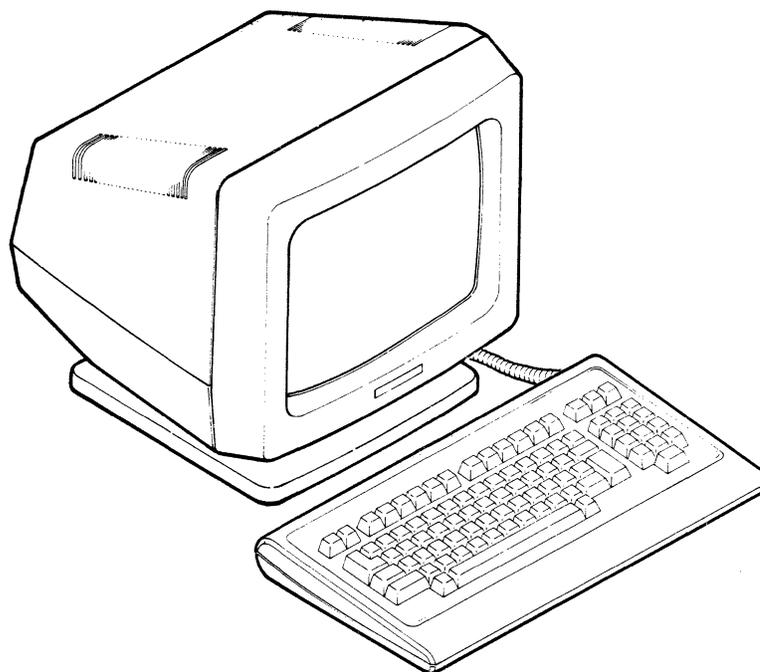


GD CONTROL DATA

CDC[®] 722-30 DISPLAY TERMINAL
PART NO. 51942413, 51942414



HARDWARE MAINTENANCE MANUAL
(SITE INFORMATION)

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or use Comment Sheet in
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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.

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PREFACE

This manual provides training and on-site maintenance information for the CDC® 722-30 Display Terminal, part number 51942413 or 51942414. This information is divided into the following major sections:

- Section 1, Training - Provides the self-study training information for maintaining the display terminal.
- Section 2, General Description - Gives an overview of the terminal and describes its standard and optional features, its operator controls, and its specifications.
- Section 3, Installation - Describes the installation of optional character sets in the terminal.
- Section 4, Theory of Operation - Describes the general functions of the terminal, its major assemblies, and its external interfaces.
- Section 5, Diagrams - Provides an interconnection diagram of the terminal.
- Section 6, Maintenance - Provides general maintenance information, SAM listings for troubleshooting the terminal, and corrective maintenance procedures.
- Section 7, Parts Data - Provides spare parts information.

Other display terminal manuals include:

<u>Title</u>	<u>Publication Number</u>
722-30 Display Terminal Owner's Manual	62950139
722-30 Display Terminal Reference Manual	62950137

All manuals may be ordered from:

Control Data Corporation
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308 North Dale Street
St. Paul, Minnesota 55103



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This section contains the student training material for the 722-30 Maintenance Course (course number HI0010).

This individualized course consists of one PLM module. The module contains several learning activities which teach the task required to maintain the 722-30 display terminal. The course does not require any tools or equipment. It is suggested, if possible, you schedule some time on the terminal to practice running diagnostics and changing parameters.

The maintenance philosophy for the 722-30 terminal is on-site replacement of the failing field replacement unit (FRU). No special tools are necessary for on-site maintenance. No preventive maintenance is necessary for the terminal. The terminal will be installed by the customer.

Although terminal installation is the customer's job, you should be familiar with the installation procedures. To gain additional information about installation and operation, read the 722-30 Owner's Manual (see preface for publication number and ordering information).

To receive credit for this training, complete the learning activities in this section, enroll in course HI0010, and successfully complete the PLATO Learning Management (PLM) Module Test.

You may now begin the 722-30 Maintenance Course by following the instructions on the next page.

MODULE 1
MAINTENANCE

This module presents the tasks required to maintain the 722-30 display terminal.

LEARNING ACTIVITIES

Check off each learning activity listed below when completed. This will show your progress as you proceed through the learning activities.

<u>Completed</u>	<u>Activity</u>	<u>Description</u>	<u>Page</u>
--	1-A	Exercise: 722-30 Components. This learning activity presents an overview of the 722-30 display terminal.	1-3
--	1-B	Exercise: Parameter Entry. This learning activity presents the steps required to change control parameters.	1-6
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--	1-D	Exercise: FRU Removal/Replacement and Adjustments. This learning activity studies the removal, replacement, and adjustment procedures for the 722-30 terminal.	1-15
--	1-E	Exercise: Fault Isolation. This learning activity describes the 722-30 troubleshooting aids found in this manual.	1-19

LEARNING ACTIVITY 1-A. EXERCISE: 722-30 COMPONENTS

This learning activity will present an overview of the 722-30 display terminal.

Objective

You will be able to recall the location and function of the 722-30 major assemblies and connectors.

Directions

Read the information presented in sections 2, 3, and 4 of this manual. Return to this learning activity when you complete the reading assignment.

Write your response to the following questions in the space provided. Check your answers with those given at the end of this activity.

1. What three emulations does the 722-30 have?
 - a. _____
 - b. _____
 - c. _____
2. To change character sets, you must replace three integrated circuit (IC) chips and change the keyboard switch setting. The ICs are located on the _____ while the switch block is found on _____.
3. When installing a German character set, the keyboard switches are set to _____.
4. List the three memories used in the storage of parameter settings.
 - a. _____
 - b. _____
 - c. _____

5. Of the three memories, which memory is cleared by a power off or reset?

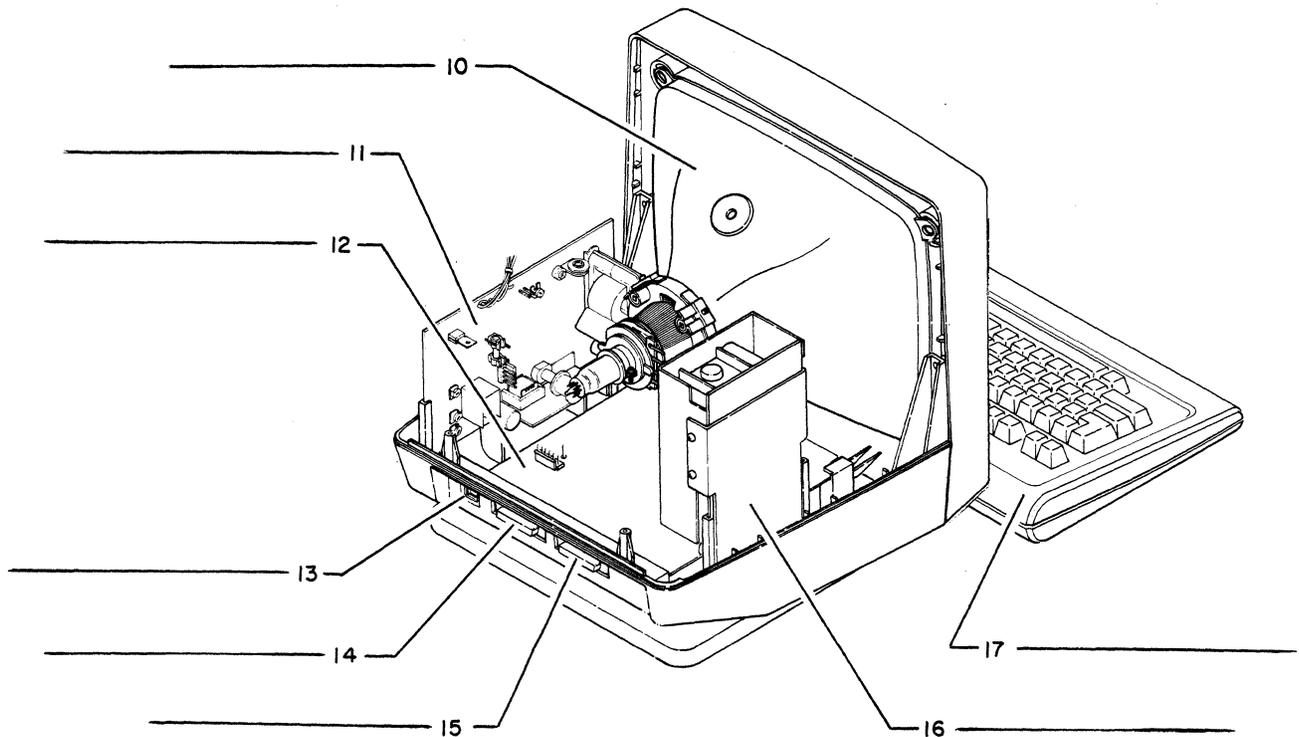
6. Parameter settings which are used by the user on a permanent basis are stored in which memory?

7. During the initial power on (installation), the parameter values stored in the _____ memory become effective.

8. How is screen contrast changed?

9. To which connector is the communication line connected to?

Identify the numbered components in figure 1-1.



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Figure 1-1. Major Assemblies

Answers to Learning Activity 1-A

1. a. Advanced (ADV) mode that emulates the advanced mode of a CDC 722-10/20 (CC628-A/B) Display Terminal
- b. ADDS mode that emulates an Applied Digital Data Systems Viewpoint Terminal
- c. ANSI mode that is compatible with ANSI standard X3.64
2. Main logic board; keyboard printed-circuit board.
3. Switch 1 either ON or OFF, switch 2 OFF, switch 3 OFF, and switch 4 ON.
4. a. EPROM
- b. EEPROM
- c. Volatile RAM
5. Volatile RAM
6. EEPROM
7. EPROM
8. By changing a parameter value
9. Connector marked EIA/CL
10. CRT/yoke assembly (replaced as one unit)
11. Monitor board
12. Main logic board
13. Keyboard connector
14. EIA/CL connector - port for host communications
15. AUX EIA connector - auxiliary port for connecting serial printer
16. Power supply
17. Keyboard

LEARNING ACTIVITY 1-B. EXERCISE: PARAMETER ENTRY

This learning activity will present the steps to change the control parameters.

Objectives

You will be able to list the steps required to change and store a parameter setting.

Directions

The only switch found on the 722-30 terminal is the On/Off switch. Instead of parameter switches, the terminal uses nonvolatile memory to store control parameter settings. The parameter settings can be entered and/or changed via the keyboard. Certain maintenance actions require you to change parameter settings. This learning activity will look at how to change parameters.

The learning activity has three parts. First, you will read the procedure for changing and displaying parameters. Second, you will review examples of changing parameters. Last, you will demonstrate your knowledge of changing and storing parameters.

Part One

Read the information found in procedure 4 of section 6B. Be sure to study both tables found in this procedure. Return to part two of this learning activity after you have completed the reading assignment.

Part Two

Study the following examples.

After the first parameter is displayed, press and hold the SHIFT key and then use the ↑ or ↓ key to display another parameter.

Example 1: Screen display is "01 Auto LF/CR On". Holding the SHIFT key pressed and pressing the ↑ key once will cause the screen display to change to "02 Auto Repeat On".

Example 2: Screen display is "01 Auto LF/CR On". Holding the SHIFT key pressed and pressing the ↓ key three times will change the screen display to "40 Tx. EOM FF".

To select an alternate parameter setting or step through the available settings, press and hold the SHIFT key and then use the → or ← key.

Example 3: Screen display is "04 Auto Wrap On". Holding the SHIFT key pressed and pressing the → or ← key once will change the screen display to "04 Auto Wrap Off".

Example 4: Screen display is "07 Baud Rate 9600". Holding the SHIFT key pressed and pressing the ← key four times will change the screen display to "07 Baud Rate 1200".

Part Three

Write your response to the following questions in the space provided. Check your answers with those given at the end of this activity.

1. After completing a service call on the 722-30, you are asked to show a new operator how to change parameters. List the steps (keys pressed) required to display parameter 01 on the screen. Also indicate the message that will appear on the screen for each step.

a. _____

b. _____

c. _____

2. Which key must be pressed to exit from parameter display mode?

3. The screen display is "11 Data Bits 7". What will be displayed on the screen after pressing and holding the SHIFT key down and pressing the ↑ key once?

4. The screen display is "18 LF Bias Bias". What will be displayed on the screen after pressing and holding the SHIFT key down and pressing the ↓ key four times?
-
5. The screen display is "31 Screen Contrast 9". What will be displayed on the screen after pressing and holding the SHIFT key down and pressing the ← key five times?
-
6. In question number 5, will the final screen display be dimmer or brighter than the original display?
-
7. The screen display is "19 Margin Bell Off." What will the screen display be after pressing and holding the SHIFT key down and pressing the → key two times?
-
8. After a parameter setting has been changed on the screen, what key(s) store the new parameter value in volatile memory?
-
9. A certain maintenance activity requires the terminal to be in local mode and ADV emulation. Presently your terminal is online and in ADDS emulation. List all the key strokes and the number of times each key is pressed to change these two parameters.
- a. Press SETUP - once e. _____
- b. _____ f. Press SETUP - once
- c. _____
- d. _____
10. With no reset switch present on the front panel of the terminal, how is the terminal reset?
-
11. What will appear across the bottom of the screen if parameter 35 is set to Off?
-

12. While using a terminal, the operator changes and stores in volatile memory the following parameters: 17 to On and 31 to 6. To save these new values for the next time, he/she presses the CTRL and S keys simultaneously before powering off. What will the settings of these parameters be after the terminal is powered on?

17 - _____ 31 - _____

Answers to Learning Activity 1-B

1. a. Press SETUP key. "PRESS UP-DOWN ARROWS TO SEE MORE, AND LEFT-RIGHT ARROWS TO CHANGE VALUES" message will appear on the screen.
b. Press and hold SHIFT key down and press the ↑ key once. This will display the set tabs line.
c. Repeat step c. This causes parameter 01 to be displayed.
2. SETUP key
3. 12 DTR On/Off Off
4. 14 Emulation ADV
5. 31 Screen Contrast 4
6. Dimmer
7. The screen display will be the same. The first depression toggles the setting to ON, while the second toggles it back to OFF.
8. Either the Cursor Up, Cursor Down, or SETUP keys will store the last value selected.
9. a. Press SETUP once. "PRESS UP-DOWN ARROW TO SEE MORE, AND LEFT-RIGHT ARROWS TO CHANGE VALUES" message will be displayed on the screen.
b. Press and hold the SHIFT key down then press the ↑ key fifteen times. The first time the ↑ key is pressed, the set tabs parameter is displayed. The next fourteen times will move you to parameter 14.
c. Press and hold the SHIFT key down then press the → key twice or press and hold the SHIFT key down and press the ← key once. Either sequence changes parameter 14 to ADV.

- d. Press and hold the SHIFT key down and then press the ↑ key eight times. This moves from parameter 14 to parameter 22. Note, the first time the ↑ key was pressed the new value for parameter 14 was stored in volatile memory as a temporary change.
 - e. Press and hold the SHIFT key down and then press the → key once. This changes parameter 22 to Local.
 - f. Press SETUP once. This stores the new value for parameter 22 in volatile memory as a temporary change and exits from the parameter display.
10. Enter the parameter display; move to parameter 28; press and hold the SHIFT key down and then press CR.
 11. If in ADV or ADDS emulation, R=xx C=xx will appear in the lower right corner of the screen. R for row, C for column and xx will be a decimal number indicating cursor location. If in ANSI mode, nothing will appear at bottom of the screen.
 12. 17 will be On and 31 will be 9. If the screen contrast parameter is set to a value not between 7 and 15, it will be defaulted to 9.

LEARNING ACTIVITY 1-C. EXERCISE: DIAGNOSTICS

This learning activity will present the steps necessary to initiate and execute the 722-30 diagnostics.

Objective

You will be able to exercise the 722-30 resident diagnostics.

Directions

In this manual, read the following:

Topic entitled "Resident Diagnostics" in section 6 and procedures 2, 3, and 17 in section 6B.

Return to this learning activity after you have completed the reading assignment.

Write your response to the following questions in the space provided. Check your answers with those given at the end of this activity.

1. List the diagnostics available in the 722-30 display terminal.

2. What indicates a fatal error occurred during the power-on self tests?

3. When powered-on, the terminal does not beep and has "722-30 ADV Rev 1.1" displayed on the screen. What type error has occurred?

4. When powered-on, the terminal does not beep and has "]*& %Tyhfg#\$^&)LK<hkjhy!#" displayed on the screen. What type of error has occurred?

5. When powered-on, the terminal does beep and has "722-30 ADDS Rev 1.1" displayed on the screen. What type of error has occurred?

6. When powered-on, the terminal does beep with "722-30 ADV Rev 1.1 06" displayed on the screen. What type of error has occurred?

7. What parameter numbers must be checked before running the power-on self tests in a loop? Also give the settings required to initiate the tests.

8. List the keystrokes necessary to place the power-on self tests in a continuous loop (assume ADV emulation).

9. What will stop a looping power-on self test. (Give both ways.)

10. To do the communication loopback test, parameter 22 (Operation Mode) is set to _____.
11. The part number of the communication loopback plug is _____.
12. To display the complete status line, parameter _____ must be set to _____.
13. What indication does the keyboard-connection test give if the keyboard was disconnected after the power-on tests have run? (List indication given with parameter 35 in the On setting and the Off setting.)

14. To display the character/symbol generated when a key is pressed, parameter 22 is set to _____ and parameter _____ is set to _____.
 15. When testing the keyboard input in ADV emulation, what will be displayed on the screen when pressing the CTRL and S keys simultaneously?
-

Answers to Learning Activity 1-C

1. Power-on tests and keyboard-connection test; monitor mode is a diagnostic aid; loopback test is method to check the main interface port
2. No beep and a meaningless display or just a cursor
3. Keyboard error
4. Fatal error
5. No error, successful completion
6. Nonfatal error of 06
7. Parameter 22 must be set to Local mode and parameter 14 must be set to ADV or ANSI emulation
8. Hold the CTRL key down and press the +=key, then the V key
9. Power off or an error
10. Online
11. 61409717
12. 35, On
13. If parameter 35 is On, a field in the status line will say "KB ERROR." If parameter 35 is Off, no indication is given.
14. Local, 20, On
15. D₃

LEARNING ACTIVITY 1-D. EXERCISE: FRU REMOVAL REPLACEMENT AND ADJUSTMENTS

This learning activity will study the removal, replacement and adjustment procedures for the 722-30.

Objective

You will be able to remove/replace all FRUs, adjust monitor board controls, and measure dc voltage.

Directions

Read procedures 5 thru 16 in section 6B of this manual. Pay special attention to all notes, warnings, and cautions given in the procedures. Return to this learning activity after you complete the reading assignment.

Write your response to the following questions in the space provided. Check your answers with those given at the end of this activity.

1. When replacing the main logic board, what must be done to ensure the parameter settings are transferred to the new board?

2. The dc voltages are checked at the power connectors on which board?

3. To measure the +5 volt output of the power supply, connect the meter between pins with _____ wires and _____ wires. (Indicate color.)

4. In figure 1-2, the 115/230 volt jumper wire would be connected to pin ___ for 115 V operation.

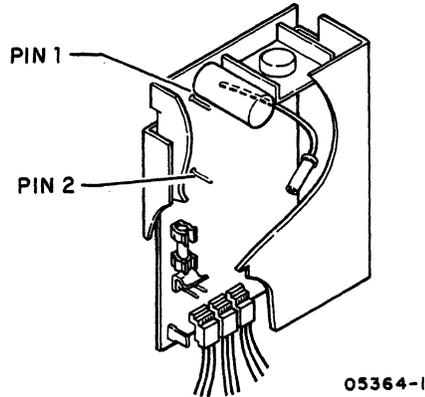


Figure 1-2. Power Supply Board

5. To perform the video adjustments, set parameter 22 to ____.

6. List the key strokes required to display the alignment pattern (assume the terminal is in ADV emulation).

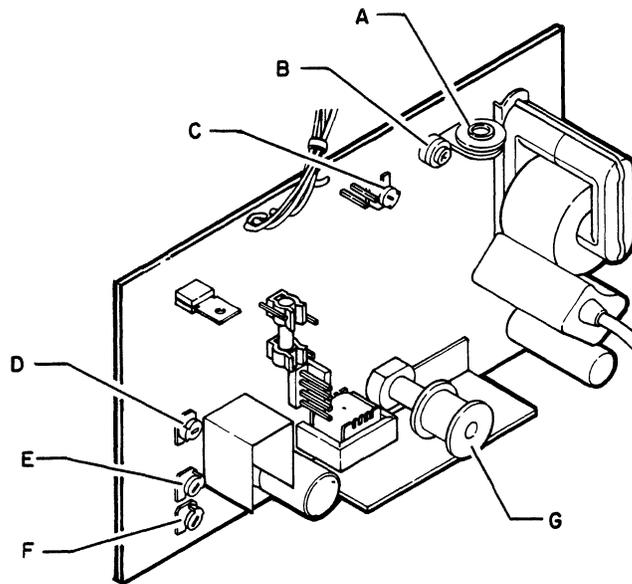
7. Circle the following power components that must be soldered when replaced.

- | | |
|---------------------|--------------|
| power on/off switch | power supply |
| fuse holder | power cord |

8. The yoke magnets will correct what problem?

9. What keys must be pressed to clear the video alignment display?

For questions 10 thru 14, use figure 1-3 as a reference.



05366-2

Figure 1-3. Video Control Board

10. Which control would you adjust for a vertically rolling display?

11. Which control adjusts the height of the display?

12. The characters at the top of the screen are larger than those at the bottom. Which control would you adjust?

13. The display pattern is seven inches wide. Which control would you adjust to change the display?

14. Which control will touch up the character focus?

Answers to Learning Activity 1-D

1. If possible, you must record the parameters on paper then enter them after the new board has been installed.
2. Power supply
3. Black, blue
4. 2
5. Local
6. Press the CTRL and = keys simultaneously, then hold the SHIFT key down and press the " and @ keys
7. Power switch, fuse holder, and power cord all require some soldering if replaced.
8. Barrelling or pincushioning
9. Press and hold the SHIFT key, then press the P CLEAR key
10. F, V HOLD VR203
11. E, V SIZE VR201
12. D, V LIN VR202
13. G, L3603
14. A, FOCUS VR303

LEARNING ACTIVITY 1-E. EXERCISE: FAULT ISOLATION

This learning activity will describe the 722-30 troubleshooting aids found in the maintenance section.

Objective

You will be able to list the action(s) necessary to correct a 722-30 display terminal malfunction.

Introduction

Many elements are needed to isolate and repair a malfunction. These elements which include, changing parameters, running diagnostics, making adjustments and replacing components, have been covered in previous learning activities. This manual contains one additional aid to help you in fault isolation, the SAM listings.

There are seven listings in all. With the exception of SAM 1, each listing covers a different type problem or symptom. SAM 1 is used to define the problem and select one of the other six listings.

Directions

Use the SAMs in section 6A to answer the following questions. If you are not familiar with the SAM format, read the SAM format information in section 6 before you answer the questions. Compare your answers with those given at the end of this activity.

1. A terminal you are working on has no beep when power is turned on. After warm up, a message does appear on the screen. According to SAM 1, what SAM would you use to further isolate the malfunction?
-

2. If the building circuit breaker trips when the terminal is plugged in, what component(s) would you replace?

3. For a power problem, list the location of the three fuses that must be checked?

4. When a 26 code appears on the first display line, which FRU would you replace first?

5. The power-on self test produces a normal emulation message with no beep. What components would you replace?

6. You have a vertically rolling display, what parameter should be checked before any adjustment or FRU is replaced?

7. The use of each key produces two characters on the screen. What parameter should be checked?

8. On a terminal with no raster, you notice the filament is not lit. All the dc voltages are present. What FRU would you first replace?

9. A 722-30 terminal was dropped off at your office. No symptom was given. List the indications you would look for to define the malfunction.

a. _____ c. _____

b. _____ d. _____

Answers to Learning Activity 1-E

1. SAM 4 according to steps 001 and 012 of SAM 1.
2. Power cord according to steps 001 and 017 of SAM 2.
3. AC line, power supply board and monitor board.
4. Main logic board according to steps 001 and 005 of SAM 4.
5. Check keyboard cable connection, then replace the keyboard according to steps 003, 008, and 009 of SAM 4.
6. Check parameter 25 as indicated by steps 002 and 018 of SAM 5.
7. Parameter 13 as indicated by steps 002 and 014 of SAM 6.
8. Monitor board as indicated by steps 003 and 005 of SAM 3.
9. SAM 1 lists the following:
 - a. Listen for the beep when powered on
 - b. Look for emulation message
 - c. Look for an octal number at end of emulation message
 - d. See if keyboard entered data appears on screen

If these checks are OK, the terminal appears to be operating correctly. Before you return it to the customer, run the power-on self test in a loop. Any error indicated by these checks should be further isolated by using the indicated SAM.



This section gives an overview of the display terminal and describes its standard and optional features, its operator controls, and its specifications.

OVERVIEW

The display terminal (figure 2-1) is an interactive input/output device for a remote or local host computer. The terminal transmits keyboard-entered data to the host computer character by character in a manner like a teletypewriter. In addition, in the later mentioned ANSI X3.64 mode, the terminal can also transmit blocks of data, allowing editing to be done before transmission. A serial-interface printer may be connected to the terminal to copy input/output or to make screen copies.

The terminal has three personalities: an advanced (ADV) mode that emulates the advanced mode operation of a CDC 722-10/20 (CC628-A/B) Display Terminal, an ADDS mode that emulates an ADDS* Viewpoint Terminal, and an ANSI X3.64** compatible mode. The emulation to be used may be selected by the terminal operator via the keyboard or be selected by the host computer.

