FCC NOTICE

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The use of shielded I/O cables is required when connecting this equipment to any and all optional peripherals or host devices. Failure to do so may violate FCC rules.

Caution: Changes or modifications not covered in this manual must be approved in writing by the manufacturer's Regulatory Engineering department. Changes or modifications made without approval may void the user's authority to operate this equipment.

CANADIAN DOC NOTICE

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numrique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.
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General Information

INTRODUCTION
This manual describes a high-resolution, non-glare with overscan, flicker-free display terminal that provides complete VT320 emulation plus numerous enhancements. This terminal incorporates the following standard features:

- 15x12 character resolution mode
- 10x20 character resolution mode
- Tilt/swivel base
- 14-inch, non-glare, dark-face, P22 phosphor, etched glass screen
- Borderless, full-screen video
- 85 Hz refresh and overscanned video for flicker-free display
- Built-in RS-232 male DB25 connector (Port A) and Wyse modular 423 connector (Port B) for easy installation

The terminal is available in two models:

- A North American model with English and French Canadian keyboard language support
- An international model that supports 15 keyboard languages and user-selectable French or German setup screens and status line messages

ENVIRONMENTAL CONSIDERATIONS
Position the terminal on a clean horizontal surface that is free from vibration and out of direct sunlight. Allow three inches of clearance on all sides of the terminal for air circulation and movement of the tilt/swivel mechanism.

INSTALLATION
To install the terminal, follow these steps:

1. Connect the attached power cord to an AC power receptacle.
2. Connect the communications cable to either the DB-25 or Wyse modular connector. Secure the communications cable to the connector using the two captive screws that are attached to the cable plug. **Do not use excessive force when tightening these screws.**
**Caution** If you are connecting the terminal to a WY-995 Multiport Adapter from Wyse Technology, use the Port A 25-pin connector.

**OPERATOR CONTROLS**
The terminal's operator controls are located on the side of the unit. Operator controls consist of an AC power button (POWER), a contrast control (CNT), and a brightness control (BRT) (see Figure 1-1).

**Figure 1-1  Operator Controls**

![Operator Controls Diagram]

**CLEANING**
Whenever it becomes soiled, turn off the terminal and clean it with a commercial grade of plastic and/or glass cleaner. Never pour or spray cleaners directly on any part of the terminal. Moisten a cloth with the cleaner and use the cloth to wipe the surface.

