

Tektronix[®]
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602

DISPLAY UNIT

INSTRUCTION MANUAL

TEST DATA RECORD

TEKTRONIX INSTRUMENT TYPE 602

1544

Serial Number B085091Mod Number 05, 95

Tek Reference Number _____

Customer Part Number _____

This instrument was calibrated to a level of performance that is equal to or better than the requirements in the Instruction Manual.

The following data was obtained during calibration and is limited to the primary characteristics of this instrument type.

| CHARACTERISTIC | MEASUREMENT |
|--|--|
| <u>Power Supply Accuracy</u> | |
| + 100 V Preset | + 100 <u>100.0</u> |
| + 12.5 V 12.25 to 12.75 | + 12.5 <u>12.47</u> |
| - 75 V - 73.5 to -76.5 | - 75 <u>74.3</u> |
| - 3900 V - 3705 to - 4095 | - 3900 <u>3830</u> |
| <u>X Amplifier</u> | |
| Bandpass 1 MHz | <u>1.18</u> MHz 10 Division Reference |
| <u>Y Amplifier</u> | |
| Bandpass 1 MHz | <u>1.23</u> MHz 8 Division Reference |
| <u>X - Y Phase Difference</u> 1 Degree | <u>0</u> Degrees |
| <u>Z Amplifier</u> | |
| Bandpass 1 MHz | <u>2.88</u> MHz |
| Risetime 150ns or less | <u>120</u> nanoseconds |

Calibrated By Broome Date 12-16-81Inspected By D Fleischer Date 12-18-81

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*Please Check for
CHANGE INFORMATION
at the Rear of this Manual*

602
DISPLAY UNIT

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077

MANUAL PART NO.
070-0799-00

First Printing JUN 1968
Revised JUN 1981

All Tektronix instruments are warranted against defective materials and workmanship for one year. Tektronix transformers, manufactured in our plant, are warranted for the life of the instrument.

Any questions with respect to the warranty mentioned above should be taken up with your Tektronix Field Engineer.

Tektronix repair and replacement-part service is geared directly to the field, therefore all requests for repairs and replacement parts should be directed to the Tektronix Field Office or representative in your area. This procedure will assure you the fastest possible service. Please include the instrument Type and Serial or Model Number with all requests for parts or service.

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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.

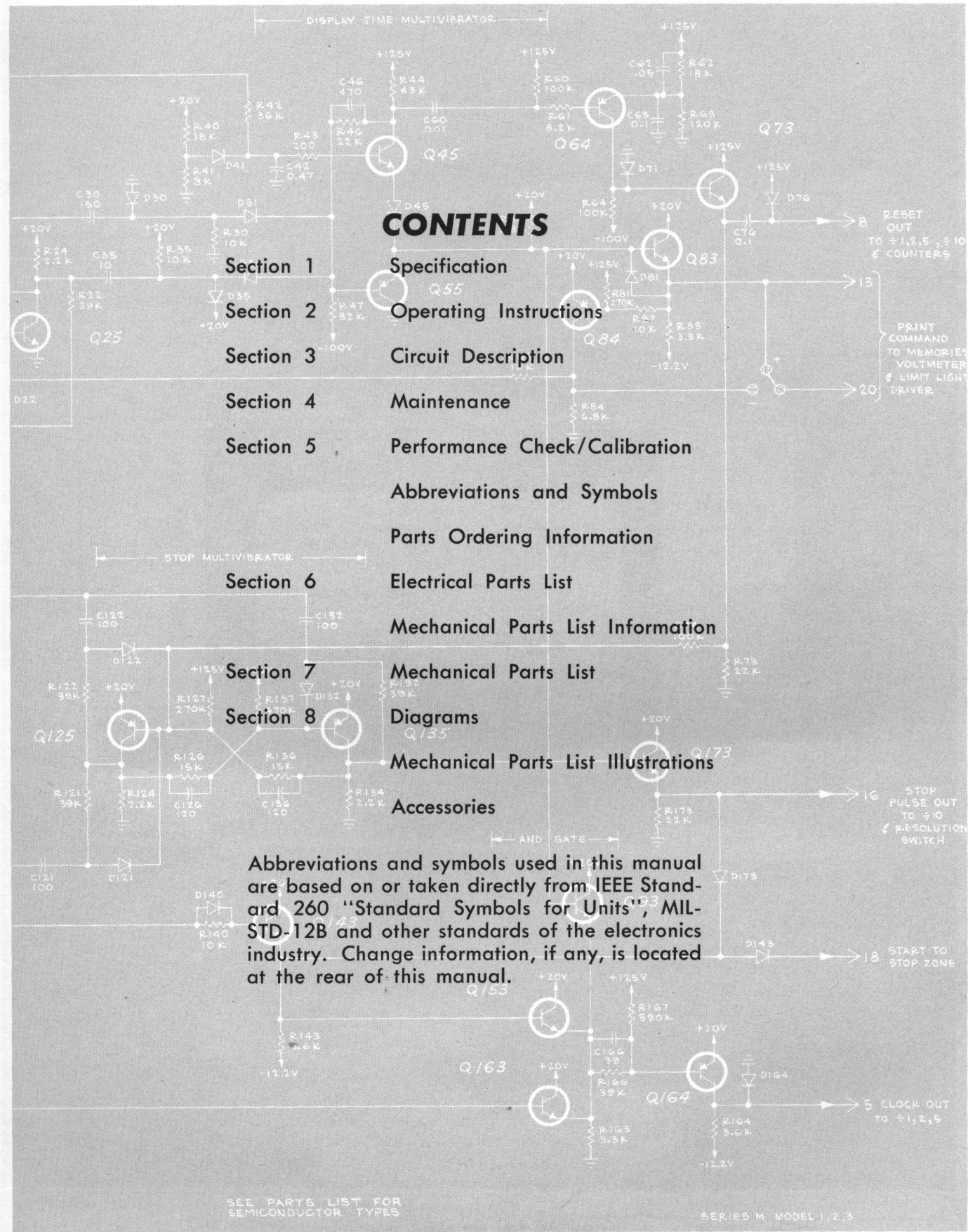
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Abbreviations and symbols used in this manual are based on or taken directly from IEEE Standard 260 "Standard Symbols for Units", MIL-STD-12B and other standards of the electronics industry. Change information, if any, is located at the rear of this manual.

SEE PARTS LIST FOR SEMICONDUCTOR TYPES

SERIES M MODEL 1,2,3



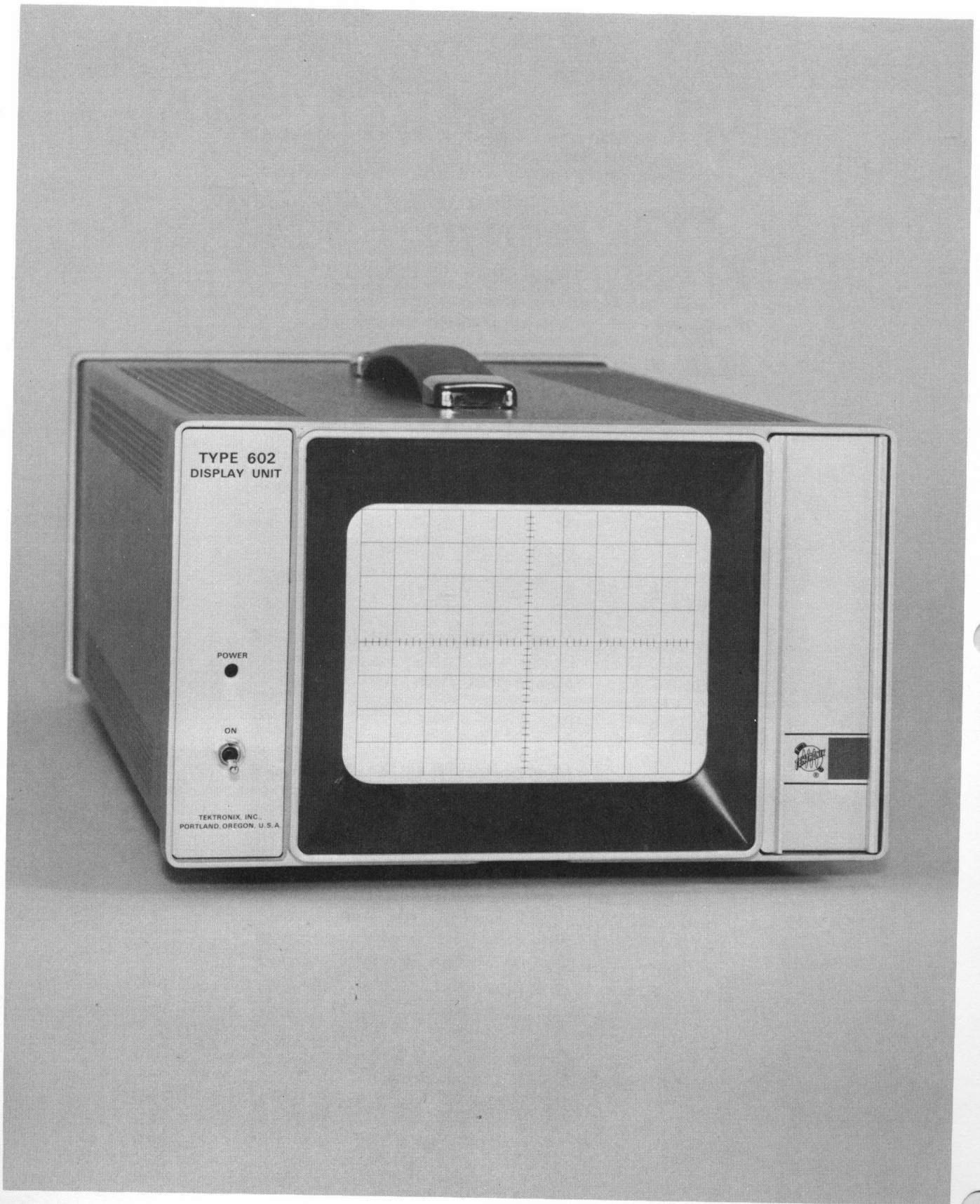


Fig. 1-1. Type 602 Display Unit.

SECTION 1

SPECIFICATION

Change information, if any, affecting this section will be found at the rear of this manual.

Introduction

The Type 602 Display Unit is a special purpose monitor designed for use in applications requiring an X-Y presentation. Differential Inputs are provided in the X and Y Inputs to reject extraneous signals common to interconnecting cables.

The cathode ray tube used in the Type 602 is a rectangular 5 inch ceramic tube with an internal graticule.

This instrument will perform as stated under the "Performance" heading, within an ambient temperature range of 0° C to +50° C (after a one minute warmup) provided that the instrument was calibrated within an ambient temperature range of +20° to +30° C.

The "CHECK" portion of the Calibration Procedure, Section 5, provides a convenient method of checking the performance of this instrument.

The Type 602 may be used with the Tektronix, Inc. Type C-30 Camera.

VERTICAL AND HORIZONTAL CHANNELS

| Characteristics | Performance |
|------------------------------------|--|
| Deflection Factor | |
| Vertical (Y), 8 div full screen | Internally variable from 0.09 V/div to 0.135 V/div |
| Horizontal (X), 10 div full screen | Internally variable from 0.09 V/div to 0.11 V/div |
| Polarity | (+) Vertical input moves beam up (+) Horizontal input moves beam to right |
| Maximum Input Voltage | ±10 V, DC + peak AC |
| Signal Source Impedance Level | 1 kΩ or less recommended |

VERTICAL AND HORIZONTAL CHANNELS

| Characteristics | Performance |
|---|--|
| Input R and C | 100 kΩ, within 10%, parallel by 30 pF or less |
| Bandwidth (X and Y Amplifiers) | 1 MHz, minimum |
| Phase Difference | Within 1° between X and Y to 1 MHz |
| Vertical and Horizontal Position Ranges | Allows setting zero signal position anywhere on screen |
| Spot Position Stability | 0.1 div or less/hour after 20 minute warmup |

Z AMPLIFIER

| Characteristics | Performance |
|-----------------------|--|
| Input Signal | Analog input DC to 1 MHz over a 0.0 V to +1 V range. (Linear amplifier modulates writing beam) |
| Maximum Input Voltage | ±10 V, DC + peak AC |
| Input R and C | 100 kΩ, within 10%, paralleled by 70 pF or less. |
| Source Impedance | 1 kΩ or less recommended |
| Bandwidth | DC to 1 MHz |

DISPLAY

| Characteristics | Performance |
|---------------------------|---|
| CRT | |
| TYPE | Electrostatic deflection |
| Phosphor | Standard P31; optional P7 |
| Display | |
| Quality Area | 8 div by 10 div (1 div equals 1 cm). |
| Linearity (Low Frequency) | |
| Vertical Axis | 2%, or less, difference in any 2 cm |
| Horizontal Axis | 6%, or less, difference in any 2 cm |
| Geometry | |
| Vertical | 0.1 div or less deviation from straight line. |
| Horizontal | 0.1 div or less deviation from straight line. |
| Graticule | Standard, internal 8 x 10 div Optional internal 8 x 10 div outline (no graticule lines). |
| Trace Width | 14 mils at 0.5 μA beam current |

POWER SUPPLY

| Characteristics | Performance |
|---|--|
| Line Voltage Range | |
| 115 V | Low 90 V to 110 V Medium 104 V to 126 V High 112 V to 136 V |
| 230 V | Low 180 V to 220 V Medium 208 V to 252 V High 224 V to 272 V |
| Maximum Power Consumption at 115 V, 60 Hz | 50 W, 0.48 A |
| Line Frequency | 48 Hz to 440 Hz |

Specification—Type 602

ENVIRONMENTAL

| Characteristics | Performance |
|-----------------|--|
| Temperature | |
| Non-operating | —40° C to +65° C |
| Operating | 0° C to 50° C |
| Altitude | |
| Non-operating | To 50,000 feet |
| Operating | To 15,000 feet |
| Transportation | Qualified under National Safe Transit Committee test procedure 1A. |

PHYSICAL

| | | |
|---------------|---------------------------------------|---------------------------------------|
| Finish | Blue vinyl painted aluminum | |
| Cabinet | Aluminum | |
| Front Casting | DELTRIN ¹ plastic | |
| CRT mask | | |
| Dimensions | Without cabinet | With cabinet |
| Height | 5 ¹ / ₄ inches | 6 inches |
| Width | 8 ¹ / ₂ inches | 8 ¹ / ₂ inches |
| Length | 17 ¹ / ₂ inches | 17 ¹ / ₂ inches |

¹DELTRIN is a registered trademark of E. I. Du pont De Nemours Co., Wilmington, Delaware.

For optional accessories available for use with this instrument, see current Tektronix, Inc., catalog.

SECTION 2

OPERATING INSTRUCTIONS

Change information, if any, affecting this section will be found at the rear of this manual.

Introduction

To effectively use the Type 602, the operation and capabilities of the instrument must be understood. This section describes the operation of the front and rear panel controls and connectors and gives first time and general operating information.

Operating Voltages

The Type 602 can be operated from either a 115 volt or a 230 volt nominal line voltage source. The line voltage selector converts the instrument from one operating range to the other. In addition, one of three regulating ranges can be selected by the line voltage range switch. These switches, located on the rear panel (Fig. 2-1), change the primary connections of the power transformer. Use the following procedure to convert this instrument between nominal line voltages or regulating ranges.

1. Make sure the instrument is disconnected from the power source.

2. To convert from 115 volts nominal to 230 volts nominal line voltage, slide the line voltage selector to the 230 volt position. Change the line cord power plug to match the power source receptacle or use a 115 to 230 volt adapter.

3. To change regulating ranges, rotate the line voltage range switch to the desired range. Select a range centered about the average line voltage to which the instrument is to be connected (see Table 2-1).

4. Apply power to the instrument.

CAUTION

Damage to the instrument may result from incorrect switch settings.

TABLE 2-1
Regulating Ranges

| Range Selector Switch Position | Regulating Range | |
|-----------------------------------|----------------------|----------------------|
| | 115 Volts Nominal | 230 Volts Nominal |
| LO (counterclockwise) | 90 to 110 V | 180 to 220 V |
| M (center) | 104 to 126 V | 208 to 252 V |
| HI (clockwise) | 112 to 136 V | 224 to 272 V |

Operating Temperature

The Type 602 can be operated where the ambient air temperature is between 0° C and +50° C. The instrument can be stored in ambient temperatures between -40° C and

+65° C. After storage at a temperature beyond the operating limits, allow the chassis temperature to come within the operating limits before power is applied. The instrument requires one minute warmup at an ambient temperature of +25° C, $\pm 5^\circ$ C, for rated accuracies.

A thermal cutout in this instrument provides thermal protection and disconnects the power to the instrument if the internal temperature exceeds a safe operating level. This device will automatically re-apply power when the temperature returns to a safe level (less than 60° C).

FUNCTIONS OF CONTROLS AND CONNECTORS

A brief description of the function or operation of the front and rear panel controls and connectors follows: See Fig. 2-1 for location.

Front Panel

| | |
|-----------|--------------------|
| ON Switch | Power ON-OFF |
| POWER | Indicates Power ON |

Front Panel (behind access door)

| | |
|--------------------|---|
| INTENSITY | Utilizes a "backlash" pot for combination fine-coarse control of beam current. |
| FOCUS | Used in conjunction with Astigmatism (mounted on Z Amplifier circuit Board) to obtain a well defined trace. |
| VERT POSITION | Controls vertical position of the display. |
| HORIZ POSITION | Controls horizontal position of the display. |
| SCALE ILLUMINATION | Adjusts the intensity of the faceplate graticule markings. |

Rear Panel

| | |
|-------------------------|--|
| X INPUT | Connectors for applying input signals to the Deflection Amplifiers. Differential input is provided by isolated shell BNC connectors. |
| Y INPUT | |
| Z INPUT | Connector for applying signal to the Z Amplifier. |
| 115-230 V Line Selector | See step 2, Operating Voltages. |
| Range Selector | See step 3, Operating Voltages. |
| Trace Rotation | Aligns the trace parallel to the horizontally scribed graticule lines. |

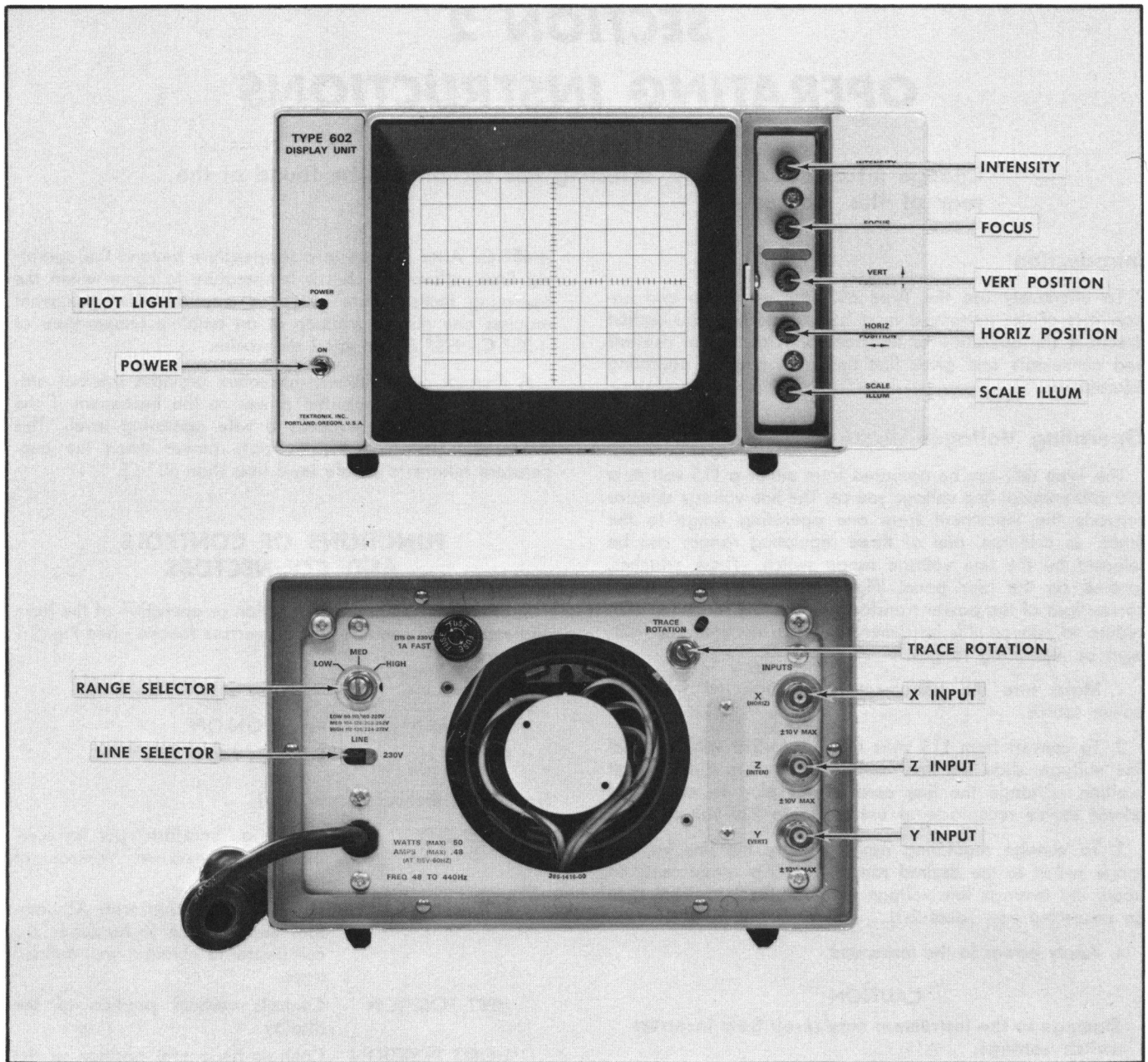


Fig. 2-1. Location of front and rear panel controls.

FIRST TIME OPERATION

The Type 602 is ready to be operated when received. The following steps will demonstrate the use of the controls and connectors.

1. Make sure that the INTENSITY control is turned fully counterclockwise.
2. Connect the instrument to a suitable power source.
3. Apply a 1 volt horizontal signal to the X INPUT and vertical signal to the Y INPUT. Apply a 1 volt beam turn-on

signal to the Z INPUT. Refer to Input Requirements for input signal levels.

4. Place the ON switch in the up position. Allow one minute warmup.

5. With the beam turn-on signal applied (Z INPUT), rotate the INTENSITY control slowly clockwise until the display is visible.

CAUTION

If the INTENSITY control is set too high, damage to the CRT phosphor may result.

6. Adjust FOCUS control for a well defined display.

GENERAL OPERATING INFORMATION

General

The Type 602 is designed primarily to display data from digital computers and data transmissions systems, and for many forms of information displays.

Bandwidth of the Deflection Amplifiers is 1 MHz or greater.

For complete instructions for adjusting the FOCUS and Astigmatism controls, and for aligning the display, refer to the Calibration Procedure, Section 5.

Intensity Control

The INTENSITY control used in this instrument is a special "backlash" potentiometer having both a fine and coarse range, with a 60° independent rotation on the fine range. The potentiometer consists of two sections sharing a single shaft. When adjusting from the full counterclockwise position, only the "fine" section is affected for the first 60°. Then as the shaft is turned clockwise the coarse section is engaged and both sections are adjusted simultaneously. This same action occurs when the control is rotated counterclockwise. When the general intensity level is reached, the "fine" section can be adjusted independently of the "coarse" section to arrive at the optimum beam current level for achieving best resolution over the display area.

Always increase the intensity slowly. A bright, sharply focused spot on the CRT may result in damage to the CRT phosphor.

Input Requirements

The X and Y Amplifiers may be adjusted to 0.1 volt for each centimeter of deflection, both vertical and horizontally. Thus, for full scale deflection in the vertical axis a 0.8 volt signal is required for full scale deflection. 1.0 volt of horizontal signal is required for full scale deflection.

The system may be adjusted for larger amplitude (up to 150 volts). Provisions have been made for attenuating the signal to the desired level. The maximum input voltage without attenuation is 10 volts, DC plus peak AC.

The Z Amplifier requires a voltage level of zero to +1.0. The display intensity will be directly related to the amplitude of the signal applied to the Z Amplifier Input.

Input Attenuation

If it is desired to attenuate the input signals to the Deflection Amplifiers, attenuating resistors must be selected and installed on the amplifier board. First determine the amounts of attenuation needed (available signal source vs. input sensitivity). In selecting values of series and shunt resistors, it must be realized that the 100 kilohm input load resistance will be affected. Find the values of the attenuating resistors as listed in Table 2-2.

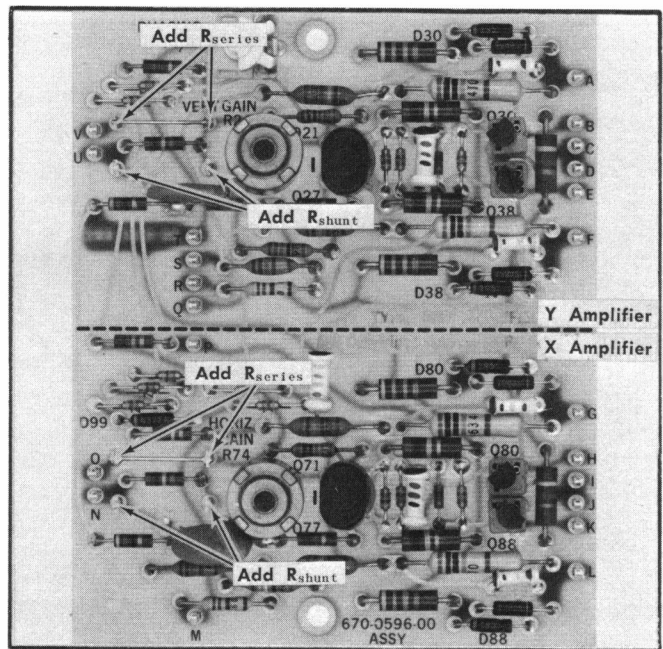


Fig. 2-2. Location of attenuator standoff pins on Deflection Amplifier board.

TABLE 2-2

| Ratio | Approx R (Series) | Comp Cap in pF | | | Approx R (Shunt) | |
|-------|-------------------|----------------|------|---------|------------------|--|
| | | X and Y | Z | X and Y | Z | |
| 2:1 | 50 kΩ | 14 | 5.6 | 100 kΩ | 50 kΩ | |
| 5:1 | 80 kΩ | 6.8 | 1 | 25 kΩ | 20 kΩ | |
| 10:1 | 90 kΩ | 4.7 | none | 11 kΩ | 9 kΩ | |
| 15:1 | 93 kΩ | 4.7 | none | 7 kΩ | 6 kΩ | |

To install the attenuating resistors, remove the wire straps from the standoff pins on the Deflection Amplifier board (Fig. 2-2) and replace the straps with the series resistors. Solder the shunt resistors between the standoff pins provided.

When using input signals having fast rise and fall times (5 μs or faster) it will be necessary to frequency compensate the attenuating resistors. For each attenuation ratio, the series resistor must be paralleled by a compensating capacitor.

Table 2-2 shows the values of attenuating resistors and compensating capacitors for each attenuation ratio.

NOTE

When replacing the series resistor on the Z Amplifier board to change the attenuation ratio, remove the 91 pF capacitor, C101, and replace with the proper value as shown in Table 2-2.

Provision to attenuate the signal to the Z Amplifier input is provided on the Z Amplifier circuit board. Series resistor

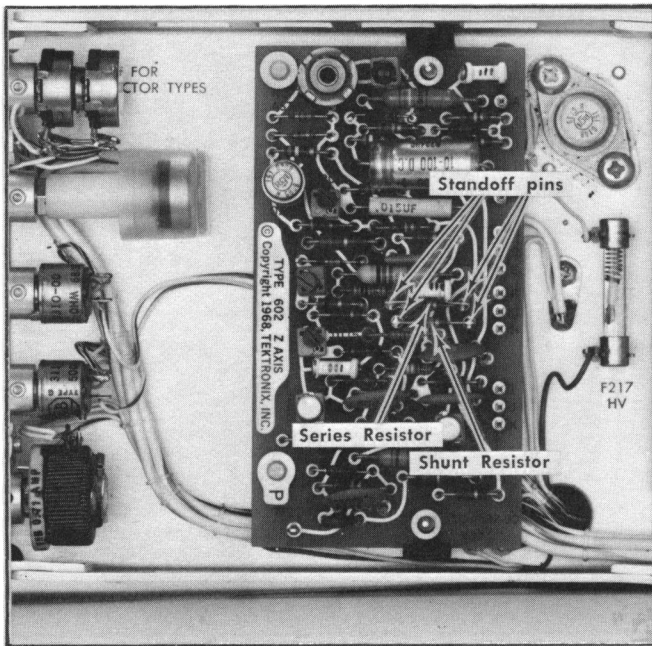


Fig. 2-3. Location of attenuator standoff pins on Z Amplifier board.

R101 and shunt resistor R102 are mounted on standoff pins and may be changed to accommodate higher input voltages. See Fig. 2-3 for location of standoff pins and Table 2-2 for resistance values.

Maximum voltages which may be applied to the Z Input are: 10 V, DC plus peak AC without the attenuator and 150 V, DC plus peak AC with 15:1 attenuator.

Phase shift specifications normally apply to the 0.1 volt/division sensitivity. If similar attenuator components (X and Y identical) are used and X and Y gains are equal, phase performance can be maintained.

Check the operation of the instrument after the resistors are installed. The signal source should have an impedance of 1 kΩ or less.

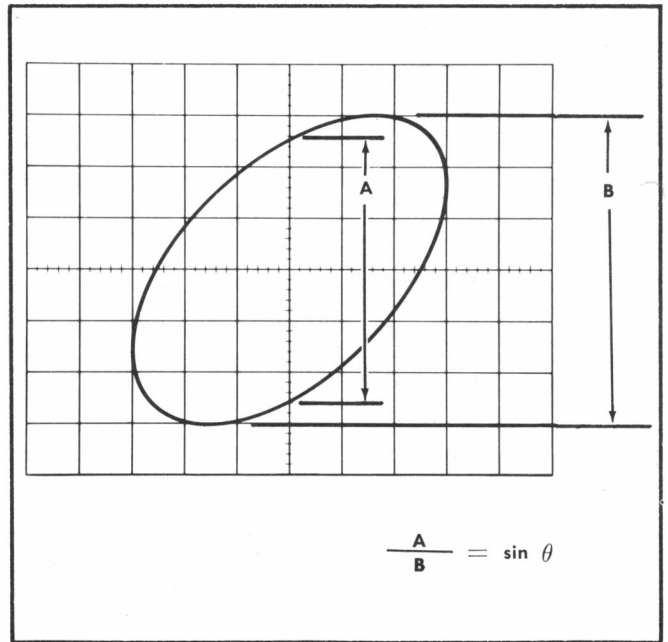


Fig. 2-4. Method of calculating phase difference (θ) of two sine waves.

Measuring Phase Difference with the Type 602

This method compares sine waves of the same frequency using the identical X and Y Deflection Amplifiers.

Apply the sine waves to the X and Y INPUT connectors. The display will be an ellipse. The display will appear as a straight diagonal line if the sine waves are in phase or exactly out of phase. The display will appear as a circle if the sine waves are exactly 90° or 270° out of phase.

Center the ellipse horizontally and vertically in the CRT graticule. Measure the distance A and B as shown in Fig. 2-4. A/B is equal to the sine of the phase difference of the two signals ($\sin \phi = A/B$). From a table of Natural Functions, find the angle.

SECTION 3

CIRCUIT DESCRIPTION

Change information, if any, affecting this section will be found at the rear of this manual.

Introduction

This section contains a description of the circuitry used in the Type 602. The section begins with a block diagram description provided to aid in understanding the overall concept of the circuitry. Then each circuit is described in detail. The electron flow convention is followed in this description.

The schematic diagrams at the rear of the manual should be referred to in addition to the illustrations when studying this circuit description. The block diagram shows the relationship of the major circuits.

BLOCK DIAGRAM DESCRIPTION

The X and Y Deflection Amplifiers each convert a single ended input signal to push-pull output suitable to drive the CRT deflection plates. The gain of the amplifiers is controlled by negative feedback circuits, which also ensures a highly stabilized output.

Beam turn-on signal is applied to the Z Amplifier which controls the CRT control grid. The Z Amplifier is an analog amplifier which produces a CRT beam intensity proportional to the level of DC voltage applied to the amplifier input.

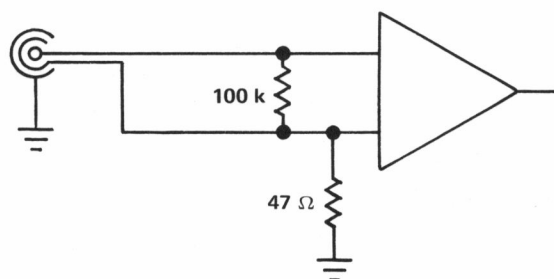
The CRT circuit provides the voltage levels required to operate the CRT. The cathode-to-anode accelerating potential is about 4 kV; +100 volts is applied to the accelerating anode and approximately -3900 volts to the cathode. Controls are provided to adjust the CRT for optimum display. An oscillator and transformer produce the high voltage which is rectified and applied to the CRT cathode and grid. A regulator circuit maintains the high voltage at a constant level.

