WANG

2110 VS/DP TERMINAL

COMPANY PROPRIETARY STATEMENT

Customer Engineering
Product Maintenance Manual   **741-1645**

COMPANY CONFIDENTIAL

PREFACE

This document is the Product Maintenance Manual (PMM) for the Wang 2110 VS/DP Terminal. The manual is organized in accordance with Customer Engineering Technical Documentation's approved PMM outline. The scope of this manual reflects the type of maintenance philosophy selected for this product.

The purpose of this manual is to provide the Wang-trained Customer Engineer (CE) with sufficient instructions to operate, troubleshoot, and repair the 2110 VS/DP Terminal. The manual will be updated on a regular schedule or as necessary. Such updates will be published either as Publication Update Bulletins (PUBs) or as full revisions.

First Edition (February, 1985)

Use of the material in this document is authorized only for the purpose stated in the Preface above.

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REASON FOR CHANGE:

This PUB provides updates for the 2110 VS/DP Terminal.

INSTRUCTIONS:

Remove pages and insert attached pages as follows:

	REMOVE	INSERT
1.	iii, iv	iii, iv
2.	1-3, 1-4	1-3, 1-4
3.	4-3 thru 4-11/Blank	4-3 thru 4-11/Blank
4.	5-1, 5-2	5-1, 5-2
5.	8-1, 8-2	8-1, 8-2
6.		
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9.		
10.		

This page is to be used as a permanent record of revisions; place it directly following the title page.

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CHAPTER 1

INTRODUCTION

1.1   SCOPE

    This Product Maintenance Manual provides information on installation,
operation, corrective and preventive maintenance, and troubleshooting for the
2110 VS/DP Terminal (figure 1-1).

    The contents of this chapter are arranged in the following sections:

        Section 1.2 contains a table listing of the 2110 VS/DP Terminal
        specifications. These specifications contain dimensions, net weight,
        power requirements, features and environmental conditions for the
        2110 VS/DP Terminal;

        Section 1.3 contains a system description of the 2110 VS/DP Terminal.

Figure 1-1.   The 2110 VS/DP Terminal

INTRODUCTION

1.2 SYSTEM SPECIFICATIONS

MONITOR DISPLAY

Screen Size   12 inch diagnonal non-glare green phospor.

Format   24 lines X 80 with 25th non-roll status line.

Character   7 X 11 dot resolution within 9 X 12 field.

Character Set   ASCII 128 character set including 96 displayable
                           alphanumeric characters, 32 control characters, line
                           mode graphics.

Screen Attributes   Light on dark or dark on light display (selectable via
                           setup from keyboard), Program selected reduced
                           intensity, Reverse video, Underline, Blink, Line mode
                           graphics, Double height, Double width plus any
                           combination.

Cursor Attributes   Blinking or steady block underline.

Status Line   Terminal setup information in setup mode. 25th
                           addressable non-roll status line in online mode.
                           Status information not affected by clear screen
                           command. Last five characters (not addressable from
                           CPU) contain row and column location of cursor.

Screen Saver   If there is no data input to the terminal after fifteen
                           minutes, the screen will be blanked out. As soon as
                           data is input into the terminal, the screen will
                           display again.

Vertical Refresh Rate   60 Hz, non-interlaced. (Vertical refresh rate is
                           independent of power line frequency).

Hor. Refresh Rate   18.25 KHz.

Display Range   200 Characters/page (80 X 25).

Display Format   80 Characters X 24 lines, plus a status line which
                           indicates terminal configuration.

Display Area   5.5 inches (13.9 cm) high X 7.5 inches (19.7 cm) wide.

Cursor Controls   Backspace, Forward Space, Up, Down, Home, Return, Read
                           Cursor, and Cursor Addressing.

KEYBOARD

Alpha/Numeric   26-letter alphabet with upper and lower case, numerics
                           0-9, Return, Shift, Puncuation, Backspace, Tab and Caps.
                           Lock. Most keys are autorepeating at approximately 15
                           characters/second rate. Selectable audible key-click.

1.2   SYSTEM SPECIFICATIONS

KEYBOARD, CONT'D

Numeric Keypad	12 keys, 0-9, Enter, Period.
Cursor Control Keys	Right, Left, Up, Down, Home, Return, Backspace and Line Feed.
Edit Keys	Character insert, character delete, line insert and line delete.
Special Function Keys	PF1-PF32 Programmable Function Keys provide special word processing functions. These keys will also activate any of the 32 special data processing program functions.
Functional Command Keys	Set-Up, Break, Escape, Delete and Save.

EDITING

Edit Operation	Clear entire screen, insert characters, delete characters, insert lines, delete lines, erase lines, erase to the end of a line and erase to the end of a page.

COMMUNICATIONS

Block Mode	Send line and send page.
Conversation Mode	Interactive (character by character transmission in full or half-duplex operation).
Program Mode	Control characters are displayed on the screen.
Monitor Mode	Hex codes are displayed for all characters.
Interfaces	Primary (Modem) Port: RS-232-C or 20mA current loop. Auxiliary port: RS-232-C.
Data Rates	75,110,150,300,450,600,900,1200,1800,2400,3600,4800,7200, 9600 and 19,200 baud (9600 max. for 20mA current loop).
Word Length	7 or 8 data bits.
Parity	Even, Odd or no parity.
Stop Bits	1 or 2.
Format	ASCII serial asyncronous communications.
Communication Protocol	Xon, Xoff, RTS, DTR signal.

SYSTEM SPECIFICATIONS, CONT'D

The following baud rates may be selected for the Main and Auxiliary ports:

75,110,150,300,450,600,900,1200,1800,2400,3600,4800,7200,9600,19,200.

GENERAL SPECIFICATIONS

Monitor Assembly	Height	12.2 inches	(31.0 cm)
	Width	16.5 inches	(42.0 cm)
	Depth	14.6 inches	(37.0 cm)
Keyboard Assembly	Height	1.7 inches	(4.3 cm)
	Width	18.3 inches	(46.5 cm)
	Depth	7.8 inches	(19.8 cm)

Net Weight

| Monitor Assembly | 24.2 lb (11.0 kg) |
| Keyboard Assembly | 4.5 lb   (2.0 kg) |

Power Requirements	Minimum	Nominal	Maximum	Frequency
	90v	115v	132v	50/60 Hz
	180v	230v	264v	50/60 Hz

Wattage
Base Unit   50 watts at 115V.

Amperage   0.44 Amps at 115 volts.
                              0.22 Amps at 230 volts.

Heat Dissipation   222 BTU/hour.

Operating Environment
Ambient Temperature   60°F – 90°F (15°C – 32°C)
Relative Humidity   20% to 80%

Non-operating Environment
Temperature   60°F – 90°F (15°C – 32°C)
Relative Humidity   50% to 90% (noncondensing)

Cabling
Terminal to Host Cable   25 Feet   (P/N 220-0447)

1.3   TERMINAL DESCRIPTION

The 2110 VS/DP Terminal is a ergonomically designed CRT display terminal capable of communicating with the host VS (22V36, 23V96 and 25V36) Asynchronous Controllers. This is accomplished via an enhanced RS-232-C type port utilizing a simple asynchronous protocol. Included with the monitor is the low cost serial keyboard designed to operate comfortably with Wang VS software. The keyboard is the same as the one used with the Wang Office Assistant equipment.

1.3.1   LOW-PROFILE, COST REDUCED SERIAL KEYBOARD

The Low-Profile, Cost Reduced Serial Keyboard (P/N 279-2050-US) is a separate, detachable keyboard that contains 102 keys. It has 16 programmable function keys, a HELP key, four cursor control keys (North Arrow, South Arrow, East Arrow, and West Arrow) and a calculator style key pad. Standard word processing Edit keys are also included (eg. Insert, Delete, Next, Previous, Move, Copy etc.).
The keyboard assembly connects to the monitor via a 4-foot coil cord. This assembly is designed with a lightweight, compact housing that provides flexibility and convenient operation.

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Figure 1-2.   Low Profile, Cost Reduced Serial Keyboard

1.3.2   LIGHTWEIGHT, MODUIAR MONITOR

The Monitor is composed of two halves, the monitor CRT assembly and the base. It is divided by a semi-sphere between the two halves, so it can be adjusted as the operator wishes. The monitor CRT section contains the display drive board, the associated 12 inch CRT, and the switching power supply. The power on/off switch and the video contrast control are located on the front of the monitor CRT. The main logic board is within the base section while the interface and keyboard connectors are mounted on the rear panel of the base. The semi-sphere is designed for vertical and horizontal adjustments (up,down: 10 degrees each, left, right: 30 degrees each). This assembly is designed with a lightweight, compact housing that provides flexibility and convenient operation.

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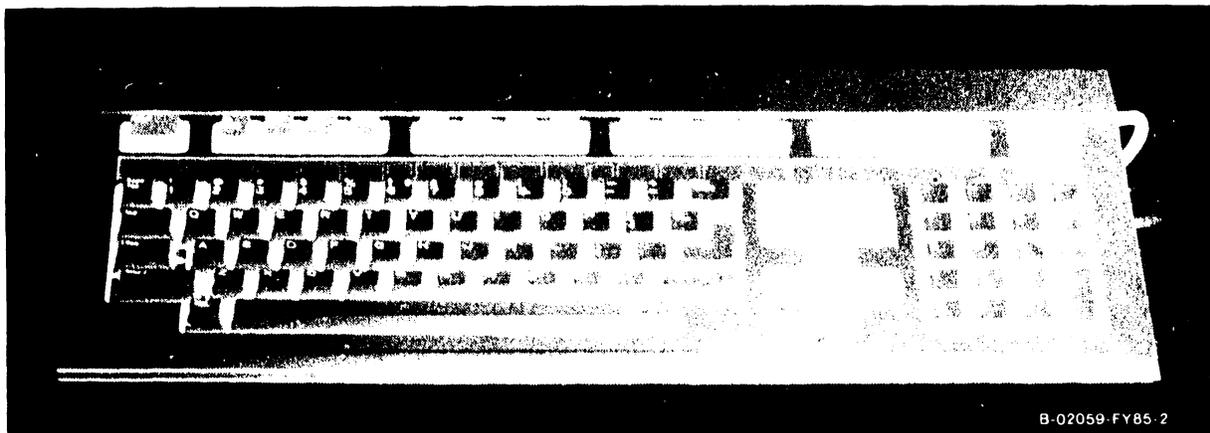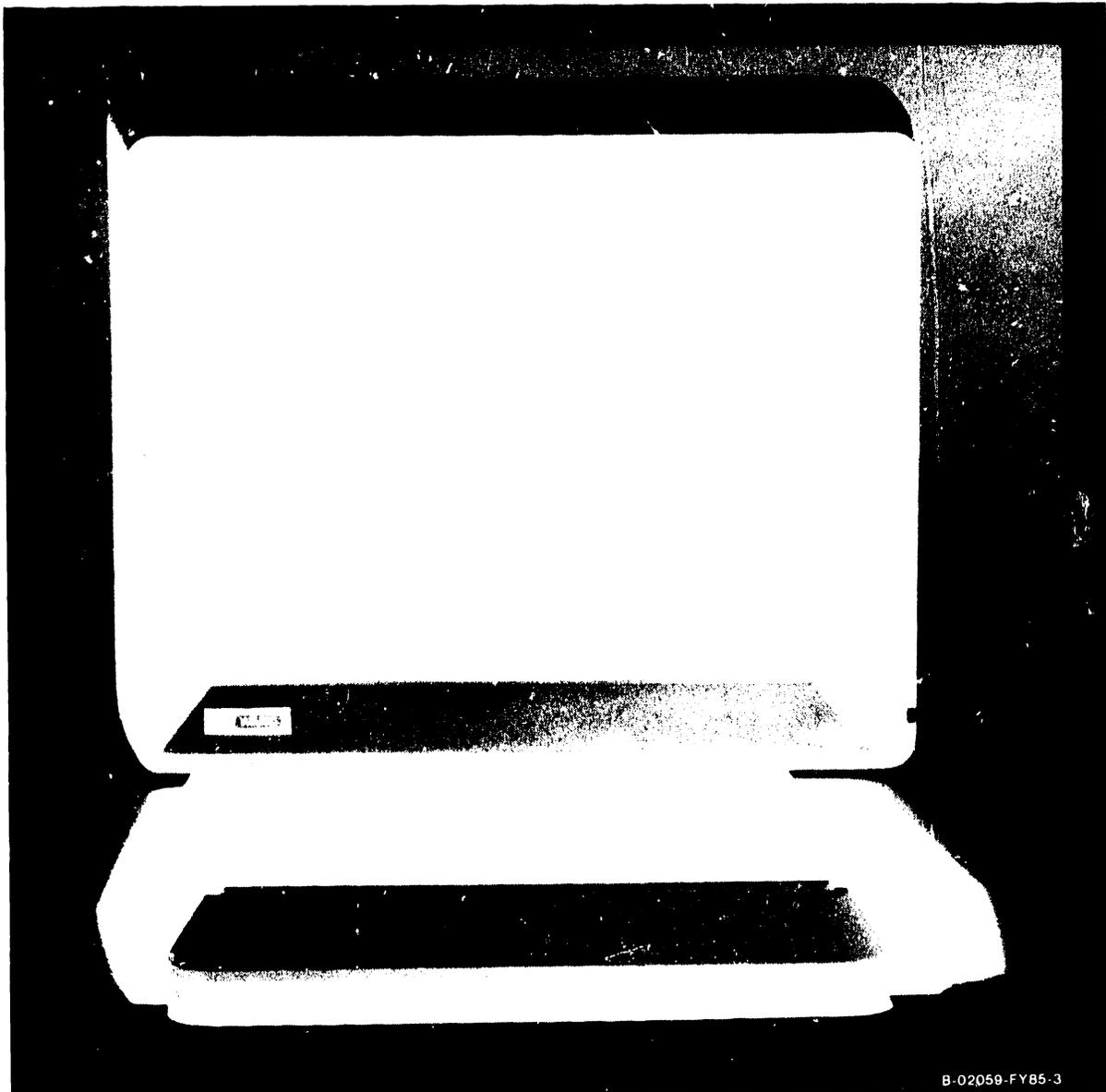Figure 1-3.   Lightweight Modular Monitor

