



Maintenance Library

**3279** - S3G

**Color Display Station  
Models 2A, 2B, 3A, and 3B**

**Maintenance Information**

SY33-0069-3  
(Part 1)



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**3279**

**Color Display Station  
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Maintenance Information**

**SY33-0069-3  
(Part 1)**

## Preface

This publication contains the information needed to service and maintain the IBM 3279 Color Display Station Models 2A, 2B, 3A, and 3B.

Part 1 comprises the Maintenance Information and Parts Catalog.

Part 2 comprises the Maintenance Analysis Procedures.

If this machine is fitted with any RPQ features, any extra RPQ documentation can be found in a tray under the keyboard.

### Fourth Edition, November 1981

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## Safety Guidelines

If you are aware of the guidelines for working with electrical and mechanical equipment and practice these guidelines, you can work safely with this equipment.

**You need not fear electricity, but you must respect it.**

You should take every safety precaution possible and observe the following safety practices while maintaining IBM equipment:

1. You should not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if this is a potential problem.
2. Remove all power before removing or assembling major components, working in the immediate area of power supplies, performing mechanical inspection of power supplies, or installing changes in machine circuitry.
3. Power supplies, pumps, blowers, motor generators, and other units with voltages which exceed 30 V ac or 42.4 V dc must not be serviced with power on when the unit is removed from its normal installed position within the machine, unless maintenance documentation clearly states otherwise. (This is done to ensure that proper grounding is maintained.)
4. Unplug the power supply cord whenever possible before working on the machine. The wall box switch when turned off should be locked in the off position or tagged with a DO NOT OPERATE tag (form Z229-0237). Be aware that a non-IBM attachment to an IBM machine may be powered from another source and be controlled by a different disconnect or circuit breaker.
5. When it is absolutely necessary to work on equipment having exposed live electrical circuitry, observe the following precautions:
  - a. Another person familiar with power off controls must be in immediate vicinity. (Someone must be there to turn off power if it should become necessary.)
  - b. Do not wear any jewelry, chains, metallic frame eyeglasses, or metal cuff links. (In the event of contact, there will be more current flowing because of the greater contact area afforded by the metal.)
  - c. Use only insulated pliers, screwdrivers, and appropriate probe tips/extendors. (Remember, worn or cracked insulation is unsafe.)
  - d. Use only one hand when working on energized equipment. Keep the other hand in your pocket or behind your back. (Remember there must be a complete circuit for electrical shock. This procedure helps eliminate a path that could complete a circuit through you!)
  - e. When using test equipment, be certain that controls are set correctly and that insulated probes of proper capacity are used.
  - f. Avoid contacting ground potential (metal floor strips, machine frames, etc.). use suitable rubber mats purchased locally if necessary.
6. Follow special safety instructions when working with extremely high voltages. These instructions are outlined in CEMs and the safety portion of maintenance documentation. Use extreme care when checking high voltage.
7. Avoid use of tools and test equipment that have not been approved by IBM. (Electrical hand tools [wire wrap guns, drills, etc.] should be inspected periodically.)
8. Replace worn or broken tools and test equipment.
9. After maintenance, restore all safety devices, such as guards, shields, signs, and ground leads. Replace any safety device that is worn or defective. (These safety devices are there to protect you from a hazard. Don't defeat their purpose by not replacing them at the completion of the service call.)

10. Safety glasses must be worn when:
    - Using a hammer to drive pins, etc.
    - Power hand drilling.
    - Using spring hooks, attaching springs.
    - Soldering, wire cutting, removing steel bands.
    - Parts cleaning, using solvents, chemicals, and cleaners.
    - All other conditions which might be hazardous to your eyes.
  11. Never assume that a circuit is deenergized. (Check it first.)
  12. Always be alert to potential hazards in your working environment (i.e., damp floors, nongrounded extension cords, power surges, missing safety grounds, etc.).
  13. Do not touch live electrical circuits with the surface of the plastic dental mirrors. The surface of the dental mirror is conductive and can result in machine damage and personal injury.
  14. Four steps that should be taken in the event of an electrical accident:
    - a. USE CAUTION - DON'T BE A VICTIM YOURSELF.
    - b. TURN POWER OFF.
    - c. HAVE SOMEONE ELSE GET MEDICAL HELP.
    - d. ADMINISTER RESCUE BREATHING IF VICTIM IS NOT BREATHING.
  15. Do not use solvents, cleaners, or oils that have not been approved by IBM.
  16. Lift by standing or pushing up with stronger leg muscles. This takes strain off back muscles. Do not lift any equipment or parts which you feel uncomfortable with.
  17. Each customer engineer is responsible to be certain that no action on his/her part renders the product unsafe or exposes hazards to customer personnel.
  18. Place removed machine covers in a safe out-of-the-way location while servicing the machine. These covers must be in place on the machine before the machine is returned to the customer.
  19. Always place CE tool kit away from walk areas where no one can trip over it (i.e., under desk or table).
  20. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be left buttoned or rolled up above the elbow. Long hair and scarves must be secured.
  21. Ties must be tucked in shirt or have a tie clasp (preferably non-conductive) approximately three inches from the end when servicing a machine.
  22. Before starting equipment, make sure that fellow CEs and customer personnel are not in a hazardous position.
  23. Maintain good housekeeping in the area of the machines while performing and after completing maintenance.
  24. Avoid touching moving mechanical parts when lubricating, checking for play, etc.
- Prevention** is the key to electrical safety. You should always be conscious of electrical safety and practice *good habits* such as:
- Making certain that the customer's power receptacle meets IBM equipment requirements.
  - Inspect line cords and plugs. Check for loose, damaged or worn parts.
  - Before removing a component which can retain a charge from the machine, review the procedure in the maintenance documentation. CAREFULLY discharge the necessary components exactly as directed by the service procedure.
  - Do not use an ordinary lamp as an extension trouble light.
- Never **assume** anything about a machine or circuit. No machine is completely safe *all* of the time. The exact condition of a machine may be unknown. Here are some of the reasons why:
- The power receptacle could be incorrectly wired.
  - Safety devices or features could be missing or defective.
  - The maintenance and/or modification history may be uncertain or unclear.

- A possible design deficiency could exist.
- The machine may have suffered transportation damage.
- The machine might have an unsafe alteration or attachment.
- An EC or sales change may have been improperly installed.
- The machine may have deteriorated due to age or environmental extremes.

- A component could be defective, creating a hazard.
- Some component of the machine may have been incorrectly assembled.

Relating to safety, these are some of the ways the condition of the machine can be affected. **Before you begin a service call or procedure, exercise good judgment and proceed with caution.**

## Electrical Accidents

### Administering First Aid

In implementing rescue procedures in an electrical accident one must

- **Use Caution** If the victim is still in contact with the electrical source, it may be necessary to use the room EPO (Emergency Power Off) or disconnect switch to remove the electrical current. If the EPO or disconnect switch cannot be located, use a dry stick or another nonconducting object to pull or push the victim away from contact with the electrical equipment.
- **Act Quickly** If the victim is unconscious, he/she may need rescue breathing and possibly external cardiac compression if the heart is not beating.
- **Call Fire Rescue** (Rescue Squad, Emergency, Ambulance, Hospital etc.) Have someone summon medical aid.

Determine if the victim needs rescue breathing.

1. Make certain that the victim's airway is open and that it is not obstructed. Check the mouth for objects that may be blocking the airway such as gum, food, dentures or even the tongue. Position the victim on his back and place one hand beneath the victim's neck and the other hand on his forehead. Then lift the neck with one hand and tilt the head backward with pressure on the forehead from the other hand as shown in Figure 1.

2. Now you must **look, listen, and feel** to determine if the victim is breathing freely. Place your cheek close to the victim's mouth and nose to listen and feel for the exhaling of air.



Figure 1

At the same time, look at the chest and upper abdomen to see if they rise and fall. If the victim is not breathing properly, you should:

- a. With the head in a backward tilt as shown in Figure 1, continue to exert pressure on the victim's forehead with your hand while rotating this same hand so that you can pinch the victim's nostrils together with the thumb and index finger (Figure 2).

#### CAUTION

**Use extreme care when administering rescue breathing to a victim that may have breathed in toxic fumes. DO NOT INHALE AIR EXHAUSTED BY THE VICTIM.**

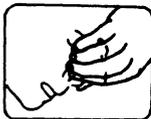


Figure 2

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



Figure 3

- c. Remove your mouth and allow the victim to exhale while watching for the victim's chest to fall (Figure 4).



Figure 4

- d. Repeat this cycle once every five seconds until the victim breathes for himself or medical help arrives.

### Reporting Accidents

It is a CE's responsibility to report all electrical accidents, potential electrical hazards, and "near miss" accidents to your **field manager**. Remember, a "near miss" accident might be the result of a design deficiency and prompt reporting will ensure that the situation will be resolved quickly.

It's important to report even a minor shock since the conditions which caused it need only be varied slightly to cause serious injury.

---

## Cathode Ray Tube Safety

The primary hazard of CRTs is flying glass as a result of an implosion. The following sections deal with different phases of CRT SAFETY. All phases are equally important and negligence in any area could result in possible injury to an employee or customer.

Any additional information or variation from this information will be included under that specific unit's CEM/Service Aids.

### Storage of Cathode Ray Tubes

1. Cathode Ray Tubes must be enclosed when received, transported, or otherwise moved from area to area. If they are shipped in a carton, they must be in the original carton or one of equivalent strength, and securely sealed to prevent accidental opening. Also,

original or equivalent packing materials and/or forms must be placed inside the carton to give the tube proper support and protection. If tubes are transported in a unit or piece of equipment, the equipment must be able to contain the glass fragments should an implosion occur.

2. CRTs should be stacked as per directions on manufacturer's carton. When in doubt, stack with faceplate (viewing surface) down. Cartons should not be stacked more than two high.
3. CRT storage areas will be away from normal flow of material handling equipment and pedestrian traffic. Also, storage areas must be dry to insure that cartons will not absorb moisture and collapse.

## Maintenance and Installation

1. No one shall be permitted to install, adjust, maintain, replace, or handle high-vacuum tubes until he has reviewed this CEM.
2. Cathode Ray Tubes when received, transported, or otherwise moved from area to area should be completely enclosed in their original shipping carton and sealed.
3. When handling CRTs, personnel will wear safety equipment at all times. The required safety equipment is:
  - a. Safety Glasses - IBM Part 5715010
  - b. Long-Sleeved Garment.
4. Tubes under vacuum will not be permitted to remain out of their carton unless they are under test or inspection.
5. Avoid scratching or bumping any part of the tube because this may weaken the glass and possibly cause it to implode.
6. Prior to removal of any high-vacuum tube, discharge all stored potential which may exist on the tube's anode button or base socket pins and the capacitor in the high-voltage supply. (NOTE: *Some Cathode Ray Tubes contain a conductive coating on both the inside and outside surfaces to form a capacitor. Within some tubes, a second capacitive charge builds up following the original discharge. It is therefore important to discharge each tube a second time immediately before removal.*)
7. Do not handle Cathode Ray Tubes by the neck alone. The neck is the weakest part of the tube and is easily broken. Always handle tubes with two hands. If the CRT is shipped with a lifting strap, this strap should be used for the removal of a tube from, and placement of a tube into, the shipping container.
8. When inserting or removing tubes from equipment, they must be supported by the large end while carefully guiding the neck in or out of position. The lifting strap, if present, can be used in this process.
9. Avoid placing the tubes on a table or bench when there is any possibility of the tube rolling. If it is necessary to place a tube anywhere except in its special carton, a piece of felt or other soft material should be placed under it to prevent scratching the glass. Place larger tubes vertically on their faces, and not on their sides, to prevent the possibility of rolling.
10. When removing a tube from equipment, it should be enclosed in its shipping container as soon as possible to reduce the chances of breaking. Cathode Ray Tubes should be placed in the carton with the large face end up and the neck down. Be sure that the weight of the tube is not resting on the neck. The container should be sealed securely with strong tape and, to prevent tipping, turned over so the tube is positioned face down.

## Disarming Cathode Ray Tubes

Field personnel should not disarm Cathode Ray Tubes. Tubes will be disarmed and disposed of in accordance with existing Environmental Protection Agency requirements at the plant of return.

## Disposal of Cathode Ray Tubes

An Inventory/Distribution letter has been issued to the Branch Office with instructions on the disposal of CRTs.

July 14, 1980

# Chapter 1. General Description and Locations

## 1.1 Introduction

The IBM 3279 Color Display Station is connected by a coaxial cable to the IBM 3274 Control Unit, or the IBM 3276 Control Unit/Display Station, or an Integrated Display Printer Adapter (IDPA) processor. The 3279 Display Station consists of a color display unit and an alphanumeric keyboard.

Four models of 3279 are available; 2A, 2B, 3A and 3B. Model 2 has 24 lines, each of 80 characters; Model 3 has 32 lines, each of 80 characters. An additional model 3279-2C is available as a system-control console, see *IBM 3279 Model 2C Color Display Console Maintenance Information, SY33-0090*. Models with an A-suffix can display four colors. Models with a B-suffix have highlighting and 7-color capability (ECS) and an additional font for APL/Text. Note that the 3276 Control Unit does not support models with a B-suffix, and that the IDPA supports only the model 2A.

Optional features include a selector light pen, a security keylock, and magnetic reader control (for

slot reader or hand scanner). Programmed symbols (PS2-two fonts, and PS4-four additional fonts) is an optional feature on model 3B.

Machines are available to operate from an ac supply of either 100 to 127 V (50 or 60 Hz) or 200 to 240 V (50 or 60 Hz). A battery is used to enable storage to retain convergence data when switched off.

### 1.1.1 Controls

#### 1.1.1.1 Power On/Off Switch

This switch controls line voltage. Wait approximately 10 seconds after switching off before switching on again. This allows any stored fault conditions to reset.

#### 1.1.1.2 Normal/Test Switch

This switch when operated takes the machine offline and into Test Mode.

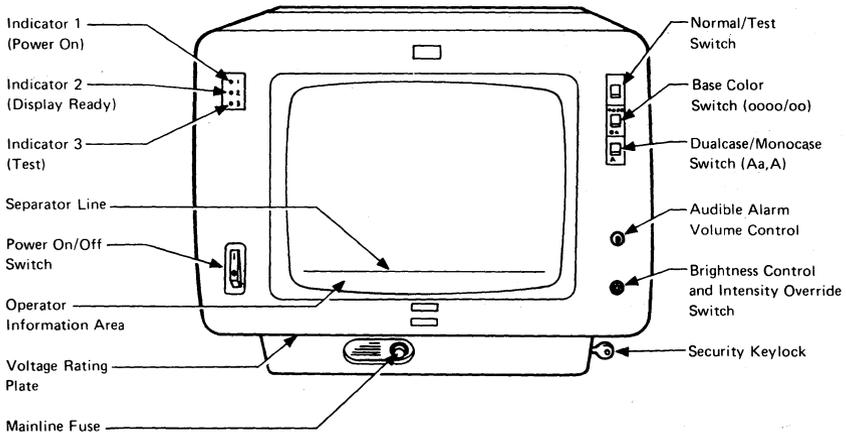


Figure 1-1. Controls and Indicators

### 1.1.1.3 Base Color Switch

When this switch is in the 'oo' position, the base colors blue and red are replaced by green and white respectively. The separator line and the operator information area remain blue. Green and white fields are not affected, nor are any fields controlled, by ECS.

### 1.1.1.4 Dualcase/Monocase Switch

When this switch is in the 'A' position, all alphabetic characters are displayed in uppercase.

### 1.1.1.5 Intensity Override Switch

This switch operates when the brightness control is turned fully counterclockwise. It sets the brightness circuits to maximum and the screen shows full rasters of red, blue, and green. See section 2.4 for details.

### 1.1.1.6 Audible Alarm Volume Control

This control sets the volume of the alarm.

### 1.1.1.7 Brightness Control

This control sets the brightness of the display.

### 1.1.1.8 Security Keylock

When in operation, this feature blanks the data area of the screen to prevent unauthorized access to the machine.

## 1.1.2 Indicators

### 1.1.2.1 Indicator 1 (Power On)

This indicates line supply and +5 V supply available. It does not confirm the availability of other voltages generated within the machine.

### 1.1.2.2 Indicator 2 (Display Ready)

This indicator lights when the display is unblanked, thus confirming that most of the analog circuits are operational. This condition occurs about 45 seconds after both deflection circuits are activated. The delay allows the CRT cathode time to warm up.

### 1.1.2.3 Indicator 3 (Test)

Indicator 3 Lights when Test Mode is selected.

### 1.1.2.4 Operator Information Area

The Operator Information Area is the row below the separator line, and displays characters that indicate the status of the 3279.

## 1.2 Display Unit

The display unit comprises a main enclosure assembly, a logic gate, and a bezel as shown in Figure 1-5. Field Replaceable Units (FRUs) are listed in the Parts Catalog.

The weight of the unit is approximately 27 Kg (58 lb) without keyboard.

### 1.2.1 Electrical Grounding

The ac ground and dc returns are electrically connected in the 3279 display unit. The coaxial cable return (shield) is isolated from the dc return at the 3279.

With the ac power cord disconnected, a correctly-wired unit should indicate continuity between ac and dc ground, and an open circuit between ground and the shield of the device coaxial cable.

See Figure 6-5 for a complete grounding diagram.

### 1.2.2 Equipment Lightning Protection

The 3279 is designed to provide a low-impedance energy path from the external coaxial cable shield to frame (ac) ground for potentials above 36 V.

Additional information on lightning protection requirements for the customer coaxial cable (customer responsibility) is provided in *IBM 3270 Information Display Station Installation Manual - Physical Planning*, GA27-2787.

### 1.2.3 Video Output Facility

This allows suitable monitors to display the contents of the 3279 screen (except for the separator line and Operator Information Area).

Red Video, Green Video, Blue Video and Sync signals are fed to individual coaxial sockets in the customer access area.

A sync polarity indicator and two switches (video control switch and sync polarity switch) are also provided in the customer access area.

#### **1.2.3.1 Video Control Switch**

This switch has three positions:

1. **Central position:** The monitor receives the same balance of color signals as the 3279 CRT.
2. **ENHANCE position:** The blue color of the monitor is brightened by the addition of a fifty-percent-green signal.
3. **TEST position:** The color signals to the monitor are internally connected to the 3279 CRT, thus allowing direct comparison of the two displays (except for the separator line and Operator Information Area).

#### **1.2.3.2 Sync Polarity Switch**

This switch is used to select either positive or negative sync pulses at the sync output socket. All devices attached at the same time will receive the same polarity.

#### **1.2.3.3 Signal Test Indicator**

This indicator lights when either

- The synchronizing signal is faulty,  
*or*
- The Video Control Switch is set to TEST.

**★ DANGER**

Pins may be up to 250 V above ground potential  
Use probe, IBM Part 1749249/1749250.

1	+12 V
2	±12 V Return
3	-12 V
4	103 V Return
5	103 V
6	Ground
7	Ground
8	LOPT
9	.LOPT Return
10	Line Input
11	● Line Test Point
12	Degauss
13	Degauss Return
14	● Neutral Test Point
15	Neutral Input
16	Ground

Test Points are shown as bullets (●)

Skip	26	1	Horizontal Sync
Skip ●	27	2	● Horiz Sync
Vertical Sync	28	3	● Vert Sync
-5 V	29	4	0 V form A3
Gnd from A3	30	5	● -5 V
+12 V LOPT	31	6	0 V to security keylock
- Display Ready	32	7	0 V to Color Sw
- Display Ready	33	8	
+5 V	34	9	0 V to A <sub>a</sub> /A Switch
+8.5 V	35	10	0 V to LED Card
+8.5 V ●	36	11	
+5 V ●	37	12	"Power Good" (+5 V)
	38	13	Input Prohibited
Gnd ●	39	14	+103 V Return
+103 V ●	40	15	+103 V
Brightness Pot	41	16	Brightness 3
Intensity Override Sw 4	42	17	Brightness 1
Intensity Override Sw 1	43	18	Intensity Override Sw 2
Brightness 2 To Color Balance	44	19	Brightness 2
-135 V ●	45	20	Balance Pots Ret (-150 V/39 kΩ)
	46	21	
+6.3 V Return ●	47	22	Heater (6.3 V) Return
+70 V ●	48	23	+70 V to Video
	49	24	+70 V Return
+6.3 V ●	50	25	Heater (+6.3 V)

**P3**  
Power Supply  
Edge Connector  
Pin Assignments

**P4**  
Analog Card  
Edge Connector  
Pin Assignments

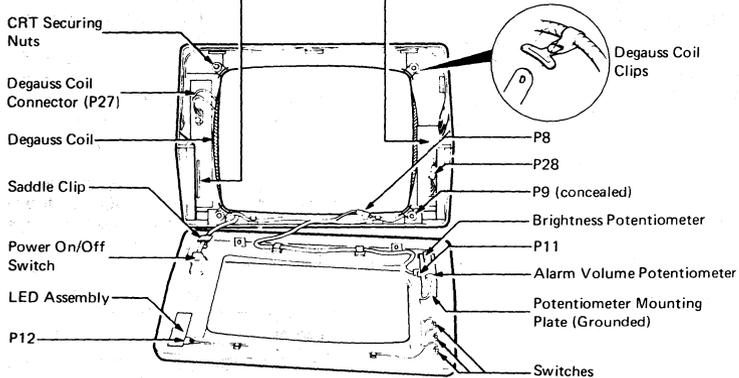


Figure 1-2. Display Unit - Front View with Bezel Removed

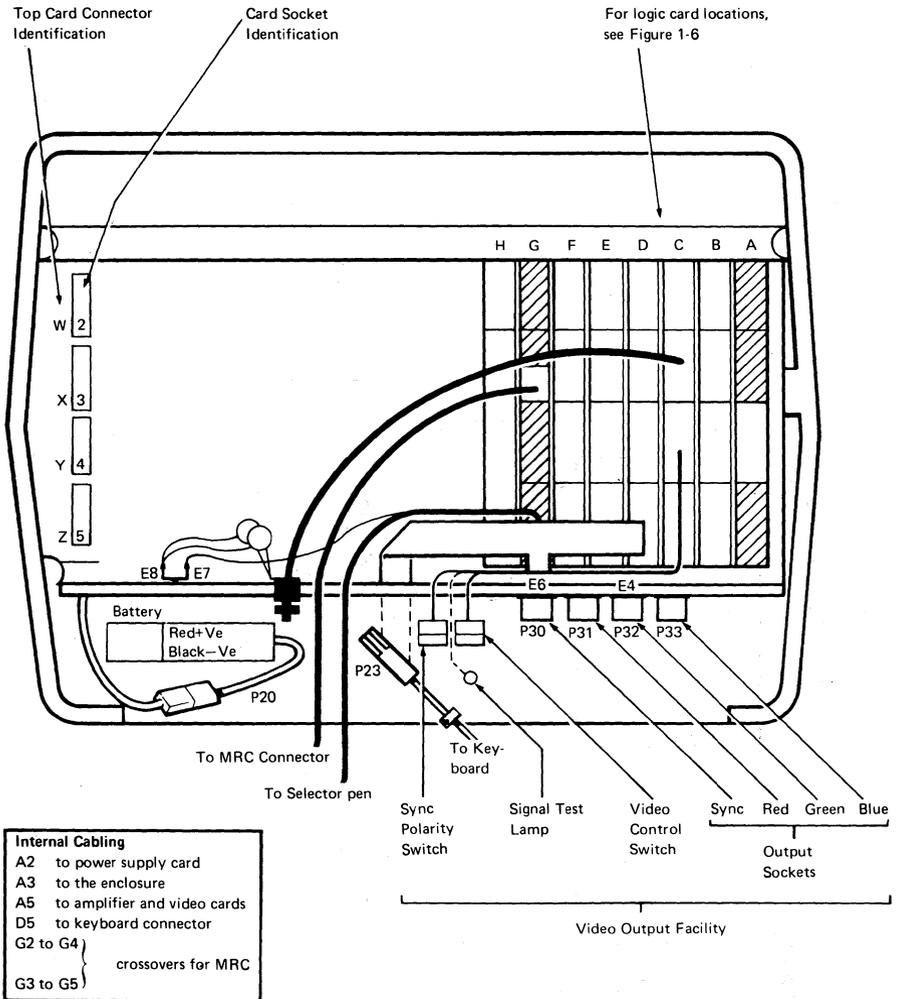
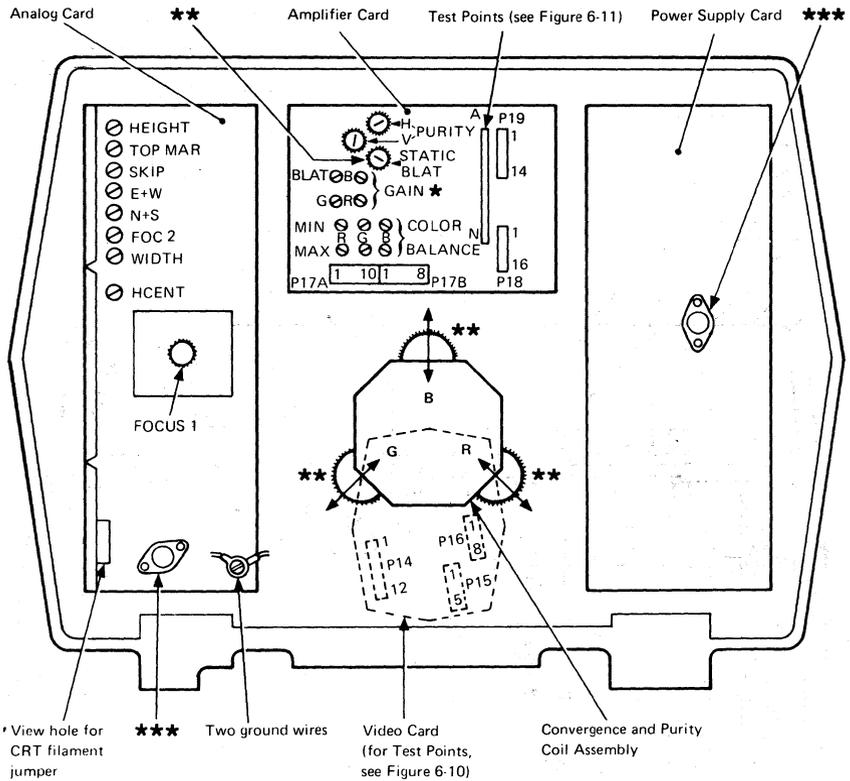


Figure 1-3. Display Unit - Rear View



★ Factory preset (some presets are only on early level cards)

★★ Four Static Convergence Controls

★★★ **DANGER** Ensure the insulated covers are in place on any transistor in these two positions as the cases are at dangerous potentials (1 kV pk)

Figure 1-4. Display Unit - Rear View, Open

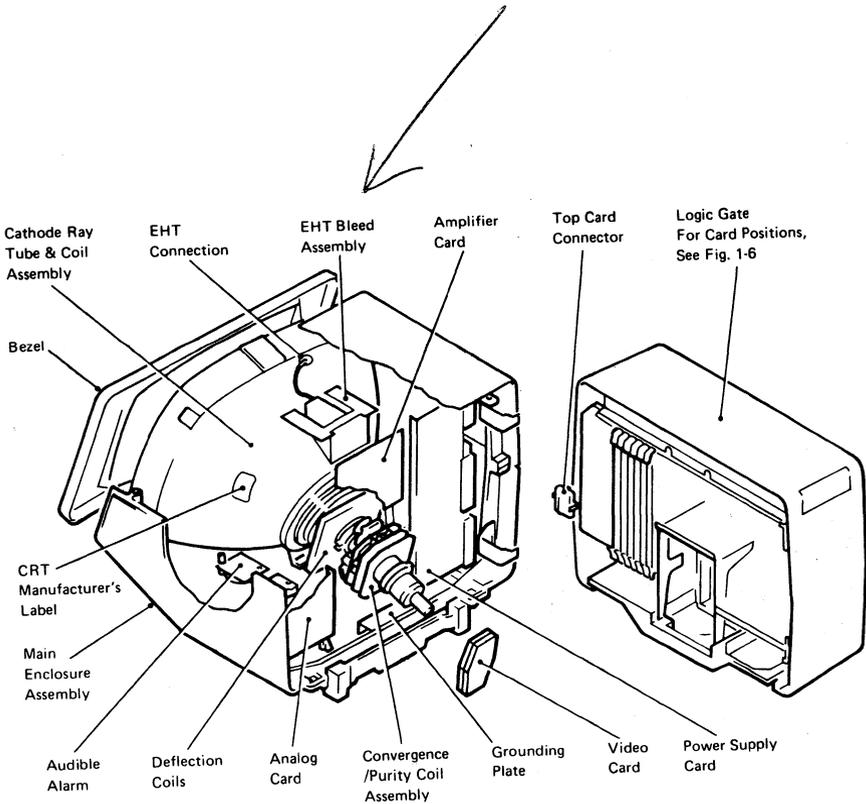
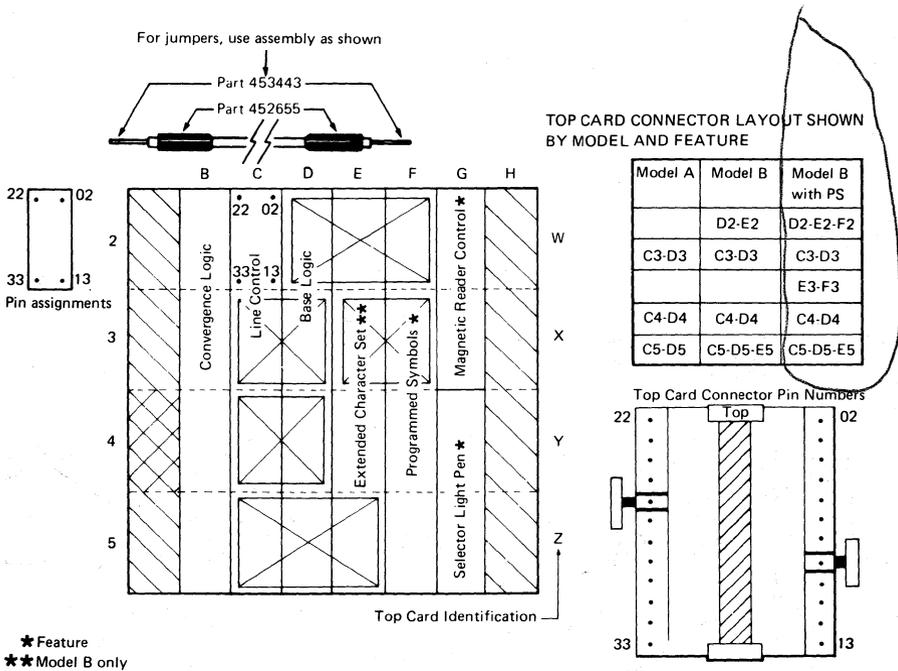


Figure 1-5. Display Unit - Interior View



Notes:

1. If Video Output Facility is installed, line control card is replaced by video output card.
2. When installing Top Card Connectors ensure that the longer (curved) pins are plugged into the card and the part number reads from top to bottom. Check that the cover and label have been installed correctly.

Figure 1-6. Logic Card and Top Card Connector Locations (card side).

## 1.3 Keyboards

### 1.3.1 Scan Codes

Pressing a key generates a seven-bit scan code that is presented serially to the control unit. The scan code for a specific key position is always the same. The control unit translates each scan code into the appropriate character or function.

### 1.3.2 Break Codes

Several keys, including the reset key, produce a second scan code (called a 'break code') as the key is released. The break code for the reset key is ignored by the control unit.

### 1.3.3 Keyboard Cable

This cable carries the control and data signals between the keyboard and the display unit. It also provides the +5 V supply for the keyboard (see Figure 6-12 for details).

### 1.3.4 System Upshift

System upshift cannot be selected from the keyboard; it is controlled by the application program and applies to all keyboard types. When the system is in upshift mode, the control unit (3274 or 3276), or IDPA, processes only specified characters. Characters other than those specified may be entered by an operator using the override capability.

### 1.3.5 Keyboard Type Identification

The keyboard logic card contains four pairs of pins that must be jumpered to indicate the type of keyboard (see Figure 6-11).

### 1.3.6 Keyboard Lock

The keyboard can be 'locked' (that is, keyed characters are ignored by the control unit). Specific data, for example a 'reset' scan code, may still be accepted.

The operator is made aware of keyboard lock by a change in the action of the keyboard clicker. The clicker normally clicks once for each key depression, but stops clicking after keyboard lock. If the operator has chosen to turn off the clicker for normal operation, then keyboard lock will cause it to click at each key depression.

An **X** is displayed in the Operator Information Area when the keyboard is locked.

### 1.3.7 Numeric Lock (Feature)

The numeric lock feature is selected by installing a keyboard jumper in position 1 of the keyboard ID jumper block. This feature limits the characters that can be entered into a numeric field to:

0 through 9  
period (.) or comma (,)  
minus (-)

The DUP key remains active. Depression of any other key while the cursor is in a numeric field causes the keyboard to lock with the symbol **X** **NUM** in the operator information area. Press RESET to clear the locked condition.

## 1.4 Tools and Test Equipment

The following tools and test equipment are required for maintenance of the 3279.

Item	IBM Part Number
Insulated probes*	1749249 and 1749250
General logic probe	453212
Miniprobe**	453718
GLP extension cable	453605
Keypot puller	9900373
Keylock retaining nut wrench	4418787
MRC test card	1742659
SLT jumper (3)	452655
SLT pins***	453443
Adjusting tool	1864853
Metric tools	1749235
Alignment mask	4423472
Isopropyl Alcohol	2200200
Lint-free cloth	2108930

\* For use with standard CE meter

\*\* This probe is for use on low voltage (up to 15 volts)

\*\*\* For use with jumpers on some top card connectors

**1.4.1 General Logic Probe**

To use the General Logic Probe (GLP), IBM Part 453212, set the switches as follows:

Technology	MULTI
Latch	NONE
Gate Ref.	GND

Power the probe from any D03 pin (red wire +5 V) and any D08 pin (black wire, ground). The ground lead on the probe tip must also be connected to a nearby ground.

Test GLP operation by probing on D03 and then D08.

## Chapter 2. Maintenance Aids

### 2.1 Maintenance Plan

The maintenance plan for the 3279 assumes the use of:

1. Problem determination procedures (performed by the customer using the *Problem Determination Guide*, which is located under keyboard handrest).
2. The General Failure Index (GFI) (see MAP 0000) for simple symptoms.
3. The Maintenance Analysis Procedures (MAPs) (referred to in section 2.3) which comprise Part 2 of this manual.
4. Intensity override (section 2.4).
5. Offline test modes (section 2.5).
6. Online tests (section 2.6).
7. Adjustment procedures (see Chapter 5).
8. FRU removal and replacement (see Chapter 4). FRU locations can be found in the Parts Catalog at the back of this manual.

#### **DANGER**

*Do not attempt to service FRUs under power outside the machine frame.*

### 2.2 General Failure Index

This section has been moved to MAP 0000.

### 2.3 MAPs

This section also has been moved to MAP 0000.

### 2.4 Intensity Override

To engage intensity override, turn and hold the brightness control *fully* counterclockwise. Intensity override turns on the red, green, and blue electron-guns at maximum brightness.

When the Normal/Test switch is set to Test, the three rasters will be un converged (see Figure 2-1) unless the Test Mode 3 jumper (D2Y08 to D2Y09) is installed. Test mode checks analog and associated circuits.

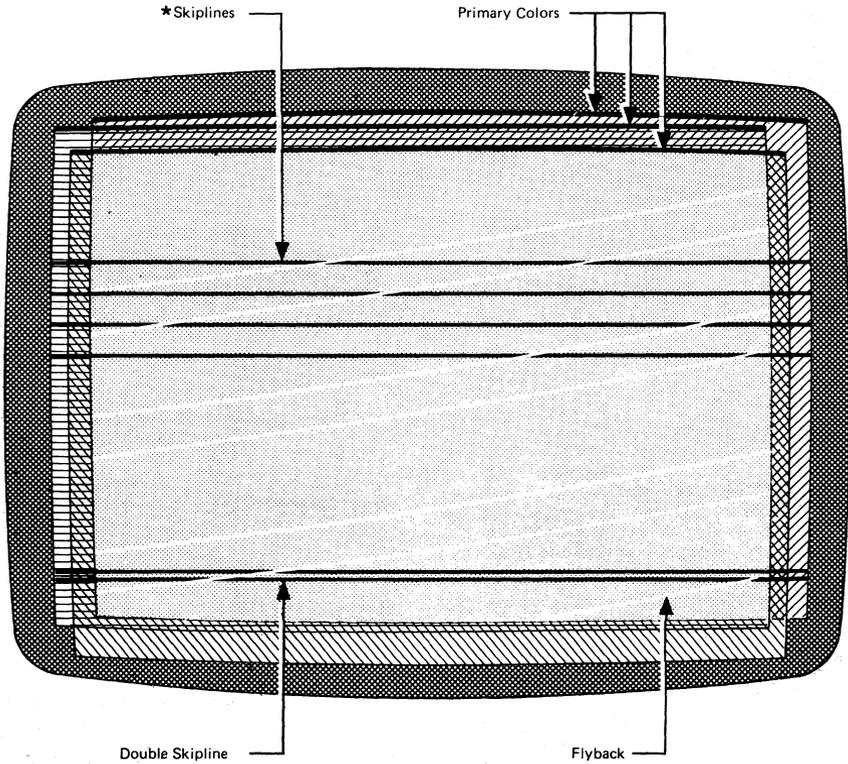
When the Normal/Test switch is set to Normal and the 3279 is connected to an active control unit, the red, green, and blue rasters should be converged. Skip and display geometry can be inspected.

### 2.5 Test Modes (Offline)

*Note: When the display station is offline, the convergence correction circuits are not active. This will be obvious when more than one color is displayed.*

#### 2.5.1 Test Mode 1: Pattern

1. Set the Dualcase/Monocase (A,a/A) switch to A,a.
2. Set the Normal/Test switch to Normal and back to Test. The Test Mode 1 pattern is displayed.
3. Verify operation of Test Mode 1 by checking the displayed pattern carefully against the pattern shown in Figure 2-2. If the test fails, read MAP 0000 page 2 and then go to MAP 0100, Entry Point BB.



\*At regular intervals across the screen on Model 2. Only the double skipline appears on Model 3. Each skipline appears as a dark line when converged.

Figure 2-1. Intensity Override (Test Mode)



**2.5.3 Test Mode 3: Commands**

**Notes:**

1. Use the keyboard diagram (Figure 2-3) to identify the keys listed below. Do not identify by keytop symbol (although the two may be identical).
2. [C] refers to the CONTROL key (see Figure 2-3).
3. When a single character is shown in the 'Results' column it will appear on the screen in the first position of the Operator Information Area (OIA) (bottom left hand corner). It is shown only when the result is important.

4. The display will be green unless specified otherwise.
5. If any action fails, recheck the test sequence and then exchange logic card C2, then D2, then read MAP 0000 page 2 and go to MAP 0100.

Perform the test in sequence (or the results are unpredictable) as follows:

Enter Test Mode 3 from Test Mode 1 or 2 by pressing the CONTROL key (Figure 2-3), or directly using a jumper - see section 2.7.

Step  
(See Notes  
1 & 2 above)

Press Keys

Result  
(See Notes  
3 & 4 above)

- 1
- 2
- 3
- 4
- 5

[C] B  
B B B  
C  
[C] J  
[C] N

̄  
̄

Test Mode 1 pattern is restored  
See Keyboard ID table in Figure 6-11

Monocase Sw.		Security Keylock
A,a	A	
0	A	Not installed
&	Q	On (clockwise)
1	B	Off (counterclockwise)

- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

[C] M A B C...  
[C] D D D...  
[C] C  
[C] B W ̄  
[C] G A  
[C] B O I  
[C] B O Q  
[C] K I  
4  
8

A B C... appear over cursor; cursor advances  
Character over cursor is displayed at OIA first position and cursor advances

Line 1 displays ̄ as far as 'a' two-thirds of the way along the line.  
Display turns red.  
Display mainly blue, some red remains.  
Display turns green.

Cursor blinks.  
Cursor is inhibited.  
Cursor returns but display is inhibited.

Set the Normal/Test switch to Normal and back to Test

<i>Step (See Notes 1 &amp; 2 above)</i>	<i>Press Keys</i>	<i>Result (See Notes 3 &amp; 4 above)</i>
17	0	Pattern returns to normal.
18	3	Cursor is blinking and reverse video.
19	2	Cursor is reverse video
20	<input type="checkbox"/> G G	Display contains all $\bar{0}$ ; reverse video cursor moves to OIA first position.
21	<input type="checkbox"/> G G	OIA fills with $\bar{0}$
22	<input type="checkbox"/> B U A	Cursor moves to start of line 2.
23	<input type="checkbox"/> E 5	Cursor moves to start of line 18.
24	<input type="checkbox"/> V	A
25	F	$\bar{5}$
26	<input type="checkbox"/> M 3 3 3 3 3 5 5 5 5 9 9	3333355559... appears on line 18.
27	<input type="checkbox"/> B W $\bar{\bar{}}$	
28	<input type="checkbox"/> S 3	Cursor moves to last '3' in line 18.
29	<input type="checkbox"/> B Q 9	Cursor moves to first '9' in line 18.
30	Set Normal/Test switch to Normal, then Test	

*End of TEST MODE 3 SEQUENCE*

## 2.6 Online Tests (Control Unit to Display Station)

<i>Test</i>	<i>Description</i>	<i>Refer to</i>
0	4-color test pattern	Section 2.6.2 and Figure 2-4
1	Error log for 3278/9	Section 2.6.3
2**	Control unit configuration data	MCM for the control unit
3	Status of attached devices	Section 2.6.4
4	Reset error log for 3278/9	Section 2.6.5
5**	Display control unit storage	MCM/MIM for the control unit
6*	Display key DCB information	MCM/MIM for the control unit
7	Operator convergence utility	See section 5.3.3
8**	7-color ECS/PS test pattern	See section 2.6.7 and Figure 2-7

\* Not available on 3276 control unit.

