

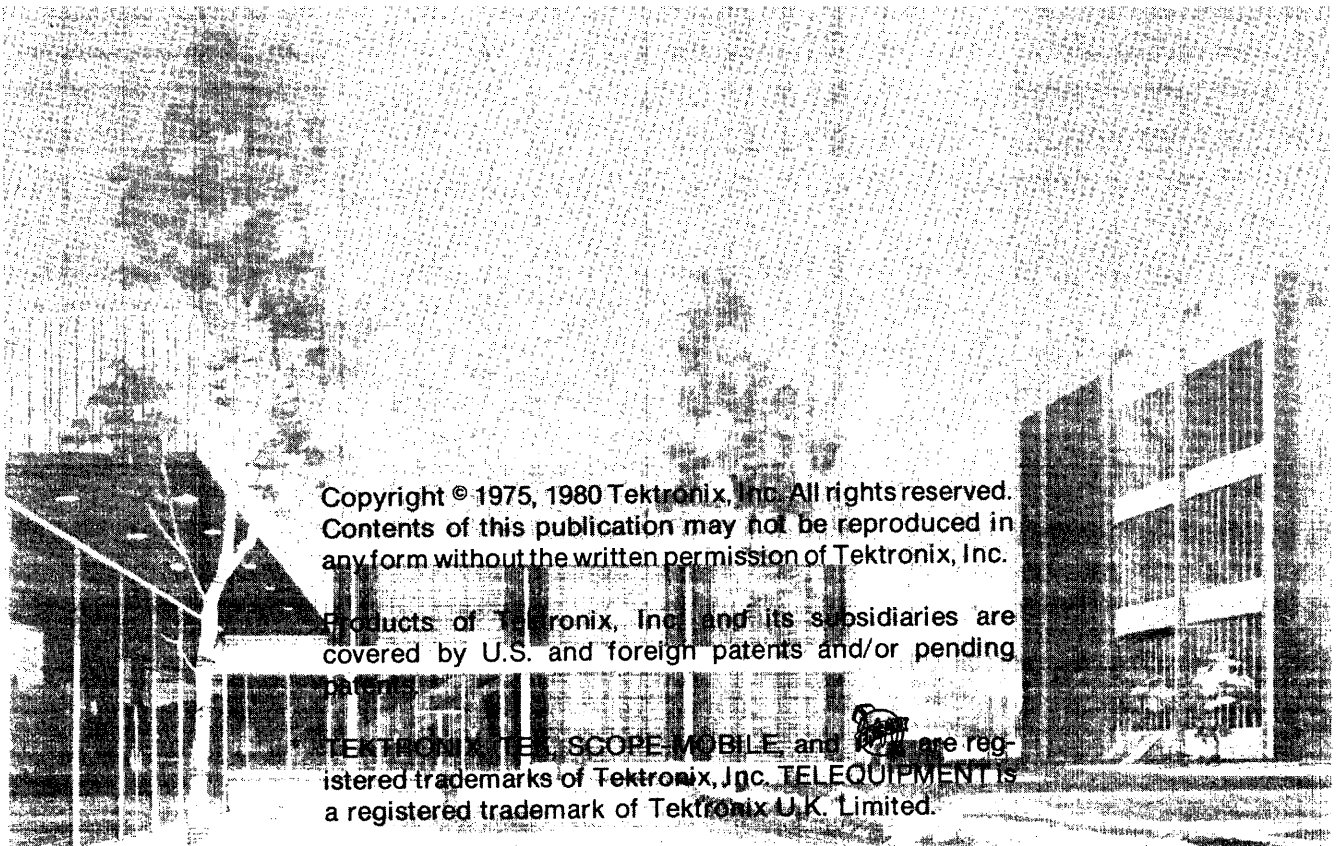


**PG 508  
50 MHz  
PULSE GENERATOR**

INSTRUCTION MANUAL


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

Serial Number \_\_\_\_\_



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**WARNING**

*THE FOLLOWING SERVICE 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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# OPERATORS SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

## Terms In This Manual

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

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

## Terms As Marked on Equipment

**CAUTION** indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

**DANGER** indicates a personal injury hazard immediately accessible as one reads the marking.

## Symbols In This Manual



This symbol indicates where applicable cautionary or other information is to be found.

## Symbols As Marked on Equipment



**DANGER** — High voltage.



Protective ground (earth) terminal.



**ATTENTION** — refer to manual.

## Power Source

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

## Grounding the Product

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A

protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

## Danger Arising From Loss of Ground

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.

## Use the Proper Power Cord

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

For detailed information on power cords and connectors, see maintenance section.

Refer cord and connector changes to qualified service personnel.

## Use the Proper Fuse

To avoid fire hazard, use only the fuse of correct type, voltage rating and current rating as specified in the parts list for your product.

Refer fuse replacement to qualified service personnel.

## Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

## Do Not Remove Covers or Panels

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

## Do Not Operate Without Covers (for TM 500 plug-ins only)

To avoid personal injury, do not operate this product without covers or panels installed. Do not apply power to the plug-in via a plug-in extender.

# **SERVICE SAFETY SUMMARY**

## **FOR QUALIFIED SERVICE PERSONNEL ONLY**

*Refer also to the preceding Operators Safety Summary.*

### **Do Not Service Alone**

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

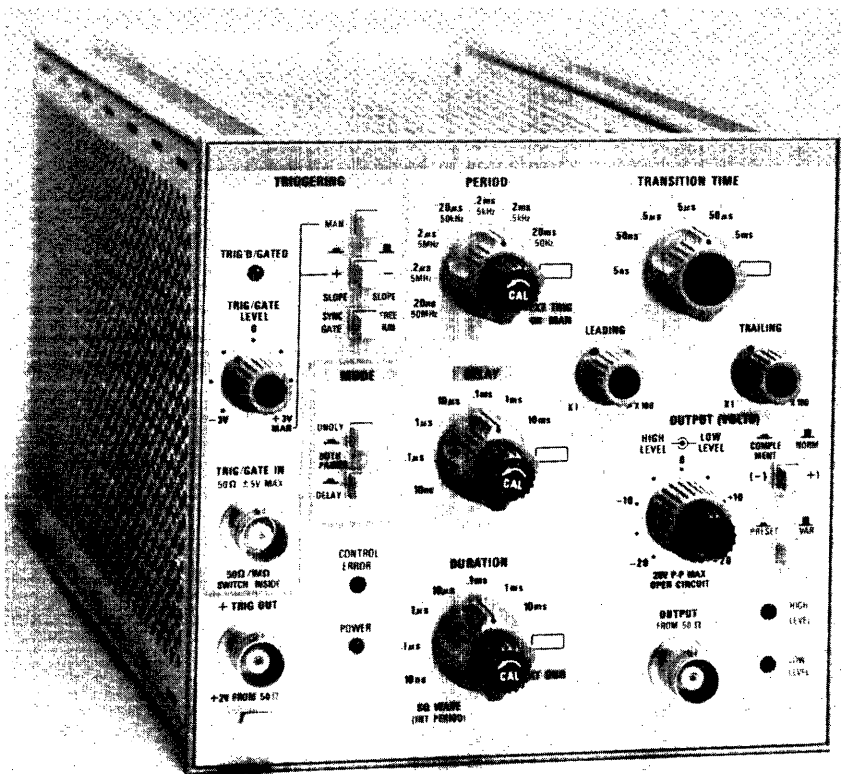
### **Use Care When Servicing With Power On**

Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

### **Power Source**

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.



2044-01

PG 508 50 MHz Pulse Generator.



# SPECIFICATIONS

## INSTRUMENT DESCRIPTION

The PG 508 is a 50 MHz general purpose pulse generator usable in all TM 500 series power modules except the TM 501. Major capabilities of the instrument include independent period, delay and duration controls. The instrument also features leading and trailing transition time controls as well as independent pulse top and bottom level controls. Custom positions on the period, duration, delay and transition controls allow customer determination of parameters for these control ranges.

A control error light indicates improper control settings such as excessive duration, delay, or transition times.

Front panel controls and connectors provide an external trigger and duration or synchronous gate input with level and slope selection. Also provided are manual trigger

or gate capabilities, delayed or paired pulse capability, square wave output, pulse complement, and preset output levels.

All outputs are internally terminated in 50  $\Omega$ . The trigger-gate input impedance is internally selectable for either 50  $\Omega$  or 1 M $\Omega$  paralleled by approximately 20 pF.

## Performance Conditions

The electrical characteristics are valid only if the PG 508 is calibrated at an ambient temperature between +20°C and +30°C and operated between 0°C and +50°C. Specifications apply only with 50  $\Omega$  output load impedances unless stated otherwise.

**Table 1-1**  
**ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirements	Supplemental Information
PERIOD Range	$\leq 20$ ns to $\geq 200$ ms in seven decade steps plus variable, with overlap on all ranges.	Periods longer than 200 ms can be obtained in custom tsmhr position.
Jitter	$\leq 0.1\% + 50$ ps.	
DELAY (Time between leading transitions in the paired pulse mode). Range	$\leq 10$ ns to $\geq 100$ ms in seven decade steps plus variable, with overlap on all ranges.	Delays longer than 100 ms can be obtained in custom range position.
Duty Factor		Delays to at least 70% of pulse periods for periods of 0.2 $\mu$ s or greater, decreasing to at least 50% for a 20 ns period.
Jitter	$\leq 0.1\% + 50$ ps.	

Table 1-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
<p>DURATION Range</p>	<p>≤10 ns to ≥100 ms in seven decade steps plus variable, with overlap on all ranges. An additional position provides durations of approximately 50% of the period setting for square wave output when using the internal period generator.</p>	<p>Durations longer than 100 ms can be obtained in custom range position.</p>
<p>Duty Factor</p>		<p>Pulse durations to at least 70% of pulse periods for periods of ≥0.2 μs, decreasing to at least 50% for a 20 ns period.</p>
<p>Jitter</p>		<p>≤0.1% + 50 ps.</p>
<p>PULSE OUTPUT Transition Times</p>	<p>Independently adjustable leading and trailing transition times from ≤5 ns typical (≤7 ns at some offset and amplitude levels) to ≥50 ms, measured from the 10% point to the 90% point in six decade steps plus variable. Variable controls with 100:1 range (50:1 on 5 ns) provide overlap on all ranges.</p>	<p>Transition times longer than 50 ms are obtainable in the custom range position.</p>
<p>Transition Linearity</p>	<p>Deviation from straight line ≤ 5% between the 10% and the 90% point for transition times greater than 10 ns.</p>	
<p>Amplitude</p>	<p>Pulse high and low levels independently adjustable over a ±20 V range. Maximum pulse amplitude into a 50 Ω load is ≥10 V peak-to-peak; minimum is ≤0.5 V peak-to-peak. Maximum pulse amplitude into an open circuit is ≥20 V peak-to-peak; minimum is ≤1.0 V peak-to-peak.</p>	<p>From a 50 Ω low reactance source. The present level controls are adjustable over the same ranges.</p>
<p>Aberrations</p>	<p>≤5%, +50 mV into a 50 Ω load for pulse levels between ±5 V. May increase to ≤10%, +50 mV for pulse levels outside this range.</p>	
<p>TRIGGER OUTPUT Amplitude</p>	<p>≥ +2 V from 50 Ω.</p>	
<p>Source Impedance</p>		<p>50 Ω.</p>
<p>Duty Cycle Internal Triggering</p>		<p>≈50%.</p>
<p>External Triggering</p>		<p>Determined by duty cycle of triggering signal.</p>

Table 1-1 (cont)

Characteristics	Performance Requirement	Supplemental Information
TRIGGER/GATE INPUT Sensitivity	80 mV peak-to-peak to $\leq 10$ MHz; 250 mV peak-to-peak to 50 MHz at 50 $\Omega$ input impedance.	
Input Impedance		Internally selected, 50 $\Omega$ or 1 M $\Omega$ paralleled by $\approx 20$ pF.
Maximum Input		$\pm 5$ V peak into 50 $\Omega$ , $\pm 20$ V peak into 1 M $\Omega$ .
Minimum Input Pulse Width		10 ns.
Trigger Level Polarity	Front Panel selectable, + or - slope.	
Range	$\pm 3$ V.	
TRIG'D GATED Light Flashing		Input triggered at greater than approximately a 10 Hz repetition rate or following the input signal at slower repetition rates.
On (Logic True)		TRIG/GATE IN input potential above TRIG/GATE LEVEL setting with + SLOPE selected or below TRIG/GATE LEVEL setting with - SLOPE selected.
Off (Logic False)		TRIG/GATE IN input potential below TRIG/GATE LEVEL with + SLOPE selected or above TRIG/GATE LEVEL with - SLOPE selected.
Synchronous Gate	Rate generator starts synchronously with external gating signal and completes the last output pulse.	
PULSE DELAY MODES	Undelayed, delayed and paired.	Paired pulse mode limited to 25 MHz. Minimum pulse separation governed by duration duty factor specification.
FIXED DELAYS Trigger Out to Pulse Out		$\approx 23$ ns in EXT DUR and SQ WAVE mode. 35 ns in internal DURATION.
Gate Input to Trigger Out		$\approx 25$ ns.
CONTROL ERROR LIGHT Steady On		Indicates invalid operating mode, output is undefined.

Table 1-1 (cont)

Characteristic	Performance Requirement	Supplemental Information
Flashing		Timing control settings selected do not properly define the output pulse because valid limits have been exceeded.
Steady Off		Indicates valid operation for most control settings.

Table 1-2

ENVIRONMENTAL CHARACTERISTICS<sup>a</sup>

Characteristics	Description	
Temperature	Meets MIL-T-28800B, class 5.	
Operating	0°C to +50°C	
Non-operating	-55°C to +75°C	
Humidity	95% RH, 0°C to 30°C 75% RH, to 40°C 45% RH, to 50°C	Exceeds MIL-T-28800B, class 5.
Altitude	Exceeds MIL-T-28800B, class 5.	
Operating	4.6 Km (15,000 ft)	
Non-operating	15 Km (50,000 ft)	
Vibration	0.38 mm (0.015") peak to peak, 5 Hz to 55 Hz, 75 minutes.	Exceeds MIL-T-28800, B class 5, when installed in qualified power modules. <sup>b</sup>
Shock	30 g's (1/2 sine) 11 ms duration, 3 shocks in each direction along a major axes, 18 total shocks.	Meets MIL-T-28800B, class 5, when installed in qualified power modules. <sup>b</sup>
Bench Handling <sup>c</sup>	12 drops from 45°, 4" or equilibrium, whichever occurs first.	Meets MIL-T-28800B, class 5.
Transportation <sup>c</sup>	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2.	
EMC	Within limits of MIL-461A, and F.C.C. Regulations, Part 15, Subpart J, Class A.	
Electrical Discharge	20 kV maximum charge applied to instrument case.	

<sup>a</sup> With power module.

<sup>b</sup> Refer to TM 500 power module specifications.

<sup>c</sup> Without power module.

**Table 1-3**

**PHYSICAL CHARACTERISTICS**

POWER REQUIREMENTS:	Nominal:	40 Watts
	Maximum:	45 Watts
POWER DISSIPATION:	Nominal:	25 Watts
	Maximum:	28 Watts
WEIGHT:	3.5 lbs.	
DIMENSIONS:	Width 5 1/4", height 5", and length 11.5" (13.3 cm x 12.7 cm x 29.2 cm)	

# OPERATING INSTRUCTIONS

## Instrument Description

The PG 508 is a 50 MHz general purpose pulse generator usable in all TM 500-series power modules except the TM 501. It is compatible with MOS and other general purpose circuitry. Important features of the instrument include independent period and duration controls with a control error light, independent pulse top and bottom level controls, variable leading and trailing transition time adjustments, and fully adjustable pulse delay capabilities. Front panel controls and connectors provide a trigger or synchronous gate input with level and slope controls, square wave output, and complementary pulse output for high duty factors. Delayed and paired pulse and manual trigger or gate capabilities are also provided. All inputs and outputs are internally terminated in 50  $\Omega$  except the TRIG/GATE input which is internally selectable for either 50  $\Omega$  or 1 M $\Omega$ , 20 pF input impedance. Special positions on PERIOD, DURATION, DELAY, and TRANSITION controls permit customized control ranges.

The front panel is color coded for easy reference to controls and their associated functions. Green indicates triggering functions and blue indicates mode functions.