**SPECIFICATIONS**
Table 1-1 lists the specifications of the terminal.

<table>
<thead>
<tr>
<th>Table 1-1  Terminal Specifications</th>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power Requirements</strong></td>
<td>Line Voltage</td>
<td>110/220 VAC</td>
</tr>
<tr>
<td></td>
<td>Line Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>Power Consumption</td>
<td>45 Watts</td>
</tr>
<tr>
<td></td>
<td>Fuse</td>
<td>2 A, 250 V</td>
</tr>
<tr>
<td><strong>Input Voltage Range</strong></td>
<td>110 VAC</td>
<td>90-132 Volts</td>
</tr>
<tr>
<td></td>
<td>220 VAC</td>
<td>180-264 Volts</td>
</tr>
<tr>
<td><strong>Input Frequency Range</strong></td>
<td></td>
<td>47.63 Hz</td>
</tr>
<tr>
<td><strong>Environmental Requirements</strong></td>
<td>Operating Temperature</td>
<td>10 to 40 degrees C</td>
</tr>
<tr>
<td></td>
<td>Storage Temperature</td>
<td>-40 to 60 degrees C</td>
</tr>
<tr>
<td></td>
<td>Operating Altitude</td>
<td>10,000 feet (3049 meters)</td>
</tr>
<tr>
<td></td>
<td>Nonoperating Altitude</td>
<td>40,000 feet (12195 meters)</td>
</tr>
<tr>
<td></td>
<td>Humidity</td>
<td>20% to 80% noncondensing</td>
</tr>
<tr>
<td>Description</td>
<td>Specification</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Scan Frequency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td>31.380 KHz</td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>60 and 85 Hz</td>
<td></td>
</tr>
<tr>
<td><strong>Picture Tube</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>14 inches</td>
<td></td>
</tr>
<tr>
<td>Gun</td>
<td>In-Line</td>
<td></td>
</tr>
<tr>
<td>Deflection Angle</td>
<td>90 degrees</td>
<td></td>
</tr>
<tr>
<td>Phosphor (white)</td>
<td>H188</td>
<td></td>
</tr>
<tr>
<td>Phosphor (green)</td>
<td>H331</td>
<td></td>
</tr>
<tr>
<td>Phosphor (amber)</td>
<td>H194</td>
<td></td>
</tr>
<tr>
<td><strong>Display Size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal Image</td>
<td>237 mm ± 5.0 mm</td>
<td></td>
</tr>
<tr>
<td>Vertical Image</td>
<td>172 mm ± 5.0 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>H</td>
<td>V</td>
</tr>
<tr>
<td>------</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>1</td>
<td>800</td>
<td>500</td>
</tr>
<tr>
<td>2</td>
<td>800</td>
<td>300</td>
</tr>
<tr>
<td>3</td>
<td>1200</td>
<td>500</td>
</tr>
<tr>
<td>4</td>
<td>1200</td>
<td>300</td>
</tr>
<tr>
<td>5</td>
<td>1188</td>
<td>500</td>
</tr>
<tr>
<td>6</td>
<td>1188</td>
<td>300</td>
</tr>
<tr>
<td><strong>Character Cell</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 Hz</td>
<td>85 Hz</td>
<td></td>
</tr>
<tr>
<td>80 column</td>
<td>10x20</td>
<td>15x12</td>
</tr>
<tr>
<td>132 column</td>
<td>9x20</td>
<td>9x12</td>
</tr>
<tr>
<td><strong>Character Size (Text Mode)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 Hz</td>
<td>85 Hz</td>
<td></td>
</tr>
<tr>
<td>80 column</td>
<td>9x16</td>
<td>12x9</td>
</tr>
<tr>
<td>132 column</td>
<td>8x16</td>
<td>8x9</td>
</tr>
<tr>
<td><strong>Centering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td>± 5.0 mm</td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>± 5.0 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Pincushion</strong></td>
<td>± 2.50 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Tilt</strong></td>
<td>± 1.20 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Brightness (maximum)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>45 FL (+7 -3)</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>70 FL (+7 -3)</td>
<td></td>
</tr>
<tr>
<td>Amber</td>
<td>32 FL (+7 -3)</td>
<td></td>
</tr>
<tr>
<td>Raster</td>
<td>1.0 FL ± 0.5 FL</td>
<td></td>
</tr>
<tr>
<td><strong>Linearity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td><strong>Wave and Jitter</strong></td>
<td>± 1 pixel</td>
<td></td>
</tr>
</tbody>
</table>
Table 1-1  Terminal Specifications, Continued

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>318 mm</td>
</tr>
<tr>
<td>Width</td>
<td>322 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>318 mm</td>
</tr>
<tr>
<td>Net Weight</td>
<td>7.5 Kg</td>
</tr>
<tr>
<td>Video Signal</td>
<td></td>
</tr>
<tr>
<td>TTL</td>
<td></td>
</tr>
<tr>
<td>Dot Frequency</td>
<td>49.4235 MHz</td>
</tr>
<tr>
<td>Synchronization Signal</td>
<td></td>
</tr>
<tr>
<td>TTL Levels</td>
<td>0.8 V (low), 2.0 V (high)</td>
</tr>
<tr>
<td>Warmup Time for Adjustment</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Regulatory Agency Approvals</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>UL 478</td>
</tr>
<tr>
<td></td>
<td>CSA C220</td>
</tr>
<tr>
<td></td>
<td>IEC 380 (220-volt unit only)</td>
</tr>
<tr>
<td></td>
<td>FCC Rules and Regulations, Part 15, Subpart J, Class A</td>
</tr>
<tr>
<td></td>
<td>VDE 0871 (VDE unit only)</td>
</tr>
<tr>
<td></td>
<td>DHHS rules 21CFR Subchapter J.</td>
</tr>
<tr>
<td></td>
<td>VDE version passes Scandinavian</td>
</tr>
<tr>
<td></td>
<td>SSI specification for EMF.</td>
</tr>
</tbody>
</table>

EMI

UL 478
CSA C220
IEC 380 (220-volt unit only)
FCC Rules and Regulations, Part 15, Subpart J, Class A
VDE 0871 (VDE unit only)
DHHS rules 21CFR Subchapter J.
VDE version passes Scandinavian
SSI specification for EMF.
Removal and Replacement Procedures

INTRODUCTION
This chapter provides removal and replacement procedures for major modules.

