D	483770	AR	• LABEL, CABLE IDENTIFICATION			
- 14E	811825	AR	• LABEL-CABLE			
- 14F	6520037	AR	• LABEL			
- 15	347745	AR	• SWITCH, LEVER- 8 POLE			
- 16	347751	AR	• PLATE, PRESSURE			
- 17	347752	AR	• STUD-KNURLED			
- 18	347755	AR	• HOUSING, CONNECTOR AND SWITCH			
- 18	347755	AR	• HOUSING, CONNECTOR AND SWITCH			
- 19	430799	AR	• TERMINAL, SLIP ON			
- 19A	430801	AR	• TERMINAL-RECEPTACLE, 14-16 AWG			
- 20	483649	AR	• TERMINAL, FL. SPADE 18-20 AWG NO. 6 STUD			
- 20A	483651	AR	• TERMINAL, RING			
- 20B	483652	AR	• TERMINAL, FL. SPADE 14-16 AWG NO. 6 STUD			
- 20C	483648	AR	• TERMINAL, FL. SPADE 22-26 AWG NO. 6 STUD			
- 21	483657	AR	• TERMINAL			
- 22	483658	AR	• TERMINAL			
- 22A	483676	AR	• TERMINAL, RING-22-26 AWG NO. 6 STUD			
- 22B	483677	AR	• TERMINAL, RING-BRASS #6 STUD 18-20 AWG			
- 22C	483678	AR	• TERMINAL, RING- NO. 6			
- 22D	483681	AR	• TERMINAL, RING- NO. 8			
- 22E	483682	AR	• TERMINAL, RING - 14 TO 16 AWG			
- 22F	483686	AR	• TERMINAL, RING-BRASS #10 STUD 14-16 AWG			
- 22G	483689	AR	• TERMINAL			
- 22H	483688	AR	• TERMINAL, RING			
- 22J	483685	AR	• TERMINAL			
- 23	517913	AR	• CLIP			
- 24	523268	AR	• HOUSING-TAB			

FIGURE 10. CABLE ASSEMBLIES WITH COMPONENT PARTS. SHEET 1 OF 6. INDEX NOS. 1-24. SEE LIST 10.

