# "DATASPEED*" 40 DISPLAY MONITOR

## DESCRIPTION AND OPERATION

CONTENTS PAGE



## 1. GENERAL

1.01 This section provides description and operation for the DATASPEED 40 display monitor (40 MN101) as shown in Figure 1. Refer to Part 5 of this section for other documents associated with the display monitor.

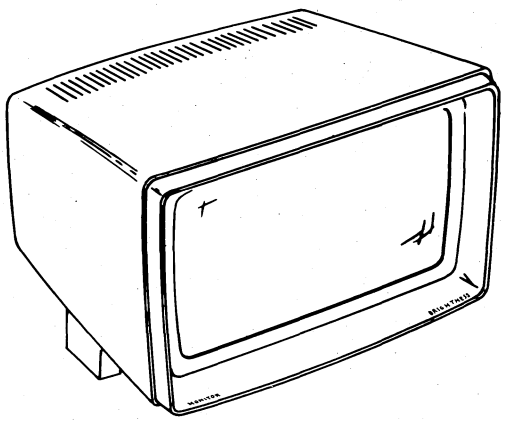

Figure 1 - DATASPEED 40 Display Monitor

1.02 The display monitor requires a display logic module for +5 v dc power, vertical synchronization, horizontal drive signals, and dot and highlight information. This module can be located up to 50 feet away from the display monitor.

1.03 The drive signals and ac power enter the display monitor through connectors located in the monitor support legs. The display monitor can be installed either onto a DATASPEED 40 logic or printer cabinet as shown in Figure 2.

1.04 The basic function of the display monitor is to display on an area of 5-1/4 by 11-1/4 inches data stored by the

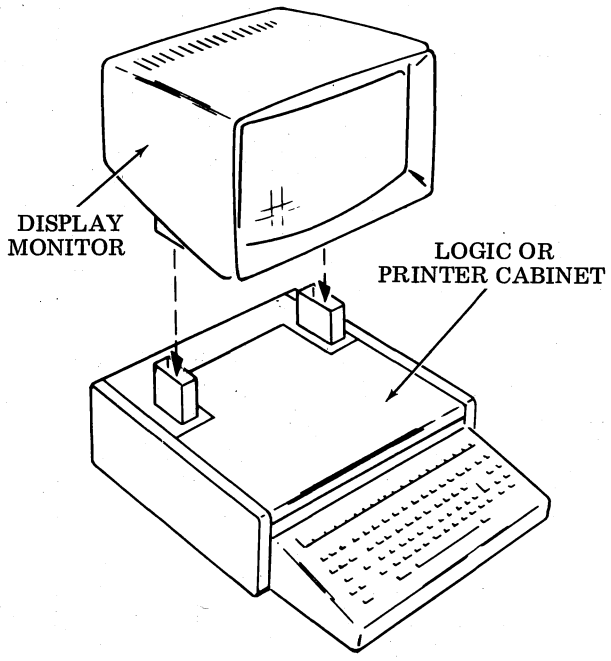


Figure 2 - Typical Display Monitor Arrangement

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Prepared for American Telephone and Telegraph Company by Teletype Corporation

display logic. This area will allow a format of up to 24 lines with room on each line for up to 80 characters.

## 2. DESCRIPTION

2.01 The DATASPEED 40 display monitor consists of a metal chassis on which major components are attached (Figure 3). The chassis and components are enclosed by a cover with ventilating slots located at the top rear of the cover. Through these slots, indicator lamps (Figure 6) for trouble analysis can be viewed.

2.02 The following paragraphs give a brief description of the display monitor electronics, operator controls, display adjustment controls, and indicator lamps.

### A. Electronics

2.03 Power Distribution Assembly — Contains the power transformer, filament transformer, and provides the termination, control, and distribution of all ac power for the display monitor.

2.04 Rectifier Assembly — Contains the rectifier circuit to provide unregulated +130 volts and +65 volts, vertical coupling capacitor, and interconnection to the vertical choke. The rectifier assembly interfaces with the power distribution assembly and the regulator and vertical deflection circuit card.

