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SC 501 OSCILLOSCOPE

INSTRUCTION MANUAL

Tektronix, Inc.
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Beaverton, Oregon 97077

Serial Number ____________

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INSTRUMENT SERIAL NUMBERS

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first number or letter designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B000000	Tektronix, Inc., Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Islands
200000	Tektronix United Kingdom, Ltd., London
300000	Sony/Tektronix, Japan
700000	Tektronix Holland, NV, Heerenveen, The Netherlands

TABLE OF CONTENTS

WARNING

The remaining portion of this Table of Contents lists servicing instructions that expose personnel to hazardous voltages. These instructions are for qualified service personnel only.

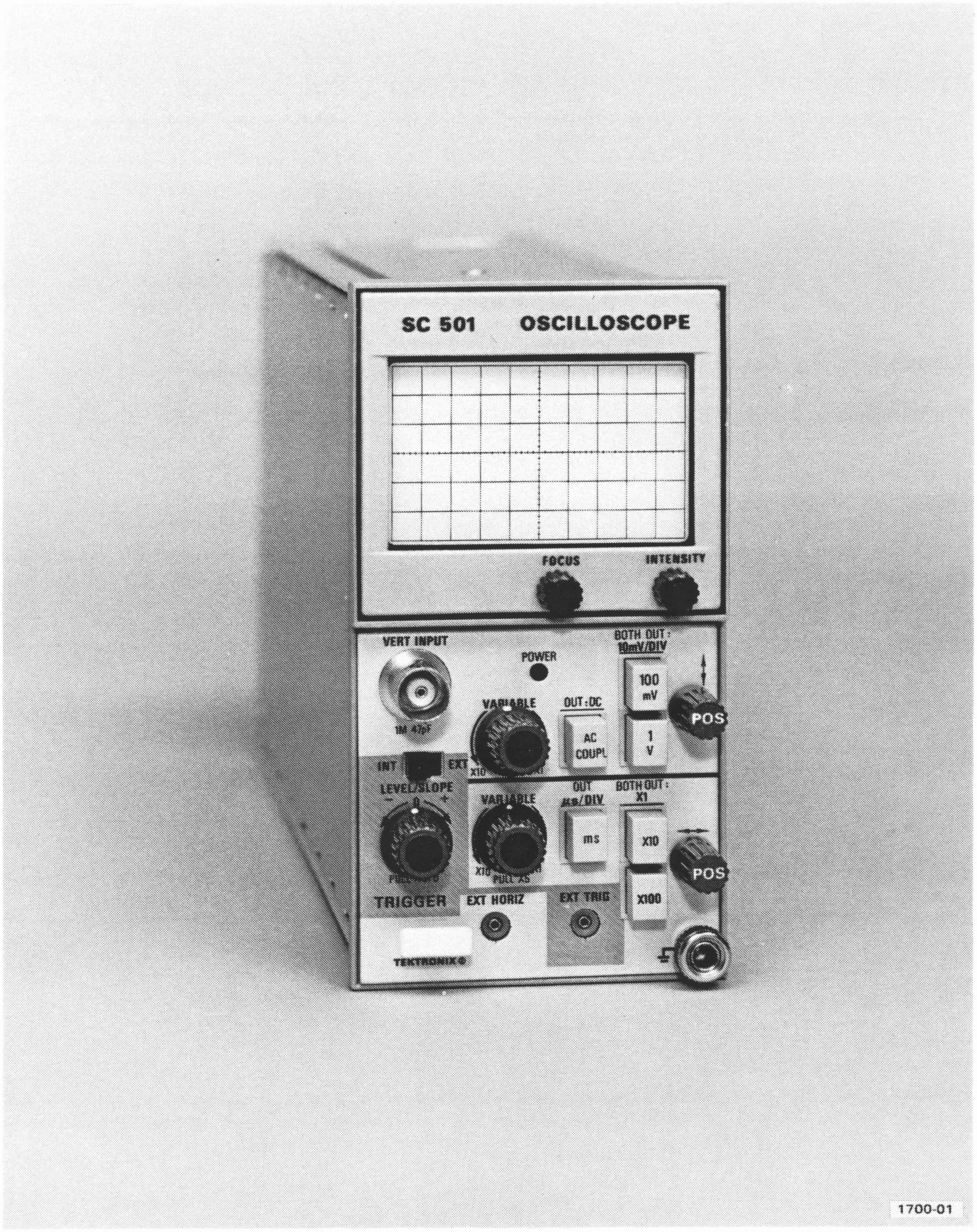


Fig. 1-1. SC 501 Oscilloscope Plug-In Module.

OPERATING INSTRUCTIONS

INTRODUCTION

Description

The SC 501 general purpose oscilloscope is designed to operate in a TM 500 Series Power Module. The SC 501 has a bandwidth of at least 5 MHz and a calibrated vertical deflection range from 10 mV/DIV to 1 V/DIV, selectable in decade steps. An uncalibrated VARIABLE control extends this range to at least 10 volts/division.

Calibrated sweep rates are selected by pushbutton-controlled logic in decade steps from 1 ms/DIV to 100 ms/DIV (millisecond range) and in decade steps from 1 μs/DIV to 100 μs/DIV (microsecond range). A VARIABLE control extends the slowest calibrated sweep rate to at least 1 second/division and a X5 Magnifier extends the fastest calibrated sweep rate to at least 200 nanoseconds/division.

The triggering circuits allow stable triggering from either internal or external sources. An AUTO triggering mode and manual LEVEL/SLOPE selection is combined in a single control. With no input signal, automatic triggering provides a bright baseline at all sweep rates.

An internal switch converts the horizontal deflection system of the SC 501 to an External Horizontal Amplifier mode of operation.

Installation and Removal

The SC 501 is calibrated and ready for use as received. Referring to Fig. 1-2, install the SC 501 and turn on the Power Module. Check that the POWER indicator on the SC 501 front panel comes on.

CAUTION

Turn the Power Module off before inserting the plug-in; otherwise, damage may occur to the plug-in indicators.

Refer to CONTROLS & CONNECTORS (Fig. 1-3) for description of front panel controls, connectors and indicators.

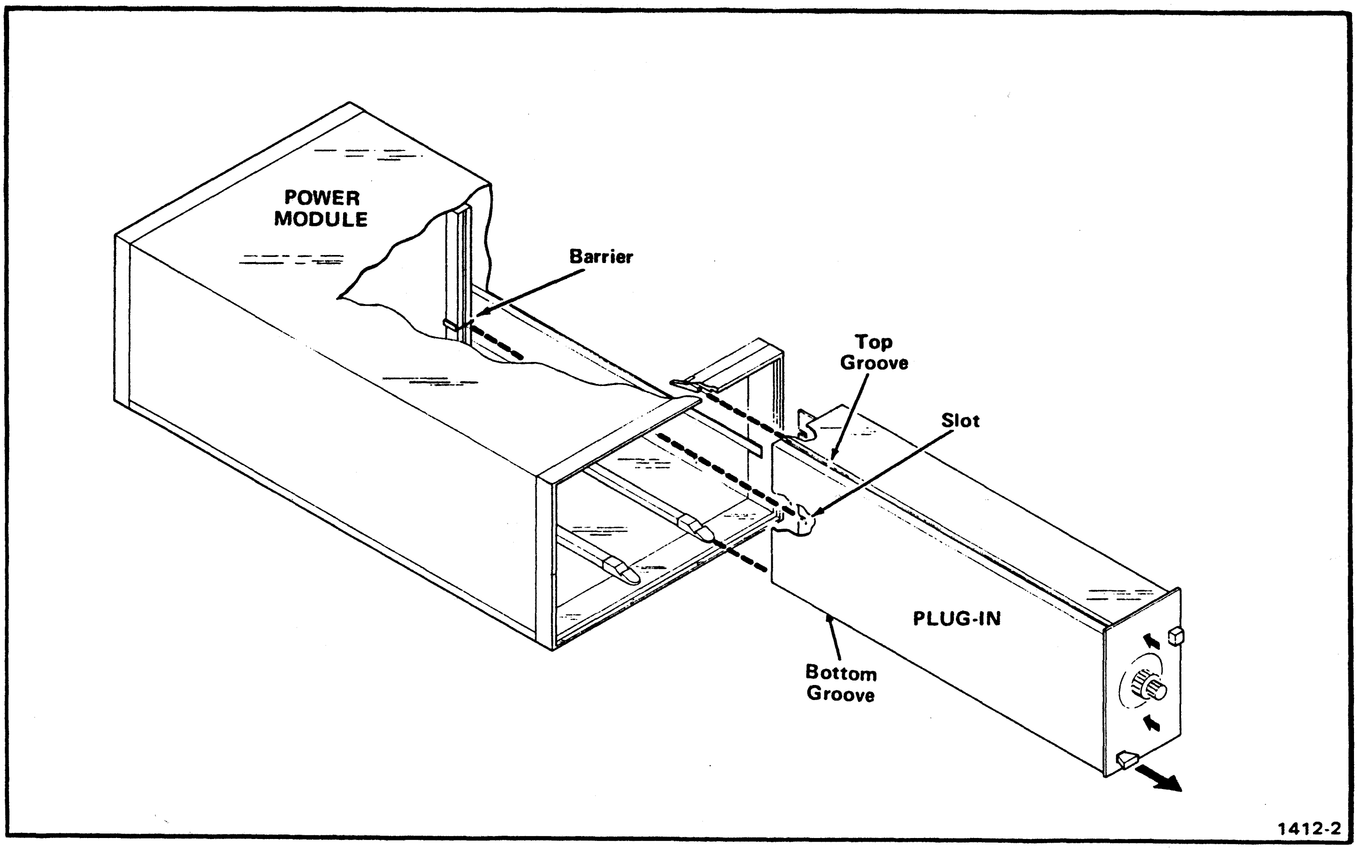


Fig. 1-2. Plug-In installation and removal.

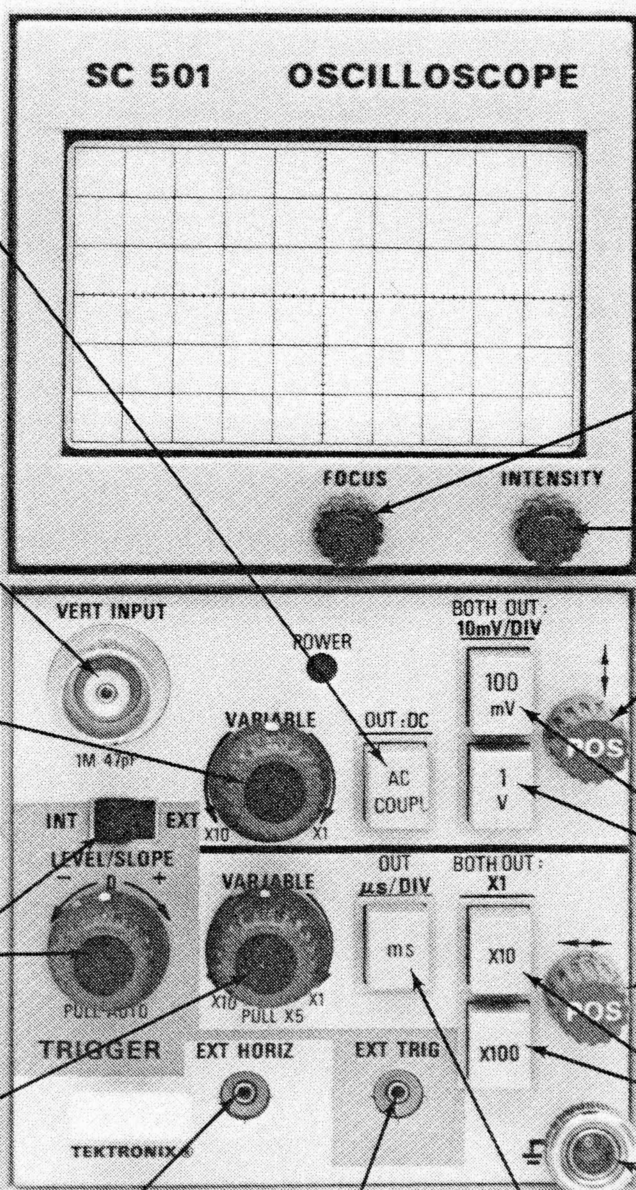


Fig. 1-3. SC 501 Controls and Connectors.

OPERATING CONSIDERATIONS

Deflection Factors

The amount of vertical deflection produced by a signal is determined by the signal amplitude, the attenuation factor (if any) of the probe, the setting of the Volts/Div pushbuttons, and the setting of the associated VARIABLE control.

Use the largest deflection factor (1 V/Div) when first connecting the SC 501 to an unknown voltage source. If the deflection is too small to make the measurement, switch to a lower deflection factor.

The deflection factors indicated by the Volts/Div pushbuttons are calibrated when the VARIABLE control is rotated fully clockwise.

The range of the VARIABLE control is at least 10:1. It provides uncalibrated deflection factors covering the full range between the fixed settings of volts/div pushbuttons. The VARIABLE control extends the maximum deflection factor to at least 10 volts/division.

Applying Signals

While most connections to the SC 501 will probably be made using coaxial cables, probes offer another convenient method of applying a signal to the input of the SC 501. Tektronix probes are shielded to prevent pickup of electrostatic interference. A 10X attenuator probe offers a high input impedance and allows the circuit under test to perform very close to normal operating conditions. The SC 501 is compatible with probes such as TEKTRONIX P6006 and P6028 Passive Probes.

NOTE

Probe compensation should be checked with a known signal (risetime of 100 ns or less) before using the SC 501. Input time constant is normalized for each attenuator step.

Unshielded test leads can sometimes be used to connect a signal source to the SC 501, particularly when a high-level, low-frequency signal is monitored at a low impedance point. However, when any of these factors are missing, it becomes increasingly important to use shielded cables. In all cases, the signal transporting leads should be kept as short as practical. Be certain that a common ground connection is established between the device under test and the SC 501. The shield of a coaxial cable or ground strap of a signal probe provides an adequate common ground connection.

Input Coupling

The AC COUPL pushbutton allows a choice of input coupling. The type of display desired determines the method of coupling used.

The dc coupling position (button out) can be used for most applications. However, if the dc component of the applied signal is much larger than the ac component, ac coupling (button in) will probably provide a better display. Use dc coupling to display an ac signal below about 3 Hz.

In the ac coupling position, the dc component is blocked by a series capacitor in the input circuit. The low-frequency response in the ac position is about 3 Hz (−3 dB point); therefore, some low-frequency attenuation and phase shift can be expected near this frequency limit. Distortion will also appear in square waves that have low-frequency components.

Sweep Triggering

When the source switch is in the INT position, the sweep is triggered by a sample of the signal applied to the VERT INPUT connector. The display is stable for either Normal or AUTO triggering modes as long as the signal frequency is above 10 Hz. Below 10 Hz, it may be desirable to use Normal mode triggering (TRIGGER/LEVEL/SLOPE control pushed in). The AUTO triggering mode (LEVEL/SLOPE control pulled out) reduces operator adjustments and provides a bright baseline in the absence of an input signal.

When the source switch is in the EXT position, the sweep is triggered by the signal applied to the EXT TRIG pin jack. The signal applied to the EXT TRIG pin jack must be time-related to the signal applied to the VERT INPUT connector in order to prevent drift in the display.

REPACKAGING FOR SHIPMENT

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

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

Surround the instrument with polyethylene sheeting to protect the finish of the instrument. Obtain a carton of corrugated cardboard of the correct carton strength and having inside dimensions of no less than six inches more than the instrument dimensions. Cushion the instrument by tightly packing three inches of dunnage or urethane foam between carton and instrument, on all sides. Seal carton with shipping tape or industrial stapler.

The carton test strength for your instrument is 200 pounds.

SPECIFICATION AND PERFORMANCE CHECK

SPECIFICATION

Performance Conditions

The electrical charcteristics are valid only if the SC 501 has been calibrated at an ambient temperature between +20°C and +30°C and is operating at an ambient temperature between 0°C and +50°C unless otherwise noted.

Information given in the Supplemental Information column is provided for user information only, and should not be interpreted as Performance Requirements.

Table 2-1
ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirements	*Supplemental Information*
VERTICAL DEFLECTION SYSTEM CHARACTERISTICS		
Deflection Factor		
Calibrated Steps	10 mV/div, 100 mV/div, and 1 V/div	
Variable Range	At least 10 to 1.	Continuously variable between calibrated steps and extends maximum uncalibrated deflection factor to at least 10 V/div.
DC Balance (+15°C to +35°C)	0.2 div.	
Accuracy	±3%.	
Linearity	0.1 div or less of compression or expansion as a 2 div signal is positioned between the graticule limits.	
HF Bandwidth	At least 5 MHz.	
AC LF Response		Approximately 2 Hz (0.2 Hz with X10 probe with ac coupling).
Input		
Impedance	1 MΩ ±2%.	Paralleled nominally by 47 pF.
Maximum Input Voltage		350 V (dc + peak ac), 350 V peak-to-peak ac at 1 kHz or less.

Table 2-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
HORIZONTAL DEFLECTION SYSTEM CHARACTERISTICS		
Sweep Rates		
Calibrated Range	100 ms/div to 1 μs/div in 6 decade steps. X5 Magnifier extends fastest calibrated rate to 200 ns/div.	
Variable Range	At least 10 to 1.	Continuously variable between calibrated sweep rates and extends slowest uncalibrated rate to at least 1 s/div.
Accuracy	±5%.	Measured over center 8 displayed divisions excluding the first 0.5 μs and magnified sweep beyond the 100th division. 200 ns/div is measured over any 5 div portion within the center 8 div.
Linearity		Typically 5% (0.1 div) or less change in timing over any 2 div interval within the center 8 div.
Sweep Length	At least 10.0 divisions.	
External Horizontal Input		Internal switch must be set to X-Y position.
Bandwidth	At least 100 kHz.	
Deflection Factor	100 mV/div ±5%.	
Impedance		Approximately 100 kΩ paralleled by 25 pF.
Maximum Input Voltage		20 V (dc + peak ac).

TRIGGERING CHARACTERISTICS

Trigger Sensitivity (Minimum peak-to-peak signal required)		
5 MHz or less	1.0 div internal; 1.0 V external.	
1 kHz	0.4 div internal.	
External Trigger Input		
Impedance		Approximately 22 kΩ for signals greater than ±0.6 V.
Maximum Input Voltage		20 V (dc + peak ac).
AUTO Triggering (Trigger LEVEL/SLOPE control pulled to out position)	Sweep free-runs in absence of a triggering signal or for trigger repetition rates below 10 Hz.	

Table 2-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
	DISPLAY CHARACTERISTICS	
CRT Type		T2110
Graticule		6 X 10 div with 0.203 inch/division (0.52 cm/div) non-illuminated.
Phosphor		P31
Acceleration Potential		1 kV.
Geometry and Orthogonality	Bowing or tilt is 0.2 div or less with respect to graticule lines.	
	POWER SUPPLIES	
+20 V		20.0 V ±0.1 V
−20 V		−20.0 V ±0.4 V
+8 V		+8.0 V, +0.5 V, −0.1 V
−8 V		−8.0 V, +0.2 V, −0.6 V
+65 V		+65.0 V ±5.0 V
−980 V		−980 V ±30 V
	MISCELLANEOUS	
Mainframe Power Line Draw		Typically less than 18.5 watts.
Recommended Adjustment Interval		1000 hours or 6 months.
Warmup Time		20 minutes, 60 minutes after exposure to or storage in high humidity (condensing) environment.
	REAR INTERFACE INPUT/OUTPUT SIGNALS	
Ramp Output		Pin 15A. Analog output of positive going sweep ramp. Amplitude is 10 V ±0.25 V and dc baseline level is 0 V ±0.15 V. Output resistance is approximately 500 Ω.

Table 2-2
ENVIRONMENTAL[a]

Characteristics	Description	
Temperature		Meets MIL-T-28800B, class 5.
Operating	0°C to +50°C.	
Non-operating	−55°C to +75°C.	
Humidity	95% RH, 0°C to +30°C. 75% RH, to +40°C. 45% RH, to +50°C.	Exceeds MIL-T-28800B, class 5.

Table 2-2 (cont)

Characteristics	Description	
Altitude		Exceeds MIL-T-28800B, class 5.
Operating	4.6 km (15,000 ft)	
Non-operating	15 km (50,000 ft)	
Vibration	0.38 mm (0.015 in) peak-to-peak, 5 Hz to 55 Hz, 75 minutes.	Meets MIL-T-28800B, class 5, when installed in qualified power modules.[a]
Shock	30 g's (1/2 sine) 11 ms duration, 3 shocks in each direction along 3 major axes, 18 total shocks.	Meets MIL-T-28800B, class 5, when installed in qualified power modules.[a]
Transportation[b]	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2.	

[a] Refer to TM 500 power module specifications.

[b] Without power module.

Table 2-3
PHYSICAL CHARACTERISTICS

Characteristics	Information
Nominal overall Dimensions (measured at maximum points)	
Height	5.0 inches (12.7 cm)
Width	2.6 inches (6.6 cm)
Length	11.6 inches (29.0 cm)
Net Weight (Instrument Only)	2 lbs. 4 ounces (1.0 kg)

PERFORMANCE CHECK

Introduction

This procedure checks the electrical characteristics of the SC 501 that appear in the Operating Instructions section of this manual. If the instrument fails to meet the requirements given in this performance check, the calibration procedure should be performed. This procedure can also be used by an incoming inspection facility to determine acceptability of performance.

The electrical characteristics in Section 2 are valid only if the SC 501 is calibrated at an ambient temperature of +20° C to +30° C and operated at an ambient temperature of 0° C to +50° C.

Tolerances that are specified in this performance check procedure apply to the instrument under test and do not include test equipment error. Limits and tolerances in this procedure are instrument performance requirements only if stated as such in the Specification part of this section.

Test Equipment Required

The following test equipment, or equivalent, is required to perform the performance check. Test equipment characteristics listed are the minimum required to verify the performance of the SC 501. Substitute equipment must meet or exceed the stated requirements. All test equipment is assumed to be operating within tolerance.

Special test devices are used where necessary to facilitate the procedure. Most of these are available from Tektronix, Inc. and can be ordered through your local Tektronix Field Office or representative.

Special Interface Connections

The test equipment or the equipment under test may have been altered to fit special application requirements. In such cases, the procedure should be changed to accommodate the instrument alterations, or the instrument should be restored to its original configuration.

Table 2-4

LIST OF TEST EQUIPMENT REQUIREMENTS

Description	Performance Requirement	Application	Example
Power Module	Three compartments or more.	All tests.	TEKTRONIX TM 503.
Calibration Generator	Amplitude calibration, 50 mV to 10 V; accuracy, ±0.25% into 1 MΩ output, square wave at approximately 1 kHz.	Trigger, Vert and Horiz gain check.	TEKTRONIX PG 506 Calibration Generator.[1]
Sine-wave Generator	Sine-wave output, to at least 5 MHz, leveled; output amplitude 5 V p-p; accuracy within 2%.	Vert bandwidth check.	TEKTRONIX SG 503 Signal Generator.[1]
Time-Mark Generator	Marker and Trigger outputs, 0.1 s through 0.5 μs, in 1-2-5 sequence. Marker amplitude: At least 1 V into 50 Ω.	Sweep Timing and Trigger checks.	TEKTRONIX TG 501.[1]
Input RC normalizer	Time constant, 1 MΩ X 47 pF; connectors, bnc.	Input compensation check.	Tektronix part no. 067-0541-00.
Termination	Impedance, 50 Ω; accuracy, within 2%; connectors, bnc.	Vert check.	Tektronix part no. 011-0049-01.
Coaxial cable (2 required)	Impedance, 50 Ω; length 42 inches; connectors, bnc.	Provides signal interconnection.	Tektronix part no. 012-0057-01.
Cable	Bnc to pin jacks.	Horiz system check.	Tektronix part no. 175-1178-00.
Adapter	Bnc Female to bnc Female.	Horiz system check.	Tektronix part no. 103-0028-00.
Adapter	Bnc tee.	Trigger system check.	Tektronix part no. 103-0030-00.

[1]**Requires TM 500-series power module.**

Preliminary Procedure

1. Ensure that all power switches are off.

2. Ensure that all test equipment and the SC 501 under test are suitably adapted to the line voltage to be applied.

3. Install the SC 501 into the power module, and if applicable, install all other TM 500 series test equipment into the power module.

4. Connect the equipment under test and the test equipment to a suitable line voltage source. Turn all equipment on and allow at least 20 minutes for the equipment to stabilize.

Initial Control Settings

Set the following controls during warm-up time:

	SC 501
VERTICAL	
POS	Centered
Volts/Div	1 V
Input Coupling	DC
VARIABLE	X1 (fully cw)
TRIGGER	
INT/EXT	INT
LEVEL/SLOPE	Centered (AUTO triggering selected)
HORIZONTAL	
POS	Centered
TIME/DIV	X1
Time/Div Range	ms
VARIABLE	X1 (fully cw)
INTENSITY	Visible trace
FOCUS	Well-defined trace

PERFORMANCE CHECK PROCEDURE

1. Check the CRT Geometry (no more than 0.2 division bowing or tilt)

a. Adjust the vertical and horizontal POS controls for a centered trace.

b. Adjust the vertical POS control so the trace is moved to the top graticule line and check that trace deviation from the graticule line does not exceed one minor division from end to end. Position the trace to the bottom graticule line and repeat the check.

c. Set the time-mark generator for 1 ms markers and connect it through a coaxial cable, terminated into a 50 Ω termination, to the VERT INPUT.

d. Push the SC 501 100 mV button in and adjust the SC 501 vertical and horizontal POS controls so that only vertical lines are seen on the crt. Adjust the TRIGGER LEVEL/SLOPE for a stable display.

e. Adjust the horizontal VARIABLE control slowly ccw to show exactly two vertical lines per horizontal division of the graticule.

f. CHECK—That each trace behind a vertical graticule line is aligned within one minor division for the full six divisions of graticule height.

g. Remove the coaxial cable and termination.

