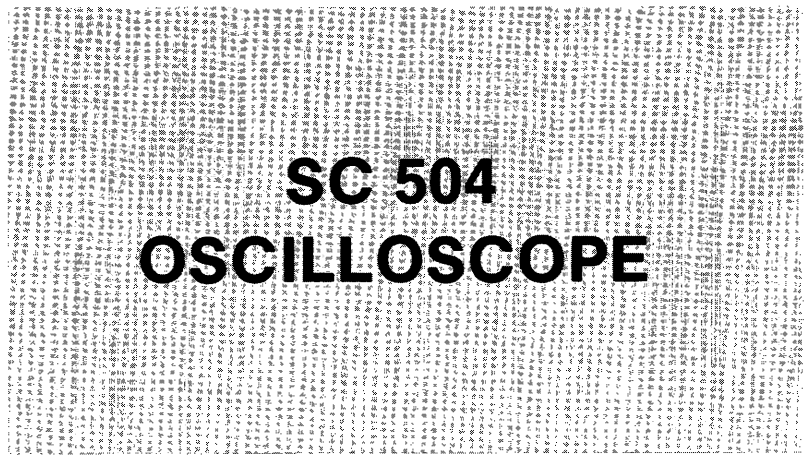


TEKTRONIX®



SC 504 OSCILLOSCOPE

INSTRUCTION MANUAL

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

Serial Number _____

WARRANTY

This Tektronix instrument is warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your Tektronix Field Engineer or representative.

All requests for repairs and replacement parts should be directed to the Tektronix Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument type number or part number and serial number with all requests for parts or service.

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WARNING

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

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SAFETY INFORMATION

The following general safety information applies to all operators and service personnel. Specific warnings appear throughout the manual where they apply and should be followed in each instance.

WARNING statements identify conditions or practices which could result in personal injury or loss of life.

CAUTION statements identify conditions or practices which could result in damage to the equipment or other property.

The word **DANGER** on the equipment identifies areas of immediate hazard which could result in personal injury or loss of life.

The following safety symbols may appear on the equipment:



— Refer to the manual



— High voltage

Protective ground terminal



— A terminal which must be connected to earth ground prior to making any other connections to the equipment.

Ground the Power Module

To avoid electric shock, the power module must be properly grounded. Refer to the power module manual for grounding instructions.

Do not use the power module power cord grounding conductor as the sole signal-return current conductor.

Use the Proper Power Cord

To avoid electric shock and fire, use only the power cord and plug specified for your power module. Use only a power cord that is in good condition.

For detailed information on power plugs see the power module manual.

Use the Proper Fuse

To avoid electric shock and fire, use only the fuses specified in your power module and plug-in manuals and which are identical in the following aspects:

- Physical Size—3AG, etc.
- Type—Slow Blow, Fast Blow, etc.
- Voltage Rating
- Current Rating

Do Not Operate in an Explosive Atmosphere

To avoid explosion, do not operate this instrument in an area where flammable gas or fumes are present. Such operation could cause an explosion.

Exercise Care When Handling the Crt

Breaking the crt may cause an implosion. Wear protective clothing and safety glasses when handling the crt. When storing the crt, put it in a protective carton or set it face down in a protected location on a smooth surface with a soft mat under the faceplate.

Avoid Excessive Moisture

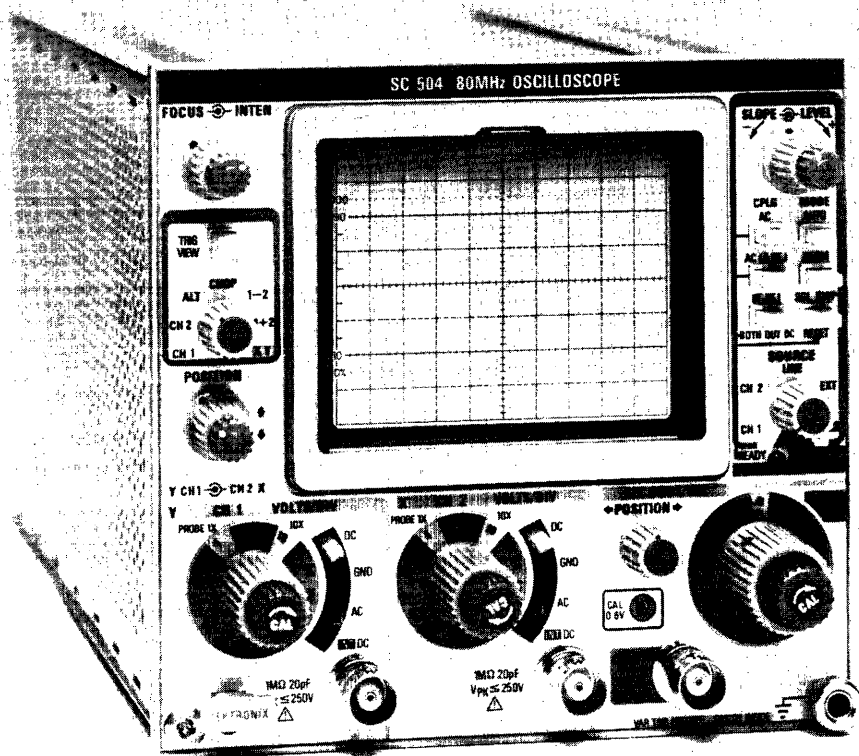
Circuit boards and components must be dry before applying power to prevent damage from arcing.

Do Not Operate Without Covers

To avoid personal injury, do not operate the instrument without the panels or covers installed. Do not perform any servicing other than that described in the operating instructions unless you are a qualified serviceperson.

Do Not Service Alone

Do not attempt internal service or adjustment unless another person capable of rendering first aid and cardiopulmonary resuscitation is present.



2296-1

The SC 504 Oscilloscope.

OPERATING INSTRUCTIONS

Introduction

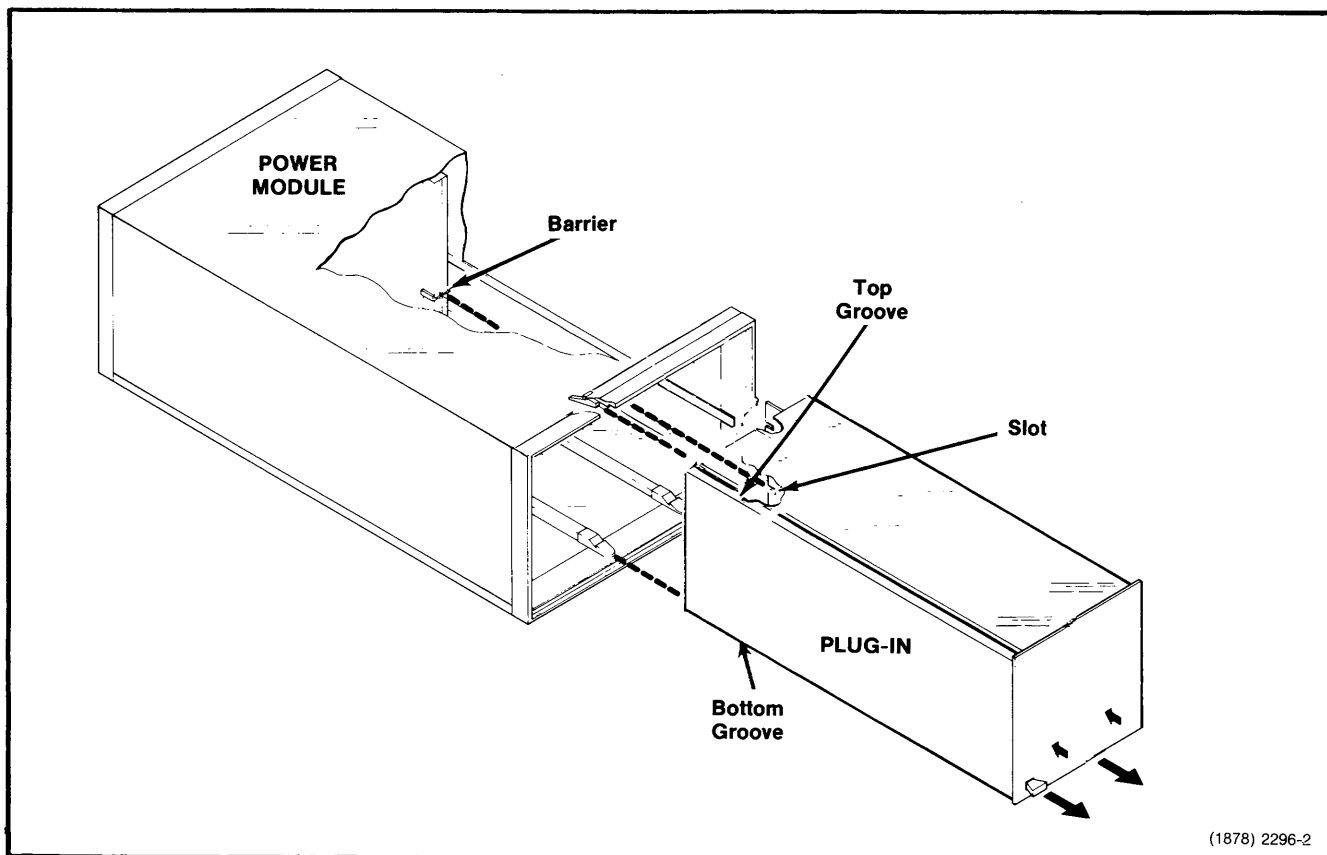
The SC 504 Oscilloscope is a general-purpose 80 MHz dual trace oscilloscope designed to operate in two compartments of a TM 500 series power module. It has a high writing speed, a wide range of sweep rates, a wide range of deflection factors and versatile triggering including auto triggering and trigger view. Recommended probes for use with the SC 504 are the P6062A and P6105. The P6062A probe has selectable 1X or 10X attenuation while the attenuation of the P6105 is 10X.

Installation

CAUTION

The SC 504 is calibrated and ready to use when received. Referring to Fig. 1-1, install the SC 504 in the power module and turn the TRIGGERING SOURCE control to CH 1 to apply power. Check that the PWR ON indicator on the front panel illuminates.

Turn the power module off before inserting the plug-in; otherwise, damage may occur to the plug-in circuitry.



(1878) 2296-2

Fig. 1-1. Plug-in installation and removal.

CONTROLS AND CONNECTORS

The SC 504 is fully calibrated and ready for use when received. The functions of the controls and connectors should be reviewed before use. Refer to Fig. 1-2.

1. **TRIGGERING SLOPE:** This switch selects the polarity of the triggering signal that starts the sweep.

2. **TRIGGERING LEVEL:** This control selects the amplitude point on the triggering signal at which the sweep is triggered.

3. **MODE AUTO:** When depressed, the sweep is started by the applied trigger signal. In the absence of an adequate triggering signal, the sweep free runs and provides a bright reference trace.

4. **MODE NORM:** When this pushbutton is depressed, the sweep is initiated by the applied triggering signal. In the absence of an adequate triggering signal, there is no trace.

5. **MODE SGL SWP-RESET:** When this pushbutton is depressed (momentary contact switch), the sweep will trigger only once in the single sweep mode. After the sweep is displayed, further sweeps cannot be presented until the button is depressed again to rearm the sweep.

6. **CPLG AC:** When this pushbutton is depressed, triggering signals are capacitively coupled to the input of the trigger generator-circuit. The dc component is rejected and the signals below approximately 50 Hz are attenuated.

7. **CPLG AC LF REJ:** When depressed, this pushbutton capacitively couples the signals to the input of the trigger circuit. The dc component is rejected and the signals below approximately 10 kHz are attenuated.

8. **CPLG HF REJ:** When this pushbutton is depressed, all signals above approximately 50 kHz are attenuated.

9. **SOURCE:** This switch selects the source of the trigger signal, coupled to the input of the trigger circuit.

STBY: This position turns the internal regulated voltage off.

CH 1: In this position a sample of the signal available in channel 1 is used as a trigger signal.

CH 2: In this position a sample of the signal available in channel 2 is used as a trigger signal.

LINE: In this position a sample of the power line frequency is used as a trigger signal.

EXT: This position selects the signal connected to the EXT TRIG connector for triggering.

INT: In this position the signal connected through the rear interface connector and the power module is used as the triggering signal.

10. **PWR ON:** This light indicates when power is applied to the SC 504.

11. **READY-TRIG'D:** This light indicates that the single sweep is armed or that the sweep is properly triggered.

12. **PULL X10 HORIZ MAG:** When this switch is pulled out (blue band exposed), the displayed sweep rate increases by a factor of 10. This magnification is also present in the XY mode.

CAL: This control, through an internal switch, VAR TRIG HOLDOFF, controls the variable sweep rate or the variable trigger holdoff.

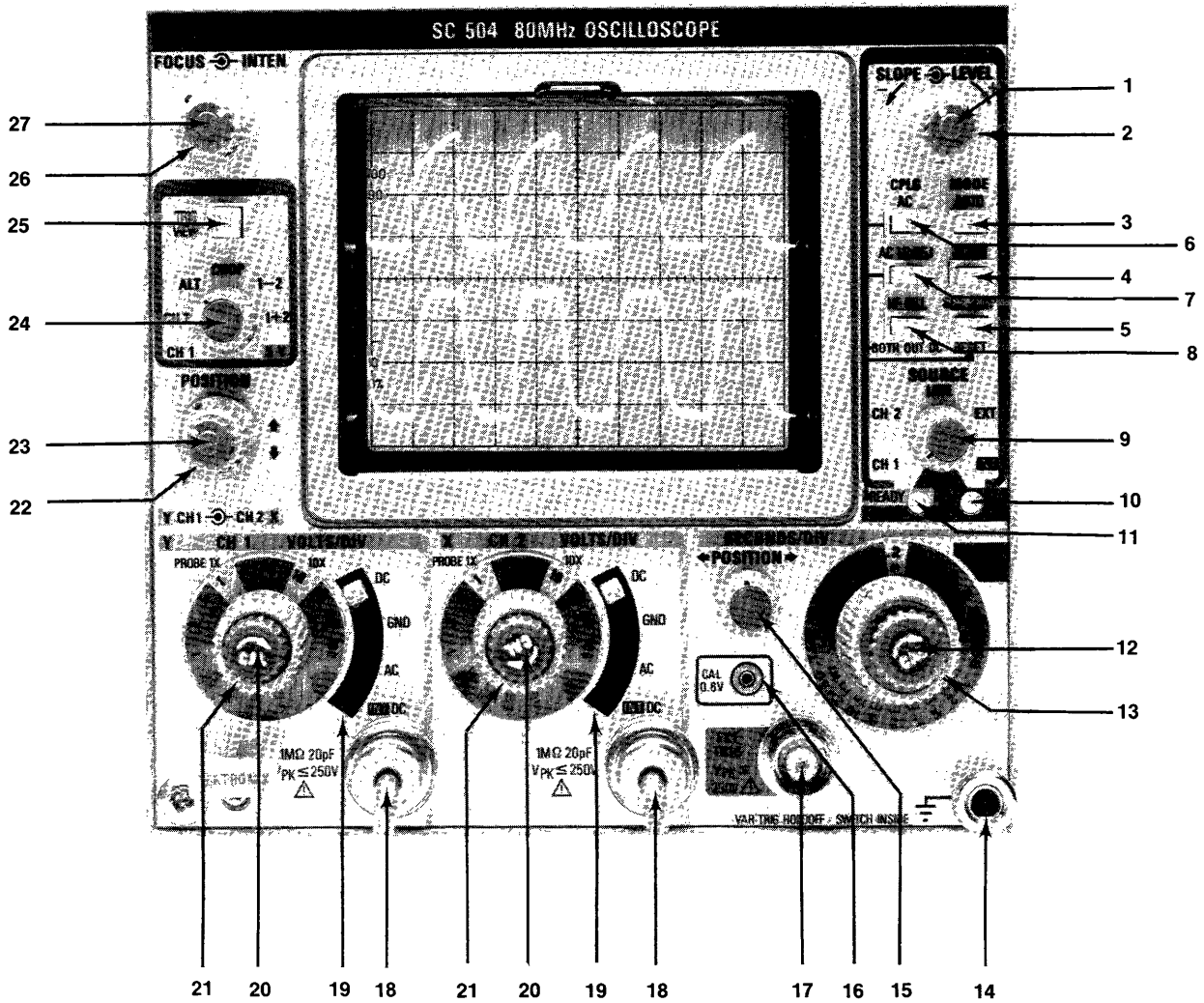
a. **Variable sweep rate:** This position provides for continuously variable sweep rates between the calibrated settings of the SECONDS/DIV switch.

b. **Variable trigger holdoff:** This position provides continuously variable trigger holdoff.

13. **SECONDS/DIV:** This switch selects the sweep rate and the external triggering mode for the external horizontal amplifier. The CAL control must be rotated fully clockwise for the calibrated sweep rates.

14. **Ground connection**

CONTROLS AND CONNECTORS



2296-3

Fig. 1-2. Controls and connectors.

Operating Instructions—SC 504

15. POSITION: This control positions the display horizontally on the crt, except in the XY mode.

16. CAL 0.6 V: This jack outputs the positive-going 0.6 V square wave at approximately 1 kHz, for calibration and probe compensation.

17. EXT TRIG: This is the input bnc connector for external triggering signals.

18. Input connector: This bnc connector accepts the vertical signal input.

19. DC-GND-AC-INT DC: This switch selects the type of signal coupling it to the vertical amplifier.

DC: In this position, the front panel input connector to the input amplifier is dc coupled.

GND: This position disconnects and grounds the input of the vertical amplifier.

AC: In this position, the signals from the front panel bnc connector are capacitively coupled to the vertical amplifier, blocking the dc component of the input signal.

INT DC: In this position, a signal connected through the rear interface connector and the power module is applied (dc coupled) to the input amplifier.

20. CAL: This control provides continuously variable deflection factors between the calibrated settings of the VOLTS/DIV switch.

21. VOLTS/DIV: This switch selects the vertical deflection factor in a 1-2-5 sequence (variable control must be rotated fully clockwise for the indicated deflection factor). Normally, the knob skirt window having the natural panel background will be read; however when a 10X probe is used on the input, read the knob skirt window having the grey background.

22. CH 2 POSITION: This control positions the display vertically. In the XY mode of operation, this control positions the display horizontally.

23. CH 1 POSITION: This control positions the display vertically. When in the XY mode of operation, this control also positions the display vertically.

24. DISPLAY: This switch selects the mode of operation for the vertical amplifier system.

CH 1: Displays CH 1 only

CH 2: Displays CH 2 only

ALT: This position produces a display that alternates between channel 1 and channel 2 and is switched after each trace across the crt.

CHOP: This position produces a display that is switched between channels at a 250 kHz rate. This position provides the best display at sweep rates slower than approximately 0.5 ms/division.

1-2: In this position the input to channel 2 is inverted and algebraically added to channel 1.

1+2: In this position the channel 2 signal is algebraically added to channel 1.

XY: In this position the channel 1 signal is displayed vertically, and the channel 2 signal is displayed horizontally.

25. TRIG VIEW: This switch, when depressed, displays the triggering signal on the crt.

26. INTEN: This control varies the display brightness.

27. FOCUS: This control provides adjustment to obtain a well defined display.

GENERAL OPERATING INFORMATION

Graticule

The graticule of the SC 504 is internally marked on the faceplate of the crt to provide accurate, parallax-free measurement. The graticule is divided into eight vertical and ten horizontal divisions. Each division is 0.25 inch by 0.25 inch. In addition, each major division is divided into five minor divisions. The vertical gain and horizontal timing are calibrated to the graticule, so accurate measurements can be made from the graticule.

Intensity Control

The INTEN control is normally adjusted so the display is easily visible, but not overly bright. Readjustment may be required for different displays or sweep rates.



Particular care should be exercised when a bright spot is displayed. A high-intensity spot may burn the crt phosphor and cause permanent damage to the crt if allowed to remain too long.

Display Focus

The FOCUS control works in conjunction with the astigmatism control to give a fine trace, or well focused spot.

To check for proper setting of the Astig control, slowly turn the FOCUS control through the optimum setting viewing the signal displayed on the crt screen. If the Astig control is correctly set, the vertical and horizontal portions of the trace will come into sharpest focus at the same position of the FOCUS control.

Calibrator

The internal calibrator of the SC 504 provides a convenient signal source for checking vertical gain. The output square-wave voltage is 600 mV in $\pm 1\%$. This signal is very useful as a probe calibrator signal as described in the probe instruction manual, and operates at a repetition rate of approximately 1 kHz.

Vertical Displays

Single-Trace Displays. Either of the input channels can be used for single-trace displays. Apply the signal to the

desired input connector and set the DISPLAY switch to display the channel used. The TRIGGERING SOURCE switch can select either vertical channel as a trigger signal source.

Dual-Trace Operation (Alternate Mode). The ALT position of the DISPLAY switch produces a display that alternates between Channel 1 and Channel 2 after each trace across the crt. Although the ALT mode can be used at all sweep rates, the CHOP mode provides a more satisfactory display at sweep rates slower than $50 \mu\text{s}/\text{div}$. At these slower sweep rates, alternate mode switching becomes visually perceptible.

In the CH 1 and CH 2 positions of the TRIGGERING SOURCE switch two signals are displayed, showing time relationship. If the signals are not time related, one of the signals displayed will be unstable.

Dual-Trace Operation (Chopped Mode). The CHOP position of the DISPLAY switch produces a display that is electronically switched between channels. Generally, the CHOP mode provides the best display at sweep rates slower than about $0.5 \text{ ms}/\text{div}$, or whenever dual-trace, single-shot phenomena are to be displayed. At faster sweep rates, the chopped switching becomes apparent and may interfere with the display.

Proper external triggering for the chopped mode of operation is obtained when using external triggering from a signal that is time-related to either signal. This provides the same result as triggering internally from channel 1 or channel 2.

Two signals that are time-related can be displayed in the chopped mode, showing the true time relationship. However, if the signals are not time-related, one signal displayed will appear to shift its horizontal position with consecutive sweeps.

Two single-shot, transient, or random signals that occur when the time interval determined by the SECONDS/DIV switch (ten times the displayed rate) can be compared using the chopped mode. To obtain a usable display the sweep must be triggered from the vertical channel, displaying the event that occurs first. Since the signals show true time relationship, time difference measurements can be used.

Operating Instructions—SC 504

Algebraic Addition. The 1—2 position of the DISPLAY switch can be used to display the difference between two signals, or for common-mode rejection to remove an undesired signal. The 1+2 position of the DISPLAY switch can be used to display the sum of two signals.

The following general precautions should be observed:

1. Do not exceed the input voltage rating of the SC 504.
2. Do not apply signals that exceed an equivalent of approximately six times the VOLTS/DIV switch setting. For example, with a VOLTS/DIV switch setting of 0.5, the voltage applied to that channel should not exceed about 3 V. Larger voltages may distort the display.
3. Use CH 1 and CH 2 POSITION control settings that most nearly position the signal of each channel to midscreen when viewed in either the CH 1 or CH 2 positions of the DISPLAY switch. This ensures the greatest dynamic range in the 1—2 and 1+2 mode of operation.
4. For similar response from each channel, set the CH 1 and CH 2 DC-GND-AC-INT DC switches to the same position.

Deflection Factor

The amount of vertical deflection produced by a signal is determined by the signal amplitude, the setting of the VOLTS/DIV switches, and the setting of the VOLTS/DIV variable controls. The calibrated deflection factors indicated by the VOLTS/DIV switches apply only when the VOLTS/DIV variable controls are set to the calibrated position (detent fully clockwise).

The VOLTS/DIV variable controls provide continuously variable (uncalibrated) vertical deflection factors between the calibrated settings of the VOLTS/DIV switches. The VOLTS/DIV variable controls extend the maximum vertical deflection factor to at least 25 V/div.

Grounding

Reliable signal measurements cannot be made unless both the oscilloscope and the unit under test are connected together by a common reference (ground) lead in addition to the signal lead or probe. The ground strap on the signal probe provides the best ground. Also, a ground lead can be connected to the post chassis ground to establish a common ground with the signal source.

Input Coupling

The DC-GND-AC-INT DC switches allow a choice of coupling method for the applied signal. The type of display desired and the applied signal determines the coupling method to use.

In the AC coupling position, the dc component of the signal is blocked by a capacitor in the input circuit. The low frequency —3 dB point in the AC position is about 10 Hz. Therefore, some low frequency attenuation can be expected near this frequency limit. Attenuation in the form of waveform tilt will also appear in square waves that have low frequency components. The AC coupling position provides the best display of signals with a dc component that is much larger than the ac component.

The DC coupling position can be used for most applications. This position allows measurement of the dc component of a signal and must be used to display signals below about 50 Hz to avoid the attenuation that would occur using ac coupling.

The GND position provides a ground reference at the input without the need to externally ground the probe. The signal applied to the probe is internally disconnected from the input circuit and connected to ground through a resistor. The amplifier input circuit is held at ground potential.

In the GND position, connecting the input signal to ground through a resistor forms a precharging network. This network allows the input coupling capacitor to charge to the average dc voltage level of the signal applied to the probe. Since this takes place in the GND position of DC-GND-AC-INT DC switch, any large voltage transients accidentally generated will not be applied to the amplifier input. The pre-charge network also provides a measure of protection to the external circuit by reducing the current levels that can be drawn from the external circuitry during capacitor charging. The following procedure should be used when the probe tip is connected to a signal source having a different dc level than previously applied, and using AC coupling.

1. Before connecting the probe tip to a signal source, set the DC-GND-AC-INT DC switch to GND.
2. Touch the probe tip to oscilloscope chassis ground. Wait several seconds for the input coupling capacitor to discharge.
3. Connect the probe tip to the signal source.

4. Wait several seconds for the input coupling capacitor to charge.

5. Set the DC-GND-AC-INT DC switch to AC. The display will remain on screen so the ac component of the signal can be measured in the normal manner. The INT DC position of the switch selects the signal connected at the rear interface input.

Trigger Source

CH 1 and CH 2 Triggering. For most applications, the sweep can be triggered internally. In the CH 1 and CH 2 positions of the TRIGGERING SOURCE switches, the trigger signal is obtained from the vertical deflection system. For dual-trace displays, special considerations must be made to provide the correct display.

Line Triggering. The LINE position of the TRIGGERING SOURCE switch connects a sample of the power line voltage to the input of the trigger generator. Line triggering is useful when the input signal is time-related (multiple) to the line frequency. It is also useful for providing a stable display of a line frequency component in a complex waveform.

External Triggering. An external signal connected to the EXT TRIG connector can be used to trigger the sweep in the EXT position of the TRIGGERING SOURCE switch. The external signal must be time related to the displayed signal for a stable display. An external trigger signal can be used to provide a triggered display when the internal signal is too low in amplitude for correct triggering, or contains signal components on which it is not desired to trigger. It is also useful when signal tracing in amplifiers, phase-shift networks, wave-shaping circuits, etc. The signal from a single point in the circuit under test can be connected to the external trigger input connector through a cable or signal probe. The sweep is then triggered by the same signal at all times and this allows amplitude, time relationship, or waveshape changes of signals at various points in the circuit to be examined without resetting the trigger controls. Rear interface INT DC triggering is used the same as EXT except the source is at the rear interface.

Trigger Coupling

Three methods of coupling the trigger signal to the CPLG trigger circuits can be selected with the TRIGGERING CPLG switches. Each method permits selection or rejection of certain frequency components of the trigger signal to obtain selective triggering.

AC Coupling. The AC position blocks the dc component of the trigger signal. Signals with low-frequency components below about 50 Hz are attenuated. In general, ac coupling can be used for most applications.

AC Low-Frequency Reject. The AC LF REJ position passes all high frequency signals at approximately 10 kHz. Dc is rejected and signals below approximately 10 kHz are attenuated. When triggering from complex waveforms, this position is useful for providing a stable display of the high-frequency components.

High-Frequency Reject. The HF REJ accepts signals below 50 kHz. HF REJ attenuates signals above 50 kHz.

Triggering Slope

The TRIGGERING SLOPE switch determines whether the trigger circuit responds on the positive-going or negative-going portion of the trigger signal. When the SLOPE switch is in the + (positive-going) position, the display starts with the – (negative-going) portion of the waveform. When several cycles of a signal appear in the display, the setting of the SLOPE switch is often unimportant. However, if only a certain portion of a cycle is to be displayed, correct setting of the SLOPE switch is important to provide a display that starts on the desired slope of the input signal.

Trigger Level

The TRIGGERING LEVEL control determines the voltage level on the triggering waveform at which the sweep is triggered. When the LEVEL control is set in the + region, the trigger circuit responds as the triggering waveform shifts in a positive-going direction. When the LEVEL control is set in the – region, the trigger circuit responds as the triggering signal changes level in a negative-going direction. To set the LEVEL control, first select the trigger SOURCE, CPLG, and SLOPE. Then set the LEVEL control fully clockwise and rotate it counterclockwise until the display starts at the desired point.

Trigger Mode

Automatic Triggering. The AUTO position (AUTO button pushed in) of the TRIGGERING MODE switch provides a stable display when the LEVEL control is correctly set and an adequate trigger signal is present. The READY TRIG'D light indicates when the sweep generator is triggered.

When the trigger repetition rate is less than approximately 20 Hz, or in the absence of an adequate trigger signal, the sweep generator free runs to produce a reference trace. When an adequate trigger signal is again applied, the free running condition ends and the sweep generator is triggered to produce a stable display (with the correct LEVEL control setting). The TRIGGERING LEVEL range is reduced to approximately the peak-to-peak range of the triggering signal. Internal and external trigger sensitivity is reduced below approximately 100 Hz.

Normal Triggering. Operation in the normal position (NORM button pushed in) of the TRIGGERING MODE switch is the same as in the AUTO position when a trigger signal is applied. However, when a trigger signal is not present, the sweep generator remains off and there is no display. The READY TRIG'D light indicates the sweep generator is triggered.

Use the normal mode to display signals with repetition rates below about 20 Hz. This mode provides an indication of an adequate trigger signal as well as the corrections of trigger control settings, since there is no display without proper trigger. Also, the READY TRIG'D light is off when the sweep is not correctly triggered.

Single Sweep. When the signal to be displayed is not repetitive or varies in amplitude, shape, or time, a conventional display may produce an unstable presentation. To avoid this, use the single sweep feature. The single sweep mode can also be used to photograph a non-repetitive signal.

To use the single sweep mode, first make sure the trigger circuit will respond to the event to be displayed. Depress the NORM button and obtain the best possible display in the normal manner (for random signals set the trigger circuit to trigger on a signal which is approximately the same amplitude and frequency as the random signal). Then, depress and release the SGL SWP button. The next trigger pulse will initiate the sweep and a single trace will be presented on the screen. After this sweep is complete, the sweep generator is "locked out" until reset. The READY indicator lights when the sweep generator circuit has been reset, and is ready to produce a sweep and the light goes out after the sweep is completed. To prepare the circuit for another single sweep display, press and release the SGL SWP button again.

Trigger Holdoff. By placing the internal SWP-VAR-HO switch in the HO position, the variable sweep control (CAL) is connected as a trigger holdoff variable control. In this configuration, the control provides for stable triggering on aperiodic or irregular signals (such as complex digital words).

To use the control first obtain the most stable presentation possible by adjusting the triggering controls in the normal manner. Now, rotate the trigger holdoff variable control counterclockwise until any remaining instability is eliminated.

Horizontal Sweep Rates

The SECONDS/DIV switch selects calibrated sweep rates for the sweep generator. The variable control provides continuously variable sweep rates between the settings of the SECONDS/DIV switch. Only when the variable control is in its fully clockwise position are the sweep rates calibrated.

Sweep Magnification

The sweep magnifier expands the sweep by a factor of ten. The center division of the unmagnified display is the portion visible on the screen in magnified form. The equivalent length of the magnified sweep is more than 100 divisions. Any 10 division portion of the magnified sweep can be viewed by adjusting the horizontal POSITION control to bring the desired portion into the viewing area.

To use the magnified sweep, first move the portion of the display which is to be expanded to the center of the graticule. Then pull the SWP MAG switch to its out position. Use the horizontal POSITION control to move the magnified portion to the desired position.

When the PULL X10 HORIZ MAG switch is set to on, the sweep rate is determined by reading the number shown against the blue background.

X-Y Operation

In some applications, it is desirable to display one signal versus another (X-Y) rather than against the internal time base. The X-Y position of the DISPLAY switch provides a means for applying an external signal to the horizontal amplifier for this type of display.

NOTE

Do not exceed the horizontal scan area of the graticule in the X-Y mode of operation. This mode can be used to measure phase differences of signals up to about 50 kHz in frequency. Above this frequency, the inherent phase in the system makes phase measurement difficult.

BASIC OSCILLOSCOPE APPLICATIONS

Phase Difference Measurement

This phase difference measurement is limited by the frequency of the vertical system. Use the vertical input channels when comparing the phase of two or more signals of the same frequency.

1. Set the CH 1 and CH 2 DC-GND-AC-INT DC switches to either AC or DC.

2. Set the DISPLAY switch to either ALT or CHOP position. Use the ALT position for high-frequency (above 30 MHz) signals and the CHOP position for low frequency (below 30 MHz) signals.

3. Set the TRIGGERING SOURCE switch to CH 1.

4. Connect the reference signal to the CH 1 input connector and the comparison signal to the CH 2 input connector. Use coaxial cables or probes which have equal time delay to connect the signals to the input connectors. If the signals are of opposite polarity, due to 180° phase difference, switch the DISPLAY switch to 1-2 position to invert the CH 2 signal.

5. Set the channel VOLTS/DIV switches and the CAL variable VOLTS/DIV controls for equal displays of about five divisions in amplitude.

6. Set the triggering controls for a stable display. Set the SECONDS/DIV switch for a sweep rate that displays about one cycle of the waveform.

7. Move the waveforms to the center of the graticule with the channel POSITION controls.

8. Turn the variable SECONDS/DIV control until one cycle of the reference signal (CH 1) occupies eight divisions between the second and tenth vertical lines of the graticule (see Fig. 1-3).

Each division of the graticule represents 45° of the cycle ($360^\circ \div 8 \text{ div} = 45^\circ/\text{div}$). The sweep rate can now be stated as 45°/div.

9. Measure the horizontal distance between corresponding points on the waveform.

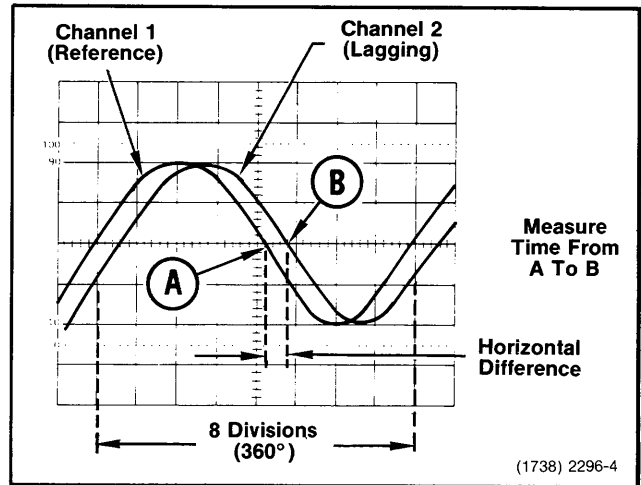


Fig. 1-3. Phase difference measurements.

10. Multiply the measured distance (in divisions) by 45°/div (sweep rate) for the amount of phase difference.

11. Example:

Assume a horizontal difference of 0.6 division with a sweep rate of 45°/div as shown in Fig. 1-3.

Substituting the given values:

$$\text{Phase difference} = 0.6 \text{ division} \times 45^\circ/\text{div}$$

$$\text{Phase difference} = 27^\circ.$$

High Resolution Phase Measurement

More accurate multitrace phase measurements can be made by increasing the sweep rate (without changing the variable SECONDS/DIV control setting).

The X10 sweep magnifier (PULL X10 HORIZ MAG) switch increases the sweep rate.

Example:

If the sweep rate was increased 10 times with the magnifier, the magnifier sweep rate should be $45^\circ/\text{div} \div 10 = 4.5^\circ/\text{div}$.

Figure 1-4 shows the same signals as used in Fig. 1-3, but with the X10 HORIZ MAG on.

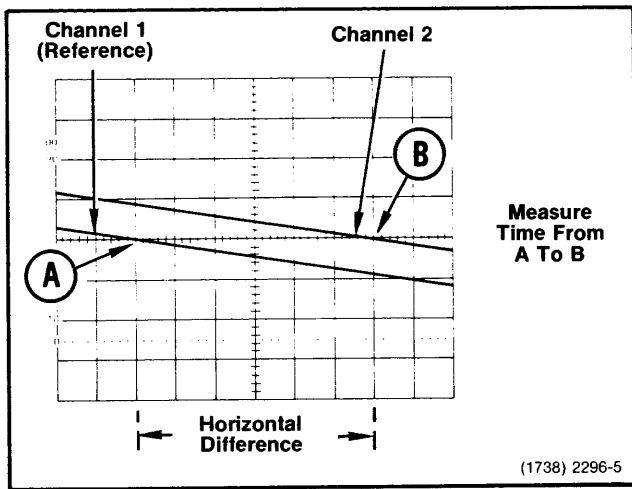


Fig. 1-4. High-resolution phase difference measurement.

With a horizontal difference of six divisions and substituting the given values.

$$\text{Phase difference} = 6 \text{ divisions} \times 4.5^\circ/\text{div} = 27^\circ.$$

$$\text{Phase difference} = 27^\circ.$$

Common-mode Rejection

When signals contain undesirable components, common-mode rejection can eliminate or reduce these components from the measurement.

Example:

The displayed signal contains an undesired line-frequency component (see Fig. 1-5).

1. Connect the signal to the CH 1 input connector.
2. Connect the line-frequency signal to the CH 2 input connector.
3. Set the DISPLAY switch to 1-2 so that the channel 2 display is opposite in polarity.

4. Adjust the channel 2 CAL variable control to make the channel 2 display amplitude about equal to the undesired component of the channel 1 display.

5. Set the DISPLAY switch to 1+2 and re-adjust the channel 2 CAL variable control for maximum rejection of the undesired signal component (see Fig. 1-5).

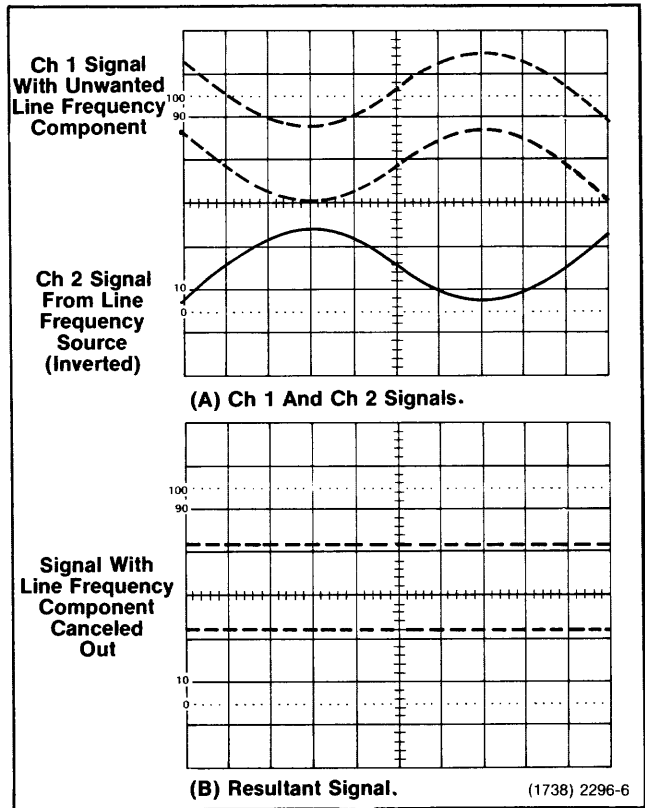


Fig. 1-5. Common-mode rejection measurements.

Cascaded Operation

The channel 1 trigger out signal is electrically tied with the channel 2 input signal via an appropriate coaxial cable.

When switching the DC-GND-AC-INT DC switch to INT DC position, the rear interface contact 28B furnishes a portion of the channel 1 vertical signal. The signal amplitude is at least 50 mV/div of crt display referenced to 0 V, when driving a 50 Ω load. The bandwidth, in this mode, is limited to approximately 30 MHz.

SPECIFICATION AND PERFORMANCE CHECK

SPECIFICATION

Performance Conditions

The electrical characteristics are valid only if the SC 504 has been calibrated at an ambient temperature between +20°C and +30°C and is operating at an ambient temperature between 0°C to +50°C unless otherwise noted.

Items listed in the Performance Requirements column of the Electrical Characteristics are verified by completing the Performance Check in this manual. Items listed in the Supplemental Information column are not verified in this manual; they are either explanatory notes or performance characteristics for which no limits are specified.

ELECTRICAL CHARACTERISTICS

Table 2-1

VERTICAL DEFLECTION SYSTEM

Characteristics	Performance Requirements		Supplemental Information	
Bandwidth at -3 dB points	0°C to +35°C	0°C to +50°C		
	DC to at least 80 MHz.	DC to at least 70 MHz.		
Risetime (calculated)			0°C to +35°C	0°C to 50°C
			4.4 ns or less.	5.0 ns or less.
AC low frequency response (Lower -3 dB point) Deflection factor	10 Hz, or less.		1 Hz with 10X probe.	
Calibrated range			5 mV to 10 V/div; 11 steps in a 1-2-5 sequence.	
Accuracy	+15°C to +35°C	0°C to +50°C	Variable in cal position (fully cw); gain correctly set at 10 mV/div.	
	±2%	±3%		
	Add 1% to above figures for channel 2 in CH1-CH2 (differential) mode.			
Attenuator step balance			Less than 1 division of shift as each VOLTS/DIV switch is rotated through-out its range.	

Table 2-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
Variable balance		Less than 2 divisions of shift as each variable (CAL) control is rotated throughout its range.
Uncalibrated (variable) range	Continuously variable between calibrated steps. Extends maximum attenuator step to at least 25 V/div.	At least a 2.5:1 range.
Input R and C		1 M Ω \pm 1% paralleled by approximately 20 pF.
Maximum input voltage Peak (dc + Peak ac)		250 V (dc coupled). 400 V (ac coupled).
Peak-to-peak (ac component)		500 V at 1 kHz or less, derates to 10 V at 100 MHz.
Common mode rejection ratio	At least 50:1 up to 1 MHz and 10:1 up to 10 MHz when using same attenuator settings; common mode signal 6 divisions or less.	
Step Response (aberrations) First 300 ns: 5 mV/div to .2 V/div		
Positive-going step 15°C to 35°C		\pm 3%
0°C to 50°C		\pm 6%
Negative-going step 15°C to 35°C		\pm 5%
0°C to 50°C		\pm 8%
(CH1 + CH 2) mode 15°C to 35°C		\pm 5%
0°C to 50°C		\pm 8%
(CH 1 – CH 2) mode 15°C to 35°C		\pm 8%
0°C to 50°C		\pm 11%
After 300 ns: 5 mV/div to 2 V/div		\pm 2%
5 V/div and 10 V/div		\pm 3%

Table 2-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
Position effect 15°C to 35°C		Typically 5% or less change in aberrations as a 5 division step is vertically positioned over the graticule area.
CH2 invert trace shift		Less than 2 div when switching from CH1 + CH2 to CH1 – CH2.
Signal isolation		
Display related	At least 50:1 up to 20 MHz.	
Input related		
a. Between front panel inputs	At least 80 dB up to 10 MHz.	
b. Between rear interface inputs		At least 40 dB up to 20 MHz.
c. From front panel input to rear interface input (each channel)		At least 40 dB up to 20 MHz.
d. From rear interface input to front panel input (each channel)		At least 80 dB up to 40 MHz.
Position Range		At least ± 6 divisions.
Signal delay between channels		≤ 1 ns.
Delay line		Permits viewing leading edge of displayed waveform.
Dual-trace modes		
Rate		
Chop		At least 250 kHz.
Duty cycle		Approximately 60%.
Alt		Every other sweep.

Table 2-2
TRIGGERING

Characteristics	Performance Requirements			Supplemental Information		
	Source	Minimum Signal Required		Source	Minimum Signal Required	
Trigger sensitivity						
DC coupling		dc to 30 MHz.	30 MHz to 80 MHz.	Interface	35 mV	80 mV
	CH1, CH2	0.4 div.	1.5 div.			
	External	60 mV	150 mV			
AC coupling				Requirements increase below approximately 50 Hz.		
AC LF REJ coupling				Requirements increase below approximately 10 kHz.		
HF REJ coupling				Requirements increase above approximately 50 kHz.		
External triggering level range (Normal mode)	At least ± 1.4 V.					
External triggering Input						
Input R and C				1 m Ω $\pm 10\%$ paralleled by approximately 24 pF when selected. 750 k Ω $\pm 10\%$ paralleled by approximately 28 pF when not selected.		
Maximum input voltage						
Peak (dc + Peak ac)				250 V.		
Peak-to-peak (ac component)				250 V at 1 kHz or less, derates to 5 V at 100 MHz.		
Auto mode	Sweep free-runs in the absence of a triggering signal.			TRIGGER LEVEL range is reduced to approximately the peak to-peak range of the triggering signal. Internal and external trigger sensitivity reduced below approximately 100 Hz.		
Single Sweep	Triggering requirements same as for normal sweep. When triggered, sweep generator produces one sweep only.					

Table 2-3

HORIZONTAL DEFLECTION SYSTEM

Characteristics	Performance Requirements				Supplemental Information
Sweep generator Calibrated sweep rates Accuracy (measured over center 8 divisions, excluding first 50 ns and all after the first 100 divisions of magnified sweep)					0.2 s to 50 ns/div, 21 steps in a 1-2-5 sequence.
20 ms/div to .2 μ s/div Linearity (any 2 division portion within the center 8 divisions) .2 s/div to 50 ms/div, and .1 μ s/div and 50 ns/div Linearity (any 2 division portion within the center 8 divisions)	+15° c to +35° C		0° C to +50° C		
	Unmag-nified	Magni-fied X10	Unmag-nified	Magni-fied X10	
	±2%	±3%	±3%	±4%	
	±5%	±6%	±6%	±7%	
	±3%	±4%	±4%	±5%	
	±6%	±7%	±7%	±8%	
Uncalibrated (variable) range	The SECONDS/DIV CAL (variable) control (selected by an internal switch) provides sweep rates that are continuously variable between the calibrated rates, and extends the slowest sweep rate to at least 0.5 s/div.				
Trigger holdoff					The SECONDS/DIV CAL (variable) control (selected by an internal switch) increases trigger holdoff time by a factor of approximately 20.

Table 2-3 (cont)

Characteristics	Performance Requirements	Supplemental Information
X-Y operation		
Bandwidth		Dc to at least 2 MHz.
Deflection factor		Selected by channel 2 controls and horizontal mag x1, x10.
Accuracy		±5%.
X and Y amplifier phase difference	Less than 3° at 50 kHz or less.	
Ac low frequency response (lower -3 dB point)	10 Hz or less.	1 Hz with 10X probe.
Input R and C		1 MΩ ±1% paralleled by approximately 20 pF.
Maximum safe input voltage		
Peak (dc + peak ac)		250 V (dc coupled). 400 V (ac coupled).
Peak-to-peak (ac components)		500 V at 1 kHz or less, derates to 10 V at 100 MHz.

Table 2-4

CATHODE RAY TUBES

Characteristics	Performance Requirements	Supplemental Information
Geometry	Bowing or tilt 0.1 major division or less.	
Orthogonality		90° C ±1.4° C.
Phosphor		P31.
Acceleration potential		12 kV.
Graticule		Scale is 8 x 10 divisions with 0.25 inch/div with internal graticule lines.

Table 2-5
POWER SUPPLIES AND CALIBRATOR

Characteristics	Performance Requirements	Supplemental Information
Calibrator		
Voltage	0.6 V, $\pm 1\%$.	
Frequency		Approximately 1 kHz.
Power consumption		Approximately 26 watts operating. Less than 1 W, with TRIGGER SOURCE switch set to STBY (stand by).

Table 2-6
REAR INTERFACE INPUT AND OUTPUT SIGNALS

Characteristics	Performance Requirements	Supplemental Information
Input Signals		
Channel 1 vertical input		Selected by CH1 and CH2 coupling switches in INT DC interface) position. Input R: 50 Ω . Maximum input voltage: 40 V peak, 5 V rms. Maximum input power: 1/2 W.
Channel 2 vertical input		
Trigger input		Selected by TRIGGER SOURCE switch in INT DC (interface) position. Input R: 50 Ω when selected, 25 Ω when not selected. Maximum input voltage: 40 V peak. Maximum input power: 1/4 W, 2.5 V rms.
Z-axis input		Input Resistance: approximately 1.5 k Ω ; +5 V turns beam ON from OFF condition. -5 V turns beam OFF from ON condition.
Input signals		
External (delayed) Gate input		Ecl balanced input with the input resistance approximately 100 Ω and operating between +5 V and ground.
Gate select input		Open selects the internal gate. Ground (1 k Ω or less) selects the external gate.