\*\* Not available on 3276 control unit or IDPA.

### 2.6.1 Running Online Tests

1. If the 'READY' symbol is not displayed in the OIA, set the Normal/Test switch to Test and back to Normal.
2. Hold down the ALT key, press the TEST key, and release both keys. TEST appears in the OIA.
3. Key in pp/n and press ENTER. (pp is the port number, 0-31, of the device to be tested or reported upon, and n is the number of the test.)

#### Notes:

- a. If pp is omitted the test is run on the requesting terminal.
  - b. The / must always be keyed in.
  - c. If n is omitted, test 0 is run.
4. To end the online tests:  
Hold down the ALT key, press the TEST key, and release both keys. TEST disappears from the OIA.
  5. Error Indicators. (Press RESET to continue.)

- a. ✘ -f (Do not enter, Function not available) ... you tried to select an in-session terminal for Test 0.
- b. ✘ 1#? (Do not enter, Op check, What number) ... you used an invalid test number, or address, or wrong test format. (Begin test format at position 0 and use only one slash / and no spaces).

Note: ✘ c-f will appear instead if connected to an IDPA.

### 2.6.2 Test 0

#### 2.6.2.1 Routines Only for Terminals Connected to IBM 3276 Controllor

The IBM 3276 control unit precedes the main test with two transmission test routines.

Note: Before going to a specific MAP reference, read the danger notice at the start of MAP 0000.

#### Test 0 - Routine 1 (3276 only)

This routine verifies the basic TA (Terminal Adapter) card functions - register, SERDES, command decode, and so on. Driver/Receiver

operations are not tested. If an error occurs, the test stops. See *IBM 3276 Control Unit Display Station Maintenance Information Manual*, SY18-2004.

#### Test 0 - Routine 2 (3276 only)

This routine is the Link test. It verifies the communications link by issuing reset and receiving a POR response. If an error occurs, the test stops. Read MAP 0000 page 2 and go to MAP 0100, Entry Point CC.

#### 2.6.2.2 Four-color Pattern Test

This test is used to verify the following:

- The correct control of a field by the field attribute byte.
- The 3279 alarm.
- The interaction of the 3279 with the control unit or IDPA.
- The action of the 0000/00 switch.

To run test 0, see section 2.6.1.

1. Ensure the 0000/00 switch is set to 0000.
2. The alarm sounds when one of the patterns in Figure 2-4 appears.
3. Verify that the red and blue fields become white and green when the 0000/00 switch is changed to 00.

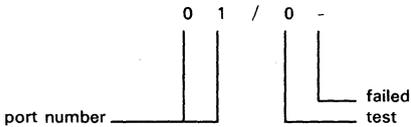
If this test fails read MAP 0000 page 2, and go to Map 0500 entry point A.

4. Reset the 0000/00 switch to 0000.
5. The pattern appears on the device connected to port number pp.

6. If the test request was to a different display, a suffix is appended to the request message.

Suffix	Meaning
+	Successful
-	Control unit or coaxial device cable failure
0	Display powered off

For example:



Control Unit Identifier  
(I = IDPA)

Port

```
TEST: nnnn;pp
?SEL PEN SEL PEN
&SEL PEN >SEL PEN
DISPLAY INSERT CK
```

White  
Intensified  
Protected

Red  
Intensified  
Non protected

Green  
Non protected

White  
} Attributes only

NON precedes DISPLAY but is a non display field that is visible only if the blanking fails.

All other fields in the test patterns are blue and protected. See Figure 6-17 for attribute bits.

Figure 2-4. Online Test 0 Pattern

**2.6.2.3 Interactive Test**

This test permits a visual display of the operation of the keyboard, selector pen, and MRC with the control unit or IDPA.

*Action**Results*

1. Ensure that the A,a/A switch is set to A,a.
2. Move the cursor under the C of the CK field.
3. Press the insert (â) key.                    ^ appears in the OIA.
4. Press keys J K L.                            ✕ > appears in OIA and the field in the fourth line becomes jkCK.
5. Press RESET.                                ✕ > and ^ are erased.
6. Test the Sel Pen feature.  
(You may simulate the Sel Pen by using the cursor and the cursor select key):
  - a. Touch the pen on ?SEL PEN field on the second line.  
(If ✕-f appears in OIA, press RESET and retry with increased brightness.)  
The second line becomes: >SEL PEN    SEL PEN
  - b. Repeat step a.                                The second line becomes: ?SEL PEN    SEL PEN
  - c. Touch the pen on >SEL PEN field on the third line.  
The third line becomes:    &SEL PEN    ?SEL PEN
  - d. Repeat step c.                                The third line becomes:    &SEL PEN >SEL PEN
7. To test the MRC feature:  
Move the cursor to the first position in the fifth line (line below the test pattern), and pass the MRC test card through the reader.  
If the read operation is successful, the cursor moves a number of positions equal to the number of characters on the MRC test card; the green light on reader turns on, and ✕-f is displayed in the OIA.  
If the read operation is unsuccessful, the red light on the reader turns on; press the reset key and repeat the test from Step 7.

Failure In	Read MAP 0000 Page 2 Then Go to MAP
Keyboard	0700 Entry Point A
Sel Pen	0800 Entry Point DD
MRC	0800 Entry Point EE

### 2.6.3 Test 1: Error Log

Online Test 1 allows the error log for any device attached to the control unit to be inspected. It may be useful to reset the error using Online Test 4 before testing, but note the contents of the log before doing this.

To run Test 1, see section 2.6.1.

#### 2.6.3.1 Online Test 1 Display: 3274 Control Unit or IDPA

```
pp/1
05XX  XXXX
XXXX  XXXX  XXXX
```

Figure 2-5. Test 1 Pattern

The most recent 3279 display error code appears in the first two digits on line 2. This code is prefixed by '2' when it appears in the operator information area.

For example, an error code of 205 ( X 42 205) is logged as '05'.

3274 error codes for the 3279 display are listed in Figure 2-8.

#### 2.6.3.2. Online Test 1 Display: 3276 Control Unit

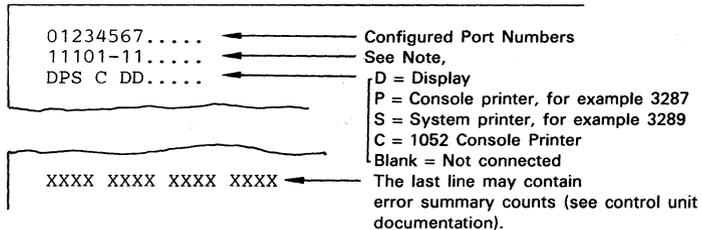
The pattern shown below is displayed. This is different from the 3274 because ALL errors are recorded and a count is kept.

Note that the 3276 error code is the same as that displayed in the OIA. For example: X 42 is logged as 42.

```
*** YY ***
0X  xx  --  xx  --  xx  --  ...
1X  --  xx  --  --  --  --  ...
2X  --  --  --  --  --  xx  ...
3X  xx  --  --  xx  --  --  ...
4X  --  --  03  --  --  --  ...
5X  --  --  --  --  --  --  ...
6X  --  --  --  --  --  --  ...
7X  --  --  --  --  --  --  ...
8X  --  --  --  --  --  --  ...
9X  --  --  --  --  --  --  ...
```

The above example shows that error code 42 (keyboard overrun) has occurred 3 times. For error code interpretation, see Figure 2-9.

### 2.6.4 Test 3: Status Summary



#### Notes:

Line 2 symbols refer to line 1 port numbers as follows:

- 1 Attached device has power on.
- TA card failed, or device is disabled because of control unit/IDPA detected error.
- 0 No TA card is installed, or the device has power off, or no device is attached to this port.

Figure 2-6. Test 3 Pattern

Test 3 gives data about each display unit attached to the control unit/IDPA.

To run Test 3, see section 2.6.1.

### 2.6.5 Test 4: Error Log Reset

Test 4 resets the error log. Its operation can be verified with test 1. A '+' response indicates that the Reset operation was successful.

To run Test 4, see section 2.6.1.

### 2.6.6 Test 7: Operator Convergence Utility.

See section 5.3.3 to use this test.

### 2.6.7 Test 8: 7-Color and Programmed Symbols (PS)

To run Test 8, see section 2.6.1. The pattern shown in Figure 2-7 is displayed.

If Extended Character Set (Models 2A and 3A) is not installed, the symbol ✕ ʘ#? appears in the OIA and the test will not run.

If Test 8 fails, read MAP 0000 page 2 and go to MAP 0800, Entry Point CC.



3274 Code	Repair Action (3279 logic card)	Error Code Explanation
202	D2.	Control unit keystroke/status buffer overflow
203	D2, then features then B2.	Feature Bus error
204	D2, or C2.	Storage error (Device Check)
205 *	D2, then C2, then features.	Unsupported feature attached
206	D2, then B2, then features.	Incorrect feature response on initialization
207 *	D2, then C2.	Lost Operation Complete this display
208	D2, then C2.	Invalid (unexpected) Operation Complete
209	D2, then C2.	Command queue failure
210 *	Keyboard ID jumpers, then cable, then D2.	Invalid keyboard attached (not configured)
211 *	D2, then features.	Invalid status received
212 *	Keyboard logic, then cable, then D2.	Invalid scan code received
222	G4, (selector pen), then D2, then C2.	Invalid selector pen status or command queue failure
223	E2, then D2.	ECS buffer parity error
224	G2 (MRC), then D2.	Invalid MRC status or command queue failure
225	E2, then D2.	ECS status/initialization failure
226	E2, then D2.	ECS command queue failure
227	E2, then D2.	ECS write alternate command queue failure
228	B2, then D2, then C2.	Storage parity error
229	B2, or D2, or C2.	Storage parity error
234	E2.	Switches not set to include APL
295	D2, then C2.	Invalid type A adapter status
299	D2, then C2.	Non-command queue cycle sharing machine check
2% % }		Not customized for attached features
2EE		

- \* Do the control unit and the customization support the 3279 features?  
Check ECS card switches, PS jumper, and keyboard jumpers (see Figure 6-14).

**Note:** For other error codes, see control unit or installed RPD documentation.

Figure 2-8. Error Codes From IBM 3274 Control Unit

3276 Code	Repair Action (3279 logic card)	Error Code Explanation
41	Keyboard logic, then cable, then D2.	Invalid scan code received
42	Keyboard logic, then D2.	Keyboard overrun
43	G2 (MRC), then D2.	MRC data parity error
44	G4 (selector pen), then D2, then C2.	Selector pen data parity error
45	G2 (MRC), then D2.	No response from MRC
55	B2 then D2, then C2.	Storage parity error
56	B2 then D2, then C2.	Storage parity error
60	G2 (MRC), then D2.	MRC timeout
61	G4 (selector pen), then D2, then C2.	Selector pen timeout
70	C2, then coaxial cable, then D2.	No response from terminal (timeout)
71	C2, then coaxial then D2.	Adapter receive parity error
72	C2, then D2.	Data parity error
73 *	D2.	Lost Operation Complete this display
74	D2, then features.	Feature timeout
77	D2, then C2.	Device check (buffer parity)
78	D2, then C2.	POR signal error

- \* Do the control unit and its features support the 3279 features?  
Check ECS card switches, and keyboard jumpers (see Figure 6-14).

**Note:** For other error codes, see control unit or installed RPQ documentation.

Figure 2-9. Error Codes From IBM 3276 Control Unit

## 2.7 Jumper Positions

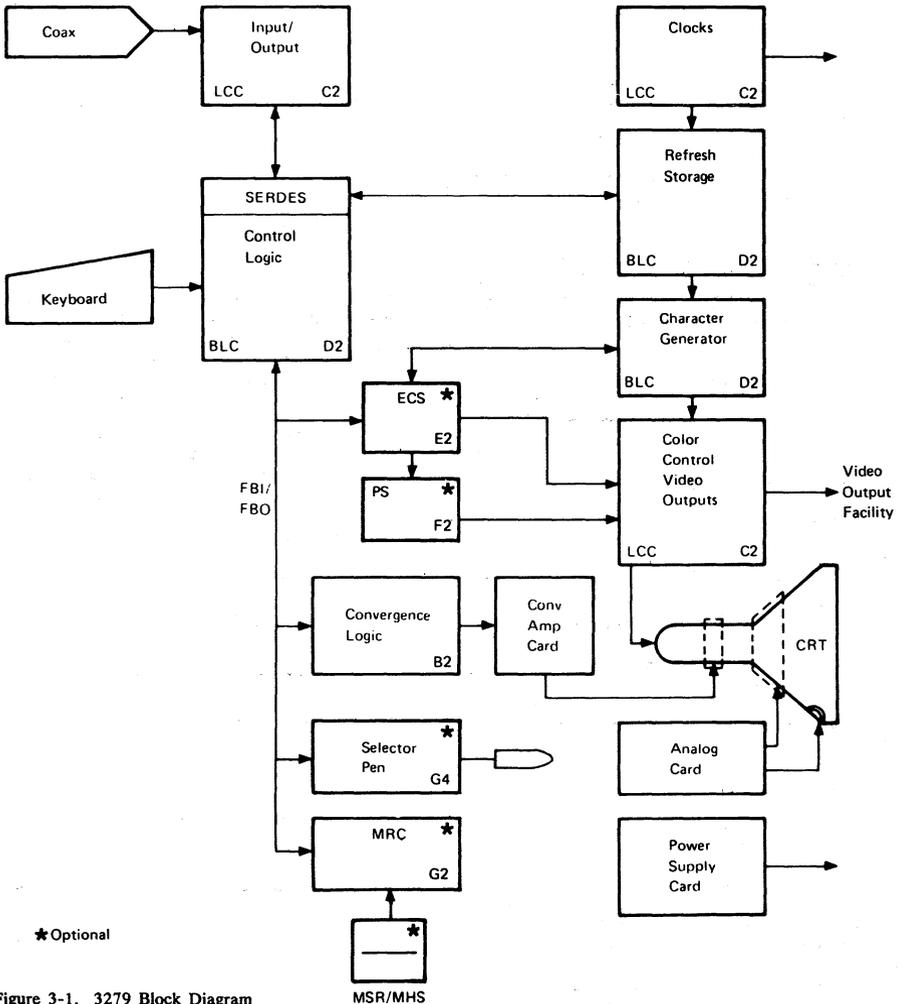
A number of jumper positions are available to aid display adjustments and fault-finding.

The positions and their uses are listed below. Note that *every* jumper position is activated when grounded. A recommended ground pin is listed.

<i>Name</i>	<i>Pin</i>	<i>Ground</i>	<i>Use/Description</i>
Force White	C2W07*	C2W28	All characters on the screen become white. Good test of convergence over whole screen, used to set up static convergence (at screen center).
Color Balance Bars	C2W09*	C2W28	A number of colored bars, 2 characters high, are displayed (must be characters on screen). Color balance.
Reverse Video	D2Y02*	D2Z04 or E2Z04	All characters are reversed. Used to check purity.
CE Jumper	D2Y09*	D2Y08	When the Normal/Test switch is set to the Test position, this jumper allows entry directly to Test Mode 3 without resetting the refresh buffer. Nulls display, attributes are blank, and red and white are interchanged.
Pen Detect Lines	D2Y10*	D2Y08	Displays selector pen detect lines.
Storage Power	B2B08	B2D08	Removes power from storage to force a convergence check. Used in setting up convergence.
Force Characters	C2G06	D2J08	Easy method of filling screen with characters when online to check overall convergence.
Disable Skip	C2J04	D2J08	Inter-row skip (Mod 2 only) is disabled. Separator line moves up. Used when adjusting image height.
Force Green	C2S11	C2U08	Green video is forced permanently on. Used to check green video amplifier and gun.
Force Blue	C2S12	C2U08	Blue video is forced permanently on. Used to check blue video amplifier and gun.
Force Red	C2U11	C2U08	Red video is forced permanently on. Used to check red video amplifier and gun.

\*See Figures 1-6 and 6-3 for top card connector pin numbering.

### Chapter 3. Functional Components



★ Optional

Figure 3-1. 3279 Block Diagram

### 3.1 Power Supply

The power supply switches the line voltage at high frequency using pulse width modulation.

The modulated voltage is fed to the primary windings of a power transformer. The outputs from the secondary windings are rectified to produce the following voltages:

<i>Voltage (V dc)</i>	<i>Tolerance (± %)</i>	<i>Max. Ripple (V pk-pk)</i>
+103	6	0.7
+12	10	0.4
-12	10	0.4
+8.5	10	0.26
+5	10	0.15
-5	10	0.15

The transformer incorporates a feedback winding to control the pulse width and hence the output voltages.

A signal from the analog card (LOPT sense) locks the power supply oscillator to the line timebase frequency, to eliminate interference on the display caused by the high frequency modulation. This signal also indicates to the power supply an overvoltage condition on the analog card.

If either the overvoltage or the overcurrent protection mechanism shuts down the power supply, it retries up to seven times, approximately once per second and the 'POWER GOOD' indicator light 1 flashes at this rate, provided that the failure is not on the +5 V line. An audible click may be heard from the supply at each retry by listening near the ventilation slots above the power supply card.

A fuse is located on the power supply card. If it fails, the power supply card must be exchanged.

### 3.2 Analog Card

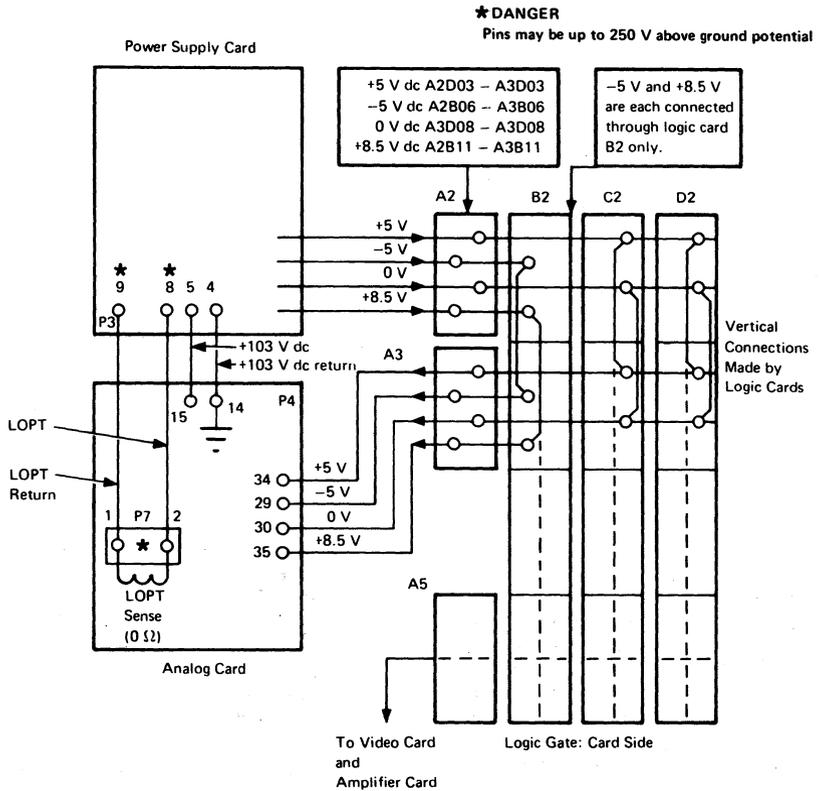
The analog card generates horizontal and vertical drives for the CRT scan coils and includes the extra-high-voltage (EHT) power supply. When the logic is supplying horizontal and vertical synchronizing signals, the timebases on the analog card lock to the imposed frequency.

The line output transformer (LOPT), in the horizontal drive circuit, provides the following supplies:

<i>Voltage (V dc)</i>	<i>Where Used</i>
+25	- On-card use, deflection amplifiers
-25	- On-card use, deflection amplifiers
+12	- On-card use and card B2
+70	- To video card
-150	- Through brightness control, amplifier card, and color balance controls to CRT grid
+280 to +450	- Focus circuits and CRT anode
+6 kV	- Focus circuits
+6.3	- CRT filament (see Figure 6-7)
+25 kV	- EHT supply to CRT

The analog card receives a further signal ('skip'), which forces the raster to move vertically a defined amount (see Figure 2-1).

To start up, the analog card requires  $\pm 5$  V dc, +8.5 V dc, and +103 V dc. When the power is turned on the horizontal drive circuit starts and produces the additional supplies. These enable the vertical drive circuit to start and this initiates a delay. After 45 seconds DISPLAY READY (indicator 2) turns on and a change in CRT grid voltage unblanks the screen.



See Figure 6-4 for voltage pins on Planar strips

Figure 3-2. Power Supplies to Logic Gate and Analog Card

### 3.3 Amplifier Card and Inputs

#### 3.3.1 Convergence Circuits

The convergence amplifiers drive the convergence coils, which provide the necessary correction for all points on the screen to the three beams (see Figure 3-3).

The current in the convergence coils is controlled by data in a store which is read in step with the scanning of the screen. The data in this store may be altered by the operator to compensate for CRT ageing.

As data in the convergence store in the display is lost when power is turned off, the convergence store is supported by battery-maintained storage. When the 3279 display is switched on, the convergence logic card B2 generates a 'power on reset' to the logic. This resets most registers and sets the status to 'power on reset'. The next poll from the control unit to which the 3279 is connected detects the status and then reads the

data from the battery-maintained storage and processes it to set up the correct data in the convergence store. This is normally complete before the screen unblanks. The power on procedure also occurs when the Normal/Test switch is returned to Normal.

When the operator uses the convergence procedure in the online tests, the data in the battery-maintained storage is modified and the convergence store is updated.

Note that the convergence control circuits are packaged on two cards (see Figure 3-3):

- Logic card B2, (4Wx3H) carries the volatile and non-volatile stores and the logic.
- The amplifier card receives four convergence analog signals from the logic card and amplifies these to drive the convergence correction coils.
- The amplifier also may contain gain controls that are factory-preset.

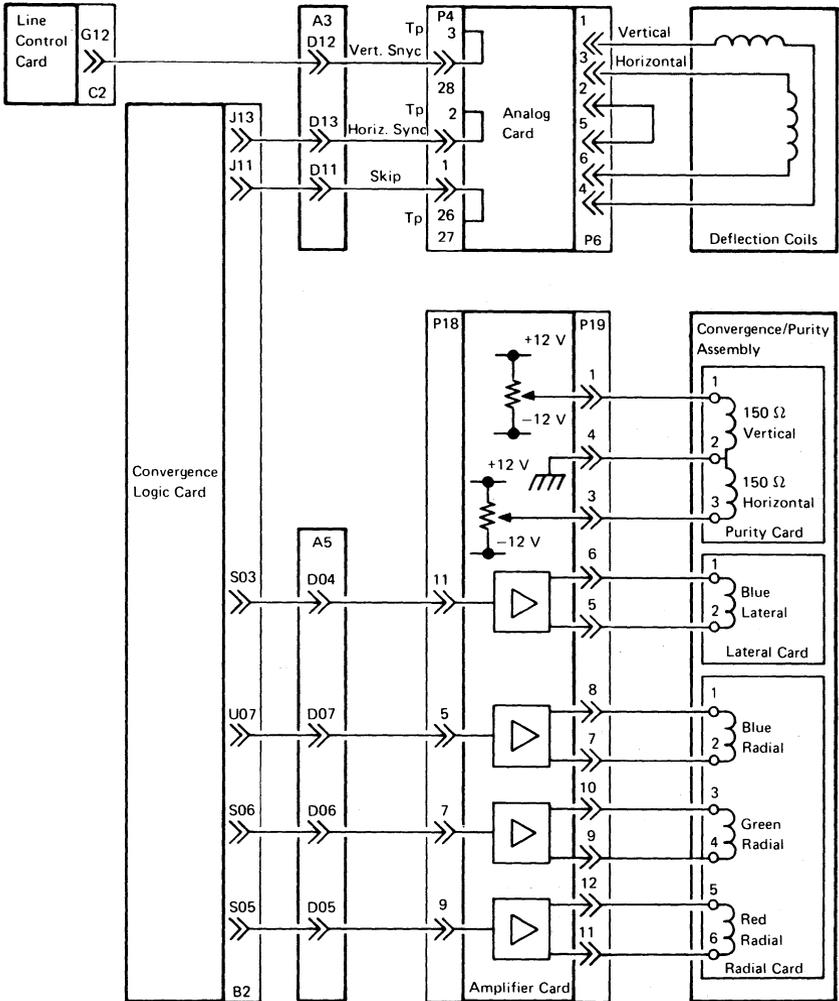


Figure 3-3. Synchronization, Convergence, Purity, and Deflection Coil Connections

### 3.3.2 Color Controls

Also located on the amplifier card are the six color-balance potentiometers. These receive a voltage of between -150 V dc and 0 V from the brightness control and work in pairs to set the minimum and maximum brightness levels for each color.

Two more potentiometers allow color purity adjustments.

### 3.4 Video Card

The video (tube neck) card receives the three video signals and amplifies them to drive the CRT cathodes (see Figure 6-7). The CRT filament supplies, the anode supply, and the grid (brightness) voltages go through this card to the CRT pins. The focus supply is wired directly to the CRT socket.

### 3.5 Cathode Ray Tube and Coil Assembly

The human eye contains detectors for red, green, and blue light. These are the 3 primary colors. Other colors (and white) are seen as mixtures of these. The screens of color CRTs are made of dots of 3 phosphors which emit red, green, and blue light when they are hit by electrons.

The red and green phosphor dots in the 3279 are pure, that is, they emit only red or green light. The blue dots are impure, that is, the blue light is mixed with a little green and red to improve the overall balance of the colors. This is done because pure blue is too dark. This means that any mixed colors that include blue will be changed. If the brightness of the primary colors is not balanced, the mixed colors will not be correct and the white will be colored.

<i>Phosphor Dots Illuminated</i>	<i>Color seen on 3279 Screen</i>
--------------------------------------	--------------------------------------

Red	Red
Green	Green
Blue	Blue
Red and Green	Yellow
Red and Blue	Pink (Violet, Magenta)
Green and Blue	Turquoise (Light Blue, Cyan)
Red, Green, Blue	White

Each primary color has a separate electron gun, with a separate grid to control its brightness, see figure 3-4. The three electron beams are accelerated and focused by a single anode assembly and deflected across the screen by a single set of deflection coils. The three beams arrive at the screen at slightly different angles. A mask (see Figure 3-4) which is at EHT voltage is located a few millimeters from the screen phosphor. The small holes in the mask break each beam into six or seven smaller beams before they hit the screen phosphor. The angle of the beam at the mask directs the beam to the correctly-colored phosphor dots.

Another group of coils is arranged around the neck of the CRT between the cathodes and the common anode. These are used to improve purity and convergence.

1. *Purity* - These coils move the three beams together under horizontal and vertical controls to strike the shadow mask at the correct angles.
2. *Static Convergence* - Three thumbwheels (mounted on an assembly on the CRT neck) and the blue lateral static convergence potentiometer (mounted on the convergence amplifier card) allow the three color beams to be aligned individually at the center of the screen.
3. *Dynamic Convergence* - The overall deflection distortion is corrected by normal pincushion correction controls. The distortion of each beam is, however, slightly different. These differences are corrected by the dynamic convergence circuits. Voltage waveforms are generated on the convergence logic card B2 and fed to the coils via the amplifier card. Thus the 3 primary color images lie on top of one another all over the screen. Observe the difference in quality of multi-colored images in Test Mode 3 compared with concurrent test 0.

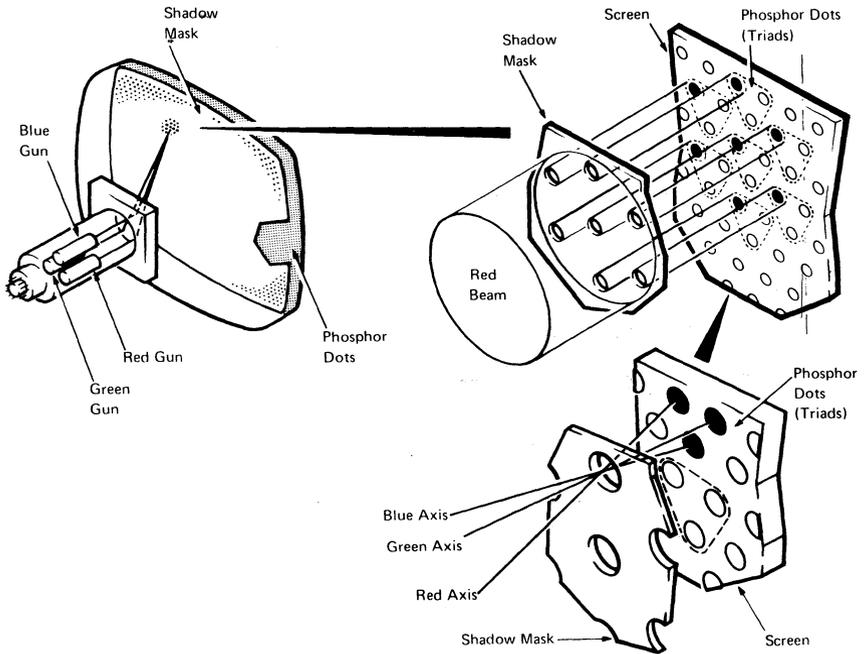


Figure 3-4. Shadow Mask

### 3.6 Convergence Logic Card (Location B2)

The convergence logic card (see Figure 3-5) provides digitally-controlled analog signals for convergence of the display unit. The card has two storage areas that hold the definitions of the currents required in the convergence coils. The digital information is converted to analog signals and fed to the amplifier card in the main enclosure assembly.

The card is connected to the base logic card through the feature bus so that the stores can be accessed and updated.

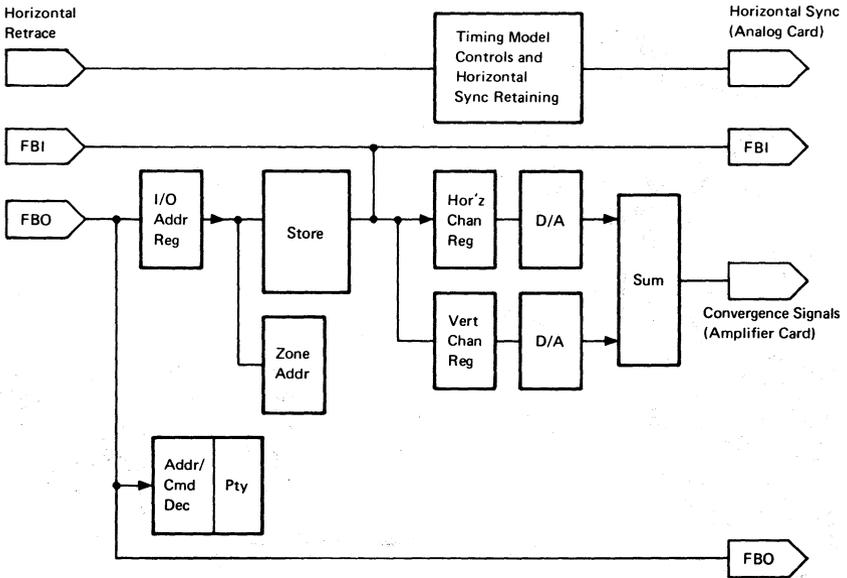


Figure 3-5. Convergence Logic Card (B2)

### 3.7 Line Control Card (Location C2)

The line control card (see lower part of Figure 3-6) contains:

- Circuits to handle transmission and reception of data down the coaxial line to the control unit.
- Main oscillator (14 MHz), dot counter and feature clock.
- A serializer that converts the ROS outputs from the base logic card to drive the three video outputs.
- Test circuits that force colored bar patterns on the screen adjustments.
- (Video Output Facility only) Circuits that produce red, blue, green, and sync signals for external monitors.

### 3.8 Base Logic Card (Location D2)

The base logic card (see upper part of Figure 3-6) contains:

- The display buffer, which holds the character code for each position on the screen.
- The ROS which stores the character shapes. It is addressed by the display buffer and the outputs are fed to the line control card.
- Attribute control circuits. The base attribute byte defines the characteristics of the field.
- Keyboard control circuits for keystrokes and responses.
- Logic for handling I/O operations with the display buffer. This involves the base I/O address counter which is also used by the features as an address for I/O operations.
- The character counters.
- Feature bus controls. The feature bus is the main path for transmitting data around the machine.

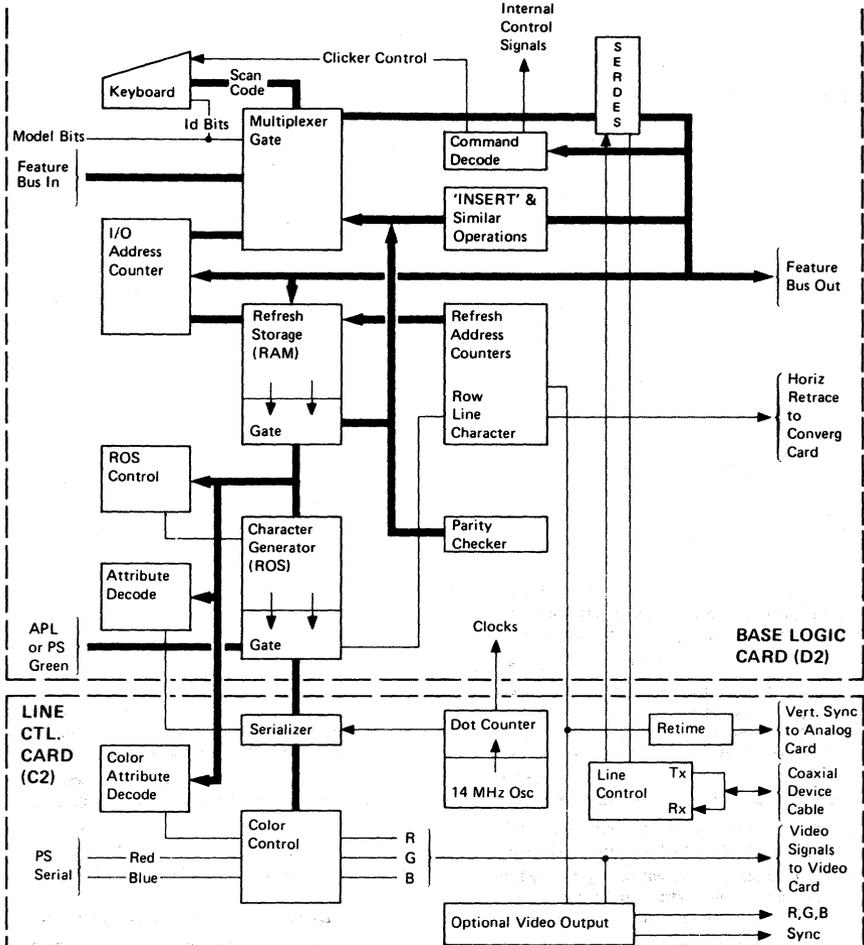


Figure 3-6. Base Logic Card (D2) and Line Control Card (C2)

### 3.9 APL/Extended Character Set (ECS) Card (Location E2)

The ECS card (see Figure 3-7) allows the user to define the color of characters on a character basis by providing a shadow buffer with a byte of information for each character position in the display buffer. This shadow buffer (see Figure 6-19) can select characters from the APL ROS (or several programmable fonts if the Programmed

Symbols feature is installed). It can cause the characters to appear in any of seven colors and can highlight the characters. The APL ROS is pluggable, although it is standard with the ECS/APL card in the 3279. The switches are set as shown in Figure 6-14. These return the correct response when the control unit addresses a 'Read ID' command to the ECS feature.

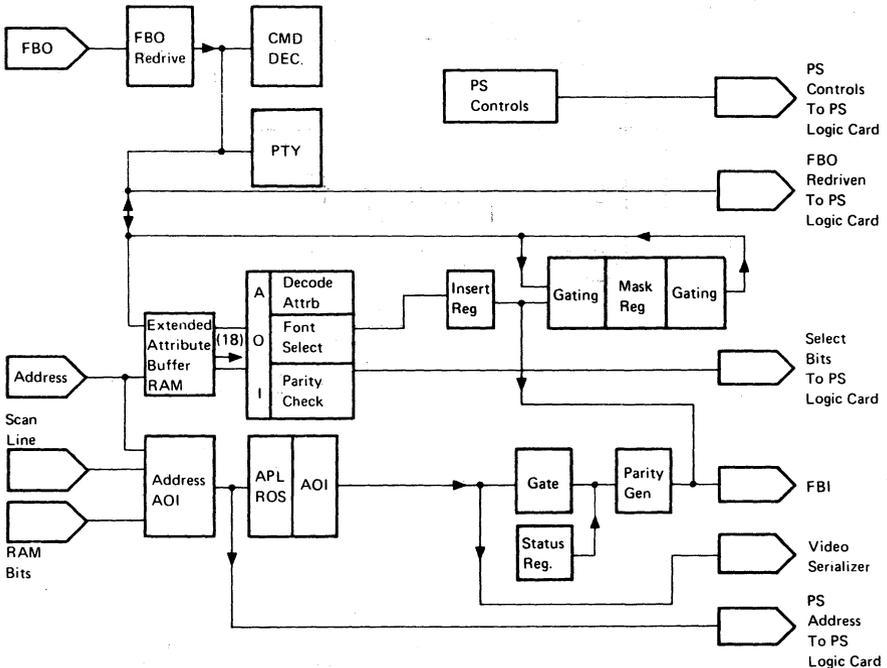


Figure 3-7. APL/ECS Card (E2)

**3.10 Programmed Symbols (PS) Card (Feature) (Location F2)**

The PS (Programmed Symbols) card (see Figure 3-8) allows the host, or the user through the host, to program the shapes of characters for display on the screen. Special character sets and graphic characters may be programmed. Two fonts (A and B, PS2 feature) or six fonts (A through F, PS2 and

PS4 feature) may be installed. Each font is used in the same manner as the APL ROS, selection being by ECS. When PS2 only is included the jumper is installed. This rearranges the addressing to bring the second programmed font within the storage module, see Figure 6-14.

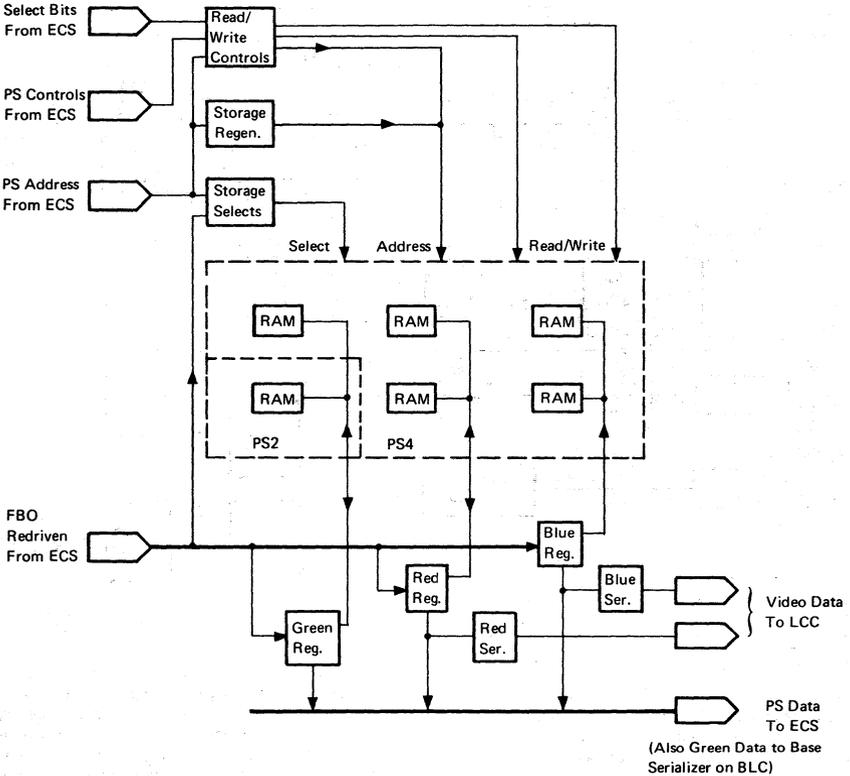


Figure 3-8. Programmed Symbols Card (F2)

Each PS font contains 190 programmable characters. The user can program each pel in the 9 x 12 matrix of each character. The color of the character is defined by the base or ECS attribute (see section 6.12).

For the triple fonts C, D, and F only, the user can program the color of each pel separately when the ECS byte color field is 111. For other combinations of the color field bits, the color of the complete character is defined by the ECS attribute, as for the other fonts.

### **3.11 Selector Light Pen (LP) Card (Feature) (Location G4)**

This card contains the logic for the operation of the selector light pen (see Figure 6-13).

### **3.12 Magnetic Reader Control (MRC) Card (Feature) (Location G2)**

This card contains the logic for the operation of the magnetic slot reader (MSR) or magnetic hand scanner (MHS) (see Figure 6-13).



## Chapter 4. Removal and Replacement Procedures

### 4.1 General

It is recommended that the display be positioned near the corner of a table with the right-hand side of the bezel nearest the corner, leaving sufficient clearance for the bezel to be placed face down on the table in front of the display. If a tilt/rotate table is used, lock it in the horizontal position.

### 4.2 Logic Gate

To open the logic gate, insert an allen wrench in each of the two slots on the right-hand side of the display and turn the wrench a quarter turn in each slot. The rear enclosure assembly can then be swung open on the hinges.