The Low Voltage Power Supply produces the operating power for the instrument from regulated +100, +12.5 and -75 volt supplies and unregulated +16 and +250 volt supplies. In addition, 6.4 volts AC is provided for the CRT heater.

DEFLECTION AMPLIFIERS

General

Differential inputs are provided to X and Y Amplifiers to reject extraneous signals common to interconnecting cables. Refer to diagram below.



The deflection amplifiers convert a single-ended input signal to a push-pull output suitable to drive the deflection plates. Negative feedback is employed to ensure a highly stable output.

NOTE

The following description applies to both the horizontal and vertical deflection amplifiers, however, the circuit numbers used are those of the vertical, or Y circuit.

Paraphase Amplifier Input Stage

Q21, Q27 and their associated circuit components form a common emitter phase inverter (paraphase amplifier). The voltage divider network consisting of R8, R10, R13, R15 and R17 establishes the DC voltage level on the base of Q27 while the network consisting of R2, R6 and R8 offsets the Q21 base current. R10, Y POS, permits adjustment of the current applied to Q27 base.

The Phasing control, C4, matches the time constants of the Vertical and Horizontal Deflection Amplifiers. Phase differences within the instrument (which would be a problem in X-Y measurements) are reduced to less than 1°.

Diodes D3 and D4 limit the input signal swing to +2.3 volts and -3.5 volts. Provisions have been made for adding attenuating resistors if large signals (up to 150 volts) are to be

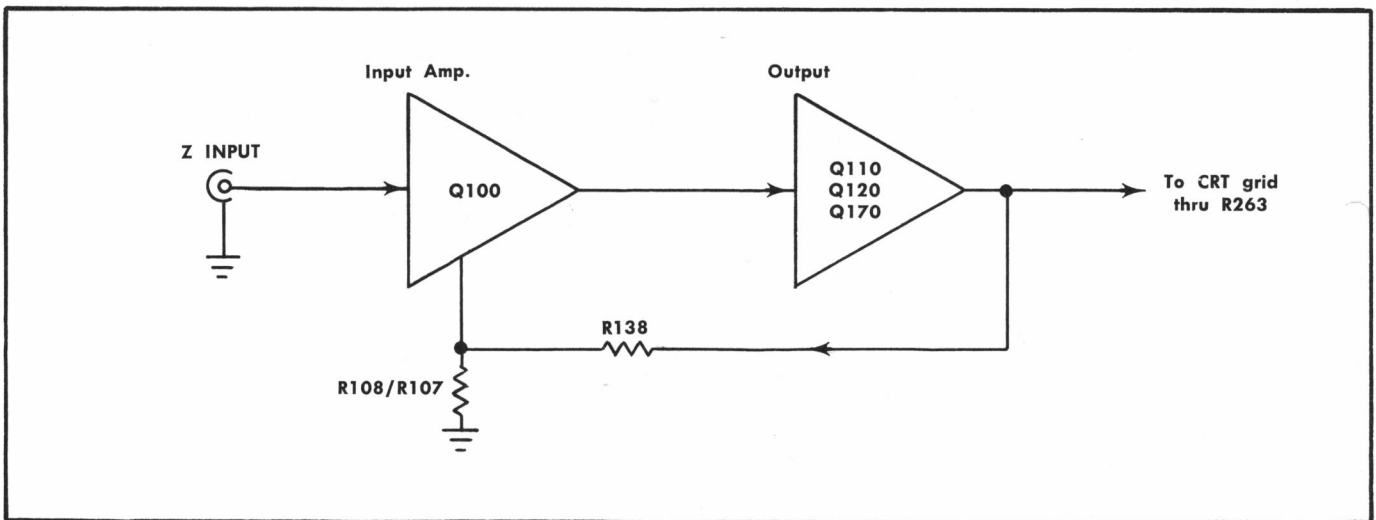


Fig. 3-1. Z Amplifier detailed block diagram.

applied. The signal is developed across the resistance between the emitter of Q21 and Q27, producing signal current through R21 and R28. This results in an output signal of equal amplitude but opposite polarities (push-pull) at Q21-Q27 collectors.

Output Amplifier

The output signal from the Paraphase Amplifier stage is coupled through emitter followers Q30 and Q38, which furnish the current drive to the Output Amplifier stage. Amplifiers Q41 and Q45 amplify the push-pull signal and apply it to the CRT deflection plates.

The gain of the Deflection Amplifier is controlled by a negative feedback circuit, which provides a highly stabilized output. A portion of the output signal at the collectors of Q41 and Q45 is fed back through R20 and R29 to the emitters of Q21 and Q27. The amount of Q21 and Q27 emitter degeneration can be changed by adjustment of R24, Y Gain to ensure the correct vertical deflection of different CRT's. In a like manner, R74, X Gain, can be adjusted to ensure the correct horizontal deflection.

Zener diode D30, and diode D20 and their counterparts prevent saturation of the deflection plate driver transistors Q41, Q45, Q91 or Q95 when the signal amplitude or positioning voltage causes deflection out of the scaled area of the graticule.

Z AMPLIFIER

The Z Amplifier is an analog amplifier in which the overall gain is set (by R107, R108 and R138) at X40 to X45. (See Fig. 3-1).

The divider R102-R104 assures visible light level when coaxial cable is disconnected from the Z INPUT.

D102 protects Q100 emitter-base junction against possible damage from negative-going signals applied to the input.

Q110 and Q120, in a cascade amplifier configuration, serve as a driver for the output transistor, Q130. Q120 con-

verts the current change furnished by Q110 to a large voltage change to the emitter follower.

C124 serves as feedback compensation at high frequencies; R130 limits Q130 collector dissipation and D134 provides a path around Q130 for discharging the capacitance of the connected circuitry.

CRT CIRCUIT

General

The CRT circuit provides the voltage levels necessary for operation of the cathode-ray tube (CRT). INTENSITY, FOCUS and Astigmatism controls are provided to adjust the CRT for proper display. The cathode-to-anode accelerating potential is about 4 kV; +100 volts is applied to the anode and -3900 volts is applied to the cathode. The biasing conditions of the CRT are dependent on the output of the Z Amplifier circuit. The control grid has about -3990 volts applied during the blanking period to keep the CRT cut off, and about -3940 volts applied during the unblanking period to turn the CRT beam on. Fig. 3-2 shows a detailed block diagram of the CRT circuit.

High Voltage Oscillator

Q217 and its associated circuitry comprise a class C oscillator to produce the drive for the high-voltage transformer, T220. When the instrument is turned on, current through Q200 causes Q200 collector to go positive, forward biasing Q217. C214 begins to charge to the Q217 base voltage. The collector current of Q217 increases and a voltage is developed across the collector winding to T220. This produces a corresponding voltage increase in the feedback winding of T220 which is connected to the base of Q217, causing Q217 to conduct harder. Eventually the rate of collector current increase in Q217 becomes less than that required to maintain the voltage across the collector winding and the output voltage drops. This turns off Q217 by way of the feedback voltage to the base. While the transformer field is collapsing, the charge on C214 is removed. Q217 remains off until the transformer field has collapsed, then C214 begins to charge again to raise the voltage at the base

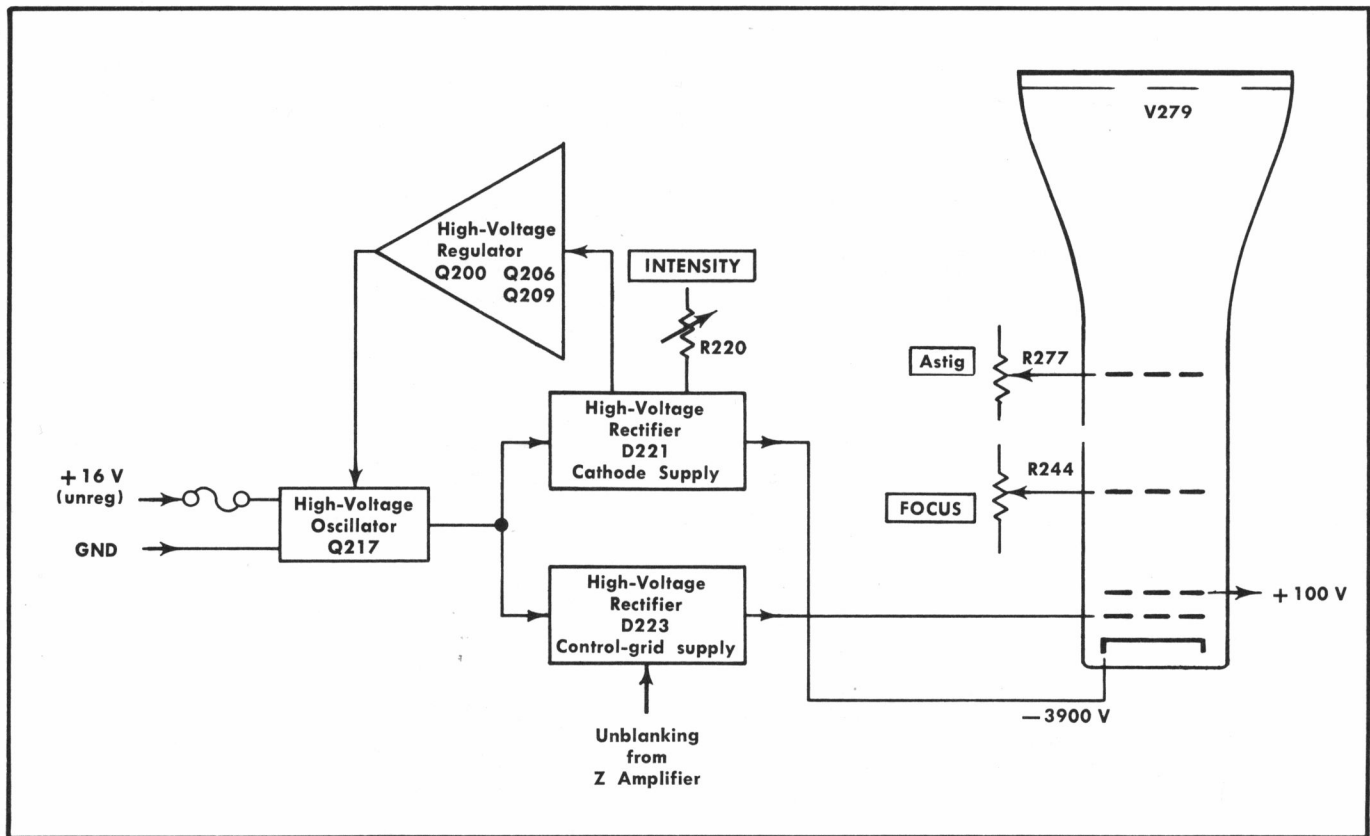


Fig. 3-2. CRT detailed block diagram.

of Q217 positive enough to bias Q217 into conduction. The cycle repeats at a frequency of 40 to 50 kilohertz. The amplitude of sustained oscillation depends upon the average current delivered to the base of Q217. Fuse F217 protects the +16 volt supply if the High Voltage Oscillator stage is shorted.

High-Voltage Regulator

Feedback from the secondary of T220 is connected to the gate of Field Effect transistor Q209 through the voltage divider network R230 through R246. This sample of the output voltage is compared to the zero volt level (ground) at the source of Q209. It is then inverted and amplified by Q209 and applied to emitter follower Q206. Q206 provides the current drive for Q200. Amplitude of the oscillations at the collector of Q217 is determined by the average collector current of Q200.

Regulation is accomplished as follows: If the output voltage at the -3900 volt test point starts to go positive (less negative), a sample of this positive-going voltage is applied to the gate of Q209. Conduction of Q209 is increased, causing an increase in Q209 drain current. Conduction of Q206 is increased as its base current is increased. The emitter of Q206 exhibits a gain in current, which is applied to the base of Q200. An increase in conduction of Q200 increases the average collector current, which is applied through the feedback winding of T220 to the base of Q217. Q217 conducts harder, increasing the collector current to produce a larger induced voltage in the secondary of T220. This in-

creased voltage appears as more negative voltage at the -3900 volt test point to correct the original positive-going change. By sampling the output from the cathode supply in this manner, the total output of the high voltage supply is held constant.

The circuit consisting of R211, C211, D211, R212 and D212 provides time delay in the rate of rise of the high voltage, allowing the CRT intensity level to come up slowly. The voltage at D211 anode is allowed to rise no faster than C211 can change its positive plate from -75 volts to ground. When the voltage level at C211 positive plate reaches approximately ground potential, D212 conducts, D211 disconnects and the high voltage circuit regulates normally.

Diodes D206 and D207 protect the FET (Q209) in the event of component failure in the regulator circuit. D206 prevents the FET drain from going more positive than +13.1 volts and D207 prevents the FET drain from going more negative than -0.6 volts with respect to the FET source.

High Voltage Rectifiers and Outputs

The High voltage transformer, T220, has two output windings. These windings provide the negative CRT cathode potential and the CRT control grid bias. These outputs are regulated by the High Voltage regulator stage in the primary of T220 to hold the output voltage constant.

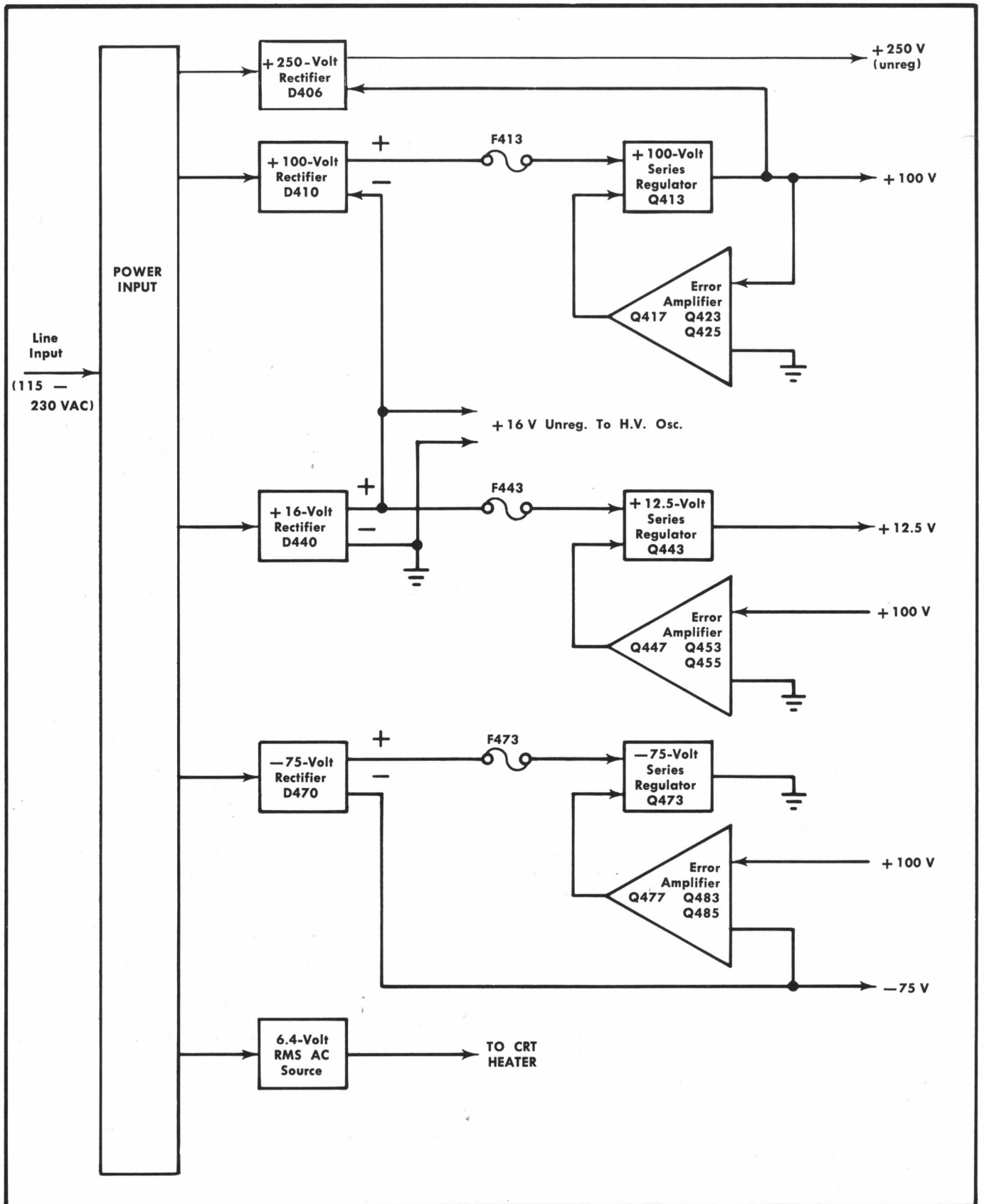


Fig. 3-3. Power Supply detailed block diagram.

The negative accelerating potential for the CRT cathode is supplied by the half wave rectifier D221. The output level is fixed at about -3900 volts on the cathode.

The half wave rectifier provides a negative voltage for the control grid of the CRT. The voltage applied to the control grid is determined by the setting of the INTENSITY control (to be discussed in the next paragraph) and the output level of the Z Amplifier. In quiescent operation, this voltage is about -3900 volts, keeping the CRT cut off. The CRT is biased into conduction when the Z Amplifier is raised to its unblanking state, applying levels of -3930 to -3990 volts to the grid.

Beam current is controlled by R220, INTENSITY. R220 is a special purpose "backlash" potentiometer having both a fine and a coarse adjustment range, with 60° independent rotation on the fine range. This type of control is very useful in arriving at the optimum beam current turn-on level for achieving best resolution over the display area. As the control is rotated clockwise, the wiper arms move toward ground. This lowers the DC reference voltage applied to the secondary winding controlling the cathode, causing the voltage at the -3900 volt test point to increase (more negative). The regulator circuit compensates for this error by conducting less and reducing the voltage in the secondary winding of T220. This action not only raises the voltage at the -3900 volt test point to its correct level, but raises the voltage applied to the control grid as well. Thus the control grid becomes more positive with respect to the cathode, increasing the beam current. Beam current is reduced in a like manner by rotating R220 counterclockwise, introducing a positive-going error voltage into the cathode circuit.

The neon bulbs B251, B252 and B253 provide protection if the voltage difference between the control grid and cathode exceeds about 135 volts, and additional protection is provided by D252 if the control grid goes more positive than 20 volts from the cathode. Zener diode D248 protects the CRT during warmup by providing a minimum bias of 20 volts. Protection for the Z Amplifier circuit is provided by neon bulbs B265 and B266 if the voltage at the emitter of Q149 exceeds about 110 volts.

CRT Control Circuits

In addition to the INTENSITY control discussed previously, two other controls have been provided for arriving at the optimum CRT display. Focus is controlled by R244, FOCUS. R244 is part of the divider network R230 through R246 between the CRT cathode supply and $+100$ volts. The voltage applied to the focus electrode is more positive than the voltage on either the control grid or the CRT cathode. The Astig adjustment, R277, which is used in conjunction with the FOCUS control to provide a well defined display, varies the positive level on the astigmatism grid. The $+150$ volt source for the Astig potentiometer is provided by Zener, D473, which is referred to the $+100$ v supply.

LOW-VOLTAGE POWER SUPPLY

General

The low-voltage Power Supply circuit provides the operating power for this instrument from the three regulated supplies and two unregulated supplies. Electronic regulation is used to provide stable, low-ripple output voltages. Fig. 3-3 shows a detailed block diagram of the Low-Voltage Power Supply.

Power Input

Power is applied to the primary of transformer T401 through F401, thermal cutout TK401 and the ON-OFF switch, SW301B. SW401 connects the split primaries of T401 in parallel for 115 VAC operation, or in series for 230 VAC operation. SW403 allows three ranges of regulation by changing the number of primary windings to fit different line requirements.

Fuse F401 provides overload protection, and thermal cutout TK401 provides thermal protection by opening to interrupt power if the instrument overheats. When the temperature returns to a safe level, TK401 automatically closes to re-apply the power.

+100 Volt Supply

The $+100$ Volt Supply provides the reference voltage for the $+12.5$ and -75 Volt supplies. The output from the secondary of T401 is rectified by bridge rectifier D410 A-D. This voltage is filtered by R412-C413 and applied through F413 to the $+100$ volt series regulator stage to provide a stable output voltage. The series regulator can be compared to a variable resistance which is changed to stabilize the output voltage. The current through the series regulator stage is controlled by the error amplifier to provide the correct regulated output voltage.

The error amplifier consists of Q423 and Q425, connected as a comparator. That is, the output voltage at the collector of Q423 indicates voltage variations at the base of Q423 relative to the voltage at the base of Q425. Zener diode D425 maintains a fixed 9 volt drop providing the reference for Q423. The base level of Q425 is determined by voltage divider R433-R434-R435 between the output of this supply and ground. R434 is adjustable to set the output voltage to $+100$ volts. R429 is the emitter resistor for both comparator transistors and the current through it divides between Q423 and Q425. The output current of the error amplifier stage controls the conduction of the series regulator stage. This is accomplished as follows: assume that the output voltage increases because of a change in load or an increase in line voltage. This voltage increase is applied to the base of Q423, increasing the conduction of Q423. The collector of Q423 goes negative, reducing the bias on Q417. This results in reduced current through the series regulator, Q413. Reduced current through Q413 also means that the current through the load is reduced, lowering the output voltage to its correct level. In a similar manner the series regulator and error amplifiers compensate for output changes due to ripple.

+16 Volt Unregulated Supply

Rectifier D440 A-D provides the unregulated output for the $+16$ volt supply. The input to D440 A-D provides the power for the pilot light. The output is filtered by R442-C443.

+12.5 Volt Supply

Rectified voltage for operation of the $+12.5$ volt supply is provided by the $+16$ volt unregulated supply and is applied through F443 to the $+12.5$ series regulator stage.

Circuit Description—Type 602

Reference voltage for this supply is provided by voltage divider R461-R463 between the regulated +100 volt supply and ground. If the +12.5 output changes, a sample of this change appears at the base of Q453 as an error signal. Regulation of the output voltage is controlled by error am-

plifier Q453-Q455 and series regulator Q443 in a manner similar to that described for the +100 volt supply.

—75 Volt Supply

Rectified voltage for operation of the —75 volt supply is provided by D470 A-D, filtered by R472-C473.

SECTION 4

MAINTENANCE

Change information, if any, affecting this section will be found at the rear of this manual.

Introduction

This section of the manual contains information for use in preventive maintenance, corrective maintenance and troubleshooting of the Type 602.

PREVENTIVE MAINTENANCE

General

Preventive maintenance consists of periodic inspection and cleaning at regular intervals. The Type 602 should be checked and/or calibrated approximately every 2000 hours of operation, or every year, whichever occurs first. If the instrument is subjected to adverse environmental conditions, such as excessive dust, high temperatures or high humidity, the frequency of the checks should be increased.

Replacement of components may necessitate recalibration of the affected circuit. Complete calibration instructions are given in the Calibration section.

The calibration procedure can also be helpful in localizing certain troubles in the instrument. In some cases, minor troubles may be revealed and/or corrected by recalibration.

Cleaning

The Type 602 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.

The cover provides protection against dust in the interior of the instrument. Operation without the cover in place may call for more frequent cleaning.

CAUTION

Avoid the use of chemical cleaning agents which might damage the plastics used in this instrument. Avoid chemicals which contain benzene, toluene, xylene, acetone and similar solvents.

Exterior. Loose dust accumulated on the outside of the Type 602 can be removed with a soft cloth or small paint brush. The paint 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.

Clean the face plate protector and CRT with a soft, lint-free cloth dampened with a mild detergent and water solution.

Interior. Dust in the interior of the instrument should be removed occasionally due to its electrical conductivity under high humidity conditions. The best way to clean the interior is to blow off the accumulated dust with dry, low velocity air. Remove any dirt which remains with a soft paint brush or a cloth dampened with a mild detergent and water solution. A cotton tipped applicator is useful for cleaning in narrow spaces and/or circuit boards.

The high voltage circuits, particularly parts located in the high voltage compartment and the area surrounding the CRT base socket should receive special attention. Excessive dirt in these areas may cause high voltage arcing and result in improper instrument operation.

Visual Inspection

The Type 602 should be inspected occasionally for such defects as broken connections, improperly seated transistors, damaged circuit boards and heat damaged parts.

The corrective procedure for most visible defects is obvious; however, particular care must be taken if heat damaged components are found. Overheating usually indicates other trouble in the instrument; therefore, it is important that the cause of overheating be corrected to prevent a recurrence of the damage.

Transistor Checks

Periodic checks of the transistors in the Type 602 are not recommended. The best check of transistor performance is its actual operation in the instrument. More details on checking transistor operation are given under Troubleshooting.

TROUBLESHOOTING

Introduction

The following information is provided to facilitate troubleshooting of the Type 602 if trouble develops. Information contained in other sections of this manual should be used along with the following information to aid in locating the defective components. An understanding of the circuit operation is very helpful in locating troubles. See the Circuit Description section for complete information.

Troubleshooting Aids

Diagrams. Circuit diagrams are given on foldout pages in Section 8. The component number and electrical value of each component in this instrument are shown on the diagrams. Each main circuit is assigned a series of component numbers. Table 4-1 lists the main circuits on the Type 602 and the series of component numbers assigned to each. Important voltages are also shown on the diagrams at the rear of this manual. The portion of the circuit mounted on the circuit board is enclosed with a blue line.

TABLE 4-1
Component Numbers

| Component Numbers on diagrams | Diagram Number | Circuit |
|-------------------------------|----------------|---------------------------------|
| 1-49 | 1 | Vertical Deflection Amplifier |
| 50-99 | 1 | Horizontal Deflection Amplifier |
| 100-199 | 2 | Z Amplifier |
| 200-299 | 3 | CRT |
| 400-499 | 4 | Power Supply |

Circuit Board. Figs. 4-14 through 4-21 show the circuit boards used in the Type 602. Each electrical component on each board is identified by its circuit number. The circuit board is also outlined on its schematic diagram with a blue line. These pictures used with the diagram will aid in locating the components mounted on the circuit boards.

Wiring Color Code. All insulated wire and cable used in the Type 602 is color coded to facilitate circuit tracing. Signal carrying leads are identified with one or two colored stripes. Regulated voltage supply leads are identified with three stripes to indicate the approximate voltage, using the EIA resistor color code. A white background indicates a

TABLE 4-2
Power Supply Wiring Color Code

| Supply | Back-ground Color | First Stripe | Second Stripe | Third Stripe |
|--------------------|-------------------|--------------|---------------|--------------|
| -75 ¹ | tan | violet | green | black |
| +12.5 ¹ | white | brown | red | black |
| +100 ¹ | white | brown | black | brown |
| +16 ² | white | red | | |
| +250 ² | white | orange | black | brown |

¹ Regulated
² Unregulated

positive voltage and a tan background indicates a negative voltage. The widest color stripe identifies the first color of the code. Table 4-2 gives the wiring color code for the power supply voltages used in the Type 602.

Power Cord Conductor Identification

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

Composition Resistors:

Metal-Film Resistors:

Ceramic Capacitors:

① ② and ③ —1st, 2nd and 3rd significant figures;
 (M) —multiplier; (T) —tolerance;
 (TC) —temperature coefficient.

Resistor and Capacitor Color Code

| Color | Significant Figures | Multiplier | | Tolerance | |
|--------|---------------------|------------------|------------------|-----------|-----------------------------|
| | | Resistors | Capacitors | Resistors | Capacitors |
| Silver | --- | 10 ⁻² | --- | ±10% | --- |
| Gold | --- | 10 ⁻¹ | --- | ±5% | --- |
| Black | 0 | 1 | 1 | --- | ±20% or 2 pF* |
| Brown | 1 | 10 | 10 | ±1% | ±1% or 0.1 pF* |
| Red | 2 | 10 ² | 10 ² | ±2% | ±2% |
| Orange | 3 | 10 ³ | 10 ³ | ±3% | ±3% |
| Yellow | 4 | 10 ⁴ | 10 ⁴ | ±4% | +100% -0% |
| Green | 5 | 10 ⁵ | 10 ⁵ | ±0.5% | ±5% or 0.5 pF* |
| Blue | 6 | 10 ⁶ | 10 ⁶ | --- | --- |
| Violet | 7 | --- | --- | --- | --- |
| Gray | 8 | --- | 10 ⁻² | --- | +80% -20% or 0.25 pF* |
| White | 9 | --- | 10 ⁻¹ | --- | ±10% or 1 pF* |
| (none) | --- | --- | --- | ±20% | ±10% or 1 pF* |

*For capacitance of 10 pF or less.

NOTE: (T) and/or (TC) color code for capacitors depends upon manufacturer and capacitor type. May not be present in some cases.

Fig. 4-1. Resistor and ceramic capacitor color code.

Resistor Color Code. In addition to the brown composition resistors, some metal-film resistors and some wire-wound resistors are used in the Type 602. The resistance values of wire-wound resistors are printed on the body of the component. The resistance values of composition resistors and metal-film resistors are color coded on the components (some metal-film resistors may have the value printed in the body) with the EIA color code. 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. 4-1). Metal-film resistors have five stripes consisting of three significant figures, a multiplier and a tolerance value.

Capacitor Marking. The capacitance values of common disc capacitors and small electrolytics are marked in microfarads on the side of the component body. The white ceramic capacitors used in the Type 602 are color coded in picofarads using a modified EIA color code (see Fig. 4-1).

Diode Color Code. The cathode end of each glass enclosed diode is indicated by a stripe, a series of stripes or a dot. For most silicon or germanium diodes with a series of stripes, the color code also indicates the type and identifies the Tektronix Part Number using the resistor color code system (e.g., a diode color coded blue-brown-gray-green, 6, 1, 8, 5 indicates Tektronix Part Number 152-0185-00). The cathode and anode ends of metal cased diodes can be identified by the diode symbol marked on the body.

Troubleshooting Equipment

A multimeter should be adequate for most of the troubleshooting in this instrument. The multimeter should have a DC sensitivity of at least 20,000 ohms/volt, accuracy $\pm 3\%$ and a resistance range of a few megohms.

For troubleshooting by signal tracing, a signal source and test oscilloscope would be useful. The test oscilloscope should have a DC to 2 MHz bandwidth and 1 millivolt/div to 50 volts/div deflection factor.

Troubleshooting Techniques

This troubleshooting procedure is arranged in an order which checks the simple trouble possibilities before proceeding with extensive troubleshooting. The first few checks assure proper connection, operation and calibration. If the trouble is not located by these checks, the remaining steps aid in locating the defective component. When the defective component is located, it should be replaced following the replacement procedures given under Corrective Maintenance.

1. **Visual Check.** Visually check the portion of the instrument in which the trouble is located. Many troubles can be located by visual indication such as unsoldered connections, broken wires, damaged circuit boards, damaged components, etc.

2. **Check Signal Source.** Be sure the signal source is of the proper DC level and polarity and the Z signal is unblanking the CRT.

3. **Check Associated Equipment.** Before proceeding with troubleshooting of the Type 602, check that the equipment used with this instrument is operating correctly. Check that the signal is properly connected and that the interconnecting cables are not defective. Also, check the power source.

4. **Check Instrument Calibration.** Check the calibration of this instrument, or the affected circuit if the trouble exists in one circuit. The apparent trouble may only be a result of misadjustment or may be corrected by calibration. Complete calibration instructions are given in the Calibration section of this manual.

5. **Isolate Trouble to a Circuit.** To isolate trouble to a circuit, note the trouble symptom. The symptom often identifies the circuit in which the trouble is located. For example, poor focus indicates that the CRT circuit (includes high voltage) is probably at fault. When trouble symptoms appear in more than one circuit, check affected circuits by taking voltage readings.

Incorrect operation of all circuits often indicates trouble in the power supplies. However, a defective component elsewhere in the instrument can appear as a power supply trouble and may also affect the operation of other circuits.

NOTE

Turn the instrument off before removing or replacing any circuit board.

The Z Amplifier and Deflection Amplifier circuit boards may be removed to check Low Voltage supplies. (The High Voltage Regulator is on the Z Amplifier board).

The Type 602 may be turned on with any circuit board removed with no damage to the instrument.

Table 4-3 lists the tolerances of the power supplies in this instrument. If a power supply voltage is within the listed tolerance the supply can be assumed to be working correctly. If outside the tolerance, the supply may be misadjusted or operating incorrectly. Use the procedure given in the Calibration section to adjust the power supplies.