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THEORY OF OPERATION

NOT APPLICABLE TO THIS MANUAL

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CHAPTER 3

OPERATION

3.1   INTRODUCTION

     This chapter provides information about operator controls and indicators,
initial control settings, initial turn-on procedures, and normal and emergency
shut-down procedures for the 2110 VS/DP Terminal.

3.2   CONTROLS AND INDICATORS

     The controls and indicators of the 2110 VS/DP Terminal are discussed with
respect to each Terminal component.

3.2.1   MONITOR CONTROLS AND INDICATORS -(Reference figure 3-1)

Control/Indicator Name and Type	Location	Purpose	Normal Indication
1. Power On/Off Switch	Monitor Front	Power On/Off	Monitor On
2. Contrast Control	Monitor Front	Contrast Adjust	Contrast Change
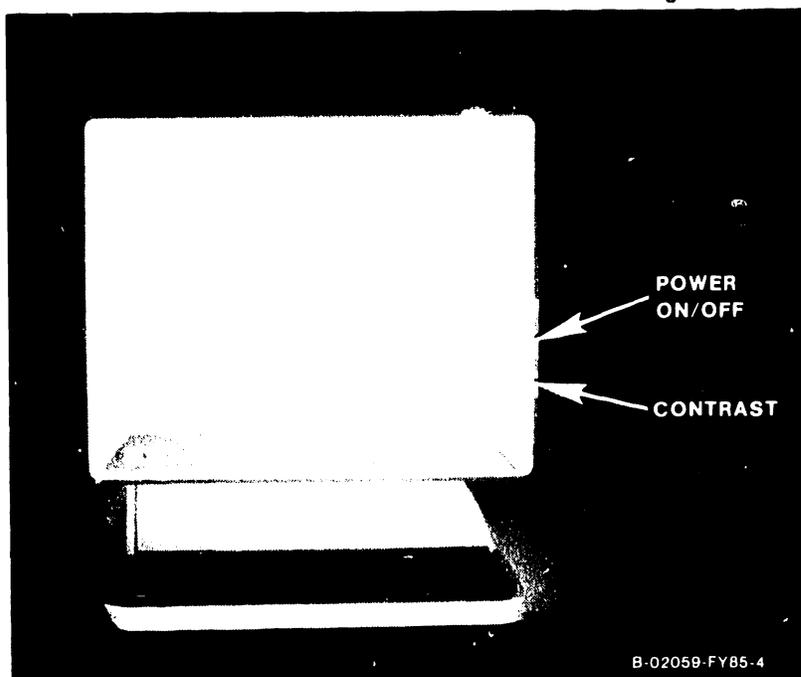
Figure 3-1.   Monitor Controls and Indicators

3.2.2   KEYBOARD CONTROLS AND INDICATORS

The Keyboard has one LED located next to the LOCK key. This LED will
flash on during system power-up if the host cannot communicate with the
Keyboard. Refer to section 4 for more complete description of Power-Up
Diagnostics.

The Caps Lock Key allows letters to be capitalized while the numeric and
symbolic characters remain unshifted. When the Caps Lock is depressed, the
LED is illuminated. Depressing the Shift key again will extinguish the LED.

3.2.2.1 Important Keyboard Keys

The Keyboard features a conventional typewriter format, cursor control and
editing keys, and 16 special function keys. The special function keys are
those normally associated with Wang WP systems (INDENT, FORMAT, SRCH, COMMAND,
etc.) and those normally associated with data processing systems.
Additionally, the Keyboard is equipped with a numeric keypad at the extreme
right.

Figure 3-2.   2110 VS/DP Terminal Keyboard

The following paragraphs describe the actions associated with each group of keys. For convenience of discussion, the Keyboard has been divided into the four zones shown in Figure 3-2.

Zone 1 - Typewriter Keyboard: Similar to a standard typewriter, this zone contains the alphanumeric characters, the special purpose character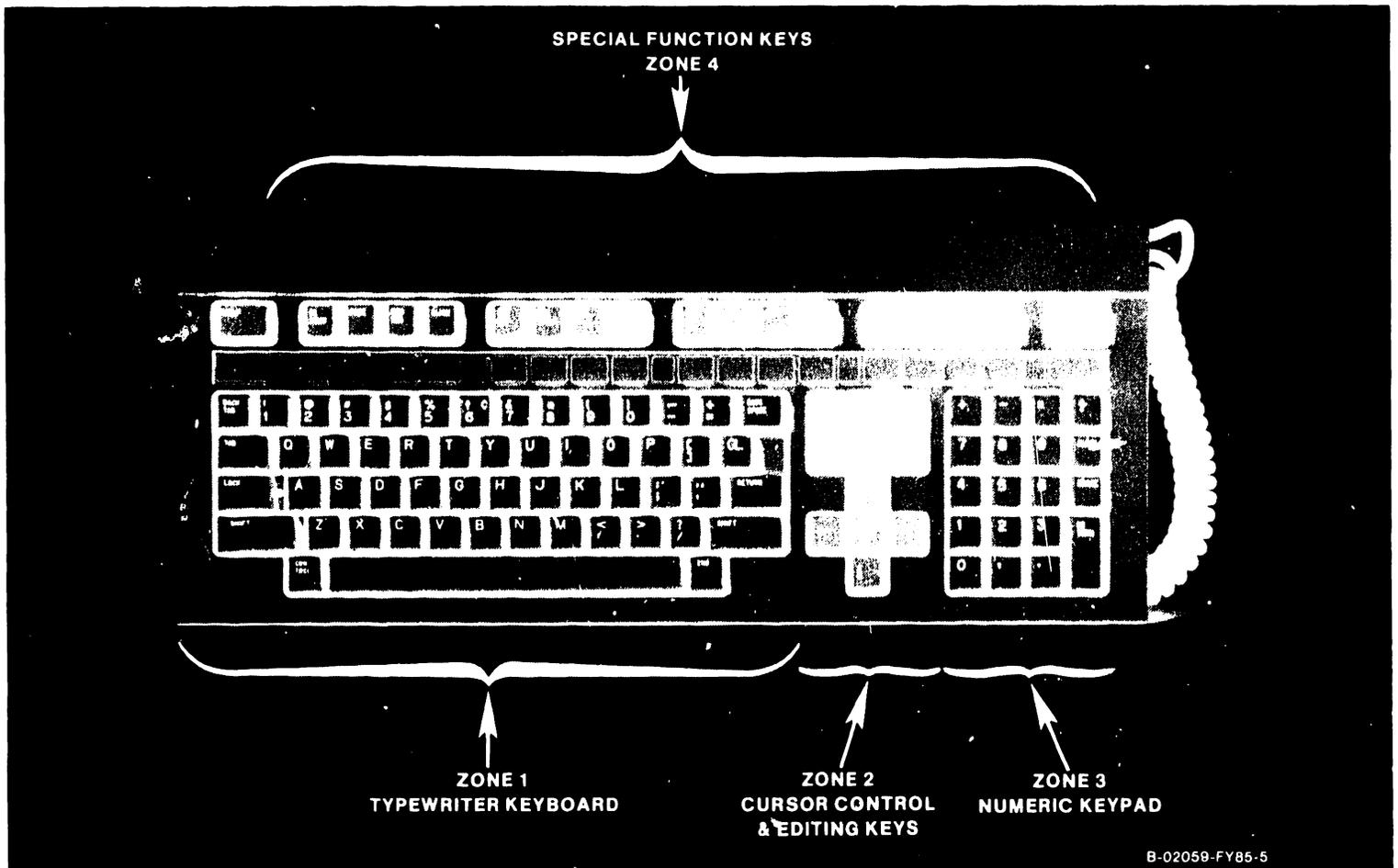s such as @ # $ ¢ and the arithmetic operators (+ - * / =). Also included are the TAB and RETURN keys which perform the following WP functions:

- TAB sets the format line zone and advances the cursor through successive zones on the screen to facilitate table creation.

- RETURN terminates the present text line and repositions the cursor at the beginning of the next line.

Zone 2 - Cursor Control and Editing Keys: This zone contains editing keys (INSERT and DELETE), location keys (NEXT SCRN and PREV SCRN), and cursor control keys which control movement of the cursor in the indicated direction, up, down, right, left, and home (top left corner of screen).

Zone 3 - Numeric Keypad: The keys in the numeric zone allow rapid entry of numeric characters, grouped here for convenience. Digits can be entered by using the numeric keys in either the numeric or the alphanumeric zone. In addition to the standard ten numeric keys, there are arithmetic operator keys (+, -, x, divide-by) and PRINT, ERASE, RETURN and decimal point (.) keys used in data processing applications.

Zone 4 - Special Function Keys: Across the top of the Keyboard are 16 Special Function keys. These keys provide the special Word Processing functions which simplify document creation and revision. For example, the CENTER key automatically centers a line of text, the MOVE key allows any amount of consecutive text to be moved within a document, and the REPLC key allows a character-defined sequence to be replaced with another within a document. For data processing, these keys can activiate any of 32 special Program Functions (PF1 through PF32).

The LOCK key acts either as a caps-lock feature in a data processing environment or as a shift-lock feature in an office automation environment. The caps-lock feature allows letters to be capitalized but does not cause the numeric/symbolic characters to be upshifted. When the LOCK key is pressed, an LED built into the key is illuminated. Pressing either SHIFT key unshifts the keyboard and extinguishes the LED. The Keyboard allows characters to be underlined and all displayable characters can be made to repeat. A "2ND" key is present which allows special operating features of the workstation to be exercised.

3.3   INITIAL TURN-ON PROCEDURES

Before powering-on the 2110 VS/DP Terminal, ensure that all packing materials (tape, plastic wrap, etc.) are removed from the unit during installation. Also inspect the system to ensure that all cables are properly attached as described in Chapter 4, the installation procedures. Also be sure to verify the proper voltage switch setting of the 115V/230V Power Supply Switch on the rear of the Monitor.

Connect the AC Power Cord to the appropriate power source. Power-up the terminal by turning on the AC Power On/Off (1/0) Switch to the (1) position.

3.4   TERMINAL INITIALIZATION

When the Terminal is powered up, four short audible beep tones occur, indicating power-up activity. This is followed by displayed status line messages such as the BIT Switch settings and the RAM, ROM pass/fail information.

3.5   SHUT-DOWN PROCEDURE

Power-down the Terminal by turning the AC Power ON/OFF (1/0) switch to the OFF (0) position. After the Terminal is powered down, remove the AC Power Plug from the wall outlet.

