

Maintenance Library

3274

**Control Unit
Model 61C
Maintenance Information**

Preface

This manual contains the information needed by the Product Field Engineering (FE) Customer Engineer to maintain the 3274 Control Unit Model 61C.

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

- Result of Host Test Routines
- Special Tools and Test Equipment

If the problem cannot be isolated and repaired with 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 Index
- Chapter 3 — Maintenance Analysis Procedures (MAPs)
- Chapter 4 — Removal and Replacement Procedures
- Chapter 5 — Remote Attachment Data
- Chapter 6 — 3274 Encrypt/Decrypt Feature
- Chapter 7 — Additional Features
- Appendix A — Reference
- Appendix B — Power
- Appendix C — Logic Boards, Cards, and Cables
- Appendix D — Operator and Control Panels
- Appendix E — IBM 51TD Diskette Drive Maintenance
- Appendix F — Parts Catalog

Second Edition (September 1983)

This major revision obsoletes SY27-2555-0. Changes or additions to the text and illustrations are indicated by a vertical line to the left of the change. This edition includes information concerning the IBM 3290 Information Panel and the Response Time Monitor (RTM), as well as various minor changes.

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Safety Procedures

This section gives the safety practices to be observed by customer engineers (CEs) and the safety notices that appear in the manual.

CE Safety Practices

These safety practices include the safety rules for CEs when they are working on machines, first-aid if an accident occurs, and reporting of accidents.

Rules for Safety

If (1) you know the safety rules for working with electrical and mechanical equipment and (2) you observe these rules, you can work safely with IBM equipment.

Do not fear electricity, but respect it.

While you are maintaining IBM equipment:

1. Observe every safety precaution possible.
2. Observe the following safety rules.

Work Environment

- Do not work alone under hazardous conditions or near equipment that has dangerous voltages. Always inform your manager if the conditions or voltages are a possible problem.
- Remove all power ac and dc when removing or assembling major components, when working in the immediate area of power supplies, when performing mechanical inspection of power supplies, and when installing changes in machine circuitry. Pull the power cable plug from the receptacle to remove the power source.
- Follow special safety instructions, such as handling cathode-ray tubes and extremely high voltages, as outlined in customer engineering memorandums (CEMs) and in the Safety Procedures section of the maintenance manuals.
- Always look for possible hazards in your work environment. Examples of hazards are moist floors, non-grounded extension cables, power surges, and missing safety grounds.
- Do not perform any action that makes the product unsafe or that causes hazards for the customer personnel.
- Before you start the equipment, make sure that other CEs, and customer personnel, are not in a hazardous position.
- Do not wear loose clothing that can be caught in the moving parts of a machine. Make sure that the sleeves of

your clothing are fastened or are rolled above the elbow. If your hair is long, or if you wear a neck scarf, fasten it to make it safe.

- Insert your necktie into your clothing or fasten it with a clip (preferably nonconductive) at approximately 8 centimeters (3 inches) from its end.
- Lift the equipment or parts by standing or pushing up with your leg muscles; this action removes the strain from the muscles in your back. Do not lift any equipment or parts that are too heavy for you.

The maximum load to be lifted is that which, in your opinion and management's, does not jeopardize your own health or well-being, or that of other employees.
- Put removed machine covers in a safe place while you are servicing the machine. Reinstall the covers before returning the machine to the customer.
- Always keep your CE tool kit away from walk areas so that other persons cannot trip over it. For example, keep the kit under a desk or table.
- Observe good housekeeping practices in the area of the machines while you are performing maintenance and after completing it.
- After maintenance, reinstall all safety devices, such as guards, shields, labels, and ground wires. Exchange safety devices that are worn or defective. (*Remember:* the safety devices protect you from a hazard. You destroy their purpose if you do not reinstall them when you have completed the service call.)

Electrical Safety

- If possible, always unplug the power-supply cable before you work on a machine. When you switch off power at the wall box, lock the switch in the off position or attach a DO NOT OPERATE tag (Z229-0237) to the switch.

Note: *A non-IBM attachment to an IBM machine may be powered from another source and may be controlled by a different switch or circuit breaker.*

- Switch off all power before (1) removing or assembling the main units of the equipment, (2) working near to power supplies, (3) inspecting power supplies, or (4) installing changes in machine circuits.
- Unless the maintenance documents specifically instruct you, do not service the following parts with power on *if the part is removed from its installed position in the machine:* power supplies, pumps, blowers, motor

generators, and other units with voltages that are more than 30 Vac or 42.4 Vdc. (This rule ensures that correct grounding is maintained.)

- If you really need to work on equipment that has exposed live electrical circuits, observe the following precautions:
 - Ensure that another person who is familiar with the power-off controls is near you. Another person must be there to switch off the power if necessary.
 - Do not wear jewelry, chains, metal-frame eyeglasses, or other personal metal objects. (*Remember:* if the metal touches the machine, the flow of current increases because the metal is a conductor.)
 - Use only insulated probe tips or extenders. (*Remember:* worn or cracked insulation is unsafe.)
 - Use only one hand while you are working on live equipment. Keep the other hand in your pocket or behind your back. (*Remember:* there must be a complete circuit for an electrical shock to occur. This precaution prevents your body from completing the circuit.)
 - When you use test equipment, set its controls correctly and use insulated probes that have the correct electrical specification.
 - Do not touch objects that are grounded, such as metal floor strips, machine frames, or other conductors. Use suitable rubber mats obtained locally, if necessary.
- When you are working with machines having voltages more than 30 Vac or 42.4 Vdc, observe the special safety instructions given in customer engineering memorandums (CEMs).
- Never assume that power has been removed from a circuit. First check to ensure that the circuit has been powered off.
- Do not touch live electrical circuits with the surface of a plastic dental mirror. (*Remember:* the surface of the dental mirror is conductive and can cause damage and personal injury.)
- If an electrical accident occurs:
 1. *Use caution: do not be a victim yourself.*
 2. *Switch off power.*
 3. *Instruct another person to get medical aid.*
 4. *If the victim is not breathing, perform mouth-to-mouth rescue breathing. See "Electrical Accidents" under "First Aid."*

Mechanical Safety

- Do not touch moving mechanical parts when you are:
 - Lubricating a part
 - Checking for play
 - Doing other similar work.
- When using a stroboscope, do not touch ANYTHING – it may be moving.

Safety Glasses

Wear safety glasses when:

- Using a hammer to drive pins or similar parts
- Using a power drill
- Using a spring hook to attach or remove a spring
- Soldering parts
- Cutting wire or removing steel bands
- Using solvents, chemicals, or cleaners to clean parts
- Working under any other conditions that could injure your eyes.

Tools, Test Equipment, and Field-Use Materials

- Do not use tools and test equipment that have not been approved by IBM. Make sure that electrical hand tools, such as Wire-Wrap¹ tools and power drills, are inspected regularly.
- Exchange worn and broken tools and test equipment.
- Do not use solvents, cleaners, or oils that have not been approved by IBM.

Summary

Prevention is the main aid to electrical safety. Always think about electrical safety and use good practice; for example:

- Make sure that the customer's power receptacle matches the IBM equipment specifications.
- Inspect power cables and plugs: check for loose, damaged, or worn parts.
- Review the procedure in the maintenance documents before you remove a part that can hold an electrical charge from the machine. Carefully discharge the necessary parts exactly as instructed by the procedure.
- Do not use a normal light (for example, a table lamp) as an extension trouble light at a machine.

¹ Trademark of the Gardner-Denver Co.

Never assume that a machine or a circuit is safe. No machine is always completely safe. You may not know the exact condition of a machine, because, for example:

- The power receptacles could be wrongly wired.
- Safety devices or features could be missing or defective.
- The machine could have been damaged in shipment.
- The machine could be deteriorated because it is old or because it operates in an extreme environment.
- A part could have become defective, thereby causing a hazard.
- A part could be wrongly assembled.

Also:

- Make sure that the maintenance or changes history is correct.
- Make sure that all sales changes and engineering changes are correctly installed.

These are some of the ways that the condition of the machine could affect safety. *Before you start a service call or procedure, use good judgment and extreme caution.*

First Aid

Serious Injury

1. Summon medical aid.
2. Do not move the victim unless absolutely necessary, to remove him from danger.
3. Try to stop serious bleeding by using pressure points or a pressure bandage.
4. Loosen the victim's clothing, and keep the victim warm.

Electrical Accidents

When performing rescue procedures for an electrical accident, do as follows:

- **Use caution:** If the victim is still in contact with an electrical-current source, remove the power; to do this, you may need to operate the room emergency power-off (EPO) switch or the disconnecting switch. If you cannot find the switch, use a dry wooden rod or other nonconductive object to pull or push the victim away from contact with the electrical-current source.

- **Work quickly:** If the victim is unconscious, he or she may need:
 - Mouth-to-mouth rescue breathing
 - External cardiac compression if the heart is not beating.

INSTRUCT ANOTHER PERSON to call for medical aid such as an ambulance, rescue service, or a hospital.

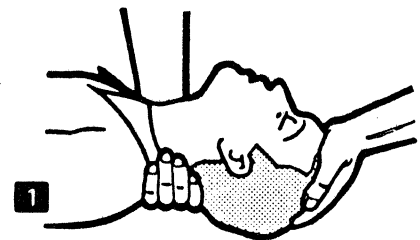
Determine whether the victim needs mouth-to-mouth rescue breathing. If he or she does, perform the following steps.

CAUTION

Use extreme care when you perform rescue breathing for a victim who may have breathed-in toxic fumes. Do not breathe-in air that the victim has breathed out.

1. Prepare for rescue breathing:

- a. Ensure that the victim's airway is open and that it is not obstructed; check the mouth for objects that may be obstructing the airway, such as chewing gum, food, dentures, or the tongue.
- b. Place the victim on his or her back, put one hand behind the victim's neck, and put the other hand on the victim's forehead.
- c. Lift the neck with one hand, and tilt the head backward by pressing on the forehead with the other hand **1**.

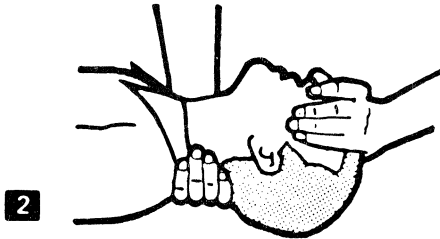


2. Look, listen, and feel to determine whether the victim is breathing freely:

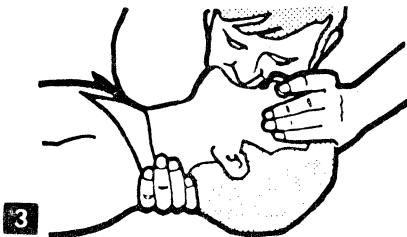
- a. Put your cheek near to the victim's mouth and nose.
- b. Listen and feel for the breathing-out of air. At the same time, look at the victim's chest and upper abdomen to see whether they move up and down.

3. If the victim is not breathing correctly:

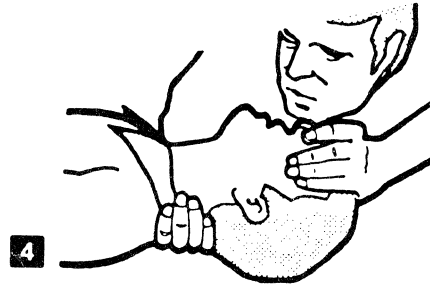
- a. Keep the victim's head tilted backward (see **1**). Continue to press on the forehead with your hand; at the same time, rotate this same hand so that you can pinch together the victim's nostrils with your thumb and finger **2** .



- b. Open your mouth wide and take a deep breath. Make a tight seal with your mouth around the victim's mouth **3** and blow into the victim's mouth.



- c. Remove your mouth to let the victim breathe out, and check that the victim's chest moves down **4** .



- d. Repeat steps b and c once every 5 seconds either until the victim breathes for himself or herself or until medical aid comes.

Reporting Accidents

Report, to your field manager, all electrical accidents, possible electrical hazards, and accidents that nearly occurred. (*Remember:* an accident that nearly occurs might be caused by a design problem; your immediate reporting ensures that the problem will be solved quickly.)

Report, also, all small electrical shocks. (*Remember:* a condition that causes a small shock need differ only slightly to cause serious injury.)

Safety Notices

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




- **DANGER:** Indicates a dangerous situation that could be lethal or extremely hazardous to people.
- **CAUTION:** Indicates an unsafe condition except as defined for **DANGER**.
- **Warning:** Indicates possible damage to a program, device, or system.

The following **DANGER**, **CAUTION**, and **Warning** notices accompany various procedures throughout this manual.

DANGER

Before starting any procedure, be sure that the control unit is completely powered off and that the power cord plug is removed from the building power receptacle.

DANGER

Input voltage is present in the On/Off switch housing when power is turned off ( /  switch in the  position).

DANGER

You must reconnect the green-yellow wire to ground (removed in step 6).

DANGER

The battery may explode if recharged or disposed of in fire. For recycling the battery, follow local procedures or return it to IBM.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

DANGER

High voltage may be present at the capacitor terminals F.

DANGER

If the part number of your power supply is 5699477 or 5699478 (located on bottom of housing cover), the power supply card may hold a stored charge. Discharging may be done as follows:

- Attach a jumper, first to CR13(K), then to resistor R5, as shown in Figure 4-6, Details 1 and 2.
- Allow 5 seconds for complete discharge.
- Remove jumper.

CAUTION



Safety glasses must be worn when performing removal and replacement procedures.

CAUTION

The motor case becomes hot after continuous use.

Warning: When the board is in the service position, the card/connector rows (1, 2, 3, 4, 5, 6) are inverted. Be careful when identifying the correct position of any card or connector.

Warning: Pluggable ROS modules 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 machine frame before handling ROS modules.

Warning: Do not attempt to remove the collet/flat spring  before removing the bail . Too much pressure or binding can damage the spring.

Warning: The head/carriage assembly is adjusted and tested at the factory. Do not attempt to adjust or repair any part of this assembly.

Warning: The head/carriage service check must be performed with the diskette drive installed (or with the diskette drive in the same position as when installed) or the adjustment might not be accurate.

Warning: The head/carriage assembly adjustment must be performed with the diskette drive installed (or in the same position as when installed), or the adjustment might not be accurate.

Warning: When the stepper motor pulley is tightened by the clamp screw, ensure that the pin located on the back of the stepper motor pulley remains within the cutout slot on the casting.

Warning: Band **C** must not be bent or damaged in any way.

Warning: When you install the head/carriage assembly, ensure that a strip of clean paper is between the diskette drive heads to protect them during installation; also, ensure that the bail is under the headload arm. Ensure that the bail return spring is correctly installed. Ensure that the band is not damaged in any way.

Warning: Do not let the solenoid plunger and cable turn while you make this adjustment.

Warning: Ensure that the heads do not touch each other when the bail is removed from under the head load arm.

Warning: The stepper drive band **J** assembly can be easily damaged. Do not bend, crease, or scratch the band.

Warning: The band **L** is easily damaged **T**. Do not bend, crease, or scratch the band.

Warning: Be careful not to damage the control card.

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Chapter 1. Introduction

1.1 General

This manual provides the information needed by the Product Customer Engineer to maintain the 3274 Control Unit Model 61C as follows:

Interface — Remote SDLC/BSC

Memory Size — 192K

Host Adapter — CCA/HPCA

File — 51TD

Device Capability — 16

Features — EMI, V.35, DDSA, Loop X.21 (Sw/Non-Sw), X.25, Encrypt/Decrypt, Response Time Monitor (RTM)

Entry to and use of the MAPs and the Maintenance Procedure should result only from performing the steps of the Subsystem Problem Isolation Procedure. This information starts on page 2-6. Specific procedures are listed in the left column, supplementary notes are given in the second column, and 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), a cable, or a connector. If the problem cannot be isolated and repaired by performing the Subsystem Problem Isolation Procedure with the associated MAPs, the Symptom/Cause Index, or the 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 involves performing the Subsystem Problem Isolation Procedure. The steps in this procedure can be followed sequentially or individually, depending on the known failure information. These steps are as follows:

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 (LED indications) of the 3274 when a problem is encountered.

Steps 2–9

Steps 2 through 9 may be performed sequentially or individually. If the problem is encountered during these steps, you will be directed to a FRU replacement figure (chart, system/cause index, MAP, or Maintenance Procedure).

When the problem has been isolated and repaired, the machine must be checked for 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 — Type A adapter, driver/receiver check, and Tests 0, 1, 3, 4, and /B

Step 6 — Operational Indicator check

Step 7 — Display symbol/error suffix check

Step 8 — Host tests

Step 9 — Voltage checks

Step 10

If the problem was not encountered during Steps 2 through 9, perform those steps once more. If the problem is still not encountered, go to Step 11.

Step 11

Step 11 is used when problems have occurred because of customization, new installation, or feature update (MES). This step is usually entered directly; the repair concept is similar to that outlined in Steps 2 through 9.

Step 12

Step 12 will familiarize you with the options to be used such as MCM, dump diskette, and other online problem determination. If this list does not assist in isolating and repairing the problem, Step 12 directs you to request assistance. This assistance should be the support structure and/or local assistance. Local assistance may consist of data searches, diagnostic assistance, and/or on-site assistance.

The first step will normally be a data search (if data is available). Diagnostic assistance may be performed by the support structure and/or locally. The method used should be one that will result in the quickest resolution of the problem. Initial on-site assistance will usually be local.

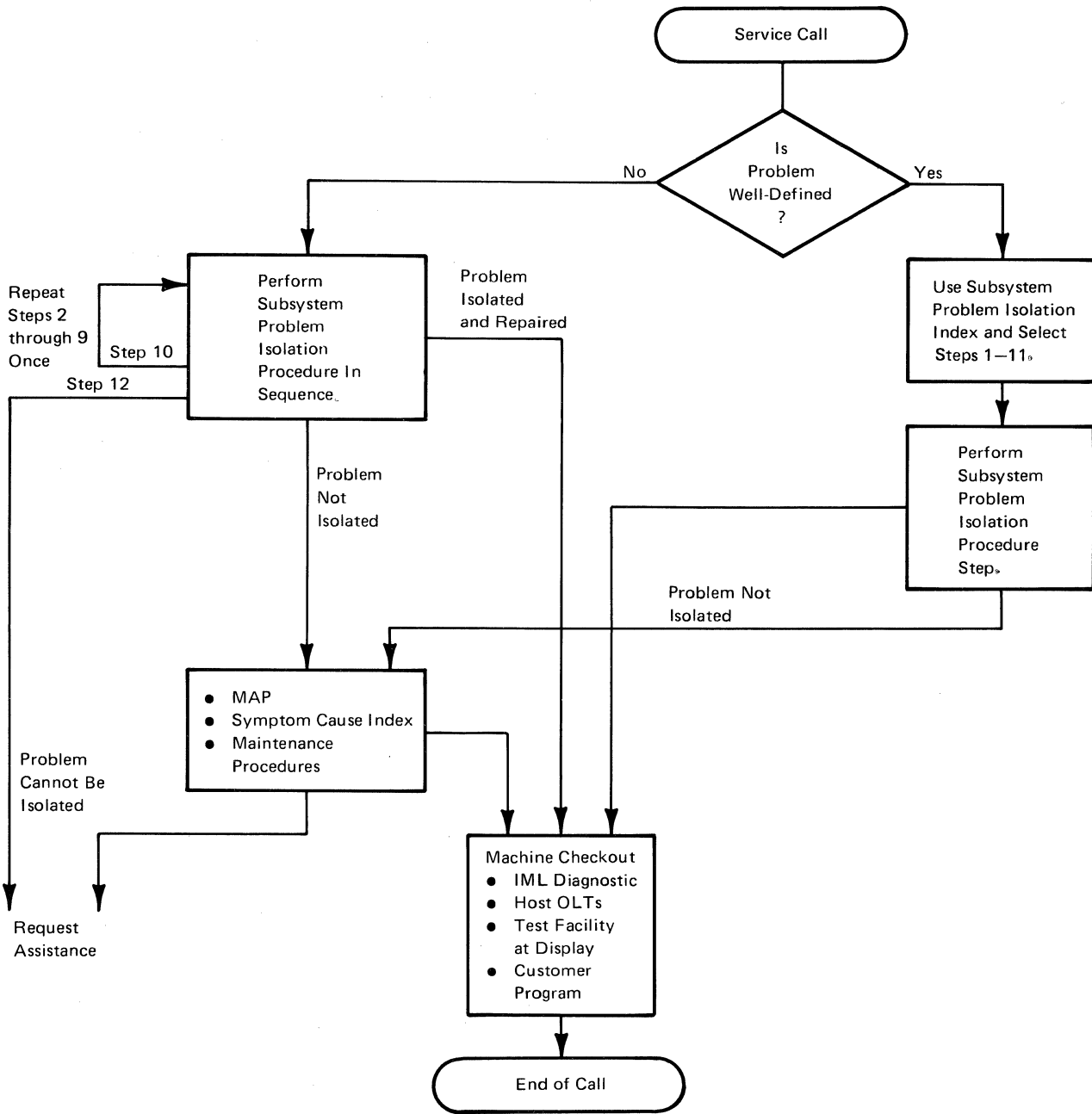


Figure 1-1. Maintenance Approach

IBM® 3274 Control Unit

Problem Report Form

Please fill out this form before requesting service.

1. Are all attached terminals failing? YES NO
 If "NO" is checked, please identify all failing terminals:

2. Check any of the following symbols that are displayed in the operator information area of any failing display terminals:

Subsystem Ready 4

Host Connection A or B

If one of these three symbols is displayed, please insert the 3-digit code following the symbol.

Communication Problem 123

Machine Check Problem 456

Program Error PROG

- 3a. 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

 All Off

- 3b. If the 3274 has the Loop Attachment, record the status of the Loop Indicators (check which indicators are on).
- External OK External Check Machine Check

4. 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

5. 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

 All Off
 Never Flashed

6. Comments (record any other symptom): _____

Address comments concerning this form to IBM Corporation, Department 52Q, Neighborhood Road, Kingston, New York 12401

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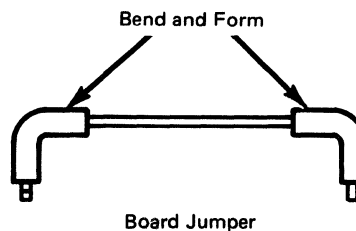
Figure 1-2. 3274 Problem Report Form, Sample

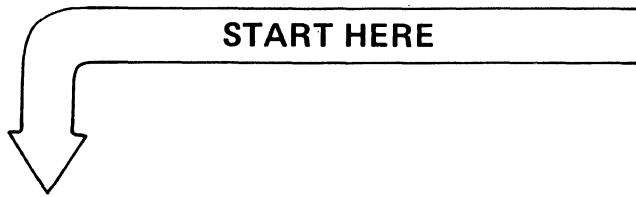
1.3 Additional Maintenance Considerations

Some points to consider when servicing the 3274:

1. Ensure that all cards and cables are plugged securely and that the fans are running.
2. Once you have made an adjustment or replacement, verify the repair using tests such as:
 - IML Diagnostics
 - Host OLTs
 - Display online tests (/0, XX/1, /3, /B)
 - Customer's Program
3. Control Logic card E2 contains a pluggable module, while the replacement card may not. Always reuse this part.
4. If you exchange an FRU and it does not correct the problem, always return the original FRU to the machine.

5. Always switch power off before removing cards, cables, etc., or damage to a card may result.
6. Be careful not to damage cards D2, D4, and E2 by electrostatic discharge when handling. Refer to Chapter 4, paragraph 4.2.
7. When experiencing a host communication problem, be sure the customer has run the self-test, the wrap test, and the line test.
8. When jumpering board pins that are located under the power supply, bend and form the jumper to prevent damage to board pins.





Chapter 2. Subsystem Problem Isolation Index

Summary of Steps

The following summarizes the steps in Chapter 2.

Note: It is necessary to ensure that the IML diagnostics run successfully before performing any step beyond Step 4.

If the problem is well-defined, use this index to select the appropriate symptom. You will then be directed to the proper step in the isolation procedure. If the problem is not defined, go to Step 1, page 2-6.

POWER TEST

The On indicator
is not on, or.
the 8 4 2 1 indicators
are always onGo to Step 2.

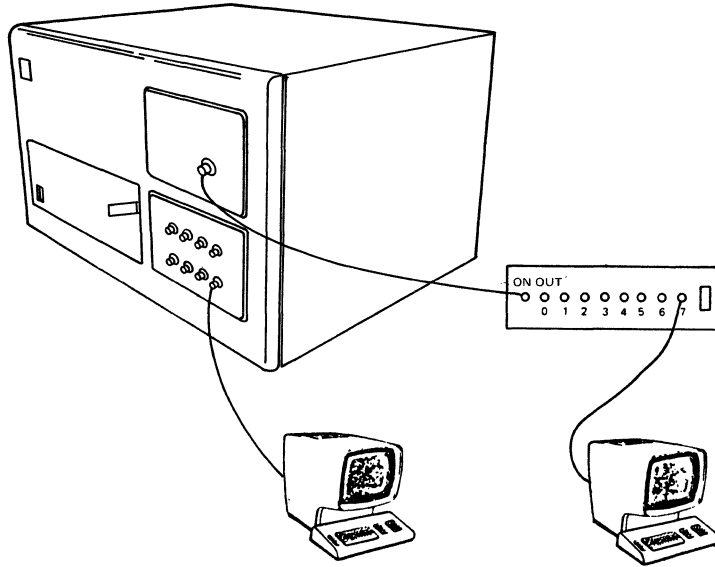
BUS TEST

If the 8 4 2 1 indicators
did not turn on when the
IML pushbutton was held,
or they did not all turn
off when the IML pushbutton
was releasedGo to Step 3.
(The Power On indicator
must be on.)

IML

If the 8 4 2 1 indicators did
not sequence to a normal
ending (0000) after the IML
pushbutton was depressed.Go to Step 4.
(The Power On indicator
must be on and the bus
test must run
successfully.)

DEVICE



The 3274 is failing to communicate with the attached devices, a device(s) is "hanging up" there are lost operations, or there are coax problemsGo to Step 5.



Note: The IML diagnostics must run successfully.

OPERATIONAL INDICATORS

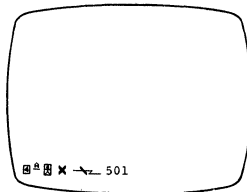
After an IML, any machine checks will light the 8 4 2 1 indicators with a codeGo to Step 6.

Note: IML diagnostics must run successfully.

DISPLAY SYMBOLS

Any \times  \times  , or \times PROGnnn code indicatedGo to Step 7.

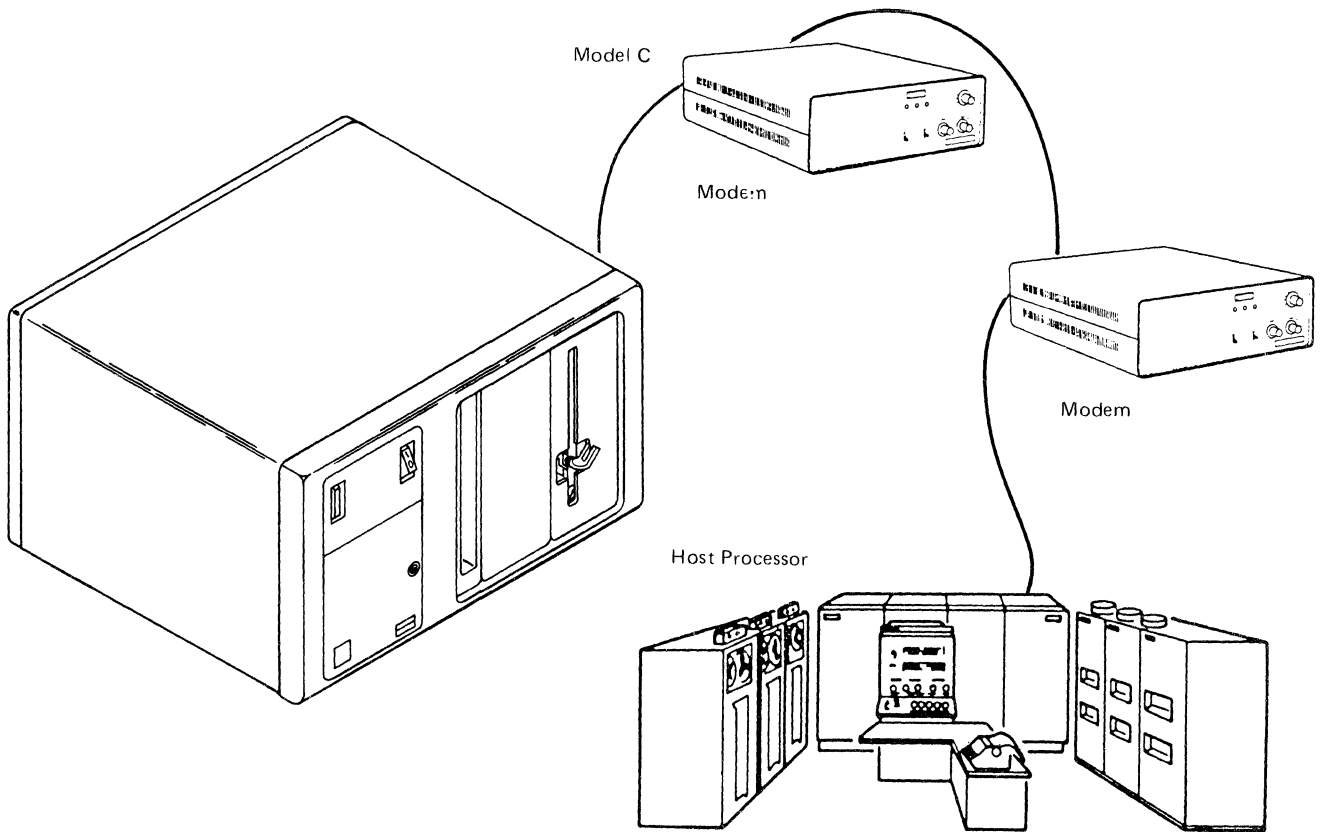
Note: IML diagnostics must run successfully.



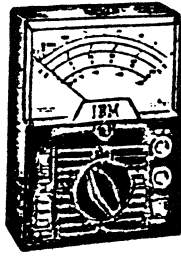
HOST

If the host is recording
timeouts, datachecks,
operational checks;
unit checks, command rejects,
or interface checks. Go to Step 8.

Note: IML diagnostics
must run successfully.



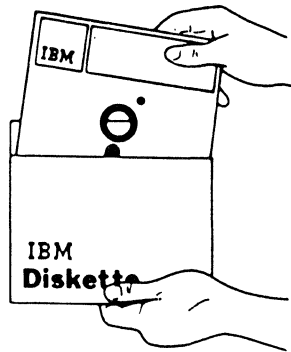
VOLTAGE
CHECK



.....Go to Step 9.

Note: IML diagnostics
must run successfully.

CUSTOMIZING



- New installation
- Feature update (MES)Go to Step 11.

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Procedure

Subsystem Problem Isolation Procedures

Step 1 – Start

- Note the following information before proceeding:
- If a problem is encountered during installation or customization, or after installing a Miscellaneous Equipment Specification (MES), go to Step 11.
 - If one or more devices are failing within a coax port group (0–7, 8–15), go directly to Step 5.

Step 2 – Power Test

- If the 3274 is off, turn it on.
- If the On indicator is off, go directly to Power MAP D120.
- If all the Operational Indicators (8 4 2 1) are on, go to the IML Failure Index, MAP D30. See Bus Test symptom. All 8 4 2 1 indicators are on.

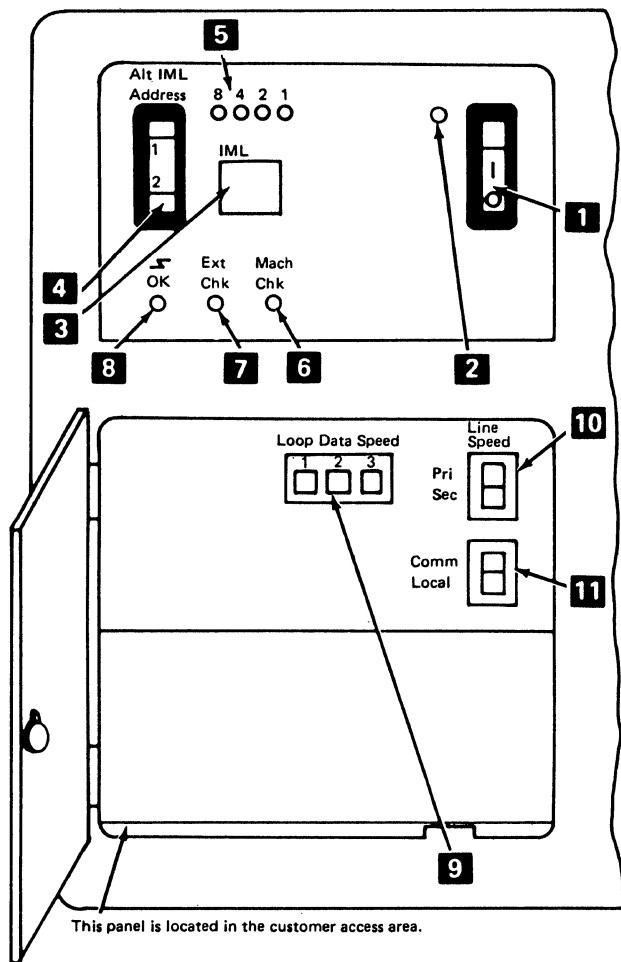
Notes

It is not necessary to perform the isolation procedure in sequence if the problem is well-defined. Instead use the Summary at the beginning of this chapter to direct you to the proper step.

Follow this problem isolation procedure if the problem is not clear, until you have fixed the problem or have gone through the procedure twice. Go to the next step if the step you are performing does not fix the problem or does not apply. If you cannot correct the problem or are in a repetitive loop, request assistance from the next level of the support structure. Verify a fix by using IML, host OLTs, test facility 0, 1, 3, or B, or the customer's program.

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

During the IML function, all terminals attached to the 3274 are disabled. The power-on or IML destroys all stored current log information.



Ref Description

- 1** On/Off Switch: = On; = Off.
- 2** On indicator: Indicates the 3274 is on.
- 3** IML (Initial Machine Load) pushbutton: Pressing and holding causes a bus test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded.
- 4** Alt IML Address switch:

Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Can sometimes be used after normal IML fails.

Note: The operational code may not be loaded unless the IML tests have sequenced to the start of test 0010 (the disk drive will click) at least once.

Position 2: Holding, while pressing the IML pushbutton, invokes the adapter and wrap tests.

Ref Description

- 5** 8 4 2 1 indicators: These light 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.
- 6** Loop Machine Check Indicator: Indicates problems internal to the 3274. See Note.
- 7** Loop External Check Indicator: Indicates errors external to the 3274.
- 8** Loop \overline{OK} (Line Ready indicator): Indicates that a valid message was received within the last 8 seconds.
- 9** Loop Data Speed switches: Used to assign the primary and secondary line speeds (up is *on*, down is *off*).

Loop Carrier Speed (bps) ⁴	Line Speed (bps) ³		Loop Data Speed Switch Settings		
	Pri	Sec	1	2	3
9600 ¹	9600	4800	Off	Off	Off
9600 ¹	9600	2400	Off	Off	On
9600 ¹	4800	2400	Off	On	Off
9600 ¹	2400	1200	On	Off	Off
38,400 ²	38,400	Not used	Off	Off	Off
38,400 ²	9600	Not used	On	Off	Off

¹ Data-link-attached loop
² Directly attached loop
³ Line speed must match speed of loop controller.
⁴ Loop carrier speed should also be set on loop card K2 and must match speed of loop controller. See Figure 5-11.

- 10** Loop Line Speed switch: Used to select the primary or secondary speed as shown in the table above under "Line Speed (bps)".
- 11** Loop Local/Communication switch: Used to isolate problems on the loop. In the Local position, the 3274 is disconnected from the loop; in the Comm position, the 3274 is connected to the loop.

Note: If the I/O cable is not attached to the LSC connector, the machine check indicator will light after the IML Op Code is loaded. This is not a machine problem.

Figure 2-1. 3274 Control Panel with and without Loop Attachment

Procedure

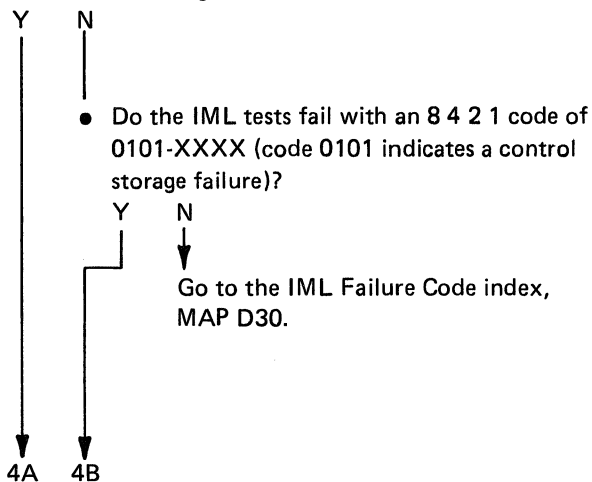
Step 3 – Bus Test

- Run the Bus Test by pressing and holding the IML pushbutton On.
- If the Bus Test fails, go to the IML Failure Code index, MAP D30.

Step 4 – IML Tests

- Run the IML Tests by momentarily pressing the IML pushbutton. First be sure the system diskette is inserted and the operator handle is closed.

- Were the IML diagnostic tests successful?



Go to page 2-10.

Notes

A successful Bus Test is indicated if all the Operational (8 4 2 1) Indicators are on while the IML pushbutton is pressed and held, and all the indicators go off when the IML pushbutton is released.

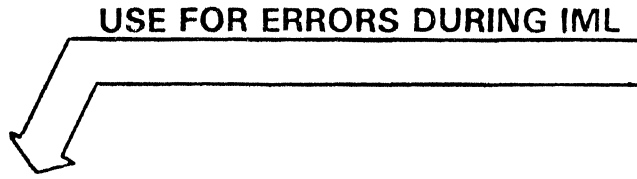
The IML tests run automatically when the 3274 is powered on or when the IML pushbutton is pressed and released. During the tests the Operational (8 4 2 1) Indicators should sequence 0001, 0010, 0011, etc., ending with all Operational Indicators on. The indicators remain on as the operational code is loaded and go off when it runs successfully.

All attached and ready display terminals should display a **4** in the Operator Information Area.

A failing code usually flashes continuously, but may flash for 5 seconds and then alternate with another code for 3 seconds. These codes can occur any time during the running of the diagnostic tests and the loading of the Operational Code.

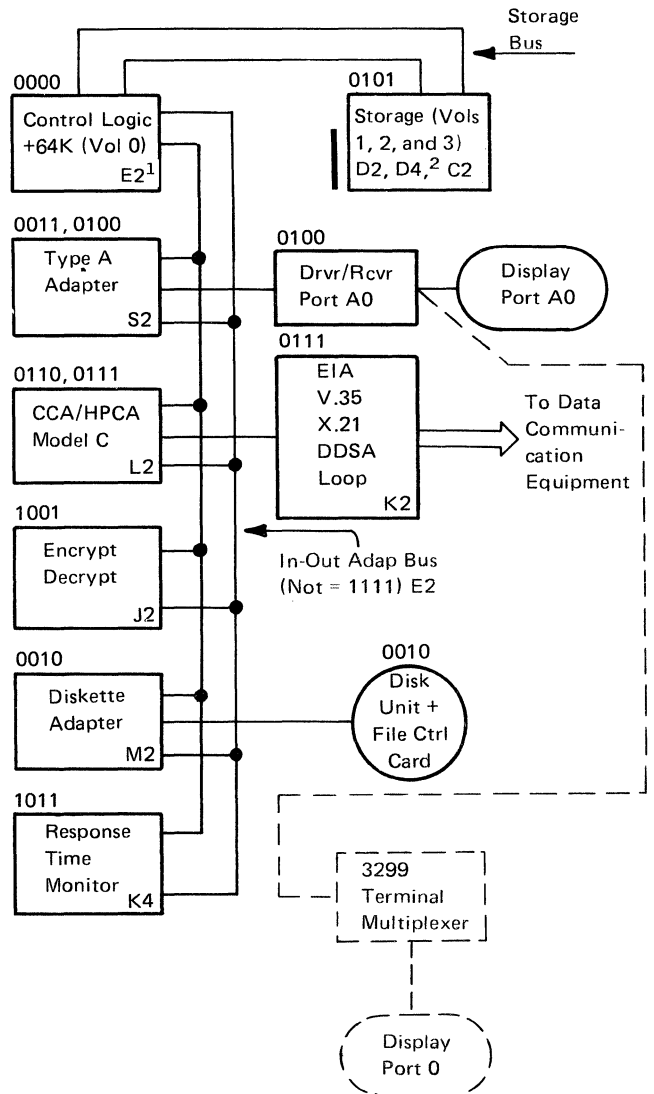
The 0101 code will flash for 5 seconds; another code representing additional card codes will be displayed continuously for 3 seconds. These codes will be displayed repeatedly.

Reference



Fail Code	FRU/Cards	Test Function
Bus Test Not = 1111	E2, ¹ S2, M2,(D2-D4), ² C2, L2, A3, K2, K4, and J2	Control logic in-out bus to adapters
0000	E2, ¹ S2, M2, A3	Control logic and ROS pre-test
0001 ³	E2, ¹ (D2-D4); ² C2, K4, S2, A3	Control logic, ROS and 64K storage (Vol 0) complete test
0010 ³	M2, Drive and card, E2, ¹ Diskette, J2	Disk drive and adapter
0011 ³	S2, T2, L2, E2, ¹ M2	Type A adapter
0100 ³	S2, T2, Device at A0, 3299	Type A adapter and display at port A0; 3299 TM
0101-XXXX ⁴	(D2-D4), ² C2, E2 ¹ (See Figure 2-3.)	Control storage, file
0110-XXXX ⁴	L2, J2	Host Adap—CCA/HPCA
0111-XXXX ⁴	K2, L2, Modem	Modem wrap—if customized
1001 ³	J2	Encrypt/Decrypt
1010 ³	Diskette	Diskette read error—after test 0010
1011	K4	Response Time Monitor Adapter
1101 ³	-----	Uncustomized diskette—end code
1111 ⁵	Diskette, E2 ¹	Operational code not loaded
1001-1110 ⁶	See Figure 2-3.	3274 does not have required storage. Using uncustomized diskette or performing ALT 1.
1001-1010 ⁶	-----	Improper diskette applied to other 3274 models.

¹Older E2 cards may contain a pluggable module. This module can be easily replaced if defective, or can be removed from an otherwise defective card and reused. New E2 cards do not contain the pluggable module.
²The storage configuration may use either one or two cards in these locations.
³This code is usually flashing.



⁴This code is usually flashing, but may also be displayed alternately as a flashing code and a continuously displayed code.
⁵This code is displayed continuously.
⁶These two codes alternate on and off.

Figure 2-2. IML Diagnostic Codes and Block Diagram

Procedure

4A 4B (Cont)

- Check the 3274 indicators or the display attached to Port A0 for the Storage Card Failure code.
- Replace the storage card as indicated in the code conversion chart, Figure 2-3.
- If this is a new installation or a recustomization, verify that the 3274 Configuration Response Number, (113), agrees with the Configuration Data Card and with the actual 3274 storage capacity (see Figure 2-3 and Step 11).
- Replace the other control storage cards that were not indicated with a display code. See Figure 2-3.

Was the Operational Code loaded successfully?

Y

N

Go to Step 6.

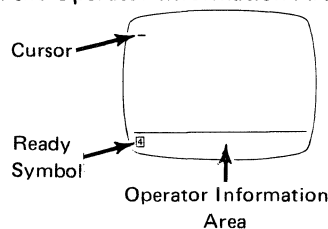
Go to Step 5.

Notes

The Configuration Data Card is stored in the 3274 access door pocket.

If the operational code detects a failure, a failure code will appear in the 8 4 2 1 indicators, after the Operational Code is completely loaded (all indicators off). The indicators may either continuously or alternately display this code.

After a successful loading of the Operational Code, all terminals attached to the 3274 that are Ready should display a **4** in the Operator Information Area.

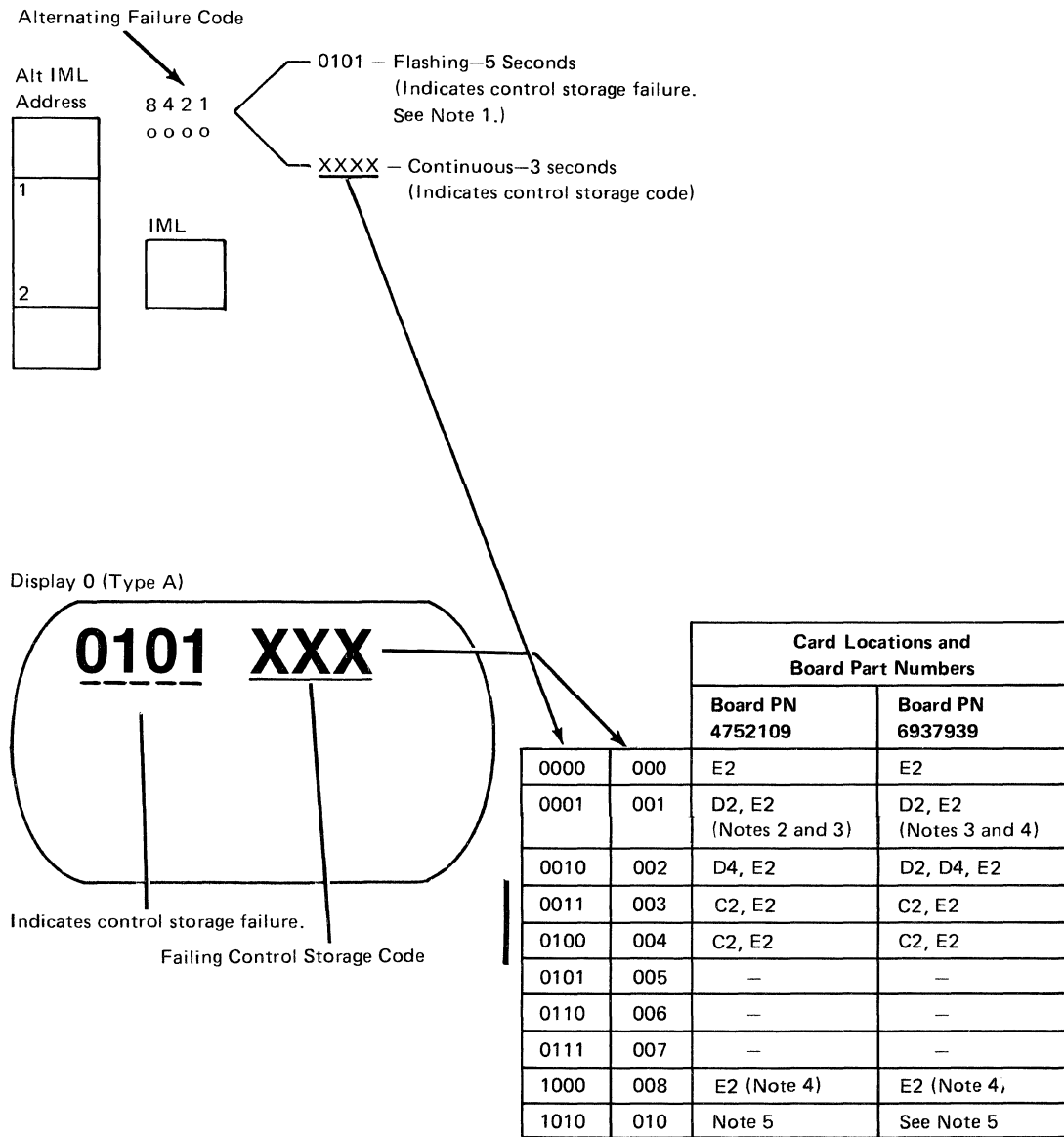


A Normal Display in the Ready State

3290 Display Sequence

1. When the 3290 is turned on, the Basic Assurance Test (BAT) starts and the BAT sequence numbers (binary) appear in the Operator Information Area. If a failure occurs, additional numbers may appear in the Operator Information Area. The correct end code is equal to 1000.
2. When the BATs are completed and the 3274 is Ready with the proper load diskette inserted, communication with the 3274 is established and a **4** will appear in the Operator Information Area.
3. Microcode loading from the control unit starts. If a routine number remains displayed for more than 30 seconds, it indicates a failure in that routine. Test numbers will then appear in the Operator Information Area.
4. When the microcode loading is completed, a **4** (a <2> if previously in setup mode) will appear in the Operator Information Area. The time between power on and the appearance of the **4** should not exceed 2 minutes.

Reference



Model Type	Configuration Response 113	Volume	04	03	02	01	00
			Note 7				
		Location	C4	C2	D4	D2	E2
61C	DA	192K (Base)	—	—	64K	64K	64K
			—	—	128K		64K
61C	DC	256K (X.25)	128K		128K		64K

1. A flashing 0101 code indicating a control logic card (E2) failure.
2. Verify that a 128K (4x3) storage card is not installed in location D2.
3. Older E2 cards may contain a pluggable module. This module can be easily replaced if defective, or can be removed from an otherwise defective card and reused. New E2 cards do not contain the pluggable module.
4. Verify that card E2 (PN 6062383) is not installed in combination with a 128K (4x3) storage card.
5. Invalid address failure. Verify that the storage card is not installed in location A4.
6. Failure of the file adapter card M2 or of the disk drive occurred during IML storage test 0101.
7. Volume 4 (64K) not used.

Figure 2-3. Storage Card Codes, Configuration 113 Codes

Procedure

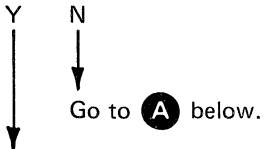
Step 5 – Device Adapters—Driver/Receiver

A. Analyzing Attached Device Failures

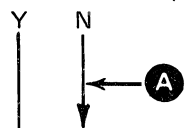
If failure information is unknown and at least one attached display is functioning, run Device Summary Test 3 and Device Log Test XX/1. See Step 5, E.1, before continuing.

B. Category A Device Failure

Is a 3299 Terminal Multiplexer attached via the device panel? See Figure 2-6.



Are the Failing devices attached to the same 3299 Terminal Multiplexer?



B.1 All devices are failing

- Replace Type A Adapter card S2.

B.2 One or more devices are failing within a coax port group (0–7, 8–15, etc.):

- If this is a new installation, a missing Displayed Device Ready 4 or a missing downstream load , initiated at a 3290, (Operator Information Area) may be caused by Customization Response 112, 116, or 117 (number of terminals attached).
- See card locations in Figure 2-4 and replace the Driver/Receiver card associated with the failing port group.
- Replace Type A adapter card S2.
- Reseat the Driver/Receiver cable in the V-row associated with the failing port group.

Go to Step 5, D.2.

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.

Error log tests can be used to verify most repair actions. See Step 5, E.1 through E.4.

Determine the I/O panel coax port location for the failing device or devices. See the Customer Device Cable Attachment Form or run Test /3.

The Driver/Receiver Type A adapter card must be compatible with or without the terminal multiplexer attachment. See Figure C-2.

Reference

The Device Error Logs should be helpful in defining or verifying a device problem and to verify most repair actions taken in Step 5. The following tests can also be used:

Note: Error log information is lost if the 3274 is powered on or if an IML is performed.

Test 0 – Use this test to transmit a display pattern and to check the communication path between the 3274 and its attached devices.

Test XX/1 – Use this test to display error log information associated with one coax port location. (XX = Port Address).

Test/3 – Use this test to display the summary status of all configured devices for all attached 3274 port locations.

Test/4 – Use to reset Test 1 error log information.

Test/B – Use this test to display the Device Address Assignment Table. The test will run if the individual port assignment table was used during customization (Responses 116, 117).

Log test information is located in Step 5, E.1 through E.4.

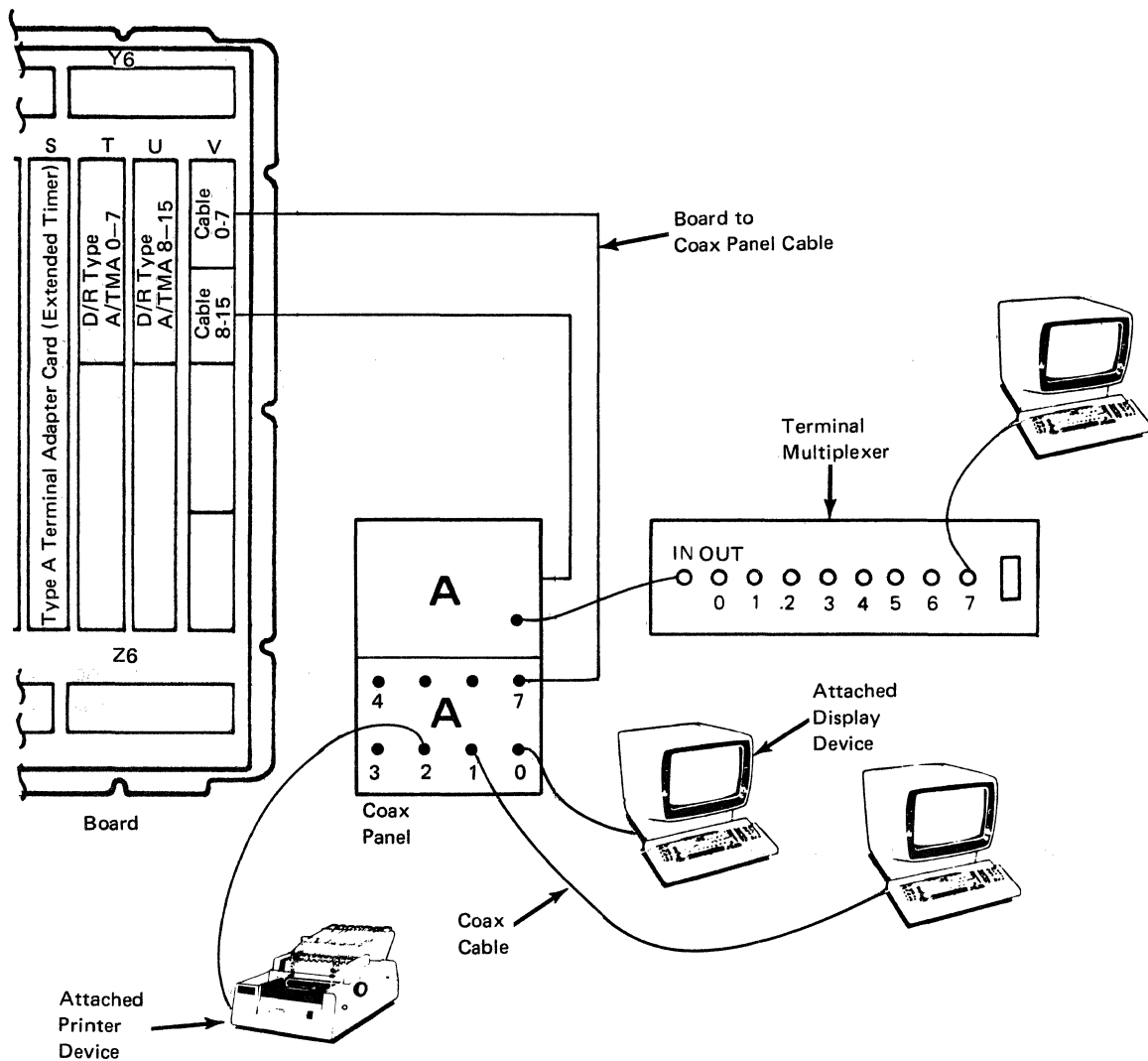


Figure 2-4. Type A Card, Device, Cable, and Panel Locations

Procedure

Step 5 – Continued

C. Isolation Procedure for a Single Device Failure

- Exchange the coaxial cable from the failing device location with one from a known working location at the 3274 coax panel.
- Turn device power off, then on.
- Retry the failing operation or run the Test 0 test pattern.

D. Isolation Procedure for a Coax Problem

- If possible, exchange the suspected coax cable with the cable at a known working port location.
- Turn device power off, then on.
- Retry the failing operation or run the Test 0 display pattern.

Note: Perform Step 5, D.1 and D.2 to isolate a cable problem.

D.1 DC Resistance Test (to attached device or 3299 Terminal Multiplexer input). See Figure 2-5 **B**.

- Power does not have to be turned off on the 3274, the attached device, nor the terminal multiplexer.
- Disconnect the cable from the 3274 coax panel or the 3299 Terminal Multiplexer output **A**. Measure the resistance from the center pin of the connector, on the cable end, to the outer case of the connector. Use the RX1 range on the meter.

Is the resistance between 1 and 250 ohms?

Y N

|
|
|
|
|
|
|
|
|
|
|

- If the resistance is too high or infinite, check for an open or a faulty connection.
- If the resistance is zero, check for a signal-to-shield short.

● Power does not have to be turned off at the 3274 or 3299.

● Reconnect the cable at the 3274 or the 3299.

Notes

Coax cables to the same type of device can be interchanged (3278 for 3278, 3287 for 3287, etc.) to assist in problem isolation. A device POR is required, after the cables are interchanged, for the control unit to recognize the change. For display set the Normal/Test switch to Test, then back to Normal. (On 3290 displays, turn power off, then on, and wait up to 2 minutes.)

To isolate a display coaxial cable, check for the Ready symbol 4 (for 3290) in the Operator Information Area.

Warning: When swapping device cables and the devices are different or the screen size or features are not the same, addressing problems may occur that can affect system operation.

It is possible to have unassigned ports if port addresses were configured individually. Run the /3 test; check for x in line 2. See Figure 2-9.

The coax signal and shield are transformer coupled at the device and terminal multiplexer driver/receiver.

The presence of 3274 driver/receiver signals will not affect the test.

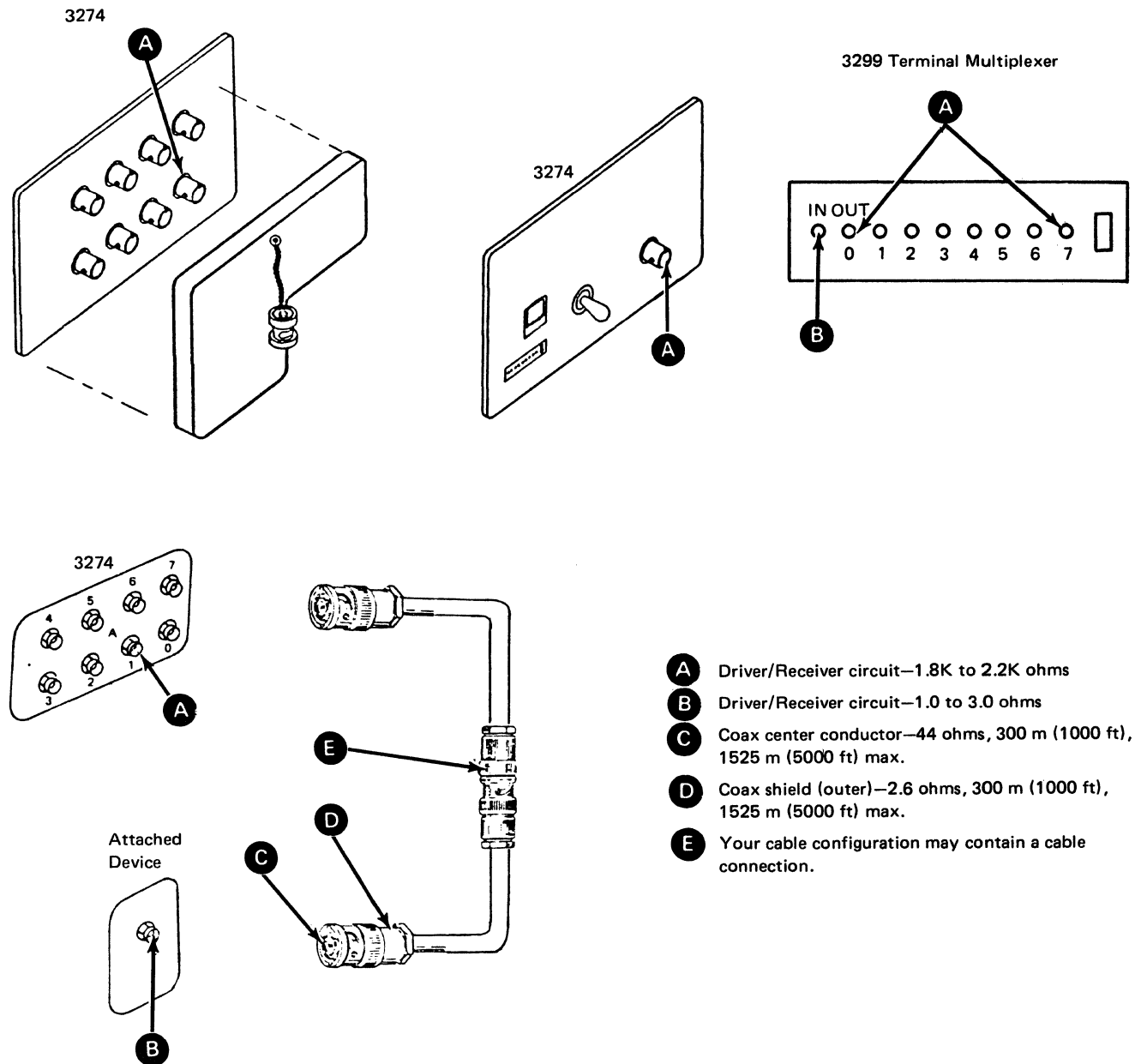


Figure 2-5. Coax Cable (Driver/Receiver) DC Resistance

Procedure

Notes

Step 5 – Continued

- D.2 DC Resistance Test (to the 3274 or the 3299 Terminal Multiplexer output. See Figure 2-5 **A**).

Disconnect the coax cable from the attached device or the 3299 Terminal Multiplexer **B**. Measure the cable resistance again, but at the device cable end, using the RX100 range on the meter.

Is the resistance between 1.8K and 2.6K ohms?

Y
|

N
|

Resistance higher than 2.6K ohms indicates an open cable, a bad cable connector, a defective 3274 driver-receiver card, or a defective 3299 Terminal Multiplexer. If zero, check for a signal-to-shield short.

- Reconnect the cables at the device or at the 3299.
- The dc cable resistance test may not detect a connector defect such as low resistance in the range of 200-300 ohms unless the exact cable length is known. The reflective sine wave test in the *3274 Models 51C and 61C Maintenance Concepts Manual* (SY27-2528) should help detect this defect.

If one or more devices are still failing, check the driver/receiver cables at V2 and V3 for defects. See Figure C-5.

End of device isolation procedure. Go to Step 6.

D.3 Terminal Multiplexer Description and Maintenance Procedure

The existing 3274 requires a coax for each attached device. The terminal multiplexer design allows eight devices to share a single coax terminal without modifying the device. See Figure 2-6.

- Any category A device can be attached to the terminal multiplexer.
- The maximum cable length is 1525 m (5000 ft) from control unit to terminal multiplexer and 1525 m (5000 ft) from terminal multiplexer to device for an overall length of 3050 meters (10,000 ft).

The terminal multiplexer is a repair center product and is not to be serviced on site by the CE. Problem determination involving the terminal multiplexer is the responsibility of the customer. This maintenance procedure has been included to assist you in doing subsystem problem determination when a terminal multiplexer is involved.

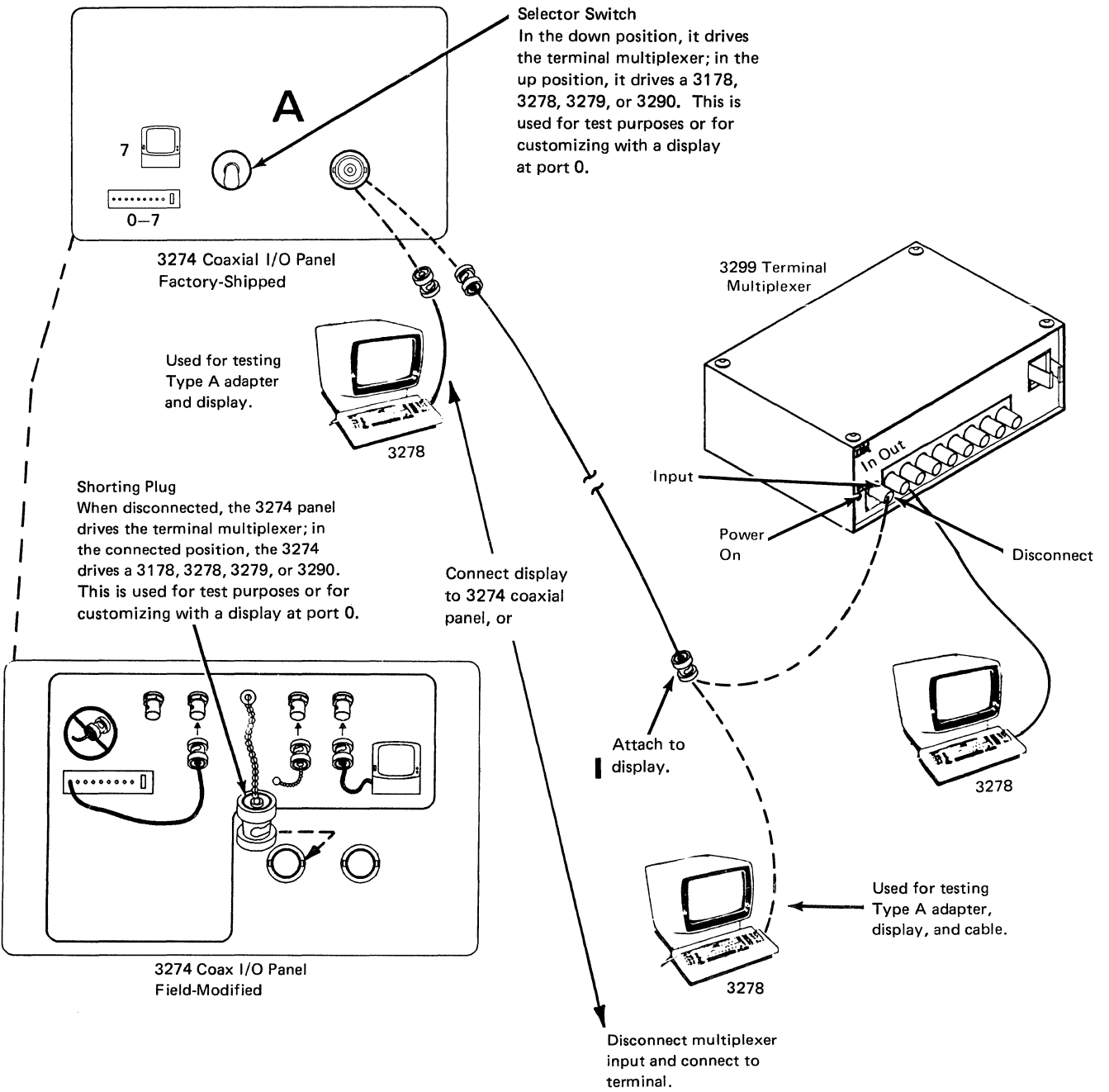


Figure 2-6. Terminal Multiplexer Attachment

Procedure

Step 5 – Continued

- If more than one device on the terminal multiplexer fails:
 1. Ensure that the selector switch on the 3274 coax I/O panel is in the multiplexer position (Down), the shorting plug is not connected, all cables are plugged into their proper positions, and the 3299 power light is on (red).
 2. Ensure that the terminal multiplexer has been swapped with a known good one or that a single display device has been tested on the 3274 I/O panel. These steps are the customer's responsibility. See Single-Device checkout.
 3. If a single device checkout fails on the 3274 I/O panel, the 3274 is probably at fault. See Step 5, B.1, for repair procedure.
 4. a. If Device Ready symbol **4** is not displayed, or coax parity errors or timeouts are encountered and normal repair procedures have not been effective, ensure that the correct part number for the Type A Adapter S2 and driver receiver cards are installed to support the terminal multiplexer. See Figure C-2.
b. Also replace the driver-receiver card associated with the failing port group (0–7, 8–15, etc.). See Figure 2-4.
- If a single device is failing on the terminal multiplexer, exchange the coaxial cable from the failing device location with one from a known working location at the terminal multiplexer. Isolate between device, coax cable, or terminal multiplexer.

To isolate a failing 3299 Terminal Multiplexer, see Single-Device checkout, (Notes column). To isolate a defective coaxial cable, follow procedure starting at Step 5, D.

End of Device Isolation Procedure. Proceed to Step 6.

E. Device Attachment Test Facility

Use the device attachment tests to verify repair actions, to monitor error counts, and to help find intermittent device-related problems. The following tests are used to support Step 5 (tests cannot be run from a 3290):

*XX/0

*XX/1

*/3

*XX/4

*/B

XX = Port Address

Notes

Single-Device Checkout:

1. Attach a known working 3278/3279 Display to the 3274 coax panel or to the cable from the terminal multiplexer input jack.
2. Set the coax panel switch to the Up position, or connect the shorting plug.
3. At the display (3278/3279), set the Normal/Test switch to Test, then back to Normal, or perform a power-on reset.
4. Test the port location for proper operation by checking that the Device Ready Symbol **4** is displayed. If it is displayed, the 3299 or its input cable is failing. If it is not displayed, the 3274 is failing. During testing of a display connected to the 3299 end of the coaxial cable, the cable is also being tested.
5. If more than one 3299 is attached, coaxial cables at the 3274 can be interchanged to assist in 3299 failure isolation. A device POR is required after the cables have been interchanged for the 3274 to recognize the change.

Warning: When swapping 3274 panel cables and the devices are different or the screen size or features are not the same, addressing problems may occur that could affect system operation.

It is possible to have unassigned ports if port addresses were configured individually. Run the /3 test; check for x in line 2. See Figure 2-9.

Reference

Assume that, after the repair of a device, Test /0 has run successfully and the repair is verified. This could be followed by Test /3 which monitors the composite summary status of all attached devices. Assume that another device is indicating a status of 1 to 10 coax errors. At this point, Test XX/1 could be run for additional information on that failing port.

The indicated number of errors can be reset to zero by running Test XX/4 to reset the error count and not disrupt the system network. Resetting the count is an aid in trying to find intermittent problems or counting the number of errors that occurred within a specific time period.

Procedure

Step 5 – Continued

E.1 Test 0 – Communication Path Test and Display Test

- This test is used to verify a repair and to indicate which port the display is attached to.

Warning: Be extremely careful not to route a test pattern to an operating terminal location.

To request Test 0, do the following at any display except a 3290:

1. Press and hold ALT; Press Test to enter Test mode.
 2. Ensure that the cursor is at location zero. Enter the following:
 - The device number you wish to test, using any two-digit number from 00 to 31.
 - A slash (/).
 - A zero (0).
 - Press the Enter key.
 3. The pattern shown in Figure 2-7 will appear on the screen if the test was successful.
- If Test 0 is failing, start at Step 5, B.2, to isolate the problem.

Notes

Test 0 causes a test pattern to be returned from the 3274 to the requesting display. It also allows a test pattern to be sent from the 3274 to a display.

Success or failure of this test is displayed on the requesting display device as follows:

Note: If the selected device is a 3290, the Test 0 display pattern will not appear; all other results will appear normally. Test results will be similar to those obtained with attached printers.

The test message you entered followed by a: +, -, or 0.

+ = Test successful or path OK.

- = Test failed, device disabled because of error.

0 = Test not run, device powered off, or improper customization for sequence numbers 112 or 116, 117 for displays, and 022 for printer authorization matrix.

The minus function (X-F) is returned if Test 0 was directed to another display that was in session or was in a time state.

If no device is specified when the test is requested, an automatic default to the requesting device occurs.

NN = The port number of the terminal that requested the test.

Reference

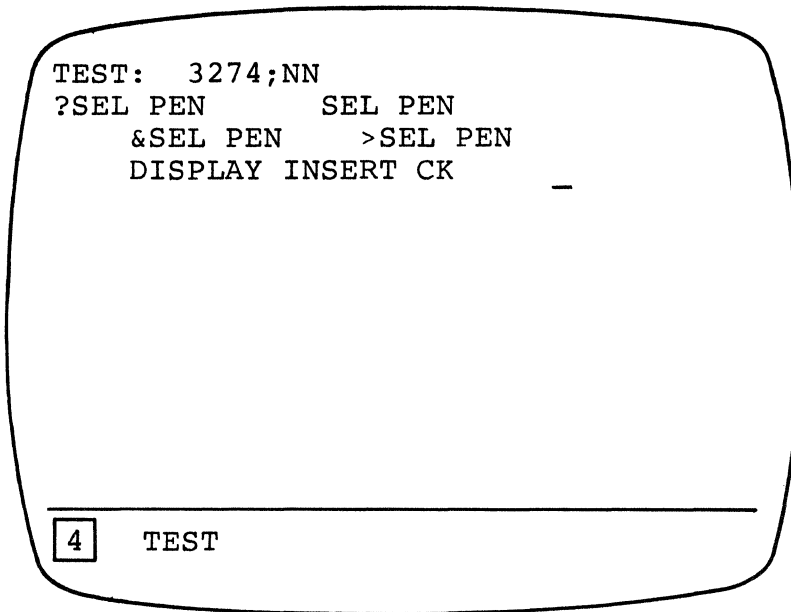


Figure 2-7. Test 0 (Path) Display Pattern

Reference

```

Line 1      01/1
Line 2      0000 0000 0000 0000
Line 3      0000 0000 0000 0000 0000 0000

          4 TEST
  
```

The format is:

```

Line 1      XX/1
Line 2      2233 4455 6677
Line 3      CCDD EEFF GGHH JJJJ KKKK KKKK
  
```

```

Line 1
XX      Port Number
1      Test Number
  
```

```

Line 2
22-nn  200 Error. — Category A
33-nn  300 Error. — Host and Control Logic
44-nn  400 Error. — Program Check
55-nn  500 Error. — Communication Check
66-nn  600 Error. — Device Detected (3290)
77-nn  700 Error. — Device Detected (3290)
00-    Not used.
      Last two digits of the most recent error
      grouping.
  
```

3278/3279 Log		Type A Printer Log	
Counter	Meaning	Counter	Meaning
CC	Coax timeouts	CC	Coax timeouts
DD	Coax parity errors	DD	Coax parity errors
EE	Power Off	EE	Power Off
FF	Device checks	FF	Device checks
GG	Error status base machine	GG	Error status
HH	Error status features	HH	Equipment checks
JJ } JJ }	Not used.		
KKKK	3290-generated		
KKKK	Summary counters. See device maintenance procedure.		
00	Not used.		
QQ	3290 device qualifier. See 3290 device maintenance procedure.		

Explanation of Line 3:

Line 3 contains coax and device error counters.

Note: If no 2nn code is logged, the error was recovered by the 3274.

- CC Coax timeouts—This counter is incremented when the 3274 sends data or commands to the device and does not receive a response in a predetermined period of time.
- DD Coax parity error—This counter is incremented when the 3274 detects a parity error in data received from the device.
- EE Normal power off—This counter indicates the number of times the device failed to respond to a poll retry sequence (device powered off). Counter 1 or 2 is incremented on the first failure to receive a poll sequence response; 32 successive poll sequence retries then follow. If all retries are unsuccessful, the control logic assumes that the device is powered off and then increments the counter.
- FF Device checks—The device attached has detected a buffer parity error and has returned device check status of the 3274. See nnn code 204 (type A devices).
- GG Display or Printer—Error status was returned from a device that indicates a device failure. Refer to 2nn in error event data.
- HH Display—Status was returned to the controller that indicates a feature failure.
- JJ }
JJ } Not used.

Type A Printer—The printer reported an equipment check. Refer to nnn=231.

Figure 2-8. Test 1 Device Logs

Step 5 – (Continued)

E.3 Test /3: Display the Status of All Configured Terminals and Display Control Unit Summary Counters.

- To display the status of all attached devices, do the following at any display except a 3290:
 1. While holding the ALT key, press the Test Request key.
 2. Key in /3.
 3. Press the Enter key.
 4. Examine the display. It should be similar to that in Figure 2-9, Test /3 Device Status.
- To exit the test mode, press and hold the ALT key and press the Test key.
- To monitor the status over a period of time, exit the existing test and initiate a Test /3 to indicate the most current changes.
- When Test /3 port locations are indicating device disabled (Line 2) or coax or device errors (Lines 4 and 5), start at Step 5, B.2, to isolate the problem.
- If Line 8 indicates summary checks, go to Step 7.

This test will display information for each configured device, such as On, Off, disabled, and the device type. The summary of coaxial and device errors is also displayed.

A coax error is a composite of Type A Adapter indications such as a timeout or erroneous data. This composite is incremented each time the error occurs.

A device error is a composite of errors detected by the attached device such as wrong parity or other error.

A device "powered off" is indicated when the device has been polled 32 times and a poll timeout or parity error has been detected each time.

A device "disabled" means an excessive number of errors has been detected and the device has been logically disconnected.

Use Test XX/4 to reset the summary error total.

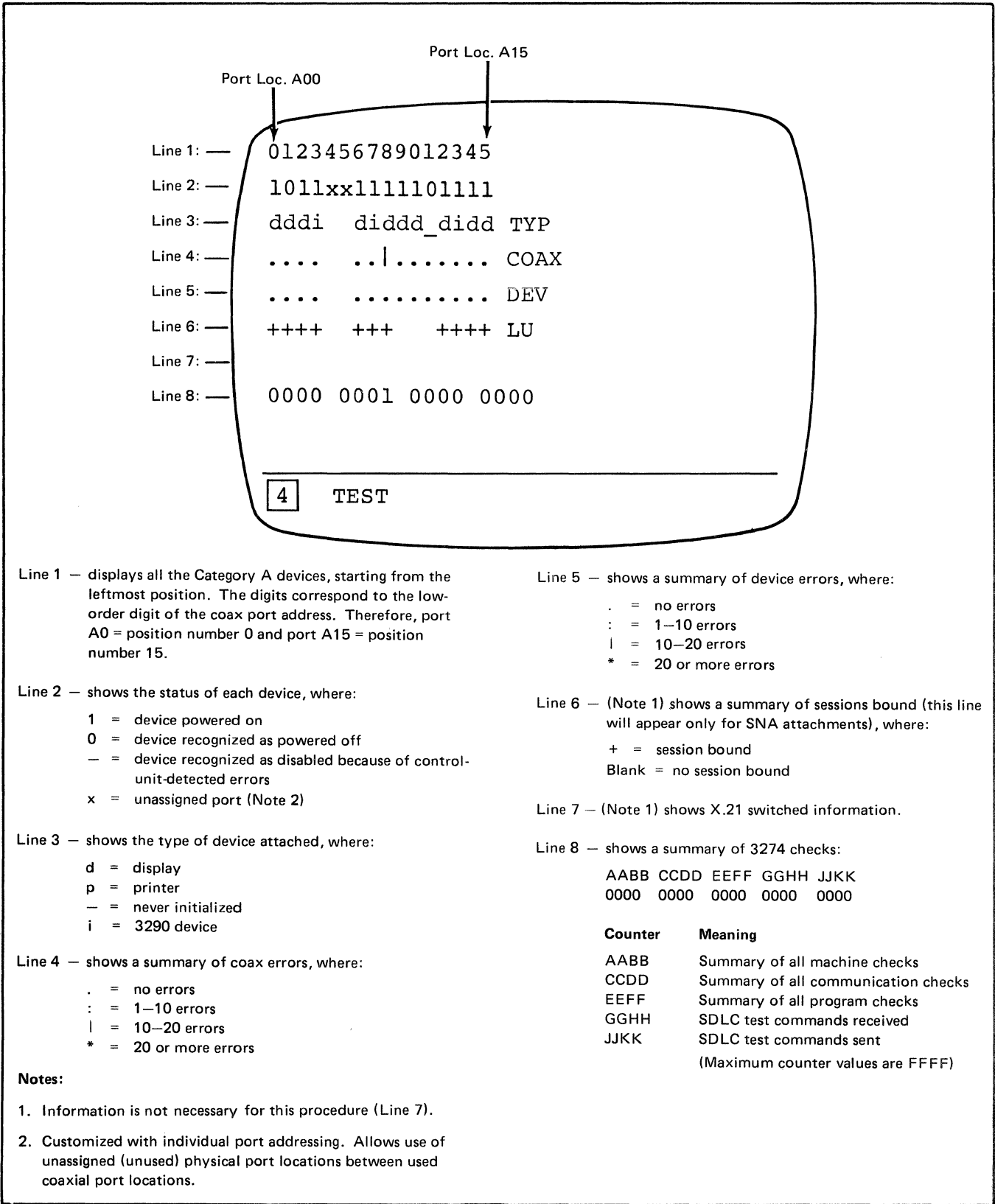


Figure 2-9. Test 3 Device Status

Procedure

Step 5 – Continued

E.4 Test 4 – Reset Any Test 1 Log

Do the following at any display except 3290:

1. While holding the ALT key, press the Test Request key.
2. Ensure that the cursor is at location 0.
3. Key in:
 - /4 – For requesting a display location, or .
 - XX/4 – Where XX=device port 00-31 to be selected.
4. Press the Enter key.
5. The display as shown in Figure 2-10 should be reset to zero.

Test 4 may now be used as shown below:

- 00 to 31/4 – Resets the device log for the device specified to all zeros.
 - A0/4 – Resets the host adapter log to all zeros.
 - A1/4 – Resets the Type A adapter log to all zeros.
 - A2/4 – Not used.
 - A3/4 – Resets the control logic to its initial values.
 - A4/1 – Resets the Response Time Monitor logs to all zeros.
6. Run Test 1 Log or Test 3 Log as required.

Notes

Test 4 provides the capability of resetting any device adapter, device, host adapter, or control logic log.

Test 4 may be used to track intermittent failures without initiating another IML nor turning power off to clear the error logs.

Reference

Line 1: 01/4
Line 2: 0000 0000
Line 3: 0000 0000 0000 0000

4 TEST

Figure 2-10. Test 1 Device Logs at Reset

Procedure

Step 5 – Continued

Test /B Device Address Assignment Table (Figure 2-10A)

- Do the following at any display except 3290:
1. While holding the ALT key, press the Test Request key.
 2. Key in /B.
 3. Press the Enter key.
 4. The minus function (x-f) is returned if the display does not have a large enough screen size.
 5. To exit the test mode, press and hold the ALT key and press the Test key.

The format will be displayed as shown in Figures 2-10B or 2-10C.

Notes

- The address table is displayed if the individual port assignment table was used during customization.
- If customization was performed using sequential port addressing (sequence number 112), the /B test will not run.
- Using individual port addressing automatically assigns the device logical addresses and allows unassigned (unused) physical port locations between used coax port locations.

Reference

Addresses Displayed With /B Test	SDLC	BSC EBCDIC	BSC ASCII
00	02	40	20
01	03	C1	41
02	04	C2	42
03	05	C3	43
04	06	C4	44
05	07	C5	45
06	08	C6	46
07	09	C7	47
08	10	C8	48
09	11	C9	49
10	12	4A	5B
11	13	4B	2E
12	14	4C	3C
13	15	4D	28
14	16	4E	2B
15	17	4F	21
16	18	50	26
17	19	D1	4A
18	20	D2	4B
19	21	D3	4C
20	22	D4	4D
21	23	D5	4E
22	24	D6	4F
23	25	D7	50
24	26	D8	51
25	27	D9	52
26	28	5A	5D
27	29	5B	24
28	30	5C	2A
29	31	5D	29
30	32	5E	3B
31	33	5F	5E
May Continue to 76	May Continue to 76		

Figure 2-10A. Translation Table for /B Test Address

Line 1	A00	A01	A02	A03	A04	A05	A06	A07
Line 2	1	1	1	0	0	0	1	1
Line 3	000	001	002				003	004
	A08	A09	A10	A11	A12	A13	A14	A15
	1	0	0	0	1	1	1	0
	005				006	007	008	

Line 1 is the physical coax port location.

Line 2 shows which physical ports were customized to have devices attached to them where:

- 1 = Available device
- 0 = Unavailable device

Line 3 is the primary address that is assigned to the device.

The primary addresses as shown in Line 3 are zero based. Translation may be required to determine the actual addresses assigned for your machine. This is necessary because of the various addressing schemes used by BSC, SNA, etc. To translate primary addresses, see Figure 2-10A.

Figure 2-10B. Port Address Table Without 3290 Displays

Line 1	A00	A01	A02	A03	A04	A05	A06	A07
Line 2	1	5	5	5	5	2	5	5
Line 3	000	001	002	003	004	005	006	007
Line 4		016-019	020-023	024-027	028-031	032	033-036	037-040
	A08	A09	A10	A11	A12	A13	A14	A15
	3	4	4	5	5	5	5	5
	041-042	043-045	046-048	049-052	053-056	057-060	061-064	065-068

Line 1 is the physical coax port location. Port A00 cannot have 3290s attached.

Line 2 is the number of interactive screens. This allows you to address and view up to 5 different screens (terminal addresses) on a single 3290.

Line 3 is the primary address that is assigned to the device.

Line 4 is the range of secondary addresses customized for that device.

Figure 2-10C. Port Address Table with 3290 Displays

Note: The primary and secondary addresses shown in lines 3 and 4 respectively are zero based. Translation may be required to determine the actual addresses that are assigned to your machine. This is necessary because of the various addressing schemes used by BSC, SNA, etc. To translate primary and secondary addresses, see Figure 2-10A.

Procedure

Step 6 – Operational Indicators (8 4 2 1)

Figure 2-11 correlates the four indicators to possible failing 3274 FRUs in a 3274. Do not change FRUs unless the failure is solid or the frequency is such that a fix can be verified.

Note: Do not use Figure 2-11 unless the IML diagnostics can be run successfully.

- Enter Figure 2-11 using the indicator status entered on the Problem Report Form, Item 3, or when the problem has been otherwise defined as an operational error.
- Using Step 7, look at Machine Check 200 and 300 nnn codes to further define the error.

Note: Some nnn codes may not be reliable because of an internal 3274 malfunction.

- See the *3274 Models 51C, 52C, and 61C Maintenance Concepts Manual*, SY27-2528, for additional nnn codes.

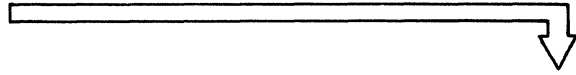
Notes

When the IML pushbutton is pressed or the 3274 is powered on, the IML diagnostics will start running. If the diagnostics are successful, all four operational indicators (8 4 2 1) will turn on while the operational code is loading. After a successful load, all operational indicators will turn off.

Any machine checks detected from this point will turn on indicators 8 4 2 1 with one of the bit patterns shown in Figure 2-1.

Reference

USE FOR ERRORS AFTER IML



Error	Failure or Intervention Required	Action ¹ /Information
0000 ² (but problem exists)	Operational Hang	Not necessarily a 3274 problem. A trace may help in diagnosis.
0001 ²	Control storage parity error—cannot be isolated to a specific card	Indicator does not provide fault isolation. Microcode-detected error. See Figure 2-3.
0010 ²	Invalid microcode instruction or invalid storage address detected	Indicator does not provide fault isolation. Microcode-detected error. Use support structure for aid.
0011 ²	Control storage parity error (Vol 0)	Replace A1E2.
0100 ²	Control storage parity error (Vol 1)	Replace A1D2.
0101 ²	Not used	—
0110 ²	Control storage parity error (Vol 2)	Replace A1D2 and D4
0111 ²	Control storage parity error (Vol 3)	Replace A1C2.
1000 ²	Type A adapter machine check	Replace ³ A1S2, A1T2, A1U2.
1000/0001 ⁴	Type A Adapter hang	Replace First Replace ³ Second
1000/0010 ⁴	Type A Adapter hang	A1T2 A1S2
1000/0101 ⁴	Type A Adapter hang	A1U2 A1S2
1001 ²	Any host attachment machine check	A1S2 See footnote 3.
1011 ²	Response time monitor machine check	Replace A1K2 and A1L2.
1100 ²	File error/machine check	See Step 8.
1100 ²	File error/machine check	Replace A1K4.
1100 ²	File error/machine check	Run the IML Tests (Step 4).
1100 ²	File error/machine check	Replace diskette, card A1M2, and file card in drive unit.
1100–1111 ⁴	Operational load diskette failure	Run the IML Tests (Step 4).
1100–1111 ⁴	Operational load diskette failure	Replace diskette.
1101 ²	Control logic failure	Replace A1M2, drive unit, and its file card.
1110 ²	Encrypt/decrypt	Replace A1E2.
1111–0001 ⁴	Load diskette intervention required	Replace A1J2.
1111–0001 ⁴	Load diskette intervention required	Drive handle was opened after IML sequence.
1111–0001 ⁴	Load diskette intervention required	Close drive handle.

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

² The 8 4 2 1 indicators are continuously displaying this code.

³ Problem could be caused by any attached device, coax cable, or 3274 driver/receiver card. If problem can be duplicated, disconnect the port devices; then disconnect the T2 and U2 cards, one at a time to isolate it. Replace with a new card. See Figure 2-4.

⁴ These two codes are alternating on and off.


Figure 2-11. Operational Indicators

Procedure

Step 7. Display Symbols (Category A Only)

If failing information is unknown, facility tests /3 or XX/1 should be performed.

- If the following display symbols are indicated in the Operator Information Area (Figure 2-12) or provided in the Status Error Logs, see Figure 2-13. See the *3274 Models 51C, 52C, and 61C Maintenance Concepts Manual, SY27-2528*, for nnn codes not listed and for additional information

Communication reminder: _nnn


Communication check:  _nnn

Use the ALT2 communication wrap procedure if a subsystem communication failure is suspected. See Step 8.

Machine check:   nnn

The 3274 operational indicators (8 4 2 1) should be checked to further define the error. Check for operational errors. See Step 6.

Program check:  PR0Gnnn

- If the subsystem Ready indication,  , is not present in the Operator Information Area, start at Step 5.
- If the host connection (A or B) is off:
 - See Figure 2-13.
 - Replace cards K2 and L2.

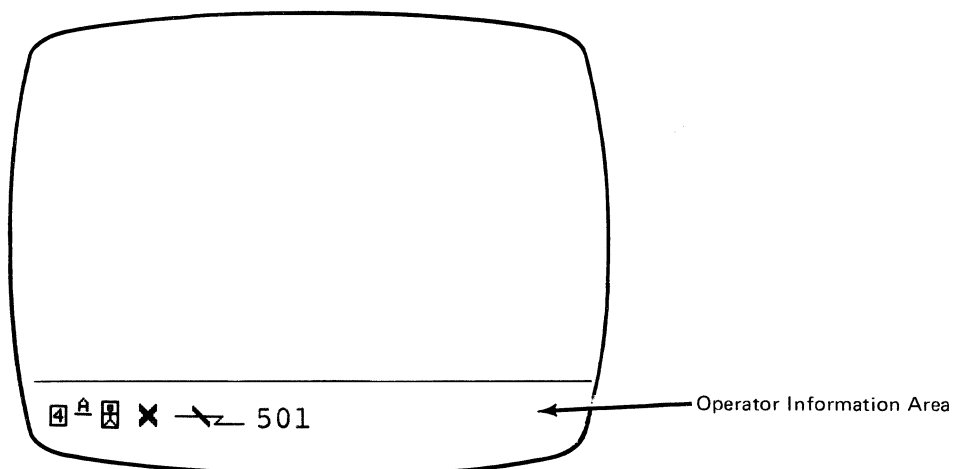


Figure 2-12. Operator Information Area

Notes

The information concerning failures accompanied by display symbols should be available on the 3274 Problem Report Form.

Test /3 can be used to provide the current total of machine, communication, and program checks. See Step 5, E.3.

Test XX/1 can be used to provide the current nnn code for the selected port location. See Step 5, E.2.

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

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

A machine check error has occurred within the 3274 or within a device that cannot be recovered by the system. The 3274 will attempt to display the error suffix.

A program check is a host protocol error or other error that has been detected in the contents of the data stream.

