



SY31-0661-1

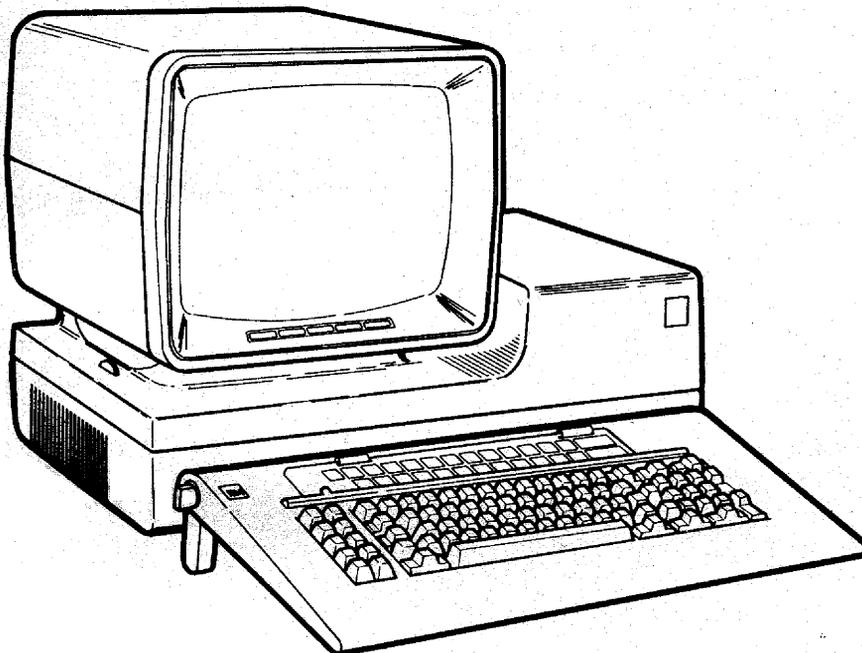
IBM 5291 Display Station Maintenance Library

**MAINTENANCE
ANALYSIS PROCEDURES (MAPs)**

MAINTENANCE INFORMATION

PARTS CATALOG

**I/PAR CODE GUIDE AND
CSR LOG**



Serial No. _____

Install Date _____



SY31-0661-1

IBM 5291 Display Station Maintenance Library

**Safety
Glossary
Legend
Using Manual**

**MAP
Charts**

**Keyboard
Unit**

**Display
Unit**

**Lower Unit
Power Supply**

Switches

**Diagnostics
CE Switch
Free Key**

**Online Tests
(600)**

Parts Catalog

**I/PAR Code Guide
and CSR Log**

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Preface

This manual is used by customer engineers for servicing the 5291 Display Station. Customer engineers using this manual are assumed to have completed the 5291 Display Station education course.

This manual has four major parts: maintenance information including MAP charts for fault isolation, a parts catalog, and I/PAR code guide, and CSR log. An index at the back of the manual supplies a keyword reference to all the information contained in the manual.

Definitions of terms and abbreviations that are not common, but are used in this manual, are in the *Glossary of Terms and Abbreviations*.

There are several *DANGER* and *CAUTION* notices in this manual. You can use the blank lines below each notice to translate it into your own words. The locations of these notices are listed in the *Safety* section.

Related Publications

Related information can be found in the following manuals:

- *IBM Synchronous Data Link Control General Information*, GA27-3093
- *IBM 5250 Information Display System Planning and Site Preparation Guide*, GA21-9337
- *IBM 5250 Information Display System Reference Card*, GX21-9249
- *IBM 5291 Display Station Setup Procedure*, GA21-9408

Second Edition (July 1983)

This publication makes obsolete SY31-0661-0. Changes are periodically made to the publication herein; any such changes will be reported in subsequent revisions.

Use this publication only for the purposes stated in the *Preface*.

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DANGER AND CAUTION NOTICES

Throughout this manual, the word DANGER is used to inform you of an action that could cause a personal injury. The word CAUTION is used to inform you of an action that could damage the machine or affect the running of a customer program.

DANGER Notices

DANGER notices appear in the following maintenance procedures:

- 230 Display Adjustments
- 242 Display Unit Top Cover
- 343 AC Capacitor
- 344 Power Supply Transformer
- 450 Station Protector

The IBM 5291 Display Station has the following specific Dangers:

DANGER

- Line voltage is present at the power supply.

- High voltage is present at the cathode-ray tube.

- The cathode-ray tube could implode if it is hit or if it falls.

CAUTION Notices

CAUTION notices appear in the following maintenance procedures:

- 347 Planar
- 450 Station Protector

CSR SAFETY PRACTICES

All Customer Service Representatives are expected to 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 you **MUST** work alone.
2. Remove all power, ac and dc, when removing or assembling major components, working in immediate areas of power supplies, performing mechanical inspection of power supplies, or installing changes in machine circuitry.
3. After turning off wall box power switch, lock it in the Off position or tag it with a "Do Not Operate" tag, Form 229-1266. Pull power supply cord whenever possible.
4. When it is absolutely necessary to work on equipment having exposed operating mechanical parts or exposed live electrical circuitry anywhere in the machine, observe the following precautions:
 - a. Another person familiar with power off controls must be in immediate vicinity.
 - b. Do not wear rings, wrist watches, chains, bracelets, or metal cuff links.
 - c. Use only insulated pliers and screwdrivers.
 - d. Keep one hand in pocket.
 - e. When using test instruments, 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.
5. Wear safety glasses when:
 - a. Using a hammer to drive pins, riveting, staking, etc.
 - b. Power or hand drilling, reaming, grinding, etc.
 - c. Using spring hooks, attaching springs.
 - d. Soldering, wire cutting, removing steel bands.
 - e. Cleaning parts with solvents, sprays, cleaners, chemicals, etc.
 - f. Performing any other work that may be hazardous to your eyes. **REMEMBER—THEY ARE YOUR EYES.**
6. Follow special safety instructions when performing specialized tasks, such as handling cathode-ray tubes and extremely high voltages. These instructions are outlined in CEMs and the safety portion of the maintenance manuals.
7. Do not use solvents, chemicals, greases, or oils that have not been approved by IBM.
8. Avoid using tools or test equipment that have not been approved by IBM.
9. Replace worn or broken tools and test equipment.
10. Lift by standing or pushing up with stronger leg muscles—this takes strain off back muscles. Do not lift any equipment or parts weighing over 60 pounds.
11. After maintenance, restore all safety devices, such as guards, shields, signs, and grounding wires.
12. Each Customer Service Representative is responsible to be certain that no action on his part renders products unsafe or exposes customer personnel to hazards.
13. Place removed machine covers in a safe out-of-the-way place where no one can trip over them.
14. Ensure that all machine covers are in place before returning machine to customer.

15. Always place CE tool kit away from walk areas where no one can trip over it; for example, under desk or table.
16. Avoid touching moving mechanical parts when lubricating, checking for play, etc.
17. When using stroboscope, do not touch ANYTHING—it may be moving.
18. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be left buttoned or rolled above the elbow.
19. Ties must be tucked in shirt or have a tie clasp (preferably nonconductive) approximately 3 inches from end. Tie chains are not recommended.
20. Before starting equipment, make certain fellow CEs and customer personnel are not in a hazardous position.
21. Maintain good housekeeping in area of machine while performing and after completing maintenance.

**Knowing safety rules is not enough.
An unsafe act will inevitably lead to an accident.
Use good judgment—eliminate unsafe acts.**

ARTIFICIAL RESPIRATION

General Considerations

1. Start Immediately—Seconds Count
Do not move victim unless absolutely necessary to remove from danger. Do not wait or look for help or stop to loosen clothing, warm the victim, or apply stimulants.
2. Check Mouth for Obstructions
Remove foreign objects. Pull tongue forward.
3. Loosen Clothing—Keep Victim Warm
Take care of these items after victim is breathing by himself or when help is available.
4. Remain in Position
After victim revives, be ready to resume respiration if necessary.
5. Call a Doctor
Have someone summon medical aid.
6. Don't Give Up
Continue without interruption until victim is breathing without help or is certainly dead.

Rescue Breathing for Adults

1. Place victim on his back immediately.
2. Clear throat of water, food, or foreign matter.
3. Tilt head back to open air passage.
4. Lift jaw up to keep tongue out of air passage.
5. Pinch nostrils to prevent air leakage when you blow.
6. Blow until you see chest rise.
7. Remove your lips and allow lungs to empty.
8. Listen for snoring and gurglings—signs of throat obstruction.
9. Repeat mouth to mouth breathing 10-20 times a minute. Continue rescue breathing until victim breathes for himself.



Thumb and
finger positions



Final mouth-to-
mouth position

SAFETY INSPECTION

Preparation

- Start the following procedure with the machine power off and all electrical power removed from the machine.
- Refer to these items:
 - All customer service representative memos (CSRMs), engineering change announcements (ECAs), and service aids (SAs) for this machine type
 - Installation Planning Manual (GA21-9242)
 - Electrical safety for IBM Customer Service Representatives (S229-8125)
 - CSR Electrical Safety Course (FIS-77170)

How to Conduct This Safety Inspection

This inspection guide is to help you identify possible unsafe conditions on machines that are being inspected. Each machine, as it was made, had all necessary safety items installed to protect the owners, operators, and service personnel from injury. This procedure addresses only those items. Good judgment should be used to identify possible safety hazards not covered by this inspection guide.

If any unsafe conditions are present, contact your field manager for the suitable action to be taken before servicing the machine.

In general, think of these conditions and the safety hazards that they may present:

- *Electrical hazards, especially primary power.* For example, a frame without a good ground can cause serious or lethal electrical shock.
- *Exploding hazards.* For example, a damaged CRT face or distorted capacitors can cause serious injury.
- *Chemical hazards.* For example, the use of solvents not specified by IBM may result in electrical, mechanical, or toxic hazards.

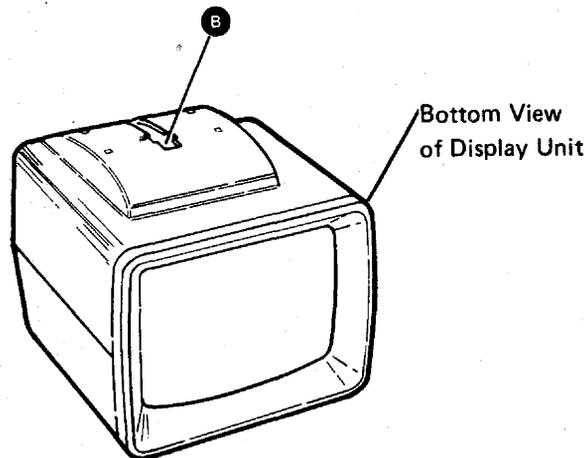
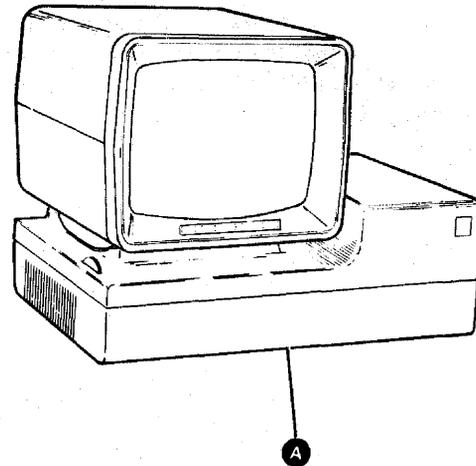
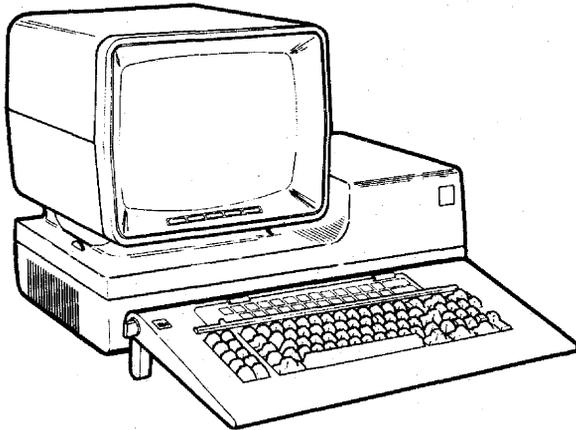
This guide contains a safety inspection procedure for the following specific safety hazard areas:

- External Inspection
- Internal Inspection—Lower Unit
- Internal Inspection—Display Unit

External Inspection

Perform the following checks:

- Are the external covers present, installed correctly, and in good condition?
- Is the power cord in good condition and of the correct size? A minimum of 18 gauge (wire size) with 3 conductors are needed. For example: If 18/3 is inscribed on the insulation of the cord, 18 indicates the gauge and 3 indicates the number of conductors in the cord.
- Does the display station line cord have the correct 15 ampere with the nonlocking power plug **U/L approved**? See the Parts Catalog section, Figure 5, Line Cord chart for the correct plug type.
- Is the machine line cord connector damaged where the line cord enters the machine?
- Is there a good AC ground line from one end of the line cord to the other? The resistance of this conductor should be less than 1 ohm.
- What is the customer's line voltage? (Reference *CSR Electrical Safety Handbook for Power Receptacle Checking*.)
- Does the machine have a voltage label on the bottom side of the lower unit near **A**?
- Does the machine voltage label match the customer's power?
- Does the display unit have an internal shield installed at **B** so that the PC board cannot be seen?

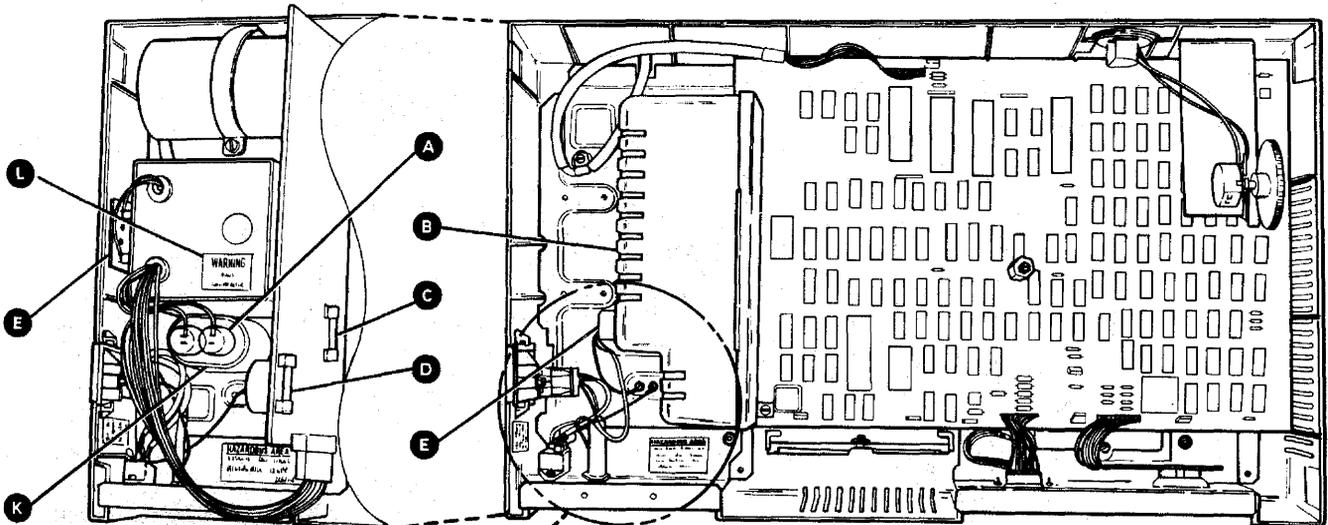


Internal Inspection—Lower Unit

Perform the following checks:

- Are there any obvious non-IBM engineering changes? If yes, has *R009 Non-IBM Alteration/Attachment Survey* been completed?
- Are there any loose screws, contaminating chemicals, signs of water or moisture, signs of fire or smoke damage, file dust, or any other internal conditions that look hazardous?
- Are any cables visibly worn, pinched, or damaged in any way? Check the primary power area for loose cables.
- Does the display station frame have a good ground? Measure the resistance from the ground pin on AC power plug to any metal frame member or exposed non-current carrying metal part. This resistance must be less than 1 ohm.
- Are any of the capacitors in the power area leaking or distorted?

- Are the primary safety covers in place? (See parts catalog for part numbers.)
 - Cover over the AC terminal block **E**
 - Cover on the line filter **H**
- For 5291 display stations with power supply board:
 - Caps on 550 volt capacitor **A**
- Are all parts installed in place tightly?
- Are all of the correct fuses present?
 - For 5291 with power supply board:
 - F1-2 Amp **G**
 - F2-5 Amp **D**
 - F3-1 Amp **C**
 - For 5291 with Single FRU Power Supply:
 - F1-2 Amp **G**



- Are all the proper safety labels present and readable?

For all 5291 display stations:

- Hazardous area label **F** PN369207
- Line voltage present label **J** PN5642855

For 5291 display stations with power supply board:

- 550 volt warning label **K** PN845762
- High temperature warning label **L** PN5785198

For 5291 with Single FRU Power Supply:

- 550 volt warning label **B** PN4420372

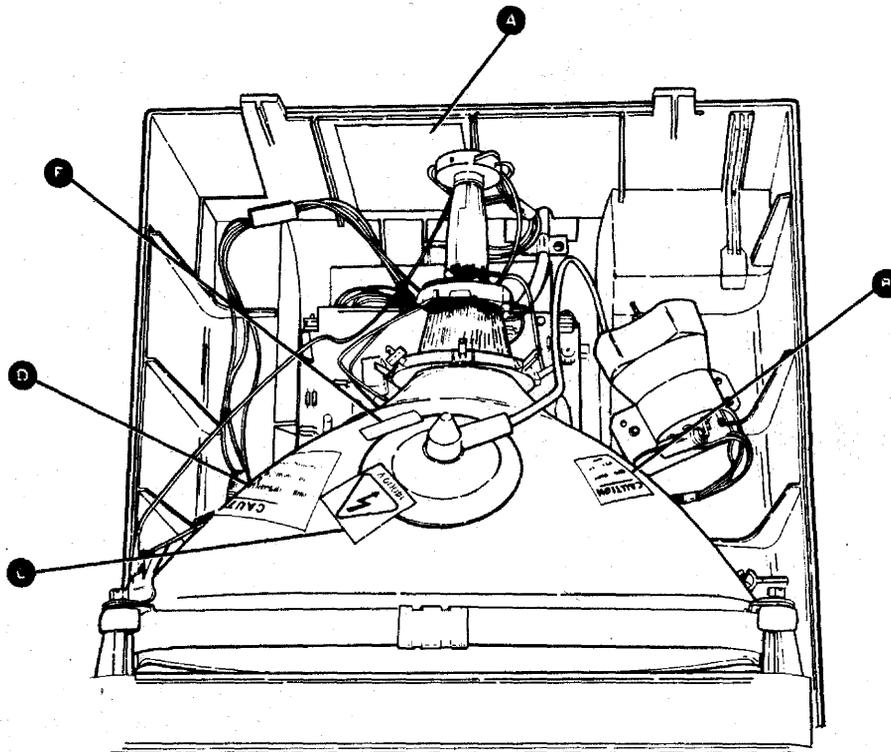
Note: Refer to reference 331 for the primary power connectors.

Internal Inspection—Display Unit

Perform the following checks:

- Are there any obvious non-IBM engineering changes? If yes, has *R009 Non-IBM Alteration/Attachment Survey* been completed?
- Are there any loose screws, contaminating chemicals, signs of water or moisture, signs of fire or smoke damage, file dust or any other internal conditions that look hazardous?
- Are any cables visibly worn, pinched, or damaged in any way?
- Does the display station frame have a good ground? Measure the resistance from the ground pin on AC power plug to any metal frame member or exposed non-current carrying metal part. This resistance must be less than 1 ohm.

- Are all parts installed in place tightly?
- Are all correct safety labels present and readable?
 - 14 000 volt warning label **C**
PN5640730
 - Cathode-ray tube ground caution label **D**
 - Hazardous area, trained service personnel only label **A**
PN7363012
- **Note:** These labels are on the cathode-ray tube but not in any specific location.
- X-ray warning label **B**
- Power requirements label **E**



Glossary of Terms and Abbreviations

address switches: Switches that permit the setting of a discrete address for each device on a system cable (line). These switches are 1, 2, and 3 on the switch block at the rear of the display station. See reference 420.

anode: The high voltage connector on the cathode-ray tube.

attribute: A characteristic that controls how data is displayed on the display screen. For example, the attributes of a display field include blinking, high intensity, and reverse image.

bezel: The mounting frame for the cathode-ray tube in the display unit.

blink attribute: An attribute of a display field that causes the characters to flash.

blink or blinking: Flashing.

Brightness control: A potentiometer on the CRT PC board that controls raster brightness. This control is not accessible to the operator. See reference 230.

Brightness control (operator): A potentiometer on the underside of the Display unit for adjusting the brightness of the data on the display screen. This control is accessible to the operator. See reference 230.

Cable Thru: A function that permits multiple display stations or printers to be attached serially to a system cable.

callout: A character, number, or name used to identify a particular part of a figure.

character set: A group of characters contained in a character generator. See reference 620.

Cmd key: The command key on the keyboard that is used to select command functions.

column separator: A dot that separates all the characters in a field of data.

command function keys: The 14 keys in the top row of the display station keyboard that are used with the Cmd (command) key to request functions.

controller: A device that controls the operation of one or more input or output devices.

CRT: Cathode-ray tube.

field attribute: The control characters that describe a displayed field. For example, a displayed field can be intensified, reversed, underscored, or made to blink.

FRU: Field-replaceable unit.

hex: Hexadecimal.

I/O: Input/output.

ID: Identification.

implode: To break inward suddenly.

Ins key: The key on the keyboard that is used to select insert mode.

IPL: Initial program load. The first machine program operation after power on.

Keylock RPO: A lock and key that prevents the use of the display station.

keystroke: The action of pressing a key on the keyboard.

KU: Keyboard Unit.

LC: Line check.

line check: A check for errors that occur during the transmission of data from the system controller to the display station.

LU: Logic unit (planar).

mandatory: Something that must be done or must be present.

menu: A list of options that can be selected.

metric: A decimal system of measurement based on the meter as a standard of measurement.

mm: Millimeter. One thousandth of a meter.

N/C: Pertains to a switch setting; normally closed.

N/O: Pertains to a switch setting; normally open.

network: All of the work stations and associated cabling attached to a controller.

online tests: A series of tests that can be requested from the system after power on and before sign on. See reference 600.

option: One of the items listed on a display screen menu.

overview: A short description which is general in scope.

PC: Printed circuit.

planar: The basic printed circuit electronic board used in the display station.

poll: A method the controller uses to determine if a display station is ready to send or receive data.

POR: Power on reset.

port: The place where a cable is connected to a controller.

protector: A device that aids in preventing injuries to persons or damage to machines.

raster: The image on the cathode-ray tube (CRT) that is made by the action of the CRT electron beam as it scans across the area where data is displayed. Normally, the intensity of the raster is not high enough to be visible. However, the raster can be displayed by adjusting the brightness control on the CRT circuit board. See reference 230.

replace: To exchange something; for example, replace a failed part with a new one.

required: See *mandatory*.

retrace lines: The lines that appear on the display screen when the display adapter returns the trace to the upper left corner of the display screen. Retrace lines are normally not displayed. See reference 230.

ripple: Small waves present on DC voltages.

rolling: Pertains to movement on a display screen; the movement can be horizontal, vertical, or a combination of both.

SA: System available.

shorting: Making an electrical short circuit.

sign on: A log-on procedure performed at a display station; the procedure can include entering the sign-on command, a password, or other user-specified security information.

slot: A narrow opening or groove.

socket: The connectors on the display station to which cables are connected.

Sys Req key: The key that is used to send a request directly to the system. See reference 600.

TB: Terminal block.

terminator switch: The switch used to terminate the customer system cable at the last display station or printer in a series. See reference 423.

twinaxial cable: A shielded, twisted-pair cable that connects a display station or printer to a controller.

typamatic key: A repeat action key on the keyboard.

U.S.: United States.

undefined: The meaning is not known or described.

underscore: A line under all positions of a field. Underscore is controlled by an attribute.

undisplayable character: A valid hexadecimal character code, but the character cannot be displayed on the CRT. See reference 620, step A2.

Vac: Volts alternating current.

Vdc: Volts direct current.

verification: Testing an operation or machine.

video: Pertains to the data displayed on the screen.

yoke assembly: The assembly on the back of the CRT, that contains the horizontal and vertical deflection coils and the centering rings. See reference 230.

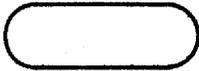
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Legend

The following symbols are used in flowcharts and figures throughout this manual.



Display Screen



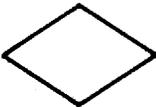
Start and End of Flowchart



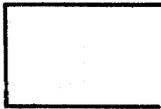
Off-Page Connector



On-Page Connector



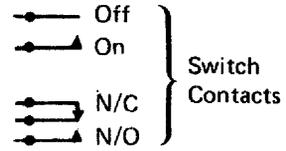
Decision Block



Comment Block



Information Block



Switch Contacts



Resistor



Ground



Transformer

Maintenance Information

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USING THE MAINTENANCE INFORMATION

The maintenance information has been designed to aid you in isolating a problem to a field replaceable unit (FRU), and then aid you in removing and replacing that unit.

The MAP charts aid you in isolating a problem to a failing FRU. The Maintenance Section contains adjustment procedures, removal and replacement procedures, and diagnostic and online test information.

You should first use the MAP charts to identify the failing FRU and then go to the referenced maintenance information or the suitable repair action.

No scheduled preventative maintenance or special tools and test equipment are required to service this display station.

The format for page numbering is X-YYY. X is the section number and YYY is the page number within that section. For example 3-22 is page 22 in Section 3.

Three-digit reference numbers are used in the MAP charts and text to index the maintenance information. In the MAP charts and text, these numbers are in parentheses. For example (110) refers to Description and Parts Location under 100 Keyboard Unit.

MAP Charts

The MAP charts help isolate a problem to a failing FRU. The 3-digit reference numbers refer you to the suitable maintenance information to adjust or replace it.

Maintenance Section

The Maintenance Section is indexed by 3-digit numbers for referencing. The major divisions that are indexed are the keyboard unit (100), display unit (200), lower unit (300), power-on diagnostics (520), and online tests (600).

MAP Charts

USING THE MAP CHARTS

The MAP charts are designed to identify a field replaceable unit (FRU) or direct you to an adjustment for a symptom. The symptoms are arranged in the charts according to five combinations of conditions identified in the vertical columns. They are:

1. Power-on diagnostics complete to alarm, screen not blank, and conditions *not* normal after power on.
2. Power-on diagnostics complete to alarm, screen not blank, and conditions normal after power on.
3. Power-on diagnostics complete to alarm, but the screen is blank.
4. Power-on diagnostics did *not* complete, and the screen is blank.
5. Power-on did *not* complete, and the screen is blank.

Locate the correct combination of conditions in the vertical columns. Find the correct symptom in the Symptom column. The Checks or Comments column contains important information about the symptom or repair action.

The Repair Action column identifies the FRU or adjustment procedure. The numbers in parentheses are references to the *Maintenance* section that describes the replacement or adjustment.

NORMAL DISPLAY SCREEN AFTER POWER ON

The following figure shows the normal display screen after power on and communications with the controller established.

Note: When a key is pressed, the character should be displayed. The location of the cursor is determined by the controller.

Status Indicators (■ = on; - - = off)

System Available. When on, it indicates that the system controller is communicating with the display station.

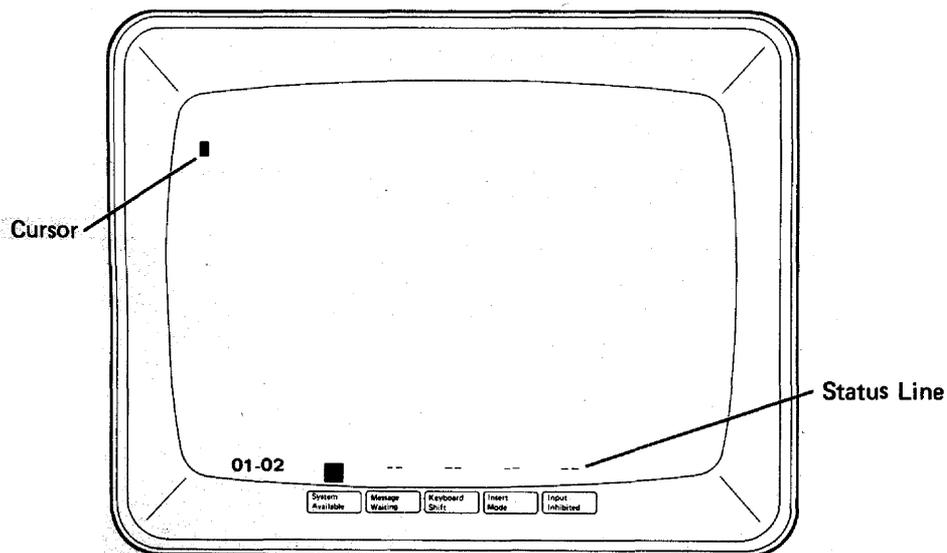
Message Waiting. When on, it indicates that a message is waiting for the display station operator.

Keyboard Shift. When on, it indicates that the uppercase (level) characters are active.

Insert Mode. When on, it indicates that an insert operation is in effect.

Input Inhibited. When on, it indicates that the system cannot process a keyboard scan code.

A four-digit cursor location number is also displayed on the status line. This number gives the row and column location of the cursor. When the cursor is in the upper leftmost corner, the number displayed is 01-02. The number is always displayed, except when an error occurs and an error status line is displayed (520). For further information concerning the status line, see reference 520 *Power-On Diagnostics*.



Note: Some display stations may display a sign-on menu.

START

Normal Conditions After Power On (2-1):

1. System Available on.
2. Cursor location equal to 01-02.
3. Normal status line (no error codes).
4. Normal size and stable screen.
5. All characters and/or indicators correctly displayed. Raster not visible.

If a sign-on menu is displayed, select the on-line test (600) to operate in free key mode or have the station varied off.

Note: The alarm sounds when power on diagnostics are complete. Clockwise (forward) rotation of the control knob increases the volume.