### 4.3 Rear Cover

To remove the rear cover, open the customer access panel by pressing up on the two clips. Remove the three screws located along the hinged section of the cover.

### 4.4 Bezel

1. Switch power off and remove the mainline power cable from the power socket.
2. Remove the two allen screws from the under side of the bezel and lift the bezel up and away from the enclosure assembly.

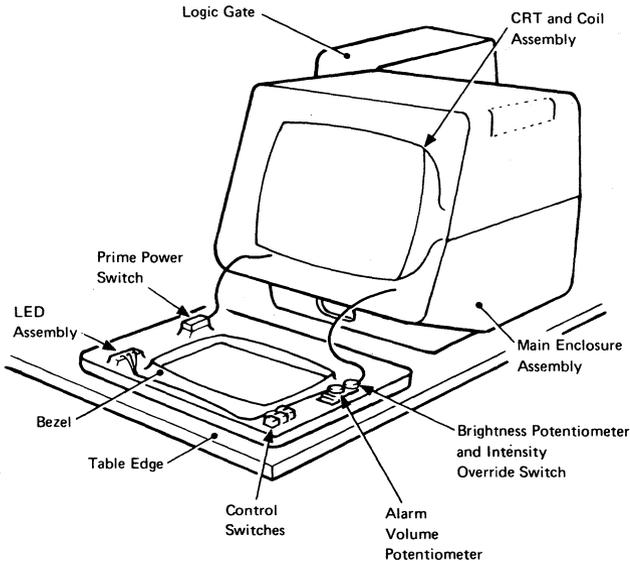


Figure 4-1. General View - Bezel Removed

#### 4.4.1 ON/OFF Switch

1. Remove the bezel (see section 4.4).
2. Release the internal power cable from the clamp near the ON/OFF switch.
3. Press to one side the plastic catch at the side of the switch, and pull the switch out. Remove the power supply (see section 4.5.2).
4. Unplug connector P2 from the prime power box.
5. Reinstall in reverse sequence.

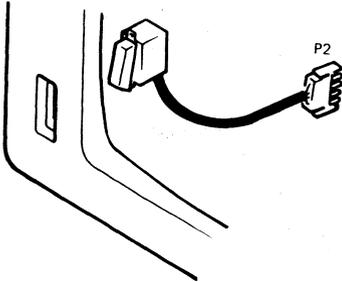


Figure 4-2. ON/OFF Switch

#### 4.4.2 Brightness and Audible Alarm Volume Controls

1. Remove the bezel (see section 4.4).
2. Pull off the two knobs.
3. Remove the tape from around P11 and unplug it. Release the mounting bracket from the inside of the bezel.
4. Reinstall in reverse sequence.
5. Wrap two turns of adhesive tape around P11 to insulate the contacts (150 V) and hold the plug and socket together.

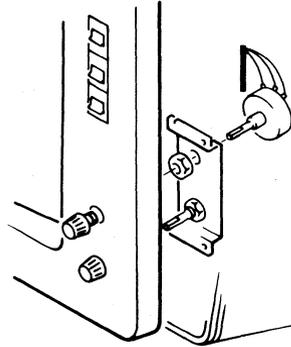


Figure 4-3. Brightness and Audible Alarm Volume Control Assembly

#### 4.4.3 Normal/Test, Base Color, and Dualcase/Monocase Switches

Three switches on the upper right of the bezel are removed as follows:

1. Remove the bezel (see section 4.4).
2. Disconnect the wiring to the switch.
3. Pinch the spring clips together and push the switch and clip out through the front of the bezel.
4. Reinstall in reverse sequence.

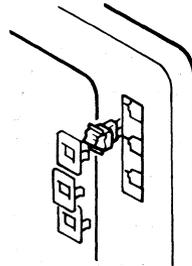


Figure 4-4. Switches

#### 4.4.4 Indicator LEDs

Before removing the LED assembly, switch off power and remove the mainline power cable from the power socket. The indicator LEDs are contained on a PCB as shown in Figure 4-5.

#### 4.4.5 Security Keylock

1. Remove the analog card (see section 4.5.4).
2. Disconnect P9 and remove the retaining nut (use wrench, IBM Part 4418787).
3. Withdraw the keylock assembly.
4. Replacement is the reverse of removal, but ensure that the keylock is inserted the correct way up so that the key can be turned without hitting the side of the display unit.

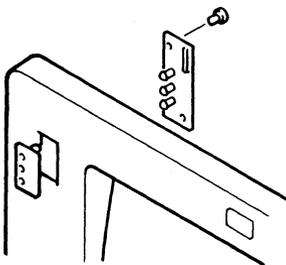


Figure 4-5. Indicator LED Assembly

### 4.5 Power Units

#### **DANGER**

*Before any power unit replacement procedures are performed, the display must be powered off and the mainline power cable disconnected at the power socket.*

#### 4.5.1 Fuse

#### **DANGER**

*Switch power off and remove the mainline power cable from the power socket before changing the fuse.*

The main supply fuse is located in the front enclosure assembly below the bezel. Push the fuse cover and turn it counterclockwise to release the fuse.

#### 4.5.2 Power Supply

The power supply is located to the right of the CRT as viewed from behind.

#### **DANGER**

*Components on this card are hot. Before handling the card, allow it to cool for 5 minutes with power turned off.*

1. Switch power off and remove the mainline power cable from the power socket.
2. Remove the rear cover (see section 4.3).
3. Unplug the A2 cable connector.
4. Remove the retaining clip that holds the cable to the inside of the logic gate.
5. Pull the flat cable through the gap (it is easier if the connector shroud is removed).
6. Remove the two screws and pull out the power supply card.
7. Reinstall in reverse sequence, ensuring that the card is correctly located in the bottom guide and both top guides.
8. See Chapter 5 for adjustments.

#### 4.5.3 Prime Power Box

1. Switch power off and remove the mainline power cable from the power socket.
2. Remove the power supply as described in section 4.5.2.
3. Remove connectors P1 and P2 from the prime power box assembly.
4. Disconnect the ground wires from the assembly.
5. Remove the two screws that secure the assembly to the base of the enclosure.
6. Remove the assembly from the display.
7. Reinstall in reverse sequence.

#### **DANGER**

*Ensure that all ground connections to the prime power assembly are reconnected.*

#### 4.5.4 Analog Card

The analog card is located to the left of the CRT when viewed from behind.

1. Switch power off and remove the mainline power cord from the power outlet.
2. Disconnect the two ground wires from the ground screw at the bottom of the card assembly.
3. Remove the two screws at the top and bottom of the analog card assembly and the center clamp.
4. Withdraw the assembly toward the rear of the machine taking care not to damage the cables connected to the card.
5. Unplug P5, P6, P7, and P26 (see Figure 4-7) from the analog card.
6. Unscrew the clamp that holds the red EHT wire at the Line Output Transformer (LOPT) connector, P21. Pull out the wire and discharge it to the frame.
7. Remove the analog card.
8. To reinstall, first check that the jumper matches the CRT.  
*Note: There are alternative positions for the CRT jumper depending on the level of the analog card, see Figure 4-7.*
  - a. If the tube is manufactured by the Matsushita Electronics Corporation (see label on the bell of the CRT behind the analog card), install the jumper in position L.
  - b. If the tube is manufactured by the Mitsubishi Electric Corporation (see label on the bell of the CRT behind the analog card), install the jumper in position H.
9. Insert the EHT cable *fully* into the LOPT socket, P21 and screw down the cable clamp.
10. Continue installation in reverse sequence. Ensure that the card is correctly located in the top and bottom guides.
11. Reconnect 2 ground wires and screw down.

#### **DANGER**

*Verify that all ground wires are reconnected securely. Refer to Figure 6-6 for grounding details.*

12. See Chapter 5 for adjustments.

#### 4.6 Logic Cards

##### 4.6.1 Removal

Switch power off. Remove any attached top card connectors. Operate the levers in the directions shown by the arrows in Figure 4-6 and withdraw the card.

##### 4.6.2 Replacement

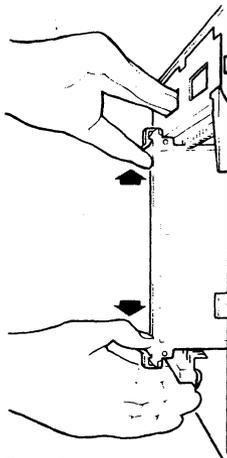
Push the card firmly into its socket and then operate the levers as shown in Figure 4-6. Replace the top card connectors, see Figure 1-6.

#### **CAUTION**

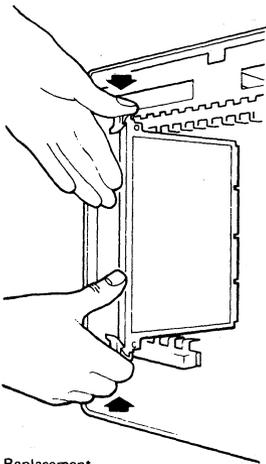
**Always use a card shroud when reinstalling a card, to prevent contact with adjacent cards.**

For ECS and PS feature cards (E2, F2) see Figure 6-14 for details of switch settings and module and jumper positions.

*Note: 3279s with the Video Output Facility have a video output card instead of a line control card in location C2. The video output card has two extra modules. When this card is installed in location C2, the resistance between each video output socket and ground falls to less than 10 kilohms.*



Removal



Replacement

#### 4.7 Connectors

Most internal connectors have mechanical locking devices.

##### 4.7.1 Multi-Pin Connections

Removal - Pinch the latch tabs together and pull the connector free from the pins.

Replacement - Reseat the connector ensuring that the tabs are latched.

##### 4.7.2 Internal Coaxial Connection

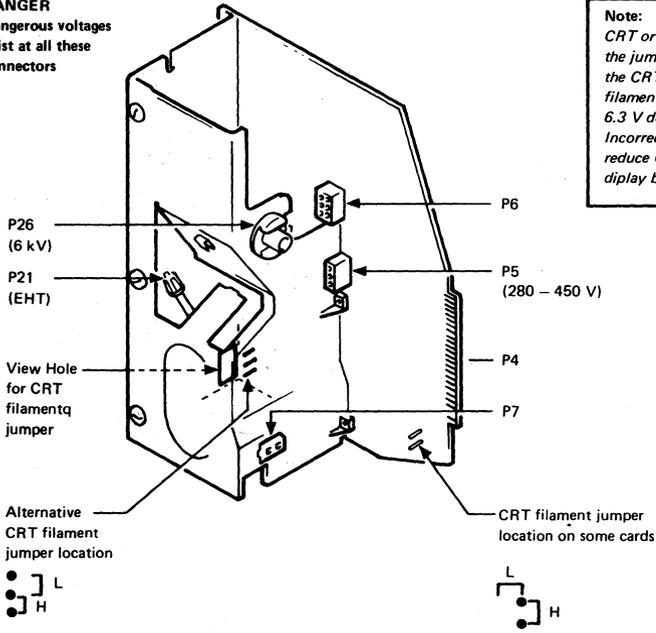
Removal - Press and hold the latch button and pull the connector free.

Replacement - Reseat the connector ensuring that it is latched (see Figure 6-13 for location).

Figure 4-6. Logic Card Removal and Replacement

**DANGER**  
 Dangerous voltages  
 exist at all these  
 connectors

**Note:** When exchanging a CRT or Analog Card, match the jumper position to the CRT. This sets the filament voltage to 6.3 V dc. Incorrect setting may reduce CRT life or the display brightness.



Jumper Position Symbol	L	H
CRT Manufacture – See label on bell of CRT behind analog card.	Matsushita Electronics Corporation	Mitsubishi Electric Corporation
CRT filament current	Low (715 mA)	High (800 mA)
Filament configuration	Three in parallel	Three in series
Filament resistance (Cold)	1.9 Ω	1.4 Ω

Figure 4-7. Analog Card

## 4.8 Video Components

### 4.8.1 Amplifier Card

#### **DANGER**

*Components on this card are hot. Before handling the card, allow it to cool for 5 minutes with power turned off.*

1. Switch power off and remove the mainline power cable from the power socket.
2. Remove the four push-in multi-wire connectors P17A, P17B, P18 and P19 from the amplifier card (see Figure 6-10).
3. Remove the screws that secure the safety cover and remove the cover.
4. Pull the amplifier card off its four locating lugs.
5. Reinstall the amplifier card in reverse sequence. The multi-wire connectors cannot be mixed up because they are different sizes. Do not finally tighten the safety cover securing screws until these connectors have been reconnected.
6. See Chapter 5 for adjustments.

### 4.8.2 Video Card

1. Switch power off and remove the mainline power cable from the power socket.
2. Remove the analog card (see section 4.5.4, steps 1 through 4 only).
3. Unplug P5 and P26 from the analog card (see Figure 4-7).
4. Disconnect the three ground wires from the video card. Note the connection points and routing of the wires (see Figure 6-9).
5. Pull the video card off the CRT base.
6. Disconnect P14, P15 and P16 from the video card (see Figure 1-4).
7. Reinstall in reverse sequence.
8. See Chapter 5 for adjustments.

### 4.8.3 CRT and Coil Assembly

**DANGER** Wear safety equipment (see 'Cathode Ray Tube Safety' at the front of this manual) when handling CRTs.

#### 4.8.3.1 Removal

#### **CAUTION**

Support the logic gate to prevent the display from falling backward when the CRT and coil assembly is removed.

1. Remove the mainline power cable from the power socket.
2. Position the display as described in section 4.1, with logic gate open.
3. Remove the bezel (see section 4.4) and place it face down in front of the display. Release the internal power cable from the rubber clamp near the ON/OFF switch.
4. Remove:
  - The power supply (see section 4.5.2)
  - The analog card (see section 4.5.4)
  - The amplifier card (see section 4.8.1)
  - The EHT bleed assembly (see section 4.8.4, but do not remove the bleed assembly from the bracket)
5. Pull the video card from the CRT base and place it on the table.
6. Loosen the clamp and pull the convergence coil assembly from the CRT neck.
7. Disconnect P27 (front left of the CRT screen - see Figure 1-2).
8. Disconnect the ground braid clamp and its jumper link (Figure 6-9). Ensure that the braid can move forward freely.

#### **CAUTION**

The following steps free the CRT from its mounting. The CRT weighs approximately 7.5 kg; support it and protect it from excessive pressure that could damage it or other units. Handle the CRT by the bell only, NOT by the neck.

9. Remove the four hexagonal nuts and washers from the corners of the CRT face.
10. Check that the logic gate is supported.

11. Observing normal CRT safety precautions (see "CRT Safety" at the front of this manual), move the CRT from the display unit and put it face down on the bezel.
12. Remove the wrap tie that secures the degauss coil.
13. Remove the degauss coil, ground braid and securing clips from the CRT.
14. Prepare a surface for the CRT and move the CRT to that surface.

#### 4.8.3.2 Replacement

1. Ensure that the case that contains the new CRT is the correct way up.
2. Remove the new CRT from its case and set it on the bezel with the EHT connector to the front.
3. If you do not have a new piece of plastic foam (acoustic shield) to fit around the deflection coils, transfer the plastic foam from the old CRT.
4. Pack the old CRT in the case provided with the new CRT.
5. Install the degauss coil, ground braid and securing clips on the new CRT. Keep the ground braid between the tube and the degauss coil.
6. Secure the degauss coil in position with the wrap.
7. Observing normal CRT safety precautions, install the CRT in the display unit, taking care to avoid trapping or fouling any cables.
8. Insert the washers and nuts but do not tighten the nuts.
9. Check that all cables and connectors within the display unit are free and accessible.
10. Connect the degauss coil (P27).
11. Center the CRT in the display and tighten the nuts.
12. Check that the CRT is centered by replacing the bezel and repeat Step 11 as necessary.
13. Remove the pin protector from the CRT and insert it on the failed CRT.
14. Slide the convergence coil assembly onto the CRT neck and position the assembly over the interelectrode gap as shown in Figure 4-8. Adjust the angular alignment to the stated tolerance. Use the machine base as a reference. *Note: If the coil assembly is too far forward there will be too little sensitivity, if it is too far to the rear, there will be too much sensitivity.*
15. Secure the convergence coil assembly by the clamp but do not over-tighten the screw. *Note: If the coil assembly is too far forward there will be too little sensitivity, if it is too far to the rear, there will be too much sensitivity.*
16. Check that the jumper on the analog card matches the CRT type (see Figure 4-7).
17. Reconnect the ground braid clamp (see Figure 6-9) and replace the jumper link.
18. Install:
  - The EHT bleed assembly (see section 4.8.4.2. steps 2 through 4)
  - The amplifier card (see section 4.8.1)
  - The video card (see section 4.8.2)
  - The analog card (see section 4.5.4)
  - The power supply (see section 4.5.2)
19. Reconnect all plugs that were disconnected during the removal procedure.
20. Ensure that all ground connections are reconnected securely, including the two on the analog card heatsink.
21. Check that all cards and connectors are correctly seated.
22. Replace the rubber clamp on the internal power cable near the ON/OFF switch.
23. Secure the bezel to the front of the display unit (see section 4.4).
24. Carry out Display Setup as detailed in Chapter 5.
25. On completion of the initial checks and the setting up procedures, replace all the safety covers and close the logic gate.

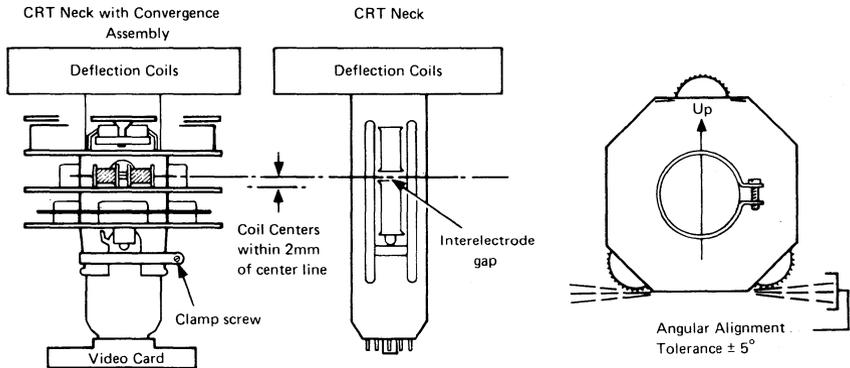


Figure 4-8. Convergence/Purity Coil Assembly

#### 4.8.4 EHT Bleed Assembly

##### 4.8.4.1 Removal

1. Switch power off and remove the mainline power cable from the power socket.
2. Remove the power supply card (section 4.5.2), analog card (section 4.5.4), and amplifier card (section 4.8.1)

##### **DANGER**

*Do not let anything fall on the tube neck.*

3. Loosen the two screws holding the bleed assembly/amplifier card bracket in the top of the box, and remove the assembly.

##### **DANGER**

*The CRT retains a capacitive charge after the EHT lead has been disconnected (step 4). It must be discharged to ground with a suitably installed lead before the CRT is handled or the EHT lead is reconnected. Ensure that the discharge lead is connected to ground BEFORE touching it onto the CRT connector.*

4. Supporting the bleed assembly, unplug the EBT cable from the top of the CRT. Lift the rubber cap at the edge to break the airlock, grasp the cap firmly, rock it to one side, and lift.

5. Disconnect the ground connector at the prime power box (see Figure 6-5).
6. Withdraw the bleed assembly/bracket, remove two securing screws, and take the bleed assembly from the bracket.

##### 4.8.4.2 Replacement

1. Mount the bleed assembly on the bleed assembly/amplifier card bracket and secure it using the two screws removed in step 6 of section 4.8.4.1.
2. Connect the bleed assembly ground cable to the prime power box.
3. Connect the EHT cable to the CRT.
4. Attach the bracket to the display and tighten the two screws loosened in step 3 of section 4.8.4.1.
5. Reinstall the analog card (see section 4.5.4).

##### **CAUTION**

Verify that all ground wires are reconnected securely. Refer to Figure 6-5 for grounding details.

6. Reinstall the power supply card and the amplifier card and make all connections.
7. Ensure that all ground connections are replaced.

#### 4.8.5 Degauss Coil

To remove and replace the degauss coil, go to section 4.8.3 "CRT and Coil Assembly". For removal, follow 'Removal' steps 1 through 13. For replacement, follow 'Replacement', steps 5 through 23 omitting step 13.

Display adjustments should not be affected, but refer to Chapter 5 if necessary. Reinstall all safety covers and close the logic gate.

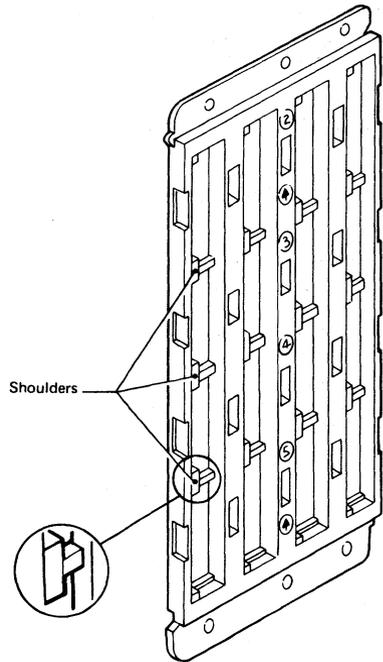
### 4.9 Logic Board Planar Strips

#### 4.9.1 Removal

1. Switch power off and remove the mainline cable from the power socket.
2. Remove the rear cover (see section 4.3)
3. Disconnect all connectors and note their locations.
4. Remove the logic cards.
5. Remove the two diagonally opposite screws (top right and bottom left) that attach each rear planar strip holder to the logic gate.
6. Remove the rear holders and planar strips.

#### 4.9.2 Replacement

1. Feed the cables that plug into the strips through the gap at the right-hand side of the logic gate (as viewed from the rear). It is easier if the shrouds are removed; replace them afterwards.
2. Ensure that the card-locating shoulders on the strip holders are positioned the correct way round (see Figure 4-9).
3. Insert the planar strips and rear holders in approximately their correct positions. Insert, but do not tighten, the strip-securing screws.
4. Plug all the logic cards into the gate and clip them in position.
5. Close the logic gate so that the enclosure positions it at the correct height, then tighten the strip-securing screws.
6. Open the logic gate. Reinstall all connectors (pass the keyboard cable through the gap at the right-hand side of the logic gate as viewed from the rear).



**Note:** Shoulders should be to the left and arrows pointing up for both card side and pin side of holders when viewed from the appropriate side.

Figure 4-9. Planar Strip Holders

## 4.10 Audible Alarm

1. Switch power off and remove the mainline power cable from the power socket.
2. Remove the analog card as detailed in section 4.5.4.
3. Remove the two screws that secure the audible alarm assembly to the base of the enclosure (see Figure 4-10).
4. Note the position of the five wires connected to the audible alarm assembly by push-in connectors (see Figure 4-10).
5. Lift the audible alarm assembly, remove the five connectors and withdraw the alarm from the display.
6. Reinstall the audible alarm assembly in the reverse sequence.

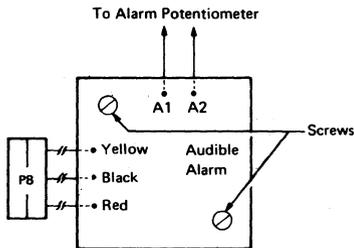


Figure 4-10. Audible Alarm Assembly.

## 4.11 Keyboard Units

### 4.11.1 Keyboard From Display Station

1. Turn power off.
2. Open the customer access panel at the rear of the display.
3. Remove the wing nut that holds the keyboard cable to the frame.
4. Free the cable clamp, and remove the keyboard cable connector from its socket.
5. Reinstall in the reverse sequence.
6. Ensure that all cable connectors are tightly seated in the sockets and that the ground straps are attached.

### 4.11.2 Keyboard Top Cover

1. Invert the keyboard.
2. Remove the four screws in the corners of the keyboard base.
3. Place the keyboard base on a flat surface.
4. Lift the top cover off the keyboard.
5. Reinstall in the reverse sequence.

*Note: Check for cover clearance around the keys after the cover has been reinstalled. Adjust if required.*

### 4.11.3 Keyboard Assembly From Base

1. Disconnect the keyboard from the display station (see section 4.11.1).
2. Remove the keyboard top cover (see section 4.11.2).
3. Disconnect the keyboard cable connector and clicker connector at the logic card.
4. Remove the two screws that hold the keyboard assembly to the base (mark for alignment reference).
5. Handle the keyboard assembly by the sides and lift it off the base, taking care not to press any keys.
6. Reinstall in the reverse sequence.
7. Ensure that the cable connector is tightly seated.

### 4.11.4 Clicker Assembly

1. Disconnect the keyboard from the display station (see section 4.11.1).
2. Remove the keyboard top cover (see section 4.11.2).
3. Disconnect the clicker connector.
4. Remove the clicker assembly by sliding the bail fastener from under the cast tabs.
5. Reinstall in the reverse sequence.

### 4.11.5 Keyputton

Keyputtons are removed by sliding the keytop puller over the keytop and pulling straight up.

### 4.11.6 Key Modules

**Warning:** The work area must be clean during work on the keyboard. Any particle between the key module flyplate and the printed circuit is a potential problem.

#### 4.11.6.1 Removal

**Note:** See section 4.11.7 if the spacebar module is to be exchanged.

1. Disconnect the keyboard from the display station (see section 4.11.1).
2. Remove the keyboard top cover (see section 4.11.2).
3. Remove the keybutton from the module to be exchanged (see section 4.11.5).
4. Remove the keyboard assembly from the base (see section 4.11.3).
5. Remove the keyboard assembly, and place it on the base using the locating pins on the left and right sides.
6. Remove the screws that hold the bottom cover and circuit board to the keyboard assembly.
7. Lift the circuit board and bottom cover from the keyboard assembly, and place them in a clean area. The part that remains on the base is known as the all-keys assembly.  
**Note:** Exchange the key module if a flyplate comes off. Do not attempt to repair the module. Repaired modules can cause intermittent failures.
8. Handle the all-keys assembly by the sides and take care not to press any keys. Turn it the correct way up onto the base, locating it on the pins
9. Press down on the key module until it is released from the holding plate.
10. Handle the all-keys assembly by the sides and take care not to press any keys. Invert it onto the base, locating it on the pins
11. Remove the module.

#### 4.11.6.2 Replacement

1. Ensure that the alignment tab and the angled keystone are in the same position as those of the other modules in the all-keys assembly.
2. Install the new module by pressing the key module into the holding plate by hand.
3. Clean the printed circuit board by carefully wiping it with a lint-free cloth moistened with isopropyl alcohol. Inspect every key module fly-plate for any foreign matter, and carefully clean if needed.
4. Align the holding screw holes through the bottom cover, circuit board, insulator, and top insulator (if used). Lower the circuit board and bottom cover onto the all-keys assembly. Secure the circuit board to the all-keys assembly with the holding screws.
5. Reinstall the keyboard assembly on the base, maintaining its original alignment.
6. Reinstall the keybutton in the correct location. If you have removed the spacebar, see section 4.11.7.2.
7. Reinstall the keyboard cable connector and clicker cable to the logic card. Reinstall the keyboard top cover, and reconnect the keyboard to the display if it was removed.
8. Use Test Mode 2 to check for correct operation of the keyboard.

### **4.11.7 Spacebar**

#### **4.11.7.1 Removal**

Perform the removals described in sections 4.11.1 and 4.11.2 for access to the keyboard assembly.

1. Hold the spacebar at each end (beyond the modules), and remove by pulling upward evenly.
2. Pivots can be removed (if necessary) by pushing with a screwdriver in the slot in the side of the pivot.

To remove the module see section 4.11.6.

#### **4.11.7.2 Replacement**

1. Press any pivots removed in step 2 (above) into the base.
2. Place the spacebar on its modules, and lower it into position while engaging the bar in the two pivots.
3. Press down on the spacebar at the spacebar modules to seat it.
4. Check the spacebar operation for binds. If it binds, the probable cause is a bent right module stem. This stem can be shaped to free the bind.
5. Install the keyboard top cover, and reconnect the keyboard to the display station if it was previously removed.

### **Logic Card Assembly**

1. Remove the keyboard top cover (see section 4.11.2).
2. Disconnect the keyboard cable connector and clicker connector at the logic card.
3. Remove the two holding screws from each end of the logic card.
4. Remove the logic card.
5. Reinstall in the reverse sequence.

**Note:** Check that the keyboard ID jumpers on the new logic card are in the same position as on the old logic card. See Figure 6-11 if necessary.



## Chapter 5. Display Adjustments

The complete adjustment procedure shown and detailed in this chapter is sufficient to set up a display from a totally unadjusted condition.

If only one control needs adjustment, for example color balance, go directly to the procedure in section 5.3 for that control. Adjustment of purity or any of the seven raster controls may disturb convergence. If the dynamic convergence has a marginal range, readjust the static convergence.

Also, after a single FRU change, there is no need to go through the complete procedure. The necessary adjustments are listed below.

1. **Power Supply Card:** Perform the initial checks (section 5.1), then go to static convergence (section 5.3.1) and work forward to make minor adjustments.
2. **Analog Card:** Perform the initial checks (section 5.1), then go to coarse adjustments (section 5.2) and work forward. Ignore Red Brightness and Color Balance (sections 5.2.1, 5.3.6, and 5.3.7) unless the display is too dim or too bright.
3. **Logic Card B2:** Perform the initial checks (section 5.1), then adjust static convergence (section 5.3.1) and dynamic convergence (section 5.3.3) only.
4. **Amplifier Card:** Perform the initial checks (section 5.1). Do not adjust the four controls marked GAIN on early level cards; these are preset during manufacture. Go to coarse adjustments (section 5.2) and carry on to adjust red brightness, color balance, purity, static convergence, and dynamic convergence only.
5. **Video Card:** Perform the initial checks (section 5.1), then if necessary, adjust red brightness and color balance (section 5.3.6 and 5.3.7).
6. **CRT:** Perform all the adjustments starting at section 5.1.
7. **Convergence/Purity Coil Assembly:** Perform the initial checks (section 5.1), then go to coarse adjustments (section 5.2) and carry on to adjust purity, static convergence, and dynamic convergence only.

8. **Planar Strips:** Perform the initial checks (section 5.1), then check dynamic convergence (section 5.3.3).

**Warning:** Use adjusting tool, IBM Part 1864853, to adjust potentiometers; screwdriver blades will damage them.

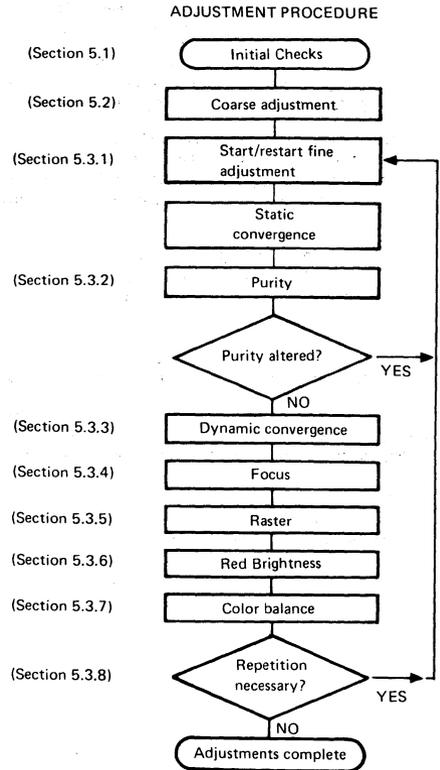


Figure 5-1. Adjustment Procedure

### 5.1 Initial Checks

1. Make ready the control unit (see control unit problem determination guide).
2. Plug the mainline power cable into the customer's outlet.
3. Switch power on and verify that indicator 1 (Power Good) is on.
4. Check that indicator 2 (Display Ready) turns on after approximately 45 seconds.

Note: The screen will probably brighten when the Display Ready indicator is on.

#### CAUTION

Use insulated probes, IBM Part 1749249 or similar, during the next step.

5. Measure the voltages in the following table and ensure they are correct. Go to MAP 0200 if you are unable to obtain the correct voltages. Use the potentiometer mounting plate on the bezel as a ground.

ANALOG CARD (P4) PIN	VOLTS (dc)	TOLERANCE (V dc)	RIPPLE (V pk-pk)
20	-135V*	±20	
43	-150	±20	
31	+12	±1.5	
48	+70	+10, -5	
37	+5.0	±0.5	0.25
5	-5.0	±0.5	0.25
30	0	.....	
36	+8.5	±0.9	0.3
POWER SUPPLY CARD (P3) PIN	VOLTS (dc)	TOLERANCE (V dc)	RIPPLE (V pk-pk)
1	+12.0	±1.0	0.4
3	-12.0	±1.0	0.4
2	0	.....	.....
5	+103	±8	3.0
4	0	.....	.....

\* -150V through 39kΩ

Figure 5-2. Voltage Table

6. Turn the BRIGHTNESS potentiometer counterclockwise until the Intensity Override switch operates - a white raster may appear. (The raster will probably be tinted due to purity/color brightness imbalances.) Now set the potentiometer to its mid-point.
7. Set the Normal/Test switch to Test. A full screen of characters may appear.

#### Notes:

1. The Control Key is used extensively by TEST MODE 3 but is not labelled CONTROL. Refer to the keyboard overlay in Figure 2-3 where the key is shown labelled CONTROL. On most keyboards this will be the RESET key.
2. During the set-up procedure. If **X** -f or **X** c-f appears in the operator information area, press the RESET key and retry the action.

If any action does not produce the expected results, repeat the action and then try repeating the whole section.

If the results are still not as expected you have a failure; go to MAP 0000, Entry Point A.

### 5.2 Coarse Adjustments

Start here to completely set up the display after replacing the CRT. See Page 5-1 for the adjustments that are required after other FRU exchanges.

Note that these coarse adjustments are intended to give a display that is an acceptable starting point for subsequent fine adjustments (see section 5.3). If any step fails, go to MAP 0000, Entry Point A.

Try to adjust the display without altering the RED MAX potentiometer (except after a CRT or amplifier card change).

Ready the display unit as follows:

1. Switch power on.
2. Turn the operator's brightness control fully clockwise.
3. Wait 45 seconds until Indicator 2 turns on.

### 5.2.1 Coarse Color Balance

**Note:** See Figure 1-4 for locations of controls.

1. Set the Normal/Test switch to Normal.
2. If the display is reasonably bright and the three primary colors are approximately balanced (look at the cursor), then go to section 5.2.2.

#### 5.2.1.1 Green Gun

1. Set the Normal/Test switch to Normal then back to Test.
2. If the screen is completely blank, set the HEIGHT control fully counterclockwise.
3. If the screen is either still blank or is very dim, turn GREEN MAX (and, if necessary, GREEN MIN) clockwise until a reasonably bright image appears. The image will be green unless the static convergence or purity controls are badly out of adjustment.
4. If the HEIGHT control was altered in Step 2, adjust it to give a normal display height.

#### 5.2.1.2 Blue Gun

1. Set the Normal/Test switch to Normal, then back to Test.
2. Press the following keys: CONTROL O Q (alphabetic)
3. If the screen is blank or very dim, turn BLUE MAX (and, if necessary, BLUE MIN) clockwise until a reasonably bright image appears.

#### 5.2.1.3 Red Gun

1. Set the Normal/Test switch to Normal then back to Test.
2. Press the following keys: CONTROL O I (alphabetic)
3. It is better not to move the RED MAX potentiometer if you can continue the adjustments at the existing brightness level. If, however, the screen is blank or very dim, *mark the current position of the RED MAX potentiometer*. Turn RED MAX (and, if necessary, RED MIN) clockwise until a reasonably bright image appears. If an acceptable image cannot be obtained, set the RED MAX potentiometer back to its marked position and go to MAP 0000, Entry Point A.

### 5.2.2 Coarse Raster Adjustment

1. Set the Normal/Test switch to Normal and back to Test to display the test pattern.
2. If the four edges of the pattern are within 3 to 35 mm (0.1 to 1.4 inches) of the sides of the screen, then go to section 5.2.3. Otherwise, adjust the WIDTH and horizontal centering (H CENT) potentiometers until the vertical edges of the pattern are within 3 to 35 mm (0.1 to 1.4 inches) of the sides of the screen.
3. Adjust the top margin (TOP MAR) potentiometer until the top line is within 3 to 35 mm (0.1 to 1.4 inches) of the top of the screen.
4. Adjust the HEIGHT potentiometer (and if necessary the SKIP potentiometer) until the pattern is within 3 to 35 mm (0.1 to 1.4 inches) of the bottom of the screen.  
**Note:** *The picture will blank if the Height control is set too low.*

### 5.2.3 Coarse Focus

1. Set the Normal/Test switch to Normal and back to Test.
2. See Figure 1-4. Adjust the static focus finger control (FOCUS 1) for best focus at screen center.

### 5.2.4 Coarse Static Convergence

At this point the raster may still be badly adjusted and any characters on the screen may be distorted. The color of the screen may still not be correct or uniform.

Note that a control unit that can support the 3279 color display must be available for the following procedures.

1. Display the convergence pattern as follows:
  - a. Set Normal/Test switch to Normal
  - b. Hold down the ALT key and press TEST then release both keys.
  - c. Press the following keys: / 7 ENTER
2. If the patterns are within 5 mm (0.2 inches) of each other, go to section 5.2.5.

3. If necessary, adjust the red and green (R and G) 'STATIC CONV CONTROLS' (see Figure 1-4) until the two patterns align vertically and horizontally.
4. Press the following key: R
5. Adjust the blue and blue lateral (B and BL) controls until the two patterns align horizontally and vertically.  
*Note: The static blue lateral control is a potentiometer on the amplifier card.*
6. Press the following key: R  
If the two patterns have moved apart, return to step 2.

### 5.2.5 Coarse Color Purity

1. Set the Normal/Test switch to Normal and back to Test.
2. Press the following keys to fill the screen with red characters:  
  
CONTROL O I (alphabetic)
3. If necessary, adjust the two (H and V) 'PURITY' potentiometers (see Figure 1-4) until the characters appear RED over all the screen.

### 5.3 Fine Adjustments

*Note: Do not attempt any fine adjustments until the 3279 has been powered on for at least 20 minutes (see section 2.6.1).*

#### 5.3.1 Static Convergence

This procedure will result in the three colors being correctly converged at the CENTER of the screen.

1. The display must be connected to a control unit that can support the 3279 color display. Step (b) removes the power supply to the convergence store. The control unit will detect a parity error and the default values will be written to the store.
  - a. Switch power off.
  - b. Connect a jumper from B2B08 to B2D08 (short circuit).
  - c. Remove the jumper after 5 seconds.
  - d. Switch power on and wait 45 seconds.
  - e. Set Normal/Test switch to Normal. An error code '228' or '55' may appear on the screen. Press RESET and ignore it.

- f. Hold down 'ALT' key and press 'TEST', then release both keys.
- g. Press the following keys: / 7 ENTER

The pattern '- | - | -' appears at the screen center.

2. The pattern displays in yellow (or green and red if misconverged).
3. Adjust red and green (R and G) 'STATIC CONV CONTROLS' until the two patterns align horizontally and vertically (see Figure 1-4).
4. Press the following key: R  
The pattern displays in pink (or red and blue if misconverged).
5. Adjust blue (B) 'STATIC CONV CONTROL' until the patterns align vertically.
6. Adjust blue lateral 'STATIC CONV CONTROL' (see Figure 1-4) until the patterns align horizontally.
7. Go back to step 5 if necessary.
8. Press the following key: R
9. If the patterns diverge, return to Step 3 and work forward again.
10. Hold down 'ALT' key and press 'TEST', then release both keys. The screen clears.

#### 5.3.2 Purity

1. Jumper D2Y02 to D2Y08. (Force Reverse Video see Figure 1-6.)

#### CAUTION

**This jumper must not be left on for more than 30 seconds at a time, otherwise the shadow mask may distort. Remove and replace at each step.**

2. Set the Normal/Test switch to Normal and then to Test. Press the following keys:

CONTROL O I (alphabetic)

3. Unless the raster is uniformly red, adjust horizontal and vertical (H and V) 'PURITY' potentiometers (see Figure 1-4) until the red area covers the screen. Pay close attention to the four corners.  
*Note: That as the color becomes pure it also becomes brighter and the adjustment should thus be made to leave the color both as pure and as bright as possible.*
4. Set the Normal/Test switch to Normal and back to Test. Check that the raster is uniformly green.
5. Press the following keys: CONTROL O Q (alphabetic)  
Check that the raster is uniformly blue.
6. If the green and blue rasters are not uniform, readjust the two purity potentiometers.
7. If any readjustment was necessary, return to step 1. If raster colors are not acceptable on the second time through the sequence, go to MAP 0000, Entry Point A.
8. Remove jumper D2Y02 to D2Y08.

### 5.3.3 Dynamic Convergence (Online Test 7)

This procedure converges the screen. The convergence pattern is stepped through 13 areas and each is converged in turn.

**Note:** If, after executing step 1.c, ✕ -f or ✕ c-f appears in the operator information area, another operator is probably using the convergence routine. Wait a few minutes before trying again. If the terminal is attached to an IDPA, the same effect occurs when the IDPA is in manual mode. If ✕ -f, ✕ c-f, or any other symbol appears in the operator information area at any other time, press the RESET key and retry the action.

1. Display the convergence pattern as follows:
  - a. Set the Normal/Test switch to Normal.
  - b. Hold down the 'ALT' key and press 'TEST', then release both keys. 'TEST' appears in the operator information area.
  - c. Press the following keys: / 7 ENTER

The pattern '- | - | -' appears at the center of the screen. Adjust the brightness control if necessary.

The following steps (2 through 7) are repeated 13 times with the pattern in different positions on the screen.