Reference

Error Suffix (nnn)	Associated Function	Repair/Action
20x/21x/22x 235, 236, 237, 238 240, 241	Category A device failure Personal computer failure or customer program 3290 synchronization error, detected by the 3274	Go to Step 5, Item B, Category A Device Failure. Use personal computer maintenance procedures. <ul style="list-style-type: none"> The diskette microcode level may be incorrect. Verify feature/load diskette compatibility. Use the 3290 maintenance procedures. Use the 3290 maintenance procedures.
242	The 3290 detected a permanent 6nn error. The end result is the indication of this code (242).	
243	The 3290 lost Op Complete. (Data stream to device may be excessive.)	Programming error. Check with the program system representative (PSR).
293	Device is attached to an unassigned port location.	<ul style="list-style-type: none"> Run the /3 test, and check for X in line 2. See Figure 2-9. Disconnect the unwanted device, or recustomize responses 112 or 116, 117.
29x	Terminal adapter failure	Replace A1S2.
31x/32x	CCA or HPCA failure	Replace A1L2.
33x	HPCA failure	Replace A1L2.
333/335	LSA failure (loop)	Replace card K2.
336	LSC failure (loop)	Verify I/O cable to LSC. Check LSC.
381/390/391	Control Logic and Storage failure	Operational codes 0001–0111 can further define the card location error. See Step 6, Figure 2-11.
382	Response Time Monitor Failure	Replace A1K4.
386, 387, 388, 389	Operational load diskette failure	<ul style="list-style-type: none"> Run the IML Tests (Step 4). Replace diskette. Replace A1M2, drive unit, and its card.
397/398/399	Encrypt/Decrypt failure	See 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	Data Set Ready not present*	<ul style="list-style-type: none"> Loop—Verify that operator panel switch is set to COMM. Run ALT2 Test. See Step 8.
502	Clear to Send not present	Verify the operational status of the communication network. Replace cards K2, L2.
506, 513, 517, 537, 538, 539	X.25 Network or 3274 problem-timeouts, connections, etc.	<ul style="list-style-type: none"> Check –12V. Go to MAP D120, entry point C. Run ALT2 Test. See Step 8. Verify the operational status of the communication network. Replace cards K2 and L2. Verify the operational status of the communication network. Run ALT2 Test. See Step 8.
52x	Timeouts, connection (SDLC)	<ul style="list-style-type: none"> Verify the operational status of the communication network. Run ALT2 Test. See Step 8.
521	Idle Timeout Model C	Host did not respond, or communication cable Test/Operate switch in Test position.
532	No sync characters received within 20 sec (BSC).	<ul style="list-style-type: none"> Verify the operational status of the communication network. Replace cards A1K2, L2. Verify the operational status of the communication network. Replace cards A1K2, L2.
51x/53x	CCA/HPCA data link error	Check –12V. Go to MAP D120, entry point C.
590	The 3290 is not being polled by the 3274. This code occurs only after the 3290 becomes Ready (4).	<p>If more than one device is failing, go to Step 5.</p> <p>If a single 3290 is failing:</p> <ul style="list-style-type: none"> Check for disconnected device cable. Isolate by swapping driver/receiver cards; see Figure 2-4. Use the 3290 maintenance procedures.
600–699 700–799	Device Attachment 3290 Failure or Program Check	Use the device maintenance procedure.

*If DDS Adapter or Loop Data Set Ready is generated within the 3274.

Figure 2-13. Display Symbol Indications

Procedure

Step 8 – Host Attachment

Do not use this step unless the IML diagnostics can be run successfully.

The host problem is usually indicated by the CPU recording timeouts, data checks, control checks, or operational checks. The 3274 may also indicate an operational code 1001 machine check.

If a loop interface is attached, see loop indicators, Figure 2-15.

Do the ALT2 wrap test and either of the following:

- a. If the modem can be wrapped, see the charts in Figures 2-14 and 2-15.
 1. Set the Wrap Switch to normal if a loop attachment wrap switch is not used.
 2. Perform the ALT2 switch function.
- b. If the modem cannot be wrapped, see the charts in Figures 2-14 and 2-15.
 1. Set the Wrap Switch to Test.
 2. Perform the ALT2 switch function. (Cable wrap is performed.)

Notes

The information concerning host problems should be available on the 3274 Problem Report Form.

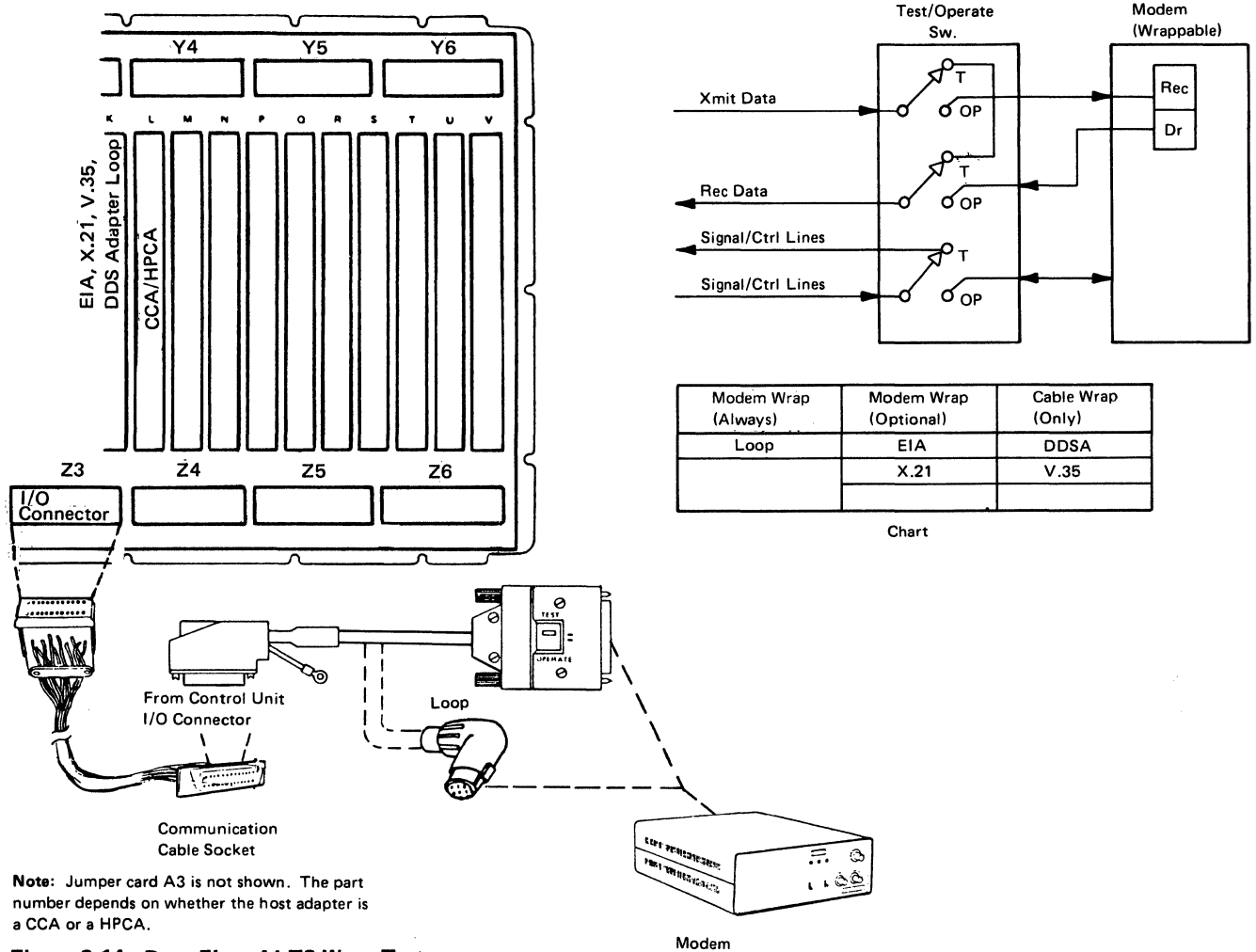
If the modem can be wrapped, this test checks the transmission path to and from the modem and tests the CCA/HPCA adapter for proper operation. The customer should have configured the system diskette for Modem Wrap (Sequence number 311). Then, each time an IML is performed, this test is automatically run as Test 0111.

If the modem cannot be wrapped, the data lines are wrapped through the communication cable test switch and back to the 3274 adapter. The cable should be plugged into the modem. The clocking is supplied by the modem.

ALT2 Switch Function:

Holding the ALT2 switch in position 2, momentarily press the IML pushbutton.

Reference



Note: Jumper card A3 is not shown. The part number depends on whether the host adapter is a CCA or a HPCA.

Figure 2-14. Data Flow ALT2 Wrap Test

Error Indicator	Failure	Action/Information
Machine Check	Problem is internal to the 3274.	Run the loop wrap test; continue Step 8. Replace card K2.
External Check	Problem is external to the 3274. A carrier level was not received. The nnn code 515 is displayed.	Check loop for carrier. Replace card K2. Use the Host/8100 maintenance procedures. Note: If I/O cable is not attached to the 3274 or the LSC connector, this indicator will come on after an IML when the operational code is loaded. This is not a machine problem.
\bar{Z} OK (Line ready)	A valid message was received within the last 8 seconds. The nnn code 520 is displayed. The 3270 is not transmitting.	If this indicator does not come on: <ul style="list-style-type: none"> Verify that the loop card K2 speed switches and the operator panel switches are set to the same speed and match the speed provided by the common carrier. Replace card K2. Communication network problem; use the Host/8100 maintenance procedures.

Figure 2-15. Loop Indicators

Procedure

Step 8 – Host Attachment—Continued

After about one minute, does the wrap test end with a code of 1111 or 1000?

Y N
(Flashing 0111)

Wrap test failed. See Figure 2-16.

Is the wrap test end code 1111?

Y N
(1000) If the ALT2 cable wrap test was performed, move the switch back to the normal position. The code should have changed to 1111. If the code did not change see Figure 2-16 and start at Step 3.

1. Verify that the card jumpering and feature attachment are correct for your host attachment. See card jumpering in Chapter 5 and Feature Configuration, Figure 2-17.
2. Request that the 3274 online tests (OLTs) be run.
3. If the OLTs indicate a failure or are unavailable, replace cards A1K2, L2.
4. If this is a new installation or a recustomization, verify the sequence number responses associated with the host.
5. If the failure information is unknown or incomplete, run the on-line Test 1 Device Logs and check the nnn codes. See Step 5, E.2.
6. Use the *3274 Models 51C, 52C, and 61C Maintenance Concepts Manual (MCM)*, SY27-2528, Appendix B, for additional information concerning the nnn codes.
7. The MCM host adapter error log A0/1 test may provide problem isolation.

Note: A good ALT2 wrap test, or wrap test jumper procedure, without attached modem, indicates that the problem is most likely in the communication line. Notify the customer that the trouble is external to the 3274 and its attached modem, if not wrappable. Use external isolation procedures such as the modem self-test, the wrap test, or the line test to isolate the problem.

8. If the problem is still not solved, go to Step 9.

Notes

If the wrap test fails with the HPCA card installed, the 0110 code will change to a continuous 0111 for approximately 26 seconds, then start flashing a 0111.

If the wrap test fails with the CCA card installed, the 0110 code will be displayed continuously for approximately 40 seconds and then change to a continuous 0111 code for 26 seconds. The code will then start flashing.

Additional information will be displayed in the 8 4 2 1 indicators as a steady code for 3 seconds, and will also be displayed at port A0. The code displayed will further define the error to the CCA/HPCA adapter or a general wrap failure.

EIA, V.35, DDSA, X.21—An indication of 0111-1101, 0111-0010 (X.21 Switched) means “general modem wrap failure”. An indication of 0001 means “modem failed to set “clear to send””.

Loop 0111-1101—Indicates a failure from the HPCA to the loop adapter.

Loop 0111-1101—Indicates that the Loop Station Connector (LSC) wrap test has failed.

If the wrap test is successful, the 0110 code will change to an end code of 1111. The wrap test will vary in time, depending on the adapter installed. With CCA, the wrap test will take about 40 seconds; with HPCA, about 6 seconds.

If the modem is not attached to an active teleprocessing line, the end code will be 1000 (carrier detect not present).

Reference

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 modems are activated for DTE control modem wrap function.
3. Check that the modem cable is plugged into the 3274.
4. Replace cards A1, K2, L2.

Note: Check that card K2 jumpers are properly installed.

5. Check the internal I/O cable in board position Z3 and the external I/O communication cable for defects. See the line flow figures in Chapter 5.
6. If this is a loop attachment, a wrap test failure could be experienced after a board replacement. Verify that the board wire K2D12 to L2U05 is not installed.
7. See the procedure for running the Wrap Test without the attached modem. See paragraph 5.3.2. Does not apply to the DDSA attachment.

Figure 2-16. Repair Procedure ALT2 Test

3274 Attachment Card K2	Host Attachment	3274 Adapter Card L2	Speed (bps)	Modem Clocking Supplied	Limitations and Notes
EMI	BSC, SNA/SDLC	CCA w/o Clock	Up to 9600	Yes	No multi-point above 19.2K } Interface with channel serv unit (CSU) } Interface with data circuit terminate equipment (DCTE)
EMI	SNA/SDLC	HPCA	Up to 9600	Yes	
V.35	BSC, SNA/SDLC	CCA w/o Clock	Up to 9600	Yes	
V.35	SNA/SDLC	HPCA	Up to 57.6K	Yes	
DDSA	BSC, SNA/SDLC	CCA w/o Clock	2400, 4800, 9600	Yes	
DDSA	SNA/SDLC	HPCA	2400, 4000, 9600 56K	Yes	
Loop	Direct	HPCA	9.6K, 38.4K	Yes	
Loop	Data Link	HPCA	2.4K, 1.2K	Yes	
X.21 (Non-Sw)	SNA/SDLC	CCA w/o Clock	2400, 4800, 9600	Yes	
X.21 (Non-Sw)	SNA/SDLC	HPCA	2400, 4800, 9600 48K	Yes	
X.21 (Sw)	SNA/SDLC	HPCA	2400, 4800, 9600, 48K	Yes	

Figure 2-17. Feature Configuration Host Attachment

Step 9 – Voltage Checks

- If a problem still exists after this step is reached, measure all the voltages. See Figure 2-18.
- If a voltage is not within limits, go to MAP D120, Entry point A.
- Check the fans for proper operation. Replace any that are defective.

Step 10 – Verification Test

- Repeat the preceding steps, beginning with Step 2, to isolate intermittent and multiple problems. Run IML tests using both the IML pushbutton and Power On Reset.
- Go to Step 12 or continue to the next step (Step 11) if there is a customization problem.

Step 11 – Customizing

Step 11 is to be used if a problem is encountered during installation or customizing, or after installing a Miscellaneous Equipment Specification (MES). Installation cannot be considered complete until the 3274 has operated successfully online.

Go to Step 12 if you do not feel this step is necessary.

1. Use the following procedures, depending on your experience and the complexity of the problem:
 - Refer to the *3270/3274 Control Unit Customizing Guide*, GA23-0065 and the *Planning and Site Preparation Guide*, GA23-0064.
 - Use Test/2 to display configuration information residing on the system diskette. See the 3274 MCM, SY27-2528.
 - Use Test XX/6 to display attached device byte information set by customization that pertains to device features and status, and verify against the actual feature installed. See the 3274 MCM, SY27-2528.

Use MAPs D151, D152, D153, and D150 as shown below.

MAP	Symptom Failure Index
D151	After successful customization.
D152	After customization and during IML.
D153	During customization—Internal 3274 problem codes.
D150	If performing this step fails to isolate the problem, request assistance from the next level of the support structure.

Contains the procedures used by the customer to perform customization.

Online tests such as Tests 2, 6, etc., will not run if IML tests are failing. Failures can be due to customization; for example, Tests 0101, 0110, 0111. Perform the ALT1 switch function (hold ALT1 depressed and momentarily press the IML pushbutton). This will allow the operational code to be loaded.

Note: The operational code may not be loaded unless the IML tests have sequenced to the start of IML test 0010 (the disk drive will click) at least once.

MAP D150 follows the sequence steps used in the setup instructions and the customization procedure form.

Reference

Volt	Board Pin	DC Limits	Ripple P-P (MV)
+5	L2D03	+4.6 to +5.5	200 MV
+8.5	L2B11	+7.8 to +9.3	340 MV
+12	B2B11	+11 to +13	480 MV
+24	M2B13	+22 to +26	960 MV
-5	L2B06	-4.6 to -5.5	200 MV
-12	K2D07	-11 to -13	480 MV

Figure 2-18. Voltage Chart

The 3274 Control Unit permits you to specify the configuration by which it operates; that is, the way in which you customize your 3274 subsystem. The configuration information is stored on a diskette mounted within the 3274 and enables the 3274 to control all the terminals attached to it. This system diskette, delivered with the 3274, also contains microcode to direct control unit functions and perform diagnostic routines to test the 3274 prior to system operation. Before the system diskette can function in your system, you must customize the diskette by writing your configuration on it.

Briefly, customizing is done by keying in the system parameters at a 3278 Display Station or a 3279 Color Display Station attached to port A0 of the 3274. As a result of this procedure, a unique configuration table is written on the system diskette. In daily operations, the operator inserts this customized system diskette in the 3274 and presses the On/Off switch to On. Or if this switch is already on, presses the IML pushbutton. This action causes the 3274 to execute the diagnostic routines stored on the system diskette. Upon the successful completion of these tests, the 3274 is loaded with the configuration data that was stored on the diskette by the customization procedure. System operation can now begin.

■ In general, the person who customizes the system diskette or load diskette uses a language diskette and a feature diskette in conjunction with the customizing procedure. The language diskette is used to customize the system diskette for languages other than English (U.S.) and Canadian French (both are EBCDIC), and ASCII (U.S.). The feature diskette is used to customize the system diskette or load diskette for all other cluster parameters.

■ The 3274 Control Unit can be IML'ed with either a customized load diskette if programmable terminals are attached, or with a customized system diskette if no programmable terminals are attached.

Customizing a 3274 Control Unit usually involves a planner and someone responsible for the actual customizing operation. The planner identifies and compiles the configuration information needed for each 3274 and gives it to the person responsible for customizing the 3274.

To simplify the customizing task, a planner usually compiles the configuration information on the initial customizing procedure form. The form should be completed for each 3274 prior to delivery of the unit. In addition, configuration information should be copied on the Configuration Data Card (shipped with the 3274) and stored in the diskette storage compartment on the front of the machine.

Procedure

Step 12 – Last Option

- If the problem has not been isolated using the previous steps, follow your support structure. The support procedure may require you to use the dump diskette, PN 6849597, for further problem determination.

Note to the Product-Trained CE:

If you wish to attempt problem determination, use the following:

- Appendix B of the 3274 Control Unit Models MCM, SY27-2528.
- The diagnostic test provided by FERS DEMF, or another similar program product (if available) to assist in problem determination.
- If this fails to result in problem isolation or you choose not to attempt problem determination, request assistance from the next level of the support structure.

Notes

None.

Note: There is no Reference Column associated with Step 12.

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 Chapter 2. You will have been directed to a specific MAP by some statement or reference in the sequence. In performing any MAP, you must follow the procedure exactly as given.

3.2 MAPs

The MAPs and the pages on which they appear are listed below:

MAP D30, Model 61, IML Failure Code Index	3-2
MAP D120, Power Problem, Indicator ON or OFF	3-22
MAP D122, Power On Indicator OFF and Fan Not Turning	3-29
MAP D150, Installation /Customization Problems	3-32
MAP D151, Problems After Successful Customization	3-39
MAP D152, IML Diagnostic Failure After Customization	3-42
MAP D153, 3274 Internal Problem Codes During Customization	3-44

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Entry Point A

START HERE

The 3274 IML error codes listed in this index can occur from the start of an IML sequence until the operational code is completely loaded, which is indicated when all the 8421 indicators go from on to off. A failing code is usually flashing or the codes of 0101, 0110, 0111 may flash for 5 seconds and alternate with another code that is continuous for 3 seconds. For these codes use the flashing code as the fail code. The possible causes in this index are listed in a particular order, usually the FRU's more likely to fail or repair actions that can be quickly verified. It is permissible to use the symptom cause in an order that may better match your problem such as: symptom, new install, your experience, etc. Some repair action steps are procedures and they should be performed in sequence.

Note 1. Always ensure that bus test is successful before using the IML fail code procedures. If bus test fails, see bus test in this MAP.

Note 2. If a flashing code is alternating, use the flashing code to find the fail code in the index.

Code	Description and Possible Cause	Repair Action
Bus Test	Code located on the ROS module checks the control logic in-out bus for inactive lines. Any lines that are active cause the Bus Test to fail when the IML SWITCH is pressed and held. <ul style="list-style-type: none"> • Bus Test will run with only cards E2, S2, and A3 installed. • A successful Bus Test is indicated if all the indicators (8421) are on while the IML pushbutton is held and all the indicators go off when released. • Verify that the power on indicator is ON; if OFF, GO TO POWER MAP D120. 	<ol style="list-style-type: none"> 1. Replace cards E2, S2, and A3. See Notes 1 and 2. 2. Failure in cards that can

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<p>cause interaction to Bus Test.</p>	<p>a) Remove the following cards as a group: C2, D2, D4, (J2 Note 3) K2, K4, L2, M2.</p> <p>b) Run Bus Test.</p> <ul style="list-style-type: none"> • If the Bus Test still fails, reinstall the removed cards. and GO NEXT TO STEP 3. • If the Bus Test is successful, one of the removed cards is failing. <p>c) Reinstall the removed cards 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.</p>
<p>3. Loose or missing pluggable card module.</p>	<p>3. Inspect for loose or missing pluggable module on card E2 See Figure 4-13.</p>
<p>4. Led indicator (8421) problem. IML tests should run successfully.</p>	<p>4.</p> <p>a) Replace card S2.</p> <p>b) Verify for good cable continuity for, -Led indicator 8, 4, 2, 1 lines, from the board to operator panel plug P2. See Figure D-3. Note: a jumper from Led indicator line to ground (D08) should lite the indicator. This should isolate a bad operator panel card.</p> <p>c) Replace the Operator Panel card.</p>
<p>6. All 8, 4, 2, 1 panel indicators are on. A blown -5 volt fuse can cause this symptom.</p>	<p>6.</p> <ul style="list-style-type: none"> • Remove the -5 volt fuse from the TSR power supply and check for open. See Figure B-4 for fuse location. If fuse still blows, a card or board short or

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		<ul style="list-style-type: none"> • fuse rating is the problem. • If fuse is good, verify for missing -5 volts. See power MAP D120, Entry Point C.
7.	Perform power supply voltage and power on reset check.	7. GO TO POWER MAP D120 and start at Entry Point C.
8.	Perform operator panel, IML switch and indicator card check.	<ul style="list-style-type: none"> • Use General Logic Probe and probe at card S2M07 as you depress the IML push button • Verify that the level (-IML PB on) goes to down (green) when button is pressed and goes back to red (up) when released. • If probe is not correct: <ul style="list-style-type: none"> a) Switch power off and reseal cables on operator panel card. b) Replace the operator panel indicator card.

NOTES FOR BUS TEST:

1. The card E2 contains a pluggable module, isolate to the module or card. New card does not contain module. Reuse from old card. See module plugging procedure Figure 4-13.
2. Step 2 can be performed before Step 1.
3. Encrypt/decrypt card removal destroys the master key. See Chapter 6.

Code	Description and Possible Cause	Repair Action
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<p>0000</p>	<p>Control logic failure - Code located on the ROS Module performs a minimum pre-testing of some control logic functions. Interaction from other adapters or control storage can also cause this failure.</p> <ul style="list-style-type: none"> • Control logic test will run with only cards E2, S2, and A3 installed. 	<ol style="list-style-type: none"> 1. Failure in cards that perform control logic test. 2. Cards that can cause interaction to control logic test. 3. Power supply voltage problem. 4. IML tests do not run when machine is powered on (runs with IML switch). 	<ol style="list-style-type: none"> 1. Replace cards E2, S2, A3. See Notes 1 and 2. 2. <ol style="list-style-type: none"> a) Remove the following cards as a group: C2, D2, D4, (J2 Note 3) K2, K4, L2, M2. b) Run the IML tests. <ul style="list-style-type: none"> • If the IML stops with a 0000 code, reinstall the removed cards and GO TO NEXT STEP 3 • If the test stops with a 0010 code, one of the removed cards is failing. <ol style="list-style-type: none"> c) Reinstall the removed cards one at a time and run IML's after you install each card. Control logic test (0000) should fail again when you install one of these cards. Replace the failing card. 3. GO TO POWER MAP D120, Entry Point C. (Measure voltages) 4. Missing power on reset signal. See MAP D120, Entry Point D.
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NOTES FOR CODE 0000:

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1. The card E2 contains a pluggable module, isolate to the module or card. New card does not contain module. Reuse from old card. See module plugging procedure. Figure 4-13.
2. Step 2 can be performed before Step 1.
3. Encrypt/decrypt card removal destroys the master key. See Chapter 6.

Code	Description and Possible Cause	Repair Action
0001	Control logic and 1st 64K of storage failure. Code located on the ROS Module performs a complete test of the control logic functions as well as its associated 64K of storage. Interaction from adapters or other storage cards can also cause this test to fail. Code is usually flashing.	<ol style="list-style-type: none"> 1. Replace card E2, S2. Notes 1 and 2. 2. <ol style="list-style-type: none"> a) Remove the following cards as a group: C2, D2, D4, (J2 Note 3) K2, K4, L2, M2. b) Run the IML tests. <ul style="list-style-type: none"> • If the IML stops with a 0001

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	code, reinstall the removed cards and GO TO NEXT STEP 3.
	<ul style="list-style-type: none"> • If the test stops with a 0010 code, one of the removed cards is failing.
	c) Reinstall the removed cards one at a time and run IML's after you install each card. Control logic test (0001) should fail again when you install one of these cards. Replace the failing card.
3. Power supply voltage problem.	3. GO TO POWER MAP D120, Entry Point C. (Measure voltage)

NOTES FOR CODE 0001:

1. The card E2 contains a pluggable module, isolate to the module or card. New card does not contain module. Reuse from old card. See module plugging procedure. Figure 4-13.
2. Step 2 can be performed before Step 1.
3. Encrypt/decrypt card removal destroys the master key. See Chapter 6.

Code	Description and Possible Cause	Repair Action
0010	Disk Drive Failure. Code located on the ROS Module performs extensive pretesting of the DISK drive and its adapter before control is	Code 0010 Checkpoint: Using a customized system/load diskette and performing a successful ALT 1 (operational code load) indicates that the data was

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<p>turned over to the diagnostic microcode which is loaded from the diskette into the control storage. This code is usually flashing.</p> <p>Maintenance Concepts for Disk Drive</p> <p>The map symptom index directs you to check for a proper diskette etc, replace cards, then will aid you in performing a quick mechanical and visual check for failures such as loose pulleys, motor rotation, Drive Belt, Pressure Pad etc. If after additional tests such as power, cables, backup diskette, the problem still exists, the disk drive is replaced as a single FRU. The MAP uses Appendix E for Reference.</p> <p>1. System/load diskette defective or not ready.</p> <p>2. Card failures.</p> <p>3. System/load diskette.</p>	<p>properly read from the system/load diskette. See Figure 2-1 Note for ALT 1 function. Knowing this ensures that MAP 'possible cause' such as:</p> <p>improper diskette, loose cables, motor rotation, fuse F4, voltages, etc. are not at fault. Select those symptoms that may be failing with the test 0010 write operation, such as: card M2, disk drive and its card, diskette. Note: disk drive 50 or 60 hz mismatch cannot be isolated with ALT 1.</p> <p>1. Check for the following:</p> <ul style="list-style-type: none"> • Diskette drive operator handle not closed. • Wrong diskette. • Diskette not inserted properly. <p>2. • Replace card M2.</p> <ul style="list-style-type: none"> • Check for loose file drive card cables and then replace file drive card. • Replace card E2 Note 1. • Replace card (J2 Note 2) and L2. <p>3. Use the system/load back up</p>
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	diskette.
4. Blown fuse F4	4. • At power supply check for blown fuse F4 (+5 volts to file drive card. See Figure B-4. Note: On some early built machines fuse F4 is not pluggable and not replaceable. Replace the power supply. • If fuse still blows, the file card, or fuse rating is the problem.
5. Loose cables.	5. Verify for loose board cable Y6 and cables on card in file drive unit.
6.a Disk drive - motor rotation.	6.a Motor rotation, if not turning, inspect the following for possible cause of failure. <ul style="list-style-type: none"> • Motor drive belt. • Loose pulleys. • Measure the AC line voltage for your machine on the prime power box plug P2-4 to P2-6. (100v) and pins P2-1 to P2-3 (200v). See Figure B-1. • Exchange the diskette drive motor. See Figure E-31.
6.b Disk drive - pressure pad	6.b Red felt pressure pad missing or contaminated. Verify by lifting head load arm tip. See Figure E-28(F). If defective use repair kit P/N 2200750 and replace red felt pad.
6.c Disk drive - cable eyelet disconnected from bail lever.	6.c Inspect that the head load solenoid cable eyelet end, did not disconnect from the

	head load bail stud. See Figure E-29(P).
6.d Disk drive motor rating.	6.d Line voltage does not match disk drive motor rating. This cause would normally be experienced during an installation. Note: the rating is on a label mounted on the motor.
6.e Disk drive not compatible with 50 or 60 HZ.	6.e Line voltage frequency 50 or 60 HZ does not match drive assembly part number. This cause would normally be experienced during a new installation. Note: check the drive unit for correct part number. See Figure A-2 for FRU part number.
7. System/load diskette is bad or diskette microcode being destroyed by defective part.	7. a) To isolate diskette use this 3274 or another 3274 and check if system diskette can run beyond IML test 0010, if so, system diskette microcode is good. If a 1001-1010 (9A) appears after the 0010 code, this indicates a microcode hardware mismatch. This does not indicate a diskette failure. Note: a 2-sided diskette will not function in a 1-sided drive. b) If system diskette is defective, or cannot be isolated, then as a group use a new set of the following parts: <ul style="list-style-type: none">• Card M2.• Card in file drive.• File drive unit 51TD.

	<ul style="list-style-type: none">• System diskette.
	Note: If the system back-up diskette is bad, an uncustomized diskette can be used to run beyond IML test 0010. This diskette will sequence 0001, 0010, 0011, 0100 and end with code 1101.
8. Voltages at file drive not within limits.	8. Measure -5V, +5V, +24V at file drive card test points. Use test point for reference ground. See card Figure E-41 (part 2 of 2). See the voltage limits chart in MAP D120, Entry Point C. <ul style="list-style-type: none">• If voltage is missing, check power supply cable P2 to file drive card. See Figure B1.• Check fuse F4. See Figure B-4. Note: On some early built machines, this fuse is not pluggable and is not replaceable. Replace the power supply.• If voltage is not within limits, replace power supply.
9. Cable to file drive is defective.	9. Verify cable continuity from board socket Y6 and power supply No. 1 to disk drive card cable socket. See Figure C-4.
10. Diskette drive unit.	10. Replace the diskette drive unit as a single FRU.

NOTES FOR CODE 0010:

1. The card E2 contains a pluggable module. Isolate to the module or card. New card does not contain module.

Reuse from old card. See module plugging procedure, Figure 4-13.

- 2. Encrypt/Decrypt card removal destroys the master key. See Chapter 6.

Code	Description and Possible Cause	Repair Action
0011	<p>Type A Adapter failure - This code is usually flashing and tests the adapter for proper operation. The attached device at port A0 is not tested. Interaction from the display or other adapter cards can also cause this test to fail.</p> <p>1. Card failures.</p> <p>2. CCA/HPCA, response 351 feature compatibility problem.</p>	<p>1. Replace cards S2, T2, E2, (Note 1) L2, M2.</p> <p>2. See MAP 152, IML symptom code 0011.</p>

NOTES FOR CODE 0011:

- 1. The card E2 contains a pluggable module. Isolate to the module or card. New card does not contain module. Reuse from old card. See module and plugging procedure, Figure 4-13.

Code	Description and Possible Cause	Repair Action
0100	<p>Type A Adapter failure - This code is usually flashing and tests the adapter for proper operation. The attached display at port A0 is also tested.</p> <p>If the display at port A0 is not powered on this test will be bypassed. Note: Some errors that disable the display may also cause this test to be bypassed.</p> <p>1. Card failures.</p> <p>2. Display at port location 0 without terminal multiplexer (3299) attachment. See Figure 2-6.</p> <p>3. Terminal multiplexer (3299) attachment.</p>	<p>1. Replace cards S2, T2 Note 1, E2 Note 2.</p> <p>2.</p> <ul style="list-style-type: none"> • At the 3274 device coax panel, disconnect coax cable at address port A0. • Connect another display to port A0 by moving a coax cable from another port location. • Run IML tests. • If the IML test code goes beyond 0100, then the problem is in the display that was disconnected from port A0. Use the display information manual. <p>3.</p> <ul style="list-style-type: none"> • Verify multiplexer cable connections, shorting plug and switch position (must be down). See Figure 2-6.

	<ul style="list-style-type: none"> • Isolate display at port A0, use single device checkout. See Figure 2-6. • Verify that 3274 driver receiver card T2 is correct and matches multiplexer attachment. See Figure C-2. • Ensure that the terminal multiplexer has been replaced.
--	---

NOTES FOR CODE 0100:

1. Verify that driver receiver card T2 is correct and matches your feature attachment. See Figure C-2.
2. The card E2 contains a pluggable module. Isolate to the module. New card does not contain module. Reuse from old card. See module plugging procedure, Figure 4-13.

Code	Description and Possible Cause	Repair Action
0101	Control Storage failure - This 0101 code is flashing (5 seconds) and the XXXX card code is steady 3 seconds for codes 0001 through 1010. The failure could be caused by any volume of storage. The 3274 indicators or the display at location A0 will display the failure codes to indicate which card	

MAP D30 Mod 61

IML Failure Code Index

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is failing. Customization response 113 must match the machine storage card configuration or this test will fail.	
1. Storage cards or customization response 113.	1. GO TO CHAPTER 2, Figure 2-3.

Code	(flashing) (steady)	Description and Possible Cause	Repair Action
0110		Host Adapter Failure - This 0110 code is flashing (5 seconds) and the adapter code 0101 or 1001 is steady (3 seconds). The 3274 indicators or the display at location A0 will display this code. Note: The codes above are as shown at the 3274. The test checks the CCA HPCA adapter for proper operation. Improper customization responses can also cause this problem code.	
		1. Card failure.	1. L2, K2, J2. See Note 1.
		2. If new installation, MES update, verify customization responses and card switches (model D)	2. See MAP D152, IML Symptom 0110
		3. Improper jumper card type P/N in location A3.	3. The jumper card part number must match your machine adapter CCA/HPCA. See Figure C-2.

Note 1: Removing the Encrypt/Decrypt card J2 destroys the

master key. See Chapter 6.

Code	Description and Possible Cause	Repair Action
0111	<p>Modem Wrap Failure</p> <p>This 0111 code is flashing (5 seconds) and the XXXX is steady (3 seconds) and indicates that the transmit/receive data wrap has failed. The CCA/HPCA adapter can also cause this failure. The 3274 indicators or the display at location A0 will display this code. The steady code displayed at the 3274 will define the error as follows:</p> <ul style="list-style-type: none"> • 0111-1101 - General Modem wrap failure. • 0111-0010 - General Modem wrap failure. • 0111-0001 - Modem failed to raise CLEAR TO SEND. • 0111-1101 (loop attach) - Failure from the HPCA adapter card L2 to the loop adapter card K2. • 0111-1101 (loop attach) - Loop station connector (LSC) wrap test has failed. • If the diskette is customized wrappable (response 311) this test will auto- 	

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atically run each time an IML is performed. This test can be selected to run by itself, by using the ALT 2 switch function. Chapter 2 step 8 uses this method.	
1. If new installation, MES update verify customization responses.	1. See MAP D152, IML symptom 0111
2. Modem connections to 3274 or wrap options.	2. • Check that the modem power and communication cable connectors are properly installed and that the modem is in the normal operating mode. • Check that the modem feature options in the modem are activated for DTE control modem wrap function.
3. I-0 communication cable.	3. Verify that the modem cable is plugged into the 3274.
4. Card jumpers.	4. Verify that card K2 jumpers are correct. See Chapter 5.
5. Card problems.	5. Replace cards K2, L2.
6. Loose or defective cables.	6. Check the internal I/O cable in board position Z3 and the external I/O communication cable for defects. See line flow Figures in Chapter 5.
7. Failure when loop attachment (feature wire was not removed).	7. This cause could be experienced after a board replacement. Verify that board wire K2D12 to L2U05 is not installed.
8. Modem	8. See the procedure for running the Wrap Test without the

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IML Failure Code Index

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attached modem. See 5.3.2.
 This test can be used to
 isolate a modem problem.

Code	Description and Possible Cause	Repair Action
1001	Encrypt/Decrypt Failure - This code is usually flashing and checks encipher and decipher data for proper operation.	1. Replace card J2. Note: removing this card destroys the master key. The customer security administrator must reload the master key. See Chapter 6.

Code	(alter- nating) Description and Possible Cause	Repair Action
1001 - 1010	This code is alternating. The customized system diskette is not proper for 3274 model hardware. This code occurs for configuration support 'D' and above.	• Verify system diskette for proper 3274 model type.

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IML Failure Code Index

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Code	(alter- nating) Description and Possible Cause	Repair Action
1001	This code is alternating and - occurs if the 3274 does not have a minimum storage of 192K. The code is indicated when using an uncustomized system diskette.	Verify storage cards installed. See Figure 2-3.

Code	Description and Possible Cause	Repair Action
1010	Diskette Failure - This code is usually flashing when a defective system diskette is causing a diskette read error during IML. Occurs after 0010 test. The failure is caused by invalid tracks or data on the diskette.	
	1. Defective diskette.	1. Use the back-up system diskette.
		2. To isolate diskette, see code 0010 in this MAP and use step 'System Diskette is Bad or Diskette Microcode being Destroyed by Defective Part.

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IML Failure Code Index

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Code	Description and Possible Cause	Repair Action
1011	This code is usually flashing. It tests the RTM adapter commands, registers, and timer functions for proper operation. If the diskette is customized (Response 127), this test will run each time an IML is performed. 1. Card failure.	1. Replace card K4.

Code	(steady) Description and Possible Cause	Repair Action
1101	1. Continuously displaying this code in about 20 seconds after an IML, indicates an uncustomized system diskette.	1. Remove diskette and replace with proper system diskette.

Code	Description and Possible Cause	Repair Action
1111	1. The operational code has	1. • Try the back-up system

failed to load. This code is continuously indicating.

diskette.

- Replace card E2.
Note: card contains a pluggable module. Isolate to card or module. New card does not contain module. Reuse from old card. See pluggable module procedure. See Figure 4-13.

**MAP D120 Power Problem, Ind. ON
or OFF (Model 61)**

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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
2	003	D122	A

**001
(Entry Point A)**

This MAP is used to find a power problem when the Power On indicator is OFF, or when indicator is on and to verify that all TSR output voltages, POWER on Reset are within limits. When the fan is not turning and the Power On indicator is OFF, this indicates a primary AC voltage problem and MAP D122 is used. The output voltages from TSR supply enters the wiring side of board socket Y2 and the +5 volts from the board is provided to the +5V jumper card Y5. Cable socket Y5 can also provide the input for an additional TSR +5V power supply. The logic board sockets A-N receive their voltages from TSR 1 location Y2 and sockets P to V from location Y5. The +5 volts from each board partition is needed to turn on the power indicator. When a voltage short or overload condition occurs on any TSR output, except the fused -5 voltage and +5V to the file drive card, the power supply shuts down and all voltages go to zero. The MAP Concept is to determine if the +5 voltage is at zero in the logic board. If zero, the overload is isolated by disconnecting loads until the power on indicator is lighted. If +5 is good, all TSR outputs are verified.

NOTE: when power is off and a short or overload is disconnected from TSR supply, a time period of 20 seconds is needed before switching power on. If this is not done the TSR voltages will not reach their proper level.

CAUTION

Before removing cards or cables switch power off.

- Refer to Appendix B for power supply diagrams.
- Switch power on.

Are the fans located under the 01A1 board running? *A*

Y N
| |
| |
| |
| |
| |
2 2
A B

A

If fans are turning this indicates AC line voltage is applied to all the prime power box jacks. Plug P3 supplies the input AC voltage to the TSR power supply.

A B
1 1

MAP D120 Power Ind.ON or OFF (Model 61)

PAGE 2 OF 7

002

Is the power on indicator lighted?

Y N

003

- Input power problem.
- Go To Map D122, Entry Point A.

004

- Switch power off and disconnect power cord plug.
- Verify plug connection at fan assembly. See Figure 4-9.
- Replace fan.
- Verify fix.

005

Is the power on indicator lighted? *B*

Y N

006

- Measure for the correct input ac voltage for your machine at power supply No. 1 Circuit Board Plug P1, between pins 1 and 3. See Figure B-1.

Is the input ac voltage present?

Y N

007

- Verify cable and connections from prime power box plug P3 to power supply No. 1, plug P1.
- Verify fix.

008

Does your machine have two TSR power supplies?

Y N

009

(Entry Point B)

- Measure +5VDC at any board D03 pin within the group of socket locations A2 thru N2 with reference to ground (D08).

Is the +5VDC within the limits of +4.6 to 5.5V?

Y N

6 6 5 3
C D E F

B

If the indicator is OFF this can be caused by a problem with: TSR power supply, TSR output 5V, overload condition at any TSR output voltage (except -5V), OPS panel card or cable.

**MAP D120 Power Ind.ON
or OFF (Model 61)**

PAGE 3 OF 7

010

Is the measured voltage at zero?

Y N

011

- Replace TSR supply No. 1 Circuit Board.
- Verify fix.

012

- Switch power off.
- At TSR power supply No. 1, disconnect the cable (P3) going to the logic board socket Y2. *C* and *F*.
- At the disconnected power supply plug measure +5VDC at pin 17. See Figure B-1. *D*

C

Disconnect all loads from TSR supply to the logic board and determine if overload is causing +5V to be at OV.

D

Higher TSR voltages may be indicated when output is unloaded.

Is the voltage still at zero?

Y N

013

- Switch power off and reconnect power supply plug P3.
- At logic board remove about half the cards as a group, except card Y5. See *E*
- After power was off wait 20 seconds and then switch power on.

E

Determine if cards are causing power overload.

F

CAUTION

Do not power on with power supply plugs P2 and P3 disconnected at the same time.

Did the power on indicator remain off?

Y N

014

- Switch power off and reinstall the previously removed group of cards, one at a time, and perform power on after you install each card. Power on indicator should remain off again when you install the failing card. NOTE: do not install cards when power is on.
- Verify fix.

**MAP D120 Power Ind.ON
or OFF (Model 61)**

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015

- Switch power off and remove the remaining cards as a group, except card Y5. *E*
- After power was off wait 20 seconds and then switch power on.

Did the power on indicator remain off?

Y N

016

- Switch power off and reinstall the previously removed group of cards one at a time. Power on indicator should remain off again when you install the failing card. NOTE: do not install cards when power is on.
- Verify fix.

017

- Switch power off.
- Reinstall all the cards that were previously removed.
- At logic board, disconnect the OPS panel cable in location A1-Z5. *H*
- After power was off wait 20 seconds and then switch power on.
- Measure +5VDC at any card socket D03 pin with reference to ground (D08).

Is the measured voltage at zero?

Y N

018

- Switch power off and reconnect the OPS panel cable in board socket Z5.
- Replace the OPS panel component card.
- Verify fix.

019

- A board voltage short is indicated. Inspect for obvious board pin, and excess wire shorts. If isolated, reinstall board cable Z5.
- Replace board. See board procedure Figure 4-10.
- Verify fix.

G

Disconnect all leads from the TSR supply to the file control card.

H

Determine if the operator panel card is the problem.

**MAP D120 Power Ind.ON
or OFF (Model 61)**

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020

- Switch power off and reconnect power supply cable plug (P3) going to the logic board socket Y2.
- At the same TSR power supply, disconnect cable plug P2 that is going to the file drive unit. *F* and *G*.
- After power was off wait 20 seconds and then switch power on.

Did the power on indicator remain off?

Y N

021

- Switch power off.
- Reconnect power supply cable plug P2.
- Verify for short in voltage line (+5, +24 -5) in disk file cable. See Figure C-4.
- Replace card in file drive unit. See Figure 4-8.
- Verify fix.

022

- Switch power off.
- Replace TSR power supply No. 1 circuit card.
- Verify fix.

023

- At logic board, inspect for loose OPS panel cable Z5 and voltage jumper card Y5. *J*
- Inspect for loose cables on operator panel indicator card. See Figure 4-11.
- Switch power off.
- At OPS panel assembly, disconnect plug P2 from indicator card.
- Switch power on.
- Measure +5VDC at disconnected plug P2 pins A02 and A11 (+) with reference to pin B01 (-). See Figure D-3 (Fold out) for cable.

J

+5 jumper card is used to route +5V to board sockets P to V. To turn on the power ind, a +5V is required from board sockets A-N and P to V.

Is +5VDC missing at either measured pin?

Y N

024

- Replace OPS panel indicator card.
- Verify fix.

C D J
2 2 5

**MAP D120 Power Ind.ON
or OFF (Model 61)**

PAGE 6 OF 7

025

- Verify wire for good continuity at logic board pins R5D03 to S6A04.
- Test for open +5 voltage and DC return pins (A02, A11, B01) in cable.
- Verify fix.

026

Does not apply.

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

027

(Entry Point C)

Use Chart A below and measure dc voltages with reference to ground (D08).

CHART A

VOLT	BOARD PIN	DC LIMITS	RIPPLE P-P (M-V)
+5	L2D03	+4.6 to +5.5	200 MV
+8.5	L2B11	+7.8 to +9.3	340 MV
+12	B2B11	+11 to +13	480 MV
+24	M2B13	+22 to +26	960 MV
-5	L2B06	-4.6 to -5.5	200 MV
-12	K2D07	-11 to -13	480 MV

Were all measured voltage in Chart A within limits?

Y N

028

- If -5 volts is missing, check for blown fuse F3 on power supply. See Figure B-4.
- If voltage is missing, verify that same voltage is missing at power supply circuit board plug P3 and repair cable/plug if needed. See Figure B-1.
- Replace TSR power supply No. 1 circuit board.
- Verify fix.

7
K

**MAP D120 Power Ind.ON
or OFF (Model 61)**

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029

(Entry Point D)

- Use General Logic Probe and probe at board pin S2J06 while power is switched on. See Figure B-1. *K*
- Verify that the signal (-power on reset) is green and after a slight delay then goes to UP (red) and stays up. *L*

K

General Logic probe is set to the multi switch position.

L

Probe to determine if power on reset is properly generated, such as reset is not being held up or down, etc.

Is the probe point correct?

Y N

030

- Switch power off.
- Check for good connection from power supply plug P3 pin 24 to logic board pin G1A11.
- Replace TSR power supply No. 1 circuit board.
- Replace card S2. *M*
- Verify fix.

M

The reset signal requires the input load of the type A adapter card to operate (S2-J06).

031

End of MAP.

**MAP D122 Power On Ind. OFF
& Fan Not Turning (Mod 61)**

PAGE 1 OF 3

**001
(Entry Point A)**

*****MAP SUMMARY*****

Maintenance concepts for MAP C122

Entry to this MAP is from MAP C120 if the fans are not turning and the power on indicator is off. When the Fan is not turning this indicates that input A.C. voltage is also not being supplied to the input of the TSR power supply, and thus the power on indicator is off. When the primary fuse F1 is not blowing this indicates the A.C. circuit is not complete through power line cord, plug P1 cable, power on-off switch and fuse.

Overloads in the TSR power supply voltage outputs do not cause the fuse F1 to blow, but instead will reduce all voltages to zero, except the fused -5V and +5V to the file drive card. The MAP concept is to measure for missing input A.C. voltage when the fuse is not blown. If the fuse is blowing, replace the fuse and disconnect components until overload condition is isolated.

CAUTION

Before removing cards or cables switch power off.

NOTE: only use this MAP if the ON-OFF indicator is OFF and fan are not turning.

- Switch power off.
- Verify fuse F1 on primary power box.

Is the fuse blown?

Y N

002

- Verify that 3274 power cable is connected to an active outlet.
- Verify that the power cable plug P4 is connected tightly on the back of the 3274.

DANGER

Input A.C. voltage is present at power on switch terminals and plug P1 when 3274 power on-off switch is in off position.

- Measure for the correct input A.C. voltage for your machine at prime power box plug P1 between pins 3 and 4. NOTE: measure with plug P1 connected. See Figure B1. (Step 002 continues)

2
A

MAP D122 Power On Ind. OFF & Fan Not Turning (Mod 61)

PAGE 2 OF 3

(Step 002 continued)

Is the correct A.C. voltage present?

Y N

003

- Disconnect the 3274 power plug from power outlet.
- Verify for open or defective power line cord/plug.
- On prime power box verify for good socket J1 and cable plug P1 connection at pins 3 and 4.
- Verify fix.

004

- Measure for input A.C. voltage at prime power plug P1 between pins 1 and 2. NOTE: measure with plug P3 connected. *A*

A

Verify that A.C. line voltage is switched through power on switch.

Is the correct A.C. Voltage present?

Y N

005

- Disconnect the 3274 power plug from power outlet.
- On prime power box verify for good socket J1 and cable plug P1 connections at pins 1 thru 4.
- An open cable/power on switch (S13) is indicated. Replace OPS panel power on switch/cable assembly. See Figure 4-12.

006

- Verify again for blown fuse F1.
- Defective fuse F1 socket is possible, verify fuse socket in prime power box.

007

- Switch power off.
- Replace blown fuse F1. See Figure A-2 for part numbers.
- At prime power box disconnect plugs P2 and P5. *B*
- Switch power on.

B

Disconnecting plug P2 and P5 to determine if fan or disk drive motor is causing fuse to blow.

Does fuse still blow?

Y N

Y	N

**MAP D122 Power On Ind. OFF
& Fan Not Turning (Mod 61)**

PAGE 3 OF 3

008

- Switch power off.
- At prime power box connect previously removed plug P2.
C
- Switch power on.

C

Determine if fan is causing fuse to blow.

Does fuse still blow?

Y N

009

- Switch power off.
- Check fan assembly and cable for short circuit.
- Replace fan assembly.
- Verify fix.

010

- Switch power off.
- Replace blown fuse F1.
- Check disk drive motor for short or binding condition.
- At prime power box reconnect previously removed plug P5.
- Replace disk drive motor assembly.
- Verify fix.

011

- Switch power off. *D*
- Verify that fuse F1 rating is correct for your machine input A.C. voltage and matches the TSR supply (100V or 200V) installed. See Figure A-2.
- Replace blown fuse.
- At prime power box reconnect plugs P2 and P5.
- Replace TSR power supply card assembly. See Figure 4-6.
- Verify fix.

D

Isolates blown fuse to TSR power supply.

MAP D150, Install/Custom

Problems - Mod 61

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ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
D10	A	1	001

001

(Entry Point A)

Maintenance Concepts For MAP A150

The map flow is developed to follow the sequence steps used in the setup instruction and customizing procedure forms. When a sequence step does not provide the proper results, a map path can be taken to provide a symptom 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 the subsystem problem isolation (Chapter 2) to isolate the error condition.

CAUTION

Before removing cards or cables switch power off.

Is this an installation setup instruction problem? See *A*

Y N

002

Did a problem occur either during customization or when IML was performed following customization? See *B*

Y N

7 2 2
A B C

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
2	005	D151	A

A

Form GA-23-0047 is used by the customer for performing 3274 Model 61C, 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 Customizing Guide GA23-0065.
- The procedures that the customer uses for planning and site preparation is contained in GA23-0064.

B C
1 1

MAP D150, Install/Custom

Problems - Mod 61

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003

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

Y N

004

Go to subsystem problem isolation Chapter 2, step 1.

005

- It is possible that the diskette configuration information is incorrect and is causing the Host System to fail. Perform the modification procedure of the Planning, Set-Up and 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. SY27-2528 for /2 test information.
- Use customization symptom index.

Go To Map D151, Entry Point A.

006

C

This question refers to a step procedure when performing the initial customizing procedure in the Planning and Set-Up Guide.

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

Y N

007

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

Y N

6 3 3
D E F

E F
2 2

MAP D150, Install/Custom

Problems - Mod 61

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008

- See figures in the initial customizing procedure of the Planning, Set-Up and Customizing Guide and look up the 8421 indicator code. Verify that the correct meaning/action fix was performed.
- To isolate the problem, replace the feature diskette with the system diskette. Perform an IML and verify the diagnostic tests ending code. See D. If error occurs go to Chapter 2, Step 1.
- Obtain another feature diskette and perform customization (IML) once more.
- Use your support structure for aid if problem is not found.

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. If the diskette is customized, tests 0101, 0110, and 0111 etc are also run. These tests may fail because your system diskette may not match your machine configuration.
- Code 0000 is the normal end with a previously 'customized system' diskette.

009

Does the 3278 display the proper starting customization screen format for sequence number 001 and XXXXXXXXXXXXXXXXXXXX? *C*

Y N

010

- If display information is missing and display port location 0 is attached to a 3299 Terminal Multiplexer, see Figure 2-6, then ensure that the 3274 panel switch is in the up position or the shorting plug is connected.
- Replace cards D2, D4 E2 and C2. Retry customization and isolate the possible failing card. Note: The E2 card contains a pluggable module. Reuse module from old card.
- Retry, customization with another display attached to Port 0.
- If problem still exists, obtain another feature diskette and perform customization once more.
- Go to subsystem problem isolation Chapter 2, Step 1.
- Use your support structure for aid if problem is not corrected.

011

- Perform the next customizing step after the starting screen format is displayed. *C*

(Entry Point B)

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

Y N

4 4
G H

G H
3 3

MAP D150, Install/Custom

Problems - Mod 61

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012

Does the entered response cause a 1 or 2 digit operator code displayed on the upper center of the 3278 display screen? *C*

Y N

013

- Swap keyboard with another 3278 display.

014

- See figure in the initial customizing procedure of the Planning, Set-Up and 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.

015

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

Y N

016

- Enter another sequence response, and keep returning to Entry Point B until verification listing with sequence number 900 is displayed.

Go to Page 3, Step 011, Entry Point B.

017

- 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? *C*

Y N

018

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

Y N

6 5 5
J K L

MAP D150, Install/Custom**Problems - Mod 61**

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019

- See figures in the initial customizing procedure of the Planning, Set-Up and 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 Planning and Set-Up Guide for displaying the configuration information and verify against 3274 customizing procedure form. See *B*
- Use 3274 problem codes index.
- Go to MAP C153, Entry Point A.
- Obtain another feature diskette and perform customization once more.
- Use your support structure for aid if problem is not corrected.

020

- 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? *C*

Y N

021

- See figures in the initial customized procedure of the Planning and Set-Up Guide and look up the 8421 indicator code. Verify that the correct meaning/action fix was performed.
- Use 3274 problem codes index.
- Go to MAP C153, Entry Point A.
- Obtain another system diskette and perform customization once more.
- Use your support structure for aid if problem is not corrected.

022

- Perform an IML startup.

Go to Page 6, Step 024, Entry Point C.

023

- 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 Planning and Set-up 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 Customizing Guide GA23-0065 describes sequence number function.
- Use your support structure for aid if problem is not corrected.

024

(Entry Point C)

Do the IML diagnostic tests fail with a flashing 8421 code value of 0101, 0110, 0111, 1000, 1001, 1011? *C* (See *G*).

Y N

025

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

C

Y N

026

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

Y N

027

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

028

- Successful IML end.

F

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.

G

Codes 0101, 0110, and 0111 may flash continuously for 5 seconds, then alternate with another continuous code for 3 seconds. Use the flashing code as the failure indicator.

A M N
1 6 6

MAP D150, Install/Custom

Problems - Mod 61

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029

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

030

- A wrong customization entry for some sequence numbers will cause a flashing 8421 error indication when an IML is attempted.
- Use IML symptom index.
- Go to MAP C152, Entry Point A.
- The 3274 can be failing due to the additional IML diagnostic testing after customization.
- Go to subsystem problem isolation Chapter 2, Step 1.

031

(Entry Point D)

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

Y N

032

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

Y N

033

- Verify that the 3274 has the proper system diskette.
- Go to subsystem problem isolation Chapter 2, Step 1.

034

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

035

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

MAP D151 Problems After

Successful Customization

PAGE 1 OF 3

Entry Point A

Code	Description and Possible Cause	Repair Action
	<p>These error symptoms can occur after a successful customization and IML diagnostic test sequence was performed. Some typical symptoms may be: failure to communicate with the host, 3274 operational error codes, operator encountered problems, display symbols indicated, and other various symptoms.</p>	<ul style="list-style-type: none"> • It is possible that the diskette configuration information is incorrect or a hardware failure is causing the host system to fail. • Use the following referenced procedures to support this MAP. • Perform the modification procedure of the Customizing Guide (GA23-0064) for displaying the configuration information and verify against 3274 customizing procedure form. • 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. SY27-2528 for /2 test information. • Perform test 6 device control block (DCB). This test will indicate if the attached device has identified its feature configuration such as: display, printer screen size, keyboard type, etc. See MCM.
Status Sense	<p>1. Bad status and sense being received at host.</p> <ul style="list-style-type: none"> • BSC multipoint attachment line is tied up because host is sending continuous 	<p>1. Verify response number 342 and ensure that the network configuration is correct for 2 wire or 4 wire operation.</p>

**MAP D151 Problems After
Successful Customization**

PAGE 2 OF 3

	NAKS.	
401	2. 401 errors are indicated on 3278 or 3279.	2. If color displays are attached, verify that response 161 is set to '1'. To determine current customization response without taking the 3274 from the customer interrogate byte 25 of the 'display configuration information' test (/2 test). '01' indicates color (field 161) was customized. '02' indicates program symbols (field 164) was customized. '03' indicates both were customized.
	3. Printer not working.	3. Verify printer port address in printer matrix form. See response 022.
Loop	4. 3274 loop attachment cannot communicate with host. Loop OK indicator not on.	4.a Verify operator panel PRI/SEC and speed switches. b See Chapter 2 step 8 and perform ALT 2 WRAP.
501	5. DDSA attachment with 501 errors.	5. Verify that DDSA card K2 is jumpered for the proper DDSA network speed.
APL	6. Display fails to go into APL mode when pressing the APL key. APL is not displayed.	6. Display has APL installed, keyboard is APL, keyboard jumpers are correct. Verify response 166, it should be B or C, depending if numeric lock is installed in keyboard. An 'A' response will cause failure.
Local Copy	7. Local copy fails or printer very busy	7. Verify customization response 213 is set to '1'.

MAP D151 Problems After

Successful Customization

PAGE 3 OF 3

	indicator displayed.	This allows the printer to be used by host and local copy.
2% %	8.a 2% % occurs when the physical feature is present in the device but is not customized. The display indicates a 2% % after powering on or when the operator tries to use the function. The 2% % error is logged as 2EE (NNN code).	8.a Run DCB test XX/6 to determine the mismatch causing the 2% % code. Examine bytes 25, 95, 96, 97 which contain the bits set due to customization and compare them to bytes 02 - 05 which are the actual features installed in the device. Check for mismatch. Reference the MCM for test 6 and 2.
	b. Keyboard jumpers plugged wrong.	b. Use display documentation.
	c. 3279 display switches on ECS card incorrectly set.	c. Use 3279 documentation and ensure that switches 5 - 8 are in the OFF position.
471 474	9. The number of devices with ECSA feature does not match response 163.	9. Run test XX/6 and check byte 96 and byte 4 line 3. Change response 163 to match feature installed. See MCM test 6.
Host Errors	10. The host CPU is usually recording timeouts, data or operational or control checks.	10. Go to Chapter 2, step 8, host attachment.

MAP D152 IML Diagnostic Failure

After Customization

PAGE 1 OF 2

Entry Point A

Code	Description and Possible Cause	Repair Action
	These error codes can occur after customization and the IML sequence was performed. The error codes are set during the period of the IML sequence. A failing code is usually flashing and the codes of 0101, 0110, 0111 may flash for 5 seconds and alternate with another code that is continuous for 3 seconds. Use the flashing code as the fail code in this index.	<ul style="list-style-type: none"> • Use the following to support this map. • 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 Customization Guide, (GA23-0064) 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.
0000 0001 0010 0011 0100 (flashing) or (solid)	1.a Hardware problem. These codes are not caused by customization except code 0011.	1.a GO TO FAILURE CODE INDEX MAP D30, ENTRY POINT A.
	1.b.Code 0011 - CCA/HPCA feature compatibility	1.b Verify that response 351 agrees with the proper adapter CCA/HPCA card installed in location A3 and L2.
0101-XXXX (flashing) (solid)	2.a Storage compatibility	2.a Verify that response 113 agrees with the actual 3274 storage installed for your model. See card layout and response required. See Chapter 2 Figure 2-3.
	2.b Storage cards.	2.b GO TO CHAPTER 2, STEP 4. Use Procedure for Figure

MAP D152 IML Diagnostic Failure

After Customization

PAGE 2 OF 2

		2-3.
0110-XXXX (flashing) (solid)	3.a CCA or HPCA feature compatibility problem.	3.a Verify that response 351 agrees with the proper adapter, CCA or HPCA feature card installed in location A3 and L2.
	3.b Response 151, Model type compatibility problem.	3.b Verify that response 151 agrees with the machine Model.
	3.c Improper jumper card type P/N in location A3.	3.c The jumper card part number must match your machine adapter CCA/HPCA. See Figure C-2.
	3.d Hardware problem.	3.d See IML MAP D30, Code 0110
0111-XXXX (flashing) (solid)	4.a Modem Wrap compatibility problem. If the customer has configured the diskette for modem wrap, sequence number 311, the modem must be wrappable.	4.a Verify that response 311 (Modem Wrap) can be performed with the interface and modem attached. Also see response 343.
	4.b Hardware or external problem.	4.b See IML MAP D30, Code 0111.
1101 (solid)	5. Uncustomized system diskette end code.	5. Insert customized system diskette.

MAP D153 3274 Internal Problem

Codes During Customization

PAGE 1 OF 4

Entry Point A

Code	Disk ID Note 3	Description and Possible Cause	Repair Action
		These error codes can occur during customization. Most of the codes that are listed are the codes that can be caused by an internal 3274 problem.	The codes that are listed are the ones that say follow your local procedure for problem recovery or internal 3274 error in the customizing guide. It is possible that some codes are due to improper level of diskette code.
0100-0010	S	1. The system diskette being used for the update procedure is not compatible with this 3274.	1. Verify your 3274 system diskette for this model.
1001-0110	F,S, L,R, W	2. Wrong level diskette being used.	2. Use Correct level diskette.
1111-0001	F	3. Micro coded detected error or procedure problem.	3. •ON/OFF switch or TEST key on the 3278/3279 pressed instead of ENTER (feature diskette). •Use your support structure for aid.
1111-0010	F	4. Must have a Mod 2 or larger screen size attached to port 0.	4. Check attached display for proper screen size model.
1111-0011	F	5. Storage compatibility.	5. Verify that machine storage cards match minimum storage requirements of 192K. See Figure 2-3.
1111-0100	S	6. Micro coded detected error.	6. Use your support structure for aid.

MAP D153 3274 Internal Problem

Codes During Customization

PAGE 2 OF 4

1111-0101	F	7. Micro coded detected error or procedure problem.	7. •ON/OFF switch or TEST key on the 3278/3279 pressed instead of ENTER (feature diskette). •Use your support structure for aid.
1111-0110	F	8. Incompatible RPQs or micro coded detected error.	8. Use your support structure for aid.
1111-0111	S	9. Micro coded detected error.	9. Use your support structure for aid.
1111-1000	S	10. Micro coded detected error.	10. Use your support structure for aid.
1111-1001	S	11. Micro coded detected error.	11. Use your support structure for aid.
1111-1010	S	12. Micro coded detected error.	12. Use your support structure for aid.
1111-1011	S	13. Micro coded detected error.	13. Use your support structure for aid.
1111-1100	F,S, L,R, W	14. Disk drive read error.	14. See Note 1.
1111-1101	F,S, W	15. Disk drive write error.	15. See Note 1.
1111-1110	F,S, L,R, W	16. Micro coded detected error.	16. Use your support structure for aid.
0010 (steady) or (flashing)	F,S, L,R, W	17. Diskette improperly inserted or disk drive error.	17. •Insert diskette properly. •See Note 1.
1001 (steady)	F,L, S,R, W	18. A 3274 machine check.	18. See Note 2.
1010 (steady)	F,L, S,R,	19. A 3274 program check has occurred.	19. Use your support structure for aid.

MAP D153 3274 Internal Problem

Codes During Customization

PAGE 3 OF 4

1010 (flashing)	W S	20.Disk drive read error.	20.See Note 1.
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NOTES FOR MAP D153

NOTE 1:

- a. Retry customization with back up diskette.
- b. IML disk drive test 0010 should also be failing. Run IML's and use to verify the repair. (Uncustomized system/load diskette can run this test.)
 - Replace card M2.
 - Replace card in file drive unit.
 - Before replacing file drive unit, GO TO MAP D30, Code 0010 and check possible cause symptoms that could apply to this failure.
 - Use your support structure for aid if problem is not found.

NOTE 2:

- a. GO TO CHAPTER 2, and use Step 3 and 4. Run bus test and IML tests.
- b. If problem was not isolated in Chapter 2:
 - Replace card D2, D4, E2 and C2. Retry customization and isolate the possible failing card. The card E2 contains a pluggable module, isolate to the module or card. New card does not contain module. Reuse from old card.
 - Use your support structure for aid if problem is not found.

NOTE 3:

- a. DISK ID: F = Feature

MAP D153 3274 Internal Problem

Codes During Customization

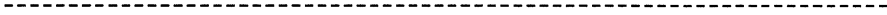
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S = System

L = Language

R = RPQ

W = Load



Chapter 4. Removal and Replacement Procedures

CAUTION

Safety glasses must be worn when performing removal and replacement procedures.

DANGER

Before starting any procedure, be sure that the control unit is completely powered off and that the power cord plug is removed from the building power receptacle.

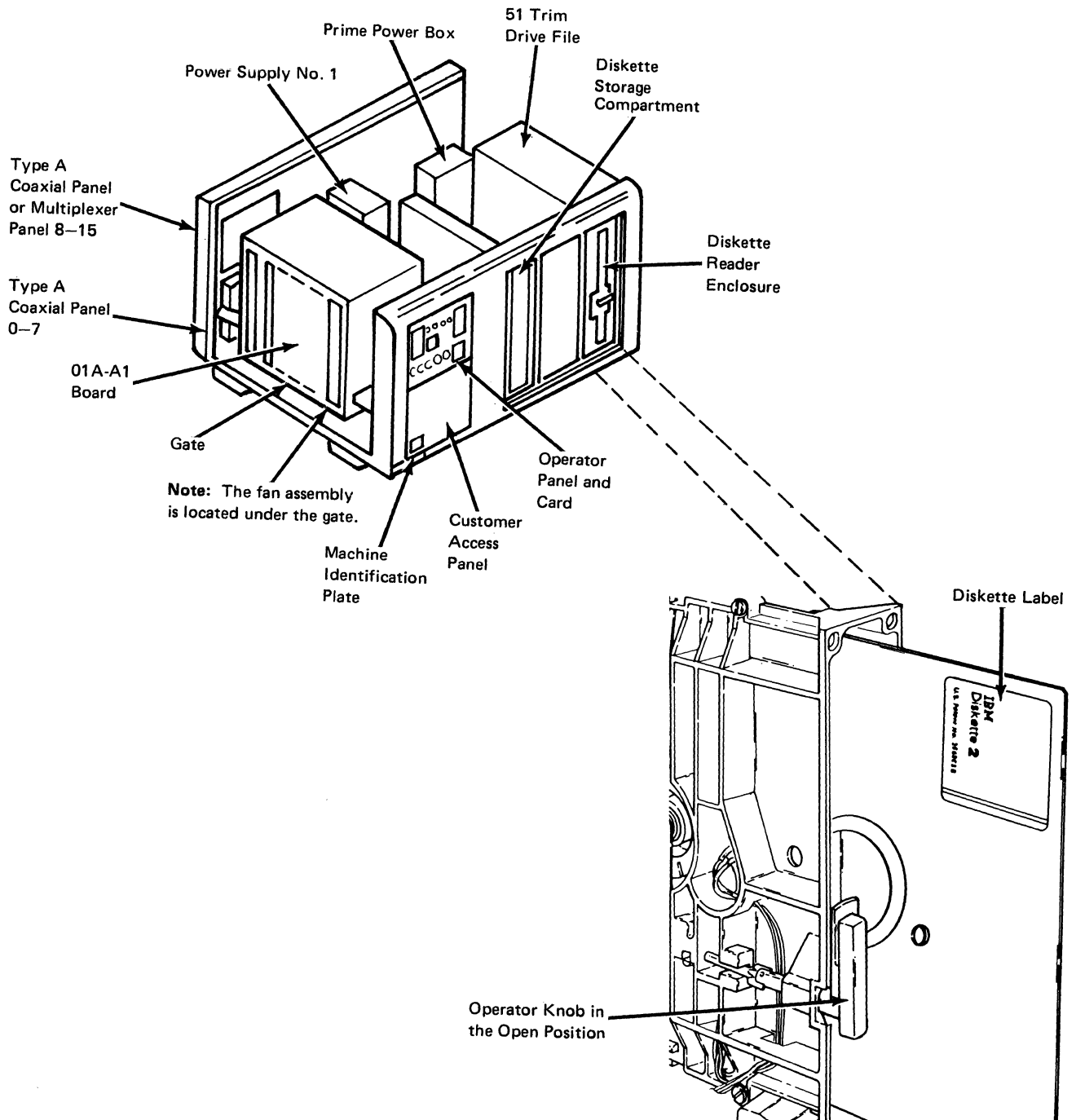


Figure 4-1. 3274 Model 61C Locations

4.1 Machine Access

4.1.1 Cover Removal/CE Manuals (Figure 4-2)

1. Place the \square / \bigcirc (on/off) switch in the \bigcirc position.
2. Turn the latches **A** to the open position by using a key-hex actuator **B** or a No. 4 metric (No. 156 domestic) Allen wrench.
3. Lift the cover straight up to remove.

The CE maintenance information manuals are located in the document storage compartment.

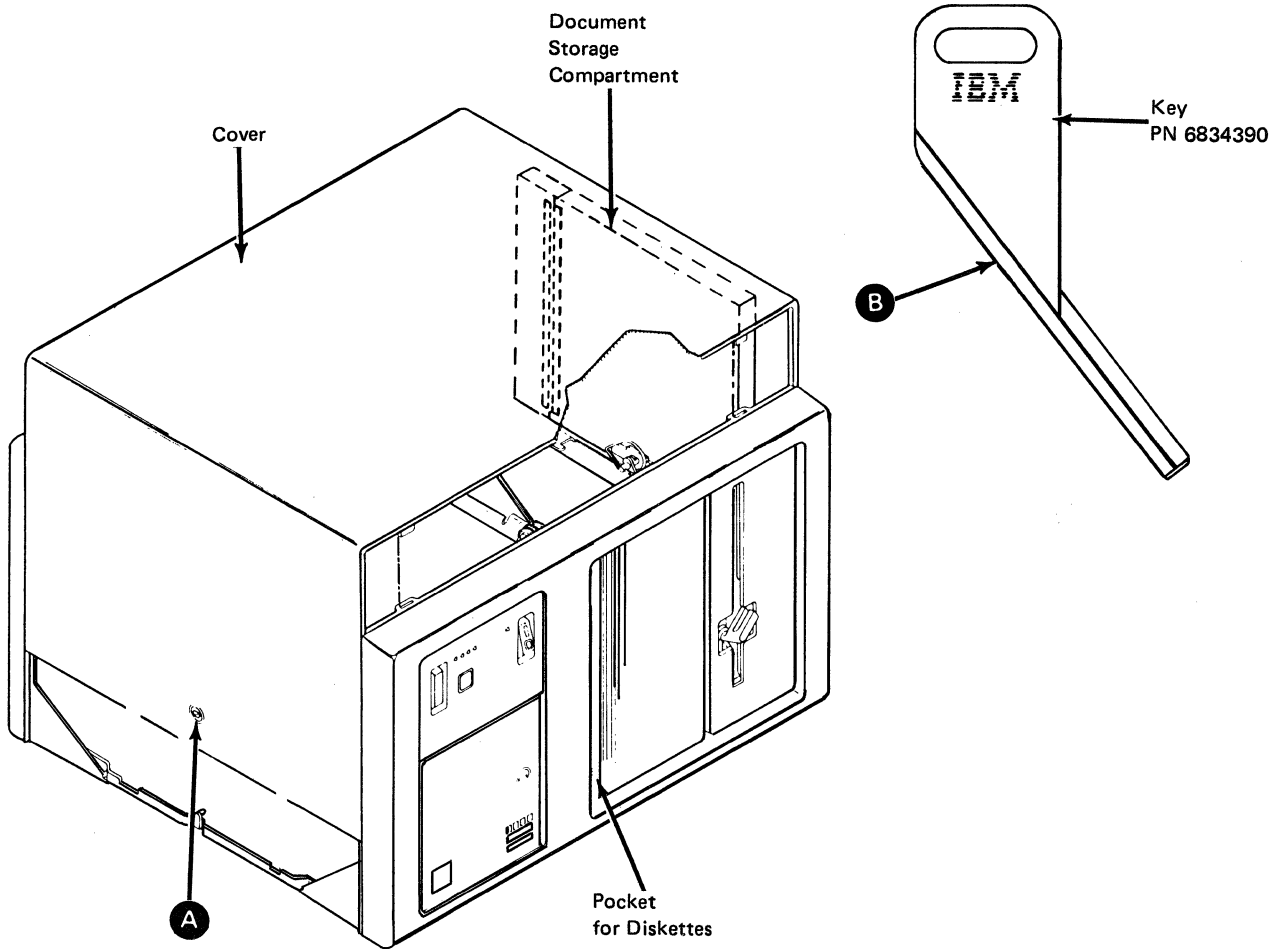


Figure 4-2. Machine Access, Cover

4.1.2 Board and TSR Supply (Figure 4-3)

1. Place the / (on/off) switch in the position.
2. Loosen the shipping bolts **A** if necessary and swing the gate open **D**.
3. Loosen power supply holding screw **F** and swing the supply open (up) **E**.

Warning. When the board is in the service position, the card/connector rows (1, 2, 3, 4, 5, 6) are inverted. Be careful when identifying the correct position of any card or connector.

4. To close the gate assembly, reverse these steps.

CAUTION

When the gate is being closed, keep your fingers from between the gate corner and the housing frame **C**.

5. To reinstall, reverse these steps.

Note: Card retainers **B** can be discarded after removal.

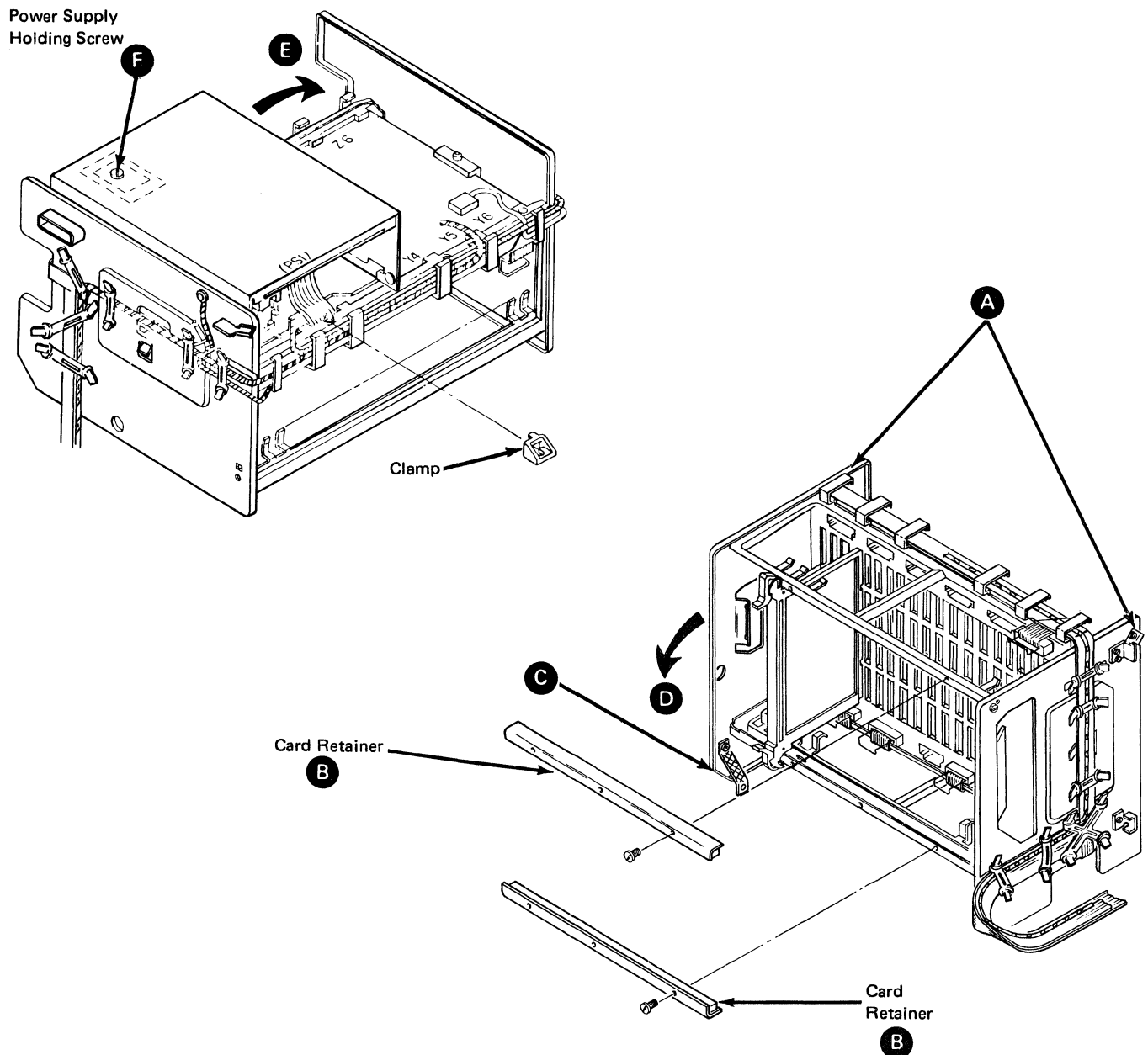
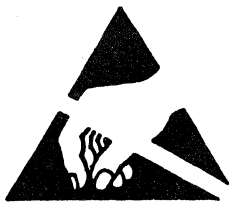


Figure 4-3. Machine Access—Board and Power Supply

4.2 Card Removal and Replacement

CAUTION

To handle ESD cards B2 through E2 and the E2 Pluggable Module:

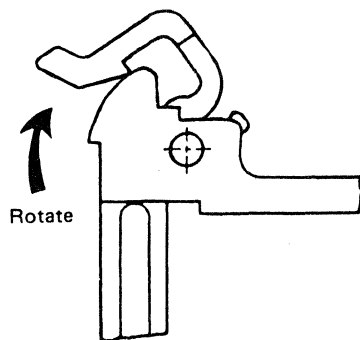


CAUTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

1. Keep the card in the original shipping container (ESD bag) until you are actually ready to plug it into the machine.
2. Just prior to touching the ESD card, discharge yourself of static electricity through the metal frame of the machine by grasping the frame or the cover. If possible, keep one hand on the frame when inserting or removing a card.
3. Avoid touching the pins on the components by handling the card by its edges or shroud. When removing a pluggable module, use the proper removal tool.

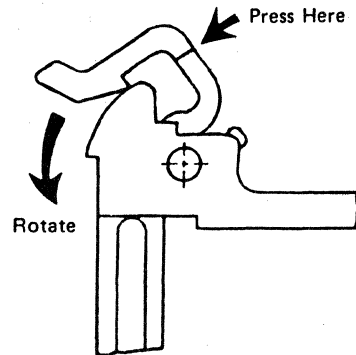
4.2.1 Removal (Figure 4-4)

1. Place the / (on/off) switch in the position.
2. Unlock and rotate the extractor **C** levers simultaneously at the top and bottom until the card disengages (as shown below).



4.2.2 Replacement (Figure 4-4)

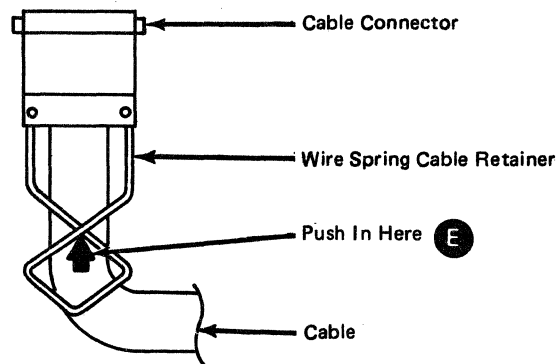
1. Open both extractor levers **C** fully. Insert the card holder tracks into the front guide fingers (card components towards right). *Do not use the extractor levers to reseat the card.* Apply firm finger pressure to the card holder **D** (or connector housing for double-ended cards) to ensure proper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



4.3 Internal Cable/Connector, Removal and Replacement (Figure 4-4)

4.3.1 Board Socket Connector

1. Open the logic gate to gain access to the cable connector through the gate opening **B**.
2. Push in the wire spring cable retainer **E** to disengage it from the slot in the gate, and pull the connector free from the pins.



3. To replace, reseat the connector and ensure that the tab in the retainer is latched in the slot in the gate.

4.3.2 U-Shaped Spring Retainer

1. Push the U-shaped spring retainer **A** to disengage it from the slot in the gate, and pull the connector free from the pins.
2. To replace, reseat the connector and ensure that the tab is latched in the slot in the gate.

Gate Shown in
Closed Position

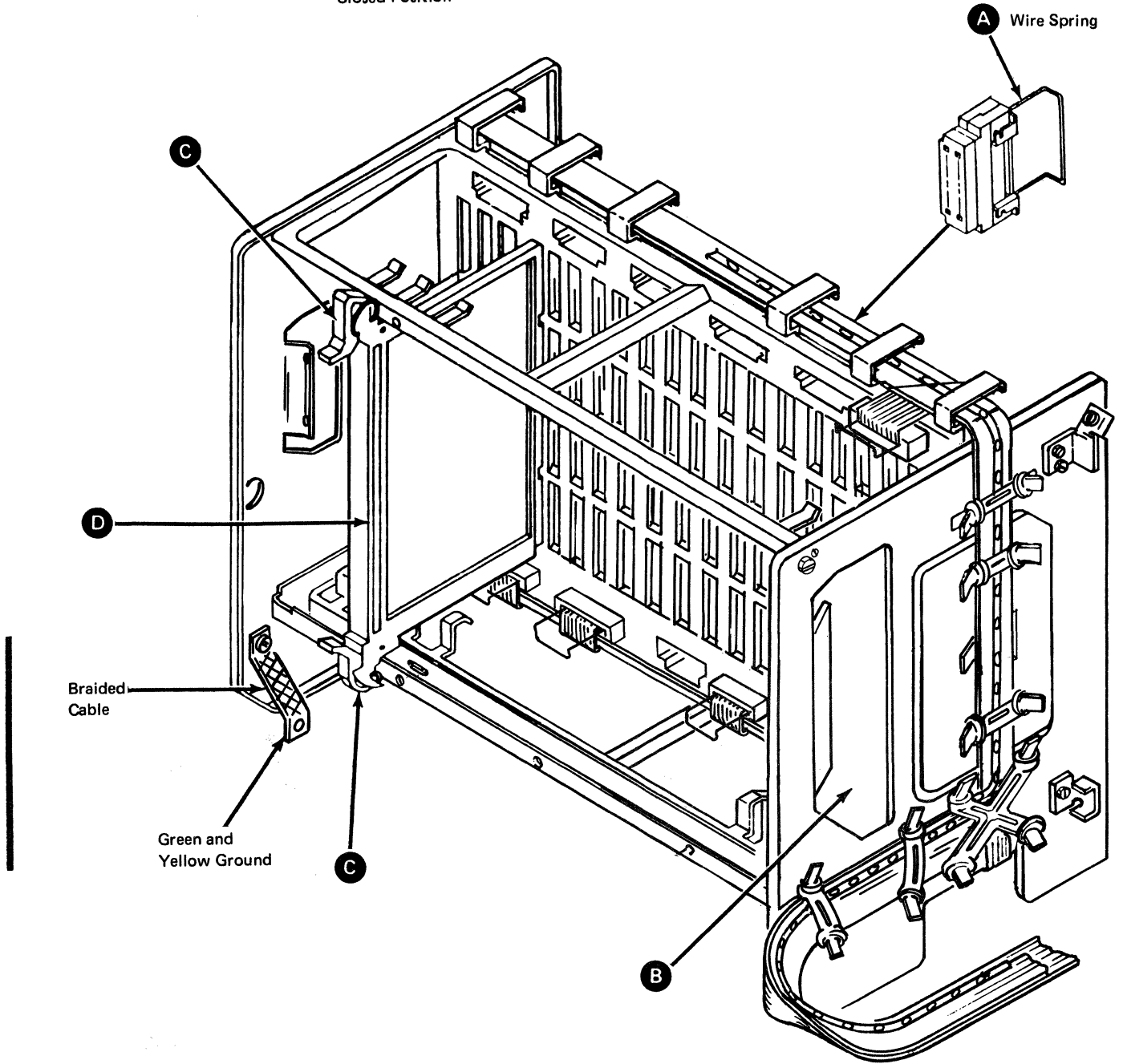








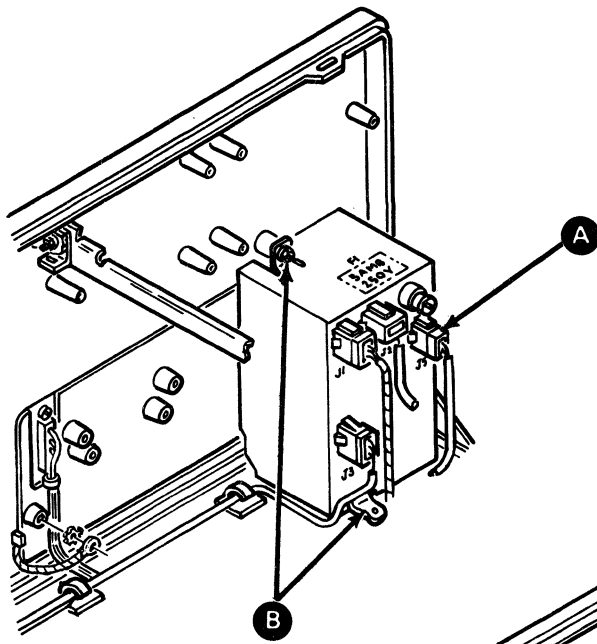
Figure 4-4. Card and Cables

4.4 Prime Power Box, Removal and Replacement (Figure 4-5)

DANGER

Input voltage is present in the On/Off switch housing when power is turned off ( /  switch in the  position).

1. Place the  /  (on/off) switch in the  position.
2. Remove the power cord plug from the building power receptacle.
3. Remove the power cord plug **C** located at the rear of the 3274.
4. Disconnect all the connectors **A** from the prime power box.
5. Remove the two hex bolts **B** from the upper and lower mounting brackets.
6. Disconnect the ground wire **D** from the machine chassis.



7. Remove the prime power box. To reinstall, reverse these steps.




DANGER

You must reconnect the green-yellow wire to ground (removed in step 6.)

4.5 Power Supply Assembly, Removal and Replacement (Figure 4-6)

CAUTION

Do not remove the nylon tie wrap or bend the metal tabs, or in any way defeat the purpose of the power supply interlock holding plug P1 to the top cover.

1. Place the  /  (on/off) switch in the  position.
2. Remove the power cord plug from the building power receptacle.
3. Loosen the power supply holding screw **H**.
4. Remove the plug P3 connector clamp **E**.
5. Remove plug P2 **F** from the power supply card.
6. Swing the power supply to the open (up) position and remove the yellow/green wire **G**.

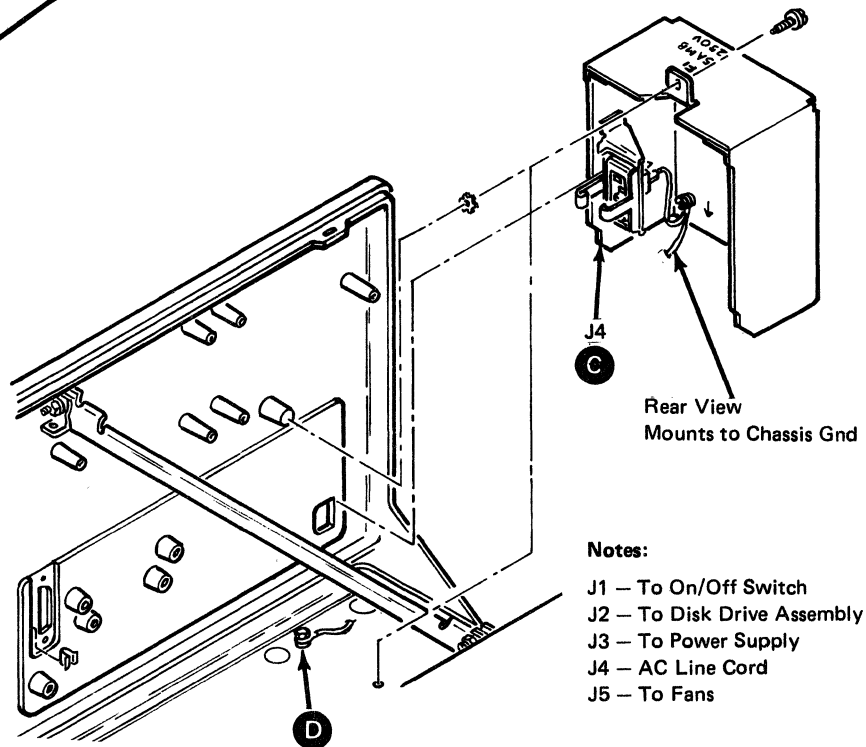


Figure 4-5. Prime Power Box

7. Remove plug P3 from the logic board Y2 position **C**.
8. Remove the power supply spring clamps **D** and remove the power supply from the logic board.
9. To reinstall the power assembly, reverse the above steps.

4.5.1 Power Supply Card

1. Perform the above procedure to remove the power supply assembly.
2. Loosen the two assembly cover holding screws **B** at the side of the cover.
3. Squeeze the input cable power plug P1 **A** locking tabs and remove the cable and top cover.

DANGER:

If the part number of your power supply is 5699477 or 5699478 (located on bottom of housing cover), the power supply card may hold a stored charge. Discharging may be done as follows:

- Attach a jumper, first to CR13(K), then to register R5, as shown in Figure 4-6, Details 1 and 2.
- Allow 5 seconds for complete discharge.
- Remove jumper.

4. To remove the card, remove the four holding screws **J**.
5. To reinstall the card, reverse the above procedure.

Notes:

1. On later-built machines, ensure that the power plug **A** ground wire is connected to the housing cover.
2. On some early-built machines, fuse F4 is not pluggable and is not replaceable.

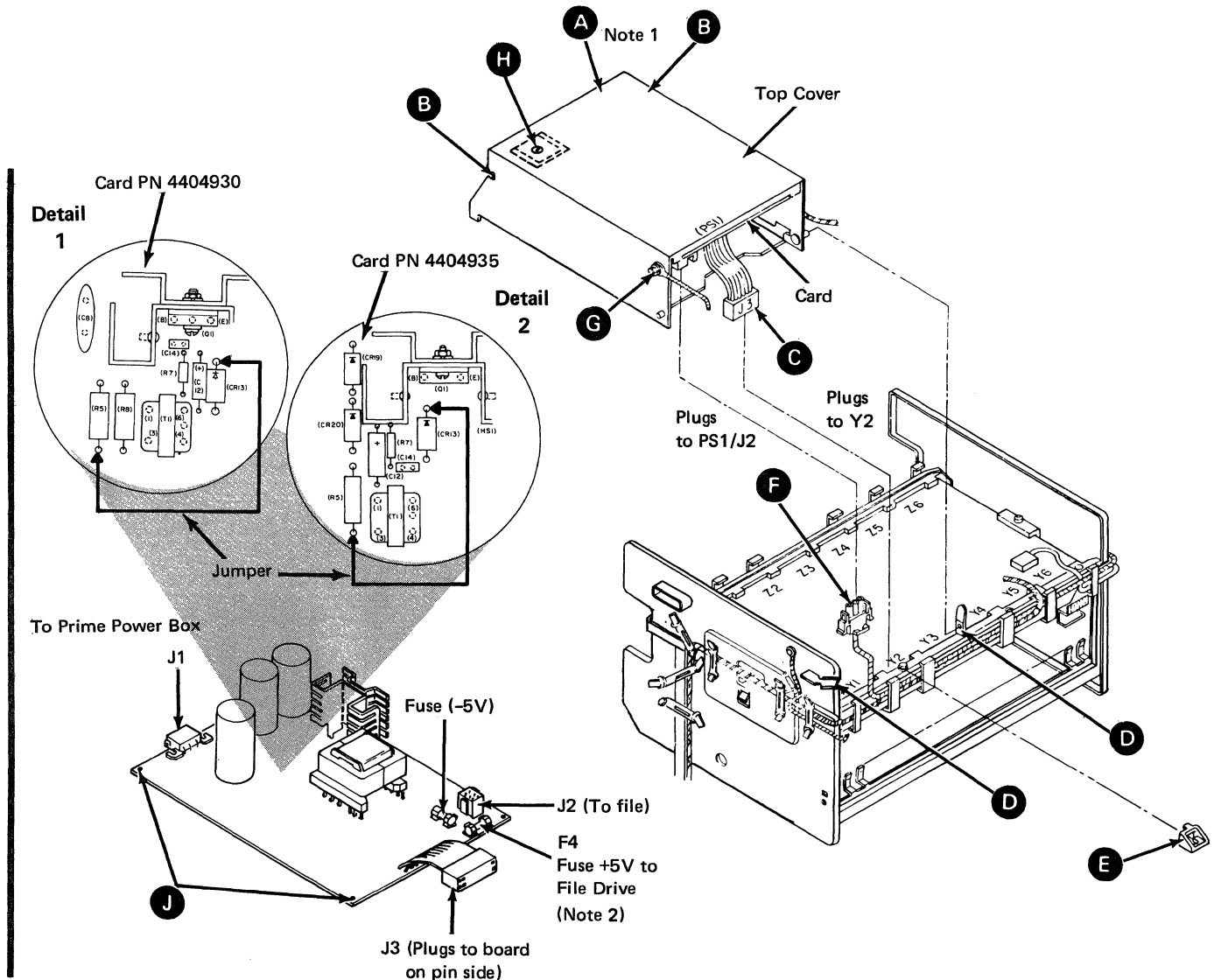





Figure 4-6. Power Supply Assembly and Card

4.6 51TD Diskette Drive, Removal and Replacement (Figure 4-7)

1. Place the  /  (on/off) switch in the  position.
2. Remove the power cord plug from the building power receptacle.
3. Disconnect the J2 connector from the prime power box **A**.
4. Unplug the I/O cable **D** from the card.
5. Loosen the four locking screws **C** at the front and rear of the unit. Slide the unit out toward the front of the machine.
6. Remove the decorative bezel **B** by placing the operator knob in the closed position and pulling the bezel free from the drive unit.
7. To reinstall the diskette drive, reverse the above steps.
8. To remove the 51TD card, refer to Figure 4-8.