2.05 Regulator and Vertical Deflection Circuit Card — Contains the vertical sweep generator, +130 volt and +65 volt regula-

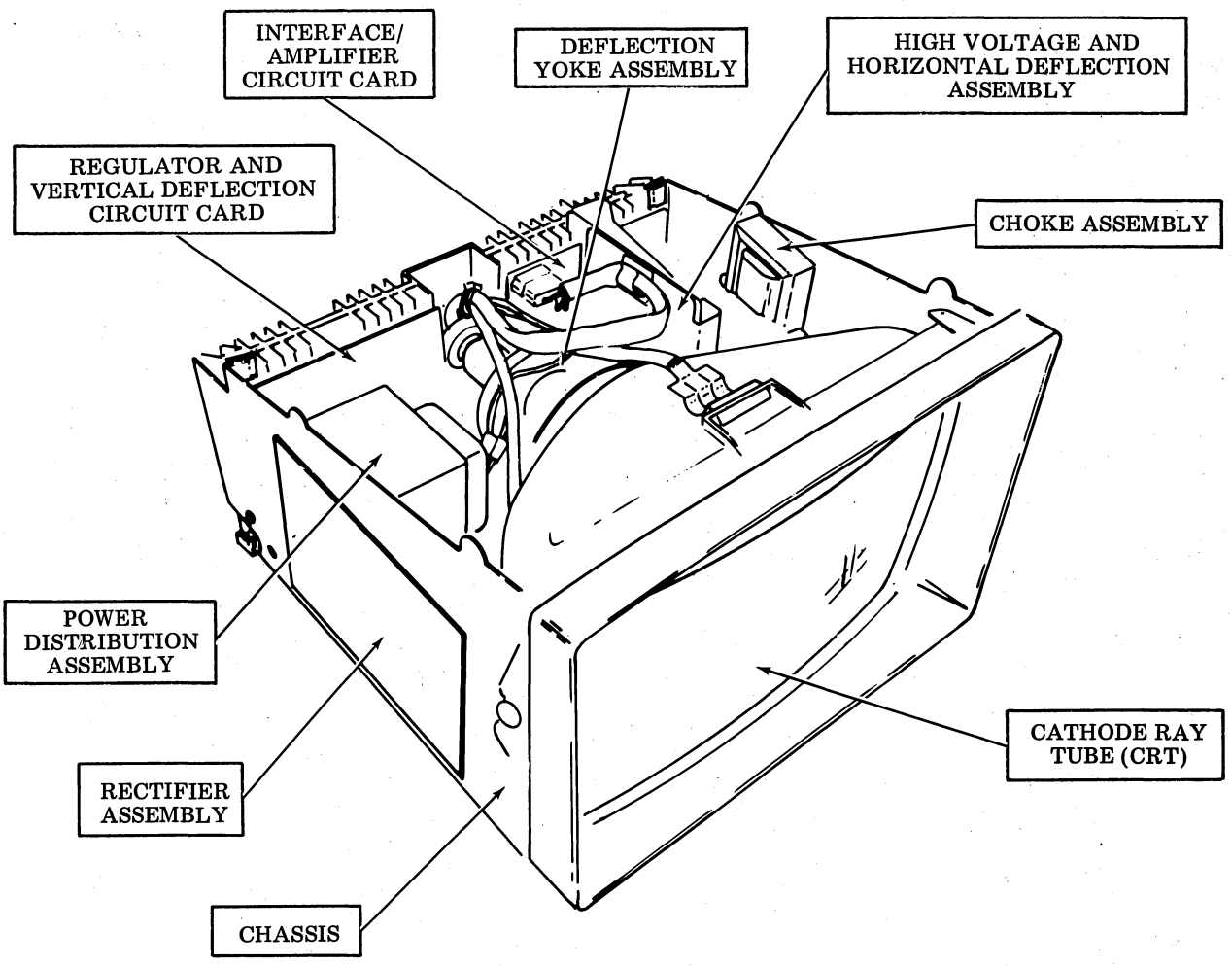


Figure 3 - DATASPEED 40 Display Monitor With Cover Removed

tor. This circuit card is used in conjunction with the rectifier assembly and interface/amplifier circuit card.