Table 2-6 (cont)

Characteristics	Performance Requirements	Supplemental Information
Intensify input		Ecl input. A low (≤ 3.4 V) intensifies. A high, or open circuit (≥ 4.0 V) does not intensify. Ecl circuit operates between +5 V and ground.
Output signals		
Channel 1 trigger output		At least 50 mV/div. Bandwidth at least 30 MHz. Output resistance $\leq 50 \Omega$.
Triggered gate output		Ecl balance output operating between +5 V and ground.
Holdoff output		Ecl balanced output operating between +5 V and ground.
Ramp output		0 to +10 V ramp. Output resistance approximately 500 Ω .

ENVIRONMENTAL CHARACTERISTICS

Table 2-7

ENVIRONMENTAL CHARACTERISTICS

Characteristics	Description
Temperature	
Operating	0°C to +45°C. To +50°C in mainframes equipped with fan.
Storage	-40°C to +75°C.
Altitude	
Operating	To 15,000 feet; maximum operating temperature decreased by 1°C/1000 feet from 5,000 to 15,000 feet.
Storage	To 50,000 feet.
Shock	
Operating and non-operating	30 g's, 1/2 sine, 11 ms duration, 3 shocks in each direction along 3 major axes, for a total of 18 shocks.
Vibration	
Operating and non-operating	With the instrument operating, the vibration frequency is swept from 10 to 55 to 10 Hz. Vibrate 15 minutes in each of the three major axes at 0.015" total displacement. Hold 10 minutes at any major resonance or, if none, at 55 Hz. Total time, 75 minutes.

PHYSICAL CHARACTERISTICS

Table 2-8

PHYSICAL CHARACTERISTICS

Characteristics	Description
Net weight	Approximately 6.0 lbs (2.7 kg).
Dimensions	5.3 in (13.5 cm) W x 12.2 in (30.99 cm) D x 5 in (12.7 cm) H.

PERFORMANCE CHECK

Introduction

This procedure checks the electrical characteristics of the SG 504 that appear in the Specification section of this manual. If the instrument fails to meet the requirements given in this performance check, the adjustment procedure should be performed. This procedure can also be used by an incoming inspection facility to determine acceptability of performance.

The electrical characteristics in Section 2 are valid only if the SG 504 is calibrated at an ambient temperature of +20° C to +30° C and operated at an ambient temperature of 0° C to +50° C.

Tolerances that are specified in this performance check procedure apply to the instrument under test and do not include test equipment error.

Test Equipment Required

Below is a list of equipment required to verify operation as specified. Other equipment may be substituted when suitable.

LIST OF TEST EQUIPMENT REQUIREMENTS

Description	Performance Requirements	Applications	Example
TM 500 power module		All steps.	TEKTRONIX TM 503, TM 504, TM 506.
Function generator	5 Hz to 5 kHz.	Frequency response.	TEKTRONIX FG 503 Function Generator ^a .
Time mark generator	.2 s to 5 ns in 1, 2, 5 sequence.	Sweep rates and Geometry.	TEKTRONIX TG 501 Time Mark Generator ^a .
Calibration generator	Amplitude calibration, 50 mV to 5 V; accuracy, $\pm 0.25\%$ into 1 M Ω ; output, squarewave at approximately 1 kHz.	Vertical deflection and vertical amp input.	TEKTRONIX PG 506 Calibration Generator ^a .
Leveled sine-wave generator	250 kHz to 100 MHz.	Bandwidth, rejection ratio, signal isolation, trig sensitivity, & range phasing.	TEKTRONIX SG 503 Leveled Sine-Wave Generator ^a .
Input normalizer	Traceable to NBS; 20 pF and 1 M Ω .	Vertical amp input.	Tektronix part no. 067-0538-00.
Termination	50 Ω with bnc connectors.	Output termination for signal generator.	Tektronix part no. 011-0049-01.
Coaxial cable	50 Ω with bnc connectors.	Provides signal interconnection.	Tektronix part no. 012-0057-01.
Dual input coupler	Bnc connectors.	Rejection ratio and phasing.	Tektronix part no. 067-0525-01.
Adapter	Bnc to pin jack.	Calibrator.	Tektronix part no. 013-0084-01.

^aRequires TM 500-series power module.

Preliminary Control Settings:

Mainframe power	ON
CH 1	
VOLTS/DIV	1
CAL	cw
DC-GND-AC-INT DC	DC
CH 2	
VOLTS/DIV	1
CAL	cw
DC-GND-AC-INT DC	DC
SECONDS/DIV	.5 m
PULL X10 HORIZ MAG-CAL	pushed in - cw
TRIGGERING	
MODE	AUTO
CPLG	DC (all buttons out)
SOURCE	CH 1
SLOPE	+
LEVEL	centered
DISPLAY	CH 1
INTEN	normal brightness
FOCUS	sharp trace

1. Check the Vertical Bandwidth (0° C to +35° C)

The front panel control settings are the same as the preliminary settings with exception of the following:

CH 1 VOLTS/DIV	10 m
CH 2 VOLTS/DIV	10 m
TRIGGERING SOURCE	LINE
SECONDS/DIV	1 m

a. Connect a 50 kHz sine-wave signal from the leveled sine-wave generator through a 50 Ω coaxial cable with a 50 Ω termination, to the CH 1 bnc connector.

b. Adjust the generator for a display of exactly 6 major graticule divisions.

c. Set the generator frequency to 10 MHz.

d. CHECK—that the displayed trace is at least 4.2 major divisions in amplitude.

e. Change the CH 1 VOLTS/DIV switch to .5.

f. Return the generator frequency to 50 kHz and set the display amplitude for 6 major divisions.

g. Change the generator frequency to 80 MHz.

h. CHECK—that the display is at least 4.2 major divisions in amplitude.

i. Repeat the above steps for CH 2.

j. Disconnect all cables and return the front panel controls to the preliminary settings.

NOTE

To check bandwidth at an ambient temperature range of 0° C to +50° C, the generator frequency is 70 MHz in parts c and g.

2. Check the Ac Coupled Low Frequency Response

The front panel control settings are the same as the preliminary settings with exception of the following:

TRIGGERING MODE	LINE
SECOND/DIV	5 m

a. Connect a 10 Hz sine-wave signal from the low frequency generator to the CH 1 input connector and adjust the signal amplitude for a vertical display of 6 major graticule divisions.

b. Change the CH 1 DC-GND-AC-INT DC switch to AC.

c. CHECK—that the signal amplitude is still ≥ 4.2 major divisions.

d. Repeat the above procedure for CH 2.

e. Disconnect all cables and return the front panel controls to the preliminary settings.

3. Check the Vertical Deflection Accuracy (+15° C to +35° C)

The front panel control settings are the same as the preliminary settings with the following exceptions:

CH 1 VOLTS/DIV	5 m
CH 2 VOLTS/DIV	50
TRIGGERING SOURCE	LINE

a. Connect the calibration generator to the CH 1 input connector through a 50 Ω coaxial cable.

b. Adjust the generator variable control until exactly 4 major graticule divisions are displayed on the crt.

c. CHECK—that the readout error is less than 2.0%.

d. CHECK—readout error for the following settings:

VOLTS/DIV	Generator Setting	Display	Tolerance
5 m	20 mV	4 div	2.0%
10 m	50 mV	5 div	2.0%
20 m	100 mV	5 div	2.0%
50 m	200 mV	4 div	2.0%
.1	500 mV	5 div	2.0%
.2	1 V	5 div	2.0%
.5	2 V	4 div	2.0%
1	5 V	5 div	2.0%
2	10 V	5 div	2.0%
5	20 V	4 div	2.0%
10	50 V	5 div	2.0%

NOTE

When checking the deflection accuracy at an ambient temperature range of 0°C to +50°C, the readout error is less than 3.0%.

e. Repeat the above procedure for CH 2.

f. Disconnect all cables and return the front panel controls to the preliminary settings.

4. Check the Vertical Amplifier Input R and C

The front panel control settings are the same as the preliminary settings with exception of the following:

TRIGGERING SOURCE LINE

a. Connect a 5 V square wave from the calibration generator through a 50 Ω coaxial cable to the CH 1 input connector and adjust the generator for exactly 5 major divisions of deflection on the crt screen.

b. Insert a 20 pF input normalizer between the generator and the input connector.

c. Change the square wave input to 10 V.

d. CHECK—that the deflection is 5 major divisions ±.1 division.

e. Change the TRIGGERING SOURCE switch to the channel being checked.

f. CHECK—that the leading edge of the displayed waveform is not undershot or overshoot by more than 0.5 major division.

g. Repeat this procedure for CH 2.

h. Disconnect all cables and return the front panel controls to the preliminary settings.

5. Check the Common Mode Rejection Ratio

The front panel control settings are the same as the preliminary settings with the following exceptions:

CH 1 VOLTS/DIV .2
 CH 2 VOLTS/DIV .2

a. Connect a 50 kHz 1 V signal from the leveled sine-wave generator to the CH 1 and CH 2 inputs using a 50 Ω coaxial cable, a 50 Ω termination and a 50 Ω dual input connector.

b. Change the DISPLAY switch to 1-2 and set the generator frequency to 1 MHz.

c. CHECK—that the crt displays less than .2 major division of deflection.

d. Disconnect all cables and return the front panel controls to the preliminary settings.

6. Check for Display Related Signal Isolation

The front panel control settings are the same as the preliminary settings with the following exceptions:

DISPLAY CH 2
 CH 1 VOLTS/DIV .2
 CH 2 VOLTS/DIV 10
 CH 2 DC-GND-AC-INT DC GND

a. Connect a 20 MHz 2 V peak-to-peak signal from a leveled sine-wave generator through a 50 Ω coaxial cable with a 50 Ω termination to the CH 1 input connector.

b. CHECK—that CH 2 displays an amplitude of 0.2 major division or less.

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c. Disconnect the generator signal from the CH 1 connector and reconnect to the CH 2 input connector.

d. Change the DISPLAY switch to CH 1 and the CH 1 VOLTS/DIV switch to 10.

e. Change the CH 1 DC-GND-AC-INT DC switch to the GND position and the CH 2 DC-GND-AC-INT DC switch to the DC position.

f. Change the CH 2 VOLTS/DIV switch to .2.

g. CHECK—that CH 1 displays no more than 0.2 major graticule division of signal.

h. Disconnect all cables and return the front panel controls to the preliminary settings.

7. Check for Input Related Signal Isolation

The front panel control settings are the same as the preliminary settings with the following exceptions:

CH 1 VOLTS/DIV	10
CH 1 DC-GND-AC-INT DC	GND
CH 2 VOLTS/DIV	5 m

a. Connect a 10 MHz 5 V peak-to-peak signal from a leveled sine-wave generator, through a 50 Ω coaxial cable with a 50 Ω termination to the CH 1 input connector.

b. CHECK—that CH 2 displays no more than 0.1 major graticule division of amplitude.

c. Disconnect the generator signal from the CH 1 connector and reconnect to the CH 2 input connector.

d. Change the DISPLAY switch to CH 2 and the CH 2 VOLTS/DIV switch to 10.

e. Change the CH 2 DC-GND-AC-INT DC switch to GND.

f. Change the CH 1 VOLTS/DIV switch to 5 m.

g. Change the CH 1 DC-GND-AC-INT DC switch to DC.

h. CHECK—that CH 1 displays no more than 0.1 major graticule division of amplitude.

i. Disconnect all cables and return the front panel controls to the preliminary settings.

8. Check the External Trigger Sensitivity

The front panel control settings are the same as the preliminary settings with the following exceptions:

TRIGGERING SOURCE	EXT
SECONDS/DIV	.5 μ

a. Connect a 60 mV peak-to-peak, 30 MHz signal from the leveled sine-wave generator through a 50 Ω coaxial cable with a 50 Ω termination to the EXT TRIG input connector.

b. Depress the TRIG VIEW switch and rotate the TRIGGERING LEVEL control.

c. CHECK—for a stable display.

d. Change the generator frequency to 80 MHz with a 150 mV peak-to-peak amplitude.

e. Depress the TRIG VIEW switch and rotate the TRIGGERING LEVEL control.

f. CHECK—for a stable display.

g. Disconnect all cables and return the front panel controls to the preliminary settings.

9. Check the Triggering Level Range

The front panel control settings are the same as the preliminary settings with the following exceptions:

CH 1 VOLTS/DIV	.1
CH 2 VOLTS/DIV	.2

a. Connect a 50 kHz sine wave from a leveled sine-wave generator through a 50 Ω coaxial cable with a 50 Ω termination to the CH 1 input connector.

b. Adjust the generator for a display of 8 major graticule divisions.

c. CHECK—that when rotating the TRIGGERING LEVEL control fully clockwise or counterclockwise the trace disappears.

d. Readjust the generator for a 2.8 V peak to peak signal and reconnect this signal to the EXT TRIG input connector.

e. Change the TRIGGERING SOURCE switch to the EXT position.

f. CHECK—repeat part c.

g. Disconnect all signals and return the front panel controls to the preliminary settings.

10. Check the Auto and Single Sweep Reset Modes of Operation

The front panel control settings are the same as the preliminary settings with the following exceptions:

CH 1 VOLTS/DIV .1
CH 2 VOLTS/DIV .2

a. CHECK—for a visible trace.

b. Push the MODE NORM switch in.

c. CHECK—that the trace disappears.

d. Connect 1 ms pulses from the time mark generator through a 50 Ω coaxial cable with a 50 Ω termination to the CH 1 input connector. Adjust the TRIGGERING LEVEL control for a stable display.

e. Momentarily depress and release the MODE SGL SWP-RESET switch.

f. CHECK—that the display appears once each time the switch is depressed.

g. Disconnect all cables and return the front panel controls to the preliminary settings.

11. Check the Horizontal Sweep Rates

The front panel control settings are the same as the preliminary settings with the following exceptions:

CH 1 VOLTS/DIV .5
TRIGGERING MODE NORM
SECONDS/DIV .2

a. Connect .2 s time marks from a time mark generator through a 50 Ω coaxial cable with a 50 Ω termination to the CH 1 input connector.

b. Rotate the TRIGGERING LEVEL control for a stable display. Vertically position the display to the center of the viewing area of the crt.

c. CHECK—that 1 time marker per major graticule division is displayed on the crt within linearity tolerance and the second and tenth time markers line up with their respective graticule lines within the specifications as shown in the table below.

d. Disconnect all cables and return the front panel controls to the preliminary settings.

12. Check the Seconds per Division Variable Range

The front panel control settings are the same as the preliminary settings with the following exception:

CH 1 VOLTS/DIV .5

SECONDS/DIV sweep rates	+15° C to +35° C		0° C to +50° C	
	unmagnified	magnified	unmagnified	magnified
.2 s/div to 50 ms/div	±3% (0.24 major div)	±4% (0.32 major div)	±4% (0.32 major div)	±5% (0.4 major div)
20 ms/div to .2 μs/div	±2% (0.16 major div)	±3% (0.24 major div)	±3% (0.24 major div)	±4% (0.32 major div)
.1 μs/div to 50 ns/div	±3% (0.24 major div)	±4% (0.32 major div)	±4% (0.32 major div)	±5% (0.4 major div)
Linearity (any 2 div portion with- in the center 8 div)	±5% (0.4 major div)	±6% (0.48 major div)	±6% (0.48 major div)	±7% (0.56 major div)

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a. Connect 5 ms time marks from a time mark generator through a 50 Ω coaxial cable with a 50 Ω termination to the CH 1 input connector.

b. Use the horizontal POSITION control to place the first time marker under the first vertical graticule line. The second time marker should be under the tenth vertical graticule line.

c. CHECK—that rotating the SECONDS/DIV CAL control fully counterclockwise, positions the second time marker to the left of the fourth vertical graticule line.

d. Disconnect all cables and return the front panel controls to the preliminary settings.

13. Check the X-Y Phasing

The front panel control settings are the same as the preliminary settings with the following exceptions:

CH 1 VOLTS/DIV	50 m
CH 2 VOLTS/DIV	.2
DISPLAY	XY

a. Connect a 50 kHz signal from a leveled sine-wave generator through a 50 Ω coaxial cable with a 50 Ω termination and dual input coupler (in that order) to the CH 1 and CH 2 input connectors.

b. Adjust the generator for a vertical deflection of 8 major graticule divisions.

c. Rotate the POSITION controls to center the display on the crt screen.

d. CHECK—that the horizontal opening, at screen center, is less than 0.4 major graticule division.

e. Disconnect all cables and return the front panel controls to the preliminary settings.

14. Check the Crt Geometry

The front panel control settings are the same as the preliminary settings with the following exception:

CH 1 VOLTS/DIV	50 m
----------------	------

a. Adjust the vertical and horizontal POSITION controls so that the displayed signal follows the top horizontal

graticule line, starting exactly at the left edge of the graticule.

b. CHECK—that the right side of the trace is no more than 0.1 major graticule division above or below the graticule line.

c. Connect 0.5 ms time markers from a time mark generator through a 50 Ω coaxial cable with a 50 Ω termination to the CH 1 input connector.

d. Adjust the TRIGGERING LEVEL control for a stable display on the crt.

e. Adjust the vertical POSITION control to place the baseline of the time markers well off scale beyond the bottom of the graticule.

f. Adjust the horizontal POSITION control to align one of the time markers with the bottom of the vertical center line of the graticule.

g. CHECK—that the top of the vertical trace is within 0.1 major graticule division left or right of the vertical center line.

h. Disconnect the time mark generator and return the front panel controls to the preliminary settings.

15. Check the Calibrator

The front panel control settings are the same as the preliminary settings with the following exceptions:

CH 1 VOLTS/DIV	.1
SECONDS/DIV	.2 m

a. Connect the output of the calibrator to the CH 1 input connector using the pin jack to bnc connector.

b. CHECK—that the display is 6 divisions within .06 division.

c. CHECK—that the period of the calibrator waveform is approximately 1 ms.

d. Disconnect the bnc to pin adapter.

This completes the Performance Check Procedure.

ADJUSTMENT PROCEDURE

INTERNAL ADJUSTMENT PROCEDURE

Adjustment is generally required after a repair has been made, or after long time intervals in which normal aging of components may affect instrument accuracy.

To ensure instrument accuracy, check the calibration every 2000 hours of operation or every six months if used infrequently.

Before complete calibration thoroughly clean and inspect this instrument as outlined in the service section of the Power Module manual. The Power Module manual also contains information for general maintenance of this instrument, including preventive, component identification and replacement etc.

NOTE

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

WARNING

Dangerous potentials exist at several points throughout this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Disconnect power by removing the SC 504 from the TM 500-series power module before cleaning the instrument or replacing parts. The SC 504 TRIGGERING SOURCE switch STBY position does not remove all power from the oscilloscope.

Equipment Required

LIST OF TEST EQUIPMENT REQUIREMENTS

Description	Performance Requirements	Applications	Example
TM 500 Power module		All steps	TEKTRONIX TM 503, TM 504, TM 506
Digital voltmeter	Range, 0 to 50 V, accuracy, $\pm 0.1\%$	Calibrator Power supplies Beam current Common mode Trigger balance	TEKTRONIX DM 501 Digital Multimeter ^a
Time-mark generator	.2 s to 5 ns in 1,2,5 sequence	Geometry Sweep mag Gain Sweep timing Fast ramp comps	TEKTRONIX TG 501 Time Mark Generator ^a
Calibration generator	Amplitude calibration, 50 mV to 5 V; accuracy, $+0.25\%$ into 1 M Ω ; Output, squarewave at approximately 1 kHz	Low freq comp Input capacitance Gain Transient response	TEKTRONIX PG 506 Calibration Generator ^a
Input normalizer	Traceable to NBS; 20 pF and 1 M Ω	Input capacitance	Tektronix part no. 067-0538-00

^a Requires TM 500-series power module.

LIST OF TEST EQUIPMENT REQUIREMENTS (cont)

Description	Performance Requirements	Applications	Example
Termination	50 Ω with bnc connectors	Output termination for signal generator	Tektronix part no. 011-0049-01
Coaxial cable	50 Ω with bnc connectors	Provides signal inter-connection	Tektronix part no. 012-0057-01
Plug-in extension		All steps	Tektronix part no. 067-0645-02 (2 required)
10X attenuator	50 Ω with bnc connectors	Low freq comp Vertical amp response	Tektronix part no. 010-6105-03
2X attenuator	50 Ω with bnc connectors	Vertical amp response	Tektronix part no. 011-0069-02

Preliminary Procedure

1. Check that the power is OFF in the TM 500 series power module.

2. Connect the nominal line selector block of the power module to the correct line selector pins (120 V ac or 220 V ac). Also check that the regulating range selected includes the input line voltage. See the Installation Section of the Power Module Manual.

a. Connect the power module to the line voltage source.

3. Remove the SC 504 Oscilloscope side, top, and bottom covers and connect the oscilloscope to the power module, using the plug-in extensions. Observe the caution signs on the plug-ins when making the connections. Align the plug-in correctly when making the connection to the short board.

NOTE

The performance of this instrument can be checked at any temperature from 0° C to +50° C. Make any adjustment at a temperature of +25° C, ±5° C.

a. Set the following controls:

FOCUS	Fully counterclockwise
INTEN	Fully counterclockwise
TRIG VIEW	Midrange
DISPLAY POSITION (vertical)	CH 1
CH 1	Midrange
CH 1	Midrange

CH 1

VOLTS/DIV	0.1
DC-GND-AC-INT DC	DC

CH 2

VOLTS/DIV	50 m
DC-GND-AC-INT DC	GND
POSITION (horizontal)	Midrange
SECONDS/DIV	0.5 ms
PULL X10 HORIZ	Fully clockwise and pushed in
MAG/CAL	
TRIGGERING	
MODE AUTO	Pushed in
CPLG	
AC	Pushed in
AC LF REJ	Out position
HF REJ	Out position
SOURCE	CH 2
SLOPE (TRIGGERING)	+
LEVEL (TRIGGERING)	Midrange

4. Turn on the power module by pulling the power switch out.

NOTE

If any work has been performed on the SC 504 power supplies, check the +20 V, -20 V, +5 V and -5 V power supplies. These supplies must be within their correct tolerances after turn on.

5. Allow fifteen minutes for the SC 504 to warm up and stabilize.

NOTE

The tabbed foldout pages labeled Adjustment Locations Figs. 8-11, 8-12, 8-13, and 8-14 contain illustrations showing the location of each adjustment in this procedure.

1. Adjust Calibrator Output

a. Connect the digital voltmeter positive lead to the CAL jack, located on the front panel. Connect the voltmeter negative lead to chassis ground, at the front panel. Set the voltmeter to 2 V full scale.

b. Short test points, TP1110 and TP1112 located on the Main Circuit board.

c. ADJUST—R3466, +20 Volts, located on the Trigger Board, for a voltmeter reading of 0.6000 V. This establishes the correct +20 V supply.

d. Remove the short from TP1110 and TP1112.

2. Power Supplies and Testpoints

+20 volts	±2%	TP3465
-20 volts	±3%	TP3365
+5 volts	±3%	TP2462
-5 volts	±3%	TP2460

Check supply voltages with respective grounds.

3. Adjust Crt Beam Current

a. Connect the positive lead of the dc voltmeter to the beam current testpoint, TP1575 located on the Main Circuit board and the voltmeter negative lead to chassis ground. Set the voltmeter to about 2 V full scale.

b. Set the DISPLAY switch to XY and position the beam off the crt viewing area using the front panel POSITION controls. Turn the INTEN control fully clockwise.

c. ADJUST—R1595, Beam Current, for a voltmeter reading between 0.39 V and 0.41 V.

d. Disconnect the voltmeter and turn the INTEN control to its midrange position.



To avoid possible damage to the crt phosphor, do not allow a bright spot to remain stationary for an extended period of time within the viewing area.

4. Adjust Crt Astigmatism

a. Position the crt spot to the center of the crt viewing area with the horizontal and vertical POSITION controls. Reduce the spot intensity to prevent crt phosphor damage.

b. Rotate the FOCUS control fully counterclockwise.

c. ADJUST—R1590, Astig located on the Main Board, for the roundest crt spot.

d. Set the FOCUS control for the best focused spot.

e. If necessary, reduce the spot intensity to prevent crt phosphor damage.

5. Adjust Crt Trace Rotation

a. Set the SECONDS/DIV switch to .5 m and the DISPLAY switch to CH 2.

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

c. ADJUST—R1585 located on the Main Board, until the crt trace is parallel to the center horizontal graticule line.

6. Adjust Crt Geometry

NOTE

The geometry adjustment will cause some change in sweep timing.

a. Connect 0.5 ms time markers from the properly terminated time mark generator to the CH 2 input connector. Trigger the display and position the baseline of the time mark below the bottom graticule line.

b. ADJUST—R1580, Geom located on the Main Board, for minimum bow or tilt of the vertical lines using the vertical graticule lines for reference. Compromise the adjustment of R1580 to bring all points within 0.1 major division or less.

c. Disconnect the time mark generator.

7. Adjust CH 1 and CH 2 Attenuator Bal Controls

- a. Set the DISPLAY switch to CH 2.
- b. Set the CH 2 DC-GND-AC-INT DC switch to GND and the VOLTS/DIV switch to 20 m.
- c. Position the crt trace to the center horizontal graticule line using the CH 2 vertical POSITION control.
- d. Set the CH 2 VOLTS/DIV switch to 5 m.
- e. ADJUST—R1570, Bal 2 located on the Main Board, (R1565, Bal 1, for Ch 1) to bring the crt trace back to the center horizontal graticule line.
- f. Return the CH 2 VOLTS/DIV switch to 20 m and reposition the crt trace to the center horizontal graticule line using the vertical POSITION control. Repeat these steps until all interaction is eliminated.
- g. Change the DISPLAY switch to CH 1 and repeat the above steps for CH 1.

8. Adjust the Vertical Common Mode Voltage

- a. Set the DISPLAY switch to CH 2.
- b. Connect the dc voltmeter leads to the center-tapped connections of L2247 and L2347 located on the F and I circuit board.
- c. ADJUST the CH 2 vertical POSITION control until the voltmeter indicates 0 V, ± 50 mV.
- d. Disconnect the voltmeter.
- e. Reconnect the positive lead of the DC voltmeter to either connection listed in step b and the voltmeter negative lead to chassis ground.
- f. ADJUST—R2137, CM located on the F & I Board, until the voltmeter indicates between +4.05 V and +3.95 V.
- g. Disconnect the voltmeter.

9. Adjust Low Frequency Compensation

- a. Set the DISPLAY switch to CH 2.

- b. Set the SOURCE switch to CH 2.
- c. Set the CH 2 VOLTS/DIV switch to 10 m with the DC-GND-AC-INT DC switch set to DC.
- d. Connect a fast rise (positive going) signal from a PG 506 Calibration Generator or equivalent, through a X10 attenuator and a 50 Ω termination network, into the CH 2 input connector.
- e. Adjust the generator for a pulse amplitude of 5 major graticule divisions.
- f. Set the calibration generator for a period of 100 Hz.
- g. Set the SECONDS/DIV switch to 1 m.
- h. Check for a flat top of the displayed waveform.
- i. Rotate the TRIGGERING LEVEL control to obtain a stable display.
- j. ADJUST—R2311, Lf Comp, located on the F & I Board to obtain a flat top of the displayed waveform.

- k. Disconnect the calibration generator and all cables.

10. Adjust CH 1 and CH 2 Input Capacitance For Hybrid Attenuators

- a. Set the CH 1 DC-GND-AC-INT DC switch to DC.
- b. Set the VOLTS/DIV switch to .2.
- c. Set the TRIGGERING SOURCE switch to CH 1 and connect a 20 pF normalizer from the calibration generator through a 2X attenuator to the CH 1 input connector.
- d. Set the TRIGGERING SLOPE to + position.
- e. Adjust the calibration generator for a 100 μ s period and an output amplitude of 6 major graticule divisions.
- f. Set the SECONDS/DIV switch to 5 μ , and the VOLTS/DIV switch to .1.

g. Rotate the TRIGGERING LEVEL control for a stable display.

h. ADJUST—C1430 located on the Main Board, (C1330 for CH 2) for a flat top on the displayed waveform.

i. Change the DISPLAY switch to CH 2, along with the applicable CH 2 controls, and repeat the above steps for CH 2.

11. Adjust the Vertical Amplifier Gain

a. Set the CH 2 VOLTS/DIV switch to 10 m and set the TRIGGERING SOURCE switch to EXT.

b. Set the CH 2 DC-GND-AC-INT DC switch to DC.

c. Connect a 50 mV standard amplitude signal from the calibration generator to the CH 2 input connector.

d. Vertically POSITION the waveform so that the top and bottom of the pulse waveform are within equal distance of the graticule center line.

e. ADJUST—R2336, Gain 2, located on the F & I Board, for a waveform amplitude of exactly five major graticule divisions.

f. Change the DISPLAY switch to CH 1 and reconnect the calibration generator output signal to the CH 1 input.

g. Set the CH 1 VOLTS/DIV switch to 10 m.

h. Set the CH 1 DC-GND-AC-INT DC switch to DC.

i. ADJUST—R1455, Gain 1 located on the Main Board, for a waveform amplitude of exactly five major graticule divisions.

12. Adjust Vertical Amplifier Transient Response

a. Connect a fast rise positive going signal from a PG 506 Calibration Generator or equivalent, through a X10 attenuator and a 50 Ω termination into the CH 2 input connector.

b. Set the DISPLAY switch to CH 2 and the VOLTS/DIV switch to 10 m.

c. Set the CH 2 DC-GND-AC-INT DC switch to DC.

d. Set the calibration generator for a period of 1 μ s and adjust the generator for a five division squarewave display.

e. Set the SECONDS/DIV switch to .1 μ and pull the X10 HORIZ MAG switch (10 ns/div).

f. Set the TRIGGERING SOURCE switch to CH 2 and rotate the TRIGGERING SLOPE control to the — position and observe the rising edge of the waveform.

g. ADJUST—R2242, R2310, C2313 and C2341 all located on the F and I board with C1349 and R1345 (located on CH 2, Main board) for the fastest flat top waveform in the first 100 ns.

h. ADJUST—R2321, C2321 and C2343 located on the F and I board for the fastest flat top waveform in the first 30 ns. It may be necessary to repeat part g to achieve the specified aberrations and risetime.

i. Reconnect the calibration generator output signal to the CH 1 input connector.

j. Set the DISPLAY switch and TRIGGERING SOURCE switch to CH 1.

k. Set the CH 1 VOLTS/DIV switch to 10 m.

l. ADJUST—C1447, R1445 and C1527 located on CH 1, Main board to obtain the specified aberrations and risetime for CH 1.

NOTE

It may be necessary to repeat parts g and h compromising the settings of R2321, R2310, C2321, C2313, R2242, C2341, C2343, C1447, R1445 and C1527 to obtain optimum transient response for both channels.

m. Disconnect the calibration generator.

13. Adjust Sweep Mag Register

a. Set the DISPLAY switch to CH 1 and the SECONDS/DIV switch to .1 m.

b. Connect .5 ms time markers from a properly terminated time mark generator to the CH 1 connector.

Adjustment Procedure—SC 504

- c. Rotate the TRIGGERING LEVEL control to obtain a stable display.
- d. Pull the X10 HORIZ MAG switch.
- e. Use the horizontal POSITION control to align the leading edge of any one of the time marks to the vertical graticule center line.
- f. Push in the X10 HORIZ MAG switch (X1 position).
- g. ADJUST—R1155, Mag Reg located on the Main board, to line up the leading edge of the unmagnified time mark with the vertical graticule center line.
- h. Pull the X10 HORIZ MAG switch and check for proper alignment of the time mark.
- i. Repeat steps d through h until there is no interaction between the X1 and X10 MAG positions.

14. Adjust Horizontal Amplifier X1 Gain

- a. Set the SECONDS/DIV switch to .2 m.
- b. Set the CH 1 VOLTS/DIV switch to .5.
- c. Connect the 0.2 ms time markers (see note) from a properly terminated time mark generator to the CH 1 input connector.

NOTE

If 0.2 ms time markers are unavailable, connect 0.1 ms markers and reference the display to two time marks per major graticule division.

- d. Rotate the TRIGGERING LEVEL control to obtain a stable display.
- e. Vertically position the display to the center of the crt viewing area with the POSITION control.
- f. ADJUST—R1167, X1 Gain located on the Main board, until a display of the proper time marks per major graticule division is obtained. The correct time markers must line up exactly with the second and tenth graticule lines.

15. Adjust Horizontal Amplifier X10 Gain

- a. Connect the 20 μ s time markers from the time mark generator to the CH 1 input connector.

NOTE

If 20 μ s time markers are unavailable, connect 10 μ s markers and reference the display to two time marks per major graticule division.

- b. Pull the X10 HORIZ MAG switch.
- c. Rotate the TRIGGERING LEVEL control to obtain a stable display.
- d. Adjust—R1169 X10 Gain located on the Main board, until a display of one time mark per major graticule division is obtained. The second and tenth time markers must line up exactly with their respective graticule lines.

16. Adjust Sweep Timing

- a. Set the SECONDS/DIV switch to 1 μ .
- b. Push in the X10 HORIZ MAG switch.
- c. Connect 1 μ s time markers from the time mark generator to the CH 1 input connector.
- d. ADJUST—C1238 located on the Main board, until a display of one time marker per major graticule division is obtained. The second and tenth time markers must line up exactly with their respective graticule lines.
- e. Change the SECONDS/DIV switch and the markers out of the time mark generator to 0.2 μ s.

NOTE

If 0.2 μ s time markers are unavailable, connect 0.1 μ s markers and reference the display to two time marks per major graticule division.

- f. Check the display for one time mark per major graticule division ($\pm 2\%$) between the second and tenth major graticule lines.
- g. Check all sweep rates between 0.2 μ s and 2 μ s using appropriate time markers (within 2%).

h. Check display again for one time mark per major graticule division (within 3%) for 50 ns and 0.1 μ s.

i. If necessary compromise the final adjustment of C1238 so that the time markers in the center eight graticule divisions for the above sweep rates are all within tolerance.

17. Adjust Fast Ramp Comp (left), and Fast Ramp Comp (right)

- a. Set DISPLAY switch to CH 1.
- b. Connect 5 ns time markers from a properly terminated time mark generator to the CH 1 input connector.
- c. Set the CH 1 VOLTS/DIV switch to 1 V.
- d. Connect the trigger out signal from the time mark generator to the EXT TRIG input connector of the SC 504.
- e. Set the TRIGGERING SOURCE switch to EXT.
- f. Set the SECONDS/DIV switch to 50 n.
- g. Push in the X10 HORIZ MAG switch (X1 Gain).
- h. Rotate the TRIGGERING LEVEL control to obtain a stable display.
- i. Use the horizontal POSITION control to center the time markers on the graticule.
- j. Pull the X10 HORIZ MAG switch and recenter the middle time mark on the graticule with the horizontal POSITION control. The second and tenth time markers must line up with their respective graticule lines.

NOTE

Accuracy is measured over the center eight divisions, excluding the first 50 ns and all after the first 100 divisions of the magnified sweep.

k. ADJUST C4131 and C4140 located on the Horiz Defl board, alternately so that the second and tenth time markers line up with their respective graticule lines.

l. While adjusting C4131 and C4140 by rotating the horizontal POSITION control, keep the center time mark positioned on the center graticule line.

m. Disconnect the Time Mark generator.

18. Adjust Triggering External Balance

- a. Set the dc voltmeter to measure 2 V full scale.
- b. Connect the positive lead of the voltmeter to TP3520 located on the Trigger Switch board, and the negative lead of the voltmeter to TP3521.
- c. Set the CPLG switch to AC.
- d. Set the SOURCE switch to INT.
- e. ADJUST R3527, Ext Bal located on the Trigger Sw. board, to obtain a $0\text{ V} \pm 10\text{ mV}$ reading on the dc voltmeter.
- f. Disconnect the dc voltmeter.

19. Adjust Horizontal X Gain

- a. Connect a 50 mV standard amplitude signal from the calibration generator to the CH 2 input connector.
- b. Set the DISPLAY switch to XY.
- c. Set the CH 2 DC-GND-AC-INT DC switch to DC.
- d. Set the CH 2 VOLTS/DIV switch to 10 m.
- e. Position the two dot display equally from left to right of the crt center graticule line with the positioning controls.
- f. ADJUST—R1160, X Gain, located on the Main board, for exactly five major graticule divisions, between two displayed dots.
- g. Disconnect the calibration generator.

20. Adjust TRIG VIEW Center

- a. Set the SECONDS/DIV switch to 2 m.

Adjustment Procedure—SC 504

b. Push in the TRIGGERING MODE AUTO pushbutton.

c. Set the TRIGGERING SOURCE switch to LINE.

d. Depress the DISPLAY TRIG VIEW pushbutton and hold it during the following adjustments.

e. ADJUST—R3336, Trig View Bal located on the Trigger board, so that the start of the waveform trace on the crt display is at the horizontal graticule center line.

f. Switch the TRIGGERING SLOPE switch to – and recheck the starting position of the display (TRIG VIEW pushbutton still depressed).

g. Compromise the final adjustment of R3336 between the display starts for both the + and – SLOPE switch positions.

21. Adjust Triggering + Peak and – Peak

a. Set the SOURCE switch to the LINE position.

b. Depress the TRIG VIEW pushbutton switch while making the following adjustments.

c. Rotate the TRIGGERING LEVEL control to the – side.

d. ADJUST—R3110, – Peak located on the Trigger board, to position the bottom of the display waveform to one-half major graticule division above the point where the waveform just loses triggering.

e. Rotate the TRIGGERING LEVEL control to the + side.

f. ADJUST—R3115, + Peak located on the Trigger board, to position the top of the displayed waveform to one-half major graticule division below the point where the waveform just loses triggering.

THEORY OF OPERATION

VERTICAL CIRCUITRY

Input Coupling

Signals entering the input connectors can be dc coupled, internally disconnected from the input to the preamplifier circuit (GND) or ac coupled signals from the rear interface can be dc coupled.

When the DC-GND-AC-INT DC switch is in the DC position, the input signal is coupled directly to the attenuator. When the switch is in the GND position, the input to the attenuator is grounded. This provides a ground reference without disconnecting the signal from the input connector. When the switch is in the AC position, the input signal passes through the coupling capacitor to the attenuator. This capacitor blocks the dc component of the signal. When the switch is in the INT DC position, the rear interface signals are internally coupled to the channel 1 or channel 2 attenuators. In channel 1, the vertical signal from pins 14A and 15A of the rear interface connector is fed into the CH 1 attenuator. When Q3286 conducts, K3386 is energized closing S3386. The operation of channel 2 circuitry is identical to that of channel 1.

VOLTS/DIV Switching and Attenuators

The overall deflection factor of each channel is determined by the VOLTS/DIV switch setting. The basic deflection factor is 5 mV/div. There is no attenuation in this setting and the preamplifier gain is maximum. Other deflection factors are achieved by signal attenuation and gain switching circuits (see Fig. 4-1). The VOLTS/DIV control operates the attenuator switch contacts and the vertical gain switch contacts from a single switch cam (S1525—CH 1, S1325—CH 2). The attenuator circuits consist of one 5X and two 10X attenuators (for each channel). A 500X attenuation factor is obtained when switching the three attenuators in series.

FET Input Source Followers

The signals from the attenuators are connected to the source followers Q1435 for channel one and Q1335 for channel two. Resistors located on the hybrid substrates provide 1 M Ω input impedance. The output resistors of the input attenuators limit the current drive to the gates of Q1435A and Q1335A when high amplitude signals are applied to the input connectors. Transistors Q1435B and Q1335B are constant current sources for Q1435A and Q1335A.

Gain Switching Circuits and Vertical Preamplifiers

The gain switching circuits for each channel consist of two 2X attenuation networks located on the hybrid circuits HY1530 for CH 1 and HY1430 for CH 2. A gain reduction of 4X is obtained when switching in both 2X networks. The dc input balance controls, R1565 and R1570, quiescently balance the preamplifier input circuits so that no current flows through the gain setting resistors.

The vertical preamplifier circuits provide the initial stages of signal amplification. The outputs from these two hybrids provide triggering signals, and signals to the trigger interface amplifier and horizontal deflection amplifier. The CH 1 and CH 2 CAL controls provide continuously variable deflection factors between the calibrated settings of the VOLTS/DIV switch. In the 1-2 position of the DISPLAY switch the + and - signal lines, within the channel 2 preamplifier, are inverted.

Channel Switching

Transistor gates inside the hybrid circuits couple either the channel 1 or channel 2 preamplifier signals to the vertical amplifier. These gates are controlled by the channel switching multivibrator and the DISPLAY switch to provide the various vertical display modes.

A differential amplifier composed of Q1455, Q1555, and associated circuitry controls both channel one and channel two switching. The DISPLAY switch, when set at either the CHOP or ALT positions, causes U2170 to operate as a flip-flop multivibrator for channel switching. This flip-flop action turns on Q1455 or Q1555, which causes pin 1 of either HY1430 or HY1530 to go high thus selecting the switching mode (see Fig. 4-2).

When the DISPLAY switch is in the CHOP position, the channel switching multivibrator free runs and outputs a positive-going signal to the Z-Axis circuitry causing the crt to blank during the switching time. This signal also causes U2170 to toggle (changing output states) thus switching the respective channels. In the ALT position, a positive-going signal is received from the sweep circuit to initiate the alternate switching of both channels one and two. The display is switched between the channels at the end of each sweep.

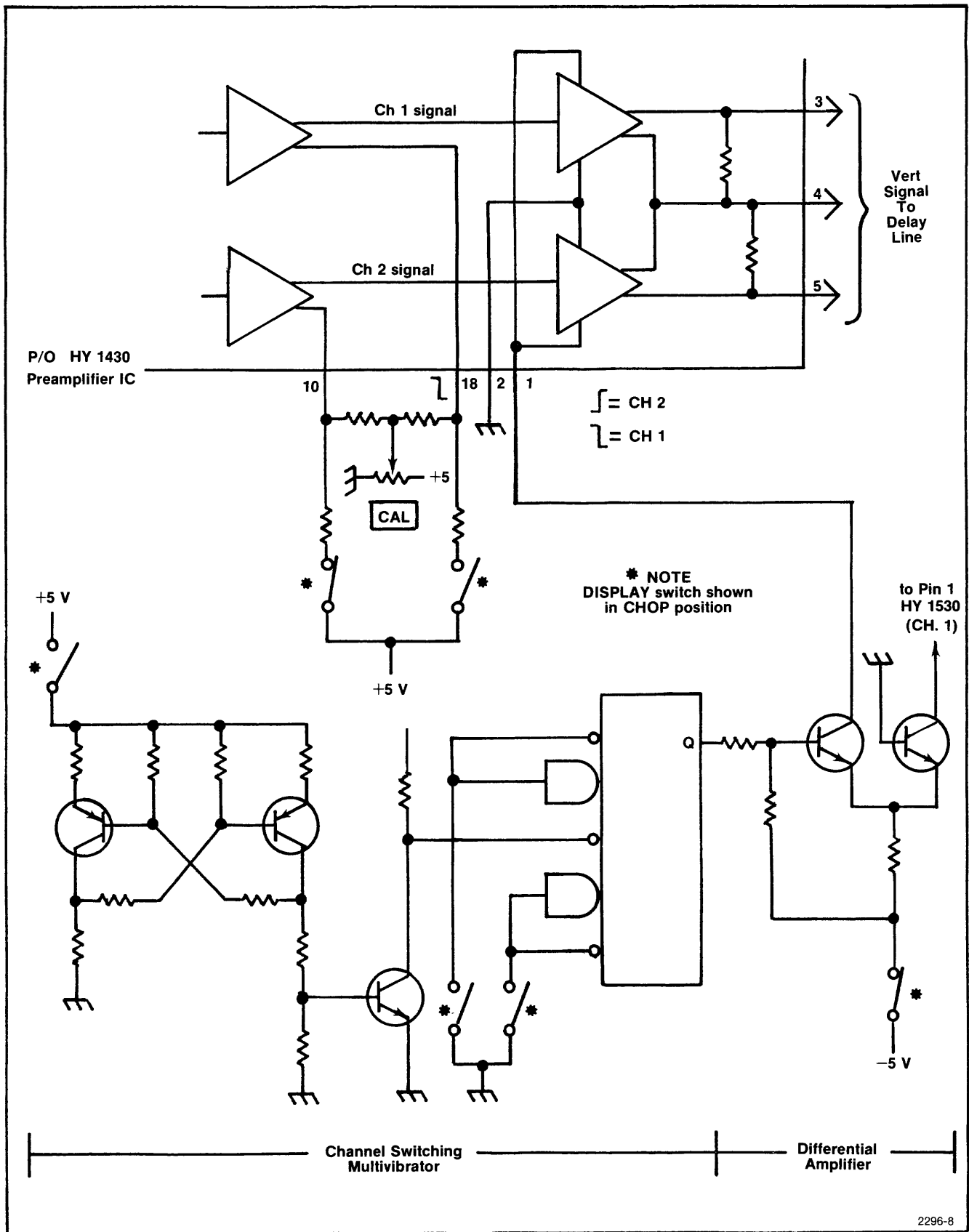


Fig. 4-1. Signal attenuation.

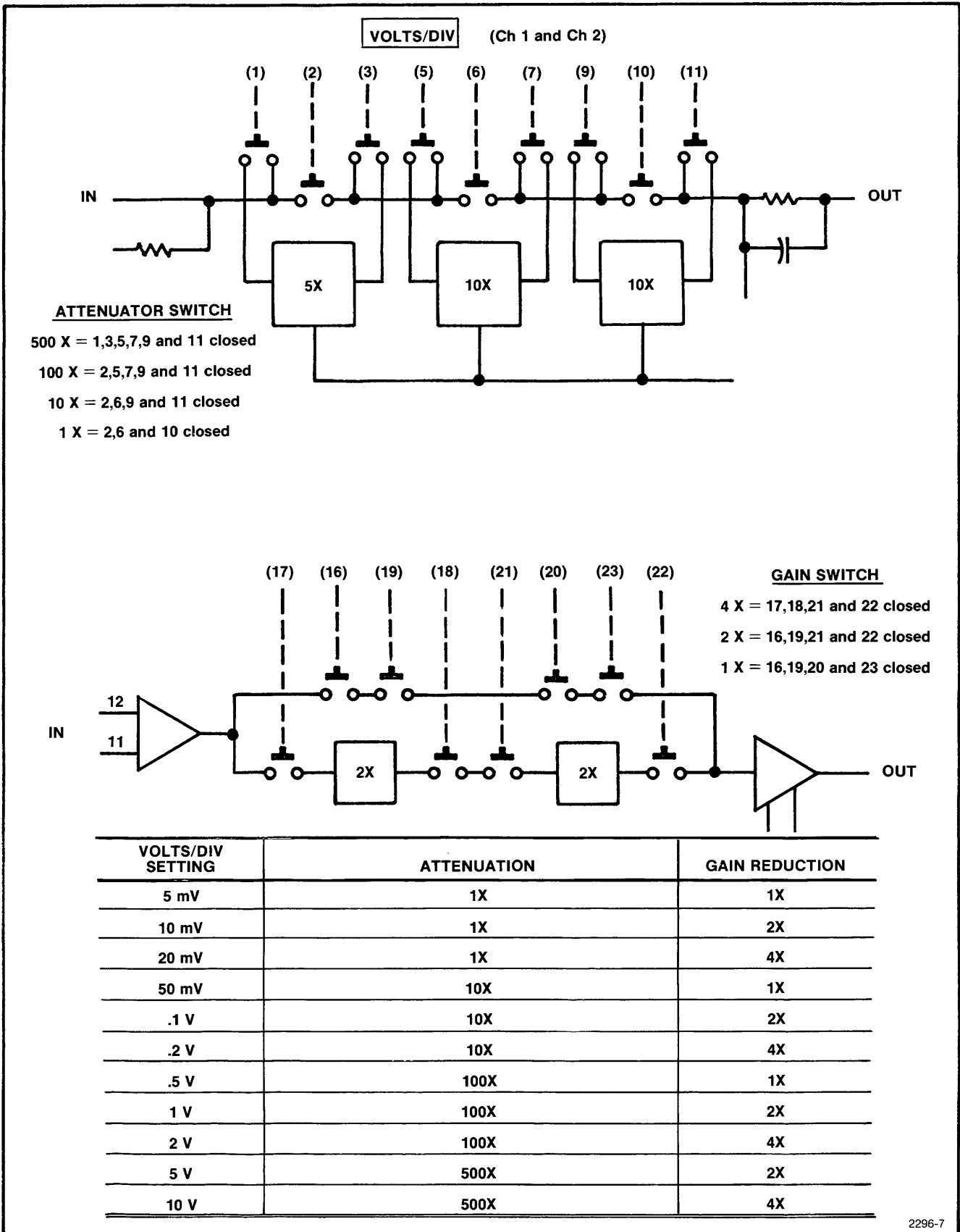


Fig. 4-2. Channel switching gates.

Trigger Interface Amplifier

The interface amplifier acts as a buffer and also provides gain. The channel 1 preamplifier output signal from pins 2 and 4 of J1450 is fed via a 50 Ω coaxial cable to pins 1 and 2 of J3170 of the trigger interface amplifier circuit. This signal is inverted through the collector of Q3178 and outputs through emitter follower Q3188, at either J3188 and the rear interface connector pins 27B and 28B.

Trigger View

When the TRIG VIEW pushbutton switch is depressed, the triggering signal is displayed on the crt.

When the TRIG VIEW switch is in the off position (pushbutton out), Q1460 and Q1462 conduct, causing current flow to pins 5 of HY1430 and HY1530. This provides for normal channel 1 and channel 2 preamplifier operation.