## Installation and Removal

The PG 508 is calibrated and ready for use when received. It operates in any two compartments of the TM 500-series power modules. See the power module instruction manual for line voltage requirements and power module operation.

Figure 2-1 shows the installation and removal procedure. Make certain the power module is **off** when inserting or removing the PG 508. Check that the PG 508 is fully inserted in the power module. Pull the power switch on the power module. The POWER light on the PG 508 should now be on. Refer to Fig. 2-2 for a description of the front panel controls and connectors.

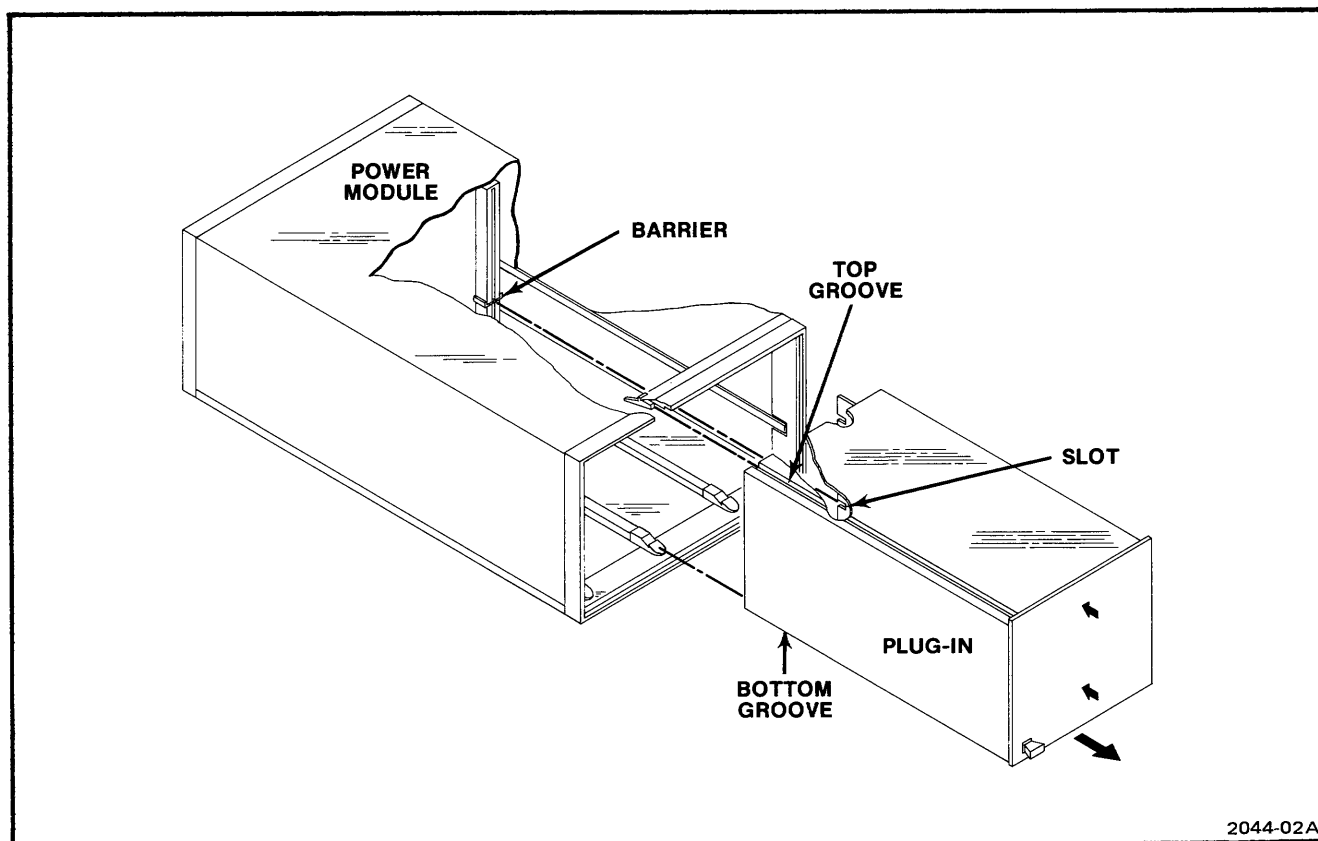


Fig. 2-1. PG 508 installation and removal.

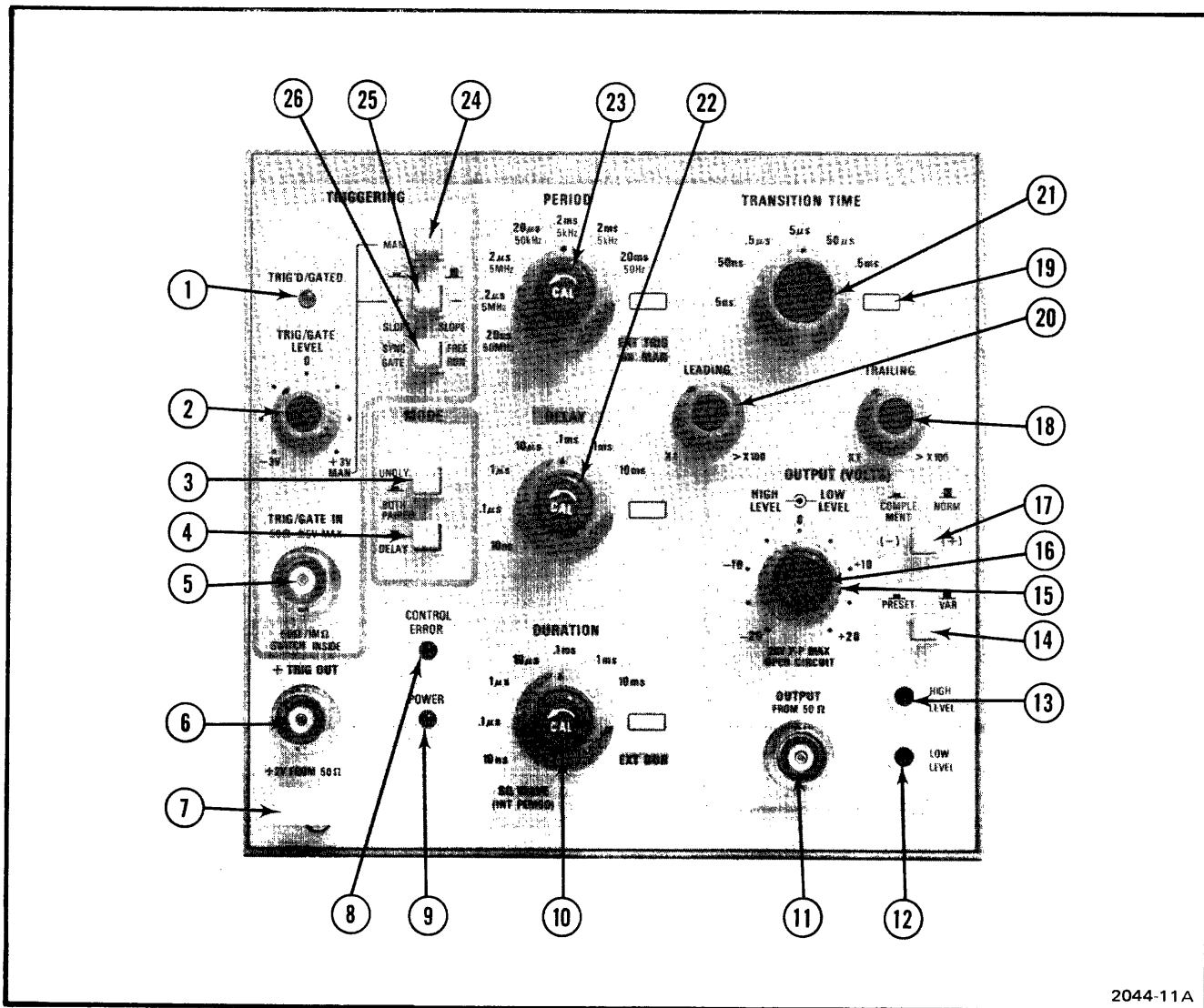


Fig. 2-2. Controls and connectors.

## CONTROLS AND CONNECTORS

- ① **TRIG'D/GATED.** Indicates when functioning in triggered or gated mode.
- ② **TRIG/GATE LEVEL.** Selects starting level on trigger or gate waveform. Turn fully cw for manual trigger.
- ③ **UNDLY.** Push with DLY button for paired pulses.
- ④ **DELAY.** Push to actuate delay circuitry for delayed or paired pulses.
- ⑤ **TRIG/GATE IN.** Input connector for trigger or gating signals.
- ⑥ **+ TRIG OUT.** Supplies positive-going waveform from the period generator for control of external circuitry.
- ⑦ **LATCH.** Pull to remove plug-in.
- ⑧ **CONTROL ERROR.** Indicates improper control settings.
- ⑨ **POWER.** Indicates when power is applied.
- ⑩ **DURATION.** Selects pulse duration time.
- ⑪ **OUTPUT.** Pulse output bnc connector.

- ⑫ **LOW LEVEL.** Control for preset low level.
- ⑬ **HIGH LEVEL.** Control for preset high level.
- ⑭ Button out selects OUTPUT HIGH and LOW LEVEL controls for output amplitude; button in selects preset LEVEL controls.
- ⑮ **OUTPUT (VOLTS) LOW LEVEL.** Controls the pulse low level.
- ⑯ **OUTPUT (VOLTS) HIGH LEVEL.** Controls the pulse high level.
- ⑰ Button out selects normal pulse, button in complement pulse.
- ⑱ **TRAILING.** Varies the trailing transition time from X1 to >X100.
- ⑲ **CUSTOM TIMING POSITION.**
- ⑳ **LEADING.** Varies the leading transition time from X1 to >X100.
- ㉑ **TRANSITION TIME.** Selects transition times measured from the 10% to the 90% points.
- ㉒ **DELAY.** Selects delay time.
- ㉓ **PERIOD.** Selects pulse period time.
- ㉔ **MAN.** Push for manual trigger or gate.
- ㉕ Push for trigger or gate start on + slope; out for - slope start.
- ㉖ Button in for gated operation, out for free run.

## BASIC OPERATION

### Period and Duration Selection

The period generator operates, in all modes except EXT TRIG or MAN, at a rate set by the PERIOD range switch and variable control. The duration of the output pulse is

set by the DURATION range switch and variable control. When the DURATION control is set for a time greater than the PERIOD, the CONTROL ERROR lamp will light. When the DURATION control is set to the SQ WAVE position, the duration time is determined internally at approximately 50% of the period time.

The custom range positions on the PERIOD and DURATION controls permit user-selected period and duration times. To determine the approximate capacitor value for the desired period, multiply the period time in seconds by  $5 \times 10^{-3}$ . The result is the value of the capacitor in Farads. For example, a 50 ms period times  $5 \times 10^{-3}$  equals  $250 \times 10^{-6}$  or 250  $\mu$ F. This capacitor must be nonpolarized and have at least a 6 V rating. Solder this capacitor in the position shown in Fig. 2-3.

To determine the capacitor value for the duration time desired, multiply the duration time by  $1 \times 10^{-2}$ . For example a 50 ms duration time requires 50 ms times  $1 \times 10^{-2}$  or a 500  $\mu$ F capacitor. If a polarized capacitor is used, observe the correct polarity. Use at least a 6 V rated capacitor. Connect this capacitor as shown in Fig. 2-3.

### Duty Factors

Duty factors greater than those specified are obtainable on several ranges. When the duty factor is increased to the point that internal circuitry prevents completion of the pulse waveform, the CONTROL ERROR light will flash. To further increase the duty factor, switch to the complement mode. Set the DURATION control for a pulse width equal to the desired pulse off time and push the front panel COMPLEMENT (-) pushbutton.

### Delayed and Paired Pulse Selection

In the pulse delay mode, the output pulse is delayed from the + TRIG OUT signal by the DELAY time selected plus a specified fixed delay. In the PAIRED mode of operation, the delay controls the time between the leading edges of the paired pulses. To use this feature push the DELAY button and trigger the external device from the + TRIG OUT jack. Set the DELAY control for the desired delay time from trigger to pulse leading edge. Use the variable control labeled CAL for time adjustments between steps or to increase the delay times beyond the steps.

Paired pulses are obtained by pushing both the DELAY and UNDLY buttons. An initial pulse now occurs at external trigger time with the second or paired pulse delayed by the selected delay time. The CONTROL ERROR light illuminates if the delay is too short or long for a valid pulse train. A custom delay position is provided on the DELAY switch. To determine the value of the capacitor required, multiply the desired delay time in seconds by  $1 \times$



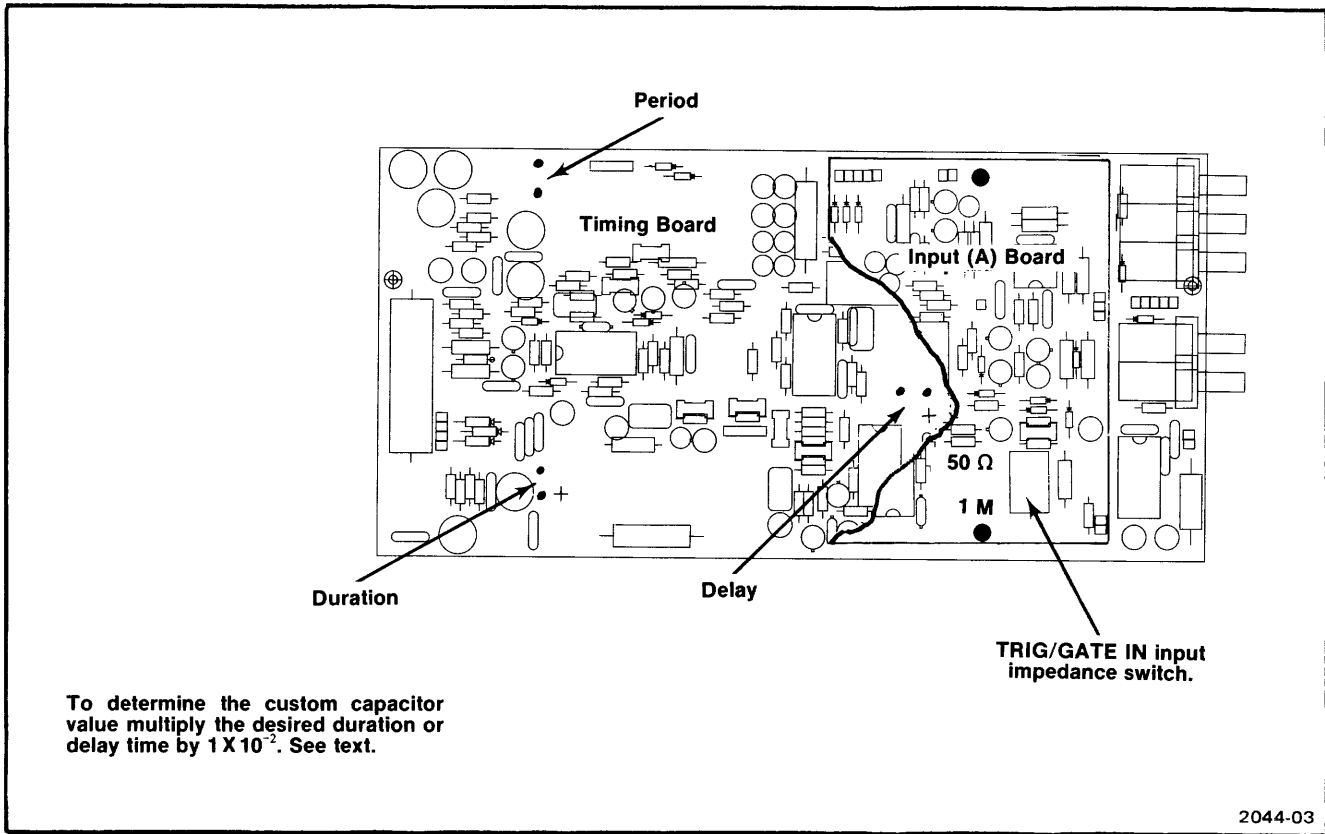


Fig. 2-3. Locations of custom timing capacitors and TRIG/GATE IN impedance switch.

$10^{-2}$ . For example, a 50 ms delay time requires a 500  $\mu\text{F}$  capacitor (50 ms times  $1 \times 10^{-2}$ ). Use either a polarized or non-polarized capacitor with a rating of at least 6 V. If a polarized capacitor is used, observe the polarity markings. Remove the input board and connect the capacitor as shown in Fig. 2-3.

