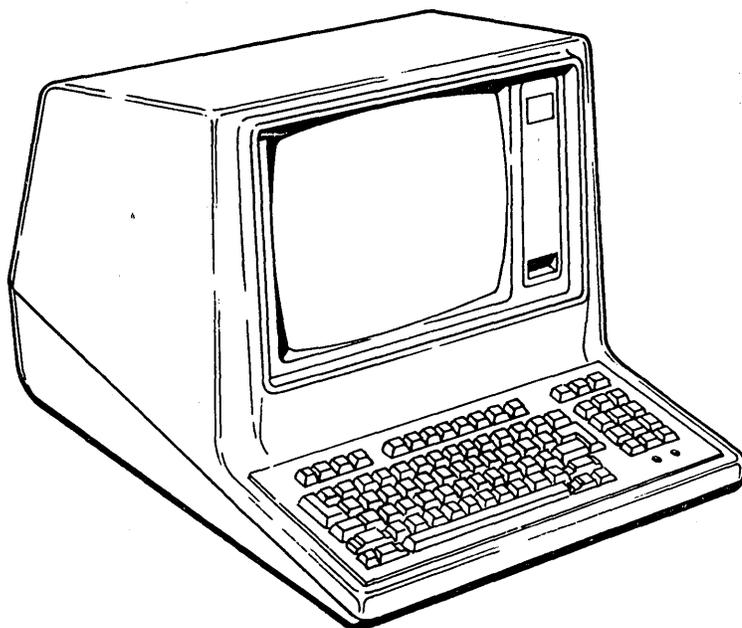**CONTROL DATA CORPORATION**

# CDC® 722-10/20 DISPLAY TERMINAL
## CC628-A

**HARDWARE MAINTENANCE MANUAL**
**(SITE INFORMATION)**

# REVISION RECORD

| REVISION | DESCRIPTION |
|---|---|
| A (10-01-80) | Manual released. Includes changes per ECO 14104, 14037, 14147, 14241, 14257, and 14262. |
| B (11-25-80) | Interim change to incorporate ECO 14353. |
| C (11-26-80) | Manual revised to incorporate ECO 14353 in its final form. |
| D (01-21-81) | Manual revised to incorporate procedure changes, to provide a switch setting record, and to update spare parts list per ECO's 14294, 14401, and 14431. |
| E (02-11-81) | Interim change to incorporate ECOs 14461, 14503, and and 14530. Also adds appendix B. |
| F (04-07-81) | Manual revised to incorporate ECO 14530 in its final form and to make editorial and technical corrections. |
| G (05-07-81) | Interim change – manual revised to incorporate ECO 14675. |
| H (06-01-81) | Manual revised to incorporate ECO 14675 in its final form. |
| J (06-25-81) | Interim change – manual revised to incorporate ECO 14640. |
| K (07-06-81) | Interim change – manual revised to incorporate ECO 14753. |
| L (09-18-81) | Manual revised to incorporate ECO 14761 and finalize ECO's 14640 and 14753. |

Publication No.

62940003

01989-2

REVISION LETTERS I, O, Q AND X ARE NOT USED

# MANUAL TO EQUIPMENT LEVEL CORRELATION SHEET

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

| EQUIPMENT TYPE | SERIES | WITH FCO'S | COMMENTS |
|---|---|---|---|
| CC628-A | 01 | | |
| | 02 | 14353 -- | All units reworked to series 05 by ECO 14530 |
| | 03 | | |
| | 04 | | |
| | 05 | – | ECO 14675 only (S/N 1016) |
| | 06 | – | ECO 14640 only (S/N 1550) |
| | 07 | 14753 | ECO 14753 |
| | 07 | – | ECO 14671 only (S/N 2601) |
| | 08 | | |

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# LIST OF EFFECTIVE PAGES

New features, as well as changes, deletions, and additions to information in this manual are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

| PAGE | REV | PAGE | REV | PAGE | REV |
|---|---|---|---|---|---|
| Cover | - | 5A-1/5A-2 | A | | |
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| ii thru vi | L | 5A-4/5A-5 | A | | |
| vii/viii | H | 5B-1 | A | | |
| ix and x | F | 5B-2 | D | | |
| xi/xii | D | 5B-3 | A | | |
| 1-1 | G | 5B-4/5B-5 | D | | |
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| 1-3 | F | 5B-8/5B-9 | D | | |
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| 2-3 | A | 5B-17/5B-18 | A | | |
| 2-4 | K | 6-1 | A | | |
| 2-5 | C | 6-2 and 6-3 | L | | |
| 2-6 | K | A-1 | K | | |
| 2-7 and 2-8 | A | A-2 | D | | |
| 2-9 | H | B-1 thru B-4 | H | | |
| 3-1 thru 3-4 | A | Comment Sheet | L | | |
| 3-5 | F | Mailer | - | | |
| 3-6 | G | Back Cover | - | | |
| 3-7 thru 3-9 | H | | | | |
| 4-1 | A | | | | |
| 4-2 | D | | | | |
| 5-1 thru 5-4 | A | | | | |
| 5-5 | K | | | | |
| 5-6 | F | | | | |
| 5-7 | E | | | | |
| 5-8 | D | | | | |
| 5-9 | G | | | | |
| 5-10/5-11 | C | | | | |

02092-1A

This manual provides information to aid in the installation, checkout, and on-site maintenance of the CDC® 722-10/20 Display Terminal. It is assumed that the customer engineer has knowledge of basic terminal operations and use of common maintenance tools and test equipment.

Information is organized under the following section headings:

Section 1 - General Description

Section 2 - Operation

Section 3 - Installation and Checkout

Section 4 - Diagrams

Section 5 - Maintenance

Section 5A - SAM Listings

Section 5B - Maintenance Procedures

Section 6 - Parts Data

Appendix A - Special Cables for Use with Terminal

Appendix B - Generating Commands in Advanced/752 Mode

Other manuals providing reference and component level maintenance information on the terminal are listed as follows. All manuals may be ordered from:

Control Data Corporation
Literature and Distribution Services
308 North Dale Street
St. Paul, Minnesota 55103

| Title | Publication Number |
|-------|--------------------|
| 722-10/20 Display Terminal Reference Manual | 62940001 |
| 722-10/20 Display Terminal Operators Guide/ Installation Instructions | 62940002 |
| 722-10/20 Display Terminal Hardware Maintenance Manual (Support Information) | 62940004 |

# CONTENTS

# 5. MAINTENANCE

# 6. PARTS DATA

## APPENDIXES

# FIGURES

# TABLES

This section provides a brief physical and functional description of the CC628-A Display Terminal including the related equipment specifications.  Refer to the associated manuals listed in the preface for detailed information.

The terminal provides asynchronous character-by-character transmission in a manner consistent with teletypewriter conventions.  Communication line coding is compatible with the CDC® 752 CRT Display Terminal and also can be set to operate in advanced (ADV) mode for extended control functions.

## PHYSICAL DESCRIPTION

The display terminal, figure 1-1, is a remotely located microprocessor controlled input/output device.  The terminal contains a 12-inch (diagonal measurement) crt and associated drive electronics, refresh memory, symbol generation and control logic, an alphanumeric keyboard, an asynchronous RS-232-C/CCITT V.24 voltage interface, and a 20-mA current-loop interface.  The current loop interface RS232 selection requires internal adjustments requiring a field service engineer.  The terminal may be ordered from the factory configured for either operating mode.  Interface connectors are provided for external communication with a host processor and a receive-only printer.
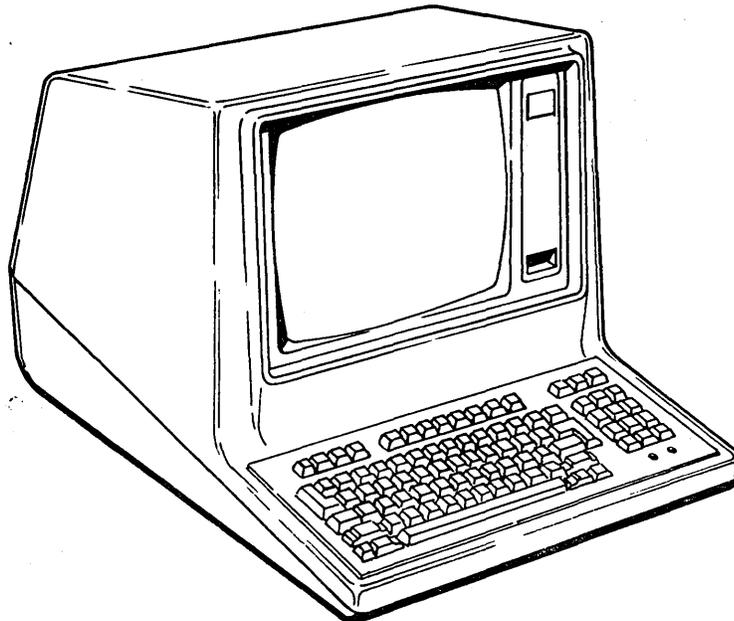


Figure 1-1.  Display Terminal

FUNCTIONAL DESCRIPTION

A simplified block diagram of the terminal is shown in fig-
ure 1-2. The keyboard provides for operator entry of alphanu-
meric characters and terminal function and control codes. All
128 ASCII X3.4 codes, plus 46 code sequences can be generated.
The logic/power-supply module provides the internal timing and
control for display raster generation, character generation,
refresh memory functions, keyboard data encoding, and I/O inter-
face functions. This module also contains the power supply,
rectifiers, and regulators for the various internal dc volt-
ages. The display module is a crt video display device that
uses a raster scan technique to produce a noninterlaced horizon-
tal scan of 300/360 lines at a vertical refresh rate of 60/50 Hz.
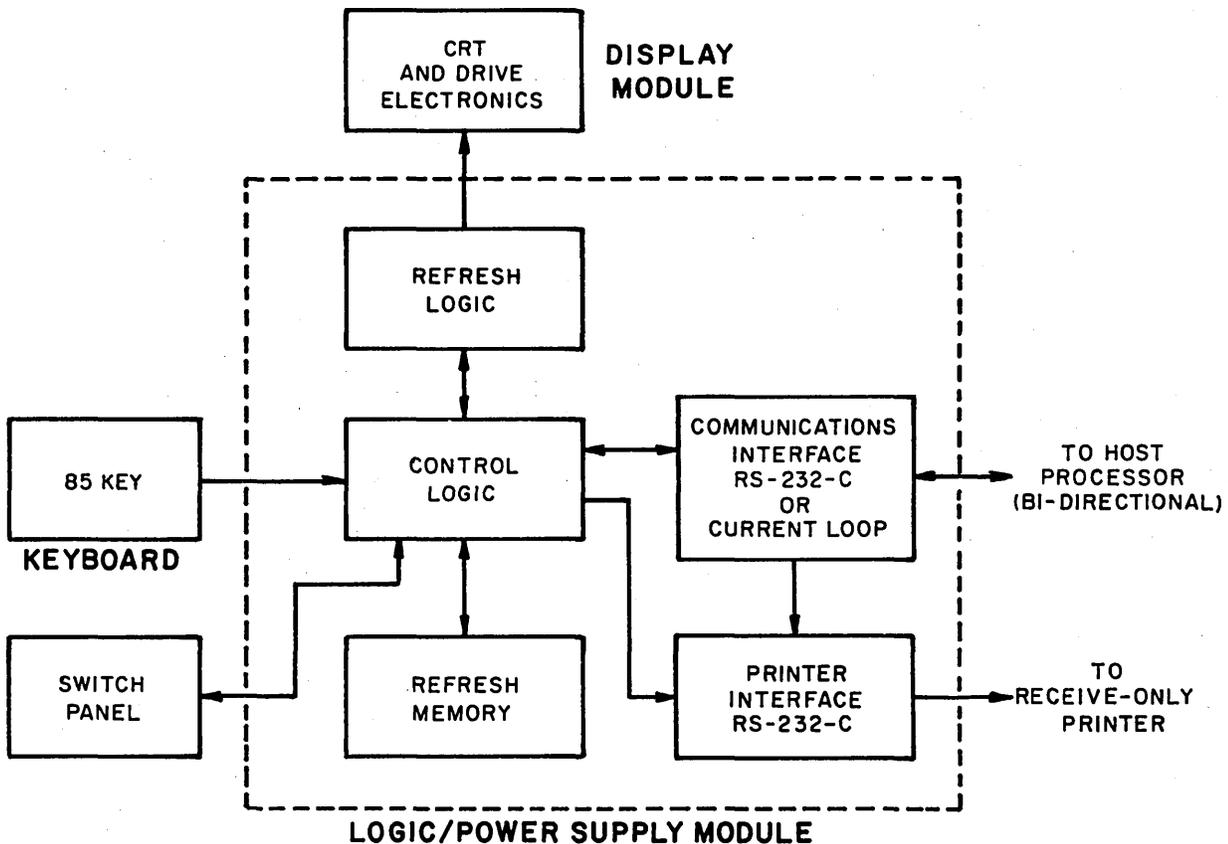


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Figure 1-2.   Simplified Terminal Block Diagram

## EQUIPMENT SPECIFICATIONS

The equipment specifications for the display terminal are listed in table 1-1.

TABLE 1-1.   EQUIPMENT SPECIFICATIONS

| CHARACTERISTIC | SPECIFICATION |
|---|---|
| Dimensions:<br>  Height<br>  Width<br>  Depth | <br>376 mm (14.8 in)<br>429 mm (16.9 in)<br>533 mm (21 in) |
| Weight:<br>  Uncrated<br>  Crated | <br>16.78 kg (37 lb)<br>19.9 kg (44 lb) |
| Power Requirements:<br>  (Nominal) | <br>120/220/240 V ac, 50/60 Hz, at<br>0.6 A (120 V) or 0.3 A<br>(220/240 V), 70 W maximum |
| Temperature:<br>  Operating<br>  Nonoperating<br>  Change/h | <br>10°C to 40°C (50°F to 104°F)<br>-40°C to 60°C (-40°F to 140°F)<br>8°C (18°F) |
| Relative Humidity:<br>  Operating<br>  Nonoperating<br>  Change/h | <br>20% to 80%<br>5% to 100%<br>10% |
| Operating Altitude: | 3000 m (9850 ft) maximum |
| Heat Dissipation (Air): | 240 Btu/h (70 W) maximum,<br>convection cooled |
| Display Format: | 24 lines, 80 characters per line |
| Display Area:<br>  (Nominal) | 216 mm (8.5 in) wide by<br>152 mm (6 in) high |
| Refresh Rate: | 50 Hz or 60 Hz, switch selectable |
| Display Memory Size: | 1920 characters |
| Transmission Speeds: | 110, 150, 200, 300, 600, 1200,<br>1800, 2400, 4800, 9600, and 1 9200<br>baud; switch selectable |

This section describes the operating controls and switches,
keyboard functions, and keyboard indicators of the display
terminal.  Information on maintenance controls, and related
adjustments is contained in section 5 under the specific
adjustment procedure requiring their use.  Internal control
jumpers are described in section 3, Installation.


OPERATING CONTROLS AND SWITCHES

Figures 2-1 and 2-2 show the location of the various operating
controls and switches.  The following paragraphs describe their
basic function.  Refer to the terminal reference manual for a
more detailed description (see preface for publication number).



OPERATOR
ACCESS DOOR

KEYBOARD

POWER ON/OFF
SWITCH

PRINTER
CONNECTOR

SNAP-IN
COVER

TEST/NORMAL
SWITCH

DATA SET
CONNECTOR

CBI CIRCUIT
BREAKER

POWER
CORD

VOLTAGE SELECT
SWITCH

03939-1
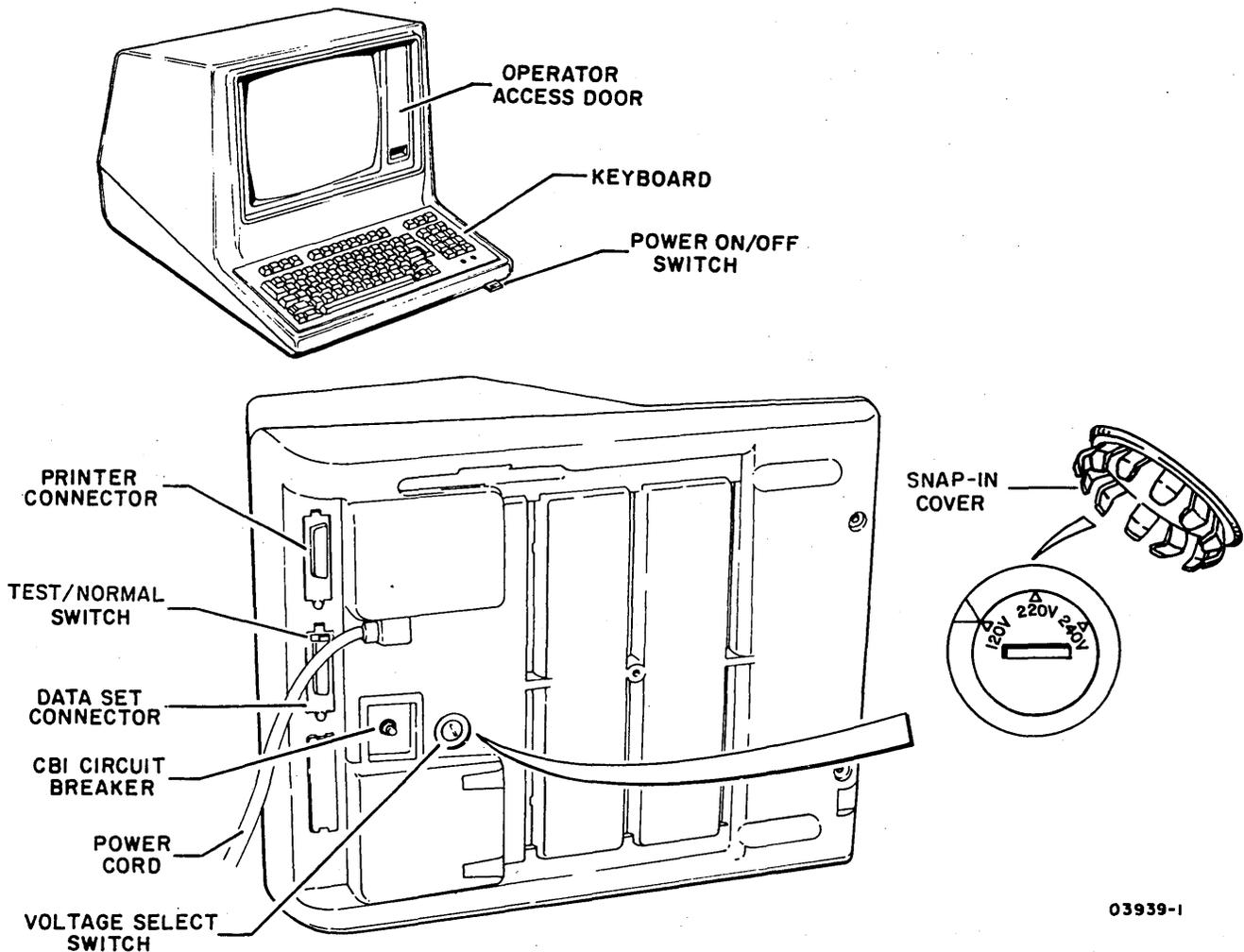
Figure 2-1.   Location of Operating Controls and Switches

POWER ON/OFF SWITCH

The power on/off switch controls the application of ac input
power to the display terminal. Power is applied by pulling the
switch lever forward (red-orange stripe on switch lever visi-
ble). Power is removed by pushing the switch lever in. Power
application automatically initiates the self-test feature.


