TEK INSTRUCTION MANUAL

Part No. 070-2507-00
Product Group 11

606A

MONITOR WITH OPTIONS

Tektronix
COMMITTED TO EXCELLENCE

TEK INSTRUCTION MANUAL

Part No. 070-2507-00
Product Group 11

606A MONITOR WITH OPTIONS

Please Check for CHANGE INFORMATION at the Rear of This Manual

First Printing SEP 1978
Revised MAY 1984

Tektronix
COMMITTED TO EXCELLENCE

TABLE OF CONTENTS

PART I
OPERATING INFORMATION

TABLE OF CONTENTS (cont)

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

PART II
SERVICE INFORMATION

TABLE OF CONTENTS (cont)

TABLE OF CONTENTS (cont)

TABLE OF CONTENTS (cont)

LIST OF ILLUSTRATIONS

TABLE OF CONTENTS (cont)

LIST OF ILLUSTRATIONS (cont)

The illustrations in Section 10 are located near their associated diagrams on the foldout pages.

TABLE OF CONTENTS (cont)

LIST OF TABLES

OPERATOR SAFETY SUMMARY

This manual contains safety information which the user must follow to ensure safe operation of the Monitor. WARNING information is intended to protect the patient and the operator, and CAUTION information is intended to protect the instrument. The following are general safety precautions which do not appear in the operating sections of this manual and which must be applied during all phases of operation.

Medical-Dental Applications

WARNING

Do not use the amplifier INPUTS for direct patient connection. Signal currents at these connectors, as well as leakage currents, may exceed values considered non-hazardous for direct patient connection.

Although this Monitor is not to be used for direct patient connection, interconnection of this instrument with other equipment can result in application of excessive current to the patient. It is extremely important that the equipment be interconnected in accordance with NFPA 76B-T, ***Tentative Standard for the Safe Use of Electricity in Patient Care Facilities****, section 3038, "Signal Transmission Between Applicances".*

Do not operate this instrument in the presence of flammable gases or anesthetics. Explosion can result from operation in such an environment.

Power Cord Safety Grounding

WARNING

This equipment has a three-wire power cord with a three-contact plug for connection to the power source and to protective ground. The plug protective-ground contact connects (through the cord protective-grounding conductor) to the accessible metal parts of the equipment. For electric-shock protection, insert this plug into a socket outlet that has a securely grounded protective-ground contact.

To assure safe grounding during operation in patient-care facilities, the Hospital-Grade power-cord plug supplied with the instrument (Option 6 instruments) must be connected only to a power outlet marked "HOSPITAL-GRADE". Refer qualified service personnel to the servicing information sections of the Instruction Manual for additional information.

For confirmation that the socket-outlet ground contact is securely grounded, refer to qualified service personnel.

Use Correct Fuse

WARNING

For continues fire-hazard protection, replace fuse only with one of the proper type and rating. Refer fuse replacement to qualified service personnel only.

The following information appears in the text of the operating sections of this manual, and is repeated here for emphasis:

Do Not Remove Instrument Covers

WARNING

High voltage is present inside the instrument. To avoid electric-shock hazard, operating personnel must not remove the protective instrument covers. Component replacement and internal adjustments must be made by qualified service personnel only.

Electric-shock hazard present; only qualified service personnel should change the input signal requirements. Refer them to the servicing information sections of the 606A Instruction Manual.

Limit Input Signals

WARNING

To avoid electric-shock hazard, do not apply input signals of more than 25 volts (dc plus peak ac).

Exercise Care With Intensity Level

CAUTION

A high intensity level combined with a stationary spot will damage the crt phosphor. Therefore, set the INTENSITY control for just enough spot intensity for good visibility.

Exercise care in establishing the correct display intensity; a high-amplitude Z-Axis input signal, combined with an excessively high setting of the INTENSITY control, may damage the crt phosphor.

WARNING

This equipment generates, uses, and can radiate radio frequency energy and may cause interference to radio communications if not installed and used in accordance with the instruction manual. It has been tested and found to comply with the limits for Class B computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when this equipment is operated in a commercial environment. Operation in a residential area is likely to cause interference in which case the users at their own expense must take whatever measures may be required to correct the interference.

SERVICE SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

The following are safety precautions which appear in the servicing information sections of this manual, and are repeated here for emphasis:

Medical-Dental Applications

WARNING

Do not use the amplifier INPUTS for direct-patient connection. Signal currents at these connectors, as well as leakage currents, may exceed values considered non-hazardous for direct-patient connection.

Although this monitor is not to be connected directly to a patient, interconnecting this monitor to other equipment can result in the application of excessive current to a patient. It is extremely important that the interconnection is made in accordance with NFPA 76B-T, ***Tentative Standard for the Safe Use of Electricity in Patient Care Facilities****, section 3038, "Signal Transmission Between Appliances".*

Power Cord Safety Grounding

WARNING

This equipment has a three-wire power cord with a three-contact plug for connection to the power source and to protective ground. The plug protective-ground contact connects (through the cord protective-grounding conductor) to the accessible metal parts of the equipment. For electric-shock protection, insert this plug into a socket outlet that has a securely grounded protective-ground contact.

To assure safe grounding during operation in patient-care facilities, the Hospital-Grade power cord plug supplied with the instrument (Option 6 instruments) must be connected only to a power outlet marked "HOSPITAL GRADE". Refer qualified service personnel to the servicing information sections of the Instruction Manual for additional information.

For confirmation that the socket-outlet ground contact is securely grounded, refer to qualified service personnel.

Disconnect Instrument Power

WARNING

Disconnect the monitor from the power source, to avoid electric shock, before removing the cabinet panels, replacing components, soldering, or changing the settings of the Input Attenuation switches.

CRT Handling

WARNING

Use care when handling a crt. Breakage of the crt causes a high-velocity scattering of glass fragments (implosion). Protective clothing and safety glasses should be worn. Avoid striking the crt on any object which might cause it to crack or implode. When storing a crt, place it in a protective carton or set it face down in a protected location on a smooth surface with a soft mat under the faceplate.

Apply Proper Line Voltage

CAUTION

To prevent damage to the instrument, always check the line-voltage information recorded on the rear panel before applying power to the instrument.

Damage to the instrument may result from incorrect placement of the line-voltage selector plug.

Exercise Care With Intensity Level

CAUTION

Do not allow a high-intensity spot to remain stationary on the crt. The crt phosphor could be permanently damaged.

Use Proper Cleaning Agents

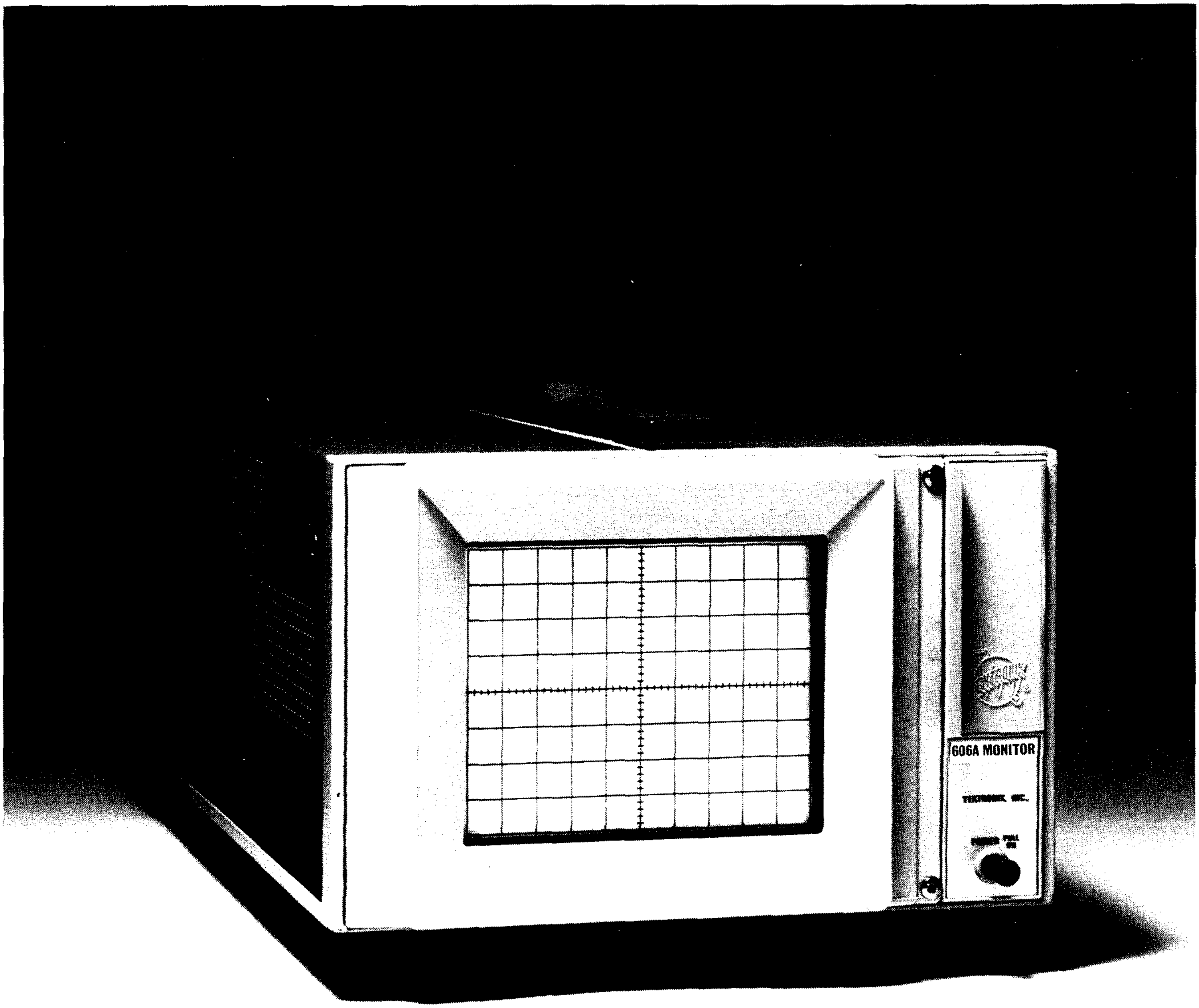
CAUTION

Avoid the use of chemical cleaning agents which might damage the plastics used in this instrument. Use a non-residue type of cleaner, preferably isopropyl alcohol, total denatured ethyl alcohol, or TP35. Before using any other type of cleaner, consult your Tektronix Service Center.

Avoid Excessive Moisture

CAUTION

Circuit boards and components must be dry before applying power to the instrument to prevent damage from electrical arcing.



2506-01

606A Display Monitor, shown with Option 1 (Internal Graticule), and Option 23 (includes handle, feet, and protective cabinet panels).

GENERAL INFORMATION

Introduction

This Instruction Manual contains information necessary to effectively operate the 606A Display Monitor, and is divided into four sections. Section 1 provides a basic description of the 606A and information on repackaging the instrument for shipment. Section 2 contains operating information for the instrument, including a functional check procedure that serves to familiarize the user with operating techniques. Operating information for the various available options is also included. The instrument specification is in Section 3 of this manual. Factory-installed options are described in Section 4.

The instruction manual provides both operating and servicing information for the 606A Display Monitor. Part I of the instruction manual includes operating information for both the user and service personnel. Part II is intended for use by qualified service personnel only.

Description

The TEKTRONIX 606A Display Monitor is a very high resolution X-Y display monitor providing a clear, bright display of analog data. The linear, broad-band Z-axis allows the many shades of gray necessary for an accurate and detailed image.

The high resolution of the 606A is particularly useful in applications such as scanning Auger and electron microscopes, ultrasound systems, and gamma camera systems. In medical/dental applications, the high resolution provides the sharp detail necessary in photographic analysis of studies that are common in tracing emissions of injected radioactive fluid as it moves through living tissue.,

The 606A offers a high degree of adaptability to various application areas through the selection of a broad variety of factory-installed options. A description of available options is included in Section 4 of this manual.

The compact size of the 606A Display Monitor permits mounting two instruments side-by-side in a standard 19-inch instrument rack; it requires only 5-1/4 inches of vertical rack space. The instrument can be operated from either a 120-volt or a 220-volt (nominal) line-voltage source.

Damage Inspection

When unpacking the instrument, carefully remove the instrument from the shipping carton and inspect for any possible damage incurred during shipment. Report any damage or shortage to the carrier as soon as possible.

Save the shipping carton and packing in case it is needed to repackage the instrument for subsequent shipment.

Repackaging For Shipment

If this instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing the following: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument type and serial number, and a description of the service required.

Save and re-use the carton and packing in which your 606A Monitor was shipped to you. If the original packaging is unfit for use or not available, repackage the instrument as follows:

1. Obtain a carton of corrugated cardboard having inside dimensions of no less than six inches more than the instrument dimensions; this will allow for cushioning. The carton test strength for this instrument is 275 pounds.

2. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.

3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the instrument, allowing three inches on all sides.

4. Seal the carton with shipping tape or with an industrial stapler.

OPERATING INSTRUCTIONS

AMBIENT TEMPERATURE CONSIDERATIONS

This instrument can be operated where the ambient air temperature is between 0 and +50°C (+32 and +122°F), and can be stored in ambient temperatures between −40 and +70°C (−40 and +158°F). After being stored in temperatures beyond the operating limits, allow the chassis temperature to return to within the operating limits before applying power. Other environments and mounting configurations, such as mounting in consoles or instrument racks, may require additional cooling measures. (Refer qualified service personnel to the servicing information sections of this manual.) Allowing the monitor to operate at an ambient temperature substantially higher than that specified may result in poor reliability as well as inaccurate performance.

OPERATING POWER INFORMATION

The instrument can be operated from either a 120-volt or 220-volt nominal line-voltage source, and over a line-frequency range of 48 to 440 hertz. In addition, three regulating ranges are provided for each nominal line-voltage source.

CAUTION

To prevent damage to the instrument, always check the line-voltage information recorded on the rear panel before applying power to the instrument. If the indicated line voltage is set for a different range than the ac line that you intend to use, refer qualified service personnel to the Installation section of this Instruction Manual.

CONTROLS AND CONNECTORS

Controls and connectors necessary for normal operation of the 606A Display Monitor are located on the front and rear panels of the instrument. (Some switches to control functions of various instrument options are located internally. Refer a qualified service technician to Part II of this Instruction Manual for information.) To make full use of the capabilities of this insturment, the operator should be familiar with the function and use of each external control and connector. The front-panel controls are shown in Figure 2-1. The rear-panel controls and connectors are shown in Figure 2-2. Some external controls and connectors shown relate to available instrument options for the 606A, and may be included in your instrument. Options are indicated in the following text by option number. These option numbers correspond to the option numbers on the rear of your display unit.

Front-Panel Controls

This is a brief description of the function or operation of the front-panel controls. See Figure 2-1.

(1) POWER (PULL ON)	Controls ac power to the instrument. Power is on when the yellow band is visible.
(2) FOCUS	Control provides adjustment to obtain a well-defined display.
(3) INTENSITY	Controls brightness of the crt display and is the offset control for the Z-Axis input.

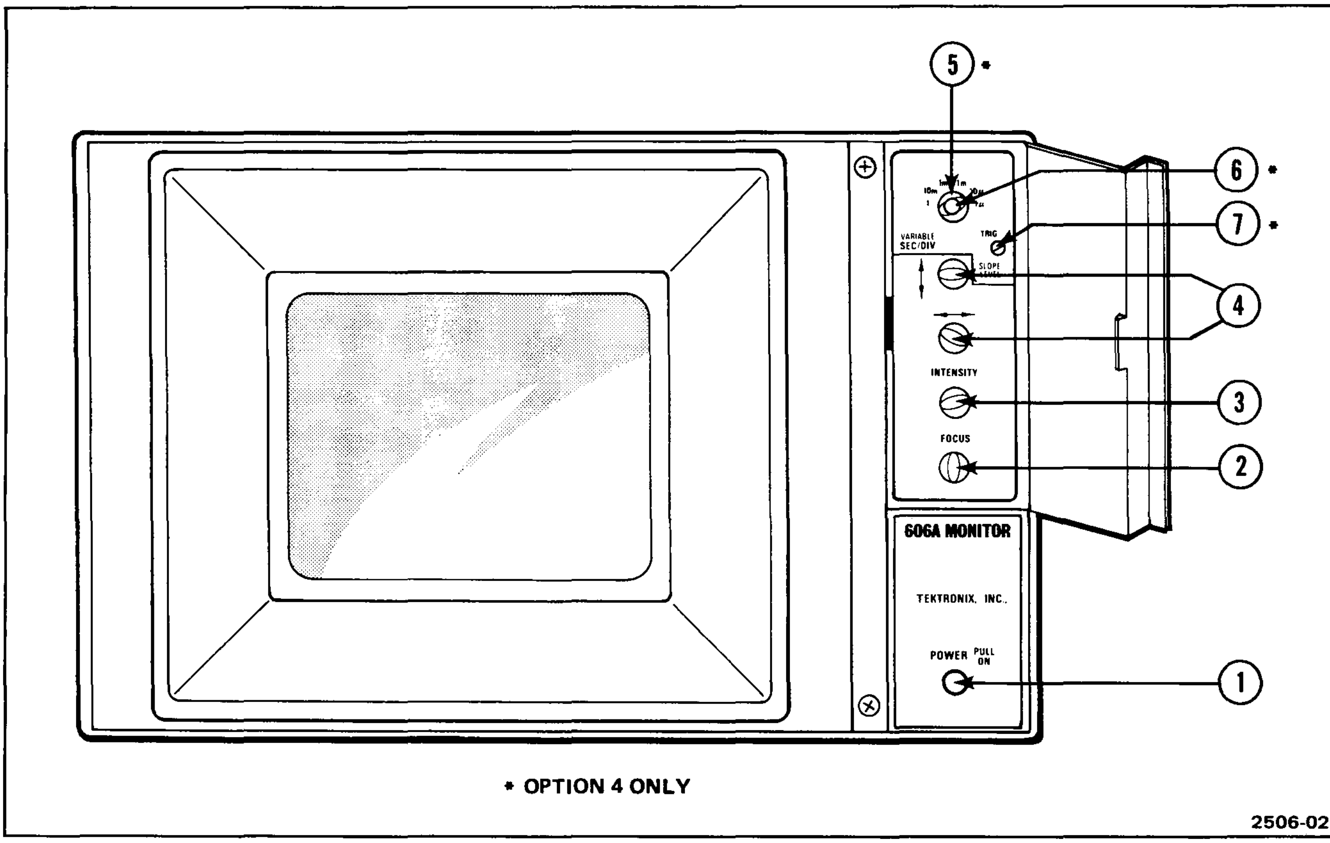


Fig. 2-1. Front-panel controls (includes Option 4).

(4) POSITION — Two controls position the display. The Vertical (Y) control positions the crt beam in the Y axis. The Horizontal (X) control positions the crt beam in the X axis. Arrows indicated the axis controlled.

Time Base Sweep — (These controls are included on the Option 4 version only.)

(5) SEC/DIV — Selects one of six calibrated sweep rates from 0.1 s/div to 1 μs/div in decade steps (Option 1, internal, non-illuminated graticule scribed in 8 X 10 divisions available). VARIABLE control must be fully clockwise for indicated sweep rate.

(6) VARIABLE — Screwdriver adjustment concentric with the SEC/DIV switch. Provides uncalibrated, continuously variable sweep rates between calibrated steps. Extends the slowest sweep-rate range to at least 1 s/div.

(7) TRIG SLOPE/LEVEL — Screwdriver adjustment that selects the slope and level of the vertical signal from which the sweep is triggered.

Rear-Panel Controls and Connectors

All signal connections to the display monitor are made through bnc coaxial connectors located on the rear panel of the instrument. See Figure 2-2.

(1) TRACE ROTATION — Screwdriver adjustment to align the trace with the crt horizontal axis.

X INPUT

(2) +X — Bnc input connector. A positive signal applied deflects the beam to the right; a negative signal deflects the beam to the left.

(3) −X (Option 21) — Bnc input connector. A positive signal applied deflects the beam to the left; a negative signal deflects the beam to the right. Used in conjunction with the +X INPUT for differential operation.

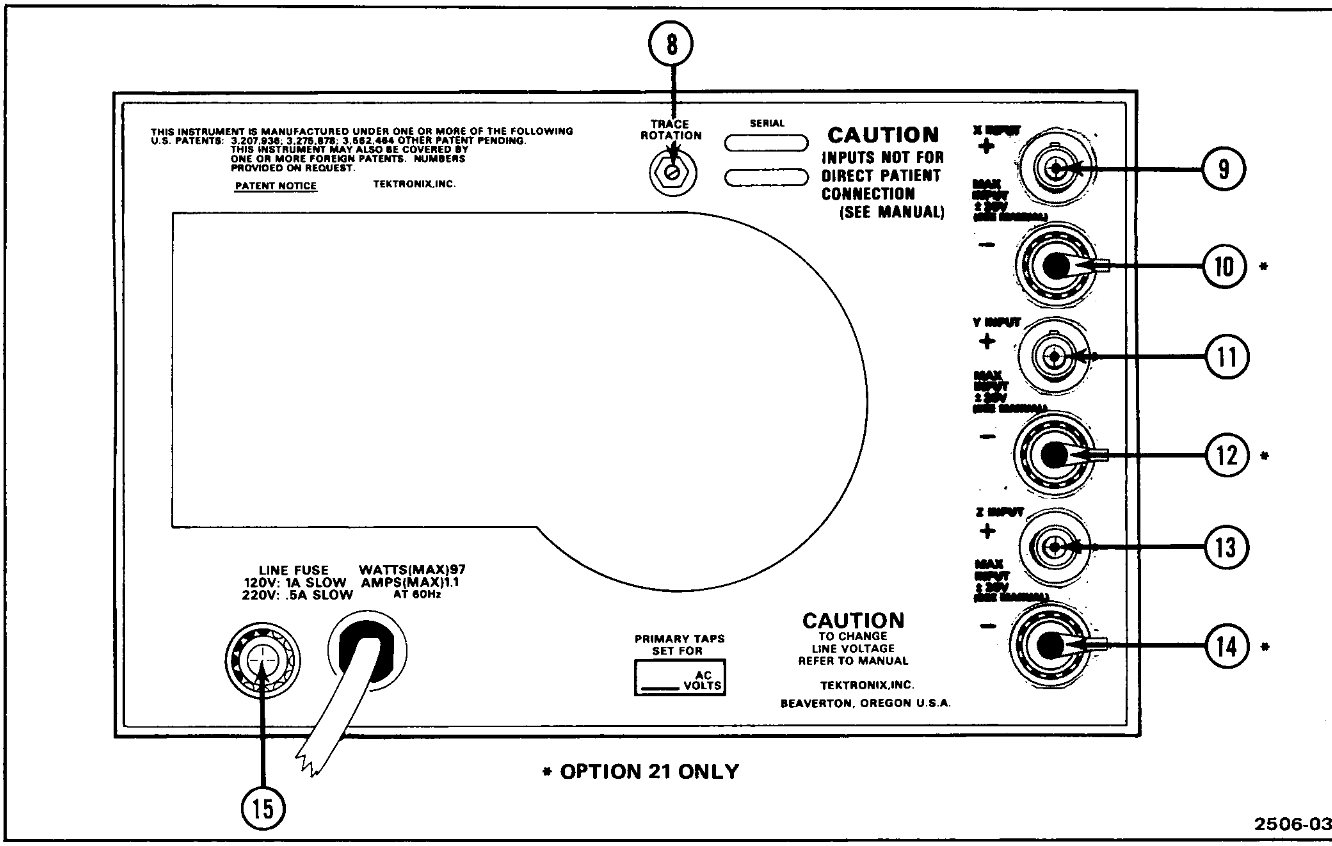


Fig. 2-2. Rear-panel controls and connectors (includes Option 21).

Y INPUT

(4) +Y — Bnc input connector. A positive signal applied deflects the beam up; a negative signal deflects the beam down.

(5) −Y (Option 21) — Bnc input connector. A positive signal applied deflects the beam down; a negative signal deflects the beam up. Used in conjunction with the +Y INPUT for differential operation.

Z INPUT

(6) +Z — Bnc input connector. Provides a linear function to control display brightness. A positive signal applied increases display brightness; a negative signal decreases display brightness.

(7) −Z (Option 21) — Bnc input connector. Provides a linear function to control display brightness. A positive signal applied decreases display brightness; a negative signal increases display brightness. Used in conjunction with the +Z INPUT for differential operation.

(8) LINE FUSE — Line-voltage fuse to protect the instrument from excessive line-voltage surges or shorts within the instrument. (Line fuse is located inside the instrument for Option 6 instruments).

DETAILED OPERATING INFORMATION

Signal Connectors

Bnc connectors are provided at the rear of the instrument for application of input signals to the Horizontal (X) and Vertical (Y) Amplifiers for display on the crt, and to the Z-Axis Amplifier to control display intensity. The standard instrument is designed for single-ended operation (inputs to the +X, +Y, and +Z connectors). For instruments equipped with Option 21 (differential inputs), −X, −Y, and −Z input connectors are provided. When the instrument is shipped from the factory, Option 21 instruments are prepared for single-ended operation, with a grounding cap connected to the −input (inverting) of each axis. For differential operation, remove the grounding cap and apply the input signals to the bnc connectors of the appropriate axis.

Input Signal Requirements

The vertical (Y) and horizontal (X) deflection factors are set at the factory to one volt for eight divisions of deflection on each axis. Thus, as shipped, the input signal required for each division of deflection is 0.125 volt.

NOTE

The Functional Check procedure may be used to determine if the vertical and horizontal deflection factors of your particular instrument meet those set at the factory, as stated above.

WARNING

Electrical-shock hazard is present within the instrument. Only qualified service personnel should change the input signal requirements. Refer them to the servicing information sections of this Instruction Manual.

The best transient response from the 606A Monitor is achieved when the input signal amplitude to the vertical and horizontal inputs is no greater than that sufficient to provide full-screen deflection.

WARNING

To avoid electric shock, do not apply input signals of more than 25 volts (dc plus peak ac). Should fault conditions occur, however, the instrument is protected for application of input signals up to 100 volts (dc plus peak ac).

With no signals applied to the Z INPUT connectors, the intensity of the display is controlled only by the front-panel INTENSITY control. The intensity range provided by this control is from no visual intensity (crt beam off) to full bright.

To control the intensity with an externally-applied signal, set the INTENSITY control to about midrange. An internal gain control permits the Z-axis input requirement for full intensity control to be adjustable from +1 volt or less to +5 volts or more, depending on the exact setting of the INTENSITY control. A zero-volt input cuts off visual intensity when the INTENSITY control is at about midrange. The best transient response of the Z-Axis Amplifier is achieved when the input signal amplitude is the minimum required to provide the desired intensity change.

CAUTION

Exercise care in establishing the correct display intensity; a high-amplitude Z-axis input signal, combined with an excessively high setting of the INTENSITY control, may damage the crt phosphor. In any case, do not apply a Z-axis input signal with amplitudes exceeding 100 volts.

FUNCTIONAL CHECK

The following procedures are provided to aid in obtaining a display on the 606A Display Monitor, and may be used as a check of basic instrument operation. The procedures may be used for incoming inspection to verify proper operation, and may also be used by the operator for instrument familiarization. Only instrument functions, and not measurement quantities or specifications, are checked in these procedures. Therefore, a minimum amount of test equipment is required. If performing the Functional Check procedure reveals improper performance or instrument malfunction, first check the operation of associated equipment; then, refer to qualified service personnel for repair or adjustment of the instrument.

The first of these procedures is intended for use in checking the standard 606A, without instrument options.

The second procedure checks operation of instruments equipped with Option 4 (Internal Sweep) and Option 21 (Differential Inputs). Use of other options is described under Operating Information for Options.

Test Equipment Required

The following test equipment was used as a basis to write the Functional Check procedures. Other test equipment, which meets these requirements, may be substituted. When other equipment is used, the control settings or setup may need to be altered.

1. Power Module

Description: TEKTRONIX TM 500-Series Power Module with one or more plug-in compartments.

Type used: TEKTRONIX TM 501 (used with the FG 503 Function Generator).

2. Function Generator

Description: Frequency range, 1 Hz to 50 kHz; output amplitude, 1 V p-p into 50 Ω; waveform output, sine wave and square wave.

Type Used: TEKTRONIX FG 503 (used with TM 501 Power Module).

3. Cables (3 Required)

Description: Length, 42 inches; connectors, bnc.

Type Used: Type RG-58/U, 50 Ω coaxial, Tektronix Part No. 012-0057-01.

4. Dual-Input Coupler

Description: Dual outputs from a single input; connectors, bnc.

Type Used: Tektronix Part No. 067-0525-01 Calibration Fixture.

5. 50-ohm Termination

Description: Impedance, 50 Ω; connectors, bnc.

Type Used: Tektronix Part No. 011-0049-01.

6. External Graticule (Not required if your instrument has Option 1 Internal Graticule.)

Description: Graticule ruled in eight vertical divisions and ten horizontal divisions.

Type Used: Tektronix Part No. 337-1674-10 (supplied as a standard accessory with the 606A).

Preliminary Setup

1. Install the internal graticule on the faceplate of the 606A crt.

NOTE

If your instrument includes Option 1, Internal Graticule, skip this step.

2. Install the function generator in the power module and turn on the power module.

3. Connect the 606A power cord to a suitable ac power source.

NOTE

Check the line voltage information recorded on the rear panel. If the source voltage is not within this range, refer qualified service personnel to the servicing information sections of this Instruction Manual.

4. Open the access door on the front panel and set the controls as follows:

SEC/DIV (Option 4 only)	10 μ
Vertical & Horizontal Positions	Midrange
INTENSITY	Fully counterclockwise
FOCUS	Midrange
POWER (PULL ON)	On (button out)

5. Allow at least five minutes for the instrument to warm up.

6. Proceed to the appropriate Functional Check procedure for your instrument.

NOTE

Your instrument may contain any of several available factory-installed optional additions or changes (Options). Refer qualified service personnel to the servicing information sections of the 606A Instruction Manual to determine if your instrument includes Option 22 (internal, switchable 1:1 or 5:1 attenuators). If included, the attenuators should be set at 1X by the service person.

If your instrument includes Option 4 (internal sweep), S350 (Int Swp) and S555 (Int Blank), located within the instrument, must be set for X-Y mode of operation for Procedure 1 or to Y-T mode if Procedure 2 is to be performed. The switch settings should be checked by qualified service personnel only.

Procedure 1 (Standard Instrument, without Option 4, Internal Sweep, Option 21, Differential Inputs, and Option 22, Internal Switchable Attenuators)

Display Functions

1. Perform the Preliminary Setup procedure.

2. Notice that a spot will appear on the crt, increasing in brightness as you slowly turn the INTENSITY control clockwise.

CAUTION

A high intensity level combined with a stationary spot will damage the crt phosphor. Therefore, set the INTENSITY control to the minimum necessary for good visibility.

3. Set the FOCUS control for a sharp, well-defined display.

4. Turn the Vertical and Horizontal Position controls and notice that the spot position can be controlled by both Position controls.

5. Set the function generator for a 1-volt (peak-to-peak), 50-kilohertz sine-wave output.

6. Connect the function generator output to the rear-panel +X INPUT connector via the 42-inch cable and the 50-ohm termination.

7. Center the display with the Horizontal Position control, and set the trace on the center horizontal graticule line with the Vertical Position control.

8. Check that the rear-panel TRACE ROTATION adjustment will align the trace with the center horizontal graticule line.

Deflection and Z-Axis Functions

1. Perform the Preliminary Setup procedure.

2. Set the function generator for a 1-volt (peak-to-peak), 50-kilohertz sine-wave output.

3. Connect the function generator output to the rear-panel +X INPUT connector via the 42-inch cable and the 50-ohm termination.

4. Center the display with the Horizontal Position control, and check for eight divisions of horizontal deflection.

5. Disconnect the signal from the +X INPUT connector and apply it to the +Y INPUT connector.

6. Center the display on the crt with the Vertical Position control, and check for eight divisions of vertical deflection.

7. Set the INTENSITY control for a barely-visible display.

8. Disconnect the signal from the +Y INPUT connector and apply it to the +X INPUT and +Z INPUT connectors via the 42-inch cable, 50-ohm termination, and the dual-input coupler.

9. Notice that the right end of the crt display becomes brighter, and that the left end disappears.

10. Disconnect the function generator.

This completes the Functional Check procedure for instruments without Options 4, 21, and 22.

Procedure 2 (Instruments with Option 4, Internal Sweep and Option 21, Differential Inputs).

NOTE

The following procedure applies to the Option 4 version of the 606A Monitor that has been properly set for internal sweep operation. Refer qulaified service personnel to the servicing information sections of this Instruction Manual to determine if the internal sweep of your instrument has been employed.

Display Functions

1. Perform the Preliminary Setup procedure.

2. Notice that a trace will appear on the crt, increasing in brightness as you slowly turn the INTENSITY control clockwise.

3. Set the FOCUS control for a sharp, well-defined trace.

4. Turn the Vertical and Horizontal Position controls and notice that the trace position can be controlled by both controls.

5. Center the display with the Horizontal Position control. Set the trace on the center horizontal graticule line with the Vertical Position control.

6. Check that the rear-panel TRACE ROTATION adjustment will align the trace with the center horizontal graticule line.

Deflection and Z-Axis Functions

1. Perform the Preliminary Setup procedure.

2. Set the function generator for a 1-volt (peak-to-peak) 50 kHz sine-wave output.

3. Connect the function generator output to the rear-panel +Y INPUT connector via the 42-inch cable and the 50-ohm termination.

4. Center the display with the Vertical Position control. If necessary, adjust the TRIG SLOPE/LEVEL control for a stable display.

5. Check for eight divisions of vertical deflection.

6. (Option 21 only—Steps 6 through 11.) Remove the grounding cap from the −Y INPUT connector.

7. Disconnect the signal from the +Y INPUT connector and connect it to the −Y INPUT connector.

8. Place the grounding cap on the −Y INPUT connector.

9. Center the display with the Vertical Position control. If necessary, adjust the TRIG SLOPE/LEVEL control for a stable display.

10. Check for eight divisions of vertical deflection.

11. Remove the grounding cap from the +Y INPUT connector. Disconnect the signal from the −Y INPUT connector.

12. Connect the function generator output to the +Y INPUT and the +Z INPUT connectors via the 42-inch cable, 50-ohm termination, and the dual-input coupler.

13. (Option 21 only.) Place grounding caps on the −Y INPUT and the −Z INPUT connectors.

14. Notice that only the top portion of the display is visible.

15. (Option 21 only—Steps 15 through 20.) Remove the grounding cap from the −Z INPUT connector.

16. Disconnect the signal from the +Z INPUT connector and connect it to the −Z INPUT connector.

17. Place the grounding cap on the +Z INPUT connector.

18. Notice that only the bottom portion of the display is visible.

19. Disconnect the function generator.

20. Replace the grounding caps on the −X INPUT, −Y INPUT, and −Z INPUT connectors.

This completes the Functional Check procedure for the 606A Monitor with Option 4 and Option 21.

OPERATING INFORMATION FOR OPTIONS

Option 4 Internal Time Base

Option 4 includes a circuit board that contains triggering, sweep generating, and unblanking circuitry. It also includes a front-panel switch to set the calibrated sweep rate, and an uncalibrated variable control to vary the sweep rate between calibrated ranges, and a screwdriver adjustment to select the slope and level of the triggering signal that initiates the sweep.

Internally-located switches must be set for Y-T mode before using the internal time base.

NOTE

Refer all internal switch settings required to qualified service personnel. Instructions on changing from X-Y to Y-T mode are located in the servicing information sections of this Instruction Manual.

In addition to internal switching changes as described, an internal switch (Trig Mode, S909) is provided to allow flexibility in triggering operation. This switch has two positions (Norm and Auto), that function as follows:

Norm (normal mode). In this mode, the sweep is held off until a triggering signal occurs. When the triggering signal (a sample of the Y input signal) reaches the slope and level selected by the front-panel TRIG SLOPE/LEVEL control, a sweep is initiated. Unblanking is initiated concurrently with the sweep sawtooth. This mode is normally necessary when viewing signals with a repetition rate slower than approximately 20 hertz.

Auto (automatic mode). This mode provides a base-line trace (free-running) in the absence of a triggering signal. This is useful for setting positioning, intensity, and focus of the trace. For any triggering signal above a 20-hertz repetition rate, the sweep is initiated when the input signal passes through the slope and level selected by the front-panel TRIG SLOPE/LEVEL control.

The front-panel SEC/DIV switch provides six calibrated sweep rates from 0.1 second to 1 microsecond/division in decade steps (VARIABLE control in the fully clockwise position). The VARIABLE control provides uncalibrated sweep rates between the calibrated settings of the SEC/DIV switch, and extends the slowest sweep rate to at least 1 second/division.

When making time measurements using the graticule, the area between the second and tenth vertical lines provides the most linear measurement. (See Figure 2-3.) Therefore, the first and last divisions of the display should not be used for making accurate time measurements. Position the start of the display to be measured to the second vertical line. Then, set the SEC/DIV switch so that the end of the display measurement section falls between the second and tenth vertical line.

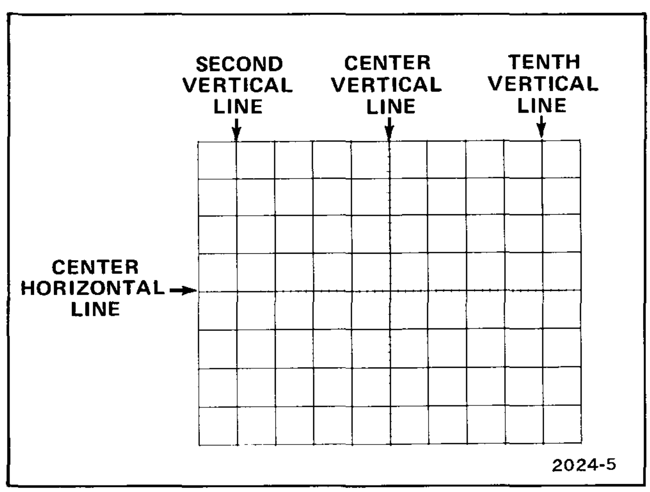


Fig. 2-3. Measurement lines on the 606A graticule.

Option 21 Full Differential Inputs

Option 21 adds −X, −Y, and −Z INPUT connectors to the 606A Display Monitor rear panel, to work in conjunction with the existing +X, +Y, and +Z INPUT's and thus provide differential input operation.

With differential operation, the X, Y, and Z output amplifier stages see only the difference between the signals applied to the + and − inputs (+X and −X, +Y and −Y, or +Z and −Z INPUT's).

This mode of operation has several useful applications. For example, if a signal to be displayed has, in addition to the desired signal, a relatively large hum component (for instance, a desired signal of 0.5-volt amplitude, with a superimposed hum signal of 1-volt amplitude), viewing and measurement of the desired signal becomes difficult, if not impossible.

The hum component can be practically eliminated with differential operation. First, the desired signal (with hum) is applied to one of the inputs; for example, the +Y INPUT. Then, the hum signal only (from some appropriate point in your circuitry) is applied to the −Y INPUT. (The hum components to both inputs must be in phase with each other, and should be as close to equal amplitudes as possible.) If your device employs balanced (push-pull) circuitry, each side of the push-pull output stage can be connected (with hum component) to an input, improving results even more.

The common-mode rejection ratio (cmrr) for signals up to 500 kHz is 100:1. This refers to the ability of the differential amplifier to reject unwanted (common-mode) signals. In the example above, the 1-volt hum signal in differential operation becomes the equivalent of 10 mV in amplitude, and there is no reduction in amplitude of the desired signal. (1 V÷100 = 0.01, or 10 mV).

The equivalent 10 mV hum becomes much less objectionable than with single-ended operation.

NOTE

For the common-mode rejection ratio (cmrr) of 100:1 to apply, the hum component at both input connectors must be identical in amplitude and phase.

For all common-mode differential applications, the common-mode dynamic range limitations must be considered. Exceeding the dynamic range limitations will result in a sharp decline in common-mode rejection ratio. The common-mode dynamic range for non-attenuated signals is +3 V or −3 V peak or less. If your instrument includes Option 22 (switchable 1:1 or 5:1 attenuators), the common-mode dynamic range (for X and Y axes) with 5:1 attenuation is +15 V or −15 V peak or less. Cmrr non-attenuated is 100:1 to 500 kHz, and 40:1 with 5X attenuation.

Another use for differential mode of operation is in nullifying the effects of a dc component which may be present along with the signal of interest. For relatively high frequencies, the dc component can be blocked by coupling the input signal through a capacitor of appropriate value. However, for very low-frequency signals, this is frequently impractical. Signal amplitude losses due to the increasing reactance of the capacitor at low frequencies plus significant phase shift, make calibrated measurements impossible.

The effect of the dc component can be eliminated by applying a matching dc level to the other differential input (the one not used for the input signal to be measured). This is easily accomplished by connecting a relatively high-resistance potentiometer (e.g., 100 kΩ) across a dc supply, such as a battery or regulated dc supply, and connecting the potentiometer center arm to the other input. The potentiometer can then be set to position the display on the screen. The dc source should be somewhat higher in level than the signal dc level to provide sufficient adjustment range. However, the source should never be higher than a few volts over the common-mode dynamic range, as described above.

WARNING

Making connection to dc supplies, especially within the monitor or other electronic equipment, involves exposure to dangerous electrical shock. This type of connection or any other procedure requiring access to the interior of the instrument, should be referred to qualified service personnel.

A variation of the technique just described can be used to measure or observe low-amplitude phenomena occurring on a higher-amplitude waveform. This particular application is commonly referred to as differential comparator operation.

For this application, the deflection factor is normally set to the most sensitive level. (A qualified service person can make an internal adjustment to set the deflection factor of the horizontal, X, axis to 50 mV/div, or the vertical, Y, axis to 62.5 mV/div.) Then, the signal to be checked, which may be as great as +3 V or −3 V (equivalent to 60 horizontal or 48 vertical divisions of deflection), is applied to one of the differential inputs. A dc level from the center arm of a potentiometer (connected across a stable dc supply as described above) is applied to the other differential input. An accurated dc voltmeter should be connected between the center arm of the potentiometer and ground.

To make the measurement, proceed as follows:

Set the potentiometer so that some reference point on the waveform is on the graticule centerline. This point is usually the zero-signal level point. If the waveform has no dc level (dc level is 0 V), or a very low-level dc component, the best procedure is to set the potentiometer to 0 V output, and use the monitor's position control to set the zero-signal to graticule center. Then, adjust the potentiometer to the level that places the point of interest on the waveform onto the graticule centerline. The amplitude at which this phenomenon occurs can now be read directly from the dc voltmeter. Also, considerable magnification of the area being observed has occurred, permitting detailed study of the phenomenon.

Differential inputs can also be used to double the sensitivity for measuring the output of equipment with push-pull (positive and negative) outputs. The deflection factors for vertical (Y) and horizontal (X) amplifiers, as stated in Specification, Section 3 of this manual, refers to single-ended operation. For single-ended inputs, the amplifiers are internally adjustable for a deflection factor of 0.5 V or less, full screen, to 2.5 V or more, full screen. With balanced push-pull input signals, the range becomes 0.25 V or less to 1.25 V or more, full screen.

Option 22 X and Y Switchable Input Attenuators

Option 22 adds internal 1:1 or 5:1 (switchable) attenuators to the Vertical (Y) and Horizontal (X) input amplifiers.

The attenuators extend the signal range over which the instrument may be used to at least 12.5 V full screen. Range in common-mode operation is also extended to permit rejection of common-mode signals as great as +15 V or −15 V peak. Attenuation is selected by the positions of internally-located switches.

WARNING

Changing of the positions of the X and Y attenuator switches necessitates working within the instrument with protective cabinet panels (if included) removed. To avoid dangerous electrical shock, refer all internal changes to qualified service personnel.

SPECIFICATION

The electrical characteristics listed in Table 3-1 apply when the following conditions are met: (1) the instrument must have been adjusted at an ambient temperature between +15°C and +25°C (+59°F and +77°F), (2) the instrument must be operating in an ambient temperature between 0°C and +50°C (+32°F and +122°F), and (3) the instrument must have been operating for at least 20 minutes before checking specification.

Items listed in the Performance Requirements column of the Electrical Characteristics are verified by completing the Performance Check in the servicing information sections of this Instruction Manual. Items listed in the Supplemental Information column are not verified in the Performance Check; they are either explanatory notes, performance characteristics for which no limits are specified, or characteristics that are impractical to check in routine maintenance.

Table 3-1

ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information	Perf. Ch. Step No.
VERTICAL AND HORIZONTAL AMPLIFIERS			
Deflection Factor			
Vertical (Y)	Adjustable from 0.5 V, or less, to at least 2.5 V full screen.	Nominally set for 1 V full screen. Range of at least 62.5 mV/div to 312.5 mV/div.	C3
Horizontal (X)	Adjustable from 0.5 V or less, to at least 2.5 V full screen.	Nominally set for 1 V for 8 div deflection. Range of at least 50 mV/div to 250 mV/div.	B3
Attenuators (Option 22)	Internal 1X-5X step attenuators extend deflection factor range to at least 12.5 V full screen.		B4-C4
Polarity			
+Y INPUT	Positive signal applied deflects beam up; negative signal deflects beam down.		
−Y INPUT (Option 21)	Positive signal applied deflects beam down; negative signal deflects beam up.	Substantiated by other checks.	
+X INPUT	Positive signal applied deflects beam to the right; negative signal deflects beam to the left.		
−X INPUT (Option 21)	Positive signal applied deflects beam to the left; negative signal deflects beam to the right.		

Table 3-1 (cont)

Characteristic	Performance Requirement	Supplemental Information	Perf. Ch. Step No.
Bandwidth (80% Full-Screen Reference Signal)	Dc to at least 3 MHz at −3 dB point.		B7-C7
Risetime		116 ns or less (10-90%)	
Settling Time			
After deflection between any two points on screen.	Crt beam must be within 0.025 cm (0.010") of final position within 750 ns.		B5-C5
(After deflection to any place on screen from any position off screen; within 10 cm of screen center.)		Crt beam must be within 0.025 cm (0.010") of final position within 750 ns.	
Common-Mode Rejection			
(Option 21)			
Attenuator at 1X	At least 100:1 cmr ratio to 500 kHz for input signals of +3 V or −3 V peak, or less.		B6-C6
Attenuator at 5X (Option 22)	At least 40:1 cmr ratio to 500 kHz for input signals of +15 V or −15 V peak, or less.		B6-C6
Phase Difference (dc to 500 kHz)	1° or less between X and Y amplifiers. X and Y amplifier gain (V/div) must be set for the same deflection factor.		C9
Input R and C (both Inputs)		1 MΩ, within 1%, paralleled by 47 pF or less.	
Option 26		50 Ω.	
Maximum Nondestructive Input Voltage (Fault Condition Only)		+100 V or −100 V (dc plus peak ac).	
Position Range (with No Input Signal Applied)	Front-panel controls allow spot to be set anywhere within the viewing area.		B8-C8
Position Stability		0.1 cm or less per hour, after 20-minute warmup with covers installed; less than 0.2 cm in 24 hours.	
Crosstalk Between X and Y Amplifiers		0.025 cm (0.01"), or less, of deflection on the undriven channel with full-screen amplitude of 1 MHz sine wave applied on other channel. All other inputs grounded or terminated into 50 Ω.	

Table 3-1 (cont)

Characteristic	Performance Requirement	Supplemental Information	Perf. Ch. Step No.
	Z-AXIS AMPLIFIER		
Bandwidth	Dc to at least 10 MHz at −3 dB point.		D3
Risetime		35 ns or less.	
Aberrations	5% or less.		D2
Common-Mode Rejection (Option 21)	Cmr ratio at least 100:1 to 500 kHz with input signals to 5 V peak-to-peak at any setting of the Z-axis gain.		D4
Input R and C		1 MΩ, within 1%, paralleled by 47 pF or less.	
Option 26		50 Ω.	
Maximum Nondestructive Input Voltage (Fault Condition Only)		+100 V or −100 V (dc plus peak ac) with crt beam positioned off screen.	
Useful Input Voltage +Z INPUT	Maximum intensity is produced either by an input amplitude of +1 V or less, with internal gain adjustment set at maximum; or +5 V or less with gain set at minimum. Crt blanking (cutoff) is produced either by an input amplitude of −1 V or more, with gain set at maximum; or by −5 V or more, with gain set at minimum.		D1
−Z INPUT (Option 21)	Maximum intensity is produced by an input amplitude of −1 V or less, with gain set at maximum; or −5 V or less with gain set at minimum. Crt blanking is produced by an inputt amplitude of +1 V or more, with gain set at maximum; or by +5 V or more, with gain set at minimum.		D1
Crosstalk between Z-Axis and Deflection Amplifiers.		0.025 cm (0.01"), or less, of deflection in X or Y axis with maximum output from Z-Axis Amplifier. X and Y inputs grounded or terminated into 50 Ω.	

Table 3-1 (cont)

Characteristic	Performance Requirement	Supplemental Information	Perf. Ch. Step No.
CATHODE-RAY TUBE DISPLAY			
Display Size		8 cm vertically, 10 cm horizontally.	
Geometry	Bowing or tilt is 0.1 div, or less, full screen.		E3
Center Screen Spot Diameter (Measured with Shrinking Raster Method)			
At 0.1 μA beam current		0.013 cm (0.005"), or less.	
At 5 μA beam current		0.018 cm (0.007"), or less.	
Orthogonality	90° within 0.7°.		E2
Phosphor		P31 standard.	
Option 78		P11.	
Deflection		Electrostatic.	
Acceleration Potential	5.625 kV, within 2%.		A3
Graticule		External 8 x 10 cm graticule is standard accessory.	
Option 1		Internal 8 x 10 cm non-illuminated orange graticule.	
POWER SOURCE			
Line Voltage (ac, rms)			
120 Vac Nominal			
Low		90 to 110 Vac.	
Med		99 to 121 Vac.	
High		108 to 132 Vac.	
220 Vac Nominal			
Low		180 to 220 Vac.	
Med		198 to 242 Vac.	
High		216 to 250 Vac.	
Line Frequency		48 to 440 Hz.	
Maximum Power Consumption		97 W; 1.1 A, at 120 Vac, 60 Hz.	

 @

Table 3-1 (cont)

Characteristic	Performance Requirement	Supplemental Information	Perf. Ch. Step No.
Line Fuse Data 120 Vac Nominal		1 A Slow-blow.	
220 Vac Nominal		0.5 A Slow-blow.	

POWER SUPPLIES

Supply	Tolerance	Perf. Ch. Step No.
−30 Vdc	−29.1 V to −30.9 V.	A2
+15 Vdc	+14.85 V to +15.15 V (adjustable to +15 V).	A1-A2
+30 Vdc	+27 V to +33 V.	A2
+120 Vdc	+108 V to +132 V.	A2
+262 Vdc	+256 V to +268 V.	A2
−5.5 kVdc	−5.39 kV to −5.61 kV (adjustable to −5.5 kV).	A3

OPTION 4 SWEEP SYSTEM

Characteristic	Performance Requirement	Supplemental Information	Perf. Ch. Step No.
Sweep Range	100 ms/div to 1 μs/div.	Decade steps.	F3
Sweep Accuracy Over Center 8 Divisions	Within 3%.	VARIABLE fully clockwise.	F3
Linearity of any 2-Division Portion Within Center 8 Divisions		Within 2%, except for first 5% of total sweep length.	
VARIABLE (Uncalibrated)	Provides continuously variable sweep rates between calibrated settings.	Decreases each sweep rate setting by at least 10:1. Extends slowest rate to at least 1 second/division.	F4
Triggering Sensitivity (Repetitive Signals)	Requires at least 0.5 division vertical deflection from dc to 2 MHz.		F2

Table 3-2

ENVIRONMENTAL CHARACTERISTICS

Characteristic	Information

NOTE

This instrument will meet the electrical characteristics given in the Performance Requirement column of Table 3-1 over the following environmental limits.

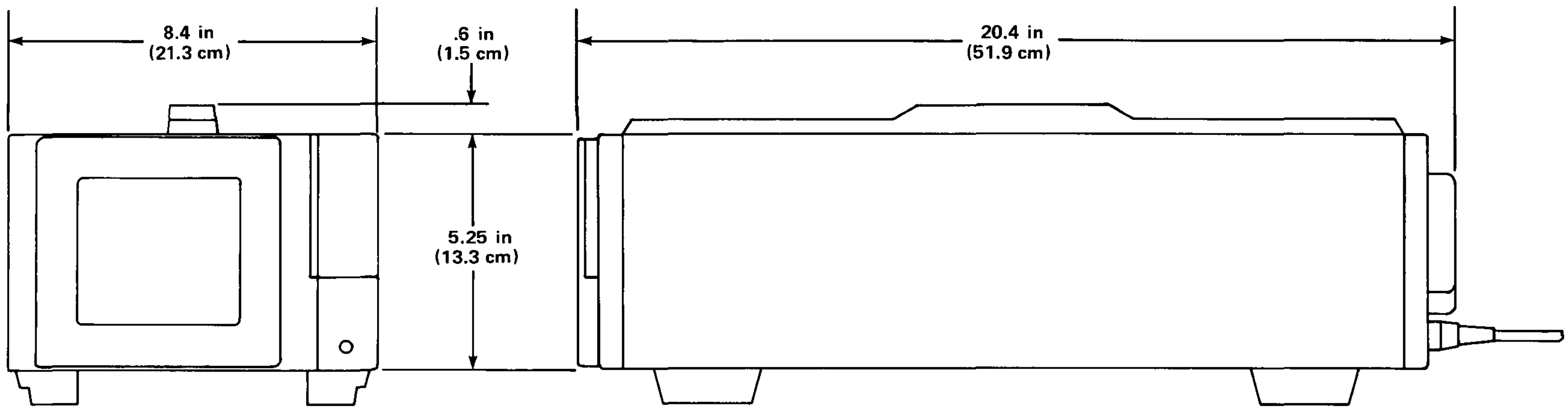
Characteristic	Information
Temperature	
Operating	0 to +50° C (+32 to +122° F).
Non-operating	−40 to +70° C (−40 to +158° F).
Altitude	
Operating	To 15,000 feet.
Non-operating	To 50,000 feet.
Transportation	Qualified under National Safe Transit Committee Test Procedure 1A, Category II.

Table 3-3

PHYSICAL CHARACTERISTICS

Characteristic	Information
Finish	Anodized aluminum panel with gray vinyl-coated frame.
Options 6, 23, or 28	Blue vinyl-coated cabinet.
Net Weight	17 lbs. (7.7 kg).
With Option 4	17 lbs. 10 oz. (8.0 kg).
Shipping Weight	Approximately 22.0 lbs. (9.9 kg).
Overall Dimensions	See Figure 3-1.
Total Depth of Rack Required for Rackmounting	48.3 cm (19 inches)

OVERALL DIMENSIONS
(MEASURED AT MAXIMUM POINTS)



NOTE: DIMENSIONS ARE GIVEN WITH TOP FIGURE IN INCHES AND BOTTOM FIGURE IN CENTIMETERS.

REFER TO DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS IN THE INSTRUCTION MANUAL FOR A DETAILED DIMENSIONAL DRAWING.

2024-2

Fig. 3-1. Overall dimensions, with cabinet, feet, and handle.

PERFORMANCE CHECK AND ADJUSTMENT

This section provides information necessary to: (1) verify that this instrument meets or exceeds the performance requirements for the electrical specifications in Section 3, Specification, (2) verify that all controls function properly, and (3) perform all internal adjustments. A separate Functional Check procedure, located in Section 2, Operating Instructions, can be used to only check the functions of the front- and rear-panel controls and connectors.

Limits given in the procedure are adjustment guides and should not be interpreted as performance requirements unless listed as such in Section 3, Specification. Where possible, instrument performance is checked before an adjustment is made.

PRELIMINARY INFORMATION

Adjustment Interval

To maintain instrument accuracy, check the performance of the 606A every 1000 hours of operation, or every six months if used infrequently. Before performing a complete adjustment procedure, thoroughly clean and inspect this instrument as outlined in Section 7, Maintenance.

Tektronix Field Service

Tektronix Field Service Centers and the Factory Service Center provide instrument repair and adjustment services. Contact your local Tektronix Field Office or representative for further information.

Using This Procedure

This Performance Check and Adjustment procedure can be used either for complete adjustment or as a check of instrument performance. The procedures are divided into functional block subsections (e.g., A. Power Supplies; B. Horizontal (X) Amplifier; etc.). The order in which the subsections and steps appear is the recommended sequence for a complete performance check and adjustment of the instrument. Each subsection can be performed independently. Any step (A1, A2, B1, B2, etc.) within any subsection can also be performed independently, which makes it possible to check any parameter or touch up any adjustment following a repair. Refer to the following discussion for instructions on a complete or partial check and adjustment.

Index

An index listing all steps precedes the procedure to aid in locating Performance Check and Adjustment steps.

Performance Check

Instrument performance can be checked by performing the complete Performance Check and Adjustment procedure, and omitting only the ADJUST parts of the steps.

Adjustment

Completion of each step in the Performance Check and Adjustment procedure ensures that the instrument is correctly adjusted and performing within specified limits. Where possible, instrument performance is checked before an adjustment is made. For best overall performance, make each adjustment to the exact setting indicated when performing the complete adjustment procedure.

Partial Procedures

The following procedure is written to completely check and adjust the 606A Monitor to the Specification in Section 3. If the applications for which the instrument is used do not require the full available performance, the procedure and the required equipment list can be shortened accordingly.

A partial performance check and adjustment may be necessary after replacing components, or to touch up the adjustment of a portion of the instrument for a particular application requirement. To check or adjust only part of the instrument, refer to the Test Equipment Required list and the Performance Check and Adjustment Procedure Index to determine necessary equipment and location of appropriate steps to be performed. Also, when performing each step, note the Equipment Required list that immediately precedes each step. To avoid unnecessary adjustment of other parts of the circuitry, adjust only if the tolerance given in each CHECK part is not met.

The alphabetical instructions under each step (a., b., c., etc.) may contain CHECK, ADJUST, or INTERACTION as the first word of the instruction. These terms are defined as follows:

1. CHECK—indicates that the instruction accomplishes a performance requirement check. If the parameter checked does not meet or better the indicated limits, an adjustment (or repair) is normally required.

2. ADJUST—describes which adjustment to make and the desired result. It is not recommended that adjustments be made unless a previous CHECK instruction indicates that an adjustment is necessary.

3. INTERACTION—indicates that the adjustment described in the preceding instruction interacts with other circuit adjustments. The nature of the interaction is described and reference is made to the procedure(s) affected.

TEST EQUIPMENT REQUIRED

The test equipment listed in Table 4-1 is required for a complete performance check and adjustment of this instrument. The specifications given in Table 4-1 for test equipment are the minimum required to check the 606A to the Specification in Section 3. Detailed operating instructions for test equipment are omitted in this procedure. Refer to the test equipment instruction manual if more information is needed.

Test Equipment Alternatives

The test equipment listed in the Examples of Applicable Test Equipment column of Table 4-1, is required to check and adjust this instrument. The Performance Check and Adjustment procedure in this manual was performed using the equipment indicated in this column. If other equipment is substituted, control settings or setups may need to be altered. If the exact item of equipment given as an example is not available, refer to the Minimum Specifications column to determine if other available equipment may be substituted. Then, check the Purpose column. If you determine that your measurement requirements will not be affected, the item and corresponding step(s) can be deleted from your procedure.