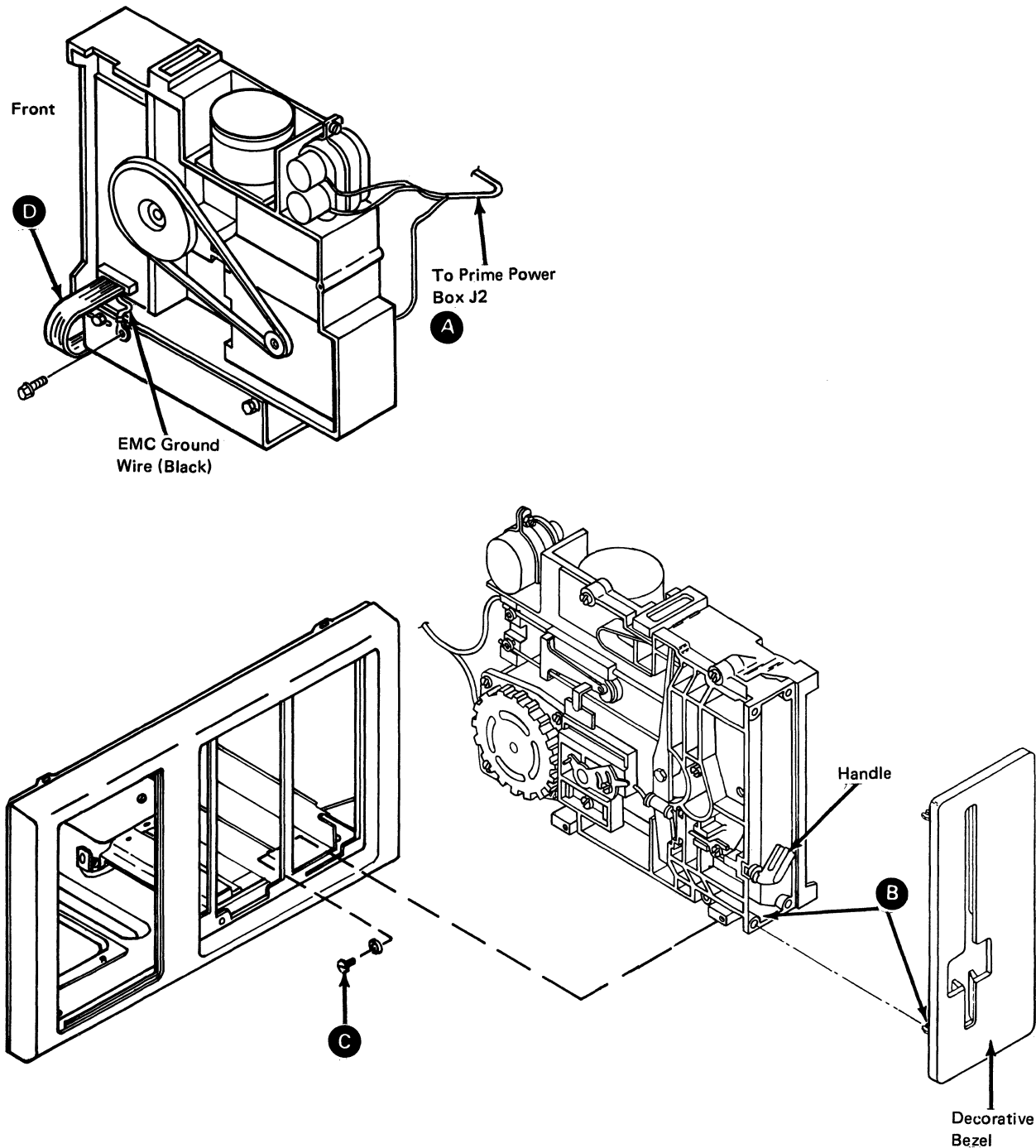


Figure 4-7. 51TD Diskette Drive

4.7 Diskette Drive Control Card Removal and Replacement (Figure 4-8)

1. Switch power off.
2. Remove the six cable connectors **A** from the control card.
3. Loosen the two retainer screws **D** and turn the two retainers **C** outward until they are no longer in the path of the control card **B**.
4. Remove the control card.
5. To reinstall the control card, reverse the above steps.

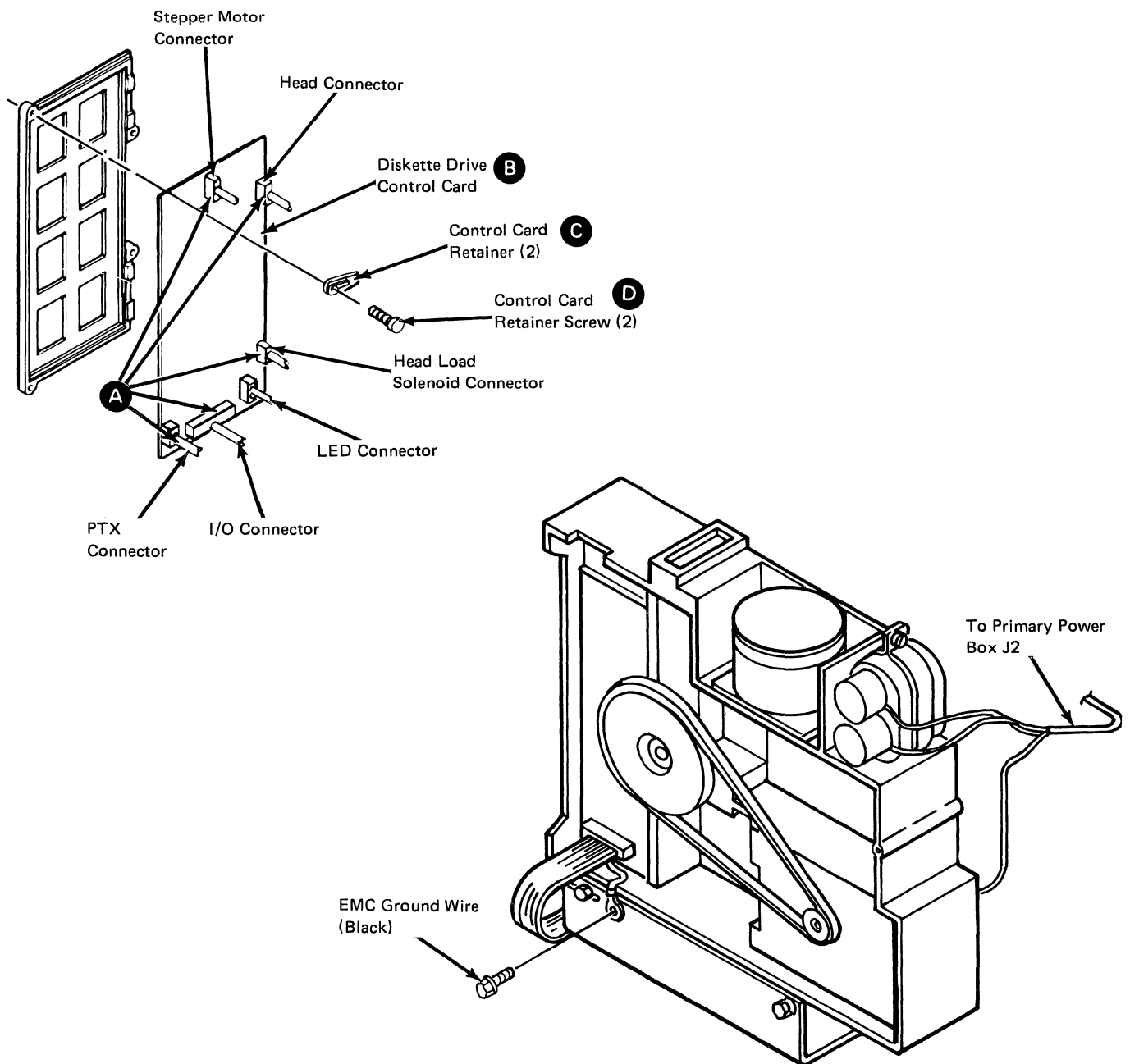


Figure 4-8. Diskette Drive Card

4.8 Fan Assembly, Removal and Replacement (Figure 4-9)

1. Place the / (on/off) switch in the position.
2. Remove the power cord plug from the building power receptacle.
3. Remove the four hex mounting bolts **A** from the plenum.
4. Remove the fan plug P5 **C** from the prime power box and the yellow/green ground wire **B**.
5. Remove the fan assembly.
6. Remove the four screws **D** securing the fan to the shock mounting bracket and angle bracket.

Note: The short screws are used for the angle bracket **E**.

7. Disconnect the plug **H** from the fan assembly and disconnect the yellow/green grounding wire **G**.
8. Remove the fan.
9. To reinstall the fan assembly, reverse the above steps.

Warning: Observe the correct direction of air flow **F** when installing the fan.

DANGER

You must reinstall the yellow/green grounding wires removed in steps 4 and 7.

Warning: Fans 1 and 2 **J** have different part numbers and must not be swapped with each other. See Figure A-2.

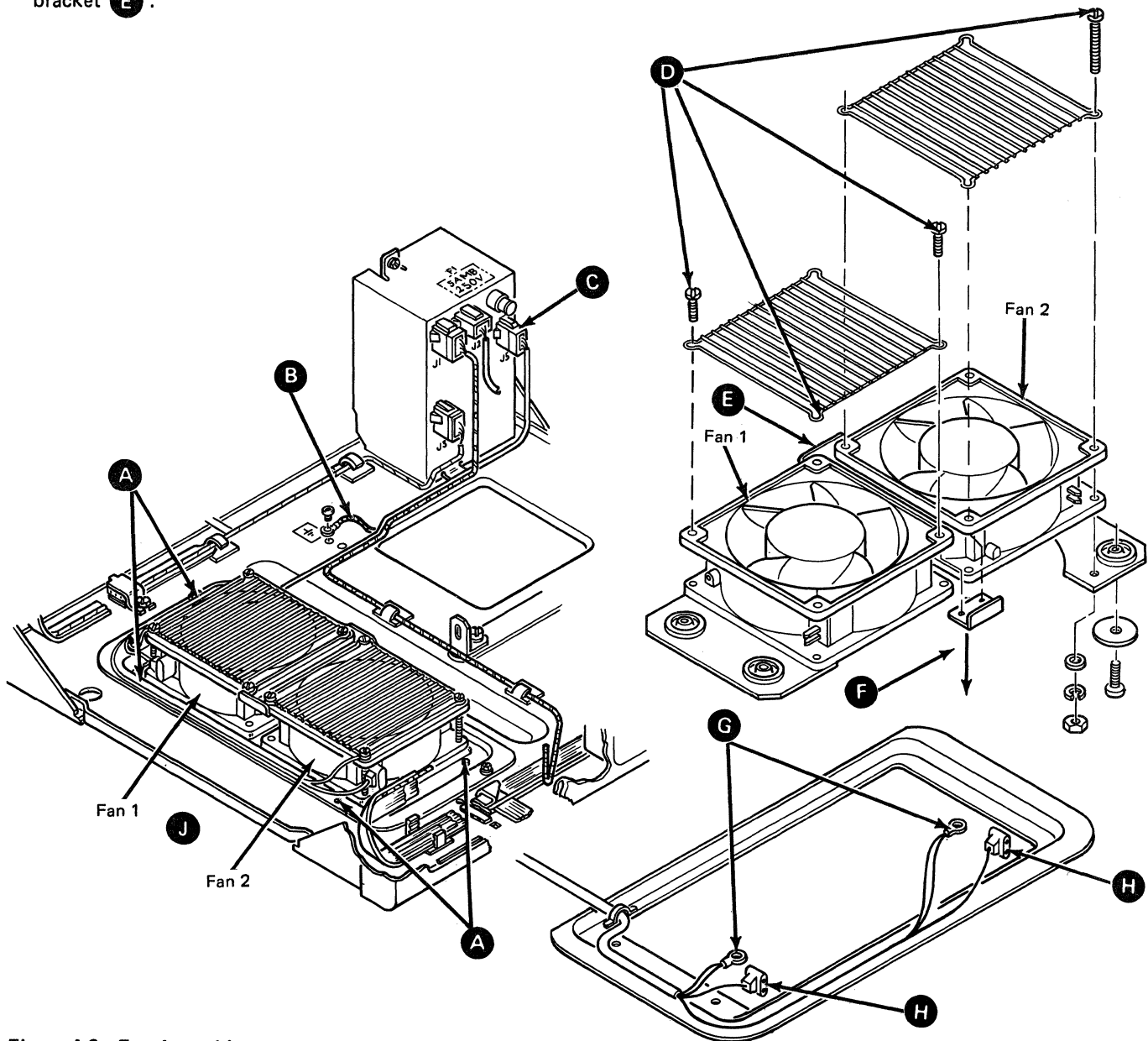


Figure 4-9. Fan Assembly

4.9 Logic Board, Removal and Replacement (Figure 4-10)

1. Place the / (on/off) switch in the position.
2. Remove the power cord plug from the building power receptacle.
3. Remove the power supply assembly. (Refer to paragraph 4-5.)
4. Remove all the cards from the board.
5. Disconnect the cables from the V, Y, and Z rows.
6. Remove the green connector from the B-row **A**.
7. Remove the power supply bracket **B** by removing the three holding screws.
8. Remove the 12 hex holding screws and retainers **C** located on the wiring side. Lift the board out (wiring side up).
9. To reinstall the board, reverse the board removal steps. Ensure that the cables and cards are inserted into their proper socket locations. Refer to Figure C-1.
10. Remove a yellow wire from K2D12 to L2U05 from those machines containing the loop attachment. Refer to card location K2. To determine whether your machine contains a loop attachment, see Figure C-2.
11. If the machine has the Encrypt/Decrypt feature (Card J2), a new master key must be entered. See Chapter 6.

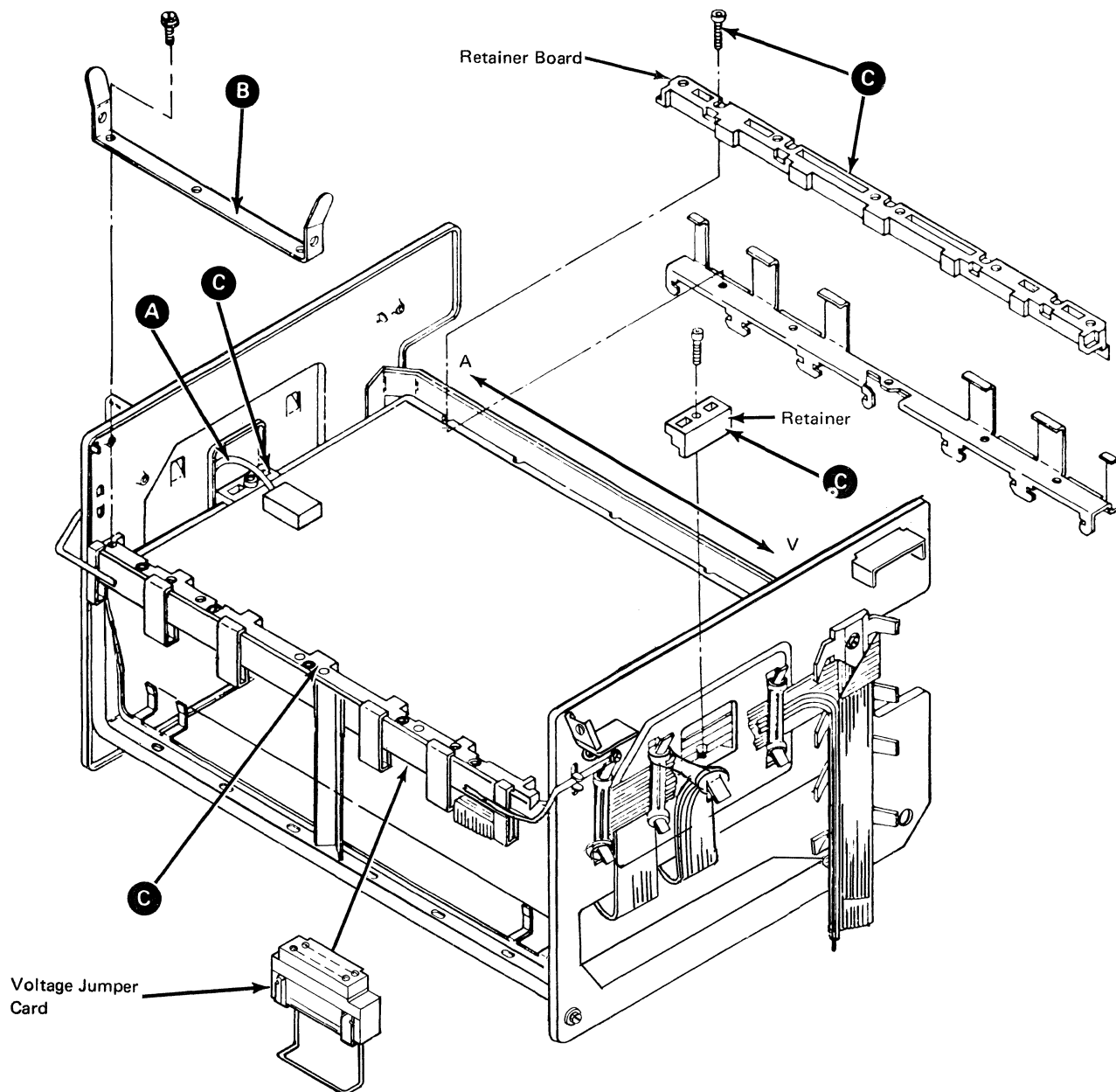





Figure 4-10. Logic Board Assembly

4.10. Operator Panel/Indicator Card, Removal and Replacement (Figure 4-11)

1. Place the  /  (on/off) switch in the  position.
2. Remove the power cord plug from the building power receptacle.
3. Open the customer access panel door **A**.
4. Depress the four locking tabs **C** on the back of the operator panel and remove the panel.
5. Disconnect the J1 and J2 connectors **E** from the indicator card.
6. Depress the two panel tabs **B** to release the card.

7. To reinstall the panel, reverse these steps. Do the following while reinstalling the card and panel:

- a. Card—Align the card holes **F** with the panel stems and insert the card edge **D** into the panel slot. Ensure that the power-on indicator is properly aligned; then press down on the card to position it under the two panel tabs.
- b. Panel—Insert the panel into the gate at the bottom edge at a slight angle, with the panel door in the open position.

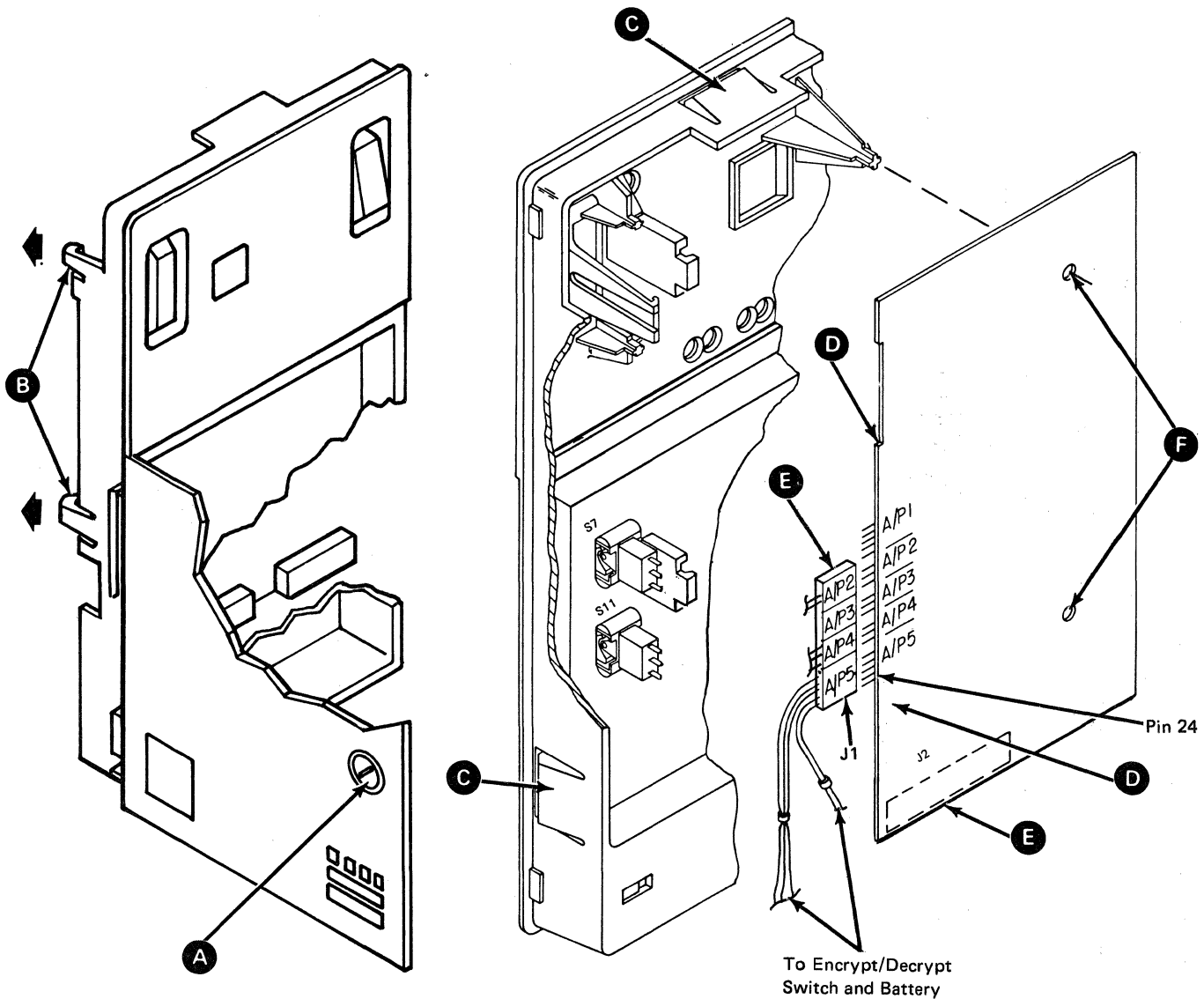




Figure 4-11. Operator Panel/Indicator Card

4.11 Operator Panel Switches, Removal and Replacement (Figure 4-12)

4.11.1 On/Off Switches

1. Place the  (on/off) switch in the  position.
2. Remove the power cord plug from the building power receptacle.
3. Remove the on/off switch as follows:
 - a. Disconnect the J1 connector from the prime power box.
 - b. Press the plastic latch **A** at the rear of the switch and remove the switch.
4. To reinstall, reverse these steps.

4.11.2 Operator Panel Switch (Not Card-Mounted)

1. Remove the operator panel switch (not card-mounted) as follows:
 - a. Disconnect the J1 connector from the indicator card **B**.
 - b. Remove the front panel decal, or cut the decal around the switch to allow removal.
 - c. Push the switch from the pin side **C** to release the switch spring from the panel and remove the switch.
 - d. Order a new front panel decal if it was damaged during switch removal.
2. To reinstall the operator panel switch assembly, reverse these steps.

4.11.3 Encrypt/Decrypt Switch

See Figures D-3 and D-5 for wiring.

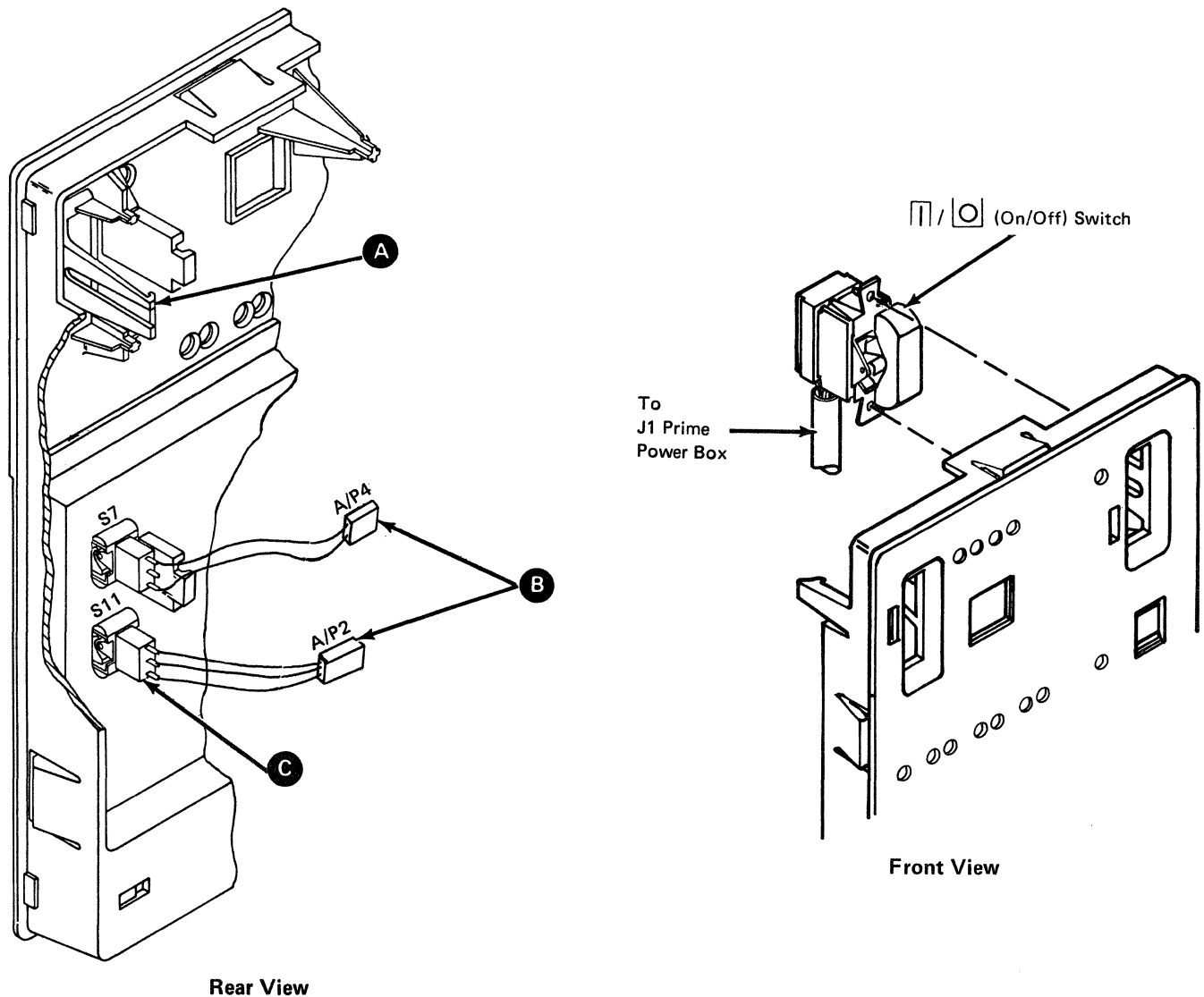


Figure 4-12. Operator Panel Switches

4.12. Card E2 Pluggable Unit

Figure 4-13 shows the pluggable ROS module and its removal tool.

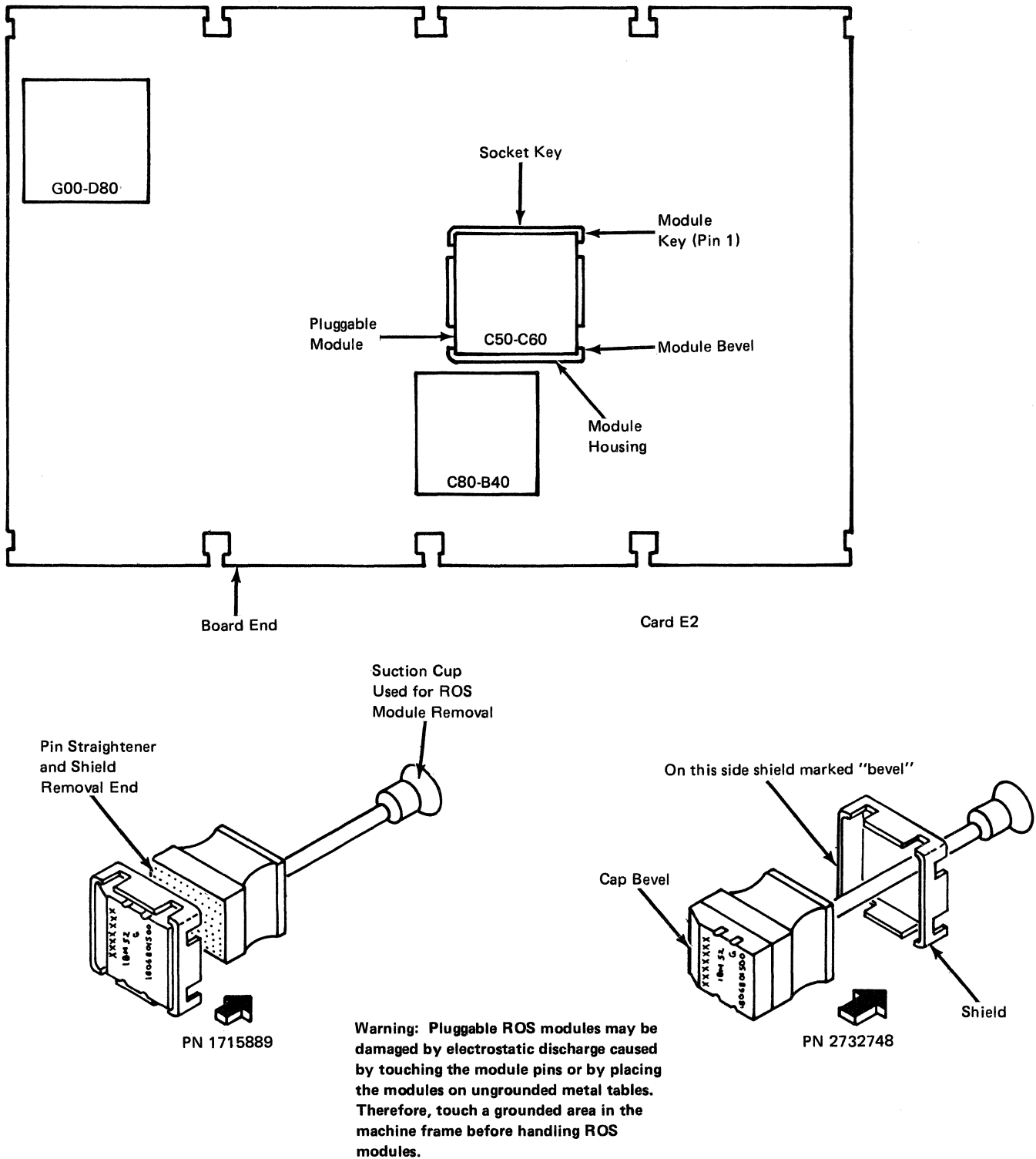


Figure 4-13. Card E2 Pluggable Module and Module Removal Tool

Chapter 5. Remote Attachment Data

5.1 Communications Facilities

5.1.1 3274 Model 61C SDLC

The 3274 Model 61C can communicate with the following, using synchronous data link control (SDLC):

- S/370 over full- or half-duplex communications facilities via a 3704 or 3705 Communications Controller. See Figure 5-1, Part 1.
- 8100 Information System through a directly attached loop or through a data-link attached loop. See Figure 5-1, Part 2.

5.1.2 3274 Model 61C BSC

The Model 61C Communicates with an S/370 or S/360 using binary synchronous communications (BSC) over duplex or half-duplex communications facilities via a 2701 Data Adapter Unit, a 2703 Transmission Control Unit, or a 3704 or 3705 Communications Controller. See Figure 5-1, Part 1.

The Model 61C can communicate with the following using BSC:

- S/370 Models 115, 125, 135, or 138 via the appropriate BSC features on the 3115, 3125, 3135, or 3138. See Figures 5-1, Part 1.
- The 4331 through its communication adapter.

5.1.3 3274 Model 61C Modes/Speeds

The 3274 Model 61C operates in half-duplex/point-to-point mode or half-duplex/multipoint mode on either half-duplex or duplex facilities at transmission speeds up to 9600 bps and in point-to-point duplex, up to 56,000 bps.

For loop attachment, Model 61C operates in half-duplex mode at the following speeds:

- Direct attached loop—9600 or 38,400 bps
- Data-link attached loop—2400, 4800, or 9600 bps.

5.1.4 Communication Adapters

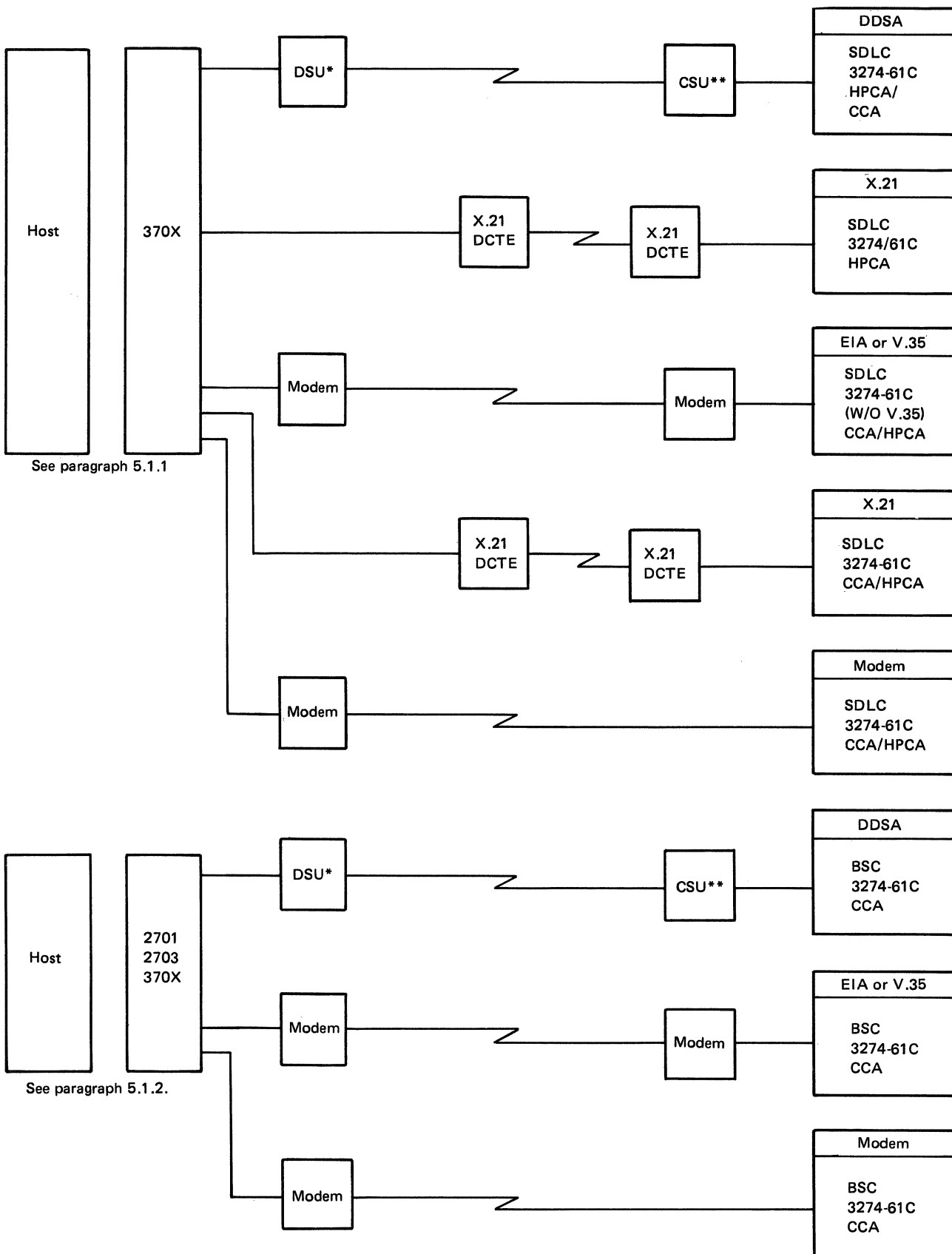
- CCA—The Communication Common Adapter (CCA) is used with a transmission facility of SNA/SDLC or BSC. The data rate can be up to 9600 bps, depending on the attached communication equipment. Clocking must be provided by the modem or the communication facility.
- HPCA—The High-Performance Communication Adapter (HPCA) is used with a transmission facility of SNA/SDLC. HPCA is required when a line speed is used that is greater than 9600 bps (V.35 Communication Attachment, X.21 Nonswitched at 48K bps, or DDS Adapter at 56K bps), when either the X.21 switched adapter or the loop adapter is installed. When attached via EM1 or V.35, clocking must be provided by the communications equipment.

5.2 Communication Attachments

5.2.1 External Modem — EIA/V.35

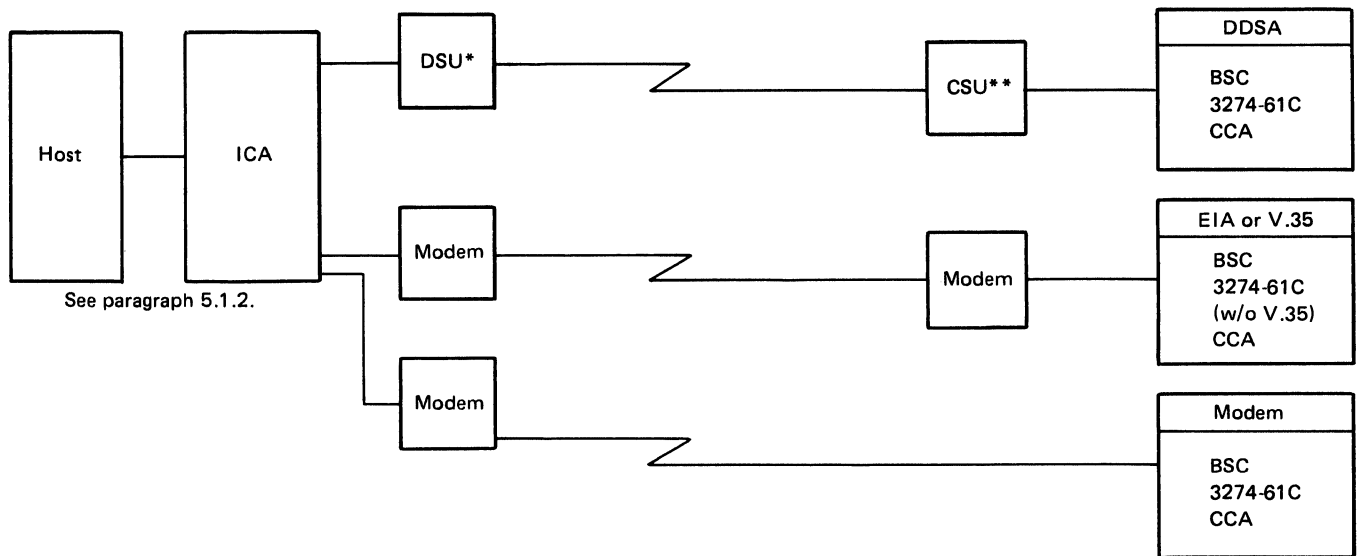
An external modem, or equivalent device, with its own clocking can be attached to a 3274 Model 61C (w/o V.35). The 3274 must have the external modem interface (EIA or V.35) and either a CCA or an HPCA installed. The V.35 interface provides support for communication line speeds up to 56K bps for SDLC and 9600 bps for BSC on Model 61C. The V.35 Interface Communications Line Flow—Model 61C is shown in Figure 5-6.

A determination should be made as to the wrap capabilities of the modem being used. The 3274 communication line flow for EIA is shown in Figure 5-2.

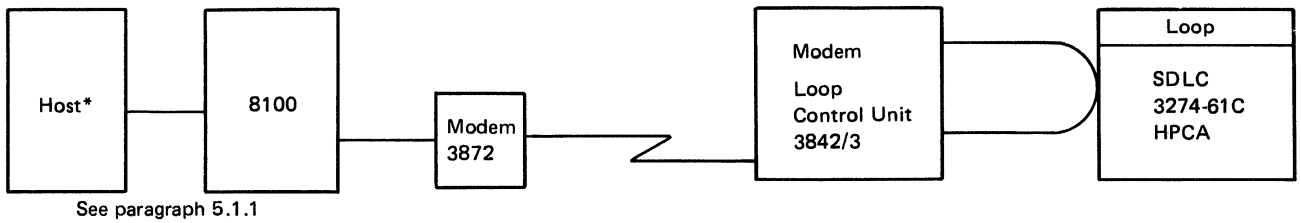


*AT&T Data Service Unit (DSU) or equivalent.
 **AT&T Channel Service Unit (CSU) or equivalent.

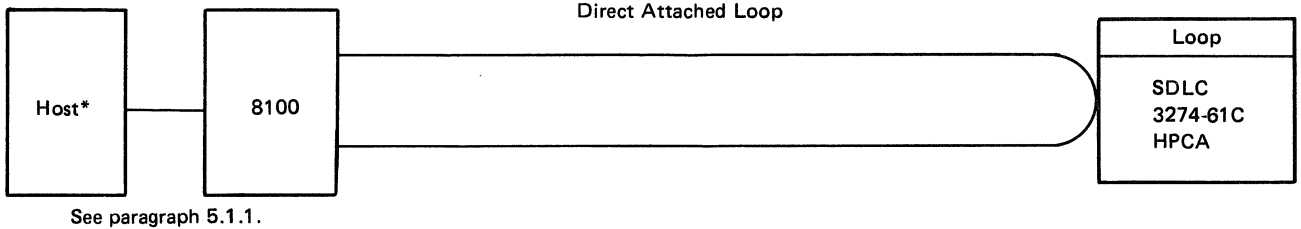
Figure 5-1 (Part 1 of 2). Communications Configuration



Data Link Attached Loop



Direct Attached Loop



*Host may not be present.

Figure 5-1 (Part 2 of 2). Communications Configuration

CCA – With or W/O Clock:
HPCA W/O Clock
Card L2

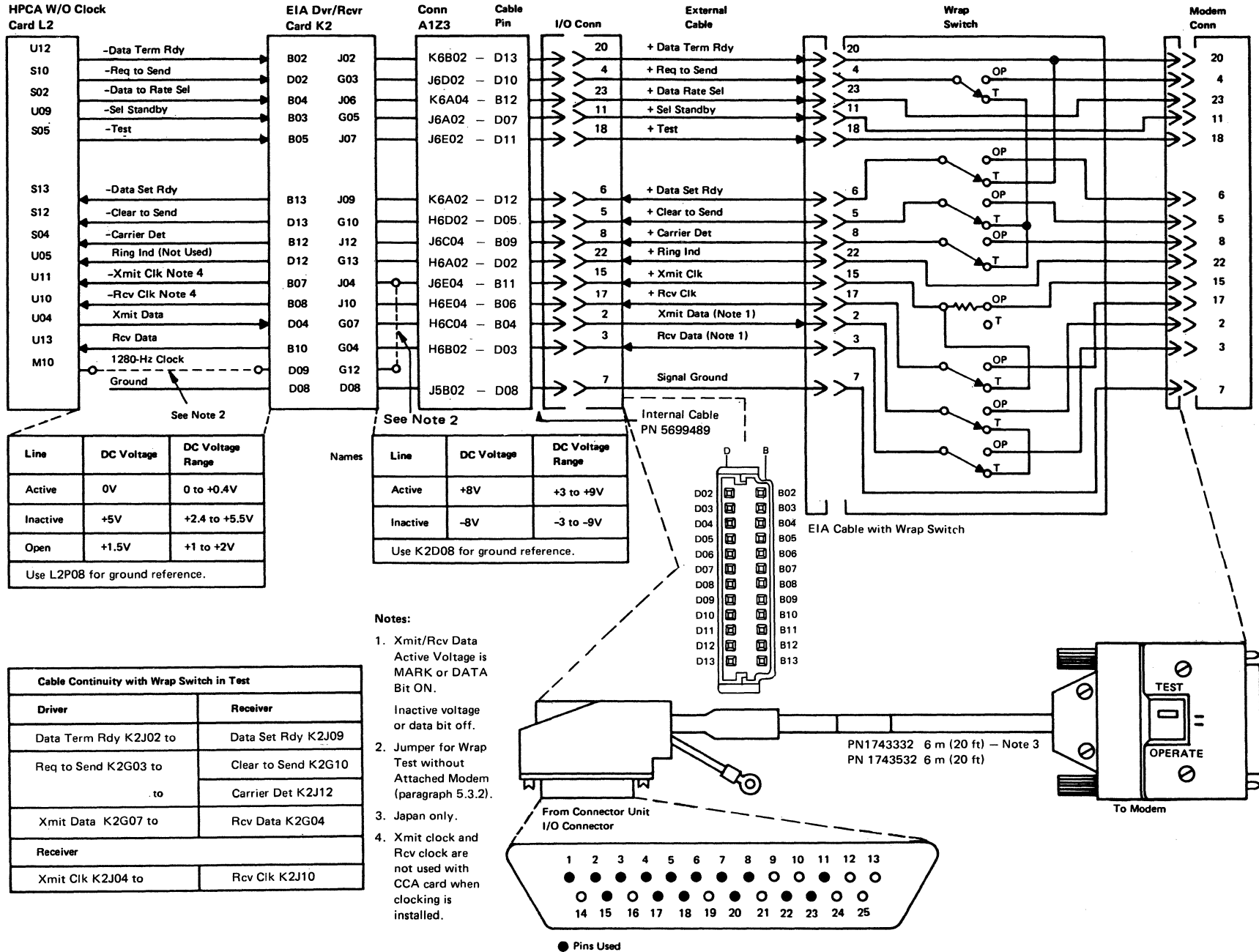


Figure 5-2. Communications Line Flow, EIA

5.2.2 DDS Adapter

The Digital Data Service (DDS) Adapter connects the 3274 Control Unit Model 61C to the AT&T nonswitched Data-^{*}phone Digital Data Service network. The DDS adapter is an integrated adapter for BSC or SDLC data transmission at speeds of 2400, 4800, 9600, or 56K bps. (If the DDS adapter card (Figure 5-13) 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 5-3.

The 3274 must have either the CCA or the HPCA installed. The DDS adapter can be used in point-to-point or multipoint configuration. 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 5-3.

5.2.3 Loop

The 3274 Model 61C can attach to an 8100 or 4331 Information System either locally through a directly attached loop, or remotely through a data-link attached loop using SDLC protocol. The directly attached loop supports a data rate of either 9.6 or 38.4 kilobits per second. The data rate of the data link attached loop is 2.4 kilobits per second with half-speed selection of 1.2 kilobits per second. The communications line flow for the loop is shown in Figure 5-4.

5.2.4 X.21 Nonswitched

The X.21 nonswitched adapter provides for the connection of 3274 Control Unit Model 61C to nonswitched Public Data Networks.

The X.21 nonswitched adapter is integrated for SDLC data transmission at speeds of 2400, 4800, 9600, and 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 [in World Trade this is the country's Postal Telephone Telegraph (PTT)]. 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 nonswitched adapter is shown in Figure 5-5.

5.2.5 X.21 Switched

The X.21 switched adapter provides for the connection of the 3274 Control Unit Model 61C to switched Public Data Networks.

The X.21 switched adapter is an integrated adapter for SDLC data transmission at speeds of 2400, 4800, 9600, and 48,000 bps. Access to the switched Public Data Network is provided by the Data Circuit Terminating Equipment (DCTE), which is supplied to the customer by the X.21 Network Authority [in World Trade this is the country's Postal Telephone Telegraph (PTT)]. The DCTE provides clocking to the 3274. See Figure 5-1.

For switched operation the 3274 must have the HPCA installed. The 3274 communications line flow for the X.21 switched adapter is shown in Figure 5-5.

^{*}Trademark of American Telephone and Telegraph Co.

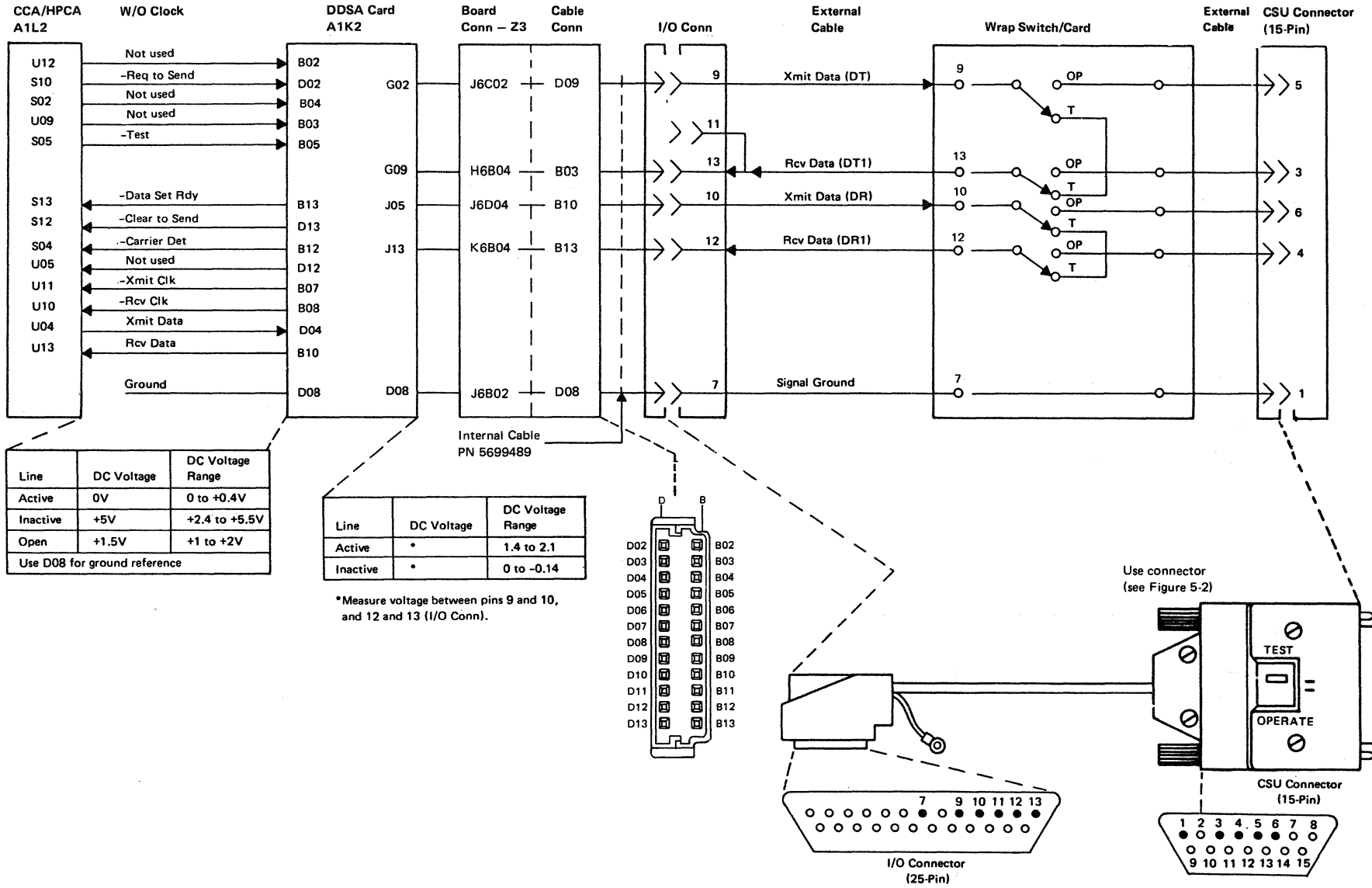
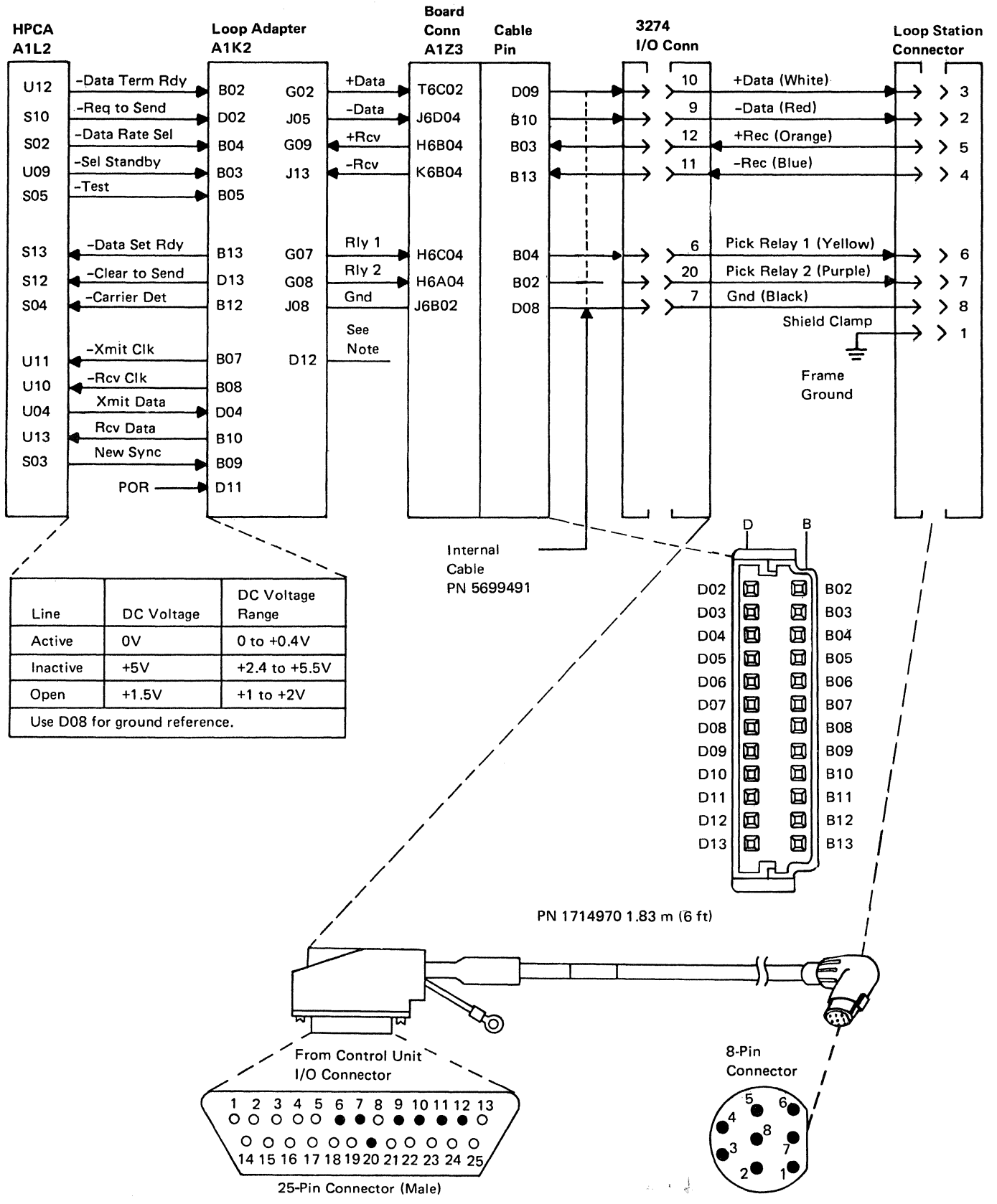


Figure 5-3. Communications Line Flow, DDS Adapter



Note: This pin goes to the Local/Comm switch in the Operator Panel. See Figure D-3.

Figure 5-4. Communications Line Flow, Loop

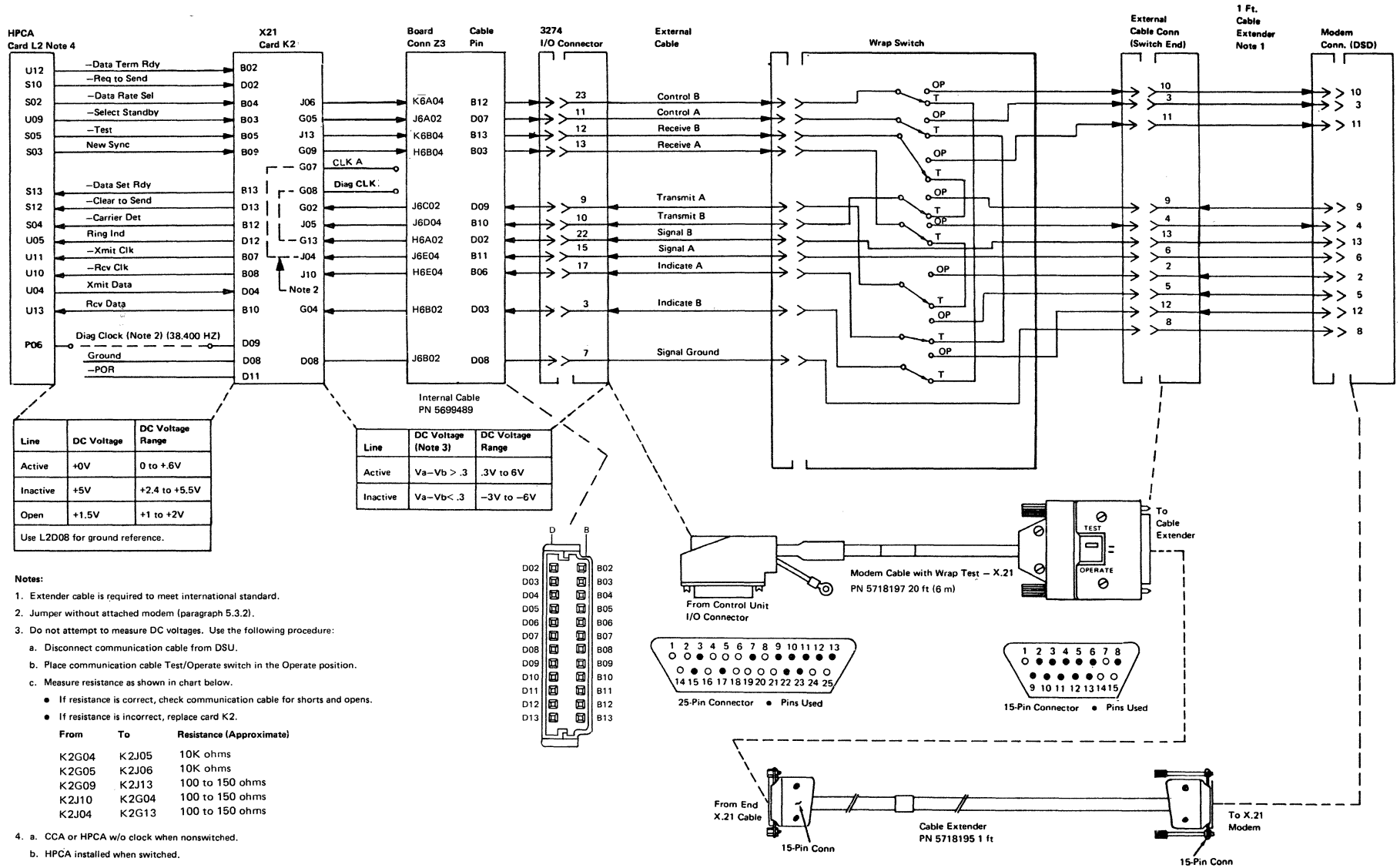


Figure 5-5. Communications Line Flow, X.21 Switched and Nonswitched—Domestic and World Trade

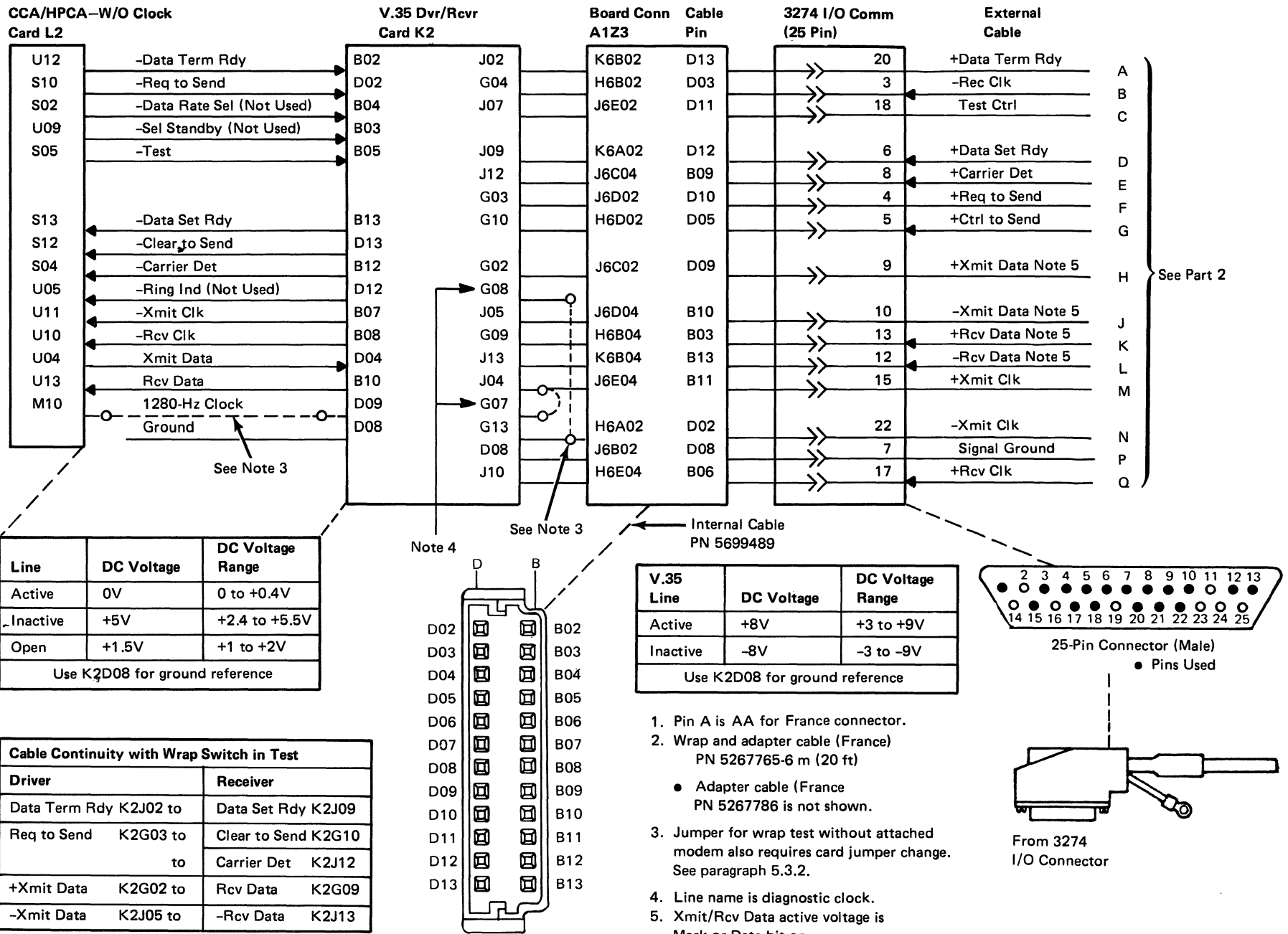


Figure 5-6 (Part 1 of 2). V.35 Communications Line Flow

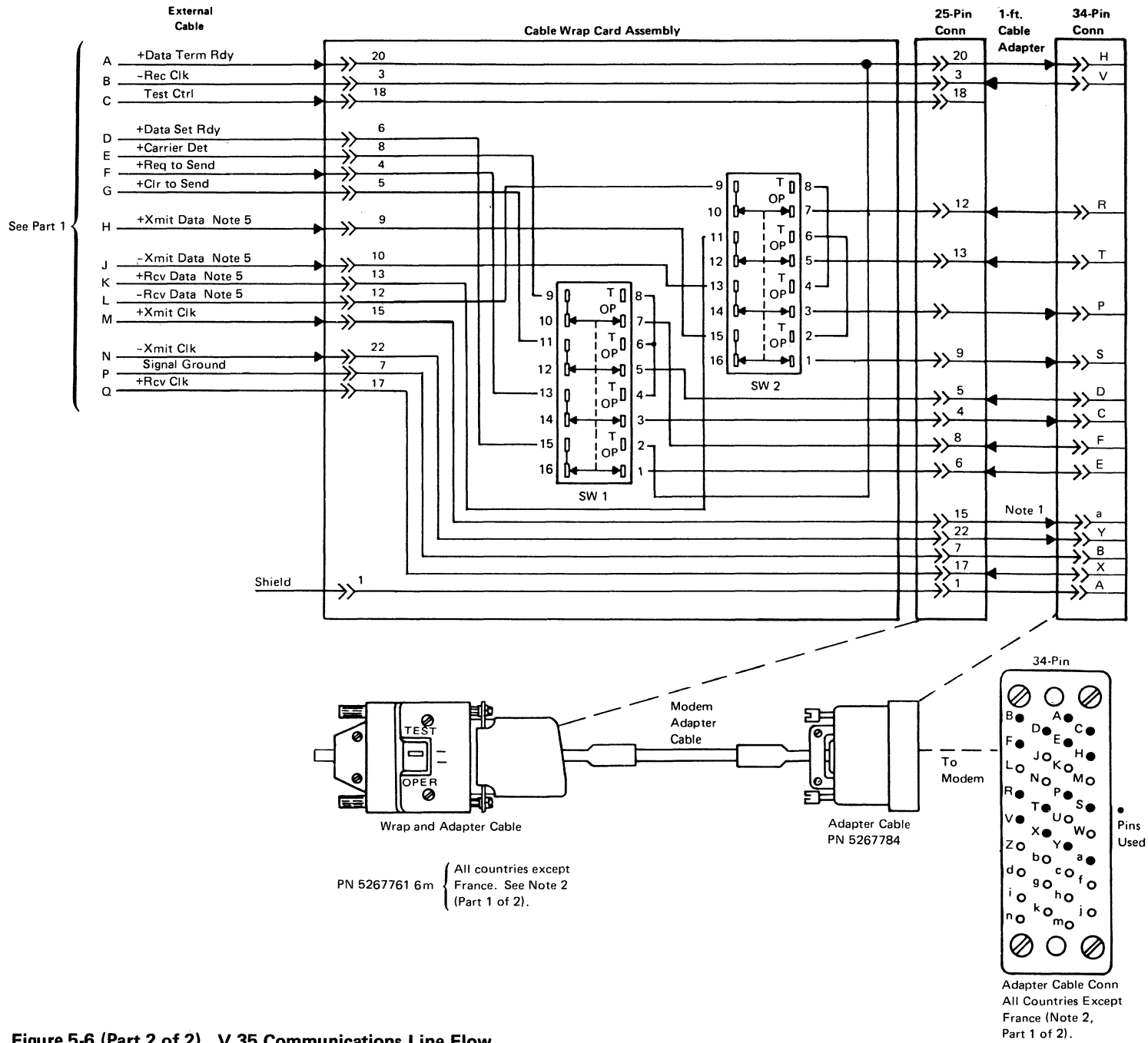


Figure 5-6 (Part 2 of 2). V.35 Communications Line Flow

5.3 Wrap Test

5.3.1 Modem Wrap Test (Figures 5-7–5-13)

- IEA
- V.35
- DDS Adapter
- Loop (see heading 5.3.4)
- X.21

The modem wrap test can be initiated by one of two IML functions (normal IML, ALT2 IML). For the wrappable modem, the normal IML and the ALT2 IML can initiate the wrap test. For the nonwrappable modem, the ALT2 IML is used. A modem is considered wrappable if its circuitry allows it to be wrapped from the DTE.

5.3.1.1 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, only the adapter and the communication cable are tested. If the wrap test fails, the 3274 indicators will alternately display a blinking 0111 code for 5 seconds and an additional code, representing further information, will be displayed continuously for 3 seconds.

Additional codes:

At Display At 3274

0111 013 0111 1101
0111 014 0111 1110
0111 021 0111 0010
0111 016 0111 0001
0110 005 0110 0101
0110 009 0110 1001

The display at port 0 will also indicate these codes.

An indication of 1101 or 0010 (X.21 Switched) means "general modem wrap failure." An indication of 0001 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 0101 or 0110 1001 appears on the display, the adapter has failed. If the wrap test failed, see MAP D30, Code 0111.

5.3.1.2 ALT2 IML (Wrappable/Nonwrappable Modem)

Pressing the IML pushbutton while holding the ALT switch in position 2 will initiate the wrap test for wrappable and nonwrappable modems. (For the DDS, X.21, EIA and V.35 with nonwrappable modems, and Loop adapters, only the adapter and the communication cables are tested.) The cable Test/Operate switch* should be set to Test. The cable should also be left plugged into the modem (clocking is supplied by the modem). If the wrap test fails, the 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 X.21 switched or loop).

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. If ALT2 failed, see Chapter 2, Step 8, Figure 2-16.

*Loop and 1200-bps Integrated Modem does not have a communication cable with a Test/Operate switch.

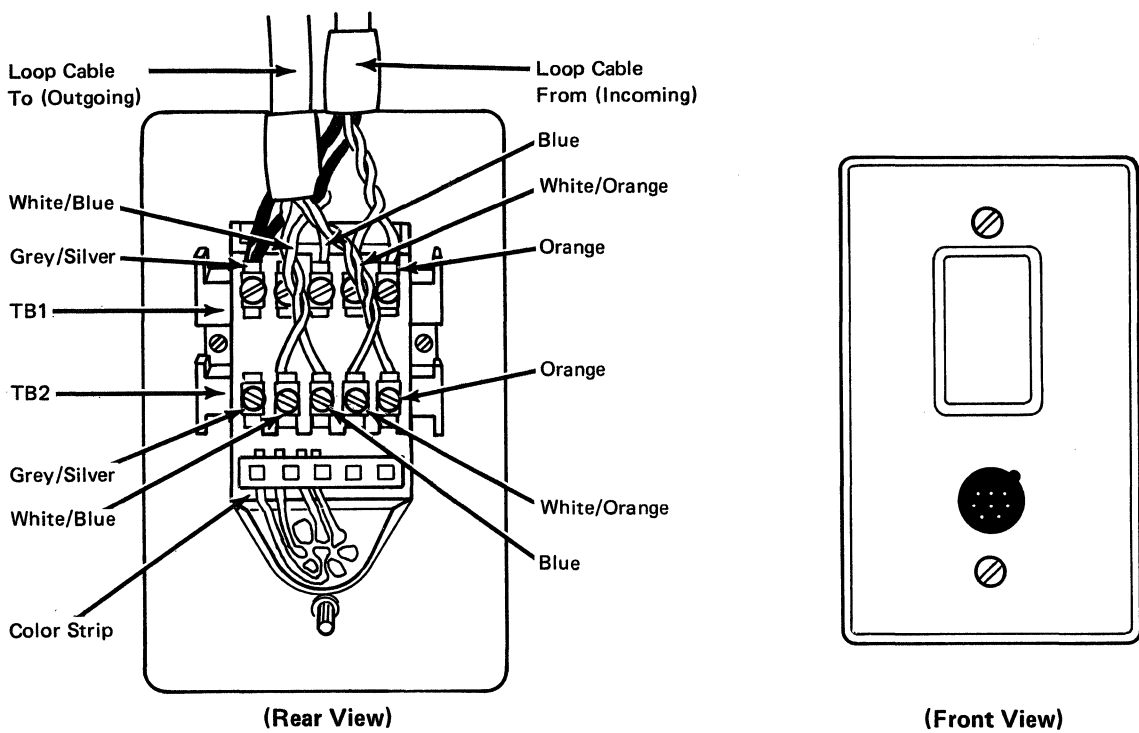
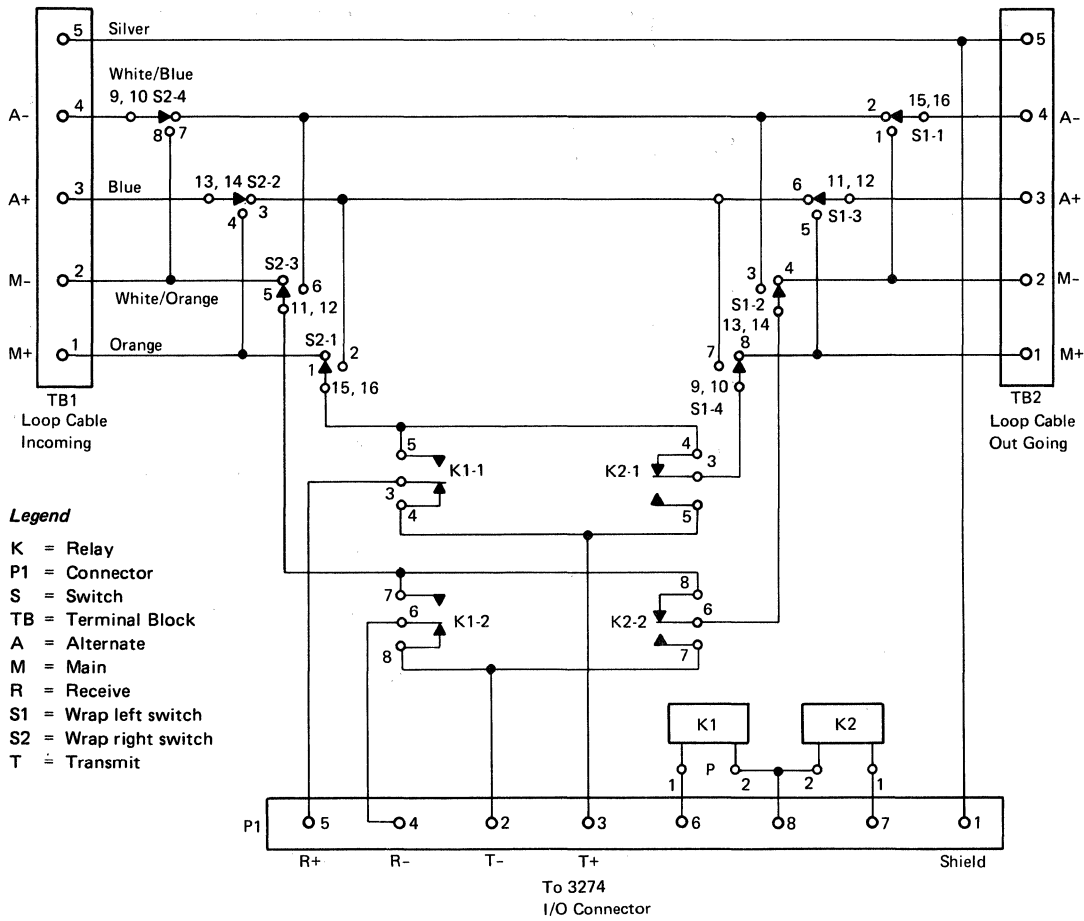
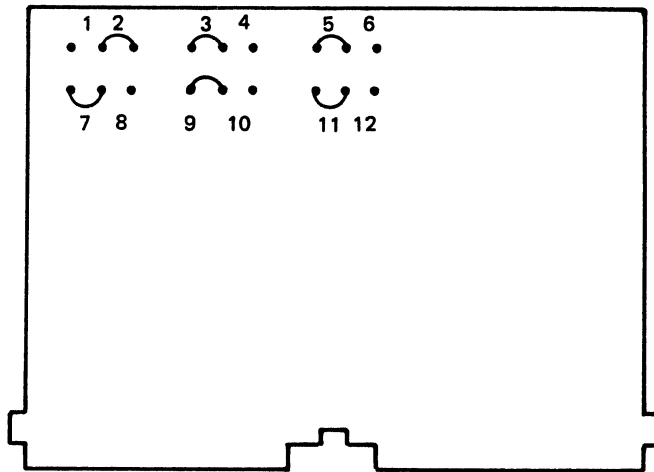


Figure 5-7. Loop Station Connector (LSC)

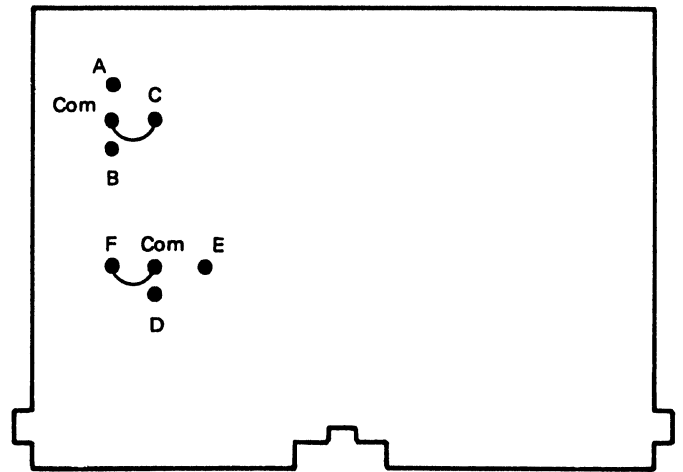


Card PN 5864683 (Switched)

Notes:

1. Use jumper PN 2731801.
2. Always jumper card as shown for switched operation.

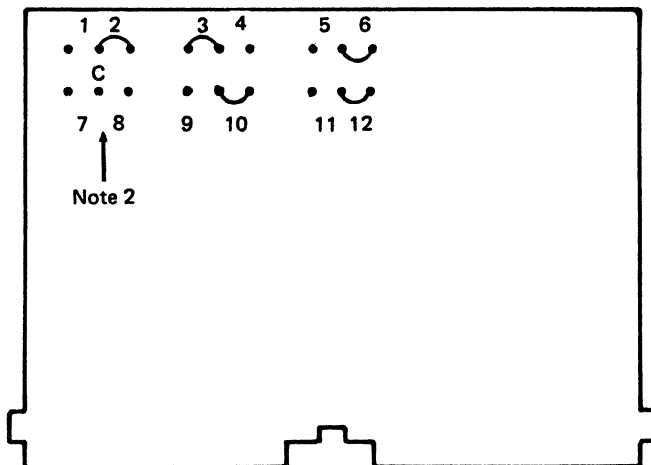
Figure 5-8. X.21 Switched Adapter Card K2 Jumpering



Notes:

1. Position A, D. Manufacturing test jumpers. Removed for field operations.
2. Position B. Storage position for card wrap jumper. It 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. Jumper (PN 2731801) must be installed.

Figure 5-10. V.35 Card K2 Jumpering

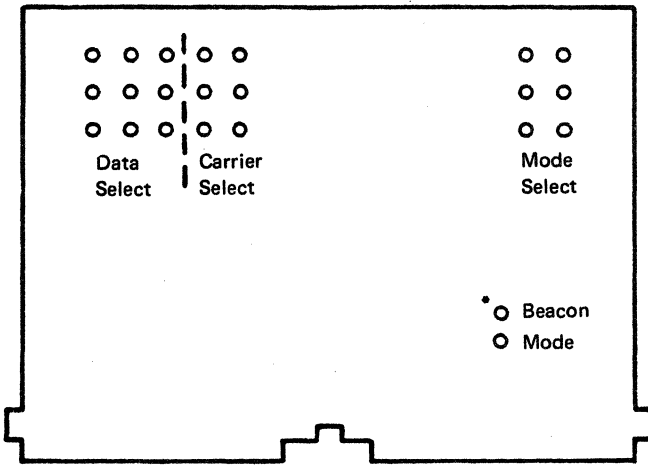


Card PN 5864683 (Nonswitched)

Notes:

1. Use jumper PN 2731801.
2. Place jumper from C to position 7 for HPCA.
Place jumper from C to position 8 for CCA.
3. Always jumper as shown above, for nonswitched operation.

Figure 5-9. X.21 Nonswitched Card K2

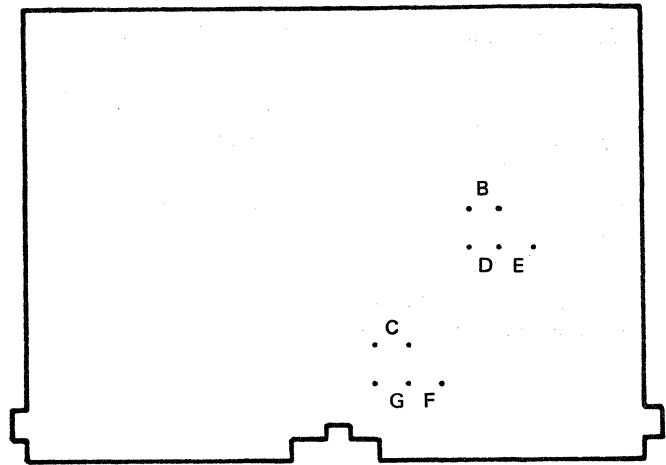


Note: Install jumper PN 6026304 (7 required) to select carrier speed and mode using chart below. Speed selected must match the speed of service provided by the loop controller.

Data/Carrier Select	Beacon *	Mode Select	Carrier Speed
			9.6K bps
			38.4K bps

Beacon mode is on card PN 8548788.

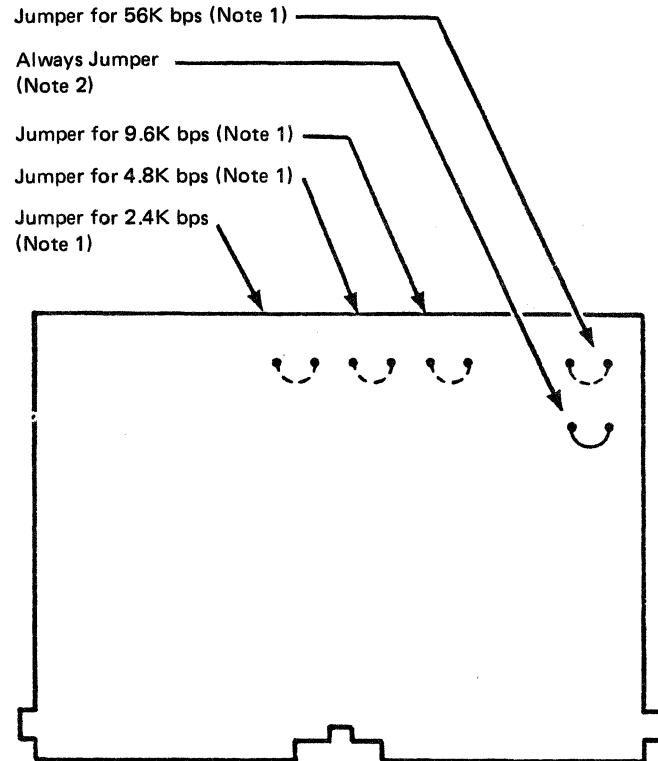
Figure 5-11. Loop Card Jumpering Card K2



Notes:

1. Position B and C are for card test purposes and should be removed.
2. Position D enables wrap at VTL interface (not used on the 3274).
3. Position E is spare.
4. Positions F and G should not be jumpered for the 3274.

Figure 5-12. EIA/CCITT Card Jumpering Card K2



Notes:

1. Install jumper (2731801) to select 56K bps, 9.6K bps, 4.8K bps, or 2.4K bps. Speed selected **MUST** match the speed of service supplied by common carrier.
2. This jumper **MUST** always be installed.

Figure 5-13. DDS Adapter Card Jumpering Card K2 U.S. and Canada Only

5.3.2 Wrap Test without Attached Modem (X.21, EIA, V.35, or Loop)

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 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, and a failing wrap test indicates that the problem is associated with the CCA/HPCA or the communication cable.

1. Turn off the 3274.
2. Set communication cable Test/Operate switch to Test.
3. Disconnect the communication cable from the modem.
4. Place jumpers on the 01A-A1 board as follows:

Note: Bend and form the jumpers if the power supply is to be closed (down).

EIA	X.21
L2M10 to K2D09	K2G07 to K2J04
K2G12 to K2J04	L2P06 to K2D09
	K2G08 to K2G13

V.35
L2M10 to K2D09
K2G07 to K2J04
K2G13 to K2G08
Move card K2 jumper from F to E. See Figure 5-10.

5. Turn on the 3274.
6. Run the wrap test by performing an ALT2 IML. Successful completion of the wrap test is indicated by the operational indicator (8 4 2 1) display of 1000.

Warning: Remove the jumpers that were placed on the 01A-A1 board before reconnecting the communication cable to the modem. For V.35, restore card K2 jumper from E to F. See Figure 5-10.

5.3.3 Wrap Test without Attached Modem (Loop) Procedure for Loop

1. Turn on the 3274.
2. Disconnect the 3274 communication cable at the loop station connector socket.
3. At the disconnected cable plug, place shorting jumpers from Pin 3 to Pin 5 (+Data to +Rec) and Pin 2 to Pin 4 (-Data to -Rec). (Refer to Figure 5-4.)
4. Turn on the 3274.
5. Run the wrap test by performing the ALT2 IML. Successful completion of the wrap test is indicated by an 8 4 2 1 display of 1000.

Note: If an IML is performed (cable disconnected) and the operational code is loaded, the machine check indicator will light. This is not a machine problem.

5.3.4 Loop Wrap Test

The loop wrap test can be initiated by a normal IML or an ALT2 IML as follows:

Normal IML—With the diskette customized for loop, a loop wrap test will be initiated each time a normal IML is performed. If the wrap test fails, the 3274 indicators will alternately display a blinking 0111 code for 5 seconds and an additional code, representing further information, will be displayed continuously for 3 seconds. The attached display on port 0 will also display these codes:

- 0111-1101 — Indicates a failure from the HPCA to the loop adapter (at 3274).
- 0111-013 — At display.
- 0111-1110 — Indicates that the Loop Station Connector (LSC) wrap test has failed (at 3274).
- 0111-014 — At display.
- ALT2 IML — The loop wrap test is initiated by holding the ALT2 switch in the 2 position and momentarily pressing the IML pushbutton.

If the wrap test fails, see Chapter 2, Step 8, Figures 2-15 and 2-16.

Chapter 6. 3274 Encrypt/Decrypt Feature

6.1 Feature Description

The 3274 Encrypt/Decrypt feature can be installed on the 3274 Model 61C. An organization using the Encrypt/Decrypt feature has the ability to protect the information transmitted and received through the communication network from unauthorized disclosure. 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) will be 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 3278/3279 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 Operator's Reference* and *3274/3270 Problem Determination Guide*, GA27-2850.

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 (A1J2) will be performed by the IML tests. If this test fails, 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 *3274 Operator's Reference* and *3274/3270 Problem Determination Guide*, GA27-2850, to replace the customer-accessible mercury battery.

6.1.2 Feature Components

The Encrypt/Decrypt feature components are the control logic card (A1J2), a customer-replaceable +4V mercury battery (PN1655387), an Enable Write master key switch, and operator panel cable connections. The cable connections and wiring are shown in Figure D-3.

6.1.3 Encrypt/Decrypt Failures



Note: Removing the Encrypt/Decrypt card (A1J2) or interrupting the battery voltage to the Encrypt/Decrypt card destroys the master key. If this occurs, the customer security administrator must reload the master key.

If crypto IML tests fail (a blinking 1001 code is displayed), reseal and/or replace card A1J2.

If display error codes 397, 398, or 399 appear at the bottom of the display screen, verify that the battery voltage on the A1 board is correct. See paragraphs 6.1.4 and 6.2. If the battery voltage is correct, perform the following additional checks:

1. Reseat and/or replace card A1J2.
2. See Figure D-3 and perform the following:
 - a. Check the battery voltage (+3.5V to +4.5V) at J2G09. See paragraph 6.2.
 - b. Check that "Write Enable" can be switched through the Encrypt/Decrypt Switch at J2P12.
3. Verify successful repair by performing the Encrypt/Decrypt Feature Test procedure as outlined in paragraph 6.6.

6.1.4 Display Error Code

If the 3274 is powered on initially or powered off with the security key in the On position, Key Parity errors (  398) may occur. To clear these errors:

1. Turn off the security key.
2. Disconnect the battery.
3. Turn power off at the 3274.
4. Reconnect the battery.
5. Turn power on at the 3274.
6. Ask the customer to reenter the master key using the procedures outlined in the Operator's Manual.

6.2 Battery Power Supply Clock

The customer replaceable mercury battery is located below the encrypt/decrypt security keylock. The battery voltage can be measured at board A1J2 pins G09(+) and J2D08 (-). The voltage level should be between +3.5V and +4.5V while the 3274 power is off.

DANGER

The battery may explode if recharged or exposed of in fire. For recycling the battery, follow local procedures or return it to IBM.

6.3 Customer Procedure for Encrypt/Decrypt Battery Replacement

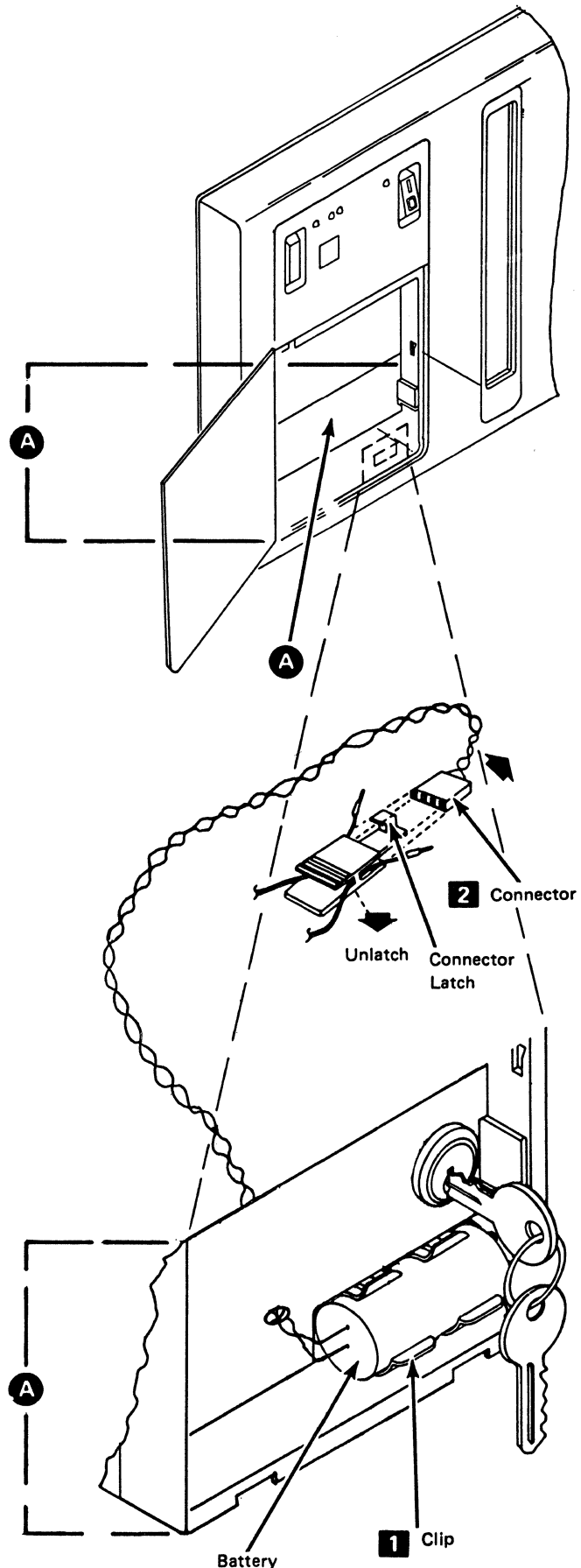
Note: If power was off while the battery was replaced, you must enter the terminal master key by performing the procedure in paragraph 6.4.