Tools
To perform these procedures, you’ll need the following tools:
- No. 1 Phillips insulated screwdriver
- No. 2 Phillips insulated screwdriver
- Insulated flat-blade screwdriver
- Long-nose pliers
- Test leads

Safety
Before beginning any procedure, familiarize yourself with the following safety warnings and cautions:

⚠️ Warning When the cover of the terminal is removed, you are exposed to high-voltage electrical hazards. If you need to work with the cover removed,
- Turn the power off and unplug the power cord before removing the cover.
- Use insulated or nonconductive tools.
- Remove jewelry from your hands and wrists.
- Keep one hand behind you while working on the terminal.

⚠️ Warning Use extreme caution when working with or around the CRT. Even a slight fracture of the glass envelope can result in an implosion due to the vacuum inside the tube. This can result in the electron gun in the neck of the CRT penetrating the viewing surface. Always hold the CRT with the neck pointing toward you.

■ Caution To help prevent damage to circuit components,
- Avoid wearing clothing made of synthetic fabrics.
- Handle circuit boards only by their edges.
- Wear a grounding strap that is connected to the terminal’s chassis.
**Warning** If you wear a grounding strap, remove it before turning on the terminal.

**PROCEDURES**

Except for the tilt/swivel base, all assemblies are accessible only after the cover is removed.

**Note** To replace assemblies, perform removal procedures in the reverse order.

**Cover**

Perform the following steps to remove the cover (refer to Figure 2-1):

1. Rest the display face of the terminal on a padded nonscratch surface.
2. Remove the two screws that secure the operator control assembly. Push the operator control assembly back into the terminal as far as it will go.
3. Remove the two screws that secure the cover.
4. Slide the cover straight back and remove.

**Note** In addition to the screws, the cover is held on by two tabs located at the top. The cover can be removed more easily if the top of the cover is pushed on slightly.

---

**Figure 2-1 Cover Removal**

---

**Fuse**

The fuse is located inside the metal housing on the PCB behind the AC power plug.

The fuse is rated at 2.0 amperes, 250 volts.
Discharging the Anode and Disconnecting the Anode Cap

Perform the following steps to discharge the anode and disconnect the anode cap (refer to Figure 2-2).

**Warning** You must always discharge the anode before removing the PCB or CRT, but be aware that the anode will build a residual charge even when the power is off. Avoid touching the anode when handling the CRT.

1. Turn off the terminal.
2. Unplug the power cable.
3. With test leads, ground the shaft of an insulated flat-blade screwdriver to the terminal’s metal frame.
4. Slip the screwdriver blade between the anode cap and the CRT, and touch the blade to the spring clips under the cap.
5. Disconnect the anode lead from the CRT by squeezing the spring clips together with long-nose pliers.

Figure 2-2 Discharging the Anode

---

Printed Circuit Board

Perform the following steps to remove the PCB from the terminal (refer to Figure 2-3):

1. Remove the terminal’s cover.
2. Discharge the CRT anode and unplug the anode cap. Cut the tie wrap holding the high voltage capacitor to the left bracket.
3. Remove the two screws holding the PCB to the terminal.
4. Unplug the following harnesses from the terminal PCB:
   - Contrast control harness (3-pin connector marked “W401”)
   - Brightness control harness (3-pin connector marked “W202”)
- Power switch harnesses (1-pin connector marked "S2A and S2B")
- LED harness (2-pin connector marked "P4")
- Yoke harness (4-pin connector marked "W201")
- Keyboard harness (4-pin connector marked "P5")

5 Unplug the CRT harness from the CRT.

6 Unscrew the screw holding the earth ground wire (green with a yellow stripe), to the right bracket. Remove the screw holding the black grounding wires to the right bracket.