CIRCUIT BREAKER (CB1)

Circuit breaker (CB1) provides overload protection for the dis-
play terminal. The circuit breaker is thermally actuated and
when tripped (circuit open) a red plunger is extended. The
circuit breaker is reset by pressing the plunger in.


VOLTAGE SELECT SWITCH

The Voltage Select switch is used to select the appropriate tap
of the power transformer for the ac voltage available at the
site power outlet. The switch has three positions marked 120 V,
220 V, and 240 V. The 120-V position is for primary power
between 104 and 128 V; the 220-V position for between 191 and
235 V; and the 240-V position for between 208 and 256 V. After
a snap-in cover is removed, the switch can be set using a
straight slot screwdriver while the terminal is tipped to one
side. The factory setting is 120 V.


BRIGHTNESS CONTROL

The BRIGHTNESS control provides for video intensity adjustment
to compensate for various ambient lighting conditions.


TEST/NORMAL SWITCH

The TEST/NORMAL switch, when positioned to the TEST position,
connects the RS-232-C/CCITT V.24 interface signals together such
that transmitted data is looped back as received data. With the
terminal in online mode, this causes keyboard data to be trans-
ferred to the switch and returned via the receive circuits at
the selected baud rate. Proper operation of the terminal in
half duplex results in two characters being displayed for each
alphanumeric character entered. Operation in full duplex
results in a single character entry. No data transfers to the
modem. Loop test is inoperative if current loop is selected.

The TEST position (switch positioned toward rear of terminal) of this switch alters the modem signal connections as follows:

## Open Connector Pins

Send Data (pin 2)                    Clear to Send (pin 5)
Received Data (pin 3)                Data Set Ready (pin 6)
Request to Send (pin 4)              Received Line Signal
                                     Detector (pin 8)

## Shorted Signal Lines

Send Data to Received Data
Request to Send to Clear to Send
Data Set Ready to Received Line Signal Detector to Data Terminal
Ready

Placing this switch to the NORM position (switch positioned toward front of terminal) restores the signal connections to their proper pins.

## CONTROL SWITCHES

The various control switches of the display terminal are shown in figure 2-2. The control functions and operating characteristics established by these switches are as follows:

## DATA RATE SELECT Switches

There are four DATA RATE SELECT switches used to select one of eleven different baud rates noted on the decal.

## PAR EVEN/PAR ODD Switch

Placing this switch to the PAR EVEN position causes the display terminal to generate, and test for, even word parity. Positioning this switch to PAR ODD causes the display terminal to generate, and test for, odd word parity.

62940003                                                          2-3

The function of this switch is altered when the PARITY ENABLE/
PARITY DISABLE switch is in the PARITY DISABLE position
(described under Mode Select Switches heading).



**DATA RATE SELECT**

| A: 110 | J: 4800 |
|--------|---------|
| B: 150 | K: 9600 |
| C: 200 | L: 19200 |
| D: 300 | M: 19200 |
| E: 600 | N: 19200 |
| F: 1200 | P: 19200 |
| G: 1800 | R: 19200 |
| H: 2400 | S: 19200 |

**MODE SELECT**

**SWITCH POSITION**

| | A | B |
|---|---|---|
| 1 | NORMAL | XPARENT |
| 2 | NORMAL | DATA ONLY |
| 3 | PAR EN | PAR DIS |
| 4 | 1 STP BIT | 2 STP BIT |
| 5 | ADVANCE | 752 |
| 6 | NORMAL | AUTO LF |
| 7 | DIS BELL | EOL BELL |
| 8 | RTS CONST | RTS SW |
| 9 | DTR CONST | DTR SW |
| 10 | 60 Hz REF | 50Hz REF |

DECAL

OPERATOR
ACCESS DOOR

NOTE: DATA RATE SWITCHES
SET FOR 300 BAUD

03878-2

POWER ON/OFF
SWITCH

Figure 2-2.  Front Panel Control Switches

ROLL/PAGE Switch

When this switch is in the ROLL position, the scroll feature is
enabled.  When this switch is in the PAGE position, the scroll
feature is disabled.  ADV mode operation changes the functions
of this switch and the display terminal remains in scroll mode
unless a scroll disable command is received.

The ROLL/PAGE switch is used to enable or disable the page print feature when the terminal is conditioned to ADV mode. Positioning the switch to PAGE enables the page print. The page print is disabled if the switch is positioned to ROLL.

## FULL DUP/HALF DUP Switch

The FULL DUP/HALF DUP switch determines how keyboard input data is routed within the terminal during online operation. Modem operation is not affected.

- In the FULL DUP position, data is sent to the modem only.

- In the HALF DUP position, data is sent to both the modem and display memory. Data is displayed or acted upon in the same manner as if received from the modem.

## ON LINE/LOCAL Switch

With the ON LINE/LOCAL switch in the LOCAL position, the terminal operates offline. This allows checking the operation of the terminal without communicating with the modem. The transmit circuits are disabled and keyboard data is displayed on the crt.

In the ON LINE position, keyboard data is transferred to the interface as keys are pressed. A 3-character internal buffer compensates for sporadic typing speeds in excess of the transmission line character rate.

## MANUAL RELEASE Switch

The MANUAL RELEASE switch is a momentary action pushbutton switch. Pressing this switch reinitializes terminal operation and if TRANSPARENT mode is selected, initiates the transparent mode test routine. Screen data is unaffected unless the transparent mode test is initiated. A print operation is terminated if active and the keyboard is unlocked if previously locked.

## MODE SELECT SWITCHES

The basic functions of the various mode select switches are described in the following paragraphs. Refer to figure 2-2 for switch locations.

## NORMAL/TRANSPARENT Switch

When this switch is in the NORMAL position, all codes are
stored, displayed, or acted upon as required for normal system
operation.

When this switch is in the TRANSPARENT position, the terminal
stores and displays all codes.  No control code functions are
performed other than storage and display of the code.

## NORMAL/DATA ONLY Switch

When this switch is in the NORMAL position, the terminal inhib-
its transmitted data if either Data-Set-Ready or Clear-to-Send
are off.  Data-Set-Ready must be on in order to recognize
received data.  If RTS SWITCHED is enabled, the
Received-Line-Signal-Detector must also be on in order to copy
received data.

When this switch is in the DATA ONLY position, the terminal dis-
regards the RS-232-C/CCITT V.24 modem control signals.  Data-
Terminal-Ready operates normally.

## PARITY ENABLE/PARITY DISABLE Switch

In the PARITY ENABLE position, the terminal generates and tests
for word parity as previously described under the PAR EVEN/PAR
ODD switch functions.

Placing this switch in the PARITY DISABLE position disables the
parity-checking logic and causes the terminal to transmit either
a mark or space condition in the parity bit position of each
transmitted word as determined by the position of the PAR
EVEN/PAR ODD switch.  Parity Even = Mark; Parity Odd = Space.

If parity is reselected, the terminal must be reinitialized by
reapplying power or by pressing the MANUAL RELEASE switch.

## 1 STOP BIT/2 STOP BITS Switch

This switch selects the number of stop bits in the transmitted word. Received data requirements are not affected. If the stop bit selection is changed, the terminal must be reinitialized by reapplying power or by pressing the MANUAL RELEASE switch.

## ADV/752 Switch

This switch determines what features are active and establishes the type of line communication coding to be used for external I/O transmission.

## NORMAL/AUTO LF Switch

The normal or auto line-feed functions apply only to 752 mode operation. Operation in ADV mode does not require the auto line feed feature thereby allowing the switch to be used in a manner not related to carriage return/line-feed operations.

- 752 mode - In the NORMAL position, a carriage-return operation positions the cursor to the beginning of the current line. A line feed is not performed.

  In the AUTO LF position, a line-feed operation and a carriage-return operation are performed during a carriage-return operation.

- ADV mode - In the NORMAL position, the first character position is equal to zero and progresses in binary fashion. When in the AUTO LF position, the cursor address is biased by $040_8$ when sending or receiving X/Y positioning information and cursor position 0 is equal to $040_8$. Addressing is incremented in normal binary progression to $157_8$ for the 80th column and $067_8$ for the 24th line position.

## DISABLE BELL/EOL BELL Switch

When this switch is in the EOL BELL position, cursor movement to the 73rd character position from the 72nd character or entry into the 24th line from the 23rd line causes the alarm to sound. In the DISABLE BELL position, the alarm is disabled.

## RTS CONSTANT/RTS SWITCHED Switch

The RTS CONSTANT position of this switch causes the Request-to-Send signal to be on whenever DSR and DTR are on.  If the RTS switch function is changed, the terminal must be reinitialized by pressing the MANUAL RELEASE switch or by reapplying power.

When the switch is in the RTS SWITCHED position, the RTS signal is activated as follows:

- Half Duplex - RTS turns on with the first keystroke and is switched off a minimum of 1 millisecond following transmission of a CR ($015_8$), ETX ($003_8$), EOT ($004_8$), LF ($012_8$), or if a break code is received, or if local mode is selected.  Automatic response sequences cause RTS to be switched off 1 millisecond following the last word transferred.

- Full Duplex - RTS turns on during a power on application and is switched off when local mode is activated.

## DTR CONSTANT/DTR SWITCHED Switch

The DTR CONSTANT position of this switch causes the DTR signal to be in the on condition.  In the DTR SWITCHED position, the DTR signal is turned off when the terminal is in local mode.  Received data is ignored if DTR is off.  If the DTR switch function is changed, the terminal must be reinitialized by pressing the MANUAL RELEASE switch or by reapplying power.

## 60 HZ REFRESH/50 HZ REFRESH Switch

The refresh rate selection switch must be set at the rate of the primary power frequency.  Selection of the improper refresh rate causes instability of the presentation on the crt.  If the refresh rate is reselected, the terminal must be reinitialized by a power-on application.

## KEYBOARD FUNCTIONS

The keyboard provides for operator input of alphanumeric data, control codes, and terminal functions.  The keyboard operates in

four different levels of line coding. The levels are established as follows:

- First level - key only

- Second level - key and SHIFT

- Third level - key and CONTROL

- Fourth level - key, SHIFT, and CONTROL

Refer to the 722-10/20 Display Terminal Reference manual for line coding generated by the various levels (publication number is listed in the preface of this manual).

KEYBOARD INDICATORS

Two indicators are located on the keyboard as shown in figure 2-3. The LOCK (keyboard locked) indicator lights during a print operation and following each Request-to-Send until a Clear-to-Send is received. The keyboard locked condition can be cleared by pressing the MANUAL RELEASE switch or by reapplying power to the terminal.

The DSR indicator indicates the condition of the Data-Set-Ready signal from the modem.
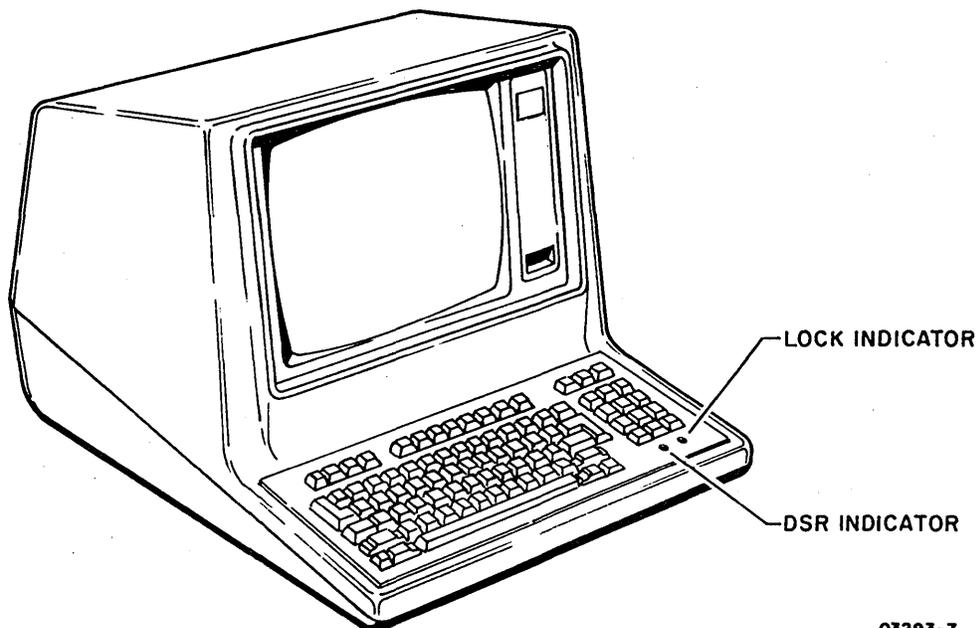


Figure 2-3. Keyboard Indicators

This section provides information on packaging, installation, and checkout of the display terminal.

## PACKAGING

### CAUTION

Observe MOS circuit handling precautions (described in section 5 of this manual) when packaging logic/power-supply module.

The display terminal is packaged for shipment as shown in figure 3-1. The I/O cable is shipped separately. If the display terminal is to be reshipped, it must be packaged as it was originally received from the factory. If the logic/power-supply module is to be returned for repair, use the materials specified in the packaging instructions of figure 3-2. Packaging materials may be obtained from:

Control Data Corporation
Corporate Traffic
8100 34th Avenue South
Minneapolis, MN 55440

## INSTALLATION

The following paragraphs describe the installation requirements and installation instructions for the display terminal.

## INSTALLATION REQUIREMENTS

Observe the following installation requirements:

- The primary power for the terminal must have adequate circuit overload protection devices to limit the maximum current flow to 20 A.