2. Check Normal Trigger (Internal) Sensitivity (0.4 division at 1 kHz; one division at 5 MHz)

a. Adjust the TRIGGER LEVEL/SLOPE control to normal triggering (TRIGGER LEVEL/SLOPE control pushed in).

b. Adjust the calibration generator for a 0.5 V, 1 kHz square-wave, and connect the output, through a coaxial cable to the VERT INPUT connector.

c. Adjust the TRIGGER LEVEL/SLOPE control for a stable display. Center the trace with the horizontal POS control.

d. Adjust the vertical VARIABLE control ccw for a 0.4 division display.

e. CHECK—While adjusting the TRIGGER LEVEL/SLOPE control ccw and cw, that you can obtain a stable display in both − and + slope of the observed waveform.

f. Disconnect the coaxial cable from the calibration generator and the VERT INPUT connector.

g. Connect a 50 Ω termination to the VERT INPUT connector.

h. Connect the sine-wave generator output to the 50 Ω termination, using a coaxial cable.

i. Set up the sine-wave generator for a frequency of 5 MHz, and adjust the VARIABLE control, along with the sine-wave generator output control, for a one division display.

j. Set the SC 501 Time/Div range to μs/DIV and the Time/Div to X1.

k. CHECK—While adjusting the TRIGGER LEVEL/SLOPE control ccw and cw, that you can obtain a stable display in both + and − slope of the observed waveform.

l. Disconnect the 50 Ω termination from the VERT INPUT connector.

3. Check Normal Trigger (External) Sensitivity (1 V at 5 MHz)

a. Connect a bnc tee adapter to the VERT INPUT connector and connect the 50 Ω terminated cable from the sine-wave generator to one side of the bnc tee adapter.

b. Connect the bnc-to-pin-jack adapter to the other side of the tee adapter and connect its red pin to the EXT TRIG input.

c. Adjust the sine-wave generator for a 1.0 V, 5 MHz output signal.

d. Set the INT/EXT Trigger selector switch to EXT.

e. CHECK—While adjusting the TRIGGER LEVEL/SLOPE control ccw and cw, that you can obtain a stable display in both − and + slope of the observed waveform.

f. Disconnect all cables from the SC 501 and return the INT/EXT switch to INT.

4. Check Auto Trigger (triggers with a 10 Hz rep-rate signal)

a. Set the SC 501 controls as follows:

Vertical	
Volts/Div	100 mV
Trigger	
LEVEL/SLOPE	Centered (AUTO triggering selected)
Horizontal	
Time/Div	X100
Time/Div Range	ms

b. *Connect a 50 Ω termination* to the VERT INPUT connector and a coaxial cable from the termination to the time-mark generator MARKER OUT connector.

c. From the time-mark generator + Trigger Out, connect the following items in the sequence listed: a coaxial cable, a 50 Ω termination, a bnc female-to-female adapter, and a bnc-to-pin-jack adapter. Insert the red pin-jack lead into the EXT TRIG connector of the SC 501.

d. Adjust the time-mark generator for a 0.1 second marker signal, and set the INT/EXT switch to EXT.

e. CHECK—That with the TRIGGER LEVEL/SLOPE control pulled out (AUTO triggering), a stable display can be obtained where the time mark always starts on the first graticule line.

f. Remove all interconnections from the SC 501 and time-mark generator.

5. Check Balance (within 0.2 div)

a. Set the SC 501 controls as follows:

Vertical	
POS	Centered
Volts/Div	10 mV/div
Input Coupling	AC
VARIABLE	X1 (fully cw)
Trigger	
INT/EXT	INT
LEVEL/SLOPE	Centered (AUTO triggering selected)
Horizontal	
POS	Centered
Time/Div	X1
Time/Div Range	μs/DIV
VARIABLE	X1 (fully cw)

b. Adjust the INTENSITY and FOCUS controls for a well-focused viewable trace on the crt.

c. CHECK—That, as the vertical VARIABLE control is rotated from fully cw to fully ccw (from X1 to X10), the trace does not shift more than 0.2 division (one minor division) up or down.

d. Adjust the vertical VARIABLE control fully cw.

6. Check the 10 mV/DIV Gain (within 3%)

a. Set the calibration generator for a 50 mV square-wave signal.

b. Connect a coaxial cable from the calibration generator output to the VERT INPUT connector.

c. CHECK—That the display on the SC 501 crt is five divisions in amplitude, within 0.15 major division (3/4 of a minor division).

7. Check the 10 mV/DIV Gain (at least 5 div or less)

a. Adjust the vertical VARIABLE control fully ccw, to its X10 position.

b. Set the calibration generator for a 0.5 V square-wave signal.

c. CHECK—That the display on the SC 501 crt is five divisions in amplitude, within 0.15 major division (3/4 of a minor division).

8. Check the 100 mV/DIV Gain (within 3%)

a. Push the SC 501 100 mV pushbutton in.

b. Adjust the vertical VARIABLE control fully cw (to its X1 position).

c. CHECK—That the display on the SC 501 crt is five divisions high within 0.15 major division (3/4 of a minor division).

9. Check the 1 V/DIV Gain (within 3%)

a. Push the SC 501 1 V pushbutton in.

b. Adjust the calibration generator for a 5 V square-wave signal.

c. CHECK—That the display on the SC 501 crt is five divisions high within 0.15 major division (3/4 of a minor division).

10. Check Low Frequency Linearity (no more than 0.1 division compression or expansion)

a. Set the calibration generator for a 20 mV square-wave signal.

b. Set the SC 501 Volts/Div control to 10 mV/DIV.

c. Adjust the vertical POS control for an exactly centered two-division display.

d. Adjust the vertical POS control so that the top of the display is exactly two divisions up from the bottom of the graticule.

e. CHECK—That the bottom of the display is within 0.1 major division of the bottom line of the graticule.

f. Adjust the vertical POS control so that the bottom of the display is exactly two divisions down from the top of the graticule.

g. CHECK—That the top of the display is within 0.1 major division of the top line of the graticule.

11. Check Input Coupling

a. Adjust the vertical POS control for an exactly centered two-division display.

b. Set the input coupling to DC.

c. CHECK—That the bottom of the display is now at graticule center.

d. Remove the coaxial cable from the SC 501 and calibration generator.

12. Check 10 mV/DIV Compensation (within 2%)

a. Connect the 1 MΩ, 47 pF input normalizer to the VERT INPUT connector.

b. Connect a coaxial cable from the calibration generator output to the input normalizer.

c. Set the calibration generator for a 0.1 V square-wave signal, the SC 501 Time/Div Range to ms, and set the Time/Div to X1.

d. Adjust the TRIGGER LEVEL/SLOPE control for a stable display. Using the vertical POS control, position the display to observe the leading edge of the waveform.

e. CHECK—That the square-wave has no more than 0.1 division roll-off or overshoot (0.1 major division is 1/2 of a minor division).

13. Check the 100 mV/DIV Compensation (within 2%)

a. Push the SC 501 100 mV pushbutton in.

b. Adjust the calibration generator for a 1 V square-wave.

c. CHECK—That the five division square-wave has no more than 0.1 major division of roll-off or overshoot.

14. Check the 1 V/DIV Compensation (within 2%)

a. Push the SC 501 1 V pushbutton in.

b. Adjust the calibration generator for a 10 V square-wave.

c. CHECK—That the five division square-wave has no more than 0.1 major division of roll-off or overshoot.

d. Remove the input normalizer and the coaxial cable from the SC 501 input connector.

15. Check the 10 mV/DIV Bandwidth (at least 5 MHz)

a. Set the SC 501 Volts/Div control to 10 mV/DIV.

b. Connect a 50 Ω termination to the VERT INPUT connector.

c. Connect a coaxial cable from the sine-wave generator output to the 50 Ω termination on the SC 501.

d. Set the sine-wave generator for a 50 kHz reference frequency and adjust the output for a six-division display.

e. Without changing the output amplitude, increase the generator frequency until the displayed amplitude is reduced to 4.2 divisions.

f. CHECK—The generator for a reading of at least 5 MHz.

16. Check the 100 mV/DIV Bandwidth (at least 5 MHz)

a. Push the SC 501 100 mV pushbutton in.

b. Set the sine-wave generator for a 50 kHz reference frequency and adjust the output for a six-division display.

c. Without changing the output amplitude, increase the generator frequency until the displayed amplitude is reduced to 4.2 divisions.

d. CHECK—*The generator for a reading of at least* 5 MHz.

17. Check the 1 V/DIV Bandwidth (at least 5 MHz)

a. Push the SC 501 1 V pushbutton in; remove the 50 Ω termination and connect the coaxial cable to the VERT INPUT connector.

b. Set the sine-wave generator for a 50 kHz reference frequency and adjust the output for a six-division display.

c. Without changing the output amplitude, increase the generator frequency until the displayed amplitude is reduced to 4.2 division.

d. *Disconnect the coaxial cable from the* VERT INPUT connector.

18. Check Sweep Length (10.5 major divisions within 0.3 division)

a. Set the SC 501 controls as follows:

Vertical

POS	Centered
Volts/Div	1 V/DIV
Input Coupling	DC
VARIABLE	fully cw

Trigger

INT/EXT	INT
LEVEL/SLOPE	Centered (AUTO trigger selected)

Horizontal

POS	Centered
Time/Div	X1
Time/Div Range	ms
VARIABLE	X1 (fully cw)

b. Adjust the INTENSITY and FOCUS controls for a well focused, viewable trace on the crt.

c. Connect a 50 Ω termination to the VERT INPUT connector.

d. Connect a coaxial cable from the time-mark generator marker out to the 50 Ω termination on the SC 501.

e. Set the time-mark generator for 1 ms time-marks.

f. Adjust the horizontal POS control to align the second time-mark with the left edge of the graticule.

g. CHECK—That the trace ends 0.5 major division from the right edge of the graticule, within 0.3 major division (1 1/2 minor divisions).

19. Check X1 Gain (within 5%)

a. Adjust the horizontal POS control to align the second time-mark with the second graticule line.

b. CHECK—That the tenth time-mark aligns with the tenth graticule line, one division in from the right edge, within 0.4 major divisions (two minor divisions).

20. Check X5 Gain (within 5%)

a. Set the time-mark generator for 0.5 ms time-marks (two time-marks per division).

b. Adjust the horizontal VARIABLE control to its X5 position, (knob pulled out) (2.5 major division between markers).

c. CHECK—That the horizontal space between any three consecutive markers (except the first and last two on the sweep) is five major divisions within 0.25 major division (1 1/4 minor division).

d. Push the horizontal VARIABLE control in.

21. Check the X10 VARIABLE Sweep (within 5%)

a. Set the time-mark generator for 10 ms time-marks.

b. Set the horizontal VARIABLE fully ccw, to X10.

c. CHECK—That there is one time-mark per division, within 0.4 major division (two minor divisions) over the center eight divisions of sweep.

d. Adjust the horizontal VARIABLE control fully cw, to X1.

20. Check Time Base Accuracy (within 5%)

a. Set the time-mark generator for 1 μs time-marks.

b. Set the horizontal Time/Div Range to μs and obtain a stable display.

c. CHECK—That there is one time-mark per division within 0.4 major division (two minor divisions) over the center eight divisions of sweep.

d. Set the time-mark generator for 10 μs time-marks.

e. Set the SC 501 Time/Div to X10, and readjust the triggering controls to obtain a stable display, if necessary.

f. CHECK—That there is one time-mark per division, within 0.4 major division (two minor divisions) over the center eight divisions of sweep.

g. Set the time-mark generator for 0.1 ms time-marks.

h. Set the SC 501 Time/Div to X100, and readjust the triggering controls to obtain a stable display, if necessary.

i. CHECK—That there is one time-mark per division, within 0.4 major division (two minor divisions) over the center eight divisions of sweep.

j. Set the time-mark generator for 10 ms time-marks.

k. Set the SC 501 TIME/DIV RANGE pushbutton to ms and TIME/DIV to X10.

l. CHECK—That there is one time-mark per division, within 0.4 major division (two minor divisions) over the center eight divisions of sweep.

m. Set the time-mark generator for 0.1 second time-marks.

n. Set the SC 501 Time/Div to X100.

o. CHECK—That there is one time-mark per division, within 0.4 major division (two minor divisions) over the center eight divisions of sweep.

23. Check 200 ns Linearity (within 5%)

a. Set the time-mark generator for 0.5 μs time-marks.

b. Pull the horizontal VARIABLE knob out to the X5 position.

c. Set the SC 501 Time/Div Range pushbutton to μs and the Time/Div pushbutton to X1; readjust the triggering controls for a stable display, if necessary.

d. CHECK—That the SC 501 200 ns linearity is within 5% in any five divisions of sweep, within the center eight divisions of the graticule.

e. CHECK—For five major divisions within any three consecutive time-marks while adjusting the horizontal POS control over the full range of the sweep. Ignore the timing between the first two and last two time-marks on the sweep. The accuracy for five major divisions of sweep should be ±0.25 major division (1 1/4 minor division). Measure the five major division timing somewhere within the center eight divisions of the graticule.

f. Set the horizontal VARIABLE control to X1.

g. Adjust the horizontal POS control to place the start of the trace at the left edge of the graticule.

h. Remove the 50 Ω termination and coaxial cable from the SC 501 and the time-mark generator. This completes the Performance Check procedure.

NOTE

This procedure does not check the external horizontal amplifier since this requires removal of one side cover and changing an internal switch, which should be done only by AUTHORIZED SERVICE PERSONNEL.

ADJUSTMENT

Introduction

This adjustment procedure is to be used to restore the SC 501 to original performance specifications. Adjustment need not be performed unless the instrument fails to meet the Performance Requirements listed in the Specification section, or the Performance Check cannot be completed satisfactorily.

Completion of all adjustment steps in this procedure ensures that the instrument will meet the performance requirements listed in the Specification section. However, to fully ensure satisfactory performance, it is recommended that the Performance Check be performed after any adjustment is made.

Services Available

Tektronix, Inc. provides complete instrument repair and adjustment at local Field Service Centers and at the Factory Service Center. Contact your local Tektronix Field Office or representative for further information.

Test Equipment Required

The test equipment listed in Table 3-1, or equivalent, is required for adjustment of the SC 501. Specifications given for the test equipment are the minimum necessary for accurate adjustment and measurement. All test equipment is assumed to be correctly calibrated and operating within specification.

If other test equipment is substituted, control settings or calibration setup may need to be altered to meet the requirements of the equipment used.

Table 3-1

LIST OF TEST EQUIPMENT REQUIREMENTS

Description	Performance Requirements	Application	Example
Oscilloscope	Bandwidth dc to 10 MHz; minimum deflection factor, 1 V/div; sweep rate, 1 ms/div.	Amplitude and Time Measurements.	TEKTRONIX 5440, 5A45, 5B10N Oscilloscope system.
Digital voltmeter	Range, zero to 1000 V; accuracy, within 0.1% ±2 counts.	LV power supply and trigger balance check. LV power supply adjustment.	TEKTRONIX DM 501 Digital Multimeter.[1]
Calibration Generator	Amplitude calibration, 50 mV to 10 V; accuracy, ±0.25% into 1 MΩ; output, square wave at approximately 1 kHz.	Trigger, Vert and Horiz gain check and adjustment.	TEKTRONIX PG 506 Calibration Generator.[1]
Time-mark Generator	Marker and Trigger outputs, 0.1 s through 100 µs, in 1-2-5 sequence. Marker amplitude; at least 1 V into 50 Ω.	Timing measurements.	TEKTRONIX TG 501 Time Mark Generator.[1]
Sine-wave Generator	Sine-wave output to at least 5 MHz, leveled; output amplitude, 5 V p-p; accuracy, within 2%.	Vertical bandwith check.	TEKTRONIX SG 503 Signal Generator.[1]
Mid-Frequency Sine-Wave Generator	Sine-Wave output from 1 kHz - 100 kHz constant amplitude.	Horizontal Frequency Response.	TEKTRONIX SG 502 Signal Generator.
Power Module	Three compartments or more.	All tests.	TEKTRONIX TM 503.

[1]**Requires TM 500-Series Power Module.**

Table 3-1 (cont)

Description	Performance Requirements	Application	Example
Autotransformer with ac voltmeter	Capable of supplying an output voltage from 90 to 132 V ac; 120 W of power at the upper limits.	Power Supply check.	General Radio W10MTR3W Variac Autotransformer.
Input RC normalizer	Time constant, 1 mΩ x 47 pF; connectors bnc.	Input compensation check.	Tektronix part no. 067-0541-00.
Termination	Impedance, 50 Ω; accuracy, within 2%; connectors, bnc.	Vert check and adjustment.	Tektronix part no. 011-0049-01.
Coaxial cable (2 required)	Impedance, 50 Ω; length, 42 inch; connectors, bnc.	Provides signal interconnection.	Tektronix part no. 012-0057-01.
Adapter	Bnc-to-female to bnc female	Horiz system check.	Tektronix part no. 103-0028-00.
Adapter	Bnc tee.	Trigger system check.	Tektronix part no. 103-0030-00.
Cable	Bnc to two pin jacks.	Horiz system check.	Tektronix part no. 175-1178-00.
1X passive probe.	Compatible with 5A-series amplifiers used in oscilloscope.	Horiz system check.	Tektronix P6101 Probe.

[1]Requires TM 500-Series Power Module.

Preparation

a. Remove the left and right side covers of the SC 501 to gain access to the component side of the circuit boards. Pull the rear end of the side cover outward from the side of the instrument (the cover snaps into place).

b. Install the SC 501 into the left power module compartment, or if appropriate, connect the SC 501 to the power module by means of the flexible plug-in extender.

c. Set the power module for the line voltage to be applied (see power module manual) and connect it to the variable autotransformer and connect the autotransformer to the line voltage source. Be sure that the power switch is off.

d. Install the TM 500-series equipment, including the SC 501 into the power module.

e. Connect all test equipment to a suitable line voltage source.

f. Turn on all test equipment and allow at least twenty minutes for the equipment to warm up and stabilize.

Initial Control Settings

Set the following controls during warm-up time:

SC 501

INTENSITY	Fully ccw
FOCUS	Midrange
POS (Vertical)	Midrange
POS (Horizontal)	Midrange
VARIABLE (Vertical)	Fully cw (X1)
VARIABLE (Horizontal)	Fully cw (X1)
LEVEL/SLOPE	AUTO (centered and pulled OUT)
Trigger Source	INT
Pushbuttons	All out except ms

Test Oscilloscope

Vertical Amplifier

Channel 1	
Input Coupling	ac
Volts/Div	10 mV (with 10X probe)
Display Mode	CH 1
Trigger Source	Internal
Time Base	
Time/Div	1 ms
Main Triggering	Internal, Auto

POWER SUPPLY AND CRT DISPLAY

1. Adjust +20 Volt Power Supply

a. Connect the digital voltmeter between the +20 V test point on the Amplifier circuit board, and chassis ground. See Fig. 3-1 for voltage test point location.

b. CHECK—For a meter reading of +19.9 to +20.1 volts.

NOTE

If the +20 volt supply is within the specified tolerance, proceed with step 2. If the +20 volt adjustment is to be made, all circuits will be affected and the entire power supply adjustment procedure should be performed to verify the accuracy of the supplies.

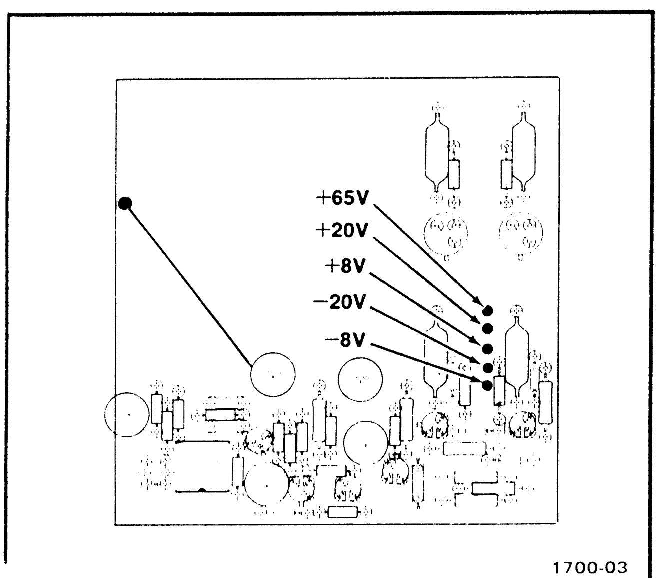


Fig. 3-1. Location of Power Supply test points.

c. ADJUST—+20 V Adj, R500, for a meter reading of exactly +20 volts. See Fig. 3-2 for adjustment location.

d. Disconnect the digital voltmeter.

2. Check Remaining Power Supply Voltages

a. Connect the digital voltmeter between each voltage test point on the Amplifier circuit board, and chassis ground. See Fig. 3-1 for voltage test point location.

b. CHECK—Each supply with the digital voltmeter to ensure that all output voltages are within the limits given in Table 3-2.

Table 3-2

POWER SUPPLY VOLTAGE TOLERANCE

Supply	Tolerance
+20 V	+19.9 V to +20.1 V
−20 V	−19.6 V to −20.4 V
+8 V	+7.9 V to +8.5 V
−8 V	−7.8 V to −8.6 V
+65 V	+60.0 V to +70.0 V
−980 V	−950.0 V to −1010.0 V

3. Check Power Supply Regulation

a. Connect the digital voltmeter between the −980 V test point on the Main circuit board, and chassis ground. See Fig. 3-2 for voltage test point location.

b. Adjust the autotransformer output voltage from the low limit to the high limit as indicated in Table 3-3. Test point voltage reading should not vary more than ±10 volts. Return the autotransformer to the nominal line voltage setting.

c. Disconnect the digital voltmeter.

Table 3-3

POWER MODULE UNIVERSAL TRANSFORMER

Line Selector Block Position	Regulating Ranges	
	110-Volts Nominal	220-Volts Nominal
L	90 Vac to 110 Vac	180 Vac to 220 Vac
M	99 Vac to 121 Vac	198 Vac to 242 Vac
H	108 Vac to 132 Vac	216 Vac to 264 Vac
Line Fuse Data	1.6 A slow-blow	0.8 A slow-blow

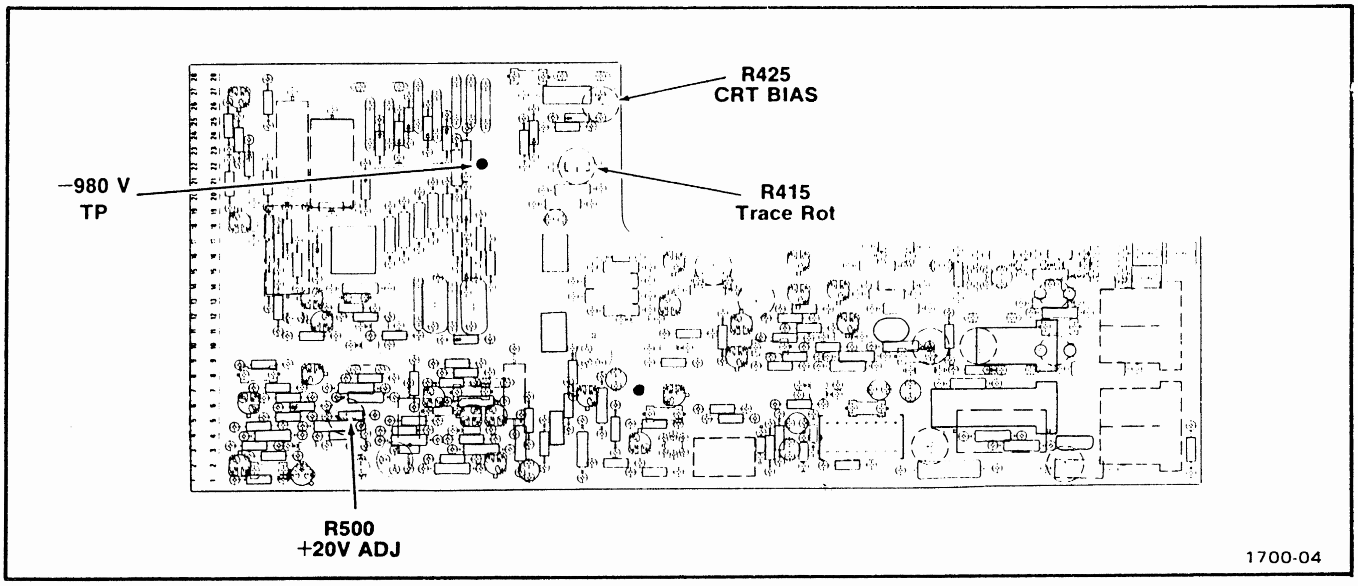


Fig. 3-2. Location of −980 V test point; +20 V, CRT Bias, and Trace Rotation adjustments.

4. Adjust CRT Bias

a. Adjust the FOCUS control for a well-defined display. Turn the INTENSITY control fully ccw.

b. ADJUST—Crt Bias, R425, until trace just becomes visible. Readjust R425 until trace just disappears.

5. Adjust Trace Alignment

a. Set the INTENSITY control for a normal viewing level and position the trace to the center horizontal graticule line.

b. CHECK—That the trace is aligned with the center horizontal graticule line.

c. ADJUST—Trace Rot, R415, to align the trace with the center horizontal graticule line. See Fig. 3-2 for adjustment location.

d. Position the trace to the top and bottom of the graticule. Observe the trace alignment at both positions. Adjustment may have to be compromised to obtain the best trace alignment at the top, center, and bottom of the graticule.