TABLE 4-3
Power Supply Tolerances

| Regulated Supply | Tolerance |
|--------------------|----------------|
| -3900 V | Within 5% |
| -75 V | Within 2% |
| +12.5 V | Within 2% |
| +100 V | Within 2% |
| Unregulated Supply | Range |
| +16 V | 14.7 V to 24 V |
| +250 V | 230 V to 280 V |

Table 4-4 gives some checks which may aid in isolating trouble to a circuit. The test equipment used for these checks should be the same as that called out for the Calibration Procedure.

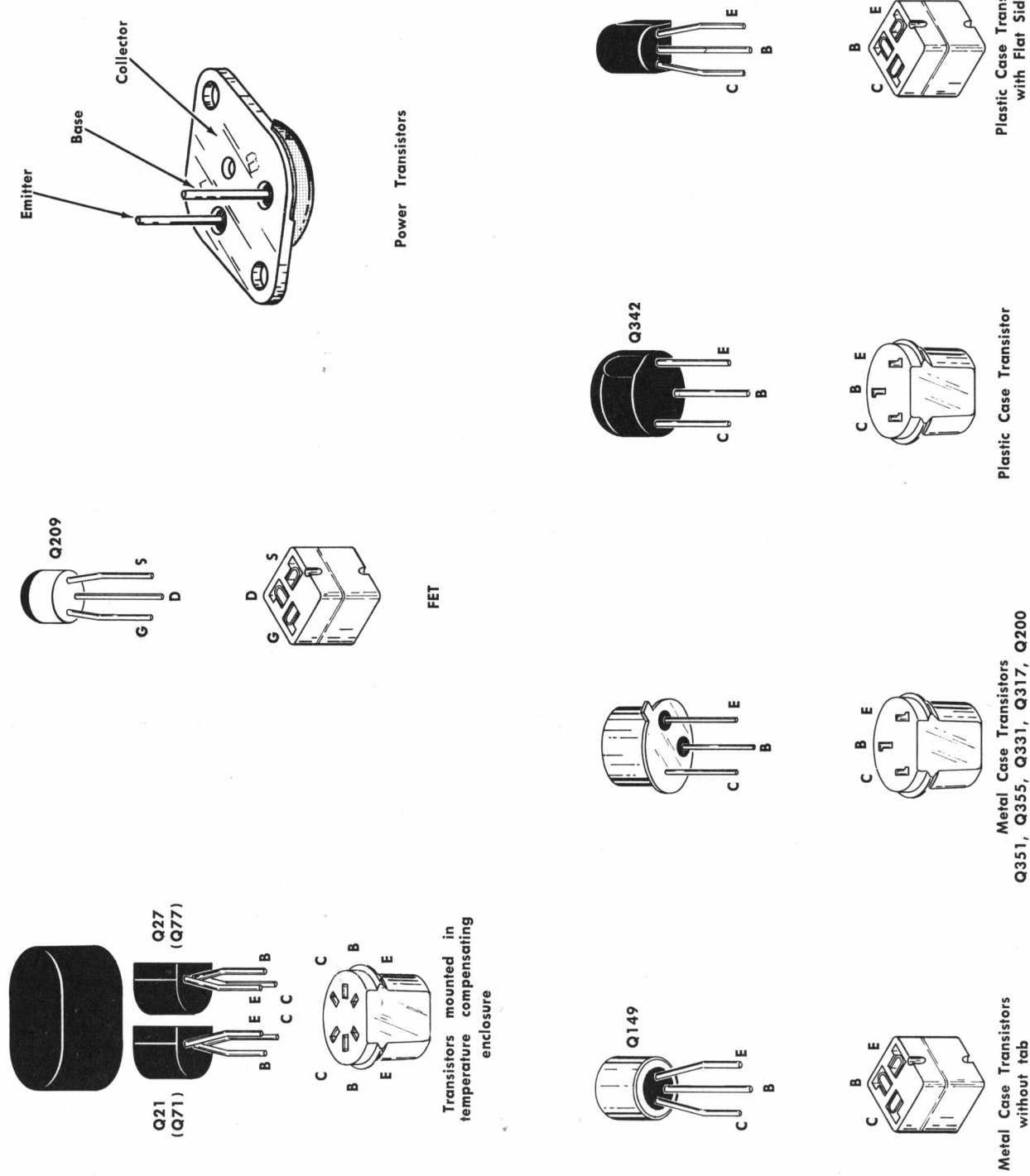


Fig. 4-2. Transistor base pin and socket arrangements.

TABLE 4-4

| Check | Procedure |
|---------------------------|--|
| Line Voltage Range Switch | <p>Connect the Type 602 to the AC power line through a variable autotransformer.</p> <p>Set the Line-Range switch (rear panel on the Type 602) to M.</p> <p>Set the 115-230 switch to 115.</p> <p>Set the autotransformer output voltage to approximately 115 volts.</p> <p>Connect an AC voltmeter to terminals 10 and 11 of the Type 602 transformer.</p> <p>Adjust the autotransformer for an AC voltage of 75 V across terminals 10 and 11.</p> <p>Switch the Line-Range switch to LO.</p> <p>Voltmeter should read 86 volts at terminals 10 and 11.</p> <p>Switch the Line-Range to HI.</p> <p>Voltmeter should read 70 volts at terminals 10 and 11.</p> |
| Z Amplifier Circuit Board | <p>Terminate X and Y INPUT connectors with 50 Ω BNC terminations.</p> <p>Connect a 50 Ω cable with BNC connectors between the Test Oscilloscope Amplitude Calibrator Output and the Type 602 Z INPUT.</p> <p>Set the calibrator source for 1.0 volt out.</p> <p>Connect the 10\times Probe tip (from the Test Oscilloscope) to Test Point TP130 (Z Amplifier Board). Connect the probe ground lead to chassis ground.</p> <p>Set the Test Oscilloscope Vertical Volts/div to 1.0 and Time/div to 0.5 ms.</p> <p>The square wave displayed on the Test Oscilloscope should have an amplitude of 43 to 49 volts (4.3 to 4.9 divisions) for an amplifier gain of 43 to 49.</p> |

After the defective circuit has been located, proceed with steps 6 and 7 to locate the defective component(s).

6. Check Voltages. Often the defective component can be located by checking for the correct voltage in the circuit. Typical voltages are given on the diagrams.

NOTE

Voltages given on the diagrams are not absolute and may vary slightly from instrument to instrument. To obtain operating conditions similar to those used to take these readings, see the first page of the circuit diagrams.

7. Check Individual Components. The following procedures describe methods of checking individual components in the Type 602. Components which are soldered in place are best checked by disconnecting one end. This isolates the measurement from the effects of surrounding circuitry.

A. TRANSISTORS. The best check of transistor operation is actual performance under operating conditions. If a transistor is suspected of being defective it can best be checked by substituting a new component or one which has been checked previously. However, be sure that circuit conditions are not such that a replacement transistor might be damaged.

If substitute transistors are not available, use a dynamic tester (such as Tektronix Type 575). Static type testers are not recommended since they do not check operation under simulated operating conditions. Fig. 4-2 shows transistor base pin and socket arrangements.

B. DIODES. A diode can be checked for an open or shorted condition by measuring the resistance between terminals. With an ohmmeter scale having an internal source of between 800 millivolts and 3 volts, the resistance should be high in one direction and low when the leads are reversed.

D. CAPACITORS. A leaky or shorted capacitor can be determined by checking resistance with an ohmmeter on the highest scale. Use an ohmmeter which will 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 whether the capacitor passes AC signals.

8. Repair and Readjust the Circuit. If any defective parts are located, follow the replacement procedures given in this section. Be sure to check the performance of any circuit that has been repaired or that has had any electrical components replaced.

CORRECTIVE MAINTENANCE

General

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

Obtaining Replacement Parts

Standard Parts. All electrical and mechanical part replacements for the Type 602 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 purchasing or ordering replacement parts, check the parts list for value, tolerance, rating and description.

NOTE

When selecting replacement parts, it is important to 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 it is known that a different component will not adversely affect instrument performance.

Special Parts. In addition to the standard electronic components, some special parts are used in the Type 602. These parts are manufactured for Tektronix, Inc. in accordance with our specifications. These special parts are indicated in the parts lists by an asterisk preceding the part number. 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.

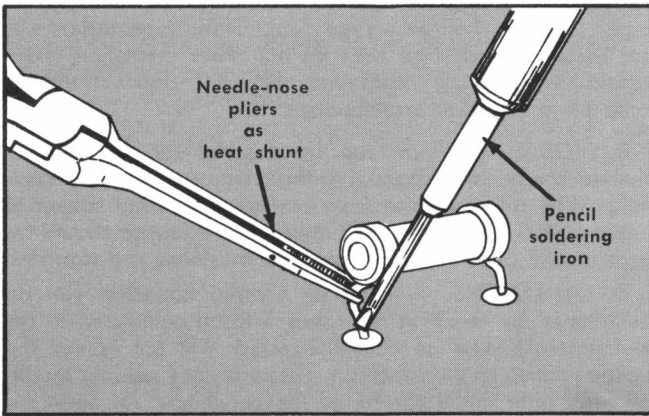


Fig. 4-3. Removing or replacing component on circuit board.

3. A description of the part (if electrical, include circuit number).
4. Tektronix part number.

Soldering Techniques

WARNING

Disconnect the instrument from the power source before soldering.

Circuit Boards. Use ordinary 60/40 solder and a 35 to 40 watt pencil type soldering iron on the circuit boards. The tip of the iron should be clean and properly tinned for best heat transfer to solder joint. A higher wattage soldering iron may separate the wiring from the base material.

The following techniques should be used to replace a component on a circuit board.

CAUTION

DO NOT solder on circuit boards without first removing the board from the instrument.

1. Grip the component lead with long-nose pliers. Touch the soldering iron tip to the lead at the solder connection. Do not lay the iron directly on the board, as it may damage the board. See Fig. 4-3.
2. When the solder begins to melt, pull the lead out gently. This should leave a clean hole in the board. If not, the hole can be cleaned by reheating the solder and placing a sharp object, such as a toothpick, into the hole to clean it.
3. Bend the leads of the new component to fit the holes in the board. Insert the leads into the holes in the board so the component is firmly seated against the board (or as positioned originally). If it does not seat properly, heat the solder and gently press the component into place.
4. Touch the iron to the connection and apply a small amount of solder to make a firm solder joint. To protect heat-sensitive components hold the lead, between the component body and solder joint, with a pair of long-nose pliers or other heat sink.
5. Clip the excess lead that protrudes through the board (if not clipped in Step 3).

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

Metal Terminals. When soldering metal terminals (e.g., switch terminals, potentiometers, etc.), ordinary 60/40 solder can be used. Use a soldering iron with a 40 to 75 watt rating and a 1/8 inch wide wedge shaped tip.

Observe the following precautions when soldering metal terminals:

1. Apply heat only long enough to make the solder flow freely.
2. Apply only enough solder to form a solid connection. Excess solder may impair the function of the part.
3. If a wire extends beyond the solder joint, clip off the excess.
4. Clean the flux from the solder joint with a flux-remover solvent.

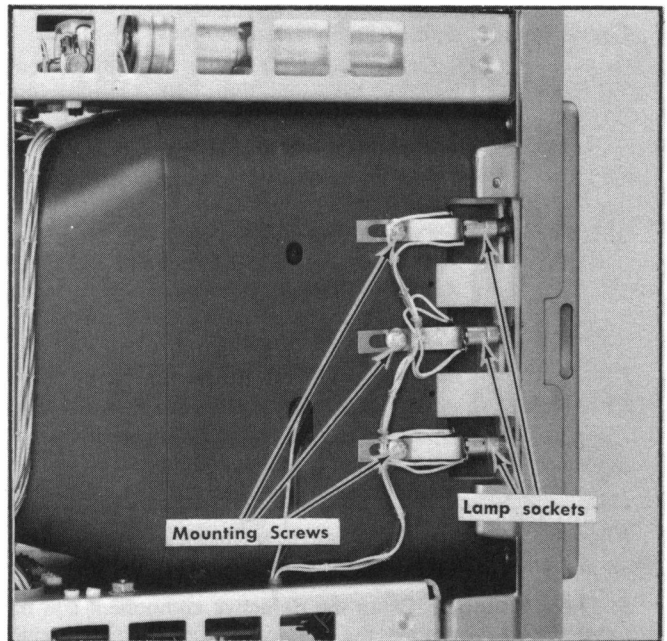


Fig. 4-4. Graticule lamp assembly.

Component Replacement

WARNING

Disconnect the instrument from the power source before replacing components.

Graticule Lamp Replacement. To remove a graticule lamp, remove the screw which fastens the lamp socket to the CRT shield (see Fig. 4-4). Remove only one of the lamp socket screws at one time. Pull the socket and lamp assembly away from the front panel.

Pull the lamp straight out of the socket.

To replace the lamp, enter the lamp base into the socket and push until the lamp base snaps into place in the socket.

Circuit Board Removal. If the circuit board is damaged beyond repair, either the entire assembly including all soldered-on components, or the boards only, can be replaced. Part numbers are given in the Mechanical Parts List for either the completely wired or the unwired board.

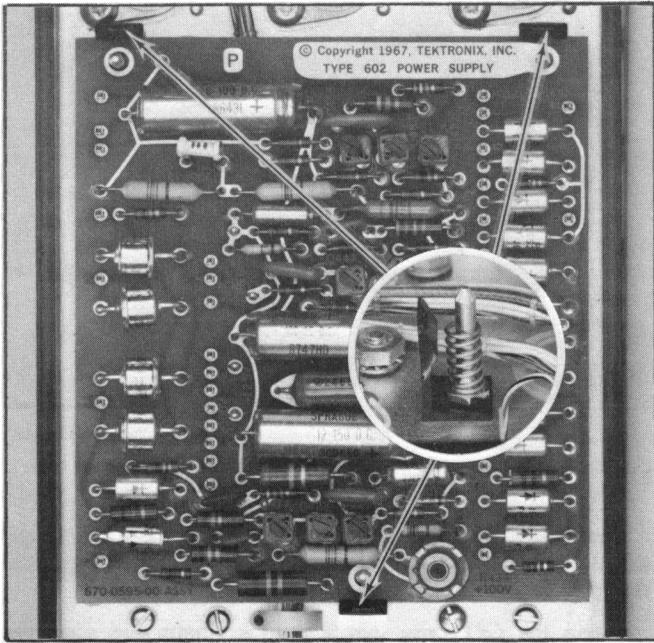


Fig. 4-5. Circuit board mounting clips.

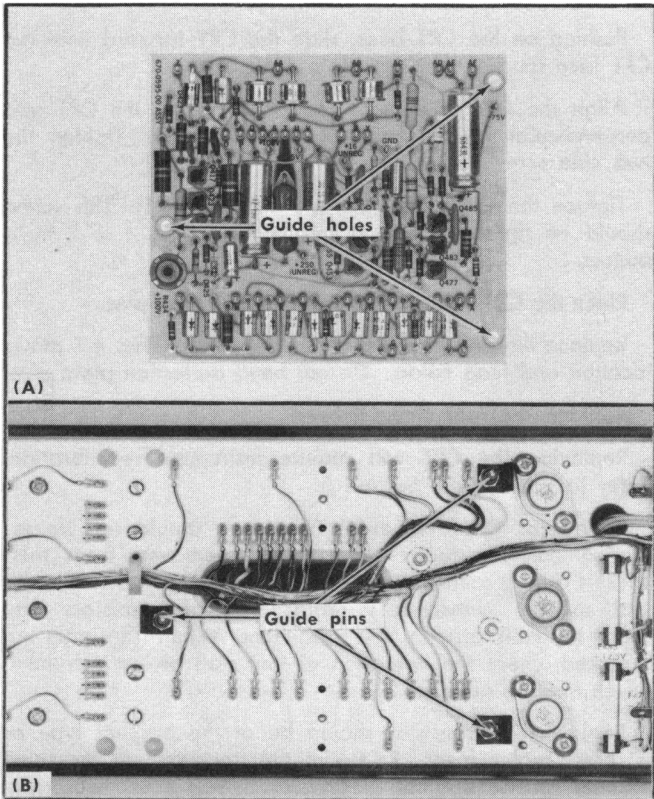


Fig. 4-6. (A) Circuit board guide holes and (B) chassis guide pins.

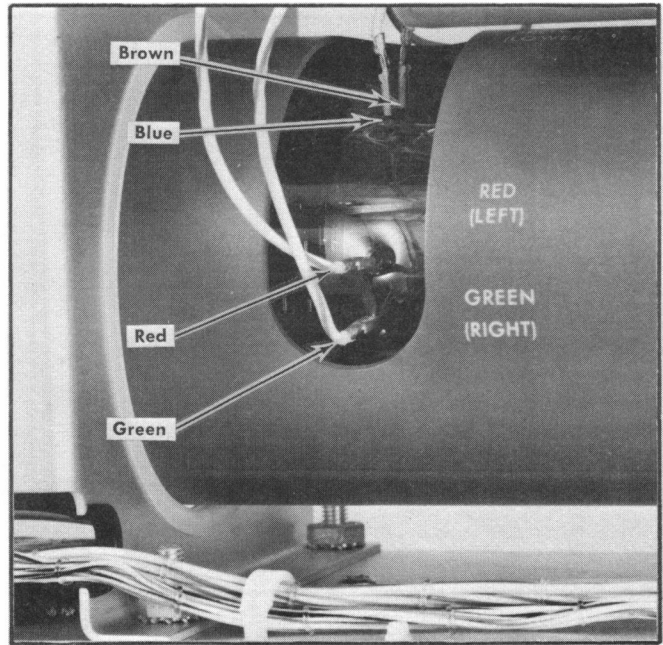


Fig. 4-7. CRT neckpins and connecting wire color codes.

Push the plastic mounting clips (Fig. 4-5) away from the edge of the circuit board. The springs under the circuit board will push the board upward as the board edge is freed from the plastic mounting clips.

Circuit Board Replacement. Position the circuit board guide holes over the guide pins (Fig. 4-6). Be sure that the connecting pins on the chassis are straight and aligned properly with the connectors on the circuit board. Press straight downward until the board edge snaps into place in the plastic clips.

Cathode-Ray Tube Removal. Remove the 4 CRT deflection plate pin connectors from the deflection plate pins. See Fig. 4-7 for location and wire colors. Do not bend the CRT deflection plate pins.

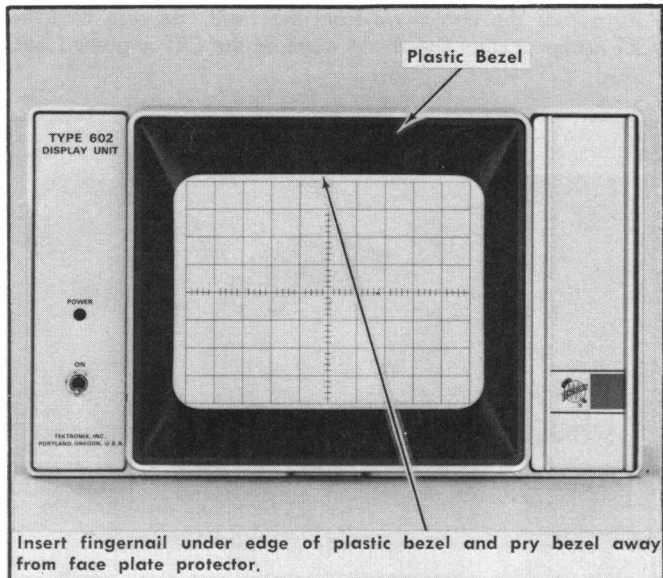


Fig. 4-8. Removing plastic bezel.

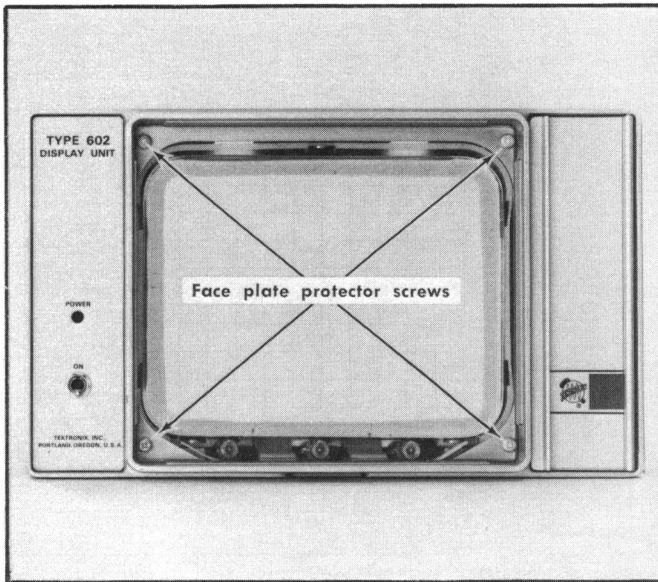


Fig. 4-9. Removing face plate protector screws.

Remove the plastic mask from the front of the instrument as shown in Fig. 4-8.

Remove the four Phillips head screws which secure the face plate protector (Fig. 4-9).

Remove the CRT face plate protector.

Remove the cover plate (Fig. 4-10) from the rear of the instrument.

Remove the CRT base socket from the CRT.

Turn the CRT clamp screw (Fig. 4-11) counterclockwise just far enough to allow the CRT base to slide in the clamp.

Pushing on the CRT base, slide the CRT forward. Pull the CRT out of the instrument from the front. Be sure that the CRT neckpins clear the shield edge as the CRT is pushed out.

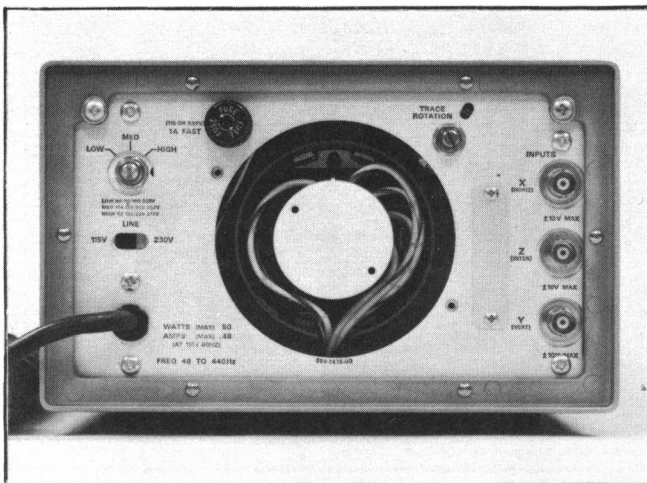


Fig. 4-10. Rear of instrument showing CRT base cover plate.

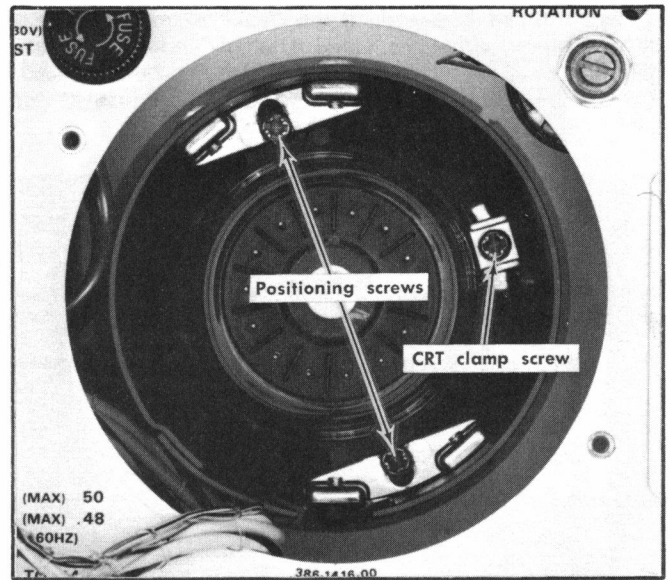


Fig. 4-11. Location of CRT clamp and positioning screws.

Replacing the Cathode-Ray Tube. Slide the CRT into the shield with the CRT neckpins to the left with the Type 602 sitting in the normal viewing position.

Guide the CRT base into the base clamp and slide the CRT toward the rear of the instrument far enough to allow room for the plastic shield. Place the plastic face plate protector and secure with four Phillips head screws.

Pushing on the CRT base, slide the CRT forward until the CRT face touches the face plate protector.

Align the CRT face plate square with, and the CRT axis perpendicular to, the front of the instrument. Tighten the two side screws. (See Fig. 4-11.)

Tighten the CRT base clamp screw (Fig. 4-11). This screw should be tightened with a torque wrench to 4 to 7 inch-ounces.

Place the CRT base socket onto the CRT base pins.

Replace the deflection plate pin connectors. Fig. 4-7 shows location and lead colors. Do not bend deflection plate pins.

Replace the rear shield (cover).

Replacing the CRT will require instrument recalibration. Refer to Calibration, Section 5.

Transistor Replacement. Transistors should not be replaced unless actually defective. If removed from their sockets during routine maintenance, return them to their original sockets. Unnecessary replacement of transistors may affect the calibration of this instrument. When transistors are replaced, check the operation of that part of the instrument which may be affected.

Replacement transistor should be of the original type or a direct replacement. Re-mount the transistors in the same manner as the original. Transistors which have heat radiators or which are mounted on the chassis use silicon grease to increase heat transfer. Replace the silicon grease when replacing these transistors.

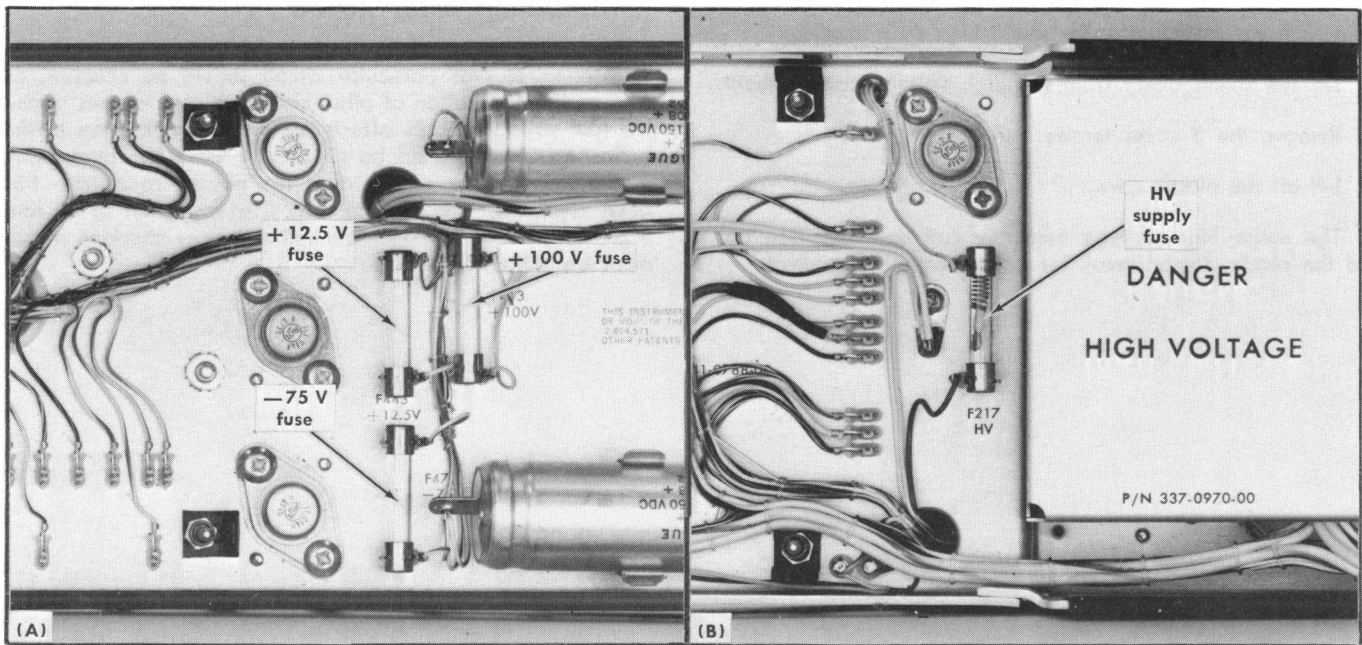


Fig. 4-12. Location of supply fuses (A) —75 V, +12.5 V and +100 V (B) High Voltage.

WARNING

Handle silicon grease with care. Avoid getting it into the eyes. Wash hands thoroughly after use.

Fig. 4-2 shows the lead configuration of the transistors used in this instrument. This view is as seen from the bottom of the transistor. All transistor sockets in this instrument are wired for the basing used for metal-case transistors.

Fuse Replacement. The power-line fuse is located on the rear panel. Low voltage power supply (DC) fuses are mounted on the chassis near the power supply circuit board. See Fig. 4-12A. A fuse in the high voltage supply is mounted on the chassis below the high voltage section. See Fig. 4-12B. Table 4-5 gives the value, location and circuit number.

Rotary Switches. Individual wafers or mechanical parts of rotary switches are normally not replaceable. If a switch is defective, replace the entire assembly.

When replacing a switch, tag the switch terminals and leads with corresponding identification tags as a guide for installing the new switch. An alternate method is to draw a sketch of the switch layout and record the wire color at each terminal. When soldering to the new switch, be careful that the solder does not flow beyond the rivets on the switch terminals. Spring tension of the switch contact can be destroyed by excessive solder.

TABLE 4-5

| Fuse | Value | Location |
|------|-------|---|
| F217 | 1 A | Between H.V. Supply and Z Amplifier board |
| F401 | 1 A | Near top of rear panel |
| F413 | 1/4 A | On chassis between Low Voltage Power Supply and front panel |
| F443 | 1/4 A | |
| F473 | 1/4 A | |

Power Transformer Replacement. Be sure to replace only with a direct replacement Tektronix transformer.

When removing the transformer, tag the leads with the corresponding terminal numbers to aid in connecting the new transformer. After the transformer is replaced, check the performance of the complete instrument using the Performance Check portion of Section 5.

High-Voltage Compartment. The components located in the high-voltage compartment can be reached for maintenance or replacement by using the following procedure:

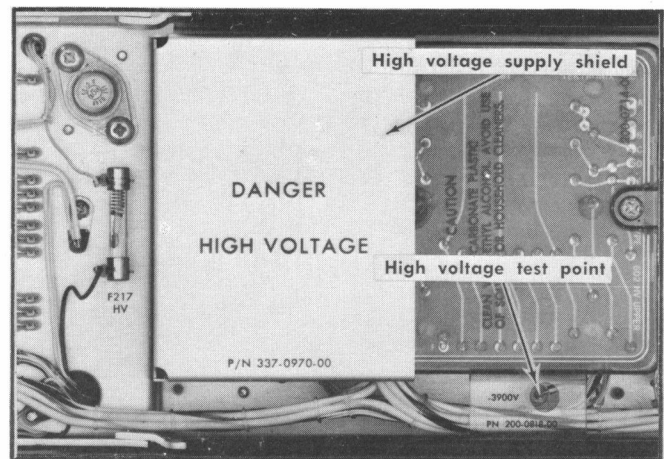


Fig. 4-13. Location of high voltage supply and high voltage test point.

Maintenance—Type 602

Remove the two hexagonal nuts under the chassis that hold the high voltage transformer shield (Fig. 4-13) in place.

Lift the shield away from the high voltage compartment.

Remove the 3 cover screws.

Lift off the plastic cover.

The entire high voltage assembly can now be lifted out of the plastic compartment for access to the components.

Recalibration After Repair

After any electrical component has been replaced, the calibration of that particular circuit should be checked, as well as the calibration of other closely related circuits. Since the low voltage supply affects all circuits, calibration of the entire instrument should be checked if work has been done in the low voltage supply or if the power transformer has been replaced. The Performance Check portion of Section 5 provides a quick and convenient means of checking instrument operation.

