

TEKTRONIX

335

OSCILLOSCOPE

DEMO SUPPORT
PACKAGE

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335 SPECIFICATIONS

INTRODUCTION

The Sony/Tektronix 335 Oscilloscope is a solid-state portable instrument that combines small size and light weight with the ability to make precision waveform measurements. The instrument is mechanically constructed to withstand the shock, vibration and other extremes of environment associated with portability.

A dual trace dc to 35 megahertz vertical system provides calibrated deflection factors from 1 millivolt to 10 volts/division.

The trigger circuits provide stable sweep triggering over the full vertical bandwidth. Separate controls are provided to select the desired mode of triggering. The A sweep can be operated in one of three modes: automatic triggering, normal triggering, or single sweep. A variable trigger holdoff control provides the ability for A sweep to trigger stably on aperiodic signals.

The horizontal deflection system provides calibrated sweep rates from 0.5 second to 0.2 microsecond/division. A ten-times magnifier increases each sweep rate by a factor of 10 to provide a maximum sweep rate of 20 nanoseconds/division in the .2 μ position of the SEC/DIV switch. The delayed sweep feature allows the beginning of the B sweep to be delayed a selected amount from the start of the A sweep to provide accurate relative time measurements. In the X-Y mode of operation, the horizontal amplifier provides a horizontal deflection factor of 20 millivolts to 2 volts/division (dependent on the settings of the EXT ATTEN and HORIZ MAG switches).

The 335 can operate from a nominal line voltage of 115 or 230 volts ac. The 335 can also operate from an external dc voltage source of +12 or +24 volts.

The following electrical characteristics apply over an ambient temperature range of +20°C to +30°C (+68°F to +86°F) unless otherwise stated. Warmup time for the specified accuracies is 30 minutes.

SPECIFICATIONS

TABLE 1-1

Electrical Characteristics

Characteristic	Performance Requirement		Supplemental Information
VERTICAL DEFLECTION SYSTEM			
Deflection Factor			
Calibrated Range	1 mV to 10 V/Div		13 steps in a 1-2-5 sequence
Accuracy	Within 3% over the calibrated range		
Uncalibrated Range (VARIABLE)	Continuously variable between calibrated deflection factors.		Each calibrated deflection factor increased by at least 2.5 to 1.
Frequency Response			
Upper -3 dB point	+20°C to +30°C	-15°C to +55°C	Bandwidth measured with a 6 div reference signal, vertically centered.
1 mV to 5 mV	To at least 25 MHz	NA at this time	
10 mV to 10 V	To at least 35 MHz	NA at this time	
Lower -3 dB point	With 1X or no probe	With 10X probe	
Dc Coupled	DC	DC	
Ac Coupled	10 Hz	1 Hz	
Risetime			Risetime is calculated from the formula $0.35 \div \text{bandwidth}$.
1 mV to 5 mV			+20°C to +30°C -15°C to +55°C 14 ns NA at this time
10 mV to 10 V			10 ns NA at this time

TABLE 1-1 (cont)

Characteristic	Performance Requirement	Supplemental Information
VERTICAL DEFLECTION SYSTEM (cont)		
Maximum Safe Input Voltage		
Dc Coupled		500 V (dc + peak ac) 500 V p-p ac at 1 kHz or less
Ac Coupled		500 V (dc + peak ac) 500 V p-p ac at 1 kHz or less
Input RC Characteristics		
Input Resistance		1 M Ω within 2%
Input Capacitance		24 pF \pm 3 pF
Signal Delay	Allows viewing leading edge of triggering waveform.	Approximately 180 ns
Chopped Repetition Rate	300 kHz	Within 20%
HORIZONTAL DEFLECTION SYSTEM		
Sweep Rate		
Calibrated Range		
A Sweep	0.5 s to 0.2 μ s/div	20 steps in a 1-2-5 sequence
B Sweep	50 ms to 0.2 μ s/div	17 steps in a 1-2-5 sequence
Magnifier	Increases each sweep rate by a factor of 10. Increases fastest sweep rate to 20 ns/div.	

TABLE 1-1 (cont)

Characteristic	Performance Requirement		Supplemental Information
HORIZONTAL DEFLECTION SYSTEM (cont)			
Accuracy	Unmagnified	Magnified*	Accuracy measured over center 8 graticule divisions
	+20°C to +30°C	3%	
	-15°C to +55°C	4%	6%
			*Parts of total magnified sweep length excluded from accuracy specification
			SEC/DIV
			Setting First and Last
			1 m — 1 μ 2 div
			.5 μ 2 div
			.2 μ 4 div
Uncalibrated Range (A Sweep Only)	Continuously variable between calibrated settings.		Each calibrated sweep rate decreased by at least 2.5 to 1.
EXT HORIZ Input			
Resistance			1 MΩ within 10%
Capacitance			24 pF within 20%
Sensitivity	20 mV to 2 V/Div		Within 20%. Sensitivity depends on setting of HORIZ MAG and EXT ATTEN.
Bandwidth (10 div Reference)			Dc to at least 500 kHz
Differential Time Measure-Accuracy	For measurements of 1 or more major dial div	For measurements of less than 1 major dial div	
	+15°C to +35°C	±2%	±0.01 major dial div
	-15°C to +55°C	NA at this time	NA at this time
		The differential time measurement accuracy specification is valid only for DELAY TIME position dial settings between 1.00 and 9.00.	

TABLE 1-1 (cont)

Characteristic	Performance Requirement	Supplemental Information
HORIZONTAL DEFLECTION SYSTEM (cont)		
Delay Time Jitter	Within 0.005% of the maximum available delay time (less than 1 part in 20,000). Maximum available delay time is 10 times the A SEC/DIV setting.	
TRIGGERING SYSTEM		
Sensitivity DC Coupled	.35 division internal or 70 millivolts external from dc to 10 megahertz, increasing to 1.5 divisions internal or 250 millivolts external at 35 megahertz.	
AC Coupled	.35 division internal or 70 millivolts external from 60 hertz to 10 megahertz, increasing to 1.5 divisions internal or 250 millivolts external at 35 megahertz. Attenuates all signals below about 60 hertz.	
LF REJ Coupled	.5 division internal or 100 millivolts external from 40 kilohertz to 10 megahertz, increasing to 2 divisions internal or 360 millivolts external at 35 megahertz. Blocks dc and attenuates all signals below about 40 kilohertz.	
HF REJ Coupled	.5 division internal or 100 millivolts external from 60 hertz to 20 kilohertz. Blocks dc and attenuates all signals below about 60 hertz and above about 20 kilohertz.	

TABLE 1-1 (cont)

Characteristic	Performance Requirement	Supplemental Information
TRIGGERING SYSTEM (cont)		
		In Single Sweep Mode, AC coupled, with no trigger signal supplied, once armed, the single sweep should remain armed if no controls are operated and the trigger level has been set to just trigger on the peaks of a 1 division peak-to-peak (or larger) medium frequency sine wave signal
External Trigger		
LEVEL Control Ranges		
EXT ATTEN—X1		At least +1 V to -1 V
EXT ATTEN—X10		At least +10 V to -10 V
Maximum Safe Input Voltage		250 V (dc + peak ac) 250 V p-p ac at 1 kHz or less
Input Resistance		1 M Ω within 10%
Input Capacitance		24 pF within 20%.

CALIBRATOR

Output Voltage		
+10°C to +30°C	0.5 V within 1% (open circuit)	
-15°C to +55°C		0.5 V within 2% (open circuit)
Repetition Rate		
+20°C to +30°C	1 kHz within 2%	
-15°C to +55°C		NA at this time
Output Resistance	10 k Ω	Within 10%

TABLE 1-1 (cont)

Characteristic	Performance Requirement	Supplemental Information
EXTERNAL BLANKING		
Sensitivity	+5 V p-p signal causes noticeable intensity modulation at normal viewing intensity.	Positive-going signal decreases intensity
Usable Frequency Range	Dc to at least 600 kHz	
Input Resistance	At least 10 k Ω	
Maximum Safe Input Voltage		50 V (dc + peak ac) 50 V p-p ac at 1 kHz or less
POWER SOURCES		
Line Voltage		
Regulating Ranges		
115 V		
Low	90 V to 110 V	
Medium	103.5 V to 126.5 V	
High	108 V to 132 V	
230 V		
Low	180 V to 220 V	
Medium	207 V to 253 V	
High	216 V to 264 V	
Line Frequency	48 to 440 Hz	
External DC Voltage		
Regulating Ranges		
+12 V	+11 V to +14 V	
+24 V	+22 V to +24 V	
Maximum Input Current		
+12 V	2.0 A	
+24 V	1.0 A	

TABLE 1-1 (cont)

Characteristic	Performance Requirement	Supplemental Information
ENVIRONMENTAL		
Temperature		
Operating	-15°C to +55°C	
Storage	-40°C to +75°C	
Altitude		
Operating	To 15,000 feet.	Maximum allowable operating temperature decreases by 1°C per each thousand feet from 5,000 feet to 15,000 feet.
Storage	To 50,000 feet.	
Humidity—Operating and Storage	5 cycles (120 hours) referenced to MIL-E-16400 F.	
Vibration—Operating and Non-Operating	15 minutes along each of the 3 major axes at a total displacement of 0.025 inch peak-to-peak (4 g at 55 hertz) with the frequency varied from 10 to 55 hertz in one minute sweeps. Frequency held at 55 hertz for 3 minutes. All major resonances must be above 55 hertz.	
Shock—Operating and Non-Operating	30 g; 1/2 sine wave; 11 milli-second duration; 2 shocks per axis in each direction; for a total of 12 shocks.	

CIRCUIT DESCRIPTION

NOTE

We were not able to supply a complete circuit description in time to be included in this package. The final manual will include the complete circuit description.

BLOCK DIAGRAM

The following discussion is given to aid in understanding the overall concept of the 335. Fig. 3-1 shows a basic block diagram of the 335. Only the basic interconnections between the blocks are shown. The diamond-enclosed number in each block indicates which schematic diagram shows the circuitry represented by the block. The schematic diagrams are located in the diagrams section at the rear of this manual. The diagrams section also contains a detailed block diagram of the 335.

Vertical System

Signals to be displayed on the crt are connected to the CH 1 VERT INPUT and/or the CH 2 VERT INPUT connector(s). The input signals are connected to the CH 1 and Ch 2 Attenuators. The Attenuators provide deflection-factor switching. The signals from the Attenuators are connected to the CH 1 and CH 2 Preamplifiers. The Preamplifiers provide signal amplification, variable deflection factor adjustment, vertical positioning, and balance controls. The outputs of the Preamplifiers are connected to the Vertical Switching and Internal Trigger Pickoff circuit. The Vertical Switching portion of the circuit determines the signal(s) to be displayed on the crt. The output of the Vertical Switching circuit is connected to the Vertical Output Amplifier which drives the vertical deflection plates of the crt. The Internal Trigger Pickoff portion of the Vertical Switching and Internal Trigger Pickoff circuit determines the source of the signal supplied to the Trigger Generators when using internal (INT) triggering.

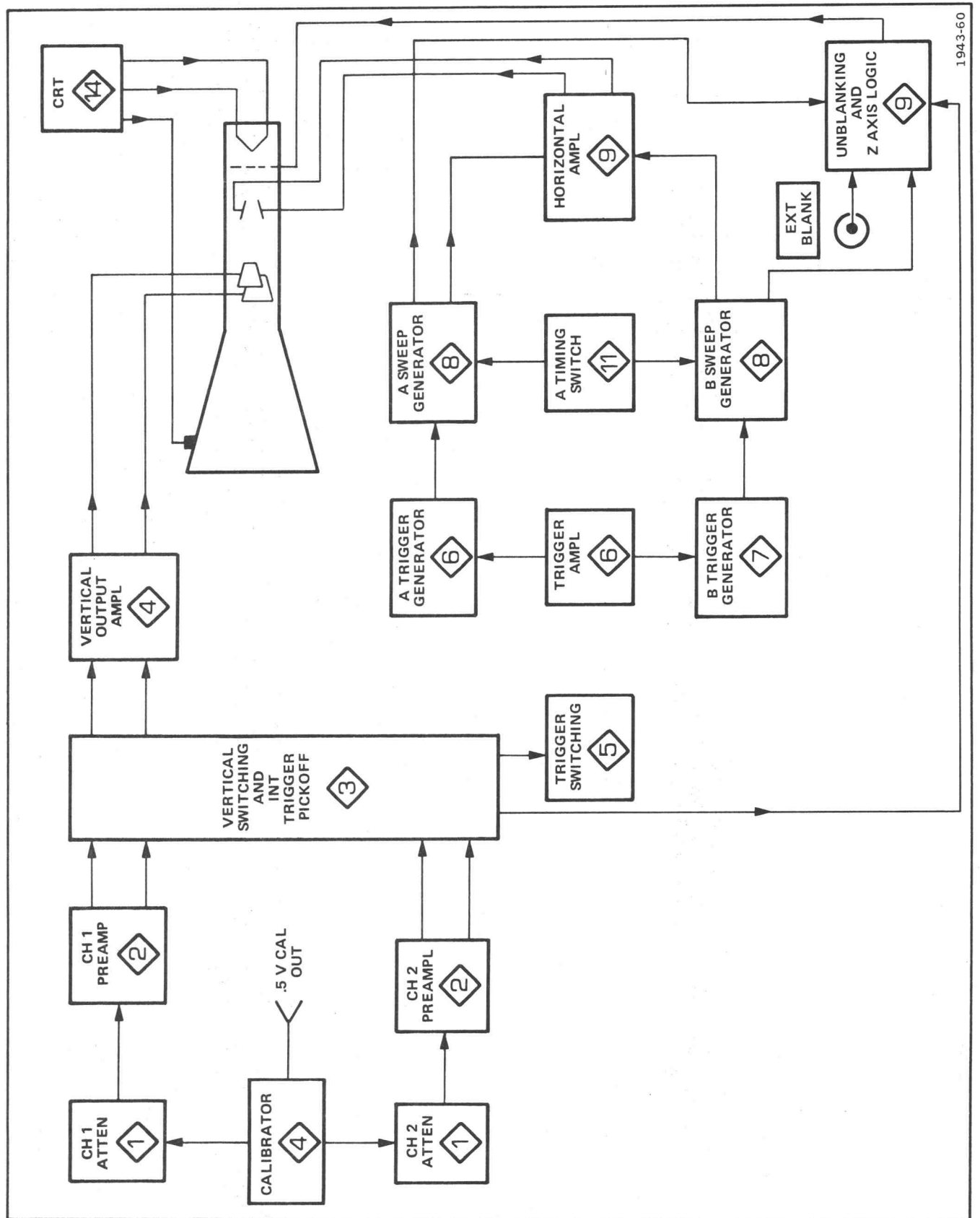
Calibrator

The Calibrator supplies a 1 kHz squarewave to the CH 1 and CH 2 Attenuators. In the 5 DIV CAL position of the VOLTS/DIV switches, this signal produces a 5-division display on the crt to check vertical gain adjustment. The Calibrator also supplies a signal to the .5 V CAL OUT jack. This signal can be used to check the attenuation factor and compensation of probes.

Trigger System

A Trigger Generator

The A Trigger Generator produces a pulse which starts the A Sweep Generator. The Internal Trigger Pickoff and Trigger Switching circuits determine the source of the signal supplied to the A Trigger circuit.



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Two A Trigger modes are provided. In the NORM (normal) mode, a trigger pulse is generated only upon receipt of an adequate trigger signal. The AUTO (automatic) mode is nearly the same as the NORM mode. The difference is that in the AUTO mode, after a period of time with no adequate trigger signal available, a trigger pulse is automatically generated. This produces a reference display on the crt when no signal is supplied to the A Trigger Generator or when the signal repetition rate is less than about 20 Hz.

B Trigger Generator

In the Triggerable After Delay mode the B Trigger Generator operates in the same manner as the NORM mode of the A Trigger Generator. However, the B Trigger Generator does not produce a trigger pulse until receipt of the first adequate signal after the completion of a delay time. This delay time is determined by the settings of the A SEC/DIV and DELAY TIME POSITION controls.

In the RUNS AFTER DLY TIME mode the B Trigger Generator produces a trigger pulse as soon as the delay time is completed.

Horizontal System

Upon receipt of a trigger pulse the A and B Trigger Generators produce linear sawtooth voltages. The start of the B Sweep sawtooth voltage is delayed from the start of the A Sweep sawtooth voltage by a time selected by the settings of the A SEC/DIV and DELAY TIME POSITION controls (see Trigger System).

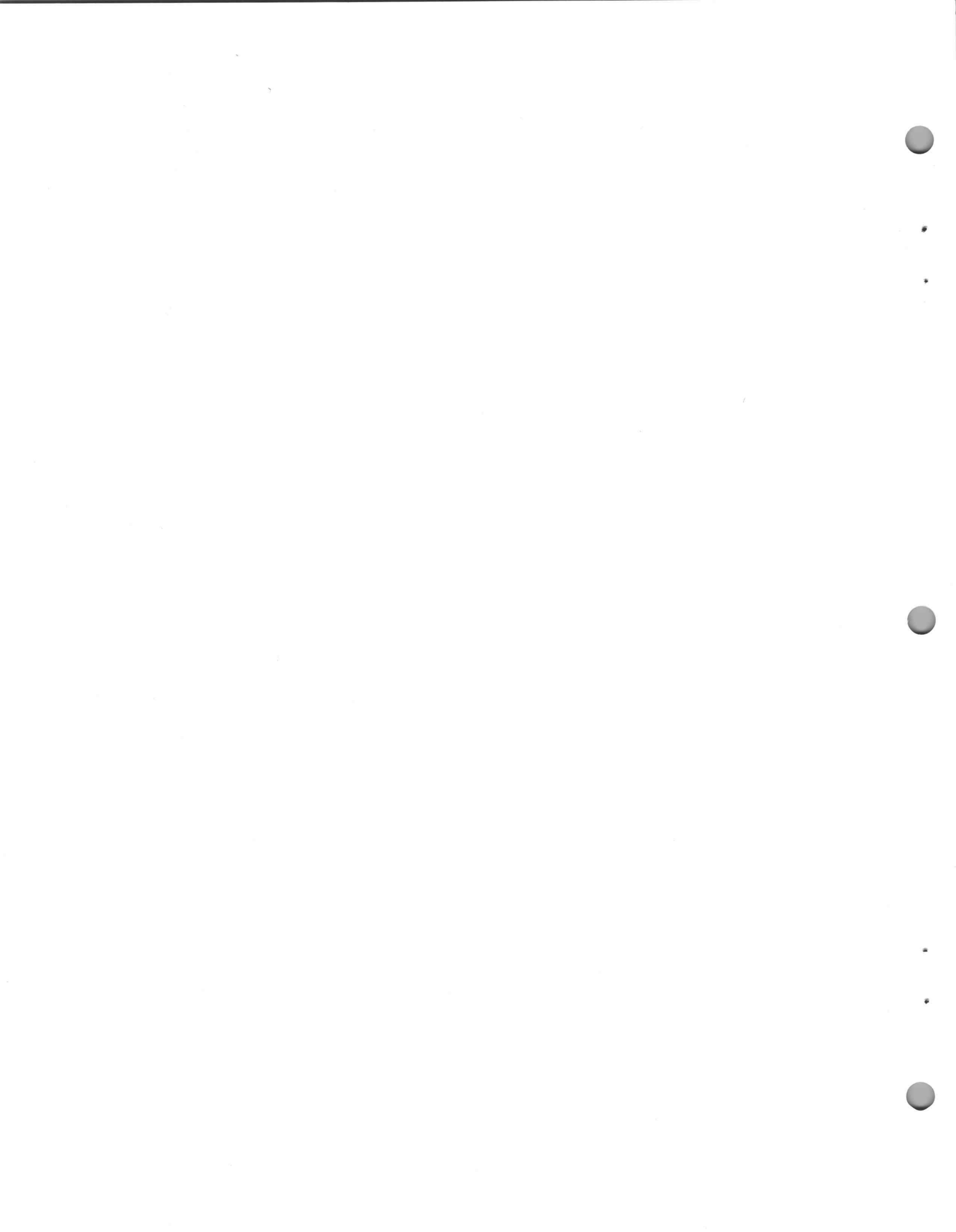
The HORIZ DISPLAY switch selects which Sweep Generator output is connected to the Horizontal Amplifier. The Horizontal Amplifier drives the horizontal deflection plates of the crt. In the A INT setting of the HORIZ DISPLAY switch, A Sweep Generator provides horizontal deflection and the display is intensified (made brighter) during the time B Sweep Generator is running. This is useful for observing the portion of the A Sweep display that would be presented in the B DLY'D mode.

CRT Circuit and Power Supply

The CRT circuit provides the high voltages needed to operate the crt. The Power Supply circuit provides all other voltages needed to operate the 335.

Unblanking and Z-Axis Logic

The Unblanking and Z-Axis Logic circuit supplies a signal to the unblanking grid of the crt. Signals for controlling blanking and unblanking are supplied to this circuit from the A Sweep Generator, the B Sweep Generator, the Vertical Switching circuit (chopped switching transient blanking), and the EXT BLANK input connector.



MAINTENANCE

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

CABINET REMOVAL

WARNING

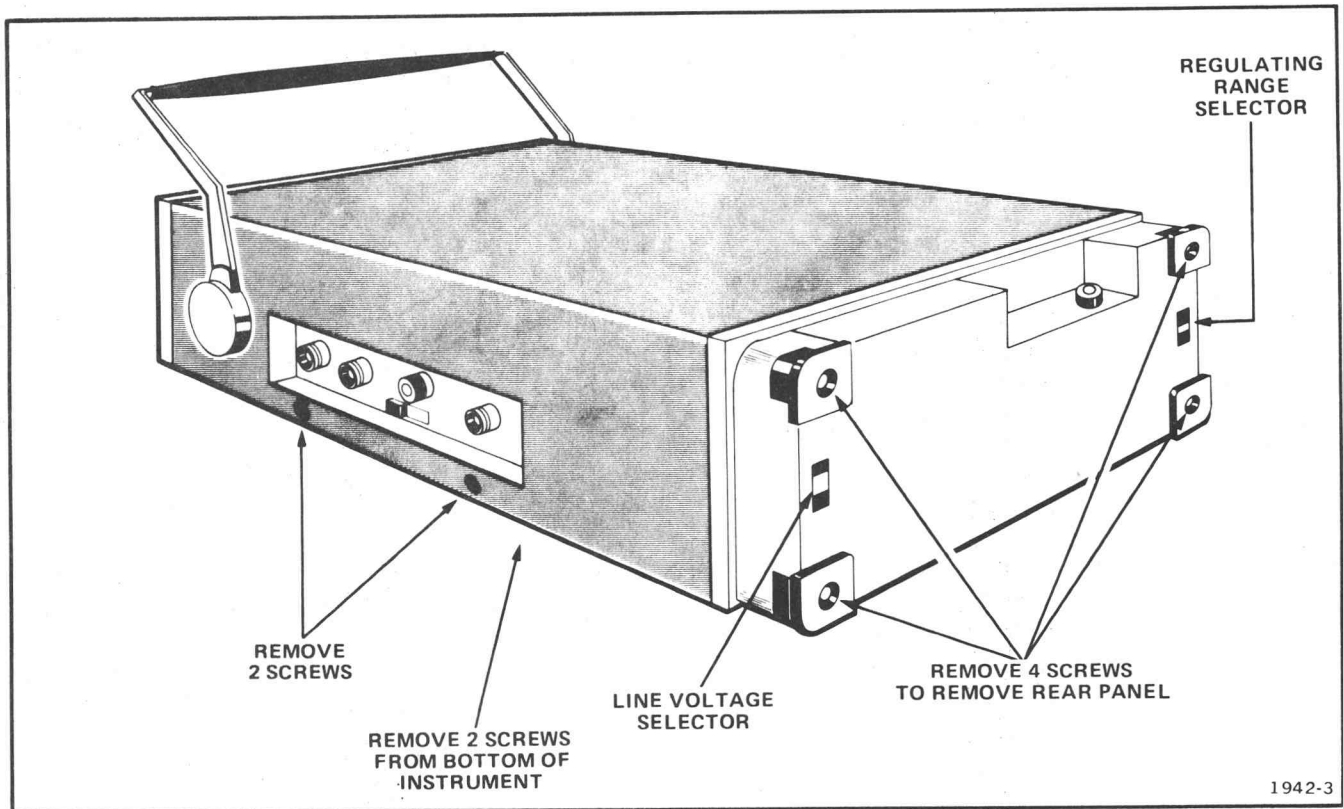
Dangerous potentials exist at several points throughout this instrument. When the instrument is operated with the cover removed, do not touch exposed connections or components. Some transistors may have elevated cases. Disconnect power before cleaning the instrument or replacing parts.

To remove the wrap around cabinet, use the following procedure:

1. Loosen the four screws holding the cabinet feet (cord wrap) and remove the cord-wrap feet (see Fig. 4-1).
2. Remove the grey-plastic rear cover.
3. Loosen (do not remove) the two screws holding the power cord strain relief (115/230 V ac selector switch mounting) and slide the strain relief toward instrument center.
4. Remove two screws below the connector panel on the right side of the cabinet.
5. Remove two screws from the cabinet bottom.
6. Position the handle to clear the instrument and slide the cabinet off the rear of the instrument.
7. To replace the cabinet, reverse the removal procedure. Be sure the power cord does not become looped through the side-panel cutout.

NOTE

The artwork for this section can be found (not necessarily in order) at the rear of this section.



PREVENTIVE MAINTENANCE

Preventive maintenance includes cleaning and visual inspection. To ensure instrument reliability, perform preventive maintenance on a regular basis. A convenient time to perform preventive maintenance is just before performing an adjustment procedure. If you use the 335 in a severe environment, perform preventive maintenance more often.

CLEANING

Clean the 335 as often as operating conditions require. A buildup of dust and dirt in the 335 acts as an insulating blanket. This can cause overheating and component breakdown. In a high-humidity environment dust and dirt can provide an electrical conduction path and cause a short circuit. The 335 cabinet reduces the amount of dust and dirt getting inside the 335. If you operate the 335 with the cabinet off you must clean the 335 more often.

CAUTION

Avoid the use of chemical cleaning agents that might damage the plastics used in the instrument. In particular, avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

Exterior

Remove loose dust on the outside of the 335 with a soft cloth or small brush. A brush is useful for cleaning hard to reach areas such as on and around front-panel controls. Clean off any dirt that is left, with a soft cloth dampened with a solution of mild detergent and water. Do not use abrasive cleaners.

Interior

To clean the interior, blow off built up dust with dry, low-pressure air. Remove any remaining dust with a soft brush or cloth dampened with a solution of mild detergent and water. Use a cotton swab for cleaning in narrow spaces.

VISUAL INSPECTION

Inspect the 335 for such problems as broken connections, poorly seated transistors, and heat-damaged parts.

Repair any obvious problems. However, take particular care if you find any heat-damaged parts. Overheating usually indicates other circuit problems. To prevent a recurrence of the damage, find and correct the cause of the overheating.

SEMICONDUCTOR CHECKS

We do not recommend periodic checks of the semiconductors in the 335. The best check of semiconductor performance is actual operation in the instrument. More details on checking semiconductors are given under troubleshooting.

RECALIBRATION

To ensure measurement accuracy, check the calibration of the 335 every 1000 hours of operation or every 6 months if used infrequently. Also, if you have replaced any components you should check and readjust the circuit repaired (see partial procedures in the introduction to the Adjustment Procedure in Section 6).

TROUBLESHOOTING

The following information is helpful when troubleshooting the 335. Information found in other sections of this manual, such as the Circuit Description and Circuit Diagrams, is also helpful in finding circuit problems.

TROUBLESHOOTING EQUIPMENT

Use the following equipment, or equivalent, when troubleshooting the 335:

1. A dynamic semiconductor tester such as the Tektronix 577-177-178 Curve Tracer System, a Tektronix 576 Curve Tracer, a 7CT1N Curve Tracer plug-in unit and a 7000-Series Oscilloscope system, or a 5CT1N Curve Tracer plug-in unit and a 5000-Series Oscilloscope.
2. A multimeter having at least 10 megohms input resistance; dc voltage range, 0 to 2000 volts; and an ohmmeter. Accuracy on the dc voltage scale should be within 2% of full scale.
3. A test oscilloscope with a frequency response of dc to 10 megahertz; deflection factors from 1 mV/Div to 10 V/Div. A 10X, 10 megohm voltage probe should be used to reduce circuit loading in high-impedance circuits.
4. A digital voltmeter with an accuracy of 0.1% for checking low-voltage power supplies.

TROUBLESHOOTING CHART

Fig. 4-2 is a guide for locating a defective circuit. Start at the top of the chart and perform the checks given on the left side of the page until a step is found that does not produce the desired results. Further checks, or the circuit in which the trouble is probably located, are listed to the right of each step. This chart does not include checks for all possible defects.

After the trouble area has been located, locate the defective component, using one or more of the procedures following this chart.

TROUBLESHOOTING PROCEDURE

This troubleshooting procedure is arranged to check the simple trouble possibilities first. The first few checks ensure proper connections, control operation, and associated equipment problems. If you do not find the trouble with these checks, move on to the troubleshooting chart and the remaining steps in this procedure.

1. Check Control Settings

Incorrect control settings can indicate a trouble that does not exist. If you have any questions about the correct function of a control, see either the Operators manual or the Operating Information section of this manual (Section 2).

2. Check Power Source

Check the power source. Be certain the 335 is set to operate from the power source available. Check the power connections.

3. Check Associated Equipment

Check the equipment being used with the 335 for proper operation. Also check the interconnections between the associated equipment and the 335.

4. Visual Check

You can locate many troubles (such as unsoldered connections, broken wires, and damaged parts) by visual inspection. If you find heat-damaged parts, find and repair the cause of overheating to prevent a recurrence of the damage.

5. Check Instrument Calibration

Check the calibration of the instrument, or the affected circuit if the trouble appears to be in one circuit. The apparent trouble may be a result of misadjustment and may be corrected by readjustment. Complete adjustment instructions are given in the Adjustment Procedure.

6. Isolate Trouble To A Circuit

Use the troubleshooting chart (Fig. 4-2) to isolate the trouble to a given circuit. Use the voltages and waveforms given in the Diagrams section to help locate the defective area of the circuit.

If the trouble appears to be in several circuits, suspect the power supply. Table 4-1 gives the power supply tolerances and ripple voltage. See the Adjustment Locations in the pullout pages for power supply test points.

TABLE 4-1
Power Supply Tolerance and Ripple

Supply	Tolerance	Ripple (p-p)
-8 V	1.5%	60 mV
+8 V	1.5%	60 mV
+15 V	0.5%	60 mV
+5 V	10%	100 mV
+35 V	10%	400 mV
+80 V	10%	1 V
-1960 V	2%	40 V

7. Check Individual Components

The following information describes methods of checking individual components in the 335. To check two-lead components that are soldered in place, unsolder one lead. This isolates the measurement from the associated circuitry.

WARNING

To prevent shock, disconnect the 335 from the power source before removing any parts.

CAUTION

To prevent damage to simiconductors, disconnect the 335 from the power source before removing any parts.

TRANSISTORS. A good check of transistor operation is actual performance under operating conditions. A transistor can be most effectively checked by substituting a new component or one that has been checked previously. However, be sure that circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic testor. Some transistors have non-standard lead configurations. See Fig. 4-3 for transistor lead configurations.

INTEGRATED CIRCUITS. A good understanding of circuit operation is desirable when troubleshooting circuits using integrated circuits (IC's). Use care when checking voltages and waveforms around the IC's so that adjacent leads are not short circuited. A convenient means of clipping a test probe to dual-in-line IC packages is with an IC test clip. This test clip also serves as an extraction tool. See Fig. 4-3 for IC lead configuration.

DIODES. A diode can be checked for an open or a short circuit by measuring the resistance between terminals using an ohmmeter on the $R \times 1k$ scale. The diode resistance should be very high in one direction and very low with the meter leads reversed.

CAUTION

Do not use an ohmmeter scale that has a high internal voltage. High current may damage the diode. Do not check tunnel or back diodes with an ohmmeter.

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

Maintenance—335 Service

A leaky tantalum decoupling capacitor can appear good when checked but fail when in use (see Troubleshooting Chart).

See Fig. 4-4 for capacitor color codes.

RESISTORS. Check resistors with an ohmmeter. Check the Electrical Parts List for tolerance of the resistors used in this instrument. Resistors normally do not need to be replaced unless the measured value varies widely from the specified value. See Fig. 4-4 for resistor color codes.

Repair and Readjust Circuit

If any defective parts are located, follow the replacement procedures given in this section. Check the performance of any circuit that has been repaired or has had any electrical components replaced. See partial procedures in the introduction to the Adjustment Procedure (Section 6 in this manual).

CORRECTIVE MAINTENANCE

OBTAINING REPLACEMENT PARTS

All electrical and mechanical replaceable parts for the 335 can be obtained through your Tektronix Field Office or representative. However, many of the standard electrical components can be obtained locally in less time than is required to order them from Tektronix, Inc. Before purchasing an ordinary part, check the parts list for value, tolerance, rating and description.

CAUTION

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

Some parts are manufactured or selected by Tektronix, Inc., to satisfy particular requirements, or are manufactured for Tektronix, Inc., to our specifications. Most of the mechanical parts have been manufactured by Tektronix, Inc. To determine the manufacturer of a part, refer to the Parts List Cross Index of Code Number to Manufacturer.

Maintenance—335 Service

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

1. Instrument Type.
2. Instrument serial number.
3. A description of the part (if electrical, include circuit number).
4. Tektronix part number.

CIRCUIT BOARD AND SUB-ASSEMBLY REMOVAL AND REPLACEMENT

WARNING

Disconnect the 335 from the power source before removing or replacing components or circuit boards.

The following information will aid you in removing circuit boards and sub-assemblies from the 335. See Fig. 4-5 for identification and location of the circuit boards in the 335. You may find the exploded drawing, located in the Mechanical Parts List, helpful in the following procedures.

Horizontal Module

1. Loosen two screws at bottom of plastic crt bezel. Screws are captive — do not remove.
2. Lift bezel away from crt face.
3. Remove horizontal deflection leads from crt neck pins.
4. Remove screw from rear center of Sweep board.
5. Carefully pull the module away from the instrument (forward). Be careful not to damage crt leads.
6. Unsolder the coaxial cable (grey with green stripe) from W and WG on the Horizontal board.
7. To replace, reverse the foregoing procedure.

Maintenance—335 Service

Sweep Board (Assembly A5)

1. Remove Horizontal module.
2. Remove ten screws from Sweep board.

Unsolder two connections between the Horizontal and Sweep boards.

4.



Be careful not to damage the SEC/DIV switch contacts and circuit board interconnecting pins when removing or replacing the Sweep board.

Carefully pull the Sweep board away from the Horizontal board.

5. There are three plug-on connectors attached to the Sweep board. These may come loose as you remove the Sweep board. If they don't, remove them and make note of their location.

6.



When replacing the Sweep board, be careful to correctly align the circuit board interconnecting pins.

Do not over-tighten the six screws to the SEC/DIV switch assembly.

To replace the Sweep board, reverse the foregoing procedure.

Horizontal Board (Assembly A4)

1. Remove Horizontal module.
2. Remove Sweep board.

NOTE

To prevent misalignment of the cam-switch assembly during reinstallation of Horizontal board, leave cam-switch assembly attached to Horizontal board.

3. Remove two small screws from front of Horizontal board.
4. Remove A CAL, A SEC/DIV, and B SEC/DIV knobs.
5. Remove plug-on connectors from P600 and P925.
6. Carefully pull Horizontal board away from front panel assembly.
7. To reinstall Horizontal board, reverse the foregoing procedure. Be sure to correctly position the ready light through the hole in the front panel.

Vertical Amplifier Board (Assembly A2)

NOTE

See Fig. 4-6 for the locations of the screws and wires mentioned in the following procedure.

1. Remove the POWER/INTENSITY and FOCUS shafts.
2. There are eight soldered connections between the Vertical Amplifier board and the Attenuator board. Unsolder these connections from the Vertical Amplifier board. When replacing the Vertical Amplifier board, be careful not to short these connections to each other or to the attenuator shield.
3. Disconnect the two single-pin plug-on connectors from the Attenuator board.
4. Unsolder four delay-line leads and two braided shields from the Vertical Amplifier board.
5. Unsolder one end of each of the four ground braids between the Vertical Amplifier board and the Attenuator board. Unsolder the ground braid near the rear of the instrument.
6. Unsolder the brown-on-white wire from the .5 V CAL OUT jack.
7. Unsolder the two leads of the vertical output IC (U400) which pass through the Vertical Amplifier board and the chassis. These leads are accessible from the side of the 335.

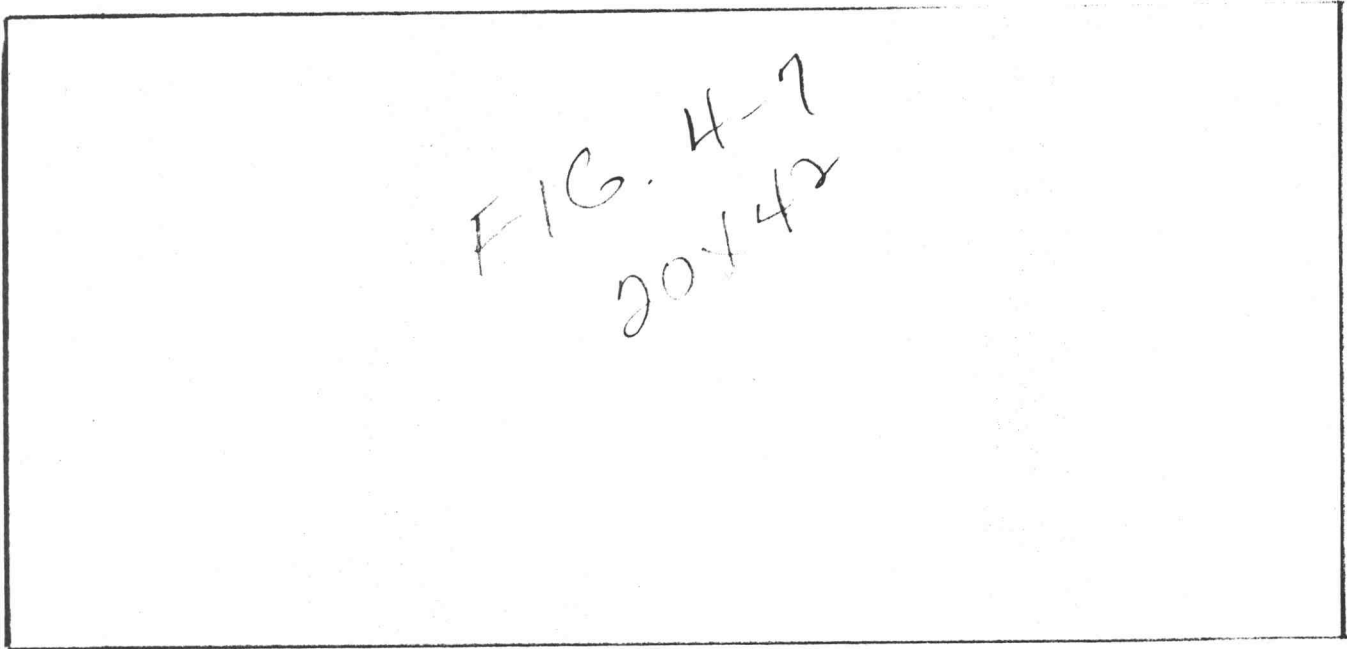
8. Unsolder the orange-on-white wire located near the IC leads you just unsoldered.
9. Remove the nut from the mounting stud of the vertical output IC (U400).
10. Remove six screws from the Vertical Amplifier board.
11. Disconnect the plug-on connectors from the Vertical Amplifier board. Make note of their location for board replacement.
12. Set the CH 1, CH 2, ALT, and CHOP pushbuttons to the in position.
13. Carefully slide the Vertical Amplifier board to the rear of the instrument while lifting up on the rear of the board. Guide the delay line through the hold in the board.
14. To replace the Vertical Amplifier board, reverse the foregoing procedure observing the following precautions:
 - a. Be certain you don't leave any wires or cables under the board where you can't reach them.
 - b. Guide the delay line through the hole in the board.
 - c. Locate the LOW LINE indicator in the hole in the front panel.
 - d. Guide the two vertical output IC leads through the holes in the chassis.

Trigger Board (Assembly A3)

NOTE

You can gain access to most of the parts on the Trigger board without removing it as follows:

- a. Remove the Horizontal module.*
- b. Remove four flat-head screws (see Fig. 4-7).*
- c. Remove the shield. The circuit board you see through the holes is the Trigger board.*



To remove the Trigger board:

1. Remove the Vertical Amplifier board.
2. Disconnect two plug-on connectors from the Trigger board. Make note of their locations for board replacement.
3. Remove the three 3/16 inch hexagonal posts.
4. Set the AC, DC, and INT pushbuttons to the in position.
5. Slide the Trigger board to the rear of the instrument while lifting up on the rear of the board. The solder lug mounted on the chassis may get in the way. If so, remove it.
6. If you need to completely remove the Trigger board, unsolder the orange-on-grey and the green-on-grey coaxial cables. Note the location for reinstallation.
7. To reinstall the Trigger board, reverse the foregoing procedure. Be careful to correctly route the cables. Use the end of the small screwdriver to align the three pushbuttons with the holes in the front panel.

Attenuator Board (Assembly A1)

NOTE

See Fig. 4-8 for the locations of the screws and wires mentioned in this procedure.

CAUTION

Be careful not to damage the VOLTS/DIV switch contacts.

1. There are eight soldered connections between the Vertical Amplifier board and the Attenuator board. Unsolder them from the Vertical Amplifier board.
2. Disconnect the two single-pin plug-on connectors from the Attenuator board.
3. Unsolder the four ground connections between the Attenuator board and the Vertical Amplifier board.
4. Unsolder two red wires, two green wires, and one coaxial cable from the Attenuator board.
5. Remove six screws from the Attenuator board.
6. Remove two flat-head screws which hold the attenuator shield to the chassis. These screws are accessible from the side of the instrument.
7. Lift the two black plastic AC-GND-DC switch couplers away from the switches.

8.

CAUTION

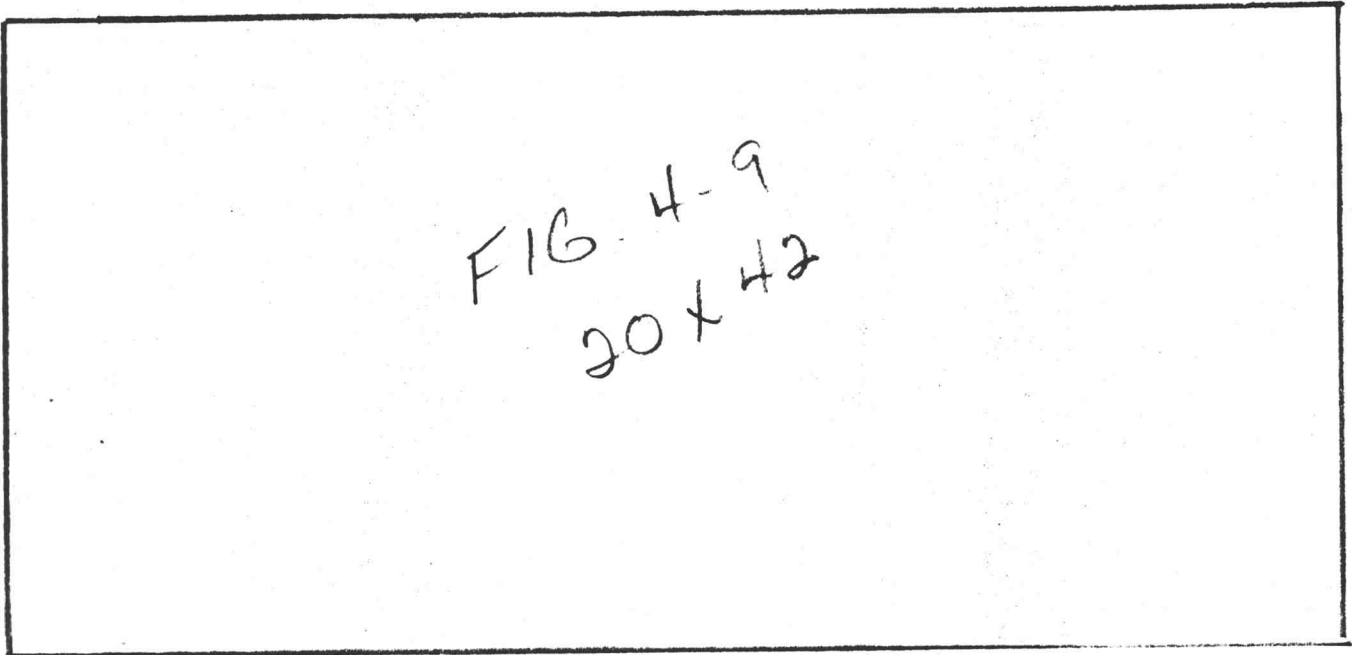
Be careful not to damage the VOLTS/DIV switch contacts located on the under side of the Attenuator board.

Carefully lift the Attenuator board away from the instrument.

9. To replace the Attenuator board, reverse the foregoing procedure. Be certain not to leave the red and green wires and the coax under the board where you can't reach them.

VOLTS/DIV Switch Cam

1. Remove Horizontal module.
2. Remove Attenuator board.
3. Remove three screws (see Fig. 4-9).



4. Lift rear of cam assembly and slide assembly toward the rear of the instrument to remove.
5. To replace cam assembly, reverse the foregoing procedure. Be sure you route the cable located near the front of the instrument so nothing rubs against it when you rotate the CH 1 VOLTS/DIV knob.

Power Supply and High Voltage Section

1. There are two plastic shields covering the power supply and high voltage section. Slide these shields toward the side of the 335 to remove.
2. Remove the Focus and Intensity shafts.
3. Remove the Horizontal module.

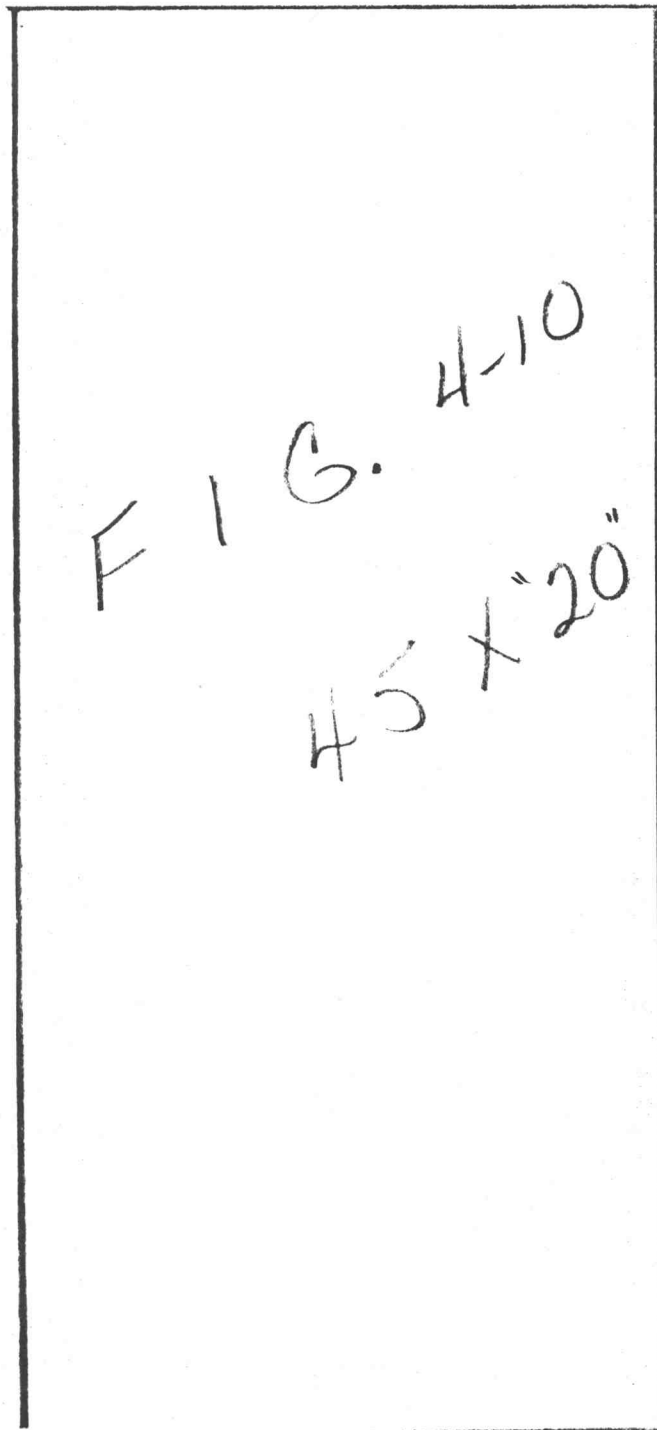
Maintenance—335 Service

4. Remove the screws shown in Fig. 4-10.

5.