VERTICAL SYSTEM

1. Adjust Vertical Balance

a. Set the vertical deflection factor to 10 mV/DIV (both pushbuttons out).

b. Depress the AC COUPL pushbutton, and center the displayed trace with the horizontal and vertical POS controls.

c. Rotate the vertical VARIABLE control from X1 to X10 and note the position of the trace at the X10 setting. Return the vertical VARIABLE control to the X1 position.

d. ADJUST—Vertical Bal, R142, so the displayed trace is in the same position as observed in the X10 setting. See Fig. 3-3 for adjustment location.

e. Repeat parts c and d of this step until there is 1/2 minor division or less of trace shift when rotating the vertical VARIABLE control over its entire range.

f. Turn the vertical VARIABLE control to the X1 position.

2. Adjust Trigger Balance

a. Connect the digital voltmeter between the R200-C200 junction on the Amplifier circuit board, and chassis ground. See Fig. 3-3 for junction location.

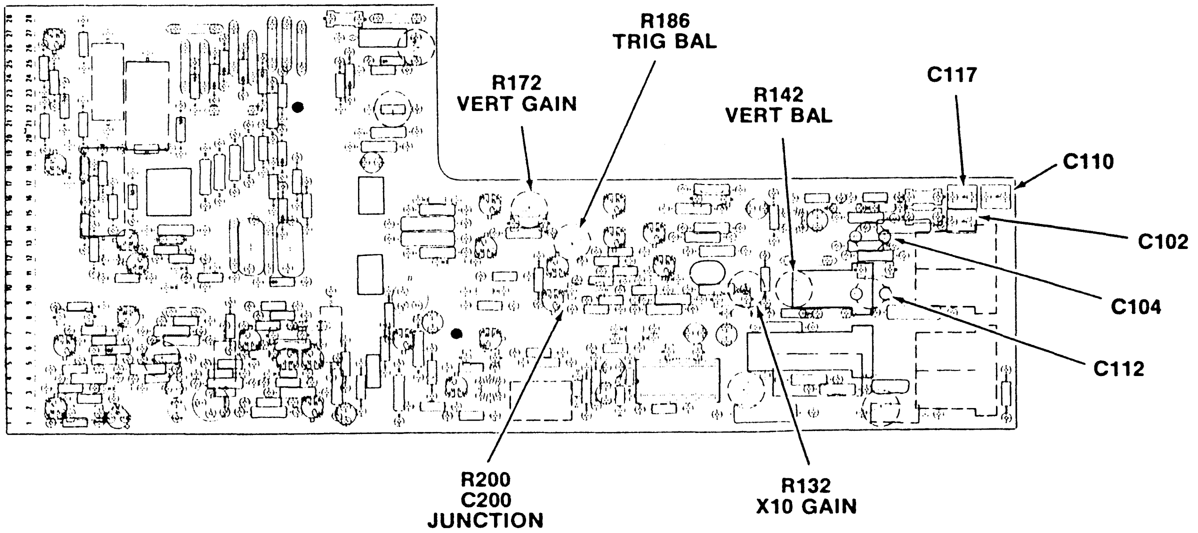


Fig. 3-3. Location of Vertical Amplifier adjustments.

b. Center the displayed trace with the vertical POS control to coincide with the center graticule line.

c. CHECK—For a meter reading of +0.065 volt.

d. ADJUST—Trig Bal, R186, for a meter reading of +0.050 to +0.080 volt.

e. Disconnect the digital voltmeter.

3. Check Trigger Amplitude

a. Connect the probe of the test oscilloscope to the junction of R200-C200 on the Amplifier circuit board. See Fig. 3-3 for junction location.

b. Connect a 1 kHz, 50 mV square-wave signal from the calibration generator to the VERT INPUT of the SC 501, using a 42-inch cable.

c. CHECK—The crt display for a square wave with a peak-to-peak amplitude not less than 2.8 volts nor more than 4.2 volts.

d. Disconnect the probe.

4. Adjust Vertical Gain

a. With the 1 kHz, 50 mV signal still applied, adjust the TRIGGER LEVEL/SLOPE control for a stable display.

b. CHECK—The crt display for a vertical deflection of five divisions ±0.15 division (with the VARIABLE control in the X1 position).

c. ADJUST—Vert Gain, R172, for five divisions of deflection over the six horizontal graticule lines. See Fig. 3-3 for adjustment location.

d. Turn the vertical VARIABLE control fully ccw to the X10 position.

e. Change the calibration generator control to apply a 500 mV square-wave signal to the SC 501 input connector.

f. CHECK—The crt display for a vertical deflection of five divisions ±0.15 division (with the VARIABLE control in the X10 position).

g. ADJUST—The X10 Gain, R132, for five divisions of deflection over the six horizontal graticule lines. See Fig. 3-3 for adjustment location.

h. Adjust the vertical VARIABLE control to the X1 position, and disconnect the cable from the SC 501 input connector.

5. Adjust 10 mV/div Input Time Constant

a. Connect a 47 pF input normalizer to the VERT INPUT connector.

b. Connect a 1 kHz, 100 mV square-wave signal to the input normalizer, using a 42-inch cable.

c. CHECK—For optimum square leading corner and flat top on a five-division display.

d. ADJUST—Vertical compensation, C117, for optimum flat top on the displayed square wave. See Fig. 3-3 for adjustment location.
move input wires around if can't get in spec.

e. Disconnect the cable and remove the input normalizer.

6. Adjust 100 mV/DIV Input Time Constant

a. Reconnect the cable to the SC 501 VERT INPUT connector.

b. Set the calibration generator for a 500 mV square-wave signal.

c. Press in the 100 mV pushbutton on the SC 501.

d. CHECK—For optimum square leading corner and flat top on a five-division display.

e. ADJUST—Vertical compensation, C104, for optimum flat top on the displayed square-wave. See Fig. 3-3 for adjustment location.

f. Disconnect the cable from the SC 501 input connector, and connect the input normalizer to the input connector. Reconnect the cable to the normalizer.

g. Set the calibration generator for a one volt square-wave signal.

h. CHECK—For optimum square leading corner and flat top on a five-division display.

i. ADJUST—Vertical compensation, C102, for optimum flat top on the displayed square wave. See Fig. 3-3 for adjustment location.

j. Disconnect the cable and remove the input normalizer.

7. Adjust 1 V/DIV Input Time Constant

a. Reconnect the cable to the VERT INPUT connector.

b. Set the calibration generator for a five volt square-wave signal.

c. Press in the 1 V pushbutton on the SC 501.

d. CHECK—For optimum square leading corner and flat top on a five-division display.

e. ADJUST—Vertical compensation, C112, for optimum flat top on the displayed square wave. See Fig. 3-3 for adjustment location.

f. Disconnect the cable from the SC 501 input connector, and connect the input normalizer to the input connector. Reconnect the cable to the normalizer.

g. Set the calibration generator for a ten volt square-wave signal.

h. CHECK—For optimum square leading corner and flat top on a five-division display.

i. ADJUST—Vertical compensation, C110, for optimum flat top on the displayed square wave. See Fig. 3-3 for adjustment location.

j. Disconnect the cable and remove the input normalizer.

8. Check Bandwidth

a. Set the vertical pushbuttons to the 10 mV/div position; dc coupled (all pushbuttons out).

b. Connect a 50 Ω termination to the VERT INPUT connector.

c. Connect the sine-wave generator output to the 50 Ω termination, using a 42-inch cable.

d. Set the sine-wave generator for a reference frequency of 50 kHz and adjust the output for a six-division display.

e. Without changing the output amplitude, increase the generator frequency until the displayed amplitude is reduced to 4.2 division.

f. CHECK—The generator for a reading of at least 5 MHz.

g. Set the vertical deflection factor to 100 mV/DIV, dc coupled.

h. Repeat parts d, e, and f of this step.

i. Set the vertical deflection factor to 1 V, dc coupled; remove the 50 Ω termination and connect the cable to the VERT INPUT connector.

j. Set the sine-wave generator for a reference frequency of 50 kHz and adjust the output for a six-division display.

k. Without changing the output amplitude, increase the generator frequency until the displayed amplitude is reduced to 4.2 divisions.

l. CHECK—The generator for a reading of at least 5 MHz.

m. Disconnect the cable from the VERT INPUT connector.

HORIZONTAL SYSTEM

1. Check Time/Div Accuracy

a. Connect the time-mark generator output to the 50 Ω termination, using a 42-inch cable.

b. Set the time-mark generator for 1 ms markers.

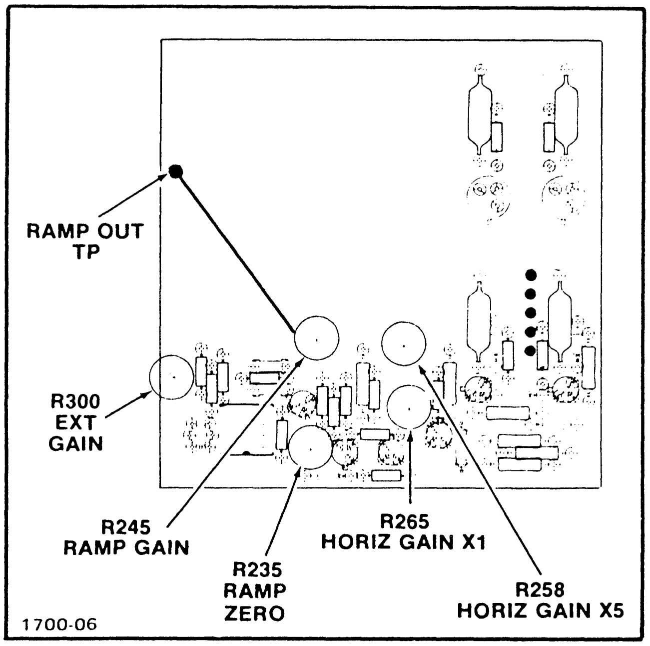


Fig. 3-4. Location of Horizontal Amplifier adjustments.

c. Adjust the TRIGGER LEVEL/SLOPE control for a stable display.

d. Horizontally position the second marker so it is on the second vertical graticule line.

e. CHECK—For proper timing over the center eight division portion of the sweep display.

2. Adjust Basic Timing

a. ADJUST—Horizontal Gain X1, R265, for nine divisions of deflection. See Fig. 3-4 for adjustment location.

b. ADJUST—Sweep Adj, R212, to display a total of eleven time-marks, then readjust R265 for one time-mark per graticule division. See Fig. 3-4 for adjustment location.

c. Using Table 3-4, repeat the check given in step 1 for the remaining Time/Div settings.

Table 3-4

SWEEP TIMING CHECKS

Time Marks	SC 502 Time/Div	Tolerance
1 ms	1 ms	The second through tenth time-marks displayed for each Time/Div setting must be aligned with its associated vertical graticule line within ±2 minor divisions (5% of eight divisions).
10 ms	10 ms	
100 ms	100 ms	
1 μs	1 μs	
10 μs	10 μs	
100 μs	100 μs	

3. Adjust X5 Magnification

a. Set the time-mark generator for 500 μs markers.

b. Push in the SC 501 μs/DIV pushbutton to ms.

c. Pull the Sweep VARIABLE control out (X5), and turn fully cw.

d. CHECK—For two time-marks per five graticule divisions.

e. ADJUST—Horiz Gain X5, R258, for two time-marks between five graticule divisions (VARIABLE control must be fully cw). See Fig. 3-4 for adjustment locations.

f. Push in the VARIABLE control.

4. Adjust Sweep Variable Range

a. Set the time-mark generator for 10 ms markers.

b. Turn the Sweep VARIABLE control fully ccw to the X10 position.

c. CHECK—For one time-mark per division display, indicating a 10:1 range of the control.

d. ADJUST—Sweep X10 Cal, R226, for a display of one time-mark per division.

e. Return the VARIABLE control to the X1 position (fully cw).

5. Check Trigger Operation

a. Connect the time-mark generator trigger output to the EXT TRIG pin jack, using a 42-inch cable, female-to-female adapter, and special cable.

b. Set the time-mark generator for 1 ms markers at both, the marker output and trigger output.

c. Set the TRIGGER source switch to EXT, and triggering mode to AUTO.

d. Adjust the TRIGGER LEVEL/SLOPE control for stable display in the negative slope, and then in the positive slope.

e. Set the time-mark generator trigger output to 10 ms.

f. Repeat part d of this step.

g. Set the time-mark generator trigger output to 0.1 second, and press in the SC 501 X10 Time/Div pushbutton.

h. Repeat part d of this step.

i. Push in the TRIGGER LEVEL/SLOPE control and set the time-mark generator trigger output to one second.

j. Disconnect the cables and termination from the SC 501.

k. Connect a bnc tee adapter to the VERT INPUT and connect a 50 Ω termination to one side of the adapte

l. Connect the sine-wave generator output to the 50 Ω termination, using a 42-inch bnc cable.

m. Connect the bnc-to-pin-jack adapter to the other side of the tee adapter and connect its red pin to the EXT TRIG input jack.

n. Set the sine-wave generator for a 1.0 V, 5 MHz output signal; set the INT/EXT TRIGGER selector switch to EXT.

o. CHECK—While adjusting the TRIGGER LEVEL/SLOPE control, that you can obtain a stable display in the negative slope, and then in the positive slope of the observed waveform.

p. Disconnect all cables, termination, and bnc tee from the SC 501; return the INT/EXT switch to INT.

6. Check + Gate Out

a. Push the SC 501 μs/DIV pushbutton to ms, the TRIGGER LEVEL/SLOPE control out to AUTO, and the TRIGGER switch to INT.

b. Connect the probe from the test oscilloscope to the +Gate test point. See Fig. 3-5 for test point location.

c. CHECK—For a positive-going, rectangluar pulse of approximately 10 ms duration, and a peak-to-peak amplitude of +7.7 to +8.7 volts.

d. Disconnect the probe.

7. Adjust Ramp Out

a. Connect the test probe from the test oscilloscope to the Ramp Out test point. See Fig. 3-4 for test point location.

b. CHECK—Crt display for a ramp waveform amplitude of 10 V peak-to-peak, ±0.25 V.

c. ADJUST—Ramp Gain, R245, for a 10 V peak-to-peak signal, within 0.25 V.

d. Disconnect the probe.

8. Adjust Ramp Zero

a. Set the vertical amplifier input coupling to dc, and establish a zero-volt reference level at the center horizontal graticule line with the position control.

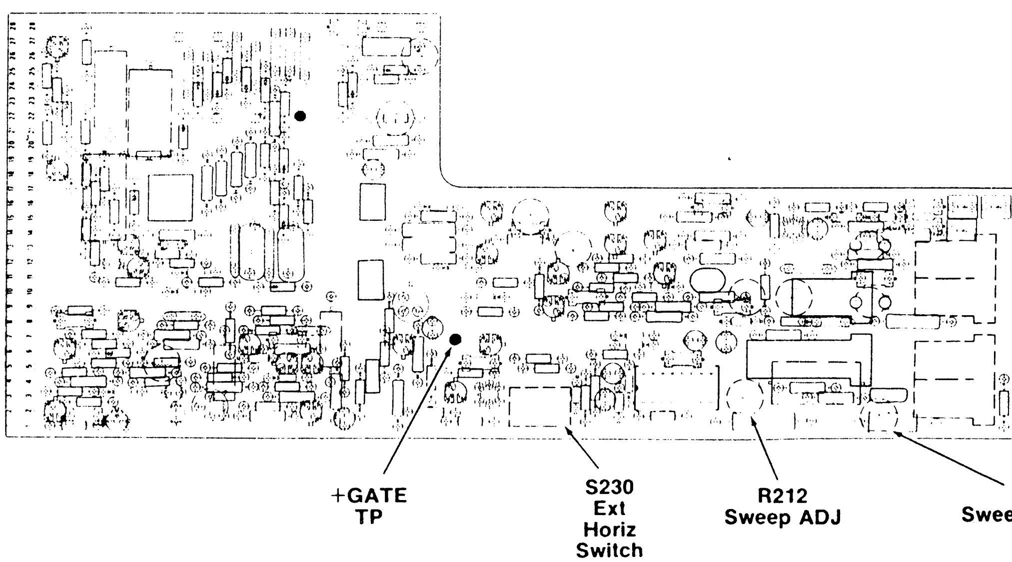


Fig. 3-5. Location of the +Gate test point; Sweep, and X10 Cal adjustments; S320 switch.

b. Connect the test probe from the test oscilloscope vertical amplifier to the Ramp Out test point. See Fig. 3-4 for test point location.

c. CHECK—That the bottom of the displayed ramp coincides with the zero reference line, within ±0.15 V.

d. ADJUST—Ramp Zero, R235, so bottom of the ramp coincides with the zero reference line. See Fig. 3-4 for adjustment location.

e. Disconnect the probe.

9. Adjust External Horiz Gain, Check External Horiz Bandwidth

a. Set the SC 501 Ext Horiz (X-Y, Y-T) selector switch, S230, to the X-Y position (toward the rear of the instrument); it may be necessary to decrease the INTENSITY control. See Fig. 3-5 for switch location.

b. Adjust the INTENSITY control for a visible dot on the crt, then position the dot to the first vertical graticule line on the left side, centered, of the crt screen.

c. Connect the calibration generator output to the EXT HORIZ pin jack, using a 42-inch cable, female-to-female adapter, and special cable.

d. Set the calibration generator for a 1 V square-wave signal.

e. CHECK—For 10 divisions of horizontal deflection, within 0.3 division.

f. ADJUST—Ext Gain, R300, for 10 divisions of horizontal deflection. See Fig. 3-4 for adjustment location.

g. Connect the bnc-to-pin-jack adapter to the mid-frequency sine-wave generator.

h. Connect the red pin of the bnc-to-pin-jack adapter to the SC 501 EXT TRIG input and connect the black pin to ground.

i. Set the sine-wave generator to 1 kHz and turn the amplitude control fully ccw.

j. Center the display.

k. Increase the sine-wave generator amplitude to produce 10 divisions of horizontal deflection.

l. Set the sine-wave generator to 100 kHz.

m. CHECK—For >7 divisions of horizontal deflection.

n. Disconnect the cables and reset the Ext Horiz selector switch to the Y-T position (toward front of instrument).

o. This completes the Adjustment Procedure for the SC 501.

MAINTENANCE AND INTERFACING INFORMATION

Preventive Maintenance

There are no special preventive maintenance procedures that apply to the SC 501. Refer to the power module instruction manual for general preventive maintenance procedures and instructions.

Corrective Maintenance

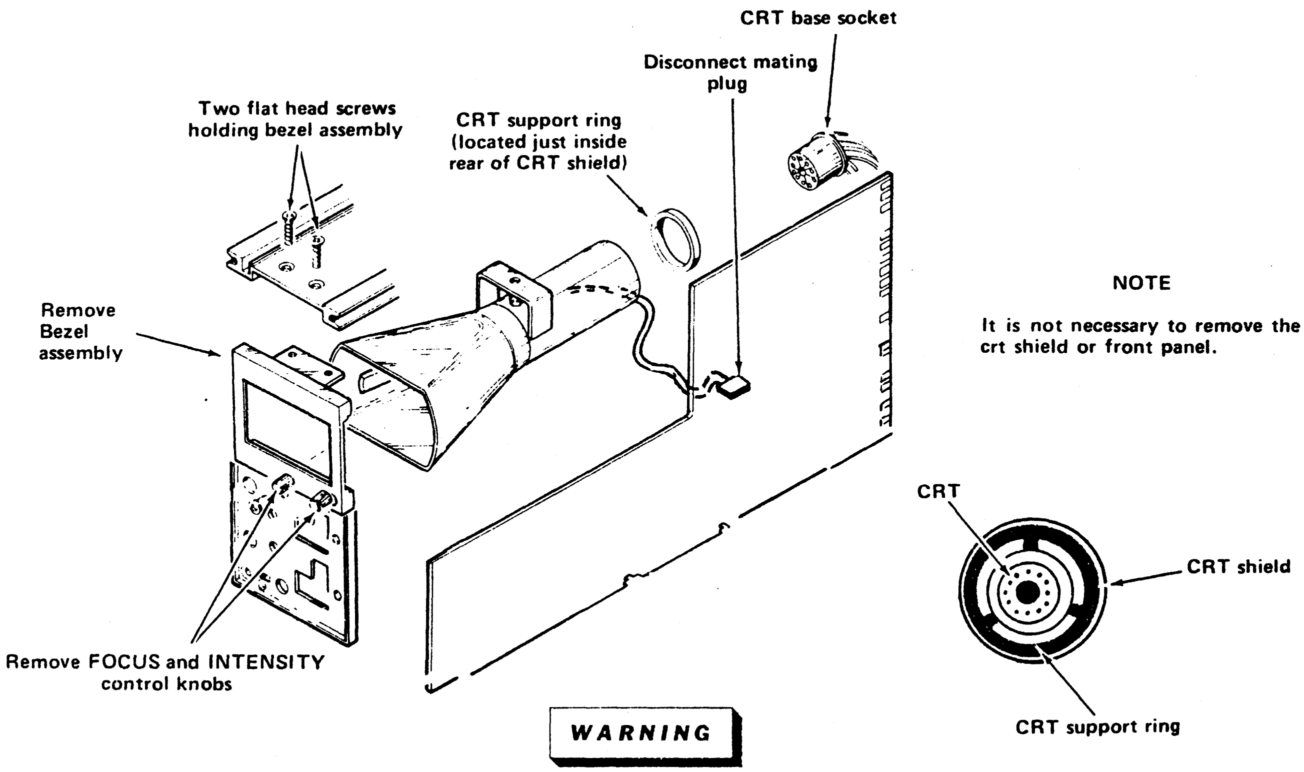
Refer to the power module instruction manual for general corrective maintenance procedures and instructions.

Troubleshooting

Use the Performance Check, Adjustment Procedure, and Circuit Description as aids to locate trouble in the event of equipment failure. The test equipment listed in the Performance Check and Adjustment Procedure will prove useful in troubleshooting the SC 501.

CRT Replacement

Replacing the crt will require instrument readjustments. Refer to the Adjustment procedure in the manual for appropriate steps. Refer to Fig. 4-1 for part identification when replacing the cathode-ray tube.



NOTE

It is not necessary to remove the crt shield or front panel.

WARNING

Use care when handling a crt. Protective clothing and safety glasses should be worn. Avoid striking it on any object which might cause it to crack or implode. When storing a crt, place it in a protective carton or set it face down in a protected location on a smooth surface with a soft mat under the faceplate to protect it from scratches.

Fig. 4-1. Exploded view drawing identifying several critical parts of the crt area.

Functions Available at Rear Connector

Pins are available at the rear connector for routing signals to and from the SC 501 for specialized applications (see Table 4-1, Rear Connector Assignments). One or more compartments of a multi-plug-in power module can be wired with barriers installed to provide specific functions between compartments. See the power module instruction manual for additional information.

Input Assignments

The VERT INPUT signal, EXT TRIG signal and EXT HORIZ signal can be applied through the rear interface connectors if the SC 501 is modified as follows:

A. VERT INPUT signal.

1. Unsolder the 200 Ω resistor attached to the VERT INPUT connector. Connect the center conductor of a coaxial cable to the 200 Ω resistor. Connect the coaxial cable shield to ground.

2. Connect the other end of the coaxial cable: center conductor to pin 17B and shield to pin 16B (common).

NOTE

Parallel operation may be obtained if another 200 Ω resistor is connected in series with the center conductor of a coaxial cable to the junction of R100 and the main circuit board. The addition of any coaxial cable to input circuits affects the input impedance.

B. EXT TRIG signal.

1. Connect the center conductor of a coaxial cable to the EXT TRIG pin jack. Ground the coaxial cable shield.

2. Connect the other end of the coaxial cable: center conductor to pin 27A and shield to pin 26A (common).

Table 4-1

REAR CONNECTOR PIN ASSIGNMENTS (REAR VIEW)

NOTE

Refer to Power Module instruction manual for information concerning pins labeled "Not used."

Pin No.	Left (B)	Right (A)
28	Unassigned	Unassigned
27	+ Gate Out[1]	EXT TRIG signal[1]
26	Unassigned	EXT TRIG common[1]
23-25	Unassigned	Unassigned
22	Unassigned	Unassigned
18-21	Unassigned	Unassigned
17	VERT INPUT signal[1]	EXT HORIZ common[1]
16	VERT INPUT common[1]	EXT HORIZ signal[1]
15	Unassigned	Ramp Out
14	Unassigned	Unassigned
13	Not used	Not used
12	+33.5 V Filtered dc	+33.5 V Filtered dc
11	Collector PNP Series-Pass Transistor	Base PNP Series-Pass Transistor
10	Not used	Emitter PNP Series-Pass Transistor
9	±33.5 Vdc common	±33.5 Vdc common
8	−33.5 V Filtered dc	−33.5 V Filtered dc
7	Collector NPN Series-Pass Transistor	Emitter NPN Series-Pass Transistor
6	No Connection	Base NPN Series-Pass Transistor
1-5	Not used	Not used

[1]Instrument not supplied with these connections. See INPUT and OUTPUT ASSIGNMENTS.

3. Set the TRIGGER source switch to the EXT position to trigger the sweep from pin 27A.

C. EXT HORIZ signal.

1. Connect the center conductor of a coaxial cable to the EXT HORIZ pin jack. Ground the coaxial cable shield.

2. Connect the other end of the coaxial cable: center conductor to pin 16A and shield to pin 17A (common).

Output Assignments

A +Gate Out signal can be routed to the rear interface connector via the center conductor of a coaxial cable to pin 27B. Shield ground may be any convenient location. A Ramp Out Signal is factory wired to pin 15A. Other pins (unassigned) are available at the rear interface connector for routing signals to and from the SC 501 for specialized applications. One or more compartments of a multi-plug-in power module can be wired with barriers installed to provide specific functions between compartments. See the power module instruction manual for additional information.