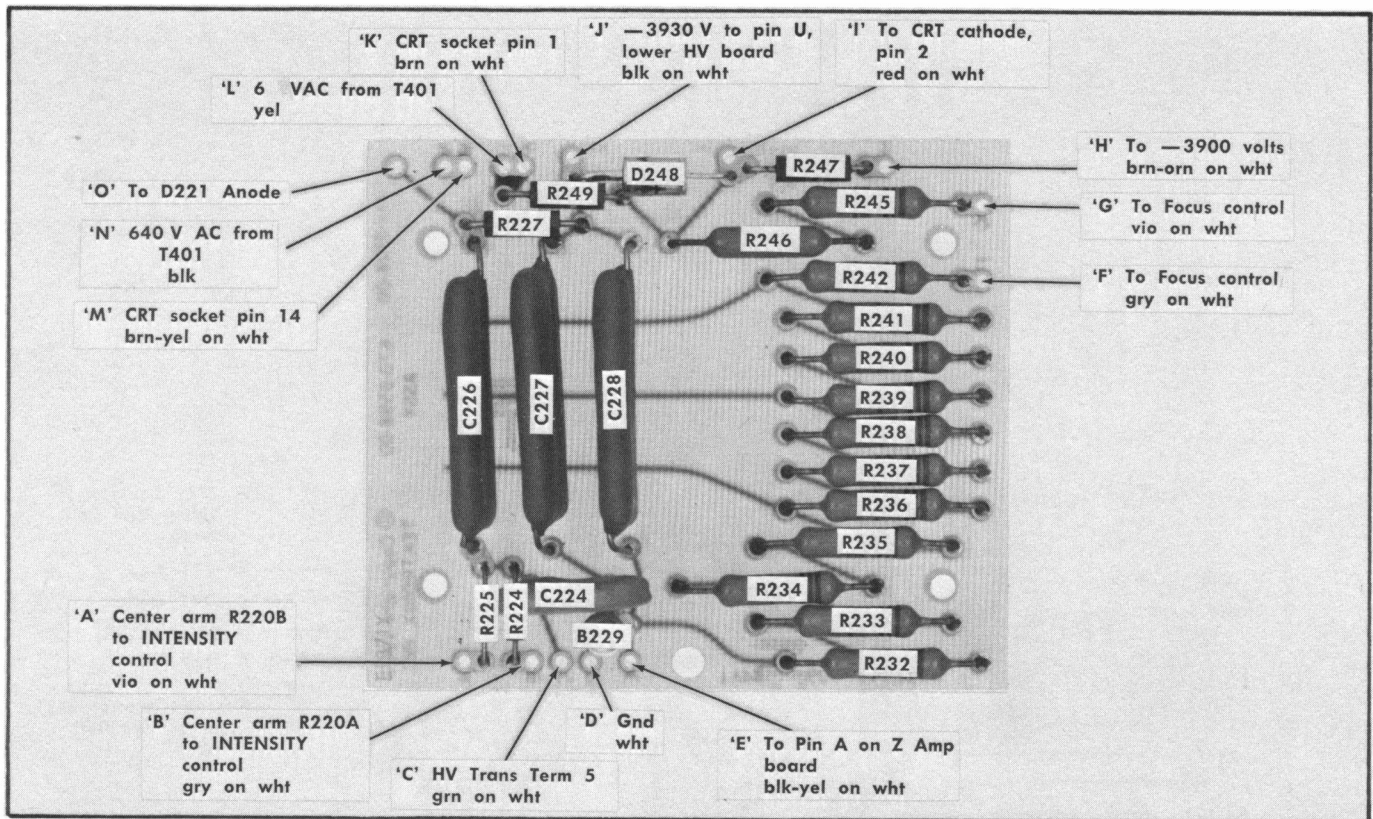


Fig. 4-14. Upper High Voltage Circuit Board.

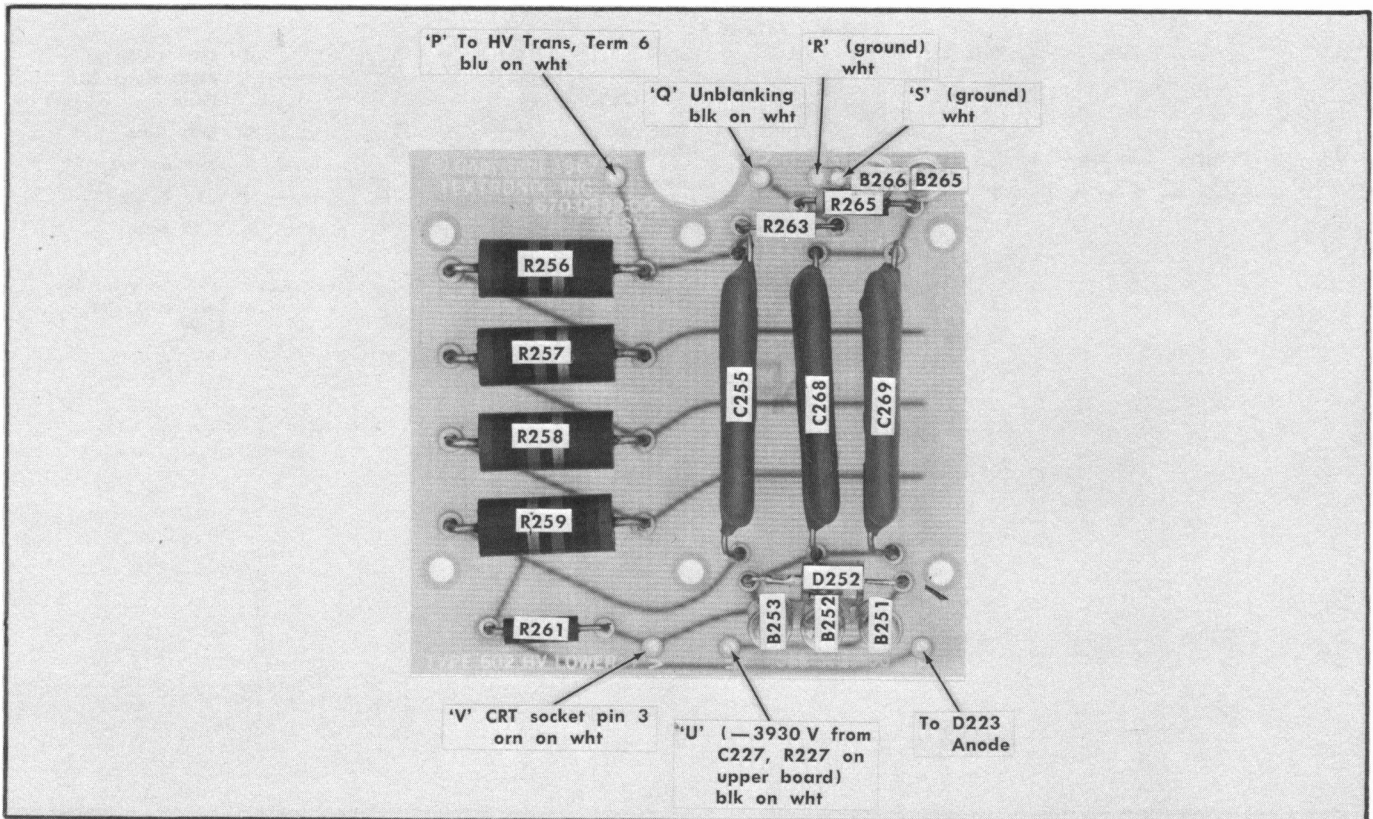


Fig. 4-15. Lower High Voltage Circuit Board.

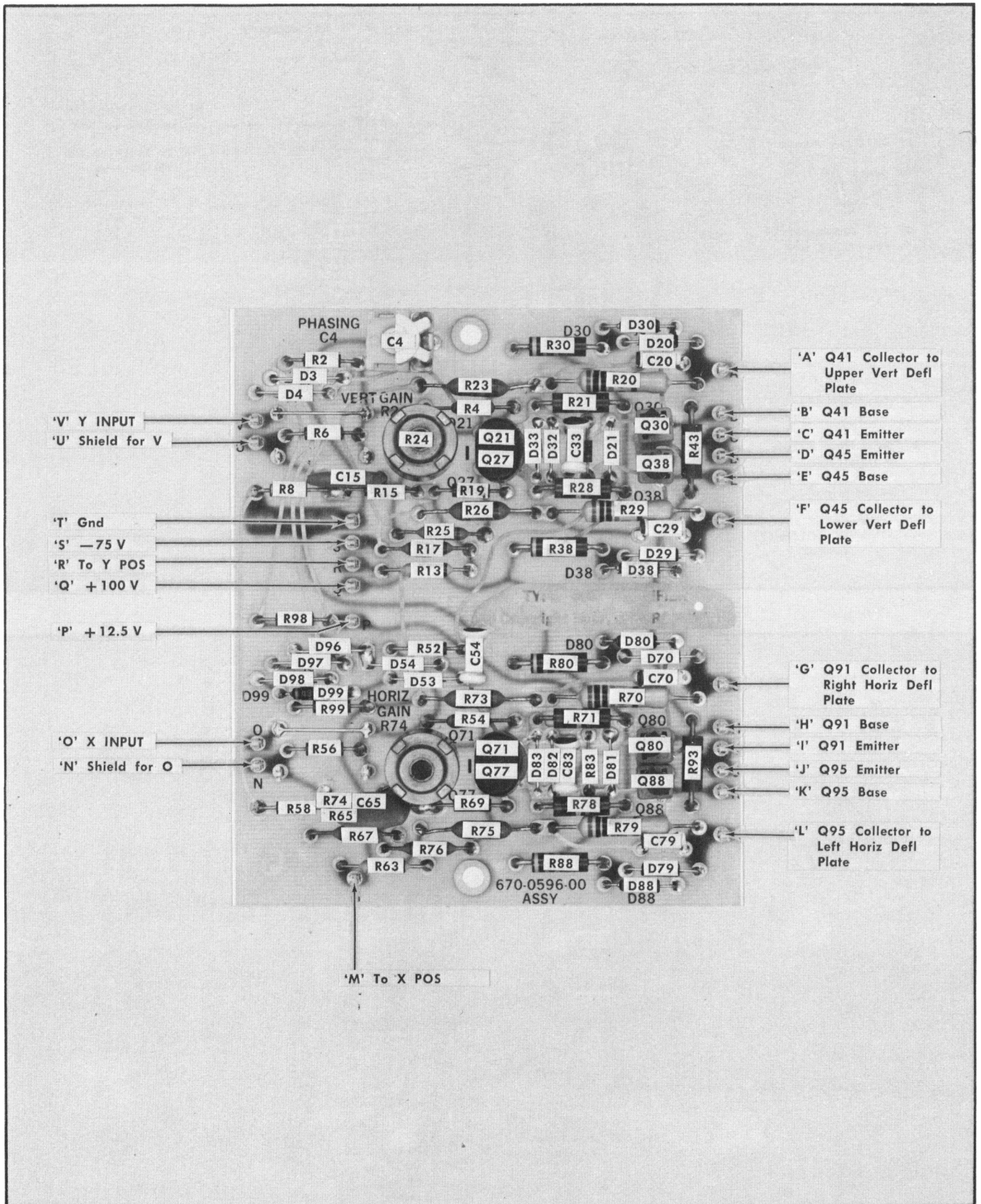


Fig. 4-16. Deflection Amplifier Circuit Board.

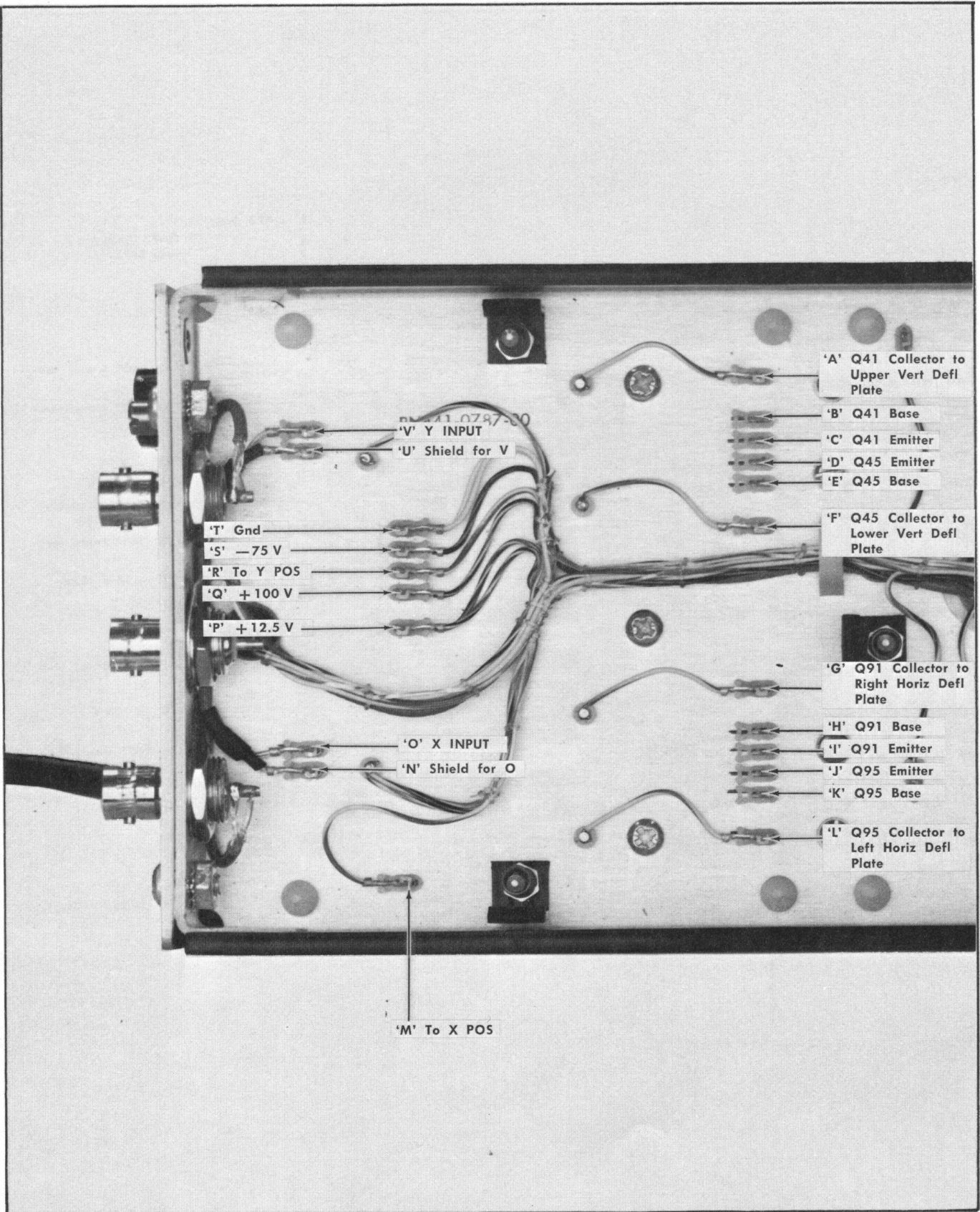


Fig. 4-17. Connecting Pin and Lead Designations, Deflection Amplifiers.

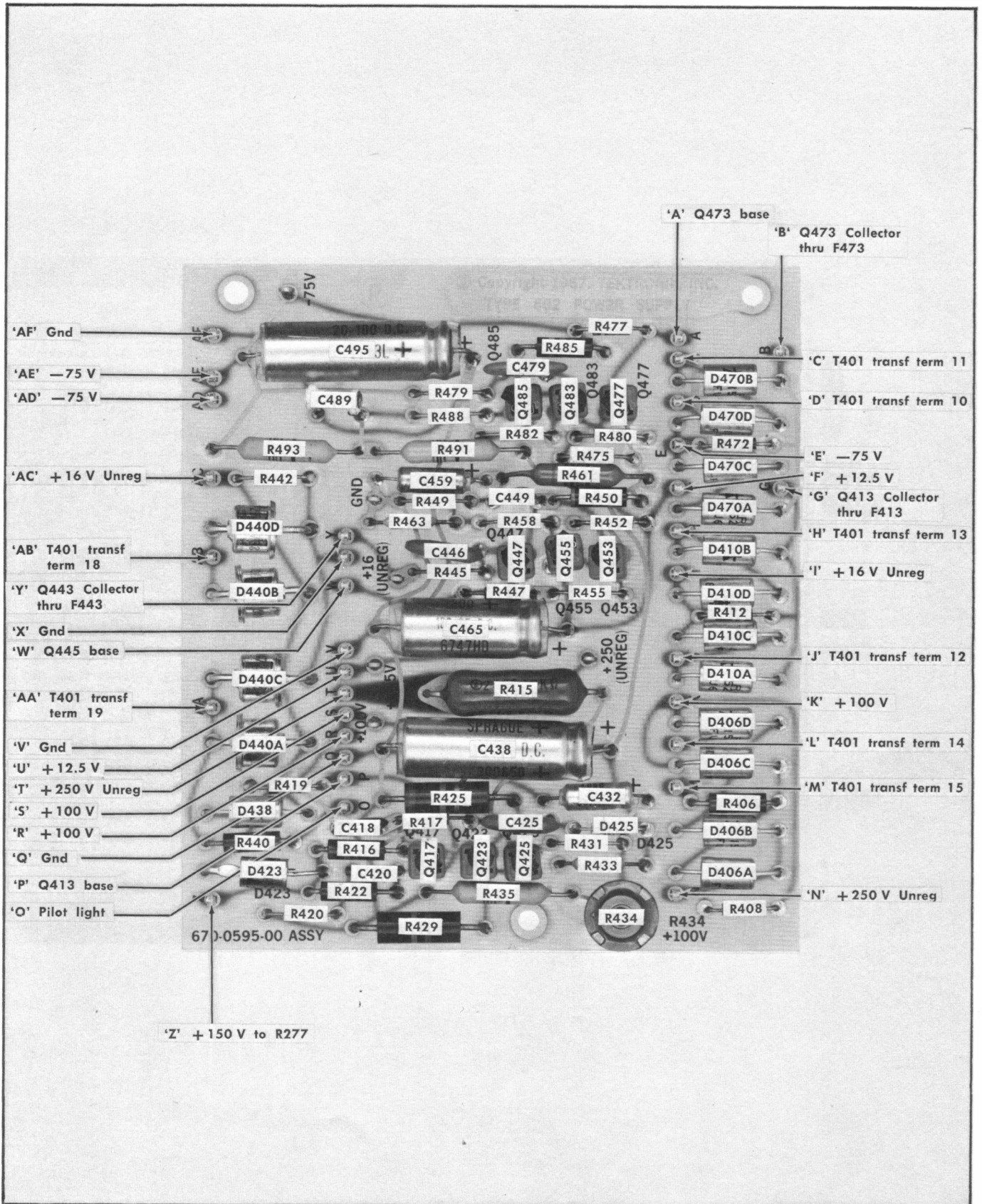


Fig. 4-18. Power Supply Circuit Board.

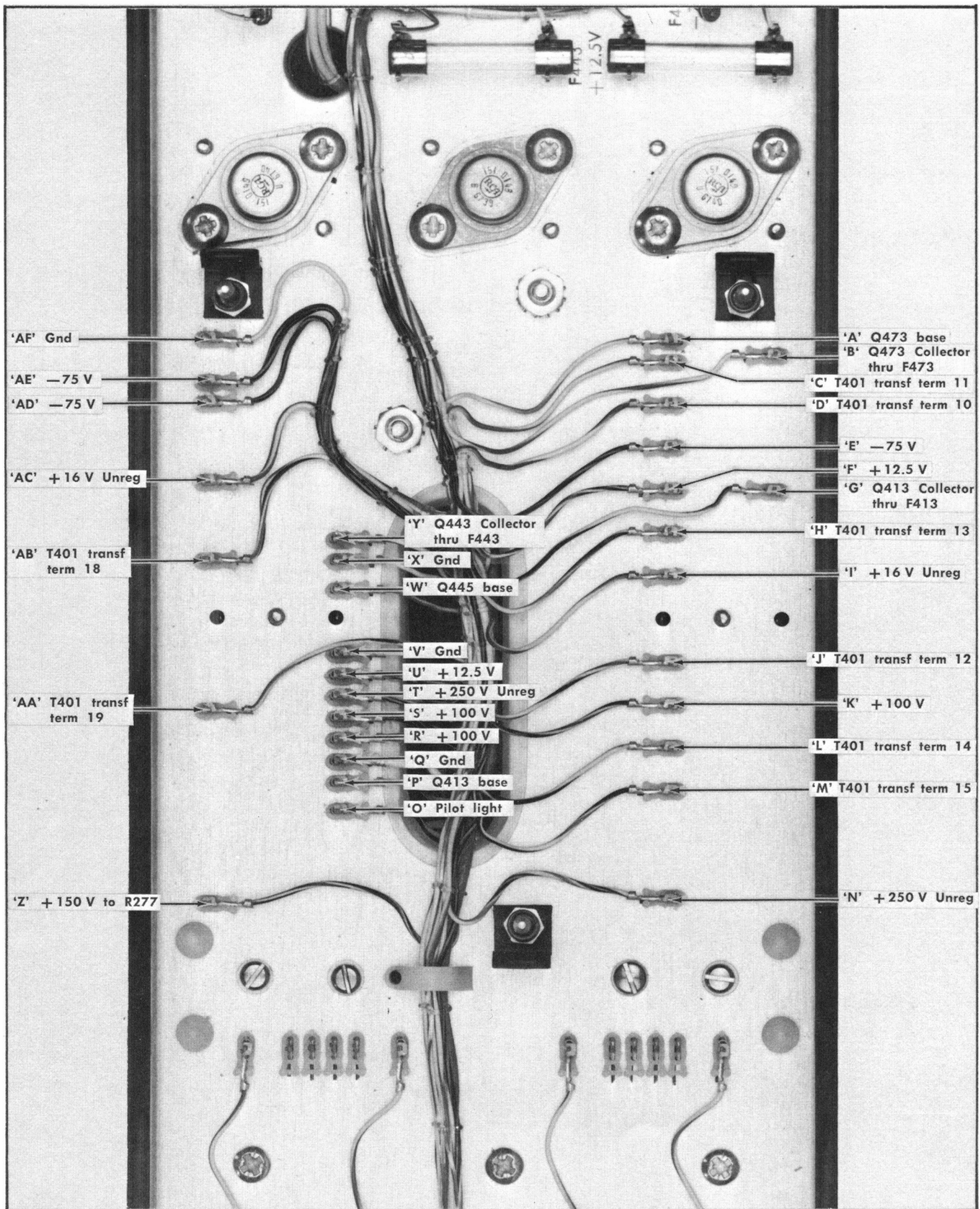
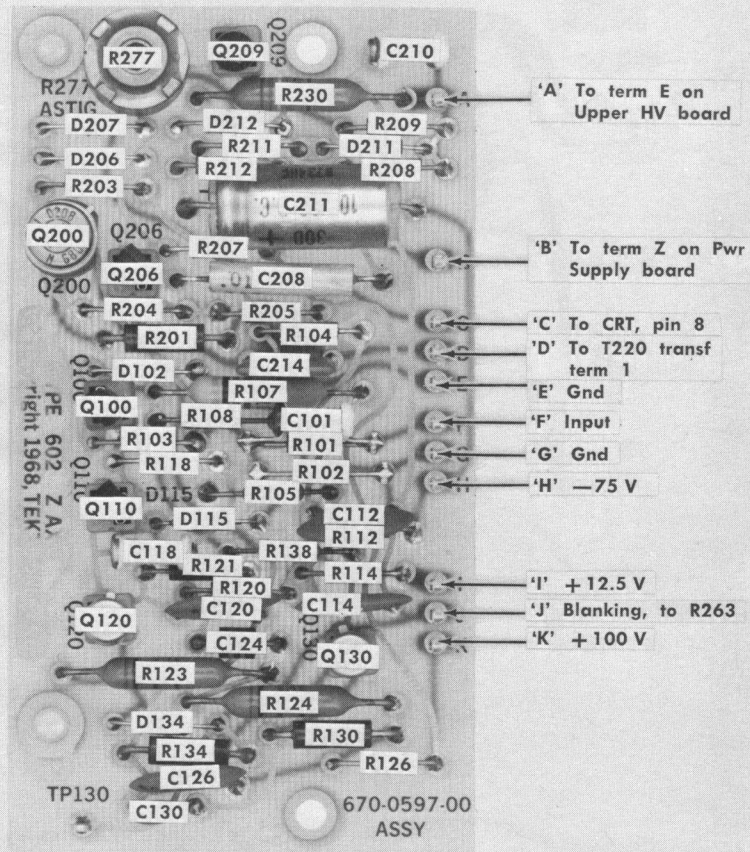


Fig. 4-19. Connecting Pin and Lead Designations, Power Supply.



0799-2

Fig. 4-20. Z Amplifier Circuit Board.

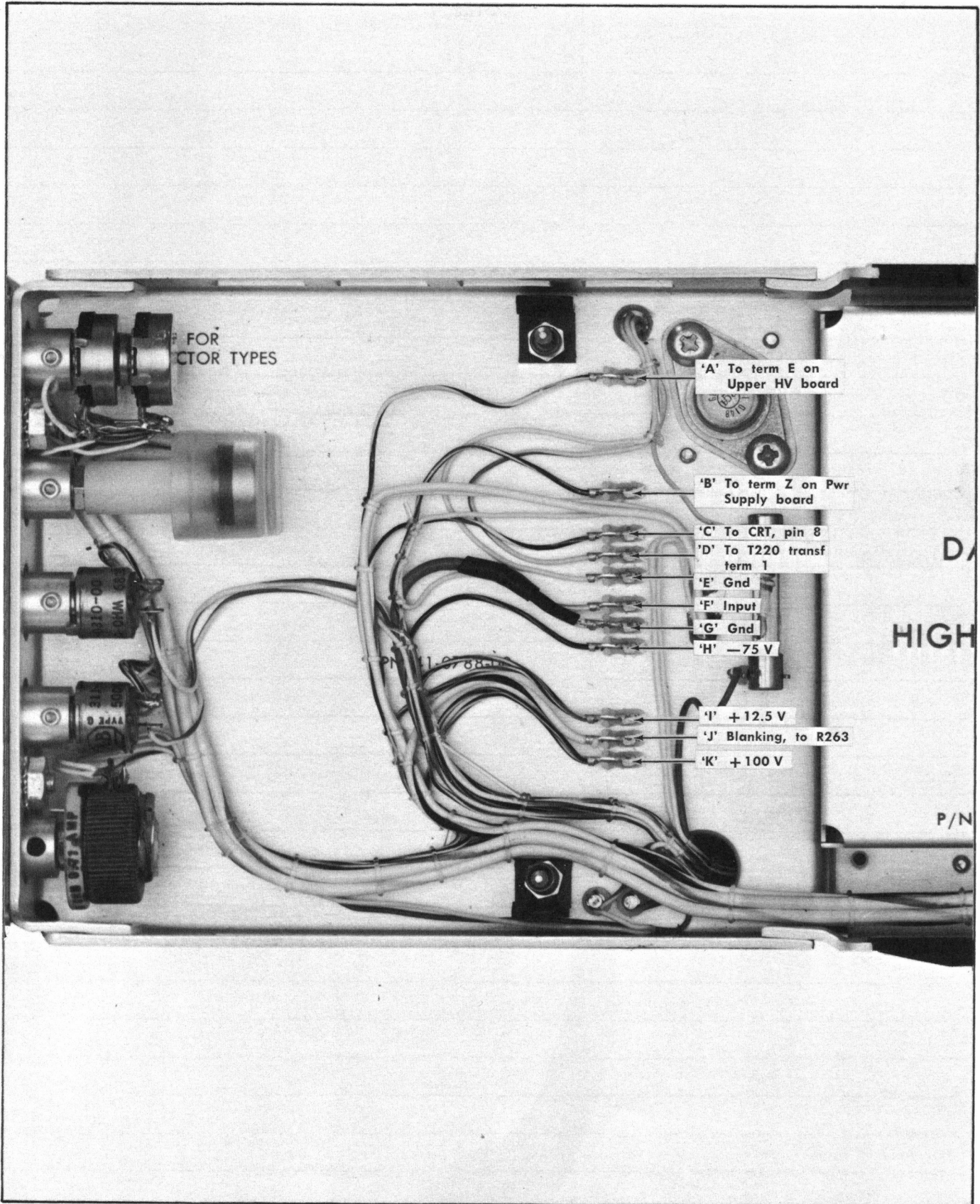


Fig. 4-21. Connecting Pin and Lead Designations, Z Amplifier.

PERFORMANCE CHECK/CALIBRATION

Change information, if any, affecting this section will be found at the rear of this manual.

Introduction

To assure instrument accuracy, check the calibration of the 602 every 2000 hours of operation, or every 12 months if used infrequently. Before complete calibration, thoroughly clean and inspect the instrument as outlined in the Maintenance section.

This section provides several features to aid in checking or calibrating the instrument; for example:

Index. The Short Form Procedure lists the step numbers and titles of the complete Performance Check/Calibration procedure and gives the page on which each step begins. Therefore, the Short Form Procedure may be used to locate a step in the complete procedure.

Performance Check. The complete Performance Check/Calibration procedure can be used as a checkout procedure by performing all portions except the ADJUST part of a step. The Performance Check procedure checks the instrument to the original performance standards without removing the covers or making internal adjustments. Some steps are not applicable to a performance checkout procedure.

Complete Calibration. Completion of each step in the complete Performance Check/Calibration procedure checks this instrument to the original performance standards and gives the procedure to return each adjustment to its optimum setting. Limits and tolerances in this procedure are given as calibration guides and are not instrument specifications. Where possible, instrument performance is checked before each adjustment is made. For best overall instrument performance make each adjustment to the exact setting even if the CHECK is within the allowable tolerance.

TEST EQUIPMENT REQUIRED

General Equipment

The following test equipment and accessories, or equivalent, is required for complete calibration of the 602. Specifications given are the minimum necessary for accurate calibration. Therefore, some of the recommended equipment may have specifications which exceed those given. All test equipment is assumed to be correctly calibrated and operating within the given specifications.

¹ Requires a TM 500-series power module.

² A high-voltage probe can be used with the DM 501 Digital Multimeter in lieu of the DC voltmeter. See the Tektronix Catalog for a list of DM 501 optional accessories.

1. Digital Voltmeter. Range, zero to 300 volts; accuracy, $\pm 1\%$. TEKTRONIX DM 501A Option 02 Digital Multimeter recommended.¹

2. Sine-Wave Generator. Frequency range to at least 1 MHz. TEKTRONIX FG 501 or FG 503 Function Generator recommended.¹

3. Voltage Source. Dc; voltage range, 0.1, 0.2, 0.5, 0.8, 1.0 volt. TEKTRONIX PS 501-1 Power Supply recommended.¹

4. Termination (3 required). Impedance, 50 Ω ; connectors, bnc. Tektronix Part Number 011-0049-01 (or equivalent) recommended.

5. DC Voltmeter (VOM)². Range, zero to 4000 volts; accuracy checked to within 1% at -3900 volts. Triplett Model 630-NA or Simpson Model 262 can be used.

Optional Equipment

To complete the optional portions of the calibration procedure the following test equipment, or equivalent, is recommended.

1. Variable Autotransformer. Must be capable of supplying at least 100 watts over a range from 90 volts to 130 volts (180 to 272 volts for 230 volt nominal line). If the autotransformer does not have an ac (rms) voltmeter to indicate output voltage, monitor the output with an ac (rms) voltmeter. The General Radio W10MT3W Metered Variac® Autotransformer is recommended.

2. Test Oscilloscope. Minimum vertical deflection factor, 0.005 volt/div; bandwidth, suitable for measuring 120Hz ripple. TEKTRONIX 5110 Oscilloscope with a 5A18N Amplifier and a 5B10N Time Base recommended.

3. 1X Probe. For use with test oscilloscope for measuring 120Hz ripple amplitude. TEKTRONIX P6101 or P6062B Probe recommended.

4. Coaxial Cable. Impedance, 50 Ω ; connectors, bnc; two needed of electrically identical length. Tektronix Part Number 012-0057-01.

5. Tee Adapter. Bnc male to two bnc female. Tektronix Part Number 103-0030-00.

Preliminary Procedure for Performance Check only

1. Rotate the 602 INTENSITY control fully counterclockwise.
2. Connect the 602 to a power source which meets its voltage and frequency requirements.
3. Set the power switch to the ON position. Allow at least one minute warmup at 25°C, for checking the instrument to the stated accuracy.
4. Terminate the X, Y, and Z INPUTS with 50Ω terminations.

Preliminary Procedure for Complete Calibration

1. Remove the 602 from the case.
2. Set the Line Selector to 115 volts and the Range Selector to MED.
3. Connect the autotransformer to a suitable power source.
4. Rotate the 602 INTENSITY control fully counterclockwise.
5. Connect the 602 power cord to the autotransformer output.
6. Set the autotransformer for a 115 volt output.
7. Set the power switch to the ON position. Allow at least one minute warmup at 25°C, ±5°C for checking and adjusting the instrument to the desired accuracy.
8. Terminate the X, Y, and Z INPUTS with 50Ω terminations.

SHORT FORM PROCEDURE

Type _____

Serial Number _____

Calibration Date _____

Calibrated by _____

1. Check or Adjust +100 volt power supply +100 volts
2. Check Low Voltage Power Supplies
3. Check Low Voltage Power Supply Regulation and Ripple (OPTIONAL CHECK)
4. Check High Voltage -3900 volts, ±5%
5. Check High Voltage Regulation (OPTIONAL CHECK)
6. Check or Adjust Focus and Astigmatism
7. Check or Adjust Trace Rotation (rear panel)
8. Check or Adjust X and Y Amplifier Gain
9. Check Z Amplifier

OPTIONAL STEPS

10. Check or Adjust Phasing
11. Check Bandwidth

COMPLETE PERFORMANCE CHECK/CALIBRATION PROCEDURE

General

The following procedure allows the 602 to be calibrated with minimum interaction of adjustments and reconnection of equipment. An equipment setup picture is shown for each group of checks and adjustments. This picture identifies the test equipment used for this group of checks and adjustments. External controls or adjustments of the 602 referred to in this procedure are capitalized (e.g., INTENSITY). Internal adjustment names are initial capitalized only (e.g., Horiz Gain).