Table 4-1

TEST EQUIPMENT

Description	Minimum Specifications	Purpose	Examples of Applicable Test Equipment
Precision Dc Voltmeter	Measurement range, −25 V to +280 V; measurement accuracy, within 0.1%.	Adjust +15 V supply. Check low-voltage supplies. Adjust X and Y average output level. Adjust grid bias.	a. TEKTRONIX DM 502A Option 2 Digital Multi-Meter (operates in TM-500 series power module). b. TEKTRONIX 7D13 Digital Multi-Meter (operates in 7000-series mainframe). c. TEKTRONIX DM 501 Digital Multi-Meter (operates in TM 500-series power module).
Dc Voltmeter	Measurement range, −5.3 kV to −5.7 kV; accuracy, within 3%.	Adjust high-voltage supply.	a. Triplett Model 630-NA. b. Simpson Model 262.
Ramp Generator	Ramp duration, 5 ms to 10 μs within 3%; ramp amplitude, 0.5 to 2 V into 1 MΩ; external trigger input, compatible with square-wave generator trigger output; gate output, 1 to 3 V into 1 MΩ.	Adjust gain and compensation of the vertical, horizontal, and Z-axis amplifiers. Check vertical and horizontal settling time. Check vertical and horizontal positioning. Adjust TRACE ROTATION, geometry, and astigmatism. Check and adjust sweep generator (Option 4 only).	a. TEKTRONIX RG 501 Ramp Generator (operates in TM 500-series power module).

Table 4-1 (cont)

Description	Minimum Specifications	Purpose	Examples of Applicable Test Equipment
Square-wave Generator	Amplitude Calibrator Mode: Frequency, approx. 1 kHz; amplitude, 0.5 V to 5 V into 1 MΩ; accuracy, within 0.25%. Pulse Mode: High-Amplitude Output; Frequency, 1 kHz to 100 kHz; amplitude, 0.5 V to 5 V into 50 Ω; risetime, 10 ns or less into 50 Ω.	Adjust gain and compensation of the vertical, horizontal, and Z-axis amplifiers. Check vertical and horizontal settling time. Check and adjust vertical and horizontal input attenuators (Option 22). Adjust astigmatism.	a. TEKTRONIX PG 506 Calibration Generator (operates in TM 500-series power module).
Sine-wave Generator	Frequency range, 500 kHz to at least 10 MHz; reference frequency, 50 kHz; amplitude, 0.5 V to 5 V into 50 Ω; amplitude accuracy, constant within 5% of reference as output frequency changes.	Check common-mode rejection (Option 21) and bandwidth of the horizontal (X), vertical (Y), and Z-Axis amplifiers.	a. TEKTRONIX SG 503 Leveled Sine-Wave Generator (operates in TM 500-series power module).
Time-mark Generator (Required for Option 4 only)	Marker output, 1 μs to 0.1 s; accuracy, within 1%.	Check and adjust sweep timing (Option 4 only).	a. TEKTRONIX TG 501 Time-Mark Generator (operates in TM 500-series power module).
Power Module Mainframe (TM 500-series)	Capable of powering and housing 3 to 6 TM 500-series test instruments.	Provide housing and power for TM 500-series test signal generators and precision dc voltmeter.	a. TEKTRONIX TM 503, TM 504 or TM 506 Power Module.
Dot Generator	Provides dot-raster display; frame rate, at least 60 Hz.	Adjust focus and astigmatism correction. (An alternative method is provided which does not require a dot generator).	a. TEKTRONIX 067-0845-00 Dot Generator (operates in TM 500-series power module). b. TEKTRONIX 067-0561-01 Test Display Generator Calibration Fixture.
Test Oscilloscope	Bandwidth, dc to at least 50 MHz; deflection factor, 0.1 V to 5 V/div within 2%; sweep rate, 1 s/div to 1 μs/div.	Adjust horizontal (X), vertical (Y), and Z-axis gain and compensation. Check horizontal and vertical phase difference and input attenuation; check horizontal, vertical, and Z-axis bandwidth.	a. TEKTRONIX SC 504 80 MHz Oscilloscope and P6105 1-meter 10X probe (operates in TM 500-series power module). b. TEKTRONIX 5440 Oscilloscope with 5A45 Amplifier, 5B40 Time Base, and P6105 1-meter 10X probe. c. TEKTRONIX 7603 Oscilloscope with 7A15A Amplifier, 7B50A Time Base, and P6053B 3.5 foot 10X probe. d. Refer to the current Tektronix catalog for compatible oscilloscope system.

Table 4-1 (cont)

Description	Minimum Specifications	Purpose	Examples of Applicable Test Equipment
Dual-input Coupler	Connectors, bnc.	Check horizontal (X), vertical (Y), and Z-axis common-mode rejection. Check and adjust horizontal and vertical phasing.	a. TEKTRONIX 067-0525-01 Calibration Fixture.
Bnc Tee Connector	Connectors, bnc.	Adjust horizontal (X), vertical (Y), and Z-axis gain.	a. Tektronix Part No. 103-0030-00.
50-ohm Termination	Impedance, 50 Ω within 2%; connectors, bnc.	Check common-mode rejection and bandwidth of the horizontal (X), vertical (Y), and Z-axis amplifiers. Check and adjust phasing. Check and adjust sweep timing. (Option 4 only).	a. Tektronix Part No. 011-0049-01.
50-ohm 2X Attenuator	Impedance, 50 Ω within 2%; attenuation, 2X (6 dB) within 2%; connectors, bnc.	Check and adjust sweep timing. (Option 4 only).	a. Tektronix Part No. 011-0069-02.
50-ohm Cables (4 required)	Impedance, 50 Ω; length, 42 inches; connectors, bnc.	Provide signal interconnection.	a. Tektronix Part No. 012-0057-01.
Screwdriver	3-inch shaft, 3/32-inch bit.	Adjust variable resistors.	a. Xcelite R3323.
Low-capacitance Screwdriver	3-3/4-inch shaft.	Adjust variable capacitors.	a. Tektronix Part No. 003-0675-00.

INDEX TO PERFORMANCE CHECK AND ADJUSTMENT PROCEDURE

PRELIMINARY PROCEDURE

NOTE

The performance of this instrument can be checked at any ambient temperature from 0°C to +50°C unless otherwise stated. Adjustments must be performed at an ambient temperature from +20°C to +30°C for specified accuracies.

1. Check that the internal Line-Voltage Selector plug has been set for the correct input line voltage (see Section 5, Installation).

2. Check that the crt has an 8 X 10 scribed graticule (standard accessory) over the display area.

3. (Options 6, 23, or 28). Remove the cabinet panels (see Section 7, Maintenance) to gain access to the internal controls and test points.

4. Connect the instrument to the line-voltage source.

NOTE

The 606A Monitor is adjusted for optimum performance at the factory. Instrument performance may exceed that required by the Performance Requirements listed in Table 3-1, Section 3, Specification. Therefore, it may be desirable to check instrument performance without changing the adjustments. Refer to Performance Check in the Preliminary Information portion of this section for instructions.

5. Set the controls as follows:

NOTE

Refer to the Internal Control and Selector Locations pullout page in Section 10, Diagrams and Circuit Board Illustrations, for the locations of the internal switches and selector plugs.

Internal

Int Swp S350 (Option 4 only)	X-Y (forward position)
Int Blank S555 (Option 4 only)	X-Y (forward position)
X and Y Atten, all (Option 22 only)	1X (up position)

Front Panel

INTENSITY	fully counter-clockwise
FOCUS	Midrange
Vertical and Horizontal Position	Midrange

6. Turn on 606A POWER, apply power to the 606A and all test equipment to be used, and allow at least 20 minutes warm-up time.

NOTE

Do not allow a high-intensity dot to remain stationary on the crt face. The crt phosphor could become permanently damaged.

WARNING

The finned transistor heat sinks on the Deflection Amplifier board are elevated to as much as +270 volts. To avoid a potential shock hazard, always turn the instrument power off before changing the settings of the switches on the Deflection Amplifier board.

A. POWER SUPPLIES

Equipment Required

1. Precision dc voltmeter (low-voltage supplies)
2. Dc voltmeter (high-voltage supply)

BEFORE YOU BEGIN, see **TEST POINT AND ADJUSTMENT LOCATIONS** in Section 10, Diagrams and Circuit Board Illustrations.

NOTE

Perform the Preliminary Procedure before making the following checks and adjustments.

A1. Check/Adjust +15 Volt Supply (R850)

a. Connect the precision dc voltmeter between the +15 V test point and ground.

b. CHECK—for a voltmeter reading between +14.85 volts and +15.15 volts.

c. ADJUST—+15 V Adj (R850) for a voltmeter reading of exactly +15.00 volts.

d. INTERACTION—Any change in adjustment of the +15 volt supply may affect operation of all circuits within this instrument.

A2. Check Low-Voltage Supplies

a. Table 4-2 lists the low-voltage supplies in this instrument. Connect the precision dc voltmeter between the appropriate test point and ground, and check that each supply is within the voltage range given in Table 4-2.

Table 4-2

LOW-VOLTAGE SUPPLY ACCURACY

Supply (dc)	Output Voltage Range
−30 V	−29.1 V to −30.9 V
+15 V	+14.85 V to +15.15 V (adjustable to +15.00 V in step A1)
+30 V	+27 V to +33 V
+120 V	+108 V to +132 V
+270 V	+262 V to +278 V

b. INTERACTION—If any of the low-voltage supplies in Table 4-2 are out of tolerance, check the adjustment of the +15 volt supply in step A1 and the high-voltage supply in step A3.

A3. Check/Adjust High-Voltage Supply (R730)

WARNING

Turn off instrument POWER when connecting and disconnecting the dc voltmeter. Potentially dangerous electric-shock hazard exists at several points on the high-voltage supply board and crt socket.

a. Turn off instrument POWER. Remove the rear crt cover (five screws) from the rear panel. Then, remove the crt socket cover.

b. Connect the dc voltmeter (set for at least −6000 dc volts full scale) between pin 2 of the crt socket (second pin clockwise from socket index) and ground.

c. Turn on the instrument POWER.

d. CHECK—for a voltmeter reading between −5.39 kV and −5.61 kV.

e. ADJUST—R730 (HV Adj) for exactly −5500 volts.

f. Turn off the instrument POWER and disconnect the voltmeter. Replace the crt socket cover and the rear crt cover.

g. Turn on the instrument POWER.

B. HORIZONTAL (X) AMPLIFIER

Equipment Required

1. Precision dc voltmeter
2. Test Oscilloscope
3. Ramp generator
4. Calibration generator
5. Sine-wave generator
6. Function generator
7. 50-ohm cables (4 required)
8. 50-ohm termination
9. Dual-input coupler
10. Bnc Tee connector

BEFORE YOU BEGIN, see **TEST POINT AND ADJUSTMENT LOCATIONS** in Section 10, Diagrams and Circuit Board Illustrations.

NOTE

Perform the Preliminary Procedure before making the following checks and adjustments.

B1. Check/Adjust Average X Output Level (R480)

a. Set the INTENSITY control to the minimum level necessary for a crt dot display.

b. Horizontally position the displayed dot to graticule center.

c. Connect the precision dc voltmeter between TP459 and TP469.

d. Set the horizontal Position control for a voltmeter reading of zero volts (denotes horizontal electrical center). Disconnect the precision dc voltmeter.

e. Connect the precision dc voltmeter between TP459 and ground.

f. CHECK—for a voltmeter reading between +122 volts and +130 volts.

g. ADJUST—R480 (X Output Level) for a voltmeter reading of +125 volts.

h. Connect the precision dc voltmeter between TP469 and ground.

i. CHECK—for a voltmeter reading between +122 volts and +130 volts.

j. Disconnect the precision dc voltmeter.

B2. Adjust Horizontal (X) Compensation and Output Gain (R392, C394, R394, C393)

WARNING

The heat sinks on the Deflection Amplifier board are elevated to as much as +270 volts. To avoid potential electric shock, always turn the POWER off before changing the settings of the X or Y Atten switches.

a. Apply a positive-going, 50 μs duration ramp of approximately 2 volts amplitude from the ramp generator to the rear-panel +Y INPUT connector.

b. Connect the calibration generator positive-going fast-rise output through a bnc Tee connector to the +X INPUT connector. Set the calibration generator mode to Fast Rise.

c. Connect the other output of the bnc Tee connector at the output of the calibration generator to the ramp generator external triggering input.

d. Set the calibration generator repetition rate to 100 kHz, and adjust the Pulse Amplitude for an eight division display (position as necessary).

e. Set the ramp generator triggering controls for a stable display on the 606A Monitor.

NOTE

(Option 21 only.) When applying a single-ended input signal to either the X, Y, or Z amplifiers, always place a grounding cap on the unused INPUT connector(s).

f. Preset R325 (X Gain) fully counterclockwise for maximum gain. Set the INTENSITY and FOCUS controls for a well-defined display.

g. ADJUST—C393 (X High Freq Comp) for an optimum square corner on the 606A display (see Fig. 4-1). Use a low-capacitance screwdriver.

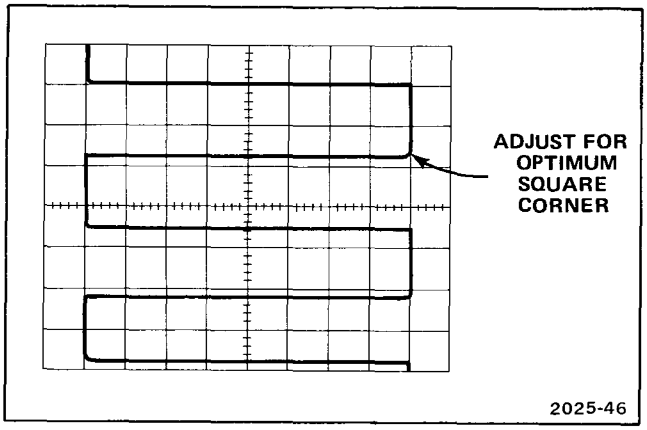


Fig. 4-1. Typical crt display for adjustment of horizontal (X) compensation and gain.

h. Turn the horizontal Position control counterclockwise until the right side of the square-wave display is on the second vertical graticule line.

i. ADJUST—Preset R392 (X Output Gain) fully clockwise. Adjust R392 counterclockwise for minimum distortion of the square-wave display. Then, adjust R392 approximately 30 degrees further counterclockwise.

j. CHECK—while turning the horizontal Position control slowly clockwise, that no distortion occurs as the square-wave display returns to graticule center.

k. INTERACTION—Repeat parts i and j as necessary.

l. ADJUST—C393 (X High Freq Comp) as necessary for an optimum square corner. Use a low-capacitance screwdriver.

m. Preset C394 to midrange.

n. ADJUST—R394 (X Medium Freq Comp) for approximately 0.2 division overshoot. Then, adjust C394 for an optimum square corner.

o. ADJUST—C393 (X High Freq Comp) as necessary for an optimum square corner.

B3. Adjust Horizontal (X) Gain (R325)

NOTE

The X Gain (R325) in this procedure is set to provide eight divisions deflection from a 1-volt input. This procedure can be repeated for any voltage, up to +2.5 volts, for the desired sensitivity. If the X Gain is changed, the + and − attenuator compensation (Option 22 instruments) may need readjustment for optimum square-wave response (see step B4).

a. Change the bnc Tee connector from the calibration generator positive-going fast-rise output to the Ampl Output (leave the cables attached as in step B2). Set the calibration generator mode to Std Ampl (standard amplitude).

b. Set the calibration generator Amplitude control to 1 volt, and check that the Variable Amplitude control is pushed in (calibrated output position).

c. ADJUST—R325 (X Gain) for an eight-division square-wave display on the 606A Monitor.

B4. Adjust Horizontal (X) Attenuation Compensation (C310, C330) and Check Horizontal Input Attenuation (Option 22 only)

NOTE

In this step, the test oscilloscope is used as the amplitude-measurement standard. The accuracy of the measurment of input attenuation is determined by the test oscilloscope vertical sensitivity calibration.

a. Turn off the instrument POWER. Then, set S310 (+X Atten switch) and S330 (−X Atten switch) to the 5X position (switches down). Turn on the instrument POWER.

b. Disconnect the calibration generator signal from the +X INPUT, and connect it to the test oscilloscope vertical input. Check that the calibration generator mode is set to Std Ampl. Set the calibration generator Amplitude control to 5 volts.

c. Set the test oscilloscope deflection factor (V/Div) to 1 V/Div. Accurately set the test oscilloscope vertical gain for five divisions of deflection.

d. Change the calibration generator mode to High Ampl, and set the Period control to .1 ms (10 kHz repetition rate). Set the calibration generator Pulse Amplitude for exactly five divisions of vertical deflection on the test oscilloscope.

e. Disconnect the calibration generator from the test oscilloscope vertical input, and connect it to the +X INPUT connector on the 606A. (The same signal, via the bnc Tee connector, should still be connected to the ramp generator external triggering input.)

f. Set the ramp generator for a 500 μs duration ramp (still applied to the +Y INPUT connector). Set the ramp generator triggering controls for a stable display on the 606A Monitor.

g. ADJUST—C310 (+X Atten Comp) for an optimum square corner on the 606A display.

h. CHECK—for an eight-division (within 0.24 division) square-wave display.

i. (Option 21, parts i through m.) Remove the grounding cap from the −X INPUT connector. Disconnect the calibration generator signal from the +X INPUT, and connect it to the −X INPUT. Place the grounding cap on the +X INPUT.

j. ADJUST—C330 (−X Atten Comp) for an optimum square corner on the 606A display.

k. CHECK—for an eight-division (within 0.24 division) squarewave display.

l. Disconnect the calibration generator from the −X INPUT. Remove the grounding cap from the +X INPUT, and place it on the −X INPUT.

m. Turn off the instrument POWER. Then set S310 (+X Atten switch) and S330 (−X Atten Switch) to the 1X position (switches up). Turn on the instrument POWER.

B5. Check Horizontal Settling Time

a. Connect the ramp generator gate output to the +Z INPUT connector. Check that a grounding cap is on the −Z INPUT connector. (Option 21 only.)

b. Set the ramp generator duration to 10 microseconds, connect the ramp output to the +Y INPUT, and set the output amplitude for exactly eight divisions of trace length.

c. Connect the calibration generator trigger output to the ramp generator trigger input, and set the ramp generator triggering controls for a triggered output.

d. Connect the calibration generator fast-rise positive-going output to the +X INPUT via a 50-ohm cable and 50-ohm termination. Set the calibration generator mode to Fast Rise, and set the Pulse Amplitude control for 10 divisions of horizontal display, and the Period control to 10 microseconds (100 kHz). Then, set the Variable Period control to obtain a display of approximately 1 cycle.

e. CHECK—that the time for the leading edge of the square wave to travel from the zero percent level to the 100 percent level (see Fig. 4-2) is 500 ns (0.4 division) or less, within a trace width (0.025 cm).

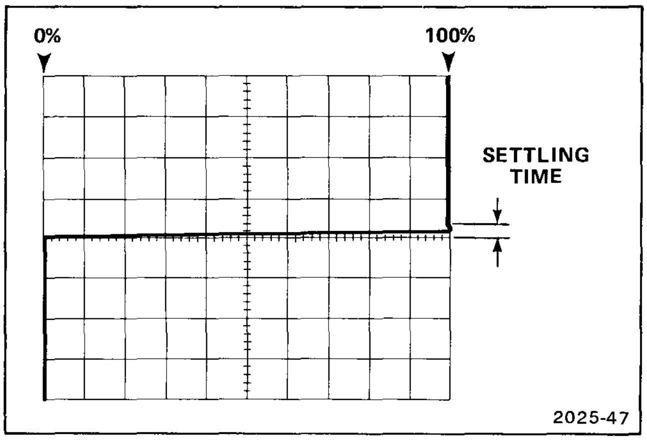


Fig. 4-2. Typical crt display for horizontal settling time measurement (settling time includes corner distortion).

f. INTERACTION—If the check requirements in part e cannot be met, repeat the adjustment of R392, C394, R394, and C393 as outlined in step B2.

g. Disconnect the equipment from the X and Z INPUT connectors.

B6. Check Horizontal (X) Common-Mode Rejection (Options 21 and 22)

NOTE

The following procedure includes the check for both the Option 21 (differential inputs) and Option 22 (5X attenuators) instruments. If your instrument does not include Option 22, disregard those subparts referring to use of attenuators.

a. Connect the function generator output to the test oscilloscope vertical input via a 50-ohm cable (do not terminate).

b. Set the function generator controls for a 500 kHz, 3 volt (p-p) sine wave as indicated on the test oscilloscope.

c. Disconnect the sine-wave signal from the test oscilloscope and connect it (using the dual-input coupler) to both the +X and −X INPUT connectors on the 606A.

d. With the ramp generator output connected to the +Y INPUT, set the generator controls for a 10 ms duration ramp with an amplitude of approximately 2 volts (to fill the screen vertically).

e. CHECK—for 0.24 division, or less, of free-running horizontal display on the 606A (position as necessary).

f. (Option 22 only, parts f through i.) Turn off the 606A POWER. Set S310 (+X Atten) and S330 (−X Atten) to the 5X (down) position. Turn on the 606A POWER.

g. Connect the function-generator output to the test oscilloscope input via a 50-ohm cable (do not terminate), and set the generator controls for a 15 volt (p-p) sine wave at 500 kHz. Then, reconnect the function-generator output to both the +X and −X INPUT connectors, using the dual-input coupler.

h. CHECK—for 0.6 division, or less, of free running horizontal display on the 606A (position as necessary).

i. Turn off the 606A POWER. Set S310 and S330 to the 1X (up) position, and disconnect the X and Y INPUT signals. Turn on the 606A POWER.

B7. Check Horizontal (X) Bandwidth

a. Connect the ramp generator to the +Y INPUT, and check that the −Y INPUT has a grounding cap attached. Set the ramp duration to 10 ms, and set the ramp amplitude to approximately 2 volts (to fill the screen vertically).

b. Connect the sine-wave generator output to the +X INPUT (terminate into 50 Ω). Check that the −X INPUT has a grounding cap attached.

c. Set the sine-wave generator frequency to 50 kHz, and set the amplitude for eight divisions of horizontal deflection.

d. Slowly increase the sine-wave generator output frequency until the 606A display amplitude is 5.7 divisions.

e. CHECK—that the sine-wave generator frequency is at least 3 MHz.

f. INTERACTION—If the check requirements in part e cannot be met, repeat the adjustment of C393 in step B2.

B8. Check Horizontal (X) Positioning

a. Disconnect the sine-wave generator from the +X INPUT.

b. CHECK—that the vertical trace can be positioned horizontally anywhere in the graticule area when rotating the horizontal Postion control.

NOTE

Refer to the Vertical Amplifier portion of this procedure for phasing check.

C. VERTICAL (Y) AMPLIFIER

Equipment Required

1. Precision dc voltmeter
2. Test oscilloscope
3. Ramp generator
4. Calibration generator
5. Sine-wave generator
6. Function generator
7. 50-ohm cables (4 required)
8. 50-ohm termination
9. Dual-input coupler
10. Bnc Tee connector

BEFORE YOU BEGIN, see **TEST POINT AND ADJUSTMENT LOCATIONS** in Section 10, Diagrams and Circuit Board Illustrations.

NOTE

Perform the Preliminary Procedure before making the following checks and adjustments.

C1. Check/Adjust Average Y Output Level (R280)

a. Set the INTENSITY control to the minimum level necessary for a crt dot display.

b. Vertically position the displayed dot to graticule center.

c. Connect the precision dc voltmeter between TP259 and TP269.

d. Set the vertical Position control for a voltmeter reading of zero volts (denotes vertical electrical center). Disconnect the precision dc voltmeter.

e. Connect the precision dc voltmeter between TP259 and ground.

f. CHECK—for a voltmeter reading between +122 volts and +130 volts.

g. ADJUST—R280 (Y Output Level) for +125 volts.

h. Connect the precision dc voltmeter between TP269 and ground.

i. CHECK—for a voltmeter reading between +122 volts and +130 volts.

j. Disconnect the precision dc voltmeter.

C2. Adjust Vertical (Y) Compensation and Output Gain (R192, C194, R194, C193)

WARNING

The heat sinks on the Deflection Amplifier board are elevated to as much as +270 volts. To avoid potential electric shock, always turn the POWER off before changing the settings of the X or Y Atten switches.

a. Apply a positive-going 50 μs duration ramp of approximately 2 volts amplitude from the ramp generator to the rear-panel +X INPUT connector.

b. Connect the calibration generator positive-going fast-rise output through a bnc Tee connector to the +Y INPUT connector. Set the calibration generator mode to Fast Rise.

c. Connect the other output of the bnc Tee connector at the output of the calibration generator to the ramp generator external triggering input.

d. Set the calibration generator repetition rate to 100 kHz, and adjust the Pulse Amplitude for a six division display (position as necessary).

e. Set the ramp generator triggering controls for a stable display on the 606A Monitor.

NOTE

(Option 21 only.) When applying a single-ended input signal to either the X, Y, or Z amplifiers, always place a grounding cap on the unused INPUT connector(s).

f. Preset R125 (Y Gain) fully counterclockwise for maximum gain. Set the INTENSITY and FOCUS controls for a well-defined display.

g. ADJUST—C193 (Y High Freq Comp) for an optimum square corner on the 606A display (see Fig. 4-3). Use a low-capacitance screwdriver.

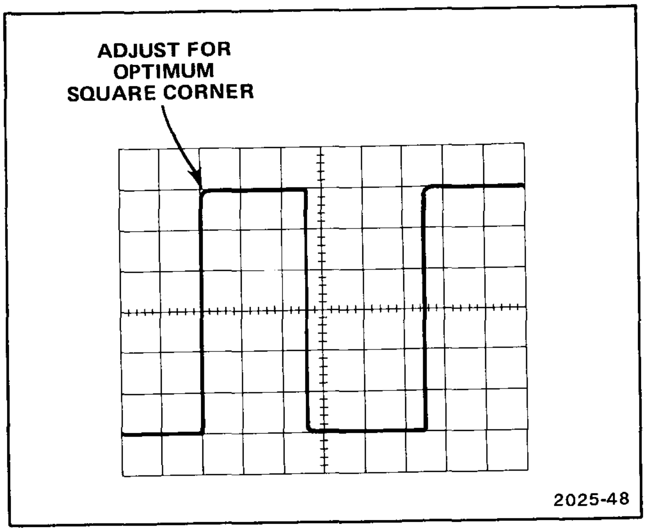


Fig. 4-3. Typical crt display for adjustment of vertical (Y) compensation and output gain.

h. Turn the vertical Position control counterclockwise until the top of the square-wave display is on the second horizontal graticule line.

i. ADJUST—Preset R192 (Y Output Gain) fully clockwise. Adjust R192 counterclockwise for minimum distortion of the square-wave display. Then, adjust R192 approximately 30 degrees further counterclockwise.

j. CHECK—while turning the vertical Position control slowly clockwise, that no distortion occurs as the square-wave display returns to graticule center.

k. INTERACTION—Repeat parts i and j as necessary.

l. ADJUST—C193 (Y High Freq Comp) as necessary for an optimum square corner. Use a low-capacitance screwdriver.

m. Preset C194 to midrange.

n. ADJUST—R194 (Medium Freq Comp) for approximately 0.2 division overshoot. Then, adjust C194 for an optimum square corner.

o. ADJUST—C193 (Y High Freq Comp) as necessary for an optimum square corner.

C3. Adjust Vertical (Y) Gain (R125)

NOTE

The Y Gain (R125) in this procedure is set to provide eight divisions of deflection from a 1-volt input. This procedure can be repeated for any voltage, up to +2.5 volts, for the desired sensitivity. If the Y Gain is changed, the + and − attenuator compensation (Option 22 instruments) may need readjustment for optimum square-wave response (see step C4).

a. Change the bnc Tee connector from the calibration generator positive-going fast-rise output to the Ampl Output (leave the cables attached as in step C2). Set the calibration generator mode to Std Ampl (standard amplitude).

b. Set the calibration generator Amplitude control to 1 volt, and check that the Variable Amplitude control is pushed in (calibrated output position).

c. ADJUST—R125 (Y Gain) for an eight division square-wave display on the 606A Monitor.

C4. Adjust Vertical (Y) Attenuation Compensation (C110, C130) and Check Vertical Input Attenuation (Option 22 only)

NOTE

In this step, the test oscilloscope is used as the amplitude-measurement standard. The accuracy of the measurement of input attenuation is determined by the test oscilloscope vertical sensitivity calibration.

@

a. Turn off the instrument POWER. Then, set S110 (+Y Atten switch) and S130 (−Y Atten switch) to the 5X position (switches down). Turn on the instrument POWER.

b. Disconnect the calibration generator signal from the +Y INPUT, and connect it to the test oscilloscope vertical input. Check that the calibration generator mode is set to Std Ampl. Set the calibration generator Amplitude control to 5 volts.

c. Set the test oscilloscope deflection factor (V/Div) to 1 V/Div. Accurately set the test oscilloscope vertical gain for five divisions of deflection.

d. Change the calibration generator mode to High Ampl, and set the Period control to .1 ms (10 kHz repetition rate). Set the calibration generator Pulse Amplitude for exactly five divisions of vertical deflection on the test oscilloscope.

e. Disconnect the calibration generator from the test oscilloscope vertical input, and connect it to the +Y INPUT connector on the 606A. (The same signal, via the bnc Tee connector, should still be connected to the ramp generator external triggering input.)

f. Set the ramp generator for a 500 μs duration ramp (still applied to the +X INPUT connector). Set the ramp generator triggering controls for a stable display on the 606A Monitor.

g. ADJUST—C110 (+Y Atten Comp) for an optimum square corner on the 606A display.

h. CHECK—for an eight division (within 0.24 division) square-wave display.

i. (Option 21, parts i through m.) Remove the grounding cap from the −Y INPUT connector. Disconnect the calibration generator signal from the +Y INPUT, and connect it to the −Y INPUT. Place the grounding cap on the +Y INPUT.

j. ADJUST—C130 (−Y Atten Comp) for an optimum square corner on the 606A display.

k. CHECK—for an eight division (within 0.24 division) square-wave display.

l. Disconnect the calibration generator from the −Y INPUT. Remove the grounding cap from the +Y INPUT, and place it on the −Y INPUT.

m. Turn off the instrument POWER. Then set S110 (+Y Atten switch) and S130 (−Y Atten switch) to the 1X position (switches up). Turn on the instrument POWER.

C5. Check Vertical Settling Time

a. Connect the ramp generator gate output to the +Z INPUT connector. Check that a grounding cap is on the −Z INPUT connector. (Option 21 only.)

b. Set the ramp generator duration to 10 μs, check that the ramp output is connected to the +X INPUT, and set the ramp amplitude for exactly 10 divisions of trace length.

c. Connect the calibration generator fast-rise positive-going output to the +Y INPUT via a 50-ohm cable and 50-ohm termination. Set the generator mode to Fast Rise, and set the Pulse Amplitude control for eight divisions of vertical display. Set the Period control to 10 μs (100 kHz).

d. Connect the calibration generator trigger output to the ramp generator trigger input, and set the ramp generator triggering controls for a triggered output. Then, set the calibration generator Variable Period control to obtain a display of approximately 1 cycle.

e. CHECK—that the time required for the leading edge of the square wave to travel from the zero percent level to the 100 percent level (see Fig. 4-4) is 500 ns (0.5 division) or less, within a trace width (0.025 cm).

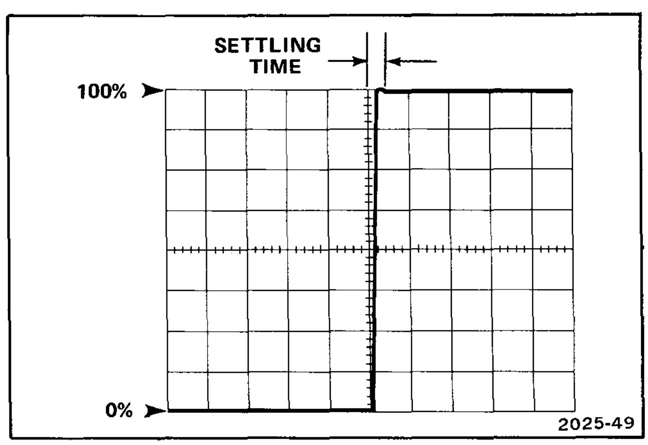


Fig. 4-4. Typical crt display for vertical settling time measurement (settling time includes corner distortion).

f. INTERACTION—If the check requirements in part e cannot be met, repeat the adjustment of R192, C194, R194, and C193 as outlined in step C2.

g. Disconnect the test equipment from the Y and Z INPUT connectors.

C6. Check Vertical (Y) Common-Mode Rejection (Options 21 and 22)

NOTE

The following procedure includes the check for both the Option 21 (differential inputs) and Option 22 (X5 attenuators) instruments. If your instrument does not include Option 22, disregard those subparts referring to use of attenuators.

a. Connect the function generator output to the test oscilloscope vertical input via a 50-ohm cable (do not terminate).

b. Set the function generator controls for a 500 kHz, 3 volt (p-p) sine wave as indicated on the test oscilloscope.

c. Disconnect the sine-wave signal from the test oscilloscope and connect it (using the dual-input coupler) to both the +Y and −Y INPUT connectors on the 606A.

d. With the ramp-generator output connected to the +X INPUT, set the generator controls for a 10 ms duration ramp with an amplitude of approximately 2 volts (to fill the screen horizontally).

e. CHECK—for 0.24 division, or less, of free-running vertical display on the 606A (position as necessary).

f. (Option 22 only, parts f through i.) Turn off the instrument POWER. Set S110 (+Y Atten switch) and S130 (−Y Atten switch) to the 5X position (switches down). Turn on the instrument POWER.

g. Connect the function-generator output to the test oscilloscope vertical input via a 50-ohm cable (do not terminate), and set the generator controls for a 15 volt (p-p) sine wave at 500 kHz. Then, reconnect the function-generator output to both the +Y and −Y INPUT connectors, using the dual-input coupler.

h. CHECK—for 0.6 division, or less, of free-running vertical display on the 606A (position as necessary).

i. Turn off the instrument POWER. Set S110 and S130 to the 1X (up) position, and disconnect the X and Y input signals. Turn on the instrument POWER.

C7. Check Vertical (Y) Bandwidth

a. Connect the ramp generator to the +X INPUT. Check that the −X INPUT has a grounding cap attached. Set the ramp duration to 10 ms, and set the ramp amplitude to approximately 2 volts (to fill the screen horizontally).

b. Connect the sine-wave generator output to the +Y INPUT connector (terminate into 50 Ω). Check that the −Y INPUT has a grounding cap attached.

c. Set the sine-wave generator for 50 kHz output and set the amplitude for six divisions of deflection.

d. Slowly increase the sine-wave generator output frequency until the display amplitude is 4.2 divisions.

e. CHECK—that the sine-wave generator frequency is at least 3 MHz.

f. INTERACTION—If the check requirements in part e cannot be met, repeat the adjustment of C193 in step C2.

C8. Check Vertical (Y) Positioning

a. Disconnect the sine-wave generator from the +Y INPUT connector.

b. CHECK—that the horizontal trace can be positioned vertically anywhere in the graticule area when rotating the vertical Position control.

c. Disconnect the ramp generator from the +Y INPUT connector.

C9. Check/Adjust Phasing (C259)

a. Connect the sine-wave generator to the +X INPUT and the +Y INPUT connectors with a 50-ohm cable, 50-ohm termination, and a dual-input coupler.

Scan by Zenith

b. Set the sine-wave generator for a 500 kHz frequency and a 1 volt amplitude.

c. Center the display within the graticule area.

d. CHECK—that the diameter of the displayed ellipse, measured vertically at the center of the graticule, is 0.1 division or less (see Fig. 4-5).

e. ADJUST—C259 (Phasing) for an ellipse diameter of 0.1 division or less.

f. Disconnect all test equipment.

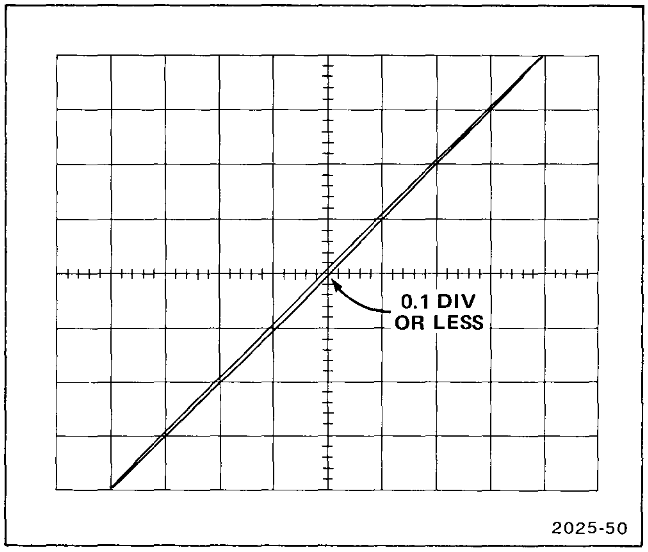


Fig. 4-5. Typical horizontal and vertical phase difference display.

D. Z-AXIS AMPLIFIER

Equipment Required

1. Test oscilloscope
2. Ramp generator
3. Calibration generator
4. Sine-wave generator
5. Function generator
6. Bnc Tee connector
7. Dual-input coupler
8. 50-ohm cables (3 required)
9. 50-ohm termination

BEFORE YOU BEGIN, see **TEST POINT AND ADJUSTMENT LOCATIONS** in Section 10, Diagrams and Circuit Board Illustrations.

NOTE

Perform the Preliminary Procedure before making the following checks and adjustments.

D1. Adjust Z-Axis Gain (R512)

NOTE

The following procedure sets Z-Axis Amplifier Gain for full intensity range from a +1 volt input. This procedure can be repeated for any voltage, up to +5 volts, to provide the desired intensity control range.

In this step, the test oscilloscope is used as the amplitude-measurement standard. The accuracy of the adjustment of Z-axis gain is determined by the test oscilloscope vertical sensitivity calibration.

a. Connect the calibration generator Ampl Output through a 50-ohm cable to the test oscilloscope vertical input. (Do not terminate the cable.) Set the calibration generator mode to Std Ampl (standard amplitude). Set the Amplitude control to 1 V.

b. Set the test oscilloscope vertical deflection factor to 200 mV/div and the sweep rate to 500 μs/div.

c. Set the test oscilloscope gain for exactly five divisions of deflection. This serves to calibrate the test oscilloscope deflection factor.

d. Apply a positive-going 100 μs ramp signal of approximately 2 volts amplitude from the ramp generator to the +X INPUT connector on the 606A.

e. Change the cable on the calibration generator from the Ampl Output connector to the positive-going fast-rise output. Set the calibration-generator mode to Fast Rise, and the Period control to 10 μs (100 kHz). Set the Pulse Amplitude control for a five-division display on the test oscilloscope. This serves to calibrate the output level of the calibration generator fast-rise output signal.

f. Connect the calibration-generator trigger output signal to the ramp generator trigger input. Set the ramp generator triggering controls for triggered operation.

g. Disconnect the 1 volt square-wave signal from the test oscilloscope vertical input. Attach a 10X probe on the vertical input.

h. Connect the 10X probe tip to TP588 on the 606A Low-Voltage Power Supply & Z-Axis board. Set the test oscilloscope for dc input coupling and a deflection factor of 20 volts/division (includes 10X attenuation of probe).

i. Set the INTENSITY control so that the trace on the 606A just disappears.

j. Note the dc level on the test oscilloscope (denotes Z-axis cutoff level).

k. Connect the 1 volt square-wave signal from the calibration generator to the +Z INPUT connector.

l. ADJUST—R512 (Z-Axis Gain) so that the upper level of the square wave (displayed on the test oscilloscope) is 70 volts higher than the cutoff level noted in part j.

m. CHECK—the 606A display for a fully-brightened trace.

n. (Option 21 only, parts n and o.) Change the cable on the calibration generator from the positive-going output to the negative-going fast-rise output. Move the other end of the cable from the +Z INPUT to the −Z INPUT connector (the INTENSITY control on the 606A should still be set at the same point as in part i of this step).

o. CHECK—the 606A display for a fully-brightened trace.

D2. Adjust Z-Axis Compensation (C557) and Check Aberrations

a. Change the cable on the calibration-generator negative-going fast-rise output to the positive-going fast-rise output. Set the calibration-generator Pulse Amplitude control for approximately 0.5 volt output, with the Period control set to 10 μs (100 kHz).

b. Set the test oscilloscope deflection factor to 10 volts/division (with 10X probe), and set the sweep rate to 1 μs/div.

c. Set the calibration-generator amplitude and the 606A INTENSITY control for six divisions amplitude (60 volts) as indicated on the test oscilloscope. (Probe still connected to TP588 as in step D1 parts a through h.)

d. ADJUST—C557 (Z HF Comp) for optimum square front corner on the displayed pulse.

e. CHECK—for 0.3 division (3 volts) or less aberrations on the top front corner of the displayed pulse.

f. Disconnect the calibration generator from the +Z INPUT.

D3. Check Z-Axis Amplifier Bandwidth

a. Apply a 50 kHz sine-wave signal with an amplitude of approximately 0.5 volt from the sine-wave generator to the +Z INPUT (terminate into 50 Ω).

b. Check that the test oscilloscope 10X probe tip is still connected to TP588, and the test oscilloscope deflection factor (including 10X probe attenuation) is 10 volts/division.

c. Set the sine-wave generator amplitude and the 606A INTENSITY control for a six division (60 volts) display on the test oscilloscope (make sure that no clipping occurs on the test oscilloscope display). Set the test oscilloscope sweep rate to 10 microseconds/division.

d. Slowly increase the sine-wave generator frequency until the display amplitude is 4.2 divisions.

e. CHECK—that the sine-wave generator output frequency is at least 10 MHz.

f. INTERACTION—If the check requirements in part e cannot be met, repeat the adjustment of C557 in step D2.

D4. Check Z-Axis Common-Mode Rejection (Option 21 only)

NOTE

Z-Axis Gain must be set for 1 volt = full intensity when performing this step.

a. Connect the sine-wave generator output to the +Z INPUT and the −Z INPUT connectors with a 50 ohm cable, 50 ohm termination, and a dual-input coupler.

b. Set the sine-wave generator for a 0.5 MHz, 5 volt output.

c. Check that the test oscilloscope 10X probe tip is still connected to TP588. Set the test oscilloscope vertical input for ac coupling, and set the deflection factor to 1 volt/division (including 10X probe attenuation).

d. CHECK—the test oscilloscope display amplitude for 3.5 divisions (3.5 volts) or less.

e. Disconnect all test equipment.

E. CRT CIRCUIT AND DYNAMIC FOCUS

Equipment Required

1. Precision dc voltmeter
2. Ramp generator
3. Calibration generator
4. Dot generator
5. 50-ohm cables (3 required)

BEFORE YOU BEGIN, see **TEST POINT AND ADJUSTMENT LOCATIONS** in Section 10, Diagrams and Circuit Board Illustrations.

NOTE

Perform the Preliminary Procedure before making the following checks and adjustments.

CAUTION

Do not allow a high-intensity dot to remain stationary on the crt. The crt phosphor could become permanently damaged.

E1. Adjust CRT Grid Bias (R774)

a. Set the INTENSITY and FOCUS controls for a sharply-focused dot display. Position the dot display near graticule center.

b. Connect the precision dc voltmeter between TP588 and ground.

c. Set the INTENSITY control for a voltmeter reading of +10 volts. Disconnect the precision dc voltmeter.

d. ADJUST—R774 (Grid Bias) until the dot just disappears.

e. Set the INTENSITY control for a visible dot display.

E2. Adjust Trace Rotation (R750) and Check Orthogonality

a. Apply a positive-going, 5 ms ramp signal from the ramp generator to the 606A +X INPUT connector.

b. Set the ramp-generator amplitude for a 10 division horizontal trace on the crt.

c. Position the trace to the center horizontal graticule line.

d. ADJUST—the rear-panel TRACE ROTATION (R750) control to align the trace with the center horizontal graticule line.

e. Disconnect the ramp generator from the +X INPUT and connect it to the +Y INPUT.

f. Position the trace to the center vertical graticule line.

g. CHECK—that the vertical trace is aligned with the center vertical graticule line at the top and bottom of the graticule within 0.1 division.

E3. Check/Adjust Geometry (R798)

a. Position the vertical trace (from step E2) to the left edge of the graticule, and then to the right edge.

b. CHECK—the vertical trace for 0.1 division or less of bowing at the left and right edges of the graticule.

c. ADJUST—R798 (Geom) for minimum trace bowing at the left and right edges of the graticule.

d. Disconnect the ramp generator from the +Y INPUT and connect it to the +X INPUT. Horizontally center the display on the graticule.

e. Position the horizontal trace to the top edge of the graticule, and then to the bottom edge.

Scan by Zenith

f. CHECK—the horizontal trace for 0.1 division or less of bowing at the top and bottom edges of the graticule.

g. INTERACTION—If necessary, readjust R798 (Geom) for minimum trace bowing at the top and bottom edges of the graticule. Then, reconnect the ramp generator to the +Y INPUT and repeat step E3 until optimum geometry is achieved.

E4. Adjust Astigmatism (R705)

a. Connect the positive-going, fast-rise output from the calibration generator to the +Y INPUT. Set the calibration generator mode to Fast Rise, and set the Period control to 10 μs (100 kHz).

b. Connect the trigger output of the calibration generator to the ramp generator trigger input. Set the ramp generator for a 50 μs duration, positive-going ramp.

c. Set the calibration-generator Pulse Amplitude control for a four-division display. Set the ramp-generator triggering controls for a stable display. Vertically position the display near crt center.

d. ADJUST—front panel FOCUS control and R705 (Astig) for best definition on the front corner of the square-wave display near crt center.

e. Disconnect all test equipment.

E5. Adjust Focus and Astigmatism Correction (R615, R625, R655, R665, and R626)

NOTE

The recommended method for adjustment of the Dynamic Focus circuit (step E5) is based on the dot generator display. If a dot generator is not available, an alternative procedure is given in step E6.

a. Set the 606A INTENSITY control fully counterclockwise, and set the vertical and horizontal Position controls to midrange. Set the POWER switch to ON, and then set the INTENSITY control to the point where the dot just disappears.

b. With the power to the dot generator turned off (PWR or POWER switch on the TM 500-series Power Module pushed in, to the "off" position), connect the X, Y, and Z outputs to the matching +INPUT connectors on the 606A.

c. Set the dot generator as follows:

Dot Raster (internal switch)	32 X 32
50 Ω-High Z (pushbutton)	out position (High Z) for standard instrument; in (50 Ω) for Option 26 (50 Ω inputs) instruments
X and Y Amplitude	midrange
Z Amplitude	fully counterclockwise

d. Turn on the power to the dot generator. Set the dot generator Z amplitude control for a dot pattern with moderate intensity (below the level that causes blooming of the dots), with good blanking between dots. This adjustment usually requires a combination of 606A INTENSITY control and dot-generator Z Amplitude control settings for the best defined dots without excess brightness or blooming.

e. Set the dot-generator X and Y Amplitude controls to provide a raster display on the 606A that just fills the screen horizontally and vertically.

f. Set the 606A FOCUS and Astig adjustment (R705) for optimum focus of the dot display near graticule center.

g. ADJUST—the focus correction adjustments (R615, R625, R655, and R665), corresponding to the appropriate area of the dot display (see Fig. 4-6) for well-defined symmetrical dots. Use the 606A vertical and horizontal Position controls to position the dot display on the graticule.

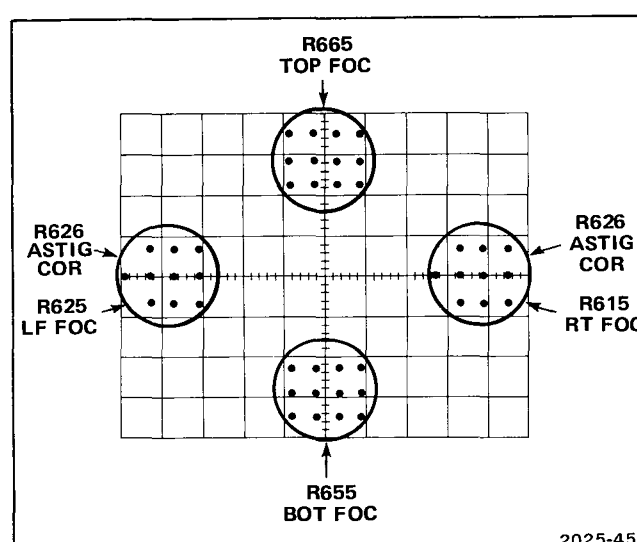


Fig. 4-6. Focus and astigmatism correction adjustments corresponding to the appropriate area of the dot display.

h. ADJUST—R626 (Astig Cor) for symmetrical dots on the left and right sides of the graticule (refer to Fig. 4-6).

i. INTERACTION—Compromise the adjustment of R615, R625, R655, R665, and R626 as necessary for optimum dot definition over the entire display area.

j. Disconnect all test equipment.

CAUTION

When using the dot generator, always turn the 606A POWER off before turning off the dot generator. The INTENSITY control may be set to a level that will cause burning of the crt phosphor when the display is a single, stationary dot.

E6. Alternative Method—Adjust Focus and Astigmatism Correction (R615, R625, R655, R665, and R626)

a. Set the 606A INTENSITY control for a moderately bright dot (use care to not use excessive intensity levels, which might damage the crt phosphor).

b. Position the dot to crt center. Set the FOCUS control and Astig adjustment (R705) for optimum focus of the displayed dot.

c. ADJUST—the focus correction adjustments (R615, R625, R655, and R665), corresponding to the appropriate area of the graticule (refer to Fig. 4-6). Position the displayed dot to the appropriate display area for each adjustment, and adjust the corresponding focus correction adjustment for a well-defined, symmetrical dot.

d. ADJUST—R626 (Astig Cor) for a symmetrical dot when the dot is positioned to the left and right sides of the graticule.

e. INTERACTION—Position the displayed dot slowly over the entire display area. Compromise the adjustment of R615, R625, R655, R665, and R626 as necessary for optimum definition over the entire display area.

F. SWEEP GENERATOR (OPTION 4)

Equipment Required

1. Sine-wave generator
2. Time-mark generator
3. 50-ohm cable
4. 50-ohm termination
5. 50-ohm 2X attenuator

BEFORE YOU BEGIN, see TEST POINT AND ADJUSTMENT LOCATIONS in Section 10, Diagrams and Circuit Board Illustrations.

NOTE

Perform the Preliminary Procedure before making the following checks and adjustments.

F1. Adjust Sweep Length (R915)

a. Set the Option 4 controls as follows:

Int Swp (S350 on Deflection Amplifier board)	Y-T (rear position)
Int Blank (S555 on Low-Voltage Power Supply and Z-Axis board)	Y-T (rear position)
Trig Mode (S909 on Sweep board)	Auto (rear position)
Sec/Div (front-panel)	1 μ
Variable (front panel)	Fully clockwise (calibrated)
TRIG SLOPE/LEVEL (front panel)	Centered

b. Set the INTENSITY control for a visible trace. Position the display to center the trace.

c. ADJUST—R915 (Swp Length) for a sweep length of approximately 10.5 divisions.

F2. Check Trigger Slope/Level

a. Apply a 2 MHz sine-wave signal from the sine-wave generator to the +Y INPUT connector.

b. Set the sine-wave generator amplitude for a 0.5-division display.

c. CHECK—that a stable, jitter-free display of sine waves can be obtained by turning the TRIG SLOPE/LEVEL control.

d. CHECK—for a free-running display when the TRIG SLOPE/LEVEL control is set fully clockwise and fully counterclockwise.

e. Set the Trig Mode switch, S909, to Norm (forward position).

f. CHECK—that a stable, jitter-free display of sine waves can be obtained by turning the TRIG SLOPE/LEVEL control.

g. CHECK—for no display when the TRIG SLOPE/LEVEL control is set fully clockwise and fully counterclockwise.

h. Set the Trig Mode switch, S909, to Auto (rear position).

F3. Check/Adjust Sweep Timing (R965)

a. Set the SEC/DIV switch to 1 m. Check that the VARIABLE control is fully clockwise (calibrated).

b. Connect the time-mark generator output through a 50-ohm cable, a 50-ohm 2X attenuator, and a 50-ohm termination to the 606A +Y INPUT connector. Set the time-mark generator for 1 ms markers.

c. Position the first time marker to the left edge of the graticule and check for 1 time marker per major graticule division.

d. CHECK—that the distance between the second and tenth time marker is eight divisions within 0.24 division (3%).

e. ADJUST—R965 (Swp Cal) so that the second and tenth time markers (center eight) are exactly eight divisions apart.

f. CHECK—Remaining SEC/DIV switch positions with time markers that correspond to each switch position. The distance between the second and tenth time marker at each SEC/DIV switch position should be eight divisions within 0.24 division (3%).

F4. Check Variable Time/Division

a. Set the time-mark generator for 0.1 ms markers.

b. Set the SEC/DIV switch to 0.1 m. Note 1 time marker per division.

c. Set the front panel VARIABLE control fully counterclockwise.

d. Set the SEC/DIV switch to 10 μ.

e. CHECK—for at least 1 time marker per graticule division.

f. Disconnect all test equipment.

NOTE

For X-Y operation, return the Int Swp and Int Blank switches on the Deflection board and the Low-Voltage Power Supply and Z-Axis board to the X-Y position.

This completes the Performance Check and Adjustment procedure.

INSTALLATION

OPERATING POWER INFORMATION

This instrument can be operated from either a 120-volt or 220-volt nominal line-voltage source, 48 to 440 Hz. In addition, three regulating ranges are provided for each nominal line-voltage source.

CAUTION

To prevent damage to the instrument, always check the line-voltage information recorded on the rear panel before applying power to the instrument.

Power Cord Information

WARNING

This instrument is intended to be operated from a single-phase earth-referenced power source having one current-carrying conductor (the Neutral Conductor) near earth potential. Operation from power sources where both current-carrying conductors are live with respect to earth (such as phase-to-phase on a three-wire system) is not recommended, since only the Line Conductor has over-current (fuse) protection within the instrument.

This instrument has a three-wire power cord with a polarized two-pole, three-terminal plug for connection to the power source and safety-earth. The safety-earth terminal of the plug is directly connected to the instrument frame. For electric-shock protection, insert this plug only in a mating outlet with a safety-earth contact.

Do not defeat the grounding connection. Any interruption of the grounding connection can create an electric-shock hazard. Before making external connections to this instrument, always ground the instrument first by connecting the power-cord to a proper mating power outlet.

Table 5-1

POWER-CORD CONDUCTOR IDENTIFICATION

Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Blue	White
Grounding (Earthing)	Green-Yellow	Green-Yellow

The power cord plug required depends upon the ac input voltage, and the country in which the instrument is to be used. Should you require a power cord plug other than that supplied with your instrument, refer to the standards listed in Table 5-2.

Table 5-2

LOCATION OF POWER-CORD PLUG CONFIGURATIONS INFORMATION

Nominal Line Voltage	Reference Standards
120 V AC	[a] ANSI C73.11 [b]NEMA 5-15-P (Hospital Grade)
220 V AC	ANSI C73.20 [c]AS C112 [d]BS 1363 [e]CEE 7, sheets IV, VI, and VII NEMA 6-15-P

[a]ANSI—American National Standards Institute
[b]NEMA—National Electrical Manufacturer's Association
[c]AS—Standards Association of Australia
[d]BS—British Standards Institution
[e]CEE—International Commission on Rules for the Approval of Electrical Equipment

For medical-dental applications, use NEMA 5-15-P (Hospital-Grade) plug for 120-volt operation, or NEMA 6-15-P plug for 220-volt operation.

Line-Voltage and Regulating-Range Selection

CAUTION

Damage to the instrument may result from incorrect placement of the line-voltage selector plug.

To select the correct nominal line voltage and regulating range, proceed as follows:

1. Disconnect the instrument from the power source.

2. Remove the bottom cabinet panel of the instrument (see Section 7, Maintenance) to gain access to the Low-Voltage Power Supply and Z-Axis board.

3. Insert the proper line-voltage selector plug (the brown plug for 120-volt operation or the red plug for 220-volt operation) on the line-voltage selector pins labeled for the desired nominal line-voltage range. Refer to Fig. 5-1, for location and additional information.

4. Remove the line fuse from the fuse holder and check for the correct rating. Replace it with one having the correct rating, if necessary. Refer to Fig. 5-1 for fuse information and location.

NOTE

An alternate line fuse, intended for the line-voltage source for which the Monitor was not set when shipped from the factory, is clipped to the Low-Voltage Power Supply and Z-Axis board (see Fig. 5-1).

5. Change the nominal line-voltage information recorded on the 606A rear panel. Use a non-abrasive eraser to remove previous data, and mark on the new data with a pencil.

6. Replace the bottom cabinet panel and apply power to the Monitor.

INSTALLATION IN PATIENT-CARE FACILITIES

WARNING

Do not use the amplifier INPUTS for direct-patient connection. Signal currents at these connectors, as well as leakage currents, may exceed values considered non-hazardous for direct-patient connection.

WARNING

Although this Monitor is not to be connected directly to a patient, interconnecting this Monitor to other equipment can result in the application of excessive current to a patient. It is extremely important that the interconnection is made in accordance with NFPA 76B-T, Tentative Standard for the Safe Use of Electricity in Patient Care Facilities, section 3038, "Signal Transmission Between Appliances".

Among the situations involving the above-mentioned patient hazard is one in which two or more pieces of interconnected equipment are grounded at locations remote from one another. The standard mentioned in the preceding warning describes both this hazard and appropriate corrective measures.

INPUT ATTENUATION SELECTION (OPTION 22)

X and Y Input Attenuation

WARNING

The heat sinks on the Deflection Amplifier board are elevated to approximately +200 volts. To avoid potential electric shock, always turn the POWER off before changing the settings of the X or Y Input Attenuators.