When the TRIG VIEW switch is depressed, Q1456 and Q1458 are biased on through R1464 and R1466. Pins 1 of HY1430 and HY1530 are pulled low turning the channel 1 and channel 2 preamplifiers off.

Delay Line and Vertical Output Amplifier

The delay line provides 125 ns of delay for the vertical signal, allowing the sweep generator circuits time to initiate a sweep before the vertical signal reaches the crt deflection plates.

The Vertical Output Amplifier is a three stage paraphase amplifier. The first stage consists of transistors Q2220, Q2320, Q2321, Q2322 and associated components. The circuitry between the emitters of Q2220 and Q2320 provides delay line, thermal and partial transient compensation. Thermistors RT2210, RT2120 and varicap CR2220 compensate the gain and transient response for ambient temperature changes.

The second stage consists of Q2230, Q2235, Q2330, Q2335 and associated components. C2233, R2231, C2333 and R2332 provide thermal compensation.

The third stage consists of Q2242, Q2246, Q2346, Q2342 and associated components with R2336 providing vertical gain adjustment. The common mode bias voltage is set by R2137 and temperature compensating diode, CR2132. Final transient compensation is provided by R2242, C2341 and C2343. Transistors Q2131 and Q2135 provide the bias voltage levels for Q2235, Q2335, Q2242 and Q2342. T-coils, L2247 and L2347, couple the output signals to the upper and lower deflection plates of the crt.

TRIGGERING AND SWEEP CIRCUITRY

Trigger Pickoff

This circuit, through the setting of the TRIGGERING SOURCE switch, inputs one of several triggering signals to the Trigger Generator circuit. Triggering signals available are the EXT TRIG, interface trigger, CH 1 trigger, CH 2 trigger and the line trigger.

Trigger Coupling

The TRIGGERING CPLG switch selects either ac or dc coupling. In the AC position, coupling capacitor C3510 blocks the dc component of the trigger signal below 60 Hz. This capacitor discharges through the TRIGGERING SOURCE switch and R3315 when switched out of the EXT position. In the AC LF REJ position, coupling capacitor C3511 blocks the dc component of the trigger signal below 10 kHz. In the HF REJ position, R3521 and C3521 provide frequency rolloff for the high frequency components above 50 kHz.

Input Source Follower

Field effect transistor Q3520 operates as a source follower. It provides a high impedance input for the triggering signals and also provides isolation between the trigger generator circuit and the trigger signal source. Diode CR3521 protects Q3520. FET Q3524 is a high impedance, relatively constant, current source and provides temperature compensation for Q3520.

Trigger Generator

The triggering signal from source follower Q3520 feeds a differential pair composed of Q3523 and Q3522. Transistor Q3524 is a current source for Q3523. Transistor Q3523 forms a voltage to current converter. Q3523 and Q3522 are cascoded and protected by diodes CR3525 and CR3520. The output signal, at the collector of Q3135 drives the Peak Detector circuitry and the trigger comparator circuitry composed of Q3235, Q3234 and their associated components.

When the MODE AUTO switch is depressed, the triggering signal enters the amplifier circuit composed of Q3132 and Q3134 for the + peak circuitry and Q3144 and Q3145 for the – peak. The peak detector circuits sample the + and – signal levels and are adjusted by dc level shift potentiometers R3114 and R3112. Peak sensing capacitors C3130 and C3140 hold peak voltage levels which are applied to the TRIGGERING LEVEL control via buffer level shifters U3125 and U3120. The LEVEL control is adjusted between the two voltage levels equal to the most negative and most positive peaks of the triggering signal. With the AUTO pushbutton out, the triggering LEVEL control limits are set by R3129, R3126 and R3124 and R3120.

The trigger level is set by the TRIGGERING LEVEL control, buffered by U3148 and sent to the base of trigger comparator Q3234. If the voltage at the base of Q3234 is higher, current flows through Q3234 and the collector of Q3235 goes high. If the base of Q3234 is lower, the collector of Q3235 is lowered. Both outputs of the trigger comparator are supplied to and switched internally by the gate generator, U3238. These signals are taken from U3238 via Q3236 and Q3237 and fed to the Trigger View circuit.

Gate Generator

Integrated circuit, U3238 converts the output signals from the trigger comparator to a gate waveform which is used for sweep generator control. With the + slope select, pin 1, of IC U3238 connected to ground, a high signal (3 V to 4 V) on pin 13 of U3238 causes pin 3 (gate output) to go more positive and pin 4 to go more negative. Pin 14 goes negative. The output gate occurs when pins 13 and 14 are within about 20 mV of each other. Ungrounding pin 1 causes gate outputs from pins 3 and 4 when pin 13 is negative going and pin 14 positive going.

The reset (holdoff) signal from pin 9 of IC U3158 causes pins 6 and 10 to go high during the holdoff time, after the completion of the sweep. This inhibits the gate generator until after holdoff time when pins 6 and 10 go more negative.

The triggered gate and holdoff outputs are available on the rear interface connector through pins 25B, 26B, and 20B, 21B.

Sweep Control Operation

The sweep control circuit recognizes initiating gates from the trigger circuitry and uses these gates to start and stop the sweep as well as reset the trigger gating generator. The control circuitry also provides blanking pulses for the crt.

The sweep control circuit is composed of two OR gates. Transistors Q3263, Q3265 and Q3262 output the sweep and logic gates to U3158. Transistors Q3258, Q3260, Q3261 and Q3262 cause a current flow which initiates the sweep (see Fig. 4-3).

Sweep Gates

The Trig Gate is a low level signal developed from U3238 pin 4 (Diagram 4). This signal turns on Q3262 causing Q3256 to initiate the sweep gate to pin 6 of U3158. The logic gate feeds pin 5 of U3158 when Q3154 conducts.

The auto gate is a low level signal from U3158, developed at pin 6. Depressing the TRIGGERING AUTO MODE switch grounds pin 4 of U3158. If no logic gate is received at pin 5 of U3158, for a period of time determined by R3162 and C3164, the circuitry in U3158 outputs, from pin 6, a negative-going square wave. This square wave turns Q3260 on, when the bases of Q3261 and Q3264 are at a higher level than the threshold voltage on the base of Q3258. A blanking signal is developed from Q3258 which is positive-going and outputs to the Z-axis circuitry.

The external gate must be an ECL input signal at the rear interface connector, and inputs to the gate enable circuit. This circuit consists of Q3268 and Q3269. The gate select signal from pin 24B on the rear interface connector causes Q3268 to conduct. Q3269 turns off, thus enabling the external gate. This gate turns on Q3264 causing current flow through CR1140, developing a sweep.

Holdoff

The holdoff signal is available at pin 9 of U3158 which connects to the gate generator (U3238) at pin 10 (Diagram 4). This positive-going signal prevents the generating of sweep gates during holdoff times or after a single sweep has occurred. Holdoff begins when pin 12 of U3158 goes high. The resistor capacitor network, connected to pins 10 and 11 of U3158, determine the holdoff time. The setting of the SECONDS/DIV switch determines the duration of the ramp.

Single Sweep

In the SGL SWP mode, pin 1 of U3158 is grounded and pin 4 of U3158 is ungrounded. When the sweep is armed, pins 13 and 15 of U3158 are low, causing the READY TRIG'D indicator to light. This action, at pins 13 and 15 also occurs when the sweep is in a triggered mode. Resistor R3156 limits the LED current to a specified value. Depressing the SGL SWP switch (momentary pushbutton) grounds pin 2 of U3158 which causes the gate generator (U3238) to reset. This action turns on the READY TRIG'D light and arms the circuit for another non-triggered ramp.

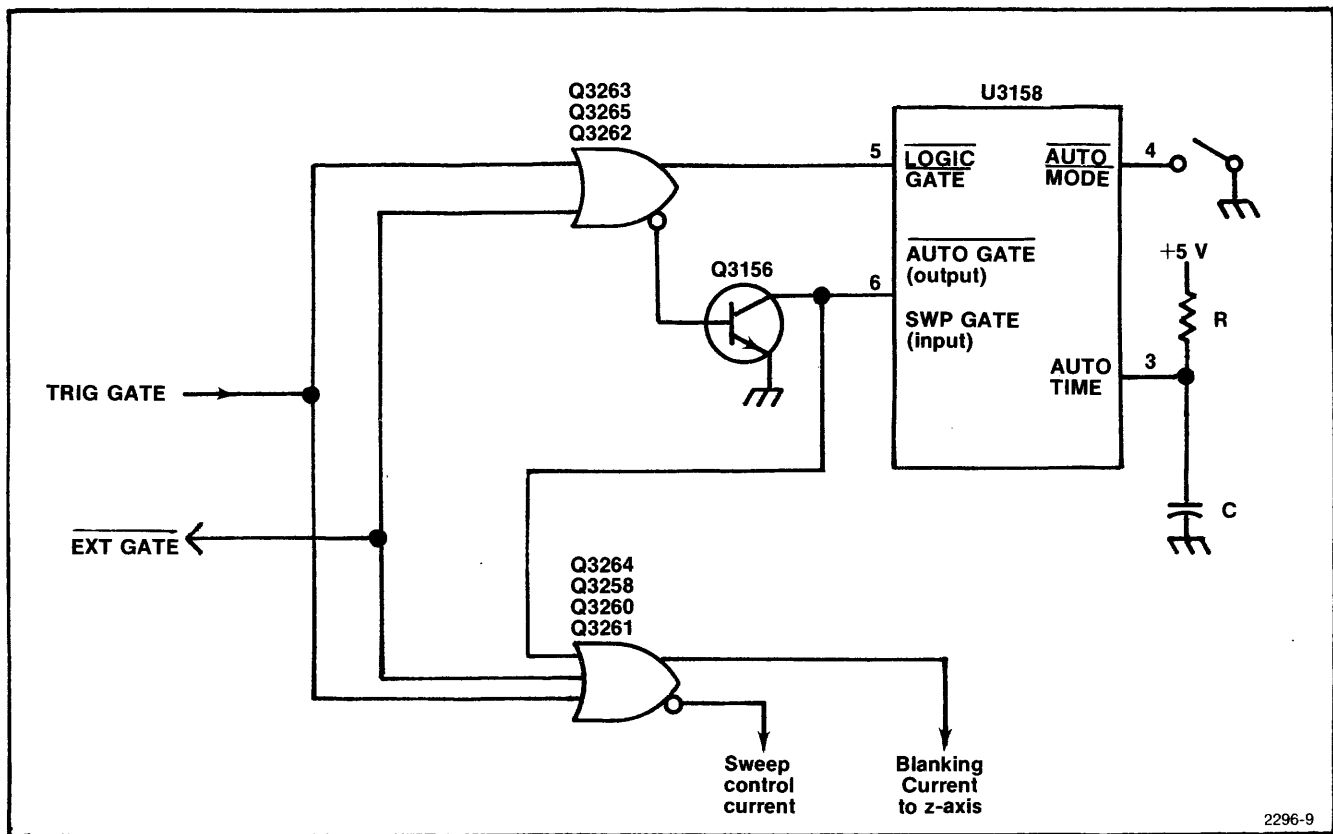


Fig. 4-3. Simplified sweep control circuit.

Ramp Generator

The sweep ramp is generated during the time that Q1240 is off. The amount of current determined by the timing resistor flows through the timing capacitor, due to the action of the operational amplifier composed of Q1237, Q1241 and Q1242. This action generates the sweep ramp. The negative-going ramp voltage decreases at a rate determined by the timing resistor and timing capacitor combination, until reaching approximately -10.5 V.

At the end of the sweep, the ramp control current turns on Q1240. If the ramp voltage attempts to go above 0 V, CR1247 conducts. This causes the current through Q1240 to equal the current through the timing resistor plus the timing capacitor discharging current. This action clamps the integrator output to 0 V until the next sweep turns off Q1240.

In the Schmitt trigger circuit, the ramp outputs through emitter follower Q3368 and is inverted through Q3366. The positive-going ramp is then emitter coupled to pin 18A of the rear interface connector. When the ramp turns Q3368 off, steering current through Q3367 creates a negative-going signal at the base of Q3266. Transistor Q3266 outputs a positive-going end-of-sweep (eos) signal to pin

12 of U3158. This output signal also feeds the Z-axis circuitry (Diagram 8) to initiate blanking of the crt. The alternate drive signal outputs via pin 3 of J2176 to the channel switch logic, Q2165 (Diagram 2).

In the XY mode Q1250 turns on, disabling the ramp; CR3359 conducts, disabling the eos comparator; and Q3152 turns on, disabling the sweep gates.

Horizontal Preamp and Output Amplifier

The horizontal preamplifier circuit is contained within a single IC, U4345. A negative-going sweep ramp is fed to pin 9 of U4345 from the sweep generator.

The X1 gain control, R1167, is connected from pin 6 to pin 3 of U4345. In the HORIZ MAG position the X10 gain control, R1169, is connected in parallel with R1167. The magnifier registration, on pins 1 and 8 of U4345, is provided by R1155. Horizontal positioning is controlled by the front panel Horiz POSITION control.

The output sweep signals, from pins 7 and 2 of U4345, drive the two separate current driven feedback amplifiers composed of: Q4126, Q4125 and Q4132 for the positive-going sweep; and Q4147, Q4145 and Q4137 for the negative-going sweep. Transistor Q4230 is the current source.

CRT AND POWER SUPPLY CIRCUITRY

Crt Circuit

The crt circuit produces the high voltage potentials and provides the control circuits necessary for operation of the cathode ray tube. The Z-axis and blanking amplifier circuits set the intensity of the display to control the crt blanking.

Z-Axis Amplifier

The Z-axis amplifier is a current driven, shunt-feedback operational amplifier with a voltage output. The amplifier consists of Q1280, Q1288 and Q1289. The feedback path is from the collectors of Q1288 and Q1289, through C1285 and R1286 to a summing point at the base of Q1280. Collector-coupled complementary amplifiers Q1288 and Q1289 provide a fast linear output signal and consume minimum quiescent power. Q1289 acts as the pull-up transistor and Q1288 acts as the pull-down transistor for the amplifier. The output voltage from the amplifier provides the drive signal to control the crt intensity level through the control-grid supply.

The output voltage level of the Z-axis amplifier is determined by the voltage drop across R1286 with reference to the voltage level at the summing point for the amplifier (base of Q1280). The current through R1286 is determined by the input current from a combination of the INTEN control setting and the sweep blanking.

Diodes CR1296 and CR1297 act as clamps for protection to the Z-axis amplifier in case of a high voltage short. Transistors Q3244 and Q3248 form a comparator, with the sweep blanking signal setting the reference level. To unblank the crt, the voltage level at the base of Q3244 must be more positive than the level at the base of Q3248.

High Voltage Regulation

The regulator circuit, composed of Q1380, Q1381, Q1378, U1270 and associated components, provides the driving current necessary to energize transformer T1475. Regulation is accomplished by sampling the -2 kV across the voltage divider composed of R1285C and R1285D, and comparing it to a $+20.6$ V reference. The junction of R1285C and R1285D, as well as pin 3 of U1270, is nominally 0 V. When the -2 kV supply becomes less negative the junction of R1285C, R1285D and pin 3 of U1270 becomes more positive. The more positive output of U1270 results in increased charging current for C1374, which causes Q1380 to conduct longer during each cycle. This increases the average current to T1475 and T1385 which causes Q1380 to saturate due to the positive feedback provided by the one turn winding of T1385. C1373 charges during the conduction of Q1380.

At the time pin 5 of T1475 is most negative, C1373 starts discharging, cutting off CR1372 and turning on CR1373 to provide base current to Q1378. When Q1378 conducts, the base current of Q1380 reduces, causing the collector of Q1380 to go more positive. The action of the one turn winding of T1385 speeds up the turn off of Q1380. The current through T1385 and energy stored within the coil now flows through T1475 via Q1381 and CR1383. Transistor Q1381 conducts until T1385 is completely discharged. With 0 V across the base-emitter junction of Q1381, the primary of T1475 now swings more positive than the input supply voltage.

When Q1380 is off, U1270 charges C1374 to a voltage which, when combined with voltage from the one turn feedback winding of T1385, causes Q1380 to conduct completing the cycle.

Initially, at instrument turn on, the reference supply goes positive slowly depending upon the charging current supplied to C1270, which is controlled by R1283. Once the voltage between CR1371 and L1270 becomes more positive than $+20$ V, CR1280 conducts and the reference supply is held at $+20.6$ V. If a short occurs across or in the secondary of T1475, the voltage at the junction of CR1371 and L1270 goes toward zero, reducing the reference voltage and the transformer drive. If the secondary winding short remains for a time, F3488 (Diagram 10) opens to protect Q1380. If the R1285C and D voltage divider or the regulator circuit fails, R1274 and R1371 allows CR1374 to conduct which removes the base drive from Q1378.

High Voltage Outputs

The secondary windings of T1475 provide the negative and positive accelerating potential for the crt, the bias voltage for the control grid and heater voltage for the crt.

The accelerating potential is supplied by voltage tripler, U1590, having an input voltage of approximately 3.3 kV peak. The secondary winding of T1475 also supplies the negative accelerating voltage for the directly heated crt cathode. Diode CR1610 half wave rectifies the transformer output and supplies the -2 kV potential to the crt cathode.

Diodes CR1621 and CR1622 provide the crt control grid voltage which is set by the Beam Current adjust, R1595. The operating level, at the control grid of V1000, is determined by diodes CR1488 and CR1390. Diode CR1390 limits the negative excursion of the bias voltage, depending upon the Z-axis amplifier output voltage. The

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positive clipping level at the cathode of CR1488 is set by the Beam Current adjust. Diodes CR1621 and CR1622 act as dc restorers. This results in a dc level across R1622 equal to the peak-to-peak excursion at the anode of CR1488.

Crt Control Circuits

The front panel FOCUS and internal Astig controls have been incorporated for arriving at an optimum crt display. The FOCUS potentiometer, R2110 provides the correct voltage for the second anode of the crt. Both the FOCUS and Astig controls are adjusted for optimum spot size and shape to provide the proper electro-static lens configuration in the crt.

The Geom control, R1580, varies the positive level on the horizontal deflection plate shields to control the overall geometry of the display.

The Trace Rotation control, R1585, adjusts the dc current through the beam rotation coil, L2156, to align the display with the horizontal graticule lines.

Low Voltage Power Supplies

The low voltage power supply circuit provides the operating power for the oscilloscope system. Electronic regulation is used, where necessary, to provide stable, low-ripple output voltages.

Power is applied to the supply by means of the TRIGGERING SOURCE switch, after the instrument has been inserted into the mainframe. The instrument is on in all positions of this switch, except when in the STBY position.

+20 V Supply

The +20 V supply, besides providing power to circuitry throughout the instrument, is a reference voltage source to establish operating levels for the feedback regulators in the -20 V, +5 V and -5 V supplies.

The +20 V supply consists of VR3465, Q3470, Q3476, Q3485, Q3484, Q3472, Q3488 and uses a series pass transistor in the mainframe. Current to the load is delivered by the series pass transistors.

The +20 V is established by the drop across CR3466, R3462 and R3461 which is compared to the voltage drop across VR3465 and the emitter-base junction of Q3470. The feedback path is through Q3485 to the base of Q3472. Any variation in output voltage due to ripple, change of current through the load, etc. is immediately transmitted

to the base of Q3472 which in turn drives the base of the series pass transistor in the mainframe. The conduction of Q3472 nullifies this voltage variation, thus maintaining a steady output. The output of the supply is set to exactly +20 V by the +20 Volts adjust, R3466.

-20 V Supply

The -20 V supply consists of Q3369, Q3475, Q3480, Q3372, Q3482, Q3375, Q3474 and a series pass mainframe transistor. The operation of this supply is very similar to the +20 V supply. The supply voltage is established by comparing the voltage at the mainframe transistor output, to the voltage drop across R3464 and the emitter-base junction of Q3369. The feedback path is through Q3480 to the base of Q3372 which drives the base of the mainframe transistor. Any variation in output voltage is sensed at the base of Q3372 and nullified, thus maintaining a steady output voltage.

When the SOURCE switch is in the STBY position, the bases of Q3478 and Q3474 are at ground. This cuts off the +20 V and -20 V supplies, removing power from the instrument.

+5 V Supply

Power for the +5 V regulator is supplied from the mainframe +11.5 V un-regulated supply. The regulator for the +5 V supply is composed of operational amplifier U2263 and the series pass transistor in the mainframe. The series pass transistor is driven by emitter follower Q2469. Feedback for the amplifier is through C2161 and R2163.

The supply voltage is established by comparing the voltage at the negative input, pin 2 of U2263, with the +20 V reference at the positive input, pin 3. Any difference between the negative and positive inputs of U2263 causes a change in the conduction of the series pass transistor correcting the output error.

For example, if +5 V goes to +6 V, pin 2 of U2263 goes more positive causing pin 6 of U2263 to go more negative. This reduces conduction in Q2469 which in turn reduces conduction in the series pass transistor, in the mainframe, causing the output voltage to drop back to +5 V.

-5 V Supply

Power for the -5 V regulator is supplied by the rectified 17.5 V source from the mainframe. The regulator is composed of operational amplifier U2480 and a series pass transistor in the mainframe. The series pass transistor is driven by the emitter follower, Q2382. Feedback for the amplifier is through R2483 and C2483. The circuit description is identical to the +5 V supply with the exception of the protection circuit composed of Q2476

and associated components. In normal operation, Q2476 provides a current source but, if the +5 V supply becomes inoperative, Q2476 shuts down the -5 V supply.



An overvoltage on the +5 V line can damage VR2420 and open F3478.

Calibrator Circuit

This circuitry produces a square-wave output with accurate amplitude at a 1 kHz frequency. The output is available at the front panel as a .6 V (ground to peak) square-wave voltage.

This circuit is composed of Q1210 and Q1116 with associated components and is a free running emitter-coupled multivibrator.

MAINTENANCE AND INTERFACING INFORMATION

General system maintenance procedures are provided in the power module instruction manual; i.e., preventive maintenance, troubleshooting aids, parts removal and replacement procedures, parts ordering information, etc.

Numbers in parentheses, in the following discussion, refer to mechanical parts referenced in Fig. 5-1.

Crt Removal and Replacement

The following procedure outlines the removal and replacement of the cathode-ray tube.

WARNING

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

1. Crt Removal

- a. Remove the instrument side and top covers.
- b. Remove the implosion shield filter (2) and the implosion shield spring (1).
- c. Disconnect the FOCUS extension shaft (3) from the focus potentiometer.
- d. Loosen the black screw (4). Remove the three screws holding the rear panel bracket and remove the rear panel bracket.
- e. Remove the screw (5) holding the horizontal deflection circuit board. Disconnect the two horizontal crt deflection pin leads. Lift the board straight up, disconnecting the square pins at the bottom.

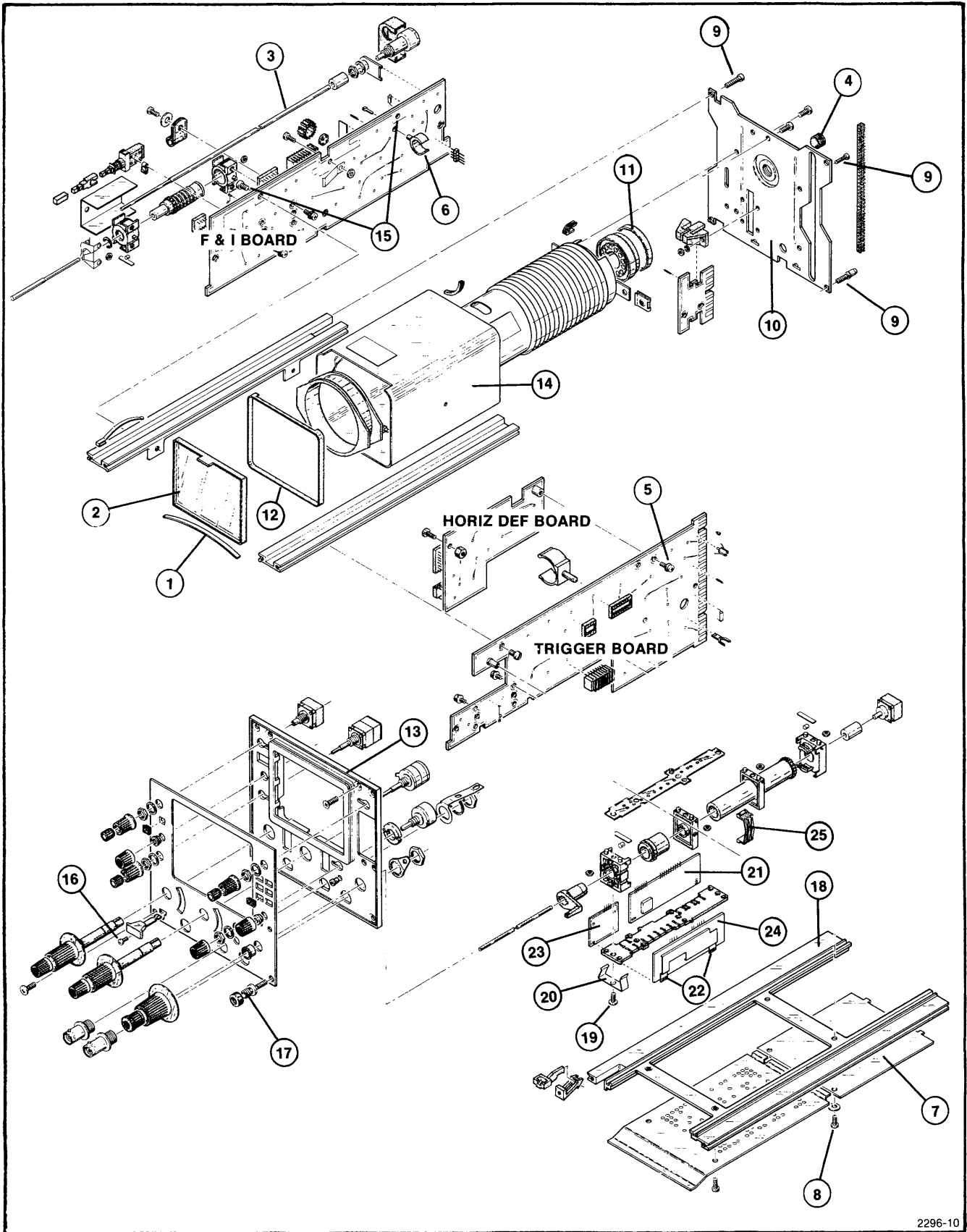
- f. Disconnect the trace rotation coil from the F and I circuit board by removing the two pin connector. Remove the two crt vertical deflection pin leads. Unsnap the anode connector from the circuit board clip (6). Disconnect the crt end (male end) of the anode connector from the remainder of the connector. Momentarily touch the crt end of the anode connector to chassis ground to discharge any voltage.

- g. Remove the two screws (8) that secure the high voltage cover and remove the cover (7). Remove the eight screws (9) holding the rear panel (10) and remove the panel.

- h. Disconnect the crt socket (11); then remove the crt shield with the crt inside. Disconnect the delay line connectors as the tube is removed.

2. Crt Replacement

- a. Install the front crt support spacer (12) into the rear bezel opening of the front subpanel (13).
- b. Install the crt in the crt shield; then install the assembly in the oscilloscope and reconnect the delay line. During installation, be careful not to bend the protruding connector pins. Place the crt shield (14) against the front crt support spacer. Push the crt into the front crt support. See Fig. 5-2. Connect the crt socket to the crt. Hold the crt assembly in position and install the rear panel with enough screws to hold the crt assembly in place.
- c. Insert two screws (8) to secure the high voltage cover and replace the remaining screws (9) to secure the rear panel.
- d. Connect the two crt vertical deflection pin leads to the F and I circuit board.
- e. Reconnect the anode connector to the connector and snap the anode connector into the circuit board clip (6).
- f. Reconnect the two pin connector from the trace rotation coil to the F and I circuit board.



2296-10

Fig. 5-1. Cathode ray tube, circuit board and cam switch parts details.

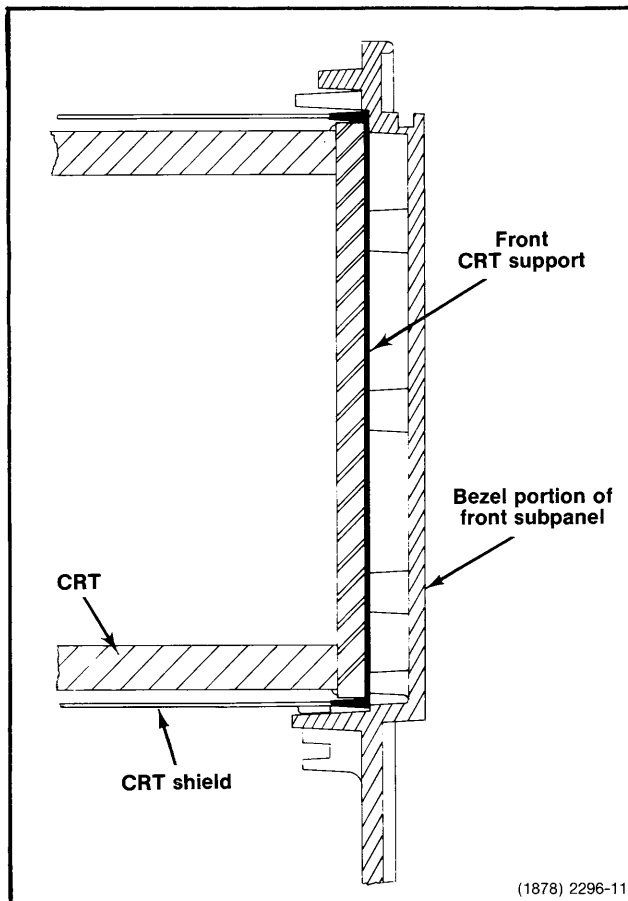


Fig. 5-2. Cross sectional view showing placement position of front crt support, crt shield and crt.

g. Reinstall the Horizontal Deflection board. Connect the square pins to the bottom of the board. Reconnect the two horizontal crt deflection pin leads. Replace the screw that holds the board.

h. Position the rear panel bracket and insert the three screws securing the bracket. Tighten the black screw.

i. Reconnect the FOCUS extension shaft to the focus potentiometer.

j. Install the implosion shield spring, with the spring ends down, in the groove between the bottom front bezel portion of the front subpanel. Install the implosion shield and filter into the front bezel portion of the front subpanel by compressing the spring and pushing into the groove.

k. Reinstall the instrument side and top covers.

l. Replacing the crt requires partial instrument readjustment. Refer to Section 3, Adjustment Procedure, of this manual.

Circuit Board Removal and Replacement

The following procedure outlines removal and installation of the circuit boards.

1. Circuit Board Removal

a. Remove the crt using the crt removal procedure.

b. Remove all of the front panel knobs except SLOPE, LEVEL, horizontal POSITION, vertical POSITION, and INTEN.

c. Remove the two screws (15) which hold the circuit board assembly to the top rails. Remove the screw (16) and the stud post with knurled nut (17) and remove the bottom section frame (18).

d. Disconnect from the circuit boards those connectors whose leads go to the front panel connectors or controls that still have knobs. Unsolder the leads at the three bnc type connectors. Remove the screw at the vertical bnc connector ground lugs.

e. Slide the circuit board assembly away from the front panel until it is clear of the subpanel.

f. Disconnect the plugged-together circuit board assembly as required.

2. Circuit Board Installation

a. Reverse the circuit board removal procedure; then follow the crt replacement procedure.

Preampifier Hybrid Substrates Removal and Replacement

Instrument Covers and Bottom Frame Removal

a. Using a blade type screwdriver, pry up the rear corner of each side cover and carefully pull the covers away from the guides.

b. Remove the two pan head screws that secure the bottom cover and pull the cover forward.

c. Remove the two pan head screws that attach the high voltage cover, pull up and remove the cover.

d. Remove the ground stud located at the bottom right corner of the front panel, and the truss head screw at the bottom left corner of the front panel. Remove the rear hex screws with a hex type nut driver and pull the bottom frame away.

Hybrid Substrate Removal

- a. Remove the two truss head screws (19) securing the two rearmost spring clips (20) to the top of the cam switch.

NOTE

Press down on the cam switch plastic top plate when removing the spring clips to prevent the plate from separating from the switch bearings.

- b. Push the substrate away from the housing so that it just clears the top cover of the cam switch, but observe the following: the substrate circuitry is very delicate and must be handled with care.



Do not touch the surface of the substrate—handle by the edges only. Protect the substrate from abrasion, dust, etc.

- c. Insert a blade-type screwdriver into the holes in the tabs (22) and gently pry upwards, using the sloping surfaces of the top plate as a fulcrum.

- d. Lift out the substrate.

Preamplifier Hybrid Substrate Replacement

- a. Set the substrate into position, pins lined up with the sockets. Check the front-to-back position of the substrate for proper alignment. If not aligned properly, remove the substrate and re-insert.

- b. Push the substrate into the sockets and then towards the switch so that the substrate seats against the top cover of the cam switch.



Attempting to force the substrate back and forth while the pins are inserted may break the substrate.

- c. Attach the two spring clips to the top of the cam switch using the two truss head screws.

Vertical Switch Boards Removal and Replacement

1. Vertical Switch Board Removal

- a. Remove the two truss head screws that secure the two frontmost spring clips to the top of the cam switch and lift out the clips.

- b. Push the board (23) away from the housing and lift out the board.

2. Vertical Switch Board Replacement

- a. Line up the pins with the sockets and set the board into position.

- b. Push the board pins into the sockets; then push the board against the top cover of the cam switch engaging the two plastic locating pins.

- c. Attach the spring clips and secure them to the top of the cam switch with the truss head screws.

Attenuator Substrates Removal and Replacement

1. Attenuator Substrate Removal

- a. Remove the three truss head screws holding the ground springs and remove the springs.

- b. Unsolder the input resistor (56 Ω) that connects the front panel input connector to the substrate input pin.

- c. Unsolder the gate lead of Q1445 for CH 1 (Q1335 for CH 2) from the output pin on the substrate.

- d. Remove the three frontmost pan head screws securing the spring clips to the top of the cam switch.

NOTE

Press down on the cam switch plastic top plate when removing the spring clip to prevent the plate from separating from the switch bearings.

- e. Push the substrate away from the housing, but do not touch the surface of the substrate—handle by the edges only.

- f. Lift out the substrate.

2. Attenuator Substrate Replacement

- a. Set the substrate into position, pins lined up with the sockets. Check the front-to-back position of the substrate for proper alignment. If not aligned properly, remove the substrate and re-insert.

- b. Push the substrate into the sockets. Attempting to force the substrate back and forth while the pins are inserted may break the substrate.

- c. Resolder the input resistor to the substrate input pin.
- d. Resolder the gate lead of Q1445 for CH 1 (Q1335 for CH 2) to the output pin of the substrate.
- e. Reinstall the ground springs.

Cam Switch Contact Removal and Replacement

NOTE

If cam switch contacts are suspected of being intermittent, the following checks are recommended prior to replacement or cleaning.

- a. If there is evidence of elastomer contact contamination, replace the switch hanger.
- b. If there is evidence of tears or cuts in elastomer, replace the switch hanger.
- c. Make certain elastomer contacts are properly seated in the cam follower. If not, carefully re-seat the elastomer contact.

1. Cam Switch Contact Removal (25)

- a. Remove the substrates to expose the switch contacts (refer to substrate removal steps).
- b. Insert a long nose tweezers between the contact assembly and the top cover of the cam switch. Push down and out on the contact assembly with the tweezers to disengage the top of the contact.

- c. Lift the contact assembly out.



To prevent contamination, do not touch the switch contacts.

2. Cam Switch Contact Replacement

- a. Grasp the contact assembly with the tweezers and set the long, pointed plastic pins of the assembly into the two holes, located on the etched circuit board.

- b. Push the contact assembly towards the switch drum while guiding the short, blunt plastic pins of the assembly into the top plate grooves of the cam switch.
- c. Push on the contact assembly until the pins snap into position.
- d. Rotate the cam switch to check for the proper alignment of the newly installed switch contact assembly.

Cleaning Information

WARNING

Do not use freon or other strong cleaners on the elastomer switch assemblies.

Do not use cotton or other fiber type material to wipe the contacts and contact pads of the switch assemblies.

1. Assembled Cam and Attenuator

- a. Spray switch area with a 5% solution of Kelite¹ spray white using an equal amount of ammonia (non-sudsing, non-soapy type) and then rinse thoroughly by spraying with distilled water.
- b. Spray switch area with isopropyl alcohol and let set for 10 seconds.
- c. Blow with compressed air while rotating the switch through all positions.

NOTE

Cam switch contacts do not require lubrication.

2. Disassembled Cam and Attenuator

Clean substrates with a freon based non-detergent cleaner.

3. Switch Hanger

Thoroughly rinse the switch hanger with isopropyl alcohol and allow to dry.

¹Allied-Kelite Products Division of the Richardson Co.; Los Angeles, Calif.

Using the Rear Interface

The tabbed foldout pages labeled Waveforms and Rear Board Connections, Fig. 8-2 and Fig. 8-3 refer to the following information:

External Z-Axis In

An external Z-axis input signal can be applied to contact 24A (center coaxial conductor) and 23A (ground) to turn the crt beam on or off. A +5 V signal will unblank the crt beam; a -5 V signal will blank the crt beam. The input resistance is 1.5 k Ω .

Ramp Out

Interface contact 18A supplies a 0 V to +10 V positive-going ramp that is coincident with the sweep. The load connected to contact 18A must have an input resistance greater than 100 k Ω . The output resistance is approximately 500 Ω .

Channel 1 Trigger Out

This signal is electrically tied with the channel 2 vertical input signal via a coaxial jumper cable. Switch the DC-GND-AC-INT DC switch to INT DC. Interface contact 28B furnishes a portion of the channel 1 vertical signal which is also supplied to the trigger circuitry. The signal amplitude is at least (50 mV)/division of crt display referenced to 0 V when driving a 50 Ω load.

Channel 2 Vertical In

To use this feature, the coaxial jumper cable (tied with the channel 1 trigger out) must be disconnected. A vertical input signal, from an input impedance of 50 Ω , can be connected to the input of the channel 2 vertical amplifier, via interface contact 16A by switching the DC-GND-AC-INT DC switch to INT DC.

Channel 1 Vertical In

A vertical input signal can be connected to the input of the channel 1 vertical amplifier via interface contact 14A, by switching the DC-GND-AC-INT DC switch to INT DC. The input impedance is 50 Ω .

Interface Trigger In

An interface input signal can be connected to the input of the trigger pickoff circuitry via interface contact 15B. The input impedance is 50 Ω when selected (25 Ω when not selected). This is accomplished by rotating the TRIGGERING SOURCE switch to the INT position.

Triggered Gate Out and $\overline{\text{Triggered Gate Out}}$

The signal at contact 26B is a positive-going waveform, while the contact 25B signal is negative-going. Both signals are coincident with the gate waveform and can be used for sweep generator control. Signals at contacts 26B and 25B are designed to drive a 100 Ω side-to-side terminated line with an ECL receiver. The ECL line driver operates between +5 V and ground and its outputs, to contacts 26B and 25B, are protected with 47 Ω resistors.

$\overline{\text{Gate Select In}}$

Grounding contact 24B through 1 k Ω or less blocks the gate waveform from the trigger generator and allows an external gate, via contacts 23B and 22B, to control the sweep generator.

External Gate In and $\overline{\text{External Gate In}}$

The input signal to contacts 23B and 22B drives a 100 Ω terminated line with an ECL receiver. The signal at contact 22B must be a negative-going waveform while the positive-going signal is applied to contact 23B. The ECL receiver is run between +5 V and ground.

Holdoff Out and $\overline{\text{Holdoff Out}}$

The signal at contact 20B is a positive-going waveform while contact 21B is negative-going. Both signals are coincident with the holdoff signal from the sweep generator. Contact 21B and 20B signals are designed to drive a 100 Ω side-to-side terminated line with an ECL receiver. The ECL line driver operates between +5 V and ground, and its outputs, to contacts 21B and 20B are protected with 47 Ω resistors.

$\overline{\text{Intensify In}}$

The signal to contact 19B is an ECL input and operates between a low (≤ 3.4 V) which intensifies or a high (≥ 4.0 V) which does not intensify. The ECL circuit operates between +5 V and ground. The input resistance is 1.5 k Ω .

Sweep A Gate Out

This positive-going gating signal is applied to connector 26A (ground reference at contact 25A). The active level is less than .5 volt through 1 k Ω during the sweep and +5 volts through 6 k Ω otherwise.

Reset In

An external ground can be applied to contact 21A to reset the gate generator in the single-sweep mode.

Ready Light Out

When the gate generator is reset (through contact 21A), an arming signal is applied to contact 20A and can be used at the operator's discretion. 5 volts is available for use with the Remote Ready Light.

+5 Volts

Available at contact 19A.

Repackaging Information

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

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

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

The carton test strength for your instrument is 200 pounds.

OPTIONS

None available at this time.

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
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
02111	SPECTROL ELECTRONICS CORPORATION	17070 EAST GALE AVENUE	CITY OF INDUSTRY, CA 91745
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
05091	TRI-ORDINATE CORPORATION	343 SNYDER AVENUE	BERKELEY HEIGHTS, NJ 07922
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
07910	TELEDYNE SEMICONDUCTOR	12515 CHADRON AVE.	HAWTHORNE, CA 90250
12697	CLAROSTAT MFG. CO., INC.	LOWER WASHINGTON STREET	DOVER, NH 03820
12969	UNITRODE CORPORATION	580 PLEASANT STREET	WATERTOWN, MA 02172
14099	SEMTECH CORP.	652 MITCHELL RD.	NEWBURY PARK, CA 91320
15454	RODAN INDUSTRIES, INC.	2905 BLUE STAR ST.	ANAHEIM, CA 92806
16546	U.S. CAPACITOR CORP/CENTRALAB ELECTRONICS DIV.	4561 COLORADO	LOS ANGELES, CA 90039
19396	ILLINOIS TOOL WORKS, INC. PAKTRON DIV.	900 FOLLIN LANE, SE	VIENNA, VA 22180
19701	ELECTRA-MIDLAND CORP., MEPCO ELECTRA INC.	P O BOX 760	MINERAL WELLS, TX 76067
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
50157	N. L. INDUSTRIES, INC., ELECTRONICS DEPT.	P. O. BOX 787	MUSKEGON, MI 49445
51642	CENTRE ENGINEERING INC.	2820 E COLLEGE AVENUE	STATE COLLEGE, PA 16801
53184	XCITON CORPORATION	5 HEMLOCK STREET	LATHAM, NY 12110
53944	ELT INC., GLOW LITE DIVISION	BOX 698	PAULS VALLEY, OK 73075
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
71590	CENTRALAB ELECTRONICS, DIV. OF GLOBE-UNION, INC.	P O BOX 858	FORT DODGE, IA 50501
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
73899	JFD ELECTRONICS COMPONENTS CORP.	PINETREE ROAD	OXFORD, NC 27565
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
76493	BELL INDUSTRIES, INC., MILLER, J. W., DIV.	19070 REYES AVE., P O BOX 5825	COMPTON, CA 90224
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
80031	ELECTRA-MIDLAND CORP., MEPCO DIV.	22 COLUMBIA ROAD	MORRISTOWN, NJ 07960
80740	BECKMAN INSTRUMENTS, INC.	2500 HARBOR BLVD.	FULLERTON, CA 92634
82389	SWITCHCRAFT, INC.	5555 N. ELSTON AVE.	CHICAGO, IL 60630
90201	MALLORY CAPACITOR CO., DIV. OF P.R. MALLORY AND CO., INC.	3029 E WASHINGTON STREET	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P O BOX 372	COLUMBUS, NE 68601
		P. O. BOX 609	

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-5109-00		CKT BOARD ASSY:MAIN	80009	670-5109-00
A2	670-5110-00		CKT BOARD ASSY:FOCUS AND INTENSITY	80009	670-5110-00
A3	670-5111-00		CKT BOARD ASSY:TRIGGER	80009	670-5111-00
A4	670-5112-00		CKT BOARD ASSY:HORIZONTAL DEFL	80009	670-5112-00
A5	670-5113-00		CKT BOARD ASSY:HIGH VOLTAGE	80009	670-5113-00
A6	670-5114-00		CKT BOARD ASSY:INTERFACE	80009	670-5114-00
A7	670-5115-00		CKT BOARD ASSY:TRIGGER SWITCH	80009	670-5115-00
A9	670-5116-00		CKT BOARD ASSY:VERTICAL SWITCH	80009	670-0116-00
C116	281-0788-00		CAP.,FXD,CER DI:470PF,10%,100V	72982	8005H9AADW5R471K
C211	283-0331-00		CAP.,FXD,CER DI:43PF,2%,100V	72982	805-505A430G
C213	281-0222-00		CAP.,VAR,CER DI:1-6.5PF,400V	80031	2222-801-96135
C217	283-0000-00		CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C221	283-0331-00		CAP.,FXD,CER DI:43PF,2%,100V	72982	805-505A430G
C223	281-0222-00		CAP.,VAR,CER DI:1-6.5PF,400V	80031	2222-801-96135
C231	283-0168-00		CAP.,FXD,CER DI:12PF,5%,100V	72982	8111-100COG0120J
C233	281-0222-00		CAP.,VAR,CER DI:1-6.5PF,400V	80031	2222-801-96135
C235	281-0557-00		CAP.,FXD,CER DI:1.8PF,10%,500V	72982	301-000COK0189B
C240	281-0659-00		CAP.,FXD,CER DI:4.3PF,+/-0.25PF,500V	72982	301-000COH0439C
C241	283-0414-00		CAP.,FXD,CER DI:0.022UF,20%,500V	72982	8131-500X7R223M
C1116	281-0788-00		CAP.,FXD,CER DI:470PF,10%,100V	72982	8005H9AADW5R471K
C1117	290-0580-00		CAP.,FXD,ELCTLT:0.27UF,20%,50V	56289	196D274X0050HA1
C1140 ¹	285-0752-00		CAP.,FXD,PLASTIC:1UF,3.5%,50V	80009	285-0752-00
C1141	290-0522-00		CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C1142	290-0512-00		CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C1150 ¹	285-0753-01		CAP.,FXD,PLASTIC:01UF,100V	80009	285-0753-01
C1151	290-0522-00		CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C1219	290-0283-00		CAP.,FXD,ELCTLT:0.47UF,10%,35V	56289	162D474X9035BC2
C1220	281-0772-00		CAP.,FXD,CER DI:0.0047UF,10%,100V	72982	8005H9AADW5R472K
C1233	281-0814-00		CAP.,FXD,CER DI:100PF 10%,100V	72982	8005A9AADCLG101K
C1238	281-0207-00		CAP.,VAR,PLSTC:2-18PF,100V	80031	HT10EA/218
C1240	283-0706-00		CAP.,FXD,MICA D:91PF,+/-1PF,500V	00853	D15-5E910F0
C1241	281-0792-00		CAP.,FXD,CER DI:82PF,10%,100V	72982	390049X5P0820K
C1242	281-0773-00		CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1250	281-0762-00		CAP.,FXD,CER DI:27PF,20%,100V	72982	390-049X5P0270M
C1270	290-0164-00		CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C1271	290-0766-00		CAP.,FXD,ELCTLT:2.2UF,+50-10%,160V	56289	502D232
C1272	281-0791-00		CAP.,FXD,CER DI:270PF,10%,100V	80009	281-0791-00
C1273	290-0522-00		CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C1282	290-0534-00		CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C1283	283-0178-00		CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C1285	283-0348-00		CAP.,FXD,CER DI:0.5PF,+/-0.1PF,100V	51642	100-100-NP0-508B
C1286	281-0773-00		CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1288	283-0167-00		CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N147 C 104K
C1290	283-0167-00		CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N147 C 104K
C1292	283-0044-00		CAP.,FXD,CER DI:0.001UF,3000V	72982	3903BW002Y5S102M
C1310	281-0773-00		CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1311	281-0773-00		CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1320	281-0773-00		CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1330	281-0214-00		CAP.,VAR,CER DI:0.5-3PF,400V	80031	2222-801-96138
C1340	290-0580-00		CAP.,FXD,ELCTLT:0.27UF,20%,50V	56289	196D274X0050HA1
C1341	281-0772-00		CAP.,FXD,CER DI:0.0047UF,10%,100V	72982	8005H9AADW5R472K
C1345	281-0809-00		CAP.,FXD,CER DI:200PF,5%,100V	72982	8005A2AADCLG201J
C1349	281-0207-00		CAP.,VAR,PLSTC:2-18PF,100V	80031	HT10EA/218

¹Available as a matched set, part number 295-0138-00. The letter suffix and the tolerance should be the same for all of the timing capacitors in the assembly.