### Transition Time Selection

The leading and trailing times of the pulses may be varied by using the TRANSITION TIME control and the LEADING and TRAILING variable controls. Select the desired transition time range with the TRANSITION TIME control and vary the leading and trailing times independently with the LEADING and TRAILING controls.

A custom range position is also provided on the TRANSITION TIME control. To select the correct capacitor (in Farads) for this range, multiply the desired transition time (in seconds) measured from 10% to 90% points, by  $4.4 \times 10^{-3}$ . For example, a desired transition time of 50 ms requires a capacitor of 220  $\mu\text{F}$ . Connect the capacitor as shown in Fig. 2-4. Use a capacitor with at least a 10 V rating and observe polarity requirements.

When the transition times become large compared with the duration or period times and the pulse does not reach

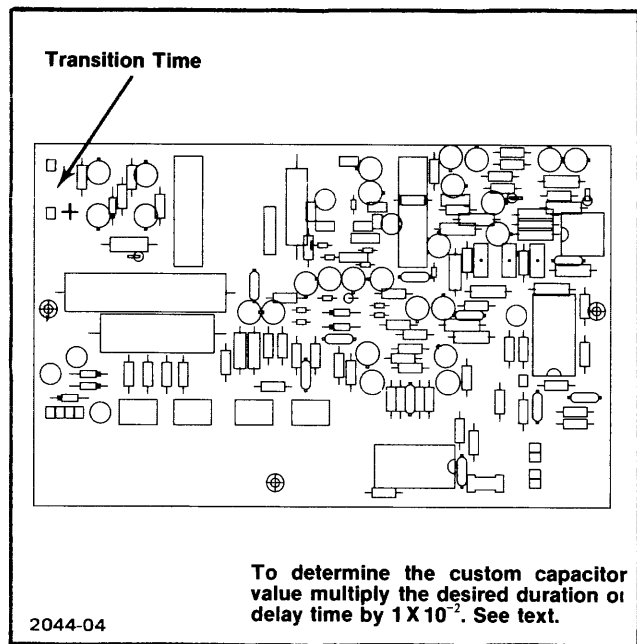


Fig. 2-4. Location for custom transition timing capacitor.

full amplitude, the CONTROL ERROR light will flash indicating improper control settings.

## Output Levels

The output amplitude and offset are selected by independent pulse LOW LEVEL and HIGH LEVEL controls. Use the front panel voltage calibration marks for an open circuit load and divide the values by two when the PG 508 is operating into a 50  $\Omega$  load. The OUTPUT (VOLTS) controls are interlocked to prevent setting the HIGH LEVEL more negative than the LOW LEVEL. It is also impossible to set the controls for more than about 20 V peak to peak output amplitude into an open circuit or 10 V into 50  $\Omega$ .

Pulse amplitude always equals the pulse high level minus the pulse low level. Offset may be the high level or the low level, whichever is used as the base line reference level. The flexibility of this method is useful in certain applications such as logic testing. Either the high or low level can be varied without disturbing the other.

The pulse high and low levels can be preset. Push the PRESET button and adjust the HIGH LEVEL and the LOW LEVEL potentiometers with a screwdriver for the desired output levels.

## External Triggering and Gating

To change the TRIG/GATE IN input impedance remove the plug-in from the mainframe. Remove the left side cover. Set the slide switch, located on the Input board and labeled Input Impedance, to either the 50  $\Omega$  or the 1 M $\Omega$  position. In the 1 M $\Omega$  position the shunt capacitance is approximately 20 pF. A standard oscilloscope probe can be used to acquire the triggering signal from the external circuitry. If a compensated probe is used, calibrate the probe on the input of a 1 M $\Omega$  20 pF oscilloscope first. A 10X probe allows triggering directly from high impedance sources such as MOS digital circuitry with an effective TRIG/GATE LEVEL range of  $\pm 30$  V.

For external gating select the desired period and duration. Press the SYNC GATE pushbutton. Select the desired trigger slope with the + or – SLOPE button. The OUTPUT now consists of pulses, described by the front panel controls, whenever the TRIG/GATE IN input exceeds the TRIG/GATE LEVEL control setting.

To externally trigger the PG 508, connect the triggering signal to the TRIG/GATE IN connector. Select the slope on which triggering is desired with the + or – SLOPE button. Place the PERIOD switch in the EXT TRIG OR MAN position. Now adjust the TRIG/GATE LEVEL control for the desired triggering level. The output waveform begins about 23 ns after the triggering signal.

For external DURATION place the DURATION control in the EXT DUR position, and the PERIOD control in the

EXT TRIG OR MAN position. The period and duration of the output waveform are now controlled by the triggering waveform. This is an extremely useful mode of operation for translating logic levels, etc. If the PERIOD is set for internal operation and the DURATION for external, the CONTROL ERROR light illuminates indicating an illegal mode of operation.

The TRIG'D/GATED indicator light functions as a TRIG/GATE level indicator. When the + SLOPE is selected and the external input level exceeds the threshold set by the TRIG/GATE LEVEL control, the light is on continuously. For input voltages below the threshold the light is continuously off. When the input transits through the threshold the light flashes. When the – SLOPE is selected the light behaves as for + SLOPE selection. However, the polarities are reversed.

The TRIG'D/GATED indicator light may be used as a logic level indicator for troubleshooting logic circuitry. Set the TRIG/GATE LEVEL control to a voltage equal to the midrange value of the logic voltage swing. If an attenuator probe is used for signal pickup, remember to consider the attenuation factor when setting the TRIG/GATE LEVEL voltage.

## Trigger Output

The signal appearing at the connector is an approximate square wave. The leading edge (positive-going) precedes the output pulse by a specified fixed delay plus the delay as set by the DELAY control. In paired pulse operation, the leading edge precedes the first pulse by the fixed delay. The second pulse then appears after the set delay. A complement square wave (negative-going leading edge) is also available at the front panel by moving a connector on the timing circuit board. See the illustration on the Rear Interface Connector Assignments in Section 5 of this manual for the location of this connector.

## Manual Trigger

To use this feature place the PERIOD switch in the EXT TRIG OR MAN position. Set the TRIG/GATE LEVEL control fully clockwise. If the + SLOPE is selected, the manual trigger will occur when the MAN button is depressed. If the – SLOPE is selected, the trigger occurs when the button is released. The manual trigger causes one output pulse, or a set of paired pulses if the DELAY and UNDLY buttons are depressed.

## Control Error Light

The CONTROL ERROR light helps to solve setup problems by indicating most control errors. A steady glow indicates static control setting errors while a flashing light indicates dynamic errors. In either case, the control settings do not correctly indicate the output. Check the control settings for compatibility. See Table 2-1. Dynamic functions monitored are period, delay, duration and transition time.

# OPERATING CONSIDERATIONS

## Output Terminations and Connections

The PG 508 operates as a voltage source in series with an internal 50 Ω impedance. Maximum pulse fidelity is obtained when the output operates into an external 50 Ω impedance. The output circuitry of the PG 508 is fully protected against any voltage transients when operating into passive loads.

Table 2-1 lists static control settings that illuminate the CONTROL ERROR light and their corresponding operating modes. Some of these modes may be useful.

If the load has a dc voltage across it, connect a blocking capacitor in series with the OUTPUT connector and the load. Make certain the time constant of the capacitor and load is large enough to maintain pulse top flatness.

**Table 2-1**

### CONTROL ERROR CONDITIONS

Control Settings	Operation
EXT TRIG OR MAN and SYNC GATE	External Trigger Mode
EXT DUR and internal Period	Square Wave Mode
EXT TRIG OR MAN and SQ WAVE (INT PERIOD)	External Duration Mode
SQ WAVE (INT PERIOD) and SYNC GATE	Truncated square wave when gate ends
SQ WAVE (INT PERIOD) and DELAY	No delay
EXT DUR and DELAY	No delay

## Risetime Measurements in Linear Systems

Consider the rise and falltime of associated equipment when measuring the rise or falltime of a linear device. If the risetime of the device under test is at least ten times slower than the combined risetimes of the PG 508, the monitoring oscilloscope, and associated cables, the error introduced will not exceed 1%, and usually may be ignored. If the rise or falltime of the test device is less than ten times slower than the combined risetimes of the testing systems, determine the actual risetime of the device under test by using the following formula:

$$R_t = R_1^2 + R_2^2 + R_3^2 + \dots$$

$R_t$  equals the overall rise or falltime of the entire measurement system and  $R_1$ ,  $R_2$ ,  $R_3$ , etc. are the risetimes or falltimes of the individual components in the system.

## External Voltage Control

The high and low level output voltages can be controlled externally through pins 22B and A at the rear interface connector. Figure 2-5 shows the equivalent circuit.

Connections must be made from pad K to pad L and pad M to pad N located as shown on the adjustment location illustration in the fold out pages at the rear of this manual. Use ordinary hookup wire of the proper length. Solder the wire to the pads. Also note the location of the Ext Hi and Ext Lo potentiometers on the output board.

To use this feature, set the front panel controls as follows: depress the PRESET button (PRESET), place the PERIOD switch in the EXT TRIG OR MAN position, the DURATION in EXT DUR and the NORM/COMPLEMENT switch in the NORM position (out). Use a screwdriver to center the Ext Hi and the preset HIGH LEVEL controls. Supply a voltage to the external high input (pin 22B on the rear interface connector) equal to the lowest external input voltage desired (maximum 20 V).

Now adjust the front panel preset HIGH LEVEL control for an OUTPUT voltage equal to the minimum desired output voltage. It may be necessary to adjust the preset LOW LEVEL control as the OUTPUT voltage is limited to 20 V peak to peak open circuit. The high level OUTPUT voltage is clamped by the low level OUTPUT voltage if this range is exceeded. Now apply a voltage equal to the highest external control voltage desired to the same rear interface connector (pin 22B). Adjust the Ext Hi potentiometer until the highest desired output voltage is obtained. It may be necessary to adjust the preset LOW LEVEL control to obtain the desired output. The high level OUTPUT voltage cannot go below the low level OUTPUT voltage due to the level control voltage clamps. The Ext Hi and the preset HIGH LEVEL controls interact. It may be necessary to repeat the above procedure several times until the desired results are obtained.

Now push the NORM COMPLEMENT switch (COMPLEMENT). Center the Ext Lo and preset LOW LEVEL potentiometers. Supply a voltage to pin 22A of the rear interface connector equal to the lowest external control voltage desired. Adjust the preset LOW LEVEL

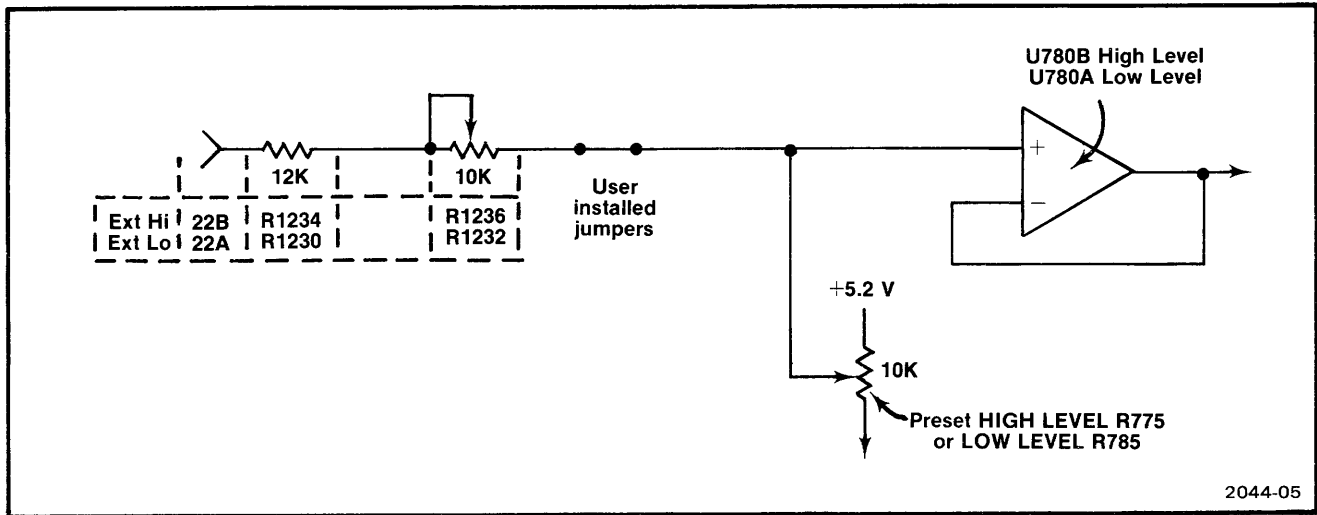


Fig. 2-5. Equivalent external input circuit for output voltage control.

control for an OUTPUT voltage equal to the lowest OUTPUT voltage desired. Change this voltage to the highest desired external control voltage. Adjust the Ext Lo potentiometer for the highest OUTPUT voltage desired. As these adjustments interact, readjust the preset LOW LEVEL and the Ext Lo potentiometers for the desired results. Do not readjust the preset HIGH LEVEL or the Ext Hi potentiometers. The OUTPUT voltages now vary linearly and independently with the external control voltage.

**Counted Burst Using the DD 501 Digital Delay Unit**

This application permits preselecting the number of output pulses from the PG 508. The event is initiated by  $\geq 5$  ns externally applied signal or pulse. The time duration of this signal or pulse has no effect on the output from the PG 508.

To use this feature, place the DD 501 in the delay interval mode of operation by moving the wire strap as shown in Fig. 2-6 or changing connections, depending on the DD 501 available. Connect the PG 508 and the DD 501 as shown in Fig. 2-7. Use ten inch (Tektronix Part Number 012-0208-00) or shorter cables for interconnecting the two units to reduce delays.

Make certain the PG 508 TRIG/GATE IN input impedance is set for 50  $\Omega$ . (See External Triggering and Gating discussion and Fig. 2-3.) Set the controls of the PG 508 for the desired output waveform with the PG 508 in FREE RUN. Do not use the SQ WAVE mode. Place the PG 508 in the + SLOPE, SYNC GATE mode and set the TRIG/GATE LEVEL control at the 2 o'clock position. Select EVENTS + SLOPE, START + SLOPE and place the EVENTS and START LEVEL controls at the 2 o'clock position on the DD 501. The three TRIG'D lights on the DD 501 and the TRIG'D/GATED light on the PG 508 will

be off until the DD 501 is triggered. Upon receipt of a trigger, all lights will illuminate. If not, check the setup and slightly adjust the LEVEL controls as necessary.

Set the EVENTS DELAY COUNT on the DD 501 for one less than the desired number of counts up to PG 508 repetition rates of about 20 MHz. See below for further information. If necessary, a single trigger may be obtained by rotating the DD 501 START LEVEL control through the 0 position, with no external trigger applied. A single trigger may also be obtained by using the TEKTRONIX manual (One Shot) Trigger Generator, Tektronix Part Number 016-0597-00. All other DD 501 and PG 508 operating controls function normally.

For counted burst operation above 20 MHz, a few extra pulses (above the selected number N) will be generated because of propagation delays in this system. This number will be stable at a given frequency and the desired count may be set by setting the DD 501 accordingly. Use a digital counter or oscilloscope to verify actual count as the DD 501 is stepped through the settings 00000 to 00009. The results will indicate how many extra pulses are being generated. Adjust the DD 501 settings for the desired number of output pulses.

**Definitions of Pulse Characteristics**

The following is a glossary of common pulse characteristics used in this manual. They are illustrated in Fig. 2-9.

**Amplitude.** The maximum absolute peak value of a pulse measured from the baseline regardless of sign, and excluding unwanted aberrations or overshoot. Measurement points are at 50% of the pulse duration time (pulse high level) and on the baseline (pulse low level) at 50% of the off time (the pulse period minus the pulse duration).