7 Remove the PCB hold-down clamps from both sides of the PCB.

8 Carefully slide the PCB straight back and away from the terminal.

---

**Figure 2-3 Terminal PCB Removal**

---

**Operator Control Assembly**

Perform the following steps to remove the operator control assembly (refer to Figure 2-4):

1 Unplug the following harnesses from the terminal PCB:
   - Contrast control harness (3-pin connector marked "W401")
   - Brightness control harness (3-pin connector marked "W202")
   - Power switch harnesses (1-pin connector marked "S2A and S2B")

2 Remove the screw holding the black ground wire to the power switch bracket.

3 Remove the two screws holding the assembly to the terminal.
CRT Assembly

Perform the following steps to remove the CRT assembly (refer to Figure 2-5):

⚠️ **Warning** Use extreme caution when working with or around the CRT. Even a slight fracture of the glass envelope can result in an implosion. Always hold the CRT with the neck pointing toward you.

1. Remove the printed circuit board and the operator control assembly.
2. Rest the display face of the terminal on a padded nonscratch surface.
3. Remove the screws holding the left and right brackets, and remove the brackets.
4. Remove the four screws holding the CRT assembly to the bezel.
Module-Level Troubleshooting

INTRODUCTION
This section describes symptoms and solutions for problems you may encounter when servicing this terminal. The material is organized to help you diagnose a problem as quickly as possible.

Tools
We recommend that you have the following tools and test equipment available when servicing the terminal:

- Insulated, 12-inch, flat-blade screwdriver
- No. 1 Phillips insulated screwdriver
- No. 2 Phillips insulated screwdriver
- Test leads
- Digital multimeter
- High voltage probe
- 150 MHz oscilloscope
- DB25 loopback connector (part number 120149-01)
- RJ-11 loopback connector (part number 940720-01)

Note See Table 3-2 and Table 3-3 at the end of this chapter for the wiring connections of the two loopback connectors.

Safety
Before beginning any procedure, familiarize yourself with the following safety warning:

⚠️ Warning This terminal contains lethal voltage levels. Observe all normal high-voltage equipment servicing precautions.

- Remove jewelry from your hands and wrists.
- Use only insulated or nonconductive tools.
- Turn off power except when making voltage or signal checks.
- Discharge the anode lead before disconnecting the lead from the CRT. Refer to the procedure "Discharging the Anode" in Chapter 2, "Removal and Replacement."
- Use extreme caution when working near the CRT. The tube may implode if the glass is fractured.
• Keep one hand behind you when working inside the terminal.

### PRIMARY TROUBLESHOOTING PROCEDURES

Begin troubleshooting by preparing the terminal properly and running the diagnostic self-test.

### Diagnostic Self-Test

The terminal diagnostic self-test starts in setup mode. If the test detects an error, an error code and message display on the screen. Error codes are defined in Table 3-1.

#### Table 3-1 Error Messages

<table>
<thead>
<tr>
<th>Code</th>
<th>Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Character Ram</td>
</tr>
<tr>
<td>1</td>
<td>Attribute Ram</td>
</tr>
<tr>
<td>2</td>
<td>Font Ram</td>
</tr>
<tr>
<td>3</td>
<td>Extended Font Ram</td>
</tr>
<tr>
<td>P</td>
<td>EPROM Checksum</td>
</tr>
<tr>
<td>K</td>
<td>Lost Setup (Battery)</td>
</tr>
<tr>
<td>A</td>
<td>Port A CTS to RTS Error</td>
</tr>
<tr>
<td>C</td>
<td>Port A DCD to DTR Error</td>
</tr>
<tr>
<td>R</td>
<td>Port A DTR to DSR Error</td>
</tr>
<tr>
<td>S</td>
<td>Port A SPDS to SPD1 Error</td>
</tr>
<tr>
<td>X-E</td>
<td>Port A I/O Loopback Error</td>
</tr>
<tr>
<td>Y</td>
<td>Port B to PR Port DTR to DSR Error</td>
</tr>
</tbody>
</table>

Perform the following steps to run the diagnostic self-test:

1. Plug the loopback connectors into the appropriate jacks.
2. Turn on the terminal.
3. If the terminal is operating correctly, it will eventually show a display of all possible characters shifting across the screen.
4. If the self-test program detects a problem, the terminal will display an error code on the CRT. Table 3-1 is a list of the possible errors.
5. If any of the error messages on Table 3-1 are displayed then replace the PCB.

**Note** The first time a board is installed it may display a "K". Also, if the battery circuit is inadvertently discharged during repair, the "K" may be displayed. In this case, depress setup to clear the "K" error, then cycle the power off, then on. If the error persists replace the board.