Replaceable Electrical Parts—SC 504

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C1355	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C1357	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C1370	283-0084-00			CAP.,FXD,CER DI:270PF,5%,1000V	72982	838-533B271J
C1372	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C1373	281-0549-00			CAP.,FXD,CER DI:68PF,10%,500V	72982	301-000U2J0680K
C1374	283-0167-00			CAP.,FXD,CER DI:0.1UF,10%,100V	72982	8131N147 C 104K
C1380	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C1385	290-0272-00			CAP.,FXD,ELCTLT:47UF,20%,50V	56289	109D476X0050F2
C1390	283-0044-00			CAP.,FXD,CER DI:0.001UF,3000V	72982	3903BW002Y5S102M
C1391	283-0263-00			CAP.,FXD,CER DI:0.0022UF,20%,3000V	56289	33C319
C1392	283-0128-00			CAP.,FXD,CER DI:100PF,5%,500V	72982	871-536T2H101J
C1395	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1396	290-0272-00			CAP.,FXD,ELCTLT:47UF,20%,50V	56289	196DA76X0050F2
C1399	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1410	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1411	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1420	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1425	283-0154-00			CAP.,FXD,CER DI:22PF,5%,50V	72982	8111B061COG220J
C1429	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1430	281-0214-00			CAP.,VAR,CER DI:0.5-3PF,400V	80031	2222-801-96138
C1445	281-0772-00			CAP.,FXD,CER DI:0.0047UF,10%,100V	72982	8005H9AADW5R472K
C1447	281-0207-00			CAP.,VAR,PLSTC:2-18PF,100V	80031	HT10EA/218
C1457	281-0759-00			CAP.,FXD,CER DI:22PF,10%,100V	72982	390-049X5P0220K
C1459	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1488	283-0043-00			CAP.,FXD,CER DI:0.0068UF,3000V	56289	41C186A
C1489	283-0043-00			CAP.,FXD,CER DI:0.0068UF,3000V	56289	41C186A
C1525	283-0168-00			CAP.,FXD,CER DI:12PF,5%,100V	72982	8111-100C0G0120J
C1527	281-0140-00			CAP.,VAR,CER DI:5-25PF,100V	72982	518-002A5-25
C1530	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C1540	290-0580-00			CAP.,FXD,ELCTLT:0.27UF,20%,50V	56289	196D274X0050HA1
C1547	281-0809-00			CAP.,FXD,CER DI:200PF,5%,100V	72982	8005A2AADC1G201J
C1556	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C1558	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C1570	290-0526-00			CAP.,FXD,ELCTLT:6.8UF,20%,6V	90201	TDC685M006EL
C1575	285-1099-00			CAP.,FXD,PLSTC:0.047UF,20%,200V	19396	473M02PT605
C2125	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C2133	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C2137	290-0283-00			CAP.,FXD,ELCTLT:0.47UF,10%,35V	56289	162D474X9035BC2
C2145	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C2161	281-0792-00			CAP.,FXD,CER DI:82PF,10%,100V	72982	390049X5P0820K
C2166	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C2183	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C2221	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C2233	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C2236	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C2257	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C2313	281-0207-00			CAP.,VAR,PLSTC:2-18PF,100V	80031	HT10EA/218
C2314	283-0326-00			CAP.,FXD,CER DI:0.082UF,10%,50V	16546	CW20C823K
C2320	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C2321	281-0158-00			CAP.,VAR,CER DI:7-45PF,50V	73899	DVJ-5006
C2325	281-0809-00			CAP.,FXD,CER DI:200PF,5%,100V	72982	8005A2AADC1G201J
C2330	281-0618-00			CAP.,FXD,CER DI:4.7PF,+/-0.5PF,200V	72982	374-001COH0479D
C2333	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C2335	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C2341	281-0158-00			CAP.,VAR,CER DI:7-45PF,50V	73899	DVJ-5006
C2343	281-0158-00			CAP.,VAR,CER DI:7-45PF,50V	73899	DVJ-5006
C2410	281-0814-00			CAP.,FXD,CER DI:100PF,10%,100V	72982	8005A9AADC1G101K
C2411	281-0814-00			CAP.,FXD,CER DI:100PF,10%,100V	72982	8005A9AADC1G101K
C2412	281-0772-00			CAP.,FXD,CER DI:0.0047UF,10%,100V	72982	8005H9AADW5R472K
C2414	290-0283-00			CAP.,FXD,ELCTLT:0.47UF,10%,35V	56289	162D474X9035BC2
C2420	290-0724-00			CAP.,FXD,ELCTLT:330UF,20%,6V	90201	TDC337M006WSH
C2422	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C2430	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C2448	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C2450	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C2483	281-0785-00			CAP.,FXD,CER DI:68PF,10%,100V	72982	390049X5P0680K
C3129	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3130	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C3139	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3140	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C3142	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C3155	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3163	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C3164	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C3165	281-0775-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8005D9AABZ5U104M
C3166	281-0786-00			CAP.,FXD,CER DI:150PF,10%,100V	72982	390049X5P0151K
C3176	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3182	281-0759-00			CAP.,FXD,CER DI:22PF,10%,100V	72982	390-049X5P0220K
C3189	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3210	283-0076-00			CAP.,FXD,CER DI:27PF,10%,500V	56289	40C287A2
C3212	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	00853	D105E430J0
C3228	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3229	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3232	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3240	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C3242	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3243	281-0763-00			CAP.,FXD,CER DI:47PF,10%,100V	72982	390049X5P0470K
C3245	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3280	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C3282	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3290	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C3322	281-0601-00			CAP.,FXD,CER DI:7.5PF,500V	72982	301-000C0H0759D
C3330	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C3332	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3360	290-0714-00			CAP.,FXD,ELCTLT:2000UF,+75-10%,40V	56289	39D641
C3365	290-0525-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
C3374	281-0786-00			CAP.,FXD,CER DI:150PF,10%,100V	72982	390049X5P0151K
C3376	281-0759-00			CAP.,FXD,CER DI:22PF,10%,100V	72982	390-049X5P0220K
C3464	290-0525-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
C3465	281-0788-00			CAP.,FXD,CER DI:470PF,10%,100V	72982	8005H9AADW5R471K
C3468	281-0791-00			CAP.,FXD,CER DI:270PF,10%,100V	80009	281-0791-00
C3473	281-0786-00			CAP.,FXD,CER DI:150PF,10%,100V	72982	390049X5P0151K
C3478	281-0792-00			CAP.,FXD,CER DI:82PF,10%,100V	72982	390049X5P0820K
C3489	281-0792-00			CAP.,FXD,CER DI:82PF,10%,100V	72982	390049X5P0820K
C3510	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C3511	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C3520	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3521	281-0759-00			CAP.,FXD,CER DI:22PF,10%,100V	72982	390-049X5P0220K
C3525	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C3526	281-0763-00			CAP.,FXD,CER DI:47PF,10%,100V	72982	390049X5P0470K
C4118	290-0572-00			CAP.,FXD,ELCTLT:0.1UF,20%,50V	56289	196D104X0050HA1
C4122	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4124	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4129	281-0611-00			CAP.,FXD,CER DI:2.7PF,+/-0.25PF,200V	72982	374-001C0J0279C
C4130	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4131	281-0217-00			CAP.,VAR,CER DI:0.5-3.5PF,400V	80031	2222-801-96127
C4135	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4140	281-0217-00			CAP.,VAR,CER DI:0.5-3.5PF,400V	80031	2222-801-96127
C4142	281-0611-00			CAP.,FXD,CER DI:2.7PF,+/-0.25PF,200V	72982	374-001C0J0279C
C4144	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4146	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4212	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C4232	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C4233	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4236	290-0572-00			CAP.,FXD,ELCTLT:0.1UF,20%,50V	56289	196D104X0050HA1
C4240	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4245	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4247	281-0773-00			CAP.,FXD,CER DI:0.01UF,10%,100V	72982	8005H9AADW5R103K
C4310	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C4312	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C4323	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C4347	281-0791-00			CAP.,FXD,CER DI:270PF,10%,100V	80009	281-0791-00
CR1110	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1140	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1150	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1218	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1242	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1246	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1247	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1252	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1280	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1281	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1296	152-0574-00			SEMICONV DEVICE:SILICON,120V,0.15A	80009	152-0574-00
CR1297	152-0574-00			SEMICONV DEVICE:SILICON,120V,0.15A	80009	152-0574-00
CR1330	152-0246-00			SEMICONV DEVICE:SILICON,400PIV,200MA	80009	152-0246-00
CR1370	152-0061-00			SEMICONV DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR1371	152-0061-00			SEMICONV DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR1372	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1373	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1374	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1380	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1383	152-0398-00			SEMICONV DEVICE:SILICON,200V,1A	80009	152-0398-00
CR1384	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1390	152-0061-00			SEMICONV DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR1430	152-0246-00			SEMICONV DEVICE:SILICON,400PIV,200MA	80009	152-0246-00
CR1457	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1464	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR1466	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR1488	152-0061-00			SEMICON D DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR1555	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR1610	152-0429-00			SEMICON D DEVICE:SILICON,5000V,10MA	14099	SA3282
CR1621	152-0242-00			SEMICON D DEVICE:SILICON,225V,200MA	12969	NDP341
CR1622	152-0242-00			SEMICON D DEVICE:SILICON,225V,200MA	12969	NDP341
CR2132	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR2163	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR2220	152-0650-00			SEMICON D DEVICE:VVC,11.5PF,30PIV	04713	BB105B
CR2475	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3120	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3124	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3126	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3128	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3188	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3222	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3224	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3235	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3244	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3248	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3252	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3258	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3259	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3282	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3284	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3285	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3348	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3359	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3362	152-0066-00			SEMICON D DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR3364	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3370	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3371	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3374	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3380	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3466	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3468	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3475	152-0066-00			SEMICON D DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR3494	152-0066-00			SEMICON D DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR3496	152-0066-00			SEMICON D DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR3520	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3521	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR3525	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR4122	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR4224	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR4227	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR4329	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR4345	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
DS1110	150-1029-00			LAMP,LED:2.0V, GREEN	53184	XC209G
DS1115	150-1029-00			LAMP,LED:2.0V, GREEN	53184	XC209G
DS1620	150-0111-00			LAMP,GLOW:NEON,1.2MA	53944	A1B-3
DS1621	150-0111-00			LAMP,GLOW:NEON,1.2MA	53944	A1B-3
F3478	159-0022-00			FUSE,CARTRIDGE:3AG,1A,250V,FAST-BLOW	71400	AGC 1
F3482	159-0025-00			FUSE,CARTRIDGE:3AG,0.5A,250V,FAST-BLOW	71400	AGC 1/2

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
F3488	159-0029-01			FUSE,CARTRIDGE:BUSSMAN ONLY	71400	BUSS MDL 3/10
HVN1590	152-0634-00			VOLTAGE MULTR:HV MULTR,6.7KV IN,10KV OUT	80009	152-0634-00
HY1320	307-0562-00			RES NIWK,FXD FI:ATTENUATOR	80009	307-0562-00
HY1430	155-0161-00			MICROCIRCUIT,LI:VERTICAL PREAMP GAIN SW	80009	155-0161-00
HY1520	307-0562-00			RES NIWK,FXD FI:ATTENUATOR	80009	307-0562-00
HY1530	155-0161-00			MICROCIRCUIT,LI:VERTICAL PREAMP GAIN SW	80009	155-0161-00
HY3230	307-0563-00			RES NIWK,FXD FI:HORIZONTAL TRIGGER	80009	307-0563-00
J100	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J200	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J1420	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J1520	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J3188	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J3200	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J3290	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J3325	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J3380	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J3382	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J3390	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
L1140	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L1141	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L1270	108-0240-00			COIL,RF:820UH	76493	B5147
L1278	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L1292	108-0422-00			COIL,RF:80UH	80009	108-0422-00
L1358	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L1359	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L1564	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L1566	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L2156	108-0829-00			COIL,TUBE DEFL:FIXED,TRACE ROTATION	80009	108-0829-00
L2247	108-0740-00			TRANSFORMER,RF:225NH	80009	108-0740-00
L2277	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L2347	108-0740-00			TRANSFORMER,RF:225NH	80009	108-0740-00
L3170	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L3172	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L3229	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L3270	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L3329	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L3334	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L3339	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L3340	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L3342	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L4212	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L4318	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L4325	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
L4330	108-0245-00			COIL,RF:3.9UH	80009	108-0245-00
LR2421	108-0331-00			COIL,RF:0.75UH	80009	108-0331-00
LR2431	108-0331-00			COIL,RF:0.75UH	80009	108-0331-00
LR2433	108-0331-00			COIL,RF:0.75UH	80009	108-0331-00
Q1116	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q1210	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q1211	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065

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Q1237	151-1031-00			TRANSISTOR:SILICON,FE,N-CHANNEL,DUAL	80009	151-1031-00
Q1240	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q1241	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q1242	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q1250	151-0342-00			TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q1255	151-0342-00			TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q1280	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q1288	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q1289	151-0350-00			TRANSISTOR:SILICON,PNP	80009	151-0350-00
Q1335	151-1090-02			TRANSISTOR:SILICON,FE,DUAL,N-CHANNEL	80009	151-1090-02
Q1378	151-0437-00			TRANSISTOR:SILICON,NPN,SEL FROM 2N5769	80009	151-0437-00
Q1380	151-0426-00			TRANSISTOR:SILICON,NPN	80009	151-0426-00
Q1381	151-0364-00			TRANSISTOR:SILICON,PNP	80009	151-0364-00
Q1435	151-1090-02			TRANSISTOR:SILICON,FE,DUAL,N-CHANNEL	80009	151-1090-02
Q1455	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q1456	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q1458	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q1460	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q1462	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q1555	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q2131	151-0342-00			TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q2135	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q2162	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q2165	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q2180	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q2220	153-0609-00			SEMICON DVC SE:SILICON,PNP	80009	153-0609-00
Q2230						
Q2235	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q2242	151-0447-00			TRANSISTOR:SILICON,NPN	80009	151-0447-00
Q2246	151-0446-00			TRANSISTOR:SILICON,NPN	80009	151-0446-00
Q2260	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q2280	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q2320	153-0609-00			SEMICON DVC SE:SILICON,PNP	80009	153-0609-00
Q2321	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q2322	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q2330 ¹						
Q2335	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q2342	151-0447-00			TRANSISTOR:SILICON,NPN	80009	151-0447-00
Q2346	151-0446-00			TRANSISTOR:SILICON,NPN	80009	151-0446-00
Q2365	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q2383	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q2469	151-0103-00			TRANSISTOR:SILICON,NPN	04713	2N2219A
Q2473	151-0342-00			TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q2476	151-0342-00			TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3132	151-0216-00			TRANSISTOR:SILICON,PNP	80009	151-0216-00
Q3134	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q3135	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q3144	151-0438-00			TRANSISTOR:SILICON,PNP,SEL FROM SPS6927	80009	151-0438-00
Q3145	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q3152	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q3154	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q3156	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q3178	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00

¹Furnished as a unit with Q2320.

Replaceable Electrical Parts—SC 504

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
Q3188	151-0333-00		TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q3224	151-0333-00		TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q3225	151-0333-00		TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q3234	151-0225-00		TRANSISTOR:SILICON,NPN	80009	151-0225-00
Q3235	151-0225-00		TRANSISTOR:SILICON,NPN	80009	151-0225-00
Q3236	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q3237	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q3244	151-0190-00		TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q3247	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3248	151-0190-00		TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q3252	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3258	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3260	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3261	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3262	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3263	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3264	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3265	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3266	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q3268	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3269	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3280	151-0341-00		TRANSISTOR:SILICON,NPN	07263	S040065
Q3286	151-0341-00		TRANSISTOR:SILICON,NPN	07263	S040065
Q3366	151-0341-00		TRANSISTOR:SILICON,NPN	07263	S040065
Q3367	151-0190-00		TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q3368	151-0190-00		TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q3369	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3372	151-0103-00		TRANSISTOR:SILICON,NPN	04713	2N2219A
Q3373	151-0341-00		TRANSISTOR:SILICON,NPN	07263	S040065
Q3375	151-0341-00		TRANSISTOR:SILICON,NPN	07263	S040065
Q3470	151-0341-00		TRANSISTOR:SILICON,NPN	07263	S040065
Q3472	151-0134-00		TRANSISTOR:SILICON,PNP	80009	151-0134-00
Q3474	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3475	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3476	151-0347-00		TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q3478	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3479	151-0347-00		TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q3480	151-0341-00		TRANSISTOR:SILICON,NPN	07263	S040065
Q3482	151-0341-00		TRANSISTOR:SILICON,NPN	07263	S040065
Q3484	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3485	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3488	151-0342-00		TRANSISTOR:SILICON,PNP	80009	151-0342-00
Q3520	151-1042-00		SEMICOND DVC SE:MATCHED PAIR FET	80009	151-1042-00
Q3522	151-0225-00		TRANSISTOR:SILICON,NPN	80009	151-0225-00
Q3523	151-0225-00		TRANSISTOR:SILICON,NPN	80009	151-0225-00
Q3524	151-1042-00		SEMICOND DVC SE:MATCHED PAIR FET	80009	151-1042-00
Q4110	151-0347-00		TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q4125	151-0347-00		TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q4126	151-0190-00		TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q4132	151-0350-00		TRANSISTOR:SILICON,PNP	80009	151-0350-00
Q4137	151-0350-00		TRANSISTOR:SILICON,PNP	80009	151-0350-00
Q4145	151-0347-00		TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q4147	151-0188-00		TRANSISTOR:SILICON,PNP	01295	2N3906

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q4230	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
R210	317-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.125W	01121	BB2005
R211	317-0910-00			RES.,FXD,CMPSN:91 OHM,5%,0.125W	01121	BB9105
R213	321-1389-03			RES.,FXD,FILM:111K OHM,0.25%,0.125W	91637	MFF1816D11102C
R215	321-0807-03			RES.,FXD,FILM:900K OHM,0.25%,0.125W	91637	MFF1816D90002C
R217	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R220	317-0240-00			RES.,FXD,CMPSN:24 OHM,5%,0.125W	01121	BB2405
R221	317-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.125W	01121	BB4705
R223	321-1389-03			RES.,FXD,FILM:111K OHM,0.25%,0.125W	91637	MFF1816D11102C
R225	321-0807-03			RES.,FXD,FILM:900K OHM,0.25%,0.125W	91637	MFF1816D90002C
R227	321-0481-03			RES.,FXD,FILM:1M OHM,0.25%,0.125W	91637	HFF1813D10003C
R233	321-0618-03			RES.,FXD,FILM:250K OHM,0.25%,0.125W	91637	MFF1816D25002C
R235	321-0891-03			RES.,FXD,FILM:800K OHM,0.25%,0.125W	91637	MFF1816D80002C
R240	317-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
R241	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R243	317-0560-00			RES.,FXD,CMPSN:56 OHM,5%,0.125W	01121	BB5605
R1110	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R1115	321-0927-07			RES.,FXD,FILM:125 OHM,0.1%,0.125W	91637	MFF1816C125R0B
R1116	321-0602-00			RES.,FXD,FILM:3.908K OHM,0.25%,0.125W	91637	MFF1816D39080C
R1119	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1140	315-0620-00			RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R1148	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1149	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1150	315-0162-00			RES.,FXD,CMPSN:1.6K OHM,5%,0.25W	01121	CB1625
R1152	311-1803-00			RES.,VAR,NONWIR:20K OHM,10%,1W	01121	13M501
R1155	311-1239-00			RES.,VAR,NONWIR:2.5K OHM,10%,0.50W	73138	72X-76-0-252K
R1160	311-1248-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	73138	72X-23-0-501K
R1166	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R1167	311-1248-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	73138	72X-23-0-501K
R1168	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R1169	311-1244-00			RES.,VAR,NONWIR:100 OHM,10%,0.50W	32997	3386X-T07-101
R1200	311-0546-00			RES.,VAR,NONWIR:10K OHM,20%,0.75W	80009	311-0546-00
R1210	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R1211	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R1215	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1216	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1217	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1218	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R1220	315-0244-00			RES.,FXD,CMPSN:240K OHM,5%,0.25W	01121	CB2445
R1223	321-0510-07			RES.,FXD,FILM:200 MEG OHM,0.1%,0.125W	91637	HFF1813C20003B
R1224	321-0414-03			RES.,FXD,FILM:200K OHM,0.25%,0.125W	91637	MFF1816D20002C
R1225	321-0318-03			RES.,FXD,FILM:20K OHM,0.25%,0.125W	91637	MFF1816D20001C
R1227	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1228	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1231	321-0318-03			RES.,FXD,FILM:20K OHM,0.25%,0.125W	91637	MFF1816D20001C
R1232	321-0414-03			RES.,FXD,FILM:200K OHM,0.25%,0.125W	91637	MFF1816D20002C
R1233	321-0510-00			RES.,FXD,FILM:2M OHM,1%,0.125W	91637	HFF188G20003F
R1234	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1235	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R1240	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R1241	315-0620-00			RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R1242	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

Replaceable Electrical Parts—SC 504

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1243	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R1245	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R1250	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R1252	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1259	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R1271	315-0361-00			RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R1272	315-0684-00			RES.,FXD,CMPSN:680K OHM,5%,0.25W	01121	CB6845
R1273	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R1276	315-0361-00			RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R1280	315-0620-00			RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R1281	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1282	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R1283	315-0394-00			RES.,FXD,CMPSN:390K OHM,5%,0.25W	01121	CB3945
R1284	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R1285	307-0490-00			RES,NTWK,FXD,FI:HIGH VOLTAGE DIVIDER	80009	307-0490-00
R1286	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R1288	315-0164-00			RES.,FXD,CMPSN:160K OHM,5%,0.25W	01121	CB1645
R1289	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R1290	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R1292	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R1293	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1300	315-0560-02			RES.,FXD,CMPSN:56 OHM,5%,0.25W	80009	315-0560-02
R1310	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1311	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1315	323-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.50W	75042	CECT0-49R90F
R1325	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1326	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R1327	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1335	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
R1339	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
R1340	315-0750-00			RES.,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505
R1341	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1342	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1343	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1344	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1345	311-1263-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
R1346	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R1347	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1348	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1349	321-0161-00			RES.,FXD,FILM:464 OHM,1%,0.125W	91637	MFF1816G464R0F
R1350	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1351	321-0091-00			RES.,FXD,FILM:86.6 OHM,1%,0.125W	91637	MFF1816G86R60F
R1352	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1355	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1356	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R1357	321-0054-00			RES.,FXD,FILM:35.7 OHM,5%,0.125W	91637	MFF1816G35R70F
R1360	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
R1361	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
R1362	321-0163-00			RES.,FXD,FILM:487 OHM,1%,0.125W	91637	MFF1816G487R0F
R1363	321-0163-00			RES.,FXD,FILM:487 OHM,1%,0.125W	91637	MFF1816G487R0F
R1364	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R1365	311-1947-00			RES.,VAR,NONWIR:5K OHM,20%,0.25W	12697	CM41722
R1370	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1371	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1372	315-0394-00			RES.,FXD,CMPSN:390K OHM,5%,0.25W	01121	CB3945
R1374	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R1380	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
R1385	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R1390	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R1391	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1392	315-0394-00			RES.,FXD,CMPSN:390K OHM,5%,0.25W	01121	CB3945
R1400	315-0560-02			RES.,FXD,CMPSN:56 OHM,5%,0.25W	80009	315-0560-02
R1410	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1411	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1415	323-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.50W	75042	CECT0-49R90F
R1417	315-0361-00			RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R1420	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1423	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1431	317-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.125W	01121	BB3305
R1432	317-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.125W	01121	BB3305
R1435	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
R1438	315-0200-00			RES.,FXD,CMPSN:20 OHM,5%,0.25W	01121	CB2005
R1440	315-0750-00			RES.,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505
R1442	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1443	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1444	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1445	311-1263-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
R1446	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1453	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1455	311-1466-00			RES.,VAR,NONWIR:2K OHM,20%,0.50W	01121	E2B202
R1464	321-0130-00			RES.,FXD,FILM:221 OHM,1%,0.125W	91637	MFF1816G221ROF
R1466	321-0130-00			RES.,FXD,FILM:221 OHM,1%,0.125W	91637	MFF1816G221ROF
R1488	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1510	315-0361-00			RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R1531	317-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.125W	01121	BB3305
R1532	317-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.125W	01121	BB3305
R1548	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R1549	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1554	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1556	315-0360-00			RES.,FXD,CMPSN:36 OHM,5%,0.25W	01121	CB3605
R1557	321-0054-00			RES.,FXD,FILM:35.7 OHM,5%,0.125W	91637	MFF1816G35R70F
R1560	311-1947-00			RES.,VAR,NONWIR:5K OHM,20%,0.25W	12697	CM41722
R1565	311-1245-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	72-28-0
R1570	311-1245-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	72-28-0
R1576	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R1578	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1580	311-1242-00			RES.,VAR,NONWIR:200K OHM,10%,0.50W	01121	E4A204
R1585	311-1245-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	73138	72-28-0
R1590	311-1242-00			RES.,VAR,NONWIR:200K OHM,10%,0.50W	01121	E4A204
R1595	311-1246-00			RES.,VAR,NONWIR:50K OHM,10%,0.50W	02111	63X-503-T602
R1610	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1614	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1615	308-0760-00			RES.,FXD,WW:0.2 OHM,10%,2W	91637	RS2B162ER2000K
R1620	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1621	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1622	315-0226-00			RES.,FXD,CMPSN:22M OHM,5%,0.25W	01121	CB2265

Replaceable Electrical Parts—SC 504

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R2110	311-0349-00			RES.,NONWIR:2 MEG OHM,0.5W	12697	381-CM30940
R2120	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2121	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R2127	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R2130	321-0286-00			RES.,FXD,FILM:9.31K OHM,1%,0.125W	91637	MFF1816G93100F
R2132	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2135	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2137	311-1423-00			RES.,VAR,NONWIR:20 OHM,20%,0.50W	73138	72PM-01-0-200
R2140	322-0617-00			RES.,FXD,FILM:47.7 OHM,1%,0.25W	19701	MF52C47R70F
R2142	321-0257-00			RES.,FXD,FILM:4.64K OHM,1%,0.125W	91637	MFF1816G46400F
R2145	315-0161-00			RES.,FXD,CMPSN:1.60 OHM,5%,0.25W	01121	CB1615
R2158	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R2163	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R2166	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2172	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2175	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2176	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R2182	315-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
R2183	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R2185	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2186	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2188	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2189	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R2190	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R2192	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R2194	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R2195	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R2197	311-1948-00			RES.,VAR,NONWIR:PNL,1K OHM,20%,0.50W	12697	CM41723
R2210	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	91637	MFF1816G301ROF
R2211	321-0091-00			RES.,FXD,FILM:86.6 OHM,1%,0.125W	91637	MFF1816G86R60F
R2212	321-0111-00			RES.,FXD,FILM:140 OHM,1%,0.125W	91637	MFF1816G140ROF
R2214	315-0390-00			RES.,FXD,CMPSN:39 OHM,5%,0.25W	01121	CB3905
R2220	321-0086-00			RES.,FXD,FILM:76.8 OHM,1%,0.125W	91637	MFF1816G76R80F
R2224	315-0390-00			RES.,FXD,CMPSN:39 OHM,5%,0.25W	01121	CB3905
R2225	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R2226	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R2227	321-0082-00			RES.,FXD,FILM:69.8 OHM,1%,0.125W	91637	MFF1816G69R80F
R2231	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R2233	321-0134-00			RES.,FXD,FILM:243 OHM,1%,0.125W	91637	MFF1816G243ROF
R2236	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R2237	321-0101-00			RES.,FXD,FILM:110 OHM,1%,0.125W	91637	MFF1816G110ROF
R2240	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100ROF
R2242	311-0605-00			RES.,VAR,NONWIR:200 OHM,10%,0.50W	80740	62-54-3
R2247	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R2253	308-0800-00			RES.,FXD,WW:470 OHM,1%,4W	91637	NS2-B470ROF
R2261	321-0306-01			RES.,FXD,FILM:15K OHM,0.5%,0.125W	91637	MFF1816G15001D
R2262	321-0764-01			RES.,FXD,FILM:5.09K OHM,0.5%,0.125W	91637	MFF1816G50900D
R2263	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R2268	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2273	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2275	321-0225-00			RES.,FXD,FILM:2.15K OHM,1%,0.125W	91637	MFF1816G21500F
R2310	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R2311	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R2313	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R2314	321-0018-00			RES.,FXD,FILM:15 OHM,1%,0.125W	91637	MFF1816G15R00F
R2315	321-0111-00			RES.,FXD,FILM:140 OHM,1%,0.125W	91637	MFF1816G140R0F
R2320	321-0086-00			RES.,FXD,FILM:76.8 OHM,1%,0.125W	91637	MFF1816G76R80F
R2321	311-1258-00			RES.,VAR,NONWIR:50 OHM,10%,0.50W	32997	3326P-T02-500
R2323	321-0082-00			RES.,FXD,FILM:69.8 OHM,1%,0.125W	91637	MFF1816G69R80F
R2328	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R2332	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R2333	321-0134-00			RES.,FXD,FILM:243 OHM,1%,0.125W	91637	MFF1816G243R0F
R2336	311-1265-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	32997	3329P-L58-202
R2337	321-0101-00			RES.,FXD,FILM:110 OHM,1%,0.125W	91637	MFF1816G110R0F
R2340	322-0617-00			RES.,FXD,FILM:47.7 OHM,1%,0.25W	19701	MF52C47R70F
R2347	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R2353	308-0800-00			RES.,FXD,WW:470 OHM,1%,4W	91637	NS2-B470R0F
R2358	308-0677-00			RES.,FXD,WW:1 OHM,5%,2W	75042	BWH-1R000J
R2361	321-0318-02			RES.,FXD,FILM:20K OHM,0.5%,0.125W	91637	MFF1816D20001D
R2362	308-0679-00			RES.,FXD,WW:0.51 OHM,5%,2W	75042	BWH-R5100J
R2363	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R2384	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2385	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R2386	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R2387	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2390	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R2391	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R2410	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R2411	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2413	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R2414	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R2419	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R2420	315-0390-00			RES.,FXD,CMPSN:39 OHM,5%,0.25W	01121	CB3905
R2421	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2422	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R2463	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R2465	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R2466	321-0764-01			RES.,FXD,FILM:5.09K OHM,0.5%,0.125W	91637	MFF1816G50900D
R2468	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R2469	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R2482	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R2483	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
R2485	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R2486	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R2487	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R2488	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2489	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2497A,B	311-1946-00			RES.,VAR,NONWIR:PNL,10K OHM,20%,0.50W	12697	CM41721
R3100	311-1192-00			RES.,VAR,NONWIR:10K OHM,20%,1W	71590	BR-232-001
R3110	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
R3112	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R3114	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R3115	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
R3116	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3118	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R3120	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215

Replaceable Electrical Parts—SC 504

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R3122	315-0514-00			RES.,FXD,CMPSN:510K OHM,5%,0.25W	01121	CB5145
R3124	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3125	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R3126	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R3127	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3128	315-0514-00			RES.,FXD,CMPSN:510K OHM,5%,0.25W	01121	CB5145
R3129	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3130	315-0620-00			RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R3134	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3135	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R3136	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3137	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3138	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3142	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
R3144	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R3146	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R3150	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R3152	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R3154	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R3156	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R3160	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R3162	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R3165	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3168	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3174	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3178	315-0560-00			RES.,FXD,CMPSN:56 OHM,5%,0.25W	01121	CB5605
R3180	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3184	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R3185	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R3186	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R3188	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R3210	315-0754-00			RES.,FXD,CMPSN:750K OHM,5%,0.25W	01121	CB7545
R3212	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
R3215	315-0750-00			RES.,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505
R3220	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R3222	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3223	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3224	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R3226	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R3227	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R3228	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3229	315-0620-00			RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R3235	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3244	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
R3246	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R3248	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R3249	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R3250	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3251	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R3252	321-0241-00			RES.,FXD,FILM:3.16K OHM,1%,0.125W	91637	MFF1816G31600F
R3253	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R3254	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3255	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R3256	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R3257	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R3258	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R3259	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R3260	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R3262	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R3264	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R3266	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R3268	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R3273	321-0310-00			RES.,FXD,FILM:16.5K OHM,1%,0.125W	91637	MFF1816G16501F
R3274	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.25W	91637	MFF1816G49900F
R3275	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3276	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R3277	321-0241-00			RES.,FXD,FILM:3.16K OHM,1%,0.125W	91637	MFF1816G31600F
R3278	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R3279	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R3281	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R3282	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3283	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R3284	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R3285	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R3286	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3287	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3288	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3289	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3290	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R3292	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3294	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3296	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R3315	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3320	315-0240-00			RES.,FXD,CMPSN:24 OHM,5%,0.25W	01121	CB2405
R3322	321-0074-00			RES.,FXD,FILM:57.6 OHM,1%,0.125W	91637	MFF1816G57R60F
R3324	321-0074-00			RES.,FXD,FILM:57.6 OHM,1%,0.125W	91637	MFF1816G57R60F
R3328	315-0240-00			RES.,FXD,CMPSN:24 OHM,5%,0.25W	01121	CB2405
R3336	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R3338	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R3344	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3346	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
R3347	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R3348	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R3350	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R3352	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R3358	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R3362	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R3364	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R3365	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3365	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3367	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3369	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R3372	321-0326-00			RES.,FXD,FILM:24.3K OHM,1%,0.125W	91637	MFF1816G24301F
R3373	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3375	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R3378	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625

Replaceable Electrical Parts—SC 504

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
R3382	315-0181-00		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R3386	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3388	321-0241-00		RES.,FXD,FILM:3.16K OHM,1%,0.125W	91637	MFF1816G31600F
R3460	321-0306-01		RES.,FXD,FILM:15K OHM,0.5%,0.125W	91637	MFF1816G15001D
R3461	321-0236-00		RES.,FXD,FILM:2.8K OHM,1%,0.125W	91637	MFF1816G28000F
R3462	321-0263-00		RES.,FXD,FILM:5.36K OHM,1%,0.125W	91637	MFF1816G53600F
R3463	321-0306-01		RES.,FXD,FILM:15K OHM,0.5%,0.125W	91637	MFF1816G15001D
R3464	315-0562-00		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R3466	311-1224-00		RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R3469	315-0432-00		RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R3470	315-0100-00		RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R3472	315-0392-00		RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R3474	315-0102-00		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3475	315-0102-00		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R3476	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3477	315-0222-00		RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R3479	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R3480	315-0562-00		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R3482	315-0270-00		RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
R3484	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3485	315-0621-00		RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R3486	315-0270-00		RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
R3487	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3488	315-0621-00		RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R3490	308-0685-00		RES.,FXD,WW:1.5 OHM,10%,1W	75042	BW20-1R500J
R3492	308-0685-00		RES.,FXD,WW:1.5 OHM,10%,1W	75042	BW20-1R500J
R3494	321-0241-00		RES.,FXD,FILM:3.16K OHM,1%,0.125W	91637	MFF1816G31600F
R3496	315-0103-00		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R3498	315-0105-00		RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R3510	315-0104-00		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R3511	315-0114-00		RES.,FXD,CMPSN:110K OHM,5%,0.25W	01121	CB1145
R3521	315-0105-00		RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R3522	315-0270-00		RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
R3523	315-0240-00		RES.,FXD,CMPSN:24 OHM,5%,0.25W	01121	CB2405
R3526	321-0052-00		RES.,FXD,FILM:34 OHM,1%,0.125W	91637	MFF1816G34R00F
R3527	311-1221-00		RES.,VAR,NONWIR:50 OHM,20%,0.50W	32997	3386F-T04-500
R3528	321-0179-00		RES.,FXD,FILM:715 OHM,1%,0.125W	91637	MFF1816G715R0F
R3529	321-0179-00		RES.,FXD,FILM:715 OHM,1%,0.125W	91637	MFF1816G715R0F
R4112	321-0294-00		RES.,FXD,FILM:11.3K OHM,1%,0.125W	91637	MFF1816G11301F
R4113	321-0345-00		RES.,FXD,FILM:38.3K OHM,1%,0.125W	91637	MFF1816G38301F
R4115	315-0620-00		RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R4127	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4130	315-0620-00		RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R4132	321-0284-00		RES.,FXD,FILM:8.87K OHM,1%,0.125W	91637	MFF1816G88700F
R4133	301-0223-00		RES.,FXD,CMPSN:22K OHM,5%,0.50W	01121	EB2235
R4135	321-0186-00		RES.,FXD,FILM:845 OHM,1%,0.125W	91637	MFF1816G845R0F
R4136	321-0186-00		RES.,FXD,FILM:845 OHM,1%,0.125W	91637	MFF1816G845R0F
R4139	315-0620-00		RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R4142	315-0101-00		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R4143	321-0171-00		RES.,FXD,FILM:590 OHM,1%,0.125W	91637	MFF1816G590R0F
R4145	315-0620-00		RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R4212	315-0470-00		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4216	321-0171-00		RES.,FXD,FILM:590 OHM,1%,0.125W	91637	MFF1816G590R0F

Kct No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R4217	321-0313-00			RES.,FXD,FILM:17.8K OHM,1%,0.125W	91637	MFF1816G17801F
R4218	321-0275-00			RES.,FXD,FILM:7.15K OHM,1%,0.125W	91637	MFF1816G71500F
R4220	321-0211-00			RES.,FXD,FILM:1.54K OHM,1%,0.125W	91637	MFF1816G15400F
R4221	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R4223	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R4224	321-0284-00			RES.,FXD,FILM:8.87K OHM,1%,0.125W	91637	MFF1816G88700F
R4225	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4227	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R4228	321-0261-00			RES.,FXD,FILM:5.11K OHM,1%,0.125W	91637	MFF1816G51100F
R4233	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R4237	301-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.50W	01121	EB2235
R4238	321-0284-00			RES.,FXD,FILM:8.87K OHM,1%,0.125W	91637	MFF1816G88700F
R4242	321-0284-00			RES.,FXD,FILM:8.87K OHM,1%,0.125W	91637	MFF1816G88700F
R4243	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R4245	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R4248	321-0231-00			RES.,FXD,FILM:2.49K OHM,1%,0.125W	91637	MFF1816G24900F
R4249	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R4336	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
R4339	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R4340	321-0271-00			RES.,FXD,FILM:6.49K OHM,1%,0.125W	91637	MFF1816G64900F
R4341	321-0081-00			RES.,FXD,FILM:68.1 OHM,1%,0.125W	91637	MFF1816G68R10F
R4342	321-0274-00			RES.,FXD,FILM:6.98K OHM,1%,0.125W	91637	MFF1816G69800F
R4344	321-0271-00			RES.,FXD,FILM:6.49K OHM,1%,0.125W	91637	MFF1816G64900F
R4346	321-0230-00			RES.,FXD,FILM:2.43K OHM,1%,0.125W	91637	MFF1816G24300F
R4348	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
RT2120	307-0181-00			RES.,THERMAL:100K OHM,10%,4MW/DEG C	15454	1DE104-K-220EC
RT2210	307-0127-00			RES.,THERMAL:1K OHM,10%	50157	2D1596
S1110	260-1811-00			SWITCH,SLIDE:DPDT,0.5A,125VAC DC	82389	C56206L2
S1130	263-1164-00			ACTR ASSY,CAM S:TIME/DIV	80009	263-1164-00
S1160						
S1325		263-1167-00			ACTR ASSY,CAM S:ATTENUATOR	80009	263-1167-00
S1525	263-1167-00			ACTR ASSY,CAM S:ATTENUATOR	80009	263-1167-00
S2285	260-1686-00			SWITCH,PUSH:1 STA,2 POLE,MOMENTARY	80009	260-1686-00
S2375	263-1163-00			ACTR ASSY,CAM S:DISPLAY MODE	80009	263-1163-00
S3315	263-1165-00			ACTR ASSY,CAM S:TRIGGER SOURCE	80009	263-1165-00
S3511A-C	263-0015-06			ACTR ASSY,PB:2 LATCH,1 CANCEL,7.5MM	80009	263-0015-06
S3512A	263-0010-00			SWITCH,PB ASSY:1 PUSH,7.5MM,WITH 2 CONTACTS	80009	263-0010-00
S3512B	263-0010-00			SWITCH,PB ASSY:1 PUSH,7.5MM,WITH 2 CONTACTS	80009	263-0010-00
S3512C	263-0010-00			SWITCH,PB ASSY:1 PUSH,7.5MM,WITH 2 CONTACTS	80009	263-0010-00
T1385	108-0828-00			COIL,RF:65UH,TOROIDAL	80009	108-0828-00
T1455	120-1167-00			TRANSFORMER,RF:TOROID,5 TURNS BIFILAR	80009	120-1167-00
T1475	120-1016-00			XFMR,PWR,SDN/SU:HIGH VOLTAGE	80009	120-1016-00
U1270	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U2170	156-0038-00			MICROCIRCUIT,DI:J-K MASTER SLAVE FLIP-FLOP	80009	156-0038-00
U2263	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U2480	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U3120	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U3125	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U3148	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U3158	155-0122-00			MICROCIRCUIT,DI:A & B LOGIC 200 OHM PER	80009	155-0122-00
U3238	155-0109-01			MICROCIRCUIT,LI:MONOLITHIC TRIG	80009	155-0109-01
U3276	156-0860-00			MICROCIRCUIT,DI:TRIPLE LINE RECEIVER	80009	156-0860-00

Replaceable Electrical Parts—SC 504

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U4345	155-0124-00			MICROCIRCUIT, LI:HORIZONTAL PREAMPL	80009	155-0124-00
V1000	154-0730-05			ELECTRON TUBE:CRT,P31,INT SCALE	80009	154-0730-05
VR1248	152-0227-00			SEMICONV DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0227-00
VR1282	152-0405-00			SEMICONV DEVICE:ZENER,1W,15V,5%	80009	152-0405-00
VR1490	152-0285-00			SEMICONV DEVICE:ZENER,0.4W,62V,5%	04713	1N980B
VR2420	152-0309-00			SEMICONV DEVICE:ZENER,1W,6.2V,5%	04713	1N3828A
VR2429	152-0309-00			SEMICONV DEVICE:ZENER,1W,6.2V,5%	04713	1N3828A
VR3465	152-0227-00			SEMICONV DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0227-00
VR3479	152-0590-00			SEMICONV DEVICE:ZENER,18V,5% AT 7MA	04713	1N967B
VR4120	152-0265-00			SEMICONV DEVICE:ZENER,0.4W,24V,5%	04713	1N970B

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols and Reference Designators

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

- Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μ F).
- Resistors = Ohms (Ω).

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

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

Abbreviations are based on ANSI Y1.1-1972.

