VT100 and PDT-11
Video Terminals Maintenance

A Self-Paced/Lab Course

Introduction
Physical/Functional Description

digital

VT100 AND PDT-11 VIDEO TERMINALS MAINTENANCE

INTRODUCTION

(AV-JB904-A8)

COURSE MAP

```
                        ┌──────────────┐
                        │  PDT-11/130  │
                        │ INTELLIGENT  │
                        │  TERMINAL *  │
                        └──────────────┘
                               ▲
         ┌──────────────┐      │
         │    VT105     │  ┌──────────────┐
         │  GRAPHICS    │  │ PDT-11/110   │
         │  TERMINAL *  │  │ INTELLIGENT  │
         └──────────────┘  │  TERMINAL *  │
               ▲           └──────────────┘
               │                  ▲
                           ┌──────────────┐
                           │    VT100     │
                           │    FAULT     │
                           │  ISOLATION   │
                           └──────────────┘
                                  ▲
   ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
   │   REMOVE/     │     │    VT100     │     │   ADJUST/    │
   │   REPLACE     │     │   OPTIONS    │     │    ALIGN     │
   └──────────────┘     └──────────────┘     └──────────────┘
                                  ▲
                           ┌──────────────┐
                           │  OPERATION   │
                           │     AND      │
                           │  ACCEPTANCE  │
                           └──────────────┘
                                  ▲
                           ┌──────────────┐
                           │ INSTALLATION │
                           │     AND      │
                           │    SETUP     │
                           └──────────────┘
                                  ▲
   ┌──────────────┐                         ┌──────────────┐
   │  THEORY OF    │                         │  PHYSICAL/   │
   │ OPERATION *   │                         │  FUNCTIONAL  │
   └──────────────┘                         │ DESCRIPTION  │
                                            └──────────────┘
                           ┌──────────────┐
 * To be provided in a     │ INTRODUCTION │
   course update.          └──────────────┘
```

* To be provided in a course update.
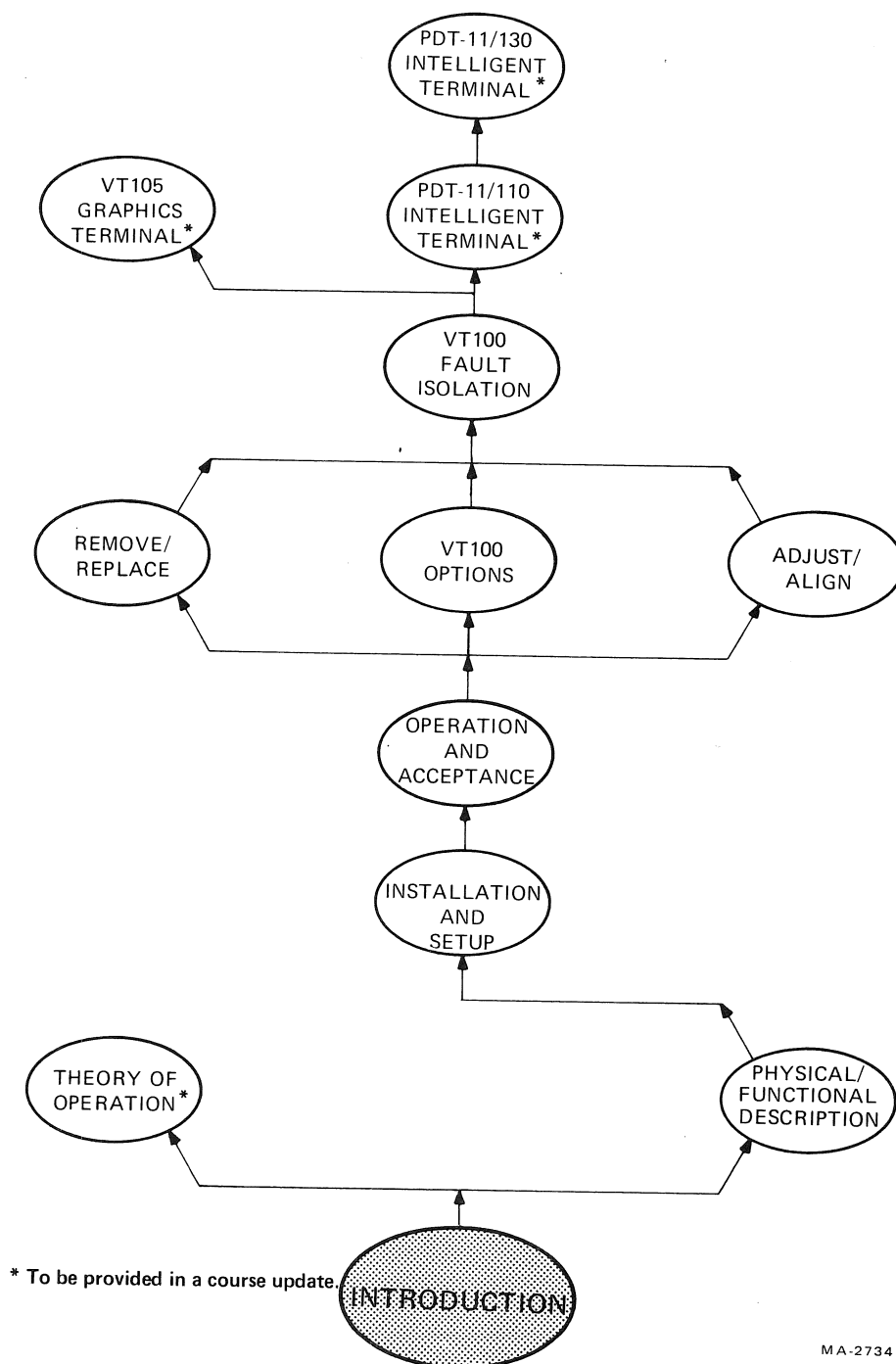
MA-2734

INTRODUCTION

CONTENTS

INTRODUCTION

This module will supply you with a general description of the capabilities, the physical and electrical specifications, and the basic functions of the VT1ØØ video terminal. You will not be tested on this module but it does provide you with information which will be valuable in interfacing with your customers.

In order to install and maintain the VT1ØØ video terminal, you should understand what the basic VT1ØØ is capable of doing, which features are standard, and which features are optional.

The basic VT1ØØ is the first member of a new family of ASCII alpha-numeric video display terminals being developed and manufactured by DIGITAL EQUIPMENT CORPORATION. The purpose of the VT1ØØ is to provide a basic modular video display terminal system which can be field upgradable from a low cost, simple video terminal to a smart or even an intelligent video terminal through the addition of optional printed circuit boards (PCBs) and yet be highly serviceable and easy to repair.