3.6   OPERATOR PREVENTIVE MAINTENANCE

Operator preventive maintenance consists of general cleaning of the unit. To clean the unit, use a slightly damp, lint-free cloth to wipe down the outside case of the monitor, electronics unit, and keyboard. DO NOT USE CHEMICAL OR ABRASIVE CLEANERS. To clean the monitor screen, use a good quality glass cleaner and a soft lint-free cloth. Dust between the keyboard keys with a soft-bristled brush.

CHAPTER 4 INSTAL-LATION

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CHAPTER 4

INSTALLATION

4.1 SCOPE

This chapter provides information on unpacking, inspecting, installing, and verifying correct operation of the 2110 VS/DP Terminal. The 2110 VS/DP Terminal is designed to be set up and installed by the customer.

4.2 PRE-INSTALLATION SITE CHECK

No special pre-site planning is required for installation of the 2110 VS/DP Terminal other than conformation to the recommended operating environment and procedural safeguards described in the Customer Site Planning Guide (Document Number 700-5978). The customer is responsible for ensuring that the 2110 VS/DP Terminal installation site conforms to requirements given in the guide.

4.2.1 CABLE LIMITATIONS

When installing the 2110 VS/DP Terminal, cable length limitations must be taken into consideration. The following list contain maximum cable lengths for the 2110 VS/DP Terminal and its peripherals.

Cable	Length
Keyboard to Monitor	6 feet (spiral)
Keyboard to Monitor	4 feet extender
AC Power Cable	6 feet
RS-232-C Cable	2000 feet maximum

4.3 SPECIAL TOOLS AND TEST EQUIPMENT

The standard items provided in the WANG CE Tool Kit will suffice for the installation of the 2110 VS/DP Terminal.

4.4   UNPACKING

NOTE

Carefully inspect each shipping container for indications of possible damage (crushed edges or corners, puncture holes, tears, etc.). If shipping damage is noted, now or after opening any package, file a claim promptly with the carrier involved. Notify the WLI Distribution Center, Dept #90, Quality Assurance Department, Tewksbury, Mass. 01876, of the nature and extent of the damage, and make arrangements for equipment replacement.

The 2110 VS/DP Terminal is shipped in two (2) separate cartons. The Keyboard carton is labeled with a keyboard symbol. A second carton contains the 2110 VS/DP Terminal Monitor. Save the packing material that came with the monitor and keyboard for storing or transporting the 2110 VS/DP Terminal.

4.4.1 UNPACKING THE KEYBOARD

Open the carton labeled with the keyboard symbol and remove the contents. Refer to figure 4-1 which shows the Keyboard unpacked.
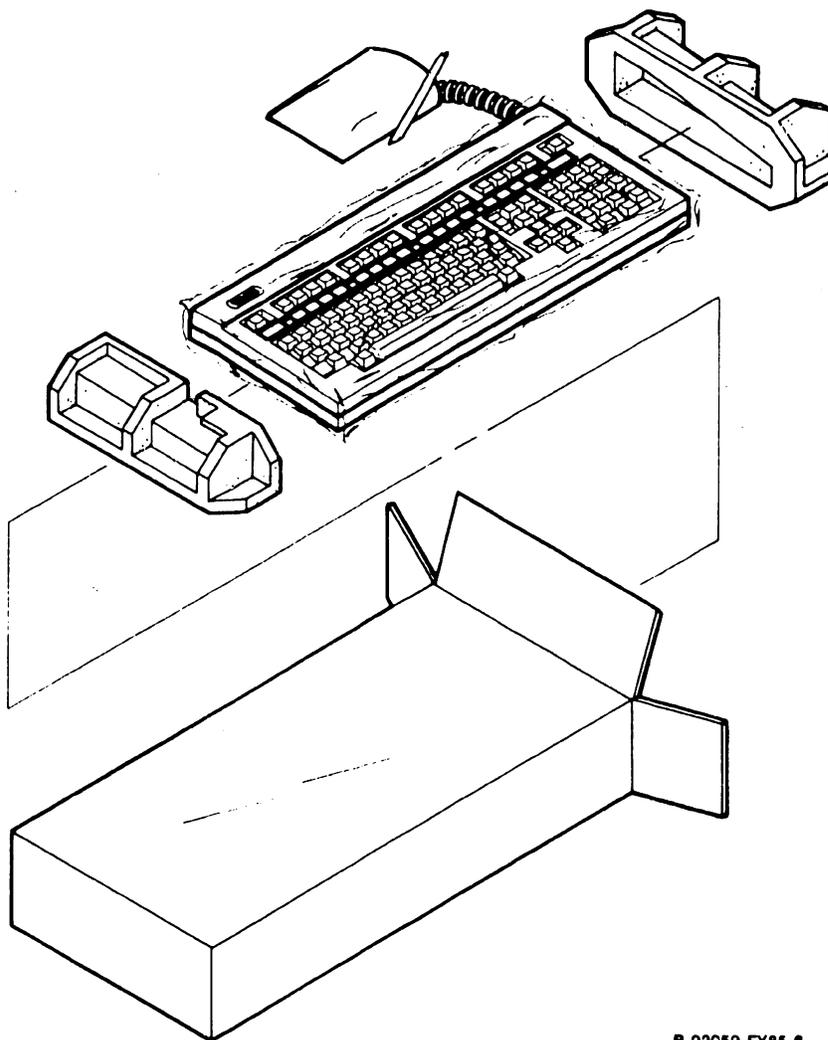
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Figure 4-1. Unpacking the Keyboard

4.4.2 UNPACKING THE MONITOR CARTON

Position the monitor carton as shown in figure 4-2. Open the monitor carton top, remove the shipping foam and lift the Monitor out of the carton. Refer to figure 4-2 which shows the Monitor unpacked.

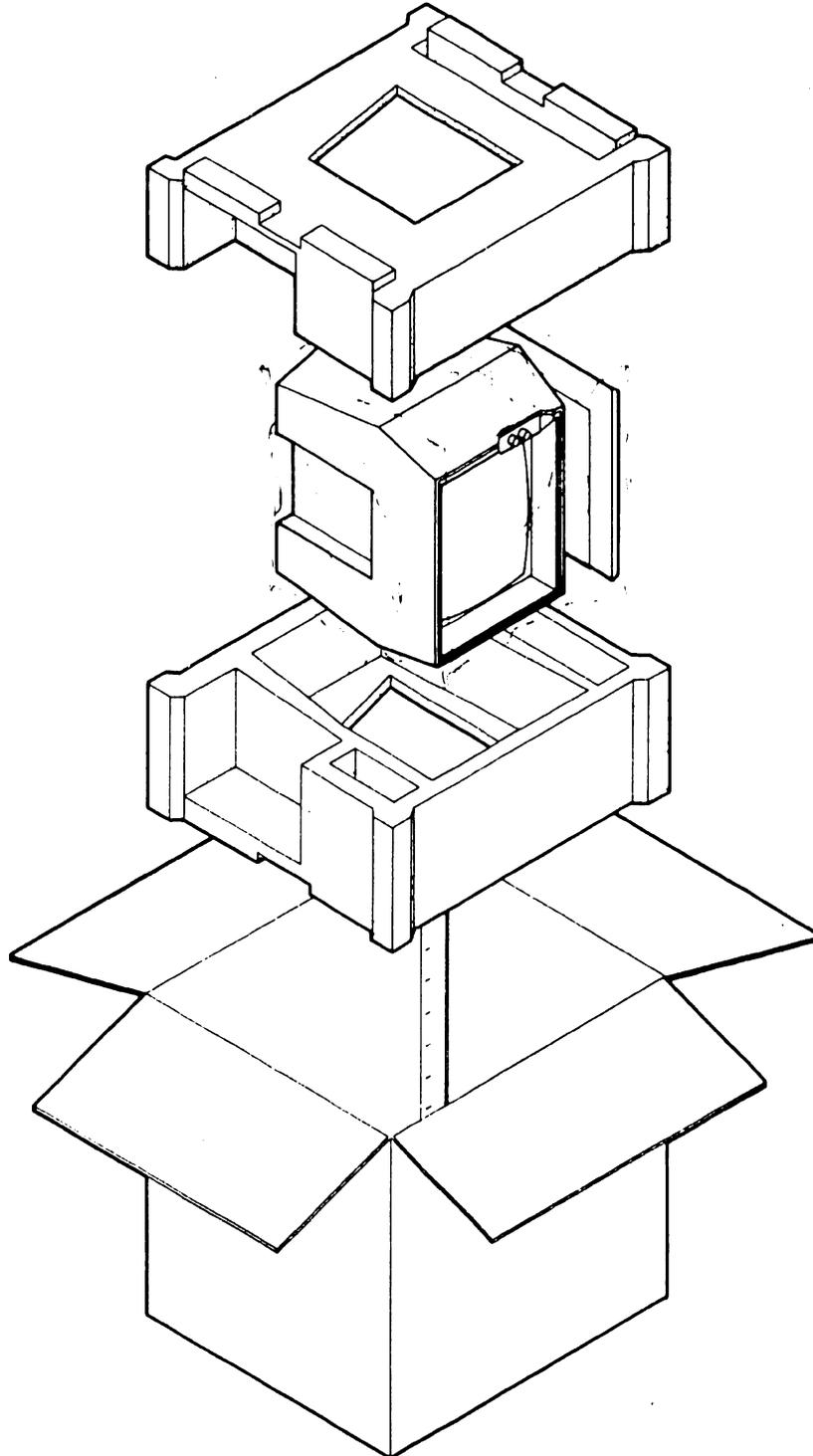B-02059-FY85-7

Figure 4-2. Unpacking the 2110 Monitor

4.4.3 INSPECTION

After unpacking the 2110 VS/DP Terminal, all equipment, cables, and components should be inspected for possible damage. Any damage should be reported as previously discussed in section 4.4.

4.5   INTERCONNECTION OF EQUIPMENT

This section identifies all connectors, signal cables, switches, etc., needed to interconnect the Terminal to the host system. Please refer to: (figure 4-3.   2110 VS/DP Terminal Interconnections).

4.5.1 CONNECTOR CABLE IDENTIFICATION

Table 4-1 lists the 2110 VS/DP Terminal cables, connector types and lengths; figure 4-3 illustrates each cable and connection location.

Table 4-1.   Cabling for the 2110 VS/DP Terminal

CABLE DESCRIPTION	PACKED WITH	LENGTH	PART NUMBER
Terminal-to-Host Cable	Terminal	25 Feet	220-0447
Keyboard-to-Monitor Base, 6-Pin DIN one end, hard-wired internally to Keyboard, coiled	Keyboard	1 Foot, Retracted	220-0305
Monitor Base-to-AC Power, 3-Prong male one end, 3-Prong female other end	Monitor Base	6 feet	420-2025

4.5.2 2110 VS/DP TERMINAL INTERCONNECTIONS

Figure 4-3 shows the interconnection of Monitor, Keyboard and host system.

Locate the keyboard connection on the back panel of the base assembly (figure 4-3), and plug in the 6-pin DIN connector on the end of the keyboard cable. Both the connector and the keyboard cable plug are constructed to allow the plug to be installed in only one way. Be sure to align the pins of the plug with the connector socket to prevent interconnection damage.