1. If any terminals attached to the 3274 are 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.
3. Open the customer access door (see the diagram to the right). The Encrypt/Decrypt battery is located in the operator panel area. **A**
4. Remove the old battery from the clip **1** in the bracket and unlatch the battery connector **2**.
5. 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.

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. For recycling the battery, follow local procedures or return it to IBM.



6.4 Entering the Terminal Master Key

Perform this procedure only if you are authorized to enter the terminal master key. Contact the appropriate person in your organization to obtain the terminal master key, the terminal-master key verification value (if available), and the CID.

1. If any terminals attached to the 3274 are 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 3178, 3278, or 3279 display station attached to 3274 port A0 to perform this procedure. Locate this display station; then make sure it has a keyboard and is turned on.
3. **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 Operator's Reference* and *3274/3270 Problem Determination Guide*, GA27-2850 for the recovery procedure.
4. Insert the encrypt/decrypt diskette.
5. If the 3274 is turned on, press the IML pushbutton on the 3274 control pass; if the 3274 is turned off, press the  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 in the 3274 security keylock, obtain the security key from the appropriate person in your organization and insert the key into the security keylock.
7. Make sure 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 3178, 3278, or 3279 display station that is attached to 3274 port A0. The top two rows of the screen should contain the following information:
001
XXXXXXXXXXXXXXXXXX
9. Use the keyboard to enter the characters 1234567890ABCDEF into the character positions occupied by the X's. 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

Note: If a 1 or a 2 appears in the top center of the screen and EMKV does not appear, you did not enter the 1 through F characters correctly in step 9. To recover, enter the 1 through F characters correctly and press the ENTER key again.

11. EMKV is a prompt message meaning "Enter master key value." Use the keyboard to enter (without space) the 16 characters of the terminal master key into the positions occupied by the hyphens; the valid characters that can be entered are the numbers 0 through 9 and the letters A through F. As each character is entered, the corresponding hyphen will be 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 *3178, 3278, or 3279 Display Station 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 8 characters, enter only as many characters as you have and the remainder of the field will be filled with 0's. As each character is entered, the corresponding underscore will be 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
YYYYYYYYYYYYYYYY

The VP message means *verification pattern*, and the Y characters represent the terminal-master-key verification value. If you have the verification value for the terminal master key just entered, make sure the verification value displayed is correct; if it is not, press the RESET key and return to step 5, and try to enter the terminal master key again.

15. 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
XXXXXXXXXXXXXXXXXXXX
```

The keyboard is now disabled and cannot be reset until an IML operation is performed. To continue your 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 your normal operation.

6.5 Verifying the Terminal Master Key

This procedure will cause 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 in the top center of the display screen on the 3178, 3278, or 3279 display station attached to the 3274 port A0.

1. If any terminals attached to the 3274 are 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 3178, 3278, or 3279 display station attached to 3274 port A0 to perform this procedure. Locate this display station; then make sure 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 Operator's Reference* and *3274/3270 Problem Determination Guide*, GA27-2850 for the recovery procedure.
4. Insert 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 **II** portion of the 3274 on/off switch. IML is complete when the 8 4 2 1 indicators are all off.
6. Make sure the security keylock is in the full counterclockwise (vertical) position; if it is not, turn the key counterclockwise to the vertical position.
7. Go to the 3178, 3278, or 3279 display station that is attached to 3274 port A0. The top two rows of the screen should contain the following information.

```
001
XXXXXXXXXXXXXXXXXXXX
```

8. Use the keyboard to enter the characters 1234567890ABCDEF into the character positions occupied by the X's. 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:

```
EMK
-----
```

Note: If a 1 or a 2 appears in the top center of the screen and EMKV does not appear, you did not enter the 1 through F characters correctly in step 8. To recover, enter the 1 through G characters correctly and press the ENTER key again.

10. Press the ENTER key. If the terminal master key is as expected, 99 will appear in the top center of the screen; if it is not as expected, 44 will appear in the top center of the screen.
11. To continue your operation, remove the encrypt/decrypt diskette and proceed with your normal operation.

6.6 Encrypt/Decrypt Feature Test

The 3274 problem determination procedures may instruct you to perform this test procedure when you are having problems operating the Encrypt/Decrypt feature. This test modifies the terminal master key presently 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 terminals attached to the 3274 are 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 3178, 3278, or 3279 station attached to 3274 port A0 to perform this procedure. Locate this display station; then make sure it has a keyboard and is turned on.

3. An **X** **397**, **X** **398**, **X** **399** code appearing in the operator information area during this procedure indicates an encrypt/decrypt failure. Refer to the *3274 Operator's Reference* and *3274/3270 Problem Determination Guide*, GA27-2850, 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 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 in the 3274 security keylock, obtain the security key from the appropriate person in your organization and insert the key into the security keylock.
7. Make sure 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 3178, 3278, or 3279 display station that is attached to 3274 port A0. The top two rows of the screen should contain the following information:


```

001
XXXXXXXXXXXXXXXXXX
      
```
9. Use the keyboard to enter the characters 1234567890ABCDEF into the character positions occupied by the X's. 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
-----
      
```