NOTE

You must remove several plug connectors as you remove the power supply and high voltage section. To make replacement easier, wrap a piece of tape around each connector and write the P number on the tape.



Slowly and carefully pull the power supply and high voltage section away from the rest of the 335.

6. To replace the power supply and high voltage section, reverse the foregoing procedure.

Interface and Low-Voltage Regulator Board (Assembly A6)

1. Remove power supply and high voltage section.

2. Remove the three 3/16 inch hexagonal posts.

3. Disconnect P1601 and P1605.

4.

CAUTION

Use care not to damage the power supply interconnecting pins during board removal or replacement.

Pull Interface and Low-Voltage Regulator board away from the rest of the power supply and high voltage section.

5. To replace the Interface and Low-Voltage Regulator board, reverse the foregoing procedure.

Power Supply Converter Board (Assembly A8)

1. Remove the power supply and high voltage section.

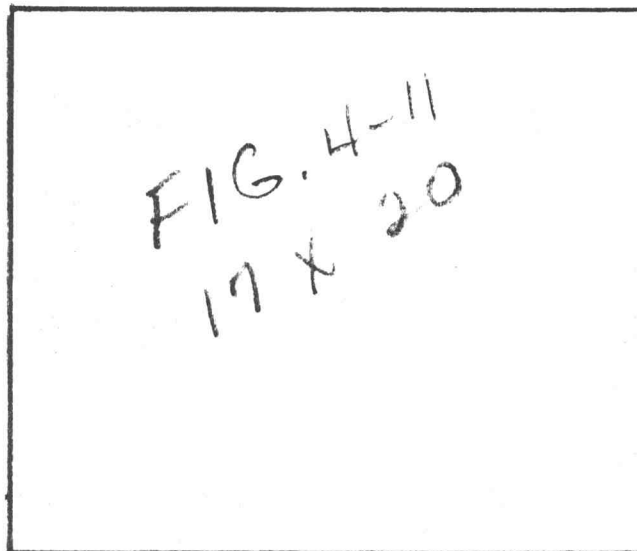
2. Remove the power supply and Low-Voltage Regulator board.

3. Remove five screws from the side panel and remove the side panel (see Fig. 4-11).

4. Disconnect the plug-on connectors from the Power Supply Converter board. Make note of their positions for replacement.

5. Carefully lift the Power Supply Converter board away from the rest of the power supply and high voltage section.

6. To replace the Power Supply Converter board, reverse the foregoing procedure.



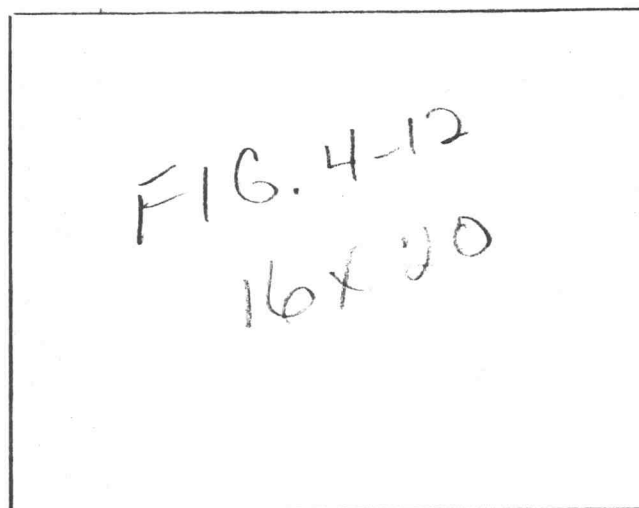
High Voltage and Unblanking Board (Assembly A7)

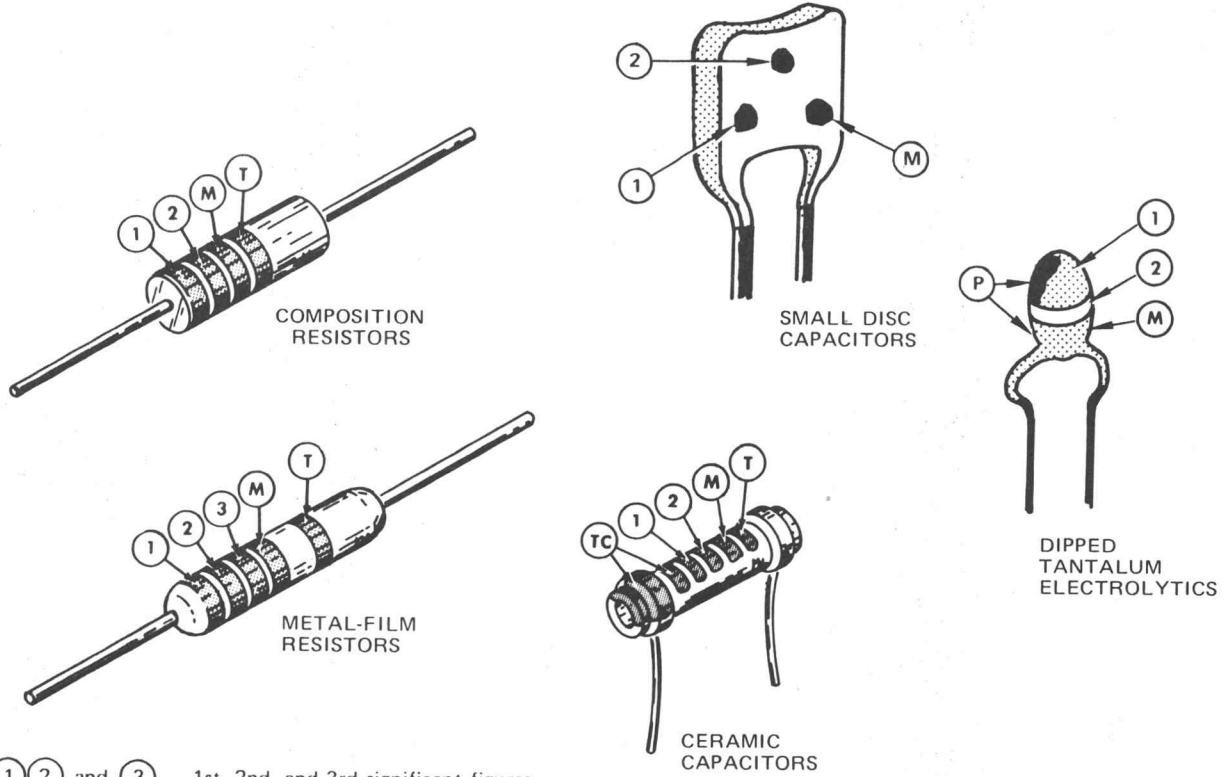
1. Remove the power supply and high voltage section.
2. Remove the Interface and Low-Voltage Regulator board.
3. Remove the Power Supply Converter board.
4. Remove the three 3/16 inch hexagonal posts.
5. Remove the one screw holding the board to the rear chassis.
6. Disconnect the plug-on connectors. Note their locations or mark plugs for easier replacement.
7. Unsolder the black wire which is looped through the hole in the circuit board. During replacement, be sure this wire is looped through this hole.
8. Carefully lift the High-Voltage and Unblanking board away from the rear chassis.
9. Remove the two screws holding the power-switch assembly.

10. Unsolder the remaining wires making note of their location for use in replacement.
11. To replace the High-Voltage and Unblanking board, reverse the foregoing procedure.

CRT

1. Loosen the two captive screws at the bottom of the crt bezel. These screws are captive, do not remove them.
2. Lift the bezel away from the crt face.
3. Disconnect the horizontal and vertical deflection plate leads from the crt neck pins.
4. Slide the plastic boot on the anode lead toward the front of the 335 (see Fig. 4-12). Unsolder the anode lead.
5. While removing the crt, hold your hand over the front of the crt to prevent it from falling. Slide the crt forward while removing the socket at the rear of the crt.
6. To replace the crt, reverse the foregoing procedure. Be certain you make a smooth solder joint on the anode lead. There will be a corona discharge from any sharp points on the connection.





1 2 and 3 — 1st, 2nd, and 3rd significant figures
 M — multiplier T — tolerance
 TC — temperature coefficient
 P — polarity and voltage rating
 T and/or TC color code may not be present on some capacitors

COLOR	SIGNIFICANT FIGURES	RESISTORS		CAPACITORS			DIPPED TANTALUM VOLTAGE RATING
		MULTIPLIER	TOLERANCE	MULTIPLIER	TOLERANCE		
					over 10 pF	under 10 pF	
BLACK	0	1	----	1	±20%	±2 pF	4 VDC
BROWN	1	10	±1%	10	±1%	±0.1 pF	6 VDC
RED	2	10 ² or 100	±2%	10 ² or 100	±2%	----	10 VDC
ORANGE	3	10 ³ or 1 K	±3%	10 ³ or 1000	±3%	----	15 VDC
YELLOW	4	10 ⁴ or 10 K	±4%	10 ⁴ or 10,000	+100% -9%	----	20 VDC
GREEN	5	10 ⁵ or 100 K	±½%	10 ⁵ or 100,000	±5%	±0.5 pF	25 VDC
BLUE	6	10 ⁶ or 1 M	±¼%	10 ⁶ or 1,000,000	----	----	35 VDC
VIOLET	7	----	±1/10%	----	----	----	50 VDC
GRAY	8	----	----	10 ⁻² or 0.01	+80% -20%	±0.25 pF	----
WHITE	9	----	----	10 ⁻¹ or 0.1	±10%	±1 pF	3 VDC
GOLD	-	10 ⁻¹ or 0.1	±5%	----	----	----	----
SILVER	-	10 ⁻¹ or 0.01	±10%	----	----	----	----
NONE	-	----	±20%	----	±10%	±1 pF	----

Fig. 4-4

100%

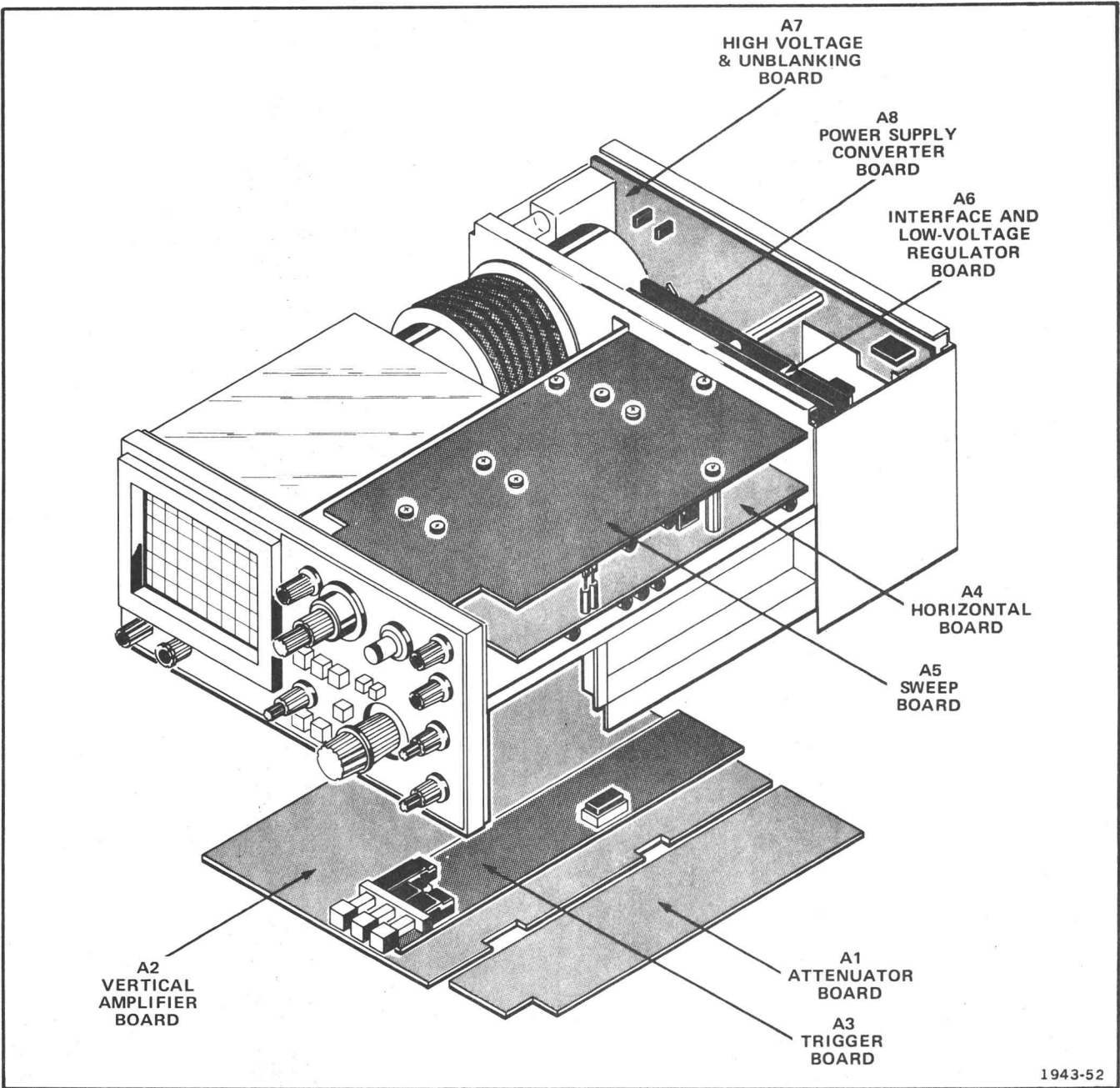
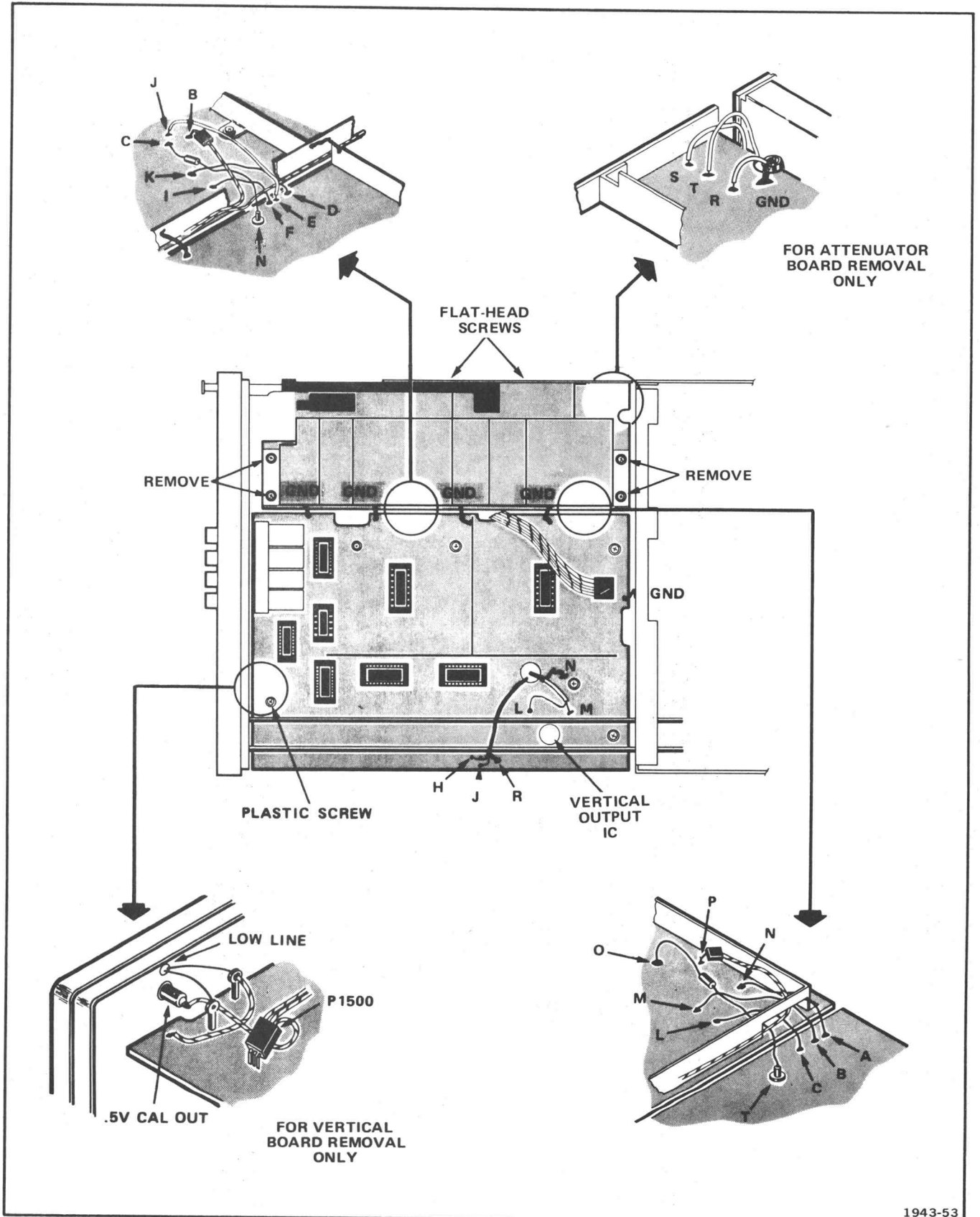


Fig 4-5

10070



1943-53

Fig 4-6 & Fig 4-8

1943-53

100%

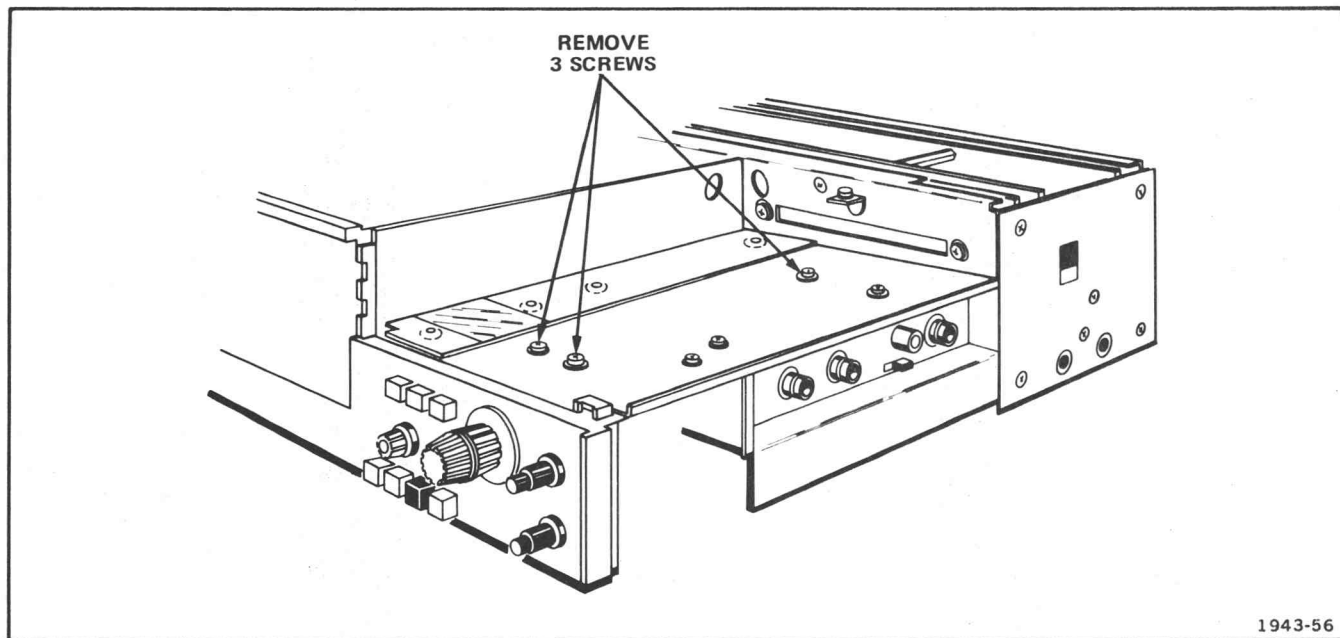


Fig 4-9

1943-56

100%

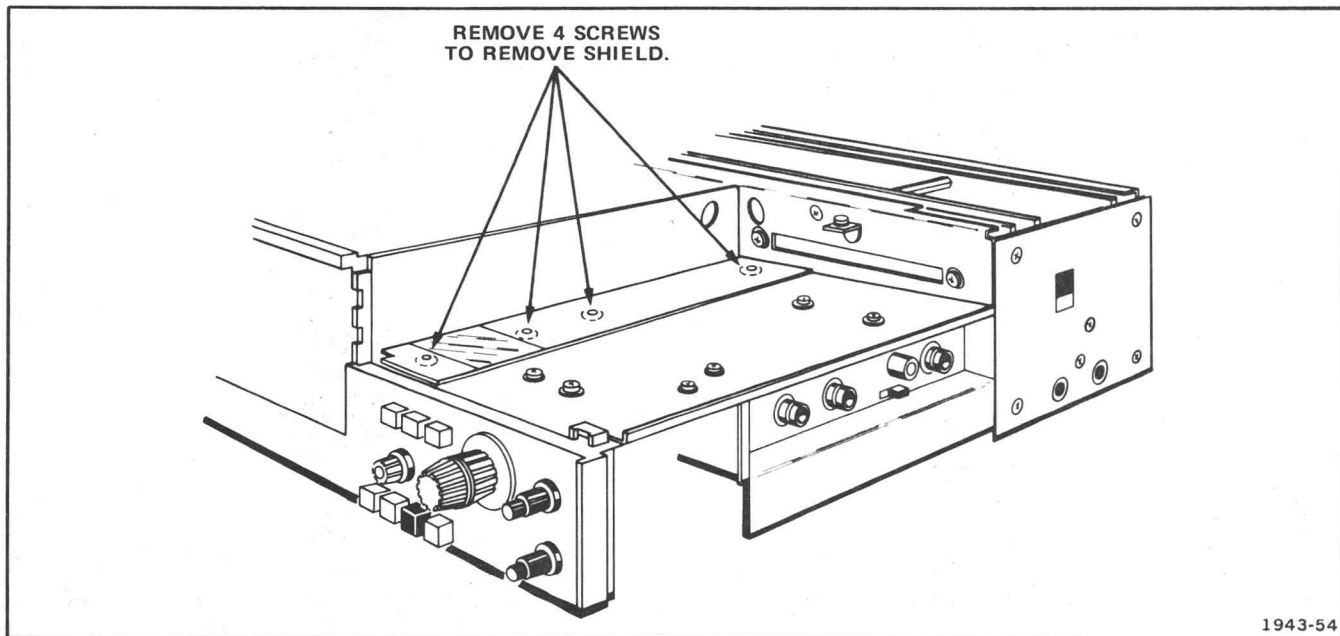


Fig 4-7

1943-54

100%

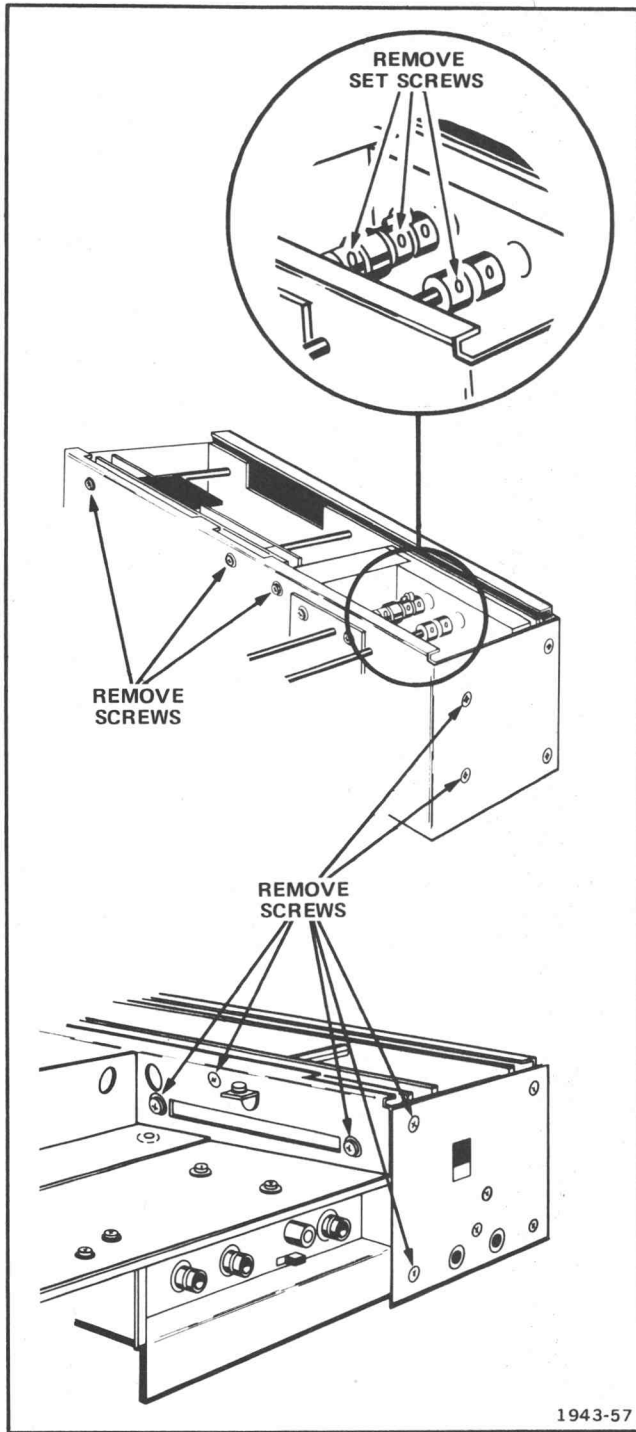


Fig 4-10

1943-57

10070

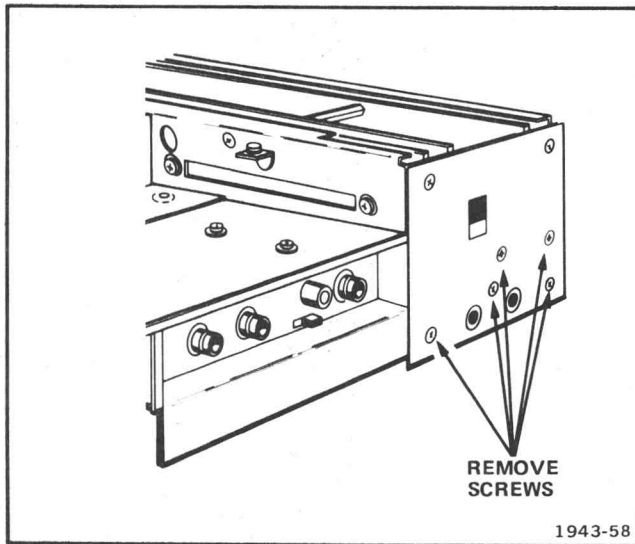


Fig 4-11

1943-58

100%

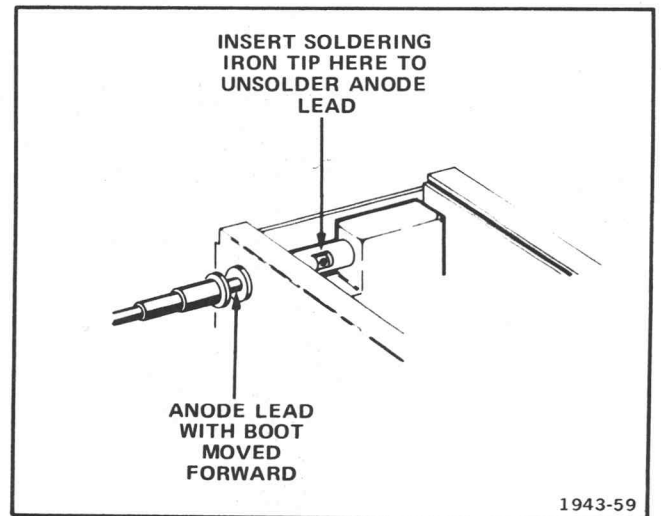


Fig 4-12

1943-59

100%

PERFORMANCE CHECK

INTRODUCTION

Purpose

This procedure is designed to be used by incoming inspection to check a newly purchased instrument or by quality control to check an instrument after performance of an adjustment procedure. You do not need to remove the instrument cover. All checks are made from the front panel.

Calibration Interval

To ensure instrument accuracy, check the calibration of the 335 every 1000 hours of operation, or every 6 months if used infrequently. If specifications are not met, see the Adjustment Procedure in Section 6 of this manual.

Limits and Tolerances

The limits and tolerances given in this procedure are valid, after a 30 minute warm-up period, if the 335 was calibrated in an ambient temperature of +20° C to +30° C. All limits and tolerances given are for the 335 under test and do not include test equipment tolerances.

Partial Procedures

If one aspect of the 335 measurement capability is more critical to your application, you may wish to perform a partial procedure and check that aspect at intervals more frequent than 1000 hours. Also, if you have replaced components, check the performance of the repaired circuit by performing a partial procedure. To make partial procedures easier to perform, the performance check is divided into several sections, each of which stands alone. An equipment required list and setup instructions are provided at the beginning of each section.

Equipment Required

The complete Performance Check requires the following equipment. For equipment specifications, usage, and recommended types, see Table 6-1 in the Adjustment Procedure section of this manual.

1. Standard amplitude calibration generator (SAC).
2. Square-wave generator.
3. Leveled sine-wave generator.

NOTE

The artwork for this section can be found (not necessarily in order) at the rear of this section.

Performance Check—335

4. Low-frequency sine-wave generator.
5. Time-mark generator.
6. 50 Ω BNC cable.
7. 50 Ω BNC termination.
8. 50 Ω BNC 10X attenuator (2 required).
9. 50 Ω BNC dual-input coupler (2 required).
10. GR to BNC adapter (if 106 square-wave generator is used).
11. BNC T-connector.
12. BNC to banana patch cord.
13. 10X probe (supplied with 335).

Index to Performance Check

A. Vertical

1. Deflection Factor Accuracy.
2. VARIABLE VOLTS/DIV Range.
3. Input R and C (VOLTS/DIV Compensation).
4. Frequency Response.

B. Triggering

1. High-frequency Internal Triggering.
2. High-frequency External Triggering.
3. Low-frequency Internal Triggering.
4. Low-frequency External Triggering.
5. Low-frequency Reject (LF REJ).
6. High-frequency Reject (HF REJ).
7. LINE Triggering.

C. Horizontal

1. A SEC/DIV Accuracy.
2. A CAL (Variable) Range.
3. B SEC/DIV Accuracy.
4. A and B Magnified SEC/DIV Accuracy.
5. Differential Time Measurement Accuracy.
6. Delay Jitter.
7. A TRIG HOLDOFF Range.
8. Chopped Mode Repetition Rate.
9. External Horizontal Sensitivity.

D. External Blanking and Calibrator.

1. External Blanking Sensitivity.
2. External Blanking-Usable Frequency Range.
3. .5 V CAL OUT (Calibrator) Frequency Accuracy.
4. Calibrator Amplitude.

A. VERTICAL

Equipment Required

1. Standard Amplitude Calibration Generator.
2. Square-wave Generator.
3. Leveled Sine-wave Generator.
4. 50 Ω BNC Cable.
5. 50 Ω BNC Termination.
6. 24 pF RC Input Normalizer.
7. 10X Attenuator (2 required).
8. GR to BNC Adapter (if 106 Square-wave generator is used).

335 CONTROL SETTINGS

NOTE

Allow 335 to warm up for 30 minutes before starting Performance Check.

Power and Display

POWER/INTENSITY	POWER—On
	INTENSITY—As desired
FOCUS	As desired
Line Voltage Selector	115
Power Source Selector	AC

Vertical (both channels if applicable)

VOLTS/DIV	1 m
VARIABLE	CAL
POSITION	Midrange
AC-GND-DC	GND
DISPLAY	CH 1
CH 2 INVERT	Button out

Horizontal

HORIZ DISPLAY	A
A and B SEC/DIV	.5 m
A CAL	Detent
HORIZ MAG	OUT: 1
DELAY TIME POSITION	Fully counterclockwise
Position	Midrange

Trigger

Trigger Mode	AUTO
A LEVEL	Clockwise
B (DLY'D) TRIGGER LEVEL	RUNS AFTER DLY TIME
A and B SLOPE	+
Coupling	AC
Source	INT—CH 1
A TRIG HOLDOFF	NORM (detent)
EXT ATTEN	1X

1. Deflection Factor Accuracy

- a. Connect test equipment as shown in Fig. 5-1.
- b. Set CH 1 AC-GND-DC switch to DC.
- c. CHECK—CH 1 deflection factor accuracy according to Table 5-1.
- d. Set:

CH 1 AC-GND-DC	GND
CH 2 AC-GND-DC	DC
DISPLAY	CH 2

- e. CHECK—CH 2 deflection factor accuracy according to Table 5-1.

TABLE 5-1

Deflection Factor Accuracy

VOLTS/DIV Setting	SAC or PG 506	Vertical Deflection
1 m	5 mV	4.85 to 5.15
2 m	10 mV	4.85 to 5.15
5 m	20 mV	3.88 to 4.12
10 m	50 mV	4.85 to 5.15
20 m	.1 V	4.85 to 5.15
50 m	.2 V	3.88 to 4.12
.1	.5 V	4.85 to 5.15
.2	1 V	4.85 to 5.15
.5	2 V	3.88 to 4.12
1	5 V	4.85 to 5.15
2	10 V	4.85 to 5.15
5	20 V	3.88 to 4.12
10	50 V	4.85 to 5.15
5 div Cal		4.85 to 5.15

2. VARIABLE VOLTS/DIV Range

- a. Set CH 1 and CH 2 VOLTS/DIV to 20 m.
- b. Set generator output to 0.1 V.
- c. CHECK—Display amplitude reduces from 5 divisions to 2 divisions or less when CH 2 VARIABLE control is turned fully counterclockwise.

d. Set:

DISPLAY	CH 1
CH 1 AC-GND-DC	DC
CH 2 AC-GND-DC	GND

e. CHECK—Display amplitude reduces from 5 divisions to 2 divisions or less when CH 1 VARIABLE Control is turned fully counterclockwise.

f. Set both VARIABLE controls to CAL (detent).

g. Disconnect test equipment.

3. Input R and C (VOLTS/DIV Compensation)

- a. Connect test equipment as shown in Fig. 5-2A.
- b. Set CH 1 and CH 2 VOLTS/DIV 10 m.
- c. Set generator frequency to 1 kHz.
- d. Connect output of Input Normalizer to CH 1 VERT INPUT connector.
- e. Adjust generator amplitude and add or remove attenuators to maintain a 5-division display throughout the rest of step 3.
- f. CHECK—0.3 division or less overshoot or rolloff of waveform.
- g. Connect test equipment as shown in Fig. 5-2B.
- h. Adjust probe compensation for best flat-top waveform.

i. CHECK—All CH 1 VOLTS/DIV switch settings for 0.15 division or less overshoot or rolloff of a 5-division waveform.

j. Move test setup to CH 2 VERT INPUT connector and set DISPLAY to CH 2 and CH 2 AC-GND-DC to DC.

k. CHECK—All CH 2 VOLTS/DIV switch settings for 0.15 division or less overshoot or rolloff of a 5-division waveform.

l. Disconnect test equipment.

4. Frequency Response (Bandwidth)

a. Connect equipment as shown in Fig. 5-3. Add or remove attenuators as needed to maintain a 6-division display of the reference signal.

b. Set:

CH 2 VOLTS/DIV	1 m
CH 2 AC-GND-DC	DC
CH 1 AC-GND-DC	GND
A LEVEL	cw (Free running)

c. Set generator to reference frequency and adjust generator amplitude for a 6-division display.

d. Without readjusting amplitude, set generator frequency according to Table 5-2.

e. CHECK—Display amplitude is 4.2 divisions or greater.

f. Repeat steps 4, parts c through e, for as many CH 2 VOLTS/DIV switch position as generator amplitude allows.

g. Set:

CH 2 AC-GND-DC	GND
CH 1 AC-GND-DC	DC
DISPLAY	CH 1

- h. Move test signal to CH 1 VERT INPUT connector.
- i. Repeat step 4, parts c through e, for as many Ch 1 VOLTS/DIV switch positions as generator amplitude allows.
- j. Disconnect test equipment.

TABLE 5-2
Frequency Response

CH 1 or CH 2 VOLTS/DIV	Generator Frequency
1 m through 5 m	25 MHz
10 m through 10	35 MHz

B. TRIGGERING

Equipment Required

1. Leveled Sine-wave Generator.
2. Low-frequency Sine-wave Generator.
3. 50 Ω BNC Cable.
4. 50 Ω BNC Termination.
5. Dual-Input Coupler (2 required).
6. 10X Probe (supplied with 335).

335 CONTROL SETTINGS (*Indicates change from previous step)

NOTE

If you are performing a partial procedure, allow 335 to warm up for 30 minutes before starting Performance Check.

Power and Display

POWER/INTENSITY	POWER—On
	INTENSITY—As desired
FOCUS	As desired
Line Voltage Selector	115
Power Source Selector	AC

Vertical (both channels if applicable)

*VOLTS/DIV	*10 m
VARIABLE	CAL
POSITION	Midrange
*AC-GND-DC	*AC
*DISPLAY	*CH 1
CH 2 INVERT	Button out

Horizontal

HORIZ DISPLAY	A
* and B SEC/DIV	*1 μ
A CAL	Detent
HORIZ MAG	OUT: 1
DELAY TIME POSITION	Fully counterclockwise
Position	Midrange

Trigger

Trigger Mode	AUTO
A LEVEL	As needed
*B (DLY'D) TRIGGER LEVEL	*As needed
A and B SLOPE	+
Coupling	AC
Source	INT—CH 1
A TRIG HOLDOFF	NORM (detent)
EXT ATTEN	1X

*Indicates change from previous step.

1. High frequency Internal Triggering

a. Connect test equipment to CH 1 VERT IN, CH 2 VERT IN, and EXT TRIG or HORIZ INPUT as shown in Fig. 5-4.

b. CHECK—Stable display can be obtained in both + and – positions of A SLOPE switch with equipment settings listed in Table 5-3.

c. Set:

A LEVEL	cw
HORIZ DISPLAY	B
B LEVEL	As needed for a stable display

d. CHECK—Stable display can be obtained in both + and – positions of B SLOPE switch with equipment settings listed in Table 5-3.

TABLE 5-3

H. F. Internal Triggering Checks

SOURCE	COUPLING	Display ¹ Amplitude	Generator Frequency	A and B SEC/DIV	HORIZ MAG Button
CH 1	AC, DC, LF REJ	0.35 div	1 MHz	1 μ	Out
CH 2	AC, DC, LF REJ	0.35 div	1 MHz	1 μ	Out
COMP	AC, DC, LF REJ	0.35 div	1 MHz	1 μ	Out
COMP	AC, DC, LF REJ	1.5 div	35 MHz	.2 μ	In
CH 2	AC, DC, LF REJ	1.5 div	35 MHz	.2 μ	In
CH 1	AC, DC, LF REJ	1.5 div	35 MHz	.2 μ	In

¹To obtain 0.3 division display:
 A. Set CH 1 VOLTS/DIV to 1 m.
 B. Adjust generator amplitude for a 3-division display.
 C. Set CH 1 VOLTS/DIV to 10 m.

To obtain 1.5 division display:
 A. Set CH 1 VOLTS/DIV to 2 m.
 B. Adjust generator amplitude for a 7.5-division display.
 C. Set Ch 1 VOLTS/DIV to 10 m.

2. High-frequency External Triggering

a. Set:

HORIZ DISPLAY	A
SOURCE	OUT: EXT/LINE
EXT ATTEN	1X

b. CHECK—Stable display can be obtained in both + and – positions of A SLOPE switch with equipment settings listed in Table 5-4.

TABLE 5-4

H. F. External Triggering Checks

Trigger Coupling	Signal ¹ Amplitude	Generator Frequency	A and B SEC/DIV	HORIZ MAG Button
AC, DC, LF REJ	70 mV	1 MHz	1 μ	Out
AC, DC, LF REJ	250 mV	35 MHz	.2 μ	In

¹To obtain 70 mV of 1 MHz:

- Set Ch 1 VOLTS/DIV to 10 m.
- Set generator to reference frequency.
- Adjust generator amplitude for a 7-division display.
- Set generator frequency to 1 MHz.

To obtain 250 mV of 35 MHz:

- Set CH 1 VOLTS/DIV to 50 m.
- Set generator to reference frequency.
- Adjust generator amplitude for a 5-division display.
- Set generator frequency to 35 MHz.

c. Set:

A LEVEL	cw
HORIZ DISPLAY	B

d. CHECK—Stable display can be obtained in both + and – positions of B SLOPE switch with equipment settings listed in Table 5-4.

3. Low-frequency Internal Triggering

a. Disconnect BNC cable from leveled sine-waved generator output and connect to output of low-frequency sine-wave generator.

Performance Check—335

b. Set:

HORIZ DISPLAY	A
A and B SEC/DIV	10 m
CH 1 VOLTS/DIV	1 m
DISPLAY	CH 1
HORIZ MAG	OUT: X1
SOURCE	INT

c. Set generator frequency to 60 Hz and adjust generator amplitude for a 3.5-division display.

d. Set Ch 1 VOLTS/DIV to 10 m.

e. CHECK—Stable display can be obtained in both + and – positions of A SLOPE switch with equipment settings listed in Table 5-5.

f. Set:

A LEVEL	cw
HORIZ DISPLAY	B

g. CHECK—Stable display can be obtained in both + and – positions of B SLOPE switch with equipment settings listed in Table 5-5.

TABLE 5-5

L. F. Internal Triggering Checks

Trigger Source	Trigger Coupling
CH 1	AC, DC, HF REJ
CH 2	AC, DC, HF REJ
COMP	AC, DC, HF REJ

4. Low frequency External Triggering

a. Set:

HORIZ DISPLAY	A
SOURCE	EXT/LINE
EXT ATTEN	1X
CH 1 VOLTS/DIV	10 m
DISPLAY	CH 1

b. Set generator amplitude for a 7-division display.

c. CHECK—Stable display can be obtained in both the + and – positions of A SLOPE switch in the following trigger coupling modes:

AC
DC
HF REJ

d. Set:

A LEVEL	CW
HORIZ DISPLAY	B

e. CHECK—Stable display can be obtained in both the + and – positions of B SLOPE switch in the following trigger coupling modes:

AC
DC
HF REJ

5. Low-Frequency Reject (LF REJ)

a. Set:

Coupling	LF REJ
Source	INT-COMP
A SEC/DIV	20 μ
HORIZ DISPLAY	A
CH 1 VOLTS/DIV	1 m

b. Set generator frequency to 10 kHz and adjust generator amplitude for a 5-division display.

c. Set CH 1 VOLTS/DIV to 10 m.

d. CHECK—Stable display can not be obtained.

e. Without changing amplitude, set generator frequency to 40 kHz.

f. CHECK—Stable display can be obtained.

Performance Check—335

6. High-Frequency Reject (HF REJ)

a. Set:

Coupling	HF REJ
CH 1 VOLTS/DIV	1 m

b. Set generator to 100 kHz and adjust generator amplitude for a 5-division display.

c. Set CH 1 VOLTS/DIV to 10 m.

d. CHECK—Stable display cannot be obtained.

e. Without changing amplitude, set generator frequency to 20 kHz.

f. CHECK—Stable display can be obtained.

g. Disconnect test equipment.

7. Line Triggering

a. Set:

A SEC/DIV	5 ms
Source	EXT/LINE
EXT ATTEN	LINE
Coupling	HF REJ
CH 2 AC-GND-DC	GND

b. Connect equipment as shown in Fig. 5-5.

c. Adjust CH 1 VOLTS/DIV for about 4 or 5 divisions of display.

d. CHECK—Stable display can be obtained in both + and – positions of A SLOPE switch.

e. Disconnect test equipment.

C. HORIZONTAL

Equipment Required

1. Time-mark Generator.
2. Standard Amplitude Calibration Generator.
3. 50 Ω BNC Cable.
4. 50 Ω Termination.

335 CONTROL SETTINGS (*Indicates change from previous step)

NOTE

If you are performing a partial procedure, allow 335 to warm up for 30 minutes before starting Performance Check.

Power and Display

POWER/INTENSITY

POWER—On

INTENSITY—As desired

FOCUS

As desired

Line Voltage Selector

115

Power Source Selector

AC

Vertical (both channels if applicable)

*VOLTS/DIV

*as needed

VARIABLE

CAL

POSITION

Midrange

*CH 1 AC-GND-DC

*DC

*AC-GND-DC

*GND

*DISPLAY

*CH 1

CH 2 INVERT

Button out

Horizontal

HORIZ DISPLAY

A

*A and B SEC/DIV

*.5 m

A CAL

Detent

HORIZ MAG

OUT: 1

DELAY TIME POSITION

Fully counterclockwise

Position

Midrange

Trigger

Trigger Mode	AUTO
A LEVEL	Clockwise
*B (DLY'D) TRIGGER LEVEL	*RUNS AFTER DLY TIME
A and B SLOPE	+
*Coupling	*AC
*Source	*INT—CH 1
A TRIG HOLDOFF	NORM (detent)
*EXT ATTEN	*1X

*Indicates change from previous step

1. A SEC/DIV Accuracy

- a. Connect test equipment as shown in Fig. 5-6.
- b. Set CH 1 VOLTS/DIV so display amplitude is about 3 divisions.
- c. CHECK—A SEC/DIV accuracy within 3% over center 8 divisions displayed (see Fig. 5-7) using equipment settings given in Table 5-6.

2. A CAL (Variable) Range

- a. Set A SEC/DIV to 1 m.
- b. Set generator to 5 ms time marks.
- c. Rotate A CAL control fully counterclockwise.
- d. CHECK—Distance between time marks is 2 divisions or less.
- e. Return A CAL control to detent position.

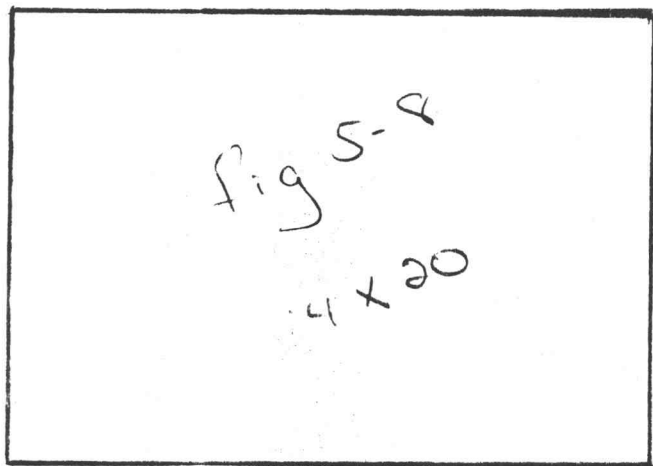
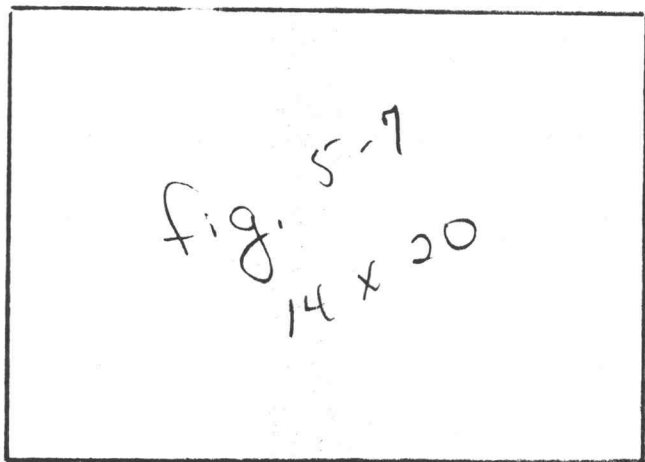
3. B SEC/DIV Accuracy

Set:	
HORIZ DISPLAY	B
B LEVEL	RUNS AFTER DLY TIME
A LEVEL	As needed for a stable display
A Trigger Mode	AUTO

- b. CHECK—B SEC/DIV accuracy within 3% over center 8 divisions displayed (see Fig. 5-7) using equipment settings given in Table 5-7.