Communication from the Terminal to the host system is accomplished via a maximum of 2000 feet of communications cable. Standard RS-232-C connectors are provided on both the Terminal and host for a system connection.
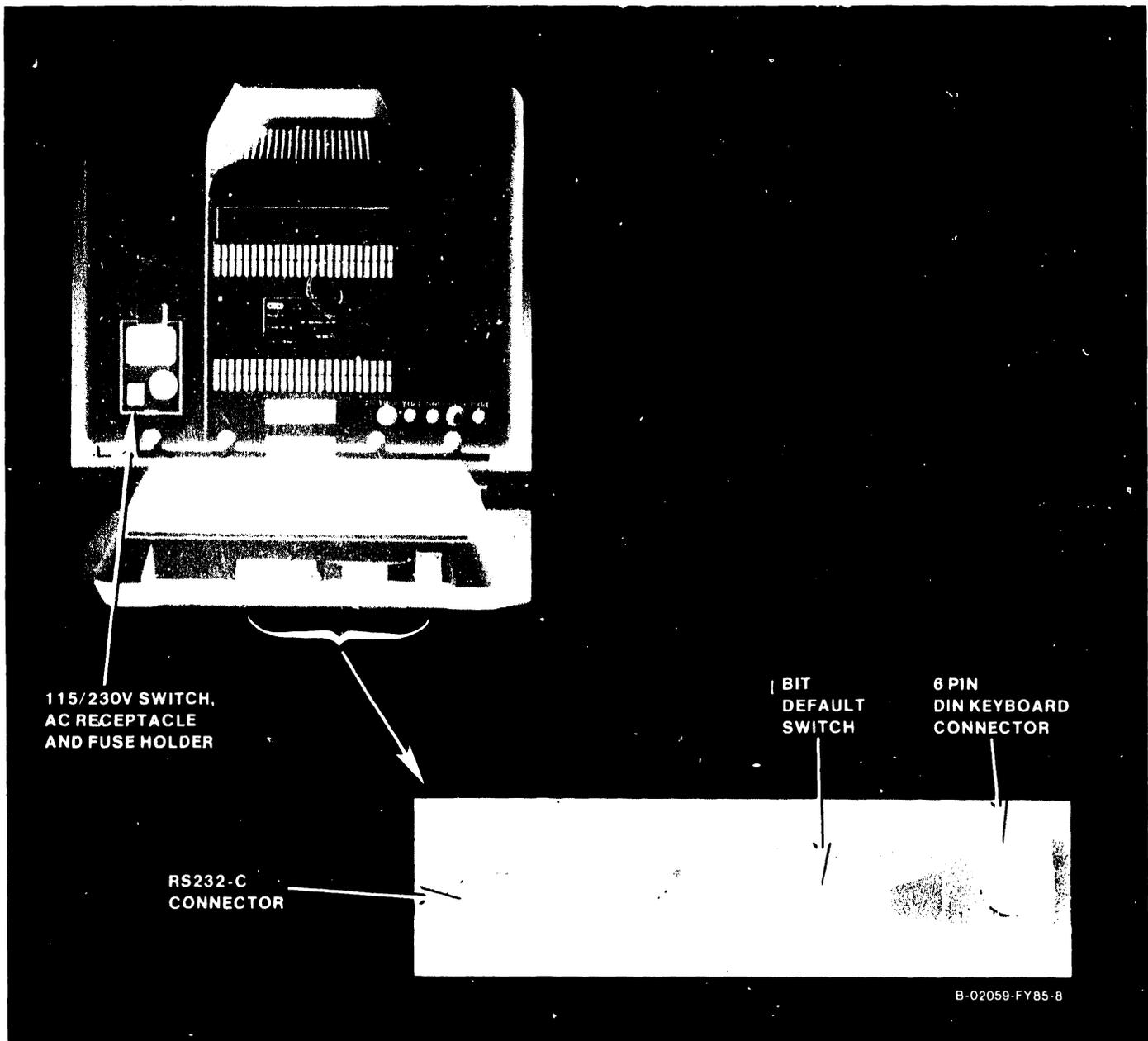

115/230V SWITCH, AC RECEPTACLE AND FUSE HOLDER

RS232-C CONNECTOR

BIT DEFAULT SWITCH

6 PIN DIN KEYBOARD CONNECTOR

B-02059-FY85-B

Figure 4-3.   2110 VS/DP Terminal Interconnections

4.6   SWITCH SETTINGS

The following paragraph describes the BIT switch settings for the 2110 VS/DP Terminal. A bank of 10 switches is located on the rear of the Monitor base as shown in figure 4-4. Switches 1 thru 4 are used to select the baud rate and the diagnostic test mode. Switches 5 thru 7 are used to select the communications protocol configuration. Switch 8 selects power line frequency. Switch 9 is used to select the communications mode. Switch 10 is used to select the power-on keyboard configuration. The default switch settings are shown in table 4-2. The 115/230 Vac switch is located on the rear of the Monitor and is used to set the proper input voltage (figure 4-5).

Table 4-2.   Monitor Base Default Switch Settings

SW1	SW2	SW3	SW4	Baud Rate
Off	Off	Off	Off	75
On	Off	Off	Off	110
Off	On	Off	Off	150
On	On	Off	Off	300
Off	Off	On	Off	450
On	Off	On	Off	600
Off	On	On	Off	900
On	On	On	Off	1200
Off	Off	Off	On	1800
On	Off	Off	On	2400
Off	On	Off	On	3600
On	On	Off	On	4800
Off	Off	On	On	7200
On	Off	On	On	9600
Off	On	On	On	19200
On	On	On	On	Terminal Diagnostics

SW8	Power Line Frequency	SW9	Communications Mode
On	60 HZ	On	Half Duplex with Local Echo Enabled
Off	50 HZ	Off	Full Duplex with Local Echo Disabled

	SW10	Power-On Keyboard Configuration
	On	Default keyboard configuration used
	Off	Operator identifies keyboard configuration during power-on initialization

| SW5	SW6	SW7	Communications Protocol
Off	Off	Off	8 Data Bits, Odd Parity, 1 Stop Bit
On	Off	Off	8 Data Bits, Even Parity, 1 Stop Bit
Off	On	Off	8 Data Bits, No Parity Bit, 1 Stop Bit
On	On	Off	8 Data Bits, No Parity Bit, 2 Stop Bits
Off	Off	On	7 Data Bits, Odd Parity, 1 Stop Bit
On	Off	On	7 Data Bits, Even Parity, 1 Stop Bit
Off	On	On	7 Data Bits, Odd Parity, 2 Stop Bits
On	On	On	7 Data Bits, Even Parity, 2 Stop Bits
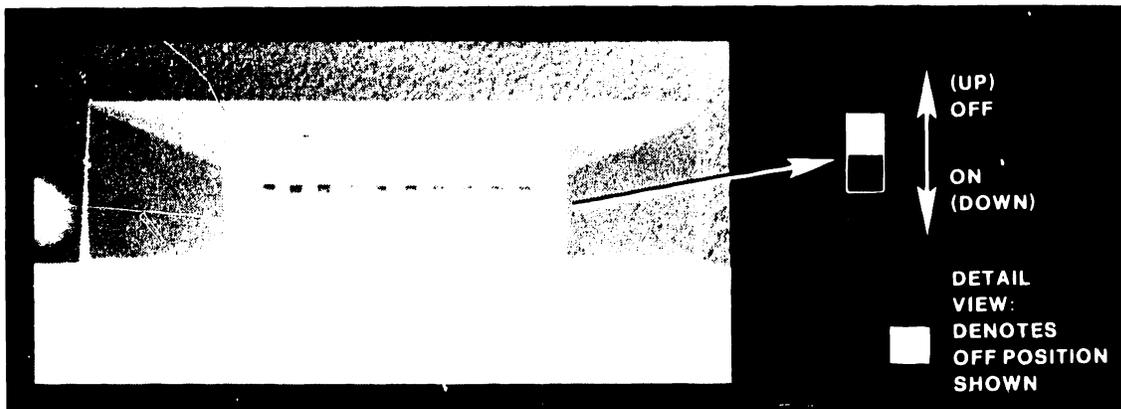
Figure 4-4.   Monitor Base Default Switch

4.6.1 KEYBOARD

The Keyboard does not contain any switches.

4.7   115/230V SWITCH SETTING

Located on the Power Supply and accessible from the exterior of the base unit, is the 115V/230V Voltage Select Switch (figure 4-5). This switch should be checked before power is applied to the terminal, to ensure that the input voltage setting matches the voltage level at the installation. The two possible settings are:

115V denotes 115V AC power source input. (Domestic US)
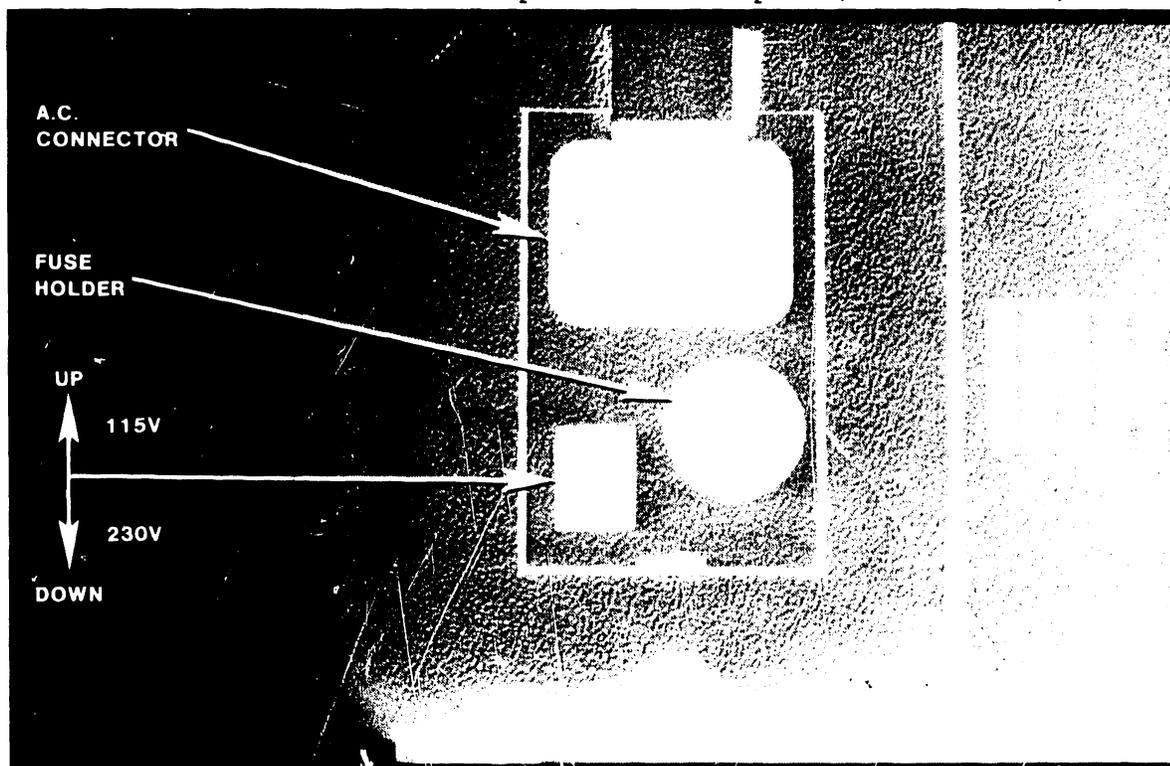230V denotes 230V AC power source input. (International)

Figure 4-5.   115V/230V Switch Location

INSTALLATION

4.8   CONNECTING THE AC POWER CORD

CAUTION

1. BEFORE CONNECTING THE AC POWER CORD, ENSURE THAT THE POWER SUPPLY IS SET FOR THE APPROPRIATE VOLTAGE RATING AS DESCRIBED IN SECTION 4.7.3.

2. BE SURE THAT THE ON/OFF SWITCH LOCATED ON THE FRONT OF THE TERMINAL UNIT IS IN THE FULLY COUNTERCLOCKWISE (OFF) POSITION.

Connect the ac power cable to the three prong ac power connector located on the rear of the Terminal Base (figure 4-5). Connect the three prong ac plug into a grounded ac wall socket to complete the installation.

4.9   POWERING-ON THE TERMINAL

Power-on the Terminal by moving the power switch fully clockwise to the ON position. During initial power-on, the Terminal will run a series of power-on diagnostic tests. These tests will run every time the Terminal is powered-on.

Upon completion of the Power-On diagnostic test, a "Log-on" screen should appear on the terminal display. If the Terminal does not respond with the screen display, refer to chapter 8 for troubleshooting information.

4.10   TERMINAL POWER-UP DIAGNOSTICS TEST

Before entering the terminal diagnostic test program, the configuration switches 1 thru 4 must be set in the "ON" condition. Set the power line frequency input [switch 8] to 50 or 60HZ, (Reference table 4-2 and figure 4-4), then power on the Terminal.

NOTE

USE NUMERIC KEYS 3 THRU 8 OF THE KEYPAD

1. This test verifys the presence or absence of a Keyboard connected to the monitor base. When a Keyboard connection doesn't exist, the Monitor displays the character 'H' in each of the screen's 2000 character display positions.

2. If the Keyboard is connected to the 2110 Terminal, the memory test program will verify the memory devices included on the 2110 logic card which are located in the monitor base. These devices are defined as: (1) system RAM [A2], (2) attribute RAM [A21], (3) character display RAM [A20], and (4) the program PROM [A12]. The screen will then display the 'terminal diagnostic function' mode. When the memory tests are complete without error, the terminal displays the following 'test function select menu':

    3.D   4.T   5.S   6.R   7.C   8.A

If the memory test fails to complete successfully, the message "Memory Error 1 and/or 2, 3 or 4" is displayed instead of the above test function menu. From the 'test function select menu' described above, six additional test functions can be repeatedly accessed from the terminal keyboard. The individual tests are selected by depressing keys 3 thru 8 on the numeric keypad.