MAP Chart 1

			Symptom	Checks or Comments	Repair Action
POWER ON DIAGNOSTICS COMPLETE TO ALARM	SCREEN NOT BLANK	CONDITIONS NOT NORMAL AFTER POWER ON	Rolling screen: Horizontal or vertical	Horizontal roll will appear as two unstable horizontal bands where cursor and status line should be	Display unit (240)/planar (347)/I/O assembly (348)
			Bright oversize raster and vertical band left center	Retrace line out of focus and Brightness control inoperative	Display unit (240)
			Everything except status line displays as a horizontal line of dashes	Displays only in the center; Status line displayed above normal position	Display unit (240)
			Status line normal; Cursor and characters displayed as multiple horizontal dashes in row 1	Display normal on all other lines	Display unit (240)
			Fuzzy (out of focus), narrow, off center, or tilted		Adjustment (230)/Display unit (240)
			Only a horizontal line is displayed	Line may be solid or broken; Line may not be straight	Display unit (240)
			Only a vertical line is displayed	Line may be solid or broken; Line may not be straight	Display unit (240)
			Raster displayed	Cursor and status line normal (2-1); Display station operates normally; No cursor; No System Available; Keyboard is OK	Display unit (240); Planar (347)
			Only displays cursor and System Available	No other status line indicators displayed	Planar (347)
			Raster with dark vertical lines		Planar (347)
			Wrong display size vertically	Characters display correctly	Adjustment (230)/Display unit (240)
			Wrong display size (all sides)	+15 Vdc is too low or too high	Power supply board (345 or 342)
			No cursor; No System Available	Characters display from keyboard OK (a raster may or may not be displayed)	Planar (347)
			Status line displayed as horizontal lines	Cursor location displayed as horizontal line	Display unit (240)
			Cursor on the right	System Available on (not flashing)	Planar (347)
			Normal Status line not displayed correctly (2-1)	Extraneous data or missing dots on the screen or wrong characters displayed	Planar (347)/Display (240)/I/O assembly (348)

MAP Chart 2

			Symptom	Checks or Comments	Repair Action
POWER ON DIAGNOSTICS COMPLETE TO ALARM	SCREEN NOT BLANK NORMAL AFTER POWER ON	CONDITIONS	Raster displayed	No cursor; No status line; Fails to display from keyboard	Planar (347) Display Unit (240)
			Displayed information is not stable	Ripple on the +15 Vdc	Power supply board (345 or 342)
			Vertical jitter (Note 2)	All other conditions normal after power on (2-1)	Power supply transformer (344)
			Continuous diagnostic loop	Loops on ERROR status line and alarm sounds with CE switch set off (422)	Planar (347)/I/O assembly (348)
			Keyboard ID field equals KU or LU (520)	If LU is displayed with the keyboard disconnected, replace the planar (347); Check keyboard cable	Keyboard (140)/Planar (347) Power Supply (342)
			Stuck key field equals 1 (520)		Keyboard (140)/Planar (347)
			Line check counter is counting (520)	Display screen resets when signing on or communicating then stops communicating	Planar (347)
			Line check counter is counting (520)	Intermittent System Available; Cursor on right; Cursor position is not displayed	Power supply board (345)
			Line check counter is counting (520)	No System Available; Cursor on the right	Planar (347) I/O Assembly (348)
			Line check counter is counting (520)	Intermittent System Available; Intermittent resets	Planar (347)
			Continuous reset of 2 stations with power on	Check the address switch settings (2 stations may be at the same address); Check configuration	Planar (347)/I/O Assembly (348)
			No System Available or system available flashing; Cursor on the right	Check the -5 Vdc net (311, 312) Check the system network; Check the system configuration (2 stations may be at the same address); Check the address switch settings; Check the system cable	Fuse 3 (311) or power supply board (345 or 342) Planar (347) I/O assembly (348) Power supply board (345 or 342)
			Missing dots on displayed characters		Planar (347)
			Continuous or intermittent resetting screen; Cursor may be at right, left, or bottom	Attempt to sign on and display station will begin to loop	Planar (347) Power supply board (345 or 342)

MAP Chart 3

			Symptom	Checks or Comments	Repair Action	
POWER DIAGNOSTICS COMPLETE TO ALARM	SCREEN NOT BLANK	CONDITIONS NORMAL AFTER POWER ON	Displayed address does not match the switches	Power off; Press and hold a key; Power on	Set address (420), Planar (347)/I/O assembly (348)	
			Missing attribute (620)	Attribute fails and no status line errors (520)	Planar (347)	
			Attribute is always on (620)	Attribute fails and no status line errors (520)	Planar (347)	
			Line check counter is greater than 5	Call system operator to check the network	Failing network/Terminator switch (423)	
			All keys fail to display from keyboard	Keylock (RPQ) is unlocked	Planar (347)/Keylock (346)	
			Fails to blank data	Keylock (RPQ) is locked	Planar (347)/Keylock (346)	
			Keyboard problems	Row, column, or single key failures, missing dots, and so on	Planar (347)/Keyboard (140)	
			Column Separators display as vertical lines of dots OR Screen fills with horizontal lines of column separators		Planar (347)	
			Display mode function failure	Fails to reverse screen	Planar (347)	
			Wrong characters displayed for keys pressed	Some keys fail; No status line errors (520)	Planar (347)	
			Missing dots on characters		Planar (347)	
			IPL sign-on displayed in place of USER ID sign-on	Nondisplay attribute fails (620)	Planar (347)	
			Cursor select or row and column (cursor position) failure	Keyboard is OK	Planar (347)	
			SCREEN BLANK		Check the +15 Vdc at the planar test point (312)	If missing replace power supply board (345 or 342)
						Display (240) Planar (347) I/O assembly (348)

MAP Chart 4

CHECK THE ALARM

If the alarm does not sound, do the following:

- Power off.
- Remove the lower unit cover (341).
- Disconnect the alarm wires from the planar connector (312).
- Use a CE meter on the +6 Vdc scale.
- Measure across the connector pins 1(+) and 3(-).
- Power on.

The meter should deflect right-left-right. If deflection is correct, go to reference 354, otherwise use MAP Chart 2.

		Symptom	Checks or Comments	Repair Action
POWER ON DIAGNOSTICS DID NOT COMPLETE	SCREEN BLANK	Keyboard ID field equals LU (520)	Check the -5 Vdc at the Planar/ Power Supply Connector (311) Check the address switch settings (421)	If missing replace power supply (342, 345) Planar (347)/I/O assembly (348)
		Only a horizontal line is displayed in center of screen		Planar (347)
		Vertically compressed raster folded horizontally in center of screen OR Wide band of horizontal lines in center of screen	Lines may or may not be rolling	Power supply board (345 or 342) Planar (347)
		Unstable horizontal lines		Power supply board (345 or 342) Planar (347)
		Bands of rolling dashes over raster; Bright horizontal bands top and bottom	Width of dashes may vary	Planar (347) Power supply board (345)
		Failing +5 Vdc (311) (Full raster vertically with bright horizontal bands on top and bottom; not stable) (For single FRU power supply, see Note 1)	1. If fuse 2 is OK (311) 2. If fuse 2 is blown, disconnect the keyboard (142) and replace fuse 2	Power supply board (345)/Planar (347) If fuse 2 does not blow again, check the keyboard cable/replace the keyboard (140); If fuse 2 blows again, replace the power supply board (345)/planar (347)
		Dashes rolling (full screen)	Check the planar/Power Supply connector pin 9 (311) for +4 Vdc or higher	If less than +4 Vdc-Power Supply (345 or 342) If +4 Vdc or higher-Planar (347)
		All of the above OK		Planar (347)
		BLANK SCREEN	Check the following in sequence	
1. Fuse 1 is blown (331)				Fuse 1
2. No AC voltage at TB1 (331) Measure across TB1-1 and 2	Check for an open line cord			Line cord/primary power assembly (349)
3. 24 Vac is zero (311) Measure J1-5 to J1-6 (Note 2)	Open transformer			Power supply transformer (344)
4. DC voltage failure (332)	+5 Vdc is less than 1.0 Vdc +15 Vdc is less than 6.0 Vdc			Planar (347)/power supply board (345)
5. 24 Vac is low (311) Measure J1-5 to J1-6 (Note 2)	Open capacitor			AC capacitor (343)
6. Power-on reset failure (312)	Planar POR test point does not read +4 Vdc or higher			Planar (347)/power supply board (345) Display unit (240)
7. All of the above OK			Planar (347)	

Notes:

1. If the single FRU power supply shown on 310 is installed (no fuse 2), disconnect the keyboard (142) and power on. If the symptom goes away, check the keyboard cable/Replace the keyboard (140). Otherwise power supply (342)/Planar (347).
2. Omit this symptom or voltage check if the single FRU power supply shown on 310 is installed.

INTERMITTENT ERROR LOG TABLE

- Find the last error code from the error log in column 1 of the chart below.
- The latest error code can be determined by noting the date in the error log.
- Find the other error code if there is one in column 4.
- Column 5 lists the probable causes.
- See 640 Error History table for sense information for the error codes.

1 Last Error Code	2 Name	3 Error Description	4 Other Error Code	5 Probable Cause
0100	No response	This error is reported when a display station and the controller are in session and the display station does not respond to a poll. The error is not normally logged.		System cable Planar
0101	Transmit activity check	This error is detected by a controller during a poll or when a command is executed by the controller		Controller
0103	Receive parity error	The controller reports this error if the wrong parity was received in response to a poll or command.	0104	Controller Planar System cable
0104	Line parity check	The display station reports this error if the wrong parity was received in response to a poll or command. A line parity check must be reset with a poll command and the reset bit on.	0103	Planar Controller System cable
0106	Receive length check	The controller received the wrong number of bytes as a result of a poll or command.		Planar
0107	Wrong station responded	An incorrect station address was returned in response to a poll or other command from the controller.	0103 0104	Planar System cable System cable
0108	Power on Transition	The power on transition status bits are set when the display station is powered on. This error is reported only if the bits are set while the display station is in session.		Planar
0109	Activate command failure	The controller checked the device status and found that the busy bit was not on after an activate command had been sent.		System cable
0111	Scan code not valid	The 7-bit code sent in the keyboard response frame does not translate to a character or function specified by the controller.	103 104	Keyboard System cable System cable

INTERMITTENT ERROR LOG TABLE (continued)

1 Last Error Code	2 Name	3 Error Description	4 Other Error Code	5 Probable Cause
0120	Command not valid	The poll or other command sent to the display station was not a valid command or the device ID was not correct.	0103 0104	Planar System cable System cable
0121	Register value not valid	The address counter value is not within the user accessible limits.	0103 0104	Planar System cable System cable
0122	Storage or input queue overrun	More than 16 commands and associated data frames have been sent to the display station by the controller, or an attempt has been made to store data beyond the limit of user accessible storage.		Planar Controller
0123	Null or attribute exception	No attribute was found or the address counter points to an attribute.		System application program Planar
0124	Activate not valid	A wrong or not valid activate command was sent to the display station.	0103 0104	Controller Planar System cable System cable
0125	Undefined exception status	An undefined exception status was returned by the display station in response to a poll.		Power Planar System cable
0149	Undefined error status	The controller found an error but the cause of the error cannot be determined.	0125 0103 0104	Planar Power System cable System cable
0182	Device type error	An unrecognized device responded to a poll.	0103	Planar System cable
0184	Incorrect Keyboard ID	Keyboard ID received by the controller was not incorrect.		Keyboard ID Controller
0185	Incorrect keyboard specified	Controller and display station do not match keyboard ID		Controller Keyboard
0190	Even/odd changes in status	Status sent to the controller by the display station has not changed in 225 milliseconds after the controller sent a positive acknowledgement and received a not busy response.		Planar
0191	Busy	The controller has found that the busy bit has been on for a time longer than 400 milliseconds.		Planar

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USING THE MAINTENANCE SECTION

The *Maintenance Section* is arranged into six subsections. Each of the subsections and the major divisions within them are identified by three-digit reference numbers.

The first three subsections are relative to the major hardware units of the display station. These are the keyboard unit (100), display unit (200), and the lower unit (300).

Within each of these subsections, the information is arranged to aid you in locating a specific part or area. Then adjustments, if necessary, are supplied. Lastly, instructions are supplied for removing and replacing the field replaceable units.

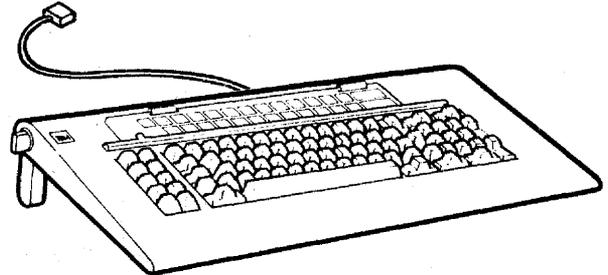
The remaining subsections contain information on the display station diagnostics (520) and online tests operation (600).

100 KEYBOARD UNIT

110 Description and Parts Location

The keyboard unit includes the covers, the keyboard (logic card and key assembly) and the cable. No repair action will be performed on the logic card and key assembly. If it fails for any reason, replace it.

The keyboard cable connects to the planar (in the lower unit) of the display station and to the logic card in the keyboard unit.



140 Keyboard and Keyboard Cable Removal and Replacement Procedure

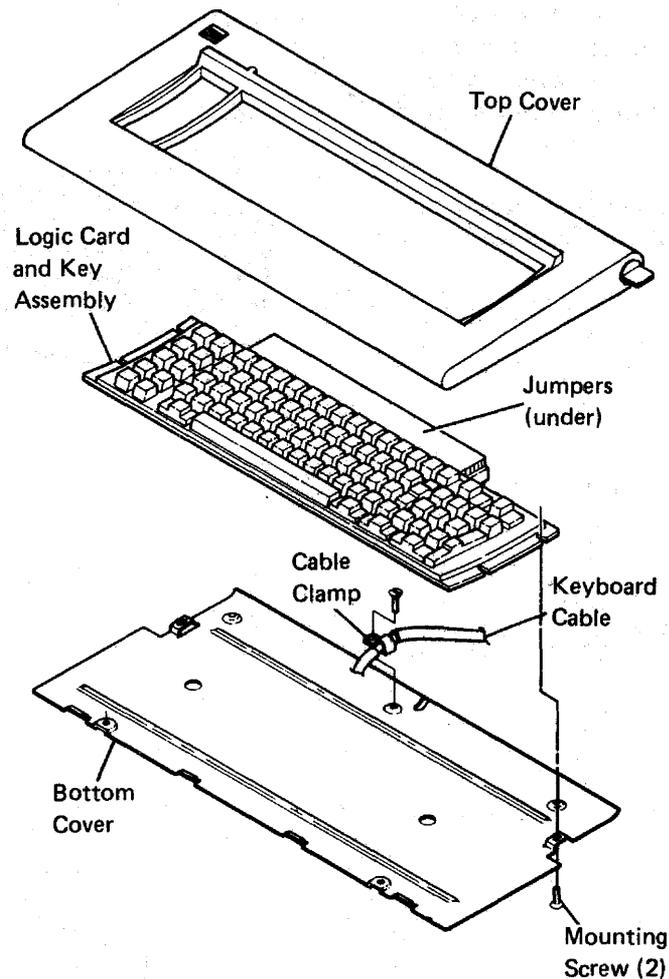
141 Keyboard (Logic Card and Key Assembly)

1. Power off and remove the line cord from the AC outlet.
2. Invert the keyboard unit.
3. Remove the two mounting screws on the bottom cover.
4. Lift off the bottom cover.

5. Disconnect the cable connector from the keyboard logic card.
6. Ensure that the new keyboard is jumpered the same as the old keyboard (143).
7. Lift the logic card and key assembly from the top cover.

Replace the new keyboard in the reverse order of removal.

Ensure that the new keyboard ID, displayed on the status line, is the same as the ID for the old keyboard. (See *Keyboard ID Field* under 520 *Power-On Diagnostics*.)

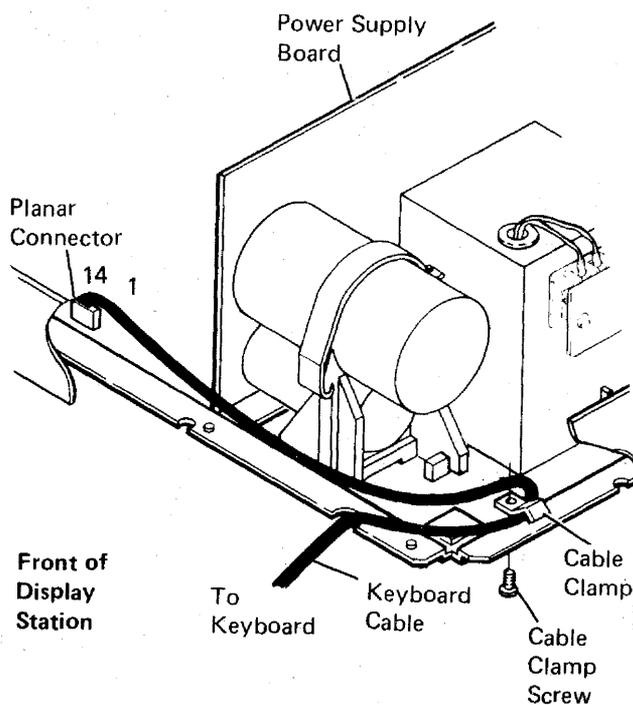


142 Keyboard Cable

140-142

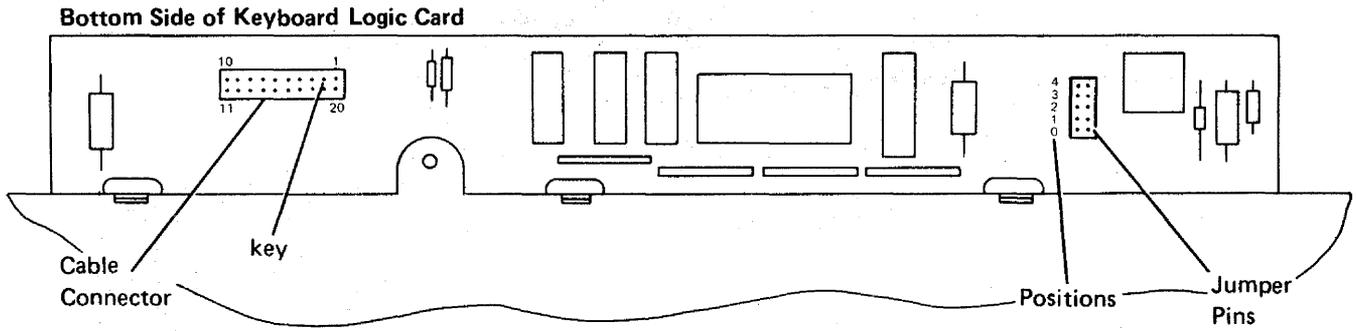
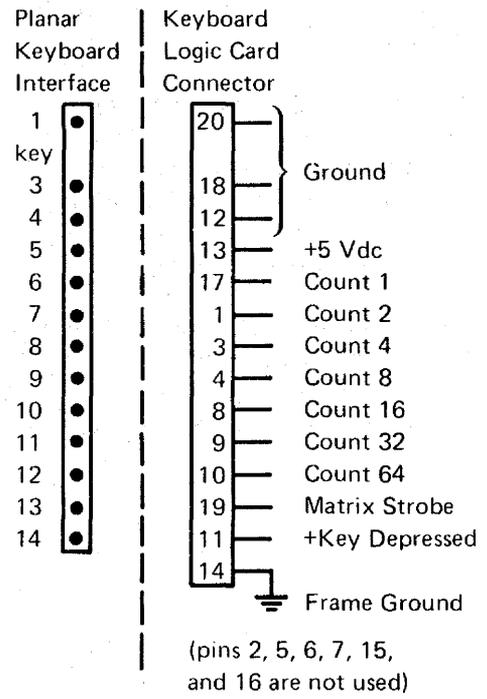
1. Power off and remove the line cord from the AC outlet.
2. Remove the keyboard unit bottom cover as follows (141):
 - a. Invert the keyboard unit.
 - b. Remove the two mounting screws on the bottom cover.
 - c. Lift off the bottom cover.
3. Remove the cable clamp from the bottom cover and then the cable.
4. Disconnect the cable from the logic card.
5. Remove the lower unit top cover (341).
6. Remove the keyboard cable connector from the planar connector.
7. Remove the keyboard cable clamp by removing the mounting screw from the bottom side of the lower unit and removing the clamp from the cable.
8. Pull the keyboard cable free from the lower unit.

Replace the keyboard cable in the reverse order of removal.



143 Keyboard Jumpers

ID Code	Language Group	Jumper Position
00	United States and Canada	No jumpers required
01	ASCII International	4
02	United Kingdom	3
03	Japan (English)	3 and 4
04	Spanish Speaking	2
05	Spain	2 and 4
06	Brazil	2 and 3
07	Portugal	2, 3, and 4
08	Austria and Germany	1
09	Finland and Sweden	1 and 4
10	Norway and Denmark	1 and 3
11	Italy	1, 3, and 4
12	France	1 and 2
13	Canada (French)	1, 2, and 4
14	Belgium	1, 2, and 3
15	Japan (Katakana)	1, 2, 3, and 4
16	Do not use	0 (Invalid)
through 31		



200 DISPLAY UNIT

The display unit shown below is to be replaced as an assembly. For adjustment procedures, go to reference 230.

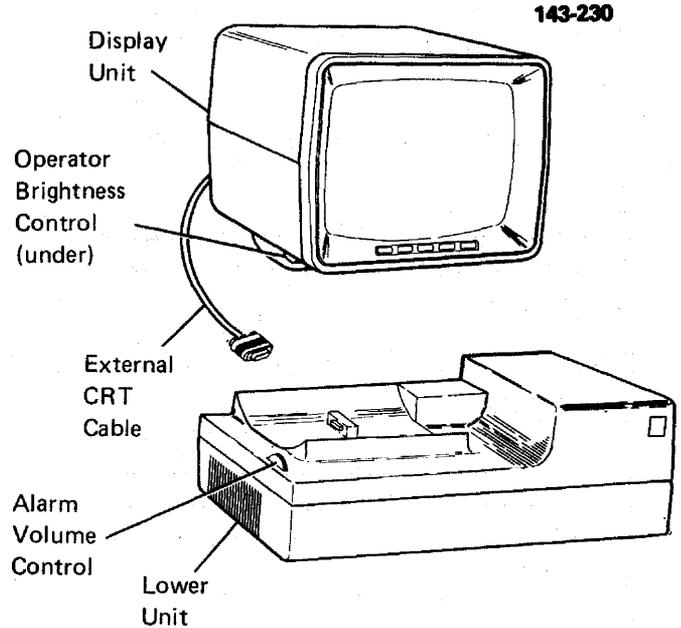
230 Display Adjustments

THE DISPLAY ADJUSTMENTS ARE SEQUENCE SENSITIVE

READ CAREFULLY. Always do the procedures one step at a time. The procedures must be carried out exactly and in the order given.

DANGER

High voltages are present inside the display unit. The CRT will implode if cracked or broken. Be especially careful not to bump the CRT socket.



Procedure Setup:

1. Remove the top cover of the display unit (see 242).
2. Perform the Online Test (600) and select the Display Attributes screen (620) which supplies a border of Hs that outlines the video area. Return to this procedure after you obtain the Display Attributes screen.
3. Read the following information carefully:
 - a. The location of the adjustments may vary from manufacturer to manufacturer. Refer to the adjustment label on the back of the CRT for locating the adjustments in your display station.
 - b. Use a fiber screwdriver (part 460811) to adjust the controls on the CRT PC board.
 - c. If any of the adjustments cannot be made, replace the display unit.

Initial Brightness and Centering Adjustments

DANGER

High voltage exists around the CRT anode and flyback transformer. Be careful when making adjustments.

Always wear safety glasses when adjusting the yoke or centering rings.

1. Adjust the operator Brightness control to the highest brightness level.
2. Adjust the Brightness control on the CRT PC board until a raster¹ appears.
3. If the raster is not squarely aligned, perform steps a through d. If the raster is squarely aligned on the screen, proceed to Step 4.
 - a. Loosen the clamp on the yoke assembly.
 - b. Turn the yoke assembly to align the raster squarely on the screen.
 - c. Ensure that the yoke assembly is pressed tightly against the back of the CRT.
 - d. Tighten the clamp on the yoke assembly.
4. Adjust the centering rings on the yoke assembly so that the raster is centered on the screen vertically and horizontally.

¹The raster is a condition of the display screen. It is visible when the Brightness control on the CRT PC board is adjusted so as to light the display screen background. A reverse image display could look similar to a raster. In reverse image, the status line is not in the lighted field. When a raster is displayed, the lighted area of the display includes the status line.

²It may be necessary to readjust the centering rings (Step 4) while you make this adjustment.

5. Adjust the horizontal phase control on the CRT PC board² to center the Display Attributes screen horizontally on the raster.
6.
 - a. Adjust the Brightness control on the CRT PC board until the raster disappears.
 - b. **For World Trade Only:**
 - Set the screen to reverse image mode.
 - Adjust the operator Brightness control to the highest brightness level.
 - Adjust the *Preset Contrast Control* for the best overall character definition.
 - Set the screen to normal image mode.
 - Check the high and low intensity character definition.

If the character definition is not good:

 - Adjust the *Preset Contrast Control* to a lower level.
7. Adjust the operator Brightness control to display the Display Attributes screen at an easy viewing level.

Vertical Size Adjustment

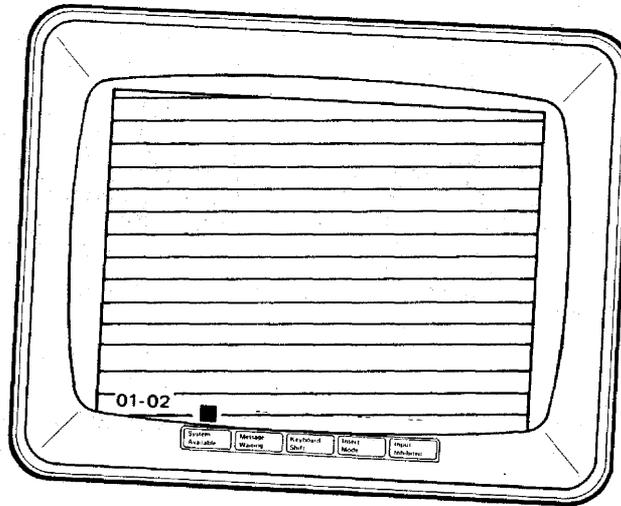
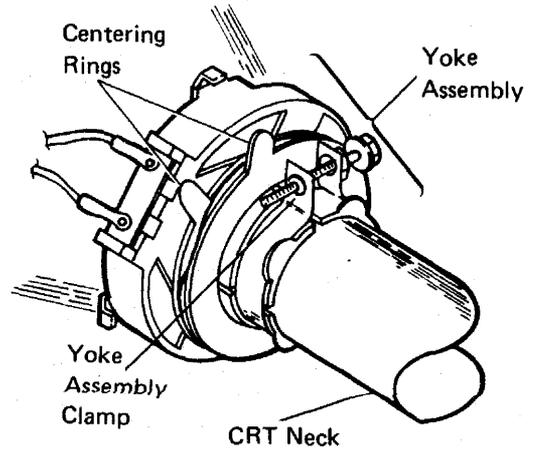
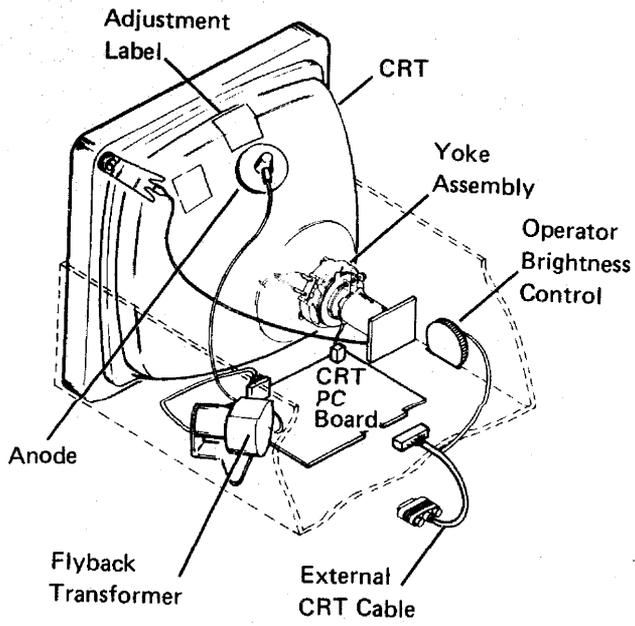
1. Use the outside border of Hs in making the following size adjustment.
2. Adjust the vertical size control on the CRT PC board to expand the screen vertically to 152.4 ± 6 millimeters (6.0 ± 0.24 inches)².

Focus

1. Ensure that the brightness of the Display Attributes screen is at an easy viewing level.
2. Adjust the focus control on the CRT PC board for the best overall definition of characters in the center and around the edges of the display.

Verification

Check that the display is correctly centered and that the brightness is adjusted for easy viewing with no raster displayed. Check the characters for distinct focus. If these conditions cannot be met, replace the display unit.



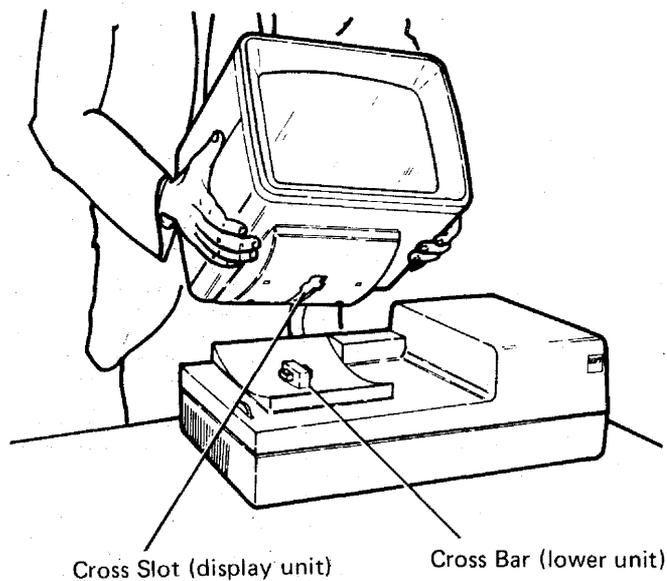
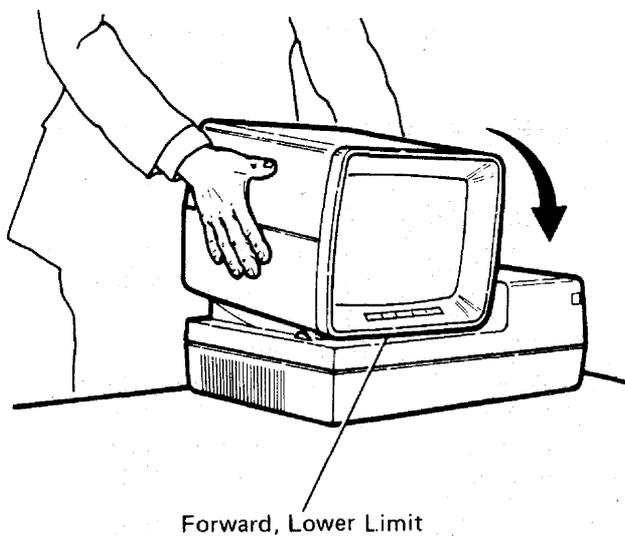
240 Display Unit Removal and Replacement Procedures

241 Display Unit

1. Power off and remove the line cord from the AC outlet.
2. Remove the external CRT cable from the lower unit.
3. Remove the display unit by positioning the unit in its forward, lower limit and lifting upward.