TABLE 5-6
A SEC/DIV Accuracy

A SEC/DIV	Time-Mark Gen.
.2 μ	² 0.2 μ s
.5 μ	0.5 μ s
1 μ	1 μ s
2 μ	² 2 μ s
5 μ	5 μ s
10 μ	10 μ s
20 μ	² 20 μ s
50 μ	50 μ s
.1 m	0.1 ms
.2 m	² 0.2 ms
.5 m	0.5 ms
1 m	1 ms
2 m	² 2 ms
5 m	5 ms
10 m	10 ms
20 m	² 20 ms
¹ 50 m	¹ 50 ms
¹ .1	¹ 0.1 s
¹ .2	^{1/2} 0.2 s
¹ .5	¹ 0.5 s



¹Change A Trigger Mode to NORM. Reduce intensity as needed.

²If the time-mark generator you are using does not have decade multiples of 2, use decade multiples of 1 and check for 2 time-marks per division.

4. A and B Magnified SEC/DIV Accuracy

a. Set:

HORIZ MAG
A Trigger Mode

IN: X10
AUTO

b. CHECK—Magnified B SEC/DIV within 4% over center 8 divisions displayed (see Fig. 5-8) using equipment settings given in Table 5-8 (accuracy applied over entire magnified sweep length except as noted in Table 5-8).

TABLE 5-7
B SEC/DIV Accuracy

A SEC/DIV	B SEC/DIV	Time-Mark Gen.
.5 μ	.2 μ	² 0.2 μ s
1 μ	.5 μ	0.5 μ s
2 μ	1 μ	1 μ s
5 μ	2 μ	² 2 μ s
10 μ	5 μ	5 μ s
20 μ	10 μ	10 μ s
50 μ	20 μ	² 20 μ s
.1 m	50 μ	50 μ s
.2 m	.1 m	0.1 ms
.5 m	.2 m	² 0.2 ms
1 m	.5 m	0.5 ms
2 m	1 m	1 ms
5 m	2 m	² 2 ms
10 m	5 m	5 ms
20 m	10 m	10 ms
¹ 50 m	¹ 20 m	^{1/2} 20 ms
¹ 100 m	¹ 50 m	¹ 50 ms

¹Change A TRIG MODE to NORM if needed.

²If the time-mark generator you are using does not have time-marks which are decade multiples of 2, use decade multiples of 1 and check for 2 time-marks per division.

c. Set:

HORIZ DISPLAY
A Trigger Mode

A
AUTO

d. CHECK—Magnified A SEC/DIV within 4% over center 8 divisions displayed (see Fig. 5-8) using equipment settings given in Table 5-8 (accuracy applies over entire magnified sweep length except as noted in Table 5-8).

TABLE 5-8
Magnified A SEC/DIV Accuracy

A and B SEC/DIV	Time-Mark Generator	Portions of Total Sweep Length Excluded From Measurement
.2 μ	² 20 ns	first and last 10 divisions
.5 μ	50 ns	first and last 4 divisions
1 μ	.1 μ s	first and last 2 divisions
2 μ	² .2 μ s	
5 μ	.5 μ s	
10 μ	1 μ s	
20 μ	² 2 μ s	
50 μ	5 μ s	
.1 m	10 μ s	
.2 m	² 20 μ s	
.5 m	50 μ s	
1 m	.1 ms	
2 m	² .2 ms	
5 m	.5 ms	
10 m	1 ms	
20 m	² 2 ms	
¹ 50 m	5 ms	
A SWEEP ONLY		
¹ .1	10 ms	none
¹ .2	² 20 ms	
¹ .5	50 ms	

¹Set Trigger Mode to NORM.

²If the time-mark generator you are using does not have time-marks which are decade multiples of 2, use multiples of 1 and check for 2 time-marks per division.

5. Differential Time Measurement Accuracy

a. Set:

HORIZ DISPLAY
B LEVEL
A Trigger Mode

B
RUNS AFTER DLY TIME
AUTO

Performance Check—335

- b. Set A and B SEC/DIV and time-mark generator to settings given in Table 5-9.
- c. Set DELAY TIME POSITION dial (DTP dial) to 1.00.
- d. Adjust Horizontal Position control so top of first displayed time-mark crosses the center vertical graticule line. If the top of the time-mark is not visible, slightly readjust the DTP dial until the top of the time-mark is visible and note the DTP dial setting.
- e. Set DTP dial to 9.00. Slightly readjust DTP dial until the top of the displayed time-mark crosses the center vertical graticule line.
- f. CHECK—DTP dial setting is 7.84 to 8.16 plus the setting in step d.

TABLE 5-9
Differential Time-Measurement Accuracy

A SEC/DIV	B SEC/DIV	Time-Mark Generator
2 μ 5 μ	.2 μ .5 μ	1 μ s (2 μ s) 5 μ s
10 μ 20 μ 50 μ	1 μ 1 μ (2 μ) 5 μ	10 μ s 10 μ s (20 μ s) 50 μ s
.1 m .2 m .5 m	10 μ 10 μ (20 μ) 50 μ	.1 ms .1 ms (0.2 ms) .5 ms
1 m 2 m 5 m	.1 m .1 m (.2 m) .5 m	1 ms 1 ms (2 ms) 5 ms
10 m 20 m 50 m	1 m 1 m (2 m) 5 m	10 ms 10 ms (20 ms) 50 ms
¹ .1 m ¹ .2 ¹ .5	¹ 10 m ¹ 10 m (20 m) ¹ 50 m	0.1 s 0.1 s (0.2 s) 0.5 s

¹Set Trigger Mode to normal.

Examples:

If DTP dial setting in step d was 1.00 then DTP dial setting in step f must be between 8.84 and 9.16;

or

If DTP dial setting in step d was 1.10 then DTP dial setting in step f must be between 8.94 and 9.26.

NOTE

If the time-mark generator you are using has time-marks which are decade multiples of 2, use the B SEC/DIV and Time-Mark generator settings given in parenthesis.

6. Delay Jitter

a. Set:

A SEC/DIV	1 m
B SEC/DIV	0.5 μ
DELAY TIME POSITION	1.00
HORIZ DISPLAY	A
A SLOPE	+

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

c. Set HORIZ DISPLAY to B.

d. Slightly readjust the DTP dial to locate a time-mark within the graticule area.

e. CHECK—Horizontal jitter is 1 division or less.

f. Set DTP dial to 9.00.

g. Slightly readjust DTP dial to locate a time-mark within the graticule area.

h. CHECK—Horizontal jitter is 1 division or less.

i. Disconnect test equipment.

Performance Check—335

7. A TRIG HOLDOFF Range

NOTE

This check is an approximation. An exact check requires removal of instrument cover and use of a test oscilloscope. If you wish to make an exact check, see the Calibration Procedure.

a. Set:

A SEC/DIV	1 m
A Trigger Mode	AUTO
A TRIG HOLDOFF	NORM (detent)
A Trigger LEVEL	Clockwise

b. CHECK—Trace flickers rapidly

c. Set:

A TRIG HOLDOFF	Fully clockwise
----------------	-----------------

d. CHECK—Trace flickers more slowly (typically about 15 sweeps every 10 seconds).

e. Set A TRIG HOLDOFF to detent.

8. Chopped Mode Repetition Rate

a. Set:

A SEC/DIV	1 μ
Trigger Source	COMP
DISPLAY	CHOP

b. Vertically position the two traces about three or four divisions apart.

c. Adjust A Trigger LEVEL for a stable display.

d. CHECK—Duration of one cycle is about 3.3 μ s (see Fig. 5-9).

9. External Horizontal Sensitivity

- a. Connect equipment to EXT TRIG or HORIZ INPUT as shown in Fig. 5-10.

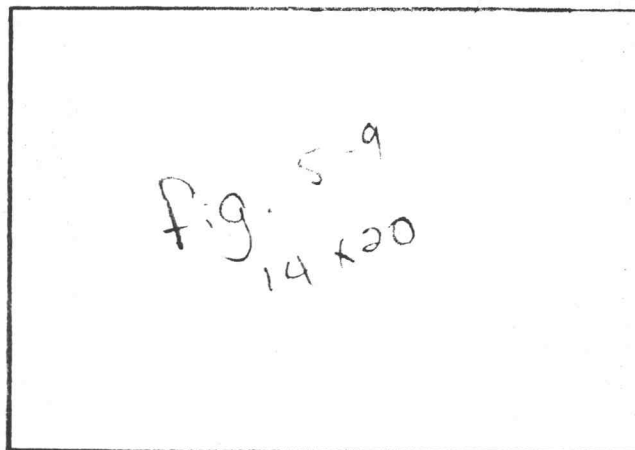
CAUTION

Reduce display intensity in X-Y mode. A bright stationary dot may damage crt phosphor.

- b. Set:

A SEC/DIV	X-Y
Trigger Source	EXT
EXT ATTEN	1X

- c. Set generator output to 1 volt.
- d. CHECK—Display is a pair of dots, separated horizontally by approximately 5 divisions.
- e. Set EXT ATTEN to 10X.
- f. Set generator output to 10 volts.
- g. CHECK—Display is a pair of dots, horizontally separated by approximately 5 divisions.



D. EXTERNAL BLANKING AND CALIBRATOR

Equipment Required

1. Leveled sine-wave generator.
2. Standard Amplitude Calibration Generator (SAC).
3. Time-mark Generator.
4. 10X Probe (supplied with 335).
5. 50 Ω BNC Cable.
6. 50 Ω BNC Termination.
7. 50 Ω BNC T Connector.
8. BNC to Banana Patch Cord.

335 CONTROL SETTINGS

(*Indicates change from previous step)

NOTE

If you are performing a partial procedure, allow 335 to warm up for 30 minutes before starting Performance Check.

Power and Display

POWER/INTENSITY	POWER—On
	INTENSITY—As desired
FOCUS	As desired
Line Voltage Selector	115
Power Source Selector	AC

Vertical (both channels if applicable)

*VOLTS/DIV	*10 m
VARIABLE	CAL
POSITION	Midrange
AC-GND-DC	GND
DISPLAY	CH 1
CH 2 INVERT	Button out

Performance Check—335

Horizontal

HORIZ DISPLAY	A
A and B SEC/DIV	1 m
A CAL	Detent
HORIZ MAG	OUT: X1
DELAY TIME POSITION	Fully cw
Position	Midrange

Trigger

Trigger Mode	AUTO
A LEVEL	Clockwise
B (DLY'D) TRIGGER LEVEL	RUNS AFTER DLY TIME
A and B SLOPE	+
Coupling	AC
Source	EXT
A TRIG HOLDOFF	NORM (detent)
*EXT ATTEN	*1X

*Indicate change from previous step.

1. External Blanking Sensitivity

- a. Connect equipment to EXT TRIG or HORIZ INPUT connector and EXT BLANK connector as shown in Fig. 5-11.
- b. Set generator frequency to 1 kHz and generator amplitude to 5 volts.
- c. CHECK—Intensity modulation visible at normal INTENSITY setting (adjust A LEVEL as needed for a stable display).
- d. Disconnect equipment.

2. External Blanking Usable Frequency Range

- a. Connect test equipment to EXT TRIG or HORIZ INPUT connector and EXT BLANK connector as shown in Fig. 5-12.
- b. Set A SEC/DIV to 5 μ .

- c. Set generator frequency to 2 MHz and generator amplitude to 5 volts.

NOTE

You may verify 5 volt generator amplitude as follows:

A. Disconnect cable and termination from BNC T connector and connector to CH 1 VERT INPUT connector.

B. Set CH 1 VOLTS/DIV to 1.

C. Adjust generator amplitude for 5 divisions of display amplitude.

D. Reconnect cable and termination to BNC T connector.

- d. CHECK—Intensity modulation visible at normal INTENSITY setting.

- e. Disconnect test equipment.

3. .5 V CAL OUT (Calibrator) Frequency Accuracy

- a. Connect test equipment as shown in Fig. 5-13.

NOTE

Be certain your probe is properly compensated. See operator adjustments and checks in Section 2 of this manual.

- b. Set:

HORIZ DISPLAY
 B LEVEL
 A SLOPE
 Trigger Source
 DISPLAY
 Trigger Coupling
 A SEC/DIV
 B SEC/DIV
 CH 1 VOLTS/DIV
 CH 2 VOLTS/DIV
 A LEVEL

A INTEN
 RUNS AFTER DLY TIME
 +
 INT-COMP
 ALT
 LF REJ
 .5 m
 50 μ
 20 m
 .5

Carefully adjusted so both waveforms are stable.

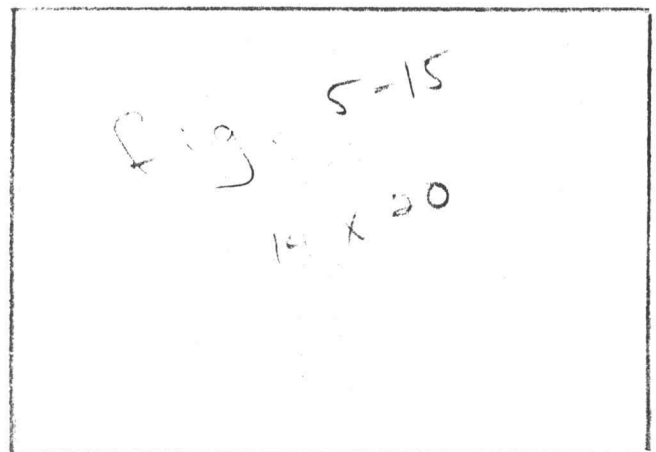
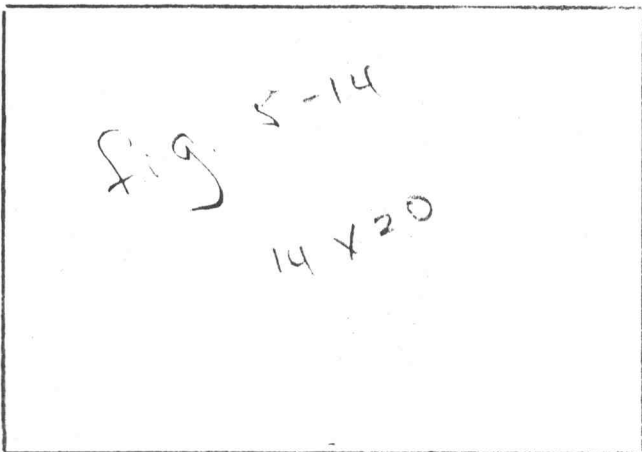
- c. CHECK—Approximately 1 cycle of calibrator waveform per time-mark (see Fig. 5-14).
- d. Adjust DTP dial so 6th time-mark is intensified (see Fig. 5-14).
- e. Set HORIZ DISPLAY to B.
- f. Adjust DTP dial so time-marker and Calibrator waveforms are visible (see Fig. 5-15).
- g. CHECK—Horizontal difference between rising portion of time-mark and rising portion of Calibrator waveform is 2 divisions or less (see Fig. 5-15).

4. Calibrator Approximate Amplitude

a. Set:

HORIZ MAG	X1
Trigger Source	INT—CH 1
DISPLAY	CH 1
CH 1 VOLTS/DIV	10 m

b. CHECK—Display amplitude is 5 divisions. If you wish to make a more accurate check, see the Adjustment Procedure.



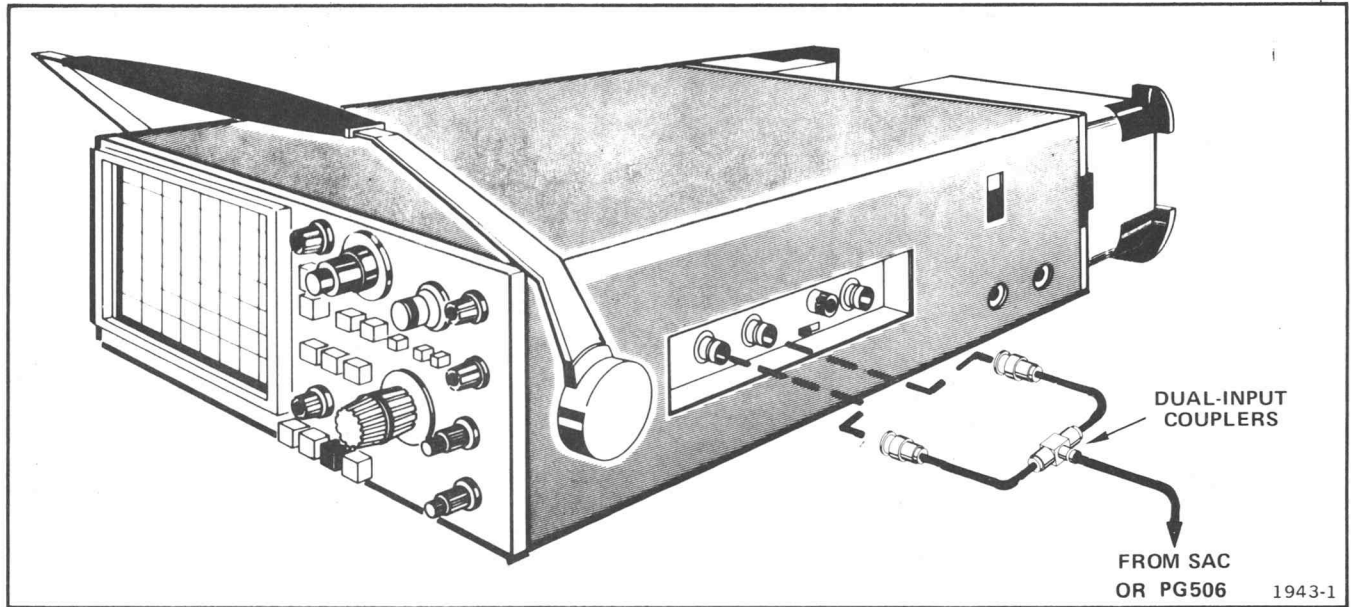


Fig 5-1

100%

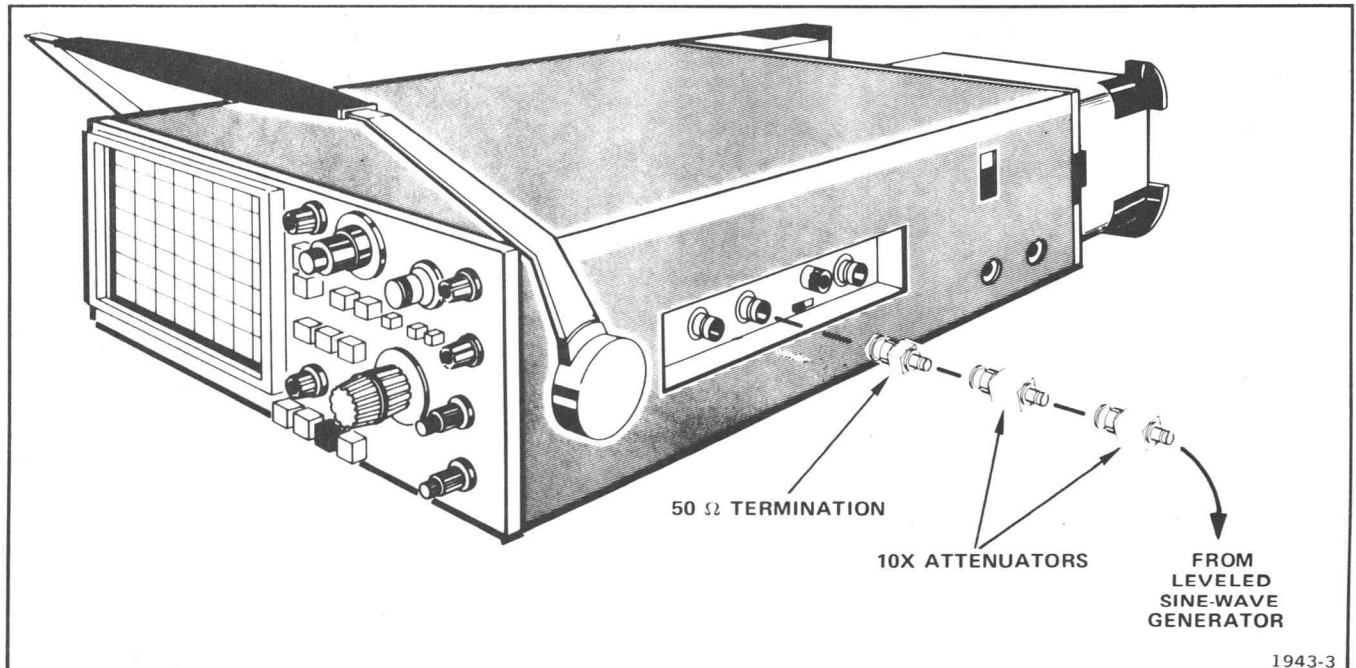


Fig 5-3

100%

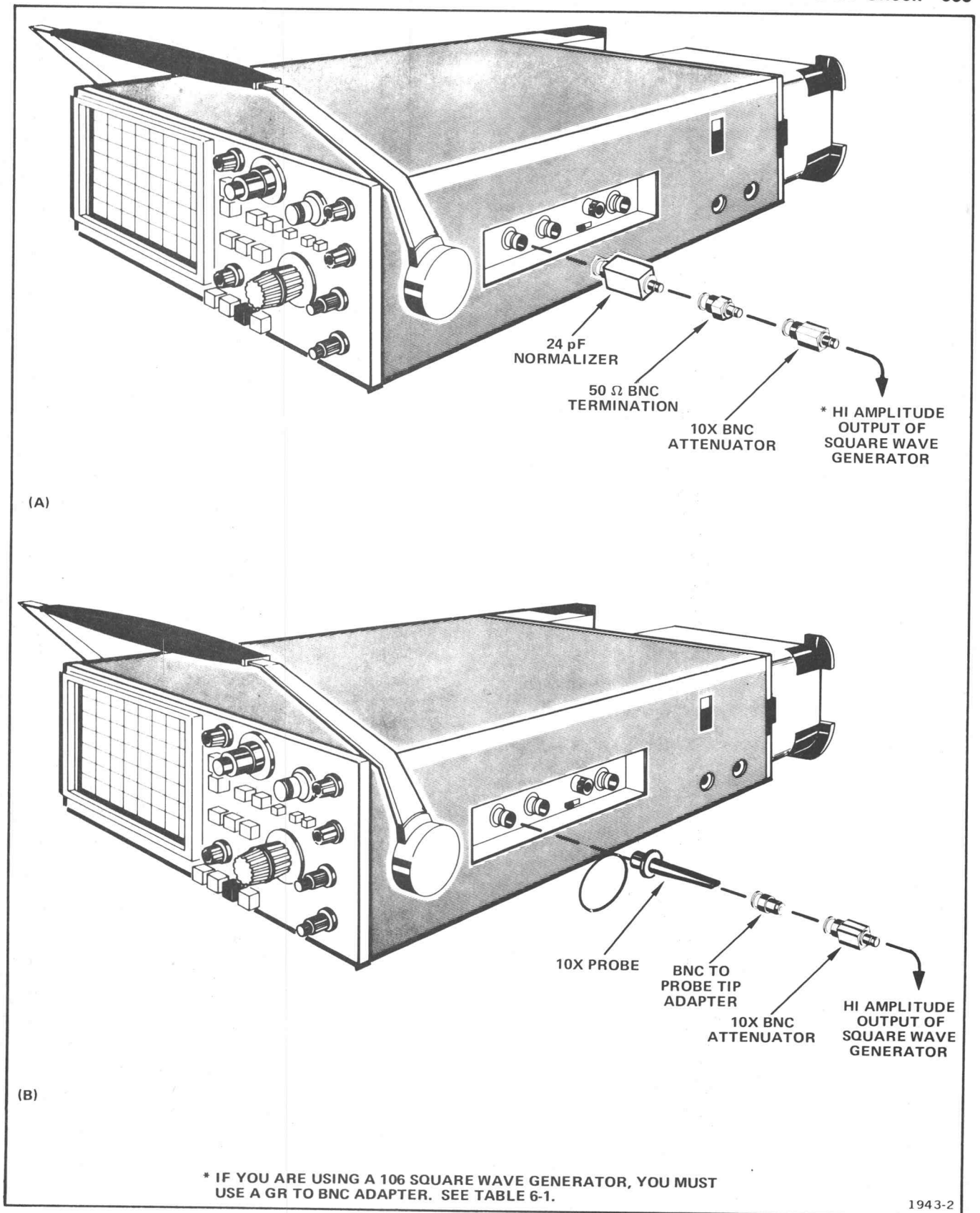


Fig 5-2

100%

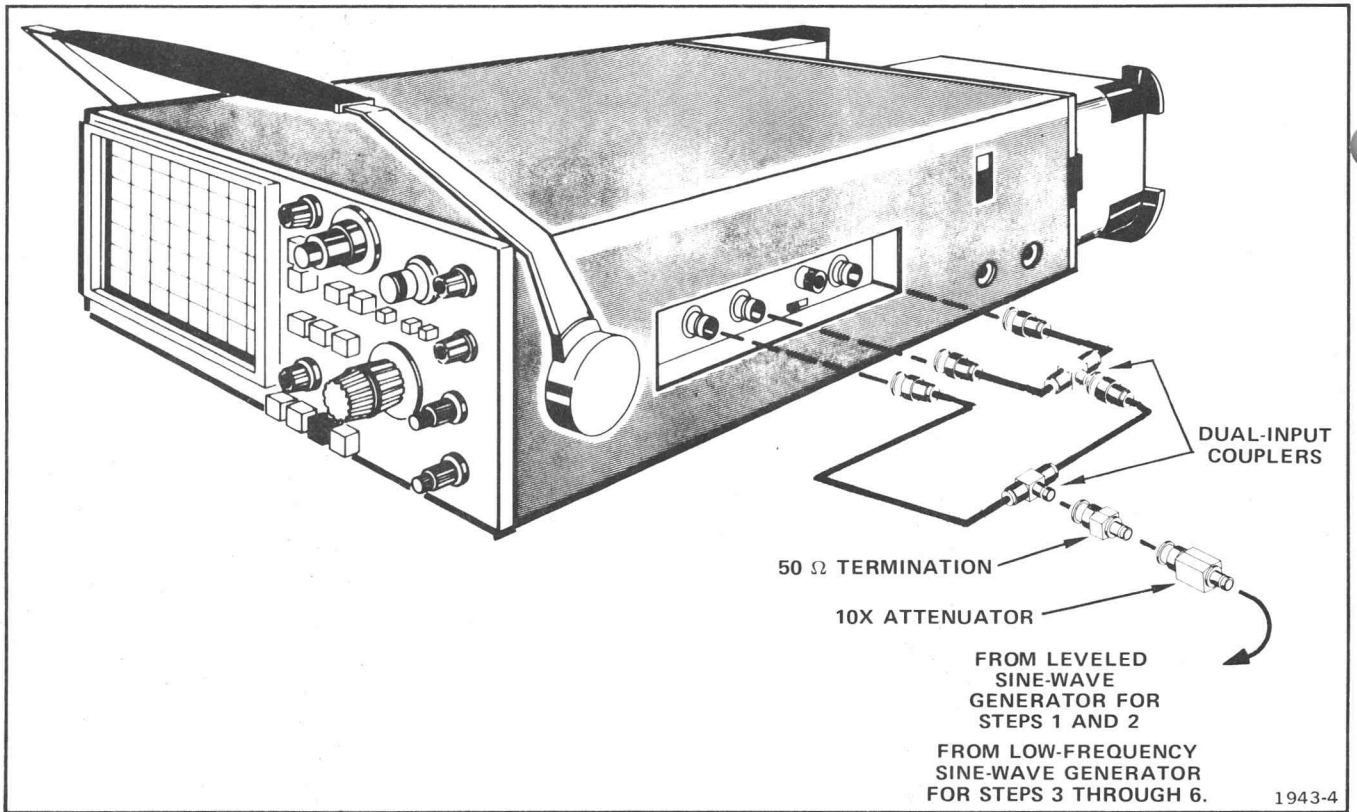


Fig 5-4

100%

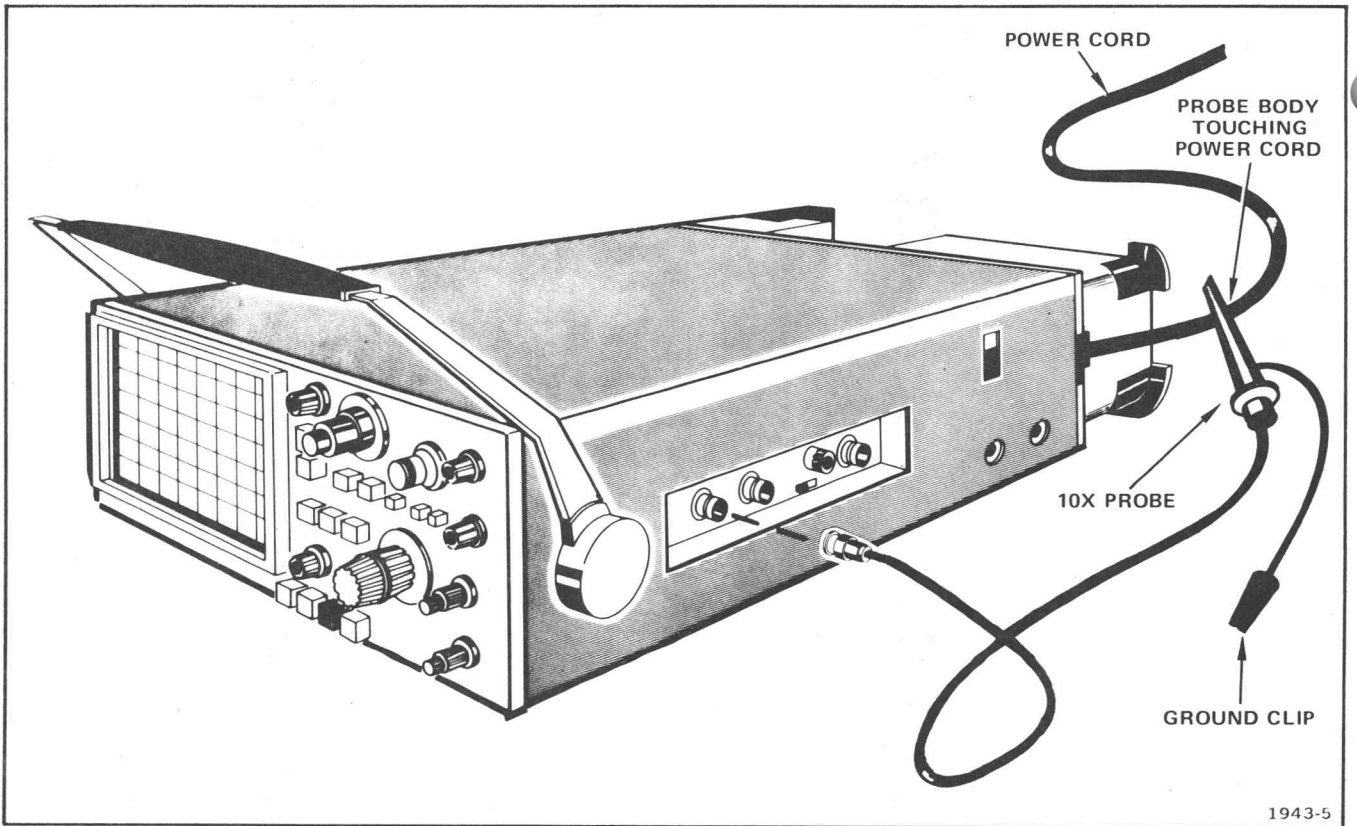


Fig 5-5

100%

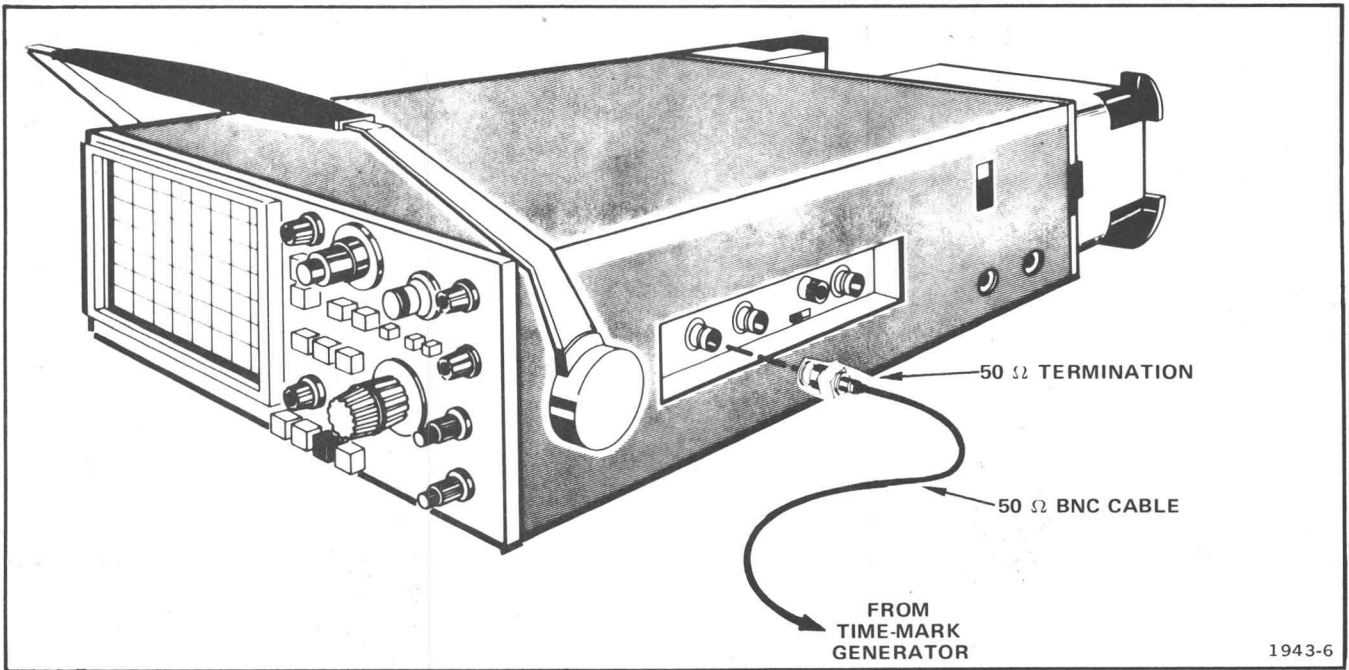


Fig 5-6

100%

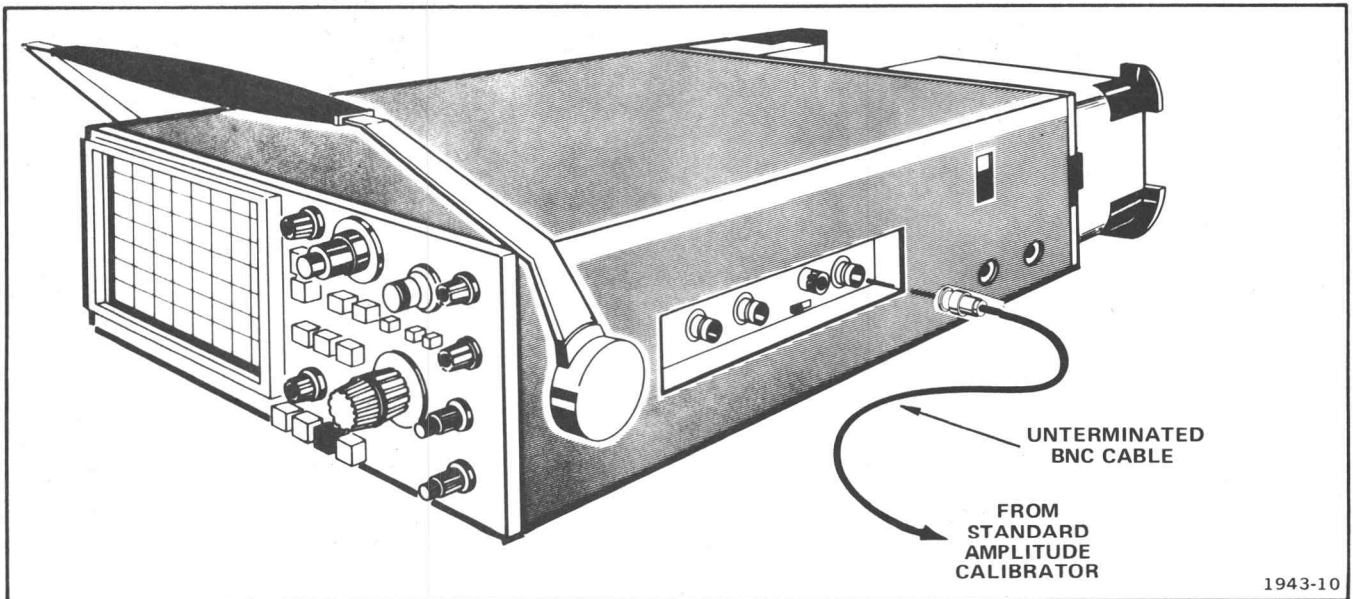
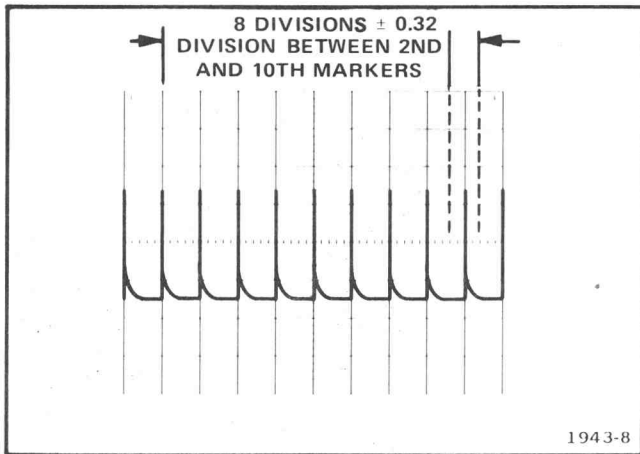


Fig 5-10

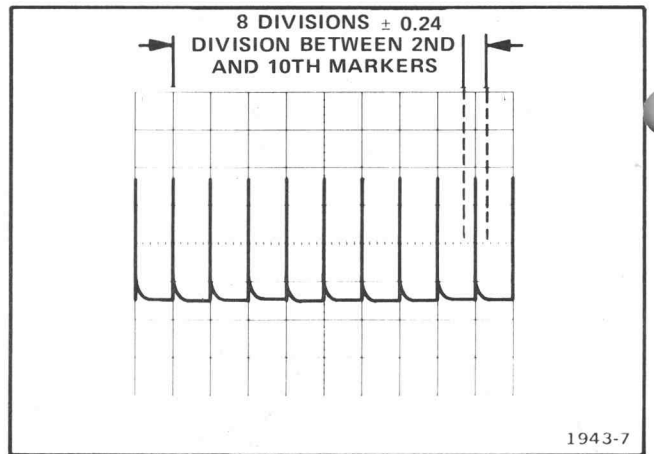
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Performance Check—335



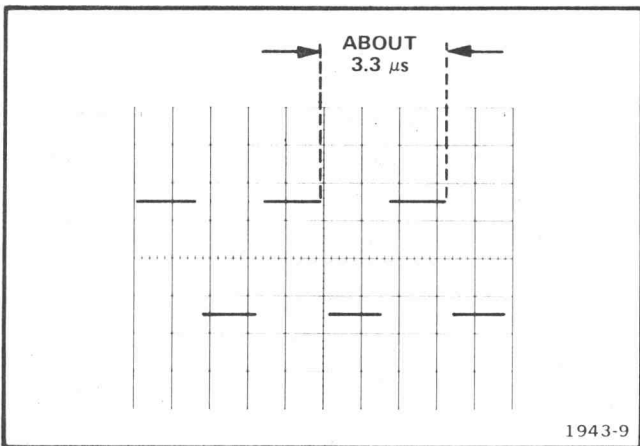
719-5-8

1943-8
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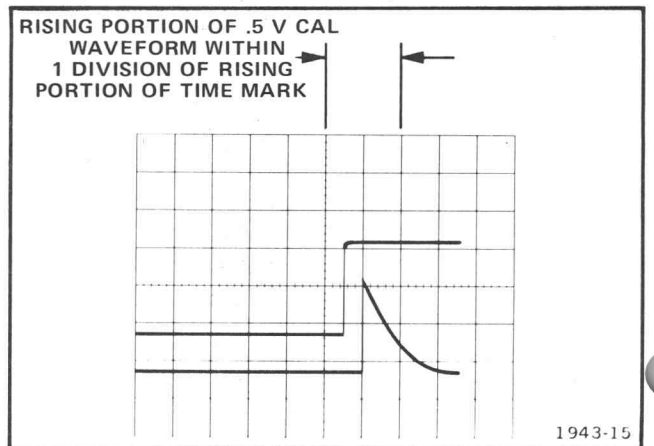
719-5-7

1943-7
100%



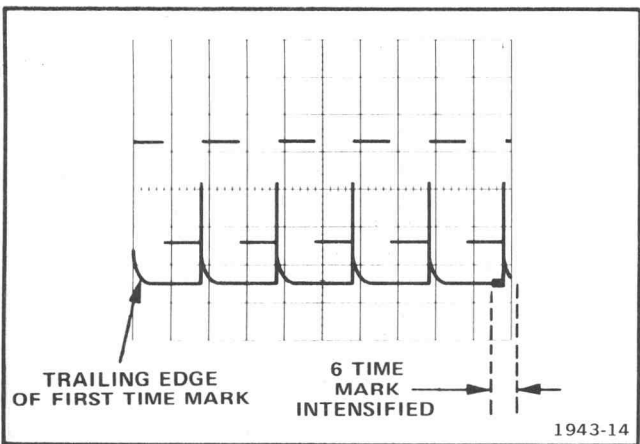
719-5-9

1943-9
100%



719-5-15

1943-15
100%



719-5-14 & Fig 6-19

1943-14
100%

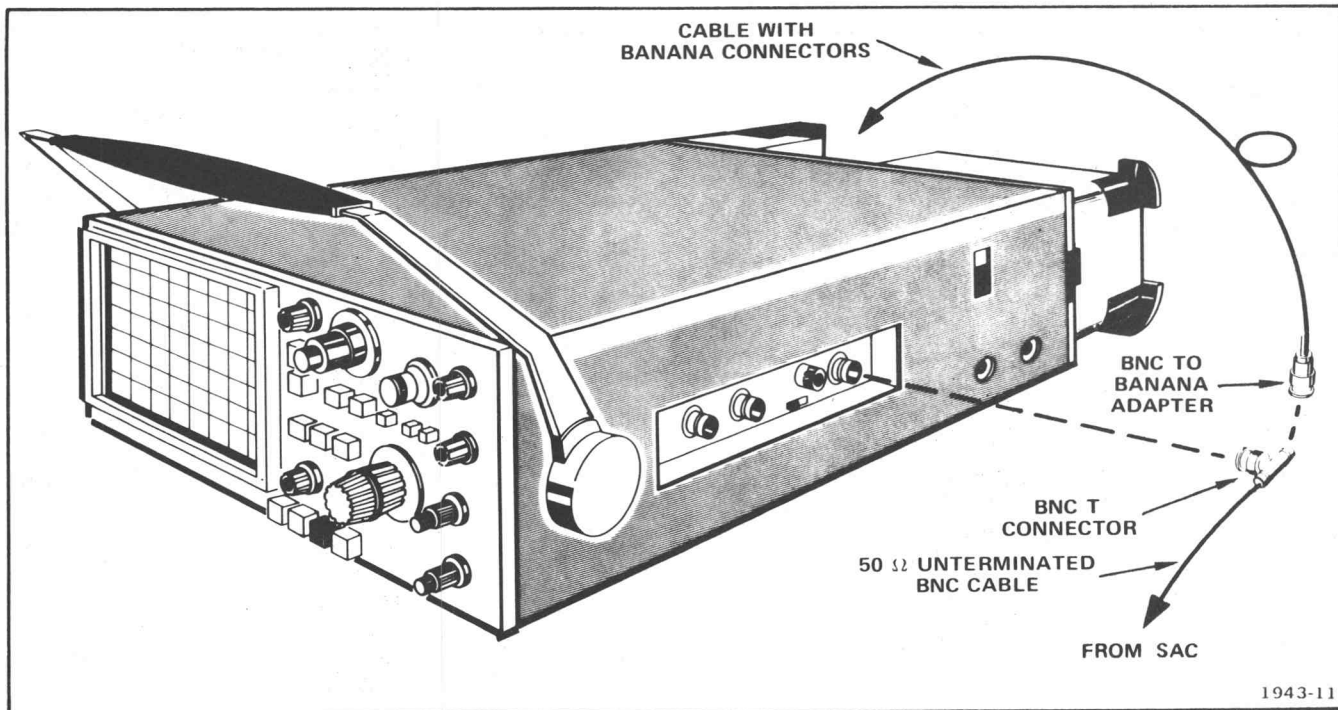


Fig 5-11

100%

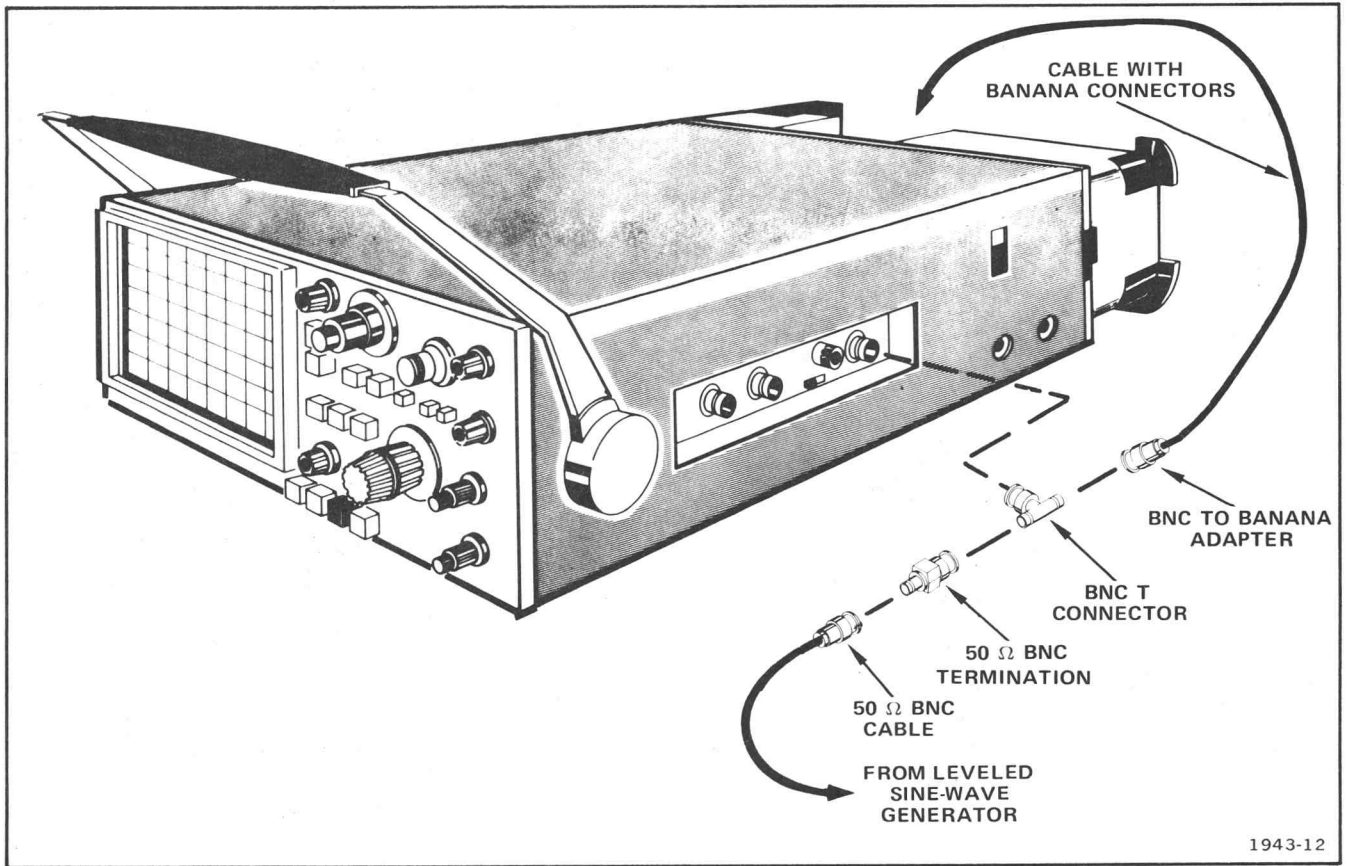


Fig 5-12

100%

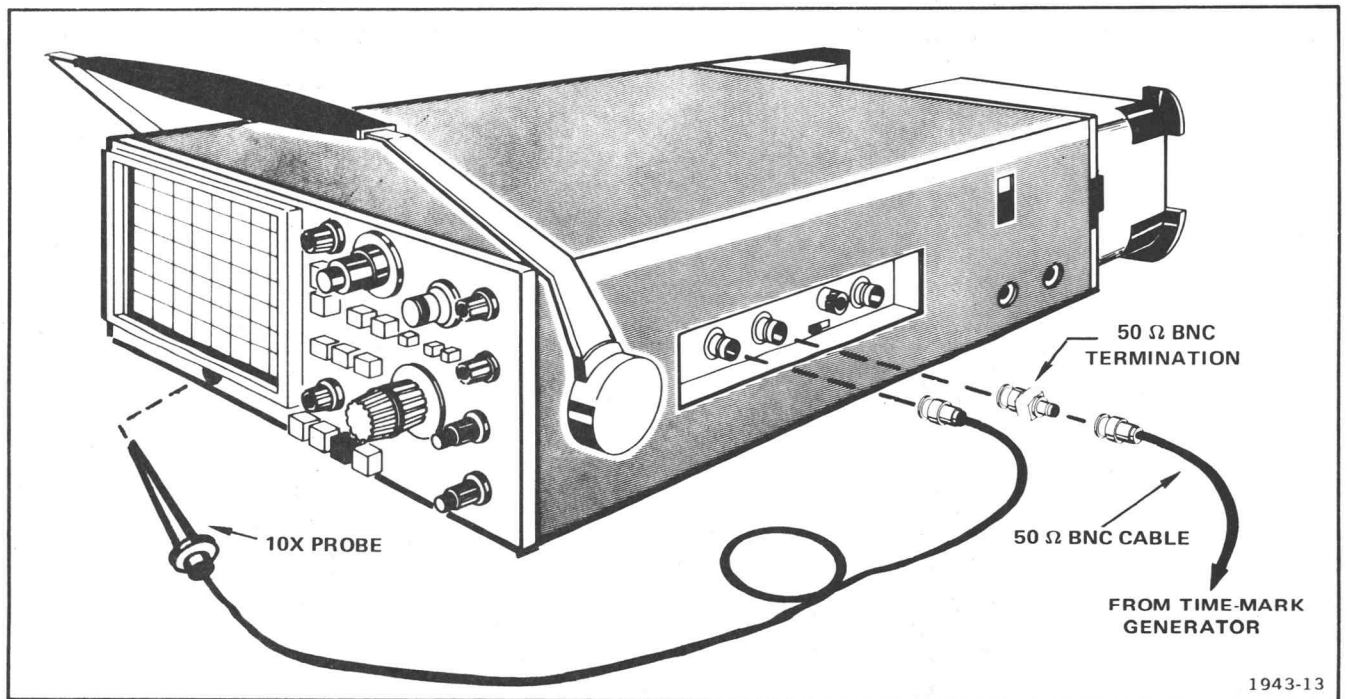


Fig 5-13

100%

ADJUSTMENT PROCEDURE

INTRODUCTION

Purpose

This is an adjustment procedure only. It does not check all instrument specifications. For instance, vertical gain is only checked at the VOLTS/DIV settings where it is adjusted (1 m and 10 m). If the 335 operates normally, performance of an adjustment procedure will ensure optimum operation. If you wish to verify all instrument specifications after performing an adjustment procedure, perform a Performance Check (Section 5 of this manual).