Note: If a 1 or a 2 appears in the top center of the screen, you did not enter the 1 through F characters correctly in 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 hyphens. As each character is entered, the corresponding hyphen will be replaced by an asterisk (*). A **X** **?** symbol in the operator information area or a keyboard lock is an indication of a miskeyed character. 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:

```

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 or 3279 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 your operation, you should now enter your organization's terminal master key into the 3274 by performing the "Entering the Terminal Master Key" procedure (paragraph 6.4), beginning at step 5.

Chapter 7. Additional Features

7.1 Response Time Monitor Feature

7.1.1 Feature Description

The Response Time Monitor (RTM) card, and its associated microcode, interfaces with the 3274 control logic card. The RTM card provides the means whereby a customer can differentiate between good and bad responses, as well as questionable ones. The RTM feature measures and records the transaction times of inbound host attention operations from display stations that communicate with the host. Depending on how the 3274 is customized, the RTM feature obtains information from a network management application in the host, from a subsystem display operator, or both.

When the RTM feature support is customized in the 3274, a series of five counters is allocated for each configured device or logical terminal, representing intervals into which the various times are mapped. During the customizing process, up to four counters may be set up by specifying the boundaries (maximum times) associated with each response. By properly specifying boundary values, a customer can obtain a distribution of responses for each logical terminal in his network.

The operator of an authorized display can retrieve and display the RTM logs of all configured devices in his network. By the operator's performing the A4/1 Test, the log information is displayed for eight logical terminals at a time, until all device logs have been displayed. See *3274 Control Unit Models 51C, 52C, 61C Maintenance Concepts, SY27-2528*.

7.1.2 IML Testing

When a 3274 contains the RTM feature and is customized for RTM, a normal IML, using the system/load diskette, will perform a functional test of RTM card K4. If this test fails, a blinking 1011 code will be displayed in the 3274 8 4 2 1 indicators.

When the IML is completed and the operational code is loaded, any RTM adapter errors detected by the operational code will generate a solid 1011 code in the 3274 8 4 2 1 indicators. These errors will also generate nnn code 382 on all attached displays.

7.2 X.25 Feature

7.2.1 Feature Description

An X.25 feature adapter permits the 3274 Model 61C to attach to a host system through a public X.25 packet network. The Model 61C can communicate, using IBM SNA protocols, with any of the following remote line interfaces:

- EIA/CCITT
- X.21
- DDSA

To utilize the X.25 feature, the High-Performance Communication Adapter (HPCA) card must be installed in the 3274 Model 61C. Data transmission speeds of up to 9600 bps can be used with an EIA interface; speeds of up to 19,200 bps can be used with interfaces other than EIA. The X.25 feature requires a minimum storage capacity of 256K in the 3274 Model 61C.

The X.25 feature permits the operator of a 3274-attached 3178, 3278, or 3279 display station, or other compatible display station using a Type A adapter, to connect the 3274 and its attached stations to a remote host via a public X.25 packet network. This capability is not supported on distributed function terminals such as the 3290 Information Panel.

Functions necessary to connect the 3274 to the remote host are initiated at the display keyboard and by incoming calls. The status of the 3274 with respect to the X.25 network is indicated in the operator information area of the display station.

7.2.2 Feature Support

The X.25 feature is supported at the display station by additional key functions and indicators. These key functions are a subset of those defined for support of the X.21 Switched feature. Indicators displayed in the operator information area are the same for X.25 as those used for X.21, except for Call Progress. In X.25, Call Progress has been expanded to include cause and diagnostic codes.

Appendix A. Reference

A.1 Locations

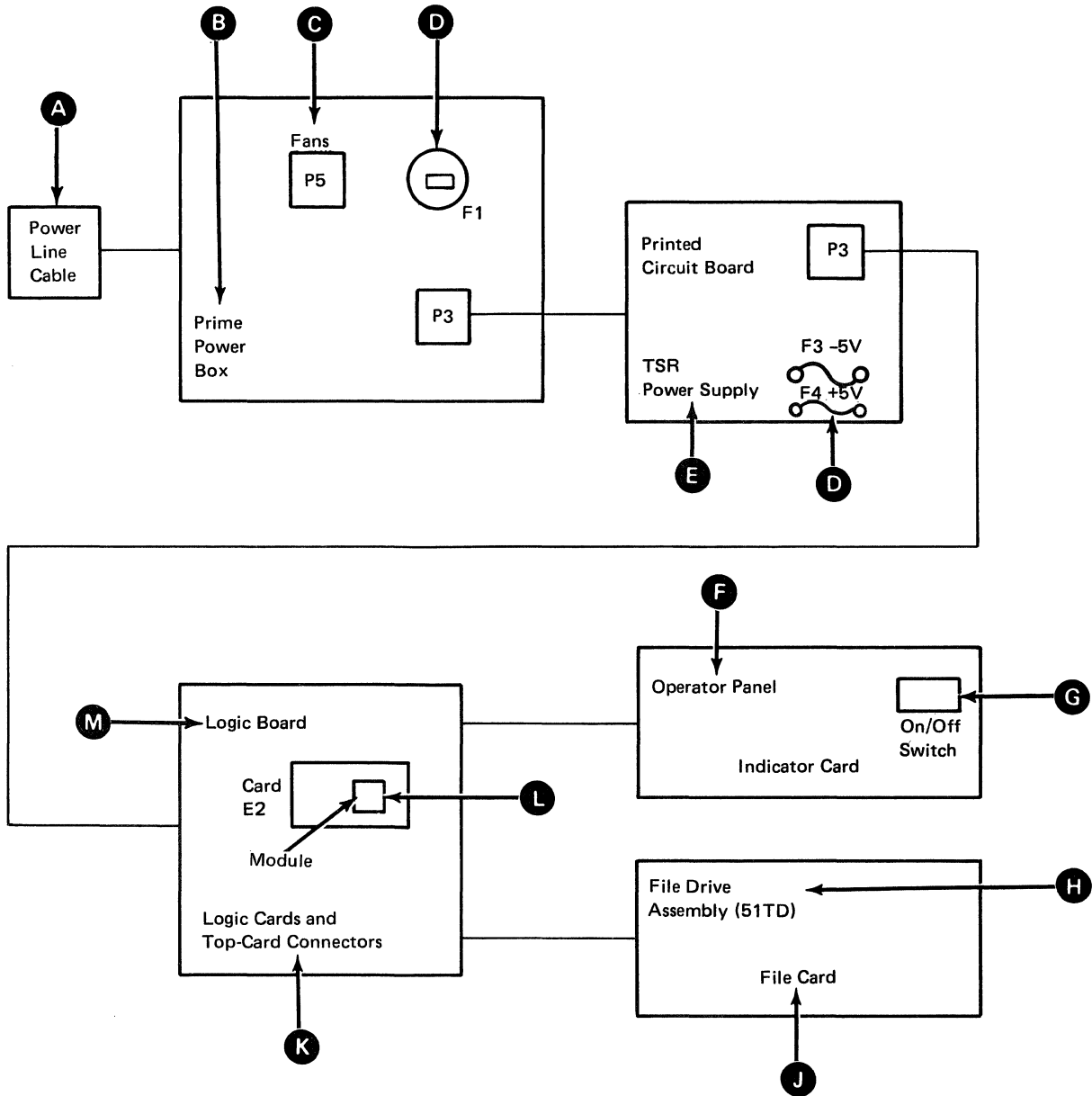


Figure A-1. Field Replaceable Units (FRUs)

	Part Name	Description	Part No.
A	Power Line Cable	See Parts Catalog, Appendix F	
B	Prime Power Box	U.S. and Canada, WT	5267720
C	Fan	Fan Location 1, 100-127V (all except Japan) Fan Location 2, 100-127V (all) Fan Location 1, 100V, Japan only Fan Location 1, 200V, Japan only Fan Location 1, 200-240V (WTC except Japan) Fan Location 2, 200-240V (all WTC)	5699358 5699513 5699360 5699361 5699359 6837984
D	Fuse F1 5A 250V SB Fuse F1 5A 250V SB Fuse F3 2A Fuse F4 2A	Single Power Supply, Input 100-127V Single Power Supply, Input 200-240V -5V TSR +5V TSR to File Drive Card	123786 123786 4402289 4402289 (Note)
E	TSR	Power Supply Card 100-127V Power Supply Card 200-240V	4752196 or 4404930 4752198 or 4404935
F	Operator Panel Card	All except loop Loop	5267726 5267758
G	Operator Panel Switch S7 Operator Panel Switch S11 Operator Panel Switch S13	Line speed (Loop) Local Comm Power On/Off with cable	5267867 5267869 6124187
H	51TD Assembly 51TD Motor 51TD Motor 51TD Belt	100-127V 50 Hz 200-240V 50 Hz 100-127V 60 Hz 200-240V 60 Hz 100-127V 50/60 Hz 200-240V 50/60 Hz Drive Belt 50 Hz Drive Belt 60 Hz	4240512 4240513 4240516 4240517 Refer to Parts Catalog, Appendix F.
J	File Card	See Figure C-2 for part numbers.	
K	Logic Cards Top-Card Connectors	See Figure C-2 for part numbers. 1-Position	1794410
L	Module	Pluggable Card E2	8665976
M	Board	See Figure C-2 for part numbers.	

Note: On some early-built machines, fuse F4 is not pluggable and is not replaceable.

Figure A-2. Field Replaceable Unit (FRU) Part Numbers

Test lead on ground: DOWN light comes on.
 Test lead on +5V dc: UP light comes on.
 Test lead on no pin: Neither light comes on.

Note: Even a signal of very short duration causes the associated light to come on enough to be seen.

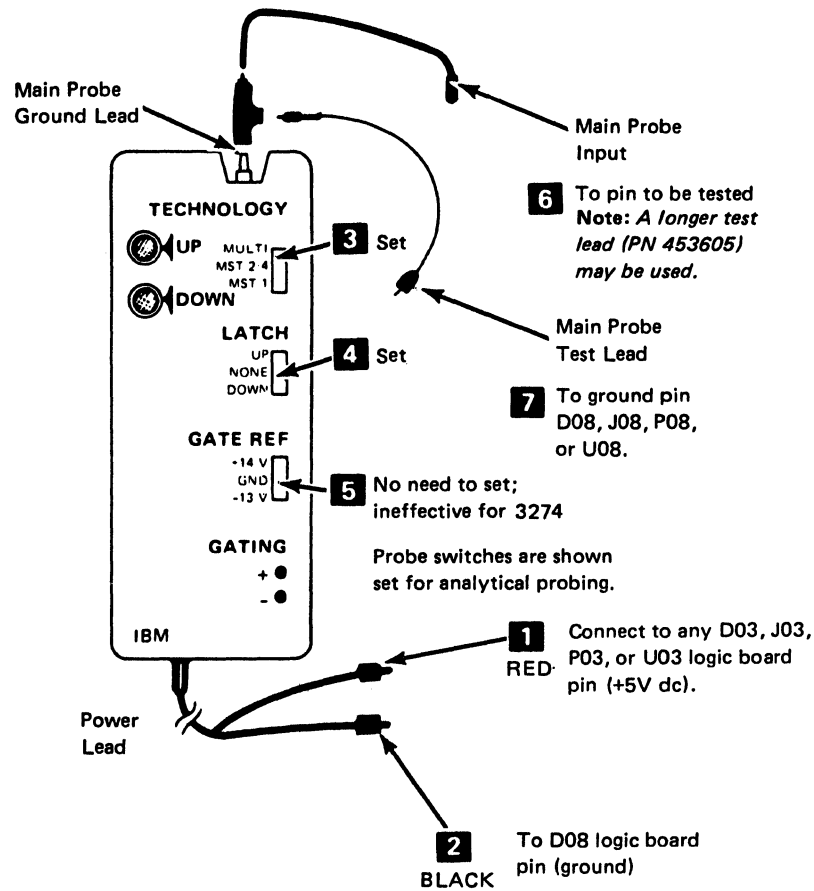


Figure A-3. General Logic Probe (PN 453212)

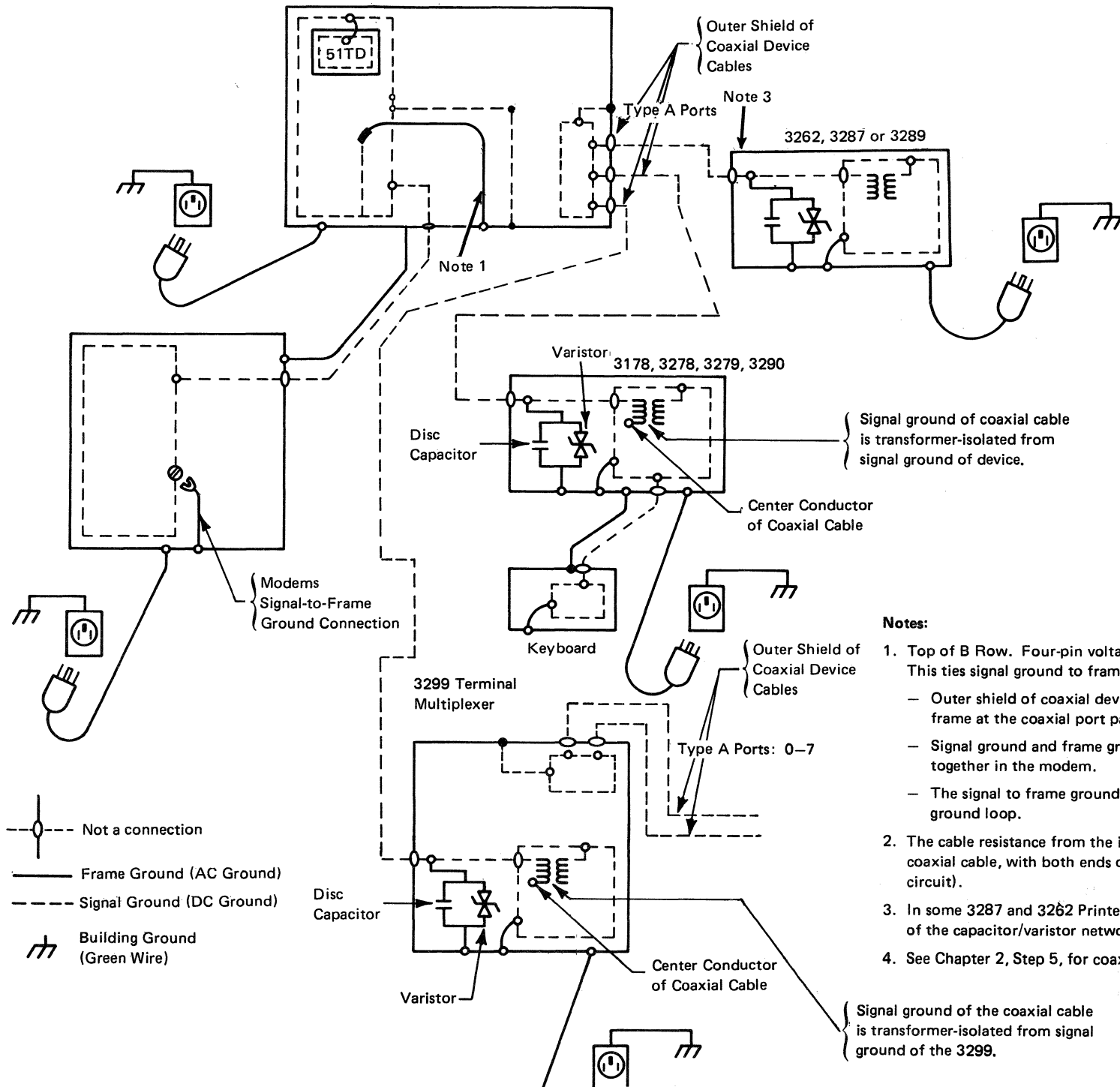
Configuration Data Card (Configuration Support: D)

Number	Meaning
001	Keyboard Validation
011	Patch Request
021	Printer Authorization Matrix
022	(See reverse side)
031	Number of RPO diskettes
032	Request RPO Parameter List
111	Number of Category B Terminals
112	Number of Category A Terminals
113	Extended Function Store
114	Personal Computer Attachment
115	Entry Assist
116	Individual Port Assignment
117	Port Assignment Specification Table
118	Port Address Table
121	Keyboard Language
125	Miscellaneous Feature Options
127	RTM Definition
128	RTM Boundaries and Interface
139	Keypad Selection
141	Magnetic Character Set
151	3274 Model Designation
160	Extended Data Stream
161	Color Convergence
165	Decompression
166	Attribute Select Keyboard
170	Distributed Function Terminals
173	3290 Options
175	Password
176	BSC Enhanced Communication Option
201	Control Unit Address
213	Between Bracket Printer Sharing
215	Physical Unit ID
220	Alert
301	BSC Control Unit Number
302	SDLC Control Unit Address
305	BSC Printer Polling
310	Modem Connection
311	Modem Wrap
313	NRZI/NRZ - Internal/External Clocking
314	Multipoint/Point to Point
317	Switched Network Backup
318	Normal/Half Speed

Number	Meaning
331	BSC/SDLC
342	RTS Control
343	Communication Interface
345	Answer Tone
347	High-Speed Data Rate
351	HPCA/CCA
352	Encrypt/Decrypt
360	X.21 Switched Retry
361	X.21 Switched Retry Timing
362	X.21 Switched Options

CE Data			
201	Local Channel CU Address		_____
	Master Terminal Operator Phone		_____
	Host CPU		_____
	Application Program		_____
	Remote TP Line	BSC	SDLC
	Logical Line No.	_____	_____
	Logical LU ID	_____	_____
	Line Speed	_____	_____
	Host	_____	_____
	Application	_____	_____
	Diskette No.	_____	_____

Figure A-4 (Part 1 of 2). Configuration and CE Data Card (Stored in Customer Access Door Pocket)



Notes:

1. Top of B Row. Four-pin voltage block connected to gate frame. This ties signal ground to frame ground.
 - Outer shield of coaxial device cables are grounded to the frame at the coaxial port panel.
 - Signal ground and frame ground should not be connected together in the modem.
 - The signal to frame ground in the modem may cause a ground loop.
2. The cable resistance from the inner to the outer shield of a coaxial cable, with both ends disconnected, is infinite (open circuit).
3. In some 3287 and 3262 Printers, a 10K resistor is used in place of the capacitor/varistor network.
4. See Chapter 2, Step 5, for coax cable DC resistance test.

A.2 Safety Inspection Guide 3274 Model 61C

Preparation

- Completion of “Electrical Safety Training Course for IBM Customer Engineers” is required. (Self-study Course 77170, or FIS II Course 70702, or the current level of each)
- Begin the checklist with the machine power off and electrical power removed from the machine.
- Reference items:
 - Copy of CEMs (ECAs and SAs) for this machine type
 - Latest machine history if possible
 - Copy of Maintenance Manual to review safety section for this machine type
 - Installation Planning Manual (SY27-2439)
 - Electrical Safety for IBM Customer Engineers (S229-8124)

Note: Although completeness and accuracy are the goals of this guide, not all machine configurations (i.e., special features, RPOs) are covered. If you encounter a machine with RPOs or features not described in this guide, use the installation instructions for the RPO or feature for additional information. Otherwise, use the the guide and good judgment to obtain a safe machine.

General Guidelines

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on machines being inspected. Each machine, at the time of its manufacture, had required safety items installed to protect the owners/operators and service personnel from injury. This checklist addresses only those items. Good judgment should be used to identify potential safety conditions not covered by this inspection guide.

The following checklist should be performed before bringing power up on the machine. If any apparent unsafe conditions are present, a determination must be made on how serious the hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical, especially primary power, for example: A hot frame can cause serious or fatal electrical shock.
- Explosive, for example: A damaged CRT face or bulging capacitors can cause serious injury.
- Mechanical hazards, such as belt covers missing, can cause bodily injury.
- Use of chemicals, cleaning solutions, or solvents other than those specified by IBM.

Checklist

Note: Portions of this checklist address features. Complete only those portions associated with features installed in your machine.

- Enter machine serial number.

Check:

- Machine power should be off and the mainline power cord disconnected before starting this procedure.
- Power cord not frayed or damaged.
- Power cord strain relief clamp is properly holding power cord. See J-4 in Figure 4-5.

Inside the machine, check:

- For any non-IBM alterations. If there are any, has "R009 Non-IBM Alteration/Attachment Survey." been completed?
- For broken or loose parts and/or assemblies.
- All retaining screws such as those that:
 - Secure the logic board to the frame housing. Refer to Figure 4-3.
 - Secure the power supply to the logic board. Refer to Figure 4-3.

Check for Machine Labels

- Verify that labels are installed as indicated. See Figure A-6.

Check for Fuse Rating:

- Check all fuses for correct current rating. Use the following for fuse location and value.

Fuse	Fuse Location	Reference Location	For PN and Value, See
F1	Prime Power Box	Figure 4-5	Figure A-1
F3	Power Supply	Figure B-4	Figure A-1
F4	Power Supply	Figure B-4	Figure A-1

-
-
-

Check for Green/Yellow Grounds:

- Remove the prime power box and verify that there is a good ground connection inside power box. See Figure 4-5.
- Verify that there is a good ground connection from the prime power box to chassis ground. See Figure 4-5.
- Verify that the fan assembly cable goes to chassis ground. See Figure 4-7.
- At the fan assembly, verify that there is a good ground connection to each fan housing. See Figure 4-7.
- Verify that there is a good ground connection at the left side of the power supply housing. See Figure 4-6, **G**.
- Verify that there is a good ground connection from the logic gate assembly to chassis ground. See Figure 4-4, braided cable.

Power Plug Ground Check:

- With a CE meter set to the RX1 range, check continuity between the ground pin on the power plug and machine frame ground.
- You should measure 0 ohms.
- Reinstall the logic board and power supply. Replace the holding screws and the top cover to the machine.
- Verify that IML tests run successfully.

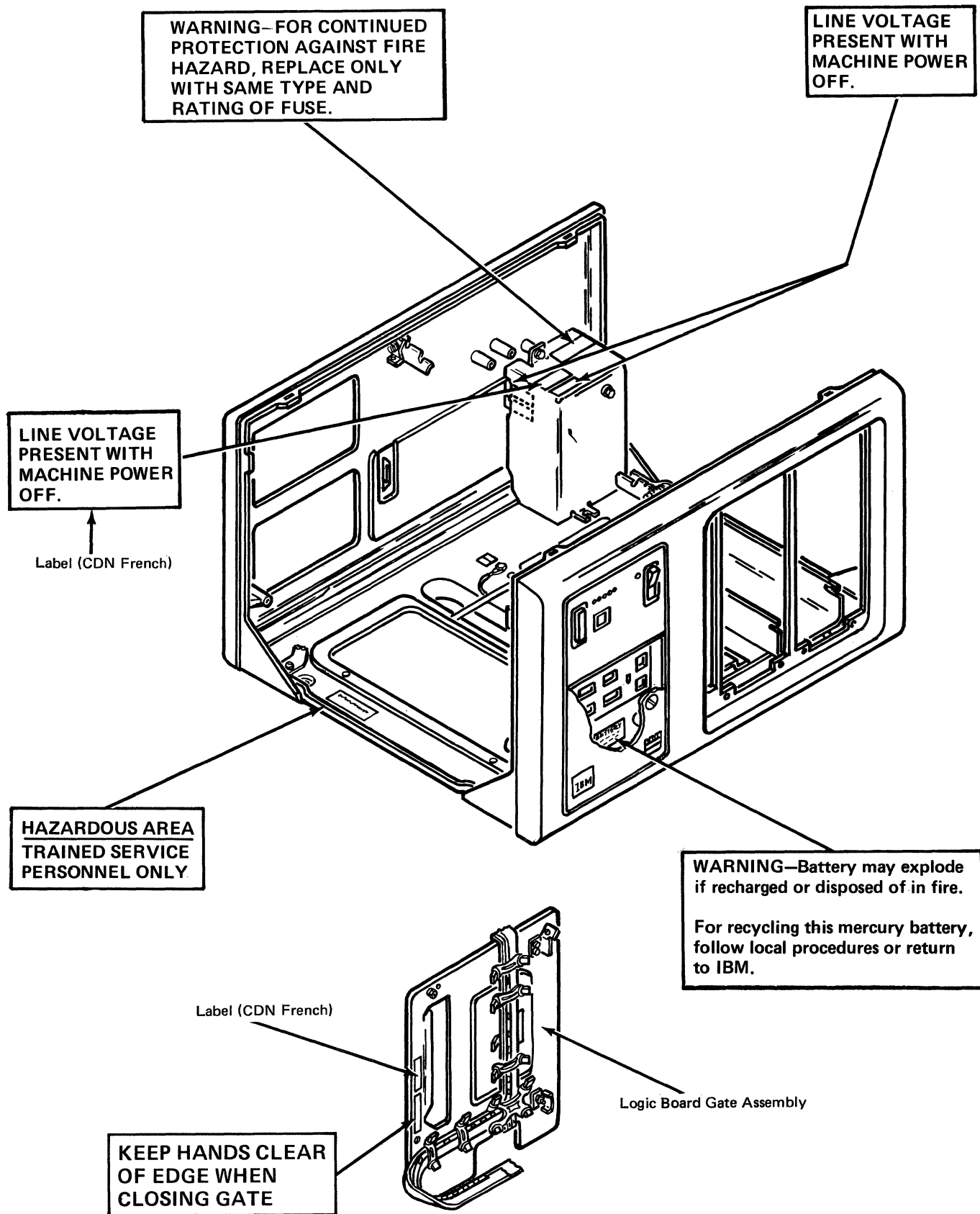
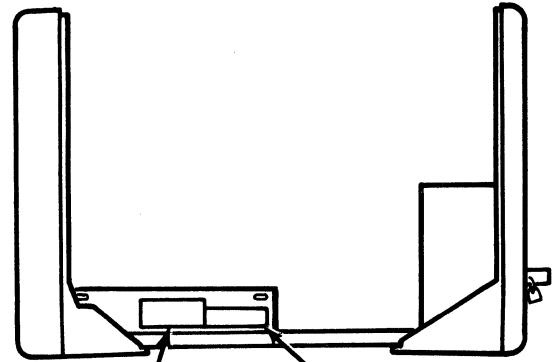
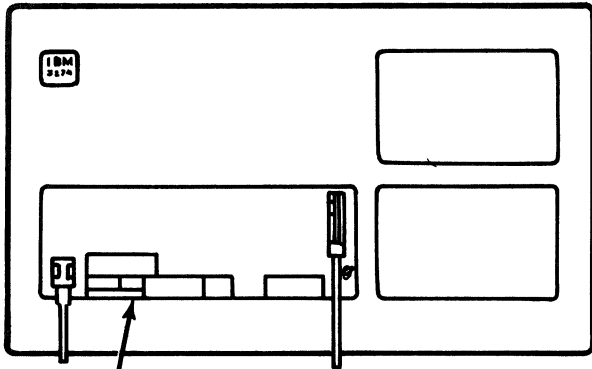


Figure A-6 (Part 1 of 2). 3274 Hazard Labels

Rear View

Side View



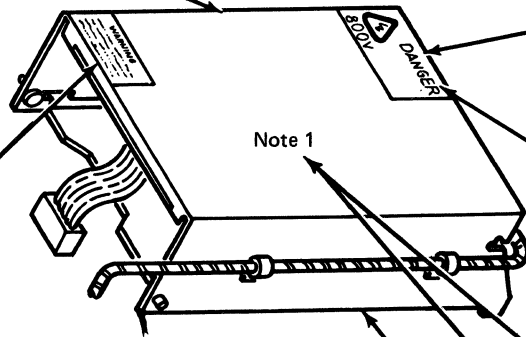
Type and model 3274	No. wires 2 Plus Ground	Branch circuit ampacity 15
k VA NFPA Type 0.3 II	Hz (Cy) PH 60 1	Branch circuit volts 120
Power to () from () other units		Maximum continuous load in amperes 2.4

CAUTION
MOVING PARTS

HAZARDOUS AREA
TRAINED SERVICE
PERSONNEL ONLY

Voltage Rating Plate
Plate Power 120V 60Hz (USA)
Plate Power 120V 60Hz (Can)
Plate Power 100-127V 50/60Hz (E/ME/A & A/FE)
Plate Power 200-240V 50/60Hz (E/ME/A & A/FE)

Power Supply



Note 1

Power Supply

 DANGER
PELIGRO
PERIGO
危険
800V

 DANGER
PELIGRO
PERIGO
危険
550V

CAUTION
STORED CHARGE
MAY BE PRESENT

ATTENTION
PEUT CONTENIR
CHARGE ACCUMULÉE

WARNING- FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE

Note 1: If the part number of your power supply is 5699477 or 5699478, the label is in place.

Figure A-6 (Part 2 of 2). 3274 Hazard Labels

A.3 Multiple Interactive Screen (MIS) Addressing

Use the following text in conjunction with Figure A-7. The figure shows a combination of a standard coax panel and a terminal multiplexer panel (field-modified).

Each customized 3274 port has an assigned port address, which is the primary logical-terminal address for the port. To support the Multiple Interactive Screen function for an attached 3290 display station, the Type A port to which the 3290 is attached must be assigned the appropriate number (1 through 4) of the secondary logical-terminal addresses, in addition to the primary logical-terminal address.

Port 0 **A** cannot be used for MIS devices.

All used port addresses **B** are designated as primary logical addresses; all unused physical ports are unassigned (14 and 15). The next unused logical address **C**, in this case 14, will be designated as the first secondary logical address.

If non-MIS type devices **D** are attached to a MIS configured port, the secondary LT address assigned **E** to that port is reserved and may not be addressed by the host. Recustomization is necessary to free those addresses, and will cause all secondary addresses to be redefined.

For BSC 3274s the maximum number of logical addresses is 32 **G**; for SDLC 3274s the maximum number is 76 addresses.

If a problem in addressing is suspected or if interactive screen devices cannot be configured for Multiple Interactive Screens, check customization responses 112, 116, 117, and 118. If previously customized, running Test /B displays a table that shows which physical ports have a primary and secondary address associated with them. See Chapter 2, Figures 2-10A, 2-10B, and 2-10C. If the problem still exists, refer to Step 5 of the Subsystem Problem Isolation Procedures (Chapter 2).

Warning: When swapping device cables and the devices are different or the screen size or features are not the same, addressing problems may occur which could affect system operation.

It is possible to have unassigned ports if port addresses were configured individually. Run the /3 test; check for x in line 2. See Figure 2-9.

Primary Logical Address	Device Type	Number of Secondary Logical Addresses	Secondary Logical Addresses
0 A	3278	—	—
1 MIS	3290	1	14 C
2 MIS	3290	1	15
3 MIS	32xx	2	16, 17
4 —	3287 D	2	18, 19 E
5 MIS	3290	3	20, 21, 22
6 MIS	3290	3	23, 24 F , 25
7 MIS	3290	4	26, 27, 28, 29
8 MIS	3290	4	30, 31 G , 32, 33
9 MIS	3290	4	34, 35, 36, 37
10 —	3278	—	—
11 —	3278	—	—
12 —	3278	—	—
13 —	3278	—	—
14 Unassigned	—	—	—
15 Unassigned	—	—	—

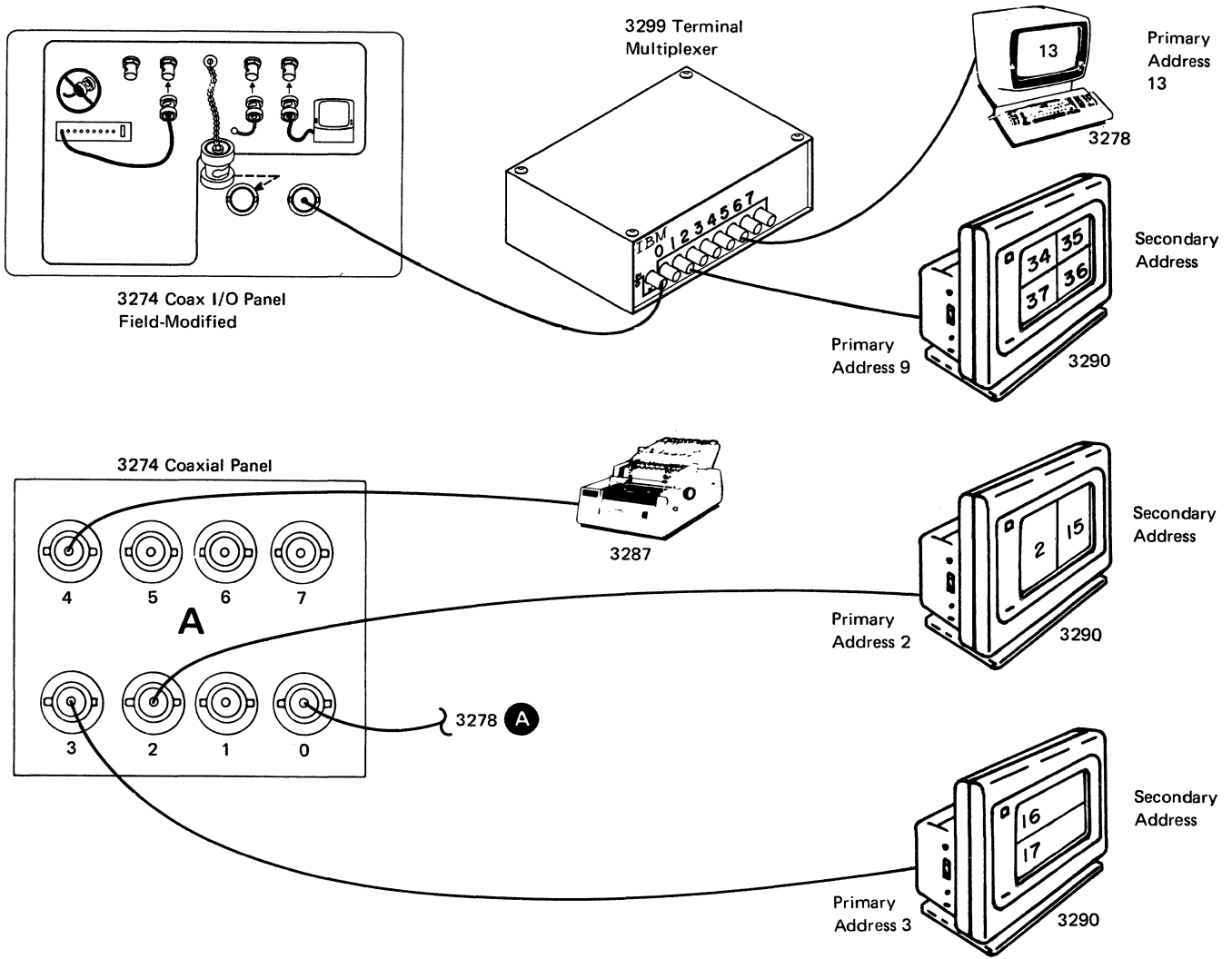


Figure A-7. Addressing Configuration for 3290 Multiple Interactive Screen (MIS) Device Attachment

Appendix B. Power

Turning power on applies input voltage to the fans, the diskette drive motor, and the TSR power supply. The TSR power supply (see Figure B-1) provides +5V dc, +8.5V dc, +12V dc, +24V dc, -5V dc, -12V dc and Power On Reset.

The power supply has an internal sensing circuit that protects it against shorts at all the voltage outputs. The supply will power down with the application of any short except for an overload on the -5V supply or the +5V used in the 51TD File Drive card, both of which are fuse-protected. The fuses are located on the power supply circuit board.

Following an overload shutdown (and the cause of the overload is removed), there must be a 20-second wait before input power is applied again to ensure that the supply voltages reach their proper levels.

A Power On Reset (POR) is generated by the power supply. This is a negative pulse, 200–800 ms wide.

Power is introduced to the logic board at the pin side of socket Y2. Sockets P–V receive +5V via the jumper card located in socket Y5. The +5V, -5V, and +24V are sent to the file control card (in the diskette drive unit) from the TSR supply via the cable from logic board socket Y6.

The Power On indicator driver requires a +5V input from both card socket groupings A through N and P through V to turn on the indicator.

Refer to:

- Figure B-2, Power Distribution Flow Diagram
- Figure B-3, Board Voltage Distribution, a foldout at the rear of this manual (page FO-1).
- Figure B-4, Power Supply No. 1 Locations

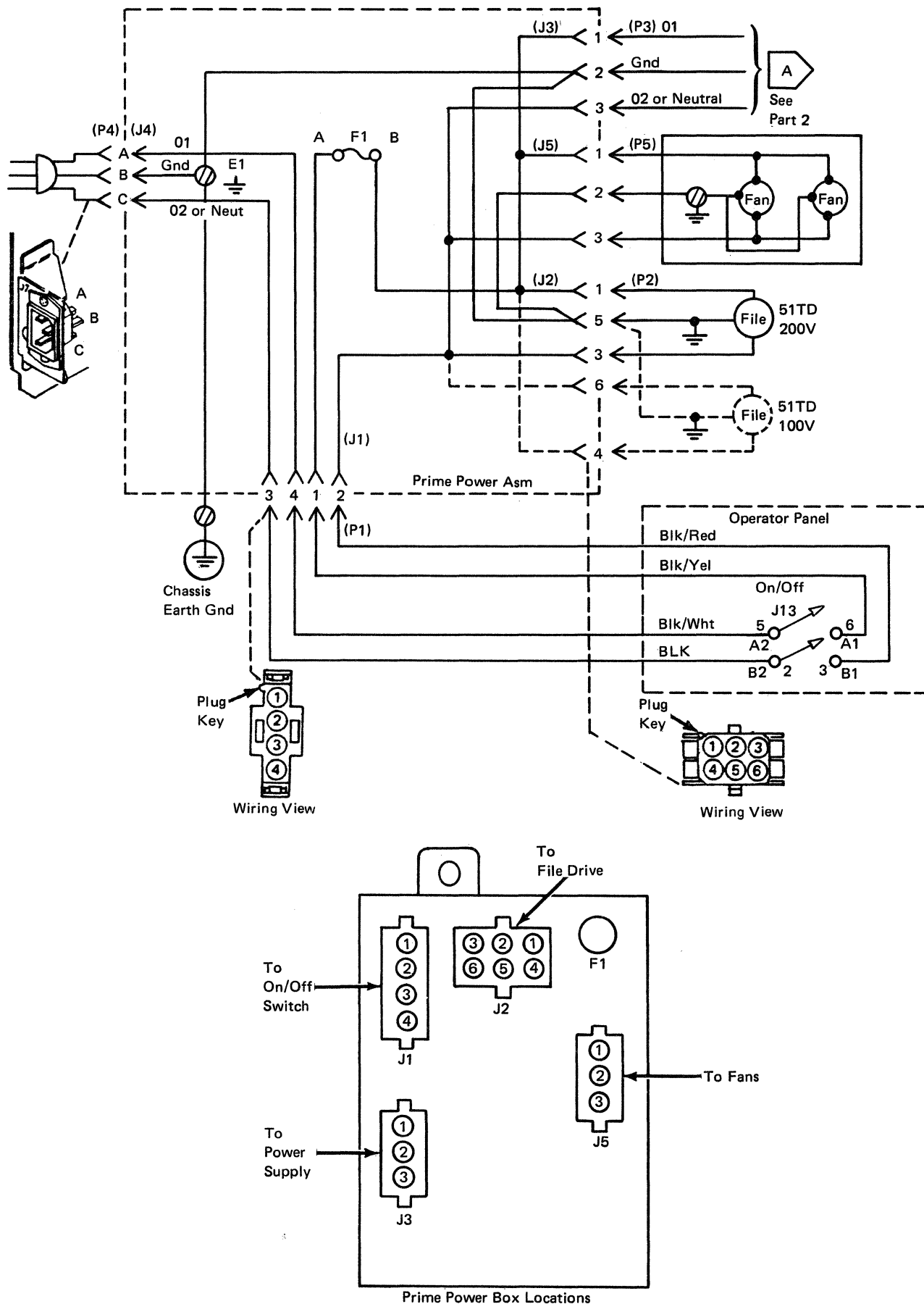


Figure B-1 (Part 1 of 2). Prime Power and TSR Supply

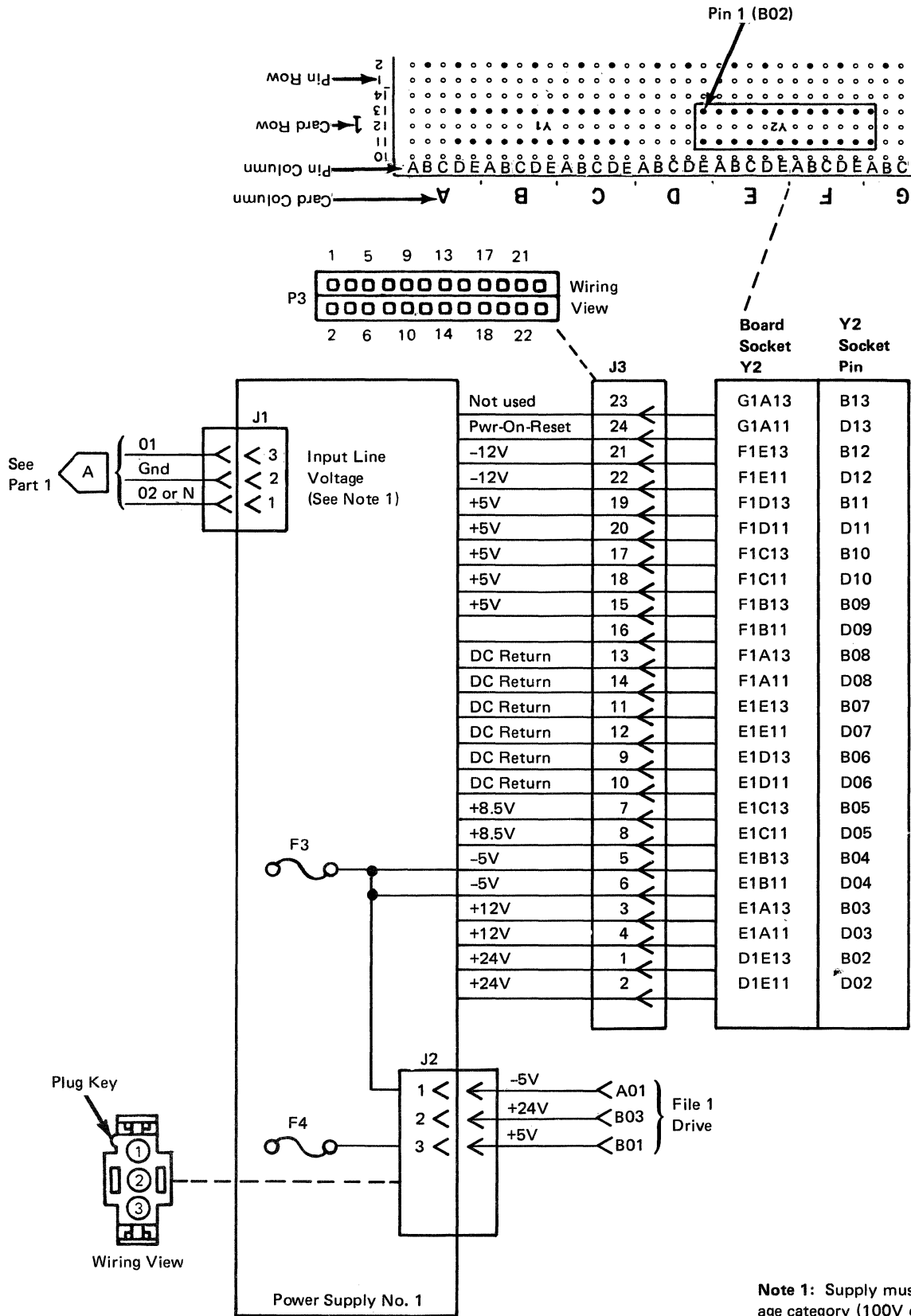


Figure B-1 (Part 2 of 2). Prime Power and TSR Supplies

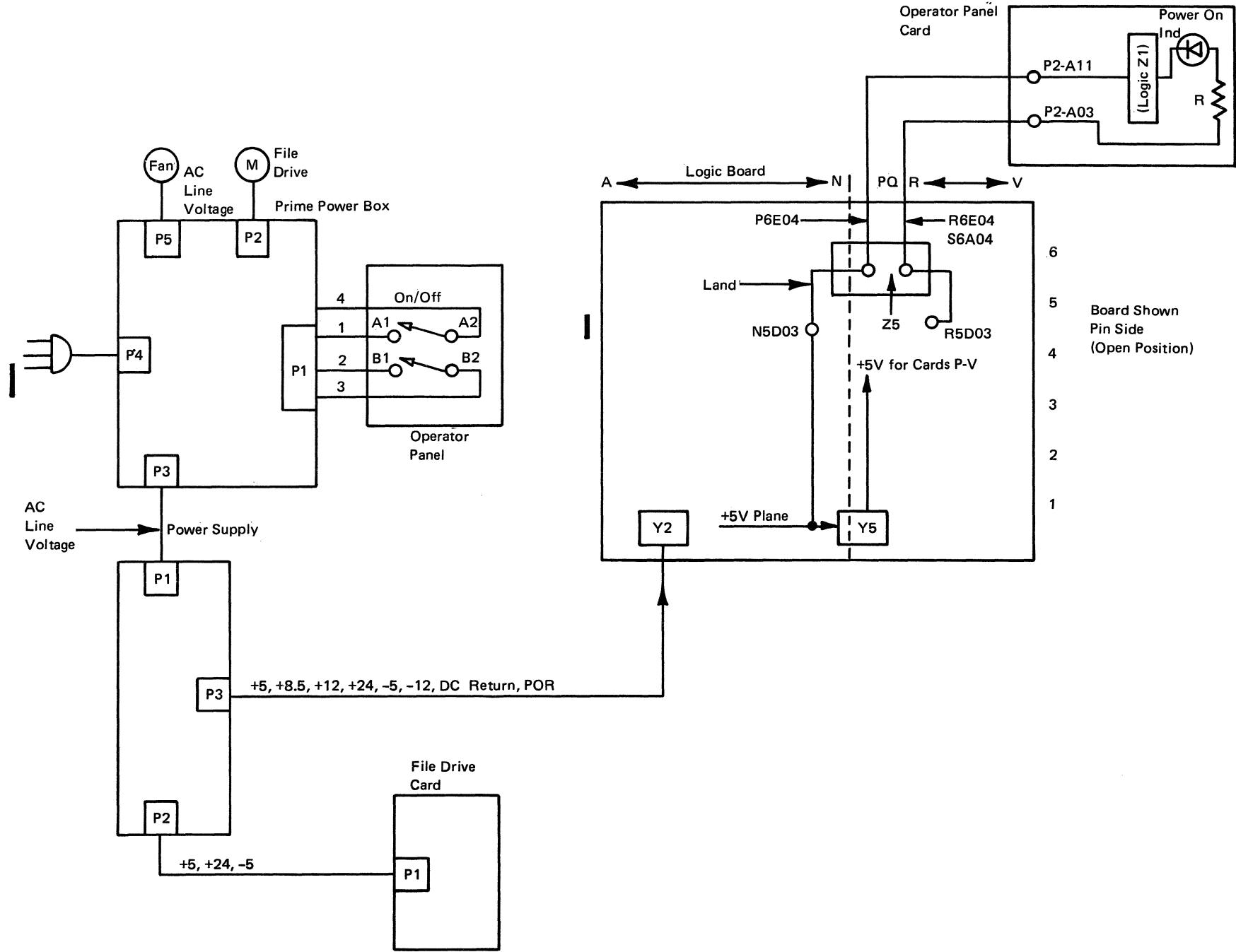
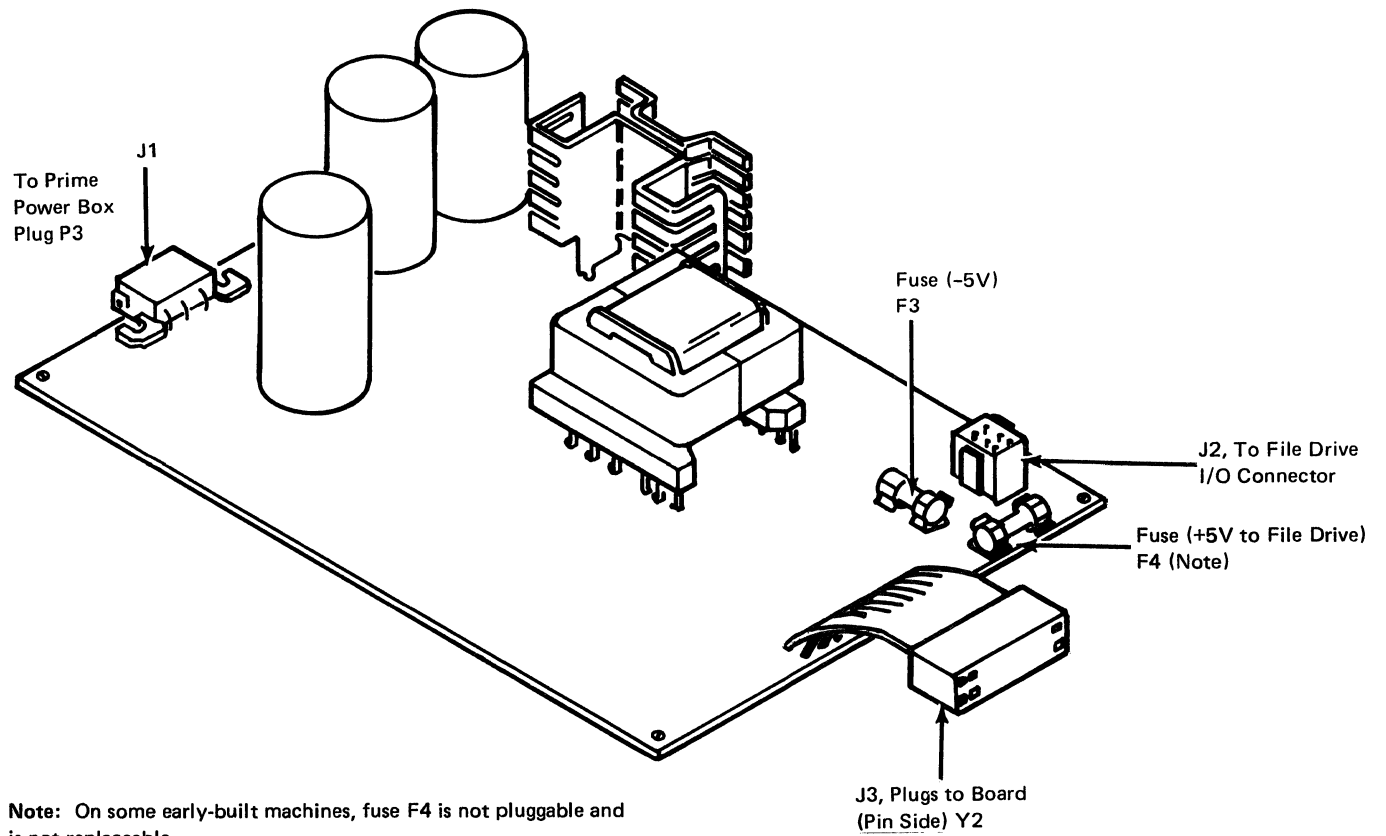


Figure B-2. Power Distribution Flow Diagram

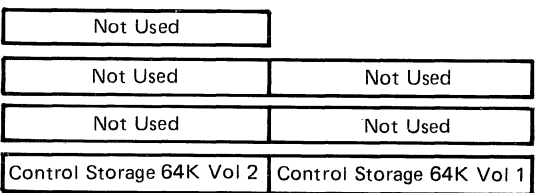
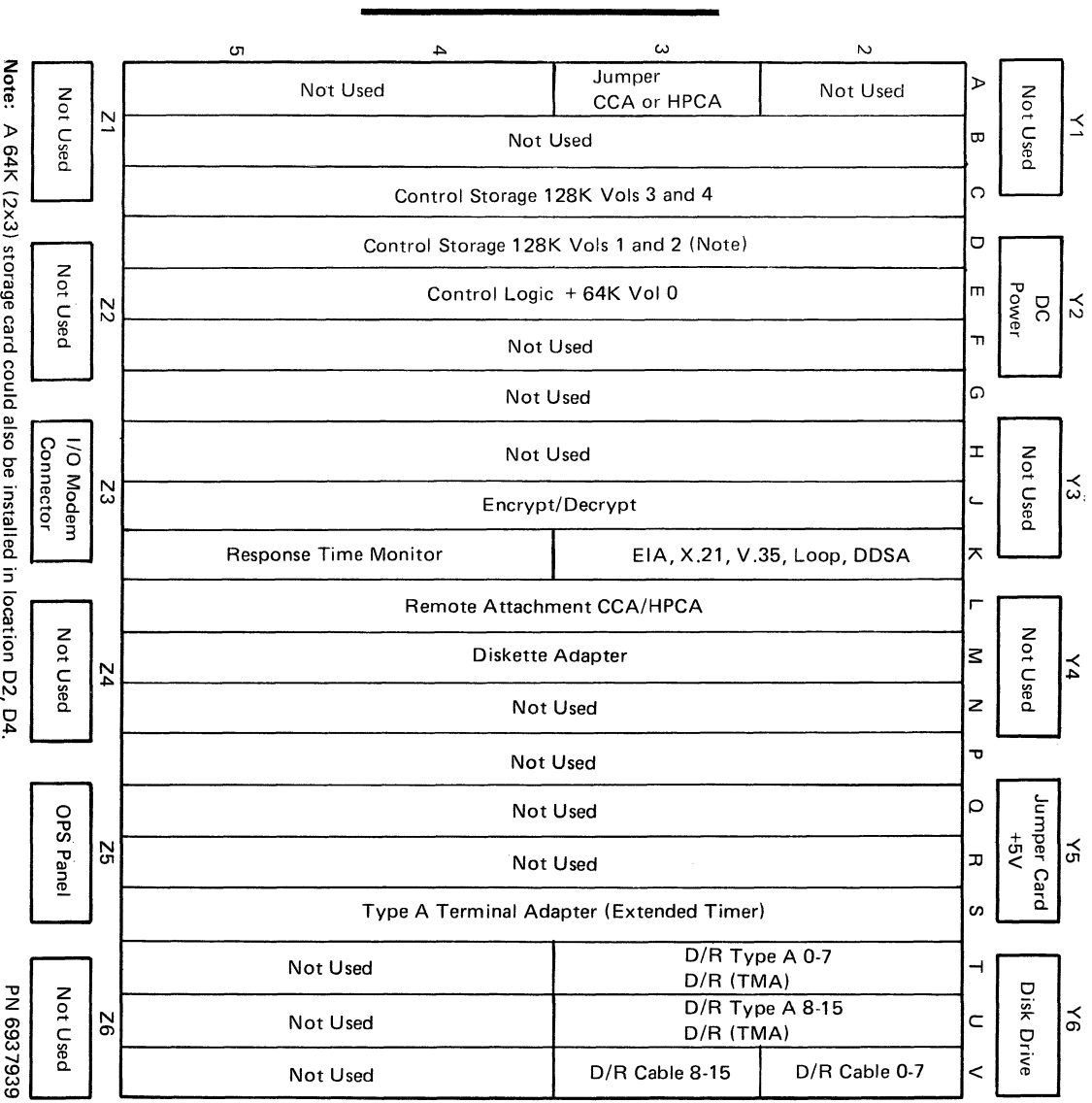


Note: On some early-built machines, fuse F4 is not pluggable and is not replaceable.

Figure B-4. Power Supply No. 1 Locations

Appendix C. Logic Boards, Cards, and Cables

C-1 Board



PN 4752109

↑
Sockets A2 and A3, and columns E through V, are the same as the board layout above.

Figure C-1. Logic Board Card Locations

Board A1 Cards and Module E2

Location	Function	Part No.	Part No.	Part No.	Part No.	Part No.
D2, D4 (2x3)	Control Storage 64K	6028789				
D2 (4x3)	Control Storage 128K ¹	6849427				
E2	Control Logic ²	6062383	8665906			
E2 Module	Pluggable Module on Card E2 ³	8665976				
M2	Diskette Adapter	5675144	6062717			
J2	Encrypt/Decrypt ³	4757527	8501248			
K2	DDS Adapter	8527032				
K2	EIA/CCITT	5864668				
K2	X.21	5864683				
K2	V.35 Interface	4939893				
K2	Loop	8548788				
K4	Response Time Monitor	4752212				
L2	CCA (without clock)	8523016				
L2	HPCA	6340976				
S2	Terminal Adapter Extended Timer	4752335				
T2, U2	Driver/Receiver (type A) ⁵	5699968				
T2, U2	TMA Driver/Receiver ⁶	8665924	1836142			
51TD	File Control (Disk Drive)	4240726				
A3	CCA Jumper	6124229				
A3	HPCA Jumper	6062824				
Y5	+5V Jumper	6062657				

Logic Board

Model	Function	Part No.	Part No.	Part No.
61	Base	4752109	6937939	

¹This card (PN 6849427) should not be plugged into board PN 4752109.

²This card (PN 6062383) should not be plugged in combination with single 128K storage cards.

³Older E2 cards may contain a pluggable module. This module can be easily replaced if defective, or can be removed from an otherwise defective card and reused. New E2 cards do not contain the pluggable module.

⁴Removing this card will destroy the Encrypt/Decrypt master key. See paragraph 6.4.

⁵This card PN must be used if the 3299 Terminal Multiplexer is not used with the driver/receiver location.

⁶This card PN must be used if the 3299 Terminal Multiplexer is used with the driver/receiver location.

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 December 1983.

Figure C-2. Card Module and Board A1 Part Numbers

C.2 Card Functions

Jumper Card (Location A3). There are two types of jumper card: CCA and HPCA. These cards are used to personalize the wiring of a remote board and to allow for host adapter changes.

- I Storage (Locations C2, D2, D4).** This card(s) contains the remaining volumes of RAM storage. (Volume 0 is located on the Control Logic card.) These storage cards contain the operational code and data after a successful IML, and are controlled by the Control Logic card.

Early-built machines incorporate 2x3 cards containing 64K storage increments. Later-built machines are cost-reduced, with improved failure rates, and incorporate 4x3 cards containing 128K storage increments. The 64K cards are compatible with later-built boards and can be intermixed with 128K cards.

Control Logic (Location E2). This card contains an interrupt-driven processor that controls the I/O devices such as the disk file and the host attachment adapters. The first two programs containing IML diagnostics are stored in ROS while the remaining diagnostics and operational code are loaded from the diskette and are stored in RAM on this card. Also contained on the Control Logic card is RAM Storage Volume 0 (64K bytes). The other volumes of storage are controlled from the Control Logic card.

Encrypt-Decrypt Adapter (Location J2). This card with its associated microcode enciphers and deciphers host data, providing a measure of security. It interfaces only with the Control Logic card. Encrypt-Decrypt is a feature found only on the SNA/SDLC versions of the 3274.

EMI Line Interface Adapter (Location K2). This card provides signal conversion from either the HPCA or CCA Interface to the external Modem Interface, as specified in RS-232-C and CCITT Recommendation V.28. It is pin-compatible with the DDSA, X.21, V.35, and Loop Adapter cards. The EMI line interface will operate at speeds up to 9600 bps. The 3274 must be attached to a modem that provides it with clocking.

Digital Data Service Adapter (DDSA) (Location K2). This card allows the HPCA or CCA to interface with AT&T's digital data network via the Channel Service Unit (CSU). The CSU is similar to the manual data access arrangement used with existing analog modems. When used in the 3274, the DDSA will operate at synchronous speeds of 2400, 4800, 9600, and 56,000 bps. This card is pin-compatible with the EIA, X.21, V.35, and Loop Adapter cards. Clocking is determined by jumper selection on the card and must match the speed that the customer has ordered from the common carrier.

Public Data Network X.21 Nonswitched Adapter (Location K2). This card provides an interface between the HPCA/HPCA/CCA adapter and data communication equipment whose electrical characteristics match those described in EIA Standard RS-422 and CCITT Recommendation V.11. This interface also operates as described in the Leased Line Operation sections of CCITT Recommendation X.21.

Card K2 is pin-compatible with the EMI, DDSA, V.35, and Loop Adapter cards. It provides a CCITT X.21 interface for synchronous, point-to-point, or multipoint operation on nonswitched public data network facilities at speeds of 2400, 4800, 9600, and 48,000 bps. Clocking is provided by the attached Data Communications Equipment.

Public Data Network X.21 Switched Adapter (Location K2). This card, with its associated microcode, enables the HPCA adapter to connect with external data communication equipment. Its electrical characteristics meet EIA standard RS-422, CCITT V.11 Recommendations, and interface operation as specified in the CCITT X.21 Recommendation.

The X.21 Switched adapter is the same adapter used for X.21 Nonswitched operation. The selection of switched vs nonswitched is accomplished by means of card jumpering. X.21 Switched operation also requires unique adapter microcode, which is selected during 3274 customization. The X.21 Switched adapter card is pin-compatible with the EMI, DDSA, V.35, and Loop adapters. It provides the CCITT X.21 Interface for synchronous operation on the switched public data network at speeds of 2400, 4800, 9600, and 48,000 bps. Clocking is provided by the attached data equipment. Connection/termination of the X.21 call is accomplished from an attached display terminal.

Loop Adapter (Location K2). This card permits the attachment of the 3274 to a multiuse communication loop operating at speeds of up to 38,400 bps. Carrier rates of 9600 or 38,000 bps are determined by means of program pin jumpers, which are inserted on the card during manufacture. Loop data rates are controlled by operator panel switches. Also contained in the Loop Adapter card are relay drivers that drive the loop station connector relays. These relays allow the 3274 to be powered on and off without disrupting loop transmissions. The Loop Adapter card is controlled by the HPCA adapter which communicates with the Control Logic card.

Response Time Monitor (Location K4). This card and its associated microcode interface with the 3274 control logic card. The Response Time Monitor (RTM) card provides the means whereby a customer can differentiate between good and bad responses, as well as questionable ones. The RTM feature measures and records the transaction times of inbound host attention operations from display stations that communicate with the host. Depending on how the

3274 is customized, the RTM feature obtains information from a network management application in the host, from a subsystem display operator, or both.

CCITT V.35 Interface (Location K2). This card provides signal level conversion from an HPCA or CCA interface to an external modem interface, as specified in CCITT Recommendation V.35. The V.35 interface will operate at up to either 56,000 bps via an external modem or by direct attachment to an IBM 8100 Controller; and up to 57,600 bps when directly attached to an IBM 3705. Clocking is provided by the attached modem or the controller. This card is pin-compatible with the DDSA, X.21, Loop, and EMI adapters.

High-Performance Communication Adapter (HPCA) (Location L2). This card provides an SNA/SDLC communication adapter between the Control Logic card and the remote host system. It is used in place of the CCA for SNA/SDLC operations above 9600 bps. This adapter is attached to only one communication line.

Communication Common Adapter (CCA) (Location L2). This card provides an SNA/SDLC or BSC communication facility between the Control Logic card and the remote host system. This adapter is attached to only one communication line. The line speed is established by either the attached data communication equipment (up to 9600 bps).

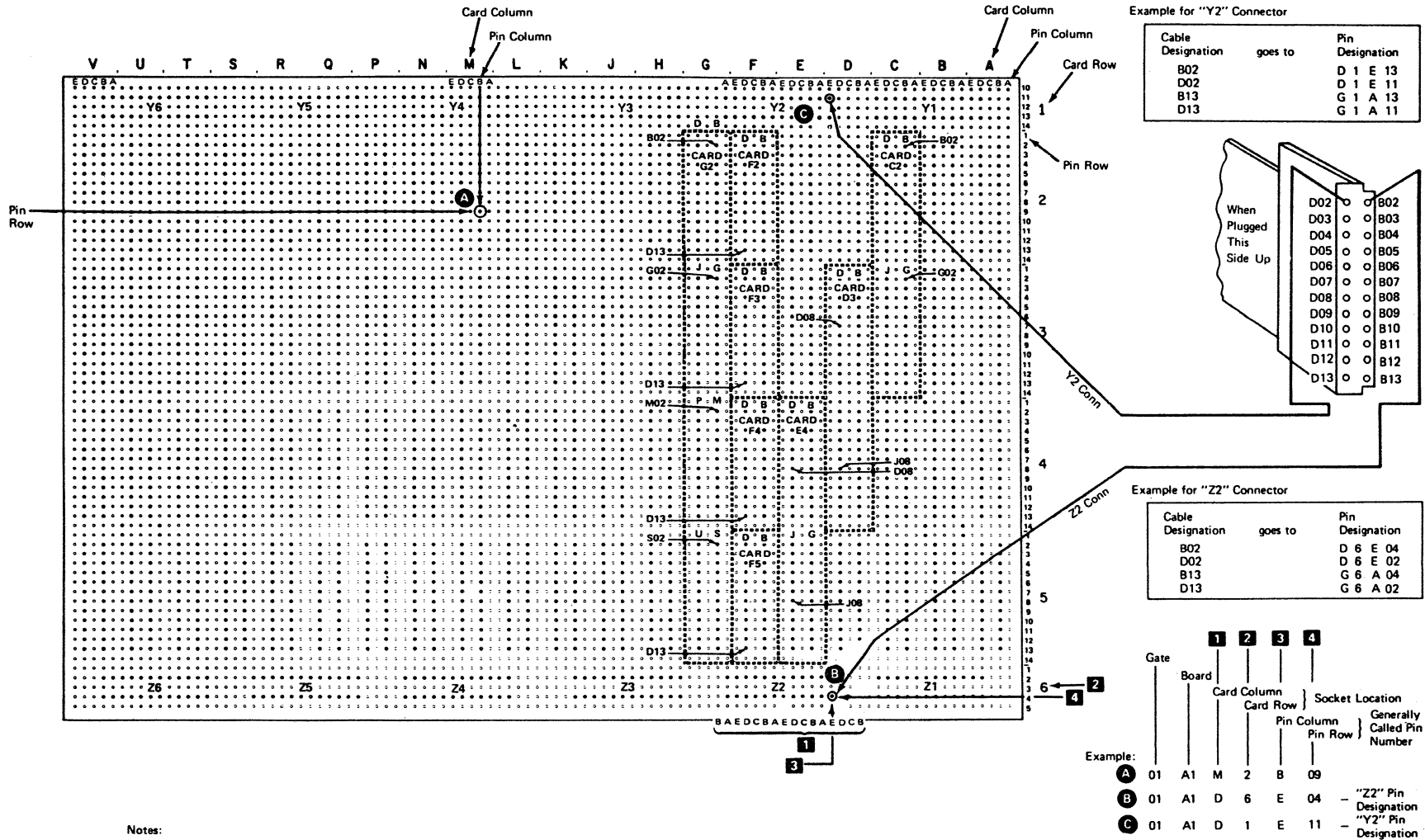
Diskette Adapter and Drive (Location M2 and card in drive unit). This card provides the control signals to the file control card located in the 51TD diskette drive unit. The diskette drive and its control card store and retrieve data by writing data to and reading data from the 51TD, containing two read/write heads, can read and write one side of a diskette 1 and either side of a diskette 2.

Type A Adapter (Extended Timer) (Location S2). This card provides a communication path between the Control Logic card and the Driver/Receiver coaxial cable. The adapter permits the attachment of up to 16 displays and/or printers in incremental blocks of eight driver/receiver cards.

Type A Receiver-Driver (Locations T2 and U2). This card is located between the Type A Adapter and the coaxial cables leading to the attached devices. Data is transmitted over a single coaxial cable per attached device. The cable type is RG62A/U. Its maximum length can be 1.5 km (4921 ft).

Terminal Multiplexer A (TMA) Receiver-Driver (Locations T2, U2). This card is located between the Type A Adapter and the coaxial cable leading to the Terminal Multiplexer (Machine Type 3299). It multiplexes the data stream of eight devices into a single coaxial cable. The cable type is RG62A/U. Its maximum length is 1.5 km (4921 ft).

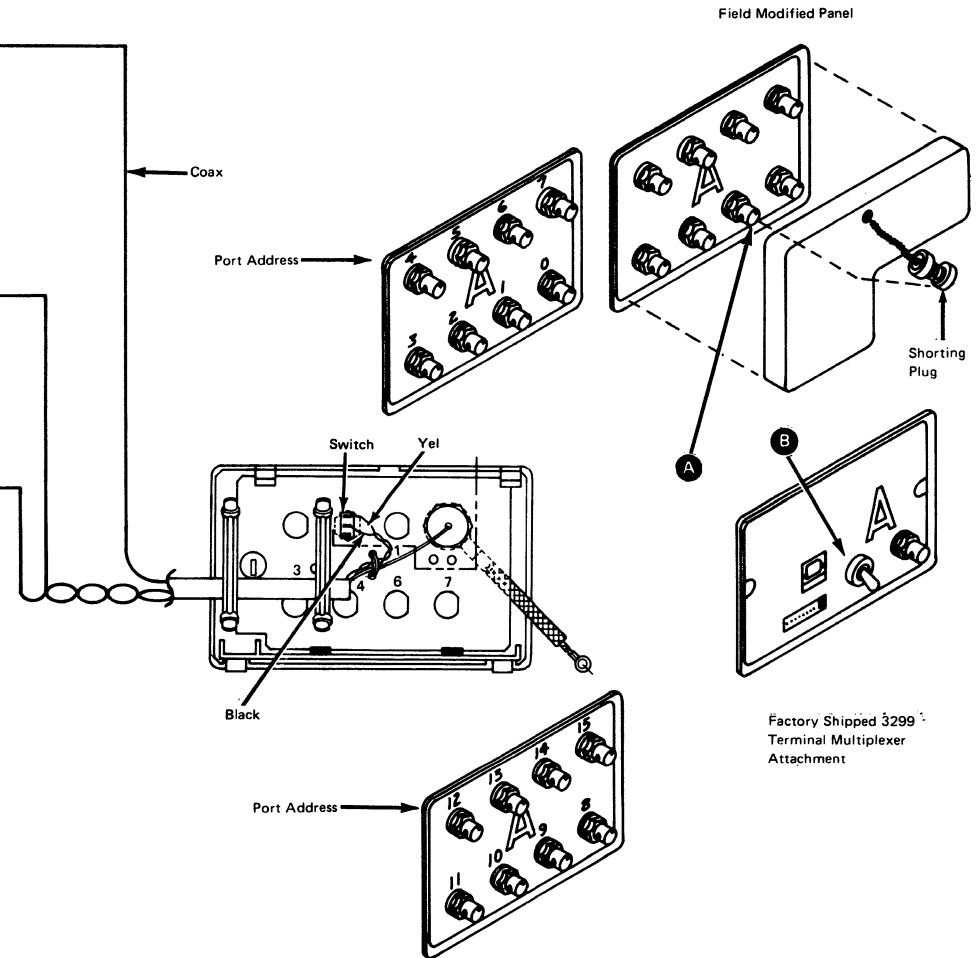
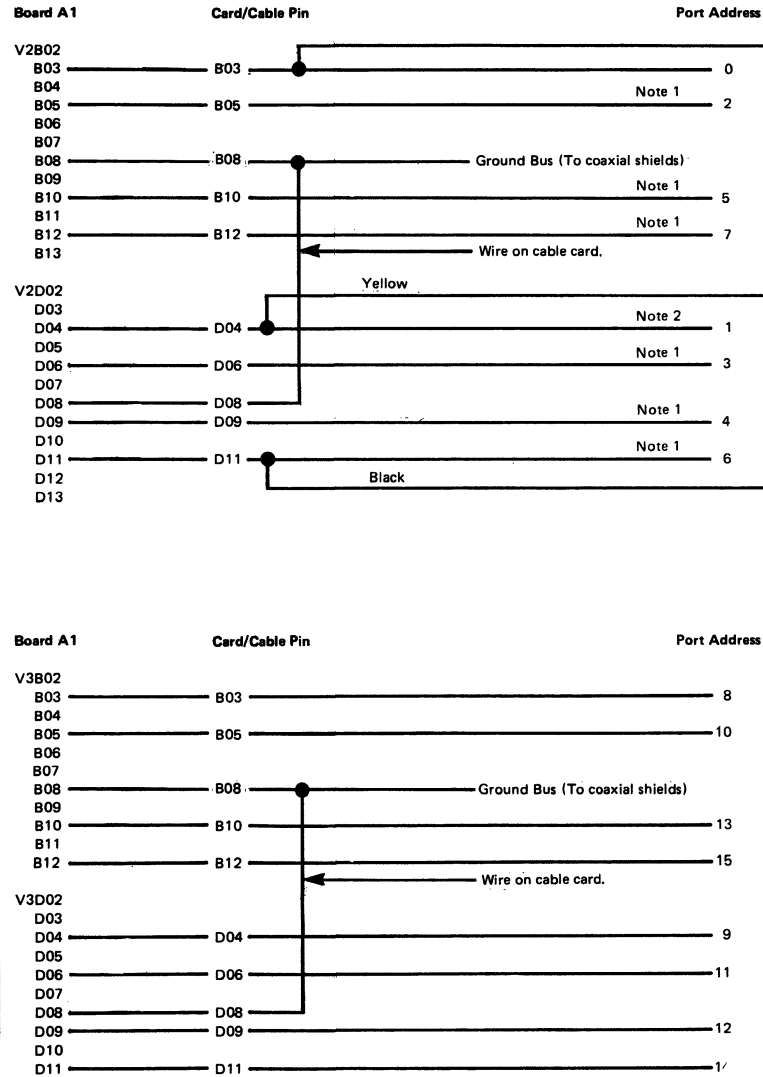
+5V Jumper Card (Location Y5). This card extends +5V from the area of card locations A-N to locations P-V.



Notes:

- 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.
- 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 row, respectively. See examples in the illustration.
- 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.

Figure C-3. Logic Board—Card, Connector, and Pin Locations



Notes:

1. These port location wires are either not wired or are not used when the terminal multiplexer is attached.
2. A general logic probe (with probe set to multi-position) placed at V2D04 will indicate a down (Gnd) level with either switch **B** in the up position or with a shorting plug connected to jack **A**. An up level will be indicated with switch **B** down and no shorting plug connected.

Figure C-5. Logic Board Cables to Coax Panel

C.5 Board Pins to Cable Connector Pins Conversion Chart (Figure C-6)

Cable Conn Pin	Board Row (Y or Z)											
	Y1	Y2	Y3	Y4	Y5	Y6	Z1	Z2	Z3	Z4	Z5	Z6
B02	A1D13	D1E13	H1A13	L1D13	P1E13	T1A13	A6D04	D6E04	H6A04	L6D04	P6E04	T6A04
B03	A1E13	E1A13	H1B13	L1E13	Q1A13	T1B13	A6E04	E6A04	H6B04	L6E04	Q6A04	T6B04
B04	B1A13	E1B13	H1C13	M1A13	Q1B13	T1C13	B6A04	E6B04	H6C04	M6A04	Q6B04	T6C04
B05	B1B13	E1C13	H1D13	M1B13	Q1C13	T1D13	B6B04	E6C04	H6D04	M6B04	Q6C04	T6D04
B06	B1C13	E1D13	H1E13	M1C13	Q1D13	T1E13	B6C04	E6D04	H6E04	M6C04	Q6D04	T6E04
B07	B1C13	E1E13	J1A13	M1D13	Q1E13	U1A13	B6D04	E6E04	J6A04	M6D04	Q6E04	U6A04
B08	B1E13	F1A13	J1B13	M1E13	R1A13	U1B13	B6E04	F6A04	J6B04	M6E04	R6A04	U6B04
B09	C1A13	F1B13	J1C13	N1A13	R1B13	U1C13	C6A04	F6B04	J6C04	N6A04	R6B04	U6C04
B10	C1B13	F1C13	J1D13	N1B13	R1C13	U1D13	C6B04	F6C04	J6D04	N6B04	R6C04	U6D04
B11	C1C13	F1D13	J1E13	N1C13	R1D13	U1E13	C6C04	F6D04	J6E04	N6C04	R6D04	U6E04
B12	C1D13	F1E13	K1A13	N1D13	R1E13	V1A13	C6D04	F6E04	K6A04	N6D04	R6E04	V6A04
B13	C1E13	G1A13	K1B13	N1E13	S1A13	V1B13	C6E04	G6A04	K6B04	N6E04	S6A04	V6B04

D02	A1D11	D1E11	H1A11	L1D11	P1E11	T1A11	A6D02	D6E02	H6A02	L6D02	P6E02	T6A02
D03	A1E11	E1A11	H1B11	L1E11	Q1A11	T1B11	A6E02	E6A02	H6B02	L6E02	Q6A02	T6B02
D04	B1A11	E1B11	H1C11	M1A11	Q1B11	T1C11	B6A02	E6B02	H6C02	M6A02	Q6B02	T6C02
D05	B1B11	E1C11	H1D11	M1B11	Q1C11	T1D11	B6B02	E6C02	H6D02	M6B02	Q6C02	T6D02
D06	B1C11	E1D11	H1E11	M1C11	Q1D11	T1E11	B6C02	E6D02	H6E02	M6C02	Q6D02	T6E02
D07	B1D11	E1E11	J1A11	M1D11	Q1E11	U1A11	B6D02	E6E02	J6A02	M6D02	Q6E02	U6A02
D08	B1E11	F1A11	J1B11	M1E11	R1A11	U1B11	B6E02	F6A02	J6B02	M6E02	R6A02	U6B02
D09	C1A11	F1B11	J1C11	N1A11	R1B11	U1C11	C6A02	F6B02	J6C02	N6A02	R6B02	U6C02
D10	C1B11	F1C11	J1D11	N1B11	R1C11	U1D11	C6B02	F6C02	J6D02	N6B02	R6C02	U6D02
D11	C1C11	F1D11	J1E11	N1C11	R1D11	U1E11	C6C02	F6D02	J6E02	N6C02	R6D02	U6E02
D12	C1D11	F1E11	K1A11	N1D11	R1E11	V1A11	C6D02	F6E02	K6A02	N6D02	R6E02	V6A02
D13	C1E11	G1A11	K1B11	N1E11	S1A11	V1B11	C6E02	G6A02	K6B02	N6E02	S6A02	V6B02

Note:

This chart is:

1. Valid only for boards with sockets A through V and sockets A through K.
2. Used to convert board row Y and Z pins to cable connector pin locations.

Figure C-6. Chart for Converting Board Rows Y and Z Pins to Cable Connector Pins

Appendix D. Operator and Control Panels

This appendix provides the following 3274 Model 61C operator/control panel information:

- General Information
- Switch and Indicator Descriptions
- Operator Panel Functions
- Loop and Modem Control Panel Settings
- Wiring Diagrams

D.1 3274 Model 61C Operator Panel

The 3274 operator panels for Model 61C are illustrated in Figures D-1 through D-5 as follows:

Figure D-1. 3274 Operator Panel—All Models Except Loop

Figure D-2. 3274 Operator Panel—Model 61C with Loop Attachment

Figure D-3. Operator Panel Card, Panel, Board Connection Wiring Diagram, a foldout at the rear of this manual (page FO-3).

Figure D-4. Operator Panel Component Pin Locations

Figure D-5. Operator Panel Assembly Cable Plugging

D.1.1 Indicators 8 4 2 1

The four lights (8 4 2 1) on the panel are the operational indicators. These indicators first serve as Bus and Lamp Test indicators: if all indicators are on while the IML pushbutton is pressed, it indicates a successful Bus and Lamp Test. When the IML pushbutton is released, all lights go out and the 3274 proceeds to execute 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 flashing in the operational indicators (8 4 2 1).

Successful completion of the IML diagnostic sequence is indicated by all the 8 4 2 1 indicators being turned on. The completion of the IML diagnostic sequence will initiate the loading of the 3274 Operational Microcode, or, depending on the diskette inserted, various other functions, such as customizing.

Successful completion of this loading process will turn the 8 4 2 1 indicators off and initialize the function that was loaded. After the full IML process has been completed, the 8 4 2 1 indicators are used to convey operational status and failure information.

The 8 4 2 1 indicators are used by the 3274 Operational Microcode to convey either unrecoverable (hung 3274) failure information or status information. When the operational microcode detects an error, most 8 4 2 1 codes are displayed continuously.

D.1.2 Loop Attachment Indicators

The operator panel with the Loop Attachment feature has three additional indicators as shown in Figure D-2. These indicators [OK (Line Ready), External Check, and Machine Check] report the loop condition and the source of check conditions associated with the loop.

D.2 IML Options

Three IML options are made available by the ALT switch, a three-position pushbutton switch. The three positions are 0 (normal), ALT1, and ALT2. 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.

D.2.1 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 by all indicators being on. All indicators remain on while the Operational Code is being loaded, and all turn off upon completion of this load. The operational load takes approximately 45 seconds.

D.2.2 ALT1

Momentarily pressing IML while holding the ALT switch in ALT1 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 memory and bring the 3274 up. Press IML with ALT in the normal position before any other startup method is attempted.

Note: Only an IBM 3278 or 3279 display can be attached to Port 0 during IML.

D.2.3 ALT2

Momentarily pressing the IML pushbutton while holding the ALT switch in the ALT2 position invokes adapter and cable-wrap test functions for the following adapters:

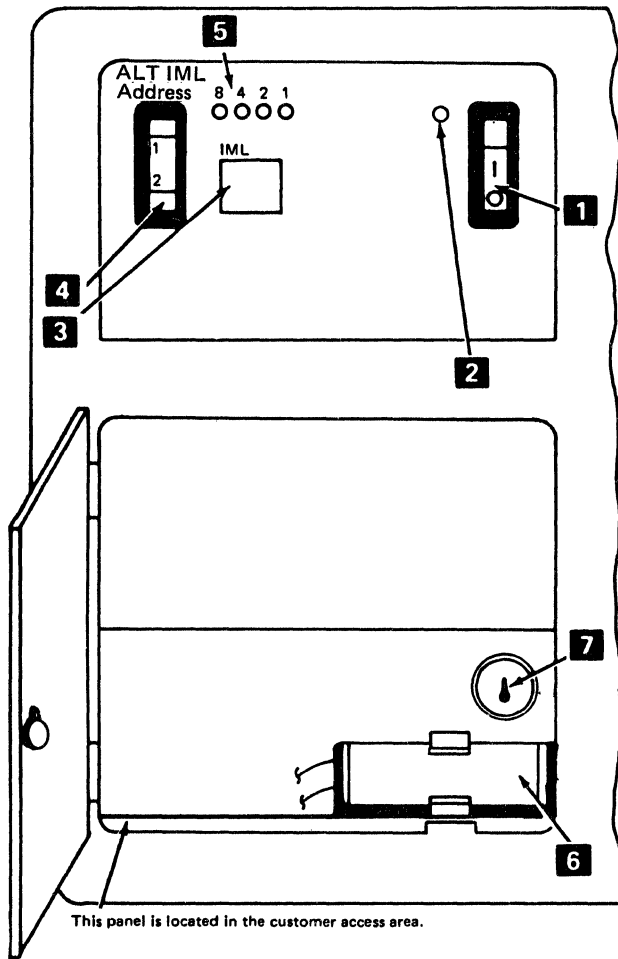
- High-Performance Communications Adapter (HPCA)
- Common Communications Adapter (CCA)
- EIA
- Digital Data Service (DDS) Adapter
- V.35
- Loop Adapter
- X.21

The Modem Wrap Test can be initiated by using the ALT2 function as well as the Normal IML Test (with wrappable modem). Momentarily pressing the IML pushbutton while holding the ALT switch in the ALT2 position invokes an extended Modem Wrap Test. Some types of modems require manual intervention to set up for wrap testing. For a wrap-able 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, will cause the 3274 8 4 2 1 indicators to repeatedly display a 0111 failure code for 5 seconds and an additional code for 3 seconds. The display unit at port 0 will also indicate these codes. For a nonwrappable modem, the data wrap path is to and from the Test/Operator switch at the end of the communication cable. (The Test/Operate switch is not installed in a loop interface.) The procedure for ALT2 with nonwrappable modem is in Chapter 2, Step 8. The Modem Wrap Test requires approximately 1 minute to complete.

D.3 Loop Attachment Control Panel

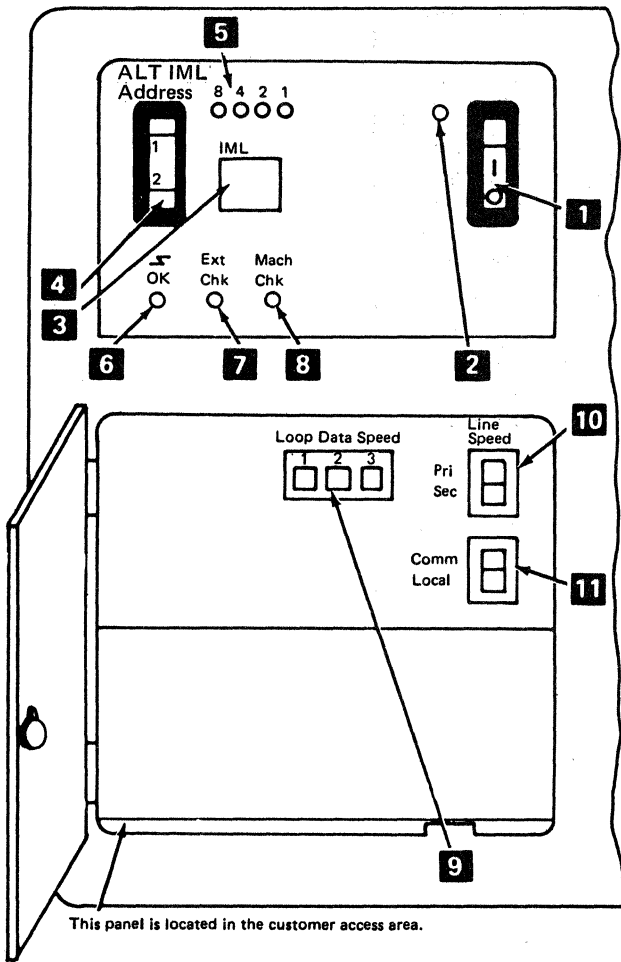
The loop attachment control panel is shown in Figure D-2. This panel, located in the customer access area, provides loop mode and speed controls.



Ref	Description
