VT100
MINI
MAINTENANCE
HARDWARE GUIDE

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VT100 Mini Maintenance
Hardware Guide

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CONTENTS

1.1 TROUBLESHOOTING WITH THE SELF-TEST FEATURES

The VT100 contains a series of internal self-tests designed to isolate a failure to a field replaceable unit (FRU). Tables 1-1 and 1-2 show the error codes, the detected failure, and the FRU which should be replaced.

Table 1-1   Keyboard LED Error Codes

Keyboard LEDs				Error Detected	Replace FRU
L1	L2	L3	L4		
OFF	OFF	OFF	ON	ROM1	Terminal Controller
OFF	OFF	ON	OFF	ROM2	Terminal Controller
OFF	OFF	ON	ON	ROM3	Terminal Controller
OFF	ON	OFF	OFF	ROM4	Terminal Controller
OFF	ON	OFF	ON	Main Data RAM	Terminal Controller

1.2 TROUBLESHOOTING THE BASIC TERMINAL

Table 1-3 lists the most common VT100 failures and associated symptoms. To use this table simply select the symptom that matches the terminal failure.

1.3 TROUBLESHOOTING THE OPTIONS

Troubleshooting the terminal options should be performed after the basic terminal is checked and found to be good. Once this is done, perform the option checkout procedure for the suspected faulty option as outlined in Chapter 6. If the option does not check out correctly, replace the option module.

Table 1-2   Display Error Codes

Error Character Displayed	Advanced Video	Nonvolatile RAM	Error Detected			Replace
			Keyboard	Data Loopback	EIA	
1	X					Advanced Video
2		X				Terminal Controller
3	X	X				Advanced Video and Terminal Controller
4			X			Keyboard
5	X		X			Advanced Video and Keyboard
6		X	X			Terminal Controller and Keyboard
7	X	X	X			Advanced Video, Terminal Controller and Keyboard
8				X		Terminal Controller
9	X			X		Advanced Video and Terminal Controller
:		X		X		Terminal Controller
;	X	X		X		Terminal Controller and Advanced Video
>			X	X		Keyboard and Terminal Controller
=	X		X	X		Advanced Video, Keyboard and Terminal Controller
<		X	X	X		Terminal Controller and Keyboard
?	X	X	X	X		Advanced Video, Keyboard and Terminal Controller
@					X	Terminal Controller
A	X				X	Advanced Video and Terminal Controller
B		X			X	Terminal Controller
C	X	X			X	Advanced Video and Terminal Controller
D			X		X	Keyboard and Terminal Controller
E	X		X		X	Advanced Video, Keyboard and Terminal Controller
F		X	X		X	Keyboard and Terminal Controller
G	X	X	X		X	Advanced Video, Keyboard and Terminal Controller
H				X	X	Terminal Controller
I	X			X	X	Advanced Video and Terminal Controller
J		X		X	X	Terminal Controller
K	X	X		X	X	Advanced Video and Terminal Controller
L			X	X	X	Keyboard and Terminal Controller
M	X		X	X	X	Advanced Video, Keyboard and Terminal Controller
N		X	X	X	X	Keyboard and Terminal Controller
O	X	X	X	X	X	Advanced Video, Keyboard and Terminal Controller

Table 1-3   Basic VT100 Troubleshooting Procedure

General notes on using the basic terminal troubleshooting chart:

1. This chart assumes that only one field replaceable unit (FRU) has failed. The symptoms displayed may be representative of a multiple failure, and as a result, the symptoms may change as FRUs are replaced. Always troubleshoot according to the current symptoms.

2. Spare parts do fail. The possibility of a failure should not be discounted just because the module has been replaced once.

3. Power must be turned off before any of the FRUs are disconnected or replaced.

Symptoms	Probable Cause	Corrective Action
No response when the power switch is set to the on position. The CRT filament is not lit and LEDs are not on.	Not plugged in; no power at wall socket.	Plug in VT100; use different wall socket if possible.
	Main power fuse	Replace fuse (if fuse blows again there is a possible shorting problem).
	Power supply	Replace power supply.
	AC line cord	Check for open or short and replace line cord.
	Power distribution harness	Replace harness.
No response when power switch is set to the on position and the CRT filament is lit.	Power Supply	Replace power supply.
	Terminal controller board	Replace board.
	Power distribution	Replace harness.
There are no audible tones when the terminal is turned on. LEDs are lit.	Keyboard	Replace.
	Keyboard cable	Replace.
	Controller	Replace.
	Speaker	Replace.
There are no audible tones when the terminal is turned on and none of the keyboard LEDs are lit.	Keyboard disconnected	Connect.
	Keyboard cable	Replace.
	Keyboard	Replace.
	Controller	Replace.
Cursor does not appear on the screen after the terminal is powered up. The CRT filament is turned on.	Connectors	Check and reconnect.
	Screen brightness too low	Adjust monitor brightness (Paragraph 4.2.1).
	Controller	Replace.
	Monitor Board	Replace.
	Flyback transformer	Replace.
	DC power harness	Replace.
	F.S. monitor assembly	Replace.

Table 1-3   Basic VT100 Troubleshooting Procedure (Cont)

Symptoms	Probable Cause	Corrective Action
Cursor does not appear on the screen after the terminal is powered up. CRT filament is not on. Keyboard is functional.	Monitor fuse open	Replace monitor board.
	Monitor wiring	Replace monitor board.
	DC power harness	Replace.
	F.S. monitor assembly	Replace.
Random characters appear on the screen.	Controller	Replace.
A horizontal or vertical line appears on the screen.	Monitor connectors	Check and reconnect.
	Monitor board	Replace.
	F.S. monitor assembly	Replace.
Screen display is distorted. Characters are narrow on the left or right side of the screen.	Monitor is misadjusted	Adjust monitor (Chapter 4).
	Monitor board	Replace.
	Flyback transformer	Replace.
	F.S. monitor assembly	Replace.
	Controller	Replace.
The display presentation bows in or out.	Yoke pincushion misadjusted	Replace F.S. monitor assembly.
Screen display is jumpy	Interlace feature on	Turn feature off.
	Wrong power feature set	Set feature to correct line frequency.
	Controller	Replace.
	Power supply	Replace.
	Monitor board	Replace.
	Flyback transformer	Replace.
The wrong character appears on the screen when typed in LOCAL mode.	Graphics, or alternate character set, or alternate keypad mode, or cursor key mode is selected.	Clear condition with power up or RESET.
	Keyboard	Replace.
	Controller	Replace.
The wrong character appears on the screen when typed in the ON-LINE mode with loopback installed. Terminal functional in LOCAL mode.	Graphics, or alternate character set, or alternate keypad mode, or cursor key mode is selected.	Clear conditions with power up or RESET.
	Transmit and receive speed not the same	Change speed setting.
	Controller	Replace.

Table 1-3   Basic VT100 Troubleshooting Procedure (Cont)

Symptoms	Probable Cause	Corrective Action
The wrong characters appear on the screen when typed in the ON-LINE mode and connected to computer. Terminal is functional with loopback connector.	Receive and/or transmit speed set incorrectly	Set speeds to match computer.
	Bits per character feature set incorrectly.	Set feature to match computer.
	Parity feature set incorrectly	Set parity and/or parity sense feature to match computer.
	Communications line	Check communication facilities.
Messages received are incomplete	XON/OFF feature set incorrectly	Set feature.
	Computer does not recognize XON/OFF sequence	See Chapter 3 of VT100 User's Guide.
	Controller	Replace.
Checkerboard character appears on screen instead of character typed (on-line with computer).	Parity feature set incorrectly	Set parity and/or parity sense feature to match computer.
	Controller	Replace.
	Communication facility problem	Check communication facility.
All characters displayed as a white area (black with reverse screen).	Alternate character set selected and not available.	Clear condition with power up or RESET.
Only top or bottom half of characters are displayed on the screen.	Incorrect use of double height escape sequence	See Chapter 3 of VT100 User's Guide.
The SET-UP features do not work correctly (multiple alarms may sound on power up or recall).	Save operation not performed.	Perform Save operation.
	Controller	Replace controller.
	Power supply	Replace power supply.
The terminal does not respond to escape sequences.	ANSI/VT52 feature set incorrectly	Set ANSI/VT52 feature to correct compability.

1.4 RECOMMENDED SPARES LIST (RSL)

Table 1-4 lists the recommended spares for the Basic VT100. Included in this list are spares for the Advanced Video Option and the 20 mA Current Loop Adapter Option.