## NOTES

1. USE PREFABRICATED SHIPPING MATERIALS (CDC P/N 41037500) FOR PACKAGING.
2. INTERLOCK FOAM BASE LEGS WITH END FRAMES.
3. PLACE END FRAMES WITH BASE LEGS ON DISPLAY TERMINAL.
4. PLACE DISPLAY TERMINAL WITH END FRAME CUSHIONING INTO EXTERIOR CONTAINER.
5. LOCK L BLOCKS IN POSITION.
6. SECURE POWER CABLE IN SLITS OF END FRAMES. (DO NOT LET PLUG DANGLE).
7. CLOSE AND SEAL EXTERIOR CONTAINER WITH 3-IN. REINFORCED BOX SEALING TAPE.
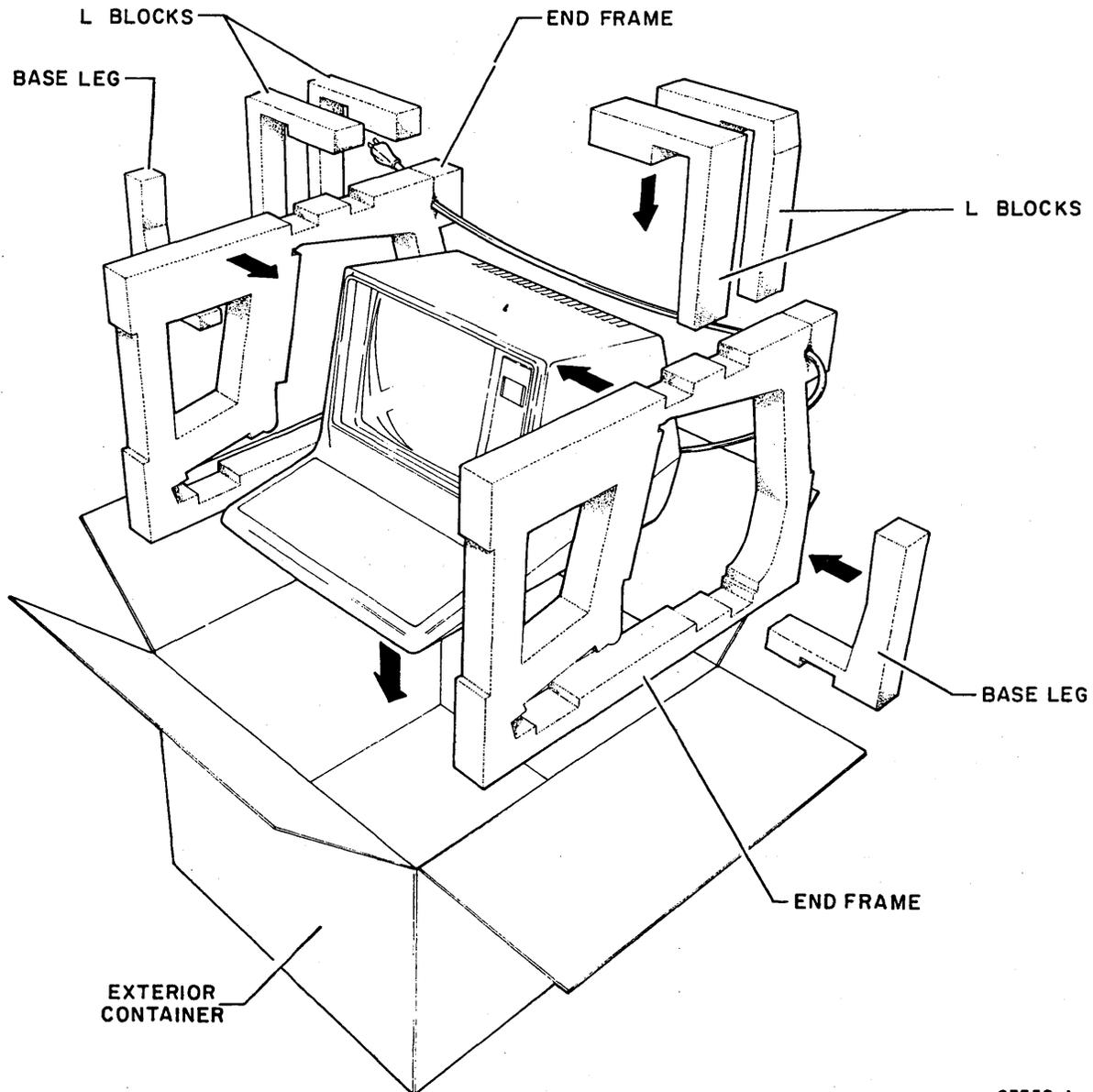


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Figure 3-1.  Display Terminal Packaging Instructions

## NOTES

1. USE PREFABRICATED SHIPPING CONTAINER AND ANTISTATIC BAG (CDC P/N 5912620O) FOR PACKAGING.

2. PLACE LOGIC/POWER-SUPPLY MODULE IN ANTISTATIC BAG WITH MODULE HEAT SINK AT OPEN END OF BAG. SEAL BAG WITH TAPE.

3. PLACE BAG CONTAINING MODULE INTO CONTAINER WITH HEAT SINK FACING UP AND LOCATED AT HINGED END OF CONTAINER.

4. CLOSE CONTAINER AND SEAL WITH 3/4-in FILAMENT TAPE.



TOP, CONVOLUTED FOAM

HEAT SINK (ON MODULE)

LOGIC/POWER-SUPPLY MODULE

CONTAINER

ANTISTATIC BAG

BOTTOM, CONVOLUTED FOAM
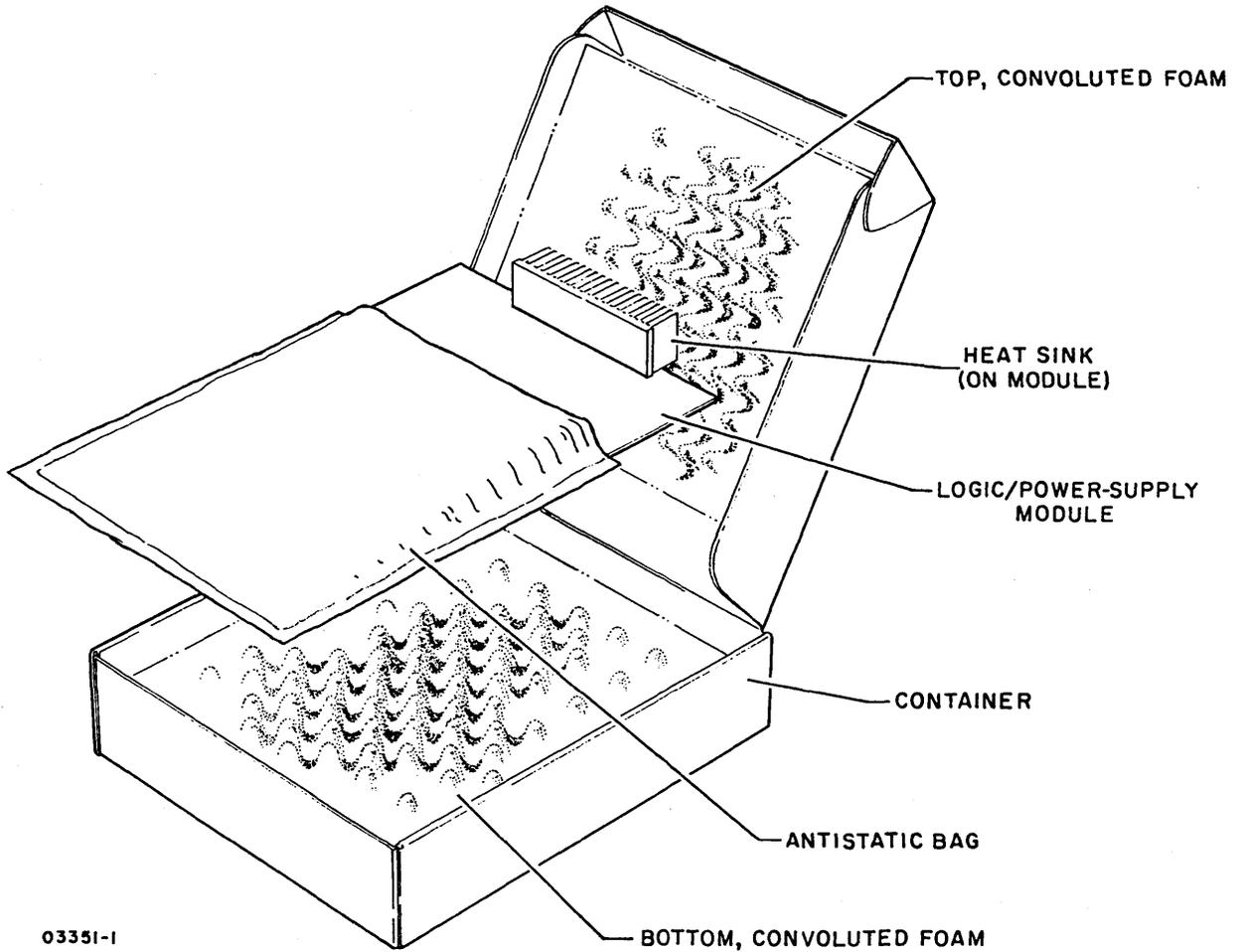
03351-1

Figure 3-2.  Logic/Power Supply Module Packaging Instructions

- The installation site must be designed in such a manner as to allow easy accesss to the primary power circuit outlet by the operator.

- Check that enough cable slack is provided to allow moving the display terminal approximately 1 meter (3 feet) to permit servicing.

- Avoid direct sunlight on the display screen.

- Allow a 102-mm (4-in) minimum air space at top and sides of display terminal to provide adequate cooling.

- Avoid installing display terminal in areas of high electromagnetic interference.

- Avoid installing display terminal where particulate, liquid, and gaseous atmospheric contaminates exist, such as found in some process industries.

- I/O cable should be separated from electrical wiring (100 or 235 volts, 50 or 60 Hz) by a minimum of 50 mm (2 in). Unshielded, high-power, or high-energy wiring may require a larger separation. Cabling may be run in the same conduit as telephone lines.

- The customer is responsible for providing the I/O cable. Standard lengths and CDC part numbers are:

  |  |  |  |
  |---|---|---|
  | 3.2 m | (10.5 ft) | 61409028 |
  | 6.2 m | (20.5 ft) | 61409029 |
  | 9.1 m | (30 ft) | 61409030 |
  | 12.2 m | (40 ft) | 61409031 |
  | 15.2 m | (50 ft) | 61409032 |

  Special cables designed for use with the terminal are described in Appendix A.

  If the I/O cable is not available with the system, have customer contact the CDC marketing representative.

- I/O cable runs, both horizontal and vertical, must be supported every 3.0 m (10 ft).

INSTALLATION INSTRUCTIONS

Install the display station per the following. Procedure numbers used in the steps refer to specific procedures contained in section 5B of this manual.

1. Unpackage display terminal (refer to figure 3-1) and move to desired location.

2. Inspect for any shipping damage.

3. Tip terminal to one side and remove snap-in cover that is over Voltage Select switch.  Verify that switch is set correctly for site input voltage.

| Switch Position | Voltage Range |
|---|---|
| 120 V | 104 V ac to 128 V ac |
| 220 V | 191 V ac to 235 V ac |
| 240 V | 208 V ac to 256 V ac |

4. Set front panel switches as required by the operating system.  The data site manager can assist in determing proper switch settings.  (Refer to the Installation section of the Operator's Guide for typical switch selections.)  Use figure 3-3 to plan the switch configuration and to provide a record for maintenance personnel.  Keep a copy of the record with each terminal.



Note:  Place an X in the appropriate column to indicate switch selection.

Figure 3-3.   Front-Panel Switch Setting Record

To set the data rate switches, refer to the decal on the inside of the operators access panel and note the alpha character associated with the desired data rate. Find the alpha character on the switch panel and set the switches as indicated by the white and black blocks below the alpha character. If a block is white, set the related switch to the left; if the block is black, set the related switch to the right.

For example, to select an 1800 baud data rate (alpha character G), set switches 1 and 4 to the right and switches 2 and 3 to the left.

If the data rate is reselected, reinitialize the terminal by powering it off and on, or by pressing the MANUAL RELEASE switch.

5. Position internal jumpers on logic/power supply and switch-panel boards as required for system operation. To change internal jumpers, remove hood (procedure CRT2) and refer to figures 3-4 and 3-5 for jumper locations. Use a small pair of needle-nose pliers to grasp jumper.

NOTE

Only the NORMAL/CURRENT LOOP and Cursor Home Position jumpers are subject to change during installation. Do not change any other jumpers. The functions established by these jumpers are as follows:

- NORMAL/CURRENT LOOP (on logic/power-supply board) - Factory jumpered to NORMAL position (two jumpers). This establishes an RS-232-C communication line interface. If a current-loop interface is desired, change both jumpers to CURRENT LOOP position (figure 3-4).

- Cursor Home Position (on switch-panel board) - Factory jumpering causes cursor home position to be as determined by ROLL/PAGE switch setting. If first character position of first line is desired for home position regardless of scroll feature, change jumper to First Line Home Position (figure 3-5).

6. Connect modem I/O cable, and printer I/O cable if used, to rear connectors of terminal (figure 3-6). The printer must operate at the same data rate as the communications interface.

7. Check that TEST/NORMAL switch is in NORMAL position.

8. Check that terminal Power On/Off switch is pressed in (off) and plug ac power cord into site outlet.

## NOTE

A CDC part number 15165426 power cord
is required for 220-V/240-V, 50-Hz
Schuko type site outlets.
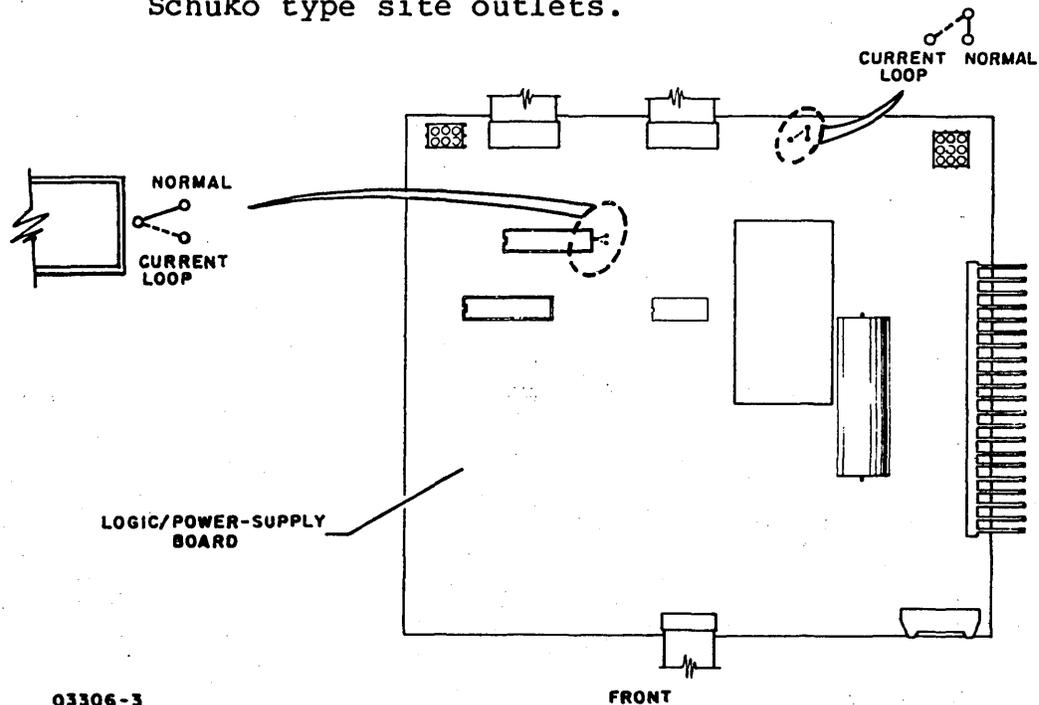


03306-3

Figure 3-4.   NORMAL/CURRENT LOOP Jumper Location
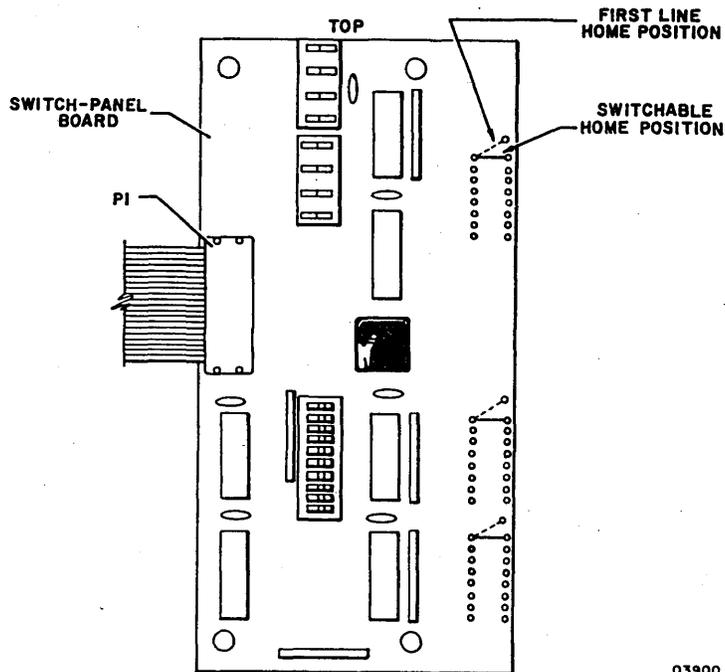


03900

Figure 3-5.   Cursor Home Position Jumper Location

DATA SET
CONNECTOR
TEST/NORMAL
SWITCH
OPTIONAL PRINTER
CONNECTOR
03299-7
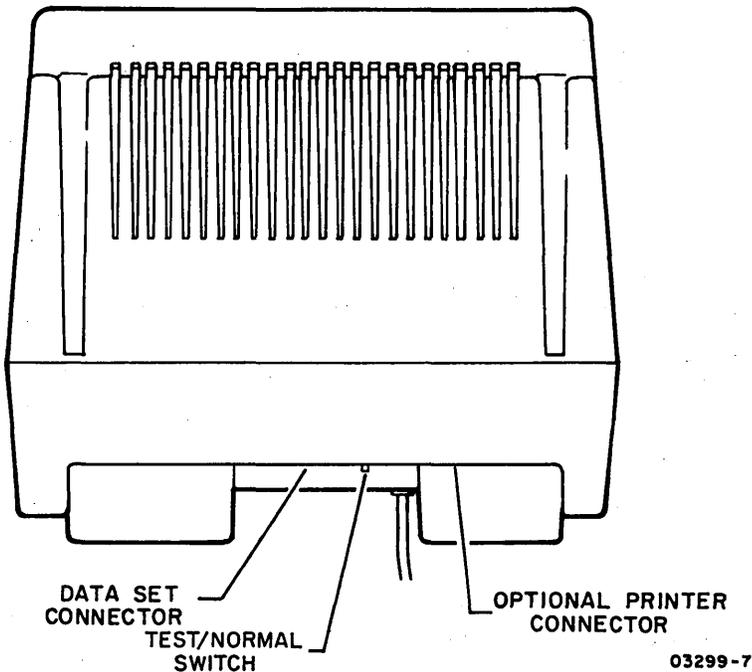
Figure 3-6.   I/O Connector Locations


CHECKOUT

Checkout of the terminal is performed through use of the diag-
nostic self-test routines described in section 5 of this manual,
and also through use of the Loop Test switch to check the exter-
nal loopback capability.  Procedure numbers used in the follow-
ing steps refer to specific procedures contained in section 5B.