Note: To remove the display unit, the cross bar in the guide post on the lower unit must be aligned with the cross slot in the display unit.

Replace the display unit in the reverse order of its removal.

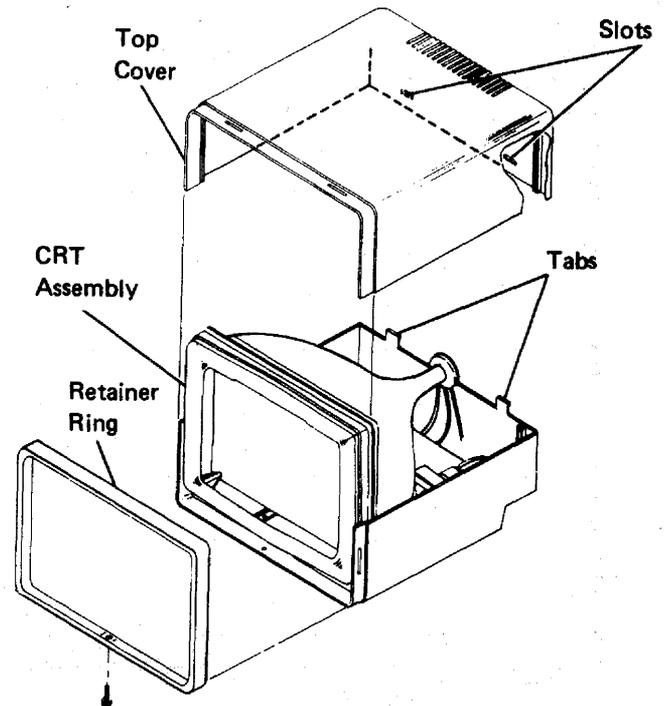
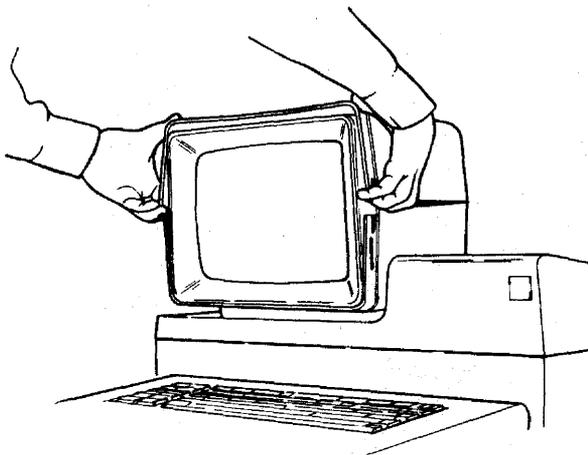
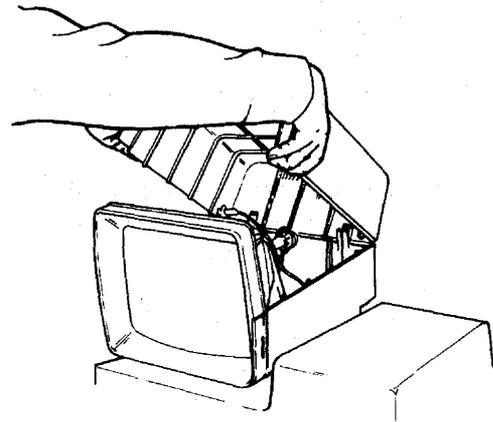


242 (continued)

4. Remove the display unit top cover as follows:
 - a. Insert your fingers in the crack between the top and bottom covers.
 - b. Pull the top cover sides out and lift up to free the cover from the CRT frame.
 - c. Lift the top cover up and move it toward the rear of the display unit to free the cover from the tabs in the rear of the display unit.

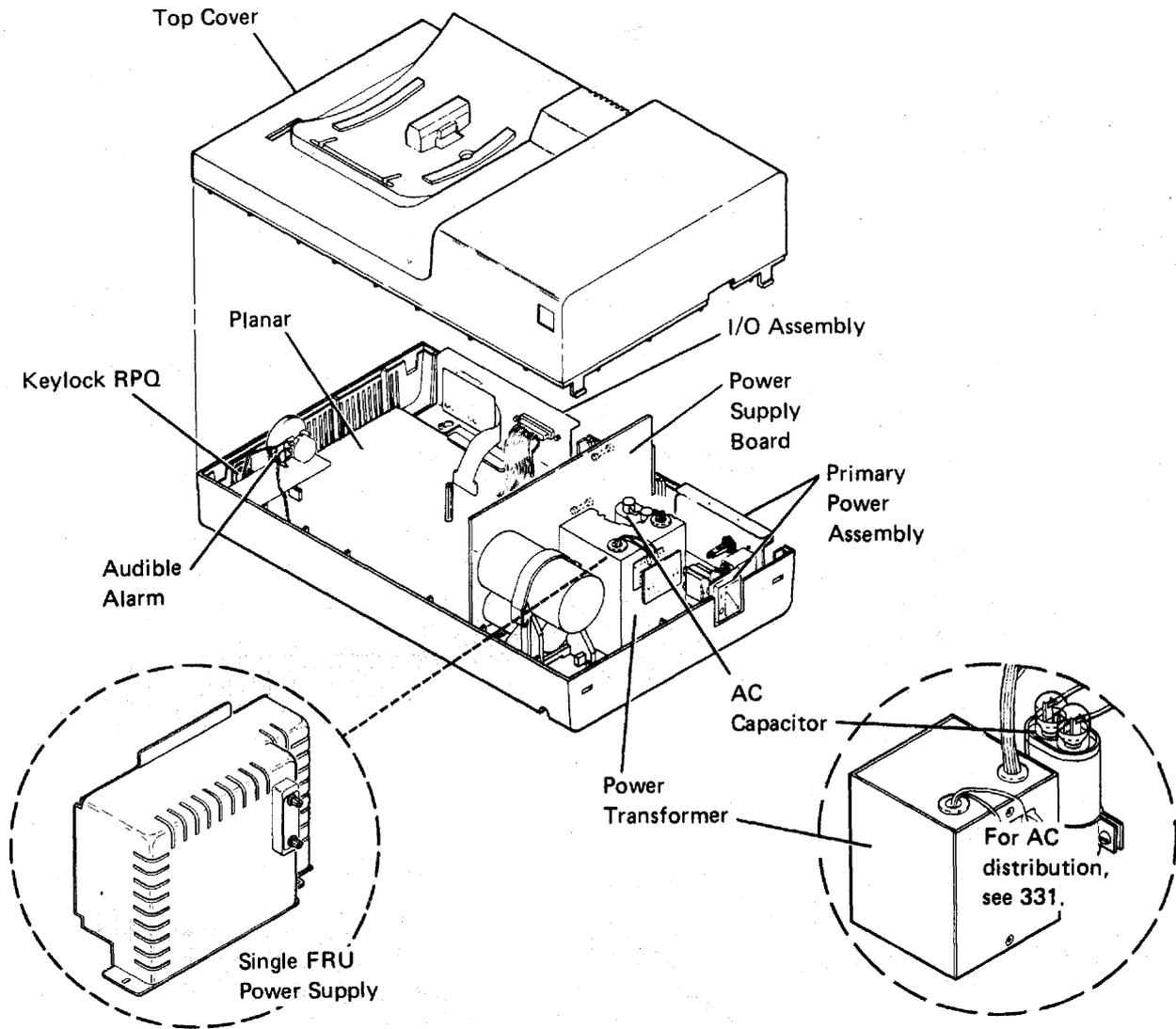
Replace the top cover in the reverse order of removal.

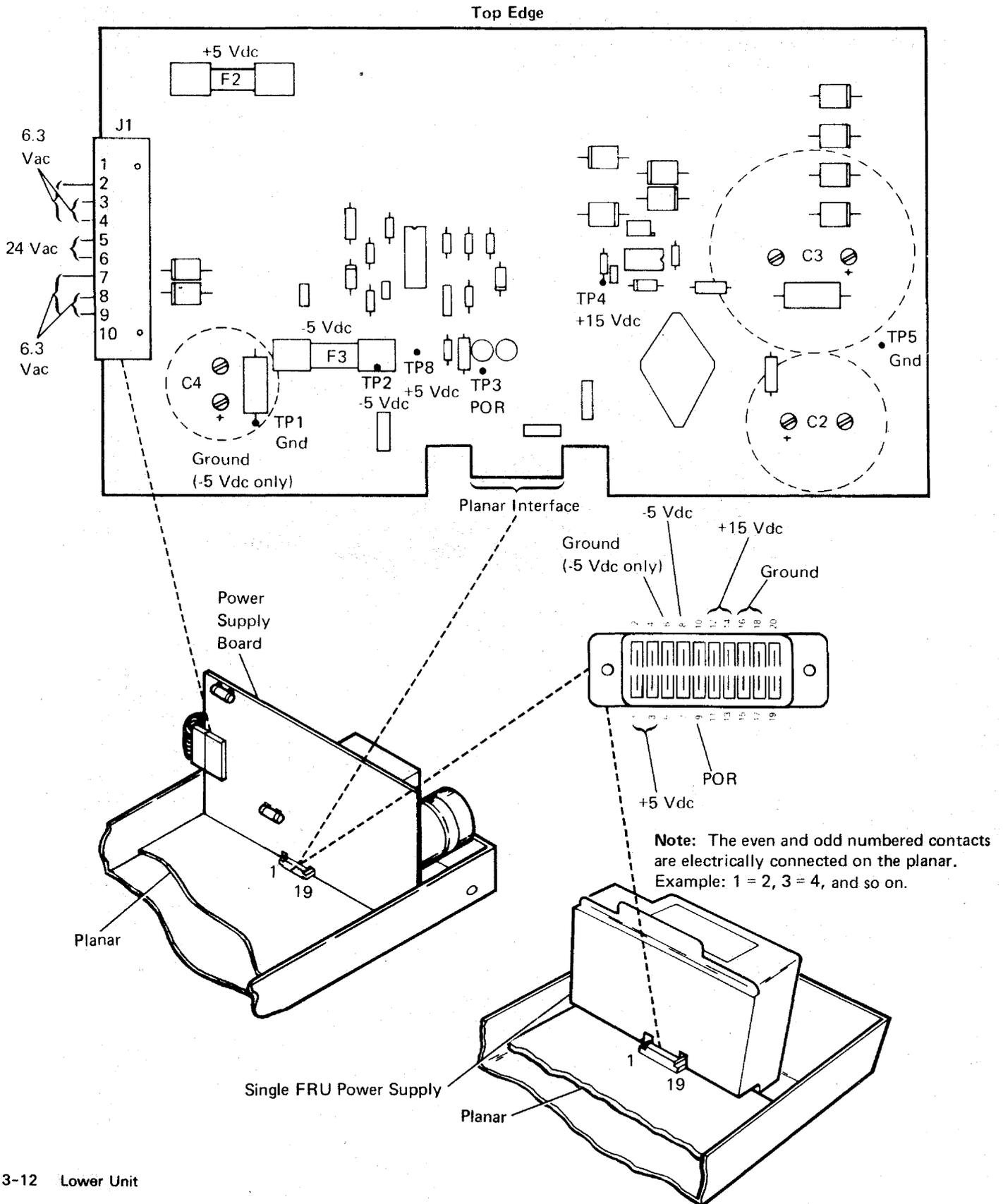
When replacing the retainer ring, set the top half in place first and then press the bottom half in place.

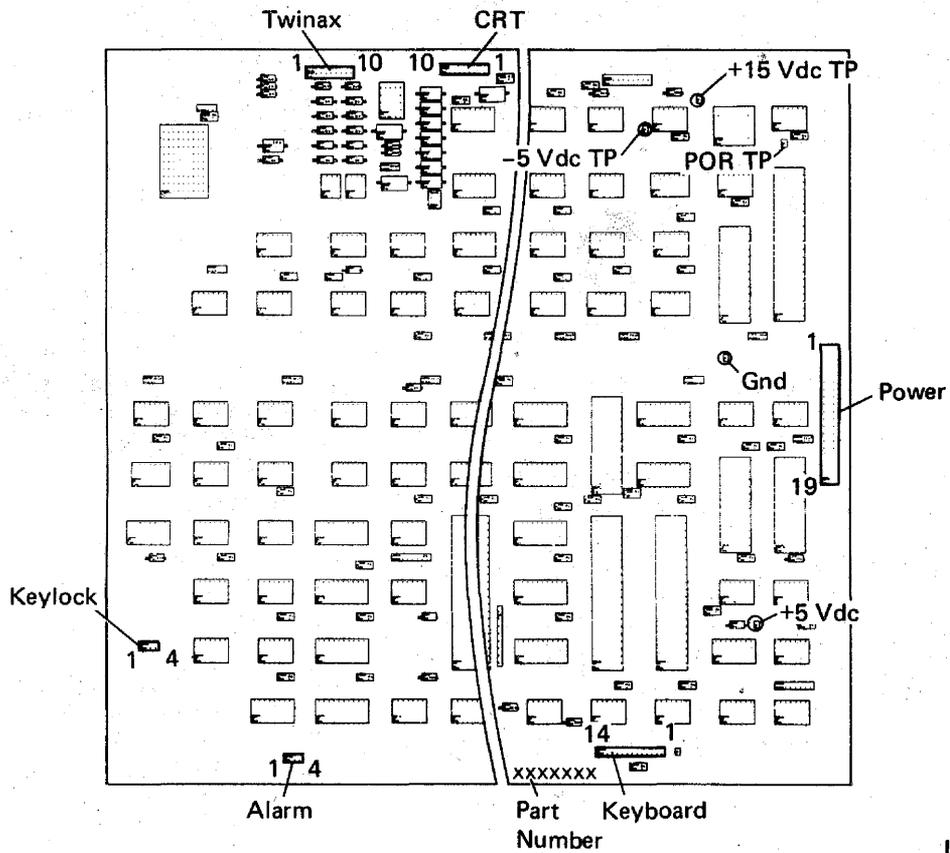
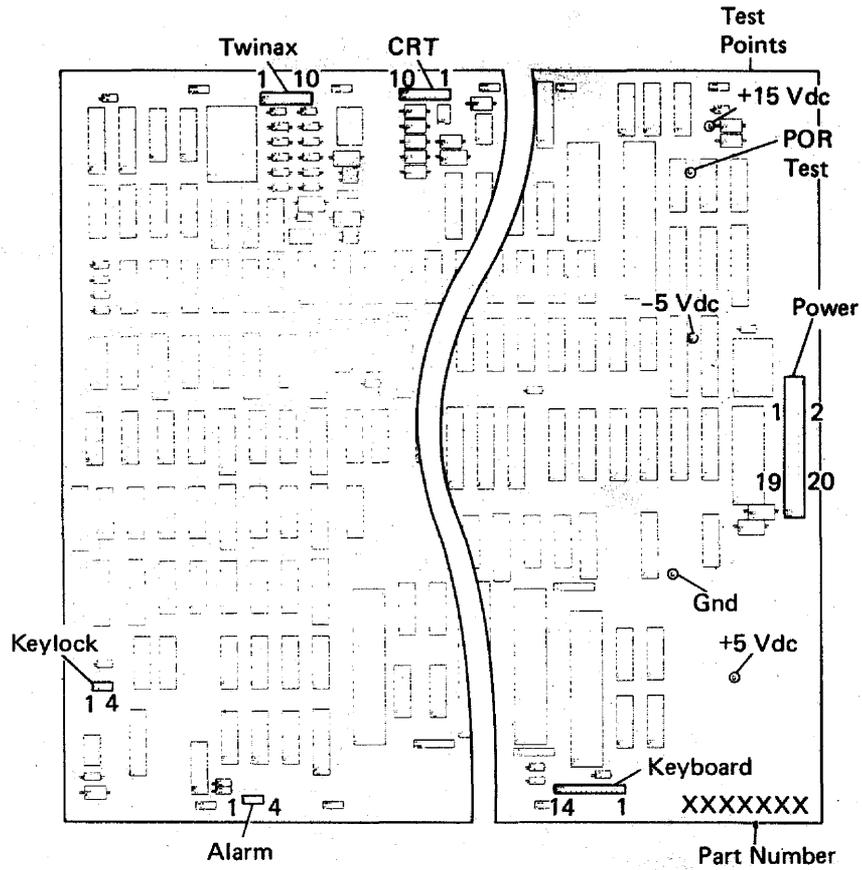


310 Description and Parts Location

The lower unit shown below contains the power supply and the logic for the display station. The lower unit of your display station may look slightly different. The one shown below includes the Keylock RPO.

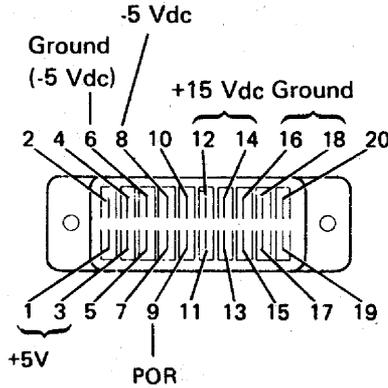




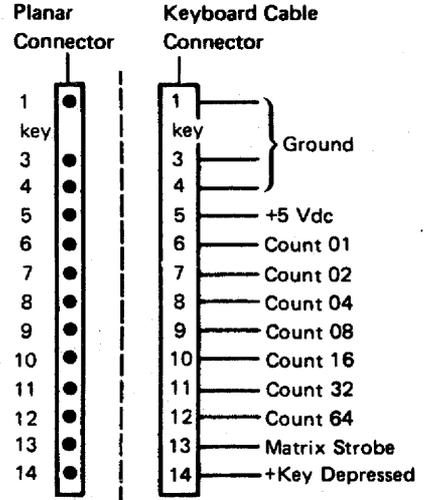


Power/Planar Connector

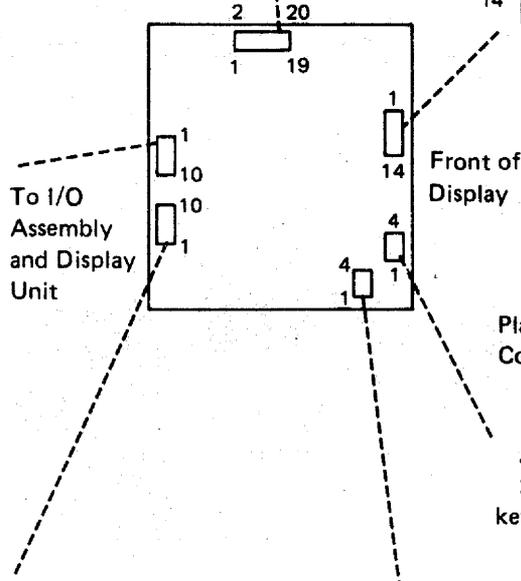
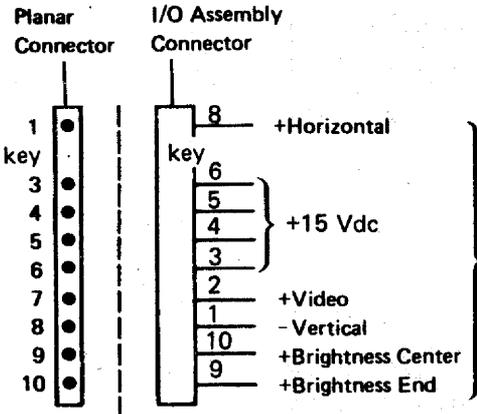
Note: The even and odd numbered contacts are electrically connected on the planar. Example: 1 = 2, 3 = 4, and so on.



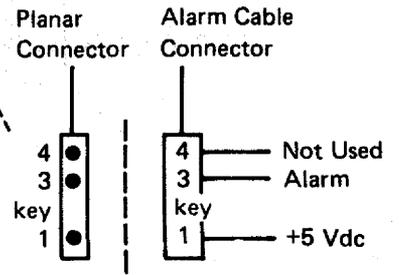
Keyboard



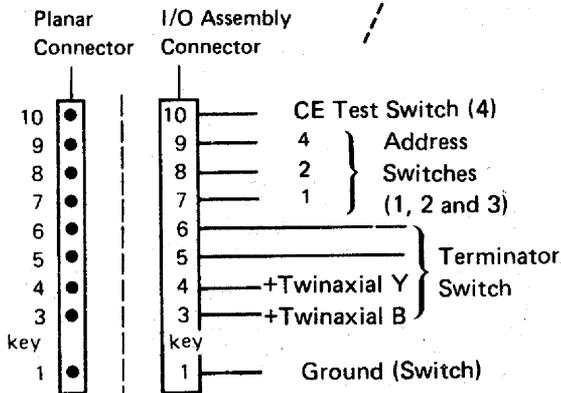
CRT



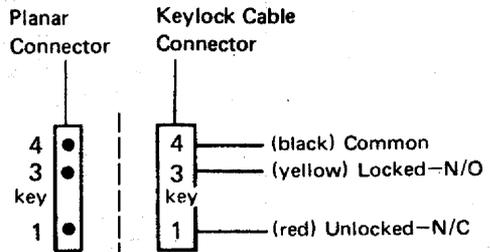
Alarm



Twinax

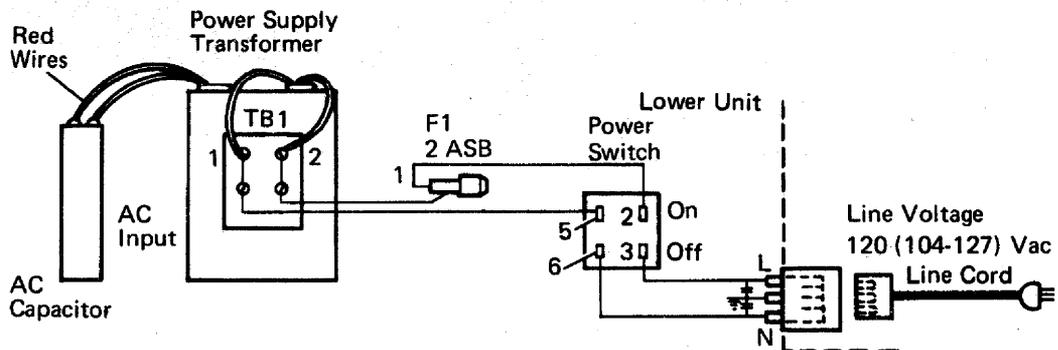
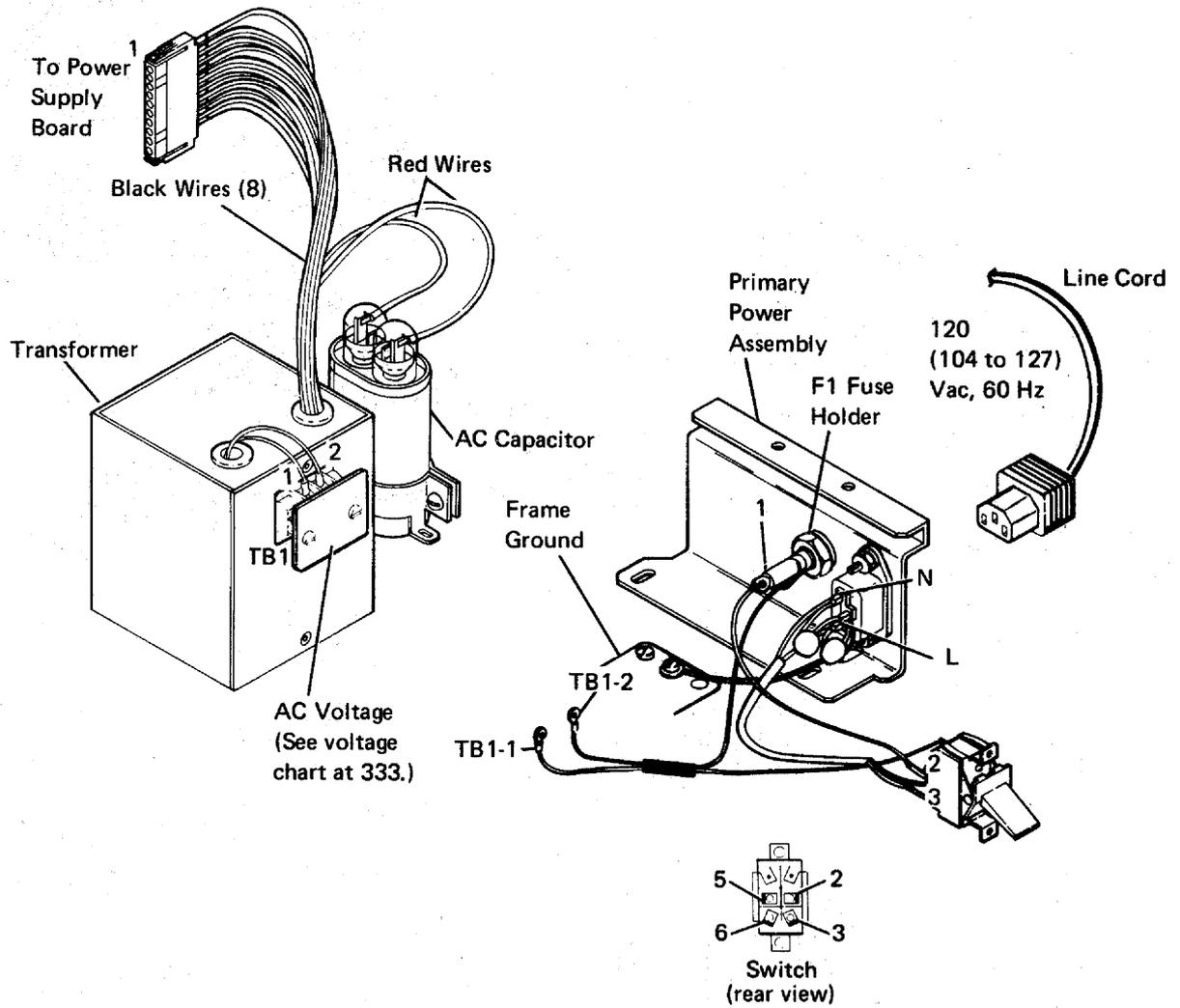