Table 1-4 Recommended Spares

Quantity	Description	Part Number
1	Monitor printed circuit board	30-14590-02
1	Terminal controller PCB	54-13009
1	Advanced Video PCB	54-13097
1	20 mA Adapter assembly	70-15273
1	20 mA Interface cable (15 ft)	BC05F-15
1	EIA cable (M-F) (10 ft)	BC05D-10
1	EIA cable (null modem)	BC03M-10
1	LK keyboard	70-15765
1	Cable assembly, keyboard	70-14652
1	Speaker	12-15050
1	LK07 keycap set	12-14333-72
1	LK08 keycap set	12-14333-91
1	Keycap removal tool	74-16355
1	Power supply assembly	70-14979
1	Power switch	12-15232
1	Voltage select switch, 110 V/220 V	12-14155-03
10	Fuse, 3 A	90-07217
1	Line cord, 115 V	170083-09
1	Line cord, 230 V	170083-10
1	DC power distribution cable	70-14978
2	Card guide	12-12405-00
5	Retainer ring*	90-10007
5	Support, chassis*	90-09747-01
5	Cable clamp*	90-10016-00
15	Plunger, chassis mounting*	90-09964
15	Grommet, chassis*	90-09966-01
5	Captive screw*	12-14811
15	Plunger, base mounting*	12-14740-00
15	Plunger, base mounting*	90-09965-00
5	Standoff, AVO*	90-09747-03
15	Grommet, base*	90-09966-00
5	Mounting screw*	12-14817
5	Feet*	90-09624-00
1	Fuse holder*	12-12893
5	Screw, #6-20 × 1/2, hex head	90-09680-04
5	Screw, #6-32 × 5/16	90-09701-00
1	CRT mask, alignment	94-03220-03
1	Shaft extender	29-23189-00
1	Alignment tool, monitor	29-23190-00
1	Kit, carrying case	29-23187
1	I.C. container	99-05812
1	Loopback connector, RS232C	12-15336
1	Loopback connector, 20 mA	70-15503-00
1	Flyback transformer, Ball monitor	30-14590-01
1	F.S. monitor assy, Ball monitor †	70-16187

* These items are expendable.
† This assembly consists of the CRT, yoke, vertical coil, flyback transformer, video monitor board, and sheet metal enclosure.

CHAPTER 2
OPERATING SUMMARY

2.1 SET-UP

SET-UP mode is a special mode of operation that allows the user to:

1. Enable and disable the terminal features
2. Enter and store a 20-character answerback message
3. Save the selected features in a nonvolatile memory
4. Temporarily change the terminal features and then recall the original settings.

To perform these functions SET-UP mode is divided into two display presentations: SET-UP A and SET-UP B.

2.1.1 SET-UP A

To enter SET-UP A press the SET-UP key. The display will now have a presentation similar to Figure 2-1. The bottom line of the display consists of a ruler that numbers each character position available on a line. The location of each tab stop is shown by a "T" placed above the ruler.
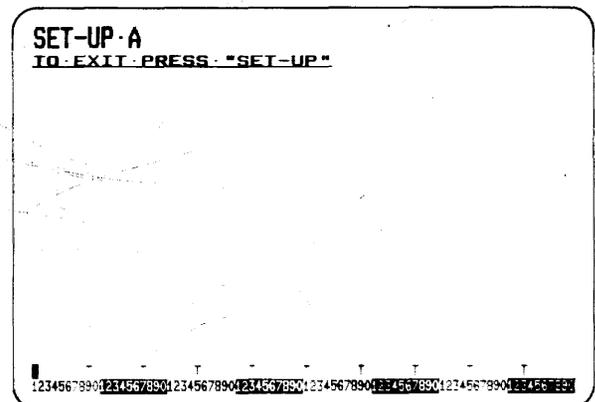
Figure 2-1 SET-UP A Presentation

In SET-UP A mode the following features may be changed:

TABS
BRIGHTNESS
CHARACTERS PER LINE
LINE/LOCAL

See Paragraph 2.1.3 to change a feature.

2.1.2 SET-UP B

SET-UP B mode may only be entered from SET-UP A mode. To enter SET-UP B from SET-UP A, press the 5 key on the main keyboard. The display will have a presentation similar to Figure 2-2. Figure 2-3 summarizes the SET-UP B presentation.

```
SET-UP B
TO EXIT PRESS "SET-UP"




 1 101  2 1111  3 0100  4 0010      T SPEED  9600   R SPEED  9600
```
MR 1510
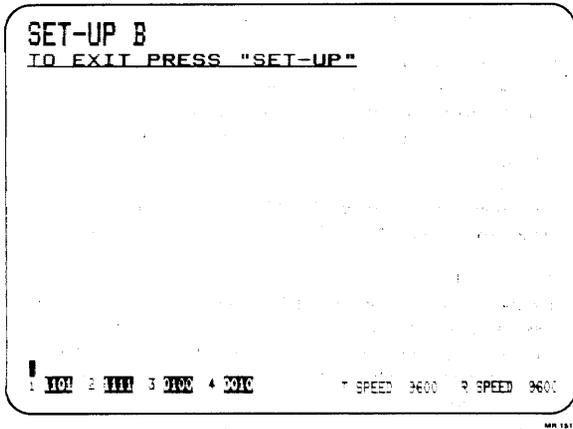
Figure 2-2   SET-UP B Presentation
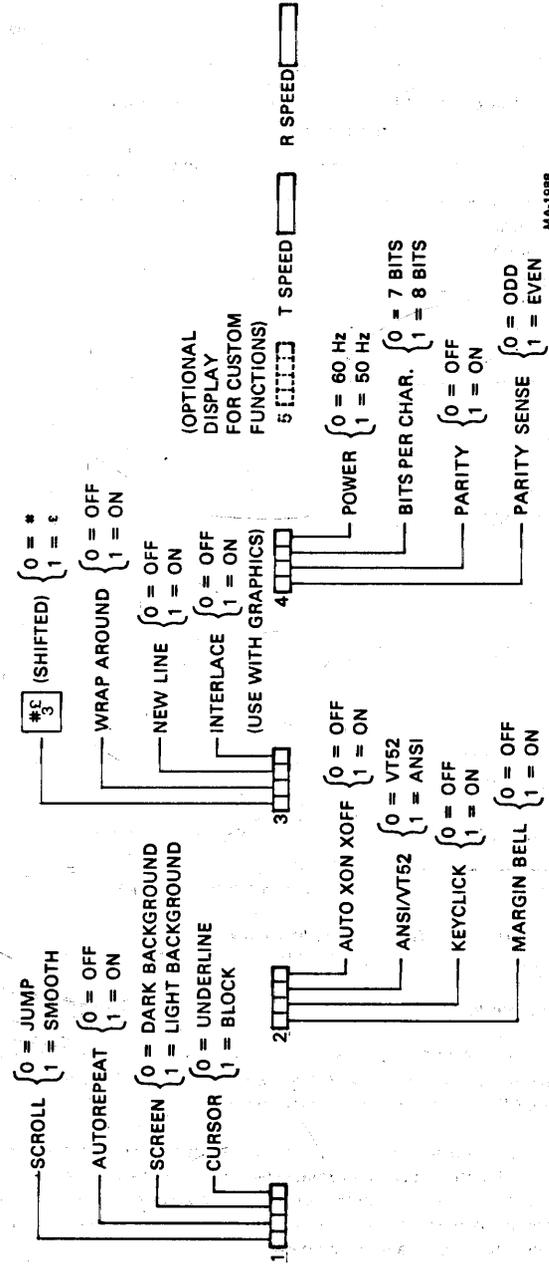
Figure 2-3   SET-UP B Summary

MA-1988

SCROLL { 0 = JUMP / 1 = SMOOTH
AUTOREPEAT { 0 = OFF / 1 = ON
SCREEN { 0 = DARK BACKGROUND / 1 = LIGHT BACKGROUND
CURSOR { 0 = UNDERLINE / 1 = BLOCK

AUTO XON XOFF { 0 = OFF / 1 = ON
ANSI/VT52 { 0 = VT52 / 1 = ANSI
KEYCLICK { 0 = OFF / 1 = ON
MARGIN BELL { 0 = OFF / 1 = ON

#3 (SHIFTED) { 0 = # / 1 = £
WRAP AROUND { 0 = OFF / 1 = ON
NEW LINE { 0 = OFF / 1 = ON
INTERLACE { 0 = OFF / 1 = ON
(USE WITH GRAPHICS)

(OPTIONAL DISPLAY FOR CUSTOM FUNCTIONS)
POWER { 0 = 60 Hz / 1 = 50 Hz
BITS PER CHAR. { 0 = 7 BITS / 1 = 8 BITS
PARITY { 0 = OFF / 1 = ON
PARITY SENSE { 0 = ODD / 1 = EVEN

T SPEED
R SPEED

2.1.3 Changing a SET-UP Feature

Table 2-1 summarizes the SET-UP features, indicates the SET-UP mode required to change the feature, and shows the key used to change the feature.