CIRCUIT DESCRIPTION

Introduction

This section of the manual contains a description of the circuitry used in the SC 501 Oscilloscope. Individual descriptions are separated into the following parts: Input Attenuator and Vertical Amplifier, Sweep and Horizontal Amp, Z-Axis and Crt, and Low Voltage Supply. Refer to the appropriate diagrams in the Diagrams section of this manual while reading the circuit description.

INPUT ATTENUATOR AND VERTICAL AMPLIFIER

Input Attenuator. The input attenuators allow a choice of either X1, X10, or X100 attenuation of the input signal, which is ac- or dc-coupled by the selected position of S100. C112 and C104 allow the X10 and X100 attenuation networks to be frequency compensated. C117, C110, and C102 allow the attenuation networks to be normalized for a time constant of 47 microseconds.

Preamplifier. The preamplifier stage employs a dual field effect transistor, Q120, to provide a high input impedance. Q120B acts as a constant-current source for Q120A. Q125 and Q135 circuitry operates as a paraphase amplifier. Q148 and Q160 operate as emitter-followers to provide a low-impedance drive to the following stages. Quiescently, the two sides of the paraphase amplifier are balanced by the adjustment of R142 so that there is no current through the gain-setting resistor, R129, when the VARIABLE control is fully clockwise. The input stages are diode clamped by CR 121 and CR125, protecting the input stages against negative-going over-drive signals. R130 (VARIABLE control) provides an adjustable attenuation factor other than the fixed calibrated values set by the input attenuators and the X1 position of R130.

Output Amplifier. A push-pull signal is developed at the emitters of Q148 and Q160, along with a dc positioning voltage from R145 (vertical POS control). The gain of the push-pull amplififer, consisting of Q150, Q158, Q167, and Q176, is controlled by Gain adjustment R172. The output stage, Q165 and Q178, with their associated components s a balanced grounded-base amplifier circuit which is protected from over-drive signals by clamping diodes, CR165 and CR178.

Trigger Takeoff. The trigger takeoff amplifier, Q184 and Q190, with their associated components, develops the internal signal to trigger the sweep generator. The gain of this stage is about seven.

SWEEP AND HORIZONTAL AMP

Trigger. Integrated circuit U200 is a combination Trigger/Sweep Generator. The Trigger portion (input pin 13) derives trigger pulses from a sample of the Vertical Amplifier signal, or from an external signal applied to the EXT TRIG pin jack. CR200 and CR201 limit the amplitude swing of the trigger signals. C204 is the differentiating capacitor for the trigger pulses. LEVEL/SLOPE control is provided by a voltage applied to pin 14 from R210. No trigger signals can start the sweep generator system until sweep hold-off period has been completed. The sweep hold-off periods (pin 3) are determined by the RC time constants of R215, C218, and C220. The timing period for the AUTO triggering mode is determined by the time constant of R205 and C205 if no voltage is applied to pin 10 through S205. For normal triggering, approximately −6 V is applied to pin 10 through S205.

Sweep Generator. The Sweep Generator portion of U200 produces two output signals; the sweep ramp voltage on pin 4 and crt unblanking gate on pin 16. The sweep is generated by a feedback operational amplifier integrating circuit. The slope of the ramp is controlled by fixed RC time constants selected by the Time/div pushbuttons. CR215 provides a low impedance discharge path for the sweep capacitors. Sweep length is controlled by a voltage applied to pin 6 from R212 (Sweep Adjust). Sweep VARIABLE control, R225, controls the charging current to the sweep (integrating) capacitors and when varied changes the slope of the ramp at pin 4.

Horizontal Amplifier. Sweep ramp voltages or signals from the EXT HORIZ pin jack are applied to the base of Q252. The circuit containing Q252 and Q270 is an emitter-coupled paraphase amplifier with a horizontal POS control voltage applied to the base of Q270 and R275. In the magnified mode, emitter degeneration is reduced, resulting in a X5 increase in gain. Clamping diodes, CR280 and CR282 limit the positive excursions of the signals at the bases of Q285 and Q290 to about −3 V as set by Zener diode, VR280. Push-pull signals are developed at the collectors of Q285 and Q290 to drive the horizontal deflection plates of the crt.

Ramp Out. The Ramp Out feedback amplifier circuit, Q240 and Q250, produces a zero to +10 V ramp or an amplified and inverted version of signals from the EXT HORIZ pin jack to the rear connector pins. The feedback arrangement allows the emitter of Q250 to be set to a zero volt dc level, and produces a low output impedance without causing Q240 to go into saturation.

External Horizontal Amplifier. The External Horizontal Amplifier circuit is an operational amplifier configuration, U310, fed by buffer amplifier Q305. The gain of U310 is fixed at about six by R310 and R305. R300 controls the external signal amplitude to the gate of Q305A.

Z-AXIS AND CRT

Z-Axis Amplifier and + Gate Out. The Z-axis amplifier is a shunt-feedback operational amplifier with a voltage output. The amplifier consists of Q336, Q348, and Q345. The feedback path is from the collectors of Q345-Q348 through C339-R339 to the summing point at the base of Q336. Q345 and Q348 are connected as a complementary amplifier to provide a fast risetime signal while consuming minimum quiescent power. Q345 acts as a pull-up transistor and Q348 acts as the pull-down transistor for the amplifier. The output voltage from the amplifier provides the drive signal to control the crt intensity level through the control-grid supply.

Emitter-follower Q315, acts as a buffer amplifier for the Z-axis amplifier and + Gate Out circuits. The negative-going unblanking gate at the emitter of Q315 is coupled through CR334 to the Z-axis amplifier. The current through CR334 is set by R330, INTENSITY control. When R330 is set to +20 V, CR334 is cut off and the crt is blanked.

Cathode-Ray Tube Circuit. A repetitive, sinusoidal signal is produced by a regenerative feedback oscillator in the primary of T380 and induced into the secondary. Current drive for the primary winding is furnished by Q380, whose conduction is controlled by the voltage difference between its base and emitter. The secondary winding of T380 developes about 350 volts peak-to-peak. The sextupler rectifier circuit (six diodes in series) produces about −980 V dc at the crt directly-heated cathode (filament). A separate transformer tap and rectifier circuit, CR382, in the secondary of T380 produces about +70 V dc for the vertical, horizontal, and Z-axis amplifiers.

The 350 volts peak-to-peak output of T380 is also applied to CR415 and CR416 to provide the rectified negative potential for the crt control grid. CR420 limits the positive swing with respect to the + dc reference level set by Bias adjustment R425. CR418 limits the negative swing with respect to the output voltage level of the Z-axis amplifier. R410 connects the crt grid voltage to the crt filament (cathode) to ensure that the crt grid is more negative than 980 V (crt is cut off). A positive-going unblanking gate from the Z-axis amplifier decreases crt bias and intensifies the trace.

High voltage regulation is accomplished by sampling the −980 V across a voltage divider returned to +20 V (five 1 MΩ resistors in series with R362). A quiescent level of zero volts is extablished at the base of Q365, a Darlington amplifier. If the output level of the nominal −980 V goes more negative, the output level of Q365 goes more positive, reducing the conduction of Q370 and Q380. The result is a lower peak-to-peak amplitude induced in the secondary of T380. Conversely, if the −980 V goes more positive, Q380 will conduct harder and a larger peak-to-peak voltage appears across the secondary of T380. C367 limits the regulator bandwidth to prevent oscillations.

Q360 and Q350, and associated omponents, is a high voltage shut-down circuit. If the +70 V or −980 V supplies increase above the amplitude regulation limits, Q360 will turn on, reducing the voltage difference between the base and emitter of Q380 to near zero and removes the current drive to the primary of T380.

LOW VOLTAGE SUPPLY

The +20 V supply provides power to operate the SC 501 and also establishes the reference supply for all other power supplies, including the crt system. An error-sensing circuit, Q500, compares a sample of the +20 V across a voltage divider (R507-R506-R504) with a reference voltage established by Zener diode, VR500. Any voltage difference (or change) between the base and emitter of Q500 is amplified by Q500 and applied to the base of Q510. This results in Q510 controlling (or regulating) the conduction of the PNP series-pass transistor (located in the mainframe) to correct for a change in the +20 V supply. R500 (+20 V Adjust) sets the quiescent level at the base of Q500. R506 provides current limiting for Q500 in case Q510 fails. C505 prevents regulator oscillations. Boot-strapped emitter-followers, Q520 and Q525 regulate the +8.2 V supply in a manner similar to the operation of the +20 V regulator.

The −20 V and −8.2 V supplies are regulated in a manner similar to the +20 V and +8.2 V supplies, except that Q545 controls the conduction of the NPN series-pass transistor located in the mainframe. The reference voltage for the error-sensing circuit, Q540, is established by CR540.

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 Code
00213	NYTRONICS COMPONENTS GROUP INC SUBSIDIARY OF NYTRONICS INC	ORANGE ST	DARLINGTON SC 29532
00853	SANGAMO WESTON INC SANGAMO CAPACITOR DIV	SANGAMO RD P O BOX 128	PICKENS SC 29671
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPRESSWAY P O BOX 225012 M/S 49	DALLAS TX 75265
02735	RCA CORP SOLID STATE DIVISION	ROUTE 202	SOMERVILLE NJ 08876
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR GROUP	5005 E MCDOWELL RD	PHOENIX AZ 85008
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV	464 ELLIS ST	MOUNTAIN VIEW CA 94042
07716	TRW INC TRW ELECTRONICS COMPONENTS TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
10389	ILLINOIS TOOL WORKS INC	1714 N DAMEN AVE	CHICAGO IL 60647
12969	UNITRODE CORP	580 PLEASANT ST	WATERTOWN MA 02172
13511	AMPHENOL CADRE DIV BUNKER RAMO CORP		LOS GATOS CA
14193	CAL-R INC	1601 OLYMPIC BLVD	SANTA MONICA CA 90404
14433	ITT SEMICONDUCTORS DIV		WEST PALM BEACH FL
14552	MICRO/SEMICONDUCTOR CORP	2830 S FAIRVIEW ST	SANTA ANA CA 92704
14752	ELECTRO CUBE INC	1710 S DEL MAR AVE	SAN GABRIEL CA 91776
19701	MEPCO/ELECTRA INC A NORTH AMERICAN PHILIPS CO	P O BOX 760	MINERAL WELLS TX 76067
24546	CORNING GLASS WORKS	550 HIGH ST	BRADFORD PA 16701
25403	AMPEREX ELECTRONIC CORP SEMICONDUCTOR AND MICROCIRCUITS DIV	PROVIDENCE PIKE	SLATERSVILLE RI 02876
31918	ITT SCHADOW INC	8081 WALLACE RD	EDEN PRAIRIE MN 55343
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507
51406	MURATA ERIE NORTH AMERICA INC GEORGIA OPERATIONS	1148 FRANKLIN RD SE	MARIETTA GA 30067
51642	CENTRE ENGINEERING INC	2820 E COLLEGE AVE	STATE COLLEGE PA 16801
56289	SPRAGUE ELECTRIC CO	87 MARSHALL ST	NORTH ADAMS MA 01247
57668	ROHM CORP	16931 MILLIKEN AVE	IRVINE CA 92713
59660	TUSONIX INC	2155 N FORBES BLVD	TUCSON, ARIZONA 85705
59821	CENTRALAB INC SUB NORTH AMERICAN PHILIPS CORP	7158 MERCHANT AVE	EL PASO TX 79915
71744	GENERAL INSTRUMENT CORP LAMP DIV	4433 N RAVENSWOOD AVE	CHICAGO IL 60640
72982	ERIE TECHNOLOGICAL PRODUCTS INC	645 W 11TH ST	ERIE PA 16512
74970	JOHNSON E F CO	299 10TH AVE S W	WASECA MN 56093
75042	TRW INC TRW ELECTRONIC COMPONENTS IRC FIXED RESISTORS PHILADELPHIA DIV	401 N BROAD ST	PHILADELPHIA PA 19108
78488	STACKPOLE CARBON CO		ST MARYS PA 15857
79727	C-W INDUSTRIES	550 DAVISVILLE RD P O BOX 96	WARMINSTER PA 18974
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
91637	DALE ELECTRONICS INC	P O BOX 609	COLUMBUS NE 68601
TK1727	PHILIPS NEDERLAND BV AFD ELONCO	POSTBUS 90050	5600 PB EINDHOVEN THE NETHERLANDS

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-3304-00	B010100	B039999	CIRCUIT BD ASSY:MAIN	80009	670-3304-00
A1	670-3304-01	B040000	B050559	CIRCUIT BD ASSY:MAIN	80009	670-3304-01
A1	670-3304-02	B050560	B050929	CIRCUIT BD ASSY:MAIN	80009	670-3304-02
A1	670-3304-03	B050930	B051759	CIRCUIT BD ASSY:MAIN	80009	670-3304-03
A1	670-3304-04	B051760	B053071	CIRCUIT BD ASSY:MAIN	80009	670-3304-04
A1	670-3304-05	B053072	B055289	CIRCUIT BD ASSY:MAIN	80009	670-3304-05
A1	670-3304-06	B055290	B056539	CIRCUIT BD ASSY:MAIN	80009	670-3304-06
A1	670-3304-07	B056540		CIRCUIT BD ASSY:MAIN	80009	670-3304-07
A2	670-3364-00	B010100	B039999	CIRCUIT BD ASSY:AUXILIARY	80009	670-3364-00
A2	670-3364-01	B040000	B056539	CIRCUIT BD ASSY:AMPLIFIER	80009	670-3364-01
A2	670-3364-02	B056540		CIRCUIT BD ASSY:AUXILIARY	80009	670-3364-02

A1	670-3304-00	B010100	B039999	CIRCUIT BD ASSY:MAIN	80009	670-3304-00
A1	670-3304-01	B040000	B050559	CIRCUIT BD ASSY:MAIN	80009	670-3304-01
A1	670-3304-02	B050560	B050929	CIRCUIT BD ASSY:MAIN	80009	670-3304-02
A1	670-3304-03	B050930	B051759	CIRCUIT BD ASSY:MAIN	80009	670-3304-03
A1	670-3304-04	B051760	B053071	CIRCUIT BD ASSY:MAIN	80009	670-3304-04
A1	670-3304-05	B053072	B055289	CIRCUIT BD ASSY:MAIN	80009	670-3304-05
A1	670-3304-06	B055290	B056539	CIRCUIT BD ASSY:MAIN	80009	670-3304-06
A1	670-3304-07	B056540		CIRCUIT BD ASSY:MAIN	80009	670-3304-07
A2	670-3364-00	B010100	B039999	CIRCUIT BD ASSY:AUXILIARY	80009	670-3364-00
A2	670-3364-01	B040000	B056539	CIRCUIT BD ASSY:AMPLIFIER	80009	670-3364-01
A2	670-3364-02	B056540		CIRCUIT BD ASSY:AUXILIARY	80009	670-3364-02

C100	283-0189-00			CAP,FXD,CER DI:0.1UF,20%,400V	51642	500400X5R 104M
C102	281-0184-00			CAP,VAR,PLASTIC:2-18PF,500VDC	TK1727	2222-809-05003
C104	281-0153-00			CAP,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-055
C105	281-0628-00			CAP,FXD,CER DI:15PF,5%,500V	59660	301-000C0G0150J
C107	283-0641-00			CAP,FXD,MICA DI:180PF,1%,100V	00853	D155F181F0
C110	281-0184-00			CAP,VAR,PLASTIC:2-18PF,500VDC	TK1727	2222-809-05003
C112	281-0153-00			CAP,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-055
C113	281-0628-00			CAP,FXD,CER DI:15PF,5%,500V	59660	301-000C0G0150J
C115	283-0696-00			CAP,FXD,MICA DI:2300PF,1%,500V	00853	D195F232F0
C117	281-0184-00			CAP,VAR,PLASTIC:2-18PF,500VDC	TK1727	2222-809-05003
C118	281-0576-00			CAP,FXD,CER DI:11PF,5%,500V	59660	301-000C0G0110J
C120	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C124	290-0525-00			CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
C127	281-0518-00			CAP,FXD,CER DI:47PF,+/-9.4PF,500V	59660	301-000U2J0470M
C138	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C154	281-0528-00	B010100	B050559	CAP,FXD,CER DI:82PF,+/-8.2PF,500V	59660	301-000U2M0820K
C154	281-0637-00	B050560	B055289	CAP,FXD,CER DI:91PF,5%,500V	59660	301-000-Z5D0910J
C154	283-0060-00	B055290		CAP,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
C156	290-0525-00			CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
C169	281-0576-00			CAP,FXD,CER DI:11PF,5%,500V	59660	301-000C0G0110J
C200	281-0550-00			CAP,FXD,CER DI:120PF,10%,500V	59660	301000X5P121K
C204	281-0629-00			CAP,FXD,CER DI:33PF,5%,600V	59660	0301-080C0G0330J
C205	290-0522-00			CAP,FXD,ELCTLT:1UF,20%,50V	05397	T368A105M050AZ
C208	283-0065-00	B053072		CAP,FXD,CER DI:0.001UF,5%,100V	59660	0835591Y5E0102J
C210	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	59660	855-558Z5V0203Z
C218	290-0522-00			CAP,FXD,ELCTLT:1UF,20%,50V	05397	T368A105M050AZ
C220	283-0051-00			CAP,FXD,CER DI:0.0033UF,5%,100V	04222	SR301A332JAA
C228	283-0594-00			CAP,FXD,MICA DI:0.001UF,1%,100V	00853	D151F102F0
C229	285-1049-00			CAP,FXD,PLASTIC:0.01UF,1%,200V	14752	230B1C103F
C230	285-1051-00			CAP,FXD,PLASTIC:1UF,1%,200V	14752	230B1C105F
C270	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C305	281-0524-00			CAP,FXD,CER DI:150PF,+/-30PF,500V	59660	301000X5U151M
C310	281-0658-00			CAP,FXD,CER DI:6.2PF,+/-0.25PF,500	59660	301-000C0H0629C
C318	281-0638-00			CAP,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
C339	281-0526-00			CAP,FXD,CER DI:1.5PF,+/-0.5PF,500V	59660	301-000S2K0159D

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
C345	283-0178-00			CAP,FXD,CER DI:0.1UF,+80-20%,100V	05397	C330C104Z1U1CA
C346	283-0178-00			CAP,FXD,CER DI:0.1UF,+80-20%,100V	05397	C330C104Z1U1CA
C348	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C367	283-0010-00			CAP,FXD,CER DI:0.05UF,+80-20%,50V	04222	SR305E503ZAA
C369	290-0522-00			CAP,FXD,ELCTLT:1UF,20%,50V	05397	T368A105M050AZ
C375	283-0010-00			CAP,FXD,CER DI:0.05UF,+80-20%,50V	04222	SR305E503ZAA
C378	290-0410-00			CAP,FXD,ELCTLT:15UF,+50-10%,100V	00853	556DD150T100B
C380	283-0629-00			CAP,FXD,MICA DI:62PF,1%,500V	00853	D105E620FO
C382	290-0410-00			CAP,FXD,ELCTLT:15UF,+50-10%,100V	00853	556DD150T100B
C384	283-0267-00			CAP,FXD,CER DI:0.01UF,20%,500V	59660	0841546Y5500103M
C385	283-0267-00			CAP,FXD,CER DI:0.01UF,20%,500V	59660	0841546Y5500103M
C387	283-0267-00			CAP,FXD,CER DI:0.01UF,20%,500V	59660	0841546Y5500103M
C388	283-0267-00			CAP,FXD,CER DI:0.01UF,20%,500V	59660	0841546Y5500103M
C390	283-0267-00			CAP,FXD,CER DI:0.01UF,20%,500V	59660	0841546Y5500103M
C391	283-0267-00			CAP,FXD,CER DI:0.01UF,20%,500V	59660	0841546Y5500103M
C392	283-0013-00	B010100	B056539	CAP,FXD,CER DI:0.01UF,-0+100%,1000V	59660	818-602Z5U0103P
C392	283-0343-00	B056540		CAP,FXD,CER DI:0.01UF,20%,2000V	72982	3848545Z5U0103M
C394	283-0013-00	B010100	B056539	CAP,FXD,CER DI:0.01UF,-0+100%,1000V	59660	818-602Z5U0103P
C394	283-0343-00	B056540		CAP,FXD,CER DI:0.01UF,20%,2000V	72982	3848545Z5U0103M
C395	283-0013-00	B010100	B056539	CAP,FXD,CER DI:0.01UF,-0+100%,1000V	59660	818-602Z5U0103P
C395	283-0343-00	B056540		CAP,FXD,CER DI:0.01UF,20%,2000V	72982	3848545Z5U0103M
C397	283-0013-00	B010100	B056539	CAP,FXD,CER DI:0.01UF,-0+100%,1000V	59660	818-602Z5U0103P
C397	283-0343-00	B056539		CAP,FXD,CER DI:0.01UF,20%,2000V	72982	3848545Z5U0103M
C408	283-0279-00			CAP,FXD,CER DI:0.001UF,20%,3000V	51406	DHR12Y5S102M3KV
C412	290-0522-00			CAP,FXD,ELCTLT:1UF,20%,50V	05397	T368A105M050AZ
C415	283-0343-00			CAP,FXD,CER DI:0.01UF,20%,2000V	72982	3848545Z5U0103M
C418	283-0279-00			CAP,FXD,CER DI:0.001UF,20%,3000V	51406	DHR12Y5S102M3K
C420	290-0164-00			CAP,FXD,ELCTLT:1UF,+50-10%,150V	56289	5000105F150BA
C422	281-0638-00			CAP,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
C424	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR306E104ZAA
C505	281-0638-00			CAP,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
C514	290-0525-00			CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
C520	290-0525-00			CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
C525	290-0525-00			CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
C527	290-0525-00			CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
C530	290-0525-00			CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
C537	290-0525-00			CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
C540	281-0638-00			CAP,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
CR121	152-0246-00			SEMICOND DVC,DI:SW,SI,40V,200MA,DO-7	14433	WG1537TK
CR125	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR152	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR154	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR165	152-0233-00			SEMICOND DVC,DI:SW,SI,80V,75MA,DO-7	03508	DA2737
CR178	152-0233-00			SEMICOND DVC,DI:SW,SI,80V,75MA,DO-7	03508	DA2737
CR190	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR200	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR201	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR215	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR238	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR280	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR282	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR285	152-0061-00			SEMICOND DVC,DI:SW,SI,175V,0.1A,DO-35	07263	FDH2161
CR290	152-0061-00			SEMICOND DVC,DI:SW,SI,175V,0.1A,DO-35	07263	FDH2161
CR334	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR362	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR365	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152
CR366	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152
CR382	152-0107-00	B010100	B056539	SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR382	152-0586-00	B056540		SEMICOND DVC,DI:RECT,SI,600V,0.5A	25403	BYV96D OR BYV95C