Keylock

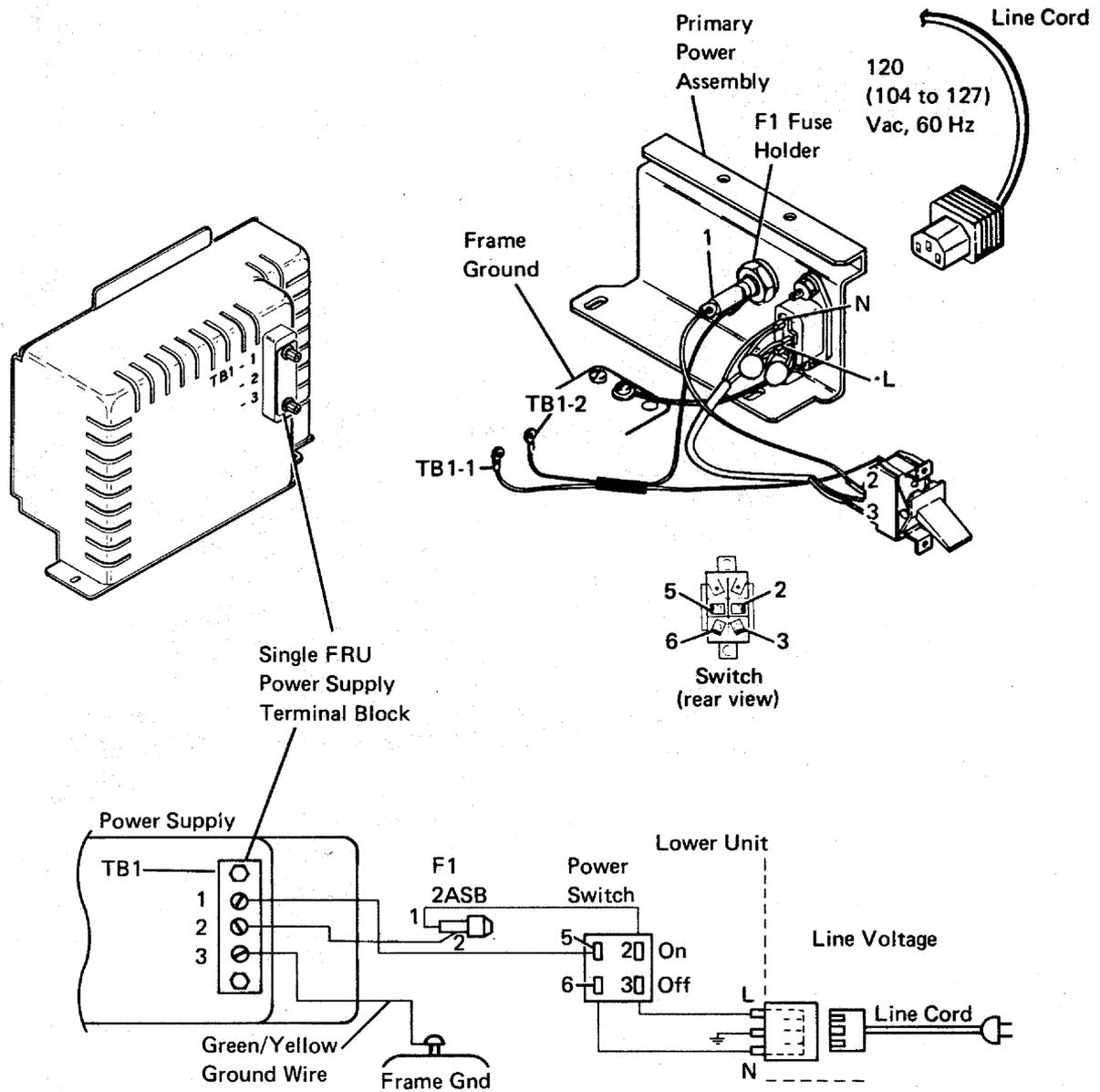


331 AC Power Distribution

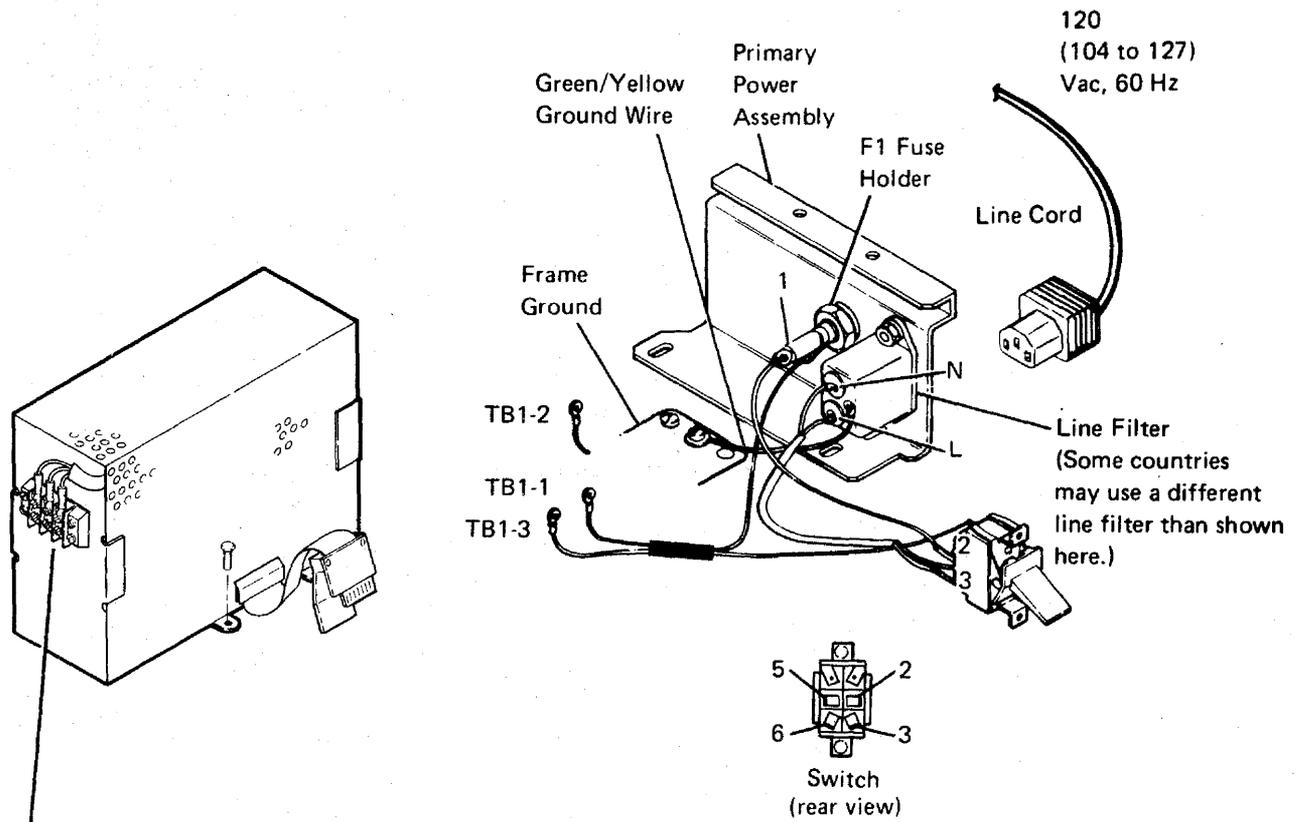
United States Only



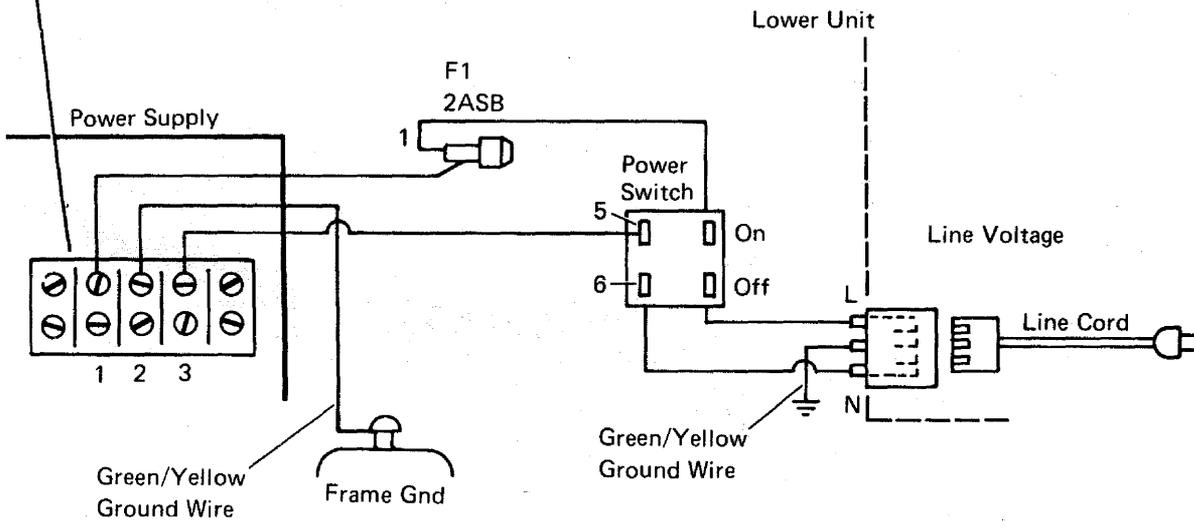
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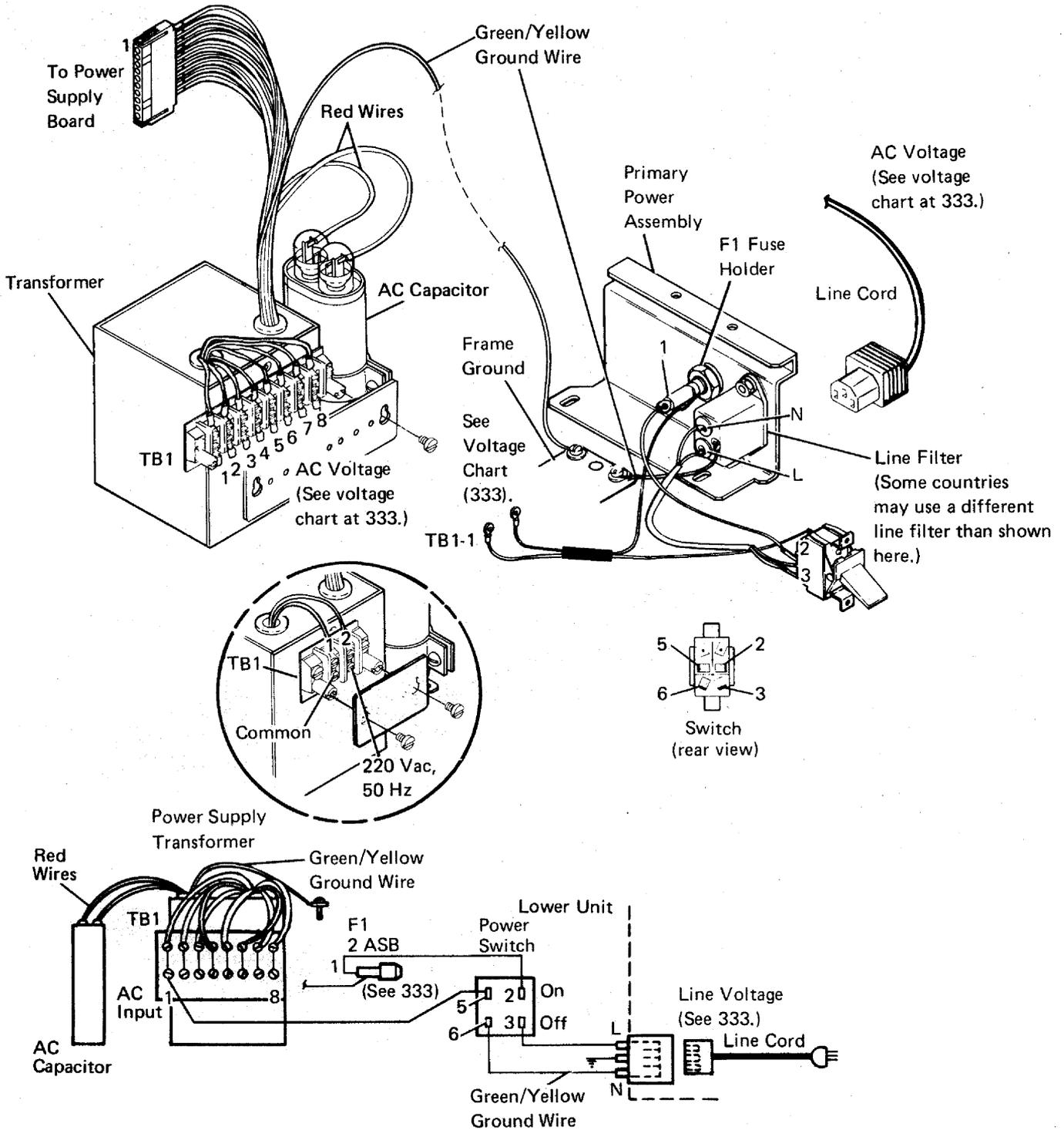


Single FRU Power Supply Terminal Block

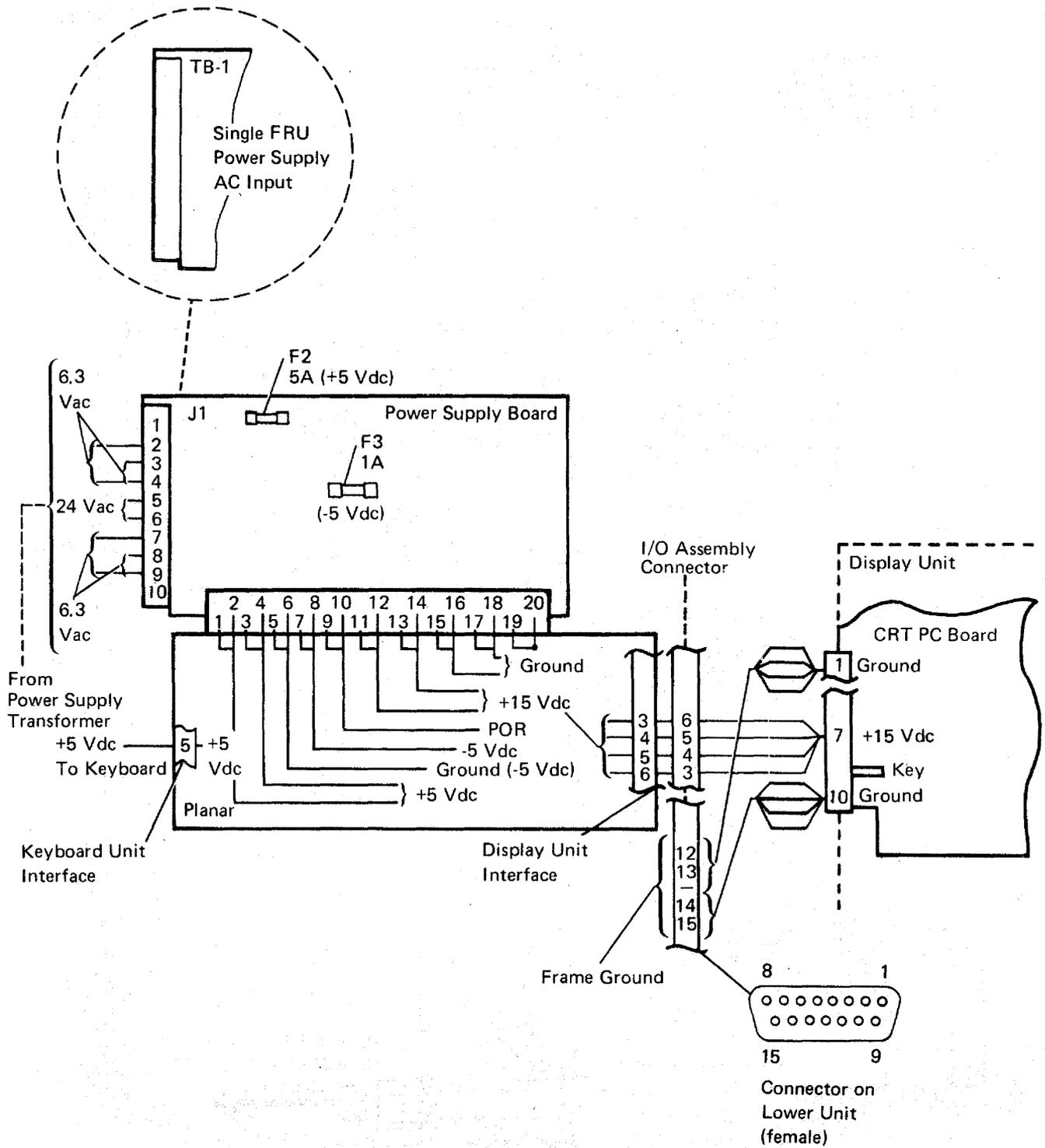


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World Trade Only



332 DC Power Distribution



Single FRU Power Supply

TB1 Connector	Voltage Rating	Voltage Limits	Part Number
100 Vac, 50 or 60 (±0.5) Hz			2777239
-1	100	90-137	
-2	100	90-137	
-3	Common		
200 Vac, 50 or 60 (±0.5) Hz			2777241
-1	200	180-259	
-2	200	180-259	
-3	Common		
200/240 Vac, 50 or 60 (±0.5) Hz E/ME/A			7363033
-1	200	180-259	
-2	200	180-259	
-3	Common		

Fuse Specifications

Fuse No.	Ampere Rating	Fuse Part Number
F1	2	615683

Power Supply Board

United States Only

TB1 Connector	Test Point	Voltage Rating	Voltage Limits	Transformer Part Part
115 Vac, 60 (±0.5) Hz				
1	Common			
2	Fuse pin 2	115	104-127	2777440

Fuse Specifications

Fuse No.	Ampere Rating	Fuse Part Number
F1	2	615683
F2	5	855251
F3	1	855253

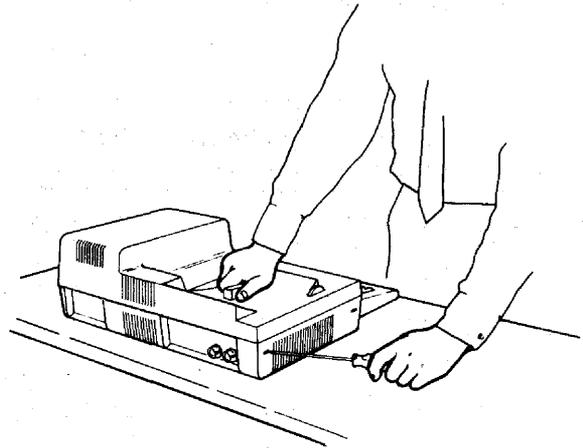
World Trade

TB1 Connector	Test Point	Voltage Rating	Voltage Limits	Transformer Part Number
XXX Vac, 50 (±0.5) Hz				
1	Common			
2	Fuse pin 2	100	90-110	2777442
3	Fuse pin 2	110	97-119	2777442
4	Fuse pin 2	200	180-220	2777442
5	Fuse pin 2	220	193-238	2777442
6	Fuse pin 2	230	202-249	2777442
7	Fuse pin 2	240	210-259	2777442
220 Vac, 50 Hz				
1	Common			
2	Fuse pin 2	220	193-238	2777439
XXX Vac, 60 Hz				
1	Common			
2	Fuse pin 2	100	90-110	2777441
3	Fuse pin 2	110	97-119	2777441
4	Fuse pin 2	120	104-127	2777441
5	Fuse pin 2	127	111-137	2777441
6	Fuse pin 2	200/208	180-220	2777441
7	Fuse pin 2	220	193-238	2777441
8	Fuse pin 2	240	208-254	2777441

340 Lower Unit Removal and Replacement Procedures

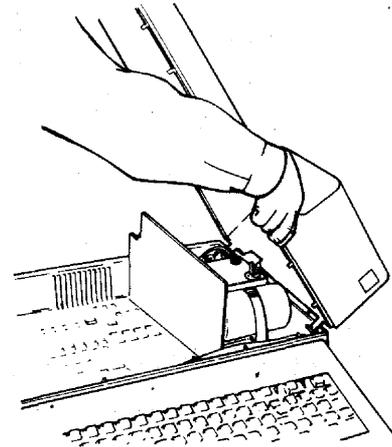
341 Lower Unit Top Cover

1. Power off and remove the line cord from the AC outlet.
2. Remove the external CRT cable from the lower unit.
3. Remove the display unit by positioning it in its forward, lower limit and lifting up (240). Set it out of the way.



Note: To remove the display unit, the cross bar in the guide post on the lower unit must be aligned with the cross slot in the display unit.

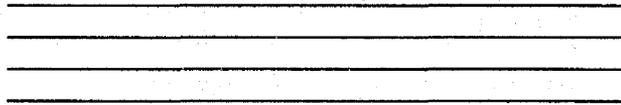
4. To remove the lower unit top cover:
 - a. Remove the screw from the top cover.
 - b. Grasp the cross bar of the top cover firmly and lift up while pressing in on the tab, as shown, with a screwdriver.
 - c. Lift the top cover up and over the power supply board, and free the top cover tabs on the power supply side of the lower unit.



Replace the lower unit top cover in the reverse order of removal.

CAUTION

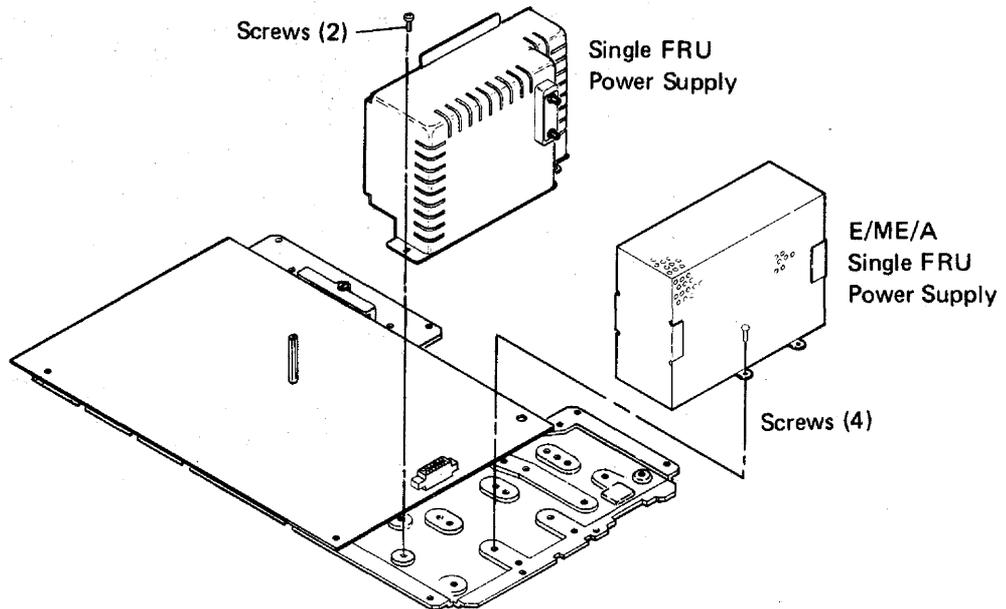
Do not remove the cover from this power supply under any conditions. Serious shock hazards are present inside this power supply even if the power switch is off.



1. Power off and remove the line cord from the AC outlet.
2. Remove the lower unit top cover (341).
3. Remove all wires from TB1 on the power supply terminals.
4. Remove the two screws holding the power supply to the base.
5. Remove the power supply by pulling it up off the planar.

Replace the power supply in the reverse order of removal.

Ensure that the wires to the power supply terminals are properly connected (331, 333).



343 AC Capacitor

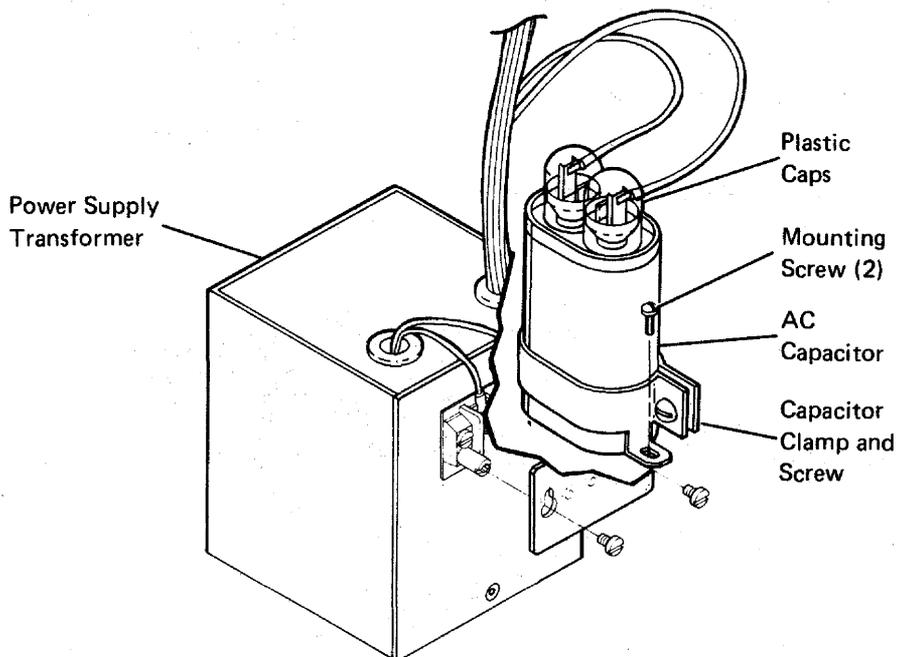
DANGER

High voltage may be present at the connectors on top of the AC capacitor.

1. Power off and remove the line cord from the AC outlet.
2. Remove the lower unit top cover (341).
3. Remove the plastic covers on the AC capacitor. (Press inward on the covers as you pull upward.)
4. Discharge the two connectors on top of the AC capacitor by shorting them together with a screwdriver or jumper.

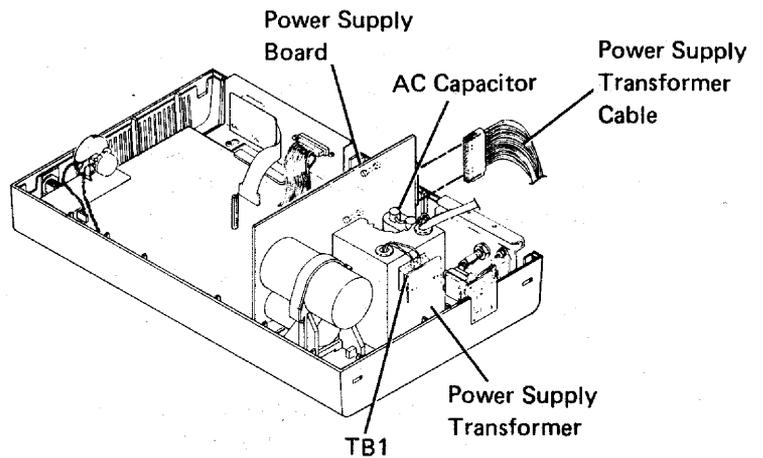
5. Remove the two wires from the AC capacitor connectors.
6. Remove the two mounting screws holding the AC capacitor clamp to the lower unit.
7. Remove the AC capacitor and clamp from the lower unit.
8. Loosen the screw holding the clamp to the AC capacitor.
9. Remove the AC capacitor from the clamp.

Replace the AC capacitor in the reverse order of removal.

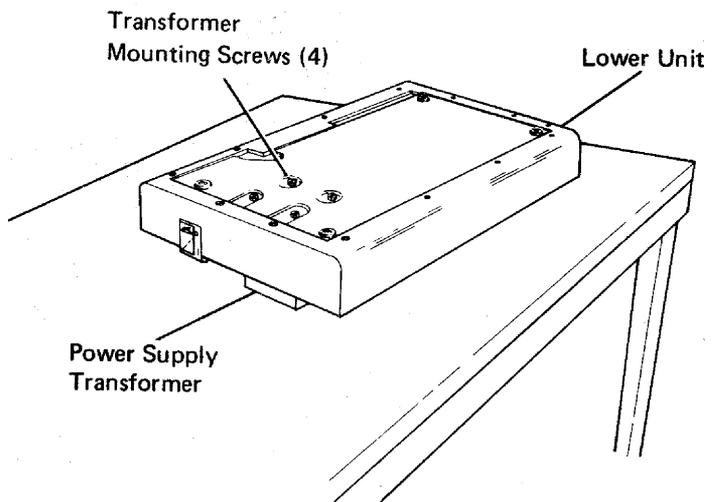


DANGER

High voltage may be present at the connectors on top of the AC capacitor.



1. Power off and remove the line cord from the AC outlet.
2. Remove the lower unit top cover (341).
3. Remove the plastic cover on the AC capacitor. (Press inward on the cover as you pull upward.)
4. Discharge the two connectors on top of the AC capacitor by shorting them together with a screwdriver or jumper.
5. Remove the two wires from the AC capacitor connectors.
6. Remove the green and yellow ground wire from frame ground.
7. Remove the cover from TB1 on the power supply transformer by loosening the two mounting screws and sliding the cover up and over them.
8. Remove the wires from the lower connectors on TB1.
9. Remove the transformer cable from the power supply board by pressing the retainer tabs and pulling the connector away.
10. Remove the power supply board (345).
11. Remove the audible alarm assembly (354).
12. Carefully invert the lower unit.
13. Remove the four mounting screws that hold the transformer to the lower unit.
14. Lift the lower unit off the transformer and set it aside.

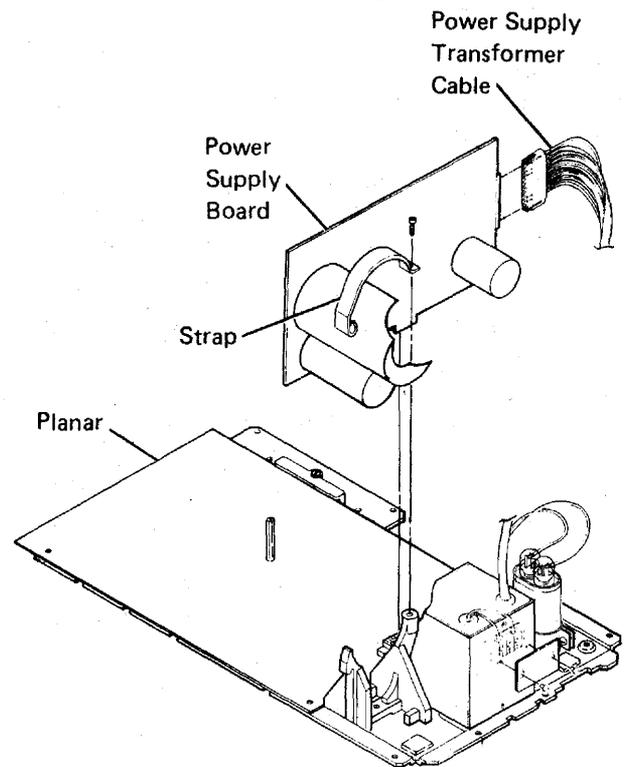


Replace the power supply transformer in the reverse order of removal.

345 Power Supply Board

1. Power off and remove the line cord from the AC outlet.
2. Remove the lower unit top cover (341).
3. Remove the power supply transformer cable by pressing the retainer tabs and pulling the connector away.
4. Remove the strap holding the large capacitor on the power supply board to the lower unit.
5. Remove the power supply board by pulling it up and out of the connector on the planar.

Replace the power supply board in the reverse order of removal.

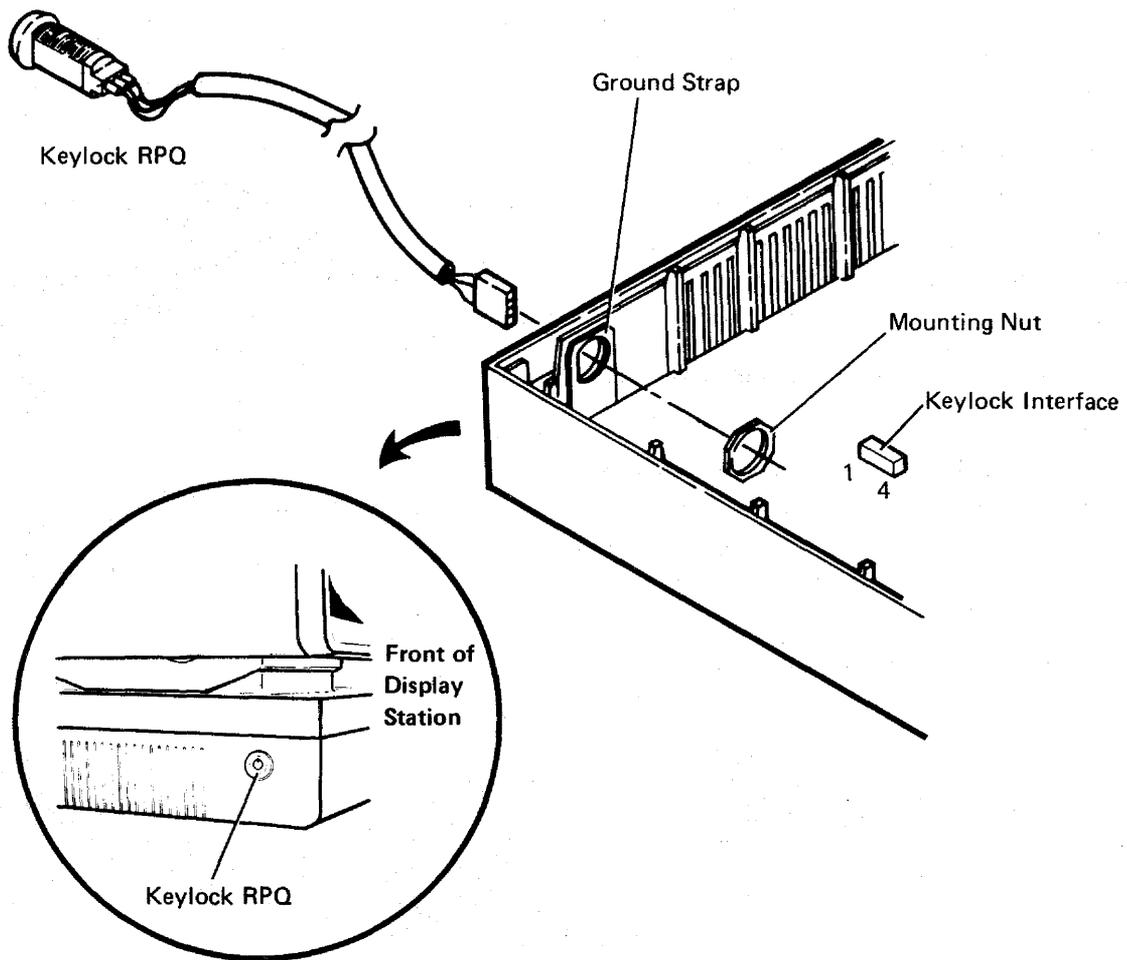


346 Keylock RPQ

345-346

1. Power off and remove the line cord from the AC outlet.
2. Remove the lower unit top cover (341).
3. Remove the keylock cable from the planar.
4. Remove the mounting nut from the keylock assembly.
5. Push the keylock out of the lower unit.