1	On/Off switch: <input type="checkbox"/> = On; <input type="radio"/> = Off.
2	On indicator: Indicates the 3274 is on.
3	IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded.
4	ALT IML Address switch: Position 1: Holding, while pressing the IML pushbutton, bypasses the tests and loads the machine directly. Use only after normal IML fails. Note: The operational code may not be loaded unless the IML tests have sequenced to the start of the IML test 0010 at least once. Position 2: Holding, while pressing the IML pushbutton, invokes the adapter and wrap test.

Ref	Description
5	8 4 2 1 indicators: These light 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.
6	Encrypt/Decrypt Battery – Allows the master key to be maintained in the 3274 when power is off.
7	Encrypt/Decrypt Key Switch – Allows a new master key to be entered when in the horizontal position.

Figure D-1. 3274 Operator Panel—All Except Loop Model 61C with/without Encrypt/Decrypt Feature



- | Ref | Description |
|----------|--|
| 1 | On/Off switch: <input type="checkbox"/> = On; <input type="radio"/> = Off. |
| 2 | On indicator: Indicates the 3274 is on. |
| 3 | IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded. |
| 4 | ALT IML Address switch:
Position 1: Holding, while pressing the IML pushbutton, bypasses the tests and loads the machine directly. Use only after normal IML fails.

Note: The operational code may not be loaded unless the IML tests have sequenced to the start of the IML test 0010 at least once.

Position 2: Holding, while pressing the IML pushbutton, invokes the adapter and wrap test. |

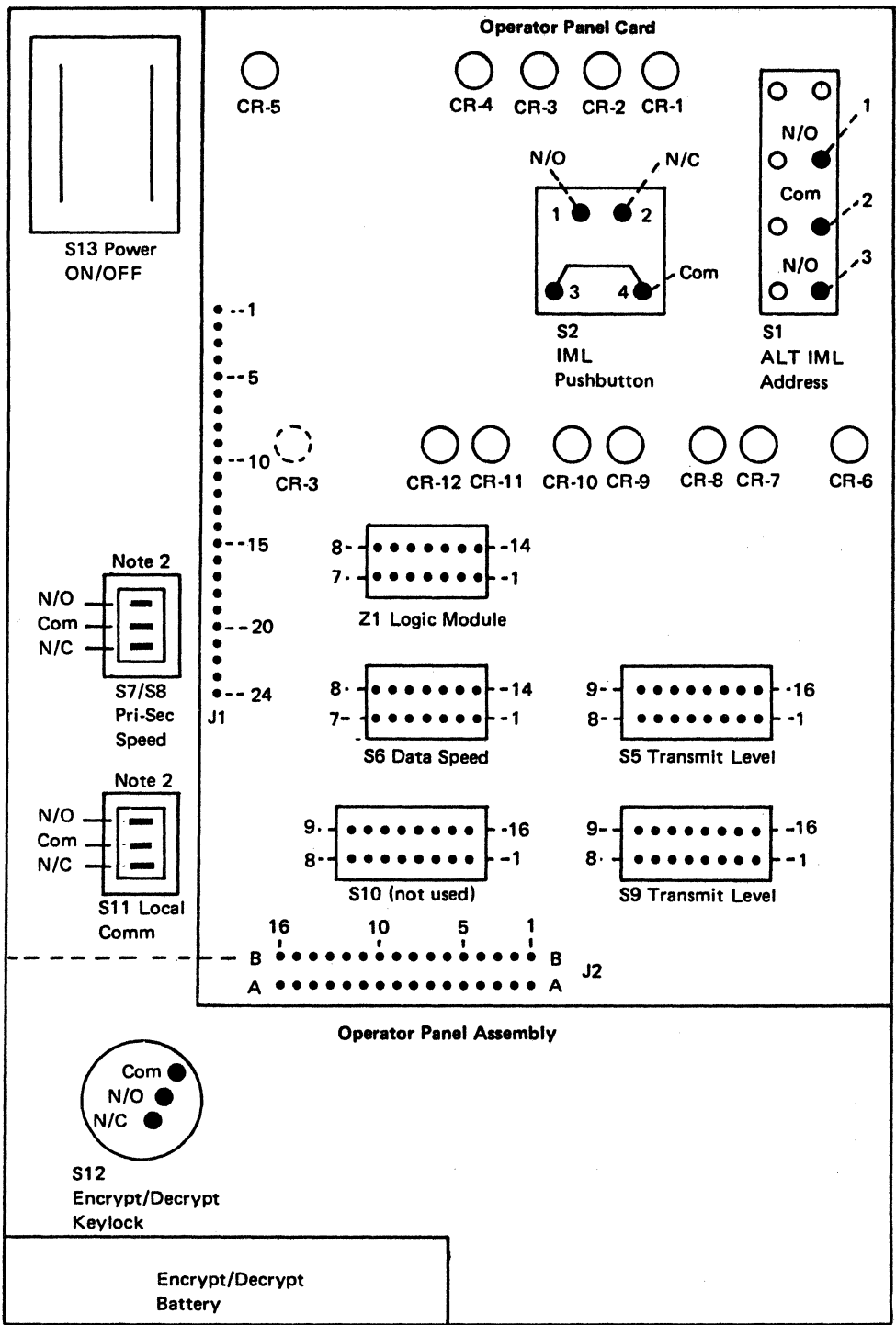
- | Ref | Description |
|----------|--|
| 5 | 8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status. |
| 6 | OK (Line Ready indicator): Indicates that a valid message was received within the last 8 seconds. |
| 7 | External Check indicator: Indicates error external to the 3274. |
| 8 | Machine Check indicator: Indicates problems internal to the 3274. |
| 9 | Loop Data Speed Switches (up is ON, down is OFF) |

Loop Carrier Speed (bps) ⁴	Line Speed (bps) ³		Loop Data Speed Switch Settings		
	Pri	Sec	1	2	3
9600 ¹	9600	4800	Off	Off	Off
9600 ¹	9600	2400	Off	Off	On
9600 ¹	4800	2400	Off	On	Off
9600 ¹	2400	1200	On	Off	Off
38,400 ²	38,400	Not used	Off	Off	Off
38,400 ²	9600	Not used	On	Off	Off

- ¹ Data-link-attached loop
- ² Directly attached loop
- ³ Line speed must match speed of loop controller.
- ⁴ Loop carrier speed is also set on loop card K2 and must match speed of loop controller. See Figure 5-11.

- | | |
|-----------|---|
| 10 | Line Speed Switch — Used to select the primary or secondary speed as shown in 9 above under "Speed (bps)". |
| 11 | Local/Communicate Switch — Used to isolate problems on the loop. In the Local position, the 3274 is disconnected from the loop; in the Communicate position, the 3274 is connected to the loop. |

Figure D-2. 3274 Operator Panel — Model 61C with Loop Attachment



Notes:

1. Probe Power ON switch S1 at cable termination Plug P2. See Figure B-2
2. Switches S1, S7, and S11—There is continuity between the Com and N/C contacts with the rocker in the position shown to the right.

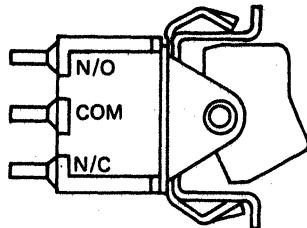


Figure D-4. Operator Panel Component Pin Locations

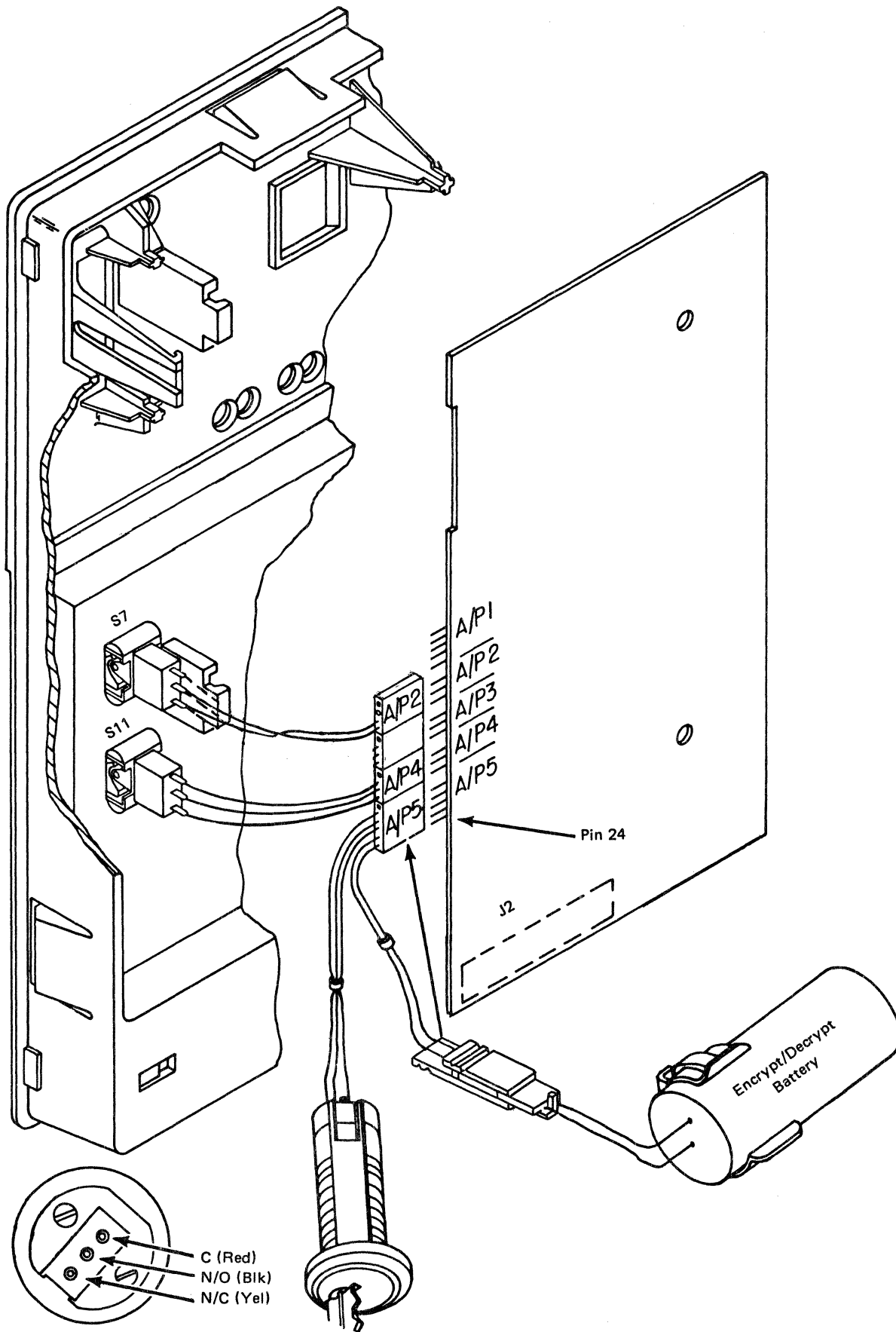


Figure D-5. Operator Panel Assembly Cable Plugging

Appendix E. IBM 51TD Diskette Drive Maintenance

Safety Information

The CE Safety practices, located at the front of this manual, should be reviewed before you service the 51TD Diskette Drive. To prevent personal injury and machine damage, observe all DANGER, CAUTION, and Warning notices, making sure you fully understand them.

AC voltages are present on the 51TD drive motor connector and capacitor terminals when the drive motor is running. The motor and the solenoid become hot after continuous use; let the parts cool before attempting servicing. The following DANGER, CAUTION, and Warning notices appear in this appendix in the sequence shown:

DANGER

Input ac voltage is present in the prime power box when the 3274 I/O (on/off) switch is in the O (off) position.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

DANGER

High voltage may be present at the capacitor terminals.

CAUTION

The motor case becomes hot after continuous use.

CAUTION

The solenoid case becomes hot after continuous use.

Warning: Do not attempt to remove the collet/flat spring before removing the bail. Too much pressure or binding can damage the spring.

Warning: Ensure that the heads do not hit each other when the bail is removed from under the head arm.

Warning: Too much pressure or binding of the flat spring will damage the spring.

Warning: The head/carriage assembly is adjusted and tested at the factory. Do not attempt to adjust or repair any part of this assembly.

Warning: The head/carriage assembly adjustment check must be performed with the diskette drive installed (or with the diskette drive in the same position as when installed) or the adjustment might not be accurate.

Warning: The stepper drive band assembly can be easily damaged. Do not bend, crease, or scratch the band. Do not use a damaged band.

Warning: When you install the head/carriage assembly, ensure that a strip of clean paper is placed between the diskette drive heads to protect them during installation; also ensure that the bail is under the head load arm. Ensure that the bail return spring is correctly installed. Ensure that the band is not damaged in any way.

Warning: Do not let the solenoid plunger and cable turn while you make the bail adjustment.

Warning: When the stepper motor pulley is tightened by the clamp screw, ensure that the pin located on the back of the stepper motor pulley remains within the cutout slot on the casting.

Warning: Be careful not to damage the control card.

E.1 Introduction

E.1.1 General Description

The IBM 51TD Diskette Drive is a direct-access, read/write, data storage device. This drive uses the flexible magnetic diskette for data entry, data exchange, and data storage.

The 51TD Diskette Drive, shown in Figure E-1, can read from and write on one side of a diskette 1 and either side of a diskette 2.

E.1.1.1 Diskette Description

The IBM 51TD Diskette, shown in Figure E-2, is a thin, flexible disk, permanently protected in a jacket. Information is stored magnetically on the diskette surface, which is covered with magnetic recording material. The diskette is free to turn inside the jacket. As the diskette turns, the inner surface of the jacket cleans the diskette.

The diskette jacket has three holes. The first hole permits the diskette drive to turn the diskette, the second hole permits the read/write head to make contact with the diskette, and the third hole permits the phototransistor light to go through the index hole to sense the type of diskette. For storage, the diskette, which is permanently protected in a thin jacket, can be placed in an envelope. Data can be read from or written on either side of the diskette.

Information is written on the diskette in tracks. A track is a circular path on the diskette surface. Information is magnetically written on or read from a track by a read/write head as the diskette turns. See Figure E-2.

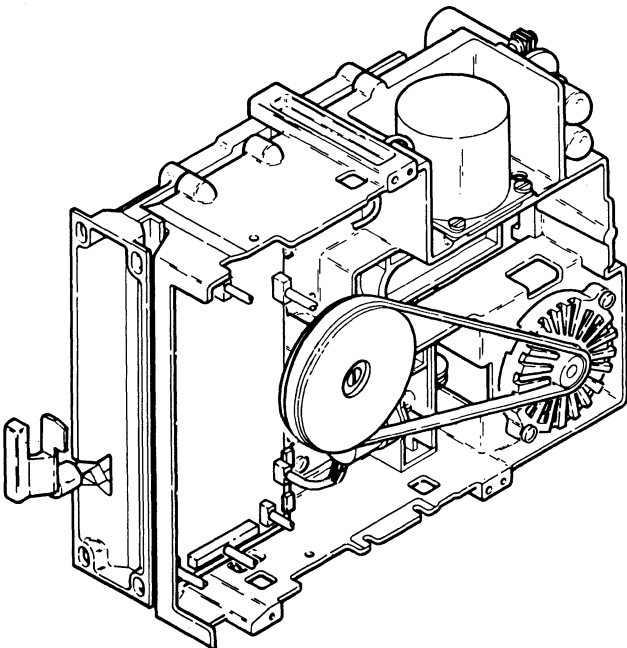


Figure E-1. IBM 51TD Diskette Drive

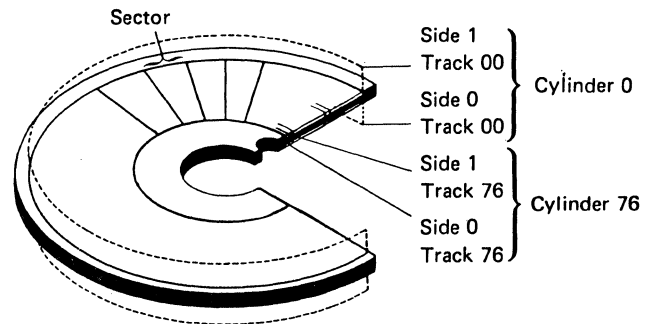
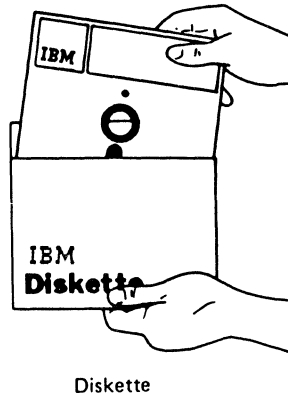
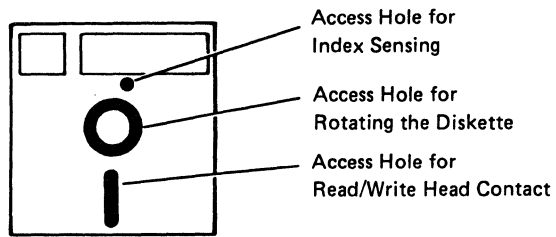


Figure E-2. 51TD Diskette

There are 77 tracks on each side of a diskette. Track 00, which is the outside track, is reserved as a label track and cannot be used for data. Tracks 75 and 76, the two tracks nearest the hub, are reserved as alternative tracks and can be used for data only if another track becomes damaged. A total of 74 tracks on one side of a diskette 1 and on each side of a diskette 2 and 2D are available for recording data.

A sector is that part of a track used for one record of information.

A cylinder is defined as the tracks of a diskette that can be read from or written on without moving the read/write heads.

E.1.1.2 Diskette Insertion and Removal (Figure E-3)

To insert a diskette:

1. Turn the operator knob to the open position.
2. Remove the diskette from its envelope.
3. Place the diskette squarely into the diskette drive (with the label facing the knob).
4. Turn the operator knob to the closed position.

To remove a diskette:

1. Turn the operator knob to the open position.
2. Remove the diskette.
3. Insert the diskette into its envelope.

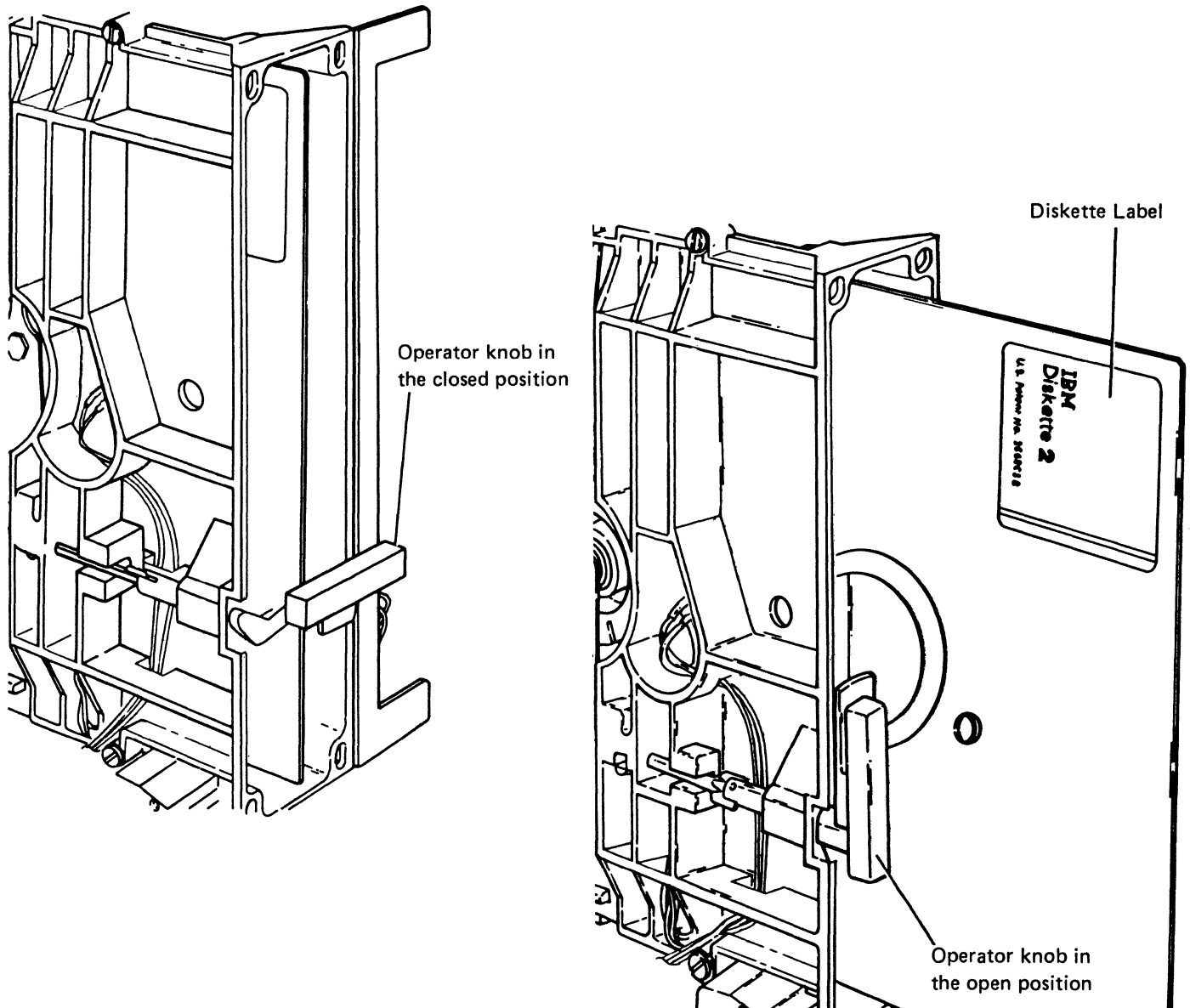


Figure E-3. Diskette Insertion

E.1.1.3 Maintenance

The diskette drive needs no planned maintenance. The MAPs guide the CE in diagnosing diskette drive failures: the MAPs also send the CE to maintenance procedures in this appendix when an adjustment, service check, or FRU replacement is needed.

Should a diskette drive unit fail (usually indicated by an IML failure code of 0010) the CE should only perform the diagnostic procedures outlined in the MAPs before replacing the drive unit FRU. The CE should perform further repairs only if he or she is capable of doing so quickly.

The head/carriage assembly and the drive hub and pulley assembly are adjusted and tested at the factory. The head/carriage assembly can be exchanged in the field; the drive hub and pulley assembly cannot be exchanged in the field. If the track 40 adjustment surface or the device hub and pulley assembly is damaged, the diskette drive should be exchanged.

E.1.1.4 Special Tools

The CE must use the following special tools (shown in Figure E-4):

- Timing pin **B** (PN 5562019) to adjust or service the read/write head/carriage stepper motor pulley. (This part is supplied with each drive.)
- Force gauge **A** (PN 460870) to adjust or service-check the drive band tension.
- Spring **D** (PN 4240631) to keep the head/carriage in place against the thickness gauge when performing the head/carriage adjustments. (This part is supplied with each drive.)

Note: Spring must match view **E**.

- Clip **C** (PN 4240632) to keep the thickness gauge in contact with the track 40 adjustment surface.

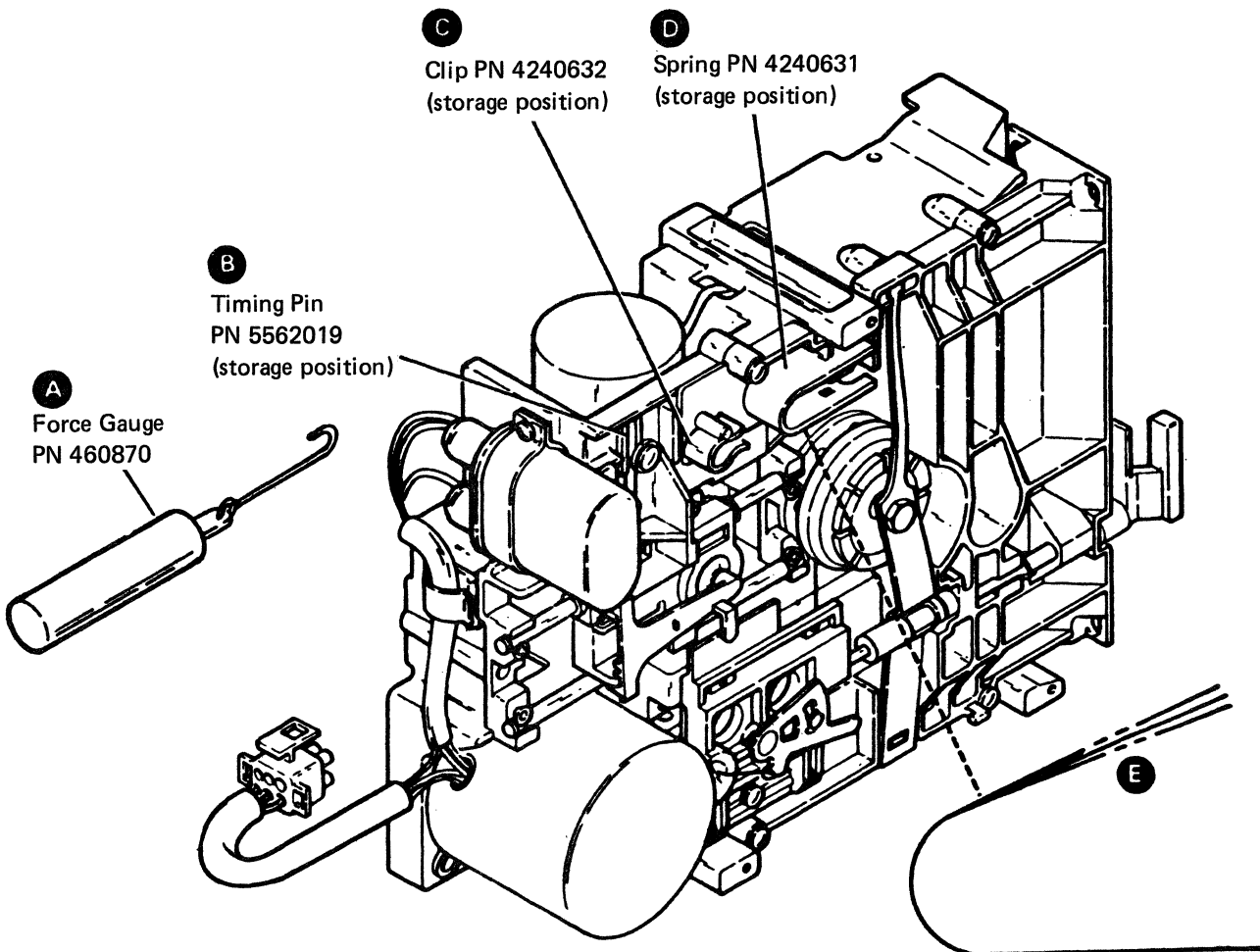


Figure E-4. 51TD Special Tools

E.1.2 Machine Characteristics

E.1.2.1 Physical Characteristics

The 51TD diskette weighs 5.0 kg (11.0 pounds) and has a speed of 360 rpm. See Figure E-5 for other physical characteristics.

E.1.2.2 Electrical Characteristics

The system supplies all the power needed to operate the diskette drive, which includes:

- All the following:

Logic Voltage (dc)	Maximum Operating Current (A)	Tolerance (%)
-5	0.08	±10
+5	0.50	±10
+24	0.50	±12

- A selection of the needed ac power from the following lists:

-60 Hz, single-phase, ac power

Input Voltage (V)	Input Voltage Range	Average Operating Current (A)
100	90–110	0.30
110	96.5–119	0.30
120	104–127	0.30
127	111–137	0.30
200	180–220	0.20
208	180–220	0.20
220	193–238	0.20
240	208–254	0.20

-50 Hz, single-phase, ac power

Input Voltage (V)	Input Voltage Range	Average Operating Current (A)
100	90–110	0.30
110	96.5–119	0.30
200	180–220	0.25
220	193–238	0.20
230	202–249	0.20
240	210–259	0.20

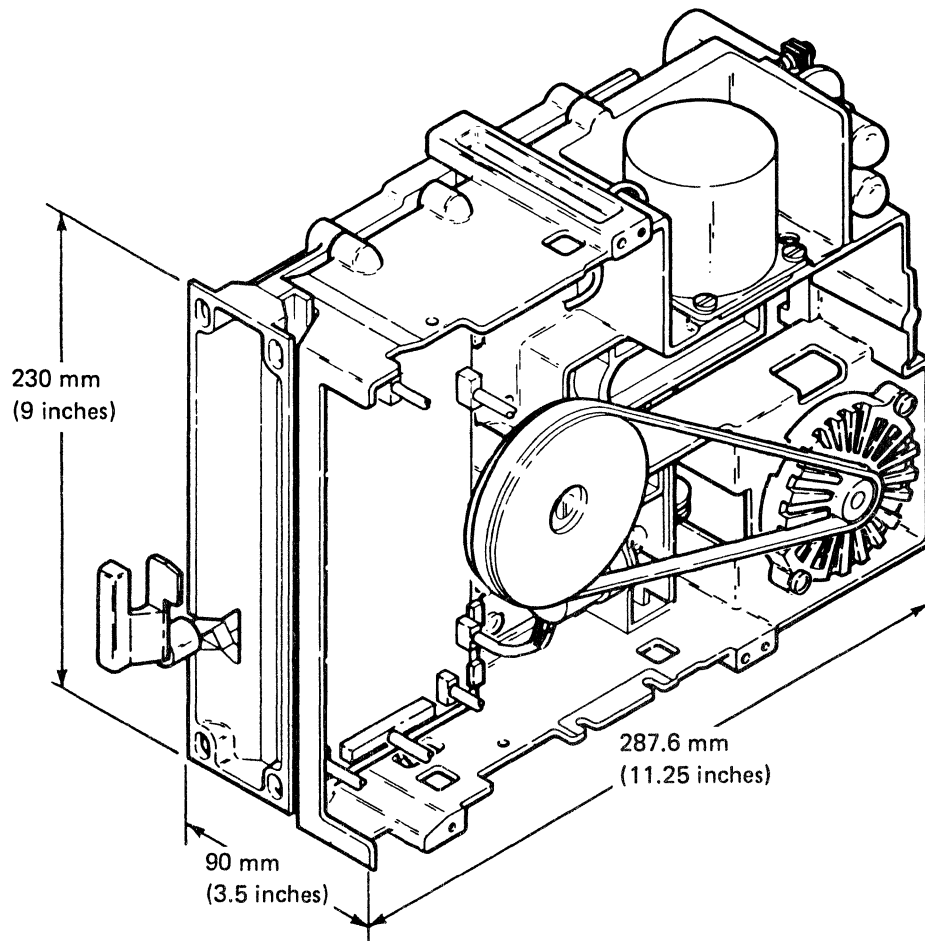


Figure E-5. 51TD Physical Characteristics

E.1.2.3 Environmental Characteristics

IBM diskette drives can be operated or stored in the following temperature and humidity ranges, shown in Figure E-6.

	Temperature		Relative Humidity
	Celsius	Fahrenheit	
Operate (Powered On)	10° to 40.6°	50° to 105°	8% to 80%
Store (Powered Off)	10° to 51.7°	50° to 125°	8% to 80%

Figure E-6. Environmental Characteristics

E.1.2.4 Functional Characteristics

The format of the data on a diskette is changed when the number of bytes written in a sector is changed. Diskettes are used with the formats shown in Figure E-7.

- The maximum number of formatted data bytes per diskette is shown in Figure E-8.
- Data rate: 250,000 bits (31,250 bytes) per second (FM).
- Cylinder-to-cylinder seek time: 5 ms, plus 35 ms for the head/carriage assembly to stop. (The total seek time is the number of cylinders the heads moved across multiplied by 5 ms, plus 35 ms.)
- Tracks per diskette side: 77 (cylinder 00 is the label cylinder; cylinders 01 through 74 are for data; cylinders 75 and 76 are reserved as alternative cylinders).

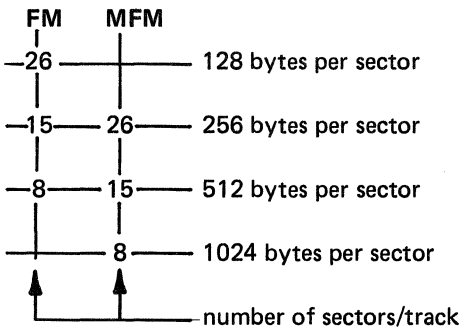


Figure E-7. Data Formats

	Diskette 1	Diskette 2	Diskette 2D
128 bytes per sector	246,272 ¹	492,544 ²	
256 bytes per sector	284,160	568,320	985,088 ³
512 bytes per sector	303,104	606,208	1,136,640
1024 bytes per sector			1,212,416

¹ The total number of data bytes that can be stored on the diskette. The Basic Data Exchange Standards for exchanging information from one system to another using diskette 1 are:

- Use 128 bytes per sector.
- Do not use track 74.

The total number of usable data bytes then becomes 242,944.

² Basic Data Exchange for a diskette 2.

³ Basic Data Exchange for a diskette 2D.

Figure E-8. Maximum Number of Formatted Data Bytes

E.1.3 Safety

E.1.3.1 Personal Safety

The system or device supplies ac and dc power. Ac voltages are present on the drive motor connector and capacitor terminals in the diskette drive when the drive motor is turning.

Motor and solenoid cases become hot after continuous use; let the parts cool before servicing them.

The DANGER and CAUTION notices throughout this appendix are personal safety precautions.

E.1.3.2 Machine Safety

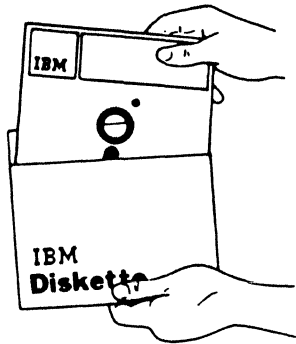
Diskette drives can be damaged if they are not operated or serviced correctly. The Warning notices in this appendix are machine safety precautions.

Do not use IBM cleaning fluid or other cleaning fluids near plastic parts.

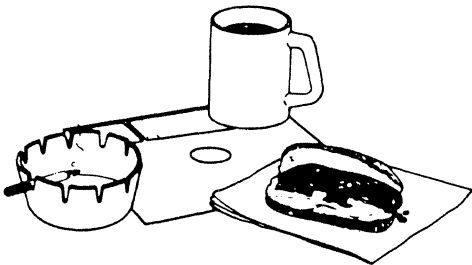
Never use damaged diskettes in a diskette drive. Diskettes that are physically damaged (creased or bent) or contaminated (by pencil marks, finger marks, or cleaning fluid) can cause data errors, equipment errors, or head damage.

E.1.3.3 Diskette Safety

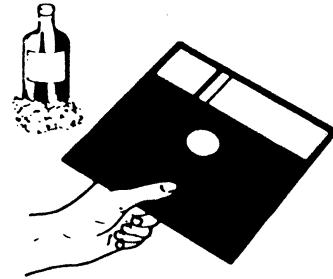
Return a diskette to its envelope when it is removed from the diskette drive.



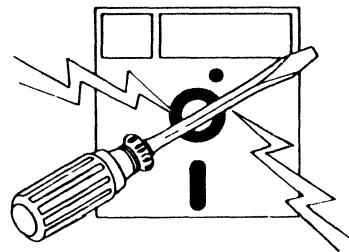
Do not lay diskettes near smoke or other sources that can contaminate the disk.



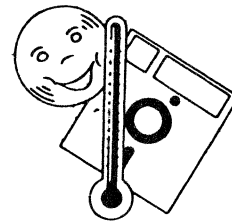
Do not touch or attempt to clean diskette surfaces; contaminated diskettes will not work correctly.



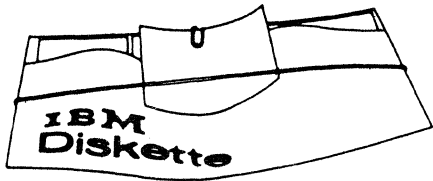
Do not place diskettes near magnetic materials; data can be lost from a diskette exposed to a magnetic field.



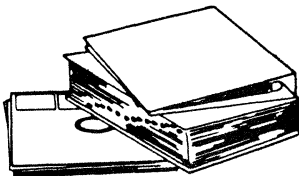
Do not expose diskettes to heat greater than 51.7°C (125°F) or to direct sunlight.



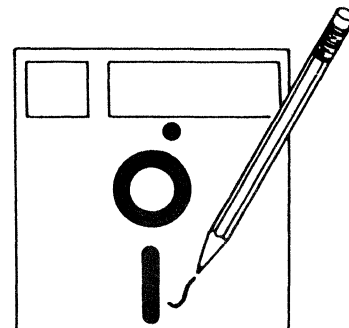
Do not use clips or rubber bands on a diskette.



Do not place heavy books on diskettes.



Do not write outside the label area on diskettes.



E.1.4 Diskette Drive Parts (Figure E-9)

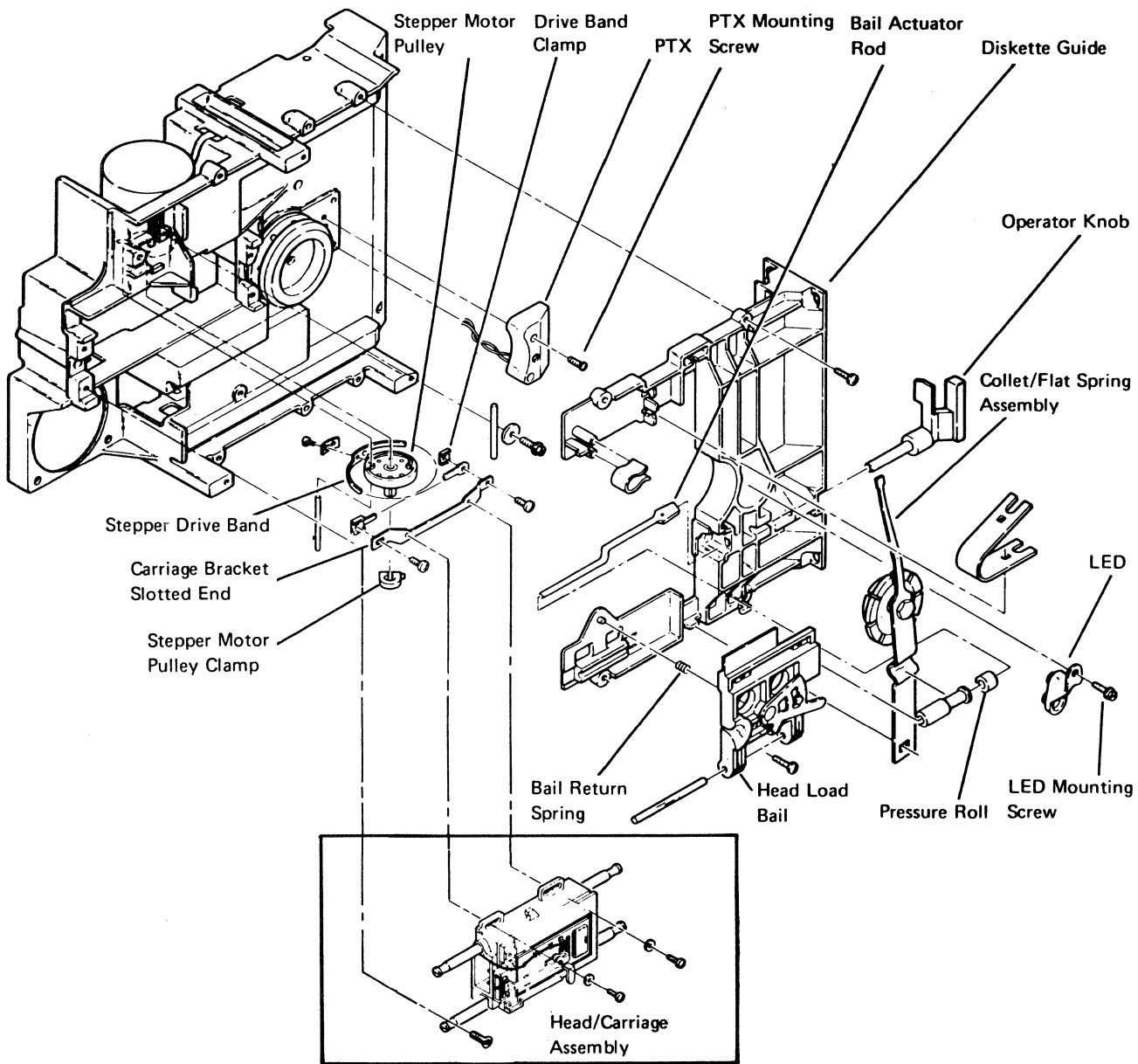


Figure E-9 (Part 1 of 5). Diskette Drive Parts

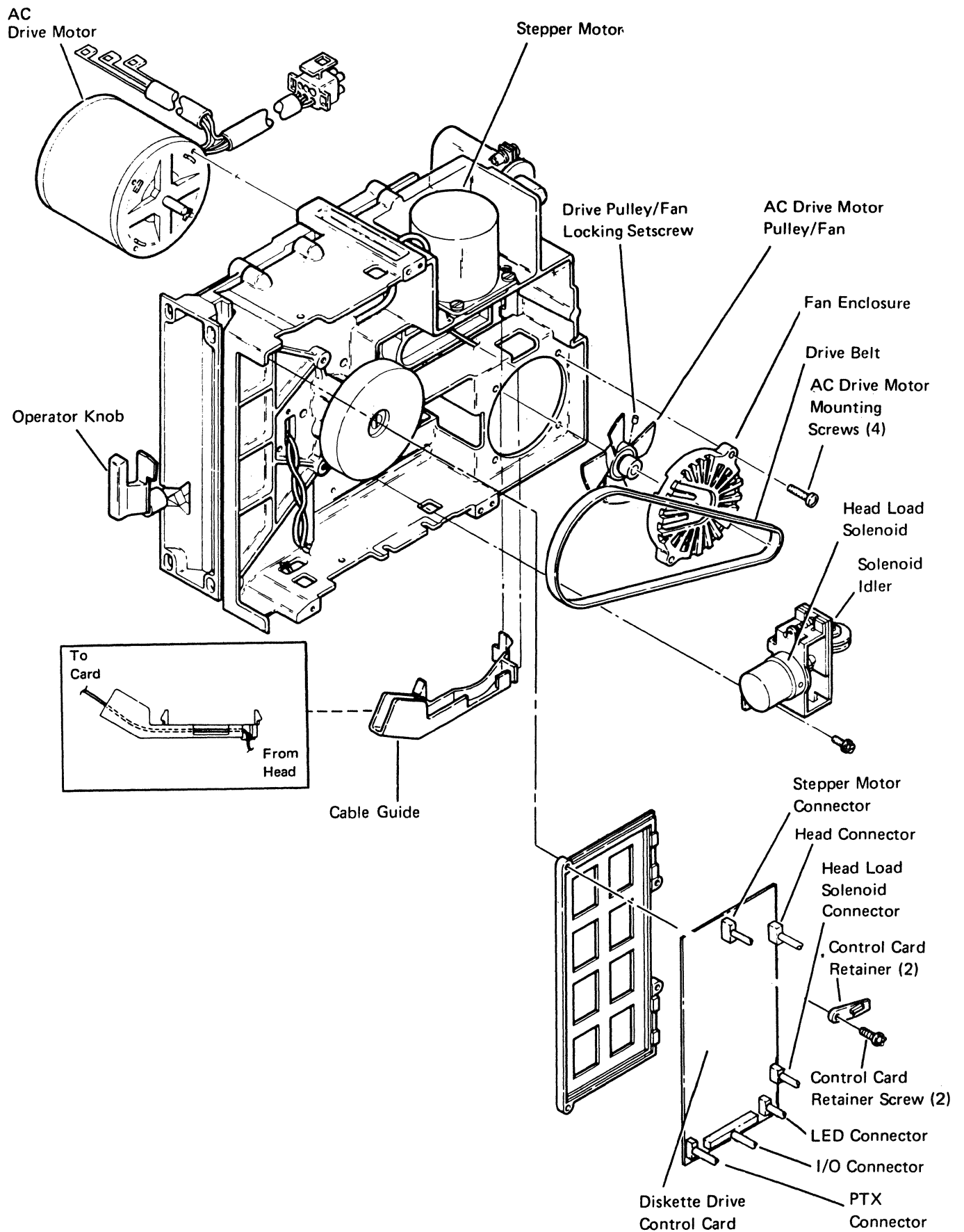
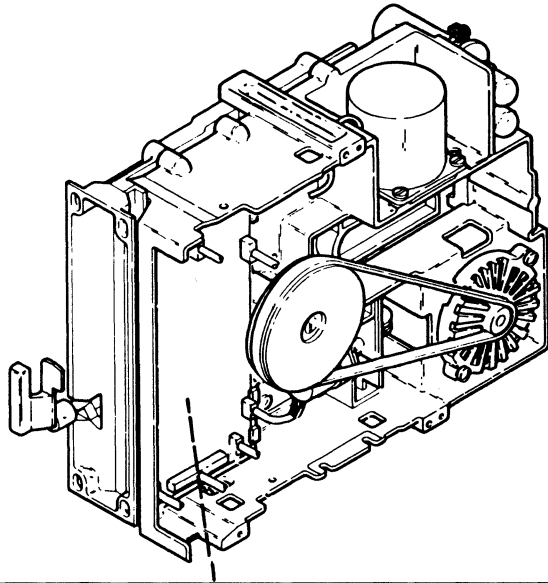
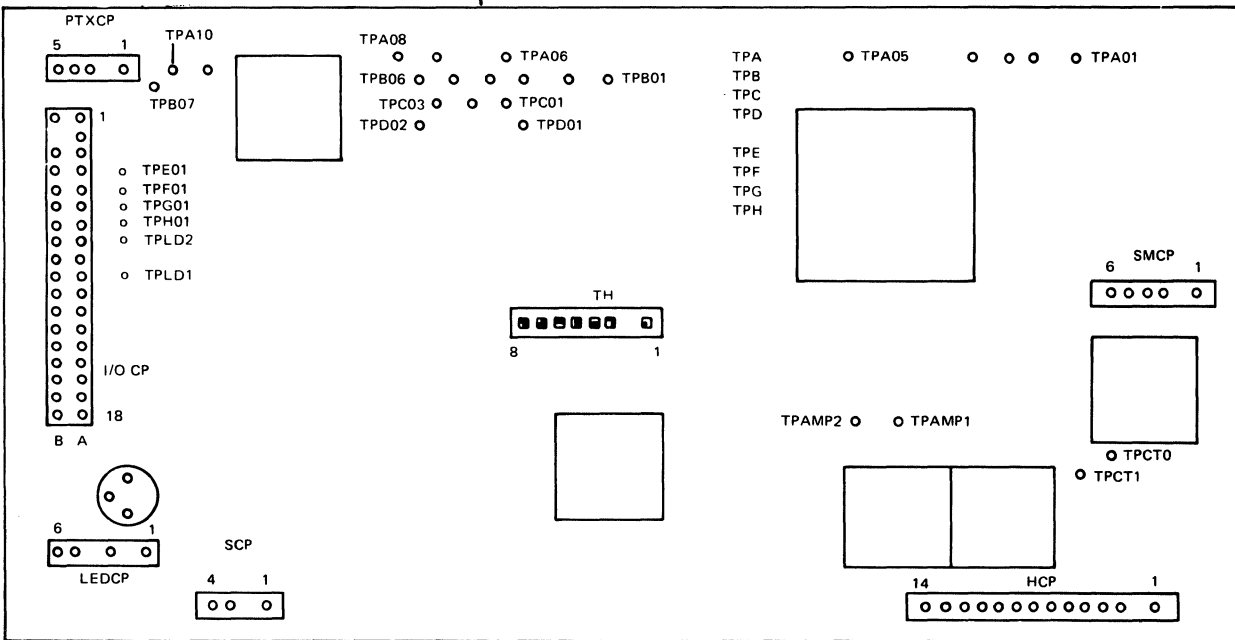


Figure E-9 (Part 2 of 5). Diskette Drive Parts



Control Card



Control Card Cable

Test Points	Line Names
TH01	Diff Read B
TH02	No Pin
TH03	Diff Read A
TH04	-High Gain
TH05	-Disable Stepper Motor
TH06	+14V
TH07	Access Clamp Voltage
TH08	Oscillator

Test Points	Line Names
TPA01	MC-3
TPA02	MC-1
TPA03	MC-2
TPA04	MC-0
TPA05	Ground
TPA06	+Erase Gate
TPA07	Ground
TPA08	-Head Load
TPA09	+5V dc
TPA10	D2 PTX
TPB01	+24V dc
TPB02	Ground
TPB03	+Select Head 1
TPB04	+Write Gate
TPB05	+Head Engage
TPB06	Write Data

Test Points	Line Names
TPB07	D1 PTX
TPC01	+Access 0
TPC02	+Inner Tracks
TPC03	-5V dc
TPD01	+Access 1
TPD02	+Switch Filter
TPE01	+Index
TPF01	+Diskette Sense
TPG01	+Write Erase Enabled
TPH01	+File Data
TPLD2	D2 LED Voltage
TPLD1	D1 LED Voltage
TPAMP2	Preamp TP2
TPAMP1	Preamp TP1
TPCT0	Center Tap Head 0
TPCT1	Center Tap Head 1

Figure E-9 (Part 3 of 5). Diskette Drive Parts

- 1** Stepper Motor
- 2** AC Drive Pulley (With Fan Hidden)
- 3** AC Drive Belt
- 4** Solenoid Idler
- 5** Head Load Solenoid
- 6** Spindle Pulley
- 7** Diskette Drive Control Card
- 8** Diskette Locking Lever
- 9** Collet
- 10** Pressure Roll
- 11** Head Load Bail
- 12** AC Drive Motor
- 13** Head/Carriage Assembly
- 14** Timing Pin (Old)
- 15** Stepper Motor
- 16** Thickness Gauge Clip
- 17** Carriage Pressure Spring
- 18** Drive Hub
- 19** Collet Flat Spring
- 20** Timing Pin (New)

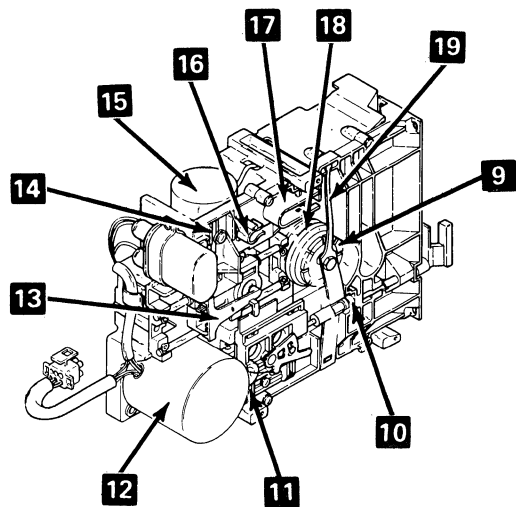
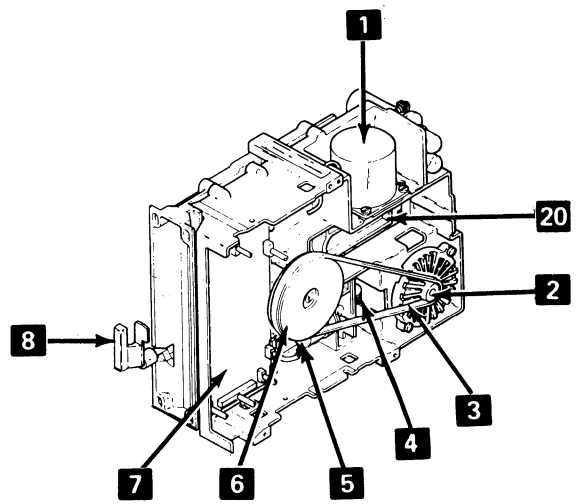
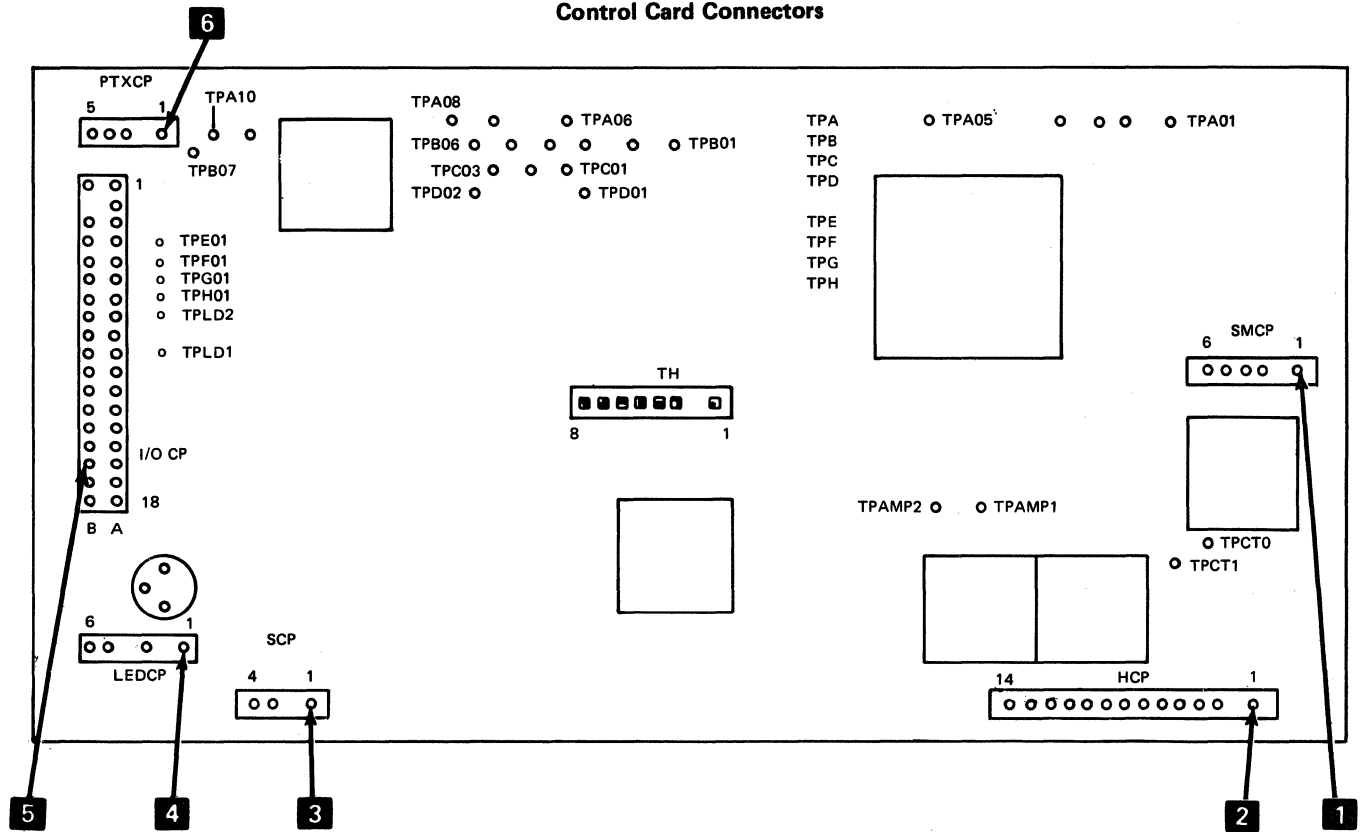


Figure E-9 (Part 4 of 5). Diskette Drive Parts

Control Card Connectors



1 Stepper Motor Connector

A01	+24V
A02	blank
A03	MC-3
A04	MC-2
A05	MC-1
A06	MC-0

2 Head Connector

A01	not used
A02	blank
A03	head 0 read/write coil
A04	head 0 center tap
A05	head 0 read/write coil
A06	head 0 erase
A07	head 0 erase common
A08	ground
A09	ground
A10	head 1 erase common
A11	head 1 erase
A12	head 1 read/write coil
A13	head 1 center tap
A14	head 1 read/write coil

3 Solenoid Connector

A01	not used
A02	blank
A03	+head load
A04	-head load

4 LED Connector

A01	diskette 2, 2D ground
A02	blank
A03	diskette 2, 2D ground
A04	blank
A05	diskette 1 ground
A06	diskette 1 anode

5 I/O Interface Connector

A01	-5V
A02	power supply ground
A03-A18	ground
B01	+5V
B02	blank
B03	+24V
B04	+index
B05	+diskette 2 sense
B06	+write/erase sense
B07	+file data
B08	+inner tracks
B09	+erase gate
B10	+access 0
B11	+select head 1
B12	not used
B13	+access 1
B14	+write gate
B15	+head engage
B16	+switch filter
B17	write data
B18	not used

6 PTX Connector

A01	diskette 1 col (+5V)
A02	blank
A03	diskette 1 PTX emitter
A04	diskette 2, 2D PTX emitter
A05	diskette 2, 2D col (+5V)

Figure E-9 (Part 5 of 5). Diskette Drive Parts

E.2 Device Theory of Operation

The Diskette Drive is an I/O device that relies on the using system for power, commands, and control. The drive can read from, and write to either side of a diskette. This section contains theory information about the device interface, data flow, and operation of the diskette drive.

E.2.1 Control Card Interface

Cylinder access is shown in Figure E-10; the interface lines at connector A1 are shown in Figure E-11. Following is a description of the interface lines at connector A1:

Write Data: For each change of this signal, the current switches in the read/write head. This process records the data on the diskette surface.

+Inner Tracks: This line is active from track 43 through track 76. When this line is active, the write current through the data is decreased because the bit density increases toward the center tracks and, therefore, less write current is needed. This line is also used to increase the read amplifier gain from tracks 43 through 76.

+Select Head 1: This line, when active, selects head 1.

+Write Gate: This line activates the write circuits and deactivates the read circuits for a write operation.

+Erase Gate: This line activates the tunnel erase circuits during a write operation to erase the edges of the track just recorded. This erasing prevents crosstalk between tracks during later read operations.

+Switch Filter: This line is used with the Inner Tracks line to make corrections for bit shift on those tracks greater than cylinder 60 (for MFM encoding). The Switch Filter line is used only during a read operation.

+Write/Erase Enabled: When this line is active, either write or erase current has been enabled on the card.

File Data: This line is a series of clock and data pulses that represent the data read from the diskette surface. The VFO circuits supplied by the using system separate the clock pulses from the data pulses.

+Index: This line indicates the start of a track. This 1.5- to 3.0-ms pulse occurs every 166.7 ms.

Diskette Sense: When this line is active, it indicates that a diskette 2 or 2D is being used. This line is not activated by a diskette 1.

Access Lines 0 and 1: Sequentially activating the access signal lines causes the read/write head to move from one cylinder to the next. Note, in Figure E-10, that the sequence is repeated every four cylinders.

These two access signal lines, 0 and 1, are sequentially activated to cause the head to move in (toward the drive hub) or out (away from the drive hub).

+Head Engage: When it is active, this line loads the read/write head.

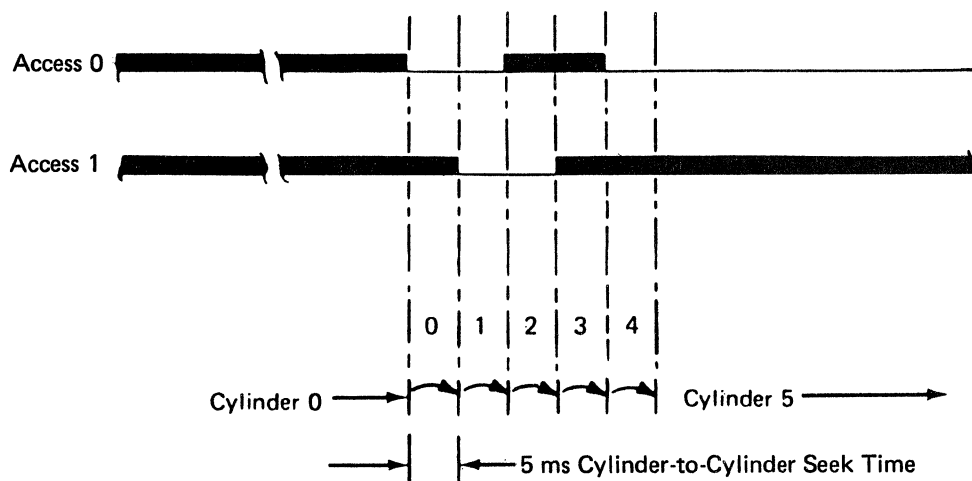
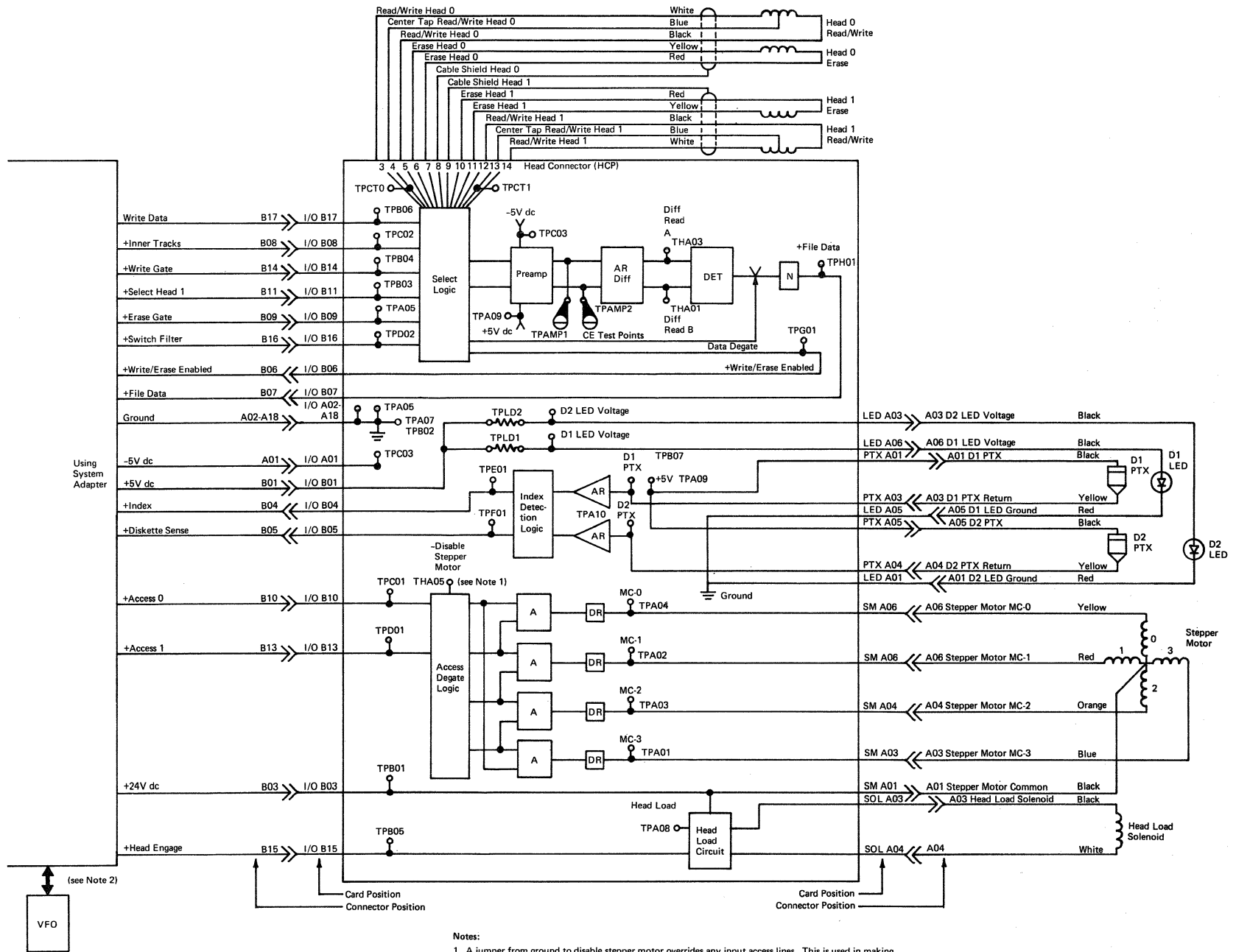


Figure E-10. Cylinder Access



- Notes:
1. A jumper from ground to disable stepper motor overrides any input access lines. This is used in making head/stepper motor adjustments.
 2. The variable frequency oscillator is packaged in the using system logic. The function of the variable frequency oscillator is to separate and clock pulses.

Figure E-11. Control Lines at Connector A1

E.2.2 Mechanical Operation

Figure E-12 shows the operation of the two read/write heads on the 51TD Diskette Drive.

The operation of the 51TD is similar to that shown in Figure E-12, but has only one head.

- The diskette is ready to be inserted **1** .
- The diskette is inserted into the diskette guide **2** ; the operator closes the knob, which clamps the collet (R/W heads are now much nearer to the diskette).

- The head is loaded (touching the diskette) **3** . The solenoid is activated, the cable pulls the bail, and the bail lowers the head to the diskette.
- Read/Write operation takes place. The heads are moved to the desired cylinder on the disk when the system activates the two stepper motor access lines in a specific sequence.
- The head is released (deactivates the solenoid) **4** .
- The operator turns the knob to the open position; the diskette is released and then removed from the drive **5** .

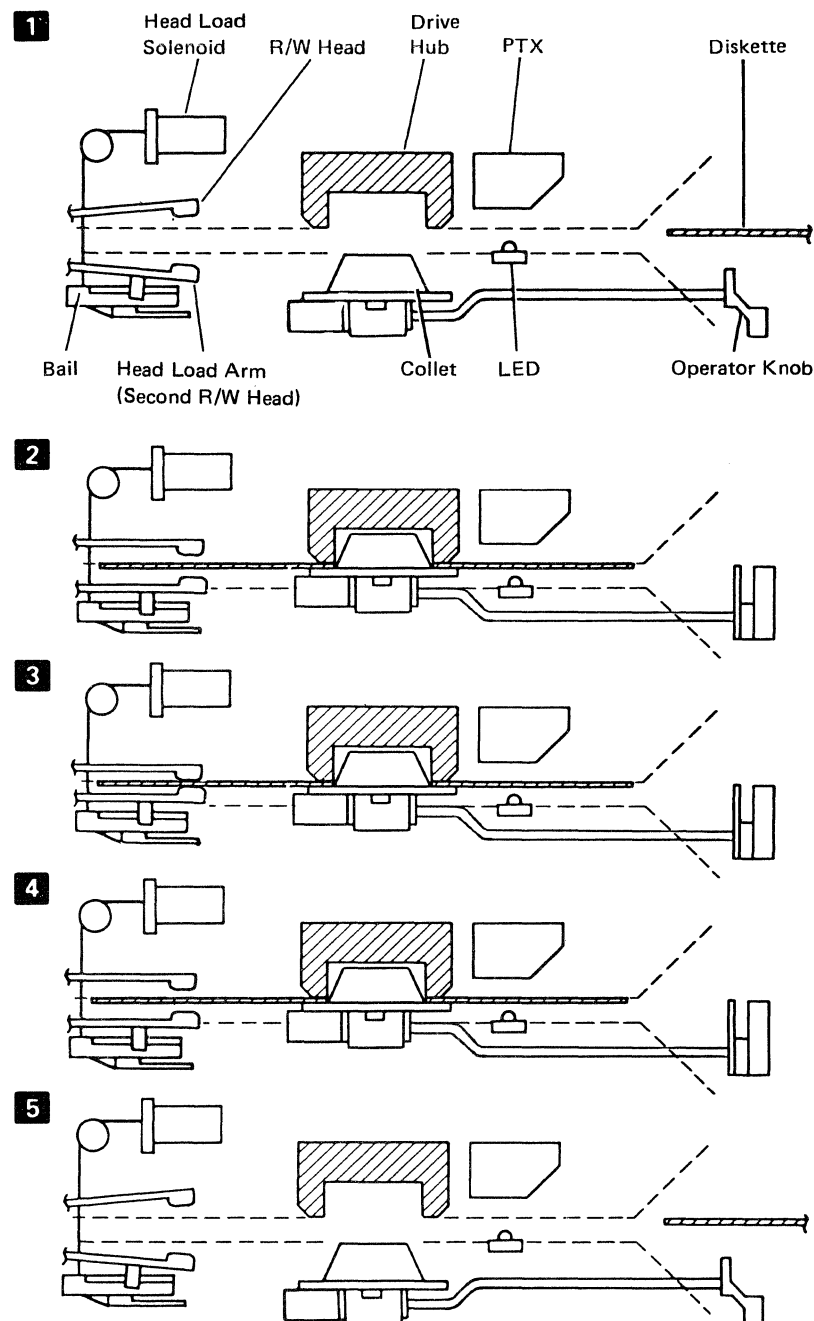


Figure E-12. Diskette Insertion and Head Load Operation

E.2.3 Typical Device Operation

Figure E-13 shows the sequence of diskette operation.

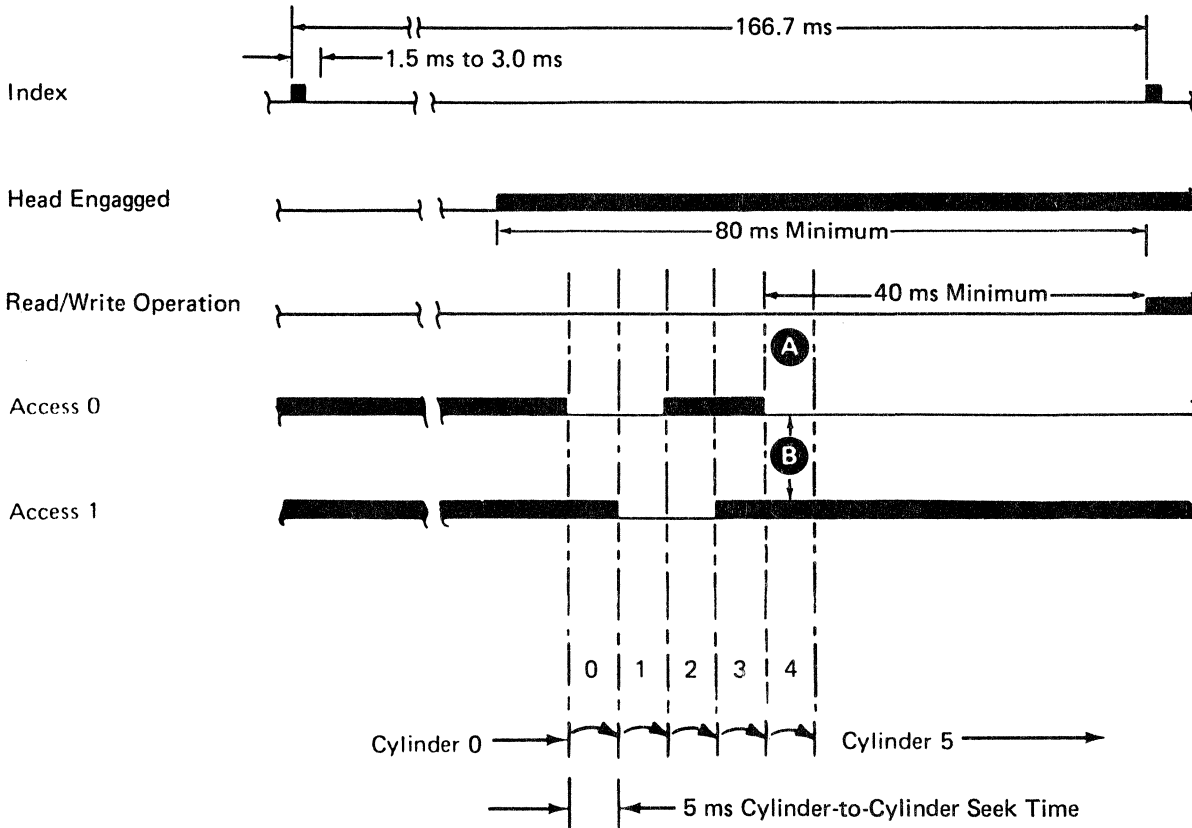
1. The host system starts the diskette drive motor.
2. The operator inserts a diskette and turns the operator knob to the closed position. With the operator knob in the closed position, the diskette starts turning, and the read/write heads move into position on the diskette surface (see E.2.2) for mechanical operation).
3. Index pulses are sensed every revolution (166.7 ms).

The type of diskette inserted is identified on the diskette Sense line. An up level indicates a diskette 2 or 2D while a down level indicates a diskette 1.

4. The using system sequentially activates the two access lines to move the head/carriage assembly in (toward the hub) or out (away from the hub) to select the desired cylinder. Then the system sequentially activates the

access line to turn the stepper motor a distance equal to one cylinder. The two access lines last used to move the head/carriage to the desired cylinder remain active **B**. Data from the selected cylinder is valid after 40 ms (minimum time for the head and carriage assembly to stop).

5. A head load command can be given before or during a seek to activate the head load solenoid. Data is valid 80 ms after the heads are loaded. Address bytes of the first available ID (identifier) field are read, which verify that the heads are in the correct position.
6. Reading or writing can occur 40 ms after seeking to the last cylinder **A**, or 80 ms after the heads are loaded.
7. The read/write head is unloaded after the read or write operation.



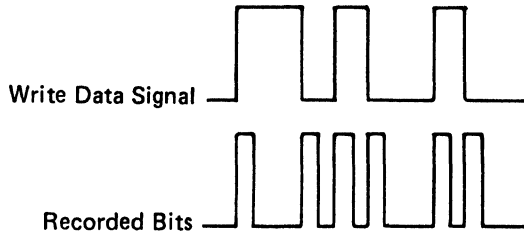
Note: Seeking and head loading are not to the index.

Figure E-13. Diskette Operation Sequence

E.2.4 Read/Write Principles

E.2.4.1 Write Data

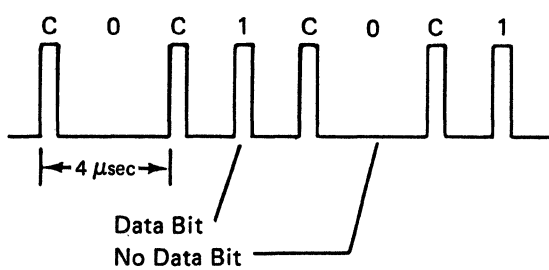
For each change of the write data signal, the current switches in the read/write head. This process records the data on the diskette surface.



FM Encoding: Writes data bits 4 μsec apart. They are recorded on the diskette as follows:

Data Bit to Be Recorded	Recorded As:	
	Clock Bit	Data Bit
1	1	1
0	1	0

Data bits 0101 appear as follows:

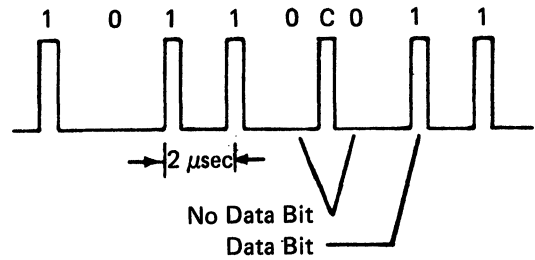


MFM Decoding: Remove the constant clock pulse. A clock bit is recorded only when a 0 (no-data bit) is followed by another 0. Therefore, the time between data bits is only 2 μsec . Either a data bit for a 1 or a no data bit for a 0 is recorded in this 2- μsec period. They are recorded on the diskette as follows:

Data Bit to Be Recorded	Recorded As:	
	Clock Bit	Data Bit
1	0	1
0	(X)	0

Note: (X) is a 0 bit if the preceding bit is a 0 bit, or a 1 bit if the preceding bit is a 1 bit.

Data bits 10110011 appear as follows:



E.2.4.2 Write Operation

For a write operation (Figure E-14), the write-gate signal activates the write circuits and deactivates the read circuits **E**.

The erase-gate signal activates the tunnel erase circuits during a write operation to erase the edge of the data track **F** just recorded. This erasing process prevents crosstalk between tracks during later read operations.

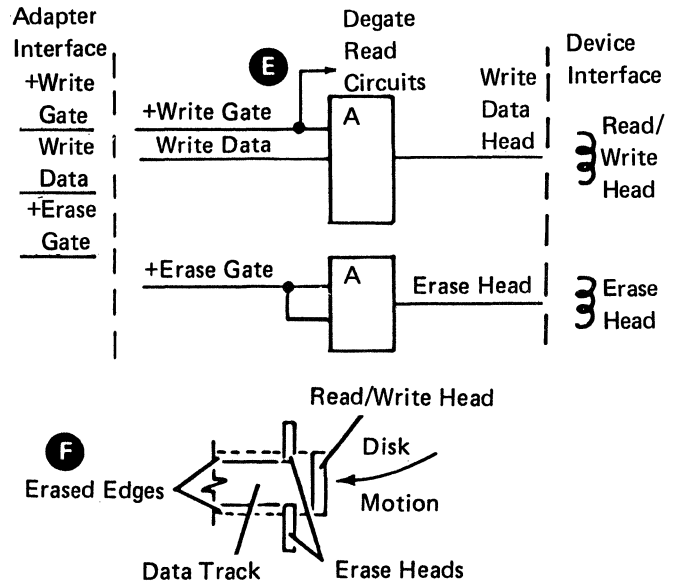
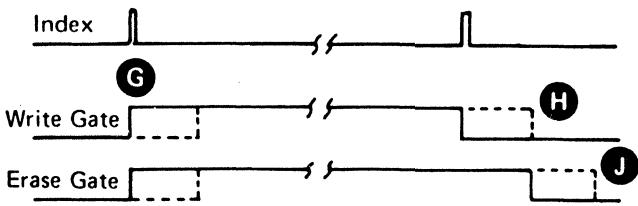


Figure E-14. Write Operation

Format Write Operation: Writes a full track exchanging all the identifier (ID) fields, data fields, and gaps. The index to the first ID field gap is 79 eight-bit bytes.



The write-gate signal is activated any time between the leading edge of the index pulse (G) and 100 bytes after the leading edge of the index pulse. The write-gate signal is deactivated approximately 102 bytes after the leading edge of the next index pulse (H).

The erase-gate signal is activated at the same time as the write-gate signal, but is deactivated 537 μsec after the write-gate signal is deactivated (J).

Record (Update) Write Operation: Performed on a data field and its VFO sync field only. ID fields and gaps are not written. See Figure E-15.

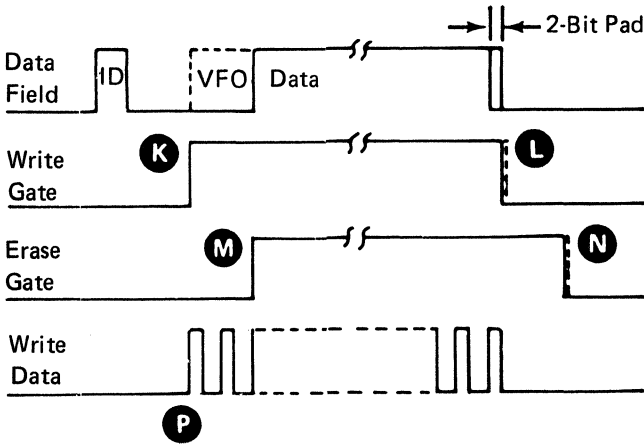


Figure E-15. Record Update – Write Operation

The write gate line is activated 316 μsec after the last ID character is read (K). The line is deactivated 5 μsec after the last clock of the 2-bit pad is written (L).

The erase-gate line is activated (M) 221 μsec after the write-gate line and is deactivated (N) 537 μsec after the fall of the write-gate line.

The writing of the new VFO sync field starts when the write-gate line is activated (P).

E.2.4.3 Read Data

Read data is the FM or MFM encoded read head signal that can be observed at TPAMP1 or TPAMP2. See Figures E-16 through E-20.

Typical measurements for FM encoding are:

- 125 kHz: 120 to 300 mV (all 0's)
- 250 kHz: 100 to 250 mV (all 1's)

The voltage is higher at the outer tracks because of the higher track speeds and lower bit density.

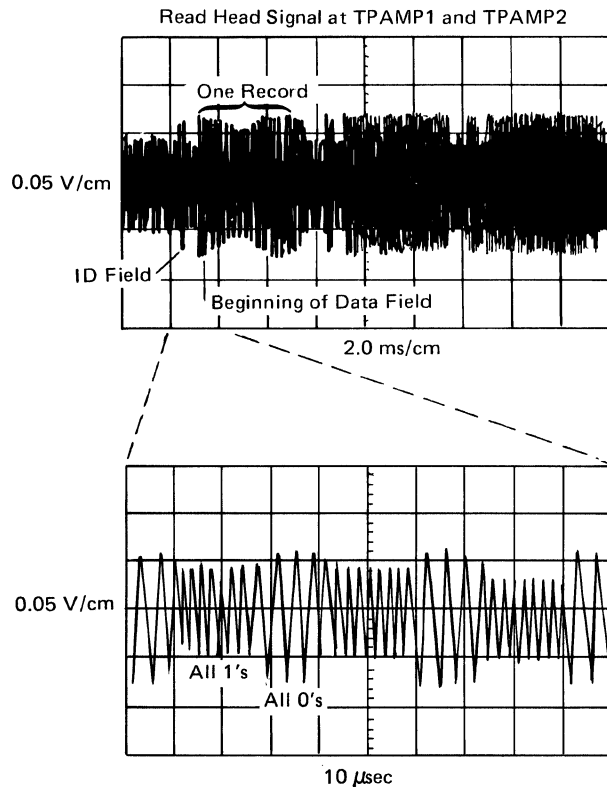
An all 0's pattern has a higher voltage amplitude and is half the frequency of an all 1's pattern.

Typical MFM encoding measurements are:

- 125 kHz, 100 mV to 300 mV (alternating 0's and 1's, typical measurements)
- 250 kHz, 100 mV to 250 mV (all 0's or all 1's typical measurements)

For MFM, an alternating 0's and 1's pattern has a higher voltage amplitude than, and is half the frequency of, an all 0's or an all 1's pattern.

Read Data:FM Encoded



Read Data:MFM Encoded

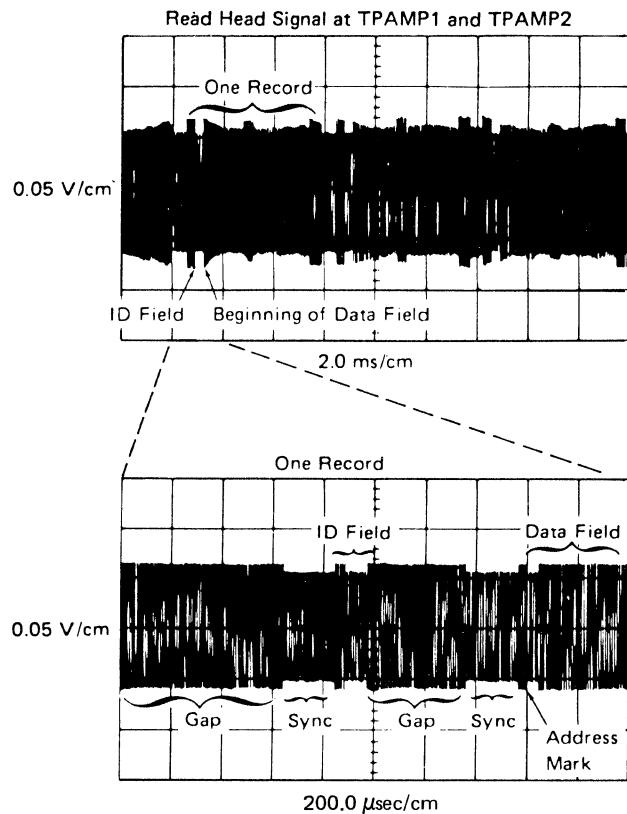


Figure E-16. Read Data Signals

Scope Setup

Note: Use Tektronix 453, 454, or similar oscilloscope with x10 probes.

Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	External
Trigger Mode	Normal Add
Channel 1 volts/division	5 mV/cm
Channel 2 volts/division	5 mV/cm
Channel 1 input	AC
Channel 2 input	AC
Invert	Pull out
Times per division	2 ms/cm
Connect channel 1 to	TPAMP1
Connect channel 2 to	TPAMP2
Connect trigger to	+Index test pin

Observe: The amplitude of the read signal will be between 100 mV to 250 mV.

Scope Setup

Note: Use Tektronix 453, 454, or similar oscilloscope with x10 probes.

Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	External
Trigger Mode	Normal Add
Channel 1 volts/division	5 mV/cm
Channel 2 volts/division	5 mV/cm
Channel 1 input	AC
Channel 2 input	AC
Invert	Pull out
Times per division	2 ms/cm
Connect channel 1 to	TPAMP1
Connect channel 2 to	TPAMP2
Connect trigger to	+Index test pin

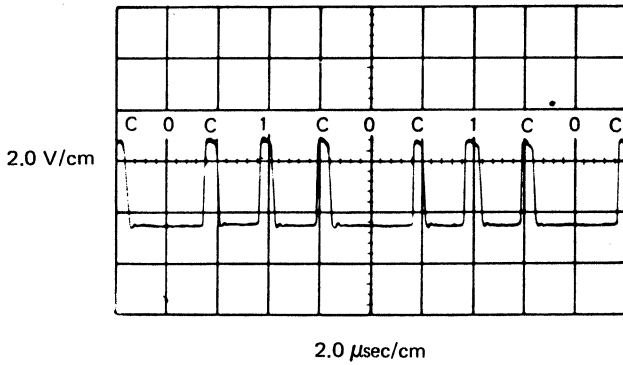
Observe: The amplitude of the read signal will be between 100 mV to 250 mV.

E.2.4.4 File Data (Figure E-17)

The 'file data' signal is a series of clock and data pulses that represents the read data. These pulses can be observed at TPH01. They are from 150 ns to 500 ns long. The VFO circuits (supplied by the using system) separate the clock pulses from the data pulses.

FM File Data Signal

Example: 01010



Scope Setup

Note: Use Tektronix 453, 454, or similar oscilloscope with x10 probes.

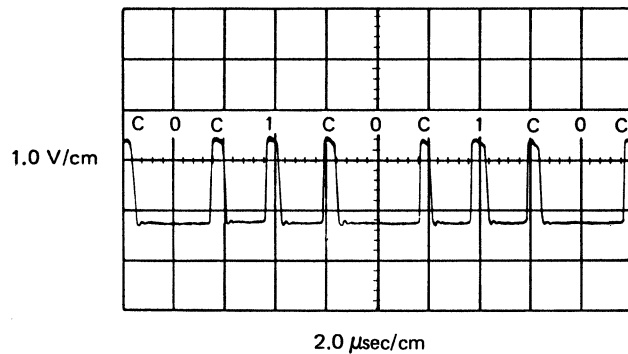
Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	External
Trigger	Normal
Mode	Channel 1
Channel 1 volts/division	0.2 V/cm
Channel 1 input	DC
Times per division	2 μsec/cm
Connect channel 1 to	+File data
Connect trigger to	+Index test pin

Observe: Clock pulses every 4 μsec. Pulse duration should be between 100 and 500 ns. Pulse amplitude should be between 2.4 and 4.2 volts.

MFM File Data Signal

Bit Pattern: Hex E5E5

Example; 0101111001



Scope Setup

Note: Use Tektronix 453, 454, or similar oscilloscope with x10 probes.

Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	External
Trigger	Normal
Mode	Channel 1
Channel 1 volts/division	1.0V/cm
Channel 1 input	DC
Times per division	2 μsec/cm
Connect channel 1 to	+File data
Connect trigger to	+Index test pin

Observe: Clock or data pulses every 2 to 4 μsec. Pulse duration should be between 100 and 500 ns. Pulse amplitude should be between 2.4 and 4.2 volts.

Figure E-17. File Data Signals

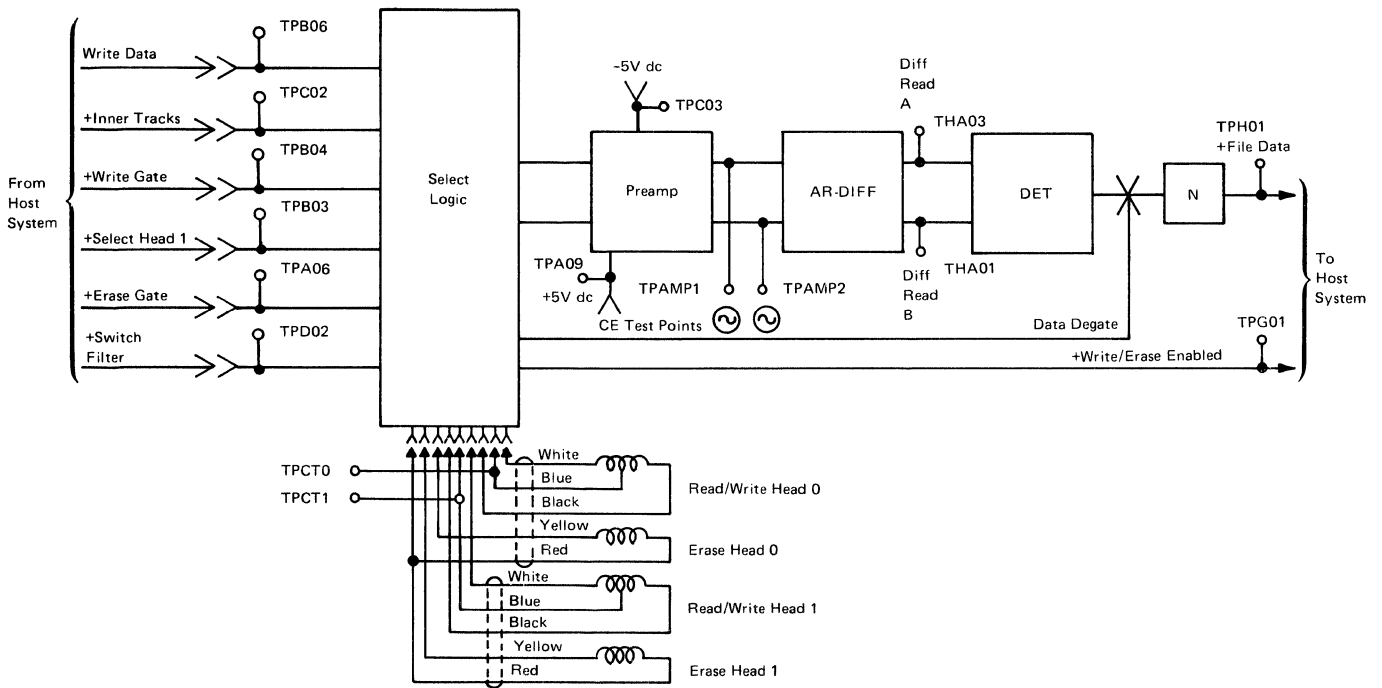
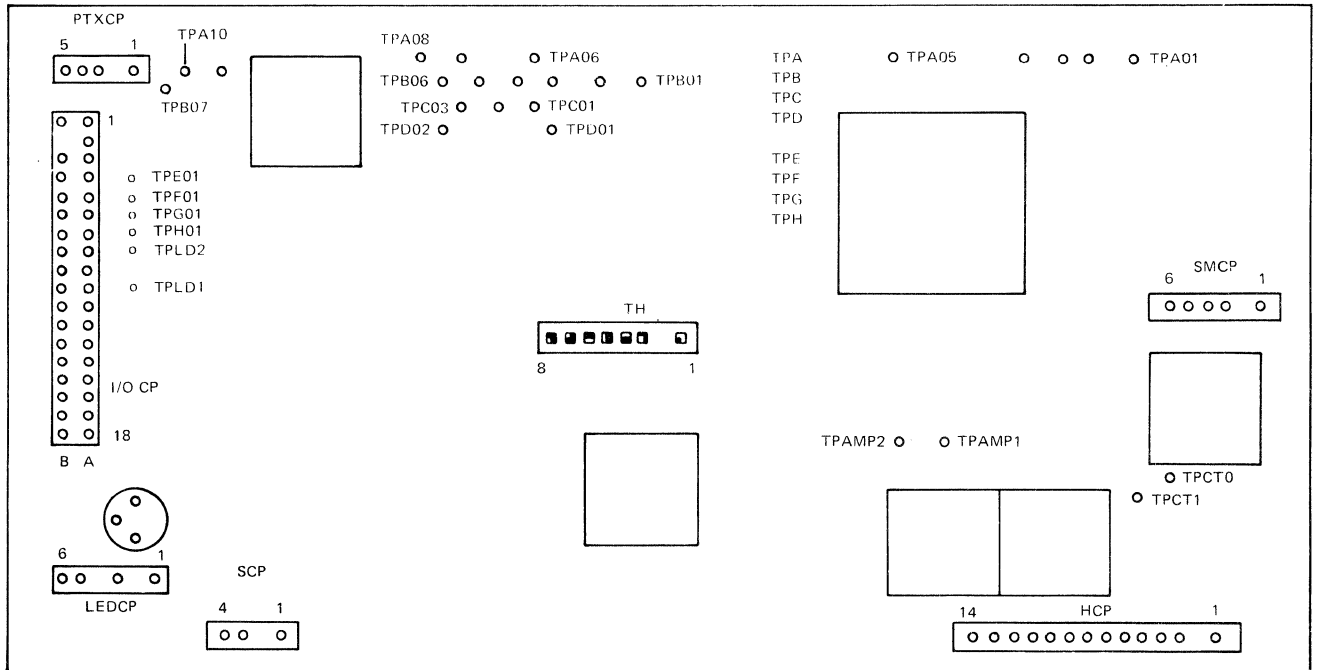


Figure E-18. 51TD Test Points



- PTXCP – PTX Connector Pins
- I/O CP – I/O Connector Pins
- LEDCP – LED Connector Pins
- SCP – Solenoid Connector Pins
- HCP – Head Connector Pins
- SMCP – Stepper Motor Connector Pins

Figure E-19. 51TD Control Card

Test Points	Line Names	Test Points	Line Names	Test Points	Line Names
TH01	Diff Read B	TPA01	MC-3	TPB07	D1 PTX
TH02	No Pin	TPA02	MC-1	TPC01	+Access 0
TH03	Diff Read A	TPA03	MC-2	TPC02	+Inner Tracks
TH04	-High Gain	TPA04	MC-0	TPC03	-5V dc
TH05	-Disable Stepper Motor	TPA05	Ground	TPD01	+Access 1
TH06	+14V	TPA06	+Erase Gate	TPD02	+Switch Filter
TH07	Access Clamp Voltage	TPA07	Ground	TPE01	+Index
TH08	Oscillator	TPA08	-Head Load	TPF01	+Diskette Sense
		TPA09	+5V dc	TPG01	+Write Erase Enabled
		TPA10	D2 PTX	TPH01	+File Data
		TPB01	+24V dc	TPLD2	D2 LED Voltage
		TPB02	Ground	TPLD1	D1 LED Voltage
		TPB03	+Select Head 1	TPAMP2	Preamp TP2
		TPB04	+Write Gate	TPAMP1	Preamp TP1
		TPB05	+Head Engage	TPCT0	Center Tap Head 0
		TPB06	Write Data	TPCT1	Center Tap Head 1

Figure E-20. 51TD Control Card Cable

E.3 Maintenance

E.3.1 Collet/Flat Spring Assembly

E.3.1.1 Collet/Flat Spring Removal (Figure E-21)

1. Power down.
2. Turn the operator knob **F** to the closed position.

Warning: Do not attempt to remove the collet/flat spring **E** before removing the bail **L**. Too much pressure or binding can damage the spring.

3. Loosen the lever screw **K**.
4. Push the bail **L** inward slightly and disconnect the bail actuator cable eyelet **N** from the lever **J**.

5. Turn the operator knob **F** to the open position.
6. Loosen the bail mounting screw **M**.
7. Observe the position of the bail return spring **R**; then remove the bail pivot rod **P**, the bail return spring **R**, and the bail **L** by sliding the bail **L** out from under the head load arm **C**.

Warning: Ensure that the heads do not hit each other when the bail **L** is removed from under the head load arm.

8. Remove the screw and nut **T** from the collet actuator rod **S**.
9. Remove the operator knob **F**.
10. Remove the collet actuator roll **H** and the pressure roll **G**.
11. Turn the collet actuator rod **S** up and out of the way. Then remove the collet/flat spring assembly **E**.

E.3.1.2 Collet/Flat Spring Replacement (Figure E-21)

Warning: Too much pressure or binding on the flat spring **E** will damage the spring.

1. Reinstall the collet/flat spring assembly **E**.
2. Reinstall the collet pressure roll **G** and actuator roll **H**.
3. Turn the collet actuator rod **S** down against the spring.
4. Reinstall the operator knob **F** in the open position.
5. Reinstall the screw and nut **T** that attach the operator knob to the collet actuator rod **S**. Push the operator knob and the collet actuator rod **S**, together until there is a maximum of 0.1-mm (0.004-inch) end play **W** between the operator knob **F** and the diskette guide **D**. (See Part 2 of Figure E-21.) Tighten the screw.
6. Reinstall the bail return spring **R**, the bail **L** and the bail pivot rod **P**. Place the bail **L** on the collet actuator rod **S**. Ensure that the spring **R** is in the correct position. Place the bail **L** under the head load arm. Place the bail pivot rod **P** in the groove, and tighten the bail mounting screw **M**.

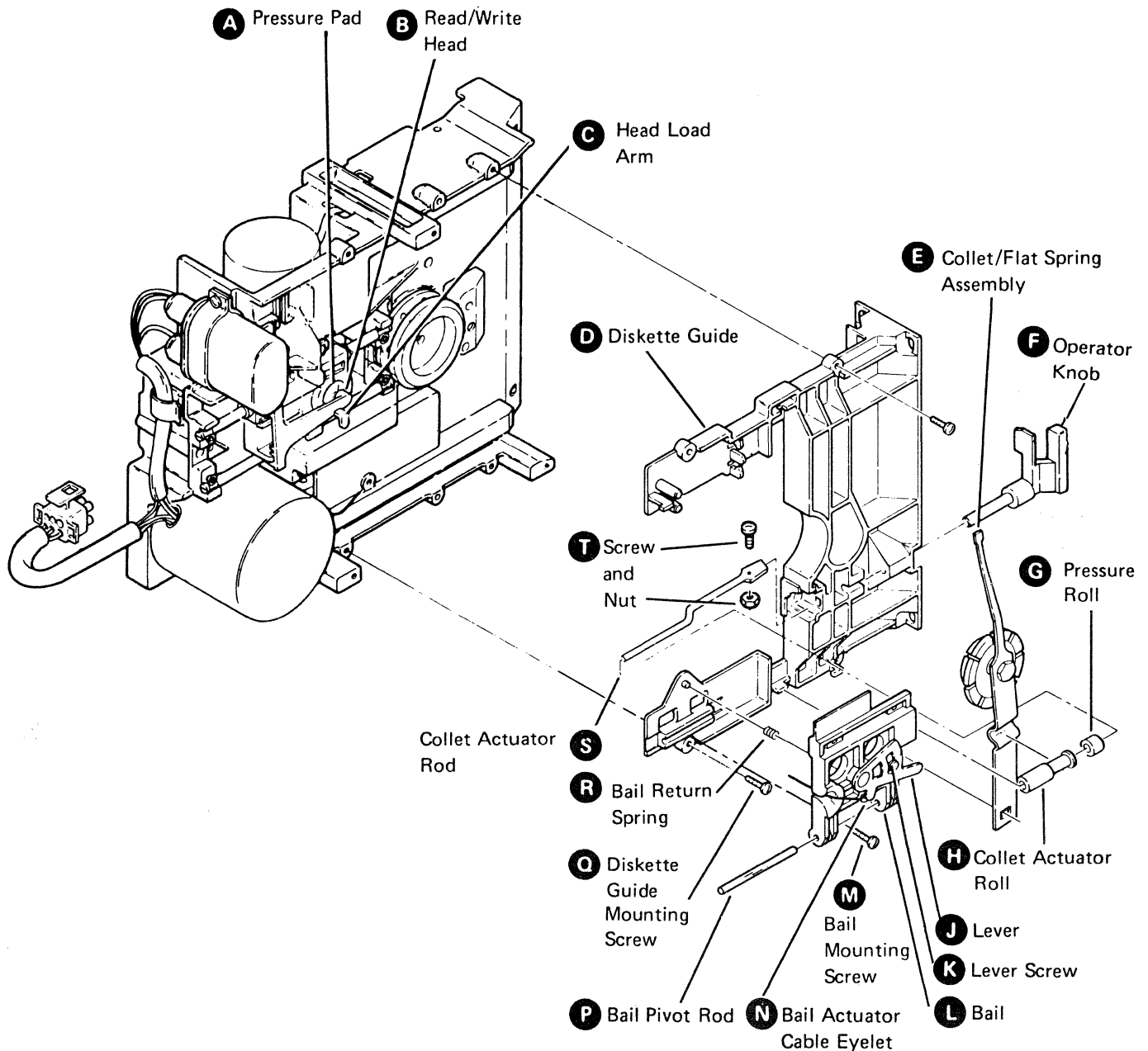


Figure E-21 (Part 1 of 2). Collet/Flat Spring Removal

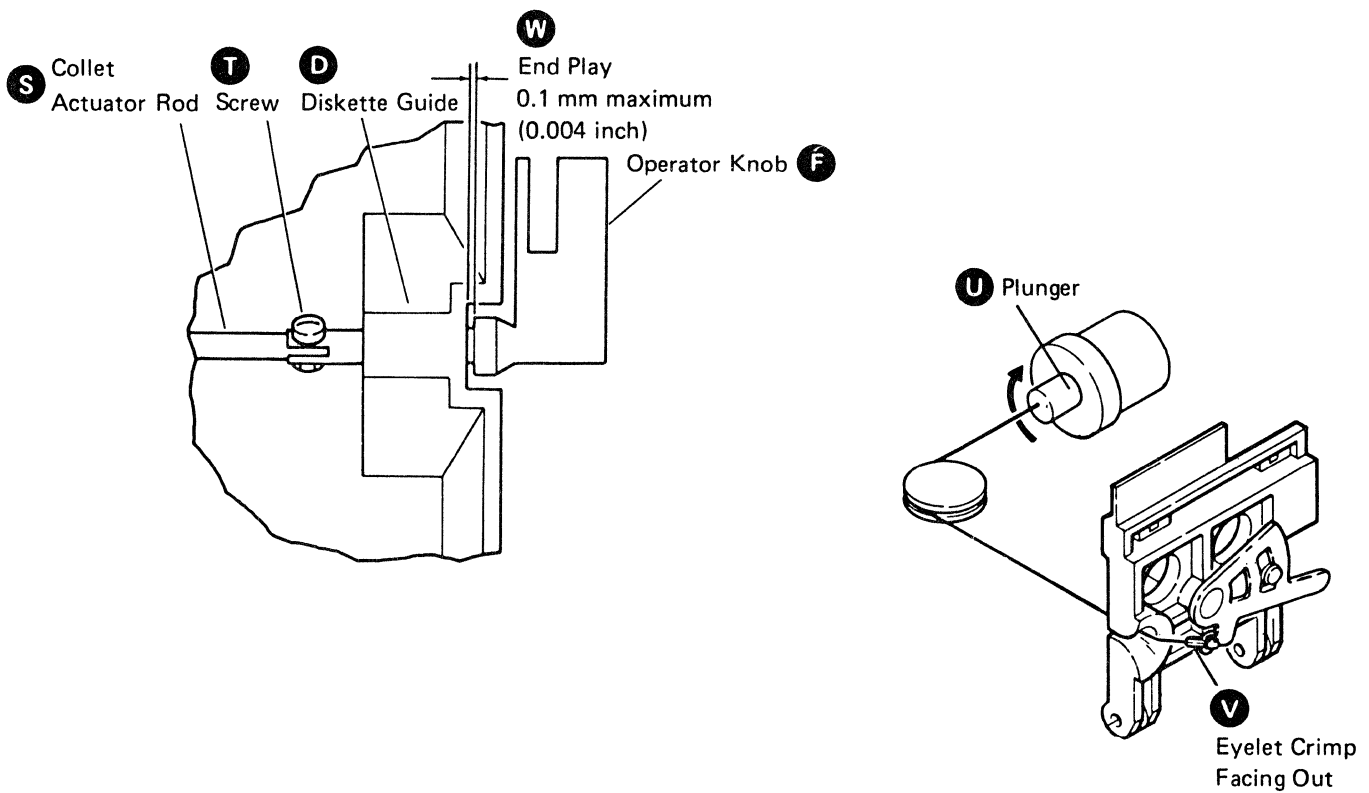


Figure E-21 (Part 2 of 2). Collet/Flat Spring Removal

7. Turn the operator knob **F** to the closed position.
8. Push the bail **L** inward slightly and connect the cable to the lever **J**. Ensure that the eyelet crimp **V** is facing outward, that the cable remains on the pulley and that the cable is not twisted. (See Part 2 of Figure E-21.) Turn the solenoid plunger **U** if necessary.
9. Turn the operator knob **F** to the open position.
10. Remove the paper from between the heads.
11. Ensure that the diskette moves in and out of the drive smoothly without hitting the collet. If the diskette will not move in and out smoothly, the flat spring **E** has been damaged and a new flat spring should be installed.
12. Perform the Head Gap Adjustment (paragraph E.3.3.3).

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E.3.2 Head/Carriage Assembly

Warning: The head/carriage assembly is adjusted and tested at the factory. Do not attempt to adjust or repair any part of this assembly.

Do not attempt to clean the head/carriage assembly. If the assembly is not clean, exchange it.

E.3.2.1 Head/Carriage Service Check (Figures E-22, E-23)

Warning: The head/carriage service check must be performed with the diskette drive installed (or with the diskette drive in the same position as when installed) or the adjustment might not be accurate.

1. Power down.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

2. Disconnect the ac drive motor power cable **J**.
3. Remove the head cable guide **A**.
4. Turn the stepper motor pulley by hand to track 40, and insert a timing pin **C**. (Ensure that the pin goes into the casting.)
5. Power up.
6. To disable the stepper motor, install a jumper **L** from TPB02 (ground) to TH05 (-'disable stepper motor').
7. To locate the stepper motor at track 40, install a jumper **M** between TPA07 (ground) and TPA04 (MC-0).
8. Put the timing pin **C** through the stepper motor pulley into the timing hole in the casting. Does the timing pin pass freely through the hole?

Y N

- Remove the timing pin **C**.
- Remove the jumpers **L** and **M**.
- Power down.
- Go to the Head/Carriage Adjustment (paragraph E.3.2.2), step 3.

9. Remove the timing pin **C**.

10. To remove the stepper motor to track 39, remove the jumper connected to TPA04 and install the jumper end on TPA01 (MC-3).
11. Verify that this is track 39 by visually checking for no gap **D** between the timing pointer **E** and the timing block **G**.
12. To move the stepper motor from track 39 back to track 40, remove the jumper connected to TPA01 and install the jumper end on TPA04 (MC-0).
13. Verify that this is track 40 by visually checking that the timing hole in the pulley lines up with the timing hole in the casting. (Use the dental mirror to verify; do not use a timing pin.)
14. Insert the thickness gauges from the end of the timing pointer **E** and timing block **G** to verify the indicated gap **F**:
 - 0.483 mm (0.019 inch). Go.
 - 0.533 mm (0.021 inch). No go.

Note: Because of the torque characteristics of the stepper motor, this step can be performed only once. If it is necessary to perform this step again, go back to step 10 of this service check.

15. If the adjustment is not correct, go to step 12 of paragraph E.3.2.2.
16. Remove the jumpers **L** and **M**.