GENERAL DESCRIPTION

The basic VT100 video terminal is a self-contained desk top unit which consists of a 12" Cathode Ray Tube (CRT) Monitor, a single 10" X 10" printed circuit board controller, a 95 watt, 110/220 volt, 47-63 Hz power supply, and a 83 key detached keyboard. The CRT monitor assembly weighs 30 pounds and the keyboard weighs 4.5 pounds. See Figure 1 for the physical dimensions of the VT100.
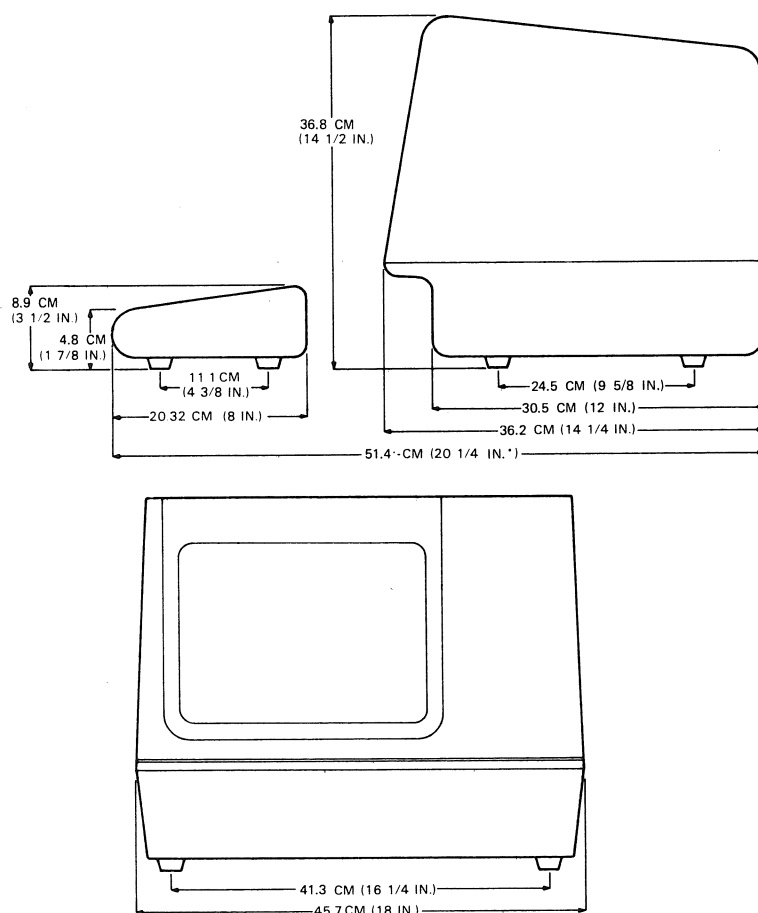
*MEASUREMENT TAKEN WITH THE KEYBOARD PLACED FLUSH TO FRONT OF TERMINAL UNDER UNDERCUT.

MA-1991

Figure 1. VT100 Physical Dimensions

FEATURES

The VT100 controller PCB contains the logic to:

1. control the terminal;
2. generate the display presentation; and
3. handle the communications with the host computer over an Electronics Industry Association (EIA) compatible modem.

The basic VT100 can display information in an 80 column by 24 line format or in a 132 column by 14 line format. This is selectable by the operator or the host computer. The character generator can produce both the standard US and the United Kingdom character sets, six displayable control codes (graphic representations of the Horizontal Tab, Vertical Tab, Carriage Return, Line Feed, Form Feed, and New Line functions), and displayable line segments which allow the terminal to be used for very limited graphics.

The characters displayed on the screen are formed using a 7X9 dot matrix (Figure 2) and can be displayed as white characters on a dark background or as black characters on a white background.

The VT100 also provides a choice in the type of cursor displayed on the screen. It can be either a flashing underline or block of video which is the opposite of the screen background.
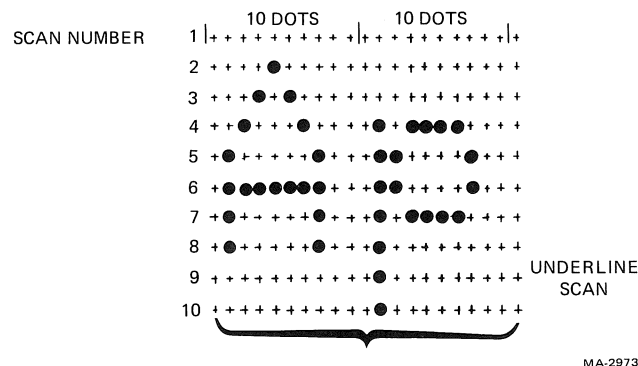

Figure 2. Character Presentation Technique

Another feature of the basic VT100 is the ability to highlight important information on the display either by underlining the information or by displaying the information as the reverse of that used to display the normal screen presentation. The type of cursor selected in SET-UP mode, underline or reverse, controls which highlighting feature is to be used. The selected highlighting feature is then turned on by receiving either the escape sequence to underscore (underline) or to reverse video.

All information which follows either escape sequence will be displayed with the same highlight features as the cursor, regardless of which escape sequence is received. To stop the highlighting of information, the VT100 must receive an escape sequence to turn of all highlighting. These escape sequences are contained in the OPERATION AND ACCEPTANCE Module (AV-JB910-A8) of this course.

Under the control of the operator or the host computer, the VT100 can display lines of characters that are twice their normal size in both height and width or in width only. These features are called Double Height-Double Width, and Double Width-Single Height respectively. When using these modes the amount of information which can be presented on the screen is reduced, both in the number of columns and in the number of lines.

The VT100 terminal provides two modes of scrolling information on the screen: jump scroll and smooth scroll. Scrolling is the vertical movement of the existing lines of information to make room for the new lines. In jump scroll mode information appears to jump up or down the screen a line at a time. In the smooth scroll mode the information moves one tenth of a chararacter line at a time, yielding a very smooth movement to the data, thus resulting in reading ease. The type of scrolling used is the choice of the operator or the host computer system.

The VT100 communicates with the host computer using full duplex, serial asynchronous transmission. In full duplex, information can be transmitted to and received from the host computer at the same time. Serial asynchronous transmission means that the seven or eight bits required to represent a unit of information (character) is transmitted sequentially and is framed by a start bit and stop bit so that the characters can be separated in time.

The VT100 can receive from and transmit to a host computer at speeds anywhere from 50 to 19,200 baud (bits per second). The receiver can be using a different speed than the transmitter. The possible baud rates are 50, 75, 110, 134, 150, 200, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, and 19200.

The basic VT100 also provides a choice as to the number of bits per character (7 or 8) used in transmission and reception of data to and from the host. The customer also has a choice of having parity enabled or disabled, and if parity is enabled a choice as to whether to use an odd or even parity check. Parity checking and generation is a means used to detect single bit errors during the transmission of data to and from the host computer. The character set used during communications is the American Standard Code for Information Interchange (ASCII)

The VT100 has only two switches on the unit: the power on/off switch (S1) and a voltage range selection switch (S2). All other features which would normally be set with switches or jumpers (such as the baud rates, ac line frequency, bits per character, etc.) are stored in a non-volatile random access memory (NVR).

The VT100 has a power-up internal diagnostic feature which verifies the major functions of the terminal when the terminal is first turned on. There are two additional internal diagnostics which, in conjunction with two special loop-back connectors, can check the communication interface to ensure that it is intact.

See Table I-1 for a summary of the physical and electrical specifications of the VT100.

Table 1. VT100 Specifications   (Sheet 1 of 2)

Dimensions

Monitor	Height: 36.8 cm (14.5 in) Width: 45.7 cm (18 in) Depth: 36.2 cm (14.25 in)
Keyboard	Height: 8.9 cm (3.5 in) Width: 45.7 cm (18 in) Depth: 20.3 cm (8 in) Minimum Table Depth: 51.435 cm (20.25 in)

Weight

Monitor	13.6 kg (30 lbs)
Keyboard	2.0 kg (4.5 lbs)
Shipping Weight	18.6 kg (41 lbs)

Environment

Operating	Temperature 10° C to 40° C (50° F to 104° F) Relative Humidity 10% to 90% Maximum Wet Bulb 28° C (82° F) Minimum Dew Point 2° C (36° F) Altitude 2.4 km (8,000 ft)
Non-Operating	Temperature -40° C to 66° C (-40° F to 151° F) Relative Humidity 0 to 95% Altitude 9.1 km (30,000 ft)

Power

Line Voltage	90 - 128 V RMS single phase, 2 wire 180 - 256 V RMS single phase, 2 wire (Switch Selectable)
Line Frequency	47 - 63 Hz
Current	3.0 A RMS maximum at 115 V RMS 1.5 A RMS maximum at 230 V RMS
Input Power	250 VA apparent 150 Watts maximum
Current Limiting	3 A normal blow fuse
Power Cord	detachable, 3 prong, 1.9 meters (6 ft)

Table 1. VT1ØØ Specifications   (Sheet 2 of 2)

Display

CRT	12 in diagonal measure P4 phosphor
Format	24 lines x 8Ø characters or 14 lines x 132 characters (Selectable)
Character	7 x 9 dot matrix with descenders
Character size	in 8Ø column mode: 3.35 mm x 2.Ø mm (Ø.13 in x Ø.Ø78 in) in 132 column mode: 3.35 mm x 1.3 mm (Ø.13 in x Ø.Ø51 in)
Active Display Size	2Ø2 mm x 115 mm (8 in x 4.5 in)
Character Set	96 character displayable ASCII subset (upper and lower case, numeric, and punctuation.)
Cursor Type	Keyboard selectable blinking block character or blinking underline.