Table 2-1   SET-UP Feature Change Summary

| SET-UP Feature	Changed In		Key Used To
	SET-UP A	SET-UP B	Change Feature
ANSWERBACK		X	†
ANSI/VT52		X	6
AUTO REPEAT		X	6
AUTO XON/XOFF		X	6
BITS PER CHARACTER		X	6
BRIGHTNESS	X	X	↑ or ↓
CHARACTERS PER LINE	X		9
CURSOR		X	6
INTERLACE		X	6
KEYCLICK		X	6
LINE/LOCAL	X	X	4
MARGIN BELL		X	6
NEW LINE		X	6
PARITY		X	6
PARITY SENSE		X	6
POWER		X	6
RECEIVE SPEED		X	8
SCREEN		X	6
SCROLL		X	6
TABS	X		2 and 3
TRANSMIT SPEED		X	7
WRAPAROUND		X	6
# £ / 3 (shifted)	X	6	

† A special sequence is required for this feature (Paragraph 2.1.4).

2.1.4   Setting the Answerback Message

Use the following procedure to set the answerback message:

1. Place the terminal in SET-UP B mode.

2. Press the SHIFT and A keys simultaneously. The terminal will respond by placing A= on the screen. (The SHIFT key is required; the CAPS LOCK key will not work here.)

3. Type the message delimiter character, which may be any character not used in the actual answerback message. (The message delimiter character is not a part of the answerback message.) If a mistake is made while typing the answerback message, type the message delimiter character again and go back to step 2. This is the only way to correct errors in the answerback message.

4. Type the answerback message, which may be up to 20 characters long, including space characters. If the message exceeds 20 characters, the answerback message will disappear from the screen after the 20th character is typed. In this case the message delimiter character described in the next step is not required.

5. Type the message delimiter character, which is only required when the answerback message is less than 20 characters. Once the message delimiter character is typed the answerback message will disappear from the screen.

2.1.5   Saving SET-UP Features

Use the following procedure to save the current SET-UP feature settings in nonvolatile memory.

1. Place the terminal in SET-UP mode.

2. Press the SHIFT and S keys simultaneously. The screen will clear and the message "Wait" will be displayed in the upper-left corner. After a brief wait the terminal will return to SET-UP A mode.

2.1.6   Recalling SET-UP Features

Use the following procedure to recall the previously saved SET-UP feature settings.

1. Place the terminal in SET-UP mode.

2. Press the SHIFT and R keys simultaneously. The screen will clear and the message "Wait" will be displayed in the upper-left corner. After a brief wait the terminal will return to SET-UP A mode.

NOTE

When a recall operation is performed the contents of the screen are destroyed.

2.1.7   Resetting the Terminal

Use the following procedure to reset the terminal:

1. Place the terminal in SET-UP mode.

2. Press the 0 key on the main keyboard. The VT100 will be reset, the power-up self test will be run, and the terminal will react according to the fixed SET-UP features.

CHAPTER 3
TESTING THE VT100

3.1 INTERNAL SELF TESTS

The VT100 contains three self-test programs in the basic ROM memory:

Power-up test
Data loopback test
Video adjust pattern

Each test is designed to isolate a failure to the faulty module so that the terminal may be repaired in a minimum amount of time.

3.1.1 Power-Up Test

3.1.1.1 Description – The power-up self test performs the following functions:

1. Writes a 1 and a 0 in each bit location of RAM on the basic terminal controller board to verify that the RAM can store each bit.

2. Writes a 1 and a 0 in each bit location of RAM on the Advanced Video Option (AVO) board to verify that the optional RAM can store each bit. If the AVO board is not installed, this part of the test is skipped.

3. Reads the contents of the nonvolatile (NVR) RAM, calculates a checksum, and then compares the checksum to the checksum stored in the NVR.

4. Reads the contents of each ROM chip, calculates a checksum, and then compares the checksum to the checksum stored in each ROM chip.

5. Turns on all keyboard LEDs, rings the keyboard bell for one-quarter second, and looks for the end of scan character from the keyboard to determine if the keyboard is functioning properly.

3.1.1.2   Performing the Test – The power-up test may be started in any one of the following ways:

1. Turn the terminal power on.

   or

2. Type the following sequence to perform the test once. (The terminal must be in the ANSI-compatible mode. In SET-UP B group switch 3 equals a 1.)

   ESC [2;ly

   or

3. Type the following sequence to perform the test continuously. (The terminal must be in ANSI-compatible mode; in SET-UP B, group 2 switch 3 equals a 1.)

   ESC [2;9y

   or

4. Reset the terminal.

NOTE

The continuously running test will end only if an error is found or the power is turned off.

Any error found by the power-up self test will be displayed on the terminal screen and/or LEDs L1 through L4 on the keyboard. Tables 3-1 and 3-2 provide the meanings for the error codes.

3.1.2   Data Loopback Test

3.1.2.1   Description – In the data loopback test the VT100 transmit and receive lines are connected via a special external connector. A predefined set of characters are then transmitted. The terminal receives the characters and compares them to the characters transmitted. If the characters do not match an error is then flagged.

3.1.2.2   Performing the Test – Use the following procedure to perform the data loopback test.

1. Install the appropriate data loopback connector. (Connector part number 12-15336 is for EIA communications; part number 70-15503-00 is for 20 mA current loop communications.)

2. Ensure that the transmit and receive speeds are the same.

3. Place the terminal in ANSI-compatible mode (in SET-UP B group 2 switch 3 equals a 1).

4. Place the terminal in ON-LINE mode.

5. Type the following sequence to perform the test once;

   ESC [2;2y

   or

   type the following sequence to perform the test continuously.

   ESC [2;10y

NOTE

The continuously running test will end only if an error is found or the power is turned off.

Any error found by the data loopback self test will be displayed on the terminal screen. Table 3-2 provides the meanings of the error codes.

3.1.3   Video Adjust Test

3.1.3.1   Description – The video adjust test provides a full screen of "Es" for the display height, width, and linearity adjustments. The test pattern is internal to the terminal and is not sent to the host computer.

3.1.3.2   Performing the Test – Use the following procedure to display the test pattern.

1. Place the terminal in ANSI-compatible mode (in SET-UP B group 2 switch 3 equals a 1).

2. Place the terminal in LOCAL mode.

3. Type the following sequence

   ESC #8

3.1.4   Error Codes

If execution of any self-test produces an error, the test stops automatically. There are two broad categories of errors: fatal and nonfatal. Fatal errors cause the terminal to immediately stop all operation. No intelligible information is displayed on the screen; however, the screen may not be blank, but will contain a random pattern of characters. The only error indication (except the hung terminal) is a possible error code displayed on the programmable keyboard LEDs (L1 through L4); however, no terminal function, including the lighting of LEDs, is guaranteed on a fatal error. The possible fatal errors and the LED codes are listed in Table 3-1.

Table 3-1   LED Error Codes

Error	L1	L2	L3	L4
ROM 1 checksum error	OFF	OFF	OFF	ON
ROM 2 checksum error	OFF	OFF	ON	OFF
ROM 3 checksum error	OFF	OFF	ON	ON
ROM 4 checksum error	OFF	ON	OFF	OFF
Main Data Ram error	OFF	ON	OFF	ON

Nonfatal errors do not halt the terminal processor. Instead, the terminal is forced to LOCAL mode, and an error code character is displayed in the upper-left corner of the screen under the blinking cursor. Additionally, if one or more nonfatal errors occurred while the test was repeating continuously, the entire screen would flash from white to black to white about once per second as an alarm. This would continue until the terminal was reset. There are four types of nonfatal errors:

1. Advanced Video Option data RAM (AVO)
2. Nonvolatile data RAM checksum error (NVR)
3. Keyboard missing or malfunction (KBD)
4. Data loopback error (Data)

Table 3-2 shows the possible nonfatal error characters which may appear on the screen and the failure which each character represents.

Table 3-2   Displayed Error Codes

Displayed Character	Fault Detected			
	AVO	NVR	KBD	Data
1	X			
2		X		
3	X	X		
4			X	
5	X		X	
6		X	X	
7	X	X	X	
8				X
9	X			X
:		X		X
;	X	X		X
<			X	X
=	X		X	X
>		X	X	X
?	X	X	X	X

Note: See Table 1-2 to determine the correct module to replace.

3.2   USE OF THE PMK04 TESTER

The PMK04 tester is compatible with the VT100. Consult the *PMK04 Operator's Manual* for instructions on how to use the tester.