17. Reinstall the head cable guide **A**. (Ensure that the read/write head can move freely.)
18. Was the head/carriage assembly exchanged?

Y

N

- Power down.
- Reconnect the ac drive motor power cable.
- Power up.
- End of procedure.

19. Go to the Head Gap Service Check (paragraph E.3.3.2).

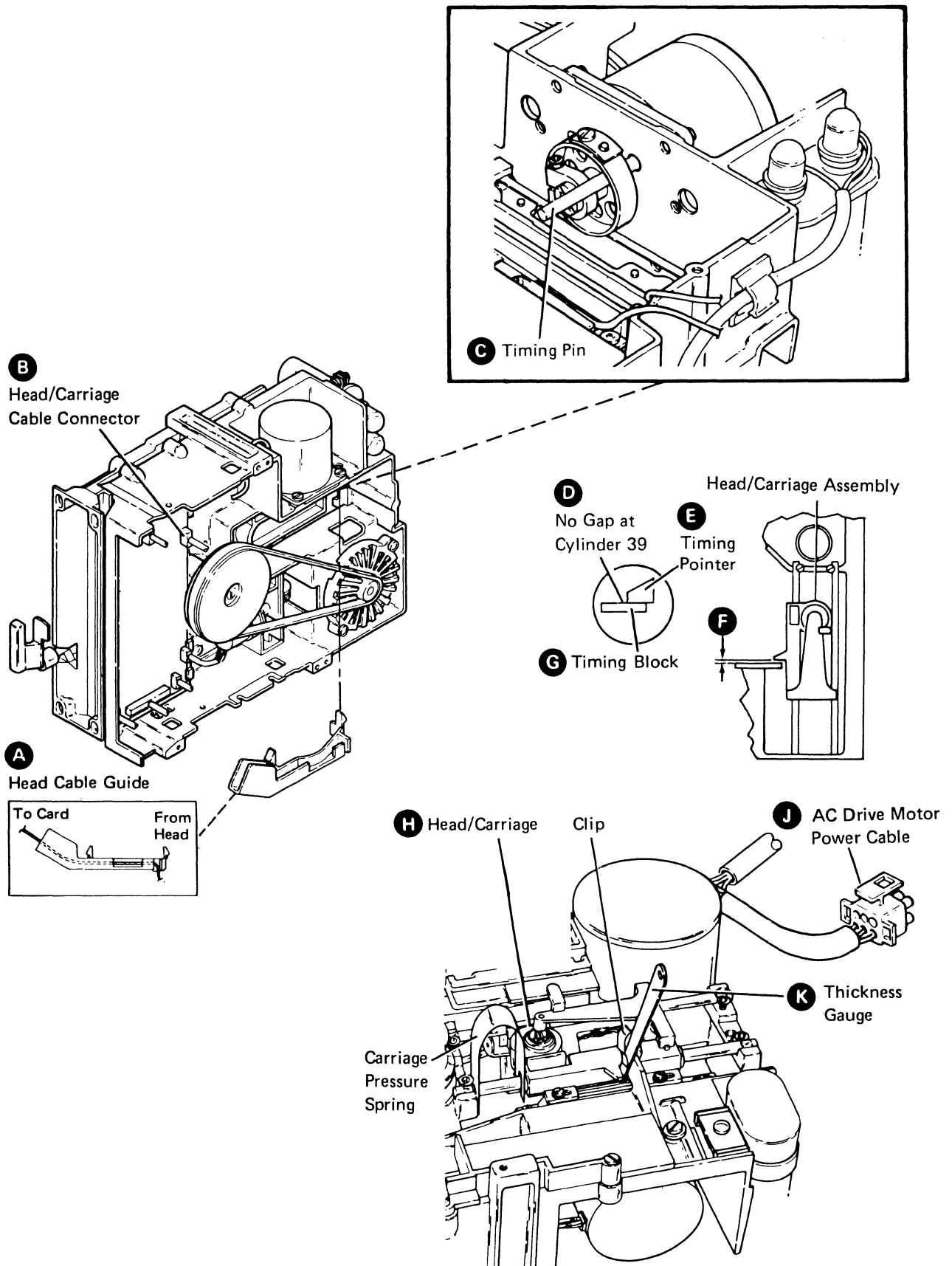


Figure E-22. Head/Carriage Service Check

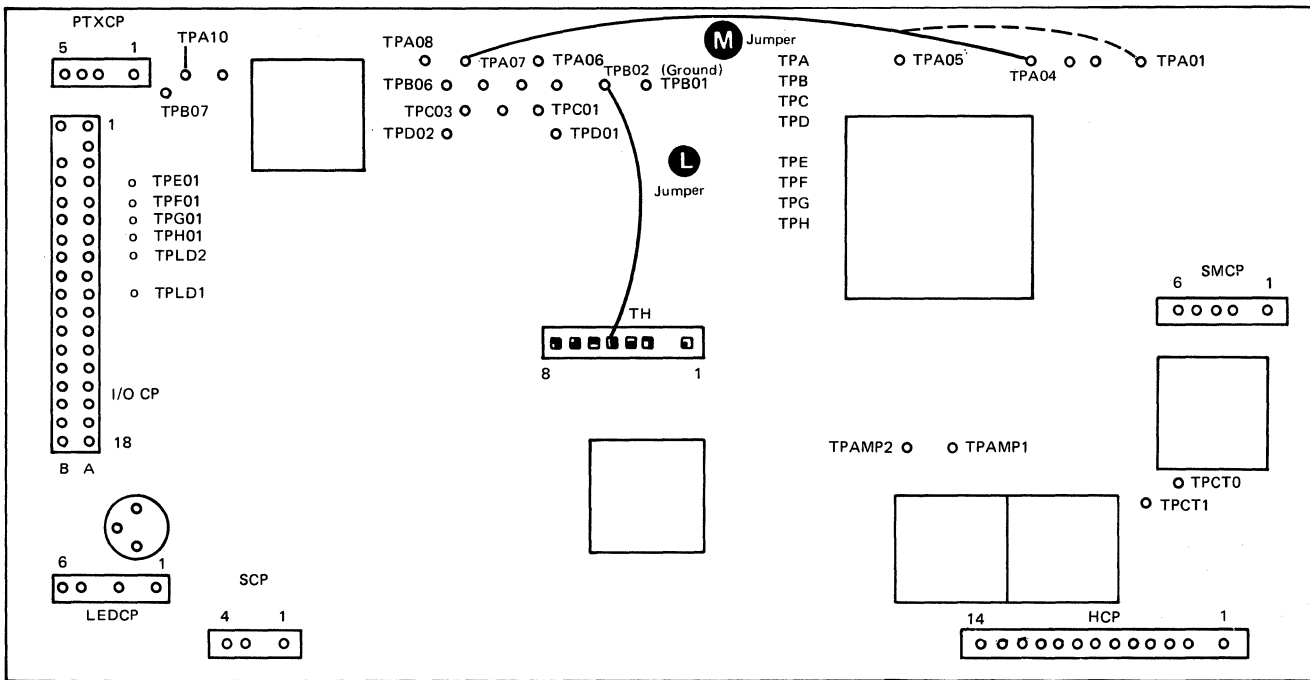


Figure E-23. Control Card

E.2.2.2 Head/Carriage Adjustment (Figure E-24)

Warning: The head/carriage assembly adjustment must be performed with the diskette installed (or in the same position as when installed), or the adjustment might not be accurate.

1. Power down.
2. Remove the cable guide **A**.
3. Measure and record the gap **K** between the stepper motor pulley **L** and the casting.
Gap is: _____.
4. Loosen the clamp screw **H** so the stepper motor drive shaft **N** can turn inside the pulley **L**.
5. Turn the stepper pulley **L** by hand to track 40, and insert the timing pin **J**. (Ensure that the pin goes into the casting.)

DANGER

Voltage is still present at the socket when the power cable is disconnected.

6. Disconnect the ac drive motor power cable **F**.
7. Power up.
8. To disable the stepper motor, install a jumper **P** from TPA05 (ground) to TH05 (—disable stepper motor).
9. To locate the stepper motor at track 40, connect a jumper from TPA07 (ground) to TPA04 (MC-0).

Warning: When the stepper motor pulley **L** is tightened by the clamp screw **H** ensure that the pin located on the back of the stepper motor pulley remains within the cutout slot on the casting.

10. Make the gap **K** the same size as the gap recorded in step 3, and tighten the clamp screw **H**. (Ensure that the timing pin passes freely through the stepper motor pulley into the hole in the casting.) The clamp **M** should be placed even with the end of the stepper motor drive shaft **N**.
11. Remove the timing pin **J**.
12. Loosen the two bracket-to-carriage clamping screws **G**.
13. Remove the jumper end from TPA04, and install the jumper end on TPH01 (MC-3).
14. Remove the jumper end from TPA01, and connect the jumper end on TPA04 (MC-0).
15. Verify that this is track 40 by visually checking that the timing hole in the pulley lines up with the timing hole in the casting. (Use the dental mirror to check; do not use a timing pin.)
16. Insert a 0.508 mm (0.020 inch) thickness gauge **E** between the timing pointer on the carriage and the track 40 adjustment surface on the casting. Use the clip (PN 4240632) **D** to attach the thickness gauge to the casting. The clip is attached to the diskette guide (see Figure E-4).

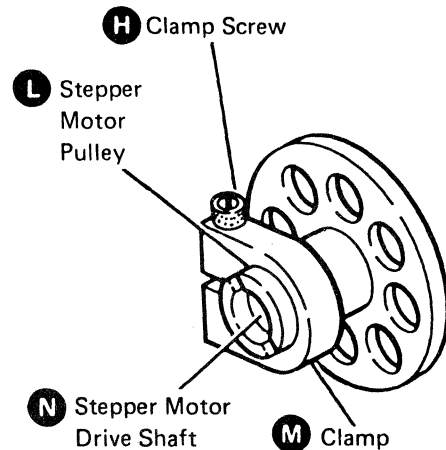
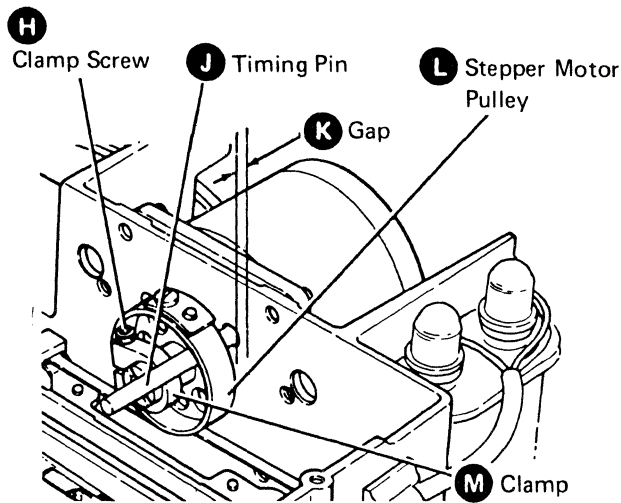
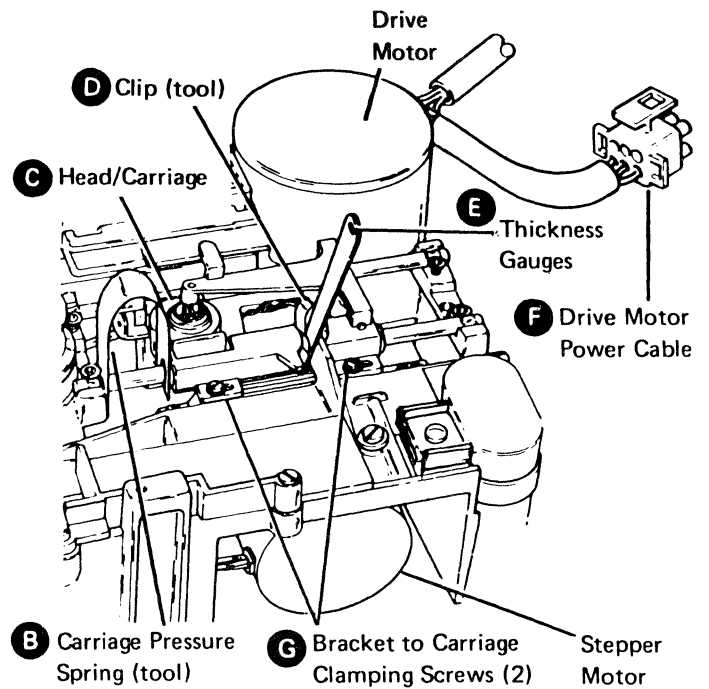
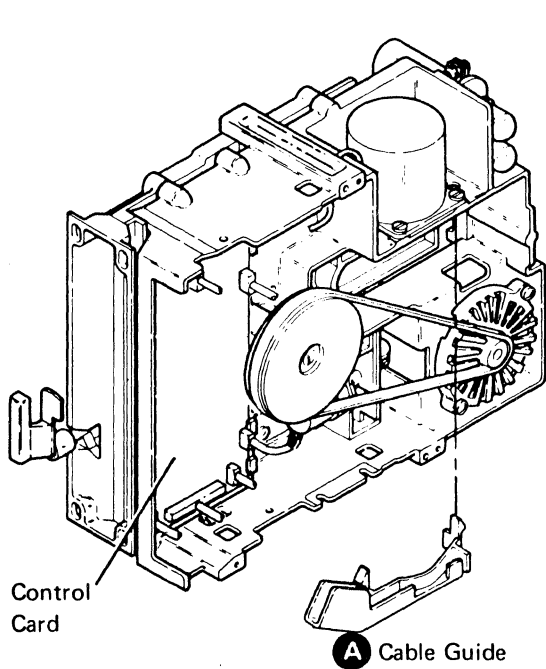


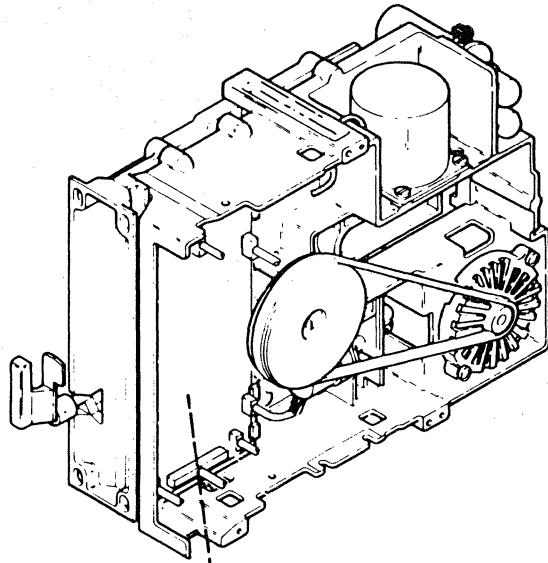
Figure E-24 (Part 1 of 2). Head/Carriage Adjustment

17. Slide the head/carriage **C** against the thickness gauge so it just touches but is not forced against the thickness gauge. Install the carriage pressure spring (PN 4240631) **B** between the casting and the carriage to hold the head/carriage assembly against the thickness gauge. The pressure spring is attached to the diskette guide (see Figure E-4).

18. Tighten the two screws **G** that fasten the bracket to the carriage.

19. Remove the clip **D** and the carriage pressure spring **B**.

20. Go to step 10 of paragraph E.3.2.2.



Control Card

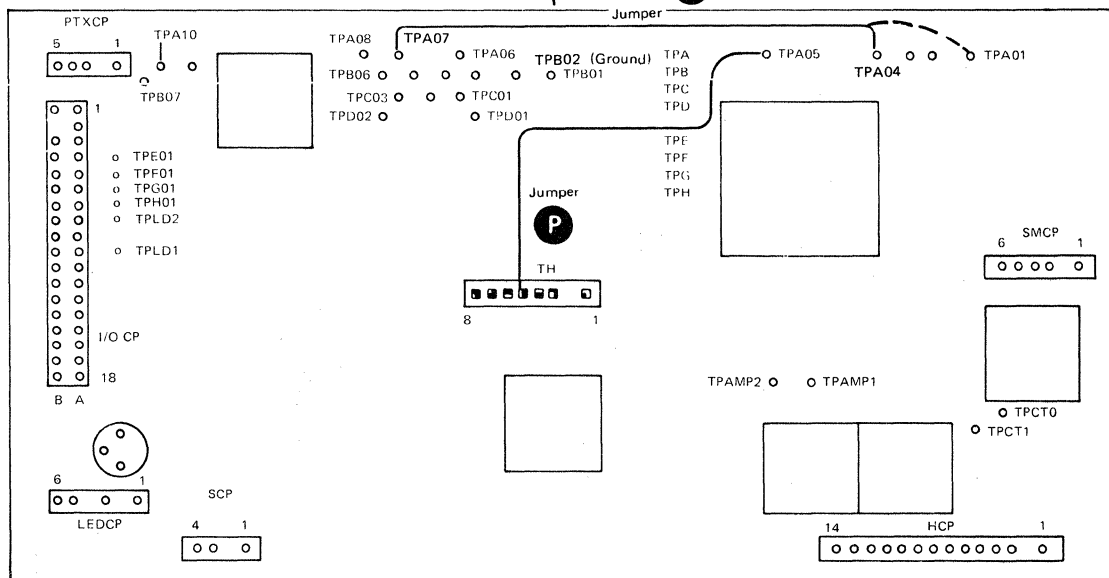


Figure E-24 (Part 2 of 2). Head/Carriage Adjustment

E.3.2.3 Head/Carriage Removal (Figure E-25)

1. Power down.
2. Carefully remove the head/carriage cable connector **A** from the control card. (Note the cable path for easier replacement.)
3. Remove the cable guide **B**.

Warning: Band **C** must not be bent or damaged in any way.

4. Remove the band **C** by removing the three screws **E** and **M** that attach the band to the stepper pulley **L** and the carriage bracket **D**. (Note the position of the band and clamps; they must be in the same position for replacement.)
5. Remove the carriage bracket **D** from the carriage. Place a clean piece of paper between the heads.
6. Remove the two screws **J** and remove the guide rod **F**. Do not allow the heads to touch each other.
7. Carefully lift and turn the head/carriage assembly **H** to remove it from the guide rod **G**.

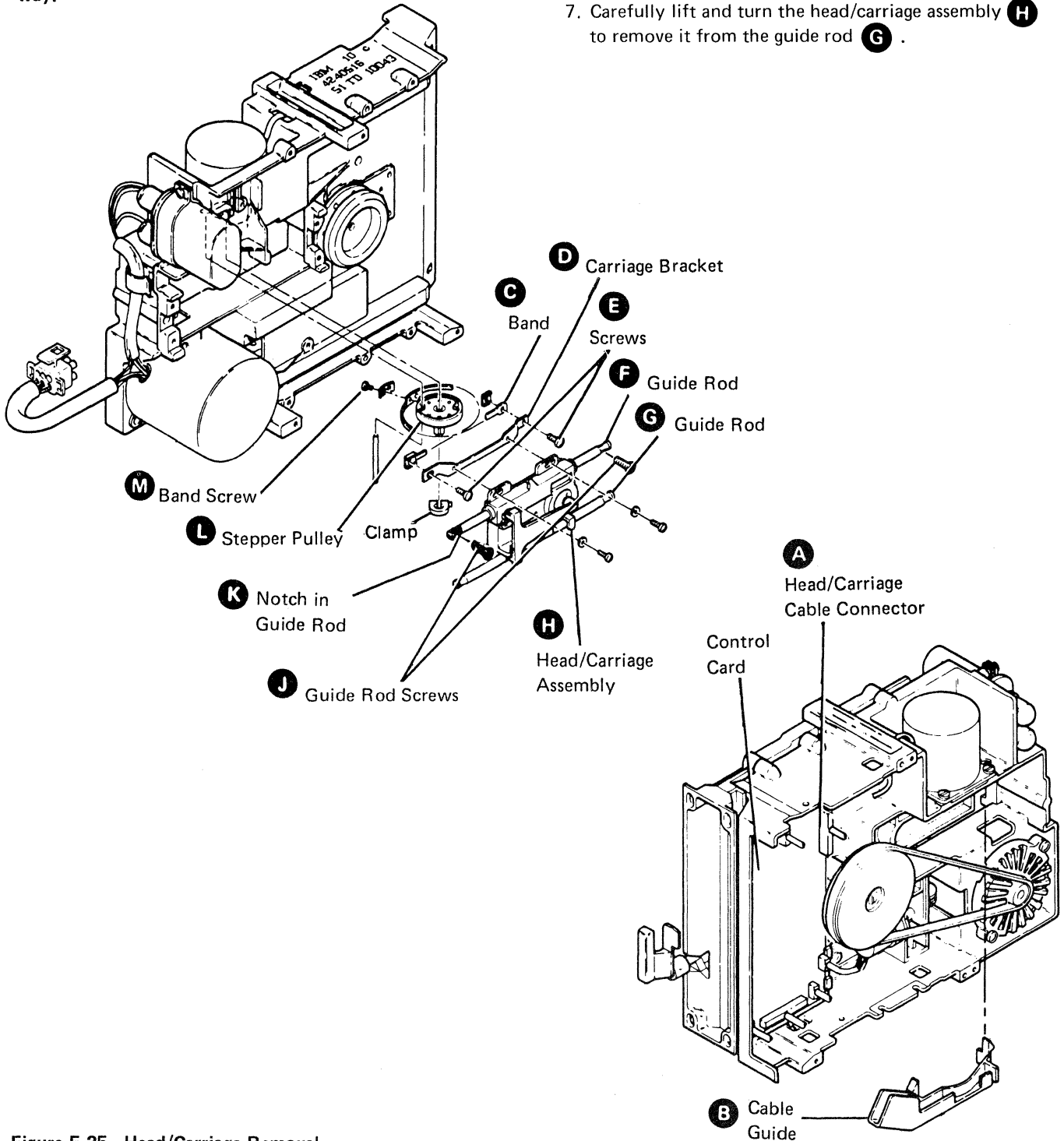


Figure E-25. Head/Carriage Removal

E.3.2.4 Head/Carriage Replacement (Figure E-26)

Warning: When you install the head/carriage assembly **S** ensure that a strip of clean paper is between the diskette drive heads to protect them during installation; also, ensure that the bail **E** is under the headload arm **D**. Ensure that the bail return spring **G** is correctly installed. Ensure that the band **L** is not damaged in any way.

1. Carefully install the head/carriage assembly **S** on the guide rod **Q**. Then place the head/carriage assembly at track 00.
2. Reinstall the guide rod **P** and tighten the two screws **R**. (Ensure that the guide rod notch **U** is aligned with the screw **T**.)
3. Place the head/carriage assembly at track 40.
4. Reinstall the carriage bracket **M** on the carriage with the screws and washers **R** installed in the center of the hole.
5. Reconnect the band **L** as follows: Install the adapter welded to band **V** to the slotted end **B** of the carriage bracket **M**. Leave the screw loose. Install band **L** to the stepper motor pulley **W** with clamp **J**. Install the end of band **L** to the carriage bracket with clamp **K**. Ensure that the band is parallel to the carriage bracket **M** and the edge of the pulley **H** during installation.
6. Block the head/carriage about 25 mm (1 inch) from the casting **F**.
7. Pull on the adapter welded to band **V** with 2.5 ± 0.25 pounds force, and tighten the band clamping screw **C**. Ensure that the band is parallel to the pulley edge **H**. Remove the paper from between the heads.

8. Move the carriage to track 00 and then to track 76. Ensure that the band track is straight and that the drive band is parallel to the pulley edge **H**.
9. Carefully connect the head/carriage cable to the control card connector **AA**.
10. Turn the stepper motor pulley **W** by hand to track 40, and check with the timing pin **X**. Ensure that the pin goes into the casting.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

11. Disconnect the ac drive motor power cable **A**.
12. Power up.
13. To disable the stepper motor, install a jumper **Y** from TPB02 (ground) to TH05 ('disable stepper motor').
14. Install a jumper **Z** from TPA07 (ground) to TPA04 (MC-0).
15. Put the timing pin through the stepper motor pulley **W** into the timing hole in the casting. Does the timing pin pass through the timing hole freely?

Y	N
↓	– Remove the timing pin X .
	– Remove the jumpers Y and Z .
	– Power down.
	– Go to step 3 of paragraph E.3.2.2.

Remove the timing pin **X**.
16. Go to step 12 of paragraph E.3.2.2.

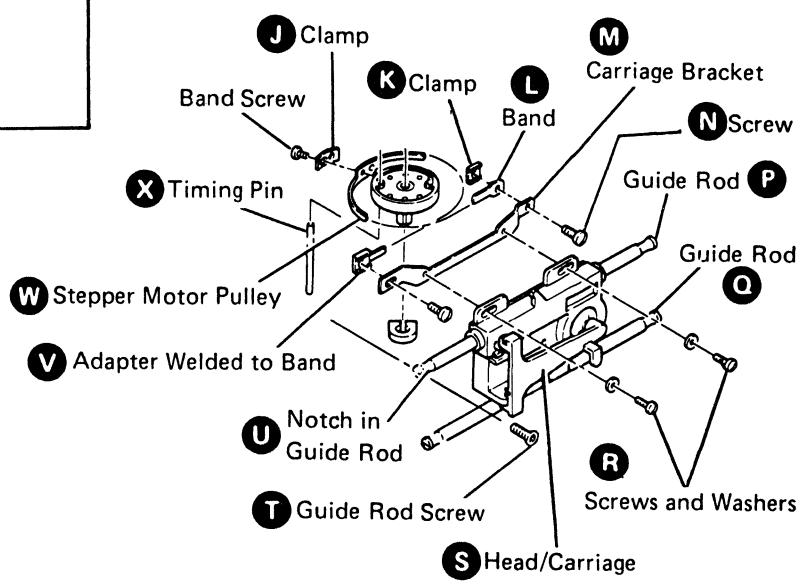
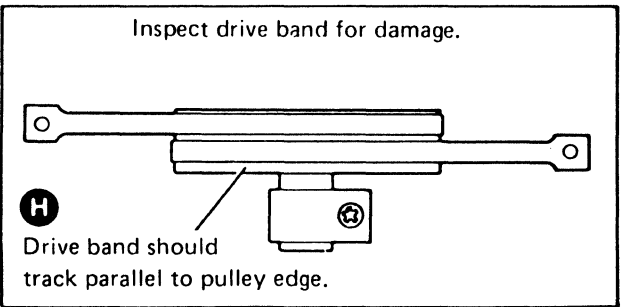
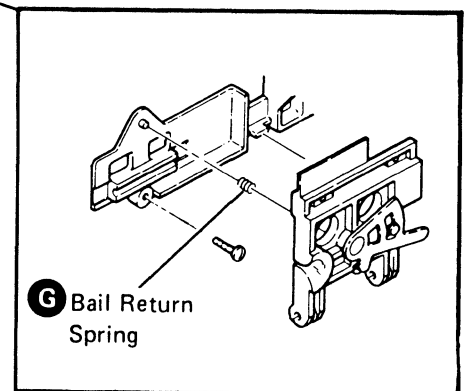
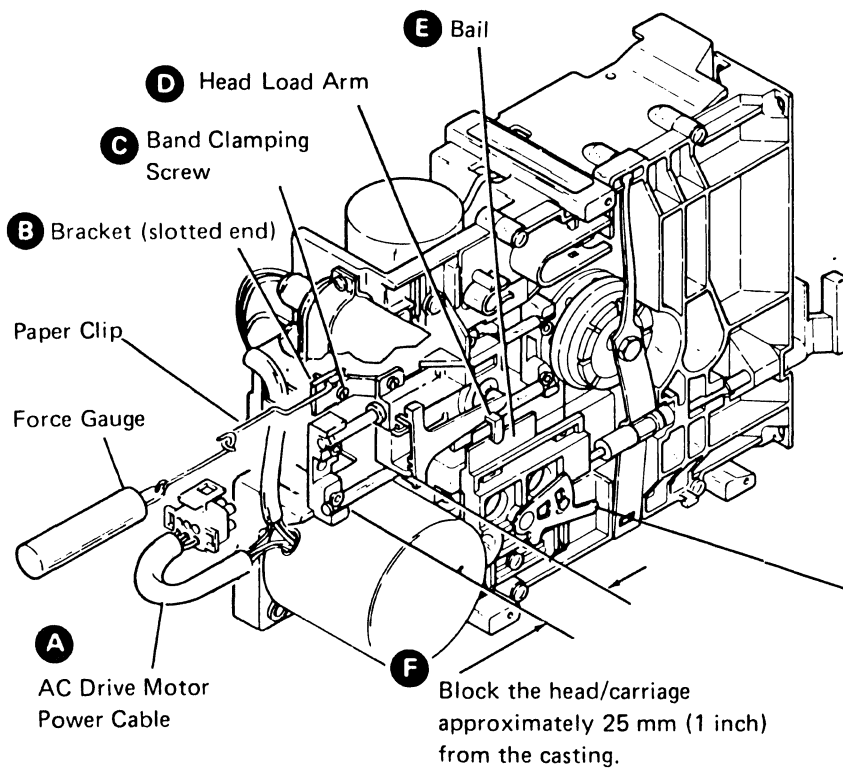
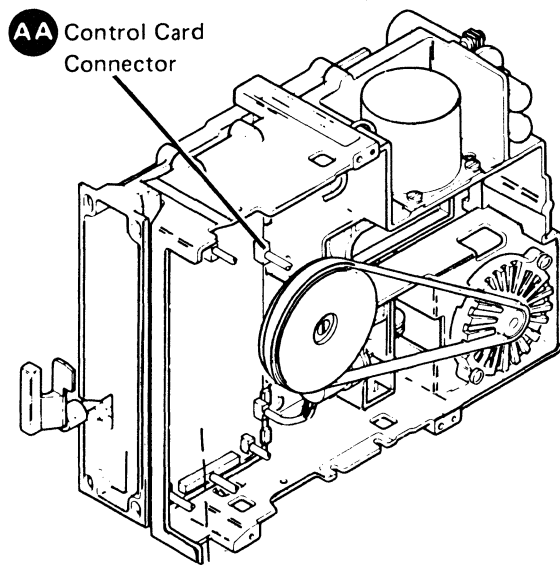


Figure E-26 (Part 1 of 2). Head/Carriage Replacement



Control Card

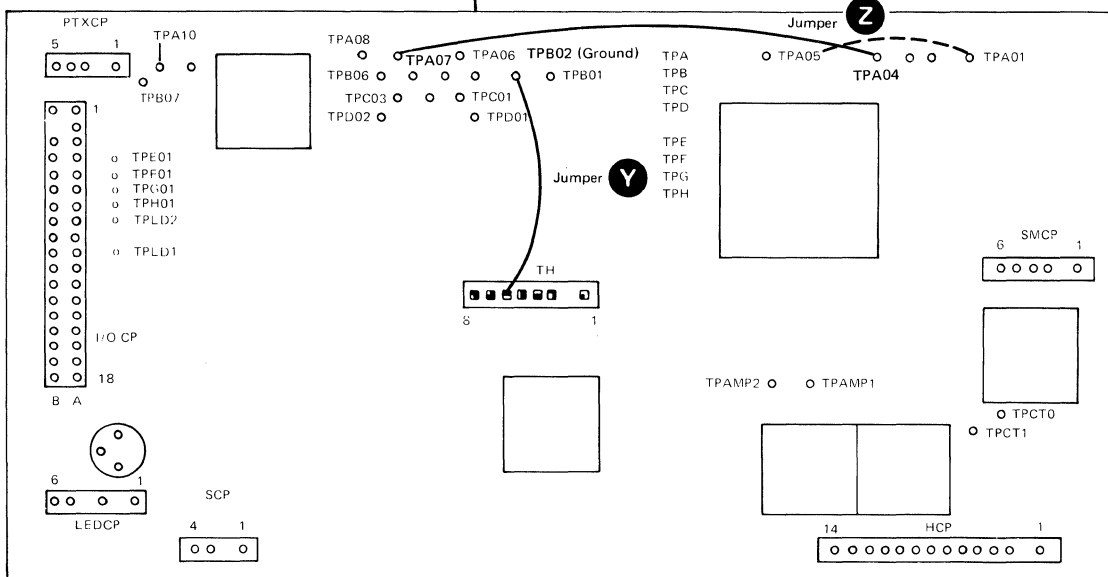


Figure E-26 (Part 2 of 2). Head/Carriage Replacement

E.3.3 Head Load Solenoid and Bail

E.3.3.1 Solenoid and Bail Service Check (Figure E-27)

1. Power down.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

2. Disconnect the ac drive motor power cable **G**.

3. Insert a diskette, and turn the operator knob **B**, to the closed position.

4. Power up.

5. To activate the head load solenoid, install a jumper **E** from TPA07 (ground) to the head load TPA08 (-'head load').

6. To deactivate the stepper motor, install a jumper **F** from TPB02 (ground) to TH05 (-'disable stepper motor').

7. Verify a 0.3 to 0.7 mm (0.012 to 0.028 inch) gap **D** between the bail and the head load arm at each end of the head movement.

8. Is the gap OK? If not, go to Bail Adjustment (paragraph E.3.3.4, step 5).

9. Remove the jumpers **E** and **F**.

10. Turn the operator knob **B** to the open position, and remove the diskette.

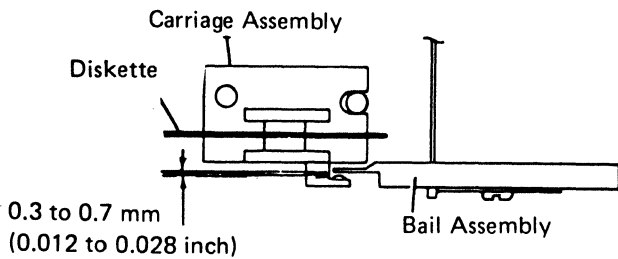
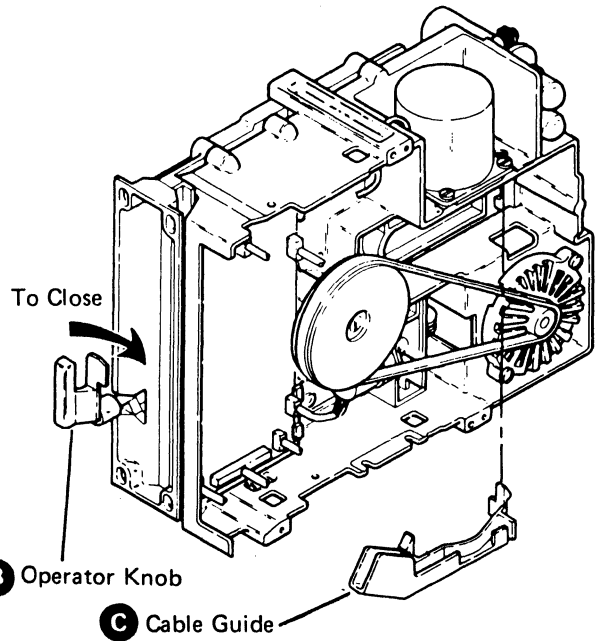
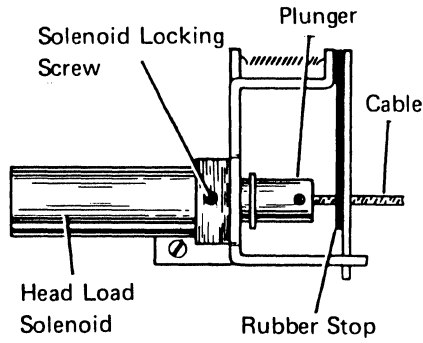
11. Turn the operator knob **B** to the closed position.

12. Power down.

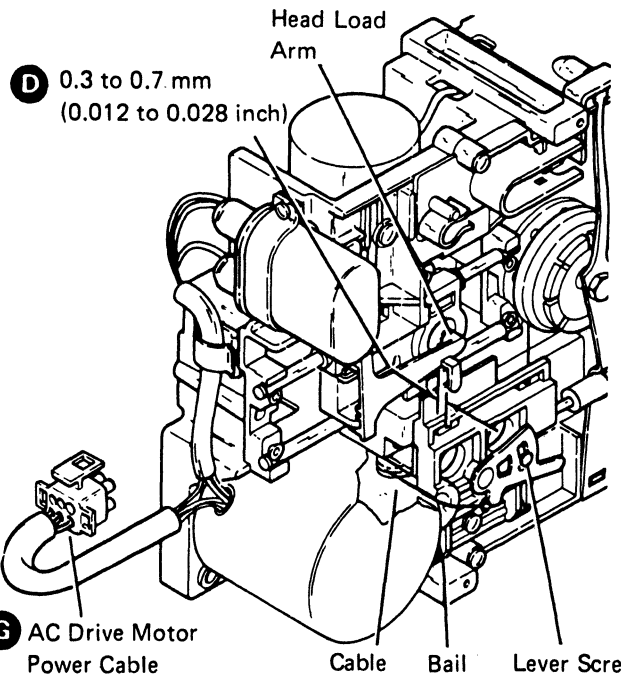
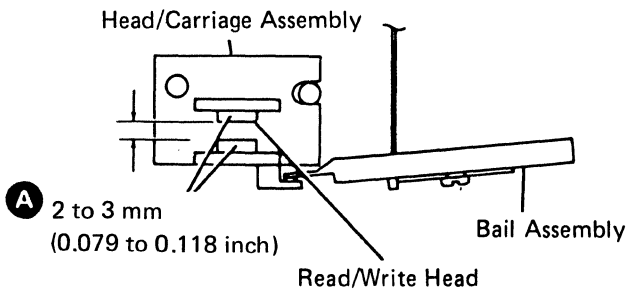
13. Reconnect the ac drive motor power cable **G**.

14. Power up.

Head Load Solenoid Activated



Head Load Solenoid Deactivated



51TD Control Card

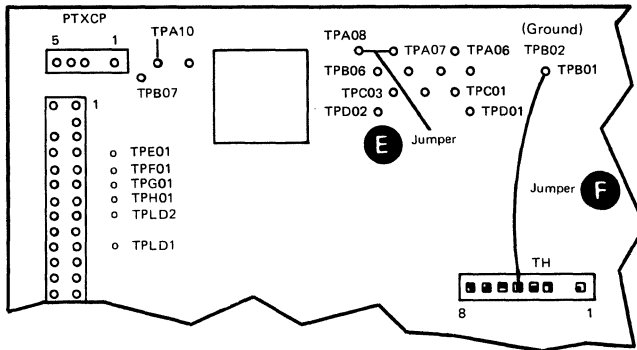


Figure E-27. Solenoid and Bail Service Check

E.3.3.2 Head Gap Service Check (Figure E-28)

1. Power down.
2. Turn the operator knob **B** to the closed position.
3. Visually check for a gap of 2 to 3 mm (0.079 to 0.118 inch) between the bail assembly and the head load arm.
4. Is the gap OK? If not, go to step 3 of paragraph E.3.3.3.
5. Turn the operator knob **B** to the open position.
6. Power up.
7. If the head/carriage assembly was exchanged, go to the Solenoid and Bail Service Check (paragraph E.3.3.1).

E.3.3.3 Head Gap Adjustment (Figure E-28)

1. Power down.
2. Turn the operator knob to the closed position.
3. Tighten the lever screw **K** just enough so that the lever **J** can still be adjusted.
4. While looking into the diskette opening, move the lever until the two heads just touch.
5. Note the lever marks **H** on the lever relative to the bail alignment edge **G**.
6. Turn the lever one space clockwise.
7. Tighten screw **K**.
8. The gap **B** between the head surface should be 2 to 3 mm (0.079 to 0.118 inch). This gap cannot be easily measured and should be checked visually only.
9. Is the gap OK?

Y N
↓ – Go back to step 3.
– Go to Solenoid and Bail Service Check (paragraph E.3.3.1).

E.3.3.4 Bail Adjustment (Figure E-28)

1. Power down.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

2. Disconnect the ac drive motor power cable **L**.

3. Power up.
4. Insert a diskette, and turn the operator knob to the closed position.
5. To activate the head load solenoid, install a jumper **C** from TPA07 (ground) to the head load TPA08 (-'head load').
6. To deactivate the stepper motor, install a jumper **D** from TPB02 (ground) to TH05 (-'disable stepper motor').

CAUTION

The solenoid case becomes hot after continuous use.

7. Loosen the solenoid locking screw **A**.

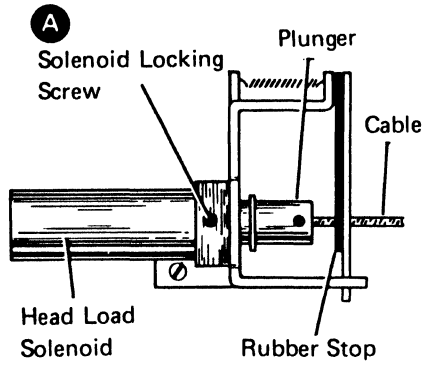
Warning: Do not let the solenoid plunger and cable turn while you make this adjustment.

8. Turn the solenoid in the mounting bracket to obtain a 0.3 to 0.7 mm (0.012 to 0.028 inch) gap **E** between the head load arm and the bail.
9. Tighten screw **A**.
10. Is the gap OK at each end of the head movement (step 8)?

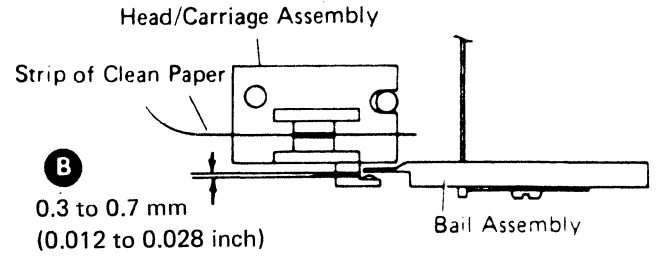
Y N
↓ – Go back to step 7.

11. Remove the jumpers **C** and **D**.
12. Turn the operator knob to the open position and remove the diskette.
13. Power down.
14. Reconnect the ac drive motor power cable **L**.
15. Power up.

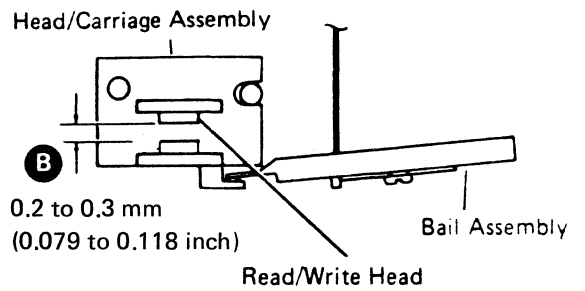
Head Load Solenoid Activated



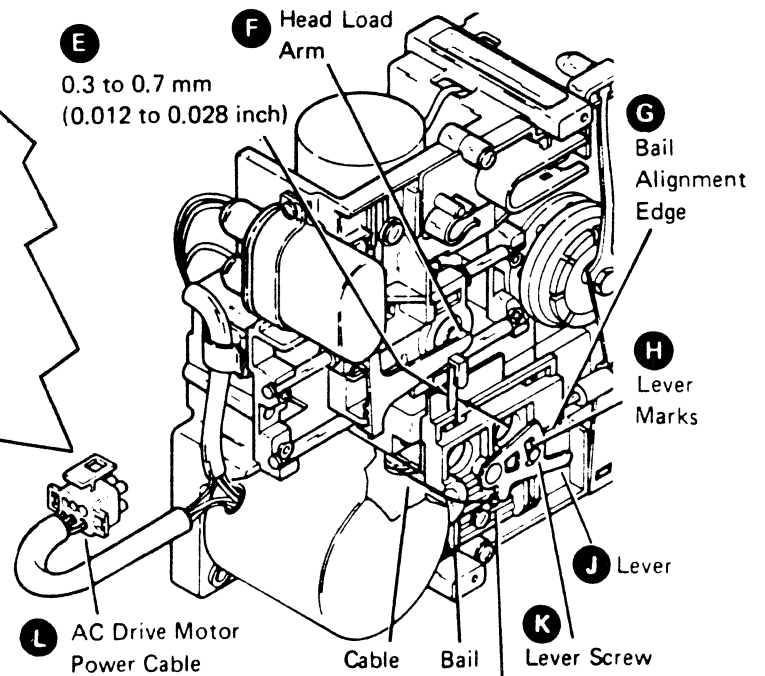
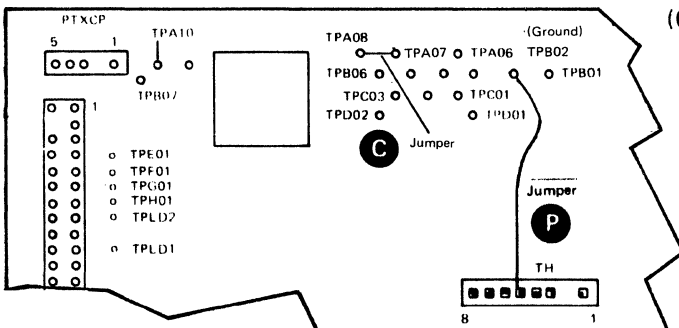
Head Load Solenoid Activated



Head Load Solenoid Deactivated



Control Card



Push in on the bail to release the cable eyelet from the stud.

Figure E-28. Head Gap Adjustment

E.3.3.5 Bail Removal (Figure E-29)

1. Power down.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

2. Disconnect the ac drive motor power cable **A**.
3. Insert a strip of clean paper between the heads to prevent them from touching.
4. Turn the operator knob to the closed position.
5. Loosen the lever screw **C**.
6. Push the bail **J** inward slightly, and disconnect the bail cable eyelet **G** from the lever **D**.
7. Turn the operator knob to the open position.
8. Loosen the bail mounting screw **E**.

Warning: Ensure that the heads do not touch each other when the bail is removed from under the head load arm.

9. Observe the position of the bail return spring **K**. Now remove the pivot rod **H**, the bail return spring **K** and the bail **J** by lifting the bail out from under the head load arm **B**.

E.3.3.6 Bail Replacement (Figure E-29)

1. Reinstall the bail return spring **K**, the bail **J**, and the pivot rod **H**. Place the bail **J** on the collet actuator rod **L**. Ensure that the bail return spring **K** is in the correct position. Place the bail **J** under the head load arm **B**, place the bail pivot rod **H** in the groove, and tighten the screw **E**.
2. Turn the operator knob to the closed position.
3. Push the bail **J** inward slightly, and connect the cable eyelet **G** to the bail lever with the crimp **N** facing outward. (Ensure that the cable remains on the pulley and is not twisted; turn the solenoid plunger **M**, if necessary.)
4. Turn the operator knob to the open position.
5. Remove the strip of paper from between the heads.
6. Perform the Head Gap Adjustment (paragraph E.3.3.3).

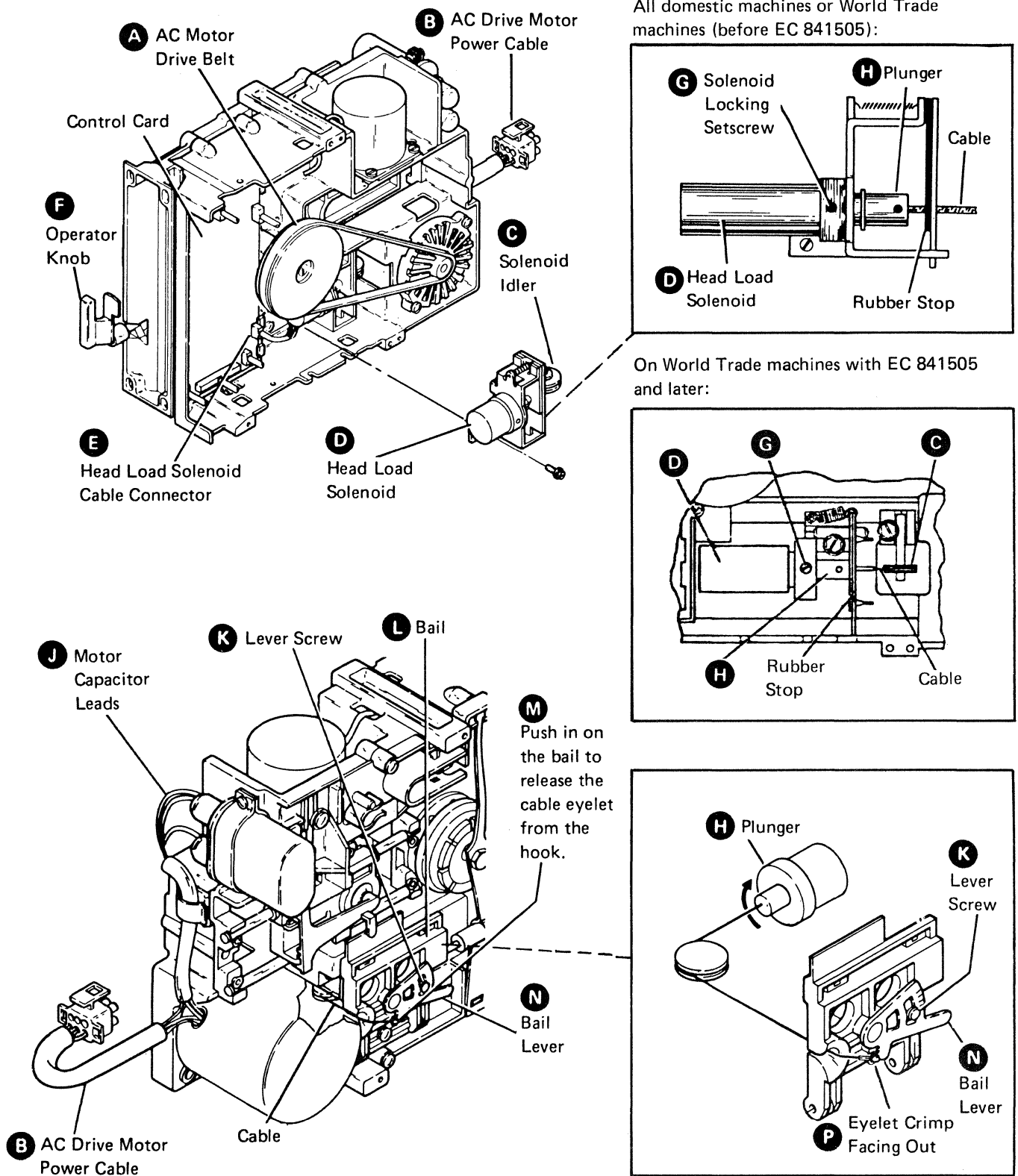


Figure E-29. Bail Removal

E.3.3.7 Solenoid and Idler Removal (Figure E-30)

1. Power down.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

2. Disconnect the ac drive motor power cable **B**.
3. Insert a strip of clean paper between the two heads.
4. Turn the operator knob **F** to the closed position.
5. Loosen the lever screw **K**.
6. Push the bail **L** inward slightly, and disconnect the cable eyelet **M** from the bail lever **N**.
7. Turn the operator knob **F** to the open position.
8. Remove the ac motor drive belt **A**.
9. Remove the solenoid cable connector **E** from the control card.
10. On all domestic machines or World Trade machines, prior to EC 841505, remove the solenoid, the bracket, and the cable as a unit **D**. On World Trade machines with EC 841505 and later, skip this step.
11. Loosen the solenoid locking setscrew **G** and unscrew the solenoid from the bracket. (The solenoid and the bail actuator cable are exchanged as a unit.)

E.3.3.8 Solenoid and Idler Replacement (Figure E-30)

1. On all domestic machines or World Trade machines, prior to EC 841505, reinstall the solenoid **D** on the bracket and tighten the solenoid locking setscrew **G**. On World Trade machines with EC 841505, and later, reinstall the head load solenoid **D** on the casting and tighten the solenoid locking setscrew **G**.
2. On all domestic machines or World Trade machines prior to 841505, reinstall the solenoid, bracket, and cable as a unit. On World Trade machines with EC 841505 and later, skip this step.
3. Reconnect the head load solenoid cable connector **E** to the control card.
4. Reinstall the ac motor drive belt **A**.
5. Turn the operator knob **F** to the closed position.
6. Push the bail **L** inward slightly, and connect the cable eyelet **M** to the bail lever **N** with the eyelet crimp **P** facing outward. (Ensure that the cable remains on the pulley and is not twisted; turn the solenoid plunger **H** if necessary.)
7. Turn the operator knob **F** to the open position.
8. Remove the strip of paper from between the heads.
9. Perform the Head Gap Adjustment (see paragraph E.3.3.3).
10. Perform the bail adjustment (see paragraph E.3.3.4).

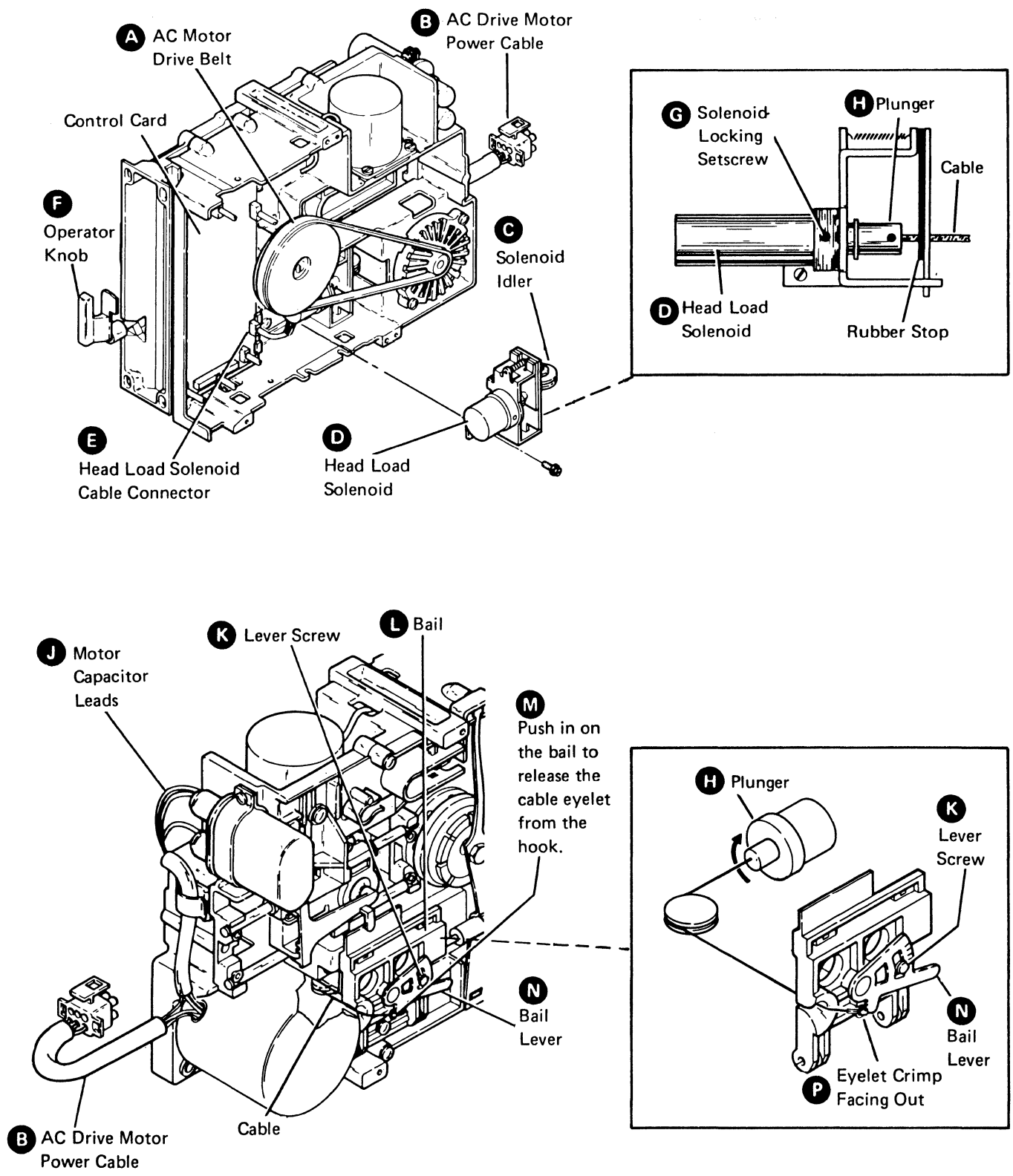


Figure E-30. Solenoid and Idler Removal

E.3.4 AC Drive Parts

E.3.4.1 Drive Motor Removal (Figure E-31)

1. Power down.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

2. Disconnect the ac drive motor power cable **B**.
3. Remove the ac motor drive belt **O**.

CAUTION

The motor case becomes hot after continuous use.

4. On all domestic machines or World Trade machines prior to EC 841505, remove the two enclosure mounting screws **P** and remove the fan enclosure **N**. On World Trade machines with EC 841505 and later, remove the two mounting screws **L** and remove the ac drive motor.
5. Loosen the drive pulley/fan locking setscrew **M**; then remove the ac drive motor pulley/fan assembly **K**.

DANGER

High voltage may be present at the capacitor terminals **F.**

6. Remove the two capacitor insulator caps **H** from the capacitor terminals.
7. Discharge the capacitor by shorting across its terminals **F** with the large blade screwdriver.
8. Remove the motor capacitor leads **G** from the capacitor terminals.
9. Remove the motor capacitor leads **G** from the cable guide **J** on the casting.
10. Remove the insulator caps **H** from the motor capacitor leads **G**.
11. On all domestic or World Trade machines prior to EC 841505, remove the remaining two motor mounting screws **L** and remove the motor **A**. On World Trade machines with EC 841505 and later, skip this step.

E.3.4.2 Drive Motor Replacement (Figure E-31)

1. On all domestic machines or World Trade machines prior to EC 841505, install the ac drive motor **A** with the two mounting screws **L**. Note in Figure E-31 that the cable **B** and the motor capacitor leads **J** should extend toward the rear of the machine. On World Trade machines with EC 841505 and later, skip this step.

2. Install the ac drive motor pulley/fan **K** on the new motor. Ensure that the setscrew **M** is centered in the flat surface of the motor shaft. (Leave the setscrew loose.)
3. Position the fan and pulley on the motor shaft with a gap of $0.5 \text{ mm} \pm 0.1 \text{ mm}$ ($0.020 \pm 0.004 \text{ inch}$) between the motor face and the fan hub. Tighten the setscrew.
4. On all domestic machines or World Trade machines prior to EC 841505, reinstall the fan enclosure **N** with the belt clearance slots toward the drive hub **R**. On World Trade machines with EC 841505 and later, install the ac drive motor **A** with the two mounting screws **L**.
5. Reinstall the drive belt **O**.
6. Reinstall the two capacitor insulator caps **H** on the motor capacitor leads **G** (one on leads 2 and 3, and one on lead 1).
7. Reconnect the motor capacitor leads **G** in the guide **J** on the casting.
8. Reinstall the motor capacitor leads **G** on the capacitor terminals **F** (leads 2 and 3 on the top terminal and lead 1 on the bottom terminal).
9. Reinstall the two insulator caps **H** on the capacitor terminals **F**.
10. Reconnect the ac drive motor power cable **B**.

E.3.4.3 Capacitor Removal (Figure E-31)

1. Power down.

DANGER

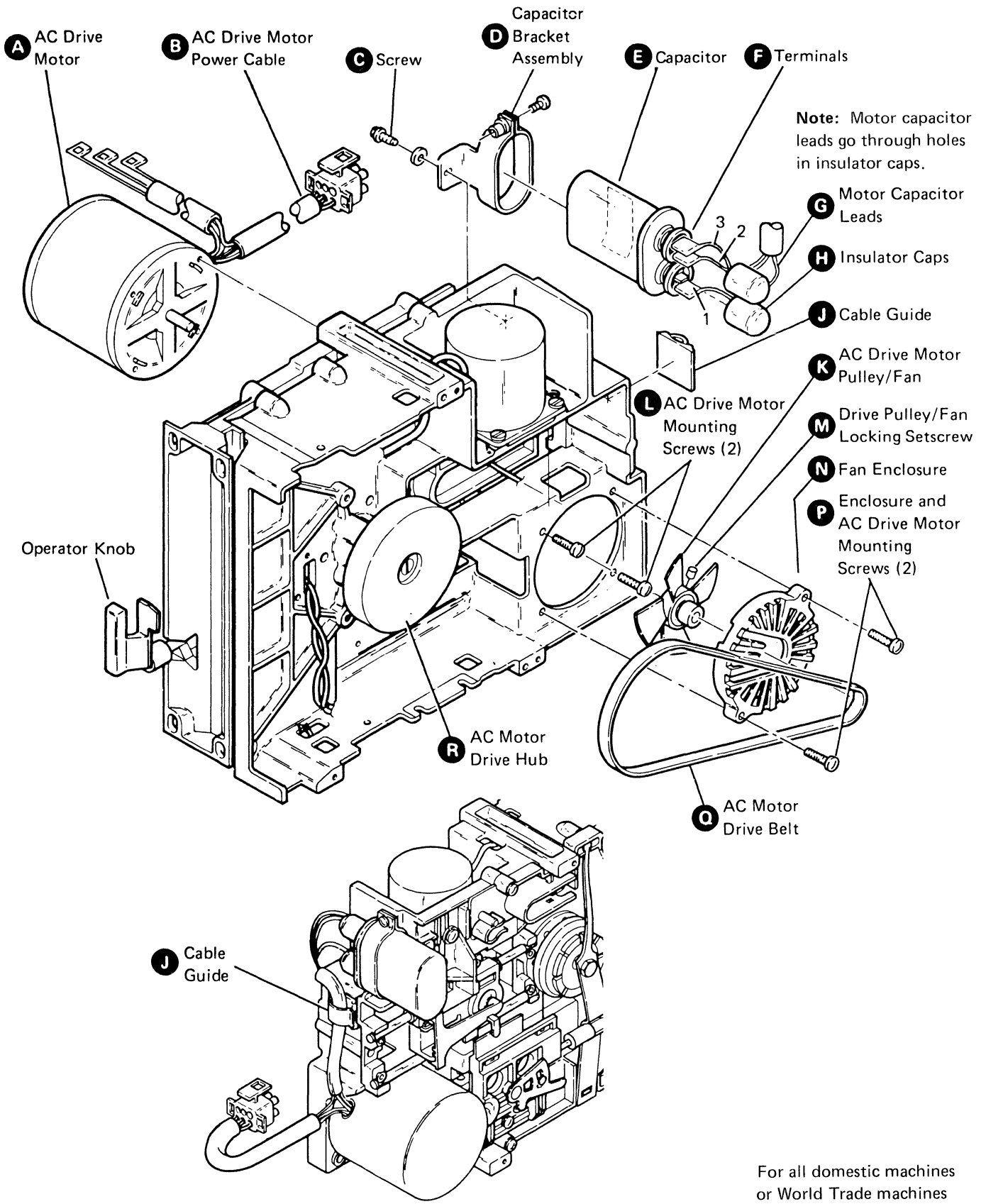
Voltage is still present at the socket when the power cable is disconnected.

2. Disconnect the ac drive motor power cable **B**.

DANGER

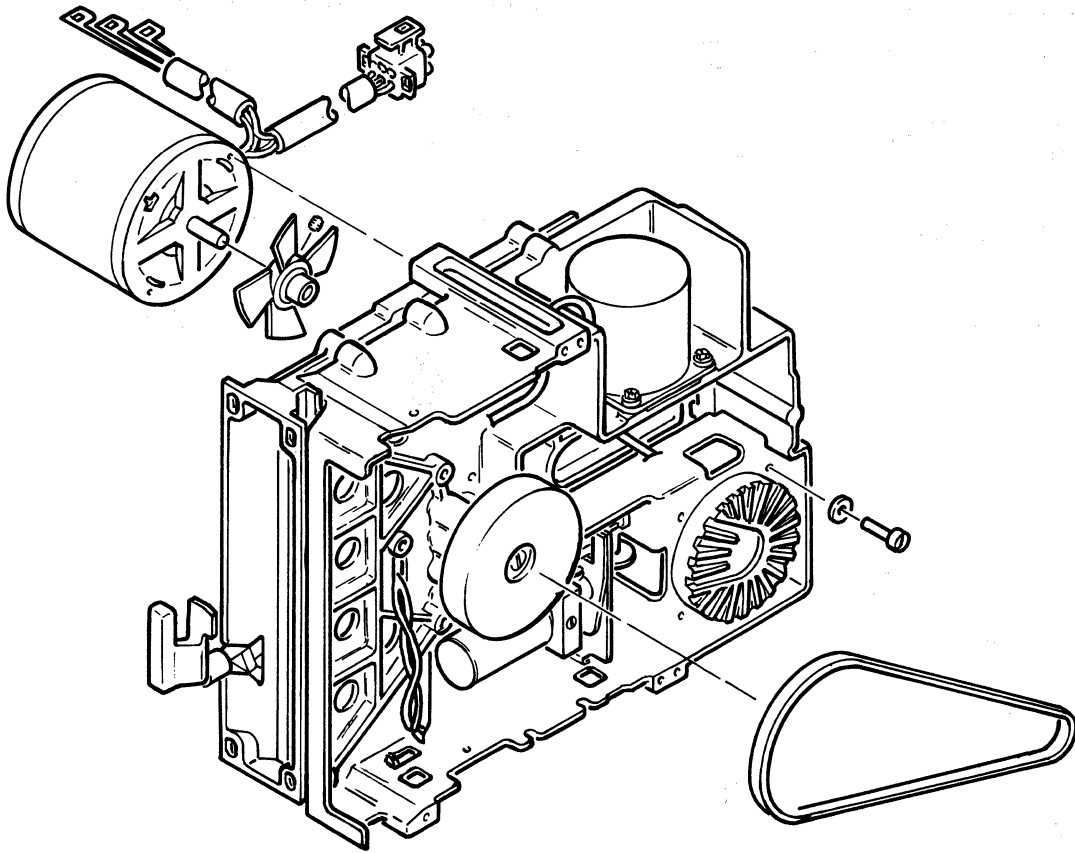
High voltage may be present at the capacitor terminals **F.**

3. Remove the two insulator caps **H** from the capacitor terminals **F**.
4. Discharge the capacitor by jumpering the capacitor terminals **F** with a large blade screwdriver.
5. Remove the motor capacitor leads **G** from the capacitor terminals.
6. Remove the screw **C** and remove the capacitor bracket assembly **D**.



For all domestic machines or World Trade machines before EC 841505.

Figure E-31 (Part 1 of 2). AC Drive Motor Removal



For World Trade machines with EC 841505 and later.

Figure E-31 (Part 2 of 2). AC Drive Motor Removal

E.3.4.4 Capacitor Replacement (Figure E-31)

1. Reinstall the capacitor assembly **D** with the screw **C** and tighten the screw.
2. Reinstall the motor capacitor leads **G** on the capacitor terminals **F** (leads 2 and 3 on the top terminal and lead 1 on the bottom terminal).
3. Reinstall the two insulator caps **H** on the capacitor terminals.

E.3.4.5 Drive Fan and Pulley Assembly Removal (Figure E-31)

1. Power down.

DANGER

Voltage is still present at the socket when the power cable **B is disconnected.**

2. Disconnect the ac drive motor cable **B**.
3. Remove the ac drive belt **O**.
4. On all domestic machines or World Trade machines prior to EC 841505, remove the fan enclosure mounting screws **P** and remove the fan enclosure **N**. On World Trade machines with EC 841505 and later, remove the ac drive motor **A** with the two mounting screws **L**.
5. Loosen the setscrew **M**; then remove the ac drive motor pulley/fan **K**.

E.3.4.6 Drive Fan and Pulley Assembly Replacement (Figure E-31)

1. Reinstall the ac drive motor pulley **K** on the motor shaft so that the setscrew **M** is centered in the flat surface of the shaft. (Leave the setscrew loose.)
2. Position the fan and pulley on the motor shaft with a gap of $0.5 \text{ mm} \pm 0.1 \text{ mm}$ (0.020 ± 0.004 inch) between the motor face and the fan hub. Tighten the setscrew.
3. On all domestic or World Trade machines prior to EC 841505, with the mounting screws **P**, reinstall the fan enclosure **N** with the belt clearance slots toward the drive hub **R**. On World Trade machines with EC 841505 and later, reinstall the ac drive motor.
4. Reinstall the drive belt **O**.
5. Reconnect the ac drive motor power cable **B**.
6. Power up.

E.3.5 Stepper Drive Parts

E.3.5.1 Stepper Motor Removal (Figure E-32)

1. Power down.
2. Remove the head cable connector **L** from the control card.
3. Remove the head cable guide **P**.

Warning: The stepper drive band **J** assembly can be easily damaged. Do not bend, crease, or scratch the band.

4. Remove the three mounting screws **A**, **F**, and **G** and clamp **B** that attach the stepper drive band **J** to the stepper motor drive pulley **C**, and carriage bracket **E**. (Note the position of the band **J** and clamp **B** for easier replacement.)
5. Remove the band assembly.
6. Measure and record the gap **U** between the stepper motor pulley **C** and the casting for later use.
Gap is _____.
7. Loosen the stepper pulley clamp screw **Q** and remove the stepper pulley **C** and the clamp **H**.
8. Remove the stepper motor cable connector **K** from the control card.

9. Remove the four stepper motor mounting screws **N**.
10. Remove the stepper motor **M**.

E.3.5.2 Stepper Motor Replacement (Figure E-32)

1. Reinstall the stepper motor **M**, using the four mounting screws **N**. (Locate the motor cable toward the control card.)
2. Reinstall the stepper motor cable connector **K** on the control card.

Warning: When the stepper motor pulley **C** is tightened by the clamp screw **Q** ensure that the pin located on the back of the stepper motor pulley remains within the cutout slot on the casting.

3. Reinstall the stepper motor pulley **C** and the clamp **H**. (Adjust the gap **U** between the pulley and the casting to the measurement recorded in step 6 of paragraph E.3.5.1.) The clamp **H** should be placed even with the end of the stepper motor drive shaft **D**.
4. Reinstall the drive band **J**. Go to Head/Carriage Replacement (paragraph E.3.2.4, step 5).

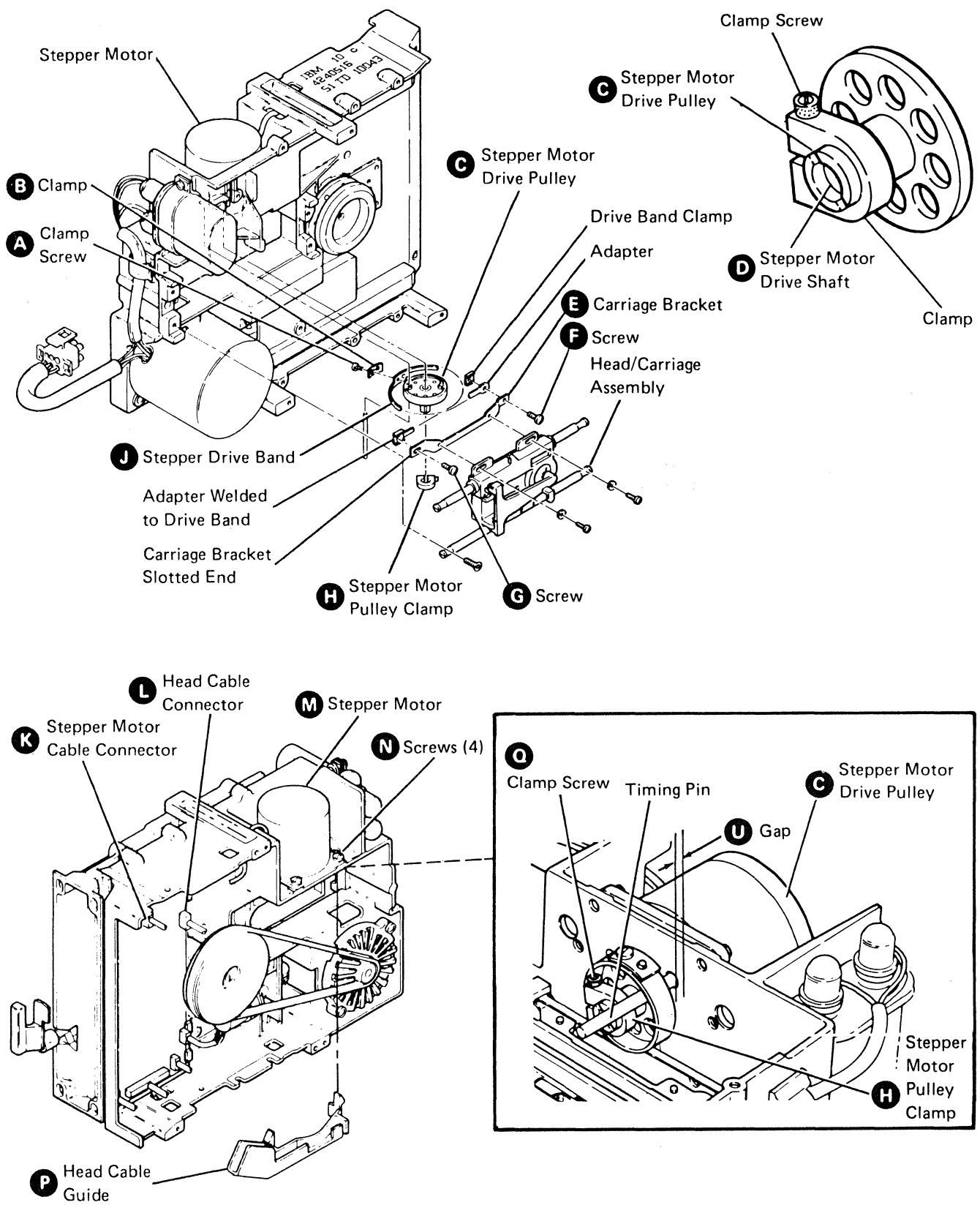


Figure E-32. Stepper Motor Removal and Replacement

E.3.5.3 Stepper Pulley and Clamp Removal (Figure E-33)

1. Power down.
2. Remove the drive band (see paragraph E.3.5.7).
3. Measure and record the gap **C** between the stepper motor pulley and the casting.

Gap is _____ .

4. Loosen the clamp screw **B** ; then remove the pulley **D** and the clamp **A** .

E.3.5.4 Stepper Pulley and Clamp Replacement (Figure E-33)

Warning: When the stepper motor pulley **C** is tightened by the clamp screw **Q** , ensure that the pin located on the back of the stepper motor pulley remains within the cutout slot on the casting.
the casting.

1. Reinstall the pulley **D** , the clamp **A** , and the clamp screw **B** . The gap should be the same as in step 3 of paragraph E.3.5.3. Ensure that the clamp is even with the end of the stepper motor drive shaft.
2. Reinstall the drive band. Go to Head/Carriage Replacement (paragraph E.3.2.4, step 5).

E.3.5.5 Drive Band Service Check (Figure E-33)

1. Power down.
2. Turn the stepper motor pulley by hand between tracks 00 and 76.
3. If the drive band does not track parallel to the pulley edge **F** , go to Drive Band Adjustment (paragraph E.3.5.6, step 6).

If the band shows signs of physical damage **F** , exchange the band (see paragraphs E.3.5.7 and E.3.5.8).

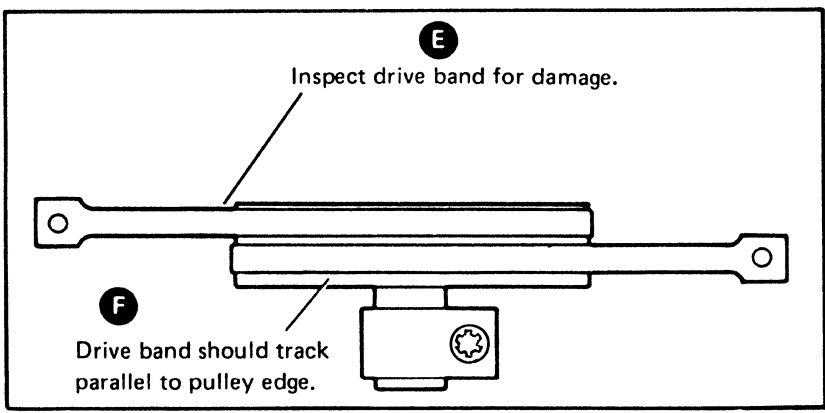
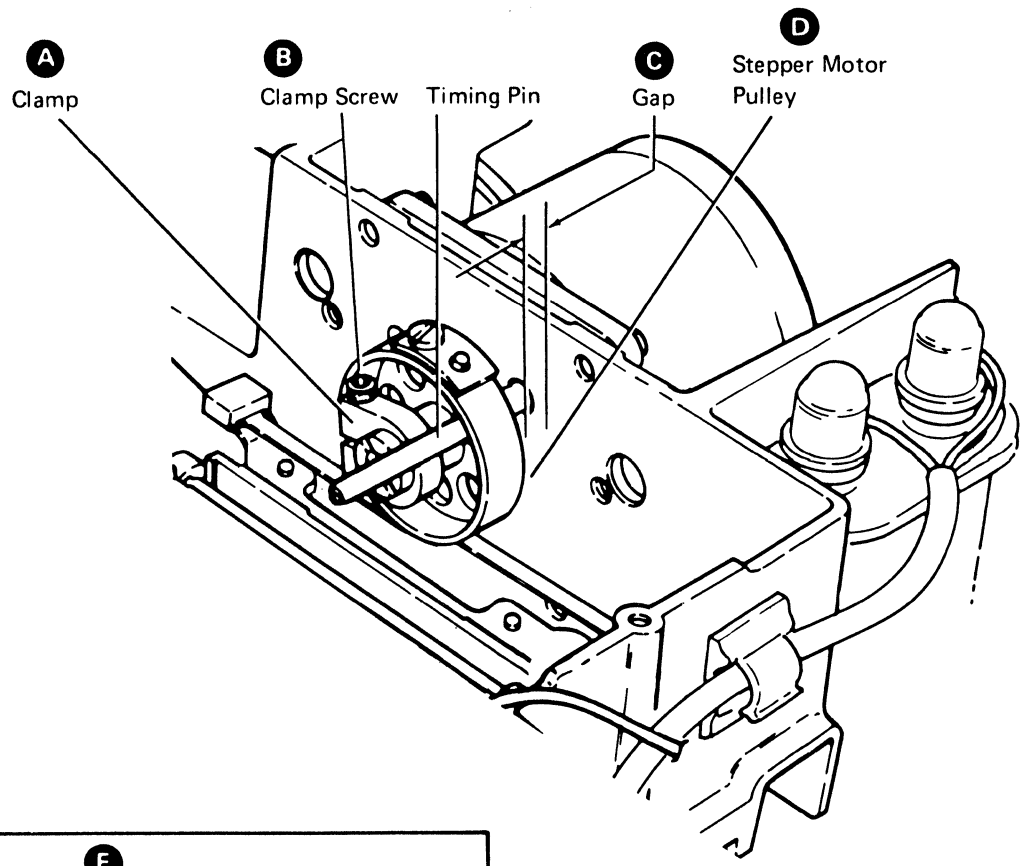


Figure E-33. Stepper Motor Pulley and Clamp Removal and Replacement

E.3.5.6 Drive Band Adjustment (Figure E-34)

1. Power down.
2. Remove the head connector **M** from the control card.
3. Remove the head cable guide **N**.
4. Loosen the three mounting screws **A**, **F**, and **H** that attach the band to the pulley **C** and the carriage bracket **E**.
5. Tighten screw **F**. (Ensure that the band **L** remains parallel to the carriage bracket **E**.)
6. Tighten screw **A**. (Ensure that the band remains parallel to the pulley edge **U**.)
7. Block the head/carriage assembly **G**, about 25 mm (1 inch) from the end of the casting **O**.
8. Pull on the loose end of the band with 2.5 ± 0.25 pounds force **P** and tighten the screw **H**. (Ensure that the band remains parallel to the pulley edge **U**. If it does not, repeat the adjustment, starting at step 5.)
9. Move the carriage to track 00 and then to track 76, and ensure that the band **L** tracks parallel to the pulley edge **U**.
10. Adjust the head/carriage assembly **G** (go to paragraph E.3.2.2, step 12).

E.3.5.7 Drive Band Removal (Figure E-34)

1. Power down.
2. Remove the head connector **M** from the control card.
3. Remove the head cable guide **N**.

Observe the position of the band **L** and clamp **S** before performing the next step.

Warning: The band **L** is easily damaged **T**. Do not bend, crease, or scratch the band.

4. Remove the three mounting screws **A**, **F**, and **H** and the clamp **B** that attach the band **L** to the stepper motor pulley **C** and the carriage bracket **E**.
5. Remove the band assembly.
6. If you have entered this procedure from Stepper Pulley and Clamp Removal (paragraph E.3.5.3), return to step 3 of paragraph E.3.5.3.

E.3.5.8 Drive Band Replacement (Figure E-34)

Warning: The band **L** is easily damaged **T**. Do not bend, crease, or scratch the band. Do NOT use a damaged band.

1. Attach the end of the band **L** with the welded adapter **K** to the slotted end **J** of the carriage bracket. Leave the clamp screw **H** loose.
2. Attach the band to the stepper motor pulley **C** with the clamp screw **A** and the clamp **B**.

Ensure that the band is parallel to the pulley edge **U**.
3. Attach the other end of the band to the carriage bracket with the screw **F** and the drive band clamp **D**. Ensure that the band is parallel to the carriage bracket.
4. Adjust the drive band. (Go to step 8 of paragraph E.3.5.6.)

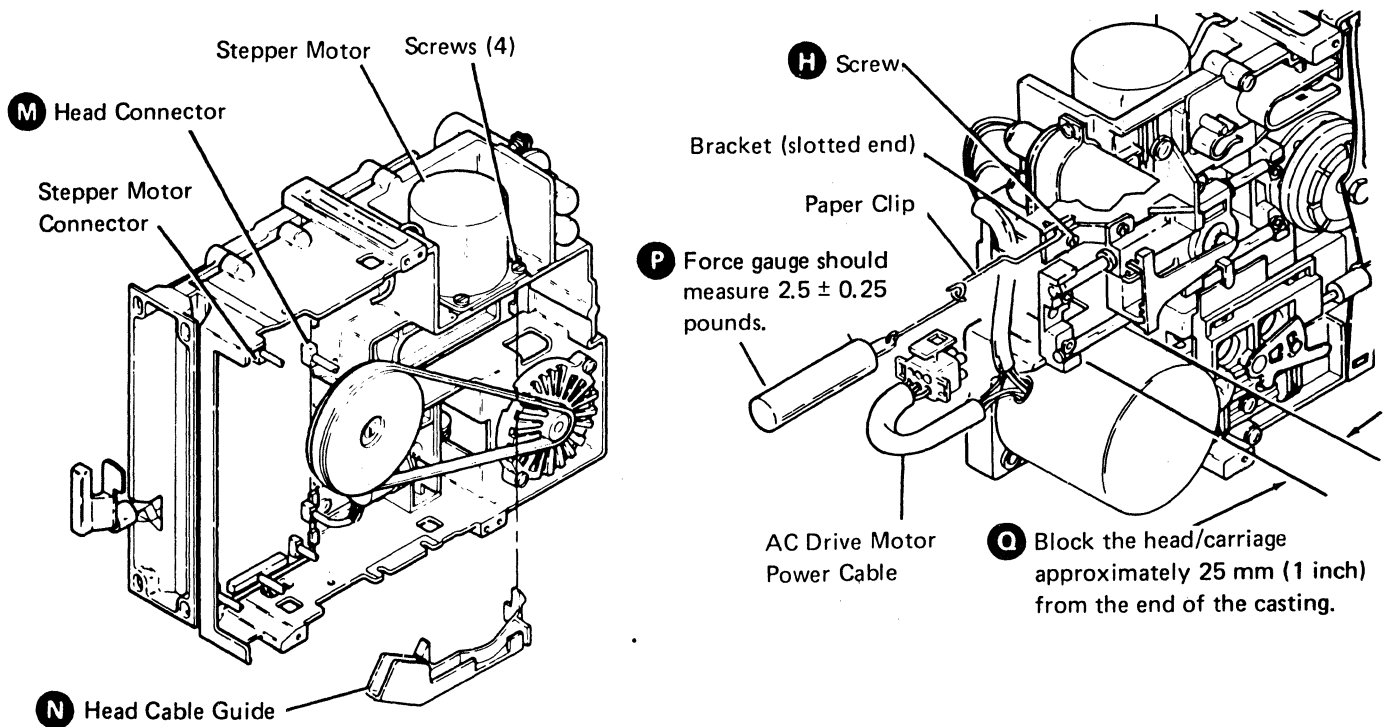
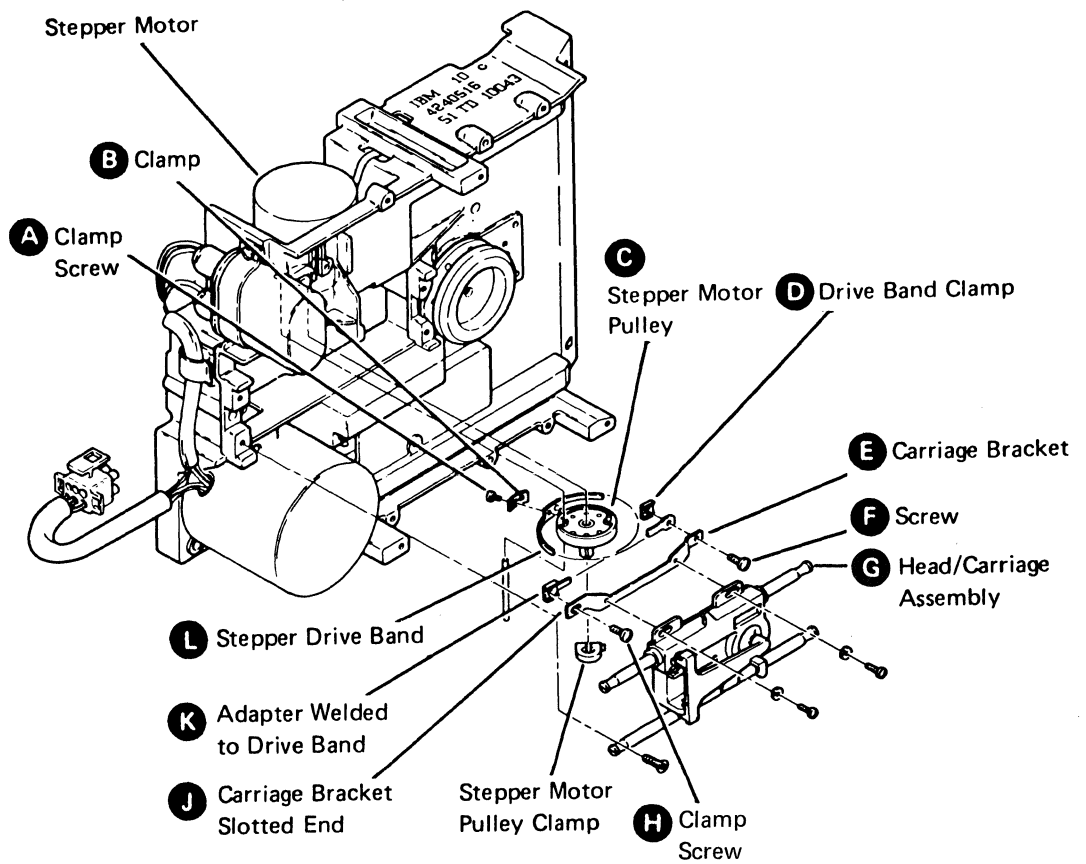


Figure E-34 (Part 1 of 2). Drive Band Adjustments

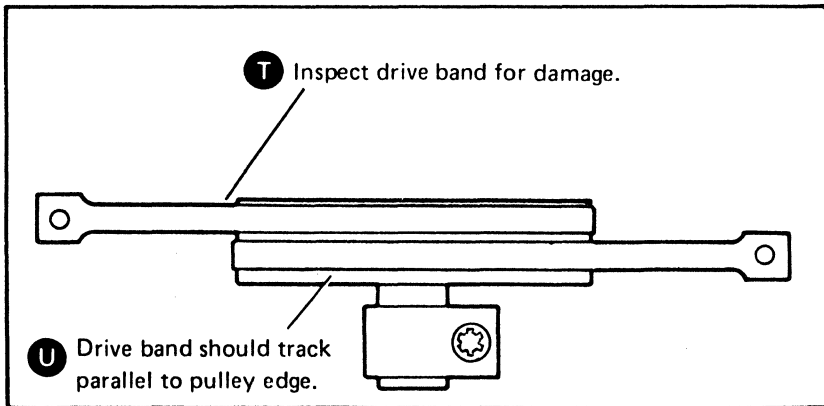
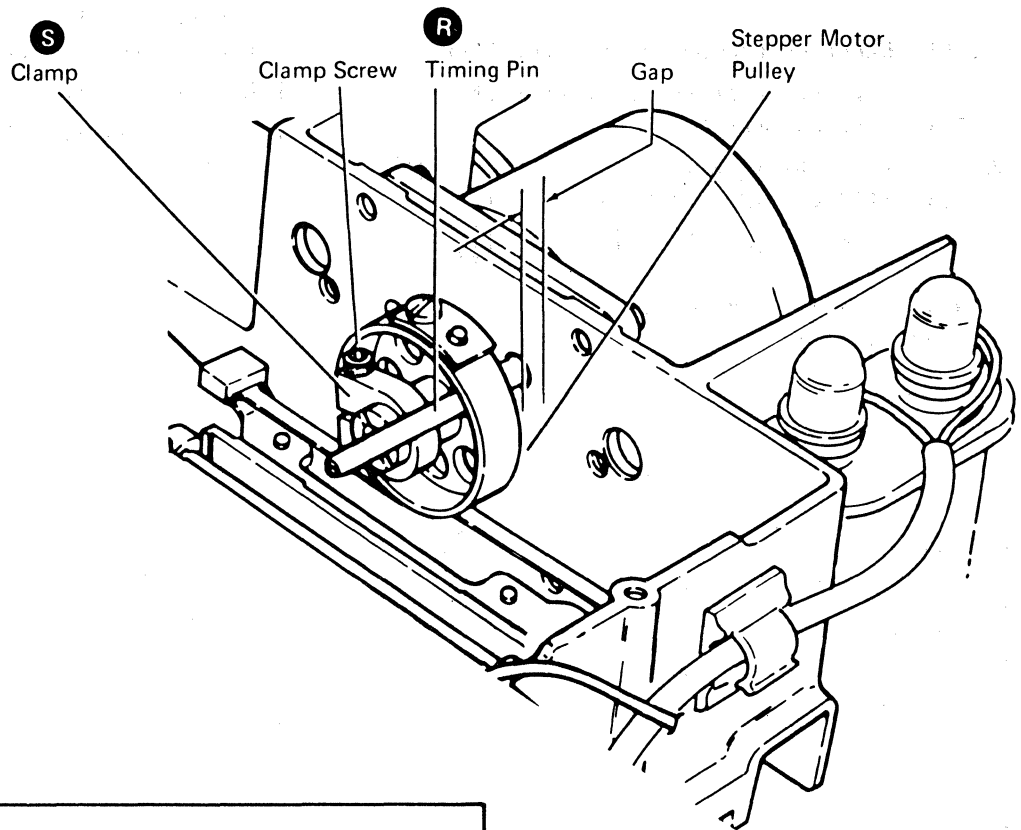


Figure E-34 (Part 2 of 2). Drive Band Adjustments

E.3.6 LED and PTX Assemblies

E.3.6.1 Diskette Speed Service Check (Figure E-35)

1. Insert a diskette 1, and close the operator knob. See Diskette Use (paragraph E.1.1.2).
2. To activate the head load solenoid, install a jumper **A** from TPA07 (ground) to TPA08 (– ‘head load’).
3. Set up an oscilloscope as shown in the chart **E**.

4. Observe an index pulse width of 1.5 to 3.0 ms **C** occurring every 166.7 ± 4.2 ms **B**. Pulse amplitude should be between 2.4 and 4.2 Vdc **D**.
5. Remove the jumper.
6. Remove the diskette. See Diskette Use (paragraph E.1.1.2).

Note: Use a Tektronix 453, 454, or a similar oscilloscope with x10 probes.

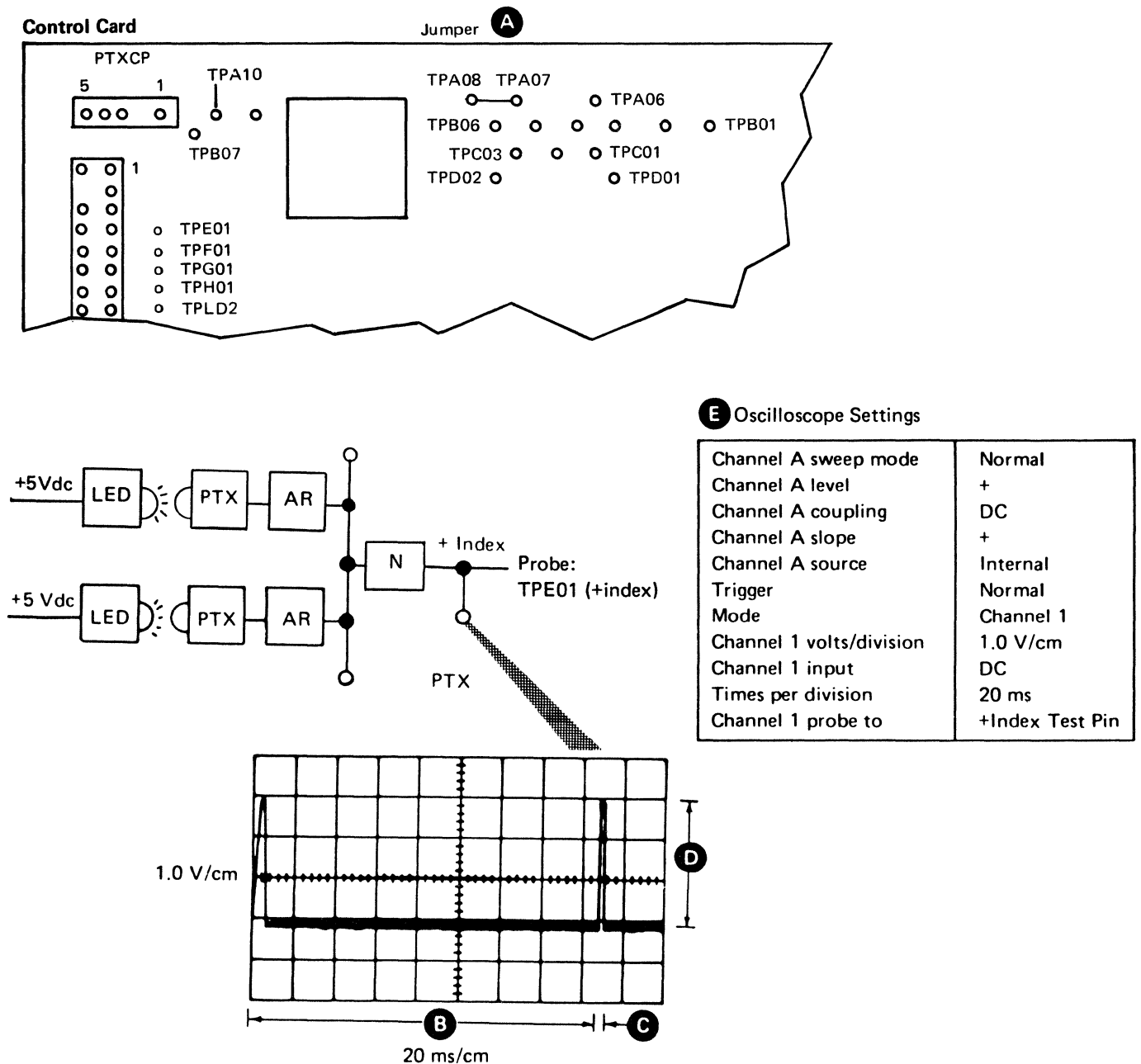


Figure E-35. Diskette Speed Check

E.3.6.2 LED Output Service Check (Figure E-36)

1. Connect the negative probe **C** of the multimeter to the TPA07 (ground) on the control card **A**.
2. Set the multimeter scale to 5 Vdc, and connect the positive probe **B**, to the LED voltage test pin TPLD2.
3. Check for a voltage level of 1 Vdc to 2 Vdc **D**.
4. Move the positive probe to LED voltage test pin TPLD1.
5. Check for a voltage level of 1 Vdc to 2 Vdc **D**.

E.3.6.3 LED Removal (Figure E-37)

1. Power down.
2. Remove the LED connector **B** from the control card.
3. Remove the LED cable. (Note the cable path for future replacement.)
4. Remove the LED mounting screw **D**; then remove the LED assembly **C**.

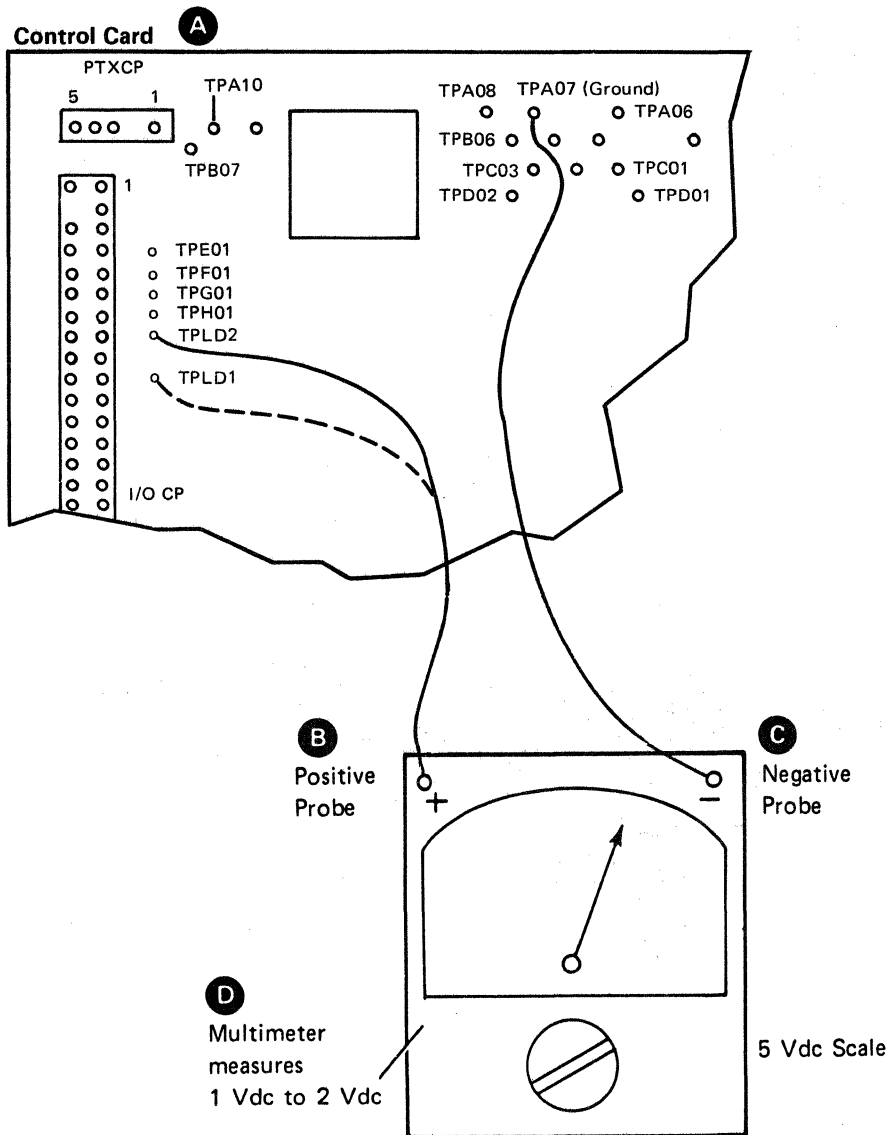


Figure E-36. LED Output Check

E.3.6.4 LED Replacement (Figure E-37)

1. Reinstall the LED cable, the LED assembly **C** and the mounting screw **D** on the diskette guide **A**.
2. Reconnect the LED connector **B** to the control card.

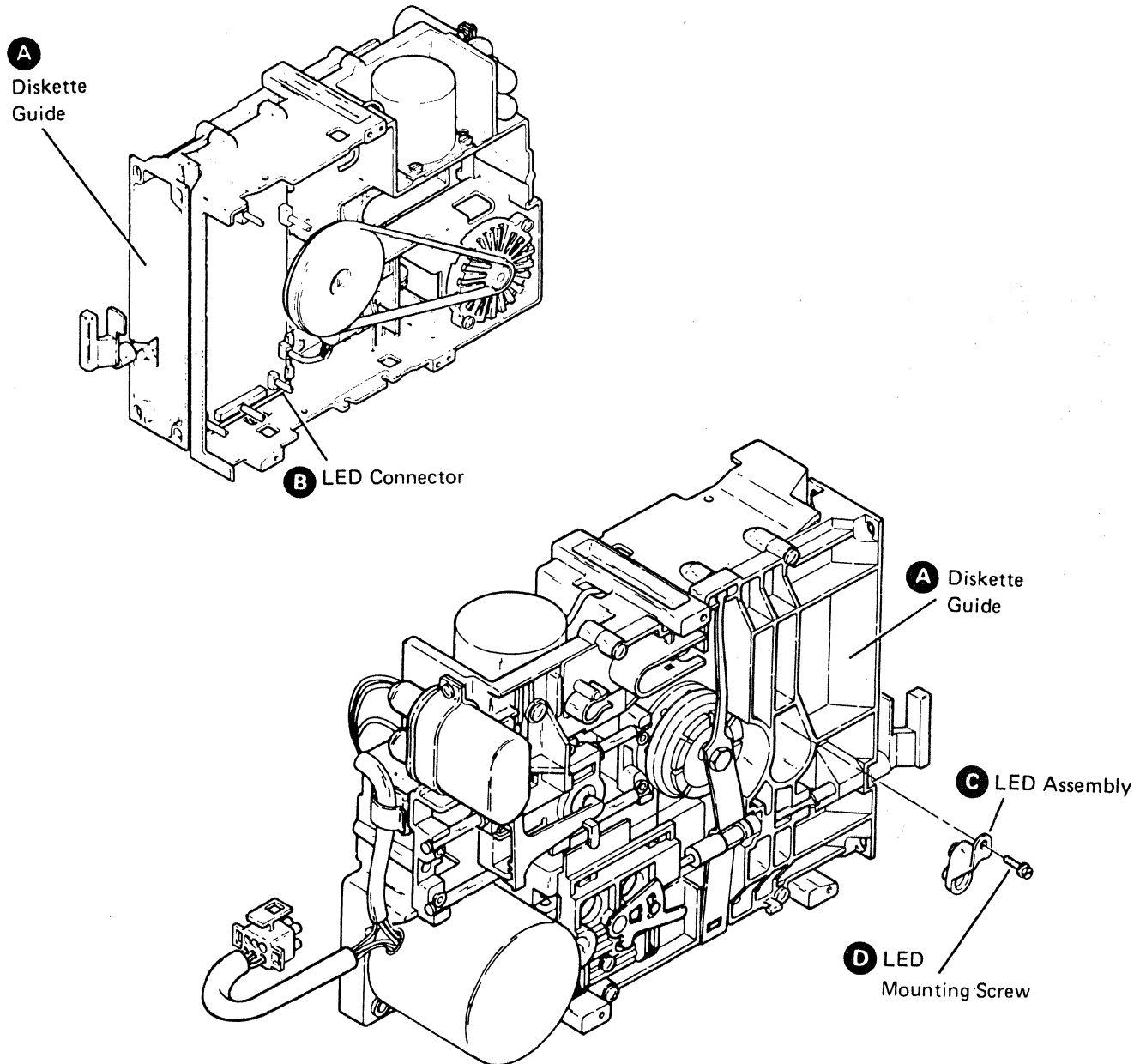


Figure E-37. LED Removal and Replacement

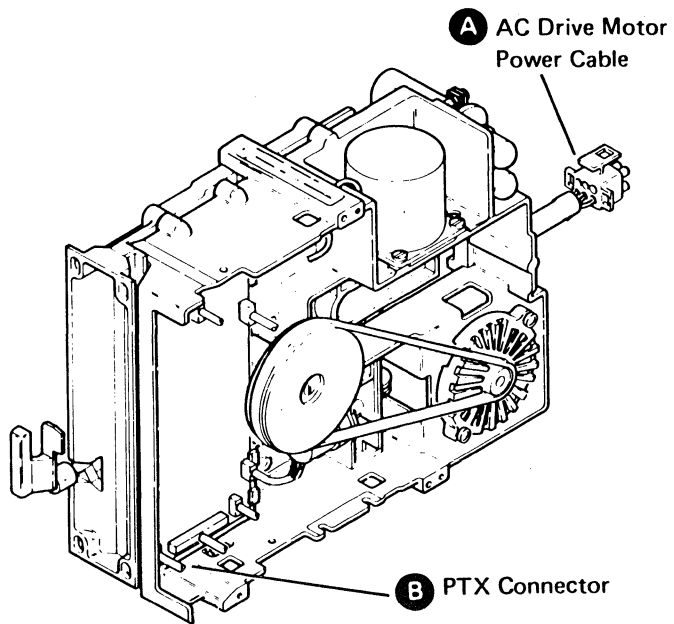
E.3.6.5 PTX Amplifier Service Check (Figure E-38)

1. Power down.

DANGER

Voltage is still present at the socket when the power cable is disconnected.

2. Disconnect the ac drive motor power cable **A**.
3. Remove the PTX connector **B** from the control card.
4. Power up.
5. Connect the positive probe **E** of multimeter **D** (15 Vdc scale) to the index test pin TPE01 on the control card.
6. Connect the negative probe **F** of the multimeter of TPB02 (ground).
7. Check the multimeter **D** for a reading of less than 1 Vdc.
8. Install one end of jumper **C** to pin A04 of the PTXCP socket on the control card.
9. Observe the multimeter, and touch the other end of the jumper several times to pin A01 of the PTXCP socket on the control card. The multimeter should read 2.5 Vdc or more when the test pin is touched. (A wrong measurement can occur the first time the test pin is touched.)
10. Repeat steps 8 and 9 with the jumper on pin A03 of the PTXCP socket on the control card.
11. Power down.
12. Remove the jumper.
13. Reinstall the PTX connector on the control card.
14. Reconnect the drive motor power cable.
15. Power up.



Control Card

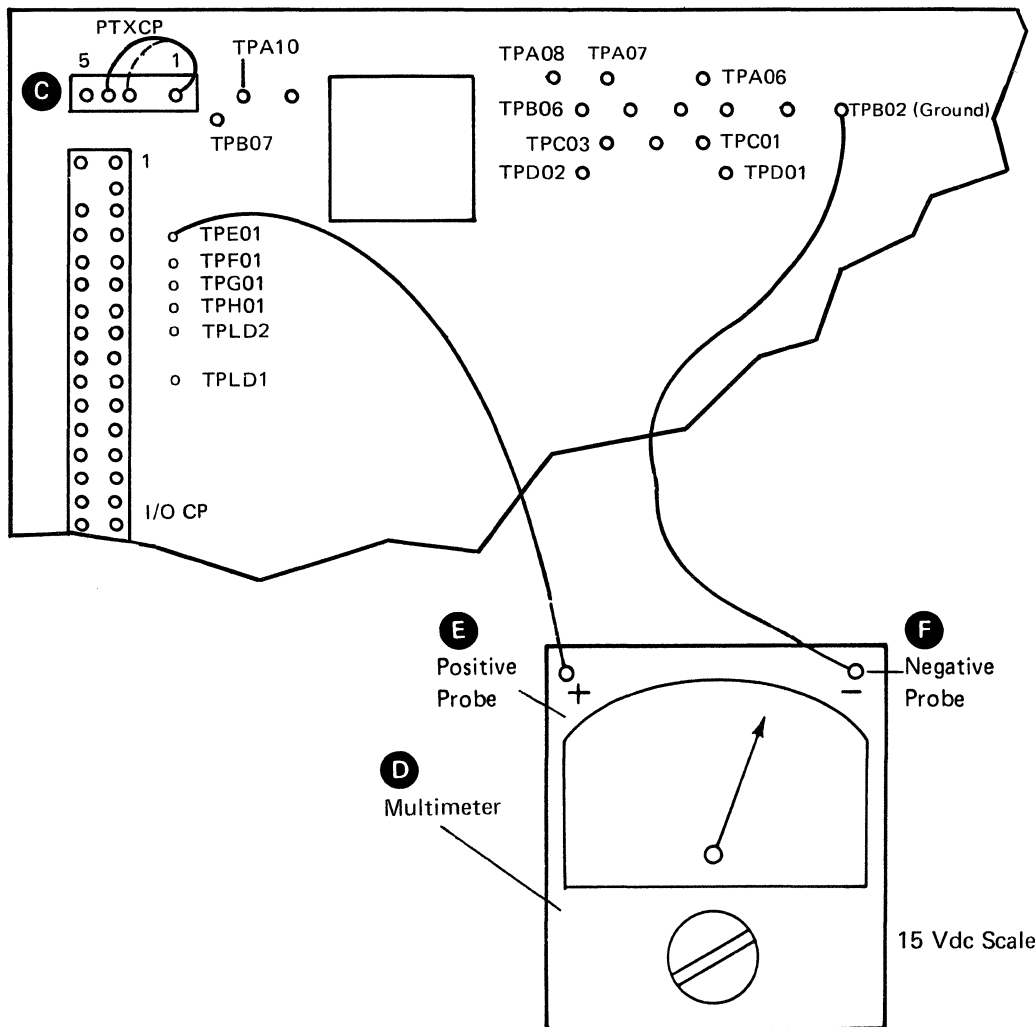


Figure E-38. PTX Amplifier Service Check

E.3.6.6 PTX Removal (Figure E-39)

1. Power down.
2. Remove the LED connector **F** from the control card. (Note the cable path for easier replacement.) Pull the cable and the connector through the casting.
3. Turn the operator knob **A** to the closed position.
4. Loosen the lever screw **R**.
5. Push the bail **Q** inward slightly, and disconnect the bail actuator cable eyelet **I** from the hook **N** on the bail lever **S**.
6. Turn the operator knob **A** to the open position.
7. Place a strip of clean paper between the heads.

Warning: Ensure that the heads do not touch each other when the bail **Q** is removed from under the head arm **G**.

8. Remove the four diskette guide mounting screws **P**.
9. Remove the diskette guide **M** by lifting it up and carefully sliding the bail **Q** from under the head load arm **G**.
10. Remove the five remaining connectors **B** from the control card. (Note the connector locations and cable paths for easier replacement.)
11. Loosen the control card retainer screw **E**.

Warning: Be careful not to damage the control card.

12. Turn the two control card retainers **D** out of the control card path, and remove the control card **C**. (Note the position of the control card for easier replacement.)
13. Remove the PTX mounting screw **L** and the PTX assembly **K**. (Note the cable path for future replacement.)

E.3.6.7 PTX Replacement (Figure E-39)

1. Reinstall the PTX assembly **K** and the PTX mounting screw **L**.
2. Reinstall the control card **C** and turn the two retainers **D** inward until they prevent the control card from moving.
3. Tighten the two retainer screws **E**.
4. Reinstall the five connectors **B** on the control card.
5. Reinstall the diskette guide **M**. Place the bail below the head load arm **G**.
6. Reinstall the four diskette guide mounting screws **P**.
7. Reinstall the LED connector **F** on the control card. Go to Bail Replacement (paragraph D.3.3.6, step 2).

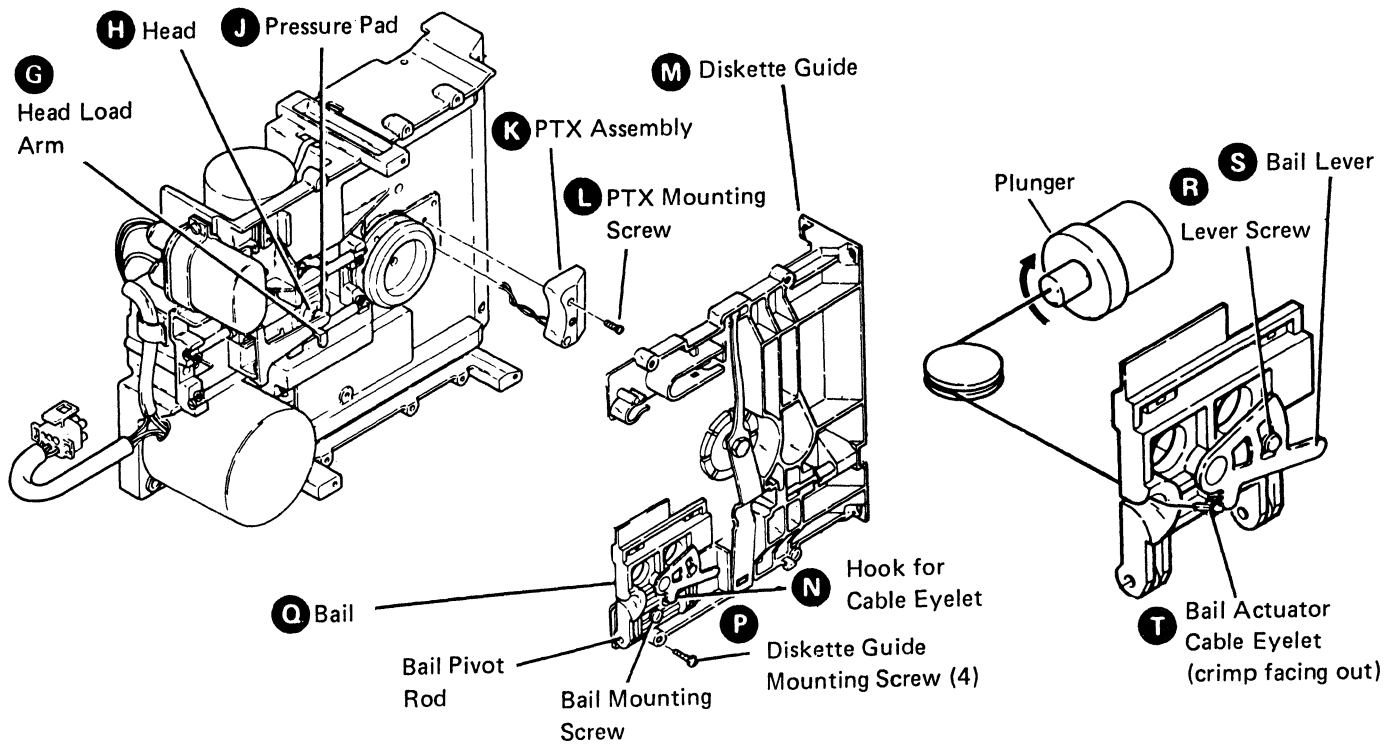
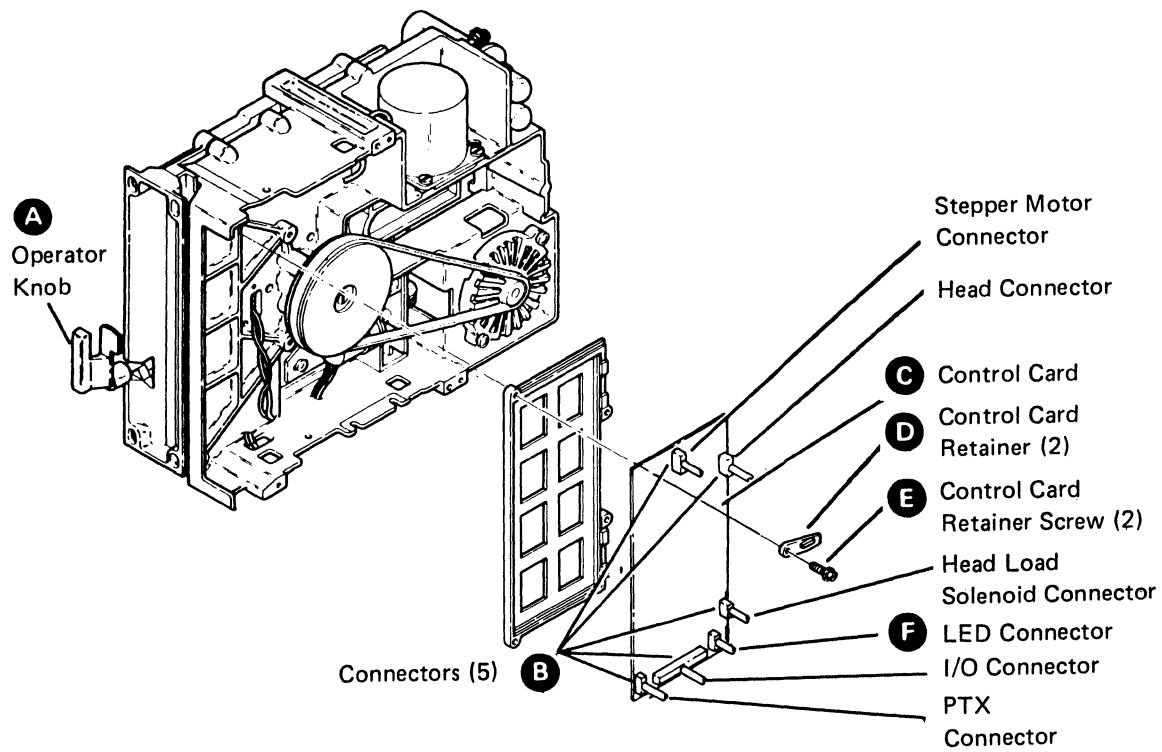


Figure E-39. PTX Removal and Replacement

E.3.7 Diskette Drive Control Card

E.3.7.1 Control Card Removal (Figure E-40)

1. Power down.
2. Remove the six connectors **A** from the control card.
3. Loosen the two retainer screws **D** and turn the two retainers **C** outward until they are no longer in the path of the control card **B**.
4. Remove the control card.

E.3.7.2 Control Card Replacement (Figure E-40)

1. Reinstall the control card **B**.
2. Turn the two retainers **C** inward slightly until they prevent the card from moving.
3. Tighten the two retainer screws **D**.
4. Reinstall the six connectors **A** on the control card.
5. Power up.

E.3.7.3 Control Card Test Pins and Connector Pins

See Figure E-41 to check test points and Figure E-42 to check connector pins.

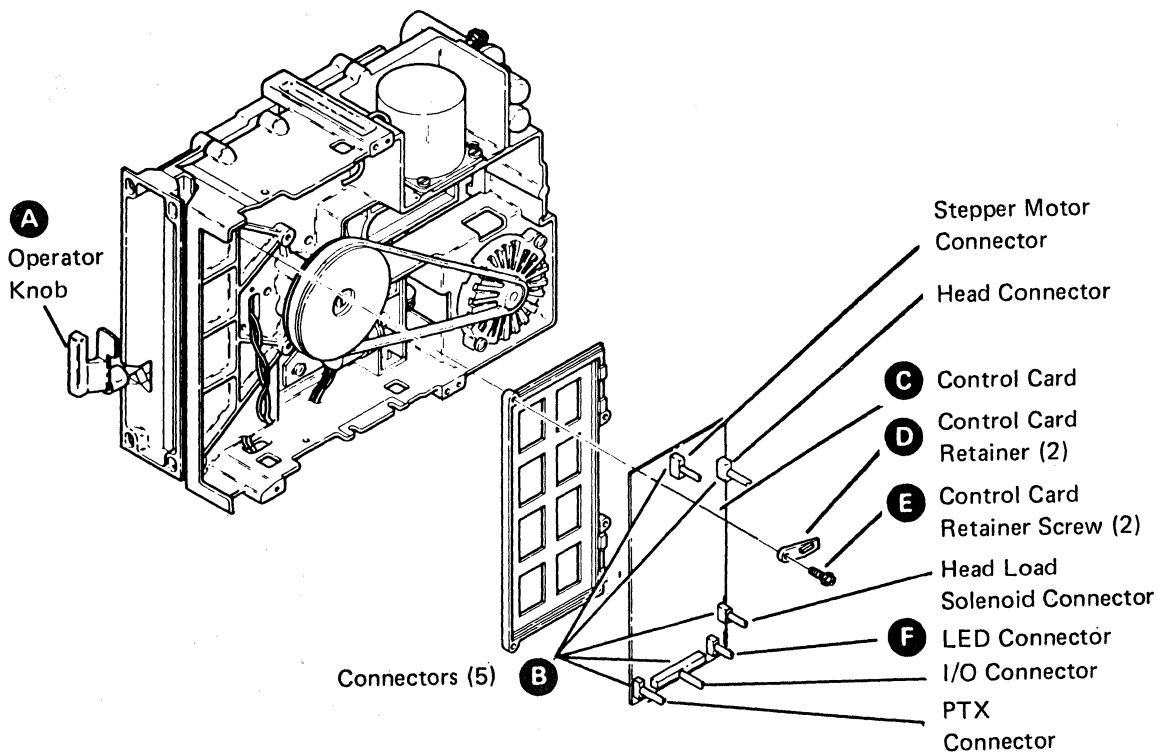


Figure E-40. Diskette Drive Control Card

- 1** Stepper Motor
- 2** AC Drive Pulley (With Fan Hidden)
- 3** AC Drive Belt
- 4** Solenoid Idler
- 5** Head Load Solenoid
- 6** Spindle Pulley
- 7** Diskette Drive Control Card
- 8** Diskette Locking Lever
- 9** Collet
- 10** Pressure Roll
- 11** Head Load Bail
- 12** AC Drive Motor
- 13** Head/Carriage Assembly
- 14** Timing Pin (Old)
- 15** Stepper Motor
- 16** Thickness Gauge Clip
- 17** Carriage Pressure Spring
- 18** Drive Hub
- 19** Collet Flat Spring
- 20** Timing Pin (New)

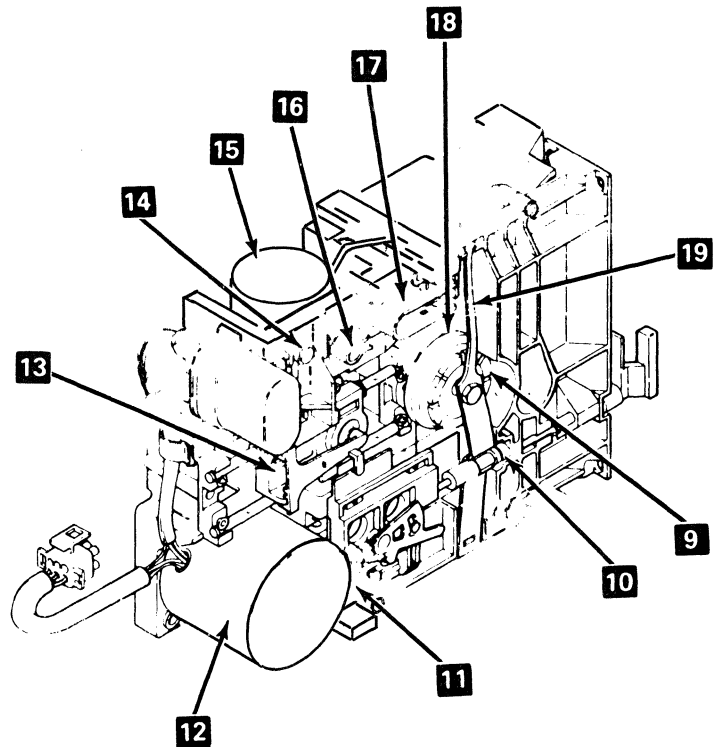
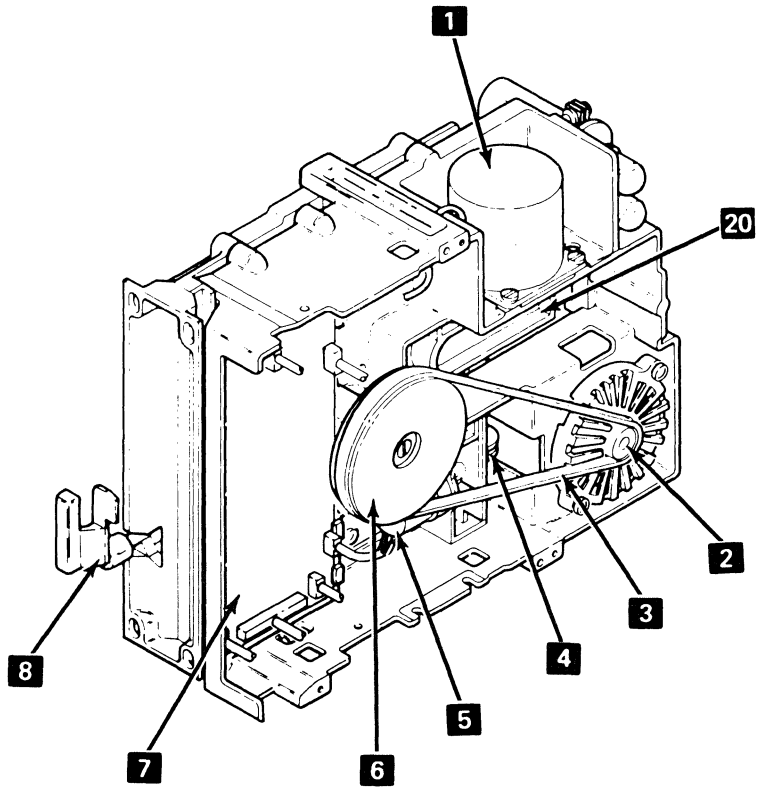
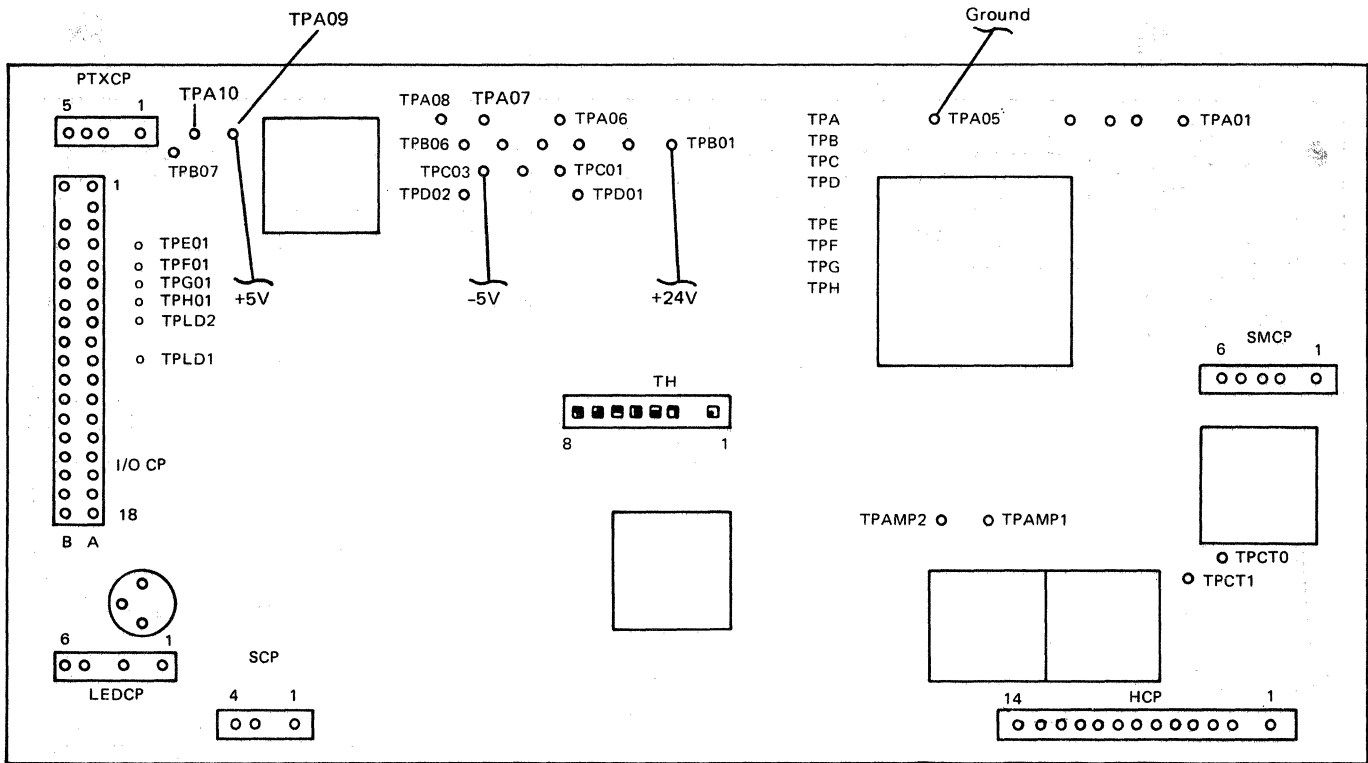


Figure E-41 (Part 1 of 2). Diskette Drive Locations and Card Test Points

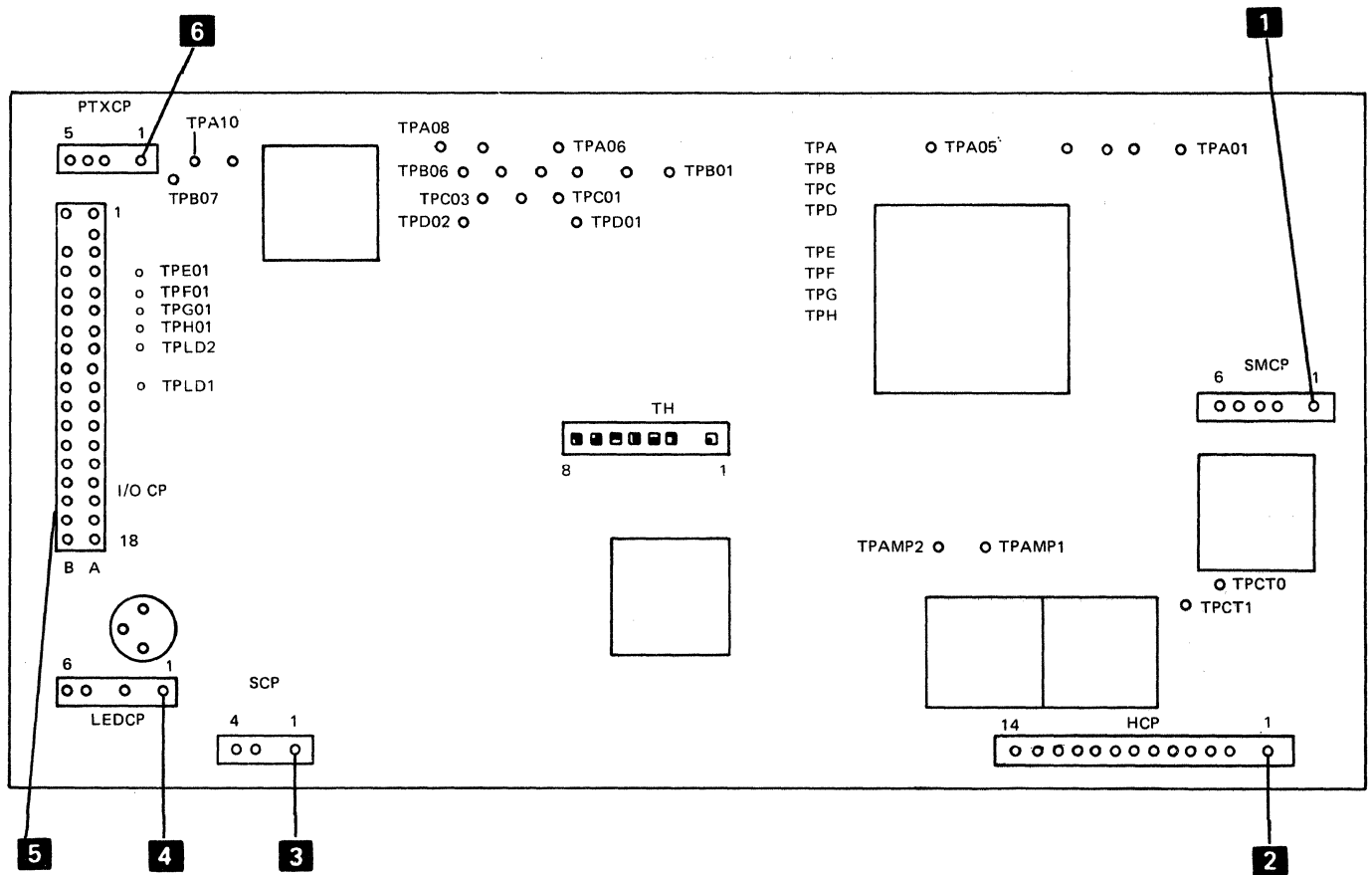


TH01	Diff Read B
TH02	No Pin
TH03	Diff Read A
TH04	-High Gain
TH05	-Disable Stepper Motor
TH06	+14V
TH07	Access Clamp Voltage
TH08	Oscillator

TPA01	MC-3
TPA02	MC-1
TPA03	MC-2
TPA04	MC-0
TPA05	Ground
TPA06	+Erase Gate
TPA07	Ground
TPA08	-Head Load
TPA09	+5V dc
TPA10	51TD PTX
TPB01	+24V dc
TPB02	Ground
TPB03	+Select Head 1
TPB04	+Write Gate
TPB05	+Head Engage
TPB06	Write Data

TPB07	31SD PTX
TPC01	+Access 0
TPC02	+Inner Tracks
TPC03	-5V dc
TPD01	+Access 1
TPD02	+Switch Filter
TPE01	+Index
TPF01	+Diskette Sense
TPG01	+Write Erase Enabled
TPH01	+File Data
TPLD2	51TD LED Voltage
TPLD1	51TD LED Voltage
TPAMP2	Preamp TP2
TPAMP1	Preamp TP1
TPCT0	Center Tap Head 0
TPCT1	Center Tap Head 1

Figure E-41 (Part 2 of 2). Diskette Drive Locations and Card Test Points



1 Stepper Motor Connector

A01	+24V
A02	blank
A03	MC-3
A04	MC-2
A05	MC-1
A06	MC-0

4 LED Connector

A01	diskette 2, 2D ground
A02	blank
A03	diskette 2, 2D ground
A04	blank
A05	diskette 1 ground
A06	diskette 1 anode

6 PTX Connector

A01	diskette 1 col (+5V)
A02	blank
A03	diskette 1 PTX emitter
A04	diskette 2, 2D PTX emitter
A05	diskette 2, 2D col (+5V)

2 Head Connector

A01	not used
A02	blank
A03	head 0 read/write coil
A04	head 0 center tap
A05	head 0 read/write coil
A06	head 0 erase
A07	head 0 erase common
A08	ground
A09	ground
A10	head 1 erase common
A11	head 1 erase
A12	head 1 read/write coil
A13	head 1 center tap
A14	head 1 read/write coil

5 I/O Interface Connector

A01	-5V
A02	power supply ground
A03-A18	ground
B01	+5V
B02	blank
B03	+24V
B04	+index
B05	+diskette 2 sense
B06	+write/erase sense
B07	+file data
B08	+inner tracks
B09	+erase gate
B10	+access 0
B11	+select head 1
B12	not used
B13	+access 1
B14	+write gate
B15	+head engage
B16	+switch filter
B17	write data
B18	not used

3 Solenoid Connector

A01	not used
A02	blank
A03	+head load
A04	-head load

Figure E-42. Diskette Drive Card Connector Pins

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Appendix F. 3274 Model 61C Parts Catalog

HOW TO USE THIS PARTS CATALOG

HOW TO FIND PART INFORMATION:

WHEN ASSEMBLY LOCATION IS KNOWN.

PERFORM STEPS

①, ③ AND ④

WHEN ASSEMBLY NAME IS KNOWN

PERFORM STEPS

②, ③ AND ④

WHEN PART NUMBER IS KNOWN

PERFORM STEPS

⑤, ⑥ AND ⑦

① TURN TO THE VISUAL INDEX - THEN LOCATE, BY ILLUSTRATION, THE ASSEMBLY CONTAINING THE PART.

② TURN TO THE CONTENTS PAGE - THEN LOCATE, BY NAME, THE ASSEMBLY CONTAINING THE PART.

③ TURN TO THE PAGE FOR THAT ASSEMBLY - THEN LOCATE THE PART VISUALLY.

④ USING THE INDEX NUMBER SHOWN WITH THE PART, REFER TO THE ACCOMPANYING LISTING TO OBTAIN THE PART NUMBER, DESCRIPTION AND QUANTITY.

⑤ TURN TO THE NUMERICAL INDEX - THEN NOTE THE FIGURE AND INDEX NUMBER GIVEN FOR THAT PART NUMBER.

⑥ TURN TO THE FIGURE NUMBER GIVEN - THEN FIND THE INDEX NUMBER ON THE ILLUSTRATION.