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
CR384	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR386	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR387	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR389	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR390	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR392	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR415	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR416	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR418	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR420	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR424	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR540	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
DS515	150-0109-00			LAMP,INCAND:18V,0.026A,#CM7220,WIRE LD	71744	CM7220
J100	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J101	355-0170-00			STUD,SHLDR&STEP:BINDING POST	80009	355-0170-00
L129	276-0569-00	B051760		CORE,EM:TOROID,FERRITE	78488	57-9660
L130	276-0569-00	B051760		CORE,EM:TOROID,FERRITE	78488	57-9660
L415	----- -----			(PART OF V415)		
P415	----- -----			(PART OF V415)		
Q120	151-1011-00			TRANSISTOR:FE,N CHAN,SI,DUAL,TO-71	04713	SFD1011
Q125	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q135	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q148	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q150	151-0188-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q158	151-0188-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q160	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q165	151-0279-00			TRANSISTOR:SELECTED	04713	SS2821
Q167	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q176	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q178	151-0279-00			TRANSISTOR:SELECTED	04713	SS2821
Q184	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
Q190	151-0341-00			TRANSISTOR:NPN,SI,TO-106	04713	SPS6919
Q230	151-1054-00			TRANSISTOR:FET,N-CHAN,SI,TO-71	80009	151-1054-00
Q240	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q250	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q252	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
Q270	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
Q285	151-0347-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS7951
Q290	151-0347-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS7951
Q305	151-1054-00			TRANSISTOR:FET,N-CHAN,SI,TO-71	80009	151-1054-00
Q315	151-0341-00			TRANSISTOR:NPN,SI,TO-106	04713	SPS6919
Q320	151-0341-00			TRANSISTOR:NPN,SI,TO-106	04713	SPS6919
Q336	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
Q345	151-0350-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS6700
Q348	151-0347-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS7951
Q350	151-0301-00			TRANSISTOR:PNP,SI,TO-18	04713	ST898
Q360	151-0519-00			SCR:SI,TO-92	80009	151-0519-00
Q365	151-0254-00			TRANSISTOR:DARLINGTON,NPN,SI	03508	X38L3118
Q370	151-0301-00			TRANSISTOR:PNP,SI,TO-18	04713	ST898
Q380	151-0358-00			TRANSISTOR:SELECTED	03508	X44T211
Q500	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q510	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
Q520	151-0208-00			TRANSISTOR:PNP,SI,TO-5	02735	65349
Q525	151-0341-00			TRANSISTOR:NPN,SI,TO-106	04713	SPS6919
Q530	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
Q535	151-0136-00			TRANSISTOR:NPN,SI,TO-5	02735	35495
Q540	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
Q545	151-0341-00			TRANSISTOR:NPN,SI,TO-106	04713	SPS6919
R100	315-0201-02	B010100	B056539	RES,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R100	315-0101-06	B056540		RES,FXD,CMPSN:100 OHM,5%,0.25 W	01121	CB1015
R105	322-0621-00			RES,FXD,FILM:900K OHM,1%,0.25W,TC=T0	19701	5043RD900K0F
R107	321-0617-00			RES,FXD,FILM:111K OHM,1%,0.125W,TC=T0	91637	MFF1816G11102F
R113	322-0624-00			RES,FXD,FILM:990K OHM,1%,0.25W,TC=T0	19701	5043RD990K0F
R115	321-0614-00			RES,FXD,FILM:10.1K OHM,1%,0.125W,TC=T0	91637	MFF1816G10101F
R117	321-0481-00			RES,FXD,FILM:1M OHM,1%,0.125W,TC=T0	19701	5043ED1M000F
R120	315-0104-00			RES,FXD,CMPSN:100K OHM,5%,0.25W	57668	NTR25J-E100K
R121	315-0201-00			RES,FXD,CMPSN:200 OHM,5%,0.25W	57668	NTR25J-E200E
R125	321-0184-00			RES,FXD,FILM:806 OHM,1%,0.125W,TC=T0	19701	5033ED806R0F
R127	321-0242-00			RES,FXD,FILM:3.24K OHM,1%,0.125W,TC=T0	19701	5043ED3K240F
R129	321-0086-00			RES,FXD,FILM:76.8 OHM,1%,0.125W,TC=T0	91637	CMF55116G76R80F
R130	311-1182-00	B010100	B055969	RES,VAR,NONWW:PNL,1.5K OHM,0.5W	01121	W7835
R130	311-1083-00	B055970		RES,VAR,NONWW:PNL,1.5K OHM,0.25W	01121	WA1N048S152BZ
R132	311-1560-00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3352T-1-502
R134	321-0242-00			RES,FXD,FILM:3.24K OHM,1%,0.125W,TC=T0	19701	5043ED3K240F
R136	321-0181-00			RES,FXD,FILM:750 OHM,1%,0.125W,TC=T0	07716	CEAD750R0F
R138	315-0560-00			RES,FXD,CMPSN:56 OHM,5%,0.25W	57668	NTR25J-E56E0
R139	315-0472-00			RES,FXD,CMPSN:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R142	311-1558-00			RES,VAR,NONWW:TRMR,20K OHM,0.5W	32997	3352T-1-203
R145	311-1298-00			RES,VAR,NONWW:PNL,10K OHM,0.5W	01121	W-7909
R146	315-0622-00			RES,FXD,CMPSN:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R147	315-0155-00			RES,FXD,CMPSN:1.5M OHM,5%,0.25W	19701	5043CX1M500J
R148	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	19701	5043CX10K00J
R150	321-0221-00			RES,FXD,FILM:1.96K OHM,1%,0.125W,TC=T0	19701	5043ED1K960F
R152	321-0230-00			RES,FXD,FILM:2.43K OHM,1%,0.125W,TC=T0	19701	5043ED2K430F
R154	321-0155-00			RES,FXD,FILM:402 OHM,1%,0.125W,TC=T0	07716	CEAD402R0F
R156	321-0230-00			RES,FXD,FILM:2.43K OHM,1%,0.125W,TC=T0	19701	5043ED2K430F
R158	321-0221-00			RES,FXD,FILM:1.96K OHM,1%,0.125W,TC=T0	19701	5043ED1K960F
R160	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	19701	5043CX10K00J
R165	308-0293-00	B010100	B039999	RES,FXD,WW:4K OHM,5%,3W	91637	RS2B-B40000J
R165	308-0349-00	B040000		RES,FXD,WW:3.60K OHM,1%,3W	00213	1200S-3600-1
R167	322-0210-00	B010100	B039999	RES,FXD,FILM:1.50K OHM,1%,0.25W,TC=T0	75042	CEBT0-1501F
R167	322-0205-00	B040000		RES,FXD,FILM:1.33K OHM,1%,0.25W,TC=T0	24546	NA6001331F
R169	321-0184-00			RES,FXD,FILM:806 OHM,1%,0.125W,TC=T0	19701	5033ED806R0F
R172	311-1563-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3352T-1-102
R174	315-0392-00			RES,FXD,CMPSN:3.9K OHM,5%,0.25W	57668	NTR25J-E03K9
R176	322-0210-00	B010100	B039999	RES,FXD,FILM:1.50K OHM,1%,0.25W,TC=T0	75042	CEBT0-1501F
R176	322-0205-00	B040000		RES,FXD,FILM:1.33K OHM,1%,0.25W,TC=T0	24546	NA6001331F
R178	308-0293-00	B010100	B039999	RES,FXD,WW:4K OHM,5%,3W	91637	RS2B-B40000J
R178	308-0349-00	B040000		RES,FXD,WW:3.60K OHM,1%,3W	00213	1200S-3600-1
R184	315-0622-00			RES,FXD,CMPSN:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R186	311-1565-00			RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3352T-1-251
R187	315-0331-00			RES,FXD,CMPSN:330 OHM,5%,0.25W	57668	NTR25J-E330E
R189	315-0561-00			RES,FXD,CMPSN:560 OHM,5%,0.25W	19701	5043CX560R0J
R190	315-0182-00			RES,FXD,CMPSN:1.8K OHM,5%,0.25W	57668	NTR25J-E1K8
R192	315-0272-00			RES,FXD,CMPSN:2.7K OHM,5%,0.25W	57668	NTR25J-E02K7
R200	315-0223-00			RES,FXD,CMPSN:22K OHM,5%,0.25W	19701	5043CX22K00J92U
R202	315-0511-00	B055290		RES,FXD,CMPSN:510 OHM,5%,0.25W	19701	5043CX510R0J
R205	315-0332-00			RES,FXD,CMPSN:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R210	311-1686-00			RES,VAR,NONWW:PNL,2.5K OHM,1W,W/SW	01121	12M358
R212	311-1559-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3352T-1-103
R214	315-0333-00			RES,FXD,CMPSN:33K OHM,5%,0.25W	57668	NTR25J-E33K0
R215	315-0122-00			RES,FXD,CMPSN:1.2K OHM,5%,0.25W	57668	NTR25J-E01K2
R220	315-0223-00			RES,FXD,CMPSN:22K OHM,5%,0.25W	19701	5043CX22K00J92U
R225	311-1686-00			RES,VAR,NONWW:PNL,2.5K OHM,1W,W/SW	01121	12M358
R226	311-1564-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3352T-CK5-501
R228	321-0368-00			RES,FXD,FILM:66.5K OHM,1%,0.125W,TC=T0	07716	CEAD66501F
R229	322-0464-00			RES,FXD,FILM:665K OHM,1%,0.25W,TC=T0	19701	5053RD665K0F
R230	323-0557-08			RES,FXD,FILM:6.19M OHM,1%,0.5W,TC=T2	91637	MFF12061903F

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R231	321-0450-00			RES,FXD,FILM:475K OHM,1%,0.125W,TC=T0	19701	5043ED475K0F
R235	311-1558-00			RES,VAR,NONWW:TRMR,20K OHM,0.5W	32997	3352T-1-203
R236	315-0433-00			RES,FXD,CMPSN:43K OHM,5%,0.25W	19701	5043CX43K00J
R238	315-0432-00			RES,FXD,CMPSN:4.3K OHM,5%,0.25W	57668	NTR25J-E04K3
R240	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	19701	5043CX10K00J
R242	315-0303-00			RES,FXD,CMPSN:30K OHM,5%,0.25W	19701	5043CX30K00J
R245	311-1558-00			RES,VAR,NONWW:TRMR,20K OHM,0.5W	32997	3352T-1-203
R248	315-0562-00			RES,FXD,CMPSN:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R250	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	19701	5043CX10K00J
R251	315-0471-00			RES,FXD,CMPSN:470 OHM,5%,0.25W	57668	NTR25J-E470E
R252	321-0246-00			RES,FXD,FILM:3.57K OHM,1%,0.125W,TC=T0	19701	5043ED3K570F
R254	321-0259-00			RES,FXD,FILM:4.87K OHM,1%,0.125W,TC=T0	07716	CEAD48700F
R256	315-0512-00			RES,FXD,CMPSN:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
R258	311-1564-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3352T-CK5-501
R260	315-0821-00			RES,FXD,CMPSN:820 OHM,5%,0.25W	19701	5043CX820R0J
R265	311-1561-00			RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3352T-1-252
R267	321-0259-00			RES,FXD,FILM:4.87K OHM,1%,0.125W,TC=T0	07716	CEAD48700F
R270	321-0246-00			RES,FXD,FILM:3.57K OHM,1%,0.125W,TC=T0	19701	5043ED3K570F
R272	315-0222-00			RES,FXD,CMPSN:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R273	315-0912-00			RES,FXD,CMPSN:9.1K OHM,5%,0.25W	57668	NTR25J-E09K1
R275	311-1298-00			RES,VAR,NONWW:PNL,10K OHM,0.5W	01121	W-7909
R280	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	57668	NTR25JE01K0
R285	308-0412-00			RES,FXD,WW:8.2K OHM,1%,3W,TC=10PPM	14193	SA31 8201F
R287	321-0243-00			RES,FXD,FILM:3.32K OHM,1%,0.125W,TC=T0	19701	5033ED3K32F
R289	321-0193-00			RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R291	321-0243-00			RES,FXD,FILM:3.32K OHM,1%,0.125W,TC=T0	19701	5033ED3K32F
R294	308-0412-00			RES,FXD,WW:8.2K OHM,1%,3W,TC=10PPM	14193	SA31 8201F
R300	311-1555-00	B010100	B056539	RES,VAR,NONWW:TRMR,100K OHM,0.5W	32997	3352T-1-104
R300	311-1914-00	B056540		RES,VAR,NONWW:TRMR,50K OHM,10%,0.5 W	32997	3386C-T07-503
R302	315-0153-00	B010100	B056539	RES,FXD,CMPSN:15K OHM,5%,0.25W	19701	5043CX15K00J
R302	315-0513-00	B056540		RES,FXD,CMPSN:51K OHM,5%,0.25W	57668	NTR25J-E51K0
R303	315-0512-00			RES,FXD,CMPSN:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
R305	315-0392-00			RES,FXD,CMPSN:3.9K OHM,5%,0.25W	57668	NTR25J-E03K9
R307	315-0332-00			RES,FXD,CMPSN:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R310	315-0243-00	B010100	B056539	RES,FXD,CMPSN:24K OHM,5%,0.25W	57668	NTR25J-E24K0
R310	315-0183-00	B056540		RES,FXD,CMPSN:18K OHM,5%,0.25W	19701	5043CX18K00J
R315	315-0273-00			RES,FXD,CMPSN:27K OHM,5%,0.25W	57668	NTR25J-E27K0
R316	315-0273-00			RES,FXD,CMPSN:27K OHM,5%,0.25W	57668	NTR25J-E27K0
R318	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	19701	5043CX10K00J
R320	315-0222-00			RES,FXD,CMPSN:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R324	321-0226-00			RES,FXD,FILM:2.21K OHM,1%,0.125W,TC=T0	07716	CEAD22100F
R326	321-0298-00			RES,FXD,FILM:12.4K OHM,1%,0.125W,TC=T0	07716	CEAD12401F
R328	315-0113-00			RES,FXD,CMPSN:11K OHM,5%,0.25W	19701	5043CX11K00J
R330	311-1298-00			RES,VAR,NONWW:PNL,10K OHM,0.5W	01121	W-7909
R334	315-0184-00			RES,FXD,CMPSN:180K OHM,5%,0.25W	19701	5043CX180K0J
R336	315-0222-00			RES,FXD,CMPSN:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R337	315-0472-00			RES,FXD,CMPSN:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R339	321-0344-00			RES,FXD,FILM:37.4K OHM,1%,0.125W,TC=T0	19701	5033ED 37K40F
R342	315-0683-00			RES,FXD,CMPSN:68K OHM,5%,0.25W	57668	NTR25J-E68K0
R343	315-0682-00			RES,FXD,CMPSN:6.8K OHM,5%,0.25W	57668	NTR25J-E06K8
R345	315-0471-00			RES,FXD,CMPSN:470 OHM,5%,0.25W	57668	NTR25J-E470E
R346	315-0182-00			RES,FXD,CMPSN:1.8K OHM,5%,0.25W	57668	NTR25J-E1K8
R348	315-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R352	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	57668	NTR25JE01K0
R354	315-0472-00			RES,FXD,CMPSN:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R356	315-0183-00			RES,FXD,CMPSN:18K OHM,5%,0.25W	19701	5043CX18K00J
R357	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	57668	NTR25JE01K0
R362	321-0645-00			RES,FXD,FILM:100K OHM,0.5%,0.125W,TC=T2	91637	MFF1816D10002D
R363	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	57668	NTR25JE01K0

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R365	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	19701	5043CX10K00J
R367	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	19701	5043CX10K00J
R369	315-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R370	315-0222-00			RES,FXD,CMPSN:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R372	315-0682-00			RES,FXD,CMPSN:6.8K OHM,5%,0.25W	57668	NTR25J-E06K8
R374	315-0472-00			RES,FXD,CMPSN:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R375	315-0100-00			RES,FXD,CMPSN:10 OHM,5%,0.25W	19701	5043CX10RR00J
R378	315-0100-00			RES,FXD,CMPSN:10 OHM,5%,0.25W	19701	5043CX10RR00J
R380	315-0100-00			RES,FXD,CMPSN:10 OHM,5%,0.25W	19701	5043CX10RR00J
R382	315-0220-00			RES,FXD,CMPSN:22 OHM,5%,0.25W	19701	5043CX22R00J
R392	315-0822-00			RES,FXD,CMPSN:8.2K OHM,5%,0.25W	19701	5043CX8K200J
R395	315-0203-00			RES,FXD,CMPSN:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R397	315-0100-00			RES,FXD,CMPSN:10 OHM,5%,0.25W	19701	5043CX10RR00J
R398	315-0100-00			RES,FXD,CMPSN:10 OHM,5%,0.25W	19701	5043CX10RR00J
R400	321-0481-00			RES,FXD,FILM:1M OHM,1%,0.125W,TC=T0	19701	5043ED1M000F
R402	321-0481-00			RES,FXD,FILM:1M OHM,1%,0.125W,TC=T0	19701	5043ED1M000F
R405	311-1312-00			RES,VAR,NONWW:PNL,5M OHM,1W	32997	81C1D-E24-BA0328
R406	321-0481-00			RES,FXD,FILM:1M OHM,1%,0.125W,TC=T0	19701	5043ED1M000F
R407	321-0481-00			RES,FXD,FILM:1M OHM,1%,0.125W,TC=T0	19701	5043ED1M000F
R408	321-0481-00			RES,FXD,FILM:1M OHM,1%,0.125W,TC=T0	19701	5043ED1M000F
R410	315-0106-00			RES,FXD,CMPSN:10M OHM,5%,0.25W	80009	315-0106-00
R412	321-0377-00			RES,FXD,FILM:82.5K OHM,1%,0.125W,TC=T0	07716	CEAD82501F
R413	321-0354-00			RES,FXD,FILM:47.5K OHM,1%,0.125W,TC=T0	19701	5043ED47K50F
R414	315-0822-00			RES,FXD,CMPSN:8.2K OHM,5%,0.25W	19701	5043CX8K200J
R415	311-1558-00			RES,VAR,NONWW:TRMR,20K OHM,0.5W	32997	3352T-1-203
R422	315-0334-00			RES,FXD,CMPSN:330K OHM,5%,0.25W	57668	NTR25J-E 330K
R424	315-0222-00			RES,FXD,CMPSN:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R425	311-1554-00			RES,VAR,NONWW:TRMR,200K OHM,0.5W	32997	3352T-1-204
R500	311-1564-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3352T-CK5-501
R501	321-0222-00			RES,FXD,FILM:2.00K OHM,1%,0.125W,TC=T0	19701	5033ED2K00F
R502	321-0252-00			RES,FXD,FILM:4.12K OHM,1%,0.125W,TC=T0	07716	CEAD41200F
R504	315-0222-00			RES,FXD,CMPSN:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R506	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	57668	NTR25JE01K0
R507	315-0621-00			RES,FXD,CMPSN:620 OHM,5%,0.25W	57668	NTR25J-E620E
R510	315-0822-00	B010100	B051759	RES,FXD,CMPSN:8.2K OHM,5%,0.25W	19701	5043CX8K200J
R510	315-0562-00	B051760		RES,FXD,CMPSN:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R512	307-0115-00			RES,FXD,CMPSN:7.5 OHM,5%,0.25W	01121	CB75G5
R514	315-0201-00			RES,FXD,CMPSN:200 OHM,5%,0.25W	57668	NTR25J-E200E
R518	308-0218-00			RES,FXD,WW:150 OHM,5%,3W	00213	1240S-150-5
R520	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	57668	NTR25JE01K0
R522	321-0237-00			RES,FXD,FILM:2.87K OHM,1%,0.125W,TC=T0	07716	CEAD 28700F
R523	321-0226-00			RES,FXD,FILM:2.21K OHM,1%,0.125W,TC=T0	07716	CEAD22100F
R525	315-0121-00			RES,FXD,CMPSN:120 OHM,5%,0.25W	19701	5043CX120R0J
R527	315-0121-00			RES,FXD,CMPSN:120 OHM,5%,0.25W	19701	5043CX120R0J
R532	321-0226-00			RES,FXD,FILM:2.21K OHM,1%,0.125W,TC=T0	07716	CEAD22100F
R533	321-0237-00			RES,FXD,FILM:2.87K OHM,1%,0.125W,TC=T0	07716	CEAD 28700F
R535	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	57668	NTR25JE01K0
R537	308-0385-00			RES,FXD,WW:200 OHM,5%,3W	00213	1240S-200-5
R540	315-0622-00			RES,FXD,CMPSN:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R542	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5033ED10K0F
R543	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5033ED10K0F
R545	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	57668	NTR25JE01K0
R546	315-0621-00			RES,FXD,CMPSN:620 OHM,5%,0.25W	57668	NTR25J-E620E
R548	315-0822-00	B010100	B051759	RES,FXD,CMPSN:8.2K OHM,5%,0.25W	19701	5043CX8K200J
R548	315-0562-00	B051760		RES,FXD,CMPSN:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R550	307-0109-00			RES,FXD,CMPSN:8.2 OHM,5%,0.25W	01121	CB82G5
S100	260-1445-00			SWITCH,PUSH:1 BUTTON,2 POLE,DC OFFSET	80009	260-1445-00
S1[illegible]0	260-1365-00			SWITCH,PUSH:2 BUTTON,2 POLE,TRIG SOURCE	31918	ORDER BY DESCR
S200	260-1470-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	10389	23-021-309

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
S220	260-1365-00			SWITCH,PUSH:2 BUTTON,2 POLE,TRIG SOURCE	31918	ORDER BY DESCR
S225	260-1332-00			SWITCH,PUSH:4PDT,PUSH-PUSH	31918	ORDER BY DESCR
S230	260-0723-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
T380	120-0863-00			XFMR,PWR,STU:HV	80009	120-0863-00
U200	155-0055-00			MICROCKT,LINEAR:TRIGGER & SWP AMPL	80009	155-0055-00
U310	156-0105-00			MICROCKT,LINEAR:OPNL AMPL	01295	LM301AP
V415	154-0699-00			ELECTRON TUBE:CRT,P31,INT SCALE	80009	154-0699-00
VR280	152-0279-00			SEMICOND DVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	14552	TD3810989
VR350	152-0283-00	B010100	B029999	SEMICOND DVC,DI:ZEN,SI,43V,5%,0.4W,D-07	04713	SZ14257KRL
VR352	152-0241-00	B010100	B029999	SEMICOND DVC,DI:ZEN,SI,33V,5%,0.4W,DO-7	14552	1N973B
VR352	152-0357-00	B030000		SEMICOND DVC,DI:ZEN,SI,82V,5%,0.4W,DO-7	04713	SZ12461KRL
VR500	152-0280-00			SEMICOND DVC,DI:ZEN,S1,6.2V,5%,0.4W,DO-7	04713	1N753A

OPTIONS

(No options are available at this time.)

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols and Reference Designators

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).

Resistors = Ohms (Ω).

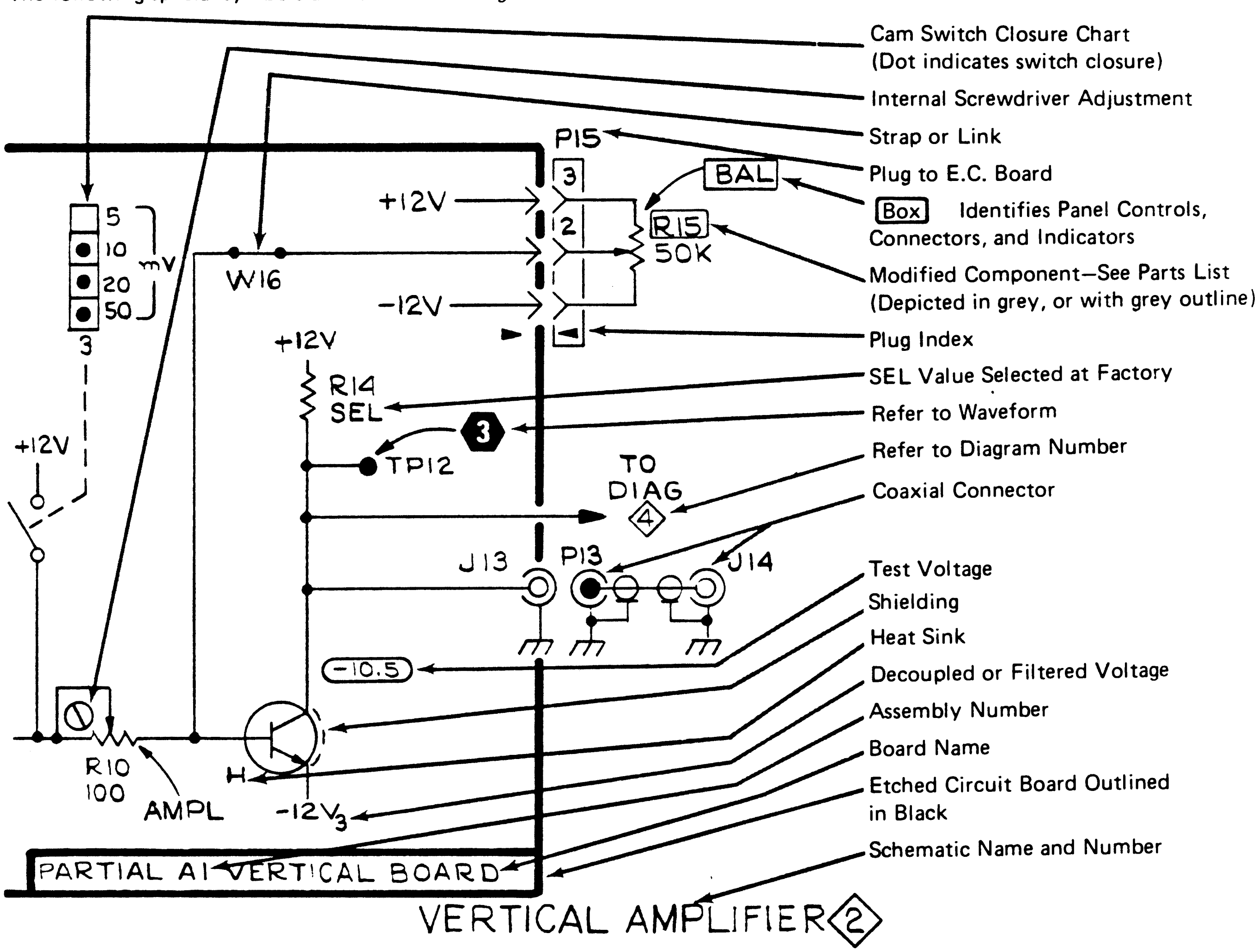
Symbols used on the diagrams are based on ANSI Standard Y32.2-1975.