1. Apply power to display terminal (procedure CRT1).

2. Observe display screen for power-on test failures.
   Troubleshoot any test errors per SAM CRT3.  If a terminal
   power-on problem occurs, refer to SAMs CRT1 and CRT2.

3. Execute transparent-mode test routines by placing
   NORMAL/TRANSPARENT switch to TRANSPARENT position,
   pressing MANUAL RELEASE switch, and placing LOOP TEST
   switch in TEST position.

4. Observe display screen for test failures.  Troubleshoot
   any test errors per SAM CRT3.

5. Perform switch-panel test per prompts on display.


NOTE

Skip steps 6 through 9 if current
loop is selected.

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6. Place TEST/NORMAL switch to TEST position.

7. Press MANUAL RELEASE switch to exit from switch-panel routine and advance to keyboard routine.

8. Check operation of several alphanumeric keys and observe screen for correct display of characters. Each keystroke will produce multiple characters on screen. Data is transferred through the TEST/NORMAL switch at the selected baud rate.

9. Observe overall display quality. Slight variations in display geometry are acceptable. If video adjustments are required, refer to procedure CRT3.

10. Return NORMAL/TRANSPARENT switch to NORMAL position, and TEST/NORMAL switch to NORMAL position (towards keyboard).

11. Press MANUAL RELEASE switch to exit from self-test routines.

12. Place ON LINE/LOCAL switch to LOCAL position.

13. Check sound level of audio alarm by performing a CONTROL G function at keyboard. To adjust, remove hood (procedure CRT2) and adjust R7 on logic/power-supply board.

14. Return ON LINE/LOCAL switch to ON LINE position.

15. Place TEST/NORMAL switch to TEST position.

16. Place FULL DUP/HALF DUP switch to FULL DUP position.

17. Key in data. A single character should display for each keyboard input. Repeat for each alphanumeric key.

18. Return TEST/NORMAL switch to NORMAL position and check that FULL DUP/HALF DUP switch is in correct position as required for system operation.

19. To checkout an attached printer, do the following:

    a. Place ADV/752 switch to ADV position.

    b. Enter data from keyboard.

    c. Press PRINT key. All data starting from beginning of current line should print out on printer. Refer to applicable printer maintenance manual for any printing problems.

20. Run any applicable system tests that may be specified by system level documentation.

This section contains only the interconnection diagram for the
display terminal.  Logic diagrams are contained in a separate
support information manual (see preface for publication number).

INTERCONNECTION DIAGRAM,
(VIKING TTY DISPLAY TERMINAL 50/60 HZ)

REFERENCE DRAWING

FIRST USED ON: CC 628A

| DWN | Mary Dietz | 1/31/80 |
| CHKD | | 2/1/80 |
| ENGR | | 2-8-80 |
| MFG | | 2-13-80 |
| APPR | | 3-28-80 |

COMPONENTS, EXCEPT AS NOTED

CODE IDENT: 15920

DRAWING NO: 62201048

SHEET 1 OF 1

NOTE: ⚠ VOLTAGES MAY VARY +10% TO -15%.

62940003 D

4-2

62201048

This section provides information necessary to perform on-site
maintenance on the terminal.  The material presented assumes
expertise in basic terminal maintenance techniques including use
of common CE tools and equipment.  The maintenance information
covers checks, adjustments, removal, and replacement of the
field-replaceable components as directed by the associated SAM
(structured analysis method) listings for the terminal.
Information is organized under the following major headings:

- General Maintenance Information

- Diagnostic and Corrective Maintenance

## GENERAL MAINTENANCE INFORMATION

The following paragraphs provide information that the customer
engineer should be familiar with before performing maintenance
on the terminal.  Topics discussed are:

- Suggested Emergency Maintenance Procedure

- Safety Precautions

- Maintenance Tools and Materials

- MOS Circuit-Handling Precautions

- Maintenance Aids

- Location of Major Assemblies

- Internal Controls

## SUGGESTED EMERGENCY MAINTENANCE PROCEDURE

The following procedure provides suggested steps for the cus-
tomer engineer (CE) to follow when responding to a customer
request for maintenance on the terminal.

## Before Leaving For Customer Site

Before leaving for the customer site, the CE should call the customer and talk to the person operating the terminal at the time the malfunction occurred, then:

1. Determine the following:

   a. Type of symptoms terminal exhibited to indicate that a malfunction occurred.

   b. Whether terminal is operating and what symptoms, if any, are present when an attempt is made to operate.

2. Decide course of action to take, for example:

   a. Go to customer site and begin troubleshooting.

   b. Deduce that terminal itself is probably not at fault and most likely cause of problem is either communication lines or a power reduction or loss. In either case, CE can notify responsible party (common carrier or customer) of problem.

   c. Decide that an error in operating procedure rather then equipment failure is probably cause of malfunction, and notify customer of correct operating procedure.

3. If a site maintenance trip is required, CE should try to determine a probable cause for failure and gather necessary tools, manuals, and spare parts that may be needed.


## Upon Arriving At Customer Site

Upon arriving at the customer site, the CE should locate the appropriate supervisory personnel and again talk to the terminal operator concerning the malfunction, then:

1. Visually inspect terminal to ensure that correct input/output and power cable connections exist.

2. Verify that a malfunction does exist, and then begin to troubleshoot terminal.

3. After source of malfunction is corrected, CE should:

    a. Run diagnostic self-test routines explained later in this section to ensure that terminal is operational.

    b. Demonstrate to customer that terminal is now operating properly within system.


SAFETY PRECAUTIONS


### WARNING

Observe the following safety precau-
tions at all times.  Failure to do
so may cause equipment damage and/or
personal injury.


- Hazardous voltages exist in the terminal.  Do not attempt repair unless qualified to do so.

- Exercise caution any time checks or adjustments are being made to terminal when power is applied.

- Always turn power off and disconnect ac power cord when removing/replacing components or cables.


MAINTENANCE TOOLS AND MATERIALS


The maintenance procedures require the use of common CE tools and test equipment.  No special materials are required.


MOS CIRCUIT-HANDLING PRECAUTIONS


Special handling procedures are necessary for printed circuit cards containing MOS (metal-oxide semiconductor) integrated circuits.  Observe the following precautions when handling the logic/power supply board:


- Turn power off before removing/installing or otherwise connecting/disconnecting any circuits.

- Ensure that any item that comes in contact with card is electrically grounded.

- Touch metal chassis frame to bleed off any accumulated static charge before handling card and continue to touch chassis while removing/installing card.

- Handle card only by a noncircuit portion. Connector pins and circuit paths must not be touched.

- Place card in a special conductive envelope whenever card is removed from chassis.

## MAINTENANCE AIDS

There is no scheduled maintenance for the terminal. In the event of failure, the primary maintenance aids are the self-test routines and SAM troubleshooting listings. These aids are structured to isolate the failure to a field-replaceable component/assembly and to provide a procedure number reference to the applicable maintenance procedure to be used for correcting the malfunction. Refer to the Diagnostic and Corrective Maintenance heading for organization of this material.

## LOCATION OF MAJOR ASSEMBLIES

Figure 5-1 shows the location of the major assemblies within the display terminal.

## INTERNAL CONTROLS AND FUSES

Internal controls are located on the monitor pc board and on the yoke assembly for maintenance adjustments of the video display. An audio alarm potentiometer is located on the logic/power supply board. The following paragraphs describe the functions of these controls and identify the power supply circuits associated with the fuses contained on the logic/power supply board.

### Monitor PC Board

The monitor pc board adjustment controls are:

- VIDEO-HORIZ PHASE control (R104) - adjusts centering of the video information within the raster.

- VERT SIZE control (R309) - adjusts vertical display height.
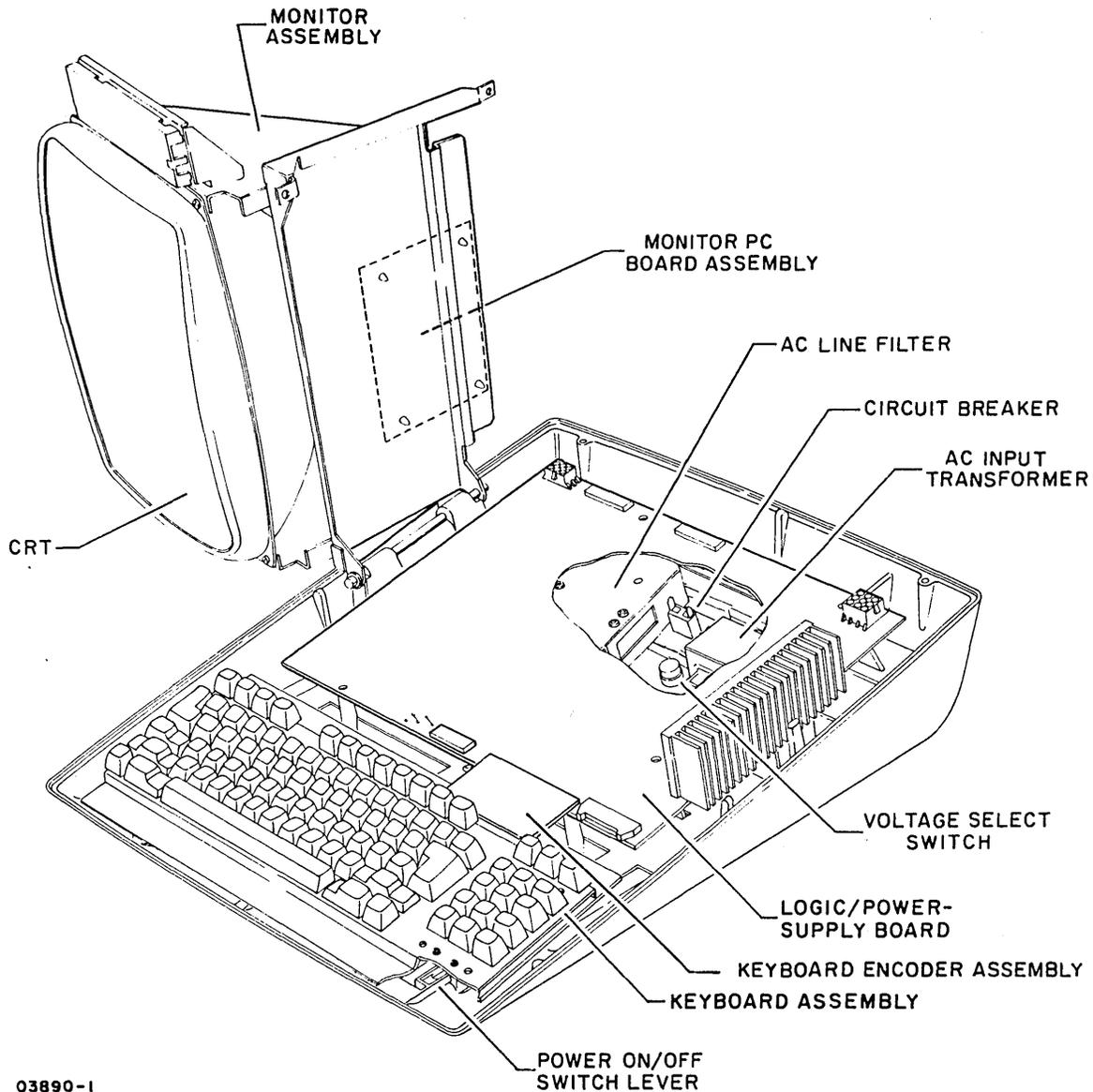
Figure 5-1. Location of Major Assemblies

- HORIZ WIDTH coil (L102) - adjusts horizontal display width.

- FOCUS control (R415) - adjusts focus of displayed data.

- BRITE control (R412) - adjusts raster cutoff level.

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## Yoke Assembly

The yoke assembly adjustment controls are:

- Centering rings - adjusts centering of raster on crt.

- Trim magnets - adjusts for minimum distortion of displayed data.


## Logic/Power Supply Board

The logic/power-supply board adjustment controls and fuses are:

- +15-V-Adjust potentiometer (R6) - this potentiometer is factory sealed. No alteration of the factory setting should be made during field maintenance.

- Audio Alarm potentiometer (R7) - adjusts sound level of audio transducer. Factory adjustment is for maximum sound level.

- Fuse F2 (4.0A Slow Blow) - provides overload protection for the 20 V ac transformer outputs feeding the +15 V power supply.

- Fuse F4 (1.5A Slow Blow) - provides overload protection for the 15.9 V ac transformer output feeding the -12 V power supply.

- Fuse F3 (1.5A Slow Blow) - provides overload protection for the 15.9 V ac transformer output feeding the +12 V power supply.

- Fuse F1 (4.0A Slow Blow) - provides overload protection for the 10.8 V ac transformer outputs feeding the +5 V power supply.


## DIAGNOSTIC AND CORRECTIVE MAINTENANCE

The following paragraphs describe the diagnostic self-test routines, provide an explanation of the SAM format used for troubleshooting information, and describe the organization of the SAMs and related maintenance procedures.

DIAGNOSTIC SELF-TEST ROUTINES

The display terminal contains three internal self-test routines
that test the basic operating capability of the logic circuits.
The first test routine (power on) is initiated immediately
following a power-on application.  The second routine (system
level) is initiated upon receipt of an Initiate Test command at
the communications interface.  The third routine (transparent
mode) is initiated by manually pressing the front panel MANUAL
RELEASE switch when the display terminal is in transparent mode.

## Power-On Test

The power-on test is initiated immediately following a power-on
application and consists of the following routines:

- Processor Routine - checks internal RAM and the
  processor.  A message of CPU OK or CPU TEST FAIL is
  displayed on crt at test completion (assuming the failure
  mode does not prevent display).

- Program Memory Routine - determines if the internal pro-
  gram coding is as intended.  Proper coding results in the
  message LRC B0 OK and LRC B1 OK being displayed.
  Improper coding causes display of a LRC B0 FAIL or LRC B1
  FAIL message.

- Program Revision Routine - causes two numerals represent-
  ing the program revision level to be displayed in the
  first line of the crt as follows:  REV 1.1, REV 1.2, etc.

- Internal Loopback Routine - determines if a problem
  exists in the communication logic.  The displayed
  messages resulting from this routine are INT LOOP OK or
  INT LOOP FAIL.

- Alarm Routine - the audible alarm is momentarily acti-
  vated upon completion of the power-on test routines.

## System Level Test

The system level test is initiated upon receipt of an Initiate
Test command ($036_8$, $026_8$) only when the terminal is in ADV
mode.  All of the routines of the power-on test are performed
but are first preceded by a program memory test.  The program

memory test consists of a write followed by a read to compare sliding alpha patterns shifted 256 times. Completion is indicated by a RAM TEST OK or RAM TEST FAIL message being displayed on the crt. Automatic responses are provided to the communication interface to indicate successful completion or failure of the test.


## Transparent Mode Test


The transparent mode test is initiated by pressing the MANUAL RELEASE switch when the display terminal is in transparent mode. This test causes all of the routines described in the previous tests to be executed, plus the following routines. Continuation of the test routines following a RAM test failure is accomplished by pressing the MANUAL RELEASE switch again.


- The RAM test is modified to halt on error with the cursor positioned to the error position. Continuation of the test following a failure is accomplished by pressing the MANUAL RELEASE switch.


- ROM Character Generation Routine - four lines containing the following information are displayed (see figure 5-2):

   - 32 control codes
   - 64 alphanumeric and special characters
   - 32 lowercase and special characters
   - 32 line-drawing characters


- Switch Panel Routine - switch positions display on the crt as a series of 1 and 0 patterns; the order of presentation is shown in the attached figure (see figure 5-3). Operating the front-panel switches cause the character to be a 1 if the switch is positioned to the left. Exit from this test is accomplished by pressing the MANUAL RELEASE switch.

RAM TEST OK
CPU TEST OK
LRC B0 OK LRC B1 OK
REV: 1.1
INT LOOP OK

!"#$%&'()*+,-./0123456789:;(=)?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`

abcdefghijklmnopqrstuvwxyz{!}~£

SWITCH TEST
10001111010010011111111111

NOTE:   PROGRAM  REVISION  LEVEL  MAY  NOT  BE  THE   03972-2
          SAME  AS  SHOWN  IN  FIGURE

Figure 5-2.   ROM Character Display Example

- Keyboard Routine – (Disabled if current loop is selected)
  this section of the transparent mode test must be run
  with the Loop Test switch set to TEST position.  In this
  routine, pressing any key causes each character position
  on the crt to be filled with the data word or control
  code entered.  Function keys cause the entry of
  characters corresponding to the code transferred during
  normal communication activities.  Exit from this routine
  is accomplished by pressing the MANUAL RELEASE switch.
  This returns the terminal to an idle transparent mode.

NOTE

The terminal is not responsive to
communications or keyboard activity
except as noted during testing.