6. If there is no display on the CRT, the following flowchart will help determine if the CRT or the PCB requires replacement.
Figure 3-1 Troubleshooting Flowchart

Start

Check the heater voltage at pin 3 (brown wire) of the CRT. Approximate voltage = 12 VDC

OK? No

Check the video signal at pin 2 (yellow wire) of the CRT.

OK? Yes

Check the grid voltage at pin 1 (green wire) of the CRT. Approximate voltage = -31 VDC

OK? No

Replace PCB.

OK? Yes

Check the grid voltage at pin 8 (red wire) of the CRT. Approximate voltage = 620 VDC

OK? No

Check the grid voltage at pin 7 (blue wire) of the CRT. Approximate voltage = 285 VDC

OK? Yes

Check the high voltage at the CRT anode. Approximate voltage = 1350 VDC

OK? No

Replace CRT.

OK? Yes

End
Table 3-2  Loopback Connector Wiring using RJ-11 Connector

<table>
<thead>
<tr>
<th>From Pin on Port B</th>
<th>To Pin on PR Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3-3  Loopback Connector Wiring using DB25 Connector

<table>
<thead>
<tr>
<th>From Pin</th>
<th>To Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>12</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 3-2 and Table 3-3 will direct you in wiring the loopback connectors correctly. These tables are intended as a guide for preparing the loopback connectors for use when running the diagnostic self-test procedure.
Alignment and Adjustment Procedures

OVERVIEW

This chapter is divided into three sections:

- Section one provides an introduction and general setup instructions.
- Section two provides alignment and adjustment procedures.
- Section three provides a quick reference to the alignment and adjustment procedures.

Each adjustment is composed of four parts:

- Part one is the name of the adjustment.
- Part two is the test point and/or setup procedure for making the adjustment.
- Part three is the specification and tolerance for the adjustment.
- Part four is the actual adjustment.

The adjustment procedures are presented in the order in which they should be performed. If you are performing a complete terminal alignment, do not deviate from the order in which the adjustments are shown. If you are performing a subset of the complete alignment, check the tolerances of all procedures that follow the subset.

Tools

To verify or perform the adjustments for this terminal, you will need the following tools and test equipment:

- No. 1 Phillips insulated screwdriver
- Insulated 12-inch flat-blade screwdriver
- Hex-head, nonconductive, tuning (alignment) tool
- Digital multimeter
- High voltage probe
- 150 MHz oscilloscope
- Photometer
- Test leads
- DB25 loopback connector (part number 120149-01)
- RJ-11 loopback connector (part number 940720-01)
WY-185
Maintenance Manual

870030-01 Rev. A
November 1989

Wyse Technology
3471 N. First Street
San Jose, CA 95134

Printed in U.S.A.
GENERAL SETUP

Refer to Figure 4-2 for locations of test points and adjustments.

1. Remove the terminal housing (refer to the instructions in Chapter 2, "Removal and Replacement").
2. Install the loopback connectors into the appropriate jacks.
3. Point the neck of the CRT in a westerly direction.
4. Turn on the terminal. The terminal will enter into its self-test routine; twenty-five rows of text will scroll across the screen.
5. Allow the terminal to warm up for 30 minutes.
6. Enter the "M" test pattern by pressing [Spacebar].

Several test patterns are called for on this procedure. Please refer to Figure 4-1 for a "road map" of how to display the requested test pattern.

Figure 4-1  Test Pattern Flowchart
Before beginning any procedure, familiarize yourself with the following safety warnings and cautions:

⚠️ **Warning** When the cover of the terminal is removed, you are exposed to high-voltage electrical hazards. If you need to work with the cover removed,

- Turn the power off and unplug the power cord before removing the cover.
- Use insulated or nonconductive tools.
- Keep one hand in your pocket.
- Remove jewelry from your hands and wrists.
- Use extreme caution when working with or around the CRT. Even a slight fracture of the glass envelope can result in an implosion due to the vacuum inside the tube. This can result in the electron gun in the neck of the CRT penetrating the viewing surface. Always hold the CRT with the neck pointing toward you.

- Keep one hand behind you when working inside the terminal.

**Caution** To help prevent damage to circuit components:

- Avoid wearing clothing made of synthetic fabrics.
- Handle circuit boards only by their edges.

**Warning** If you wear a grounding strap, remove it before turning on the terminal.

---

**ALIGNMENT AND ADJUSTMENT PROCEDURES**

This section describes the alignment and adjustment procedures for this terminal. Refer to Figure 4-2 for locations of test points and adjustments.