CHAPTER 4
VIDEO ALIGNMENT

4.1   GENERAL

This chapter describes the alignment of the video monitor. All of the individual adjustments do not have to be performed each time the monitor is aligned; however, each adjustment should always be checked since many of the adjustments are interdependent.

Figure 4-1 shows the alignment templates used in this procedure. If the mylar adjustment templates are not available, reproduce the templates shown in Figure 4-1 on a separate piece of paper. Cut out the shaded area on each and use these copies to perform the adjustments in place of the mylar templates.

4.2   MONITOR ADJUSTMENTS

The following paragraphs describe the alignment of the video monitor. All adjustments must be made under the following conditions:

1. Normal video mode (white characters on a dark background)
2. 80 characters per line mode
3. ANSI-compatible mode
4. LOCAL mode.

4.2.1   Brightness

Use the following procedure to adjust the brightness control on the monitor board.

1. Increase the brightness to the maximum level with the "↑" key in SET-UP mode.

2. Remove the terminal top cover (Paragraph 5.10).

3. Adjust R117 (Figure 4-2) until the display raster is visible; then back off on the adjustment until the raster disappears.

4. Replace the terminal top cover.

4.2.2 FOCUS

Use the following procedure to check and adjust the focus.

1. Type the following sequence.

   ESC #8

2. Examine the characters at the four corners and in the center of the screen. The individual dots in the vertical segment of the "E" should be visible in each character.

NOTES

In some cases, the operator may want the focus misadjusted to suit personal preference.

If the focus is adjusted correctly do not perform the following steps.

3. Remove the terminal top cover (Paragraph 5.10).

4. Adjust R122 (Figure 4-2) for the best overall character presentation.

5. Replace the terminal top cover if no further adjustments are required.

4.2.3 Yoke

Use the following procedure to check and adjust the yoke.

1. Type the following sequence.

   ESC #8

2. With the top cover still on the terminal, place the VT100 alignment template (part number 940322-3) on the screen. Ensure that the template lies as flat as possible on the screen.

3. Verify that all four sides of the display presentation are parallel to the red shaded area of the alignment template.

NOTE

If the yoke is adjusted correctly do not perform the following steps.

4. Remove the alignment template from the screen.

5. With the dark blue or black felt-tip pen, mark the four edges of the screen.

6. Remove the terminal top cover (Paragraph 5.10).

7. Tape the VT100 alignment template to the screen. To orient the template use the felt-tip pen marks placed on the screen in step 5.

8. Loosen the yoke collar clamp screw (Figure 4-3) and turn the yoke until the four sides of the display presentation are parallel to the red shaded area of the alignment template.

RED SHADED AREA

MIN

MAX

CHARACTER WIDTH

VT100 9403246-3A

RED SHADED AREA

CHARACTER HEIGHT

MIN

MAX

VT100 9403246-3B

CUT ALONG THE OUTSIDE LINES

VT100 ALIGNMENT TEMPLATE
9403220-3

RED SHADED AREA

MA-2069

Figure 4-1   Video Alignment Templates

4-3
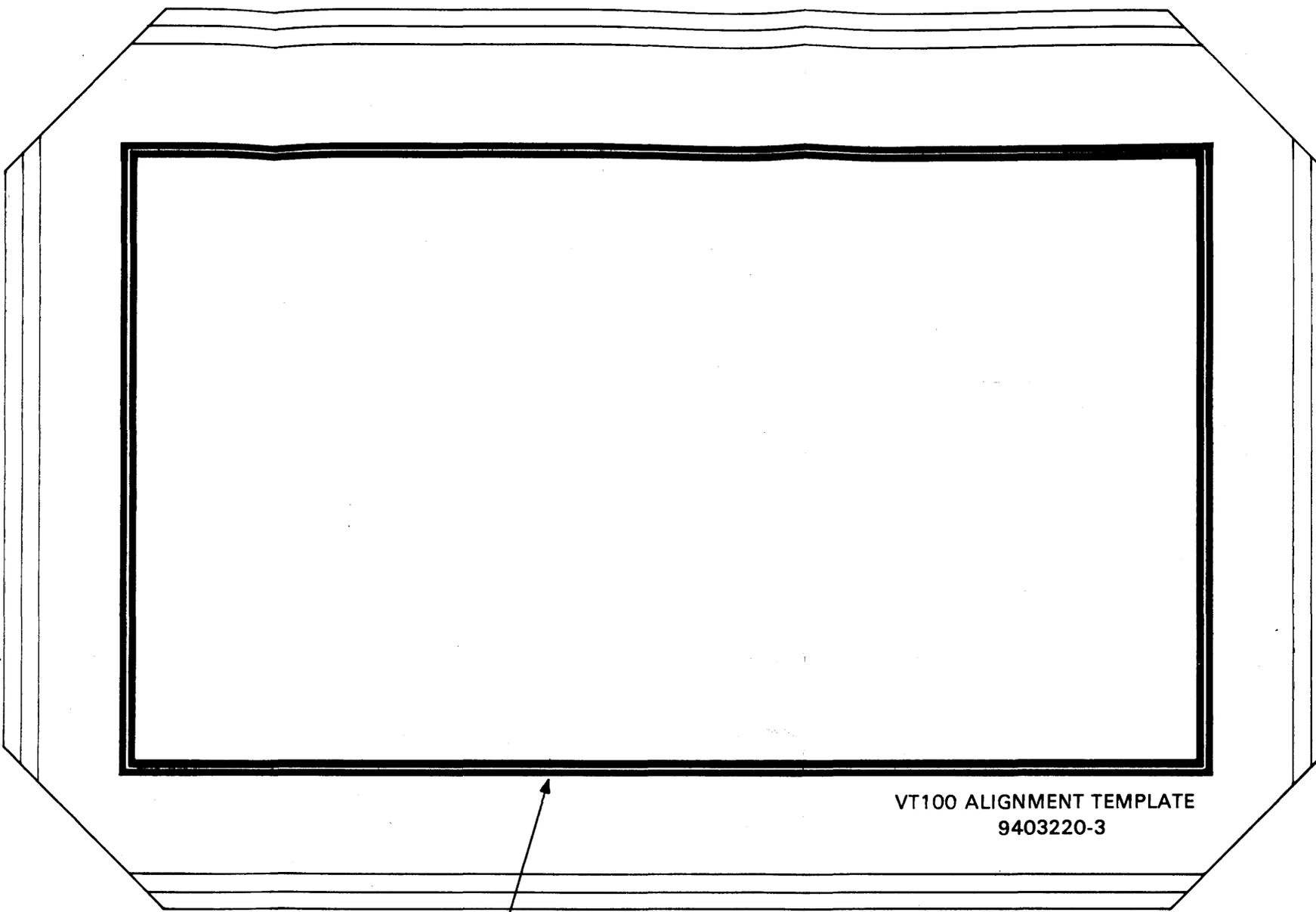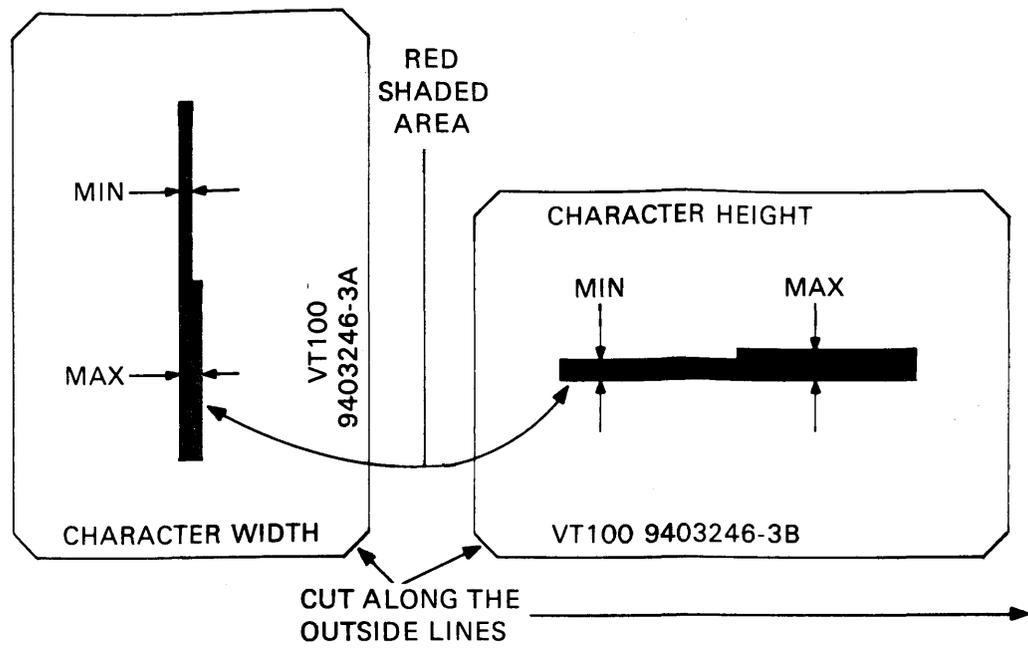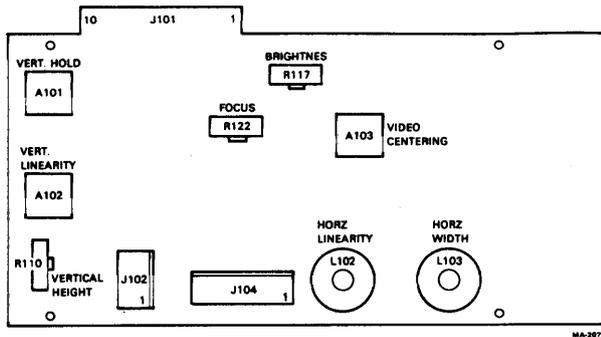
Figure 4-2   Video Monitor Board Adjustments
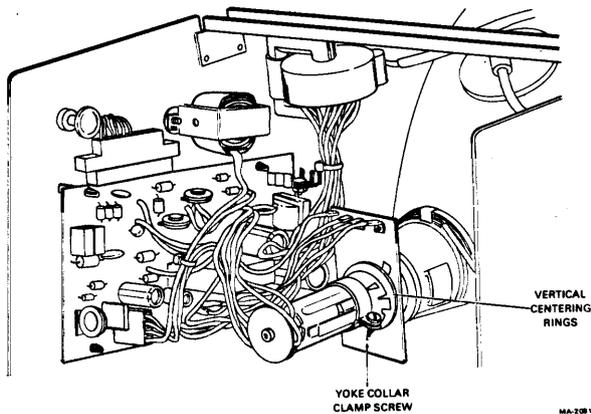
Figure 4-3   CRT Adjustments