The switch panel diagram shows diagonal labels (top to bottom):
ROLL - PAGE
FULL DUP - HALF DUP
ONLINE - LOCAL
NORMAL - XPARENT
DIS BELL - EOL BELL
NORMAL - AUTO LF
ADVANCE - 752
MANUAL RELEASE
PAR EVEN - PAR ODD
1 STP BIT - 2 STP BIT
PAR EN - PAR DIS
NORMAL - DATA ONLY
DATA RATE 4TH
DATA RATE 3RD
DATA RATE 2ND
DATA RATE 1ST (TOP)
60 HZ REFRESH - 50HZ REFRESH
DTR CONST - DTR SW
RTS CONST - RTS SW

X X X | X | X X X | X | X X X X X X X X | X X X X | X X X

NOT USED "1" OR "0"

└ SHOULD ALWAYS BE A "1"

└ SHOULD READ A "0"

04031

Figure 5-3.   Switch Panel Test Presentation Order

## EXPLANATION OF SAM FORMAT

A SAM listing is a specialized format used to present trouble-shooting information in a logical manner.  Figure 5-4 illustrates the basic SAM format.  Any applicable assumptions or advisory information is provided in the header information of the SAM.

To interpret a SAM, start at the top of the page and determine the response for the first question posed.  Then follow the appropriate dashed line beneath the Y or N response.  Answer the next question, etc. until the action numbers are reached. Perform the action(s) listed in that column in numerical order to correct the problem.

ORGANIZATION OF SAMs AND PROCEDURES

The SAMs and maintenance procedures are organized in two separate subsections of this manual as follows:

- SAM Listings (section 5A)
- Maintenance Procedures (section 5B)
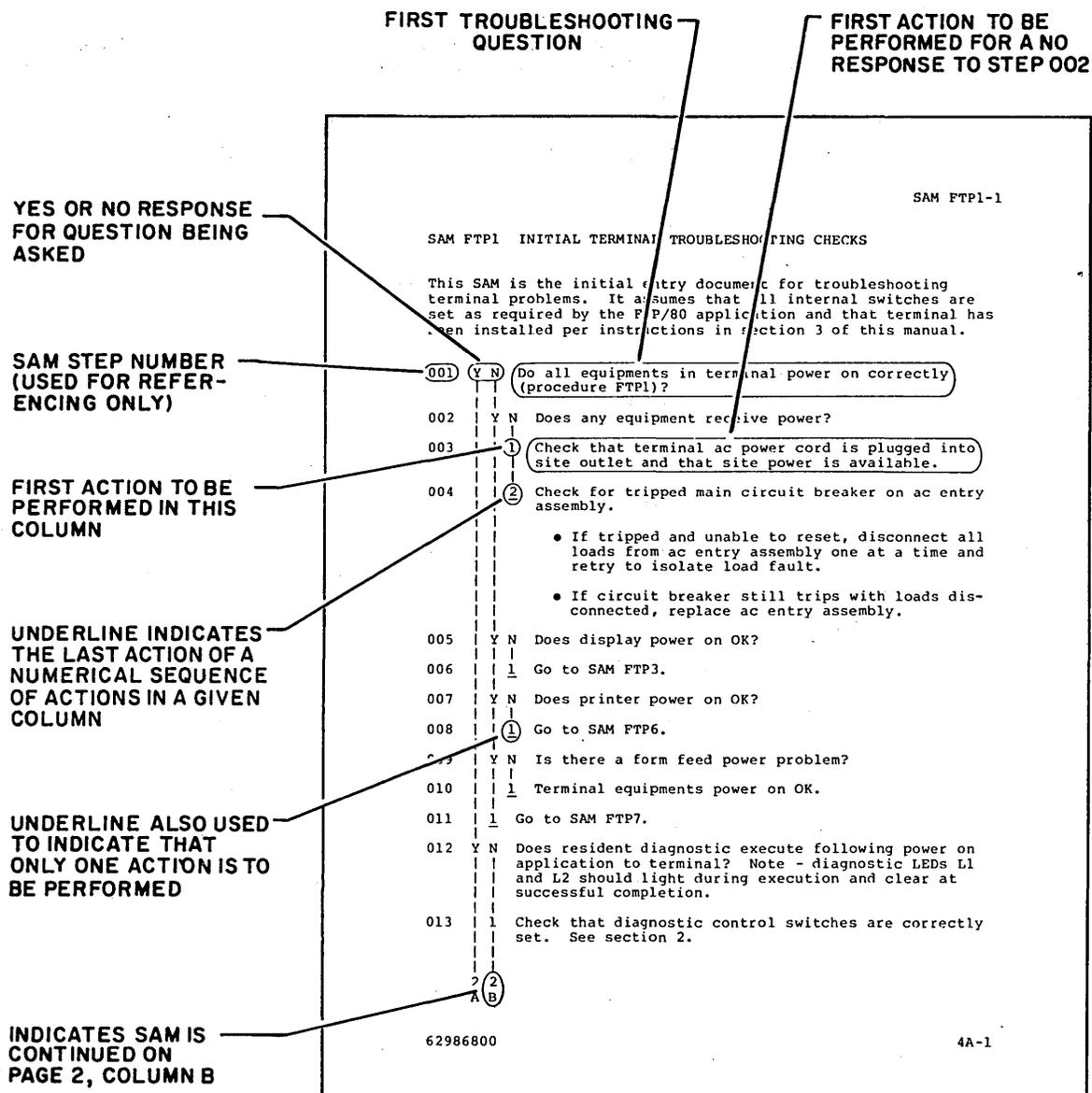


Figure 5-4.   SAM Example

SAMS

SECTION 5A

SAM CRT1 POWER FAULT ISOLATION


This SAM assumes that ac power cord is plugged into site outlet
and that voltage select switch is set correctly for site voltage
available.


```
001   Y N   Does circuit breaker CB1 trip when power is applied?
      | |
002   | Y N   Are any fuses blown on logic/power supply board?
      | | |
003   | | Y N   Are any transformer secondary ac voltages missing
      | | | |   at input connector J6/P6 of logic/power-supply
      | | | |   board?  Refer to interconnection diagram, section 4
      | | | |   of this manual for connector pins/ac voltages to be
      | | | |   measured.
      | | | |
004   | | | Y N   Is +15 V low or missing at connector J8/P8 of
      | | | | |   logic/power-supply board?  Pin 2 is +15 V and
      | | | | |   pin 3 is return.  Do not use chassis for ground
      | | | | |   when measuring +15 V.
      | | | | |
005   | | | | Y N   Is +12 V low or missing?  Measure at IC pins of
      | | | | | |   A4 or A7.  Pin 14 is +12 V, pin 7 is ground. (1)
      | | | | | |
006   | | | | | Y N   Is -12 V low or missing?  Measure at IC pins
      | | | | | | |   of A4 or A7.  Pin 1 is -12 V, pin 7 is
      | | | | | | |   ground. (1)
      | | | | | | |
007   | | | | | | Y N   Is +5 V low or missing?  Note that three
      | | | | | | | |   separate +5 V regulators are used for
      | | | | | | | |   rows A, B, C, and D, E, and F, G.  The
      | | | | | | | |   regulator outputs can be checked at IC
      | | | | | | | |   locations A06, D04, and G07.  Pin 14 is
      | | | | | | | |   +5 V, pin 1 is ground. (1)
      | | | | | | | |
008   | | | | | | | 1   Internal voltages are OK.
      | | | | | | |
009   | | | | 1 1 1   Replace logic/power-supply board (proce-
      | | | |         dure CRT8).
      | | | |
010   | | | 1   If +15 V is low or missing, disconnect monitor
      | | |     assembly, allow time to cool, and retry.  If still
      | | |     low or missing, replace logic/power-supply board
      | | |     (procedure CRT8).  If OK, isolate/replace monitor-
      | | |     assembly field-replaceable components.
      | | |
      | | |
      2 2 2
      A B C
```

```
     A B C
     1 1 1
     | | |
010  | | 1  Replace transformer, or if all secondary voltages are
     |   ─    missing, check ac input components for open circuit
     | |      (refer to interconnection diagram in section 4 of this
     | |      manual).
     | |
     | |
011  1 |    Reset circuit breaker and retry.
     ─ |
     | |
012  | 1    Replace logic/power supply board (procedure CRT8).  Note
     |  ─     that fuses provide secondary protection and if blown
     |        indicate a solid failure that cannot be repaired by
     |        fuse replacement.
     |
013  2      Isolate electrical short (procedure CRT13).
     ─
```

---

(1) An outline drawing showing pin configuration of 14-pin ICs is
    as follows:

**TOP VIEW**

```
        ┌──┴──┐
    1 □ │     │ □ 14
    2 □ │     │ □ 13
    3 □ │     │ □ 12
    4 □ │     │ □ 11
    5 □ │     │ □ 10
    6 □ │     │ □ 9
    7 □ │     │ □ 8
        └─────┘
```

SAM CRT2 MONITOR/CONTROL PROBLEMS

This SAM assumes power is applied, circuit breaker CB1 does not trip, and no internal fuses are blown.

```
001  Y N   Is screen blank (no video or cursor) and BRIGHTNESS con-
     | |     trol has no effect?
     | |
002  | Y N   Is there a single vertical or horizontal line on crt?
     | | |
003  | | Y N   Is there a video-display or control-function
     | | | |   problem?
     | | | |
004  | | | Y N   Is there a keyboard-input problem?
     | | | | |
005  | | | | Y N   Is there a self-test diagnostic error?
     | | | | | |
006  | | | | | Y N   Is there a system communication problem?
     | | | | | | |
007  | | | | | | Y N   Is there a printer-control problem?
     | | | | | | | |
008  | | | | | | | | 1  Basic operational checks are OK.  Call for
     | | | | | | | |    assistance if other problems exist.
     | | | | | | | |
009  | | | | | | 2 1  Check I/O cable connections.
     | | | | | | | |
010  | | | | | | 1 2  Verify that printer operation is OK (refer
     | | | | | | | |  to applicable printer maintenance manual for
     | | | | | | | |  troubleshooting information or replace with
     | | | | | | | |  a known good printer).
     | | | | | | | |
011  | | | | | | 4 3  Replace logic/power-supply board (proce-
     | | | | | | | |  dure CRT8).
     | | | | | | | |
012  | | | | | | 5 4  Replace switch-panel assembly.
     | | | | | |T
013  | | | | | 1  Verify that TEST/NORMAL switch is in NORMAL
     | | | | | |  position.
     | | | | | |
     | | | | | |                     NOTE
     | | | | | |
     | | | | | |     To verify correct operation of
     | | | | | |     TEST/NORMAL switch, refer to Check-
     | | | | | |     out information in section 3 of
     | | | | | |     this manual.
     | | | | | |
     | | | | | 3  Verify correct modem and communication line
     | | | | |    operation.
     2 2 2 2 2
     A B C D E
```

```
      A B C D E
      2 2 2 2 2
      | | | | |
      | | | | |
014   | | | | 1   Go to SAM CRT3.
      | | | |
015   1 1 1 1     Check for loose internal cable connections.
      | | | |
016   | | | 2     Replace keyboard assembly (procedure CRT9).
      | | | |
017`  | | 5 3     Replace logic/power-supply board (procedure CRT8).
      | | T
018   | | 2       Check monitor pc board adjustments (procedure CRT3).
      | | |        Replace if unable to adjust correctly (proce-
      | | |        dure CRT4).
      | | |
019   | | 3       Check BRIGHTNESS control for open circuit (proce-
      | | |        dure CRT10).  Replace if open.
      | | |
020   2 | |        Check for lit crt filament.  If unlit, check for +15-V
      | | |        filament voltage at pin 3 (brown wire) of crt socket
      | | |        (use J8 pin 3 for ground side of voltmeter).  If
      | | |        voltage is OK, replace crt (procedure CRT7).  If
      | | |        voltage is missing, check +15-V supply.  If supply
      | | |        voltage is OK, replace monitor pc board (procedure
      | | |        CRT4).  If supply voltage is missing, replace
      | | |        logic/power-supply board (procedure CRT8).
      | | |
021   3 | |        Replace high-voltage assembly (procedure CRT6).
        | |
022     3 |        Replace yoke assembly (procedure CRT5).
        T |
023     2 4        Replace monitor pc board (procedure CRT4).
```

SAM CRT3 DIAGNOSTIC SELF-TEST ERRORS


This SAM is for isolating errors detected by the resident self-test diagnostic routines.


```
N Y   Is there a test FAIL message displayed?
| |
| 1   Replace logic/power-supply board (procedure CRT8).
| |
| 2   Replace switch-panel assembly (procedure CRT11).
|
N Y   Is there a switch-panel test error?
| |
| 1   Check interconnecting cables.
| |
| 2   Check for interference with switch mechanisms.
| |
| 3   Replace switch-panel assembly.
| |
| 4   Replace logic/power-supply board (procedure CRT8).
|
N Y   Is there a keyboard-test problem (incorrect or missing
| |   characters)?
| |
| 1   Check interconnecting cables.
| |
| 2   Replace keyboard assembly (procedure CRT9).
| |
| 3   Replace logic/power-supply board (procedure CRT8).
|
1  Self-test diagnostic checks are OK.
```

PROCEDURES

SECTION 5B

## Procedure CRT1 - Power Application/Removal

This procedure assumes that the display terminal is plugged into the site ac outlet.

1. Apply power by pulling forward on power on/off switch lever (figure CRT1).  A visible red-orange stripe on top of switch lever indicates power is on.

2. Remove power by pushing power on/off switch lever back in.  Red-orange stripe on top of switch lever is not visible with power off.



POWER ON/OFF
SWITCH LEVER
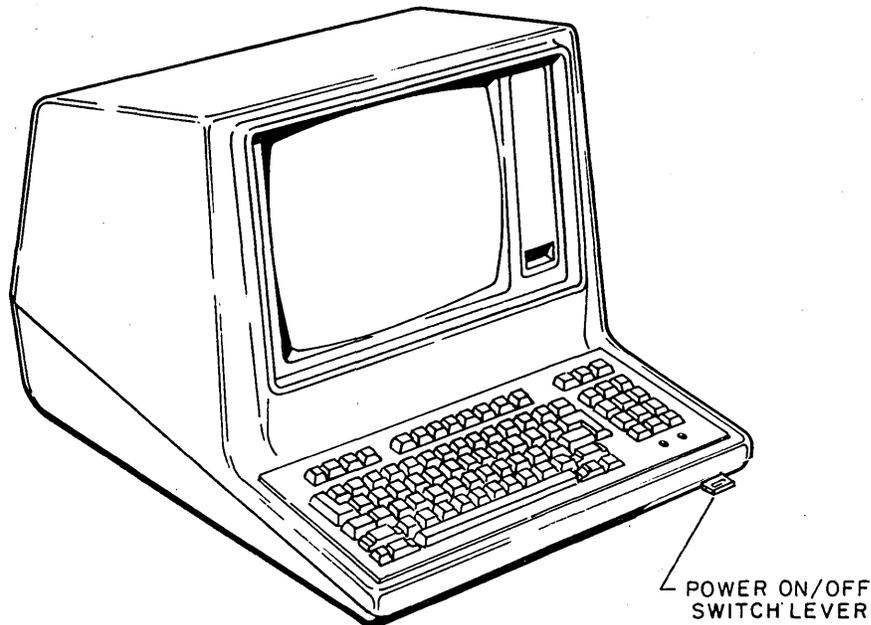
Figure CRT1.  Power On/Off Switch and Hood Mounting Screws

## Procedure CRT2 - Hood Removal/Replacement

1. Slide display terminal forward on table until two front screws can be accessed.

2. Remove two mounting screws from bottom front of unit (figure CRT1).

3. Reposition display terminal on table and remove two
   screws from top rear of unit.

4. Lift hood off of display terminal.

5. Ensure bezel for keyboard is snapped into hood before
   replacing hood (keyboard bezel self-aligns to keyboard by
   two positioning pegs).  CRT bezel should be installed
   after hood is in place.

## Procedure CRT3 - Video Adjustments

Perform the following steps, as applicable, to adjust the moni-
tor assembly for correct video display characteristics.  Refer
to figure CRT2 for control locations on monitor pc board.

### WARNING

With power applied, high voltage is
present at the high-voltage assembly
and crt anode lead.  Use caution
when performing the following
adjustments.

1. Turn terminal power on (procedure CRT1) and allow a 15
   minute warm-up period before performing adjustments.

2. Remove hood (procedure CRT2).

3. Place TEST/NORMAL switch on the I/O connector to TEST
   position.

4. Adjust front-panel BRIGHTNESS control so that cursor is
   visible.  If unable to view cursor, perform brightness
   adjustment (steps 12 through 14) before continuing.

5. Place NORMAL/TRANSPARENT switch to TRANSPARENT position.

6. Press MANUAL RELEASE switch to initiate self-test
   routines.  When test stops on switch-panel routine, press
   MANUAL RELEASE switch again to advance to keyboard
   routine.

7. Press SHIFT and H keys to fill display screen with
   uppercase Hs.

Tilt Adjustment:

    8. If video is tilted, do the following:

        a. Loosen yoke clamp screw (figure CRT4) and rotate yoke
           to correct tilt.

        b. Hold yoke in position and tighten yoke clamp screw.
           DO NOT OVERTIGHTEN.

Height/Width Adjustment:

    9. Displayed pattern of Hs should be nominally 152 mm (6 in)
       high by 216 mm (8.5 in) wide.  Adjust as follows:

        a. Height - Adjust VERT SIZE control (R309).

        b. Width - Adjust HORIZ WIDTH coil (L102).

Centering Adjustment:

    10. Adjust yoke ring magnets to center raster within crt
        screen (figure CRT4).  Note - adjust R412 to obtain
        visual raster.