CABLE ASSEMBLIES WITH COMPONENT PARTS

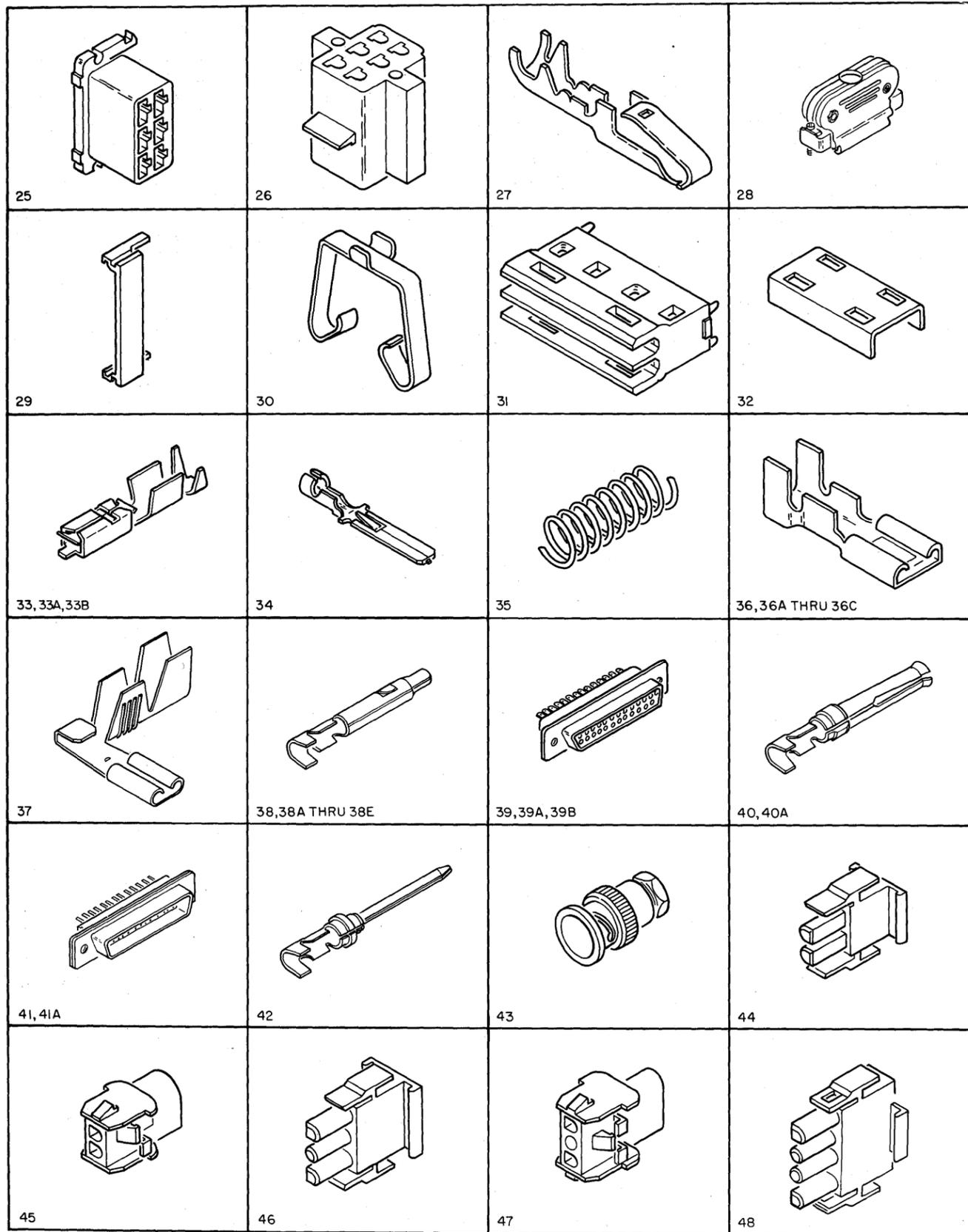