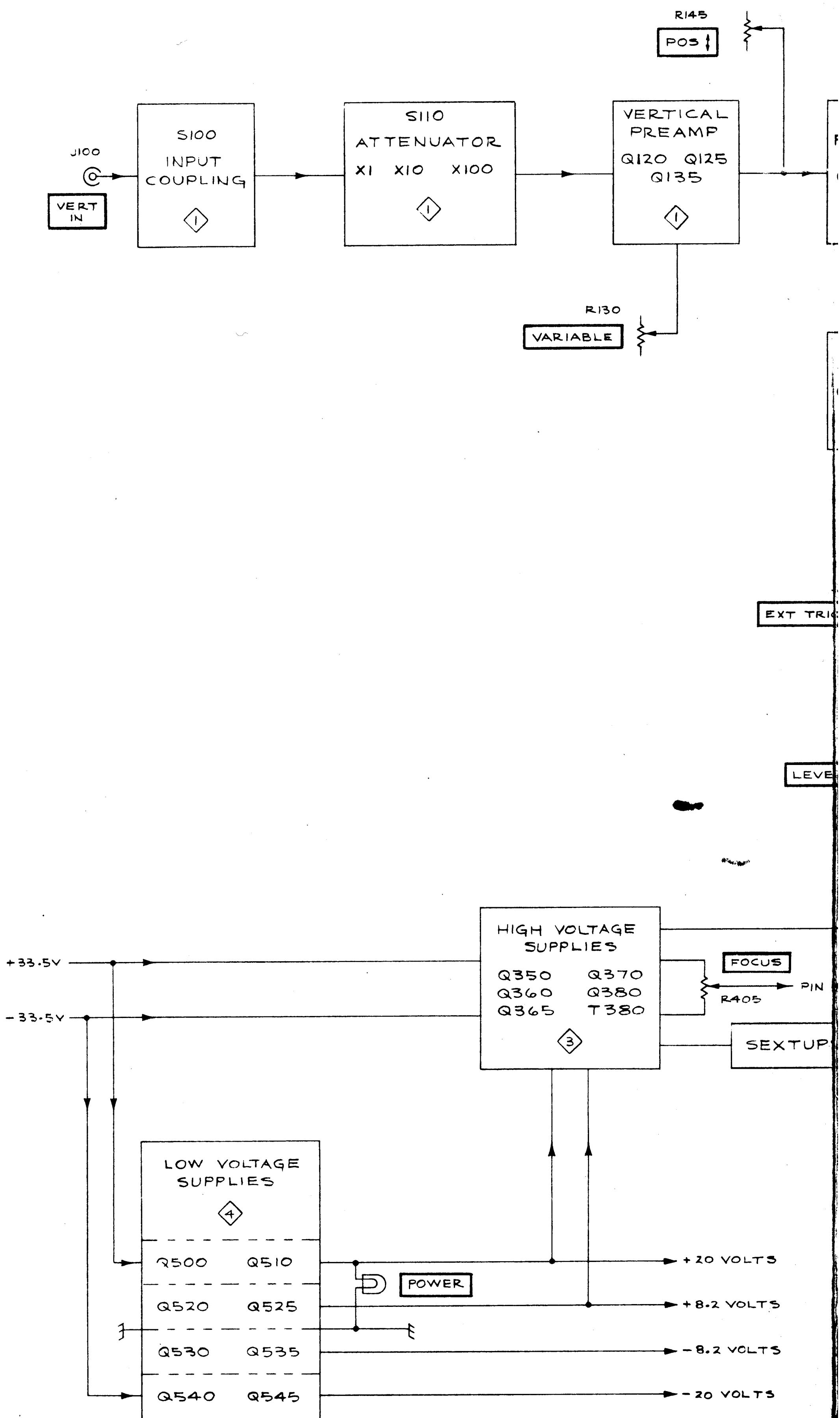
Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc.)
AT	Attenuator, fixed or variable
B	Motor
BT	Battery
C	Capacitor, fixed or variable
CB	Circuit breaker
CR	Diode, signal or rectifier
DL	Delay line
DS	Indicating device (lamp)
E	Spark Gap
F	Fuse
FL	Filter
H	Heat dissipating device (heat sink, heat radiator, etc.)
HR	Heater
HY	Hybrid circuit
J	Connector, stationary portion
K	Relay
L	Inductor, fixed or variable
M	Meter
P	Connector, movable portion
Q	Transistor or silicon-controlled rectifier
R	Resistor, fixed or variable
RT	Thermistor
S	Switch or contactor
T	Transformer
TC	Thermocouple
TP	Test point
U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
V	Electron tube
VR	Voltage regulator (zener diode, etc.)
W	Wirestrap or cable
Y	Crystal
Z	Phase shifter

The following special symbols are used on the diagrams:





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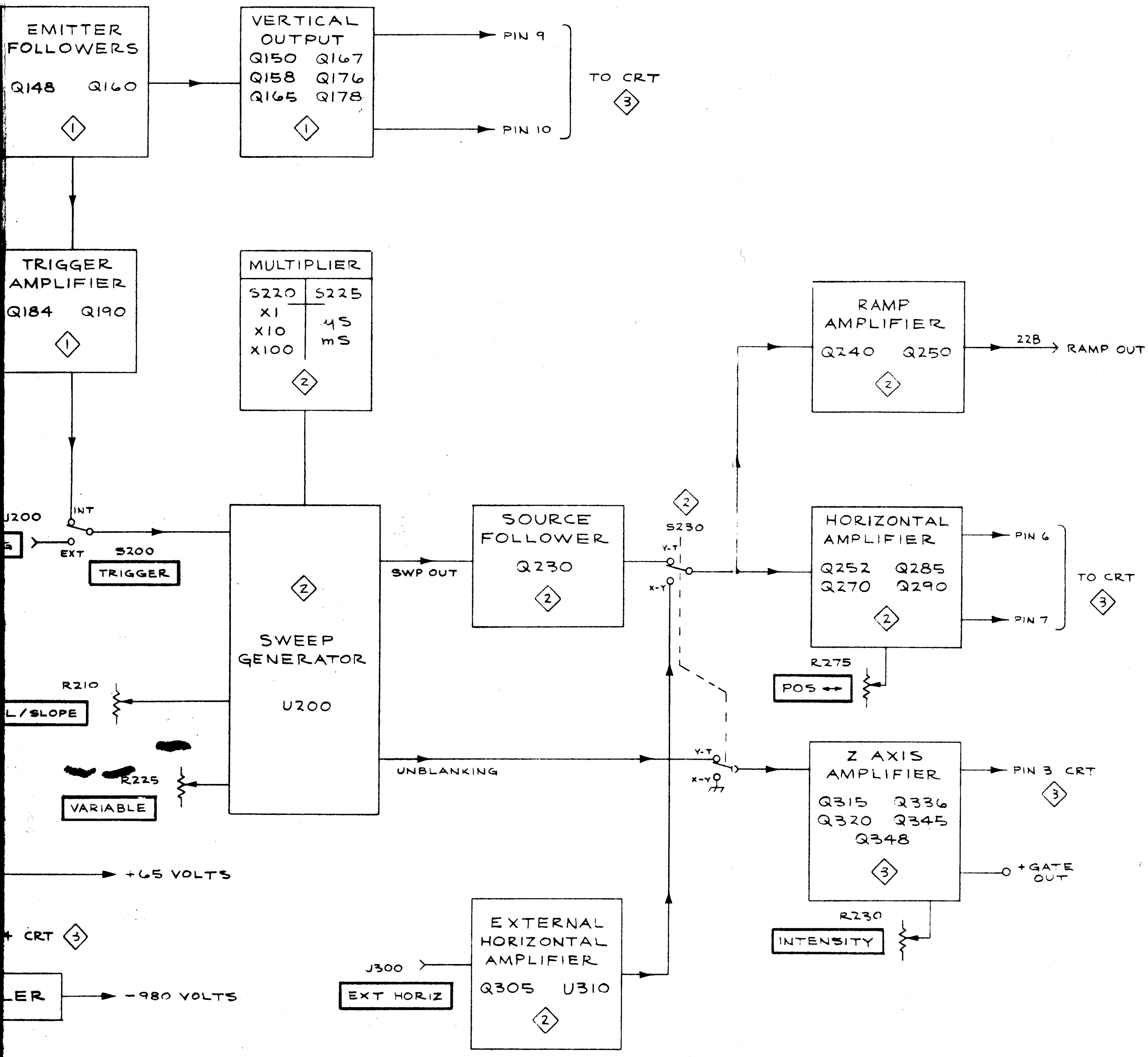
Scans by Outsource-Options =>



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BLOCK DIAGRAM

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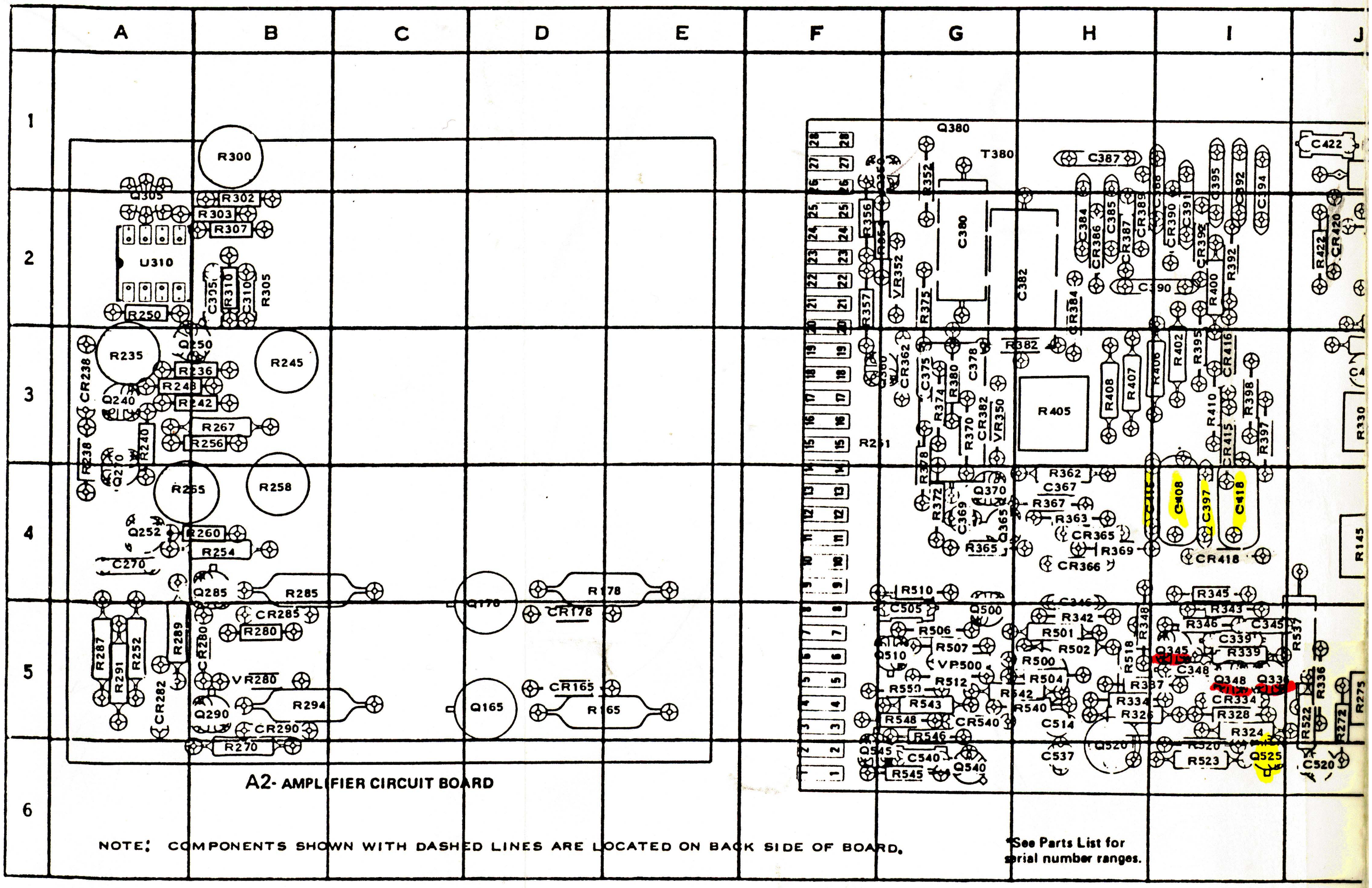
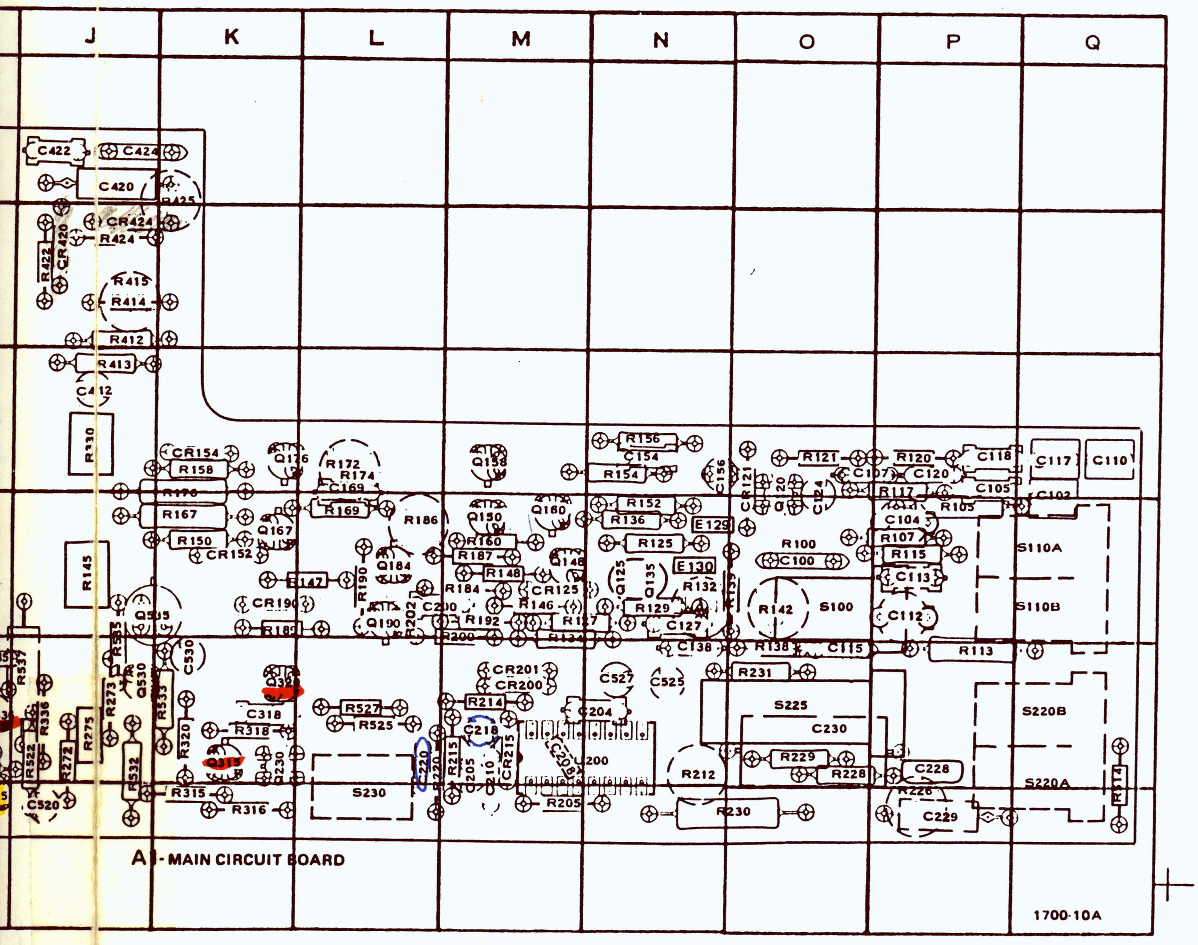


CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO
C100	O·4	C120	P·3	C210	M·5	C346	H·5	C388	I·1	C420	J·1	CR121	O·3	CR280	B·5	CR387	H·2	Q120	O·3	Q184	L·4	Q320
C102	Q·3	C124	O·3	C218	M·5	C348	I·5	C390	I·2	C422	J·1	CR125	M·4	CR282	A·5	CR389	H·2	Q125	N·4	Q190	L·4	Q336
C104	P·4	C127	N·4	C220	L·5	C367	H·4	C391	I·2	C424	J·1	CR152	K·4	CR285	B·5	CR390	I·2	Q135	N·4	Q230	K·5	Q345
C105	P·3	C138	N·5	C228	P·5	C369	G·4	C392	I·1	C505	G·5	CR154	K·3	CR290	B·5	CR392	I·2	Q148	M·4	Q240	A·3	Q348
C107	P·3	C154	N·3	C229	P·6	C375	G·3	C394	I·1	C514	H·5	CR165	D·5	CR334	I·5	CR415	I·3	Q150	M·4	Q250	B·3	Q350
C110	Q·3	C156	N·3	C230	O·5	C378	G·3	C395	I·1	C520	J·6	CR178	D·5	CR362	G·3	CR416	I·3	Q158	M·3	Q252	A·4	Q360
C112	P·4	C169	L·3	C270	A·4	C380	G·2	C397	I·4	C525	N·5	CR190	K·4	CR365	H·4	CR418	I·4	Q160	M·4	Q270	A·4	Q365
C113	P·4	C200	M·4	C305	B·2	C382	H·2	C408	I·4	C527	N·5	CR200	M·5	CR366	H·4	CR420	J·2	Q165	D·5	Q285	B·4	Q370
C115	O·5	C204	N·5	C310	B·2	C384	H·2	C412	J·3	C530	K·5	CR201	M·5	CR382	G·3	CR424	J·2	Q167	K·4	Q290	B·5	Q380
C117	Q·3	C205	M·5	C318	K·5	C385	H·2	C415	I·4	C537	H·6	CR215	M·5	CR384	H·2	CR540	G·5	Q176	K·3	Q305	A·2	Q500
C118	P·3	C208	M·5	C339	I·5	C387	H·1	C418	I·4	C540	G·6	CR238	A·3	CR386	H·2			Q178	D·5	Q315	K·5	Q510
				C345	I·5											E129*	N4					
																E130*	N4					



CKT NO	GRID LOC	CKT NO	GRID LOC
R336	J-5	R535	J-5
R337	H-5	R537	J-5
R339	I-5	R540	H-5
R342	H-5	R542	H-5
R343	I-5	R543	G-5
R345	I-4	R545	G-5
R346	I-5	R546	G-5
R348	I-5	R548	G-5
R352	G-1	R550	G-5
R354	G-2		
R356	F-2	S100	O-4
R357	F-2	S110	Q-4
R362	H-4	S220	Q-5
R363	H-4	S225	O-5
R365	G-4	S230	L-6
R367	H-4		
R369	H-4	T380	G-1
R370	G-3		
R372	G-4	U200	M-5
R374	G-3	U310	A-2
R375	G-2		
R378	F-4	VR280	B-5
R380	G-3	VR350*	G3
R382	H-3	VR352	G-2
R392	I-2	VR500	G-5
R395	I-3		
R397	I-3		
R398	I-3		
R400	I-2		
R402	I-3		
R405	H-3		
R406	I-3		
R407	H-3		
R408	H-3		
R410	I-3		
R412	J-2		
R413	J-3		
R414	J-2		
R415	J-2		
R422	J-2		
H424	J-2		
R425	K-1		
R500	H-5		
R501	H-5		
R502	H 5		
R504	H-5		
R506	G-5		
R507	G-5		
R510	G-4		
R512	G-5		
R514	Q-6		
R518	H-5		
R520	I-6		
R522	J-5		
R523	I-6		
R525	L-5		
R527	L-5		
R532	J-5		
R533	K-5		

RID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
4	Q320	K-5	Q520	H-6	R117	P-3	R142	O-4	R165	E-4	R190	L-4	R229	O-5	R251	F3	R275	J-5	R307	B-2
4	Q336	I-5	Q525	I-6	R120	P-4	R145	J-4	R167	K-4	R192	M-4	R230	O-6	R252	A-5	R280	B-5	R310	B-2
5	Q345	I-5	Q530	J-5	R121	O-3	R146	M-4	R169	L-4	R200	M-4	R231	O-5	R254	B-4	R285	B-4	R315	K-6
3	Q348	I-5	Q535	K-4	R125	N-4	R147	L-4	R172	L-3	R202*	L-4	R235	A-3	R256	B-3	R287	A-5	R316	K-6
3	Q350	G-1	Q540	G-6	R127	M-4	R148	M-4	R174	L-4	R205	M-6	R236	B-3	R258	B-4	R289	A-5	R318	K-5
4	Q360	G-3	Q545	F-6	R129	N-4	R150	K-4	R176	K-4	H212	N-5	R238	A-3	R260	B-4	R291	A-5	R320	K-5
4	Q365	G-4	R100	O-4	R132	N-4	R152	N-4	R178	E-4	R214	M-5	R240	A-3	R265	A-4	R294	B-5	R324	I-5
4	Q370	G-4	R105	P-4	R134	M-4	R154	N-3	R184	M-4	R215	M-5	R242	B-3	R267	B-3	R300	B-1	R326	H-5
5	Q380	G-1	R107	P-4	R136	N-4	R156	N-3	R186	L-4	R220	M-5	R245	B-3	R270	B-6	R302	B-2	R328	I-5
2	Q500	G-5	R113	P-5	R138	O-5	R158	K-3	R187	M-4	R226	P-6	R248	A-3	R272	J-5	R303	B-2	R330	J-3
5	Q510	G-5	R115	P-4	R139	O-4	R160	M-4	R189	K-4	R228	O-5	R250	A-2	R273	J-5	R305	B-2	R334	H-5

REV DEC 1981

Scans by Outsource-Options =>

VOLTAGE AND WAVEFORM CONDITIONS

WARNING

Dangerous potentials exist at several points throughout this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect the power source before replacing parts.

The voltages and waveforms shown on diagrams 1 and 2 were taken with the SC 501 front panel controls set as follows:

VOLTAGES & *WAVEFORMS

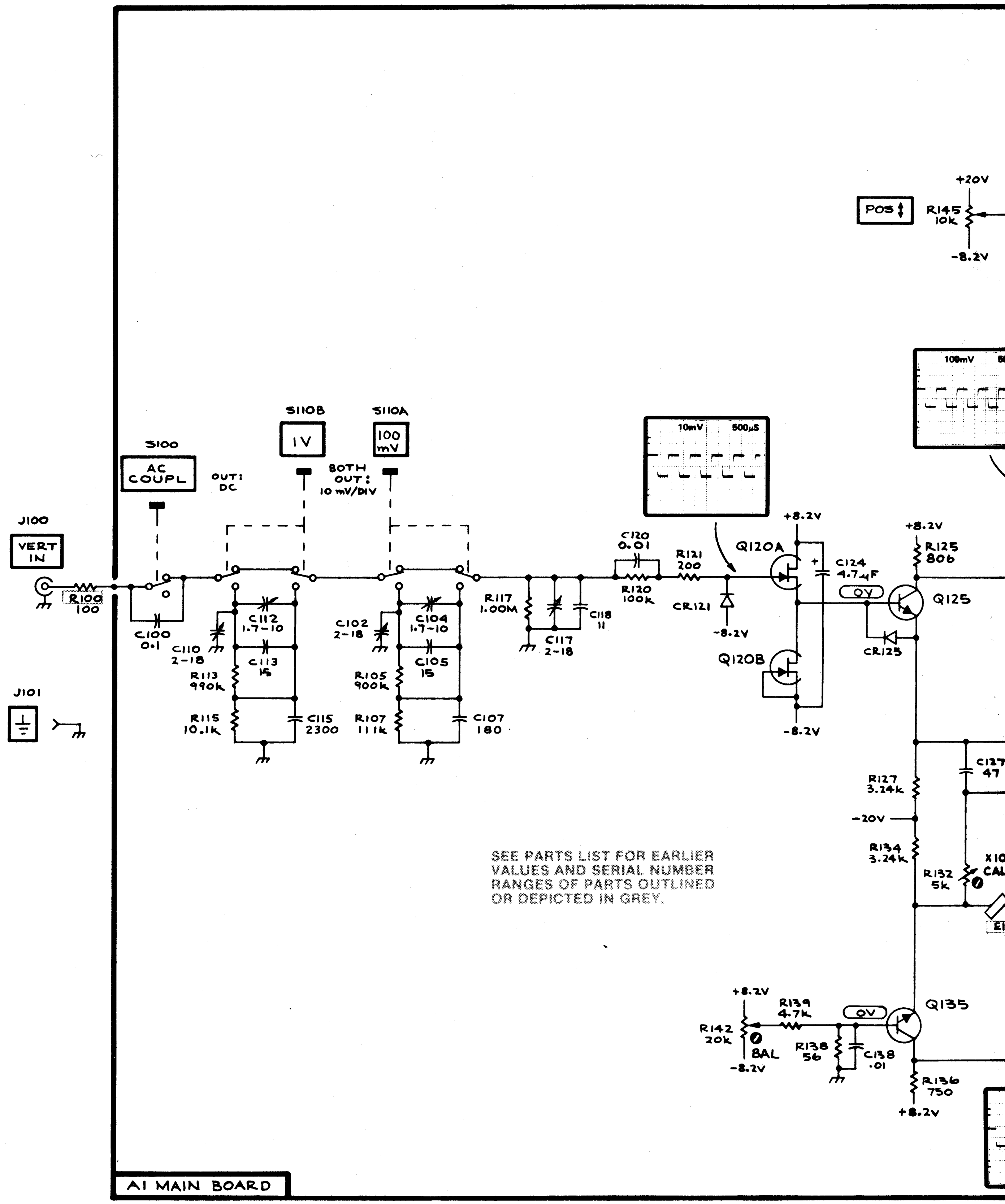
TRIGGER	pulled out (Auto)
Sweep VARIABLE	X1 (fully clockwise)
Time/Div Range pushbutton	X1
Time/Div pushbutton	X1
Horiz POS	centered
Vert VARIABLE	X1 (fully clockwise)
Coupling	ac
Volts/Div pushbutton	10 mV/Div
Vert POS	centered
INTENSITY/FOCUS controls	set for normal display

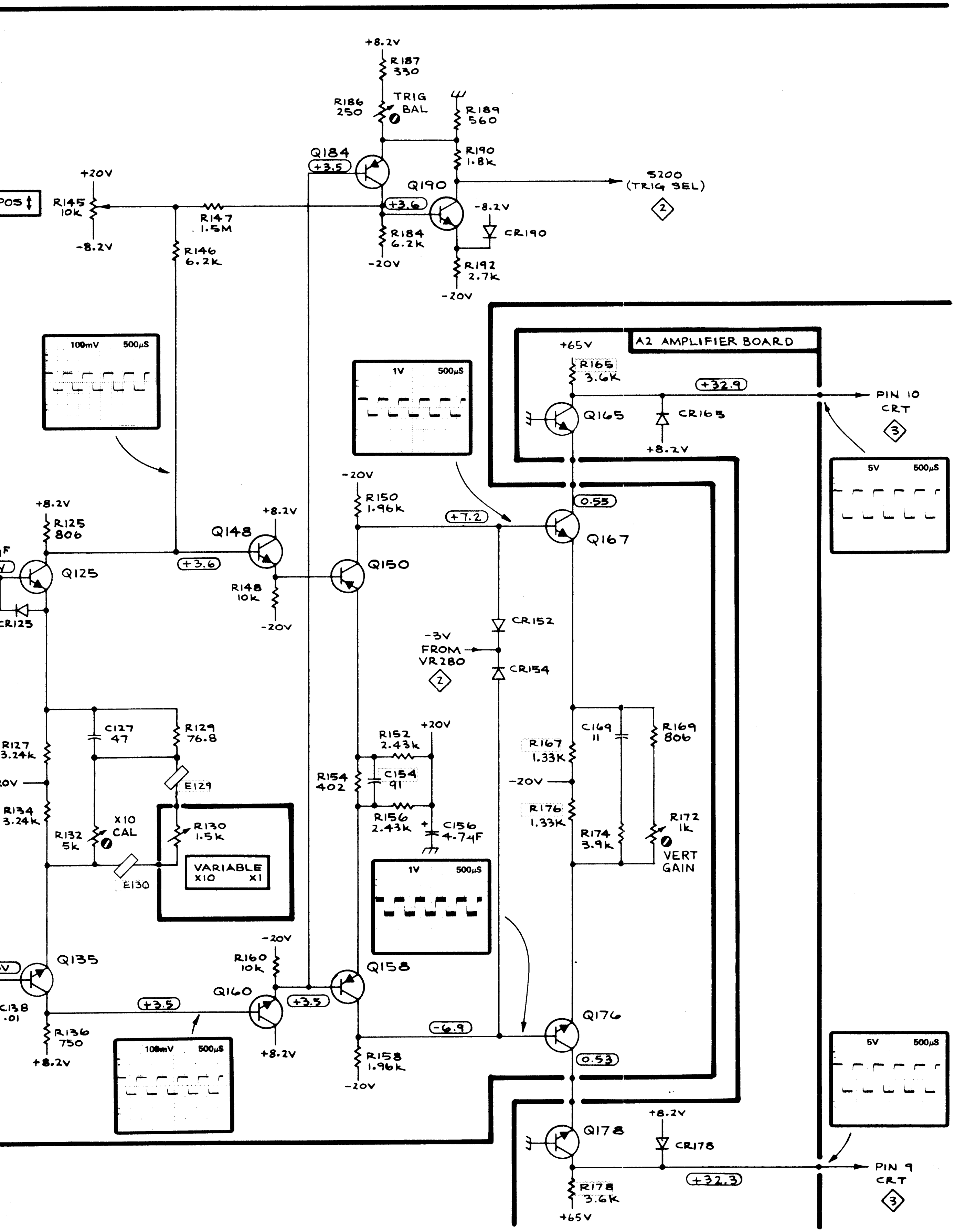
***gnd reference: center horizontal graticule line**

The waveforms shown were taken with a 20 mV square-wave input signal applied to the input connector of the SC 501.