2.06 Interface/Amplifier Circuit Card — Contains the interface circuits necessary to receive and process the horizontal drive, vertical synchronization, and dot signals used to control the deflection and modulation of the electron beam in the CRT. The interface/amplifier circuit card is used in conjunction with the regulator and vertical deflection circuit card and with the high voltage and horizontal deflection assembly.

2.07 High Voltage and Horizontal Deflection Assembly — Contains the circuits necessary to generate horizontal deflection, CRT bias voltage, and the second anode accelerating voltage for the CRT. The high voltage and horizontal deflection assembly is used in conjunction with the interface/amplifier circuit card, regulator and vertical deflection circuit card, and the deflection yoke assembly.

2.08 Cathode Ray Tube (CRT) — Is a high contrast tube with a glare reducing etched face. The CRT is mounted between two pivot points to allow adjustment by operator for line of vision or lighting conditions.

2.09 Deflection Yoke Assembly — Contains the horizontal and vertical coil windings that control the sweep of the electron beam across the display screen.

B. Operator Controls (Figure 4)

2.10 Monitor Control — Is located on the lower left-hand corner of the display monitor. Turning the control counterclockwise (as viewed from the front of the display monitor) applies ac power to the monitor power supply circuits. Turning the control clockwise turns off power to the monitor power supply circuits but continues to supply current to the CRT filaments to provide the "instant on" display feature.

2.11 Brightness Control — Is located on the lower right-hand corner of the display monitor. Turning the control counterclockwise (as viewed from the front of the display monitor) increases the brightness of the display until the raster is just visible. Turning the control clockwise decreases the brightness sufficiently to black out the screen.

2.12 Tube Tilt — Is located along the bottom on the right-hand side of the display monitor. Rotating this control will tilt

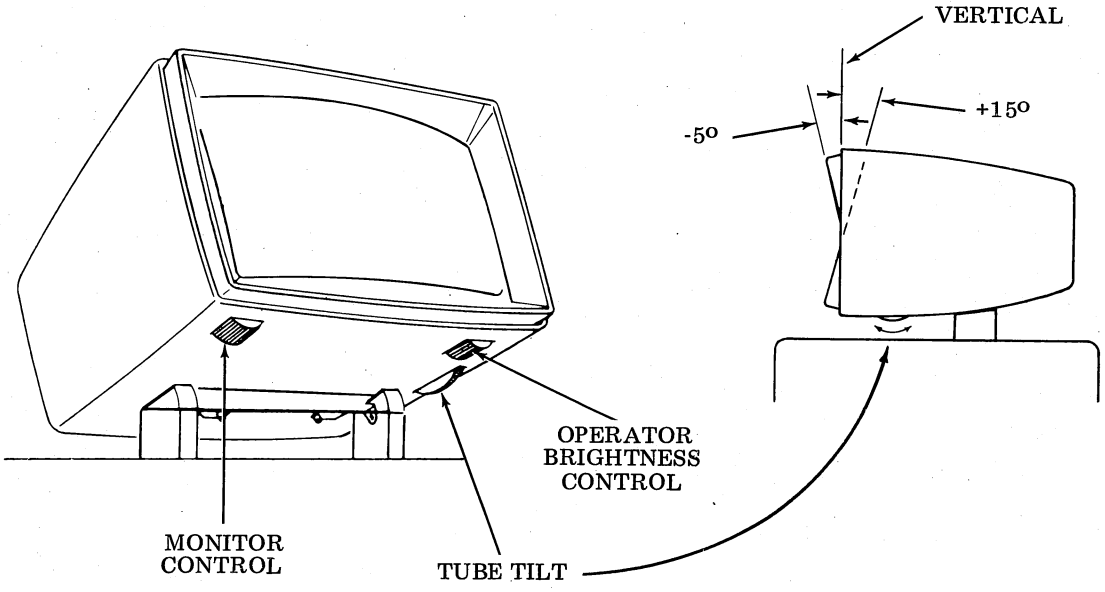


Figure 4 - Location of Operator Controls

the tube face (upward or downward) through an angle of -5 degrees to +15 degrees from the vertical.