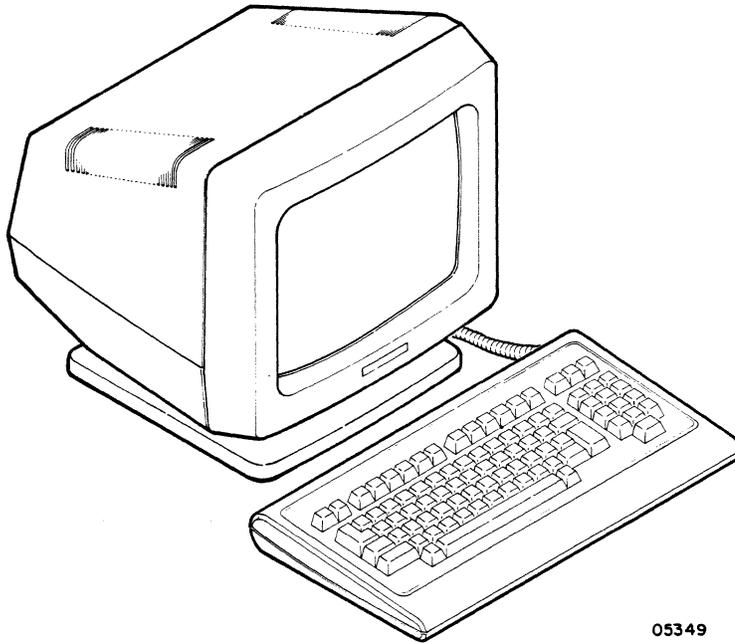
STANDARD FEATURES

The standard features of the terminal include:

- Parameters governing operating characteristics are entered via the keyboard and are stored in electrically-erasable, programmable, read-only memory (EEPROM). This type memory provides nonvolatile storage until a parameter entry is made and the previous entry is electrically erased by associated circuits.

*Registered trademark of Applied Digital Data Systems.

**ANSI X3.64 is a standard that establishes multi-code commands using ASCII codes. ANSI is an acronym for American National Standards Institute. ASCII is an acronym for American Standard Code for Information Interchange.



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Figure 2-1. Display Terminal

- Display format of 24 lines by 80 characters per line. In addition, terminal status information appears on a 25th line if enabled in the parameters.
- Display character set includes 95 ASCII alphanumeric characters and two groups of special symbols. The special symbols include line-drawing symbols and graphic/mathematical symbols. In addition, the terminal has a monitor mode where characters for 33 ASCII control codes are displayable without the control functions being performed.
- Characters may be displayed at half (low) intensity, blinking, underlined, in inverse video (dark characters on light background), or in any combination.
- Display cursor may be an underline or a block and may blink, be steadily-lit, or be blanked (not displayed).
- Self tests that check the terminal hardware.

- Host and printer interfaces that are asynchronous, RS-232-C/CCITT-V.24* compatible, and have selectable word formats and selectable speeds from 110 to 19 200 bps. In addition, the host interface can be set up for current-loop communications.
- Detached keyboard with ASCII character set.
- Tilt and swivel display unit.

OPTIONAL FEATURES

Optional character sets are available that allow the terminal to operate in the languages listed below. These options require installation by customer engineering personnel (instructions are in section 3).

- English (United Kingdom)
- German
- French
- Spanish
- Swedish/Finnish
- Danish/Norwegian

OPERATOR CONTROLS

The operator controls on the terminal (figure 2-2) include the:

- Power switch - Pressing the front end of the switch up turns power on and pressing the back end turns power off.
- AC line fuse - Provides electrical overload protection.

*RS-232-C is the Electronic Industries Association standard for signal interchange between data terminal equipment and data communication equipment. CCITT V.24 is a comparable European standard.

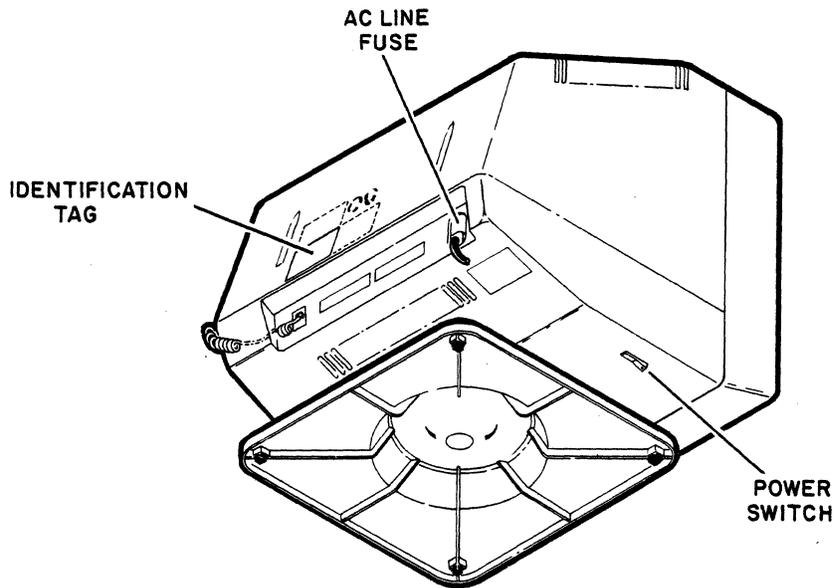


Figure 2-2. Operator Controls and Identification Tag

SPECIFICATIONS

The following paragraphs describe the electrical, environmental, and physical specifications for the terminal.

ELECTRICAL SPECIFICATIONS

The electrical specifications for the terminal are:

- Units with part number 51942413* require: 110 (+11) V ac, 60 Hz, single phase input
- Units with part number 51942414* require: 220/240 (+22/24) V ac, 50 Hz, single phase input

*The part number of the terminal appears on the identification tag shown in figure 2-2.

ENVIRONMENTAL SPECIFICATIONS

The environmental requirements of the terminal are:

Operating Temperature: 10 C to 40 C (50 F to 104 F)

Nonoperating Temperature: -20 C to 65 C (-40 F to 149 F)

Relative Humidity: 0 to 90%, no condensation

PHYSICAL SPECIFICATIONS

The overall dimensions of the terminal and keyboard are shown in figure 2-3. The terminal weighs 7.0 kg (15.4 lb) and the keyboard weighs 1.5 kb (3.3 lb).

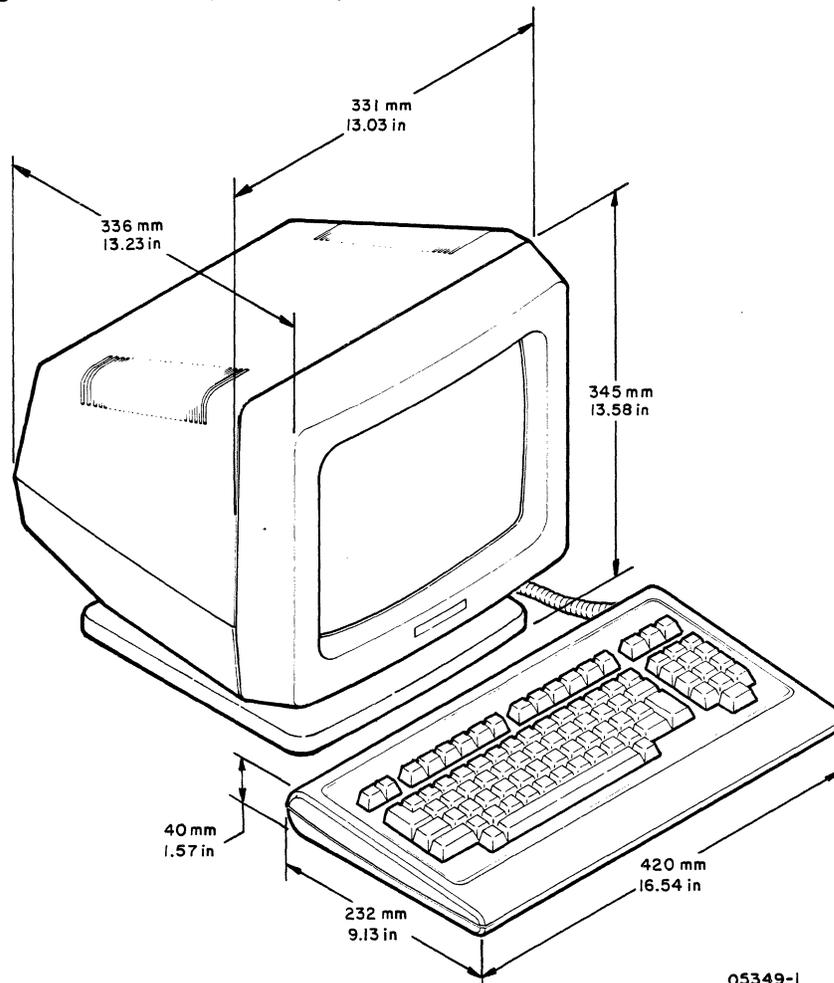


Figure 2-3. Terminal Dimensions



This section describes how to install an optional character set in the terminal. This is done by customer engineering personnel. The installation of the terminal is the responsibility of the customer and is covered in the 722-30 Display Terminal Owner's Manual.

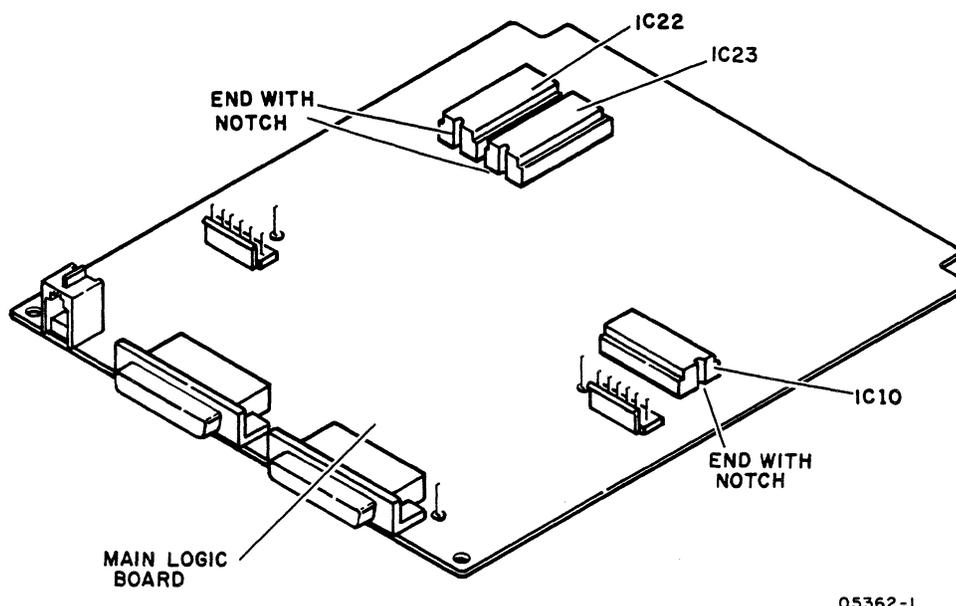
To install an optional character set:

1. Unplug ac power cord.
2. Remove cabinet hood from terminal (procedure 5 in subsection 6B of this manual).

CAUTION

Observe the Electostatic Discharge Precautions in section 6 when handling the integrated-circuit (IC) chips in the following steps.

3. Locate the 24-pin IC 10, the 28-pin IC 22, and the 28-pin IC 23 on main logic board at bottom of terminal (figure 3-1).



05362-1

Figure 3-1. Replacing IC Chips

4. Use a small screwdriver and lift IC 10, IC 22, and 23 straight up to avoid bending pins.
5. Note alignment of notches (figure 3-1) and install the IC 10, IC 22, and IC 23 that came with optional character set kit.
6. Replace hood.
7. Disconnect keyboard cable from terminal.
8. Remove six screws from bottom of keyboard and remove lower keyboard case (figure 3-2).
9. Remove four screws holding keyboard printed-circuit board assembly to upper keyboard case.
10. Turn keyboard printed-circuit board assembly over to access SW1 block switches.
11. Table 3-1 lists the SW1 switch settings for the optional character sets. These settings compensate for the different keyboard configuration which will exist after the optional keycaps have been installed. Use a small screwdriver or a ball-point pen to set these switches.

TABLE 3-1. KEYBOARD SWITCH SETTINGS FOR CHARACTER SETS

CHARACTER SET	SW1 SWITCHES			
	1	2	3	4
United Kingdom	*	ON	OFF	ON
German, French, Spanish, Swedish/Finnish, or Danish/Norwegian	*	OFF	OFF	ON
Standard ASCII (original setting)	*	OFF	ON	OFF

*Either ON or OFF.

12. Do steps 7 through 10 in reverse order and action and reassemble keyboard.
13. Figures 3-3 through 3-8 show which keycaps need to be replaced for each optional character set. Use a keycap removal tool (part number 71493510) and refer to the appropriate figure and replace the indicated keycaps.

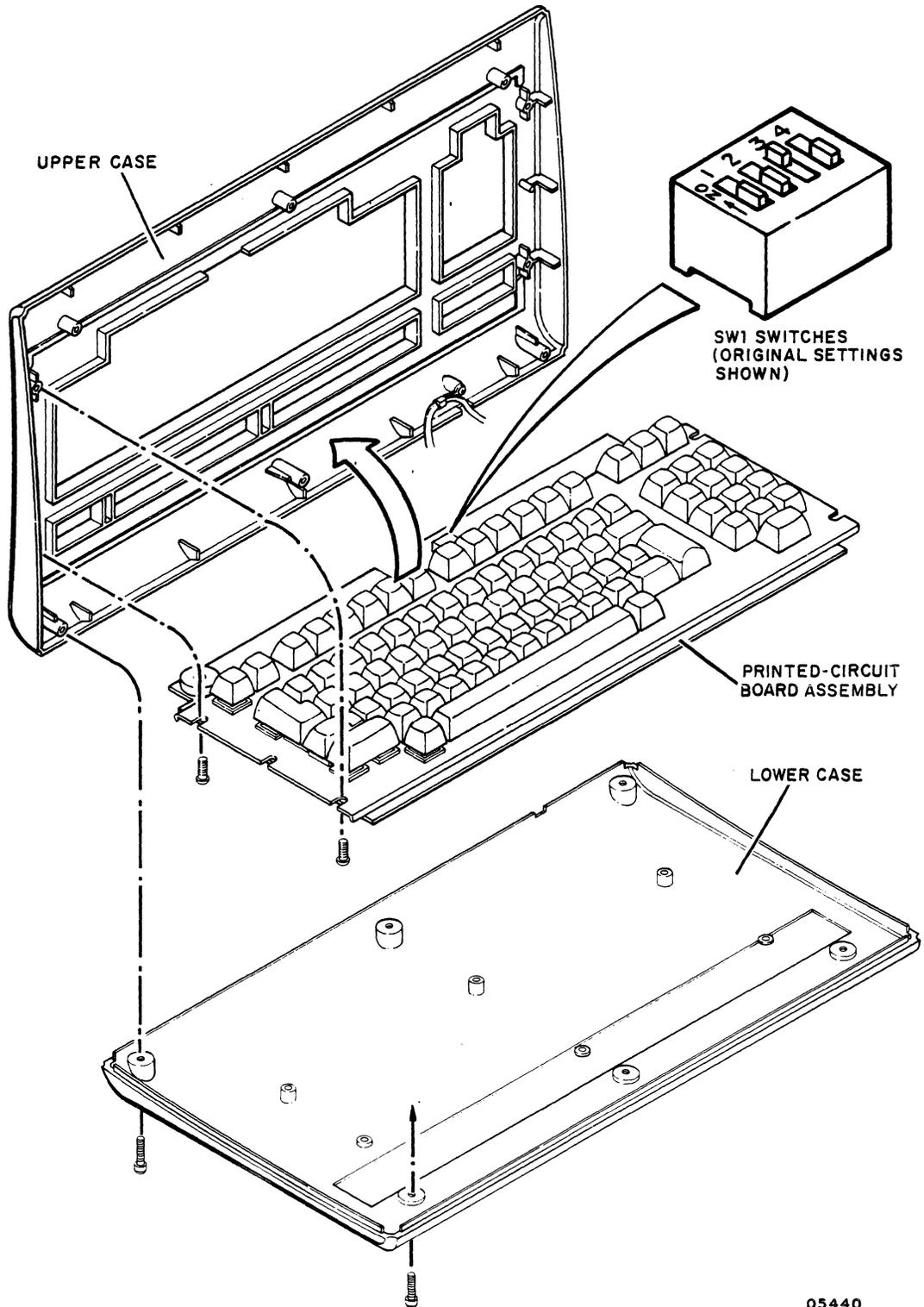
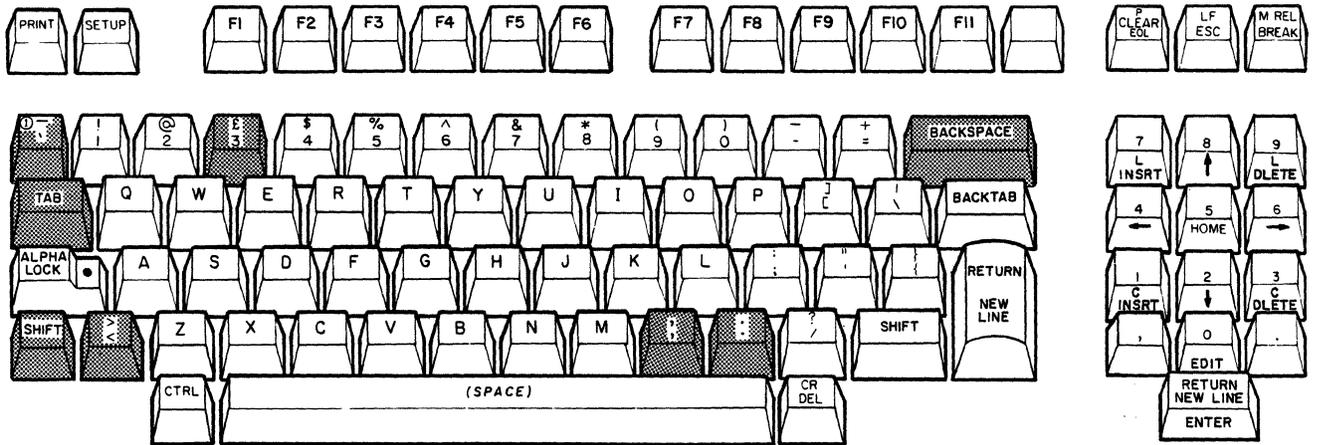


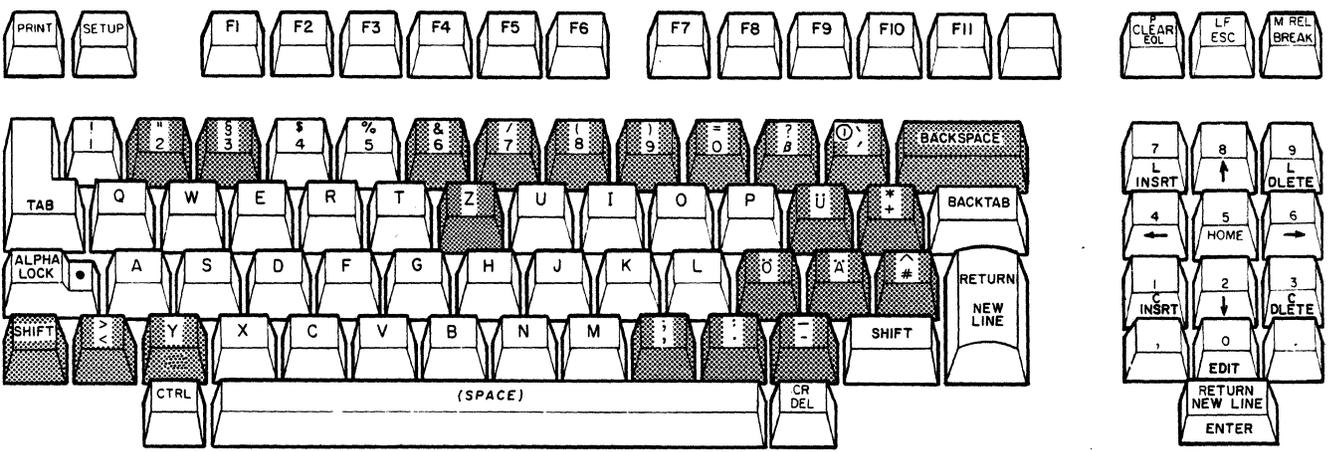
Figure 3-2. Accessing Keyboard Switches



① UPPER-OVER BAR
LOWER-GRAVE ACCENT

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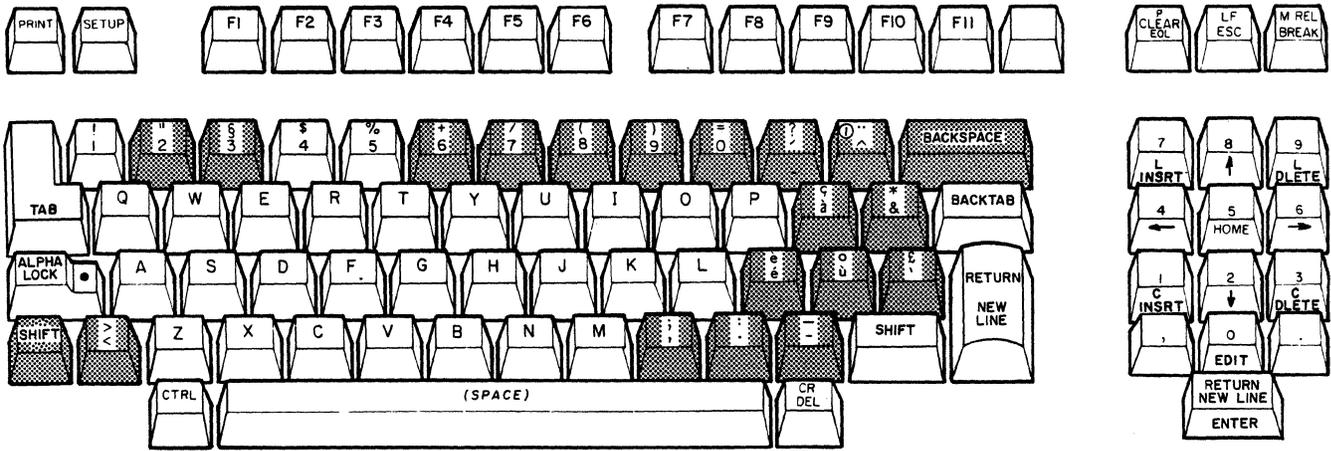
Figure 3-3. United Kingdom Keycaps



① UPPER-GRAVE ACCENT
LOWER-APOSTROPHE, ACUTE ACCENT

05426

Figure 3-4. German Keycaps



① UPPER-UMLAUT

05427

Figure 3-5. French Keycaps

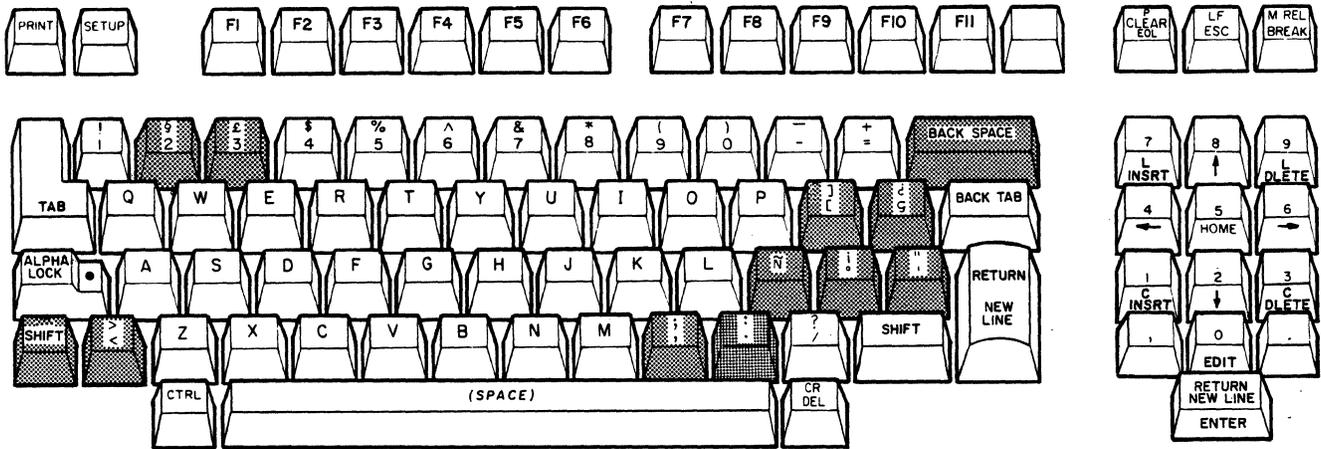


Figure 3-6. Spanish Keycaps

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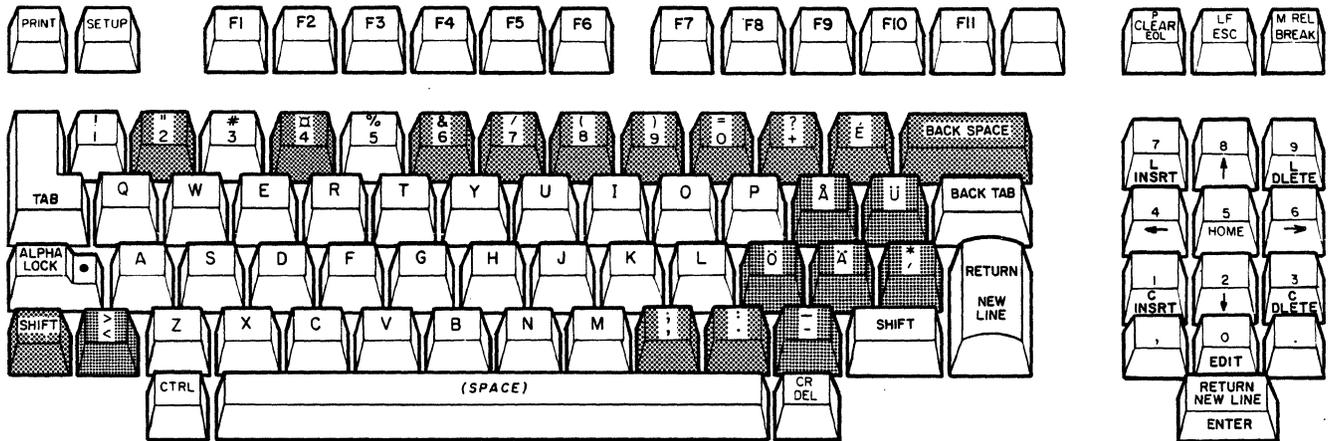


Figure 3-7. Swedish/Finnish Keycaps

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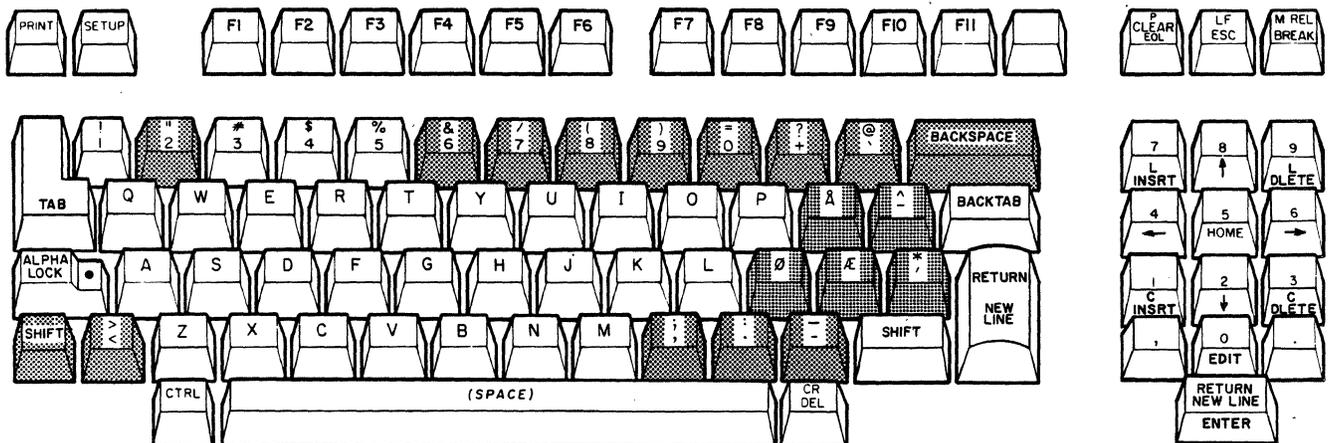


Figure 3-8. Danish/Norwegian Keycaps

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This section describes the general functions of the display terminal and its major assemblies and external interfaces.