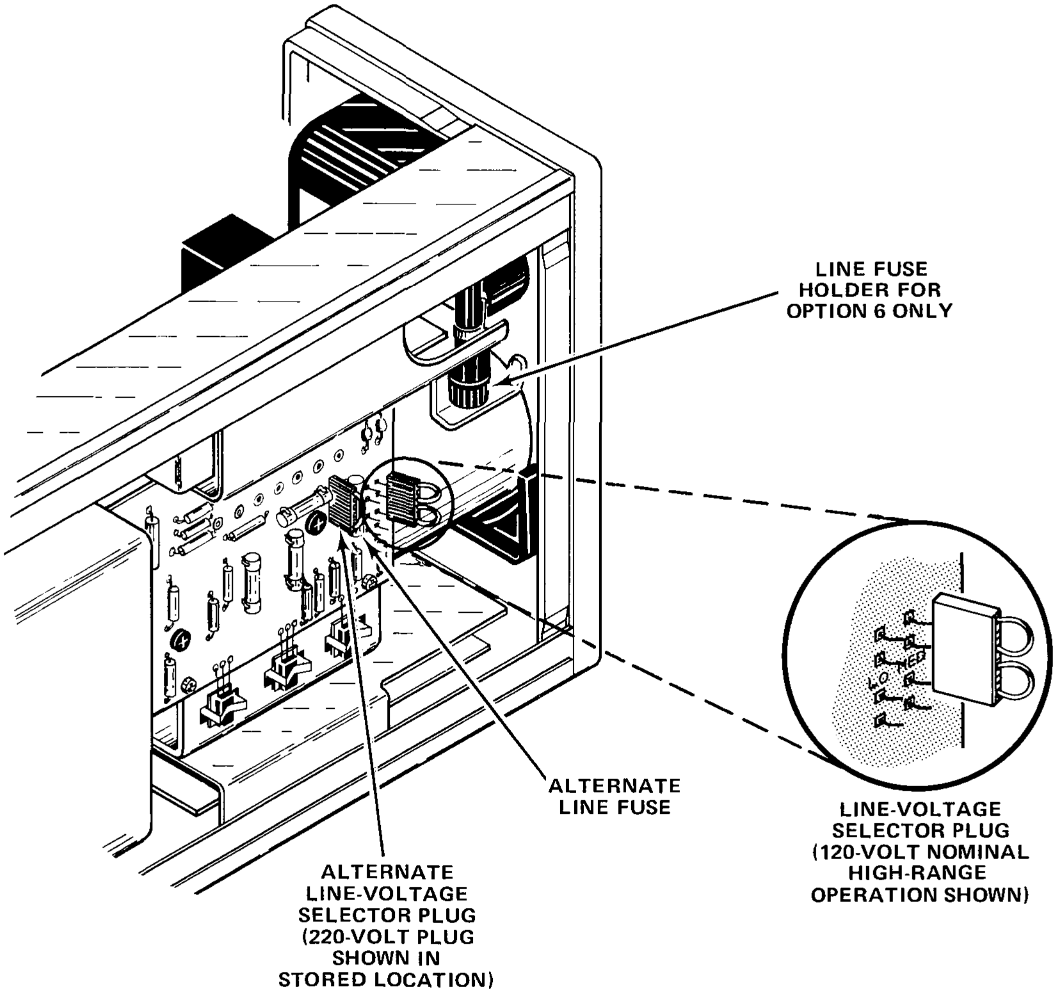
The Horizontal (X) and Vertical (Y) Amplifiers include a selectable 1:1 and 5:1 step attenuator in both the + (non-inverting) and the − (inverting) input circuits. These attenuators extend the deflection factor range of the appropriate amplifier to at least 12.5 volts for full-screen signal deflection. Refer to the Internal Control and Selector Locations foldout page in Section 10, Diagrams and Circuit Board Illustrations, for the position settings and locations of the attenuator switches. To maintain proper differential operation of the amplifier, always change both the + and − attenuators to the same setting.

Z-Axis Input Attenuation

The Z-Axis Amplifier is shipped from the factory with 1X input attenuation and 1 MΩ input impedance. However, the attenuation and input impedance can be modified to suit a specific application. Posts, on the Low-Voltage Power Supply and Z-Axis board, allow components to be changed without damage to the circuit board. Figure 5-2 illustrates the method used to modify input attenuation and input impedance of the +Z INPUT. The same method applies to both the +Z INPUT and the −Z INPUT. Refer to the Internal Control and Selector Locations foldout page in Section 10, Diagrams and Circuit Board Illustrations, for location of the Z-Axis attenuation components. Refer to your Tektronix Field Office or representative for additional information.

CONNECTING THE INTERNAL SWEEP (OPTION 4)

Internal switches are provided to connect the optional sweep generator circuit. Remove the protective cabinet panels from the Monitor (see Section 7, Maintenance) to



Regulating Ranges

Line-Voltage Selector Position	Regulating Range and Fuse Data	
	120 Volts (Nominal)	220 Volts (Nominal)
LO	90 V ac to 110 V ac	180 V ac to 220 V ac
MED	99 V ac to 121 V ac	**198V ac to 242V ac**
HI	108 V ac to 132 V ac	216 V ac to 250 V ac
Line Fuse Data	1 A slow-blowing type	0.5 A slow-blowing type

2025-7

Fig. 5-1. Location of line-voltage selector plugs, regulating-range pins, and line fuses.

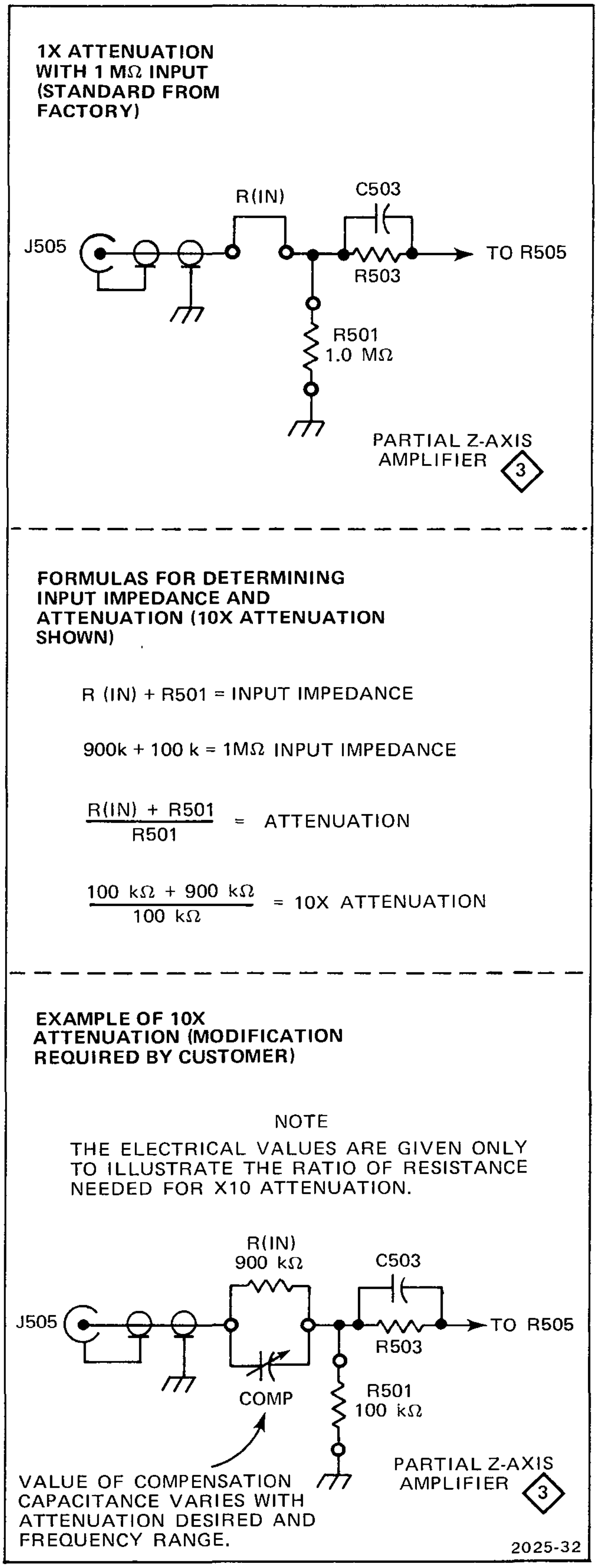


Fig. 5-2. Typical method for modifying Z-Axis input impedance and attenuation.

gain access to these switches. Switch locations and positions are shown on the Internal Control and Selector Locations foldout page in Section 10, Diagrams and Circuit Board Illustrations. To use the internal sweep, proceed as follows:

1. Set S350 (Int Swp) located on the Deflection Amplifier board to the Y-T (rear) position.

2. Set S555 (Int Blank) located on the Low-Voltage Power Supply and Z-Axis board to the Y-T (right) position.

3. Set S909 (Trig Mode) located on the Sweep board to the Auto (rear) position.

4. Replace the cabinet panels.

RACKMOUNTING INFORMATION

The 606A can be operated in a standard 19-inch instrument rack with front and rear holes that conform to universal hole spacing. Kits are available to convert the 606A from the cabinet to a rackmounted configuration, and vice versa. Complete instructions are included in the kits. A brief description of each available conversion kit is given here. Consult your Tektronix Field Office or representative for additional information.

Cabinet-to-Rackmount Conversion

Tektronix Part No. 040-0600-00. Mounts two 606A Monitors side-by-side in a standard 19-inch wide rack. The kit comes equipped with a slide-out assembly and includes the securing hardware. Complete rackmounting instructions are included in each kit.

Tektronix Part No. 040-0601-00. Mounts one 606A Monitor in a standard 19-inch wide rack. The kit is equipped with a slide-out assembly, securing hardware, and a blank front panel to cover the second instrument opening in the rack. Complete rackmounting instructions are included with each kit.

Tektronix Part No. 040-0624-01. Converts one TM 503 Power Module and one 606A Monitor to mount side-by-side in a standard 19-inch wide instrument rack. The kit includes a slide-out assembly and securing hardware. Complete rackmounting instructions are included with each kit.

Tektronix Part No. 016-0337-00. Converts one 606A Monitor and one 602A Monitor or one 528 Waveform Monitor to rackmount side-by-side in a standard 19-inch rack. The kit includes a slide-out assembly, securing hardware, and blank panel for mounting only one instrument in the rack. Complete rackmounting instructions are included in each kit.

Rackmount-to-Cabinet Conversion

Tektronix Part No. 040-0602-00. Converts one 606A Monitor from a rackmount configuration to a cabinet configuration. Complete instructions are included in each kit.

Instrument Dimensions

A drawing showing the major dimensions of the 606A is shown in Fig. 3-1 (Specification section). Further details and tolerances are shown on the Detailed Dimensional Drawing foldout page in Section 10, Diagrams and Circuit Board Illustrations.

Ventilation Requirements

When the 606A Monitor is mounted in a rack with other equipment, it is important that the ambient temperature surrounding the Monitor does not exceed +50°C (+122°F). Additional clearance or forced ventilation methods (fan) may need to be employed to maintain ambient temperatures below +50°C (+122°F). Reliability and performance of the 606A will be affected if the ventilation holes in the protective panels are obstructed, or if the 606A is operated at an ambient temperature higher than +50°C (+122°F).

Slide-Out Tracks Information

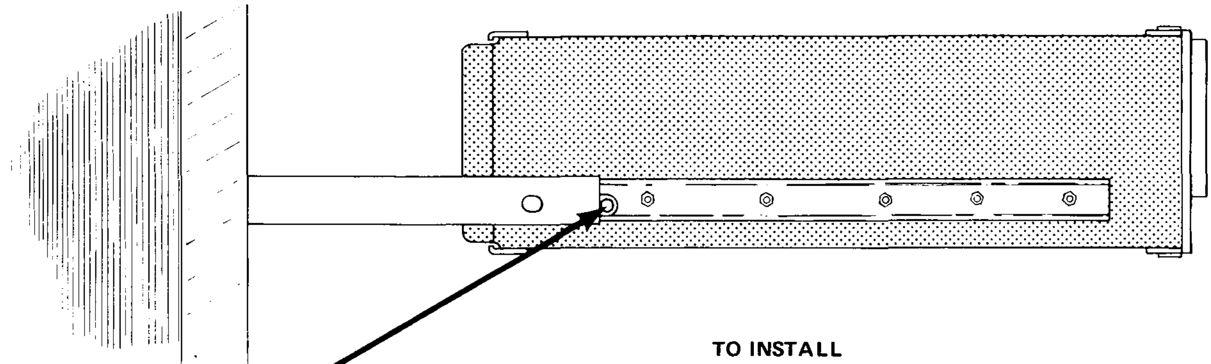
The slide-out tracks provided in the conversion kits permit this instrument to be extended out of the rack for maintenance without removing it from the rack. Be sure the power cord and signal cables are long enough to allow operation in the extended position. Refer to the instructions in the appropriate rackmount kit for additional information.

Removing or Installing the Instrument

After initial installation and adjustment of the slide-out tracks, the instrument can be removed or installed by following the instructions given in Fig. 5-3. No further adjustments are required under normal conditions.

Slide-Out Track Lubrication

The special finish on the sliding surfaces of the tracks provides permanent lubrication. However, if the tracks require additional lubrication, a thin coat of paraffin can be rubbed onto the sliding surfaces.

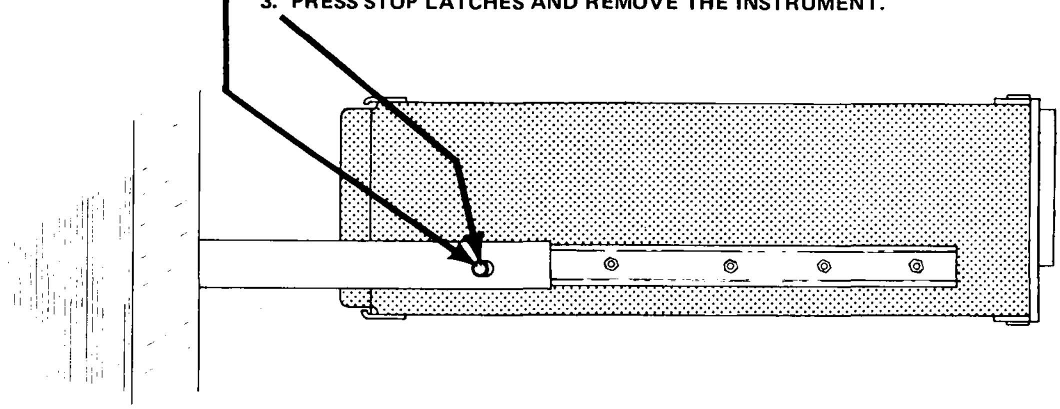


TO INSTALL

1. PULL THE SLIDE-OUT TRACK INTERMEDIATE SECTIONS OUT TO THE FULLY EXTENDED POSITION.
2. INSERT THE INSTRUMENT CHASSIS SECTIONS INTO THE INTERMEDIATE SECTIONS.
3. PRESS STOP LATCHES AND PUSH INSTRUMENT TOWARD RACK UNTIL THE LATCHES SNAP INTO THEIR HOLES.
4. AGAIN PRESS STOP LATCHES AND PUSH INSTRUMENT INTO RACK.
5. SECURE THE INSTRUMENT IN PLACE WITH THE FRONT-PANEL SECURING SCREWS. DELETE THIS STEP FOR INITIAL INSTALLATION.

TO REMOVE

1. REMOVE THE FRONT-PANEL SECURING SCREWS.
2. PULL THE INSTRUMENT OUTWARD UNTIL THE STOP LATCHES SNAP INTO THE HOLES.
3. PRESS STOP LATCHES AND REMOVE THE INSTRUMENT.



(1675-4) 2091-20

Fig. 5-3. Installing and removing a rackmounted instrument.

@

THEORY OF OPERATION

This section of the manual describes the circuitry in the 606A Monitor. The description begins with a discussion of the instrument using the block diagram of Fig. 6-1, and then continues in detail, showing the relationships between the stages in each major circuit. Schematics of all major circuits are given in Section 10, Diagrams and Circuit Board Illustrations. Refer to these schematics throughout the following discussions for specific electrical values and relationships.

NOTE

The Theory of Operation for available electrical options is included in the following text. The information is preceded by the appropriate option number.

BLOCK DIAGRAM

The following discussion is provided to aid in understanding the overall concept of the 606A before the individual circuits are discussed in detail. A basic block diagram is shown in Fig. 6-1.

Vertical and horizontal signals to be displayed on the crt are supplied to the Deflection Amplifiers through the appropriate Y and X INPUT connectors. The Deflection Amplifiers process the input signals and provide push-pull outputs to drive the deflection plates of the cathode-ray tube (crt). Both Deflection Amplifiers contain position and gain controls.

Option 21 (Differential Inputs). Instruments equipped with this option have both positive (+) and negative (−) inputs for the vertical (Y), horizontal (X), and Z-axis amplifiers. This option permits driving the amplifiers with either single-ended or differential input signals. Use of the instrument in each case is described in Section 2, Operating Instructions.

Option 22 (1X—5X Input Attenuators). This option includes internal, switchable 1:1—5:1 attenuators for the vertical and horizontal amplifiers. The attenuators are frequency-compensated.

The Z-Axis Amplifier controls the display intensity by providing a voltage to drive the crt control grid. Input signals are applied to the Z INPUT connector. The front-panel INTENSITY control sets the output level of the Z-axis amplifier, thus controlling the static brightness of the display.

The Dynamic Focus circuit provides focus correction for the display when it is deflected from crt center. Thus, by varying the voltage to the crt focus element as the beam is deflected to various areas of the screen, the Dynamic Focus circuit compensates for geometric defocusing.

The High-Voltage and Low-Voltage Power Supplies provide all the voltages necessary for operation of the 606A. Electronic regulation is used on all critical supplies to provide stable operation under varying line-voltage conditions.

Option 4 (Internal Sweep). This circuitry produces a positive-going sawtooth voltage, which is amplified by the Horizontal (X) Amplifier to provide sweep deflection in the crt. A sample of the signal applied to the Vertical (Y) Amplifier is picked off to serve as a triggering signal. The level of the vertical signal from which triggering occurs is determined by the setting of the TRIG SLOPE/LEVEL control. The Sweep circuit also produces an unblanking gate signal coincident with the sawtooth waveform. This gate signal is coupled to the Z Output Amplifier to unblank the crt and permit display presentation.

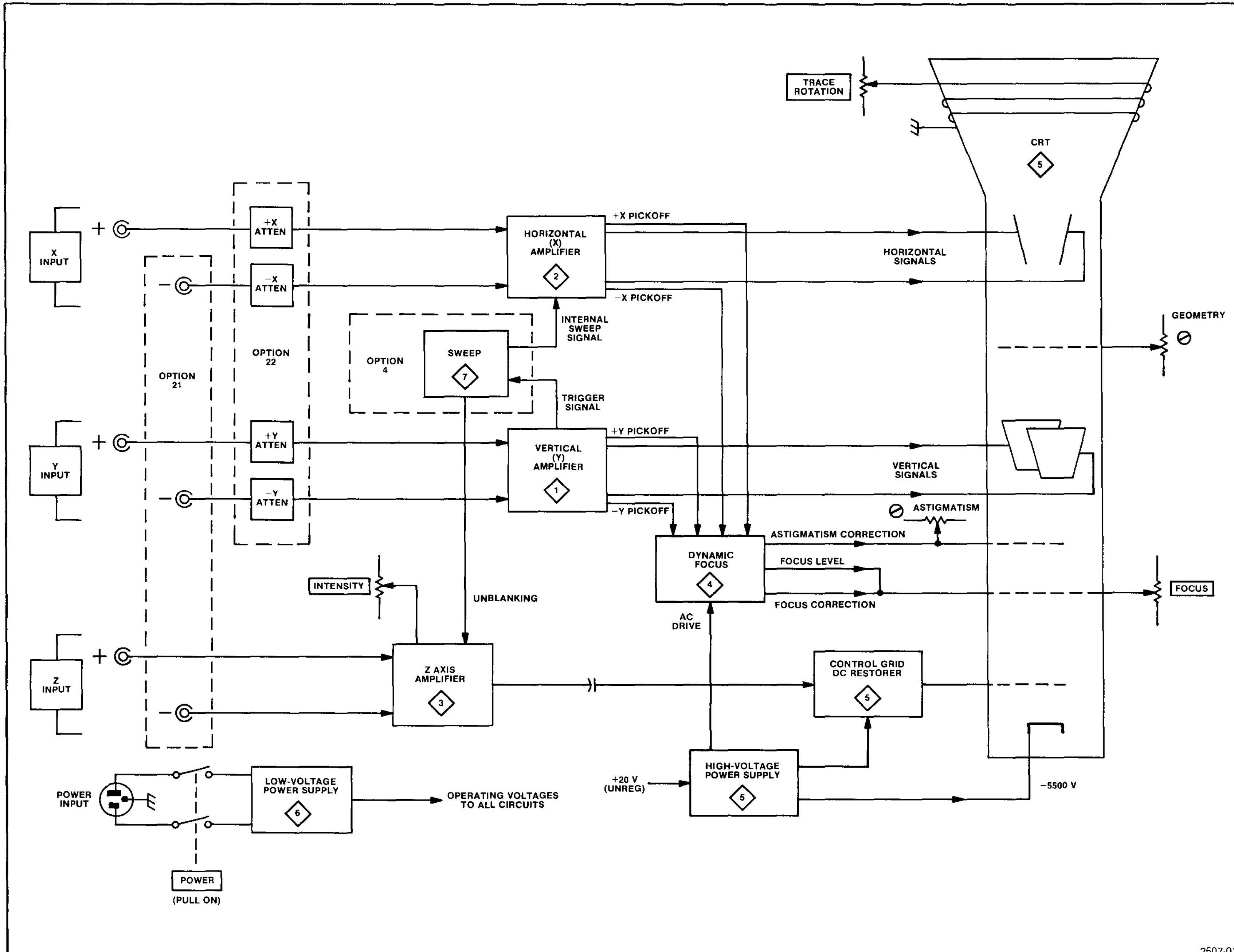


Fig. 6-1. 606A block diagram (with options).

DETAILED CIRCUIT DESCRIPTION

Complete schematic diagrams are provided in Section 10, Diagrams and Circuit Board Illustrations. The numbers inside the diamond after a heading in the following discussions refer to the schematic diagram for that circuit. The schematic diagrams contain shaded borders around the major stages of the circuits to conveniently locate the components as mentioned in the following discussions. The name of each major stage is given in a shaded box on the diagram and as the sub-heading in the discussion of that schematic diagram.

VERTICAL (Y) AMPLIFIER ⟨1⟩

The Vertical (Y) Amplifier processes the Y input signals and provides amplification to drive the vertical deflection plates of the cathode-ray tube (crt). A schematic diagram of the Vertical (Y) Amplifier is shown on Diagram 1. A detailed block diagram, showing each major stage of the vertical amplifier, is superimposed on the schematic with shaded lines to conveniently locate the components mentioned here. The stage names (given as subheadings in the following discussion) can be found in the shaded boxes on Diagram 1.

Input Attenuators (Option 22 only)

An internal switch (S110, and S130 with Option 21) allows either 1X or 5X attenuation of the input signal before it is applied to the Y Preamplifier(s). The 5X position of each attenuator is a frequency-compensated voltage divider. The step attenuators are set in the 1X position when shipped from the factory. For optimum frequency-response of the amplifier, both attenuators (with Option 21) should be set in the same position.

Differential Inputs (Option 21 only)

This option consists primarily of an added bnc connector (J130) to permit application of signals to the inverting (−) input of the amplifier, thus providing differential operation. With this option, the gate of Q120B receives drive from the −Y INPUT connector.

With this option, the instrument is shipped from the factory prepared for single-ended operation, with a grounding cap connected to the −INPUT of the amplifier.

Y Preamplifier

Two identical, noninverting operational amplifiers, Q120A-Q150 and Q120B-Q160, form the Y Preamplifier. The amplifier can be operated as either a paraphrase amplifier (with a single-ended input) or as a differential amplifier (with Option 21). A push-pull signal is produced at the collectors of Q150 and Q160. The Y Preamplifier employs field-effect transistors to provide high input impedance and temperature stability. Excessively large negative-going signals are clamped by diodes CR118 and CR138 before application to transistors Q120A and Q120B. The Y Gain control, R125, allows setting the crt full-screen deflection from 0.5 volt, or less, to at least 2.5 volts. This adjustment is set at the factory for eight divisions of deflection with a 1-volt input signal applied.

Vertical Position and Limiter

Vertical positioning is provided by front-panel control R175, through the current sources of Q170-Q180, via the forward-biased zener diodes VR170-VR180. The push-pull signals from the Y Preamplifier are applied through R156 and R166 to the Y Output Amplifier after being offset by the vertical positioning stage. Diodes CR170-VR170 and CR180-VR180 prevent overdriving the Y Output Amplifier by limiting the Y Preamplifier signals to within about 5 volts of each other.

Y Output Amplifier

The Y Output Amplifier stage provides final amplification for the vertical (Y) signals before they are applied to the vertical deflection plates of the crt.

The Y Output Amplifier consists of two identical, noninverting operational amplifiers connected in a differential configuration. Frequency compensation is provided by C193-C194-R194. The Y Output Gain is set by variable resistor R192. Transistor Q280 provides source current, and Y Output Level R280 varies this source current, to determine the dc output voltage level. The + side of the Y Output Amplifier consists of active components Q190-Q210-Q230-Q235-Q250-Q255, with the feedback path provided through R198 and C198.

NOTE
(Option 21 only)

Since operation of the −Y Output Amplifier is complementary to that of the +Y Output Amplifier, signal operation of only the +Y Output Amplifier will be discussed. To locate the components of the −Y Output Amplifier which correspond to those in the following discussion, add 10 to the circuit number.

Low-Frequency Signal Operation. Low-frequency signals from the + side of the Y Preamplifier are amplified and inverted by Q190. Buffer Amplifier Q210 applies the signals through R216 to cascode amplifier Q230-Q235. The cascode amplifier again inverts the signals and provides the final amplification before the signals are applied to the crt. Transistors Q250-Q255 supply constant current to Q235.

Positive-Going High-Frequency Signal Operation. Positive-going high-frequency signals applied to the +Y Output Amplifier are inverted and amplified by Q190 and buffered by Q210. The signals are then passed through C216 and C217 to the bases of Q230 and Q250. These signals turn Q230 off, and turn Q250 on. Amplifier Q250 inverts and amplifies the applied signals.

Negative-Going High-Frequency Signal Operation. Negative-going high-frequency signals applied to the +Y Output Amplifier are inverted and amplified by Q190. Buffer amplifier Q210 applies the signals through C216 and C217 to the bases of Q230 and Q250. This turns Q250 off, and turns Q230 on. Cascode amplifier Q230-Q235 inverts and provides final amplification before the signal is applied to the crt deflection plate. Transistors Q250-Q255 also supply constant current to Q235.

Y Focus Correction Pickoff

Samples of the +Y and −Y signals are coupled to the Dynamic Focus circuit (Diagram 4) for focus correction in the Y axis. The signal from the + side of the Y Preamplifier is coupled through emitter follower Q155. The signal from the − side of the Y Preamplifier is coupled to the Dynamic Focus circuit through emitter follower Q165.

HORIZONTAL (X) AMPLIFIER ⟨2⟩

The Horizontal (X) Amplifier processes the X input signals and provides final amplification to drive the horizontal deflection plates of the crt. A schematic diagram of the Horizontal (X) Amplifier is shown in Diagram 2. A detailed block diagram showing each major stage of the Horizontal (X) Amplifier is superimposed on the schematic with shaded lines.

The Horizontal (X) Amplifier is identical to the Vertical (Y) Amplifier, with the exception of the circuit numbers and the provisions made for the optional internal sweep. For the Option 4 instrument, a sample of the vertical signal is taken from the collector of Q150 in the Vertical (Y) Amplifier, and is sent to the Sweep (Option 4) circuit. The internal sweep signal is applied to the collector of Q360 on the Horizontal (X) Amplifier.

The Horizontal (X) Amplifier circuit numbers are of the 300- and 400-series, whereas the Vertical (Y) Amplifier circuit numbers are in the 100- and 200-series. For example, Q265 on the Vertical (Y) Amplifier (Diagram 1) corresponds to Q465 on the Horizontal (X) Amplifier (Diagram 2). Therefore, the Vertical (Y) Amplifier discussion will apply to the Horizontal (X) Amplifier after converting the circuit numbers to those of the 300- and 400-series.

Z-AXIS AMPLIFIER ⟨3⟩

The Z-Axis Amplifier circuit provides the drive signal that controls the crt intensity. A schematic diagram of the Z-Axis Amplifier is shown on Diagram 3 at the rear of this manual. A detailed block diagram, showing each major stage of the Z-Axis Amplifier, is superimposed on the schematic diagram with shaded lines. The stage names (given as sub-headings in the following discussion) can be found in shaded boxes on Diagram 3.

Z Inputs

Signals can be applied to either the +Z INPUT (noninverting) bnc connector J505, or the −Z INPUT (inverting) bnc connector J515 (Option 21 only), as single-ended inputs; or to both connectors as a differential input. Provisions are made on each input line to permit installation of attenuating resistors and to change the input impedance (see Input Attenuation Selection in Section 5, Installation).

Z Preamplifier

Two identical operational amplifiers, Q508A-Q520-Q525 and Q508B-Q530-Q535, which can be operated as either a paraphase amplifier (single-ended input) or as a differential amplifier (with Option 21) form the basic Z Preamplifier. Excessively large negative-going signals are clamped by diodes CR505 and CR515 before application to transistors Q508A and Q508B. A single-ended output is produced at the collector of Q535, and is in phase to signals applied to the +Z INPUT and opposite in phase with signals applied to the −Z INPUT. Maximum crt intensity is obtained by applying from 1 to 5 volts to the Z-axis INPUTS, as controlled by the setting of Z-Axis Gain Adjustment R512.

Z Output Amplifier

The Z Output Amplifier is a noninverting operational amplifier consisting of Q550-Q560-Q585-Q570-Q580. The feedback network consists of R557-C557, with C557 also supplying high-frequency compensation. Transistors Q585 and Q570 are connected as a collector-coupled complementary amplifier to provide a fast, linear output signal to the crt control grid. Constant current for Q585 is

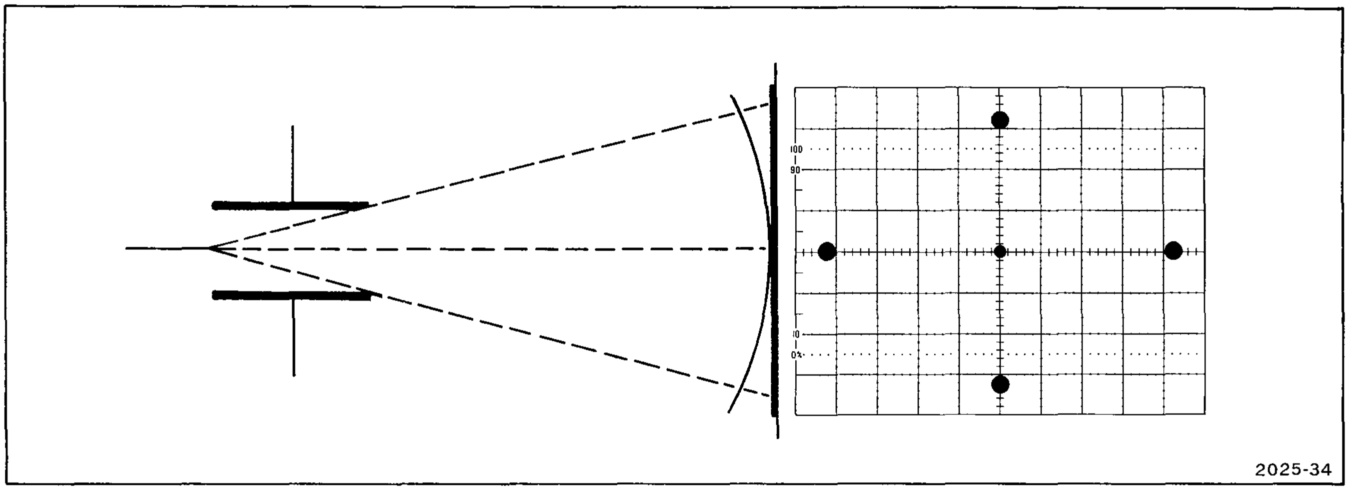


Fig. 6-2. Simplified illustration of geometric defocusing.

supplied by Q570 and Q580. The quiescent output voltage level of the Z Output Amplifier is set by adjustment of the front-panel INTENSITY control, R555. The output of the amplifier is applied to the crt control grid, through the Control Grid Dc Restorer network shown on Diagram 5 to control the crt beam intensity.

Unblanking (P/O Option 4)

If your instrument includes Option 4 (Internal Sweep), a negative unblanking pulse is applied, through R554, to the emitter of Q550. This pulse serves to brighten the trace during sweep time, thus causing the retrace time of the sweep to be blanked (not visible to the eye). The pulse is generated, along with the sweep sawtooth, on the Sweep board.

DYNAMIC FOCUS ⟨4⟩

The Dynamic Focus circuit provides focus correction as the crt beam is deflected to the edges of the display area in both the vertical (Y) and horizontal (X) axis. A schematic diagram of the Dynamic Focus circuit is shown on Diagram 4. A detailed block diagram, showing the major stages of this circuit, is superimposed on the schematic diagram with shaded lines. The stage names (given as sub-headings in the following discussion) can be found in shaded boxes on Diagram 4.

Geometric defocusing, a contributing factor to overall crt defocusing, occurs when the beam is deflected from crt center. The electron beam, at center screen, is focused for a particular beam length. When the beam is deflected, either vertically or horizontally, the beam length changes; the focus voltage remains the same. As a result, the display is defocused; and will appear larger at the top, bottom, and sides of the crt than it does at the crt center (see Fig. 6-2).

The Dynamic Focus circuit varies the voltage to the focus element of the crt with respect to both the vertical and horizontal positions of the electron beam. Therefore, overall focus is improved over the crt display area. Figure 6-3 illustrates the typical correction-voltage curve as the beam is deflected over the crt display area. The correction-voltage curves for vertical and horizontal deflection are not identical; however, the theory is the same.

X Focus Correction Shaper

A sample of the horizontal signal from the X Focus Correction Pickoff Amplifiers shown on Diagram 2, is coupled differentially to the X Focus Correction Shaper stage of the Dynamic Focus circuit. Transistors Q610 and Q620 form a differential amplifier, with Q605 providing source current.

Quiescently, with the beam horizontally deflected to within about three divisions of crt center, CR613 and CR623 are reverse biased. The voltage level at the bases of Q630 and Q635 is approximately −15 volts, as determined by Zener diode VR634.

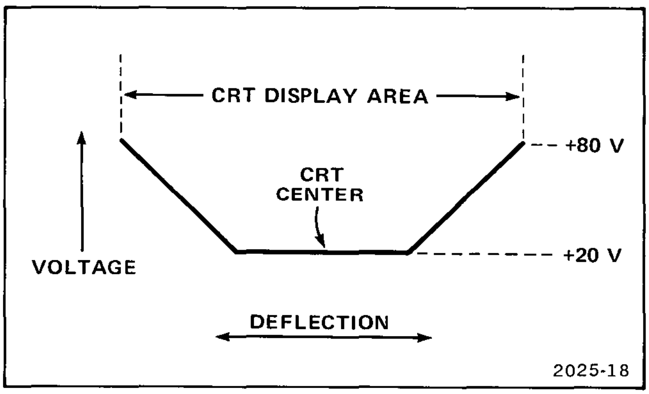


Fig. 6-3. Typical correction-voltage curve applied to the crt focus element (correction voltage applied for both vertical and horizontal deflection).

As the beam is deflected to the right region of the crt display area, the output of Q610 rises above −15 volts, forward biasing CR613 (CR623 is reverse biased). The signal from CR613 is inverted and amplified by Q630.

As the beam is deflected to the left region of the crt display area, the output of Q620 rises above −15 volts, forward biasing CR623 (CR613 is reverse biased). The signal from CR623 is inverted and amplified by Q635.

The composite correction voltage for horizontal (X) deflection is coupled from Q630 and Q635 to the Summing and Output Amplifier stage at the emitter of Q678.

Y Focus Correction Shaper

A sample of the vertical signal from the Y Focus Correction Pickoff Amplifiers shown on Diagram 1, is coupled differentially to the Y Focus Correction Shaper stage of the Dynamic Focus circuit. Transistors Q650 and Q660 form a differential amplifier, with Q645 providing source current.

Quiescently, with the beam vertically deflected to within about three divisions of crt center, CR653 and CR663 are reverse biased. The voltage level at the bases of Q670 and Q675 is approximately −15 volts, as determined by Zener diode VR674.

As the beam is deflected to the bottom region of the crt display area, the output of Q650 rises above −15 volts, forward biasing CR653 (CR663 remains reverse biased). The signal from CR653 is inverted and amplified by Q670.

As the beam is deflected to the top region of the crt display area, the output of Q660 rises above −15 volts, forward biasing CR663 (CR653 is reverse biased). The signal from CR663 is inverted and amplified by Q675.

The composite correction voltage for vertical (Y) deflection is coupled from Q670 and Q675 to the Summing and Output Amplifier stage at the emitter of Q678.

Summing and Output Amplifier

Outputs from both the X and Y Focus Correction Shapers are added in the Summing and Output Amplifier stage of the Dynamic Focus circuit. The focus correction signals are coupled to common-base transistor Q678. Diode CR679 limits the output of Q678 to prevent overdriving the Output Amplifier. The Output Amplifier of this stage consisting of transistors Q680-Q685-Q690, is an inverting operational amplifier. The input signal to this amplifier is developed across R679. The feedback network for the Output Amplifier consists of C683 and R683. Emitter follower Q680 provides current amplification for Q685 and Q690, which are connected in a collector-coupled complementary amplifier configuration. Circuit protection for the complementary transistors is provided by CR685 and CR690. The composite correction signal is coupled to the Focus-Element Dc Restorer stage through R692.

Focus-Element Dc Restorer

The Focus-Element Dc Restorer couples the dc and low-frequency components of the Dynamic Focus correction signals to the crt focus element at pin 8 of V725. This allows the X and Y Focus Correction Shaper stages to control the focus element potentials. The potential difference between the Dynamic Focus output and the focus element (approximately 3000 volts) prohibits direct coupling.

The Focus-Element Dc Restorer is divided into two sections for ease of explanation. The first section can be considered a modulator at low-voltage potentials and the remaining section a demodulator at high-voltage potentials (see Fig. 6-4).

Modulator. When the secondary-winding output at T710 pin 10 (Diagram 5) swings positive, C694 charges through R673, C673, and R694 (Diagram 4) to a voltage level determined by the output level from the Summing and Output Amplifier at R692. At this voltage level (approximately 20 volts at center-screen deflection) CR692 conducts, preventing any additional increase in positive voltage across C694. When the secondary winding output swings negative, CR692 turns off. Then, CR693 conducts and clamps the negative excursion at C694 a diode drop below ground. The result is a square-wave output from the Modulator, with output amplitude determined by the difference between the Summing and Output Amplifier output level and approximately ground (see waveform 2 on Fig. 6-4). The Modulator output is coupled through C694 to the Demodulator.

Demodulator. The Demodulator rectifies the signal from the Modulator and references it to the crt focus-element level. The negative swing of waveform 3 in Fig. 6-4 is limited by CR696 to the crt focus-element level; the positive excursion is coupled through CR695 to C693. Quiescently, C693 will charge to about −3000 volts through R693. After repetitive cycles from C694, C693 will charge to the positive level of waveform 3. Capacitor C693 holds the voltage constant at the focus element, and also provides a path for the ac portions of the X and Y focus correction signal to be coupled to the crt focus element at V725-pin 8 (Diagram 5).

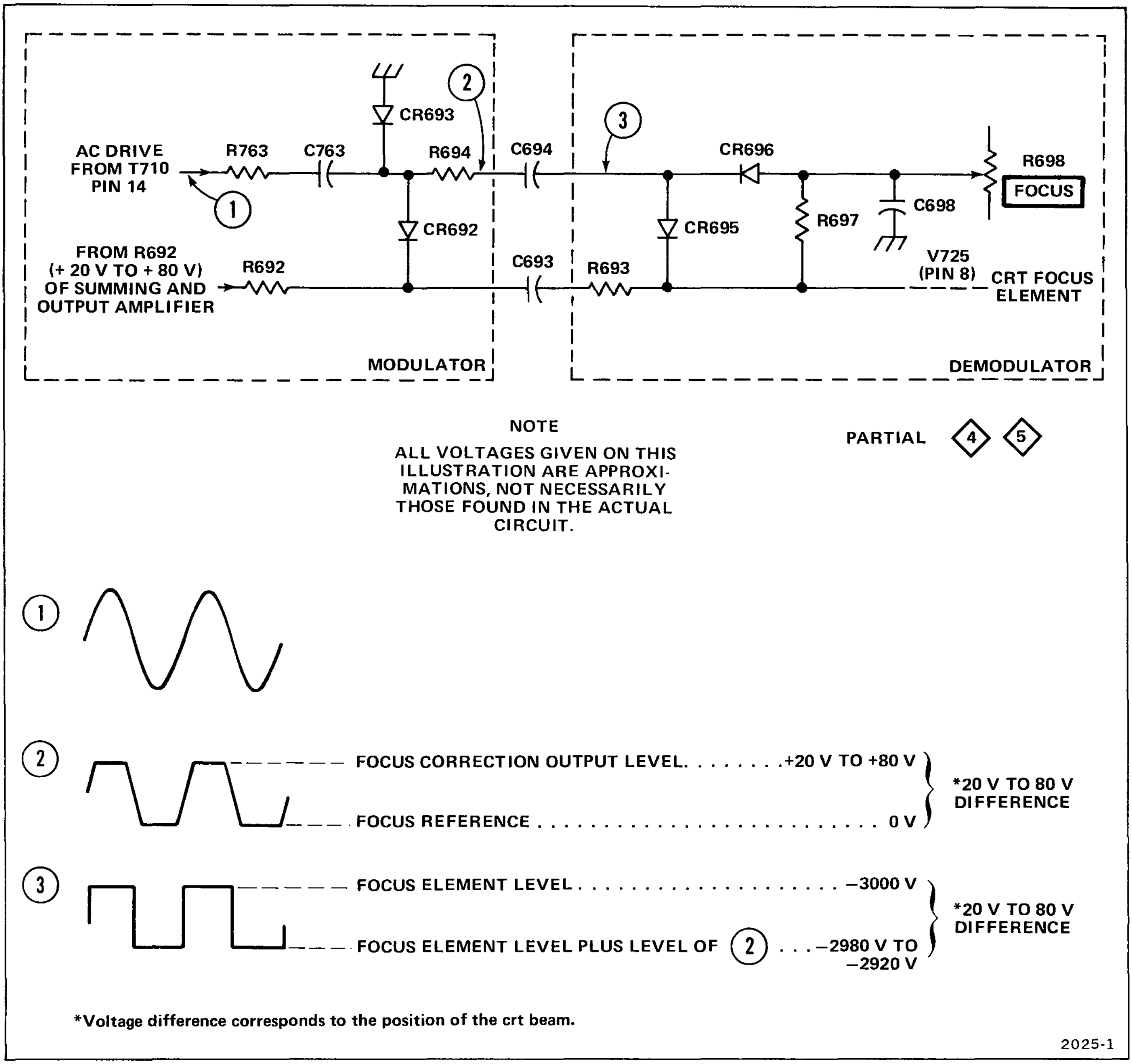


Fig. 6-4. Simplified diagram of Focus-Element Dc Restorer.

The remainder of the components not shown on the simplified diagram in Fig. 6-4 provides circuit protection in the event of a high-voltage arc or other malfunction.

Astigmatism Correction Shaper

The Astigmatism Correction Shaper varies the voltage to the crt astigmatism element (pin 6 of V725) corresponding to the horizontal position of the beam. Samples of current from the right and left circuits of the X Focus Correction Shaper (refer to discussion in this section) are taken at R615 and R625 respectively. Correction current, which is coupled through common-base amplifier Q625 and emitter-follower amplifier Q638, develops astigmatism correction voltage across R638. Gain for the Astigmatism Correction stage is set by R626.

The astigmatism correction voltage is amplified by common-base transistor Q702 (Diagram 5) and coupled to the astigmatism element at pin 6 of V725. Zener diode VR706 provides dc level shifting, and diode VR705 provides constant voltage across Astig adjustment R705.

HIGH-VOLTAGE POWER SUPPLY ⑤

The High-Voltage Power Supply provides the voltage levels and control circuits necessary for operation of the cathode-ray tube (crt). A schematic diagram of the High-Voltage Power Supply is shown on Diagram 5. A detailed block diagram, showing each major stage of this circuit, is superimposed on the schematic diagram with shaded lines. The stage names (given as sub-headings in the following discussion) can be found in the shaded boxes on Diagram 5.

Control-Grid Dc Restorer

The Control-Grid Dc Restorer couples the dc and low-frequency components of the Z-Axis Amplifier output signal to the crt control grid. This allows the Z-Axis Amplifier to control the crt beam intensity. The potential difference between the Z-Axis Amplifier output level and the crt control grid (about −5600 volts) prohibits direct coupling.

The Control-Grid Dc Restorer is actually a cathode-referenced bias supply for the crt control grid. Quiescently, its output voltage is more negative than the crt cathode by an amount determined by the Z-Axis Amplifier output level and the setting of the Grid Bias adjustment, R774. (The cutoff voltage at the crt control grid is typically about 100 volts more negative than the crt cathode level.)

NOTE

A simplified diagram of the Control-Grid Dc Restorer is shown in Fig. 6-5. The voltages given on this diagram are idealized levels and will not necessarily be the same as those found in the actual instrument.

The Control-Grid Dc Restorer is divided into two sections for ease of explanation. The first section can be considered a modulator at low-voltage potentials, and the remaining section as a demodulator at high-voltage potentials (see Fig. 6-5).

High-Voltage Oscillator

A repetitive, sinusoidal signal is produced by a regenerative feedback oscillator in the primary of T710 and induced into the secondary. Current drive for the primary winding is furnished by Q722-Q720-Q714. The conduction of the High-Voltage Oscillator transistors is controlled by the output voltage of the Error Amplifier.

Error Amplifier

The cathode supply voltage is half-wave rectified by CR764 in the secondary of T710. Then it is filtered by C764, R765, and C766, before being applied to the crt cathode.

Regulation of the cathode supply voltage is accomplished by applying a sample of the −5500 volts, from voltage divider R734A-R734B, to the positive input (pin 3) of U740. If the output level of the cathode supply goes above the normal −5500 volts (becomes more negative), the voltage at pin 3 of U740 goes negative from its quiescent zero-volt level. This results in a reduced output voltage from U740. A lower potential from the Error Amplifier reduces the conduction of the High-Voltage Oscillator, resulting in a smaller peak-to-peak amplitude of the signal in the secondary of T710 and returning the cathode supply to −5500 volts.

Current Limiter

Transistor Q725 protects Q714 if excess current is demanded from the cathode supply, due to a short circuit or similar malfunction, by limiting the maximum current drawn by the High-Voltage Oscillator.

Modulator. When the secondary-winding output of T710 (pin 14) swings positive, C778 charges through R768 and C768 to a voltage level determined by the setting of the Grid Bias adjustment, R774. At this voltage level (approximately 110 volts), CR776 conducts, preventing any additional increase in positive voltage across C778. When the secondary-winding output swings negative, CR776 turns off. Then CR769 conducts and clamps the negative excursion at C778 to the voltage level of the Z-Axis Amplifier output.

The result is a square-wave output from the Modulator; the output amplitude is determined by the difference between the Z-Axis Amplifier output level and the Grid Bias adjustment setting. (See waveform 2 on Fig. 6-5.) This square wave is coupled through C778 to the Demodulator.

Demodulator. The Demodulator rectifies the signal from the Modulator and references it to the crt cathode supply level. The positive swing of waveform 3, Fig. 6-5, is limited by CR782 to the cathode supply level; the negative excursion is coupled through CR780 to C770. Quiescently, C770 will charge to about −5500 volts through R786. After repetitive cycles from C778, C770 will charge to the negative level of waveform 3. Capacitor C770 holds the voltage constant at the crt control grid, and also provides a path for the ac portions of the Z-Axis Amplifier output signal to be coupled to the crt control grid.

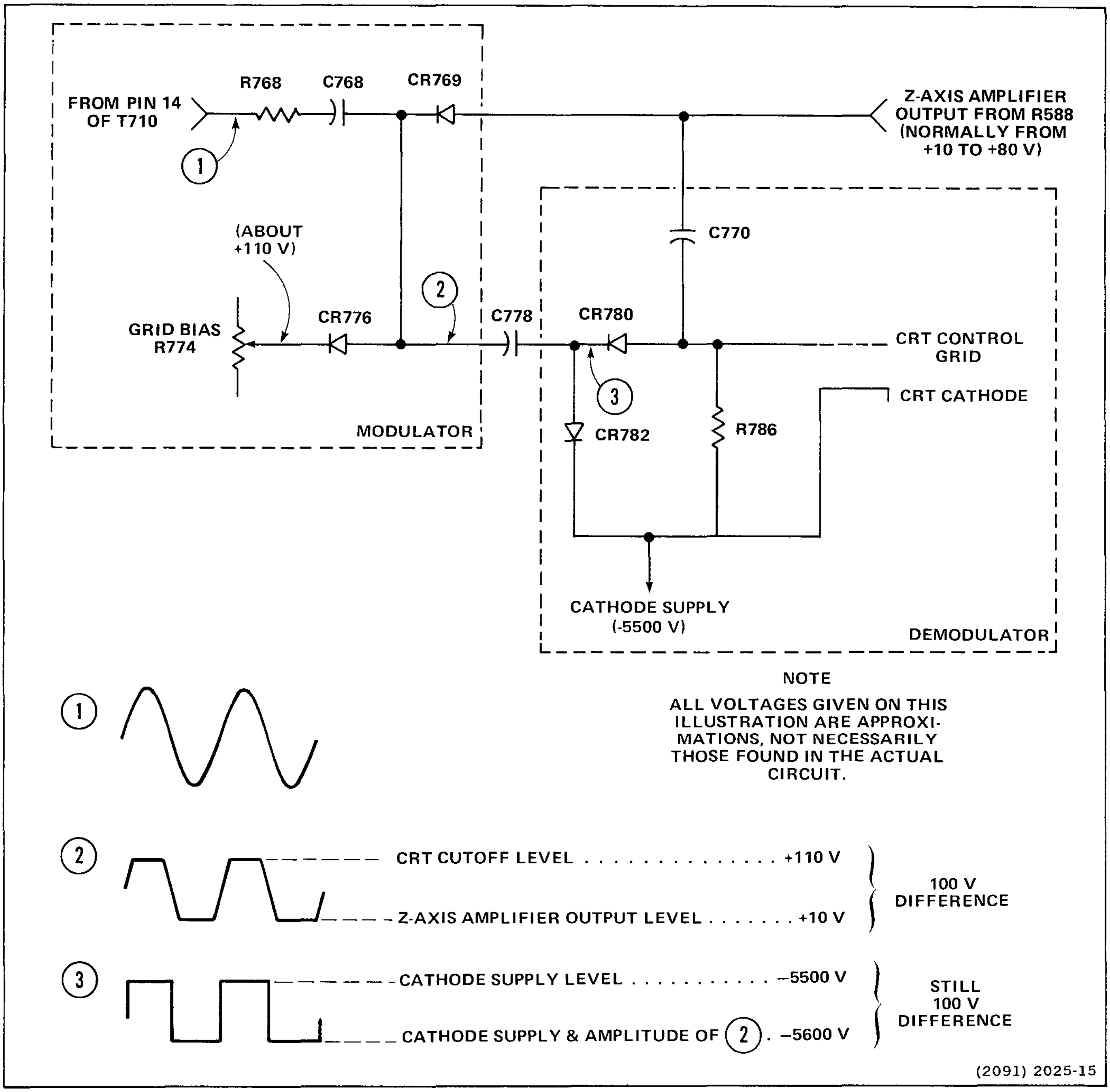


Fig. 6-5. Simplified diagram of the Control-Grid Dc Restorer.

The remainder of the components not shown on the simplified diagram in Fig. 6-5 provide circuit protection in the event of a high-voltage arc, or other malfunction.

Crt Control Circuits

The Astigmatism adjustment, R705, which is used in conjunction with the FOCUS control to provide a well-defined display, varies the positive level on the astigmatism grid of the crt. Geometry adjustment R798 varies the positive level on the geometry grid to control the over-all geometry of the display. TRACE ROTATION adjustment R750 controls the current through L725 to provide adjustment of the display alignment.

LOW-VOLTAGE POWER SUPPLY ⑥

The Low-Voltage Power Supply provides the operating power for the Monitor. Electronic regulation is used to provide stable, low-ripple output voltages. A schematic diagram of the Low-Voltage Power Supply is shown on Diagram 6 at the rear of this manual. A detailed block diagram, showing each major stage of this circuit is superimposed on the schematic with shaded lines. The stage names (given as sub-headings in the following discussion) can be found in the shaded blocks on Diagram 6.

Power Input

Power is applied to the primary of transformer T805 through fuse F800, thermal cutoff S802, POWER switch S800, and Line-Voltage Selector plug P805 or P806. The Line-Voltage Selector plugs allow changing the primary winding taps of T805 to meet different line-voltage and regulating range requirements. Line fuse F800 should be changed for each nominal line voltage (current rating of fuse for 220-volt operation must be 0.5 A slow-blowing type; for 120-volt operation the current rating of the fuse must be 1 A slow-blowing type).

Thermal cutoff S802 provides thermal protection for this instrument. If the internal temperature of the instrument exceeds a safe operating level, S802 opens to interrupt the applied power. When the temperature returns to a safe level, S802 automatically closes to re-apply the power.

+20-Volt Unregulated Supply

The +20-Volt Unregulated Supply provides unregulated power for the +15-Volt Regulated Supply and the high-voltage transformer (T710) on Diagram 5. A full-wave bridge circuit, composed of CR812-CR813-CR814-CR815, rectifies the ac voltage from the secondary of T805. Filtering is provided by C816 and C818. Fuse F856 provides circuit protection in the event of an overload.

+15-Volt Regulated Supply

The +15-Volt Regulated Supply, in addition to providing power to circuitry throughout the instrument, provides a reference-voltage source to establish the operating levels for the feedback regulators of the −30-Volt Regulated, the +270-Volt Regulated, and the High-Voltage Power Supplies. The regulator for the +15-Volt Regulated Supply is a feedback amplifier system that operates between ground and the +20-Volt Unregulated Supply. Current to the load is delivered by series-pass transistor Q840, which is located in the output side of the supply. The supply voltage is established by the drop across resistive divider network R852, R850, and R854. The feedback through this network is compared to the reference level established at the base of Q830 by the voltage drop across VR832 and the emitter-base junction of Q830. Any variation in output voltage of the supply (due to ripple, change of current through the load, etc.), is immediately transmitted to the base of Q840, the +15-volt series regulator, and nullified by a change in Q840 conduction, to maintain a steady output. The output of the supply is set to exactly +15 volts by adjustment of R850, the +15-V Adjust. This adjustment controls conduction of Q830 which sets the bias levels of Q840 through emitter-follower Q845.

Transistor Q845 protects the +15-volt series regulator (Q840) if excess current is demanded from this supply. Since the load is connected to this supply through R844, all current must flow through this resistor. When excess current is demanded from the +15-volt series regulator, due to a short circuit or similar malfunction at the output of this supply, the voltage drop across R844 increases enough to forward bias CR847 and CR846. The resulting current in these diodes takes control away from Q830, and will turn on Q845, turning off Q840 to limit the supply current to a safe level.

−30-Volt Regulated Supply

A full-wave bridge circuit, composed of CR862-CR863-CR864-CR865, rectifies the ac voltage from T805 to provide unregulated power for the −30-Volt Regulated Supply. Filtering is provided by C866. Fuse F868 provides circuit protection in the event of an overload.

The regulator for the −20-Volt Regulated Supply consists of series-pass transistor Q880 and error amplifier Q870. This is a feedback amplifier system similar to that just described for the +15-Volt Regulated Supply, except that the regulator is located in the return side of the supply instead of the output.

The center of resistive divider network R876-R877 is set by error amplifier Q870 to be zero volts, with respect to ground, during normal operation. Any variation in output from the −30-volt Regulated Supply is coupled to the error amplifier, which changes the bias of the series-pass transistor. This change in bias, and resulting change in conduction of the regulator, alters the voltage at the −30-V Return, which maintains the −30-Volt Regulated Supply at the proper level.

Transistor Q885 protects the −30-volt series regulator (Q880) if excess current is demanded from this supply. All current from this supply must flow through R884. When excess current is demanded, the voltage drop across R884 increases enough to forward bias CR888. The resulting current through this diode takes control away from Q870, and will turn on Q885, turning off Q880 to limit the supply current to a safe level.

+270-Volt Regulated Supply

A full-wave bridge circuit, composed of CR802-CR803-CR804-CR805, rectifies the ac voltage from T805 to provide unregulated power for the +270-Volt Regulated Supply. Filtering is provided by C812. Fuse F814 provides circuit protection in the event of an overload.

The regulator for the +270-Volt Regulated Supply consists of series-pass transistor Q820 and error amplifier Q825. This is a feedback amplifier system similar to that described for the −30-Volt Regulated Supply, with the feedback path through R826 to the base of error amplifier Q825.

SWEEP (OPTION 4) ⟨7⟩

The optional Sweep circuit produces a positive-going sawtooth voltage, which is amplified by the Horizontal (X) Amplifier, to provide sweep deflection in the crt. The Sweep circuit also produces an unblanking gate signal coincident with the sawtooth waveform to unblank the crt and permit display presentation. A schematic diagram of the Sweep (Option 4) circuit is shown on Diagram 7 at the rear of this manual. A detailed block diagram, showing the major stages of this circuit, is superimposed on the schematic with thick shaded lines. The stage names (given as sub-headings in the following discussion) can be found in shaded blocks on Diagram 7.

Trigger and Sweep Generator

The trigger and Sweep Generator stage produces a positive-going sawtooth voltage that is amplified by the Horizontal (X) Amplifier to provide sweep deflection in the crt. Six sweep rates are provided: 0.1 second through 1 microsecond/per division, in decade steps. A negative-going gate is produced at the same time the sawtooth is produced to unblank the crt.

The Trigger and Sweep Generator is made up of Tektronix-manufactured integrated circuit U930 and the associated discrete circuit components. Integrated circuit U930 contains the trigger generator, the sweep-gating circuit, and an operational amplifier to form the basis of a Miller integrator. Power is applied to pins 7 and 12 to establish the operating levels within the device. An internal reference Zener diode provides 6.4 volts between pins 8 and 9 for operation of external controls; pin 8 provides a level of two diode junctions above the negative level at pin 12.

The timing components are selected by switch S930 (SEC/DIV), which permits one of six nominal sweep rates to be chosen. Potentiometer R945 (VARIABLE) varies the timing current for a continuously variable sweep rate.

Pins 10, 11, 13, and 14 are associated with the Trigger Generator portion of U930. The triggering signal is applied to a field-effect transistor input at pin 13. Potentiometer R918 (TRIG SLOPE/LEVEL) at pin 14 controls the internal comparators that determine the level and slope at which the internal Schmitt multivibrator switches states, initiating a sweep trigger. Differentiating capacitor C912 at pin 11 determines the trigger-pulse width.

For normal triggered operation, −8.2 volts is applied to pin 10 to hold the bright-baseline auto circuit inactive. In this mode, when the triggering signal is lost, a sweep cannot be produced. When internal switch S909 (Trig Mode) is set to Auto, the −8.2 volts is disconnected to permit a free-running sweep, or bright baseline, to be produced. Pin 10 moves positive as C910 charges, and this positive potential replaces the incoming triggering signal. A new sweep will be initiated immediately following the sweep hold-off time. However, with S909 (Trig Mode) in the Auto position, any incoming triggering signal will discharge C910. If the signal is occurring at a rate greater than about 20 Hz, C910 will be held below the auto-trigger level to permit a triggered sweep to be produced.

Pins 1 through 6, and 16, are associated with the Sweep Generator portion of U930. Upon receipt of a trigger from the Trigger Generator, the sweep gate turns on. While the gate is on, CR930 is turned off by a high logic level at pin 2, allowing the current through external R_t components R930 and R946 to be switched to timing capacitors C930 and C938. Pin 5 is the operational amplifier null point, thus the nearly constant timing current charges the capacitors linearly, producing a linear, negative-going sawtooth voltage at pin 4. When the sawtooth reaches a level determined by R915 (Swp Length), the sweep terminates. At this point, the sweep gate turns off, turning on CR930 and quickly discharging the timing capacitors. A short-duration trigger-lockout period (to allow the sweep generator to reset and stabilize), is provided by C924 and C925 at pin 3.