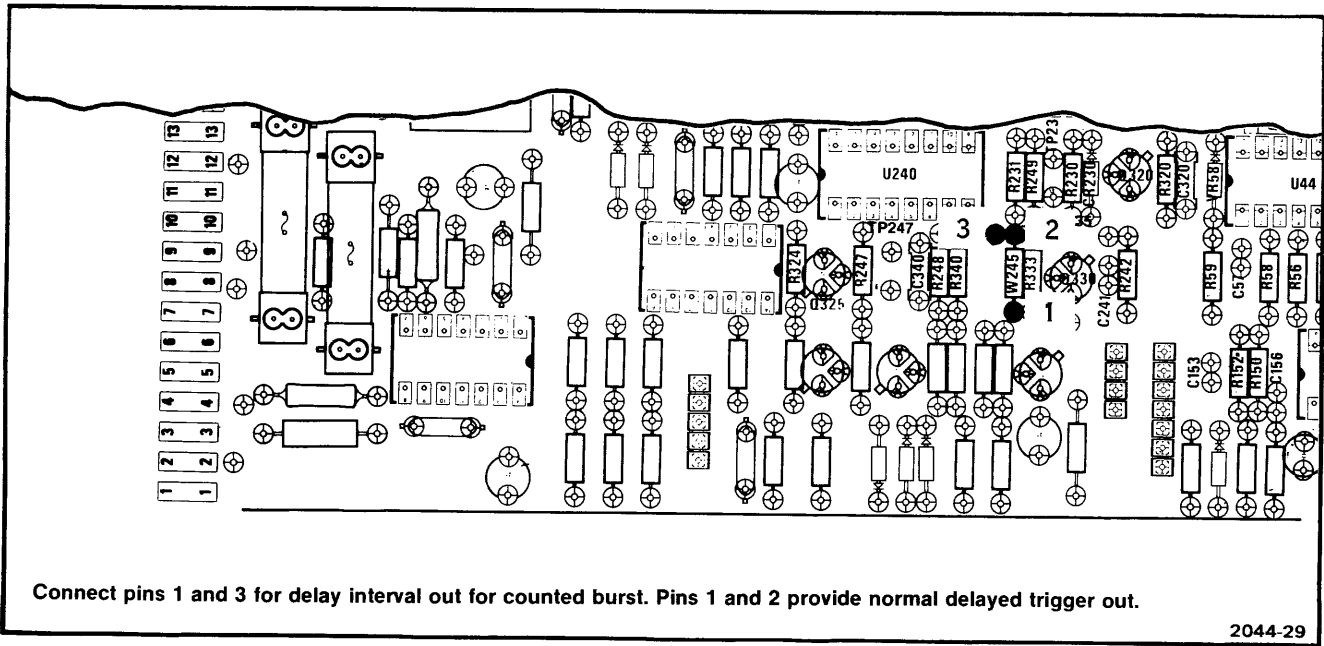


Fig. 2-6. Location of trigger Jumpers in DD 501 for selecting trigger or delay interval output.

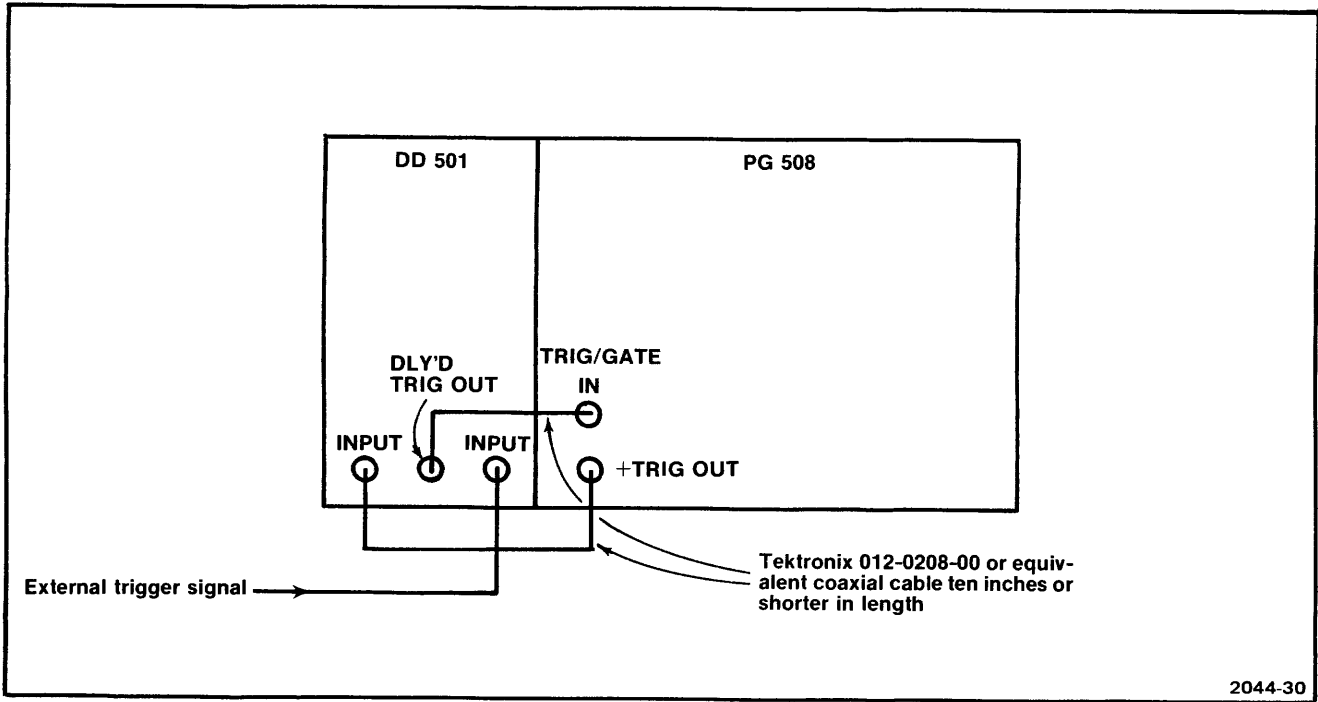


Fig. 2-7. PG 508/DD 501 interconnections for counted burst operation.

**Aberrations.** Unwanted deviations or excursions in the pulse shape from an ideal square corner and flat top, i.e., overshoot, undershoot or rounding, ringing, and tilt or slope.

**Baseline.** The quiescent dc voltage reference level of the pulse waveform.

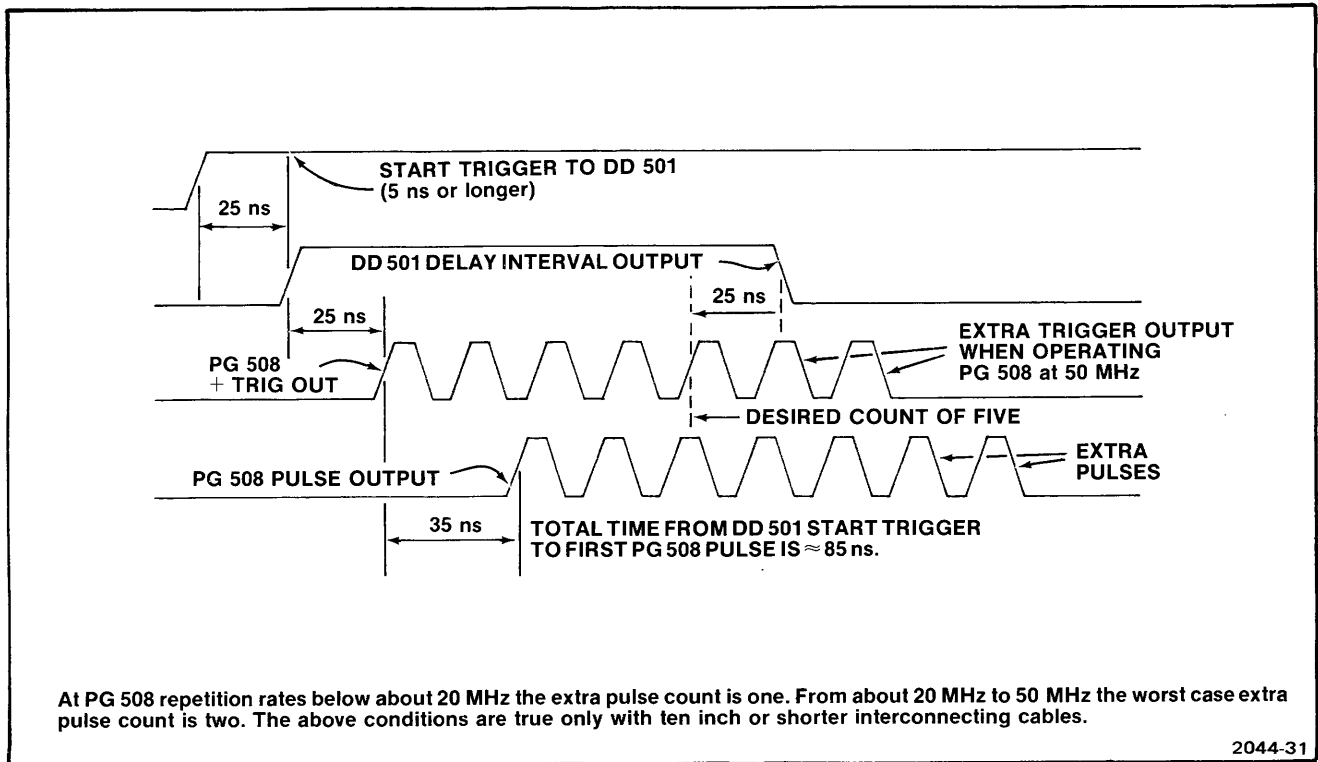


Fig. 2-8. Typical propagation delays using PG 508 with DD 501 in counted burst mode at 50 MHz repetition rate.

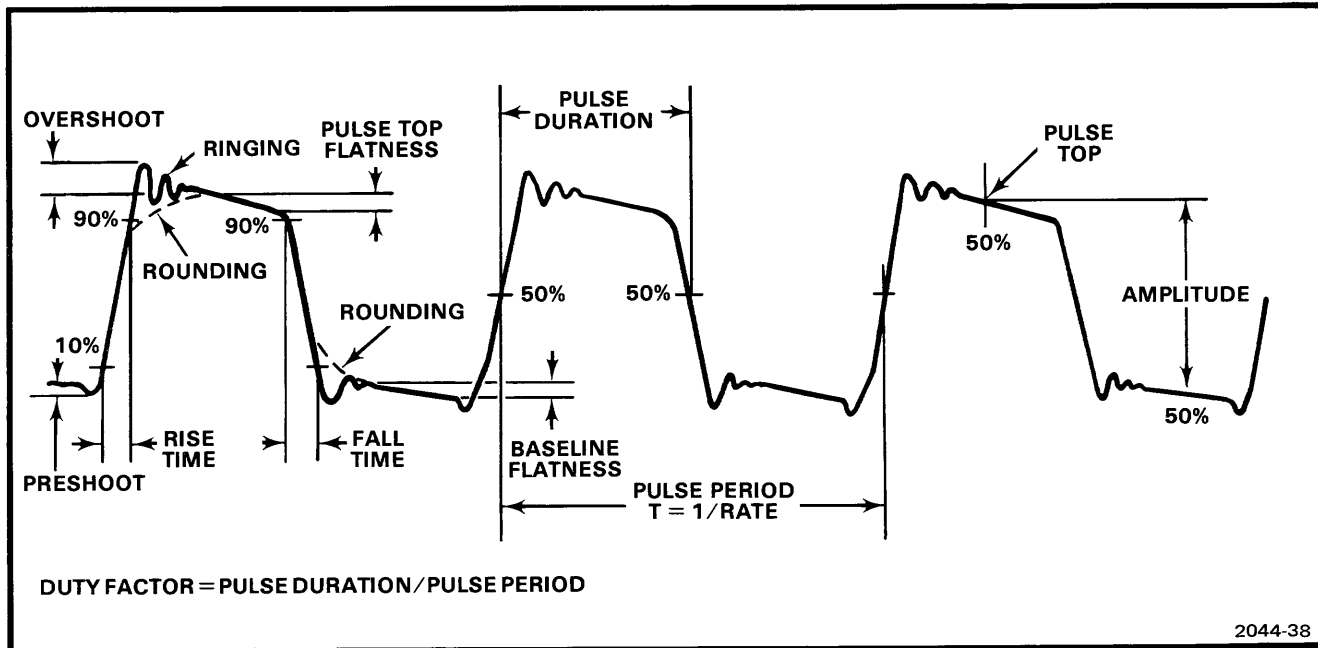


Fig. 2-9. Pulse characteristics.

**Complementary Pulse.** Normal pulse with high and low levels interchanged. Pulse on-time becomes pulse off-time.

**Duty Factor.** Sometimes referred to as duty cycle. The ratio of pulse duration to period, or the product of pulse duration and pulse repetition rate. Duty factor in % = Duration/Period X 100.

**Falltime.** The time interval, at the pulse trailing edge, for the pulse amplitude to fall from the 90% amplitude level to the 10% amplitude level.

**Flatness.** The absence of long term variations to the pulse top; excluding overshoot, ringing or pulse rounding. Sometimes referred to as tilt or slope.

**High Level.** The most positive value of a pulse, regardless of unwanted aberrations or overshoot, measured at a point that is located at 50% of the pulse duration.

**Low Level.** The most negative value of a pulse, regardless of unwanted aberrations or overshoot, measured at a point that is 50% of the off time.

**Offset.** A dc potential of either polarity applied to the waveform to bias the baseline to an amplitude other than zero.

**Overshoot.** The short term pulse excursion (or transient) above the pulse top or below the baseline, which is simultaneous to the leading or trailing edge of the pulse.

**Period.** The time interval for a full pulse cycle, inverse of frequency or repetition rate, or the interval between corresponding pulse amplitudes of two consecutive un-

delayed or delayed pulses. Generally measured between the 50% amplitude levels of two consecutive pulses.

**Preshoot.** A transient excursion that precedes the step function. It may be of the same or opposite polarity as the pulse.

**Pulse Duration.** The time interval between the leading and trailing edge of a pulse at which the instantaneous amplitude reaches 50% of the peak pulse amplitude.

**Polarity.** The direction from the baseline of the pulse excursion, either positive-going (+) or negative-going (-).

**Ringing.** Periodic aberrations that dampen in time, following the overshoot.

**Risetime.** The time interval, at the step function leading edge, for the pulse to rise from the 10% to 90% amplitude levels.

**Rounding or Undershoot.** The rounding of the pulse corners at the edges of a step function.

**Tilt or Slope.** A distortion of an otherwise flat-topped pulse, characterized by either a decline or a rise of the pulse top (see Flatness).

## **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.





# THEORY OF OPERATION

## Introduction

Refer to the block diagram and the schematics in the foldout pages at the rear of this manual as well as the following discussion to understand the operation of the PG 508.

## Input Circuitry (Diagram 1)

This circuitry processes the external trigger or gating signal providing triggering waveforms for the period circuit. The 50  $\Omega$  input impedance for this circuitry is provided by R12, switched in or out by internal switch S12. When R12 is out of the circuit, the input impedance is 1 M $\Omega$ , obtained by R14 and R16. Diodes CR16 and CR17 are protective diodes. The proper voltage at the drain of Q20 is set by VR20. The source voltage of Q20 is set by VR22. Impedance transformation, with no voltage shift, is obtained by source follower Q20. Constant current for Q20 is supplied by Q22. A differential comparator is formed by Q25 and Q26. This comparator compares the trigger or gate input level with the level set by the front panel TRIG/GATE control. Constant current for this comparator is provided by Q30. Level control voltage for the differential comparator is provided by operational amplifier U40. The output, pin 6, swings over a range of  $\pm 3$  V. The voltage at TP36 is the triggering level voltage, as set by the TRIG/GATE LEVEL control. If the triggering or gating voltage at the base of Q25 is more positive than TP36, then Q26 is conducting and Q25 is off. This places the collector of Q26 more positive than the collector of Q25. When the gating or triggering waveform level drops below TP36, Q25 conducts and Q26 turns off.

This switching waveform is applied to the bases of U60A and U60B, operating as a differential pair. The collector of U60A drives U60C in a cascode mode of operation. The collector of U60C drives the base of U60D which, as an emitter follower, drives the input of U70B. This gate operates as a dual input Schmitt trigger shaper. When the emitter of U60D goes to about 4.2 V above ground, pin 7 of U70B goes high. When the emitter of U60D drops to about 3.8 V, pin 7 of U70B drops to its low level. The inverting output terminal, pin 6, is always in the opposite state from pin 7. Positive feedback for this portion of the Schmitt is provided by R72. If the unit is manually triggered, pin 10 of U70B is momentarily connected to +5 V. Pin 10 of U70B, along with R75 and R76 now acts as a Schmitt shaper for the manual trigger. This action holds the output, pin 7, high and the inverting output, pin 6, low as long as the MAN button is depressed.