9. Ensure that the yoke is pushed all the way forward toward the face of the CRT. While holding the yoke in place, tighten the yoke collar clamp screen.

10. Replace the terminal top cover if no further adjustments are required.

4.2.4   Vertical Height

Use the following procedure to check and adjust the overall presentation height.

1. Type the following sequence.

   ESC #8

2. With the top cover still on the terminal, place the VT100 alignment template on the screen. Ensure that the template lies as flat as possible on the screen.

3. Verify that the top and bottom lines of the presentation are covered by the red shaded area of the adjustment template.

NOTE
If the vertical height is correct do not perform the following steps.

4. Remove the alignment template from the screen.

5. With the dark blue or black felt-tip pen, mark the four edges of the screen.

6. Remove the terminal top cover (Paragraph 5.10).

7. Tape the VT100 alignment template to the screen. To orient the template use the felt-tip pen marks placed on the screen in step 5.

8. Adjust the vertical height using R110.

9. Check and adjust the vertical linearity and vertical hold if needed.

10. Replace the terminal top cover if no further adjustments are required.

4.2.5   Horizontal Width

Use the following procedure to check and adjust the overall presentation width.

1. Type the following sequence.

   ESC #8

2. With the top cover still on the terminal, place the VT100 alignment template on the screen. Ensure that the template lies as flat as possible on the screen.

3. Verify that the first and last columns of the presentation are covered by the red shaded area of the adjustment template.

NOTE
If the horizontal width is correct do not perform the following steps.

4. Remove the alignment template from the screen.

5. With a dark blue or black felt-tip pen, mark the four edges of the screen.

6. Remove the terminal top cover (Paragraph 5.10).

7. Tape the VT100 alignment template to the screen. To orient the template use the felt-tip marks placed on the screen in step 5.

8. Adjust the horizontal width using L103.

9. Check and adjust the horizontal linearity if needed.

10. Replace the terminal top cover.

4.2.6 Centering

Use the following procedure to check and adjust the presentation centering.

1. Type the following sequence.

ESC #8

2. With the top cover still on the terminal, place the VT100 alignment template on the screen. Ensure that the template lies as flat as possible on the screen.

3. Verify that the display presentation falls within the red shaded area on the alignment template. If the presentation is too large or too small perform the appropriate width or height adjustment.

NOTE
If the centering is correct do not perform the following steps.

4. Remove the alignment template from the screen.

5. With a dark blue or black felt-tip pen, mark the four edges of the screen.

6. Remove the terminal top cover (Paragraph 5.10).

7. Tape the VT100 alignment template to the screen. To orient the template use the felt-tip pen marks placed on the screen in step 5.

8. Set A103 fully counterclockwise.

9. Center the presentation by rotating the centering tabs on the yoke (Figure 4-3).

NOTE
A103 may be used to move the display presentation a small distance horizontally. If A103 is misadjusted, the left side of the screen presentation may be distorted.

10. Replace the terminal top cover if no further adjustments are required.

4.2.7 Vertical Linearity

Use the following procedure to check and adjust for uniform character height.

1. Type the following sequence.

ESC #8

2. Using the VT100 character height template (part number 94-03246-3B) verify that the characters located near the four corners and the center of the presentation fall between the minimum and maximum units of the template.

NOTE
If the vertical linearity is correct do not perform the following steps.

3. Remove the terminal top cover (Paragraph 5.10).

4. Adjust the vertical linearity using A102.

5. Check and adjust the vertical height and vertical hold if needed.

6. Replace the terminal top cover if no further adjustments are required.

4.2.8 Horizontal Linearity

Use the following procedure to check and adjust for uniform character width.

1. Type the following sequence.

ESC #8

2. Using the VT100 character width template (part number 94-03346-3A) verify that the characters located near the four corners and the center of the presentation fall between the minimum and maximum limits of the template.

NOTE
If the horizontal linearity is correct do not perform the following steps.

3. Remove the terminal top cover (Paragraph 5.10).

4. Adjust the horizontal linearity using L102.

5. Check and adjust the horizontal width if needed.

6. Replace the terminal top cover if no further adjustments are required.

4.2.9 Vertical Hold

Use the following procedure to adjust the vertical hold.

1. Remove the terminal top cover (Paragraph 5.10).

2. Set A101 fully counterclockwise.

3. Check and adjust the vertical height and vertical linearity if needed.

4. Replace the terminal top cover if no further adjustments are required.

CHAPTER 5
MODULE REMOVAL AND REPLACEMENT

5.1 GENERAL

This chapter contains procedures for the removal and replacement of the mechanical subassemblies of the VT100.

Figure 5-1 lists all removal procedures in this chapter and the sequence in which they are to be performed. As an example, Figure 5-1 illustrates that to remove the dc power harness, the top cover, bottom cover, and power supply removal procedures must be performed first.

5.2 ACCESS COVER

The following procedure describes the removal and installation of the terminal access cover.

1. Remove power from the terminal by disconnecting the ac plug.

2. Unplug the keyboard.

3. Unplug the connectors from the video input/output jacks.

4. Disconnect the communications cable.

5. With a blade-type screwdriver loosen the four captive screws holding the access cover (Figure 5-2).

6. If the 20 mA Current Loop Option is installed, gently pull the access cover away from the terminal about two inches; then reach in and disconnect J5 from the terminal controller board.

7. Remove the access cover.

8. To install the access cover, perform steps 1 through 7 in reverse.

5.3 TERMINAL CONTROLLER BOARD

The following procedure describes the removal and installation of the terminal controller board.

1. Perform the terminal access cover removal procedure (Paragraph 5.2).

4. Grasp the advanced video board by its edges near the connector and gently but firmly lift the board straight up and off the terminal controller board.

5. To install the advanced video board, perform steps 1 through 4 in reverse.

5.5 20 mA CURRENT LOOP BOARD
The following procedure describes the removal and installation of the 20 mA Current Loop Board.

1. Perform the access cover removal procedure (Paragraph 5.2).

2. With a Phillips head screwdriver, remove the two screws holding the Mate-N-Lok connector to the bottom of the access cover.

3. With a Phillips head screwdriver, remove the three screws holding the 20 mA Current Loop Board to the access cover and remove the board.