2. Use cursor control control keys to move the green pattern until the red and green images are superimposed (as closely as possible) to give a yellow pattern.
3. Press the following key: R
4. Use the cursor keys again to move the blue pattern until the blue and red images are superimposed (as well as possible) and give a pink pattern.
5. Press the following key: R  
Go back to step 2 at least once to check.
6. Press the spacebar once or twice until the pattern appears in the next position.
7. When you press the spacebar after converging the 13th area, the (white) pattern appears simultaneously in all 13 positions. Until this happens go back to step 2 to continue converging.
8. *On the first pass through the complete fine adjustments*, when all 13 patterns appear, hold down ALT and press TEST then release both. The screen will clear. Go to section 5.3.4.
9. *On the second pass through the complete fine adjustments*, when all 13 patterns appear, check the convergence of each pattern. If any need further adjustment, press the spacebar once and return to step 2.
10. If, on the second pass, you cannot converge the screen, then there is a fault. Inspect the position of the convergence coil assembly, see Figure 4-8, and correct it if necessary. If you have exchanged the amplifier card go to section 5.3.9; otherwise, go to MAP 0600, Entry Point A.
11. Hold down the 'ALT' key and press 'TEST', then release both keys. The screen will clear.

### 5.3.4 Focus Adjustments

1. Set up a bright red pattern as follows:
  - Turn the brightness control fully clockwise.
  - Set the Normal/Test switch to Normal and then to Test.
  - Press the following keys: CONTROL O I (alphabetic)

2. Turn the FOC2 control fully counterclockwise.
3. Adjust the 'FOCUS1' control for the sharpest image in the center of the screen.
4. While examining the upper right corner of the screen, turn the FOCUS1 control slowly counterclockwise. If the focus in the corner improves (ignore the center), the FOC2 control will improve the overall focus.
5. Turn FOC2 one eighth of a turn clockwise.
6. Adjust the FOCUS1 control for the sharpest image at the center of the screen.
7. Repeat the three previous steps until there is no improvement.
8. If the last movement of FOC2 made the focus worse, turn it back one eighth turn to its previous best setting and readjust FOCUS1.
9. Press the following keys: CONTROL C  
Verify that the focus on green is good.
10. Press the following keys: CONTROL O Q (alphabetic)  
Verify that the focus on blue is good, and FOC2 a little to achieve a good compromise between the focus of the red, green, and blue images.
12. Finally inspect all three colors and verify that an optimum focus setting has been achieved.  
Key in: (alphabetic)
  - a. Green: CONTROL C.
  - b. Blue: CONTROL C CONTROL O Q.
  - c. Red: CONTROL C CONTROL O I.

**5.3.5 Raster Controls**

*Note: The raster controls may be set accurately only when the display is online, that is, converged, and viewed from a normal operating position.*

1. Set the Normal/Test switch to Normal.
2. Hold down the ALT key, press TEST, release both.
3. Jumper C2G06 to D2J08 (ground). Characters will fill the screen.
4. Attach the alignment mask (Figure 5-3) to the CRT face.

**5.3.5.1 Raster Centering/Size Controls**

Figure 1-4 shows the location of the controls referred to in the following steps. If any of the following controls has insufficient range to produce the desired adjustment, set it as nearly as possible and continue.

1. Adjust the top margin (TOP MAR) potentiometer until the top character row is centered in the top space on the alignment mask.
2. Adjust the WIDTH and horizontal centering (H CENT) potentiometers until the vertical edges of the images are correctly aligned.
3. *Model 2 only* Jumper C2J04 to D2D08 (ground). (Disable interrow skip.)
4. Adjust the HEIGHT potentiometer until the bottom trace of the last character row above the divider line centers on the HEIGHT space (for the correct model) on the alignment mask.
5. *Model 2 only* Remove jumper C2J04 to D2D08.
6. Adjust the 'SKIP' potentiometer until the bottom trace of the characters in the Operator Information Area is centered in the SKIP space of the alignment mask.
7. Repeat from the beginning of section 5.3.5.1, until the picture height and interrow gaps are correct.
8. Remove the alignment mask.

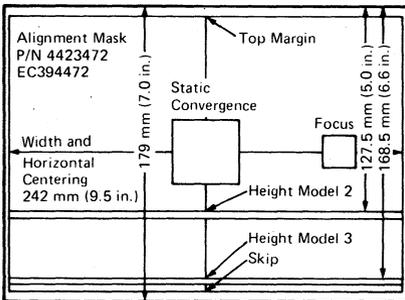


Figure 5-3. CRT Alignment Mask

### 5.3.5.2 Pincushion

1. Adjust the East and West (E + W) pincushion potentiometer on the analog card (Figure 1-4) until the vertical edges of the image are straight.
2. Adjust the North and South (N + S) pincushion potentiometer so that the top and bottom edges of the image are straight.
3. Repeat steps 1 and 2 if necessary.
4. Remove the jumper C2G06 to D2J08.

### 5.3.6 Red Brightness.

The adjustments in this section should only be required after exchanging a CRT or amplifier card or if the red characters are known to be too bright or too dim. Otherwise continue at section 5.3.7.

The maximum brightness of the red characters on the screen is controlled by the R MAX and R MIN potentiometers which are set during manufacture of the display unit. If the brightness is set too high the life of the CRT will be shortened.

Compare the red characters with those of another 3279 if possible, before assuming that adjustment is necessary.

1. Ensure that the focus adjustments have been done (see section 5.3.4).
2. Set the Normal/Test switch to Normal then back to Test.
3. Press the following keys: CONTROL B O I (alphabetic)
4. Turn the brightness control fully clockwise.
5. Turn the R MIN potentiometer to its mid position.
6. Find an '@' near the right-hand side of the fifteenth row. Adjust the R MAX potentiometer until the center of the '@' is just filled in. View the display from directly in front of the screen and turn back the potentiometer until the '@' is clear, and the center of the screen is legible.
7. Turn the brightness control fully counterclockwise (but not past the intensity override switch). Adjust the R MIN potentiometer until the characters are just visible (move the screen away from direct light if necessary).
8. Turn the brightness control fully clockwise. Verify step 6.

### 5.3.7 Color Balance

**Note:** Do not move the R MAX or R MIN potentiometers during this procedure.

This procedure sets the brightness of the green and blue characters which also controls the mixed colors: yellow, pink, turquoise, and white.

If the 3279 is not connected to an active display printer adapter, misconvergence may cause difficulty.

1. Set the Normal/Test switch to Normal.
2. See Figure 1-6 for jumper pin notation.
3. Connect the CE jumper D2Y09 to D2Y08 (ground). This will maintain convergence during Test Mode. See section 5.3.3 for more details if required.
4. Set the Normal/Test switch to Test and key in: CONTROL C . The screen fills with a pattern of characters.
5. Jumper C2W09 to C2W28 (color bars).
6. Set the B MIN and G MIN color balance potentiometers to their mid positions.
7. Ensure that the brightness control is turned fully clockwise.
8. Adjust the G MAX potentiometer until the green areas are as bright as the red, and the yellow is good.
9. Adjust the B MAX potentiometer until the blue areas are as bright as the red, and the turquoise, pink, and white areas are good.
10. Jumper D2Y02 to D2Z04 (reverse video); use E2Z04 if D2Z04 is not available.
11. Turn the brightness control to minimum (counterclockwise) but *not* past the switch into intensity override.
12. Adjust the G MIN and B MIN potentiometers so that the green and blue areas are as dim as the red; and the yellow, turquoise, pink, and white areas are good.
13. Remove the jumper from D2Y02.

14. Turn the brightness control to maximum and back again to check that the color balance is good over the whole range of the control. Pay special attention to the white areas. Make further small adjustments if necessary (but *not* to R MAX or R MIN).
15. Remove the jumpers.

### 5.3.8 Repetition

1. If necessary repeat the sequence of fine adjustments. Only small changes in the settings should be necessary and the repetition steps within the procedure can be omitted. Go to section 5.3.
2. If you have been through the complete procedure three times, and the display is still not satisfactory, go to MAP 0100, Entry Point A.
3. Return the brightness control to a normal setting. Set the Normal/Test switch to Normal. Replace the *Maintenance Manual* and close the covers.

### 5.3.9 Convergence Amplifier Gain Controls

The amplifier card may contain separate gain controls for one or more of the four convergence amplifiers. These are preset at the manufacturing plant and should NOT need adjustment. However, if you fail to achieve dynamic convergence after exchanging this card, readjustment may be necessary. When the gain is too low, the patterns have too little movement to converge; when too high, the patterns move in large steps with insufficient control to align precisely.

Before making any adjustments:

1. Use Online Test 7 to confirm that you can move the pattern in the correct direction. See MAP 0600.

2. Measure the supplies to the amplifier card:

Amplifier Card Test Point (see Figure 6-10)	Voltage and Tolerance
K	+12 V dc $\pm 1.5$ V
N	-12 V dc $\pm 1.5$ V

3. If any of these checks fail, read MAP 0000 page 2 and go to MAP 0600 (Entry Point A).
4. Inspect the amplifier card and write down the settings of the gain controls.
5. Normally controls R, G, and B (Red, Green and Blue) are set 3/4 clockwise, and B LAT (Blue Lateral) is set fully clockwise (Maximum Gain).
6. If any are set to a position that is not normal, set them to normal and try the convergence routine again (section 5.3.3). If you know which gain is set wrongly adjust only that control.
7. If convergence still fails, set all controls to maximum gain and try again (see section 5.3.3).
8. If convergence still fails, put the gain controls back to the settings you wrote down. Go to MAP 0600 Entry Point A.

If convergence is now working return to section 5.3.3.

# Chapter 6. Support Information

## 6.1 Block Diagram

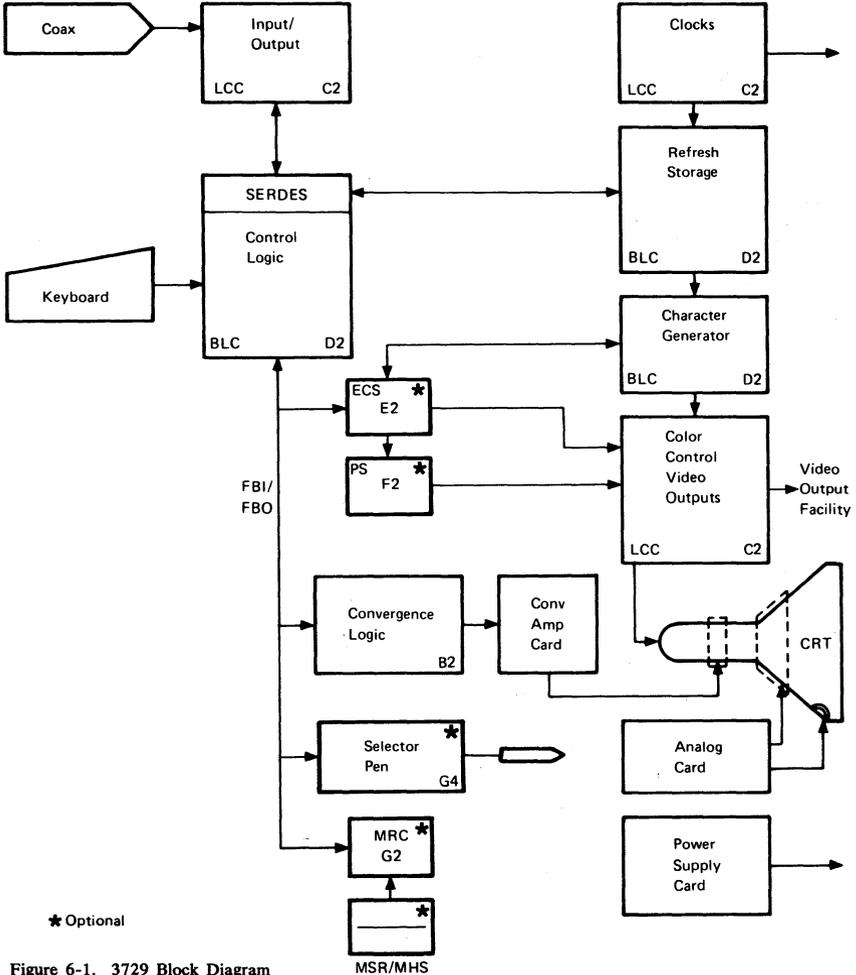
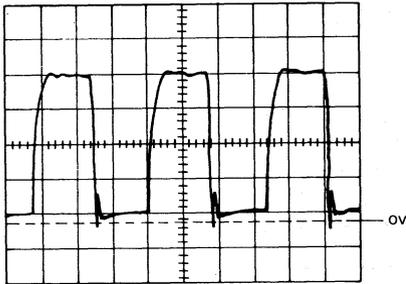


Figure 6-1. 3729 Block Diagram

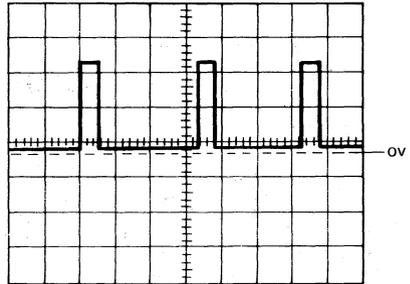
## 6.2 3279 Control Signals

### 6.2.1 Waveforms



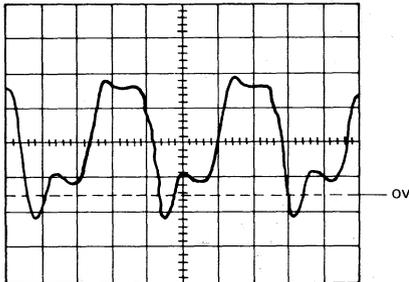
**Feature Clock**

Scopepoint C2 M08 Sync. Internal  $0.2 \mu\text{s}/\text{cm}$ ,  $1 \text{ V}/\text{cm}$  x 10 probe. If bad, change card C2 then B2, D2, E2.



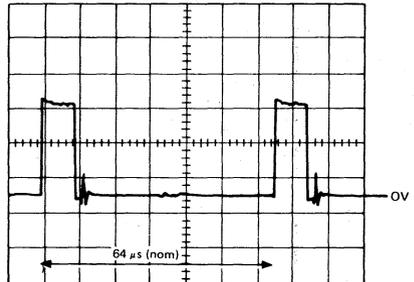
**Horizontal Retrace**

Scopepoint B2 G13 Sync. Internal  $20 \mu\text{s}/\text{cm}$ ,  $2 \text{ V}/\text{cm}$  x 10 probe. If bad, change card D2 then B2.



**14 MHz Clock**

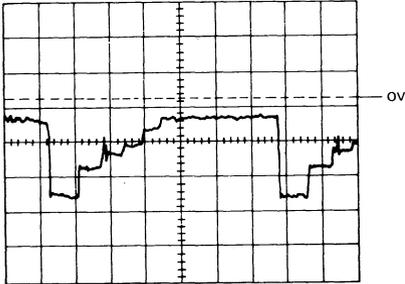
Scopepoint C2 P13 Sync. Internal  $20 \text{ ns}/\text{cm}$ ,  $1 \text{ V}/\text{cm}$  x 10 probe. If bad, change card C2.



**Horizontal Sync.**

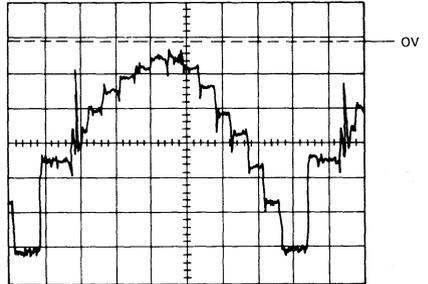
Scopepoint B2 J13 Sync. Internal  $10 \mu\text{s}/\text{cm}$ ,  $1 \text{ V}/\text{cm}$  x 10 probe. If bad, change card B2 then analog.

**Figure 6-2 (Part 1 of 3). Waveforms**



Example of Convergence Parabola for Badly Converged Screen

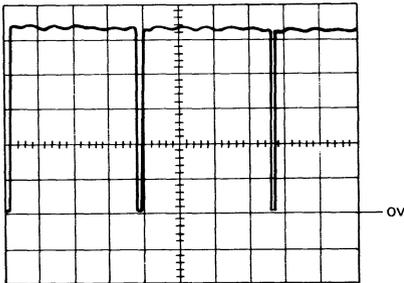
Scopepoint B2 S06 Sync, etc. as for Convergence Parabola. If unable to converge, change card B2 then analog.



Convergence Parabola

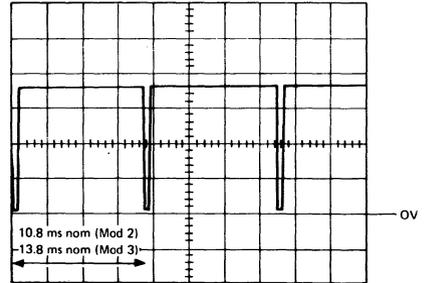
Scopepoint B2 S06 Sync C2 Z08 (Indicator Row) Use 2 ms/cm Main sweep, 10  $\mu$ s/cm. Delayed sweep, 0.2 V/cm x 10 probe.

If bad, change card B2 then analog.



— Skip (Model 2 only)

Scopepoint B2 G10 Sync. Internal 1 V/cm, 0.1 ms/cm x 10 probe. If bad, change card C2 then D2.

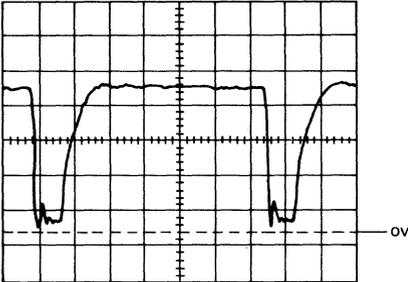


— Skip Out (Model 2 only)

Scopepoint B2 J11 Sync, Internal 1 V/cm x 10 probe.

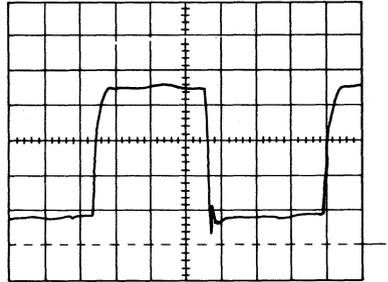
If bad, change card B2 then analog.

Figure 6-2 (Part 2 of 3). Waveforms



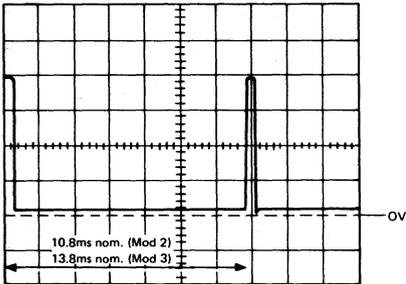
**Dot 0**

Scopepoint C2 B04 Sync. Internal  $0.1 \mu\text{s}/\text{cm}$ ,  $1 \text{ V}/\text{cm}$  x 10 probe. If bad, change card C2 then D2, E2, F2.



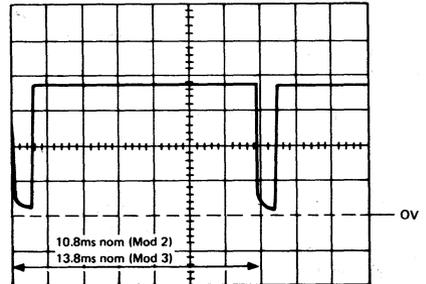
**+ Videotime (and +7 x Trig)**

Scopepoints C2 D02 C2 J10 Sync. Internal  $0.2 \mu\text{s}/\text{cm}$ ,  $1 \text{ V}/\text{cm}$  x 10 probe. If bad, change card D2, then C2, E2, F2.



**+ Indicator Row**

Scopepoint C2 Z08 Sync. Internal  $1 \text{ V}/\text{cm}$  x 10 probe. If bad, change card D2 then C2, E2.

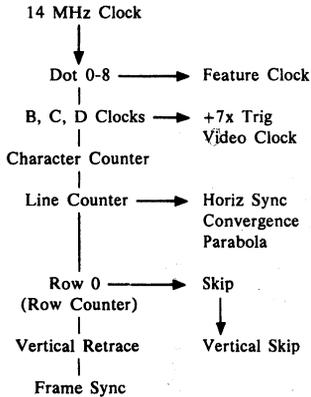


**Frame Sync.**

Scopepoint C2 G12 Sync. Internal  $1 \text{ V}/\text{cm}$  x 10 probe. If bad, change card B2 then analog.

**Figure 6-2 (Part 3 of 3). Waveforms**

### 6.2.2 Activation Sequence



This diagram is a representation of some of the main control signals in the 3279, and the sequence in which they are developed.

The following connector strip diagrams show how these signals are distributed around the machine.

### 6.3 Top Card Connector and Planar Strip Wiring

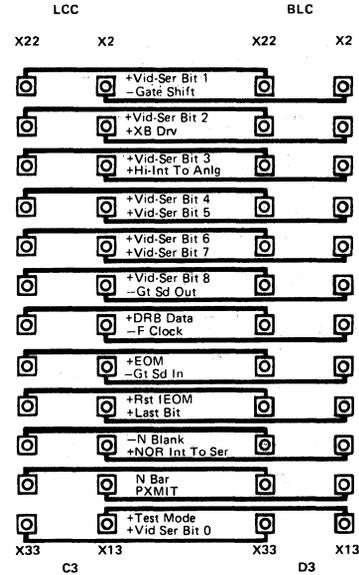


Figure 6-3 (Part 1 of 4). Top Card Connectors



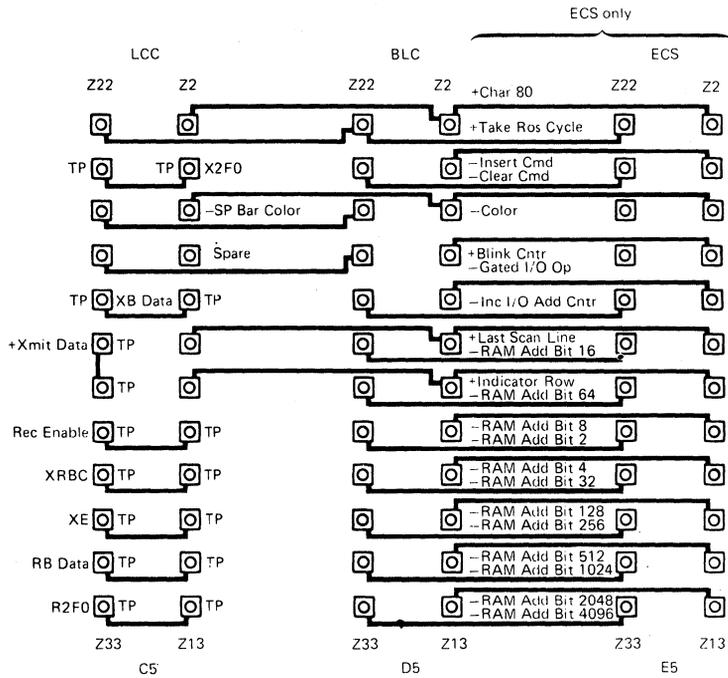


Figure 6-3 (Part 3 of 4). Top Card Connectors

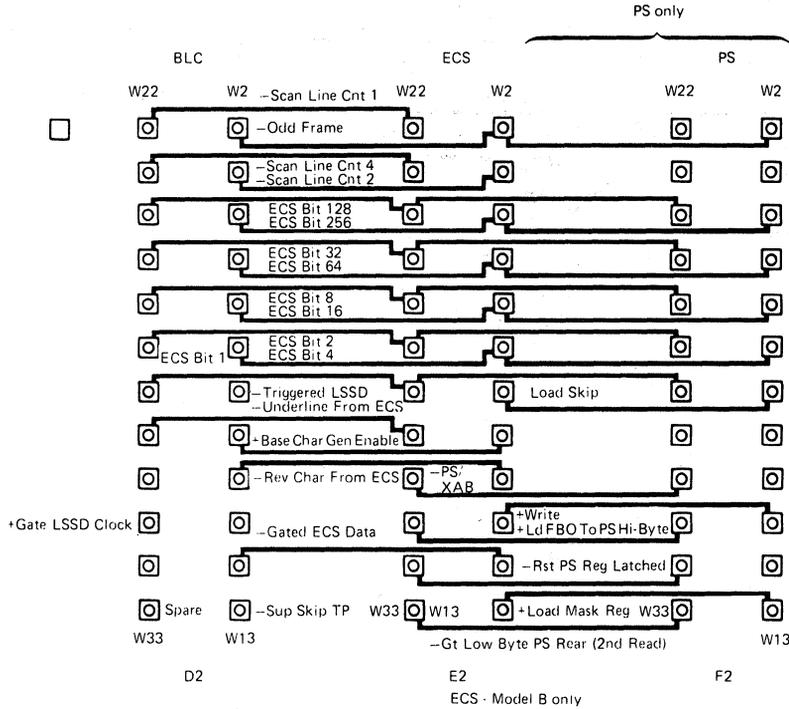
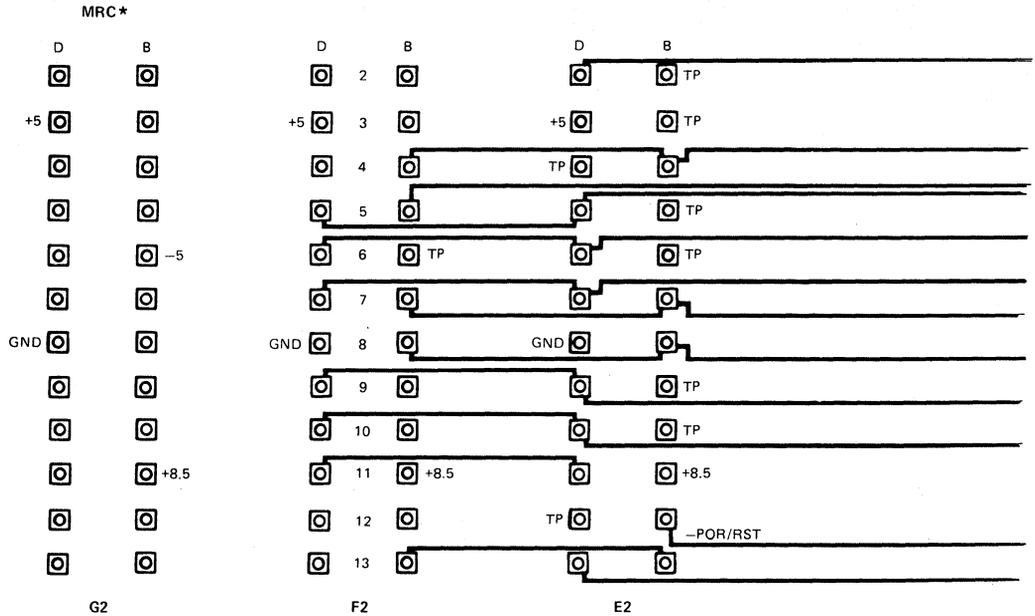


Figure 6-3 (Part 4 of 4). Top Card Connectors

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\*Note that there is also a cable between G2 and G4 when MRC<sub>s</sub> is installed, see Figure 6-6.

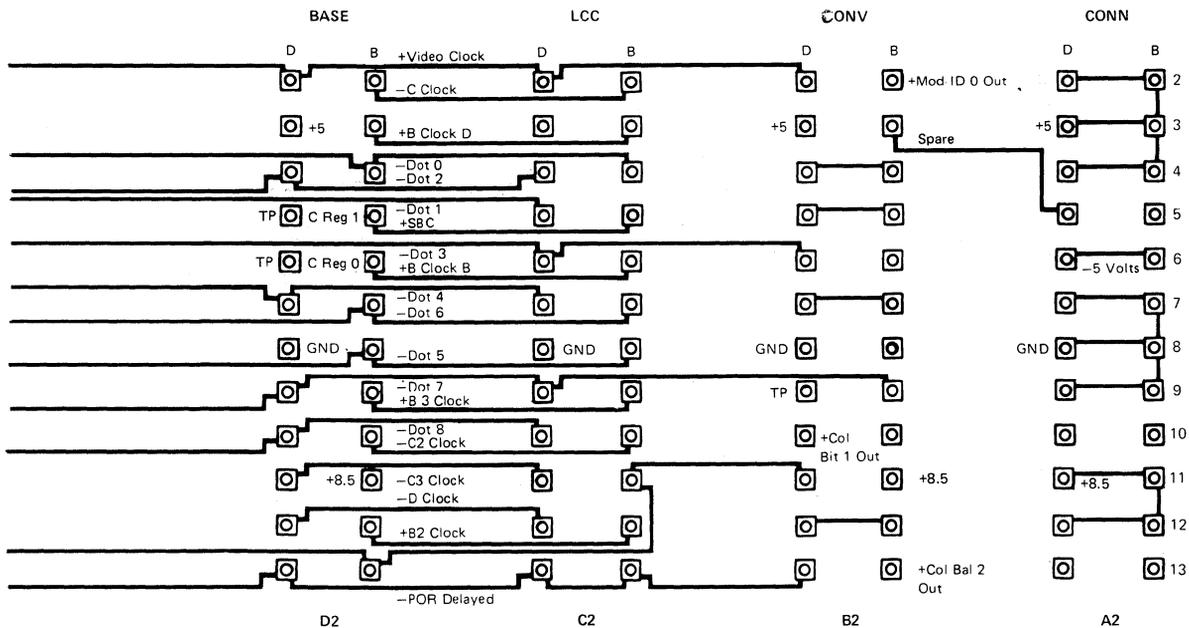
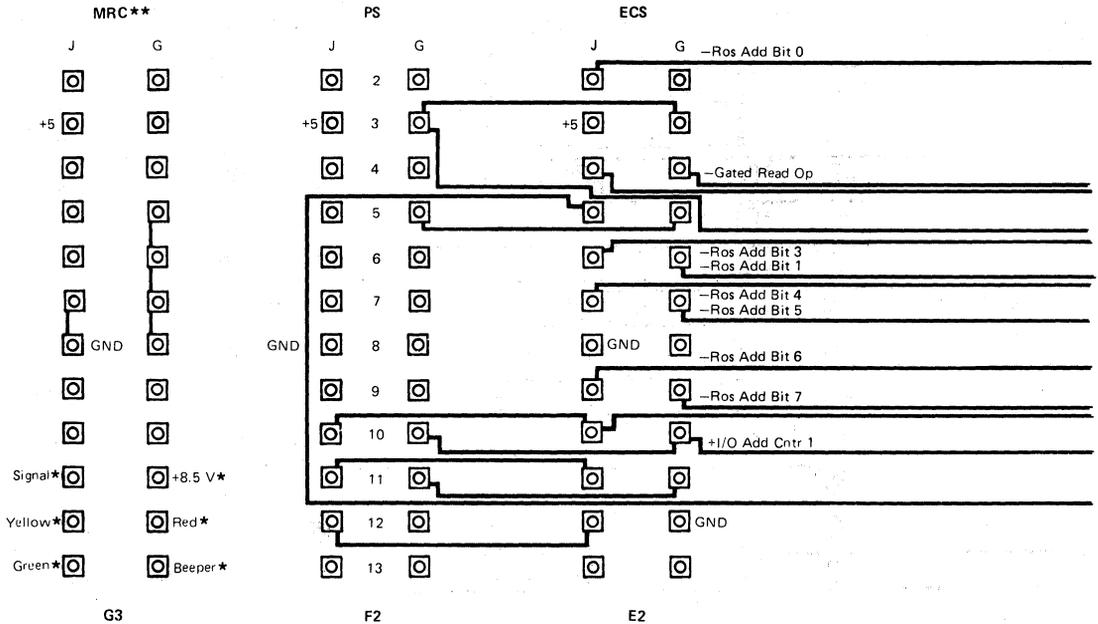
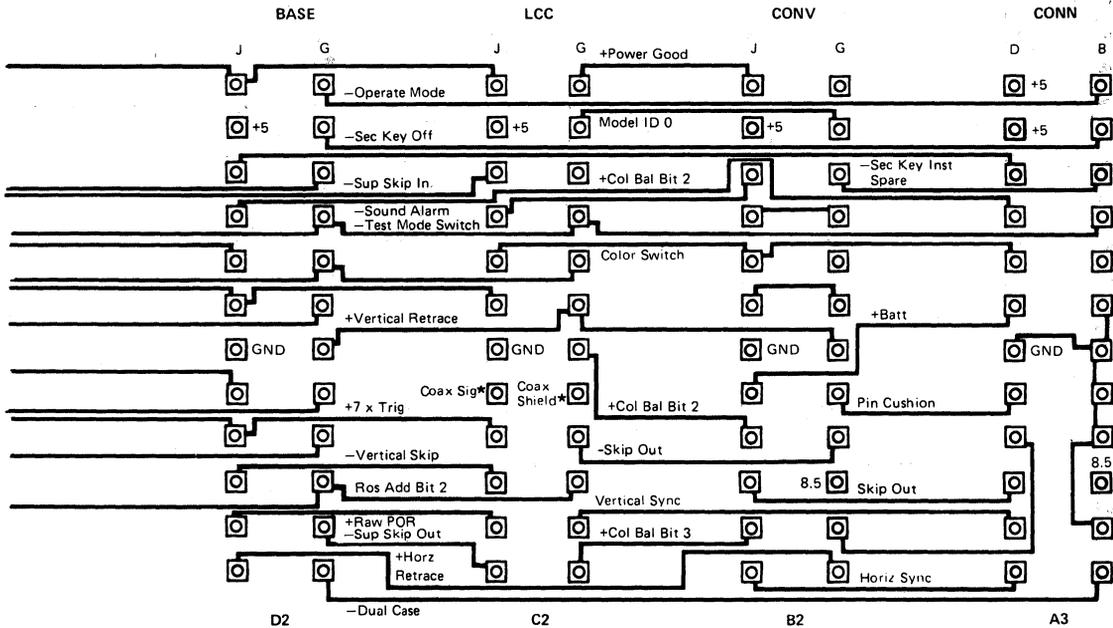


Figure 6-4 (Part 1 of 4). Planar Strips - BD



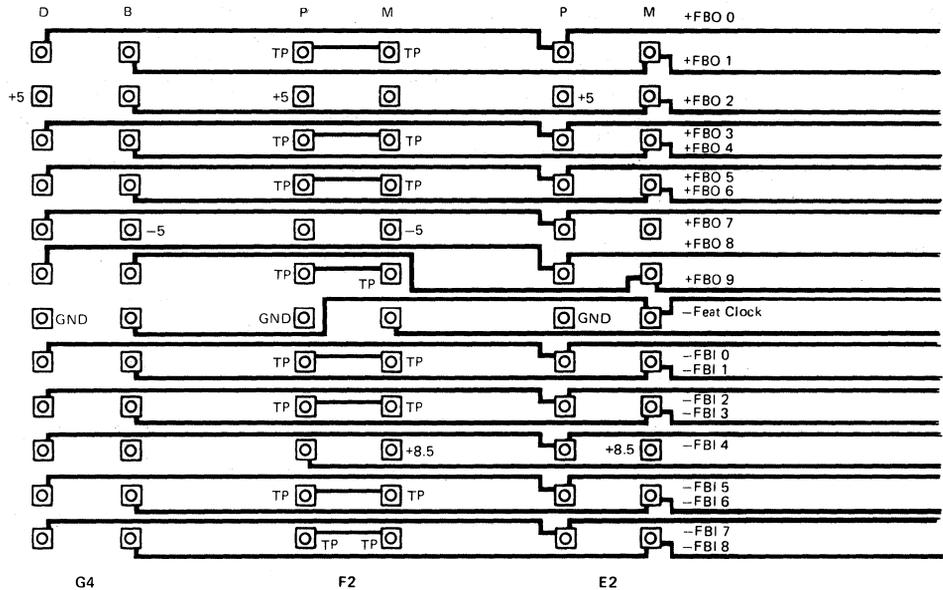
\*Cable to MSR/MHS

\*\*Note that there is also a cable between G3 and G5  
When MRC is installed, see Figure 6-6.



\*Coaxial device cable

Figure 6-4 (Part 2 of 4). Planar Strips - GJ



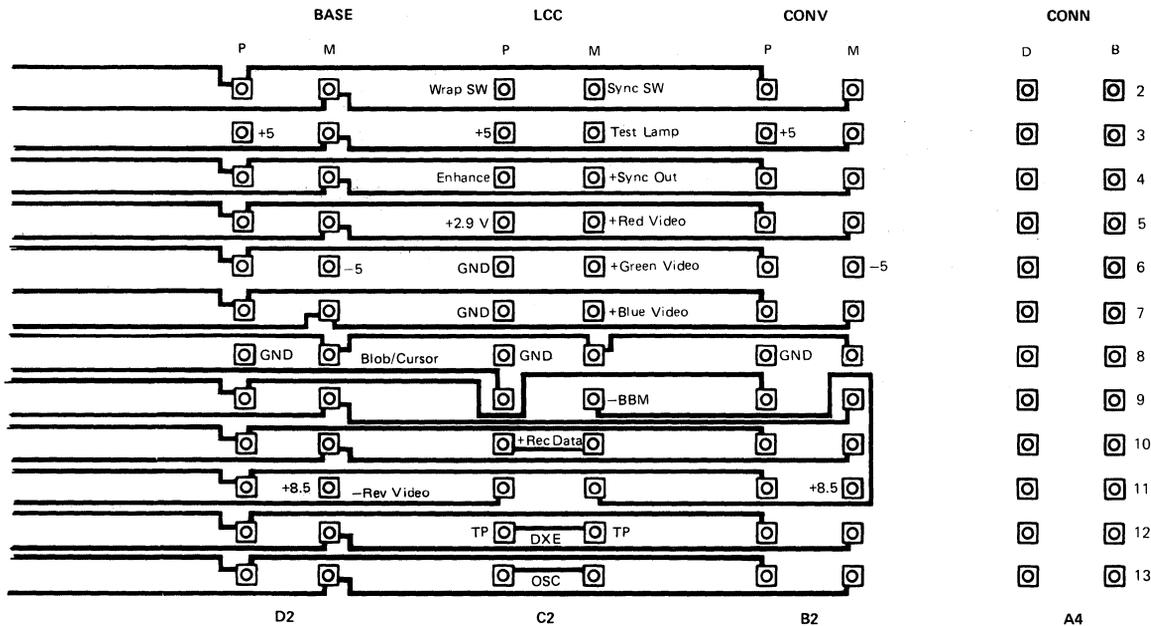
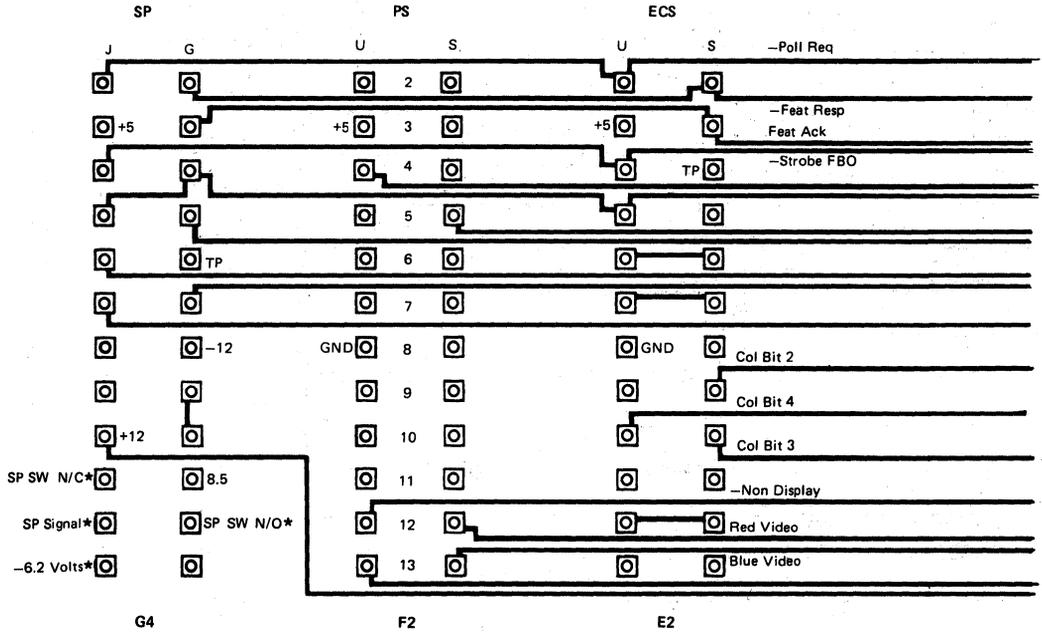
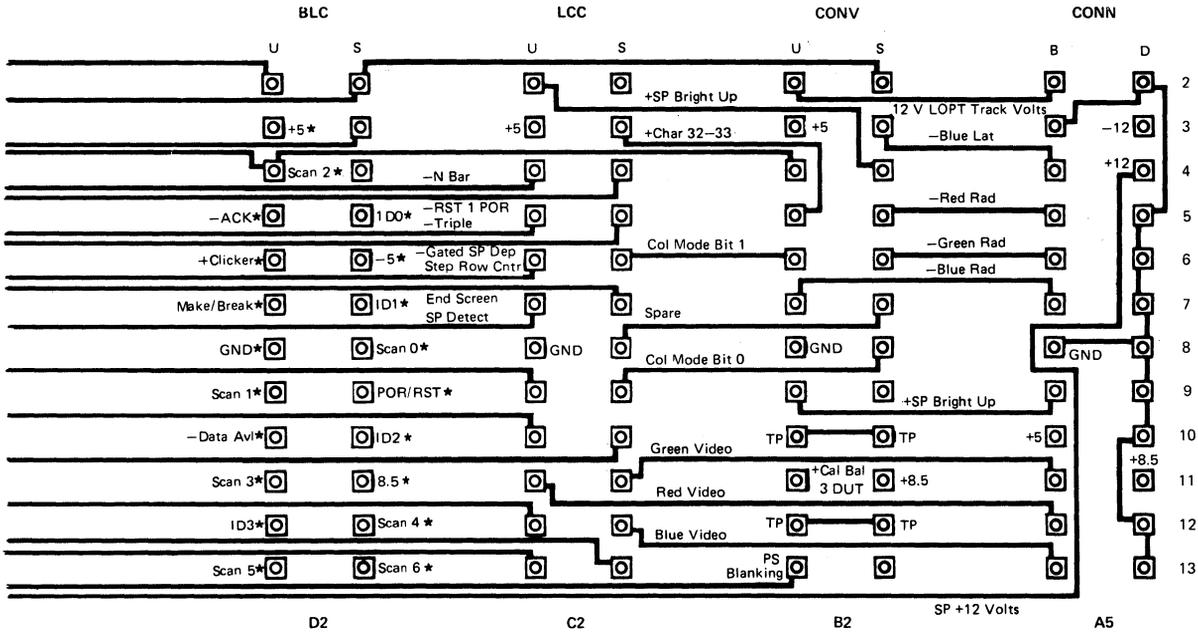


Figure 6-4 (Part 3 of 4). Planar Strips - MP



\*Selector Light Pen Cable, see Figure 6-6.