The following procedure uses the equipment listed under Test Equipment Required. If equipment is substituted, control settings or equipment setup may need to be altered to meet the requirements of the equipment used. Detailed operating instructions for the test equipment are not given in this procedure. If in doubt as to the correct operation of any of the test equipment, refer to the instruction manual for that unit.

NOTE

This instrument should be calibrated at an ambient temperature of 25°C, ±5°C. The performance of this instrument can be checked at any temperature within the 0°C to +50°C range.

POWER SUPPLIES

Control Settings (602)

| | |
|----------------|------------------------|
| INTENSITY | Fully counterclockwise |
| FOCUS | Midrange |
| VERT POSITION | Midrange |
| HORIZ POSITION | Midrange |

Test Oscilloscope (Optional to check ripple)

| | |
|------------------|------|
| Time Base | |
| Triggering Level | 0 |
| Triggering Mode | Auto |
| Triggering Slope | + |
| Trigger Coupling | AC |
| Trigger Source | Int |
| Time/cm | 1 ms |

Vertical Amplifier

| | |
|----------------|------|
| Volts/cm | .005 |
| Input Selector | AC |

1. Check or Adjust +100 Volt Power Supply

a. Connect the digital voltmeter between the +100 volt test point and ground (see Fig. 5-1).

b. ADJUST—R434, +100 V (Fig. 5-1), for exactly +100 volts.

c. INTERACTION—Operation of all circuits within the 602 is affected by the +100 volt supply.

2. Check Low Voltage Supplies

a. Connect the digital voltmeter successively between each low voltage test point and chassis ground. See Fig. 5-1 for test point locations.

b. CHECK—Each supply is within the tolerance listed in Table 5-1.

Table 5-1

| Supply | Tolerance | Max. Ripple |
|---------|----------------------|-------------|
| +100 V | Set to +100 V | 5 mV |
| +12.5 V | +12.25 V to +12.75 V | 5 mV |
| -75 V | -73.5 V to -76.5 V | 5 mV |
| +16 V | +14.7 V to +24 V | ---- |
| +250 V | +230 V to +280 V | ---- |

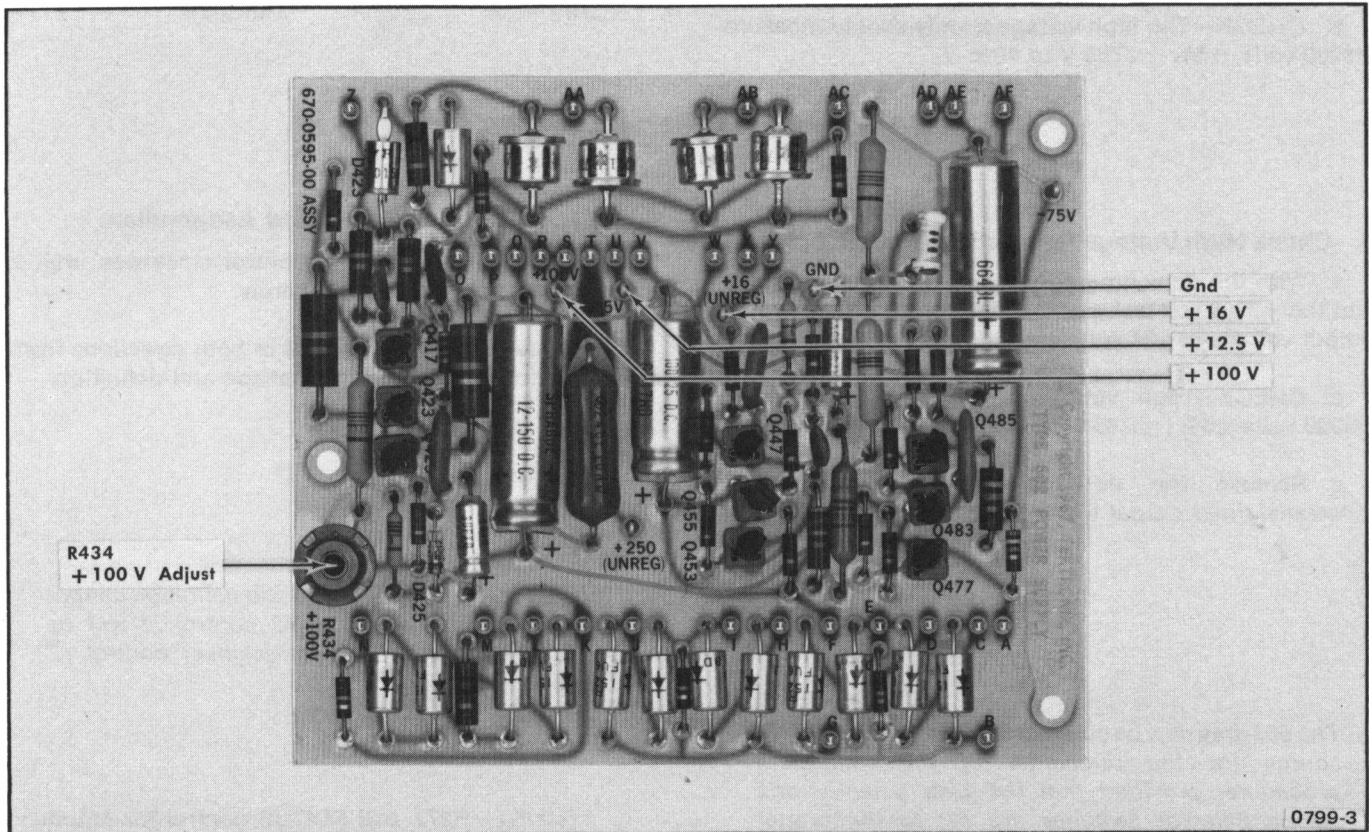


Fig. 5-1. Locations of power supply test points and R434, +100 volt adjustment.

3. Check Low Voltage Power Supply Regulation and Ripple (optional check)

a. To check regulation, connect the digital voltmeter successively between each low voltage supply test point and chassis ground. To check ripple, connect the 1X probe from the test oscilloscope Input to each test point in succession.

b. Set the autotransformer output to 104 Vac.

c. CHECK—Each supply output and ripple amplitude must be within limits listed in Table 5-1.

d. Set the autotransformer output to 126 Vac.

e. CHECK—Each supply output and ripple amplitude must be within the limits listed in Table 5-1.

f. Return the autotransformer output to 115 volts ac and disconnect the voltmeter and test oscilloscope.

4. Check High Voltage

a. Connect a dc voltmeter between the -3900 volt test point and chassis ground (Fig. 5-2).

b. CHECK—The high voltage supply should measure -3900 volts, $\pm 5\%$ (-3705 V to 4095 V).

5. Check High Voltage Regulation (optional check)

a. With the dc voltmeter connected between ground and the -3900 volt test point, adjust the autotransformer output voltage to 104 volts and then 126 volts.

b. CHECK—High voltage supply should measure -3900 volts $\pm 5\%$ (-3705 V to 4095 V).

c. Remove the dc voltmeter and return the autotransformer output to 115 Vac.

NOTE

The 602 may now be connected directly to the power source for the remainder of the calibration procedure, provided that the Line Selector and Range Selector switches are set to the proper positions for the source line voltage.

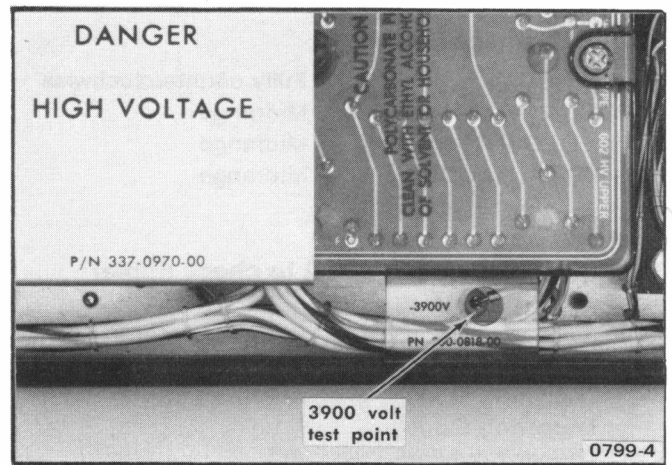


Fig. 5-2. Location of -3900 volt test point.

CRT CIRCUIT

Control Settings

602

| | |
|-----------|------------------|
| INTENSITY | Counterclockwise |
| FOCUS | Midrange |
| VERT POS | Midrange |
| HORIZ POS | Midrange |

6. Check or Adjust Focus and Astigmatism

a. Rotate the INTENSITY control clockwise until a spot appears in the crt viewing area.

b. Rotate the FOCUS control in both directions from midrange, to give the best spot shape and definition.

NOTE

If it is felt that best spot shape and definition cannot be achieved with the FOCUS control, it will be necessary to adjust the Astigmatism control (Z Amplifier board, Fig. 5-3).

c. ADJUST—R277 and FOCUS control for optimum spot shape and definition.

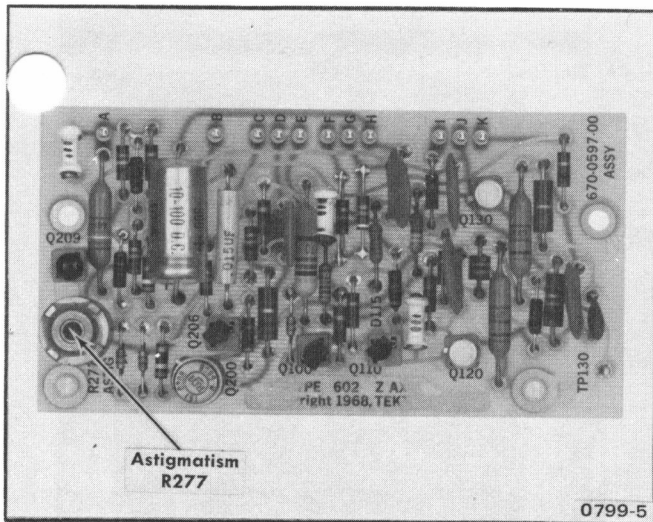


Fig. 5-3. Location of Astigmatism control on Z Amplifier.

7. Check or Adjust Trace Rotation

- Connect the sine-wave generator output to the 602 X INPUT.
- Set the generator frequency to 10 kHz.
- Leave Y and Z INPUTS terminated in 50 Ω .

Adjust the sine-wave generator output amplitude horizontal trace of approximately 10 cm on the 602 graticule.

- CHECK—The trace should be aligned with the center horizontal graticule line (vertically) throughout its length (10 cm).
- ADJUST—R275, TRACE ROTATION control, to align the trace with the center horizontal graticule line.

8. Check or Adjust X and Y Amplifier Gain

NOTE

The X and Y Amplifier gains should be adjusted to the desired deflection factor(s), depending on the input signals to be used. The following procedure shows adjustments to 0.1 volt/division for either amplifier.

- Remove the 50 Ω termination from the X Amplifier INPUT.
- Horizontally position the spot to the first (left) graticule line.

- Connect the dc voltage source to the Digital Multimeter and adjust for an output of +1.0 volt.

- Connect the dc voltage source (+1.0 volt) to the X INPUT (negative to ground and positive to X INPUT).

- CHECK—For horizontal deflection of the spot to the last graticule line (10 cm of deflection).

- ADJUST—R74 to give exactly 10 cm (Full Scale) of horizontal deflection. Connect and disconnect the voltage source while adjusting R74.

- Remove the 50 Ω termination from the Y INPUT and terminate the X INPUT.

- Vertically position the spot to the bottom graticule line.

- Connect the voltage source to the Digital Multimeter and adjust for an output of +0.8 volt.

- Connect the voltage source (0.8 V) to the Y INPUT (negative to ground and positive to the Y INPUT).

- CHECK—For upward deflection of the spot to the top graticule line (8 cm of deflection).

- ADJUST—R24 to give exactly 8 cm (Full Scale) of vertical deflection (connect and disconnect the voltage source, see note above, while adjusting R24).

- Remove the voltage source from Y INPUT and terminate Y INPUT in 50 Ω .

9. Check Z Amplifier

- Remove the 50 Ω termination from the Z INPUT.
- Connect the voltage source to the Digital Multimeter and adjust for an output of +0.1 volt.
- Connect the voltage source (set at 0.1 volt) to the Z INPUT.
- Set the 602 INTENSITY control so the displayed spot is just visible.
- Set the dc voltage source output to 0.2 volt, then to 0.5 volt and finally to 1.0 volt.
- CHECK—Spot intensity should increase with each increase in source voltage.
- Remove the voltage source and terminate the Z INPUT.

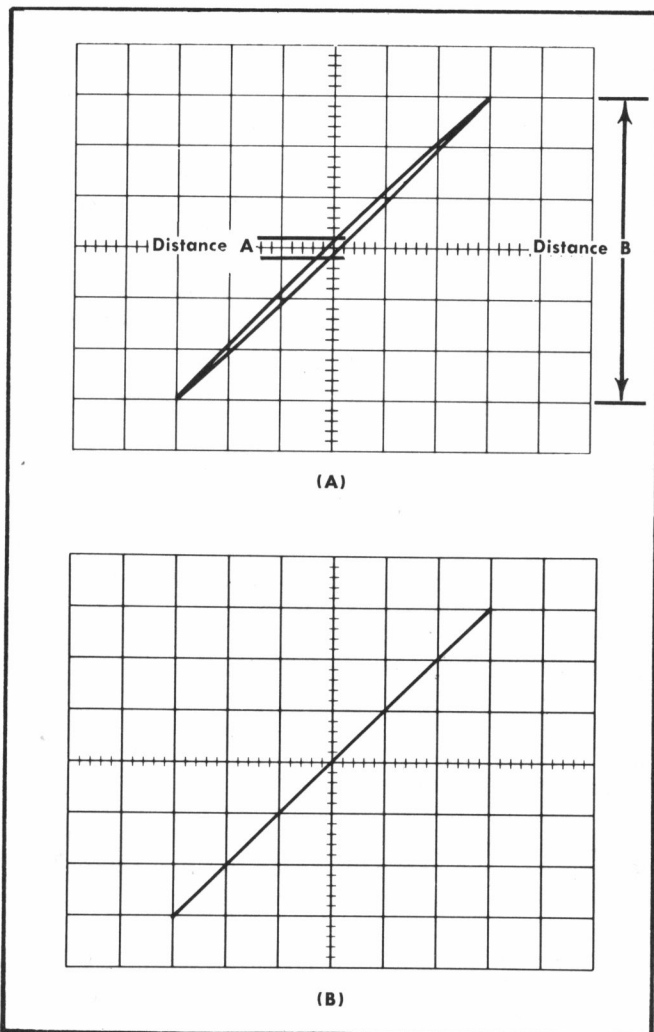


Fig. 5-4. Typical display showing a phase difference of (A) approximately 2 degrees. (B) Zero degrees.

OPTIONAL STEPS

10. Check or Adjust Phasing

- Remove the $50\ \Omega$ terminations from X and Y INPUTS.
- Connect the bnc tee connector to the sine-wave generator output.
- Connect two bnc coaxial cables (of identical electrical length) between the tee connector and the 602 X and Y INPUTS.
- Set the sine-wave generator frequency to 1 MHz.
- Adjust the sine-wave generator amplitude (and the 602 VERT and HORIZ POSITION controls) for diagonal display as shown in Fig. 5-4.

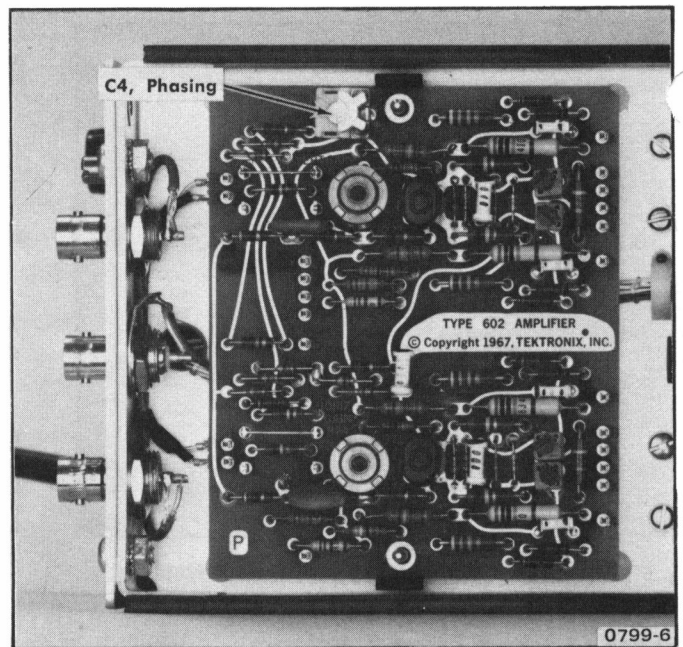


Fig. 5-5. Location of C4, Phasing Control.

- CHECK—For not more than 1 mm vertical separation of the traces. See Fig. 5-4.
- ADJUST—C4, Phasing, Fig. 5-5, for minimum trace opening.

11. Check Bandwidth

- Apply 8 divisions (bottom to top graticule line) of 50 kHz sine wave from the sine-wave generator to the Y INPUT.
- Increase the sine-wave generator frequency to 1 MHz. (Maintain the output of the generator at the same level as used for 50 kHz.)
- CHECK—For not less than 5.6 divisions of display (70% of initial display).
- Move the sine-wave generator output to X INPUT.
- Apply 10 divisions (left to right graticule line) of 50 kHz sine wave from the sine-wave generator to the X INPUT.
- Increase the sine-wave generator frequency to 1 MHz. (Maintain the output of the generator at the same level as used for 50 kHz.)
- CHECK—For not less than 7.0 divisions of display (70% of initial display).

Fig. 5-8. Typical display showing a phase difference of (A) approximately 2 degrees. (B) Zero degrees.

- f. Remove the 50 Ω termination from the Y INPUT and terminate the X INPUT.
- g. Vertically position the spot to the bottom graticule line.
- h. Connect the voltage source (0.8 V) to the Y INPUT (negative to ground and positive to the Y INPUT).
- i. CHECK—for upward deflection of the spot to the top graticule line (8 cm of deflection).
- j. ADJUST—R24 to give exactly 8 cm (Full Scale) of vertical deflection (connect and disconnect the voltage source, see note above, while adjusting R24).
- k. Remove the voltage source from Y INPUT and terminate Y INPUT in 50 Ω .

9. Check Z Amplifier

- a. Remove the 50 Ω termination from the Z INPUT.

Fig. 5-9. Location of C4, Phasing control.

- b. Connect the DC voltage source (set at 0.1 volt) to the Z INPUT.
- c. Set the Type 602 INTENSITY control so the displayed spot is just visible.
- d. Set the DC voltage source output to 0.2 volt, then to 0.5 volt and finally to 1.0 volt.
- e. CHECK—spot intensity should increase with each increase in source voltage.
- f. Remove the voltage source and terminate the Z INPUT.

OPTIONAL STEPS

10. Check or Adjust Phasing

- a. Test equipment is shown in Fig. 5-7.
- b. Remove the 50 Ω terminations from X and Y INPUTS.
- c. Connect the BNC "T" Connector to the Sine-Wave Generator Output.
- d. Connect two BNC coaxial cables (of identical electrical length) between the "T" Connector and the Type 602 X and Y INPUTS.
- e. Set the Sine-Wave Generator frequency to 1 MHz.
- f. Adjust the Sine-Wave Generator Amplitude (and the Type 602 VERT and HORIZ POSITION controls) to display a diagonal display as shown in Fig. 5-8.
- g. CHECK—for not more than 1 mm vertical separation of the traces. See Fig. 5-8.
- h. ADJUST—C4, Phasing, Fig. 5-9, for minimum trace opening.

11. Check Bandwidth

- a. Test equipment is shown in Fig. 5-7.
- b. Apply 8 divisions (bottom to top graticule line) of 50 kHz Sine Wave from the Sine-Wave Generator to the Y INPUT.
- c. Increase the Sine-Wave Generator frequency to 1 MHz. (Maintain the output of the Generator at the same level as the 50 kHz used in step b if the Generator does not have constant output amplitude).
- d. CHECK—for not less than 5.6 divisions of display (70% of initial display).
- e. Move the Sine Wave Generator output to X INPUT.
- f. Apply 10 divisions (left to right graticule line) of 50 kHz Sine Wave from the Sine-Wave Generator to the X INPUT.
- g. Increase the Sine-Wave Generator frequency to 1 MHz. (Maintain the output of the Generator at the same level as the 50 kHz used in step f, if the Generator does not have constant output amplitude).
- h. CHECK—for not less than 7.0 divisions of display (70% of initial display).

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.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number
00X Part removed after this serial number

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.

ABBREVIATIONS

| | | | |
|--------|----------------------|----------|-----------------|
| ACTR | ACTUATOR | PLSTC | PLASTIC |
| ASSY | ASSEMBLY | QTZ | QUARTZ |
| CAP | CAPACITOR | RECP | RECEPTACLE |
| CER | CERAMIC | RES | RESISTOR |
| CKT | CIRCUIT | RF | RADIO FREQUENCY |
| COMP | COMPOSITION | SEL | SELECTED |
| CONN | CONNECTOR | SEMICOND | SEMICONDUCTOR |
| ELCTLT | ELECTROLYTIC | SENS | SENSITIVE |
| ELEC | ELECTRICAL | VAR | VARIABLE |
| INCAND | INCANDESCENT | WW | WIREWOUND |
| LED | LIGHT EMITTING DIODE | XFMR | TRANSFORMER |
| NONWIR | NON WIREWOUND | XTAL | CRYSTAL |

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 |
| 02735 | RCA CORPORATION, SOLID STATE DIVISION | ROUTE 202 | SOMERVILLE, NY 08876 |
| 03508 | GENERAL ELECTRIC COMPANY, SEMI-CONDUCTOR PRODUCTS DEPARTMENT | ELECTRONICS PARK | SYRACUSE, NY 13201 |
| 04222 | AVX CERAMICS, DIVISION OF AVX CORP. | P O BOX 867, 19TH AVE. SOUTH | MYRTLE BEACH, SC 29577 |
| 04713 | MOTOROLA, INC., SEMICONDUCTOR PROD. DIV. | 5005 E MCDOWELL RD, PO BOX 20923 | PHOENIX, AZ 85036 |
| 07263 | FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP. | 464 ELLIS STREET | MOUNTAIN VIEW, CA 94042 |
| 07910 | TELEDYNE SEMICONDUCTOR | 12515 CHADRON AVE. | HAWTHORNE, CA 90250 |
| 08806 | GENERAL ELECTRIC CO., MINIATURE LAMP PRODUCTS DEPARTMENT | NELA PARK | CLEVELAND, OH 44112 |
| 09353 | C AND K COMPONENTS, INC. | 103 MORSE STREET | WATERTOWN, MA 02172 |
| 14433 | ITT SEMICONDUCTORS | 3301 ELECTRONICS WAY P O BOX 3049 | WEST PALM BEACH, FL 33402 |
| 15605 | CUTLER-HAMMER, INC. | 4201 27TH STREET | MILWAUKEE, WI 53216 |
| 32997 | BOURNS, INC., TRIMPOT PRODUCTS DIV. | 1200 COLUMBIA AVE. | RIVERSIDE, CA 92507 |
| 44655 | OHMITE MFG. CO. | 3601 W. HOWARD ST. | SKOKIE, IL 60076 |
| 56289 | SPRAGUE ELECTRIC CO. | 87 MARSHALL ST. | NORTH ADAMS, MA 01247 |
| 71400 | BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO. | 2536 W. UNIVERSITY ST. | ST. LOUIS, MO 63107 |
| 71590 | CENTRALAB ELECTRONICS, DIV. OF GLOBE-UNION, INC. | P O BOX 858 | FORT DODGE, IA 50501 |
| 72982 | ERIE TECHNOLOGICAL PRODUCTS, INC. | 644 W. 12TH ST. | ERIE, PA 16512 |
| 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 |
| 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 |
| 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 | INDIANAPOLIS, IN 46206 |
| 91637 | DALE ELECTRONICS, INC. | P. O. BOX 372 | COLUMBUS, NE 68601 |
| 91836 | KINGS ELECTRONICS CO., INC. | P. O. BOX 609 40 MARBLEDALE ROAD | TUCKAHOE, NY 10707 |

Replaceable Electrical Parts—Type 602

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|--------------------|----------------------|---------|--|----------|------------------|
| A1 | 670-0596-00 | | | CKT BOARD ASSY:AMPLIFIER | 80009 | 670-0596-00 |
| A2 | 670-0597-00 | B010100 | B082109 | CKT BOARD ASSY:Z AXIS AMPLIFIER | 80009 | 670-0597-00 |
| A2 | 670-0597-01 | B082110 | | CKT BOARD ASSY:Z AXIS AMPLIFIER | 80009 | 670-0597-01 |
| A3 | 670-0599-00 | B010100 | B082895 | CKT BOARD ASSY:HIGH VOLTAGE, LOWER | 80009 | 670-0599-00 |
| A3 | 670-0599-01 | B082896 | | CKT BOARD ASSY:HIGH VOLTAGE, LOWER | 80009 | 670-0599-01 |
| A4 | 670-0598-00 | B010100 | B082895 | CKT BOARD ASSY:HIGH VOLTAGE, UPPER | 80009 | 670-0598-00 |
| A4 | 670-0598-01 | B082896 | | CKT BOARD ASSY:HIGH VOLTAGE, UPPER | 80009 | 670-0598-01 |
| A5 | 670-0595-00 | | | CKT BOARD ASSY:POWER SUPPLY | 80009 | 670-0595-00 |
| B229 | 150-0002-00 | | | LAMP, GLOW:0.5 MA 60/125V | 74276 | NE-2T(T2) |
| B251 | 150-0002-00 | | | LAMP, GLOW:0.5 MA 60/125V | 74276 | NE-2T(T2) |
| B252 | 150-0002-00 | | | LAMP, GLOW:0.5 MA 60/125V | 74276 | NE-2T(T2) |
| B253 | 150-0002-00 | | | LAMP, GLOW:0.5 MA 60/125V | 74276 | NE-2T(T2) |
| B265 | 150-0002-00 | | | LAMP, GLOW:0.5 MA 60/125V | 74276 | NE-2T(T2) |
| B266 | 150-0002-00 | | | LAMP, GLOW:0.5 MA 60/125V | 74276 | NE-2T(T2) |
| B440 | 150-0046-00 | | | LAMP, INCAND:10V, 0.04A | 08806 | 2107D |
| B497 | 150-0047-00 | | | LAMP, INCAND:6.3V, 0.2A | 08806 | 398 |
| B498 | 150-0047-00 | | | LAMP, INCAND:6.3V, 0.2A | 08806 | 398 |
| B499 | 150-0047-00 | | | LAMP, INCAND:6.3V, 0.2A | 08806 | 398 |
| C4 | 281-0079-00 | | | CAP., VAR, AIR DI:1.5-9.1PF, 800V | 74970 | 189-7504-005 |
| C15 | 283-0010-00 | | | CAP., FXD, CER DI:0.05UF, +100-20%, 50V | 56289 | 273C20 |
| C20 | 281-0609-00 | | | CAP., FXD, CER DI:1PF, +/-0.1PF, 500V | 72982 | 374-005C0K0109B |
| C29 | 281-0609-00 | | | CAP., FXD, CER DI:1PF, +/-0.1PF, 500V | 72982 | 374-005C0K0109B |
| C33 | 281-0511-00 | | | CAP., FXD, CER DI:22PF, +/-2.2PF, 500V | 72982 | 301-000C0G0220K |
| C54 | 281-0659-00 | | | CAP., FXD, CER DI:4.3PF, +/-0.25PF, 500V | 72982 | 301-000C0H0439C |
| C65 | 283-0010-00 | | | CAP., FXD, CER DI:0.05UF, +100-20%, 50V | 56289 | 273C20 |
| C70 | 281-0609-00 | | | CAP., FXD, CER DI:1PF, +/-0.1PF, 500V | 72982 | 374-005C0K0109B |
| C79 | 281-0609-00 | | | CAP., FXD, CER DI:1PF, +/-0.1PF, 500V | 72982 | 374-005C0K0109B |
| C83 | 281-0511-00 | | | CAP., FXD, CER DI:22PF, +/-2.2PF, 500V | 72982 | 301-000C0G0220K |
| C101 | 281-0637-00 | | | CAP., FXD, CER DI:91PF, 5%, 500V | 72982 | 301000Z5D910J |
| C112 | 283-0079-00 | | | CAP., FXD, CER DI:0.01UF, 20%, 250V | 72982 | 8151B202Y5S0103M |
| C114 | 283-0079-00 | | | CAP., FXD, CER DI:0.01UF, 20%, 250V | 72982 | 8151B202Y5S0103M |
| C118 | 281-0546-00 | | | CAP., FXD, CER DI:330PF, 10%, 500V | 04222 | 7001-1380 |
| C120 | 283-0079-00 | | | CAP., FXD, CER DI:0.01UF, 20%, 250V | 72982 | 8151B202Y5S0103M |
| C124 | 281-0537-00 | | | CAP., FXD, CER DI:0.68PF, 20%, 600V | 80009 | 281-0537-00 |
| C126 | 283-0079-00 | | | CAP., FXD, CER DI:0.01UF, 20%, 250V | 72982 | 8151B202Y5S0103M |
| C130 | 283-0067-00 | | | CAP., FXD, CER DI:0.001UF, 10%, 200V | 72982 | 835-515B102K |
| C208 | 285-0719-00 | | | CAP., FXD, PLSTC:0.015UF, 5%, 100V | 56289 | 410P15351 |
| C210 | 281-0536-00 | | | CAP., FXD, CER DI:1000PF, 10%, 500V | 72982 | 301000 X5P0 102K |
| C211 | 290-0194-00 | | | CAP., FXD, ELCTLT:10UF, +50-10%, 100V | 56289 | 30D106F100DC4 |
| C214 | 283-0134-00 | | | CAP., FXD, CER DI:0.47UF, +80-20%, 50V | 72982 | 8131N087Z5U0474Z |
| C216 | 290-0560-00 | XB070000 | | CAP., FXD, ELCTLT:47UF, 20%, 25V | 90201 | TDC476M025WL |
| C217 | 290-0560-00 | XB070000 | | CAP., FXD, ELCTLT:47UF, 20%, 25V | 90201 | TDC476M025WL |
| C224 | 283-0057-00 | | | CAP., FXD, CER DI:0.1UF, +80-20%, 200V | 56289 | 274C10 |
| C226 | 283-0071-00 | B010100 | B082895 | CAP., FXD, CER DI:0.0068UF, +80-30%, 5000V | 56289 | 45C10A1 |
| C226 | 285-0509-01 | B082896 | | CAP., FXD, PLSTC:0.0068UF, 20%, 5000V | 56289 | 430P507 |
| C227 | 283-0071-00 | B010100 | B082895 | CAP., FXD, CER DI:0.0068UF, +80-30%, 5000V | 56289 | 45C10A1 |
| C227 | 283-0509-01 | B082896 | | CAP., FXD, PPR DI:0.0068UF, 20%, 5000V | 56289 | 430P507 |
| C228 | 283-0071-00 | B010100 | B082895 | CAP., FXD, CER DI:0.0068UF, +80-30%, 5000V | 56289 | 45C10A1 |
| C228 | 283-0509-01 | B082896 | | CAP., FXD, PPR DI:0.0068UF, 20%, 5000V | 56289 | 430P507 |
| C255 | 283-0071-00 | B010100 | B082895 | CAP., FXD, CER DI:0.0068UF, +80-30%, 5000V | 56289 | 45C10A1 |
| C255 | 283-0509-01 | B082896 | | CAP., FXD, PPR DI:0.0068UF, 20%, 5000V | 56289 | 430P507 |
| C268 | 283-0071-00 | B010100 | B082895 | CAP., FXD, CER DI:0.0068UF, +80-30%, 5000V | 56289 | 45C10A1 |
| C268 | 283-0509-01 | B082896 | | CAP., FXD, PPR DI:0.0068UF, 20%, 5000V | 56289 | 430P507 |
| C269 | 283-0071-00 | B010100 | B082895 | CAP., FXD, CER DI:0.0068UF, +80-30%, 5000V | 56289 | 45C10A1 |
| C269 | 283-0509-01 | B082896 | | CAP., FXD, PPR DI:0.0068UF, 20%, 5000V | 56289 | 430P507 |
| C409 | 290-0331-00 | | | CAP., FXD, ELCTLT:200UF, +50-10%, 250V | 80031 | 62C12 |