Sawtooth Amplifier

Operational amplifier system Q960 and Q964 provides amplification of the sweep sawtooth to an amplitude suitable to meet the sensitivity requirements of the Horizontal (X) Amplifier. Potentiometer R965 (Swp Cal) permits calibrating the sweep to the crt graticule. The base of Q960 is the null point, R950 is the R_{in} element, and R955 is the feedback element. A positive-going sawtooth is produced at the emitter of Q964.

Unblanking-Gate Output Amplifier

The negative-going gate produced at pin 16 of U930 is amplified by Q975 and Q978. The negative-going gate produced at the collector of Q978 is applied to R554 in the Z-Axis Amplifier circuit to turn on the crt during the sweep.

MAINTENANCE

This section of the manual contains information for performing preventive maintenance, troubleshooting, and corrective maintenance for the 606A Monitor.

PREVENTIVE MAINTENANCE

Preventive maintenance, when performed on a regular basis, can prevent instrument breakdown and may improve the reliability of the instrument. The severity of the environment to which the instrument is subjected will determine the frequency of maintenance. A convenient time to perform preventive maintenance is preceding electrical adjustment of the instrument.

CABINET PANEL REMOVAL (Options 6, 23, or 28)

WARNING

Disconnect power to the instrument before removing the cabinet panels to avoid electric-shock hazard.

The cabinet panels are held in place by slotted fasteners. To remove the panels, turn each fastener counterclockwise a quarter turn with a large screwdriver. Lift the panels away. Always operate the instrument with the panels in place to protect the interior from dust.

CLEANING

The 606A Monitor should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause overheating and component breakdown. Dirt on components acts as an insulating blanket and prevents efficient heat dissipation. It also provides an electrical conduction path which may result in instrument failure. The cabinet panels provide protection against dust in the interior of the instrument.

CAUTION

Avoid the use of chemical cleaning agents which might damage the plastics used in the instrument. Use a non-residue type of cleaner, preferably isopropyl alcohol, total denatured ethyl alcohol, or TP35. Before using any other type of cleaner, consult your Tektronix Service Center.

Exterior

Loose dust accumulated on the outside of the instrument can be removed with a soft cloth or small brush. The brush is particularly useful for dislodging dirt on and around the front-panel controls. Dirt which remains can be removed with a soft cloth dampened in a mild detergent and water solution. Abrasive cleaners should not be used.

Cathode-Ray Tube (CRT)

Clean the crt faceplate with a soft, lint-free cloth dampened with denatured alcohol.

Interior

Cleaning the interior of the instrument should only be occasionally necessary. The best way to clean the interior is to blow off the accumulated dust with dry, low-velocity air (approximately 5 lb/in^2). Remove any dirt which remains with a soft brush or a cloth dampened with a mild detergent and water solution. A cotton-tipped applicator is useful for cleaning in narrow spaces, or for cleaning more delicate circuit components.

CAUTION

Circuit boards and components must be dry before applying power to the instrument to prevent damage from electrical arcing.

The high-voltage circuits should receive special attention. Excessive dirt in this area may cause high-voltage arcing and result in improper instrument operation.

VISUAL INSPECTION

The 606A Monitor should be inspected occasionally for such defects as broken connections, improperly seated semiconductors, damaged or improperly installed circuit boards, and heat-damaged parts. The corrective procedure for most visible defects is obvious; however, particular care must be taken if heat-damaged parts are found. Overheating usually indicates other trouble in the instrument; therefore, it is important that the cause of overheating be corrected to prevent recurrence of the damage.

SEMICONDUCTOR CHECKS

Periodic checks of semiconductors are not recommended. The best check of semiconductor performance is actual operation in the instrument. More details on semiconductors are given under Troubleshooting later in this section.

PERIODIC ELECTRICAL ADJUSTMENT

To ensure accurate measurements, check the electrical adjustment of this instrument after each 1000 hours of operation, or every six months if used infrequently. In addition, replacement of components may necessitate adjustment of the affected circuits. Complete adjustment instructions are given in Section 4, Performance Check and Adjustment. This procedure can be helpful in localizing certain troubles in the instrument, and in some cases, may correct them.

TROUBLESHOOTING

The following information is provided to facilitate troubleshooting of the 606A Monitor. Information contained in other sections of this manual should be used in conjunction with the following data to aid in locating a defective component. An understanding of the circuit operation is helpful in locating troubles. See Section 6, Theory of Operation, for this information.

TROUBLESHOOTING AIDS

Diagrams

Complete schematic diagrams are given on the foldout pages in Section 10, Diagrams and Circuit Board Illustrations. The component number and electrical value of each component in this instrument are shown on these diagrams. Values that have been selected for optimum circuit performance are noted "SEL" rather than the value. See the Replaceable Electrical Parts list for these values. (See the first page of the Diagrams and Circuit Board Illustrations section for definitions of the reference designators and symbols used to identify components in this instrument.) Important voltages and numbered waveform test points are shown on the diagrams. Important waveforms, and the numbered test points where they were obtained, are located adjacent to each diagram. The portions of circuits mounted on circuit boards are enclosed with heavy, solid black lines. Each schematic diagram is divided into functional blocks, as indicated by the wide shaded lines. These functional blocks are described in detail in Section 6, Theory of Operation.

Circuit Board Illustrations

To aid in locating circuit boards, a circuit-board location illustration appears on the back of the foldout page facing each schematic diagram. In addition, an illustration of the circuit board is included here, with the physical location of the components and waveform test points that appear on the schematic diagram identified. Each circuit board illustration is arranged in a grid locator with an index to facilitate rapid location of components contained in the schematic diagrams.

Troubleshooting Chart

A troubleshooting chart is given in Section 10, Diagrams and Circuit Board Illustrations, to aid in locating a defective circuit. The shaded blocks on the Troubleshooting Chart indicate circuit(s) that may cause the indicated malfunction. The circuits listed are discussed in detail in Section 6, Theory of Operation.

Adjustment and Test Point Locations

To aid in locating test points and adjustable components called out in the Performance Check and Adjustment procedure, an Adjustment and Test Point Locations foldout page is provided in Section 10, Diagrams and Circuit Board Illustrations.

Component Color Coding

The instrument contains brown composition resistors, some metal-film resistors, and some wire-wound resistors. The resistance values of wire-wound resistors are usually printed on the component body. The resistance values of composition resistors and metal-film resistors are color coded on the components using the EIA color code (some metal-film resistors may have the value printed on the body). The color code is read starting with the stripe nearest the end of the resistor. Composition resistors have four stripes, which consist of two significant figures, a multiplier, and a tolerance value (see Fig. 7-1). Metal-film resistors have five stripes consisting of three significant figures, a multiplier, and a tolerance value.

COLOR CODE

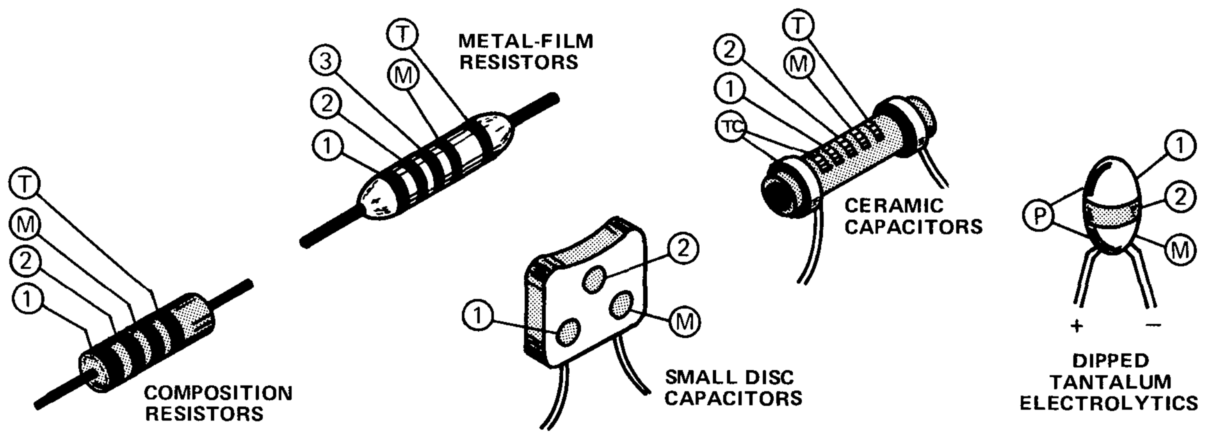
1 2 AND 3 - 1st, 2nd, AND 3rd SIGNIFICANT FIGS.

M - MULTIPLIER; T - TOLERANCE;

TC - TEMPERATURE COEFFICIENT.

T AND/OR TC COLOR CODE MAY NOT BE PRESENT ON SOME CAPACITORS;

P - POSITIVE (+) POLARITY AND VOLTAGE RATING.



COLOR	SIGNIFICANT FIGURES	RESISTORS		CAPACITORS			DIPPED TANTALUM VOLTAGE RATING
		MULTIPLIER (OHMS)	TOLERANCE	MULTIPLIER (pF)	TOLERANCE		
					OVER 10pF	UNDER 10 pF	
BLACK	0	1	---	1	±20%	± 2pF	4VDC
BROWN	1	10	±1%	10	±1%	±0.1pF	6VDC
RED	2	10^2 or 100	±2%	10^2 or 100	±2%	---	10VDC
ORANGE	3	10^3 or 1 K	±3%	10^3 or 1000	±3%	---	15VDC
YELLOW	4	10^4 or 10K	±4%	10^4 or 10,000	+100% −0%	---	20VDC
GREEN	5	10^5 or 100 K	±1/2%	10^5 or 100,000	±5%	±0.5pF	25VDC
BLUE	6	10^6 or 1 M	±1/4%	10^6 or 1,000,000	---	---	35VDC
VIOLET	7	---	±1/10%	10^7 or 10,000,000	---	---	50VDC
GRAY	8	---	---	10^{-2} or 0.01	+80% −20%	±0.25pF	---
WHITE	9	---	---	10^{-1} or 0.1	±10%	±1pF	3VDC
GOLD	---	10^{-1} or 0.1	±5%	---	---	---	---
SILVER	---	10^{-2} or 0.01	±10%	---	---	---	---
NONE	---	---	±20%	---	±10%	±1pF	---

(1862-74) 1866-57

Fig. 7-1. Color code for resistors and capacitors.

The values of common disc capacitors and small electrolytics are marked on the side of the component body. The white ceramic and epoxy-coated tantalum capacitors used in the instrument are color coded using a modified EIA code (see Fig. 7-1).

The cathode end of glass-encased diodes is indicated by a stripe, a series of stripes, or a dot. The cathode and anode ends of metal-encased diodes can be identified by the diode symbol marked on the body.

Cam-Switch Contact Identification

Cam switches shown on the diagrams are coded to indicate the position of the contact in the complete switch assembly counting from the front, or knob end of the switch, toward the rear. The contact closure chart on the diagrams indicates when each contact is closed.

Semiconductor Lead Configurations

Figure 7-2 shows the lead configurations of the semiconductors in the 606A Monitor.

Multi-Connector Holders

The multi-connector holders are keyed either with two triangles, one on the holder and one on the circuit board, or with one triangle on the holder and a dot on the circuit board. When a connection is made perpendicular to a circuit board surface, the orientation of the triangle on the end-lead multi-pin connector holder is determined by the placement of the multi-pin connector index (see Fig. 7-3).

Troubleshooting Equipment

The following equipment, in addition to that listed in the Performance Check and Adjustment section, is useful for troubleshooting the 606A Monitor:

Semiconductor Tester.

Description: Dynamic-type tester.

Purpose: To test the semiconductors used in this instrument.

Recommended type: TEKTRONIX Type 576 or equivalent.

Multimeter.

Description: 10 MΩ input impedance and 0 to 300 volts range, ac and dc; ohmmeter, 0 to 50 MΩ. Accuracy, within 3%. Test probes must be insulated to prevent accidental shorting.

Purpose: To check voltages and for general troubleshooting.

Test Oscilloscope.

Description: Frequency response, dc to 10 MHz minimum; deflection factor, 1 mV/div to 5 V/div. A 10X, 10 MΩ voltage probe should be used to reduce circuit loading for voltage measurements.

Purpose: To check operating waveforms.

Recommended type: TEKTRONIX 5440 Oscilloscope with 5A45 Amplifier, 5B40 Time Base, and P6105 1-meter probe; or, TEKTRONIX 7603 Oscilloscope with 7A15A Amplifier, 7B50A Time Base, and P6053B 3.5-foot probe.

TROUBLESHOOTING TECHNIQUES

This troubleshooting procedure is arranged in an order that checks the simple trouble possibilities before proceeding with extensive troubleshooting. The first few checks assure proper connection, operation, and adjustment. If the trouble is not located by these checks, the remaining steps aid in locating the defective component. When the defective component is located, replace it using the replacement procedure given under Component Replacement in this section.

1. Check Control Settings

Incorrect control settings can indicate a trouble that does not exist. If there is any question about the correct function or operation of any control on the 606A, refer to Section 2, Operating Instructions.

2. Check Associated Equipment

Before proceeding with troubleshooting, check that the equipment used with this instrument is operating correctly. Also, check that the input signals are properly connected and that the interconnecting cables are not defective. Check the line-voltage source.

WARNING

Although this Monitor is not to be connected directly to a patient, interconnecting this Monitor to other equipment can result in the application of excessive current to a patient. It is extremely important that the interconnection is made in accordance with NFPA 76B-T, Tentative Standard for the Safe Use of Electricity in Patient Care Facilities, section 3038, "Signal Transmission Between Appliances".

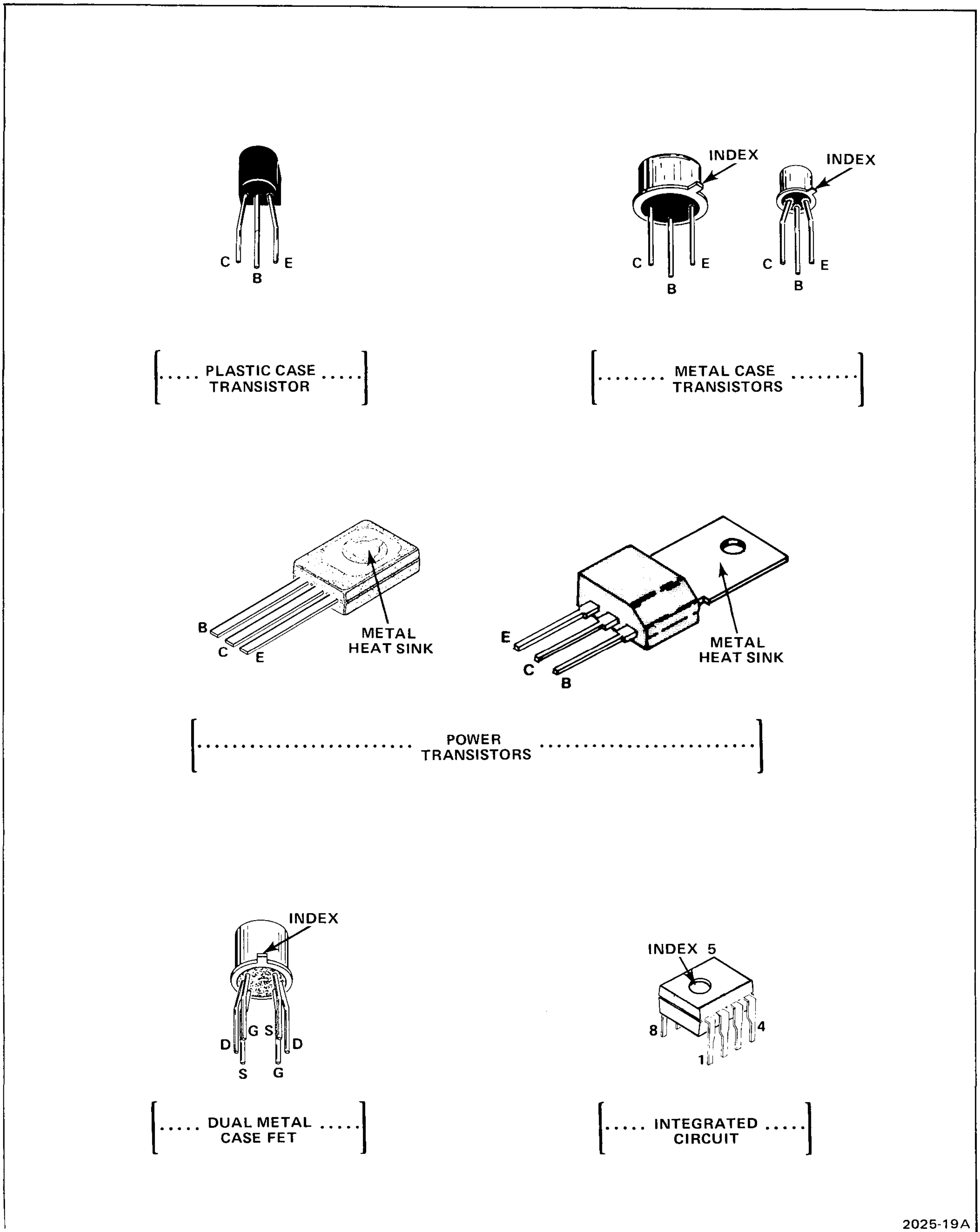


Fig. 7-2. Semiconductor lead configurations.

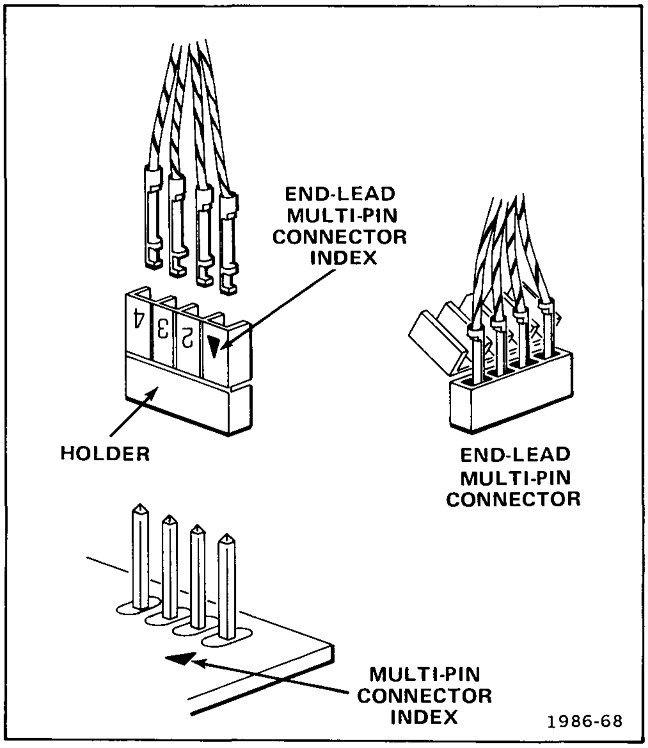


Fig. 7-3. Orientation of multi-connector holders.

3. Visual Check

Visually check that portion of the instrument in which the trouble is located. Many troubles can be found by visible indications, such as unsoldered connections, broken wires, damaged circuit boards, and damaged components.

4. Check Instrument Adjustment

Check the electrical adjustment of this instrument, or of the affected circuit if the trouble appears in one circuit. The apparent trouble may only be a result of misadjustment. Complete adjustment instructions are given in Section 4, Performance Check and Adjustment.

5. Isolate Trouble to a Circuit

To isolate trouble to a particular circuit, note the trouble symptom. The symptom often identifies the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, check the affected circuits by taking voltage and waveform readings.

Incorrect operation of all circuits often indicates trouble in the power supplies. Check first for the correct output voltage of the individual supplies. A defective component elsewhere in the instrument can appear as a power supply trouble (for example, a shorted decoupling capacitor on one of the circuit boards), and may also affect the operation of other circuits. Table 7-1 lists the output voltage range and typical ripple of the power supplies in the instrument. These voltages are measured between the power-supply test points and ground (see the Adjustment and Test Point Locations foldout page in Section 10, Diagrams and Circuit Board Illustrations, for test point locations). If the power-supply voltage and ripple is within the listed range, the supply can be assumed to be working correctly. If outside the range, the supply may be misadjusted or operating incorrectly. Use the procedure given in Section 4, Performance Check and Adjustment, to adjust the power supplies.

Figure 10-10 in Section 10, Diagrams and Circuit Board Illustrations, provides a guide for locating a defective circuit. Start at the top left of the Troubleshooting Chart and perform the checks given across the top of the chart until the indicated results are **not** found. Then proceed to further checks, or the circuit in which the trouble is suspected, as listed underneath the step. The shaded blocks on the Troubleshooting Chart indicate the circuit(s) that may cause the malfunction. The circuits listed are discussed in detail in Section 6, Theory of Operation. After the defective circuit has been located, proceed with steps 6 and 7 of the Troubleshooting Techniques to isolate the defective component.

6. Check Voltages and Waveforms

Often, the defective component can be located by checking for the correct voltages or waveforms in the circuit. Typical voltages and waveforms are given in Section 10, Diagrams and Circuit Board Illustrations.

Table 7-1

POWER-SUPPLY OUTPUT VOLTAGES

Power Supply	Test Point	Output Voltage Range	Typical Ripple (peak-to-peak)
−30 V	−30	−29.1 V to −30.9 V	2 mV or less
+15 V (Adjustable)	+15	+14.85 V to +15.15 V	2 mV or less
+30 V	+30	+27 V to +33 V	1 V or less
+120 V	+120	+108 V to +132 V	2 V or less
+270 V	+270	+262 V to +278 V	200 mV or less

NOTE

Voltages and waveforms given in Section 10, Diagrams and Circuit Board Illustrations, are not absolute and may vary slightly between 606A Monitors. To obtain operating conditions similar to those used to take these readings, see the appropriate schematic under the heading "Voltage and Waveform Conditions".

7. Check Individual Components

The following procedures describe methods of checking individual components in the 606A Monitor. Components which are soldered in place are best checked by first disconnecting one end. This isolates the measurement from the effects of surrounding circuitry.

WARNING

Always disconnect the Monitor from the power source before replacing components to avoid electric-shock hazard.

Fuses. Check for open fuses by checking continuity with an ohmmeter. The location and rating of power-supply fuses is shown in Fig. 7-4.

Transistors. A good check of transistor operation is actual performance under operating conditions. A transistor can most effectively be checked by substituting a new component for it (or one which has been checked previously). However, be sure that circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic tester. Static-type testers are not recommended, since they do not check operation under simulated operating conditions.

Integrated Circuits. Integrated circuits can be checked with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of the circuit operation is essential to troubleshooting circuits using integrated circuits. In addition, operating waveforms, logic levels, and other operating information for the integrated circuits are given in Section 6, Theory of Operation and Section 10, Diagrams and Circuit Board Illustrations. Use care when checking voltages and waveforms around the integrated circuits so that adjacent leads are not shorted together. A convenient means of clipping a test probe to the in-line multi-pin integrated circuits is with an integrated-circuit test clip. This device also doubles as an integrated-circuit extraction tool. Special IC test tips are also available for most probes (see your Tektronix Products catalog for further information about probe tips).

Diodes. A diode can be checked for an open or shorted condition by measuring the resistance between terminals with an ohmmeter scale having a low internal source current, such as the R X 1 K scale. The resistance should be very high in one direction and very low when the meter leads are reversed.

CAUTION

When checking diodes, do not use an ohmmeter scale that has a high internal current, since high currents may damage the diodes under test.

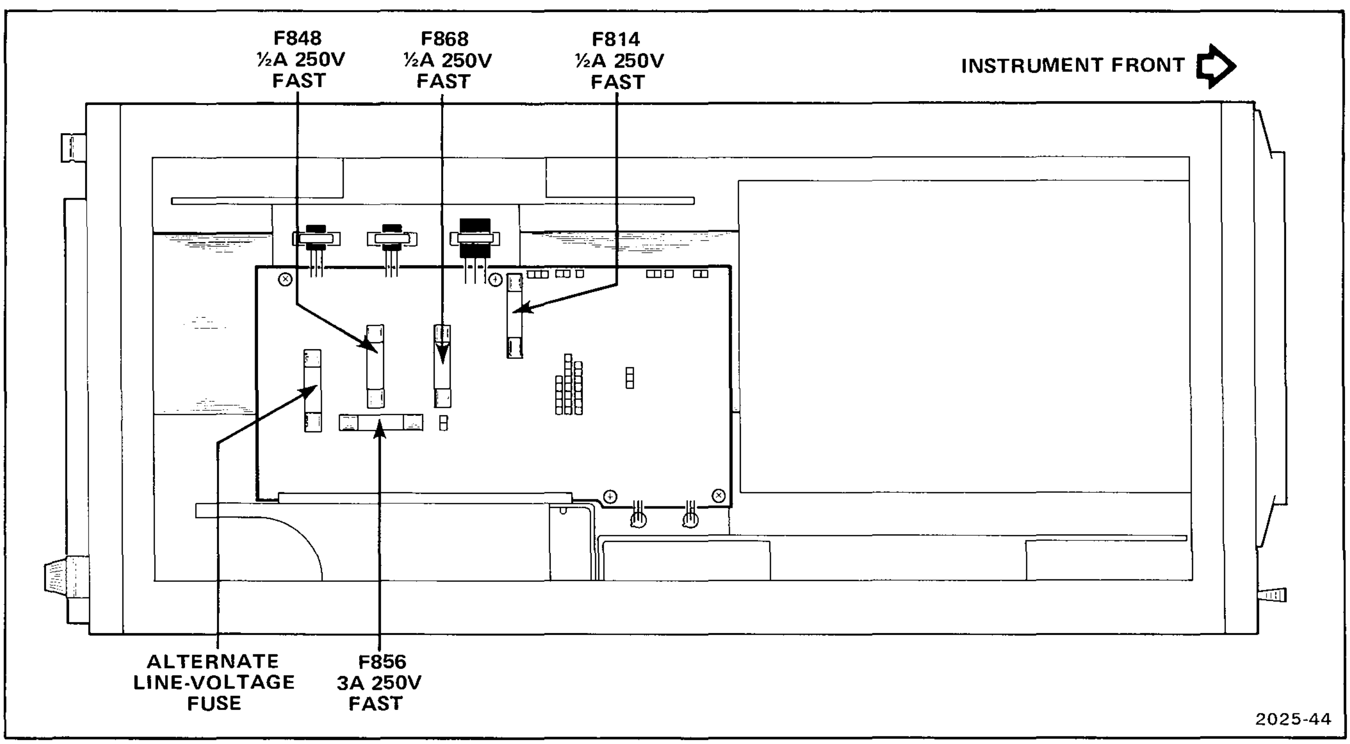


Fig. 7-4. Location and rating of power-supply fuses.

Resistors. Check the resistors with an ohmmeter. Resistor tolerance is given in Section 9, Replaceable Electrical Parts. Normally, resistors do not need to be replaced unless the measured value varies widely from the specified value.

Capacitors. A leaky or shorted capacitor can best be detected by checking resistance with an ohmmeter on the highest scale. Do not exceed the voltage rating of the capacitor. The resistance reading should be high after initial charge of the capacitor. An open capacitor can best be detected with a capacitance meter or by checking if the capacitor passes ac signals.

8. Repair and Readjust the Circuit

If any defective parts are located, follow the replacement procedures given under Component Replacement in this section. Check the performance of any circuit that has been repaired or that has had any electrical components replaced. Adjustment of the circuit may be necessary.

CORRECTIVE MAINTENANCE

Corrective maintenance consists of component replacement and instrument repair. Special techniques required to replace components in the 606A Monitor are given here.

OBTAINING REPLACEMENT PARTS

Standard Parts

All electrical and mechanical part replacements can be obtained through your local Tektronix Field Office or representative. However, many of the standard electronic components can be obtained locally in less time than is required to order them from Tektronix, Inc. Before ordering or purchasing replacement parts, check the parts list for value, tolerance, rating, and description.

NOTE

When selecting replacement parts, remember that the physical size and shape of a component may affect its performance in the instrument. All replacement parts should be direct replacements unless you know that a different component will not adversely affect instrument performance.

Special Parts

Some components of the 606A are manufactured or selected by Tektronix, Inc. to meet specific performance requirements. Most of the mechanical parts used in this instrument have been manufactured by Tektronix, Inc. Order all special parts directly from your local Tektronix Field Office or representative.

Ordering Parts

When ordering replacement parts from Tektronix, Inc., include the following information:

1. Instrument type.
2. Instrument serial number.
3. A description of the part (if electrical, include the circuit number; for example, VR239).
4. Tektronix part number.

SOLDERING TECHNIQUES

WARNING

To avoid electric-shock hazard, disconnect the Monitor from the power source before soldering.

The reliability and accuracy of this instrument can be maintained only if proper soldering techniques are used when repairing or replacing parts. General soldering techniques which apply to maintenance of any precision electronic equipment should be used when working on this instrument. Use only 60/40 rosin-core, electronic-grade solder.

The choice of soldering iron is determined by the repair to be made. When soldering on circuit boards or small wiring, use only a 15-watt, pencil-type soldering iron. A higher-wattage soldering iron can cause the etched-circuit wiring to separate from the board base material and melt the insulation from small wiring. Always keep the soldering-iron tip properly tinned to ensure the best heat transfer to the solder joint. Apply only enough heat to remove the component or to make a good solder joint.

To protect heat-sensitive components, hold the component lead with a pair of long-nose pliers between the component body and the solder joint (see Fig. 7-5). Use a solder-removing wick to remove excess solder from connections or to clean circuit-board pads.

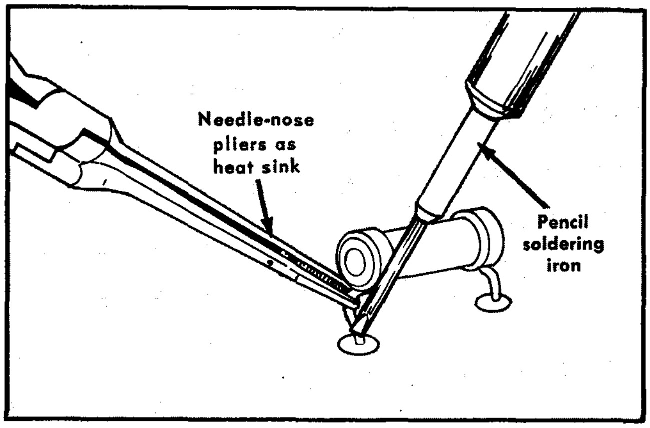


Fig. 7-5. Use of a heat sink to protect components during soldering.

The following technique should be used to replace a component on any of the circuit boards in this instrument. Most components can be replaced without removing the board(s) from the instrument.

1. Touch the soldering iron tip to the lead at the solder connection. Never place the iron directly on the board, as this may damage the board.

2. Melt a small amount of solder onto the component lead connection. This replaces the flux, which may have been removed during instrument cleaning, and facilitates removal of the component.

3. Grip the component lead with a pair of long-nose pliers. When the solder begins to flow, gently pull the component lead from the board. If unable to separate the lead from the board, try removing the other end of the component.

NOTE

Some components are difficult to remove from the circuit boards due to a bend placed in each lead during machine insertion of the component. The purpose of the bent leads is to hold the component in position during a flow-solder manufacturing process which solders all components at once. To make removal of machine-inserted components easier, straighten the leads of the component on the back of the circuit board using a small screwdriver or pliers while heating the soldered connection.

4. Bend the leads of the replacement component to fit the holes in the circuit board. If the component is replaced while the board is mounted in the instrument, cut the leads so they will just protrude through the board. Insert the leads into the holes in the board so that the component is firmly seated against the board, or as originally positioned.

5. Touch the iron tip to the connection and apply enough solder to make a firm solder joint.

6. Cut off any excess lead protruding through the board (if not clipped in step 4).

7. Clean the area around the solder connection with a flux-removing solvent. Be careful not to remove information printed on the circuit board.

COMPONENT REMOVAL AND REPLACEMENT

WARNING

Always disconnect the Monitor from the power source before replacing components to avoid potential electric-shock hazard.

The exploded-view drawings associated with the Replaceable Mechanical Parts list (located at the rear of this manual) may be helpful in the removal or disassembly of individual components or sub-assemblies.

Circuit Boards

If a circuit board is damaged beyond repair, the entire assembly, including all soldered-on components, can be replaced. Part numbers for the completely-wired boards are given in Section 9, Replaceable Electrical Parts.

All of the circuit boards in this instrument are mounted on the chassis. Use the following procedures to remove and replace the individual circuit boards.

Deflection Amplifier Board—A1. Remove and replace the Deflection Amplifier board as follows (see Fig. 7-6):

1. Remove the four screws securing the insulated heat-sink holding bars to the chassis.

NOTE

When removing wires from a circuit board, always tag the wire and the corresponding connection point on the circuit board.

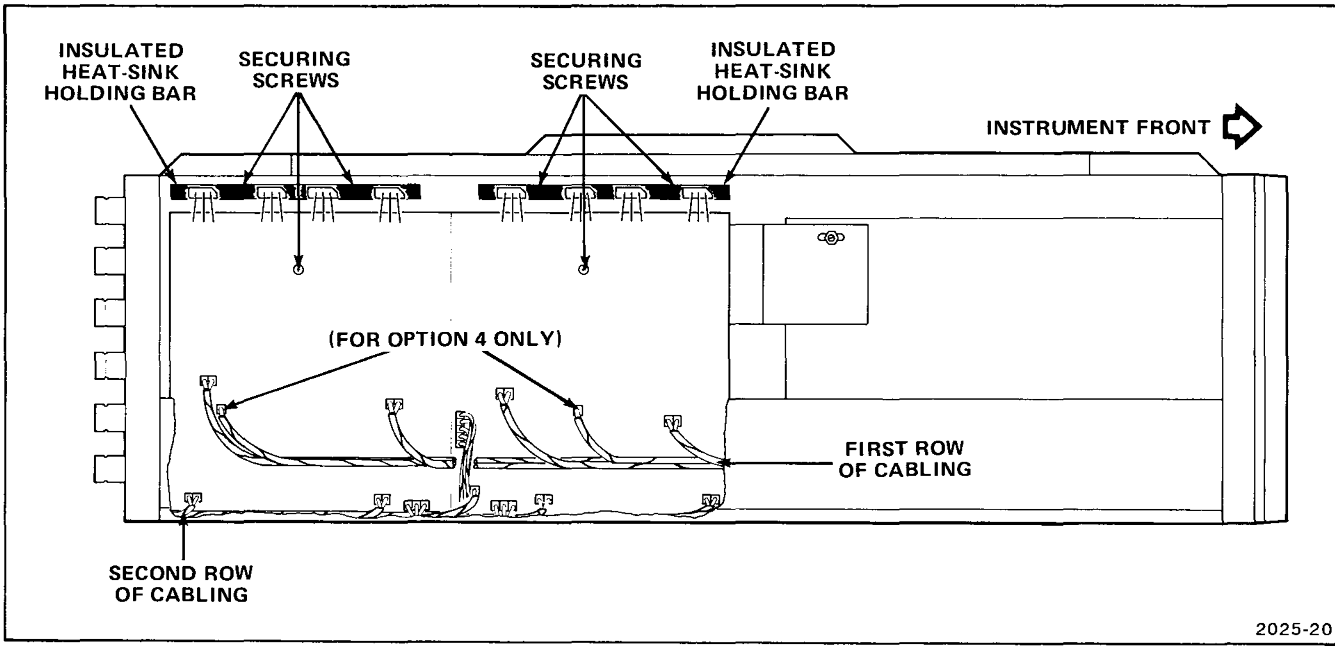


Fig. 7-6. A1—Deflection Amplifier board removal and replacement.

2. Disconnect the first row of cabling connected to the component side of the circuit board.

3. Remove the two screws holding the board to the chassis.

4. Disconnect the deflection leads from the crt neck pins.

5. Lift the circuit board up from the chassis.

6. Disconnect the second row of cabling connected to the board.

7. Remove any obstructions which would prevent the board from being lifted out of the instrument.

8. Lift the circuit board up and out of the instrument. Do not force or bend the board.

9. To replace the board, reverse the order of removal.

Control Interface and Dynamic Focus Board—A2. Remove and replace the Control Interface and Dynamic Focus board as follows:

NOTE

For Option 4 instruments (internal sweep), the Sweep board (A5) must be removed before removing the Control Interface and Dynamic Focus board (A2).

1. Remove the protective cover from the board.

NOTE

When removing wires from a circuit board, always tag the wire and the corresponding connection point on the circuit board.

2. Disconnect all wires connected to the component side of the board.

3. Remove the six screws holding the board to the chassis.

4. Slide the board toward the rear of the instrument to free the front-panel controls.

5. Lift the board out of the instrument. Do not force or bend the board.

6. To replace the board, reverse the order of removal.

High-Voltage Power Supply Board—A3. Remove and replace the High-Voltage Power Supply board as follows:

1. Remove the two screws holding the protective shield to the chassis.

2. Remove the protective shield from the instrument to gain access to the circuit board.

NOTE

When removing wires from a circuit board, always tag the wire and the corresponding connection point on the circuit board.

3. Disconnect all solderless wire holders from the circuit board.

4. Remove the three screws holding the board to the chassis.

5. Gently lift the board up to the level of the chassis rail.

6. Unsolder all attached wires to free the board. (See Soldering Techniques in this section.)

7. Remove any obstructions which would prevent the board from being lifted completely out of the instrument.

8. Lift the circuit board out of the instrument. Do not force or bend the board.

9. Disconnect the soldered wire connections from the back of the circuit board.

10. To replace the board, reverse the order of removal.

Low-Voltage Power Supply and Z-Axis Board—A4. Remove and replace the Low-Voltage Power Supply and Z-Axis board as follows (see Fig. 7-7):

NOTE

When removing wires from a circuit board, always tag the wire and the corresponding point on the circuit board.

1. Disconnect all wires connected to the component side of the board.

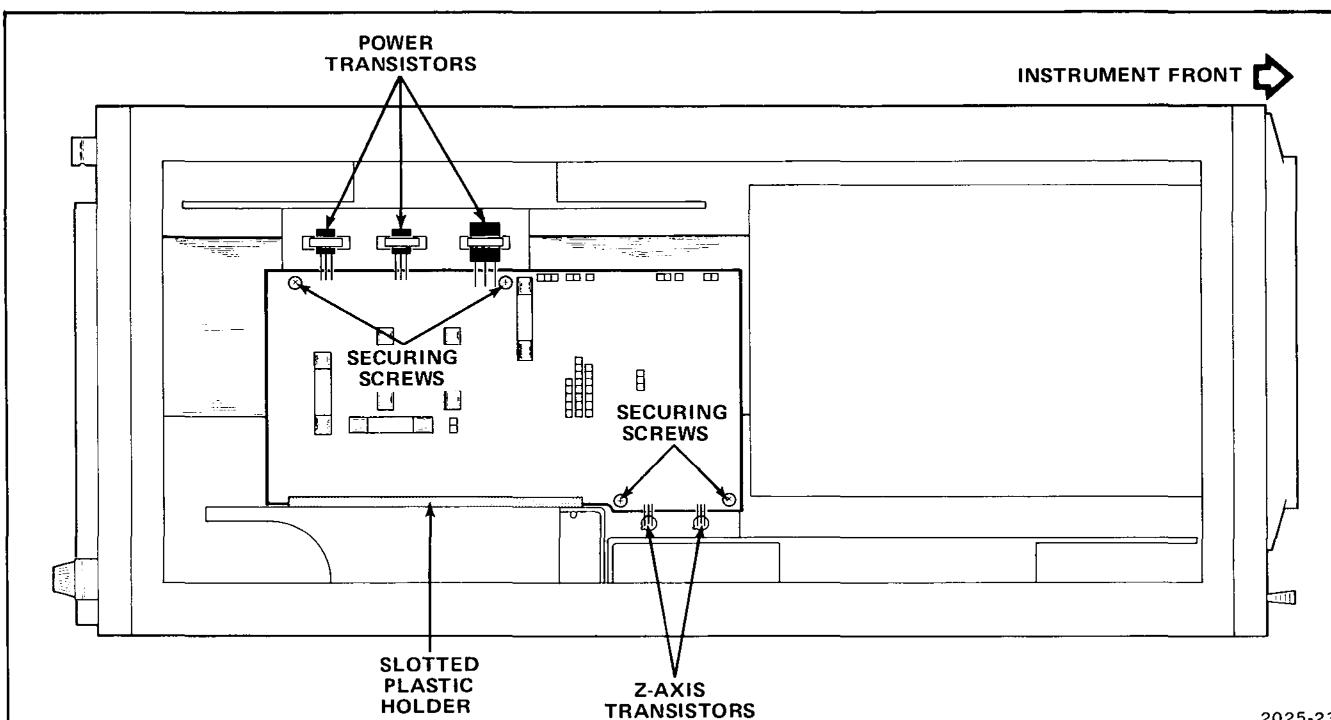


Fig. 7-7. A4—Low-Voltage Power Supply and Z-Axis board removal and replacement.

2. Using a small screwdriver, remove the spring-clips securing the power transistors to the chassis.

3. Unsolder the Z-Axis transistor leads from the circuit board.

4. Remove the four screws holding the board to the chassis.

5. Slide the board toward the power transistors to free it from the slotted plastic holder.

6. Gently pull the board from the instrument, freeing the large capacitors on the back of the board from their plastic holders. Do not force or bend the board.

7. Disconnect the soldered-wire connections from the back of the circuit board.

8. To replace the board, reverse the order of removal.

Sweep Board—A5 (Option 4 only). Remove and replace the optional Sweep board as follows:

NOTE

When removing wires from a circuit board, always tag the wire and the corresponding connection point on the circuit board.

1. Disconnect all wires connected to the component side of the circuit board.

2. Remove the four screws holding the board to the chassis.

3. Slide the board toward the rear of the instrument to free the front-panel controls.

4. Lift the board out of the instrument. Do not force or bend the circuit board.

5. To replace the board, reverse the order of removal.

Semiconductors

Semiconductors should not be replaced unless actually defective. If removed from their sockets during routine maintenance, return them to their original sockets. Unnecessary replacement of semiconductors may affect the adjustment of the instrument. When semiconductors are replaced, check the operation of circuits which may be affected.

WARNING

Always disconnect the Monitor from the power source before replacing components to avoid potential electrical-shock hazard. This is particularly true for the horizontal (X) and vertical (Y) amplifier output transistors, whose heat sinks may be elevated to as much as 250 volts.

Replacement semiconductors should be of the original type or a direct replacement. Lead configurations of the semiconductors used in this instrument are shown in Fig. 7-2. Some plastic-case transistors have lead configurations that do not agree with those shown.

If a replacement transistor is made by a different manufacturer than the original, check the manufacturer's basing diagram for correct basing. All transistor sockets in the 606A are wired for the standard basing as used for metal-cased transistors.

When removing soldered-in transistors, use a solder-removing wick to remove the solder from the circuit-board pads. Transistors that have heat radiators (heat sinks) or are mounted on the chassis use silicone grease to increase heat transfer. Replace the silicone grease on both sides of the insulator plate and on the metal tab, if the transistor has one, when replacing these transistors.

WARNING

Handle silicone grease with care. Avoid getting silicone grease in the eyes. Wash hands thoroughly after use.

To replace one of the power transistors mounted on the chassis adjacent to the Low-Voltage Power Supply and Z-Axis board, first unsolder the leads. Then, either remove the push-on clip that clamps the transistor to the chassis, or pull the transistor from the chassis-mounted heat sink.

To replace one of the transistors mounted on the chassis adjacent to the Deflection Amplifier board, first unsolder the leads. Then, remove the heat-sink holding bar to remove the defective transistor.

An extracting tool should be used to remove the 8-pin integrated circuits to prevent damage to the pins. This tool is available from Tektronix, Inc.; order Tektronix Part No. 003-0619-00. If an extracting tool is not available, use care to avoid damaging the pins. Pull slowly and evenly on both ends of the IC. Try to avoid having one end disengage from the socket before the other.

Cathode-Ray Tube Replacement

Remove and replace the cathode-ray tube (crt) as follows:

WARNING

Use care when handling a crt. Breakage of the crt causes a high-velocity scattering of glass fragments (implosion). Protective clothing and safety glasses should be worn. Avoid striking the crt on any object which might cause it to crack or implode. When storing a crt, place it in a protective carton or set it face down in a protected location on a smooth surface with a soft mat under the faceplate.

1. Remove the bezel assembly and snap-in implosion shield (with graticule) by removing the two screws holding them to the front panel.

2. (Options 6, 23, or 28 only). Remove the left and bottom protective cabinet panels.

3. Disconnect the four leads from the Deflection Amplifiers at the crt neck pins. Tag each lead with the information concerning which crt neck pin it was connected to.

NOTE

The red and black wires entering the crt shield are connected to the display-rotation coil inside the shield, and will not hamper crt removal.

4. Remove the crt base cover on the rear panel of the instrument by removing the five screws around its perimeter. Remove the crt base-pin socket.

5. With one hand on the crt faceplate, push on the crt base. Slide the crt forward. Pull the crt out of the instrument from the front.

To replace the crt, proceed as follows:

1. Make sure that the soft plastic crt faceplate supports are in place, then insert the crt into the main shield.

2. With the crt fully inserted and loose in the shield, mount the bezel assembly with implosion shield into place and tighten the bezel screws.

3. Place the crt base socket onto the crt base pins. Replace the crt base cover.

4. Connect the leads from the Deflection Amplifiers to the proper crt neck pins.

Replacing the crt will necessitate adjustment of the crt circuit, the Vertical (Y) and Horizontal (X) Amplifiers, and the Dynamic Focus circuit. Refer to Section 4, Performance Check and Adjustment.

Power Transformer Replacement

Replace the power transformer only with a direct replacement Tektronix transformer. After the transformer has been replaced, check the power supply output voltages and the crt operation as outlined in Section 4, Performance Check and Adjustment.

Interconnecting Circuit-Board Pin Replacement

A circuit-board pin replacement kit, including necessary tools, instructions, and replacement pins with attached spare ferrules, is available from Tektronix, Inc. Order Tektronix Part No. 040-0542-00.

To replace a damaged pin, first disconnect any pin connectors. Then, unsolder (see Soldering Techniques) the damaged pin and pull it from the board with a pair of pliers, leaving the ferrule (see Fig. 7-8) in the hole if possible. If the ferrule remains in the circuit board, remove the spare ferrule from the replacement pin and press the new pin into the hole in the circuit board. If the ferrule is removed with the damaged pin, clean out the hole using a solder-removing wick and a scribe. Then press the replacement pin, with attached spare ferrule, into the hole. Position the replacement pin in the same manner as the original pin had been. Solder the pin to the circuit board on each side of the circuit board. If the original pin was bent at an angle to mate with a connector, carefully bend the new pin to the same angle. Replace the pin connector.

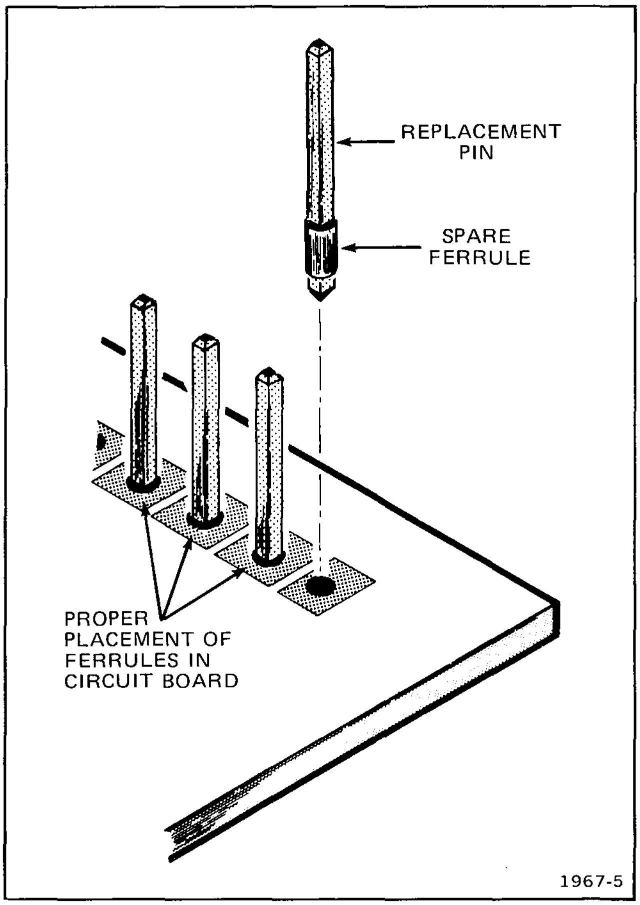


Fig. 7-8. Exploded view of circuit-board pin and ferrule.

OPTIONS

INTRODUCTION

Your instrument may be equipped with one or more instrument options. These options are factory-installed additions or changes to the standard instrument to more closely adapt it to your particular application needs.

A brief description of each available option is given in the following discussion. Refer to Table 8-1 for location of option information in this manual. For further information on instrument options, see your Tektronix catalog or contact your Tektronix Field Office.

OPTION 1

An internal, unlighted, orange graticule of 8 x 10 centimeters is included on the crt faceplate.

OPTION 4

Includes an internal X-axis time-base (sweep) with rates from 0.1 second/division to 1 microsecond/division in decade steps, plus an uncalibrated VARIABLE control provides sweep rates between the calibrated decade steps and extends the slowest range to at least 1 second/division. The instrument includes internal selection of X-Y or Y-T mode of operation.

OPTION 6

The standard 606A Monitor has been modified to meet Underwriter's Laboratory 544 Medical and Dental Equipment requirements. The modifications include warnings required for medical equipment, a hospital-grade power cord and plug cap, and an internal line fuse. The option also includes protective cabinet panels, cabinet feet, and a carrying handle.

OPTION 9

The instrument is designated as a recognized component by Underwriter's Laboratory for medical-dental applications.

OPTION 21

Includes differential INPUT connectors (+ and −) on the rear panel for the Horizontal (X), Vertical (Y), and Z-Axis Amplifiers.

OPTION 22

Includes internal 1:1 or 5:1 switchable input attenuators in the Horizontal (X) and Vertical (Y) Amplifiers to permit extending the gain range of the instrument.

OPTION 23

Includes a carrying handle, protective cabinet panels, and feet. (Not available with Options 6 and 28.)

OPTION 26

Changes the input resistance of the X, Y, and Z axes to 50 ohms.

OPTION 28

Includes protective cabinet panels. (Not available with Option 6 or Option 23.)

OPTION 29

Includes a metal bezel over the crt faceplate to provide a secure mount for trace-recording cameras.

OPTION 78

Provides a P11 phosphor on the crt (rather than the standard P31) for applications where maximum writing speed for photography is desired.

Table 8-1

OPTION INFORMATION LOCATOR

Instrument Option	Manual Section	Location of Information
Option 1 (Crt with Internal graticule)	2 Operating Instructions	Operating Information for Options Option 4 Internal Time Base and Fig. 2-3. Time measurements using the graticule is discussed, and the graticule is illustrated.
	3 Specification	Lists Option 1 Characteristics.
	8 Instrument Options	Option 1 The introduction includes a description of Option 1.
	9 Replaceable Electrical Parts	Provides the replacement part number for the crt with an internal graticule.
Option 4 (Provides an internal horizontal sweep circuit)	2 Operating Instructions	Controls and Connectors Describes the function of the Option 4 front-panel controls.
		Functional Check Provides a functional check procedure for the Option 4 instrument.
		Operating Information for Options Option 4 Internal Time Base Discusses use of the graticule, controls, and internal sweep generator for making accurate time measurements.
	3 Specification	Electrical Table 3-1, Option 4 Sweep System Includes electrical characteristics for the Option 4 instrument.
	4 Performance Check and Adjustment	Sweep Generator (Option 4) Contains a procedure for checking and adjusting the Option 4 instrument.
	5 Installation	Connecting the Internal Sweep (Option 4) Provides a procedure for setting internal switching to connect the internal sweep generator.
	6 Theory of Operation	Option 4—Time Base Sweep Discusses the operation of the internal sweep circuit.
	7 Maintenance	Corrective Maintenance Sweep Board—A5 Gives instructions on removal and replacement of the Option 4 Sweep board.

Table 8-1 (cont)

Instrument Option	Manual Section	Location of Information
Option 4 (cont)	8 Instrument Options	Option 4 The introduction includes a description of Option 4.
	9 Replaceable Electrical Parts	Provides an electrical parts list for the Option 4 instrument.
	10 Diagrams and Circuit Board Illustrations	Provides a block diagram, component adjustment, test point, internal control and selector locations, and a schematic diagram for the Option 4 instrument.
	11 Replaceable Mechanical Parts	Provides a mechanical parts list and an exploded-view drawing for the Option 4 instrument.
Option 6 (Listed by Underwriter's Laboratories, Inc., 544 Medical-Dental Equipment Requirements)	5 Installation	Line-Voltage and Regulating-Range Selection Fig. 5-1 shows the location of the line fuse for the Option 6 instrument.
	8 Instrument Options	Option 6 The introduction includes a description of Option 6.
	9 Replaceable Electrical Parts	Provides an electrical parts list with replacement parts footnoted for the Option 6 instrument.
	11 Replaceable Mechanical Parts	Provides a mechanical parts list with replacement parts footnoted for the Option 6 instrument.
Option 9 (Instrument designated by Underwriter's Laboratories as a recognized component for Medical-Dental Equipment applications)	8 Instrument Options	Option 9 The introduction includes a description of Option 9.
Option 21 (Provides differential inputs for the X, Y, and Z-Axis Amplifiers)	2 Operating Instructions	Rear-Panel Controls and Connectors Describes the functions of the −X, −Y, and −Z INPUT connectors.
		Functional Check Provides a functional check procedure for the Option 21 instrument.
		Operating Information for Options Option 21 Full Differential Inputs Provides application information for Option 21 instruments.
	3 Specification	Electrical Table 3-1 Includes electrical characteristics for the Option 21 instrument.

Table 8-1 (cont)

Instrument Option	Manual Section	Location of Information
Option 21 (cont)	4 Performance Check and Adjustment	Provides a procedure for checking and adjusting the Option 21 instrument.
	6 Theory of Operation	Differential Inputs (Option 21) Discusses operation with Option 21 (differential operation).
	8 Instrument Options	Option 21 The introduction includes a description of Option 21.
	9 Replaceable Electrical Parts	Provides an electrical parts list with replacement parts footnoted for the Option 21 instrument.
	10 Diagrams and Circuit Board Illustrations	Provides a block diagram; component adjustment, test point, internal control and selector locations; a troubleshooting chart; and schematic diagrams for the Option 21 instrument.
	11 Replaceable Mechanical Parts	Provides an exploded-view drawing and a mechanical parts list with replacement parts footnoted for the Option 21 instrument.
Option 22 (Internal 1:1 and 5:1 switchable attenuators for the X and Y Amplifiers)	2 Operating Instructions	Operating Information for Options Option 22 Switchable Attenuators for X and Y INPUTs. Describes use of the 5:1 input attenuators.
	3 Specification	Electrical Table 3-1 Includes electrical characteristics for the Option 22 instrument.
	4 Performance Check and Adjustment	Provides a procedure for checking and adjusting the Option 22 instrument.
	5 Installation	Input Attenuation Selection (Option 22) Provides information on attenuators.
	8 Instrument Options	Option 22 The introduction includes a description of Option 22.
	9 Replaceable Electrical Parts	Provides an electrical parts list with replacement parts footnoted for the Option 22 instrument.
	10 Diagrams and Circuit Board Illustrations	Provides a block diagram; component adjustment, test point, internal control and selector locations; a troubleshooting chart; and schematic diagrams for the Option 22 instrument.

Table 8-1 (cont)

Instrument Option	Manual Section	Location of Information
Option 22 (cont)	11 Replaceable Mechanical Parts	Provides an exploded-view drawing and a mechanical parts list with replacement parts footnoted for the Option 22 instrument.
Option 23 (With handle, feet, and protective cabinet panels)	3 Specification	Overall Dimensions Fig. 3-1 shows the 606A with handle, feet, and protective cabinet panels.
	7 Maintenance	Cabinet Panel Removal Includes directions on removal of the protective cabinet panels.
	8 Instrument Options	Option 23 The introduction includes a description of Option 23.
	11 Replaceable Mechanical Parts	Provides an exploded-view drawing and a mechanical parts list with replacement parts footnoted for the Option 23 instrument.
Option 26 (Changes input resistance of X, Y, and Z Amplifiers to 50 Ω).	3 Specification	Electrical Table 3-1 Includes electrical characteristics for the Option 26 instrument.
	4 Performance Check and Adjustment	Table 4-1, Test Equipment Indicates change of test equipment requirements with Option 26 instruments.
	8 Instrument Options	Option 26 The introduction includes a description of Option 26.
	9 Replaceable Electrical Parts	Provides an electrical parts list with replacement parts footnoted for the Option 26 instrument.
Option 28 (Includes protective cabinet panels)	Same as Option 23	Same as Option 23.
Option 29 (Includes a metal crt bezel)	8 Instrument Options	Option 29 The introduction includes a description of Option 29.
	11 Replaceable Mechanical Parts	Provides an exploded-view drawing and a mechanical parts list with replacement parts footnoted for the Option 29 instrument.
Option 78 (P11 crt phosphor)	3 Specification	Electrical Table 3-1, Cathode-Ray Tube Display Lists the P11 phosphor option.