When the plus slope is selected for triggering or gating, +5 V is applied to pin 4 of U70A. This gate is now inhibited and the signal passes through U70C. As the outputs of U70A and C are connected together, a high on either output overrides the low. Pin 13 of U70C is low as long as the anodes of CR82 and CR84 are low. This occurs when the logic circuitry has enabled the input circuitry. When the control logic is set to disable the input circuitry, the anodes of these diodes are raised to +5 V which disables gates U70A and U70C.

Pin 12 of U70C shifts between the high and low state corresponding with the input gate or trigger. The output from U70C, pin 14, is passed to the period circuitry. A high at the output of U70C turns the period circuitry off and a low starts the period generator.

## TRIG'D/GATED Light Circuitry

Transistors Q100, Q102, Q110 and their associated components compose the circuitry that operates the front panel TRIG'D/GATE light emitting diode. The pair, Q100 and Q102, form a modified astable multivibrator, while Q110 operates as a voltage source. When the output of U70A or U70C is high (period generator off) or the logic circuitry has inhibited the input circuitry, the base of Q100 is high. This causes the base of Q102 to be low through R106. The collector of Q102 is now high and the light emitting diode is off. When the base of Q100 goes low, the base of Q102 goes high, the collector goes low and the light emitting diode illuminates. The light emitting diode circuitry follows the triggering gate up to about a 5 Hz rate, i.e., about 100 ms on and 100 ms off. At faster gating frequencies, C106 inhibits the changing states of this circuitry.

## Triggered Mode (Diagram 2)

In the triggered mode of operation S200-2 is closed. This places a high on pin 10 of U140B locking pin 7 high and pin 6 low irrespective of the level on pin 11. This disables the period generator. Pin 15 of U140C now follows pin 4 of U140A in coincidence with the input triggering signal. Pin 14 of U140C drives Q244 and pin 15 drives Q240. The output from the collector of Q240 is in phase with the trigger or gate input signal providing the trigger output. The phase of the waveform at the collector of Q244 is inverted.

### Period Generator (Diagram 2)

This circuitry generates the internal period timing waveform. In this mode, U140B operates as an astable multivibrator. When either input of U140B is high, pin 7 is high and pin 6 is low. The switched timing capacitances are connected from pin 7 to pin 11. These capacitors are switched by the period range switch. The period variable control, R190, varies the resistance in the negative feedback loop.

To start the period cycle, assume pin 7 of U140B goes high and pin 6 low. This positive step, at pin 7, is coupled through the period timing capacitor to pin 11. As the timing capacitor discharges through the resistances connected from pin 11 to pin 6, the voltage at pin 11 decays at a rate determined by the timing capacitor and these resistances. When the switching level (approximately 4 V) is reached, pin 7 goes low and pin 6 goes high. The negative step, at pin 7, is coupled through the timing capacitor, and appears at pin 11. The capacitor now charges through the resistances until the switching level is reached, and the period cycle repeats. The symmetry adjustment compensates for the bias current through pin 11.

When the PERIOD switch is in any position other than EXT TRIG (MAN), switch S200-2 is opened. This lowers pin 10 of U140B and permits the period generator to operate during the external gate on time. During the time of the external gating signal pins 4 and 2 of U140A are low. Pin 3 is high. As transistors Q150 and Q160 form a comparator, with their bases connected to pins 3 and 1 of U140A respectively, the collector of Q150 is low causing the emitter of Q175 to be low, as well as pin 11 of U140B. This allows the period generator to operate. During the gated off time this action reverses. Pin 11 of U140B rises and inhibits the period generator.

Resistor R170 and R165 adjust the lock up voltage at pin 11 of U140B so that, at turn on, the first period generated is identical in time with subsequent periods. Resistor R165 is switched into the circuit only on the 20 ns range. Components R177 and C177 form a time constant to help compensate for first period error.

### Delay Generator (Diagram 3)

This circuitry provides the delay for delayed or paired pulse operation. As the signal from the period generator of the external trigger input goes from high to low at pin 7 of U270B, pin 3 goes high. This causes pin 5 of U270A to go high and pin 2 low. Pin 13 of U270D and pin 9 of U300B go low. Pin 15 of U270D goes high but pin 10 of U300B does not follow until about 10 ns later, due to the delaying action of R275 and C275. When pin 9 of U300B goes low pin 6 goes high, assuming pin 11 is already low. Pin 6 stays high until pin 10 goes high as described above. This action

provides the delay generator with about a 10 ns trigger pulse under all input conditions.

The positive-going trigger pulse at pin 5 of U300A, causes pin 3 to go low and pin 2 high. Positive feedback through R300 and C300 causes pin 4 to go high. The low at the base of Q320 turns Q320 off. The emitter of Q320 goes negative at a rate determined by the timing capacitor and current source Q342, with its variable emitter resistances. As the emitter of Q320 goes negative, it pulls the base of Q294 negative which lowers pin 4 of U300A. When pin 4 reaches the switching threshold ( $\approx 4.0$  V) pin 2 goes low and pin 3 high. The timing capacitor is now discharged through Q320. The monostable delay generator is now reset for the next trigger pulse. Transistor Q290 provides a constant load for the power supplies irrespective of the current flowing through Q294.

Components R304, R306 and C304 provide a delay for the CONTROL ERROR light. The output from the delay generator is connected to pin 13 of U300C. Pin 15 of U300C is high during the delay time and pin 14 low. Gates U360B and D provide a positive-going trigger at pin 15 of U360D when the delay time ends. Gates U360A and C provide a positive-going trigger at pin 14 when the delay time starts. As the delay time starts, pin 4 of U360A goes low as does pin 11 of U360C. Pin 10 of U360C is low as the anode of CR378 is grounded through the UNDLY switch. The low at pin 11 of U360C allows pin 14 to go high. Pin 14 stays high until the propagation time through gate U360A and the delaying action of R364 and C366 allow the high generated in U360A, from pin 2, to reset U360C through pin 10. This causes pin 14 to return to its low state. The width of the output trigger pulse is about 6 ns.

To obtain the delayed trigger, the anode of CR378 is connected to +5 V disabling gate U360C. The anode of CR382 is grounded through the DLY switch. Gates U360B and U360D now operate in exactly the same manner as U360A and C. A positive trigger pulse appears on pin 15 of U360D when the delay time ends (pin 6 of U360B goes from high to low). In the paired pulse mode both gates operate. Gate U360C provides a positive-going trigger at the start of the delay time and U360D a positive trigger at the end of the delay time.

### Duration Generator (Diagram 4)

This circuitry generates the duration times. Gate U400B accepts the delayed or undelayed positive triggers from the delay generator. The result is a positive-going pulse at pin 5 of U400A. This triggers the duration generator which operates in the same manner as the delay generator. Refer to the discussion under the heading Delay Generator for a description of the duration generator operation. Gate U400C is an output buffer. Pin 12 goes high during the pulse duration time and if pin 13 is

low, pin 15 goes high and pin 14 low. Pin 13 controls U400C in the square wave and external duration modes.

### Duration and Delay Control Error Light Circuitry

This circuitry illuminates the CONTROL ERROR light when the duration or delay times are greater than the periods of their respective triggers. The positive pulse from the duration generator is fed into the D input, pin 10, of U480A. The clock enable line is low. If the duration time is set so that a trigger pulse (connected to the clock in) for the next duration pulse occurs before the output of the duration generator goes low, the high on the D input, pin 10 of U380A, is transferred to the output, pin 15. This high is connected to the set input, pin 5, of U480B which causes the output, pin 2, of U480B to go high illuminating the error light. When the output, pin 2, of U480B goes high, the inputs to U480A and B are disabled through the clock enable line preventing further trigger inputs until both flip flops are reset. When the output, pin 2, of U480B goes and stays high, C487 starts to charge to the voltage on pin 2, through R490. This takes approximately 100 ms. When the reset inputs to U480A and B, pins 13 and 4, reach the high level (about 4.0 V) U480A and B are reset and C487 discharges through R490. When these reset inputs return to the low level both flip flops are ready to accept triggers and the error cycle is ready to repeat. If the delay time is set for a time greater than the period of the delay triggers, the high on pin 7 of U480B transfers to pin 2 directly, and the light is illuminated. Reset takes place in the same manner as described above. Also connected to this circuitry is a line from the transition time board which also lights the CONTROL ERROR light.

The CONTROL ERROR light is also illuminated for certain improper control settings. Figure 3-1 shows a simplified schematic for the CONTROL ERROR indicator logic and control settings causing illumination.

### Variable Transition Time Circuitry (Diagram 5)

This circuitry controls the output transition times. Resistors R534 and R536 provide equivalent 50  $\Omega$  termination impedance for the normal (positive-going) input from the duration generator. Also, R520 and R522 provide an identical termination impedance for the complement input (negative-going) from the duration generator. These inputs drive the bases of Q525 and Q530. When the input from the duration generator is high and the complement is low, the collector of Q530 drops from ground to about  $-1/2$  V. This turns Q565 on and Q560 off. The adjustable constant current through Q545, to  $+15$  V, is now passed through R578, from the  $-15$  V supply. Transistor Q560 is turned off as its base is connected to ground. Zener diodes VR620 and VR630 lower the voltage from the bases of Q565 and Q560 to the bases of Q625 and Q630 by about 7.5 V. Transistor Q625 is therefore off and Q630 is conducting. Current flows from  $-15$  V through an adjustable current source Q635 and then through Q630 to

charge the particular capacitor determined by the transition time selected. As the capacitor charges through a constant current source, the junction of CR584 and CR600 goes negative at a linear rate until the diode CR600 turns on. This diode serves as the negative clamp. The voltage at the anode of CR600 is set by R615 through Q608 and Q600. The voltage at the junction of CR584 and CR600 remains low for the pulse duration.

At the end of the pulse duration time, the collector of Q530 goes positive. This action turns Q565 off and Q560 on. Current from the  $+15$  V supply flows through constant current source Q545, then through Q560 raising the junction of CR584 and CR600 at a linear rate determined by the capacitor value and the current available. The junction of CR584 and CR600 goes positive until CR584 turns on. The voltage at the cathode of CR584 is set by R570 through Q575 and Q580. Transistor Q625 is turned on, and Q630 off, passing current from constant current source Q635 through Q625, CR604, and R604 to ground. The leading and trailing transition times are varied independently by varying the amount of current passing through constant current source transistors Q635 and Q545.

The output waveform at the junction of CR584 and CR600 passes to the gate of fet Q680. This fet serves as a source follower for driving Q685 and Q690. These transistors compose a linear differential amplifier. The clamp levels for diodes CR584 and CR600 are set so that Q685 and Q690 are slightly overdriven. This serves to remove any ringing or other signal irregularities at the top and bottom of the waveform. Operational amplifier U665 provides, along with Q660, constant current for Q685 and Q690.

### Transition Time Control Error Light Circuitry

This circuitry illuminates the control error light when the leading transition time is greater than the pulse duration time, or when the trailing transition time is greater than the pulse off time. The inverted signal from the leading and trailing generator appears at the base of Q704 through fet follower Q700. A differential amplifier is formed by Q704 and Q706. The output is taken from the collector of Q706. Transistors Q704 and Q706 are overdriven to reduce the window of comparison. During the pulse on time, the base of Q704 is negative with respect to ground. This action causes the collector of Q706 to also go negative, driving the base of Q715, an emitter follower negative. The emitter of Q715 is connected to pins 7 and 10, the D input of flip flops U720A and B.

The waveforms driving the transition time circuitry are also applied to gates U740A and B. Pin 6 of U740B is high during pulse time while pin 4 of U740A is low. The purpose of the four gates in U740 is to delay the signal ap-

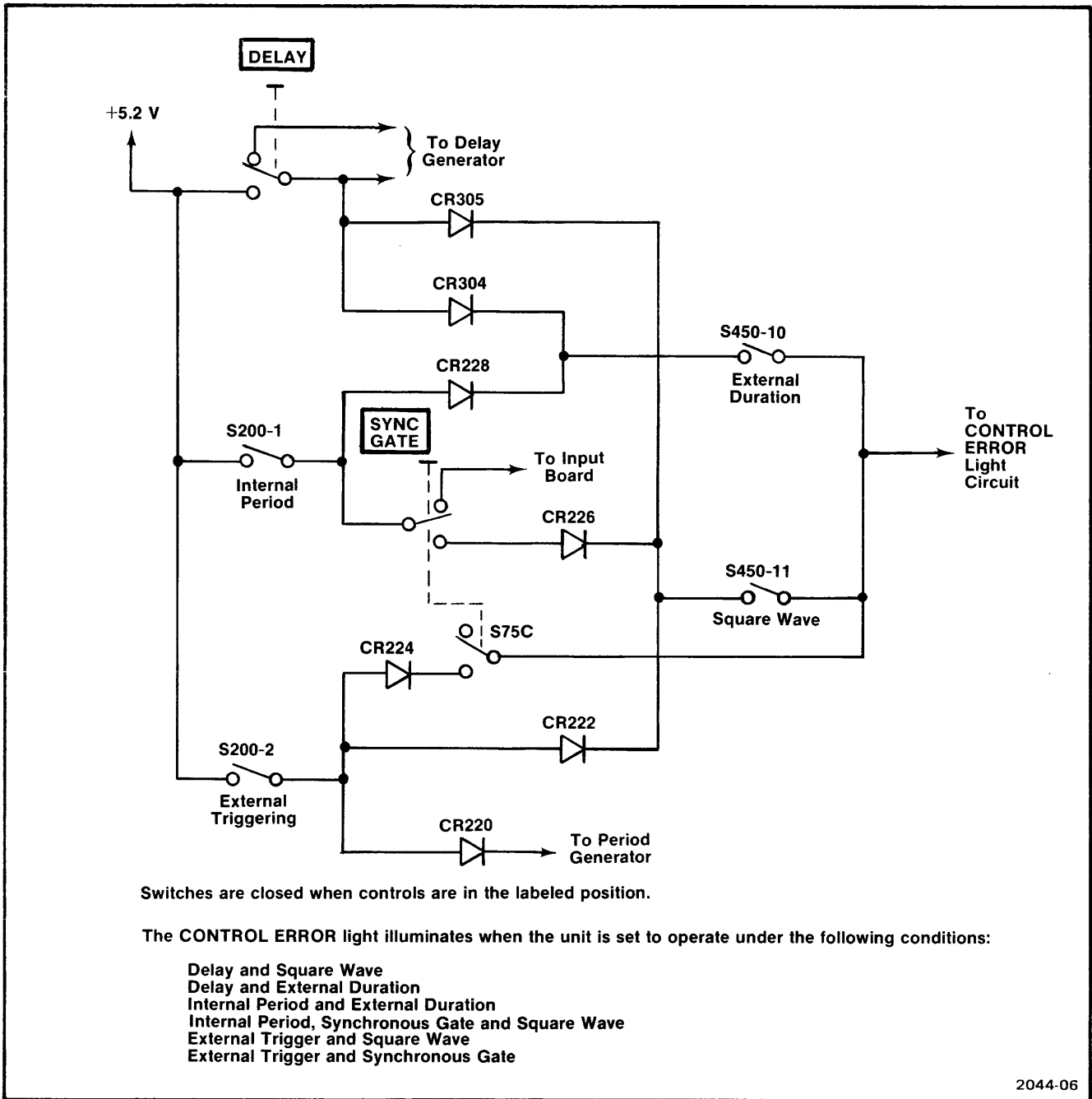


Fig. 3-1. Simplified schematic for CONTROL ERROR indicator logic with control settings that cause illumination.

proximately the same amount as the circuitry in the variable transition time generator. The positive-going waveform from pin 14 of U740C is fed through pin 6 to the clock input, pin 6, of flip flop U720A. The negative-going output from pin 15 is fed to the clock input pin 11, of flip flop U720B. Flip flop U720A senses the pulse trailing timing error and U720B, the pulse leading timing error. If the leading time from the output of the variable transition time generator is slow enough so that the D input of U720B has not dropped below approximately the 50% point, when the waveform at the clock input of flip flop U720B

(waveform driving the transition time board) goes positive (end of pulse), the high on D input, pin 10, transfers to the output, pin 15, and the CONTROL ERROR lamp is lit.