**Note** If you are aligning the terminal, adjust the 30.5 VDC voltage to specification. If you are checking terminal alignment, the voltage may be anywhere within the stated tolerance. If you adjust a voltage, you must check all other voltages in the alignment procedure.

**Voltage Adjustment**

Use the "M" test pattern to perform this adjustment.

Test point/setup—Using a digital multimeter, measure the DC voltage at the cathode of D113.

Measurement—30.5 VDC ± 0.15 VDC.

Adjustment—Adjust VR101 until 30.5 VDC is measured at the cathode of D113.

Test point/setup—Using a digital multimeter, measure the supply voltages listed below for correct tolerance.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Tolerance</th>
<th>Test Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>+15 VDC</td>
<td>± 0.8 VDC</td>
<td>D110</td>
</tr>
<tr>
<td>+5 VDC</td>
<td>± 0.25 VDC</td>
<td>D109</td>
</tr>
<tr>
<td>+12 VDC</td>
<td>± 1.5 VDC</td>
<td>U11 pin 8</td>
</tr>
<tr>
<td>-12 VDC</td>
<td>± 1.5 VDC</td>
<td>U11 pin 5</td>
</tr>
</tbody>
</table>

**Horizontal Hold**

Test point/setup—Display the pincushion test pattern by pressing [Ctrl] [a].

Attach the test lead between the output (terminal) side of R37 and ground.

**Caution** Make sure that your connection is on the output side of the resistor. Damage to the gate array may result if its output is shorted directly to ground.

Measurement—The display will "roll" in the horizontal direction only.
Adjustment—Adjust VR201 for the best possible display stabilization. The “rolling” may not stop; this is acceptable, but all vertical “roll” must be adjusted out.

**Display Rotation**

Test point/setup—Display the pincushion test pattern on the screen.

Measurement—The test pattern must be “square” to the bezel.

Measurement and tolerance can be verified using the following formula (refer to Figure 4-3):

\[ |AB - CD| \]

The maximum value rotation allowed is ± 1.2 mm.

Adjustment—Loosen the yoke by turning the thumbscrew. Rotate the yoke until the display is “square” to the bezel. Retighten the thumbscrew.

⚠️ **Warning** You may crack or break the neck of the CRT by overtightening the yoke thumbscrew.

**Figure 4-3 Display Geometries**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Display</strong></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vertical Center</th>
<th></th>
<th>Horizontal Center</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(</td>
<td>IJ - LK</td>
<td>)</td>
<td>(</td>
</tr>
</tbody>
</table>

**Horizontal Size:** FG  
**Vertical Size:** JK
Vertical Center Adjustment
Test point/setup—Display the pincushion test pattern on the screen.
Measurement—The test pattern should be centered to the bezel.
Adjustment—Rotate the centering rings to center the test pattern.
Measurement and tolerance can be verified using the following formula (refer to Figure 4-3):

\[ |IJ - LK| \]

The display must be centered to within ± 3 mm.

Horizontal Center Adjustment
Test point/setup—Display the pincushion test pattern on the screen.
Measurement—The test pattern should be centered to the bezel.
Adjustment—Adjust VR202 to center the test pattern on the horizontal aspect.
Measurement and tolerance can be verified using the following formula (refer to Figure 4-3):

\[ |EF - HG| \]

The horizontal center adjustment tolerance is ± 3 mm.

Vertical Size, 60 Hz Mode
Test point/setup—Display the pincushion test pattern in the 60 Hz mode on the screen.
Measurement—The test pattern should be the correct vertical size (172 mm ± 3 mm).
Adjustments—Adjust VR302 to meet the vertical size specification.

Vertical Size, 85 Hz Mode
Test point/setup—Display the pincushion test pattern in the 85 Hz mode on the screen by pressing \[ \text{Ctrl} + s \].
Measurement—The test pattern should be the correct vertical size (172 mm ± 3 mm).
Adjustments—Adjust VR301 to meet the vertical size specification.