C. Display Adjustment Controls (Figure 5)

2.13 Vertical Size — Adjusts the vertical height of the display and is located on the regulator and vertical deflection circuit card.

2.14 Vertical Linearity — Adjusts for uniformity of the character height and is located on the regulator and vertical deflection circuit card.

2.15 Horizontal Size — Adjusts the width of the display. This control is located on the high voltage and horizontal deflection assembly.

2.16 Horizontal Linearity — Adjusts for uniformity of the character width. This control is located under the deflection yoke assembly around the CRT neck (late design) or on high voltage and horizontal deflection assembly (early design).

2.17 Centering Rings — Positions the display up or down and left or right by moving the two centering rings. The centering rings are part of the deflection yoke assembly and are located directly in front of the deflection yoke clamp.

2.18 Master Brightness — Adjusts the range and limits the maximum brightness of the operator brightness control. This control is located on the interface/amplifier circuit card.

2.19 Focus — Adjusts the overall focus of the display and is located on the interface/amplifier circuit card.

D. Indicator Lamps (Figure 6)

2.20 There are seven indicator lamps located on various assemblies monitoring major circuits within the display monitor. These lamps can all be seen with the monitor cover in place.

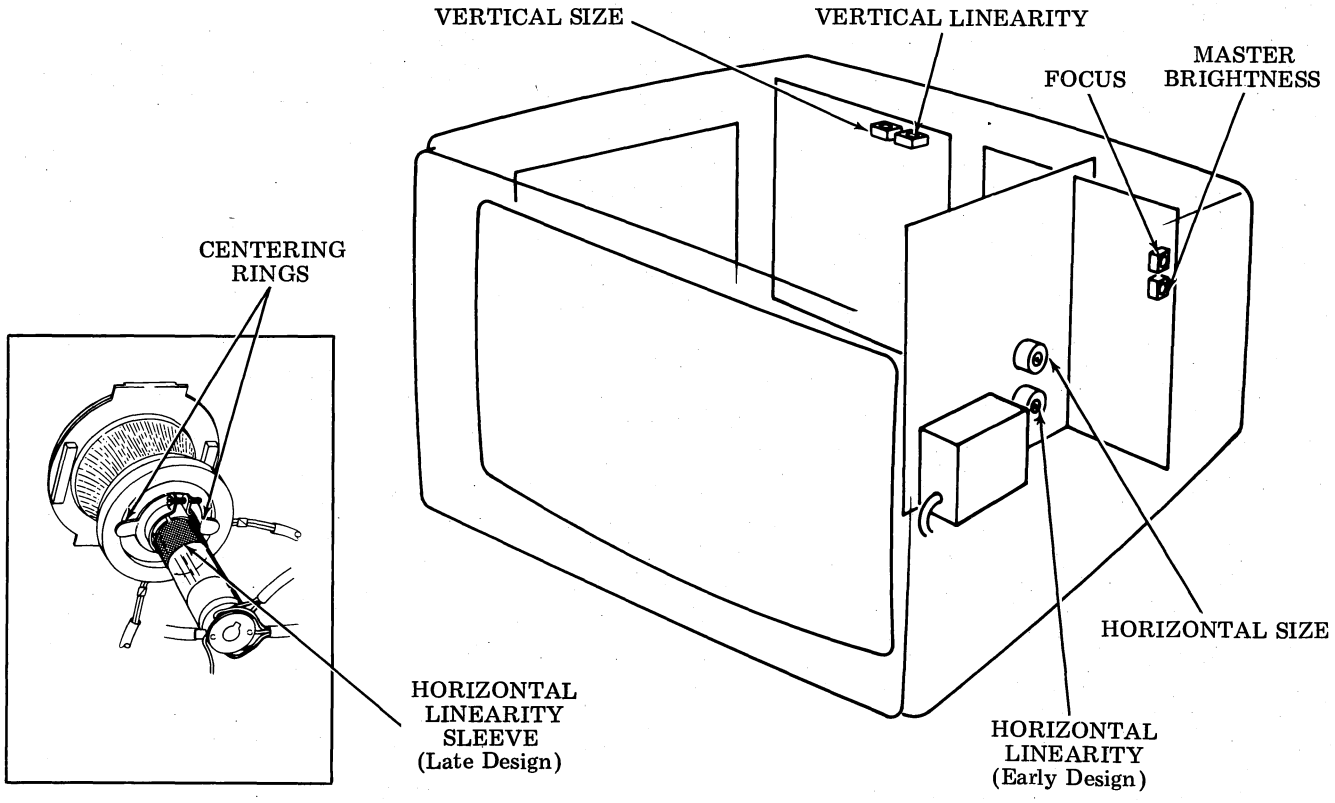


Figure 5 - Location of Display Adjustment Controls

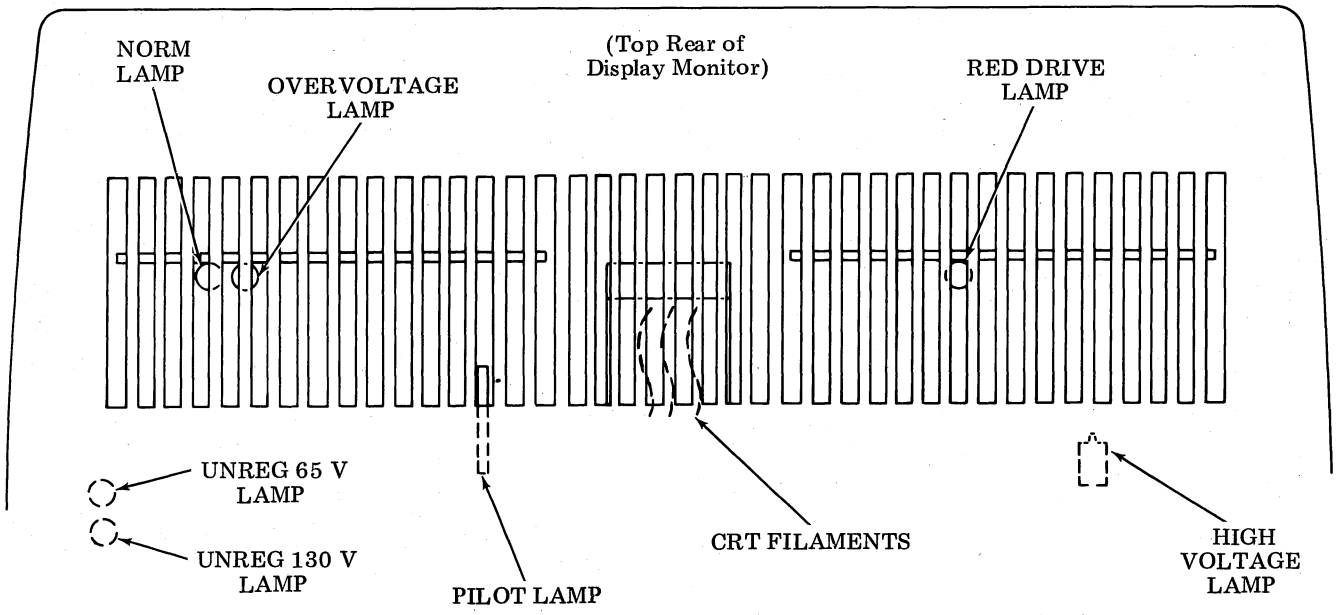


Figure 6 - Indicator Lamps as Seen Through Top Slots of Monitor Cover

2.21 Pilot Lamp — Monitors the incoming ac power to the monitor before the monitor control. This lamp when lit also indicates that the primary fuse is good.

2.22 Unregulated 130 V Lamp — Detects the presence of rectified and filtered dc power prior to regulation to 130 volts.

2.23 Unregulated 65 V Lamp — Detects the presence of rectified and filtered dc power prior to regulation to 65 volts.

2.24 Norm Lamp — Indicates the presence of regulated 130 volt power.

2.25 Overvoltage Lamp — Monitors the output of the 130 volt regulator and will light only when the output of the regulator exceeds about 145 volts.

2.26 Red Drive Lamp — Monitors the incoming horizontal drive pulses. This lamp will be lit whenever the display logic is sending drive pulses and 5 volt power. The monitor does not have to be on for this lamp to operate.