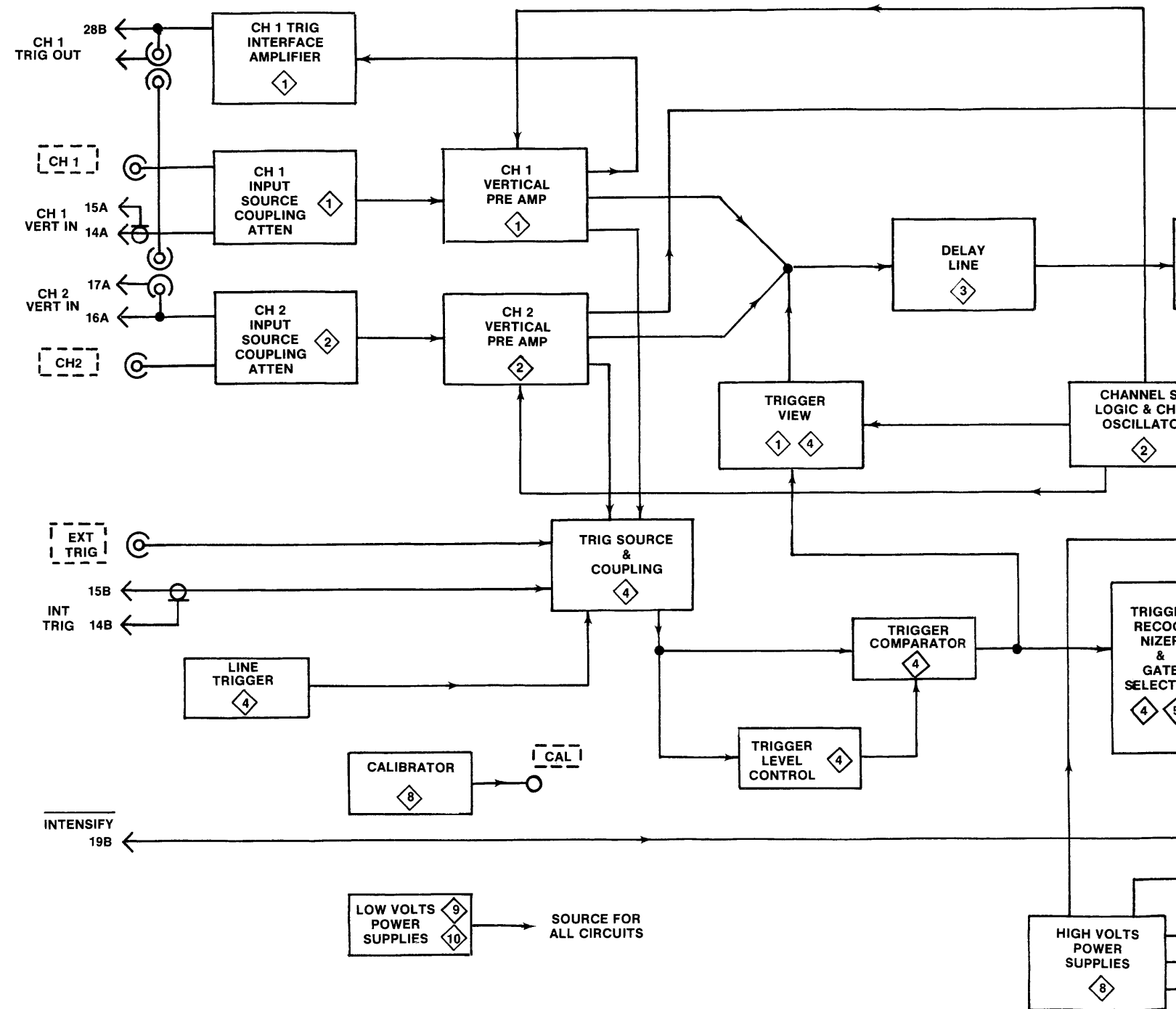
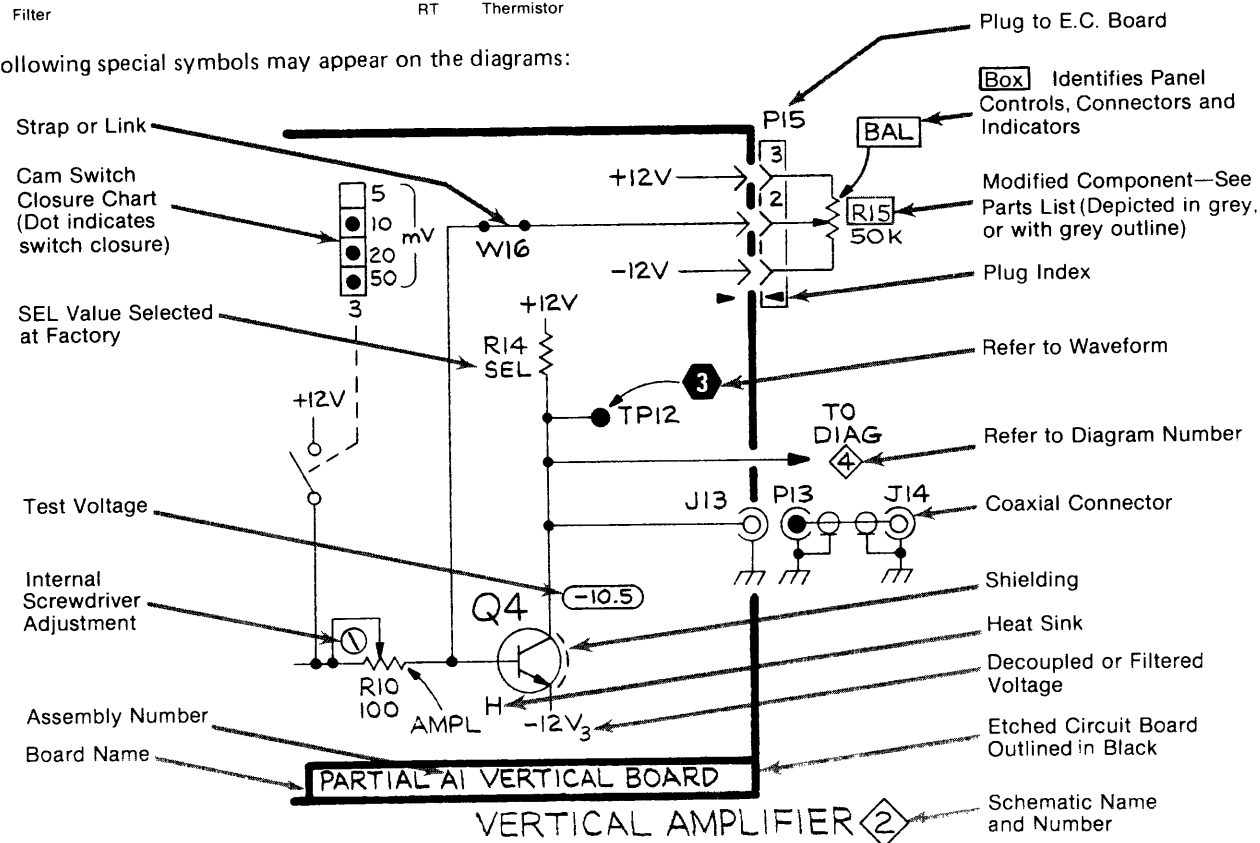
Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

- Y14.15, 1966 Drafting Practices.
- Y14.2, 1973 Line Conventions and Lettering.
- Y10.5, 1968 Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

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

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

The following special symbols may appear on the diagrams:



REV A, FEB 1979

DESCRIPTIONS

ie logic

on the diagrams.

h or contactor
 stformer
 nocouple
 point
 mbly, inseparable or non-repairable
 grated circuit, etc.)
 ron tube
 ge regulator (zener diode, etc.)
 strap or cable
 ial
 e shifter

lug to E.C. Board

Identifies Panel controls, Connectors and indicators

Modified Component—See parts List (Depicted in grey, or with grey outline)

lug Index

refer to Waveform

refer to Diagram Number

Coaxial Connector

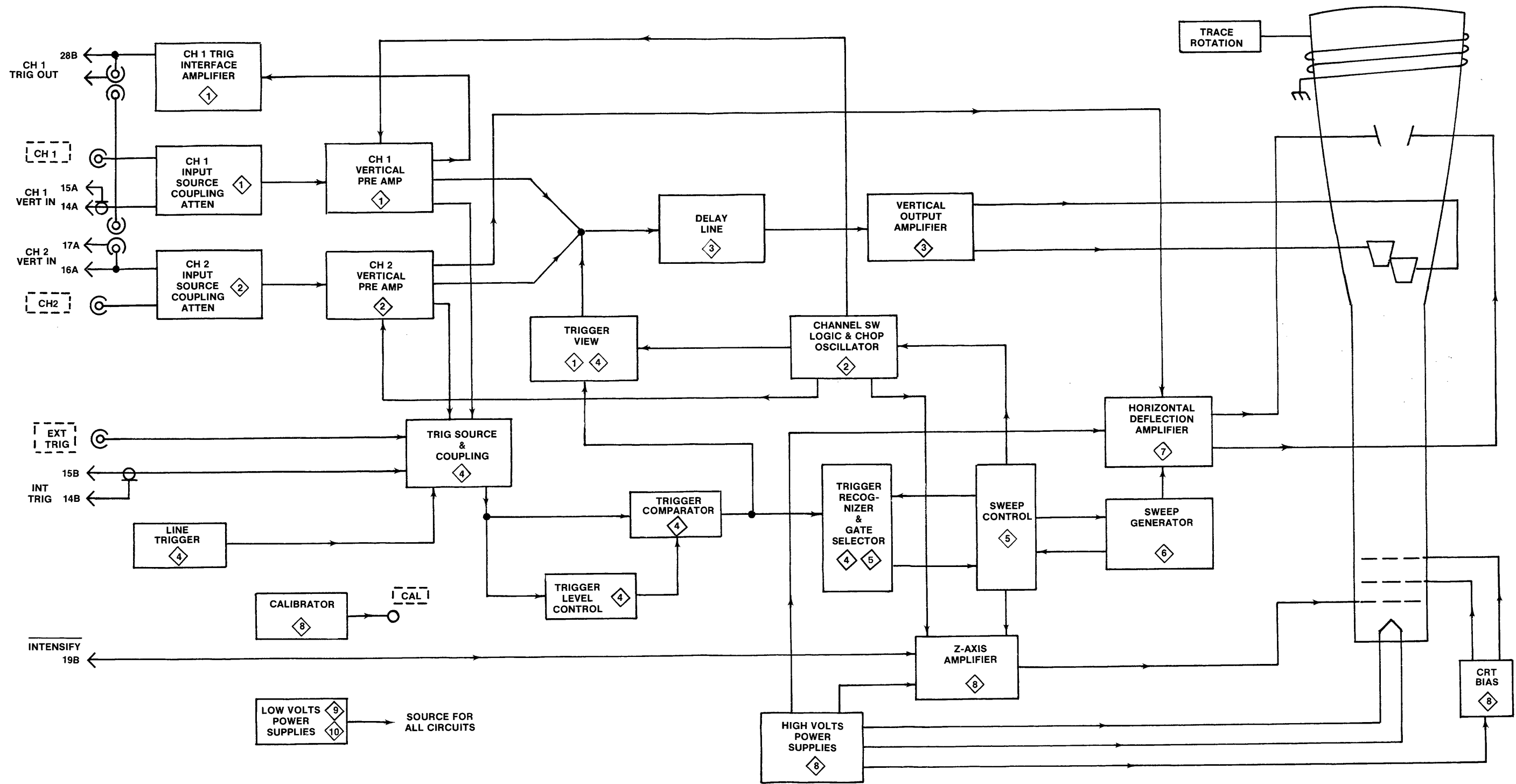
Shielding

Heat Sink

Decoupled or Filtered Voltage

Etched Circuit Board Outlined in Black

Schematic Name and Number



TRIGGERING MODE Auto
 TRIGGERING CPLG AC
 TRIGGERING SLOPE +
 TRIGGERING LEVEL Midrange
 INTEN Midrange
 DISPLAY ALT
 HORIZ Position Midrange
 SECONDS/DIV 2 m
 CAL/HORIZ MAG cw and out

WAVEFORM DIAGRAMS

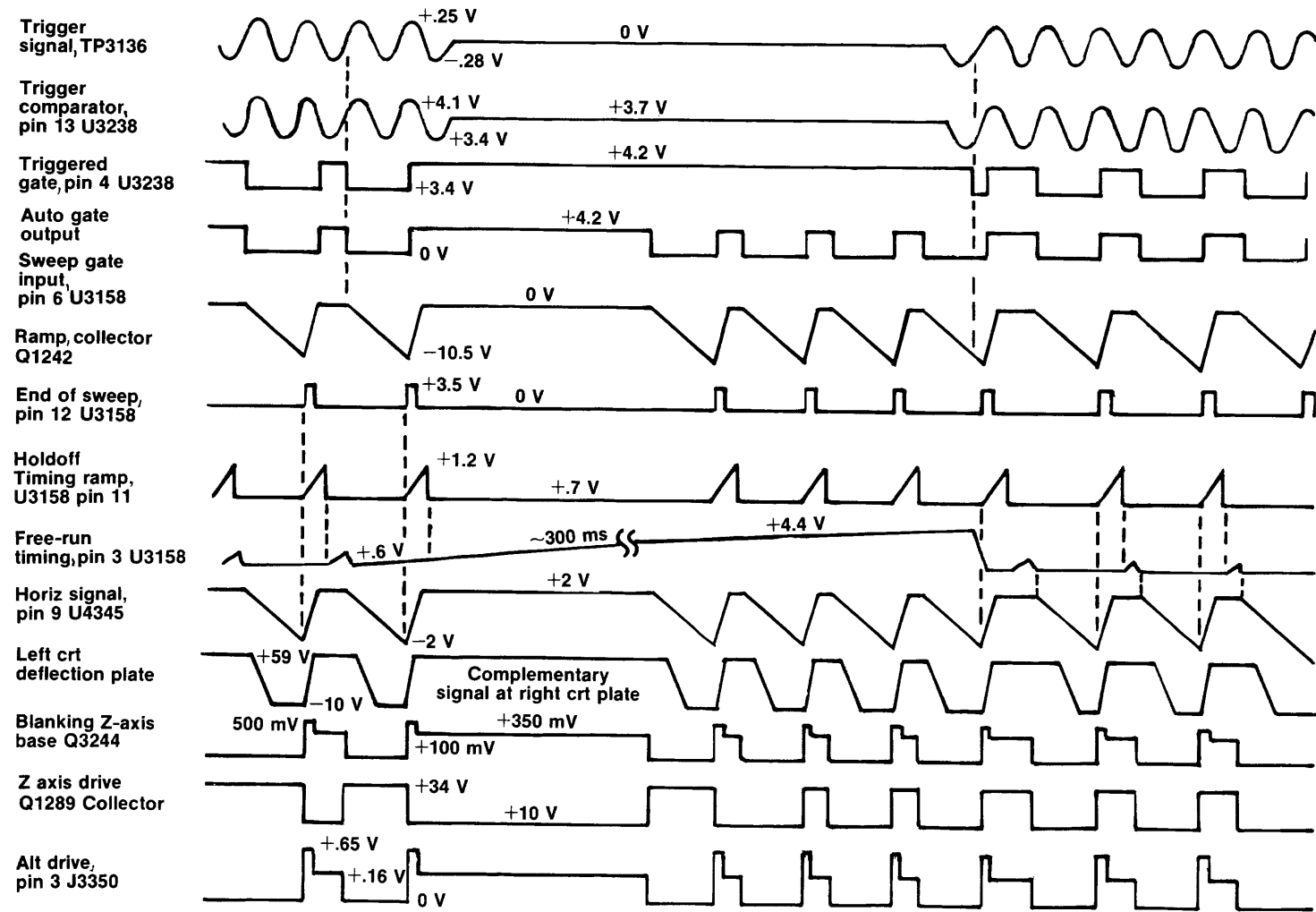


Fig. 8-1

2296-13

TRIGGER BOARD CONNECTOR REAR VIEW

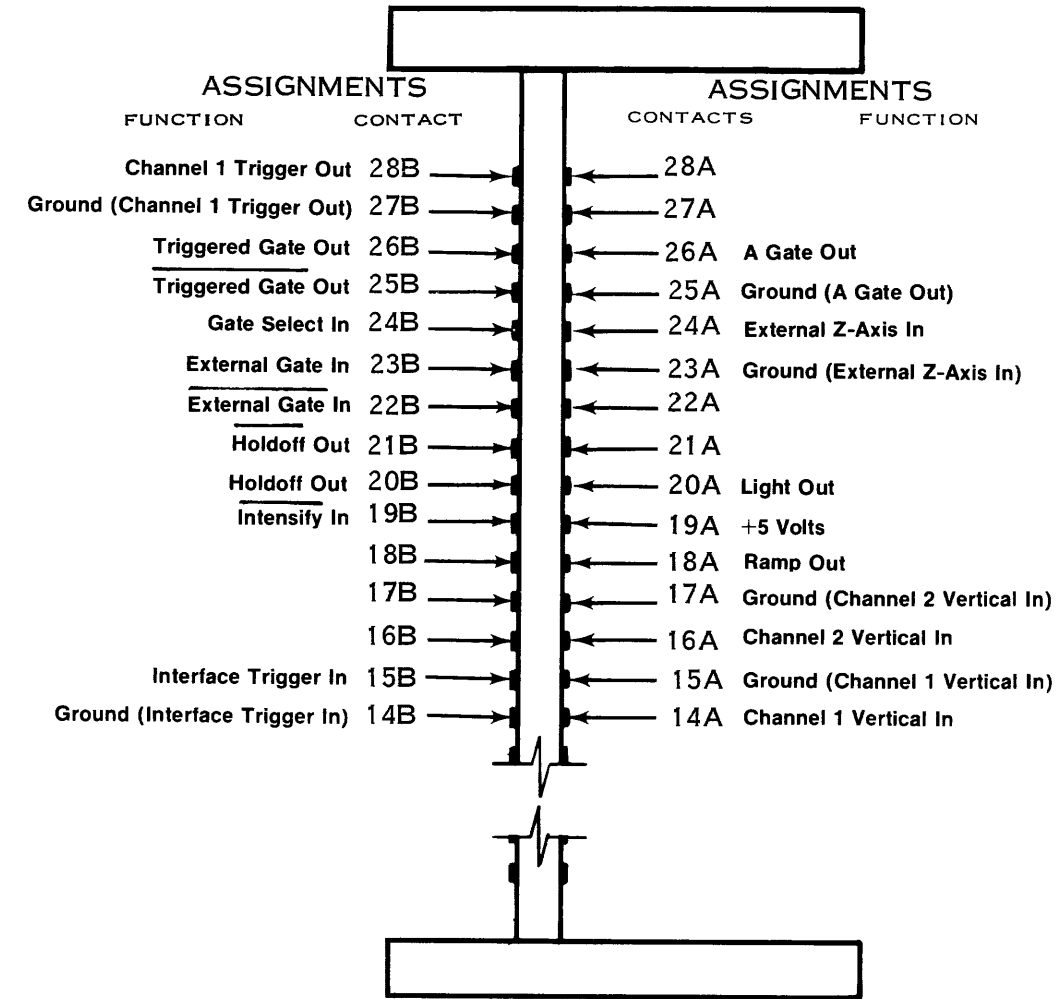


Fig. 8-2

2296-14

TRIGGER BOARD CONNECTOR REAR VIEW

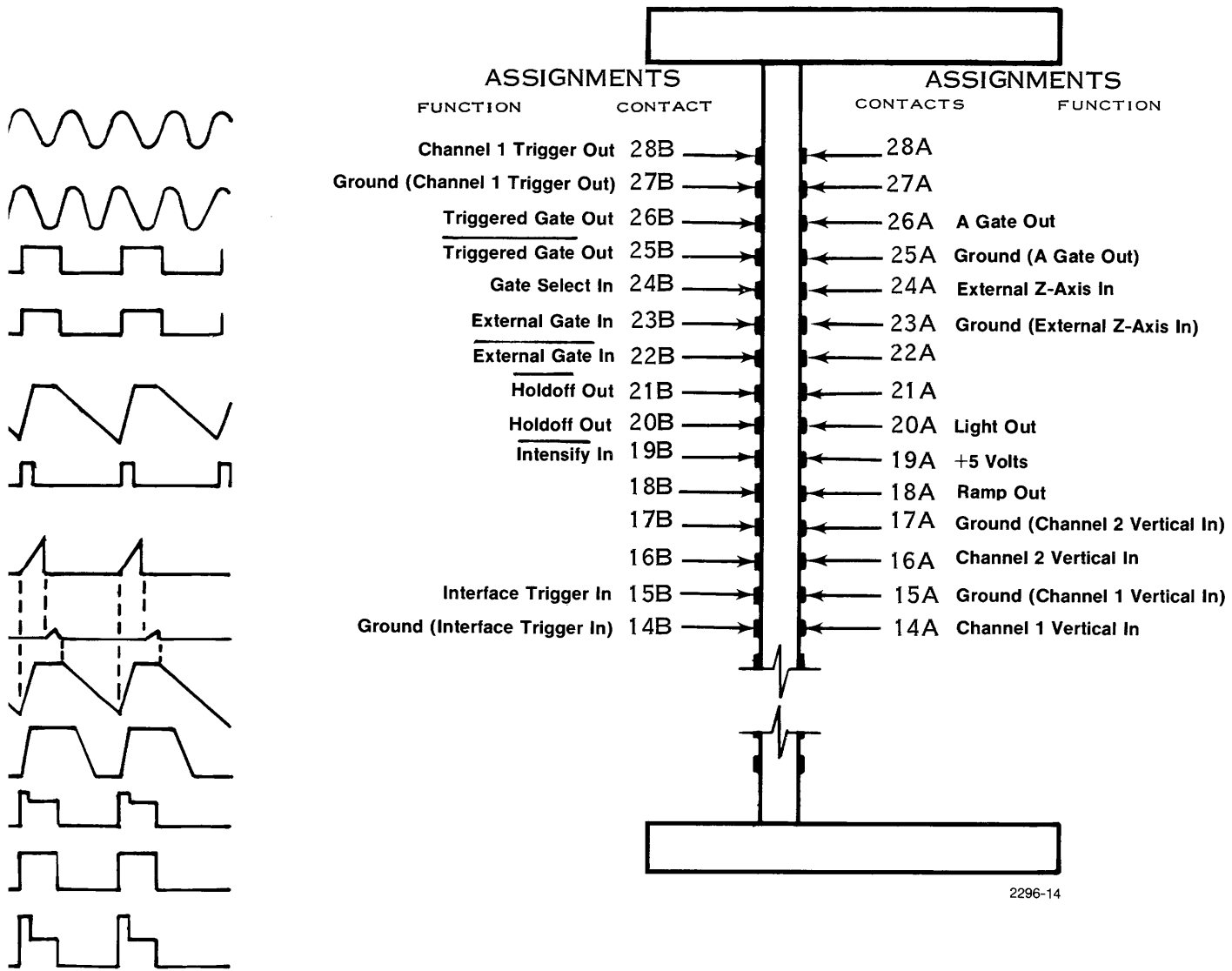


Fig. 8-2

INTERFACE BOARD CONNECTOR REAR VIEW

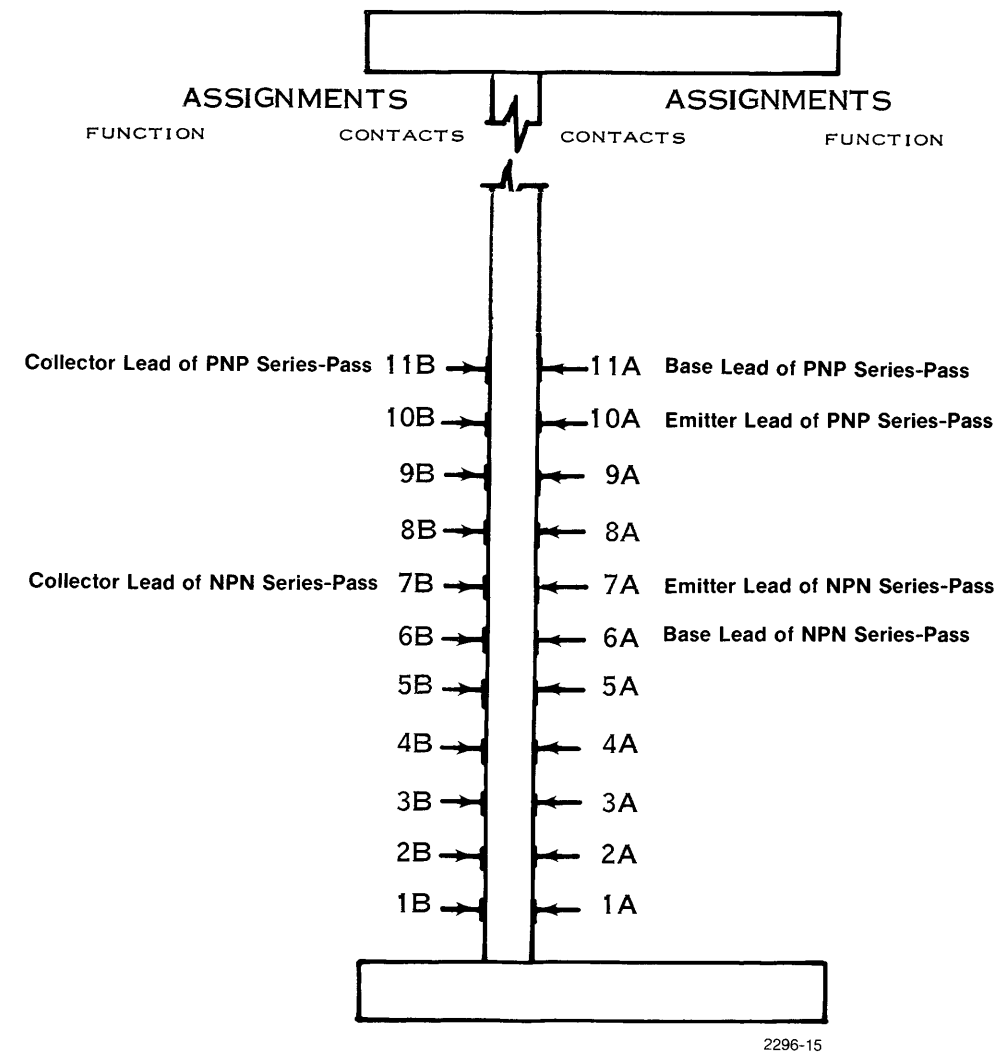


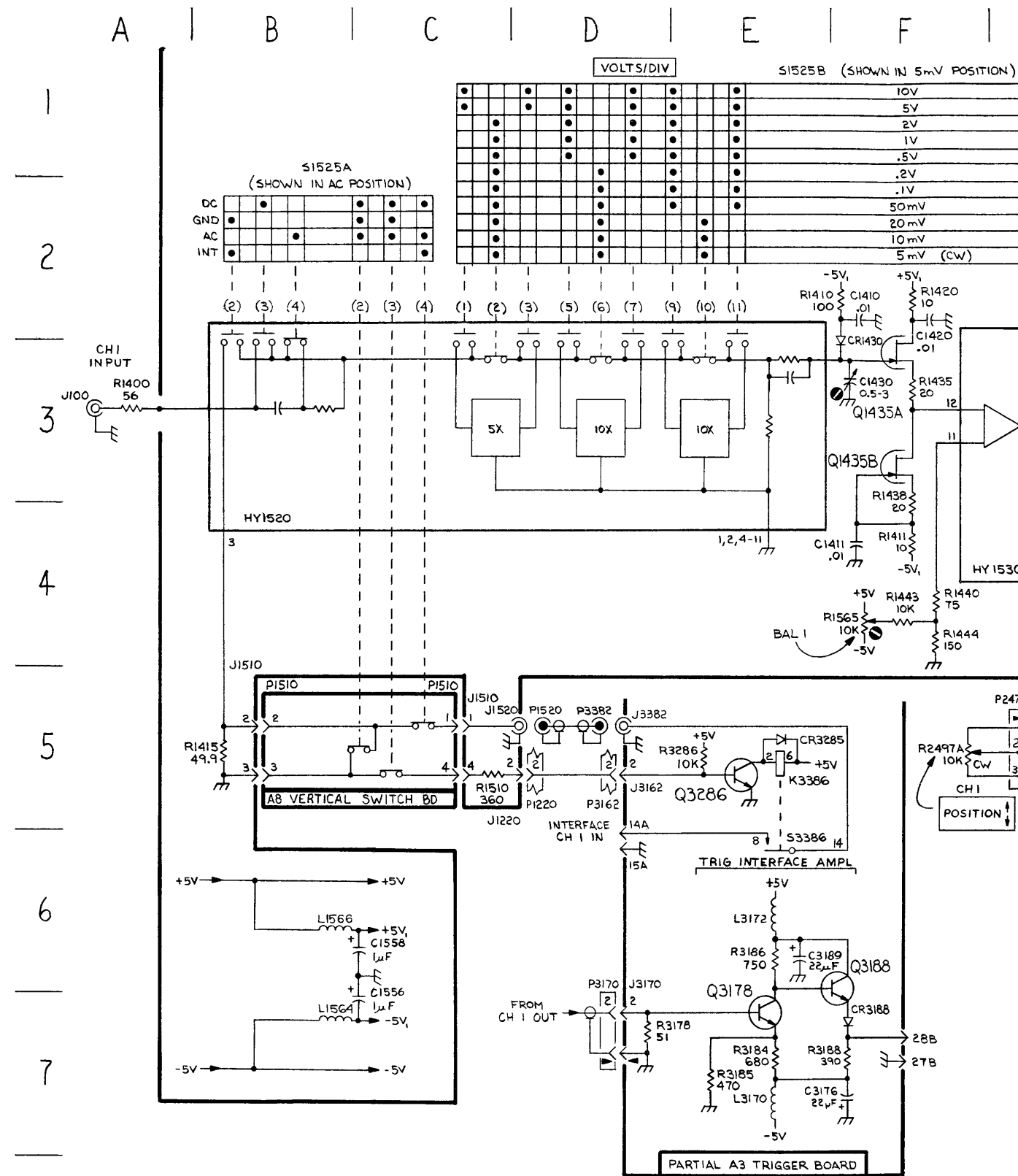
Fig. 8-3

2296-13

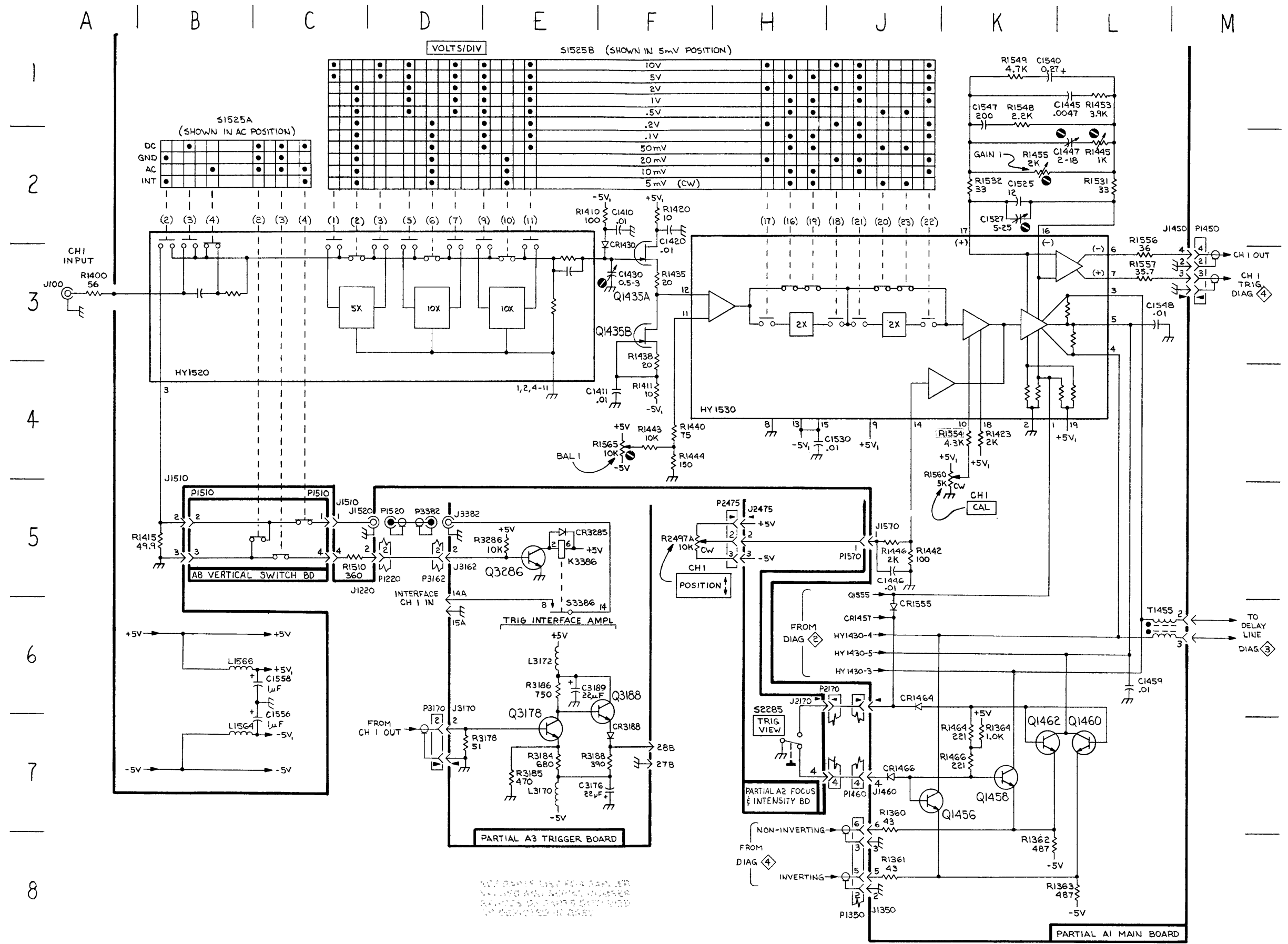
Table 8-1

INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

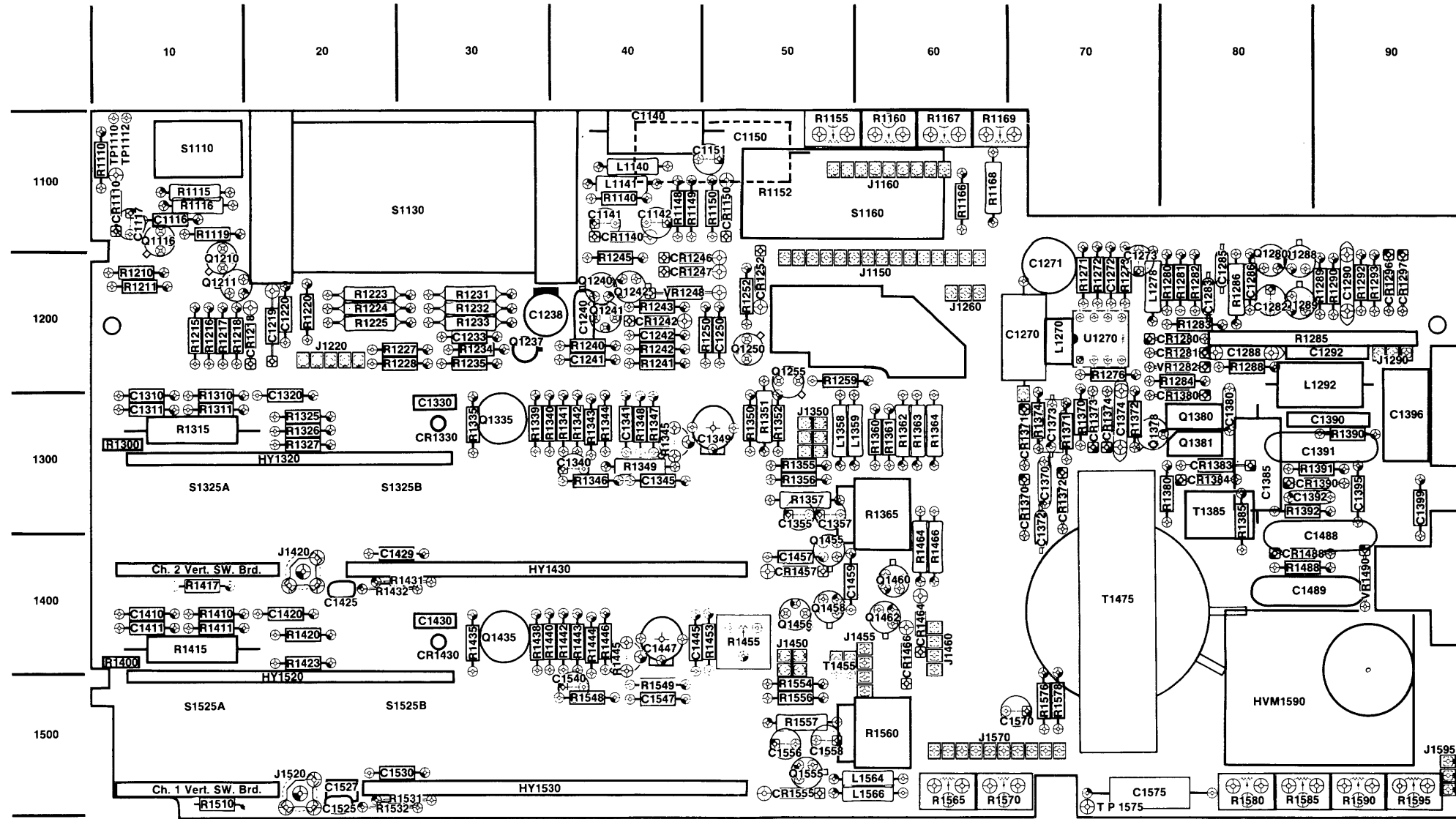
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1410	F2	HY1430-3J6		R1360	J7	R1548	K1
C1411	F4	HY1430-4J6		R1361	J8	R1549	K1
C1420	F2	HY1430-5J6		R1362	K8	R1554	K4
C1430	F3	HY1520 B2		R1363	L8	R1556	L3
C1445	L1	HY1530 F2		R1364	K7	R1557	L3
C1446	J5			R1400	A3	R1560	K4
C1447	L2			R1410	F2	R1565	F4
C1459	L6	K3386 E5		R1411	F4	R2182	E6
C1525	K2			R1415	B5	R2183	D6
C1527	K2			R1420	F2	R2185	E6
C1530	H4	L1564 B7		R1423	K4	R2186	E6
C1540	K1	L1566 B6		R1435	F3	R2497A	F5
C1547	K1	L3170 E7		R1438	F3	R3178	D7
C1548	L3	L3172 E6		R1440	F4	R3184	E7
C1556	B7			R1442	J5	R3185	E7
C1558	B6			R1443	F4	R3186	E6
C3176	F7	Q1435A F3		R1444	F4	R3188	F7
C3189	E6	Q1435B F3		R1445	L2	R3286	E5
		Q1456 J7		R1446	J5		
		Q1458 K7		R1453	L1	S1525A	B2
CR1430	F3	Q1460 L7		R1455	K2	S1525B	C1
CR1457	J6	Q1462 K7		R1464	K7	S2285	H7
CR1466	J7	Q1555 J5		R1466	K7	S3386	E6
CR1469	J6	Q3178 E7		R1510	C5		
CR1555	J6	Q3188 F5		R1531	L2		
CR3188	F7	Q3286 E5		R1532	K2	T1455	L6
CR3285	E5						



FOR PARTS LIST FOR SCHEMATIC
 VALUE AND TOLERANCE
 VALUES OF PARTS CONTAINED
 IN SCHEMATIC ARE GIVEN.



MAIN CIRCUIT BOARD



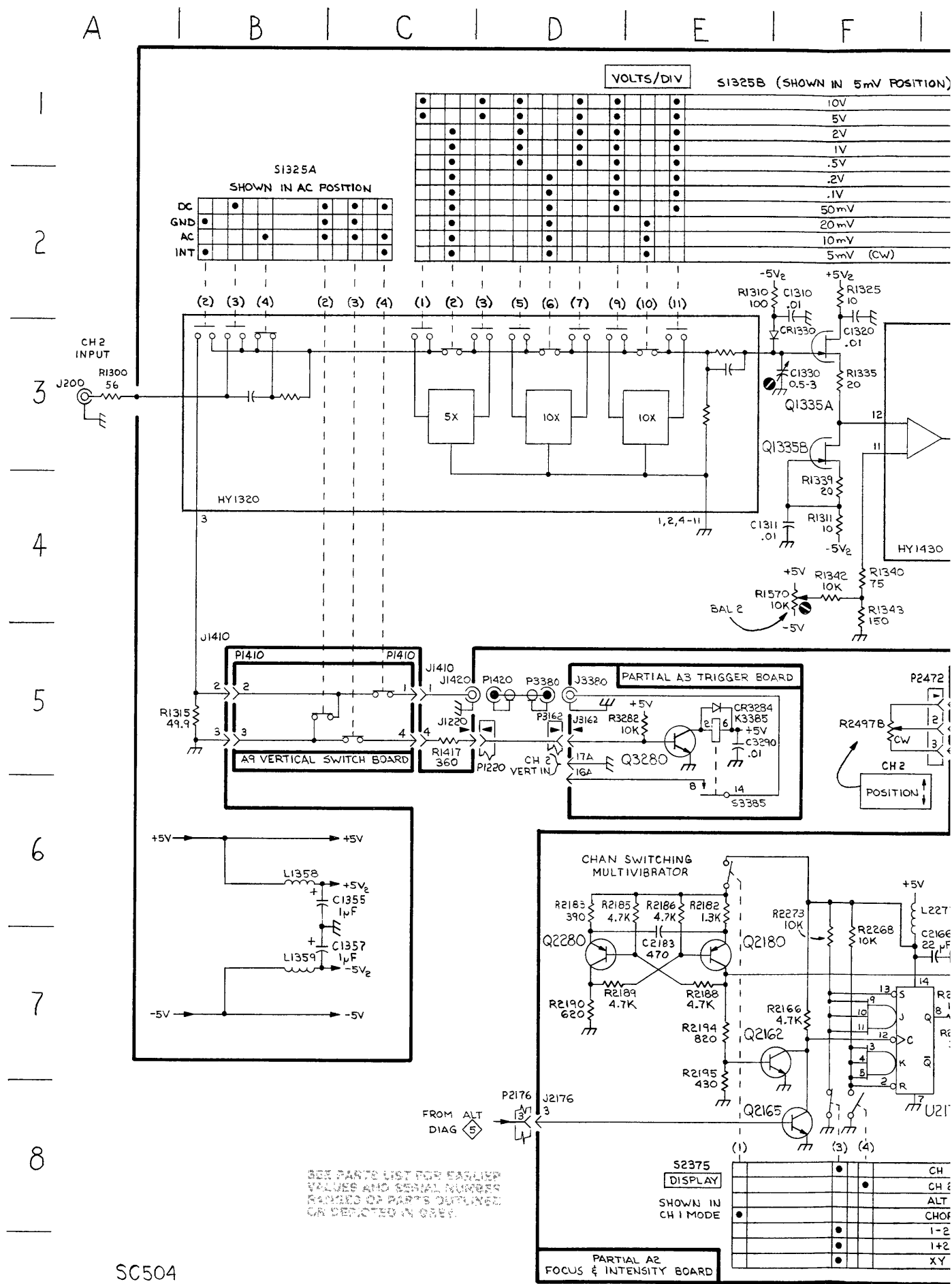
2296-16

Fig. 8-4

Table 8-2

INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

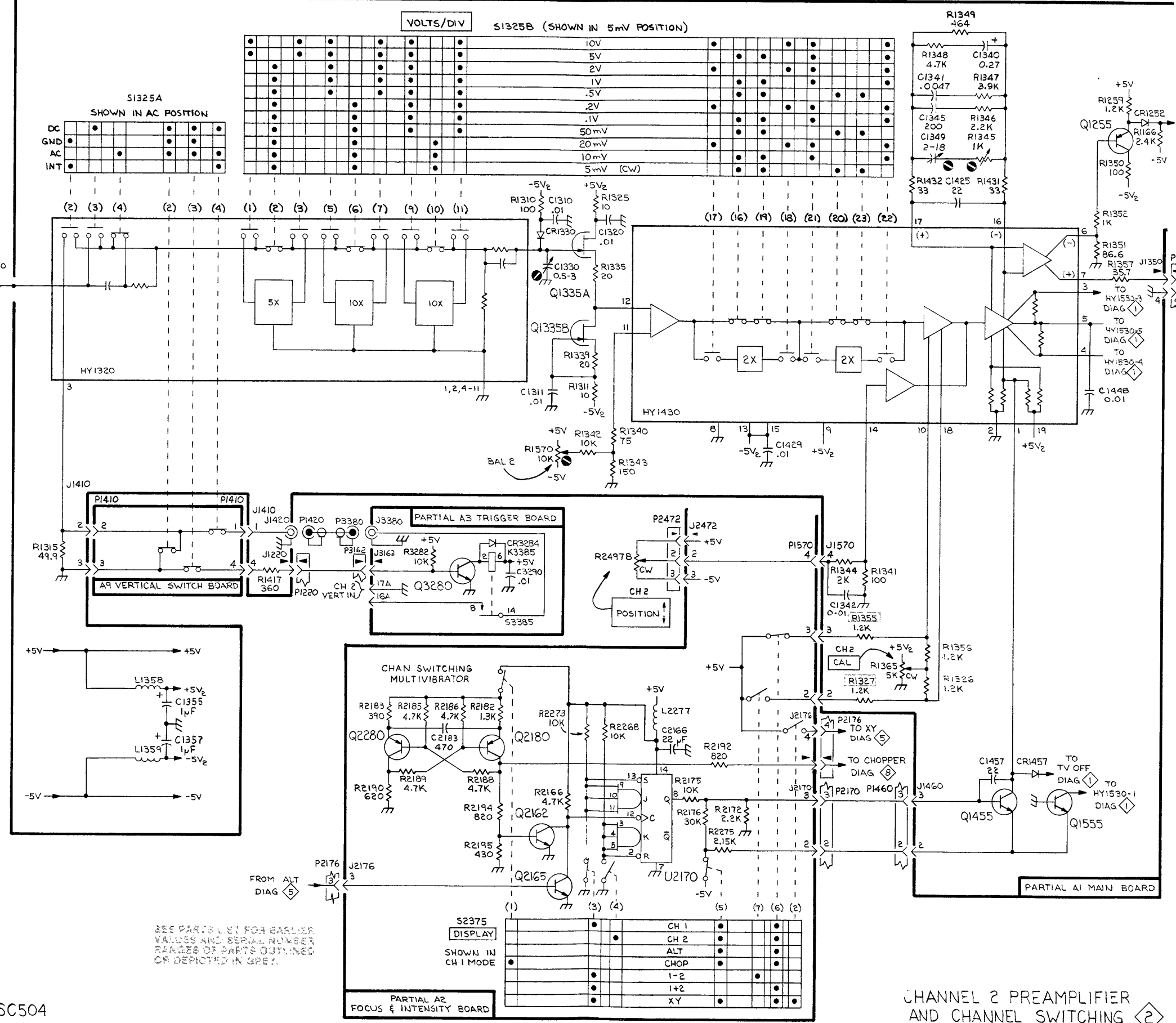
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1310	F2	K3385	E5	R1326	K6	R2166	F7
C1311	F4			R1327	J6	R2172	H7
C1320	F2			R1335	F3	R2175	H7
C1330	F3	L1358	B6	R1339	F4	R2176	H7
C1340	K1	L1359	B7	R1340	F4	R2182	E6
C1342	J5	L2277	F6	R1341	J5	R2183	D6
C1345	K2			R1342	F4	R2185	E5
C1349	K2			R1343	F4	R2186	E6
C1350	K1	Q1255	L2	R1344	J5	R2188	E7
C1355	B6	Q1335B	F3	R1345	K2	R2189	D7
C1357	B7	Q1335B	F3	R1346	K2	R2190	D7
C1425	K2	Q1455	K7	R1347	K1	R2192	H7
C1429	H4	Q1555	L7	R1348	K1	R2194	E7
C1448	L4	Q2162	F7	R1349	K1	R2195	E7
C1457	K7	Q2165	F8	R1350	L2	R2268	F7
C2166	H7	Q2180	E7	R1351	L3	R2273	F7
C2183	E6	Q2280	D7	R1352	L2	R2275	H7
C3290	E5	Q3280	E5	R1355	J6	R2497B	F5
				R1356	K6	R3282	E5
				R1357	L3		
CR1252	L2	R1166	M2	R1365	J6	S1325A	B2
CR1330	F2	R1259	L1	R1417	C5	S1325B	C1
CR1457	L7	R1300	A3	R1431	K2	S2375	E8
CR3284	E5	R1310	E2	R1432	K2	S3385	E6
		R1311	F4	R1570	F4		
		R1315	B5				
		R1325	F2	R1570	J5		
HY1320	B3					U2170	F7
HY1430	F3						



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CHANNEL 2 PREAMPLIFIER AND CHANNEL SWITCHING 2

CHANNEL SWITCHING

FOCUS AND INTENSITY BOARD

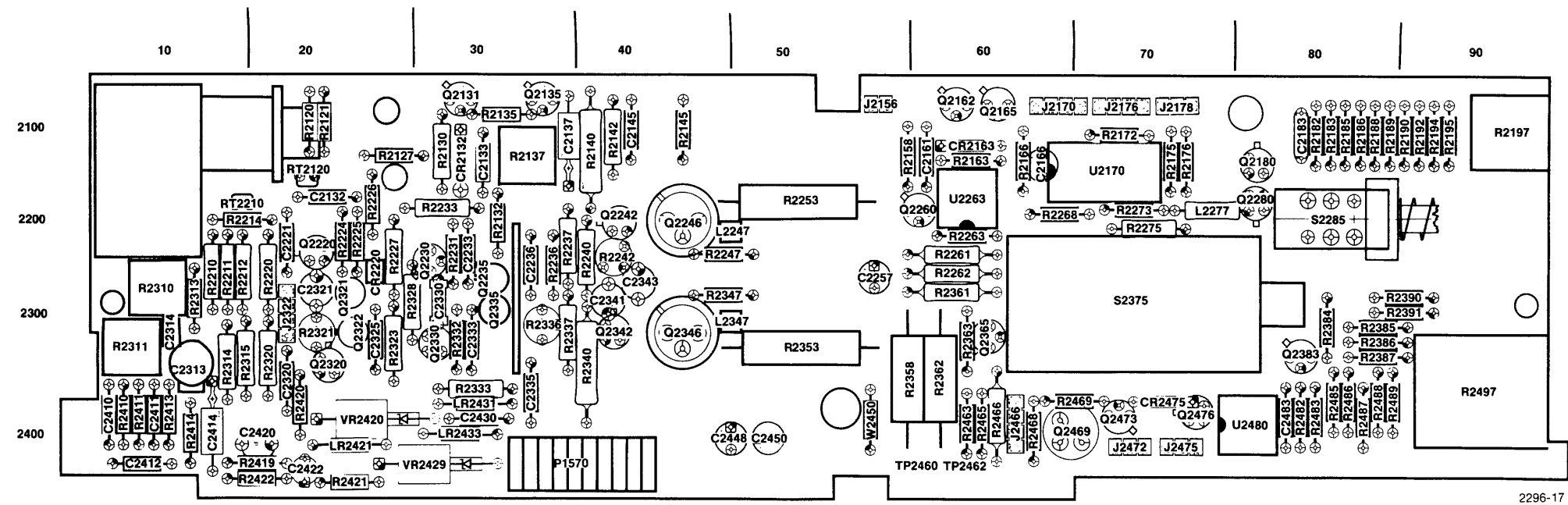
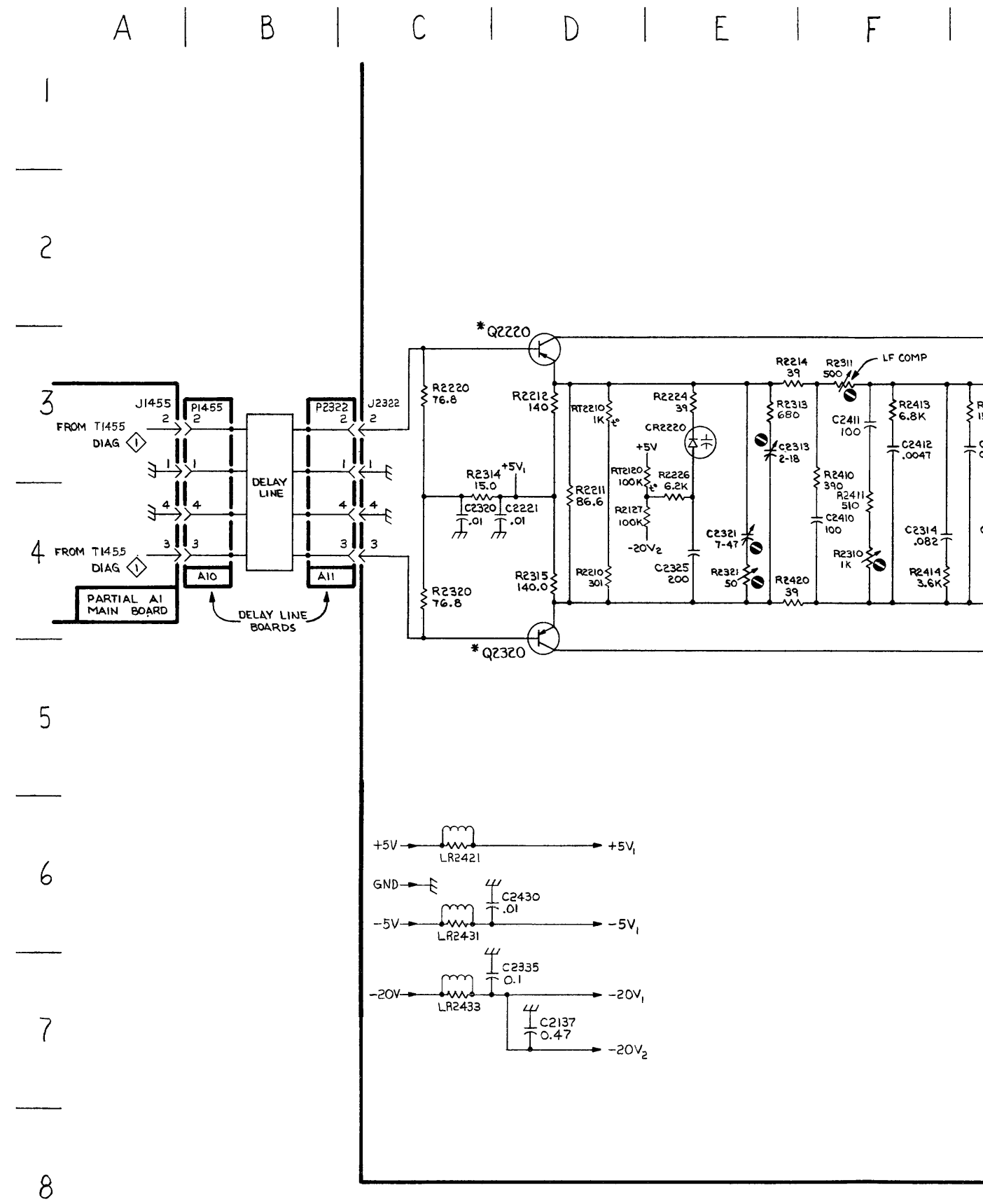