Calibration Interval

To ensure measurement accuracy, check the calibration of the 335 every thousand hours of operation or every six months if used infrequently.

Limits and Tolerances

All limits and tolerances given in this procedure are calibration guides and should not be interpreted as instrument specifications unless they are also found in the Specification section of this manual (Section 1).

All limits and tolerances given are for the 335 under test and do not include test equipment error.

All limits and tolerances given are for an ambient temperature of +20°C to +30°C.

Partial Procedures

If one aspect of the 335 measurement capability is critical to your application, you may wish to perform a partial adjustment procedure at intervals more frequent than 1000 hours. Also, if you have replaced components you should check the adjustment of the circuit repaired. To make partial procedures easier to perform, the adjustment procedure is divided into several sections, each of which stands alone. An equipment required list and setup instructions are given at the beginning of each section.

Cabinet Removal

Performance of the adjustment procedure requires removal of the instrument cover.

NOTE

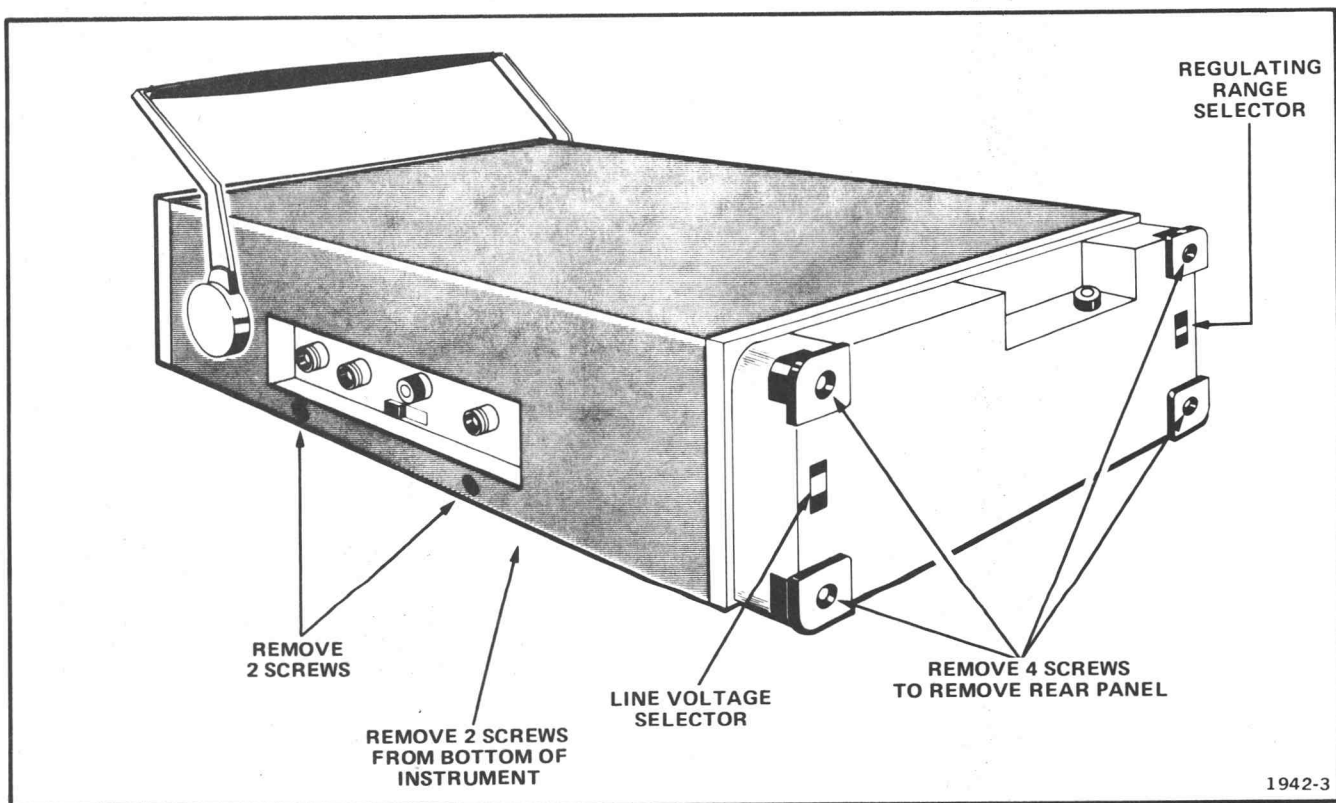
The artwork for this section can be found (not necessarily in order) at the rear of this section.

WARNING

Dangerous potentials exist at several points throughout this instrument. When the instrument is operated with the cover removed, do not touch exposed connections or components. Some transistors may have elevated cases. Disconnect power before cleaning the instrument or replacing parts.

To remove the wrap-around cabinet, use the following procedure:

1. Loosen the four screws holding the cabinet feet (cord wrap) and remove the cord-wrap feet (see Fig. 6-1).
2. Remove the grey-plastic rear cover.
3. Loosen (do not remove) the two screws holding the power cord strain relief (115/230 V ac selector switch mounting) and slide the strain relief toward instrument center.
4. Remove two screws below the connector panel on the right side of the cabinet.



1942-3

5. Remove two screws from the cabinet bottom.
6. Position the handle to clear the instrument and slide the cabinet off the rear of the instrument.
7. To replace the cabinet, reverse the removal procedure. Be sure the power cord does not become looped through the side-panel cutout.

Equipment Required

The equipment required to perform the complete adjustment procedure is listed in Table 6-1.

TABLE 6-1
Test Equipment

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
1. Dc Voltmeter ²	Calibrated for <1% error at -2030 V and -1960 V.	High-voltage supply.	A. Triplet Model 630 NA. B. Simpson Model 262.
2. Digital Voltmeter ²	Range, 0 to at least 15.000 V; Accuracy, $\pm 0.15\%$; Display, 4-1/2 digits.	+15 volts supply. Calibrator amplitude.	A. Tektronix DM 501 Digital Multimeter. ¹ B. Any digital volt-meter which meets minimum specifications.
3. Test oscilloscope, with 10X probe	Vertical deflection factor, 5 mV to 10 V/DIV; Sweep rate, 5 s to 5 μ s/DIV; Bandwidth, dc to at least 4 MHz.	EXT HORIZ compensation. A TRIG HOLDOFF range.	A. Sony-Tektronix 335 Oscilloscope with P6065A 10X probe. B. Sony-Tektronix 323 Oscilloscope with P6049A 10X probe.

¹Requires a TM 500 series power module.

²Used for calibration only; NOT used for performance check.

TABLE 6-1 (cont)

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
4. Time-Mark Generator	Markers, 20 ns to 0.5 s; marker accuracy, $\pm 0.1\%$.	Focus and astigmatism. Geometry. Timing.	A. Tektronix TG 501 Time Mark Generator. ¹ B. Tektronix 2901 Time Mark Generator.
5. Dc Power Supply ²	Output voltage, 10 to 11 V adjustable to 10.9; maximum current, 2 A.	Power supply turnoff.	
6. Leveled Sine-wave Generator	Frequency, 350 kHz to above 35 MHz; output amplitude, 0.5 V, p-p to above 4 V p-p; reference frequency, 50 kHz; amplitude accuracy, constant within 3% of reference frequency as output frequency is changed.	Vertical output amplifier bias. Vertical system frequency response. Triggering.	A. Tektronix SG 503 Leveled Sine-wave Generator. ¹ B. Tektronix Type 191 Constant Amplitude Signal Generator.
7. Standard Amplitude Calibration Generator	Amplitude accuracy, within 0.25%; signal amplitude 5 mV to 50 V; output, 1 kHz square wave.	Vertical gain. X Gain. EXT HORIZ compensation.	A. Tektronix PG 506 Calibration Generator. ¹ B. Tektronix 067-0502-01 Calibration Fixture.
8. Square-wave Generator	Repetition rate, 1 kHz to 100 kHz; risetime from fast-rise output, 1 ns or less; amplitude from fast-rise output, to at least 0.5 V; amplitude from high-amplitude output, to at least 2 V.	VOLTS/DIV compensation. Transient response.	A. Tektronix PG 506 Calibration Generator. ¹ B. Tektronix Type 106 Square-wave Generator.

¹Requires a TM 500 series power module.

TABLE 6-1 (cont)

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
9. Cables (2 required)	Connectors, banana plugs.	Dc power connection.	012-0039-00 (Black). 012-0031-00 (Red).
10. Cable	Connector, BNC; length, 42 inches; impedance	Signal inter-connection.	A. Tektronix Part No. 012-0057-01.
11. T Connector	Connectors, 2 BNC female to 1 BNC Male.	Signal inter-connection.	A. Tektronix Part No. 103-0030-00.
12. Dual-input Coupler (2 required)	Connectors, 2 BNC male to 1 BNC Female.	Signal inter-connection.	A. Tektronix Part No. 067-0525-00.
13. 5X Attenuator	Ratio, 5:1; impedance, 50 Ω ; connectors, BNC.	Signal Attenuation.	A. Tektronix Part No. 011-0060-01.
14. 10X Attenuator	Ratio, 10:1; impedance, 50 Ω ; connectors, BNC.	Signal Attenuation.	A. Tektronix Part No. 011-0059-01.
15. Termination	Impedance, 50 Ω ; connectors, BNC.	Signal termination.	A. Tektronix Part No. 011-0049-01.
16. Input RC	Connectors, BNC; impedance, 1 M Ω paralleled by 25 pF.	VOLTS/DIV compensation.	
17. BNC to banana adapter	Connectors, BNC male to banana Female.	External Blanking.	Tektronix Part No. 103-0033-00.
18. BNC to probe tip adapter	Connectors, BNC male to probe tip.	VOLTS/DIV compensation.	Tektronix Part No. 013-0084-01.

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A. POWER SUPPLY AND DISPLAY

Equipment Required

1. Dc Voltmeter.
2. Digital Voltmeter.
3. Test oscilloscope.
4. X10 Probe.
5. Time-mark generator.
6. Dc power supply.
7. Cables (2) with banana plugs for connecting dc power supply.
8. 50 Ω BNC cable.
9. 50 Ω BNC termination.

335 Control Settings

NOTE

Allow 335 to warm up for 30 minutes before starting adjustment procedure.

Power and Display

POWER/INTENSITY	POWER-on
	INTENSITY — ccw
FOCUS	As desired
Line Voltage Selector	115
Power Source Selector	AC

Vertical (both channels if applicable)

VOLTS/DIV	10 m
VARIABLE	CAL
POSITION	Midrange
AC-GND-DC	GND
DISPLAY	CH 1
CH 2 INVERT	Out

Adjustment Procedure—335 Service

Horizontal

HORIZ DISPLAY	A
A and B SEC/DIV	1 m
A CAL	Detent
HORIZ MAG	X1
DELAY TIME POSITION	ccw
Position	Midrange

Trigger

Mode	AUTO
A LEVEL	cw
B LEVEL	RUNS AFTER DLY TIME
A and B SLOPE	+
Coupling	AC
Source	INT-CH 1
A TRIG HOLDOFF	NORM
EXT ATTEN	1X

1. —2025 Volts

a. Set:

POWER	OFF
Power Source Selector	22 V - 28 V

b. Connect dc power supply and digital voltmeter to 335 as shown in Fig. 6-2.

c. Set dc power supply for a digital voltmeter reading of 24.00 volts.

d. Connect shorting strap between TP1250 and ground.

e. Turn 335 POWER on.

f. Connect + lead of dc voltmeter to ground and – lead to TP1270.

g. ADJUST—R1009 for a dc voltmeter reading of 2025 volts.

h. Turn 335 POWER off.

i. Remove shorting strap. Leave dc voltmeter connected to TP1270.

- j. Turn 335 POWER on.

2. +15 Volts

- a. Disconnect digital voltmeter from dc power supply and connect between +15 volt test point and ground.

- b. ADJUST—R1080 for a digital voltmeter reading of 15.00 volts.

- c. Disconnect digital voltmeter from 335 and reconnect to dc power supply.

3. -1960 Volts

- a. ADJUST—R1261 for a dc voltmeter reading of -1960 volts.

- b. Disconnect dc voltmeter.

4. Power Supply Turnoff Level

- a. Set:

POWER	OFF
Power Source	11 V to 14 V

- b. Set dc power supply to 10.9 volts.

- c. Preset R1005 fully ccw.

- d. Turn on POWER.

NOTE

If 335 does not come on and LOW LINE indicator blinks red; turn POWER off, set R1005 fully cw, wait 30 seconds, and turn on POWER.

- f. ADJUST—R1005 very slowly until 335 turns off (trace disappears) and LOW LINE blinks red.

- g. Turn 335 POWER off and disconnect test equipment.

Adjustment Procedure—335 Service

5. Crt Grid Bias

a. Set:

Power Source Selector	AC
POWER	On
A SEC/DIV	EXT HORIZ

b. Connect dc voltmeter between TP1442 and ground.

c. Adjust INTENSITY for a dc voltmeter reading of 30 volts.

d. ADJUST—R1208 for no visible dot on crt, then readjust R1208 until dot just becomes visible.

e. Disconnect dc voltmeter.

6. Trace Rotation

a. Set:

INTENSITY	Visible display
HORIZ DISPLAY	A
A and B SEC/DIV	1 m

b. Vertically and horizontally center trace.

c. ADJUST—R1275 to make trace parallel with center horizontal graticule line.

7. Z-axis Compensation

a. Set:

SEC/DIV	2 μ
INTENSITY	Low intensity display

b. ADJUST—C1434 so dot at beginning of trace is slightly brighter than rest of trace.

8. FOCUS and Astigmatism

a. Set:

CH 1 VOLTS/DIV	.5
SEC/DIV	1 m
INTENSITY	For a low intensity display
CH 1 AC-GND-DC	DC

b. Connect test equipment to CH 1 VERT IN connector as shown in Fig. 6-3.

c. Set time mark generator for 1 ms markers.

d. Adjust INTENSITY for low-intensity display.

e. ADJUST—FOCUS (front panel) and R1271 (astigmatism) for best defined display.

9. Geometry

a. Set:

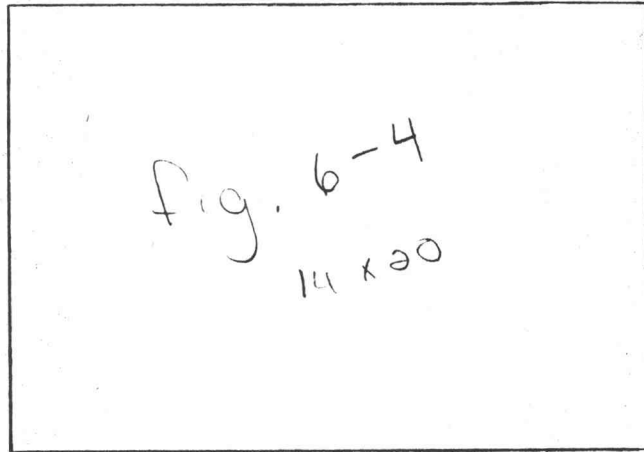
SEC/DIV .5 m

VOLTS/DIV .1

b. Adjust A CAL control for exactly 1 marker per graticule division.

c. ADJUST—R1273 for minimum curvature of time marks (see Fig. 6-4).

d. Disconnect test equipment.



B. VERTICAL

Equipment Required

1. Leveled sine-wave generator.
2. Standard amplitude calibration generator.
3. Square-wave generator.
4. 50 Ω BNC cable.
5. 50 Ω BNC termination.
6. 5X BNC attenuator.
7. 10X BNC attenuator.
8. 25 pF input RC standardizer.
9. BNC to probe tip adapter.

335 Control Setting

(*indicates change from previous step)

NOTE

Allow 335 to warm up for 30 minutes before starting adjustment procedure.

Power and Display

*POWER/INTENSITY	POWER-on
	INTENSITY — as desired
FOCUS	As desired
Line Voltage Selector	115
Power Source Selector	AC

Vertical (both channels if applicable)

*VOLTS/DIV	10 m
*VARIABLE	CAL
POSITION	Midrange
CH 1 AC-GND-DC	DC
CH 2 AC-GND-DC	GND
DISPLAY	CH 1
CH 2 INVERT	Out

Horizontal

HORIZ DISPLAY	A
A and B SEC/DIV	1 m
*A CAL	Detent
HORIZ MAG	X1
DELAY TIME POSITION	ccw
Position	Midrange

Trigger

Mode	AUTO
A LEVEL	cw
B LEVEL	RUNS AFTER DELAY TIME
A and B SLOPE	+
Coupling	AC
Source	INT — CH 1
A TRIG HOLDOFF	NORM
EXT ATTEN	1X

1. Vertical Output Amplifier Bias*INTERACTION*

Vertical Output Amplifier bias adjustment (R403) affects transient response, bandwidth, and vertical gain.

- a. Connect test equipment as shown in Fig. 6-5.
- b. Set generator frequency to 1 MHz and adjust generator amplitude and CH 1 VOLTS/DIV for about 2 divisions of display.
- c. ADJUST—R403 for maximum display amplitude.
- d. Disconnect test equipment.

2. Dc Bias

- a. Set:

CH 1 VOLTS/DIV	5 DIV CAL
CH 1 VARIABLE	For 2 division display at graticule center.

b. ADJUST—R445 for minimum vertical compression and expansion when positioning display to top and bottom of graticule.

c. Disconnect test equipment.

3. CH 1 Variable Balance

a. Set:

CH 1 VOLTS/DIV	10 m
CH 1 VARIABLE	ccw

b. Vertically position trace to center horizontal graticule line.

c. ADJUST—R117 for minimum trace shift as you rotate CH 1 VARIABLE control from extreme to extreme.

d. Set CH 1 VARIABLE control to CAL.

4. CH 1 Step Attenuator Balance

a. Set CH 1 VOLTS/DIV to 10 m.

b. Vertically position trace to center horizontal graticule line.

c. Set CH 1 VOLTS/DIV to 5 m.

d. ADJUST—R112 to move trace back to center horizontal graticule line.

e. Repeat step 4 parts a through d for minimum trace shift.

5. CH 1 POSITION Control Centering

a. Set CH 1 POSITION control to mechanical center (index pointing to CAL).

b. ADJUST—R124 to position trace to center horizontal graticule line.

Adjustment Procedure—335 Service

6. CH 2 INVERT Balance

- a. Set DISPLAY to CH 2.
- b. Operate the INVERT switch several times.
- c. ADJUST—R217 for minimum trace shift as INVERT switch is operated.
- d. Set INVERT to normal (button out).

7. CH 2 Step Attenuator Balance

- a. Set CH 2 VOLTS/DIV to 10 m.
- b. Vertically position trace to center horizontal graticule line.
- c. Set CH 2 VOLTS/DIV to 5 m.
- d. ADJUST—R212 to move trace back to center horizontal graticule line.
- e. Repeat step 7 parts a through d for minimum trace shift.

8. CH 2 POSITION Control Centering

- a. Set CH 2 POSITION Control to mechanical center (index pointing to CAL).
- b. ADJUST—R224 to move trace to center horizontal graticule line.

9. CH 1 Gain

- a. Connect test equipment as shown in Fig. 6-6.
- b. Set generator amplitude to 5 mV.

c. Set:

DISPLAY	CH 1
CH 1 and CH 2 VOLTS/DIV	1 m

Adjustment Procedure—335 Service

- d. ADJUST—R135 for 5 divisions of display.
- e. Set CH 1 VOLTS/DIV to 10 m.
- f. Set generator amplitude to 50 m.
- g. ADJUST—R110B for 5 divisions of display.

10. CH 2 Gain

- a. Set generator amplitude to 5 mV.
- b. Set:

DISPLAY	CH 2
CH 1 AC-GND-DC	GND
CH 2 AC-GND-DC	DC
- c. ADJUST—R235 for 5 divisions of display.
- d. Set CH 2 VOLTS/DIV to 10 m.
- e. Set generator amplitude to 50 mV.
- f. ADJUST—R210B for a 5 division display.
- g. Disconnect test equipment.

11. CH 1 and CH 2 VOLTS/DIV Compensation

- a. Install calibration shield.
- b. Connect test equipment to CH 1 VERT IN connector as shown in Fig. 6-7.
- c. Set:

CH 1 VOLTS/DIV	10 m
SEC/DIV	.2 m
DISPLAY	CH 1

Adjustment Procedure—335 Service

- d. Set generator frequency to 1 kHz and adjust generator amplitude for 5 division display.
- e. Adjust probe compensation for best flat-top waveform.
- f. ADJUST—CH 1 adjustments for best flat-top waveform according to Table 6-2. Set generator amplitude for 5-division display for each adjustment.

TABLE 6-2
VOLTS/DIV Compensation

CH 1 or CH 2 VOLTS/DIV	Corner		Flat-Top	
	CH 1	CH 2	CH 1	CH 2
10 m				C11
20 m	C7A	C17A	C7B	C17B
50 m	C6A	C16A	C6B	C16B
.1	C5A	C15A	C5B	C15B
1	C4A	C14A	C4B	C14B

- g. Set:
 - DISPLAY CH 2
 - CH 2 VOLTS/DIV 10 m
- h. Move test setup to CH 2 VERT IN connector.
- i. ADJUST—CH 1 adjustment for best flat-top waveform according to Table 6-2. Set generator amplitude for 5-division display for each adjustment.
- j. Disconnect test equipment.

12. Transient Response

INTERACTION

CH 1 Preamplifier adjustments interact with each other. CH 2 Preamplifier adjustments interact with each other. The vertical Output Amplifier adjustments interact with both CH 1 and CH 2 Preamplifier adjustments (see Fig. 6-8).

Adjustment Procedure—335 Service

Following this adjustment procedure, you first adjust CH 1 Preamplifier and Vertical Output Amplifier together. Next you adjust CH 2 Preamplifier. If you have trouble adjusting CH 2 Preamplifier, try slightly readjusting the Vertical Output Amplifier. After readjusting Vertical Output Amplifier recheck and readjust CH 1 Preamplifier.

NOTE

Risetime measurements are given as calibration aids only. If you can obtain a waveform with aberrations of 0.15 division or less, with the risetimes given, the vertical system should pass the bandwidth check.

- a. Connect equipment to CH 1 VERT IN connector as shown in Fig. 6-9.
- b. Set:

CH 1 and CH 2 VOLTS/DIV	1 m
CH 2 AC-GND-DC	GND
- c. Set generator frequency to 1 kHz and generator amplitude for 5 divisions of display.
- d. ADJUST—R414 for best flat-top waveform with aberrations of ± 0.15 division, not to exceed 0.15 division peak-to-peak.
- e. Set generator frequency to 100 kHz.
- f. Set SEC/DIV to $.2 \mu$.

Adjustment Procedure—335 Service

g. ADJUST—R105A, R408, R413, and R441 for flat-top waveform with aberrations of 0.15 division or less and a risetime of 14 ns or less (see Fig. 6-10).

h. Set CH 1 VOLTS/DIV to 10 m and remove 10X attenuator from test setup.

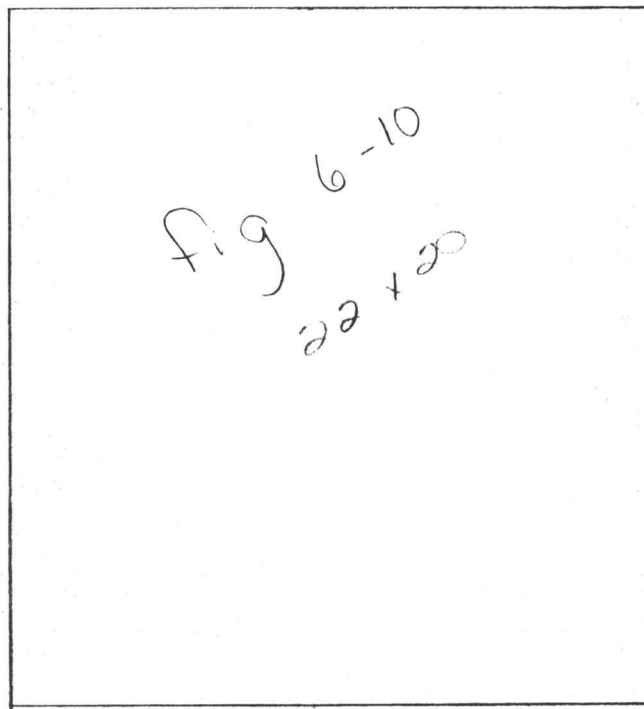
i. ADJUST—C110 and R109 for flat-top waveform with aberrations of 0.15 division or less and risetime of 10 ns or less.

j. Reinstall 10X attenuator to test setup and move test setup to CH 2 VERT IN connector.

k. Set:

DISPLAY	CH 2
CH 1 AC-GND-DC	GND
CH 2 AC-GND-DC	DC

l. ADJUST—R205A for flat-top waveform with aberrations of 0.15 division or less and risetime of 14 ns or less.



m. Set CH 1 VOLTS/DIV to 10 m and remove 10X attenuator from test setup.

n. ADJUST—C210 and R209 for flat-top waveform with aberrations of 0.15 division or less and risetime of 10 ns or less.

o. Disconnect test equipment.

13. Frequency Response (Check Only)

NOTE

If bandwidth check fails, readjust transient response for faster risetime.

a. Connect test equipment to CH 2 VERT IN connector as shown in Fig. 6-11. Add or remove attenuators as needed to maintain 6 division reference display.

b. Set:

CH 2 VOLTS/DIV	1 m
A LEVEL	ccw (free-running)
HORIZ MAG	X1 (out)

c. Set generator to reference frequency and adjust generator amplitude for a 6-division display.

d. Without readjusting generator amplitude, set generator frequency according to Table 6-3.

e. CHECK—Display amplitude is 4.2 divisions or greater.

f. Repeat step 13 parts c through e for as many CH 2 VOLTS/DIV switch positions desired or as generator amplitude allows.

TABLE 6-3
Frequency Response

CH 1 or CH 2 VOLTS/DIV	Generator Frequency
1 m through 5 m	25 MHz
10 m through 10	35 MHz

g. Set:

CH 1 VOLTS/DIV	1 m
CH 2 AC-GND-DC	GND
CH 1 AC-GND-DC	DC
DISPLAY	CH 1

h. Move test setup to CH 1 VERT IN connector.

i. Repeat step 13 parts c through e for as many CH 1 VOLTS/DIV switch positions as desired or as generator amplitude allows.

j. Disconnect test equipment.

C. TRIGGER

Equipment Required

1. Leveled sine-wave generator.
2. 50 Ω BNC cable.
3. 50 Ω BNC 10X attenuator.
4. 50 Ω BNC termination.

335 Control Settings

(*indicates change from previous step).

NOTE

Allow 335 to warm up 30 minutes before starting adjustment procedure.

Power and Display

POWER/INTENSITY	POWER-on
	INTENSITY-as desired
FOCUS	As desired
Line Voltage Selector	115
Power Source Selector	AC

Vertical (both channels if applicable)

*VOLTS/DIV	1 m
VARIABLE	CAL
POSITION	Midrange
CH 1 AC-GND-DC	DC
CH 2 AC-GND-DC	GND
DISPLAY	CH 1
CH 2 INVERT	Out

Horizontal

HORIZ DISPLAY	A
A and B SEC/DIV	.2 μ
A CAL	Detent
HORIZ MAG	X1 (out)
DELAY TIME POSITION	ccw
Position	Midrange

Trigger

Mode	AUTO
A LEVEL	As needed
B LEVEL	RUNS AFTER DLY TIME
A and B SLOPE	+
Coupling	AC
Source	INT-CH 1
A TRIG HOLDOFF	NORM
EXT ATTEN	1X

1. A Sensitivity**NOTE**

This adjustment sets sensitivity slightly higher than specification for ease of adjustment.

- a. Connect test equipment to CH 1 VERT IN connector as shown in Fig. 6-12.
- b. Set generator frequency to 1 MHz. Adjust generator amplitude for 3 division display. Do not readjust generator amplitude throughout the remainder of steps 1 and 2.
- c. Set CH 1 VOLTS/DIV to 10 m (0.3 division display).
- d. ADJUST—R705 so you can obtain stable display by adjusting A LEVEL.
- e. Set CH 1 VOLTS/DIV to 20 m (0.15 division display).
- f. READJUST—R705 slightly so you cannot obtain stable display by adjusting A LEVEL.
- g. Repeat step 1 parts c through f until, by adjusting A LEVEL, you can obtain stable display of 0.3 division display (step 1d) but not of 0.15 division display (step 1f).

2. B Sensitivity

- a. Set:

HORIZ DISPLAY	B
B LEVEL	Out of detent

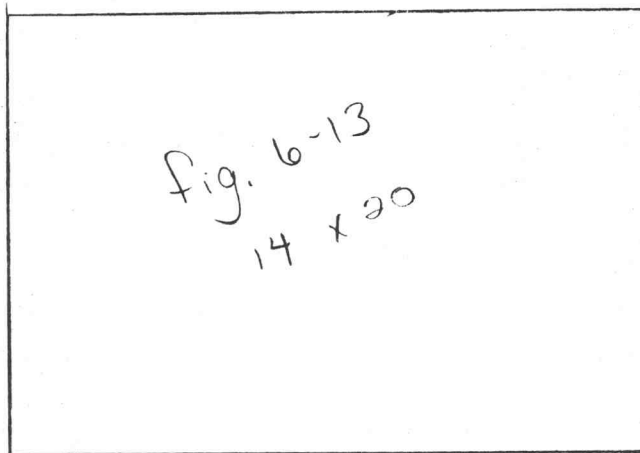
- b. Set CH 1 VOLTS/DIV to 10 m (0.3 division display).

- c. ADJUST—R636 so you can obtain stable display by adjusting B LEVEL.
- d. Set CH 1 VOLTS/DIV to 20 m (0.15 division display).
- e. READJUST—R636 slightly so you cannot obtain stable display by adjusting B LEVEL.
- f. Repeat step 2 parts b through e until, by adjusting B LEVEL, you can obtain stable display of 0.3 division display (step 2c) but not of 0.15 division display (step 2e).

3. Trigger Dc Level

- a. Set:

Trigger Coupling	AC
A and B SEC/DIV	10 μ
VOLTS/DIV	10 m
B LEVEL	As needed for stable display
- b. Set generator frequency to 50 kHz (reference) and adjust generator amplitude for 2 division display.
- c. Set CH 1 POSITION control to vertically center display. Do not readjust CH 1 POSITION control throughout steps 3 and 4.
- d. Set B LEVEL control so display triggers at graticule center (see Fig. 6-13). Do not readjust B LEVEL control throughout remainder of step 3.



Adjustment Procedure—335 Service

- e. Set Trigger Coupling to DC.
- f. ADJUST—R386 to move triggering point back to graticule center.

4. A and B LEVEL Control Centering

- a. Set A and B LEVEL controls so indices point to 0.
- b. ADJUST—R608 to move triggering point to graticule center.
- c. Set HORIZ DISPLAY to A.
- d. ADJUST—R543 to move trigger point to graticule center.

D. HORIZONTAL AND CALIBRATOR

Equipment Required

1. Time mark generator.
2. Standard amplitude calibration generator.
3. 50 Ω BNC cable.
4. 50 Ω BNC termination.
5. Test oscilloscope.
6. 10X probe.

335 Control Settings

(* indicates change from previous step)

NOTE

Allow 335 to warm up 30 minutes before starting adjustment procedure.

Power and Display

POWER/INTENSITY	POWER-on
	INTENSITY-as desired
FOCUS	As desired
Line Voltage Selector	115
Power Source Selector	AC

Vertical (both channels if applicable)

*VOLTS/DIV	.5
VARIABLE	CAL
POSITION	Midrange
CH 1 AC-GND-DC	DC
CH 2 AC-GND-DC	GND
DISPLAY	CH 1
CH 2 INVERT	Out

Adjustment Procedure—335 Service

Horizontal

*HORIZ DISPLAY	A INTEN
*A SEC/DIV	1 m
*B SEC/DIV	5 μ
A CAL	Detent
HORIZ MAG	X1
*DELAY TIME POSITION	1.00
Position	Midrange

Trigger

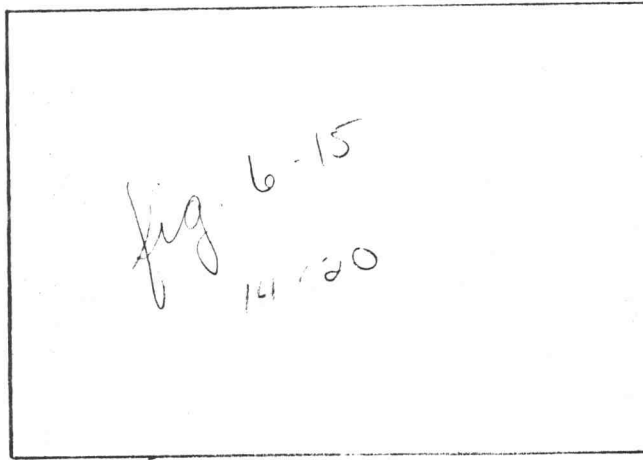
Mode	AUTO
A LEVEL	As needed
*B LEVEL	RUNS AFTER DLY TIME
A and B SLOPE	+
Coupling	AC
Source	INT-CH 1
A TRIG HOLDOFF	NORM
EXT ATTEN	1X

1. Coarse Sweep Start and Stop

- a. Connect equipment as shown in Fig. 6-14.
- b. Set generator for 1 ms markers.
- c. Set DTP (DELAY TIME POSITION) to 1.00.
- d. ADJUST—R713 so intensified zone starts at second marker (see Fig. 6-15).
- e. Set DTP to 9.00.

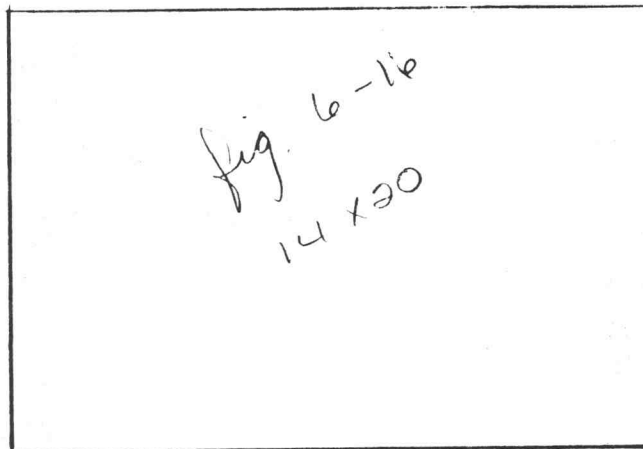
Adjustment Procedure—335 Service

- f. ADJUST—R715 so intensified zone starts at tenth marker (see Fig. 6-15).
- g. Due to interaction, repeat step 1 parts c through f as necessary.



2. Fine Sweep Start and Stop

- a. Set HORIZ DISPLAY to B.
- b. Set DTP to 1.00.
- c. ADJUST—R713 so displayed marker starts at beginning of sweep (see Fig. 6-16).
- d. Set DTP to 9.00.



- e. ADJUST—R715 so displayed marker starts at beginning of sweep.
- f. Due to interaction, repeat step 2 parts b through e until no further adjustment is needed.

3. Horizontal Amplifier Gain

a. Set:

HORIZ DISPLAY	A
A and B SEC/DIV	1 m
DTP	ccw

b. ADJUST—R938 for 1 marker per division over center 8 divisions.

c. Set:

HORIZ MAG	X10 (in)
Horizontal Position	Midrange

d. Set generator for 0.1 ms markers.

e. ADJUST—R940 for 1 marker per division over center 8 divisions displayed.

4. Magnifier Registration

a. Set generator for 5 ms markers.

b. Horizontally position second marker to center vertical graticule line.

c. Set HORIZ MAG to X1 (out).

d. ADJUST—R933A to move second marker back to center vertical graticule line.

e. Due to interaction, repeat step 4 parts b through d for no shift of second marker when switching from X10 to X1.

Adjustment Procedure—335 Service

5. B Sweep Cal

a. Set:

HORIZ MAG	X1 (out)
A SEC/DIV	2 m
B SEC/DIV	1 m
DTP	ccw
HORIZ DISPLAY	B
B LEVEL	Out of detent

b. Set generator for 1 ms markers and adjust B LEVEL for stable display.

c. ADJUST—R818 for 1 marker per division over center 8 divisions.

6. A Sweep 2 μ s Timing

a. Set:

HORIZ DISPLAY	A
A SEC/DIV	2 μ
B SEC/DIV	.2 μ
B LEVEL	RUNS AFTER DLY TIME (detent)

b. Set generator for 1 μ s markers.

c. ADJUST—C727C for 2 markers per division over center 8 divisions.

d. Set HORIZ DISPLAY to B.

e. Set DTP to 1.00.

f. Horizontally position center display marker to center vertical graticule line.

g. Set DTP to 9.00.

h. ADJUST—C727C to move center displayed marker to center vertical graticule line.

i. Due to interaction, repeat step 6 parts e through h until no further adjustment is needed.

7. B Sweep 1 μ s Timing

a. Set:

DTP	ccw
B SEC/DIV	1 μ
B LEVEL	Out of detent

b. Adjust B LEVEL for stable display.

c. ADJUST—C850C for 1 marker per division over center 8 divisions.

8. High-Speed Magnified Timing

a. Set:

HORIZ DISPLAY	A
HORIZ MAG	X10 (in)
A SEC/DIV	.2 μ
HORIZONTAL POSITION	Midrange

b. Set generator for 20 ns markers (markers may be sine-wave with 20 ns between positive peaks).

c. ADJUST—C955, C975, and R933B for 1 marker per division over 8 divisions displayed. Try to set adjustment screws of C955 and C975 so they are about equal in length.

d. Set A SEC/DIV to .5 μ .

e. Set generator for 50 ns markers.

f. CHECK—One marker per division ± 0.24 division over center 8 divisions displayed.g. READJUST—C955, C975, and R933B, if necessary, for best compromise between .2 μ and .5 μ positions of SEC/DIV switch.

h. Disconnect test equipment.

Adjustment Procedure—335 Service

9. EXT HORIZ Variable Balance

a. Set:

A SEC/DIV	EXT HORIZ
HORIZ MAG	X10 (in)
Trigger Source	EXT-CH 1
Trigger Coupling	DC



Set INTENSITY control for a low-intensity display after location of dot. Allowing bright dot to remain stationary will burn crt phosphor.

- b. Adjust Vertical Position and Horizontal Position controls until a dot is visible.
- c. Rotate A CAL from extreme to extreme several times.
- d. ADJUST—R905, while rotating A CAL, until no horizontal dot movement is visible.

10. EXT HORIZ Compensation

- a. Set test oscilloscope timing to 0.2 ms/division.
- b. Set 335 HORIZ MAG to X1 (out).
- c. Connect test equipment as shown in Fig. 6-17 (probe to right horizontal deflection plate and generator to EXT TRIG OR HORIZ INPUT connector).
- d. Set generator amplitude to 1 volt.
- e. ADJUST—C534 for best flat-top waveform (on test oscilloscope).
- f. Set EXT ATTEN to X10 and set generator amplitude to 10 volts.
- g. ADJUST—C537 for best flat-top waveform (on test oscilloscope).
- h. Set INTENSITY to ccw.

Adjustment Procedure—335 Service

- i. Disconnect test equipment.

11. Calibrator Amplitude

- a. Connect a shorting strap across C1500 (see Adjustment Locations).
- b. Connect the digital voltmeter between the .5 V CAL OUT plug and ground.
- c. ADJUST—R1519 for a digital voltmeter reading of 0.500 volts.
- d. Disconnect shorting strap and digital voltmeter.

12. Calibrator Repetition Rate

- a. Connect test equipment as shown in Fig. 6-18 (probe to 0.5 V CAL OUT).

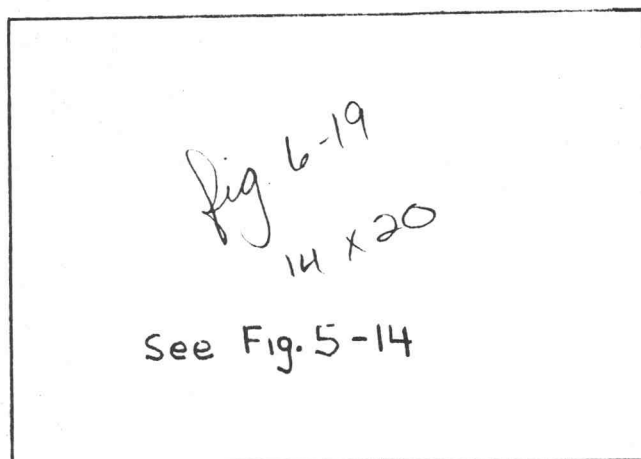
- b. Set:

HORIZ DISPLAY	A INTEN
B LEVEL	RUNS AFTER DLY TIME
A and B SLOPE	+
Trigger Mode	AUTO
Trigger Source	INT-COMP
DISPLAY	ALT
Trigger Coupling	LF REJ
A SEC/DIV	.5 m
B SEC/DIV	50 μ
CH 1 VOLTS/DIV	20 m (.2 VOLTS/DIV including probe attenuation)
CH 2 VOLTS/DIV	.5

- c. Carefully adjust A LEVEL so both calibrator and time mark waveforms are stably displayed (see Fig. 6-19).

Adjustment Procedure—335 Service

- d. ADJUST—R1501 for 1 marker per 1 cycle of calibrator waveform (see Fig. 6-19).

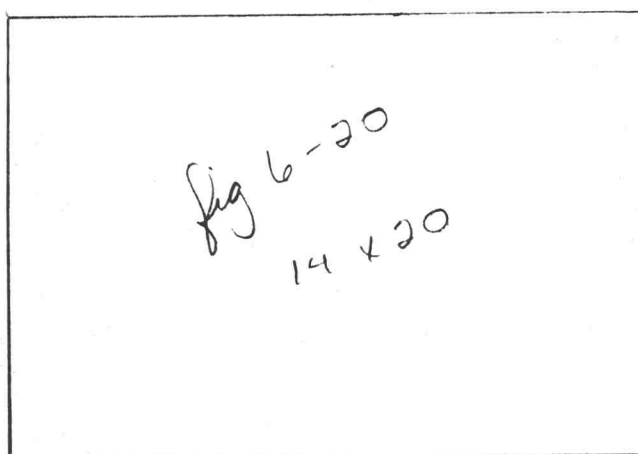


- e. Adjust DTP to intensify sixth marker (see Fig. 6-19).

- f. Set HORIZ DISPLAY to B.

- g. ADJUST—R1501 to superimpose rising edge of marker waveform and rising edge of calibrator waveform (see Fig. 6-20).

- h. Disconnect test equipment.



13. A TRIG HOLDOFF Range (Check Only)

a. Set:

A SEC/DIV	20 μ
A TRIG HOLDOFF	NORM

b. Set test oscilloscope:

Trigger slope	negative
Timing	0.1 ms/division

c. Connect (or just touch and hold) 10X probe from test oscilloscope to pin 1 of U730.

d. Set test oscilloscope timing and variable timing to make holdoff portion of test oscilloscope waveform 1 division long. Holdoff time is negative portion of waveform.

e. Set:

A TRIG HOLDOFF	Fully cw
----------------	----------

f. CHECK—Holdoff time increases to 10 divisions or greater.

g. Disconnect test equipment.