GENERAL FUNCTIONS

The display terminal functions as an interactive input/output device for a remote or local host computer. Data input/output occurs asynchronously. A serial-interface printer may be connected to the terminal to copy input/output or to do page prints of the data on the display screen.

The terminal has a standard ASCII character set and six foreign character sets are available as options. In addition, the terminal can display special symbols and can emulate the advanced mode of a CDC CC628 Display Terminal (ADV emulation), an ADDS Viewpoint Terminal (ADDS emulation), or an ANSI X3.64 compatible terminal (ANSI emulation). These emulations are generated by the terminal firmware. The chosen emulation is placed in effect by a keyboard-entered parameter or by a host command.

The following paragraphs describe the terminal firmware and the keyboard-entered parameters.

TERMINAL FIRMWARE

The terminal firmware resides in erasable, programmable, read-only memory (EPROM) on the main logic board of the terminal. The firmware consists of program instructions that drive a microprocessor in the logic circuits. The firmware contains the routines for:

- Operating online with the host using ADV, ADDS, or ANSI emulation. The emulation in effect governs which control codes the terminal recognizes and how it responds to them.

- Performing local mode operations (offline from the host). With these operations, keyboard entered data always displays even though the terminal may be set up for full-duplex operation (data displays when host echoes it back). No data is sent to the host in local mode operation and the emulation in effect governs how the terminal responds to control code keys.
- Self-testing the terminal hardware. These diagnostic self tests are described in section 6, maintenance.

KEYBOARD-ENTERED PARAMETERS

The keyboard-entered parameters determine which operating features are in effect (for example: determines whether the display operates in a scroll or page manner, whether the display cursor is an underline or a block, etc.). The settings currently in effect may be displayed, and if desired, changed in either online or local mode.

The next paragraphs describe the categories of parameters that exist and the storage of parameter settings in memory.

Categories of Parameters

The keyboard-entered parameters consist of parameters that:

- Are set to make the terminal compatible with the site and its host
- Are set for operator comfort
- Control functions commonly controlled on other type terminals by manual controls. These functions include:
 - Screen contrast adjustment
 - Terminal reset
 - Online/local mode selection

Storage of Parameter Settings in Memory

The storage of parameter settings involves EPROM, EEPROM, and volatile random-access memory (RAM). The EPROM holds default parameter settings that are established at the factory. These default settings become effective when the terminal is initially powered on following installation. The person installing the terminal then changes the undesired default settings and stores the default and changed settings into EEPROM.

The EEPROM stores the parameter settings that the user desires to use on a permanent basis. These settings are permanent in that, unless changed, they automatically become effective each time the terminal is powered on or reset.

If a temporary parameter change is desired, the changed setting should be stored in volatile RAM. Such a change will override the permanent setting until cleared by a power off or reset.

In addition to the initial power on, the default settings become effective if instructed via the keyboard or if the terminal cannot detect any stored settings in EEPROM when a power on or reset occurs. The procedure for displaying, changing, and storing settings via the keyboard is in subsection 6B of the maintenance section. The procedure also defines each parameter selection and indicates its default setting.

MAJOR ASSEMBLIES

Figure 4-1 is a simplified block diagram of the terminal. The major assemblies comprising the terminal include the keyboard, power supply, main logic board, monitor board, and the crt/yoke assembly. The physical location of these assemblies is shown in figure 4-2 and the following paragraphs describe their functions.

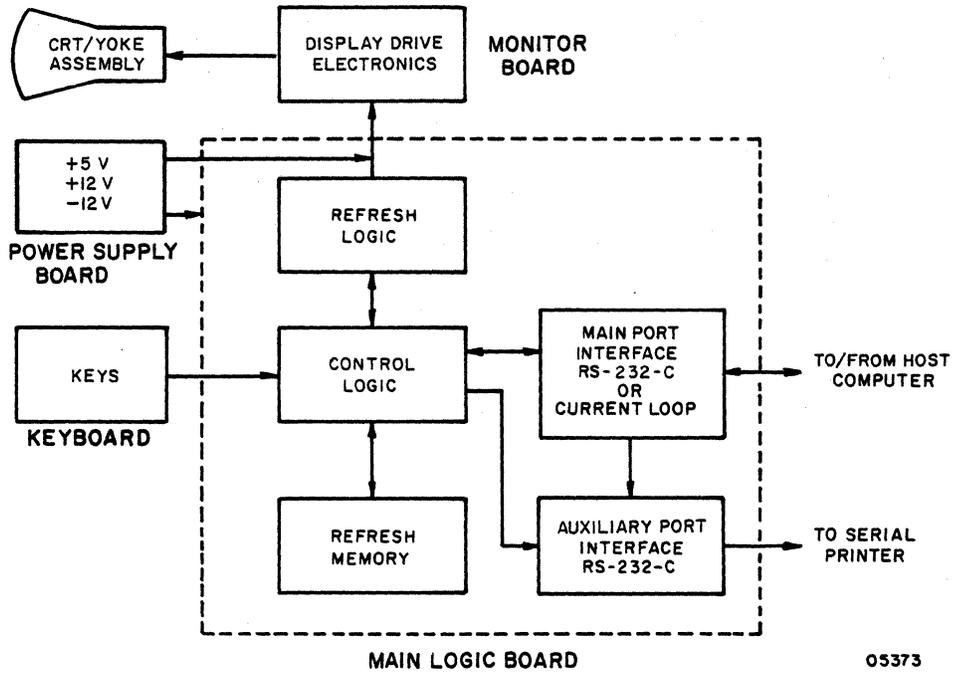


Figure 4-1. Simplified Terminal Block Diagram

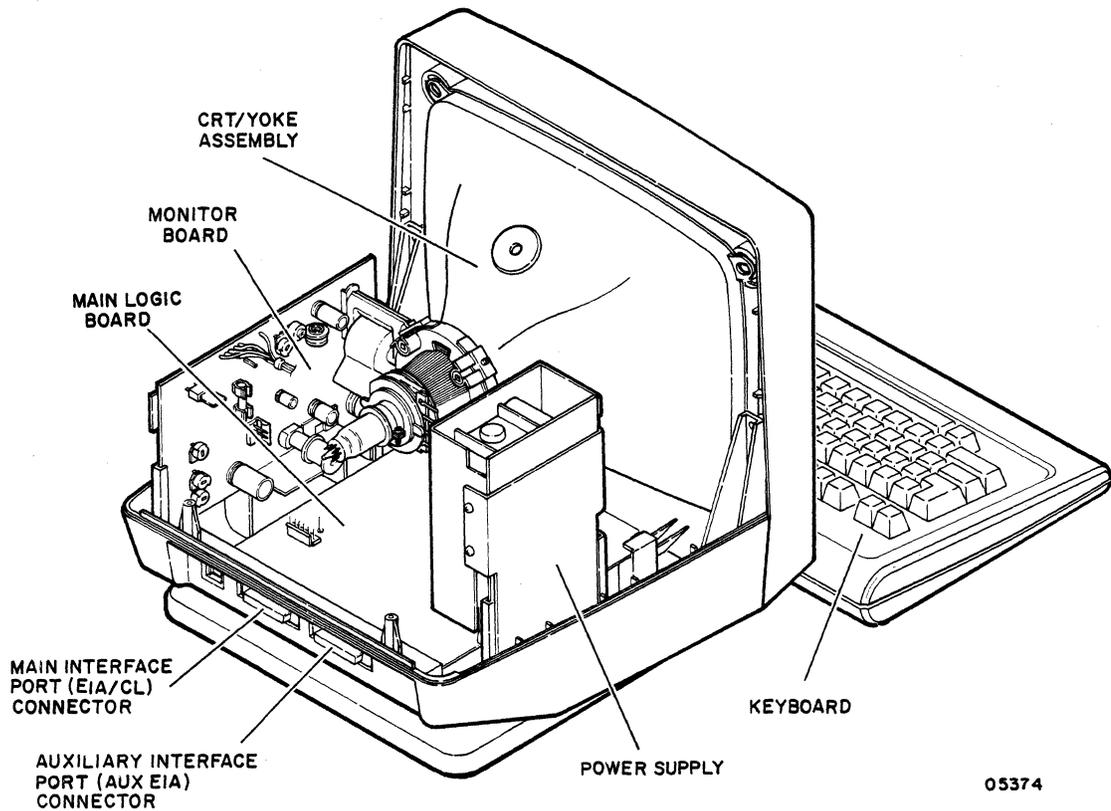


Figure 4-2. Location of Major Assemblies and Interface Connectors

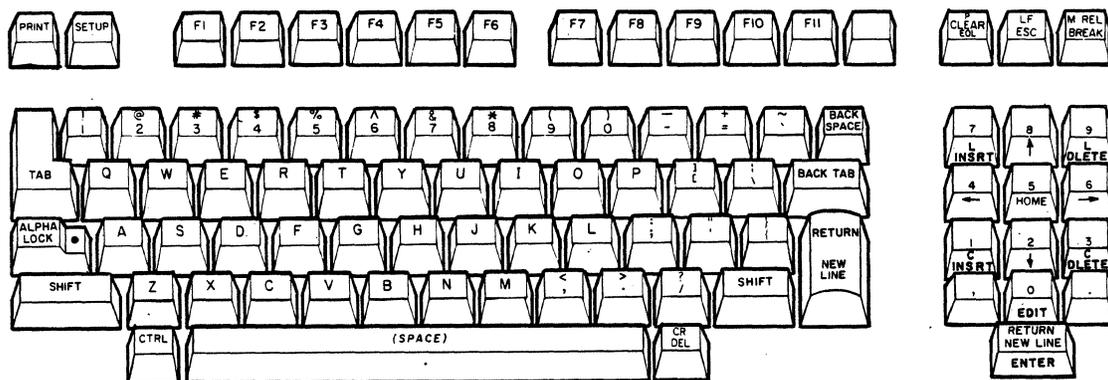
KEYBOARD

The detached keyboard (figure 4-3) provides for operator entry of alphanumeric characters and control codes. Each key when pressed sends an 8-bit serial code with parity to a universal asynchronous receiver/transmitter (UART) on the main logic board.

The keyboard operates in four modes, unshifted, shifted, control, and shifted control. The codes transmitted for pressed keys are determined by the emulation in effect and are controlled by the main logic board circuits. Transmitted codes are also affected if an optional foreign character set is installed. The foreign character sets include special keycaps that are installed on the keyboard and the replacement of three integrated-circuit chips on the main logic board. In addition, the settings of switches inside the keyboard must be changed.

POWER SUPPLY

The power supply converts the site ac voltage to +5, +12, and -12 V dc. A jumper on the power supply conditions it for a nominal input of 115 V ac at 60 Hz or 230 V ac at 50 Hz. The power supply is a switcher type that provides regulated dc power with a minimal power loss. There are no voltage adjustments.



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Figure 4-3. Keyboard with Standard Keycaps

MAIN LOGIC BOARD

The main logic board contains the circuits that control the terminal. The main logic component of the board is an Intel 8085 Microprocessor integrated circuit that executes the previously described firmware. Other circuits provide firmware storage, parameter storage, data storage, timing, display refresh, keyboard data encoding, and external input/output.

MONITOR BOARD

The monitor board contains horizontal and vertical deflection circuits, video circuits, and a high-voltage power supply circuit. These circuits provide the voltages that illuminate and deflect the electron beam in the crt. A video signal from the main logic board determines when the crt beam illuminates to form characters on the screen. The deflection circuits for the beam are synchronized by horizontal and vertical sync pulses from the main logic board.

The monitor board contains controls for adjusting display size, centering, linearity, brightness, focus, and vertical stability. These video adjustments are described in subsection 6B of the maintenance section.

CRT/YOKE ASSEMBLY

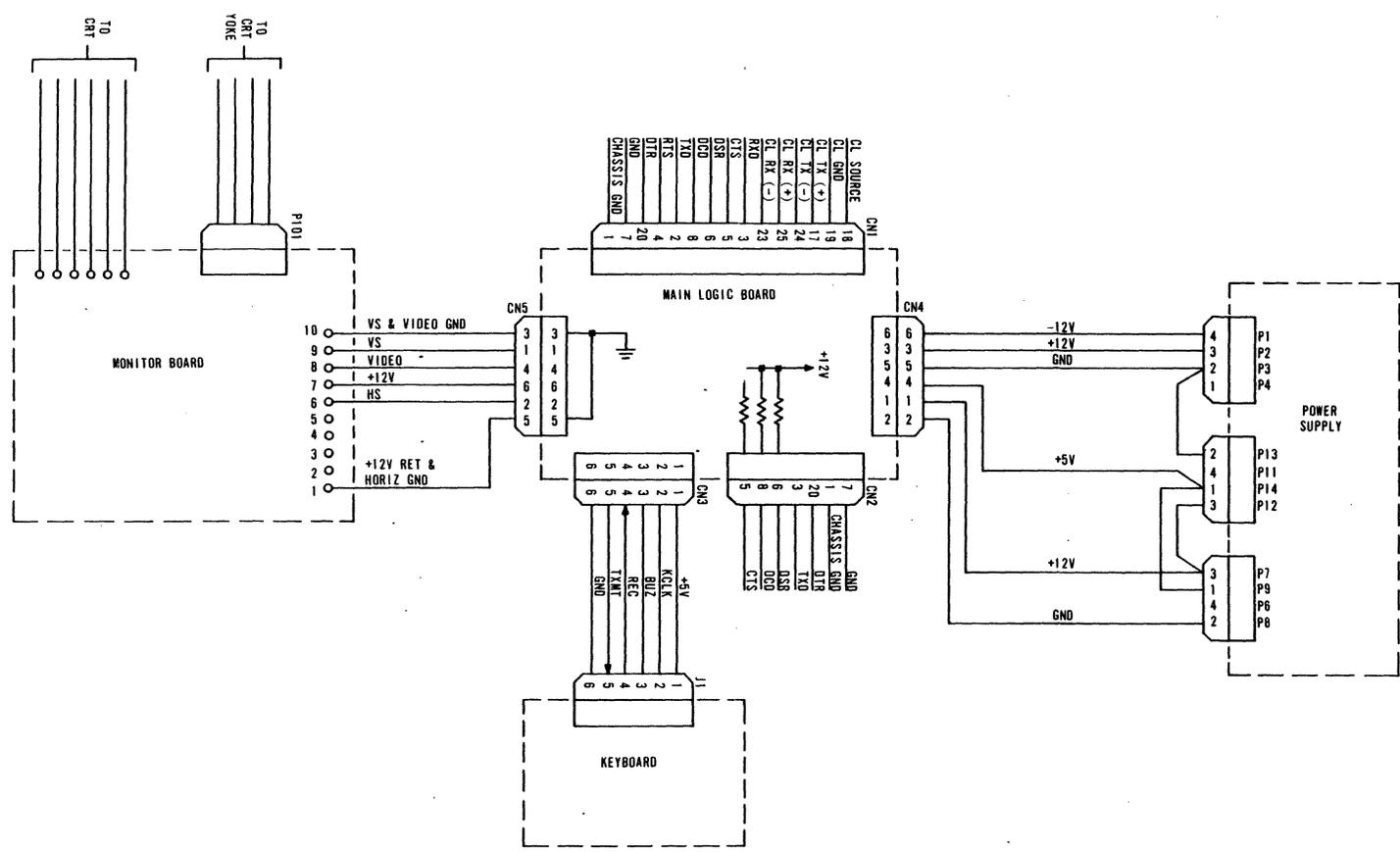
This assembly provides the display screen. The crt has a green phosphor screen that has a display format of 24 lines by 80 characters with a 25th line as a status line. The displayable area on the screen is typically 205 mm (8 in) wide and 150 mm (6 in) high. This can be adjusted via width and height adjustments on the monitor board.

EXTERNAL INTERFACES

The external interfaces of the terminal are on the main logic board, including the interface connectors. These connectors protrude through two openings at the rear of the terminal (figure 4-2). The connector labeled EIA/CL is the main interface port for host communications (EIA/CL equates to RS-232-C/current loop). The connector labeled AUX EIA is the auxiliary interface port for connecting a serial printer. The pin assignments of these connectors are shown in the interconnection diagram in section 5.

This section contains an interconnection diagram of the display terminal.

SHEET REVISION STATUS				REVISION RECORD			
REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP	
A	16201-72	RELEASED CLASS 'A'	✓	6-8-84	✓	MEX	



5-2

62950138

REFERENCE DRAWING	CONTROL DATA	TITLE
	FIRST USED ON TN126-A	INTERCONNECTION DIAGRAM
	DWN E ERSFELD 6/4/84	
	CHKD	
	ENGR	
	MFG	
	APPR	
COMPONENTS, EXCEPT AS NOTED		CODE IDENT 15920
RES	TOLERANCE	VALUE
CAP		RATING
DRAWING NO 66330420		SCALE
CROSS REF NO		SHEET 1 OF 1

D

C

↑

666330420

A

This section provides information for performing on-site maintenance on the display terminal. This information is divided into three subsections in the following order:

- General maintenance information on pages 6-1, 6-2, 6-3, etc.
- SAM (structured analysis method) listings on pages 6A-1, 6A-2, 6A-3, etc.
- Corrective maintenance procedures on pages 6B-1, 6B-2, 6B-3, etc.

GENERAL MAINTENANCE INFORMATION

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

- Suggested emergency maintenance procedure - Describes the suggested approach to emergency maintenance.
- Safety precautions - Describes the safety precautions to be taken when performing maintenance.
- Electrostatic discharge precautions - Describes the precautions to take to guard against equipment damage caused by static electricity.
- Special tools - Lists the special tools required for terminal maintenance.
- Resident diagnostics - Describes the diagnostic self-tests of the terminal.

SUGGESTED EMERGENCY MAINTENANCE PROCEDURE

The following procedure provides suggested steps for the customer 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, contact the person operating the terminal at the time the malfunction occurred, and then:

1. Determine the following:
 - a. Whether customer has on-call or carry-in maintenance coverage. (Check warranty and shipping tag.)
 - b. Specific configuration of terminal; for example, does it have an optional character set.
 - c. Type of symptoms terminal exhibited to indicate that a malfunction occurred.
 - d. Whether terminal is operating and what symptoms, if any, are present when an attempt is made to operate.
2. Determine a course of action, considering the following suggestions:
 - a. If it becomes apparent that the terminal itself is not at fault and, for example, it becomes likely that the cause of problem is either communication lines or a power loss, direct the customer to contact appropriate maintenance personnel.
 - b. Determine that an error in operating procedure rather than an equipment failure is probable cause of problem, and notify customer of correct operating procedure.
 - c. If appropriate, suggest that the terminal be brought into a repair center.
 - d. Go to customer site and begin troubleshooting.
3. If a site maintenance trip is required, 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, locate the appropriate supervisory personnel and again discuss the malfunction with the terminal operator. Then proceed as follows:

1. Visually inspect terminal to ensure that correct input/output cable connections exist.
2. Verify that a malfunction does exist, and then begin troubleshooting the terminal, as follows:
 - a. Run the diagnostic self tests described later in this section.
 - b. Refer to the SAM in this section that covers the malfunction and perform the prescribed corrective actions.
3. After malfunction has been corrected, proceed as follows:
 - a. Rerun self tests to ensure that terminal is operational.
 - b. Inform or demonstrate to customer that terminal is now operating properly.
 - c. Complete all administrative paperwork (MAFs and defective tags, etc.).

SAFETY PRECAUTIONS

WARNING

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

- Lethal voltages exist in the cathode-ray tube (crt) and on the monitor board of the terminal.
- 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.

ELECTROSTATIC DISCHARGE PRECAUTIONS

The precautions given here apply to the handling of electrostatic-sensitive components. Such components include semiconductors and assemblies that contain semiconductors. Heed the following precautions to avoid damage to these components.

- Equipment must be powered off when removing/replacing parts or disconnecting/connecting circuits.
- Parts are only to be removed from equipment when a grounded wrist strap is being worn. The wrist strap must be connected to the chassis of the equipment that the part is being removed from. If the removed part is to be turned in or reinstalled, the part must be placed in a static-shielded bag before it is laid aside.
- Replacement parts must only be removed from their static-shielded bag when you have a wrist strap on that is connected to the equipment being repaired.
- Only handle the edges of circuit boards, not the connectors or components.
- Touch leads of test devices to ground on equipment before testing.
- Wrist straps contain a 1 M ohm resistor for current limiting and user safety. The value of this resistor is to be checked monthly with an ohmmeter. This is done as follows:
 - Measure from the banana plug to the inside metal strip of the wrist strap.
 - The reading must be from 870 K ohms to 1.5 M ohms.
 - If the reading is outside the specified range, discard the wrist strap and obtain a new one.

SPECIAL TOOLS

In addition to common hand tools and electronic test equipment, an alignment tool kit (part number 12263463) is recommended for making video adjustments and a loopback plug (part number 61409717 or any standard RS-232-C loopback plug) is recommended for doing loopback testing. The loopback plug is only applicable for testing a main interface port that is setup for RS-232-C/CCITT-V.24 signals.

RESIDENT DIAGNOSTICS

The next paragraphs describe the diagnostic self tests that reside in the terminal firmware. These are the power-on tests and the keyboard-connection test. Following that is a description of monitor mode, which is also in the firmware and is a diagnostic aid.

Power-On Tests

The power-on tests detect basic hardware faults. These tests run automatically when power is turned on or when the terminal is reset. These tests can also be run in a continuous loop. The procedures for running the tests and interpreting the results are in subsection 6B.

The sequence of the tests after a power on or reset is as follows:

- All segments of terminal memory are tested.
- The keyboard connection to the terminal is tested.
- If the keyboard connection is good and no fatal error occurs, the terminal sounds a soft beep.
- The screen clears and the cursor goes to the home position.
- The revision level of ADV, ADDS, or ANSI emulation displays. If a memory error was detected, an error code appears with the revision level message (figure 6-1).
- A status line appears at half intensity at the bottom of the screen if parameter 35 (Status Line) is set to On or just R/C (row/column) status appears in ADV or ADDS emulation if parameter 35 is set to Off.

This sequence immediately halts if a fatal (terminal cannot continue) error occurs. The screen in such a case will show random (meaningless) data. If the keyboard connection is bad, the sequence is completed but no beep sounds and the words KB-Error are displayed in the status line if the status line is enabled.