Vertical Linearity Adjustment
Test point/setup—Display the “M” test pattern on the screen by pressing \[ \text{Ctrl} + a \] twice or until the pattern is displayed.
Press \[ \text{Ctrl} + s \] to shift to the 60 Hz mode.
Measurement—There should be proper linearity.
Adjustment—Adjust VR303 for optimum linearity.
Horizontal Size Adjustment
Test point/setup—Display the pincushion test pattern on the screen.
Measurement—The test pattern should be the correct horizontal size (237 mm ± 3 mm).
Adjustment—Adjust L201 to meet the horizontal size specification.

Sub-Brightness Adjustment
Test point/setup—Display the "M" test pattern on the screen by pressing [Ctrl] [s] twice (or until the test pattern is displayed).
Set the brightness and contrast controls to their minimum levels.
Measurement—Using the photometer, measure the raster level. The raster brightness should be the correct level (1 ft. ± 0.5 ft.).
Adjustment—Adjust VR204 to meet the raster brightness specification.

Sub-Contrast Adjustment
Test point/setup—Display the "M" test pattern on the screen by pressing [Ctrl] [s] twice (or until the test pattern is displayed).
Set the brightness and contrast controls to their maximum levels.
Measurement—Using the photometer, measure the light output of the center (brightness) box. The specifications for each of the CRT types are as follows:

<table>
<thead>
<tr>
<th>Color</th>
<th>Level</th>
<th>Raster</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>45 ft.</td>
<td>(+7-3)</td>
</tr>
<tr>
<td>Green</td>
<td>70 ft.</td>
<td>(+7-3)</td>
</tr>
<tr>
<td>Amber</td>
<td>32 ft.</td>
<td>(+7-3)</td>
</tr>
</tbody>
</table>
Adjustment—Adjust VR402 to meet the above specification.

Focus Adjustment
Test point/setup—Display the "M" test pattern on the screen. Set the contrast control to its maximum level. Set the brightness control to 3/4 of its full counterclockwise position, (normal Luser level).
Measurement—The horizontal and vertical focus lines in the test pattern should all be in focus.
Adjustment—Adjust VR203 until the horizontal and vertical focus lines in the test pattern are sharpest and in proper focus.

Pincushion Adjustment
Test point/setup—Display the pincushion test pattern on the screen. Set the brightness and contrast controls to their normal viewing levels.
Measurement—There should be a minimum of pincushion or barrel distortion.
Measurement and tolerance can be verified using the following formula (refer to Figure 4-3):

\[|EF - NO|\]

The pincushion tolerance is ± 2.5 mm.
Adjustment—Adjust the display magnets on the yoke to minimize any pincushion or barrel distortion. The magnet locations and the areas of the display they affect are shown in Figure 4-3.

This section should only be used by technicians who have experience servicing this particular terminal. Table 4-1 lists the adjustments in the order that they are to be performed. The format indicates an adjustment name and abbreviated adjustment procedure, the test pattern, and the adjustment point. If more information about the adjustment is needed, please refer to the full description in the previous section.

<table>
<thead>
<tr>
<th>Adjustment/Specification</th>
<th>Test Pattern</th>
<th>Adjustment Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>+30.5 VDC +30.5 VDC ± 0.15 VDC</td>
<td>“M” test pattern</td>
<td>Cathode of D113</td>
</tr>
<tr>
<td>Horizontal Hold Best display stability</td>
<td>Pincushion test pattern; short output side of R37 to ground</td>
<td>VR201</td>
</tr>
<tr>
<td>Display Rotation Test pattern is “square” to bezel (± 1.2 mm)</td>
<td>Pincushion test pattern</td>
<td>Yoke</td>
</tr>
<tr>
<td>Vertical Center Test pattern is centered ± 3 mm</td>
<td>Pincushion test pattern</td>
<td>Centering rings</td>
</tr>
<tr>
<td>Horizontal Center Test pattern is centered</td>
<td>Pincushion test pattern</td>
<td>VR202</td>
</tr>
<tr>
<td>Vertical Size (60 Hz) 172 mm ± 3 mm</td>
<td>Pincushion test pattern in 60 Hz mode</td>
<td>VR302</td>
</tr>
<tr>
<td>Vertical Size (85 Hz) 172 mm ± 3 mm</td>
<td>Pincushion test pattern in 85 Hz mode</td>
<td>VR301</td>
</tr>
<tr>
<td>Vertical Linearity Correct linearity</td>
<td>“M” test pattern</td>
<td>VR303</td>
</tr>
<tr>
<td>Horizontal Size 237 mm ± 3 mm</td>
<td>Pincushion test pattern</td>
<td>L201</td>
</tr>
<tr>
<td>Sub-Brightness 1 FL ± 0.5 FL</td>
<td>“M” test pattern</td>
<td>VR204</td>
</tr>
<tr>
<td>Sub-Contrast White 45 FL (+7-3) Green 70 FL (+7-3) Amber 32 FL (+7-3)</td>
<td>“M” test pattern</td>
<td>VR402</td>
</tr>
<tr>
<td>Focus Optimum focus</td>
<td>“M” test pattern</td>
<td>VR203</td>
</tr>
<tr>
<td>Pincushion Least pincushion distortion (2.5 mm)</td>
<td>Pincushion test pattern</td>
<td>Yoke display magnets</td>
</tr>
</tbody>
</table>
# Module-Level Parts List