Replaceable Electrical Parts—Type 602

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|--------------------|----------------------|---------|---|----------|------------------|
| C413 | 290-0328-00 | | | CAP., FXD, ELCTLT: 150UF, +50-10%, 150V | 56289 | D47908 |
| C418 | 283-0004-00 | B010100 | B079639 | CAP., FXD, CER DI: 0.02UF, +80-20%, 150V | 72982 | 855-558Z5V0203Z |
| C418 | 283-0006-00 | B079640 | | CAP., FXD, CER DI: 0.02UF, +80-20%, 500V | 72982 | 0841545Z5V00203Z |
| C420 | 283-0000-00 | | | CAP., FXD, CER DI: 0.001UF, +100-0%, 500V | 72982 | 831-516E102P |
| C425 | 283-0010-00 | | | CAP., FXD, CER DI: 0.05UF, +100-20%, 50V | 56289 | 273C20 |
| C432 | 290-0305-01 | | | CAP., FXD, ELCTLT: 3UF, 10%, 150V | 56289 | 109D305X9150C2 |
| C438 | 290-0200-00 | | | CAP., FXD, ELCTLT: 12UF, +50-10%, 150V | 56289 | 30D2858 |
| C443 | 290-0329-00 | | | CAP., FXD, ELCTLT: 2400UF, +75-10%, 25V | 56289 | 34D248G025JS4 |
| C446 | 283-0010-00 | | | CAP., FXD, CER DI: 0.05UF, +100-20%, 50V | 56289 | 273C20 |
| C449 | 283-0000-00 | | | CAP., FXD, CER DI: 0.001UF, +100-0%, 500V | 72982 | 831-516E102P |
| C459 | 290-0284-00 | | | CAP., FXD, ELCTLT: 4.7UF, 10%, 35V | 56289 | 150D475X9035B2 |
| C465 | 290-0215-00 | | | CAP., FXD, ELCTLT: 100UF, +75-10%, 25V | 56289 | 30D107G025DD9 |
| C473 | 290-0328-00 | | | CAP., FXD, ELCTLT: 150UF, +50-10%, 150V | 56289 | D47908 |
| C479 | 283-0002-00 | | | CAP., FXD, CER DI: 0.01UF, +80-20%, 500V | 72982 | 811-546E103Z |
| C489 | 281-0543-00 | | | CAP., FXD, CER DI: 270PF, 10%, 500V | 72982 | 301055X5P271K |
| C495 | 290-0226-00 | | | CAP., FXD, ELCTLT: 20UF, 100V | 56289 | 30D206F100DF9 |
| D3 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D4 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D20 | 152-0242-00 | | | SEMICOND DEVICE: SILICON, 225V, 200MA | 07263 | FDH5004 |
| D29 | 152-0242-00 | | | SEMICOND DEVICE: SILICON, 225V, 200MA | 07263 | FDH5004 |
| D30 | 152-0195-00 | | | SEMICOND DEVICE: ZENER, 0.4W, 5.1V, 5% | 04713 | SZ11755 |
| D31 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D32 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D33 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D38 | 152-0195-00 | | | SEMICOND DEVICE: ZENER, 0.4W, 5.1V, 5% | 04713 | SZ11755 |
| D53 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D54 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D70 | 152-0242-00 | | | SEMICOND DEVICE: SILICON, 225V, 200MA | 07263 | FDH5004 |
| D79 | 152-0242-00 | | | SEMICOND DEVICE: SILICON, 225V, 200MA | 07263 | FDH5004 |
| D80 | 152-0195-00 | | | SEMICOND DEVICE: ZENER, 0.4W, 5.1V, 5% | 04713 | SZ11755 |
| D81 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D82 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D83 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D88 | 152-0195-00 | | | SEMICOND DEVICE: ZENER, 0.4W, 5.1V, 5% | 04713 | SZ11755 |
| D96 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D97 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D98 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D99 | 152-0278-00 | | | SEMICOND DEVICE: ZENER, 0.4W, 3V, 5% | 04713 | SZG35009K20 |
| D102 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D115 | 152-0195-00 | | | SEMICOND DEVICE: ZENER, 0.4W, 5.1V, 5% | 04713 | SZ11755 |
| D134 | 152-0061-00 | | | SEMICOND DEVICE: SILICON, 175V, 100MA | 07263 | FDH2161 |
| D206 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D207 | 152-0185-00 | | | SEMICOND DEVICE: SILICON, 40PIV, 150MA | 07910 | 1N4152 |
| D211 | 152-0061-00 | | | SEMICOND DEVICE: SILICON, 175V, 100MA | 07263 | FDH2161 |
| D212 | 152-0061-00 | | | SEMICOND DEVICE: SILICON, 175V, 100MA | 07263 | FDH2161 |
| D221 | 152-0218-00 | B010100 | B049999 | SEMICOND DEVICE: SILICON, 10KV, 20MA | 83003 | 7715-10XVPN |
| D221 | 152-0408-00 | B050000 | | SEMICOND DEVICE: SILICON, 10KV, 5MA | 83003 | H345 |
| D223 | 152-0218-00 | B010100 | B049999 | SEMICOND DEVICE: SILICON, 10KV, 20MA | 83003 | 7715-10XVPN |
| D223 | 152-0408-00 | B050000 | | SEMICOND DEVICE: SILICON, 10KV, 5MA | 83003 | H345 |
| D248 | 152-0291-00 | | | SEMICOND DEVICE: ZENER, 1W, 20V, 5% | 04713 | 1N3027B |
| D252 | 152-0170-00 | | | SEMICOND DEVICE: SILICON, 1500V, 10UA | 80009 | 152-0170-00 |
| D406A | 152-0066-00 | | | SEMICOND DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D406B | 152-0066-00 | | | SEMICOND DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D406C | 152-0066-00 | | | SEMICOND DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D406D | 152-0066-00 | | | SEMICOND DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D410A | 152-0066-00 | | | SEMICOND DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D410B | 152-0066-00 | | | SEMICOND DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |

Replaceable Electrical Parts—Type 602

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|--------------------|----------------------|---------|--|----------|-----------------|
| D410C | 152-0066-00 | | | SEMICON D DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D410D | 152-0066-00 | | | SEMICON D DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D423 | 152-0150-00 | | | SEMICON D DEVICE: ZENER, 0.75W, 5% 51V | 80009 | 152-0150-00 |
| D425 | 152-0212-00 | | | SEMICON D DEVICE: ZENER, 0.5W, 9V, 5% | 04713 | SZ50646RL |
| D438 | 152-0066-00 | | | SEMICON D DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D440A | 152-0198-00 | | | SEMICON D DEVICE: SILICON, 200V, 3A | 03508 | 1N5624 |
| D440B | 152-0198-00 | | | SEMICON D DEVICE: SILICON, 200V, 3A | 03508 | 1N5624 |
| D440C | 152-0198-00 | | | SEMICON D DEVICE: SILICON, 200V, 3A | 03508 | 1N5624 |
| D440D | 152-0198-00 | | | SEMICON D DEVICE: SILICON, 200V, 3A | 03508 | 1N5624 |
| D470A | 152-0066-00 | | | SEMICON D DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D470B | 152-0066-00 | | | SEMICON D DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D470C | 152-0066-00 | | | SEMICON D DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| D470D | 152-0066-00 | | | SEMICON D DEVICE: SILICON, 400V, 750MA | 14433 | LG4016 |
| F217 | 159-0019-00 | | | FUSE, CARTRIDGE: 3AG, 1A, 250V, SLOW BLOW | 71400 | MDL1 |
| F401 | 159-0022-00 | | | FUSE, CARTRIDGE: 3AG, 1A, 250V, FAST-BLOW | 71400 | AGC 1 |
| F413 | 159-0028-00 | | | FUSE, CARTRIDGE: 3AG, 0.25A, 250V, FAST-BLOW | 71400 | AGC 1/4 |
| F443 | 159-0028-00 | | | FUSE, CARTRIDGE: 3AG, 0.25A, 250V, FAST-BLOW | 71400 | AGC 1/4 |
| F473 | 159-0028-00 | | | FUSE, CARTRIDGE: 3AG, 0.25A, 250V, FAST-BLOW | 71400 | AGC 1/4 |
| J1 | 131-0274-00 | | | CONNECTOR, RCPT, : BNC | 91836 | KC79-67 |
| J51 | 131-0274-00 | | | CONNECTOR, RCPT, : BNC | 91836 | KC79-67 |
| J101 | 131-0126-00 | | | CONNECTOR, RCPT, : BNC, FEMALE | 77820 | 9663-1 NT-34 |
| L275 | 108-0495-00 | | | COIL, TUBE DEFLE: TRACE ROTATOR | 80009 | 108-0495-00 |
| Q21 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q27 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q30 | 151-0188-00 | | | TRANSISTOR: SILICON, PNP | 04713 | SPS6868K |
| Q38 | 151-0188-00 | | | TRANSISTOR: SILICON, PNP | 04713 | SPS6868K |
| Q41 | 151-0150-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0150-00 |
| Q45 | 151-0150-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0150-00 |
| Q71 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q77 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q80 | 151-0188-00 | | | TRANSISTOR: SILICON, PNP | 04713 | SPS6868K |
| Q83 | 151-0188-00 | | | TRANSISTOR: SILICON, PNP | 04713 | SPS6868K |
| Q91 | 151-0150-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0150-00 |
| Q95 | 151-0150-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0150-00 |
| Q100 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q110 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q120 | 151-0250-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0250-00 |
| Q130 | 151-0250-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0250-00 |
| Q200 | 151-0208-00 | B010100 | B081159 | TRANSISTOR: SILICON, PNP | 80009 | 151-0208-00 |
| Q200 | 151-0385-00 | B081160 | | TRANSISTOR: SILICON, PNP | 02735 | 2N5416 |
| Q206 | 151-0216-00 | | | TRANSISTOR: SILICON, PNP | 04713 | SPS8803 |
| Q209 | 151-1005-00 | | | TRANSISTOR: SILICON, JFE, N-CHANNEL | 80009 | 151-1005-00 |
| Q217 | 151-0148-00 | | | TRANSISTOR: SILICON, NPN | 02735 | 36568 |
| Q413 | 151-0149-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0149-00 |
| Q417 | 151-0190-00 | | | TRANSISTOR: SILICON, NPN | 07263 | S032677 |
| Q423 | 151-0192-00 | | | TRANSISTOR: SILICON, NPN, SEL FROM MPS6521 | 04713 | SPS8801 |
| Q425 | 151-0192-00 | | | TRANSISTOR: SILICON, NPN, SEL FROM MPS6521 | 04713 | SPS8801 |
| Q443 | 151-0148-00 | | | TRANSISTOR: SILICON, NPN | 02735 | 36568 |
| Q447 | 151-0190-00 | | | TRANSISTOR: SILICON, NPN | 07263 | S032677 |
| Q453 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q455 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q473 | 151-0149-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0149-00 |
| Q477 | 151-0190-00 | | | TRANSISTOR: SILICON, NPN | 07263 | S032677 |
| Q483 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |
| Q485 | 151-0195-00 | | | TRANSISTOR: SILICON, NPN | 80009 | 151-0195-00 |

Replaceable Electrical Parts—Type 602

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|--------------------|----------------------|---------|--|----------|-----------------|
| R2 | 316-0275-00 | | | RES., FXD, CMPSN: 2.7M OHM, 10%, 0.25W | 01121 | CB2751 |
| R4 | 321-0193-00 | | | RES., FXD, FILM: 1K OHM, 1%, 0.125W | 91637 | MFF1816G10000F |
| R6 | 315-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 5%, 0.25W | 01121 | CB1045 |
| R8 | 316-0470-00 | | | RES., FXD, CMPSN: 47 OHM, 10%, 0.25W | 01121 | CB4701 |
| R10 | 311-0310-00 | | | RES., VAR, NONWIR: 5K OHM, 20%, 0.50W | 01121 | W-7350A |
| R13 | 321-0253-00 | | | RES., FXD, FILM: 4.22K OHM, 1%, 0.125W | 91637 | MFF1816G42200F |
| R15 | 316-0102-00 | | | RES., FXD, CMPSN: 1K OHM, 10%, 0.25W | 01121 | CB1021 |
| R17 | 321-0358-00 | | | RES., FXD, FILM: 52.3K OHM, 1%, 0.125W | 91637 | MFF1816G52301F |
| R19 | 316-0101-00 | | | RES., FXD, CMPSN: 100 OHM, 10%, 0.25W | 01121 | CB1011 |
| R20 | 323-0385-00 | | | RES., FXD, FILM: 100K OHM, 1%, 0.50W | 75042 | CECTO-1003F |
| R21 | 302-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.50W | 01121 | EB1041 |
| R23 | 322-0344-00 | | | RES., FXD, FILM: 37.4K OHM, 1%, 0.25W | 75042 | CEBTO-3742F |
| R24 | 311-0462-00 | B010100 | B059999 | RES., VAR, NONWIR: 1K OHM, 20%, 0.2W | 01121 | FR102M |
| R24 | 311-1225-00 | B060000 | | RES., VAR, NONWIR: 1K OHM, 20%, 0.50W | 32997 | 3386F-T04-102 |
| R25 | 321-0170-00 | | | RES., FXD, FILM: 576 OHM, 1%, 0.125W | 91637 | MFF1816G576ROF |
| R26 | 322-0344-00 | | | RES., FXD, FILM: 37.4K OHM, 1%, 0.25W | 75042 | CEBTO-3742F |
| R28 | 302-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.50W | 01121 | EB1041 |
| R29 | 323-0385-00 | | | RES., FXD, FILM: 100K OHM, 1%, 0.50W | 75042 | CECTO-1003F |
| R30 | 301-0433-00 | | | RES., FXD, CMPSN: 43K OHM, 5%, 0.50W | 01121 | EB4335 |
| R33 | 317-0102-00 | B010100 | B069999 | RES., FXD, CMPSN: 1K OHM, 5%, 0.125W | 01121 | BB1025 |
| R33 | 315-0102-00 | B070000 | | RES., FXD, CMPSN: 1K OHM, 5%, 0.25W | 01121 | CB1025 |
| R38 | 301-0433-00 | | | RES., FXD, CMPSN: 43K OHM, 5%, 0.50W | 01121 | EB4335 |
| R41 | 308-0108-00 | | | RES., FXD, WW: 15K OHM, 5%, 5W | 91637 | CW5-15001J |
| R43 | 301-0241-00 | | | RES., FXD, CMPSN: 240 OHM, 5%, 0.50W | 01121 | EB2415 |
| R45 | 308-0108-00 | | | RES., FXD, WW: 15K OHM, 5%, 5W | 91637 | CW5-15001J |
| R52 | 316-0275-00 | | | RES., FXD, CMPSN: 2.7M OHM, 10%, 0.25W | 01121 | CB2751 |
| R54 | 321-0193-00 | | | RES., FXD, FILM: 1K OHM, 1%, 0.125W | 91637 | MFF1816G10000F |
| R56 | 315-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 5%, 0.25W | 01121 | CB1045 |
| R58 | 316-0470-00 | | | RES., FXD, CMPSN: 47 OHM, 10%, 0.25W | 01121 | CB4701 |
| R60 | 311-0310-00 | | | RES., VAR, NONWIR: 5K OHM, 20%, 0.50W | 01121 | W-7350A |
| R63 | 321-0253-00 | | | RES., FXD, FILM: 4.22K OHM, 1%, 0.125W | 91637 | MFF1816G42200F |
| R65 | 316-0102-00 | | | RES., FXD, CMPSN: 1K OHM, 10%, 0.25W | 01121 | CB1021 |
| R67 | 321-0358-00 | | | RES., FXD, FILM: 52.3K OHM, 1%, 0.125W | 91637 | MFF1816G52301F |
| R69 | 316-0101-00 | | | RES., FXD, CMPSN: 100 OHM, 10%, 0.25W | 01121 | CB1011 |
| R70 | 323-0385-00 | | | RES., FXD, FILM: 100K OHM, 1%, 0.50W | 75042 | CECTO-1003F |
| R71 | 302-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.50W | 01121 | EB1041 |
| R73 | 322-0344-00 | | | RES., FXD, FILM: 37.4K OHM, 1%, 0.25W | 75042 | CEBTO-3742F |
| R74 | 311-0462-00 | B010100 | B059999 | RES., VAR, NONWIR: 1K OHM, 20%, 0.2W | 01121 | FR102M |
| R74 | 311-1225-00 | B060000 | | RES., VAR, NONWIR: 1K OHM, 20%, 0.50W | 32997 | 3386F-T04-102 |
| R75 | 321-0168-00 | | | RES., FXD, FILM: 549 OHM, 1%, 0.125W | 91637 | MFF1816G549ROF |
| R76 | 322-0344-00 | | | RES., FXD, FILM: 37.4K OHM, 1%, 0.25W | 75042 | CEBTO-3742F |
| R78 | 302-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.50W | 01121 | EB1041 |
| R79 | 323-0385-00 | | | RES., FXD, FILM: 100K OHM, 1%, 0.50W | 75042 | CECTO-1003F |
| R80 | 301-0433-00 | | | RES., FXD, CMPSN: 43K OHM, 5%, 0.50W | 01121 | EB4335 |
| R83 | 317-0102-00 | B010100 | B069999 | RES., FXD, CMPSN: 1K OHM, 5%, 0.125W | 01121 | BB1025 |
| R83 | 315-0102-00 | B070000 | | RES., FXD, CMPSN: 1K OHM, 5%, 0.25W | 01121 | CB1025 |
| R88 | 301-0433-00 | | | RES., FXD, CMPSN: 43K OHM, 5%, 0.50W | 01121 | EB4335 |
| R91 | 308-0108-00 | | | RES., FXD, WW: 15K OHM, 5%, 5W | 91637 | CW5-15001J |
| R93 | 301-0241-00 | | | RES., FXD, CMPSN: 240 OHM, 5%, 0.50W | 01121 | EB2415 |
| R95 | 308-0108-00 | | | RES., FXD, WW: 15K OHM, 5%, 5W | 91637 | CW5-15001J |
| R98 | 316-0223-00 | | | RES., FXD, CMPSN: 22K OHM, 10%, 0.25W | 01121 | CB2231 |
| R99 | 316-0154-00 | | | RES., FXD, CMPSN: 150K OHM, 10%, 0.25W | 01121 | CB1541 |
| R101 | 316-0103-00 | B010100 | B082109 | RES., FXD, CMPSN: 10K OHM, 10%, 0.25W | 01121 | CB1031 |
| R101 | 315-0103-00 | B082110 | | RES., FXD, CMPSN: 10K OHM, 5%, 0.25W | 01121 | CB1035 |
| R102 | 315-0913-00 | | | RES., FXD, CMPSN: 91K OHM, 5%, 0.25W | 01121 | CB9135 |
| R103 | 316-0101-00 | | | RES., FXD, CMPSN: 100 OHM, 10%, 0.25W | 01121 | CB1011 |
| R104 | 316-0275-00 | | | RES., FXD, CMPSN: 2.7M OHM, 10%, 0.25W | 01121 | CB2751 |

Replaceable Electrical Parts—Type 602

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|--------------------|----------------------|---------|--|----------|-----------------|
| R105 | 321-0273-00 | | | RES., FXD, FILM: 6.81K OHM, 1%, 0.125W | 91637 | MFF1816G68100F |
| R107 | 323-0347-00 | | | RES., FXD, FILM: 40.2K OHM, 1%, 0.50W | 75042 | CECT0-4022F |
| R108 | 321-0193-00 | | | RES., FXD, FILM: 1K OHM, 1%, 0.125W | 91637 | MFF1816G10000F |
| R112 | 316-0101-00 | | | RES., FXD, CMPSN: 100 OHM, 10%, 0.25W | 01121 | CB1011 |
| R114 | 316-0101-00 | | | RES., FXD, CMPSN: 100 OHM, 10%, 0.25W | 01121 | CB1011 |
| R118 | 316-0122-00 | | | RES., FXD, CMPSN: 1.2K OHM, 10%, 0.25W | 01121 | CB1221 |
| R120 | 315-0152-00 | | | RES., FXD, CMPSN: 1.5K OHM, 5%, 0.25W | 01121 | CB1525 |
| R121 | 315-0821-00 | | | RES., FXD, CMPSN: 820 OHM, 5%, 0.25W | 01121 | CB8215 |
| R123 | 323-0268-00 | | | RES., FXD, FILM: 6.04K OHM, 1%, 0.50W | 75042 | CECT0-6041F |
| R124 | 323-0268-00 | | | RES., FXD, FILM: 6.04K OHM, 1%, 0.50W | 75042 | CECT0-6041F |
| R126 | 316-0101-00 | B010100 | B082109 | RES., FXD, CMPSN: 100 OHM, 10%, 0.25W | 01121 | CB1011 |
| R126 | 315-0101-00 | B082110 | | RES., FXD, CMPSN: 100 OHM, 5%, 0.25W | 01121 | CB1015 |
| R130 | 302-0272-00 | | | RES., FXD, CMPSN: 2.7K OHM, 10%, 0.50W | 01121 | EB2721 |
| R134 | 302-0103-00 | | | RES., FXD, CMPSN: 10K OHM, 10%, 0.50W | 01121 | EB1031 |
| R138 | 321-0356-00 | | | RES., FXD, FILM: 49.9K OHM, 1%, 0.125W | 91637 | MFF1816G49901F |
| R201 | 302-0181-00 | | | RES., FXD, CMPSN: 180 OHM, 10%, 0.50W | 01121 | EB1811 |
| R203 | 316-0392-00 | | | RES., FXD, CMPSN: 3.9K OHM, 10%, 0.25W | 01121 | CB3921 |
| R204 | 315-0302-00 | | | RES., FXD, CMPSN: 3K OHM, 5%, 0.25W | 01121 | CB3025 |
| R205 | 316-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.25W | 01121 | CB1041 |
| R207 | 316-0563-00 | | | RES., FXD, CMPSN: 56K OHM, 10%, 0.25W | 01121 | CB5631 |
| R208 | 316-0103-00 | | | RES., FXD, CMPSN: 10K OHM, 10%, 0.25W | 01121 | CB1031 |
| R209 | 316-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.25W | 01121 | CB1041 |
| R211 | 316-0684-00 | | | RES., FXD, CMPSN: 680K OHM, 10%, 0.25W | 01121 | CB6841 |
| R212 | 316-0395-00 | | | RES., FXD, CMPSN: 3.9M OHM, 10%, 0.25W | 01121 | CB3951 |
| R220A) | | | | | | |
| R220B) | 311-0470-00 | | | RES., VAR, NONWIR: PNL, 2X50K OHM, 0.5W | 71590 | BA205-001 |
| R224 | 316-0472-00 | | | RES., FXD, CMPSN: 4.7K OHM, 10%, 0.25W | 01121 | CB4721 |
| R225 | 316-0273-00 | | | RES., FXD, CMPSN: 27K OHM, 10%, 0.25W | 01121 | CB2731 |
| R227 | 302-0103-00 | | | RES., FXD, CMPSN: 10K OHM, 10%, 0.50W | 01121 | EB1031 |
| R230 | 323-1457-00 | | | RES., FXD, FILM: 569K OHM, 1%, 0.5W | 91637 | MFF1226G56902F |
| R232 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R233 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R234 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R235 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R236 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R237 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R238 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R239 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R240 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R241 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R242 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R244 | 311-0397-01 | | | RES., VAR, NONWIR: 2M OHM, 10%, 0.50W | 71590 | BA147-044UV3 |
| R245 | 323-0498-00 | | | RES., FXD, FILM: 1.5M OHM, 1%, 0.50W | 91637 | MFF1226G15003F |
| R246 | 323-0505-00 | | | RES., FXD, FILM: 1.78M OHM, 1%, 0.50W | 91637 | MFF1226G17803F |
| R247 | 302-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.50W | 01121 | EB1041 |
| R249 | 302-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.50W | 01121 | EB1041 |
| R256 | 306-0106-00 | | | RES., FXD, CMPSN: 10M OHM, 10%, 2W | 01121 | HB1061 |
| R257 | 306-0106-00 | | | RES., FXD, CMPSN: 10M OHM, 10%, 2W | 01121 | HB1061 |
| R258 | 306-0106-00 | | | RES., FXD, CMPSN: 10M OHM, 10%, 2W | 01121 | HB1061 |
| R259 | 306-0106-00 | | | RES., FXD, CMPSN: 10M OHM, 10%, 2W | 01121 | HB1061 |
| R261 | 302-0565-00 | | | RES., FXD, CMPSN: 5.6M OHM, 10%, 0.50W | 01121 | EB5651 |
| R263 | 316-0393-00 | | | RES., FXD, CMPSN: 39K OHM, 10%, 0.25W | 01121 | CB3931 |
| R265 | 302-0471-00 | | | RES., FXD, CMPSN: 470 OHM, 10%, 0.50W | 01121 | EB4711 |
| R272 | 316-0103-00 | | | RES., FXD, CMPSN: 10K OHM, 10%, 0.25W | 01121 | CB1031 |
| R275 | 311-0317-00 | | | RES., VAR, WW: PNL, 2X1K OHM, 2.25W | 01121 | JJ94517A |
| R277 | 311-0551-00 | B010100 | B059999 | RES., VAR, NONWIR: TRMR, 500K OHM, 0.25W | 01121 | FR 504M |
| R277 | 311-1252-00 | B060000 | | RES., VAR, NONWIR: 500K OHM, 20%, 0.50W | 32997 | 3386F-T04-504 |

Replaceable Electrical Parts—Type 602

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|--------------------|----------------------|---------|---|----------|-----------------|
| R406 | 301-0100-00 | | | RES., FXD, CMPSN: 10 OHM, 5%, 0.50W | 01121 | EB1005 |
| R408 | 316-0184-00 | | | RES., FXD, CMPSN: 180K OHM, 10%, 0.25W | 01121 | CB1841 |
| R412 | 316-0184-00 | | | RES., FXD, CMPSN: 180K OHM, 10%, 0.25W | 01121 | CB1841 |
| R415 | 308-0054-00 | | | RES., FXD, WW: 10K OHM, 5%, 5W | 91637 | CW5-10001J |
| R416 | 301-0113-00 | | | RES., FXD, CMPSN: 11K OHM, 5%, 0.50W | 01121 | EB1135 |
| R417 | 315-0433-00 | | | RES., FXD, CMPSN: 43K OHM, 5%, 0.25W | 01121 | CB4335 |
| R419 | 316-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.25W | 01121 | CB1041 |
| R420 | 316-0102-00 | B010100 | B075639 | RES., FXD, CMPSN: 1K OHM, 10%, 0.25W | 01121 | CB1021 |
| R420 | 315-0471-00 | B075640 | | RES., FXD, CMPSN: 470 OHM, 5%, 0.25W | 01121 | CB4715 |
| R422 | 301-0203-00 | | | RES., FXD, CMPSN: 20K OHM, 5%, 0.50W | 01121 | EB2035 |
| R425 | 304-0123-00 | | | RES., FXD, CMPSN: 12K OHM, 10%, 1W | 01121 | GB1231 |
| R429 | 303-0203-00 | | | RES., FXD, CMPSN: 20K OHM, 5%, 1W | 01121 | GB2035 |
| R431 | 316-0271-00 | | | RES., FXD, CMPSN: 270 OHM, 10%, 0.25W | 01121 | CB2711 |
| R433 | 321-0222-00 | | | RES., FXD, FILM: 2K OHM, 1%, 0.125W | 91637 | MFF1816G20000F |
| R434 | 311-0480-00 | B010100 | B059999 | RES., VAR, NONWIR: 500 OHM, 20%, 0.25W | 01121 | FR501M |
| R434 | 311-1224-00 | B060000 | | RES., VAR, NONWIR: 500 OHM, 20%, 0.50W | 32997 | 3386F-T04-501 |
| R435 | 323-0323-00 | | | RES., FXD, FILM: 22.6K OHM, 1%, 0.50W | 91637 | MFF1226G22601F |
| R440 | 301-0201-00 | | | RES., FXD, CMPSN: 200 OHM, 5%, 0.50W | 01121 | EB2015 |
| R442 | 316-0103-00 | | | RES., FXD, CMPSN: 10K OHM, 10%, 0.25W | 01121 | CB1031 |
| R445 | 316-0270-00 | | | RES., FXD, CMPSN: 27 OHM, 10%, 0.25W | 01121 | CB2701 |
| R447 | 316-0562-00 | | | RES., FXD, CMPSN: 5.6K OHM, 10%, 0.25W | 01121 | CB5621 |
| R449 | 316-0102-00 | | | RES., FXD, CMPSN: 1K OHM, 10%, 0.25W | 01121 | CB1021 |
| R450 | 301-0363-00 | | | RES., FXD, CMPSN: 36K OHM, 5%, 0.50W | 01121 | EB3635 |
| R452 | 316-0221-00 | | | RES., FXD, CMPSN: 220 OHM, 10%, 0.25W | 01121 | CB2211 |
| R455 | 316-0222-00 | | | RES., FXD, CMPSN: 2.2K OHM, 10%, 0.25W | 01121 | CB2221 |
| R458 | 316-0221-00 | | | RES., FXD, CMPSN: 220 OHM, 10%, 0.25W | 01121 | CB2211 |
| R461 | 323-0341-00 | | | RES., FXD, FILM: 34.8K OHM, 1%, 0.50W | 75042 | CECT0-3482F |
| R463 | 321-0260-00 | | | RES., FXD, FILM: 4.99K OHM, 1%, 0.125W | 91637 | MFF1816G49900F |
| R472 | 316-0104-00 | | | RES., FXD, CMPSN: 100K OHM, 10%, 0.25W | 01121 | CB1041 |
| R475 | 316-0102-00 | | | RES., FXD, CMPSN: 1K OHM, 10%, 0.25W | 01121 | CB1021 |
| R477 | 316-0393-00 | | | RES., FXD, CMPSN: 39K OHM, 10%, 0.25W | 01121 | CB3931 |
| R479 | 315-0511-00 | | | RES., FXD, CMPSN: 510 OHM, 5%, 0.25W | 01121 | CB5115 |
| R480 | 316-0103-00 | | | RES., FXD, CMPSN: 10K OHM, 10%, 0.25W | 01121 | CB1031 |
| R482 | 316-0221-00 | | | RES., FXD, CMPSN: 220 OHM, 10%, 0.25W | 01121 | CB2211 |
| R485 | 301-0243-00 | | | RES., FXD, CMPSN: 24K OHM, 5%, 0.50W | 01121 | EB2435 |
| R488 | 316-0221-00 | | | RES., FXD, CMPSN: 220 OHM, 10%, 0.25W | 01121 | CB2211 |
| R491 | 323-0335-00 | | | RES., FXD, FILM: 30.1K OHM, 1%, 0.50W | 75042 | CECT0-3012F |
| R493 | 323-0323-00 | | | RES., FXD, FILM: 22.6K OHM, 1%, 0.50W | 91637 | MFF1226G22601F |
| R497 | 311-0845-00 | B010100 | B039999 | RES., VAR, NONWIR: PNL, 25K OHM, 0.50W | 80009 | 311-0845-00 |
| R497 | 311-0943-00 | B040000 | | RES., VAR, WW: TRMR, 2K OHM, 12.5W | 44655 | E57205 |
| SW301B | 260-0398-00 | B010100 | B010139 | SWITCH, TOGGLE: DPDT | 15605 | 8906K1053 |
| SW301B | 260-0834-00 | B010140 | | SWITCH, TOGGLE: DPDT, 5A, 125VAC, 0.25-40 THD | 09353 | U21-SHZQE |
| SW401 | 260-0675-00 | | | SWITCH, SLIDE: DPDT, W/O DETENTS | 82389 | 11A1024 |
| SW403 | 260-0906-00 | | | SWITCH, ROTARY: DPDT, 0.5A, 125V | 76854 | 5-15631-418 |
| T220 | 120-0530-00 | B010100 | B080189 | XFMR, PWR, STU: HIGH VOLTAGE | 80009 | 120-0530-00 |
| T220 | 120-0530-01 | B080190 | | XFMR, PWR, STU: HIGH VOLTAGE | 80009 | 120-0530-01 |
| T401 | 120-0569-00 | | | XFMR, PWR, SDN&SU: | 80009 | 120-0569-00 |
| TK401 | 260-0413-00 | | | SW, THERMOSTATIC: 10A, 240V | 73803 | 20700L63-253 |
| TP130 | 214-0579-00 | | | TERM, TEST POINT: BRS CD PL | 80009 | 214-0579-00 |
| V279 | 154-0562-00 | | | ELECTRON TUBE: CRT, P31, INT SCALE | 80009 | 154-0562-00 |
| VR209 | 152-0166-00 | XB082110 | | SEMICONV DEVICE: ZENER, 0.4W, 6.2V, 5% | 04713 | SZ11738 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-------------------------------------|----------------------|--------|--|----------|-----------------|
| | | | | OPTIONAL PHOSPHORS | | |
| | 154-0562-01 ----- | | | ELECTRON TUBE:CRT,P7,INT SCALE (OPTION 76) | 80009 | 154-0562-01 |
| | 154-0572-00 ----- | | | ELECTRON TUBE:CRT,P31,INT SCALE (OPTION 02) | 80009 | 154-0572-00 |
| | 154-0572-01 154-0727-00 ----- | | | ELECTRON TUBE:CRT,P7,INT SCALE | 80009 | 154-0572-01 |
| | | | | ELECTRON TUBE:CRT,P31,INT SCALE (OPTION 05) | 80009 | 154-0727-00 |

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.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number
00X Part removed after this serial number

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.