\*Key board cable

Figure 6-4 (Part 4 of 4). Planar Strips - SU

### 6.4 Grounding and Cables

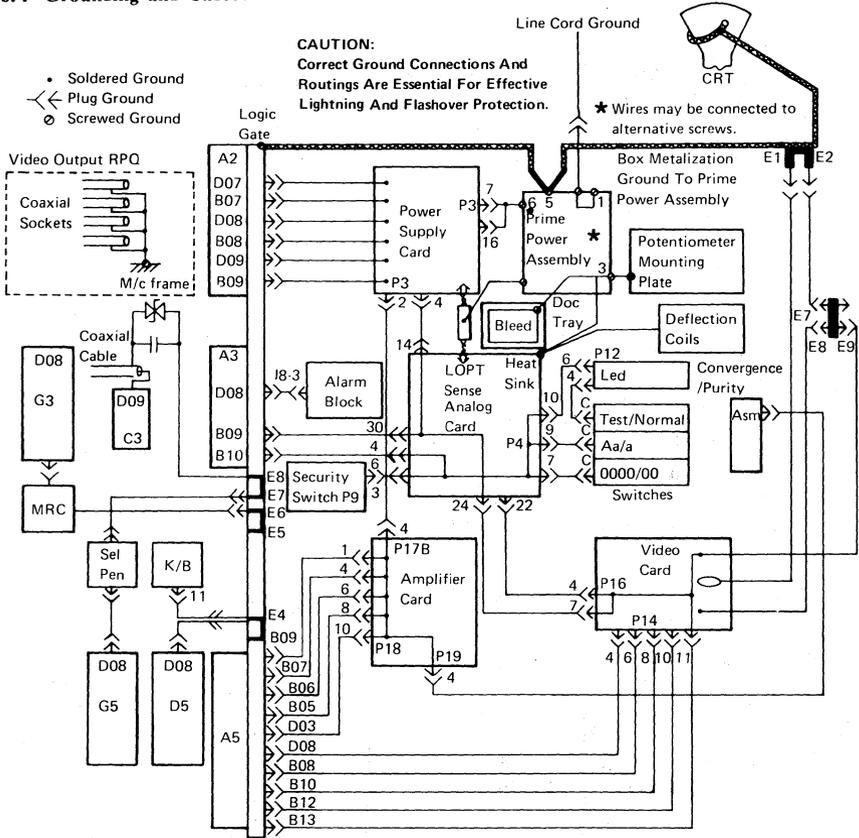
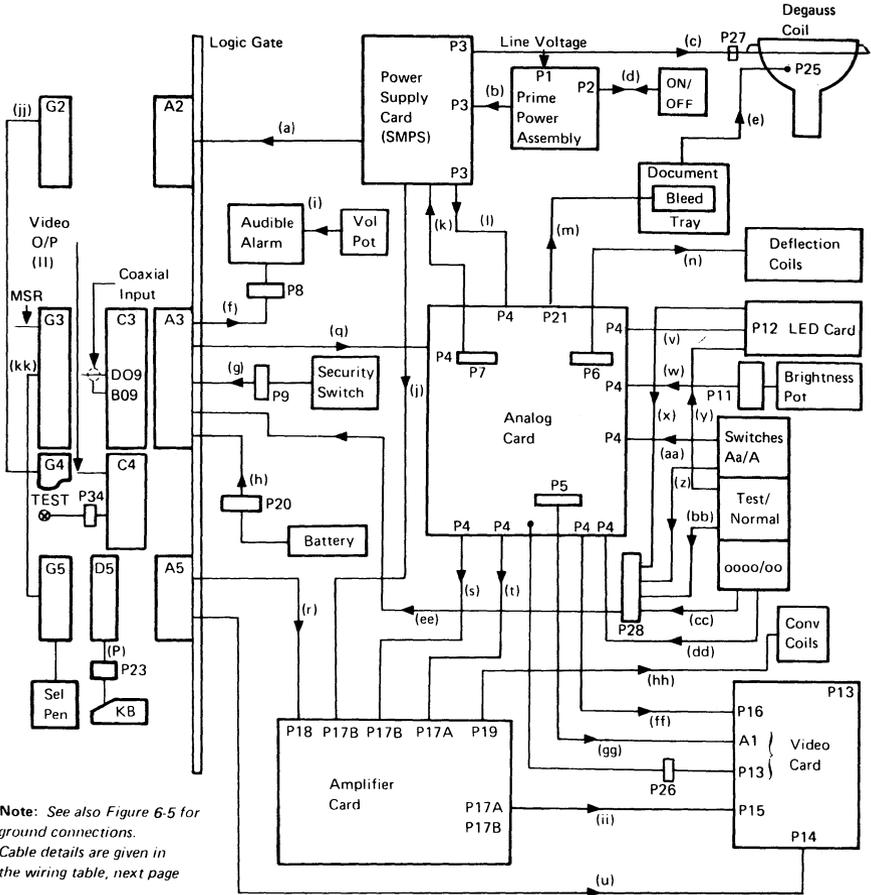


Figure 6-5. Grounding Diagram



Note: See also Figure 6-5 for ground connections. Cable details are given in the wiring table, next page

Figure 6-6. Cabling Diagram

Wiring Table (see Figure 6-6)

<i>Cable</i>	<i>Description</i>	<i>From</i>	<i>To</i>
	+5 V dc		A2D02
	+5 V dc		A2B02
	+5 V dc		A2D03
	+5 V dc		A2B03
	+5 V dc		A2D04
	+5 V dc		A2B04
	+12 V dc	Hard-Wired	A2B05
	-5 V dc		A2D06
	-5 V dc	at	A2B06
	0 V dc		A2D07
	0 V dc	Power Supply	A2B07
	0 V dc		A2D08
	0 V dc		A2B08
	0 V dc		A2D09
	0 V dc		A2B09
	-12 V dc		A2B10
	+8.5 V dc		A2D11
	+8.5 V dc		A2B11
	+8.5 V dc		A2D12
	+8.5 V dc		A2B12
b	Line	Hard-wired to fuseholder	P3-10
	Neutral	P2-2	P3-15
	Ground	Screw #6	P3-7
	Ground	Screw #6	P3-16
c	Degauss	P3-12	P27-2
	Neutral	P3-13	P27-1
d	Line (Switched)	P2-1	6 hard-wired
	Neutral (Switched)	P2-2	3 at power
	Neutral	P2-3	2 switch
	Line	P2-4	5
e	EHT Anode	Bleed Asm 2	P25
f	+5 V dc (red)	A3D02	P8-1
	0 V dc (black)	A3D08	P8-3
	Sound Alarm (yellow)	A3D05	P8-4
g	Security Key Op	P9-1	A3B03
	Security Key Ins	P9-4	A3D04
	Security Key Gnd	P9-3	P4-6
h	Battery +ve	P20-4	A3D07
	Battery -ve	P20-1	A3B07

Wiring Table (continued)

<i>Cable</i>	<i>Description</i>	<i>From</i>	<i>To</i>
i	Vol Pot 1 Vol Pot 2	3 (cw) 1 (ccw) + 2	Alarm A1 Alarm A3
j	+12 V dc ±12 V dc return -12 V dc	P3-1 P3-2 P3-3	P17B-3 P17B-4 P17B-6
k	LOPT Return LOPT Sense	P7-1 P7-2	P3-9 P3-8
l	103 V dc Return 103 V dc	P3-4 P3-5	P4-14 P4-15
m	EHT	P21	Bleed 1
n	Horiz Drive Horiz Return Vert Drive Vert Return Horiz Supply Voltage	P6-6 P6-3 P6-1 P6-4 P6-2	Hard-wired at yoke  P6-5
p	+5 V dc Scan Bit 2 KB Ack KB Ident Bit 0 Clicker -5 V dc Make/Break KB Ident Bit 1 DC Return Scan Bit 0 Scan Bit 1 POR Data Available KB Ident Bit 2 Scan Bit 3 +8.5 V dc KB Ident Bit 3 Scan Bit 4 Scan Bit 5 Scan Bit 6	P23-16 P23-3 P23-4 P23-17 P23-5 P23-19 P23-6 P23-18 P23-11 P23-23 P23-8 P23-21 P23-9 P23-22 P23-10 P23-20 P23-7 P23-14 P23-12 P23-2	D5D03 D5B04 D5D05 D5B05 D5D06 D5B06 D5D07 D5B07 D5D08 D5B08 D5D09 D5B09 D5D10 D5B10 D5D11 D5B11 D5D12 D5B12 D5D13 D5B13
q	+5 V dc -5 V dc +8.5 V dc Skip	A3D03 A3B06 A3B11 A3D11	P4-34 P4-29 P4-35 P4-26

## Wiring Table (continued)

<i>Cable</i>	<i>Description</i>	<i>From</i>	<i>To</i>
q	Vert Sync	A3D12	P4-28
	Horiz Sync	A3D13	P4-1
	0 V	A3B09	P4-30
	Ground	A3B10	P4-4
	Ground Separator	A3B04	-
	Ground Separator	A3B12	-
r	12 V dc LOPT	A5D02	P18-13
	12 V dc LOPT Return	A5B02	P18-12
	Ground Separator	A5D03	P18-10
	-12 V dc	A5B03	P18-15
	Lateral Blue	A5D04	P18-11
	+12 V dc	A5B04	P18-14
	Radial Red	A5D05	P18-9
	Ground Separator	A5B05	P18-8
	Radial Green	A5D06	P18-7
	Ground Separator	A5B06	P18-6
	Radial Blue	A5D07	P18-5
	Ground Separator	A5B07	P18-4
	Blue Bright-Up	A5D09	P18-3
	Ground Separator	A5B09	P18-1
s	Display Ready	P4-32	P17B-7
	12 V dc LOPT	P4-31	P17B-8
t	Bri Pot Wiper	P4-44	P17A-1
	Bri Pot	P4-41	P17A-3
	Bri Pot Return (-150 V)	P4-20	P17A-5
u	0 V dc	A5D08	P14-4
	Ground Separator	A5B08	P14-6
	+5 V dc	A5D10	P14-1
	Ground Separator	A5B10	P14-8
	Green Video	A5D11	P14-5
	+8.5 V dc	A5B11	P14-3
	Red Video	A5D12	P14-7
	Ground Separator	A5B12	P14-10
	Blue Video	A5D13	P14-9
	Ground Separator	A5B13	P14-11
v	0 V dc	P12-6	P4-10
	+5 V dc	P12-7	P4-12
	Display Ready	P12-8	P4-33

Wiring Table (continued)

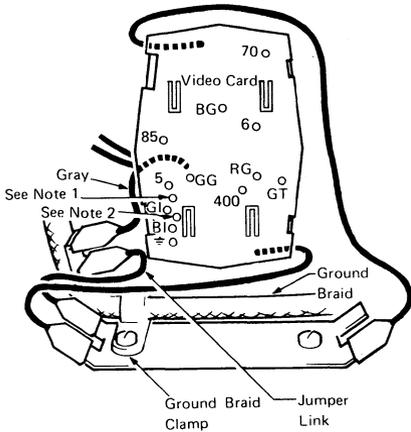
<i>Cable</i>	<i>Description</i>	<i>From</i>	<i>To</i>
w	BR11	P11-6	P4-17
	BR12	P11-7	P4-19
	BR13	P11-8	P4-16
	Intensity Override Sw. 4	P11-3	P4-42
	Intensity Override Sw. 2	P11-4	P4-18
	Intensity Override Sw. 1+3	P11-5	P4-43
x	Test	P12-3	P28-3
y	Test	Test Sw. Top	P12-4
	0 V dc	Test Sw. Center	P12-5
z	Dualcase	A.a/A Sw. Bottom	P28-5
aa	0 V dc	A.a/A Sw. Center	P4-9
bb	Operate	Test Sw. Bottom	P28-4
cc	Base Col Supp	oooo/oo Sw. Bottom	P28-1
dd	0 V dc	oooo/oo Sw. Center	P4-7
ee	Test	P28-3	A3B05
	Operate	P28-4	A3B02
	Color Switch	P28-1	A3D06
	Monocase Switch	P28-5	A3B13
ff	70 V dc	P4-23	P16-1
	70 V dc Return	P4-24	P16-7
	+6.3 V dc	P4-25	P16-3
	+6.3 V dc Return	P4-22	P16-4
	Intensity Override	P4-13	P16-5
gg	A1 (+280 to +450 V dc)	P5-3	hard-wired
	Focus (6 kV)	P26	hard-wired
hh	Blue Radial Return	P19-8	Radial Card 1
	Blue Radial Drive	P19-7	Radial Card 2
	Green Radial Return	P19-10	Radial Card 3
	Green Radial Drive	P19-9	Radial Card 4
	Red Radial Return	P19-12	Radial Card 5
	Red Radial Drive	P19-11	Radial Card 6
	Vertical Purity Drive	P19-1	Purity Card 1
	Purity Return	P19-4	Purity Card 2
	Horizontal Purity Drive	P19-3	Purity Card 3
	Lateral Drive	P19-5	Lateral Card 2
	Lateral Return	P19-6	Lateral Card 1

## Wiring Table (continued)

<i>Cable</i>	<i>Description</i>	<i>From</i>	<i>To</i>
ii	Red Grid	P17A-7	P15-1
	Green Grid	P17A-9	P15-5
	Blue Grid	P17B-1	P15-3
jj		G2B02	G4B02
		G2D02	G4D02
		G2B03	G4B03
		G2B04	G4B04
		G2D04	G4D04
		G2B05	G4B05
		G2D05	G4D05
		G2D06	G4D06
		G2B07	G4B07
		G2D07	G4D07
		G2B08	G4B08
		G2B09	G4B09
		G2D09	G4D09
		G2B10	G4B10
		G2D10	G4D10
	G2D11	G4D11	
	G2B12	G4B12	
	G2D12	G4D12	
	G2B13	G4B13	
	G2D13	G4D13	
kk		G2G02	G4G02
		G2J02	G4J02
		G2G03	G4G03
		G2G04	G4G04
		2J04	G4J04
	G2J05	G4J05	
ll	Sync Out	C4B04	J30
	Red Video	C4B05	J31
	Green Video	C4B06	J32
	Blue Video	C4B07	J33
	Wrap Test	C4D02	Video Ctl Sw. - Top
	Sync Polarity	C4B02	Sync Pol Sw. - Bot
	Ground	C4D08	Video Ctl Sw. - Ctr
	Ground	C4D08	Sync Pol Sw. - Ctr
	+5 V dc	C4D03	P34-1
	Signal Test Lamp	C4B03	P34-4
	Blue Enhance	C4D04	Video Ctl Sw. - Bot







Video Card – Rear View

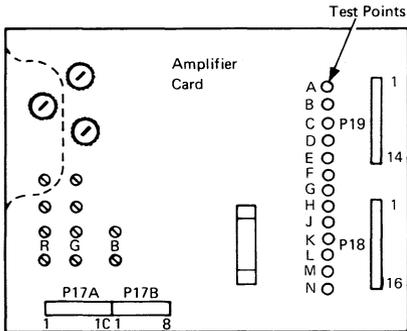
Test Point	Description
5	+5 V dc
8.5	+8.5 V dc
70	+70 V dc (video amps)
⊖	Return 0 V
6	+6.3 V dc (Heater)
RI	Red } Video Amp.
GI	Green } Inputs
BI	Blue } (0.5 V)
400	Anode Voltage (+280 to +450 V dc)
GT	Intensity Override (0.5 V)
RG	Red } Grid
GG	Green } Voltages
BG	Blue } (0 to -150 V)

**Notes:**

1. RI (all Cards except IBM Part 5148396)
2. RI (card IBM Part 5148396)

**CAUTION:** Probing the wrong RI point may short-circuit land patterns and damage cards.

Figure 6-9. Video Card Test Points



A	Blue Lateral	} Convergence
B	Blue	
C	Green	
D	Red	} Coil
E	Red	
F	Green	} Analog Inputs
G	Blue	
H	Blue Lateral	
J	Blue Bright-up	} from B2 card
K	+12 V dc (Fused)	
L	-150 V dc	
M	+12 V dc	
N	-12 V dc	

Figure 6-10. Amplifier Card Test Points

6.7 Keyboard Jumpers and Cables

	Jumper Position	Keyboard ID response (See Test Model 3) Ensure that the Aa/A switch is set to Aa	
		Model 2	Model 3
Reserved	-	⊕	✕
Reserved	1	U	W
Typewriter	3	Ç	Š
Typewriter with Numeric Lock	1, 3	E	G
Data Entry	2	Ⓚ	▶
Data Entry with Numeric Lock	1, 2	u	w
Data Entry, Keypunch	2, 3	é	ž
Data Entry, Keypunch with Numeric Lock	1, 2, 3	e	g
APL with PSHICO	0	Û	Ê
RPO	0, 1	:	┘
Text	0, 3	Ù	Ö
Text with Numeric Lock	0, 1, 3	4	6
APL	0, 2	ü	ê
APL with Numeric Lock	0, 1, 2	/	l
Typewriter with PSHICO	}	0, 2, 3	ö
Overlay with PSHICO			
Reserved	0, 1, 2, 3	4	6

If PSHICO present, Numeric lock is specified at CU customization and not by the keyboard I/D

PSHICO = PS, Highlighting and Color select on PF Keys (not valid on 3276 CU)

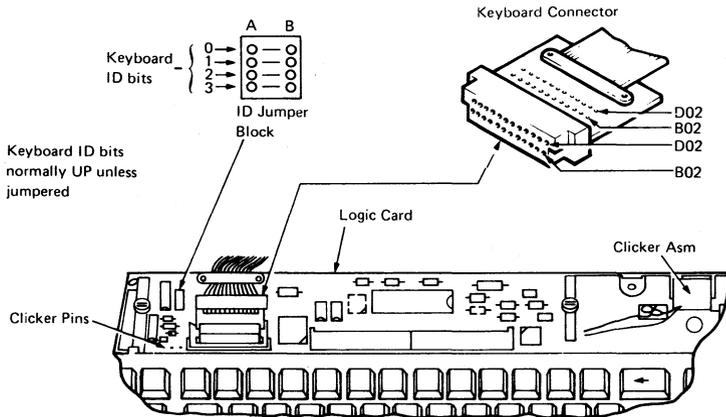


Figure 6-11. Keyboard Logic and Connector



6.8 Attachment Cabling

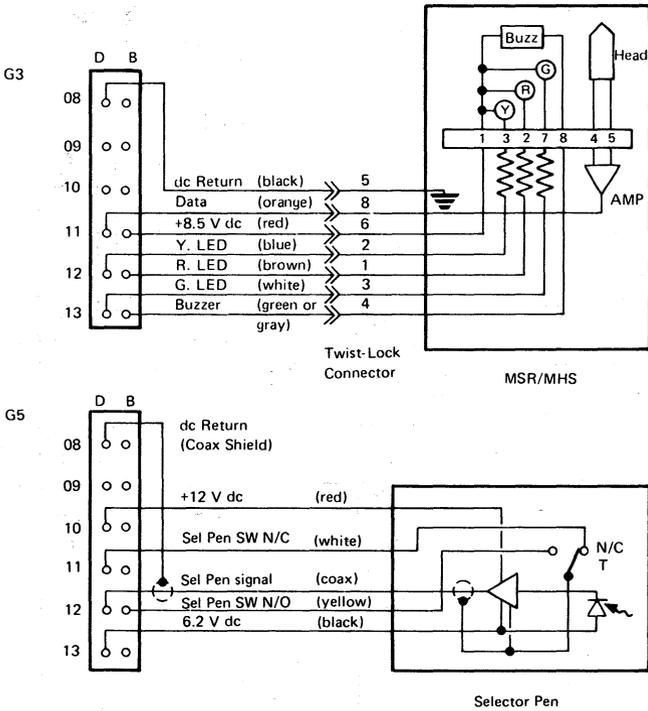


Figure 6-13 (Part 1 of 2). Attachment Cabling

C3

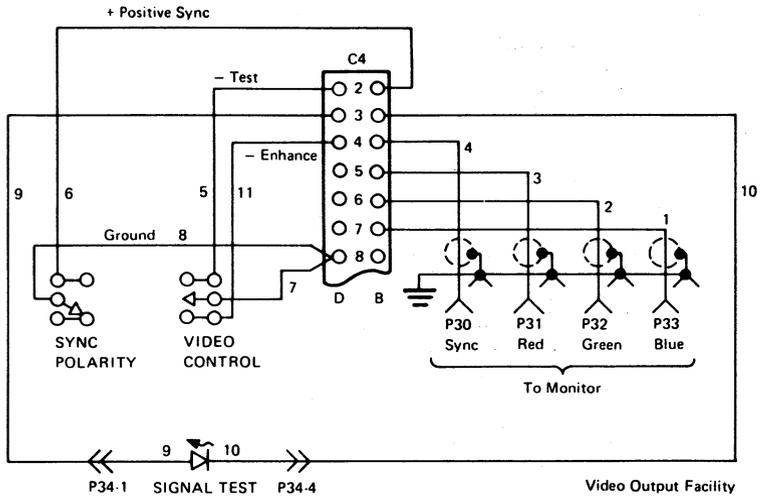
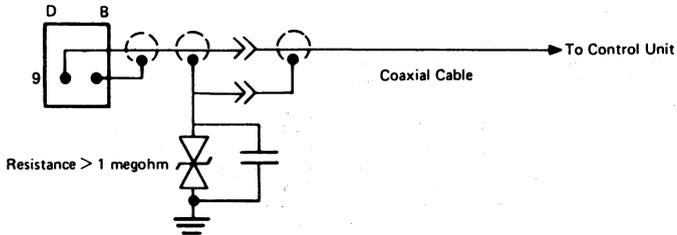
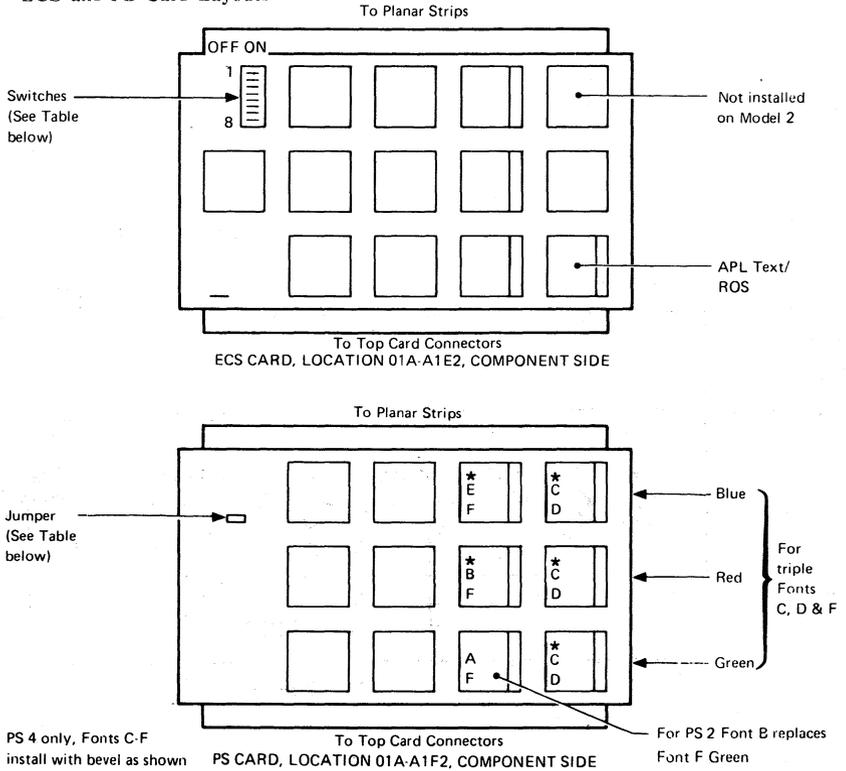


Figure 6-13 (Part 2 of 2). Attachment Cabling

6.9 ECS and PS Card Layouts



Feature	ECS Card Switches				PS Card **
	SW 2	SW 3	SW 1 & 4	SW 5-8	Jumper
No PS	OFF	OFF	ON	OFF	NO CARD
PS 2 **	OFF	ON	ON	OFF	INSTALL
PS 2 PS 4 **	ON	ON	ON	OFF	NO

\*\* These features are only supported in the 3279 by certain control units (for example, 3274). If the feature is not supported by the control unit (including its features and customization), set switches SW 2 and SW 3 OFF. See Figures 2-6 and 2-7 for relevant error codes.

Figure 6-14. ECS and PS Card Layouts

## 6.10 Power Supplies

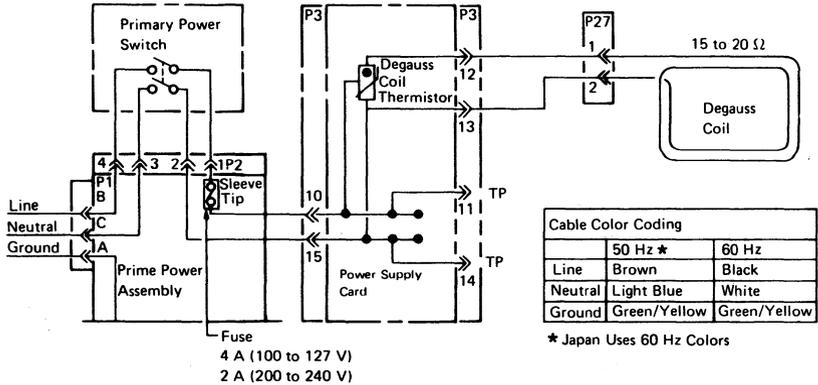


Figure 6-15. Mainline Supply

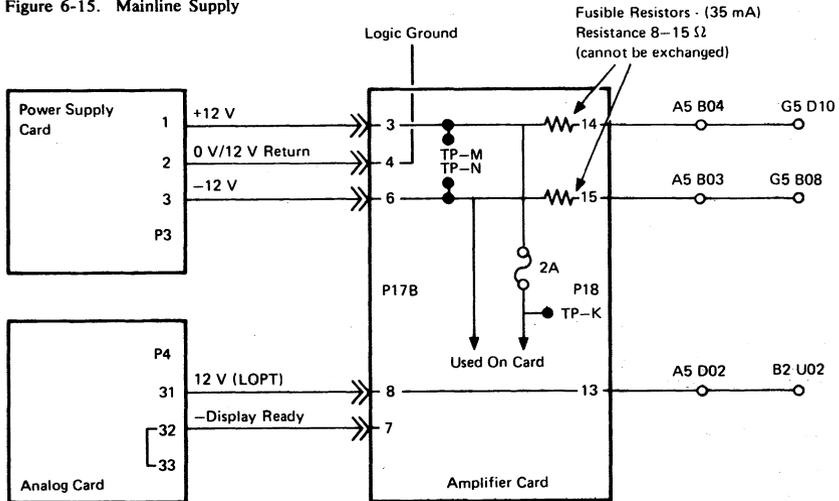


Figure 6-16. Supplies to Amplifier Card

### 6.11 Display Attributes and Modified Data Tags

Data in the refresh buffer (not the ECS buffer) may be examined for proper attributes and the setting or resetting of modified data tags (MDTs).

The procedure is as follows:

1. Jumper D2Y09 to D2Y08 (see section 2.5).
2. Position the cursor at the location of the attribute to be displayed.
3. Set the Normal/Test switch to Test. Nulls will display as % and attributes are blank.

Note that the colors of white and red fields (base) change to red and white respectively.

4. Press CONTROL D. The character, or attribute, at the cursor position is copied into the first position of the Operator Information Area and the cursor advances (see Test Mode 3, section 2.5.3).
5. Use the attribute bit definition figure and the attributes character tables (Figures 6-17 and 6-18) to determine if the attributes are being correctly interpreted by the hardware.

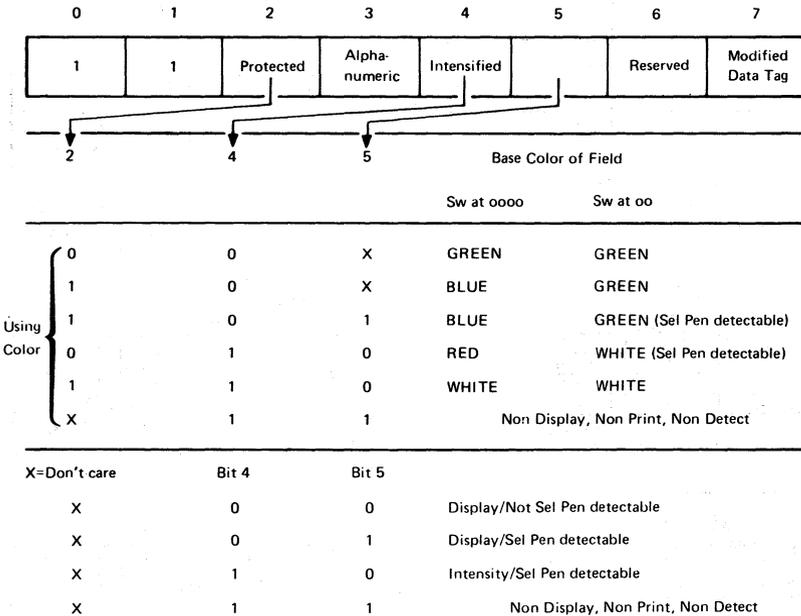


Figure 6-17. Base Field Attribute Byte

C	D	E	F	
ê	P	Ç	↖	0
ô	S	Ë	—	1
û	□	Û	Z	2
z	↗	Ž	—	3
é	□	Ć	⊙	4
ž	□	Ń	⊗	5
ý	□	Ś	⊗	6
ÿ	□	Ÿ	■	7
À	→	Ē	←	8
Š	↖	Š	↖	9
đ	↑	Đ	○	A
p	↖	p	└┘	B
L	⊥	I	⊥	C
l	⊥	i	⊥	D
ı	⊥	ı	⊥	E
ç	■	½	⊗	F

English

C	D	E	F	
ä	P	Ä	↖	0
σ	S	Ö	—	1
ü	□	Ü	Z	2
ä	↗	Ä	—	3
ñ	□	Ñ	⊙	4
õ	□	Õ	⊗	5
á	↖	Á	⊗	6
é	□	É	■	7
í	→	Í	←	8
ó	↖	Ó	↖	9
ú	↑	Ú	○	A
à	↖	à	└┘	B
è	⊥	è	⊥	C
ì	⊥	ì	⊥	D
ù	⊥	ù	⊥	E
ü	■	½	⊗	F

Katakana and  
Japanese English

Figure 6-18. Attribute Characters

### 6.12 Extended Character Set Buffer

The ECS buffer contains the Character Attribute (CA) bytes (defined in Figure 6-19). If the corresponding byte in the refresh buffer is itself an attribute, then the ECS byte becomes an extended field attribute (EFA).

Normally, the character attribute controls the displaying of the corresponding character, however, if the character attribute contains blank fields then attribute control defaults to the EFA. If the EFA also contains a blank color field, then color control defaults to the attribute byte in the refresh buffer.

The hardware is tested by Online Test 8, but no test exists to display the contents of the ECS buffer. (The OIA symbols can be used to determine the contents of the ECS buffer.)

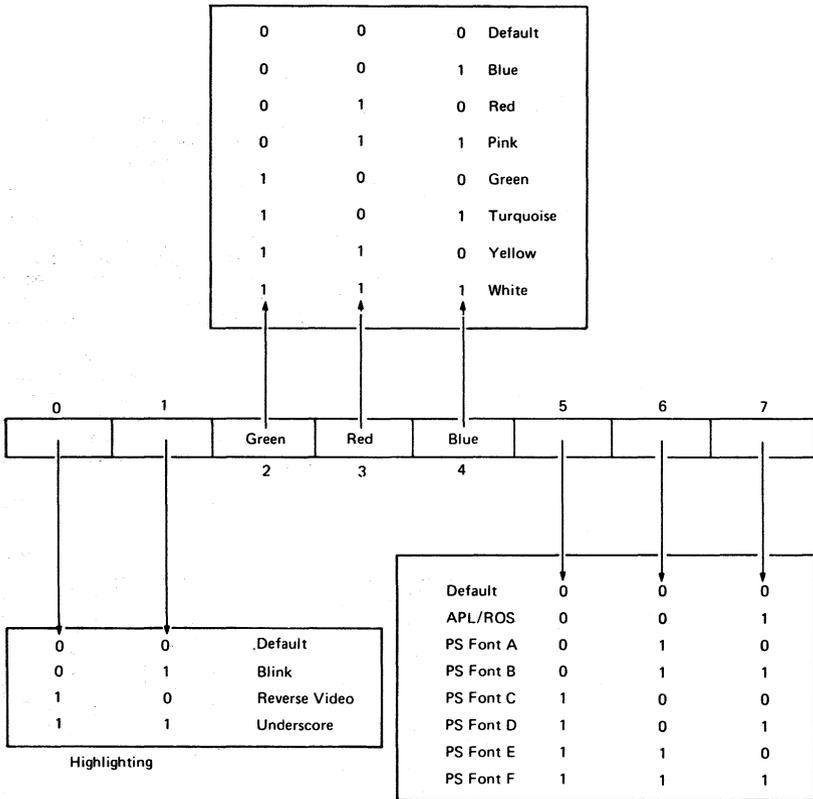
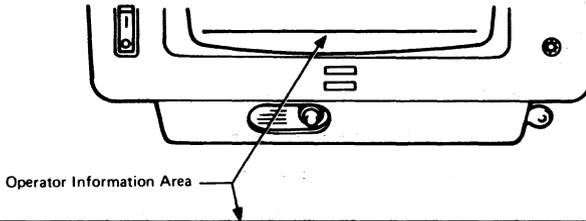


Figure 6-19. ECS Byte

## Appendix A. Indicators In Operator Information Area



	Readiness and System Connection	Do Not Enter (Input Inhibited)	Reminders	PS	Shift and Modes	High-lighting	Color	Insert Mode	Printer Status
Col.	1 6	9 17	21 27	31 34	36 44	46 47	49 50	52	60 64

**Note:** The column numbers (0 - 64) of the indicator row do not appear on the screen.

Figure A-1. Layout of Operator Information Area

The following describes the symbols that may appear in the Operator Information Area.

-  3274 Control Unit is ready.
-  3276 Control Unit is ready.
-  IDPA is ready.
-  Control Unit is connected to system under 'a' rules.
-  Control Unit is connected to system under 'b' rules (SNA).
-  3279 is connected to application.
-  3279 is connected to system operator (control program).
-  3279 is connected to host but not to application or control program. Use SYS REQ to LOGON.
- TEST** 3279 is in online test mode (to control unit).
-  Wait for system to complete.
-  Keyboard overrun - RESET and retry.
-  System has locked keyboard while busy - wait for complete.

	Action must be taken elsewhere on the screen - RESET.
	Too many characters attempted to insert - RESET.
	Only numerals can be entered in numeric field - RESET.
	Wrong or invalid number entered - RESET.
	Requested function is unavailable - RESET.
	
	3279 logic failure - see Error Codes in section 2.6.6.
	As above.
	Communication check - see Control Unit MIM.
	As above.
	Host data stream programming error - see Control Unit MCM.
	As above.
	Assigned printer is busy. If  is displayed at right, the printer is busy on your work. Wait for printer to complete or use DEV CNCL. (Print in progress cannot be stopped by DEV CNCL.)
	Longer wait time expected than above.
	Assigned printer is not working. If  is displayed in printer status area, printer stopped while printing your work - use DEV CNCL.
	Function not allowed on this 3279.
	Security keylock is off. Key is needed to unlock.
	Questionable card - but usable in this operation.
	An invalid key was entered after the dead key accent.
	The symbol that was keyed is not available.
	A message from the operator was received and rejected.
	Errors are occurring on the link to the host.
	Host link established.
	Operator Selectable.
	Field Inherit.

S	Base symbols are selected.
PSA	Program Symbols Set A is selected.
	Reverse Video.
	Blink.
	Underscore.
a	Normal.
	Color in effect is shown by colored blob.
	Color is green or white by default.
NUM	Keyboard is in numeric mode (0123456789 -. and DUP only).
APL	The keyboard is in APL mode.
TEXT	The keyboard is in text mode.
	The keyboard is in upshift.
	The 3279 is in insert mode. (This symbol appears in position 41 on Model A or position 42 on Model B.)
	When printer ID/class is changed, two keyed-in numerals appear here.
	Authorization to use printer nn.
	Selected printer is printing your work.
	Selected printer stopped while printing for this 3279.
	Printer assignment for this 3279 has changed.



## Abbreviations

A	Amp	MM	Millimetre
A/R	As Required	No No	No Number
ASM	Assembly	NOS	Numbers
BM	Bill of Material	OD	Outside Diameter
CAN/FR	Canadian French	P HD	Pan Head
COL	Column	P/N	Part Number
CONN	Connector	POSN	Position
CRT	Cathode Ray Tube	POT	Potentiometer
CSK	Countersunk	PT. NO.	Part Number
DIST	Distribution	PWR	Power
EX TH	External Tooth	QTY	Quantity
GAPL	Group Assembly Parts List	REF	Reference
GN	Green	RES	Resistor
GND	Ground	RH	Right Hand
HD	Head	SHLDR	Shoulder
HEX	Hexagon	STD	Standard
ID	Inside Diameter	SW	Switch
LCK W	Lock Washer	TEMP	Temperature
L.E.D.	Light Emitting Diode	THK	Thick
LG	Long	UNC	Unified National Coarse
LH	Left Hand	V	Volt
LOCN	Location	W.O.	Without
M	Metre	WSHR	Washer
MANUF	Manufacturing	WTC	World Trade Corporation
MFI	Machine Feature Index	YEL	Yellow

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## Group Assembly Parts List

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Figure 3. Rear Enclosure Assembly (4 sheets)	14	Figure 12. AC Box (Power Plate) Assembly (US/AFE)	58
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## HOW TO USE THIS PARTS CATALOG

This catalog is divided into three major sections:

The **Visual Index** contains small overall views of the machine, and gives references for all the major assemblies which are broken down in the Group Assembly Parts List (GAPL).

The **Group Assembly Parts List** contains exploded illustrations of the assemblies, subassemblies, and detail parts of the machine. Parts are cross-referenced by index number to the list of part numbers that accompanies each figure.

The **Numerical Index** follows the GAPL. It contains all of the part numbers on the GAPL in numerical order, and cross-references them by figure and index number.

### Finding a Part

Turn to the visual index and find the general area of the machine in which the part is located. An arrow from that area will point to one or more reduced GAPL figures. Find the figure or figures containing the part required; there is a cross reference to indicate which GAPL figure contains the part.

Turn to the referenced figure in the GAPL to find the index number of the part required and locate the index number on the accompanying list. The list contains the following details:

- **Part Number**
- **Description**  
(Trailer lines after the description are used for clarification or to indicate usage or obtainability of parts.)
- **Units per Assembly**  
(This refers to the number of units used in the area indexed, or the number used for a similar purpose in the assembly.)

### Circled Index Numbers

A circled index number indicates that the assembly is broken down within the figure.

### Example for Ordering Parts

5726422	REF	FAN ASM POWER SUPPLY ENCLOSURE FOR NEXT HIGHER ASSEMBLY SEE FIGURE 1184 FOR ILLUSTRATION SEE FIGURE 9
1	334921 2	● TERMINAL RING 18 22 AWG 6 HOLE INS
2	187854 1	● SHIELD TERMINAL BLOCK 2 PDS
3	210984 1	● SCREW RD HD 6 32 x 0 250 LG
4	5357050 1	● FAN ASM RD CONN EC OR
5	52042 2	● SCREW BIND HD 10 22 x 0 375 LG
6	5357066 1	● BLADE
7	5357067 1	● MOTOR 208 V 230 V 60-HZ 220 V 50-HZ
8	336434 2	● SCREW SLOTTED HEX HD 10 22 x 0 375 LG
9	58079 2	● LOCKWASHER EXT TH 0 195 ID x 0 410 OD
10	5726436 1	● HEADER POWER SUPPLY FAN

If the entire fan assembly is to be replaced, order part number 5726422; all of the items on that list will be supplied. If only the subassembly is required, order part number 5357050; it will include all of the two-dot items that immediately follow its attaching parts. Attaching parts must be ordered separately.

All parts may be ordered individually.

# GLOSSARY

## 1 NO NO.

When this appears in the part number column, it denotes a group of parts for which no assembly part number has been assigned. The detail parts must be ordered separately.

## 2 AR

As Required (AR) in the units per assembly column denotes that the quantity is used as required.

## 3 ATT PT

Attaching Parts: These parts are used to attach a subassembly to an assembly. The attaching parts are listed immediately following the part to be attached.

## 4 REF

This entry in the units per assembly column denotes a part or assembly included for reference only. It is not part of the assembly breakdown and is also included elsewhere in the catalog.