Replace the keylock in the reverse order of removal.



347 Planar

CAUTION

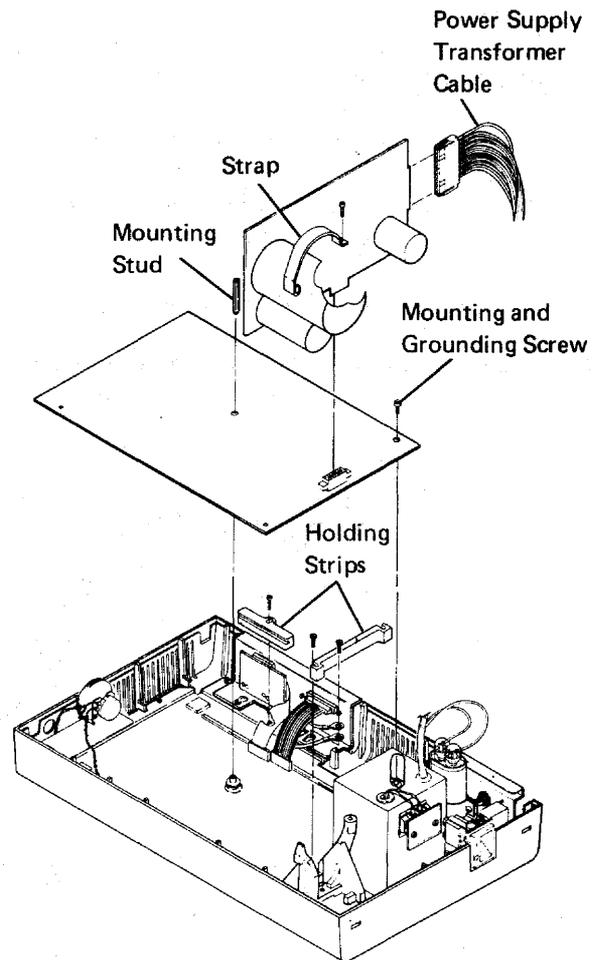
Twisting or bending the planar can damage the printed circuits. Be careful when removing and replacing the planar.

1. Power off and remove the line cord from the AC outlet.
2. Remove the lower unit top cover (341).
3. Remove all cables attached to the planar.
4. Remove the power supply board (345) or Single FRU Power Supply (342).
5. Remove the mounting stud and mounting screw holding the planar to the lower unit.
6. Loosen or remove the two holding strips at the edges of the planar and place them out of the way.
7. Carefully remove the planar from the lower unit.

CAUTION

When replacing the planar, ensure that the mounting and grounding screw is tight.

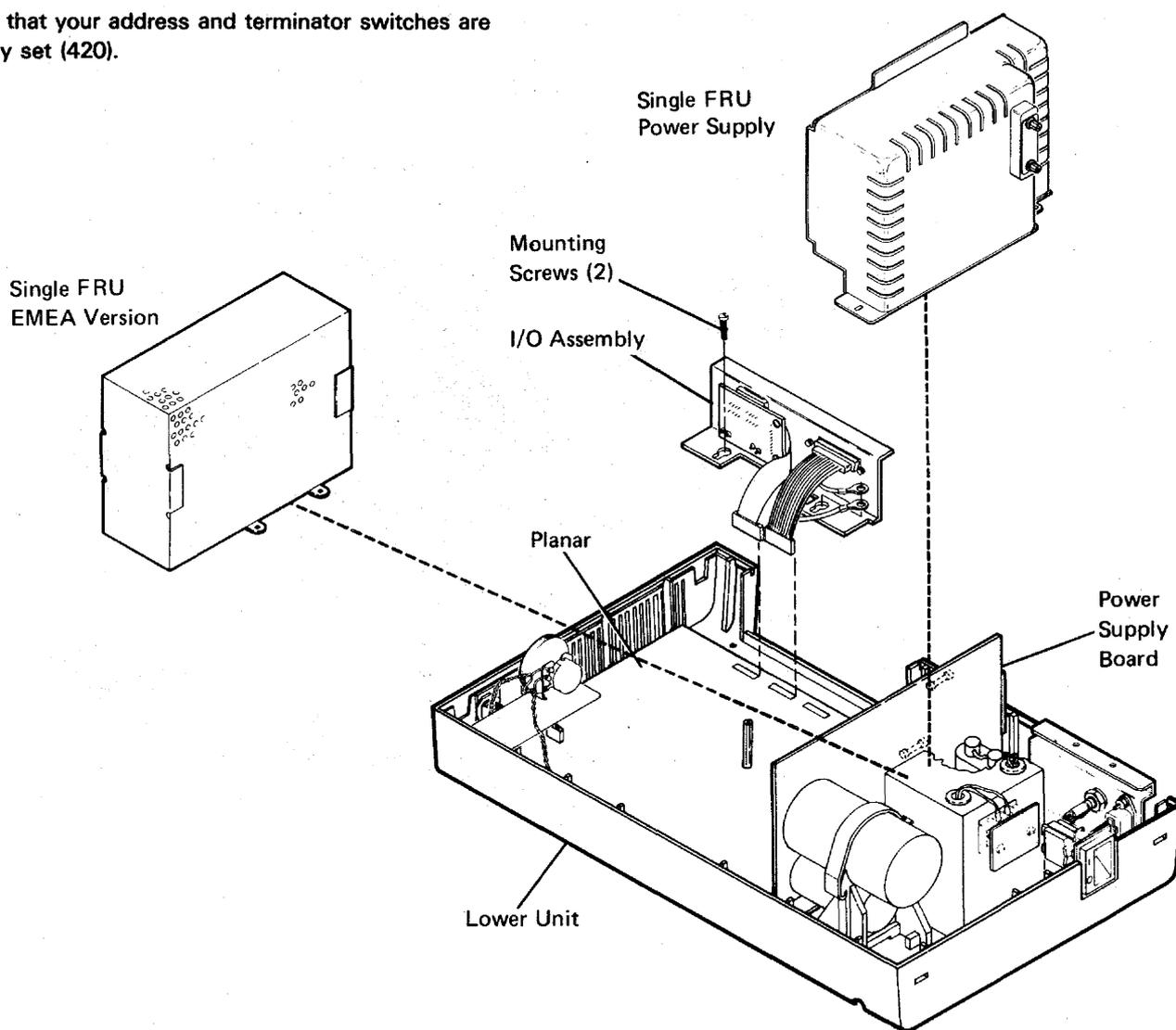
Replace the planar in the reverse order of removal.



1. Power off and remove the line cord from the AC outlet.
2. Remove the lower unit top cover (341).
3. Remove the I/O assembly cables from the planar.
4. Loosen or remove the two mounting screws that hold the frame of the I/O assembly to the bottom of the lower unit.
5. Move the I/O assembly inward, and then lift it up and clear of the lower unit.

Replace the I/O assembly in the reverse order of removal.

Ensure that your address and terminator switches are properly set (420).



349 Primary Power Assembly

The primary power assembly includes the panel at the rear of the display station and the power switch.

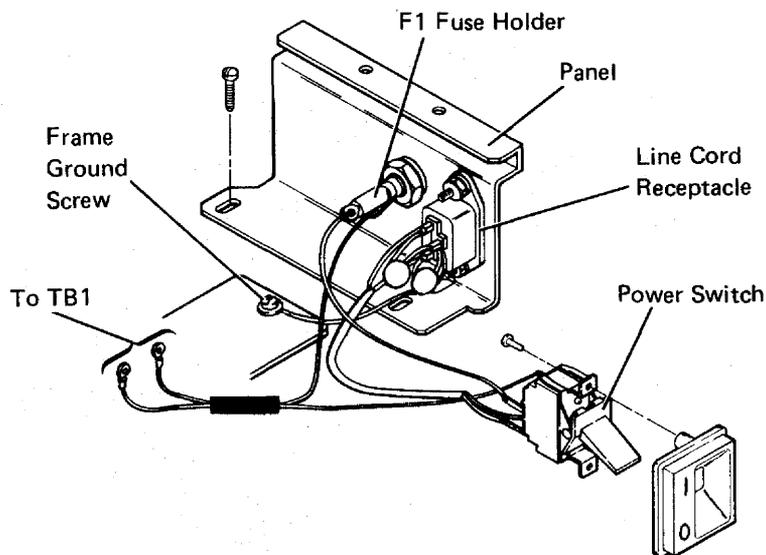
1. Power off and remove the line cord from the AC outlet.
2. Remove the line cord from the socket on the panel.
3. Remove the lower unit top cover (341).
4. Remove the cover on TB1 by loosening the two mounting screws and sliding the cover up and over them.
5. Remove the two wires from TB1.
6. Remove the frame ground screw holding the ground wire.

7. Remove the two mounting screws that hold the panel to the lower unit.

Note: Steps 8 and 9 must be performed together because the panel and the power switch are connected together.

8. Remove the power switch by carefully forcing the rear of the switch out of the retainer with a screwdriver. Lift the switch straight up and out of its frame.
9. Remove the switch cover by removing the two mounting screws holding the switch to the cover. Keep the screws and switch cover for attaching them to the new switch.

Replace the primary power assembly in the reverse order of removal. Ensure that the two wires to TB1 are connected correctly (333).

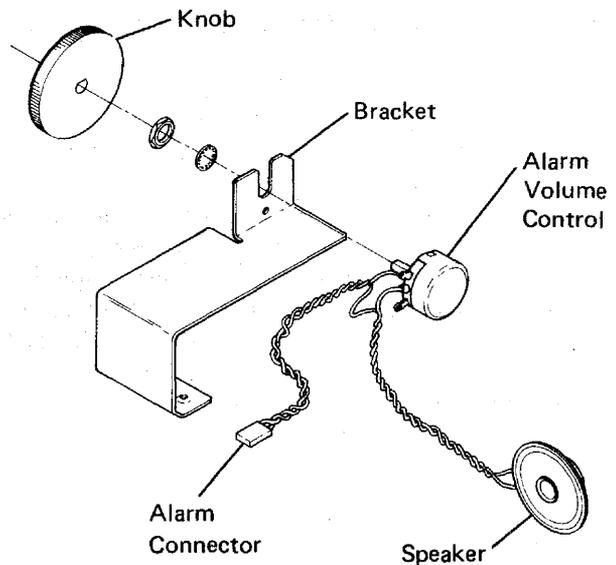
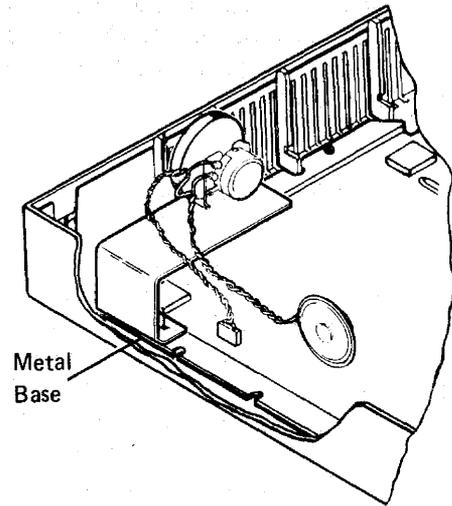


354 Audible Alarm Assembly

349-354

1. Power off the display station and remove the line cord from the AC outlet.
2. Remove the display station lower unit top cover (341).
3. Disconnect the alarm cable from the planar alarm interface.
4. Slide the alarm speaker up and out of the retainer on the side of the lower unit.
5. Remove the knob.
6. Remove the volume control assembly by loosening the mounting nut holding the volume control to the mounting bracket and sliding the volume control out of the slot.

Replace the audible alarm assembly in the reverse order of removal.



420 I/O Assembly Switches

The I/O Assembly switches are located at the rear of the lower unit. Functionally, the switches are divided into the three address switches, the CSR test switch, and the terminator switch.

421 Address Switches (1, 2, and 3)

The first three switches from the left of the switch module are address switches. Each display station has a discrete address identifiable by the controller. This address is set into the display station by means of the address switches. Each switch has a discrete binary value that allows an address range from 0 to 6. An address of 7 is incorrect. The switch setting summary table shows how these switches are coded.

422 CSR Test Switch (4)

The CSR test switch is used along with power-on diagnostics by the customer service representative for intermittent fault isolation. For further information, see reference 525.

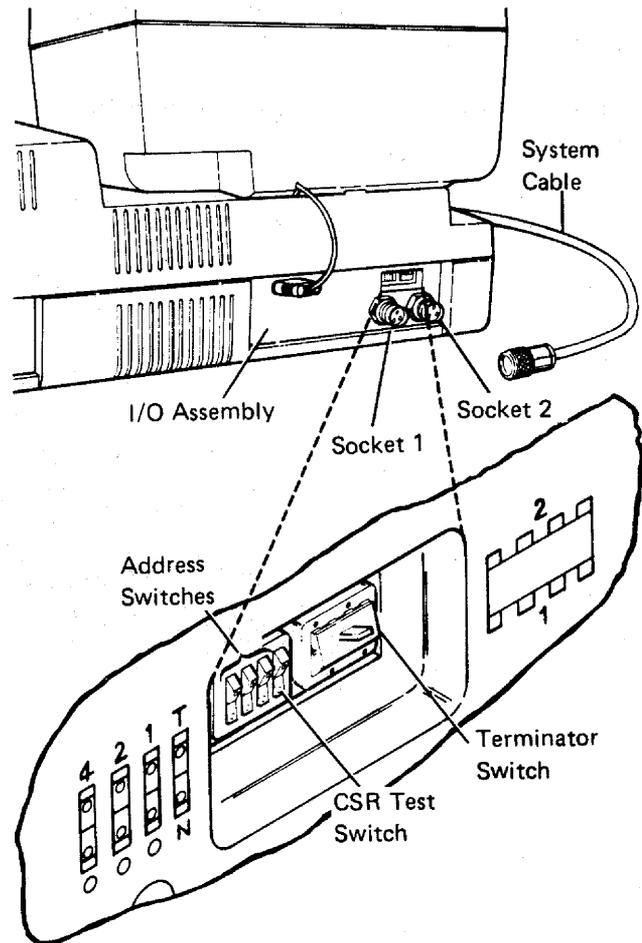
423 Terminator Switch

The terminator switch is on the I/O assembly at the rear of the lower unit. This switch, when at position 1, supplies electrical termination of the communications line when the display station is either the *last* station or the *only* station on the line. If the station is *not* the last or only station on the line, the terminator switch must be positioned at 2.

Switch Setting Summary

		Station Address							
Switch Number	Binary Value	0	1	2	3	4	5	6	7
1	4	Off	Off	Off	Off	On	On	On	¹
2	2	Off	Off	On	On	Off	Off	On	¹
3	1	Off	On	Off	On	Off	On	Off	¹
4 ²									
Terminator Switch		Inline Station			Last or Only Station				
		2			1				

¹Not valid
²Switch 4 is the CSR test switch



450 Station Protector

See the *IBM 5250 Information Display System Planning and Site Preparation Guide, GA21-9337*, for detailed information.

The station protector is owned and maintained by the customer. Only two station protectors should be connected to any one port.

DANGER

Never handle cables or connectors during an electrical storm.

Service Hint

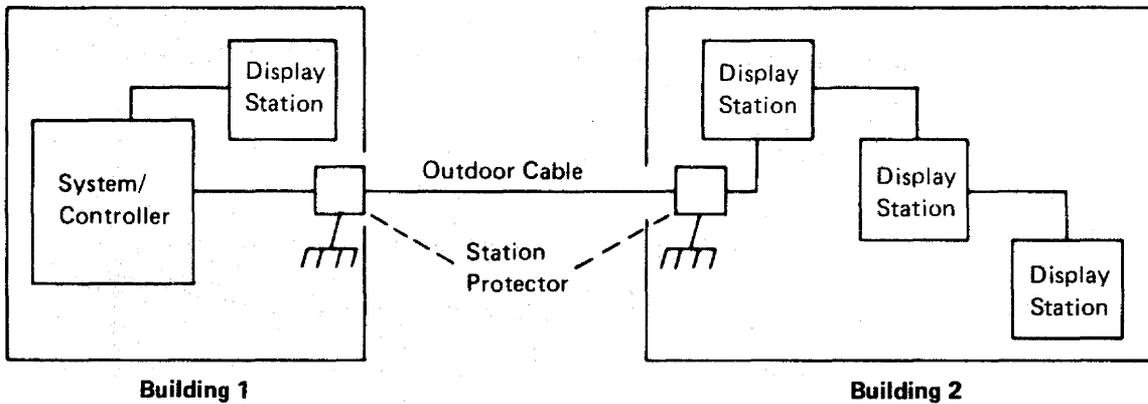
420-450

CAUTION

This service hint is for temporary use only. Do not leave the station unprotected.

If you have difficulty isolating the failure to the station protector, you can temporarily bypass the station protector by using the adapter (part 7362230 or a similar part).

Disconnecting the cables to the station protector will disconnect the stations from the system.

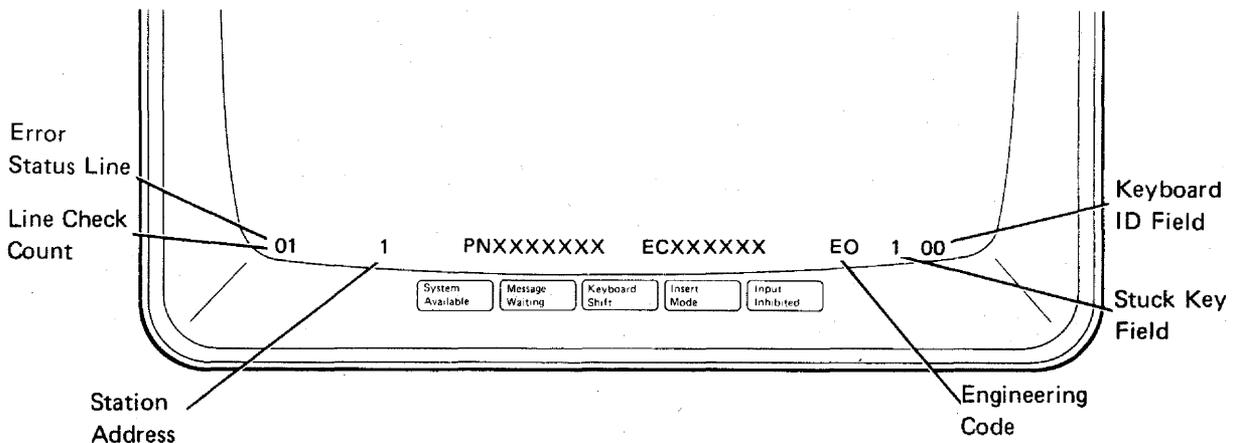


520 Power-On Diagnostics

The power-on diagnostics perform tests on all major parts of the display station. These tests are performed internal to the display station and, therefore, do not rely on a controller or host system.

The diagnostics take approximately 4 seconds to run. If there are no errors after all of the tests are run, the diagnostics place the display station in the normal mode of operation with a normal status line (see the start of the MAP section). If an error is found, the tests are stopped and an error status line will be displayed that contains coded information indicating the major part that failed. The image of the display screen identifies the type of information contained on the error status line. Status line information can also be obtained by holding down any key on the keyboard and then powering on the display station. As long as the key is held down, the status line will be displayed. When the key is released, the diagnostics place the display station in the ready mode for normal operation.

Loop-on diagnostics can be attained by using the CSR test switch (525).



Notes:

1. When the Status Line is displayed as shown above at power-on, it denotes an error condition. A normal display screen at power-on is shown at the start of the MAP section.
2. A description of the Status Line shown above is provided on the following pages.
3. Line check count will appear only if the error occurred when the System Available indicator is on.

Status Line Information

The information on the status line describes the configuration of the display station and, if applicable, an error condition. The following paragraphs describe in detail the fields of an error status line. A normal status line after power-on is shown at the start of the MAPs section.

Line Check Count: This 2-digit code (00 through 99) is the count of parity errors that occurred during the transmission of data from the system controller. This code appears only when an *online* error occurs.

Station Address: This 1-digit code (0 through 7) is the display station address as set by the address switches at the rear of the display station. Addresses 0 through 6 are valid.

ROS Part Number (PN): The part number (PNXXXXXXXX) shown is for the read only storage (ROS) module installed on the planar. This number, along with the engineering change number, is useful when discussing a failure with the IBM engineering representative.

ROS Engineering Change (EC) Number: This number (ECXXXXXX) identifies the change level of the ROS module installed on the planar. It is useful, along with the ROS part number, when discussing a failure with the IBM engineering representative.

Engineering Code: This 2-digit code (E0 through E7) identifies the major function on the planar that failed. This is for engineering use only and is useful when discussing a failure with the IBM engineering representative.

Stuck Key Field: This 1-digit code (blank or 1), when displaying a 1, means that a key on the keyboard is making contact. If no error is found, the field is blank.

Keyboard ID Field: This 2-digit code (00 through 31) normally identifies the keyboard language group installed. Codes 00 through 31 are valid and are described below:

ID Code	Language Group
00	United States and Canada
01	ASCII International
02	United Kingdom
03	Japan (English)
04	Spanish-Speaking
05	Spain
06	Brazil
07	Portugal
08	Austria and Germany
09	Finland and Sweden
10	Norway and Denmark
11	Italy
12	France
13	Canada (French)
14	Belgium
15	Japan Katakana
16-31	Not used

When an error is found, this field will display a KU for a keyboard error or an LU (logic unit) for a planar error.

If any other alphabetic data besides ID codes, KU, or LU appears in the keyboard ID field, it means a planar failure has occurred.

At the end of this diagnostic, you can perform more tests using the free key mode (530) or the online verification tests (600), or you can sign on using the sign-on procedure.

525 CSR Test Switch

The CSR test switch (switch 4 on the I/O assembly) is a diagnostic aid for the customer service representative to use in fault isolation. There are two conditions in which the CSR test switch may be used that provide different results.

If the CSR test switch is positioned on *prior* to display station power-on, the diagnostics will loop continuously until an error, other than a keyboard wrap test error, is detected. Upon detecting an error, an error status line is displayed at the bottom of the screen (520). An error can be caused by pressing and holding any keyboard key (key struck error).

If the CSR test switch is positioned on *after* the display station System Available indicator appears, the 2-second time-out is inhibited. With the 2-second time-out inhibited, the diagnostics will not loop and the information on the display screen will not be lost, even if the System Available indicator disappears (meaning that communication with the controller has been lost).

530 Free Key Mode

The free key mode allows characters to be entered on the keyboard and displayed on the CRT to test the operation of the keyboard and character display circuits. While in the free key mode, the display station communicates with the controller, sending a code to the controller and receiving back a character code for displaying the character on the CRT.

The display station is in the free key mode after the station has been powered on and, depending on the system to which it is attached, . . .

- Has the System Available indicator on, but no sign-on menu displayed, or
- Is varied off, or
- Is in the online test mode, with the Prime Option Menu displayed (see 610).

The following function keys may display an error code if pressed while in the free key mode.

Print	Enter/Record Advance
Help	Attention
Roll ↑ (Up)	Command function keys
Roll ↓ (Down)	1 through 24
Duplicate	Field-

Use the online tests (600) to check these key operations.

600 ONLINE TESTS

Online tests include work station exerciser routines that are contained in the system. When the Prime Option Menu is displayed, it permits the selection of the following: display verification, printer verification, configuration data, ERAP (error recording analysis procedure), and link test. For the purpose of verifying the display station operation, only the Display Verification Menu option is described here.

The Display Verification Menu (620) permits the selection of the following tests: the display attributes test, the displayable characters test, the specified input fields test, and the function keys and features test. The display attributes test and the displayable characters test check the planar. The specified input fields test checks the controller. The function keys and features test checks the system and the features installed on the display station.

Online tests can be run on the work station while other jobs are being run on the system. However, the work station must be in a signed off condition before online tests can be run on that work station. There may be various methods that can be used to terminate or sign off a job. These methods are not described in this manual because they are system operating procedures.

To start the online tests, the display station must be communicating with the host system (the System Available indicator is on). The following procedure is appropriate for most systems. (Steps 1 and 2 are not necessary if a sign-on menu is already displayed.)

1. Press and hold the Shift key and press the Sys Req key.
2. Press the Enter key.
3. Press the Cmd key and then the test request key. (On typewriter keyboards, this is the  key; on data entry keyboards, this is the rightmost blank  key in the top row.)

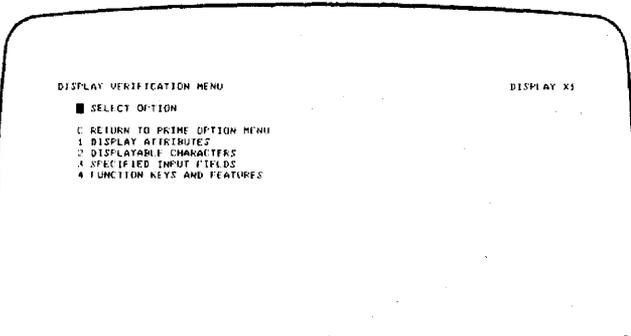
The online test Prime Option Menu should now be displayed. If it is not displayed, check the following list of possible reasons:

- The display station is not signed off. Check with the operator before signing off the display station.
- The display station is varied off. Call the system operator.
- An error message is waiting on the System Console about this display station. Call the system operator.



To select the Display Verification Menu:

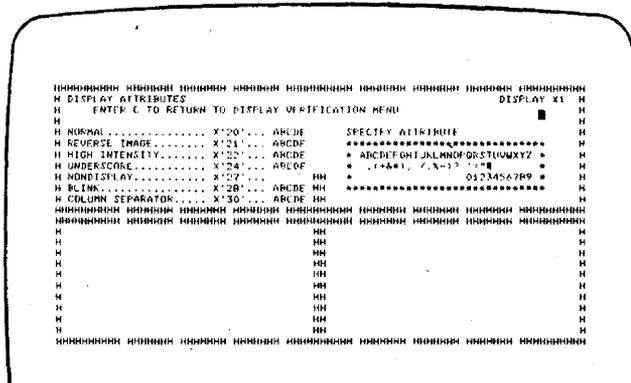
1. Press the 1 key.
2. Press the Enter key.



To select the display attributes option:

1. Press the 1 key.
2. Press the Enter key.

This display tests the attributes, the Brightness control, and the alignment of characters on the display screen.



How to use this display:

1. Slowly decrease the Brightness control; observe the pattern of Hs that alternates in intensity.
2. Adjust the Brightness control to obtain the best character image.
3. Press the Spacebar once to position the cursor to the right of SPECIFY ATTRIBUTES statement on the display screen.
4. Key in one of the hexadecimal numbers shown on the left side of the display screen; press the Enter key.

Observe the results that take place on the right side of the display screen. Compare these results with the attribute description on the left. If a wrong entry is made, the entry blinks at high intensity. Repeat Steps 3 and 4 for each of the remaining hexadecimal numbers.

In addition to the attributes present on the display screen, the following hexadecimal codes, marked by an asterisk (*), supply combinations of attribute options.

Hex Code	Description
20	Normal display
21	Reverse image
22	High intensity
23*	Reverse image, high intensity
24	Underscore
25*	Underscore, reverse image
26*	Underscore, high intensity
27	No display
28	Blink
29*	Blink, reverse image
2A*	Blink, high intensity
2B*	Blink, high intensity, reverse image
2C*	Blink, underscore
2D*	Blink, underscore, reverse image
2E*	Blink, underscore, high intensity
2F*	No display

Hexadecimal codes 30 through 3F are the same as 20 through 2F; however, codes 30 through 3F contain column separators between each character in the field.

620 (continued)

To return to the Display Verification Menu:

1. Press the C key.
2. Press the Enter key.



To select the Displayable Characters option:

1. Press the 2 key.
2. Press the Enter key.

This display shows the characters that are generated when the comparable keyboard keys are pressed. The United States and Canada character set is shown below.

United States/Canada

Second Hex-Char	First Hex Char-	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	0					SP	&	-	ø	Ø		¢	{	}	\	0	
	1					SP	é	/	É	á	ˆ	£	À	J	SP	1	
	2									b	k	§	¥	€	ƒ	2	
	3									c	l	t	R	O	L	T	3
	4						µ	è		d	m	u		D	M	U	4
	5									e	n	v		E	N	V	5
	6						µ	À		f	o	w		F	O	W	6
	7						µ	À		g	p	x		G	P	X	7

Second Hex-Char	First Hex Char-	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
B						§	Q		h	q	v		H	Q	Y	8	
9						ñ	Ñ		l	r	Z		I	R	Z	9	
A						¢	|	:			]	-		
B						\$	#			|							
C						€	<	*	%	@	*	-	u				
D						()	_	.			..					
E						-	+	.	>	=	Æ	'					
F						■	|	]	?	"	×		ö		ö		

Character sets for other languages supported by this display station are shown on the following pages.