⑦ FIND THE CORRESPONDING INDEX NUMBER IN THE ACCOMPANYING LISTING TO OBTAIN THE DESCRIPTION AND QUANTITY OF THE PART.

NOTE:
IF THE DESIRED ITEM IS PART OF A SUBASSEMBLY NOT BROKEN DOWN WITHIN THAT FIGURE, REFER TO THE FIGURE ASSIGNED TO THE SUBASSEMBLY, 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:

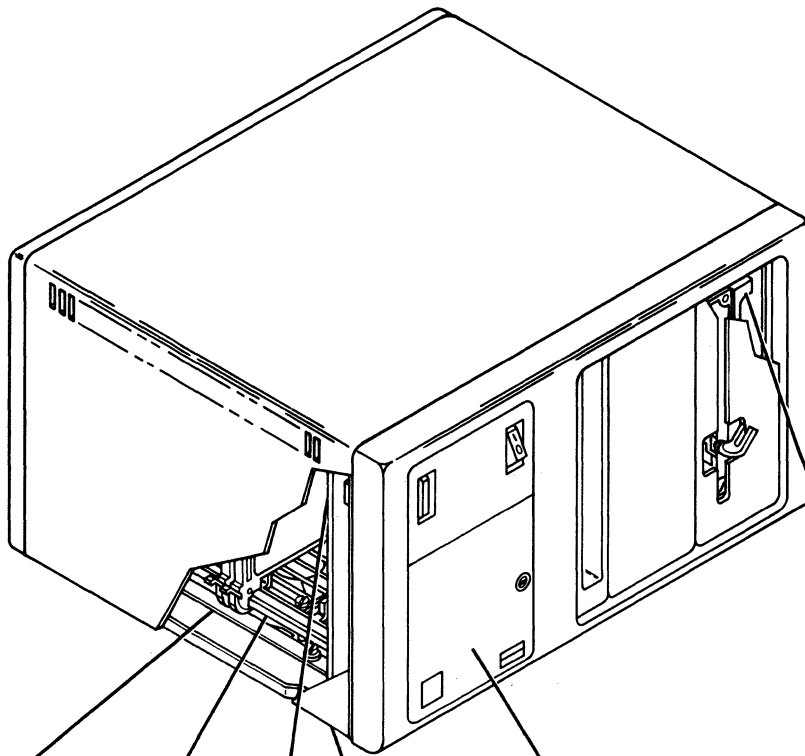
1	2	3	4
(No dot)	MAIN ASSEMBLY		
(One dot)	●	Detail parts of main assembly	
(One dot)	●	Assembly within main assembly	
(Two dot)	● ●	Detail part of one dot assembly	
(Two dot)	● ●	Assembly within one dot assembly	
(Three dot)	● ● ●	Detail parts of two dot assembly	
- 8 ATT PT - This notation in the Description 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.

Note: Space left for customizing glossary terms if required.

FIGURE - INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
22 -	NO NO.	REF	TRANSPORT AND VACUUM ASSEMBLY			
1			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		
			FOR DETAIL BREAKDOWN, SEE FIGURE 23A			
- 2	55918	5	●	SCREW, MACH BD HD - 10-32 X 0.625 LG		
- 3	45690	5	●	WASHER, FL - 0.203 ID X 0.408 OD		
- 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		
			FOR DETAIL BREAKDOWN, SEE FIGURE 24			
- 9	2523727	1	●	DISC, DECORATIVE		
- 10	1767707	1	●	COVER		
- 11	322562	3	●	SCREW, BD HD - 10-32 X 2.000 INCHES LG		
- 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		
- 17	1090873	6	● ●	LOCKWASHER, SPLIT - 0.168 ID X 0.296 OD		
- 18	1767703	3	● ●	ROLLER, TRIPLE		
- 19	1767711	3	● ●	ROLLER, SINGLE		

CONTENTS

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F-4	MOTOR, CAPACITOR AND ACTUATOR ASSEMBLY	F-14
F-5	DISKETTE GUIDE AND CLAMPING ASSEMBLY.	F-16
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F-10	GATE ASSEMBLY	F-26
F-11	DUAL FAN ASSEMBLY.	F-28
F-12	CHASSIS ASSEMBLY.	F-30
F-13	CABLE ASSEMBLIES WITH COMPONENT PARTS (2 sheets).	F-32
	NUMERICAL INDEX.	F-X-1



DUAL FAN ASM
FIGURE F-11
PAGE F-28

LOGIC GATE ASM
FIGURE F-9
PAGE F-24

POWER SUPPLY ASM
FIGURE F-8
PAGE F-22

GATE ASM
FIGURE F-10
PAGE F-26

CHASSIS ASM
FIGURE F-12
PAGE F-30

OPS PANEL ASM
FIGURE F-2
PAGE F-10

FILE ASM 51TD
FIGURES F-3 THRU F-7
PAGES F-12 THRU F-20

CABLE ASSEMBLIES
WITH COMPONENT PARTS
FIGURE F-13
PAGE F-32

FINAL ASM 3273
FIGURE F-1
PAGE F-2

VISUAL INDEX

CATALOG SECTION

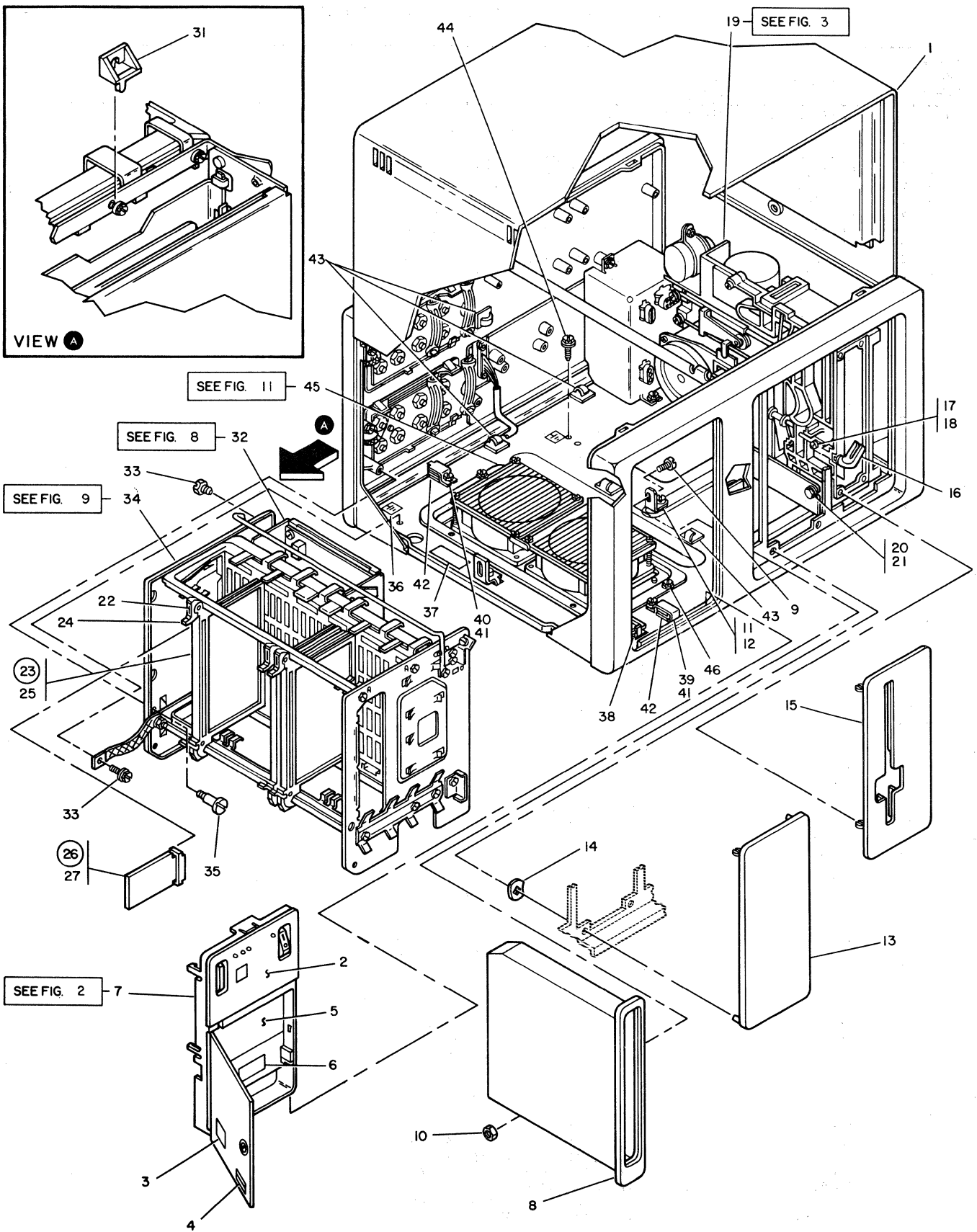


FIGURE F-1. FINAL ASSEMBLY 3274 (SHEET 1 OF 2, INDEX NOS. 1-46)

LIST F-1. FINAL ASSEMBLY 3274 (SHEET 1 OF 4)

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
1 -	5267700 NP	REF	FINAL ASM 3274 FOR ILLUSTRATION SEE FIGURE 1			
- 1	5267714	REF	. COVER ASM			
- 2	5699190	1	. LABEL- OPS PNL,DDSA/X21- ENGLISH			
- 2	5699194	1	. LABEL- OPS PNL,R LOOP- ENGLISH			
- 2	5699196	1	. LABEL- OPS PNL,DDSA/X21 FRENCH			
- 2	5699200	1	. LABEL- OPS PNL,R LOOP- FRENCH			
- 2	5699202	1	. LABEL- OPS PNL,DDSA/X21 FRENCH/CANADIAN			
- 2	5699206	1	. LABEL- OPS PNL,R LOOP- FRENCH/CANADIAN			
- 2	5699208	1	. LABEL- OPS PNL,DDSA/X21 GERMAN			
- 2	5699212	1	. LABEL- OPS PNL,R LOOP- GERMAN			
- 2	5699214	1	. LABEL- OPS PNL,DDSA/X21 ITALIAN			
- 2	5699218	1	. LABEL- OPS PNL,R LOOP- ITALIAN			
- 2	5699226	1	. LABEL- OPS PNL,DDSA/X21 BRAZILIAN/PORT			
- 2	5699230	1	. LABEL- OPS PNL,R LOOP- BRAZILIAN/PORT			
- 2	5699232	1	. LABEL- OPS PNL,DDSA/X21 SPANISH			
- 2	5699236	1	. LABEL- OPS PNL,R LOOP- SPANISH			
- 3	5699480	1	. NAMEPLATE- 3274 61C			
- 4	5718217	1	. LABEL,WRITE-IN			
- 5	5699238	1	. LABEL- OPS PNL,BLANK			
- 5	5699242	1	. LABEL- OPS PNL,R LOOP- ENGLISH			
- 5	5699248	1	. LABEL- OPS PNL,R LOOP- FRENCH			
- 5	5699254	1	. LABEL- OPS PNL,R LOOP- FRENCH/CANADIAN			
- 5	5699260	1	. LABEL- OPS PNL,R LOOP- GERMAN			
- 5	5699266	1	. LABEL- OPS PNL,R LOOP- ITALIAN			
- 5	5699278	1	. LABEL- OPS PNL,R LOOP- BRAZILIAN/PORT			
- 5	5699284	1	. LABEL- OPS PNL,R LOOP- SPANISH			
- 6	4423216	1	. LABEL- BATTERY JAPANESE			
- 6	6815209	1	. LABEL, BAT. DISP. - PORTUGAL			
- 6	6815210	1	. LABEL, BAT. DISP. - FRANCE			
- 6	6815211	1	. LABEL, BAT. DISP. - ENGLISH/JAPAN			
- 6	6815262	1	. LABEL, BAT. DISP. - FRENCH CANADIAN			
- 6	6815263	1	. LABEL, BAT. DISP. - SPANISH			
- 6	6815265	1	. LABEL, BAT. DISP. - ITALIAN			
- 6	6815266	1	. LABEL, BAT. DISP. - GERMAN			
- 7	5267803 NP	1	. OPS PANEL ASM FOR DETAIL BREAKDOWN, SEE FIGURE 2			
- 8	5267832	1	. POCKET- DOCUMENTATION			
- 9	1621061	1	. SCREW,SLOTTED CHEESE HD- M4 X 10 LG ATT PT			
- 10	1622403	1	. NUT- HEX M4 ATT PT			
- 11	5267849	1	. BRACKET- POCKET MTG			
- 12	7362385	1	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG ATT PT			
- 13	5267831	1	. BEZEL- BLANK			
- 14	5267940	2	. CLIP ATT PT			
- 15	5267830	1	. BEZEL- DECORATIVE			
- 16	4177829	1	. HANDLE			
- 17	1621182	1	. SCREW,MACH PAN HD- M3 X 8 LG ATT PT			
- 18	1622402	1	. NUT,HEX-M3.5 X 6 PLW X 2.8 THK ATT PT			
- 19	4240512	1	. FILE ASM 51TD, 100-110V 50 HZ			
- 19	4240513	1	. FILE ASM 51TD, 200-240V 50 HZ			
- 19	4240516	1	. FILE ASM 51TD, 100-127V 60 HZ			
- 19	4240517	1	. RD/WRT ASM			
- 20	4796654	4	. SCREW FOR DETAIL BREAKDOWN, SEE FIGURE 3 ATT PT			
- 21	1622334	4	. WASHER,LOCK INT STAR M4- 8 OD X 0.5 THK ATT PT			
- 22	818579	1	. MARKER STRIP- CARD IDENT			
- 23	1743142	AR	. HOLDER ASM, CARD 4 WIDE 3 HI TCC			
- 23	1743143	AR	. HOLDER ASM,CARD 2 X 2 WIDE,3 HI,W/O TCC			
- 23	1743144	AR	. HOLDER ASM,4W W/O TCC			
- 23	5699368	AR	. HOLDER ASM			
- 24	1743149	2	. . EAR,LOCKING			
- 25	1743146	1	. . CARD HOLDER- 4 WIDE, 3 HIGH W/TCC			
- 25	1743147	1	. . CARD HOLDER- 2-2 WIDE, 3 HIGH			
- 25	1743148	1	. . CARD HOLDER- 4 WIDE, 3 HIGH			
- 26	6062824	1	. CARD ASM- JUMPER CARD HPCA			
- 26	6124229	1	. CARD ASM- JUMPER CARD CCA/LCA			
- 27	6062823	1	. . RAW CARD ASM			
- 27	6124228	1	. . RAW CARD ASM			
- 31	5267969	1	. CLAMP- CONN USED ON CCA/LCA ONLY			
- 32	5699420	1	. POWER SUPPLY ASM- 100V 50/60 HZ			
- 32	5699421	1	. POWER SUPPLY ASM- 200V 50/60 HZ			
- 33	7362385	2	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG FOR DETAIL BREAKDOWN, SEE FIGURE 8			
- 34	5699602	1	. LOGIC GATE ASM- 61C FOR DETAIL BREAKDOWN, SEE FIGURE 9			
- 35	5267842	2	. SCREW- SHOULDER M5			

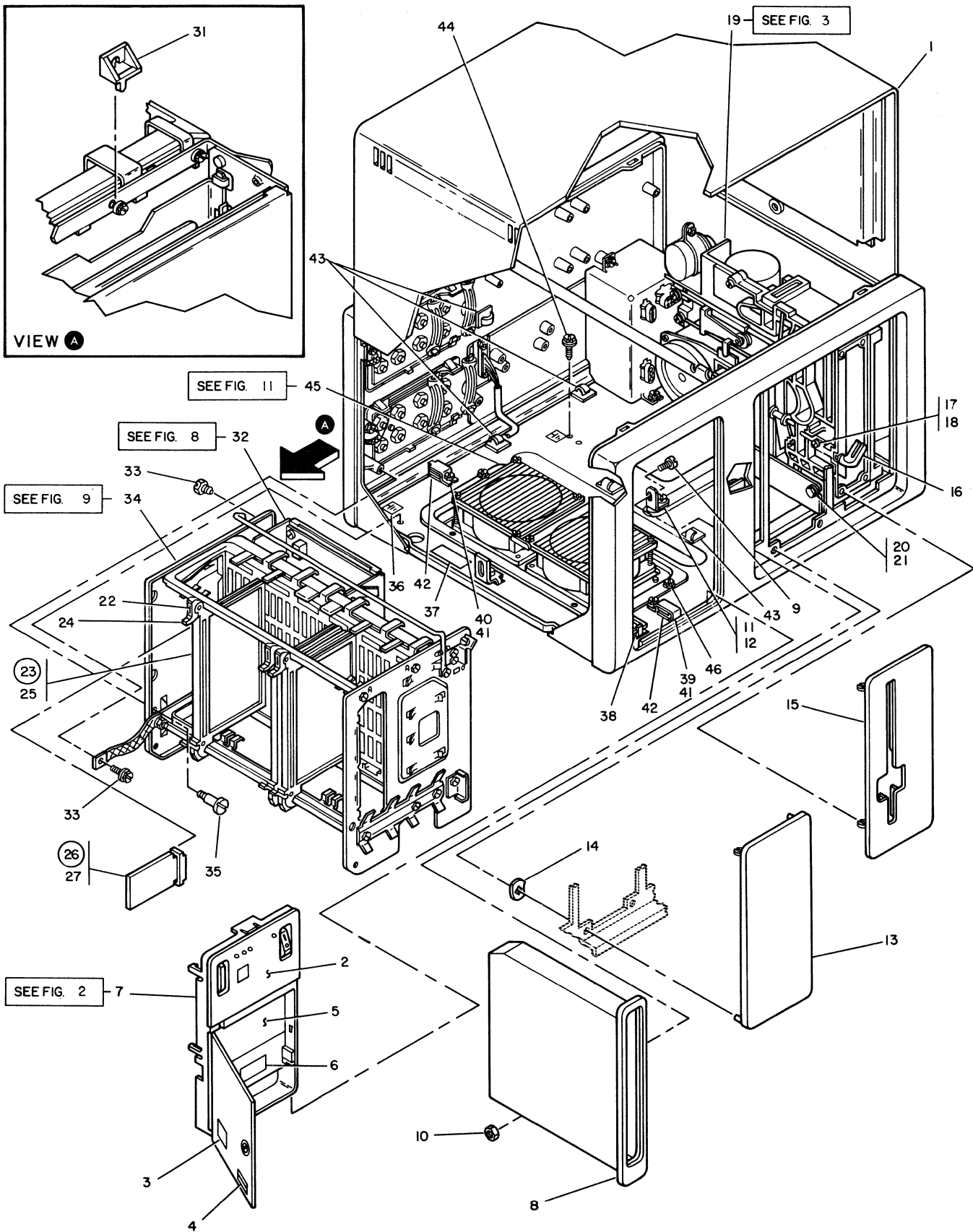


FIGURE F-1. FINAL ASSEMBLY 3274 (SHEET 1 OF 2, INDEX NOS. 1-46)

LIST F-1. FINAL ASSEMBLY 3274 (SHEET 2 OF 4)

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
1 - 36	5865679	2	. LABEL- SAFETY,GROUND			
- 37	369207	1	. LABEL,VOLTAGE			
- 37	1743548	1	. LABEL			
- 37	4423212	1	. LABEL- HAZARDOUS ZONE- NORWEGIAN			
- 37	5685244	1	. LABEL- HAZARDOUS ZONE- BELGIAN			
- 37	6815180	1	. LABEL,HAZARDOUS ZONE-SPANISH			
- 37	6815181	1	. LABEL,HAZARDOUS ZONE-ITALIAN			
- 37	6815182	1	. LABEL,HAZARDOUS ZONE-FRENCH			
- 37	6815183	1	. LABEL,HAZARDOUS ZONE-PORTUGUESE			
- 37	6815193	1	. LABEL,HAZARDOUS ZONE-GERMAN			
- 37	8326797	1	. LABEL- WARNING JAPAN			
- 37	8326801	1	. LABEL- HAZARDOUS ZONE- FINNISH			
- 37	8551904	1	. LABEL- HAZARDOUS ZONE- SWEDISH			
- 38	2565252	1	. GUIDE			
- 39	5699527	1	. CLAMP ASM			
- 40	5267936	1	. CLAMP,CABLE			
- 41	7362385	2	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG ATT PT			
- 42	5699526	2	. PAD- CLAMP			
- 43	2596293	6	. CABLE CLAMP			
- 44	2549782	1	. SCREW- THD FORMING,HEX WASHER HEAD			
- 45	5699539	1	. DUAL FAN ASM, 100-127V			
- 45	5699540	1	. DUAL FAN ASM, 200-240V WTC			
			FOR DETAIL BREAKDOWN, SEE FIGURE 11			
- 46	7362385	4	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG ATT PT			

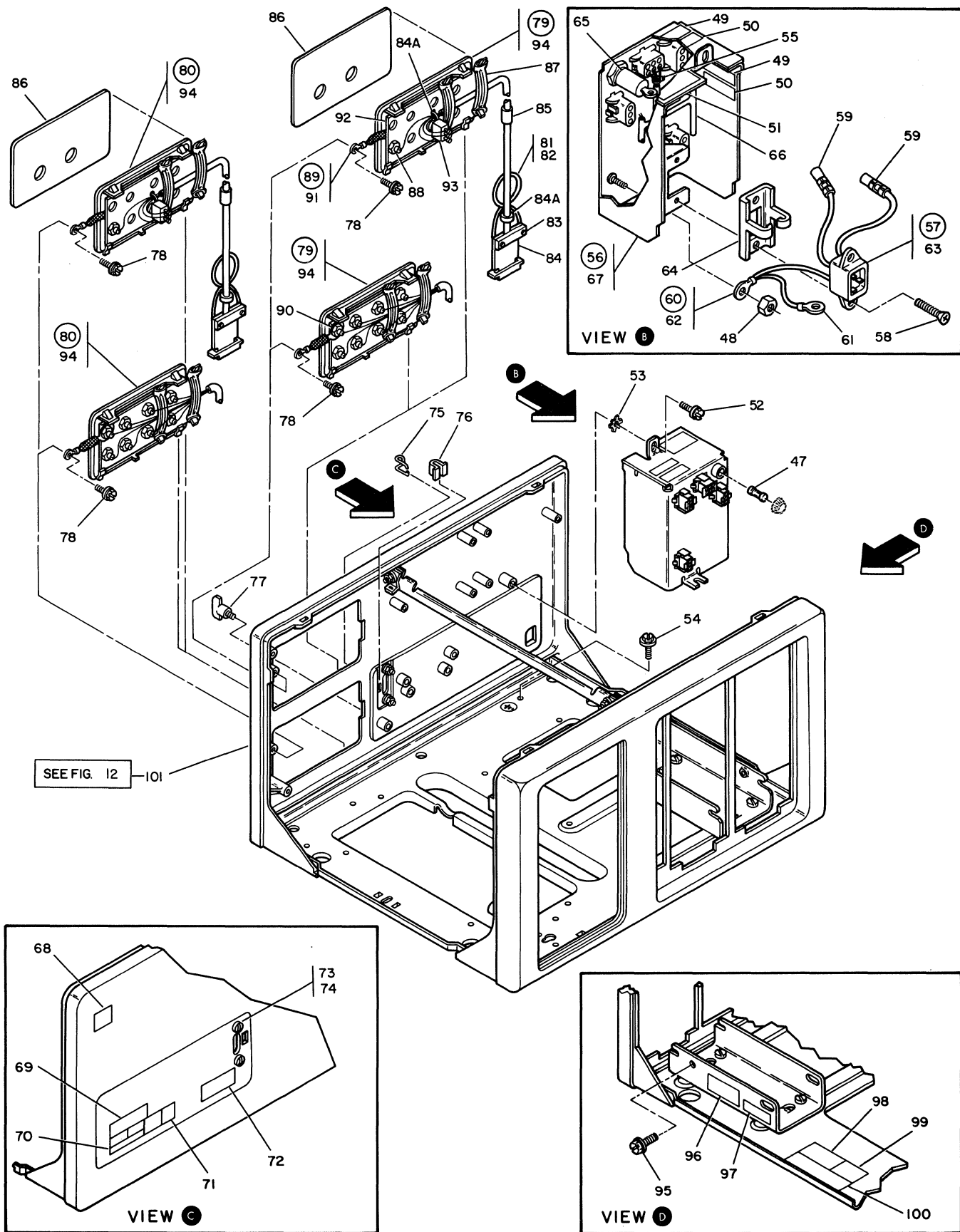


FIGURE F-1. FINAL ASSEMBLY 3274 (SHEET 2 OF 2, INDEX NOS. 47-102)

LIST F-1. FINAL ASSEMBLY 3274 (SHEET 3 OF 4)

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION				
			1	2	3	4	
1 - 47	123786	1	.	.	.	.	FUSE,CARTRIDGE- 5 AMP 250V
- 48	1622403	1	.	.	.	.	NUT-HEX M4
- 49	138754	2	.	.	.	.	LABEL
- 49	4418722	2	.	.	.	.	LABEL- VOLTAGE PRESENT NORWEGIAN
- 49	4420467	2	.	.	.	.	LABEL- VOLTAGE PRESENT BELGIAN
- 49	6812828	2	.	.	.	.	LABEL- VOLTAGE PRESENT FRENCH
- 49	6812829	2	.	.	.	.	LABEL- VOLTAGE PRESENT SPANISH
- 49	6812830	2	.	.	.	.	LABEL- VOLTAGE PRESENT ITALIAN
- 49	6812832	2	.	.	.	.	LABEL- VOLTAGE PRESENT GERMAN
- 49	6815188	2	.	.	.	.	LABEL- VOLTAGE, PORTUGUESE
- 49	6825818	2	.	.	.	.	LABEL- VOLTAGE PRESENT FINNISH
- 49	6825840	2	.	.	.	.	LABEL- VOLTAGE JAPANESE
- 49	8551903	2	.	.	.	.	LABEL- VOLTAGE PRESENT SWEDISH
- 50	6812831	2	.	.	.	.	LABEL,LINE VOLTAGE-CANADIAN FRENCH
- 51	4406240	1	.	.	.	.	LABEL- FUSE WARNING- FRENCH
- 51	4406241	1	.	.	.	.	LABEL- FUSE WARNING- GERMAN
- 51	4406242	1	.	.	.	.	LABEL- FUSE WARNING- SPANISH
- 51	4406243	1	.	.	.	.	LABEL- FUSE WARNING- ITALIAN
- 51	4406244	1	.	.	.	.	LABEL- FUSE WARNING- JAPANESE
- 51	4406245	1	.	.	.	.	LABEL- FUSE WARNING- PORTUGUESE
- 51	4942502	1	.	.	.	.	LABEL,WARNING
- 51	5718483	1	.	.	.	.	LABEL- FUSE WARNING ENGLISH- CDN/FRENCH
- 51	6825826	1	.	.	.	.	LABEL- FUSE WARNING- FINNISH
- 51	8329451	1	.	.	.	.	LABEL- FUSE WARNING- BELGIAN
- 51	8551901	1	.	.	.	.	LABEL- FUSE WARNING- SWEDISH
- 52	2549782	2	.	.	.	.	SCREW- THD FORMING,HEX WASHER HEAD
- 53	1622347	1	.	.	.	.	WASHER,LOCK EXT STAR M5- 10 OD X 0.6 THK
- 54	7362385	1	.	.	.	.	SCREW- THD FORMING INDT HEX HD M4 X 8 LG
- 55	5420242	2	.	.	.	.	TY-MINIATURE
- 56	5267720	1	.	.	.	.	PRI POWER ASM- 100-240 VOLTS 50/60 HZ
- 57	5267975	1	.	.	.	.	RECEPTACLE ASM- PRI/PWR BOX
- 58	4236454	2	.	.	.	.	SCREW- THD FORMING, FL HD ATT PT
- 59	1471018	2	.	.	.	.	PIN,DUAL LANCE 14-20 AWG
- 60	5267862	1	.	.	.	.	JUMPER ASM- P/P BOX GND
- 61	483681	1	.	.	.	.	TERMINAL,RING- NO. 8
- 62	483682	1	.	.	.	.	TERMINAL, RING - 14 TO 16 AWG
- 63	6814345	1	.	.	.	.	RECEPTACLE- POWER CEE STYLE
- 64	5267944	1	.	.	.	.	RETAINER- POWER CORD
- 65	4201819	1	.	.	.	.	FUSEHOLDER
- 66	5267732	1	.	.	.	.	CABLE ASM- P/P BOX
- 67	5267966	1	.	.	.	.	FOR COMPONENT PARTS, SEE FIGURE 13
- 68	5699481	1	.	.	.	.	CHASSIS- PRI POWER
- 69	855284	1	.	.	.	.	NAMEPLATE- 3274 61C
- 69	855285	1	.	.	.	.	PLATE- MANUFACTURING EXPORT
- 69	1743359	1	.	.	.	.	NAMEPLATE
- 69	1743648	1	.	.	.	.	LABEL,FCC
- 69	8112300	1	.	.	.	.	LABEL-AUSTRALIA
- 69	8112301	1	.	.	.	.	PLATE,MANUFACTURING-U.K. EXPORT
- 69	8112302	1	.	.	.	.	PLATE,TRADEMARK-GUATEMALA
- 69	5267970	1	.	.	.	.	PLATE,TRADEMARK-CHILE/MEXICO/PERU
- 70	5240773	1	.	.	.	.	LABEL, MODEM LABEL WTC GERMANY ONLY
- 70	5240775	1	.	.	.	.	LABEL- POWER RATING
- 70	5240777	1	.	.	.	.	LABEL- POWER RATING,CANADIAN
- 70	5240778	1	.	.	.	.	LABEL- POWER RATING
- 71	855286	1	.	.	.	.	LABEL
- 71	960766	1	.	.	.	.	PLATE
- 72	5267920	1	.	.	.	.	LABEL- ENGLISH MODEM CABLE
- 72	5267921	1	.	.	.	.	LABEL- ENG/CAN-FRENCH MODEM CABLE
- 72	5267922	1	.	.	.	.	LABEL- FRENCH MODEM CABLE
- 72	5267923	1	.	.	.	.	LABEL- GERMAN MODEM CABLE
- 72	5267924	1	.	.	.	.	LABEL- SPANISH MODEM CABLE
- 72	5267925	1	.	.	.	.	LABEL- ITALIAN MODEM CABLE
- 72	5267926	1	.	.	.	.	LABEL- BRAZIL/PORT MODEM CABLE
- 72	5267927	1	.	.	.	.	LABEL- JAPANESE MODEM CABLE
- 73	38264	2	.	.	.	.	SCREW,MACH-FIL H 4-40 X 3/8 LG
- 74	37913	2	.	.	.	.	NUT-HEX 4-40 X .250 ID
- 75	5178360	1	.	.	.	.	BAIL
- 76	5267928	1	.	.	.	.	CLIP
- 77	5267844	1	.	.	.	.	WING STUD- M5
- 78	2549782	2	.	.	.	.	SCREW- THD FORMING,HEX WASHER HEAD
- 79	5699543	1	.	.	.	.	CABLE ASM- I/O 8-15 PORTS
- 79	5699617	1	.	.	.	.	CABLE ASM- I/O 8-15 PORTS MPXR
- 80	5699542	1	.	.	.	.	CABLE ASM- I/O 0-7 PORTS
- 80	5699616	1	.	.	.	.	CABLE ASM- I/O 0-7 PORTS MPXR
- 81	5717466	1	.	.	.	.	RETAINER
- 82	244049	2	.	.	.	.	SCREW,TAPPING,THD CUTTING 4-40 X 5/16 LG ATT PT

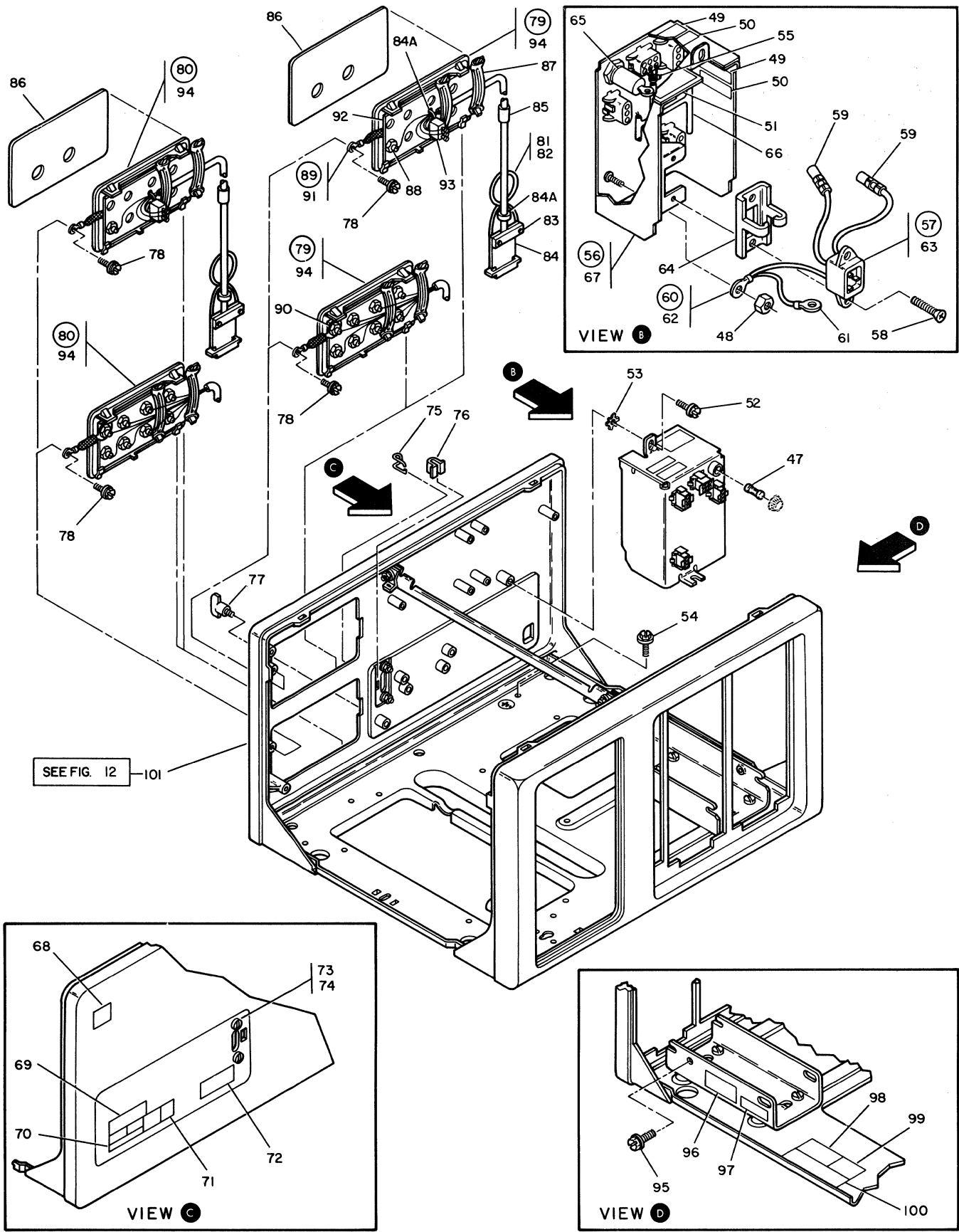


FIGURE F-1. FINAL ASSEMBLY 3274 (SHEET 2 OF 2, INDEX NOS. 47-102)

LIST F-1. FINAL ASSEMBLY 3274 (SHEET 4 OF 4)

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
1 - 83	5717486	1	.	.	STRAIN RELIEF	
- 84	5800530	1	.	.	CARD ASSEMBLY	
- 84A	5420242	2	.	.	TY-MINATURE	
- 85	811825	1	.	.	LABEL-CABLE	
- 86	5699508	1	.	.	LABEL- I/3 A8-15	
- 86	5267712	1	.	.	LABEL- I/O A0-7	
- 86	5699615	1	.	.	LABEL- I/O 8-15 MPXR	
- 86	5699614	1	.	.	LABEL- I/O 0-7 MPXR	
- 87	811427	2	.	.	STRAP,CABLE	
- 88	5252661	AR	.	.	CONNECTOR	
- 89	5699544	1	.	.	JUMPER ASM- I/O PANEL GND	
- 89	5699618	1	.	.	JUMPER ASM- I/O PANEL GND MPXR	
- 90	2565189	1	.	.	TERMINAL	
- 91	483686	1	.	.	TERMINAL,RING-BRASS #10 STUD 14-16 AWG	
- 92	5699495	1	.	.	PLATE- COAX MTG	
- 93	5242307	1	.	.	SWITCH	
- 94	5699514	1	.	.	PANEL- ADAPTER I/3	
- 95	7362385	1	.	.	SCREW- THD FORMING INDT HEX HD M4 X 8 LG	
- 96	369207	1	.	.	LABEL,VOLTAGE	
- 96	1743548	1	.	.	LABEL	
- 96	4423212	1	.	.	LABEL- HAZARDOUS ZONE- NORWEGIAN	
- 96	5685244	1	.	.	LABEL- HAZARDOUS ZONE- BELGIAN	
- 96	6815180	1	.	.	LABEL,HAZARDOUS ZONE-SPANISH	
- 96	6815181	1	.	.	LABEL,HAZARDOUS ZONE-ITALIAN	
- 96	6815182	1	.	.	LABEL,HAZARDOUS ZONE-FRENCH	
- 96	6815183	1	.	.	LABEL,HAZARDOUS ZONE-PORTUGUESE	
- 96	6815193	1	.	.	LABEL,HAZARDOUS ZONE-GERMAN	
- 96	8326797	1	.	.	LABEL- WARNING JAPAN	
- 96	8326801	1	.	.	LABEL- HAZARDOUS ZONE- FINNISH	
- 96	8551904	1	.	.	LABEL- HAZARDOUS ZONE- SWEDISH	
- 97	5267983	1	.	.	LABEL,SAFETY-JAPANESE	
- 97	5718343	1	.	.	LABEL-SAFETY	
- 97	5718477	1	.	.	LABEL,SAFETY-CANADIAN FRENCH	
- 97	5718478	1	.	.	LABEL,SAFETY-FRENCH	
- 97	5718479	1	.	.	LABEL,SAFETY-GERMAN	
- 97	5718480	1	.	.	LABEL,SAFETY-ITALIAN	
- 97	5718481	1	.	.	LABEL,SAFETY-SPANISH	
- 97	5718482	1	.	.	LABEL,SAFETY-PORTUGUESE	
- 98	855282	1	.	.	PLATE- SERIAL NO. LEFT	
- 99	855283	1	.	.	PLATE- SERIAL NO. RIGHT	
-100	855262	1	.	.	PLATE- PROPERTY OF IBM	
-100	855263	1	.	.	PLATE- PROPERTY OF IBM WT	
-100	855264	1	.	.	PLATE- MANUFACTURED BY USA	
-100	855265	1	.	.	PLATE- MANUFACTURED BY	
-100	855266	1	.	.	PLATE- MANUFACTURED BY WT	
-100	855267	1	.	.	PLATE- MANUFACTURED FOR USA	
-100	855268	1	.	.	PLATE- MANUFACTURED FOR	
-100	855269	1	.	.	PLATE- MANUFACTURED FOR WT	
-100	855270	1	.	.	PLATE- RECONDITIONED BY USA	
-100	855272	1	.	.	PLATE- RECONDITIONED BY WT	
-100	855273	1	.	.	PLATE- RENOVATED BY USA	
-100	855275	1	.	.	PLATE- RENOVATED BY WT	
-100	855276	1	.	.	PLATE- RECONDITIONED FOR USA	
-100	855278	1	.	.	PLATE- RECONDITIONED FOR WT	
-100	855279	1	.	.	PLATE- RENOVATED FOR USA	
-100	855281	1	.	.	PLATE- RENOVATED FOR WT	
-100	960746	1	.	.	PLATE,PROP OF IBM CANADA	
-101	5267810	1	.	.	CHASSIS ASM	
					FOR DETAIL BREAKDOWN, SEE FIGURE 12	
-102	5699489	1	.	.	CABLE ASM- TP,EIA / DDSA / X21	
-102	5699491	1	.	.	CABLE ASM- TP,R LOOP	
					FOR COMPONENT PARTS, SEE FIGURE 13	

FOR PARTS
NOT SHOWN
SEE FIG. F-1
SHEET 1 OF 2

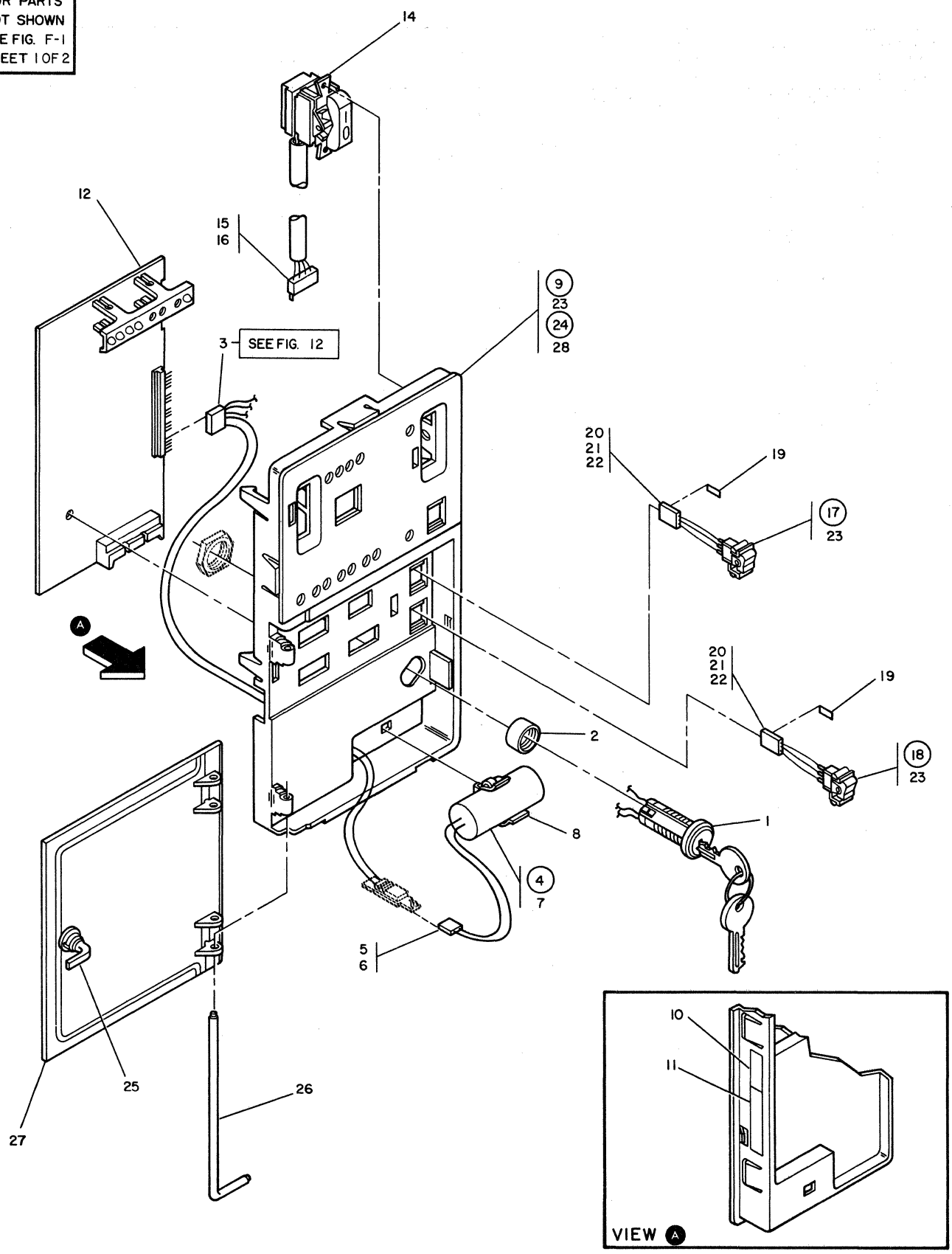


FIGURE F-2. OPS PANEL ASSEMBLY

LIST F-2. OPS PANEL ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
2 -	5267803 NP	REF	OPS PANEL ASM FOR NEXT HIGHER ASM, SEE FIGURE 1-7 FOR ILLUSTRATION SEE FIGURE 2			
- 1	6814398	1	. SWITCH LOCK ASM			
- 2	5267879	1	. SPACER- LOCK			
- 3	5267870	1	. CONNECTOR ASM- CRYPTO FOR COMPONENT PARTS, SEE FIGURE 13			
- 4	1743456	1	. BATTERY ASM INDEX NOS. 1 THRU 4 USED ON 61C ONLY			
- 5	2637682	2	. . CONNECTOR - DISCRETE			
- 6	2731835	1	. . HOUSING			
- 7	1655387	1	. . BATTERY- 4.14 VOLT MERCURY			
- 8	1743455	1	. CLIP- CAPACITOR			
- 9	5267897	1	. OPS PANEL ASM- DDSA,X21 L OR S			
- 9	5267898	1	. OPS PANEL ASM- R LOOP			
- 10	138754	1	. . LABEL			
- 10	4418722	1	. . LABEL- VOLTAGE PRESENT NORWEGIAN			
- 10	4420467	1	. . LABEL- VOLTAGE PRESENT BELGIAN			
- 10	6812828	1	. . LABEL- VOLTAGE PRESENT FRENCH			
- 10	6812829	1	. . LABEL- VOLTAGE PRESENT SPANISH			
- 10	6812830	1	. . LABEL- VOLTAGE PRESENT ITALIAN			
- 10	6812832	1	. . LABEL- VOLTAGE PRESENT GERMAN			
- 10	6815188	1	. . LABEL- VOLTAGE, PORTUGUESE			
- 10	6825818	1	. . LABEL- VOLTAGE PRESENT FINNISH			
- 10	6825840	1	. . LABEL- VOLTAGE JAPANESE			
- 10	8551903	1	. . LABEL- VOLTAGE PRESENT SWEDISH			
- 11	6812831	1	. . LABEL,LINE VOLTAGE-CANADIAN FRENCH			
- 12	5267726	1	. . ASM OPS PNL CD DDSA,X21 L OR S USED ON 5267897			
- 12	5267758	1	. . CARD ASM- OPS PNL,R-LOOP USED ON 5267898			
- 14	6124187	1	. . SWITCH ASM- ROCKER, DPST, POWER			
- 15	1471028	4	. . . SOCKET,DUAL LANCE 14-20 AWG			
- 16	1847528	1	. . . PLUG 14 CIRCUIT			
- 17	5267867	1	. . SWITCH ASM-SPDT PRI-SEC SPEED SEC R LOOP USED ON 5267898			
- 18	5267869	1	. . SWITCH ASM-SPDT LOCAL/COMMUNICATE USED ON 5267898			
- 19	1563214	1	. . . LABEL,CONN. - A/P1 THRU K/P5			
- 20	2637689	1	. . . INSERT- NYLON			
- 21	2637682	AR	. . . CONNECTOR - DISCRETE			
- 22	2637680	1	. . . HOUSING			
- 23	1655371	1	. . . SWITCH- SPDT ROCKER, SNAP-IN MTG			
- 24	5267753	1	. . OPS PANEL ASM			
- 25	5267847	1	. . . LATCH- DOOR			
- 26	5267848	1	. . . PIN- HINGE			
- 27	5267751	1	. . . COVER- OPS PANEL			
- 28	5267750	1	. . . PANEL- OPERATOR			

FOR PARTS
NOT SHOWN
SEE FIG. F-1
SHEET 1 OF 1

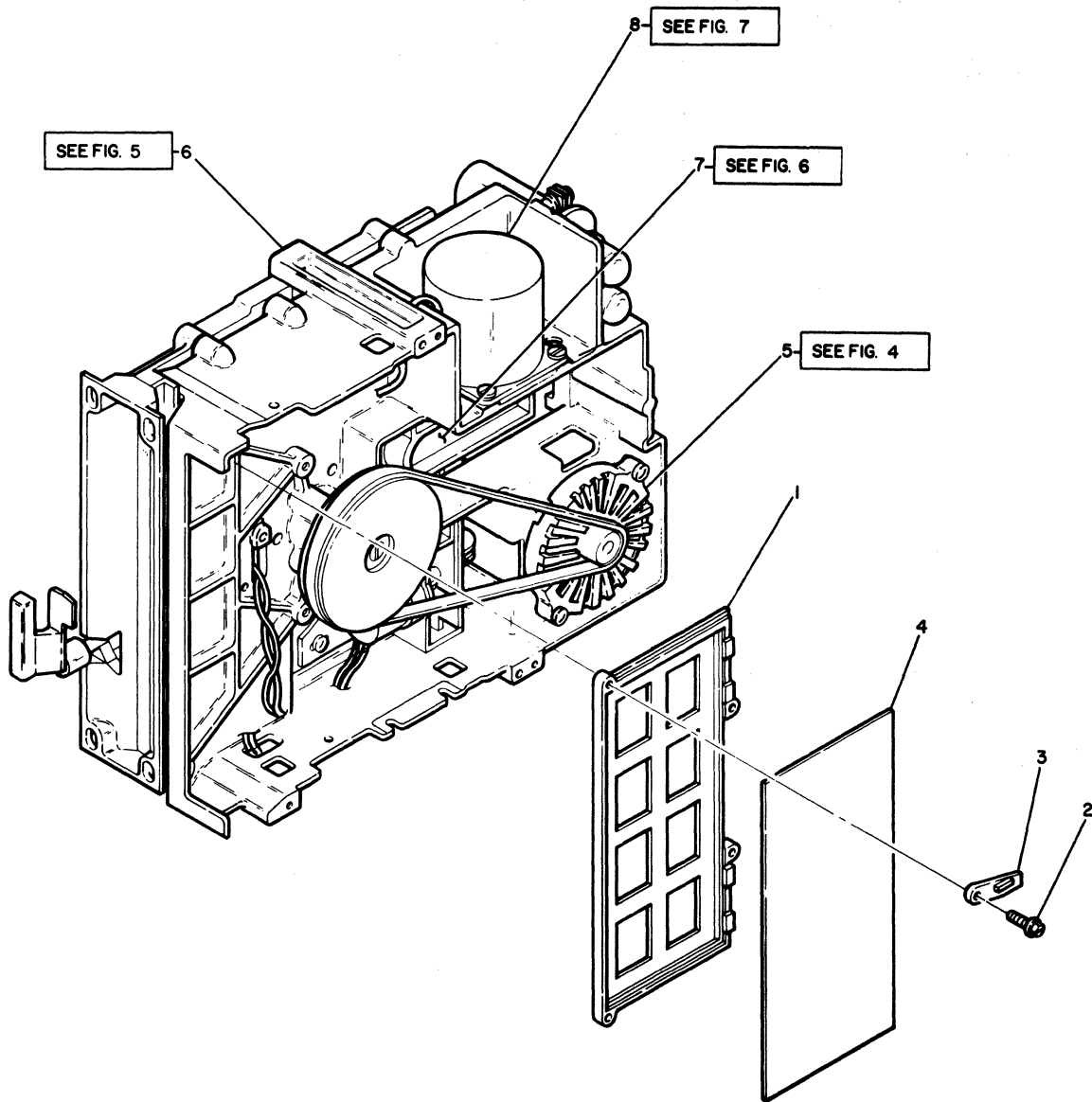


FIGURE F-3. FILE ASSEMBLY 51TD

LIST F-3. FILE ASSEMBLY 51TD

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
3 -	4240512 NP	REF	FILE ASM 51TD, 100-110V 50HZ			
-	4240513 NP	REF	FILE ASM 51TD, 200-240V 50HZ			
-	4240516 NP	REF	FILE ASM 51TD, 100-127V 60HZ			
-	4240517 NP	REF	FILE ASM 51TD, 200-240V 60HZ			
			FOR NEXT HIGHER ASM, SEE FIGURE 1-19			
			FOR ILLUSTRATION SEE FIGURE 3			
- 1	4240638	1	. HOLDER CARD			
- 2	2462686	4	. SCREW- THD FORMING M4 X 16 LG			
- 3	4240584	2	. RETAINER- CARD			
- 4	4240726	1	. CARD ASM- 51TD			
- 5	NO NO.	NP	. MOTOR CAPACITOR AND ACTUATOR ASM			
			FOR DETAIL BREAKDOWN, SEE FIGURE 4			
- 6	NO NO.	NP	. DISKETTE GUIDE AND CLAMPING ASM			
			FOR DETAIL BREAKDOWN, SEE FIGURE 5			
- 7	NO NO.	NP	. CARRIAGE AND PULLEY ASM			
			FOR DETAIL BREAKDOWN, SEE FIGURE 6			
- 8	NO NO.	NP	. SPINDLE AND PULLEY ASM			
			FOR DETAIL BREAKDOWN, SEE FIGURE 7			

FOR PARTS
NOT SHOWN
SEE FIG. F-3

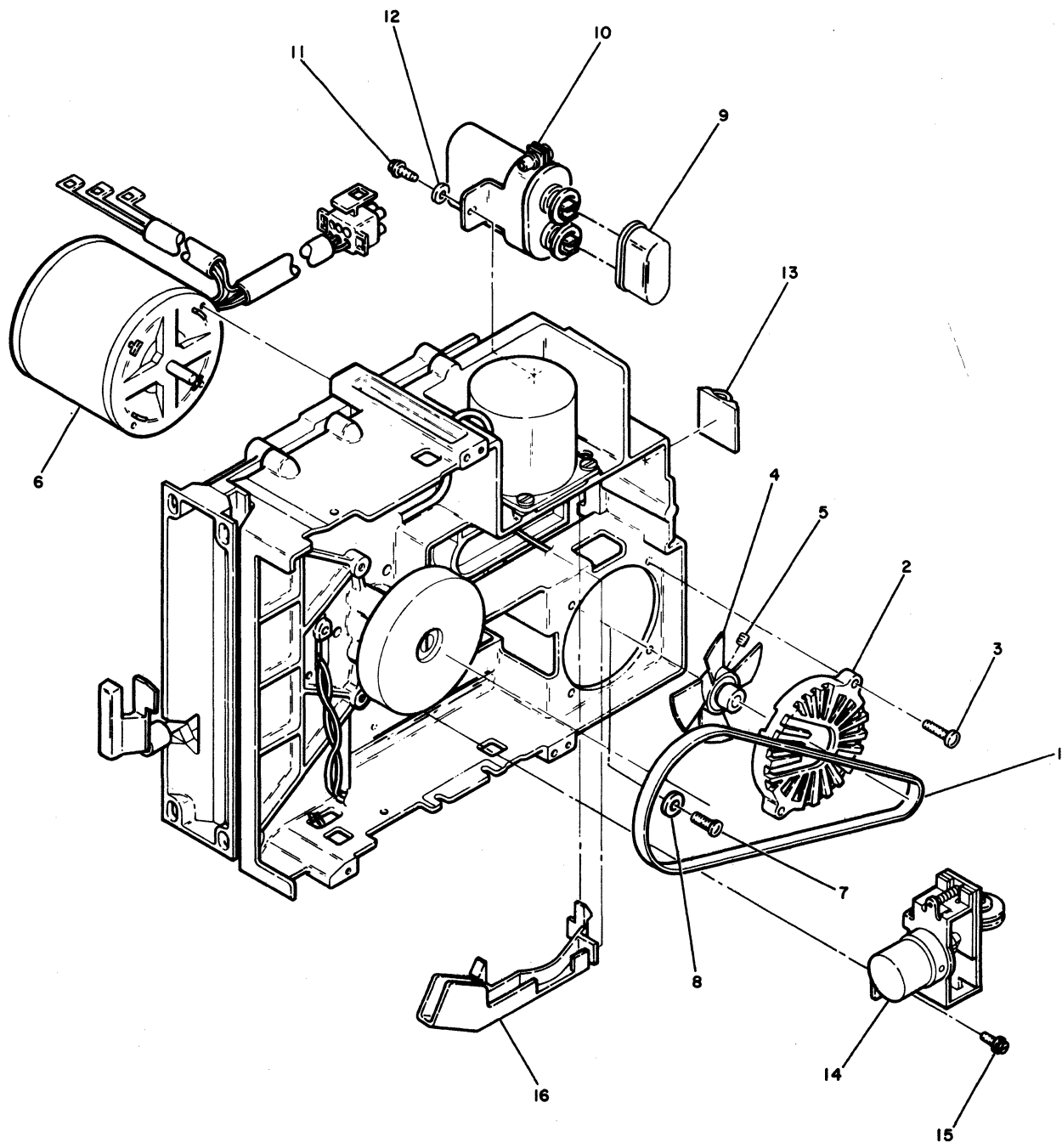


FIGURE F-4. MOTOR, CAPACITOR AND ACTUATOR ASSEMBLY

FOR PARTS
NOT SHOWN
SEE FIG. F-3

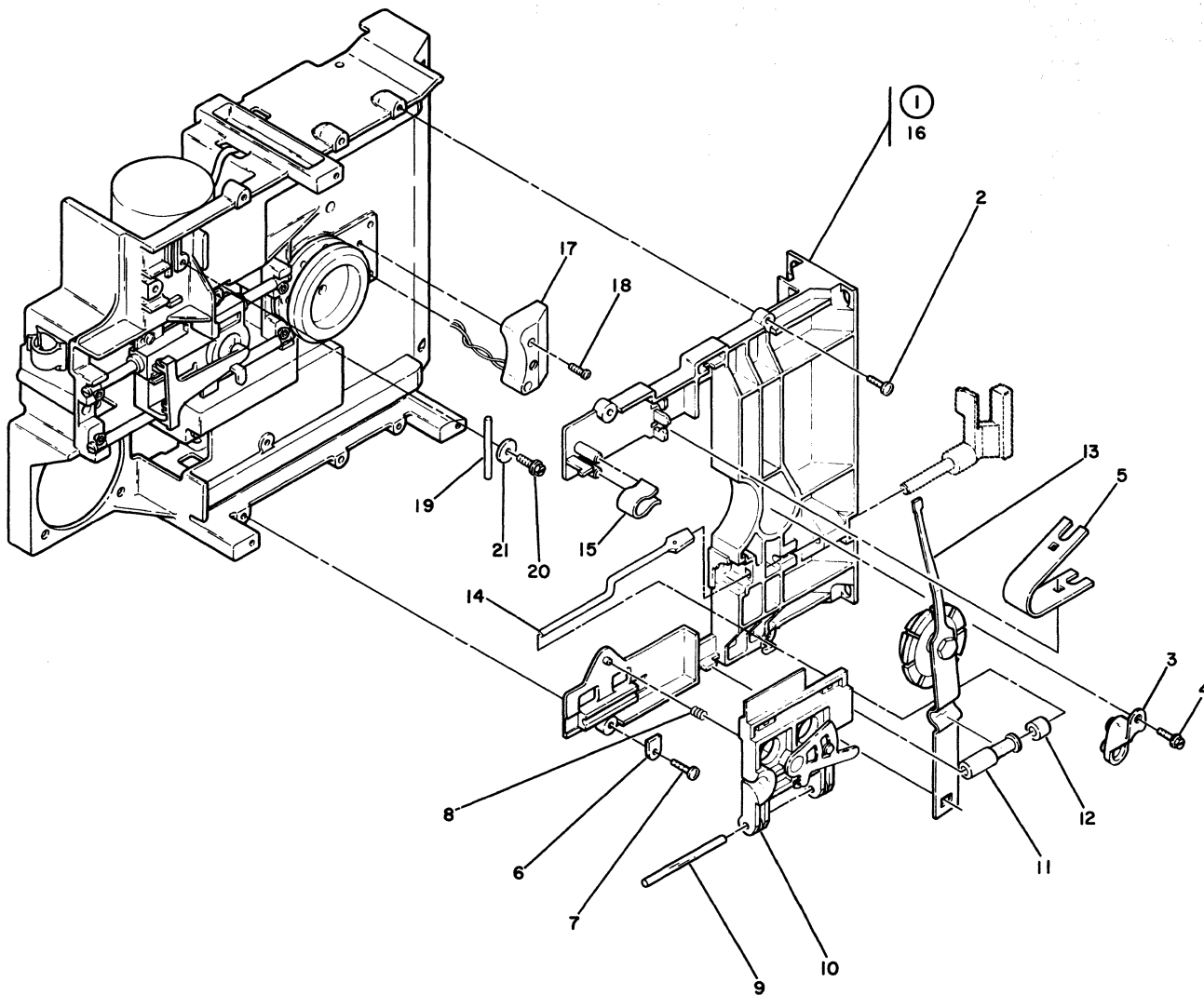


FIGURE F-5. DISKETTE GUIDE AND CLAMPING ASSEMBLY

LIST F-5. DISKETTE GUIDE AND CLAMPING ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
5 -	NO NO.	NP	DISKETTE GUIDE AND CLAMPING ASM FOR NEXT HIGHER ASM, SEE FIGURE 3-6 FOR ILLUSTRATION SEE FIGURE 5			
- 1	4240684	1	. GUIDE ASN- 51TD			
- 2	1621193	2	. SCREW, MACH PAN HD-M4 X 16 LG			
- 3	4240661	1	. . LED ASN- 51TD			
- 4	4364729	1	. . SCREW			
- 5	4240631	1	. . SPRING- CARRIAGE ADJUST			
- 6	4240659	1	. . RETAINER-BAIL PIVOT			
- 7	1621193	1	. . SCREW, MACH PAN HD-M4 X 16 LG			
- 8	4240583	1	. . SPRING, COMPRESSION-TRIM DISKETTES			
- 9	2462574	1	. . PIN- TIMING			
- 10	4240580	1	. . BAIL ASM- ACTUATOR			
- 11	4240614	1	. . ROLLER			
- 12	4240687	1	. . ROLL ASM 51TD			
- 13	4240589	1	. . COLLET ASM			
- 14	4240592	1	. . LEVER			
- 15	4240632	1	. . SPRING- FEELER GAGE			
- 16	4240663	1	. . GUIDE- DISKETTE			
- 17	4240576	1	. . PTX ASM-TRIM DISKETTES			
- 18	2462686	1	. SCREW- THD FORMING M4 X 16 LG			
- 19	5562019	1	. PIN, TIMING			
- 20	2462685	1	. SCREW- THD FORMING M4 X 10 LG			
- 21	35229	1	. WASHER, 11/64 ID X 7/16 OD			

FOR PARTS
NOT SHOWN
SEE FIG. F-3

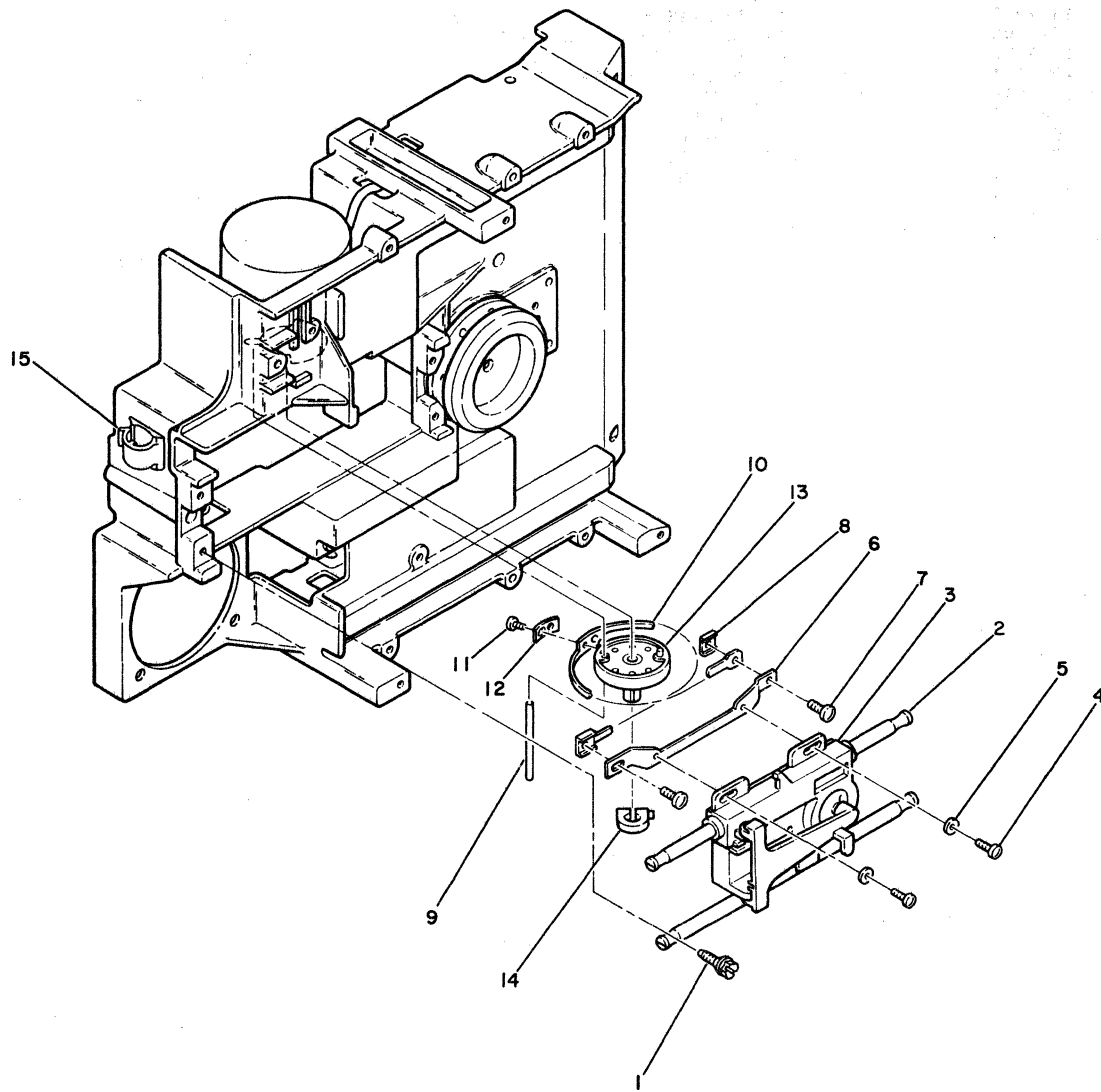


FIGURE F-6. CARRIAGE AND PULLEY ASSEMBLY

LIST F-6. CARRIAGE AND PULLEY ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
6 -	NO NO.	NP	CARRIAGE AND PULLEY ASM FOR NEXT HIGHER ASM, SEE FIGURE 3-7 FOR ILLUSTRATION SEE FIGURE 6			
- 1	4240648	4	. SCREW- THREAD FORMING M4 X 12 LG			
- 2	4240573	2	. ROD- GUIDE			
- 3	4240620	1	. CARRIAGE, HEAD- 51TD			
- 4	1621170	2	. SCREW, MACH PAN HD-M3 X 6 LG			
- 5	1622302	2	. WASHER, FLAT M3- 50D X 0.5 THK			
- 6	4240600	1	. BRACKET- BAND TO CARRIAGE			
- 7	1621170	2	. SCREW, MACH PAN HD-M3 X 6 LG			
- 8	4240601	1	. CLAMP- BAND TO BRACKET			
- 9	5562019	1	. PIN, TIMING			
- 10	4240596	1	. ASM- BAND			
- 11	1621170	1	. SCREW, MACH PAN HD-M3 X 6 LG			
- 12	4240599	1	. CLAMP- BAND TO PULLEY			
- 13	4240594	1	. PULLEY ASM			
- 14	2305493	1	. CLAMP			
- 15	2596291	1	. CLIP- CABLE			
						ATT PT
						ATT PT
						ATT PT
						ATT PT
						ATT PT
						ATT PT

FOR PARTS
NOT SHOWN
SEE FIG. F-3

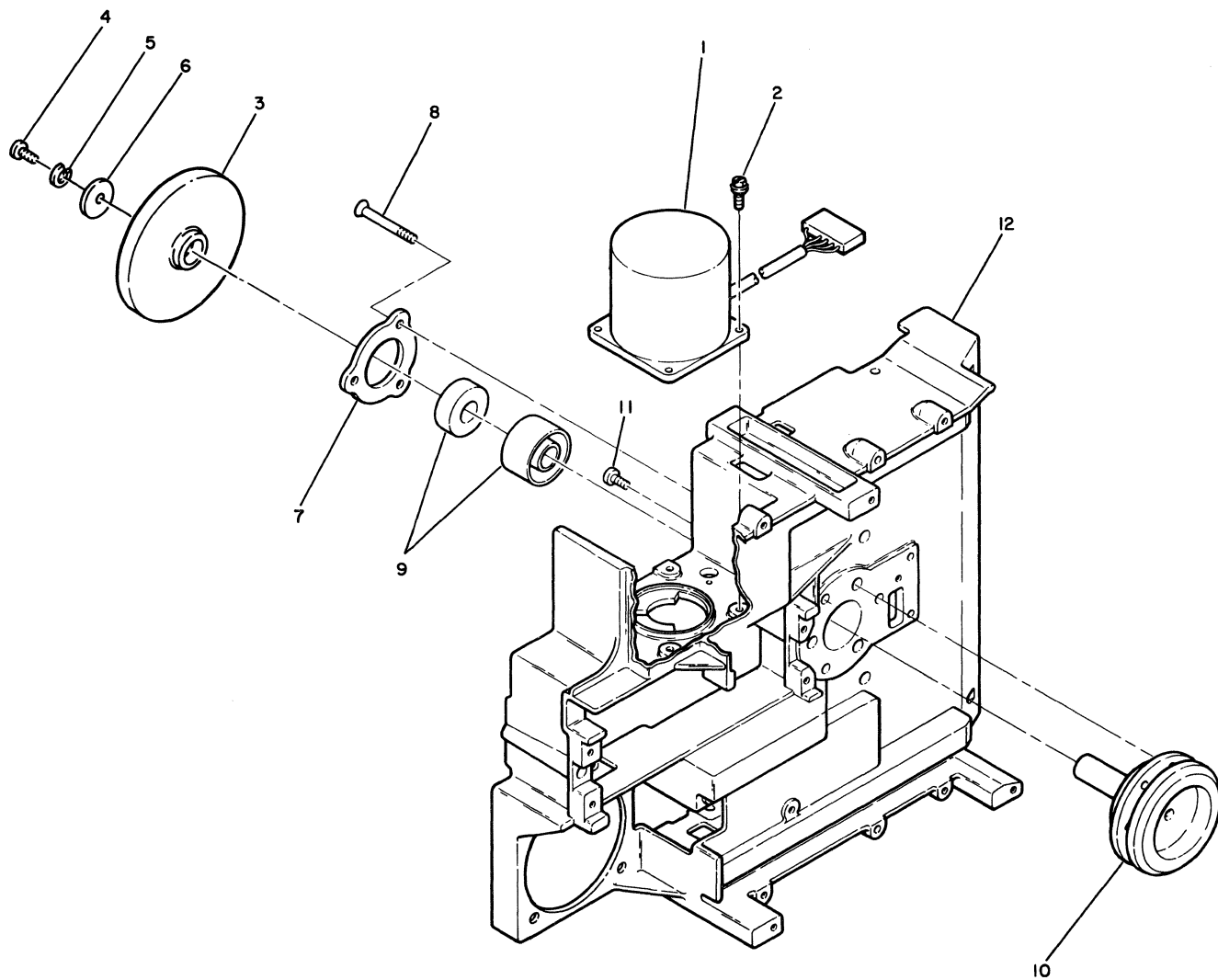


FIGURE F-7. SPINDLE AND PULLEY ASSEMBLY

LIST F-7. SPINDLE AND PULLEY ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
7 -	NO NO.	NP	SPINDLE AND PULLEY ASM FOR NEXT HIGHER ASM, SEE FIGURE 3-8 FOR ILLUSTRATION SEE FIGURE 7			
- 1	4240593	1	. MOTOR ASM- STEPPER			
- 2	2462685	4	. SCREW- THD FORMING M4 X 10 LG ATT PT			
- 3	4240557 NR	1	. PULLEY- SPINDLE			
- 4	5562071 NR	1	. SCREW ATT PT			
- 5	9092 NR	1	. WASHER-LOCK,SPLIT RING, .194 ID .337OD ATT PT			
- 6	49374 NR	1	. WASHER ATT PT			
- 7	4240556 NR	1	. RETAINER- BEARING, SPINDLE, BACK			
- 8	1621327 NR	3	. SCREW,SLOTTED FL HD- M5 X 40 LG ATT PT			
- 9	4240555 NR	1	. SPACER- BEARING, MATCHED SET			
- 10	4240552 NR	1	. SPINDLE ASM- DRIVE			
- 11	1621190 NR	3	. SCREW,PAN HD-M4 X 8LG ATT PT			
- 12	4240551 NR	1	. CASTING- DRIVE			

FOR PARTS
NOT SHOWN
SEE FIG. F-1
SHEET 1 OF 2

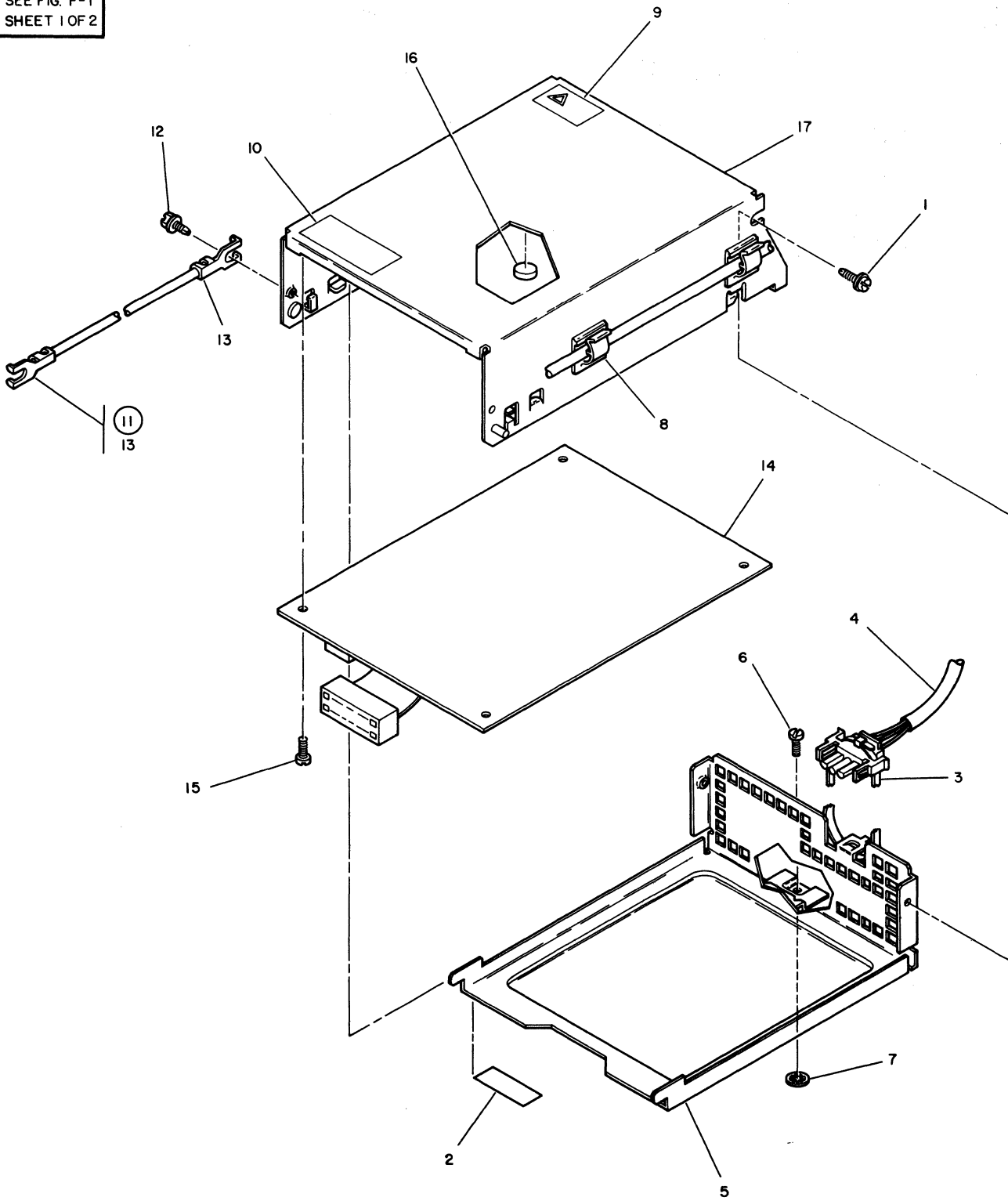


FIGURE F-8. POWER SUPPLY ASSEMBLY

LIST F-8. POWER SUPPLY ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
8 -	5699420	REF	POWER SUPPLY ASM- 100V 50/60 HZ			
-	5699421	REF	POWER SUPPLY ASM- 200V 50/60 HZ			
			FOR NEXT HIGHER ASM, SEE FIGURE 1-32			
			FOR ILLUSTRATION SEE FIGURE 8			
- 1	7362385	2	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG			
- 2	811825	1	. LABEL-CABLE			
- 3	5420242	1	. TY-MINIATURE			
- 4	5699496	1	. CABLE ASM- A/C TO P/S			
			FOR COMPONENT PARTS, SEE FIGURE 13			
- 5	5699538	1	. COVER ASM- POWER SUPPLY			
- 6	1621191	1	. . SCREW, MACH PAN HD-M4 X 10 LG			
- 7	5267973	1	. . RETAINER			
- 8	2596291	2	. CLIP- CABLE			
- 9	4422117	1	. LABEL- VIDEO			
			USED ON 5699420			
- 9	5240780	1	. LABEL			
			USED ON 5699421			
- 10	4406240	1	. LABEL- FUSE WARNING- FRENCH			
- 10	4406241	1	. LABEL- FUSE WARNING- GERMAN			
- 10	4406242	1	. LABEL- FUSE WARNING- SPANISH			
- 10	4406243	1	. LABEL- FUSE WARNING- ITALIAN			
- 10	4406244	1	. LABEL- FUSE WARNING- JAPANESE			
- 10	4406245	1	. LABEL- FUSE WARNING- PORTUGUESE			
- 10	4942502	1	. LABEL, WARNING- ENGLISH, NORWEGIAN			
- 10	5718483	1	. LABEL- FUSE WARNING ENGLISH- CDN/FRENCH			
- 10	6825826	1	. LABEL- FUSE WARNING- FINNISH			
- 10	8329451	1	. LABEL- FUSE WARNING- BELGIAN			
- 10	8551901	1	. LABEL- FUSE WARNING- SWEDISH			
- 11	5267974	1	. JUMPER ASM- P/S GND			
- 12	7362385	1	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG			
- 13	483651	2	. . TERMINAL, RING			
- 14	4752196	1	. POWER SUPPLY 100V			
			USED ON 5699420			
- 14	4752198	1	. POWER SUPPLY 200V			
			USED ON 5699421			
- 15	1621660	4	. SCREW- PAN HD THD CUTTING M3 X 6 LG			
- 16	2565179	1	. BUMPER			
- 17	5699537	1	. CHASSIS- POWER SUPPLY MTG			

FOR PARTS
NOT SHOWN
SEE FIG. F-1
SHEET 1 OF 2

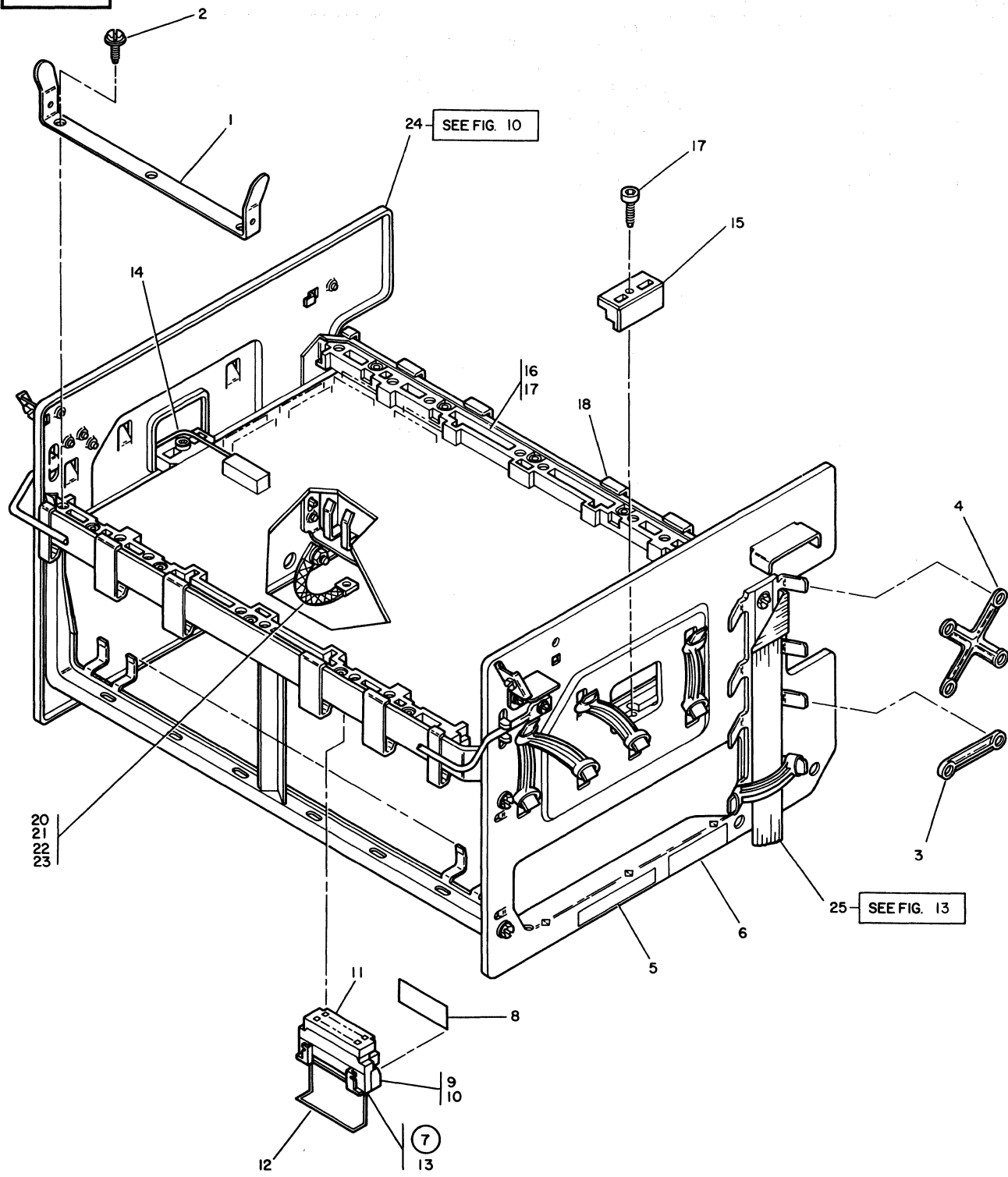


FIGURE F-9. LOGIC GATE ASSEMBLY

LIST F-9. LOGIC GATE ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
9 -	5699602 NP	REF	LOGIC GATE ASM- 61C FOR NEXT HIGHER ASM, SEE FIGURE 1-34 FOR ILLUSTRATION SEE FIGURE 9			
- 1	5699536	1	. HINGE- PCWER SUPPLY			
- 2	1622681	3	. SCREW- HEX WASHER HD THD ROLL 10 LG ATT PT			
- 3	811427	12	. STRAP, CABLE			
- 4	813519	1	. RETAINER, CABLE			
- 5	5267952	2	. LABEL- CANADIAN FRENCH			
- 6	5267948	2	. LABEL- ENGLISH,CDN/FRENCH,NORWEGIAN			
- 6	5267950	2	. LABEL- PORTUGUESE			
- 6	5267951	2	. LABEL- FRENCH			
- 6	5267953	2	. LABEL- GERMAN			
- 6	5267954	2	. LABEL- ITALIAN			
- 6	5267955	2	. LABEL- SPANISH			
- 6	5267956	2	. LABEL- JAPANESE			
- 6	5267962	2	. LABEL- FINNISH			
- 6	5267963	2	. LABEL- BELGIUM/FRENCH			
- 6	5267980	2	. LABEL- SWEDISH			
- 7	6062657	1	. CONNECTOR ASM			
- 8	811825	1	. . LABEL-CABLE			
- 9	1743616	1	. . HOOD,CONNECTOR			
- 10	109918	2	. . SCREW,THD CUTTING-FLAT HD 4-40 X 1/2 LG ATT PT			
- 11	6062656	1	. . VOLTAGE PLANE CARD ASM			
- 12	1743618	1	. . LATCH,CONNECTOR			
- 13	1743617	1	. . HOOD,CONN-STRAIN RELIEF			
- 14	5242022	1	. JUMPER ASM			
- 15	5241434	2	FOR COMPONENT PARTS, SEE FIGURE 13			
- 16	5699498	2	. RETAINER- BOARD SHORT			
- 17	2181088	12	. RETAINER- BOARD			
- 18	5699499	2	. SCREW,HEX SOC- 6-32 X 7/8 LG ATT PT			
- 20	6870773	1	. RACEWAY- CABLE			
- 21	1622403	1	. JUMPER ASM- GATE GROUNDING			
- 22	1622318	1	. NUT- HEX M4 ATT PT			
- 23	1622304	1	. WASHER,LOCK SPLIT M3- 6.2 OD X 0.8 THK ATT PT			
- 24	5267806	1	. WASHER- FLAT 9 OD X .8 THK ATT PT			
- 25	5699484	1	. GATE ASM			
- 25	5699486	1	FOR DETAIL BREAKDOWN, SEE FIGURE 10			
			. CABLE ASM- OP'S PANEL EIA/DDSA			
			. CABLE ASM- FILE 1 SIGNAL AND D/C POWER			
			FOR COMPONENT PARTS, SEE FIGURE 13			

FOR PARTS
NOT SHOWN
SEE FIG. F-9

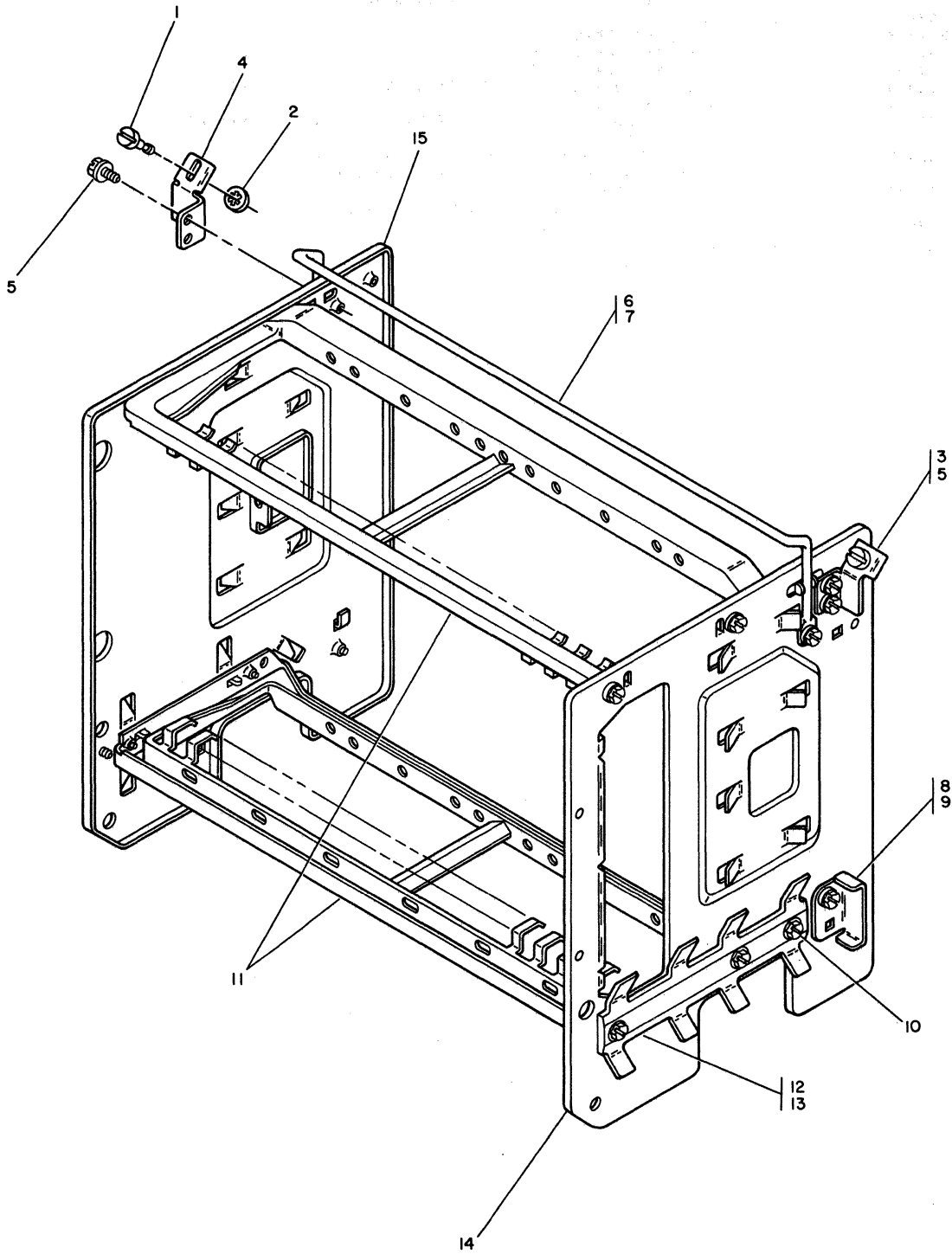


FIGURE F-10. GATE ASSEMBLY

LIST F-10. GATE ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
10 -	5267806	REF	GATE ASM FOR NEXT HIGHER ASM, SEE FIGURE 9-24 FOR ILLUSTRATION SEE FIGURE 10			
- 1	5267933	2	. SCREW			
- 2	5267973	2	. CLIP, RETAINING			
- 3	5267851	1	. RETAINER- GATE, RH			
- 4	5267852	1	. RETAINER- GATE, LH			
- 5	7362385	4	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG			
- 6	5267834	1	. HANDLE- GATE			
- 7	7362385	2	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG			
- 8	5267853	2	. STOP GATE			
- 9	7362385	2	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG			
- 10	7362385	1	. SCREW- THD FORMING INDT HEX HD M4 X 8 LG			
- 11	5267949	2	. GUIDE, CARD-GATE			
- 12	5350012	8	. SCREW, THD FORMING HEX WSR HD 8-32 X .25			
- 13	5267968	1	. TROUGH- FLAT CABLES			
- 14	5267965	1	. PANEL- GATE, R.H.			
- 15	5267964	1	. PANEL- GATE, L.H.			

FOR PARTS
NOT SHOWN
SEE FIG. F-1
SHEET 1 OF 2

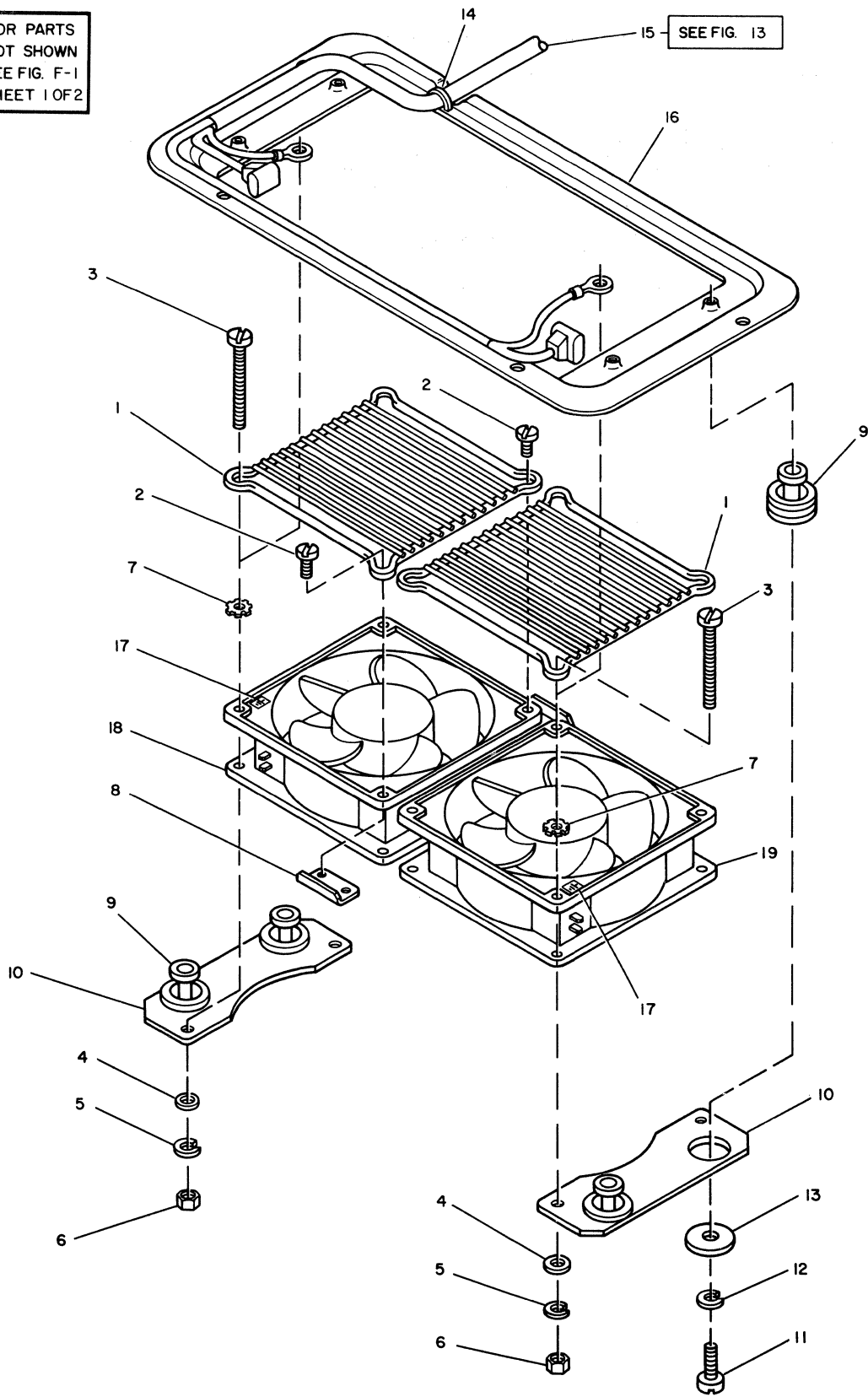


FIGURE F-11. DUAL FAN ASSEMBLY

LIST F-11. DUAL FAN ASSEMBLY

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
11 -	5699539	REF	DUAL FAN ASM, 100-127V ALL EXCEPT JAPAN			
-	5699540	REF	DUAL FAN ASM, 200-240V WTC EXCEPT JAPAN FOR NEXT HIGHER ASM, SEE FIGURE 1-45 FOR ILLUSTRATION SEE FIGURE 11			
- 1	177946	2	. GUARD-FAN			
- 2	322065	4	. SCREW, MACH-BIND HD 6-32 X 5/8 LG ATT PT			
- 3	438572	4	. SCREW, MACH-UNDRCT BIND HD 6-32 X 2 LG ATT PT			
- 4	257986	4	. WASHER, FLAT NO. 6 ATT PT			
- 5	6364	4	. WASHER, LOCK-SPLIT NO. 6 X 1/4 OD ATT PT			
- 6	257187	4	. NUT, PLAIN, HEX- 6-32 X 3/8 PL W ATT PT			
- 7	56722	2	. WASHER, LOCK-EXT TEETH NO. 6			
- 8	5699501	2	. BRACKET			
- 9	5717483	4	. ISOLATOR, FAN			
- 10	5699503	2	. BRACKET- FAN MTG, DUAL			
- 11	5677	4	. SCREW, MACH-BIND HD 10-32 X 3/4 LG ATT PT			
- 12	9092	4	. WASHER-LOCK, SPLIT RING, .194 ID .3370D ATT PT			
- 13	5717473	4	. WASHER-SNUBBER ATT PT			
- 14	5420242	1	. TY-MINIATURE			
- 15	5267985	1	. CABLE ASM- A/C DUAL FAN FOR COMPONENT PARTS, SEE FIGURE 13			
- 16	5699502	1	. PLENUM- FAN			
- 17	5865679	2	. LABEL- SAFETY, GROUND			
- 18	5699358	1	. FAN- 115VAC 50/60HZ 75 CFM USED ON 5699539			
- 18	5699359	1	. FAN- 200VAC 50/60HZ 75 CFM USED ON 5699540			
- 19	5699513	1	. FAN- 115VAC-60HZ, 110/123.5VAC 50HZ USED ON 5699539			
- 19	6837984	1	. FAN- 230VAC 50/60HZ USED ON 5699540			

FOR PARTS
NOT SHOWN
SEE FIG. F-1
SHEET 2 OF 2

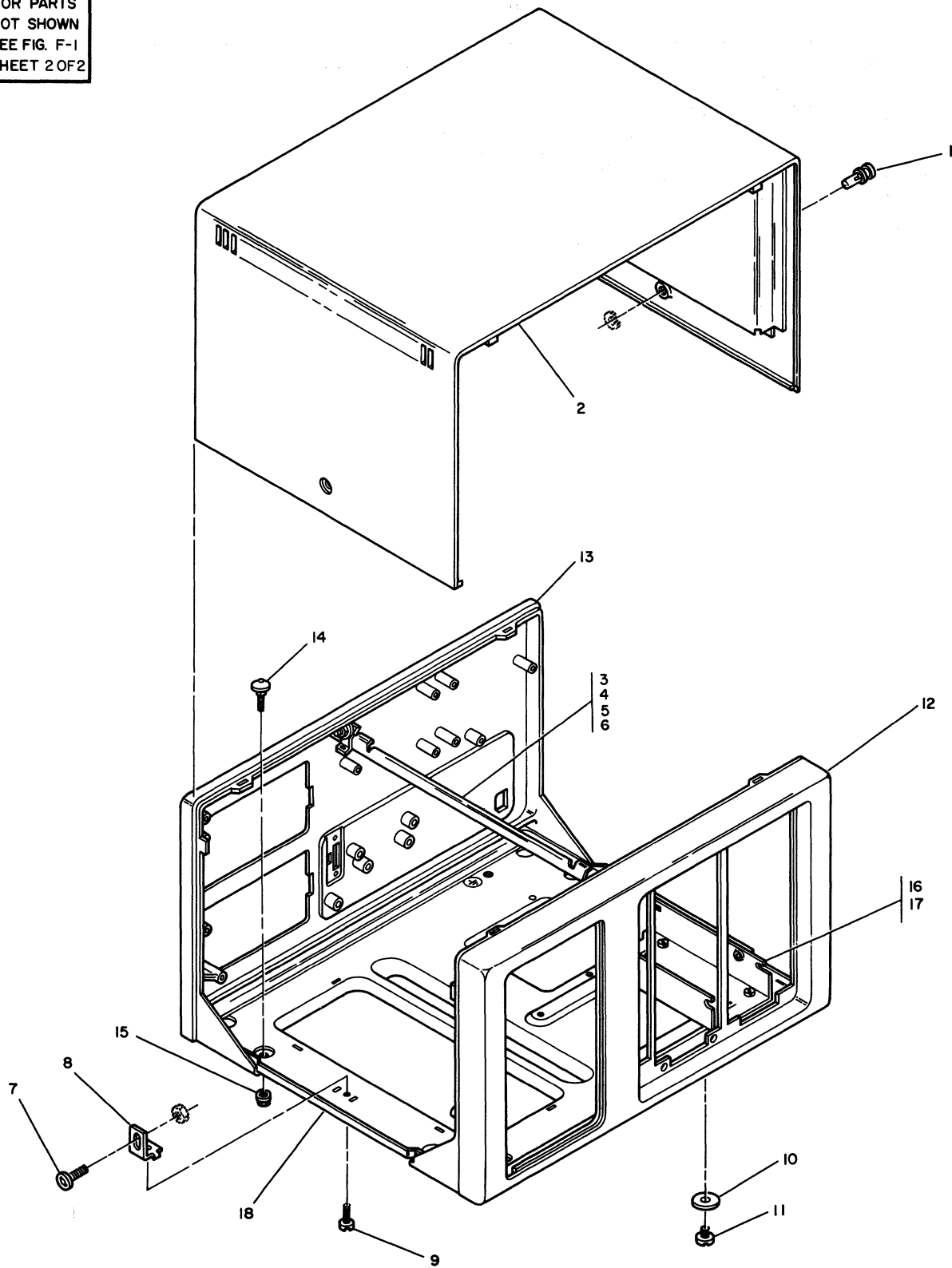


FIGURE F-12. CHASSIS ASSEMBLY

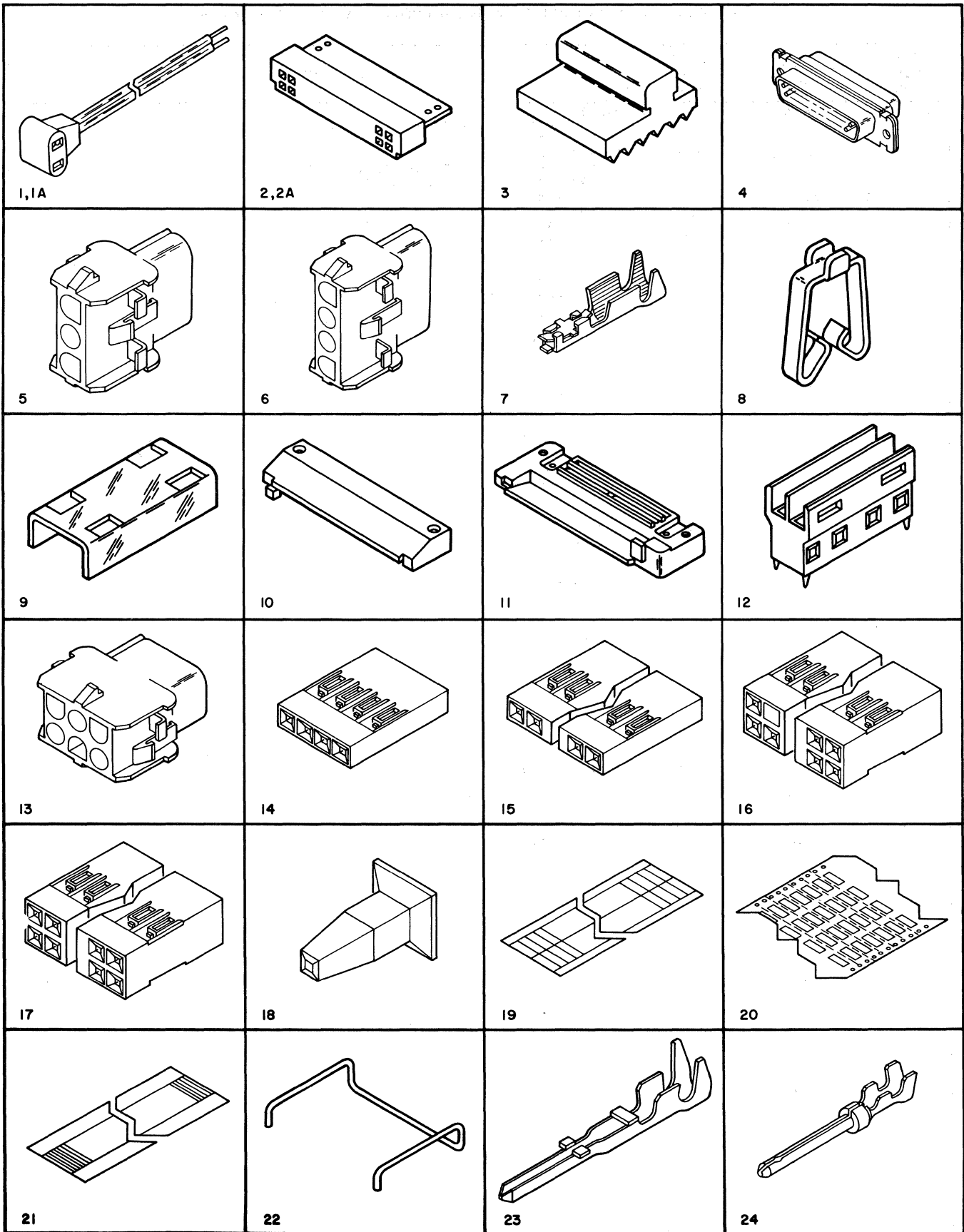


FIGURE F-13. CABLE ASSEMBLIES WITH COMPONENT PARTS (SHEET 1 OF 2, INDEX NOS. 1-24)

LIST F-13. CABLE ASSEMBLIES WITH COMPONENT PARTS (SHEET 1 OF 2)

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
13 - A	5242022	REF	JUMPER ASM FOR COMPONENT PARTS SEE INDICES -8,-9, -12 AND -33			
- A	5267732	REF	CABLE ASM- P/P BOX FOR COMPONENT PARTS SEE INDICES -5,-6, -13,-20,-25,-27,-27B,-35 AND -36			
- A	5267870	REF	CONNECTOR ASM- CRYPTO FOR COMPONENT PARTS SEE INDICES -7,-14, -15,-18,-21,-23,-28 AND -32			
- A	5267985	REF	CABLE ASM- A/C DUAL FAN FOR COMPONENT PARTS SEE INDICES -1,-1A, -20,-26,-27A,-34,-34A AND -36			
- A	5699484	REF	CABLE ASM- OP'S PANEL E1A / DDSA FOR COMPONENT PARTS SEE INDICES -2,-3, -7,-10,-11,-16,-20 AND -22			
- A	5699486	REF	CABLE ASM- FILE 1 SIGNAL AND D/C POWER FOR COMPONENT PARTS SEE INDICES -2A,-7, -10,-11,-17,-18,-19,-20,-22,-26,-27B, -29,-30 AND -36			
- A	5699489	REF	CABLE ASM- TP, E1A / DDSA / X21 FOR COMPONENT PARTS SEE INDICES -2,-3, -4,-10,-11,-20,-22 AND -24			
- B	5699491	REF	CABLE ASM- TP, R LOOP FOR COMPONENT PARTS SEE INDICES -2,-3, -4,-10,-11,-20,-22 AND -24			
- B	5699496	REF	CABLE ASM- A/C TO P/S FOR COMPONENT PARTS SEE INDICES -20,-25, -26 AND -31			
- 1	5213784	AR	. ATTACHMENT CORD- ROTRON FAN 115V AC			
- 1A	5718089	AR	. ATTACHMENT CORD			
- 2	1743048	AR	. CARD,CABLE- 24 POS.			
- 2A	5699483	AR	. CARD, CABLE- 24 POS			
- 3	5466393	AR	. CLAMP, STRAIN RELIEF			
- 4	1655338	AR	. CONNECTOR, PLUG- 25 POSITION			
- 5	1847527	AR	. CONNECTOR, 3 POS.			
- 6	1847529	AR	. CONNECTOR, 4 POS.			
- 7	2637682	AR	. CONNECTOR - DISCRETE			
- 8	813681	AR	. CONTACT			
- 9	813802	AR	. COVER			
- 10	1743616	AR	. HOOD,CONNECTOR			
- 11	1743617	AR	. HOOD,CONN-STRAIN RELIEF			
- 12	813801	AR	. HOUSING			
- 13	1847531	AR	. HOUSING, 6 CIRCUIT, UNIVERSAL			
- 14	2637680	AR	. HOUSING			
- 15	2731731	AR	. HOUSING, 1 X 6			
- 16	2731847	AR	. HOUSING, 2 X 16			
- 17	8324648	AR	. HOUSING- .100 CTR TO CTR SPACING			
- 18	2637689	AR	. INSERT- NYLON			
- 19	317296	AR	. LABEL-NUMBERING L TO R 1 THRU 33			
- 20	811825	AR	. LABEL-CABLE			
- 21	1563214	AR	. LABEL,CONN. - A/P1 THRU K/P5			
- 22	1743618	AR	. LATCH,CONNECTOR			
- 23	2731384	AR	. PIN			
- 24	1655339	AR	. PIN,CONTACT			

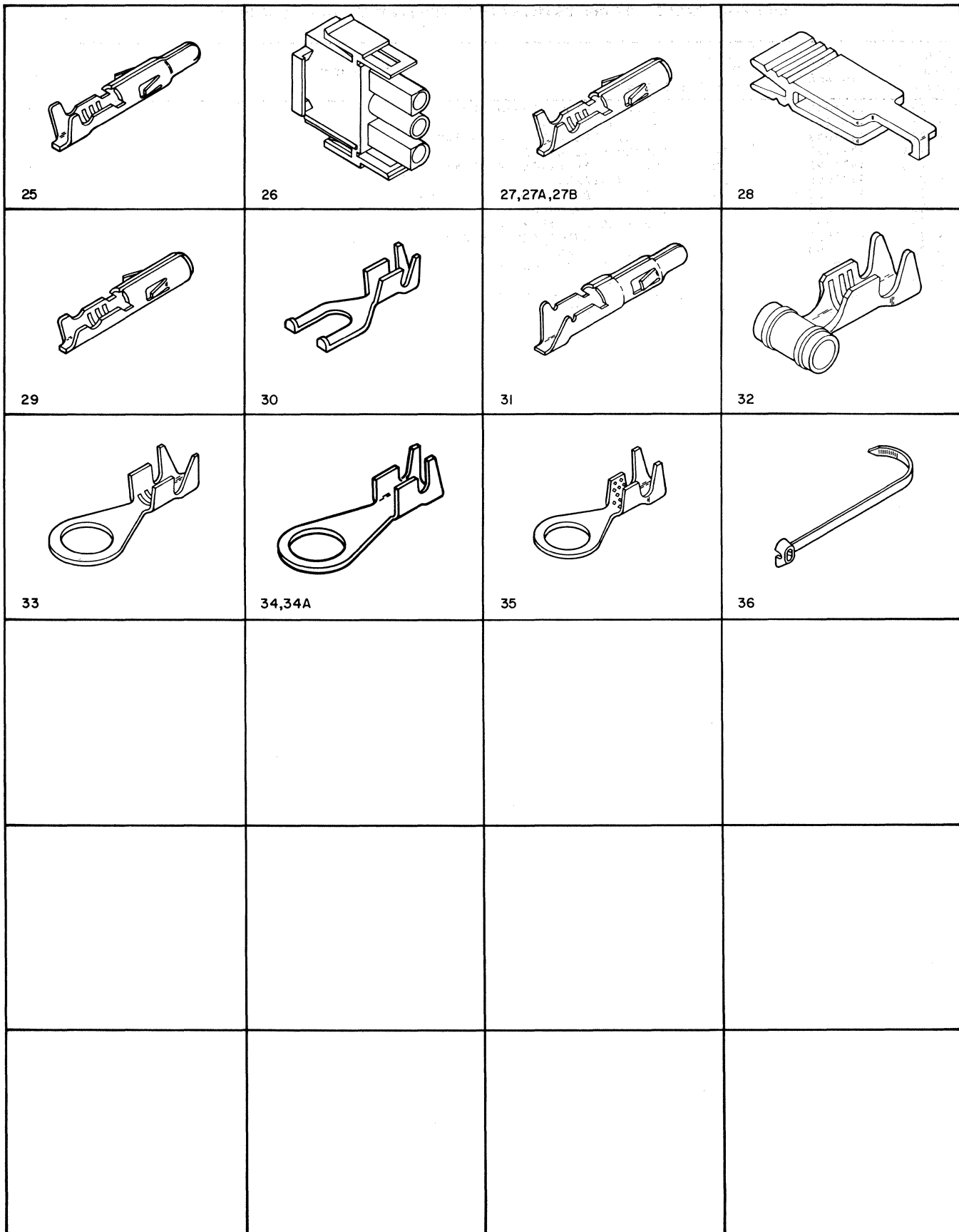


FIGURE F-13. CABLE ASSEMBLIES WITH COMPONENT PARTS (SHEET 2 OF 2, INDEX NOS. 25-36)

LIST F-13. CABLE ASSEMBLIES WITH COMPONENT PARTS (SHEET 2 OF 2)

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION			
			1	2	3	4
13 - 25	1471018	AR	.	PIN, DUAL LANCE 14-20 AWG		
- 26	1847526	AR	.	PLUG, 3 CIRCUIT		
- 27	1471019	AR	.	SOCKET, DUAL LANCE 14-20 AWG		
- 27A	1471027	AR	.	SOCKET, DUAL LANCE		
- 27B	1471028	AR	.	SOCKET, DUAL LANCE 14-20 AWG		
- 28	1743055	AR	.	STRAIN RELIEF		
- 29	1661132	AR	.	TERMINAL, DUAL LANCE 18-24 AWG		
- 30	483650	AR	.	TERMINAL, FLANGED SPADE		
- 31	2451131	AR	.	TERMINAL, PIN 16-18 AWG		
- 32	5462535	AR	.	TERMINAL, QUICK DISCONNECT-RIGHT ANGLE		
- 33	483651	AR	.	TERMINAL, RING		
- 34	483678	AR	.	TERMINAL, RING- NO. 6		
- 34A	483689	AR	.	TERMINAL		
- 35	483681	AR	.	TERMINAL, RING- NO. 8		
- 36	5420242	AR	.	TY-MINIATURE		

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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.
5677	11 - 11	1621170	6 - 4	2637682	2 - 5	4423216	1 - 6
6364	11 - 5		6 - 7		2 - 21	4752196	8 - 14
9092	7 - 5		6 - 11		13 - 7	4752198	8 - 14
	11 - 12	1621182	1 - 17	2637689	2 - 20	4796654	1 - 20
22478	4 - 8	1621190	7 - 11		13 - 18	4942502	1 - 51
35229	4 - 12	1621191	8 - 6	2731384	13 - 23		8 - 10
	5 - 21	1621192	4 - 7	2731731	13 - 15	5178360	1 - 75
37913	1 - 74	1621193	5 - 2	2731835	2 - 6	5213784	13 - 1
38264	1 - 73		5 - 7	2731847	13 - 16	5240773	1 - 70
49374	7 - 6	1621194	4 - 3	4177829	1 - 16	5240775	1 - 70
56722	11 - 7	1621327	7 - 8	4201819	1 - 65	5240777	1 - 70
109918	9 - 10	1621660	8 - 15	4236454	1 - 58	5240778	1 - 70
123786	1 - 47	1621719	4 - 5	4240512	1 - 19	5240780	8 - 9
138754	1 - 49	1622302	6 - 5		3 - REF	5241434	9 - 15
	2 - 10	1622304	9 - 23	4240513	1 - 19	5242022	9 - 14
177946	11 - 1		12 - 5		3 - REF		13 - A
244049	1 - 82	1622318	9 - 22	4240516	1 - 19	5242307	1 - 93
257187	11 - 6	1622334	1 - 21		3 - REF	5252661	1 - 88
257986	11 - 4	1622346	12 - 6	4240517	1 - 19	5267700	1 - REF
317296	13 - 19	1622347	1 - 53		3 - REF	5267712	1 - 86
322065	11 - 2	1622402	1 - 18	4240551	7 - 12	5267714	1 - 1
369207	1 - 37	1622403	1 - 10	4240552	7 - 10	5267720	1 - 56
	1 - 96		1 - 48	4240555	7 - 9	5267726	2 - 12
438572	11 - 3		9 - 21	4240556	7 - 7	5267732	1 - 66
483650	13 - 30		12 - 4	4240557	7 - 3		13 - A
483651	8 - 13	1622681	9 - 2	4240573	6 - 2	5267750	2 - 28
	13 - 33	1655338	13 - 4	4240576	5 - 17	5267751	2 - 27
483678	13 - 34	1655339	13 - 24	4240580	5 - 10	5267753	2 - 24
483681	1 - 61	1655371	2 - 23	4240583	5 - 8	5267758	2 - 12
	13 - 35	1655387	2 - 7	4240584	3 - 3	5267803	1 - 7
483682	1 - 62	1661132	13 - 29	4240589	5 - 13		2 - REF
483686	1 - 91	1743048	13 - 2	4240592	5 - 14	5267806	9 - 24
483689	13 - 34A	1743055	13 - 28	4240593	7 - 1		10 - REF
736992	12 - 14	1743142	1 - 23	4240594	6 - 13	5267810	1 - 101
811427	1 - 87	1743143	1 - 23	4240596	6 - 10		12 - REF
	9 - 3	1743144	1 - 23	4240599	6 - 12	5267811	12 - 12
811825	1 - 85	1743146	1 - 25	4240600	6 - 6	5267812	12 - 13
	8 - 2	1743147	1 - 25	4240601	6 - 8	5267813	12 - 18
	9 - 8	1743148	1 - 25	4240604	4 - 1	5267814	12 - 2
	13 - 20	1743149	1 - 24	4240605	4 - 1	5267830	1 - 15
813519	9 - 4	1743359	1 - 69	4240610	4 - 16	5267831	1 - 13
813681	13 - 8	1743455	2 - 8	4240614	5 - 11	5267832	1 - 8
813801	13 - 12	1743456	2 - 4	4240620	6 - 3	5267834	10 - 6
813802	13 - 9	1743548	1 - 37	4240631	5 - 5	5267842	1 - 35
818579	1 - 22		1 - 96	4240632	5 - 15	5267844	1 - 77
836008	4 - 9	1743616	9 - 9	4240638	3 - 1	5267847	2 - 25
855262	1 - 100		13 - 10	4240648	6 - 1	5267848	2 - 26
855263	1 - 100	1743617	9 - 13	4240659	5 - 6	5267849	1 - 11
855264	1 - 100		13 - 11	4240661	5 - 3	5267850	12 - 3
855265	1 - 100	1743618	9 - 12	4240663	5 - 16	5267851	10 - 3
855266	1 - 100		13 - 22	4240666	4 - 14	5267852	10 - 4
855267	1 - 100	1743648	1 - 69	4240671	4 - 2	5267853	10 - 8
855268	1 - 100	1847526	13 - 26	4240673	4 - 4	5267862	1 - 60
855269	1 - 100	1847527	13 - 5	4240675	4 - 4	5267867	2 - 17
855270	1 - 100	1847528	2 - 16	4240677	4 - 6	5267869	2 - 18
855272	1 - 100	1847529	13 - 6	4240679	4 - 6	5267870	2 - 3
855273	1 - 100	1847531	13 - 13	4240681	4 - 10		13 - A
855275	1 - 100	2181088	9 - 17	4240684	5 - 1	5267879	2 - 2
855276	1 - 100	2305493	6 - 14	4240687	5 - 12	5267897	2 - 9
855278	1 - 100	2451131	13 - 31	4240726	3 - 4	5267898	2 - 9
855279	1 - 100	2462574	5 - 9	4364729	5 - 4	5267920	1 - 72
855281	1 - 100	2462685	4 - 11	4406240	1 - 51	5267921	1 - 72
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855285	1 - 69	2462686	3 - 2	4406242	1 - 51	5267925	1 - 72
855286	1 - 71		5 - 18		8 - 10	5267926	1 - 72
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960766	1 - 71		1 - 52		8 - 10	5267928	1 - 76
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1164976	12 - 11	2565179	8 - 16		8 - 10	5267936	1 - 40
1471018	1 - 59	2565189	1 - 90	4406245	1 - 51	5267937	12 - 8
	13 - 25	2565252	1 - 38		8 - 10	5267938	12 - 7
1471019	13 - 27	2565265	12 - 15	4418722	1 - 49	5267939	12 - 1
1471027	13 - 27A	2596291	4 - 13		2 - 10	5267940	1 - 14
1471028	2 - 15		6 - 15	4420467	1 - 49	5267944	1 - 64
	13 - 27B		8 - 8		2 - 10	5267948	9 - 6
1563214	2 - 19	2596293	1 - 43	4422117	8 - 9	5267949	10 - 11
	13 - 21	2637680	2 - 22	4423212	1 - 37	5267950	9 - 6
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5267953	9 - 6	5699503	11 - 10	6825818	1 - 49		
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5267975	1 - 57	5699543	1 - 79		8 - 12		
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5267983	1 - 97	5699602	1 - 34		10 - 7		
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5466393	13 - 3	5717486	1 - 83		1 - 96		
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5562071	7 - 4	5718343	1 - 97	8329451	1 - 51		
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5699190	1 - 2	5718479	1 - 97		8 - 10		
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5699200	1 - 2	5718482	1 - 97	8551904	1 - 37		
5699202	1 - 2	5718483	1 - 51		1 - 96		
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5699212	1 - 2	5865679	1 - 36				
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5699238	1 - 5	6124228	1 - 27				
5699242	1 - 5	6124229	1 - 26				
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5699254	1 - 5		2 - 10				
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5699368	1 - 23	6812832	1 - 49				
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5699421	1 - 32	6814398	2 - 1				
	8 - REF	6815180	1 - 37				
5699480	1 - 3		1 - 96				
5699481	1 - 68	6815181	1 - 37				
5699483	13 - 2A		1 - 96				
5699484	9 - 25	6815182	1 - 37				
	13 - A		1 - 96				
5699486	9 - 25	6815183	1 - 37				
	13 - A		1 - 96				
5699489	1 - 102	6815188	1 - 49				
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5699491	1 - 102	6815193	1 - 37				
	13 - B		1 - 96				
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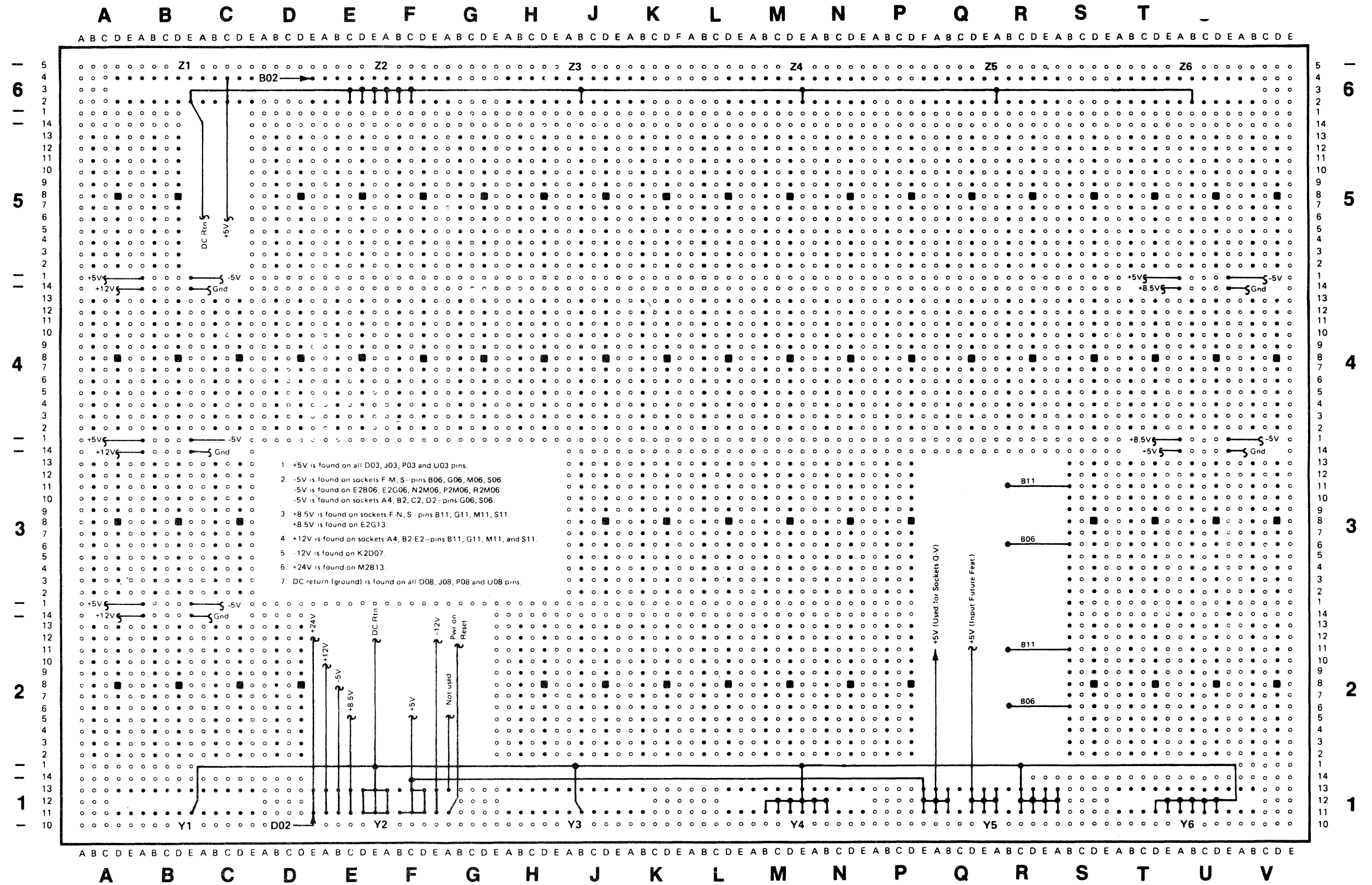


Figure B-3. Board Voltage Distribution

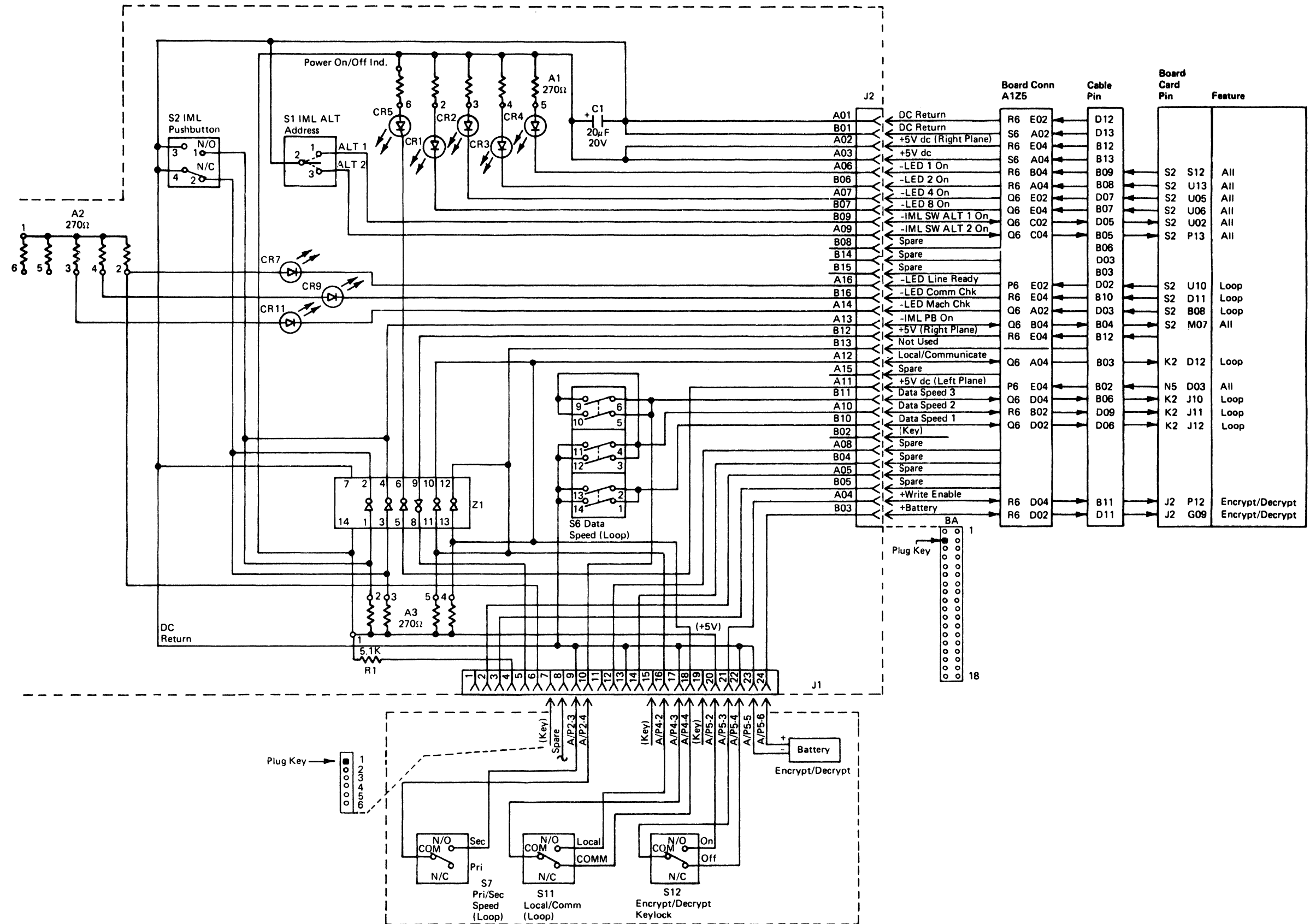


Figure D-3. Operator Panel Card/Panel/Board Connection Wiring Diagram

3274 Control Unit Model 61C
Maintenance Information

Order No. SY27-2555-1

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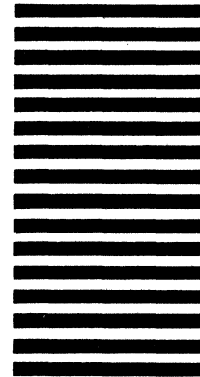
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This Technical Newsletter provides replacement pages for the subject publication. The pages to be inserted and removed are:

Cover, ii	3-3 through 3-8
ix, x	3-33, 3-34
1-1, 1-2	3-45, 3-46
2-9 through 2-12	7-1, blank
2-31 through 2-34	C-1 through C-4

A change to the text or to an illustration is indicated by a vertical line to the left of the change.

Summary of Changes

Information concerning the X.25 Packet Network feature has been added.

Note: Please file this cover letter at the back of the manual to provide a record of changes.