VT100 OPTIONS

At the present time the VT100 has two option which are available. These are the Advanced Video Option and the 20ma Current Loop Communication Option.

The Advanced Video Option (AVO) is a plug-in module which mounts on the Terminal Controller PCB and provides; additional memory to allow a 24 line by 132 column screen format, space for additional Read-Only program memory, the ability to have a second character generator chip installed on the Terminal Controller.

The AVO also provides additional ways of highlighting important information on the screen on a character by character basis. These additional highlighting features are the ability to blink information and to make the information brighter (Bold). Also with the AVO installed the VT100 can use both underscore and reverse video, independent of the type of cursor selected. This provides more capability than that offered with the basic VT100. All of the above highlighting features can be used independently or in any and all combinations giving the customer up to sixteen different ways of making information stand out.

The 20mA Current Loop Communications Option allows the terminal to communicate over a 20mA current loop communication facility to the host processor instead of using the standard EIA interface which normally requires the use of modems. This option is normally used when the terminal is in the same building as the host computer while modems are used when you must go over greater distances.

In the future other options will be added to the VT100, some of these options will possibly be a printer adapter, an internal modem, other communications options, etc. As these different options are added to the equipment new course modules will be added to this course's OPTION and FAULT ISOLATION sections. All you will then need to do is study the new modules, if you are proficient with the basic course material which you will cover in the following modules.
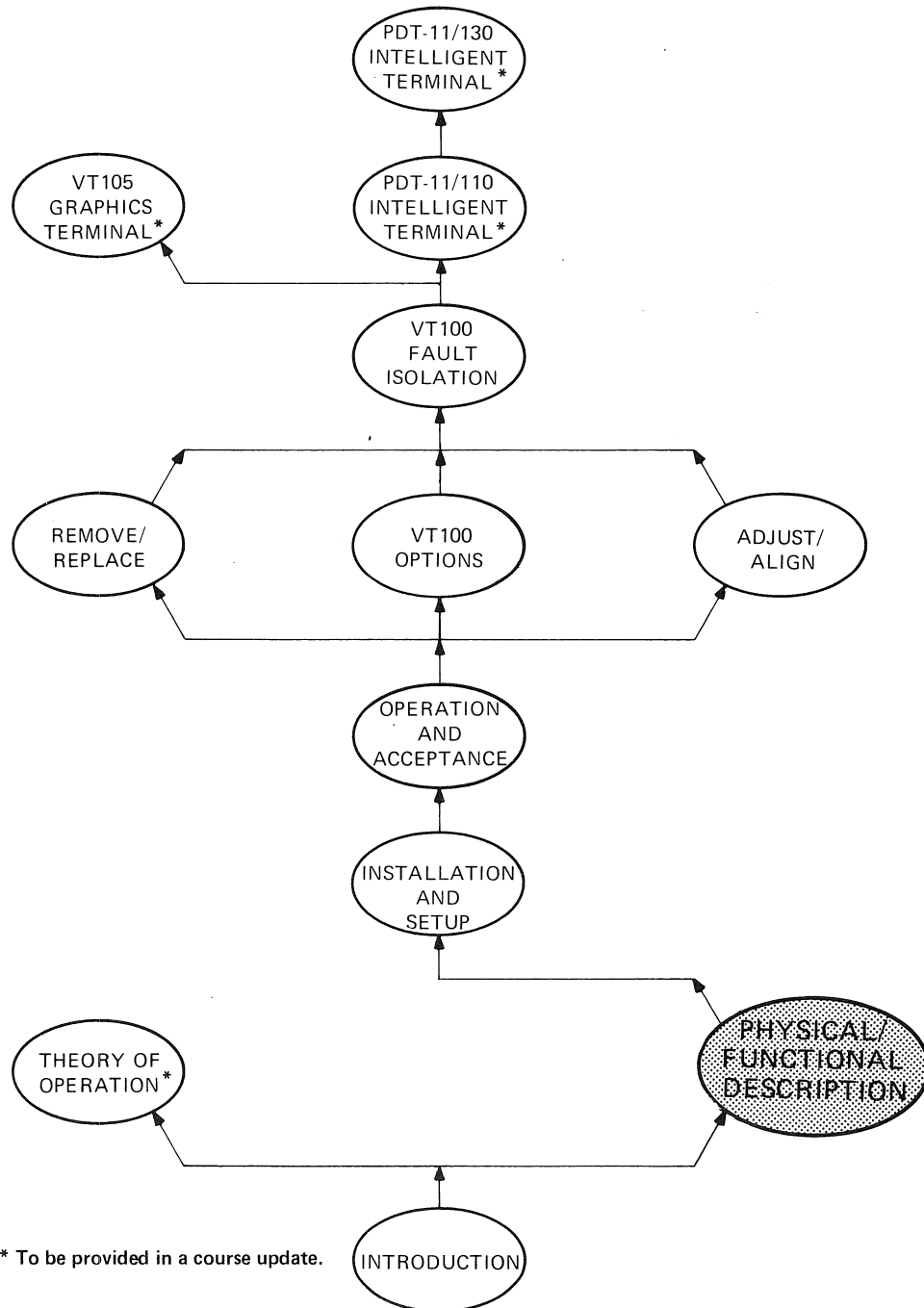
VT100 AND PDT-11 VIDEO TERMINALS MAINTENANCE

PHYSICAL/FUNCTIONAL DESCRIPTION

(AV-JB904-A8)

COURSE MAP

PDT-11/130
INTELLIGENT
TERMINAL*

VT105
GRAPHICS
TERMINAL*

PDT-11/110
INTELLIGENT
TERMINAL*

VT100
FAULT
ISOLATION

REMOVE/
REPLACE

VT100
OPTIONS

ADJUST/
ALIGN

OPERATION
AND
ACCEPTANCE

INSTALLATION
AND
SETUP

THEORY OF
OPERATION*

PHYSICAL/
FUNCTIONAL
DESCRIPTION

* To be provided in a course update.

INTRODUCTION

MA-2734

Physical/Functional Description

CONTENTS

Physical/Functional Description

INTRODUCTION

This module is one of the key elements which will enable you to perform the major maintenance tasks associated with the VT100. These major tasks are diagnosing and isolating problems, locating the faulty FRU, removal and replacement of the suspected FRU and then the verfication that the problem has been repaired by operating the terminal.

The purpose of this learning module is to assist you in the identification, location, and understanding of the major functions of the FIELD REPLACEABLE UNITS (FRUs) which make up the Basic VT100 video terminal. The knowledge of the physical and functional relationships which you will gain in this module is a building block towards the total understanding you will need to maintain the VT100 Based Video terminals.

This page is for notes.