When pin 15, of flip flop U720B goes high, C734 starts to charge through R728. When the voltage at pin 13 of U720B and pin 5 of U720A reaches the high level ( $\approx 4.0$  V), both flip flops are reset to their initial conditions and the CONTROL ERROR light goes out. If the trailing time of the pulse is slow enough so that the D input of flip flop U720A

has not reached the high level when the pulse at the clock terminal (pin 6) of flip flop U720A goes high (leading portion of the next pulse driving the transition circuitry) the 0 terminal, pin 3, of flip flop U720A goes high. This high is connected to the set terminal, pin 12, of U720B causing terminal 1 of U720B to go high illuminating the CONTROL ERROR light. The on time and reset for this error indicating mode now proceeds as previously described.

### Level Control Multiplier (Diagram 6)

This circuitry provides independent top and bottom level control of the output pulse by controlling the amplitude and offset of the drive signal to the linear output amplifier. Also included is circuitry to accomplish the normal complement function and the preset function. Control voltage clamps to ensure the output amplifier is not overdriven are also provided.

Amplitude control of the signal occurs in the analog multiplier, U850. The pulse signal provides the X input, and the level control voltages provide the Y input. The X·Y product of these inputs is converted to a drive current for the output amplifier.

Input and complement pulses from the variable transition time generator are applied to the bases of Q825 and Q840. These transistors form a differential amplifier, supplied by constant current source U800B and Q820. A positive-going signal at the base of Q825, with the complementary (negative-going) signal at the base of Q840 causes the signal current at pin 11 of the multiplier to go negative and the signal current at pin 12 to go positive. When the pulse polarity reverses, at the bases of Q825 and Q840, the signal current also reverses polarity at pins 11 and 12. The difference between the currents at pins 11 and 12 corresponds to the X signal input for the multiplier.

The total current flowing from pins 2 and 3 of U850 is essentially equal to the current required by the constant current source, U895A and Q900. However, the difference in currents between these pins corresponds to the Y input signal for the multiplier.

The amplitude difference of these currents is controlled by U895B. This is a dc differential amplifier which amplifies the difference between the high and low level control voltages to produce the Y input signal. Gain adjustment for the Y input signal is provided by R885.

The high and low level control voltages are determined by their respective front panel controls, R770B and R770A. If the preset function is selected, the preset high and preset low potentiometers, R775 and R785, provide the control voltages. These voltages are buffered by unity gain amplifiers U780A and U780B. Both control voltages range

between 0 and +5.2 V. When the control voltages are equal, the Y input is zero and the multiplier signal output (X·Y) equals zero. A difference of +2.6 V between the high and low level control voltages corresponds to maximum output amplitude from the pulse generator.

The normal complement switch inverts the level control voltage inputs to differential amplifier U895B. However, since the difference between the voltages is unchanged, the control voltage input signal has constant amplitude, but reverses polarity. This complements the pulse generator output. The normal complement balance adjustment, R910, ensures that the Y multiplier input responds equally to changes in either the high or low level control voltages.

The signal current at pins 5 and 6 of U850 is the pulse signal. Since Q845, in conjunction with U800B, provides a constant current sink, the current through R954, from the emitter of common base stage Q954, also contains signal current variations. The current driver for the output amplifier is Q954. The signal currents into pins 8 and 9 of U850 also contain the pulse signal. However constant current sink R847, and common base stage Q950 are included only as a balancing thermal load for the multiplier.

To obtain independent control of the output pulse high and low levels, the control voltages are averaged by resistor network R914, R915, R918 and R920. High and Low tracking potentiometers, R915 and R920, are adjustable to provide minimum interaction between pulse levels. The dc voltage from this network, along with the voltage from the offset adjustment R925, is summed and inverted by U930A. U930B provides further gain and level shifting and, in conjunction with Q945, serves as a level controlled offset generator. A dc current source to the collector of Q954 is provided by Q945. The collector of Q954 is the virtual ground input to the output amplifier.

When the high and low level control potentiometers are both at midrange (+2.6 V zero output) Q945 sources all the quiescent bias current required by Q954, which is approximately 15 mA. Therefore, there is no current drive to the output amplifier through R975 or R1055. If the high level control is turned fully cw (maximum output), the low level control voltage remains at +2.6 V. The high level control voltage increases to +5.2 V. This causes the voltage output of U930A to decrease, causing the offset generator U930B and Q945 to source approximately 20 mA. This is an increase of 5 mA. This difference in control voltage settings also causes maximum difference in the control voltage input signal to the multiplier. This action also causes 10 mA peak-to-peak signal current variations in the collector current of Q954. Since the signal current variations and dc offset currents are summed at the collectors of Q945 and Q954, the output pulse high

level changes to maximum voltage and the low level remains at 0 V.

It follows that any positive increase in either the high or low level control voltages causes an increase in the dc offset current. A decrease in either control voltage causes a decrease in offset current. However, signal current variations respond only to differences between these control voltages. The larger the voltage difference, the larger the signal current amplitude into the output amplifier.

Since the dynamic range of the pulse generator output is + or - 20 V, and the maximum amplitude is only 20 V peak-to-peak, clamping circuits are provided to prevent the difference between the high and low level control voltages from exceeding +2.6 V, which corresponds to maximum output. A clamping circuit also prevents the high level from becoming less than the low level control voltage.

The level control unity gain amplifiers U780A and U780B contain a precision diode clamp composed of CR782, CR790, R780, and R782. Since the feedback for U780A is taken from the cathode of CR790, the voltage at the junction of CR782 and CR790 is equal to the low level control voltage plus one diode drop (CR790). If the high level attempts to decrease below the low level or attempts to increase above the high level control voltage, CR782 conducts clamping the high level at the low level voltage. Current limiting for U780B, during clamping, is provided by R780.

U800A is also configured as a precision clamping circuit. The output at pin 1 is equal to the low level control voltage plus 2.6 V plus one diode drop. Therefore, if the high level voltage attempts to exceed the low level plus 2.6 volts, or the low level is decreased more than 2.6 V below the high level, CR805 conducts and the high level is clamped at the low level control voltage plus 2.6 V. The low level control always overrides the high level control.

### Output Amplifier (Diagram 7)

The positive and negative dc voltages for this amplifier are provided by dual power supplies which track the high and low level control voltages. These tracking supplies ensure that the positive potential is at least 6 V above the output pulse high level and the negative potential is at least 6 V below the output pulse low level. This arrangement enables the pulse generator to provide a 40 V dynamic range, with a 20 V peak-to-peak maximum output pulse, while maintaining minimum power dissipation and voltage requirements for the amplifier transistors. The range of the positive tracking supply is +6 to +26 V, with a -6 to -26 V range for the negative supply.

The output circuit functions as a linear current driven operational amplifier with a closed loop transresistance gain of 2 V/mA. Negative feedback through R1042 to the input node (collectors of Q945 and Q954) causes a virtual ground at the input. A 10 mA peak-to-peak input signal creates a 20 V peak-to-peak output pulse (open circuit).

Since the output amplifier is a complementary circuit, only the operation of one side will be explained.

For a positive-going output pulse, current is driven into the input node. This action causes an increase in base current to Q975 which decreases the base drive to Q980. A cascode circuit is formed by Q980 and Q990, with R985 and L980 serving as a constant current source to the common collector-emitter connection. Therefore, when the base drive to Q980 is decreased, the current in Q990 increases. (The constant current source supplies approximately 60 mA which, with no signal, is equally divided between Q980 and Q990.) Another constant current source, Q1000, causes a 2.0 V drop across R1002. The emitter follower, Q995, buffers this potential and provides a voltage source for the base of the cascode transistor, Q990. An increasing current through Q990 increases the base current from the output parallel emitter followers, Q1010 and Q1015. The emitters of these transistors drive the output positive through a network of resistors and capacitors. Components R1020, R1024, and C1024, in this network, are adjustable to provide an internal resistive 50  $\Omega$  termination for the output. Network C1048 and R1048, with potentiometer R1050, provides transient response peaking for the amplifier.

Equivalent biasing for the complementary output emitter followers is provided by CR990, R990, and CR991. With zero output, the quiescent current in each output follower is approximately 20 mA. The output potential is available at the rear interface connector, pin 25A, for monitoring the output amplitude.

### Power Supply (Diagram 8 & 9)

The +11.5 Vdc from the mainframe provides the raw supply voltage for the series regulated +5.2 Vdc supply. The precision voltage regulator, U1210, includes a temperature compensated voltage reference supply at pin 6. The +5.2 V potentiometer, R1210, with the voltage divider R1209 and R1211 provides the reference input to the non-inverting input, pin 5. The output voltage is applied to the inverting input, pin 4, through R1217. Sensing differences in the two input potentials, the regulator amplifier provides base current drive from pin 10 to the mainframe transistor used as the series pass element, until the inverting and non-inverting inputs are approximately equal. The series pass transistor drops the voltage from the raw supply until the output is +5.2 V. Current limiting is provided by R1215. When the current from the supply exceeds approximately 1.1 A, the

regulator provides no further base drive current to the series pass element and current limiting occurs.

The +33.5 Vdc from the mainframe is the raw supply for the regulated +15 Vdc. The 3-terminal voltage regulator, U1205, performs the entire regulating function. Current limiting occurs within U1205.

The -33.5 Vdc from the mainframe is the raw supply for the regulated -15 Vdc. As in the +15 Vdc supply a 3-terminal voltage regulator, U1335, provides the regulating function. However, due to additional load considerations, the raw supply is pre-regulated to decrease power dissipated by the integrated circuit. A shunt current path to the load is furnished by VR1330 and R1330. The zener voltage is also used to maintain base drive to the series pass mainframe transistor. This transistor is used as a pre-regulator to drop the voltage across U1335 to approximately 3.6 V. Current limiting is also provided by the regulator, U1335.

The dual tracking supplies provide the positive and negative voltages required by the output amplifier. The voltage at the base of Q1255 varies from 0 V to +5.2 V depending on the setting of the HIGH LEVEL control. When the voltage at the base of Q1255 varies from 0 V to +2.6 V, the voltage at the collector of the series pass transistor is +6 V. As the voltage at the base of Q1255 varies from +2.6 V to +5.2 V, the voltage at the collector of the series pass transistor varies from +6 V to +26 V.

Transistor Q1255 and Q1270 form a differential comparator. The voltage at the base of Q1270 is referenced between the +5.2 V supply, ground and the output voltage. As the HIGH LEVEL control is moved in the positive direction, the collector of Q1255 goes negative.

This increases current flow through Q1280 and therefore the series pass transistor in the mainframe which raises the + tracking supply voltage to the output amplifier. Feedback to the differential comparator is provided by R1275. Transistor Q1265 prevents the + V tracking supply from going lower than about +6 V. The base of Q1265 is set at about 2.6 V. When the base of Q1255 goes more negative than about 2.6 V, Q1265 comes into conduction holding the common emitter circuit at one diode drop from the base of Q1265. If the base of Q1255 is lowered further, Q1255 loses control of the circuit and the supply voltage remains at the level determined by Q1265, +6 V.

Current limiters for this circuit are Q1285, Q1295 and Q1300. A differential comparator is formed by Q1285 and Q1295. If the load on the + V supply exceeds the maximum current allowed for the voltage supplied, the voltage drop across R1282 becomes great enough that Q1285 comes into conduction. This action increases conduction in Q1270 reducing the current flow in Q1255. Finally, the conduction through the series pass transistor is limited to a safe value. The current through Q1300 is determined by the actual supply output voltage. Therefore, the current limit varies proportionally with the supply voltage. In most overload conditions, the supply folds back to minimum current. Diode CR1310 conducts should the + V supply go more negative than ground.

The - V supply operates in the same manner as the + V supply. Only the polarities are reversed. Transistors Q1355 and Q1370 are the basic comparator transistors. The base of Q1355 varies between 0 V and +5.2 V. The - V output is prevented from going more positive than about -6 V by Q1365. The series pass transistor is driven by Q1380. The comparator transistors for the current limiting circuitry are Q1385 and Q1395. The current source for the current comparator is Q1400. Diode CR1410 prevents the - V output from going more positive than ground.

# CALIBRATION PROCEDURE

## PERFORMANCE CHECK

### Introduction

This procedure checks the electrical characteristics of the PG 508. Perform the calibration procedure if the instrument fails to meet the requirements of these checks. In some cases, recalibration may not correct the discrepancy. Circuit troubleshooting may then be needed. Tolerances specified apply only to the instrument under test. They do not include test equipment error. For convenience, some steps in the procedure check the performance of this instrument at only one value in a specified performance range. When performing the procedure, use the limits listed for the ambient temperature for instrument operation.

### Calibration Interval

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

### Test equipment required

The following test equipment, or equivalent, is suggested to perform this procedure:

**Table 4-1**  
**TEST EQUIPMENT REQUIREMENTS**

Description	Performance Requirements	Suggested Equipment
Power Module		TEKTRONIX TM 503 or TM 504
Oscilloscope Main frame	DC to 200 MHz	TEKTRONIX 7704A
Vertical Plug-in (2)	DC to 200 MHz	TEKTRONIX 7A16
Horizontal Plug-in	0.5 ns/div - 0.2 s/div	TEKTRONIX 7B92A
Vertical Sampling Plug-in	DC to 1 GHz	TEKTRONIX 7S11 with S-1 Head
Horizontal Sampling Plug-in	1 ns to 100 ns/div	TEKTRONIX 7T11
Leveled Sine Wave Generator	500 kHz to 50 MHz	TEKTRONIX SG 503
Pulse Generator	10 kHz to 50 MHz	TEKTRONIX PG 502
Digital Voltmeter	5 V to $\pm 15$ V	TEKTRONIX DM 502A
Digital Counter	Pulse width from 15 ns to 0.5 s. Frequency to 50 MHz	TEKTRONIX DC 503A
50 $\Omega$ Coaxial Cable (2)	36 inch, Bnc Connectors	Tektronix Part No. 012-0482-00
Extender Cable (2)	For TM 500	Tektronix Part No. 067-0645-02
50 $\Omega$ 10 X Attenuator	Bnc Connectors	Tektronix Part No. 011-0059-02



Table 4-1 (cont.)

Description	Performance Requirements	Suggested Equipment
50 Ω 5 X Attenuator	Bnc Connectors	Tektronix Part No. 011-0060-02
50 Ω Feed Through Attenuator	Bnc Connectors	Tektronix Part No. 011-0049-01
Bnc Female to GR		Tektronix Part No. 017-0063-00

**Preliminary Procedure**

With the power module turned off, install the PG 508 and the digital counter in the power module. Turn all equipment on and allow at least 20 minutes warm-up time.

When connecting the OUTPUT terminal through a coaxial cable to a real time plug in vertical input, terminate the cable with a 50 Ω termination. Unless specified otherwise, all control settings are as listed in this step.

Initial control settings: During warm-up, set the counter to measure period and set the PG 508 controls as follows:

PERIOD	20 ns
DELAY	10 ns
DURATION	SQ WAVE
TRANSITION TIME	5 ns
LEADING and TRAILING	X1
CAL	All in calibrated positions
LOW LEVEL	0 V
HIGH LEVEL	10 V
TRIG/GATE LEVEL	0 V
PUSH BUTTONS	All out except UNDLY

1. Check Period Range

- a. Connect a coaxial cable from the PG 508 OUTPUT through a termination to the input of the counter.
- b. Adjust the counter to trigger on the output pulse.
- c. CHECK: The period times in the following table: (Ranges must overlap)
- d. Return all controls to their initial settings.