Adjustment Procedure—335 Service

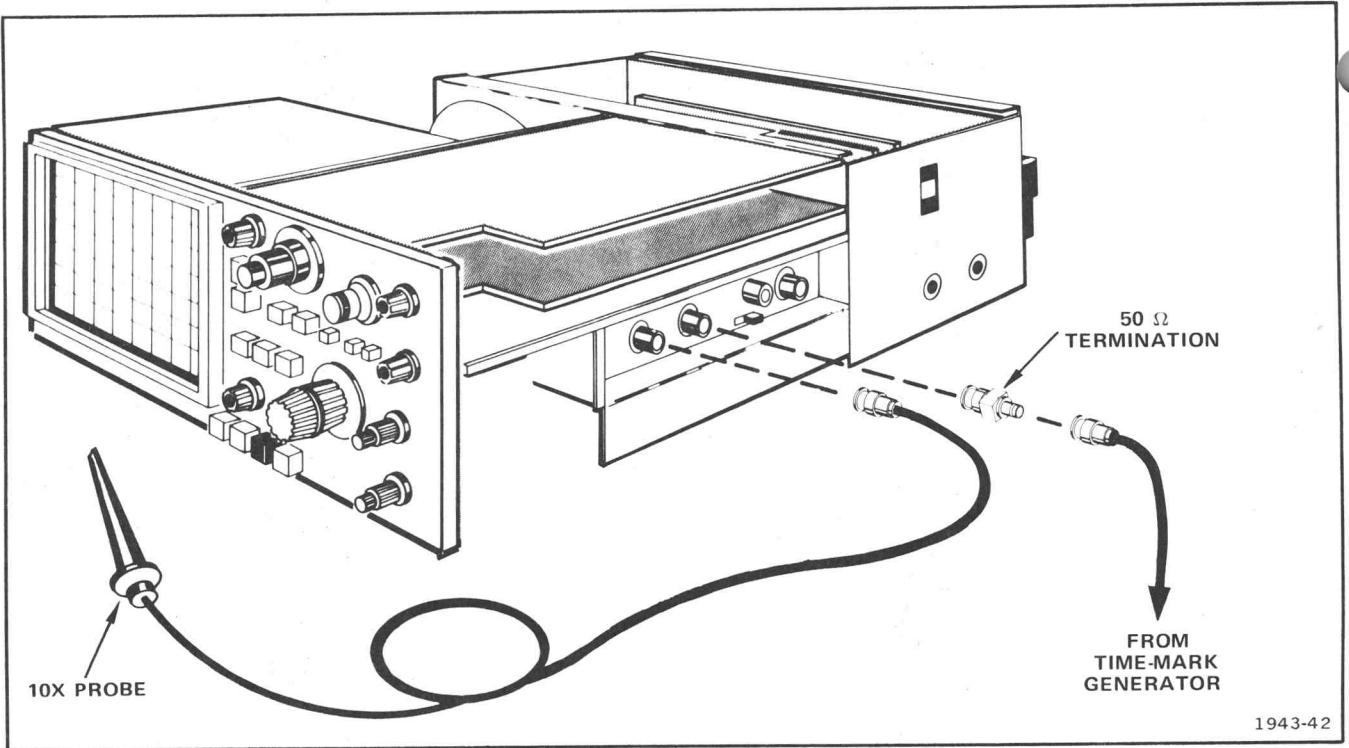


Fig 6-18

100%

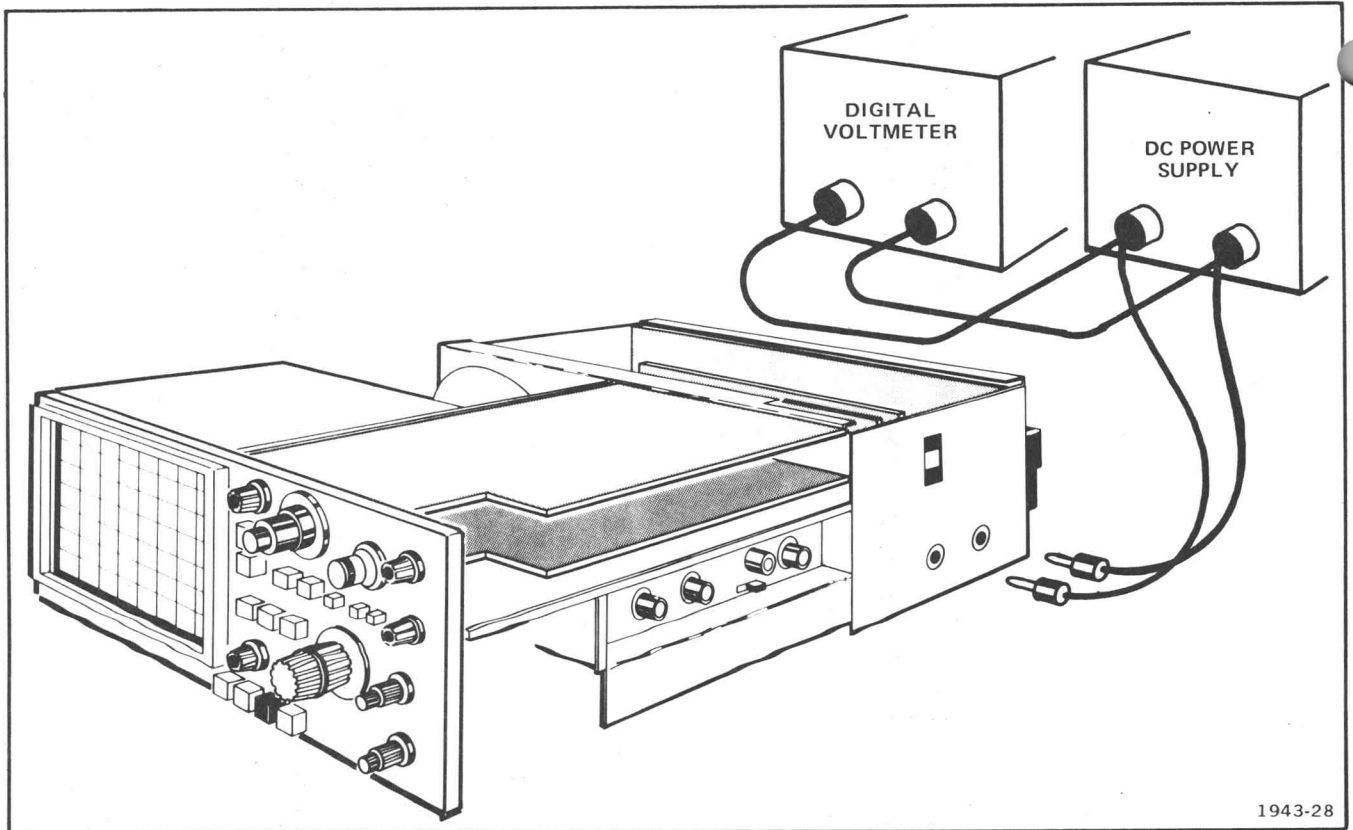


Fig 6-2

100%

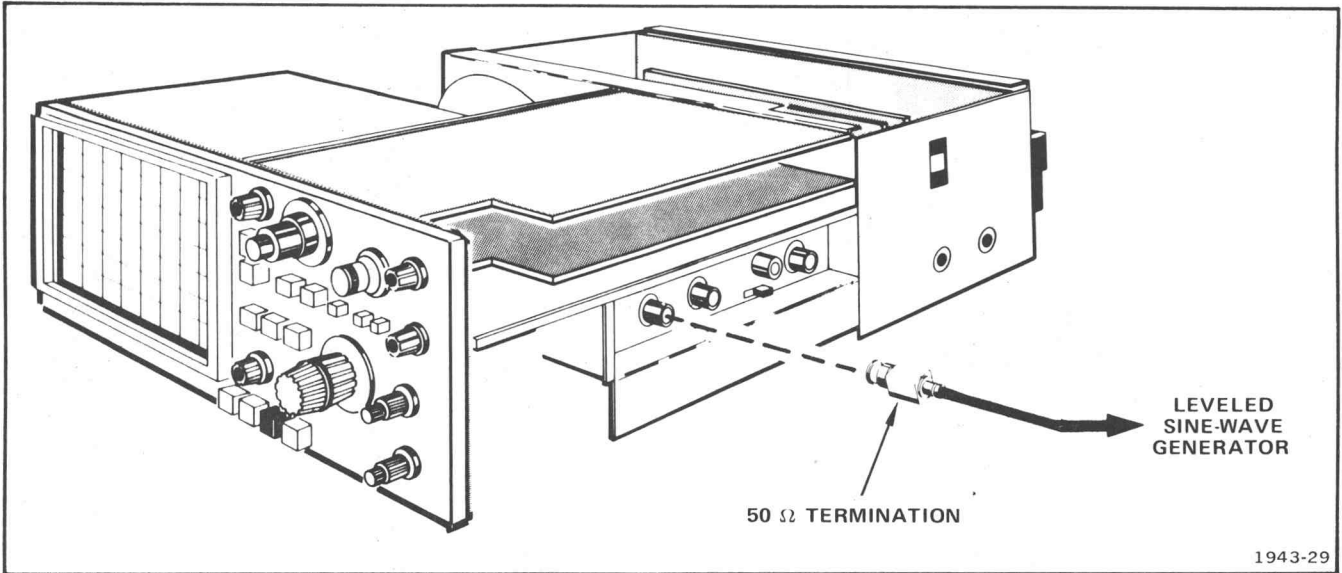


Fig 6-5

100%

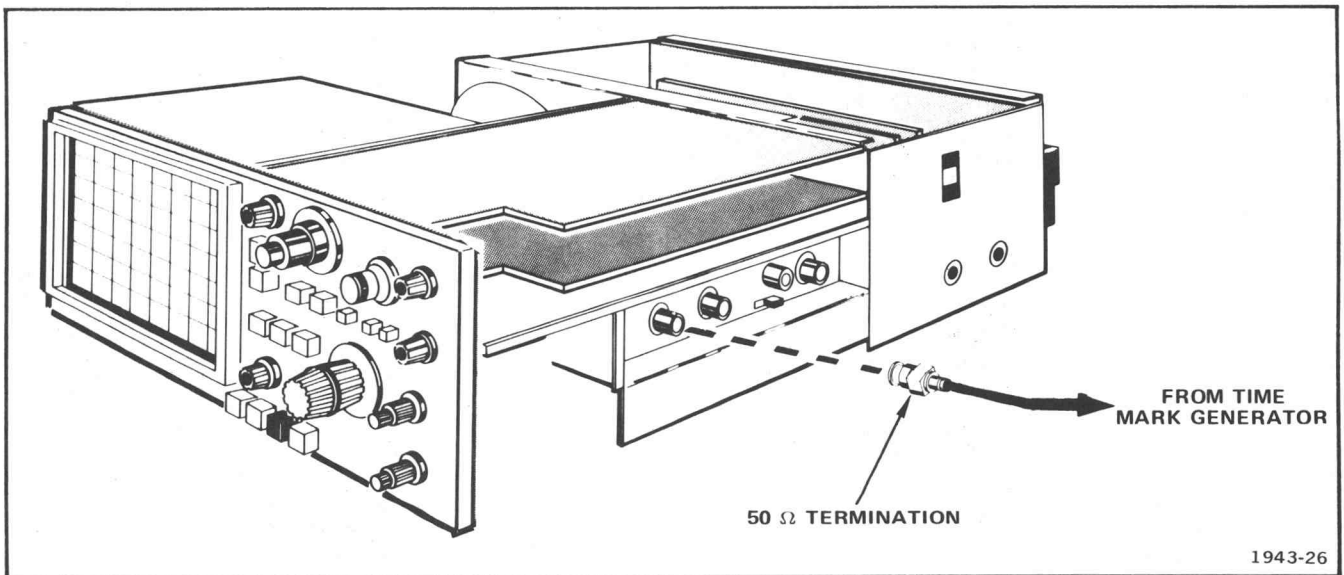


Fig 6-3

100%

Adjustment Procedure—335 Service

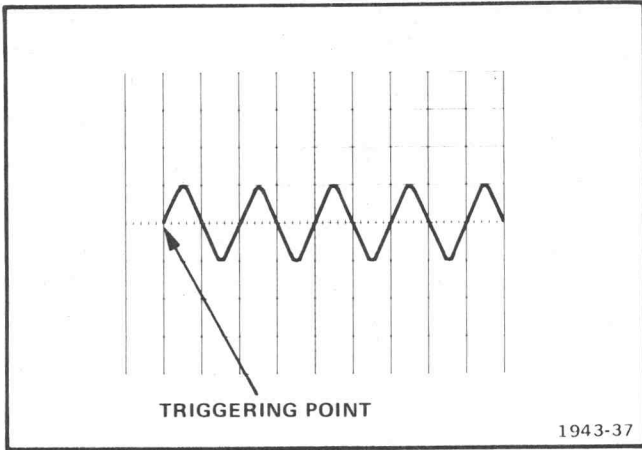


Fig 6-13

100%

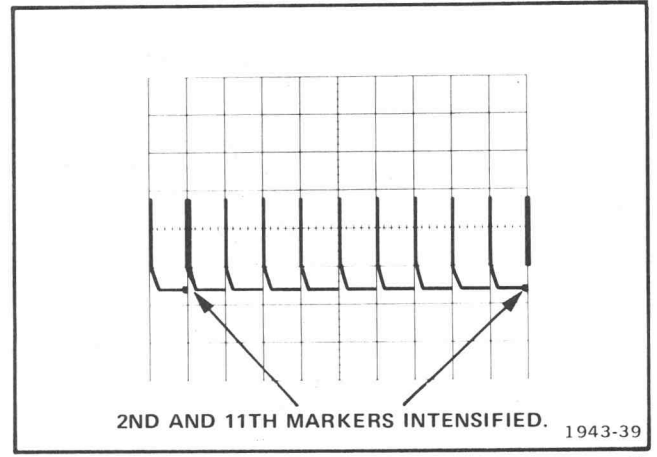


Fig 6-15

100%

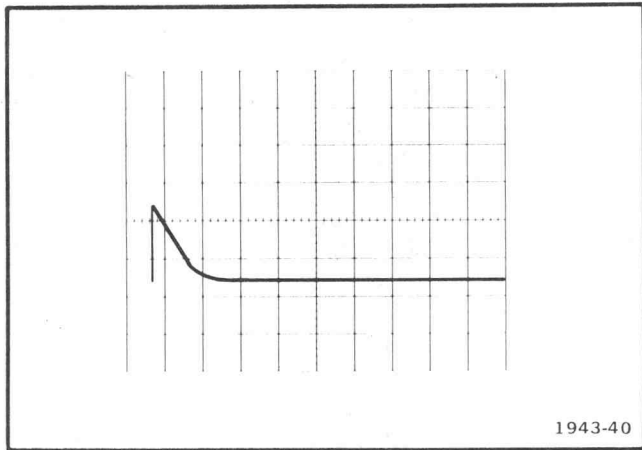


Fig 6-16

100%

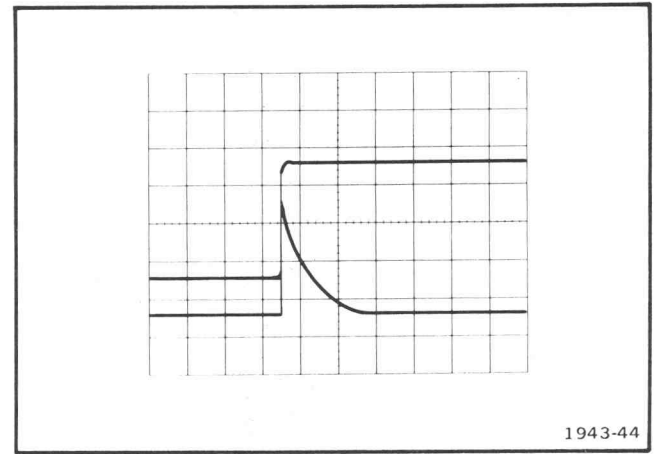


Fig 6-20

100%

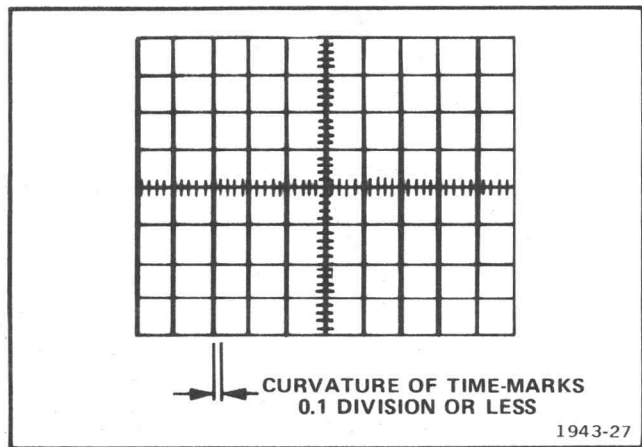
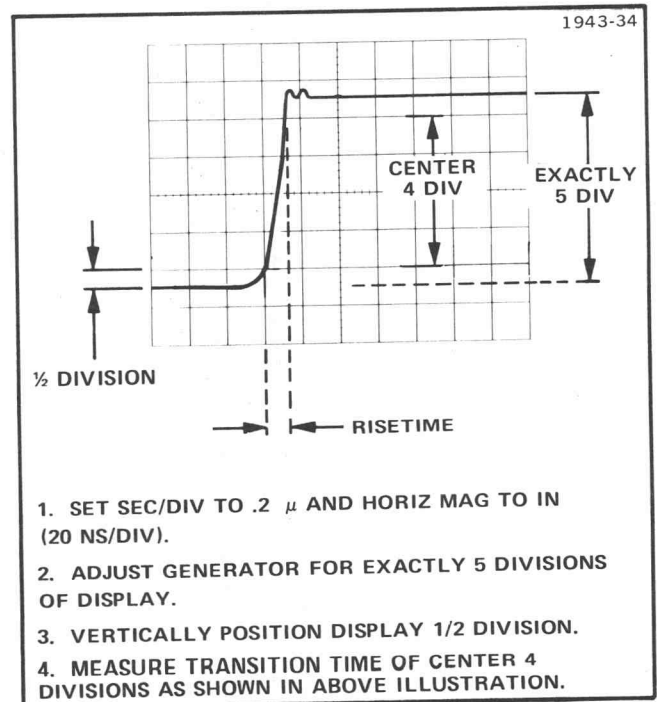


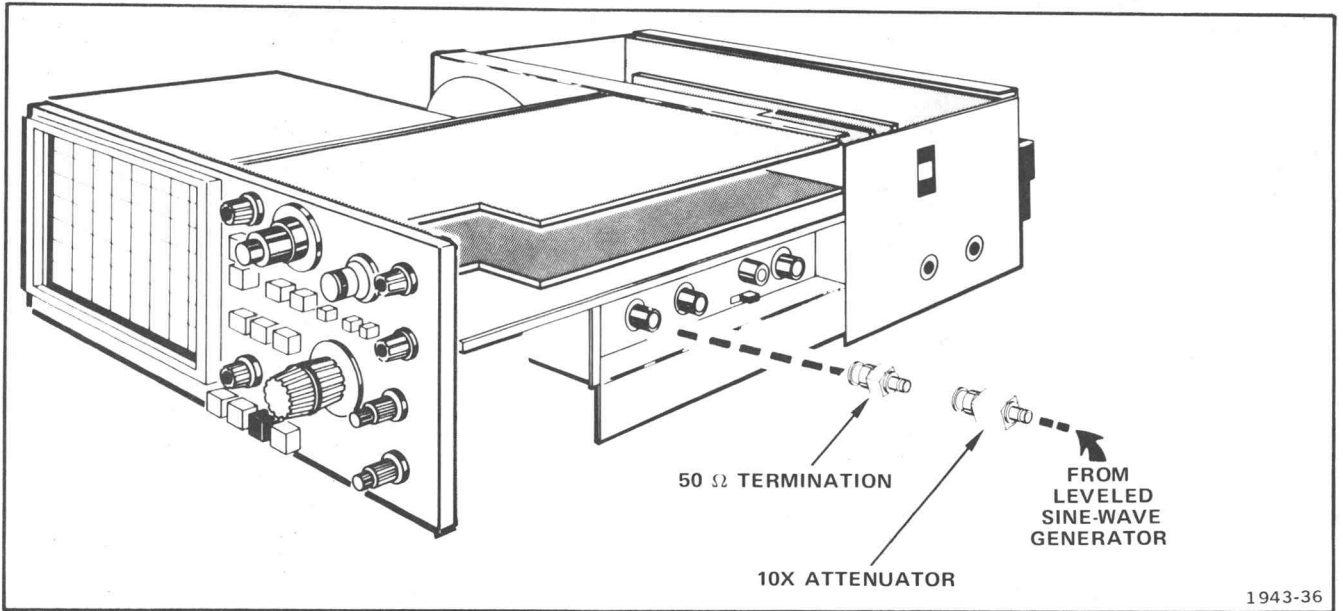
Fig 6-34

100%



6-10

100%



6-12

100%

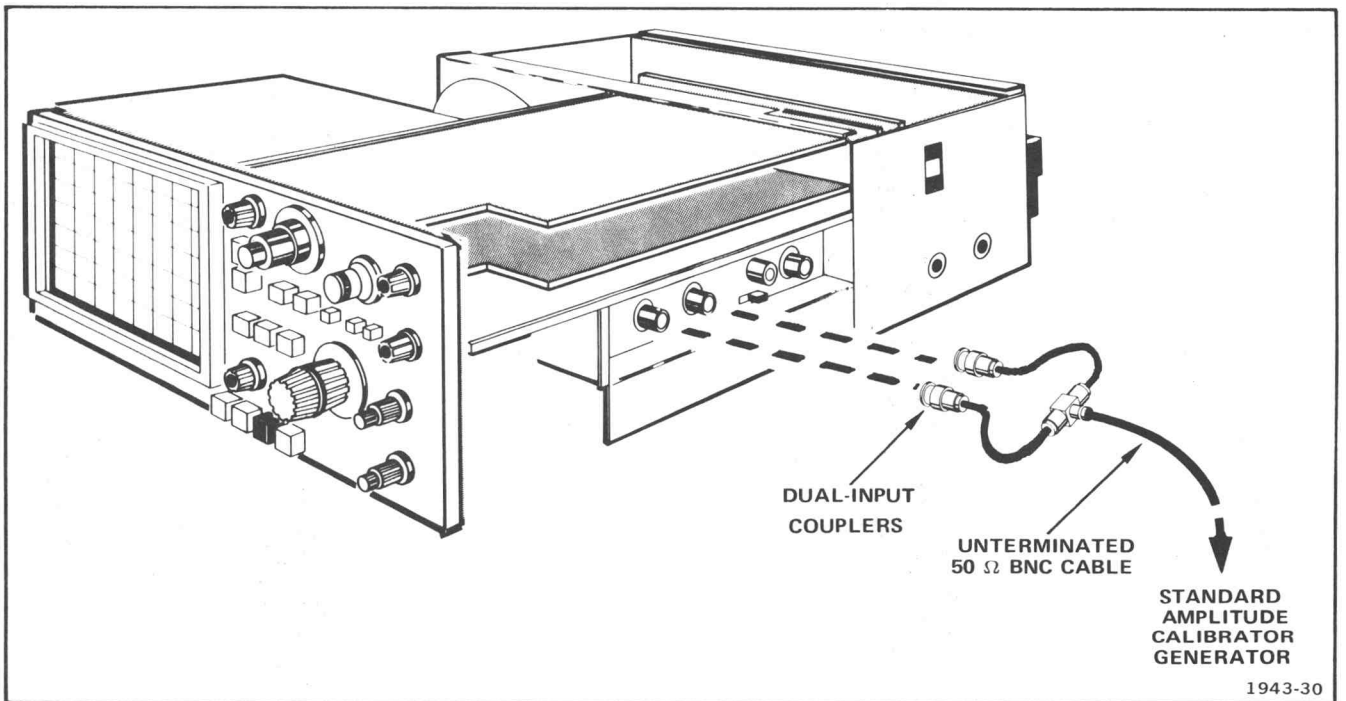


Fig 6-6

100%

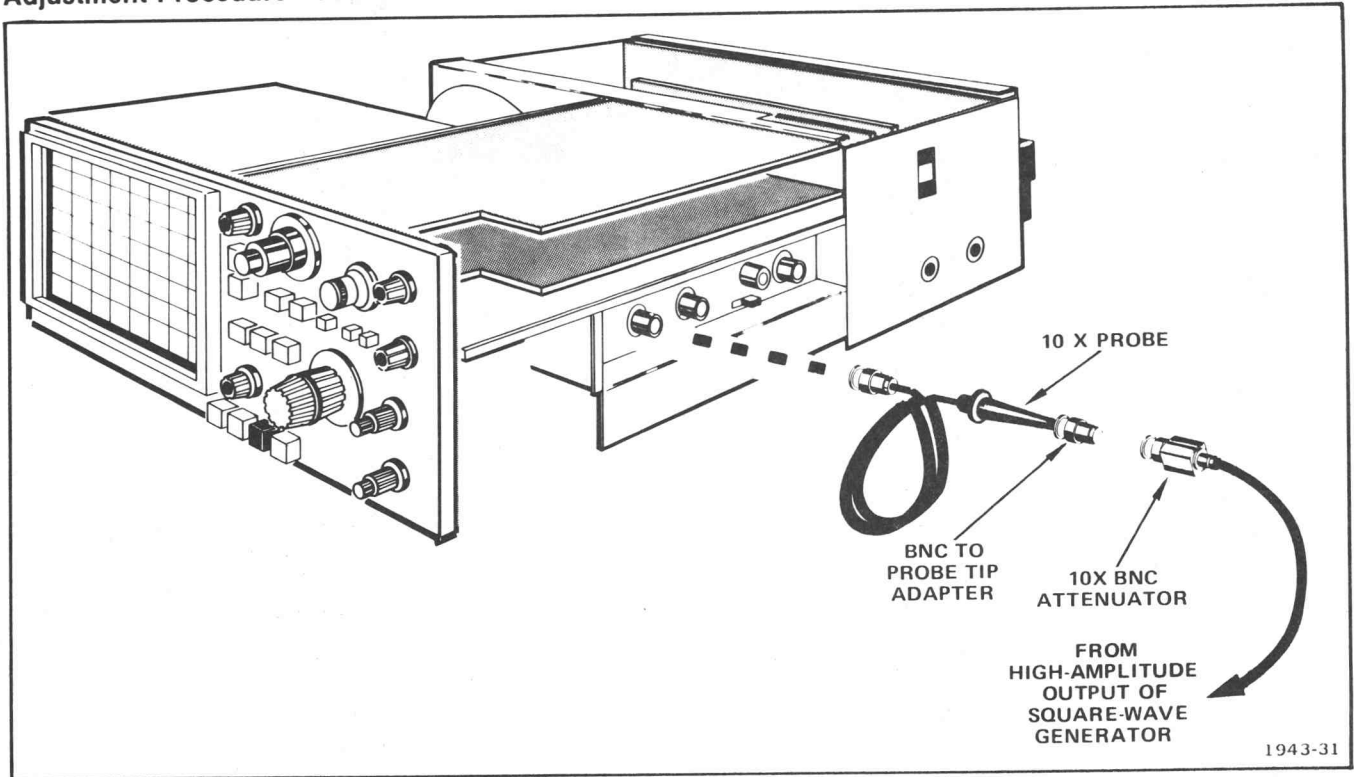


Fig 6-7

100%

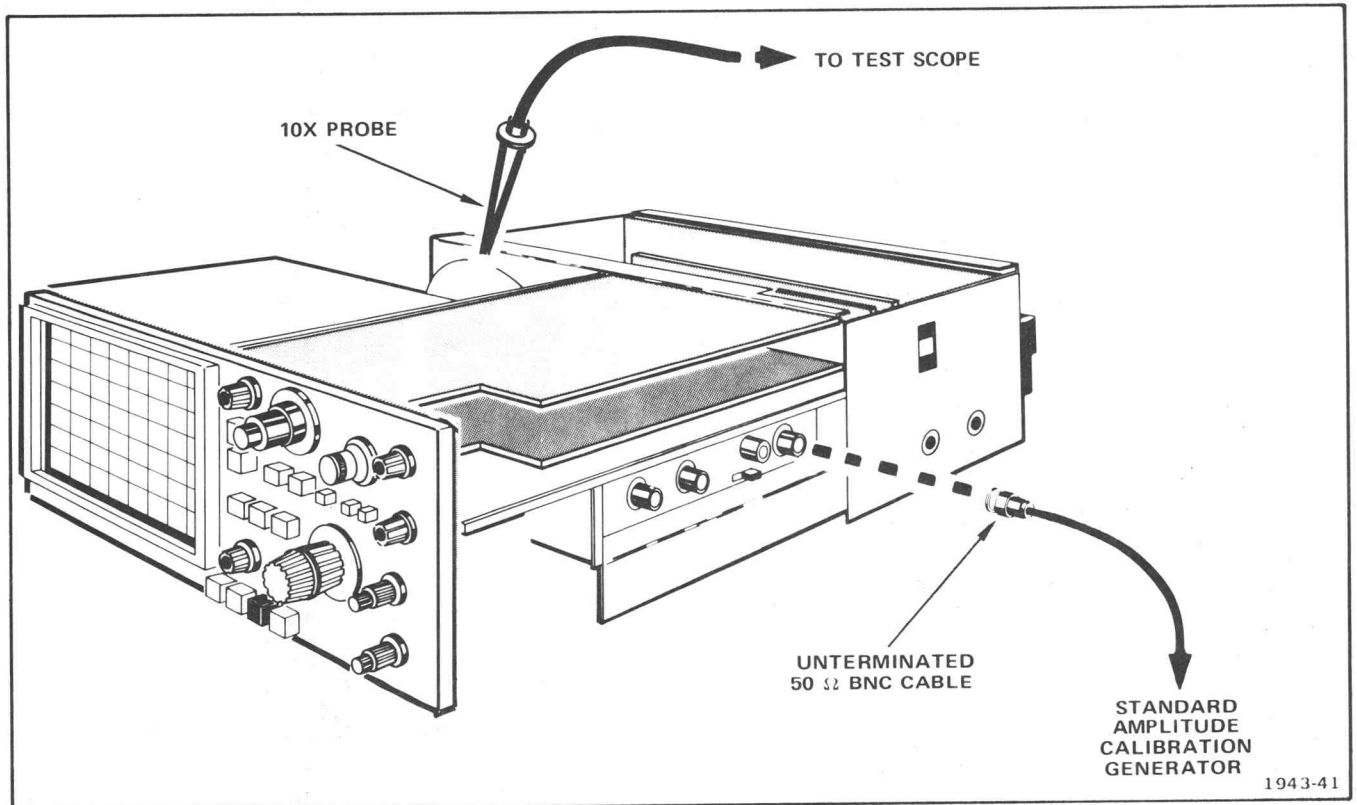
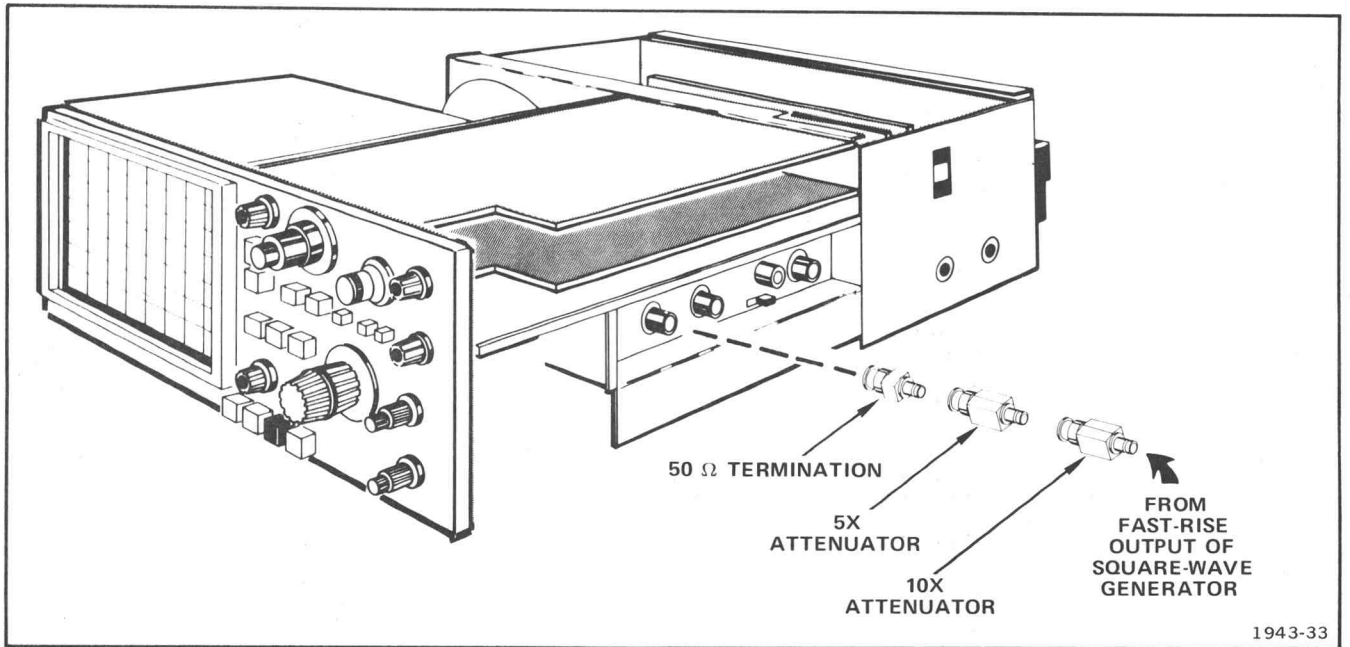


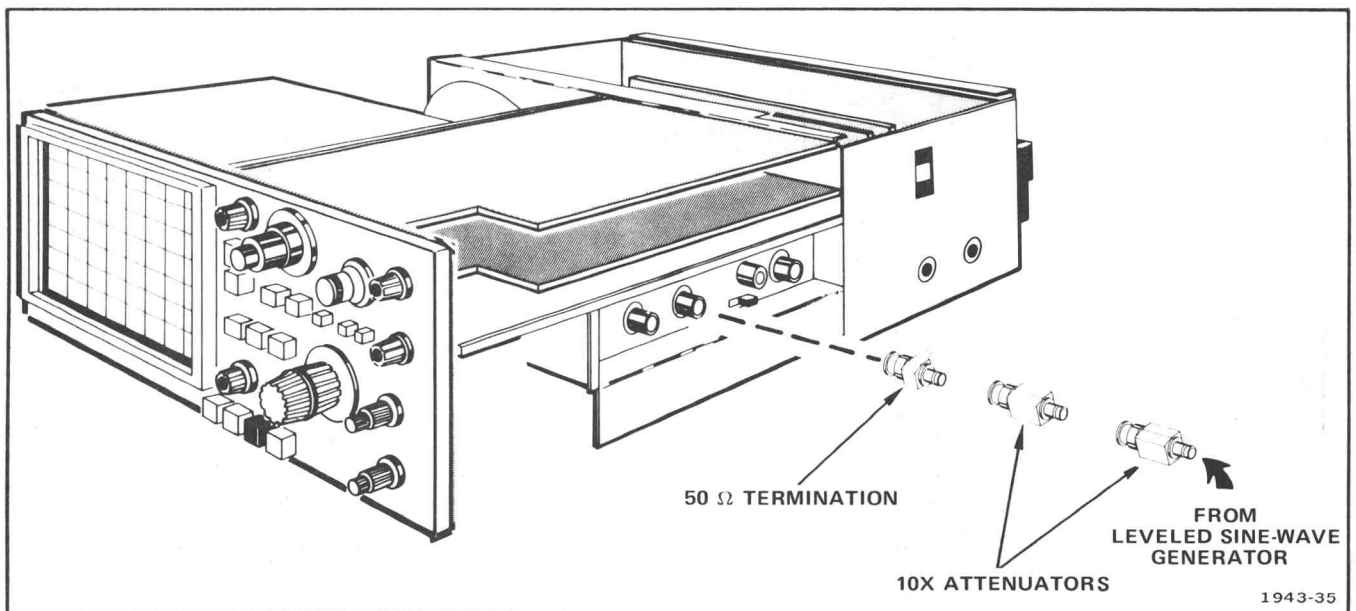
Fig 6-17

100%



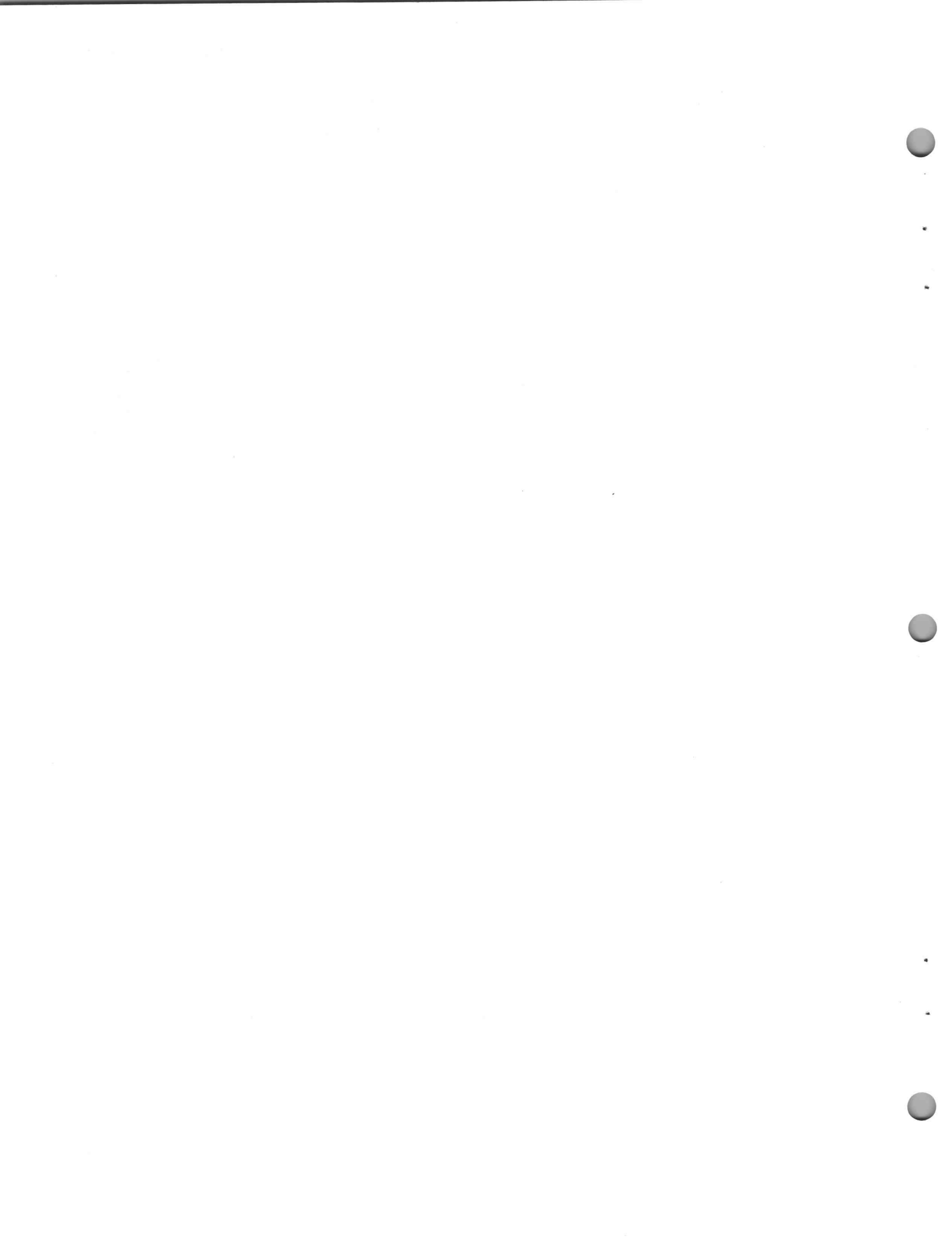
7196-9

100%



4196-11

100%



REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

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

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

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

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
01121	ALLEN-BRADLEY CO.	1201 2ND ST. SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P. O. BOX 5012 17070 EAST GALE AVE.	DALLAS, TX 75222 CITY OF INDUSTRY, CA 91745
02111	SPECTROL ELECTRONICS CORP.	ELECTRONICS PARK	SYRACUSE, NY 13201
03508	GENERAL ELECTRIC CO., SEMI-CONDUCTOR PRODUCTS DEPT.	60 S. JEFFERSON RD.	WHIPPANY, NJ 07981
03888	KDI PYROFILM CORP.	5005 E. MCDOWELL RD.	PHOENIX, AZ 85036
04713	MOTOROLA, INC., SEMICONDUCTOR PRODUCTS DIV.		
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS ST.	MOUNTAIN VIEW, CA 94042
07910	TELEDYNE SEMICONDUCTOR	12515 CHADRON AVE.	HAWTHORNE, CA 90250
09353	C AND K COMPONENTS, INC.	103 MORSE STREET	WATERTOWN, MA 02172
12294	ERIE TECHNOLOGICAL PRODUCTS OF CANADA LTD.	1262 DON MILLS RD.	DON MILLS, ONT, CANADA
12637	FLEET PRODUCTS CO., INC.	1920 E POMONA ST.	SANTA ANA, CA 92705
12969	UNITRODE CORP.	580 PLEASANT ST.	WATERTOWN, MA 02172
18324	SIGNETICS CORP.	811 E. ARQUES	SUNNYVALE, CA 94086
29604	STACKPOLE COMPONENTS CO.	P.O. BOX 14466	RALEIGH, NC 27610
34553	AMPEREX ELECTRONIC CORP., COMPONENT DIV.	35 HOFFMAN AVE.	HAPPAUGE, NY 11787
50157	N. L. INDUSTRIES, INC., ELECTRONICS DEPT.	P. O. BOX 787	MUSKEGON, MI 49443
56289	SPRAGUE ELECTRIC CO.	644 W. 12TH ST.	NORTH ADAMS, MA 01247 ERIE, PA 16512
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.		
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
80009	TEKTRONIX, INC.	P. O. BOX 500	BEAVERTON, OR 97077
80294	BOURNS, INC., INSTRUMENT DIV.	6135 MAGNOLIA AVE.	RIVERSIDE, CA 92506
80740	BECKMAN INSTRUMENTS, INC.	2500 HARBOR BLVD.	FULLERTON, CA 92634
81483	INTERNATIONAL RECTIFIER CORP.	9220 SUNSET BLVD.	LOS ANGELES, CA 90069
82104	STANDARD GRIGSBY CO., DIV. OF SUN CHEMICAL CORP.	920 RATHBONE AVE.	AURORA, IL 60507
82389	SWITCHCRAFT, INC.	5555 N. ELSTON AVE.	CHICAGO, IL 60630
86684	RCA CORP., ELECTRONIC COMPONENTS	415 S. 5TH ST.	HARRISON, NJ 07029
95712	BENDIX CORP., THE ELECTRICAL COMPONENTS DIV., MICROWAVE DEVICES PLANT	HURRICANE ROAD	FRANKLIN, IN 46131
98291	SEALECTRO CORP.	225 HOYT	MAMARONECK, NY 10544

Electrical Parts List—335 Service

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	Mfr Part Number
	Part No.	Eff	Dscont		Code	
A1	670-3771-00			CKT BOARD ASSY:ATTENUATOR	80009	670-3771-00
A2	670-3772-00			CKT BOARD ASSY:VERTICAL AMPLIFIER	80009	670-3772-00
A3	670-3773-00			CKT BOARD ASSY:TRIGGER	80009	670-3773-00
A4	670-3774-00			CKT BOARD ASSY:HORIZONTAL	80009	670-3774-00
A5	670-3775-00			CKT BOARD ASSY:SWEEP	80009	670-3774-00
A6	670-3776-00			CKT BOARD ASSY:INTERFACE	80009	670-3776-00
A7	670-3777-00			CKT BOARD ASSY:HIGH VOLTAGE AND UNBLANKING	80009	670-3777-00
A8	670-3778-00			CKT BOARD ASSY:POWER SUPPLY CONVERTER	80009	670-3778-00
C1	281-0627-00			CAP.,FXD,CER DI:1PF,+/-0.25PF,500V	72982	301-000C0G0109C
C2	285-0816-02			CAP.,FXD,PLSTC:0.019UF,10%,600V	80009	285-0816-02
C4A	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C4B	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C4C	283-0760-00			CAP.,FXD,MICA D:400PF,10%,100V		
C5A	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C5B	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C5C	283-0761-00			CAP.,FXD,MICA D:40PF,10%100V		
C6A	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C6B	281-0178-00			CAP.,VAR,PLSTC:1-4PF,500V	34553	2222-809-05001
C7A	281-0178-00			CAP.,VAR,PLSTC:1-4PF,500V	34553	2222-809-05001
C7B	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C11	281-0178-00			CAP.,VAR,PLSTC:1-4PF,500V	34553	2222-809-05001
C12	285-0816-01			CAP.,FXD,PLSTC:0.19UF,10%,600V	80009	285-0816-01
C14A	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C14B	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C14C	283-0760-00			CAP.,FXD,MICA D:400PF,10%,100V		
C15A	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C15B	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C15C	283-0761-00			CAP.,FXD,MICA D:40PF,10%,100V		
C16A	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C16B	281-0178-00			CAP.,VAR,PLSTC:1-4PF,500V	34553	2222-809-05001
C17A	281-0178-00			CAP.,VAR,PLSTC:1-4PF,500V	34553	2222-809-05001
C17B	281-0182-00			CAP.,VAR,PLSTC:1.8-10PF,300V	34553	2222-809-05002
C101	283-0068-00			CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C102	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C103	283-0139-00			CAP.,FXD,CER DI:150PF,20%,50V	72982	8101A058B
C105	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C106	283-0247-01			CAP.,FXD,CER DI:680PF,10%,500V		
C110	281-0184-00			CAP.,VAR,PLSTC:2-18PF,500VDC	34553	2222-809-05003
C111	SELECTED					
C170	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C171	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C172	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C173	290-0739-00			CAP.,FXD,ELCTLT:33UF,20%,25V		
C174	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C200	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C201	283-0068-00			CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C202	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C203	283-0139-00			CAP.,FXD,CER DI:150PF,20%,50V	72982	8101A058B
C204	290-0134-01			CAP.,FXD,ELCTLT:22UF,20%,15V		
C205	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C206	283-0247-01			CAP.,FXD,CER DI:680PF,10%,500V		
C210	281-0184-00			CAP.,VAR,PLSTC:2-18PF,500VDC	34553	2222-809-05003
C211	SELECTED					

Electrical Parts List—335 Service

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C270	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C271	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C272	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C273	290-0739-00			CAP.,FXD,ELCTLT:33UF,20%,25V		
C300	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C320	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C335	281-0518-00			CAP.,FXD,CER DI:47PF,+/-9.4PF,500V	72982	301-000U2J0470M
C340	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N058651103M
C341	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C342	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C343	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C345	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C386	290-0729-00			CAP.,FXD,ELCTLT:15UF,20%,20V		
C388	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C389	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C390	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C391	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C395	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C396	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C397	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C401	290-0271-00			CAP.,FXD,ELCTLT:9UF,+20-15%,125V	56289	109D905C2125F2
C404	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C408	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-505B102J
C411	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C412	283-0238-00			CAP.,FXD,CER DI:0.01UF,10%,50V	72982	8121N071WR5103K
C413	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C414	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C415	283-0058-00			CAP.,FXD,CER DI:0.027UF,10%,100V	72982	8131N147W5R273K
C440	283-0144-00			CAP.,FXD,CER DI:33PF,1%,500V	72982	801-457P2G330F
C442	281-0158-00			CAP.,VAR,CER DI:7-45PF,50V	72982	518-000G7-45
C443	281-0622-00	300000	300100	CAP.,FXD,CER DI:47PF,1%,500V	72982	308-000C0G0470F
C443	283-0115-00	300101		CAP.,FXD,CER DI:47PF,5%,200V	72982	805-509C0G470J
C460	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C501A	283-0076-00			CAP.,FXD,CER DI:27PF,10%,500V	56289	40C287A2
C501B	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C502	283-0128-00			CAP.,FXD,CER DI:100PF,5%,500V	72982	871-536T2H101J
C503	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-547E203Z
C504	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C511	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C521	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C532	283-					
C534	281-0184-00			CAP.,VAR,PLSTC:2-18PF,500VDC	34553	2222-809-05003
C535	283					
C536	281-0628-00			CAP.,FXD,CER DI:15PF,5%,600V	72982	301-000C0G0150G
C537	281-0184-00			CAP.,VAR,PLSTC:2-18PF,500VDC	34553	2222-809-05003
C541	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C590	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C591	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C592	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C602	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C605	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C617	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C650	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		

Electrical Parts List—335 Service

Kct No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
C651	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
C652	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
C707	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C708	283-0226-00		CAP., FXD, CER DI: 12PF, 10%, 500V		
C710	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C712	290-0741-00		CAP., FXD, ELCTLT: 1UF, 20%, 35V		
C717	290-0741-00		CAP., FXD, ELCTLT: 1UF, 20%, 35V		
C722	283-0149-00		CAP., FXD, CER DI: 25PF, 2%, 200V	72982	865-528T2H250G
C723	283-0060-00		CAP., FXD, CER DI: 100PF, 5%, 200V	72982	855-535U2J101J
C727A ¹	295-0134-00		CAP., SET, MTCHD: 1UF, 0.1UF, 0.01UF, 0.001UF, 82PF		
C727B					
C727D					
C727C	281-0096-00		CAP., VAR, AIR DI: 5.5-18PF	72982	538-006D9-35
C730	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C731	281-0670-00		CAP., FXD, CER DI: 1.8PF, +/-0.1PF, 500V	72982	374-005COK0189B
C739	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C745A	283-0229-00		CAP., FXD, CER: 220PF, 10%, 50V		
C745B	290-0741-00		CAP., FXD, ELCTLT: 1UF, 20%, 35V		
C745C	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C746	290-0741-00		CAP., FXD, ELCTLT: 1UF, 20%, 35V		
C753	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
C757	283-0060-00		CAP., FXD, CER DI: 100PF, 5%, 200V	72982	855-535U2J101J
C767	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C769	283-0087-00		CAP., FXD, CER DI: 300PF, 5%, 1000V	56289	403637
C772	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
C773	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
C774	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20% 25V		
C807	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C810	283-0226-00		CAP., FXD, CER, DI: 12PF, 10%, 500V		
C813	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
C814	283-0149-00		CAP., FXD, CER DI: 25PF, 2%, 200V	72982	865-528T2H250G
C816	283-0060-00		CAP., FXD, CER DI: 100PF, 5%, 200V	72982	855-535U2J101J
C820	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
C823	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C825	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C828	283-0149-00		CAP., FXD, CER DI: 25PF, 2%, 200V	72982	865-528T2H250G
C840	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
C841	290-0740-00		CAP., FXD, ELCTLT: 68UF, 20%, 16V		
C842	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		
	295-0134-00		CAP., SET, MTCHD: 1UF, 0.1UF, 0.01UF, 0.001UF, 82PF		
C850A ¹	281-0096-00		CAP., VAR, AIR DI: 5.5-18PF	72982	538-006D9-35
C850B					
C850C					
C850D	283-0675-01		CAP., FXD, MICA D: 82PF, 1%, 300V		
C955	283-0290-00		CAP., FXD, CER DI: 1PF, +1-0.25PF, 500V		
C956	281-0095-00		CAP., VAR, PLSTC: 0.2-1.5PF	12294	057001
C961	283-0341-00		CAP., FXD, CER DI: 0.047UF, 10%, 100V	72982	8131N145W5R473K
C963	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C965	281-0095-00		CAP., VAR, PLSTC: 0.2-1.5PF	12294	057001
C971	283-0341-00		CAP., FXD, CER DI: 0.047UF, 10%, 100V	72982	8131N145W5R473K
C975	283-0290-00		CAP., FXD, CER DI: 1PF, +1-0.25PF, 500V		
C981	290-0738-00		CPA., FXD, ELCTLT: 2.2UF, 20%, 25V		
C982	283-0003-00		CAP., FXD, CER DI: 0.01UF, +80-20%, 150V	72982	855-547E103Z
C983	290-0738-00		CAP., FXD, ELCTLT: 2.2UF, 20%, 25V		

¹Furnished as a unit.