Section 9
REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.

component number

A23R1234 — A23 R1234

Assembly number — Circuit number

Read: Resistor 1234 of Assembly 23

Example b.

component number

A23A2R1234 — A23 A2 R1234

Assembly number — Subassembly number — Circuit number

Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC. SEMICONDUCTOR GROUP	P.O. BOX 5012	DALLAS, TX 75222
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
03508	GENERAL ELECTRIC COMPANY, SEMI-CONDUCTOR PRODUCTS DEPARTMENT	ELECTRONICS PARK	SYRACUSE, NY 13201
03888	KDI PYROFILM CORPORATION	60 S JEFFERSON ROAD	WHIPPANY, NJ 07981
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867	MYRTLE BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05397	UNION CARBIDE CORPORATION, MATERIALS SYSTEMS DIVISION	11901 MADISON AVENUE	CLEVELAND, OH 44101
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
10389	CHICAGO SWITCH, INC.	2035 WABANSIA AVE.	CHICAGO, IL 60647
11237	CTS KEENE, INC.	3230 RIVERSIDE AVE.	PASO ROBLES, CA 93446
12697	CLAROSTAT MFG. CO., INC.	LOWER WASHINGTON STREET	DOVER, NH 03820
12969	UNITRODE CORPORATION	580 PLEASANT STREET	WATERTOWN, MA 02172
13511	AMPHENOL CARDRE DIV., BUNKER RAMO CORP.		LOS GATOS, CA 95030
14433	ITT SEMICONDUCTORS	3301 ELECTRONICS WAY P O BOX 3049	WEST PALM BEACH, FL 33402
14552	MICRO SEMICONDUCTOR CORP.	2830 E FAIRVIEW ST.	SANTA ANA, CA 92704
15238	ITT SEMICONDUCTORS, A DIVISION OF INTER NATIONAL TELEPHONE AND TELEGRAPH CORP.	P.O. BOX 168, 500 BROADWAY	LAWRENCE, MA 01841
17856	SILICONIX, INC.	2201 LAURELWOOD DRIVE	SANTA CLARA, CA 95054
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
51406	MURATA CORPORATION OF AMERICA	2 WESTCHESTER PLAZA	ELMSFORD, NY 10523
51642	CENTRE ENGINEERING INC.	2820 E COLLEGE AVENUE	STATE COLLEGE, PA 16801
53944	ELT INC., GLOW LITE DIVISION	BOX 698	PAULS VALLEY, OK 73075
54473	MATSUSHITA ELECTRIC, CORP. OF AMERICA	1 PANASONIC WAY	SECAUCUS, NJ 07094
56289	SPRAGUE ELECTRIC CO.	87 MARSHALL ST.	NORTH ADAMS, MA 01247
59660	TUSONIX INC.	2155 N FORBES BLVD	TUCSON, AZ 85705
59821	CENTRALAB INC SUB NORTH AMERICAN PHILIPS CORP	7158 MERCHANT AVE	EL PASO, TX 79915
60705	CERA-MITE CORP.	1327 6TH AVE.	GRAFTON, WI 53024
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
74276	SIGNALITE DIV., GENERAL INSTRUMENT CORP.	1933 HECK AVE.	NEPTUNE, NJ 07753
74970	JOHNSON, E. F., CO.	299 10TH AVE. S. W.	WASECA, MN 56093
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
76493	BELL INDUSTRIES, INC., MILLER, J. W., DIV.	19070 REYES AVE., P O BOX 5825	COMPTON, CA 90224
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
80031	ELECTRA-MIDLAND CORP., MEPCO DIV.	22 COLUMBIA ROAD	MORRISTOWN, NJ 07960
82389	SWITCHCRAFT, INC.	5555 N. ELSTON AVE.	CHICAGO, IL 60630
83003	VARO, INC.	P O BOX 411, 2203 WALNUT STREET	GARLAND, TX 75040
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E. WASHINGTON STREET P. O. BOX 372	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601
91929	HONEYWELL, INC., MICRO SWITCH DIV.	CHICAGO & SPRING STS.	FREEPORT, IL 61032

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-4295-01	B010100	B010799	CKT BOARD ASSY:DEFLECTION AMPLIFIER	80009	670-4295-01
A1	670-4295-06	B010800	B011236	CKT BOARD ASSY:DEFLECTION AMPLIFIER	80009	670-4295-04
A1	670-4295-07	B011237		CKT BOARD ASSY:DEFLECTION AMPLIFIER	80009	670-4295-07
A1	670-4295-02			CKT BOARD ASSY:DEFLECTION AMPLIFIER	80009	670-4295-02
A1	----- -----			(OPTION 04 ONLY)		
A1	670-4295-03			CKT BOARD ASSY:DEFLECTION AMPLIFIER	80009	670-4295-03
A1	----- -----			(OPTION 22 ONLY)		
A2	670-4299-00			CKT BOARD ASSY:CONT-INTFC DYNAMIC FOCUS	80009	670-4299-00
A3	670-4296-00	B010100	B010119	CKT BOARD ASSY:HIGH VOLTAGE	80009	670-4296-00
A3	670-4296-01	B010120	B010849	CKT BOARD ASSY:HIGH VOLTAGE	80009	670-4296-01
A3	670-4296-02	B010850		CKT BOARD ASSY:HIGH VOLTAGE	80009	670-4296-02
A4	670-4297-03	B010100	B010331	CKT BOARD ASSY:LV POWER & Z AXIS AMPL	80009	670-4297-03
A4	670-4297-05	B010332		CKT BOARD ASSY:LV POWER & Z AXIS AMPL	80009	670-4297-05
A5	670-2278-00			CKT BOARD ASSY:SWEEP GENERATOR	80009	670-2278-00
.						
.						
C110	281-0198-00			CAP.,VAR,AIR DI:1.7-11PF,250V	74970	187-0306-105
C110	----- -----			(OPTION 22 ONLY)		
C112	281-0511-00			CAP.,FXD,CER DI:22PF,+/-2.2PF,500V	59660	301-000C0G0220K
C112	----- -----			(OPTION 22 ONLY)		
C115	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C122	281-0512-00			CAP.,FXD,CER DI:27PF,+/-2.7PF,500V	59660	0301080C0G0270K
C124	281-0604-00			CAP.,FXD,CER DI:2.2PF,+/-0.25PF,500V	04222	7001-C0J-2R2C
C130	281-0198-00			CAP.,VAR,AIR DI:1.7-11PF,250V	74970	187-0306-105
C130	----- -----			(OPTION 22 ONLY)		
C132	281-0511-00			CAP.,FXD,CER DI:22PF,+/-2.2PF,500V	59660	301-000C0G0220K
C132	----- -----			(OPTION 22 ONLY)		
C135	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C144	281-0604-00			CAP.,FXD,CER DI:2.2PF,+/-0.25PF,500V	04222	7001-C0J-2R2C
C160	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C186	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C191	281-0512-00			CAP.,FXD,CER DI:27PF,+/-2.7PF,500V	59660	0301080C0G0270K
C193	281-0207-00			CAP.,VAR,PLSTC:2-18PF,100V	80031	2807C00218MH02F0
C194	281-0220-00	B010100	B010799	CAP.,VAR,CER DI:1-5.5PF,400V	80031	2502A015R5VP0ZF0
C194	281-0218-00	B010800		CAP.,VAR,CER DI:1-5PF,+2-2.5%,100V	59660	513-013A1-5
C197	281-0593-00			CAP.,FXD,CER DI:3.9PF,10%,500V	04222	7001-C0J-3R9C
C198	281-0609-00			CAP.,FXD,CER DI:1PF,+/-0.1PF,500V	59660	374-018C0K0109B
C208	281-0661-00			CAP.,FXD,CER DI:0.8PF,+/-0.1PF,500V	04222	7001-COK-OR8B
C210	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C216	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C217	283-0187-00			CAP.,FXD,CER DI:0.047UF,10%,400V	72982	8131N401X5R0473K
C226	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C227	283-0187-00			CAP.,FXD,CER DI:0.047UF,10%,400V	72982	8131N401X5R0473K
C230	283-0028-00			CAP.,FXD,CER DI:0.0022UF,20%,50V	59660	0805585Y5SO222M
C239	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	56289	273C11
C240	283-0028-00			CAP.,FXD,CER DI:0.0022UF,20%,50V	59660	0805585Y5SO222M
C250	283-0008-00			CAP.,FXD,CER DI:0.1UF,20%,500V	56289	3C37X7R104M500B
C259	281-0220-00	B010100	B010799	CAP.,VAR,CER DI:1-5.5PF,400V	80031	2502A015R5VP0ZF0
C259	281-0182-00	B010800		CAP.,VAR,PLSTC:1.8-10PF,500V	80031	2805D1R810BH02F0
C260	283-0008-00			CAP.,FXD,CER DI:0.1UF,20%,500V	56289	3C37X7R104M500B
C269	283-0187-00			CAP.,FXD,CER DI:0.047UF,10%,400V	72982	8131N401X5R0473K
C270	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C272	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C285	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C310	281-0198-00			CAP.,VAR,AIR DI:1.7-11PF,250V	74970	187-0306-105
C310	----- -----			(OPTION 22 ONLY)		
C312	281-0511-00			CAP.,FXD,CER DI:22PF,+/-2.2PF,500V	59660	301-000C0G0220K
C312	----- -----			(OPTION 22 ONLY)		
C315	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C322	281-0512-00			CAP.,FXD,CER DI:27PF,+/-2.7PF,500V	59660	0301080C0G0270K
C324	281-0604-00			CAP.,FXD,CER DI:2.2PF,+/-0.25PF,500V	04222	7001-C0J-2R2C
C330	281-0198-00			CAP.,VAR,AIR DI:1.7-11PF,250V	74970	187-0306-105
C330	----- -----			(OPTION 22 ONLY)		
C332	281-0511-00			CAP.,FXD,CER DI:22PF,+/-2.2PF,500V	59660	301-000C0G0220K
C332	----- -----			(OPTION 22 ONLY)		
C335	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C344	281-0604-00			CAP.,FXD,CER DI:2.2PF,+/-0.25PF,500V	04222	7001-C0J-2R2C
C360	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C386	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C391	281-0512-00			CAP.,FXD,CER DI:27PF,+/-2.7PF,500V	59660	0301080C0G0270K
C393	281-0207-00			CAP.,VAR,PLSTC:2-18PF,100V	80031	2807C00218MH02F0
C394	281-0220-00	B010100	B010799	CAP.,VAR,CER DI:1-5.5PF,400V	80031	2502A015R5VP0ZF0
C394	281-0218-00	B010800		CAP.,VAR,CER DI:1-5PF,+2-2.5%,100V	59660	513-013A1-5
C397	281-0593-00			CAP.,FXD,CER DI:3.9PF,10%,500V	04222	7001-C0J-3R9C
C398	281-0609-00			CAP.,FXD,CER DI:1PF,+/-0.1PF,500V	59660	374-018C0K0109B
C408	281-0661-00			CAP.,FXD,CER DI:0.8PF,+/-0.1PF,500V	04222	7001-COK-OR8B
C410	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C416	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C417	283-0187-00			CAP.,FXD,CER DI:0.047UF,10%,400V	72982	8131N401X5R0473K
C426	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C427	283-0187-00			CAP.,FXD,CER DI:0.047UF,10%,400V	72982	8131N401X5R0473K
C430	283-0028-00			CAP.,FXD,CER DI:0.0022UF,20%,50V	59660	0805585Y5SO222M
C439	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	56289	273C11
C440	283-0028-00			CAP.,FXD,CER DI:0.0022UF,20%,50V	59660	0805585Y5SO222M
C450	283-0008-00			CAP.,FXD,CER DI:0.1UF,20%,500V	56289	3C37X7R104M500B
C460	283-0008-00			CAP.,FXD,CER DI:0.1UF,20%,500V	56289	3C37X7R104M500B
C485	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C503	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C510	281-0516-00	B010332		CAP.,FXD,CER DI:39PF,+/-3.9PF,500V	59660	301-000U2J0390K
C513	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C522	281-0544-00			CAP.,FXD,CER DI:5.6PF,10%,500V	04222	7001-COH-5R6D
C523	281-0544-00			CAP.,FXD,CER DI:5.6PF,10%,500V	04222	7001-COH-5R6D
C525	281-0501-00	B010100	B010331	CAP.,FXD,CER DI:4.7PF,+/-1PF,500V	59660	301-000S2H0479F
C536	281-0504-00	B010332		CAP.,FXD,CER DI:10PF,+/-1PF,500V	04222	7001-COG-100F
C557	281-0064-00			CAP.,VAR,PLSTC:0.25-1.5PF,600V	74970	273-0001-101
C561	281-0584-00			CAP.,FXD,CER DI:100PF,5%,500V	72982	0301000Y5E0101J
C565	281-0763-00	B010332		CAP.,FXD,CER DI:47PF,10%,100V	04222	GA101A470KAA
C566	281-0584-00			CAP.,FXD,CER DI:100PF,5%,500V	72982	0301000Y5E0101J
C570	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	2C20Z5U104Z200B
C573	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C580	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C592	290-0572-00			CAP.,FXD,ELCTLT:0.1UF,20%,50V	56289	196D104X0050HA1
C593	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C594	290-0572-00			CAP.,FXD,ELCTLT:0.1UF,20%,50V	56289	196D104X0050HA1
C596	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	2C20Z5U104Z200B
C597	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C600	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C601	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C603	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C617	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C631	281-0542-00			CAP.,FXD,CER DI:18PF,10%,500V	59660	301-000C0GO180K
C636	281-0542-00			CAP.,FXD,CER DI:18PF,10%,500V	59660	301-000C0GO180K
C638	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C643	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C657	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C671	281-0542-00			CAP.,FXD,CER DI:18PF,10%,500V	59660	301-000C0GO180K
C676	281-0542-00			CAP.,FXD,CER DI:18PF,10%,500V	59660	301-000C0GO180K
C683	281-0661-00			CAP.,FXD,CER DI:0.8PF,+/-0.1PF,500V	04222	7001-COK-OR8B
C684	281-0661-00			CAP.,FXD,CER DI:0.8PF,+/-0.1PF,500V	04222	7001-COK-OR8B
C686	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	56289	273C11
C689	283-0267-00			CAP.,FXD,CER DI:0.01UF,20%,500V	60705	562CBD501AL103MA
C690	283-0008-00			CAP.,FXD,CER DI:0.1UF,20%,500V	56289	3C37X7R104M500B
C693	283-0270-00			CAP.,FXD,CER DI:0.0068UF,+80/-20%,4000V	56289	45C17
C694	283-0021-00			CAP.,FXD,CER DI:0.001UF,20%,5000V	59660	848-556-Y5S-102M
C698	283-0270-00			CAP.,FXD,CER DI:0.0068UF,+80/-20%,4000V	56289	45C17
C702	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C709	283-0328-00			CAP.,FXD,CER DI:0.03UF,+80-20%,200V	72982	8131N225Z5U0303Z
C715	290-0529-00			CAP.,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C716	290-0529-00			CAP.,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C729	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
C734	283-0300-00			CAP.,FXD,CER DI:0.001UF,+80-20%,10,000V	59660	3910BBX5T0102Z
C736	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131M058Z5U0474M
C740	290-0719-00			CAP.,FXD,ELCTLT:47UF,20%,25V	56289	196D476X0025TE3
C746	283-0142-00			CAP.,FXD,CER DI:0.0027UF,5%,200V	59660	875571YEE0272J
C748	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	56289	273C11
C749	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	1C10Z5U503Z050B
C756	290-0480-00			CAP.,FXD,ELCTLT:0.5UF,+50-10%,200V	80009	290-0480-00
C758	290-0480-00			CAP.,FXD,ELCTLT:0.5UF,+50-10%,200V	80009	290-0480-00
C760	290-0779-00			CAP.,FXD,ELCTLT:10UF,+50-10%,50VDC	56289	502D237
C762	283-0034-00			CAP.,FXD,CER DI:0.005UF,20%,4000V	51406	DHR23Z5V502M4KV
C763	281-0512-00			CAP.,FXD,CER DI:27PF,+/-2.7PF,500V	59660	0301080C0G0270K
C764	285-1138-00			CAP.,FXD,PLSTC:0.01UF,10%,8000V	56289	430P558
C766	285-1138-00			CAP.,FXD,PLSTC:0.01UF,10%,8000V	56289	430P558
C768	281-0512-00			CAP.,FXD,CER DI:27PF,+/-2.7PF,500V	59660	0301080C0G0270K
C770	285-1138-00			CAP.,FXD,PLSTC:0.01UF,10%,8000V	56289	430P558
C776	290-0758-00			CAP.,FXD,ELCTLT:2.2UF,+50-10%,160V	56289	502D227
C778	283-0300-00			CAP.,FXD,CER DI:0.001UF,+80-20%,10,000V	59660	3910BBX5T0102Z
C795	283-0328-00	B010100	B010849	CAP.,FXD,CER DI:0.03UF,+80-20%,200V	72982	8131N225Z5U0303Z
C795	283-0414-00	B010850		CAP.,FXD,CER DI:0.022UF,20%,500V	51642	300-500X7R223M
C799	283-0328-00			CAP.,FXD,CER DI:0.03UF,+80-20%,200V	72982	8131N225Z5U0303Z
C812	290-0781-00			CAP.,FXD,ELCTLT:150UF,+50-10%,350VDC	56289	68D10869
C814	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	2C20Z5U104Z200B
C816	290-0571-00			CAP.,FXD,ELCTLT:5000UF,+100-0%,25V	90201	PFP20-36043
C818	290-0571-00			CAP.,FXD,ELCTLT:5000UF,+100-0%,25V	90201	PFP20-36043
C834	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C843	290-0745-00			CAP.,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
C847	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C866	290-0702-00			CAP.,FXD,ELCTLT:2000UF,+100-0%,50V	56289	68D10715
C877	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C886	281-0580-00			CAP.,FXD,CER DI:470PF,10%,500V	04222	7001-1374
C892	290-0779-00			CAP.,FXD,ELCTLT:10UF,+50-10%,50VDC	56289	502D237
CR118	152-0246-00			SEMICOND DEVICE:SW,SI,40V,200MA	03508	DE140

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR138	152-0246-00			SEMICOND DEVICE:SW,SI,40V,200MA	03508	DE140
CR150	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR160	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR170	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR180	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR284	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR318	152-0246-00			SEMICOND DEVICE:SW,SI,40V,200MA	03508	DE140
CR338	152-0246-00			SEMICOND DEVICE:SW,SI,40V,200MA	03508	DE140
CR350	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR360	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR370	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR380	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR484	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR505	152-0246-00			SEMICOND DEVICE:SW,SI,40V,200MA	03508	DE140
CR515	152-0246-00			SEMICOND DEVICE:SW,SI,40V,200MA	03508	DE140
CR520	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR530	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR565	152-0141-02	B010332		SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR566	152-0153-00			SEMICOND DEVICE:SILICON,15V,50MA	07263	FD7003
CR568	152-0233-00			SEMICOND DEVICE:SILICON,85V,100MA	07263	FDH1986
CR569	152-0233-00	B010332		SEMICOND DEVICE:SILICON,85V,100MA	07263	FDH1986
CR572	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR577	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR585	152-0141-02	B010332		SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR586	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR591	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR613	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR623	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR653	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR657	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR663	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR679	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR685	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR690	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR692	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR693	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR706	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR696	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR696	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR717	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR723	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR724	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR725	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR728	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR735	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR737	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR737	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR756	152-0400-00			SEMICOND DEVICE:SILICON,400V,1A	80009	152-0400-00
CR760	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR762	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	83003	VG12X-1
CR764	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	83003	VG12X-1
CR769	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR776	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR780	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004

Scan by Zenith

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR782	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR795	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR799	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	07263	FDH5004
CR802	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	12969	G727
CR803	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	12969	G727
CR804	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	12969	G727
CR805	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	12969	G727
CR812	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
CR813	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
CR814	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
CR815	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
CR825	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR828	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	12969	G727
CR834	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR842	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
CR843	153-0066-00			SEMICOND DVC,SE:SELECTED,5.0V,2% AT 2MA	80009	153-0066-00
CR845	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR846	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR847	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR858	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	12969	G727
CR862	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
CR863	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
CR864	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
CR865	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
CR872	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
CR874	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR888	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR892	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
DS735	150-0111-00			LAMP,GLOW:NEON,1.2MA	53944	A1B-3
DS777	150-0111-00			LAMP,GLOW:NEON,1.2MA	53944	A1B-3
DS778	150-0111-00			LAMP,GLOW:NEON,1.2MA	53944	A1B-3
E692	119-0181-00			ARSR,ELEC SURGE:230V,GAS FILLED	74276	CG230L
E696	119-0181-00			ARSR,ELEC SURGE:230V,GAS FILLED	74276	CG230L
E770	119-0181-00			ARSR,ELEC SURGE:230V,GAS FILLED	74276	CG230L
E783	119-0181-00			ARSR,ELEC SURGE:230V,GAS FILLED	74276	CG230L
F800	159-0019-00			FUSE,CARTRIDGE:3AG,1A,250V,SLOW BLOW	71400	MDL1
F814	159-0083-00			FUSE,CARTRIDGE:0.15A,250V,FAST-BLOW	71400	AGC 15/100
F848	159-0025-00			FUSE,CARTRIDGE:3AG,0.5A,250V,FAST-BLOW	71400	AGC 1/2
F856	159-0015-00			FUSE,CARTRIDGE:3AG,3A,250V,0.65 SEC	71400	AGC 3
F868	159-0025-00			FUSE,CARTRIDGE:3AG,0.5A,250V,FAST-BLOW	71400	AGC 1/2
J110	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J130	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J310	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J330	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J505	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J515	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
L725	108-0805-00			COIL,TUBE DEFL:TRACE ROTATOR	80009	108-0805-00
L756	108-0324-00			COIL,RF:10MH	76493	70F102A1
Q120	151-1054-00			TRANSISTOR:SILICON,JFE,N-CHANNEL,DUAL	17856	DN1114
Q150	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q155	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q160	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q165	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q170	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q180	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q190	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q200	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q210	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q220	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q230	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q235	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q235	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q240	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q245	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q245	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q250	151-0612-00	B010100	B010349	TRANSISTOR:SILICON,PNP	80009	151-0612-00
Q250	151-0612-01	B010350		TRANSISTOR:SILICON,PNP,SCREENED	80009	151-0612-01
Q255	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q255	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q260	151-0612-00	B010100	B010349	TRANSISTOR:SILICON,PNP	80009	151-0612-00
Q260	151-0612-01	B010350		TRANSISTOR:SILICON,PNP,SCREENED	80009	151-0612-01
Q265	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q265	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q280	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q320	151-1054-00			TRANSISTOR:SILICON,JFE,N-CHANNEL,DUAL	17856	DN1114
Q350	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q355	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q360	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q365	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q370	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q380	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q390	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q400	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q410	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q420	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q430	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q435	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q435	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q440	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q445	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q445	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q450	151-0612-00	B010100	B010349	TRANSISTOR:SILICON,PNP	80009	151-0612-00
Q450	151-0612-01	B010350		TRANSISTOR:SILICON,PNP,SCREENED	80009	151-0612-01
Q455	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q455	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q460	151-0612-00	B010100	B010349	TRANSISTOR:SILICON,PNP	80009	151-0612-00
Q460	151-0612-01	B010350		TRANSISTOR:SILICON,PNP,SCREENED	80009	151-0612-01
Q465	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q465	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q480	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q508	151-1042-00			SEMICOND DVC SE:MATCHED PAIR FET	01295	SKA5390
Q520	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q525	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q530	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q535	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q550	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q560	151-0190-00	B010100	B010331	TRANSISTOR:SILICON,NPN	07263	S032677
Q560	151-0302-00	B010332		TRANSISTOR:SILICON,NPN	07263	S038487

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q561	151-0281-00			TRANSISTOR:SILICON,NPN	03508	X16P4039
Q570	151-0406-00	B010100	B010349	TRANSISTOR:SILICON,PNP	04713	ORD BY DESCR
Q570	151-0406-02	B010350		TRANSISTOR:SGC7282,SCREENED	04713	ST1264H
Q580	151-0407-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SS2456
Q580	151-0407-01	B010350		TRANSISTOR:SILICON,NPN	80009	151-0407-01
Q585	151-0124-00	B010100	B010349	TRANSISTOR:SILICON,NPN,SEL FROM 2N3501	04713	SM8138
Q585	151-0124-02	B010350		TRANSISTOR:SILICON,NPN	04713	SM8138H
Q590	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q605	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q610	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q620	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q625	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q630	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q635	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q638	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q645	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q650	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q660	151-0410-00			TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q670	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q675	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q678	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q680	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q685	151-0615-00	B010100	B010349	TRANSISTOR:SILICON,NPN	04713	SDS358K
Q685	151-0615-01	B010350		TRANSISTOR:2N6558,SCREENED	80009	151-0615-01
Q690	151-0612-00	B010100	B010349	TRANSISTOR:SILICON,PNP	80009	151-0612-00
Q690	151-0612-01	B010350		TRANSISTOR:SILICON,PNP,SCREENED	80009	151-0612-01
Q702	151-0347-00			TRANSISTOR:SILICON,NPN	56289	2N5551
Q714	151-0349-00	B010100	B010349	TRANSISTOR:SILICON,NPN,SEL FROM MJE280	04713	SJE924
Q714	151-0349-05	B010350		TRANSISTOR:SILICON,NPN,SCREENED	80009	151-0349-05
Q720	151-0136-00			TRANSISTOR:SILICON,NPN	02735	35495
Q722	151-0134-00			TRANSISTOR:SILICON,PNP	80009	151-0134-00
Q725	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q727	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q820	151-0415-00			TRANSISTOR:SILICON,NPN	04713	SJE419
Q825	151-0350-00			TRANSISTOR:SILICON,PNP	04713	SPS6700
Q830	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q840	151-0405-00	B010100	B010349	TRANSISTOR:SILICON,NPN,SEL FROM MJE800	04713	SJE943
Q840	151-0405-04	B010350		TRANSISTOR:SILICON,NPN,SCREENED	80009	151-0405-04
Q845	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q870	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q880	151-0405-00	B010100	B010349	TRANSISTOR:SILICON,NPN,SEL FROM MJE800	04713	SJE943
Q880	151-0405-04	B010350		TRANSISTOR:SILICON,NPN,SCREENED	80009	151-0405-04
Q885	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
R105	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R109	322-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.25W	75042	CEBT0-49R90F
R109	----- -----			(OPTION 26 ONLY)		
R110	321-0891-00			RES.,FXD,FILM:800K OHM,1%,0.125W	91637	MFF1816G80002F
R110	----- -----			(OPTION 22 ONLY)		
R112	321-0423-00			RES.,FXD,FILM:249K OHM,1%,0.125W	91637	MFF1816G24902F
R112	----- -----			(OPTION 22 ONLY)		
R114	322-0481-00			RES.,FXD,FILM:1M OHM,1%,0.25W	75042	CEBT0-1004F
R115	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R118	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R120	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R122	321-0928-02			RES.,FXD,FILM:250 OHM,0.5%,0.125W	91637	MFF1816D250R0D
R124	321-0207-00			RES.,FXD,FILM:1.4K OHM,1%,0.125W	91637	MFF1816G14000F
R125	311-1417-00			RES.,VAR,NONWIR:2.5K OHM,10%,0.25W	73138	72-58-0
R129	322-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.25W	75042	CEBT0-49R90F
R129	----- -----			(OPTION 26 ONLY)		
R130	321-0891-00			RES.,FXD,FILM:800K OHM,1%,0.125W	91637	MFF1816G80002F
R130	----- -----			(OPTION 22 ONLY)		
R132	321-0423-00			RES.,FXD,FILM:249K OHM,1%,0.125W	91637	MFF1816G24902F
R132	----- -----			(OPTION 22 ONLY)		
R134	322-0481-00			RES.,FXD,FILM:1M OHM,1%,0.25W	75042	CEBT0-1004F
R135	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R138	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R140	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R144	321-0207-00			RES.,FXD,FILM:1.4K OHM,1%,0.125W	91637	MFF1816G14000F
R150	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R152	315-0242-00	B010100	B011236	RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R152	301-0242-00	B011237		RES.,FXD,CMPSN:2.4K OHM,5%,0.50W	01121	EB2425
R155	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R156	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R157	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R162	315-0242-00	B010100	B011236	RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R162	301-0242-00	B011237		RES.,FXD,CMPSN:2.4K OHM,5%,0.50W	01121	EB2425
R165	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R166	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R167	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R170	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R173	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R175	311-1311-00			RES.,VAR,NONWIR:1K OHM,20%,0.5W	01121	73M4G048L102M
R176	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R180	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R183	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R185	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R186	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R190	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R192	311-1561-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	73138	91-83-0
R193	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R194	311-1274-00			RES.,VAR,NONWIR:500K OHM,10%,0.50W	32997	3329P-L58-504
R195	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R198	323-0385-00			RES.,FXD,FILM:100K OHM,1%,0.50W	75042	CECT0-1003F
R200	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R202	321-0256-00			RES.,FXD,FILM:4.53K OHM,1%,0.125W	91637	MFF1816G45300F
R205	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R208	323-0385-00			RES.,FXD,FILM:100K OHM,1%,0.50W	75042	CECT0-1003F
R210	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R214	301-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.50W	01121	EB6815
R216	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R217	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R220	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R224	301-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.50W	01121	EB6815
R226	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R227	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R230	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R233	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R237	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R239	315-0270-00			RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
R240	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R242	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R243	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R247	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R250	321-0166-00			RES.,FXD,FILM:523 OHM,1%,0.125W	91637	MFF1816G523R0F
R252	321-0238-00			RES.,FXD,FILM:2.94K OHM,1%,0.125W	91637	MFF1816G29400F
R253	323-0403-00			RES.,FXD,FILM:154K OHM,1%,0.50W	75042	CECT0-1543F
R255	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R256	321-0197-00			RES.,FXD,FILM:1.1K OHM,1%,0.125W	91637	MFF1816G11000F
R258	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	91637	MFF1816G301R0F
R259	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R260	321-0166-00			RES.,FXD,FILM:523 OHM,1%,0.125W	91637	MFF1816G523R0F
R262	321-0238-00			RES.,FXD,FILM:2.94K OHM,1%,0.125W	91637	MFF1816G29400F
R263	323-0403-00			RES.,FXD,FILM:154K OHM,1%,0.50W	75042	CECT0-1543F
R265	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R266	321-0197-00			RES.,FXD,FILM:1.1K OHM,1%,0.125W	91637	MFF1816G11000F
R268	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	91637	MFF1816G301R0F
R269	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R280	311-1263-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
R282	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R284	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R286	321-0346-00			RES.,FXD,FILM:39.2K OHM,1%,0.125W	91637	MFF1816G39201F
R305	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R309	322-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.25W	75042	CEBT0-49R90F
R309	----- -----			(OPTION 26 ONLY)		
R310	321-0891-00			RES.,FXD,FILM:800K OHM,1%,0.125W	91637	MFF1816G80002F
R310	----- -----			(OPTION 22 ONLY)		
R312	321-0423-00			RES.,FXD,FILM:249K OHM,1%,0.125W	91637	MFF1816G24902F
R312	----- -----			(OPTION 22 ONLY)		
R314	322-0481-00			RES.,FXD,FILM:1M OHM,1%,0.25W	75042	CEBT0-1004F
R315	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R318	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R320	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R322	321-0122-00	B010100	B011889	RES.,FXD,FILM:182 OHM,1%,0.125W	91637	MFF1816G182R0F
R322	321-0118-00	B011890		RES.,FXD,FILM:165 OHM,1%,0.125W	91637	MFF1816G165R0F
R324	321-0207-00			RES.,FXD,FILM:1.4K OHM,1%,0.125W	91637	MFF1816G14000F
R325	311-1417-00			RES.,VAR,NONWIR:2.5K OHM,10%,0.25W	73138	72-58-0
R329	322-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.25W	75042	CEBT0-49R90F
R329	----- -----			(OPTION 26 ONLY)		
R330	321-0891-00			RES.,FXD,FILM:800K OHM,1%,0.125W	91637	MFF1816G80002F
R330	----- -----			(OPTION 22 ONLY)		
R332	321-0423-00			RES.,FXD,FILM:249K OHM,1%,0.125W	91637	MFF1816G24902F
R332	----- -----			(OPTION 22 ONLY)		
R334	322-0481-00			RES.,FXD,FILM:1M OHM,1%,0.25W	75042	CEBT0-1004F
R335	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R338	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R340	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R344	321-0207-00			RES.,FXD,FILM:1.4K OHM,1%,0.125W	91637	MFF1816G14000F
R350	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R352	315-0242-00	B010100	B011236	RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R352	301-0242-00	B011237		RES.,FXD,CMPSN:2.4K OHM,5%,0.50W	01121	EB2425
R355	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R356	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R357	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R362	315-0242-00	B010100	B011236	RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R362	301-0242-00	B011237		RES.,FXD,CMPSN:2.4K OHM,5%,0.50W	01121	EB2425
R365	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R366	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R367	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R370	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R373	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R375	311-1311-00			RES.,VAR,NONWIR:1K OHM,20%,0.5W	01121	73M4G048L102M
R376	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R380	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R383	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R385	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R386	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R390	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R392	311-1561-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	73138	91-83-0
R393	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R394	311-1274-00			RES.,VAR,NONWIR:500K OHM,10%,0.50W	32997	3329P-L58-504
R395	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R398	323-0385-00			RES.,FXD,FILM:100K OHM,1%,0.50W	75042	CECT0-1003F
R400	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R402	321-0256-00			RES.,FXD,FILM:4.53K OHM,1%,0.125W	91637	MFF1816G45300F
R405	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R408	323-0385-00			RES.,FXD,FILM:100K OHM,1%,0.50W	75042	CECT0-1003F
R410	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R414	301-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.50W	01121	EB6815
R416	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R417	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R420	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R424	301-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.50W	01121	EB6815
R426	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R427	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R430	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R433	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R437	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R439	315-0270-00			RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
R440	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R442	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R443	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R447	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R450	321-0166-00			RES.,FXD,FILM:523 OHM,1%,0.125W	91637	MFF1816G523R0F
R452	321-0238-00			RES.,FXD,FILM:2.94K OHM,1%,0.125W	91637	MFF1816G29400F
R453	323-0403-00			RES.,FXD,FILM:154K OHM,1%,0.50W	75042	CECT0-1543F
R455	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R456	321-0197-00			RES.,FXD,FILM:1.1K OHM,1%,0.125W	91637	MFF1816G11000F
R458	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	91637	MFF1816G301R0F
R459	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R460	321-0166-00			RES.,FXD,FILM:523 OHM,1%,0.125W	91637	MFF1816G523R0F
R462	321-0238-00			RES.,FXD,FILM:2.94K OHM,1%,0.125W	91637	MFF1816G29400F
R463	323-0403-00			RES.,FXD,FILM:154K OHM,1%,0.50W	75042	CECT0-1543F
R465	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R466	321-0197-00			RES.,FXD,FILM:1.1K OHM,1%,0.125W	91637	MFF1816G11000F
R468	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	91637	MFF1816G301R0F
R469	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R480	311-1263-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
R482	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R484	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R486	321-0346-00			RES.,FXD,FILM:39.2K OHM,1%,0.125W	91637	MFF1816G39201F
R501	322-0481-00			RES.,FXD,FILM:1M OHM,1%,0.25W	75042	CEBT0-1004F
R501	----- -----			(OPTION 26 ONLY)		
R501	322-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.25W	75042	CEBT0-49R90F
R503	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R505	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R508	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R510	321-0109-00			RES.,FXD,FILM:133 OHM,1%,0.125W	91637	MFF1816G133R0F
R511	322-0481-00			RES.,FXD,FILM:1M OHM,1%,0.25W	75042	CEBT0-1004F
R511	----- -----			(OPTION 26 ONLY)		
R511	322-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.25W	75042	CEBT0-49R90F
R512	311-1563-00			RES.,VAR,NONWIR:1K OHM,20%,0.50W	73138	91-85-0
R513	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R515	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R518	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R523	315-0682-00	B010100	B010331	RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R523	315-0432-00	B010332		RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R525	315-0181-00	B010332		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R529	321-0169-00			RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562R0F
R533	315-0682-00	B010100	B010331	RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R533	315-0432-00	B010332		RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R535	315-0181-00	B010332		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R536	315-0164-00	B010332		RES.,FXD,CMPSN:160K OHM,5%,0.25W	01121	CB1645
R537	321-0197-00			RES.,FXD,FILM:1.1K OHM,1%,0.125W	91637	MFF1816G11000F
R538	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R550	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R552	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R554	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R555	311-1313-00			RES.,VAR,NONWIR:2K OHM,20%,0.5W	01121	73M4G048L202M
R556	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R557	323-0322-00			RES.,FXD,FILM:22.1K OHM,1%,0.50W	75042	CECT0-2212F
R560	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R562	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
R564	303-0202-00	B010100	B010331	RES.,FXD,CMPSN:2K OHM,5%,1W	01121	GB2025
R564	303-0162-00	B010332		RES.,FXD,CMPSN:1.6 OHM,5%,1W	01121	GB1625
R568	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R570	308-0436-00	B010100	B010331	RES.,FXD,WW:2K OHM,0.1%,3W	91637	RS2B-110-20000B
R570	308-0300-00	B010332		RES.,FXD,WW:1.75K OHM,1%,3W	91637	RS2B-B17500F
R572	321-0306-00	B010100	B010331	RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R572	321-0296-00	B010332		RES.,FXD,FILM:11.8K OHM,1%,0.125W	91637	MFF1816G11801F
R574	323-0358-00			RES.,FXD,FILM:52.3K OHM,1%,0.50W	75042	CECT0-5232F
R577	321-0176-00			RES.,FXD,FILM:665 OHM,1%,0.125W	91637	MFF1816G665R0F
R580	303-0102-00			RES.,FXD,CMPSN:1K OHM,5%,1W	01121	GB1025
R582	321-0126-00			RES.,FXD,FILM:200 OHM,1%,0.125W	91637	MFF1816G200R0F
R588	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R590	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R591	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R592	315-0270-00			RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
R593	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R596	315-0270-00			RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
R598	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R603	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R604	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R606	321-0178-00			RES.,FXD,FILM:698 OHM,1%,0.125W	91637	MFF1816G698R0F
R611	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R612	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R614	321-0175-00			RES.,FXD,FILM:649 OHM,1%,0.125W	91637	MFF1816G649R0F
R615	311-1561-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	73138	91-83-0
R617	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R618	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R621	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R622	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R624	321-0175-00			RES.,FXD,FILM:649 OHM,1%,0.125W	91637	MFF1816G649R0F
R625	311-1561-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	73138	91-83-0
R626	311-1560-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	73138	91-82-0
R631	321-0183-00			RES.,FXD,FILM:787 OHM,1%,0.125W	91637	MFF1816G787R0F
R636	321-0183-00			RES.,FXD,FILM:787 OHM,1%,0.125W	91637	MFF1816G787R0F
R638	321-0155-00			RES.,FXD,FILM:402 OHM,1%,0.125W	91637	MFF1816G402R0F
R643	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R644	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R646	321-0175-00			RES.,FXD,FILM:649 OHM,1%,0.125W	91637	MFF1816G649R0F
R651	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R652	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R654	321-0175-00			RES.,FXD,FILM:649 OHM,1%,0.125W	91637	MFF1816G649R0F
R655	311-1561-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	73138	91-83-0
R657	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R661	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R662	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R664	321-0175-00			RES.,FXD,FILM:649 OHM,1%,0.125W	91637	MFF1816G649R0F
R665	311-1561-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	73138	91-83-0
R671	321-0183-00			RES.,FXD,FILM:787 OHM,1%,0.125W	91637	MFF1816G787R0F
R672	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R673	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R675	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R676	321-0183-00			RES.,FXD,FILM:787 OHM,1%,0.125W	91637	MFF1816G787R0F
R679	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R681	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R682	315-0150-00			RES.,FXD,CMPSN:15 OHM,5%,0.25W	01121	CB1505
R683	323-0354-00			RES.,FXD,FILM:47.5K OHM,1%,0.50W	75042	CECT0-4752F
R687	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R688	323-0381-00			RES.,FXD,FILM:90.9K OHM,1%,0.50W	75042	CECT0-9092F
R690	308-0391-00			RES.,FXD,WW:7.2K OHM,5%,3W	91637	RS2B-B72000J
R692	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R693	301-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.50W	01121	EB4715
R694	301-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.50W	01121	EB2235
R695	316-0102-00			RES.,FXD,CMPSN:1K OHM,10%,0.25W	01121	CB1021
R696	301-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.50W	01121	EB2725
R697	301-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.50W	01121	EB1065
R698	311-1312-00			RES.,VAR,NONWIR:5M OHM,20%,1W	32997	81C1D-E24-BAO328
R701	316-0471-00			RES.,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R702	321-0268-00			RES.,FXD,FILM:6.04K OHM,1%,0.125W	91637	MFF1816G60400F
R703	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
R705	311-1555-00			RES.,VAR,NONWIR:100K OHM,20%,0.5W	73138	91-77-0
R707	323-0354-00			RES.,FXD,FILM:47.5K OHM,1%,0.50W	75042	CECT0-4752F
R709	323-0231-00			RES.,FXD,FILM:2.49K OHM,1%,0.50W	75042	CECT0-2491F

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R712	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R715	308-0499-00			RES.,FXD,WW:0.5 OHM,10%,2.5W AXIAL	91637	CW2B-R500K-TR
R718	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R720	301-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.50W	01121	EB1005
R723	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R724	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R725	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
R726	316-0100-00			RES.,FXD,CMPSN:10 OHM,10%,0.25W	01121	CB1001
R727	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R728	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R729	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R730	311-1561-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	73138	91-83-0
R732	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R734	307-0524-00			RES.,THICK FILM:	80009	307-0524-00
R735	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R738	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R740	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R742	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R744	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R746	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R748	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R750	311-1332-00			RES.,VAR,NONWIR:5K OHM,10%,2W	12697	CM40936
R754	301-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.50W	01121	EB8215
R760	316-0100-00			RES.,FXD,CMPSN:10 OHM,10%,0.25W	01121	CB1001
R763	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
R764	301-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.50W	01121	EB4705
R765	301-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.50W	01121	EB2735
R766	301-0560-00			RES.,FXD,CMPSN:56 OHM,5%,0.50W	01121	EB5605
R767	301-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.50W	01121	EB2005
R768	315-0564-00			RES.,FXD,CMPSN:560K OHM,5%,0.25W	01121	CB5645
R769	316-0471-00			RES.,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R770	301-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.50W	01121	EB1815
R772	323-0386-00	B010100	B010119	RES.,FXD,FILM:102K OHM,1%,0.50W	75042	CECT0-1023F
R772	323-0363-00	B010120		RES.,FXD,FILM:59K OHM,1%,0.50W	91637	MFF1226G59001F
R774	311-1557-00			RES.,VAR,NONWIR:25K OHM,20%,0.50W	73138	91-79-0
R775	321-0354-00	B010100	B010119	RES.,FXD,FILM:47.5K OHM,1%,0.125W	91637	MFF1816G47501F
R775	322-0331-00	B010120		RES.,FXD,FILM:27.4K OHM,1%,0.25W	01121	ORD BY DESCR
R776	316-0471-00			RES.,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R777	301-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.50W	01121	EB4715
R778	301-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.50W	01121	EB4715
R782	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
R786	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R788	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
R794	323-0376-00			RES.,FXD,FILM:80.6K OHM,1%,0.50W	75042	CECT0-8062F
R795	316-0471-00			RES.,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R798	311-1556-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	73138	91-78-0
R799	316-0471-00			RES.,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R808	301-0150-00			RES.,FXD,CMPSN:15 OHM,5%,0.50W	01121	EB1505
R810	301-0304-00			RES.,FXD,CMPSN:300K OHM,5%,0.50W	01121	EB3045
R816	308-0460-00			RES.,FXD,WW:56 OHM,5%,3W	91637	RS2B-B56R00J
R818	308-0061-00			RES.,FXD,WW:1.5K OHM,5%,5W	91637	RS5-B15000J
R822	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
R824	301-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.50W	01121	EB8225
R826	323-0726-00			RES.,FXD,FILM:306K OHM,1%,0.50W	91637	MFF1226G30602F

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R828	321-0359-00	B010100	B010331	RES.,FXD,FILM:53.6K OHM,1%,0.125W	91637	MFF1816G53601F
R828	321-0360-00	B010332		RES.,FXD,FILM:54.9K OHM,1%,0.125W	91637	MFF1816G54901F
R830	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R832	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R834	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R836	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R842	308-0231-00			RES.,FXD,WW:220 OHM,5%,3W	91637	RS2B-B220R0J
R844	308-0058-00			RES.,FXD,WW:1.5 OHM,10%,1W	75042	BW20-1R500K
R845	301-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.50W	01121	EB2245
R850	311-1564-00			RES.,VAR,NONWIR:TRMR,500 OHM,0.5W	73138	91-86-0
R852	321-0250-00			RES.,FXD,FILM:3.92K OHM,1%,0.125W	91637	MFF1816G39200F
R854	321-0242-00			RES.,FXD,FILM:3.24K OHM,1%,0.125W	91637	MFF1816G32400F
R857	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R870	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R872	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R874	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
R876	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R877	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	CMF55116G30101F
R882	308-0231-00			RES.,FXD,WW:220 OHM,5%,3W	91637	RS2B-B220R0J
R884	308-0703-00			RES.,FXD,WW:1.8 OHM,5%,2W	75042	BWH-1R800J
R885	301-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.50W	01121	EB2245
R886	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R888	315-0101-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB1015
S110	260-1811-00			SWITCH,SLIDE:DPDT,0.5 A,125VAC-DC	82389	C5B206L2
S110	----- -----			(OPTION 22 ONLY)		
S130	260-1811-00			SWITCH,SLIDE:DPDT,0.5 A,125VAC-DC	82389	C5B206L2
S130	----- -----			(OPTION 22 ONLY)		
S310	260-1811-00			SWITCH,SLIDE:DPDT,0.5 A,125VAC-DC	82389	C5B206L2
S310	----- -----			(OPTION 22 ONLY)		
S330	260-1811-00			SWITCH,SLIDE:DPDT,0.5 A,125VAC-DC	82389	C5B206L2
S330	----- -----			(OPTION 22 ONLY)		
S800	260-1222-00			SWITCH,PUSH-PUL:10A,250VAC	91929	2DM301
S802	260-0413-00			SW,THERMOSTATIC:10A,240V	73803	20700L63-253
T710	120-1053-00			XFMR,POWER:H.V.	80009	120-1053-00
T805	120-1054-00			XFMR,POWER:H.V.	80009	120-1054-00
U740	156-0067-00	B010100	B010684	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	01295	MICROA741CP
U740	156-0067-01	B010685		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,CHK	01295	UA741CP3
V725	154-0802-00			ELECTRON TUBE:CRT,P31,FINISHED	80009	154-0802-00
V725	154-0811-00			ELECTRON TUBE:CRT,P31,INTERNAL SCALE	80009	154-0811-00
V725	----- -----			(OPTION 1 ONLY)		
V725	154-0811-04			ELECTRON TUBE:CRT,P11,INTERNAL SCALE	80009	154-0811-04
V725	----- -----			(OPTION 1 & 78 ONLY)		
V725	154-0802-04			ELECTRON TUBE:CRT,P11,FINISHED	80009	154-0802-04
V725	----- -----			(OPTION 78 ONLY)		
VR160	152-0055-00			SEMICOND DEVICE:ZENER,0.4W,11V,5%	04713	SZG35009K1
VR170	152-0395-00			SEMICOND DEVICE:ZENER,0.4W,4.3V,5%	14552	TD332317
VR180	152-0395-00			SEMICOND DEVICE:ZENER,0.4W,4.3V,5%	14552	TD332317
VR239	152-0520-00			SEMICOND DEVICE:ZENER,1W,12V,5%	15238	Z6033
VR258	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR268	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR360	152-0055-00			SEMICOND DEVICE:ZENER,0.4W,11V,5%	04713	SZG35009K1
VR370	152-0693-00			SEMICOND DEVICE:ZENER,0.4W,4V,5%	80009	152-0693-00
VR380	152-0395-00			SEMICOND DEVICE:ZENER,0.4W,4.3V,5%	14552	TD332317
VR439	152-0520-00			SEMICOND DEVICE:ZENER,1W,12V,5%	15238	Z6033

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
VR458	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR468	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR550	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR569	152-0286-00	B010332		SEMICOND DEVICE:ZENER,0.4W,75V,5%	80009	152-0286-00
VR582	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR591	152-0212-00			SEMICOND DEVICE:ZENER,0.5W,9V,5%	04713	SZ50646RL
VR597	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR634	152-0243-00			SEMICOND DEVICE:ZENER,0.4W,15V,5%	14552	TD3810983
VR674	152-0243-00			SEMICOND DEVICE:ZENER,0.4W,15V,5%	14552	TD3810983
VR686	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR704	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903
VR705	152-0357-00			SEMICOND DEVICE:ZENER,0.4W,82V,5%	04713	SZ12461KRL
VR706	152-0357-00			SEMICOND DEVICE:ZENER,0.4W,82V,5%	04713	SZ12461KRL
VR712	152-0243-00			SEMICOND DEVICE:ZENER,0.4W,15V,5%	14552	TD3810983
VR794	152-0241-00			SEMICOND DEVICE:ZENER,0.4W,33V,5%	04713	SZG35009K5
VR795	152-0286-00			SEMICOND DEVICE:ZENER,0.4W,75V,5%	80009	152-0286-00
VR798	152-0428-00	B010100	B010849	SEMICOND DEVICE:ZENER,0.4W,120V,5%	80009	152-0428-00
VR798	152-0357-00	B010850		SEMICOND DEVICE:ZENER,0.4W,82V,5%	04713	SZ12461KRL
VR828	152-0394-00			SEMICOND DEVICE:ZENER,1W,47V,5%	04713	1N3036B
VR832	152-0227-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ13903

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A5	670-2278-00			CKT BOARD ASSY:SWEEP GENERATOR	80009	670-2278-00
C905	281-0503-00			CAP.,FXD,CER DI:8PF,+/-0.5PF,500V	59660	0301-080-COHO-80
C910	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C912	281-0629-00			CAP.,FXD,CER DI:33PF,5%,600V	04222	7027-C0G-330J
C914	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
C924	283-0041-00			CAP.,FXD,CER DI:0.0033UF,5%,500V	59660	841-542B332J
C925	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C930	285-0754-02			CAP.,FXD,PLSTC:0.001UF,3%,400V	80009	285-0754-02
C930	----- -----			(AVAIL AS A MATCHED SET, PART NUMBERS		
C930	----- -----			295-0159-00. THE LETTER SUFFIX AND THE		
C930	----- -----			TOLERANCE SHOULD BE THE SAME FOR ALL OF		
C930	----- -----			ASSEMBLY)		
C934	285-0753-00			CAP.,FXD,PLSTC:0.01UF,3.5%,100V	80009	285-0753-00
C934	----- -----			(SEE FOOTNOTE ON C930)		
C938	285-0895-00			CAP.,FXD,PLSTC:1.0UF,3%,25V	80009	285-0895-00
C938	----- -----			(SEE FOOTNOTE ON C930)		
C960	281-0604-00			CAP.,FXD,CER DI:2.2PF,+/-0.25PF,500V	04222	7001-C0J-2R2C
C976	281-0549-00			CAP.,FXD,CER DI:68PF,10%,500V	59660	301-000U2J0680K
C962	290-0572-00			CAP.,FXD,ELCTLT:0.1UF,20%,50V	56289	196D104X0050HA1
C990	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C994	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C995	290-0572-00			CAP.,FXD,ELCTLT:0.1UF,20%,50V	56289	196D104X0050HA1
CR930	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR975	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
Q960	151-0342-00			TRANSISTOR:SILICON,PNP	07263	S035928
Q964	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q975	151-0342-00			TRANSISTOR:SILICON,PNP	07263	S035928
Q978	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
R364	315-0361-00			RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R905	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
R906	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R910	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R915	311-0607-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	82-25-2
R918	311-0949-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	01121	WA1G040S202UA
R920	316-0333-00			RES.,FXD,CMPSN:33K OHM,10%,0.25W	01121	CB3331
R922	316-0122-00			RES.,FXD,CMPSN:1.2K OHM,10%.0.25W	01121	CB1221
R924	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R930	321-0356-00			RES.,FXD,FILM:49.9K OHM,1%,0.125W	91637	MFF1816G49901F
R934	321-0452-00			RES.,FXD,FILM:499K OHM,1%,0.125W	91637	MFF1816G49902F
R938	307-0381-00			RES.,FXD,FILM:4.99M OHM,1%,0.5W	03888	FLYZ 4.99M+/-1%
R945	311-0443-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.75W	11237	300SF-41330
R946	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R950	321-0327-00			RES.,FXD,FILM:24.9K OHM,1%,0.125W	91637	MFF1816G24901F
R952	321-0311-00			RES.,FXD,FILM:16.9K OHM,1%,0.125W	91637	MFF1816G16901F
R955	321-0369-00			RES.,FXD,FILM:68.1K OHM,1%,0.125W	91637	MFF1816G68101F
R956	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R958	316-0222-00			RES.,FXD,CMPSN:2.2K OHM,10%,0.25W	01121	CB2221
R960	316-0333-00			RES.,FXD,CMPSN:33K OHM,10%,0.25W	01121	CB3331
R962	316-0101-00			RES.,FXD,CMPSN:100 OHM,10%,0.25W	01121	CB1011
R965	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.5%,0.5W	73138	82P-6-2-102K
R967	321-0230-00			RES.,FXD,FILM:2.43K OHM,1%,0.125W	91637	MFF1816G24300F
R971	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R973	316-0102-00			RES.,FXD,CMPSN:1K OHM,10%,0.25W	01121	CB1021
R975	316-0102-00			RES.,FXD,CMPSN:1K OHM,10%,0.25W	01121	CB1021

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R976	316-0471-00			RES.,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R978	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R990	301-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.50W	01121	EB2415
R994	303-0821-00			RES.,FXD,CMPSN:820 OHM,5%,1W	01121	GB8215
S350	260-1811-00			SWITCH,SLIDE:DPDT,0.5 A,125VAC-DC	82389	C5B206L2
S555	260-1811-00			SWITCH,SLIDE:DPDT,0.5 A,125VAC-DC	82389	C5B206L2
S909	260-0960-01			SWITCH,SLIDE:0.5A,120VDC,CKT BD MT	10389	23-021-043
S930	105-0389-00			ACTR ASSY,CAM S:TIMING	80009	105-0389-00
U930	155-0055-00			MICROCIRCUIT,LI:MONOLITHIC,TRIG AND SWEEP	80009	155-0055-00
VR962	152-0166-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZ11738RL
VR990	152-0217-00			SEMICOND DEVICE:ZENER,0.4W,8.2V,5%	04713	SZG20
VR994	152-0217-00			SEMICOND DEVICE:ZENER,0.4W,8.2V,5%	04713	SZG20

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols and Reference Designators

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).

Resistors = Ohms (Ω).

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it goes to the low state.

Abbreviations are based on ANSI Y1.1-1972.

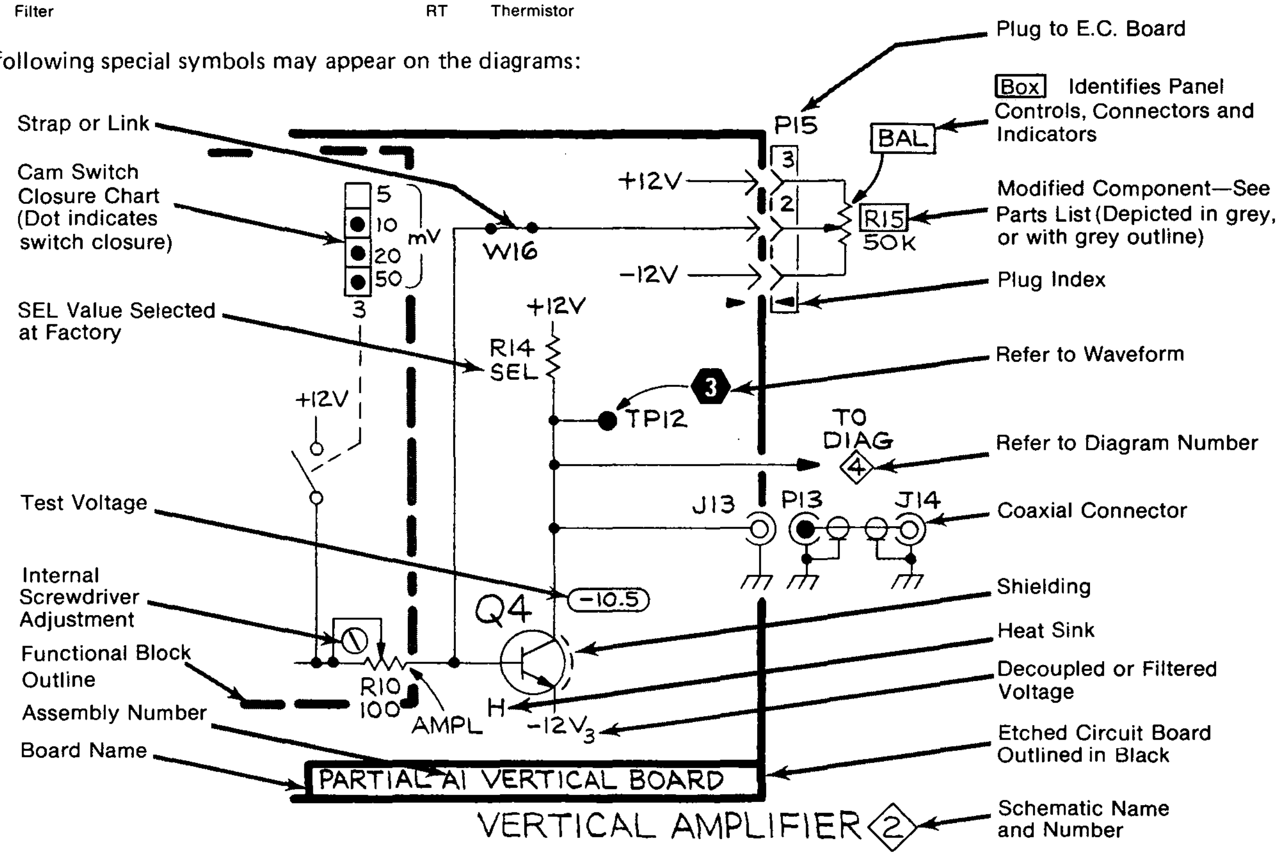
Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

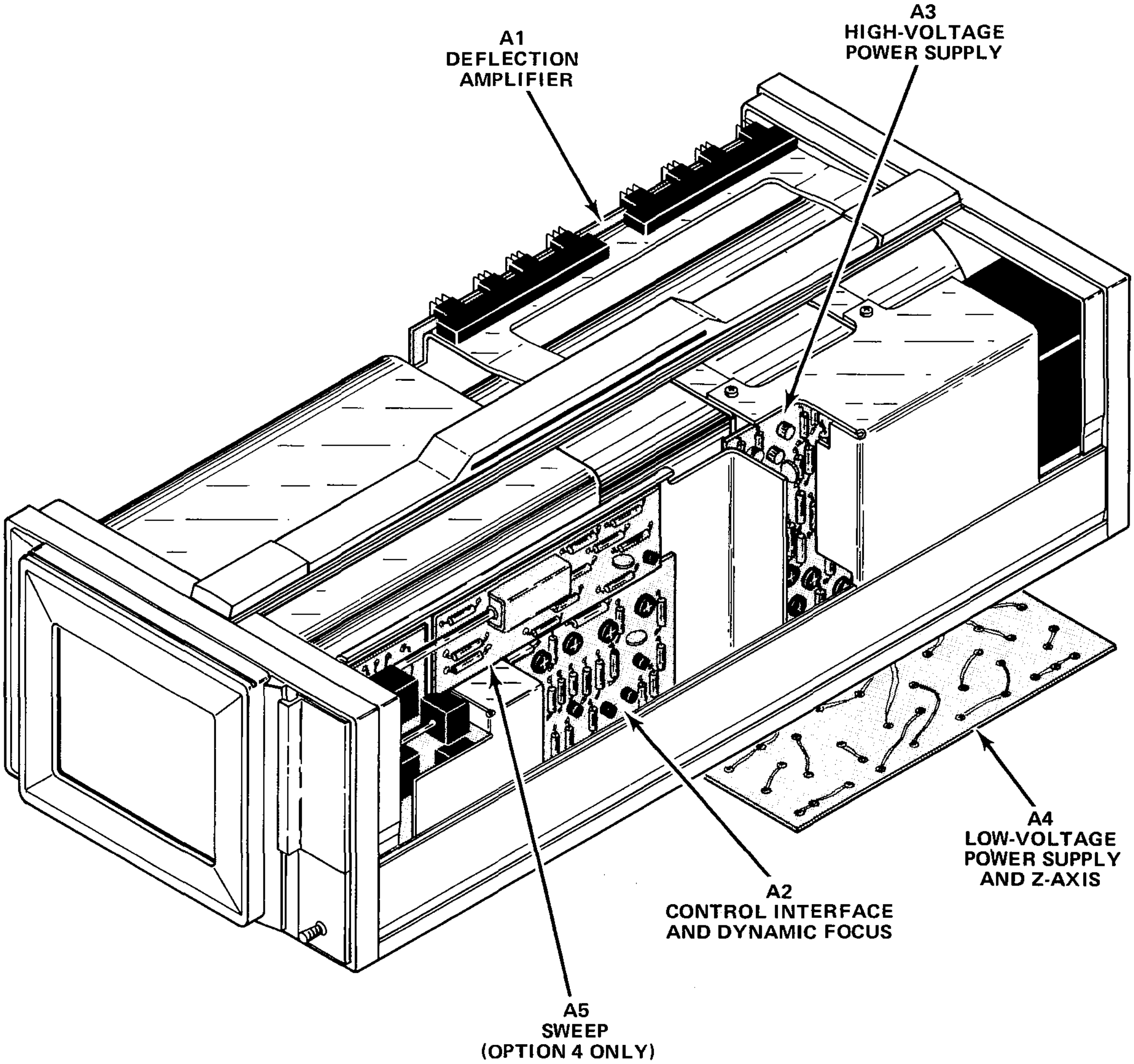
Y14.15, 1966	Drafting Practices.
Y14.2, 1973	Line Conventions and Lettering.
Y10.5, 1968	Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc)
AT	Attenuator, fixed or variable
B	Motor
BT	Battery
C	Capacitor, fixed or variable
CB	Circuit breaker
CR	Diode, signal or rectifier
DL	Delay line
DS	Indicating device (lamp)
E	Spark Gap, Ferrite bead
F	Fuse
FL	Filter
H	Heat dissipating device (heat sink, heat radiator, etc)
HR	Heater
HY	Hybrid circuit
J	Connector, stationary portion
K	Relay
L	Inductor, fixed or variable
M	Meter
P	Connector, movable portion
Q	Transistor or silicon-controlled rectifier
R	Resistor, fixed or variable
RT	Thermistor
S	Switch or contactor
T	Transformer
TC	Thermocouple
TP	Test point
U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
V	Electron tube
VR	Voltage regulator (zener diode, etc.)
W	Wirestrap or cable
Y	Crystal
Z	Phase shifter

The following special symbols may appear on the diagrams:




A1
DEFLECTION
AMPLIFIER
A3
HIGH-VOLTAGE
POWER SUPPLY
A4
LOW-VOLTAGE
POWER SUPPLY
AND Z-AXIS
A2
CONTROL INTERFACE
AND DYNAMIC FOCUS
A5
SWEEP
(OPTION 4 ONLY)

2025-33

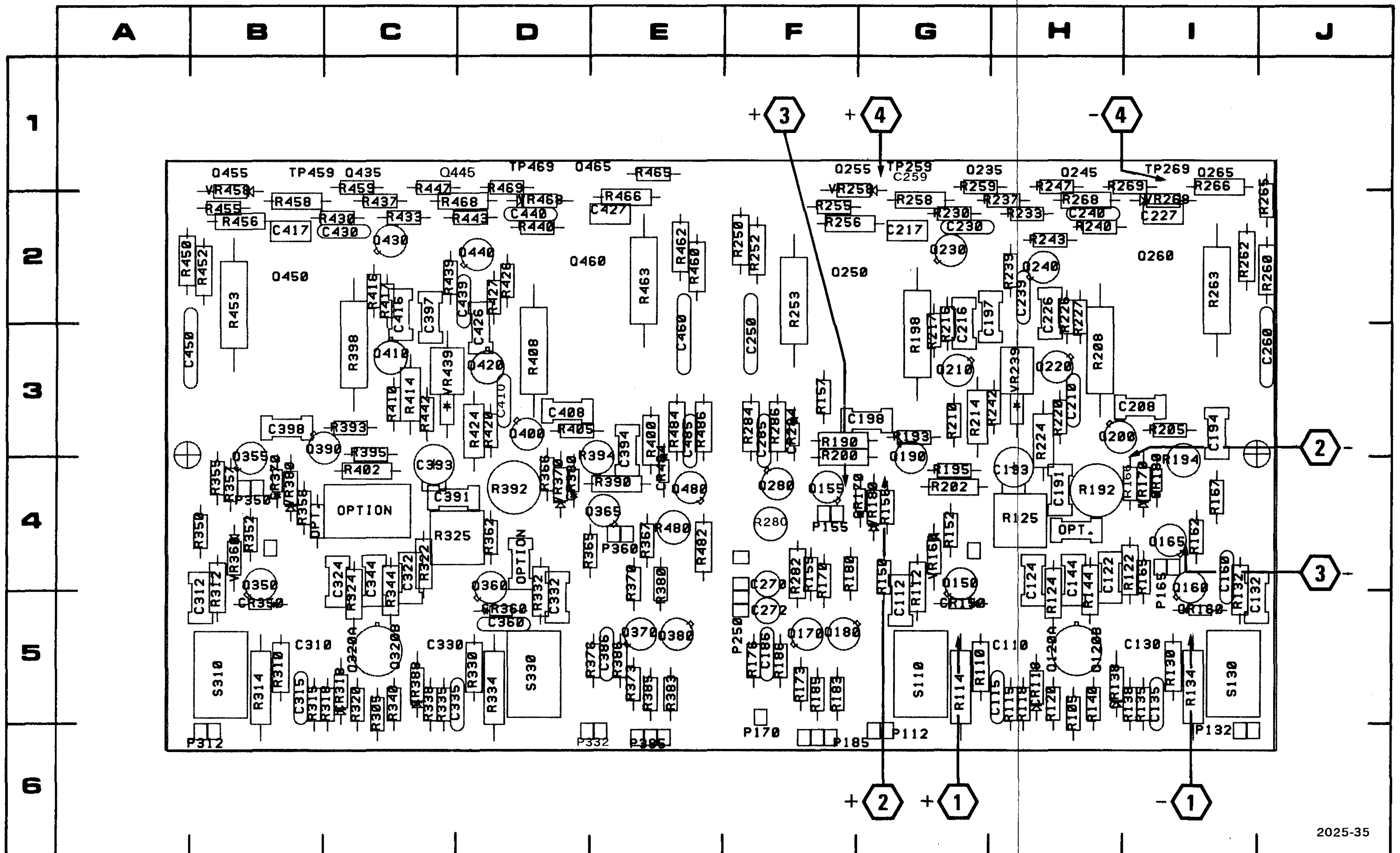


Fig. 10–2. A1–Vertical (Y) Amplifier component and waveform test point locations.