**INTRODUCTION**

Table 5-1 lists the modular level repair parts available for servicing the WY-185 Terminal.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom housing (Domestic &amp; Int'l)</td>
<td>710339-02</td>
</tr>
<tr>
<td>Bottom housing (VDE)</td>
<td>710339-05</td>
</tr>
<tr>
<td>Top housing (Domestic &amp; Int'l)</td>
<td>710406-07</td>
</tr>
<tr>
<td>Top housing (VDE)</td>
<td>710406-08</td>
</tr>
<tr>
<td>Bezel (Domestic &amp; Int'l)</td>
<td>710783-01</td>
</tr>
<tr>
<td>Bezel (VDE)</td>
<td>710783-02</td>
</tr>
<tr>
<td>CRT green</td>
<td>780056-01</td>
</tr>
<tr>
<td>CRT white</td>
<td>780057-01</td>
</tr>
<tr>
<td>CRT amber</td>
<td>780058-01</td>
</tr>
<tr>
<td>WY-185 Keyboard assembly</td>
<td>840266-01</td>
</tr>
<tr>
<td>LED assembly</td>
<td>840469-01</td>
</tr>
<tr>
<td>Control bracket assembly</td>
<td>840844-01</td>
</tr>
<tr>
<td>AC socket assembly</td>
<td>840845-01</td>
</tr>
<tr>
<td>Power switch harness</td>
<td>940515-01</td>
</tr>
<tr>
<td>Keyboard cable</td>
<td>940531-01</td>
</tr>
<tr>
<td>AC harness</td>
<td>940566-01</td>
</tr>
<tr>
<td>MPS/Logic/CRT Driver PCBA, 110 V (Domestic)</td>
<td>990370-01</td>
</tr>
<tr>
<td>MPS/Logic/CRT Driver PCBA, 220 V (Int'l)</td>
<td>990370-02</td>
</tr>
<tr>
<td>MPS/Logic/CRT Driver PCBA 220 V (VDE)</td>
<td>990370-03</td>
</tr>
<tr>
<td>WY-185 Keyboard PCBA</td>
<td>990161-01</td>
</tr>
<tr>
<td>Complete unit — WY-185 green</td>
<td>900353-01</td>
</tr>
<tr>
<td>Complete unit — WY-185 white</td>
<td>900353-04</td>
</tr>
<tr>
<td>Complete unit — WY-185 amber</td>
<td>900353-07</td>
</tr>
<tr>
<td>Complete unit — WY-185 green (Int'l)</td>
<td>900353-02</td>
</tr>
<tr>
<td>Complete unit — WY-185 white (Int'l)</td>
<td>900353-05</td>
</tr>
<tr>
<td>Complete unit — WY-185 amber (Int'l)</td>
<td>900353-08</td>
</tr>
<tr>
<td>Complete unit — WY-185 green (VDE)</td>
<td>900353-03</td>
</tr>
<tr>
<td>Complete unit — WY-185 white (VDE)</td>
<td>900353-06</td>
</tr>
<tr>
<td>Complete unit — WY-185 amber (VDE)</td>
<td>900353-09</td>
</tr>
</tbody>
</table>
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Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The use of shielded I/O cables is required when connecting this equipment to any and all optional peripherals or host devices. Failure to do so may violate FCC rules.

Caution: Changes or modifications not covered in this manual must be approved in writing by the manufacturer's Regulatory Engineering department. Changes or modifications made without approval may void the user's authority to operate this equipment.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.