2.27 High Voltage — Monitors the high voltage generated by the horizontal circuit before voltage is multiplied.

2.28 CRT Filaments — Indicates the presence of filament voltage at the CRT. The monitor does not have to be on for the filaments to be lit (see 4.01).

## 3. TECHNICAL DATA

### 3.01 Power Requirements

| | |
|---|---|
| Supply Voltage | 115 v ac ±10% @ 60 Hz |
| Starting Current | .35 amperes |
| Operating Power | 115 watts |
| Heat Generation | 400 BTU/hr. |

### 3.02 Environmental Requirements

| | |
|---|---|
| Operating Temperature | +40°F to 110°F |
| Storage Temperature | -40°F to 150°F |

Relative Humidity

| | |
|---|---|
| Storage and Operating | 2% to 95% (noncondensing) |

Altitude

| | |
|---|---|
| Shipping | Sea level to 50,000 feet |
| Operating | Sea level to 10,000 feet |

Note: This equipment is intended to be operated in a room environment within the temperature range of 40° F to 110° F. Serious damage to it could result if this range is exceeded.

3.03 Physical Characteristics

| | |
|---|---|
| Height (Support legs included) | 12-1/2 inches |
| Width | .16 inches |
| Depth | .15 inches |
| Weight | 38 pounds |

3.04 Display Characteristics

| | |
|---|---|
| Display Dot Matrix | 720 by 336 dots |
| Character Dot Matrix | 7 by 9 dots |
| Dot Spacing | .0.01562 inch |
| Brightness (Raster not visible) | 5-foot lamberts |
| Contrast (Light transmission) | 30% |

4. OPERATION (Figure 7)

A. Power

4.01 Ac power is applied to the power distribution assembly through the left support leg of the display monitor. At this time