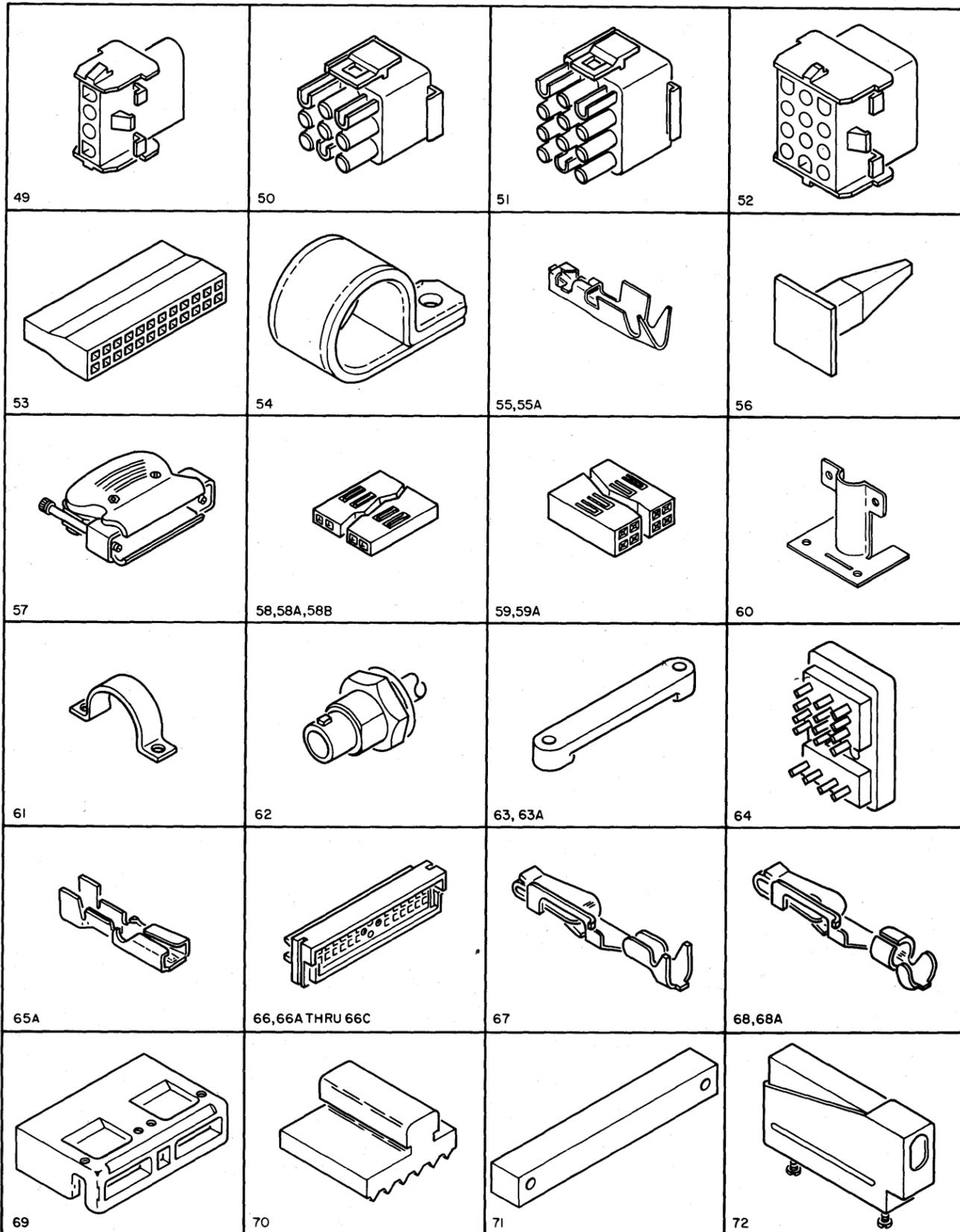


FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 - 25	523269	AR	• CONNECTOR-ELECT 6 POS INSERT			
- 26	609686	AR	• CONNECTOR			
- 27	609687	AR	• CONTACT			
- 28	765295	AR	• STRAIN RELIEF AND HOOD			
- 29	811802	AR	• GUIDE, CARD			
- 30	813681	AR	• CONTACT			
- 31	813801	AR	• HOUSING			
- 32	813802	AR	• COVER			
- 33	815933	AR	• CONNECTOR, DISCRETE WIRE			
- 33A	815934	AR	• CONNECTOR-WIRE, 22-26 AWG			
- 33B	5462535	AR	• TERMINAL, QUICK DISCONNECT-RIGHT ANGLE			
- 34	827991	AR	• TERMINAL, QUICK DISCONNECT, 22-18 AWG			
- 35	1105806	AR	• SPRING			
- 36	1127037	AR	• RECEPTACLE, TAB- 0.755 LG			
- 36A	2502307	AR	• TERMINAL			
- 36B	4409547	AR	• TERMINAL			
- 36C	5252721	AR	• TERMINAL- .205 RECEPTACLE 18-22 AWG			
- 37	1187169	AR	• TERMINAL-FLAG			
- 38	1471018	AR	• PIN, DUAL LANCE 14-20 AWG			
- 38A	1471019	AR	• SOCKET, DUAL LANCE 14-20 AWG			
- 38B	1471027	AR	• SOCKET DUAL LANCE			
- 38C	1471028	AR	• SOCKET, DUAL LANCE 14-20 AWG			
- 38D	1661131	AR	• TERMINAL, DUAL LANCE 18-22 AWG			
- 38E	1661132	AR	• TERMINAL, DUAL LANCE 18-24 AWG			
- 39	1655336	AR	• CONNECTOR, 25 POS. FEMALE			
- 39A	5252593	AR	• CONNECTOR-FEMALE 25 POSITION			
- 39B	5302662	AR	• CONNECTOR, MALE			
- 40	1655337	AR	• SOCKET, CONTACT 20-24 AWG			
- 40A	1655358	AR	• SOCKET, CONTACT			
- 41	1655338	AR	• CONNECTOR			
- 41A	5252592	AR	• CONNECTOR, MALE- 25 POSITION			
- 41B	1608648	AR	• CONNECTOR, 15 POS RECP			
- 41C	1608649	AR	• CONNECTOR, 15 POS PLUG			
- 42	1655339	AR	• PIN, CONTACT			
- 43	1836444	AR	• CONNECTOR			
- 44	1847524	AR	• PLUG, 2 CIRCUIT			
- 45	1847525	AR	• HOUSING, 2 CIRCUIT			
- 46	1847526	AR	• PLUG, 3 CIRCUIT			
- 47	1847527	AR	• CONNECTOR, 3 POS.			
- 48	1847528	AR	• PLUG 14 CIRCUIT			

FIGURE 10. CABLE ASSEMBLIES WITH COMPONENT PARTS. SHEET 2 OF 6. INDEX NOS. 25-48. SEE LIST 10.