Fig. 8-5

Table 8-3

INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

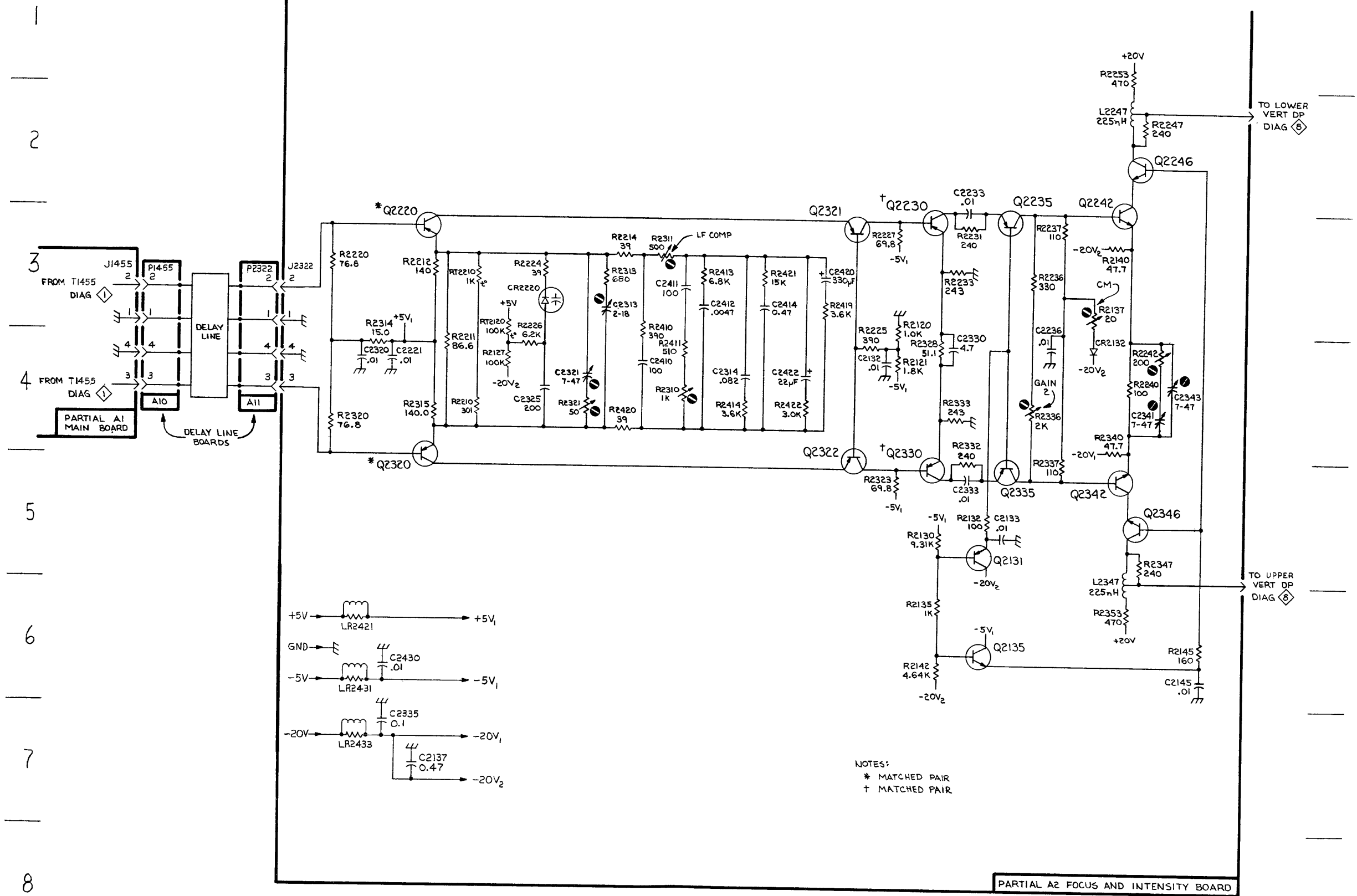
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C2132	J4	L2247	L2	R2135	J6	R2320	C4
C2133	K5	L2347	L5	R2135	J6	R2321	E4
C2137	D7			R2137	K3	R2323	J5
C2145	L6			R2150	L3	R2328	J4
C2221	D4	LR2321	C6	R2142	J6	R2332	J5
C2233	J2	LR2431	C6	R2145	L6	R2333	J4
C2236	K4	LR2433	C7	R2210	D4	R2336	K4
C2313	E3			R2211	D4	R2337	K5
C2314	F4			R2212	D3	R2340	L4
C2320	C4	Q2131	J5	R2214	E3	R2347	L5
C2321	E4	Q2220	D3	R2220	C3	R2353	L6
C2325	E4	Q2230	J3	R2224	E3	R2410	F3
C2330	J4	Q2235	K3	R2225	J4	R2411	F4
C2333	J5	Q2242	L2	R2226	E4	R2413	F3
C2335	D7	Q2246	L2	R2227	J3	R2414	F4
C2341	L4	Q2320	D5	R2231	J3	R2419	H3
C2343	L4	Q2321	H3	R2233	J3	R2420	E4
C2410	F4	Q2322	H4	R2236	K3	R2421	H3
C2411	F3	Q2330	J5	R2237	K3	R2422	H4
C2412	F3	Q2335	K3	R2240	L4		
C2414	H3	Q2342	L5	R2242	L4		
C2420	H3	Q2346	L5	R2247	L2		
C2422	H4			R2253	L1	RT2120	D3
C2430	D6	R2120	J3	R2310	F4	RT2210	D3
CR2132	K4	R2121	J4	R2311	F3		
CR2220	E3	R2127	D4	R313	E3		
		R2130	J5	R2314	C4		
		R2132	J5	R2315	D4		



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NOTES:
* MATCHED PAIR
+ MATCHED PAIR

PARTIAL A2 FOCUS AND INTENSITY BOARD

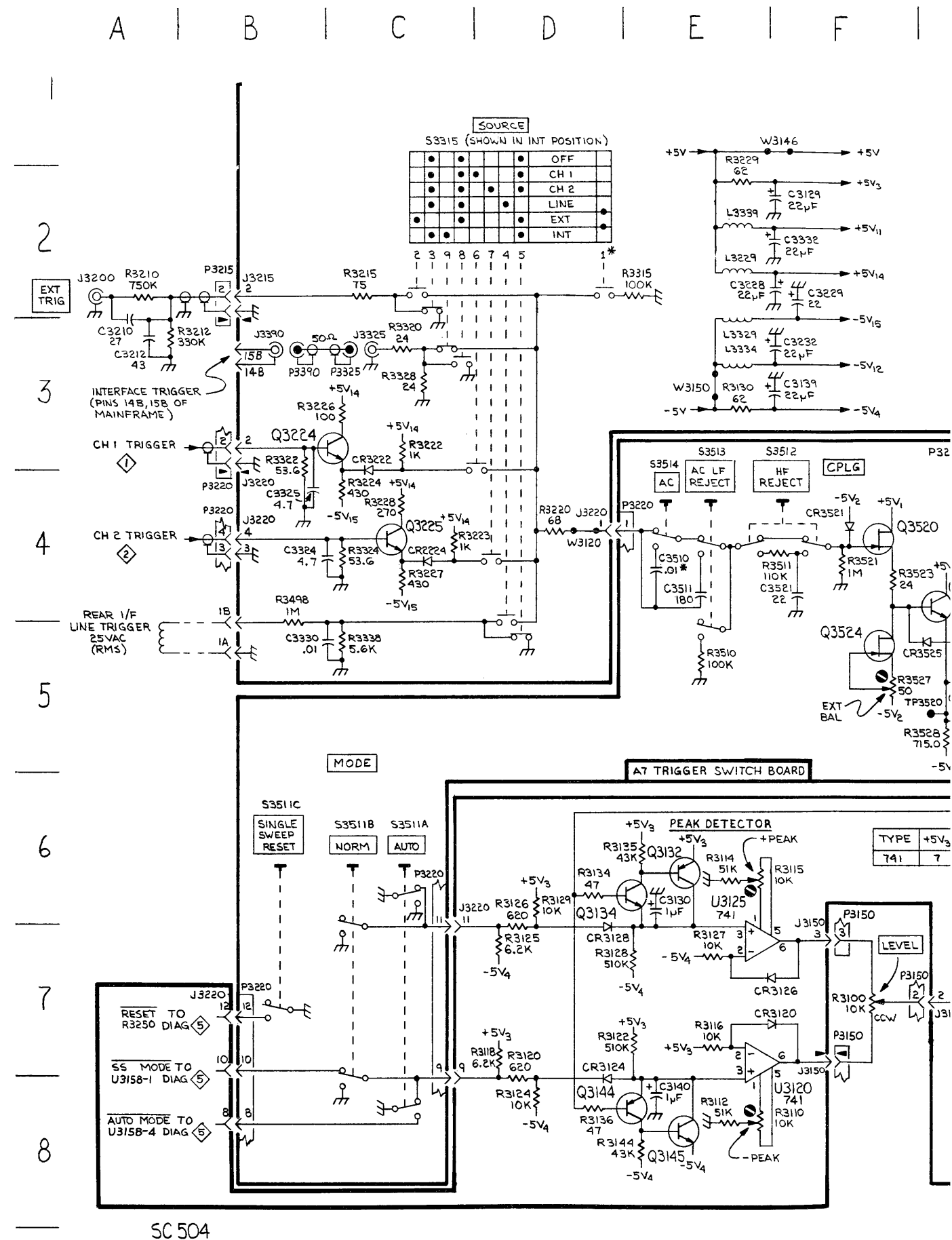
SC504

VERTICAL AMPLIFIER 3

Table 8-4

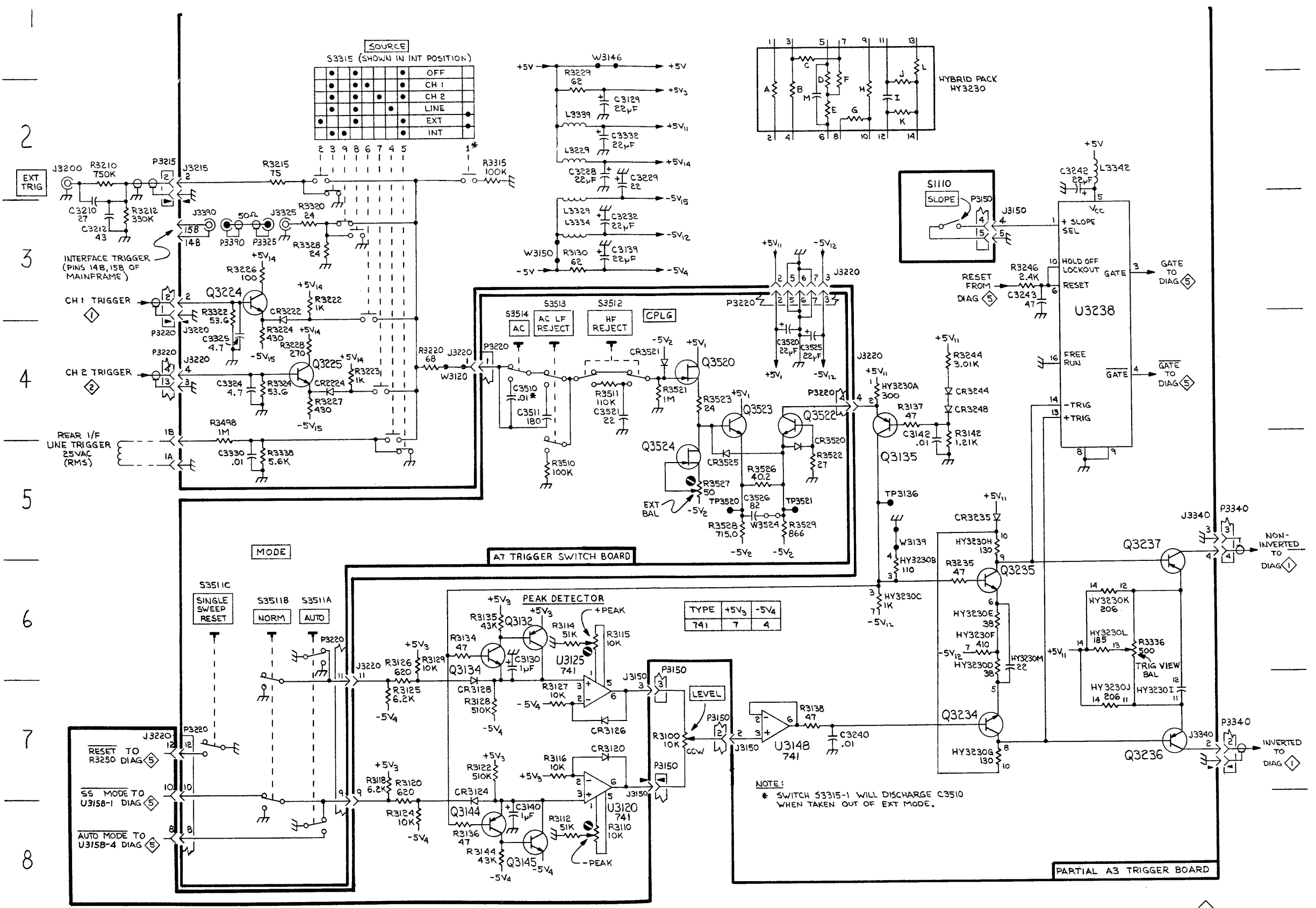
INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C3129	F2	HY3230	H1	R3100	F7	R3320	C3
C3130	E6	HY3230A	J4	R3110	E8	R3322	B3
C3139	F3	HY3230B	J6	R3112	E8	R3324	C4
C3140	E8	HY3230C	J6	R3114	E6	R3328	C3
C3142	J5	HY3230D	K6	R3115	E6	R3336	L6
C3210	A3	HY3230E	K6	R3116	E7	R3338	C5
C3212	A3	HY3230F	K6	R3118	D7	R3498	B4
C3228	E2	HY3230G	K7	R3120	D8	R3510	E5
C3229	F2	HY3230HK	5	R3122	E7	R3511	F4
C3232	F3	HY3230I	L7	R3124	D8	R3521	F4
C3240	H7	HY3230J	L7	R3125	D7	R3522	H5
C3242	L2	HY3230K	L6	R3126	D6	R3523	F4
C3243	K3	HY3230L	L6	R3127	E7	R3526	H5
C3324	B4	HY3230MK	6	R3128	H7	R3527	F5
C3325	B4			R3129	D6	R3528	H5
C3330	B5	L3229	E2	R3130	E3	R3529	H5
C3332	F2	L3329	E3	R3134	D6		
C3510	E4	L3334	E3	R3135	E6	S1110	J2
C3511	E4	L3339	E2	R3136	D8	S3315	C1
C3520	H4	L3342	L2	R3137	J4	S3511A	C6
C3521	F4			R3138	H7	S3511B	C6
C3525	H4	Q3132	E6	R3142	J5	S3511C	B6
C3526	H5	Q3134	D6	R3144	E8	S3512	E3
		Q3135	J4	R3210	A2	S3514	E3
CR2224	C4	Q3144	D8	R3212	A3		
CR3120	E7	Q3145	E8	R3215	C2	TP3136	J5
CR3124	D8	Q3224	C3	R3220	D4	TP3520	H5
CR3126	E7	Q3225	C4	R3222	C3	TP3521	H5
CR3128	D7	Q3234	K7	R3223	C4		
CR3222	C3	Q3235	K6	R3224	C4	U3120	E7
CR3235	K5	Q3236	L7	R3226	C3	U3125	E7
CR3244	J4	Q3237	L6	R3227	C4	U3148	H7
CR3248	J4	Q3520	F4	R3228	C4	U3238	L4
CR3520	H5	Q3522	H4	R3229	E2		
CR3521	F4	Q3523	H4	R3235	J6	W3120	D4
CR3525	H5	Q3524	F5	R3244	J4	W3139	J5
				R3246	K3	W3146	F1
				R3315	E2	W3150	E3
						W3524	H5



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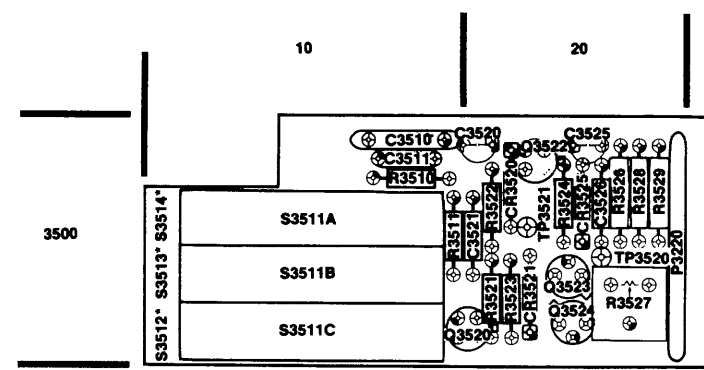
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TRIGGERING 4

NOTE:
* SWITCH S3315-1 WILL DISCHARGE C3510 WHEN TAKEN OUT OF EXT MODE.

TRIGGER SWITCH BOARD

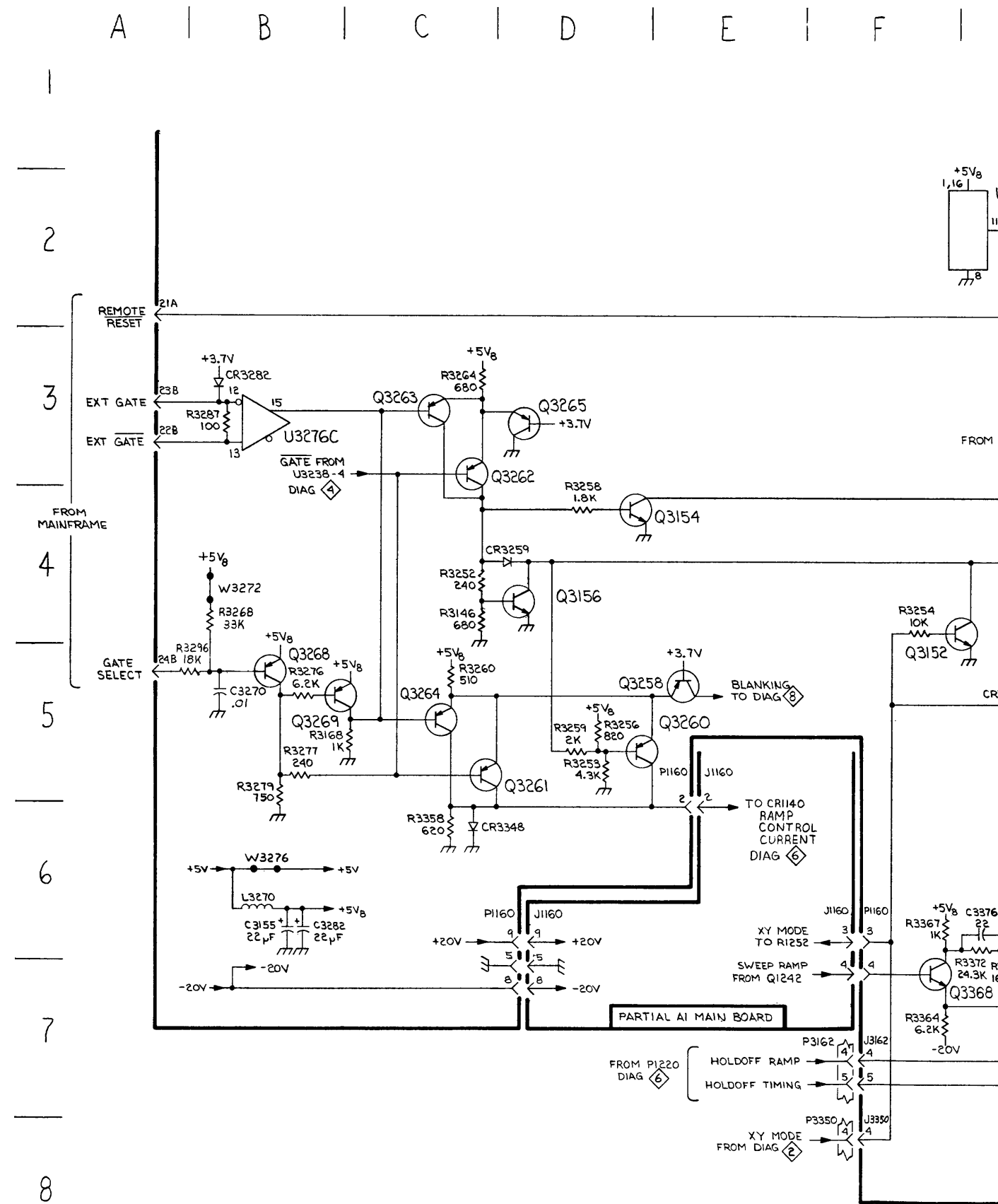


*Indicates mounted on back. 2296-19

Fig. 8-7

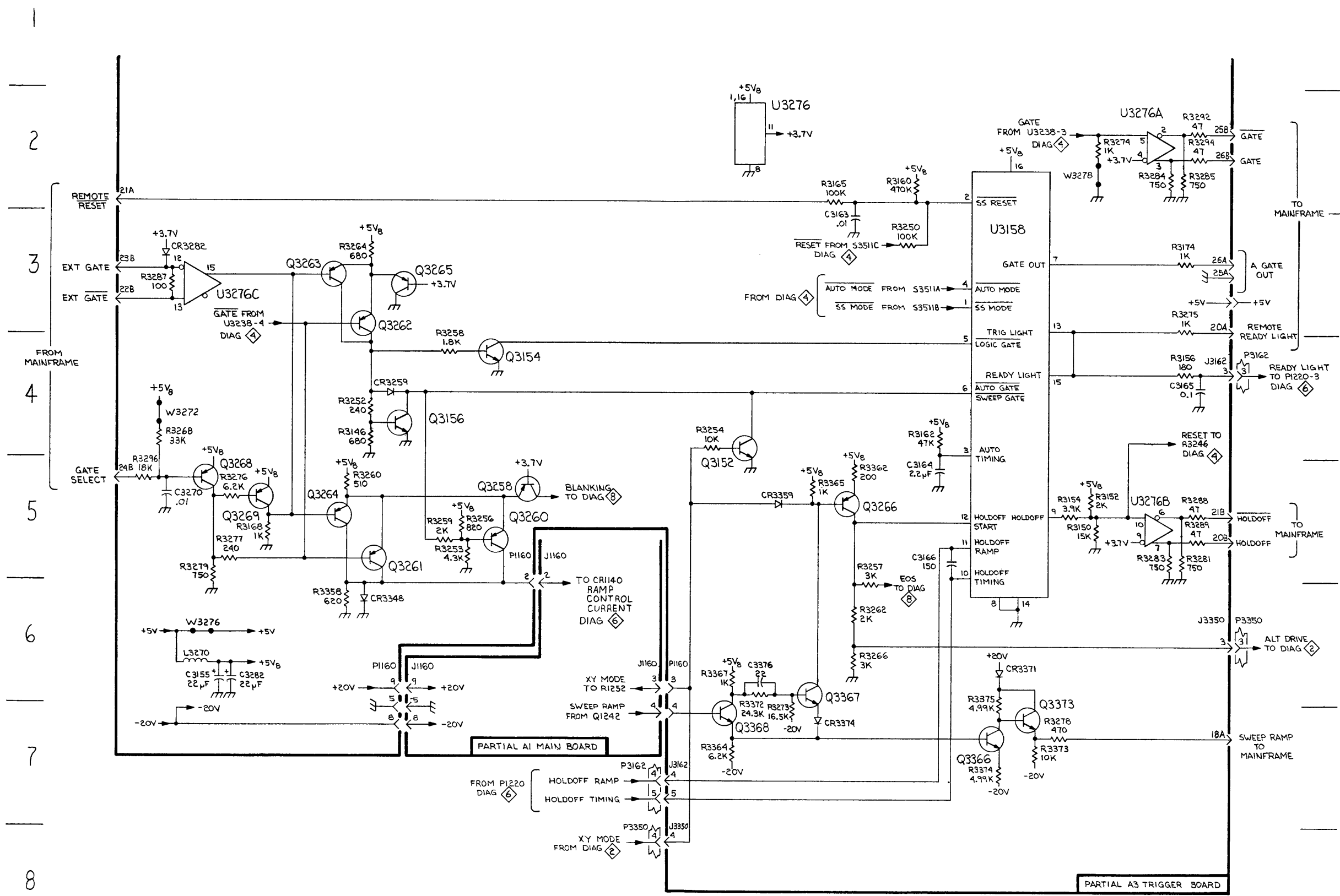
Table 8-5
INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C3155	B6	Q3258	E5	R3165	H2	R3284	L2
C3163	H3	Q3260	D5	R3168	C5	R3285	L2
C3164	J5	Q3261	C5	R3174	L3	R3287	B3
C3165	L4	Q3262	C3	R3250	J3	R3288	L5
C3166	J5	Q3263	C3	R3252	C4	R3289	L5
C3280	B5	Q3264	C5	R3253	D5	R3292	L2
C3282	B6	Q3265	D3	R3254	F4	R3294	L2
C3376	H6	Q3266	H5	R3256	D5	R3296	B5
		Q3269	B5	R3257	H6	R3358	C6
CR3259	D4	Q3286	B5	R3258	D4	R3362	H5
CR3282	B3	Q3366	K7	R3259	D5	R3364	F7
CR3348	C6	Q3367	H6	R3260	C5	R3365	H5
CR3359	H5	Q3368	F7	R3262	H6	R3367	F6
CR3371	K6	Q3373	K7	R3264	C3	R3372	H6
CR3374	H7			R3266	H6	R3373	K7
		R2274	K2	R3268	B4	R3374	K7
		R3146	C4	R3273	H7	R3375	K6
		R3150	K5	R3275	L3		
L3270	B6	R3152	K5	R3276	H2	U3276A	L2
		R3154	K5	R3277	B5	U3276B	L5
Q3152	F4	R3156	L4	R3278	K7	U3276C	B3
Q3154	D4	R3160	J2	R3279	B5		
Q3156	D4	R3162	J4	R3281	L5	W3272	B4
				R3283	L5	W3276	B6
						W3278	K2



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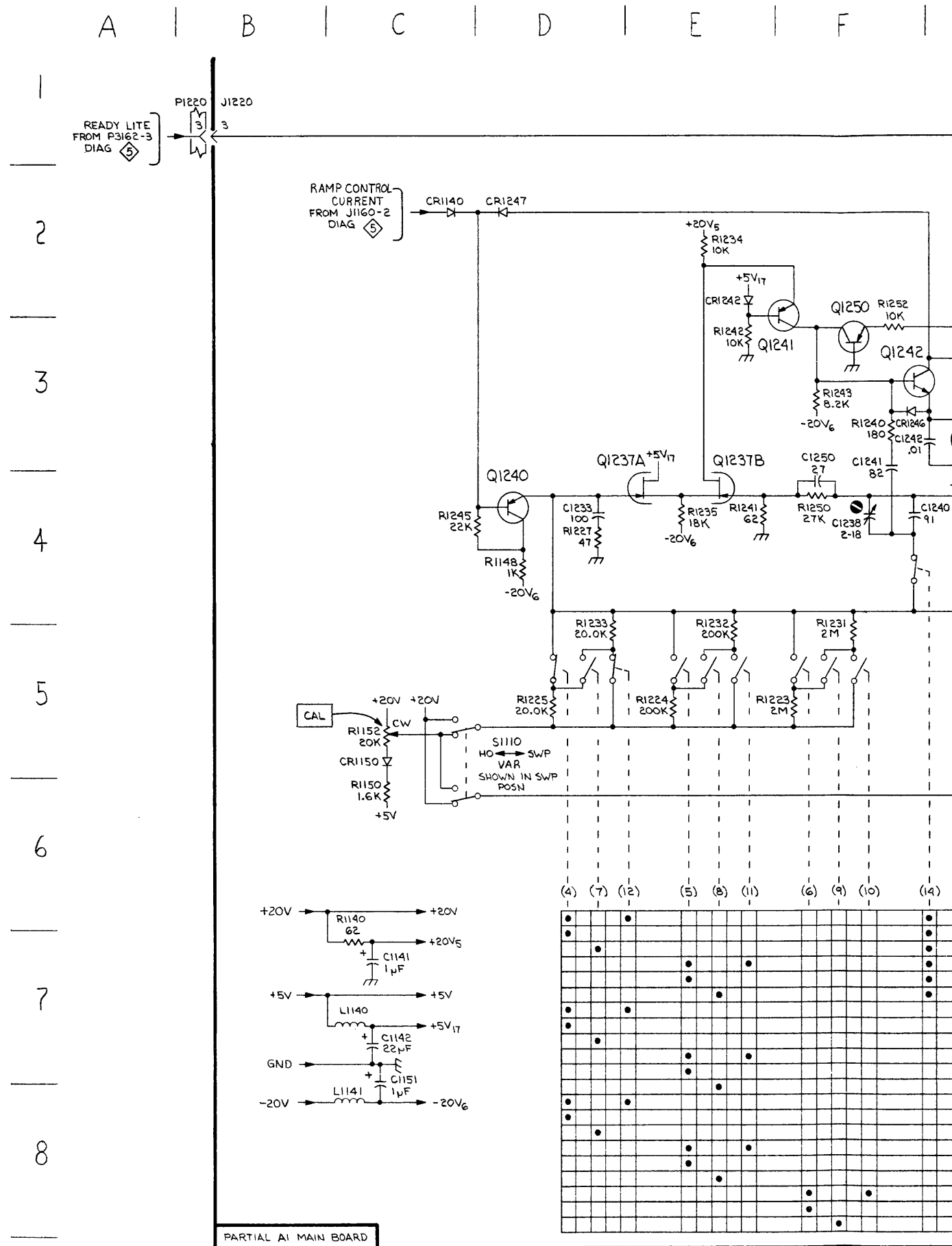
SC504

SWEEP GATING 5

Table 8-6

INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

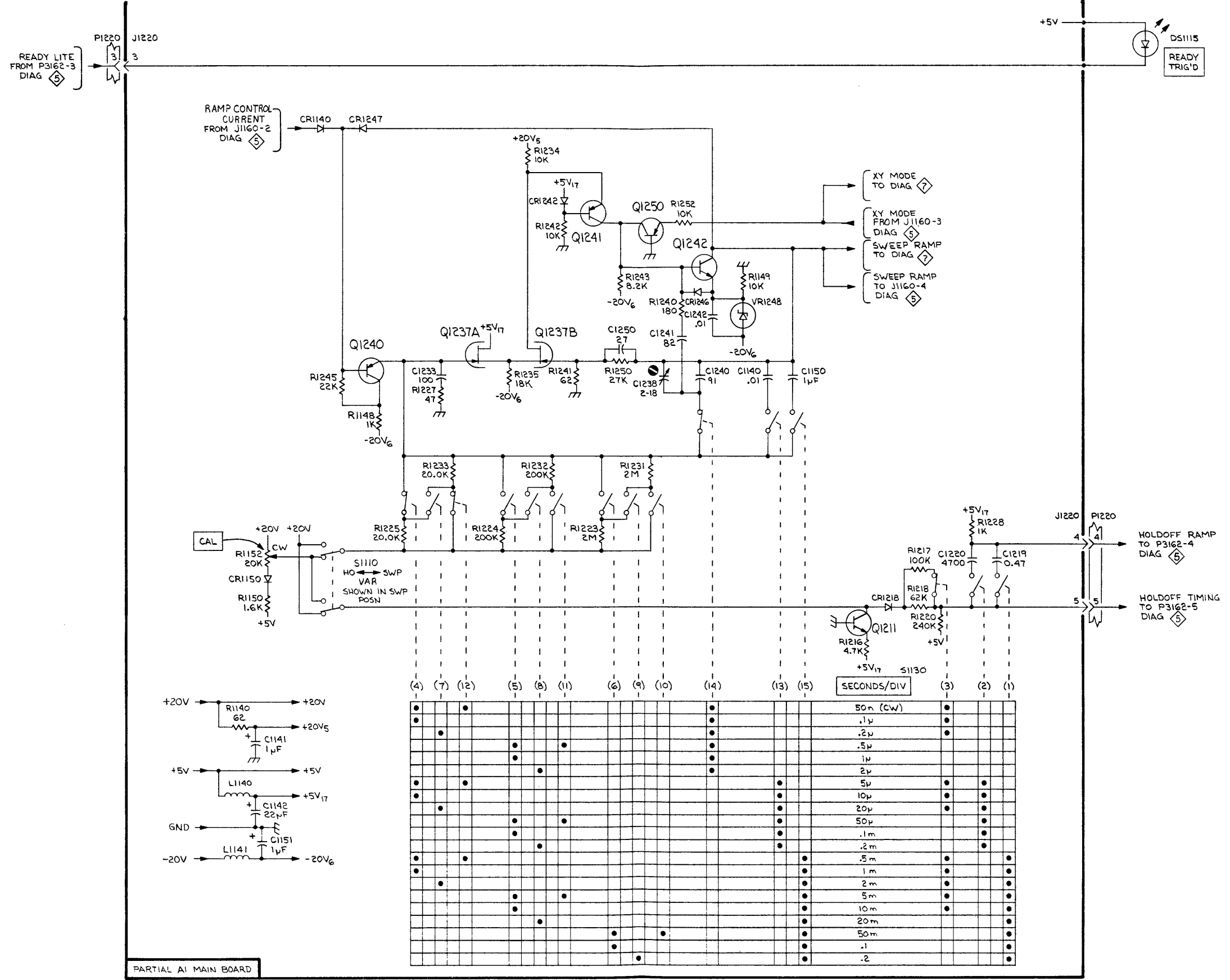
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1140	H4	CR1242	E2	R1140	C7	R1233	D5
C1141	C7	CR1246	F3	R1148	D4	R1234	E2
C1142	C7	CR1247	D2	R1149	H3	R1235	E4
C1150	H4			R1150	C6	R1240	F3
C1151	C7			R1152	C5	R1241	E4
C1219	K5	L1140	C7	R1216	J6	R1242	E3
C1220	K5	L1141	C8	R1217	J5	R1243	F3
C1233	D4			R1218	J6	R1245	C4
C1238	F4			R1220	J6	R1250	F4
C1240	F4	Q1211	J6	R1223	F5	R1252	F3
C1241	F3	Q1237A	E4	R1224	E5		
C1242	H3	Q1237B	E4	R1225	D5	S1110	D5
C1250	F4	Q1240	D4	R1227	D4	S1130	J6
		Q1241	F2	R1228	K5		
		Q1242	F3	R1231	F5		
		Q1250	F3	R1232	E5	VR1248	H3



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PARTIAL A1 MAIN BOARD

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SWEEP GENERATOR 6

HORIZONTAL DEFLECTION BOARD

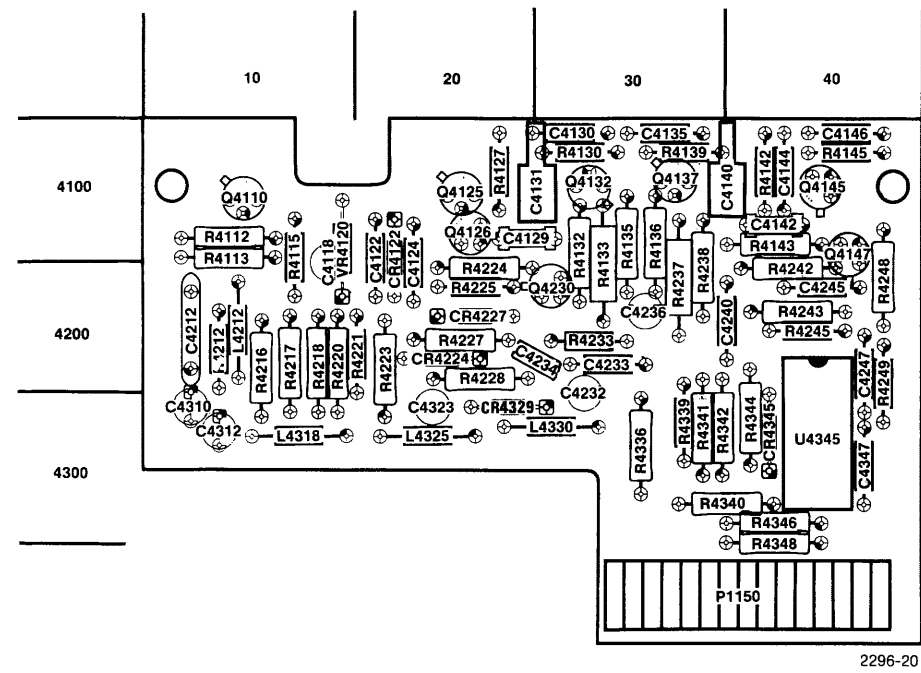
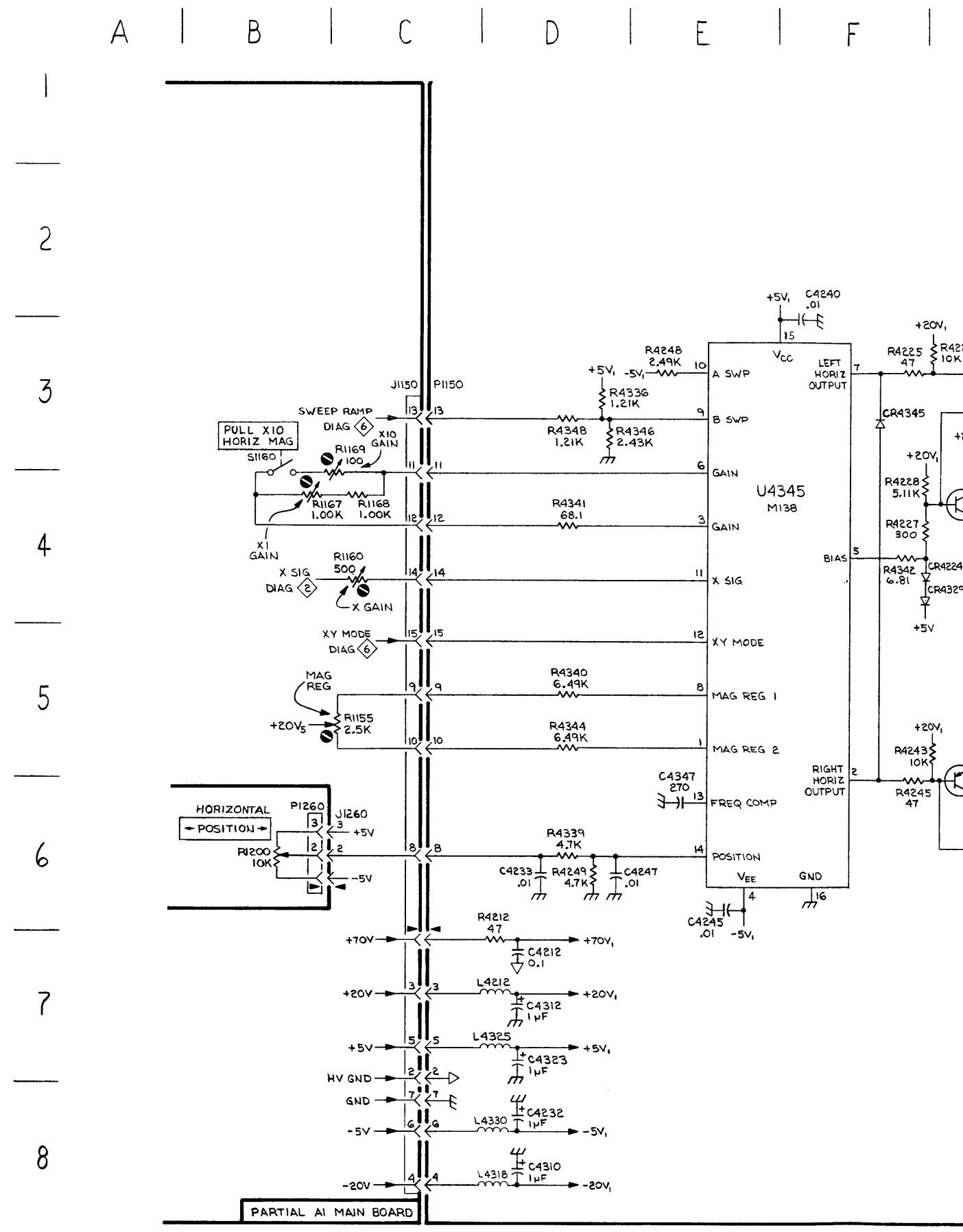


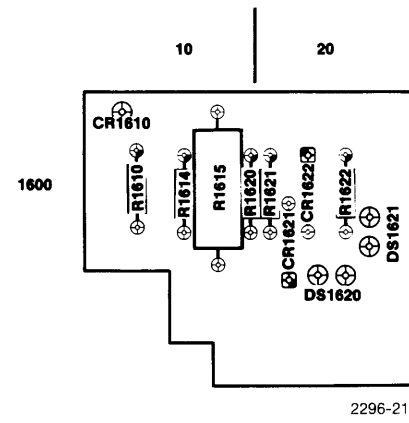
Fig. 8-8

Table 8-7
INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C4118	J2	CR4227	H4	R4112	J3	R4242	J6
C4122	J2	CR4329	H4	R4113	J4	R4243	H5
C4124	J3	CR4345	F3	R4115	K2	R4245	F6
C4129	J1			R4127	K2	R4248	E3
C4130	J2			R4130	K2	R4249	D6
C4131	J1	L4212	D7	R4132	J1	R4336	D3
C4135	J5	L4318	D8	R4133	J2	R4339	D6
C4140	J6	L4325	D7	R4135	J2	R4340	D5
C4142	J6	L4330	D8	R4136	J5	R4341	D4
C4144	J5			R4139	K5	R4342	F4
C4212	D7			R4142	K5	R4344	D5
C4232	D8	Q4110	J4	R4143	J6	R4346	D3
C4233	D6	Q4125	J2	R4145	K5	R4348	D3
C4234	H3	Q4126	H3	R4212	D7		
C4236	H4	Q4132	J2	R4216	J3		
C4240	F2	Q4137	J5	R4217	K3		
C4245	E6	Q4145	J5	R4218	K3	S1160	B3
C4247	D6	Q4147	H5	R4220	H3		
C4310	D8	Q4230	H4	R4221	H4		
C4312	D7			R4223	H3	U4345	E4
C4323	D7			R4224	J1		
C4347	E6	R1155	C5	R4225	F3		
		R1160	C4	R4227	F4	VR4120	J3
		R1167	B4	R4228	F4		
		R1168	C4	R4233	H3		
CR4122	H4	R1169	C3	R4237	J5		
CR4224	H4	R1200	B6	R4238	J6		



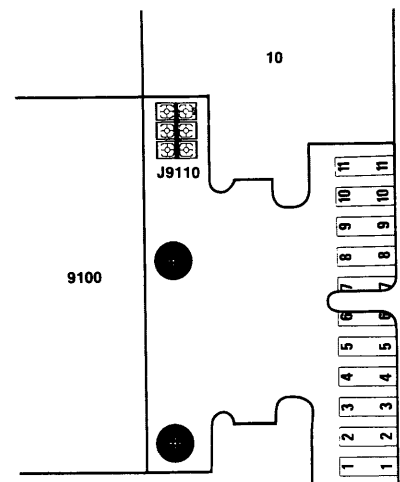
HIGH VOLTAGE BOARD



2296-21

Fig. 8-9

INTERFACE BOARD



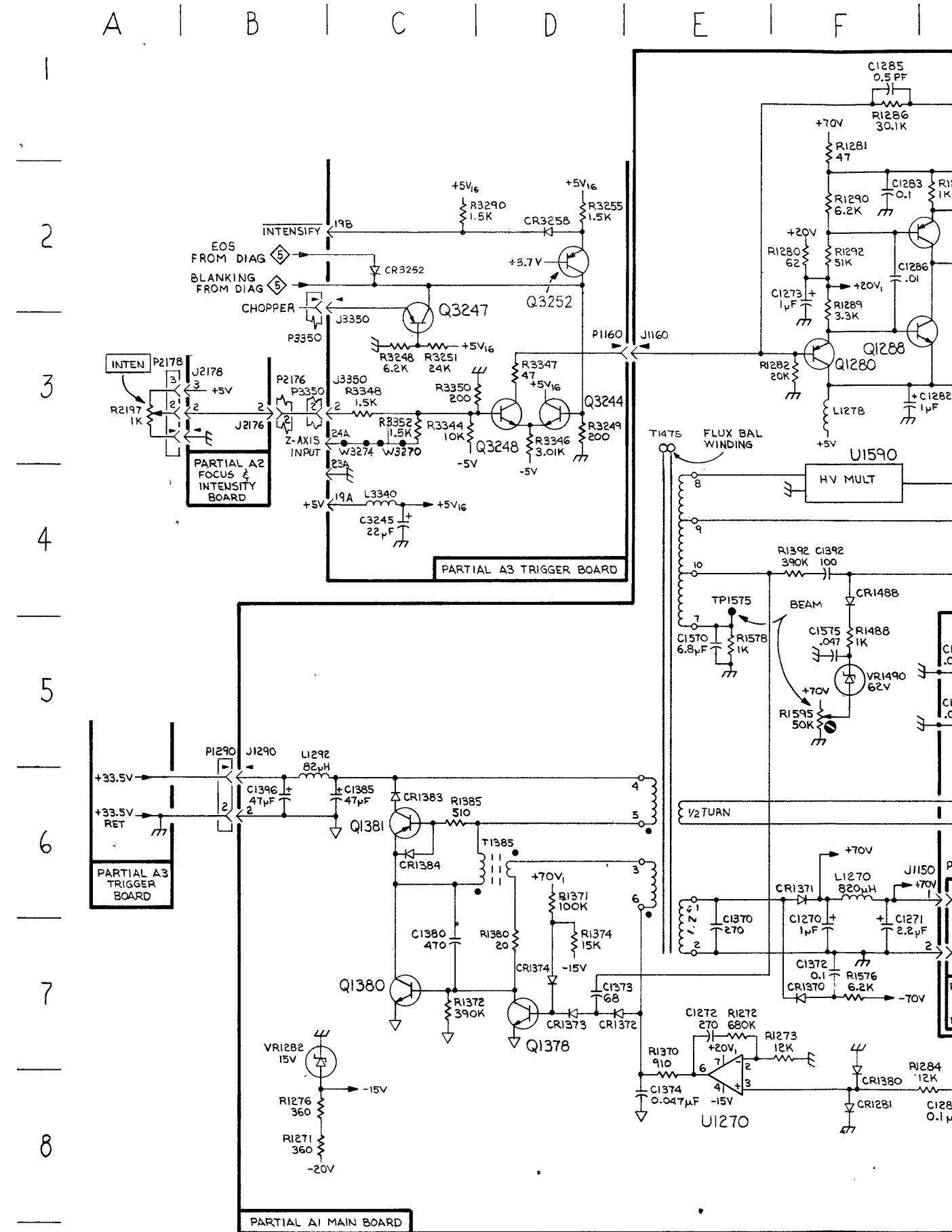
2296-22

Fig. 8-10

Table 8-8

INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1116	K8	CR1372	E7	R1119	K8	R1610	H5
C1117	K8	CR1373	D7	R1210	K8	R1614	J5
C1270	F7	CR1374	D7	R1211	K8	R1615	J5
C1272	E7	CR1380	F8	R1215	J8	R1620	H6
C1273	F2	CR1383	C6	R1271	B8	R1621	H5
C1282	F3	CR1384	C6	R1272	E7	R1622	J5
C1283	F2	CR1390	J4	R1273	F7	R2110	K5
C1285	F1	CR1488	F4	R1274	D7	R2197	A3
C1286	F2	CR1610	F4	R1276	B8	R3248	C3
C1288	H8	CR1621	H5	R1280	F2	R3249	D3
C1290	H2	CR1622	J5	R1281	F1	R3251	C3
C1292	H7	CR3252	C2	R1282	F3	R3255	D2
C1372	F7	CR3258	D2	R1283	J8	R3290	D2
C1373	D7			R1284	H8	R3344	C3
C1374	E8	DS1620	J5	R1285A	J5	R3346	D3
C1380	C7	DS1621	J5	R1285A	J5	R3347	D3
C1385	C6			R1285B	K6	R3348	C3
C1390	H5			R1285C	H7	R3350	D3
C1391	J5	L1270	F6	R1286	F1	R3352	C3
C1392	F4	L1278	F3	R1288	J8		
C1395	M4	L1292	B6	R1289	F2	T1385	D6
C1396	B6	L3340	C4	R1290	F2	T1475	E3
C1399	M5			R1292	F2		
C1470	E7			R1293	H2		
C1488	H5	Q1116	K8	R1370	E8		
C1489	H5	Q1210	K8	R1371	D6	TP1110	K8
C1570	E5	Q1280	F3	R1372	C7	TP1115	K8
C1575	F5	Q1288	F3	R1380	D7	TP1575	E4
C3245	C4	Q1289	H2	R1385	C6		
		Q1378	D7	R1390	J4		
		Q1380	C7	R1391	H4	U1270	E8
		Q1381	C5	R1392	F4	U1590	F4
		Q3244	D3	R1488	F5		
		Q3247	C3	R1576	F7		
		Q3248	D3	R1578	E5	V1000	K2
		Q3252	D2	R1580	M4		
				R1585	M3		
				R1590	M5	VR1282	B7
				R1595	F5	VR1490	F5