┌──────────────── **OBJECTIVE 1** ─────────────────┐
│   │
│ Provided with the name of the Field Replacement Unit │
│ and a selection of functional descriptions match each │
│ FRU to its major function.   │
│   │
│ The Field Replacement Units are: │
│   │
│   ● Power Supply   │
│   ● DC Power Harness   │
│   ● Terminal Controller PCB   │
│   ● Video Monitor PCB   │
│   ● Flyback Transformer   │
│   ● Field Service CRT Monitor Assy.   │
│   ● Keyboard PCB   │
│   ● Keyboard Cable   │
│   ● Speaker   │
│   │
└──┘

┌─────────────── **SAMPLE TEST ITEM 1** ───────────────┐
│   │
│ Provided with the name of the Field Replacement Unit │
│ and a selection of functional descriptions match each │
│ FRU to its major function. Blacken the letter in │
│ front of your response.   │
│   │
│ FIELD REPLACEMENT UNIT   FUNCTIONAL DESCRIPTION │
│   │
│ Terminal Controller   A. Controls the CRT   │
│   presentation only. │
│   │
│   B. Emulates the VT52 Video │
│   Terminal only.   │
│   │
│   C. Controls the flow of │
│   information to the host │
│   computer only.   │
│   │
│   D. Controls the flow of │
│   information from the │
│   Keyboard to the host │
│   computer and from the │
│   host computer to the CRT │
│   screen.   │
│   │
└──┘

This page is for notes.

```
┌──────────── OBJECTIVE 2 ─────────────────────┐
│                                              │
│                                              │
│  Provided with the Connector number and a selection of  │
│  functional descriptions for the connectors on the      │
│  Terminal Controller and Video Monitor PCBs match each  │
│  connector to its function.                             │
│                                              │
│  The connector numbers are:                  │
│                                              │
│        ●   J1            ●   J2              │
│        ●   J3            ●   J4              │
│        ●   J5            ●   J6              │
│        ●   J7            ●   J8              │
│        ●   J9            ●   J101            │
│        ●   J102          ●   J104            │
│                                              │
└──────────────────────────────────────────────┘
```

```
┌──────────── SAMPLE TEST ITEM 2 ──────────────┐
│                                              │
│  Provided with the Connector number and a selection of │
│  functional descriptions match each connector to its   │
│  function.  Blacken out the letter in front of your    │
│  response.                                   │
│                                              │
│     Connector Number          Connector Function       │
│                                              │
│           J1             A.  External Video   │
│                              input connec-    │
│                              tion.            │
│                                              │
│                          B.  Connection point │
│                              for the 20 mA    │
│                              current loop     │
│                              communication    │
│                              option.          │
│                                              │
│                          C.  Connection point │
│                              for the Keyboard │
│                              cable.           │
│                                              │
│                          D.  Connection point │
│                              for the advanced │
│                              Video option.    │
│                                              │
└──────────────────────────────────────────────┘
```

┌─────────────────────── **RESOURCES** ───────────────────────┐
│   │
│ VT100 Mini Maintenance Hardware Guide   EK-VT100-J1-001 │
│   │
│ VT100 User Guide   EK-VT100-UG-001 │
│   │
└───┘

Physical/Functional Description

THE FIELD REPLACEABLE UNITS

The VT100 consists of nine Field Replaceable Units (FRUs). The functions and physical locations of each of these FRUs will be covered in this module. The nine FRUs are as follows:

- Power Supply Assembly
- DC Power Harness
- Terminal Controller PCB
- Video Monitor PCB
- Flyback Transformer
- Field Service Replacement CRT Monitor Assembly
- Keyboard PCB
- Speaker
- Keyboard Cable

The Physical/Functional Block Diagram, found in the VT100 Mini Maintenance Hardware Guide, will help you:

1) physically identify each FRU
2) identify each FRU by part number
3) identify each connector and its function
4) determine the interrelationship of the FRUs.

> At this time locate each FRU on the Physical/Functional Block Diagram.

In addition to these nine FRUs there are optional units which are considered FRUs when installed in the basic VT100. These units will be covered in the VT100 OPTIONS Module (AV-JB914-A8) of the course. This module deals with the basic VT100 only.

POWER SUPPLY ASSEMBLY P/N 70-14979

The VT100 Power Supply is considered a one-piece unit under the recommended maintenance philosophy. It is physically located in the lower left rear corner of the CRT Monitor Chassis and is held in place by three expansion lock (POP) fasteners (Figure 1).
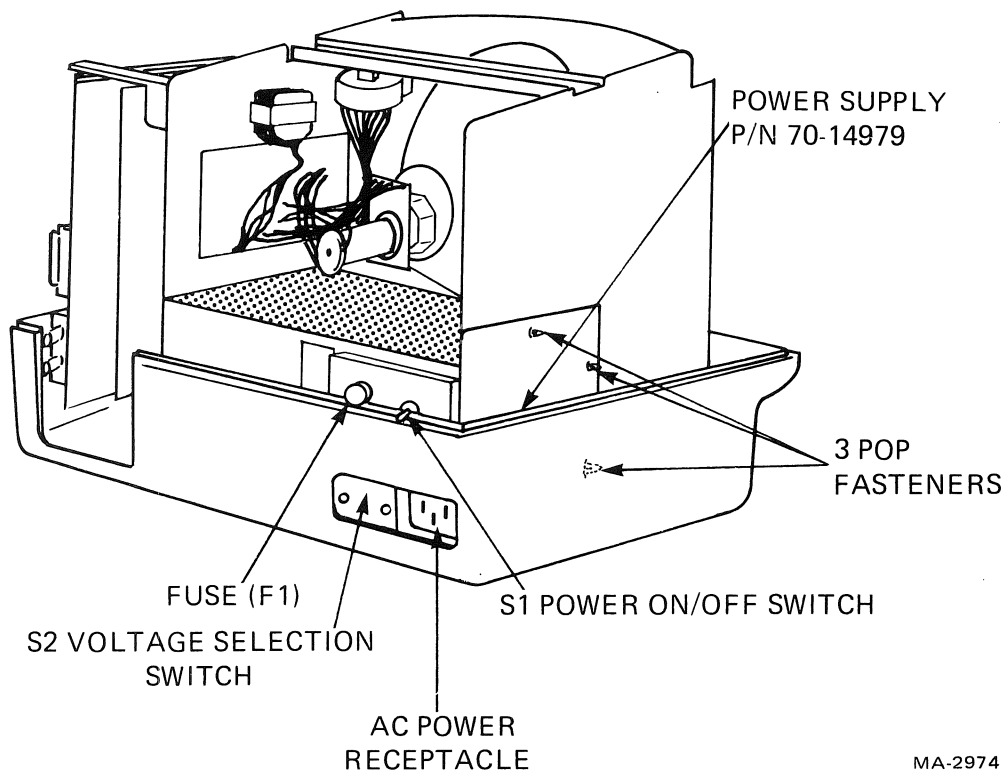
Figure 1. VT100 Power Supply Location

The VT100 Power Supply is capable of operating with either 110V (90V to 128V) or 220V (180V to 256V) volts ac at a frequency of 47 to 63 Hz. The voltage selection switch (S2) is a slide switch located on the Power Supply next to the input power connector. The switch is labeled so that it displays the voltage range selected. To match the Power Supply to the available ac voltage simply use a small screwdriver to slide the switch either left or right to display the correct voltage range. The second switch on the

power supply is the Power ON/OFF toggle switch (S1) and is
located above the ac input power recepticle. Also located
on the Power Supply is the line fuse (F1) which is used to
protect the unit from drawing to much power. The Power
Supply is protected by a 3.0 AMPS, normal acting fuse.