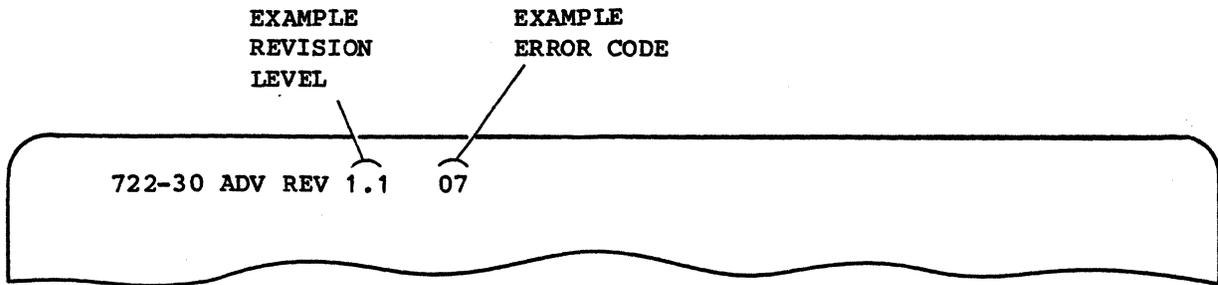


Figure 6-1. Location of a Displayed Error Code

Keyboard-Connection Test

The testing of the keyboard connection done in the power-on tests continues throughout all operations. If the connection is found bad, the words KB-Error are displayed in the status line if the status line is enabled. No other error indication is given.

Monitor Mode

Monitor mode is a diagnostic aid that is placed in effect through parameter 20. It allows control codes to be monitored on the screen instead of the control functions being performed. The procedure for using this feature to test keyboard input is in subsection 6B.

DIAGNOSTIC AND CORRECTIVE MAINTENANCE PROCEDURES

The remainder of this section contains the SAMs (subsection 6A) and associated corrective maintenance procedures (subsection 6B) for the terminal. The SAM listings provide information for isolating a malfunction and refer to the applicable corrective maintenance procedure for correcting it. The corrective maintenance procedures cover the available terminal adjustments and the replacement of field-replaceable components.

The next paragraphs describe the format and use of SAMs and explain the organization of the SAMs and procedures that follow in the section.

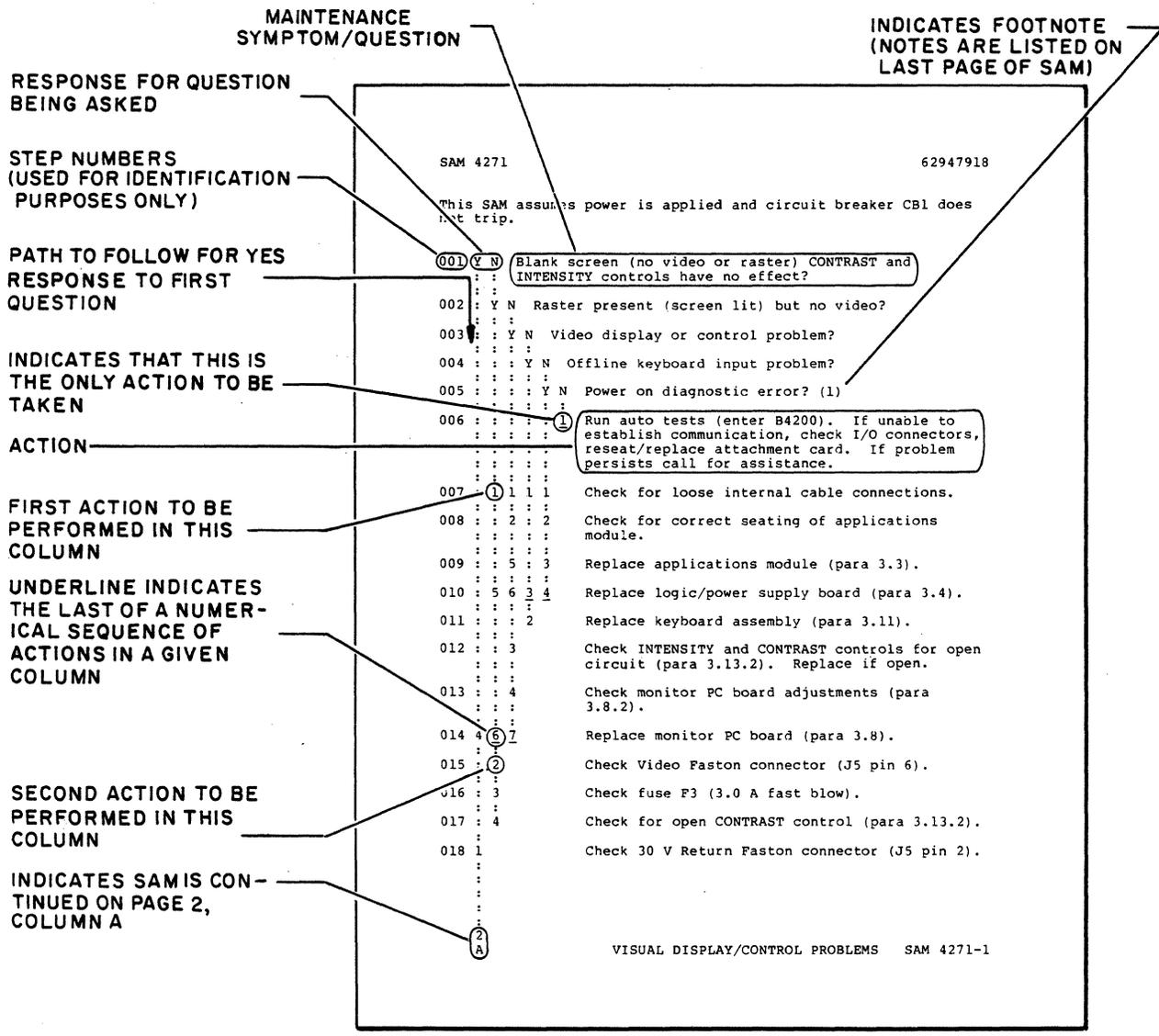
SAM FORMAT

An example SAM showing the basic SAM format appears in figure 6-2. A SAM is a formatted listing that presents troubleshooting information in a logical manner. Each SAM contains a sequential listing of questions that can be answered yes or no. The response made to a particular question either leads to the next question or to the specific action (or numerical sequence of actions) that is to be taken to correct the problem.

Each SAM listing is identified by a SAM number and a title that denotes the type of problems that it covers. A hyphen and number following the SAM number identifies the pages within the listing.

USE OF SAMs

The SAMs are to be used in conjunction with the diagnostic self tests described earlier in this section. If the self tests detect an error or cannot be run, refer to the SAM that covers the existing problem. Verify that all assumed conditions stated at the beginning of the SAM are present and observe any preliminary instructions. Enter the listing and answer yes (Y) or no (N) to the question asked or the condition being tested. Follow down the appropriate Y or N column and when column leads to action numbers, perform the corresponding actions in numerical order to correct the problem.



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Figure 6-2. Example of a SAM

ORGANIZATION OF SAMs AND PROCEDURES

The organization of the following SAMs (subsection 6A) and corrective maintenance procedures (subsection 6B) is shown in figure 6-3.

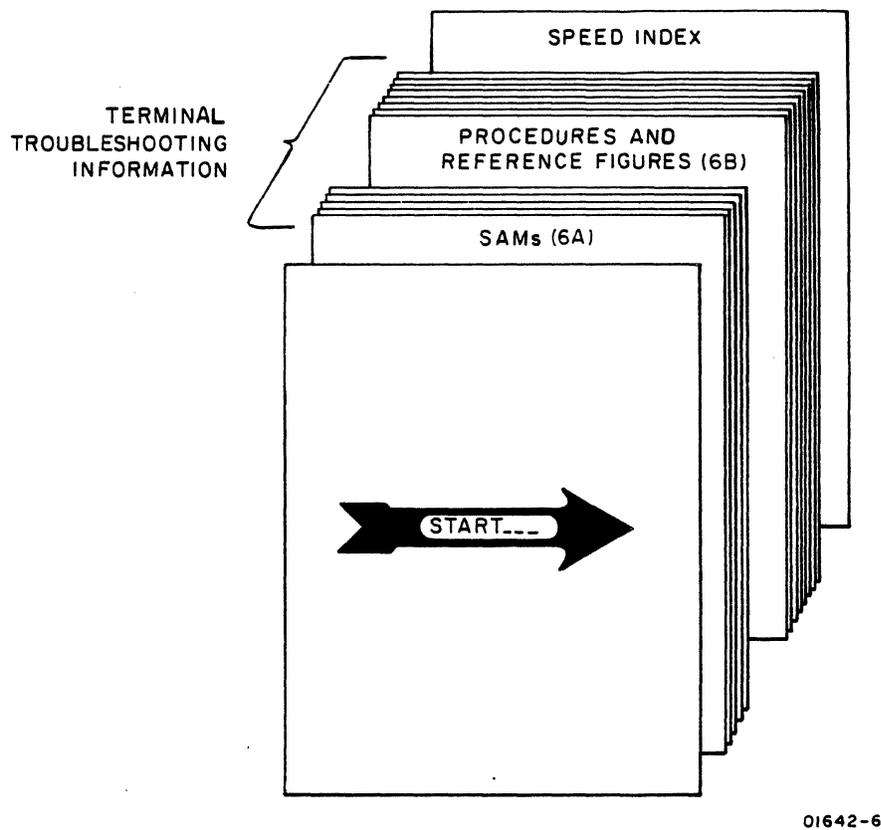


Figure 6-3. Organization of SAMs and Corrective Maintenance Procedures



NOTE

The keyboard entries referred to in the SAMs and procedures assume a standard keyboard is present. If the terminal being worked on has an optional character set, you will have to compensate for its different keys.



SAM 1 - Defining the Problem

Instructions: If you are not sure of the type problem a terminal has, use this SAM to help define the problem. If the type problem is known, refer to table 6A-1 below and go to the appropriate SAM.

TABLE 6A-1. PROBLEM/SAM CORRELATION

TYPE PROBLEM	SAM
Power problems	2
No video	3
Self tests fail during power on or in loop or parameters change without operator intervention	4
Video problems	5
Communication/printing problems	6
Keyboard problems	7

Prerequisites: None.

Assumptions: The terminal has been installed and the power cord and interface cables are connected.

- 001 Y N Turn terminal off and then on (procedure 1). Is there absence of a beep or does the sound remain on?
- 002 Y N Message indicating revision level of the emulation (ADV, ADDS, or ANSI) missing from the screen)?
- 003 Y N Does an octal number from 01 to 77 appear after the revision level?
- 004 Y N Test keyboard input (procedure 3). Does an incorrect character or symbol display or is an input missing that should display?
- 005 Y N Has incorrect data been displayed or data lost during recent online operations?
- 006 1 Terminal appears to be operating correctly. If trouble occurs intermittently, run power-on tests in a loop as described in procedure 2.

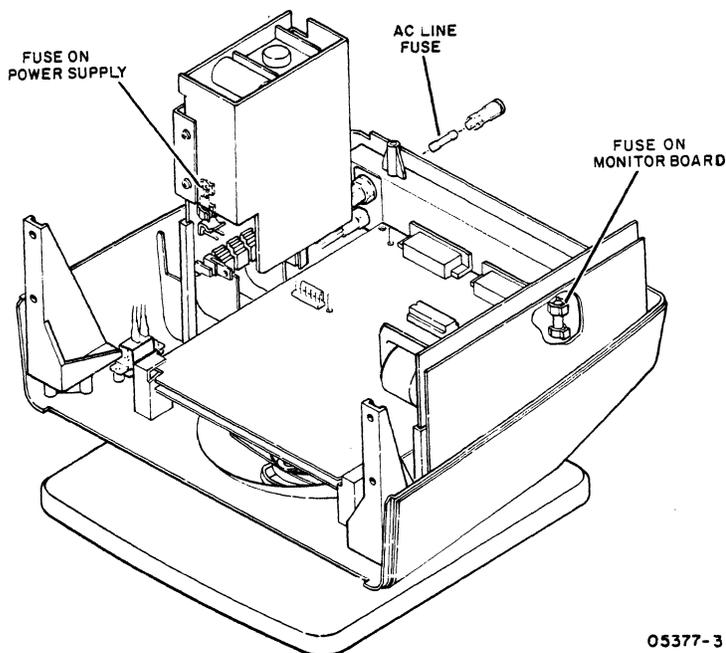
2 2 2 2 2 2
A B C D E F

	A	B	C	D	E	F	
	1	1	1	1	1	1	
007	|	|	|	|	|	<u>2</u>	Have terminal operator perform the operation where trouble occurs and verify that correct operating procedures are being followed. If that is not the cause, call for assistance.
008	|	|	|	|	|	<u>1</u>	Go to SAM 6 (Communication/Printing Problems).
009	|	|	|	|	|	<u>1</u>	Go to SAM 7 (Keyboard Problems).
010	|	|	|	|	|	<u>1</u>	Octal number is an error code. Refer to procedure 2 for meaning. Then go to SAM 4 (Power-On Self Tests Fail).
011	|	|	|	|	|	<u>1</u>	If no display appears, go to SAM 3 (No Video). If display is incorrect or hard to read, go to SAM 5 (Video Problems).
012	|	|	|	|	|	<u>1</u>	If any display appears, go to SAM 4 (Power-On Self Tests Fail); otherwise go to SAM 2 (Power Problems).

SAM 2 - Power Problems

Instructions: Disconnect the power cord, remove the hood from the terminal (procedure 5), and do a preliminary check of cable and wire connections. Also look for foreign objects, such as paper clips, which may have fallen into the unit.

Prerequisites: To use this SAM, you must be able to locate the items shown in figure 6A-1.



05377-3

Figure 6A-1. Power Check Items

Assumptions: Terminal is connected to a live power outlet.

- | | | | |
|-----|---|---|--|
| 001 | Y | N | Does building circuit breaker for outlet trip when terminal is turned on? |
| 002 | Y | N | Is ac line fuse blown? To check, turn off power and unscrew fuse holder at rear of terminal. |
| 003 | Y | N | Is fuse on power supply blown? To check, turn off power, unfasten the ground strap from the power supply, and lift up power supply from cabinet slots. |
| | 3 | 3 | 2 |
| | A | B | C D |

- D
1
- 004 Y N Is fuse on monitor board blown?
- 005 Y N Is there complete absence of power?
- 006 Y N Check power supply voltages (procedure 7). Are any voltages bad?
- 007 1 Problem is not covered in this SAM. Review SAM 1 to make sure you have problem defined. If this manual does not cover your problem, call for assistance.
- 008 1 Replace power supply (procedure 8). If that does not correct problem, replace the following one at a time:
- Cable between main logic board and power supply board (procedure 9)
 - Main logic board (procedure 6)
 - Monitor board (procedure 10)
 - CRT/yoke assembly (procedure 11)
- 009 2 Call for assistance.
- 010 1 Disconnect power cord and check its continuity. Hot (black) wire of power cord goes to rear-panel fuse holder and neutral (white) wire goes to 2-pin plug at power supply board. If continuity does not exist, replace power cord (procedure 15).
- 011 2 Check for continuity between wires of fuse holder at rear of terminal. If continuity does not exist, replace fuse holder (procedure 15).
- 012 3 Leave power cord disconnected and press front end of Power switch up. Check for continuity between wires of Power switch. If continuity does not exist, replace Power switch (procedure 14).
- 013 4 Check continuity of brown wiring leading from rear-panel fuse holder to Power switch and from Power Switch to 2-pin plug at power supply board. If continuity does not exist, replace wire; if continuity does exist, replace power supply (procedure 8).
- 3 3
D E

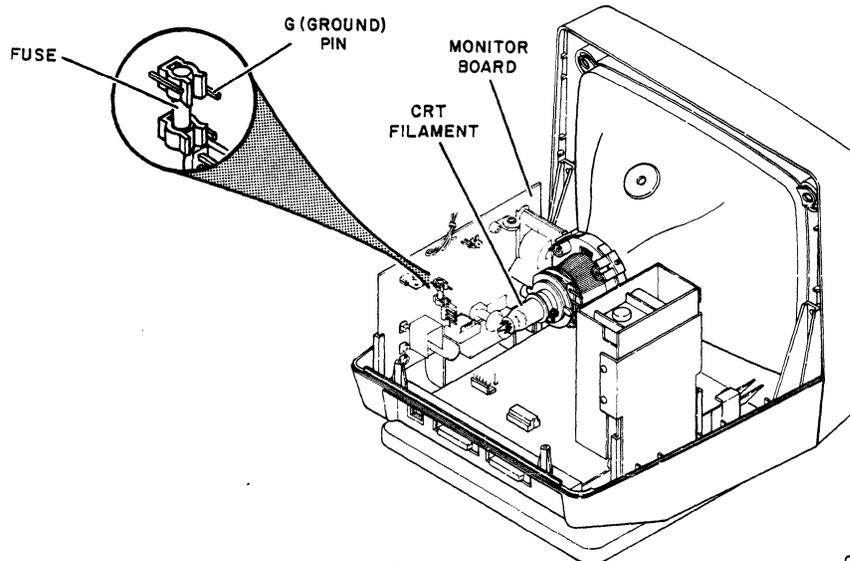
	A	B	C	D	E	
	1	1	1	2	2	
014	|	|	|	<u>1</u>	|	Go to SAM 3 (No Video).
015	|	1	1	|	|	Turn power off and replace fuse. If fuse blows again after power is turned on, replace fuse and the following items one at a time:
						<ul style="list-style-type: none"> ● Power supply (procedure 8) ● Cable between main logic board and power supply (procedure 9) ● Main logic board (procedure 6)
016	1	|	|	|	|	Disconnect power cord and inspect ac input wiring for a short. Replace any shorted wires.
017	2	|	|	|	|	Replace power cord (procedure 15).
018	<u>3</u>	<u>2</u>	<u>2</u>	|	<u>5</u>	Call for assistance.



SAM 3 - No Video

Instructions: Remove the hood from the terminal (procedure 5).

Prerequisites: To use this SAM, you must be able to locate the items shown in figure 6A-2.



05375-1

Figure 6A-2. No-Video Check Items

Assumptions: Terminal power is on, parameter 31 (Screen Contrast) is not set too low, and screen is not being blanked by parameter 32 (Screen Saver). If the setting of parameter 31 is unknown, turn the terminal off/on to select the setting stored in nonvolatile memory. If you are not sure whether Screen Saver is blanking the screen, check by pressing any key.

- | | | | |
|-----|---|---|---|
| 001 | Y | N | Is fuse on monitor board blown? |
| 002 | Y | N | Check for +12 \pm 0.60 V at fuse on monitor board (use adjacent G pin for ground). Is voltage low or missing? |
| 003 | | Y | Is crt filament lit? |
| 004 | | | 1 Turn off power and check seating of socket at end of crt. |
| 005 | | | 1 2 Replace monitor board (procedure 10). |
| | 2 | 2 | 2 2 |
| | A | B | C D |

	A	B	C	D	
	1	1	1	1	
006	|	|	3	3	Replace crt/yoke assembly (procedure 11).
007	|	|	2	|	Replace main logic board (procedure 6).
008	|	|	<u>4</u>	<u>4</u>	Call for assistance.
009	|	1	|	|	Check for loose internal cable connection.
010	|	2	|	|	Check power supply voltages (procedure 7). If any voltages are bad, go to SAM 2 (Power Problems).
011	|	3	|	|	Replace main logic board (procedure 6).
012	|	4	|	|	Replace monitor board (procedure 10).
013	|	1	|	|	Turn power off and replace fuse. If fuse blows again when power is turned on, replace fuse and the following items one at a time:
	|	|	|	|	• Monitor board (procedure 10)
	|	|	|	|	• CRT/yoke assembly (procedure 11)
014	|	<u>2</u>	<u>5</u>	|	Call for assistance.

SAM 4 - Power-On Self Tests Fail

Instructions: None.

Prerequisites: To use this SAM, you must be able to interpret the results of the power-on self tests (procedure 2).

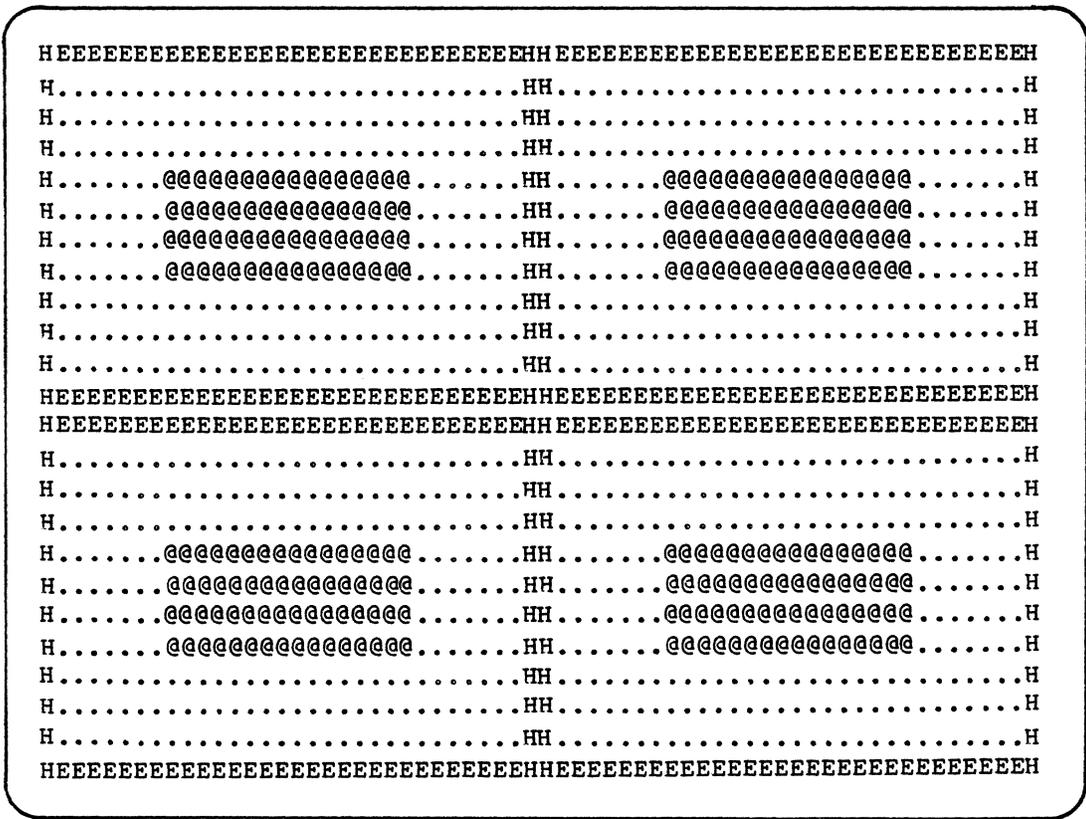
Assumptions: The terminal did not successfully complete its self tests during a power on or when run in a loop or terminal parameters change without operator intervention.

- | | | | | | |
|-----|----------|----------|----------|--|--|
| 001 | Y | N | | Is terminal displaying an error code of 01 to 77 octal on first display line? | |
| 002 | Y | N | | Is a meaningless display or just the cursor showing and/or is the beep missing or constant? | |
| 003 | | Y | N | If the status line is enabled, does it show the words KB-Error or is the absence of the beep the only indication that the self tests failed? | |
| 004 | | Y | N | Did the beep sound but nothing displayed on the screen? | |
| 005 | | | <u>1</u> | Problem is not covered in this SAM. Review SAM 1 to make sure you have problem defined. If this manual does not cover your problem, call for assistance. | |
| 006 | | 4 | 1 | Replace monitor board (procedure 10). | |
| 007 | 1 | 3 | 3 | 2 | Replace main logic board (procedure 6). |
| 008 | | 5 | | | Replace power supply (procedure 8). |
| 009 | | 6 | | | Replace cable between main logic board and power supply (procedure 9). |
| 010 | | 1 | 1 | | Check that keyboard cable is securely connected at rear of terminal. |
| 011 | | 2 | 2 | | Replace keyboard (procedure 13). |
| 012 | <u>2</u> | <u>7</u> | <u>4</u> | <u>3</u> | Call for assistance. |



SAM 5 - Video Problems

Instructions: Remove the hood from the terminal (procedure 5). Change parameter 22 (Operation Mode) to Local, and if in ANSI emulation, change parameter 14 (Emulation) to either ADV or ADDS (procedure 4). Then if in ADV emulation, press the CTRL and = keys simultaneously, then hold the SHIFT key down and press the " and @ keys; if in ADDS emulation, press the ESC key, then hold the SHIFT key down and press the " and @ keys. This should display an alignment pattern like shown in figure 6A-3. When completed with the pattern, press the SHIFT and P CLEAR keys to erase it from the screen.



05376

Figure 6A-3. Example of Good Alignment Display

Prerequisites: None.

Assumptions: Terminal power is on and the alignment display in figure 6A-3 has been called up.

- 001 Y N Is only a vertical or horizontal line displayed?
 - 002 Y N Is display rolling vertically?
- 2 2 2
A B C

	A	B	C							
	1	1	1							
003			Y	N						Does display have extra characters or lines?
004			Y	N						Is display distorted or unsymmetrical?
005			Y	N						Is display pattern off center?
006				Y	N					Are characters at top of screen a different size than at bottom of screen?
007				Y	N					Is display too dim or too bright?
008				Y	N					Is display out of focus?
009									1	Problem is not covered in this SAM. Review SAM 1 to make sure you have problem defined. If this manual does not cover your problem, call for assistance.
010									1	Do Focus Adjustment (procedure 12).
011									1	Check that parameter 31 (Screen Contrast) is not set too low or too high (procedure 4). If parameter setting of 9 does not yield normal brightness, do Brightness Adjustment (procedure 12).
012									1	Do Vertical Linearity Adjustment (procedure 12).
013	2	3	1	2	2	2	2	2		Replace monitor board (procedure 10).
014	3							4	3	Replace crt/yoke assembly (procedure 11).
015		4	2	3					3	Replace main logic board (procedure 6).
016				1						Do Geometric Distortion Adjustment (procedure 12).
017					1					Do Horizontal Centering Adjustment (procedure 12).
018		1								Check that parameter 25 [Power (Refresh)] is set correctly (procedure 4). For a 60-Hz model terminal, parameter 25 must be set to 60 Hz; for a 50-Hz model, parameter 25 must be set to 50 Hz.
019		2								Adjust V HOLD potentiometer on monitor board (procedure 12).
020	1									Check for loose internal cable connection.
021	4	5	3	4	3	3	5	4		Call for assistance.