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.

ABBREVIATIONS

| | | | | | | | |
|-------|--------------------|---------|-----------------------|----------|----------------------|---------|-----------------|
| " | INCH | ELECTRN | ELECTRON | IN | INCH | SE | SINGLE END |
| # | NUMBER SIZE | ELEC | ELECTRICAL | INCAND | INCANDESCENT | SECT | SECTION |
| ACTR | ACTUATOR | ELECTLT | ELECTROLYTIC | INSUL | INSULATOR | SEMICON | 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 | IDNT | 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 |
|-----------|---|-------------------------------|-----------------------------|
| S3629 | PANEL COMPONENTS CORP. | 2015 SECOND ST. | BERKELEY, CA 94170 |
| 000EP | AROW FASTENERS INC. | 2112 AMERICAN AVENUE | HAYWARD, CA 94545 |
| 00779 | AMP, INC. | P O BOX 3608 | HARRISBURG, PA 17105 |
| 00866 | GOE ENGINEERING COMPANY, INC. | P O BOX 3485, 250 S 9TH AVE. | CITY OF INDUSTRY, CA 91746 |
| 02735 | RCA CORPORATION, SOLID STATE DIVISION | ROUTE 202 | SOMERVILLE, NY 08876 |
| 03614 | BUSSMAN MFG., DIV. OF MCGRAW EDISON CO. | 502 EARTH CITY PLAZA | EARTH CITY, MO 63045 |
| 04811 | PRECISION COIL SPRING COMPANY | P O BOX 5450, 10107 ROSE ST. | EL MONTE, CA 91734 |
| 06776 | ROBINSON NUGENT INC. | 800 E. 8TH ST., BOX 470 | NEW ALBANY, IN 47150 |
| 12136 | PHILADELPHIA HANDLE COMPANY, INC. | 1643 HADDON AVENUE | CAMDEN, NJ 08103 |
| 12327 | FREEWAY CORPORATION | 9301 ALLEN DRIVE | CLEVELAND, OH 44125 |
| 22753 | U. I. D. ELECTRONICS CORP. | 4105 PEMBROKE RD. | HOLLYWOOD, FL 33021 |
| 26365 | GRIES REPRODUCER CO., DIV. OF COATS AND CLARK, INC. | 125 BEECHWOOD AVE. | NEW ROCHELLE, NY 10802 |
| 28520 | HEYMAN MFG. CO. | 147 N. MICHIGAN AVE. | KENILWORTH, NJ 07033 |
| 70276 | ALLEN MFG. CO. | P. O. DRAWER 570 | HARTFORD, CT 06101 |
| 70318 | ALLMETAL SCREW PRODUCTS CO., INC. | 821 STEWART AVE. | GARDEN CITY, NY 11530 |
| 70485 | ATLANTIC INDIA RUBBER WORKS, INC. | 571 W. POLK ST. | CHICAGO, IL 60607 |
| 71400 | BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO. | 2536 W. UNIVERSITY ST. | ST. LOUIS, MO 63107 |
| 71785 | TRW, CINCH CONNECTORS | 1501 MORSE AVENUE | ELK GROVE VILLAGE, IL 60007 |
| 73743 | FISCHER SPECIAL MFG. CO. | 446 MORGAN ST. | CINCINNATI, OH 45206 |
| 75915 | LITTELFUSE, INC. | 800 E. NORTHWEST HWY | DES PLAINES, IL 60016 |
| 77250 | PHEOLL MANUFACTURING CO., DIVISION OF ALLIED PRODUCTS CORP. | 5700 W. ROOSEVELT RD. | CHICAGO, IL 60650 |
| 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 |
| 79807 | WROUGHT WASHER MFG. CO. | 2100 S. O BAY ST. | MILWAUKEE, WI 53207 |
| 80009 | TEKTRONIX, INC. | P O BOX 500 | BEAVERTON, OR 97077 |
| 80033 | PRESTOLE EVERLOCK, INC. | P. O. BOX 278, 1345 MIAMI ST. | TOLEDO, OH 43605 |
| 82389 | SWITCHCRAFT, INC. | 5555 N. ELSTON AVE. | CHICAGO, IL 60630 |
| 83385 | CENTRAL SCREW CO. | 2530 CRESCENT DR. | BROADVIEW, IL 60153 |
| 86445 | PENN FIBRE AND SPECIALTY CO., INC. | 2032 E. WESTMORELAND ST. | PHILADELPHIA, PA 19134 |
| 86928 | SEASTROM MFG. COMPANY, INC. | 701 SONORA AVENUE | GLENDAL, CA 91201 |
| 88245 | LITTON SYSTEMS, INC., USECO DIV. | 13536 SATICOY ST. | VAN NUYS, CA 91409 |
| 91836 | KINGS ELECTRONICS CO., INC. | 40 MARBLEDALE ROAD | TUCKAHOE, NY 10707 |
| 95146 | ALCO ELECTRONICS PRODUCTS, INC. | P. O. BOX 1348 | LAWRENCE, MA 01842 |
| 95263 | LEECRAFT MFG. CO., INC. | 21-16 44TH RD. | LONG ISLAND CITY, NY 11101 |
| 98978 | INTERNATIONAL ELECTRONIC RESEARCH CORP. | 135 W. MAGNOLIA BLVD. | BURBANK, CA 91502 |

| 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 | 333-1075-00 | B010100 | B083799 | 1 | | PANEL,FRONT:LEFT | 80009 | 333-1075-00 |
| | 333-1075-01 | B083800 | | 1 | | PANEL,FRONT:LEFT,PUNCHED & PTD | 80009 | 333-1075-01 |
| -2 | 200-0872-02 | | | 1 | | DOOR,ACCESS PNL: (ATTACHING PARTS) | 80009 | 200-0872-02 |
| -3 | 214-1029-01 | | | 2 | | PIN,SHLDR,HLDS:0.081 X 0.31 L,SST | 80009 | 214-1029-01 |
| -4 | 214-0301-00 | | | 2 | | SPRING,HLCPS:0.075 OD X 0.562 L - * - - - | 04811 | OBD |
| -5 | 333-1077-00 | | | 1 | | PANEL,FRONT:RIGHT | 80009 | 333-1077-00 |
| -6 | 105-0072-00 | | | 1 | | CATCH,FRICTION:LOCKING TAB & LIP,ACETAL (ATTACHING PARTS) | 80009 | 105-0072-00 |
| | 211-0507-00 | | | 1 | | SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL - * - - - | 83385 | OBD |
| -7 | 337-1017-00 | | | 1 | | SHLD,IMPLOSION:CLEAR (ATTACHING PARTS) | 80009 | 337-1017-00 |
| -8 | 211-0097-00 | | | 4 | | SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL - * - - - | 83385 | OBD |
| -9 | 331-0192-00 | | | 1 | | MASK,CRT SCALE: | 80009 | 331-0192-00 |
| | 378-0586-00 | | | 1 | | FILTER,LT,CRT:SMK GY,5.165 X 4.685 X 0.03 | 80009 | 378-0586-00 |
| -10 | 386-1304-07 | | | 1 | | SUBPANEL,FRONT: | 80009 | 386-1304-07 |
| -11 | 352-0084-01 | | | 1 | | HOLDER,NEON:T-2 OR SMALLER UNBASED LAMP | 80009 | 352-0084-01 |
| -12 | 378-0541-01 | | | 1 | | LENS,LIGHT:GREEN PLASTIC | 80009 | 378-0541-01 |
| -13 | 200-0609-00 | | | 1 | | BASE,LAMPHOLDER:0.4 OD X 0.16"L,GRAY PLSTC | 80009 | 200-0609-00 |
| -14 | ----- | | | 1 | | SWITCH,TOGGLE:(SEE SW301B REPL) (ATTACHING PARTS) | | |
| | 210-0940-00 | B010100 | B010139 | 1 | | WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL | 79807 | OBD |
| | 210-0562-00 | B010140 | | 1 | | NUT,PLAIN,HEX.:0.25-40 X 0.312 INCH,BBS | 73743 | 2X20224-402 |
| | 342-0444-00 | XB081270 | | 1 | | INSUL,SW HANDLE:GRAY VINYL - * - - - | 95146 | C-10-GREY |
| -15 | 200-0249-00 | B010100 | B010139 | 1 | | SHLD,ELEC CONN:U/W 9-PIN CABLE SOCKET | 80009 | 200-0249-00 |
| | 200-0799-00 | B010140 | | 1 | | COV,ELEC SW:BLACK VINYL | 80009 | 200-0799-00 |
| -16 | 366-0392-01 | | | 5 | | KNOB: 80009 366-0392-01 | | |
| -17 | 354-0327-00 | | | 1 | | MOUNT,RESILIENT:CRT DELRIN | 80009 | 354-0327-00 |
| -18 | 386-1412-00 | | | 1 | | DIFUSER,LIGHT:CRT SCALE ILLUM,PLEXIGLAS | 80009 | 386-1412-00 |
| | 352-0142-00 | | | 1 | | HOLDER,LT CONDCT:DELRIN | 80009 | 352-0142-00 |
| -18.1 | 348-0070-01 | XB084200 | | 2 | | PAD,CUSHIONING:0.69 INCH,RUBBER - (ON TRACE ROTATION COIL) | 80009 | 348-0070-01 |
| -19 | 337-1011-01 | B010100 | B059999 | 1 | | SHIELD,CRT: | 80009 | 337-1011-01 |
| | 337-1280-01 | B060000 | | 1 | | SHIELD,CRT: | 80009 | 337-1280-01 |
| | 348-0146-00 | XB061880 | | 1 | | . PAD,CUSHIONING (ATTACHING PARTS) | 80009 | 348-0146-00 |
| -20 | 211-0590-00 | | | 3 | | SCREW,MACHINE:6-32 X 0.250,PNH,BRS,CD PL - * - - - | 83385 | OBD |
| -21 | 136-0273-00 | | | 3 | | LAMPHOLDER:FOR GROOVED BASE (ATTACHING PARTS) | 95263 | 25-06XP11A |
| | 211-0590-00 | | | 3 | | SCREW,MACHINE:6-32 X 0.250,PNH,BRS,CD PL - * - - - | 83385 | OBD |
| -22 | 348-0145-00 | | | 1 | | GROMMET,PLASTIC:U-SHP,1.0 X 0.42 INCH | 80009 | 348-0145-00 |
| -23 | 352-0091-01 | | | 2 | | RTNR,LOOP CLAMP:ELECTRON TUBE (ATTACHING PARTS) | 80009 | 352-0091-01 |
| -24 | 211-0590-00 | | | 4 | | SCREW,MACHINE:6-32 X 0.250,PNH,BRS,CD PL - * - - - | 83385 | OBD |
| -25 | 252-0564-00 | | | FT | | PLASTIC EXTR:1.563 FT LONG | 80009 | 252-0564-00 |
| -26 | 386-1413-00 | | | 1 | | SPRT,CHAS-SHLD: (ATTACHING PARTS) | 80009 | 386-1413-00 |
| | 211-0504-00 | | | 3 | | SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL - * - - - | 83385 | OBD |
| -27 | 343-0124-00 | | | 1 | | CLAMP,LOOP:ELECTRON TUBE RETAINER (ATTACHING PARTS) | 80009 | 343-0124-00 |
| | 211-0599-00 | | | 2 | | SCREW,MACHINE:6-32 X 0.750 INCH,FIL SST | 83385 | OBD |
| | 220-0444-00 | | | 2 | | NUT,PLAIN,SQ:6-32 X 0.250 INCH,STL - * - - - | 70318 | OBD |
| -28 | 343-0123-01 | | | 2 | | CLAMP,RET.,ELEC:CRT,REAR (ATTACHING PARTS) | 80009 | 343-0123-01 |
| | 211-0600-00 | | | 2 | | SCREW,MACHINE:6-32 X 2 INCH,FIL SST | 83385 | OBD |
| -29 | 220-0444-00 | | | 2 | | NUT,PLAIN,SQ:6-32 X 0.250 INCH,STL - * - - - | 70318 | OBD |

Replaceable Mechanical Parts—Type 602

| 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- | 621-0434-00 | | 1 | | POWER SUPPLY: | 80009 | 621-0434-00 |
| | 214-0931-00 | B010100 B049999X | 2 | | . RTNR,COMPONENT:1.0 X 0.5 X0.079,SI RUBBER | 80009 | 214-0931-00 |
| -30 | 380-0115-00 | | 2 | | . HSG,HV PWR SPLY:POLYCARBONATE | 80009 | 380-0115-00 |
| -31 | 179-1304-00 | B010100 B069999 | 1 | | . WIRING HARNESS:TRANSFORMER | 80009 | 179-1304-00 |
| | 179-1304-01 | B070000 | 1 | | . WIRING HARNESS:TRANSFORMER | 80009 | 179-1304-01 |
| -32 | 136-0305-00 | | 1 | | . . SKT,PL-IN ELEK:ELCTRN:TUBE,5 CONT W/LEADS | 80009 | 136-0305-00 |
| | 136-0202-01 | B010100 B069999 | 1 | | . . . SOCKET,PLUG-IN:14 PIN | 80009 | 136-0202-01 |
| | 136-0301-01 | B070000 | 1 | | . . . SKT,PL-IN ELEK:ELCTN TUBE,14CONTACT | 80009 | 136-0301-01 |
| -33 | 166-0319-00 | | 3 | | . INSERT,INS:0.177 X 0.625X 0.750 INCH | 80009 | 166-0319-00 |
| -34 | ----- | | 1 | | . CKT BOARD ASSY:HV,LOWER(SEE A3 REPL) (ATTACHING PARTS) | | |
| | 211-0040-00 | | 4 | | . SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC -----*----- | 26365 | OBD |
| -35 | ----- | | 1 | | . CKT BOARD ASSY:HV,UPPER(SEE A4 REPL) (ATTACHING PARTS) | | |
| -36 | 211-0040-00 | | 4 | | . SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC -----*----- | 26365 | OBD |
| -37 | 361-0137-00 | | 4 | | . POST,ELEC-MECH:1.345 INCH,W/4-40 THREAD | 80009 | 361-0137-00 |
| -38 | 200-0714-00 | | 1 | | . COVER,HV SUPPLY:5.395 X 3.595X 0.5,PLSTC (ATTACHING PARTS) | 80009 | 200-0714-00 |
| -39 | 211-0529-00 | | 2 | | . SCREW,MACHINE:6-32 X 1.25 INCHES,PNH STL | 83385 | OBD |
| -40 | 211-0510-00 | | 1 | | . SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL (ATTACHING PARTS) | 83385 | OBD |
| -41 | 211-0507-00 | B010100 B069999 | 3 | | SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL | 83385 | OBD |
| | 211-0507-00 | B070000 | 2 | | SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL | 83385 | OBD |
| | 129-0006-00 | B070000 | 1 | | TERMINAL,STUD:INSULATED -----*----- | 00866 | 1700P |
| -42 | 337-0970-00 | | 1 | | SHIELD,ELEC:HV BOX (ATTACHING PARTS) | 80009 | 337-0970-00 |
| -43 | 210-0457-00 | | 2 | | NUT,PL,ASSEM WA:6-32 X 0.312 INCH,STL -----*----- | 83385 | OBD |
| -44 | 200-0818-00 | | 1 | | COVER,TERMINAL:1.37 X 1.275 X 0.8,PLASTIC | 80009 | 200-0818-00 |
| -45 | 337-0971-00 | | 1 | | SHIELD,ELEC:HV ANGLE SHAPE (ATTACHING PARTS) | 80009 | 337-0971-00 |
| -46 | 211-0504-00 | | 2 | | SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL -----*----- | 83385 | OBD |
| -47 | ----- | | 1 | | SWITCH,ROTARY:(SEE SW403 REPL) (ATTACHING PARTS) | | |
| -48 | 210-0978-00 | | 1 | | WASHER,FLAT:0.375 ID X 0.50 INCH OD,STL | 78471 | OBD |
| -49 | 210-0590-00 | | 1 | | NUT,PLAIN,HEX.:0.375 X 0.438 INCH,STL -----*----- | 73743 | 2X28269-402 |
| -50 | 179-1306-00 | | 1 | | WIRING,HARNESS:SWITCH | 80009 | 179-1306-00 |
| -51 | ----- | | 1 | | SWITCH,SLIDE:(SEE SW401 REPL) (ATTACHING PARTS) | | |
| -52 | 210-0406-00 | | 2 | | NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS | 73743 | 2X12161-402 |
| | 337-1036-00 | | 1 | | SHIELD,SOLDER:6 TERM SLIDE SWITCH -----*----- | 82389 | 429T003 |
| -53 | 344-0159-00 | | 8 | | CLIP,ELECTRICAL:FUSE,CKT BD MT (ATTACHING PARTS) | 80009 | 344-0159-00 |
| -54 | 358-0329-00 | | 8 | | BSHG,FEED THRU:FUSEHOLDER TERM,DELTRIN -----*----- | 80009 | 358-0329-00 |
| -55 | 129-0006-00 | | 1 | | TERMINAL,STUD:INSULATED (ATTACHING PARTS) | 00866 | 1700P |
| -56 | 210-0457-00 | | 1 | | NUT,PL,ASSEM WA:6-32 X 0.312 INCH,STL -----*----- | 83385 | OBD |
| -57 | 129-0072-00 | | 1 | | INSULATOR,STDF:0.938 INCH LONG (ATTACHING PARTS) | 80009 | 129-0072-00 |
| -58 | 361-0007-00 | | 1 | | SPACER,SLEEVE:0.250 INCH DIA,PLASTIC -----*----- | 80009 | 361-0007-00 |
| -59 | ----- | | 1 | | TRANSFORMER:(SEE T401 REPL) | | |
| -60 | 212-0590-00 | B010100 B083987 | 4 | | . SCREW,MACHINE:10-32 X 0.5 INCH,HEX HD STL | 83385 | OBD |
| | 212-0590-00 | B083988 | 3 | | . SCREW,MACHINE:10-32 X 0.5 INCH,HEX HD STL | 83385 | OBD |
| -60.1 | 212-0576-00 | B083988 | 1 | | . SCREW,MACHINE:10-32 X 1.375,HEX HD,STL | 000EP | OBD |
| -60.2 | 210-0812-00 | | 4 | | . WASHER,NONMETAL:#10,FIBER | 86445 | OBD |

Replaceable Mechanical Parts—Type 602

| 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 | 361-0175-00 | | | 1 | . | SPACER,XFMR MTG: | | | | (ATTACHING PARTS) | 80009 | 361-0175-00 |
| -62 | 220-0410-00 | | | 4 | NUT,EXTENDED WA:10-32 X 0.375 INCH,STL | | | | | - - - * - - - | 83385 | OBD |
| -62.1 | 200-0663-00 | B010100 | B083804X | 1 | CAP,SCREW TIP:0.222 DIA X 0.141 | | | | | | 80009 | 200-0663-00 |
| -63 | 348-0150-00 | | | 1 | GROMMET,PLASTIC:U SHAPED | | | | | | 80009 | 348-0150-00 |
| -64 | 210-0201-00 | | | 3 | TERMINAL,LUG:0.12 ID,LOCKING,BRZ TIN PL | | | | | (ATTACHING PARTS) | 86928 | OBD |
| -65 | 213-0044-00 | | | 3 | SCR,TPG,THD FOR:5-32 X 0.188 INCH,PNH STL | | | | | - - - * - - - | 83385 | OBD |
| -66 | 255-0249-00 | | | FT | PLASTIC CHANNEL: | | | | | | 80009 | 255-0249-00 |
| -67 | ----- | | | 4 | TRANSISTOR: | | | | | (ATTACHING PARTS) | | |
| -68 | 213-0104-00 | | | 8 | SCR,TPG,THD FOR:6-20 X 0.375 INCH,TRH STL | | | | | | 83385 | OBD |
| | 386-0143-00 | | | 4 | INSULATOR,PLATE:TRANSISTOR MICA | | | | | - - - * - - - | 02735 | DF31A |
| -69 | 136-0270-00 | | | 4 | SOCKET,PLUG-IN:XSTR,2 PIN | | | | | (ATTACHING PARTS) | 22753 | 03-100-0003 |
| -70 | 213-0088-00 | | | 8 | SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL | | | | | - - - * - - - | 83385 | OBD |
| -71 | 348-0055-00 | | | 3 | GROMMET,PLASTIC:0.25 INCH DIA | | | | | | 80009 | 348-0055-00 |
| -72 | 348-0063-00 | | | 2 | GROMMET,PLASTIC:0.50 INCH DIA | | | | | | 80009 | 348-0063-00 |
| -73 | 337-1036-00 | | | 1 | SHIELD,SOLDER:6 TERM SLIDE SWITCH | | | | | | 82389 | 429T003 |
| -74 | 348-0056-00 | | | 1 | GROMMET,PLASTIC:0.375 INCH DIA | | | | | | 80009 | 348-0056-00 |
| -75 | 131-0227-00 | | | 2 | TERMINAL,STUD:0.353 L | | | | | (ATTACHING PARTS) | 88245 | 421479-9 |
| -76 | 358-0176-00 | | | 2 | INSULATOR,BSHG: | | | | | - - - * - - - | 88245 | 421472 |
| -77 | ----- | | | 1 | CKT BOARD ASSY:Z AXIS AMPL(SEE A2 REPL) | | | | | | | |
| -78 | 105-0065-00 | | | 2 | . SUPPORT,CKT BD:ACETAL | | | | | (ATTACHING PARTS) | 80009 | 105-0065-00 |
| -79 | 361-0007-00 | | | 2 | . SPACER,SLEEVE:0.250 INCH DIA,PLASTIC | | | | | - - - * - - - | 80009 | 361-0007-00 |
| -80 | 131-0505-00 | B010100 | B050409 | 4 | . TERMINAL,STUD:0.345 L | | | | | | 80009 | 131-0505-00 |
| | 214-0579-00 | B050410 | | 4 | . TERM,TEST POINT:BRS CD PL | | | | | | 80009 | 214-0579-00 |
| -81 | 136-0183-00 | | | 1 | . SOCKET,PLUG-IN:3 PIN,ROUND | | | | | | 80009 | 136-0183-00 |
| -82 | 136-0220-00 | | | 6 | . SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT | | | | | | 71785 | 133-23-11-034 |
| -83 | 136-0263-00 | | | 12 | . SOCKET,PIN TERM:U/W 0.025 SQ PIN | | | | | | 00779 | 85861-3 |
| -84 | 214-0579-00 | | | 1 | . TERM,TEST POINT:BRS CD PL | | | | | | 80009 | 214-0579-00 |
| -85 | 344-0147-00 | | | 7 | CLIP,SPR,TNSN:CIRCUIT CARD MOUNTING | | | | | (ATTACHING PARTS) | 80009 | 344-0147-00 |
| -86 | 214-0967-00 | | | 7 | PIN,SHLD,HDL:0.119 OD X 1.035 L,0.25 HEX | | | | | | 80009 | 214-0967-00 |
| -87 | 214-0966-00 | | | 7 | SPRING,HLCPS:0.212 OD X 0.438 L,SST | | | | | | 80009 | 214-0966-00 |
| -88 | 210-0586-00 | | | 7 | NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL | | | | | - - - * - - - | 83385 | OBD |
| -89 | 131-0513-00 | | | 42 | TERM,FEEDTHRU:1.384 L X 0.025 SQ EA END | | | | | | 00779 | 1-86074-5 |
| -90 | 441-0788-00 | | | 1 | CHAS,DSPL UNIT:HIGH VOLTAGE POWER | | | | | (ATTACHING PARTS) | 80009 | 441-0788-00 |
| -91 | 212-0023-00 | | | 3 | SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL | | | | | | 83385 | OBD |
| -92 | 210-0458-00 | | | 5 | NUT,PL,ASSEM WA:8-32 X 0.344 INCH,STL | | | | | - - - * - - - | 83385 | OBD |
| -93 | 441-0787-00 | | | 1 | CHAS,DSPL UNIT:CRT BD | | | | | (ATTACHING PARTS) | 80009 | 441-0787-00 |
| | 212-0023-00 | | | 2 | SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL | | | | | | 83385 | OBD |
| | 210-0458-00 | | | 4 | NUT,PL,ASSEM WA:8-32 X 0.344 INCH,STL | | | | | - - - * - - - | 83385 | OBD |
| -94 | 344-0016-00 | | | 2 | RTNR,CAPACITOR:0.859 ID X 0.937 INCH H | | | | | (ATTACHING PARTS) | 80033 | E50007-007 |
| | 213-0044-00 | | | 2 | SCR,TPG,THD FOR:5-32 X 0.188 INCH,PNH STL | | | | | - - - * - - - | 83385 | OBD |
| -95 | 252-0564-00 | | | FT | PLASTIC EXTR:1.563 FT LONG | | | | | | 80009 | 252-0564-00 |
| -96 | ----- | | | 1 | THERMAL CUTOUT: | | | | | (ATTACHING PARTS) | | |
| -97 | 211-0504-00 | | | 2 | SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL | | | | | | 83385 | OBD |
| -98 | 210-0457-00 | | | 2 | NUT,PL,ASSEM WA:6-32 X 0.312 INCH,STL | | | | | - - - * - - - | 83385 | OBD |

Replaceable Mechanical Parts—Type 602


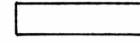



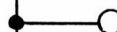

| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Qty | 1 2 3 4 5 | Name & Description | Mfr Code | Mfr Part Number |
|------------------|--------------------|-----------------------------|-----|-----------|--|----------|------------------|
| 1-99 | 214-0757-00 | | 4 | | HEAT SINK,ELEC: | 98978 | TXP0503B |
| -100 | 131-0359-00 | | 6 | | TERMINAL,STUD:0.583 L,BRASS (ATTACHING PARTS) | 88245 | 421485-9 |
| -101 | 358-0176-00 | | 6 | | INSULATOR,BSHG: - - - * - - - | 88245 | 421472 |
| -102 | 179-1303-00 | | 1 | | WIRING HARNESS:MONITOR | 80009 | 179-1303-00 |
| -103 | 255-0249-00 | | FT | | PLASTIC CHANNEL: | 80009 | 255-0249-00 |
| -104 | 131-0513-00 | | 12 | | TERM,FEEDTHRU:1.384 L X 0.025 SQ EA END | 00779 | 1-86074-5 |
| -105 | 131-0126-00 | | 1 | | CONNECTOR,RCPT,:BNC,FEMALE (ATTACHING PARTS) | 77820 | 9663-1 NT-34 |
| -106 | 210-0241-00 | | 1 | | TERMINAL,LUG:0.515 ID X 0.625 INCH OD SE - - - * - - - | 80009 | 210-0241-00 |
| -107 | ----- | | 1 | | CKT BOARD ASSY:POWER SUPPLY(SEE A5 REPL) | | |
| -108 | 136-0220-00 | | 9 | | . SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT | 71785 | 133-23-11-034 |
| -109 | 136-0263-00 | | 32 | | . SOCKET,PIN TERM:U/W 0.025 SQ PIN | 00779 | 85861-3 |
| -110 | 214-0579-00 | | 6 | | . TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -111 | ----- | | 1 | | CKT BOARD ASSY:AMPLIFIER(SEE A1 REPL) | | |
| -112 | 131-0505-00 | B010100 B050409 | 8 | | . TERMINAL,STUD:0.345 L | 80009 | 131-0505-00 |
| | 214-0579-00 | B050410 | 8 | | . TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -113 | 136-0220-00 | | 4 | | . SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT | 71785 | 133-23-11-034 |
| -114 | 136-0235-00 | | 2 | | . SOCKET,PLUG-IN:6 CONTACT,ROUND | 71785 | 133-96-12-062 |
| -115 | 136-0263-00 | | 22 | | . SOCKET,PIN TERM:U/W 0.025 SQ PIN | 00779 | 85861-3 |
| -116 | 200-0715-00 | | 2 | | . COVER,HT STAB:TO-92,BLACK VINYL | 80009 | 200-0715-00 |
| -117 | 386-1416-00 | | 1 | | PANEL,REAR: | 80009 | 386-1416-00 |
| -118 | ----- | | 1 | | RESISTOR,VARIABLE:(SEE R497 REPL) (ATTACHING PARTS) | | |
| | 210-0978-00 | | 1 | | WASHER,FLAT:0.375 ID X 0.50 INCH OD,STL | 78471 | OBD |
| -119 | 210-0590-00 | | 1 | | NUT,PLAIN,HEX.:0.375 X 0.438 INCH,STL - - - * - - - | 73743 | 2X28269-402 |
| -120 | 200-0865-00 | | 1 | | COVER,MTG HOLE:2.164 X 0.53,AL (ATTACHING PARTS) | 80009 | 200-0865-00 |
| | 211-0008-00 | | 2 | | SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL | 83385 | OBD |
| -121 | 210-0586-00 | | 2 | | NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL - - - * - - - | 83385 | OBD |
| | 352-0002-00 | B010100 B080739 | 1 | | FUSEHOLDER:ASSEMBLY | 80009 | 352-0002-00 |
| | 352-0362-00 | B080740 B083804 | 1 | | FUSEHOLDER: W/MOUNTING HARDWARE | 75915 | 345001 |
| -122 | 352-0010-00 | B010100 B083804 | 1 | | . FUSEHOLDER:WITH HARDWARE | 03614 | HKP-L |
| -123 | 200-0582-00 | B010100 B080739X | 1 | | . CAP,ELECTRICAL:FUSE HOLDER | 71400 | 9435 1/2 |
| -124 | 210-0873-00 | B010100 B083804 | 1 | | . WASHER,NONMETAL:0.5 ID X 0.688 INCH OD,NPRN | 70485 | OBD |
| -125 | ----- | | 1 | | . NUT,FUSEHOLDER: | | |
| 125.1 | 204-0837-00 | B083805 | 1 | | BODY FUSEHOLDER:3AG,6.3A,250V,PNL MT | S3629 | 031.1681(MDLFEU) |
| 125.2 | 200-2264-00 | B083805 | 1 | | CAP.,FUSEHOLDER:3AG FUSES | S3629 | FEK 031 1666 |
| 125.3 | 200-0237-04 | XB083805 | 1 | | COVER,FUSE HLDR:PLASTIC | 80009 | 200-0237-04 |
| -126 | 337-0968-01 | | 1 | | PLATE,ELEC SHLD: (ATTACHING PARTS) | 80009 | 337-0968-01 |
| -127 | 211-0008-00 | | 2 | | SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL | 83385 | OBD |
| | 210-0004-00 | | 2 | | WASHER,LOCK:#4 INTL,0.015THK,STL CD PL - - - * - - - | 78189 | 1204-00-00-0541C |
| -128 | 161-0046-00 | | 1 | | CABLE ASSY,PWR,:MALE CONN,COILED | 80009 | 161-0046-00 |
| -129 | 358-0161-00 | | 1 | | BSHG,STRAIN RLF:FOR 0.50 INCH HOLE,PLASTIC | 28520 | SR5P4 |
| -130 | ----- | | 5 | | RESISTOR,VARIABLE:(SEE R10,R60,R220A & B,R244 R275 REPL) (ATTACHING PARTS) | | |
| | 213-0020-00 | | 5 | | SETSCREW:6-32 X 0.125 INCH,HEX.SOC STL - - - * - - - | 70276 | OBD |
| -131 | 200-0608-00 | | 1 | | COVER,VAR RES.:PLASTIC | 80009 | 200-0608-00 |
| -132 | 343-0089-00 | | 4 | | CLAMP,LOOP:LARGE | 80009 | 343-0089-00 |
| -133 | 198-2006-00 | B010100 B083804 | 1 | | WIRE SET,ELEC: | 80009 | 198-2006-00 |
| | 198-2006-01 | B083805 | 1 | | WIRE SET,ELEC: | 80009 | 198-2006-01 |
| -134 | 131-0049-00 | B010100 B079659 | 4 | | . CONTACT,ELEC:0.535 L,22-24AWG WIRE | 00779 | 42765-1 |
| | 131-1963-00 | B079660 B083804 | 4 | | . TERM.,QIK DISC.:FOR 0.038 DIACRT PIN | 00779 | 42428-9 |
| | 131-2525-00 | B083805 | 4 | | . CONN,PLUG,ELEC:CRT,22-26 AWG - - - * - - - | 06776 | PS40-101 |
| -135 | 131-0274-00 | | 2 | | CONNECTOR,RCPT,:BNC | 91836 | KC79-67 |