**CABLE ASSEMBLIES WITH COMPONENT PARTS**

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 - 49	1847529	AR	• CONNECTOR, 4 POS.			
- 50	1847532	AR	• PLUG, 9 CIRCUIT			
- 51	1847534	AR	• PLUG 12 CIRCUIT			
- 52	1847535	AR	• HOUSING 12 CIRCUIT			
- 53	1851295	AR	• HOUSING 24 POSITION			
- 54	2565144	AR	• CLAMP			
- 55	2637681	AR	• CONNECTOR, 18-20 AWG			
- 55A	2637682	AR	• CONNECTOR - DISCRETE			
- 56	2637689	AR	• INSERT- NYLON			
- 57	2721890	AR	• HOOD ASM.			
- 58	2731838	AR	• HOUSING, 1 X 12			
- 58A	2731850	AR	• HOUSING			
- 58B	2637680	AR	• HOUSING			
- 59	2731844	AR	• HOUSING			
- 59A	5718356	AR	• CONNECTOR-BLOCK			
- 60	4685389	AR	• PLATE, SWITCH MTG.			
- 61	4685390	AR	• CLAMP			
- 62	5252661	AR	• CONNECTOR			
- 63	5275481	AR	• STRAIN RELIEF			
- 63A	5353922	AR	• CLAMP			
- 64	5318967	AR	• SOCKET, 4 POSITION RELAY			
- 65	5351177	AR	• RECEPTACLE, TAB- 0.825 LG			
- 65A	523267	AR	• RECEPTACLE, TAB- 0.798 LG			
- 66	5353867	AR	• BLOCK, CONNECTOR-A STYLE			
- 66A	5353869	AR	• CONNECTOR, BLOCK-B STYLE			
- 66B	5529190	AR	• CONNECTOR, BLOCK, A STYLE			
- 66C	5529191	AR	• CONNECTOR, BLOCK, B STYLE			
- 67	5362301	AR	• CONTACT, LARGE SERPENT. 20-24AWG			
- 68	5362302	AR	• CONTACT, SMALL SERPENT			
- 68A	5404480	AR	• CONTACT, GREAT SERPENT			
- 69	5362306	AR	• COVER, CONNECTOR BLOCK			
- 70	5466393	AR	• CLAMP, STRAIN RELIEF			
- 71	5466457	AR	• STRAIN RELIEF			
- 72	5717874	AR	• HOOD, CONNECTOR- 90 DEG			

FIGURE 10. CABLE ASSEMBLIES WITH COMPONENT PARTS. SHEET 3 OF 6. INDEX NOS. 49-72. SEE LIST 10.