ASCII International

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					SP	&	-	©	®		¢	{	}	\	0	
1					SP	é	/	é	á	í	ñ	£	À	J	SP	1
2									b	k	£	£	B	K	S	Z
3									c	l	t	£	O	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	u		E	N	U	5
6					ä	Ä			f	o	w		F	O	W	6
7					ä	Ä			g	p	x		G	P	X	7
8					ç	Ç			h	q	y		H	Q	Y	8
9					ñ	Ñ	`		l	r	z		I	R	Z	9
A					[	]	|	:					¬	-	
B					.	§	,	#					|			
C		×			<	*	%	@		æ			-		u	
D					()	_	'					..			
E		-			+	,	>	=		Æ			´			
F		■			!	^	?	"		ÿ			ö		ö	

Austria/Germany

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					SP	&	-		°	µ		ä	ü	ö	0	
1					SP	é	/	é	ä	í	ß	£	À	J	SP	1
2									b	k	£		B	K	S	Z
3					a		A		c	l	t		O	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	u	§	E	N	U	5
6									f	o	w	¶	F	O	W	6
7					ä		Ä		g	p	x		G	P	X	7
8					ç	i			h	q	y		H	Q	Y	8
9						ß	`		l	r	z		I	R	Z	9
A					A	U	o	:	«	»	i		-			
B					.	§	,	#	»	«	:					
C		×			<	*	%	@					ö	ü	ö	ü
D					(	)	_	'					ö	ü		
E					+	,	>	=		Æ		ß	´			
F		■			!	^	?	"		ÿ						

Belgium

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					sp	&	-		°	µ		é	è	ç	0	
1					sp	é	/	É	a	j	˘	£	A	J	sp	1
2									b	k	s		B	K	S	2
3					ä		Ä		c	l	t		C	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	u	§	E	N	U	5
6									f	o	w	¶	F	O	W	6
7					ä		Ä		g	p	x		G	P	X	7
8					ç	i			h	q	y		H	Q	Y	8
9					ß		˘		i	r	z		I	R	Z	9
A					[	]	ù	:	<	≡	i		-			
B					.	\$,	#	>	≡	¿					
C		×			<	*	%	à					ø	ü	ö	ü
D					(	)	_	˘			˘		ø	ö		
E					+	;	>	=	ƒ	ƒ	˘					
F		■			!	^	?	"		×						

Brazil

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					sp	&	-	ø	Ø		ç	ç	é	\	0	
1					sp	é	/	É	a	j	˘	£	A	J	sp	1
2									b	k	s	¥	B	K	S	2
3									c	l	t	ƒ	C	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	u		E	N	U	5
6					ä		Ä		f	o	w		F	O	W	6
7					ä		Ä		g	p	x		G	P	X	7
8					ç		ç		h	q	y		H	Q	Y	8
9					ã		Ã	ä	i	r	z		I	R	Z	9
A					É	\$	ç	:				˘	-			
B					.	\$	,	ø				|				
C		×			<	*	%	à		≈		-		ü		
D					()	_	˘			˘					
E		-			+	;	>	=	ƒ	ƒ	˘					
F		■			!	^	?	"		×			ø	ö		

Canada (French)

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					sp	&	-		°	µ		é	è	¸	0	
1					sp	é	/	É	a	J	ü	£	À	J	sp	1
2									b	k	s		B	K	S	2
3					ä		À		c	l	t		C	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	v	§	E	N	V	5
6									f	o	w	¶	F	O	W	6
7					ä		À		g	p	x		G	P	X	7
8					ç	i			h	q	y		H	Q	Y	8
9						ß		`	i	r	z		I	R	Z	9
A					ä	'	ù	:	«	»	ı		-			
B					.	ç	,	#	»	ı	ı					
C		×			<	*	%	@					ø	ü	ö	ü
D					(	)	-	'					ø	ü		
E					+	,	>	=	ƒ		ƒ	'				
F		■			ı	^	?	"		×						

Finland/Sweden

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					sp	&	-		°	µ		ä	å	É	0	
1					sp	é	/	É	a	J	ü	£	À	J	sp	1
2									b	k	s		B	K	S	2
3					ä		À		c	l	t		C	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	v	§	E	N	V	5
6									f	o	w	¶	F	O	W	6
7					ä		À		g	p	x		G	P	X	7
8					ç	i			h	q	y		H	Q	Y	8
9						ß		é	i	r	z		I	R	Z	9
A					§	×	ø	:	«	»	ı		-			
B					.	ç	,	#	»	ı	ı					
C		×			<	*	%	@					ø	ü	ö	ü
D					(	)	-	'					ø	ü		
E					+	,	>	=	ƒ		ƒ	'				
F		■			ı	^	?	"		×						

France

First Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					sp	&	-		°	µ		é	è	ç	0	
1					sp	ë	/	é	a	j		£	À	J	sp	1
2									b	k	s		B	K	S	2
3					ä	Ä			c	l	t		C	L	T	3
4					à	â			d	m	u		D	M	U	4
5									e	n	u	§	E	N	U	5
6									f	o	w	¶	F	O	W	6
7					ä	Ä			g	p	x		G	P	X	7
8					ç	i			h	q	y		H	Q	Y	8
9					ß		`		i	r	z		I	R	Z	9
A					°	§	ù	:	<	≡	ı		-			
B					.	§	,	£	>	ö	ı					
C		×			<	*	%	à					ö	u	o	ü
D					(	)	_	'		ı		..	ö	ü		
E					+	,	>	=	ƒ		ƒ	'				
F		■			ı	^	?	"		ö						

Second Hexadecimal Character

Italy

First Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					sp	&	-		°	µ		à	è	ç	0	
1					sp	ë	/	é	a	j	i	£	À	J	sp	1
2									b	k	s		B	K	S	2
3					ä	Ä			c	l	t		C	L	T	3
4					à	â			d	m	u		D	M	U	4
5									e	n	u	§	E	N	U	5
6									f	o	w	¶	F	O	W	6
7					ä	Ä			g	p	x		G	P	X	7
8					ç	i			h	q	y		H	Q	Y	8
9					ß		ù		i	r	z		I	R	Z	9
A					°	é	ò	:	<	≡	ı		-			
B					.	§	,	£	>	ö	ı					
C		×			<	*	%	§					ö	u	o	ü
D					(	)	_	'		ı		..	ö	ü		
E					+	,	>	=	ƒ		ƒ	'				
F		■			ı	^	?	"		×						

Second Hexadecimal Character

Japan (English)

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					SP	&	-	ø	Ø		φ	{	}	\$	0	
1					SP	é	/	é	a	j	-	£	A	J	SP	1
2									b	k	s	¥	B	K	S	2
3									c	l	t	R	C	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	u		E	N	U	5
6					ä	Ä			f	o	w		F	O	W	6
7					ä	Ä			g	p	x		G	P	X	7
8					ç	Ç			h	q	y		H	Q	Y	8
9					ñ	Ñ	ˆ		i	r	z		I	R	Z	9
A					£	!	|	:				¬	-			
B					.	¥	,	#				|				
C		×			<	*	%	@		≈		-		u		
D					()	_	·				..				
E		-			+	,	>	=		€		'				
F		■			|	¬	?	"		¤			§		ö	

Japan (Katakana)

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					SP	&	-		∨						\$	0
1					o	i	/		ア	イ	-	£	A	J	SP	1
2					カ	キ			イ	チ	ハ	¥	B	K	S	2
3					ク	ケ			ウ	ツ	ホ		C	L	T	3
4					、	ユ			イ	テ	マ		D	M	U	4
5					・	ヨ			オ	ト	ミ		E	N	U	5
6					ヲ	ツ			カ	ナ	△		F	O	W	6
7					ア				キ	ニ	×		G	P	X	7
8					イ	-			フ	ヌ	モ		H	Q	Y	8
9					ウ				ケ	ネ	ヤ		I	R	Z	9
A					£	!		:	コ	ノ	1	レ	-			
B					.	¥	,	#				□				
C		×			<	*	%	@	サ		ヨ	フ				
D					(	)	_	'	シ	ハ	ラ	ン				
E					+	,	>	=	ス	ヒ	リ	"				
F					|	¬	?	"	セ	フ	ル	°				

Norway/Denmark

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					sp	&	-	ø	Ø			☉	æ	å	\	0
1					sp	é	/	é	a	J	ü	£	Å	J	sp	1
2									b	k	s	¥	B	K	S	2
3									c	l	t	R	C	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	v		E	N	V	5
6					ä	Ä			f	o	w		F	O	W	6
7					å	Å			g	p	x		G	P	X	7
8					ç	Ç			h	q	y		H	Q	Y	8
9					ñ	Ñ	`		i	r	z		I	R	Z	9
A					#	×	ø	:				¬	-			
B					.	Ä	,	Æ				|				
C		×			<	*	%	Ø		*		-		u		
D					()	_	'				..		.		
E		-			+	;	>	=	Æ		'					
F		■			!	^	?	"	×			ø		ö		

Portugal

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					sp	&	-	ø	Ø			☉	ã	'	Ç	0
1					sp	é	/	é	a	J	ç	£	Å	J	sp	1
2									b	k	s	¥	B	K	S	2
3									c	l	t	R	C	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	v		E	N	V	5
6					ä	Ä			f	o	w		F	O	W	6
7					å	Å			g	p	x		G	P	X	7
8					ç	Ç			h	q	y		H	Q	Y	8
9					ñ	Ñ	`		i	r	z		I	R	Z	9
A					[	]	ø	:				¬	-			
B					.	ç	,	Ä				|				
C		×			ç	*	%	ö		*		-		u		
D					()	_	'				..		.		
E		-			+	;	>	=	Æ		'					
F		■			!	^	?	"	×			ø		ö		

Spain

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					SP &	-	ø	Ø			φ	{	}	\	0	
1					SP é	/	É	á	¡	¨	£	À	ª	SP	1	
2								b	k	š	¥	ß	Ɔ	Ɔ	Ɔ	Ɔ
3								c	l	t	Ɔ	Ɔ	Ɔ	Ɔ	Ɔ	Ɔ
4					à	è		d	m	u		D	M	U	4	
5								e	n	v		E	N	V	5	
6					ä	Ä		f	o	w		F	O	W	6	
7					ä	Ä		g	p	x		G	P	X	7	
8					ç	Ç		h	q	y		H	Q	Y	8	
9					ñ	Ñ	`	i	r	z		I	R	Z	9	
A					[	]	ñ	:				Ɔ	-			
B					.	ß	,	Ñ				|				
C		×			<	*	%	©		æ		-		ü		
D					()	_	'				..				
E		-			+	,	>	=		€		'				
F		■			|	Ɔ	?	"		×			ø		ö	

Spanish Speaking

First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					SP &	-	ø	Ø			φ	{	}	\	0	
1					SP é	/	É	á	¡	¨	£	À	ª	SP	1	
2								b	k	š	¥	ß	Ɔ	Ɔ	Ɔ	Ɔ
3								c	l	t	Ɔ	Ɔ	Ɔ	Ɔ	Ɔ	Ɔ
4					à	è		d	m	u		D	M	U	4	
5								e	n	v		E	N	V	5	
6					ä	Ä		f	o	w		F	O	W	6	
7					ä	Ä		g	p	x		G	P	X	7	
8					ç	Ç		h	q	y		H	Q	Y	8	
9					ñ	Ñ	`	i	r	z		I	R	Z	9	
A					[	]	ñ	:				Ɔ	-			
B					.	ß	,	Ñ				|				
C		×			<	*	%	©		æ		-		ü		
D					()	_	'				..				
E		-			+	,	>	=		€		'				
F		■			|	Ɔ	?	"		×			ø		ö	

United Kingdom

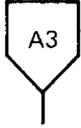
First Hexadecimal Character

Second Hexadecimal Character

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					SP	&	-	ø	Ø			¢	{	}	\	0
1					SP	é	/	É	a	j	-	£	A	J	SP	1
2									b	k	s	¥	B	K	S	2
3									c	l	t	R	C	L	T	3
4					à	è			d	m	u		D	M	U	4
5									e	n	u		E	N	U	5
6					ä	Ä			f	o	w		F	O	W	6
7					ä	Ä			g	p	x		G	P	X	7
8					ç	Ç			h	q	y		H	Q	Y	8
9					ñ	Ñ	`		i	r	z		I	R	Z	9
A					\$	|	|	:					¬	-
B					.	£	,	#					|			
C		×			<	*	%	ø		æ			-	u		
D					()	_	·					..			
E		-			+	,	>	=		€			'			
F		■			|	¬	?	"		×			ø		ö	

To return to the Display Verification Menu:

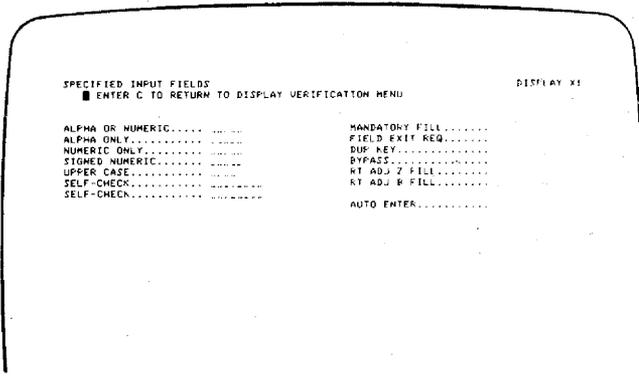
1. Press the C key.
2. Press the Enter key.



To select the Specified Input Fields option:

1. Press the 3 key.
2. Press the Enter key.

This display tests the controller operations that are used by the display station. Fields of information are entered, read by the controller, and written back to the display screen next to the input field.



To use this display:

1. Press the Spacebar once to position the cursor at the start of the first input field. The cursor moves from the field on the left to the field on the right when the input field information is entered.
2. Enter information in the fields described on the display screen. If an error is made, press the Error Reset key and correct the error.

The field descriptions are:

Alpha or Numeric: Key in five alphabetic or numeric characters.

Mandatory Fill: This field must be filled with five alphabetic or numeric characters.

Alpha Only: Key in five alphabetic characters.

Field Exit Req: Key in five alphabetic or numeric characters and then press the Field Exit key.

Numeric Only: Key in five numeric characters.

Dup Key: Press the Dup key once. The key code of the Dup key is shown until the screen is written by the controller. This field duplicates the Numeric Only field.

Signed Numeric: Key in four numeric characters. The cursor remains under the last character keyed. Press the Field Exit key (positive) or the Field- key (negative).

Bypass: This field is automatically bypassed and no entry is needed.

Upper Case: Key in five alphabetic characters.

Rt Adj Z Fill: Key in one alphabetic or numeric character. Press the Field Exit key. The character keyed is moved to the right (Rt) of the field and the left four positions will be filled with zeros.

Self Check (Modulus 10): Key in A F 1 2 7 6 5 6.

Rt Adj B Fill: Key in one alphabetic or numeric character. Press the Field Exit key. The character keyed will be moved to the right (Rt) of the field and the left four positions are filled with blanks.

Self Check (Modulus 11): Key in A F 1 2 7 6 5 5.

Auto Enter: Key in five alphabetic or numeric characters.

As soon as the last character is keyed, the controller reads all the input fields, sends the information to the system, and writes the information back to the display screen next to the input fields.

To return to the Display Verification Menu:

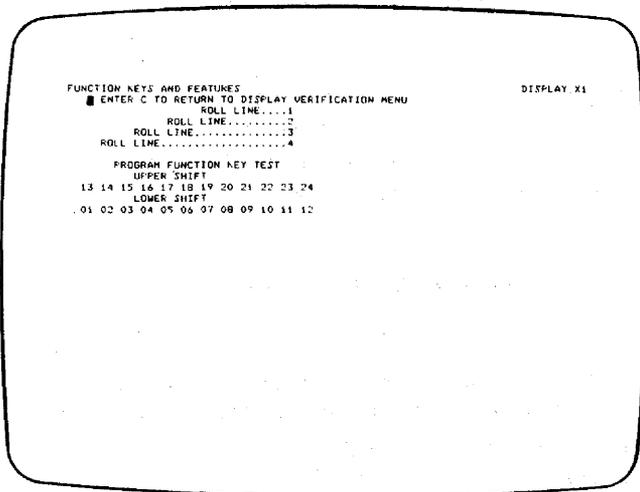
1. Press the C key.
2. Press the Enter key.



To select the Function Keys and Features option:

1. Press the 4 key.
2. Press the Enter key.

This display tests the roll keys and command function keys.



To use this display:

1. Press and hold the Upper Shift key while you press either the Roll↑ or Roll↓ key.
2. Observe roll lines 1, 2, 3, and 4. You can return lines that have rolled off the display screen by pressing the Enter key.
3. Observe the intensity of the numbers on the display screen while you perform Step 4.
4. Press the Cmd key; then press command function key 1. Repeat until command function keys 1 through 12 have been pressed. Press the Cmd key again; then press and hold the Upper Shift key while pressing command function key 13. Release both keys. Repeat until command function keys 13 through 24 have been pressed.
5. Repeat Step 4 to obtain a normal display of the numbers.

To return to the Display Verification Menu:

1. Press the C key.
2. Press the Enter key.

Return to the Prime Option Menu by:

1. Press the C key.
2. Press the Enter key.

B

To select the Configuration Data option:

1. Press the 3 key.
2. Press the Enter key.

```

CONFIGURATION DATA REMOTE STATIONS          DISPLAY X1
ENTER C TO RETURN TO PRIME MENU
LINE STATION ADDR  LSID  LOGICAL ID  DESCRIPTION
1      01          00      R1      DISPLAY  960
1      01          02      R2      DISPLAY 1920

*** PRESS ENTER TO SCROLL *** SYSTEM CONFIGURATION SEE CNFIGSSP ***

```

The following are descriptions of the configuration data for remote stations:

- Line is the communication line number that this display station is on.
- Station Addr is the address for the 5251 Model 2 or 12 controller. The station address permits the host system to address a specific Model 2 or 12 controller.
- LSID (logical session identifier) permits the host system to identify to the 5251 Model 2 or 12 controller which specific work station it wants to communicate with. The work station address is the last 6 bits of the LSID.
- Logical ID is the name the host system uses to address a specific work station.
- Description is the type of device being addressed.

Press the Enter key.

```

CONFIGURATION DATA - LOCAL STATIONS          DISPLAY X1
ENTER C TO RETURN TO PRIME MENU
DEVICE ADDR  UNIT ADDR  LOGICAL ID  DESCRIPTION
CO          20          P2          PRINTER
CO          31          P3          PRINTER
CO          00          W1          DISPLAY 1920
CO          10          W2          DISPLAY 1920
CO          11          W3          DISPLAY 1920
CO          12          W4          DISPLAY 1920
CO          30          X1          DISPLAY 1920
CO          32          X2          DISPLAY 1920

*** PRESS ENTER TO SCROLL *** SYSTEM CONFIGURATION SEE CNFIGSSP ***

```

The following are descriptions of the configuration data for local stations:

- Device Addr is the address of the controller.
- Unit Addr is the address of the work station(s) assigned to the controller. The first digit is the physical port/cable number, and the second digit is the station address.
- Logical ID is the name the system uses to address the station(s) assigned to the controller.
- Description is the type of device being addressed.

To return to the Prime Option Menu:

1. Press the C key.
2. Press the Enter key.

C

To select the Error Recording Analysis Procedure (ERAP) Menu:

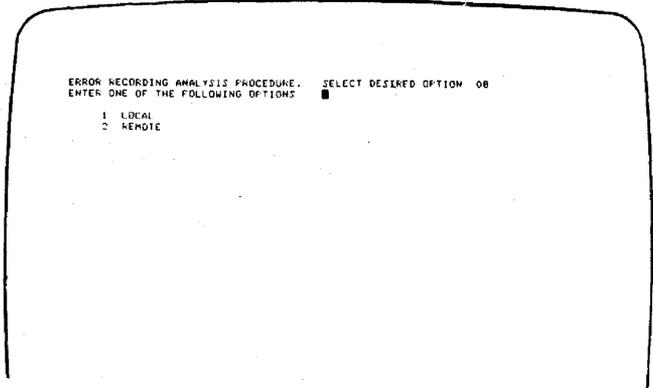
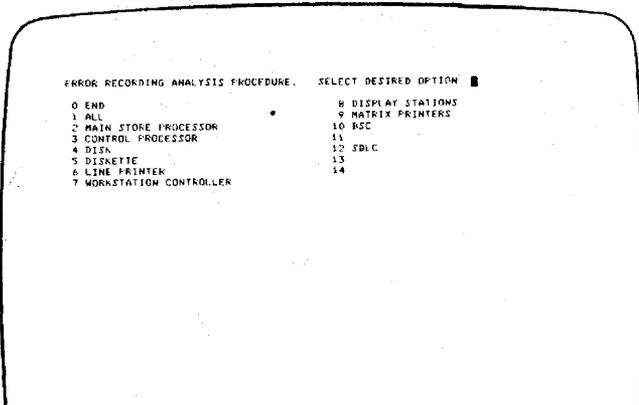
1. Press the 4 key.
2. Press the Enter key.

Note: For a detailed ERAP description, see the system documents. For display station problem identification, see 640 *Error History Table* in this section.

This manual describes only the Display Stations option.

To select the Display Stations option:

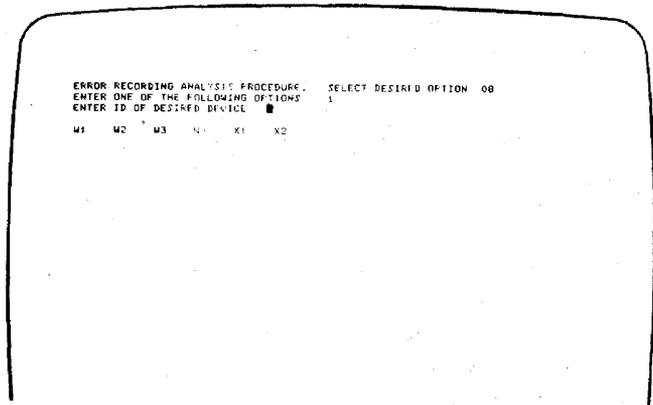
1. Press the 0 and 8 keys.
2. Press the Enter key.



Local Option

To select option 1 (local workstations):

1. Press the 1 key.
2. Press the Enter key.

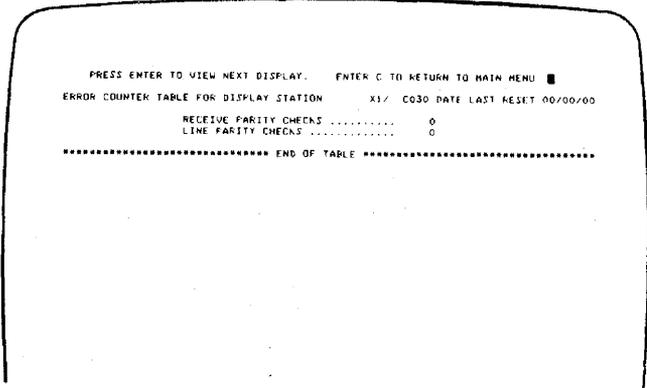
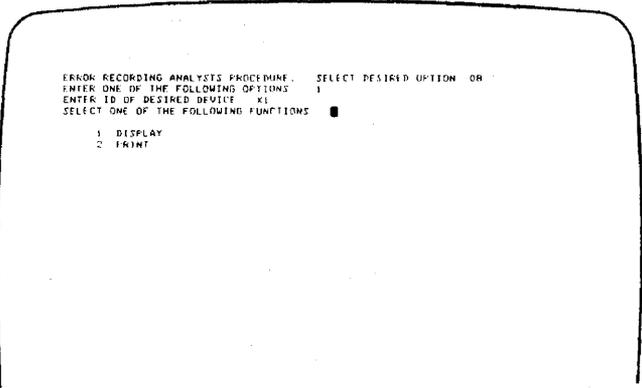


To select the desired device:

1. Key in the device ID.
2. Press the Enter key.

The following are descriptions of the ERAP options:

- If you select the END option, the ERAP function is terminated. If you select the END option and press the Field Exit key, the display returns to the sign-on menu.
- If you select the ALL option, the ERAP tables are displayed one at a time for all devices on the line. When the error history table for the first device is displayed and the Enter key is pressed, the I/O counter table for the second device is displayed. This sequence is repeated until the error history table for the last device on the line is displayed.
- If you select the Workstation Controller option, the Display Stations option, or the Matrix Printers option, you must also select a specific device. The I/O counter table, the error counter table, and the error history table are displayed for the selected device only.



If you want to look at the error tables on the display screen:

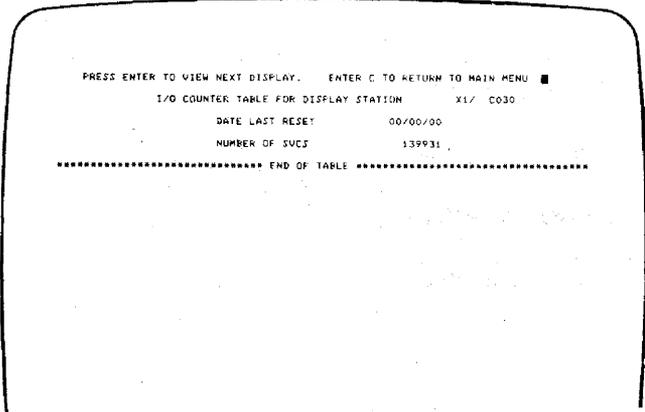
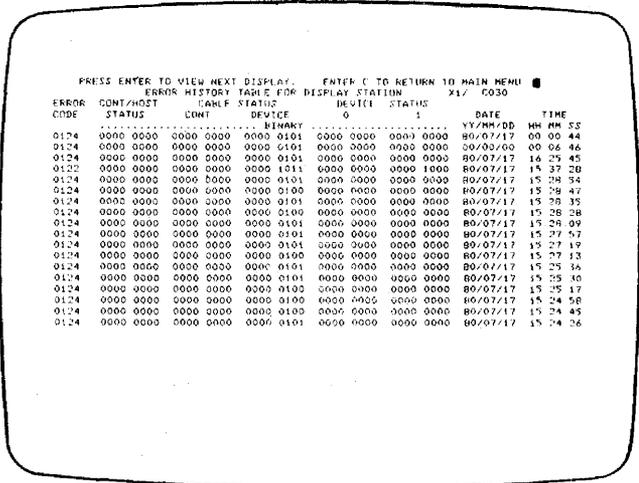
1. Press the 1 key.
2. Press the Enter key.

Note: For a description of the error history table, see 640.

If you want a printout of the error tables:

1. Press the 2 key.
2. Press the Enter key.

The following three tables will be displayed again or printed again (in order) as many times as desired; you must press the Enter key after each table has been displayed or printed.



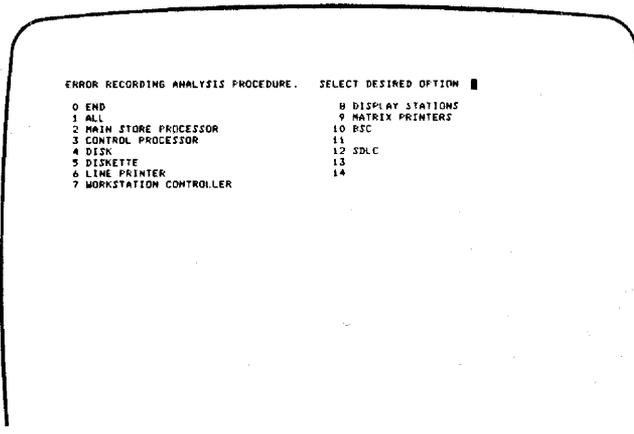
Press the Enter key.

620 (continued)

To return to the main ERAP Menu:

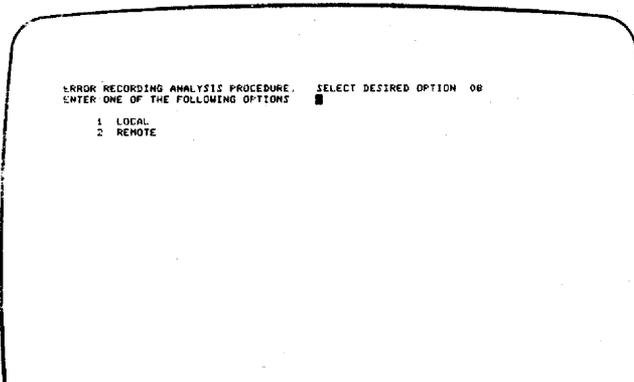
1. Press the C key.
2. Press the Enter key.

Remote Option



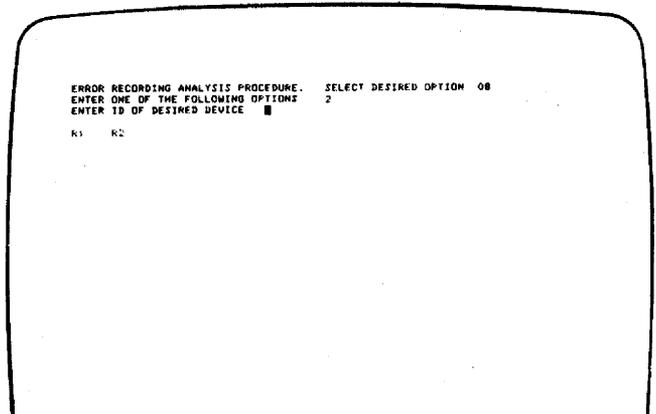
To select the Display Stations option:

1. Press the 0 and 8 keys.
2. Press the Enter key.



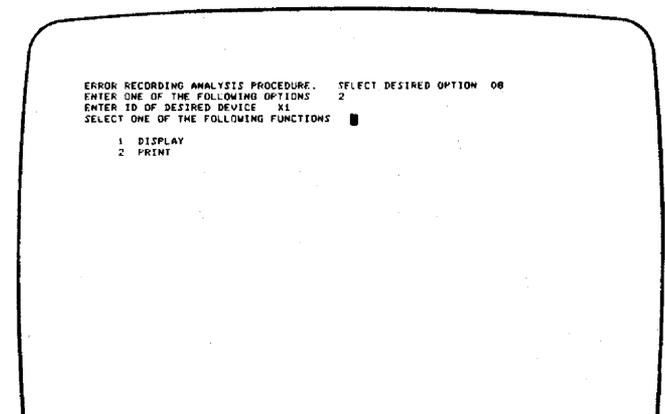
To select option 2 (remote workstations):

1. Press the 2 key.
2. Press the Enter key.



To select the desired device:

1. Key in the device ID.
2. Press the Enter key.

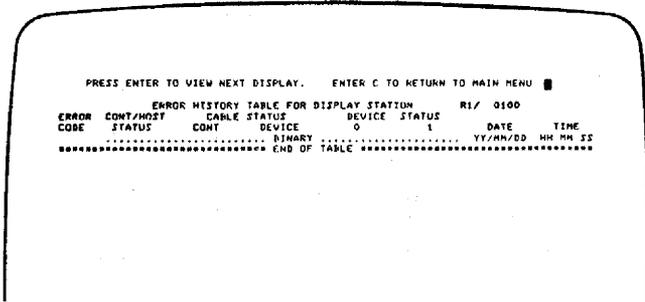


If you want to look at the error tables on the display screen; do the following:

1. Press the 1 key.
2. Press the Enter key.

If you want a printout of the error tables:

1. Press the 2 key.
2. Press the Enter key.



To return to the main ERAP Menu:

1. Press the C key.
2. Press the Enter key.

To return to the Prime Option Menu:

1. Press the 0 (zero) key.
2. Press the Field Exit key.

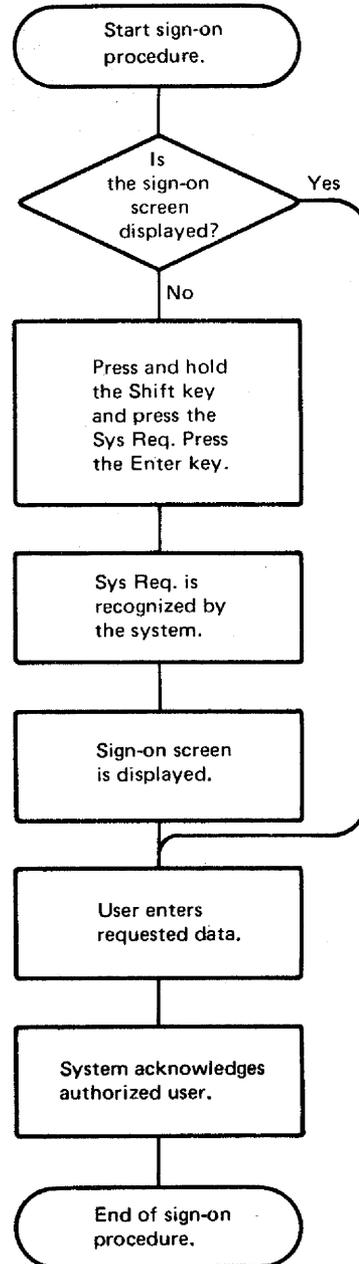
To terminate the on-line tests:

1. Press the C key.
2. Press the Enter key.

The sign-on screen should now be displayed. If not, ask the System Operator to vary on the display station.