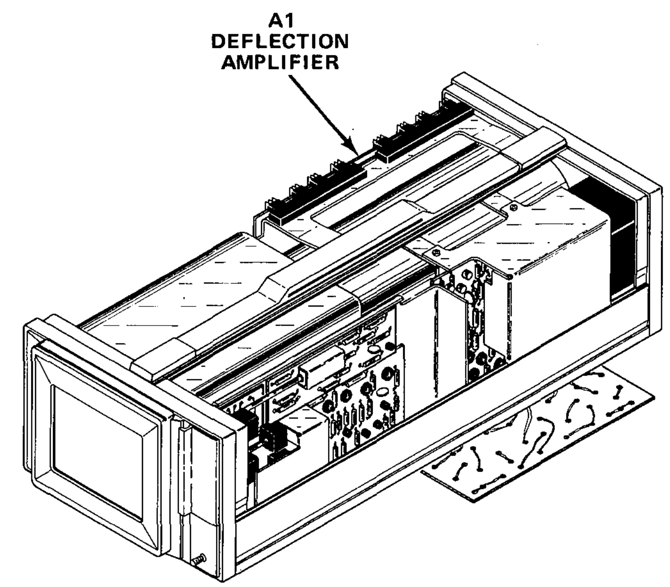


Fig. 10–2(A). Location of A1 Deflection Amplifier board.

@

CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD
C110	5H	C394	3E	Q120A	5H	R110	5G	R217	3G	R334	5D	R442	3C
C112	5G	C397	2C	Q120B	5H	R112	5G	R220	3H	R335	5C	R443	2D
C115	5H	C398	3B	Q150	4G	R114	5G	R224	3H	R338	5C	R447	1C
C122	4H	C408	3D	Q155	4F	R115	5H	R226	2H	R340	5C	R450	2A
C124	4H	C410	3D	Q160	4I	R118	5H	R227	2H	R344	4C	R452	2B
C130	5I	C416	2C	Q165	4I	R120	5H	R230	2G	R350	4B	R453	2B
C132	5I	C417	2B	Q170	5F	R122	4I	R233	2H	R352	4B	R455	2B
C135	5I	C426	3D	Q180	5F	R124	5H	R237	2H	R355	4B	R456	2B
C144	4H	C427	2E	Q190	4G	R125	4H	R239	2H	R356	4B	R458	2B
C160	4I	C430	2C	Q200	3H	R130	5I	R240	2H	R357	4B	R459	1C
C186	5F	C439	2D	Q210	3G	R132	4I	R242	3H	R362	4D	R460	2E
C191	4H	C440	2D	Q220	3H	R134	5I	R243	2H	R365	4E	R462	2E
C193	4H	C450	3A	Q230	2G	R135	5I	R247	1H	R366	4D	R463	2E
C194	3I	C460	3E	Q235	1G	R138	5I	R250	2F	R367	4E	R465	1E
C197	3G	C485	3E	Q240	2H	R140	5H	R252	2F	R370	4E	R466	2E
C198	3G			Q245	1H	R144	4H	R253	2F	R373	5E	R468	2D
C208	3I	CR118	5H	Q250	2F	R150	4G	R255	2F	R376	5E	R469	1D
C210	3H	CR138	5H	Q255	1F	R152	4G	R256	2F	R380	4E	R480	4E
C216	3G	CR150	5G	Q260	2I	R155	4F	R258	2G	R383	5E	R482	4E
C217	2G	CR160	5I	Q265	1I	R156	4G	R259	1G	R385	5E	R484	3E
C226	2H	CR170	4G	Q280	4F	R157	3F	R205	3I	R386	5E	R486	3E
C227	2I	CR180	4I	Q320A	5C	R162	4I	R260	2J	R390	4E		
C230	2G	CR284	3F	Q320B	5C	R165	4I	R262	2I	R392	4D	TP259	1G
C239	2H	CR318	5C	Q350	4B	R166	4I	R263	2I	R393	3C	TP269	1I
C240	2H	CR338	5C	Q355	3B	R167	4I	R265	2J	R394	3E	TP459	1B
C250	3F	CR350	5B	Q360	4D	R170	4F	R266	1I	R395	3C	TP469	1D
C259	1G	CR360	5D	Q365	4E	R173	5F	R268	2H	R398	3C		
C260	3J	CR370	4B	Q370	5E	R176	5F	R269	1I	R400	3E	S110	5G
C270	4F	CR380	4D	Q380	5E	R180	4F	R280	4F	R402	4C	S130	5I
C272	5F	CR484	4E	Q390	3C	R183	5F	R282	4F	R405	3D	S310	5B
C285	3F			Q400	3D	R185	5F	R284	3F	R408	3D	S330	5D
C310	5B			Q410	3C	R186	5F	R286	3F	R410	3C		
C312	5B	P112	6G	Q420	3D	R190	3F	R305	5C	R404	3C	VR160	4G
C315	5B	P132	6I	Q430	2C	R192	4H	R310	5B	R416	2C	VR170	4I
C322	4C	P155	4F	Q435	1C	R193	3G	R312	5B	R417	2C	VR180	4G
C324	4C	P165	4I	Q440	2D	R194	4I	R314	5B	R420	3D	VR239	3H
C330	5C	P170	5F	Q445	1D	R195	4G	R315	5B	R424	3D	VR258	1F
C332	5D	P185	6F	Q450	2B	R198	3G	R318	5C	R426	2D	VR268	2I
C335	5C	P250	5F	Q455	1B	R200	3F	R320	5C	R427	2D	VR360	4B
C344	4C	P312	6B	Q460	2D	R202	4G	R322	4C	R430	2C	VR370	4D
C360	5D	P332	6E	Q465	1E	R208	3H	R324	4C	R433	2C	VR380	4B
C386	5E	P350	4B	Q480	4E	R210	3G	R325	4C	R437	2C	VR439	3C
C391	4C	P360	4E			R214	3G	R330	5D	R439	2C	VR458	1B
C393	4C	P385	6E	R105	5H	R216	3G	R332	5D	R440	2D	VR468	2D

VOLTAGE AND WAVEFORM CONDITIONS

NOTE

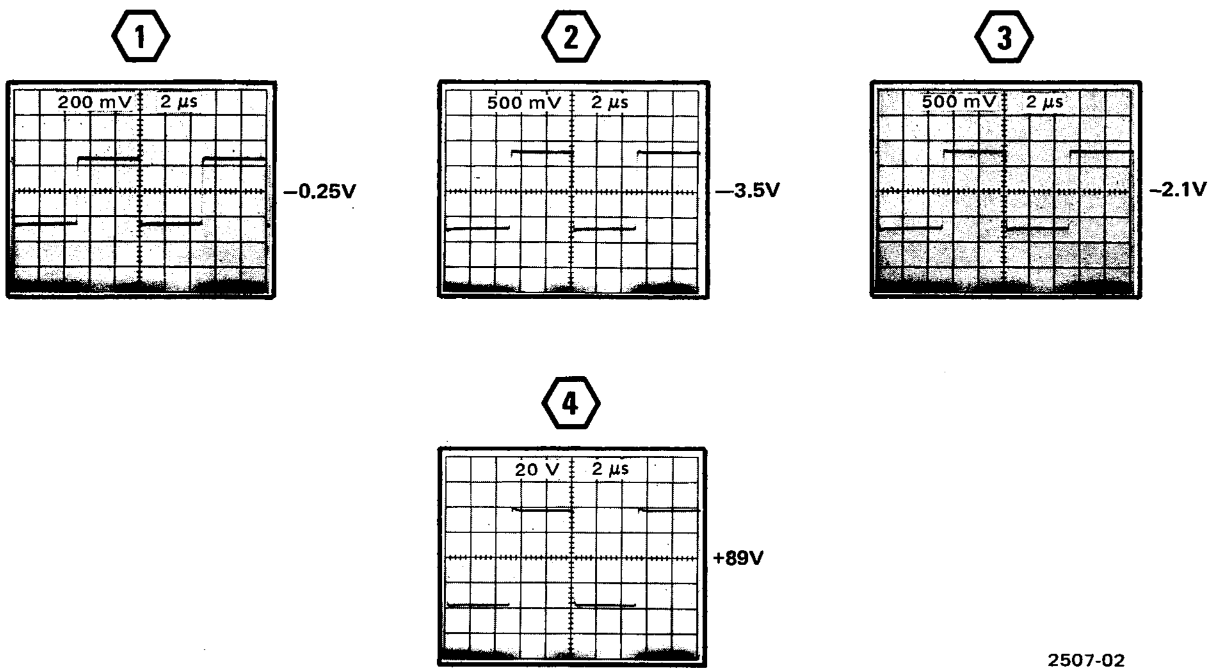
The test equipment used to obtain the voltages and waveforms is listed in Table 6-1, Test Equipment.

VOLTAGE CONDITIONS

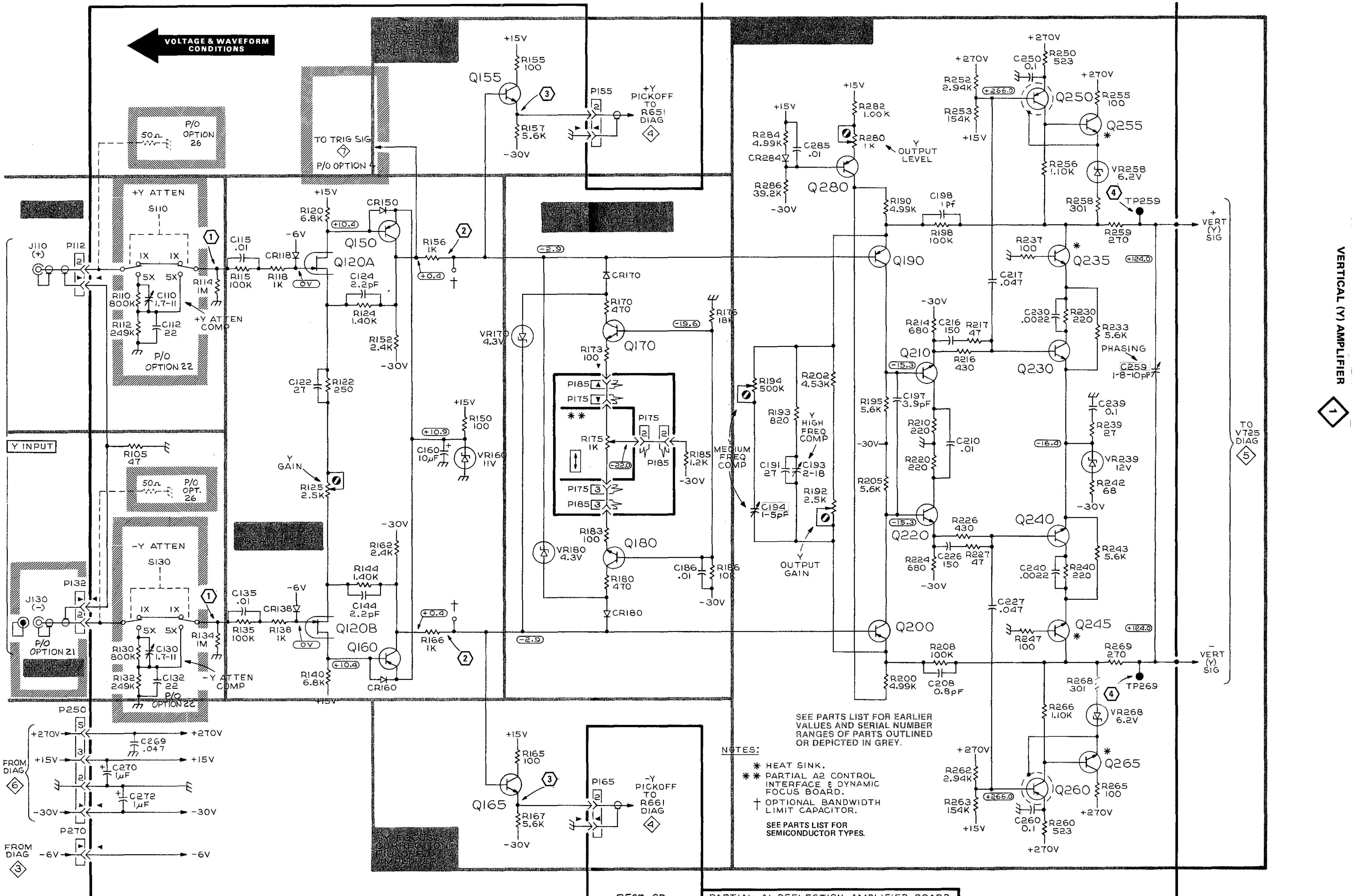
The dc voltages indicated on the schematic diagram were obtained with no test signal input using a digital multimeter. The INTENSITY and Position controls were set for a barely visible dot at near center screen with the internal sweep generator disconnected (Option 4 version only).

WAVEFORM CONDITIONS

The following waveforms were monitored with a test oscilloscope and a 10X probe. A negative-going 100 kHz, 0.5 V, square wave was applied to the appropriate input connector with the vertical position control centered, Y Atten switches at 1X, internal sweep generator disconnected (Option 4 version only), and the unused input connector grounded (grounding cap installed). The Y Gain was adjusted to 1 V for 8 divisions of deflection. The test points shown on the component and waveform test point location illustration with a + or — sign opposite the test point number indicates the input connector to which the test signal was applied.



2507-02



VERTICAL (Y) AMPLIFIER 1

606A MONITOR

2507-03

REV, MAY 1984

VERTICAL (Y) AMPLIFIER 1

Scan by Zenith

606A

ASSEMBLY A1

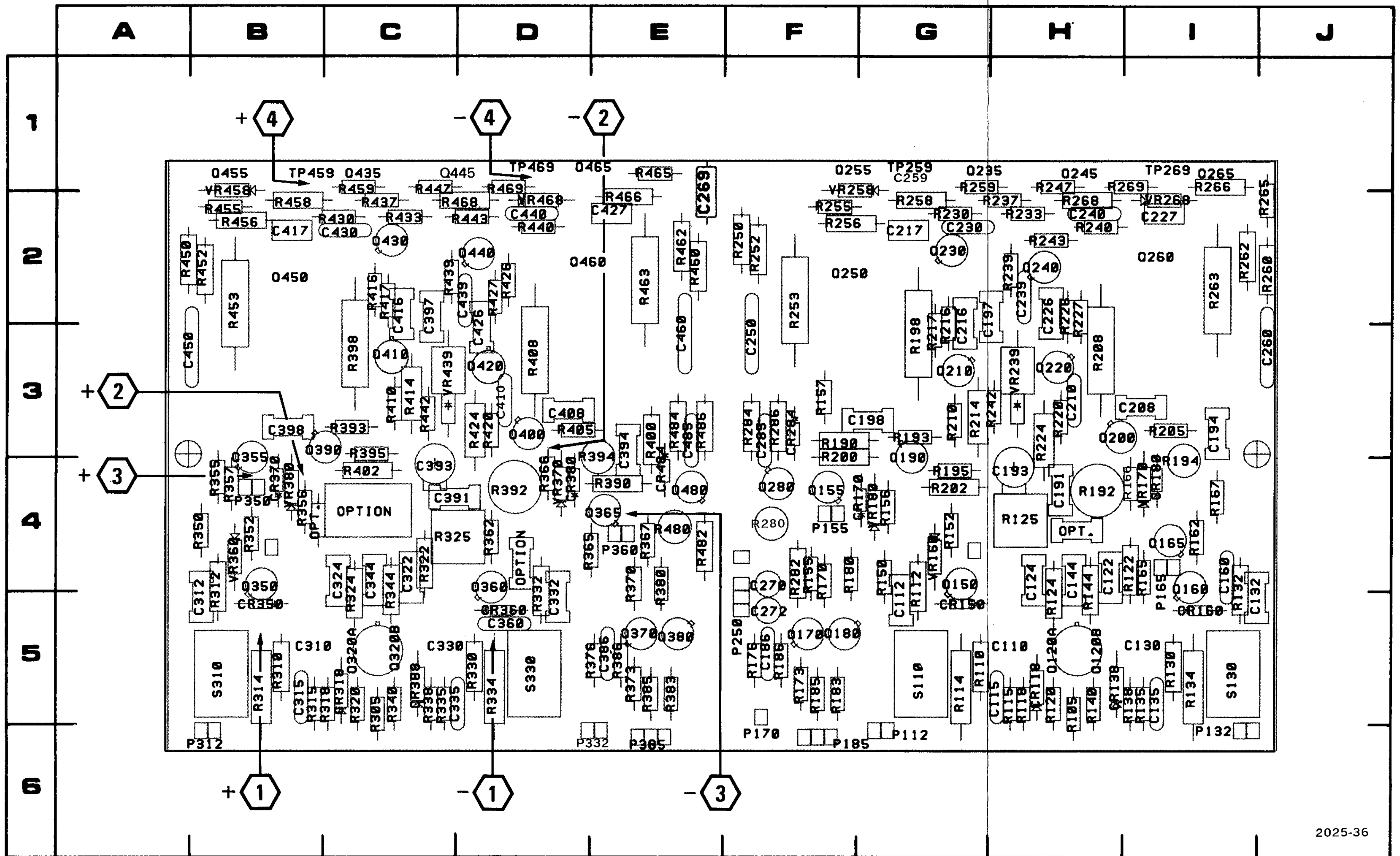


Fig. 10—3. A1—Horizontal (X) Amplifier component and waveform test point locations.

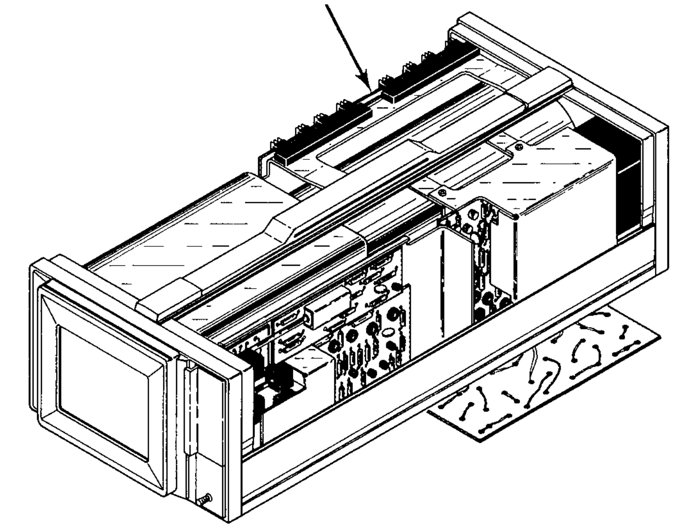


Fig. 10—3(A). Location of A1 Deflection Amplifier board.

*See Parts List
serial number

@

Scan by Zenith

CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD
C110	5H	C394	3E	Q120A	5H	R110	5G	R217	3G	R334	5D	R442	3C
C112	5G	C397	2C	Q120B	5H	R112	5G	R220	3H	R335	5C	R443	2D
C115	5H	C398	3B	Q150	4G	R114	5G	R224	3H	R338	5C	R447	1C
C122	4H	C408	3D	Q155	4F	R115	5H	R226	2H	R340	5C	R450	2A
C124	4H	C410	3D	Q160	4I	R118	5H	R227	2H	R344	4C	R452	2B
C130	5I	C416	2C	Q165	4I	R120	5H	R230	2G	R350	4B	R453	2B
C132	5I	C417	2B	Q170	5F	R122	4I	R233	2H	R352	4B	R455	2B
C135	5I	C426	3D	Q180	5F	R124	5H	R237	2H	R355	4B	R456	2B
C144	4H	C427	2E	Q190	4G	R125	4H	R239	2H	R356	4B	R458	2B
C160	4I	C430	2C	Q200	3H	R130	5I	R240	2H	R357	4B	R459	1C
C186	5F	C439	2D	Q210	3G	R132	4I	R242	3H	R362	4D	R460	2E
C191	4H	C440	2D	Q220	3H	R134	5I	R243	2H	R365	4E	R462	2E
C193	4H	C450	3A	Q230	2G	R135	5I	R247	1H	R366	4D	R463	2E
C194	3I	C460	3E	Q235	1G	R138	5I	R250	2F	R367	4E	R465	1E
C197	3G	C485	3E	Q240	2H	R140	5H	R252	2F	R370	4E	R466	2E
C198	3G			Q245	1H	R144	4H	R253	2F	R373	5E	R468	2D
C208	3I	CR118	5H	Q250	2F	R150	4G	R255	2F	R376	5E	R469	1D
C210	3H	CR138	5H	Q255	1F	R152	4G	R256	2F	R380	4E	R480	4E
C216	3G	CR150	5G	Q260	2I	R155	4F	R258	2G	R383	5E	R482	4E
C217	2G	CR160	5I	Q265	1I	R156	4G	R259	1G	R385	5E	R484	3E
C226	2H	CR170	4G	Q280	4F	R157	3F	R205	3I	R386	5E	R486	3E
C227	2I	CR180	4I	Q320A	5C	R162	4I	R260	2J	R390	4E		
C230	2G	CR284	3F	Q320B	5C	R165	4I	R262	2I	R392	4D	TP259	1G
C239	2H	CR318	5C	Q350	4B	R166	4I	R263	2I	R393	3C	TP269	1I
C240	2H	CR338	5C	Q355	3B	R167	4I	R265	2J	R394	3E	TP459	1B
C250	3F	CR350	5B	Q360	4D	R170	4F	R266	1I	R395	3C	TP469	1D
C259	1G	CR360	5D	Q365	4E	R173	5F	R268	2H	R398	3C		
C260	3J	CR370	4B	Q370	5E	R176	5F	R269	1I	R400	3E	S110	5G
C269*	1E	CR380	1E	Q380	5E	R180	4F	R280	4F	R402	4C	S130	5I
C270	4F	CR484	4E	Q390	3C	R183	5F	R282	4F	R405	3D	S310	5B
C272	5F			Q400	3D	R185	5F	R284	3F	R408	3D	S330	5D
C285	3F			Q410	3C	R186	5F	R286	3F	R410	3C		
C310	5B	P112	6G	Q420	3D	R190	3F	R305	5C	R404	3C	VR160	4G
C312	5B	P132	6I	Q430	2C	R192	4H	R310	5B	R416	2C	VR170	4I
C315	5B	P155	4F	Q435	1C	R193	3G	R312	5B	R417	2C	VR180	4G
C322	4C	P165	4I	Q440	2D	R194	4I	R314	5B	R420	3D	VR239	3H
C324	4C	P170	5F	Q445	1D	R195	4G	R315	5B	R424	3D	VR258	1F
C330	5C	P185	6F	Q450	2B	R198	3G	R318	5C	R426	2D	VR268	2I
C332	5D	P250	5F	Q455	1B	R200	3F	R320	5C	R427	2D	VR360	4B
C335	5C	P312	6B	Q460	2D	R202	4G	R322	4C	R430	2C	VR370	4D
C344	4C	P332	6E	Q465	1E	R208	3H	R324	4C	R433	2C	VR380	4B
C360	5D	P350	4B	Q480	4E	R210	3G	R325	4C	R437	2C	VR439	3C
C386	5E	P360	4E			R214	3G	R330	5D	R439	2C	VR458	1B
C391	4C	P385	6E	R105	5H	R216	3G	R332	5D	R440	2D	VR468	2D
C393	4C												

VOLTAGE AND WAVEFORM CONDITIONS

NOTE

The test equipment used to obtain the voltages and waveforms is listed in Table 6-1, Test Equipment.

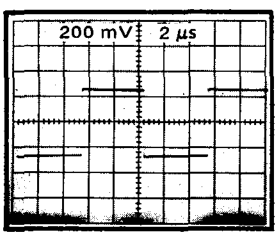
VOLTAGE CONDITIONS

The dc voltages on the schematic diagram were obtained with no test signal input using a digital multimeter. The INTENSITY and Position controls were set for a barely visible dot at near center screen with the internal sweep generator disconnected (Option 4 version only).

WAVEFORM CONDITIONS

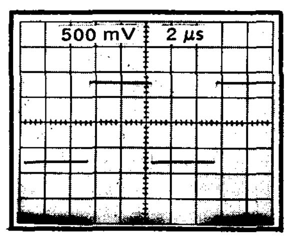
The following waveforms were monitored with a test oscilloscope and a 10X probe. A negative-going 100 kHz, 0.5 V square wave was applied to the appropriate input connector with the vertical Position control centered, X Atten switches at 1X, internal sweep generator disconnected (Option 4 version only), and the unused input connector grounded (grounding cap installed). The X Gain was adjusted to 1 V for 8 divisions of deflection. The test points shown on the component and waveform test point location illustration with a + or — sign opposite the test point number indicates the input connector to which the test signal was applied.

1



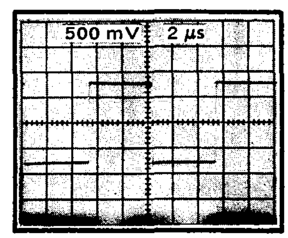
—0.25V

2



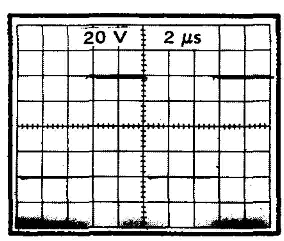
—3.4V

3



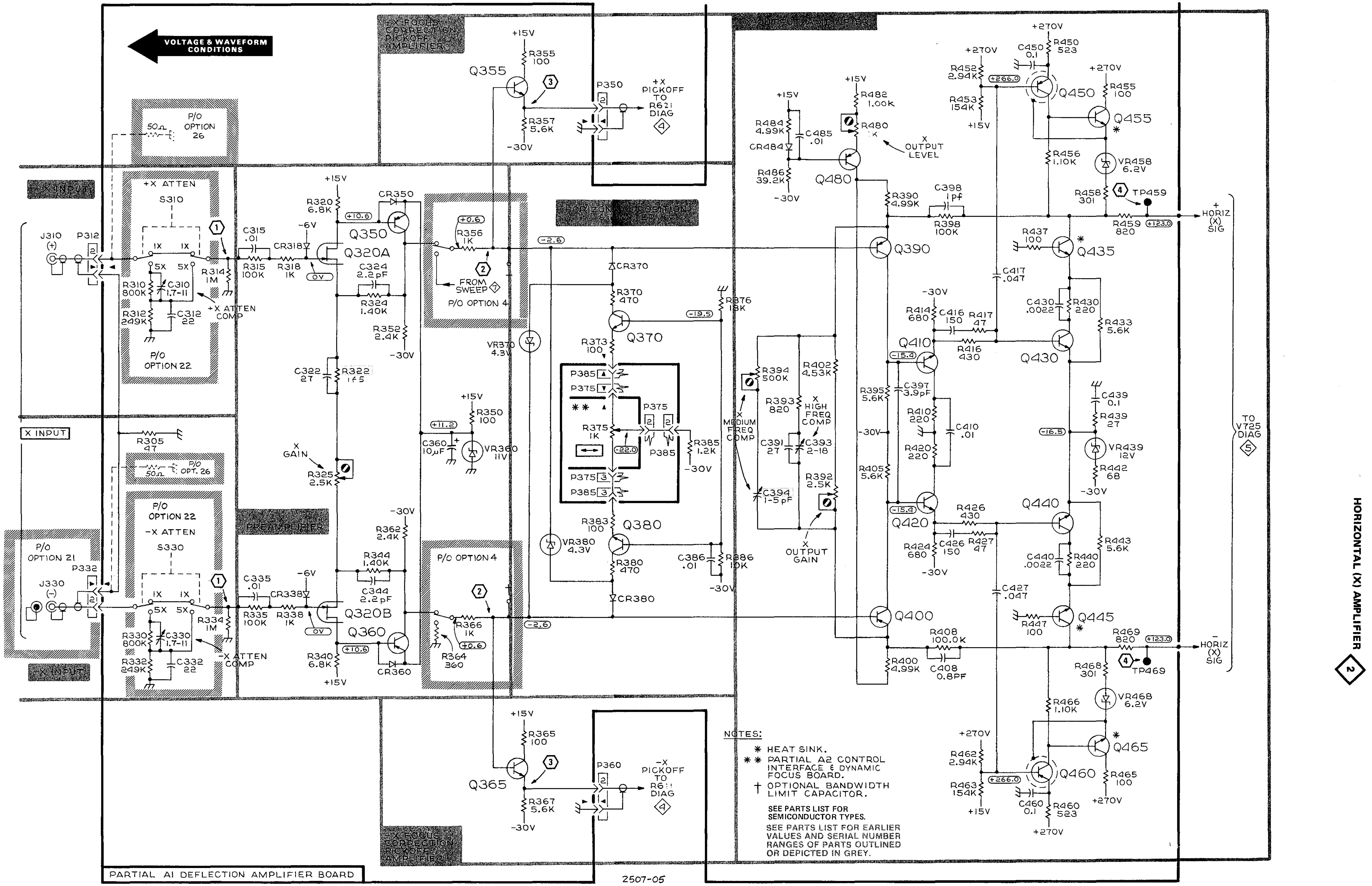
—4V

4



+87V

2507-04


VOLTAGE & WAVEFORM CONDITIONS
+X ATTEN
S310
-X ATTEN
S330
P/O OPTION 26
P/O OPTION 22
P/O OPTION 21
P/O OPTION 4
X INPUT
J310 (+)
J330 (-)
+X ATTEN COMP
-X ATTEN COMP
X GAIN
FROM SWEEP
+X PICKOFF TO R621 DIAG 4
-X PICKOFF TO R611 DIAG 4
X OUTPUT LEVEL
X MEDIUM FREQ COMP
X HIGH FREQ COMP
X OUTPUT GAIN
+ HORIZ (X) SIG
- HORIZ (X) SIG
TO V725 DIAG 5
Q350
Q320A
Q320B
Q360
Q355
Q365
Q370
Q380
Q390
Q400
Q410
Q420
Q430
Q440
Q435
Q445
Q450
Q455
Q460
Q465
Q480
NOTES:
* HEAT SINK.
** PARTIAL A2 CONTROL INTERFACE & DYNAMIC FOCUS BOARD.
† OPTIONAL BANDWIDTH LIMIT CAPACITOR.
SEE PARTS LIST FOR SEMICONDUCTOR TYPES.
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
PARTIAL A1 DEFLECTION AMPLIFIER BOARD
HORIZONTAL (X) AMPLIFIER 2

Scan by Zenith

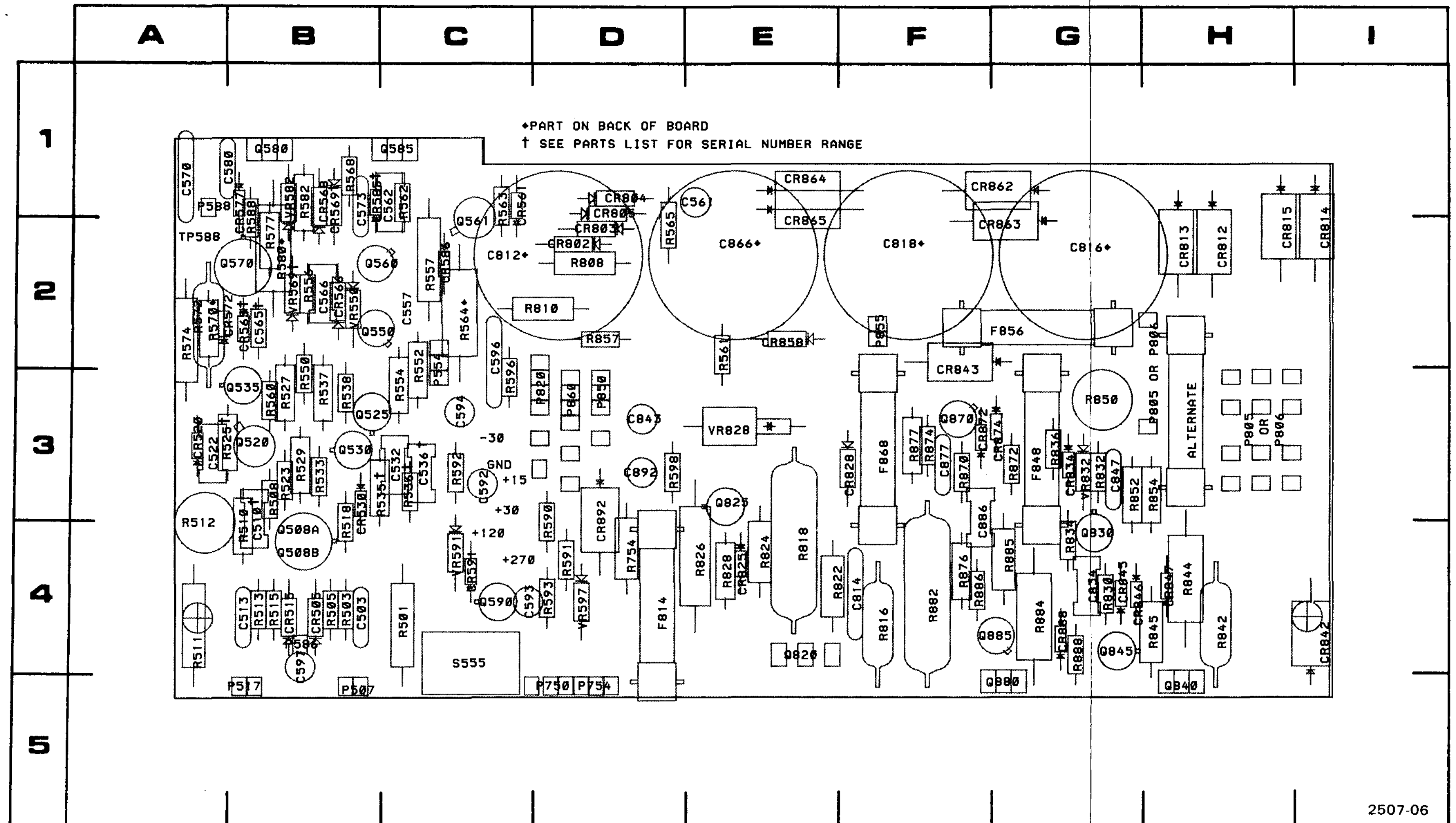


Fig. 10–4. A4–Z-Axis Amplifier component and waveform test point locations.

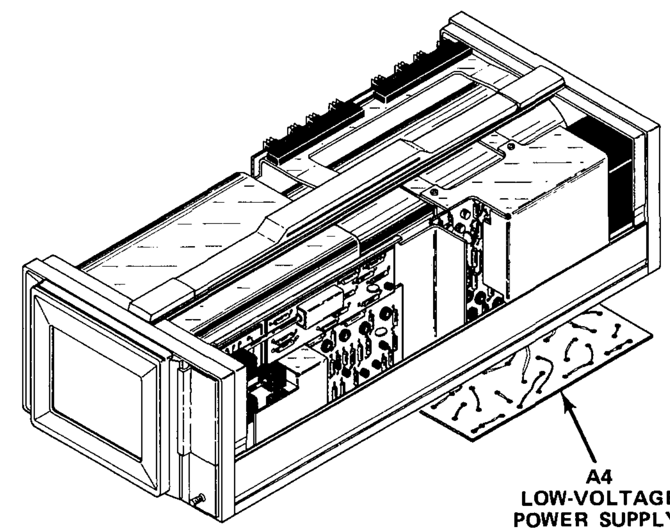


Fig. 10–4(A). Location of A4 Low-Voltage Power Supply and Z-Axis board.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C503	4B	CR815	2H	Q825	3E	R754	4D
C510	4B	CR825	4E	Q830	4G	R808	2D
C522	3A	CR828	3E	Q840	5H	R810	2D
C525	2B	CR834	3G	Q845	4G	R816	4F
C532	3C	CR842	4I	Q870	3F	R818	4E
C536	3C	CR843	3F	Q880	5G	R822	4E
C557	2C	CR846	4G	Q885	4G	R824	4E
C561	1E	CR847	4G			R826	4E
C562	1C	CR848	4H	R501	4C	R828	4E
C565	2B	CR858	2E	R503	4B	R830	4G
C566	2B	CR862	1F	R505	4B	R832	3G
C570	1A	CR863	2G	R508	3B	R834	4G
C573	1B	CR864	1E	R510	4B	R836	3G
C580	1A	CR865	2E	R511	4A	R842	4H
C592	3C	CR872	3F	R512	4A	R844	4H
C593	4C	CR874	3G	R513	4B	R845	4H
C594	3C	CR888	4G	R515	4B	R850	3G
C596	2C	CR892	3D	R518	4B	R852	3G
C597	4B			R523	3B	R854	3H
C812	2C	F814	4D	R525	3A	R857	2D
C814	4F	F848	3G	R527	3B	R870	3F
C816	2G	F856	2G	R529	3B	R874	3F
C818	2F	F868	3F	R533	3B	R876	4F
C834	4G			R535	3B	R877	3F
C843	3D	P507	5B	R536	3C	R882	4F
C847	3G	P517	4B	R537	3B	R884	4G
C866	2E	P554	3C	R538	3B	R885	4G
C877	3F	P586	5B	R550	3B	R886	4F
C886	4F	P588	1A	R552	2C	R888	4G
C892	3D	P750	5D	R554	3C		
		P754	5D	R556	2B	S555	4C
CR505	4B	P805	3H	R557	2C		
CR515	4B	P806	2H	R560	3B	TPGND	3C
CR520	3A	P820	3D	R561	2E	TPGND	3E
CR530	4B	P850	3D	R562	1C	TP+15	3E
CR561	1C	P855	2F	R563	1C	TP+15	3C
CR565	2B	P860	3D	R564	2C	TP−30	3C
CR566	2B			R565	2D	TP+30	3C
CR568	1B	Q508A	4B	R568	1B	TP+120	4C
CR569	1B	Q508B	4B	R570	2A	TP+270	4C
CR572	2A	Q520	3B	R572	2A	TP588	2A
CR577	1B	Q525	3B	R574	2A		
CR585	1B	Q530	3B	R577	2B	VR550	2B
CR586	2C	Q535	3B	R580	2B	VR569	2B
CR591	4C	Q550	2B	R582	1B	VR582	1B
CR802	2D	Q560	2B	R588	1B	VR591	4C
CR803	2D	Q561	1C	R590	4D	VR597	4D
CR804	1D	Q570	2B	R591	4D	VR828	3E
CR805	1D	Q580	1B	R592	3C	VR832	3G
CR812	2H	Q585	1C	R593	4D		
CR813	2H	Q590	4C	R596	3C		
CR814	2I	Q820	4E	R598	3D		

VOLTAGE AND WAVEFORM CONDITIONS

NOTE

The test equipment used to obtain the voltages and waveforms is listed in Table 6-1, Test Equipment.

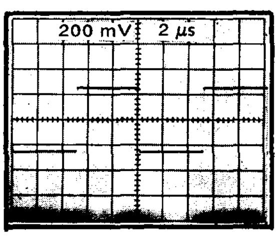
VOLTAGE CONDITIONS

The dc voltages indicated on the schematic diagram were obtained with no test signal input using a digital multimeter. The INTENSITY and Position controls were set for a barely visible dot at near center screen with the internal sweep generator disconnected (Option 4 version only).

WAVEFORM CONDITIONS

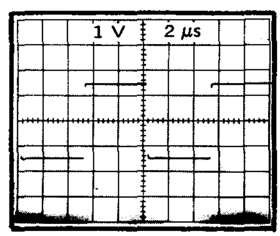
The following waveforms were monitored with a test oscilloscope and a 10X probe. A negative-going 100 kHz, 0.5 V, square wave was applied to the appropriate input connector with the vertical and horizontal Position controls fully clockwise, internal sweep generator disconnected (Option 4 version only), and the unused input connector grounded (grounding cap installed). The INTENSITY control was set for +40 V dc at test point 4 with the test signal applied to the +Z INPUT and +10 V dc at test point 4 with the test signal applied to the −X INPUT.

1



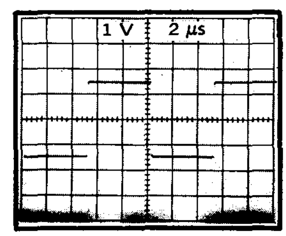
−0.25V

2



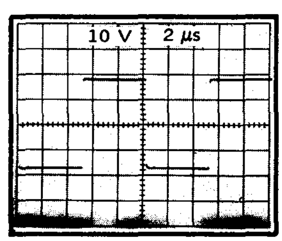
−14V

3



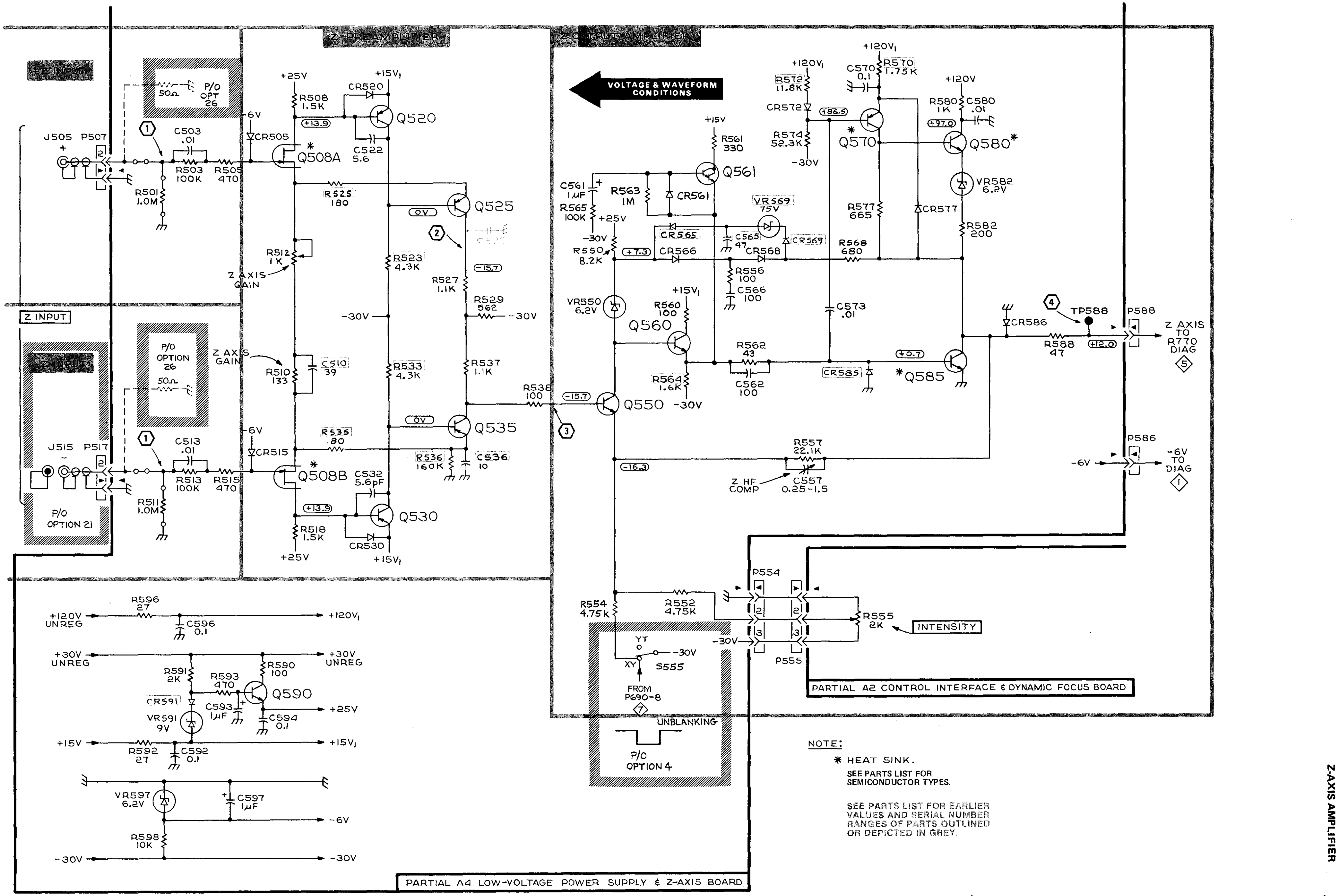
−17V

4



+23V

2507-07



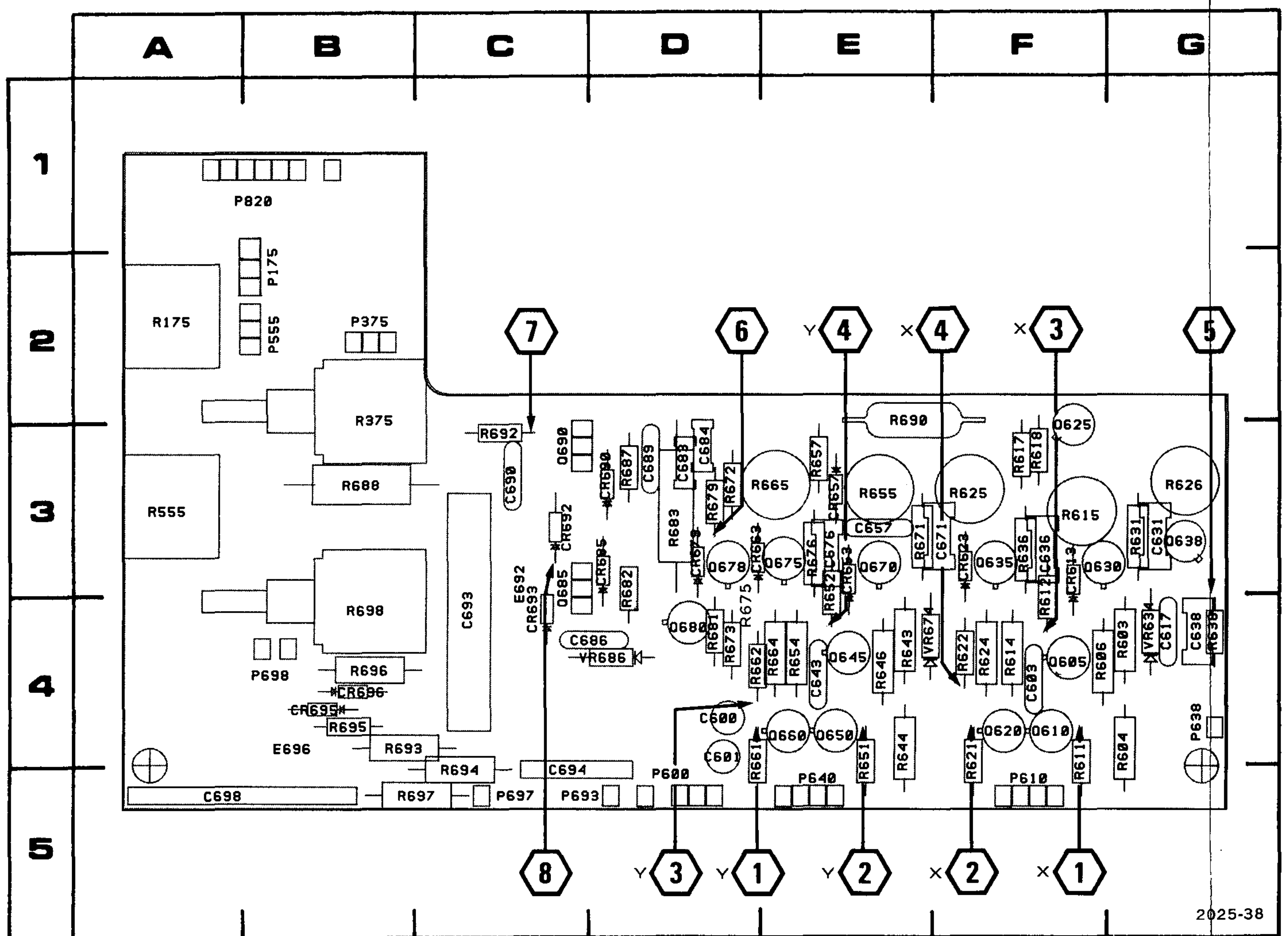


Fig. 10–5. A2–Dynamic Focus component and waveform test point locations.

CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD
C600	4D	CR613	3F	P610	5F	R622	4F	R672	3D	Q610	4F
C601	4D	CR623	3F	P638	4G	R624	4F	R673	4D	Q620	4F
C603	4F	CR653	3E	P640	5E	R625	3F	R675	4D	Q625	3F
C617	4G	CR657	3E	P693	5D	R626	3G	R676	3E	Q630	3F
C631	3G	CR663	3D	P697	5C	R631	3G	R679	3D	Q635	3F
C636	3F	CR679	3D	P698	4B	R636	3F	R681	4D	Q638	3G
C638	4G	CR685	3D			R638	4G	R682	3D	Q645	4E
C643	4E	CR690	3D	R175	2A	R643	4E	R683	3D	Q650	4E
C657	3E	CR692	3C	R375	2B	R644	4E	R687	3D	Q660	4E
C671	3F	CR693	4C	R555	3A	R646	4E	R688	3B	Q670	3E
C676	3E	CR695	4B	R603	4G	R651	5E	R690	2E	Q675	3E
C680	3D	CR696	4B	R604	4G	R652	3E	R692	3C	Q678	3D
C683	3D			R606	4F	R654	4E	R693	4B	Q680	4D
C684	3D	E692	3C	R611	4F	R655	3E	R694	5C	Q685	3C
C686	4D	E696	4B	R612	4F	R657	3E	R695	4B	Q690	3C
C689	3D			R614	4F	R661	4D	R696	4B		
C690	3C	P175	1A	R615	3F	R662	4D	R697	5C	VR634	4G
C693	4C	P375	2B	R617	3F	R664	4E	R698	4B	VR674	4E
C694	5C	P555	2B	R618	3F	R665	3E			VR686	4D
C698	5A	P600	5D	R621	4F	R671	3E	Q605	4F		

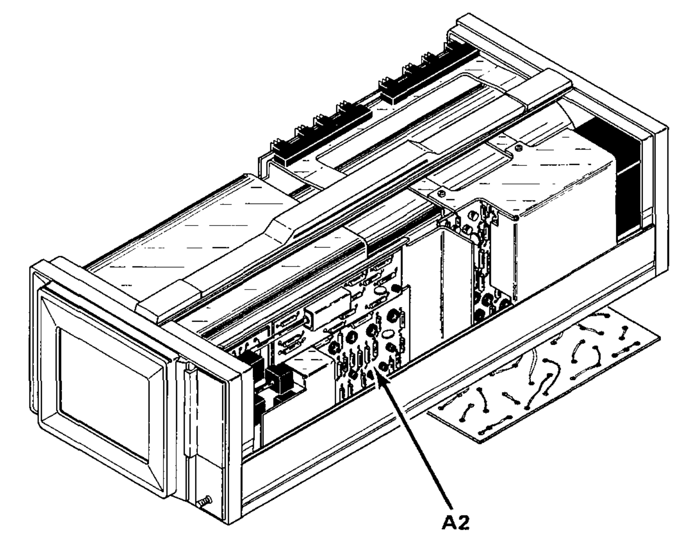


Fig. 10–5(A). Location of A2 Control Interface and Dynamic Focus board.

VOLTAGE AND WAVEFORM CONDITIONS

NOTE

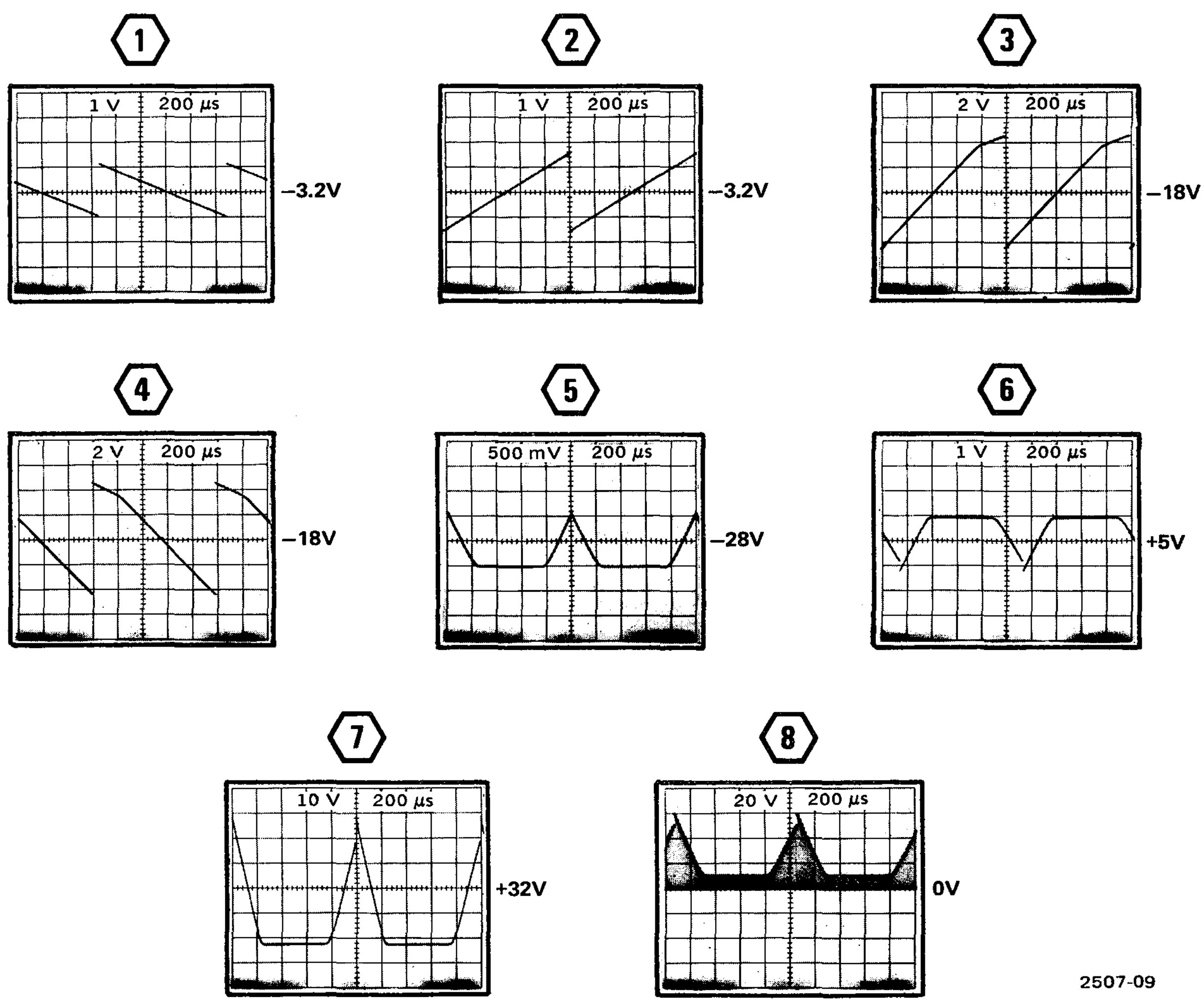
The test equipment used to obtain the voltages and waveforms is listed in Table 6-1, Test Equipment.