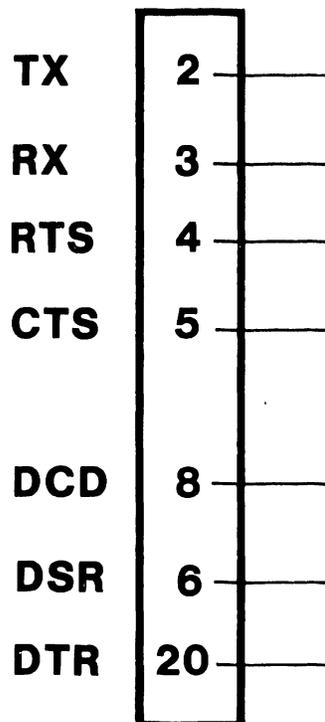4.10   TERMINAL POWER-UP DIAGNOSTICS TEST

An Explanation Of Test Options And Memory Test Results Follows:

3.   3.D---RS-232-C Connector Functionality Test.   This test verifies the
     functionality of the RS-232-C connector functions RTS, CTS, DSR, DTR, AND
     DCD.   Upon successful completion, the terminal displays the character 'P'
     indicating test pass.   Otherwise the terminal displays the character 'F'
     which indicates a test failure.   A successful test completion requires a
     loop-back connector as configured below in figure 4-6.

     Press the "3" key to activate this test.

4.   4.T---Communications Protocol and Baud Rate Options.   Successful
     implementation of this test function requires the connection of a second
     2110 Terminal with a unique test program PROM installed.   Since this test
     cannot be completed on a stand alone basis, test details are not included
     in this document.

     Press the "4" key to activate this test.

TX	2
RX	3
RTS	4
CTS	5
DCD	8
DSR	6
DTR	20

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Figure 4-6.   RS 232-C Loopback Plug Diagram

4.10   TERMINAL POWER-UP DIAGNOSTICS TEST

5.   5.S---DIP Switch Configuration.   This test displays the current DIP switch
     settings of the external configuration switch block.

     Press the "5" key to activate this test.

     Example: 0 1 0 1 0 0 0 1 1 1   (where 1=Off, 0=On)

     The switch settings can be changed, then by depressing the "5" key, the
     screen will display the current switch state.

6.   6.R---Reverse Video Test.   This test function verifies the 'reverse video'
     display function and the RS-232-C control signals for the time duration
     that the test function key is depressed.   The screen will display reverse
     video for 1 second and then display the results of the RS-232-C control
     signal test (PASS OR FAIL).

     A loopback connector or an RS-232-C cable is needed to run this test.
     (Refer to figure 4-6 for the RS-232-C Loopback Plug wiring diagram).   Use
     either the RS-232-C Loopback Plug (Wang P/N 420-1040) or use the basic
     RS-232-C blank connector (Wang P/N 350-1030) and fabricate the connections
     per figure 4-6 diagram.

     Press the "6" key to activate this test.

7.   7.C---Character Generator Display Test.   This test displays five separate
     block areas each of which contains the total of 256 available display
     characters.   The block areas are displayed with different attributes
     enabled.

     Press the "7" to activate this test.

     Each "7" key depression displays the next higher number attribute test.

     BLOCK   ATTRIBUTES
     (A)   Normal Intensity (no display attribute active)
     (B)   Reverse Video
     (C)   Underline
     (D)   High Intensity
     (E)   Blinking

4.10   TERMINAL POWER-UP DIAGNOSTICS TEST

8.   8.A----Monitor Alignment Test Pattern. - (Reference figure 4-7).
     The monitor alignment screen function produces the monitor alignment
     display pattern of "E's" and "H's" shown in figure 4-7. The test screen
     is initially displayed in high intensity. Continued depressions of the
     test function select key, will display the alignment test screen with
     either normal or high intensity attribute. Press the "8" key to activate
     this test.

```
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
%HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH%
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH    Calibration     HHHHHHHHHH    Calibration     HHHHHH
HHHHHH      Block         HHHHHHHHHH      Block          HHHHHH
HHHHHH      Area          HHHHHHHHHH      Area           HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH%HHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH    Calibration     HHHHHHHHHH    Calibration     HHHHHH
HHHHHH      Block         HHHHHHHHHH      Block          HHHHHH
HHHHHH      Area          HHHHHHHHHH      Area           HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
HHHHHH                    HHHHHHHHHH                    HHHHHH
%HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH%
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
```

Figure 4-7.   Monitor Alignment Test Pattern

CHAPTER 5 MAINT- ENANCE

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CHAPTER 5

PREVENTIVE AND CORRECTIVE MAINTENANCE

5.0   PREVENTIVE MAINTENANCE

    No scheduled preventive maintenance is required for the 2110 VS/DP
Terminal.

5.1   CORRECTIVE MAINTENANCE

    This section describes all necessary electrical and mechanical adjustments
for the 2110 VS/DP Terminal.

5.1.1 SPECIAL TOOLS

    No special tools are required to perform corrective maintenance on the
2110 VS/DP Terminal. All maintenance performed can be accomplished with the
standard tool kit.

5.1.2 POWER SUPPLY

    Power Supply voltage adjustments are not applicable to this chapter, since
no design provision has been made for adjustments to the power supply.
If the Terminal is not operational, replace the entire Monitor assembly.

5.1.3 MONITOR

    The following procedure describes monitor alignment for the 2110 VS/DP
Terminal. Monitor alignment is required whenever drifting of the display
occurs due to component aging, monitor movement or component replacement.

    Monitor alignment entails adjusting for vertical hold, vertical size,
vertical linearity, horizontal width, horizontal linearity, static focus,
focus, dynamic focus, raster centering and picture brightness.

    Equipment Required:

    Standard Tool Kit
    Six Inch Ruler (Non-Metallic)
    Eight Inch Ruler (Non-Metallic)

5.1.3.1   Pre-alignment Procedures

NOTE

ALL OF THE FOLLOWING EXTERNAL (NON-ASTERISKED) ADJUSTMENTS
SHOULD BE ACCOMPLISHED BY THE CUSTOMER ENGINEER.   COVER
REMOVAL AND ALL HIGH VOLTAGE MEASUREMENTS AND ALIGNMENTS
(ASTERISKED) SHOULD BE ACCOMPLISHED ONLY BY REPAIR CENTER
PERSONNEL.

1. Power-down the Terminal by turning the AC Power ON/OFF (1/0) switch
fully counter-clockwise to the OFF (0) position. After the Terminal is
powered down, remove the AC Power Plug from the wall outlet.

2. Disconnect ALL monitor cables. (NOTE FOR REPAIR CENTER PERSONNEL ONLY:
REFER TO PARAGRAPH 5.2.1 FOR MONITOR COVER REMOVAL PROCEDURE). Remove monitor
cover.

3. Connect the AC Power Plug to the wall outlet. Power-up the Terminal
by turning on the AC Power ON/OFF (1/0) Switch clockwise to the ON (1)
position.

5.1.3.2   Monitor Alignment

Vertical Hold:

1. When the picture rolls vertically as illustrated below (figure 5-1), a
    Vertical Hold adjustment is required.
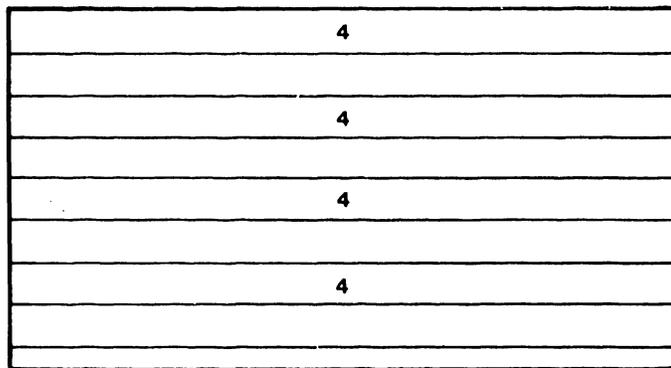
B-02059-FY85-12

Figure 5-1.   Vertical Hold Symptom

Adjust Vertical Hold potentiometer (VR401) (figure 5-2) until the picture
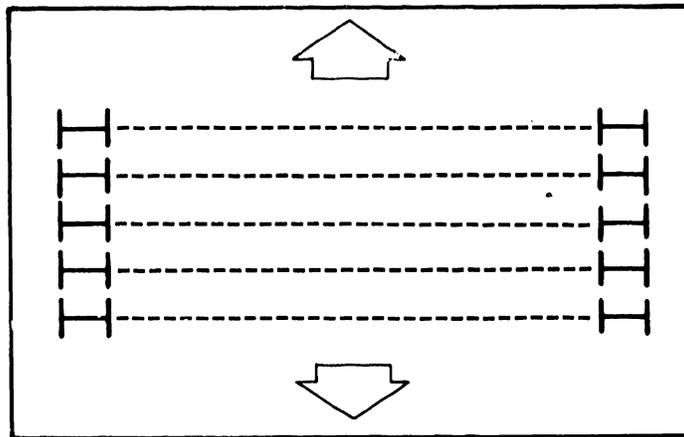has stabilized.
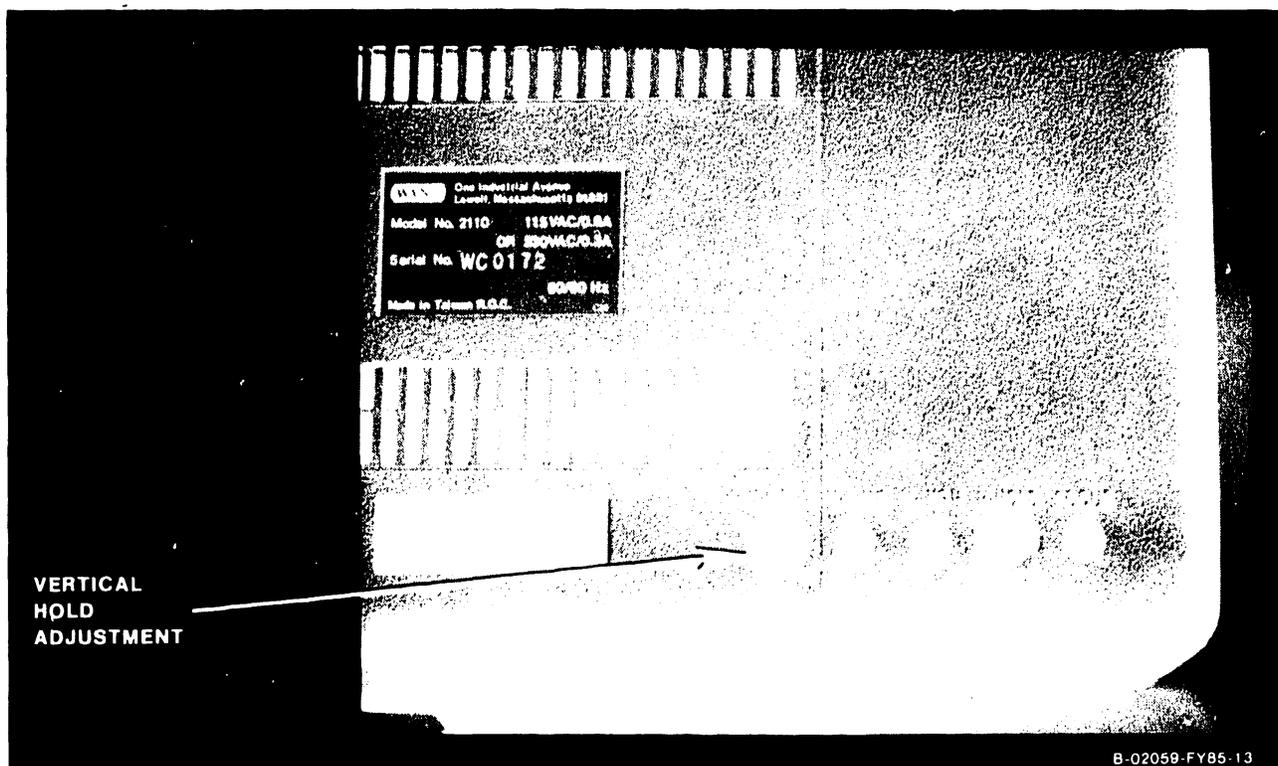
B-02059-FY85-13