SAM 6 - Communication/Printing Problems

Instructions: If the problem being experienced involves certain characters or control codes from the keyboard, verify that keyboard input is correct (procedure 3). If keyboard input is not correct, go to SAM 7 (Keyboard Problems).

Prerequisites: None.

Assumptions: Terminal power is on, interface cables are connected, and terminal is in online mode (parameter 22 set to Online).

001	N	Y	Can communications with host be established and kept without being cut off?
002	N	Y	Does one character display for each alphanumeric keyboard entry?
003	N	Y	Is correct data being displayed?
004	N	Y	If terminal has a printer connected, are print operations performed OK?
005		<u>1</u>	Problem is not covered in this SAM. Review SAM 1 to make sure you have problem defined. If this manual does not cover your problem, call for assistance.
006	1		Verify that host and communications equipment are operational. If communications are via phone lines, dial the number for host and listen for high-pitch answering tone or carrier signal when connection is made. Then verify that phone line is switched to terminal.
007		1	Change parameter 22 to Local (procedure 4) and try doing an offline print operation (print operations are described in section 2 of the 722-30 Display Terminal Reference Manual). If offline printing can be done, system software is likely at fault.
	2	2	2
	A	B	C
			D

	A	B	C	D	
	1	1	1	1	
008				2	Verify that baud rate, number of data bits, number of stop bits, and parity used by printer are the same as those set in terminal parameters (refer to installation information in applicable printer manual).
009				3	Verify that printer is operational (refer to applicable printer manual for test-print/self-test information or replace with a known good printer and cable).
010	5	5	4	4	Replace main logic board (procedure 6).
011	2	1	1		If site has other terminals connected to same host, check whether they are showing similar symptoms. If so, there is a system problem.
012	3	2	2		Check that correct emulation, baud rate, number of data bits, parity, and number of stop bits are set in parameters (procedure 4).
013		3			If two characters display for each alphanumeric entry, host is echoing data back and terminal is set for half-duplex operation. If this is the case, change parameter 13 (Duplex Mode) to FDX (procedure 4).
014	4	4			If no characters display for alphanumeric entries, parameter 13 may be set to FDX (full duplex) and host may not be echoing data back. If this is the case, change parameter 13 to HDX (procedure 4).
015			3		If main interface port is using RS-232-C/CCITT-V.24 signals, perform loopback testing (procedure 17). If no errors occur in loopback testing, fault is likely in communication link and not in terminal.
016	6	6	5		Replace keyboard (procedure 13).
017	7	7	6	5	Call for assistance.

SAM 7 - Keyboard Problems

Instructions: None.

Prerequisites: None

Assumptions: Terminal power is on and display is working.

- | | | | | |
|-----|----------|----------|--|---|
| 001 | Y | N | KB-Error appears in fifth field of status line? | |
| 002 | Y | N | Absence of keyboard input on screen? | |
| 003 | Y | N | Key(s) generate incorrect input when tested per procedure 3? | |
| 004 | <u>1</u> | | Problem is not covered in this SAM. Review SAM 1 to make sure you have problem defined. If this manual does not cover your problem, call for assistance. | |
| 005 | 1 | 1 | Check that keyboard cable is securely connected at rear of terminal. | |
| 006 | | 1 | If problem key(s) are in numeric pad on right side of keyboard, check that parameter 21 (Numeric Keypad) is set for desired operation (procedure 4). If parameter is set to Shifted, normally shifted cursor functions and normally unshifted numbers are generated just the opposite than normal. | |
| 007 | | 2 | Keyboard may have gotten inadvertently locked (KB-Lock shown at bottom of screen if status line is enabled). Turn terminal off/on and repeat the operation that was being attempted. If keyboard remains locked, disconnect cables from interface ports. If keyboard then unlocks, problem is not with terminal or keyboard. | |
| 008 | | 3 | If this is occurring when online, change parameter 22 to Local (procedure 4). If keyboard input then displays, go to SAM 6 (Communication/Printing Problems). | |
| 009 | 2 | 4 | 2 | Replace keyboard (procedure 13). |
| 010 | 3 | 5 | 3 | Replace main logic board (procedure 6). |
| 011 | <u>4</u> | <u>6</u> | <u>4</u> | Call for assistance. |



PROCEDURES



Procedure 1 - Turning Power On/Off

To turn terminal power on:

1. Check that power cord is plugged into site outlet.
2. Press front of Power switch up.

To turn power off:

1. Press back of Power switch up.
2. If replacing parts, disconnect power cord from site outlet.

Procedure 2 - Running/Interpreting Power-On Self Tests

The power-on self tests run automatically when power is turned on or when the terminal is reset via parameter 28. This procedure describes how to interpret the test results and how to run the tests in a loop. Running the tests in a loop is good for isolating intermittent problems.

Interpreting Power-On Self Tests

The power-on self tests complete in less than a second after power is turned on or the terminal is reset. There are four basic ways the tests may end:

- Successfully without an error
- With a fatal error (terminal cannot continue)
- With a keyboard error
- With a nonfatal error

To interpret the results of the power-on tests, listen and look for the following sequence:

- 1.- Indication of tests passing - Terminal sounds a beep within a second after power is turned on or the terminal is reset.
- 1.- Indication of tests failing - If either a fatal or keyboard error is detected, the terminal does not beep.
- 2.- Indication of tests passing - Revision level message of ADV, ADDS, or ANSI emulation appears on the top display line when the crt warms up.
- 2.- Indication of tests failing - If a fatal error was detected, the terminal is hung with a meaningless display or just the cursor. If a nonfatal error was detected, the displayed revision level message has a 01 to 77 octal error code after it.
- 3.- Indication of tests passing - If parameter 35 (Status Line) is set to On, a status line like shown in figure 6B-1 appears. If parameter 35 is set to Off, only the R/C (row/column) status appears in ADV or ADDS emulation.
- 3.- Indication of tests failing - If a keyboard error was detected and the status line is enabled, the words KB-Error appears in the fifth field of the status line.

THIS FIELD WILL SHOW "KB-Error" IF A KEYBOARD ERROR OCCURS

Online or Local	All Char or Caps-Only	DSR-On or DSR-Off	ADV or ADDS	KB-Lock or KB Avail	Aux-Ready, Aux-Busy, or Aux-Off	R = -- C =
-----------------------	-----------------------------	-------------------------	-------------------	---------------------------	---------------------------------------	---------------

ADV/ADDS STATUS LINE

Online, Edit, or Local	All Char or Caps-Only	DSR-On or DSR-Off	ANSI	KB-Lock or KB Avail	Aux-Ready, Aux-Busy, or Aux-Off	All or Unprotect
------------------------------	-----------------------------	-------------------------	------	---------------------------	---------------------------------------	------------------------

ANSI STATUS LINE

Figure 6B-1. Status Line

For any failing indication in the power-on tests, go to SAM 4 for troubleshooting information. If the error is nonfatal, record the displayed error code. The error code indicates which memory on the main logic board may have failed. Include this information on the Defective Parts Tag when returning a faulty main logic board.

TABLE 6B-1. NONFATAL ERROR CODES

ERROR CODE	POSSIBLE FAILING MEMORY					
	EPROM 2	DATA RAM	ATTRIBUTE RAM	NONVOLATILE RAM	EPROM 1	SYSTEM RAM
01						X
02					X	
03					X	X
04				X		
05				X		X
06				X	X	
07				X	X	X
10			X			
11			X			X
12			X		X	
13			X		X	X
14			X	X		
15			X	X		X
16			X	X	X	
17			X	X	X	X
20		X				
21		X				X
22		X			X	
23		X			X	X
24		X		X		
25		X		X		X
26		X		X	X	
27		X		X	X	X
30		X	X			
31		X	X			X
32		X	X		X	
33		X	X		X	X
34		X	X	X		
35		X	X	X		X
36		X	X	X	X	
37		X	X	X	X	X
40	X					
41	X					X
42	X				X	
43	X				X	X
44	X			X		
45	X			X		X
46	X			X	X	
47	X			X	X	X
50	X		X			
51	X		X			X
52	X		X		X	
53	X		X		X	X
54	X		X	X		
55	X		X	X		X
56	X		X	X	X	
57	X		X	X	X	X
60	X	X				

TABLE 6B-1. NONFATAL ERROR CODES (CONTD)

ERROR CODE	POSSIBLE FAILING MEMORY					SYSTEM RAM
	EPROM 2	DATA RAM	ATTRIBUTE RAM	NONVOLATILE RAM	EPROM 1	
61	X	X				X
62	X	X			X	
63	X	X			X	X
64	X	X		X		
65	X	X		X		X
66	X	X		X	X	
67	X	X		X	X	X
70	X	X	X			
71	X	X	X			X
72	X	X	X		X	
73	X	X	X		X	X
74	X	X	X	X		
75	X	X	X	X		X
76	X	X	X	X	X	
77	X	X	X	X	X	X

Running Power-On Self Tests in a Loop

The following steps place the terminal in a continuous test loop. When in this loop, the screen flickers and no beep sounds. The looping only stops if an error occurs or power is turned off.

1. Test looping requires that the terminal be in local mode and in either ADV or ANSI emulation. If these are not in effect, change parameters 14 and 22 (procedure 4). The operation mode and emulation in effect are shown in the first and fourth fields of the status line if parameter 35 is set to On.
2. If in ADV emulation, hold the CTRL key down and press the +/- key, then the V key. This starts test looping. If in ANSI emulation, start test loop by pressing the following keys: LF/ESC,]/[, @/2, :/;, */8, Y.

Procedure 3 - Testing Keyboard Input

This procedure is for testing the input of suspect key(s) or for testing the entire keyboard. To do either type testing:

1. Set parameter 13 (Duplex Mode) to HDX, parameter 20 (Monitor Mode) to On (allows keys for control codes to be tested), and parameter 22 (Operation Mode) to Local (procedure 4).
2. Keyboard input differs with the emulation being used (parameter 14). Tables 6B-2, 6B-3, and 6B-4 list the correct input for ADV emulation, ADDS emulation, and ANSI emulation. If input for a key (unshifted, shifted, with CTRL, or with CTRL shifted) is displayed incorrectly, go to SAM 7 (Keyboard Problems). For testing keys unique to optional foreign character sets, refer to appendix A.

TABLE 6B-2. DISPLAYED INPUT FOR ADV EMULATION

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	PRINT		R _S D ₁	R _S S _H	R _S D ₁	R _S S _H
	SETUP		None	None	None	None
	F1		R _S q	R _S a	R _S 1	R _S !
	F2		R _S r	R _S b	R _S 2	R _S "
	F3		R _S s	R _S c	R _S 3	R _S #
	F4		R _S t	R _S d	R _S 4	R _S \$
	F5		R _S u	R _S e	R _S 5	R _S %
	F6		R _S v	R _S f	R _S 6	R _S &
	F7		R _S w	R _S g	R _S 7	R _S '
	F8		R _S x	R _S h	R _S 8	R _S (
	F9		R _S y	R _S i	R _S 9	R _S)
	F10		R _S z	R _S j	R _S :	R _S *
	F11		R _S {	R _S k	R _S ;	R _S +
	(Blank)		R _S D ₂	R _S S _X	R _S D ₂	R _S S _X

TABLE 6B-2. DISPLAYED INPUT FOR ADV EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
P	CLEAR	EOL	V _T	F _F	V _T	F _F
LF		ESC	E _C	L _F	E _C	L _F
M REL		BREAK	None	None	None	None
	TAB		H _T	H _T	H _T	H _T
!		1	1	!	1	!
@		2	2	@	N _U	N _U
#		3	3	#	3	#
\$		4	4	\$	4	\$
%		5	5	%	5	%
^		6	6	^	6	^
&		7	7	&	7	&
*		8	8	*	8	*
(		9	9	(	9	(
)		0	0	)	0)
-		-	-	-	U _S	U _S
+		=	=	+	R _S	R _S
~		`	`	~	`	~
	BACKSPACE		See Note 1	See Note 1	See Note 1	See Note 1
L INSRT*	7		7	None	7	None
↑		8	8	E _B	8	E _B
L DLETE*	9		9	None	9	None
	Q		q	Q	D ₁	D ₁
	W		w	W	E _B	E _B

TABLE 6B-2. DISPLAYED INPUT FOR ADV EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	E		e	E	E _Q	E _Q
	R		r	R	D ₂	D ₂
	T		t	T	D ₄	D ₄
	Y		y	Y	E _M	E _M
	U		u	U	N _K	N _K
	I		i	I	H _T	H _T
	O		o	O	S _I	S _I
	P		p	P	D _L	D _L
]		[	[	]	G _S	G _S
:		\	\	:	F _S	F _S
	BACK TAB		R _S V _T	R_{S}V_{T}	R_{S}V_{T}	R_{S}V_{T}
←		4	4	E _M	4	E _M
HOME*		5	5	B _S	5	B _S
→		6	6	C _N	6	C _N
ALPHA		LOCK	None	None	None	None
	A		a	A	S _H	S _H
	S		s	S	D ₃	D ₃
	D		d	D	E _T	E _T
	F		f	F	A _K	A _K
	G		g	G]]
	H		h	H	B _S	B _S
	J		j	J	L _F	L _F
	K		k	K	V _T	V _T
	L		l	L	F _F	F _F

TABLE 6B-2. DISPLAYED INPUT FOR ADV EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
:		;	;	:	;	:
"		,	,	"	,	"
}		{	{	}	{	}
	RETURN NEW LINE		L _F	L _F	L _F	L _F
C INSRT*	1		1	None	1	None
↓		2	2	S _B	2	S _B
C DLETE*	3		3	None	3	None
	SHIFT		None	None	None	None
	Z		z	Z	S _B	S _B
	X		x	X	C _N	C _N
	C		c	C	E _X	E _X
	V		v	V	S _Y	S _Y
	B		b	B	S _X	S _X
	N		n	N	S _O	S _O
	M		m	M	C _R	C _R
<		,	,	<	,	<
>		.	.	>	.	>
?		/	/	?	/	?
	SHIFT		None	None	None	None
	,		,	None	,	None
EDIT*	0		0	None	0	None
	.		.	None	.	None
	CTRL		None	None	None	None

TABLE 6B-2. DISPLAYED INPUT FOR ADV EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	(Space Bar)		None	None	None	None
CR		DEL	See Note 1	C _R	See Note 1	C _R
ENTER*	RETURN NEW LINE		L _F	L _F	L _F	L _F

Notes:

*Labeled on front of keycap.

1. In ADV emulation, BACKSPACE and CR/DEL keys are affected by parameter 6 (Backspace Key). If parameter 6 is set to Normal, the BACKSPACE key should display E_M and the CR/DEL key unshifted or with CTRL key should display □. If parameter 6 is set to DEL, the BACKSPACE key should display □ and the CR/DEL key should only display C_R.

TABLE 6B-3. DISPLAYED INPUT FOR ADDS EMULATION

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	PRINT		None	None	None	None
	SETUP		None	None	None	None
	F1		S _X 1C _R	S _X !C _R	S _X 1C _R	S _X !C _R
	F2		S _X 2C _R	S _X "C _R	S _X 2C _R	S _X "C _R
	F3		S _X 3C _R	S _X #C _R	S _X 3C _R	S _X #C _R
	F4		S _X 4C _R	S _X \$C _R	S _X 4C _R	S _X \$C _R
	F5		S _X 5C _R	S _X &C _R	S _X 5C _R	S _X &C _R
	F6		S _X 6C _R	S _X &C _R	S _X 6C _R	S _X &C _R
	F7		S _X 7C _R	S _X 'C _R	S _X 7C _R	S _X 'C _R
	F8		S _X 8C _R	S _X (C _R	S _X 8C _R	S _X (C _R

TABLE 6B-3. DISPLAYED INPUT FOR ADDS EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	F9		S _X 9C _R	S _X)C _R	S _X 9C _R	S _X)C _R
	F10		S _X :C _R	S _X *C _R	S _X :C _R	S _X *C _R
	F11		S _X ;C _R	S _X +C _R	S _X ;C _R	S _X +C _R
	(Blank)		S _X <C _R	S _X ,C _R	S _X <C _R	S _X ,C _R
P	CLEAR	EOL	E _C K	F _F	E _C K	F _F
LF		ESC	E _C	L _F	E _C	L _F
M REL		BREAK	None	None	None	None
	TAB		H _T	H _T	H _T	H _T
!		1	1	!	None	None
@		2	2	@	N _U	N _U
#		3	3	#	3	#
\$		4	4	\$	4	\$
%		5	5	%	5	%
^		6	6	^	R _S	R _S
&		7	7	&	7	&
*		8	8	*	8	*
(		9	9	(	9	(
)		0	0	)	0)
-		-	-	-	U _S	U _S
+		=	=	+	=	+
~		\	\	~	N _U	R _S
	BACKSPACE		B _S	B _S	B _S	B _S
L INSRT*	7		7	None	7	None
↑		8	8	S _B	8	S _B

TABLE 6B-3. DISPLAYED INPUT FOR ADDS EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
L DELETE*	9		9	None	9	None
	Q		q	Q	D ₁	D ₁
	W		w	W	E _B	E _B
	E		e	E	E _Q	E _Q
	R		r	R	D ₂	D ₂
	T		t	T	D ₄	D ₄
	Y		y	Y	E _M	E _M
	U		u	U	N _K	N _K
	I		i	I	H _T	H _T
	O		o	O	S _I	S _I
	P		p	P	D _L	D _L
]		[	[	]	E _C	G _S
:		\	\	:	F _S	F _S
	BACK TAB		E _C I	E _C I	E _C I	E _C I
←		4	4	N _K	4	N _K
HOME*		5	5	S _H	5	S _H
→		6	6	A _K	6	A _K
ALPHA		LOCK	None	None	None	None
	A		a	A	S _H	S _H
	S		s	S	D ₃	D ₃
	D		d	D	E _T	E _T
	F		f	F	A _K	A _K
	G		g	G	∩	∩
	H		h	H	B _S	B _S

TABLE 6B-3. DISPLAYED INPUT FOR ADDS EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	J		j	J	L _F	L _F
	K		k	K	V _T	V _T
	L		l	L	F _F	F _F
:		:	:	:	:	:
"		"	"	"	"	"
}		{	{	}	E _C	G _S
	RETURN NEW LINE		CR	CR	CR	CR
C INSRT*	1		1	None	1	None
		2	2	L _F	2	L _F
C DLETE*	3		3	None	3	None
	SHIFT		None	None	None	None
	Z		z	Z	S _B	S _B
	X		x	X	C _N	C _N
	C		c	C	E _X	E _X
	V		v	V	S _Y	S _Y
	B		b	B	S _X	S _X
	N		n	N	S _O	S _O
	M		m	M	C _R	C _R
<		,	,	<	,	<
>		.	.	>	.	>
?		/	/	?	/	?
	SHIFT		None	None	None	None
	,		,	None	,	None

TABLE 6B-3. DISPLAYED INPUT FOR ADDS EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
EDIT*	0		0	None	0	None
	.		.	None	.	None
	CTRL		None	None	None	None
	(Space Bar)		None	None	None	None
CR		DEL	□	C _R	□	C _R
ENTER*	RETURN NEW LINE		CR	CR	CR	CR

Notes:

*Labeled on front of keycap.

TABLE 6B-4. DISPLAYED INPUT FOR ANSI EMULATION

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	PRINT		None	None	None	None
	SETUP		None	None	None	None
	F1		E _C OP	E _C Oq	E _C OP	E _C Oq
	F2		E _C OQ	E _C Or	E _C OQ	E _C Or
	F3		E _C OR	E _C Os	E _C OR	E _C Os
	F4		E _C OS	E _C Ot	E _C OS	E _C Ot
	F5		E _C Om	E _C Ou	E _C Om	E _C Ou
	F6		E _C Ol	E _C Ov	E _C Ol	E _C Ov

See Note 1

TABLE 6B-4. DISPLAYED INPUT FOR ANSI EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	F7		E _C OM	E _C Ow	E _C OM	E _C Ow
	F8		E _C On	E _C Ox	E _C On	E _C Ox
	F9		E _C OA	E _C Oy	E _C OA	E _C Oy
	F10		E _C OB	E _C Op	E _C OB	E _C Op
	F11		E _C OC	E _C Oz	E _C OC	E _C Oz
	(Blank)		E _C OD	E _C O{	E _C OD	E _C O{
P	CLEAR	EOL	E _C [K	E _C [2J	E _C [K	E _C [2J
LF		ESC	E _C	L _F	E _C	L _F
M REL		BREAK	None	None	None	None
	TAB		H _T	H _T	H _T	H _T
!		1	1	!	1	!
@		2	2	@	2	@
#		3	3	#	3	#
\$		4	4	\$	4	\$
%		5	5	%	5	%
^		6	6	^	6	^
&		7	7	&	7	&
*		8	8	*	8	*
(		9	9	(	9	(
)		0	0	)	0)
-		-	-	-	-	-
+		=	=	+	=	+
~		\	\	~	\	~
	BACKSPACE		B _S	B _S	B _S	B _S

See Note 1

TABLE 6B-4. DISPLAYED INPUT FOR ANSI EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
L INSRT*	7		7	EC[L	7	EC[L
↑		8	8	EC[A	8	EC[A
L DELETE*	9		9	EC[M	9	EC[M
	Q		q	Q	D ₁	D ₁
	W		w	W	E _B	E _B
	E		e	E	E _Q	E _Q
	R		r	R	D ₂	D ₂
	T		t	T	D ₄	D ₄
	Y		y	Y	E _M	E _M
	U		u	U	N _K	N _K
	I		i	I	H _T	H _T
	O		o	O	S _I	S _I
	P		p	P	D _L	D _L
]		[	[	]	E _C	E _C
:		\	\	:	F _S	F _S
	BACK TAB		EC[F	EC[F	EC[F	EC[F
←		4	4	EC[D	4	EC[D
HOME*		5	5	EC[H	5	EC[H
→		6	6	EC[C	6	EC[C
ALPHA		LOCK	None	None	None	None
	A		a	A	S _H	S _H
	S		s	S	D ₃	D ₃
	D		d	D	E _T	E _T

TABLE 6B-4. DISPLAYED INPUT FOR ANSI EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	F		f	F	A _K	A _K
	G		g	G	Q	Q
	H		h	H	B _S	B _S
	J		j	J	L _F	L _F
	K		k	K	V _T	V _T
	L		l	L	F _F	F _F
:		;	;	:	;	:
"		'	'	"	'	"
}		{	{	}	{	}
	RETURN NEW LINE		See Note 2	See Note 2	See Note 2	See Note 2
C INSRT*	1		1	E _C [4h	1	E _C [4h
↓		2	2	E _C [B	2	E _C [B
C DLETE*	3		3	E _C [P	3	E _C [P
	SHIFT		None	None	None	None
	Z		z	Z	S _B	S _B
	X		x	X	C _N	C _N
	C		c	C	E _X	E _X
	V		v	V	S _Y	S _Y
	B		b	B	S _X	S _X
	N		n	N	S _O	S _O
	M		m	M	C _R	C _R
<		,	,	<	,	<

TABLE 6B-4. DISPLAYED INPUT FOR ANSI EMULATION (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
>		.	.	>	.	>
?		/	/	?	/	?
	SHIFT		None	None	None	None
	'		'	'	'	'
EDIT*	0		0	See Note 3	0	See Note 3

	CTRL		None	None	None	None
	(Space Bar)		None	None	None	None
CR		DEL		C _R		C _R
ENTER*	RETURN NEW LINE		See Note 4	See Note 4	See Note 4	See Note 4

Notes:

*Labeled on front of keycap.

1. If parameter 37 (Tx. CR) is set to On, a C_R should display at the end of these character groups.
2. If parameter 1 (Auto LF/CR) is set to Off, C_R should display. If parameter 1 is set to On, C_RLF should display.
3. If terminal is in block (edit) mode and parameter 23 (Page Key) is set to DEF, E_C[?10h should display. If terminal is in character mode and parameter 23 is set to DEF, E_C[?10l should display. If parameter 23 is set to IMMED, nothing should display in either block or character mode.
4. If terminal is in character mode, either C_R or C_RLF should display per the condition described in note 2. If terminal is in block mode and parameter 38 (Tx. Execution) is set to DEF, E_CS should display. If terminal is in block mode and parameter 38 is set to IMMED, nothing should display.

Procedure 4 - Displaying/Changing Parameters

The following paragraphs describe how to display, change, and store the terminal parameters. Following that is a definition of the parameters.

Displaying Parameters

Pressing the SETUP key enters the terminal into setup mode where parameter information is displayed at the bottom of the screen. The first information displayed is the message:

```
PRESS UP-DOWN ARROWS TO SEE MORE, AND LEFT-RIGHT ARROWS TO  
CHANGE VALUES
```

Pressing the shifted Cursor Up (↑) key or the shifted Cursor Down (↓) key then clears the message and displays the terminal parameters one at a time. The first parameter displayed is the set tabs parameter. The display of the set tabs parameter includes a line of digits 0 through 9 repeated 8 times (for the 80 columns across the screen) with letter Ts above the digits where tabs have been set when in ANSI emulation.