SC504

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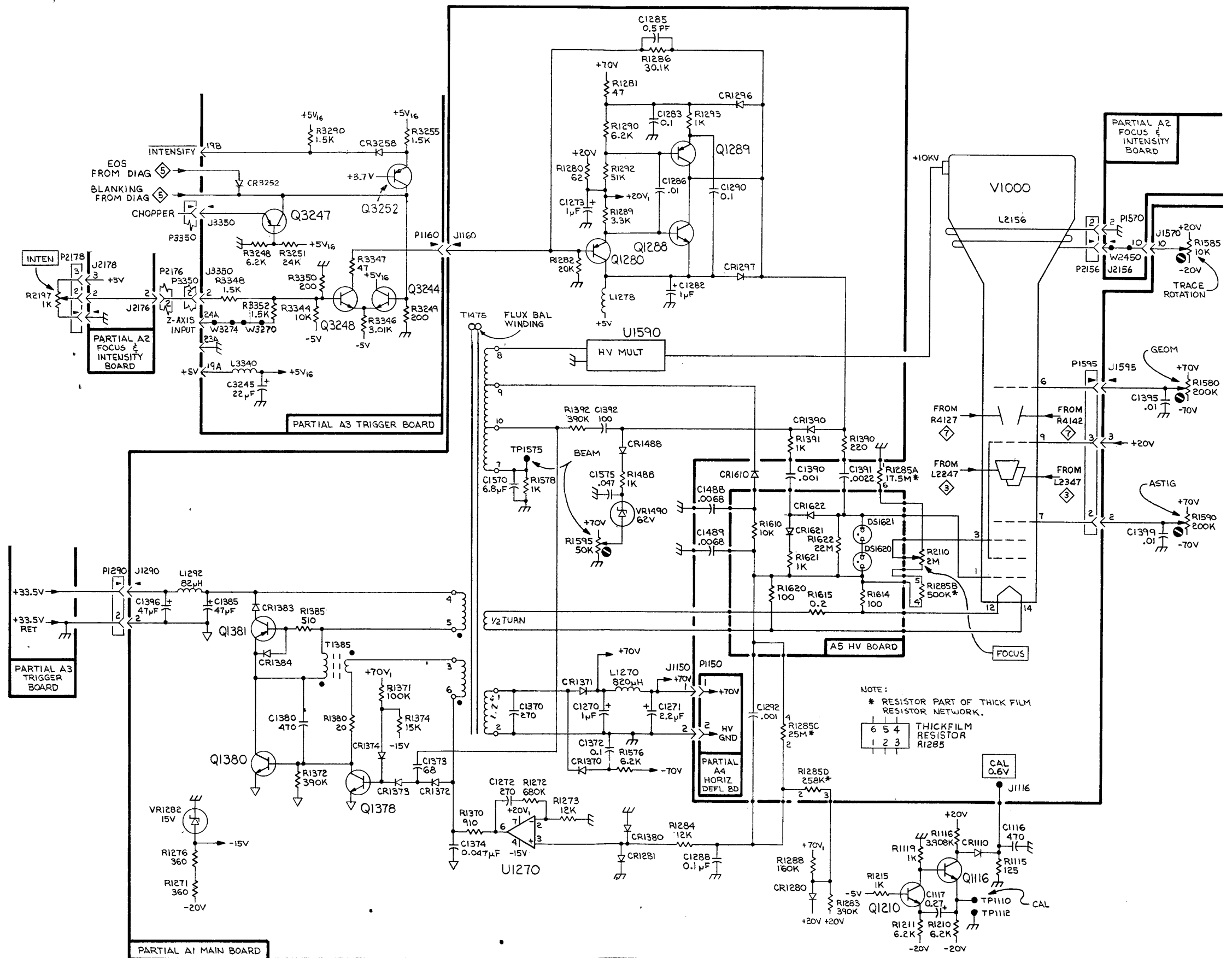
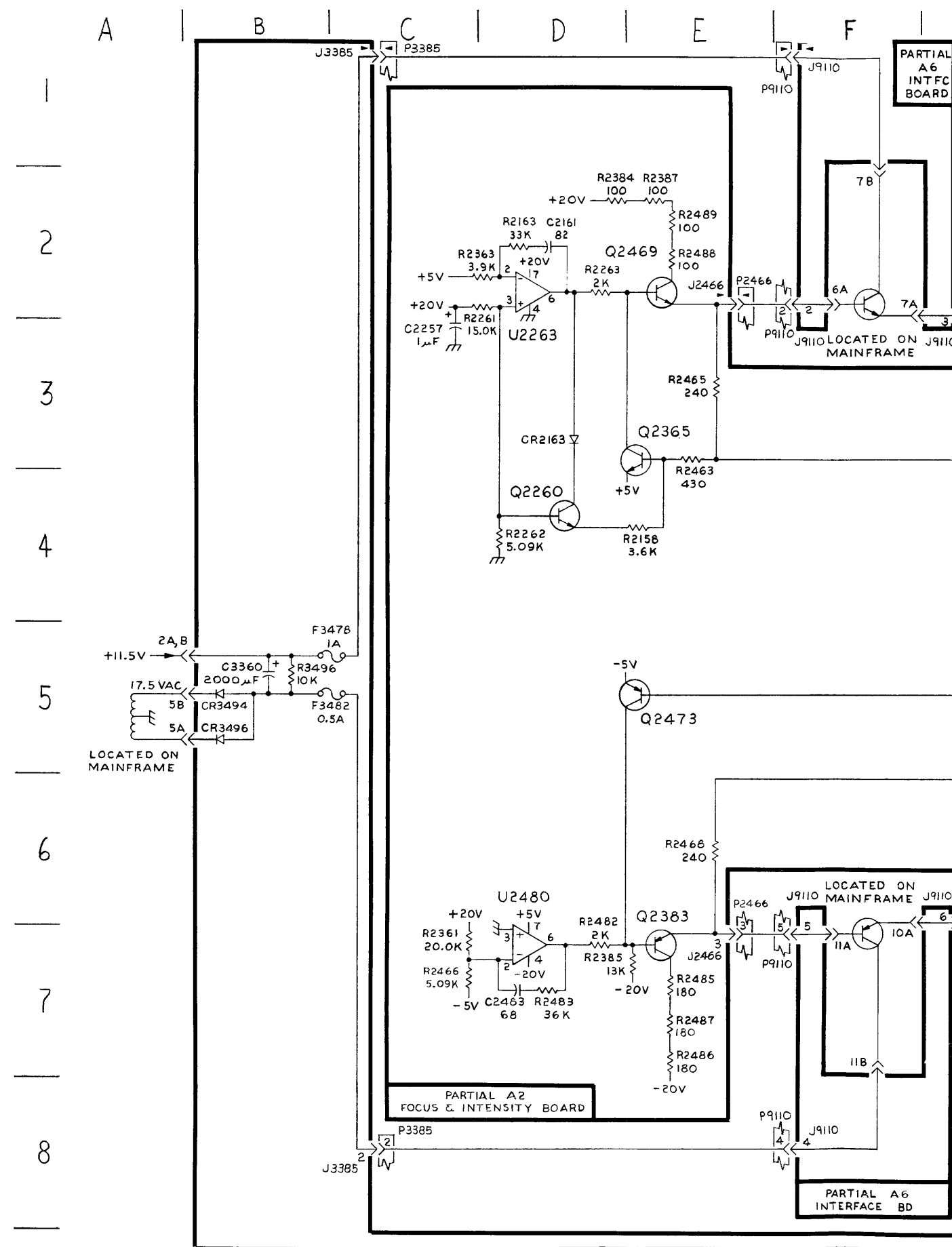


Table 8-9

INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C2161	D2	Q2383	E7	R2465	E3
C2257	C3	Q2469	E2	R2466	C7
C2448	J6	Q2473	E5	R2468	E6
C2450	J3	Q2476	J5	R2469	H5
C2483	D7			R2482	D7
C3360	B5			R2483	D7
		R1110	K3	R2485	E7
		R2158	E4	R2486	E7
CR2163	D3	R2163	D2	R2487	E7
CR2475	J5	R2261	C2	R2488	E2
CR3494	B5	R2262	D4	R2489	E2
CR3496	B5	R2263	D2	R3496	B5
		R2358	J6		
		R2361	C7	TP2460	J7
DS1110	K4	R2362	J2	TP2462	J2
		R2363	C2		
		R2384	D2		
F347B	B5	R2385	D7	U2263	D2
F3482	B5	R2386	K4	U2480	D7
		R2387	E2		
		R2390	J5	VR2420	J3
Q2260	D4	R2391	J5	VR2429	J6
Q2365	E3	R2463	E3		



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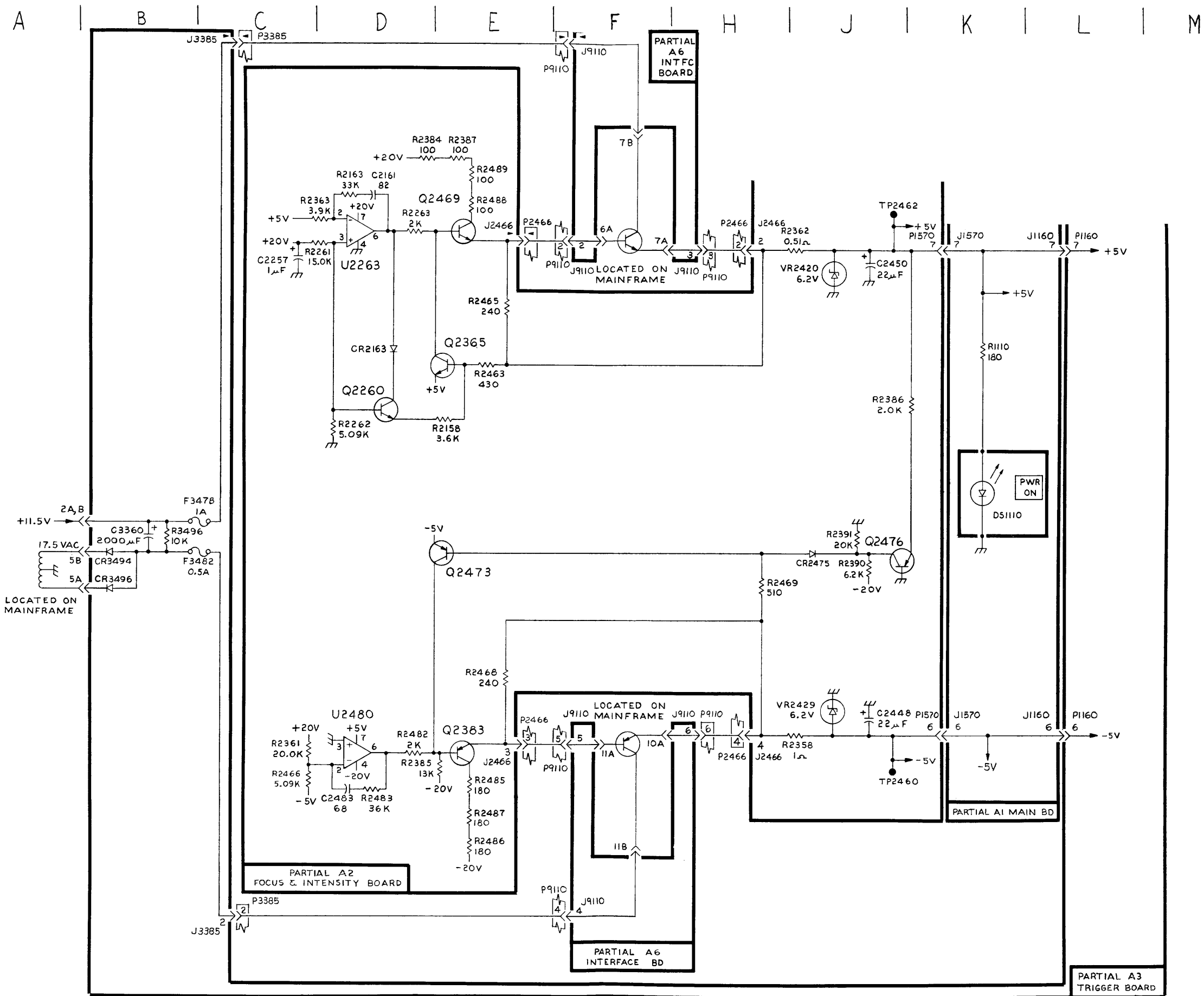
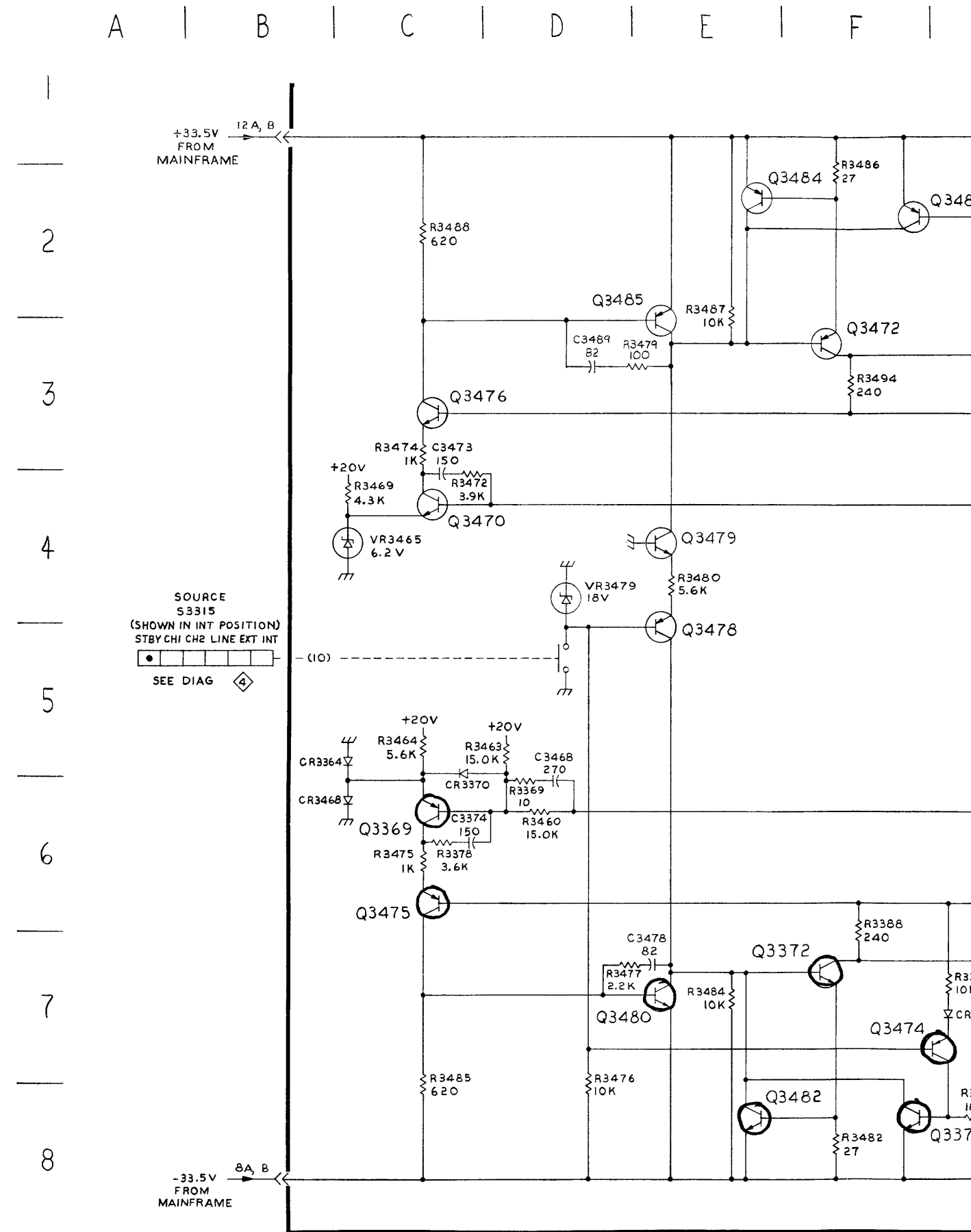


Table 8-10

INDEX TO COMPONENT LOCATIONS ON SCHEMATIC

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C3365	L6	Q3472	F3	R3470	K4
C3374	C6	Q3474	F7	R3472	C4
C3464	L3	Q3475	C6	R3474	C3
C3465	K3	Q3476	C3	R3475	C6
C3468	D6	Q3478	E5	R3476	D7
C3473	C4	Q3479	E4	R3477	D7
C3478	E7	Q3480	E7	R3479	D3
C3489	E3	Q3482	E8	R3480	E4
		Q3484	E2	R3482	F8
		Q3485	E2	R3484	E7
		Q3488	F2	R3485	C7
CR3362	L7			R3486	F2
CR3364	C5			R3487	E2
CR3370	C5	R3369	D6	R3488	C2
CR3380	H7	R3378	C6	R3490	J8
CR3466	K3	R3382	H8	R3492	J2
CR3475	L3	R3386	H7	R3494	F3
		R3388	F6		
		R3460	D6		
F3488	J1	R3461	K4	TP3365	L7
		R3462	K3	TP3465	L3
		R3463	D5		
Q3369	C6	R3464	C5		
Q3372	F7	R3466	K4	VR3465	C4
Q3375	F8	R3468	C6	VR3479	D4
Q3470	C4	R3469	C4		



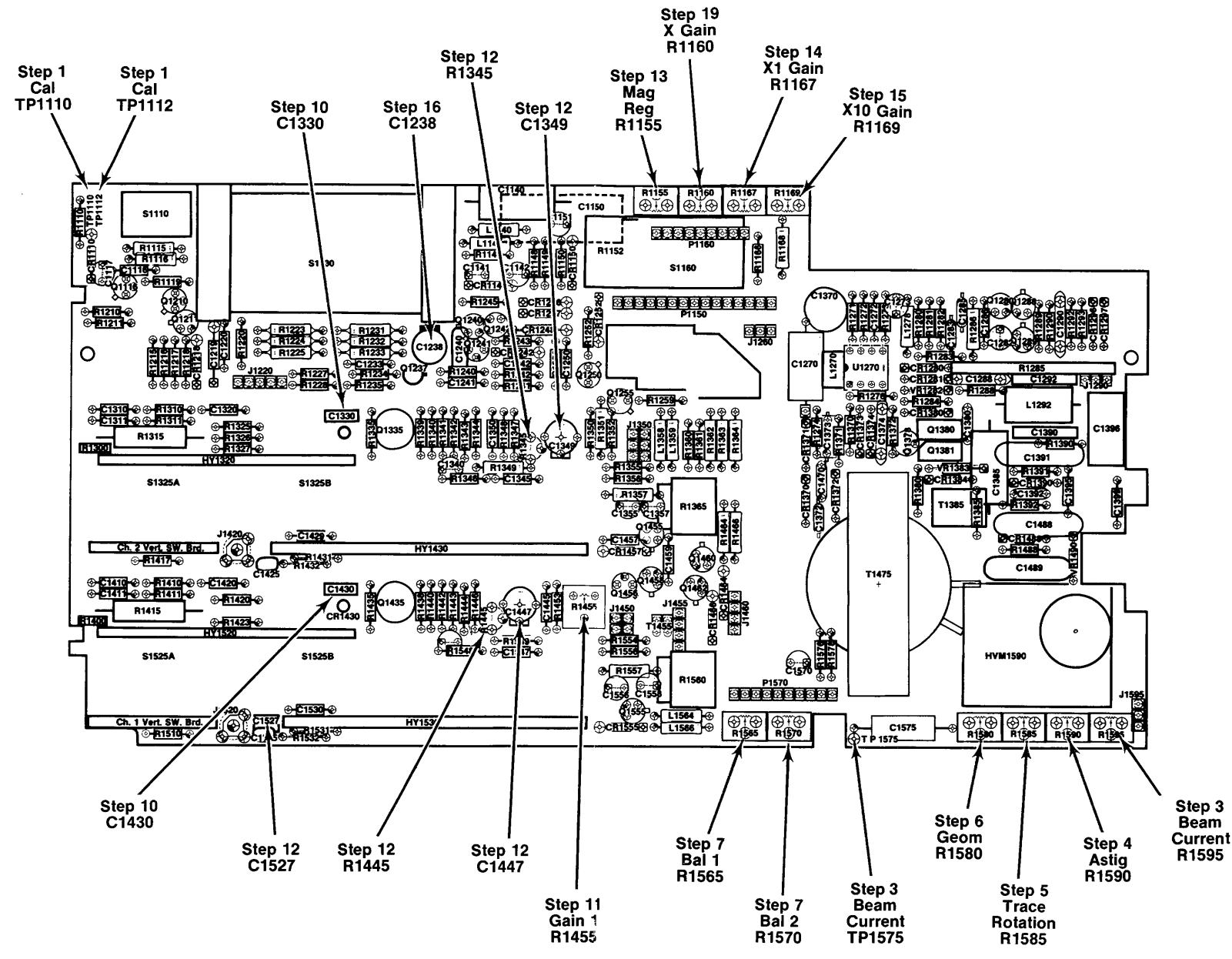


Fig. 8-11. Main Board

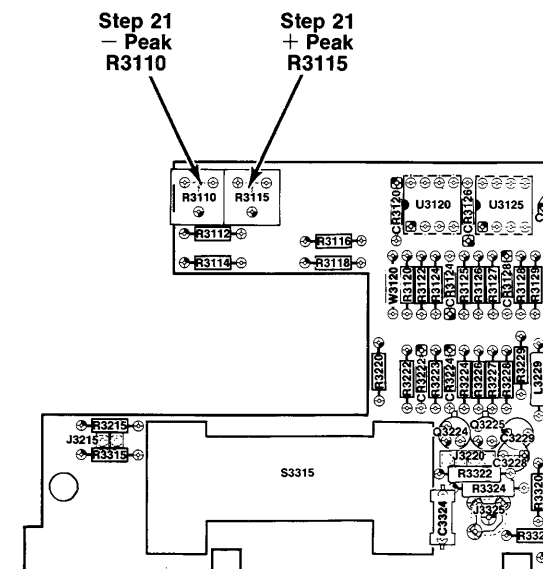


Fig. 8-12. Trigger Board

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ADJUSTMENT LOCATIONS

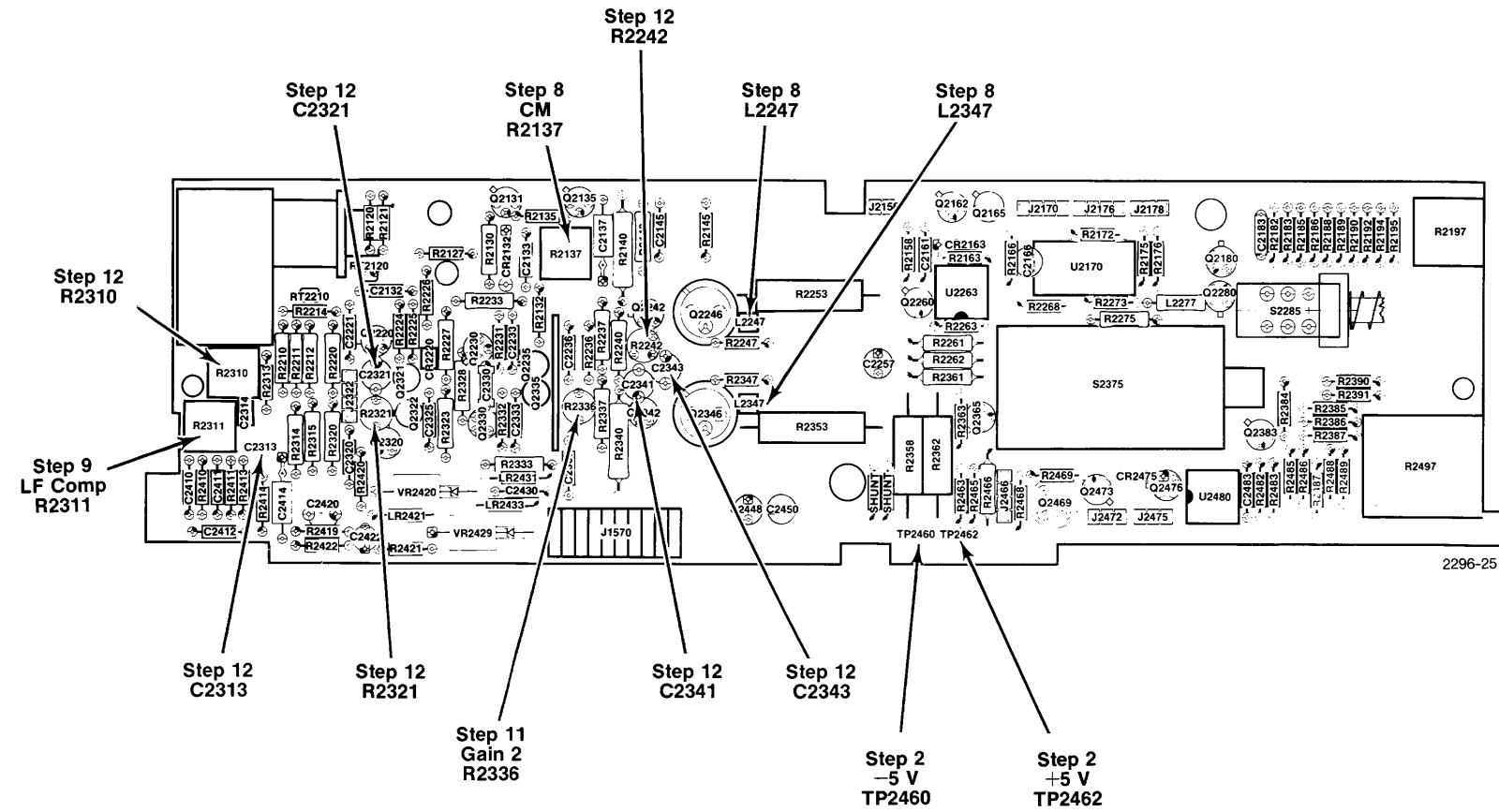


Fig. 8-13. Focus & Intensity Board

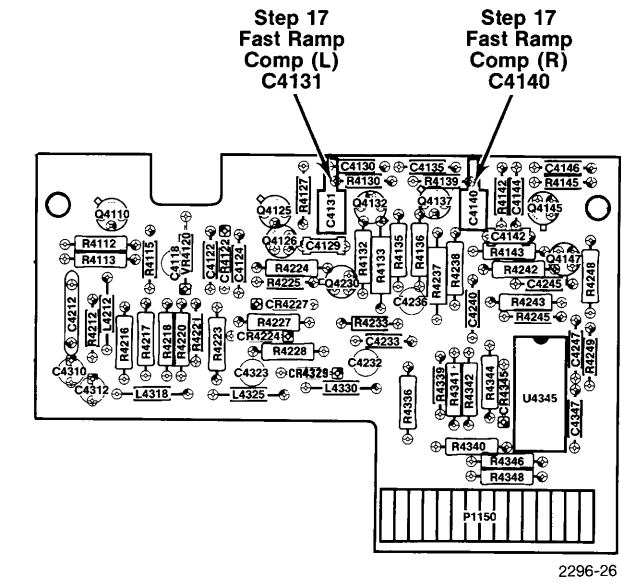
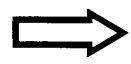


Fig. 8-14. Horizontal Deflection Board and Trigger Switch Board



REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

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

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

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

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

SPECIAL NOTES AND SYMBOLS

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

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

```

1 2 3 4 5           Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component
    ---*---
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
    ---*---
Parts of Detail Part
Attaching parts for Parts of Detail Part
    ---*---
  
```

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol ---*--- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

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

ABBREVIATIONS

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

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
0000M	SONY/TEKTRONIX CORPORATION	P O BOX 14, HANEDA AIRPORT	TOKYO 149, JAPAN
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
06229	ELECTROVERT, INC.	86 HARTFORD AVENUE	MT. VERNON, NY 10553
07707	USM CORP., USM FASTENER DIV.	510 RIVER RD.	SHELTON, CT 06484
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
11897	PLASTIGLIDE MFG. CORPORATION	P O BOX 867, 1757 STANFORD ST.	SANTA MONICA, CA 90406
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
13103	THERMALLOY COMPANY, INC.	2021 W VALLEY VIEW LANE	DALLAS, TEXAS 75234
22526	BERG ELECTRONICS, INC.	P O BOX 34829	NEW CUMBERLAND, PA 17070
23050	PRODUCT COMPONENTS CORP	YOUK EXPRESSWAY	MT VERNON, NY 10553
55210	GETTIG ENG. AND MFG. COMPANY	30 LORRAINE AVE.	SPRING MILLS, PA 16875
70276	ALLEN MFG. CO.	PO BOX 85, OFF ROUTE 45	HARTFORD, CT 06101
71159	BRISTOL SOCKET SCREW, DIV. OF AMERICAN CHAIN AND CABLE CO., INC.	P O BOX 2244, 40 BRISTOL ST.	WATERBURY, CT 06720
71279	CAMBRIDGE THERMIONIC CORP.	445 CONCORD AVE.	CAMBRIDGE, MA 02138
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
78553	EATON CORPORATION, ENGINEERED FASTENERS DIVISION, TINNEMAN PLANT	PO BOX 6688, 8700 BROOKPARK RD.	CLEVELAND, OH 44101
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
82647	TEXAS INSTRUMENTS, INC., CONTROL PRODUCTS DIV.	34 FOREST ST.	ATTLEBORO, MA 02703
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
83693	HELDOR ASSOCIATES, INC.	100 COLUMBUS STREET	HAMDEN, CT 06514
87308	N. L. INDUSTRIES, INC., SOUTHERN SCREW DIV.	P. O. BOX 1360	STATESVILLE, NC 28677
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-1	337-1399-04		2		SHIELD,ELEC:SIDE	80009	337-1399-04
-2	200-1837-01		1		COVER,PLUG-IN:TOP & BOTTOM (ATTACHING PARTS)	80009	200-1837-01
-3	211-0008-00		2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-4	200-1780-01		1		COVER,HV:BOTTOM,ALUMINUM (ATTACHING PARTS)	80009	200-1780-01
-5	211-0071-00		2		SCREW,MACHINE:4-40 X 0.375 INCH,TRH,STL	83385	OBD
-6	210-0851-00		2		WASHER,FLAT:0.119 ID X 0.375 INCH OD,STL - - - * - - -	12327	OBD
-7	200-2063-00		1		COVER,PLUG-IN:BOTTOM (ATTACHING PARTS)	80009	200-2063-00
-8	211-0008-00		2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-9	366-1391-01		3		KNOB:GY,0.081 ID,0.28 OD,0.32 H	80009	366-1391-01
	-----		-		. EACH KNOB INCLUDES:		
	213-0725-00		2		. SETSCREW:3-48 X 0.095 INCH,HEX SOC STL	74445	OBD
-10	366-1077-01		3		KNOB:GY,0.127 ID,0.5 OD,0.531 H	80009	366-1077-01
	-----		-		. EACH KNOB INCLUDES:		
	213-0246-00		1		. SETSCREW:5-40 X 0.093 INCH L,HEX SOC	71159	OBD
-11	366-1023-07		3		KNOB:GRAY,0.127 ID,0.392 OD,0.466	80009	366-1023-07
	-----		-		. EACH KNOB INCLUDES:		
	213-0246-00		1		. SETSCREW:5-40 X 0.093 INCH L,HEX SOC	71159	OBD
-12	366-1031-08		2		KNOB:GY,CAL/W/ARROW	80009	366-1031-08
	-----		-		. EACH KNOB INCLUDES:		
	213-0246-00		1		. SETSCREW:5-40 X 0.093 INCH L,HEX SOC	71159	OBD
-13	366-1733-01		2		KNOB:W/SKIRT	80009	366-1733-01
-14	366-1405-04		1		KNOB:WHITE,CAL	80009	366-1405-04
	213-0048-00		1		. SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-15	366-1735-00		1		KNOB:GRAY,0.252 ID,0.72 OD,0.79 H	80009	366-1735-00
	213-0153-00		2		. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-16	220-0633-00		1		NUT,PLAIN,KNURL:0.25-28 X 0.25 INCH L,BRS	80009	220-0633-00
-17	355-0170-00		1		STUD,SHOULDERED:6-32 X 0.40 INCH LONG	80009	355-0170-00
-18	-----		2		CONNECTOR,RCPT,: (SEE J100 AND J200 EPL)		
-19	-----		1		CONNECTOR,RCPT,: (SEE J3200 EPL)		
-20	210-0255-00		1		TERMINAL,LUG:0.391" ID INT TOOTH	80009	210-0255-00
-21	348-0067-00		1		GROMMET,PLASTIC:0.312 INCH DIA	80009	348-0067-00
-22	358-0378-00		2		BUSHING,SLEEVE:PRESS MOUNT	80009	358-0378-00
-23	366-1691-01		6		PUSH BUTTON:GRAY,EJECTOR PIN MARK	80009	366-1691-01
-24	426-1206-01		6		FRAME,PUSH BTN:MOMENTARY,GRAY PLASTIC	80009	426-1206-01
-25	366-1559-00		1		PUSH BUTTON:GRAY	80009	366-1559-00
-26	426-1072-00		1		FRAME,PUSH BTN:PLASTIC	80009	426-1072-00
-27	105-0719-00		1		LATCH,RETAINING:PLUG-IN (ATTACHING PARTS)	80009	105-0719-00
-28	213-0113-00		1		SCR,TPG,THD FOR:2-32 X 0.312 INCH,PNH STL - - - * - - -	83385	OBD
-29	105-0718-00		1		RELEASE,LATCH:	80009	105-0718-00
-30	366-1690-00		1		KNOB,LATCH:	80009	366-1690-00
-31	384-1513-00		1		EXTENSION SHAFT:8.94 L X 0.123 OD,PLASTIC	80009	384-1513-00
-32	376-0029-00		1		CPLG,SHAFT,RGD:0.128 ID X 0.312 OD X 0.5"L	80009	376-0029-00
	213-0075-00		2		. SETSCREW:4-40 X 0.094 INCH,HEX SOC STL	70276	OBD
-33	-----		1		RES.,VAR,NONWIR: (SEE R2197 EPL) (ATTACHING PARTS)		
-34	210-0583-00		1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-35	210-0940-00		1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL - - - * - - -	79807	OBD
-36	384-1136-00		1		EXTENSION SHAFT:0.95 INCH LONG	80009	384-1136-00
-37	-----		1		RES.,VAR,NONWIR: (SEE R2497A,B EPL) (ATTACHING PARTS)		
-38	210-0583-00		1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-39	210-0940-00		1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL - - - * - - -	79807	OBD

Replaceable Mechanical Parts—SC 504

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-40	384-0289-00		1		EXTENSION SHAFT:2.813 L X 0.125 STEP OD STL	80009	384-0289-00
-41	200-1809-00		1		COVER,VAR RES:HIGH VOLTAGE	80009	200-1809-00
-42	343-0002-00		1		CLAMP,LOOP:0.188 INCH DIA (ATTACHING PARTS)	95987	3-16-6B
-43	211-0008-00		1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-44	210-0851-00		1		WASHER,FLAT:0.119 ID X 0.375 INCH OD,STL - - - * - - -	12327	OBD
-45	-----		1		RES.,VAR, NONWIR:(SEE R3100 EPL) (ATTACHING PARTS)		
-46	210-0583-00		1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-47	210-0940-00		1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL - - - * - - -	79807	OBD
-48	-----		1		RES.,VAR, NONWIR:(SEE R1200 EPL) (ATTACHING PARTS)		
-49	210-0583-00		1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-50	210-0940-00		1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL - - - * - - -	79807	OBD
-51	361-0143-00		1		WASHER,KEY:0.281 ID X 0.562 INCH OD	80009	361-0143-00
-52	343-0013-00		1		CLAMP,LOOP:0.375 INCH DIA (ATTACHING PARTS)	95987	3-8-6B
-53	211-0008-00		1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-54	210-0851-00		1		WASHER,FLAT:0.119 ID X 0.375 INCH OD,STL - - - * - - -	12327	OBD
-55	333-2327-00		1		PANEL,FRONT:SC504 (ATTACHING PARTS)	80009	333-2327-00
-56	211-0537-00		1		SCREW,MACHINE:6-32 X 0.375 INCH,TRH STL - - - * - - -	83385	OBD
-57	-----		2		LAMP,LED:(SEE DS1110 AND DS1115 EPL)		
-58	337-2203-00		1		SHLD,IMPLOSION:BLUE POLYCARBONATE	80009	337-2203-00
-59	214-1700-00		1		SPRING,FLAT:73MM X 3.2MM,PH BRS	0000M	214-1700-00
-60	386-3160-00		1		SUPPORT,CRT:FRONT	80009	386-3160-00
-61	386-3134-03		1		SUBPANEL,FRONT:PAINTED GRAY (ATTACHING PARTS)	80009	386-3134-03
-62	213-0123-00		4		SCREW,TPG,TF:6-32 X 0.375,SPCL TYPE,FLH - - - * - - -	80009	213-0123-00
-63	213-0282-00		1		THUMBSCREW:0.375 X 10.7MM,9.525 OD,PLASTIC	0000M	213-0282-00
-64	255-0334-00		FT		PLASTIC CHANNEL:(CUT TO FIT)	11897	122-37-2500
-65	407-1623-00		1		BRACKET,PANEL:REAR (ATTACHING PARTS)	80009	407-1623-00
-66	211-0507-00		3		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL - - - * - - -	83385	OBD
-67	351-0449-00		2		GUIDE,CKT CARD: (ATTACHING PARTS FOR EACH)	80009	351-0449-00
-68	211-0062-00		2		SCREW,MACHINE:2-56 X 0.312 INCH,RDH STL	83385	OBD
-69	210-0405-00		2		NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	2X12157-402
-70	210-0053-00		2		WASHER,LOCK:INTL,0.092 ID X 0.175"OD,STL - - - * - - -	83385	OBD
-71	-----		1		CKT BOARD ASSY:INTERFACE(SEE A6 EPL)		
-72	131-0608-00		6		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-73	386-3135-01		1		PANEL,REAR: (ATTACHING PARTS)	80009	386-3135-01
-74	213-0192-00		2		SCR,TPG,THD FOR:6-32 X 0.50 INCH,PNH STL	87308	OBD
-75	211-0504-00		2		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
-76	386-3671-00		2		SUPPORT,PLUG-IN: - - - * - - -	80009	386-3671-00
-77	220-0625-00		2		NUT,SHEET SPR:6-32 THD,STL	78553	C8090-632-24
-78	386-1316-00		1		SUPPORT,CRT:REAR,PLASTIC	80009	386-1316-00
-79	136-0679-00		1		SOCKET ASSY,CRT:	80009	136-0679-00
-80	252-0562-00		FT		PLASTIC CHANNEL:0.100 X 0.120,POLYETHYLENE	06229	OBD
-81	334-2361-00		1		MARKER,IDENT:WARNING UP TO 80V ON THIS BOARD		
-82	358-0281-00		2		GROMMET,PLASTIC:	80009	358-0281-00
-83	334-1379-00		1		LABEL:CRT,ADHESIVE BACK	80009	334-1379-00
-84	-----		1		COIL,TUBE DEFL:(SEE L2156 EPL)		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-85	337-2437-01			1						SHIELD,CRT:W/DELAY LINE	80009	337-2437-01
-86	426-1199-01			1						FR,SECT,PLUG-IN:BOTTOM	80009	426-1199-01
-87	214-2585-00			2						SPRING,GROUND:COPPER BERYLLIUM (ATTACHING PARTS FOR EACH)	80009	214-2585-00
-88	211-0008-00			1						SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-89	210-0330-00			2						TERMINAL,LUG:0.375 ID,STEEL (ATTACHING PARTS FOR EACH)	80009	210-0330-00
	211-0008-00			1						SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-90	131-2037-00			2						CONTACT,ELEC:HYBRID GROUND (ATTACHING PARTS FOR EACH)	80009	131-2037-00
	211-0008-00			1						SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-91	214-2586-00			8						SPRING,RTNG:COPPER BERYLLIUM	80009	214-2586-00
-92	334-2363-00			1						MARKER INDENT:WARNING,DANGER,HV	80009	334-2363-00
-93	-----			1						VOLTAGE MULTR:(SEE U1590 EPL) (ATTACHING PARTS)		
-94	210-0407-00			2						NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS - - - * - - -	73743	3038-0228-402
-95	-----			1						CKT BOARD ASSY:TRIGGER SW(SEE A7 EPL) (ATTACHING PARTS)		
-96	211-0244-00			1						SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL - - - * - - -	78189	OBD
-97	-----			1						. SWITCH PB ASSY:(SEE S3511A,B,C EPL)		
-98	-----			3						. SWITCH PB ASSY:(SEE S3512A,B,C EPL)		
-99	343-0495-05			2						. CLIP,SWITCH:FRONT,7.5MM X5 UNIT (ATTACHING PARTS)	80009	343-0495-05
-100	210-3050-00			3						. EYELET,METALLIC:0.218 L X 0.059 OD,BRS - - - * - - -	07707	SE-27
-101	343-0499-03			2						. CLIP,SWITCH:7.5 MM,4 UNIT (ATTACHING PARTS)	80009	343-0499-03
-102	210-3050-00			3						. EYELET,METALLIC:0.218 L X 0.059 OD,BRS - - - * - - -	07707	SE-27
-103	214-0579-00			2						. TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-104	131-0566-00			1						. LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-105	131-1425-00			1						. CONTACT SET,ELE:R ANGLE,0.150" L,STR OF 36	22526	65521-136
-106	-----			1						CKT BOARD ASSY:HORIZ DEFL(SEE A4 EPL) (ATTACHING PARTS)		
-107	211-0244-00			1						SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL - - - * - - -	78189	OBD
-108	136-0577-00			1						. CONNECTOR,RCPT,:6 CONTACT	22526	65001-015
-109	136-0260-02			1						. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	82647	C951601
-110	220-0665-00			1						. NUT,PLAIN,HEX.:SLFLKG,4-40 X0.25",PLSTC (ATTACHING PARTS)	23050	OBD
-111	211-0213-00			1						. SCREW,MACHINE:4-40 X 0.312 INCH,PNH NYLON - - - * - - -	23050	OBD
-112	129-0455-00			1						. SPACER,POST:0.305 L,W/4-40 THD THRU,BRS	80009	129-0455-00
	672-0653-00			1						CKT BOARD ASSY:TRIGGER,W/CAM SWITCH (ATTACHING PARTS)	80009	672-0653-00
-113	212-0109-00			1						SCREW,MACHINE:8-32 X 0.188,FLH,STL - - - * - - -	83385	OBD
	-----			1						. DRUM ASSY,CAM S:(SEE S3315 EPL) (ATTACHING PARTS)		
-114	211-0244-00			4						. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL - - - * - - -	78189	OBD
	-----			-						. . DRUM ASSY INCLUDES:		
-115	200-1332-00			1						. . COVER,CAM SW:	80009	200-1332-00
-116	131-1248-00			1						. . CONTACT,ELEC:SHAFT GND	80009	131-1248-00
-117	210-0406-00			2						. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-118	214-1704-01			2						. . SPRING,FLAT:CAM SW DETENT,0.008 INCH THK	80009	214-1704-01
-119	214-1127-00			2						. . ROLLER,DETENT:0.125 DIA X 0.125 INCH L	80009	214-1127-00

Replaceable Mechanical Parts—SC 504

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-120	105-0753-00		1	.	ACTUATOR,CAM SW:TRIGGER SOURCE (ATTACHING PARTS)	80009	105-0753-00
-121	354-0219-00		1	.	RING,RETAINING:FOR 0.25 INCH SHAFT	79136	5103-25-MD-R
-122	401-0155-00		1	.	BEARING,CAM SW:FRONT	80009	401-0155-00
					- - - * - - -		
-123	210-0406-00		2	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-124	401-0156-00		1	.	BEARING,CAM SW:REAR	80009	401-0156-00
-125	-----		1	.	CKT BOARD ASSY:TRIGGER(SEE A3 EPL)		
-126	131-0604-00		10	.	CONTACT,ELEC:CKT CD SW,SPR	80009	131-0604-00
-127	351-0213-00		1	.	GUIDE-POST,LOCK:0.285 INCH LONG	80009	351-0213-00
-128	136-0631-00		1	.	SOCKET,PLUG-IN:9 PIN FEMALE	00779	1-380949-9
	136-0547-00		2	.	CONNECTOR,RCPT,:6 PIN,FEMALE	00779	1-380949-6
-129	129-0455-00		1	.	SPACER,POST:0.305 L,W/4-40 THD THRU	80009	129-0455-00
-130	214-0579-00		3	.	TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-131	344-0154-00		6	.	CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
-132	131-0566-00		11	.	LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-133	131-0608-00		30	.	CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-134	-----		6	.	CONNECTOR BODY:(SEE J3188,J3290,J3325,J3380 J3382,J3390 EPL)		
-135	136-0252-04		6	.	SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-136	344-0244-00		1	.	CLIP,CMPNT MTG:	80009	344-0244-00
-137	136-0514-00		3	.	SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	73803	C950802
-138	136-0260-02		3	.	SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	82647	C951601
	334-3080-00		1	.	MARKER,IDENT:	80009	334-3080-00
-139	426-1246-00		1	.	FR SECT,PLUG-IN:RIGHT SIDE,TOP AND BOTTOM	80009	426-1246-00
-140	-----		2	.	CKT BOARD ASSY:VERT SW(SEE A9 EPL)		
-141	131-1347-00		4	.	TERM,QIK DISC:0.187 X 0.02 BLADE,45 DEG BEND		
-142	-----		2	.	MICROCIRCUIT,LI:(SEE HY1430 AND HY1530 EPL)		
-143	-----		2	.	RES NTWK,FXD FI:(SEE HY1320 & HY1520)		
	672-0651-00		1	.	CKT BOARD ASSY:MAIN,W/CAM SWITCH	80009	672-0651-00
-144	384-1380-00		1	.	EXTENSION SHAFT:5.2 L X 0.081 OD,SST,PSVT	80009	384-1380-00
-145	376-0050-00		1	.	CPLG,SHAFT,FLEX:FOR 0.081/0.125 INCH SHAFTS	80009	376-0050-00
	213-0022-00		4	.	SETSCREW:4-40 X 0.188 INCH,HEX SOC STL	74445	OBD
-146	-----		1	.	RES.,VAR NONWIR:(SEE R1152 EPL)		
	361-0515-00		1	.	SPACER,SWITCH:PLASTIC	80009	361-0515-00
	-----		1	.	DRUM ASSY,CAM S:(SEE S1130 EPL) (ATTACHING PARTS)		
-147	211-0244-00		4	.	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
	131-0963-00		1	.	CONTACT,ELEC:GROUNDING	80009	131-0963-00
	-----		-	.	DRUM ASSY INCLUDES:		
-148	200-2107-00		1	.	COVER,CAM SW:15 ELEMENT ALUMINUM (ATTACHING PARTS)	80009	200-2107-00
-149	211-0008-00		4	.	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-150	210-0004-00		4	.	WASHER,LOCK:INTL,0.12 ID X 0.26"OD,STL	78189	1204-00-00-0541C
					- - - * - - -		
-151	131-0963-00		1	.	CONTACT,ELEC:GROUNDING	80009	131-0963-00
-152	210-0406-00		2	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-153	214-1139-03		1	.	SPRING,FLAT:RED COLORED	80009	214-1139-03
	214-1139-02		1	.	SPRING,FLAT:GREEN COLORED	80009	214-1139-02
-154	214-1752-00		2	.	ROLLER,DETENT:	80009	214-1752-00
-155	105-0754-00		1	.	ACTUATOR,CAM SW:TIME/DIV	80009	105-0754-00
-156	384-0878-07		1	.	SHAFT,CAM SW:OUTER CONCENTRIC W/DRIVER (ATTACHING PARTS)	80009	384-0878-07
-157	354-0390-00		1	.	RING,RETAINING:0.338 ID X 0.025" THK,STL	79136	5100-37MD
					- - - * - - -		
-158	401-0180-00		1	.	BEARING,CAM SW:FRONT	80009	401-0180-00
-159	210-0406-00		2	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-160	401-0178-00		1	.	BEARING,CAM SW:CENTER/REAR	80009	401-0178-00
-161	384-1180-00		2	.	EXTENSION SHAFT:6.40 INCH LONG	80009	384-1180-00
-162	214-2567-00		2	.	LEVER,SWITCH:AC-GND-DC	80009	214-2567-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-163	376-0029-00		2	.	CPLG,SHAFT,RGD:0.128 ID X 0.312 OD X 0.5"L	80009	376-0029-00
	-----		-	.	EACH COUPLER INCLUDES:		
	213-0075-00		2	.	SETSCREW:4-40 X 0.094 INCH,HEX SOC STL	70276	OBD
-164	-----		2	.	RES.,VAR,NONWIR:(SEE R1365 AND R1560 EPL)		
-165	-----		2	.	ACTR ASSY,CAM S:(SEE S1325 AND S1525 EPL)		
-166	131-0907-00		1	.	CONTACT,ELEC:GROUNDING	80009	131-0907-00
-167	214-2666-00		1	.	CONTACT,ELEC:GROUNDING	80009	214-2666-00
	-----		-	.	EACH ACTR ASSY INCLUDES:		
-168	211-0244-00		4	.	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
-169	200-2105-00		1	.	COVER,CAM SW:4 & 24 ELEMENTS AL (ATTACHING PARTS)	80009	200-2105-00
-170	211-0214-00		4	.	SCREW,MACHINE:4-40 X 0.25 INCH,TRH STL	83385	OBD
					- - - * - - -		
-171	352-0492-00		1	.	HOLDER,CONTACT:	80009	352-0492-00
-172	214-2587-01		8	.	HANGER,SWITCH:W/CONTACT	80009	214-2587-01
-173	210-0406-00		2	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-174	214-1126-01		2	.	SPRING,FLAT:GREEN COLORED	80009	214-1126-01
-175	214-1752-00		2	.	ROLLER,DETENT:	80009	214-1752-00
-176	401-0379-00		1	.	BEARING,CAM SW:END,0.6 DIA	80009	401-0379-00
-177	105-0749-00		1	.	ACTUATOR,CAM SW:AC-GND-DC	80009	105-0749-00
-178	210-0406-00		2	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-179	401-0381-00		1	.	BEARING,CAM SW:CENTER	80009	401-0381-00
-180	210-0406-00		2	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-181	214-1126-01		2	.	SPRING,FLAT:GREEN COLORED	80009	214-1126-01
-182	214-1752-00		2	.	ROLLER,DETENT:	80009	214-1752-00
-183	401-0379-00		1	.	BEARING,CAM SW:END,0.6 DIA	80009	401-0379-00
-184	210-0406-00		2	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-185	401-0380-00		1	.	BEARING,CAM SW:CENTER	80009	401-0380-00
	376-0182-00		1	.	CPLG,SHAFT,RGD:0.192 AND 0.25 DIA SFT	80009	376-0182-00
-186	105-0750-00		1	.	ACTUATOR,CAM SW:ATTENUATOR	80009	105-0750-00
-187	-----		-	.	CKT BOARD ASSY:MAIN(SEE A1 EPL)		
-188	-----		-	.	CKT BOARD ASSY:(SEE A5 EPL) (ATTACHING PARTS)		
-189	211-0507-00		1	.	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
-190	358-0016-00		1	.	BUSHING,RUBBER: (ATTACHING PARTS)	83693	1028
-191	211-0507-00		1	.	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
-192	337-2428-00		1	.	SHIELD,ELEC:HIGH VOLTAGE (ATTACHING PARTS)	80009	337-2428-00
-193	211-0244-00		2	.	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
-194	337-2429-00		2	.	SHIELD,ELEC:CIRCUIT CARD	80009	337-2429-00
	334-2363-00		1	.	MARKER INDENT:WARNING,DANGER,HV	80009	334-2363-00
	334-3299-00		1	.	MARKER,IDENT:MARKED DANGER 150V	80009	334-3299-00
-195	214-0579-00		3	.	TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-196	136-0252-04		144	.	SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-197	-----		2	.	CONNECTOR,BODY:(SEE J1420 AND J1520 EPL)		
-198	131-0639-00		4	.	CONTACT,ELEC:SPR CLIP,TYPE	22526	44642
-199	129-0455-00		1	.	SPACER,POST:0.305 L,W/4-40 THD THRU,BRS	80009	129-0455-00
	131-0382-00		1	.	TERMINAL,STUD:0.812 L,INSULATED	71279	572-4822-01-0516
-200	131-0608-00		22	.	CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-201	131-0604-00		15	.	CONTACT,ELEC:CKT CD SW,SPR	80009	131-0604-00
-202	136-0514-00		1	.	SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	73803	C950802
-203	131-1857-00		1	.	TERM SET,PIN:36/0.025 SQ PIN,ON 0.1 CTRS		
	198-3548-00		1	.	WIRE SET,ELEC:	80009	198-3548-00
	672-0652-00		1	.	CKT BOARD ASSY:DISPLAY/MODE,W/CAM SWITCH (ATTACHING PARTS)	80009	672-0652-00
-204	212-0109-00		1	.	SCREW,MACHINE:8-32 X 0.188,FILH,STL	83385	OBD
					- - - * - - -		
-205	214-1061-00		1	.	SPRING,GROUND:FLAT	80009	214-1061-00
-206	426-1245-01		1	.	FR SECT,PLUG-IN:TOP LEFT	80009	426-1245-01