Electrical Parts List—335 Service

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C984	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C985	290-0271-00			CAP.,FXD,ELCTLT:9UF,+20-15%,125V	56289	109D905C2125F2
C1000	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C1001	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131N075651104M
C1002	290-0562-00			CAP.,FXD,ELCTLT:210UF,+75-10%,40V		
C1003	290-0736-00			CAP.,FXD,ELCTLT:330UF,+100-10%,40V		
C1004	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1005	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1007	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1008	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1009	290-0117-00			CAP.,FXD,ELCTLT:50UF,+75-10%,50V	56289	30D506G050DD4
C1010	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1014A	283-0231-01			CAP.,FXD,CER DI:470PF,10%,500V		
C1014B	283-0231-01			CAP.,FXD,CER DI:470PF,10%,500V		
C1021A	283-0231-01			CPA.,FXD,CER DI:470PF,10%,500V		
C1021B	283-0231-01			CAP.,FXD,CER DI:470PF,10%,500V		
C1022	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C1028	283-0087-00			CAP.,FXD,CER DI:300PF,5%,1000V	56289	403637
C1029	283-0087-00			CAP.,FXD,CER DI:300PF,5%,1000V	56289	403637
C1035	283-0087-00			CAP.,FXD,CER DI:300PF,5%,1000V	56289	403637
C1036	283-0087-00			CAP.,FXD,CER DI:300PF,5%,1000V	56289	403637
C1045	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C1046	290-0183-01			CAP.,FXD,ELCTLT:1UF,10%,35V		
C1076	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1077	290-0741-00			CAP.,FXD,ELCTLT:1UF,20%,35V		
C1078	290-0739-00			CAP.,FXD,ELCTLT:33UF,20%,25V		
C1079	290-0271-00			CAP.,FXD,ELCTLT:9UF,+20-15%,125V	56289	109D905C2125F2
C1080	290-0271-00			CAP.,FXD,ELCTLT:9UF,+20-15%,125V	56289	109D905C2125F2
C1081	290-0739-00			CAP.,FXD,ELCTLT:33UF,20%,25V		
C1084	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C1091	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1093	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1098	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C1099	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1106	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1107	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1119	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1120	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1121	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1123	290-0740-00			CAP.,FXD,ELCTLT:68UF,20%,16V		
C1124	290-0739-00			CAP.,FXD,ELCTLT:33UF,20%,25V		
C1128	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C1200	283-0120-00			CAP.,FXD,CER DI:0.015UF,+80-30%,2500V	56289	45C12
C1201	285-1040-00			CAP.,FXD,PLSTC:0.0012UF,10%,4000V	56289	430P522
C1213	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1224	285-1040-00	300000	300120	CAP.,FXD,PLSTC:0.0012UF,10%,4000V	56289	430P522
C1224	283-0071-00	300121		CAP.,FXD,CER DI:0.0068UF,+80-30%,5000V	56289	45C10A1
C1225	283-0120-00			CAP.,FXD,CER DI:0.015UF,+80-30%,2500V	56289	45C12
C1226	283-0120-00			CAP.,FXD,CER DI:0.015UF,+80-30%,2500V	56289	45C12
C1251	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1260	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1263	283-0087-00			CAP.,FXD,CER DI:300PF,5%,1000V	56289	403637
C1267	290-0733-00			CAP.,FXD,ELCTLT:330UF,20%,3.15V		

Electrical Parts List—335 Service

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont			
C1270	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1271	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1273	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1400	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1425	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C1426	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C1430	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1432	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1434	281-0095-00			CAP.,VAR,PLSTC:0.2-1.5PF	12294	057001
C1435	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145651104Z
C1438	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C1444	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145651104Z
C1450	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1451	290-0738-00			CAP.,FXD,ELCTLT:2.2UF,20%,25V		
C1500	285-1117-00			CAP.,FXD,PLSTC:0.018UF,2%,100V		
C1504	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C1505	290-0740-00	300000	300100	CAP.,FXD,ELCTLT:22UF,20%,16V		
C1505	290-0730-00	300101		CAP.,FXD,ELCTLT:22UF,20%,16V		
CR101	152-0323-00			SEMICONV DEVICE:SILICON,35V,100MA	03508	SE365
CR103	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR202	152-0323-00			SEMICONV DEVICE:SILICON,35V,100MA	03508	SE365
CR203	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR300	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR301	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR330	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR332	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR336	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR340	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR341	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR360	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR361	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR500	152-0323-00			SEMICONV DEVICE:SILICON,35V,100MA	03508	SE365
CR521	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR554	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR555	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR561	152-0630-00			SEMICONV DEVICE:TUNNEL,GE,4.7MA		
CR571	152-0630-00			SEMICONV DEVICE:TUNNEL,GE,4.7MA		
CR602	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR629	152-0630-00			SEMICONV DEVICE:TUNNEL,GE,4.7MA		
CR630	152-0630-00			SEMICONV DEVICE:TUNNEL,GE,4.7MA		
CR709	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR734	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR752	150-1027-00			LAMP,LED:4V,30MA,GREEN		
CR754	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR756	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR757	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR811	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR930	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR940	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR950	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR967	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		
CR1000	152-0107-00	X300050		SEMICONV DEVICE:SILICON,375V,400MA		
CR1001	152-0327-00			SEMICONV DEVICE:SILICON,BAX 13		

Electrical Parts List—335 Service

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
CRI005A CRI005B CRI005C CRI005D CRI006	152-0556-00 152-0327-00		SEMICOND DEVICE:BRIDGE,50V,2.5A SEMICOND DEVICE:SILICON,BAX 13	04713	MDA960-1
CRI007 CRI009 CRI011 CRI029 CRI030	152-0327-00 152-0414-00 152-0327-00 152-0327-00 152-0327-00	300000 300020X	SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13		
CRI035 CRI037 CRI055 CRI078A CRI078B	152-0327-00 152-0327-00 150-1027-00 152-0414-00 152-0414-00		SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 LAMP,LED:4V,30MA,GREEN SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A	80009 80009	152-0414-00 152-0414-00
CRI079A CRI079B CRI079C CRI079D CRI080	152-0414-00 152-0414-00 152-0414-00 152-0414-00 152-0414-00		SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A	80009 80009 80009 80009 80009	152-0414-00 152-0414-00 152-0414-00 152-0414-00 152-0414-00
CRI091A CRI091B CRI091C CRI091D CRI105A	152-0414-00 152-0414-00 152-0414-00 152-0414-00 152-0414-00		SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE SILICON:200V,0.75A	80009 80009 80009 80009 80009	152-0414-00 152-0414-00 152-0414-00 152-0414-00 152-0414-00
CRI105B CRI1123 CRI1124 CRI1200 CRI1201	152-0414-00 152-0327-00 152-0327-00 152-0061-00 152-0242-00		SEMICOND DEVICE SILICON:200V,0.75A SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,175V,100MA SEMICOND DEVICE:SILICON,225V,200MA	80009 12969	152-0414-00 152-0061-00 NDP341
CRI1202 CRI1204 CRI1240 CRI1400 CRI1401	152-0242-00 152-0061-00 152-0061-00 152-0327-00 152-0327-00		SEMICOND DEVICE:SILICON,225V,200MA SEMICOND DEVICE:SILICON,175V,100MA SEMICOND DEVICE:SILICON,175V,100MA SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13	12969 80009 80009	NDP341 152-0061-00 152-0061-00
CRI1405 CRI1407 CRI1410 CRI1413 CRI1414	152-0327-00 152-0327-00 152-0327-00 152-0327-00 152-0327-00		SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13		
CRI1415 CRI1417 CRI1418 CRI1419 CRI1431	152-0327-00 152-0327-00 152-0327-00 152-0327-00 152-0327-00		SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13		
CRI1442 CRI1511 CRI1519	152-0061-00 152-0327-00 152-0327-00	X300121	SEMICOND DEVICE:SILICON,175V,100MA SEMICOND DEVICE:SILICON,BAX 13 SEMICOND DEVICE:SILICON,BAX 13	80009	152-0061-00
DL370	175-1477-01		DELAY LINE		
F1000 F1002 F1003	159-0121-00 159-0107-00 159-0064-00		FUSE,CARTRIDGE:0.4A,250V FUSE,CARTRIDGE:2A,FAST-BLOW,250V FUSE,CARTIDGE:1A,FAST-BLOW,250V		

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	
	Part No.	Eff	Dscont		Code	Mfr Part Number
J1	131-0106-00			CONNECTOR, RCPT, :FEMALE, BNC	95712	9856-1
J11	131-0106-00			CONNECTOR, RCPT, :FEMALE, BNC	95712	9856-1
J15	129-0103-00			POST, BDG, ELEC: ASSEMBLY	80009	129-0103-00
J510	131-0106-00			CONNECTOR, RCPT, :FEMALE, BNC	95712	9856-1
J1002	136-0490-00			JACK, TIP: BANANA JACK ASSY	80009	136-0490-00
J1003	136-0491-00			JACK, TIP: BANANA JACK ASSY	80009	136-0491-00
J1420	136-0491-00			JACK, TIP: BANANA JACK ASSY	80009	136-0491-00
J1500	131-0251-00			JACK, TIP: PANEL MTG, RED:	98291	016-8010-2
J1600	131-1662-00			CONNECTOR, RCPT: 15/30 CONTACTS		
L4 ¹						
L14 ¹						
L173	108-0692-00			COIL, RF: 270UH		
L273	108-0692-00			COIL, RF: 270UH		
L401	108-0692-00			COIL, RF: 270UH		
L772	108-0692-00			COIL, RF: 270UH		
L1015	108-0554-00			COIL, RF: 5UH	80009	108-0554-00
L1020	108-0554-00			COIL, RF: 5UH	80009	108-0554-00
L1091	108-0692-00			COIL, RF: 270UH		
L1105	108-0692-00			COIL, RF: 270UH		
L1119	108-0692-00			COIL, RF: 270UH		
L1270	108-0799-00			COIL, RF: TRACE ROTATOR		
L1425	108-0692-00			COIL, RF: 270UH		
L1500	108-0692-00			COIL, RF: 270UH		
L1505	108-0692-00			COIL, RF: 270UH		
LR400	108-0659-00			COIL, RF: 1.5UH	80009	108-0659-00
LR402A	108-0659-00			COIL, RF: 1.5UH	80009	108-0659-00
Q100A,B	151-1091-00			TRANSISTOR, SILICON, FE, N CHANNEL		
Q130	151-0221-02			TRANSISTOR: SILICON, PNP	80009	151-0221-02
Q140	151-0221-02			TRANSISTOR: SILICON, PNP	80009	151-0221-02
Q150	151-0611-00			TRANSISTOR: SILICON, NPN		
Q160	151-0611-00			TRANSISTOR: SILICON, NPN		
Q200A,B	151-1091-00			TRANSISTOR, SILICON, FE, N CHANNEL		
Q230	151-0221-02			TRANSISTOR: SILICON, PNP	80009	151-0221-02
Q240	151-0221-02			TRANSISTOR: SILICON, PNP	80009	151-0221-02
Q250	151-0611-00			TRANSISTOR: SILICON, NPN		
Q260	151-0611-00			TRANSISTOR: SILICON, NPN		
Q322	151-1087-00			TRANSISTOR: SILICON, NPN		
Q335	151-1087-00			TRANSISTOR: SILICON, NPN		
Q340	151-1087-00			TRANSISTOR: SILICON, NPN		
Q360	151-0220-00			TRANSISTOR: SILICON, PNP	80009	151-0220-00
Q365	151-0221-02			TRANSISTOR: SILICON, PNP	80009	151-0221-02
Q370	151-0221-02			TRANSISTOR: SILICON, PNP	80009	151-0221-02
Q375	151-0333-00			TRANSISTOR: SILICON, NPN, SEL FROM MPS918	80009	151-0333-00
Q380	151-0333-00			TRANSISTOR: SILICON, NPN, SEL FROM MPS918	80009	151-0333-00
Q385	151-0220-00			TRANSISTOR: SILICON, PNP	80009	151-0220-00
Q390	151-0376-00			TRANSISTOR: SILICON, PNP		
Q500A,B	151-1042-00			SEMICON DVC SE: MATCHED PAIR FET	80009	151-1042-00
Q510	151-1087-00			TRANSISTOR: SILICON NPN		
Q520	151-1087-00			TRANSISTOR: SILICON, NPN		
Q540	151-0333-00			TRANSISTOR: SILICON, NPN, SEL FROM MPS918	80009	151-0333-00
Q545	151-0333-00			TRANSISTOR: SILICON, NPN, SEL FROM MPS918	80009	151-0333-00
Q555	151-0220-00			TRANSISTOR: SILICON, PNP	80009	151-0220-00

¹Part of Circuit Board.

Electrical Parts List—335 Service

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
Q560	151-0221-02		TRANSISTOR:SILICON,PNP	80009	151-0221-02
Q570	151-0221-02		TRANSISTOR:SILICON,PNP	80009	151-0221-02
Q605	151-0333-00		TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q610	151-0333-00		TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q616	151-0221-02		TRANSISTOR:SILICON,PNP	80009	151-0221-02
Q618	151-0221-02		TRANSISTOR:SILICON,PNP	80009	151-0221-02
Q620	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q630	151-1087-00		TRANSISTOR:SILICON,NPN		
Q640	151-1087-00		TRANSISTOR:SILICON,NPN		
Q720	151-1092-00		TRANSISTOR:SILICON,FE,N CHANNEL		
Q732	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q734	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q739	151-1087-00		TRANSISTOR:SILICON,NPN		
Q744	151-0410-00		TRANSISTOR:SILICON,PNP	04713	SPS6765
Q767	151-1087-00		TRANSISTOR:SILICON,NPN		
Q769	151-0410-00		TRANSISTOR:SILICON,PNP	04713	SPS6765
Q780	151-1087-00		TRANSISTOR:SILICON,NPN		
Q824	151-1087-00		TRANSISTOR:SILICON,NPN		
Q827	151-1087-00		TRANSISTOR:SILICON,NPN		
Q906	151-1087-00		TRANSISTOR:SILICON,NPN		
Q915	151-1087-00		TRANSISTOR:SILICON,NPN		
Q925	151-1087-00		TRANSISTOR:SILICON,NPN		
Q930	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q940	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q955	151-0489-00		TRANSISTOR:SILICON,PNP		
Q960	151-0406-00		TRANSISTOR:SILICON,PNP	07263	S37880
Q965	151-0333-00		TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q970	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q975	151-0489-00		TRANSISTOR:SILICON,NPN		
Q980	151-0406-00		TRANSISTOR:SILICON,PNP	07263	S37880
Q1000	151-0349-00		TRANSISTOR:SILICON,NPN,SEL FROM MJE2801	04713	SJE924
Q1003	151-0601-00		TRANSISTOR:SILICON,NPN		
Q1007	151-0601-00		TRANSISTOR:SILICON,NPN		
Q1011	151-1092-00		TRANSISTOR:SILICON,FE,N CHANNEL		
Q1014	151-0306-00		TRANSISTOR:SILICON,2SC756,CHECKED		
Q1015	151-0306-00		TRANSISTOR:SILICON,2SC756,CHECKED		
Q1021	151-0306-00		TRANSISTOR:SILICON,2SC756,CHECKED		
Q1022	151-0306-00		TRANSISTOR:SILICON,2SC756,CHECKED		
Q1028	151-1087-00		TRANSISTOR:SILICON,NPN		
Q1035	151-1087-00		TRANSISTOR:SILICON,NPN		
Q1037	151-0601-00		TRANSISTOR:SILICON,NPN		
Q1039	151-0601-00		TRANSISTOR:SILICON,NPN		
Q1043	151-0506-00		TRANSISTOR:SILICON,CONTROLLED RECTIFIER	03508	C106B2
Q1045	151-0516-00		TRANSISTOR:SILICON,CONTROLLED RECTIFIER		
Q1050	151-1087-00		TRANSISTOR:SILICON,CONTROLLED RECTIFIER		
Q1055	151-0410-00		TRANSISTOR:SILICON,PNP	04713	SPS6765
Q1084	151-0601-00		TRANSISTOR:SILICON,PNP	04713	SPS6765
Q1098	151-0601-00		TRANSISTOR:SILICON,PNP	04713	SPS6765
Q1128	151-1095-00		TRANSISTOR:SILICON,PNP	04713	SPS6765
Q1240	151-0600-00		TRANSISOTR:SILICON,PNP	04713	SPS6765
Q1250	151-0499-00		TRANSISTOR:SILICON,PNP	04713	SPS6765
Q1260	151-1092-00		TRANSISTOR:SILICON,FE,N CHANNEL		
Q1267	151-0601-00		TRANSISTOR:SILICON,NPN		

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Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont			
Q1410	151-1087-00			TRANSISTOR:SILICON,NPN		
Q1420	151-1087-00			TRANSISTOR:SILICON,NPN		
Q1430	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q1435	151-1087-00			TRANSISTOR:SILICON,NPN		
Q1440	151-0489-00			TRANSISTOR:SILICON,NPN		
Q1442	151-0406-00			TRANSISTOR:SILICON,PNP	07263	S37880
R1	315-0120-00			RES.,FXD,CMPSN:12 OHM,5%,0.25W	01121	CB1205
R2	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R4B	322-0624-01			RES.,FXD,FILM:990K OHM,0.5%,0.25W	75042	CEBT0-9903D
R4C	321-1289-31			RES.,FXD,FILM:10.1K OHM,0.5%,0.125W		
R4D	317-0150-00			RES.,FXD,CMPSN:15 OHM,5%,0.125W	01121	BB1505
R4E	317-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.125W	01121	BB1515
R4F	317-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.125W	01121	BB8205
R4G	317-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.125W	01121	BB8205
R5A	317-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.125W	01121	BB2005
R5B	322-0621-31			RES.,FXD,FILM:900K OHM,0.5%,0.25W		
R5C	321-1389-31			RES.,FXD,FILM:111K OHM,0.5%,0.125W		
R5D	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R6B	322-0620-31			RES.,FXD,FILM:800K OHM,0.5%,0.25W		
R6C	321-0618-31			RES.,FXD,FILM:250K OHM,0.5%,0.125W		
R6D	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R7B	322-0610-31			RES.,FXD,FILM:500K OHM,0.5%,0.25W		
R7C	322-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.25W	75042	CEBT0-1004D
R7D	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R11	315-0120-00			RES.,FXD,CMPSN:12 OHM,5%,0.25W	01121	CB1205
R12	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R14B	322-0624-01			RES.,FXD,FILM:990K OHM,0.5%,0.25W	75042	CEBT0-9903D
R14C	321-1289-31			RES.,FXD,FILM:10.1K OHM,0.5%,0.125W		
R14D	317-0150-00			RES.,FXD,CMPSN:15 OHM,5%,0.125W	01121	BB1505
R14E	317-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.125W	01121	BB1515
R14F	317-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.125W	01121	BB8205
R14G	317-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.125W	01121	BB8205
R15A	317-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.125W	01121	BB2005
R15B	322-0621-31			RES.,FXD,FILM:900K OHM,0.5%,0.25W		
R15C	321-1389-31			RES.,FXD,FILM:111K OHM,0.5%,0.125W		
R15D	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R16B	322-0620-31			RES.,FXD,FILM:800K OHM,0.5%,0.25W		
R16C	321-0618-31			RES.,FXD,FILM:250K OHM,0.5%,0.125W		
R16D	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R17B	322-0610-31			RES.,FXD,FILM:500K OHM,0.5%,0.25W		
R17C	322-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.25W	75042	CEBT0-1004D
R17D	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R100A	317-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.125W	01121	BB1005
R100B	322-0481-00			RES.,FXD,FILM:1M OHM,1%,0.25W	75042	CEBT0-1004F
R101A	315-0244-00			RES.,FXD,CMPSN:240K OHM,5%,0.25W	01121	CB2445
R101B	315-0244-00			RES.,FXD,CMPSN:240K OHM,5%,0.25W	01121	CB2445
R103	321-0155-30			RES.,FXD,FILM:402 OHM,1%,0.125W		
R104	321-0155-30			RES.,FXD,FILM:402 OHM,1%,0.125W		
R105A	311-0605-02			RES.,VAR, NONWIR:200 OHM,10%,0.50W		
R105B	321-0022-30			RES.,FXD,FILM:16.5 OHM,1%,0.125W		
R106	321-0208-30			RES.,FXD,FILM:1.43K OHM,1%,0.125W		
R106B	311-0634-02			RES.,VAR, NONWIR:500 OHM,10%,0.50W		

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R107	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R108	321-0208-30			RES.,FXD,FILM:1.43K OHM,1%,0.125W		
R109	311-0633-01			RES.,VAR,NONWIR:5K OHM,10%,0.50W		
R110A	321-0146-30			RES.,FXD,FILM:324 OHM,1%,0.125W		
R110B	311-0605-02			RES.,VAR,NONWIR:200 OHM,10%,0.50W		
R111A	SELECTED					
R111B	321-0201-30			RES.,FXD,FILM:1.21K OHM,1%,0.125W		
R112	311-0634-02			RES.,VAR,NONWIR:500 OHM,10%,0.50W		
R113	321-0208-30			RES.,FXD,FILM:1.43K OHM,1%,0.125W		
R114	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R115	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R116A	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R116B	321-0289-30			RES.,FXD,FILM:10K OHM,1%,0.125W		
R117	311-1227-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	80294	3389F-P31-502
R119	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R120	321-0362-30			RES.,FXD,FILM:57.6K OHM,1%,0.125W		
R121	321-0354-30			RES.,FXD,FILM:47.5K OHM,1%,0.125W		
R122A,B	311-1795-00			RES.,VAR,NONWIR:10K OHM X 10K OHM,,10%,0.1W		
R123	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R124	311-0613-00			RES.,VAR,NONWIR:100K OHM,10%,0.50W	80740	62-63-3
R125	315-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
R130	321-0183-31			RES.,FXD,FILM:787 OHM,0.5%,0.125W		
R131	321-0146-30			RES.,FXD,FILM:324 OHM,1%,0.125W		
R132	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R134	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R135	311-0633-01			RES.,VAR,NONWIR:5K OHM,10%,0.50W		
R140	321-0183-31			RES.,FXD,FILM:787 OHM,0.5%,0.125W		
R140	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R141	321-0146-30			RES.,FXD,FILM:324 OHM,1%,0.125W		
R142	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R150	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R161	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R163	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
R164	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
R170	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R171	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R172	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R173	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R200A	317-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.125W	01121	BB1005
R200B	322-0481-00			RES.,FXD,FILM:1M OHM,1%,0.25W	75042	CEBT0-1004F
R201A	315-0244-00			RES.,FXD,CMPSN:240K OHM,5%,0.25W	01121	CB2445
R201B	315-0244-00			RES.,FXD,CMPSN:240K OHM,5%,0.25W	01121	CB2445
R203	321-0155-30			RES.,FXD,FILM:402 OHM,1%,0.125W		
R204	321-0155-30			RES.,FXD,FILM:402 OHM,1%,0.125W		
R205A	311-0605-02			RES.,VAR,NONWIR:200 OHM,10%,0.50W		
R205B	321-0022-30			RES.,FXD,FILM:16.5 OHM,1%,0.125W		
R206	321-0208-30			RES.,FXD,FILM:1.43K OHM,1%,0.125W		
R206B	311-0634-02			RES.,VAR,NONWIR:500 OHM,10%,0.50W		
R207	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R208	321-0208-30			RES.,FXD,FILM:1.43K OHM,1%,0.125W		
R209	311-0633-01			RES.,VAR,NONWIR:100 OHM,10%,0.50W	80294	3329HH76-101
R210A	321-0146-30			RES.,FXD,FILM:324 OHM,1%,0.125W		
R210B	311-0605-02			RES.,VAR,NONWIR:200 OHM,10%,0.50W		

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
R211A	SELECTED				
R211B	321-0201-30		RES., FXD, FILM:1.21K OHM, 1%, 0.125W		
R212	311-0634-02		RES., VAR, NONWIR:500 OHM, 10%, 0.50W		
R213	321-0208-30		RES., FXD, FILM:1.43K OHM, 1%, 0.125W		
R214	315-0302-00		RES., FXD, CMPSN:3K OHM, 5%, 0.25W	01121	CB3025
R215	315-0202-00		RES., FXD, CMPSN:2K OHM, 5%, 0.25W	01121	CB2025
R216A	315-0151-00		RES., FXD, CMPSN:150 OHM, 5%, 0.25W	01121	CB1515
R216B	321-0289-30		RES., FXD, FILM:10K OHM, 1%, 0.125W		
R217	311-1227-00		RES., VAR, NONWIR:5K OHM, 20%, 0.50W	80294	3389F-P31-502
R219	315-0392-00		RES., FXD, CMPSN:3.9K OHM, 5%, 0.25W	01121	CB3925
R220	321-0362-30		RES., FXD, FILM:57.6K OHM, 1%, 0.125W		
R221	321-0354-30		RES., FXD, FILM:47.5K OHM, 1%, 0.125W		
R222A,B	311-1795-00		RES., VAR, NONWIR:10K OHM X 10K OHM, 10%, 0.1W		
R223	315-0683-00		RES., FXD, CMPSN:68K OHM, 5%, 0.25W	01121	CB6835
R224	311-0613-00		RES., VAR, NONWIR:100K OHM, 10%, 0.50W	80740	62-63-3
R225	315-0132-00		RES., FXD, CMPSN:1.3K OHM, 5%, 0.25W	01121	CB1325
R230	321-0183-31		RES., FXD, FILM:787 OHM, 0.5%, 0.125W		
R231	321-0146-30		RES., FXD, FILM:324 OHM, 1%, 0.125W		
R232	315-0101-00		RES., FXD, CMPSN:100 OHM, 5%, 0.25W	01121	CB1015
R234	315-0102-00		RES., FXD, CMPSN:1K OHM, 5%, 0.25W	01121	CB1025
R235	311-0633-01		RES., VAR, NONWIR:5K OHM, 10%, 0.50W		
R240	321-0183-31		RES., FXD, FILM:787 OHM, 0.5%, 0.125W		
R241	321-0146-30		RES., FXD, FILM:324 OHM, 1%, 0.125W		
R242	315-0101-00		RES., FXD, CMPSN:100 OHM, 5%, 0.25W	01121	CB1015
R250	315-0101-00		RES., FXD, CMPSN:100 OHM, 5%, 0.25W	01121	CB1015
R251	315-0822-00		RES., FXD, CMPSN:8.2K OHM, 5%, 0.25W	01121	CB8225
R261	315-0822-00		RES., FXD, CMPSN:8.2K OHM, 5%, 0.25W	01121	CB8225
R263	315-0200-00		RES., FXD, CMPSN:20 OHM, 5%, 0.25W	01121	CB2005
R264	315-0200-00		RES., FXD, CMPSN:20 OHM, 5%, 0.25W	01121	CB2005
R270	315-0100-00		RES., FXD, CMPSN:10 OHM, 5%, 0.25W	01121	CB1005
R271	315-0100-00		RES., FXD, CMPSN:10 OHM, 5%, 0.25W	01121	CB1005
R272	315-0100-00		RES., FXD, CMPSN:10 OHM, 5%, 0.25W	01121	CB1005
R273	315-0100-00		RES., FXD, CMPSN:10 OHM, 5%, 0.25W	01121	CB1005
R300	315-0103-00		RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R301	315-0432-00		RES., FXD, CMPSN:4.3K OHM, 5%, 0.25W	01121	CB4325
R303	315-0432-00		RES., FXD, CMPSN:4.3K OHM, 5%, 0.25W	01121	CB4325
R305	315-0103-00		RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R320	315-0432-00		RES., FXD, CMPSN:4.3K OHM, 5%, 0.25W	01121	CB4325
R322	315-0202-00		RES., FXD, CMPSN:2K OHM, 5%, 0.25W	01121	CB2025
R330	315-0202-00		RES., FXD, CMPSN:2K OHM, 5%, 0.25W	01121	CB2025
R331	315-0123-00		RES., FXD, CMPSN:12K OHM, 5%, 0.25W	01121	CB1235
R332	315-0183-00		RES., FXD, CMPSN:18K OHM, 5%, 0.25W	01121	CB1835
R334	315-0243-00		RES., FXD, CMPSN:24K OHM, 5%, 0.25W	01121	CB2435
R335	315-0103-00		RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R336	315-0333-00		RES., FXD, CMPSN:33K OHM, 5%, 0.25W	01121	CB3335
R337	315-0204-00		RES., FXD, CMPSN:200K OHM, 5%, 0.25W	01121	CB2045
R340	315-0122-00		RES., FXD, CMPSN:1.2K OHM, 5%, 0.25W	01121	CB1225
R341	315-0122-00		RES., FXD, CMPSN:1.2K OHM, 5%, 0.25W	01121	CB1225
R342	315-0103-00		RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R348	315-0203-00		RES., FXD, CMPSN:20K OHM, 5%, 0.25W	01121	CB2035
R350	321-0216-30		RES., FXD, FILM:1.74K OHM, 1%, 0.125W		
R351	321-0216-30		RES., FXD, FILM:1.74K OHM, 1%, 0.125W		
R352	321-0131-30		RES., FXD, FILM:226 OHM, 1%, 0.125W		

Electrical Parts List—335 Service

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R354	321-0176-30			RES.,FXD,FILM:665 OHM,1%,0.125W		
R356	321-0216-30			RES.,FXD,FILM:1.74K OHM,1%,0.125W		
R357	321-0216-30			RES.,FXD,FILM:1.74K OHM,1%,0.125W		
R358	321-0131-30			RES.,FXD,FILM:226 OHM,1%,0.125W		
R360	321-0249-30			RES.,FXD,FILM:3.83K OHM,1%,0.125W		
R361	321-0249-30			RES.,FXD,FILM:3.83K OHM,1%,0.125W		
R362	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R363	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R364	321-0249-30			RES.,FXD,FILM:3.83K OHM,1%,0.125W		
R365	321-0249-30			RES.,FXD,FILM:3.83K OHM,1%,0.125W		
R366	321-0176-30			RES.,FXD,FILM:665 OHM,1%,0.125W		
R367	321-0126-30			RES.,FXD,FILM:200 OHM,1%,0.125W		
R368	321-0126-30			RES.,FXD,FILM:200 OHM,1%,0.125W		
R369	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R370	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R371	321-0193-30			RES.,FXD,FILM:1K OHM,1%,0.125W		
R372	321-0193-30			RES.,FXD,FILM:1K OHM,1%,0.125W		
R373	321-0193-30			RES.,FXD,FILM:1K OHM,1%,0.125W		
R374	321-0193-30			RES.,FXD,FILM:1K OHM,1%,0.125W		
R375	321-0181-30			RES.,FXD,FILM:750 OHM,1%,0.125W		
R376A	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R376B	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R379	321-0138-30			RES.,FXD,FILM:267 OHM,1%,0.125W		
R380	321-0181-30			RES.,FXD,FILM:750 OHM,1%,0.125W		
R385A	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R386	311-0635-03			RES.,VAR,NONWIR:1K OHM,10%,0.50W		
R387	321-0162-30			RES.,FXD,FILM:475 OHM,1%,0.125W		
R388	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R389	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R390	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R391	315-0821-00	300000	300020	RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R391	315-0751-00	300021		RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R395	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R396	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R397	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R398	307-0111-00			RES.,FXD,CMPSN:3.6 OHM,5%,0.25W	01121	CB36G5
R401A	323-0191-00			RES.,FXD,FILM:953 OHM,1%,0.50W	75042	CECT0-9530F
R401B	323-0191-00			RES.,FXD,FILM:953 OHM,1%,0.50W	75042	CECT0-9530F
R402B	323-0191-00			RES.,FXD,FILM:953 OHM,1%,0.50W	75042	CECT0-9530F
R402C	323-0191-00			RES.,FXD,FILM:953 OHM,1%,0.50W	75042	CECT0-9530F
R403	311-0609-02			RES.,VAR,NONWIR:2K OHM,10%,0.50W		
R404	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
R405	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R406	321-0151-30			RES.,FXD,FILM:365 OHM,1%,0.125W		
R407	315-0121-00			RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R408	311-0635-03			RES.,VAR,NONWIR:1K OHM,10%,0.50W		
R409	321-0151-30			RES.,FXD,FILM:365 OHM,1%,0.125W		
R410	321-0151-30			RES.,FXD,FILM:365 OHM,1%,0.125W		
R411	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R412	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R413	311-0643-02			RES.,VAR,NONWIR:50 OHM,10%,0.50W		
R414	311-0635-03			RES.,VAR,NONWIR:1K OHM,10%,0.50W		
R415	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscnt	Name & Description	Mfr Code	Mfr Part Number
R416	321-0151-30		RES.,FXD,FILM:365 OHM,1%,0.125W		
R420	321-0189-30		RES.,FXD,FILM:909 OHM,1%,0.125W		
R421	321-0082-30		RES.,FXD,FILM:69.8 OHM,1%,0.125W		
R430	321-0189-30		RES.,FXD,FILM:909 OHM,1%,0.125W		
R431	321-0082-30		RES.,FXD,FILM:69.8 OHM,1%,0.125W		
R440	321-0065-30		RES.,FXD,FILM:46.4 OHM,1%,0.125W		
R441	311-0633-01		RES.,VAR,NONWIR:5K OHM,10%,0.50W		
R442	321-0047-30		RES.FXD,FILM:30.1 OHM,1%,0.125W		
R443	311-0635-03		RES.,VAR,NONWIR:1K OHM,10%,0.50W		
R444	321-0047-30		RES.FXD,FILM:30.1 OHM,1%,0.125W		
R445	311-0605-02		RES.,VAR,NONWIR:200 OHM,10%,0.50W		
R446	321-0183-31		RES.,FXD,FILM:787 OHM,0.5%,0.125W		
R450	321-0065-30		RES.,FXD,FILM:46.4 OHM,1%,0.125W		
R451	321-0193-30		RES.,FXD,FILM:1K OHM,1%,0.125W		
R453	321-0138-30		RES.,FXD,FILM:267 OHM,1%,0.125W		
R460	315-0100-00		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R500	315-0563-00		RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
R501	315-0104-00		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R502	321-0452-30		RES.,FXD,FILM:499K OHM,1%,0.125W		
R504	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R505	315-0150-00		RES.,FXD,CMPSN:15 OHM,5%,0.25W	01121	CB1505
R507	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R508	315-0132-00		RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
R510	315-0150-00		RES.,FXD,CMPSN:15 OHM,5%,0.25W	01121	CB1505
R511	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R512	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R520	315-0512-00		RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R521	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R522	315-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R532	321				RES.,FXD,FILM:
R534	322-0622-30		RES.,FXD,FILM:950K OHM,1%,0.25W		
R535	322-				RES.,FXD,FILM:
R540	311-1192-00		RES.,VAR,NONWIR:10K OHM,20%,1W	12637	381-CM39695
R541	315-0681-00		RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R542	315-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R543	311-0607-02		RES.,VAR,NONWIR:10K OHM,10%,0.50W		
R544	315-0392-00		RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R545A	321-0247-30		RES.,FXD,FILM:3.65K OHM,1%,0.125W		
R545B	321-0247-30		RES.,FXD,FILM:3.65K OHM,1%,0.125W		
R546	315-0560-00		RES.,FXD,CMPSN:56 OHM,5%,0.25W	01121	CB5605
R547	315-0302-00		RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R548	315-0512-00		RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R549	315-0104-00		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R550	315-0302-00		RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R551	315-0512-00		RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R554	321-0136-30		RES.,FXD,FILM:255 OHM,1%,0.125W		
R555	321-0136-30		RES.,FXD,FILM:255 OHM,1%,0.125W		
R556	315-0221-00		RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R557	315-0302-00		RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R558	315-0392-00		RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R559	321-0173-30		RES.,FXD,FILM:619 OHM,1%,0.125W		
R560	315-0121-00		RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R561	321-0228-30		RES.,FXD,FILM:2.32K OHM,1%,0.125W		

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
R570	315-0121-00		RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R571	321-0265-30		RES.,FXD,FILM:5.62K OHM,1%,0.125W		
R585B	315-0681-00		RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R590	315-0100-00		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R591	315-0100-00		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R592	315-0100-00		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R603	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R604	321-0247-30		RES.,FXD,FILM:3.65K OHM,1%,0.125W		
R605	315-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R607	315-0392-00		RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R608	311-1743-00		RES.,VAR,NONWIR:10K OHM,10%,0.50W		
R609	315-0681-00		RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R610	311-1798-00		RES.,VAR,NONWIR:10K OHM,10%,0.1W		
R611	315-0560-00		RES.,FXD,CMPSN:56 OHM,5%,0.25W	01121	CB5605
R612	321-0247-30		RES.,FXD,FILM:3.65K OHM,1%,0.125W		
R613	315-0302-00		RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R615	315-0512-00		RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R616	321-0136-30		RES.,FXD,FILM:255 OHM,1%,0.125W		
R617	321-0173-30		RES.,FXD,FILM:619 OHM,1%,0.125W		
R618	321-0136-30		RES.,FXD,FILM:255 OHM,1%,0.125W		
R620	315-0122-00		RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R621	315-0392-00		RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R622	315-0302-00		RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R626	321-0228-30		RES.,FXD,FILM:2.32K OHM,1%,0.125W		
R627	315-0121-00		RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R628	315-0121-00		RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R629	315-0122-00		RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R630	321-0265-30		RES.,FXD,FILM:5.62K OHM,1%,0.125W		
R635	315-0153-00		RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R636	311-1743-00		RES.,VAR,NONWIR:10K OHM,10%,0.50W		
R650	315-0100-00		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R651	315-0100-00		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R652	315-0100-00		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R700	317-0271-00		RES.,FXD,CMPSN:270 OHM,5%,0.125W	01121	BB2715
R701	321-0164-30		RES.,FXD,FILM:499 OHM,1%,0.125W		
R702	315-0153-00		RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R703	321-0183-31		RES.,FXD,FILM:787 OHM,0.5%,0.125W		
R704	315-0151-00		RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R705	311-1743-00		RES.,VAR,NONWIR:10K OHM,10%,0.50W		
R707	315-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R708	315-0202-00		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R709	315-0183-00		RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R710	315-0152-00		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R711	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R712	315-0203-00		RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R713	311-1605-00		RES.,VAR,NONWIR:50K OHM,10%,0.50W		
R714	311-0946-00		RES.,VAR,WW:50K OHM,3%,2W	02111	534-70
R715	311-1743-00		RES.,VAR,NONWIR:10K OHM,10%,0.50W		
R716	321-0193-30		RES.,FXD,FILM:1K OHM,1%,0.125W		
R717	315-0820-00		RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R718	321-0331-30		RES.,FXD,FILM:27.4K OHM,1%,0.125W		
R720	315-0822-00		RES.,FXD,CMPSN:8.2K OHM,5%,0.25W		
R721	315-0472-00		RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont			
R722	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R723	321-0285-30			RES.,FXD,FILM:9.09K OHM,1%,0.125W		
R725A	322-0510-02			RES.,FXD,FILM:2M OHM,0.5%,0.25W	03888	PME60C20003D
R725B	322-0510-02			RES.,FXD,FILM:2M OHM,0.5%,0.25W	03888	PME60C20003D
R725C	322-0620-31			RES.,FXD,FILM:800K OHM,0.5%,0.25W		
R725D	322-0620-31			RES.,FXD,FILM:800K OHM,0.5%,0.25W		
R725E	321-1661-31			RES.,FXD,FILM:80K OHM,0.5%,0.125W		
R725F	321-1661-31			RES.,FXD,FILM:80K OHM,0.5%,0.125W		
R725G	321-1308-31			RES.,FXD,FILM:16K OHM,0.5%,0.125W		
R726A,B	311-1796-00			RES.,VAR, NONWIR:20K OHM X 20K OHM,10%,0.1W		
R729	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R730	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R732	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R734	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R736	321-0265-30			RES.,FXD,FILM:5.62K OHM,1%,0.125W		
R737	321-0289-30			RES.,FXD,FILM:10K OHM,1%,0.125W		
R738	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R739	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R740	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R741	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R742	311-1794-00			RES.,VAR, NONWIR:30K OHM,10%,0.125W		
R743	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R744	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R745	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R746	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R747	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R748	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R749	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R750	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R752	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R754	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R755	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R758	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R760	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R761	315-0112-00			RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
R762	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R763	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R764	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R767	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R768	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R769	321-0230-30			RES.,FXD,FILM:2.43K OHM,1%,0.125W		
R770	321-0265-30			RES.,FXD,FILM:5.62K OHM,1%,0.125W		
R772	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R773	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R774	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R780	315-0153-00	300000	300100	RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R780	315-0682-00	300101		RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R781	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R782	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R801	321-0183-31			RES.,FXD,FILM:787 OHM,0.5%,0.125W		
R802	321-0164-30			RES.,FXD,FILM:499 OHM,1%,0.125W		
R804	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R805	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515

Electrical Parts List—335 Service

Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	
	Part No.	Eff	Dscont		Code	Mfr Part Number
R807	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R808	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R810	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R811	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R813	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R816	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R817	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R818	311-1745-00			RES,VAR,NONWIR:100K OHM,10%,0.50W		
R820	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R821	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R822	321-0265-30			RES.,FXD,FILM:5.62K OHM,1%,0.125W		
R823	321-0289-30			RES.,FXD,FILM:10K OHM,1%,0.125W		
R825	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R826	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R827A	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R827B	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R828	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R829	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R830	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R831	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R832	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R835	321-0285-30			RES.,FXD,FILM:9.09K OHM,1%,0.125W		
R840	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R842	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R850A	322-0510-02			RES.,FXD,FILM:2M OHM,0.5%,0.25W	03888	PME60C20003D
R850B	322-0510-02			RES.,FXD,FILM:2M OHM,0.5%,0.25W	03888	PME60C20003D
R850C	322-0620-31			RES.,FXD,FILM:800K OHM,0.5%,0.25W		
R850D	322-0620-31			RES.,FXD,FILM:800K OHM,0.5%,0.25W		
R850E	321-1661-31			RES.,FXD,FILM:80K OHM,0.5%,0.125W		
R850F	321-1661-31			RES.,FXD,FILM:80K OHM,0.5%,0.125W		
R850G	321-1308-31			RES.,FXD,FILM:16K OHM,0.5%,0.125W		
R900	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R903	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R904	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R905	311-1740-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W		
R906A,B	311-1797-00			RES.,VAR,NONWIR:20K OHM X 20K OHM,10%,0.1W		
R907	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R908	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R909	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R910	321-0216-30			RES.,FXD,FILM:1.74K OHM,1%,0.125W		
R924	321-0264-30			RES.,FXD,FILM:5.49K OHM,1%,0.125W		
R925	321-0251-30			RES.,FXD,FILM:4.02K OHM,1%,0.125W		
R926	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R927	321-0251-30			RES.,FXD,FILM:4.02K OHM,1%,0.125W		
R929	321-0207-30			RES.,FXD,FILM:1.4K OHM,1%,0.125W		
R930	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R931	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R932	321-0207-30			RES.,FXD,FILM:1.4K OHM,1%,0.125W		
R933A	311-1742-00			RES.,VAR,NONWIR:0.5K OHM,10%,0.50W		
R933B	311-1742-00			RES.,VAR,NONWIR:0.5K OHM,10%,0.50W		
R934	321-0282-30			RES.,FXD,FILM:8.45K OHM,1%,0.125W		
R935	321-0282-30			RES.,FXD,FILM:8.45K OHM,1%,0.125W		
R936	321-0286-30			RES.,FXD,FILM:9.31K OHM,1%,0.125W		

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
R937	321-0231-30			RES.,FXD,FILM:2.49K OHM,1%,0.125W		
R938	311-1742-00			RES.,VAR,NONWIR:0.5K OHM,10%,0.50W		
R939	321-0155-30			RES.,FXD,FILM:402 OHM,1%,0.125W		
R940	311-1604-00			RES.,VAR,NONWIR:200 OHM,10%,0.50W		
R942	321-0265-30			RES.,FXD,FILM:5.62K OHM,1%,0.125W		
R946	321-0255-30			RES.,FXD,FILM:4.42K OHM,1%,0.125W		
R954	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R955A	321-0289-30			RES.,FXD,FILM:10K OHM,1%,0.125W		
R955B	321-0346-30			RES.,FXD,FILM:39.2K OHM,1%,0.125W		
R957	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R960	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R962	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R963	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R971	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R972	321-0385-30			RES.,FXD,FILM:100K OHM,1%,0.125W		
R973	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R974	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R975A	321-0289-30			RES.,FXD,FILM:10K OHM,1%,0.125W		
R975B	321-0346-30			RES.,FXD,FILM:39.2K OHM,1%,0.125W		
R978	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R979	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R981	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R982	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R983	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R984	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R985	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1000	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1001	315-0205-00			RES.,FXD,CMPSN:2M OHM,5%,0.25W	01121	CB2055
R1003	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R1004	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R1005	311-1605-00			RES.,VAR,NONWIR:50K OHM,10%,0.50W		
R1006	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R1007	321-0318-30			RES.,FXD,FILM:20K OHM,1%,0.125W		
R1008	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R1009	311-1744-00			RES.,VAR,NONWIR:20K OHM,10%,0.50W		
R1010	321-0348-30			RES.,FXD,FILM:41.2K OHM,1%,0.125W		
R1011	321-0299-			RES.,FXD,FILM:12.7K OHM,1%,0.125W		
R1012	321-0336-30			RES.,FXD,FILM:30.9K OHM,1%,0.125W		
R1013	321-0260-30			RES.,FXD,FILM:4.9 K OHM,1%,0.125W		
R1014A	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1014B	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1015	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1016	321-0289-30			RES.,FXD,FILM:10K OHM,1%,0.125W		
R1021A	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1021B	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1022	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1028	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1030	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R1031	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R1032	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
R1035	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R1036	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
R1037	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225