After the set tabs parameter is a series of 41 numbered parameters. The shifted Cursor Up key steps the display to the next higher-numbered parameter (to parameter 1 from set tabs parameter), while the shifted Cursor Down key steps the display to the next lower-numbered parameter (wrapped around to parameter 41 from set tabs parameter).

A second pressing of the SETUP key exits the terminal from setup mode.

Changing/Storing Parameters

The following is an example parameter.

```
1 Auto LF/CR On
```

The 1 identifies the example parameter as being parameter 1 and the word On indicates the Auto LF/CR (automatic line feed/carriage return) is in effect. The alternate setting for this particular parameter is Off.

The setting of On can be toggled to Off using either the shifted Cursor Left (←) key or the shifted Cursor Right (→) key. The last selection made automatically goes into volatile memory when either the Cursor Up or Cursor Down key is pressed to step the display to another parameter or when the SETUP key is pressed a second time to leave setup mode.

A parameter change stored in volatile memory automatically clears after a power off or reset. If a change is to be permanent (such as a correction), store the change in nonvolatile memory. The keyboard entries for doing this (plus other operations) are given in table 6B-5.

TABLE 6B-5. KEYBOARD ENTRIES TO CHANGE/STORE PARAMETERS

OPERATION	KEYBOARD ENTRY
Toggle alternate setting of parameter on screen. If parameter has more than two possible settings, shifted Cursor Left key steps display to next lower setting and shifted Cursor Right key steps display to next higher setting.	Shifted Cursor Left (←) or Shifted Cursor Right (→)
Display default setting for parameter currently on screen and store default settings for all parameters into volatile memory.	CTRL and D keys simultaneously
Display setting stored in nonvolatile memory for current parameter and store all nonvolatile memory settings into volatile memory.	CTRL and R keys simultaneously
Store current displayed setting and all volatile memory settings into non-volatile memory (permanent change).	CTRL and S keys simultaneously

Definition of Parameters

Table 6B-6 defines the parameters. Unless indicated otherwise, the definitions given apply to all three emulations.

TABLE 6B-6. TERMINAL PARAMETERS

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
-	Set tabs display described earlier in this procedure under Displaying Parameters	-	Applies only to ANSI emulation. Allows tab stops to be set.	Tab every 8th column
1	Auto LF/CR	On, Off	Applies only to ADDS and ANSI emulations. With the On setting, cursor does an automatic line feed with each carriage return received from the host or generated by the RETURN/NEW LINE keys. In ADDS emulation, this also applies to each carriage return that is generated by the shifted CR key. With the Off setting, cursor does not do an automatic line feed.	Off
2	Auto Repeat	On, Off	Determines whether alphanumeric keys repeat at 15 characters per second when held down for one-half second.	On
3	Auto Scroll	On, Off	Determines whether display operates in a scroll (On) or page manner (Off).	On
4	Auto Wrap	On, Off	Determines whether cursor automatically advances to the beginning of the next line after the previous line is filled (On) or does not automatically advance (Off).	On

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
5	Auto Xon-Xoff	On, Off	Determines whether terminal sends X-off/X-on codes on main port when it cannot/can receive further data.	On
6	Backspace Key	Normal, DEL	Applies only to ADV emulation. With the Normal setting, BACKSPACE and CR/DEL keys operate normally. With the DEL setting, BACKSPACE key performs the delete function of the CR/DEL key and the CR/DEL key performs only the carriage return function.	Normal
7	Baud Rate	110, 150, 300, 600, 1200, 1800, 2400, 4800, 9600, 19 200	Sets transmit/receive rates for main and auxiliary ports.	9600
8	Block Mode	On, Off	Applies only to ANSI emulation. Determines the transmission mode that terminal enters after a power on or reset. With the On setting, keyboard entered data can be edited and sent in a block (block transmission mode). With the Off setting, keyboard entered data is sent character by character (character transmission mode).	Off

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
9	Character Sent	All, Unprotected	Applies only to block transmission mode in ANSI emulation. With the All setting, all data on screen is enabled to be sent to host. With the Unprotected setting, only unprotected data on screen is enabled to be sent.	All
10	Cursor	BNK-LIN, LIN-CUR, BNK-BLK, BLK-CUR, Blank	Determines which of the following type cursors display: <ul style="list-style-type: none"> ● Blinking underline (BNK-LIN) ● Steadily lit underline (LIN-CUR) ● Blinking block (BNK-BLK) ● Steadily lit block (BLK-CUR) ● Blank 	BNK-LIN
11	Data Bits	7,8	Determines whether received/transmitted characters on main and auxiliary ports contain 7 or 8 data bits (not including parity).	7
12	DTR On/Off	On,Off	Determines whether terminal issues a constant Data Terminal Ready signal on main port (On) or drops Data Terminal Ready when in local mode (Off).	Off

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
13	Duplex Mode	HDX,FDX	Affects the internal routing of keyboard entered data when on-line and transmitting character by character. With the HDX (half-duplex) setting, entered characters display simultaneously as they are transmitted. With the FDX (full-duplex) setting, entered characters do not display until echoed back by host.	FDX
14	Emulation	ADV,ADDS,ANSI	Determines whether ADV, ADDS, or ANSI emulation is in effect.	ADV
15	Erase Mode	All, Unprotected	Applies only to ANSI emulation. With the All setting, all data on screen can be erased by host. With the Unprotected setting, only unprotected data on screen can be erased by host.	All
16	Interface	EIA,C.L.	Determines whether main port uses EIA RS-232-C/CCITT-V.24 signals (EIA) or current loop signals (C.L.).	EIA
17	Keyclick	On,Off	Determines whether a beep sounds each time a key is pressed.	Off

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
18	LF Bias	Bias,Normal	Applies only to ADV emulation. Determines whether cursor address is biased by 20 ₁₆ (20 ₁₆ added) when receiving/sending X/Y positioning data.	Bias
19	Margin Bell	On,Off	Determines whether a beep sounds when cursor is 8 character positions from end of line.	Off
20	Monitor Mode	On,Off	Determines whether terminal displays symbols for control codes instead of executing them (On).	Off
21	Numeric Keypad	Unshifted, Shifted	Determines whether keys in numeric pad on right side of keyboard operate in accordance with their lowercase/uppercase legends (Unshifted) or operate just the opposite (Shifted).	Unshifted
22	Operation Mode	Local,Online	Sets terminal for online operations with host or for independent, local operations.	Online
23	Page Key	IMMED,DEF	Applies only to ANSI emulation. With the IMMED setting, shifted use of key labeled EDIT (on front of keycap) switches terminal between character transmission mode and block transmission mode. With the DEF setting, shifted	IMMED

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
	Page Key (Contd)		use of key labeled EDIT sends code sequences to host that must be echoed back to switch terminal between character transmission mode and block transmission mode.	
24	Parity	Odd, Even, Spc, Mark, No	Determines whether terminal uses odd, even, space (Spc), mark, or no parity on main and auxiliary ports.	No
25	Power (Refresh)	60 Hz, 50 Hz	Establishes display refresh rate (to be the same frequency as site line voltage).	60 Hz
26	Print Extent	Full, Scroll	Applies only to ANSI emulation. With the Full setting, all characters on screen are enabled to be transferred to a connected printer. With the Scroll setting, only characters in programmed scroll region (two lines to whole screen) are enabled for printing.	Full
27	Print EOM	FF, No	Applies only to ANSI emulation. With the FF (form feed) setting, terminal inserts a form feed code at end of print operations, while with the No setting, it does not.	FF

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
28*	Reset Terminal		When this parameter is being displayed, pressing the shifted CR key resets the terminal.	
29	Response Suppress	On,Off	Applies only to ADV emulation. Determines whether terminal sends a completion response to host (Off) or does not (On).	Off
30	RTS On/Off	On,Off	Determines whether terminal issues a Request to Send signal on main port whenever Data Set Ready and Data Terminal Ready signals are on or when only a transmission occurs (Off).	Off
31	Screen Contrast	1 through 15	Determines whether screen contrast is dimmer (8 through 1) or brighter (10 through 15) than the default value of 9. Only a value of 7 through 15 is allowed to be stored in non-volatile memory. If storage of a value outside that range is attempted, a 9 is stored instead.	9
32	Screen Saver	On,Off	Determines whether screen goes blank after 15 to 20 minutes of no activity from keyboard or host (On) or does not go blank (Off). A blanked screen returns to normal upon keyboard or host activity.	On

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
33	Set Protection	Off, HF, RV, RV/HF, UL, UL/HF, UL/RV, UL/RV/HF, BI, BI/HF, BI/RV, BI/RV/HF, BI/UL, BI/UL/HF, BI/UL/RV, BI/UL/RV/HF, Normal High	Applies only to ANSI emulation. The setting of this parameter determines the type of displayed characters that can be assigned as protected from operator entries). The abbreviations used are: HF = half intensity, RV = inverse video, BI = blinking, and UL = underlined. With the Normal High setting, normal displayed characters can be assigned as protected data. With the Off setting, no characters can be assigned as protected data.	Off
34	Space Compression	On,Off	Applies only to block transmission mode in ANSI emulation. With the On setting, terminal sends a control code in place of consecutive spaces when transmitting to host. With the Off setting, spaces are transmitted as encountered on the screen.	Off
35	Status Line	On,Off	Determines whether a complete half-intensity status line appears (On) or just row/column status in ADV or ADDS emulation (Off).	Off

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
36	Stop Bits	1,2	Determines whether received/transmitted characters on main and auxiliary ports contain one or two stop bits.	1
37	Tx. CR	On,Off	<p>Applies only to ANSI emulation. With the On setting, the following occurs as applicable:</p> <ul style="list-style-type: none"> ● If in character transmission mode, terminal adds a carriage return (CR) code to the code sequence transmitted for a special function key (a F1 through F12 key or the blank key). ● If in block transmission mode, pressing a special function key starts a block transmission and a CR code is added after the code sequence for the special function key like in character transmission mode. In addition, a CR code is sent to end each block transmission started by the key labeled ENTER (on front of keycap). 	On

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
	Tx. CR (Contd)		With the Off setting, no CR code is added for special function keys in either character or block transmissions. In addition, no CR code is added to block transmissions started by the ENTER key.	
38	Tx. Execution	IMMED, DEF	Applies only to block transmission mode in ANSI emulation. With the IMMED setting, pressing the ENTER key starts a block transmission. With the DEF setting, pressing the ENTER key transmits a control code sequence that notifies host that terminal has a block of data to transmit. No block transmission occurs until commanded by host.	IMMED
39	Tx. Extent	Page, Part, Line	Applies only to block transmission mode in ANSI emulation. Determines the size of data block sent to host. The Page setting selects the data within the programmed scroll region. The Part setting selects the data from either the start of the scroll region or from a programmed transmit marker up to the current cursor position. The Line setting selects the data from the current line.	Page

TABLE 6B-6. TERMINAL PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION	DEFAULT SETTING
NO.	PARAMETER	SELECTION		
40	Tx. EOM	FF, No	Applies only to block transmission mode in ANSI emulation. Determines whether terminal adds a form feed code at end of block transmissions (FF) or not (No).	FF
41	Type Ahead Buffer	On, Off	<p>Applies only to character-by-character transmission mode in ANSI emulation. With the On setting, the following occurs:</p> <ul style="list-style-type: none"> ● Keyboard data is entered until a CR (00₁₆) is sent to the host. ● Further data is then stored in the buffer. Trying to enter more than 64 key presses results in the bell sounding but buffer contents remain unchanged. ● The host must send one of two responses to continue: either allowing data in the buffer to be displayed and transmitted, or emptying the buffer. <p>With the Off setting, keyboard entries are displayed and transmitted in the normal manner.</p>	Off
<p>*Parameter 28 is not stored in nonvolatile memory like the other parameters and does not have a default setting.</p>				

Procedure 5 - Removing/Replacing Hood

To remove the hood, refer to figure 6B-2 and:

1. Remove two screws at rear of hood.
2. Lift rear of hood up and slide hood backward off terminal.

To replace the hood:

1. Engage tabs at front of hood under bezel and lower hood in place.
2. Install two screws at rear of hood and tighten.

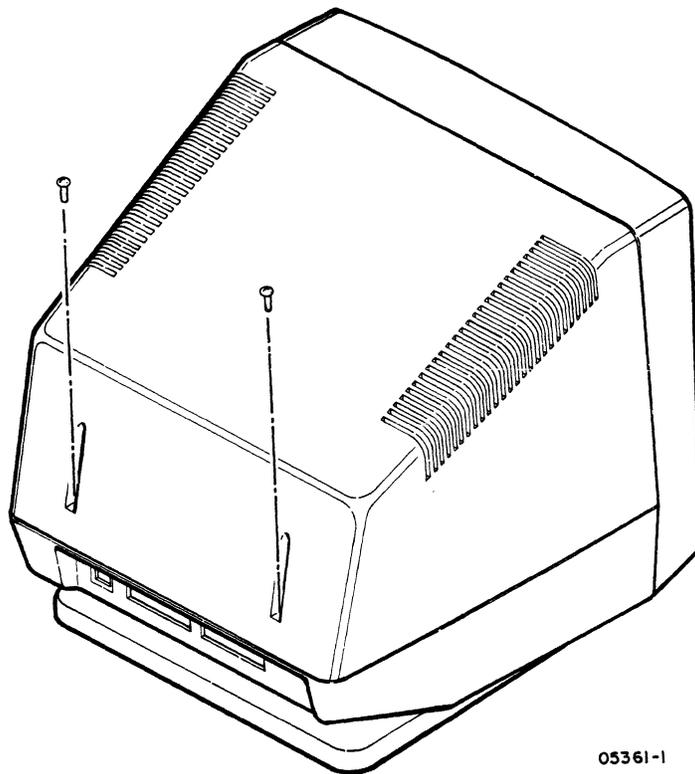


Figure 6B-2. Removing/Replacing Hood

Procedure 6 - Removing/Replacing Main Logic Board

To remove the main logic board, refer to figure 6B-3 and:

NOTE

If a new main logic board is to be installed, ensure that parameter settings are recorded for later entry.

1. Turn off terminal and unplug ac power cord (procedure 1).

2. Disconnect keyboard cable and any other cables attached to connectors at back of terminal.
3. Remove hood (procedure 5).
4. At main logic board, remove monitor-board-to-main-logic-board connector.
5. At main logic board, remove two ground clips from pins.
6. At main logic board, remove power supply connector.
7. Remove two screws that secure main logic board to cabinet base (one screw also secures a ground strap from the power supply).
8. Lift straight up and remove power supply. Place power supply to side of terminal.
9. Push main logic board about 1/2 inch toward front of terminal until board stops.
10. Lift back edge of main logic board about two inches and pull board toward back of terminal until board is free.

To replace the main logic board, do the preceding steps in reverse order and action. If the board is new, refer to procedure 4 after the board is installed and change the default parameter settings to match the recorded settings and store the settings into nonvolatile memory.

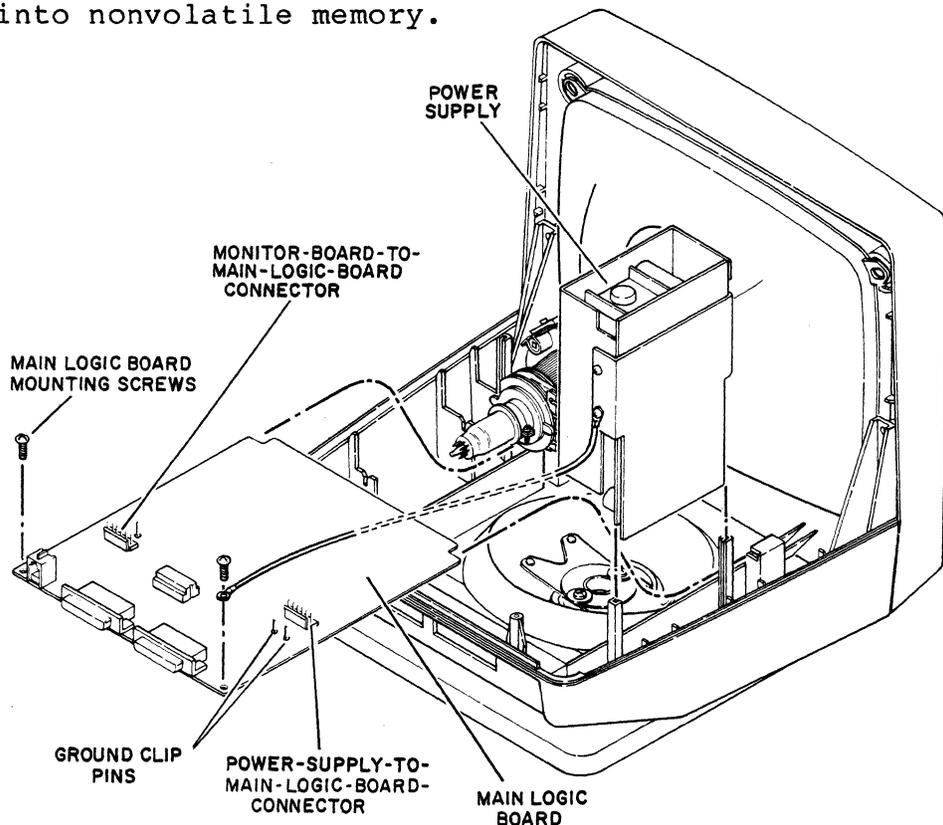


Figure 6B-3. Removing/Replacing Main Logic Board

Procedure 7 - Checking Power Supply Voltages

To check the power supply voltages, do as follows:

1. Turn off terminal (procedure 1).
2. Remove hood (procedure 5).
3. Unfasten ground strap from power supply cover.
4. Lift straight up and remove power supply from cabinet slots. Leave cables connected and lean power supply over outside of cabinet so the three output connectors are accessible (figure 6B-4).
5. Turn on power.

WARNING

Line voltages are present on the power supply board. Touch only the cover when power is on.

6. Check voltages at pins shown in figure 6B-4. Voltages should be:
 - +12 \pm 0.60 V between pins with black (common) wires and violet wires
 - +5 \pm 0.25 V between pins with black wires and blue wires
 - -12 \pm 0.60 V between pins with black wires and white wires

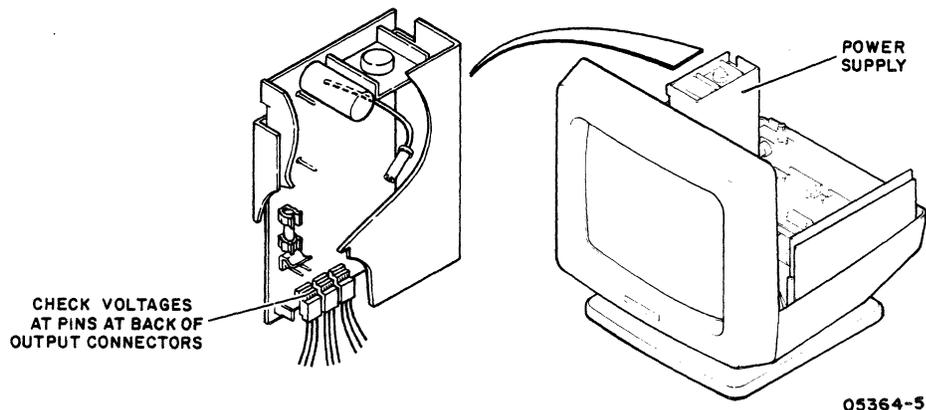


Figure 6B-4. Accessing Power Supply

7. If voltages are OK, turn off power and do steps 1 through 4 in reverse order and action to reassemble terminal. If voltages are not OK, go to SAM 2 (Power Problems).

Procedure 8 - Removing/Replacing Power Supply

To remove the power supply, refer to figure 6B-5 and:

1. Turn off terminal and unplug ac power cord (procedure 1).
2. Remove hood (procedure 5).
3. Unfasten ground strap from power supply cover.
4. Lift power supply straight up and disconnect power-supply-to-main-logic-board cable at main logic board.
5. Disconnect ac input cable at power supply.
6. Disconnect ground terminal from power supply and lift power supply free from cabinet.
7. Remove power-supply-to-main-logic-board cable from three connectors on power supply.

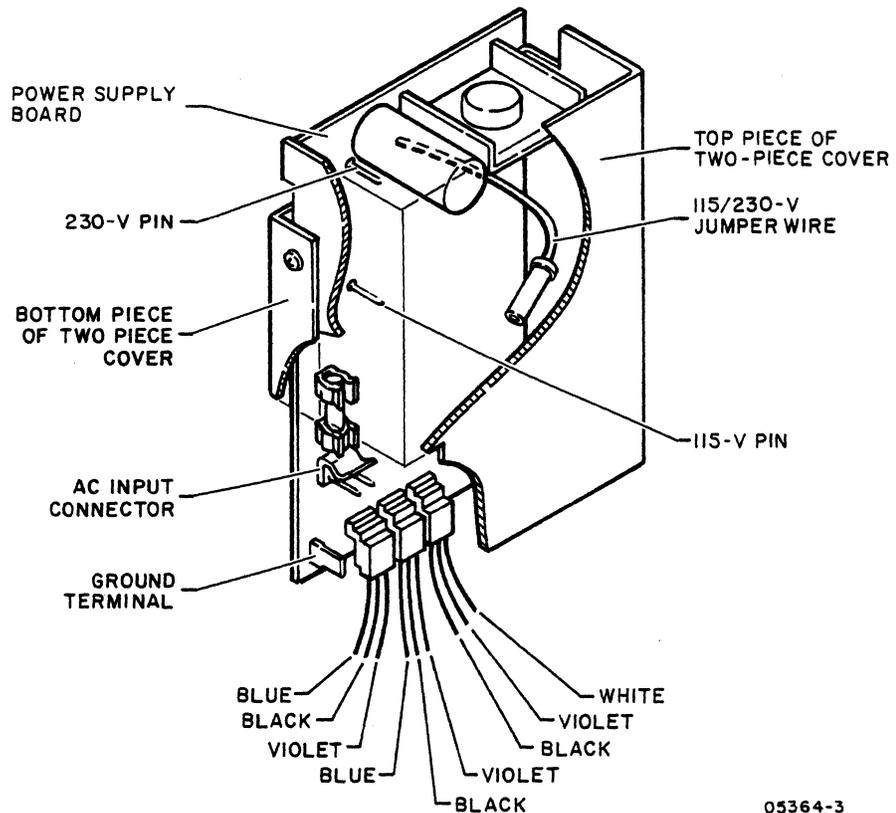


Figure 6B-5. Power Supply Board with Cover

To replace the power supply:

1. If unit being worked on is a 110-V ac, 60-Hz terminal (part number 51942413), do the preceding steps of removal procedure in reverse order and action. When replacing power-supply-to-main-logic-board cable, see figure 6B-5 for color coding of leads of the three power supply connectors. If unit being worked on is a 220/240-V ac, 50-Hz terminal (part number 51942414), the following must be done to the new power supply before replacement:
 - a. Remove screw holding power supply board to bottom cover plate.
 - b. Remove four screws holding two-piece cover together and remove bottom cover plate.
 - c. Remove two screws holding power supply board to top cover.
 - d. Pull sides of the top cover apart to remove power supply board.
 - e. Reposition 115/230-V jumper on power supply board to 230-V pin (figure 6B-5).
 - f. Do steps a through d in reverse order and action and reassemble power supply.

Procedure 9 - Removing/Replacing Power-Supply-to-Main-Logic-Board Cable

To remove the power-supply-to-main-logic-board cable:

1. Turn off terminal and unplug ac power cord (procedure 1).
2. Remove hood (procedure 5).
3. Unfasten ground strap from power supply cover.
4. At main logic board, disconnect connector of power supply cable.
5. Lift power supply straight up and disconnect three connectors from power supply board (figure 6B-6).

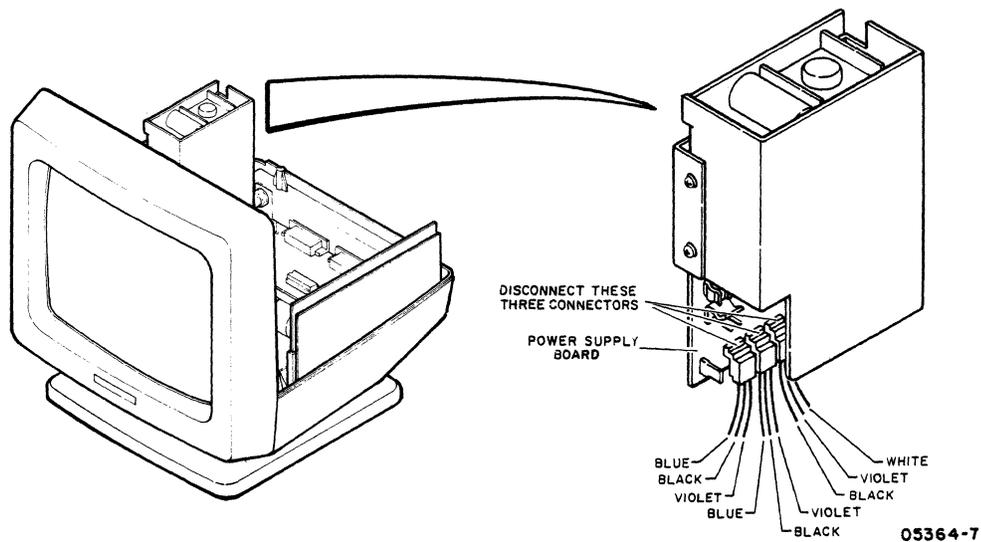


Figure 6B-6. Connection of Power Supply Output Connectors

To replace the power-supply-to-main-logic-board cable, do the preceding steps in reverse order and action and refer to figure 6B-6 for connection of the three power supply board connectors.