    11. Adjust VIDEO-HORIZ PHASE control (R104) to center video
        within raster.

Brightness Adjustment:

    12. Turn front-panel BRIGHTNESS control fully counterclock-
        wise (minimum intensity).

    13. Adjust BRITE control (R412) for visual cutoff of raster.

    14. Adjust BRIGHTNESS control to comfortable viewing level.

Focus Adjustment:

    15. Adjust front-panel BRIGHTNESS control for desired inten-
        sity of displayed characters.

NOTE

        Overly bright characters will appear
        out of focus and contribute to
        eyestrain.

    16. Adjust FOCUS control (R415) for best overall focus.

Geometric Distortion Adjustment:

    17. To correct for any barreling or pincushioning at top,
        bottom, or sides of displayed pattern, turn yoke trim
        magnets (figure CRT4) to minimize distortion.

    18. When adjustments are complete, return terminal to normal
        operating conditions.
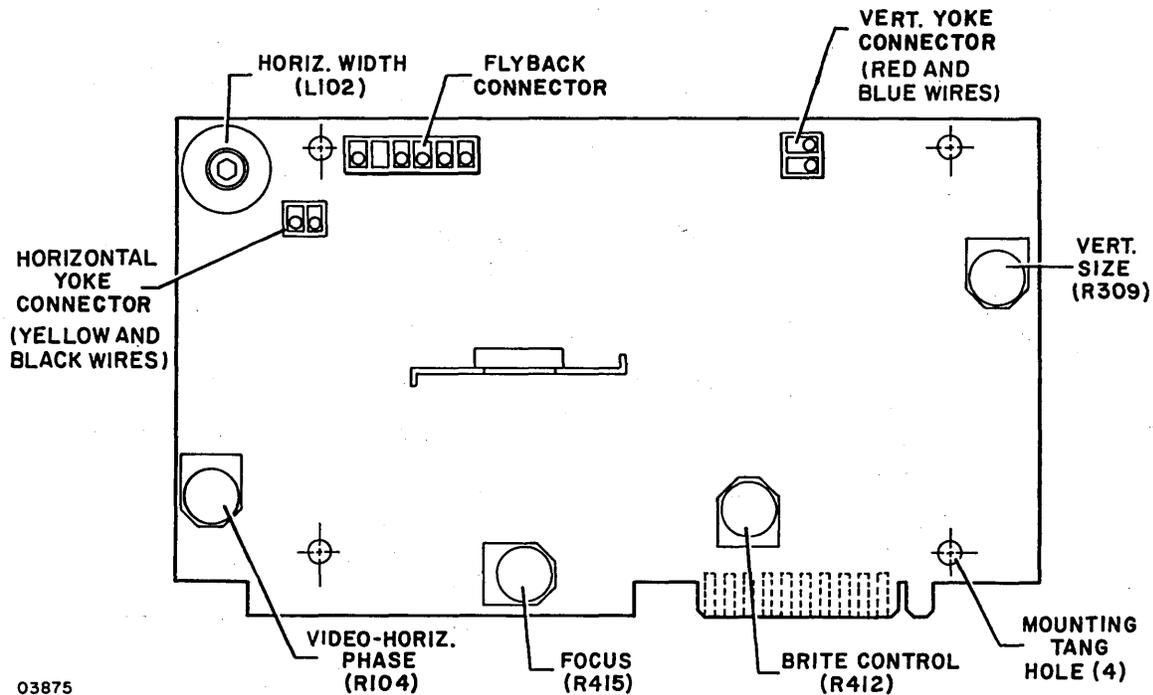


Figure CRT2.  Monitor Adjustment Controls

## Procedure CRT4 - Monitor PC Board Replacement

Perform the following steps to replace the monitor pc board.
Refer to figure CRT3 for details.

    1. Turn terminal power off (procedure CRT1) and unplug ac
      power cord from site outlet.

    2. Remove hood (procedure CRT2).

    3. Disconnect white/gray wire from aquadag grounding clip.

    4. Disconnect connector socket from crt.

5. Disconnect two yoke connectors from monitor pc board.

6. Disconnect flyback connector from monitor pc board.

7. Disconnect board-edge connector from monitor pc board.

8. Compress four mounting tangs holding monitor pc board and lift pc board to remove.

9. Install replacement pc board per reverse of preceding steps. Refer to figure CRT4 for correct connection of yoke wires.

10. Perform video adjustments per procedure CRT3.



AQUADAG GROUNDING CLIP

CRT CONNECTOR SOCKET

YOKE CONNECTORS

BOARD-EDGE CONNECTOR

MOUNTING TANGS(4)

03882-1
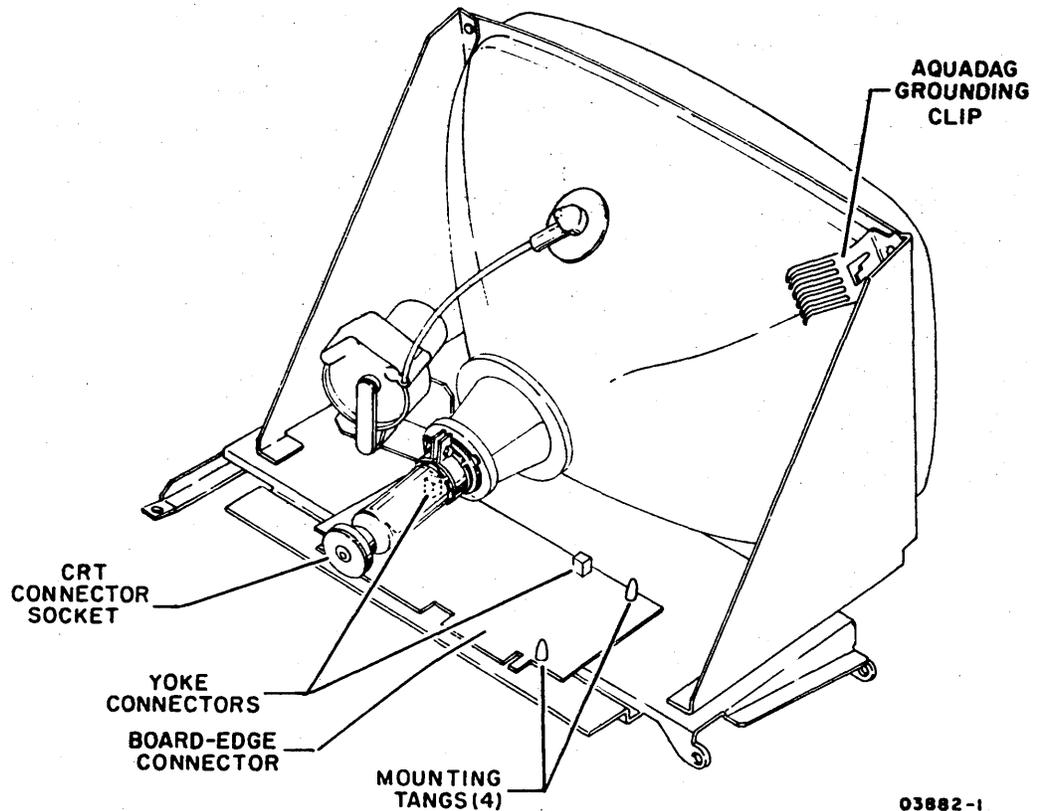
Figure CRT3.  Monitor PC Board Mounting Details

## Procedure CRT5 - Yoke Replacement

Refer to figure CRT4 and perform the following steps to replace the yoke assembly.

1. Turn terminal power off (procedure CRT1) and unplug ac power cord from site outlet.

2. Remove hood (procedure CRT2).

### WARNING

Rough handling, nicks or scratches, or undue pressure on crt neck can cause crt to implode. Wear safety glasses and heavy gloves.

3. Remove connector socket from crt.

4. Disconnect two yoke connectors from monitor pc board.

5. Remove monitor pc board per procedure CRT4.

6. Loosen yoke clamp screw and carefully slide yoke assembly off of crt neck.

7. Slide replacement yoke assembly onto crt neck and position so that red and blue yoke wires are on the left and yellow and black wires are on the right of crt neck.

### WARNING

Do not overtighten yoke clamp in following step.

8. Butt yoke assembly against rear of crt and tighten yoke clamp.

9. Reinstall monitor pc board.

10. Connect yoke wires to monitor pc board. Note that yellow and black wires connect to left of crt neck and red and blue wires connect to right of crt neck as viewed from the rear (figure CRT4).

11. Connect crt socket to crt and perform video adjustments per procedure CRT3.
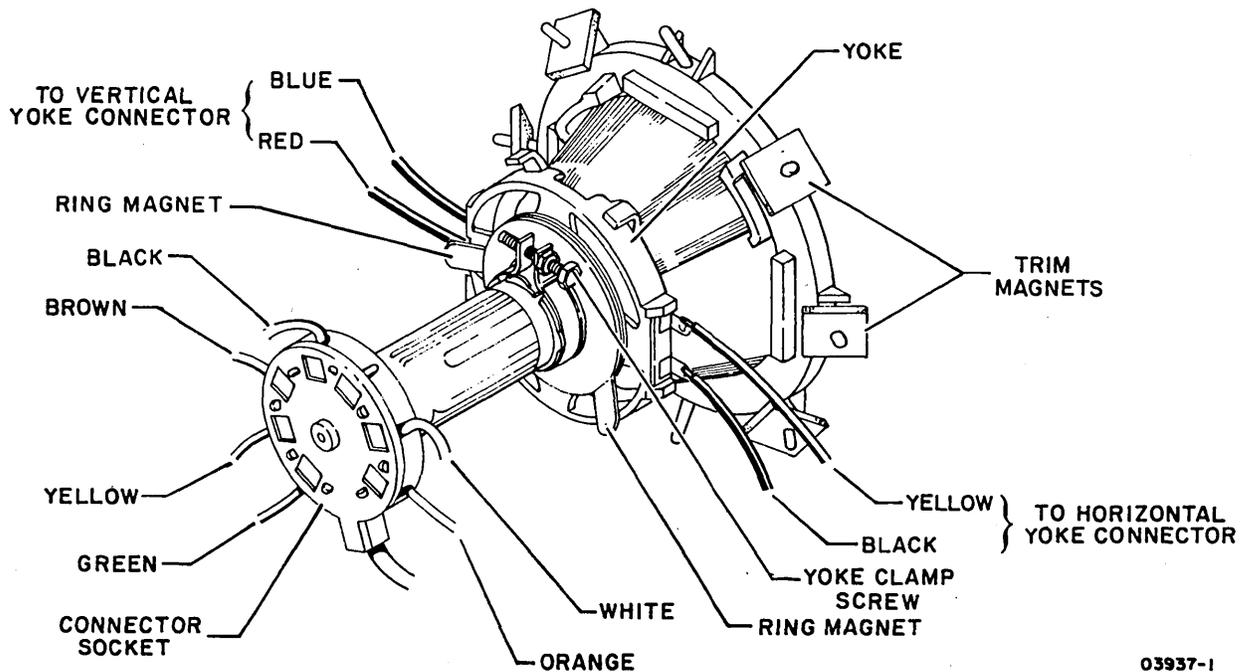
Figure CRT4.  Yoke Assembly Details

## Procedure CRT6 - High-Voltage Assembly Replacement

Perform the following steps to replace the high-voltage assembly.

1. Turn terminal power off (procedure CRT1) and unplug ac power cord from site outlet.

2. Remove hood (procedure CRT2).

### WARNING

CRT high voltage may be present at tube anode.  Perform the following step to discharge crt.

3. Connect a wire to ground and then slide other end under anode cap to discharge high voltage from crt.

4. Squeeze anode cap and disconnect anode lead from crt.

5. Disconnect high-voltage-assembly connector from monitor pc board.

6. Remove two mounting screws from base of high-voltage assembly.

7. Install replacement high-voltage assembly and perform video adjustments per procedure CRT3.


Procedure CRT7 - CRT Replacement

To replace the crt, refer to figure CRT5, and perform the following steps.

1. Turn terminal power off (procedure CRT1) and unplug ac power cord from site outlet.

2. Remove hood (procedure CRT2).


### WARNING

CRT high voltage may be present at tube anode. Perform the following step to discharge crt.


3. Connect a wire to ground and then slide other end under anode cap to discharge high voltage from crt.

4. Squeeze anode cap and disconnect anode lead from crt.

5. Remove monitor PC board (procedure CRT4).

6. Remove yoke assembly (procedure CRT5).

6. Support neck of crt and remove four screws mounting crt
   to monitor chassis.

7. When installing replacement crt, aquadag grounding clip
   must be reinstalled in upper right corner of rear of crt.

8. Reinstall yoke assembly (procedure CRT5) and perform
   monitor adjustments per procedure CRT3.

### NOTE

The procedure for replacing the glare
shield is included in the Equipment
Care section of the Operator's
Guide.  Use Scotchbrand No. 465
double-back adhesive tape or equiva-
lent to install the glare shield.
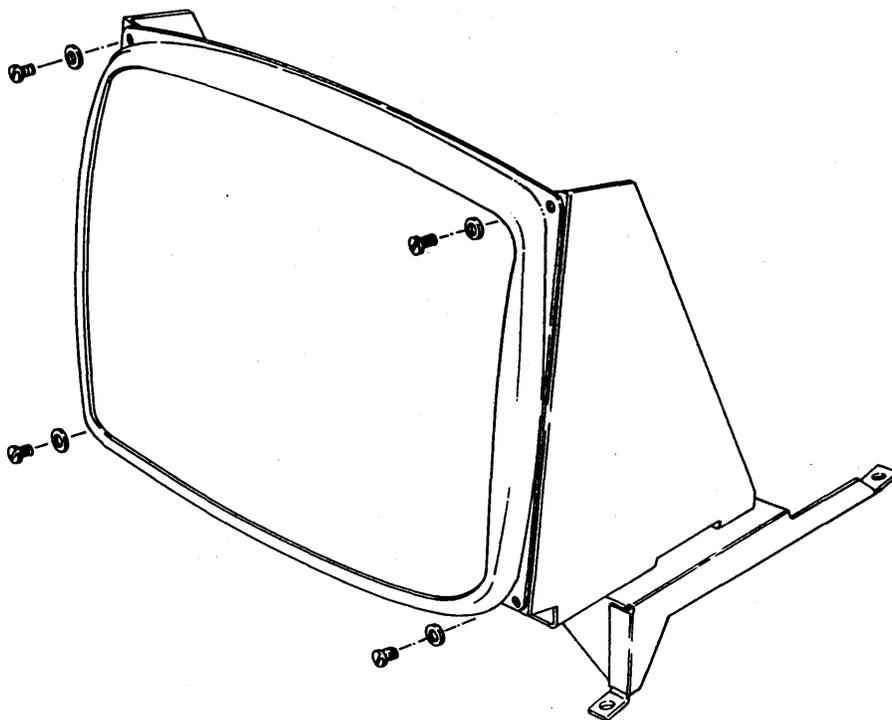
03887

Figure CRT5.  CRT Replacement Details

## Procedure CRT8 – Logic/Power-Supply Board Replacement

To replace the logic/power-supply board, refer to figure CRT6 and perform the following:

1. Power off display terminal (procedure CRT1) and unplug ac power cord from site outlet.

2. Remove hood (procedure CRT2).

3. Remove snap-on switch panel.

4. Remove two monitor assembly hold-down screws and tilt monitor assembly to gain access to logic/power-supply board.

5. Disconnect monitor cable connector J8/P8 from logic/ power-supply board.

6. Disconnect flat ribbon cable from keyboard assembly.

### CAUTION

To prevent pc board damage, support corner of logic board by grasping firmly when removing/installing connector J6/P6.

7. Disconnect transformer cable connector J6/P6 from logic/power-supply board.

8. Disconnect printer and modem I/O cables and remove mounting screw from each I/O connector.

9. Remove two screws mounting logic/power-supply board to cabinet.

10. Disconnect switch-panel ribbon cable from connector J5/P5 of logic/power supply board.

11. Lift logic/power-supply board out of unit and install replacement per reverse of preceding steps. Ensure Keyboard Encoder Assembly is properly positioned.

12. Verify that replacement pc board has NORMAL/CURRENT LOOP jumper installed correctly. Refer to section 3 for jumper placement.

13. Return faulty logic/power-supply board for repair using packaging materials that spared assembly was shipped in. Refer to section 3 for packaging instructions.