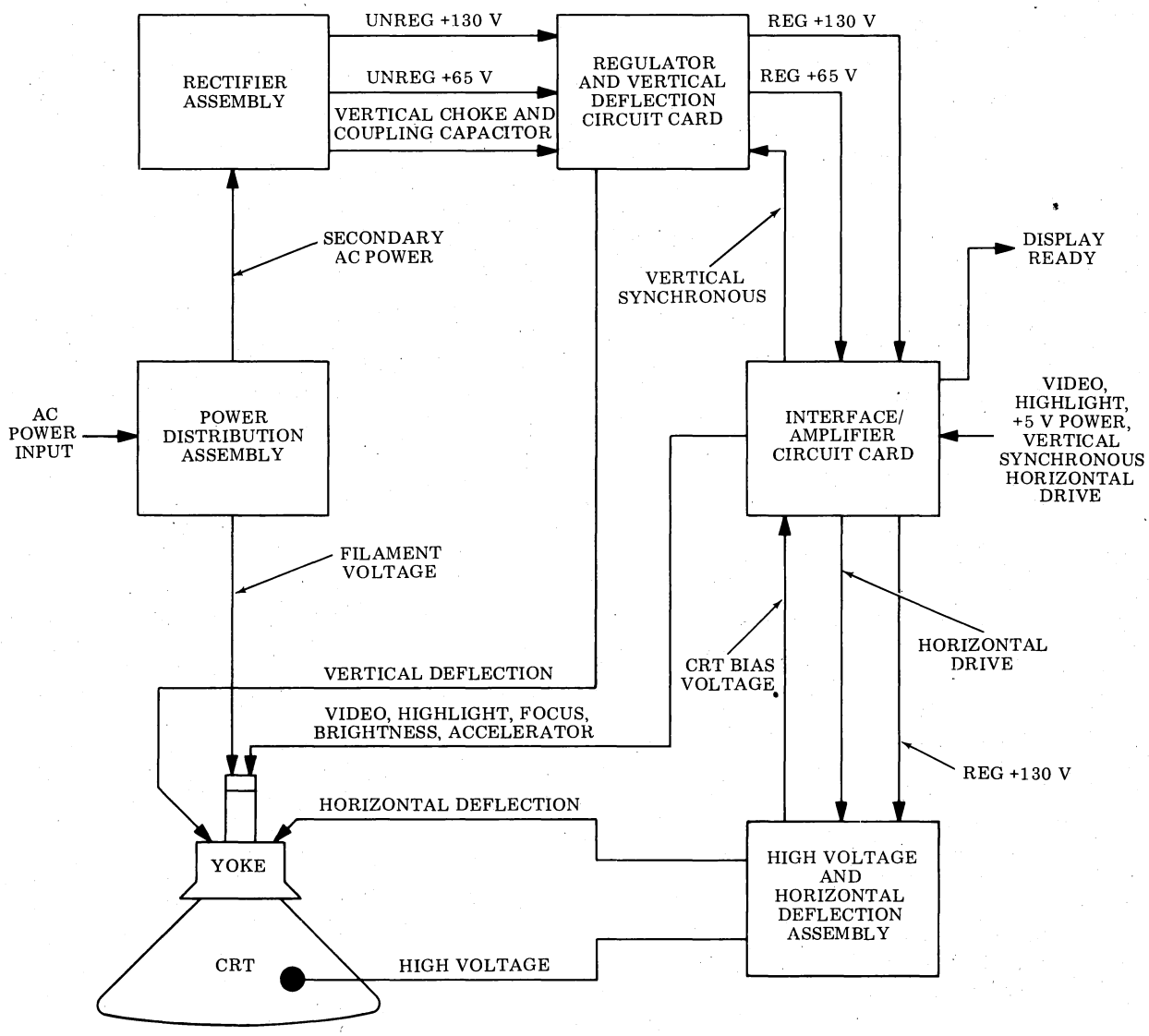


Figure 7 - Block Diagram for DATASPEED 40 Display Monitor

the pilot lamp lights and half power is supplied to the filaments of the CRT. By turning on the display monitor control, full ac power is supplied to the power distribution assembly where the voltage is stepped up and applied to the rectifier assembly. Normal filament voltage is now provided for the CRT.

4.02 The rectifier assembly provides two filtered dc voltages for use on the regulator assembly, unregulated +65 v and unregulated +130 v. The two indicator lamps on the circuit card are now indicating the presence of the two dc voltages.

4.03 The regulator assembly has two regulators which provide +130 v and +65 v to the interface/amplifier assembly. The norm lamp on the circuit card should be on indicating regulated 130 volt power.

4.04 The raw voltages needed to bias the CRT are processed and controlled by the interface/amplifier assembly. These voltages as well as the horizontal deflection current are generated by the high voltage assembly.

4.05 The high voltage assembly also generates the 17,000 v accelerating voltage for the CRT. An indicator lamp on the circuit card indicates the presence of high voltage during normal operation.

B. Deflection

4.06 In order to form characters, numbers, or symbols on the screen of the CRT, the electron beam of the CRT must be positioned from up to down, and from left to right across the screen in successive sweeps.

4.07 This is done by generating two independent ramps of current coupled to the vertical and horizontal coils of the deflection yoke. One ramp of current is generated by the vertical sweep generator of the regulator assembly at a 60 Hz rate. The other ramp generated by the high voltage assembly sweeps the electron beam from left to right and back again at a 21,000 Hz rate.

4.08 Since the horizontal rate is much faster than the vertical rate, the electron beam will travel across the screen of the CRT 350 times during one vertical cycle, thereby, creating a uniform lighted area called the raster. Video signals from the display logic to the CRT grid element turn the electron beam on or off at the proper times during vertical raster deflection to accomplish writing of a character on the display screen.

5. REFERENCES

5.01 Reference manuals associated with the DATASPEED 40 display monitor are Section 999-300-121, How to Operate (KD, KDP, and RO) and Section 575-100-350, Field Installation and Maintenance Practices.

5.02 The following list of literature pertains to the DATASPEED 40 Display Monitor.

| SECTIONS | TITLE |
|---|---|
| 582-213-100 | Description and Operation |
| 582-213-500 | Testing and Troubleshooting |
| 582-213-700 | Adjustments and Lubrication |
| 582-213-701 | Disassembly and Reassembly and Parts |