Figure 5-2.   Vertical Hold Adjustment
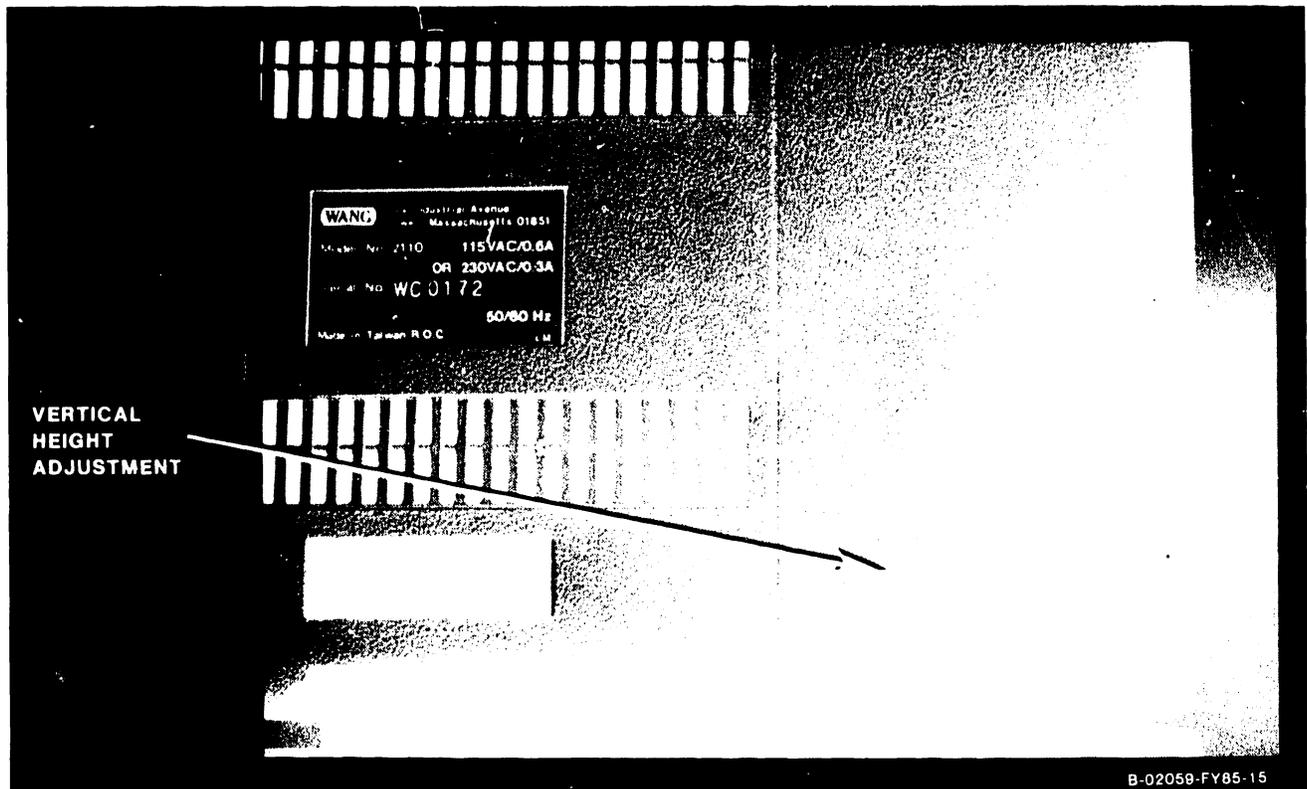
5.1.3.2   Monitor Alignment

Vertical Data Height:

2. When the vertical data height is improper as illustrated below (figure 5-3), a Vertical Height adjustment is required.


B-02059-FY85-14

Figure 5-3.   Vertical Data Height Symptom

Adjust Vertical Height potentiometer (VR402) (figure 5-4) clockwise or counter-clockwise until the rated picture height is within tolerance.

B-02059-FY85-15

Figure 5-4.   Vertical Data Height Adjustment

5.1.3.2   Monitor Alignment

Vertical Data Linearity:

3. When the vertical data linearity is improper as illustrated below (figure 5-5), a Vertical Linearity adjustment is required.

B-02059-FY85-16
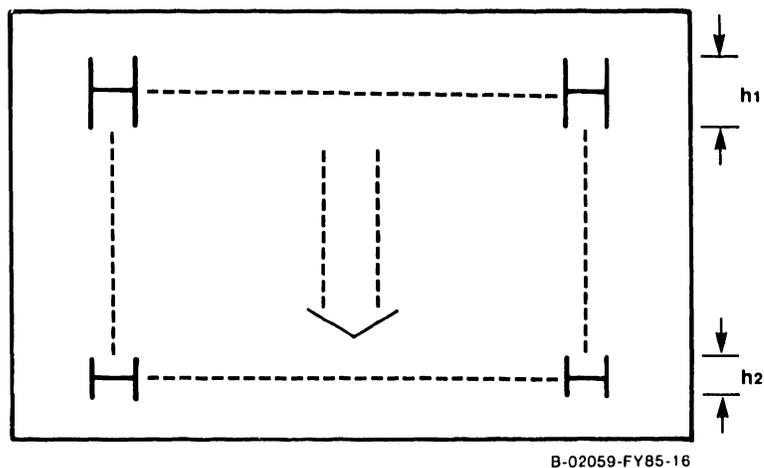
Figure 5-5.   Vertical Data Linearity Symptom

Adjust the Vertical Linearity potentiometer (VR403) (figure 5-6) clockwise or counter-clockwise until the vertical linearity is equal on the top and bottom of the raster (H1=H2).
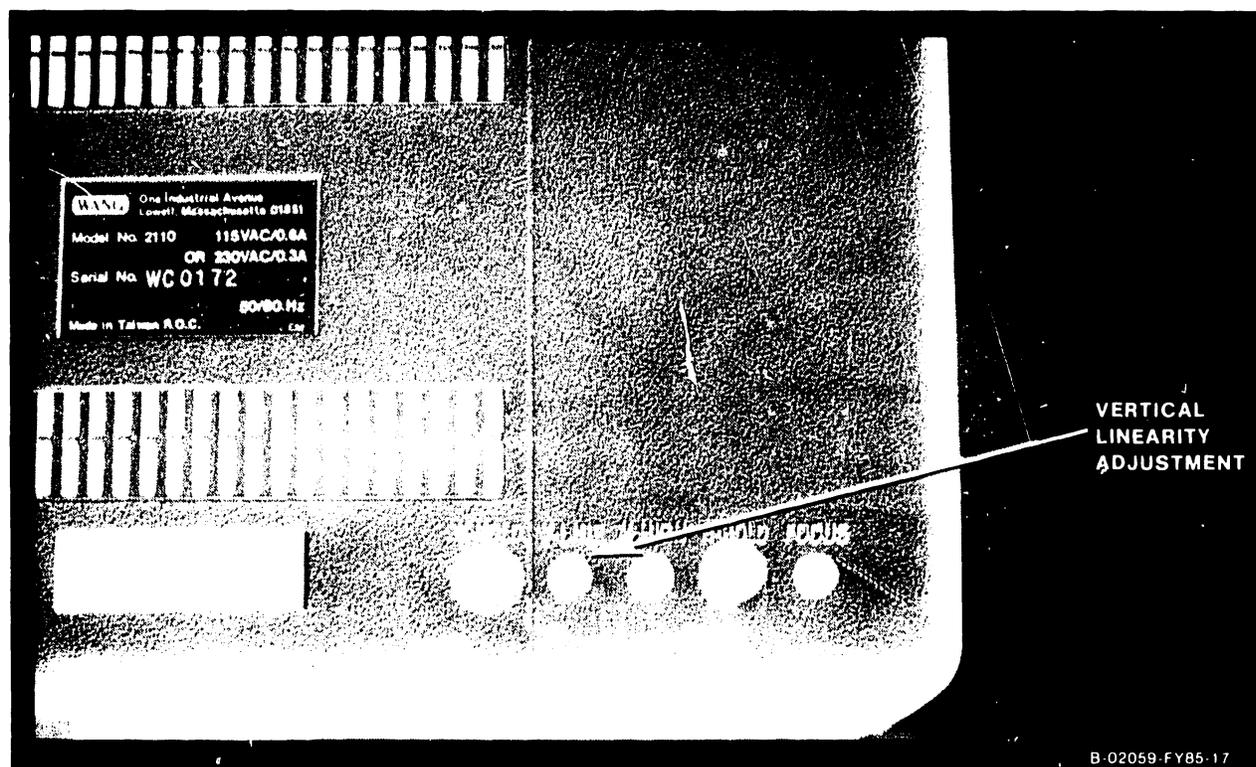

VERTICAL
LINEARITY
ADJUSTMENT

B-02059-FY85-17

Figure 5-6.   Vertical Data Linearity Adjustment

5.1.3.2 Monitor Alignment

Static Focus:

4. Adjust the Static Focus (VR501) (figure 5-7) clockwise or counter-clockwise to get good center of screen focus.
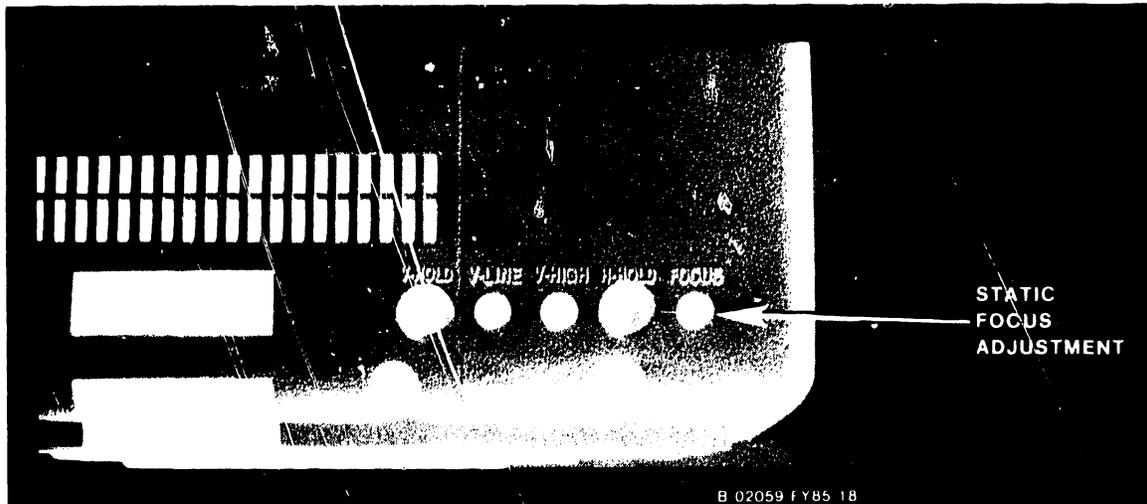
Figure 5-7. Static Focus Adjustment

* Dynamic Focus:

5. Align the Dynamic Focus by adjusting (L505) (figure 5-8) to get good corner of screen focus. Readjust (VR501) to get good total screen focus.
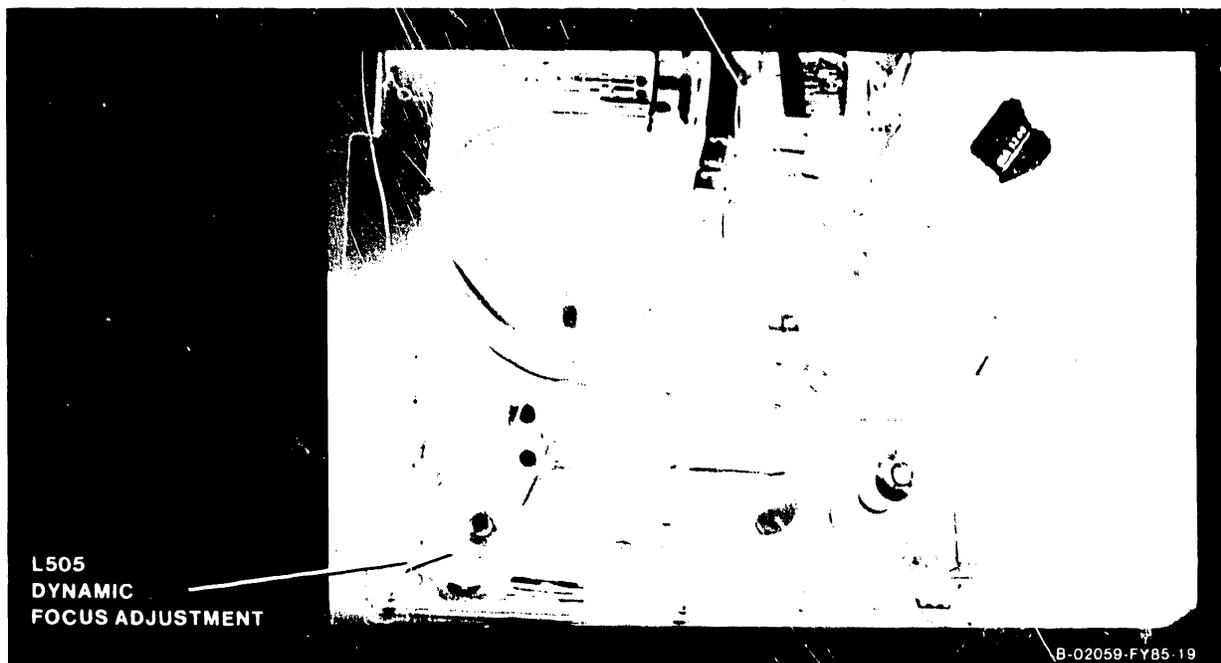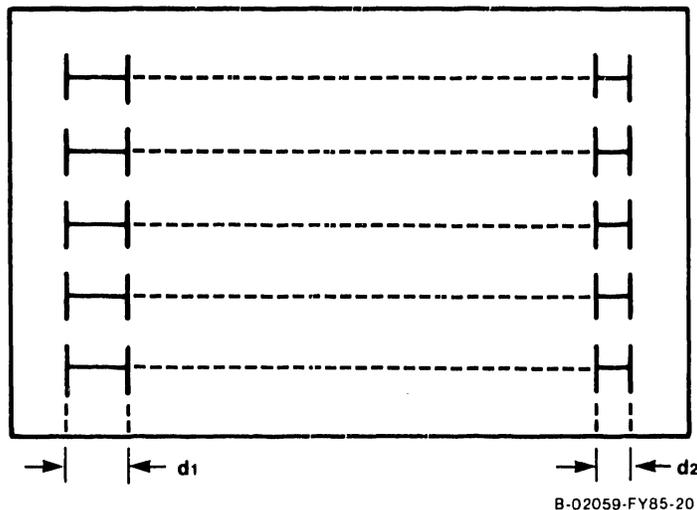

Figure 5-8. Dynamic Focus Adjustments
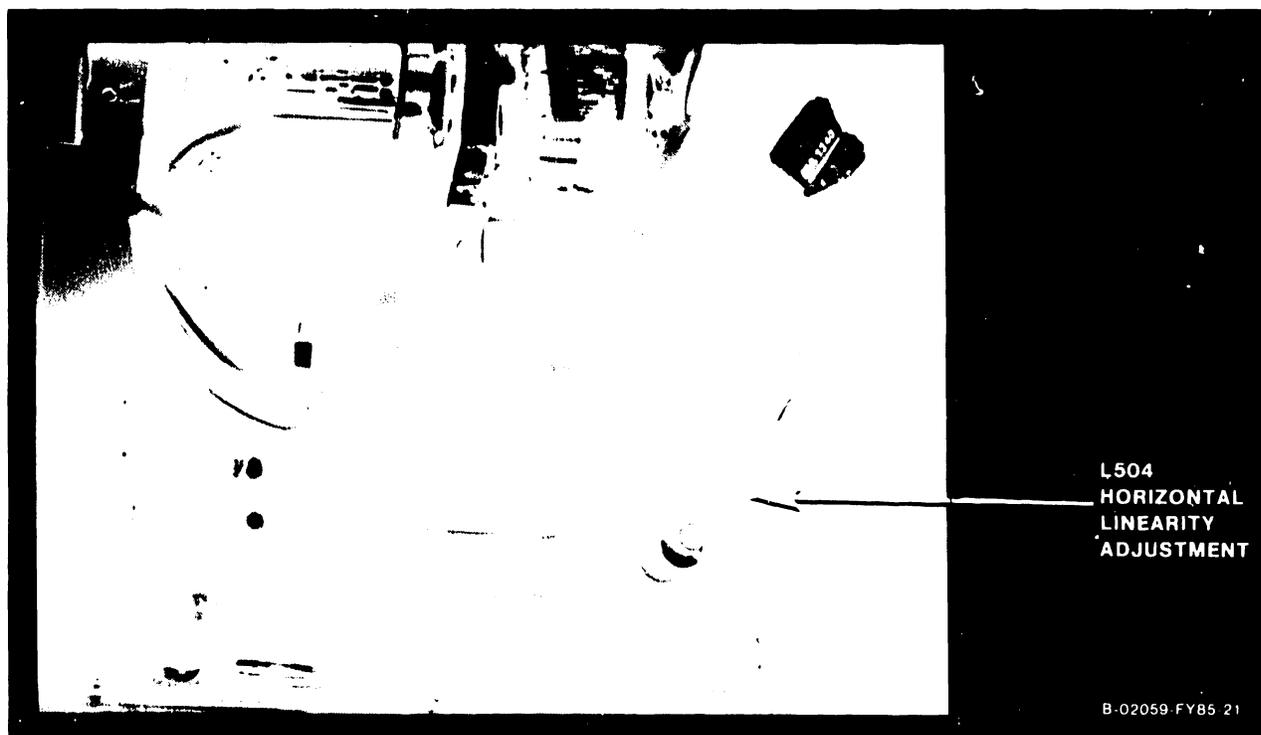
5.1.3.2   Monitor Alignment

* Horizontal Linearity:

6. When the horizontal data linearity is improper as illustrated below
    (figure 5-9), a Horizontal Linearity adjustment is required.

B-02059-FY85-20

Figure 5-9.   Horizontal Linearity Symptom

Align the Horizontal Linearity by adjusting (L504) (figure 5-10) to get
an equal horizontal linearity adjustment with a crosshatch signal applied
to the CRT (D1=D2).
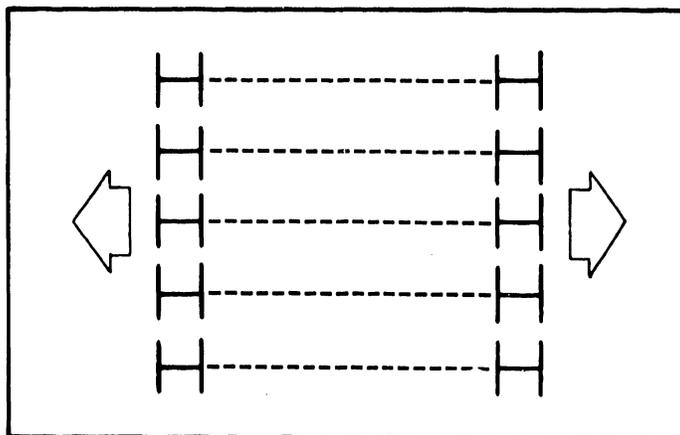

L504
HORIZONTAL
LINEARITY
ADJUSTMENT

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Figure 5-10.   Horizontal Linearity Adjustment

5.1.3.2 Monitor Alignment

* Horizontal Width:

7. When the horizontal data display width is improper as illustrated below (figure 5-11), a Horizontal Width adjustment is required.

B-02059-FY85-22

Figure 5-11.   Horizontal Width Symptom

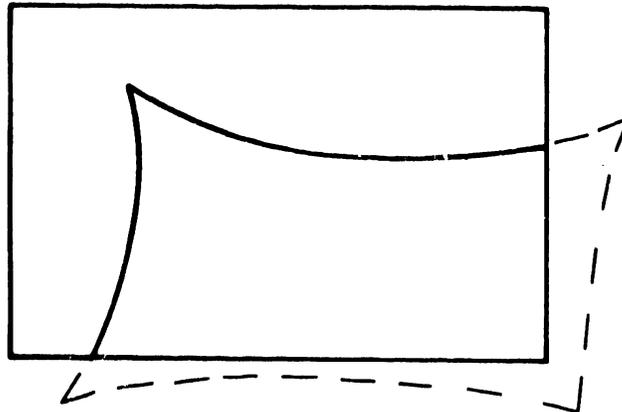Align the Horizontal Width by adjusting the width coil (L503) (figure 5-12) for proper horizontal data display width.

L503
HORIZONTAL
WIDTH
ADJUSTMENT

B-02059-FY85-23

Figure 5-12.   Horizontal Width Adjustment

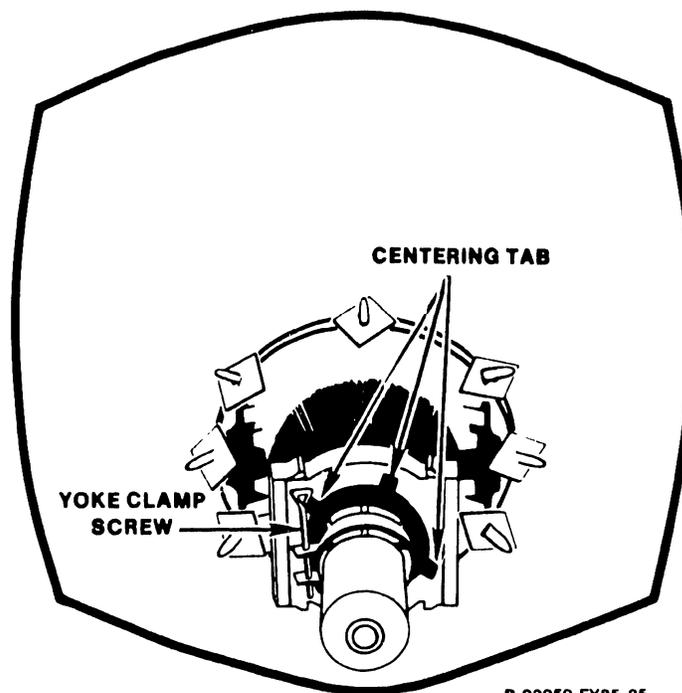### 5.1.3.2   Monitor Alignment

* <u>Raster Deviation</u>:

8. When raster deviation exists as illustrated below (figure 5-13), a raster adjustment is required.

B-02059-FY85-24

Figure 5-13.   Raster Deviation Symptom

Adjust the two centering magnets so the raster is centered (figure 5-14).
Apply locking compound to the assembly after completion of this adjustment.

CENTERING TAB

YOKE CLAMP
SCREW

B-02059-FY85-25

Figure 5-14.   Raster Deviation Adjustment

MAINTENANCE

5.1.3.2 Monitor Alignment

CAUTION

DO NOT OVERTIGHTEN THE YOKE CLAMP. FAILURE TO COMPLY COULD
CAUSE EITHER PERSONAL HARM OR EQUIPMENT DAMAGE.

* Raster Centering:

9. If the complete raster is not properly centered, recenter as follows:

    A.   With the raster displayed, loosen the Yoke clamp screw (figure 5-15)
        and slide the yoke as far forward on the CRT neck as possible.