**F3**
**F4**
**F2**
**FI**

MONITOR ASSEMBLY
HOLD-DOWN SCREWS

J8/P8

LOGIC/POWER-
SUPPLY BOARD
MOUNTING SCREW

ALTERNATE
LOCATION
OF FUSES

LOGIC/POWER-
SUPPLY BOARD
MOUNTING SCREW

FUSE F3

NORMAL/CURRENT-
LOOP JUMPER

KEYBOARD
CONNECTOR

J6/P6

FUSE F4

FUSE FI

FUSE F2

J5/P5

AUDIO ALARM
ADJUST (R7)

03890-3

Figure CRT6.  Logic/Power Supply Board Mounting Details

## Procedure CRT9 - Keyboard Assembly Replacement

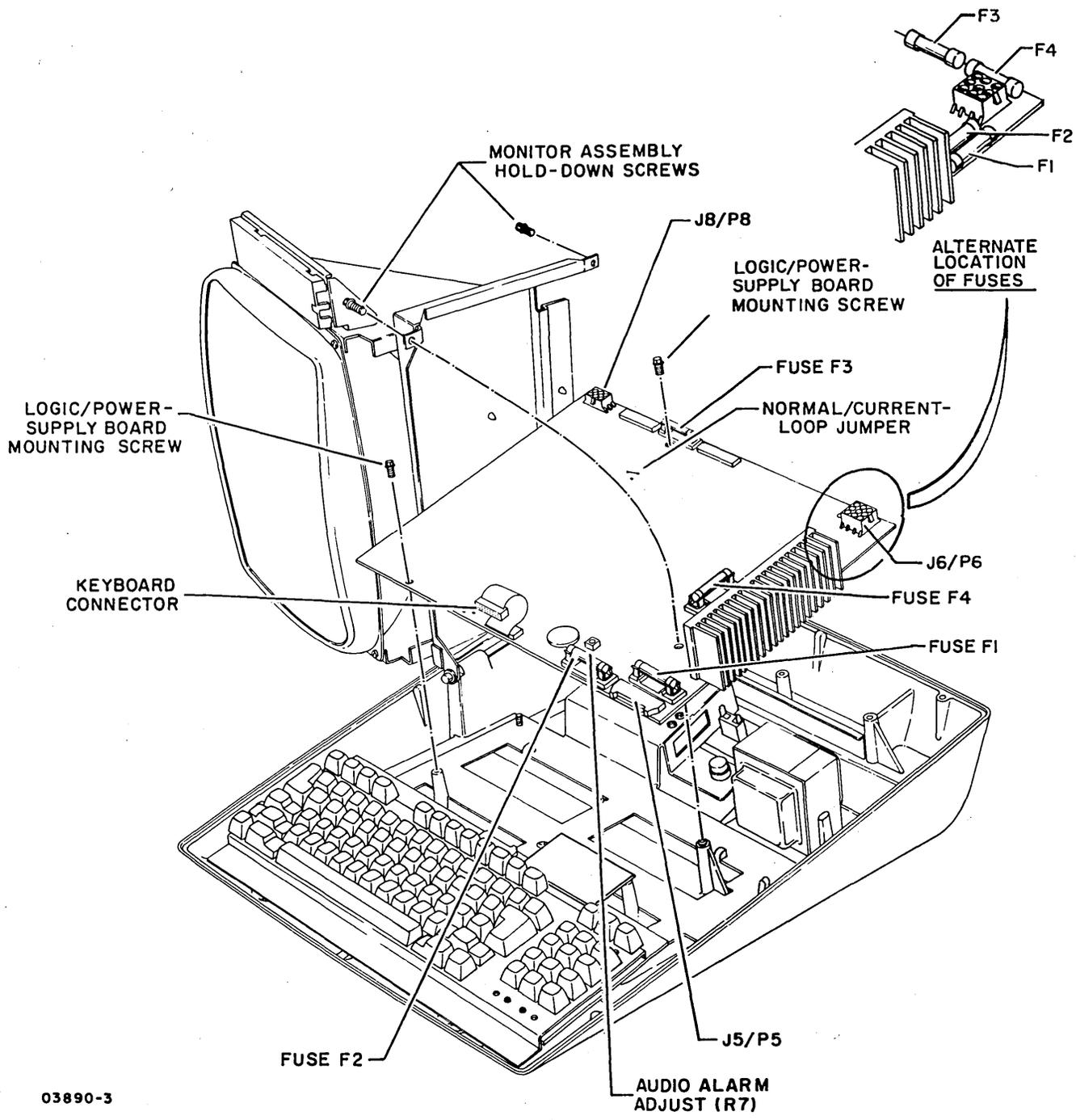To replace the keyboard assembly, refer to figure CRT7 and perform the following:

1. Power off display terminal (procedure CRT1) and unplug ac power cord from site outlet.

2. Remove hood (procedure CRT2).

3. Disconnect flat ribbon cable from keyboard assembly.

4. Remove two screws mounting keyboard assembly to cabinet.

5. Install replacement keyboard assembly per reverse of preceding steps.  Ensure that ground lead is reconnected to keyboard mounting screw.

6. Ensure keyboard encoder assembly is firmly inserted in socket.



MOUNTING SCREWS

KEYBOARD ENCODER ASSEMBLY

GROUND LEAD
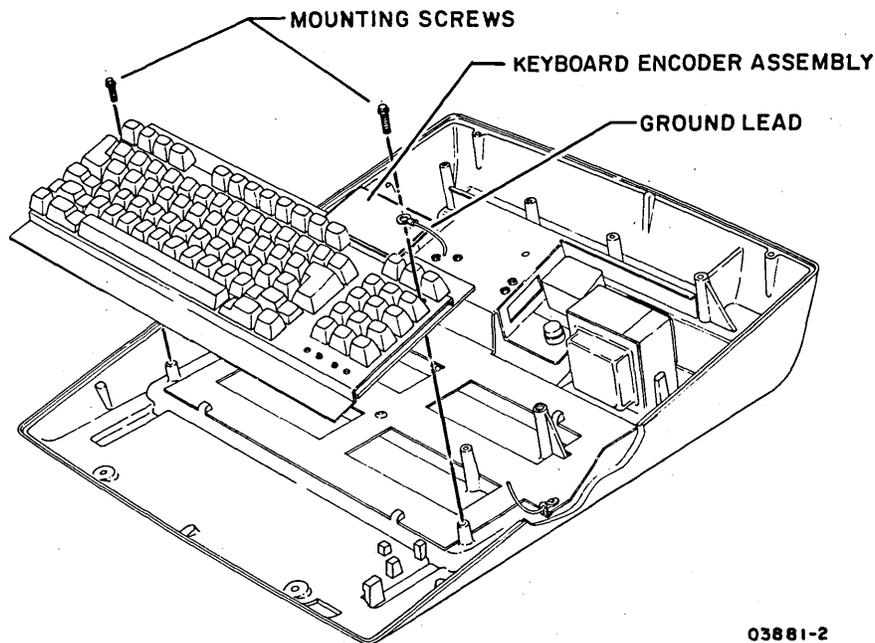
03881-2

Figure CRT7.  Keyboard Assembly Mounting Details

## Procedure CRT10 – BRIGHTNESS Control Checks/Replacement

Perform the following to check and/or replace the front-panel
BRIGHTNESS control.  Refer to figure CRT8 for assembly details.

   1. Power off display terminal (procedure CRT1) and unplug ac
      power cord from site outlet.

   2. Remove hood (procedure CRT2).

   3. Disconnect board-edge connector from monitor pc board and
      connector J8/P8 from logic/power-supply board.

   4. To check control:

      a. Determine resistance of potentiometer (stamped on
         case).

      b. Check that total resistance value is present between
         outer lugs of potentiometer.

      c. Connect meter leads between center lug and one outer
         lug of potentiometer.  Rotate control shaft and
         observe resistance reading.  Resistance value should
         change linearly as control shaft is rotated through
         its range.

      d. Check for continuity of white, red, and black leads
         between lugs of BRIGHTNESS control and associated
         connector pins.

   5. To replace control:

      a. Cut cable tie holding BRIGHTNESS control cable to
         monitor-assembly chassis.

      b. Remove snap-on switch-panel assembly by releasing top
         and raising assembly from frame.

      c. Remove mounting nut from BRIGHTNESS control and remove
         control and cable from unit.  Install replacement
         assembly per reverse of preceding steps.

MOUNTING NUT

BRIGHTNESS CONTROL

P8

BOARD-EDGE CONNECTOR

CABLE TIE

SWITCH-PANEL ASSEMBLY

03885-3
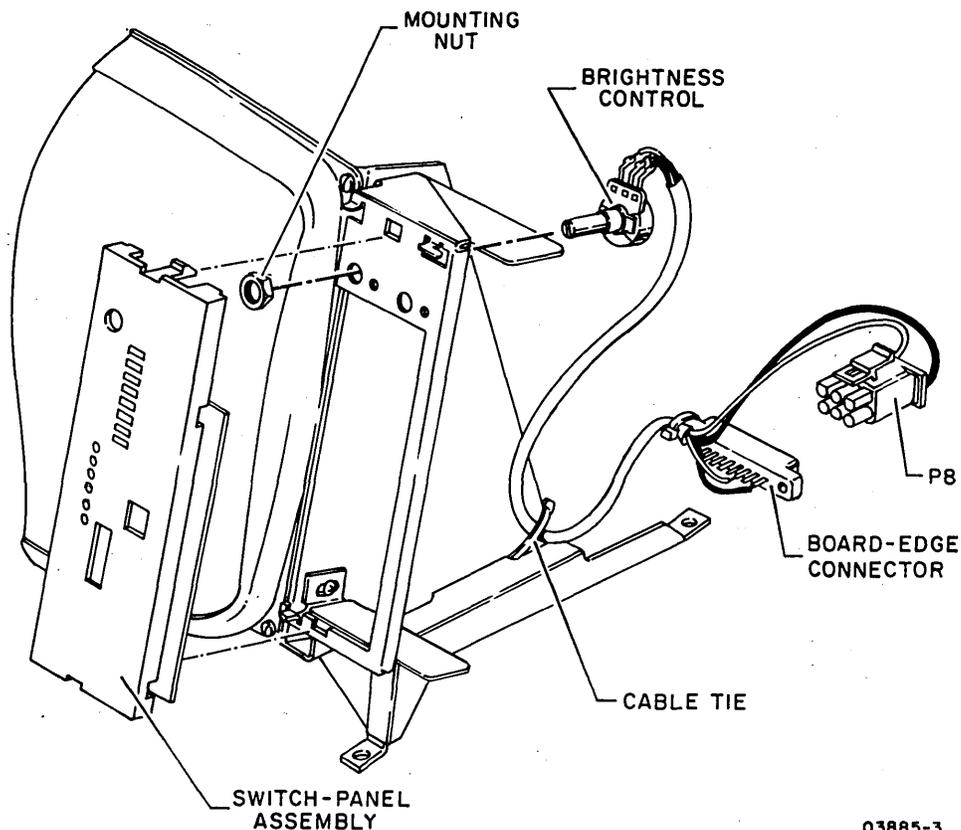
Figure CRT8.  BRIGHTNESS Control Mounting Details

## Procedure CRT11 - Switch-Panel Assembly Replacement

To replace the switch-panel assembly, refer to figure CRT9 and perform the following:

1. Power off display terminal (procedure CRT1) and unplug ac power cord from site outlet.

2. Remove hood (procedure CRT2).

3. Remove snap-on switch-panel assembly by releasing top and raising panel assembly from frame.

4. Loosen keyboard-assembly mounting screws and tilt keyboard forward to disconnect J5/P5 from logic/power-supply board.

5. Install replacement switch-panel assembly per reverse of preceding steps.

6. Verify that all switches are set correctly for required system operation and ensure that Cursor Home Position jumper is in same position as original board (refer to section 3 for jumper placement information).



SWITCH PANEL COVER

SWITCH PANEL

P5

03885-1
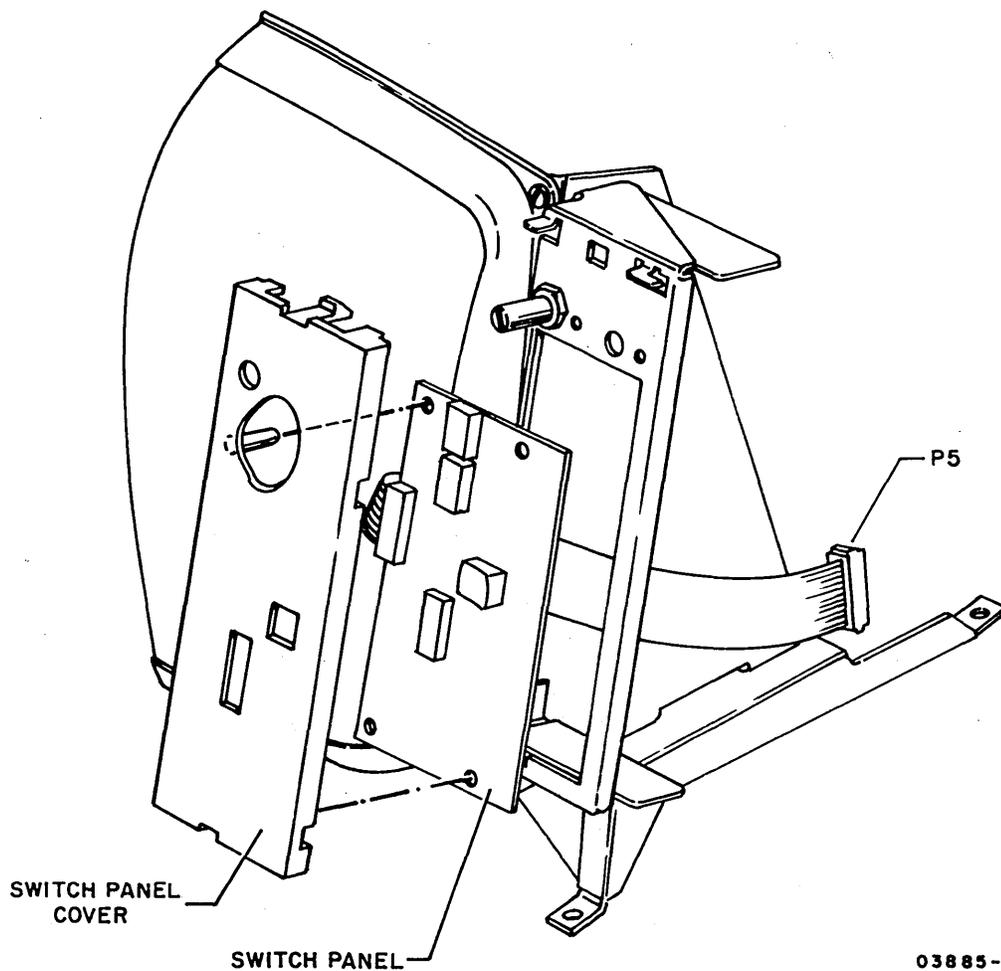
Figure CRT9.  Switch Panel Assembly Mounting Details

Procedure CRT12 - Keyboard Switch Module Replacement

To replace keyboard switch modules, refer to figure CRT10 and perform the following:

1. Power off display terminal (procedure CRT1).

2. Remove keycap by prying it up.

3. Lift spring out of switch housing.

4. Pry switch housing loose from keyboard by pressing detent on each side of switch housing. It may be necessary to remove keycaps and springs from adjacent switch modules to provide sufficient clearance. Also note that pc board of keyboard assembly has retaining screws attached to some switch modules. Retaining screw must be removed from bottom of pc board before removing associated switch housing. If detents are not accessible from top, remove keyboard assembly (procedure CRT9) and separate pc board and keyswitch assembly. This is done by removing screws on underside of pc board. Then access faulty switch module from reverse of keyboard panel.Refer to procedure CRT9 for accessing pc board.

5. Install replacement switch module per reverse of preceding steps. Replacement switch module will have a blank keycap. Discard blank keycap and use existing one.



03884
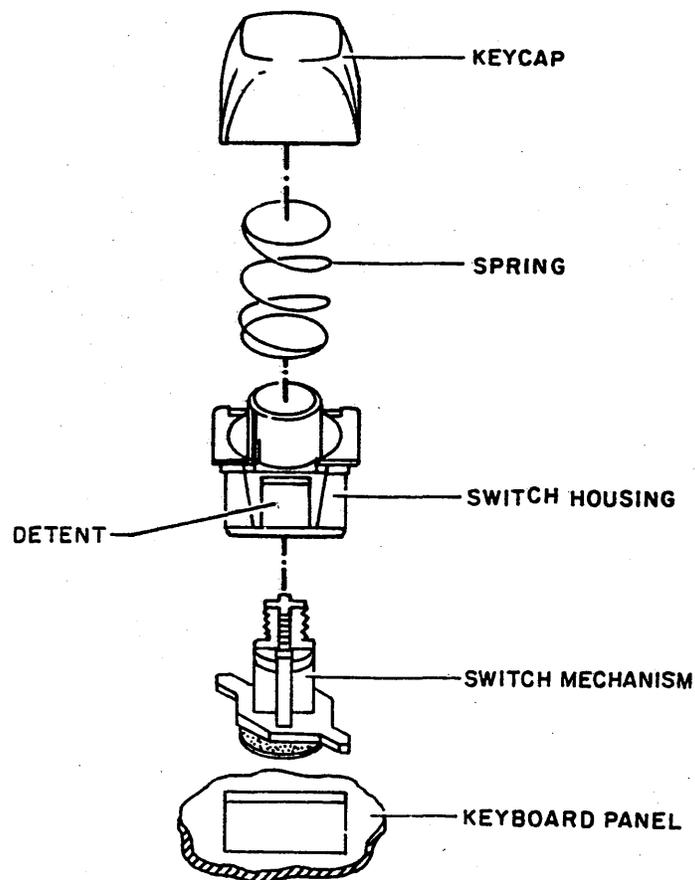
Figure CRT10.   Keyboard Switch Module Mounting Details

## Procedure CRT13-AC Short-Circuit Isolation

This procedure isolates short circuits causing CB1 to trip. Refer to the interconnection diagram (section 4) in conjunction with this procedure.

1. Turn terminal power off (procedure CRT1).

2. Remove hood (procedure CRT2).

3. Disconnect J8/P8 from logic/power-supply board.

4. Allow time for circuit breaker (CB1) to cool, then reset CB1 and power on display terminal.  If CB1 no longer trips, replace monitor pc board (procedure CRT4).  If CB1 still trips, continue with the following steps until fault is isolated.

5. Disconnect J6/P6 from logic/power-supply board.

6. Allow time for circuit breaker (CB1) to cool, then reset CB1 and power on display terminal.  If circuit breaker no longer trips, replace logic/power supply board (procedure CRT8).  If circuit breaker still trips, continue with the following steps until fault is isolated.