This is the procedure that the operator and customer engineer use to sign on and use the display station. It is also a check to verify that all parts of the display station, customer system cable, controller, and system are operating correctly.

The system initial program load (IPL) sign-on procedure must be completed before the display station sign-on procedure can be used.



640 Error History Table

This figure is an example of an error history table that describes the fields that can be displayed on the display station or printed on a printer.

ERROR CODE	CONT/HOST STATUS		CABLE STATUS		DEVICE STATUS		DATE	TIME
	0123	4567	0123	4567	0123	4567		
0123	0123	4567	0123	4567	0123	4567	YY/MM/DD	HH:MM:SS
0104	0000	0000	0000	0000	0100	0001	81/08/24	04:46:19
0120	0000	0000	0000	0000	0000	1001	81/07/24	02:32:06

<p>Device 01 = Display</p> <p>Error type</p> <p>Controller defined. If any error bit is present, see the Controller/Host MAP</p> <p>(reserved)</p> <p>No response</p> <p>Transmit activity check</p> <p>(reserved)</p> <p>Receive parity check</p> <p>Receive length check</p> <p>(reserved)</p> <p>Even/odd timeout</p> <p>Busy</p> <p>Line parity</p> <p>(reserved)</p> <p>Outstanding status</p>	<p>456</p> <p>000 No exception status</p> <p>010 Invalid activate</p> <p>011 (reserved)</p> <p>100 Invalid command</p> <p>101 Input Q/storage overrun</p> <p>110 Invalid register value</p> <p>111 Power-on transition</p>	<p>Modify Data Tag (MDT)</p> <p>Defines status byte 0 0010 = Keyboard scan code</p> <p>Scan code or command</p> <p>Even/odd response level 0 = Even 1 = Odd</p>
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Figure 3. Base Plate Assembly	4-10
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Numerical Index	4-15
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FRU List

I/O Attach Assembly	5642953
Keyboard (U.S.A.)	2688831
Display Assembly	5642867
Status Indicator Template (U.S.A.)	5642973
Retainer Ring	5642885
Planar	7362986
Fuse 2A SB	615683
Fuse 5A	855251
Fuse 1A	855253
Transformer, Domestic	2777440
Power Supply Board	2777444
Capacitor, AC	5252850
Primary Power Assembly, Domestic	5642972
Line Cord 2.5 M (U.S.A.) Non-Locking	6841461
Keylock Assembly (RPQ)	5642857
Adjustable Audible Alarm Knob	7363022
Adjustable Audible Alarm Brk	7363015
Adjustable Audible Alarm Cable Asm	7363020
Document Storage Tray	7362999

HOW TO USE THIS PARTS CATALOG

PART 1

To find parts quickly, a general understanding of the structure of this catalog is necessary. The catalog is divided into three major sections:

- The Visual Index, containing overall views of the machine, with call-outs pointing to detailed figures.
- The Catalog Section, containing a pictorial breakdown of assemblies and subassemblies.
- The Numerical Index, which is a numerical list of all parts used in the machine, with cross-references to the figure on which the part is found.

VISUAL INDEX

The Visual Index, located before the Catalog Section, contains a reduced illustration of every figure in the Catalog Section. The reduced illustrations are tied together with flow arrows to form a natural progression from large assemblies to small assemblies and possibly subassemblies. In effect, a visual table of contents is formed by the Visual Index illustrations.

CATALOG SECTION

The Catalog Section contains the full-sized illustrations previously noted in the Visual Index. Index numbers on figures refer to corresponding entries in the Group Assembly Parts List accompanying each figure. Refer to part II for explanation of terms used in the Group Assembly Parts List.

ATTACHING PARTS LIST

The Attaching Parts List contains common screws, nuts, washers, etc. that are used in the machine. Index numbers for attaching parts are on the illustration, and the description is in the Attaching Parts List.

NUMERICAL INDEX

The Numerical Index is located after the Catalog Section and contains a complete list, in numerical order, of all part numbers used on the machine. Listed with the part number is the index and figure number on which the part is illustrated. The numerical index makes it possible to locate a part when only the part number is known.

STACKED INDEX NUMBERS

Stacked Index numbers are used when showing a part and its attaching hardware. The sequence of a typical stack is shown at the right. The circled index number indicates the assembly is broken down within the figure.

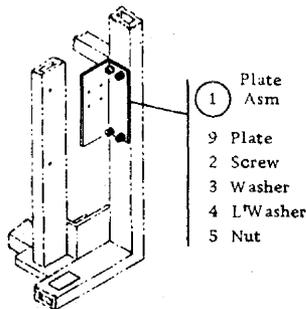


ILLUSTRATION NOTES

Cross-reference notes are directly on the illustration. The illustration's next higher assembly reference, normally located in the upper left corner of the page will read: "For Parts Not Shown See Figure X". If an assembly is referenced to a lower level figure, the note located next to the index number will read: "5 See Figure X."

DOUBLE LINED DETAIL BOX

The double lined box differentiates between parts shown on the basic model and parts related to a level and/or feature difference. An explanation of the level or feature difference is given in the double lined box.

FINDING A PART

The Visual Index is the starting point for locating a part. The illustrations in the Visual Index are reduced versions of all illustrations in the Catalog Section; therefore, the illustrations can be used to find the assembly containing the desired part. Use references to the detailed figure in the Catalog Section, or to another Visual Index illustration, to determine location of part number.

Once the detailed figure in the catalog section is determined, finding the part on the figure and referring to the listing for the part number and description is all that is required in most cases. If the first catalog section figure referenced shows the assembly containing the required part, the index number for the assembly will reference a lower-level figure where the assembly is broken down to its component parts. If the figure referenced by the Visual Index contains neither the part nor an assembly containing the part, it is then necessary to go to the next higher assembly figure. This figure should then contain the part or an assembly containing the part; if not, an even higher level figure must be used. Refer back to the Visual Index for some other figure that could show the desired part.

Note: Many detailed parts are unavailable, because they are part of an inseparable assembly (two or more parts welded or bonded together), or because they are part of an assembly purchased as a unit. If parts are found on a welded or bonded assembly, the following note follows the description of the assembly: "Assembly components are not replaceable." If the part is found on a purchased assembly, and the detail parts of this assembly do not have IBM part numbers, the note following the assembly description will read: "Assembly components are not available." In either case, you need to obtain the part number of the assembly, rather than the detailed part.

EXAMPLE FOR ORDERING PARTS

FIGURE INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION FOR FIGURE 25			
			1	2	3	4
25	2592881		FAN ASM RD HZ FOR NEXT HIGHER ASM SEE LIST 23 AND FOR ILLUSTRATION SEE FIG. 25			
- 1	2172166	1	-	-	-	GUARD
- 2	2591483	AR	-	-	-	SEAL
- 3	2592892	1	-	-	-	BRACKET
- 4	2591431	1	-	-	-	FAN ASM
- 5	324832	1	-	-	-	RING TERMINAL
- 6	1166117	1	-	-	-	CONNECTOR
- 7	1166114	3	-	-	-	TERMINAL
- 8	2591402	1	-	-	-	FAN
FOR ATTACHING PARTS, INDEX NOS. 151 AND ABOVE, SEE LIST 76						

If the entire fan is required, part number 2592881 should be ordered (all one dot items will be received). If only the subassembly is required, part number 2591431 should be ordered (all two dot items will be received). Each part may be ordered individually.

Note: If you order a part that requires a label, make sure you order the label in the correct language. For example: A part of a Quebec machine should have a French Canadian language label rather than a French language label.