> Using Figure 1 and the Physical/Functional
> Block Diagram locate the following:
>
> - ac Recepticle
> - Voltage Selection switch(S2)
> - Power ON/OFF switch(S1)
> - Fuse (F1)
> - Pop Fastners

The function of the Power Supply is to convert the ac
line voltage into four dc voltages needed to operate the
terminal. The power supply has no adjustments. All output
voltages are over-current protected. This means that if the
unit draws to much current from the supply regulators the
power supply will automatically reduce the output current
and voltage to protect the regulator circuits from being
destroyed. The dc voltages developed in the power supply
are:

- +5 Vdc at 11.0 AMPS maximum which is used by the
  Terminal Controller and any options which plug into
  the Controller.

- +12 Vdc at 2.75 AMPS maximum which is used by the
  Terminal Controller, the Keyboard, the Video Monitor
  PCB and as the CRT filament voltage.

- -12 Vdc at .5 AMPS maximum which is used by the
  Terminal Controller.

- -23 Vdc at 10 milliamps maximum which is used only by
  the Terminal Controller for the NVR memory.

All the dc voltages are fed out of the power supply via
the edge connector which plugs into the 18 pin connector of
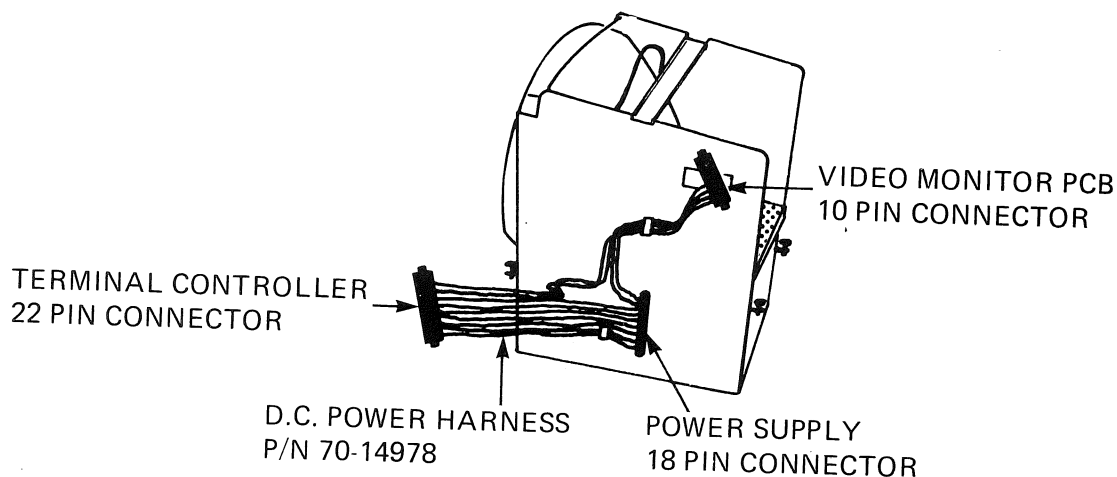the dc Power Harness.

DC POWER HARNESS P/N 70-14978

The dc Power Harness assembly (Figure 2) has three con-
nectors:

- 22 pin connector to the Terminal Controller PCB,
- 10 pin connector to the Video Monitor PCB,
- 18 pin connector to the Power Supply

The power supply and the Terminal Controller connectors
mount to their respective chassis and are held in place with
screws and nuts or Retainer Rings, "E" clip fasteners.

> Using Figure 2 and The Physical/Function-
> al Block Diagram locate and identify the
> dc Power Harness and connectors.

VIDEO MONITOR PCB
10 PIN CONNECTOR

TERMINAL CONTROLLER
22 PIN CONNECTOR

D.C. POWER HARNESS
P/N 70-14978

POWER SUPPLY
18 PIN CONNECTOR

MA-2975

Figure 2. dc Power Harness

The dc Power Harness distributes the voltages from the
Power Supply to the Terminal Controller and the Video
Monitor PCBs. The harness also carries the video drive
signals which are used to generate the screen presentation
from the Terminal Controller PCB to the Video Monitor PCB.

TERMINAL CONTROLLER PCB P/N 54-13009

The Terminal Controller, a single 10.5 in^2 PCB, is the brain of the VT100 terminal. It controls the flow of information from the keyboard to the host computer and from the host computer to the CRT screen. To accomplish this, the Terminal Controller contains the following functional sections:

- 8080 Microprocessor and associated logic
- 8K Read Only Memory (ROM)
- 3K Read/Write Memory (RAM)
- Keyboard Interface Logic
- EIA Communications Logic
- Video Processor Logic

The Terminal Controller PCB always mounts in slot 1, the left most card slot in the card cage when viewed from the rear.

> Using Figure 3 and The Physical/Function-
> al Block Diagram locate the Terminal Con-
> troller.
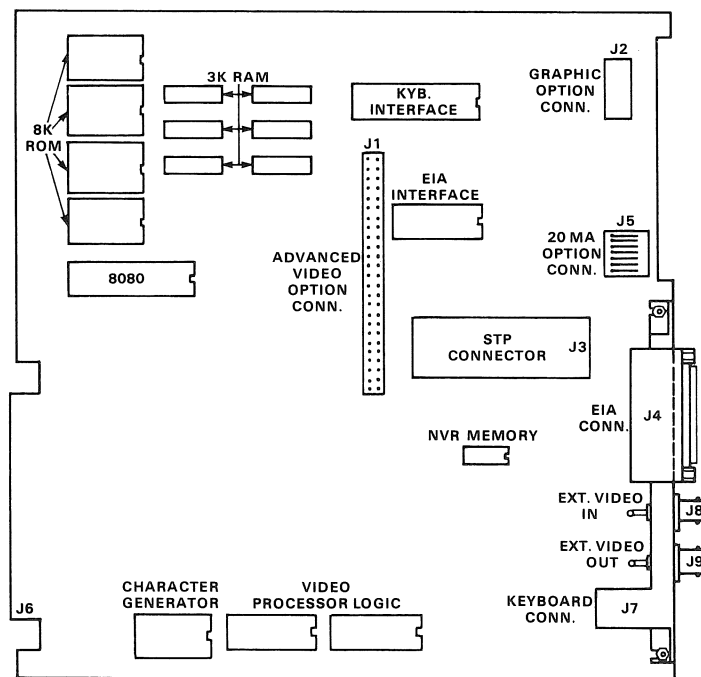
Figure 3. Terminal Controller

The Terminal Controller PCB has nine connectors and each connector is used for a different function. The connection numbers and functions are as follows:

CONNECTOR NUMBER   FUNCTION

J1   A 50 pin connector used as the connection point for the advanced video option.

J2   An 18 pin dual in-line IC type connector used to connect the M7071 graphics processor option to the basic VT100.

J3   A 40 pin connector which will be used for future options. This connector is also called the Standard Terminal Port (STP).

J4   A 25 pin connector used to connect the terminal to the EIA communications line.

J5   A 7 pin connector used to connect the 20mA current loop communications option to the basic VT100.

J6   The 22 pin PCB edge connector used to connect the Terminal Controller to the Power Supply and the Video Monitor PCB via the dc Power Harness.

J7   The phone jack used to connect the Keyboard to the Terminal Controller.

J8   The top BNC, coax, connector which allows the customer to feed an external video source into the terminal.