7. Unplug ac power cord from site outlet.

8. Remove keyboard assembly (procedure CRT9).

9. Remove logic/power-supply board (procedure CRT8).

10. Inspect ac wiring for electrical shorts.

11. Check transformer primary for shorts as follows:

    a. Disconnect blue line-filter lead and white, blue, and orange transformer leads from Voltage Select switch.

    b. Disconnect brown transformer primary lead from Power On/Off switch.

    c. Use VOM to check for shorts between brown transformer lead and each of the remaining transformer primary leads (white, blue, and orange).  Typical resistance readings are as follows:

    - Brown to white lead - 7 ohms
    - Brown to blue lead - 17 ohms
    - Brown to orange lead - 20 ohms

    If shorted, replace transformer.  Refer to schematic diagram in section 4 for color codes of transformer leads and connection information.

12. Check for shorted Voltage Select switch as follows:

    ● With all leads disconnected from Voltage Select
      switch, check for shorts between each switch contact
      and ground.  If shorted, replace Voltage Select switch.

13. Check for transformer secondary shorts between all pins
    of connector P6 and each pin to ground.  If shorted,
    replace transformer.

14. Check for shorted power on/off switch by measuring
    between each switch contact and ground.  If shorted
    replace power on/off switch.

15. The only remaining component that could cause CB1 to trip
    is a faulty CB1 itself.  Therefore, replace CB1.

62940003

This section contains the spare parts list covering the field-
replacable components and assemblies of the terminal.  Note that
the majority of items are warehouse spares and are not stocked
on site.  Refer to the support information manual for associated
assembly drawings (see preface for publication number).

**CONTROL DATA**

**TITLE:** VIKING TTY DISPLAY TERMINAL

**PREFIX:** SPL  **DOCUMENT NO.** 66310609  **REV** K

**FIRST USED ON:** CC628A

**CODE IDENT:** 15920  **SHEET** 1 of 3

### SHEET REVISION STATUS / REVISION RECORD

| 3 | 2 | 1 | REV | ECO | DESCRIPTION | DRFT | DATE | APP |
|---|---|---|-----|-----|-------------|------|------|-----|
| 00 | 00 | 00 | 00 | 50004-62 | RELEASED CLASS B | | 2/1/80 | |
| 00 | 01 | 01 | 01 | 51058 | F/N 16 WAS 96837905 | WJG 3-21-80 | 3/31/80 | JPR |
| A | A | A | A | 13471-79 | RELEASED CLASS "A" | | 4-9-80 | Nut |
| B | B | B | B | 14104 | REVISED PER ECO | WJH | 6-27-80 | ME |
| B | C | C | C | 14241 | REVISED PER ECO | WJN | 9-15 | JPR |
| B | D | D | D | 14262 | REVISED PER ECO | WJH 9-16-80 | 9-17-8 | |
| E | D | E | E | 14294 | F/N 23 WAS 61408439 | WJN 10-7-80 | 10-7-80 | JPR |
| E | F | F | F | 14431 | F/N 13 WAS 51918969 | EE | 1/14/81 | |
| E | G | G | G | 14530 | CHG P/N 1, 4 | D.S | 3/11/81 | |
| E | H | H | H | 14675 | F/N 1 WAS 90446277 | WJG 5-19-81 | 5/21/81 | |
| E | J | J | J | 14640 | F/N 17 WAS 61408810 | EE | 7/13/81 | |
| K | K | K | K | 14753 | CHANGE P/N 4,26 | D.S | 8-27-81 | |

NOTES: 1. Under quantity required where REF is used, there is a quantity of one (1) in each equipment, unless otherwise noted.

/2\ P/N 90446253 MAY BE USED INTERCHANGEABLY WITH P/N 90446308 IN THE FIELD.

DETACHED LISTS

AA3180 REV. 8 71                    PRINTED IN U.S.A.

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**CONTROL DATA**

**CODE IDENT** 15920  **SHEET** 2  **S PL** **DOCUMENT NO.** 66310609  **REV** J

| FIND NO. | PART IDENTIFICATION | QUANTITY REQUIRED | | | | | | | | UNIT OF MEAS | NOMENCLATURE OR DESCRIPTION | SPECIFICATIONS, NOTES, OR MATERIAL |
|----------|---------------------|---|---|---|---|---|---|---|---|--------------|------------------------------|-------------------------------------|
| 1 | 90446308 | 1 | | | | | | | | PC | CARD ASSY 9BTD LOGIC MAIN | /2\ |
| 2 | 90446156 | 1 | | | | | | | | PC | CARD ASSY 9BSD PANEL SW | |
| 3 | 66312052 | 1 | | | | | | | | PC | MONITOR CKT CARD | |
| 4 | 51940700 | 1 | | | | | | | | PC | KEYBOARD | |
| 5 | 66312532 | REF | | | | | | | | PC | SW MOD ASSY (CAP) | (86 PER KYBD) |
| 6 | 66312533 | REF | | | | | | | | PC | SW MOD ASSY, AA, LIGHTED (CAP) | |
| 7 | 66312050 | REF | | | | | | | | PC | CRT | |
| 8 | 66312051 | REF | | | | | | | | PC | FLYBACK TRANSFORMER ASSY | |
| 9 | 66312065 | REF | | | | | | | | PC | YOKE ASSY | |
| 10 | 15165425 | REF | | | | | | | | PC | POWER CORD (60HZ) | |
| 11 | 15165426 | REF | | | | | | | | PC | POWER CORD (50HZ) | |
| 12 | 51918306 | REF | | | | | | | | PC | SLIDE SWITCH (POWER) | |
| 13 | 61409074 | REF | | | | | | | | PC | VOLTAGE SELECT SWITCH ASSY | |
| 14 | 61408878 | REF | | | | | | | | PC | LINE FILTER ASSY | |
| 15 | 61408984 | REF | | | | | | | | PC | TRANSFORMER ASSY | |
| 16 | 51782143 | REF | | | | | | | | PC | CIRCUIT BREAKER | SINGLE POLE |
| 17 | 61409138 | REF | | | | | | | | PC | CABLE ASSY CRT/BRIGHTNESS | |
| 18 | 66312531 | REF | | | | | | | | PC | KEYCAP SET | |
| 19 | 66312526 | REF | | | | | | | | PC | SPRING, STANDARD (2.5 oz) | (82 PER KYBD) |
| 20 | 66312527 | REF | | | | | | | | PC | SPRING, SPACE BAR (2.8 oz) | |

AA3181 REV. 8/71                    PRINTED IN U.S.A.

| FIND NO. | PART IDENTIFICATION | | QUANTITY REQUIRED | | | | | | | | | | UNIT OF MEAS | NOMENCLATURE OR DESCRIPTION | SPECIFICATIONS, NOTES, OR MATERIAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 71493086 | REF | | | | | | | | | | | PC | DECAL, KEYBOARD | |
| 22 | 71493107 | REF | | | | | | | | | | | PC | DECAL, SWITCH PANEL | |
| 23 | 71493222 | REF | | | | | | | | | | | PC | BEZEL/DOOR ASSY | |
| 24 | 71493056 | REF | | | | | | | | | | | PC | MASK, SWITCH PANEL | |
| 25 | 71493057 | REF | | | | | | | | | | | PC | MASK, KEYBOARD | |
| 26 | 66312534 | REF | | | | | | | | | | | PC | KYBD Encoder Assy. | |
| 27 | 51903800 | REF | | | | | | | | | | | PC | INDICATOR, LED | {2 PER KYBD} |
| 28 | 66312530 | REF | | | | | | | | | | | PC | SPACE BAR MECHANISM | |
| 29 | 66312525 | REF | | | | | | | | | | | PC | SPRING, DUAL RETURN {1.2 oz} {4 PER KYBD} | |
| 30 | 66312528 | REF | | | | | | | | | | | PC | IC CS263 SENSE AMP | |
| 31 | 15112800 | REF | | | | | | | | | | | PC | IC MC840 | |
| 32 | 17183900 | REF | | | | | | | | | | | PC | IC 7407 | {2 PER KYBD} |
| 33 | 50254300 | REF | | | | | | | | | | | PC | IC 74123 | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
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AA3181 REV. 8/71

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This appendix identifies the various special I/O cables that can be used with the terminal. The interface application, cable configuration, and associated CDC part numbers are as follows:

---

### CURRENT LOOP INTERFACE

| 12-CAVITY FEMALE CONNECTOR (AMP 86402-4) | 25-PIN MALE CONNECTOR (RS-232) |
|---|---|
| XDATA 1 | 9 REC+ |
| TD 2 | 10 REC- |
| RD 11 | 18 TRANS+ |
| RDATA 12 | 25 TRANS- |

| Length | CDC Part Number |
|---|---|
| 30.4 m (100 ft) | 61409000 |
| 152.0 m (500 ft) | 61409001 |
| 304.8 m (1000 ft) | 61409002 |

---

### CURRENT LOOP INTERFACE

| 25-PIN FEMALE CONNECTOR (RS-232) | 25-PIN MALE CONNECTOR RS-232) |
|---|---|
| +V 11 | 9 REC+ |
| TD 2 | 10 REC- |
| RD 3 | 18 TRANS+ |
| -12 V 18 | 25 TRANS- |

| Length | CDC Part Number |
|---|---|
| 30.4 m (100 ft) | 61408995 |
| 152.0 m (500 ft) | 61408996 |
| 304.8 m (1000 ft) | 61408997 |

```
                              RS-232 INTERFACE

   12-CAVITY FEMALE                                    25-PIN MALE
    CONNECTOR                                           CONNECTOR
    (AMP 86402-4)                                       (RS-232)


         RD 11  ◄─────────────────────────────►   2  TD
         TD  2  ◄─────────────────────────────►   3  RD
                                                   4  RTS
                                                ⊂  5  CTS

         GND 9  ◄─────────────────────────────►   7  GND
         +V  1  ◄─────────────────────────────►   8  CD
                                                ⊂  6  DSR
         CTS 6  ◄─────────────────────────────►  20  DTR


         Length                    CDC Part Number

     3.0  m (10 ft)                   61408990
     7.6  m (25 ft)                   61408991
    15.2  m (50 ft)                   61408992
```
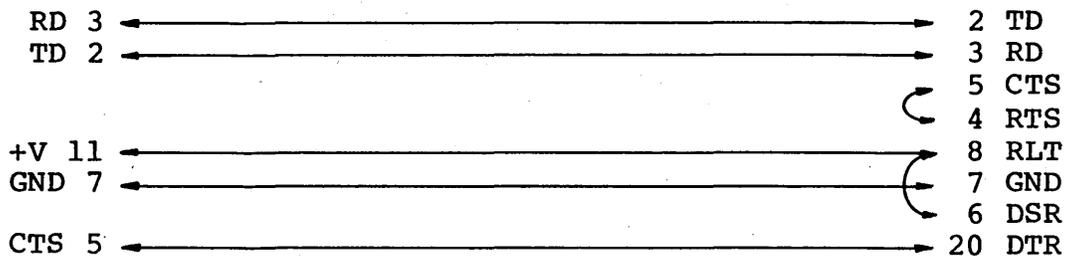
```
                              RS-232 INTERFACE

   25-PIN FEMALE                                       25-PIN MALE
    CONNECTOR                                           CONNECTOR
    (RS-232)                                            (RS-232)


         RD  3  ◄─────────────────────────────►   2  TD
         TD  2  ◄─────────────────────────────►   3  RD
                                                   5  CTS
                                                ⊂  4  RTS
         +V 11  ◄─────────────────────────────►   8  RLT
         GND 7  ◄─────────────────────────────► ⊂ 7  GND
                                                   6  DSR
         CTS 5  ◄─────────────────────────────►  20  DTR


         Length                    CDC Part Number

     3.0  m (10 ft)                   61408985
     7.6  m (25 ft)                   61408986
    15.2  m (50 ft)                   61408987
```

TABLE B-1.  GENERATING ASCII CONTROL CODES FOR
ADVANCE MODE COMMANDS

| COMMAND | CODE MNEMONIC | KEY SEQUENCE | OCTAL CODE |
|---|---|---|---|
| Print Form | SOH | CONTROL and A | 001 |
| Page Print | DC1 | CONTROL and Q | 021 |
| Print I/O | RS, F | CONTROL and +/=, then SHIFT and F | 036, 106 |
| Blind Printer | RS, DEL | CONTROL and +/=, then DEL | 036, 177 |
| Start Blink | SO | CONTROL and N | 016 |
| Start Underscore | DC4 | CONTROL and T | 024 |
| Start Dim | FS | CONTROL and  /Reverse Slash | 034 |
| Stop Blink | SI | CONTROL and O | 017 |
| End Underscore | NAK | CONTROL and U | 025 |
| End Dim | GS | CONTROL and ]/[ | 035 |
| Enable Blink | ETX | CONTROL and C | 003 |
| Disable Blink | EOT | CONTROL and D | 004 |
| Roll Enable | DC2 | CONTROL and R | 022 |
| Roll Disable | DC3 | CONTROL and S | 023 |
| Set Scroll Field | RS, W | CONTROL and +/=, then SHIFT and W | 036, 127 |
| Field Scroll Up | RS, U | CONTROL and +/=, then SHIFT and U | 036, 125 |
| Field Scroll Down | RS, V | CONTROL and +/=, then SHIFT and V | 036, 126 |
| Tab | RS, EOT | CONTROL and +/=, then CONTROL and D | 036, 004 |

| COMMAND | CODE MNEMONIC | KEY SEQUENCE | OCTAL CODE |
|---------|---------------|--------------|------------|
| Clear Field of: | | | |
| - All data | RS, P | CONTROL and +/=, then SHIFT and P | 036, 120 |
| - All data except low intensity areas | RS, @ | CONTROL and +/=, then SHIFT and @/2 | 036, 100 |
| - Only low intensity areas | RS, ? | CONTROL and +/=, then SHIFT and ?/Slash | 036, 077 |
| Delete Line | RS, Q | CONTROL and +/=, then SHIFT and Q | 036, 121 |
| Insert Line | RS, R | CONTROL and +/=, then SHIFT and R | 036, 122 |
| Line Drawing | RS, FS | CONTROL and +/=, then CONTROL and  /Reverse Slash | 036, 034 |
| Basic Character | RS, GS | CONTROL and +/=, then CONTROL and ]/[ | 036, 035 |
| Read Cursor Address | ENQ | CONTROL and E | 005 |
| Write Cursor Address | DLE | CONTROL and P | 020 |
| Initiate Test | RS, SYN | CONTROL and +/=, then CONTROL and V | 036, 026 |
| Read Status | RS, DC4 | CONTROL and +/=, then CONTROL and T | 036, 024 |
| Read Parameter | RS, DC3 | CONTROL and +/=, then CONTROL and S | 036, 023 |
| Read Data | RS, DLE | CONTROL and +/=, then CONTROL and P | 036, 020 |
| Read Attribute | RS, SO | CONTROL and +/=, then CONTROL and N | 036, 016 |
| Alarm | BEL | CONTROL and G | 007 |
| Add Delimiter | RS, ENQ | CONTROL and +/=, then CONTROL and E | 036, 005 |

## TABLE B-2.  GENERATING ASCII CONTROL CODES FOR 752 MODE COMMANDS

| COMMAND | CODE MNEMONIC | KEY SEQUENCE | OCTAL CODE |
|---|---|---|---|
| Alarm | BEL | CONTROL and G | 007 |
| Reduced Intensity | SO | CONTROL and N | 016 |
| Blink | ETB | CONTROL and W | 027 |
| Stop Highlight | SI | CONTROL and O | 017 |
| X-Y Positioning | ESC, 1 | ESC, then 1 | 033, 061 |
| Backspace | BS | SHIFT and /4 | 010 |
| Line Feed | LF | SHIFT and /2 | 012 |
| Carriage Return | CR | CR or NEW LINE | 015 |
| Line Clear | SYN | CONTROL and V | 026 |
| Page Clear | CAN | SHIFT and EOP/EOL | 030 |
| Home | EM | SHIFT and HOME/5 | 031 |
| Cursor Up | SUB | SHIFT and /8 | 032 |
| * | NUL | CONTROL and @/2 | 000 |
| * | SOH | CONTROL and A | 001 |
| * | STX | CONTROL and B | 002 |
| * | ETX | CONTROL and C | 003 |
| * | EOT | CONTROL and D | 004 |
| * | ENQ | CONTROL and E | 005 |
| * | ACK | CONTROL and F | 006 |
| * | HT | TAB | 011 |
| * | VT | CONTROL and K | 013 |
| * | FF | CONTROL and L | 014 |
| * | DLE | CONTROL and P | 020 |
| * | DC1 | CONTROL and Q | 021 |

| COMMAND | CODE MNEMONIC | KEY SEQUENCE | OCTAL CODE |
|---|---|---|---|
| * | DC2 | CONTROL and R | 022 |
| * | DC3 | CONTROL and S | 023 |
| * | DC4 | CONTROL and T | 024 |
| * | NAK | SHIFT and /Q | 025 |
| * | ESC | ESC | 033 |
| * | FS | CONTROL and / Reverse Slash | 034 |
| * | GS | CONTROL and / | 035 |
| * | RS | CONTROL and +/= | 036 |
| * | US | CONTROL and _/- | 037 |
| * | DEL | DEL | 177 |

*Only code transmission occurs.

# COMMENT SHEET

MANUAL TITLE: CDC 722-10/20 Display Terminal CC628-A
Hardware Maintenance Manual (Site Information)

PUBLICATION NO.: 62940003                    REVISION: L

NAME:_____

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