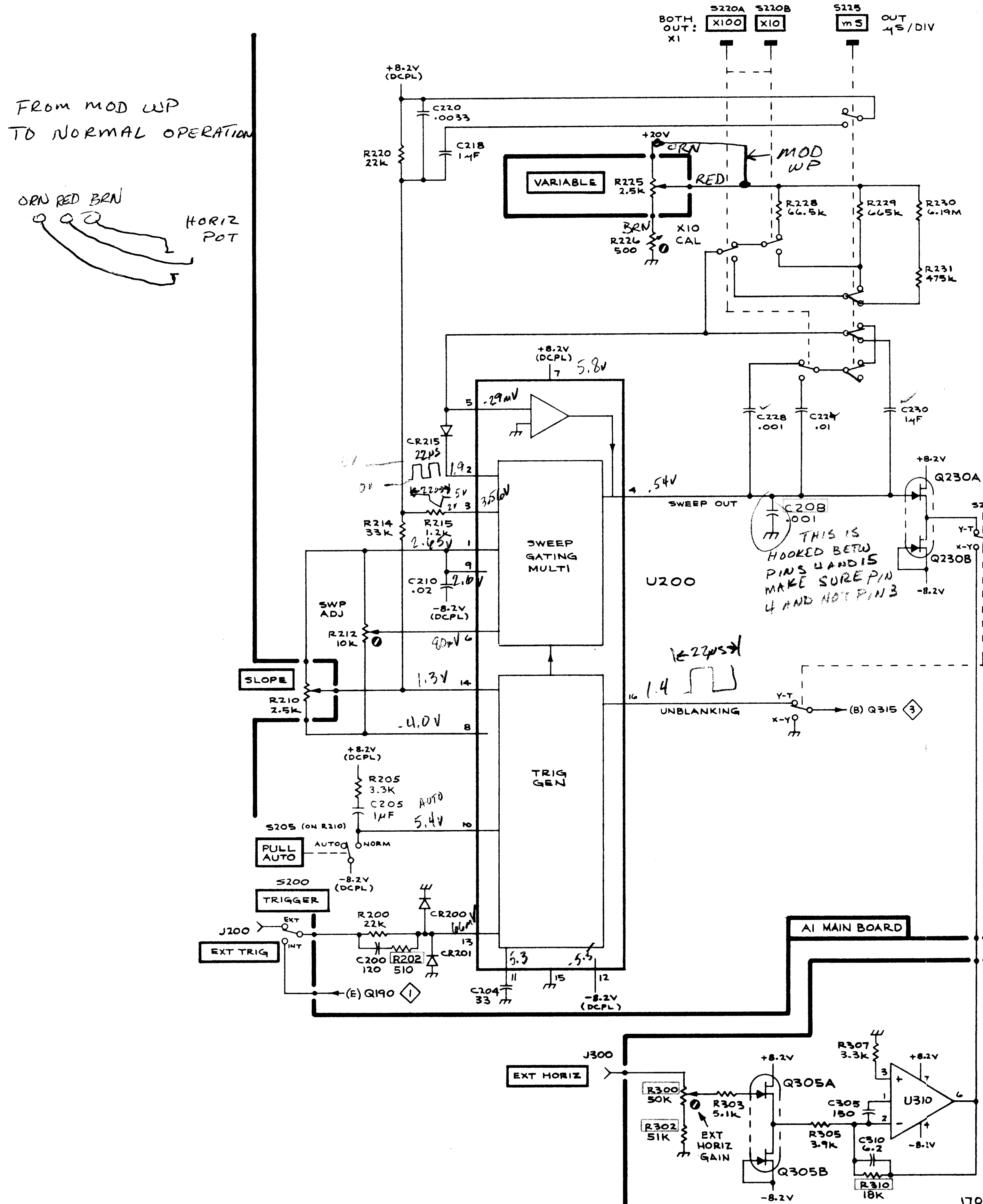
Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a 10 mΩ input impedance (TEKTRONIX DM 501 Digital Multimeter or TEKTRONIX 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

Waveform Conditions. The waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on the waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.

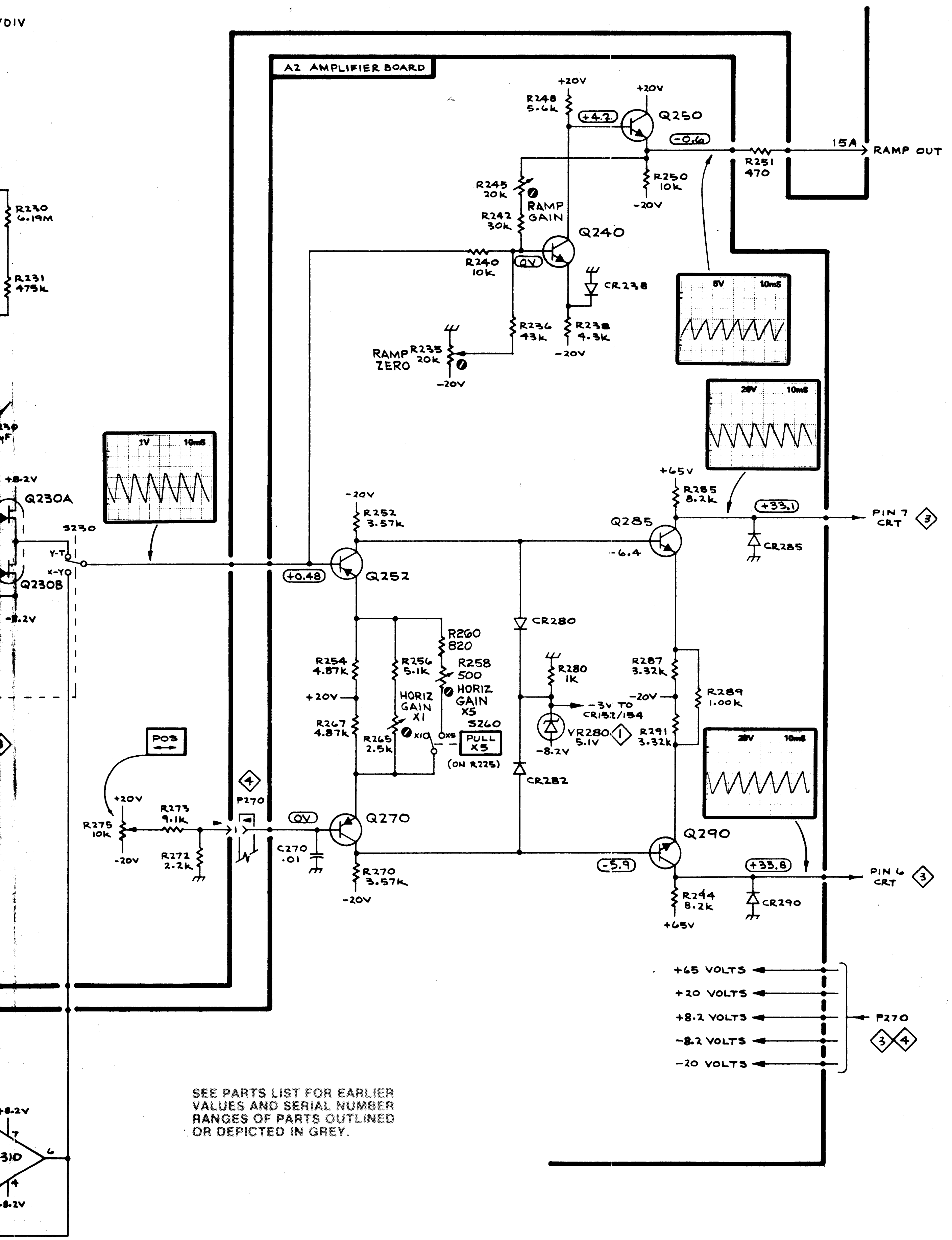

J100
VERT IN
R100
100
J101
S100
AC COUPL
OUT: DC
C100
0.1
S110B
1V
S110A
100 mV
BOTH OUT: 10 mV/DIV
C110
2-18
C112
1.7-10
C113
15
R113
990k
R115
10.1k
C115
2300
C102
2-18
C104
1.7-10
C105
15
R105
900k
R107
111k
C107
180
R117
1.00M
C117
2-18
C118
11
C120
0.01
R120
100k
R121
200
CR121
-8.2V
10mV
500µS
+8.2V
Q120A
Q120B
C124
4.7µF
0V
Q125
R125
806
CR125
+20V
POS
R145
10k
-8.2V
100mV
C127
47
R127
3.24k
-20V
R134
3.24k
R132
5k
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
R142
20k
BAL
R139
4.7k
R138
56
C138
.01
Q135
R136
750
A1 MAIN BOARD



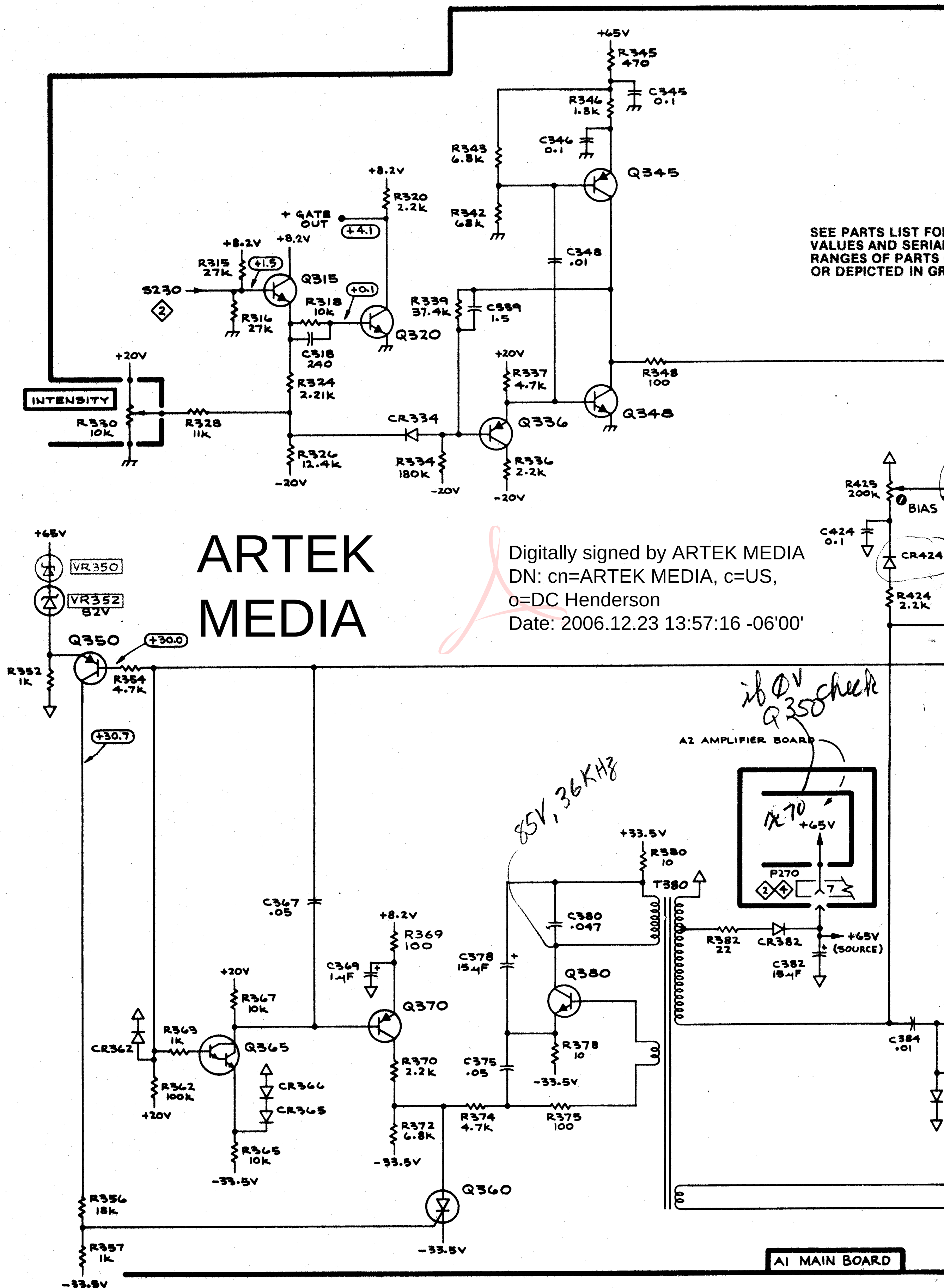
INPUT AND VERTICAL AMPLIFIER 1 DEH 0174


FROM MOD WP
TO NORMAL OPERATION
ORN RED BRN
HORIZ POT
BOTH OUT: X1
S220A X100
S220B X10
S225 mS
OUT 1S/DIV
+8.2V (DCPL)
C220 .0033
C218 1µF
R220 22k
+20V
ORN
MOD WP
VARIABLE
R225 2.5k
RED
R228 66.5k
R229 665k
R230 6.19M
R231 475k
BRN
R226 500
X10 CAL
5.8v
-29mV
CR215
22µS
1.9
5V
2V
3.5
R214 33K
R215 1.2K
2.65V
SWEEP GATING MULTI
4
.54V
SWEEP OUT
C208 .001
THIS IS HOOKED BETW PINS 4 AND 15 MAKE SURE PIN 4 AND NOT PIN 3
C228 .001
C224 .01
C230 1µF
Q230A
Q230B
Y-T
X-Y
-8.2V
U200
C210 .02
2.1V
SWP ADJ
R212 10K
80mV
SLOPE
R210 2.5K
1.3V
-4.0V
22µS
1.4
UNBLANKING
(B) Q315 3
TRIG GEN
R205 3.3K
C205 1µF
AUTO
5.4V
S205 (ON R210)
PULL AUTO
AUTO
NORM
S200
TRIGGER
EXT
INT
J200
EXT TRIG
R200 22K
CR200
CR201
C200 120
R202 510
(E) Q190 1
5.3
C204 33
-8.2V (DCPL)
A1 MAIN BOARD
J300
EXT HORIZ
R300 50K
R302 51K
R303 5.1K
EXT HORIZ GAIN
Q305A
Q305B
R305 3.9K
C305 150
C310 6.2
R310 18K
R307 3.3K
U310
+8.2V
-8.1V
170
REV

SC 501



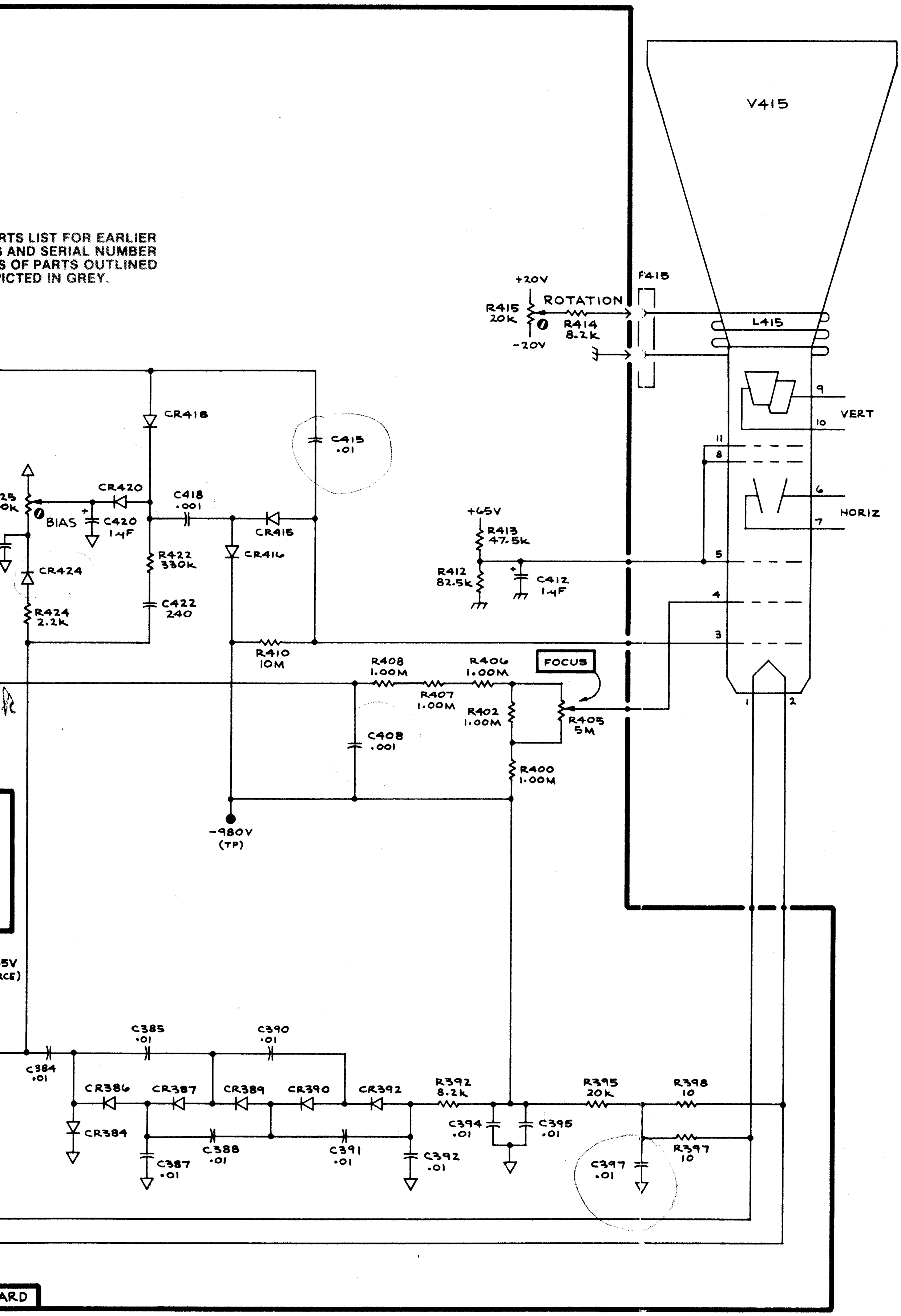
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.



1700-13
REV D DEC 1979

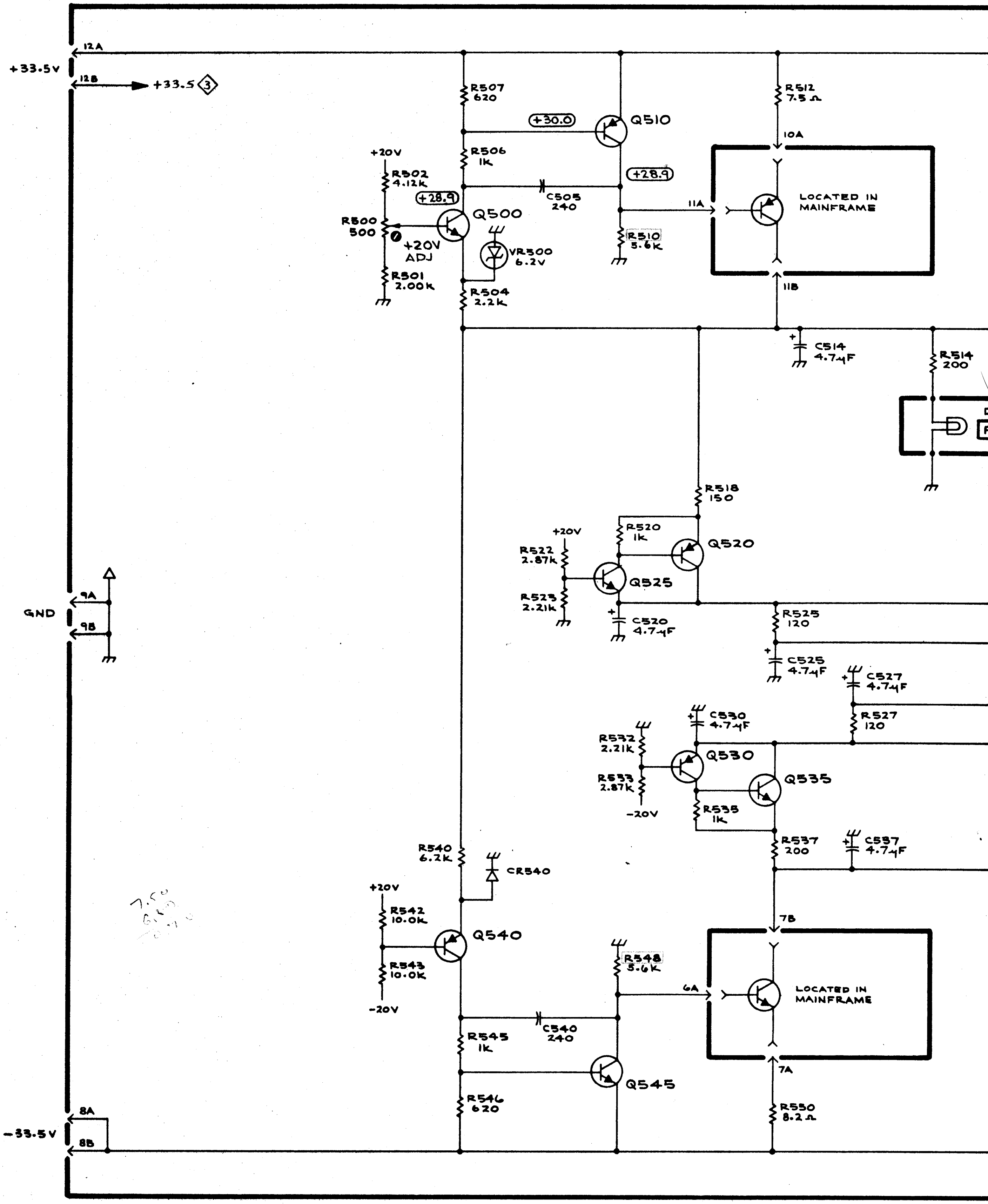
SC 501

RTS LIST FOR EARLIER
S AND SERIAL NUMBER
S OF PARTS OUTLINED
ICTED IN GREY.