J9   The bottom BNC, coax, connector which allows a customer to connect a slave monitor to the VT100.
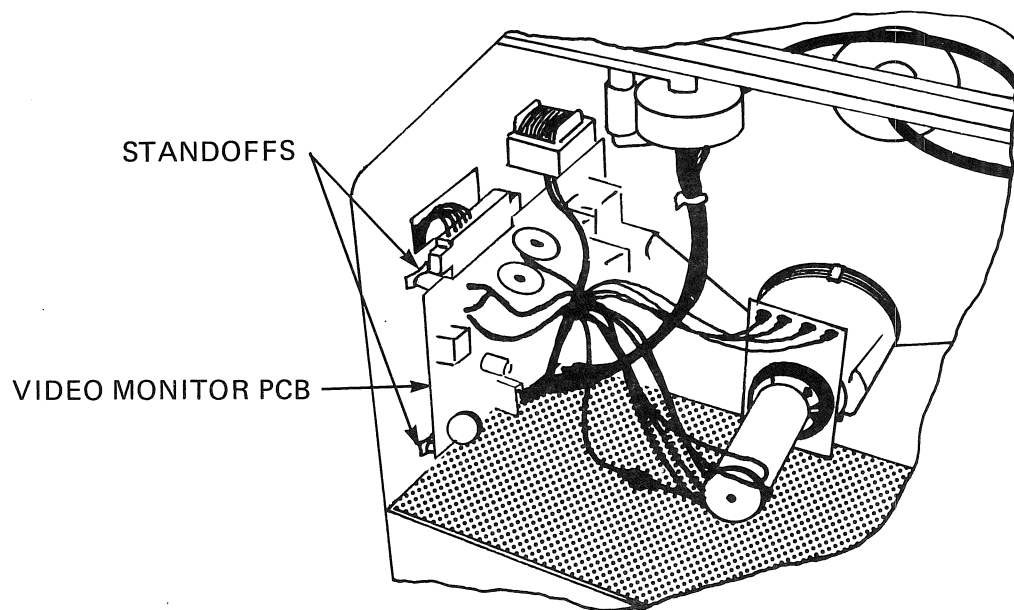
> Using Figure 3 and the Physical/Function-
> al Block Diagram locate and identify the
> nine connectors on the Terminal Control-
> ler.

VIDEO MONITOR PCB P/N 30-14590-02

The Video Monitor PCB contains circuits which accomplish the following functions:

- Generate horizontal and vertical beam deflection signals for moving the electron beam from left to right and from top to bottom of the screen.

- Generate the beam modulation signals for turning on and off the dots which make up the characters on the screen.

- Rectify the high voltages supplied from the Flyback Transformer to control the focus and the intensity of the information presented on the CRT screen.

When you stand behind the unit you will find the Video Monitor PCB mounted on the left wall of the CRT Monitor Assembly with four stand-offs (Figure 4).

STANDOFFS

VIDEO MONITOR PCB

MA-2977

Figure 4. Video Monitor PCB Location

The Video Monitor PCB receives its input power (+12Vdc)
from the Power Supply and its drive signals from the
Terminal Controller via the dc Power Harness at connector
J101. Connector J104 is used to pass signals to and from
the Flyback Transformer. J102 provides connections to
the Vertical Coil and the Vertical Yoke. The wire
bundle which is soldered to the Video Monitor PCB feeds
signals to the CRT base connector, the Horizontal Yoke, and
CRT ground connections.

> Using Figure 5 and the Physical/Function-
> al Block Diagram, locate and identify
> each Connector.
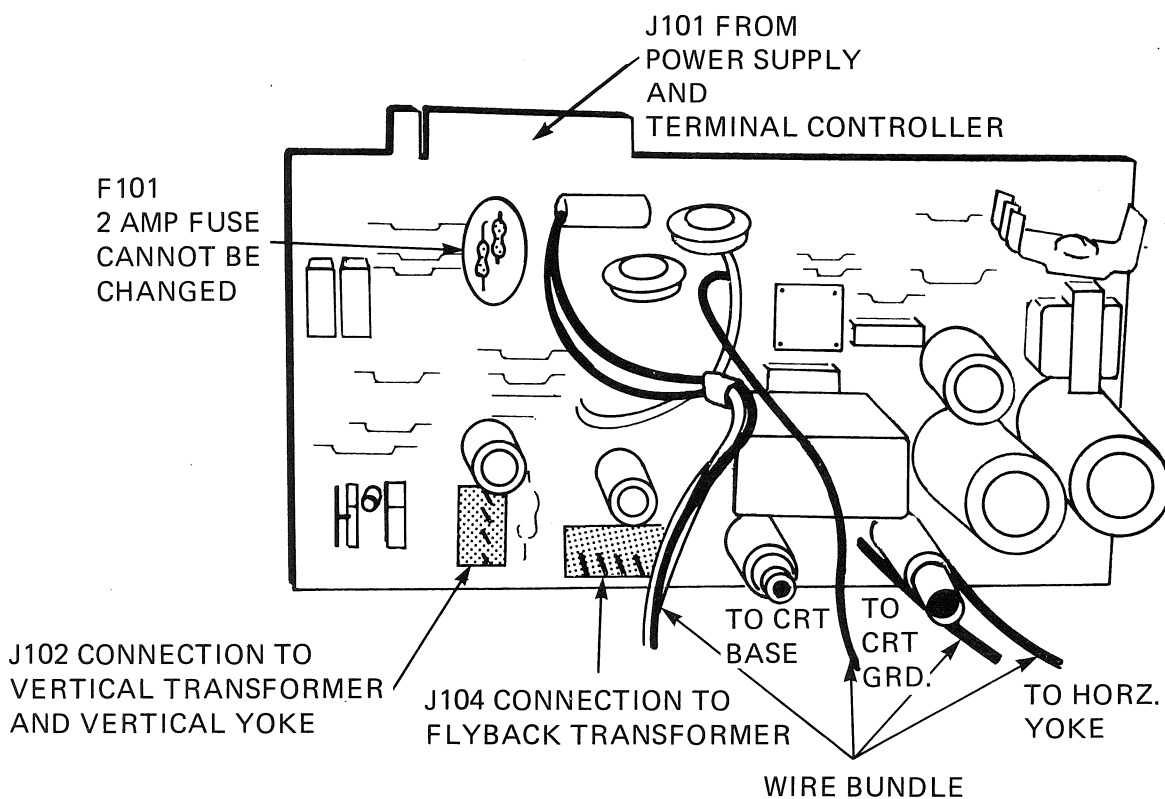
Figure 5. Video Monitor Connectors

The Video Monitor PCB contains a 2 amp pico-fuse F101. If the fuse fails the Video Monitor PCB will have to be replaced. See Figure 5 for location.

There are eight adjustments on the Video Monitor PCB. They are used to control:

- The size of the screen presentation
- The size of the characters
- The brightness of the characters
- The focus of the characters.

The name, number, and location of each of these adjustments are called-out in Figure 6 and on the Physical/Function block diagram. The adjustments are:

NAME	NUMBER	FUNCTION
Horizontal Linearity	L102	Adjusts horizontal size of the characters to be equal on the right and left sides of the screen.
Horizontal Width	L103	Adjusts horizontal screen size
Video Centering	A103	Adjusts the horizontal positioning of the character dots within the raster.
Brightness	R117	Controls the brightness of the raster. It should be set so that the raster just disappears from the screen.
Focus	R122	Adjusts sharpness of the characters

NAME	NUMBER	FUNCTION
Vertical Hold	A101	Locks screen vertically
Vertical Linearity	A102	Adjusts the vertical character size to be equal at the top and bottom of the screen.
Vertical Height.	R110	Adjusts vertical screen size