HOW TO USE THIS PARTS CATALOG

Part II

- A** *AR*
As Required (AR) in the units per assembly column denotes that the quantity is used as required.
- B** *ATT PT*
Attaching Parts: These parts are used to attach a subassembly to an assembly. The attaching parts are listed in the last list just before the numeric index. Special attaching parts are listed with the figure.
- C** *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 of Subassemblies
. Detail Parts for Subassemblies, etc.

```

- D** *NR*  
The 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.
- E** *NP*  
The entry NP in the part number column denotes the assembly is non-procurable and the detail parts should be ordered separately.
- F** *NO NO.*  
When this indication appears in the part number column, it denotes a group of parts for which no assembly part number has been assigned, and the detail parts should be ordered separately.

### EXAMPLE OF PARTS LIST

| FIGURE-INDEX NUMBER | PART NUMBER | UNITS PER ASM. | DESCRIPTION FOR FIGURE 5                                                                            |   |   |   |
|---------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------|---|---|---|
|                     |             |                | 1                                                                                                   | 2 | 3 | 4 |
| 5                   | NO NO.      |                | BEZEL AND OPERATOR PANEL ASM<br>FOR NEXT HIGHER ASM SEE FIGURE 1-4<br>AND FOR ILLUSTRATION FIGURE 5 |   |   |   |
| - 1                 | 7362008     | 1              | • BRACKET,LED AND SWITCH                                                                            |   |   |   |
| - 2                 | 2767289 NR  | 1              | • POTENTIOMETER                                                                                     |   |   |   |
| - 3                 | 7362248     | 1              | • POTENTIOMETER                                                                                     |   |   |   |
| - 4                 | 7362263     | 2              | • KNOB ASM                                                                                          |   |   |   |
| - 5                 | 2397045     | 5              | • LED LIGHT                                                                                         |   |   |   |
| - 6                 | 7362200     | 1              | • BLOCK,LED                                                                                         |   |   |   |
| - 7                 | 2632773     | AR             | • CLIP                                                                                              |   |   |   |
| - 8                 | 1608427     | 2              | • SCREW,THD FORM-HEX WSHR HD 6-19 X 1/2 LG                                                          |   |   |   |
| - 9                 | 7362158     | 1              | • CABLE ASM,CE DIAG IND AND SWITCH                                                                  |   |   |   |
| - 10                | 7361265     | 1              | • CABLE ASM,AC DISTRIBUTION                                                                         |   |   |   |
| - 11                | 1608571     | 1              | • SWITCH                                                                                            |   |   |   |
| - 12                | 7362254 NP  | 1              | • BEZEL,ENGLISH                                                                                     |   |   |   |
| - 12                | 7362255 NP  | 1              | • BEZEL,FRENCH                                                                                      |   |   |   |
| - 12                | 7362256 NP  | 1              | • BEZEL,JAPANESE                                                                                    |   |   |   |
| - 12                | 7362257 NP  | 1              | • BEZEL,SPANISH                                                                                     |   |   |   |
| - 12                | 7362258 NP  | 1              | • BEZEL,GERMAN                                                                                      |   |   |   |
| - 12                | 7362259 NP  | 1              | • BEZEL,ITALIAN                                                                                     |   |   |   |

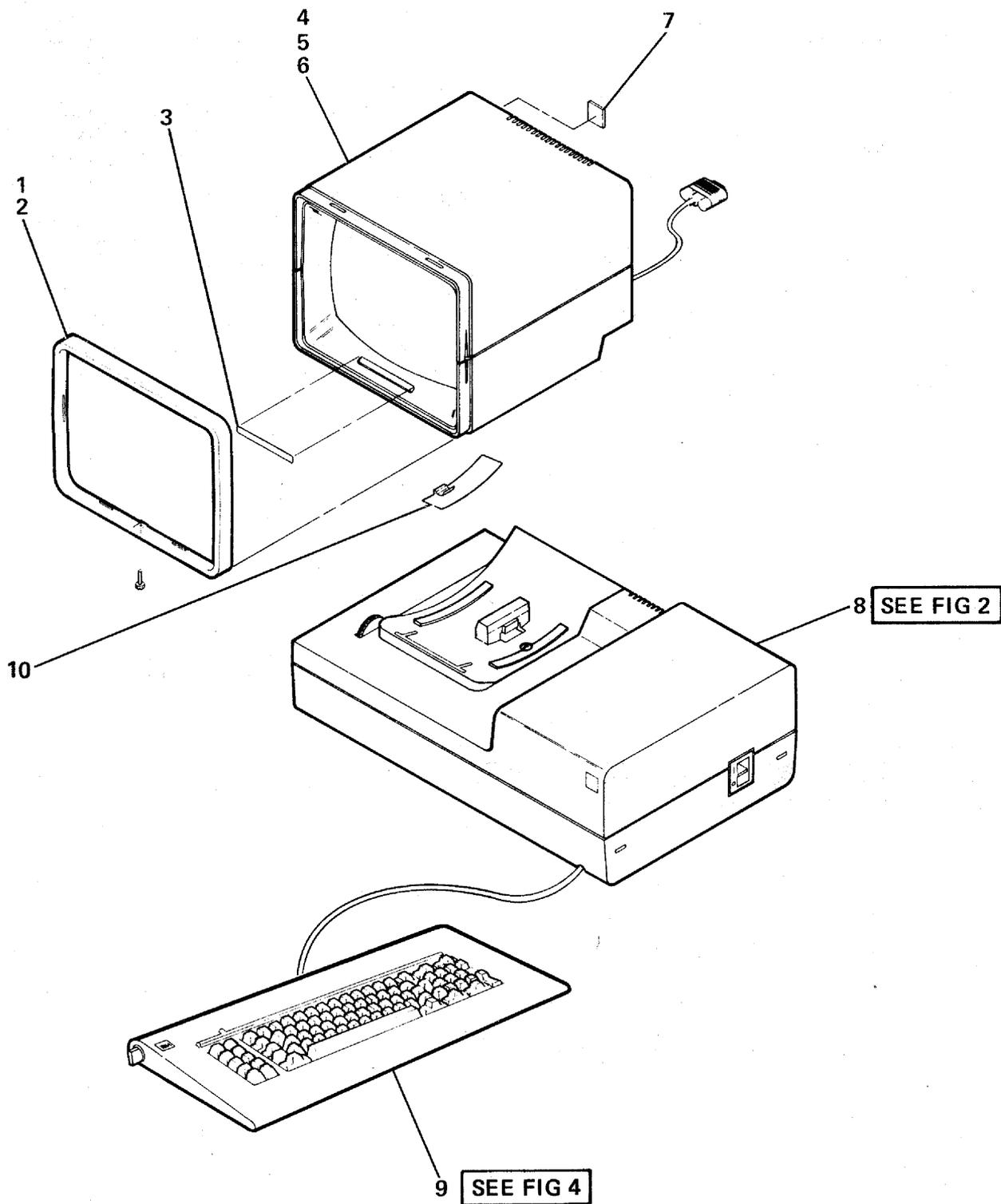


FIGURE 1. FINAL ASSEMBLY. SEE LIST 1.

| FIGURE-<br>INDEX<br>NUMBER | PART<br>NUMBER | UNITS<br>PER<br>ASM. | DESCRIPTION FOR FIGURE 1                                                     |   |   |   |
|----------------------------|----------------|----------------------|------------------------------------------------------------------------------|---|---|---|
|                            |                |                      | 1                                                                            | 2 | 3 | 4 |
| 1                          | NO NO.         |                      | FINAL ASSEMBLY                                                               |   |   |   |
| - 1                        | 5642885        | 1                    | • Retainer Ring                                                              |   |   |   |
| - 2                        | 5642985        | 1                    | • Screw, Thd-Form Hex Wshr Hd 3.63 x 1.34 x 12 Lg                            |   |   |   |
| - 3                        | 5642973        | 1                    | • Status Indicator Template (U.S.A)                                          |   |   |   |
| - 3                        | 5642974        | 1                    | • Status Indicator Template (French)                                         |   |   |   |
| - 3                        | 5642975        | 1                    | • Status Indicator Template (Italy)                                          |   |   |   |
| - 3                        | 5642976        | 1                    | • Status Indicator Template (Spain)                                          |   |   |   |
| - 3                        | 5642977        | 1                    | • Status Indicator Template (Germany)                                        |   |   |   |
| - 3                        | 5642978        | 1                    | • Status Indicator Template (Japanese/English)                               |   |   |   |
| - 3                        | 5642979        | 1                    | • Status Indicator Template (French/Canada)                                  |   |   |   |
| - 3                        | 5642980        | 1                    | • Status Indicator Template (Katakana)                                       |   |   |   |
| - 4                        | 5642867        | 1                    | • Display Assembly (USA/AFE)-Status Indicator Template must also be ordered. |   |   |   |
| - 4                        | 5642900        | 1                    | • Display Assembly (EMEA)-Status Indicator Template must also be ordered.    |   |   |   |
| - 4                        |                |                      | • Top Cover                                                                  |   |   |   |
| - 5                        | 5642966        | 1                    | • Bottom Cover                                                               |   |   |   |
| - 6                        | 5642967        | 1                    | (Not Recommended For Replacement)                                            |   |   |   |
| - 6                        |                |                      | • IBM Logo                                                                   |   |   |   |
| - 7                        | 5642889        | 1                    | • Base Assembly                                                              |   |   |   |
| - 8                        | No No.         | 1                    | • Keyboard Assembly (USA & Canada)                                           |   |   |   |
| - 9                        | 5642852        | 1                    | • Keyboard Assembly (French Azerty)                                          |   |   |   |
| - 9                        | 5643009        | 1                    | • Keyboard Assembly (Italy)                                                  |   |   |   |
| - 9                        | 5643010        | 1                    | • Keyboard Assembly (Spanish Speaking)                                       |   |   |   |
| - 9                        | 5643011        | 1                    | • Keyboard Assembly (Germany/Austria)                                        |   |   |   |
| - 9                        | 5643012        | 1                    | • Keyboard Assembly (Japanese/English)                                       |   |   |   |
| - 9                        | 5643013        | 1                    | • Keyboard Assembly (French/Canadian)                                        |   |   |   |
| - 9                        | 5643014        | 1                    | • Keyboard Assembly (Katakana)                                               |   |   |   |
| - 9                        | 5643015        | 1                    | • Keyboard Assembly (French Querty)                                          |   |   |   |
| - 9                        | 5643016        | 1                    | • Keyboard Assembly (Belgium)                                                |   |   |   |
| - 9                        | 5643017        | 1                    | • Keyboard Assembly (Denmark)                                                |   |   |   |
| - 9                        | 5643018        | 1                    | • Keyboard Assembly (Norway)                                                 |   |   |   |
| - 9                        | 5643019        | 1                    | • Keyboard Assembly (Portugal)                                               |   |   |   |
| - 9                        | 5643020        | 1                    | • Keyboard Assembly (Spain)                                                  |   |   |   |
| - 9                        | 5643021        | 1                    | • Keyboard Assembly (Sweden)                                                 |   |   |   |
| - 9                        | 5643022        | 1                    | • Keyboard Assembly (United Kingdom)                                         |   |   |   |
| - 9                        | 5643023        | 1                    | • Keyboard Assembly (Brazil)                                                 |   |   |   |
| - 9                        | 5643024        | 1                    | • Keyboard Assembly (International)                                          |   |   |   |
| - 9                        | 5643025        | 1                    | • Keyboard Assembly (ASCII)                                                  |   |   |   |
| - 9                        | 5643026        | 1                    | • RFI Plate                                                                  |   |   |   |
| - 9                        | 7363290        | 1                    |                                                                              |   |   |   |
| - 10                       | 7363650        | 1                    |                                                                              |   |   |   |
|                            |                |                      |                                                                              |   |   |   |
|                            |                |                      |                                                                              |   |   |   |
|                            |                |                      |                                                                              |   |   |   |
|                            |                |                      |                                                                              |   |   |   |
|                            |                |                      |                                                                              |   |   |   |
|                            |                |                      |                                                                              |   |   |   |

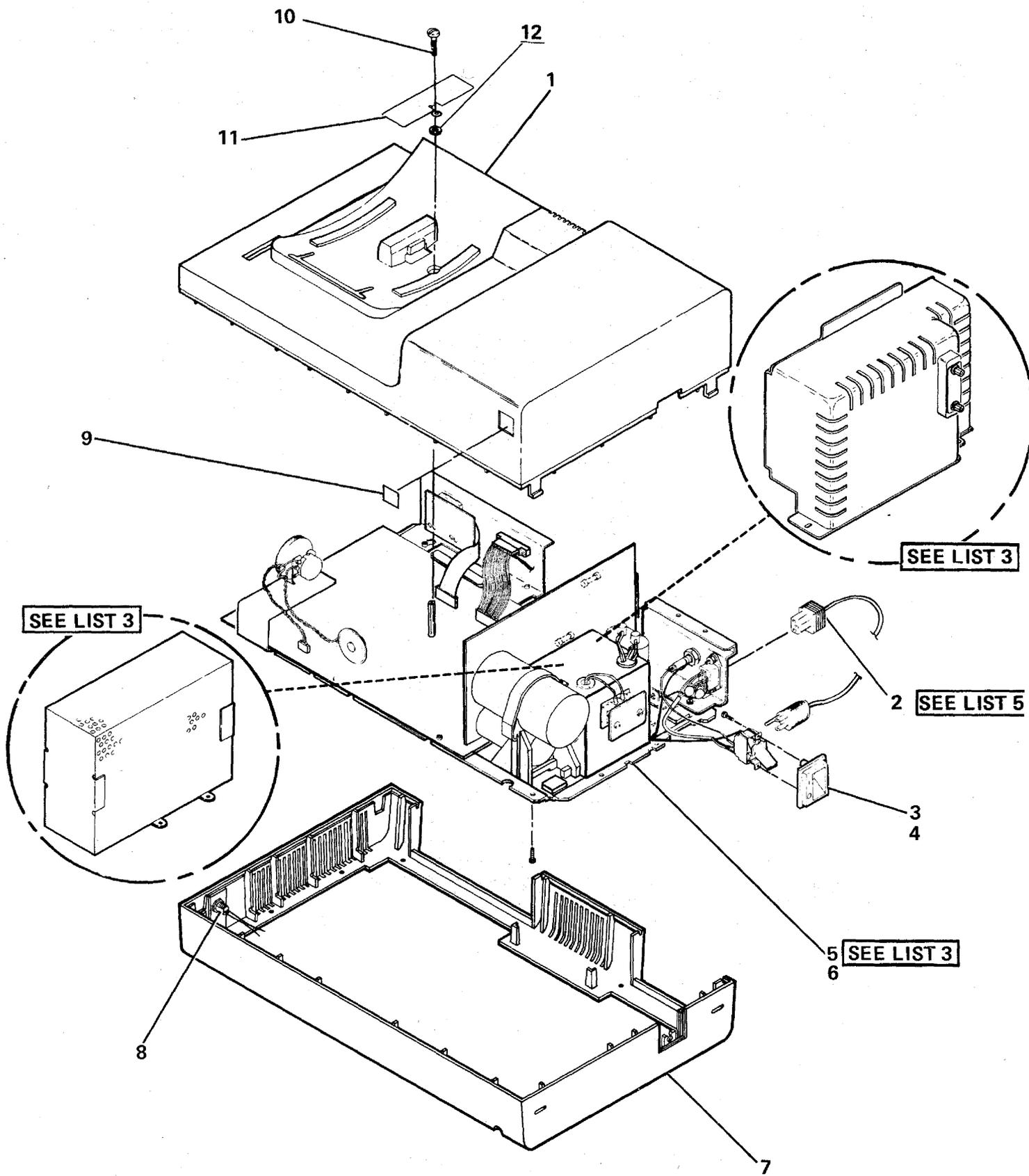


FIGURE 2. BASE ASSEMBLY. SEE LIST 2.





| FIGURE-<br>INDEX<br>NUMBER | PART<br>NUMBER | UNITS<br>PER<br>ASM. | DESCRIPTION FOR FIGURE 3                        |   |   |   |
|----------------------------|----------------|----------------------|-------------------------------------------------|---|---|---|
|                            |                |                      | 1                                               | 2 | 3 | 4 |
| 3                          | NO NO.         |                      | BASE PLATE ASSEMBLY                             |   |   |   |
| - 1                        | 855253         | 1                    | • Fuse, F3 1A DC                                |   |   |   |
| - 2                        | 855251         | 1                    | • Fuse, F2 5A DC                                |   |   |   |
| - 3                        | 2777444        | 1                    | • Power Supply Board Assembly                   |   |   |   |
| - 4                        | 2777239        | 1                    | • 100V Single FRU Power Supply                  |   |   |   |
| - 4                        | 2777241        | 1                    | • 200V Single FRU Power Supply                  |   |   |   |
| - 4                        | 7363033        | 1                    | • 200V EMEA Single FRU Power Supply             |   |   |   |
| - 5                        | 5642953        | 1                    | • I/O Assembly                                  |   |   |   |
| - 6                        | 7362130        | 2                    | • Screw,Thd-Form Hex Hd M4 x .7 x 6 Lg          |   |   |   |
| - 7                        | 1622346        | 2                    | • Washer,Lock-Ext Star 4.3 ID x 8 OD x .5 Thk   |   |   |   |
| - 8                        | 1621190        | 1                    | • Screw,Thd-Form Hex Hd M4 x .7 x 6 Lg          |   |   |   |
| - 9                        | 615683         | 1                    | • Fuse, 250 Vac 2A SB                           |   |   |   |
| - 10                       | 5642972        | 1                    | • Primary Power Assembly, Domestic              |   |   |   |
| - 10                       | 5643040        | 1                    | • Primary Power Assembly, World Trade           |   |   |   |
| - 11                       | 7362130        | 2                    | • Screw,Thd-Form Hex Hd M4 x .7 x 6 Lg          |   |   |   |
| - 12                       | 1622346        | 2                    | • Washer,Lock-Ext Star 4.3 ID x 8 OD x .5 Thk   |   |   |   |
| - 13                       | 526378         | 2                    | • Insulating Cap                                |   |   |   |
| - 14                       | 5252850        | 1                    | • Capacitor                                     |   |   |   |
| - 15                       | 7362130        | 2                    | • Screw,Thd-Form Hex Hd M4 x .7 x 6 Lg          |   |   |   |
| - 16                       | 737732         | 1                    | • Clamp Capacitor (Bracket Assembly)            |   |   |   |
| - 17                       | 2777440        | 1                    | • Transformer, 60 Hz Domestic                   |   |   |   |
| - 17                       | 2777441        | 1                    | • Transformer, 60 Hz World Trade                |   |   |   |
| - 17                       | 2777442        | 1                    | • Transformer, 50 Hz World Trade (Multi-Tap)    |   |   |   |
| - 17                       | 2777439        | 1                    | • Transformer, 50 Hz World Trade (220 Vac Only) |   |   |   |
| - 18                       | 1621812        | 1                    | • Screw,Thd-Form Hex Wshr Hd M4 x .7 x 8 Lg     |   |   |   |
| - 19                       | 7363003        | 1                    | • Clamp, Keyboard Cable                         |   |   |   |
| - 20                       | 1621812        | 4                    | • Screw,Thd-Form Hex Wshr Hd M4 x .7 x 8 Lg     |   |   |   |
| - 21                       | 7362999        | 1                    | • Document Storage Tray                         |   |   |   |
| - 22                       | 1621811        | 4                    | • Screw,Thd-Form Hex Wshr Hd M4 x .7 x 10 Lg    |   |   |   |
| - 23                       | 5642921        | 1                    | • Clamp                                         |   |   |   |
| - 24                       | 5643034        | 2                    | • Screw,Thd-Form Slot Hex Hd M4 x .7 x 18 Lg    |   |   |   |
| - 25                       | 5642920        | 1                    | • Holder                                        |   |   |   |
| - 26                       | 7362507        | 1                    | • Screw,Hex Wshr Hd M4 x .7 x 12 Lg             |   |   |   |
| - 27                       | 5554146        | 4                    | • Pad                                           |   |   |   |
| - 28                       | 5642855        | 1                    | • Base Plate                                    |   |   |   |
| - 29                       | 5642922        | 1                    | • Clamp                                         |   |   |   |
| - 30                       | 5643034        | 1                    | • Screw,Thd-Form Slot Hex Hd M4 x .7 x 18 Lg    |   |   |   |
| - 31                       | 7363015        | 1                    | • Adjustable Audible Alarm Bracket              |   |   |   |
| - 32                       | 1621811        | 2                    | • Screw,Thd-Form Hex Wshr Hd M4 x .7 x 10 Lg    |   |   |   |
| - 33                       | 7363022        | 1                    | • Adjustable Audible Alarm Knob                 |   |   |   |
| - 34                       | 7363020        | 1                    | • Audible Alarm Cable Assembly                  |   |   |   |
| - 35                       | 7362986        | 1                    | • Planar Assembly                               |   |   |   |
| - 36                       | 5642996        | 1                    | • Standoff                                      |   |   |   |
| - 37                       | 5642866        | 1                    | • Strap                                         |   |   |   |
| - 38                       | 5552875        | 1                    | • Screw,Thd-Form Hex Hd 8-16 x 9/16 Lg          |   |   |   |
| - 39                       | 5642880        | 1                    | • Green/Yellow Gnd Wire                         |   |   |   |
| - 40                       | 1621812        | 2                    | • Screw,Thd-Form Hex Wshr Hd M4 x .7 x 8 Lg     |   |   |   |
|                            |                |                      |                                                 |   |   |   |
|                            |                |                      |                                                 |   |   |   |
|                            |                |                      |                                                 |   |   |   |

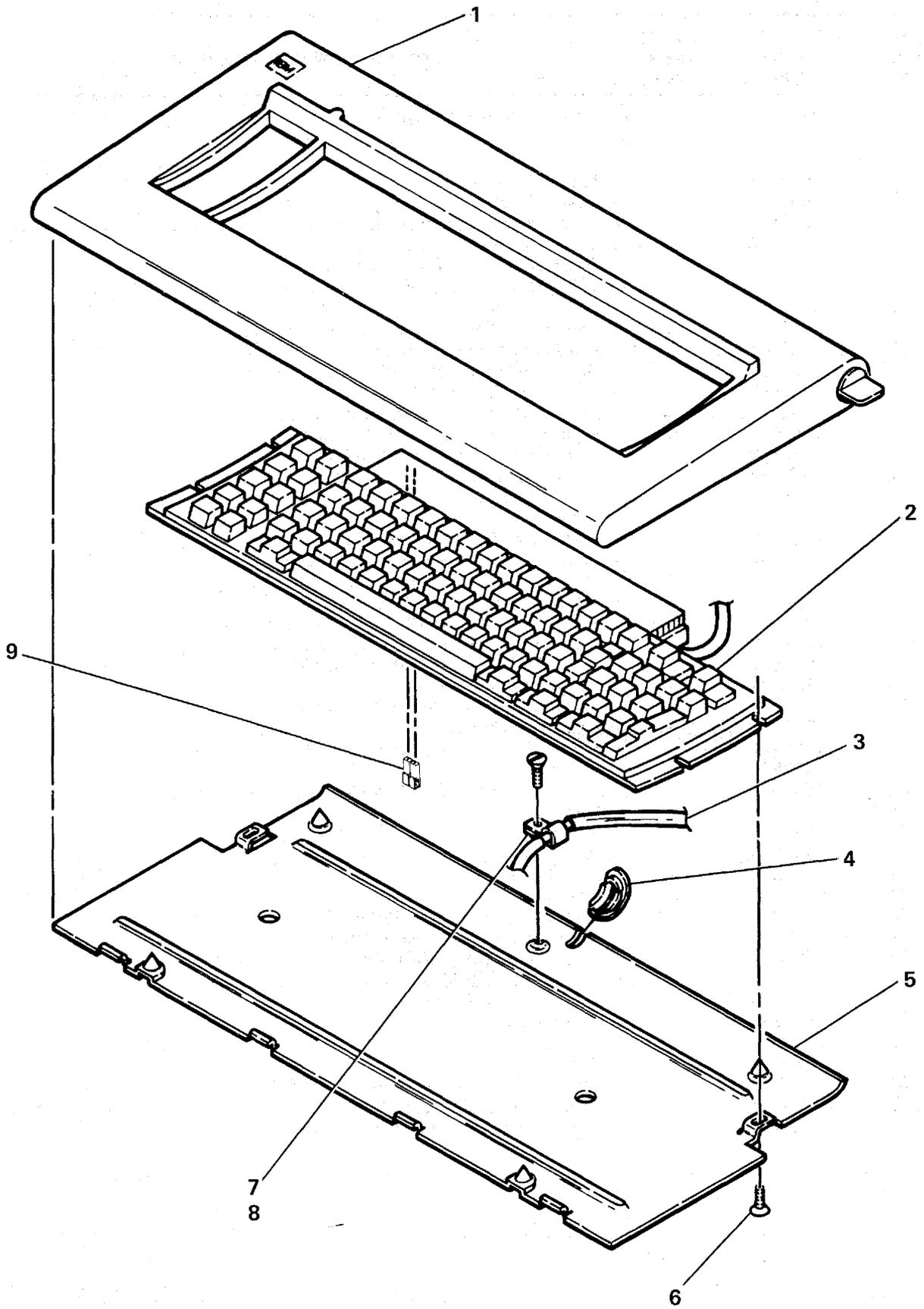


FIGURE 4. KEYBOARD ASSEMBLY. SEE LIST 4.



Line Cord Chart

| Plug                                                                                          | P/N     | Country                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Non-Lock | 6841461 | 2.5 M Lg., U.S., Canada, Bahamas, Barbados, Bermuda, Bolivia, Costa Rica, Brazil, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Japan, Mexico, Trinidad, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, Thailand |
| No Plug                                                                                       | 5642989 | WTC, 60 Hz                                                                                                                                                                                                                                                      |
| No Plug                                                                                       | 2684642 | WTC, 50 Hz                                                                                                                                                                                                                                                      |
|              | 2684463 | Australia, Argentina, Columbia, New Zealand, Paraguay, Uruguay, Venezuela, Trinidad                                                                                                                                                                             |
|              | 2684647 | Finland, Germany, Norway, Netherlands, Sweden, Austria, Spain, Indonesia, Iran, Bulgaria, Portugal, Iceland, Poland, Rumania                                                                                                                                    |
|              | 2684591 | United Kingdom, Ireland                                                                                                                                                                                                                                         |
|              | 2684648 | France, Belgium, Malaysia, Algeria, Hungary, Yugoslavia, Greece                                                                                                                                                                                                 |
|             | 2684646 | Switzerland                                                                                                                                                                                                                                                     |
|            | 2684645 | Denmark                                                                                                                                                                                                                                                         |
|            | 2684644 | Italy, Chile                                                                                                                                                                                                                                                    |
|            | 2684590 | South Africa                                                                                                                                                                                                                                                    |
|            | 2684643 | Israel                                                                                                                                                                                                                                                          |
|            | 5642992 | Japan, 15A maximum 200V                                                                                                                                                                                                                                         |

FIGURE 5. LINE CORD CHART.

NUMERICAL INDEX

| PART NUMBER | LIST AND INDEX NO. | | | | | | |
|---|---|---|---|---|---|---|---|
| 526378      | 3 - 13             | 1761219     | 4 - 2              | 5642921     | 3 - 23             | 5643024     | 1 - 9              |
| 615683      | 3 - 9              | 1761220     | 4 - 2              | 5642922     | 3 - 29             | 5643025     | 1 - 9              |
| 737732      | 3 - 16             | 1761221     | 4 - 2              | 5642953     | 3 - 5              | 5643026     | 1 - 9              |
| 855251      | 3 - 2              | 1761222     | 4 - 2              | 5642963     | 2 - 3              | 5643034     | 3 - 24             |
| 855253      | 3 - 1              | 1761223     | 4 - 2              | 5642966     | 1 - 5              | 5643034     | 3 - 30             |
| No No.      | 1 - 8              | 2688831     | 4 - 2              | 5642967     | 1 - 6              | 5643040     | 3 - 10             |
| No No.      | 2 - 2              | 2777239     | 3 - 4              | 5642972     | 3 - 10             | 7362130     | 3 - 6              |
| 1159827     | 2 - 12             | 2777241     | 3 - 4              | 5642973     | 1 - 3              | 7362130     | 3 - 11             |
| 1621190     | 3 - 8              | 2777439     | 3 - 17             | 5642974     | 1 - 3              | 7362130     | 3 - 15             |
| 1621811     | 2 - 6              | 2777440     | 3 - 17             | 5642975     | 1 - 3              | 7362130     | 4 - 8              |
| 1621811     | 3 - 22             | 2777441     | 3 - 17             | 5642976     | 1 - 3              | 7362507     | 3 - 26             |
| 1621811     | 3 - 32             | 2777442     | 3 - 17             | 5642977     | 1 - 3              | 7362932     | 4 - 3              |
| 1621812     | 3 - 18             | 2777444     | 3 - 3              | 5642978     | 1 - 3              | 7362986     | 3 - 35             |
| 1621812     | 3 - 20             | 4496152     | 4 - 2              | 5642979     | 1 - 3              | 7362999     | 3 - 21             |
| 1621812     | 3 - 40             | 5252850     | 3 - 14             | 5642980     | 1 - 3              | 7363003     | 3 - 19             |
| 1621813     | 2 - 10             | 5552875     | 3 - 38             | 5642985     | 1 - 2              | 7363003     | 4 - 7              |
| 1622346     | 3 - 7              | 5552875     | 4 - 6              | 5642996     | 3 - 36             | 7363014     | 4 - 4              |
| 1622346     | 3 - 12             | 5552876     | 2 - 4              | 5643009     | 1 - 9              | 7363015     | 3 - 31             |
| 1650667     | 4 - 9              | 5554146     | 3 - 27             | 5643010     | 1 - 9              | 7363020     | 3 - 34             |
| 1761205     | 4 - 2              | 5642852     | 1 - 9              | 5643011     | 1 - 9              | 7363022     | 3 - 33             |
| 1761206     | 4 - 2              | 5642855     | 2 - 5              | 5643012     | 1 - 9              | 7363030     | 2 - 1              |
| 1761208     | 4 - 2              | 5642855     | 3 - 28             | 5643013     | 1 - 9              | 7363030     | 2 - 7              |
| 1761209     | 4 - 2              | 5642857     | 2 - 8              | 5643014     | 1 - 9              | 7363033     | 3 - 4              |
| 1761210     | 4 - 2              | 5642866     | 3 - 37             | 5643015     | 1 - 9              | 7363034     | 2 - 7              |
| 1761211     | 4 - 2              | 5642867     | 1 - 4              | 5643016     | 1 - 9              | 7363035     | 2 - 1              |
| 1761212     | 4 - 2              | 5642880     | 3 - 39             | 5643017     | 1 - 9              | 7363227     | 4 - 1              |
| 1761213     | 4 - 2              | 5642885     | 1 - 1              | 5643018     | 1 - 9              | 7363228     | 4 - 5              |
| 1761215     | 4 - 2              | 5642889     | 1 - 7              | 5643019     | 1 - 9              | 7363290     | 1 - 9              |
| 1761216     | 4 - 2              | 5642889     | 2 - 9              | 5643021     | 1 - 9              | 7363650     | 1 - 10             |
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## Instructions For Using This Guide

The minor codes have been expanded to allow additional feedback to identify why a field replaceable unit (FRU) was replaced.

For troubles on which a repair action has been taken:

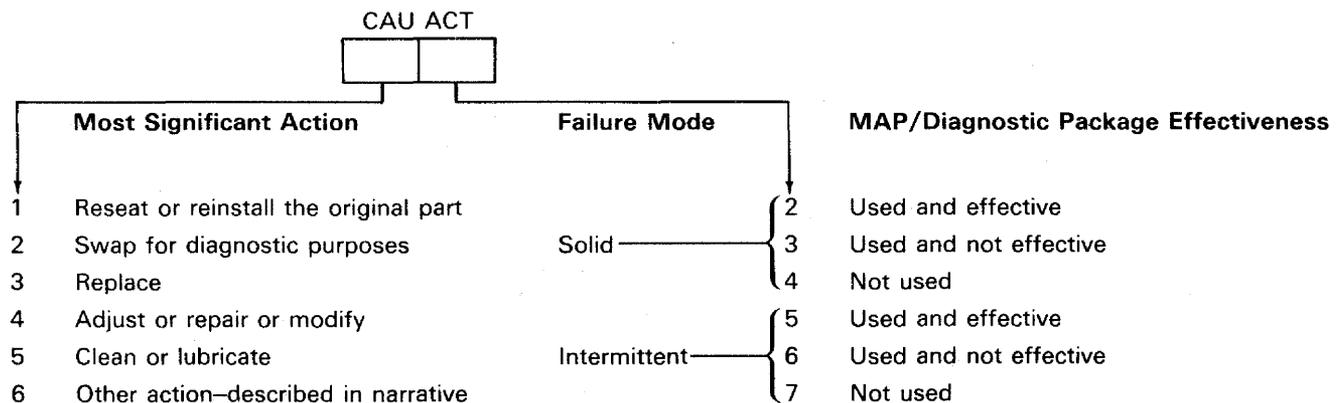
- When a FRU is listed more than once, select the best overall description and add a comment in the narrative section of the I/PAR. Code 00 (Other) is not used as a minor code. Use the minor code supplied that best describes why the FRU was replaced.
- Record the 3-digit major and the 2-digit minor codes in the unit field of the I/PAR document.
- Select the cause code that best identifies the action, failure mode, MAP/diagnostic package, and problem determination procedures effectiveness.
- Record the cause code in the CAU ACT field of the I/PAR document.
- Complete the CSR Log at the back of this guide.

For all *No Trouble Found* calls:

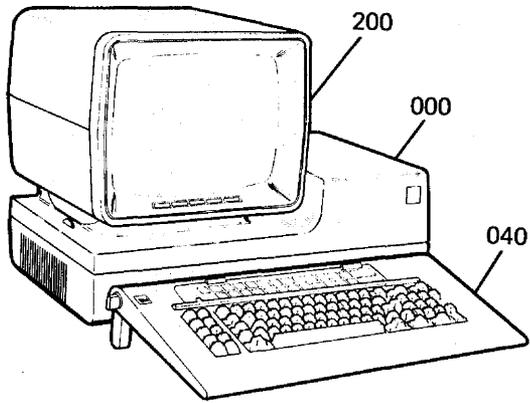
- Refer to major code 960.
- Complete the CSR Log at the back of this guide.

## Cause Codes

Choose one digit from each column:



**Note:** Consider the MAPs and diagnostics effective if they identify the failing part or direct you to the appropriate repair action or procedure.



**000 BASE (LOWER UNIT)**

For the primary power panel, see major code 600.

**Alarm Assembly**

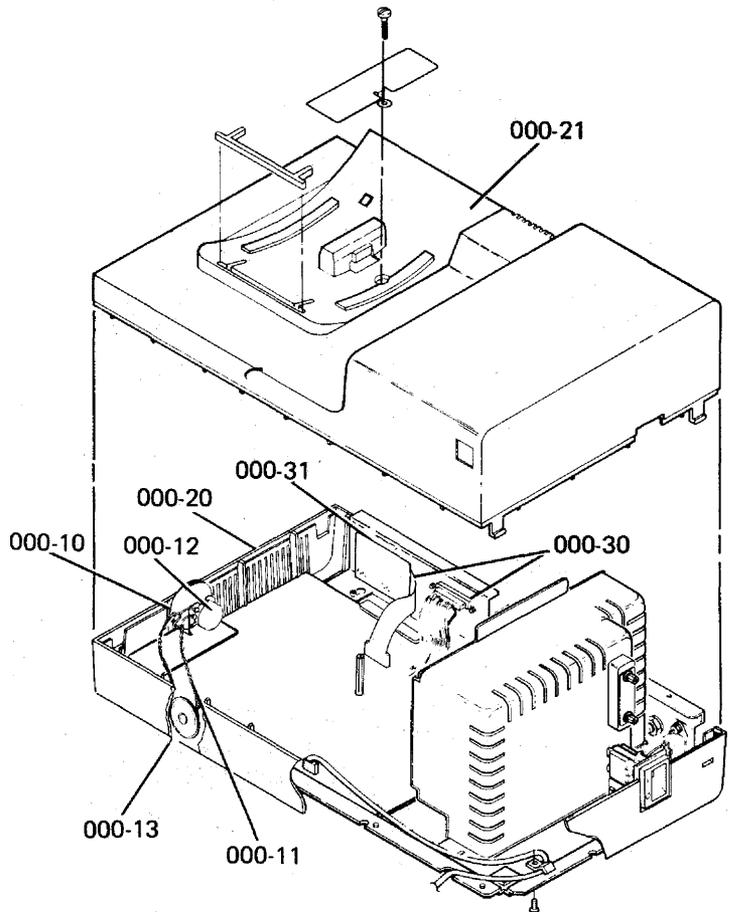
- 10 Alarm Knob
- 11 Cable
- 12 Potentiometer
- 13 Speaker

**Covers**

- 20 Bottom
- 21 Top

**I/O Assembly**

- 30 Cable/Connector
- 31 Address/Terminator Switches



# 040 KEYBOARD UNIT

## Cable Assembly

10 Cable

## Covers

20 Base

21 Tilt Mechanism

22 Upper

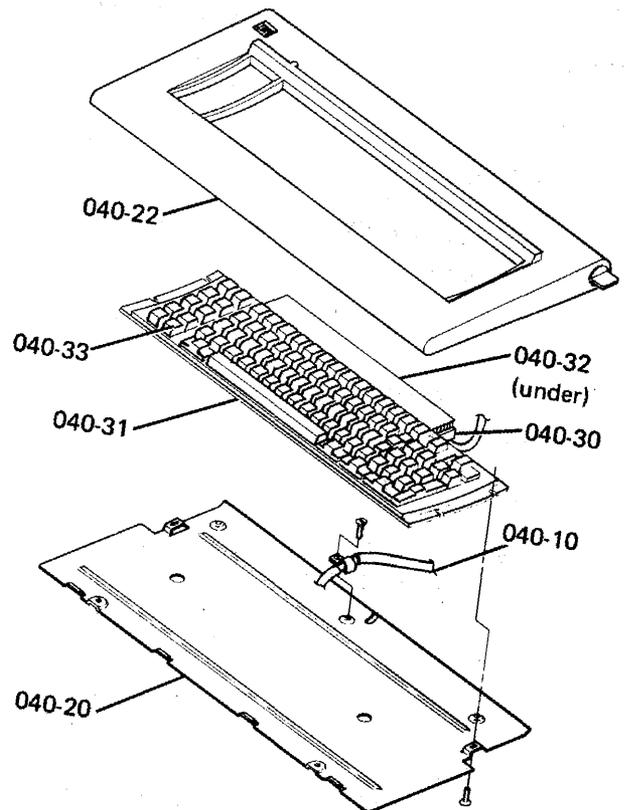
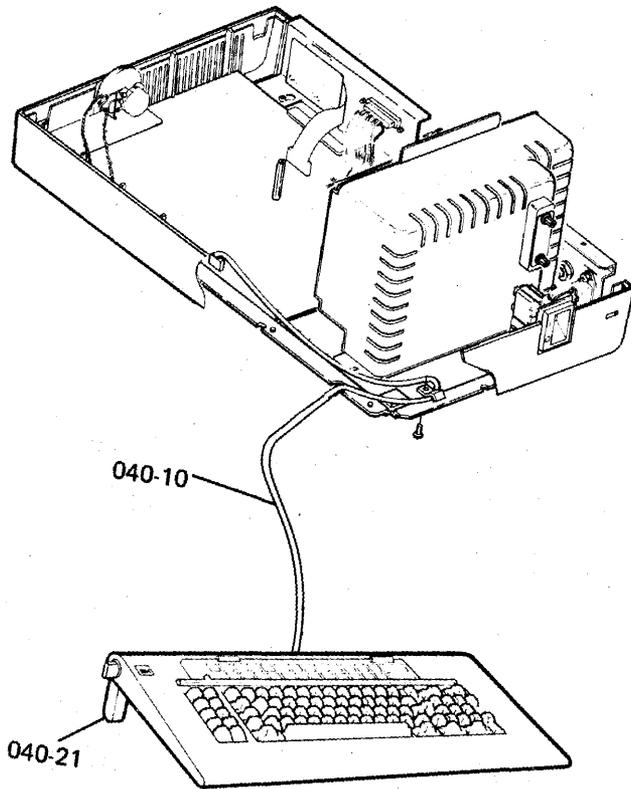
## Logic Card/Key Assembly

30 Connector

31 Electrical

32 Jumpers

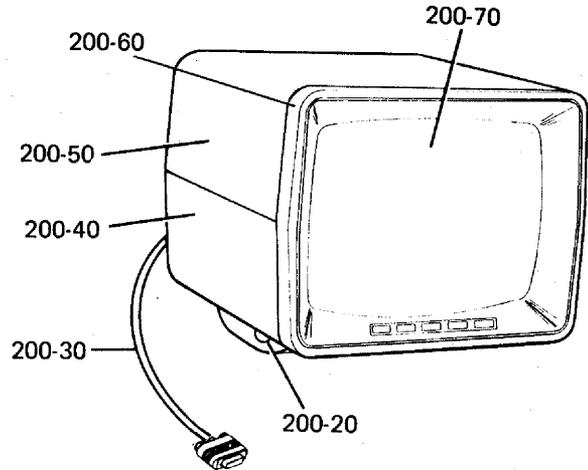
33 Key Stem/Key Tops



**200 DISPLAY UNIT**

**Display Assembly**

- 10 Adjustment (Describe in narrative)
- 20 Brightness Control/Knob
- 30 Cable Assembly
- 40 Cover, Bottom
- 50 Cover, Top
- 60 Retaining Ring
- 70 Screen (Describe symptom in narrative)



**300 LOGIC**

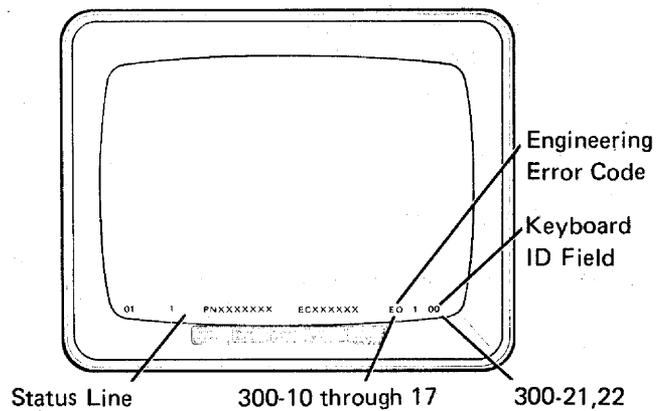
Error code available (Record first applicable error listed.)

**Engineering Error Codes**

- 10 E0
- 11 E1
- 12 E2
- 13 E3
- 14 E4
- 15 E5
- 16 E6
- 17 E7
- 21 KU
- 22 LU

**Planar Symptom Codes**

- 30 Communications Problem
- 40 Continuously Looping Diagnostics
- 50 Keyboard Logic Problem
- 60 No System Available Indicator
- 70 Screen Problem



**600 POWER**

**AC Capacitor**

10 AC Capacitor

**AC Fuse**

20 AC Fuse, F1

**Line Cord**

30 Line Cord

**Power Supply Board**

40 Fuse, +5 Vdc  
 41 Fuse, -5 Vdc  
 42 Printed Circuit Board

**Primary Power Assembly**

50 Cable  
 51 Fuse Holder  
 52 Line Filter (capacitor)  
 53 Receptacle, Line Cord  
 54 Switch, Power

**Transformer**

60 Transformer

**Single FRU Power Supply**

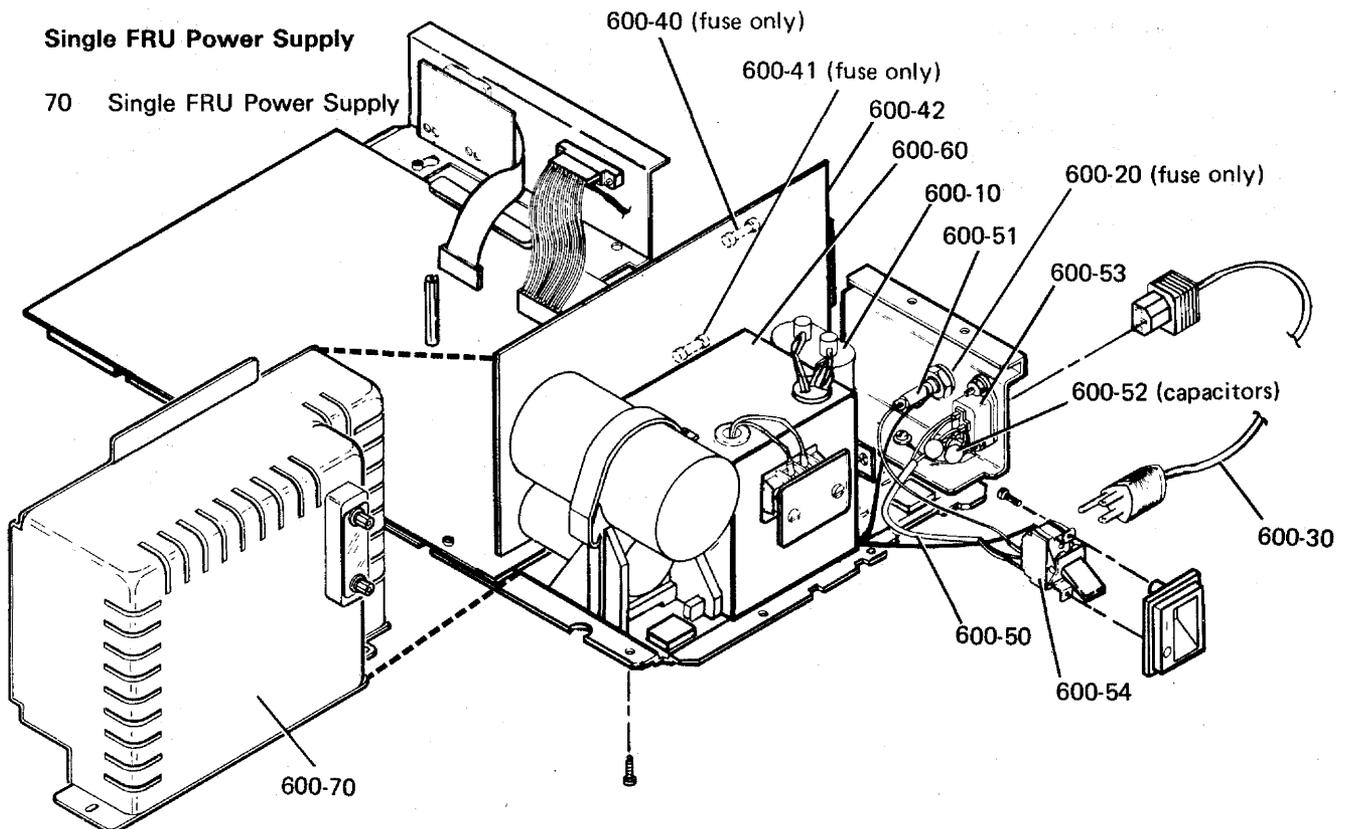
70 Single FRU Power Supply

**870 CUSTOMER RESPONSIBILITY**

Construct a minor code from one choice out of the tens column (7, 8, or 9) and one choice out of the units column (1 through 9). Enter the minor code in the unit field of the I/PAR document.

- 7 Customer problem determination: not used/not provided
  - 8 Customer problem determination: used and effective
  - 9 Customer problem determination: used and not effective
- 
- 1 Address or terminator switches
  - 2 Configuration problem other than switches or application program
  - 3 Customer application program
  - 4 Environment unsuitable
  - 5 Hardware compatibility
  - 6 Operating procedures incorrect or operator error
  - 7 Power failure or difficulty (external)
  - 8 Station protectors
  - 9 Twinaxial/coaxial cable, connectors

Minor Code (record in the unit field of the I/PAR document)



## 960 NO TROUBLE FOUND

Use major code 960 only to report calls when an error is logged, indicated, or reported, but no specific repair action is taken. Record 960 for the major code and the appropriate two digits for the minor code.

### Error Code

If you have a 4-digit error code, either on the display screen or in the Error History Table, record the first two digits for the minor code and the last two digits for the CAU ACT code of the I/PAR document.

Example:

| Major | Minor | Cause |
|-------|-------|-------|
| 960   | 01    | 49    |

(The error code on the display screen was 0149.)

### 20 Display Unit

Use the appropriate cause code in the CAU ACT field of the I/PAR document.

### 30 Logic

### 40 Keyboard Unit

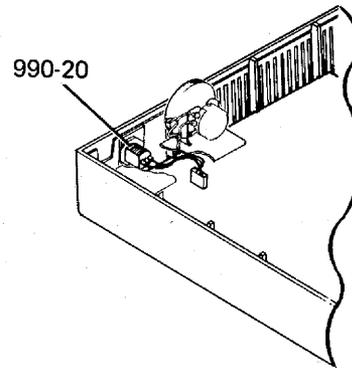
Use the appropriate cause code in the CAU ACT field of the I/PAR document.

### 60 Power

Use the appropriate cause code in the CAU ACT field of the I/PAR document.

## 990 FEATURES/RPQs

- 20 Keylock RPQ
- 30 RPQ (other than keylock.  
Explain fully in narrative.)









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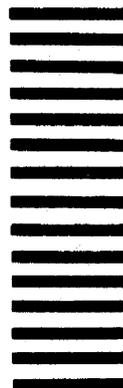


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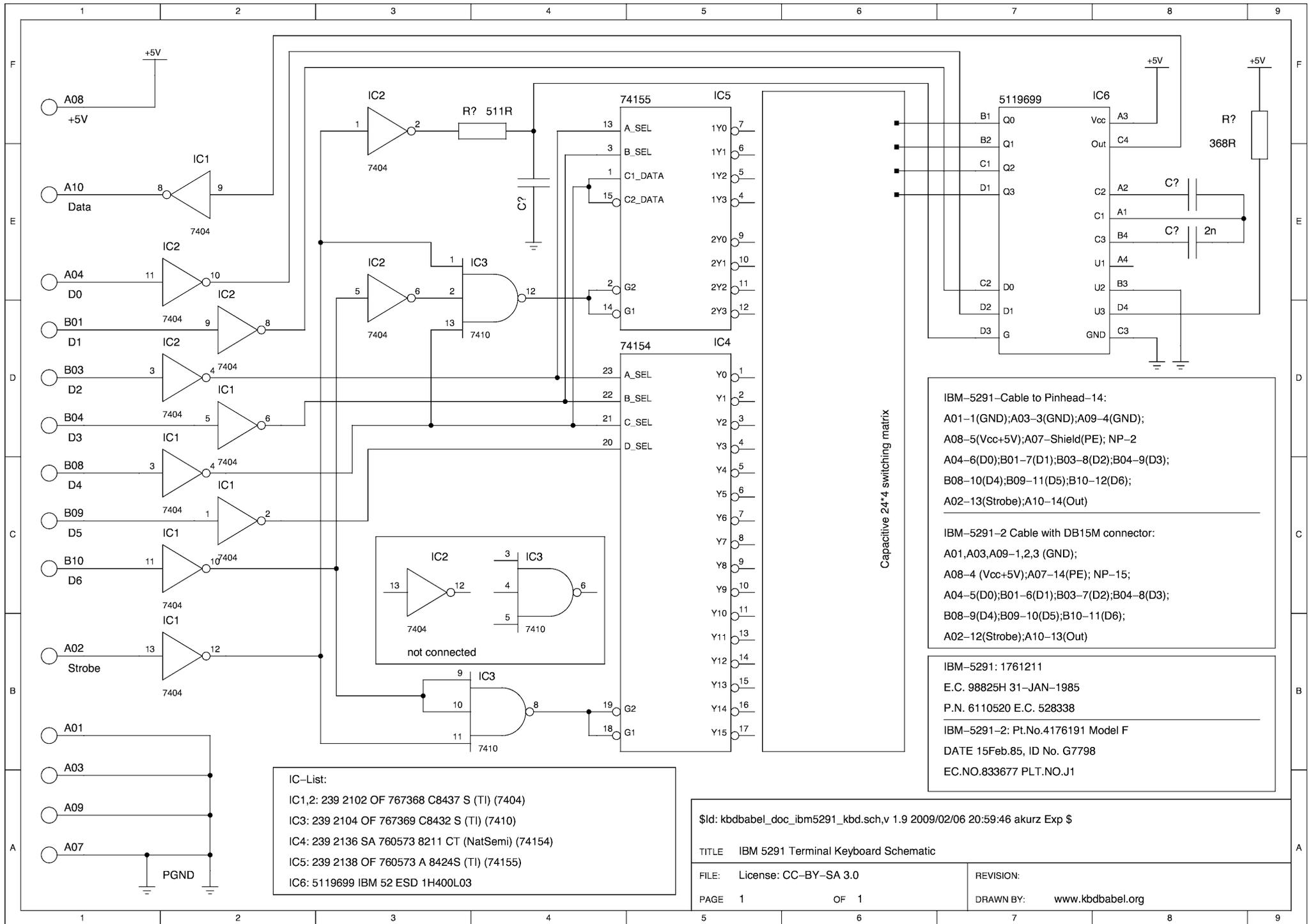
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 IC4: 239 2136 SA 760573 8211 CT (NatSemi) (74154)  
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