## 5 INDENTURE

The relationship of a part to its next higher assembly is indicated by indentures. For example:

1 2 3 4

Unit

- Assemblies and Detail Parts of Unit
- Attaching Parts for Assemblies & Detail Parts
- Subassemblies
- Attaching Parts for Subassemblies
- Detail Parts for Subassemblies, etc.

## 6 NR

NR in the part number column denotes the part is procurable but not recommended for field replacement, and that the next higher assembly should be ordered.

## 7 NP

The entry NP in the part number column denotes that the part is non-procurable. Order detail parts or next higher assembly, as applicable.

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM				DESCRIPTION
		1	2	3	4	
2						DRIVE MOTOR ASSEMBLY
	2199386	7 NP	4 REF			MOTOR ASM, DRIVE-220 VOLTS, 50 HZ FOR NEXT HIGHER ASM, SEE FIGURE 1-92 FOR ILLUSTRATION, SEE FIGURE 2
- 1	2199255		1			PULLEY
- 2	79842		2 AR			• SETSCREW, SPLINE DR CUP PT- 8-32 x 0.375 LG
- 3	2204116		1			• MOTOR ASM, 220 V AC 60 HZ
- 4	NO NO	1 1				• MOTOR ASM, 220 V AC, 50 HZ
- 5	5526		4 5			• SCREW, BIND HD-8-32 x 0.625 LG
- 6	2204082		1			• FERRULE, OUTER
- 7	2204033		1			• FERRULE, INNER
- 8	2199258		1			• MOTOR, DRIVE - 220 V, 50 HZ
- 9	2199402	6 NR	1			• PLATE, MOTOR MY-220 V, 50 HZ

# GROUP ASSEMBLY PARTS LIST

3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	1 2 3 4				DESCRIPTION
			COVER ASSEMBLY				
1 -	4423162	REF					COVER ASM
- 1	4423377	1	.	.	.	.	CABINET, LOWER
- 2	4420421	4	.	.	.	.	SCREW, HEX WSHR HD, 6-19, 8 MM LG, THD FORMING
- 3	1622346	4	.	.	.	.	LCK W, EX TH, 4.3 MM ID
- 4	4420449	1	.	.	.	.	SPRING
- 5	4420448	1	.	.	.	.	SPRING
- 6	4423378	1	.	.	.	.	CABINET, UPPER
- 7	4423381	4	.	.	.	.	STUD
- 8	4423364	2	.	.	.	.	CLIP
- 9	4420395	1	.	.	.	.	HINGE, BRACKET
- 10	1673725	2	.	.	.	.	SCREW, P HD, M4, 12 MM LG
- 11	1622346	2	.	.	.	.	LCK W, EX TH, 4.3 MM ID
- 12	4420424	2	.	.	.	.	SCREW, HEX WSHR HD, 6-19, 16 MM LG, THD FORMING
- 13	1188748	2	.	.	.	.	WSHR, 0.172 IN ID, 0.5 IN, OD
- 14	4420348	1	.	.	.	.	CABLE CLAMP
- 15	4420394	1	.	.	.	.	HINGE BRACKET
- 16	1673725	2	.	.	.	.	SCREW, P HD, M4, 12 MM LG
- 17	1622346	2	.	.	.	.	LCK W, EX TH, 4.3 MM ID
- 18	4422079	2	.	.	.	.	LATCH ASM
- 19	4420481	2	.	.	.	.	CAM
- 20	4423376	1	.	.	.	.	COVER, REAR
- 21	4420398	1	.	.	.	.	HINGE, LOWER
- 22	1621190	2	.	.	.	.	SCREW, P HD, M4, 8 MM LG
- 23	1622346	2	.	.	.	.	LCK W, EX TH, 4.3 MM ID
- 24	1622304	2	.	.	.	.	WSHR, 4.3 MM ID, 9 MM OD
- 25	4420397	1	.	.	.	.	HINGE, UPPER
- 26	1621190	2	.	.	.	.	SCREW, P HD, M4, 8 MM LG
- 27	1622346	2	.	.	.	.	LCK W, EX TH, 4.3 MM ID
- 28	1622304	2	.	.	.	.	WSHR, 4.3 MM ID, 9 MM OD
- 29	4420401	1	.	.	.	.	PANEL, REAR
- 30	4420422	2	.	.	.	.	SCREW, HEX WSHR HD, 6-19, 10 MM LG, THD FORMING
- 30A	1621509	1	.	.	.	.	SCREW, SCK HD, M4, 8 MM LG FOR DETAILS SEE FIG 3 ITEM 3
- 31	4420441	1	.	.	.	.	LATCH, BRACKET
- 32	1621190	2	.	.	.	.	SCREW, P HD, M4, 8 MM LG
- 33	1622346	2	.	.	.	.	LCK W, EX TH, 4.3 MM ID
- 34	1622304	2	.	.	.	.	WSHR, 4.3 MM ID, 9 MM OD
- 35	4420400	1	.	.	.	.	PANEL, HINGE
- 36	4420442	1	.	.	.	.	LATCH, BRACKET
- 37	1621190	1	.	.	.	.	SCREW, P HD, M4, 8 MM LG
- 38	1622346	2	.	.	.	.	LCK W, EX TH, 4.3 MM ID
- 39	1622304	2	.	.	.	.	WSHR, 4.3 MM ID, 9 MM OD
- 40	4418777	1	.	.	.	.	LATCH, R.H.
- 41	4418778	1	.	.	.	.	LATCH, L.H.
- 42	4420424	4	.	.	.	.	SCREW, HEX WSHR HD, 6-19, 16 MM LG, THD FORMING
- 43	638537	3	.	.	.	.	WSHR

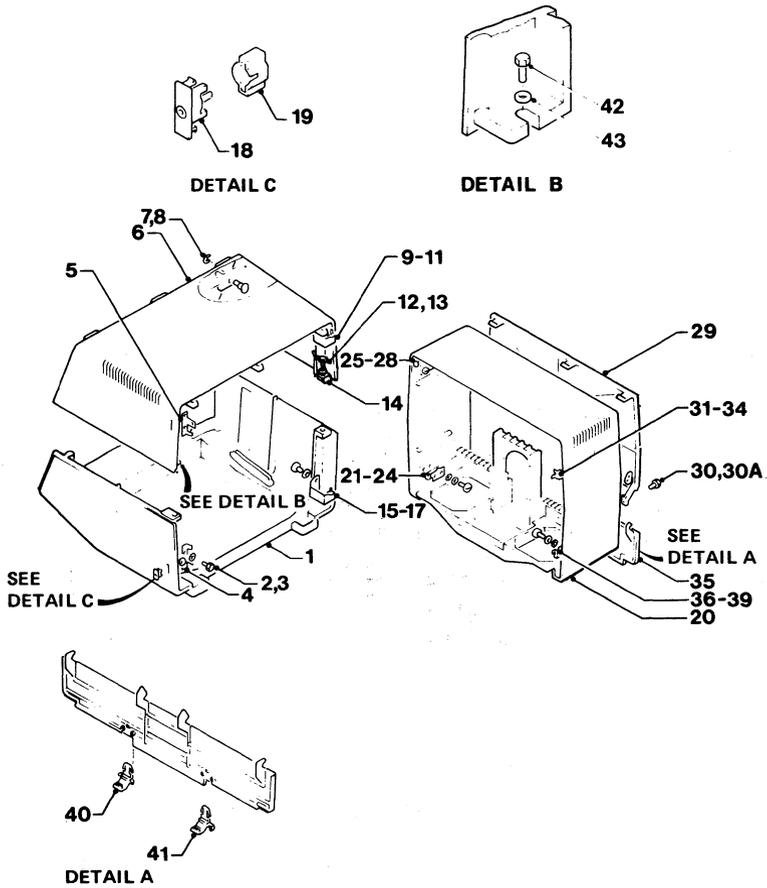


Figure 1. Cover Assembly

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			FRONT ENCLOSURE ASSEMBLY			
2 -	NO NO	REF	FRONT ENCLOSURE			
- 1	4423252	1	BEZEL ASM			
- 2	4423408	1	BEZEL			
- 3	4423410	1	INSERT, L.E.D.			
- 4	5830579	1	CARD ASM, L.E.D.			
- 5	4420426	2	SCREW, HEX WSHR HD, 4-20, 8 MM LG, THD FORMING			
- 6	1743194	1	LOGO			
- 7	1655357	3	SWITCH			
- 8	4423231	1	INSERT, NORMAL TEST			
- 9	4423232	1	INSERT, COLOR DEFAULT			
- 10	4423336	1	INSERT, MONO DUAL			
- 11	4423406	1	POTENTIOMETER ASM, BRIGHTNESS			
- 12	4420426	2	SCREW, HEX WSHR HD, 4-20, 8 MM LG, THD FORMING			
- 13	4423405	1	KNOB, BRIGHTNESS			
- 14	1743174	1	CUP			
- 15	2114043	1	CRADLE			
- 16	4420422	1	SCREW, HEX WSHR HD, 6-19, 10 MM LG, THD FORMING			
- 17	1743178	1	SWITCH, ON/OFF			
- 18	2114044	1	CLIP			
- 19	4423479	1	POTENTIOMETER ASM			
- 20	4423403	1	KNOB			
- 21	1743174	1	CLIP			
- 22	4420281	2	CAPSCREW, HEX SOC HD, M3, 8 MM LG			
- 23	615683	1	FUSE, 2 AMP (220 V)			
- 23	1143492	1	FUSE, 4 AMP (110 V)			
- 24	811427	1	RETAINER			
- 24A	2596291	1	CLIP, UPPER			
- 24B	2596275	1	CLIP, LOWER			

ITEMS 24A AND 24B MAY BE  
FOUND ON OLDER MACHINES.  
THEY ARE NOT SHOWN ON THE DRAWING

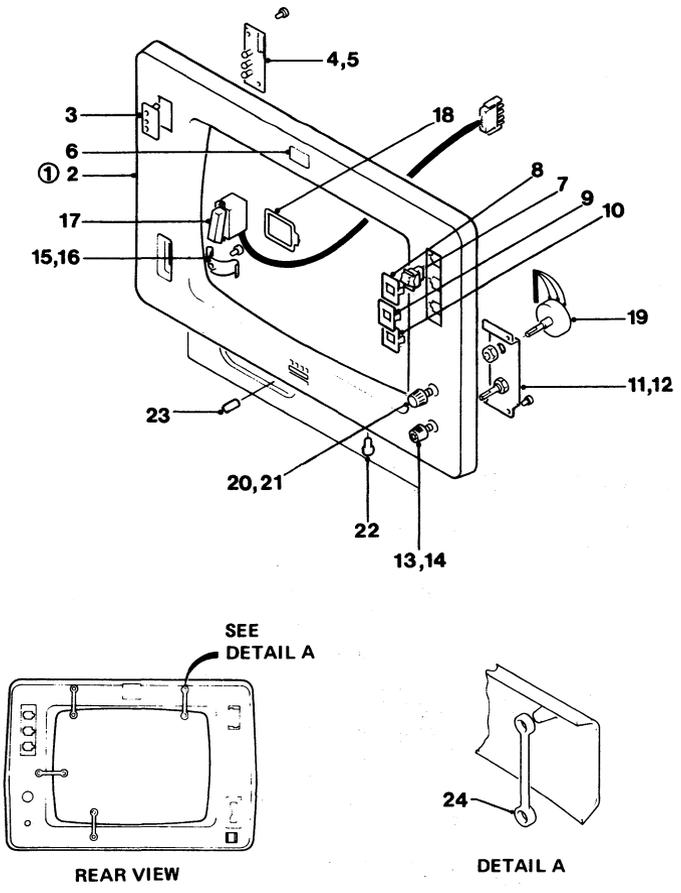


Figure 2 (Sheet 1 of 4). Front Enclosure Assembly

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
FRONT ENCLOSURE ASSEMBLY (CONT)						
2 -						FRONT ENCLOSURE
- 25	SEE NOTE	1				AMPLIFIER CARD ASM
- 25A	855231	1				FUSE, 2 AMP
- 26	4423028	1				COVER
- 27	1621195	2				SCREW, P HD, M4, 25 MM LG
- 28	SEE NOTE	1				POWER SUPPLY CARD
						USED ON MACHINE 100-127 V
- 28	SEE NOTE	1				POWER SUPPLY CARD
						USED ON MACHINE 200-240 V
- 29	4420423	2				SCREW, HEX WSHR HD, 6-19, 12 MM LG, THD FORMING
- 30	4423344	1				HOUSING
- 31	SEE NOTE	1				CARD-VIDEO
- 32	4423029	1				COVER
- 32A	4422119	1				LABEL
						4420293 LABEL SUBSTITUTE FOR EMEA ONLY
- 33	SEE NOTE	1				ANALOG CARD ASM
- 34	4420423	2				SCREW, HEX WSHR HD, 6-19, 12 MM LG, THD FORMING
- 35	4420437	1				CLIP
- 36	4420423	1				SCREW, HEX WSHR HD, 6-19, 12 MM LG, THD FORMING
- 37	4420772	1				JUMPER

NOTE: WHEN REORDERING CARDS USE THE PART NUMBER ON THE FAILED CARD

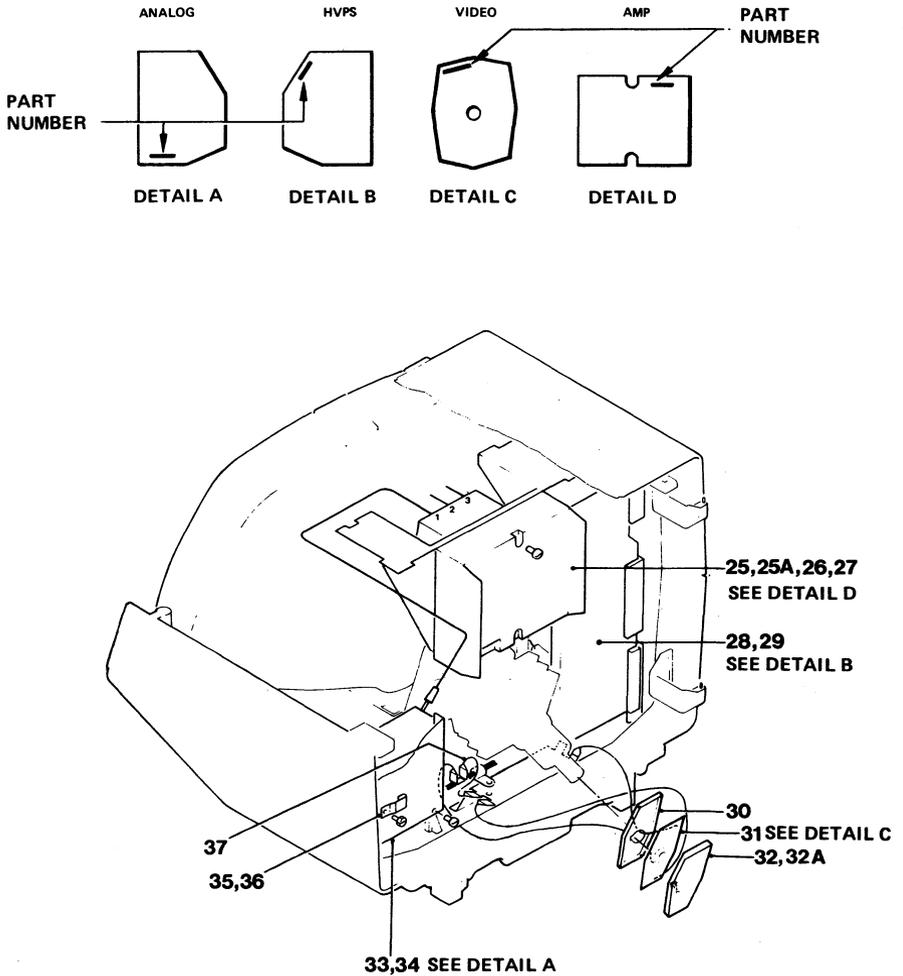


Figure 2 (Sheet 2 of 4). Front Enclosure Assembly

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
FRONT ENCLOSURE ASSEMBLY (CONT)						
2 -						
- 38	4423140	1	.	.	.	FRONT ENCLOSURE
- 39	4423397	1	.	.	.	ENCLOSURE ASM
- 39A	4423462	1	.	.	.	CONVERGENCE ASM
- 39B	1621193	1	.	.	.	CLAMP
- 40	4422195	1	.	.	.	SCREW, P HD, M4, 16 MM LG
- 41	4422196	4	.	.	.	SCREEN
- 42	4420770	1	.	.	.	CLIP
- 43	4420422	1	.	.	.	PLATE
			.	.	.	SCREW, HEX WSHR HD, 6-19, 10 MM LG, THD FORMING
- 44	2102365	1	.	.	.	CLIP
- 45	4420422	1	.	.	.	SCREW, HEX WSHR HD, 6-19, 10 MM LG, THD FORMING
- 46	1743407	1	.	.	.	CARD ASM, AUDIBLE ALARM
- 47	4423373	2	.	.	.	THUMBSCREW, M3, 6 MM LG
- 48	4423357	2	.	.	.	INSERT
- 49	4423048	1	.	.	.	KEYSWITCH
- 50	4423317	4	.	.	.	CLIP
- 51	7341290	A/R	.	.	.	WASHER
						USE TO OBTAIN 2±2 MM BETWEEN CRT LUGS AND CABINET
- 52	4418776	4	.	.	.	NUT
- 53	4422109	1	.	.	.	COIL
- 54	5213306	4	.	.	.	CLIP
- 55	4422110	1	.	.	.	TIE, RELEASABLE
- 56	4423392	1	.	.	.	TUBE AND YOKE ASM, MODEL 2
						ORDER ITEM 57 WHEN ORDERING THIS ITEM
- 56	4423393	1	.	.	.	TUBE AND YOKE ASM, MODELS 3
						ORDER ITEM 57 WHEN ORDERING THIS ITEM
- 57	4420274	1	.	.	.	ACOUSTIC SHIELD
- 58	4423146	1	.	.	.	BLEEDER ASM
- 59	4423318	1	.	.	.	BRACKET
- 60	2568709	4	.	.	.	STAND-OFF
- 61	1621191	2	.	.	.	SCREW, P HD, M4, 10 MM LG
						NOTE: WHEN REORDERING CARDS, USE THE PART NUMBER ON THE FAILED CARD

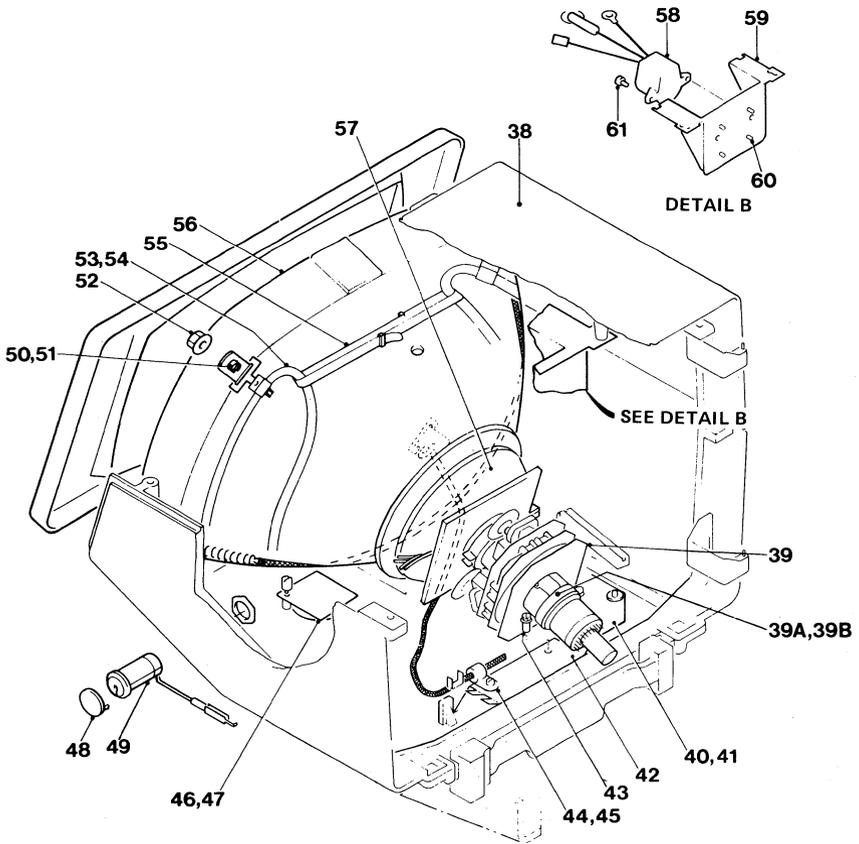


Figure 2 (Sheet 3 of 4). Front Enclosure Assembly

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
FRONT ENCLOSURE ASSEMBLY (CONT)						
2 -						FRONT ENCLOSURE
- 62	4423490	1	.			DOCUMENT TRAY
- 63	4420421	4	.			SCREW, HEX WSHR HD, 6-19, 8 MM LG, THD FORMING
- 64	4423353	1	.			BRACKET
- 65	4420425	1	.			SCREW, HEX WSHR HD, 6-19, 12 MM LG, THD FORMING
- 66	4420283	1	.			SPRING
- 67	4423244	1	.			FOOT
- 68	4423354	1	.			BRACKET
- 69	4420425	1	.			SCREW, HEX WSHR HD, 6-19, 12 MM LG, THD FORMING
- 70	219615	4	.			CLIP
- 71	4423385	1	.			SCREEN
- 72	4423494	1	.			BRACKET
- 73	1621190	2	.			SCREW, P HD, M4, 8 MM LG
- 74	1622346	2	.			LCK W, EX TH, 4.3 MM ID
- 75	1622304	2	.			WSHR, 4.3 MM ID, 9 MM OD
- 76	1621190	2	.			SCREW, P HD, M4, 8 MM LG
- 77	1622346	2	.			LCK W, EX TH, 4.3 MM ID
- 78	1622304	2	.			WSHR, 4.3 MM ID, 9 MM OD
- 79	4423493	1	.			BRACKET

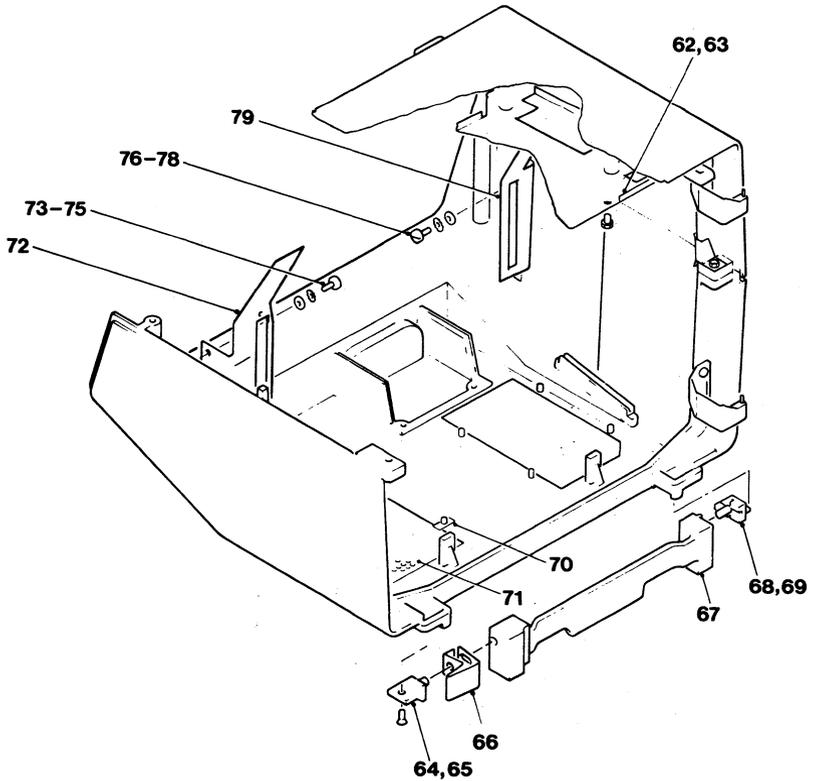


Figure 2 (Sheet 4 of 4). Front Enclosure Assembly

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
						REAR ENCLOSURE ASSEMBLY.
3 -	NO NO	REF				REAR ENCLOSURE
- 1	4420421	3	.			SCREW, HEX WSHR HD, 6-19, 8 MM LG, THD FORMING
- 2	4423374	1	.			THUMBSCREW, M4, 9 MM LG
- 3	1621509	1	.			SCREW, SCK HD, M4, 8 MM LG
- 4	4418790	1	.			GUARD
- 5	1621844	1	.			SCREW, P HD, M3, 6 MM LG, THD FORMING
- 6	NO NO	REF	.			BATTERY
						CUSTOMER REPLACEABLE ITEM
- 7	1743455	1	.			CLIP
- 8	4420350	1	.			PLATE
- 9	473442	1	.			GROMMET, 27 MM LG
- 9A	4423374	3	.			THUMBSCREW, M4, 9 MM LG (MODEL 2)
- 9B	4422107	1	.			PLATE (MODEL 2)
- 9C	4422106	1	.			STRAP (MODEL 2)
- 9D	4423312	3	.			CLAMP (MODEL 2)

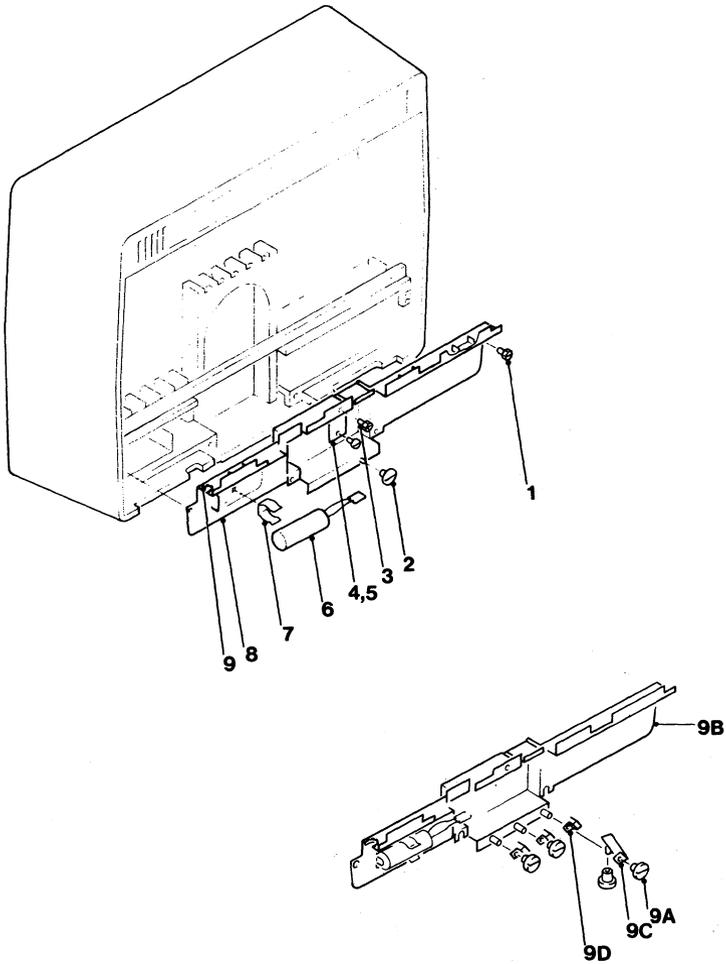


Figure 3 (Sheet 1 of 4). Rear Enclosure Assembly

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			REAR ENCLOSURE ASSEMBLY (CONT)			
3 -						REAR ENCLOSURE
- 10	4423162	1	.			COVER ASM
- 11	4420368	1	.			GUARD
- 12	219615	6	.			CLIP
- 13	1621191	2	.			SCREW, P HD, M4, 10 MM LG
- 14	1622346	1	.			LCK W. EX TH, 4.3 MM ID
- 15	4423483	1	.			SUPPORT
- 16	4420421	4	.			SCREW, HEX WSHR HD, 6-19, 8 MM LG, THD FORMING
- 17	4423365	8	.			GROMMET
- 18	4423233	1	.			PLATE, STOP
- 19	1621197	1	.			SCREW, P HD, M4, 6 MM LG
- 20	4420421	4	.			SCREW, HEX WSHR HD, 6-19, 8 MM LG, THD FORMING
- 21	4423485	1	.			BRIDGE
- 22	1621197	2	.			SCREW, P HD, M4, 6 MM LG
- 23	811427	14	.			RETAINER

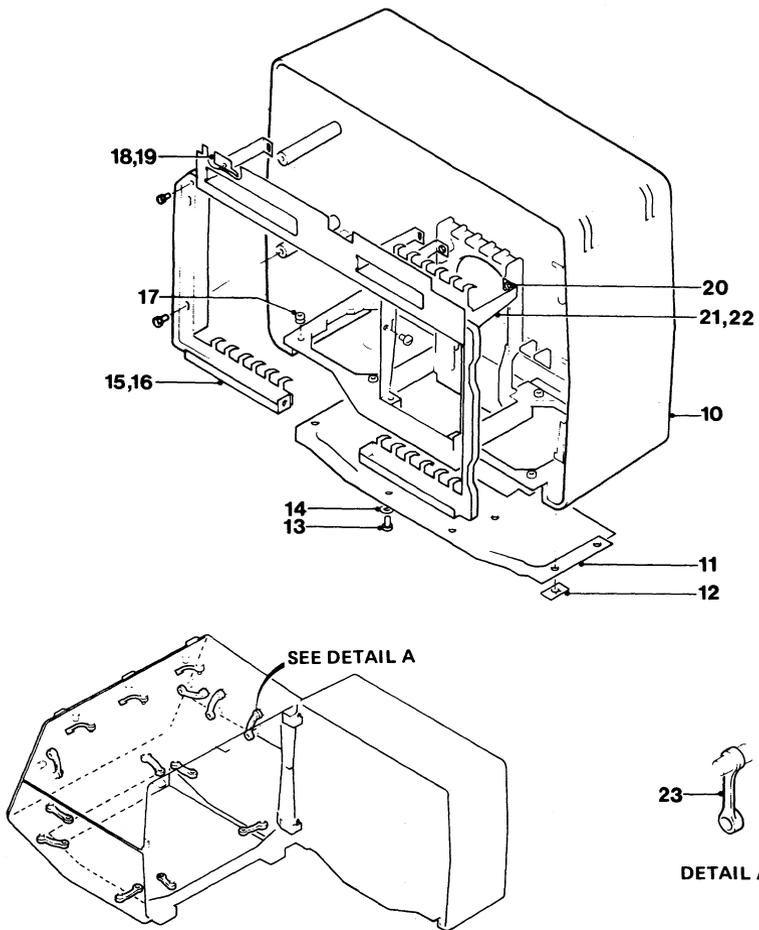
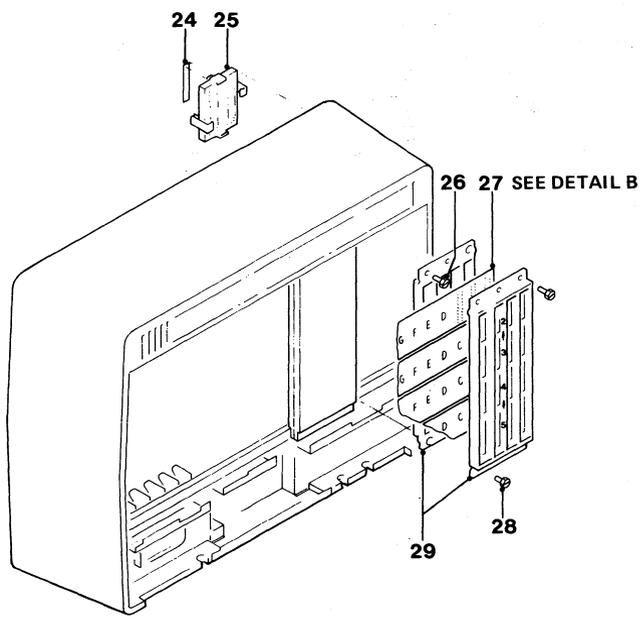
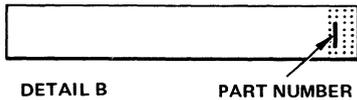


Figure 3 (Sheet 2 of 4). Rear Enclosure Assembly

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			REAR ENCLOSURE ASSEMBLY (CONT)			
3 -						REAR ENCLOSURE
- 24	NO NO	REF	.			LABEL
						FOR DETAILS SEE CHART Y
- 25	NO NO	REF	.			CONNECTOR, TOP CARD
						FOR DETAILS SEE CHART Y
- 26	4420426	4	.			SCREW, HEX WSHR HD, 4-20, 8 MM LG, THD FORMING
- 27	NO NO	REF	.			PLANAR STRIPS
						FOR DETAILS SEE CHART X
- 28	4420427	4	.			SCREW, HEX WSHR HD, 4-20, 16 MM LG, THD FORMING
- 29	4134800	4	.			STIFFENER



**CHART X**

ROW	FROM COL	TO COL	BM	PLANAR STRIP PART NUMBER			
				EC 393807	EC 394427	EC 394686	EC
2	A	G	A	5148164	5148932		EC
3	A	G	A	5148165	5148706		
4	A	G	A	5148166	5148707	5147535	
5	A	G	A	5148167	5148933		

**CHART Y**

LOCATION	TCC Asm Part No.	LABEL
C3-D3	2766726	4423095
C4-D4	2766726	4423089
C5-D5	4423325	4423090
D2-E2	4423324	4423093
C5-E5	4420450	4423091
D2-F2	4423323	4423092
E3-F3	2766726	4423094
C4-D4	4420718	4423089

**NOTE: PLANAR STRIP, PART NO. 5148707, MAY HAVE BEEN REPLACED BY PART 5147535 IF RPQ 7J0039 IS INSTALLED**

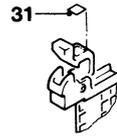
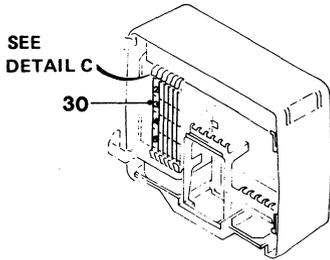
## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			REAR ENCLOSURE ASSEMBLY (CONT)			
3 -			.	.	.	REAR ENCLOSURE
- 30	NO NO	REF	.	.	.	CARD AND HOLDER FOR DETAILS SEE CHART A
- 31	1743002	1	.	.	.	LABEL, 'B'
- 31	1743003	1	.	.	.	LABEL, 'C'
- 31	1743004	1	.	.	.	LABEL, 'D'
- 31	1743005	A/R	.	.	.	LABEL, 'E'
- 31	1743006	A/R	.	.	.	LABEL, 'F'
- 31	1743007	A/R	.	.	.	LABEL, 'G'
			.	.	.	FOR DETAILS SEE CHART A
- 32	2731801	1	.	.	.	JUMPER
- 34	1599501	5	.	.	.	MODULE, CONC-T, PLUGGABLE SEE DETAIL H
- 35	5645546	1	.	.	.	MODULE, ROS, PLUGGABLE SEE DETAIL E NOTE: USE THE PART NUMBER ON THE CARD TO REORDER

## CHART A

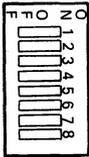
CARD DESCRIPTION	CARD HOLDER PART NUMBER	CARD LOCN	LABEL P/N	CARD DESCRIPTION	CARD HOLDER PART NUMBER	CARD LOCN	LABEL P/N
CONVERGENCE CARD	1743142	B2	1743002	ECS CARD MOD 2B LATIN	1743142	E2	1743005
LINE CONTROL CARD *	1743142	C2	1743003	ECS CARD MOD 3B LATIN	1743142	E2	1743005
BLC CARD MOD 2A LATIN	1743142	D2	1743004	ECS CARD MOD 2B KATAKANA	1743142	E2	1743005
BLC CARD MOD 3A LATIN	1743142	D2	1743004	ECS CARD MOD 3B KATAKANA	1743142	E2	1743005
BLC CARD MOD 2A KATAKANA	1743142	D2	1743004	PS2 CARD MOD 2B	1743142	F2	1743006
BLC CARD MOD 3A KATAKANA	1743142	D2	1743004	PS2 CARD MOD 3B	1743142	F2	1743006
BLC CARD MOD 2A LATIN	1743142	D2	1743004	PS4 CARD MOD 2B	1743142	F2	1743006
BLC CARD MOD 3A LATIN	1743142	D2	1743004	PS4 CARD MOD 3B	1743142	F2	1743006
BLC CARD MOD 2A KATAKANA	1743142	D2	1743004	SELECTOR PEN	1743141	G4	1743007
BLC CARD MOD 3A KATAKANA	1743142	D2	1743004	MAG READ CONTROL	1743141	G2	1743007
				SELECTOR PEN AND MAG READ CONTROL	1743141	G4	1743007

\* IF RPQ 7J0039 IS INSTALLED, LINE CONTROL CARD IS REPLACED BY VIDEO OUTPUT CARD.