Z Axis and CRT Circuit ③

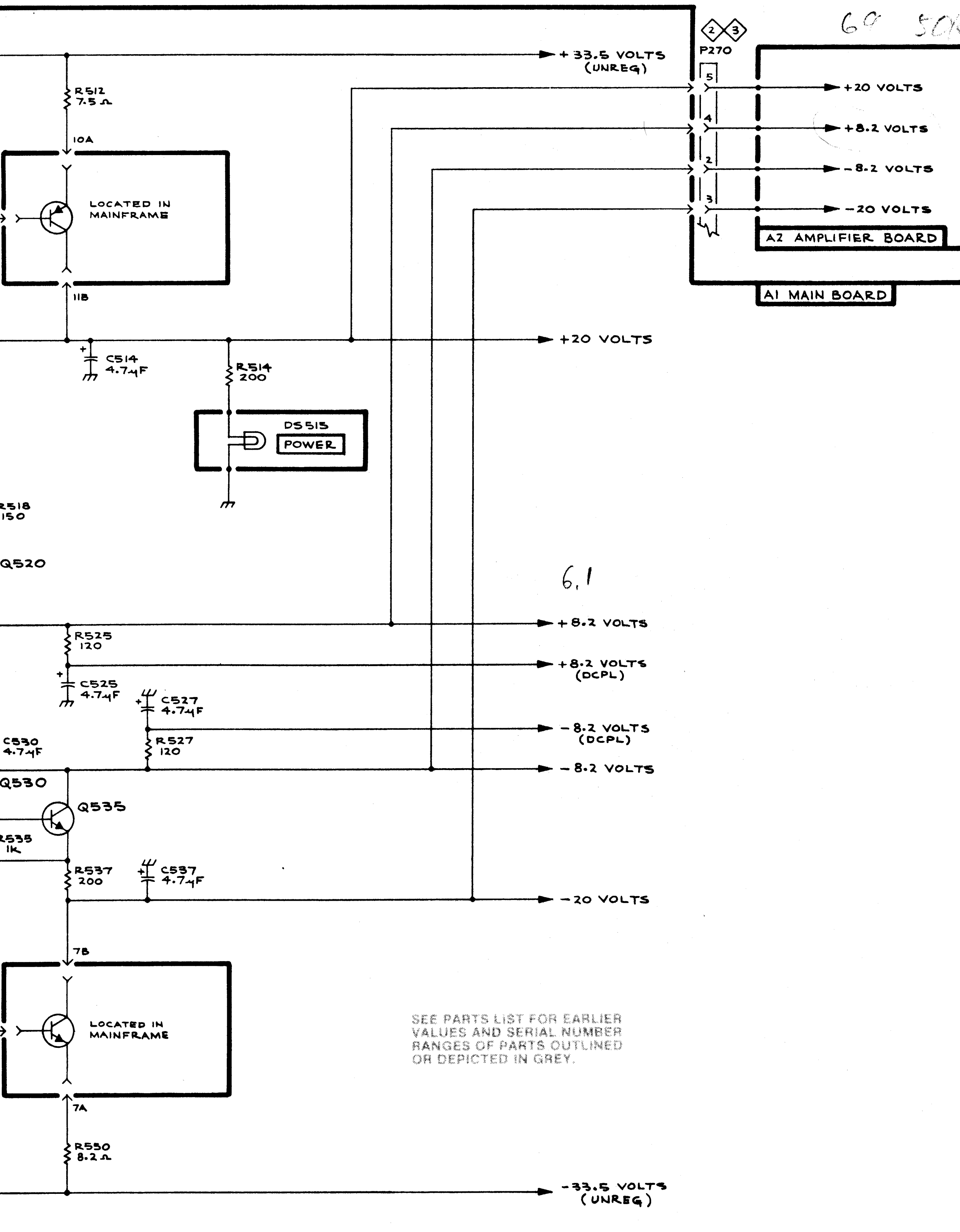
DEH 0274



1700-14
REV D JUL 1979

SC 501

Scans by Outsource-Options =>


+33.5 VOLTS (UNREG)
P270
2
3
69 50K Ω
+20 VOLTS
960
+8.2 VOLTS
620
-8.2 VOLTS
915
-20 VOLTS
630
A2 AMPLIFIER BOARD
A1 MAIN BOARD
R512 7.5 Ω
10A
LOCATED IN MAINFRAME
11B
C514 4.7μF
R514 200
+20 VOLTS
DS515
POWER
R518 150
Q520
6.1
R525 120
+8.2 VOLTS
+8.2 VOLTS (DCPL)
C525 4.7μF
C527 4.7μF
-8.2 VOLTS (DCPL)
C530 4.7μF
R527 120
-8.2 VOLTS
Q530
Q535
R535 1k
R537 200
C537 4.7μF
-20 VOLTS
7B
LOCATED IN MAINFRAME
7A
R550 8.2 Ω
-33.5 VOLTS (UNREG)
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

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	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICOND	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDENT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

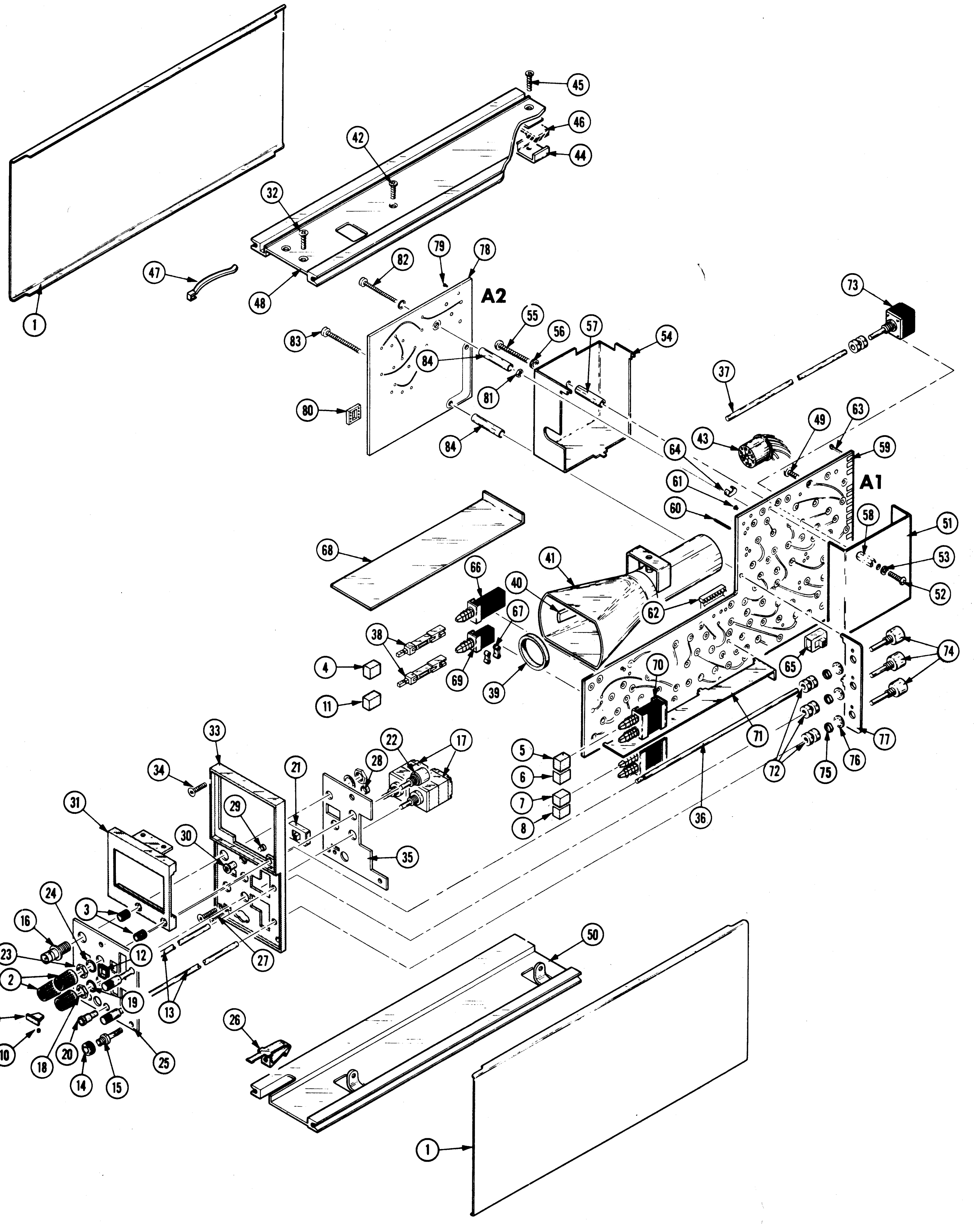
CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	P O BOX 3608	HARRISBURG PA 17105
08261	SPECTRA-STRIP AN ELTRA CO	7100 LAMPSON AVE	GARDEN GROVE CA 92642
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
10389	ILLINOIS TOOL WORKS INC	1714 N DAMEN AVE	CHICAGO IL 60647
13511	AMPHENOL CADRE DIV BUNKER RAMO CORP		LOS GATOS CA
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT CONNECTOR SYSTEMS	30 HUNTER LANE	CAMP HILL PA 17011
27238	BRISTOL INDUSTRIES	630 E LAMBERT RD P O BOX 630	BREA CA 92621
28520	HEYCO MOLDED PRODUCTS	147 MICHIGAN AVE P O BOX 160	KENILWORTH NJ 07033
31918	ITT SCHADOW INC	8081 WALLACE RD	EDEN PRAIRIE MN 55343
45722	USM CORP., PARKER-KALON FASTENER DIV .		CAMPBELLSVILLE, KY 42718
71159	BRISTOL SOCKET SCREW CO		WATERBURY CT
71279	MIDLAND-ROSS CORP CAMBION DIV	ONE ALEWIFE PLACE	CAMBRIDGE MA 02138
71590	GLOBE-UNION INC CENTRALAB ELECTRONICS DIV	HWY 20 W P O BOX 858	FORT DODGE IA 50501
72228	AMCA INTERNATIONAL CORP CONTINENTAL SCREW CO DIV	459 MT PLEASANT	NEW BEDFORD MA 02742
73743	FISCHER SPECIAL MFG CO	446 MORGAN ST	CINCINNATI OH 45206
77900	SHAKEPROOF DIV OF ILLINOIS TOOL WORKS	SAINT CHARLES RD	ELGIN IL 60120
79727	C-W INDUSTRIES	550 DAVISVILLE RD P O BOX 96	WARMINSTER PA 18974
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
83385	MICRODOT MANUFACTURING INC GREER-CENTRAL DIV	3221 W BIG BEAVER RD	TROY MI 48098
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
86113	MICRODOT MFG INC CENTRAL SCREW- KEENE DIV	149 EMERALD ST	KEENE NH 03431
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61101

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	337-1399-00			2	SHIELD,ELEC:SIDE	80009	337-1399-00
-2	366-0494-00			3	KNOB:GRAY WITH SETSCREW	80009	366-0494-00
	213-0153-00			3	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX SKT	27238	ORDER BY DESCR
-3	366-1173-03			2	KNOB:CHARCOAL,0.096 ID X 0.28 OD X 0.33	80009	366-1173-03
	213-0239-00			2	.SETSCREW:3-48 X 0.062,STL BK OXD,HEX	71159	ORDER BY DESCR
-4	366-1257-27			1	PUSH BUTTON:SIL GY,AC COUPL	80009	366-1257-27
-5	366-1257-54			1	PUSH BUTTON:SIL GY,100MV	80009	366-1257-54
-6	366-1257-55			1	PUSH BUTTON:SIL GY,1V	80009	366-1257-55
-7	366-1257-87			1	PUSH BUTTON:SIL GY,X10	80009	366-1257-87
-8	366-1402-41			1	PUSH BUTTON:SIL GY,X100	80009	366-1402-41
-9	366-1422-01	B010100	B051759	1	KNOB:LATCH	80009	366-1422-01
	366-1690-00	B051760		1	KNOB,LATCH:SIL GY,0.53 X 0.23 X 1.059	80009	366-1690-00
-10	214-1840-00	B010100	B051759	1	PIN,KNOB SECRG:0.12L X 0.94-0.100,ACETAL	80009	214-1840-00
-11	366-1489-74			1	PUSH BUTTON:SIL GY,MS	80009	366-1489-74
-12	426-0681-00			6	FRAME,PUSH BTN:	80009	426-0681-00
-13	384-1114-02			2	KNOB:UNFINISHED	80009	384-1114-02
	358-0378-00	B010100	B052379	2	BUSHING,SLEEVE:0.131ID X 0.180D X 0.125L	80009	358-0378-00
	358-0599-00	B052380		2	BUSHING,SLEEVE:0.125 ID X 0.25 OD X 0.234	28520	8-187-125
-14	220-0633-00			1	NUT,PLAIN,KNURL:0.25-28 X 0.375 OD,BRS NP	80009	220-0633-00
-15	355-0170-00			1	STUD,SHLDR&STEP:BINDING POST	80009	355-0170-00
-16	131-0955-00			1	CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
-17	----- -----			2	RES.,VAR,NONWIR:(SEE R210/R225 REPL)		
					(ATTACHING PARTS)		
-18	210-0583-00			2	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-19	210-0940-00			2	WASHER,FLAT:0.25 ID X 0.02 THK,STL	79807	ORDER BY DESCR
					(END ATTACHING PARTS)		
-20	136-0387-00			2	JACK,TIP:U/W 0.04 DIA PIN,GRAY	71279	4504352010318
-21	260-1470-00			1	SWITCH,SLIDE:DPDT,0.5A,125VAC	10389	23-021-309
-22	----- -----			1	RES.,VAR:(SEE R130 REPL)		
					(ATTACHING PARTS)		
-23	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-24	210-0940-00			1	WASHER,FLAT:0.25 ID X 0.02 THK,STL	79807	ORDER BY DESCR
	210-0046-00	B055970		1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL	77900	1214-05-00-0541C
					(END ATTACHING PARTS)		
-25	333-1890-00			1	PANEL,FRONT:	80009	333-1890-00
-26	214-1513-01	B010100	B051759	1	LCH,PL-IN RTNG:PLASTIC	80009	214-1513-01
	105-0719-00	B051760		1	LATCH,RETAINING:PLUG-IN	80009	105-0719-00
					(ATTACHING PARTS)		
-27	213-0254-00			1	SCR,TPG,TF:2-32 X 0.25,SPCL TYPE,FLH,STL	45722	ORDER BY DESCR
					(END ATTACHING PARTS)		
	105-0718-00	B051760	B052449	1	BAR,LATCH RLSE:	80009	105-0718-00
	105-0718-01	B052450		1	BAR,LATCH RLSE:	80009	105-0718-01
-28	200-0935-00			1	BASE,LAMPHOLDER:0.29 OD X 0.19 L,BK PLSTC	80009	200-0935-00
-29	378-0602-00			1	LENS,LIGHT:GREEN	80009	378-0602-00
-30	352-0157-00			1	LAMPHOLDER:(1)T-2 UNBASED,WHITE	80009	352-0157-00
-31	200-1555-01			1	RTNR,IMPLOSION:2.52 X 2.28 NYLON SIL GRAY	80009	200-1555-01
					(ATTACHING PARTS)		
-32	211-0101-00			2	SCREW,MACHINE:4-40 X 0.250,FLH,100 DG,STL	83385	ORDER BY DESCR
					(END ATTACHING PARTS)		
-33	386-2641-01			1	SUBPANEL,FRONT:	80009	386-2641-01
					(ATTACHING PARTS)		
-34	213-0229-00	B010100	B052619	3	SCREW,TPG,TF:6-20 X 0.375,TYPE B,FLH	93907	ORDER BY DESCR
	213-0123-00	B052620		3	SCR,TPG,TF:6-32 X 0.375,SPCL TYPE,FLH STL	72228	ORDER BY DESCR
					(END ATTACHING PARTS)		
-35	337-2026-00			1	SHIELD,ELEC:REAR SUBPANEL	80009	337-2026-00
-36	384-1216-00			1	EXTENSION SHAFT:6.375 L X 0.123 OD,EPOXY GL	80009	384-1216-00
-37	384-1217-00			1	EXTENSION SHAFT:8.45 L X 0.123 OD,EPOXY GL	80009	384-1217-00
-38	384-1099-00			2	EXTENSION SHAFT:1.58 L X 0.187 SQ,PLSTC	80009	384-1099-00
-39	354-0423-00			1	RING,CRT SPRT:BLACK VINYL	80009	354-0423-00
-40	348-0279-00			1	PAD,CUSHIONING:3.5 X 0.67 X 0.188,RUBBER	80009	348-0279-00
-41	337-1458-03			1	SHIELD,CRT:	80009	337-1458-03
					(ATTACHING PARTS)		
-42	211-0101-00			1	SCREW,MACHINE:4-40 X 0.250,FLH,100 DG,STL	83385	ORDER BY DESCR
					(END ATTACHING PARTS)		
-43	136-0611-00			1	SKT,PL-IN ELEK:ELCTRN TUBE,11 CONT W/LEADS	80009	136-0611-00
	136-0453-00			1	.SKT,PL-IN ELEK:ELECTRON TUBE,11 CONTACT	80009	136-0453-00
	131-1109-00			10	.CONNECTOR,TERM:20-26 AWG,U/O 0.04 OD PIN	00779	42869-6

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-44	343-0403-00			1	CLAMP,RIM CLENC:ALUMINUM	80009	343-0403-00
					(ATTACHING PARTS)		
-45	211-0114-00			1	SCREW,MACHINE:4-40 X 0.438,FLH,100 DEG,STL	83385	ORDER BY DESCR
-46	342-0082-00			1	INSULATOR,PLATE:TRANSISTOR,ALUMINA	80009	342-0082-00
					(END ATTACHING PARTS)		
-47	214-1061-00			1	CONTACT,ELEC:GROUNDING,CU BE	80009	214-1061-00
-48	426-1022-00			1	FR SECT,PLUG-IN:TOP	80009	426-1022-00
					(ATTACHING PARTS)		
-49	213-0146-00			1	SCREW,TPG,TF:6-20 X 0.312,TYPE B,PNH,STL	83385	ORDER BY DESCR
					(END ATTACHING PARTS)		
	361-0568-00	B051760		1	SPACER,SLEEVE:0.065 L X 0.159 ID,AL	80009	361-0568-00
	386-3657-00	B051760	B052773	2	SUPPORT,PLUG-IN:	80009	386-3657-00
	386-3657-01	B052774		2	SUPPORT,PLUG-IN:	83486	ORDER BY DESCR
	210-1270-00	B051760		2	WASHER,FLAT:0.141ID X 0.04THK,AL,0.219OD	80009	210-1270-00
-50	426-1047-00			1	FR SECT,PLUG-IN:BOTTOM	80009	426-1047-00
					(ATTACHING PARTS)		
	213-0146-00			1	SCREW,TPG,TF:6-20 X 0.312,TYPE B,PNH,STL	83385	ORDER BY DESCR
					(END ATTACHING PARTS)		
-51	337-1839-00			1	SHIELD,ELEC:HIGH VOLTAGE,RIGHT	80009	337-1839-00
					(ATTACHING PARTS)		
-52	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-53	210-0994-00			1	WASHER,FLAT:0.125 ID X 0.022 X 0.25 OD	86928	A371-283-20
					(END ATTACHING PARTS)		
-54	337-1842-00	B010100	B056539	1	SHIELD,ELEC:HIGH VOLTAGE,LEFT	80009	337-1842-00
	337-1842-01	B056540		1	SHIELD,ELEC:HIGH VOLTAGE,LEFT	80009	337-1842-01
					(ATTACHING PARTS)		
-55	211-0144-00	B010100	B051759	1	SCREW,MACHINE:4-40X1.312,PNH,STL,CD,PL,POZ	83385	ORDER BY DESCR
	211-0008-00	B051760		1	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-56	210-0994-00			1	WASHER,FLAT:0.125 ID X 0.022 X 0.25 OD	86928	A371-283-20
-57	361-0581-00	B010100	B051759	1	SPACER,SLEEVE:1.044 L X 0.134 ID,AL	80009	361-0581-00
	129-0427-00	B051760		1	SPACER,POST:1.056 L,4-40,AL,0.188 HEX	80009	129-0427-00
-58	129-0419-00	B010100	B051759	1	SPACER,POST:0.588 L,4-40,AL,0.25 HEX	80009	129-0419-00
	129-0354-00	B051760		1	SPACER,POST:0.54 L,4-40 ONE END/STUD,BRS,CU SN ZN PL,0.188 HEX	80009	129-0354-00
	361-0535-00	B051760		1	SPACER,RING:0.03 L X 0.13 ID,BRS	80009	361-0535-00
					(END ATTACHING PARTS)		
-59	----- -----			1	CKT BOARD ASSY:MAIN(SEE A1 REPL)		
-60	131-0608-00			8	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-61	136-0252-04			15	.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-62	136-0260-02	B010100	B056049	1	.SKT,PL-IN ELEK:MICROCKT,16 DIP,LOW CL	09922	DILB16P-108T
	136-0729-00	B056050		1	.SKT,PL-IN ELEK:MICROCKT,16 CONTACT	09922	DILB16P-108T
-63	214-0579-00			1	.TERM,TEST POINT:	80009	214-0579-00
-64	214-0973-00			1	.HEAT SINK,XSTR:TO-92,CU BE CD PL	80009	214-0973-00
-65	260-0723-00			1	.SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
-66	260-1332-00			1	.SWITCH,PUSH:4PDT,PUSH-PUSH	31918	ORDER BY DESCR
-67	361-0542-00			2	.SPACER,PUSH SW:0.078 L,POLYPROPYLENE	71590	J76113
-68	337-1838-00	B010100	B051759	1	.SHIELD,ELEC:PUSHBUTTONS,LEFT	80009	337-1838-00
	337-1838-01	B051760		1	.SHIELD,ELEC:PUSH BUTTON,LEFT	80009	337-1838-01
	342-0269-00	B051760	B053823	1	..INSULATOR,FILM:CIRCUIT BOARD,POLYESTER	80009	342-0269-00
	342-0490-00	B053824		2	..INSULATOR,PLATE:SHIELD,POLYESTER	80009	342-0490-00
-69	260-1445-00			1	.SWITCH,PUSH:1 BUTTON,2 POLE,DC OFFSET	80009	260-1445-00
-70	260-1365-00			2	.SWITCH,PUSH:2 BUTTON,2 POLE,TRIG SOURCE	31918	ORDER BY DESCR
-71	337-1837-00			1	.SHIELD,ELEC:PUSHBUTTONS,RIGHT	80009	337-1837-00
-72	376-0051-01			4	.CPLG,SHAFT,FLEX:0.127ID X 0.375OD,DELRIN	80009	376-0051-01
	354-0251-00			2	..RING,CPLG:0.251ID X 0.375OD X 0.187,AL	80009	354-0251-00
-73	----- -----			1	.RES.,VAR,NONWIR:(SEE R405 REPL)		
-74	----- -----			3	.RES.,VAR,NONWIR:(SEE R145,R275,R330 REPL)		
					.(ATTACHING PARTS)		
-75	210-0583-00			3	.NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-76	210-0046-00			3	.WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL	77900	1214-05-00-0541C
-77	337-1840-00			1	.SHIELD,ELEC:POT MTG	80009	337-1840-00
					.(END ATTACHING PARTS)		
	198-3545-00	B051760	B056089	1	.WIRE SET,ELEC:	80009	198-3545-00
	175-4232-00	B056090		1	.CA ASSY,SP,ELEC:2,26 AWG,4.0 L,RIBBON	80009	175-4232-00
	175-0829-00	B051760	B056089	AR	..CABLE,SP,ELEC:6,26 AWG,STRD,PVC JKT,RBN	08261	111-2699-973
	175-0825-00	B056090		AR	..CABLE,SP,ELEC:2,26 AWG,STRD,PVC JKT,RBN	80009	175-0825-00
	131-0707-00	B051760	B056089	6	..CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	22526	47439-000

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-	352-0165-02	B051760	B056089	1	..HLDR,TERM CONN:7 WIRE,RED	80009	352-0165-02
	175-5371-00	B056090		1	..CA ASSY,SP,ELEC:3,26 AWG,4.0 L,RIBBON	80009	175-5371-00
	175-5372-00	B056090		1	..CA ASSY,SP,ELEC:3,26 AWG,4.5 L,RIBBON	80009	175-5372-00
	175-5878-00	B056090	B056539	1	..CA ASSY,SP,ELEC:2,26 AWG,6.0 L,RIBBON	80009	175-5878-00
	175-5893-00	B056540		1	..CA ASSY,SP,ELEC:2,26 AWG,9.5 L,RIBBON	80009	175-5893-00
	175-5509-00	B056090		1	..CA ASSY,SP,ELEC:2,26 AWG,5.0 L,RIBBON	80009	175-5509-00
-78	----- -----			1	CKT BOARD ASSY:AMPLIFIER(SEE A2 REPL)		
-79	136-0252-04			6	.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-80	136-0514-00	B010100	B056049	1	.SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP	09922	DILB8P-108
					.(ATTACHING PARTS FOR CKT BD)		
-81	210-0406-00			1	NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL	73743	12161-50
-82	211-0144-00	B010100	B051759	1	SCREW,MACHINE:4-40X1.312,PNH,STL,CD,PL,POZ	83385	ORDER BY DESCR
	211-0008-00	B051760		1	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-83	213-0336-00			1	SCREW,TPG,TF:6-20 X 1.5,TYPE B,PNH,STL	86113	ORDER BY DESCR
-84	361-0671-00	B010100	B051759	2	SPACER,SLEEVE:1.06 L X 0.157 ID,BRS	80009	361-0671-00
	361-0671-00	B051760		1	SPACER,SLEEVE:1.06 L X 0.157 ID,BRS	80009	361-0671-00
	129-0457-00	B051760		1	SPACER,POST:1.07 L,4-40 TAP/STUD,BRS	80009	129-0457-00
					(END ATTACHING PARTS)		
	198-2248-00	B010100	B056089	1	WIRE SET,ELEC:	80009	198-2248-00
	175-0825-00	B010100	B051759	AR	.CABLE,SP,ELEC:2,26 AWG,STRD,PVC JKT,RBN	80009	175-0825-00
	175-0825-00	B051760	B056089	AR	.CABLE,SP,ELEC:2,26 AWG,STRD,PVC JKT,RBN	80009	175-0825-00
	175-0829-00	B010100	B051759	AR	.CABLE,SP,ELEC:6,26 AWG,STRD,PVC JKT,RBN	08261	111-2699-973
	175-0826-00	B010100	B056089	AR	.CABLE,SP,ELEC:3,26 AWG,STRD,PVC JKT,RBN	80009	175-0826-00
					STANDARD ACCESSORIES		
	070-1700-01			1	MANUAL,TECH:INSTRUCTION	80009	070-1700-01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A2

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.