Procedure 10 - Removing/Replacing Monitor Board

To remove the monitor board:

1. Turn off terminal and unplug ac power cord (procedure 1).
2. Remove hood (procedure 5).

WARNING

High voltage may be present at crt anode. Be sure to do steps 3 through 7 to discharge voltage from crt. A 10-inch or longer piece of wire with clips at each end will be needed.

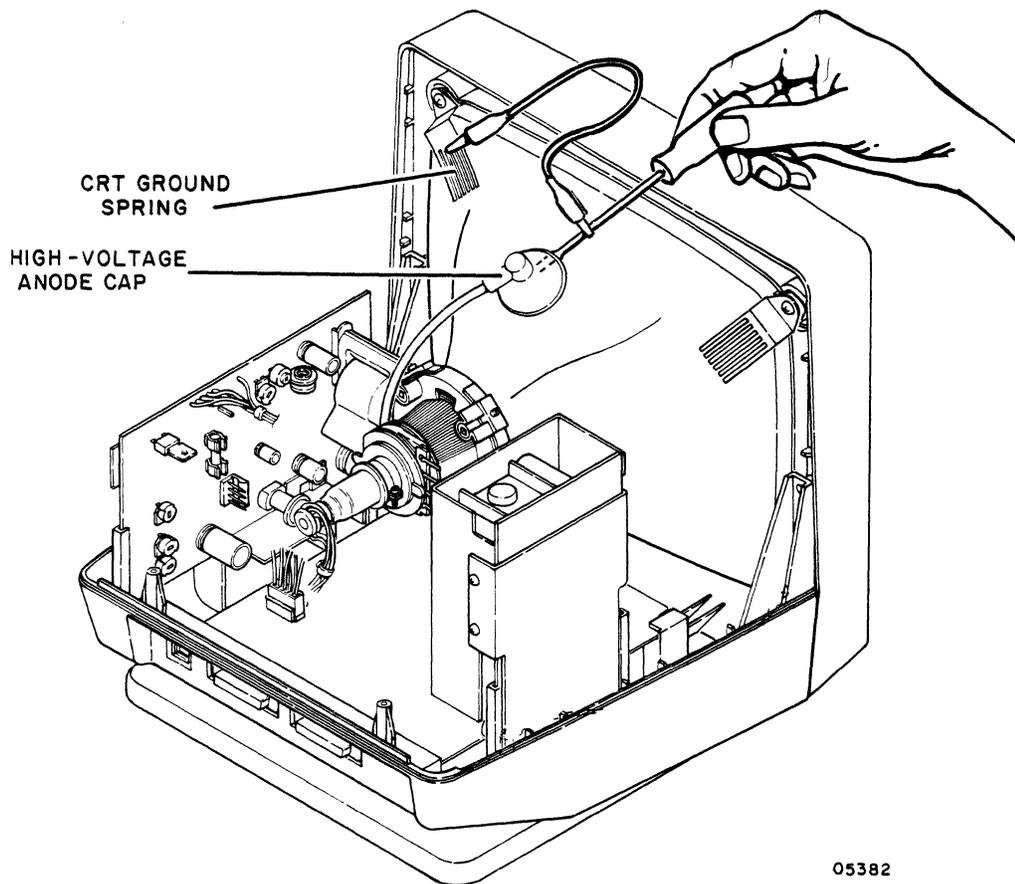
3. Using long thin shaft screwdriver with insulated handle, attach one end of clip lead to screwdriver.
4. Attach clip at other end of lead to crt ground spring (figure 6B-7).

5. Hold screwdriver handle with one hand.

WARNING

Do not touch any high voltage parts
or screwdriver metal shaft.

6. Slip blade of screwdriver under plastic anode cap (figure 6B-7) until it contacts metal anode connector and discharges high voltage. A noticeable spark usually results when screwdriver touches anode metal contact. Hold screwdriver against anode for minimum of five seconds to completely discharge high voltage.



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Figure 6B-7. High-Voltage Discharge

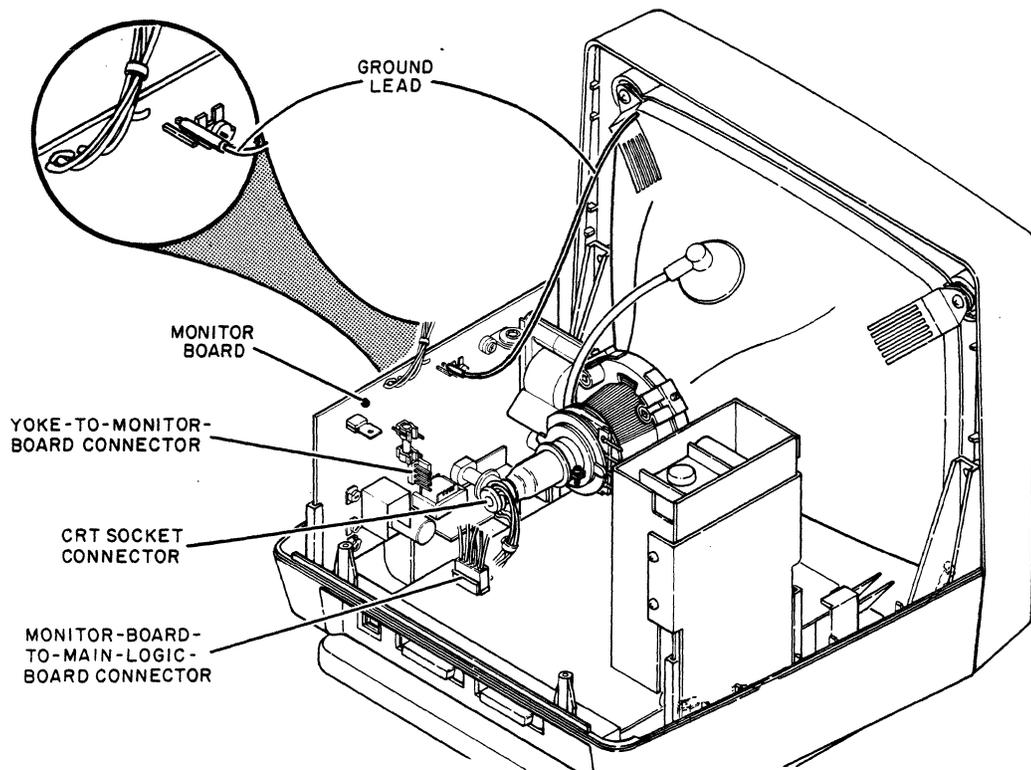
7. Remove screwdriver and disconnect clip lead from ground spring.

8. Lift edge of plastic anode cap and press on one of the contacts underneath to release connector.

WARNING

Be careful of sharp edges on the tip of crt socket when socket connector is removed.

9. Remove crt socket connector (figure 6B-8).
10. At main logic board, disconnect monitor-board-to-main-logic-board connector.
11. At monitor board, disconnect yoke-to-monitor-board connector.
12. Remove ground lead from pin on monitor board.
13. Lift straight up and remove monitor board from cabinet slots.



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Figure 6B-8. Monitor Board Connections

To replace the monitor board:

1. Repeat steps 3 through 7 of removal procedure and place screwdriver in anode connector hole to discharge any residual charge that may have built up in crt.
2. Do other steps of removal procedure in reverse order and action.
3. If a new monitor board is being installed, do video adjustments (procedure 12).

Procedure 11 - Removing/Replacing CRT/Yoke Assembly or Bezel

WARNING

Wear safety glasses and safety gloves when handling the crt. Do not hit or scratch the crt or subject it to more than moderate pressure. Do not hold the crt by its neck or by the yoke. The crt contains a high vacuum; breaking the crt may cause injury from flying glass.

To remove the crt/yoke assembly or bezel:

1. Remove monitor board (procedure 10).
2. Unfasten ground strap from power supply cover.
3. Lift power supply (figure 6B-9) straight up and disconnect power-supply-to-main-logic-board cable at main logic board.
4. Disconnect ac input cable at power supply.
5. Disconnect ground terminal from power supply and lift power supply free from cabinet.
6. Disconnect keyboard (procedure 13).
7. Place terminal screen down on a soft surface.
8. Remove four screws that hold bezel (and crt/yoke assembly) to cabinet base and set cabinet base aside.
9. Remove four screws and washers that hold crt/yoke assembly to bezel and remove two crt ground springs and crt/yoke assembly.

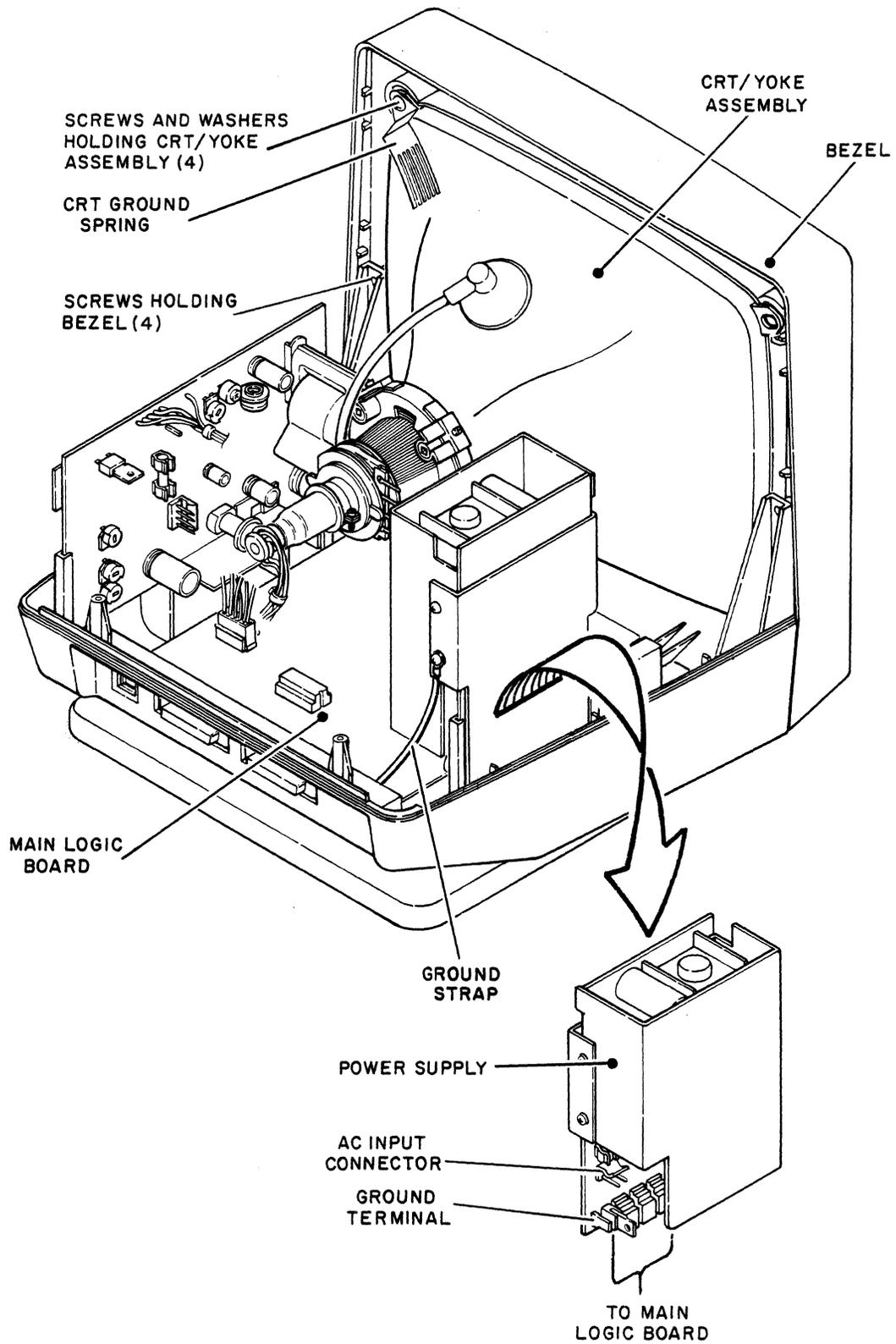


Figure 6B-9. Removing/Replacing CRT/Yoke Assembly or Bezel

To replace the crt/yoke assembly or bezel, do the preceding removal steps in reverse order and action. If a new crt/yoke assembly is being installed, do video adjustments (procedure 12) when replacement is done.

Procedure 12 - Making Video Adjustments

Table 6B-7 describes the functions of the video controls and the following steps give the sequence of adjustment. This sequence is for when a new monitor board or crt/yoke assembly has been installed. For touch-up adjustments, do the steps that are applicable. Figure 6B-10 shows the location of the controls.

WARNING

Lethal voltages exist in the crt and on monitor board. Use extreme caution when performing adjustments.

TABLE 6B-7. VIDEO CONTROLS

CONTROL	FUNCTION
VR201 V (vertical) SIZE potentiometer	Controls height of display
VR202 V LIN (vertical linearity) potentiometer	Controls size ratio between top and bottom halves of screen
VR203 V (vertical) HOLD potentiometer	Controls vertical stability
VR301 CENT (horizontal centering) potentiometer	Controls horizontal centering of display
VR302 BRITE (brightness) potentiometer	Controls screen brightness
VR303 FOCUS potentiometer	Controls display clarity or sharpness in center screen area
L3603 coil	Controls width of display
Yoke magnets	Controls display geometry

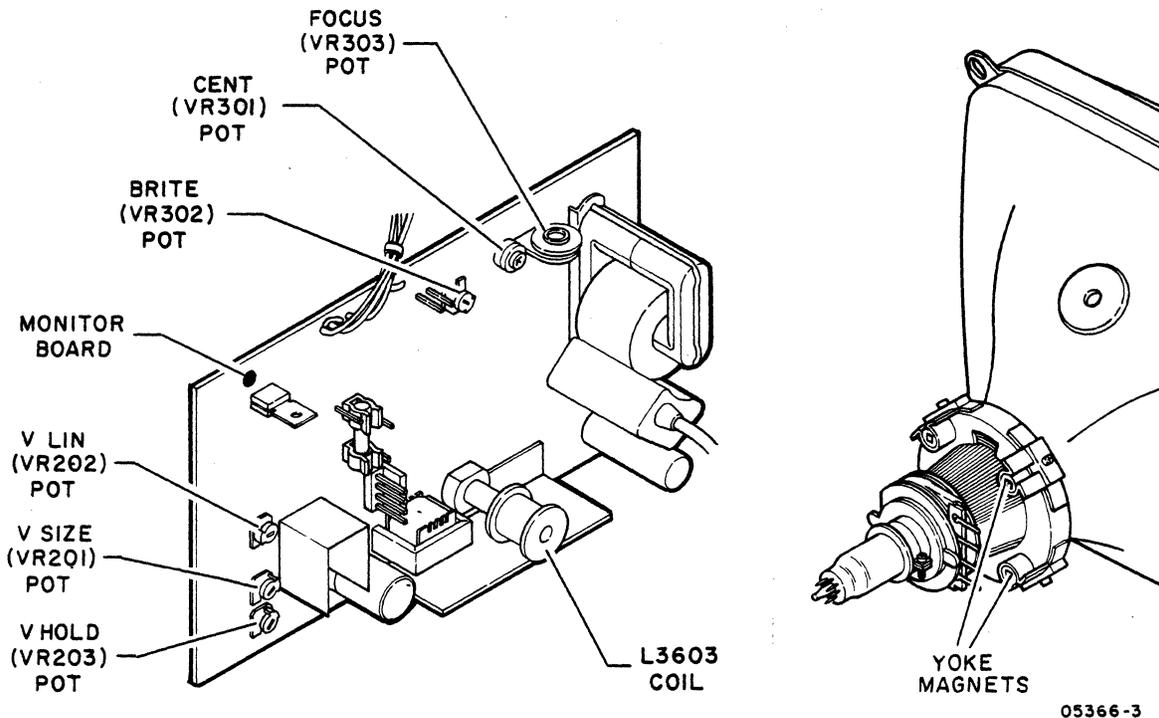


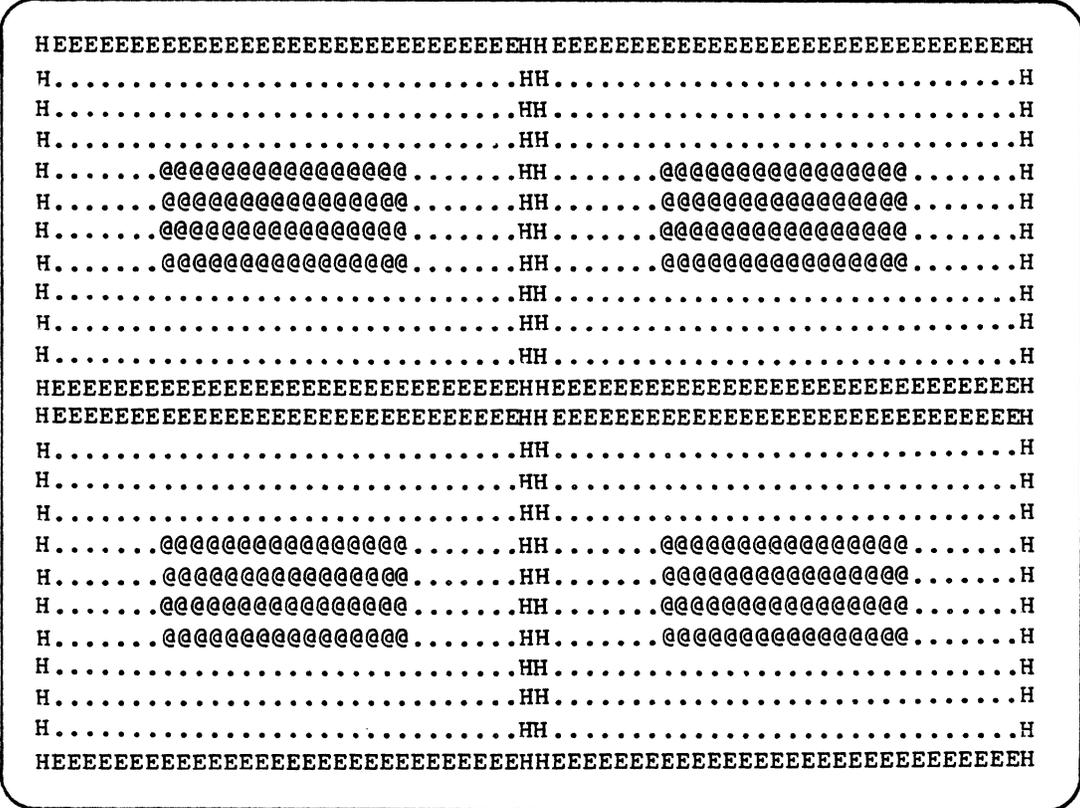
Figure 6B-10. Video Controls

1. Turn terminal on (procedure 1) and allow 15 minutes for crt to warm up before making adjustments.
2. Change parameter 22 (Operation Mode) to Local, and if in ANSI emulation, change parameter 14 (Emulation) to either ADV or ADDS (procedure 4).
3. If in ADV emulation, press CTRL and = keys simultaneously, then hold SHIFT key down and press " and @ keys; if in ADDS emulation, press ESC key, then hold SHIFT key down and press " and @ keys. This displays the alignment pattern shown in figure 6B-11.

NOTE

When the alignment pattern is no longer needed, it is cleared from the screen by pressing the SHIFT and P CLEAR keys.

4. Remove hood (procedure 5).



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Figure 6B-11. Example Alignment Display

Sync Adjustment:

- 5. If display rolls vertically, adjust V HOLD (VR203) potentiometer half way between where rolling begins.

Horizontal Centering/Width Adjustment:

- 6. If test pattern is horizontally off center, adjust CENT (VR301) potentiometer to center pattern on screen.
- 7. Displayed pattern should be nominally 205 mm (8 in) wide. To change width, use a nonmagnetic tool and adjust coil L3603.

Vertical Height/Linearity Adjustment:

8. Displayed pattern should be nominally 150 mm (6 in) high. To change height, adjust V SIZE (VR201) potentiometer.
9. If characters at top of pattern are different in size than at bottom, adjust V LIN (VR202) potentiometer.
10. V SIZE and V LIN potentiometers interact with each other. Repeat steps 8 and 9 as necessary until results are satisfactory.

Brightness Adjustment:

NOTE

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

11. Change parameter 31 (Screen Contrast) to its highest setting of 15 and leave parameter display at bottom of screen (procedure 4).
12. Adjust BRITE (VR302) potentiometer until raster appears, then adjust it back just far enough so raster does not show.
13. Change parameter 31 to its lowest setting of 1 (do not exit from parameter display) and check that no video is visible on screen. Then change parameter 31 back to 15 and verify that raster does not show. If necessary, readjust BRITE potentiometer until these conditions are met.
14. Change parameter 31 to its default setting of 9 and press SETUP key to exit from parameter display.

Focus Adjustment:

15. Adjust FOCUS (VR303) potentiometer for best overall focus.

Geometric Distortion Adjustment:

16. If barrelling or pincushioning exists (figure 6B-12), adjust yoke magnets in the following manner:
 - a. Use a nonmagnetic tool and rotate magnet slugs until best straightness is achieved.
 - b. If display cannot be corrected by rotating magnets, loosen screws holding magnets to yoke and adjust position of magnets until best straightness is achieved. Then tighten screws.
 - c. Repeat steps a and b as necessary.

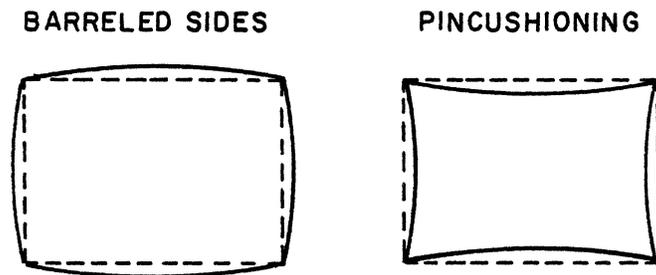


Figure 6B-12. Display with Barrelling/Pincushioning

Procedure 13 - Removing/Replacing Keyboard

To remove the keyboard:

1. Turn off terminal (procedure 1).
2. Press down on plastic tab at top of keyboard cable connector and disconnect cable from terminal (figure 6B-13).

To replace the keyboard, do the preceding steps in reverse order and action.

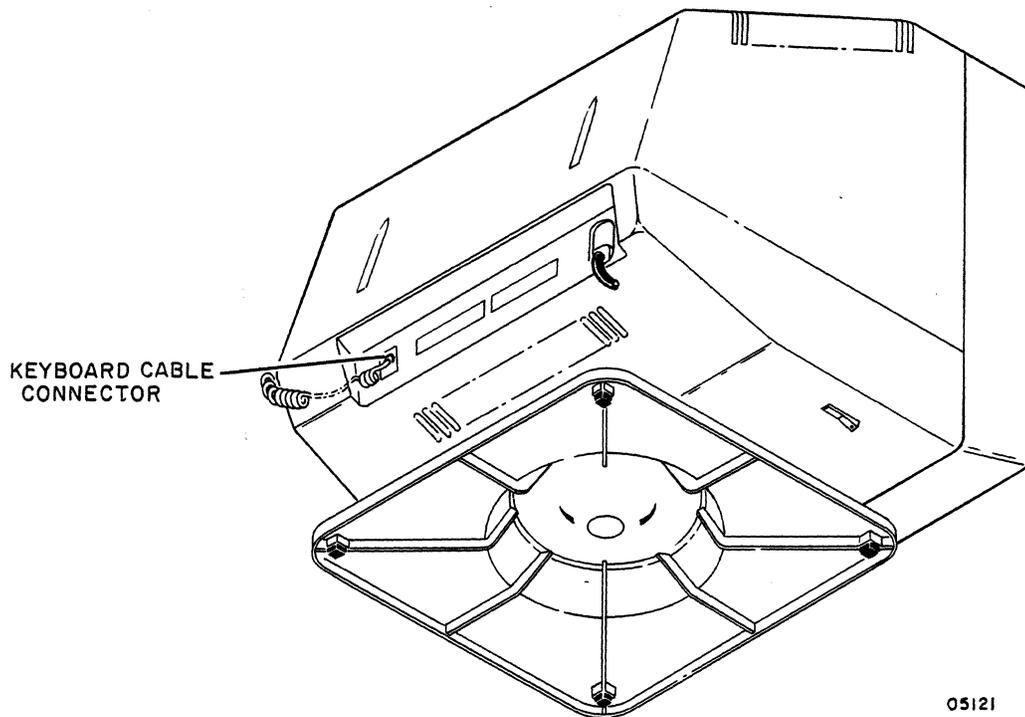


Figure 6B-13. Keyboard Cable Connector

Procedure 14 - Removing/Replacing Power Switch

To remove the Power switch, refer to figure 6B-14 and:

1. Turn off terminal and unplug ac power cord (procedure 1).
2. Remove hood (procedure 5).
3. Unfasten ground strap from power supply cover.
4. Lift power supply straight up and disconnect power-supply-to-main-logic-board cable at main logic board.
5. Disconnect ac input cable from power supply.
6. Disconnect ground terminal from power supply and set power supply aside.
7. Remove two screws holding Power switch to cabinet base.
8. Unsolder leads from Power switch.

To replace the Power switch, do the removal steps in reverse order and action.