VOLTAGE CONDITIONS

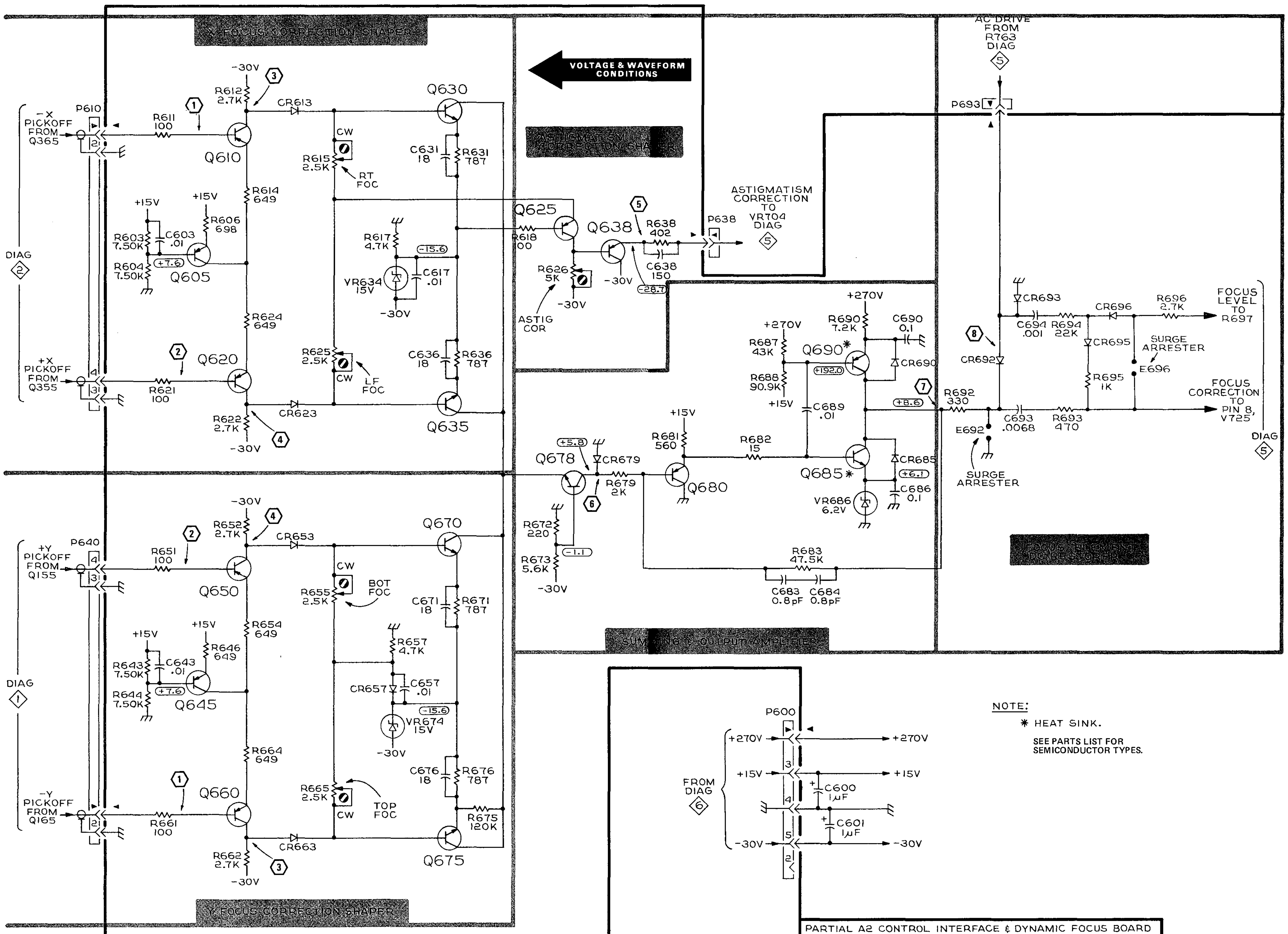
The dc voltages indicated on the schematic diagram were obtained with no test signal input using a digital multimeter. The INTENSITY and Position controls were set for a barely visible dot at near center screen with the internal sweep generator disconnected (Option 4 version only).

WAVEFORM CONDITIONS

The following waveforms were monitored with a test oscilloscope and a 10X probe. A positive-going 1 V, 1 ms, ramp test signal was applied from a ramp generator to the appropriate input connector. The internal sweep generator was disconnected (Option 4 version only), the unused input connector grounded (grounding cap installed) and the trace was centered. The test points shown on the component and waveform test point location illustration with an X or Y opposite the test point number indicates the input connector to which the test signal was applied.



2507-09


X FOCUS CORRECTION SHAPER
VOLTAGE & WAVEFORM CONDITIONS
-X PICKOFF FROM Q365
+X PICKOFF FROM Q355
DIAG ②
P610
R611 100
R621 100
Q610
Q620
Q605
Q630
Q635
Q625
Q638
R612 2.7K
R622 2.7K
R614 649
R624 649
R603 7.50K
R604 7.50K
C603 .01
R606 698
CR613
CR623
R615 2.5K
RT FOC
R625 2.5K
LF FOC
C631 18
R631 787
C636 18
R636 787
R617 4.7K
VR634 15V
C617 .01
R618 100
R626 5K
ASTIG COR
R638 402
C638 150
P638
ASTIGMATISM CORRECTION TO VR704 DIAG ⑤
AC DRIVE FROM R763 DIAG ⑤
P693
+270V
+15V
-30V
R690 7.2K
C690 0.1
R687 43K
Q690*
CR690
R688 90.9K
C689 .01
R681 560
R682 15
Q685*
CR685
C686 0.1
VR686 6.2V
Q678
CR679
R679 2K
Q680
R672 220
R673 5.6K
R683 47.5K
C683 0.8pF
C684 0.8pF
SUMMING & OUTPUT AMPLIFIER
CR693
C694 .001
R694 22K
CR696
R696 2.7K
FOCUS LEVEL TO R697
CR695
SURGE ARRESTER
E696
R695 1K
CR692
R692 330
C693 .0068
R693 470
FOCUS CORRECTION TO PIN 8, V725
DIAG ⑤
E692
SURGE ARRESTER
+Y PICKOFF FROM Q155
-Y PICKOFF FROM Q165
DIAG ①
P640
R651 100
R661 100
Q650
Q660
Q645
Q670
Q675
R652 2.7K
R662 2.7K
R654 649
R664 649
R643 7.50K
R644 7.50K
C643 .01
R646 649
CR653
CR663
R655 2.5K
BOT FOC
R665 2.5K
TOP FOC
C671 18
R671 787
C676 18
R676 787
R675 120K
R657 4.7K
CR657
C657 .01
VR674 15V
Y FOCUS CORRECTION SHAPER
FROM DIAG ⑥
P600
C600 1µF
C601 1µF
NOTE:
* HEAT SINK.
SEE PARTS LIST FOR SEMICONDUCTOR TYPES.
PARTIAL A2 CONTROL INTERFACE & DYNAMIC FOCUS BOARD

2507-10

@

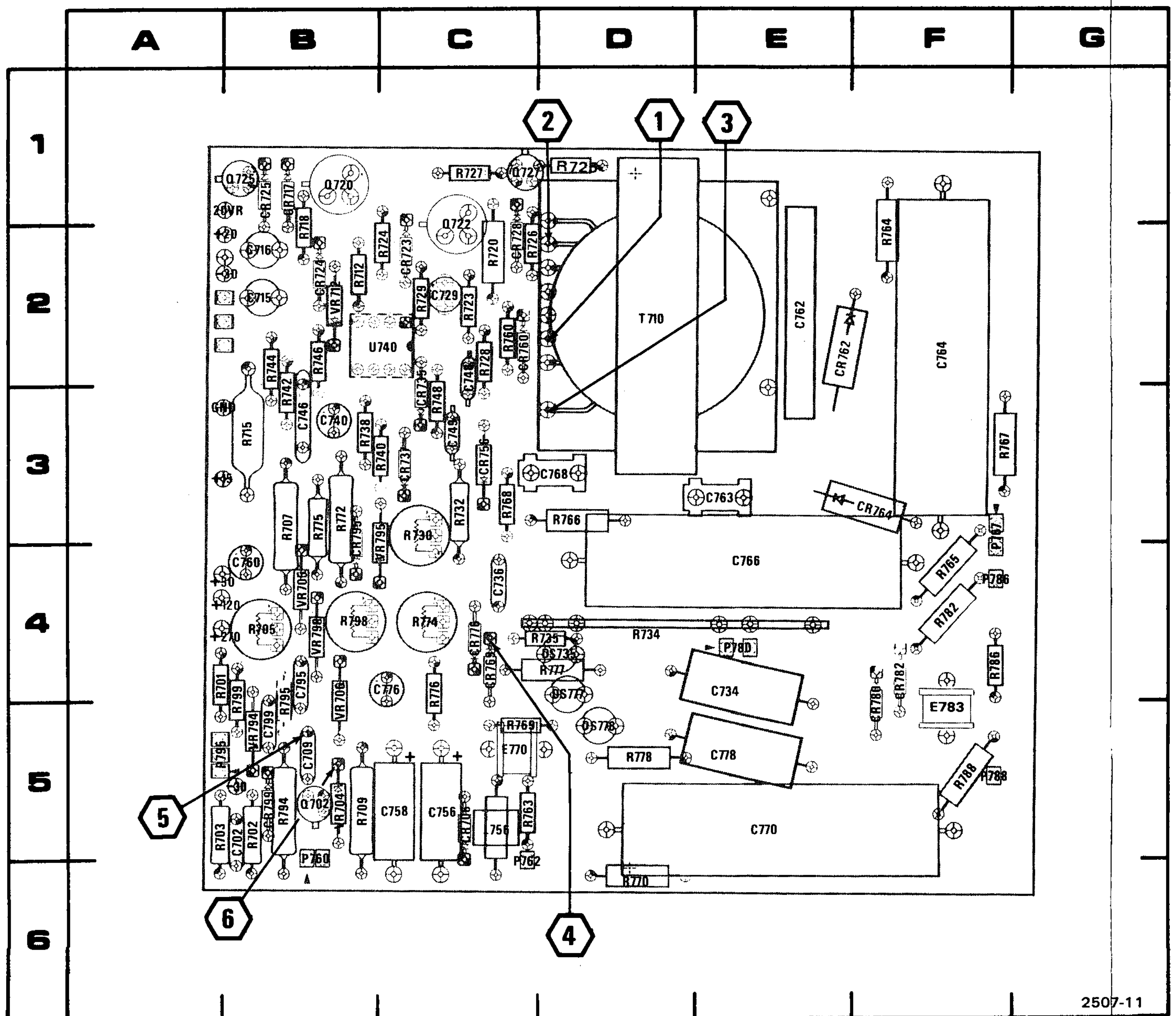


Fig. 10–6. A3—High-Voltage Power Supply component location and waveform test point locations.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C702	5A	C764	2F	CR737	3C	L756	5C	R701	4B	R728	2C	R766	3D	R798	4B
C709	5B	C766	4E	CR756	3C			R702	5B	R729	2C	R767	2F	R799	5A
C715	2B	C768	3C	CR760	2C	P760	6B	R703	5A	R730	4C	R768	4C		
C716	2B	C770	5E	CR762	3E	P762	6C	R705	4B	R732	3C	R769	5C	T710	2D
C729	2C	C776	5B	CR764	3F	P767	3F	R706	4B	R734	4D	R770	5D		
C734	5E	C778	5E	CR769	4C	P780	4E	R707	4B	R735	4C	R772	4B	U740	2B
C736	4C	C795	5B	CR776	4C	P786	4F	R709	5B	R738	3B	R774	4C		
C740	3B	C799	5B	CR780	5F	P788	5F	R712	2B	R740	3B	R775	4B	VR704	5B
C746	3B			CR782	4F	P795	5A	R715	3B	R742	3B	R776	5C	VR705	4B
C748	3C	CR706	5C	CR795	3B			R718	1B	R744	3B	R777	4D	VR706	5B
C749	3C	CR717	1B	CR799	5B	Q702	5B	R720	2C	R746	2B	R778	5D	VR712	2B
C756	5C	CR723	2C			Q720	2B	R723	2C	R748	3C	R782	4F	VR794	5B
C758	5B	CR724	2B	DS735	4D	Q722	2C	R724	2B	R760	2C	R786	4F	VR795	4B
C760	4B	CR725	1B	DS777	5D	Q725	1B	R725	1D	R763	5D	R788	5F	VR798	4B
C762	2E	CR728	2C	DS778	5D	Q727	1C	R726	2C	R764	2F	R794	5B		
C763	3E	CR735	3C					R727	1C	R765	4F	R795	5B		
				E770	5C										
				E783	5F										

@

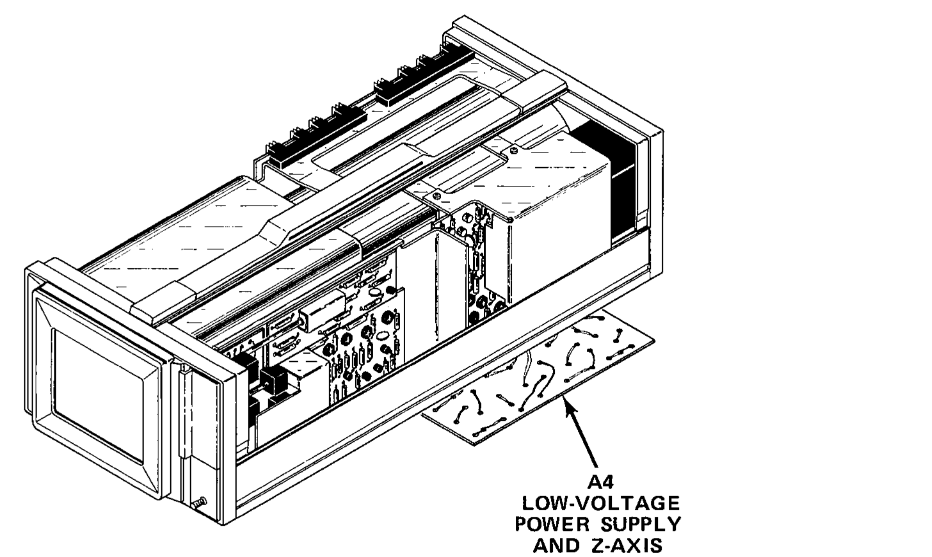


Fig. 10–6(A). Location of A3 High-Voltage Power Supply board.

VOLTAGE AND WAVEFORM CONDITIONS

NOTE

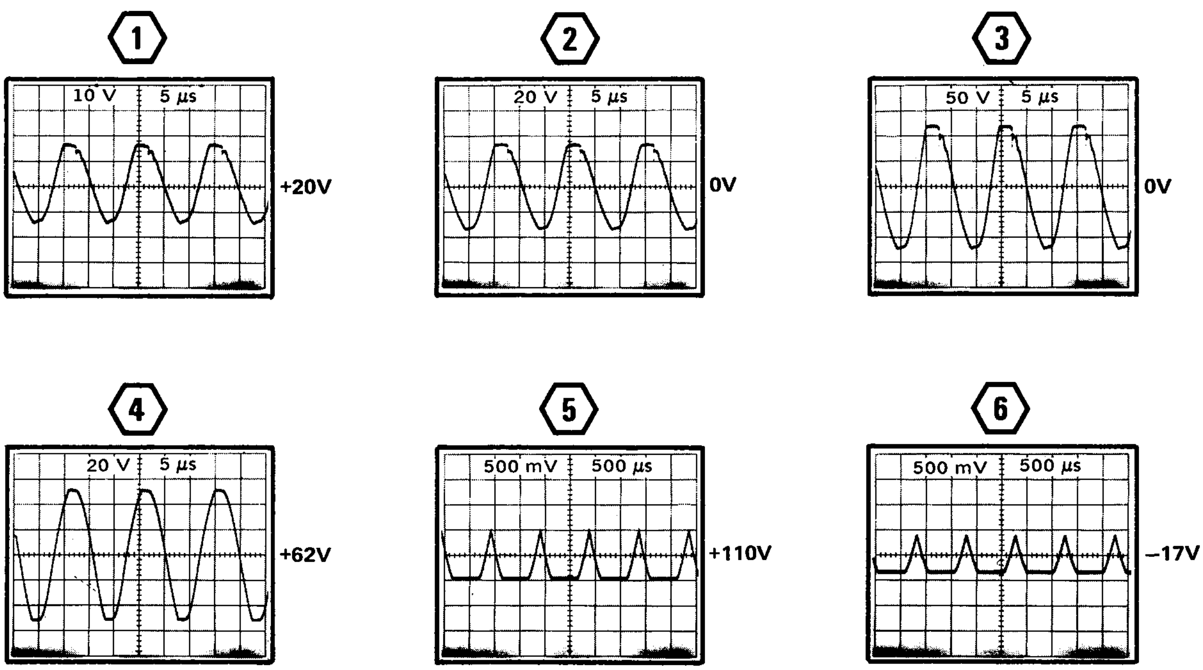
The test equipment used to obtain the voltages and waveforms is listed in Table 6-1, Test Equipment.

VOLTAGE CONDITIONS

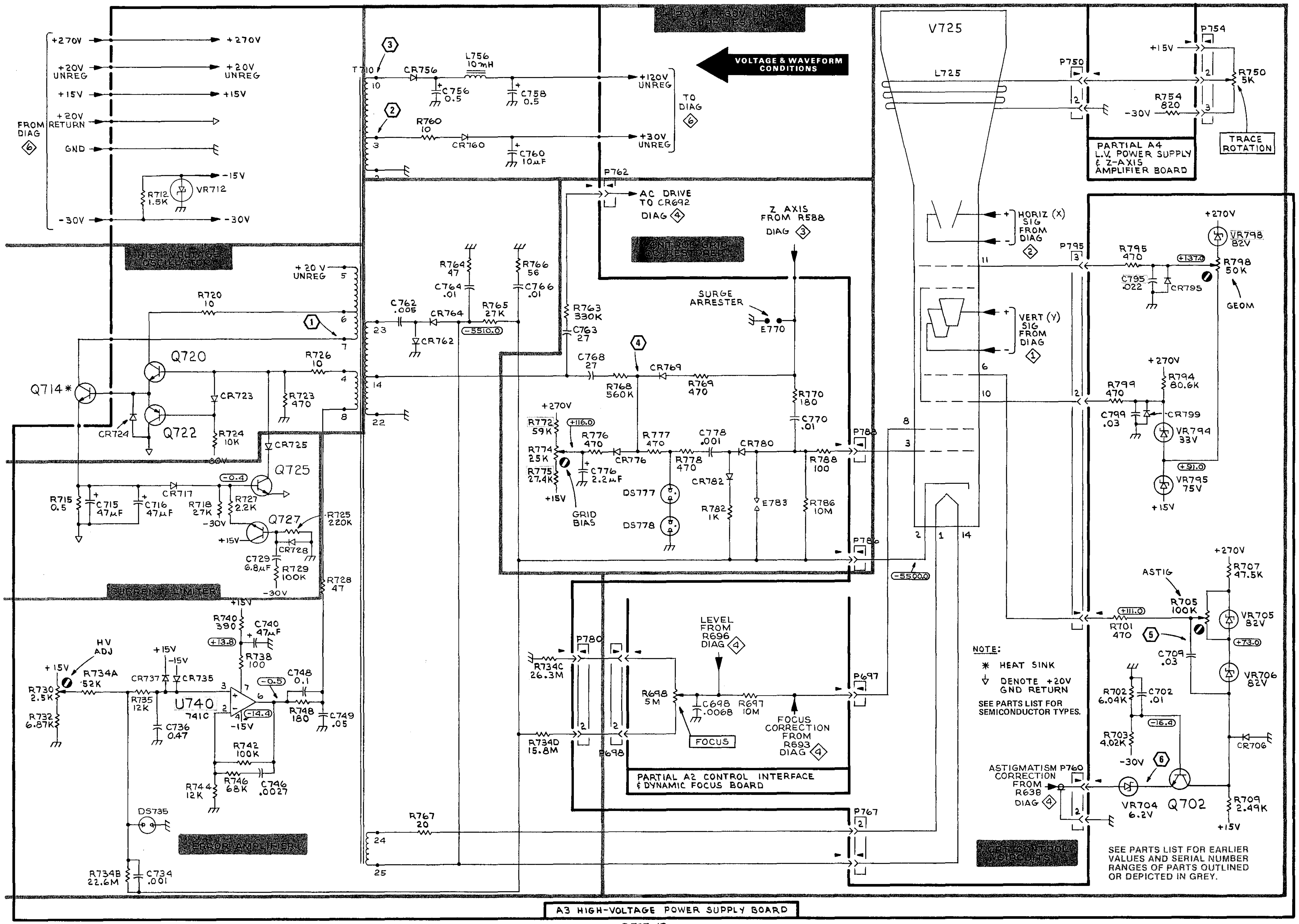
The dc voltages indicated on the schematic diagram were obtained with no test signal input using a digital multimeter. The INTENSITY and Position controls were set for a barely visible dot at near center screen with the internal sweep generator disconnected (Option 4 version only).

WAVEFORM CONDITIONS

The following waveforms were monitored with a test oscilloscope and a 10X probe. The internal sweep generator was disconnected (Option 4 version only). Waveforms at test points 1 through 4 were obtained with no test signal applied and the INTENSITY control set for a barely visible dot. Waveforms at test points 5 and 6 were obtained with a positive-going 1 V, 1 ms, ramp test signal applied from a ramp generator to the +X INPUT connector.



2507-12



2507-13

HIGH-VOLTAGE POWER SUPPLY 5

ASSEMBLY A4

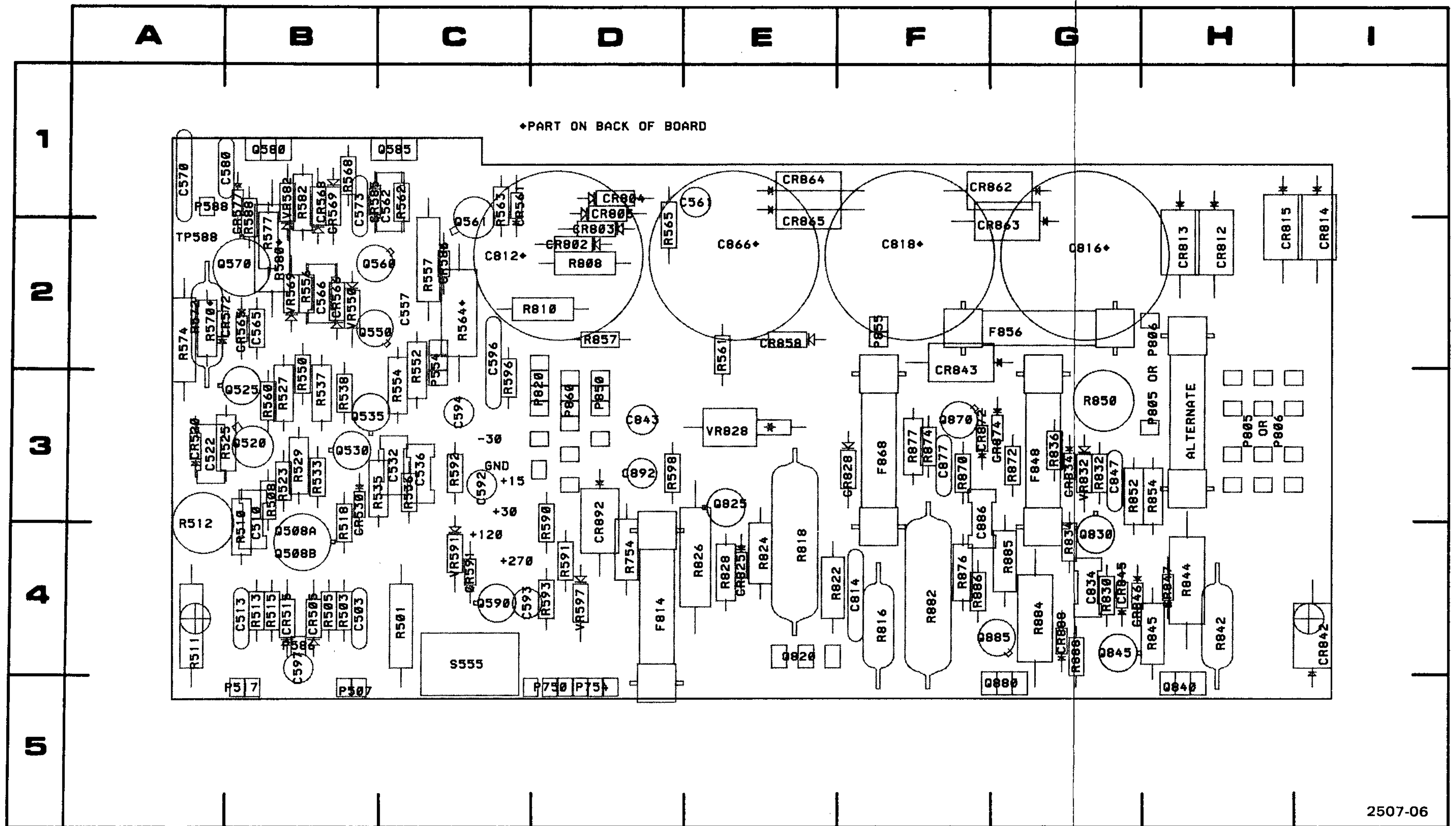


Fig. 10—7. Low-Voltage Power Supply component locations.

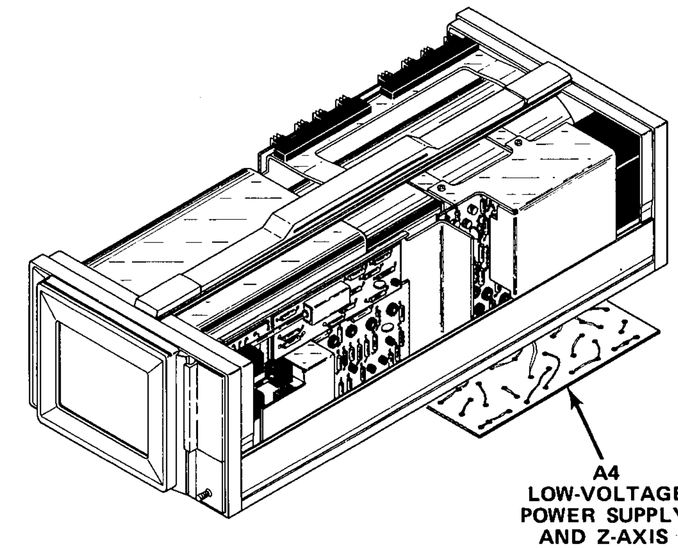


Fig. 10—7(A). Location of A4 Low-Voltage Power Supply and Z-Axis board.

@

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C503	4B	CR815	2H	Q825	3E	R754	4D
C510	4B	CR825	4E	Q830	4G	R808	2D
C522	3A	CR828	3E	Q840	5H	R810	2D
C525	2B	CR834	3G	Q845	4G	R816	4F
C532	3C	CR842	4I	Q870	3F	R818	4E
C536	3C	CR843	3F	Q880	5G	R822	4E
C557	2C	CR846	4G	Q885	4G	R824	4E
C561	1E	CR847	4G			R826	4E
C562	1C	CR848	4H	R501	4C	R828	4E
C565	2B	CR858	2E	R503	4B	R830	4G
C566	2B	CR862	1F	R505	4B	R832	3G
C570	1A	CR863	2G	R508	3B	R834	4G
C573	1B	CR864	1E	R510	4B	R836	3G
C580	1A	CR865	2E	R511	4A	R842	4H
C592	3C	CR872	3F	R512	4A	R844	4H
C593	4C	CR874	3G	R513	4B	R845	4H
C594	3C	CR888	4G	R515	4B	R850	3G
C596	2C	CR892	3D	R518	4B	R852	3G
C597	4B			R523	3B	R854	3H
C812	2C	F814	4D	R525	3A	R857	2D
C814	4F	F848	3G	R527	3B	R870	3F
C816	2G	F856	2G	R529	3B	R874	3F
C818	2F	F868	3F	R533	3B	R876	4F
C834	4G			R535	3B	R877	3F
C843	3D	P507	5B	R536	3C	R882	4F
C847	3G	P517	4B	R537	3B	R884	4G
C866	2E	P554	3C	R538	3B	R885	4G
C877	3F	P586	5B	R550	3B	R886	4F
C886	4F	P588	1A	R552	2C	R888	4G
C892	3D	P750	5D	R554	3C		
		P754	5D	R556	2B	S555	4C
CR505	4B	P805	3H	R557	2C		
CR515	4B	P806	2H	R560	3B	TPGND	3C
CR520	3A	P820	3D	R561	2E	TPGND	3E
CR530	4B	P850	3D	R562	1C	TP+15	3E
CR561	1C	P855	2F	R563	1C	TP+15	3C
CR565	2B	P860	3D	R564	2C	TP−30	3C
CR566	2B			R565	2D	TP+30	3C
CR568	1B	Q508A	4B	R568	1B	TP+120	4C
CR569	1B	Q508B	4B	R570	2A	TP+270	4C
CR572	2A	Q520	3B	R572	2A	TP588	2A
CR577	1B	Q525	3B	R574	2A		
CR585	1B	Q530	3B	R577	2B	VR550	2B
CR586	2C	Q535	3B	R580	2B	VR569	2B
CR591	4C	Q550	2B	R582	1B	VR582	1B
CR802	2D	Q560	2B	R588	1B	VR591	4C
CR803	2D	Q561	1C	R590	4D	VR597	4D
CR804	1D	Q570	2B	R591	4D	VR828	3E
CR805	1D	Q580	1B	R592	3C	VR832	3G
CR812	2H	Q585	1C	R593	4D		
CR813	2H	Q590	4C	R596	3C		
CR814	2I	Q820	4E	R598	3D		

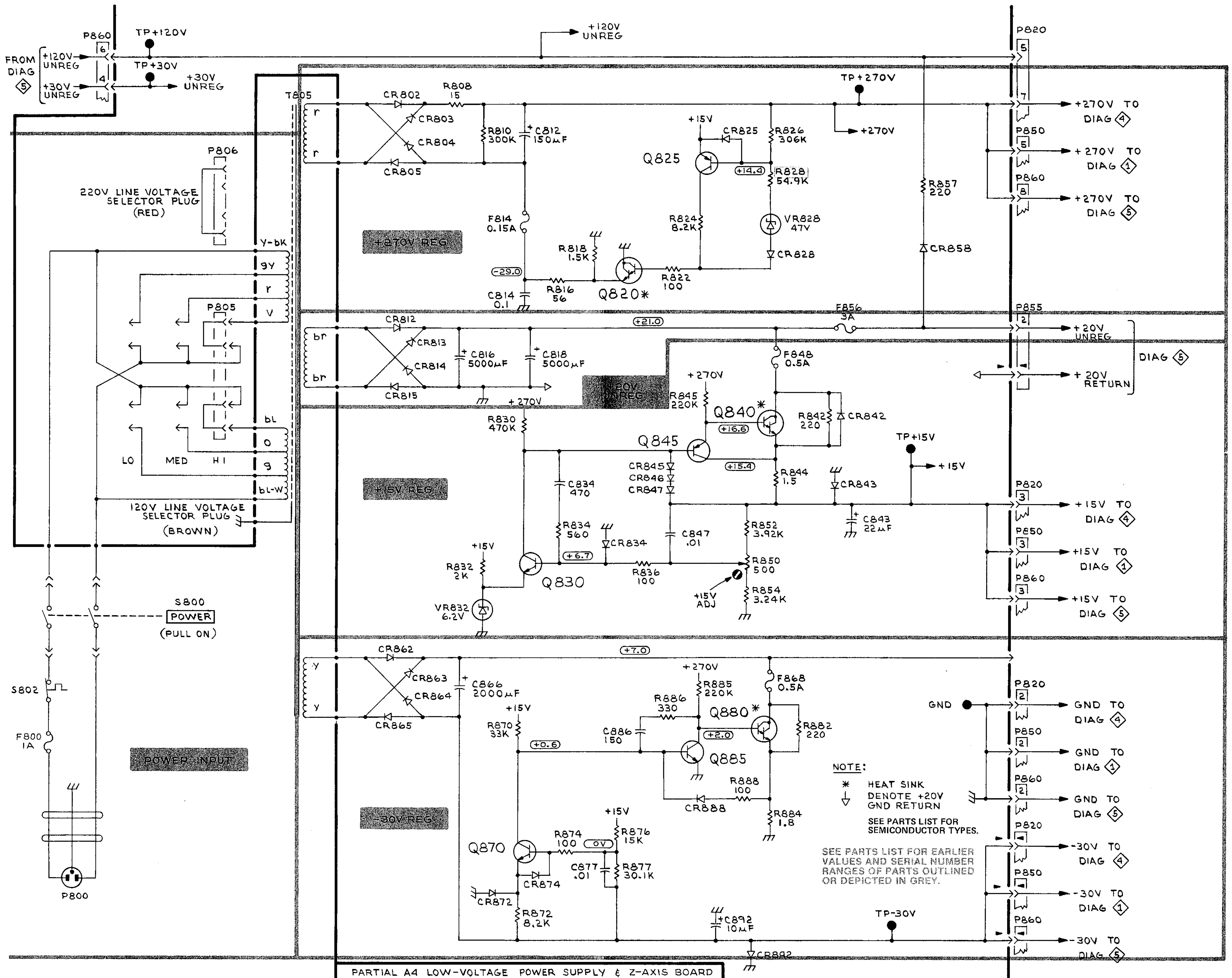
VOLTAGE CONDITIONS

NOTE

The test equipment used to obtain the voltages is listed in Table 6-1, Test Equipment.

The dc voltages indicated on the schematic diagram were obtained with no test signal input using a digital multimeter. The INTENSITY and Position controls were set for a barely visible dot at near center screen with the internal sweep generator disconnected (Option 4 version only).

2507-14


FROM DIAG 5
+120V UNREG
+30V UNREG
P860
TP+120V
TP+30V
+120V UNREG
+30V UNREG
P820
T805
CR802
R808 15
CR803
CR804
CR805
R810 300K
C812 150µF
+15V
CR825
R826 306K
Q825
R828 54.9K
TP+270V
+270V
+270V TO DIAG 4
P850
+270V TO DIAG 1
P860
+270V TO DIAG 5
R857 220
P806
220V LINE VOLTAGE SELECTOR PLUG (RED)
F814 0.15A
+270V REG
R818 1.5K
R824 8.2K
VR828 47V
CR828
CR858
Q820*
R822 100
R816 56
C814 0.1
P805
Y-bK
9Y
r
V
bL
o
g
bL-W
LO
MED
HI
120V LINE VOLTAGE SELECTOR PLUG (BROWN)
CR812
CR813
CR814
CR815
C816 5000µF
C818 5000µF
+21.0
F856 3A
P855
+20V UNREG
+20V RETURN
DIAG 5
F848 0.5A
+270V
R845 220K
Q840*
R842 220
CR842
+16.6
R830 470K
Q845
CR845
CR846
CR847
+15.4
R844 1.5
TP+15V
+15V
CR843
+15V REG
C834 470
P820
+15V TO DIAG 4
C843 22µF
R834 560
CR834
C847 .01
R852 3.92K
P850
+15V TO DIAG 1
+15V
R832 2K
+6.7
R836 100
R850 500
Q830
+15V ADJ
R854 3.24K
P860
+15V TO DIAG 5
VR832 6.2V
S800
POWER
(PULL ON)
S802
F800 1A
POWER INPUT
P800
CR862
+7.0
CR863
CR864
CR865
C866 2000µF
+270V
R885 220K
F868 0.5A
R886 330
Q880*
R882 220
GND
P820
GND TO DIAG 4
R870 33K
+0.6
C886 150
+2.0
Q885
P850
GND TO DIAG 1
NOTE:
* HEAT SINK
DENOTE +20V GND RETURN
SEE PARTS LIST FOR SEMICONDUCTOR TYPES.
R888 100
CR888
P860
GND TO DIAG 5
-30V REG
R884 1.8
+15V
R876 15K
Q870
R874 100
0V
P820
-30V TO DIAG 4
C877 .01
R877 30.1K
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
CR874
P850
-30V TO DIAG 1
CR872
R872 8.2K
C892 10µF
TP-30V
P860
-30V TO DIAG 5
CR892
PARTIAL A4 LOW-VOLTAGE POWER SUPPLY & Z-AXIS BOARD

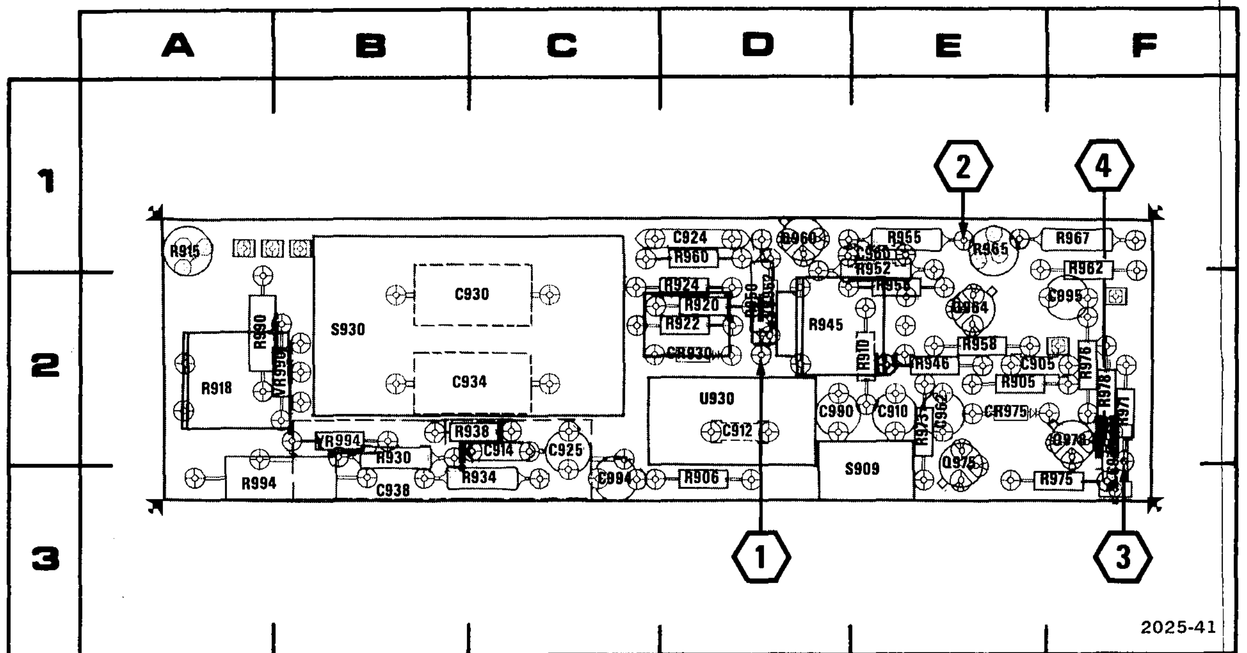


Fig. 10–8. A5–Sweep (Option 4) component and waveform test point locations.

CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD	CKT NO	GRID COORD
C905	2E	C994	3C	R910	2E	R955	1E	R994	3A
C910	2E	C995	2F	R915	1A	R956	2E		
C912	2D			R918	2A	R958	2E	S909	3E
C914	2C	CR930	2D	R920	2D	R960	1D	S930	2B
C924	1D	CR975	2E	R922	2D	R962	2F		
C925	2C			R924	2D	R965	1E	U930	2D
C930	2C	Q960	1D	R930	2B	R967	1F		
C934	2C	Q964	2E	R934	3C	R971	2F	VR962	2D
C938	3B	Q975	2E	R938	2C	R973	2E	VR990	2B
C960	1E	Q978	2F	R945	2D	R975	3F	VR994	2B
C962	2E			R946	2E	R976	2F		
C976	2F	R905	2E	R950	2D	R978	2F		
C990	2D	R906	3D	R952	1E	R990	2A		

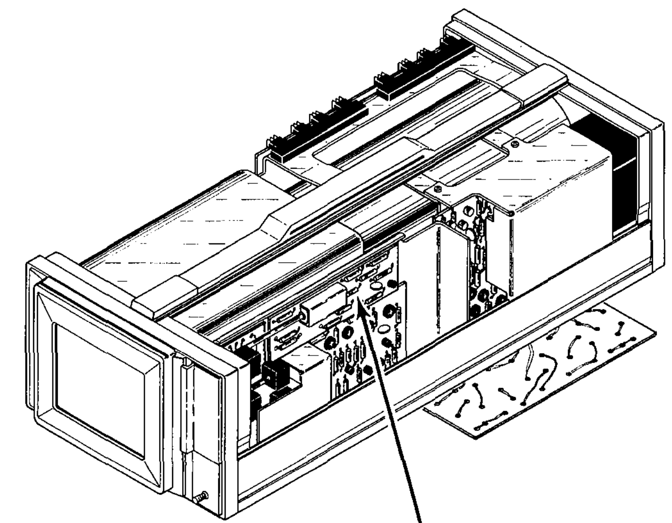


Fig. 10–8(A). Location of A5 Sweep board.

VOLTAGE AND WAVEFORM CONDITIONS

NOTE

The test equipment used to obtain the voltages and waveforms is listed in Table 6-1, Test Equipment.

VOLTAGE CONDITIONS

The dc voltages indicated on the schematic diagram were obtained with no test signal input using a digital multimeter. The INTENSITY and Position controls were set for a barely visible trace at near center screen with the internal sweep generator connected. The internal Trig Mode switch (S909) was set to the Normal position.

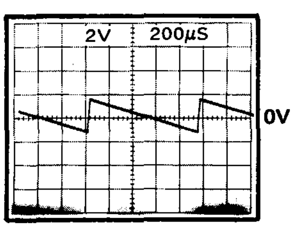
WAVEFORM CONDITIONS

The following waveforms were monitored by a test oscilloscope and a 10X probe with no test signal applied and the internal sweep generator connected. The internal Trig Mode switch (S909) was set to the Auto position, SEC/DIV switch to .1 m, and VARIABLE control fully clockwise (calibrated).

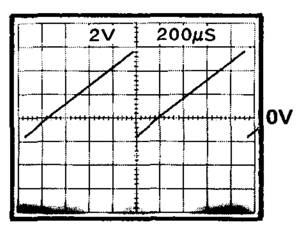
NOTE

If no waveform is obtained at the test points, adjust the SLOPE/LEVEL control.

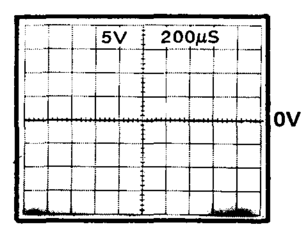
1



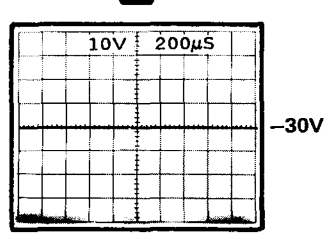
2



3

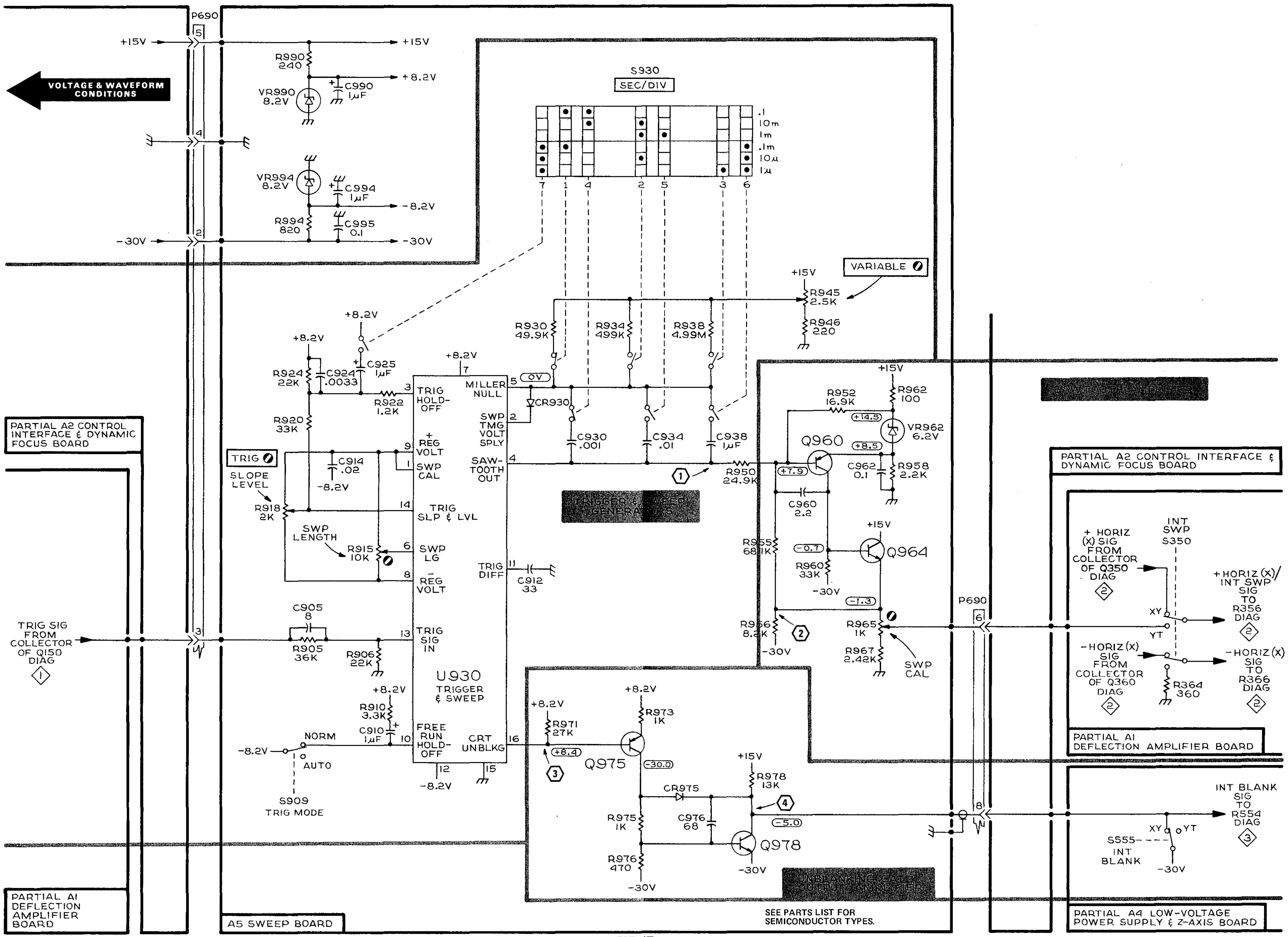


4



2507-16

Scan by Zenith



2507-17

TROUBLESHOOTING CHART INSTRUCTIONS:

1. Beginning at the top left block of the chart proceed to the right until the Monitor does not perform as indicated.

2. Then follow the dashed line as the symptom indicates. Each shaded block indicates a circuit or a stage which may be the cause of the malfunction. Refer to section 4, Theory of Operation, for a detailed discussion.

NOTE

For instruments equipped with the Option 4 Sweep circuit, disconnect the sweep (by reversing the procedure given in section 3, Installation) before beginning this procedure.

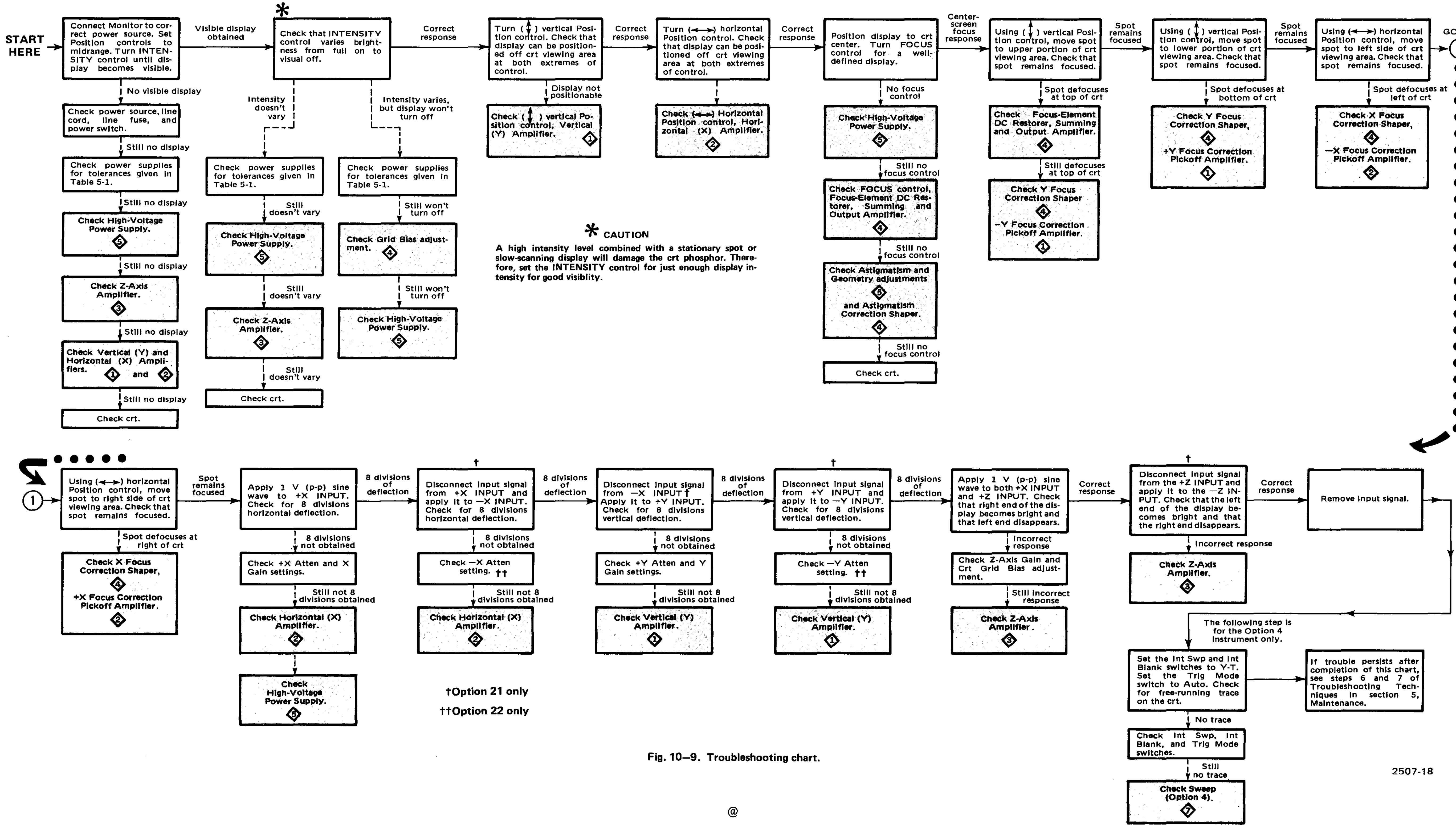


Fig. 10–9. Troubleshooting chart.

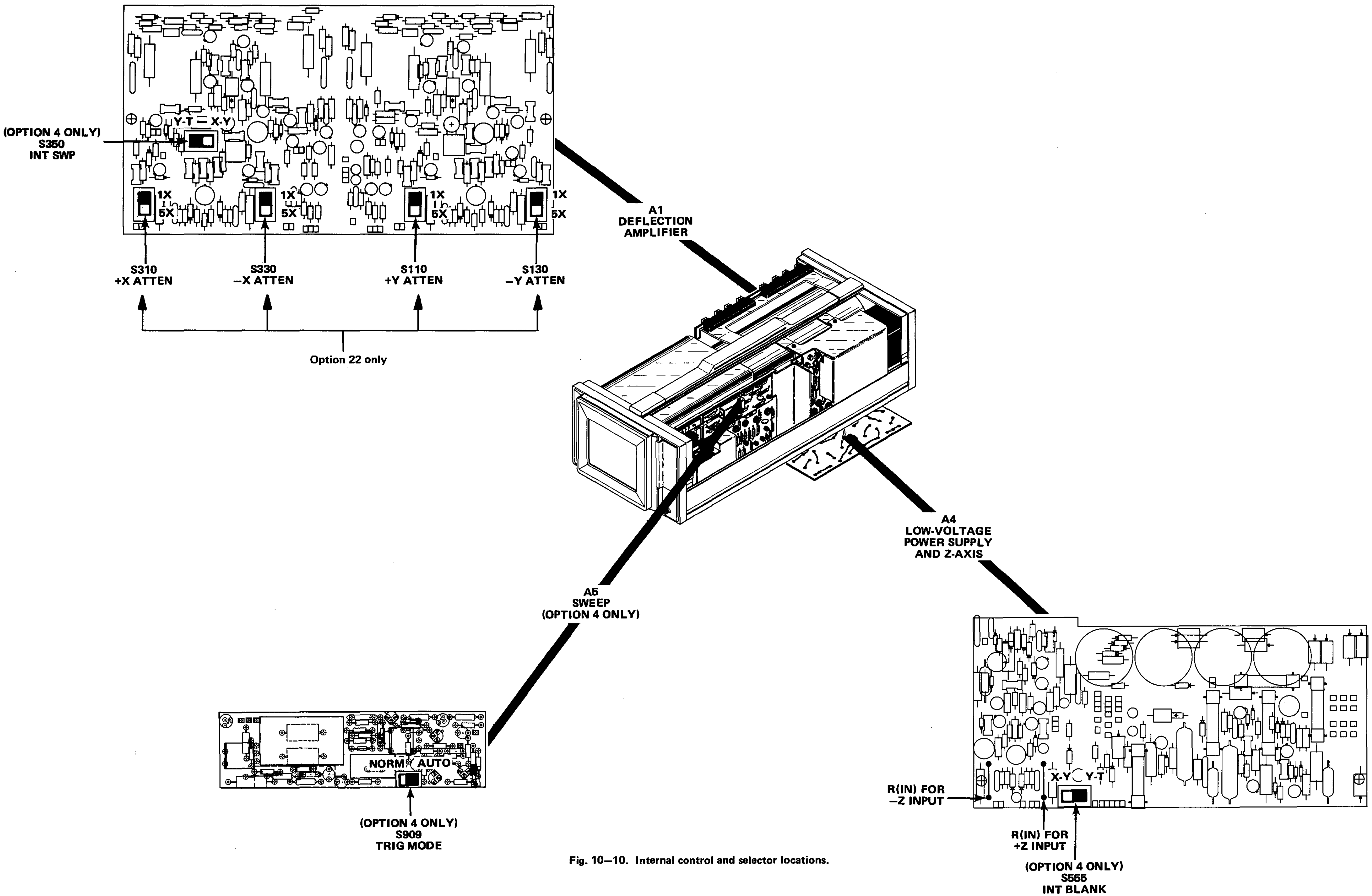


Fig. 10—10. Internal control and selector locations.