Table 4-2  
PERIOD RANGE CHECK

Period	Counter Reading Period Cal Fully CCW	Counter Reading Period Cal Fully CW
20 ns	≤20 ns (≥50 MHz)	>200 ns (<5 MHz)
.2 μs	≈200 ns (5 MHz)	>2 μs (<.5 MHz)
2 μs	≈2 μs (.5 MHz)	>20 μs (<.05 MHz)
20 μs	≈20 μs (.05 MHz)	>200 μs (<5 kHz)
.2 ms	≈.2 ms (5 kHz)	>2 ms (<500 Hz)
2 ms	≈2 ms (500 Hz)	>20 ms (<50 Hz)
20 ms	≈20 ms (50 Hz)	≥200 ms (<5 Hz)

2. Check Period Jitter
  - a. Connect a coaxial cable from the OUTPUT of the PG 508 through a 50 Ω termination to the input of the oscilloscope.
  - b. Set the delaying sweep to 20 μs/Div and the delayed sweep to 1 μs/Div. View the delayed sweep. Use the B runs after delay mode of operation.
  - c. Set the PG 508 OUTPUT (VOLTS) HIGH LEVEL control and the oscilloscope Volts/Division control for a vertical display of five divisions.
  - d. Set the delay time multiplier to 10.
  - e. Set the PG 508 for a period of 2 μs.
  - f. Check for period horizontal jitter of less than 0.2 major divisions.
  - g. Return controls to the initial settings.
3. Check Delay Range
  - a. Connect the OUTPUT terminal through a 50 Ω termination to the oscilloscope vertical input.
  - b. Connect the + TRIG OUT to the external trigger input of the oscilloscope.
  - c. Set the oscilloscope for external triggering.
  - d. Push in both MODE pushbuttons on the PG 508.
  - e. Obtain a vertical display on the test oscilloscope of four divisions.
  - f. CHECK the delay range according to the following table:
4. Check DELAY Duty Factor
  - a. Connect the OUTPUT terminal on the PG 508 through a 50 Ω coaxial cable and 50 Ω termination to the input of the oscilloscope.
  - b. Connect the + TRIG OUT to the external trigger input of the oscilloscope.
  - c. Press the UNDLY button. Set PG 508 controls as listed in the table. Set all CAL controls fully ccw.
  - d. Place the 50% point of the output waveform on the second vertical graticule line.
  - e. Press the DELAY button and note the delay as viewed on the oscilloscope.
  - f. Rotate the DELAY CAL control until the trace on the oscilloscope becomes unstable or fails to trigger properly.
  - g. CHECK: The total delay, the delay from UNDLY to DELAY plus that added by the CAL control, must equal or exceed the value shown in the following table: (After each step, return the DELAY CAL control to the calibrated position and proceed to the next line in the table.)
  - h. Return all controls to initial settings.
5. Check Delay Jitter
  - a. Connect the OUTPUT of the PG 508 through a coaxial cable and a 50 Ω termination to a vertical input of the oscilloscope.
  - b. Connect the +TRIG OUT to the other vertical input of the oscilloscope.

**Table 4-3  
DELAY RANGE CHECK**

Delay	Period	Duration	Transition Time	Paired Pulse Delay Cal Control Fully CCW	Paired Pulse Delay Cal Control Fully CW
10 ns	2 μs <sup>a</sup>	10ns	5 ns	≤10 ns <sup>c</sup>	>.1μs
.1 μs	20 μs	10 ns	5 ns	≈.1 μs <sup>b</sup>	>1 μs
1 μs	.2 ms	.1 μs	5 ns	≈1 μs <sup>b</sup>	>10 μs
10 μs	2 ms	1 μs	.5 μs	≈10 μs <sup>b</sup>	>.1 ms
.1 ms	2 ms	10 μs	.5 μs	≈.1 ms <sup>b</sup>	>1 ms
1 ms	20 ms	.1 ms	.5 μs	≈1 ms <sup>b</sup>	>10 ms
10 ms	20 ms <sup>a</sup>	1 ms	.5 μs	≈10 ms <sup>b</sup>	≥100 ms

<sup>a</sup> Turn PERIOD variable CAL control fully cw.

<sup>b</sup> Ranges must overlap.

<sup>c</sup> Cal Control may have to be turned slightly from fully CCW to resolve the two pulses.

Table 4-4  
DELAY DUTY FACTOR CHECK

Period	Delay	Duration	Transition Time	Sweep Rate	Total Delay
20 ns	10 ns	10 ns	5 ns	10 ns	≥10 ns
.2 μs	.1 μs	.1 μs	5 ns	.1 μs	≥140 ns
2 μs	1 μs	1 μs	50 ns	1 μs	≥1.4 μs
20 μs	10 μs	10 μs	.5 μs	10 μs	≥14 μs
.2 ms	.1 ms	.1 ms	5 μs	.1 ms	≥14 ms
2 ms	1 ms	1 ms	50 μs	1 ms	≥1.4 ms
20 ms	10 ms	10 ms	.5 ms	10 ms	≥14 ms

- c. Set the oscilloscope to trigger on the positive going part of the trigger waveform.
- d. Set the oscilloscope to:
 

Delaying sweep	0.2 ms/Div
Delayed sweep	2.0 μs/Div
- e. Set the PG 508 to:
 

<b>MODE</b>	<b>DELAY</b>
PERIOD	2 ms
DELAY	0.1 ms
DURATION	10 μs
- f. Set the DELAY TIME MULTIPLIER to 8.0 and use the DELAY CAL control to position the delayed pulse to the ninth graticule line.
- g. CHECK that fast jitter on the pulse does not exceed 0.8 Div when the oscilloscope is switched to the delayed sweep position. It may be necessary to vary the DELAY TIME MULTIPLIER slightly to bring the pulse on screen.
- h. Return the controls to the initial settings.
- 6. Check Duration Range
  - a. Connect the OUTPUT of the PG 508 to the oscilloscope through a 50 Ω termination.
  - b. CHECK: the duration (pulse width) according to the following table.
  - c. Return the controls to the initial settings.

Table 4-5  
DURATION RANGE CHECK

Duration	Period	Duration with Cal Fully CCW	Duration with Cal Fully CW
10 ns	.2 μs	≤10 ns	>100 ns
.1 μs	2 μs	≈100 ns <sup>b</sup>	>1 μs
10 μs	.2 ms	≈10 μs <sup>b</sup>	>100 μs
.1 ms	2 ms	≈100 μs <sup>b</sup>	>1 ms
1 ms	20 ms	≈1 ms <sup>b</sup>	>10 ms
10 ms	20 ms <sup>a</sup>	≈10 ms <sup>b</sup>	≥100 ms

<sup>a</sup> Turn CAL control fully cw.

<sup>b</sup> Range must overlap with adjacent ranges.

7. Check Duration Duty Factor

- a. Connect the OUTPUT terminal on the PG 508 through a 50 Ω coaxial cable and a 50 Ω termination to the input of the oscilloscope.
- b. Connect the +TRIG OUT to the external trigger input of the oscilloscope.
- c. Adjust the oscilloscope for a 4 division display. Place the 50% point on the output waveform at the center graticule line.
- d. Rotate the DURATION CAL control cw until the pulse becomes distorted or mistriggers.
- e. CHECK: the pulse duration duty factor measured at the 50% point according to the following table.

Table 4-6

DURATION DUTY FACTOR CHECK

Duration	Period	Pulse Duration Time
10 ns <sup>a</sup>	20 ns	≥10 ns
.1 μs	.2 μs	≥140 ns
1 μs	2 μs	≥1.4 μs
10 μs	20 μs	≥14 μs
.1 ms	.2 ms	≥140 μs
1 ms	2 ms	≥1.4 ms
10 ms	20 ms	≥14 ms

<sup>a</sup> It may be necessary to use a sampling scope on this range for adequate resolution.

- f. Return all controls to initial settings.

8. Check Duration Jitter

- a. Connect the OUTPUT of the PG 508 through a coaxial cable and a 50 Ω attenuator to the vertical input of the oscilloscope.
- b. Adjust the vertical sensitivity of the oscilloscope and the PG 508 output for a vertical display of four divisions.
- c. Set the oscilloscope as follows:

DELAYING SWEEP	20 μsec/Div
DELAYED SWEEP	100 ns/Div
DELAY TIME MULT	5.0

Set the PG 508 as follows:

PERIOD	0.2 ms
DURATION	0.1 ms
TRANSITION TIME	50 ns

- d. Trigger the oscilloscope on the positive transition of the waveform and view the falling transition with the delayed sweep.
  - e. CHECK that the fast jitter is less than one division. (100 ns)
9. Check Pulse Output Transition Times and Linearity
- a. Connect the +TRIG OUT to the external triggering input on the oscilloscope.
  - b. Set the OUTPUT (VOLTS) HIGH LEVEL control to +5 V and the LOW LEVEL control to -5 V.
  - c. Connect the OUTPUT of the PG 508 through a coaxial cable and a 50 Ω termination to the vertical input of the oscilloscope.
  - d. CHECK the transition times between the 10% and 90% portions of the waveforms according to the following table.
  - e. CHECK the linearity from the 10% to the 90% point on the leading and trailing edges of the waveform. Place a straight edge on the 10% and 90% points of the transitions and measure any deviations as shown in Fig. 4-1.

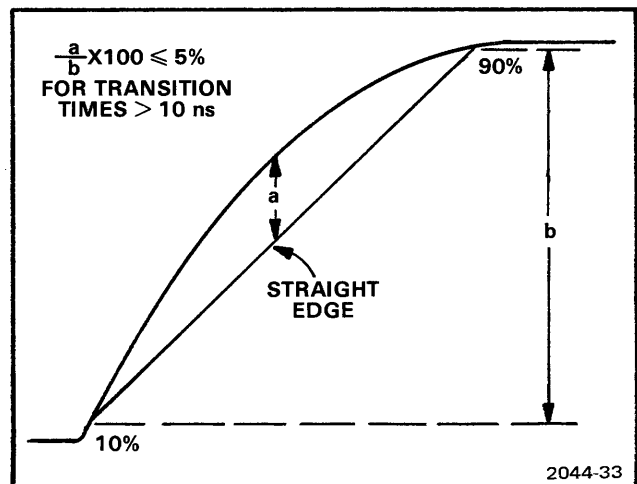


Fig. 4-1. Linearity check.

Table 4-7

TRANSITION TIME CHECK

Transition Time	Period	Duration	Leading and Trailing Variables X1	Leading and Trailing Variables X100
5 ns	20 $\mu$ s	1 $\mu$ s	<7 ns	>350 ns
50 ns	.2 ms	10 $\mu$ s	<50 ns	>5 $\mu$ s
.5 $\mu$ s	2 ms	.1 ms	<.5 $\mu$ s	>50 $\mu$ s
5 $\mu$ s	2 ms	1 ms	<5 $\mu$ s	>.5 ms
50 $\mu$ s	20 ms	10 ms	<50 $\mu$ s	>5 ms
.5 ms	20 ms	10 ms	<.5 ms	>50 ms <sup>a</sup>

<sup>a</sup> Turn the PERIOD and DURATION CAL controls fully cw for this measurement.

10. Check Output Amplitude

- a. Connect the OUTPUT of the PG 508 to the vertical input of the oscilloscope. Do not terminate the coaxial cable connected to the OUTPUT terminal.
- b. Set the PERIOD control at .2  $\mu$ s and the DURATION control to .1  $\mu$ s.
- c. Turn the HIGH LEVEL control to the right until it locks with the LOW LEVEL control. It may be necessary to turn the LOW LEVEL ccw to lock the controls together.
- d. CHECK the OUTPUT pulse amplitude at  $\geq 20$  V peak-to-peak.
- e. Connect a 50  $\Omega$  termination at the oscilloscope end of the coaxial cable.
- f. CHECK the output amplitude for  $\geq 10$  V peak-to-peak.
- g. Turn the HIGH LEVEL ccw until it locks with the LOW LEVEL control.
- h. Remove the 50  $\Omega$  termination.
- j. CHECK for an output amplitude of  $\leq 1.0$  V peak-to-peak.

11. Check Pulse Output Aberrations

- a. Install the sampling plug-ins in the oscilloscope main frame.
- b. Set the PERIOD to .2  $\mu$ s, DURATION to .1  $\mu$ s, and the TRANSITION TIME to 5 ns.
- c. Set the OUTPUT (VOLTS) HIGH LEVEL control to +5 V and the LOW LEVEL control to -5 V.

- d. Connect the OUTPUT of the PG 508 to the input of the sampling plug-in through a 10 X attenuator.
- e. Set the sampling vertical to 0.2 V/cm.
- f. Connect a coaxial cable from the TRIGGER OUT on the PG 508 through a 5 X attenuator to the external trigger input on the sampling sweep plug-in.
- g. Adjust the output of the PG 508 for a 5 division display.
- h. Set the Sampling oscilloscope to 20 mv/div and use the dc offset to bring the top of the waveform onto the screen.
- i. CHECK the aberrations as shown in the diagram.
- j. Remove the sampling plug-ins and re-install the real time plug-ins.

12. Check Trigger Output Amplitude

- a. Connect the +TRIG OUT through a coaxial cable to the vertical input of the oscilloscope. Do not terminate the trigger output.
- b. CHECK that the signal out is  $\geq 2$  V.

13. Check Trigger/Gate Input Sensitivity

- a. Set the sine wave generator output for 10 MHz with an amplitude of 80 mV into 50  $\Omega$ .
- b. Connect the sine wave generator to the TRIG/GATE IN connector. Make certain the input impedance of the TRIG/GATE IN connector is set for 50  $\Omega$ .

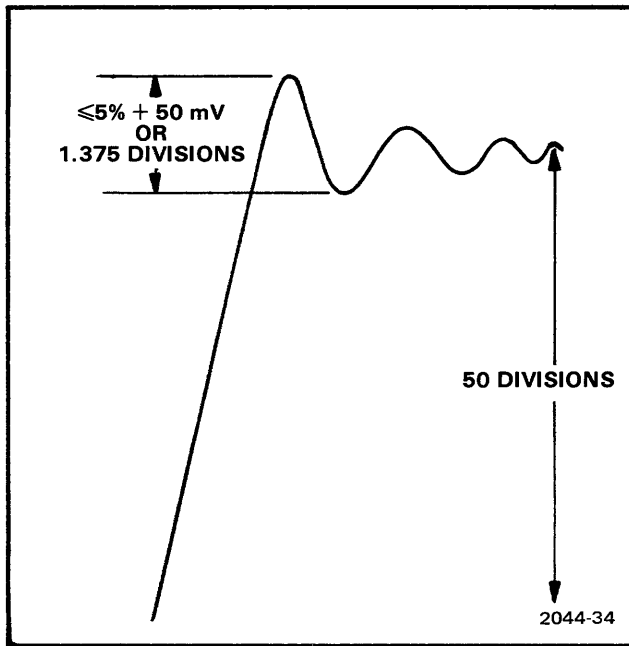


Fig. 4-2. Aberration measurement.

- c. Place the PG 508 in the SYNC/GATE +SLOPE mode.
  - d. CHECK for proper triggering. (Flashing TRIG'D/GATED light with the TRIG/GATE LEVEL control properly set.)
  - e. Change the sine wave generator output amplitude to 250 mV and the frequency to 50 MHz.
  - f. CHECK for proper triggering.
14. Check Trigger Level Polarity
    - a. Use the same settings as in the previous step.
    - b. Place the PG 508 in the -SLOPE triggering mode.
    - c. Re-adjust the TRIG/GATE LEVEL control if necessary.
    - d. CHECK that the PG 508 triggers properly.
  15. Check TRIG/GATE LEVEL Range and TRIG'D GATED Light Operation
    - a. Set the PG 508 for +SLOPE and SYNC/GATE operation.
- b. Release all other push buttons.
  - c. Connect a 0 V to +3 V pulse with a frequency of 5 kHz from the pulse generator to the TRIG/GATE IN.
  - d. Position the TRIG/GATE LEVEL control to 0 V.
  - e. CHECK for a flashing TRIG'D/GATED light when the TRIG/GATE LEVEL CONTROL is turned cw.
  - f. CHECK that the light goes out as the control is turned cw beyond the flashing condition.
  - g. CHECK for a steady light when the control is turned ccw past 0 V.
  - h. Change the polarity of the pulse from the generator so that it varies from 0 V to -3 V.
  - i. Change the PG 508 to the -SLOPE mode.
  - j. Set the TRIG/GATE LEVEL control to the 0 V position.
  - k. CHECK that turning the TRIG/GATE LEVEL control ccw causes the TRIG'D/GATED light to flash.
  - l. CHECK that continued turning of the TRIG/GATE LEVEL control in a ccw direction causes the light to go out.
  - m. CHECK that turning the control cw past 0 V causes the light to be continuous.
16. Check Control Error Light
    - a. Place all controls as listed under initial control settings.
    - b. CHECK that the CONTROL ERROR light is on with the following control settings:
      1. EXT TRIG or MAN and SYNC/GATE
      2. EXT DUR and any internal period setting
      3. EXT TRIG or MAN and SQ WAVE (INT PERIOD)
      4. SQ WAVE (INT PERIOD) and SYNC GATE
      5. SQ WAVE (INT PERIOD) and DELAY
      6. EXT DUR and DELAY
    - c. CHECK that the CONTROL ERROR light flashes in illegal control settings such as duration time greater than the period time.