DETAIL C

SWITCH POSITIONS  
FOR MODEL B

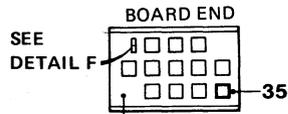


DETAIL F  
ECS CARD SWITCH  
SETTINGS

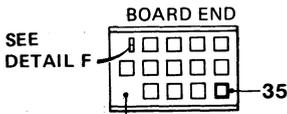
- 1 ON
- 2 } SEE BELOW
- 3 } SEE BELOW
- 4 ON
- 5 OFF
- 6 OFF
- 7 OFF
- 8 OFF

FOR PS

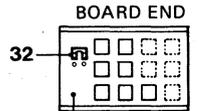
SWITCH BIT	2	3
NO PS	OFF	OFF
PS2	OFF	ON
PS4	ON	ON



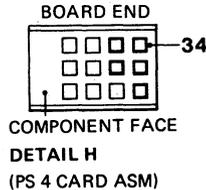
COMPONENT FACE  
DETAIL E  
(ECS CARD FOR MODEL 2B)



COMPONENT FACE  
DETAIL G  
(ECS CARD FOR MODEL 3B)



COMPONENT FACE  
DETAIL D  
(PS 2 CARD ASM)



COMPONENT FACE  
DETAIL H  
(PS 4 CARD ASM)

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			KEYBOARD ASSEMBLY 87/88 KEY			
4 -	4418901	REF				KEYBOARD FINAL ASM, 87 KEY FOR DETAILS SEE FIGURE 5
-	4418903	REF				KEYBOARD FINAL ASM, 88 KEY FOR DETAILS SEE FIGURE 5
-	4422623	REF				KEYBOARD FINAL ASM, 87 KEY FOR DETAILS SEE FIGURE 5
- 1	1742683	1	.	.	.	BASE ASM, 87 KEY
- 1	1742653	1	.	.	.	BASE ASM, 88 KEY
- 1	1742771	1	.	.	.	BASE ASM, 87 KEY
- 2	4406233	1	.	.	.	LABEL USED IN US/CANADA ONLY
- 3	1742689	1	.	.	.	STRAIN RELIEF
- 4	2181012	1	.	.	.	SCREW, HEX WSHR HD, 8-32, 11 MM (0.437) LG
- 5	1742668	1	.	.	.	CABLE ASM, 0.90 MM (3 FT) FOR COMPONENT PARTS SEE FIGURE 12 ITEMS 45-48
- 6	1742662	1	.	.	.	CLICKER ASM
- 7	1742643	1	.	.	.	CLICKER ASM
- 8	1742663	1	.	.	.	CUSHION
- 9	1742664	1	.	.	.	CRADLE
- 10	1742658	1	.	.	.	BAIL SPRING
- 11	NO NO	1	.	.	.	KEYBOARD ASM FOR FURTHER INFORMATION SEE FIGURE 5
- 11A	1809895	1	.	.	.	PAD CARD, 87 POSITION
- 11A	1752330	1	.	.	.	PAD CARD, 88 POSITION
- 12	1748131	REF	.	.	.	KEYMODULE, ACTIVE
- 13	NO NO	REF	.	.	.	KEYBUTTON FOR DETAILS, SEE FIGURE 9
- 14	2181005	2	.	.	.	SCREW, HEX WSHR HD, 6-32, 9.5 MM (0.375) LG
- 15	2125765	2	.	.	.	LCK W, IN TH, 14.27 MM (0.562) OD, SHAKEPROOF
- 16	1854442	1	.	.	.	SPACE BAR ASM
- 17	5183361	1	.	.	.	STABILIZER
- 18	1854443	1	.	.	.	SPACEBAR
- 19	5183362	2	.	.	.	PIVOT
- 20	1742779	1	.	.	.	COVER ASM, 87 KEY
- 20	1742657	1	.	.	.	COVER ASM, 88 KEY
- 21	4942245	4	.	.	.	SCREW, HEX WSHR HD, 8-32, 12.7 MM (0.50) LG
- 22	NO NO	1	.	.	.	PROBLEM DETERMINATION GUIDE FOR DETAILS SEE FIGURE 10
- 23	1742688	1	.	.	.	LATCH
- 24	1742686	1	.	.	.	ROD, HINGE
- 25	1742687	1	.	.	.	SPRING
- 26	1742685	1	.	.	.	REST, PALM
- 27	1650667	1	.	.	.	JUMPER
- 28	SEE NOTE	1	.	.	.	KEYBOARD LOGIC CARD, 87/88 KEY
- 29	1742635	1	.	.	.	CADDY, CE

NOTE: ORDER ITEM 28 USING THE PART NUMBER  
ON THE FAILED CARD

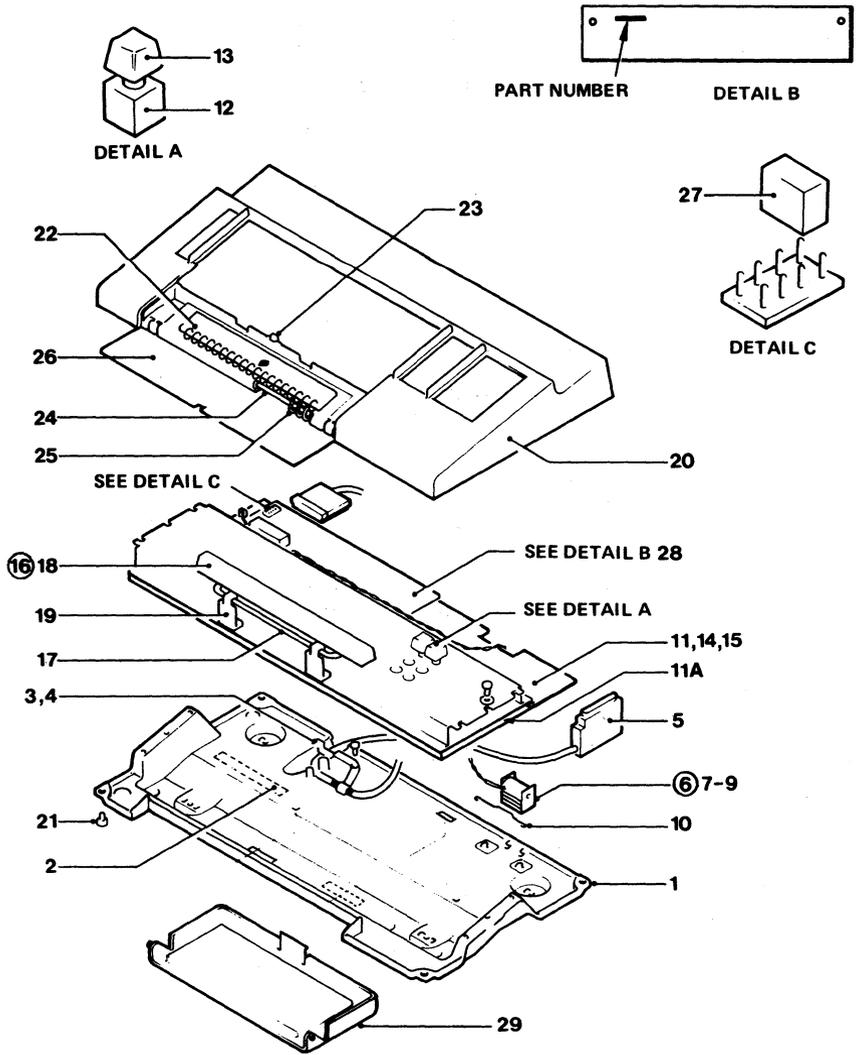


Figure 4. Keyboard Assembly 87/88 Key

LANGUAGE	KEYBOARD TYPE	KYBD ASM*	FINAL ASM	FINAL ASM WITH NUM LOCK
UNITED STATES	TYPEWRITER	1645100	1742700	1742720
	OCP TYPEWRITER			
	W/O CH TO CH			
	AND POWER ON	5194328	4942161	
	DATA ENTRY I	1645102	1742701	1742710
BELGIUM	DATA ENTRY II	1762694	1742702	1742711
	ASCII	1648531	1742704	4941978
	TYPEWRITER	1650668	4941771	4941940
	OCP TYPEWRITER			
BRAZIL	W/O CH TO CH			
	AND POWER ON	5194374	4942162	
	DATA ENTRY I	1650685	4941772	4941903
	DATA ENTRY II	1752424	4941773	4941904
	TYPEWRITER	1650669	4941777	4941942
CANADIAN FRENCH	OCP TYPEWRITER			
	W/O CH TO CH			
	AND POWER ON	5194387	4942163	
	DATA ENTRY I	1650686	4941778	4941905
	DATA ENTRY II	1752425	2941779	4941906
DENMARK	TYPEWRITER	1650684	4941783	4941944
	OCP TYPEWRITER			
	W/O CH TO CH			
	AND POWER ON	5194388	4942164	
FINLAND	DATA ENTRY I	1650702	4941784	4941907
	DATA ENTRY II	1752441	4941785	4941908
	TYPEWRITER	1650670	4941789	4941946
	OCP TYPEWRITER			
EBCDIC (WTC)	W/O CH TO CH			
	AND POWER ON	5194375	4942165	
	DATA ENTRY I	1650687	4941790	4941909
	DATA ENTRY II	1752426	4941791	4941910
	TYPEWRITER	1650671	4941795	4941948
FINLAND	OCP TYPEWRITER			
	W/O CH TO CH			
	AND POWER ON	5194386	4942166	
	DATA ENTRY I	1645102	1742701	1742710
FINLAND	DATA ENTRY II	1762694	1742702	1742711
	TYPEWRITER	1650672	4941801	4941950
	OCP TYPEWRITER			
FINLAND	W/O CH TO CH			
	AND POWER ON	5194376	4942167	
	DATA ENTRY I	1650689	4941802	4941913
FINLAND	DATA ENTRY II	1752428	4941803	4941914

\*PART NUMBERS LISTED IN THIS COLUMN ARE KEYBOARDS ONLY.  
FINAL ASM NUMBERS (IN NEXT COLUMN) INCLUDES COVERS; CABLE, ETC.

LANGUAGE	KEYBOARD TYPE	KYBD ASM*	FINAL ASM	FINAL ASM WITH NUM LOCK
FRANCE (QWERTY)	TYPEWRITER	1650673	4941807	4941952
	OCP TYPEWRITER W/O CH TO CH			
	AND POWER ON	5194377	4942168	
	DATA ENTRY I	1650690	4941808	4941915
	DATA ENTRY II	1752429	4941809	4941916
FRANCE (AZERTY)	TYPEWRITER	1752427	4941877	4941974
	OCP TYPEWRITER W/O CH TO CH			
	AND POWER ON	5194378	4942169	
	DATA ENTRY I	1650688	4941878	4941937
	DATA ENTRY II	1752897	4941879	4941938
AUSTRIA/ GERMANY	TYPEWRITER	1650674	4941813	4941954
	OCP TYPEWRITER W/O CH TO CH			
	AND POWER ON	5194373	4942170	
	DATA ENTRY I	1650691	4941814	4941917
	DATA ENTRY II	1752430	4941815	4941918
ITALY	TYPEWRITER	1650676	4941819	4941956
	OCP TYPEWRITER W/O CH TO CH			
	AND POWER ON	5194380	4942171	
	DATA ENTRY I	1650693	4941820	4941919
	DATA ENTRY II	1752432	4941821	4941920
INTERNATIONAL	TYPEWRITER	1650675	4941825	4941958
	OCP TYPEWRITER W/O CH TO CH			
	AND POWER ON	5194379	4942172	
	DATA ENTRY I	1650692	4941826	4941921
	DATA ENTRY II	1752431	4941827	4941922
NORWAY	TYPEWRITER	1650677	4941841	4941962
	OCP TYPEWRITER W/O CH TO CH			
	AND POWER ON	5194381	4942173	
	DATA ENTRY I	1650695	4941842	4941925
	DATA ENTRY II	1752434	4941843	4941926
PORTUGAL	TYPEWRITER	1650678	4941847	4941964
	OCP TYPEWRITER W/O CH TO CH			
	AND POWER ON	5194382	4942174	
	DATA ENTRY I	1650696	4941848	4941927
	DATA ENTRY II	1752435	4941849	4941928

\* PART NUMBERS LISTED IN THIS COLUMN ARE KEYBOARD ONLY.  
FINAL ASM NUMBERS (IN NEXT COLUMN) INCLUDES COVERS; CABLE, ETC.

LANGUAGE	KEYBOARD TYPE	KYBD ASM*	FINAL ASM	FINAL ASM WITH NUM LOCK
JAPAN/ ENGLISH	TYPEWRITER	1650737	4941831	4941960
	OCP TYPEWRITER W/O CH TO CH AND POWER ON	5194389	4942179	
	DATA ENTRY I	1650694	4941832	4941923
	DATA ENTRY II	1752433	4941833	4941924
JAPAN/ KATAKANA	TYPEWRITER	1648549	4941835	4941976
	OCP TYPEWRITER W/O CH TO CH AND POWER ON	5194390	4942180	
	DATA ENTRY I	1648550	4941836	4941939
UNITED KINGDOM	TYPEWRITER	1650682	4941871	4941972
	OCP TYPEWRITER W/O CH TO CH AND POWER ON	5194384	4942178	
	DATA ENTRY I	1650700	4941872	4941935
	DATA ENTRY II	1752439	4941873	4941936
SPAIN	TYPEWRITER	1650679	4941853	4941966
	OCP TYPEWRITER W/O CH TO CH AND POWER ON	5194383	4942175	
	DATA ENTRY I	1650697	4941854	4941929
	DATA ENTRY II	1752436	4941855	4941930
SPANISH SPEAKING	TYPEWRITER	1650680	4941859	4941968
	OCP TYPEWRITER W/O CH TO CH AND POWER ON	5194391	4942176	
	DATA ENTRY I	1650698	4941860	4941931
	DATA ENTRY II	1752437	4941861	4941932
SWEDEN	TYPEWRITER	1650681	4941865	4941970
	OCP TYPEWRITER W/O CH TO CH AND POWER ON	5194385	4942177	
	DATA ENTRY I	1650699	4941866	4941933
	DATA ENTRY II	1752438	4941867	4941934

\*PART NUMBERS LISTED IN THIS COLUMN ARE KEYBOARD ONLY.  
FINAL ASM NUMBERS (IN NEXT COLUMN) INCLUDES COVER, CABLE, ETC.

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FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
						KEYBOARD ASSEMBLY 75/76 KEY
6 -	NO NO	REF				KEYBOARD ASM, 75 KEY FOR DETAILS SEE FIGURE 7
-	NO NO	REF	.			KEYBOARD ASM, 76 KEY FOR DETAILS SEE FIGURE 7
- 1	1742678	1	.			BASE ASM, 75/76 KEY
- 2	4406233	1	.			LABEL USED IN US/CANADA ONLY
- 3	1742689	1	.			STRAIN RELIEF
- 4	2181012	1	.			SCREW, HEX WSHR HD, 8-32, 11 MM (0.437) LG
- 5	1742668	1	.			CABLE ASM, 0.9 M (3 FT) FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 45-48
- 5	1742661	1	.			CABLE ASM, 1.8 M (6 FT) FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 45-48
- 6	1742662	1	.			CLICKER ASM
- 7	1742643	1	.			CLICKER ASM
- 8	1742663	1	.			CUSHION
- 9	1742664	1	.			CRADLE
- 10	1742658	1	.			BAIL SPRING
- 11	NO NO	1	.			KEYBOARD ASM FOR FURTHER INFORMATION SEE FIGURE 7
- 12	7388944	1	.			PAD CARD, 75 POSITION
- 12	1752366	1	.			PAD CARD, 76 POSITION
- 13	1748131	REF	.			KEY MODULE, ACTIVE
- 14	NO NO	REF	.			KEY BUTTON FOR DETAILS SEE FIGURE 9
- 15	2181012	2	.			SCREW, HEX WSHR HD, 8-32, 11 MM (0.437) LG
- 16	4942270	2	.			WSHR
- 17	1854442	1	.			SPACE BAR ASM
- 18	5183361	1	.			STABILIZER
- 19	1854443	1	.			SPACE BAR
- 20	5183362	2	.			PIVOT
- 21	1742773	1	.			COVER ASM, 75 KEY
- 21	1742637	1	.			COVER ASM, 76 KEY
- 21	1742672	1	.			COVER ASM, 75 KEY
- 22	2181012	4	.			SCREW, HEX WSHR HD, 8-32, 8-32, 11 MM (0.437)
- 23	NO NO	1	.			PROBLEM DETERMINATION GUIDE FOR DETAILS SEE FIGURE 10
- 24	742688	1	.			LATCH
- 25	1742686	1	.			ROD, HINGE
- 26	1742687	1	.			SPRING
- 27	1742085	1	.			REST, PALM
- 28	1650667	1	.			JUMPER
- 29	1742635	1	.			CADDY, CE
- 30	SEE NOTE	1	.			KEYBOARD LOGIC CARD, 75/76 KEY NOTE: ORDER ITEM 30 USING THE PART NUMBER ON THE FAILED CARD

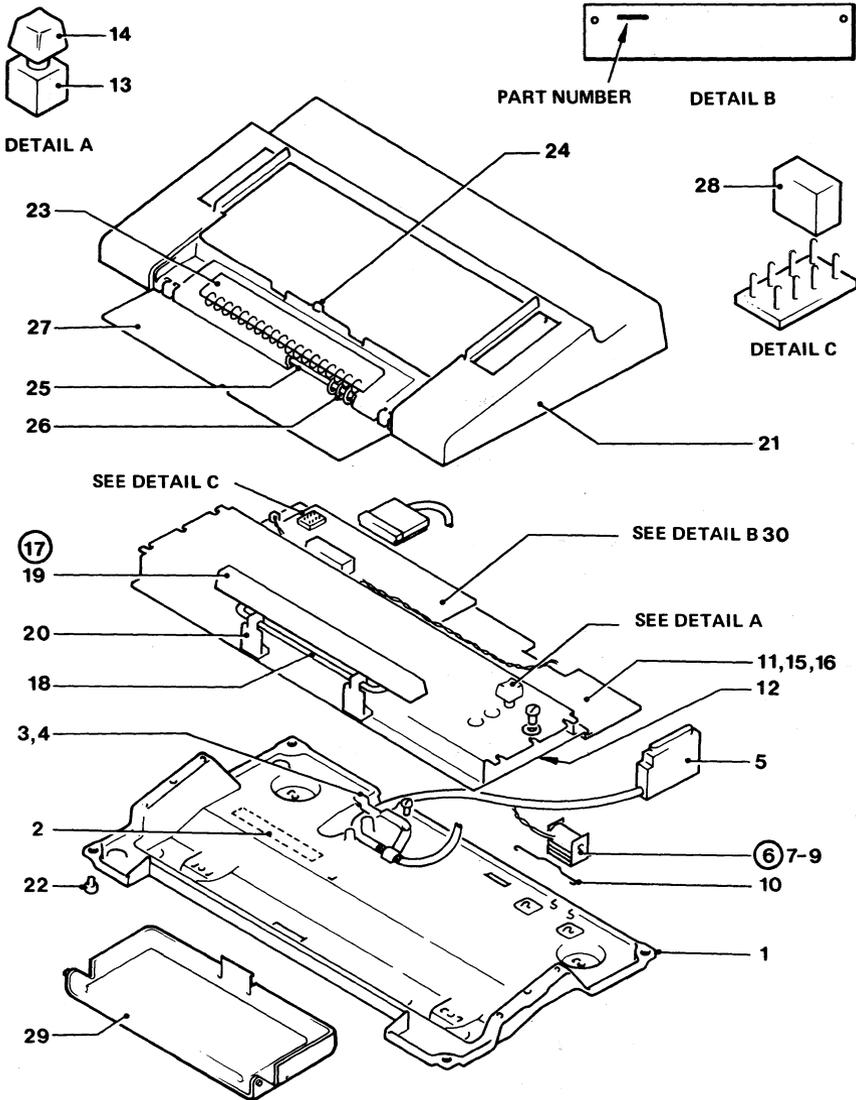


Figure 6. Keyboard Assembly 75/76 Key

LANGUAGE	KEYBOARD TYPE	KYBD ASM *	FINAL ASM	FINAL ASM WITH NUM LOCK	
UNITED STATES	TYPEWRITER	1645101	1742705	1742721	
	TYPEWRITER OVERLAY	1648552		4942225	
	TYPEWRITER PROG. CHAR. SET	1648552	1742708		
	TYPEWRITER ATTRIBUTE SELECT	8627024		4419251	
	ASCII	1752462	1742707	4941979	
	TEXT	5189580	1742709	1742719	
	APL	1752918	1742706	1742718	
	APL ATTRIBUTE SELECT	8627044		4419179	
	BELGIUM	TYPEWRITER	1650703	4941775	4941941
		TYPEWRITER OVERLAY	1752899		4942226
TYPEWRITER PROG. CHAR. SET		1752899	4941883		
TYPEWRITER ATTRIBUTE SELECT		8627027		4419267	
APL		1752919	4941776	4941980	
APL ATTRIBUTE SELECT		8627044		4419179	
BRAZIL		TYPEWRITER	1650704	4941781	4941943
		TYPEWRITER OVERLAY	1752900		4942227
	TYPEWRITER PROG. CHAR. SET	1752900	4941884		
	TYPEWRITER ATTRIBUTE SELECT	8627028		4419271	
	APL	1752920	4941782	4941981	
	APL ATTRIBUTE SELECT	8627048		4419199	
	CANADIAN FRENCH	TYPEWRITER	1650719	4941787	4941945
		TYPEWRITER OVERLAY	1752915		4942228
TYPEWRITER PROG. CHAR. SET		1752915	4941885		
TYPEWRITER ATTRIBUTE SELECT		8627039		4419311	
APL		1755757	4941788	4941982	
APL ATTRIBUTE SELECT		8627059		4419239	

\* PART NUMBERS LISTED IN THIS COLUMN ARE KEYBOARDS ONLY.  
FINAL ASM. NUMBERS (IN NEXT COLUMN) INCLUDES COVERS; CABLE, ETC.

LANGUAGE	KEYBOARD TYPE	KYBD ASM *	FINAL ASM	FINAL ASM WITH NUM LOCK
DENMARK	TYPEWRITER	1650705	4941793	4941947
	TYPEWRITER			
	OVERLAY	1752901		4942229
	TYPEWRITER			
	PROG. CHAR. SET	1752901	4941886	
	TYPEWRITER			
	ATTRIBUTE SELECT	8627029		4419275
	APL	1752921	4941794	4941983
	APL ATTRIBUTE SELECT	8627049		4419203
EBCDIC (WTC)	TYPEWRITER	1650706	4941799	4941949
	TYPEWRITER			
	OVERLAY	1752902		4942230
	TYPEWRITER			
	PROG. CHAR SET	1752902	4941887	
	TYPEWRITER			
	ATTRIBUTE SELECT	8627025		4419259
	APL	1752922	4941800	4941984
	APL ATTRIBUTE SELECT	8627045		4419187
FINLAND	TYPEWRITER	1650707	4941805	4941951
	TYPEWRITER			
	OVERLAY	1752903		4942231
	TYPEWRITER			
	PROG. CHAR. SET	1752903	4941888	
	TYPEWRITER			
	ATTRIBUTE SELECT	8627030		4419279
	APL	1752923	4941806	4941985
	APL ATTRIBUTE SELECT	8627050		4419207
FRANCE (QWERTY)	TYPEWRITER	1650708	4941811	4941953
	TYPEWRITER			
	OVERLAY	1752904		4942232
	TYPEWRITER			
	PROG. CHAR. SET	1752904	4941889	
	TYPEWRITER			
	ATTRIBUTE SELECT	8627031		4419287
	APL	1755746	4941812	4941986
	APL ATTRIBUTE SELECT	8627051		4419215

\* PART NUMBERS LISTED IN THIS COLUMN ARE KEYBOARDS ONLY.  
 FINAL ASM. NUMBERS (IN NEXT COLUMN) INCLUDES COVERS; CABLE, ETC.

LANGUAGE	KEYBOARD TYPE	KYBD ASM *	FINAL ASM	FINAL ASM WITH NUM LOCK
FRANCE (AZERTY)	TYPEWRITER	1752764	4941881	4941985
	TYPEWRITER OVERLAY	1752916		4942244
	TYPEWRITER PROG. CHAR. SET	1752916	4941901	
	TYPEWRITER ATTRIBUTE SELECT	8627032		4419283
	APL	1755758	4941882	4941987
	APL ATTRIBUTE SELECT	8627052		4419211
	TYPEWRITER	1650709	4941817	4941955
	TYPEWRITER OVERLAY	1752905		4942233
AUSTRIA/ GERMANY	TYPEWRITER PROG. CHAR. SET	1752905	4941890	
	TYPEWRITER ATTRIBUTE SELECT	8627026		4419263
	APL	1755747	4941818	4941988
	APL ATTRIBUTE SELECT	8627046		4419191
	TYPEWRITER	1650711	4941823	4941957
	TYPEWRITER OVERLAY	1752907		4942234
	TYPEWRITER PROG. CHAR. SET	1752907	4941891	
ITALY	TYPEWRITER ATTRIBUTE SELECT	8627034		4419295
	APL	1755749	4941824	4941989
	APL ATTRIBUTE SELECT	8627054		4419223
	TYPEWRITER	1650710	4941829	4941959
	TYPEWRITER OVERLAY	1752906		4942235
	TYPEWRITER PROG. CHAR. SET	1752906	4941892	
	TYPEWRITER ATTRIBUTE SELECT	8627033		4419291
INTERNATIONAL	APL	1755748	4941830	4941990
	APL ATTRIBUTE SELECT	8627053		4419219

\* PART NUMBERS LISTED IN THIS COLUMN ARE KEYBOARDS ONLY.  
FINAL ASM. NUMBERS (IN NEXT COLUMN) INCLUDES COVERS; CABLE, ETC.

LANGUAGE	KEYBOARD TYPE	KYBD ASM *	FINAL ASM	FINAL ASM WITH NUM LOCK
NORWAY	TYPEWRITER	1650712	4941845	4941963
	TYPEWRITER OVERLAY	1752908		4942238
	TYPEWRITER PROG. CHAR. SET	1752908	4941895	
	TYPEWRITER ATTRIBUTE SELECT	8627040		4419315
	APL	1755750	4941846	4941991
	APL ATTRIBUTE SELECT	8627060		4419243
	TYPEWRITER	1650713	4941851	4941965
	TYPEWRITER OVERLAY	1752909		4942239
PORTUGAL	TYPEWRITER	1752909	4941896	
	TYPEWRITER PROG. CHAR. SET	1752909	4941896	
	TYPEWRITER ATTRIBUTE SELECT	8627035		4419299
	APL	1755751	4941852	4941992
	APL ATTRIBUTE SELECT	8627055		4419227
	TYPEWRITER	1650714	4941857	4941967
	TYPEWRITER OVERLAY	1752910		4942240
	TYPEWRITER PROG. CHAR. SET	1752910	4941897	
SPAIN	TYPEWRITER	1752910	4941897	
	TYPEWRITER ATTRIBUTE SELECT	8627036		4419303
	APL	1755752	4941858	4941993
	APL ATTRIBUTE SELECT	8627056		4419231
	TYPEWRITER	1650715	4941863	4941969
	TYPEWRITER OVERLAY	1752911		4942241
	TYPEWRITER PROG. CHAR. SET	1752911	4941898	
	TYPEWRITER ATTRIBUTE SELECT	8627037		4419307
SPANISH SPEAKING	APL	1755753	4941864	4941994
	APL ATTRIBUTE SELECT	8627057		4419235

\* PART NUMBERS LISTED IN THIS COLUMN ARE KEYBOARDS ONLY.  
 FINAL ASM. NUMBERS (IN NEXT COLUMN) INCLUDES COVERS; CABLE, ETC.

LANGUAGE	KEYBOARD	KYBD ASM*	FINAL ASM	FINAL ASM WITH NUM LOCK
SWEDEN	TYPEWRITER	1650716	4941869	4941971
	TYPEWRITER OVERLAY	1752912		4942242
	TYPEWRITER PROG. CHAR. SET	1752912	4941899	
	TYPEWRITER ATTRIBUTE SELECT	8627041		4419319
	APL	1755754	4941870	4941995
	APL ATTRIBUTE SELECT	8627061		4419247
	UNITED KINGDOM	TYPEWRITER	1650717	4941875	4941973
TYPEWRITER OVERLAY		1752913		4942243
TYPEWRITER PROG. CHAR. SET		1752913	4941900	
TYPEWRITER ATTRIBUTE SELECT		8627038		4419255
APL		1755755	4941876	4941996
APL ATTRIBUTE SELECT		8627058		4419183
JAPAN		TYPEWRITER		
	JAPAN/ENGLISH TYPEWRITER	1650739	4941837	4941961
	TYPEWRITER OVERLAY	1752461		4942236
	TYPEWRITER PROG. CHAR. SET	1752461	4941894	
	TYPEWRITER ATTRIBUTE SELECT	8627042		4419323
	APL	1755759	4941838	4941997
	APL ATTRIBUTE SELECT	8627062		4419331
JAPAN KATAKANA	TYPEWRITER	1648551	4941839	4941977
	TYPEWRITER OVERLAY	1755761		4942237
	TYPEWRITER PROG. CHAR. SET	1755761	4941893	
	TYPEWRITER ATTRIBUTE SELECT	8627043		4419327
	APL	1755760	4941840	4941998
	APL ATTRIBUTE SELECT	8627063		4419335

\* PART NUMBERS LISTED IN THIS COLUMN ARE KEYBOARDS ONLY.  
FINAL ASM. NUMBERS (IN NEXT COLUMN) INCLUDES COVERS; CABLE, ETC.

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## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			CONTROLLER SWITCH ASSEMBLY			
8 -	4420277	REF				CONTROLLER SWITCH ASM
- 1	4422020	1	.			CONTROLLER SWITCH ASM
- 2	1743316	1	.			LABEL, ENGLISH
- 2	1743317	1	.			LABEL, FRENCH
- 2	1743318	1	.			LABEL, ITALIAN
- 2	1743319	1	.			LABEL, SPANISH
- 2	1743320	1	.			LABEL, GERMAN
- 2	1743313	1	.			LABEL, CANADIAN FRENCH
- 2	1743314	1	.			LABEL, PORTUGUESE
- 2	1743315	1	.			LABEL, JAPANESE

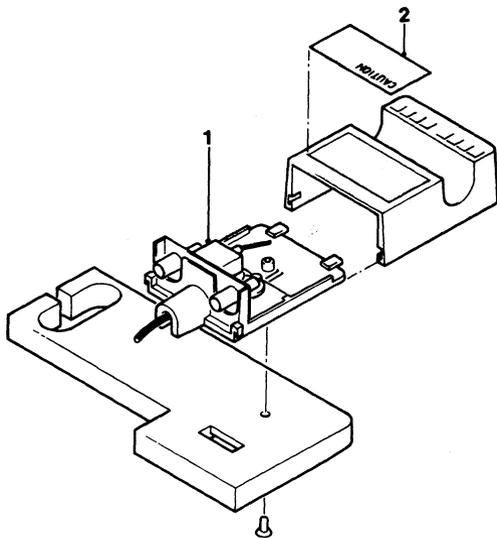
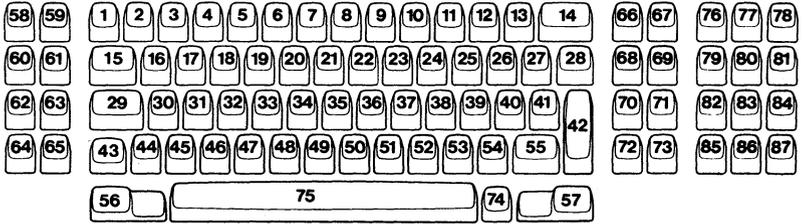
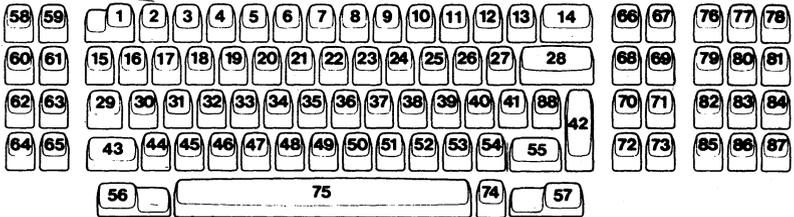


Figure 8. Controller Switch Assembly



Keybutton Positions for 87 Key Keyboard



Keybutton Positions for 88 Key Keyboard

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
1		1853775	2		1757481	3		8326284	3		1853547
		1854578			8326283			8626901			1855131
		5192898			8626900			1854857	4		1643628
		1752539			1853571			1853572			1752523
		8542644			1757230			1855131			1757145
		1643611			1757308			1854265			1757303
		1757229			1855167			1855149			1756271
		5587644			1853547			1855336			1757485
		5588068	3		1643633			1854098			1756278
2		1643634			1752521			1855164			5587610
		1752520			1756286			1752818			8326285
		1756284			1757483			1855169			8626914
		5587735			5587609			1854858			8626937

Figure 9 (Sheet 2 of 17). Keypbutton Group

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
4		8626952	5		1854859	7		1756266	7		1757185
		8626954			1855139			1752525			1757269
		1854858			1757301			1757146			5587622
		1855169			1855170			1757491			5588070
5		1643623			1854858			5587612	8		1643625
		1752532	6		1643624			8326288			1752526
		1756290			1756292			8626910			1756296
		5587736			1757489			8626902			1757493
		1757487			8326287			8627073			1756279
		1752532			1854860			1853606			5587613
		8326286			1855137			1757091			8326289
		8626909			5588069			5188362			8626903
		8626955	7		1643632			1757151			8626957

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
8		1853607	10		1752628	11		8642688	11		1757186
		1757148			1756300			5587616			5587646
		1855173			1757497			8326292	12		1643630
9		1643626			5887615			8626906			1752530
		1752527			8326291			8626958		? beta button with PF11"/>	1757125
		1756298			8626905			1853572		? + button with PF11"/>	1752533
		1757495			1854864			1853573		? i button with P11"/>	1756304
		5587614			1756276			1757231			1756281
		8326290			5588071			1757309			5587617
		8626904	11		1643629			5588072			8326293
		1854863			1752529			1854071		? - + button with !"/>	8626907
		1855174			1756302			1757092		? - + button with !"/>	8626933
10		1643627			1757499			1757243		? - + button with !"/>	8626912

Figure 9 (Sheet 4 of 17). Keybutton Group

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
12		8626959	13		1757126	13		8626934	13		5588074
		1853573			1752531			8626908			1853572
		1853574			1752534			8626911			1757232
		1757232			1757147			8626915			1757310
		1757310			1756313			8626935	14		1643648
		5588073			5587653			8626938			8326295
		1853572			1756272			8626953			8626936
		1853571			1757306			8626956			8626932
		1757231			1761423			8626960			8626951
		1757309			5587618			1853574			8627074
		1761422			1752524			1853575			1752485
13		1643631			8326294			1757233			1756321
		1752517			8626913			1757311			1756316

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
14		1757174	17		5189788	19		1855120	20		1752819
		5587737			1854871			1855143			1855154
15		1643646			1855136			1855150			1855183
16		1853743			1855180			5194238	21		1853748
		1854104	18		1853745			1762676			1854105
		1752565			1752567			1855153			1752570
		5189786			1854872			1855182			5189906
		1854870			1855181	20		1853747			1854875
		1855132	19		1853746			1752569			1855126
		1855170			1752568			1854874			1854921
17		1853744			1854873			1855125			1855184
		1854105			1855124			1855133	22		1853749
		1752566			1854920			1855138			1752571

Figure 9 (Sheet 6 of 17). Keybutton Group

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
22		1854876	25		1853752	26		1854285	26		5189761
		5182751			1752574			1854244			5189819
		1855185			1853814			1854266			5189851
23		1853750			1854879			1752575			1643612
		1752572			1855188			5189835			1855127
		1854877	26		1854107			5189909			185510
		5182752			1854108			5189791			1855141
		1855186			1855354			5189851			1855145
24		1853751			1854256			5189925			1757236
		1752573			1854283			5189965			1757312
		1854878			1854269			5189881			5588075
		5182753			1854289			5189917			1854076
		1855187			1854277			5189891			1757245

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
26.		5194240	27		5189871	27		1757312	31		1752579
		1757296			5189793	28		5194148			1854894
		5188352			5189853			5194344			1855193
		5587649			8542655	29		5194147	32		1853755
27		1854579			5189821			5588077			1752580
		1855036			1643613	30		1853753			1854895
		1854107			1643612			1854110			1855194
		1855025			1757237			1752578	33		1853756
		5194235			1757313			5189794			1752581
		5192899			5588076			1854893			1854896
		5188378			5188377			1855134			1855198
		5189739			1854076			1855192	34		1853757
		5189942			1757236	31		1853754			1752582

Figure 9 (Sheet 8 of 17). Keybutton Group

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
34		1854897	37		1752585	39		1854279	39		5189967
		8627065			1854900			1854271			5189863
		1854922			1855199			1854290			5189883
		1855196	38		1853761			1854114			5189919
35		1853758			1752586			1854111			5189873
		1752583			1854901			1854259			5189765
		1854898			1855200			1854148			5189937
		1855197	39		1853762			1752587			5189855
36		1853759			1752515			5189837			1853632
		1752584			1854113			5189855			1855128
		1854899			1854245			5189797			1757238
		1855198			1854258			5189899			1757197
37		1853760			1854294			5189927			5588078

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
40		1853763	40		1854149	40		5189767	40		1757180
		1752514			1854279			5189823			5587733
		1854118			1752589			5189939	41		1854580
		1855356			5189839			1643614			1855037
		1854259			5189857			1855129			5188335
		1854295			5189799			1855142			1855018
		1855030			5189901			1855144			1855024
		1854248			5189929			1757239			1855026
		1854291			5189969			1757197			1855027
		5194236			5189865			1645044			1855029
		1854116			5189885			1757314			5194237
		5587633			5189921			5588079			5192900
		1854258			5189893			1752522			5587634

Figure 9 (Sheet 10 of 17). Keybutton Group

Loc.	Character	P/N										
41		1855030	41	PF7	1643614	42		1752487	43		1643637	
		1752591		TAB	1645044			1757101			5588001	
		5189840		SKIP	1853632			1756325	44		1854581	
		5189910		PF6	1752522			1756320			1855039	
		5189800		P8	1757240			1756325			5194319	
		5189858		PF7	1757314			1756320			1752592	
		5189970		PF8	5587836			1756320			8542649	
		5189886		PF8 J	5588080			1757246		44	PF9	1643616
		5189796		PF4	1756315			1757246			PF8	1756270
		5189894		P7	1757239			5587845			PF6	1756268
		2542648		PF8	5587733			5587845			PF7	1756269
		5189824	42		8326350			5587845			P9	1757241
	PF8	1643615						1757297			PF9	1757316

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
44		1757315	46		1752594	49		1854909	51		1752599
		1854317			1854906			1853902			1854911
45		1853764			1855209			1854923			5182756
		1854129	47		1853766			1855151			1855214
		1854128			1752595			1855337	52		1853804
		1752593			1854907			5194239			1853868
		5189803			1855210			1762677			1853771
		5189802	48		1853767			1855212			5587637
		1854905			1752596	50		1853769			1854109
		1855130			1854908			1752598			1752600
		1855135			1855211			1854910			5189804
		1855200	49		1853768			1855213			8628917
46		1853765			1752597	51		1853770			5189771

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
52		5189831	53		5189827	54		5189829	56	RESET	1853564
		1854912			5189805		PF10	1643617		GRDSTG	1757122
		1855146			1854913		SPRG	1757113		RESTAUR	1757244
		5182757			1855148		PF7	1756269		RIPRIST	1757207
		1855215			5182758		PF8	1756270		REST	5188348
53		1853805	54		5588083		Ö	1855147		PF10	1752489
		1853869			1853773		FP10	5587734		PF8	1756317
		1853772			1854241		FP9	1757316		PF7	1756324
		5587638			5188364		PF10	5588084		P10	1757247
		1854115			1854119			1854143		FP10	5587651
		1752602			1752604	55		1643644		FP9	1757299
		8626919			5189807			5194149	57	ENTER	1853555
		5189773			5189935			5588085		DAT FREIG	1757124

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
57		1757178	59		1757089	62		5188817	63		5188342
		5188780			1757143			5194131	64		5194150
		1757295			1757184			5194135	65		5194153
		5587643			1757266			5194127			5194158
		5188375			5587607			5194129			5194159
		8326351			5188360			5194133			5194157
58		1643618	60		8326349	63		1853544			5194160
		1757806			8326353			1757099			5194156
		1757140	61		8326354			1757163	66		1643635
		1757181			8326356			1757195			1757149
		1756294			8326357			1757279			1757211
		5188358			8326358			5587632			5587620
59		1648441			6326355			5188638			1853594

Figure 9 (Sheet 14 of 17). Keybutton Group



Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
78		8626989	79		8326414	80		8326419	82		8326387
		8626991			8326348	81		8326384			8326389
		8626990			8627334			8326386			8326388
		8627333	80		8627392			8326385			8326423
		8627391			8627370			8626992			8326425
		8627369			8627323			8626994			8326424
		8627322			8627381			8626993	83		8627337
		8627380			8627359			8627336			8627395
		8627358			8326379			8627394			8627373
79		8326375			8326383			8627372			8627326
		8326377			8326381			8627325			8627384
		8326376			8326417			8627383			8627362
		8326432			8326421			8627361			8326391

Figure 9 (Sheet 16 of 17). Keybutton Group

Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N	Loc.	Character	P/N
83		8326395	84		8627375	86		8626983	87		8627388
		8326393			8627328			8626987			8627366
		8626971			8627386			8626985			
		8626975			8627364	87		8326411			
		8626973			8326400			8326413			
84		8326396	85		8326404			8326412			
		8326398			8326402			8626998			
		8326397			8626977			8627000			
		8626995			8626981			8626999			
		8626997			8626979			8627341			
		8626996	86		8326406			8627399			
		8627339			8326410			8627377			
		8627397			8326408			8627330			

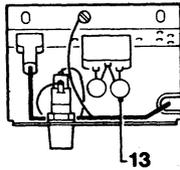
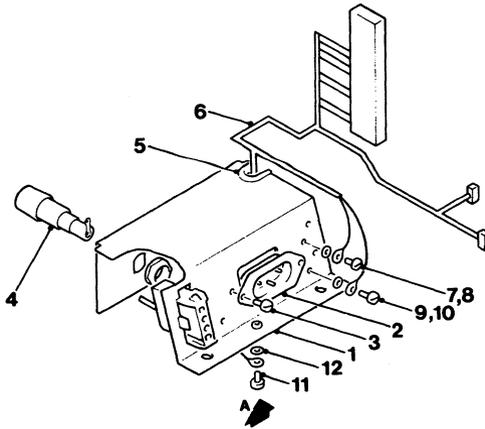
<b>PROBLEM DETERMINATION GUIDE</b>	
<b>COUNTRY</b>	<b>FORM NUMBER</b>
Brazil	GA17-0029
Canada	GA09-0090
Denmark	GA19-6031
Finland	GB11-6145
France	GA11-0118
Germany	GA12-2409
Italy	GA13-0158
Japan (English/Katakana)	NGA18-2067*
Japan (English/Katakana)	GA18-2067
Japan (WT)	NGA33-3051*
Netherlands	GA14-5193
Norway	GA15-3062
Spain	GA10-8174
Sweden	GA14-0526
US English	GA33-3051

\*Printed in Japanese

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			AC BOX (POWER PLATE) ASSEMBLY (EMEA*)			
11 -	4420492	REF				AC BOX (POWER PLATE) ASM
- 1	4420460	1				PLATE
- 2	5640669	1				RECEPTACLE
- 3	1621286	2				SCREW, P HD, M3, 20 MM LG
- 4	6814322	1				FUSE HOLDER ASM
- 5	473442	1				GROMMET, 24 MM LG
- 6	4420488	REF				CABLE ASM, AC DISTRIBUTION
						FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 29,30
- 7	1621190	1				SCREW, P HD, M4, 8 MM LG
- 8	1622346	1				LCK W, EX TH, 4.3 MM ID
- 9	1621190	1				SCREW, P HD, M4, 8MM LG
- 10	1622346	1				LCK W, EX TH, 4.3 MM ID
- 11	1621197	1				SCREW, P HD, M4, 6 MM LG
- 12	1622346	1				LCK W, EX TH, 4.3 MM ID
- 13	4409572	2				CAPACITOR

\* FOR COUNTRIES SERVICED BY IBM WORLD TRADE  
EUROPE/MIDDLE EAST/AFRICA CORPORATION

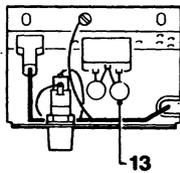
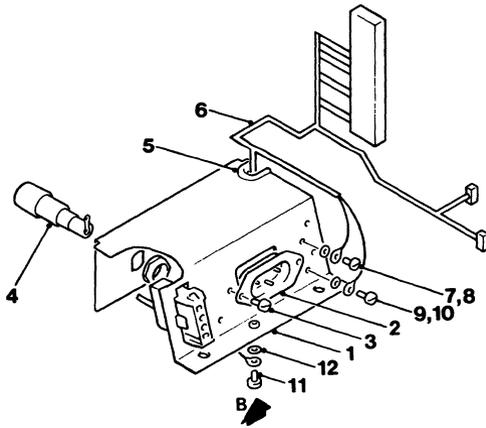


**VIEW A**

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			AC BOX (POWER PLATE) ASSEMBLY (US/AFEM)			
12 -	4420491	REF				AC BOX (POWER PLATE) ASM
- 1	4420461	1	.			PLATE
- 2	4406541	1	.			RECEPTACLE
- 3	1621844	2	.			SCREW, P HD, M3, 6 MM LG
- 4	6814322	1	.			FUSE HOLDER ASM
- 5	473442	1	.			GROMMET, 24 MM LG
- 6	4420488	REF	.			CABLE ASM, AC DISTRIBUTION FOR COMPONENT PARTS SEE FIGURE 15, ITEMS: 29, 30
- 7	1621190	1	.			SCREW, P HD, M4, 8 MM LG
- 8	1622346	1	.			LCK W, EX TH, 4.3 MM ID
- 9	1621190	1	.			SCREW, P HD, M4, 8 MM ID
- 10	1622346	1	.			LCK W, EX TH, 4.3 MM ID
- 11	1621197	1	.			SCREW, P HD, M4, 6 MM LG
- 12	1622346	1	.			LCK W, EX TH, 4.3 MM ID
- 13	4409572	2	.			CAPACITOR