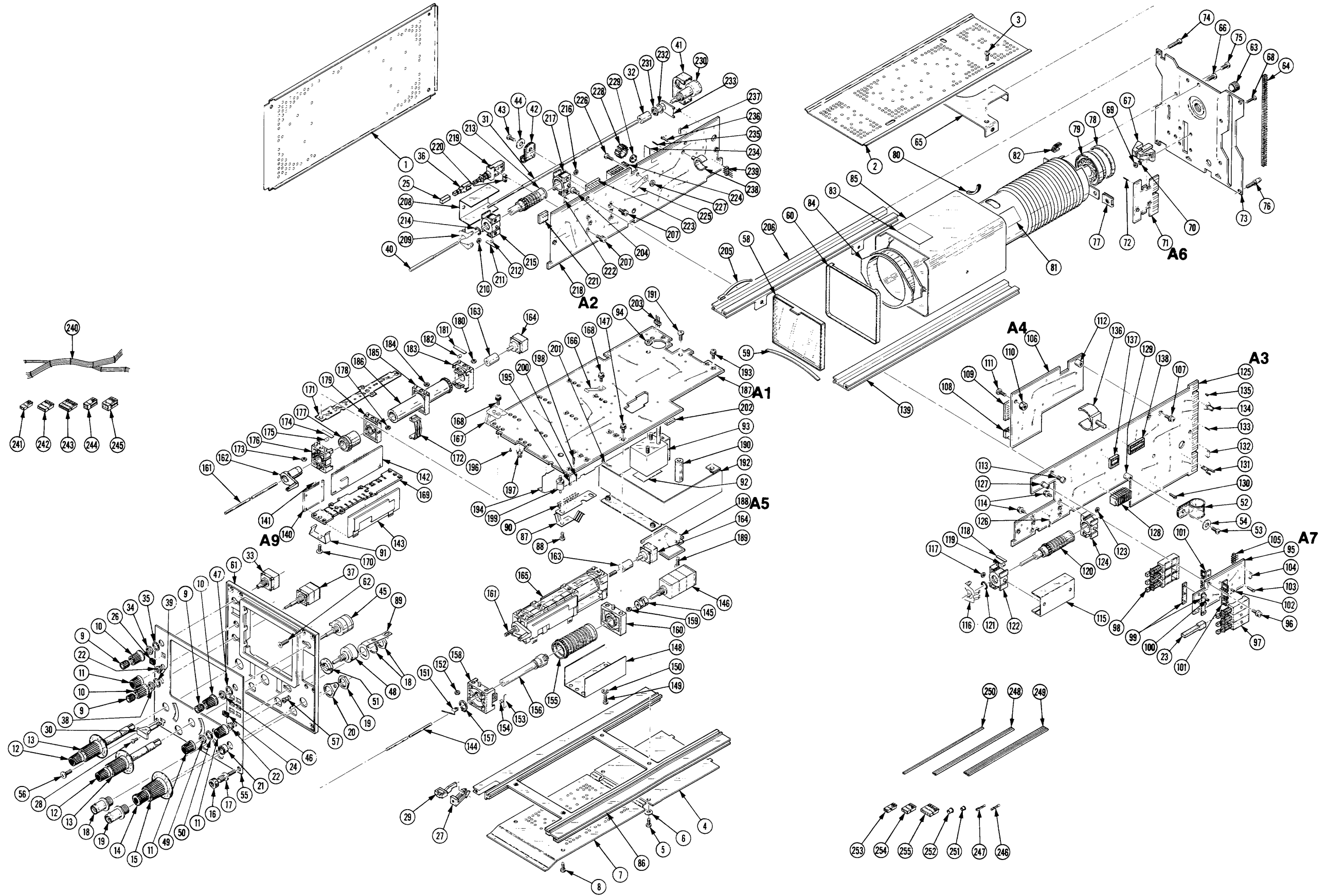
Replaceable Mechanical Parts—SC 504

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-	-----		-	.	.	.	.	.	CKT BOARD ASSY INCLUDES:		
	-----		1	.	.	.	.	.	ACTR ASSY,CAM S:(SEE S2375 EPL) (ATTACHING PARTS)		
-207	211-0244-00		4	.	.	.	.	.	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL - - - * - - -	78189	OBD
-208	200-1441-00		1	.	.	.	.	.	COVER,CAM SW.:7 ELEMENTS CAM SW INCLUDES:	80009	200-1441-00
-209	131-1248-00		1	.	.	.	.	.	CONTACT,ELEC:SHAFT GND	80009	131-1248-00
-210	210-0406-00		2	.	.	.	.	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-211	214-1704-01		1	.	.	.	.	.	SPRING,FLAT:CAM SW DETENT,0.008 INCH THK	80009	214-1704-01
-212	214-1127-00		1	.	.	.	.	.	ROLLER,DETENT:0.125 DIA X 0.125 INCH L	80009	214-1127-00
-213	105-0752-00		1	.	.	.	.	.	ACTUATOR,CAM SW:DISPLAY MODE (ATTACHING PARTS)	80009	105-0752-00
-214	354-0219-00		1	.	.	.	.	.	RING,RETAINING:FOR 0.25 INCH SHAFT - - - * - - -	79136	5103-25-MD-R
-215	401-0155-00		1	.	.	.	.	.	BEARING,CAM SW:FRONT	80009	401-0155-00
-216	210-0406-00		2	.	.	.	.	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-217	401-0156-00		1	.	.	.	.	.	BEARING,CAM SW:REAR	80009	401-0156-00
-218	-----		1	.	.	.	.	.	CKT BOARD ASSY:F AND I(SEE A2 EPL)		
-219	-----		1	.	.	.	.	.	SWITCH,PUSH:(SEE S2285 EPL)		
-220	361-0384-00		2	.	.	.	.	.	SPACER,PB SW:0.133 INCH LONG	80009	361-0384-00
-221	136-0514-00		2	.	.	.	.	.	SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	73803	C950802
-222	131-0604-00		7	.	.	.	.	.	CONTACT,ELEC:CKT CD SW,SPR	80009	131-0604-00
-223	136-0548-00		1	.	.	.	.	.	CONNECTOR,RCPT:SIDE ENTRY,10 CONTACT	00779	2-380949-0
-224	136-0269-02		1	.	.	.	.	.	SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C951401
-225	131-0907-00		1	.	.	.	.	.	CONTACT,ELEC:GROUNDING (ATTACHING PARTS)	80009	131-0907-00
-226	211-0008-00		1	.	.	.	.	.	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-227	210-0406-00		1	.	.	.	.	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS - - - * - - -	73743	2X12161-402
-228	214-2593-00		2	.	.	.	.	.	HEAT SINK,XSTR:(6) TO-5 ALUMINUM	80009	214-2593-00
-229	342-0324-00		3	.	.	.	.	.	INSULATOR,DISC:TO-5 TRANSISTOR	13103	7717-5N-BLUE
-230	-----		1	.	.	.	.	.	RES.,VAR,NONWIR:(SEE R2110 EPL) (ATTACHING PARTS)		
-231	210-0583-00		1	.	.	.	.	.	NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-232	210-0046-00		1	.	.	.	.	.	WASHER,LOCK:INTL,0.26 ID X 0.40" OD,STL	78189	1214-05-00-0541C
-233	386-3263-00		1	.	.	.	.	.	PL,VAR RES MTG:	80009	386-3263-00
-234	337-2139-00		1	.	.	.	.	.	SHIELD,ELEC:INPUT COUPLING SWITCH	80009	337-2139-00
-235	131-0608-00		25	.	.	.	.	.	CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-236	214-0579-00		2	.	.	.	.	.	TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-237	131-0566-00		2	.	.	.	.	.	LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-238	352-0086-00		1	.	.	.	.	.	HOLDER,TOROID:0.50 INCH DIA	80009	352-0086-00
-239	131-1857-00		1	.	.	.	.	.	TERM SET,PIN:36/0.025 SQ PIN,ON 0.1 CTRS		
-240	179-2546-00		1	.	.	.	.	.	WIRING HARNESS,:CHASSIS	80009	179-2546-00
-241	352-0162-00		1	.	.	.	.	.	CONN BODY,PL,EL:4 WIRE BLACK	80009	352-0162-00
	352-0162-02		1	.	.	.	.	.	CONN BODY,PL,EL:4 WIRE RED	80009	352-0162-02
	352-0162-04		1	.	.	.	.	.	CONN BODY,PL,EL:4 WIRE YELLOW	80009	352-0162-04
	352-0162-07		2	.	.	.	.	.	CONN BODY,PL,EL:4 WIRE VIOLET	80009	352-0162-07
	352-0162-09		2	.	.	.	.	.	CONN BODY,PL,EL:4 WIRE WHITE	80009	352-0162-09
-242	352-0163-08		1	.	.	.	.	.	CONN BODY,PL,EL:5 WIRE GRAY	80009	352-0163-08
-243	352-0169-01		1	.	.	.	.	.	CONN BODY,PL,EL:2 WIRE BROWN	80009	352-0169-01
	352-0169-07		1	.	.	.	.	.	CONN BODY,PL,EL:2 WIRE PURPLE	80009	352-0169-07
-244	352-0176-00		2	.	.	.	.	.	CONN BODY,PL,EL:4 WIRE,DBL ROW BLACK	80009	352-0176-00
-245	352-0177-00		1	.	.	.	.	.	CONN BODY,PL,EL:6 WIRE,DBL ROW BLACK	80009	352-0177-00
	198-3547-00		1	.	.	.	.	.	WIRE SET,ELEC:	80009	198-3547-00
-246	131-0707-00		32	.	.	.	.	.	CONNECTOR,TERM.:0.48" L,22-26AWG WIRE	22526	75691-005
-247	131-1538-00		4	.	.	.	.	.	CONTACT,ELEC:CRIMP-ON,22-26 AWG WIRE	22526	75369-002
-248	175-0826-00		FT	.	.	.	.	.	WIRE,ELECTRICAL:3 WIRE RIBBON	08261	175-0826-00
-249	175-0828-00		FT	.	.	.	.	.	WIRE,ELECTRICAL:5 WIRE RIBBON	08261	OBD

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-250	175-0863-00		FT	.					WIRE,ELECTRICAL:2 WIRE RIBBON	08261	OBD
-251	210-0774-00		2	.					EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
-252	210-0775-00		2	.					EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-253	352-0161-03		2	.					CONN BODY,PL,EL:3 WIRE ORANGE	80009	352-0161-03
	352-0161-04		2	.					CONN BODY,PL,EL:3 WIRE YELLOW	80009	352-0161-04
	352-0161-05		2	.					CONN BODY,PL,EL:3 WIRE GREEN	80009	352-0161-05
	352-0161-09		1	.					CONN BODY,PL,EL:3 WIRE WHITE	80009	352-0161-09
-254	352-0163-05		1	.					CONN BODY,PL,EL:5 WIRE GREEN	80009	352-0163-05
-255	352-0169-00		1	.					CONN BODY,PL,EL:2 WIRE BLACK	80009	352-0169-00
	195-0189-00		1	.					LEAD,ELECTRICAL:DEFLECTION	80009	195-0189-00

ACCESSORIES

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty						Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont		1	2	3	4	5			
	070-2296-00			1						MANUAL, TECH: INSTRUCTION	80009	070-2296-00



MANUAL CHANGE INFORMATION

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

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

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

SERVICE NOTE

Because of the universal parts procurement problem, some electrical parts in your instrument may be different from those described in the Replaceable Electrical Parts List. The parts used will in no way alter or compromise the performance or reliability of this instrument. They are installed when necessary to ensure prompt delivery to the customer. Order replacement parts from the Replaceable Electrical Parts List.

CALIBRATION TEST EQUIPMENT REPLACEMENT

Calibration Test Equipment Chart

This chart compares TM 500 product performance to that of older Tektronix equipment. Only those characteristics where significant specification differences occur, are listed. In some cases the new instrument may not be a total functional replacement. Additional support instrumentation may be needed or a change in calibration procedure may be necessary.

Comparison of Main Characteristics

DM 501 replaces 7D13		
PG 501 replaces 107 108	PG 501 - Risetime less than 3.5 ns into 50 Ω . PG 501 - 5 V output pulse; 3.5 ns Risetime	107 - Risetime less than 3.0 ns into 50 Ω . 108 - 10 V output pulse 1 ns Risetime
PG 502 replaces 107 108 111	PG 502 - 5 V output PG 502 - Risetime less than 1 ns; 10 ns Pretrigger pulse delay	108 - 10 V output 111 - Risetime 0.5 ns; 30 to 250 ns Pretrigger pulse delay
PG 508 replaces 114 115 2101	Performance of replacement equipment is the same or better than equipment being replaced.	
PG 506 replaces 106 067-0502-01	PG 506 - Positive-going trigger output signal at least 1 V; High Amplitude output, 60 V. PG 506 - Does not have chopped feature.	106 - Positive and Negative-going trigger output signal, 50 ns and 1 V; High Amplitude output, 100 V. 0502-01 - Comparator output can be alternately chopped to a reference voltage.
SG 503 replaces 190, 190A, 190B 191 067-0532-01	SG 503 - Amplitude range 5 mV to 5.5 V p-p. SG 503 - Frequency range 250 kHz to 250 MHz.	190B - Amplitude range 40 mV to 10 V p-p. 0532-01 - Frequency range 65 MHz to 500 MHz.
SG 504 replaces 067-0532-01 067-0650-00	SG 504 - Frequency range 245 MHz to 1050 MHz.	0532-01 - Frequency range 65 MHz to 500 MHz.
TG 501 replaces 180, 180A 181 184 2901	TG 501 - Trigger output-slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time. TG 501 - Trigger output-slaved to market output from 5 sec through 100 ns. One time-mark can be generated at a time. TG 501 - Trigger output-slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	180A - Trigger pulses 1, 10, 100 Hz; 1, 10, and 100 kHz. Multiple time-marks can be generated simultaneously. 181 - Multiple time-marks 184 - Separate trigger pulses of 1 and 0.1 sec; 10, 1, and 0.1 ms; 10 and 1 μ s. 2901 - Separate trigger pulses, from 5 sec to 0.1 μ s. Multiple time-marks can be generated simultaneously.

NOTE: All TM 500 generator outputs are short-proof. All TM 500 plug-in instruments require TM 500-Series Power Module.



TEKTRONIX®

committed to
technical excellence

MANUAL CHANGE INFORMATION

PRODUCT SC 504
070-2296-00

CHANGE REFERENCE C1/478
DATE 4-21-78

CHANGE:	DESCRIPTION
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EFF ALL SN

TEXT CORRECTIONS

Page 1-2

CHANGE item 13. SECONDS/DIV to read:

This switch selects the sweep rate. The CAL control must be turned fully clockwise for calibrated sweep rates.

Page 1-4

CHANGE item 21. VOLTS/DIV to read:

This switch selects the vertical deflection factor in a 1-2-5 sequence (variable control must be rotated fully clockwise for the indicated deflection factor). When using a 1X probe or no probe, read the deflection factor through the knob skirt window labeled 1X; however, when a 10X probe is used on the input, read the knob skirt window labeled 10X.

Page 1-7

CHANGE the first sentence under Trigger Coupling to read:

Four methods of coupling the trigger signal to the trigger circuits can be selected with the TRIGGERING CPLG switches.

ADD the following trigger coupling information following the High-Frequency Reject information.

DC Coupling (all buttons out). The dc coupling method accepts all trigger signals between dc and 80 MHz.

CHANGE:	DESCRIPTION	
<p>Page 2-2 & 2-3 Table 2-1</p> <p>CHANGE all of Step Response (aberrations) as shown below:</p>		
Characteristics	Performance Requirements	Supplemental Information
<p>Step Response (aberrations)</p> <p>Measured with a 5-division step vertically positioned within the center 6 divisions, and the input terminated in 50 Ω.</p> <p>First 100 ns 5 mV/div to .2V/div</p>		<p>≤ ±5%</p>
<p>After 100 ns 5 mV/div to 2 V/div</p>		<p>≤ ±2%</p>
<p>5 V/div to 10 V/div</p>		<p>≤ ±3%</p>
<p>Position Effect</p>		<p>≤ ±3% change in aberrations as a 5-division step is vertically positioned over the graticule area.</p>

Page 2-4 Table 2-2

CHANGE: Trigger sensitivity DC coupling in the Supplemental Information column as shown below:

Supplemental Information		
Source	Minimum Signal Required	
	dc to 30 MHz.	30 MHz to 80 MHz.
Interface	35 mV	80 mV

CHANGE:	DESCRIPTION							
<p>Page 2-5 Table 2-3 CHANGE Sweep Generator Linearity as shown below:</p>								
<table border="1"> <thead> <tr> <th>Characteristics</th> <th>Performance Requirements</th> <th>Supplemental Information</th> </tr> </thead> <tbody> <tr> <td>Linearity</td> <td></td> <td> $\leq \pm 5\%$ (0.1 div) change in timing over any 2-division interval within the center 8 divisions. </td> </tr> </tbody> </table>	Characteristics	Performance Requirements	Supplemental Information	Linearity		$\leq \pm 5\%$ (0.1 div) change in timing over any 2-division interval within the center 8 divisions.		
Characteristics	Performance Requirements	Supplemental Information						
Linearity		$\leq \pm 5\%$ (0.1 div) change in timing over any 2-division interval within the center 8 divisions.						
<p>Page 2-7 Table 2-6 ADD the following to the Supplemental Information column for Input Signals: Noise may exceed 2 mV peak-to-peak. Bandwidth is greater than 50 MHz; however, it is recommended that signals be limited to 20 MHz or less (20 ns risetime or greater) to prevent possible crosstalk with other signal lines.</p>								
<p>Page 2-8 Table 2-6 CHANGE Output Signals in the Supplemental Information column to read as follows: At least 50 mV/div. Bandwidth is typically 20 MHz. Output resistance is less than 50 Ω.</p>								
<p>Page 2-9 CHANGE the first sentence of first paragraph to read: This procedure checks the electrical characteristics of the SC 504 that appear..... CHANGE the first sentence of second paragraph to read: The electrical characteristics in Section 2 are valid only if the SC 504 is calibrated.....</p>								
<p>CHANGE the Tektronix part no. of the Dual Input Coupler to 067-0525-01 in the LIST OF TEST EQUIPMENT REQUIREMENTS.</p>								
<p>Page 2-11 Step 5. (Check the Common Mode Rejection Ratio) CHANGE part c to read: CHECK - that the crt displays less than 0.1 major division of deflection. CHANGE the last part of Step 5 from d. to f. ADD the following parts between part c. and part f. d. Set the sine-wave generator frequency to 10 MHz. e. CHECK - the display for less than 0.5 major division of deflection.</p>								
<p>Page 2-13 (Sweep rate accuracy table) DELETE all of the linearity information along the bottom of the table.</p>								

CHANGE:	DESCRIPTION
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Page 3-2

CHANGE the Tektronix part no. of the 10X attenuator to 011-0059-02 in the LIST OF TEST EQUIPMENT REQUIREMENTS.

REMOVE from the control settings list of Step 3a, the reference to TRIG VIEW - Midrange. At the bottom of the list, change CH 1 to CH 2.

Page 3-4

REPLACE the procedure of Step 9 (Adjust Low Frequency Compensation) with the following procedure:

- a. Set the DISPLAY switch to CHOP.
- b. Set the CH 1 input coupling switch to GND, then position the display to mid-screen.
- c. Set the TRIGGERING SOURCE switch to CH 2.
- d. Set the CH 2 VOLTS/DIV switch to 10 m and set input coupling to DC.
- e. Connect a fast rise (positive going) signal from the PG 506 Calibration Generator, through a 2X attenuator and a 50 Ω termination network, to the CH 2 input connector.
- f. Set the calibration generator for a period of 100 Hz.
- g. Set the SECONDS/DIV switch to 1 m.
- h. Adjust the generator for a pulse amplitude of 8 major graticule divisions.
- i. Rotate the TRIGGERING LEVEL control to obtain a stable display.
- j. ADJUST--R2311, Lf Comp, located on the F & I Board, to obtain the minimum CH 1 display amplitude.
- k. Disconnect the calibration generator and all cables.

Page 4-2

CHANGE the drawing outline to: Fig. 4-2. Channel switching gates.

Page 4-3

CHANGE the drawing outline to: Fig. 4-1. Signal attenuation.

Page 5-7

CHANGE the information under Sweep A Gate Out to read:

This positive-going gating signal is applied to connector 26A (ground reference at contact 25A). The active level is approximately +5 volts during the sweep and approximately zero volts otherwise. Source impedance is 1 kΩ.

CHANGE:	DESCRIPTION
REPLACEABLE ELECTRICAL PARTS LIST CORRECTIONS	
Page 7-3	
REMOVE all information associated with circuit numbers C116 through C241 (11 consecutive lines).	
ADD:	
A8	670-5116-00 CKT BOARD ASSY:VERTICAL SWITCH
C1342	281-0773-00 CAP.,FXD,CER DI:0.01UF,10%,100V
Page 7-4	
CHANGE TO:	
C1374	283-0341-00 CAP.,FXD,CER DI:0.047UF,10%,100V
ADD:	
C1446	281-0773-00 CAP.,FXD,CER DI:0.01UF,10%,100V
C1448	281-0773-00 CAP.,FXD,CER DI:0.01UF,10%,100V
C1548	281-0773-00 CAP.,FXD,CER DI:0.01UF,10%,100V
Page 7-5	
REMOVE:	
C3182	281-0759-00 CAP.,FXD,CER DI:22PF,10%,100V
ADD:	
C3324	281-0618-00 CAP.,FXD,CER DI:4.7 PF,500V
C3325	281-0618-00 CAP.,FXD,CER DI:4.7 PF,500V
Page 7-8	
CHANGE: Ckt No. HVN1590 to U1590	
Page 7-9	
CHANGE TO:	
Q2220 } Q2320 }	153-0609-00 SEMICON DVC SE:SILICON,PNP,MATCHED PAIR
Q2230 } Q2330 }	153-0609-00 SEMICON DVC SE:SILICON,PNP,MATCHED PAIR
REMOVE: footnote 1.	
Page 7-10	
CHANGE TO:	
Q3520 } Q3524 }	151-1042-00 SEMICON DVC SE: MATCHED PAIR FET

CHANGE:	DESCRIPTION
<p>Page 7-11</p> <p>REMOVE all information associated with circuit numbers R210 through R243 (15 consecutive lines).</p> <p>ADD:</p> <p>A footnote indicator to R1152⁽¹⁾</p> <p>A footnote at bottom of page - ¹Furnished as a unit with S1160.</p> <p>CHANGE TO:</p> <p>R1167 311-1237-00 RES.,VAR,NONWIR:1K OHM,10%,0.5W</p>	
<p>Page 7-12</p> <p>CHANGE TO:</p> <p>R1370 315-0911-00 RES.,FXD,CMPSN:910 OHM,5%,0.25W</p>	
<p>Page 7-16</p> <p>CHANGE TO:</p> <p>R3178 315-0510-00 RES.,FXD,CMPSN:51 OHM,5%,0.25W</p> <p>REMOVE:</p> <p>R3180 315-0101-00 RES.,FXD,CMPSN:100 OHM,5%,0.25W</p>	
<p>Page 7-17</p> <p>CHANGE TO:</p> <p>R3322 } 321-0071-00 RES.,FXD,FILM:53.6 OHM,1%,0.125W R3324 }</p> <p>ADD:</p> <p>R3374 321-0260-00 RES.,FXD,FILM:4.99K OHM,1%,0.125W</p>	
<p>Page 7-18</p> <p>CHANGE TO:</p> <p>R4112 321-0271-00 RES.,FXD,FILM:6.49 OHM,1%,0.125W</p> <p>R4135 } 321-0159-00 RES.,FXD,FILM:442 OHM,1%,0.125W R4136 }</p>	
<p>Page 7-19</p> <p>CHANGE TO:</p> <p>R4227 315-0301-00 RES.,FXD,CMPSN:300 OHM,5%,0.25W</p> <p>R4342 321-0273-00 RES.,FXD,FILM:81 OHM,1%,0.125W</p> <p>From S1130 } To S1130 S1160 } S1160¹</p>	

CHANGE:	DESCRIPTION
<p>Page 7-19</p>	
<p>CHANGE TO:</p>	
<p>From S3512A</p>	<p>To S3512</p>
<p>From S3512B</p>	<p>To S3513</p>
<p>From S3512C</p>	<p>To S3514</p>
<p>ADD:</p>	
<p>Footnote at bottom of page - ¹Furnished as a unit with R1152.</p>	
<p style="text-align: center;">SCHEMATIC CHANGES</p>	
<p>DIAGRAM 1 CHANNEL 1 PREAMPLIFIER</p>	
<p>CHANGE: R3178 to 51 ohm</p>	
<p>REMOVE: C3182, 22 (PF) and symbol</p>	
<p>REMOVE: R3180, 100 (OHM) and symbol</p>	
<p>REMOVE: J3188 - P3188 to CH 2 DIAG 2 and symbols</p>	
<p>ADD: C1446, 0.01 (UF) between left end of R1446 and ground.</p>	
<p>ADD: C1548, 0.01 (UF) between pin 5 of HY1530 and ground.</p>	
<p>DIAGRAM 2 CHANNEL 2 PREAMPLIFIER AND CHANNEL SWITCHING</p>	
<p>REMOVE: J3290 - P3290 FROM CH 1 DIAG 1 and symbols.</p>	
<p>ADD: C1342, 0.01 (UF) between left end of R1344 and ground.</p>	
<p>ADD: C1448, 0.01 (UF) between pin 5 of HY1430 and ground.</p>	
<p>DIAGRAM 3 VERTICAL AMPLIFIER</p>	
<p>ADD: Another asterisk(*) to circuit numbers Q2230 and Q2330.</p>	
<p>ADD: The following under NOTES: ** MATCHED PAIR</p>	
<p>CHANGE: Q2131 symbol to a PNP transistor symbol</p>	
<p>DIAGRAM 4 TRIGGERING</p>	
<p>CHANGE these circuit numbers: J500 to J3200, R510 to R3210, C510 to C3210, C512 to C3212, R512 to R3212.</p>	
<p>CHANGE: R3322 to 53.6 ohm</p>	
<p>CHANGE: C3324 to 4.7 PF</p>	
<p>CHANGE: R3324 to 53.6 ohm</p>	
<p>ADD: C3325, 4.7 (PF) between base of Q3224 and ground.</p>	
<p style="text-align: center;">PAGE 7 OF 8</p>	

CHANGE:	DESCRIPTION
DIAGRAM 5 SWEEP GATING	
CHANGE:	REMOTE RESET to REMOTE RESET (located near coordinate A2)
CHANGE:	Circuit number R3275 to R3375
DIAGRAM 7 HORIZONTAL PREAMPLIFIER & OUTPUT AMPLIFIER BOARD	
CHANGE:	R1167 to 1K
CHANGE:	R4227 to 300 ohm
CHANGE:	R4342 to 6.81 ohm
CHANGE:	R4135 to 442 ohm
CHANGE:	R4112 to 6.49 ohm
CHANGE:	R4136 to 442 ohm
DIAGRAM 8 CALIBRATOR, CRT, HIGH VOLTAGE AND Z AXIS	
CHANGE:	R1370 to 910 ohm
CHANGE:	C1374 to 0.047 UF
CHANGE:	L1270 to 820 UH
CHANGE:	Circuit number L1292 to C1292



MANUAL CHANGE INFORMATION

PRODUCT SC 504
070-2296-00

CHANGE REFERENCE C2/478
DATE 4-27-78

CHANGE:	DESCRIPTION
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EFF ALL SN

REPLACEABLE ELECTRICAL PARTS LIST CORRECTIONS

Page 7-6

Remove all information associated with circuit numbers C4130 and C4146.

ADD:

C4234 281-0773-00 CAP., FXD, CER DI:0.01UF,10%,100V

Page 7-9

CHANGE TO:

Q1280 151-0301-00 TRANSISTOR:SILICON,PNP

Page 7-14

CHANGE TO:

R2310 311-1225-00 RES., VAR, NONWIR:1K OHM,20%,0.50W

Page 7-15

CHANGE TO:

R2313 315-0681-00 RES., FXD, CMPSN:680 OHM,5%,0.25W

R2411 315-0511-00 RES., FXD, CMPSN:510 OHM,5%,0.25W

SCHEMATIC CHANGES

DIAGRAM 3 VERTICAL AMPLIFIER

CHANGE: R2313 to 680 ohm

CHANGE: R2411 to 510 ohm

CHANGE: R2310 to 1K ohm

DIAGRAM 7 HORIZONTAL PREAMPLIFIER & OUTPUT AMPLIFIER BOARD

REMOVE: C4130, .01 (UF) and symbol

REMOVE: C4146, .01 (UF) and symbol

ADD: C4234, 0.01 (UF) between base of Q4230 and ground.

DIAGRAM 8 CALIBRATOR, CRT, HIGH VOLTAGE, AND Z AXIS

REMOVE: J3490, P3490 and symbols (located near coordinate A6)

ADD: Continuity of +33.5 V lines from PARTIAL A3 TRIGGER BOARD to P1290 (located near coordinate A6).



MANUAL CHANGE INFORMATION

PRODUCT SC 504
070-2296-00

CHANGE REFERENCE C3/1178
 DATE 11-14-78

CHANGE:	DESCRIPTION
---------	-------------

Pilot Changes #12 & #15

TEXT CORRECTIONS

Page 2-3 (Manual) and Page 2 of C1/478 insert

TABLE 2-1

CHANGE the Supplemental Information column of Position effect to read:

Characteristics	Supplemental Information
-----------------	--------------------------

Position effect	Typically 5% or less change in aberrations as a 5 division step is vertically positioned over the graticule area.
-----------------	---

Page 2-4 TABLE 2-2

CHANGE the Supplemental Information column of Input R and C to read:

Characteristics	Supplemental Information
-----------------	--------------------------

Input R and C	1 MΩ ±10% paralleled by approximately 24 pF when selected. 750KΩ ±10% paralleled by approximately 28 pF when not selected.
---------------	--

Page 2-5 TABLE 2-3

CHANGE the Supplemental Information column of Trigger holdoff to read:

Characteristics	Supplemental Information
-----------------	--------------------------

Trigger holdoff	The SECONDS/DIV CAL (variable) control (selected by an internal switch) increases trigger holdoff time by a factor of approximately 20.
-----------------	---

Page 2-10

ADD to the Preliminary Control Settings:

Step 1, control settings

CHANGE to read:

CH 1 VOLTS/DIV	10 m
CH 2 VOLTS/DIV	10 m
TRIGGERING SOURCE	LINE
SECONDS/DIV	1 m

Step 1, part a.

ADD: , to the CH1 bnc connector.

CHANGE:	DESCRIPTION
---------	-------------

Page 2-10
 Step 1, part c.
 CHANGE to read:
 c. Set the generator frequency to 10 MHz.

Page 2-11
 Step 3, part d, item 8
 CHANGE to read:

VOLTS/DIV	Generator Setting	Display	Tolerance
1	5 V	5 div	2.0%

Pilot Change #12 EFF SN B010100

ELECTRICAL PARTS LIST ONLY

CHANGE TO:

R3226	315-0101-00	RES.,FXD,CMPSN:100 OHM,5%,0.25W
R3228	315-0271-00	RES.,FXD,CMPSN:271 OHM,5%,0.25W

Pilot Change #15 EFF SN B010230

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

R1327	315-0122-00	RES.,FXD,CMPSN:1.2K OHM,5%,0.25W
R1355	315-0122-00	RES.,FXD,CMPSN:1.2K OHM,5%,0.25W
R1554	315-0432-00	RES.,FXD,CMPSN:4.3K OHM,5%,0.25W

The above components are located on the MAIN circuit board assembly.
 R1327 and R1355 are shown on diagram 2 CH 2 PREAMP & CHANNEL SWITCHING.
 R1554 is shown on diagram 1 CHANNEL 1 PREAMPLIFIER.

CHANGE	DESCRIPTION
--------	-------------

ELECTRICAL PARTS LIST CORRECTIONS

Page 7-4

REMOVE:

C2125 281-0773-00 CAP.,FXD,CER DI:0.01UF,10%,100V

ADD:

C2132 281-0773-00 CAP.,FXD,CER DI:0.01UF,10%,100V

Page 7-5

REMOVE:

C3322 281-0601-00 CAP.,FXD,CER DI:7.5PF,500V

Page 7-8

REMOVE:

J3188 131-1003-00 CONNECTOR BODY,:CKT CD MT,3 PRONG

J3290 131-1003-00 CONNECTOR BODY,:CKT CD MT,3 PRONG

ADD:

K3385 148-0064-00 RELAY REED:SPST,NO,5V

K3386 148-0064-00 RELAY REED:SPST,NO,5V

Page 7-16

CHANGE TO:

R3250 315-0104-00 RES.,FXD,CMPSN:100K OHM,5%,0.25W

Page 7-18

CHANGE TO:

R3388 315-0241-00 RES.,FXD,CMPSN:240 OHM,5%,0.25W

R3494 315-0241-00 RES.,FXD,CMPSN:240 OHM,5%,0.25W



050-1601-01

M44232, M44233
M51320

V800R OR V1000 REPLACEMENT

For the following TEKTRONIX[®] Oscilloscopes:

SC502 Serial Numbers B010100 - B040670¹
SC504 Serial Numbers B010100 - BXXXXXX¹

Cathode ray tube, pn 154-0859-01, replaces cathode ray tubes, pn 154-0730-05 and pn 154-0859-00, which are no longer available. Use of the new crt requires several circuit changes.

NOTE

If the instrument serial number is greater than those listed above, or this kit has already been installed, disregard these instructions and use pn 154-0859-01 as a direct replacement.

¹ The ending serial number was not available at this printing.

KIT PARTS LIST:

Ckt. Number	Quantity	Part Number	Description
W890 or W1395	1 EA	131-0556-00	BUS, CONDUCTOR, DUMMY RESISTOR
V800 or V1000	1 EA	154-0859-01	ELECTRON TUBE, CRT, P31
	1 EA	---	LABEL, 050-1601-XX

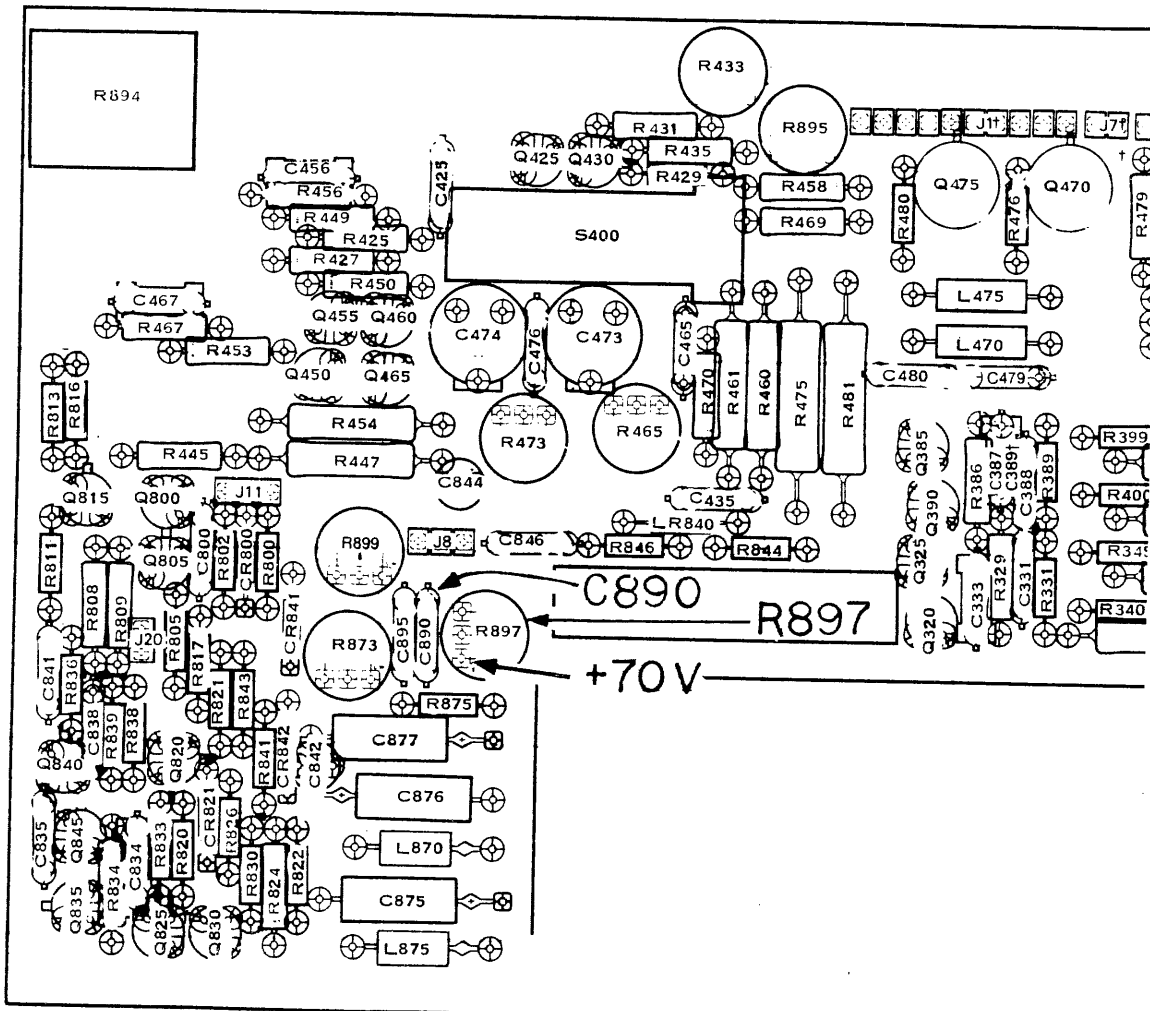


Fig. 1 Partial - F & I circuit board

PART 1 - SC502 ONLY

INSTRUCTIONS:

WARNING

To avoid electric shock hazard, disconnect the instrument from all other electrical equipment and the power source before proceeding.

The following instructions are for use by qualified service personnel only. To avoid personal injury, do not perform any of the following procedure unless you are qualified to do so.

- () 1. Refer to the Maintenance section of your SC502 Instruction Manual and perform the steps necessary to remove the crt.
- () 2. Remove the Geometry adjust potentiometer, R897 (see Fig. 1).
- () 3. Replace C890, a 0.01 μ F capacitor, with the dummy resistor, W890, from the kit.
- () 4. If your instrument has a red-violet wire soldered to the board at the location labeled +70V in Fig. 1, remove the wire from the board, and remove it from the pin in the crt socket to which it connects.
- () 5. Refer to the Maintenance section of your SC502 Instruction Manual and perform the steps necessary to replace the crt.
- () 6. Refer to the Calibration procedure in your Instruction Manual and recalibrate as necessary.
- () 7. For future reference, fasten the manual Modification Insert into your Instruction Manual.
- () 8. Remove the protective backing from the 050-1601-XX label and affix it to a clean area of the top frame section near the serial number tag.

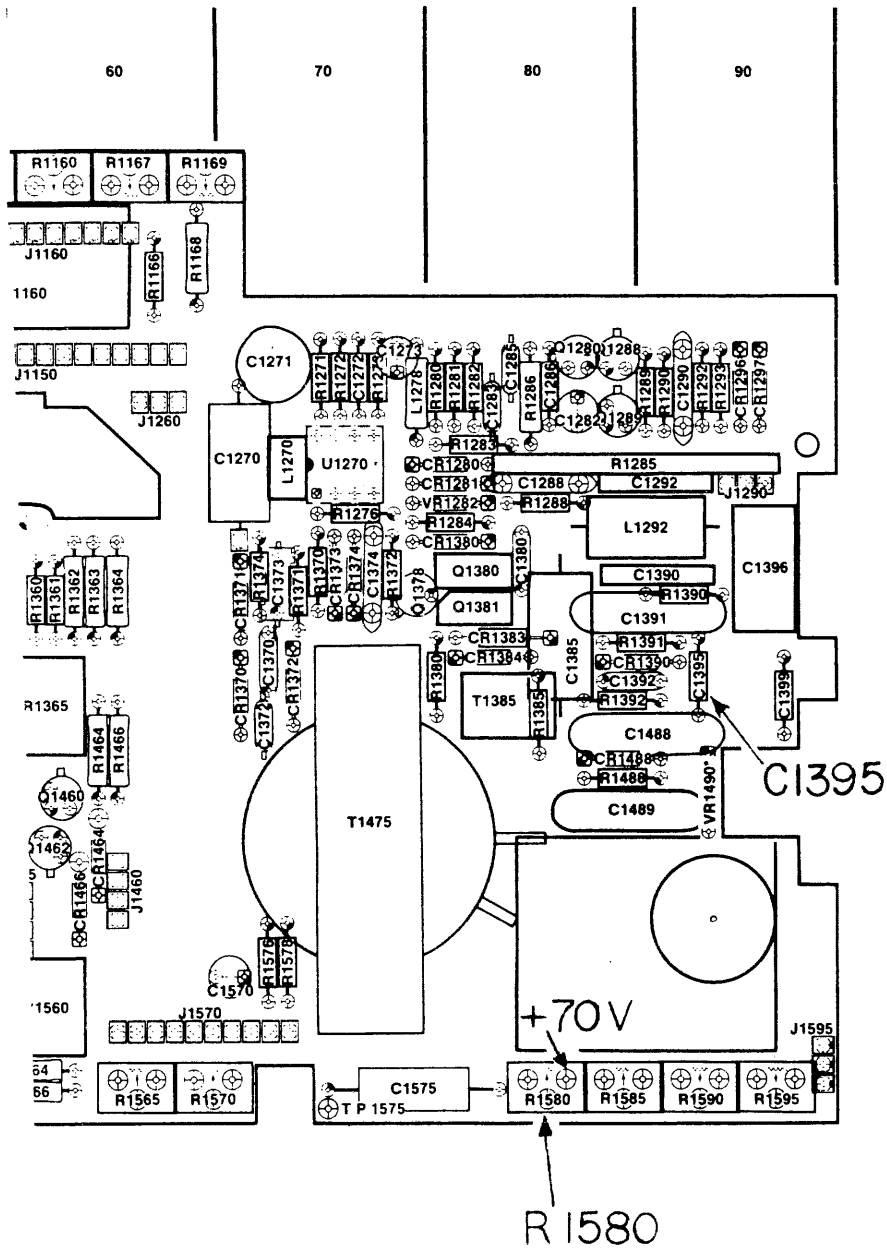


Fig. 2 Partial - Main circuit board

INSTRUCTIONS:

WARNING

To avoid electric shock hazard, disconnect the instrument from all other electrical equipment and the power source before proceeding.

The following instructions are for use by qualified service personnel only. To avoid personal injury, do not perform any of the following procedure unless you are qualified to do so.

- () 1. Refer to the Maintenance and Interfacing Information section of your SC504 Instruction Manual and perform the steps necessary to remove the crt.
- () 2. Remove the HV cover at the bottom rear of the instrument.
- () 3. Remove the Geometry adjust potentiometer, R1580 (refer to Fig. 2).
- () 4. Replace C1395, a 0.01 μ F capacitor, with the dummy resistor, W1395, from the kit.
- () 5. If your instrument has a red-violet wire soldered to the board at the location labeled +70V in Fig. 2, remove the wire from the board, and remove it from the pin in the crt socket to which it connects.
- () 6. Refer to the Maintenance and Interfacing section of your SC504 Instruction Manual and perform the steps necessary to replace the crt.
- () 7. Refer to the Calibration procedure in your Instruction Manual and recalibrate as necessary.
- () 8. For future reference, fasten the manual Modification Insert into your Instruction Manual.
- () 9. Remove the protective backing from the 050-1601-XX label and affix it to a clean area of the top frame section near the serial number tag.

CM: cm

PRODUCT MODIFICATION KIT SUGGESTION/CORRECTION FORM

DATE _____

KIT NUMBER _____ STEP/PAGE _____

FIGURE NUMBER _____ PUBLICATION DATE _____

DISCREPANCY _____

SUGGESTED CORRECTION/COMMENTS _____

SUGGESTED BY: NAME/ORGANIZATION _____
(PLEASE TYPE OR PRINT LEGIBLY)

_____ REPLY REQUESTED

RETURN TO LOCAL FIELD OFFICE/SERVICE CENTER

FIELD OFFICE/SERVICE CENTER/DEL. STA. _____

SERVICE CENTER: RETURN TO FIELD MODS 73-860

REPLY

_____ WILL MAKE CHANGE IMMEDIATELY

_____ WILL MAKE CHANGE AT NEXT PRINTING

_____ OTHER _____

SIGNED _____ DATE _____

TEKTRONIX

MANUAL MODIFICATION INSERT

V800R OR V1000 REPLACEMENT

for

SC502 Serial Numbers B010100 - B040670¹
SC504 Serial Numbers B010100 - BXXXXXX¹

Installed in SN _____ Date _____

This modification insert is provided to supplement the manual for the above listed product(s). The information given in this insert supersedes that given in the manual.

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GENERAL INFORMATION

The Parts Replacement Kit, 050-1601-XX, provided parts and instructions to replace the crt in SC502 or SC504 oscilloscopes. The new crt, pn 154-0859-01, replaced crt's, pn 154-0730-05 and 154-0859-00, which are no longer available. The use of the new crt required a number of circuit changes.

¹ The ending serial number was not available at this printing.

REPLACEABLE ELECTRICAL PARTS

SC502 OSCILLOSCOPE

CKT. NO.	PART NUMBER	DESCRIPTION
A2	670-3760-04	CKT BD ASSY: FOCUS AND INTENSITY
C890	DELETE	
R897	DELETE	
V800	154-0859-01	ELECTRON TUBE: CRT, P31, INTERNAL SCALE
W890	131-0566-00	BUS CONDUCTOR, DUMMY RESISTOR

SC504 OSCILLOSCOPE

CKT. NO.	PART NUMBER	DESCRIPTION
A2	670-5110-02	CKT BD ASSY: FOCUS AND INTENSITY
C1395	DELETE	
R1580	DELETE	
V1000	154-0859-01	ELECTRON TUBE: CRT, P31, INTERNAL SCALE
W1395	131-0566-00	BUS CONDUCTOR, DUMMY RESISTOR