CABLE ASSEMBLIES WITH COMPONENT PARTS

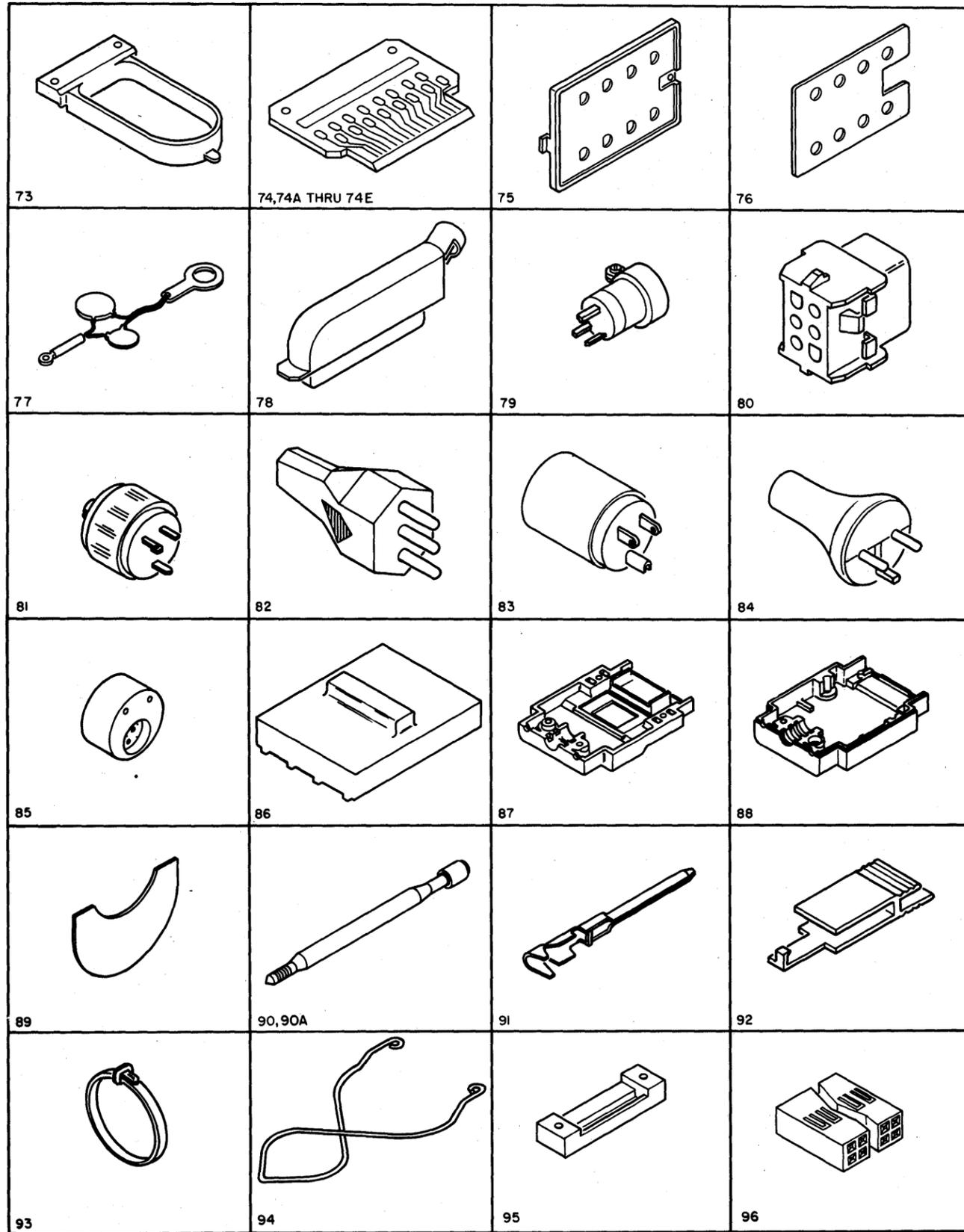


FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 - 73	5717926	AR	•	HOLDER-CABLE		
- 74	5717973	AR	•	PADDLE CARD		
- 74A	5800530	AR	•	CARD ASSEMBLY		
- 74B	5800634	AR	•	CARD ASSEMBLY		
- 74C	5718184	AR	•	CARD ASM, SWITCH		
- 74D	5718107	AR	•	CARD ASM		
- 74E	5800671	AR	•	CARD ASSEMBLY		
- 75	5717997	AR	•	PANEL		
- 76	5717998	AR	•	PLATE-GROUND		
- 77	5718338	AR	•	CAPACITOR DIODE ASM		
- 78	5824321	AR	•	CONNECTOR, 25 WAY		
- 79	624034	AR	•	PLUG, TWIST LOCK-15A 125V		
- 79	1452552	AR	•	PLUG, 3 POLE-TWIST LOCK		
- 80	1847531	AR	•	HOUSING, 6 CIRCUIT, UNIVERSAL		
- 81	1975238	AR	•	PLUG- 3W, 3P TWIST LOCK		
- 82	4409569	NP	•	PLUG, MOLDED		
- 83	1655421	AR	•	PLUG HOSPITAL GRADE- 3W, 3P		
- 84	4409574	NP	•	PLUG, MOLDED		
- 85	483664	AR	•	TERMINAL, FL. SPADE 14-16 AWG NO. 6 STUD		
- 86	1743528	AR	•	ACTUATOR, SLIDE-SWITCH		
- 87	5718181	AR	•	SHELL, UPPER		
- 88	5718182	AR	•	SHELL, LOWER		
- 89	5718185	AR	•	STRAIN RELIEF		
- 90	5718186	AR	•	JACK SCREW		
- 90A	5718109	AR	•	JACK SCREW-MALE		
- 91	2731384	AR	•	PIN		
- 92	1743055	AR	•	STRAIN RELIEF		
- 93	5420242	AR	•	TY-MINIATURE		
- 94	5717466	AR	•	CARD RETAINER		
- 95	5717486	AR	•	STRAIN RELIEF		
- 96	2731845	AR	•	HOUSING		

FIGURE 10. CABLE ASSEMBLIES WITH COMPONENT PARTS. SHEET 4 OF 6. INDEX NOS. 73-96. SEE LIST 10.