> Using Figure 6 and the Physical/Functional Block Diagram Locate each of the Video Monitor Adjustments.
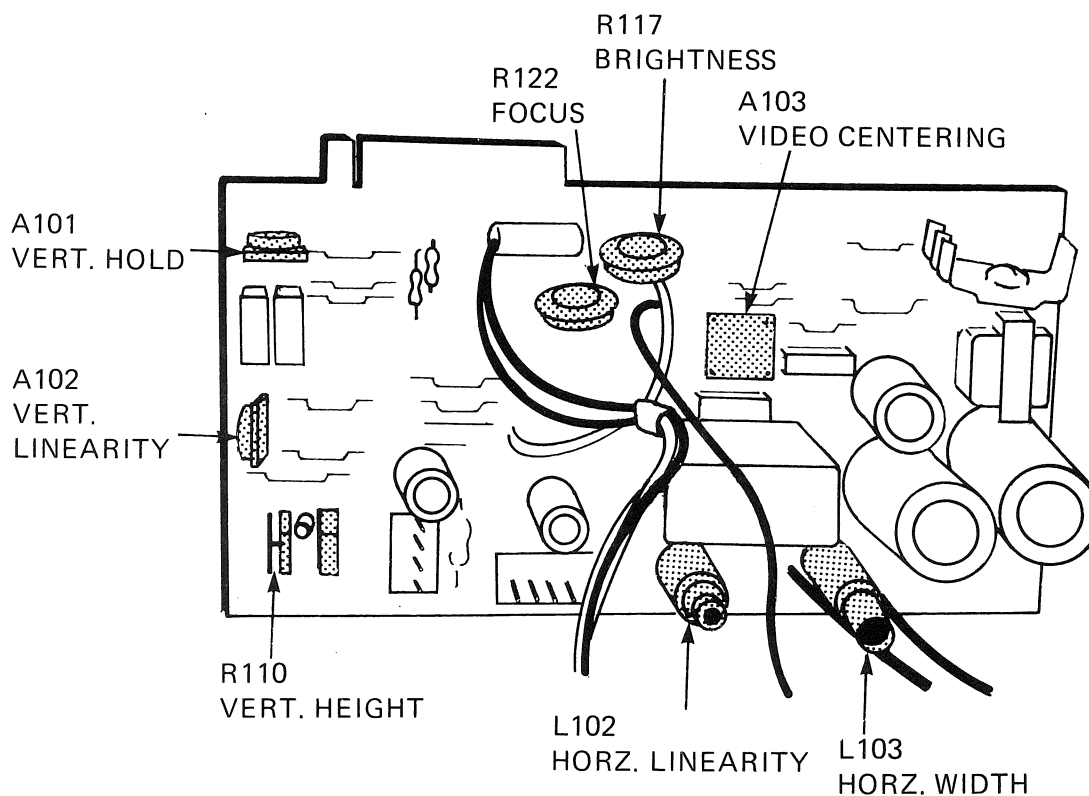

Figure 6. Video Monitor Adjustment Location

The procedures on how to perform these adjustments are discussed in the ADJUST/ALIGN module (AV-JB912-A8) of this course.

FLYBACK TRANSFORMER P/N 30-14590-01

The Flyback Transformer is located above the CRT on the horizontal cross brace (Figure 7). The function of the Flyback transformer is to generate all of the high voltages required for the Video Monitor Assembly. The Flyback Transformer develops the high voltages from the horizontal deflection signal which moves the electron beam from right to left on the screen. The voltages developed are 11.5KV for the CRT anode, and 400Vdc and 32Vdc for the Video Monitor PCB to control the focus, beam shaping, and brightness of the CRT.

The Flyback Transformer receives the drive signal from the Video Monitor PCB via connnector J104. The 11.5KV is connected to the CRT through the heavy red wire.

CRT ANODE CAP

FLYBACK TRANSFORMER
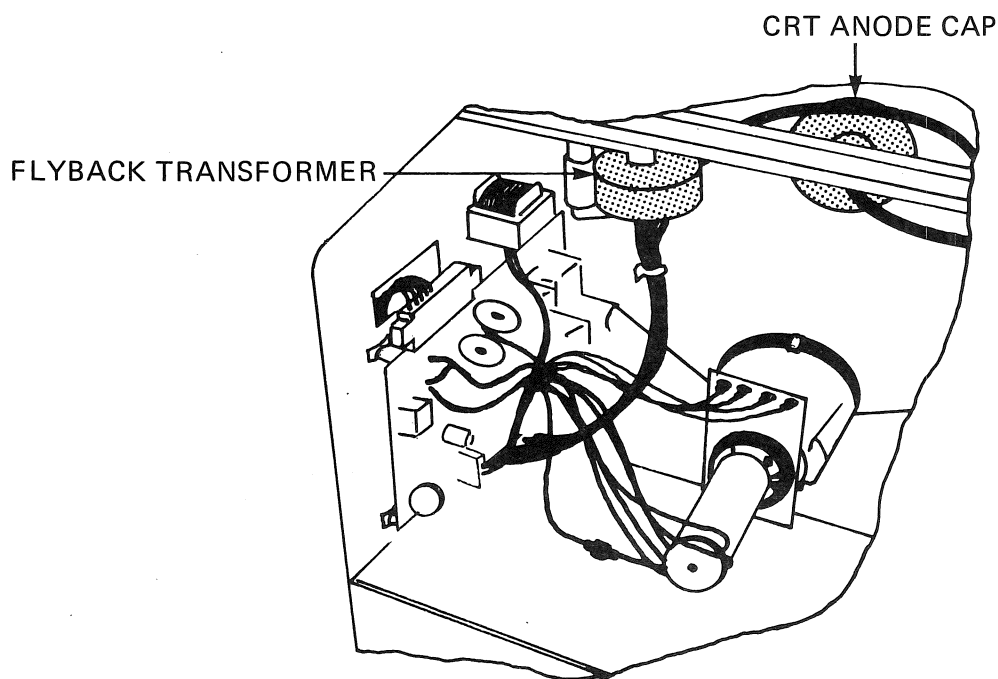
MA-2980

Figure 7. Flyback Transformer

```
==================== WARNING ====================

WHEN  WORKING  ON  THE  TERMINAL  WITH  THE
POWER  TURNED  ON  DO  NOT  TOUCH  THE  FLYBACK
TRANSFORMER OR THE ANODE CONNECTOR ON THE
CRT.    11.5KV  MAY  BE  PRESENT  AT  THESE
POINTS.
```

FIELD SERVICE REPLACEMENT CRT MONITOR ASSEMBLY P/N 70-16187

The Field Service Replacement CRT Monitor Assembly
consists of the following items:

- The CRT
- The sheet metal chassis
- The Yoke
- The Vertical Coil
- The Video Monitor PCB
- The Flyback Transformer

Under the recommended maintenance philosophy, if a
problem is suspected to be caused by the CRT, Yoke, or
Vertical Coil you are to replace the complete CRT Monitor
Assembly as a single unit. If the problem is in the monitor
board or flyback transformer replace only that item.

The CRT generates the electron beam used to print the
characters on the CRT face. The Yoke takes the vertical and
horizontal outputs of the video monitor PCB and convert them
to a magnetic field. This causes the electron beam inside
the CRT to move from left to right and from top to bottom of
the CRT face.

The CRT Monitor Assembly has two adjustments which
affect the video presentation. Both of these adjustment
deal with the Yoke Assembly. The first involves the
positioning of the yoke on the CRT neck to eliminate any
tilting of the display presentation. The second is the use
of the two centering rings on the back of the yoke to
control the horizontal and vertical centering of the display
presentation. These adjustments will be performed in the
ADJUST/ALIGN Module (AV-JB912-A8) of the course.

> Using the Physical/Functional Block Dia-
> gram locate and identify the parts con-
> tained in the Field Service replacement
> CRT Monitor Assembly.