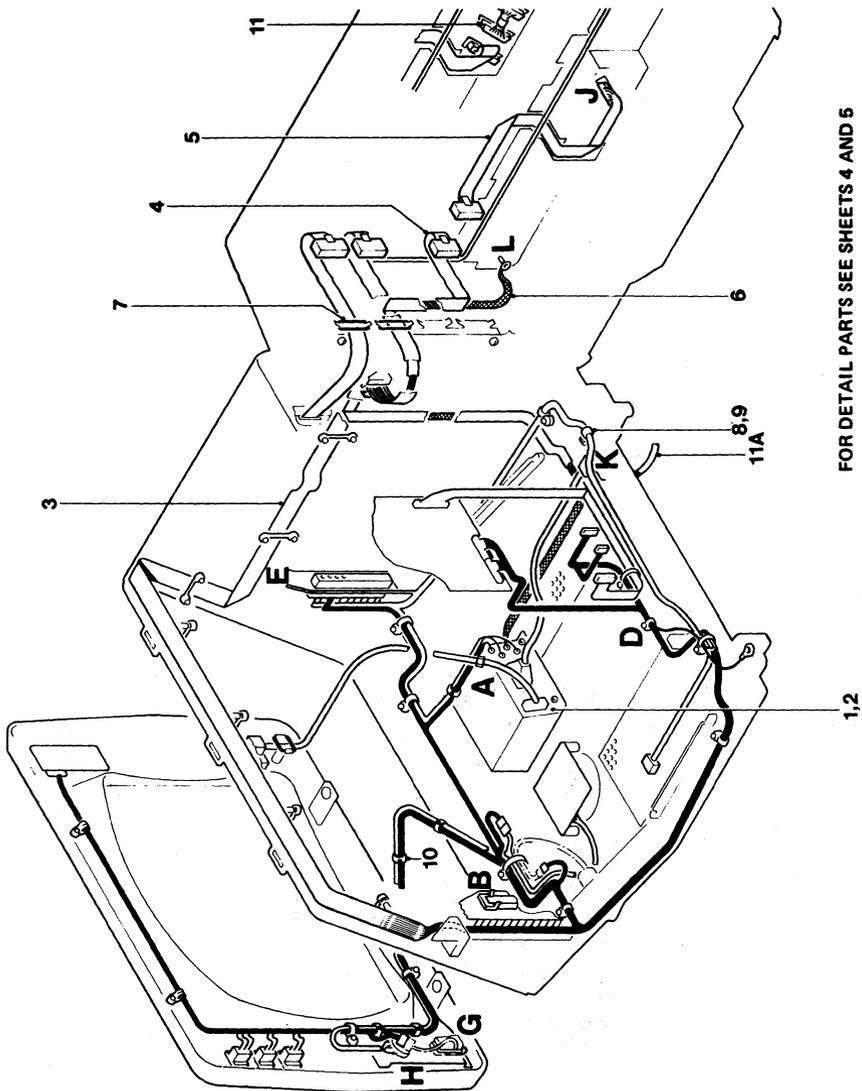
\* FOR COUNTRIES SERVICED BY IBM WORLD  
TRADE AMERICAS/FAR EAST CORPORATION



**VIEW B**

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
						CABLE ASSEMBLY
13 -		REF				CABLE ASM
- 1	4420491	1	.			POWER PLATE ASM (US/AFE)
- 1	4420492	1	.			POWER PLATE ASM (EMEA)
- 2	4420421	2	.			SCREW, HEX WSHR HD, 6-19, 8 MM LG, THD FORMING
- 3	4423437	1	.			CABLE ASM, DISTRIBUTION FOR COMPONENT PARTS SEE FIGURE 15, ITEMS ITEMS 1-6, 9, 10, 12-14, 18, 20-22, 25, 27, 29, 30
- 4	4423237	1	.			CABLE ASM, LOGIC TO VIDEO AND AN 2 FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 7, 8, 12, 13, 18, 20
- 5	4423475	1	.			CABLE ASM, KEYBOARD INT FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 12, 13, 15, 18, 19, 32
- 6	4420793	1	.			GROUND JUMPER ASM FOR COMPONENT PARTS SEE FIGURE 15, ITEM 30
- 7	2114044	3	.			CABLE STRAP
- 8	472707	1	.			CABLE CLAMP
- 9	4420421	1	.			SCREW, HEX WSHR HD, 6-19, 8 MM LG, THD FORMING
- 10	5420242	4	.			CABLE TIE
- 11	1743057	1	.			CABLE ASM FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 15, 23, 45, 46
- 11A	NO NO	REF	.			LINE CORD SEE FIGURE 14

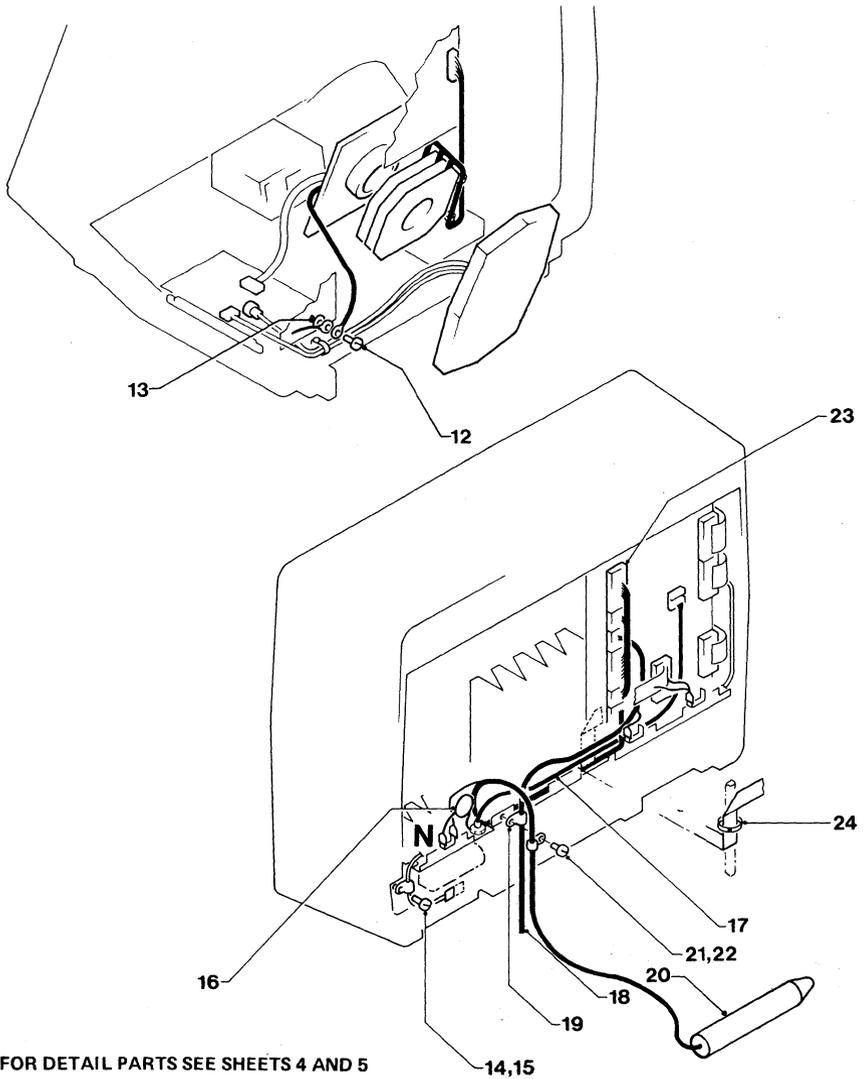


FOR DETAIL PARTS SEE SHEETS 4 AND 5

Figure 13 (Sheet 1 of 5). Cable Assembly

## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			CABLE ASSEMBLY (CONT)			
13 - 12	1621191	1	.	.	.	SCREW, PHD, M4, 10 MM LG
- 13	1622346	1	.	.	.	LCK W, EX TH, 4.3 MM ID
- 14	5213276	1	.	.	.	CABLE CLAMP
- 15	4420424	1	.	.	.	SCREW, HEX WSHR HD, 6-19, 10 MM LG, THD FORMING
- 16	4418786	1	.	.	.	FILTER ASM
- 17	4423481	1	.	.	.	CABLE ASM, COAX INT FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 16, 17, 26, 38, 39
- 18	4423250	1	.	.	.	CABLE ASM, MSR FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 11, 13, 18, 19, 24, 33, 35-37
- 19	2102364	1	.	.	.	CABLE CLIP
- 20	4423097	1	.	.	.	SEL PEN ASM, (OLD MODEL 3) SMALL LENS
- 20	4420407	1	.	.	.	SEL PEN ASM, (OLD MODEL 2) LARGE LENS
- 20	4422183	1	.	.	.	SEL PEN ASM, (NEW MODEL 3) SMALL LENS
- 20	4422184	1	.	.	.	SEL PEN ASM, (NEW MODEL 2) LARGE LENS
- 21	5213276	1	.	.	.	CABLE CLIP
- 22	1621852	1	.	.	.	SCREW, P HD, M4, 10 MM LG, THD FORMING
- 23	4423112	1	.	.	.	CABLE ASM, GATE CROSSOVER FOR COMPONENT PARTS SEE FIGURE 15, ITEMS 12, 13, 23
- 24	5420242	1	.	.	.	CABLE TIE



FOR DETAIL PARTS SEE SHEETS 4 AND 5

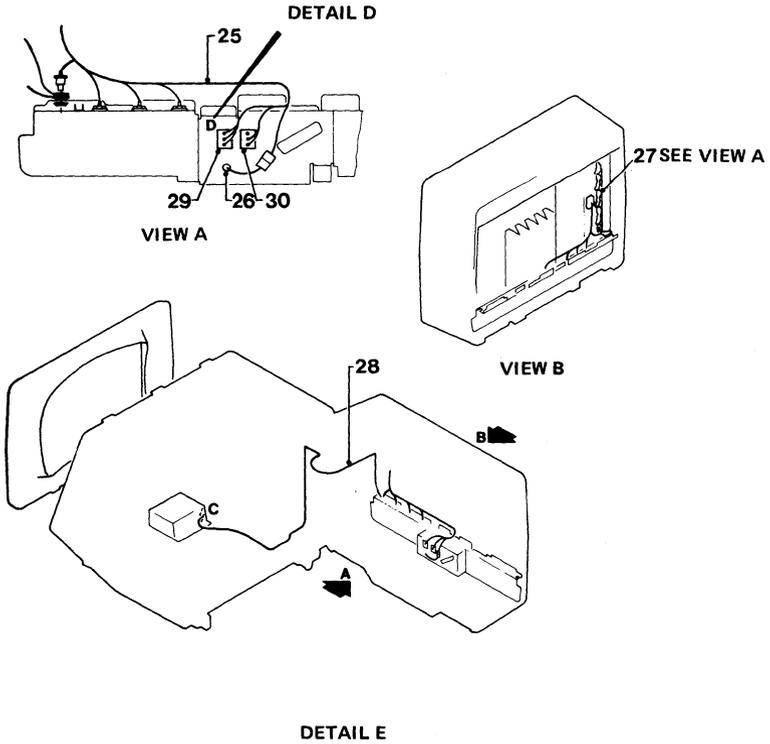
Figure 13 (Sheet 2 of 5). Cable Assembly

## 3279

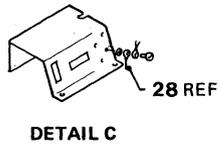
FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			CABLE ASSEMBLY (CONT)			
13 - 25	4418779	1	.	CABLE ASM, MON ATTACH FOR COMPONENT PARTS SEE FIGURE 15, ITEMS ITEMS 2, 10, 12, 13, 16, 18, 21, 27		
- 26	4420428	1	.	L.E.D. ASM		
- 27	5881129	1	.	BUS STRIP ASM		
- 28	5881272	1	.	EARTH STRAP ASM		
- 29	5881268	1	.	SWITCH, SP DT		
- 30	1655357	1	.	SWITCH, SP DT		



FIGURES DENOTE WIRE NUMBERS TO DETAIL D

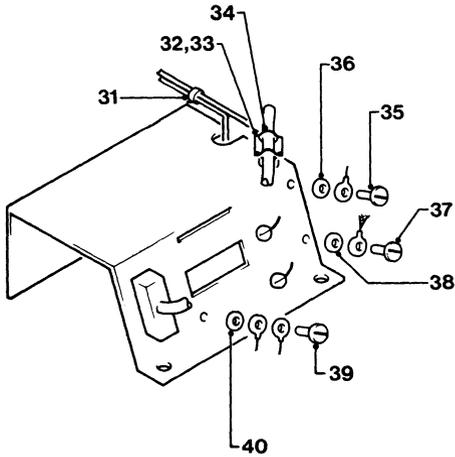


NOTE: THIS DRAWING SHOWS ADDITIONAL CABLES FOR RPQ 7J0039

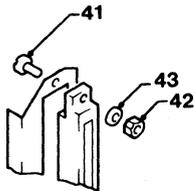


## 3279

FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			CABLE ASSEMBLY (CONT)			
13 - 31	5420242	1	.	.	.	CABLE TIE
- 32	2114043	1	.	.	.	CRADLE
- 33	1621197	1	.	.	.	SCREW, P HD, M4, 6 MM LG
- 34	2114044	1	.	.	.	CLIP
- 35	1621190	1	.	.	.	SCREW, P HD, M4, 8 MM LG
- 36 <sup>a</sup>	1622346	1	.	.	.	LCK W, EX TH, 4.3 MM ID
- 37	1621190	1	.	.	.	SCREW, P HD, M4, 8 MM LG
- 38	1622346	1	.	.	.	LCK W, EX TH, 4.3 MM ID
- 39	1621190	1	.	.	.	SCREW, P HD, M4, 8 MM LG
- 40	1622346	1	.	.	.	LCK W, EX TH, 4.3 MM ID
- 41	1621173	2	.	.	.	SCREW, P HD, M3, 12 MM LG
- 42	1622401	2	.	.	.	NUT



DETAIL A (SHEET 1)

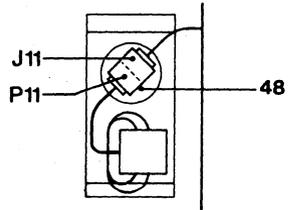


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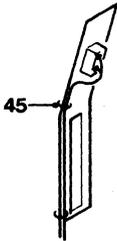
FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
CABLE ASSEMBLY (CONT)						
13 - 43	1622344	2	.	.	.	LCK W, EX TH, 3.2 MM ID
- 44	811427	2	.	.	.	RETAINER
- 45	5420242	2	.	.	.	CABLE TIE
- 46	1621852	1	.	.	.	SCREW, P HD, M4, 10 MM LG, THD FORMING
- 47	1622346	1	.	.	.	LCK W, EX TH, 4.3 MM ID
- 48	450692	A/R	.	.	.	TAPE, 110 MM LG
- 49	2565092	2	.	.	.	SCREW, HEX HD, 4-40, 6.3 MM (0.248) LG, THD FORMING
- 49	2565092	4	.	.	.	SCREW, HEX HD, 4-40, 6.3 MM (0.248) LG, THD FORMING, USED ON MODEL 2
- 50	4420457	1	.	.	.	STRAIN RELIEF
- 51	4420423	2	.	.	.	SCREW, HEX WSHR HD, 6-19, 12 MM LG, THD FORMING
- 52	1622403	1	.	.	.	NUT
- 53	1622346	1	.	.	.	LCK W, EX TH, 4.3 MM ID



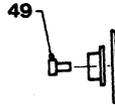
DETAIL D



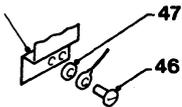
DETAIL H



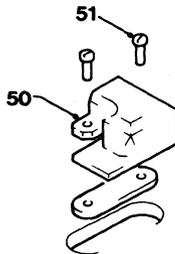
DETAIL E



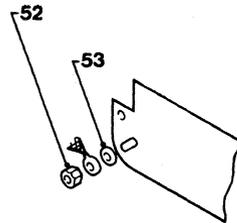
DETAIL J



DETAIL G



DETAIL K



DETAIL L

AFE (WITH UL M/C PLUG)								
COUNTRIES	VOLTAGE	FREQ (HZ)	CSU PLUG TYPE	WIRE COLOURS	PART NUMBERS			
					1.8M	2.8M	3.7M	4.6M
BAHAMAS	120	60	TYPE 'DD'	BLACK		1655379		1655424
BERMUDA	120	60	FIG 4	WHITE				
BOLIVIA	115	60	NON-LOCK	GN/YEL				
BRAZIL	120-127	60	↓	↓				
COLOMBIA	120	60						
COSTA RICA	120	60						
DOMINICAN REP	120	60						
ECUADOR	110	60						
EL SALVADOR	120	60						
GUATEMALA	120	60						
HONDURAS	110	60						
JAPAN	100	50/60						
MEXICO	127	60						
NETH. ANTILLES	120-127	60						
NICARAGUA	120	60						
PANAMA	120	60						
PHILLIPINES	110	60						
TAIWAN	110	60						
TRINIDAD	115	60						
VENEZUELA	120	60						
ARGENTINA	220	50	TYPE 'EE'	BROWN		1655392		4406528
CHILE	220	50	FIG 5	LIGHT BLUE				
PARAGUAY	220	50	NON-LOCK	GN/YEL				
URUGUAY	220	50	↓	↓				
AUSTRALIA	240	50						
NEW ZEALAND	230	50						
INDONESIA	220	50	TYPE 'MA'	BROWN		1655391		4406536
			FIG 15	LIGHT BLUE				
			NON-LOCK	GN/YEL				
JAPAN	200	60/60	TYPE 'MG'	BLACK		1743137		1743139
			FIG 20	WHITE				
			TWIST-LOCK	GN/YEL				
MALAYSIA	240	50	TYPE 'MJ'	BROWN		1655390		1655430
SINGAPORE	230	50	FIG 23	LIGHT BLUE				
			NON-LOCK	GN/YEL				
HONG KONG	200	50	TYPE 'MH'	BROWN	1743381	1743382	1743383	1743384
			FIG 21	LIGHT BLUE				
			NON-LOCK	GN/YEL				
BRAZIL	220	60	TYPE 'EE'	BLACK				
PERU	220	60	FIG 5	WHITE				
COLOMBIA	208/240	60	NON-LOCK	GN/YEL				
TRINIDAD	230	60	↓	↓				
VENEZUELA	208/240	50						
BARBADOS	120	50	TYPE 'DD'	BROWN				
CHILE	110	50	FIG 4	LIGHT BLUE				
JAMAICA	110	50	NON-LOCK	GN/YEL				

VERSION WITH NO CSU PLUG							
COUNTRIES	M/C PLUG TYPE	FREQ (HZ)	WIRE COLOURS	PART NUMBERS			
				1.8M	2.8M	3.7M	4.6M
US/AFE	UL	60	BLACK WHITE GN/YEL	4406504	4406505	4406506	4406507
AFE	UL	50	BROWN LIGHT BLUE GN/YEL	1655425	1655378	1655426	1655427
EMEA	CEE 22	50	BROWN LIGHT BLUE GN/YEL		5640660		4420410
EMEA	CEE 22	60	BLACK WHITE GN/YEL	5640673	5640687		4420418

EMEA (WITH CEE 22 M/C PLUG)								
COUNTRIES	VOLTAGE	FREQ (HZ)	CSU PLUG TYPE	WIRE COLOURS	PART NUMBERS			
					1.8M	2.8M	3.7M	4.6M
AUSTRIA	220	50	TYPE 'MA' FIG 15	BROWN LIGHT BLUE		5640663		4420411
BULGARIA	220	50		GRN/YEL				
FINLAND	220	50	NON-LOCK					
GERMANY	220	50						
ICELAND	220	50						
IRAN	220	50						
NORWAY	220	50						
POLAND	220	50						
PORTUGAL	220	50						
ROMANIA	220	50						
SPAIN	220	50						
SWEDEN	220	50						
TURKEY	220	50						
YUGOSLAVIA	220	50						
ALGERIA	220	50	TYPE 'MC' FIG 18	BROWN LIGHT BLUE		5640661		4420412
BELGIUM	220	50		GN/YEL				
FRANCE	220	50	NON-LOCK					
GREECE	220	50						
HUNGARY	220	50						
ITALY	220	50						
SWITZERLAND	220	50						
DENMARK	220	50	TYPE 'MF' FIG 19	BROWN LIGHT BLUE		5640667		4420415
			NON-LOCK	GN/YEL				
ISRAEL	230	50	TYPE 'XK' FIG 32	BROWN LIGHT BLUE		5640672		4420419
			NON-LOCK	GN/YEL				
ITALY	220	50	TYPE 'ML' FIG 25	BROWN LIGHT BLUE		5640668		4420417
			NON-LOCK	GN/YEL				
SAUDI ARABIA	127	60	TYPE 'GG' FIG 7 (15A)	BLACK WHITE		4420362		4420363
			TW-LOCK	GN/YEL				
SAUDI ARABIA	220	60		BLACK WHITE				
				GN/YEL				
SOUTH AFRICA	230	50	TYPE 'MI' FIG 22	BROWN LIGHT BLUE		5640666		4420414
			NON-LOCK	GN/YEL				
SWITZERLAND	220	50	TYPE 'MK' FIG 24	BROWN LIGHT BLUE		5640665		4420416
			NON-LOCK	GN/YEL				
UNITED KINGDOM	240	50	TYPE 'MJ' FIG 23	BROWN LIGHT BLUE		5640662		4420413
IRELAND	240	50	NON-LOCK	GN/YEL				
NETHERLANDS	220	50	TYPE 'MA' FIG 15	BROWN LIGHT BLUE		5641082		4420337
			NON-LOCK	GN/YEL				

DOMESTIC (WITH UL M/C PLUG)								
COUNTRIES	VOLTAGE	FREQ (HZ)	CSU PLUG TYPE	WIRE COLOURS	PART NUMBERS			
					1.8M	2.8M	3.7M	4.6M
USA	208/240	60	TYPE 'CC' FIG 2	BLACK WHITE				
			NON-LOCK	GN/YEL				
USA	120	60	TYPE 'GG' FIG 8 (20A)	BLACK WHITE				
			TWIST-LOCK	GN/YEL				
USA/CANADA	120	60	TYPE 'GG' FIG 7 (15A)	BLACK WHITE	1655402	1655401	1655431	1655432
			TWIST-LOCK	GN/YEL				
USA/CANADA	120	60	TYPE 'DD' FIG 4	BLACK WHITE	1655377	1655379	1655423	1655424
			NON-LOCK	GN/YEL				

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FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			JUMPER & CABLE COMPONENT ASM			
15 -						JUMPER & CABLE COMPONENT
- 1	2731835	.				HOUSING
- 2	2731850	.				HOUSING
- 3	2732354	.				HOUSING
- 4	2731851	.				HOUSING
- 5	2731836	.				HOUSING
- 6	2731852	.				HOUSING
- 7	2731838	.				HOUSING
- 8	2731839	.				HOUSING
- 9	2637689	.				INSERT
- 10	1743055	.				STRAIN RELIEF
- 11	2732337	.				HOUSING
- 12	2732338	.				HOUSING
- 13	2732342	.				SHROUD
- 14	6814383	.				HOUSING
- 15	1655336	.				CONNECTOR
- 16	5252661	.				CONNECTOR
- 17	1743169	.				HOUSING
- 18	2637691	.				CONTACT
- 19	2637690	.				CONTACT
- 20	1661528	.				CONTACT
- 21	2731384	.				CONTACT
- 22	2122259	.				CONTACT
- 23	1655337	.				CONTACT
- 24	1655358	.				CONTACT

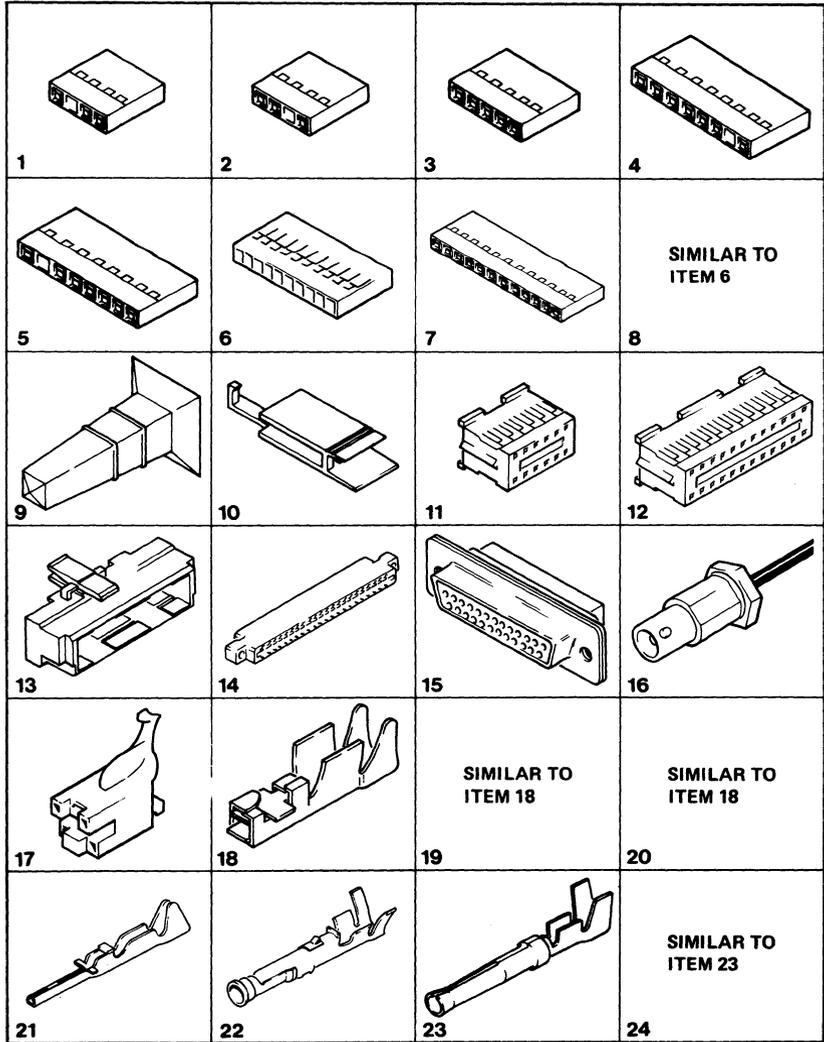


Figure 15 (Sheet 1 of 2). Jumper and Cable  
Component Assembly

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FIGURE- INDEX NUMBER	PART NUMBER	UNITS PER ASM	DESCRIPTION			
			1	2	3	4
			JUMPER & CABLE COMPONENT ASM (CONT)			
15 -			JUMPER & CABLE COMPONENT			
- 25	6814354	.				CONTACT
- 26	816884	.				CONTACT
- 27	1608893	.				TERMINAL
- 28	6814371	.				HOUSING
- 29	483681	.				TERMINAL
- 30	483682	.				TERMINAL
- 31	1847525	.				HOUSING
- 32	523267	.				TERMINAL
- 33	430799	.				TERMINAL
- 34	1847529	.				HOUSING
- 35	4832993	.				RECEPTACLE
- 36	5576593	.				SEAL
- 37	4832957	.				CABLE CRIMP
- 38	2577718	.				BUSH
- 39	442458	.				WASHER
- 40	1847524	.				HOUSING
- 41	1847520	.				CONTACT
- 42	1847521	.				CONTACT
- 43	2122261	.				CONTACT
- 44	5275481	.				STRAIN RELIEF
- 45	1655338	.				CONNECTOR
- 46	1655339	.				CONTACT
- 47	1655359	.				CONTACT

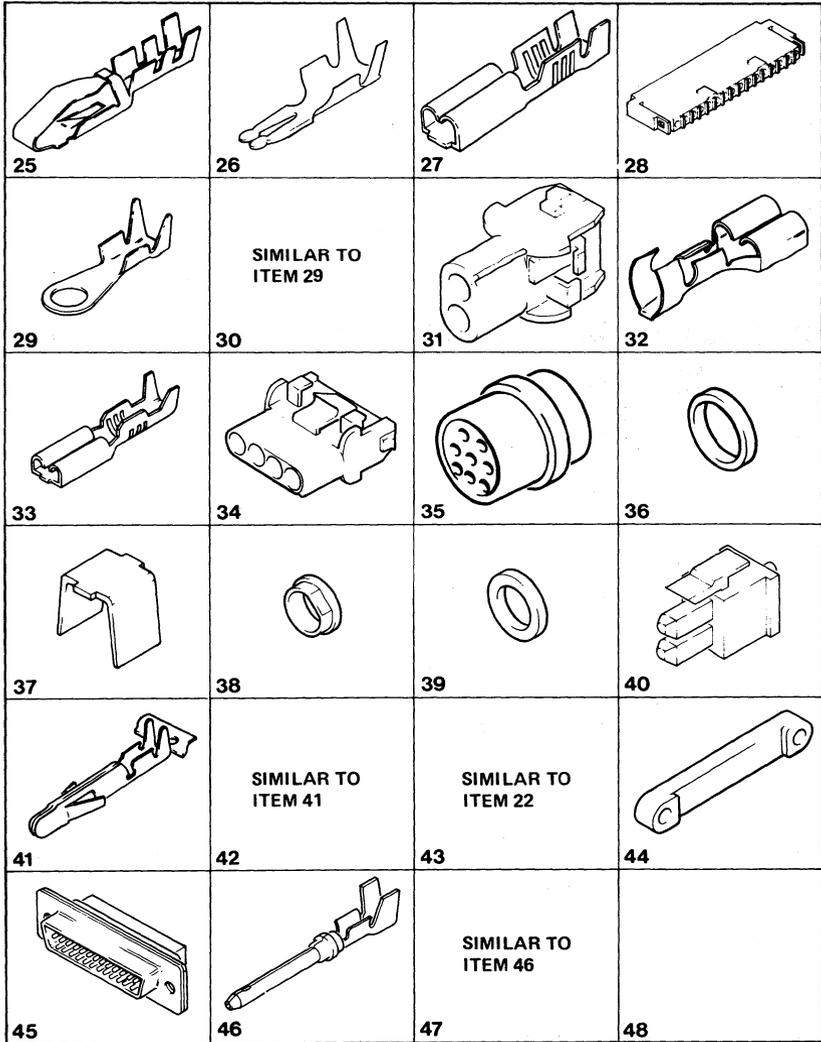


Figure 15 (Sheet 2 of 2). Jumper and Cable  
Component Assembly

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442458	15 - 39		1 - 39	1742685	4 - 26		6 - 22
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472707	13 - 8		2 - 78		6 - 25		13 - 49
473442	3 - 9	1622344	13 - 43	1742687	4 - 25	2568709	2 - 60
	11 - 5	1622346	1 - 3		6 - 26	2577718	15 - 38
	12 - 5		1 - 11	1742688	4 - 23	2596275	2 - 24B
483681	15 - 29		1 - 17	1742689	4 - 3	2596291	2 - 24A
483682	15 - 30		1 - 23		6 - 3	2637689	15 - 9
523267	15 - 32		1 - 27	1742771	6 - 1	2637690	15 - 19
615683	2 - 23		1 - 33	1742773	6 - 21	2637691	15 - 18
638537	1 - 43		1 - 38	1742779	4 - 20	2731384	15 - 21
742688	6 - 24		2 - 74	1743002	3 - 31	2731801	3 - 32
811427	2 - 24		2 - 77	1743003	3 - 31	2731835	15 - 1
	3 - 23		3 - 14	1743004	3 - 31	2731836	15 - 5
	13 - 44		11 - 8	1743005	3 - 31	2731838	15 - 7
816884	15 - 26		11 - 10	1743006	3 - 31	2731839	15 - 8
855231	2 - 25A		11 - 12	1743007	3 - 31	2731850	15 - 2
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	2 - 31		13 - 13		2 - 14	2732338	15 - 12
	2 - 33		13 - 36		2 - 21	2732342	15 - 13
	4 - 28		13 - 38	1743178	2 - 17	2732354	15 - 3
	6 - 30		13 - 40	1743194	2 - 6	4134800	3 - 29
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1188748	1 - 13		13 - 53	1743314	8 - 2		6 - 2
1599501	3 - 34	1622401	13 - 42	1743315	8 - 2	4406541	12 - 2
1608893	15 - 27	1622403	13 - 52	1743316	8 - 2	4409572	11 - 13
1621173	13 - 41	1650667	4 - 27	1743317	8 - 2		12 - 13
1621190	1 - 22		6 - 28	1743318	8 - 2	4418776	2 - 52
	1 - 26	1655336	15 - 15	1743319	8 - 2	4418777	1 - 40
	1 - 32	1655337	15 - 23	1743320	8 - 2	4418778	1 - 41
	1 - 37	1655338	15 - 45	1743607	2 - 46	4418779	13 - 25
	2 - 73	1655339	15 - 46	1743455	3 - 7	4418786	13 - 16
	2 - 76	1655357	2 - 7	1748131	4 - 12	4418790	3 - 4
	11 - 7		13 - 30		6 - 13	4418901	4 -
	11 - 9	1655358	15 - 24	1752330	4 - 11A	4418903	- REF
	12 - 7	1655359	15 - 47	1752366	6 - 12	4420274	2 - 57
	12 - 9	1661528	15 - 20	1809895	4 - 11A	4420277	8 - REF
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	13 - 37		1 - 16	1847521	15 - 42	4420283	2 - 66
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1621191	2 - 61	1742635	4 - 29	1847525	15 - 31	4420350	3 - 8
	3 - 13		6 - 29	1847529	15 - 34	4420368	3 - 11
	13 - 12	1742637	6 - 21	1854442	4 - 16	4420394	1 - 15
1621193	2 - 39B	1742643	4 - 7		6 - 17	4420395	1 - 9
1621195	2 - 27		6 - 7	1854443	4 - 18	4420397	1 - 25
1621197	3 - 19	1742653	4 - 1		6 - 19	4420398	1 - 21
	3 - 22	1742657	4 - 20	2102364	13 - 19	4420400	1 - 35
	11 - 11	1742658	4 - 10	2102365	2 - 44	4420401	1 - 29
	12 - 11		6 - 10	2114043	2 - 15	4420407	13 - 20
1621286	13 - 33	1742661	6 - 5		13 - 32	4420421	2 - 63
1621509	11 - 3	1742662	6 - 6	2114044	2 - 18		2 - 61
	1 - 30A		6 - 6		13 - 7		3 - 16
	3 - 3	1742663	4 - 8		13 - 34		3 - 16
1621844	3 - 5		5 - 8	2122259	15 - 22		3 - 20
	3 - 5	1742664	4 - 9	2122261	15 - 43		13 - 2
1621852	13 - 3		6 - 9	2125765	4 - 15		13 - 9
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4420423	2 - 45	4423317	2 - 50	6814371	15 - 28		
	2 - 29	4423318	2 - 59	6814383	15 - 14		
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	2 - 36	4423344	2 - 30	7388944	6 - 12		
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	1 - 12	4423354	2 - 68				
	1 - 42	4423357	2 - 48				
	13 - 15	4423364	1 - 8				
4420425	2 - 65	4423365	3 - 17				
	2 - 69	4423373	2 - 47				
4420426	2 - 5	4423374	3 - 2				
	3 - 26		3 - 9A				
4420427	3 - 28	4423376	1 - 20				
4420428	13 - 26	4423377	1 - 1				
4420437	2 - 35	4423378	1 - 6				
4420441	1 - 31	4423381	1 - 7				
4420442	1 - 36	4423385	2 - 71				
4420448	1 - 5	4423392	2 - 56				
4420449	1 - 4	4423393	2 - 56				
4420457	13 - 50	4423397	2 - 39				
4420460	11 - 1	4423403	2 - 20				
4420461	12 - 1	4423405	2 - 13				
4420481	1 - 19	4423406	2 - 11				
4420488	11 - 6	4423408	2 - 2				
	12 - 6	4423410	2 - 3				
4420491	12 - REF	4423437	13 - 3				
	13 - 1	4423462	2 - 39A				
4420492	11 - REF	4423475	13 - 5				
	13 - 1	4423479	2 - 19				
4420770	2 - 42	4423481	13 - 17				
4420772	2 - 37	4423483	3 - 15				
4420793	13 - 6	4423485	3 - 21				
4422020	8 - 1	4423490	2 - 62				
4422079	1 - 18	4423493	2 - 79				
4422106	3 - 9C	4423494	2 - 72				
4422107	3 - 9B	4832957	15 - 37				
4422109	2 - 53	4832993	15 - 35				
4422110	2 - 55	4942245	4 - 21				
4422119	2 - 32A	4942270	6 - 16				
4422183	13 - 20	5183361	4 - 17				
4422184	13 - 20		6 - 18				
4422195	2 - 40	5183362	4 - 19				
4422196	2 - 41		6 - 20				
4422623	- REF	5213276	13 - 14				
4423028	2 - 26		13 - 21				
4423029	2 - 32	5213306	2 - 54				
4423048	2 - 49	5252661	15 - 16				
4423097	13 - 20	5275481	15 - 44				
4423112	13 - 23	5420242	13 - 10				
4423140	2 - 38		13 - 24				
4423146	2 - 58		13 - 31				
4423162	1 - REF		13 - 45				
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4423231	2 - 8	5640669	11 - 2				
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		5881272	13 - 28				



## Abbreviations and Glossary

### Abbreviations

<b>ac.</b> alternating current	<b>EBCDIC.</b> extended binary-coded decimal interchange code
<b>ack.</b> acknowledge	<b>ECS.</b> extended character set
<b>addr.</b> address	<b>EFA.</b> extended field attribute
<b>alt.</b> alternate	<b>EHT.</b> extra high tension (3279 = 25 kV)
<b>APL.</b> a programming language	<b>EOM.</b> end of message
<b>B.</b> bottom	<b>E + W.</b> east and west
<b>bal.</b> balance	<b>FBI.</b> feature bus in
<b>BLC.</b> base logic card	<b>FBO.</b> feature bus out
<b>C.</b> center	<b>foe.</b> focus
<b>CA.</b> character attribute	<b>FRU.</b> field replaceable unit
<b>CCW.</b> counter clockwise	<b>FSU.</b> functional storage unit
<b>char.</b> character	<b>GLP.</b> general logic probe
<b>cm.</b> centimeters	<b>H CENT.</b> horizontal centering
<b>cmd.</b> command	<b>Hz.</b> hertz
<b>cntr.</b> counter	<b>ID.</b> identification
<b>coax.</b> coaxial	<b>ident.</b> identification
<b>col.</b> color	<b>int.</b> internal
<b>CRT.</b> cathode ray tube	<b>I/O.</b> input/output
<b>ctr.</b> counter	<b>KB.</b> keyboard
<b>CU.</b> control unit	<b>kg.</b> kilograms
<b>CW.</b> clockwise	<b>kV.</b> kilovolts
<b>D/A.</b> digital to analog	<b>kΩ.</b> kilohms
<b>DEC.</b> decoder	

3279 MIM

**lb.** pounds**LCC.** line control card**LCM.** line control module**LED.** light emitting diode**LOPT.** line output transformer**LP.** light pen**MAP.** maintenance analysis procedure**MAX.** maximum**MCM.** Maintenance Concepts Manual**MHS.** Magnetic Hand Scanner**MHz.** megahertz**MIN.** minimum**MIM.** Maintenance Information Manual**mm.** millimeters**Mod.** model**MRC.** Magnetic Reader Control**MSR.** magnetic slot reader**No.** number**ns.** nanoseconds**num.** numeric**N + S.** north and south**OIA.** Operator Information Area**OP.** operation**O/P.** output**PDG.** problem determination guide**pk-pk.** peak-to-peak**POR.** power-on reset**pot.** potentiometer**PS.** programmed symbols**PSHICO:** PS, highlighting and color select**pty.** parity**RA.** read address**RAM.** random access memory**reg.** register**ret.** return**ROS.** read-only storage**RPQ.** request for price quotation**rx.** receiver**sec.** second**sel.** selector**SER.** serializer**SERDES.** serializer/deserializer**SUP.** suppress**Sw.** switch**sync.** synchronization**T.** top**TA.** terminal adapter**T/C.** timing and control

**TOP MAR.** top margin

**TP.** test point

**trig.** trigger

**V.** volts

**vert.** vertical

**vid.** video

**VTL.** vendor transistor logic

**WA.** write address

**W/O.** without

**WR.** write

$\mu$ F. microfarads

$\mu$ S. microseconds

## Glossary

**bezel.** The front panel that surrounds the display screen.

**coaxial cable.** A cable consisting of one conductor, usually a small copper tube or wire, within and insulated from another conductor of larger diameter, usually copper tubing or copper braid.

**converged, convergence.** Ideally, the condition in which the red, blue, and green electron beams together produce a white display with no colored fringes.

**degauss coil.** A coil that prevents misconvergence due to stray magnetic fields.

**feature bus.** The logical data path in the 3279, along which the base machine communicates with added features.

**jitter.** An irregular random repetitive movement of an image on the screen.

**misconvergence.** Opposite in meaning to "convergence" (see above).

**pel.** Picture element.

**monochrome.** Single color.

**phosphors.** The coatings on the inner surface of the screen that emit light when hit by an electron beam.

**pincushion (distortion).** The appearance of the display when the sides of the raster are curved.

**raster.** The pattern of lines on the display screen that is traced out by the scanning electron beams. The raster may be visible when the brightness control is turned up or when intensity override is engaged.

**retimed.** With improved timing.

**ripple.** An ac signal on a dc level.



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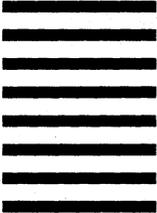
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