4. To install the 20 mA Current Loop Board, perform steps 1 through 3 in reverse.

5.6 KEYBOARD TOP COVER
The following procedure describes the removal and installation of the keyboard cover.

1. Remove power from the terminal by disconnecting the ac plug.

2. Unplug the keyboard from the monitor.

3. Turn the keyboard over so that the keycaps are face down; then place the keyboard on a flat surface.

4. With a blade-type screwdriver, loosen the captive screws holding the keyboard together (Figure 5-4).

5. Grasp the entire keyboard assembly and turn it right side up.

6. Remove the top cover by lifting it straight up.

7. To install the keyboard top cover, perform steps 1 through 6 in reverse.

5.7 KEYBOARD
The following procedure describes the removal and installation of the keyboard.

1. Perform the keyboard top cover removal procedure (Paragraph 5.6).

2. Disconnect keyboard cable J2 from the keyboard.

3. Remove the keyboard.

4. To install the keyboard perform steps 1 through 3 in reverse.

5.8 KEYBOARD CABLE
The following procedure describes the removal and installation of the keyboard cable.

1. Perform the keyboard top cover removal procedure (Paragraph 5.6).

2. Perform the keyboard removal procedure (Paragraph 5.7).

3. Disconnect the keyboard cable from the speaker.

4. Remove the keyboard cable.

5. To install the keyboard cable, perform steps 1 through 4 in reverse.
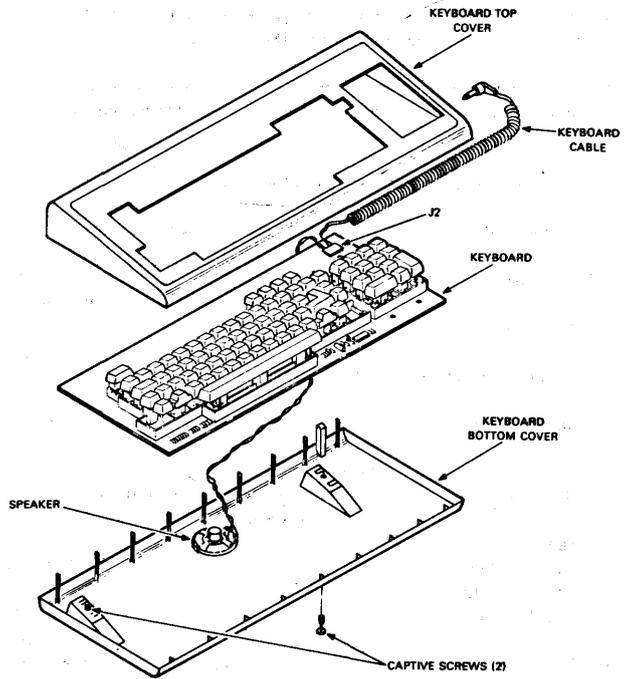
Figure 5-4   Keyboard Disassembly

5.9 KEYBOARD SPEAKER
The following procedure describes the removal and installation of the keyboard speaker.

1. Perform the keyboard top cover removal procedure (Paragraph 5.6).

2. Perform the keyboard removal procedure (Paragraph 5.7).

3. Perform the keyboard cable removal procedure (Paragraph 5.8).

4. Remove the speaker by sliding toward the front edge of the keyboard cover.

5. To install the keyboard speaker, perform steps 1 through 4 in reverse.

5.10 TOP COVER
The following procedure describes the removal and installation of the terminal top cover.

1. Remove power from the terminal by disconnecting the ac plug.

2. Unplug the keyboard.

3. With a small blade-type screwdriver release the two front pop fasteners located under the front lip (Figure 5-5a).

4. With a small blade-type screwdriver release the two rear pop fasteners located on the lower-rear edge of the bottom cover (Figure 5-5b).

5. Remove the top cover by lifting straight up.

6. To install the top cover, perform steps 1 through 5 in reverse.

5.11 VIDEO MONITOR BOARD
The following procedure describes the removal and installation of the video monitor board.

1. Perform the top cover removal procedure (Paragraph 5.10).

2. Remove the circular connector from the base of the CRT (Figure 5-6).

3. Disconnect the four wires from the yoke connection card.

   Tab 1 – Yellow
   Tab 2 – Red
   Tab 3 – Blue
   Tab 4 – Brown

4. Disconnect 4-wire connector J102, located at the bottom of the video monitor board.

5. Disconnect 7-wire connector J104, located at the bottom-center of the video monitor board. Move the harness up and out of the way.

6. Disconnect the in-line connector on the green ground wire.

7. Disconnect video input cable J101 from the top edge of the video monitor board.

8. Release the four standoffs and remove the video monitor board.

9. To install the video monitor board perform steps 1 through 8 in reverse.
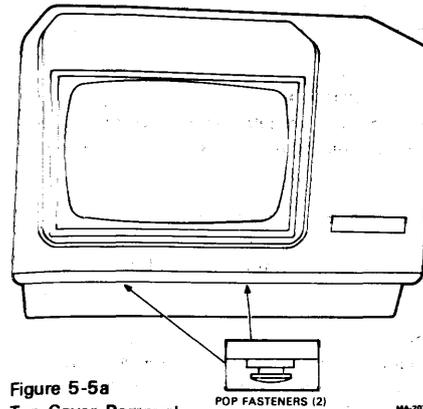

Figure 5-5a
Top Cover Removal
(Front View)

POP FASTENERS (2)   MA-2076
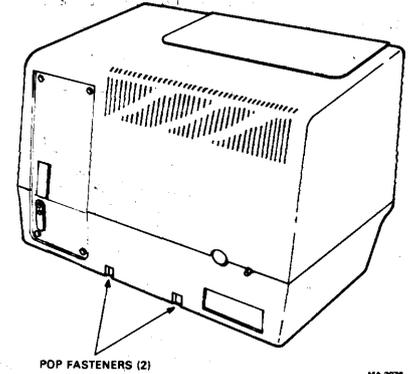
Figure 5-5b
Top Cover Removal
(Rear View)

POP FASTENERS (2)   MA-2076
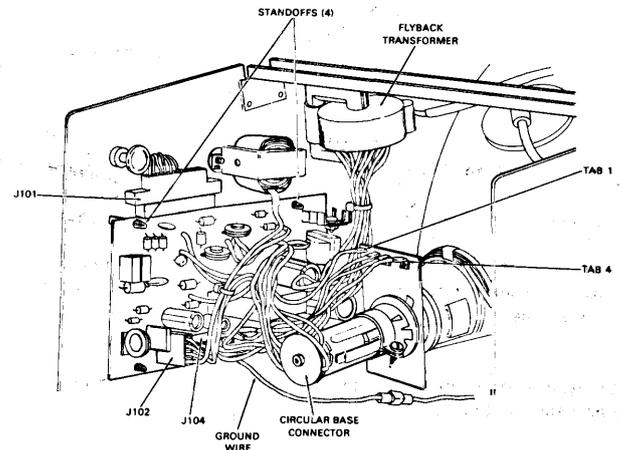
Figure 5-6   Video Monitor Board Removal

5.12 FLYBACK TRANSFORMER

The following procedure describes the removal and installation of the flyback transformer.

WARNING

This procedure deals with the CRT anode which may contain a stored high voltage. Refer to step 3 for the anode discharge procedure.

1. Perform the top cover removal procedure (Paragraph 5.10).

2. Disconnect 7-wire connector J104, located at the bottom-center of the video monitor board. Move the harness up and out of the way (Figure 5-6).

3. Discharge the high voltage contained at the CRT anode by gently slipping the end of an insulated-handle screwdriver under the plastic anode cap on the top of the CRT while shorting the other end of the screwdriver to a nonpainted metal area of the CRT frame (Figure 5-7).
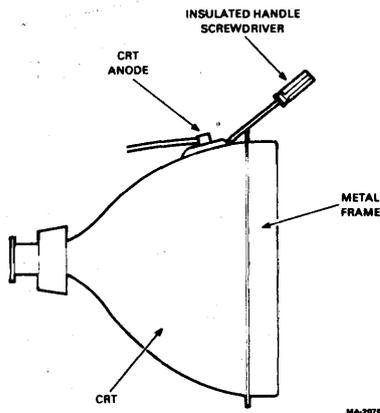
Figure 5-7   CRT Anode Discharging

CAUTION

Do not scratch the CRT glass when discharging the CRT anode.

4. Disconnect the heavy red CRT anode wire from the CRT.

5. Using a 1/4 inch nutdriver, remove the two nuts mounting the flyback transformer to the horizontal cross brace and remove the transformer.

CAUTION

The flyback transformer ferrite material is brittle. Exercise care when handling the transformer.

Ferrite is a conductive material. Remove any pieces that might fall into the chassis to eliminate any possibility of an electrical short.

6. To install the flyback transformer, perform steps 1 through 5 in reverse.

5.13 BOTTOM COVER

The following procedure describes the removal and installation of the terminal bottom cover.

1. Perform the top cover removal procedure (Paragraph 5.10).

2. Disconnect the power cord from the terminal.

3. Release the two front pop fasteners holding the frame to the base by pulling the plunger up.

4. Release the two rear pop fasteners holding the frame to the base by pulling the plunger up.

5. Grasp the metal frame and lift the frame up and out of the terminal.

6. To install the bottom cover perform steps 1 through 5 in reverse.

5.14 POWER SUPPLY

The following procedure describes the removal and installation of the power supply.