VT100 KEYBOARD

The VT100 features a detached keyboard assembly which allows the operator to position the keyboard within a 1.9 meter (6 foot) arc of the monitor for the most convenient operation. The keyboard assembly consists of the three remaining FRUs:

- the Keyboard PCB
- the Speaker
- the Keyboard Cable

Using Figure 8 and the Physical/Functional Block Diagram locate each FRU.
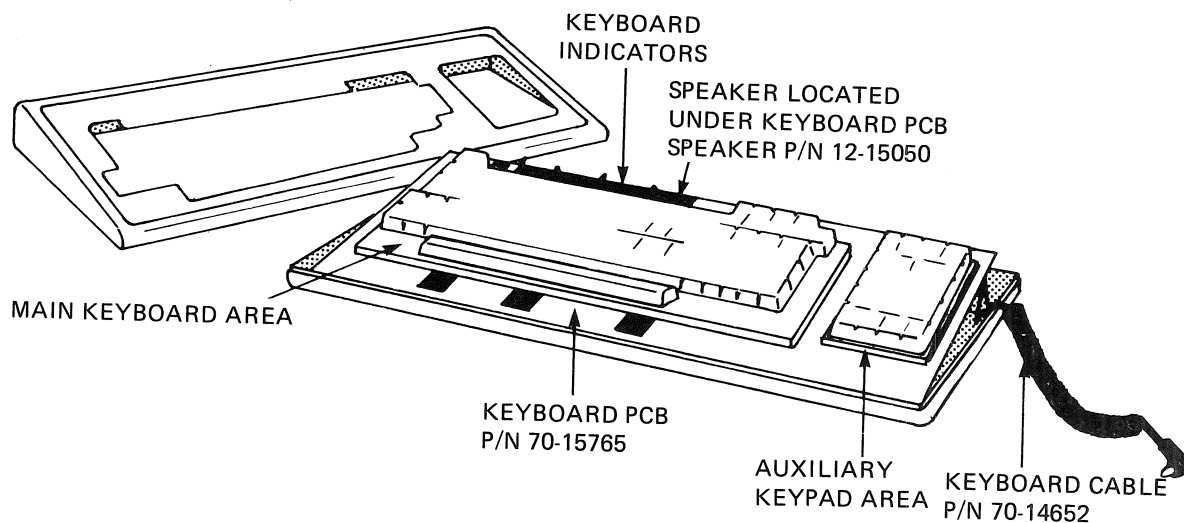
Figure 8. VT100 Keyboard

KEYBOARD PCB P/N 70-15765

The keyboard is the data entry device for the terminal. The operator keys the inputs (data) which are to be transferred to the host computer. The keyboard is an 83 key switch matrix type unit with the main keyboard arranged somewhat like a standard typewriter. To the right of the main keyboard is an auxiliary keypad with an arrangement similar to that of an adding machine with additional keys. Along the top center of the keyboard are seven indicators. The functions of the different keys and the keyboard indicators are covered in the OPERATION AND ACCEPTANCE Module (AV-JB910-A8) of the course.

SPEAKER P/N 12-15050

The speaker is used to generate the audible tones for keyclick, right margin bell, and the alarm bell. The volume of the keyclick and bell tones are not adjustable. The speaker mounts in the keyboard base cover under the keyboard. It is connected by two wires to the keyboard connector end of the keyboard cable.

KEYBOARD CABLE P/N 70-14652

The keyboard cable is a three wire coiled cable used to connect the speaker to the Keyboard PCB and the keyboard to the Terminal Controller. It carries +12Vdc and ground to the Keyboard PCB for powering the keyboard logic. The third wire is used as a bi-directional communications line. It carries requests for keyboard data, LED indicator information, and bell commands from the Terminal Controller to the keyboard logic. It also carries the typed data from the keyboard back to Terminal Controller. The keyboard is asked (scanned) for data 50 or 60 times per second depending on the line frequency to which the VT100 is set.

PRACTICE EXERCISE

Using the text of this module and the
Physical/Functional Block Diagram   as
reference material, match each of the
following Field Replaceable Units   to
its function. Blacken the letter   of
your response.

FRU NAME   FUNCTION

1. POWER   A. Converts input dc voltages
    SUPPLY   to ac.

                         B. Provides the deflection sig-
                             nals for the CRT.

                         C. Provides the high voltages
                             required for the CRT.

                         D. Converts input ac to four dc
                             output voltages.

2. TERMINAL   A. Controls the flow of informa-
    CONTROLLER PCB   tion from the keyboard to the
                             host computer, and the host
                             computer to the CRT screen.

                         B. Emulates the VT52 terminal
                             only.

                         C. Controls only the flow of
                             information to the host
                             computer.

                         D. Controls the CRT presentation
                             only.

FRU NAME   FUNCTION

3. VIDEO   A. Provides characters.
    MONITOR PCB
                            B. Provides the High Voltage
                                directly to the CRT Anode.

                            C. Provides the signals to
                                deflect the CRT beam.

                            D. Turns the CRT filaments ON
                                and OFF.

4. KEYBOARD   A. Contains the 8080 micro-
    PCB   processor.

                            B. Controls the flow of informa-
                                tion to and from the host
                                computer.

                            C. Generates the keyclick and
                                bell tones.

                            D. Is the data entry device for
                                the terminal.

Using the text of this module and the
Physical/Functional Block Diagram as a
reference, match each connector to its
function. These connectors are on either
the Terminal Controller or Video Monitor
PCBs. Blacken the letter of your re-
sponse.

CONNECTOR NUMBER   FUNCTION

5. J1   A. Connection point for the
                                Advanced Video Option.

                            B. Connection point for the 20mA
                                current loop communications
                                option.

                            C. External video input.

                            D. Connection point for the
                                Keyboard.

CONNECTOR NUMBER	FUNCTION

6. J2

A. Connection point for the VT105 graphics option.

B. Connection point for the keyboard.

C. Connection point from the Power Supply to the Terminal Controller.

D. Connection point for the EIA communications line.

7. J3

A. Connection point for the EIA communications line.

B. Connection point for the Terminal Controller to the Video Monitor.

C. Connection point for the Advanced Video Option.

D. Connection point for the STP options.

8. J4

A. Connection point for the EIA communcations line.

B. Connection point to the keyboard.

C. Connection point for the 20mA current loop option.

D. Connection point for the STP options.

CONNECTOR NUMBER	FUNCTION

9. J5

A. Connection point to the Flyback Transformer.

B. Connection point to the CRT base.

C. Connection point to the 20mA current loop option.

D. Connection point to the M7071 graphics option.

10. J6

A. Connection point to the keyboard.

B. Connection point for the Terminal Controller from the Power Supply to the Video Monitor.

C. Connection point for an external video input.

D. Connection point for an external video output.

11. J7

A. Connection point for the keybaord.

B. Connection point for the M7071 graphics option.

C. Connection point for the 20mA current loop option.

D. Connection point for the external video input.

CONNECTOR NUMBER	FUNCTION

12. J8

A. Connection point for the external video input.

B. Connection point for the external video output.

C. Connection point for the Advanced Video option.

D. Connection point for the Keyboard.

13. J9

A. Connection point to the Power Supply and Video Monitor.

B. Connection point for an external video output.

C. Connection point for the STP options.

D. Connection point for an external video input.

14. J101

A. Output connection to the Flyback transformer.

B. Output connection to the vertical yoke and vertical coil.

C. Input connection point from the Power Supply and Terminal Controller.

D. Input connection to the CRT base.

CONNECTOR NUMBER	FUNCTION

15. J102

A. Connection point to the CRT base.

B. Connection point to the Terminal Controller and the Power Supply.

C. Connection point to the vertical yoke and vertical coil.

D. Connection point to the Flyback Transformer.

16. J104

A. Connection point to the Flyback Transformer.

B. Connection point to the vertical yoke and the vertical coil.

C. Connection point to the CRT base.

D. Connection point to the keyboard.

Check your answers with the Practice
Exercises Solutions on the following
page.

PRACTICE EXERCISE SOLUTIONS

1. D   9. C

2. A   10. B

3. C   11. A

4. D   12. A

5. A   13. B

6. A   14. C

7. D   15. C

8. A   16. A

- Review the exercises and solutions which you have just completed.

- If you had more than 3 incorrect, review the material.

EDUCATIONAL SERVICES