    B.   Check that the raster is not tilted on the screen. If the raster is
        tilted, rotate the yoke assembly clockwise or counterclockwise
        until the raster is no longer tilted. Secure the yoke assembly by
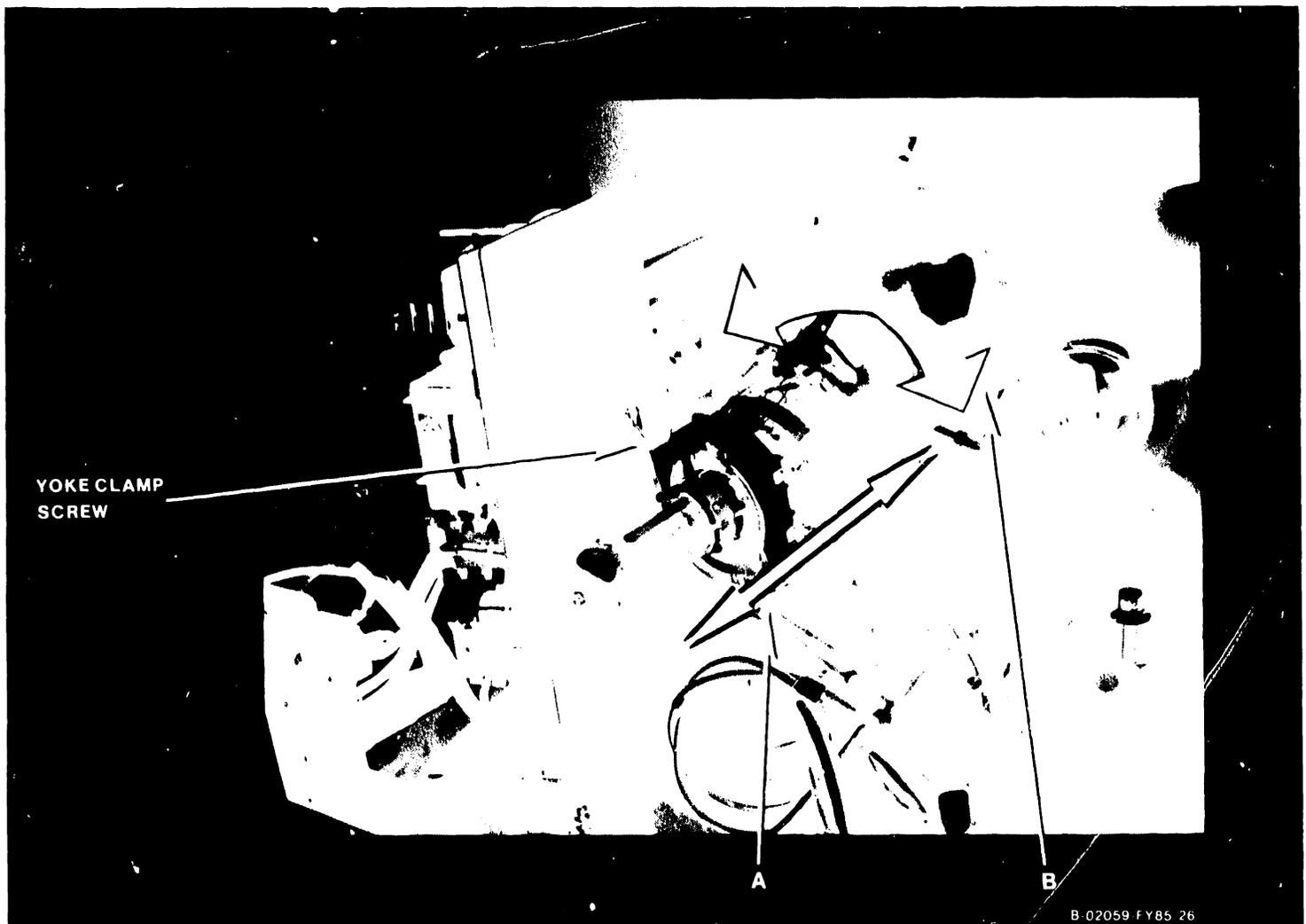   carefully tightening the clamp screw over the CRT neck.

Figure 5-15. CRT Raster Centering Adjustments

5.1.3.2   Monitor Alignment

* <u>Sub-Brightness:</u>

10. Adjust sub-brightness potentiometer (VR503) (figure 5-16) clockwis. or counter-clockwise so the raster is lightly visible.

VR503
SUB-BRIGHTNESS
ADJUSTMENT

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Figure 5-16.   Sub-Brightness Adjustments

11. Reconnect all Monitor cables.

5.2   MONITOR AND KEYBOARD REMOVAL AND REPLACEMENT

The Monitor and the Keyboard are field replacement units and as such are
NOT opened in the field for any reason. If they fail, replace the
complete failed unit/units.

5.2.1   MONITOR COVER REMOVAL

NOTE

THIS INSTRUCTION IS FOR FSC USE ONLY AND IS NOT TO BE
IMPLEMENTED BY ANY OTHER PERSONNEL.

To remove the Monitor Cover, remove the following hardware:

A.   Remove 6 Phillips head screws as shown in figure 5-17.

B.   Remove lift-off snap cover mounted over the AC Power Input, AC Line
Fuse and 115/230 Vac Select Switch. Remove additional Phillips
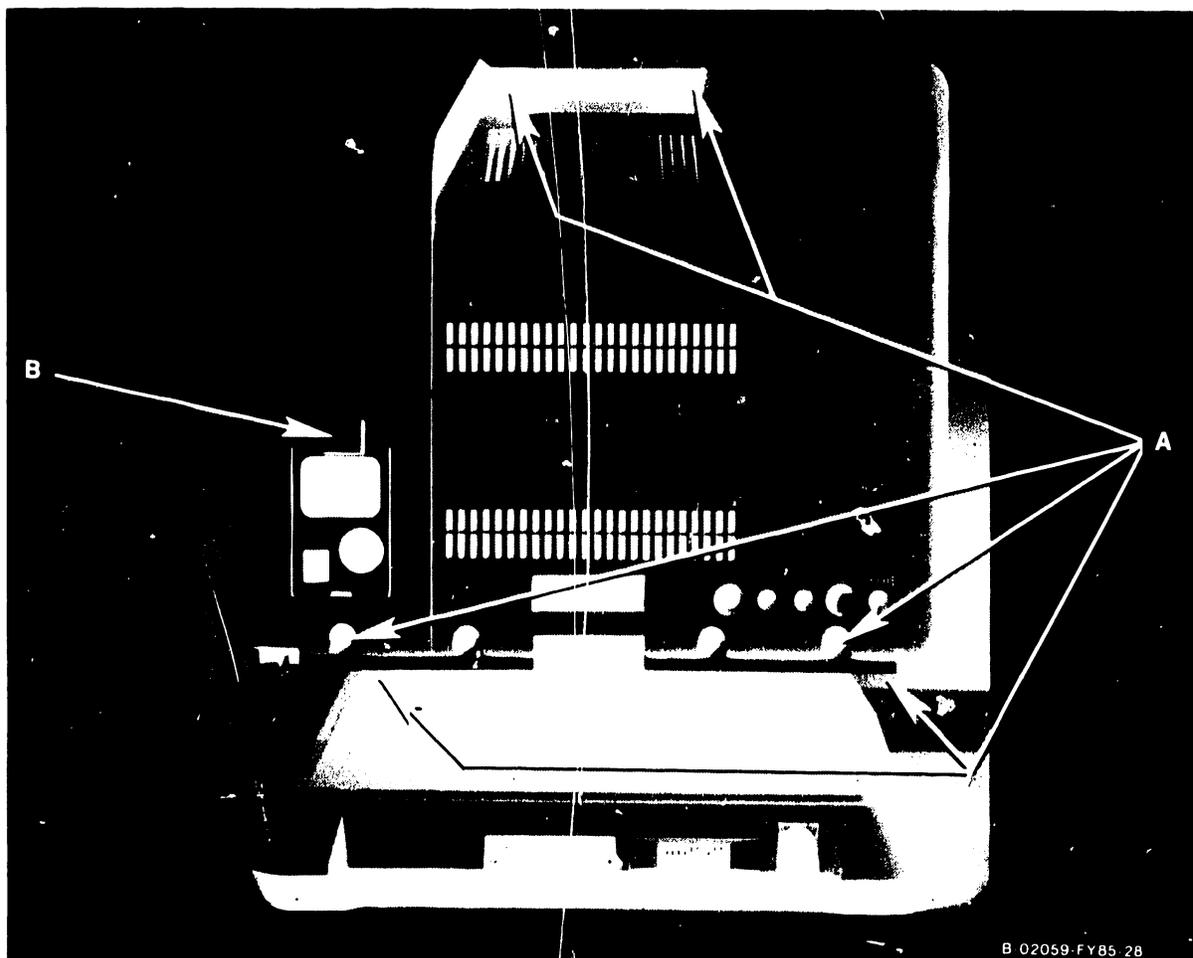head screw fastened under this cover (figure 5-17).

Figure 5-17.   Monitor Cover Hardware Locations

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MATICS

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SCHEMATICS

NOT APPLICABLE TO THIS MANUAL

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CHAPTER 7

ILLUSTRATED PARTS BREAKDOWN

NOT APPLICABLE TO THIS MANUAL

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8
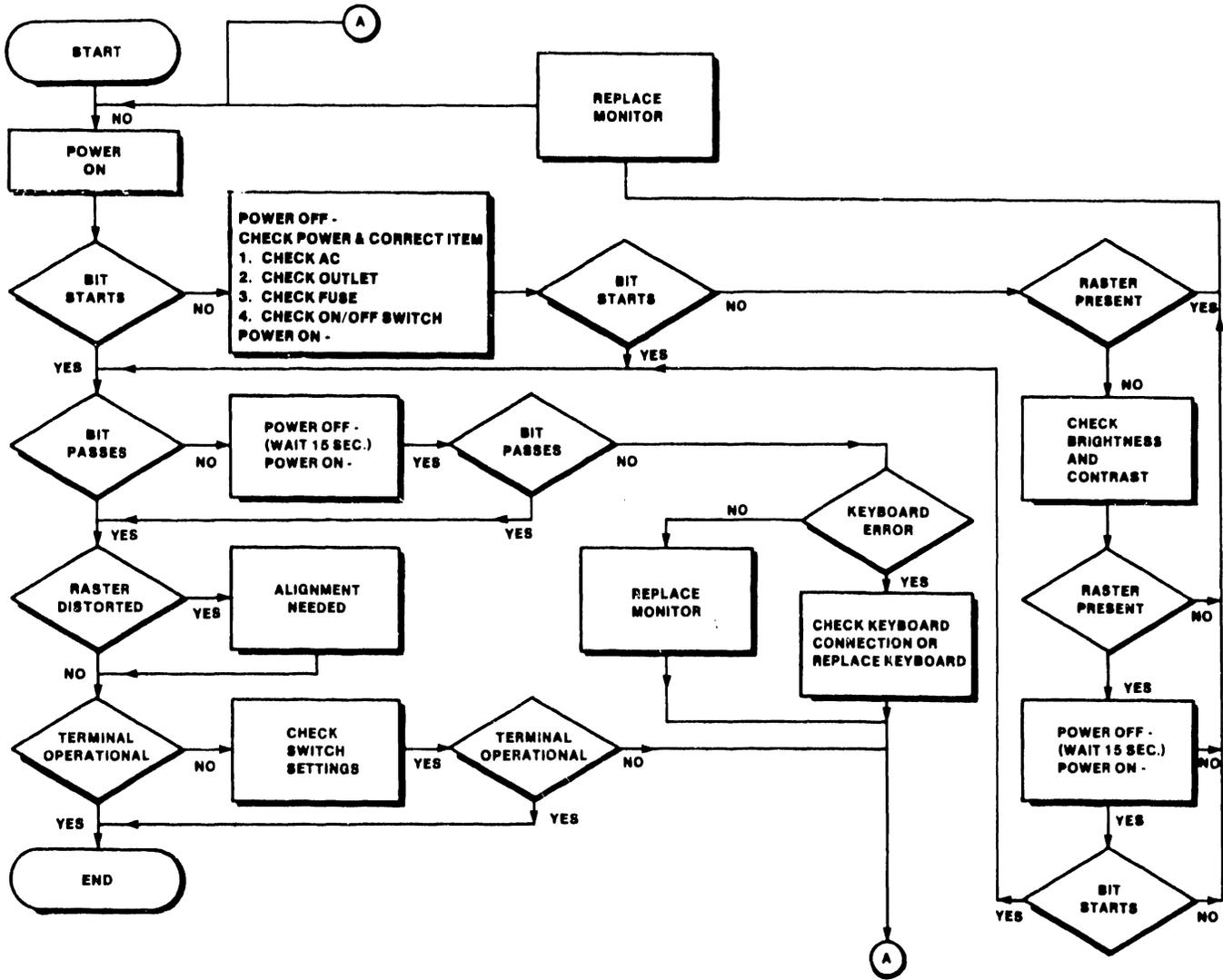# TROUBLE-
SHOOTING

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CHAPTER 8

TROUBLESHOOTING

8.1   SCOPE

Effective troubleshooting is carried out from a system viewpoint. No procedure can list every potential problem or combination of problems for even a very simple device. Use the troubleshooting chart in this section as an aid in the systematic investigation, and diagnosis of failures common to the Wang 2110 VS/DP Terminal.

Figure 8-1. 2110 VS/DP Terminal Troubleshooting Flowchart (Sht. 1 of 1)

END