1. Perform the top cover removal procedure (Paragraph 5.10).

2. Perform the bottom cover removal procedure (Paragraph 5.13).

3. Release the three pop fasteners on the side of the chassis by pulling the plungers out (Figure 5-8).
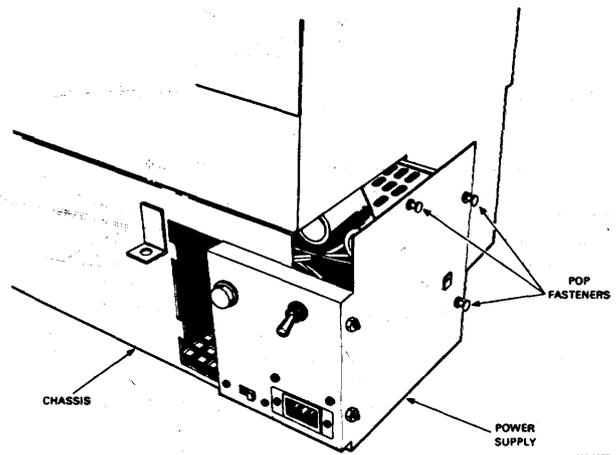
Figure 5-8   Power Supply Removal

WARNING

Capacitors C9, C14, and the surrounding circuits contain a 300 Vdc charge. To discharge the capacitors, leave the power supply plugged into the terminal for a minimum of four minutes after the power cord is removed.

To ensure complete discharge of the capacitors short the capacitors with an insulated wire as shown in Figure 5-9.
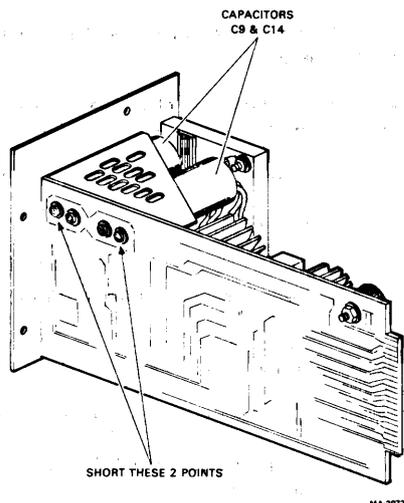
Figure 5-9   Power Supply Capacitor Discharging

4. Grasp the power supply by the end plate and remove the power supply by pulling it straight out.

5. To install the power supply perform steps 1 through 4 in reverse.

5.15   DC POWER HARNESS

The following procedure describes the removal and installation of the dc power harness.

1. Perform the top cover removal procedure (Paragraph 5.10).

2. Perform the bottom cover removal procedure (Paragraph 5.13).

3. Disconnect 10-pin edge connector J101 from the video monitor board (Figure 5-10).

4. Remove the card cage by releasing the two pop fasteners holding the top of the card cage to the chassis. Tilt the card cage top out slightly and then lift the card cage out of the bottom holding clips.

5. Remove the two fasteners holding the 22-pin edge connector to the card cage and then remove the connector.

6. Remove the two fasteners holding the 18-pin edge connector to the chassis and then remove the connector.

7. Remove the dc power harness.

8. To install the dc power harness, perform steps 1 through 8 in reverse.
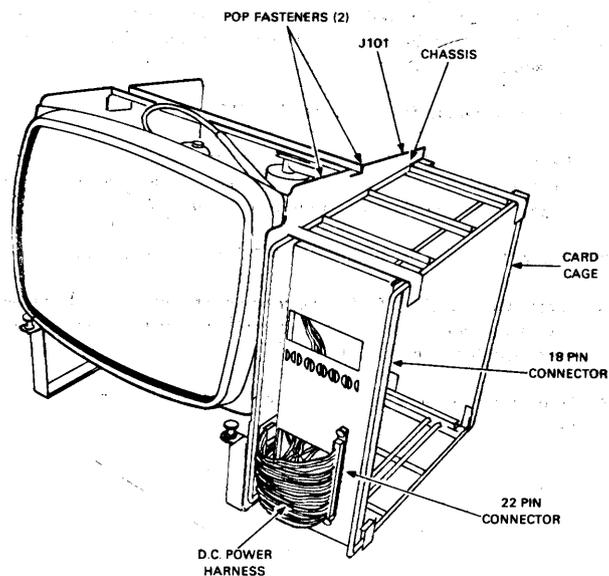
Figure 5-10   DC Power Harness Removal

5.16   FIELD SERVICE CRT MONITOR ASSEMBLY

The CRT is not designated a replaceable item; it should only be replaced as part of the Field Service CRT monitor assembly due to the lack of adequate protective equipment. The following procedure describes the removal and installation of the Field Service CRT monitor assembly.

WARNING

High voltage may be present at the CRT anode. See Paragraph 5.12, step 3 for the anode discharge procedure.

1. Remove the card cage by releasing the two pop fasteners holding the top of the card cage to the chassis. Tilt the cage top out slightly and then lift the card cage out of the bottom holding clips (Figure 5-10).

2. Remove the two fasteners holding the 18-pin edge connector to the chassis and then remove the connector.

3. Replace the Field Service CRT monitor assembly.

WARNING
Do not strike the CRT; this can cause the tube to implode.

4. To install the Field Service CRT monitor assembly, perform steps 1 through 5 in reverse.

5.16.1 CRT Storage and Disposal

All CRTs should be stored in the closed shipping container. Any CRT which has failed must be destroyed. Destruction of the CRT will prevent liability and safety problems.

The proper procedure for destroying the CRT is as follows:

1. Place the defective CRT assembly in the replacement parts shipping container and seal the container. Be sure to mark the side of the container that corresponds to the face of the CRT.

2. Return the defective CRT assembly to the local service office.

3. Locate the face of the CRT in the sealed container. Using a hammer, drive a screwdriver or similar tool through both the shipping container and the face of the CRT.

4. Dispose of the shipping container with the CRT in the normal manner.

CHAPTER 6
VT100 OPTIONS

6.1 GENERAL

This chapter contains detailed descriptions on how to install and check out the Advanced Video Option and the 20 mA Current Loop Option.

6.2 ADVANCED VIDEO OPTION

The Advanced Video Option adds the following features to the Basic VT100:

- Capability of 24 lines of 132 characters each

- Capability of using an alternate character set provides additional character attributes.

6.2.1 Advanced Video Option Installation

Use the following procedure to install the Advanced Video Option:

1. Remove the terminal access cover (Paragraph 5.2).

2. Remove the terminal controller board (Paragraph 5.3).

3. Place the terminal controller board on a flat surface with the component side up.

4. Place a standoff in each of the four mounting holes in the terminal control board (Figure 6-1).

5. Align advanced video connector J1 and mount the advanced video board on the standoffs.

6. Reinstall the terminal controller board and terminal access cover.

6.2.2 Advanced Video Option Checkout

Use the following procedure to check out the operation of Advanced Video Option:

1. Turn the terminal power on and verify that no error was detected during the power up self-test.
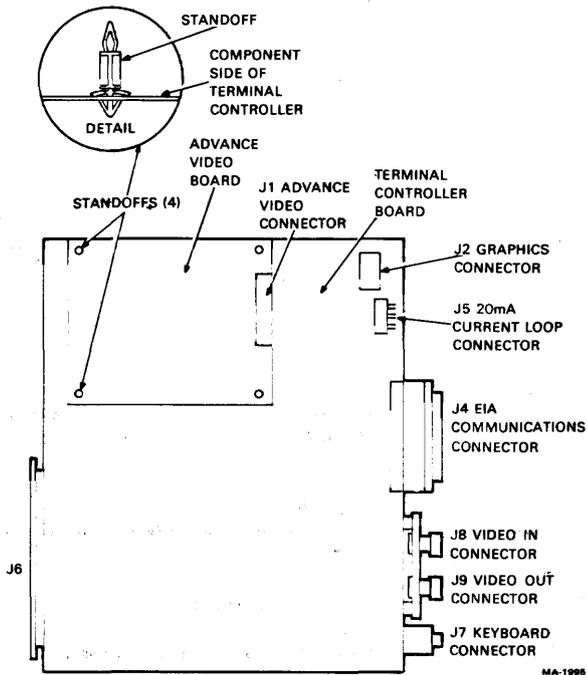
Figure 6-1   Advanced Video Option Installation

2. Press the SET-UP key. The words "SET-UP A" should blink in bold face, the words "TO EXIT PRESS SET-UP" should be underlined, and the ruler should contain alternating normal and reverse video fields.

3. Place the terminal in 132 column mode and then in LOCAL mode.

4. Exit SET-UP and type the following sequence:

    ESC < ESC #8

The screen should now display 24 lines X 132 columns.