CABLE ASSEMBLIES WITH COMPONENT PARTS

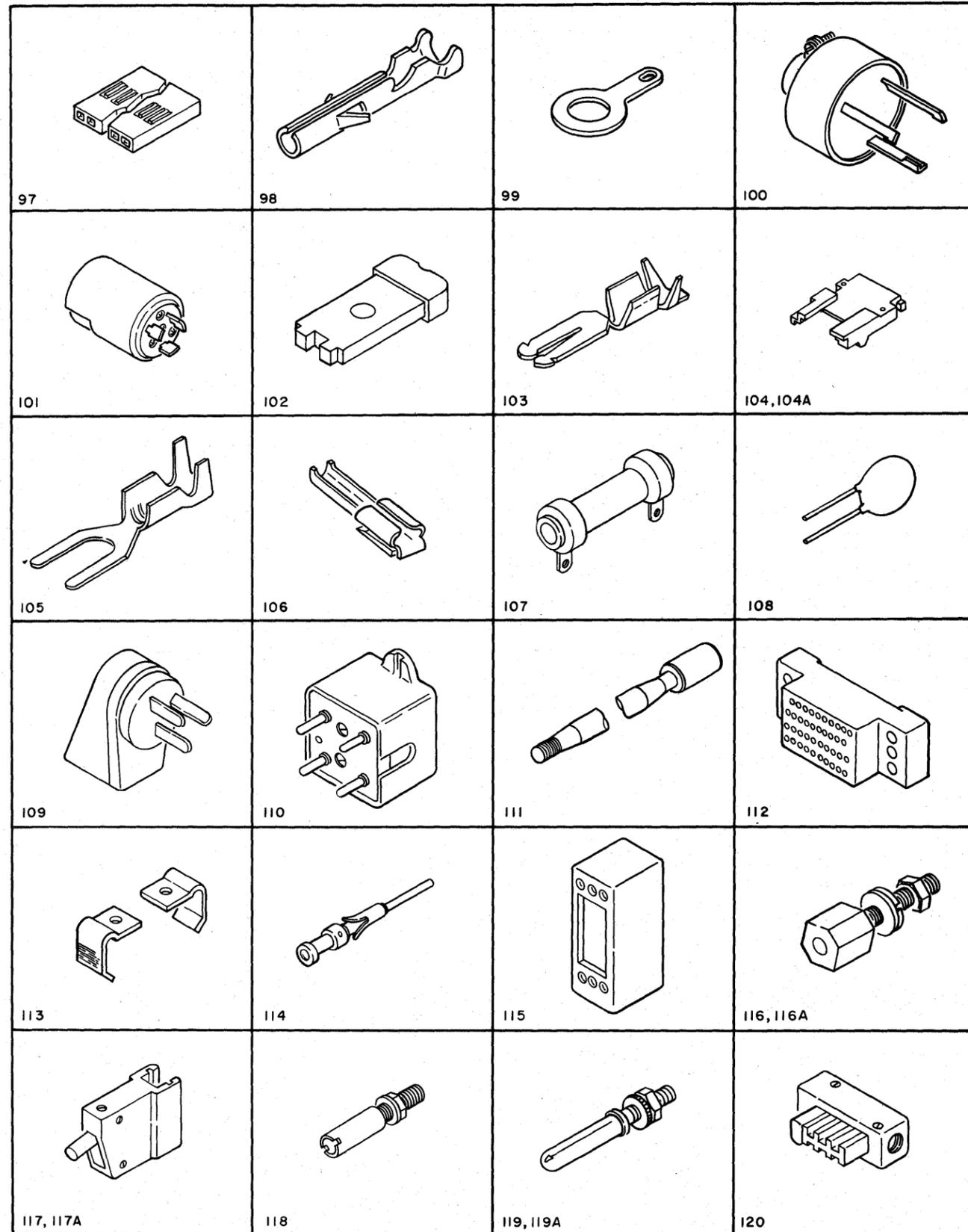


FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 - 97	2731835	AR	• HOUSING			
- 98	1471019	AR	• SOCKET, DUAL LANCE 14-20 AWG			
- 99	5718293	AR	• STRAP, GROUND			
-100	624034	AR	• PLUG, TWIST LOCK-15A 125V			
-101	2590278	AR	• PLUG, TREE WIRE 250V			
-102	1743169	AR	• CONNECTOR, 2 POS.			
-103	816883	AR	• CONTACT, 18-20 AWG			
-104	813803	AR	• BLOCK, STRAIN RELIEF			
-104A	813804	AR	• BLOCK, STRAIN RELIEF			
-105	483696	AR	• TERMINAL, SPADE- NO.6 STUD 18-20 AWG			
-106	5312429	AR	• TERMINAL			
-107	482499	AR	• RESISTOR, FXD WIREWOUND			
-108	4216001	AR	• VARISTOR			
-109	6814300	AR	• PLUG, PWR-ISRAEL 16A 250V			
-110	341200	AR	• PLUG-TELEPHONE			
-111	5718109	AR	• JACK SCREW-MALE			
-112	1749353	AR	• BLOCK, CONNECTOR- 34 POSITION			
-113	1749354	AR	• SPRING SET, LOCKING			
-114	1749355	AR	• PIN, CONTACT			
-115	1749356	AR	• HOOD, CONNECTOR PIN			
-116	1754259	AR	• SCREWLOCK KIT, FEMALE			
-116A	1785931	AR	• SCREWLOCK, FEMALE			
-117	1855555	AR	• HOOD, CONNECTOR			
-117A	4943864	AR	• HOOD			
-118	2122202	AR	• SOCKET, GUIDE-CENTER			
-119	2122203	AR	• PIN, GUIDE, BRASS, /SUPPLIED W/HARDWARE/			
-119A	2122734	AR	• PIN, GUIDE CORNER 34 AND 50 POSITION			
-120	2767228	AR	• PLUG, TP- 6 POSITION FRENCH			

FIGURE 10. CABLE ASSEMBLIES WITH COMPONENT PARTS. SHEET 5 OF 6. INDEX NOS. 97-120. SEE LIST 10.