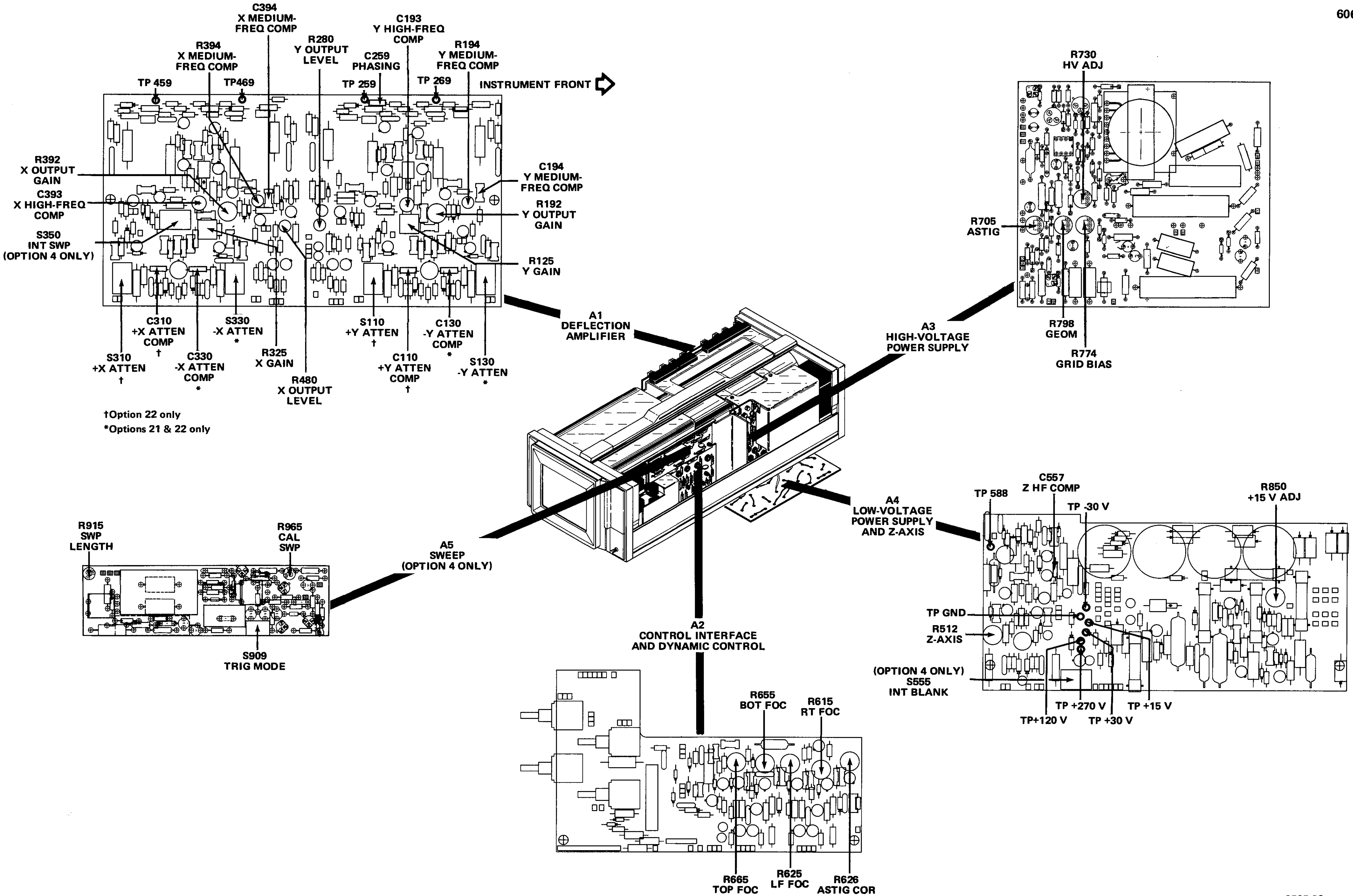


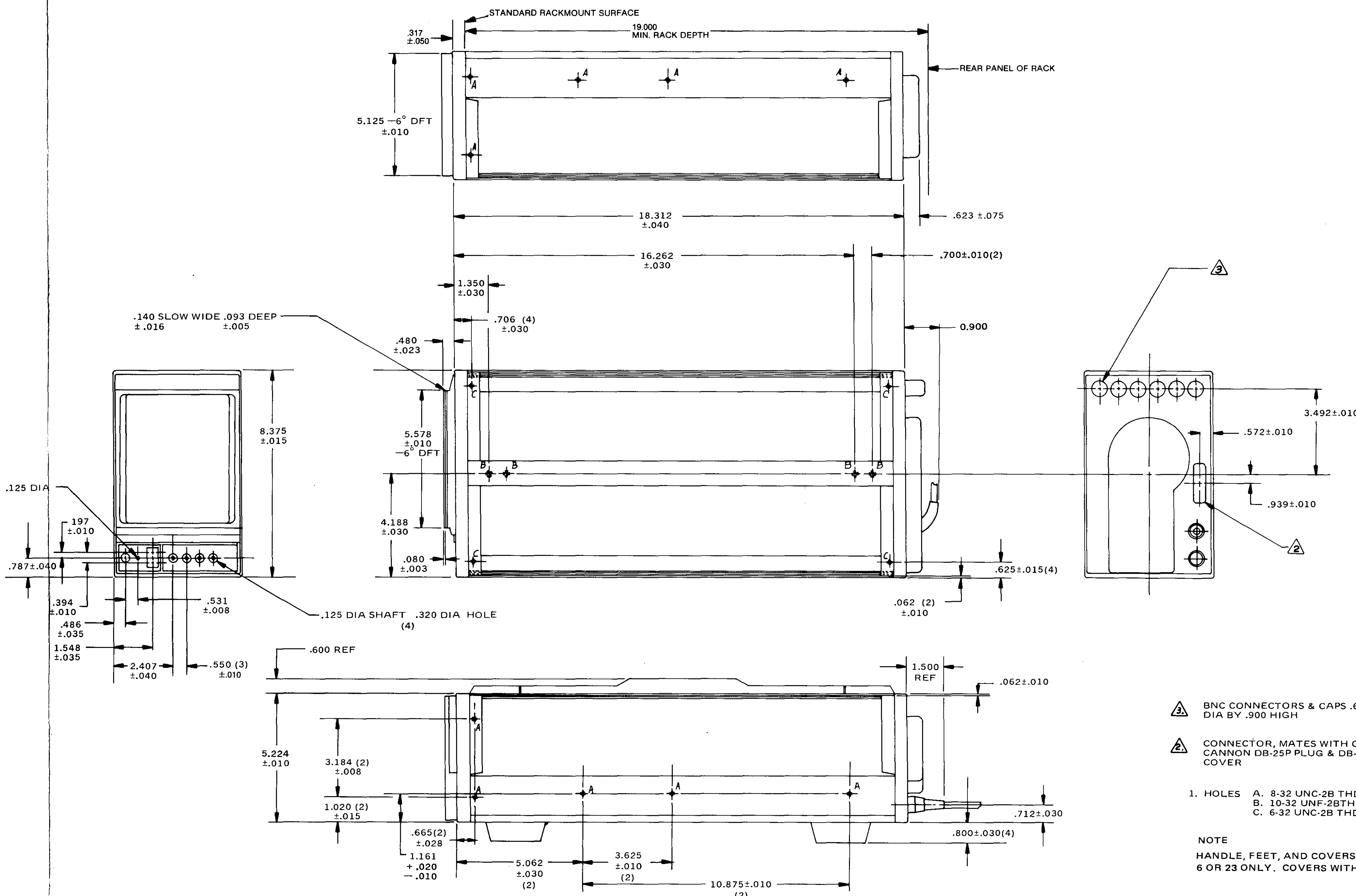
Fig. 10—11. Test point and adjustment locations.

2507-20

@

English To Metric Conversion

Inches	Centimeters	Inches	Centimeters
0.003	0.008	0.600	1.524
0.005	0.013	0.623	1.582
0.008	0.020	0.625	1.588
0.010	0.025	0.665	1.689
0.015	0.038	0.700	1.778
0.016	0.041	0.706	1.793
0.020	0.051	0.712	1.809
0.023	0.058	0.787	1.999
0.028	0.071	0.800	2.032
0.030	0.076	0.900	2.286
0.035	0.089	1.020	2.591
0.040	0.102	1.161	2.949
0.050	0.127	1.350	3.429
0.062	0.158	1.500	3.810
0.075	0.191	1.548	3.932
0.080	0.203	2.407	6.116
0.093	0.236	3.187	8.087
0.125	0.318	3.492	8.870
0.140	0.356	3.625	9.208
0.197	0.500	4.188	10.638
0.317	0.805	5.062	12.858
0.320	0.813	5.125	13.018
0.339	0.861	5.224	13.269
0.394	1.001	5.578	14.168
0.480	1.219	8.325	21.273
0.486	1.234	10.875	27.623
0.531	1.349	16.262	41.306
0.550	1.397	18.312	46.513
0.572	1.453	19.000	48.260



3\. BNC CONNECTORS & CAPS .625 MAX DIA BY .900 HIGH

2\. CONNECTOR, MATES WITH CINCH OR CANNON DB-25P PLUG & DB-51226-1A COVER

1\. HOLES A. 8-32 UNC-2B THD
B. 10-32 UNF-2BTHD
C. 6-32 UNC-2B THD

NOTE

HANDLE, FEET, AND COVERS WITH OPTIONS 6 OR 23 ONLY. COVERS WITH OPTION 28.

Fig. 10–12. Detailed dimensional drawing.

2507-21

@

Section 11

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 Name & Description

Assembly and/or Component
Attaching parts for Assembly and/or Component
--- * ---

Detail Part of Assembly and/or Component
Attaching parts for Detail Part
--- * ---

Parts of Detail Part
Attaching parts for Parts of Detail Part
--- * ---

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol --- * --- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

"	INCH	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICOND	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDENT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000BK	STAUFFER SUPPLY	105 SE TAYLOR	PORTLAND, OR 97214
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRUS DRIVE	BEAVERTON, OR 97005
00779	AMP, INC.	P.O. BOX 3608	HARRISBURG, PA 17105
05820	WAKEFIELD ENGINEERING, INC.	AUDUBON ROAD	WAKEFIELD, MA 01880
06383	PANDUIT CORPORATION	17301 RIDGELAND	TINLEY PARK, IL 60477
06776	ROBINSON NUGENT INC.	800 E. 8TH ST., BOX 470	NEW ALBANY, IN 47150
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
12136	PHILADELPHIA HANDLE COMPANY, INC.	1643 HADDON AVENUE	CAMDEN, NJ 08103
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
12360	ALBANY PRODUCTS CO., DIV. OF PNEUMO DYNAMICS CORPORATION	145 WOODWARD AVENUE	SOUTH NORWALK, CT 06586
13103	THERMALLOY COMPANY, INC.	2021 W VALLEY VIEW LANE P O BOX 34829	DALLAS, TX 75234
16428	BELDEN CORP.	P. O. BOX 1331	RICHMOND, IN 47374
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
27264	MOLEX, INC.	2222 WELLINGTON COURT	LISLE, IL 60532
28520	HEYMAN MFG. CO.	147 N. MICHIGAN AVE.	KENILWORTH, NJ 07033
49671	RCA CORPORATION	30 ROCKEFELLER PLAZA	NEW YORK, NY 10020
57668	R-OHM CORP.	16931 MILLIKEN AVE.	IRVINE, CA 92713
70485	ATLANTIC INDIA RUBBER WORKS, INC.	571 W. POLK ST.	CHICAGO, IL 60607
71785	TRW, CINCH CONNECTORS	1501 MORSE AVENUE	ELK GROVE VILLAGE, IL 60007
72653	G. C. ELECTRONICS CO., A DIVISION OF HYDROMETALS, INC.	400 S. WYMAN ST.	ROCKFORD, IL 61101
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
76854	OAK INDUSTRIES, INC., SWITCH DIV.	S. MAIN ST.	CRYSTAL LAKE, IL 60014
77820	BENDIX CORP., THE, ELECTRICAL COMPONENTS DIVISION	SHERMAN AVE.	SIDNEY, NY 13838
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
78471	TILLEY MFG. CO.	900 INDUSTRIAL RD.	SAN CARLOS, CA 94070
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
80710	ALLEGHENY LUDLUM STEEL CORP., A DIVISION OF ALLEGHENY LUDLUM INDUSTRIES, INC.	BRACKENRIDGE WORKS, RIVER AVE.	BRACKENRIDGE, PA 15014
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
83907	ACCURATE RUBBER PRODUCTS CO.	123 N. RACINE	CHICAGO, IL 60607
93907	TEXTRON INC. CAMCAR DIV	600 18TH AVE	ROCKFORD, IL 61101
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641
98978	INTERNATIONAL ELECTRONIC RESEARCH CORP.	135 W. MAGNOLIA BLVD.	BURBANK, CA 91502
S3629	PANEL COMPONENTS CORP.	2015 SECOND ST.	BERKELEY, CA 94170

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-1	390-0244-00			1	COVER,MONITOR:RIGHT	80009	390-0244-00
	----- -----			-	(OPTION 23 & 28 ONLY)		
	390-0543-00			1	CAB.SIDE,MON:	80009	390-0543-00
	----- -----			-	(OPTION 6 ONLY)		
	214-0816-00			2	.FASTENER,PAWL:	80009	214-0816-00
-2	386-1151-00			2	..CLAMP,RIM CLENC:SPG STL CD PL	80009	386-1151-00
-3	386-0227-00			2	..STOP,CLP,RIM CL:ACETAL	80009	386-0227-00
-4	214-0604-00			2	..WASH.,SPG TNSN:0.26 ID X 0.47 INCH OD	80009	214-0604-00
-5	214-0603-01			2	..PIN,SECURING:0.27 INCH LONG	80009	214-0603-01
-6	390-0270-00			1	COVER,MONITOR:LEFT	80009	390-0270-00
	----- -----			-	(OPTION 23 & 28 ONLY)		
	390-0543-00			1	CAB.SIDE,MON:	80009	390-0543-00
	----- -----			-	(OPTION 6 ONLY)		
	214-0816-00			2	.FASTENER,PAWL:	80009	214-0816-00
-7	386-1151-00			2	..CLAMP,RIM CLENC:SPG STL CD PL	80009	386-1151-00
-8	386-0227-00			2	..STOP,CLP,RIM CL:ACETAL	80009	386-0227-00
-9	214-0603-01			2	..PIN,SECURING:0.27 INCH LONG	80009	214-0603-01
-10	214-0604-00			2	..WASH.,SPG TNSN:0.26 ID X 0.47 INCH OD	80009	214-0604-00
-11	348-0275-00			1	FLIPSTAND,CAB.:	80009	348-0275-00
	----- -----			-	(OPTION 6,23 ONLY)		
-12	390-0280-00			1	COVER,SCOPE:BOTTOM	80009	390-0280-00
	----- -----			-	(OPTION 23 ONLY)		
	342-0127-00			1	INSULATOR,PLATE:POWER SUPPLY,POLYESTER	80009	342-0127-00
	----- -----			-	(OPTION 6, 23 & 28 ONLY)		
	390-0523-00			1	COVER,SCOPE:BOTTOM	80009	390-0523-00
	----- -----			-	(OPTION 6 ONLY)		
	214-0816-00			4	.FASTENER,PAWL:	80009	214-0816-00
-13	386-1151-00			4	..CLAMP,RIM CLENC:SPG STL CD PL	80009	386-1151-00
-14	386-0227-00			4	..STOP,CLP,RIM CL:ACETAL	80009	386-0227-00
-15	214-0604-00			4	..WASH.,SPG TNSN:0.26 ID X 0.47 INCH OD	80009	214-0604-00
-16	214-0603-01			4	..PIN,SECURING:0.27 INCH LONG	80009	214-0603-01
-17	348-0074-00			2	.HINGE BLOCK,STA:R FR,L REAR,BLACK ACETAL	80009	348-0074-00
					.************(ATTACHING PARTS)************		
-18	211-0532-00			8	.SCREW,MACHINE:6-32 X 0.75 INCH,FILH STL	83385	ORD BY DESCR
-19	210-0457-00			8	.NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
					.***********(END ATTACHING PARTS)*********		
-20	348-0207-00			2	.FOOT,CABINET:RIGHT FRONT AND LEFT REAR	80009	348-0207-00
-21	348-0073-00			2	.HINGE BLOCK,STA:L FR,R REAR,BLACK ACETAL	80009	348-0073-00
					.************(ATTACHING PARTS)************		
-22	211-0532-00			8	.SCREW,MACHINE:6-32 X 0.75 INCH,FILH STL	83385	ORD BY DESCR
-23	210-0457-00			8	.NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
					.***********(END ATTACHING PARTS)*********		
-24	348-0208-00			2	.FOOT,CABINET:LEFT FRONT AND RIGHT REAR	80009	348-0208-00
	390-0281-00			1	COVER,SCOPE:BOTTOM	80009	390-0281-00
	----- -----			-	(OPTION 28 ONLY)		
	214-0816-00			4	.FASTENER,PAWL:	80009	214-0816-00
	386-1151-00			4	..CLAMP,RIM CLENC:SPG STL CD PL	80009	386-1151-00
	386-0227-00			4	..STOP,CLP,RIM CL:ACETAL	80009	386-0227-00
	214-0603-01			4	..PIN,SECURING:0.27 INCH LONG	80009	214-0603-01
	214-0604-00			4	..WASH.,SPG TNSN:0.26 ID X 0.47 INCH OD	80009	214-0604-00
-25	200-0728-00			2	COV,HANDLE END:	80009	200-0728-00
	----- -----			-	(OPTION 6 & 23 ONLY)		
-26	367-0116-00			1	HANDLE,CARRYING:	12136	ORD BY DESCR
	----- -----			-	(OPTION 6 & 23 ONLY)		
					**************(ATTACHING PARTS)***********		
-27	212-0597-00			4	SCREW,MACHINE:10-32 X 0.50 INCH,STL	93907	ORD BY DESCR
	----- -----			-	(OPTION 6 & 23 ONLY)		
-28	386-1624-00			2	PLATE,HDL RTNG:STAINLESS STEEL	80009	386-1624-00
	----- -----			-	(OPTION 6 & 23 ONLY)		
-29	386-1283-00			2	PLATE,HDL MTG:FRONT	80009	386-1283-00
	----- -----			-	(OPTION 6 & 23 ONLY)		
					************(END ATTACHING PARTS)*********		
-30	200-1661-01			1	RTNR,CRT SCALE:	80009	200-1661-00
	200-1661-03			1	RTNR,CRT SCALE:606 OPT 06	80009	200-1661-03
	----- -----			-	(OPTION 6 ONLY)		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-	200-2178-01			1	RTNR,CRT SCALE:	80009	200-2178-01
	----- -----			-	(OPTION 29 ONLY)		
					**************(ATTACHING PARTS)***********		
-31	211-0188-00			2	SCREW,MACHINE:4-40 X 0.30 INCH,SST	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-31.1	134-0163-00			1	PLUG,HOLE:PLASTIC	80009	134-0163-00
	----- -----			-	(OPTION 29 ONLY)		
					**************(ATTACHING PARTS)***********		
-31.2	213-0816-00			2	SCREW,TPG,TC:2-56 X 0.188 L,TYPE T PNH	000BK	ORD BY DESCR
	----- -----			-	(OPTION 29 ONLY)		
					************(END ATTACHING PARTS)*********		
-32	337-1674-13			1	SHLD,IMPLOSION:CLEAR	80009	337-1674-13
	337-1674-11			1	SHLD,IMPLOSION:BLUE	80009	337-1674-11
	----- -----			-	(OPTION 78 ONLY)		
	337-2626-00			1	SHIELD,LT,CRT:6.35 X 4.9,PAPER	80009	337-2626-00
-33	386-2544-00			4	SUPPORT,CRT:FRONT	80009	386-2544-00
-34	386-3530-00			1	SUPPORT,CRT:FRONT	80009	386-3530-00
-35	384-1270-00			1	EXTENSION SHAFT:	80009	384-1270-00
-36	385-0033-00			1	SPACER,POST:0.625 L W/6-32 THD THRU,NYL	80009	385-0033-00
					**************(ATTACHING PARTS)***********		
-37	211-0538-00			1	SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH ST	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-38	376-0127-00			1	COUPLER,SHAFT:PLASTIC	80009	376-0127-00
-39	358-0216-00			1	BUSHING,PLASTIC:0.257 ID X 0.412 INCH OD	80009	358-0216-00
-40	333-2145-01			1	PANEL,FRONT:	80009	333-2145-01
					**************(ATTACHING PARTS)***********		
-41	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
-42	210-0958-00			1	WASHER,FLAT:0.115 ID X 0.469 INCH OD,ST	78471	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-43	200-1282-00			1	DOOR,ACCESS:	80009	200-1282-00
-44	333-1514-00			1	PANEL,FRONT:	80009	333-1514-00
					**************(ATTACHING PARTS)***********		
-45	210-0406-00			3	NUT,PLAIN,HEX:4-40 X 0.188,BRS,CD PL	73743	12161-50
-46	210-0054-00			3	WASHER,LOCK:SPLIT,0.118 ID X 0.212"OD	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-47	386-2067-03			1	SUBPANEL,FRONT:	80009	386-2067-03
-48	200-1308-01			1	COVER,CRT,REAR:	80009	200-1308-01
					**************(ATTACHING PARTS)***********		
-49	211-0097-00			5	SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-50	358-0529-00			1	BSHG,STRAIN RLF:FOR 0.3-0.36 OD CABLE,STR	28520	207 (UL 6P3-4)
-51	161-0017-02			1	CABLE ASSY,PWR,:3.18 AWG,96.0 LONG	16428	ORD BY DESCR
	----- -----			-	(OPTION 6 ONLY)		
	161-0106-00			1	CABLE ASSY,PWR,:3,18 AWG,115V,70.0 L	80009	161-0106-00
	----- -----			-	(OPTION 21 ONLY)		
-52	346-0045-00			3	STRAP,CONN COV:BNC ONE END,POLYPROPYLENE	80009	346-0045-00
	----- -----			-	(OPTION 21 ONLY)		
-53	200-0991-00			3	COV,ELEC CONN:BNC ,W/CTR GND	77820	2096-5
	----- -----			-	(STANDARD & OPTION 21 ONLY)		
-54	----- -----			6	CONN,RCPT:(SEE J110,130,310,330,505,515 RE		
	----- -----			-	(STANDARD & OPTION 21 ONLY)		
-55	210-0255-00			6	TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL	80009	210-0255-00
	----- -----			-	(STANDARD & OPTION 21 ONLY)		
-56	342-0117-00			12	INSULATOR,BSHG:0.375 ID X 0.065 L,DELRIN	80009	342-0117-00
	----- -----			-	(STANDARD & OPTION 21 ONLY)		
	214-2668-00			3	PLUG,HOLE:0.497 DIA,PLASTIC	80009	214-2668-00
-57	----- -----			1	RES.,VAR:(SEE R750 REPL)		
					**************(ATTACHING PARTS)***********		
-58	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-59	210-0940-00			1	WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	ORD BY DESCR
-60	210-0046-00			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,BRS	78189	1214-05-00-0541C
					************(END ATTACHING PARTS)*********		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-61	----- -----			1	TRANSFORMER:(SEE T805 REPL)		
-62	343-0267-00			2	BRACKET,XFMR:	80009	343-0267-00
					**************(ATTACHING PARTS)***********		
-63	212-0100-00			4	SCREW,MACHINE:8-32 X 0.625 INCH,HEX.HD,ST	83385	ORD BY DESCR
-64	210-0804-00			4	WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	ORD BY DESCR
-65	210-0458-00			4	NUT,PL,ASSEM WA:8-32 X 0.344 INCH,STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-66	352-0076-00	B010100	B010241	1	FUSEHOLDER:W/HARDWARE	75915	342012-L
	204-0837-00	B010242		1	BODY FUSEHOLDER:3AG,6.3A,250V,PNL MT	S3629	031.1681(MDLFEU)
-66.1	200-2264-00	B010242		1	CAP.,FUSEHOLDER:3AG FUSES	S3629	FEK 031 1666
-67	210-0873-00			1	WASHER,NONMETAL:0.5 ID X 0.688 INCH OD,NPR	70485	ORD BY DESCR
-68	210-0202-00			1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
					**************(ATTACHING PARTS)***********		
-69	210-0457-00			1	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	334-2550-00			1	MARKER,IDENT:MARKED CAUTION AND FUSE INF	80009	334-2550-00
	334-3379-00			1	MARKER,IDENT:MARKED GROUND SYMBOL	80009	334-3379-00
-70	333-2146-00			1	PANEL,REAR:	80009	333-2146-00
	333-2146-01			1	PANEL,REAR:	80009	333-2146-01
	----- -----			-	(OPTION 6 ONLY)		
-71	426-1301-01			1	FRAME,MONITOR:	80009	426-1301-01

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number

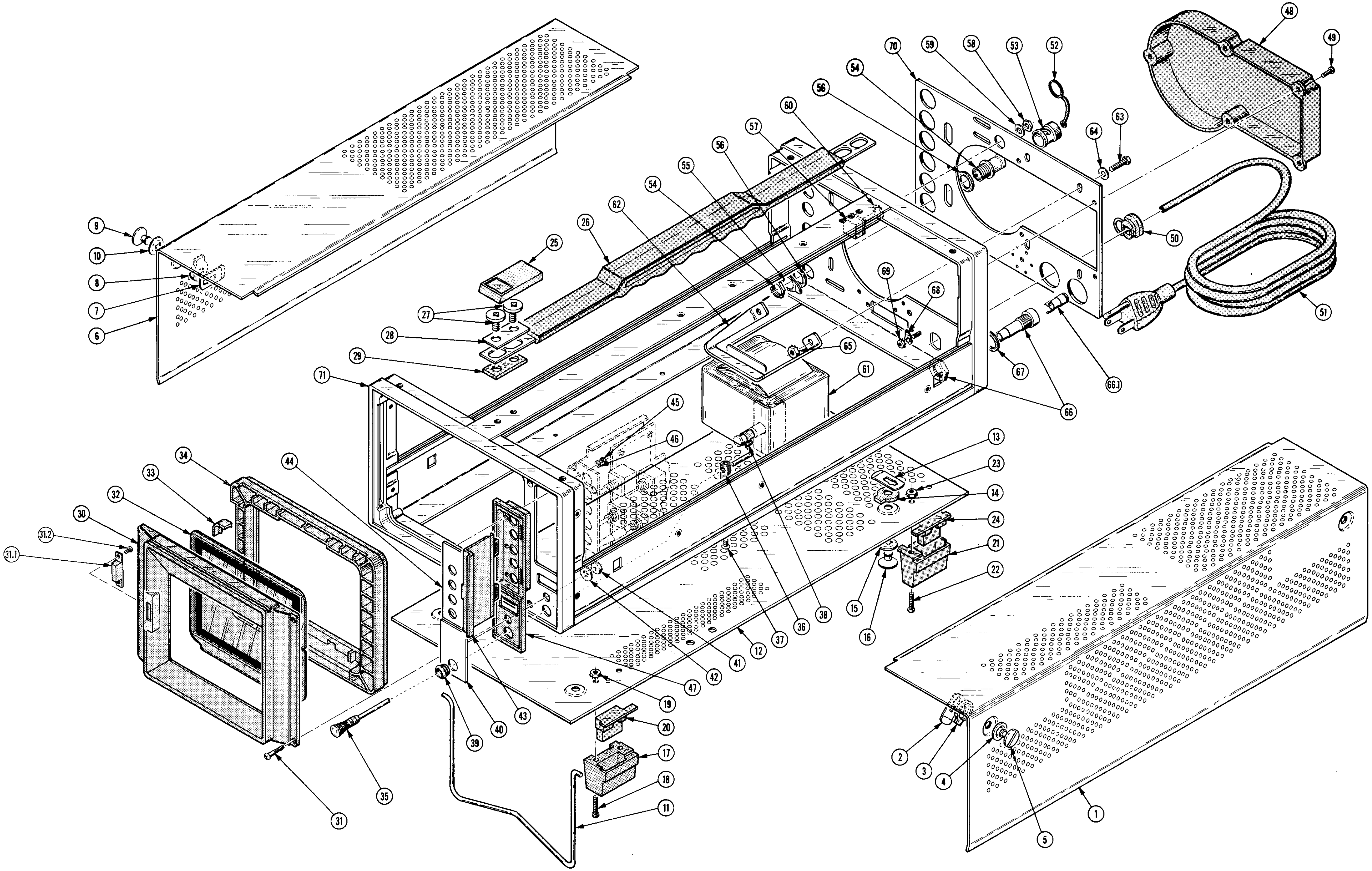
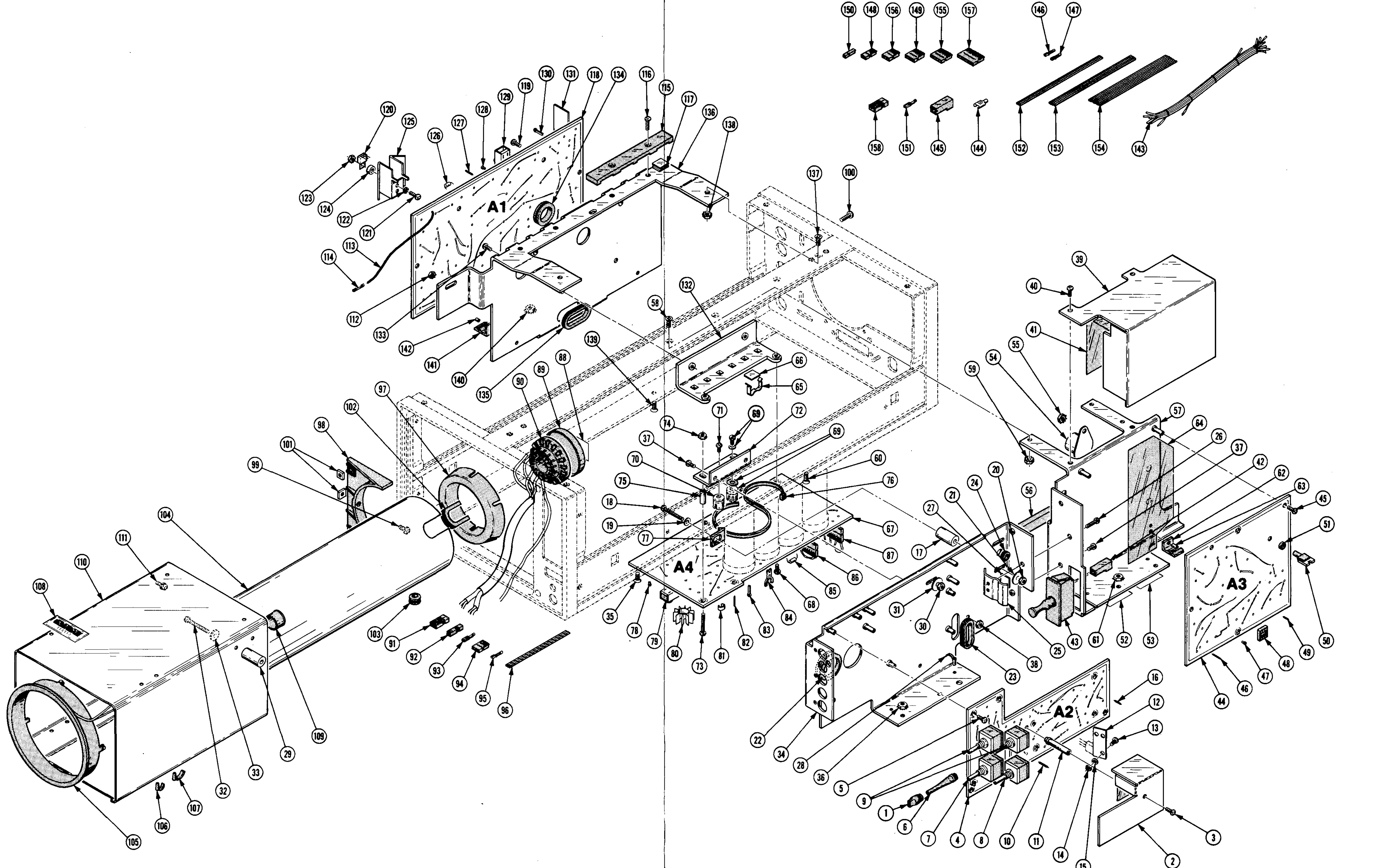


FIG. 1 CABINET & CHASSIS

FIG. 2 CRT &
CIRCUIT BOARDS



@

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-1	366-1432-00			4	KNOB:GRAY,W/SPRING	80009	366-1432-00
-2	200-1987-00			1	COVER,CKT CARD:CONTROL	80009	200-1987-00
					**************(ATTACHING PARTS)***********		
-3	211-0101-00			1	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-4	----- -----			1	CKT BOARD ASSY:CONT-INTFC DYN FOCUS		
	----- -----			-	(SEE A2 REPL)		
					**************(ATTACHING PARTS)***********		
-5	211-0008-00			6	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-6	384-1121-00			2	.EXTENSION SHAFT:1.41 INCH LONG	80009	384-1121-00
-7	----- -----			1	.RESISTOR,VAR:(SEE R555 REPL)		
-8	----- -----			1	.RESISTOR,VAR:(SEE R698 REPL)		
-9	----- -----			2	.RESISTOR,VAR:(SEE R175 AND R375 REPL)		
-10	131-0589-00			3	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-11	129-0427-00			1	.POST,ELEC-MECH:4-40 X 0.188 X 1.056" L HE	80009	129-0427-00
					.************(ATTACHING PARTS)************		
	210-0004-00			1	.WASHER,LOCK:#4 INTL,0.015 THK,STL CD PL	000BK	ORD BY DESCR
	211-0008-00			1	.SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					.**********(END ATTACHING PARTS)*********		
-12	214-2454-00			1	.HEAT SINK,ELEC:CKT BOARD,CONTROL	80009	214-2454-00
					.************(ATTACHING PARTS)************		
-13	211-0007-00			2	.SCREW,MACHINE:4-40 X 0.188,PNH STL,CD PL	83385	ORD BY DESCR
-14	210-0406-00			2	.NUT,PLAIN,HEX:4-40 X 0.188,BRS,CD PL	73743	12161-50
-15	210-0004-00			2	.WASHER,LOCK:#4 INTL,0.015 THK,STL CD PL	000BK	ORD BY DESCR
					.**********(END ATTACHING PARTS)*********		
-16	131-0608-00			23	.TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-17	384-0539-00			1	ROD,SPACER:0.375 X 0.750 INCH	80009	384-0539-00
					**************(ATTACHING PARTS)***********		
-18	211-0231-00			1	SCREW,MACHINE:4-40 X 1.0 PNH,SST,PSVT,POZ	83385	ORD BY DESCR
-19	210-1001-00			1	WASHER,FLAT:0.119 ID X 0.375" OD,BRS	12360	ORD BY DESCR
-20	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
-21	210-0958-00			1	WASHER,FLAT:0.115 ID X 0.469 INCH OD,ST	78471	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-22	348-0051-00			1	GROMMET,RUBBER:BLACK,ROUND,0.75 ID	83907	1107
-23	348-0253-00			1	GROMMET,PLASTIC:BLACK,OBLONG,3.OXO.925	80009	348-0253-00
-24	348-0517-00			1	GROMMET,PLASTIC:BLACK,ROUND,0.25 ID	28520	SB-375-4
-25	343-0521-00			1	CLAMP,XSTR:750 WIDE W(2) 4-40 THD HOLE	80009	343-0521-00
					**************(ATTACHING PARTS)***********		
-26	211-0014-00			1	SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-27	342-0082-00			1	INSULATOR,PLATE:0.52 SQ X 0.015 INCH THK,A	80009	342-0082-00
-28	343-0213-00			2	CLAMP,LOOP:0.2 ID,PLASTIC	80009	343-0213-00
-29	384-0539-00			1	ROD,SPACER:0.375 X 0.750 INCH	80009	384-0539-00
					**************(ATTACHING PARTS)***********		
-30	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
-31	210-0958-00			1	WASHER,FLAT:0.115 ID X 0.469 INCH OD,ST	78471	ORD BY DESCR
-32	211-0231-00			1	SCREW,MACHINE:4-40 X 1.0 PNH,SST,PSVT,POZ	83385	ORD BY DESCR
-33	210-1001-00			1	WASHER,FLAT:0.119 ID X 0.375" OD,BRS	12360	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	334-2360-00			1	MARKER,IDENT:WARNING	80009	334-2360-00
-34	441-1224-01			1	CHAS,ELEC EQPT:CONTROL	80009	441-1224-01
					**************(ATTACHING PARTS)***********		
-35	211-0538-00			2	SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH ST	83385	ORD BY DESCR
-36	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
-37	211-0008-00			4	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
-38	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
					************(END ATTACHING PARTS)*********		
-39	337-2307-00			1	SHLD,ELECTRICAL:HIGH VOLTAGE	80009	337-2307-00
					**************(ATTACHING PARTS)***********		
-40	211-0008-00			2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-	----- -----			-	HV SHIELD INCLUDES:		
-41	342-0329-00			1	.INSULATION,FILM:HV SHIELD,3.15 W X 4.15 L	80009	342-0329-00
-42	200-1075-00			1	COVER,TERM:QUICK DISCONNECT	00779	1-480435-0
-43	----- -----			1	SWITCH,PUSH-PUL:(SEE S800 REPL)		
-44	----- -----			1	CKT BOARD ASSY:HIGH VOLTAGE(SEE A3 REPL)		
					*************(ATTACHING PARTS)***********		
-45	211-0008-00			3	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-46	131-0589-00			6	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-47	136-0252-07			3	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-48	136-0514-00			1	.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
-49	131-0608-00			6	.TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-50	124-0118-00			1	.TERMINAL BOARD:1 NOTCH,CERAMIC,CLIP MTD	80009	124-0118-00
-51	361-0008-00			1	.SPACER,SLEEVE:0.11 ID X 0.25 OD X 0.28"H	80009	361-0008-00
	198-3388-00			1	.WIRE SET,ELEC:	80009	198-3388-00
	131-0707-00			1	..CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOL	22526	47439
	352-0171-02			1	..CONN BODY,PL,EL:1 WIRE RED	80009	352-0171-02
-52	334-2360-00			1	MARKER,IDENT:WARNING	80009	334-2360-00
-53	334-2359-00			1	MARKER,IDENT:WARNING	80009	334-2359-00
	334-2363-00			1	MARKER INDENT:WARNING,DANGER,HV	80009	334-2363-00
-54	----- -----			1	SW,THERMOSTATIC:(SEE S802 REPL)		
					*************(ATTACHING PARTS)***********		
-55	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
					***********(END ATTACHING PARTS)*********		
-56	351-0087-00			1	GUIDE,CKT BOARD:4.75 INCH LONG,PLASTIC	80009	351-0087-00
-57	441-1327-01			1	CHAS,ELEC EQPT:HIGH VOLTAGE	80009	441-1327-01
					*************(ATTACHING PARTS)***********		
-58	211-0025-00			2	SCREW,MACHINE:4-40 X 0.375 100 DEG,FLH ST	83385	ORD BY DESCR
-59	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
-60	211-0538-00			3	SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH ST	83385	ORD BY DESCR
-61	210-0457-00			3	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
	----- -----			-	.HV CHASSIS INCLUDES:		
-62	344-0131-00			2	..CLIP,SPG TENS:CIRCUIT BOARD MOUNTING	80009	344-0131-00
					..***********(ATTACHING PARTS)***********		
-63	210-0659-01			2	..EYELET,METALLIC:0.121 OD X 0.156 INCH LO	80009	210-0659-01
					..*********(END ATTACHING PARTS)*********		
-64	342-0330-00			1	..INSULATOR,FILM:HV SHIELD,1.87 W X 4.75 L	80009	342-0330-00
-65	344-0236-00			3	CLIP,SPR TNSN:	80009	344-0236-00
-66	342-0082-00			3	INSULATOR,PLATE:0.52 SQ X 0.015 INCH THK,A	80009	342-0082-00
	346-0128-00			1	STRAP,TIE DOWN:0.1W X 8.0" LONG,NYLON	06383	PLT2M
-67	----- -----			-	CKT BOARD ASSY:LV POWER & Z AXIS AMPL		
	----- -----			-	(SEE A4 REPL)		
					*************(ATTACHING PARTS)***********		
-68	211-0008-00			2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-69	214-0757-00			1	.HEAT SINK,ELEC:	98978	TXP0503B
-70	214-1611-00			1	.HEAT SINK,ELEC:0.280 ID,W/ 4-40 THREADS	05820	260-4T5E-C4631
					.***********(ATTACHING PARTS)***********		
-71	211-0007-00			1	.SCREW,MACHINE:4-40 X 0.188,PNH STL,CD PL	83385	ORD BY DESCR
					.**********(END ATTACHING PARTS)*********		
-72	200-1949-00			1	.HEAT SINK,ELEC:CKT CARD	80009	200-1949-00
					.***********(ATTACHING PARTS)***********		
-73	211-0017-00			2	.SCREW,MACHINE:4-40 X 0.375 INCH,PNH STL	83385	ORD BY DESCR
-74	210-0586-00			2	.NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
					.**********(END ATTACHING PARTS)*********		
-75	361-0564-00			2	.SPACER,SLEEVE:0.50 L X 0.133 ID BRS CD	76854	3-5165-275
-76	346-0128-00			1	.STRAP,TIE DOWN:0.1W X 8.0" LONG,NYLON	06383	PLT2M
-77	343-0150-00			1	.CLAMP,TIE DOWN:	95987	ORD BY DESCR
-78	136-0252-04			6	.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-79	----- -----			-	.SWITCH,SLIDE:(SEE S555 REPL)		
	----- -----			-	.(OPTION 4 ONLY)		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-80	214-1291-00			1	.HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H	05820	207SB
-81	214-0973-00			1	.HEAT SINK,ELEC:0.28 X 0.18 OVAL X 0.187"H	80009	214-0973-00
-82	131-0608-00			45	.TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-83	214-0579-00			15	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-84	344-0154-00			10	.CLIP,ELECTRICAL:FUSE,CKT BD MT	80009	344-0154-00
-85	131-0566-00			1	.BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	57668	JWW-0200E0
	342-0324-00	B010332		1	.INSULATOR,DISC:TO-5 TRANSISTOR	13103	7717-5N-BLUE
-86	131-1895-00			1	.LINK,TERM. CONN:8,22 AWG,1.5 L	80009	131-1895-00
	352-0166-02			1	..HLDR,TERM CONN:8 WIRE,RED	80009	352-0166-02
	131-0707-00			2	..CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOL	22526	47439
-87	131-1896-00			1	.LINK,TERM. CONN:8,22 AWG,1.5 L	80009	131-1896-00
	352-0166-01			1	..CONN BODY,PL,EL:8 WIRE BROWN	80009	352-0166-01
	131-0707-00			4	..CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOL	22526	47439
	131-1334-00			1	.BUS CONDUCTOR:	80009	131-1334-00
-88	334-2363-00			1	MARKER INDENT:WARNING,DANGER,HV	80009	334-2363-00
-89	200-0616-00			1	COVER,CRT SKT:1.78 DIA X 0.2 D,WHITE	80009	200-0616-00
-90	136-0663-00			1	SOCKET ASSY:CRT	80009	136-0663-00
-91	352-0198-00			1	.HLDR,TERM CONN:2 WIRE BLACK	80009	352-0198-00
-92	352-0197-00			2	.CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0197-00
-93	131-0792-00			4	.CONNECTOR,TERM:18-20 AWG,CU BE GOLD PL	22526	46221
-94	352-0161-00			1	.HLDR,TERM CONN:3 WIRE,BLACK	80009	352-0161-00
-95	131-0707-00			3	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	47439
-96	175-0826-00			FT	.WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-97	386-2246-00			1	SUPPORT,CRT:REAR	80009	386-2246-00
-98	407-1128-00			1	BRKT,CRT SHIELD:REAR,NYLON	80009	407-1128-00
					*************(ATTACHING PARTS)***********		
-99	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
-100	211-0589-00			1	SCREW,MACHINE:6-32 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
-101	220-0419-00			3	NUT,PLAIN,SQ:6-32 X 0.312 INCH,STL	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-102	348-0145-00			1	GROMMET,PLASTIC:U-SHP,1.0 X 0.42 INCH	80009	348-0145-00
-103	348-0517-00			1	GROMMET,PLASTIC:BLACK,ROUND,0.25 ID	28520	SB-375-4
-104	337-2309-00			1	SHIELD,ELEC:CRT REAR	80710	337-2309-00-A
-105	----- -----			1	COIL,TUBE DEFF:(SEE L725 REPL)		
-106	343-0088-00			5	CLAMP,LOOP:0.062 INCH DIA	80009	343-0088-00
-107	343-0089-00			2	CLAMP,LOOP:LARGE	80009	343-0089-00
-108	334-1379-00			1	LABEL:CRT,ADHESIVE BACK	80009	334-1379-00
	334-2551-00			1	MARKER,IDENT:MKD WARNING POWER PLUG	80009	334-2551-00
	----- -----			-	(OPTION 6 ONLY)		
-109	348-0518-00			1	GROMMET,PLASTIC:BLACK,ROUND,0.5 ID	28520	SB-625-8
-110	337-2306-00			1	SHIELD,CRT:FRONT	80710	337-2306-00-A
					*************(ATTACHING PARTS)***********		
-111	211-0116-00			1	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	ORD BY DESCR
-112	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
					************(END ATTACHING PARTS)*********		
-113	195-0164-00			1	LEAD SET,ELEC:CRT DEFL	80009	195-0164-00
-114	131-1538-00			4	.CONTACT,ELEC:CRIMP-ON,22-26 AWG WIRE	22526	75369-002
-115	343-0618-00			2	RETAINER,XSTR:	80009	343-0618-00
					*************(ATTACHING PARTS)***********		
-116	211-0025-00			4	SCREW,MACHINE:4-40 X 0.375 100 DEG,FLH ST	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
-117	342-0082-00			16	INSULATOR,PLATE:0.52 SQ X 0.015 INCH THK,A	80009	342-0082-00
-118	----- -----			1	CKT BOARD ASSY:DEFLECTION AMPL(SEE A1 REPL		
					*************(ATTACHING PARTS)***********		
-119	211-0008-00			2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					************(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-120	----- -----			4	.TRANSISTOR:(SEE Q250,260,450 & 460 REPL)		
					.***********(ATTACHING PARTS)***********		
-121	211-0008-00			4	.SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
-122	210-1178-00			4	.WASHER,SHLDR:U/W T0-220 TRANSISTOR	49671	DF137A
-123	210-0586-00			4	.NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
					.**********(END ATTACHING PARTS)*********		

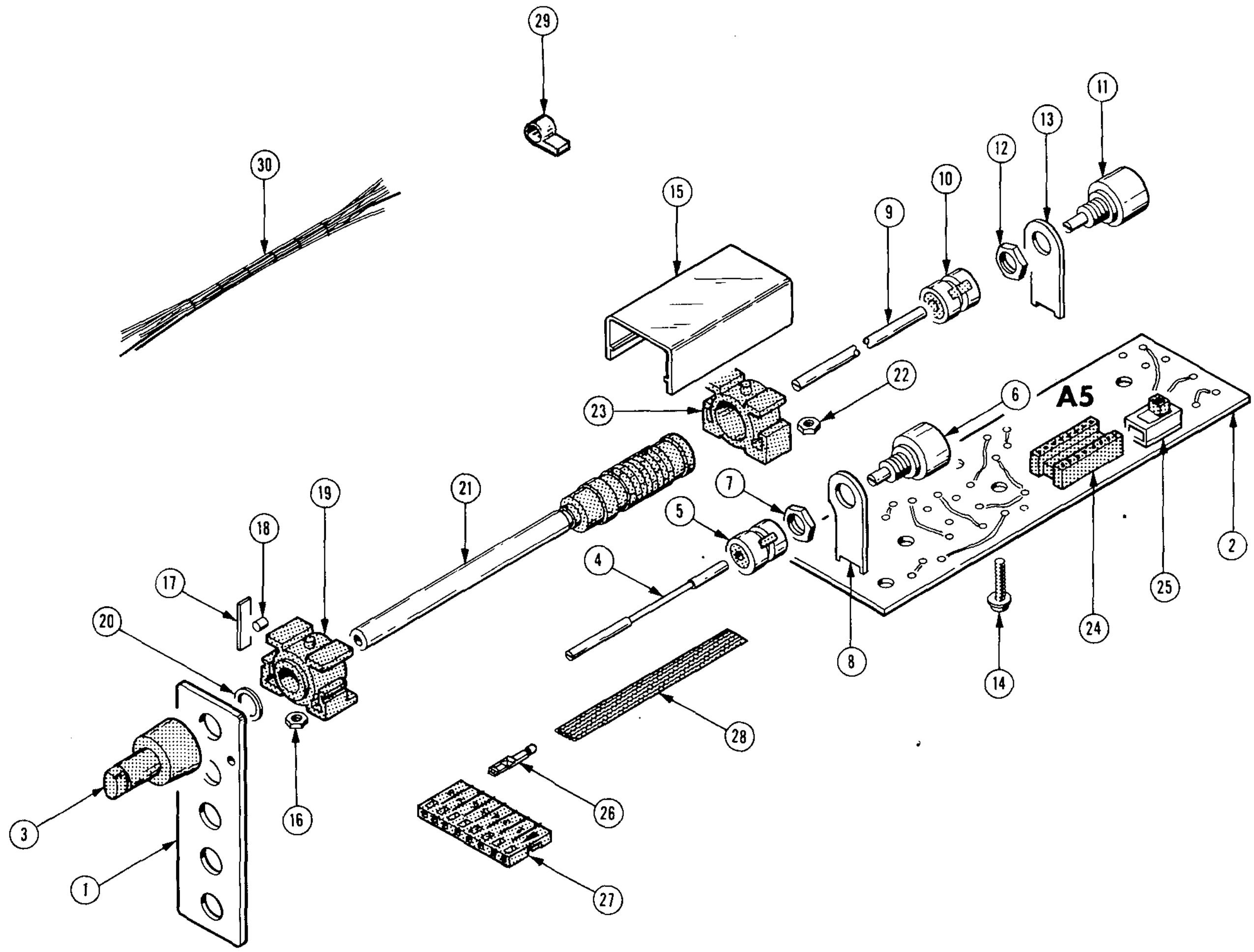
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-124	361-0555-00			4	.SHIM:0.30 OD X 0.134 ID	80009	361-0555-00
-125	214-2418-00			4	.HEAT SINK,ELEC:TRANSISTOR	80009	214-2418-00
-126	131-0566-00			6	.BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	57668	JWW-0200E0
-127	131-0608-00			27	.TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-128	136-0252-07			12	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-129	----- -----			4	.SWITCH,SLIDE:(SEE S110,130,310 & 330 REPL		
-130	214-0579-00			4	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-131	337-2305-00			2	.SHIELD,ELEC:CIRCUIT CARD	80009	337-2305-00
	198-3036-00	B010100	B010899	1	.WIRE SET,ELEC:	80009	198-3036-00
	198-3036-01	B010900		1	.WIRE SET,ELEC:	80009	198-3036-01
	131-1538-00	B010100	B010899	4	..CONTACT,ELEC:CRIMP-ON,22-26 AWG WIRE	22526	75369-002
	131-2525-00	B010900		4	..CONN,PLUG,ELEC:CRT,22-26 AWG	06776	PS40-101
	343-0854-00	B010900		4	..STRAIN RLF,TERM:CKT BOARD,22-26 AWG	27264	16-02-0034
	131-1334-00			2	..BUS CONDUCTOR:	80009	131-1334-00
-132	407-1498-00			1	BRACKET,ANGLE:POWER SUPPLY	80009	407-1498-00
					*************(ATTACHING PARTS)***********		
-133	211-0008-00			2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
-134	348-0012-00			2	GROMMET,RUBBER:0.625 INCH DIA	72653	1043-1M
-135	348-0233-00			1	GROMMET,PLASTIC:GRAY,OVAL SHAPE,0.927 ID	80009	348-0233-00
	334-2360-00			1	MARKER,IDENT:WARNING	80009	334-2360-00
	343-0213-00			1	CLAMP,LOOP:0.2 ID,PLASTIC	80009	343-0213-00
-136	441-1324-00			1	CHASSIS,MONITOR:DEFLECTION	80009	441-1324-00
					*************(ATTACHING PARTS)***********		
-137	211-0025-00			2	SCREW,MACHINE:4-40 X 0.375 100 DEG,FLH ST	83385	ORD BY DESCR
-138	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
-139	211-0538-00			2	SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH ST	83385	ORD BY DESCR
-140	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
	----- -----			-	DEFLECTION CHASSIS INCLUDES:		
-141	344-0131-00			2	.CLIP,SPG TENS:CIRCUIT BOARD MOUNTING	80009	344-0131-00
					.*************(ATTACHING PARTS)***********		
-142	210-0659-00			1	.EYELET,METALLIC:0.121 OD X 0.156" L,BRASS	00779	SE-45
					.***********(END ATTACHING PARTS)*********		
-143	179-2163-00			1	WIRING HARNESS,:POWER	80009	179-2163-00
-144	131-0861-00			4	.TERM,QIK DISC:16-20 AWG,0.22 W X 0.02 THK	00779	42617-2
-145	200-1075-00			3	.COVER,TERM:QUICK DISCONNECT	00779	1-480435-0
	179-2464-00			1	WIRING HARNESS,:POWER	80009	179-2464-00
-146	131-0707-00			8	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	47439
-147	131-0708-00			8	.CONTACT,ELEC:0.48"L,28-32 AWG WIRE	22526	47437
-148	352-0169-01			4	.HLDR TERM CONN:2 WIRE,BROWN	80009	352-0169-01
-149	352-0162-02			2	.CONN BODY,PL,EL:4 WIRE RED	80009	352-0162-02
-150	198-4007-00			1	WIRE SET,ELEC:	80009	198-4007-00
	352-0171-01			1	.CONN BODY,PL,EL:1 WIRE BROWN	80009	352-0171-01
	352-0171-02			1	.CONN BODY,PL,EL:1 WIRE RED	80009	352-0171-02
	352-0169-02			2	.CONN BODY,PL,EL:2 WIRE RED	80009	352-0169-00
	131-0707-00			4	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	47439
	198-4008-00			2	WIRE SET,ELEC:	80009	198-4008-00
-151	131-0621-00			4	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	46231
	131-0707-00			56	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	47439
-152	175-0826-00			FT	.WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-153	175-0827-00			FT	.CABLE,SP,ELEC:4,26 AWG,STRD.PVC JKT,RBN	08261	SS04267(1061)0C
-154	175-0831-00			FT	.WIRE,ELECTRICAL:8 WIRE RIBBON	08261	SS-0826-710610C
-155	352-0163-00			2	.CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0163-00
	352-0163-03			1	.CONN BODY,PL,EL:5 WIRE ORANGE	80009	352-0163-03
	352-0169-00			1	.HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
	352-0169-01			3	.HLDR TERM CONN:2 WIRE,BROWN	80009	352-0169-01
-156	352-0161-04			1	.CONN BODY,PL,EL:3 WIRE YELLOW	80009	352-0161-04
	352-0161-05			2	.CONN BODY,PL,EL:3 WIRE GREEN	80009	352-0161-05
	352-0161-06			2	.CONN BODY,PL,EL:3 WIRE BLUE	80009	352-0161-06
	352-0161-07			2	.CONN BODY,PL,EL:3 WIRE VIOLET	80009	352-0161-07
-157	352-0165-03			1	.CONN BODY,PL,EL:7 WIRE ORANGE	80009	352-0165-03
	352-0166-01			1	.CONN BODY,PL,EL:8 WIRE BROWN	80009	352-0166-01

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-158	352-0198-00			1	.HLDR,TERM CONN:2 WIRE BLACK	80009	352-0198-00
	352-0198-03			1	.HLDR,TERM CONN:2 WIRE ORANGE	80009	352-0198-03
	352-0171-00			1	.HLDR,TERM CONN:1 WIRE BLACK	80009	352-0171-00
	352-0171-01			1	.CONN BODY,PL,EL:1 WIRE BROWN	80009	352-0171-01
	352-0171-03			1	.CONN BODY,PL,EL:1 WIRE ORANGE	80009	352-0171-03
	198-4009-00			1	WIRE SET,ELEC:	80009	198-4009-00
	----- -----			-	(OPTION 21 ONLY)		
	131-0707-00			6	.CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD	22526	47439
	352-0169-01			2	.HLDR TERM CONN:2 WIRE,BROWN	80009	352-0169-01

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
3-1	333-1513-00			1	PANEL,FRONT:	80009	333-1513-00
-2	----- -----			1	CKT BOARD ASSY:SWEEP GENERATOR(SEE A5 REPL		
					**************(ATTACHING PARTS)***********		
	211-0008-00			4	SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
					***********(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-3	366-1369-00			1	.KNOB:GRAY	80009	366-1369-00
	213-0153-00			2	..SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	ORD BY DESCR
	131-0604-00			7	.CONTACT,ELEC:CKT BD SW,SPR,CU BE	80009	131-0604-00
-4	384-1156-00			1	.EXTENSION SHAFT:2.20 INCH LONG	80009	384-1156-00
-5	376-0051-01			1	.CPLG,SHAFT,FLEX:0.127 ID X 0.375 OD	80009	376-0051-01
	213-0048-00			1	..SETSCREW:4-40 X 0.125 INCH,HEX SOC S	74445	ORD BY DESCR
-6	----- -----			1	.RESISTOR,VAR:(SEE R918 REPL)		
					.***********(ATTACHING PARTS)***********		
-7	210-0583-00			1	.NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
	210-0940-00			1	.WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	ORD BY DESCR
					.**********(END ATTACHING PARTS)*********		
-8	386-2351-00			1	.PL,VAR RES MTG:HORIZ CKT BD	80009	386-2351-00
-9	384-0284-00			1	.EXTENSION SHAFT:5.688 INCH LONG	80009	384-0284-00
-10	376-0051-01			1	.CPLG,SHAFT,FLEX:0.127 ID X 0.375 OD	80009	376-0051-01
	213-0048-00			4	..SETSCREW:4-40 X 0.125 INCH,HEX SOC S	74445	ORD BY DESCR
-11	----- -----			1	.RESISTOR,VAR:(SEE R945 REPL)		
					.***********(ATTACHING PARTS)***********		
-12	210-0583-00			1	.NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
	210-0940-00			1	.WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	ORD BY DESCR
					.**********(END ATTACHING PARTS)*********		
-13	387-0794-00			1	.PLATE,CMPNT MTG:VAR RESISTOR,BRASS	80009	387-0794-00
	----- -----			1	.ACTR ASSY,CAM S:(SEE S930 REPL)		
					.***********(ATTACHING PARTS)***********		
-14	211-0292-00			4	.SCR,ASSEM WSHR:4-40 X 0.29,BRS NI PL	78189	ORD BY DESCR
					.**********(END ATTACHING PARTS)*********		
	----- -----			-	.DRUM ASSEMBLY INCLUDES:		
-15	200-1441-00			1	..COVER,CAM SW.:7 ELEMENTS	80009	200-1441-00
-16	210-0406-00			2	..NUT,PLAIN,HEX:4-40 X 0.188,BRS,CD PL	73743	12161-50
-17	214-1704-01			2	..SPRING,FLAT:CAM SW DETENT,0.008 INCH TH	80009	214-1704-01
-18	214-1127-00			2	..ROLLER,DETENT:0.125 DIA X 0.125,SST	80009	214-1127-00
-19	401-0155-00			1	..BEARING,CAM SW:FRONT	80009	401-0155-00
					..*********(ATTACHING PARTS)************		
-20	354-0219-00			1	..RING,RETAINING:FOR 0.25 INCH SHAFT	79136	5103-25-MD-R
					..*********(END ATTACHING PARTS)*********		
-21	105-0388-00			1	..ACTUATOR,CAM SW:	80009	105-0388-00
-22	210-0406-00			2	..NUT,PLAIN,HEX:4-40 X 0.188,BRS,CD PL	73743	12161-50
-23	401-0156-00			1	..BEARING,CAM SW:REAR	80009	401-0156-00
-24	136-0260-02			1	.SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL	71785	133-51-92-008
-25	----- -----			1	.SWITCH,SLIDE:(SEE S909 REPL)		
	198-2861-00			1	.WIRE SET,ELEC:	80009	198-2861-00
-26	131-0707-00			8	..CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOL	22526	47439
-27	352-0166-05			2	..CONN BODY,PL,EL:8 WIRE GREEN	80009	352-0166-05
-28	175-0828-00			FT	..WIRE,ELECTRICAL:5 WIRE RIBBON	08261	SS-0526-710610C
-29	343-0298-00			1	CLAMP,LOOP:PLASTIC,W/ADHESIVE BACK	95987	HPC25
-30	179-2478-00			1	WIRING HARNESS,:SWEEP	80009	179-2478-00

Scan by Zenith

OPTION 4



ACCESSORIES

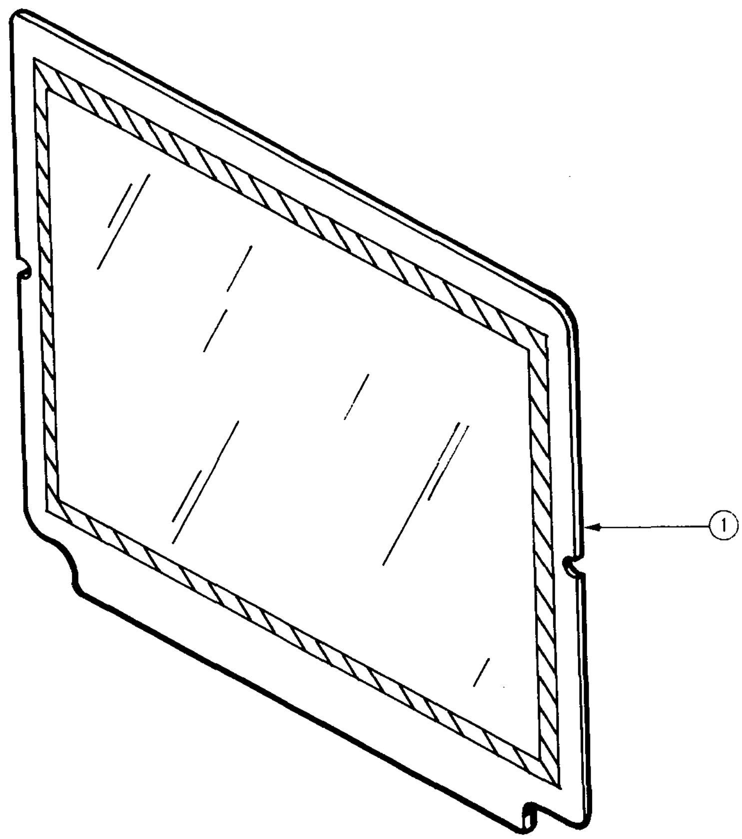


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
-1	337-1674-10			1	SHLD,IMPLOSION:CLEAR,MARKED FOR SCALE	80009	337-1674-10
	070-2506-00			1	MANUAL,TECH:OPERATORS	80009	070-2506-00
	070-2507-00			1	MANUAL,TECH:INSTRUCTION	80009	070-2507-00