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Ckt No.	Tektronix	Serial/Model No.		Name & Description	Mfr	Mfr Part Number
	Part No.	Eff	Dscont		Code	
R1038	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1042	321-0268-30			RES.,FXD,FILM:6.04K OHM,1%,0.125W		
R1043	307-0093-00			RES.,FXD,CMPSN:1.2 OHM,5%,0.50W	01121	EB12G5
R1044	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1045	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1046	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R1047	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1048	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R1049	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1050	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1053	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R1054	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R1055	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1056	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R1057	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R1077	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R1078	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1079	321-0255-30			RES.,FXD,FILM:4.42K OHM,1%,125W		
R1080	311-1740-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W		
R1081	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R1082	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1083	321-0286-30			RES.,FXD,FILM:9.31K OHM,1%,0.125W		
R1085	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1091	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R1092	321-0303-31			RES.,FXD,FILM:14K OHM,0.5%,0.125W		
R1093	321-1308-31			RES.,FXD,FILM:16K OHM,0.5%,0.125W		
R1120	321-1662-31			RES.,FXD,FILM:30K OHM,0.5%,0.125W		
R1121	321-1308-31			RES.,FXD,FILM:16K OHM,0.5%,0.125W		
R1122	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1123	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1129	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R1200	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1201	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1202	316-0226-00			RES.,FXD,CMPSN:22M OHM,10%,0.25W	01121	CB2261
R1203	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1204	315-0185-00			RES.,FXD,CMPSN:1.8M OHM,5%,0.25W	01121	CB1855
R1205	315-0185-00			RES.,FXD,CMPSN:1.8M OHM,5%,0.25W	01121	CB1855
R1206	315-0185-00			RES.,FXD,CMPSN:1.8M OHM,5%,0.25W	01121	CB1855
R1207	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1208	311-1745-00			RES.,VAR,NONWIR:100K OHM,10%,0.50W		
R1210	301-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.50W	01121	EB4735
R1212	301-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.50W	01121	EB8225
R1218A	303-0752-00	300000	300020	RES.,FXD,CMPSN:7.5K OHM,5%,1W	01121	GB7525
R1218A	303-0562-00	300021		RES.,FXD,CMPSN:5.6K OHM,5%,1W	01121	GB5625
R1218B	301-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.50W	01121	EB3925
R1222	325-0196-00			RES.,FXD,FILM:40M OHM,10%,2W		
R1223	311-1739-00			RES.,VAR,NONWIR:5M OHM,0.50W		
R1225	315-0155-00			RES.,FXD,CMPSN:1.5M OHM,5%,0.25W	01121	CB1555
R1226	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1240	315-0103-00	300000	300020X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1241	315-0513-00	300000	300020X	RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R1242	315-0754-00	300000	300020	RES.,FXD,CMPSN:750K OHM,5%,0.25W	01121	CB7545
R1242	316-0226-00	300021		RES.,FXD,CMPSN:22M OHM,10%,0.25W	01121	CB2261

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Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
R1251	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R1260	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1261	311-1744-00			RES.,VAR,NONWIR:20K OHM,10%,0.50W		
R1262	321-0431-30			RES.,FXD,FILM:301K OHM,1%,0.125W		
R1263	325-0196-00			RES.,FXD,FILM:40M OHM,10%,2W		
R1265	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1266	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1267	307-0106-01			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W		
R1271	311-1745-00			RES.,VAR,NONWIR:100K OHM,10%,0.50W		
R1273	311-1745-00			RES.,VAR,NONWIR:100K OHM,10%,0.50W		
R1275	311-1743-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W		
R1400	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1401	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1403	321-0251-30			RES.,FXD,FILM:4.02K OHM,1%,0.125W		
R1404	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R1405	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1407	321-0267-30			RES.,FXD,FILM:5.9K OHM,1%,0.125W		
R1411	321-0205			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1413	321-0267-30			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1414	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1415	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1417	315-0112-00			RES.,FXD,CMPSN:1.1K OHM,5%,0.25W	01121	CB1125
R1418	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R1419	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1421	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R1425	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1426	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1430	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1431	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1432	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1433	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R1434B	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2025
R1435	311-1812-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W		
R1436	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1438	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1439	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1444	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R1445	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R1447	315-0913-00			RES.,FXD,CMPSN:91K OHM,5%,0.25W	01121	CB9135
R1450	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1451	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1500	321-0328-30			RES.,FXD,FILM:25.5K OHM,1%,0.125W		
R1501	311-1022-01			RES.,VAR,NONWIR:50K OHM,10%,0.50W		
R1502	321-0289-30			RES.,FXD,FILM:10K OHM,1%,0.125W		
R1510	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R1512	321-0289-30	300000	300070	RES.,FXD,FILM:10K OHM,1%,0.125W		
R1512	321-0289-01	300071		RES.,FXD,FILM:10K OHM,0.5%,0.125W		
R1513	321-0381-30	300000	300035	RES.,FXD,FILM:90.9K OHM,1%,0.125W		
R1513	321-1672-31	300036		RES.,FXD,FILM:70K OHM,0.5%,0.125W		
R1514	321-0385-31	300000	300035	RES.,FXD,FILM:100K OHM,0.5%,0.125W		
R1514	321-1671-31	300036		RES.,FXD,FILM:79K OHM,0.5%,0.125W		
R1515	321-0193-30	300000	300070	RES.,FXD,FILM:1K OHM,1%,0.125W		
R1515	321-0193-01	300071		RES.,FXD,FILM:1K OHM,0.5%,0.125W	75042	CEAT0-1001D

Electrical Parts List—335 Service

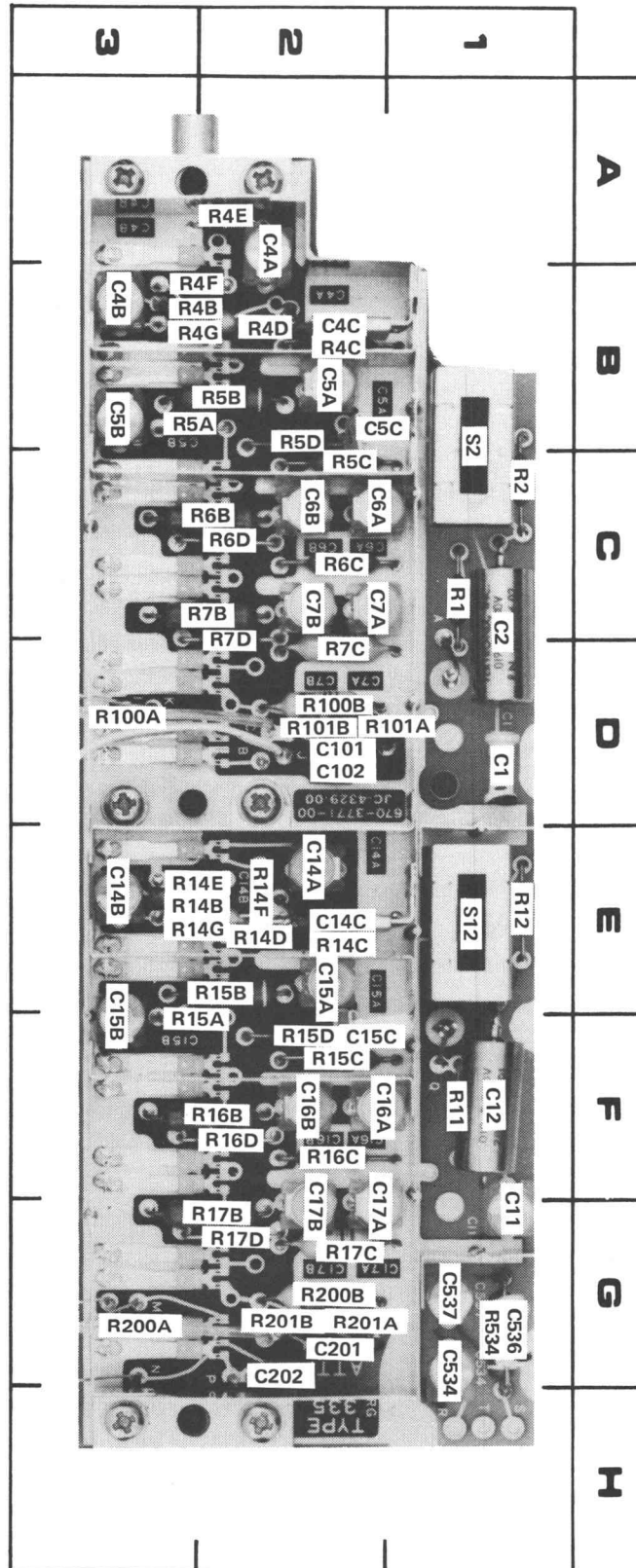
Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont			
R1519	311-0607-02			RES.,VAR, NONWIR:10K OHM,10%,0.50W		
R1521	321-1671-31	300036		RES.,FXD,FILM:79K OHM,0.5%,0.125W		
R15222	321-0193-30	300000	300070	RES.,FXD,FILM:1K OHM,1%,0.125W		
R1522	321-0193-01	300070		RES.,FXD,FILM:1K OHM,0.5%,0.125W	75042	CEAT0-1001D
RT452	307-0125-00			RES.,THERMAL:500 OHM,10%,25 DEG C	50157	2D1595
S2	260-1731-00			SWITCH,SLIDE:	29604	68-0328
S4	263-1107-00			DRUM ASSY,CAM S:	80009	263-1107-00
S12	260-1731-00			SWITCH,SLIDE:	29604	68-0328
S14	263-1107-00			DRUM ASSY,CAM S:	80009	263-1107-00
S220	260-1713-00			SWITCH,PUSH:	82104	2039PB402-0001
S300	260-1712-00			SWITCH,PUSH:	82104	0BD
S500	260-1717-00			SWITCH,PUSH:		
S510	260-1730-00			SWITCH,SLIDE:	29604	68-327
S600	260-1713-00			SWITCH,PUSH:	82104	2039PB402-0001
S630						
S700	260-1718-00			SWITCH,PUSH:		
S750	263-1104-00			ACTR ASSY,CAMS:		
S850	263-1104-00			ACTR ASSY,CAMS:		
S900	260-1716-00			SWITCH,PUSH:		
S910	260-1716-00			SWITCH,PUSH:		
S930	260-1713-00			SWITCH,PUSH:	82104	2039PB402-0001
S1000A	260-1615-00			SWITCH,TOGGLE:	09353	7318H1
S1000B	260-0834-00			SWITCH,TOGGLE:DPDT,5A,125VAC,0.25-40 THD	09353	7201-SN
S1001	260-1300-00			SWITCH,SLIDE:	82389	46206LFE
S1002	260-1728-00			SWITCH,SLIDE:		
S1003	260-1728-00			SWITCH,SLIDE:		
T1001	120-0980-00	300000	300140	XFMR,PWR,STU:		
T1001	120-0980-01	300141		XFMR,PWR,STU:		
T1002	120-0973-00			XFMR,CONVERTER:		
T1003	120-0974-00			XFMR,DRIVER:		
T1267	276-0638-00			CORE,FERRITE:		
U100	155-0032-00			MICROCIRCUIT,LI:ML,PRE-AMPLIFIER	80009	155-0032-00
U200	155-0032-00			MICROCIRCUIT,LI:ML,PRE-AMPLIFIER	80009	155-0032-00
U300	156-0174-00			MICROCIRCUIT,DI:DUAL J-K MS,FLIP-FLOP	01295	SN74111N
U320	156-0186-00			MICROCIRCUIT,DI:QUAD 2-INPUT NAND	01295	SN7403N
U330	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U340	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U350	155-0022-00			MICROCIRCUIT,DI:ML,CHANNEL SWITCH	80009	155-0022-00
U360	155-0022-00			MICROCIRCUIT,DI:ML,CHANNEL SWITCH	80009	155-0022-00
U400	155-0077-00			MICROCIRCUIT,LI:HYBRID	80009	155-0077-00
U550	156-0048-00			MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY	86684	CA3046
U700	156-0048-00			MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY	86684	CA3046
U730	155-0042-03			MICROCIRCUIT,LI:MILLER INTEGRATOR	80009	155-0042-03
U750	155-0049-01			MICROCIRCUIT,DI:MONOLITHIC,SWEEP CONTROL	80009	155-0049-01
U800	156-0048-00			MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY	86684	CA3046
U815	155-0042-03			MICROCIRCUIT,LI:MILLER INTEGRATOR	80009	155-0042-03
U825	156-0113-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN74L00N
U1001	156-0158-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U1002	156-0158-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U1003	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U1214	119-0710-00			POWER SUPPLY:2KV AC-DC		

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U1230	119-0711-00			POWER SUPPLY:2KV AC-10KV DC		
U1405	156-0113-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN74L00N
U1500	156-0402-00			MICROCIRCUIT,DI:TIMER	18324	NE555V
V1270	154-0726-00			ELECTRON TUBE:CRT		
VR738	152-0279-00	300000	300100	SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A
VR738	152-0175-00	300101		SEMICONV DEVICE:ZENER,0.4W,5.6V,5%	04713	1N752A
VR764	152-0278-00			SEMICONV DEVICE:ZENER,0.4W,3V,5%	07910	1N4372A
VR963	152-0279-00			SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A
VR973	152-0278-00			SEMICONV DEVICE:ZENER,0.4W,3V,5%	07910	1N4372A
VR1004	152-0217-00			SEMICONV DEVICE:ZENER,0.4W,8.2V,5%	07910	1N756A
VR1008	152-0279-00	300000	300020	SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A
VR1008	152-0175-00	300021		SEMICONV DEVICE:ZENER,0.4W,5.6V,5%	04713	1N752A
VR1009	152-0278-00			SEMICONV DEVICE:ZENER,0.4W,3V,5%	07910	1N4372A
VR1043	152-0243-00			SEMICONV DEVICE:ZENER,0.4W,15V,5%	81483	1N965B
VR1044	152-0282-00	300000	300140	SEMICONV DEVICE:ZENER,0.4W,30V,5%	04713	1N972B
VR1044		300141				
VR1077	152-0279-00			SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A
VR1081	152-0304-00			SEMICONV DEVICE:ZENER,0.4W,20V,5%	04713	1N968B
VR1207	152-0286-00			SEMICONV DEVICE:ZENER,0.4W,75V,5%	04713	1N982B
VR1439	152-0279-00			SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A
VR1500	152-0175-00	300000	300035	SEMICONV DEVICE:ZENER,0.4W,5.6V,5%	04713	1N752A
VR1500	152-0279-00	300036		SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	07910	1N751A



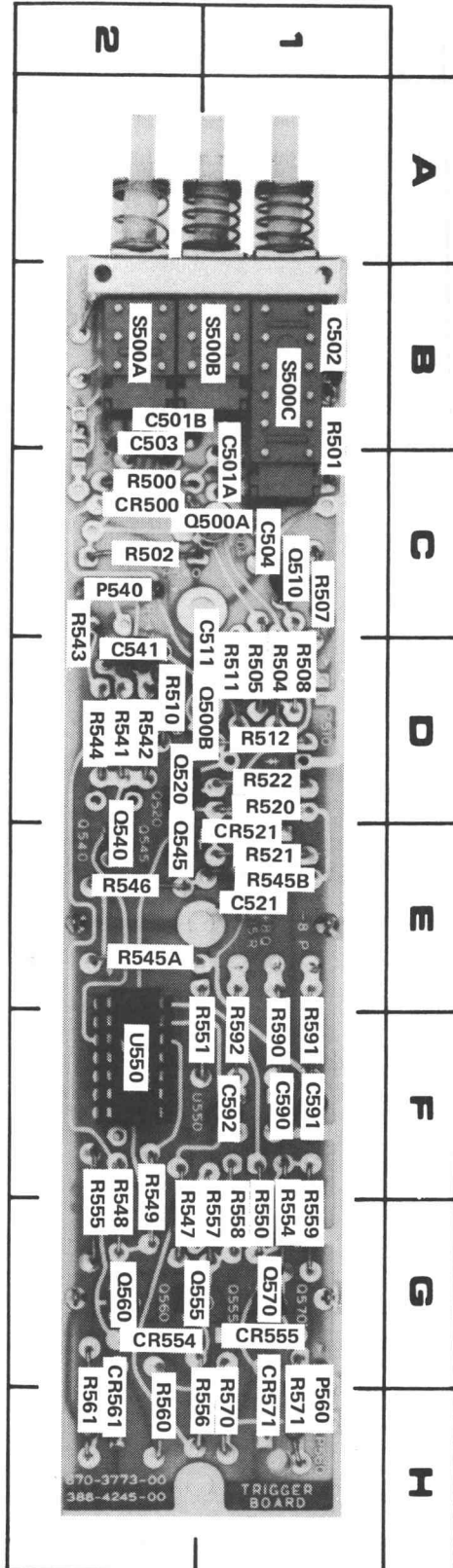
335 Service

ATTENUATOR BOARD



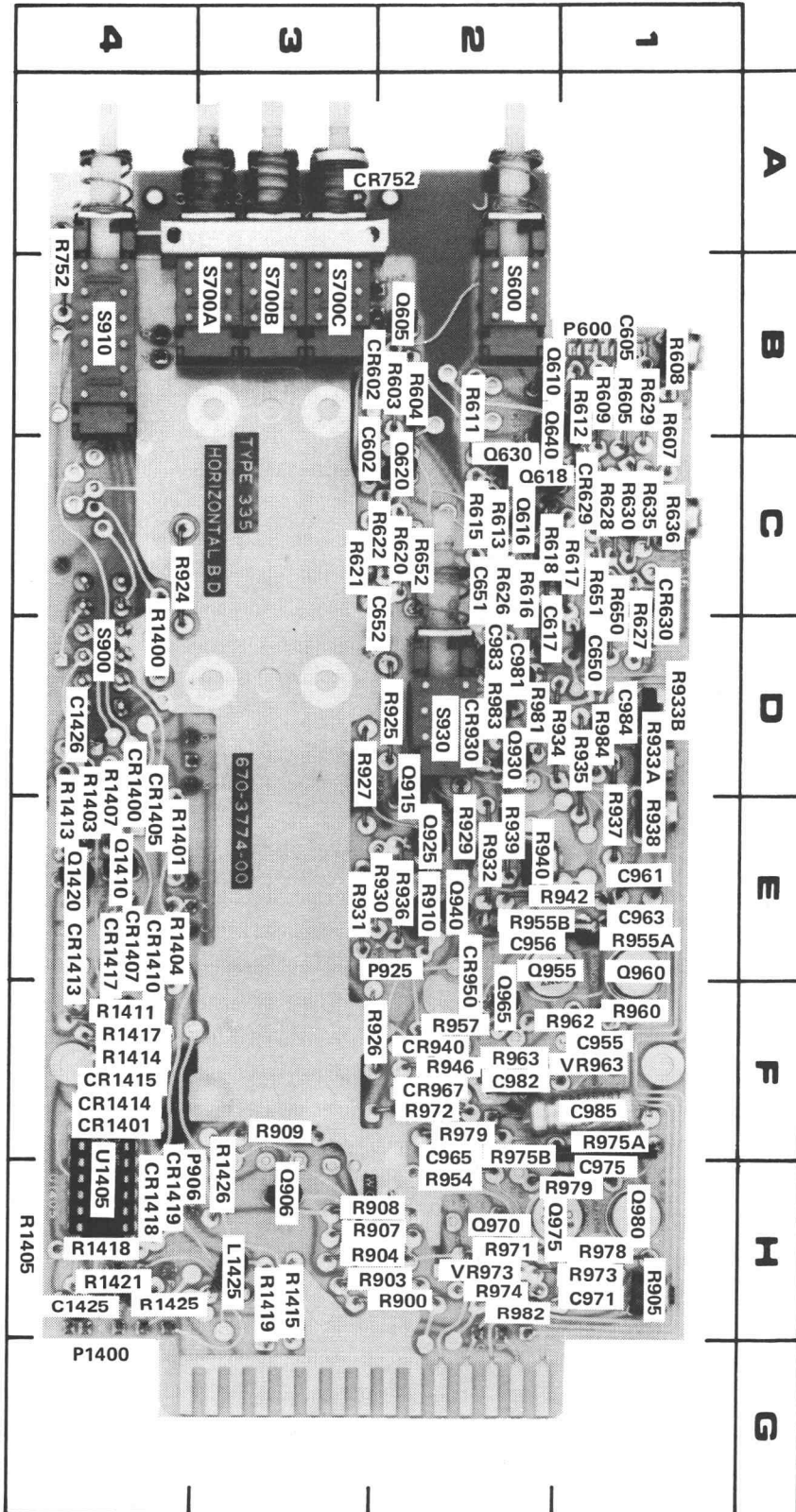
335 Service

TRIGGER GENERATOR BOARD

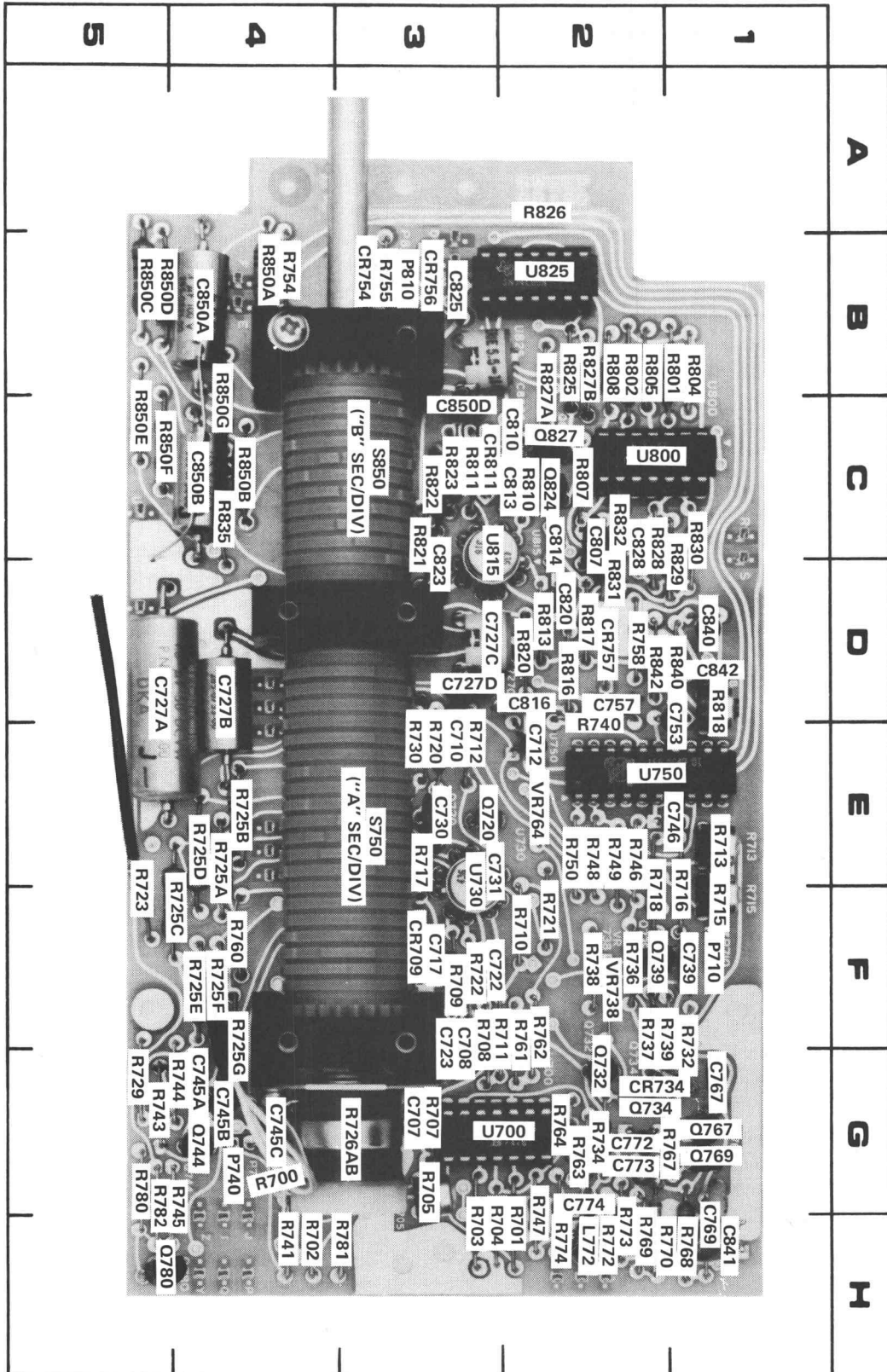


335 Service

HORIZONTAL BOARD

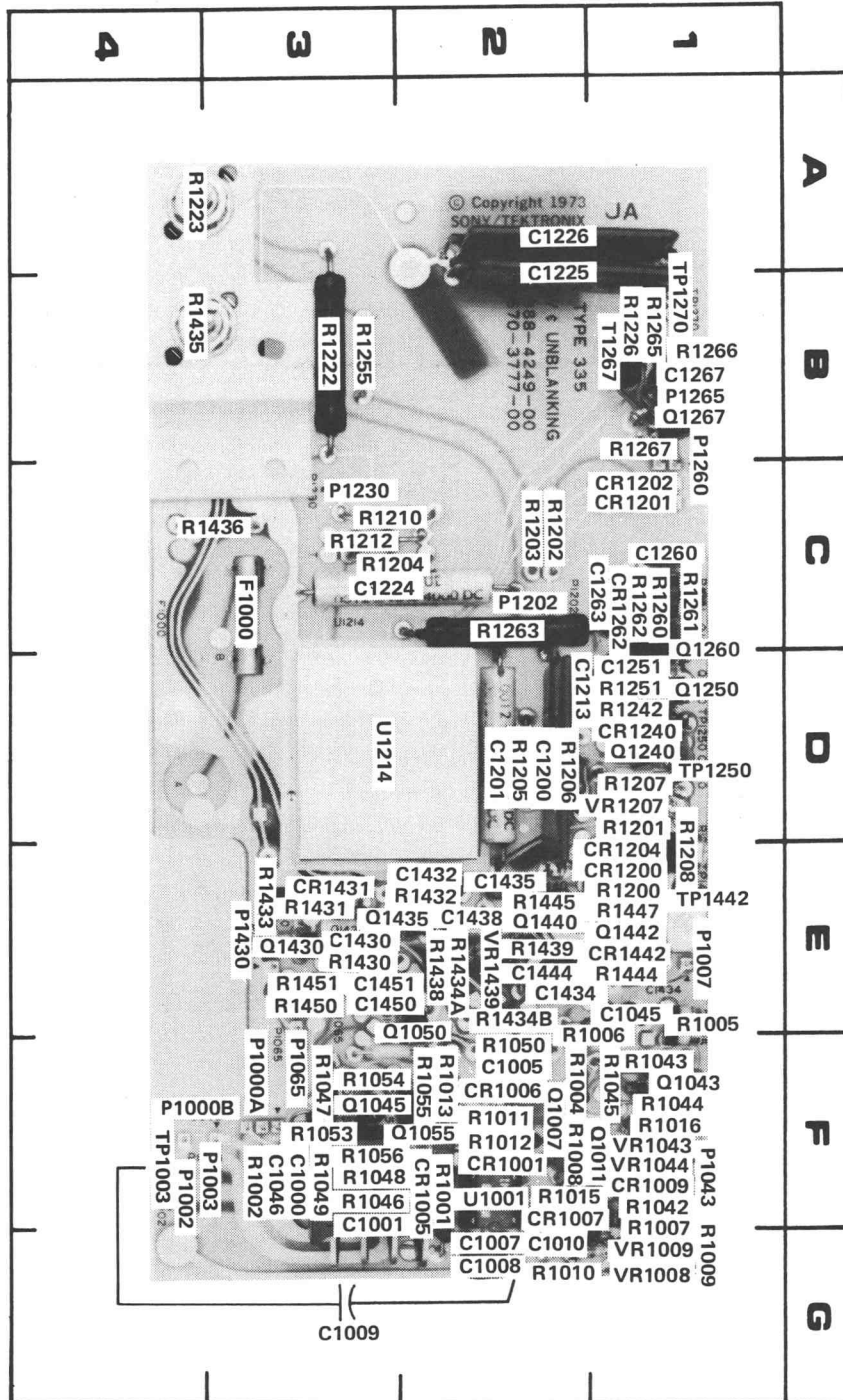


335 Service
SWEEP BOARD



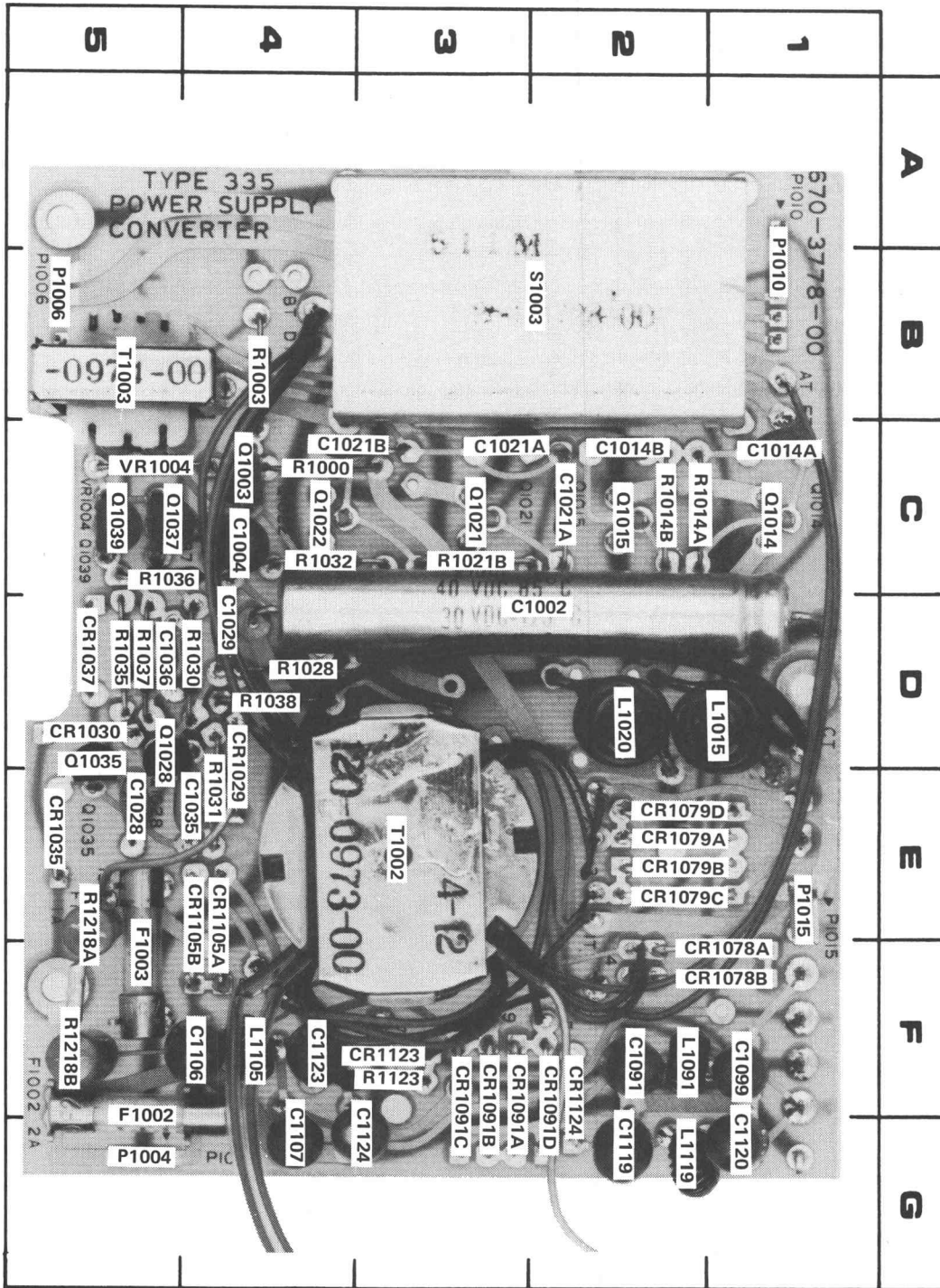
335 Service

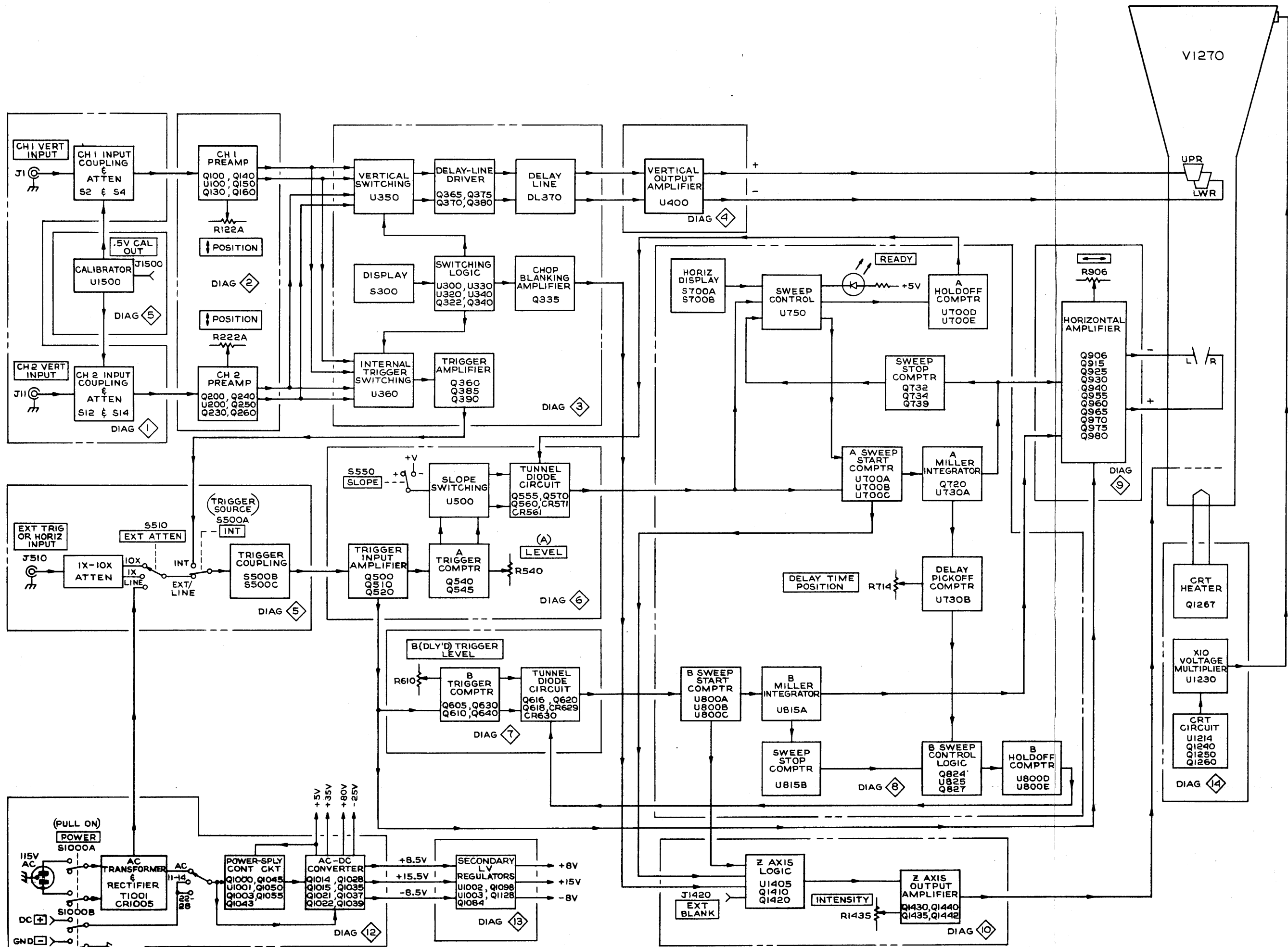
HV & UNBLANKING BOARD



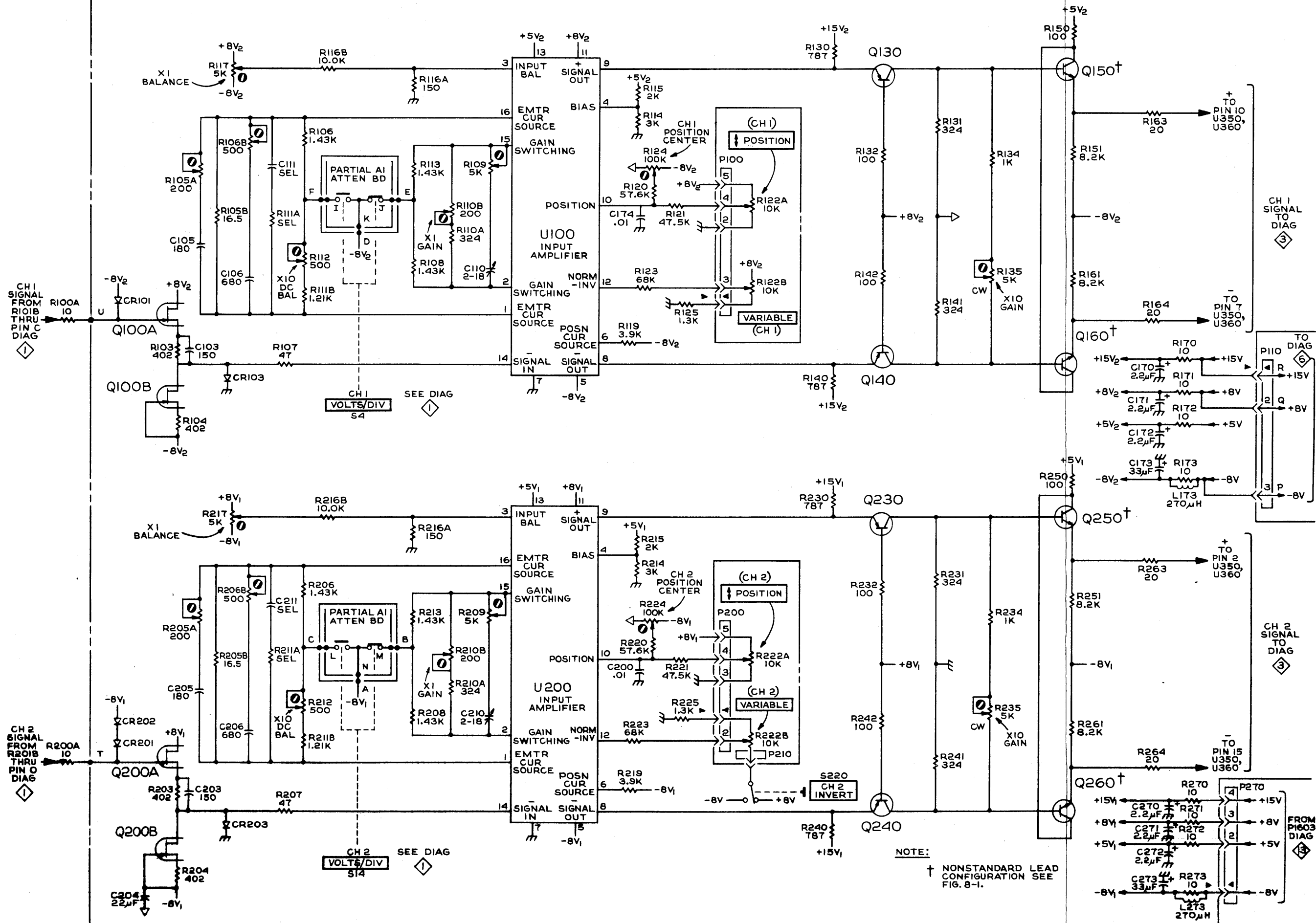
335 Service

POWER SUPPLY CONVERTER BOARD

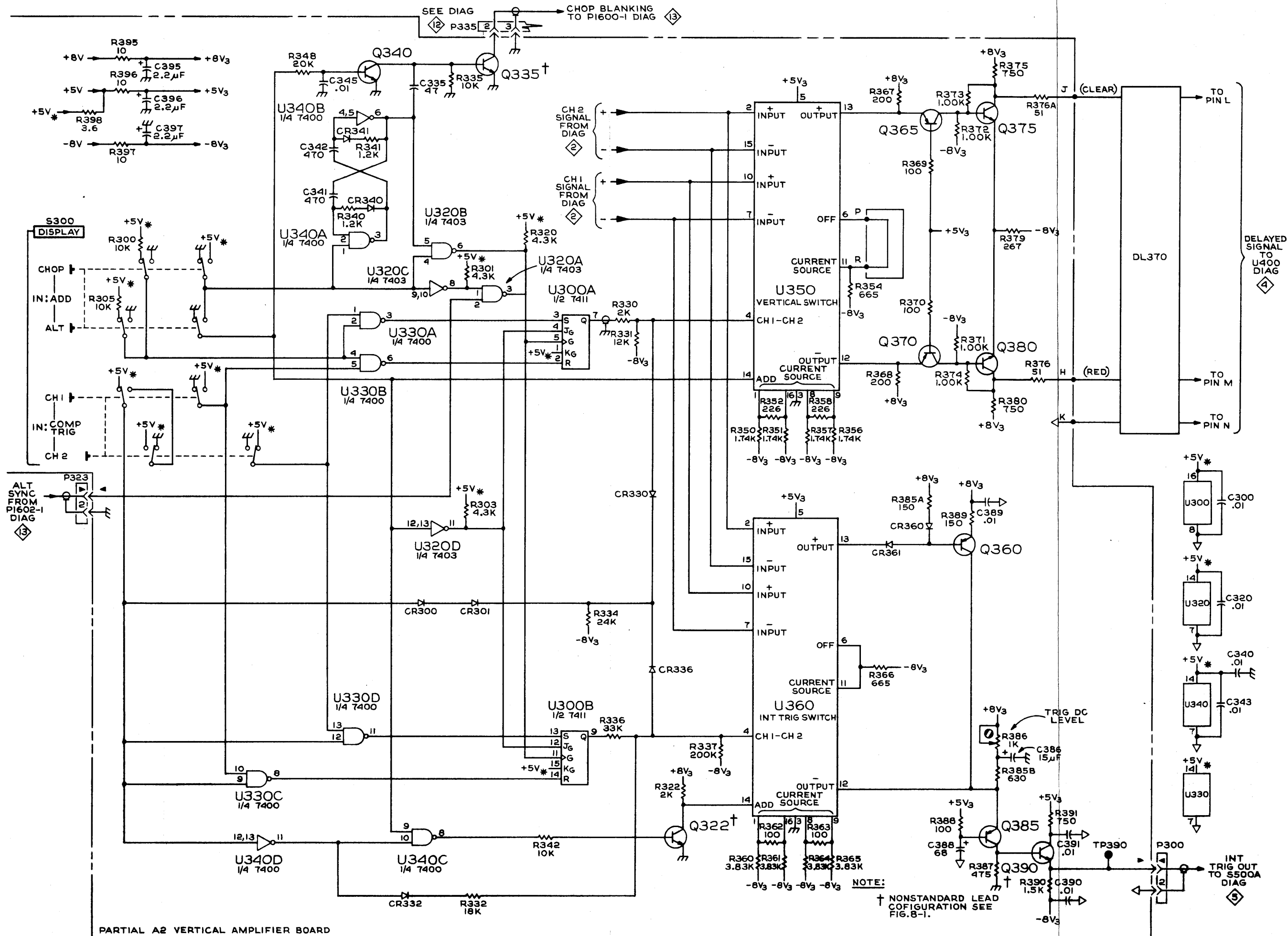


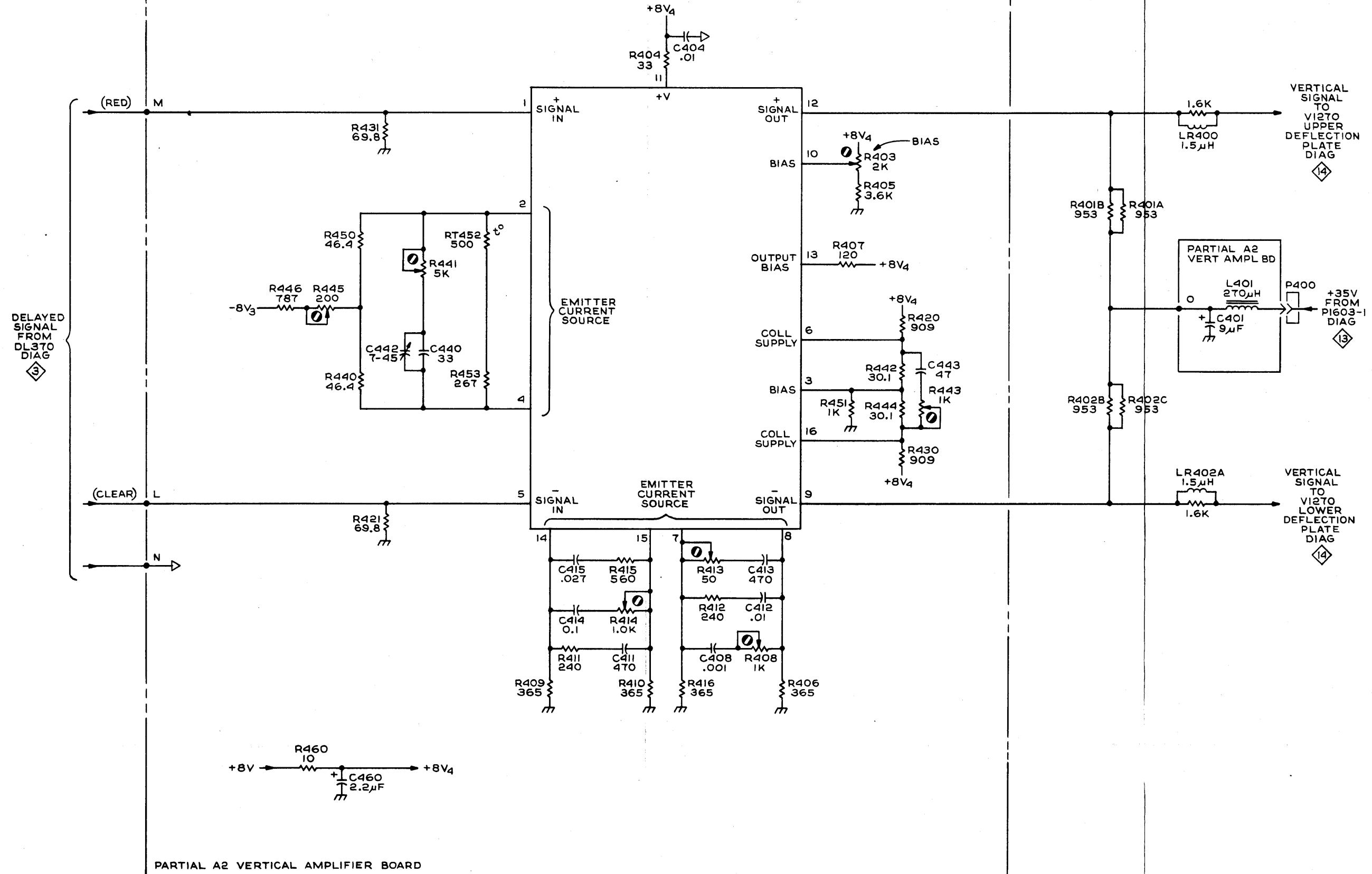


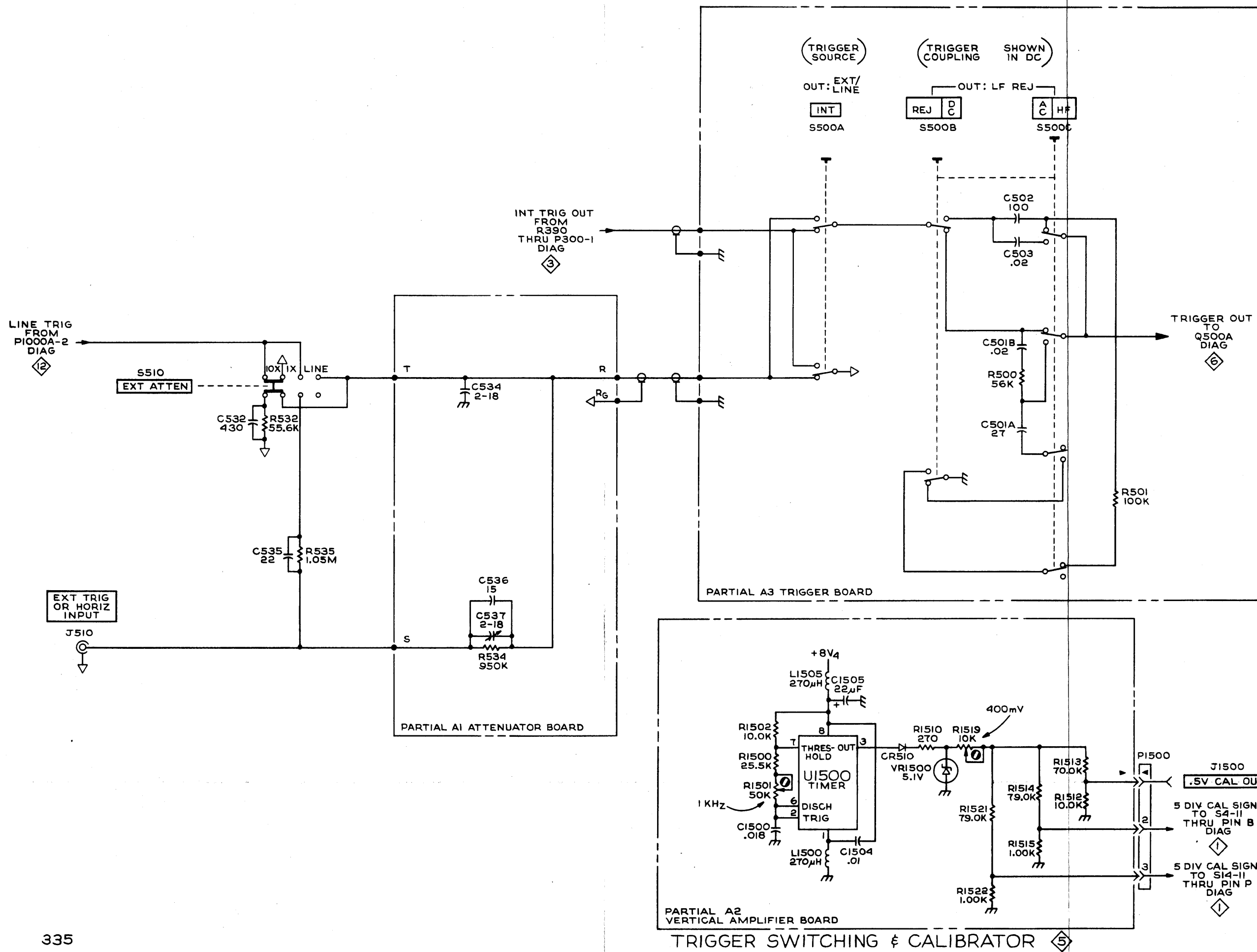
PARTIAL A2 VERTICAL AMPLIFIER BOARD

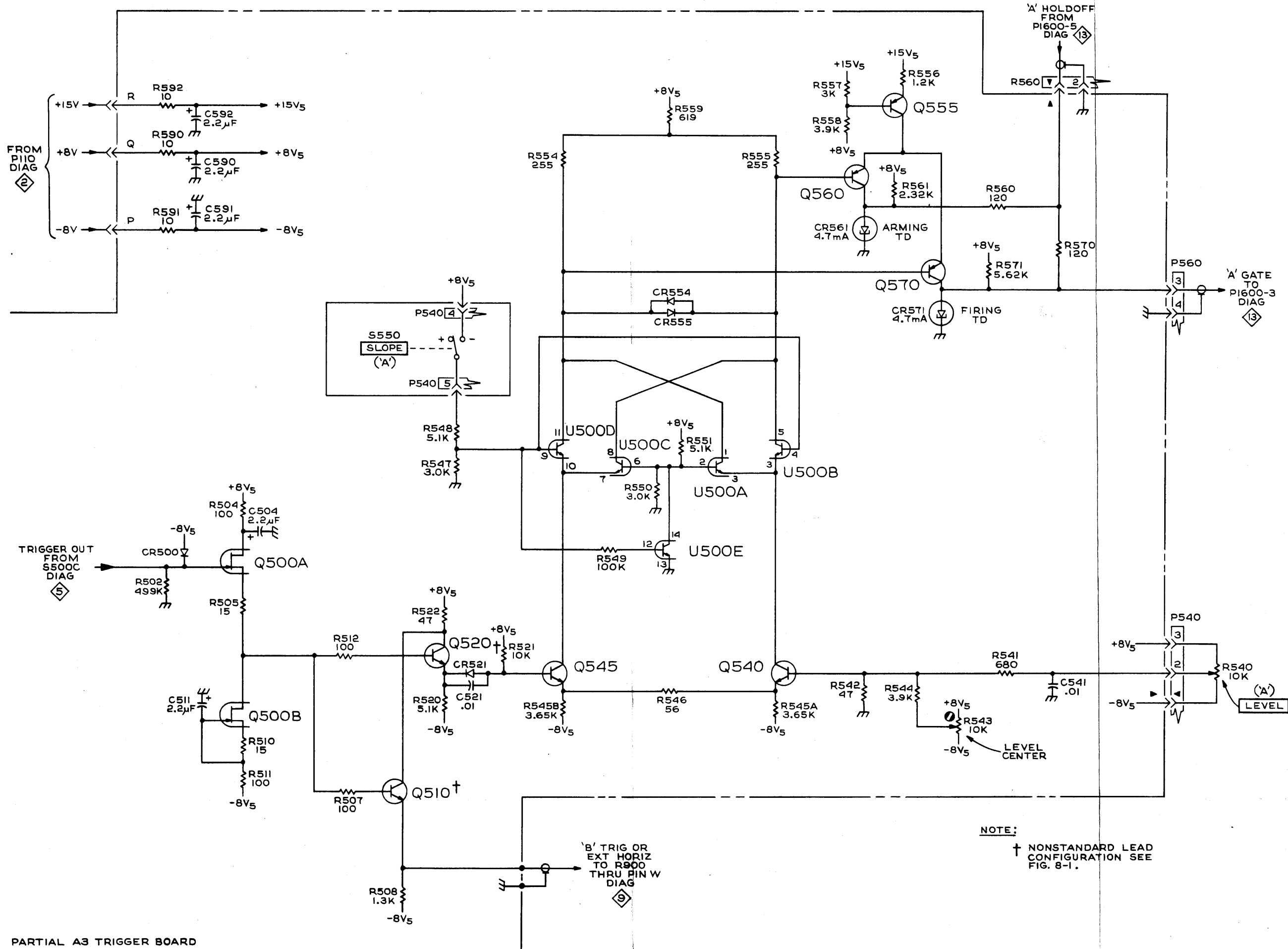


NOTE:
 † NONSTANDARD LEAD CONFIGURATION SEE FIG. 8-1.