6.3   20 mA CURRENT LOOP OPTION
The 20 mA Current Loop Option allows the terminal to communicate directly with the computer over short distances without the use of a modem.

6.3.1   20 mA Current Loop Option Installation
Use the following procedure to install the 20 mA Current Loop Option.

1. Remove the terminal access cover (Paragraph 5.2).
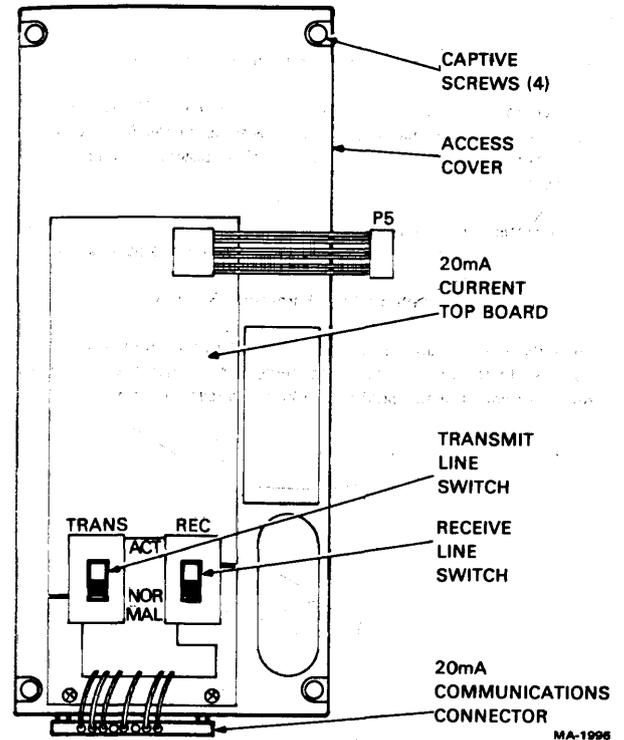
Figure 6-2   20 mA Current Loop Option

2. Place the new terminal access cover containing the 20 mA current loop card down on a flat surface.

3. Set the TRANS switch to the NORMAL position (Figure 6-2). (If the terminal must provide current on the transmit line set the switch to the ACT position.)

4. Set the REC switch to the NORMAL position (Figure 6-2). (If the terminal must provide current on the receive line set the switch to the ACT position.)

5. Connect P5 to J5 on the terminal controller board (Figure 6-1).

6. Install the terminal access cover containing the 20 mA Current Loop Option in place of the old access cover.

7. Connect the communications line to the Mate-N-Lok connector located on the bottom of the access cover.

6.3.2 20 mA Current Loop Option Checkout

Use the following procedure to check out the 20 mA Current Loop Option.

1. Disconnect the terminal from the communications line.

2. Remove the terminal access cover containing the 20 mA current loopback board and place one of the switches in the ACT position. The other switch must be in the NORMAL position. Reinstall the access cover.

3. Connect the 20 mA loopback connector (PN 70-15503-00) to the Mate-N-Lok connector mounted to the bottom of the access cover.

4. Perform the data loopback test (Paragraph 3.1.2.2).

5. Once the test is completed return the 20 mA current loop board switches to the original positions, remove the loopback connector, and reconnect the terminal to the communications line.

CHAPTER 7
PHYSICAL/FUNCTIONAL
BLOCK DIAGRAM

P101
PIN 5 – GROUND
PIN 6 – HORIZ. DRIVE
PIN 7 – +12 VDC
PIN 8 – VIDEO
PIN 9 – VERT. DRIVE
PIN 10 – GND

10 P101 1

10 J101 1

VIDEO
MONITOR
BOARD P/N
30-14590-02-

VERT. HOLD
A101

VERT.
LINEARITY
A102

GROUND

FOCUS
R122

FUSE
F101

+12 V

BRIGHTNESS
R117

A103 VIDEO
CENTERING

R
1
1
0 VERTICAL
HEIGHT

HORZ.
LINEARITY

J
1
0
2

J104 1

L102 E112 L103

HORZ.
WIDTH

E113

D.C. POWER CABLE ASSEMBLY
P/N 70-14978

POWER SUPPLY ASSEMBLY P/N 70-14979

F-1 3A FAST BLOW

110/220
SWITCH
S-2 S-1 POWER SWITCH

F1 FUSE P/N 90-07217
S1 SWITCH P/N 12-15232
S2 SWITCH P/N 12-14155-03

LINE CORD	P/N
115 V USA	1700083-09
230 V USA	1700083-10

POWER CORD COLORS
ARE AS FOLLOWS

VOLTAGE	115 V	230 V
GND	GREEN	GRN/YEL
NEUTRAL	WHITE	BLUE
HOT	BLACK	BROWN
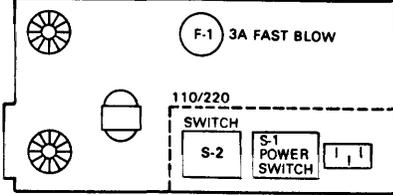
PIN 1 GND
PIN 2 +12 VDC
PIN 3 +12 VDC
PIN 4 GND
PIN 5 –12 VDC
PIN 6 –23 VDC
PINS 8–13 GND
PINS 14–18 +5 VDC

J5
PIN 1 PROT. GND
PIN 2 TRANSMIT
PIN 3 +12 VDC
PIN 4 RECEIVE
PIN 5 SIG. GND
PIN 6 +5 VDC
PIN 7 –12 VDC

P5

20 MIL
OPTION
P/N 70-15273

TRANS   REC
ACT
NORMAL

FIELD SERVICE
CRT MONITOR
ASSY P/N
70-16187

P
1
0
2

P104 1

TO P102
PIN 2

TO P102
PIN 1

L1
VERTICAL
COIL

ADVANCED
VIDEO
OPTION
P/N 54-13097

J1
2 1
7 +5 V
9
41 42 GND
50 49

TERMINAL
CONTROLLER
MODULE
P/N 54-13009

P6 J6

1

22

GRAPHICS
CONN J2 1

20 MIL J5
CONN 1
7

STANDARD
TERMINAL
PORT (STP)

39 1
40 2
J3

EIA
CONN J4

VIDEO IN J8

VIDEO OUT J9

DATA J7

+12 V KYB

GND

DATA GND

+12 V

EIA
COMMUNICATIONS
CABLE
P/N BC05D-10

EIA
SELFTEST
CONN.
P/N 12-15336

TO E113
TO E112
TO P102
PIN 3
TO P102
PIN 4

4 3 2 1

FLYBACK
TRANSFORMER
P/N 30-14590-01

J6
PIN 1 HORIZ. DRIVE   PIN 8 GND
PIN 2 GROUND   PIN 9 –12 VDC
PIN 3 VIDEO   PIN 10 –23 VDC
PIN 4 VERT. DRIVE   PINS 13–17 GND
PIN 7 +12 VDC   PIN 18–22 +5 VDC

SPEAKER
P/N 12-15050

1   5

COILED KEYBOARD
CABLE P/N 70-14652

20 mA
LOOPBACK
CONNECTOR
P/N 70-15503-00

20 mA CURRENT LOOP
COMMUNICATIONS
CABLE
P/N BC05F - 15

TO CRT ANODE
11.5 KV

KEYBOARD
P/N 70-15765

SET-UP o o o o o o o ↑ ↓ ← →

1   5 J2
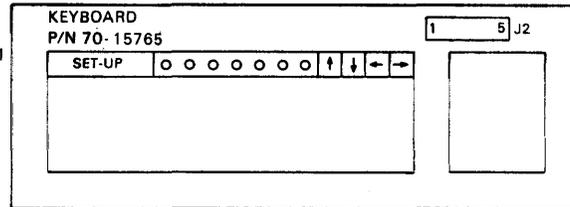
J2 (KEYBOARD)
PIN 1 – SPEAKER
PIN 2 – SPEAKER
PIN 3 – +12 VDC
PIN 4 – GND
PIN 5 – DATA

J4 (CONTROLLER)
PIN 1 PORT GND   PIN 14 –
PIN 2 TRANS DATA   PIN 15 TRANS CLK
PIN 3 REC DATA   PIN 16 –
PIN 4 RTS   PIN 17 REL CLK
PIN 5 CTS   PIN 18 –
PIN 6 DSR   PIN 19 SPEED SEL
PIN 7 SIG GND   PIN 20 DTR
PIN 8 CD   PIN 21 –
PIN 9 –   PIN 22 RI
PIn 10 –   PIN 23 SPEED SEL
PIN 11 SPEED SEL.   PIN 24 –
PIN 12 SI   PIN 25 –
PIN 13 –

MA-2088