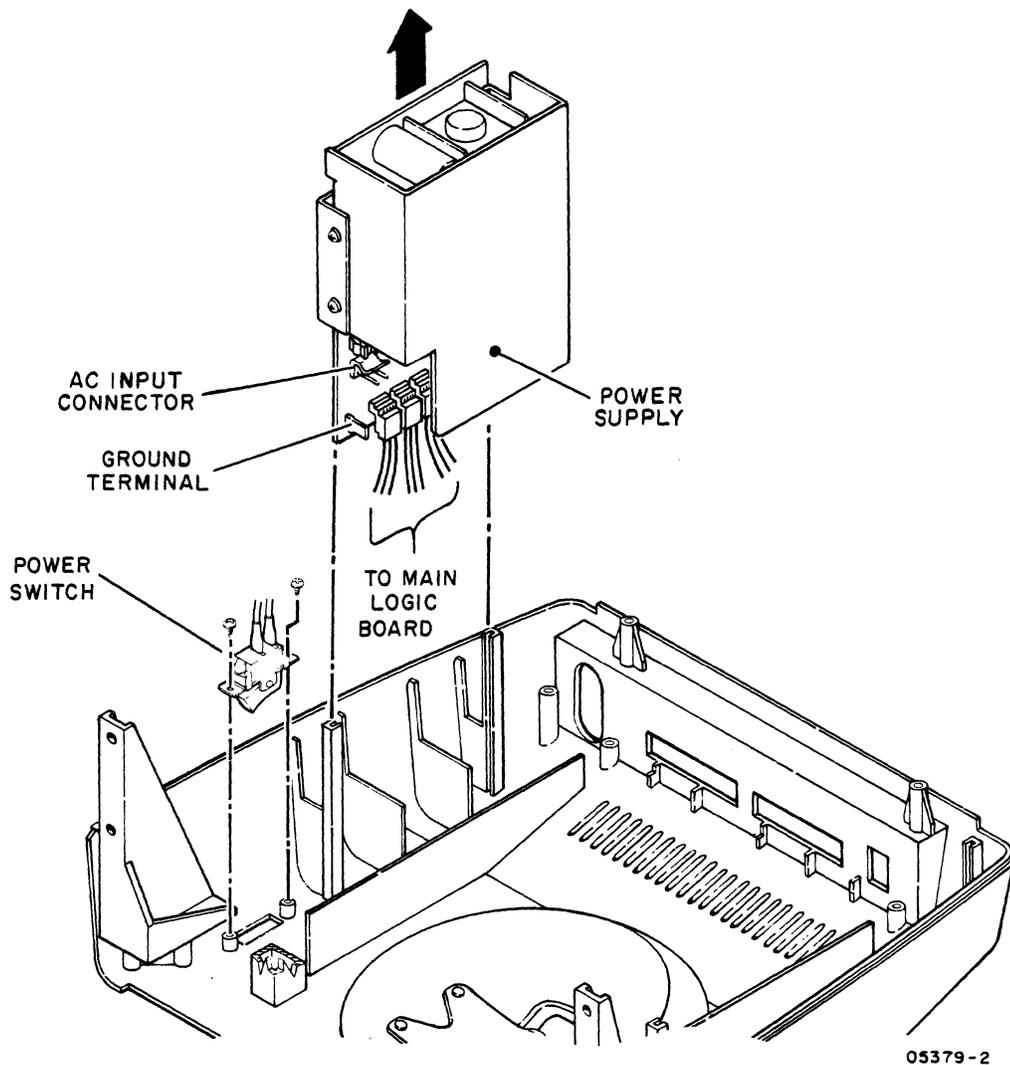


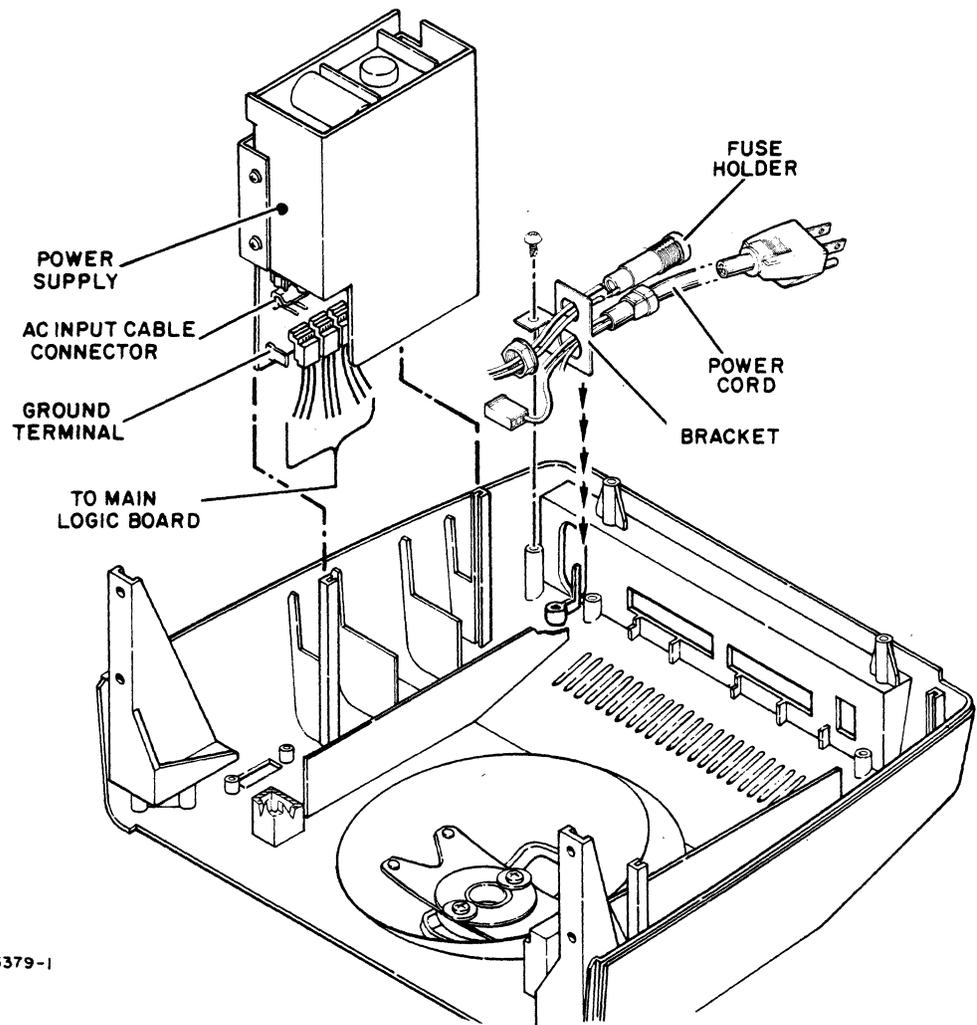
Figure 6B-14. Removing/Replacing Power Switch

Procedure 15 - Removing/Replacing AC Power Cord or Fuse Holder

To remove the ac power cord or fuse holder, refer to figure 6B-15 and:

1. Turn off terminal and unplug ac power cord (procedure 1).
2. Remove hood (procedure 5).
3. Unfasten ground strap from power supply cover.
4. Lift power supply straight up and disconnect power-supply-to-main-logic-board cable at main logic board.

5. Disconnect ac input cable from power supply.
6. Disconnect ground terminal from power supply and set power supply aside.
7. Remove screw that holds power-cord/fuse-holder bracket to cabinet base.
8. Push power-cord/fuse-holder bracket in and slide it up free from cabinet slot.
9. To remove fuse holder, do the following; to remove power cord, go to step 10.
 - a. Unsolder two leads from fuse holder.
 - b. Remove nut holding fuse holder to bracket and remove fuse holder.



05379-1

Figure 6B-15. Removing/Replacing AC Power Cord or Fuse Holder

10. Remove screw holding green (safety ground) wire of power cord to ground strip on cabinet base.
11. Unsolder black (hot) wire of power cord from fuse holder.
12. Cut tie wrap securing brown wire from fuse holder to white wire of power cord.
13. Use a scribe or unbent paper clip and release white (neutral) wire of power cord from ac input connector.
14. Using pliers, pull strain relief from bracket on power-cord-plug side.
15. Remove power cord.

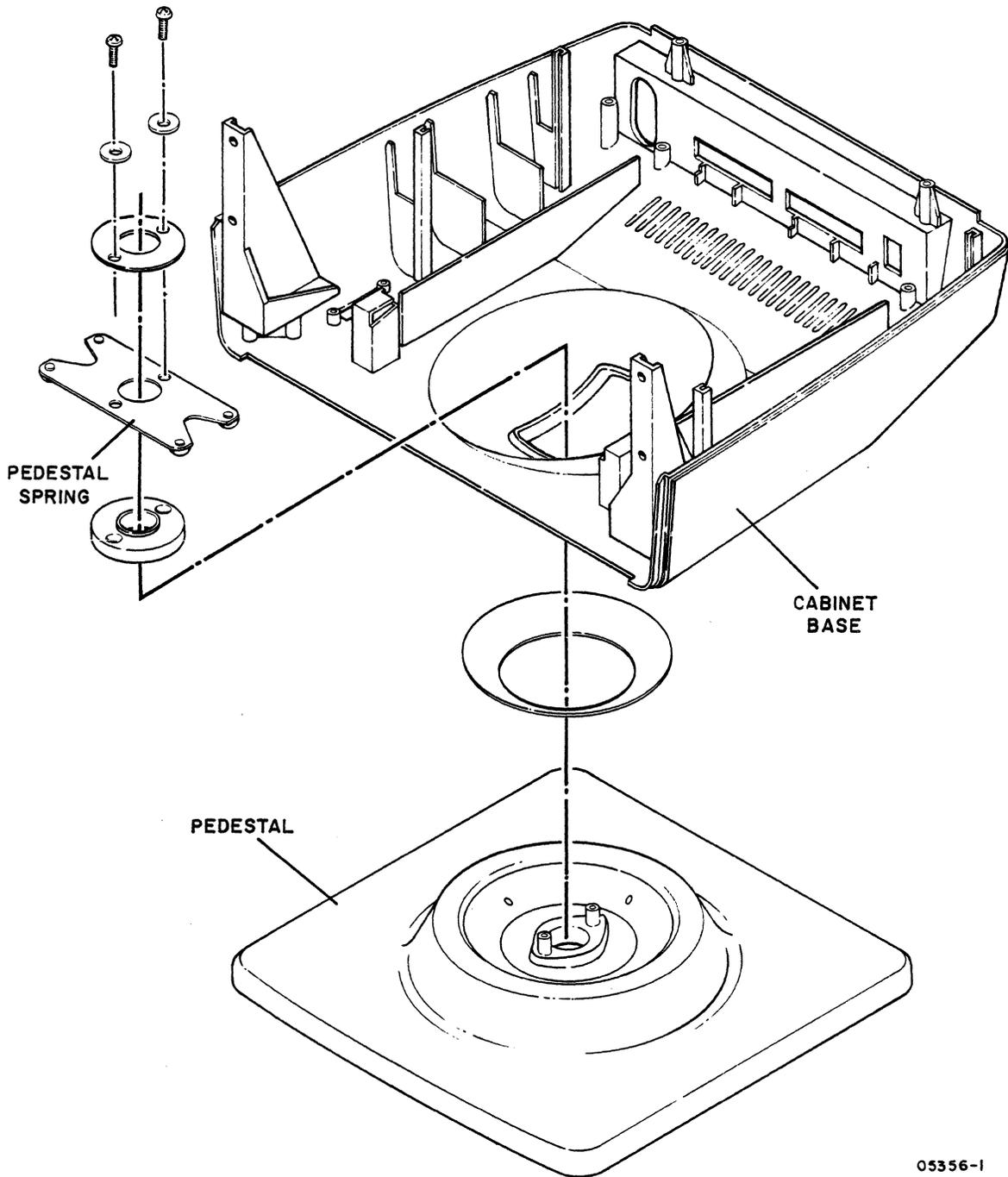
To replace the power cord or fuse holder, do the removal steps in reverse order and action.

Procedure 16 - Removing/Replacing Cabinet Base, Pedestal, or Pedestal Spring

To remove the cabinet base, pedestal, or pedestal spring:

1. Remove main logic board (procedure 6).
2. Remove monitor board (procedure 10).
3. Do steps 3 through 8 of procedure 11 to remove crt/yoke assembly and bezel.
4. Remove two screws holding pedestal spring and pedestal to cabinet base (figure 6B-16).
5. If removing cabinet base:
 - a. Do steps 7, 8, and 10 through 15 of procedure 15 to remove power cord.
 - b. Remove two screws holding Power switch and remove switch and connected wires and fuse holder.
 - c. Remove screw holding ground strip and remove strip and connected ground wires.

To replace the cabinet base, pedestal, or pedestal spring, do the removal steps in reverse order and action.



05356-1

Figure 6B-16. Mounting of Pedestal/Pedestal Spring to Cabinet Base

Procedure 17 - Doing Loopback Testing

This procedure only applies to testing a main interface port that is setup for RS-232-C/CCITT-V.24 signals. To do loopback testing:

1. Turn off terminal (procedure 1).
2. Disconnect cable from main interface port.
3. Install loopback plug (part number 61409717) in main interface port.
4. Turn terminal on.
5. If terminal is in local mode, change parameter 22 to Online (procedure 4).
6. Enter keyboard data and check for correct characters on screen. If terminal is set for half-duplex operation (parameter 13 set to HDX), two characters should display for each alphanumeric entry. If no errors occur, terminal is transmitting and receiving data correctly (do steps 4 through 1 in reverse order and action to reconnect terminal). If an error does occur, return to SAM 6 (Communication/Printing Problems).



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This section contains spare parts information for the display terminal. This information includes a spare parts kit, a spare parts list, and source/cross-reference lists.

DWN	W. Glaser	1/84	 CONTROL DATA CORPORATION	TITLE	SPARE PARTS LIST VIKING TTY II	PREFIX	DOCUMENT NO.	REV.
CHKD	W. Glaser	1-2-84		FIRST USED ON	TTY II	SPL	66330135	
ENG				CODE IDENT	15920			SHEET 1 of 3
MFG								
APPR	S. H. ...	1/84						

SHEET REVISION STATUS										REVISION RECORD					
										REV	ECO	DESCRIPTION	DRFT	DATE	APP
												RELEASED CLASS 'A'		1-17-84	ME
														11-27-84	TE

NOTES:

DETACHED LISTS

AA3180 REV. 8/71 * 79 CDC

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CONTROL DATA		CODE IDENT	SHEET	SPL	DOCUMENT NO.	REV.
		15920	2		66330135	B

FIND NO.	PART IDENTIFICATION	QUANTITY REQUIRED	UNIT OF MEAS	NOMENCLATURE OR DESCRIPTION	SPECIFICATIONS, NOTES, OR MATERIAL
1	66329968	1	PC	REPLACED BY 66329993	For U.S. use, this is interchangeable w/66329993
2	66329969	1	PC	MONITOR PCB	
3	66329970	1	PC	CRT/YOKE	
4	66329971	1	PC	FUSE (AC 60 HZ)	
5	66329972	1	PC	FUSE (AC 50 HZ)	
6	66329973	1	PC	FUSE (MONITOR PCB)	
7	66329974	1	PC	FUSE (POWER SUPPLY PCB)	
8	66329975	1	PC	FUSE HOLDER (AC)	
9	66329976	1	PC	POWER CORD (60 HZ)	
10	66329977	1	PC	POWER CORD (50 HZ)	
11	66329978	1	PC	POWER SWITCH	
12	66329979	1	PC	CABLE (MONITOR TO MAIN LOGIC)	
13	66329980	1	PC	CABLE (PS TO MAIN LOGIC)	
14	66329981	1	PC	BEZEL	
15	66329982	1	PC	BASE	
16	66329983	1	PC	COVER	
17	66329984	1	PC	PEDESTAL	
18	66329985	1	PC	SPRING PEDESTAL TENSION	
19	66329986	1	PC	MAIN LOGIC PCB	
20	66329987	1	PC	KEYBOARD W/ENCLOSURE	

AA3181 REV. 8/71

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The following source list contains products to be used as specified in CDC-SPEC 51942413/14, the vendor (Tatung Electronics Corp.) guarantees satisfactory operation.

The products and their containers shall be permanently and legibly marked with the CDC part numbers.

SOURCE LIST

CDC Part Number	Description	Vendor Part Number
66329966	Replaced by 66330135	N/A
66329967	Replaced by 66330136	N/A
66329968	Replaced by 66329993	5719001311
66329969	Monitor Printed-Circuit Board	5710717581
66329970	CRT/Yoke	5711101121
66329971	Fuse (AC 60 Hz)	5724714220
66329972	Fuse (AC 50 Hz)	5724714220
66329973	Fuse (Monitor Printed-Circuit Bd)	5724712022
66329974	Fuse (Power Supply PC Board)	
66329975	Fuse Holder (AC)	5056512010
66329976	Power Cord (60 Hz)	5726800000
66329977	Power Cord (50 Hz)	5726800000
66329978	Power Switch	5724580011
66329979	Cable, Monitor to Main Logic	5713300106
66329980	Cable, PS to Main Logic	5713300206
66329981	Bezel	5642220400
66329982	Lower Cover	5642220000
66329983	Upper Cover	5642220300
66329984	Base	5742220500
66329985	Spring, Suppressor	5731300040
66329986	Main Logic Board	5710707481
66329987	Keyboard w/Enclosure	5712006240
66329988	Spring Suppressor (Base)	5734200040
66329989	Frictional Dome (Bumpers)	5734200050
66329990	Washer (Whirl)	5731201612
66329991	Frictional Washer	5734200060
66329992	Screws for Spring Suppressor	7001261612
66329993	VDE Approved Pwr. Supply w/Shield	5719400001
66329994	Reserved	
66329995	Reserved	

SOURCE CONTROL DRAWING

CONTROL DATA CORPORATION	Source/Cross Reference List for Viking TTY II	CODE IDENT	A	DWG NO	REV
		15920		66329966	D
		SHEET 2 OF 3			

WP0103b
CD8324R

CROSS REFERENCE LIST

Vendor Part Number	Description	CDC Part Number	Symbol
	Fuse (AC 60 Hz)	66329971	
	Fuse (AC 50 Hz)	66329972	
	Fuse (Monitor Printed-Circuit Bd)	66329973	
	Fuse (Power Supply PC Board)	66329974	
5056512010	Fuse Holder (AC)	66329975	
5642220000	Lower Cover	66329982	
5642220300	Upper Cover	66329983	
5642220400	Bezel	66329981	
5710707481	Main Logic Board	66329986	
5710717581	Monitor Printed-Circuit Board	66329969	
5711101121	CRT/Yoke	66329970	
5712006240	Keyboard w/Enclosure	66329987	
5713300106	Cable, Monitor to Main Logic	66329979	
5713300206	Cable, PS to Main Logic	66329980	
5719001311	Replaced by Vendor P/N 5719400001	66329968	
5719400001	VDE Approved Pwr. Supply w/Shield	66329993	
5724580011	Power Switch	66329978	
5726800000	Power Cord (60 Hz)	66329976	
5726800000	Power Cord (50 Hz)	66329977	
5731201612	Washer (Whirl)	66329990	
5731300040	Spring, Suppressor	66329985	
5734200040	Spring Suppressor (Base)	66329988	
5734200050	Frictional Dome (Bumpers)	66329989	
5734200060	Frictional Washer	66329991	
5742220500	Base	66329984	
7001261612	Screws for Spring Suppressor	66329992	

SOURCE CONTROL DRAWING

CONTROL DATA CORPORATION	Source/Cross Reference List for Viking TTY II	CODE IDENT	A	DWG NO	REV
		15920		66329966	D
				SHEET 3 OF 3	

WP0103b
CD8324R

The following source list contains products to be used as specified in CDC-SPEC 51942413/14, the vendor (Tatung Electronics Corp.) guarantees satisfactory operation.

The products and their containers shall be permanently and legibly marked with the CDC part numbers.

SOURCE LIST

CDC Part Number	Description	Vendor Part Number
66330158	Spanish Foreign Character Set	5712007046
66330159	French Foreign Character Set	5712007041
66330160	German Foreign Character Set	5712007042
66330161	Swedish/Finnish Foreign Character Set	5712007043
66330162	British Foreign Character Set	5712007045
66330163	Danish/Norwegian Foreign Character Set	5712007044
66330164	American Standard Character Set*	
66330165	Reserved	
66330166	Reserved	
66330167	Reserved	
66330168	Reserved	
66330169	Reserved	

*This character set consists of keycaps only and maybe optionally purchased direct from:

Cherry Electrical Products Corporation
3600 Sunset Avenue
Waukegan, Illinois 60087

SOURCE CONTROL DRAWING

CONTROL DATA CORPORATION	Source/Cross Refer- ence List for Tatung Electronics Corp. for VIKING TTY II Foreign Character Sets	CODE IDENT	A	DWG NO	REV
		15920		66330158	B
				SHEET 2 OF 3	

WP0103b
CD8831R

CROSS REFERENCE LIST

Vendor Part Number	Description	CDC Part Number
5712007041	French Foreign Character Set	66330159
5712007042	German Foreign Character Set	66330160
5712007043	Swedish/Finnish Foreign Character Set	66330161
5712007044	Danish/Norwegian Foreign Character Set	66330163
5712007045	British Foreign Character Set	66330162
5712007046	Spanish Foreign Character Set	66330158
	American Standard Character Set	66330164

SOURCE CONTROL DRAWING

CONTROL DATA CORPORATION	Source/Cross Refer- ence List for Tatung Electronics Corp. for VIKING TTY II Foreign Character Sets	CODE IDENT	A	DWG NO	REV
		15920		66330158	B
				SHEET 3 OF 3	

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CD8831R

This appendix contains information for testing the keyboard keys that are unique to optional foreign character sets. This information supplements procedure 3 (Testing Keyboard Input) in subsection 6B. The information assumes that parameter 16 (Monitor Mode) is set to On and parameter 18 (Operation Mode) is set to Local. Unless indicated otherwise, the inputs listed apply to both ADV emulation and ADDS emulation. The order of this information is as follows:

- Table A-1 - United Kingdom keys
- Table A-2 - German keys
- Table A-3 - French keys
- Table A-4 - Spanish keys
- Table A-5 - Swedish/Finnish keys
- Table A-6 - Danish/Norwegian keys

TABLE A-1. DISPLAYED INPUT FOR UNITED KINGDOM KEYS

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
£		3	3	£	3	£
'		'	'	'	'	'
.	
-		\	\	-	\	-
>		<	<	>	<	>

TABLE A-2. DISPLAYED INPUT FOR GERMAN KEYS

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
"		2	2	"	None	None
§		3	3	§	3	§
&		6	6	&	6	&
/		7	7	/	7	/
(		8	8	(	8	(
)		9	9	)	9)
=		0	0	=	0	=
?		β	β	?	U _S	U _S
\		'	'	\	R _S	R _S
	Z		Z	Z	E _M	E _M
	Ü		ü	Ü	G _S	G _S
*		+	+	*	F _S	F _S
	Ö		ö	Ö	ö	Ö
	Ä		ä	Ä	ä	Ä
^		#	#	^	#	^
	Y		Y	Y	S _B	S _B
;		'	'	;	'	;
:		.	.	:	.	:
-		-	-	-	-	-
>		<	<	>	<	>

TABLE A-3. DISPLAYED INPUT FOR FRENCH KEYS

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
"		2	2	"	None	None
§		3	3	§	3	§
+		6	6	+	6	+
/		7	7	/	7	/
(		8	8	(	8	(
)		9	9	)	9)
=		0	0	=	0	=
?		'	'	?	U _S	U _S
..		^	^	..	R _S	R _S
£		`a	`a	£	G _S	G _S
*		&	&	*	F _S	F _S
é		e'	e'	é	e'	e'
o		`u	`u	o	`u	o
£		'	'	£	'	£
;		,	,	;	,	;
:		.	.	:	.	:
-		-	-	-	-	-
>		<	<	>	<	>

TABLE A-4. DISPLAYED INPUT FOR SPANISH KEYS

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
§		2	2	§	None	None
£		3	3	£	3	£
~		,	,	~	,	~
ç		ç	ç	ç	F _S	F _S
	Ñ		ñ	Ñ	ñ	Ñ
i		o	o	i	o	i
"		,	,	"	,	"
;		,	,	;	,	;
:		.	.	:	.	:
>		<	<	>	<	>

TABLE A-5. DISPLAYED INPUT FOR SWEDISH/FINNISH KEYS

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
"		2	2	"	None	None
¤		4	4	¤	4	¤
&		6	6	&	6	&
/		7	7	/	7	/
(		8	8	(	8	(
)		9	9	)	9)
=		0	0	=	0	=
?		+	+	?	U _S	U _S
	· É		· é	· É	R _S	R _S
	· Ä		· ä	· Ä	G _S	G _S

TABLE A-5. DISPLAYED INPUT FOR SWEDISH/FINNISH KEYS (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
	Ü		ü	Û	F _S	F _S
	Ö		ö	Ï	ö	Ï
	Ä		ä	Ä	ä	Ä
*		,	,	*	,	*
;		,	,	;	,	;
:		.	.	:	.	:
-		-	-	-	-	-
>		<	<	>	<	>

TABLE A-6. DISPLAYED INPUT FOR DANISH/NORWEGIAN KEYS

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
"		2	2	"	None	None
&		6	6	&	6	&
/		7	7	/	7	/
(		8	8	(	8	(
)		9	9	)	9)
=		0	0	=	0	=
?		+	+	?	U _S	U _S
@		,	,	@	R _S	R _S
	Å		å	Ä	G _S	G _S
^		-	-	^	F _S	F _S
	Ø		ø	Ø	Ø	Ø
	Æ		æ	Æ	æ	Æ

TABLE A-6. DISPLAYED INPUT FOR DANISH/NORWEGIAN KEYS (CONTD)

KEYCAP LEGEND			DISPLAYED CHARACTER/SYMBOL			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	WITH CTRL	WITH CTRL SHIFTED
*		'	'	*	'	*
;		'	'	;	'	;
:		.	.	:	.	:
-		-	-	-	-	-
>		<	<	>	<	>

COMMENT SHEET

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(On-Site Information)

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