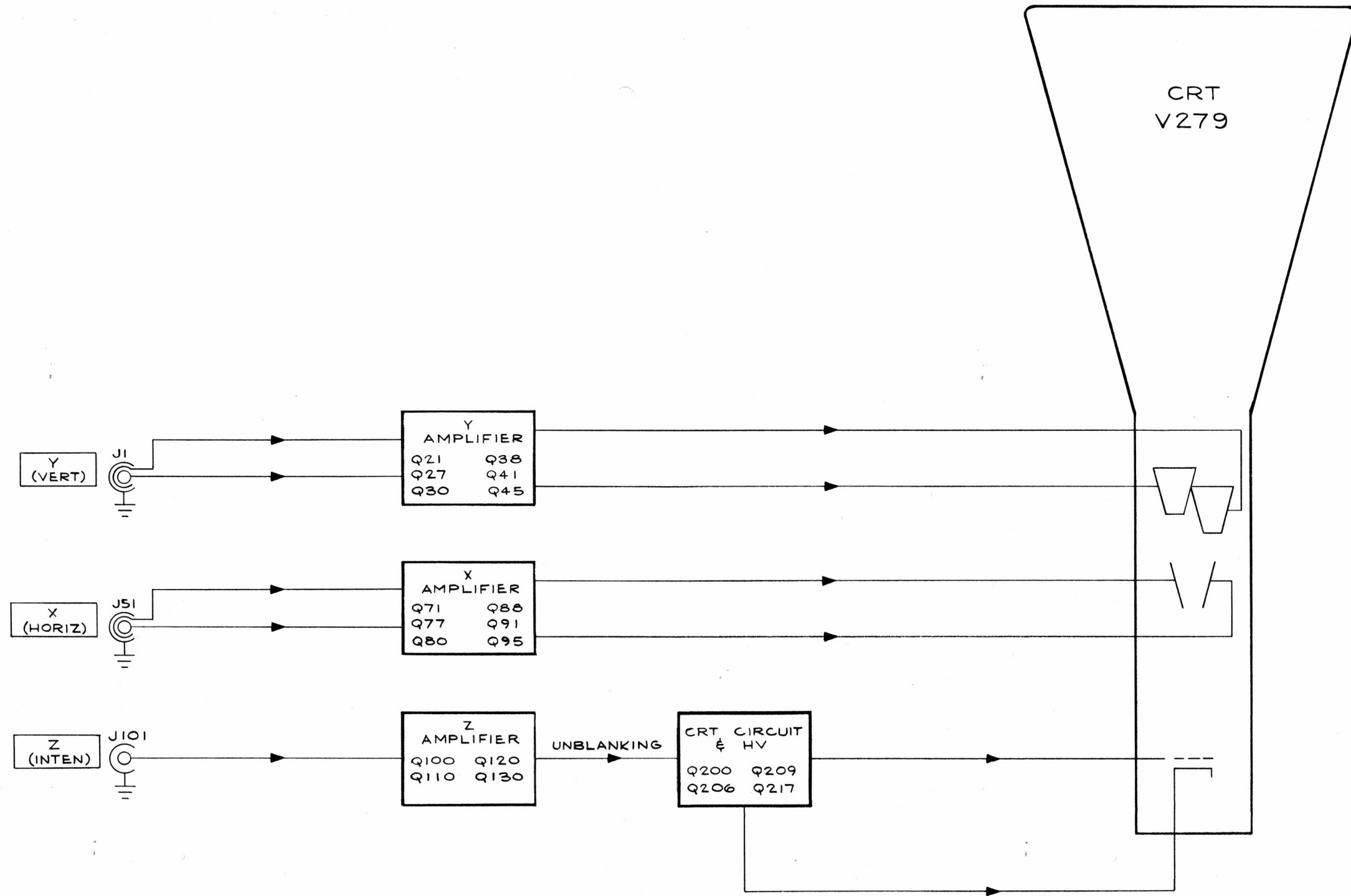
Replaceable Mechanical Parts—Type 602

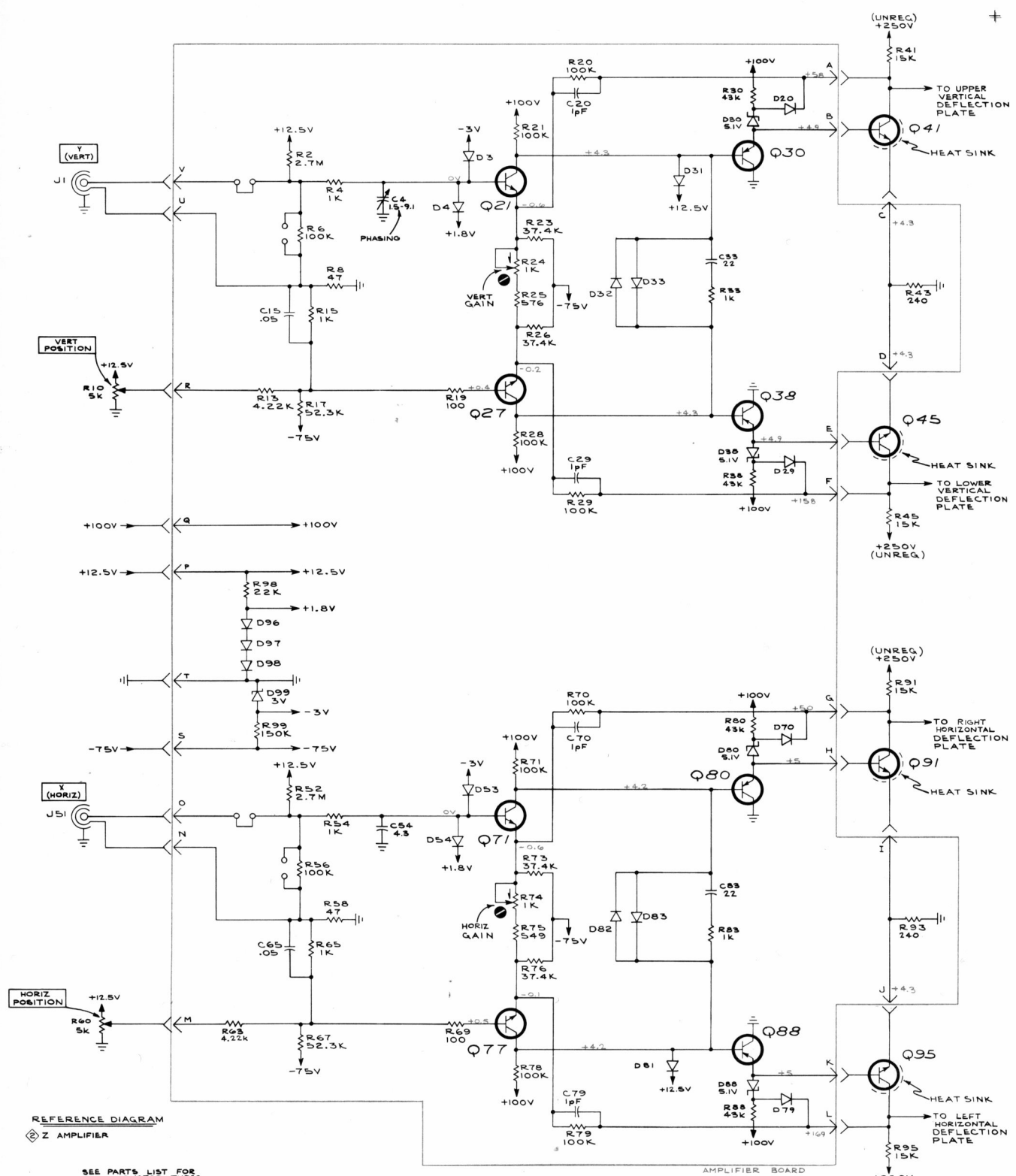
| Fig. & Index No. | Tektronix Part No. | Serial/Model No. | | Qty | 1 2 3 4 5 | Name & Description | Mfr | |
|------------------------|-----------------------|------------------|----------|-----|-----------|---|-------|------------------|
| | | Eff | Dscont | | | | Code | Part Number |
| 2-1 | 390-0018-00 | B010100 | B059999 | 1 | | COVER,DISPLAY:WRAPAROUND 0.050 AL | 80009 | 390-0018-00 |
| | 390-0018-01 | B060000 | | 1 | | CAB. ELEC EQUIP: | 80009 | 390-0018-01 |
| -2 | 348-0138-00 | B010100 | B020249 | 4 | | . FOOT,CABINET: | 80009 | 348-0138-00 |
| | 348-0187-00 | B020250 | | 4 | | . FOOT,CABINET:0.780 X 1.650 INCH LONG (ATTACHING PARTS) | 80009 | 348-0187-00 |
| -3 | 211-0503-00 | | | 1 | | . SCREW,MACHINE:6-32 X 0.188 INCH,PNH STL | 83385 | OBD |
| -4 | 210-0006-00 | B010100 | B050770X | 1 | | . WASHER,LOCK:#6 INTL,0.018THK,STL CD PL - - - * - - - | 78189 | 1206-00-00-0541C |
| -5 | 367-0037-00 | | | 1 | | . HANDLE,CARRYING: (ATTACHING PARTS) | 80009 | 367-0037-00 |
| -6 | 344-0098-00 | | | 2 | | . CLIP,DECORATIVE:CARRYING HANDLE,STL NP | 12136 | OBD |
| -7 | 213-0155-00 | | | 2 | | . SCREW,MACHINE:10-32 X 0.40 INCH LONG,STL - - - * - - - | 77250 | OBD |
| -8 | 105-0074-00 | | | 1 | | . STRIKE,CATCH:REAR,INSTR SECRG,ACETAL (ATTACHING PARTS) | 80009 | 105-0074-00 |
| -9 | 210-0802-00 | | | 2 | | . WASHER,FLAT:0.15 ID X 0.312 INCH OD | 12327 | OBD |
| -10 | 210-0407-00 | | | 2 | | . NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS | 73743 | 3038-0228-402 |
| -11 | 212-0033-00 | | | 2 | | SCREW,MACHINE:8-32 X 0.750 INCH,PNH STL - - - * - - - | 83385 | OBD |

SECTION 8 DIAGRAMS

The following special symbols are used on the diagrams:

-  Screwdriver adjustment.
-  Front-, side- or rear-panel control or connector.
-  Refers to the indicated diagram.
-  Connection soldered to circuit board.
-  Blue line encloses components located on circuit board.
-  Test point.
-  Coax Connector.





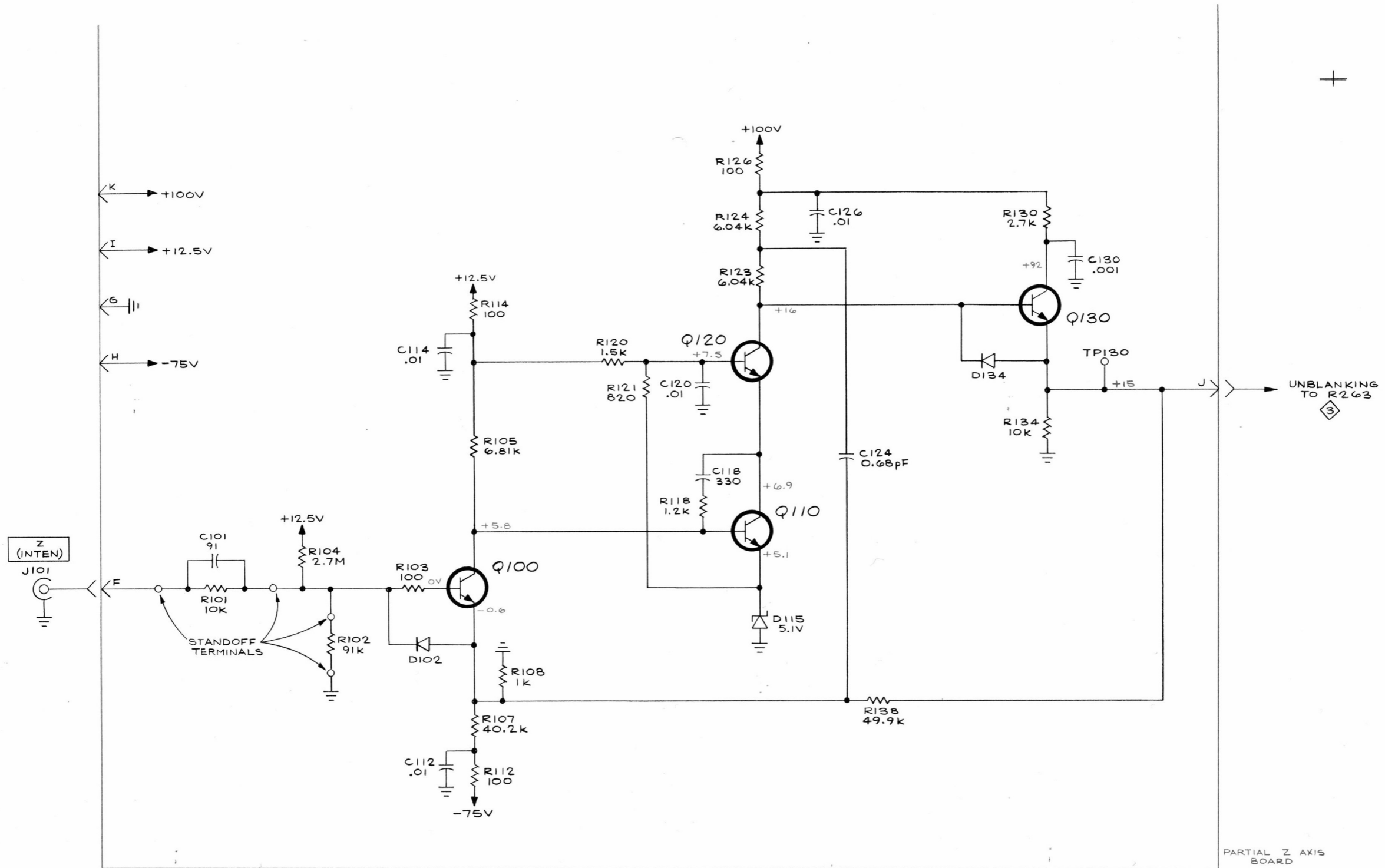
REFERENCE DIAGRAM
 Z AMPLIFIER

SEE PARTS LIST FOR SEMICONDUCTOR TYPES

ALL VOLTAGES ON THIS DIAGRAM WERE TAKEN WITH NO SIGNAL APPLIED AND WITH X, Y, AND Z INPUTS TERMINATED IN 50Ω.

+ TYPE 602 DISPLAY UNIT

DEFLECTION AMPLIFIERS 1



ALL VOLTAGES ON THIS DIAGRAM WERE TAKEN WITH NO SIGNAL APPLIED AND WITH X, Y, AND Z INPUTS TERMINATED IN 50Ω.

SEE PARTS LIST FOR SEMICONDUCTOR TYPES

REFERENCE DIAGRAM
 3 CRT CIRCUIT

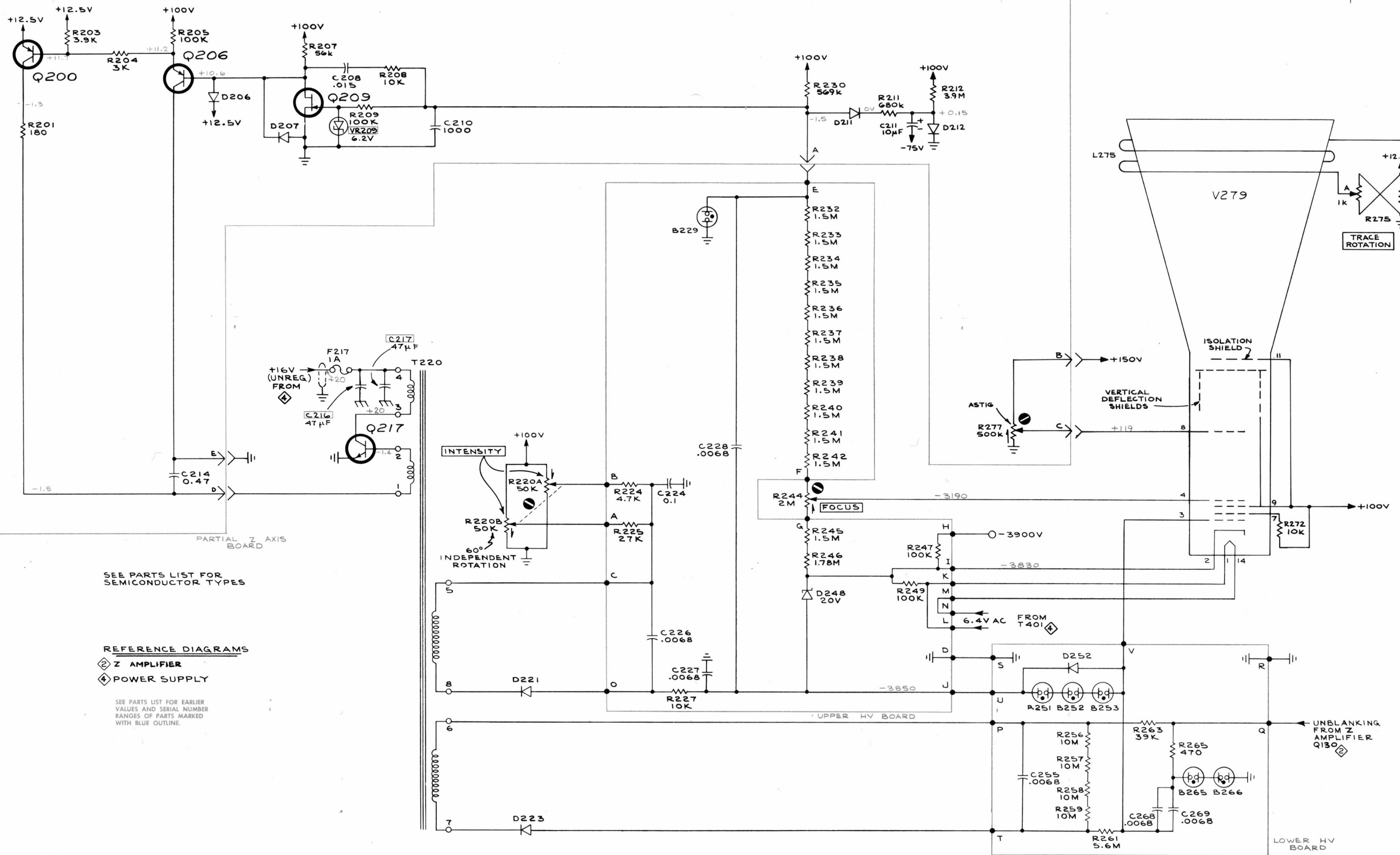
TYPE 602 DISPLAY UNIT

A

Z AMPLIFIER 2

608

Z AMPLIFIER 2

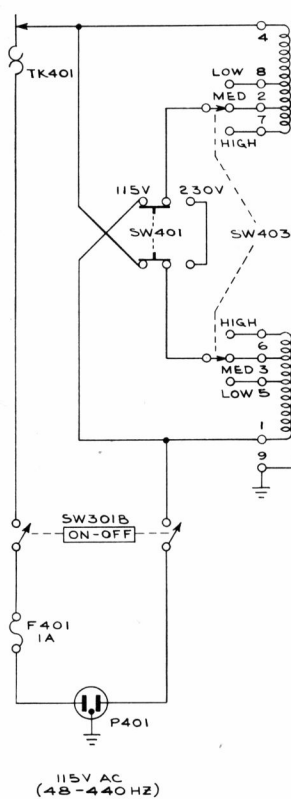
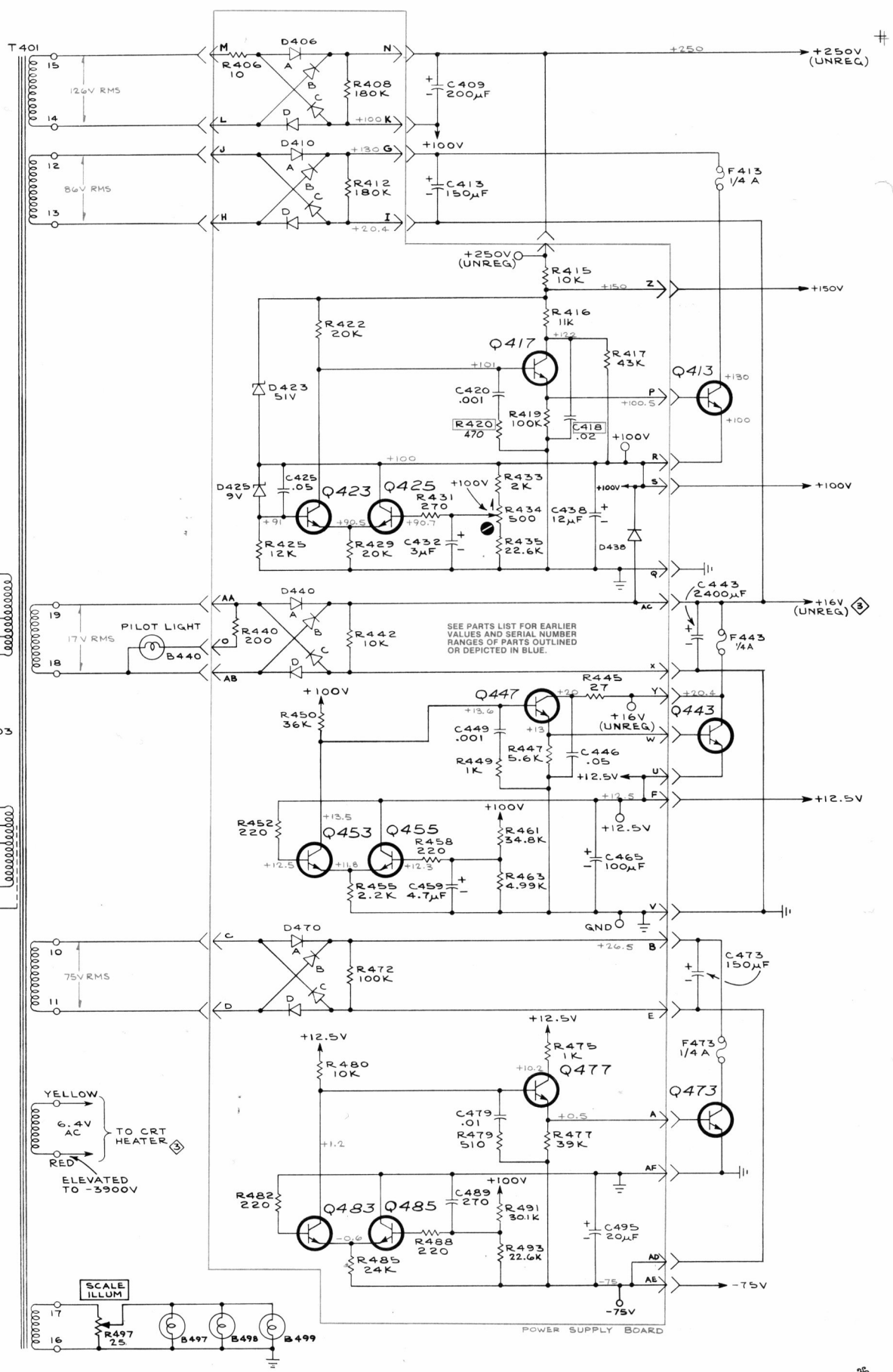


SEE PARTS LIST FOR SEMICONDUCTOR TYPES

REFERENCE DIAGRAMS

- ② Z AMPLIFIER
- ⊕ POWER SUPPLY

SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS MARKED WITH BLUE OUTLINE.



REFERENCE DIAGRAM
 CRT CIRCUIT

SEE PARTS LIST FOR SEMICONDUCTOR TYPES

FIG. 1 EXPLODED

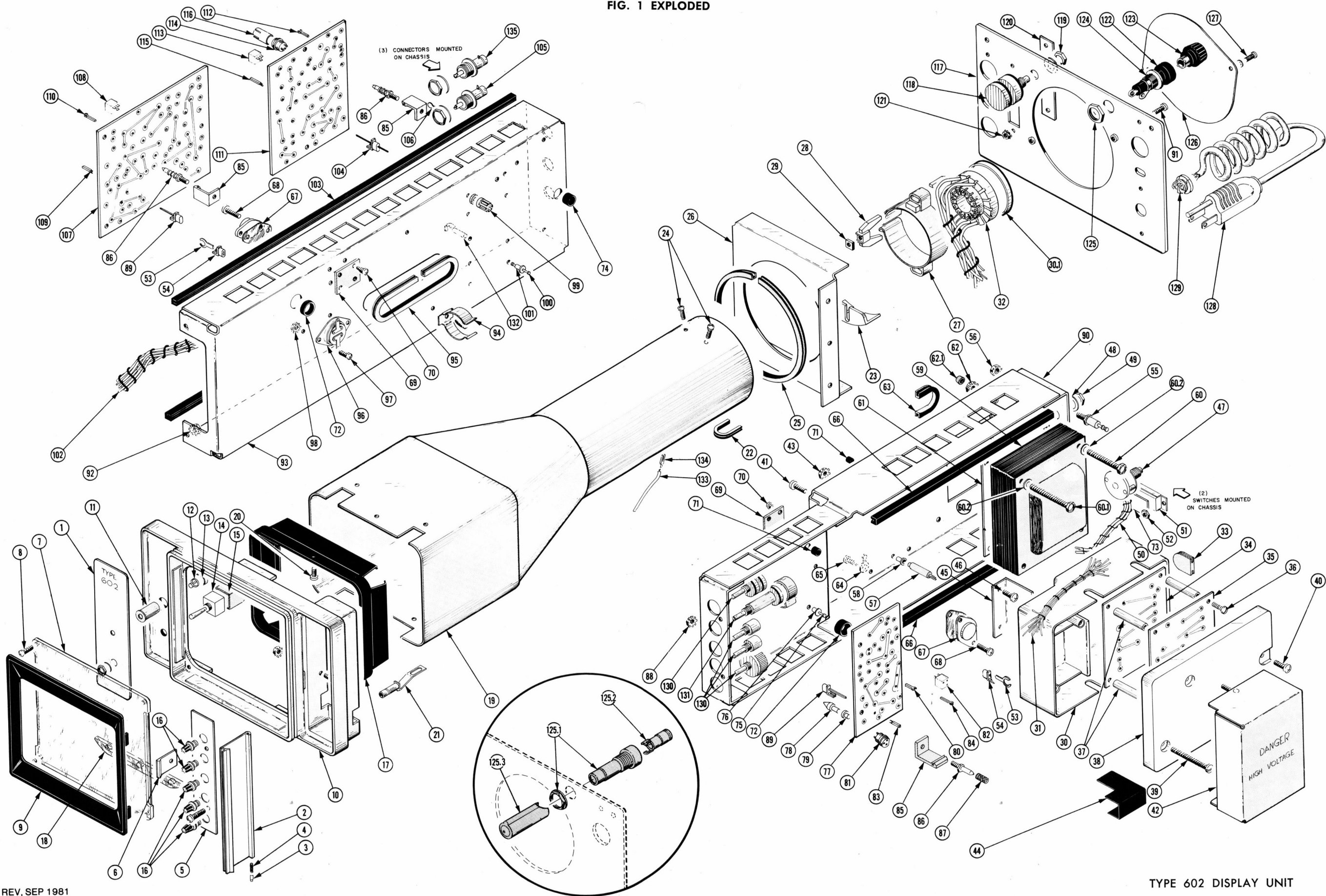


FIG. 2 CABINET

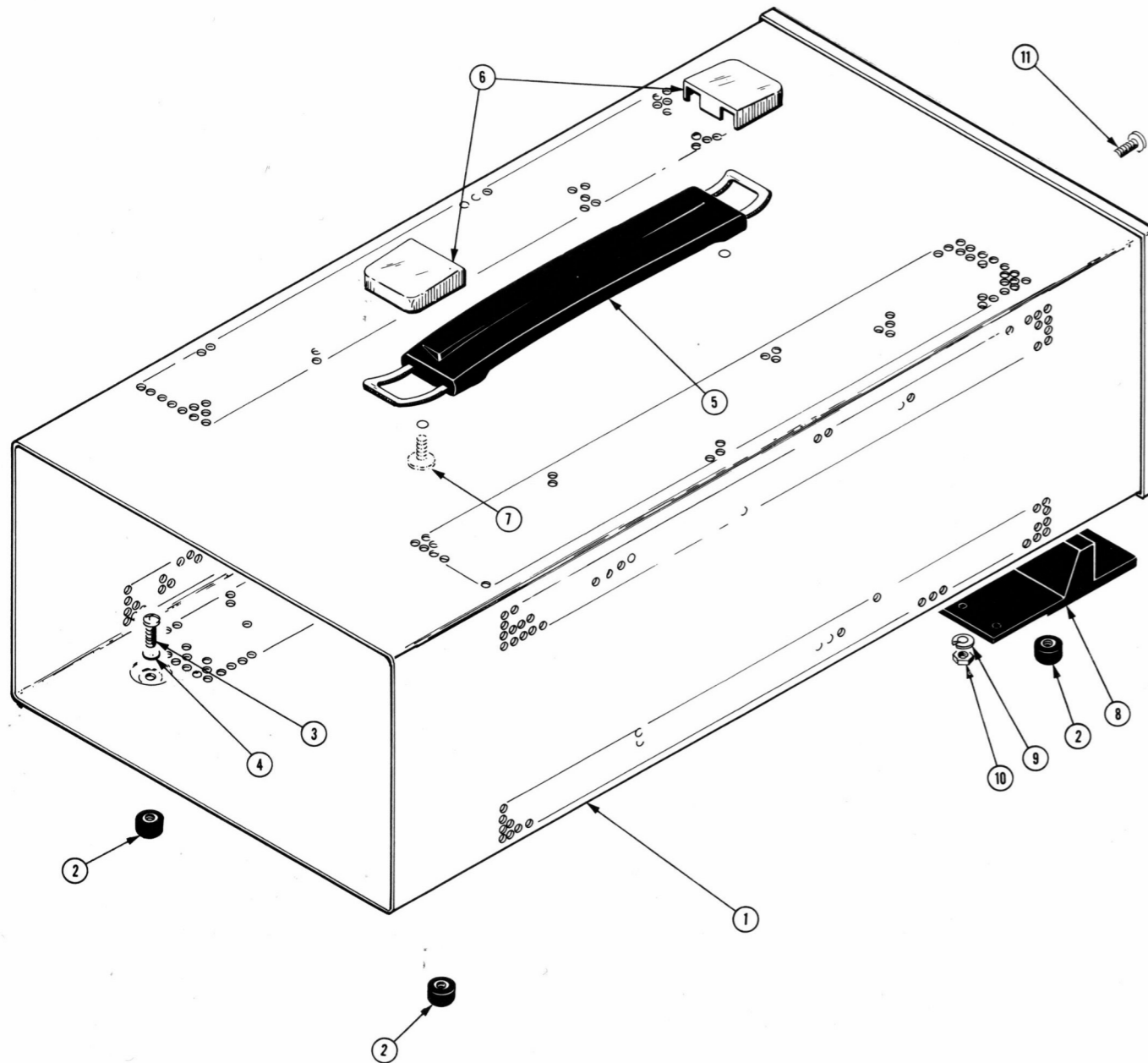
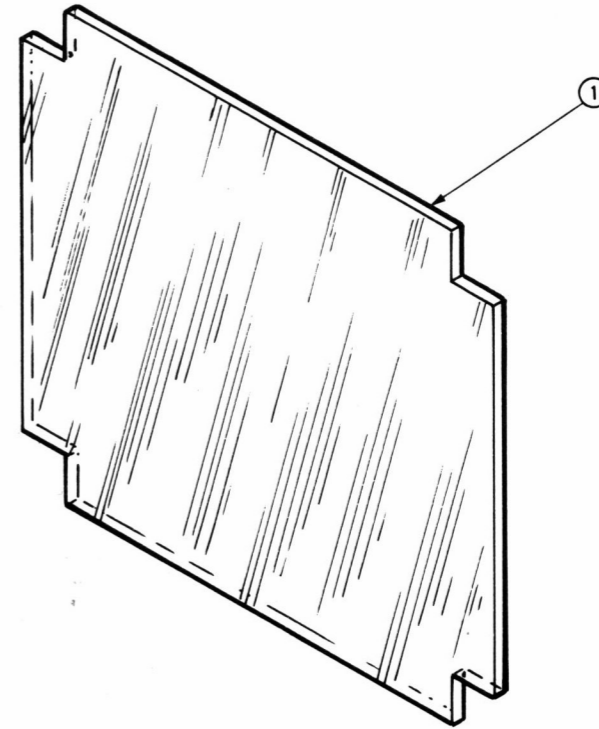


FIG. 3 STANDARD ACCESSORIES



| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff | Dscnt | Qty | Name & Description | | | | | Mfr | |
|------------------|--------------------|----------------------|-------|-----|--|---|---|---|---|------|-----------------|
| | | | | | 1 | 2 | 3 | 4 | 5 | Code | Mfr Part Number |
| 1- | 378-0586-00 | | | 1 | FILTER, light, smokey gray (installed) | | | | | | |
| | 070-0799-00 | | | 1 | MANUAL, instruction (not shown) | | | | | | |
| | 331-0406-00 | | | 1 | SCALE, CRT, 602 option only | | | | | | |
| | 378-0845-00 | | | 1 | FILTER, light, blue (602 option only) | | | | | | |

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.