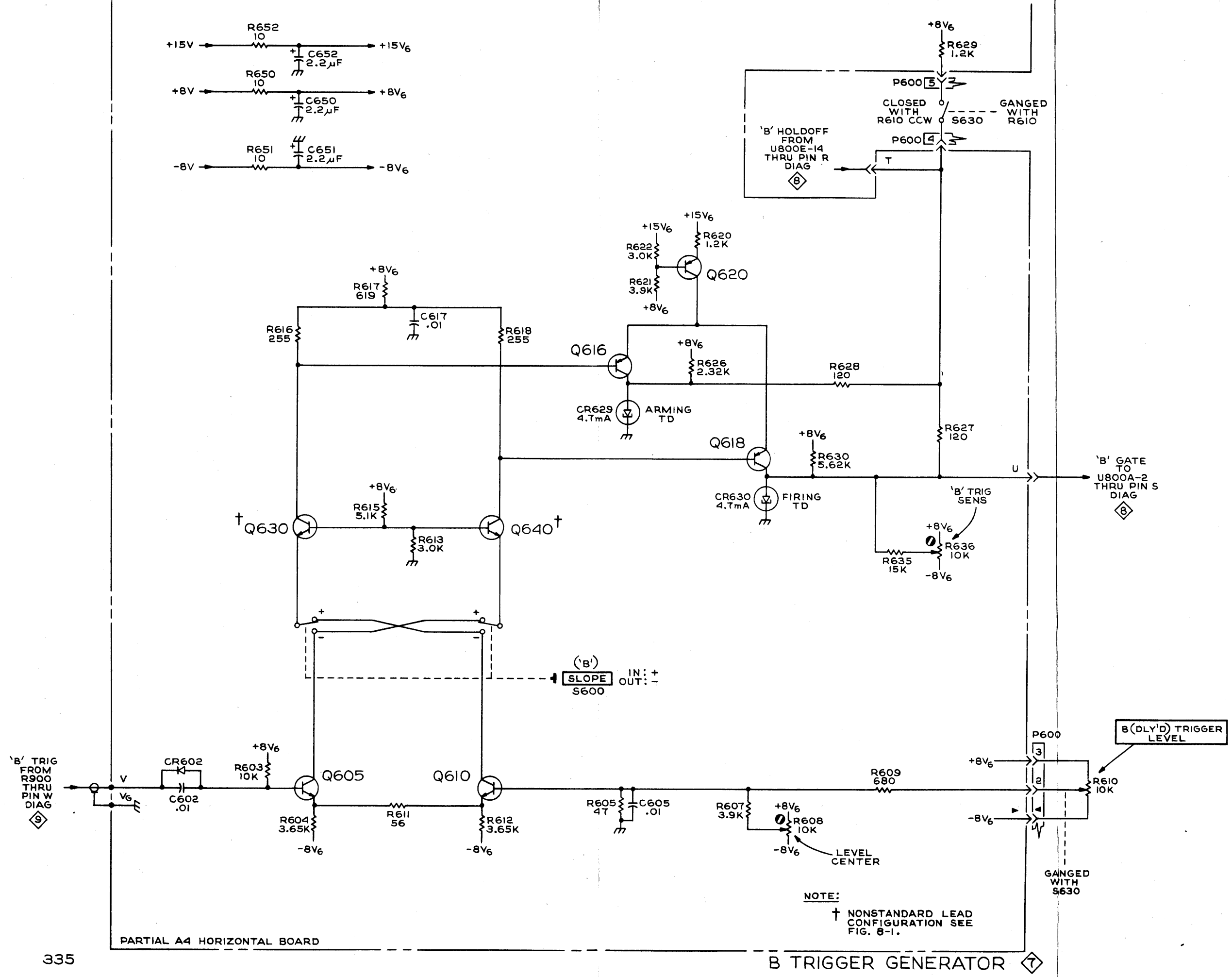




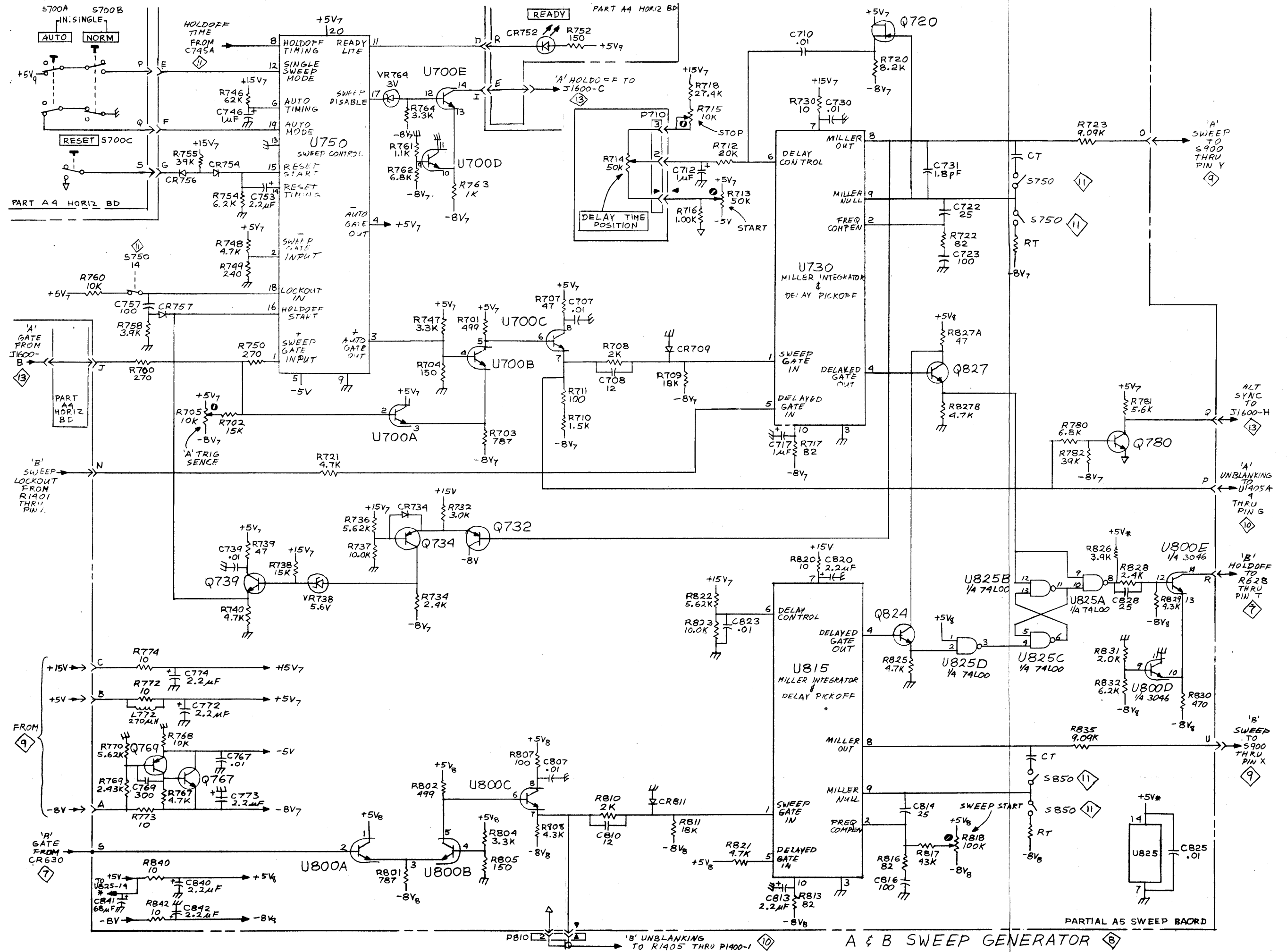


PARTIAL A3 TRIGGER BOARD

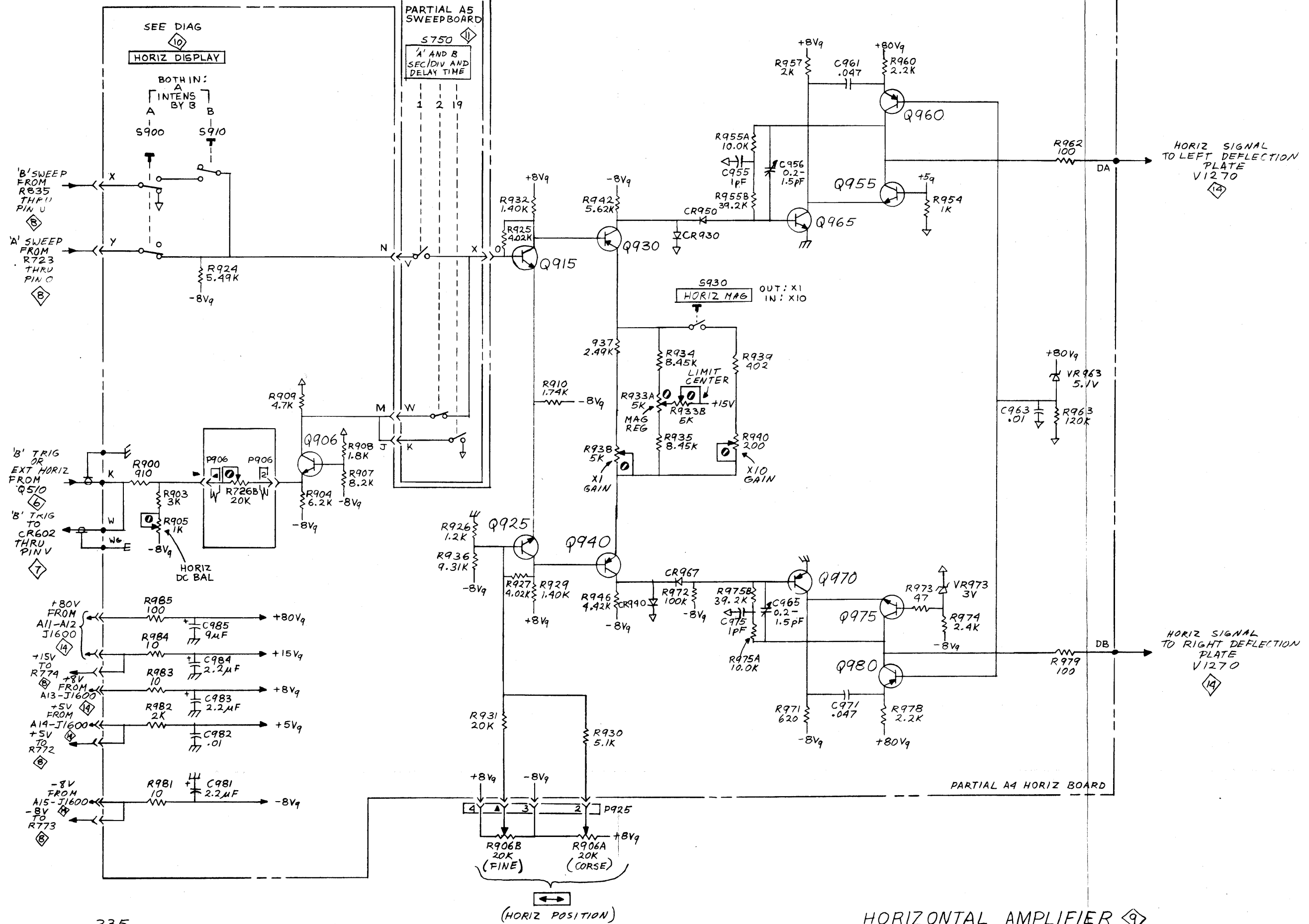
NOTE:
 † NONSTANDARD LEAD CONFIGURATION SEE FIG. 8-1.

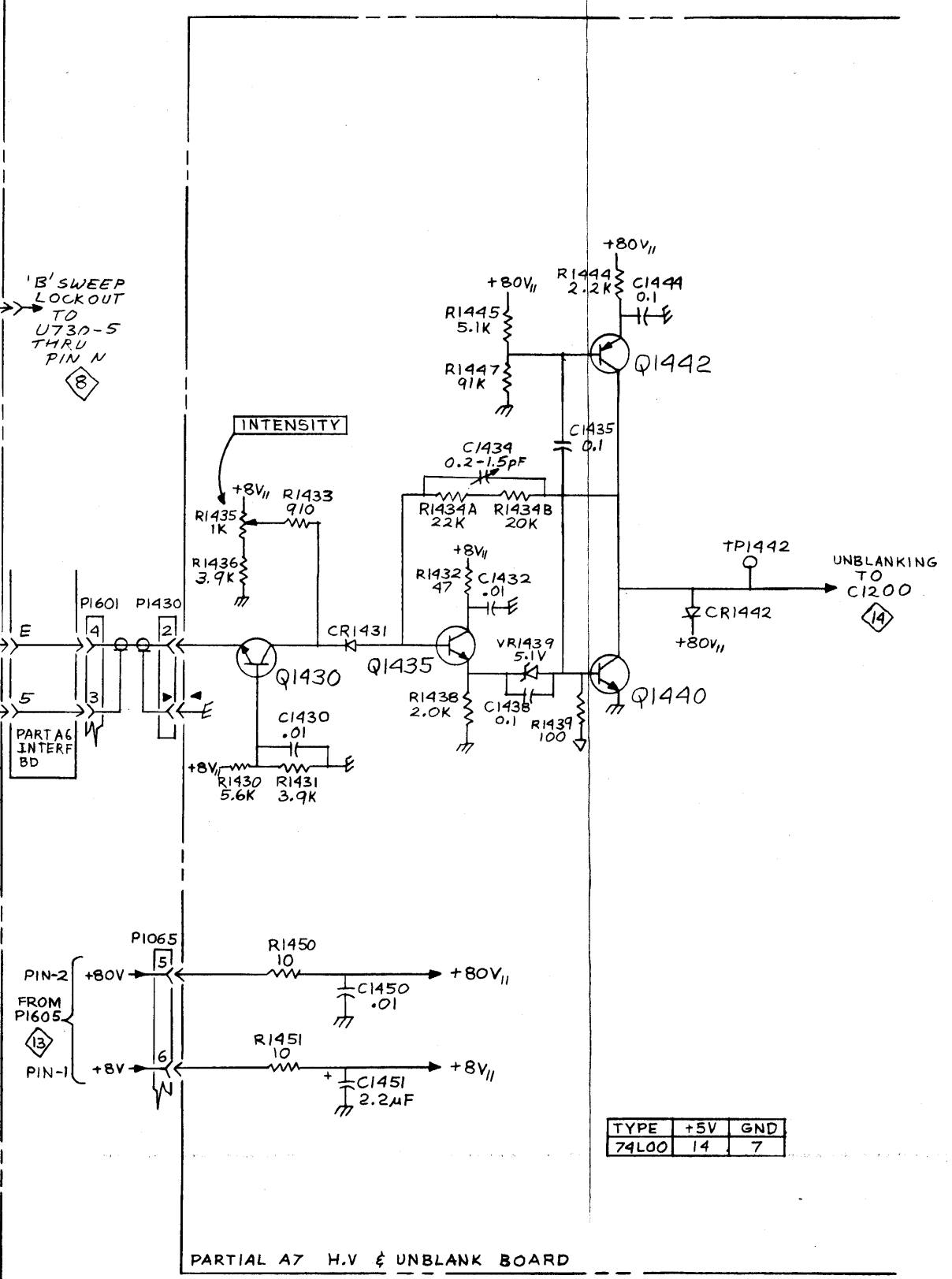
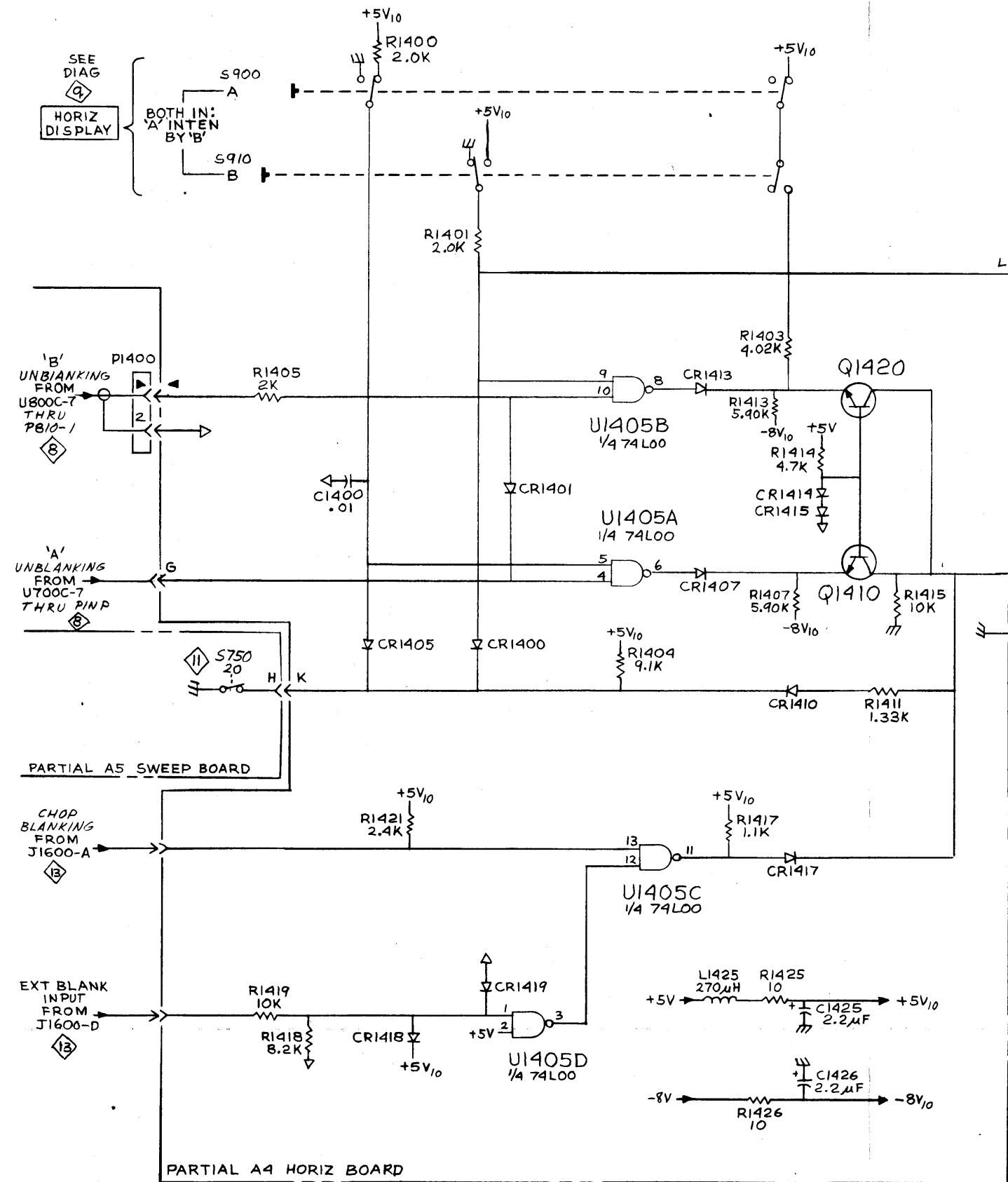


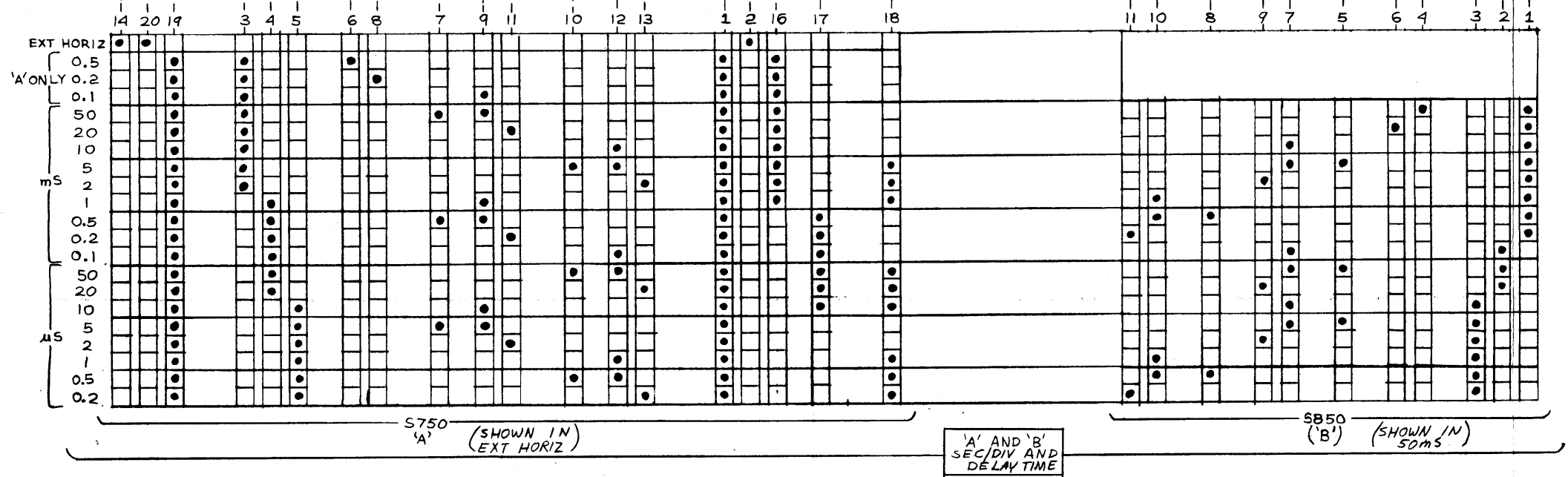
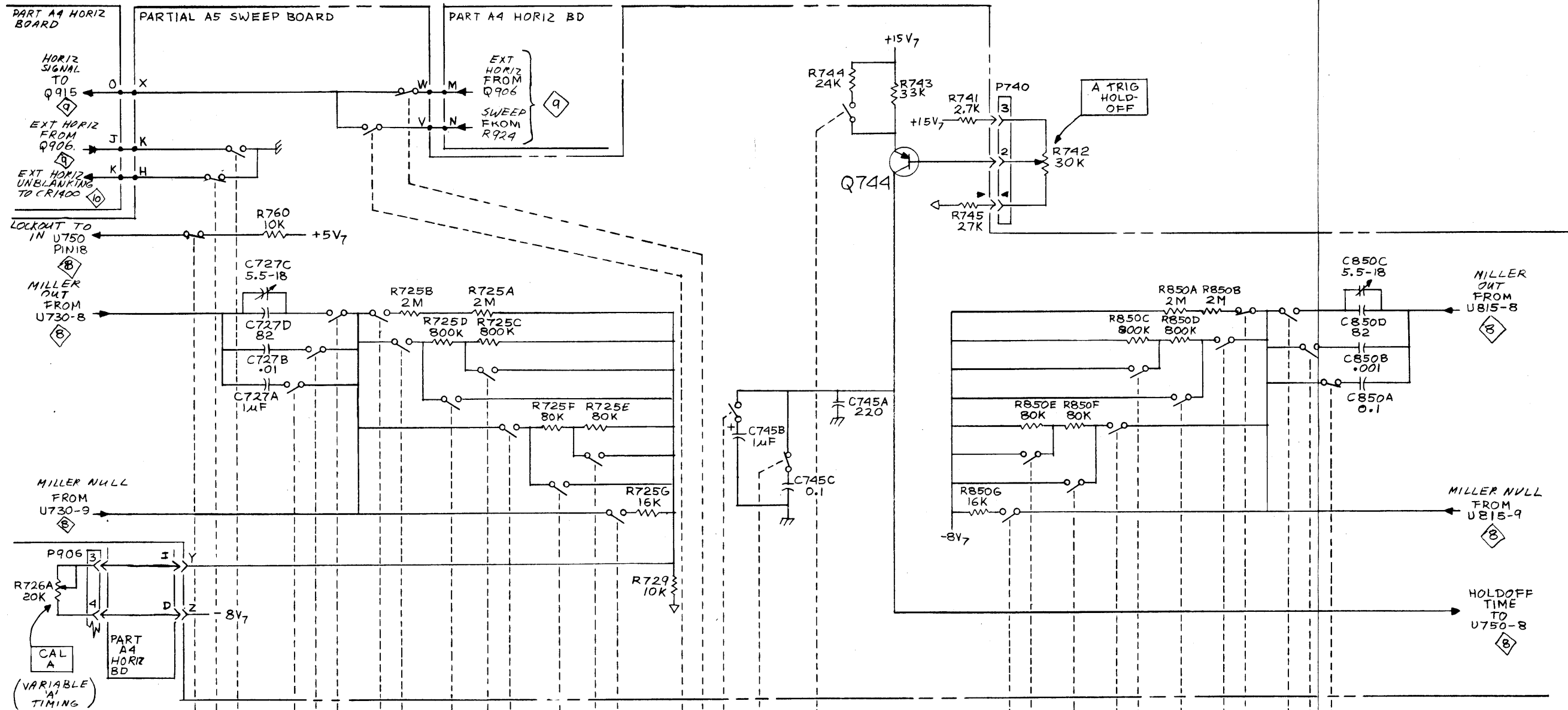
PARTIAL A4 HORIZONTAL BOARD

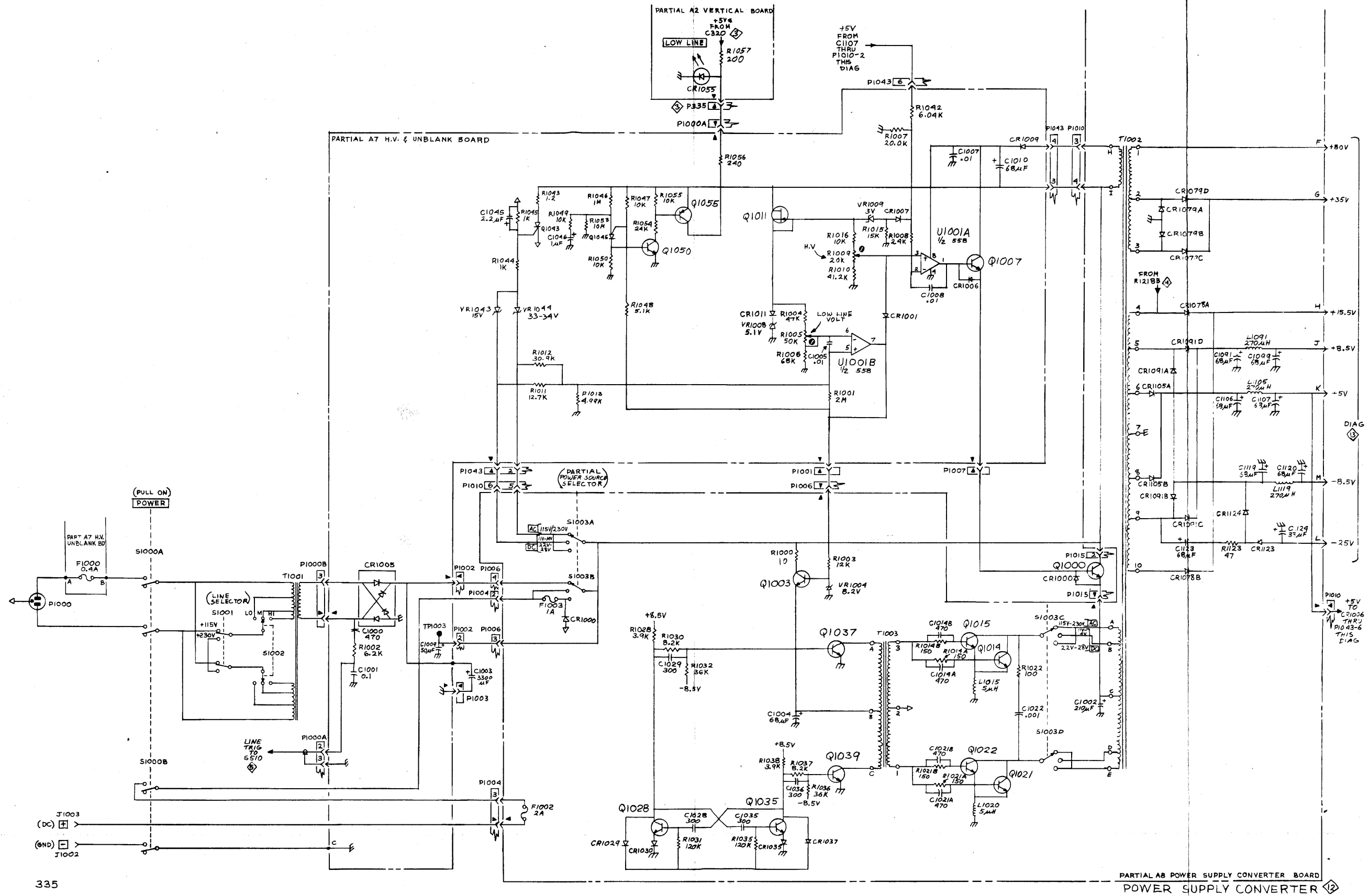


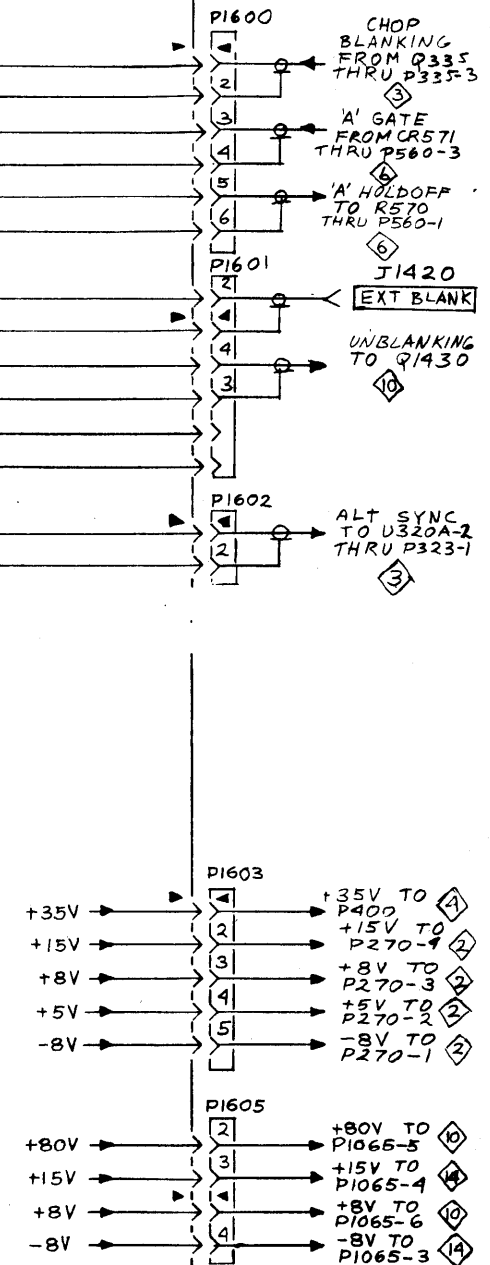
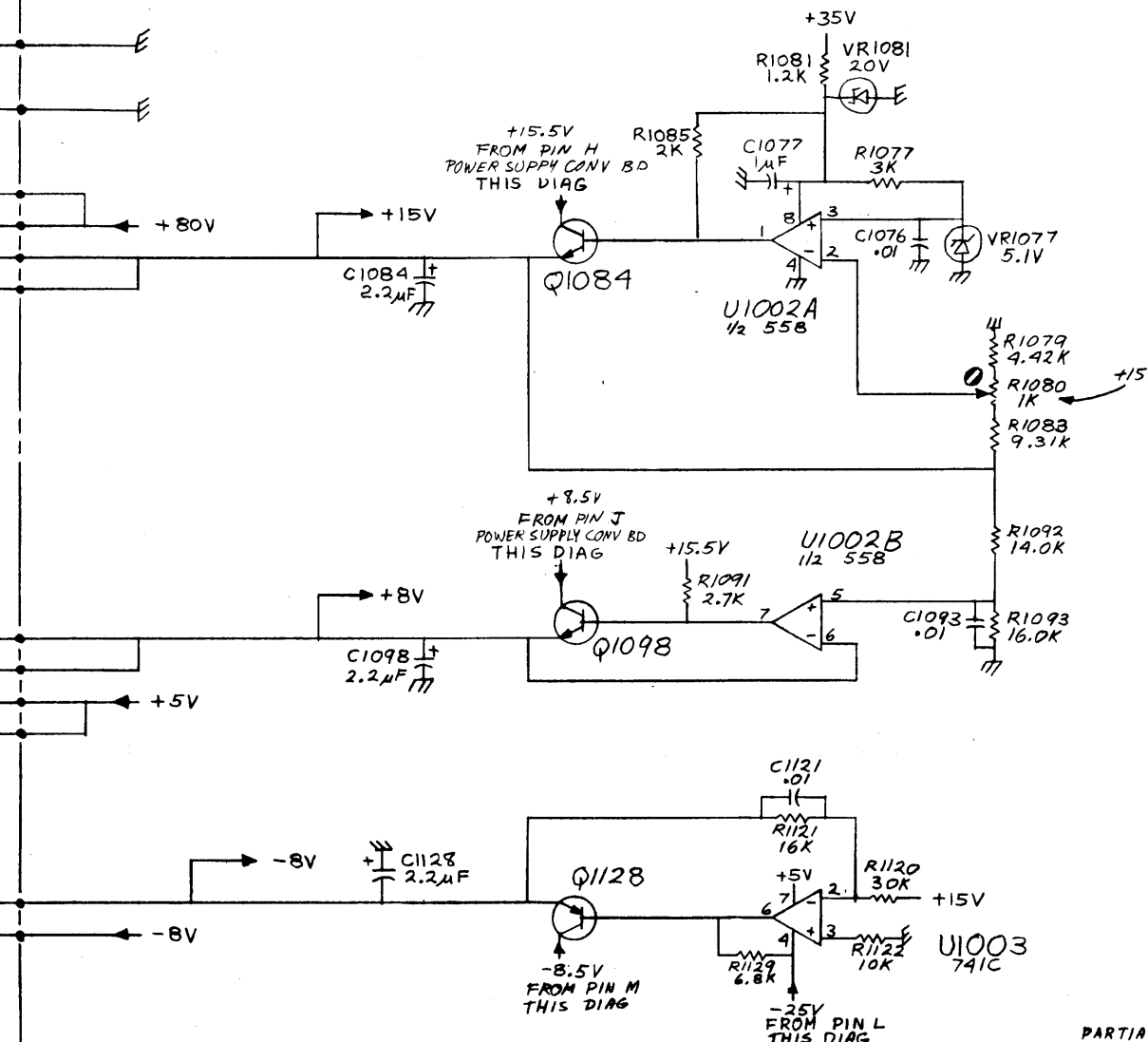
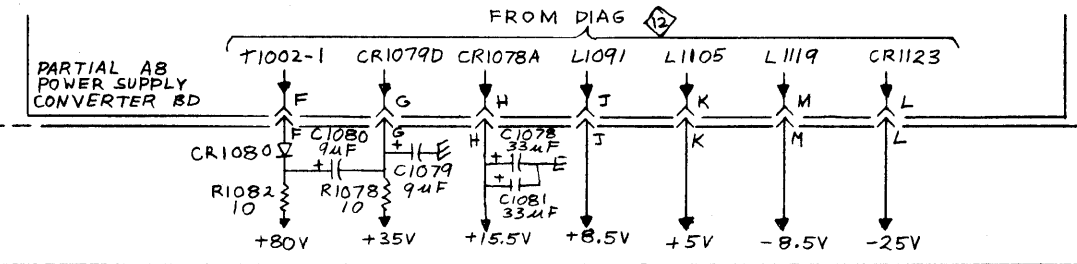
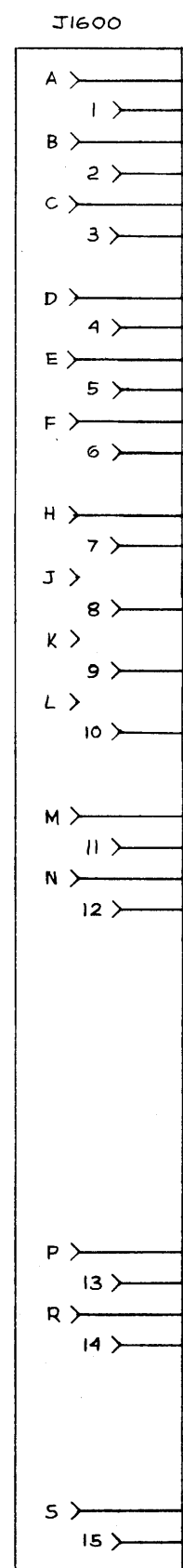
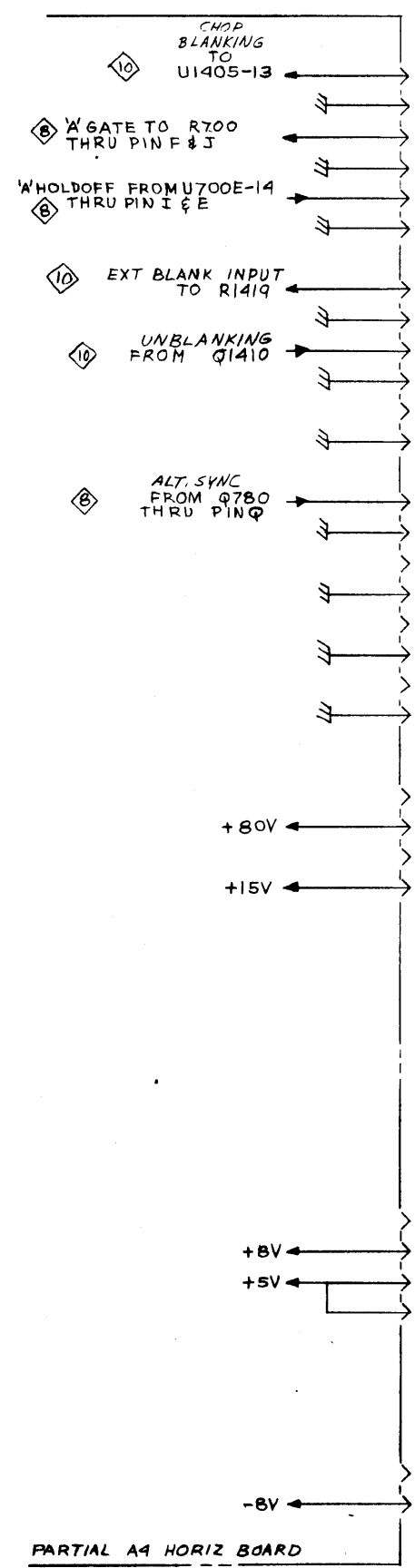
A & B SWEEP GENERATOR



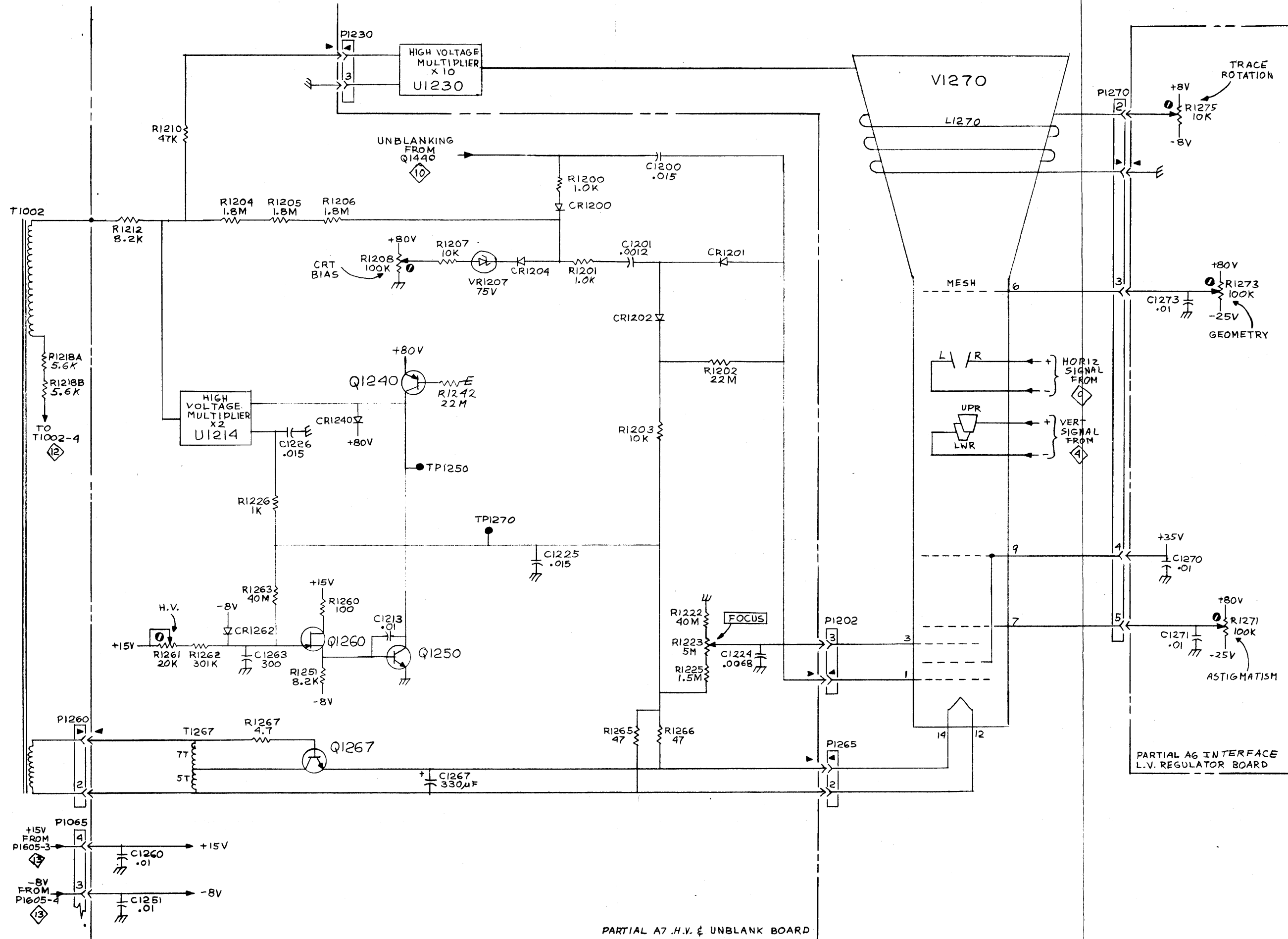








PARTIAL A6 INTERFACE & L.V. REGULATOR BOARD
 INTERFACE & L.V. REGULATOR 3



DEMO SUPPORT PACKAGE

This Demo Support Package is dedicated to all those courageous field engineers whose demonstration instruments fail to operate.

The intent of this package is basically for troubleshooting and some instrument familiarity. The contents of this package may vary from one instrument type to another depending on the information available. This package should not in any way be considered a permanent manual. If you have any corrections regarding technical accuracy, please direct all correspondence to Measurement Product Manuals, P.O. Box 500, Beaverton, Oregon, 97077, c/o Delivery Station 50-438 or call (503) 644-0161, Ext. 6527.