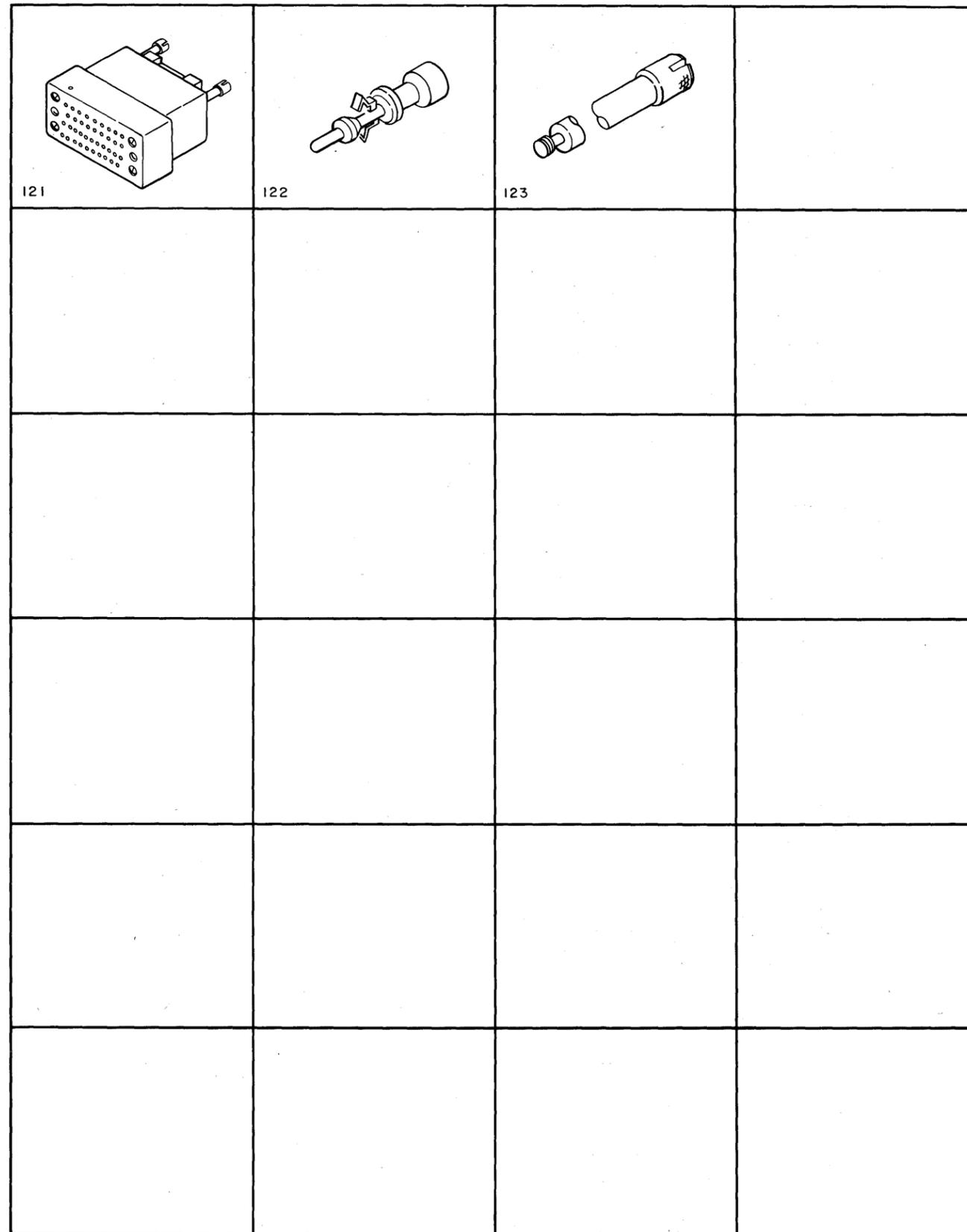


FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 -121	5182931	AR				
-122	5182932	AR				
-123	5718077	AR				

FIGURE 10. CABLE ASSEMBLIES WITH COMPONENT PARTS. SHEET 6 OF 6. INDEX NOS. 121-123. SEE LIST 10.

# NUMERICAL INDEX

PART NO.	LIST AND INDEX NO.	PART NO.	LIST AND INDEX NO.	PART NO.	LIST AND INDEX NO.	PART NO.	LIST AND INDEX NO.	PART NO.	LIST AND INDEX NO.	PART NO.	LIST AND INDEX NO.	PART NO.	LIST AND INDEX NO.	PART NO.	LIST AND INDEX NO.
2903	8 - 21	257977	3 - 10	483770	10 - 14D	1471019-CONT	10 - 98	1754259	10 - 116	2305546	9 - 12	2722069	10 - D	5267786	10 - L
6364	5 - 51	257982	9 - 33	507144	4 - 28	1471027	10 - 388	1785931	10 - 116A	2305547	9 - 13	2722507	2 - 47	5267824	5 - 31
	9 - 5	257985	5 - 53B		4 - 41	1471028	10 - 38C	1794410	5 - 25	2305548	9 - 44	2731384	10 - 91	5267949	5 - 63
10170	2 - 40	257986	5A- 9	510810	5 - 15	1589254	6 - 15	1794951	10 - B	2305549	9 - 61	2731835	2 - 103	5271288	6 - 22
	2 - 52		9 - 42	512137	2 - 62	1589880	3 - 4	1794952	10 - B	2305554	9 - 3		10 - 97	5275481	10 - 63
	2 - 77	300606	4 - 27		4 - 16	1608648	10 - 41B	1794953	10 - B	2305555	9 - 36	2731838	10 - 58	5302662	10 - 39B
	2 - 83	302090	6 - 9	513668	1 - 6	1608649	10 - 41C	1794954	10 - B	2305559	9 - 51	2731844	10 - 59	5312429	10 - 106
	4 - 2	302131	6 - 11	517913	10 - 23	1646686	4 - 45	1831799	3 - 7	2305564	9 - 60	2731845	10 - 96	5318966	6 - 5
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Extract	Insert	Extract	Insert
iii, iv	iii, iv		5-17 (added), blank
2-1, 2-2	2-1, 2-2	B-11, B-12	B-11, B-12
	2-2.1 (added), blank	C-1, C-2	C-1, C-2
2-7, 2-8	2-7, 2-8	C-5, C-6	C-5, C-6
4-5, 4-6	4-5, 4-6	C-9, C-10	C-9, C-10
4-11, blank	4-11, blank	C-19 through C-22	C-19 through C-22
5-5, 5-6	5-5, 5-6	P-7, P-8	P-7, P-8
5-13, 5-14	5-13, 5-14	P-11 through P-16	P-11 through P-16

A change to the text or to an illustration is indicated by a vertical line to the left of the change.

#### Summary of Amendments

This Technical Newsletter contains additions and corrections involving X.21.

*Note: Please file this cover letter at the back of the manual to provide a record of changes.*