# ADJUSTMENT PROCEDURE

Adjustment is generally required after the instrument has been repaired or after long intervals of use in which normal component aging may affect the accuracy of the instrument.

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

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

## NOTE

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

## WARNING

*Dangerous potentials may exist at several points in this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Disconnect all power before cleaning the instrument or replacing parts.*

## Preliminary Procedure

1. Make certain that the power is off in the power module.

2. For easy access to all adjustments, calibrate the PG 508 using the extender cables. Make certain that the cables have the proper barrier between pins 6 and 7. Connect the top of each end of the extender cable to the top of the power module connector and to the top of the plug-in connector. Adjustments are located on the output board, (right side of the instrument), period board, (left side and top of the instrument), and the transition board, (bottom of the instrument). Make adjustments at an ambient temperature between +20° C and +30° C.

## NOTE

*The tabbed fold-out page labeled "Adjustment Locations", contains illustrations showing the location of the adjustments in this procedure.*

## 1. Output Voltage Control Knob Adjustments

a. Set the PG 508 controls as follows:

TRIGGERING	FREE RUN
MODE	UNDLY
PERIOD	2 ms Calibrated
DELAY	10 ns Calibrated
DURATION	Square WAVE Calibrated
TRANSITION TIME	5 ns
LEADING	X1
TRAILING	X1
OUTPUT VOLTS	NORMAL
HIGH LEVEL	+5 V
LOW LEVEL	0 V

b. Adjust the oscilloscope trace to the center of the screen and set the sensitivity to 2 V/Div, DC coupled.

c. Connect the OUTPUT of the PG 508 to the oscilloscope. Adjust the LOW LEVEL for an output of 0 V on the oscilloscope. If the knob pointer does not point to 0, loosen the set screw and reset the knob to the 0 mark on the front panel.

d. Now set the LOW LEVEL knob for a reading of -5 V, and set the HIGH LEVEL for 0 V on the oscilloscope. If the HIGH LEVEL knob does not point to 0, loosen the set screw and readjust.

## 2. Adjust +5.2 V Supply

a. Set the PG 508 controls as in step 1.

b. Connect the + lead from the DVM to the test point labeled +5.2 V on the Adjustment Locations illustration and connect the - lead from the DVM to the point labeled GND.

c. Adjust R1210 for a reading of +5.2 V.

## 3. Check +15 V and -15 V supplies

a. Set the PG 508 controls as listed in step 1.

b. Connect the - lead of the DVM to the GND point shown on the Adjustment Locations illustration. Connect the + lead from the DVM to the +15 V point. Check for a voltage from 14.25 V to 15.75 V.

c. Move the + lead of the DVM to the -15 V point. Check for a voltage from -14.25 V to -15.75 V.

4. Adjust 2  $\mu$ s Period

- a. Set the PG 508 controls as follows:

TRIGGERING	FREE RUN
MODE	UNDLY
PERIOD	2 $\mu$ s Calibrated
DELAY	1 $\mu$ s Calibrated
DURATION	10 ns Calibrated
TRANSITION TIME	5 ns
LEADING	X1
TRAILING	X1
OUTPUT VOLTS	NORMal
HIGH LEVEL	+5 V
LOW LEVEL	0 V

- b. Connect a coaxial cable from the +TRIG OUT connector. Connect the other end of the cable through a 50  $\Omega$  termination to the input of the frequency counter.
- c. Adjust R186 (PER) for a frequency of 500 kHz.

5. Adjust Symmetry

- a. Set the PG 508 controls as described in the preceding step except set DURATION to SQUARE WAVE.
- b. Connect a coaxial cable from the OUTPUT connector through a 50  $\Omega$  termination to the vertical input of the oscilloscope.
- c. Adjust the sweep speed so one cycle is displayed over the entire graticule. Switch the trigger slope from + to - and adjust R180, (SYM), for minimum horizontal shift of the vertical transition in the middle of the oscilloscope screen.

6. Adjust 20 ns Period.

- a. Set the PG 508 controls as follows:

TRIGGERING	FREE RUN
MODE	UNDLY
PERIOD	20 ns Calibrated
DELAY	10 ns Calibrated
DURATION	10 ns Calibrated
TRANSITION TIME	5 ns
LEADING	X1
TRAILING	X1
OUTPUT VOLTS	NORMal
HIGH LEVEL	+5 V
LOW LEVEL	0 V

- b. Connect a coaxial cable from the +TRIG OUT connector through a 50  $\Omega$  termination to the input of the frequency counter.

- c. Adjust 20 ns Per.,(R195) for a reading of 51.5 MHz.

7. Adjust 1st Period.

- a. Set the PG 508 controls as follows:

TRIGGERING	SYNC/GATE	+ SLOPE
MODE	UNDLY	
PERIOD	2 $\mu$ s	
DELAY	10 ns Calibrated	
DURATION	SQ WAVE	
TRANSITION TIME	5 ns	
LEADING	X 1	
TRAILING	X 1	
OUTPUT VOLTS	NORM	
HIGH LEVEL	5 V	
LOW LEVEL	0 V	

- b. Connect a coaxial cable from the OUTPUT of the PG 508 through a 50  $\Omega$  termination to the vertical input of the oscilloscope. See Fig. 4-3.
- c. Trigger the oscilloscope externally from the square wave generator. (See Fig. 4-3).
- d. Set the square wave generator for 2.5 V output and connect it to the TRIG/GATE IN connector on the PG 508.
- e. Set the square wave generator for 5 kHz.
- f. Adjust the TRIG/GATE LEVEL control for a flashing TRIG'D/GATED light.
- g. Set the oscilloscope sweep speed to 50  $\mu$ s and trigger the time base from the square wave generator.
- h. Adjust the square wave generator frequency for a PG 508 output burst of ten pulses.
- i. Set the delayed sweep speed to 5  $\mu$ s. Switch the time base to delayed sweep.
- j. Using the delay time multiplier dial, compare the first and second cycles in the burst.
- k. Adjust 1 per (R170) for a first period length matching the second period length.

8. Adjust 1st Period 20 ns.

- a. Connect the instruments as shown in Fig. 4-3.
- b. Set the PG 508 PERIOD to 20 ns, set the square wave generator to 500 kHz, and set the oscilloscope main sweep time to 0.5  $\mu$ s.



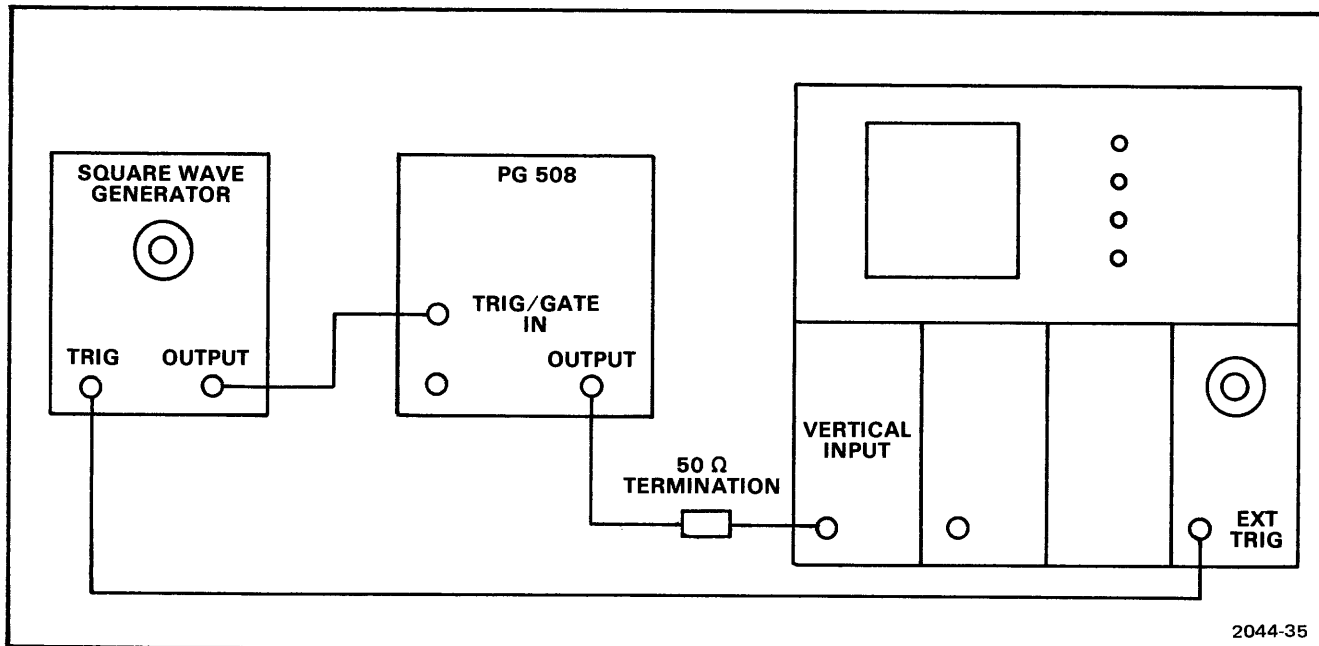


Fig. 4-3. 1st period adjustment instrument connections.

- c. Adjust the square wave generator for a burst of ten pulses from the PG 508. Set the delayed sweep speed to 50 ns.
  - d. Adjust 20 ns 1 Per (R165) for a first period length matching the second period length.
  - d. Change the PERIOD to 20 ns, and change the DURATION to 10 ns.
  - e. Adjust the period CAL knob about 45° from the fully ccw position.
  - f. Set the sweep rate to 2 ns per division.
  - g. Adjust Dur 10 ns (R465) for a duration of 10 ns, measured at the 50% points on the waveform.
9. Adjust 1  $\mu$ s and 10 ns Duration.
- a. Set the PG 508 controls as follows:
- |                 |                      |
|-----------------|----------------------|
| TRIGGERING      | FREE RUN             |
| MODE            | UNDLY                |
| PERIOD          | 2 $\mu$ s Calibrated |
| DELAY           | 10 ns Calibrated     |
| DURATION        | 1 $\mu$ s Calibrated |
| TRANSITION TIME | 5 ns                 |
| LEADING         | X1                   |
| TRAILING        | X1                   |
| OUTPUT VOLTS    | NORM                 |
| HIGH LEVEL      | +2.5 V               |
| LOW LEVEL       | -0 V                 |
- a. Connect a coaxial cable from the OUTPUT connector through a 50  $\Omega$  termination to the vertical input of the oscilloscope. Connect the +TRIG OUT to the external trigger input of the oscilloscope.
  - b. Set the sweep rate to 0.2  $\mu$ s on the sampling unit.
  - c. Adjust the Dur 1  $\mu$ s (R470) for a pulse duration (pulse on time) of five horizontal divisions.
10. Adjust Delay
- a. Set the PG 508 controls as follows:
- |                 |             |
|-----------------|-------------|
| TRIGGERING      | FREE RUN    |
| MODE            | UNDLY       |
| PERIOD          | 2 $\mu$ s   |
| DELAY           | 1 $\mu$ s   |
| DURATION        | 0.1 $\mu$ s |
| TRANSITION TIME | 5 ns        |
| LEADING         | X1          |
| TRAILING        | X1          |
| OUTPUT VOLTS    | NORM        |
| HIGH LEVEL      | +2.5 V      |
| LOW LEVEL       | 0.0 V       |
- b. With the oscilloscope triggered externally as in the previous step, note the position of the pulse.
  - c. Now push the MODE/DELAY button and adjust Del (R352) for a pulse delayed exactly five

divisions ( $1 \mu\text{s}$ ) from the position of the previous pulse.

11. Adjust Top and Bottom Level Clamps

a. Set the PG 508 controls as follows:

TRIGGERING	FREE RUN
MODE	UNDLY
PERIOD	$2 \mu\text{s}$
DELAY	10 ns
DURATION	$1 \mu\text{s}$
TRANSITION TIME	5 ns
LEADING	Fully cw
TRAILING	Fully cw
OUTPUT VOLTS	NORM
HIGH LEVEL	+5 V
LOW LEVEL	-5 V

- b. Connect a coaxial cable from the OUTPUT of the PG 508 through a  $50 \Omega$  termination to the input of the oscilloscope.
- c. Set the oscilloscope for a  $0.2 \mu\text{s}$  sweep rate.
- d. Adjust Bot Lvl Clmp, (R570) so that the transition from the bottom level of the waveform to the leading edge transition, point 1, looks the same as point 2. See Fig. 4-4.
- e. Adjust Top Level Clamp, (R615) so that the transitions at the top and bottom of the trailing edge transition look alike. See Fig. 4-5.

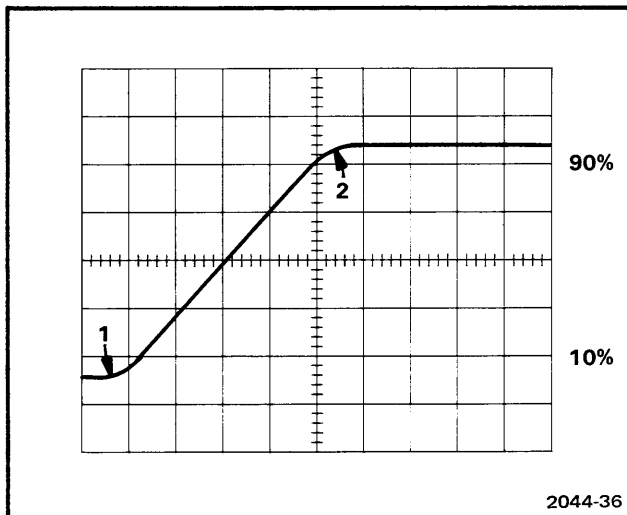


Fig. 4-4. Top Level Clamp Adjustment.

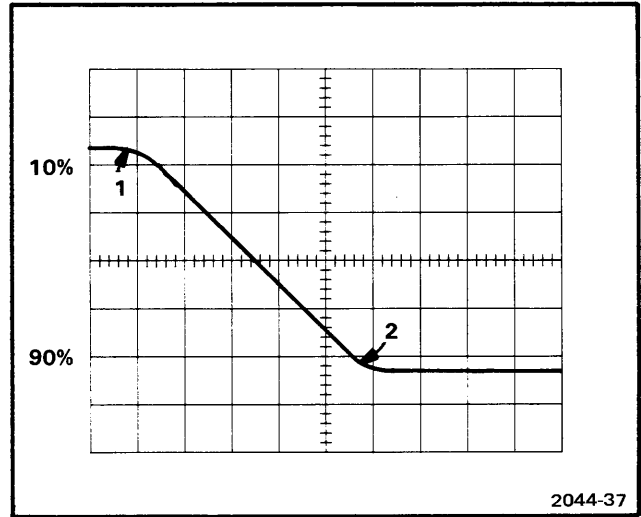


Fig. 4-5. Bottom Level Clamp Adjustment.

12. Adjust Transition Time

a. Set the PG 508 controls as follows:

TRIGGERING	FREE RUN
MODE	UNDLY
PERIOD	$20 \mu\text{s}$
DELAY	10 ns
DURATION	$10 \mu\text{s}$
TRANSITION TIME	$0.5 \mu\text{s}$
LEADING	Fully ccw
TRAILING	Fully ccw
OUTPUT VOLTS	NORM
HIGH LEVEL	+5 V
LOW LEVEL	-5 V

- b. Connect a coaxial cable from the OUTPUT of the PG 508 through a  $50 \Omega$  termination to the input of the oscilloscope.
- c. Set the oscilloscope sweep speed to  $0.1 \mu\text{s}$ .
- d. Adjust the oscilloscope to display the leading transition of the waveform.
- e. Adjust Set Trailing, (R650) for a leading transition time of  $0.5 \mu\text{s}$  measured from the 10% to the 90% points of the transition.
- f. Adjust the oscilloscope to display the trailing edge of the waveform transition.
- g. Adjust Set Trailing, (R542) for a trailing transition time of  $0.5 \mu\text{s}$  measured from the 10% to the 90% points of the transition.

**Calibration Procedure—PG 508  
Adjustment Procedure**

13. Adjust NORMAL/COMPLEMENT Balance and Gain

a. Set the PG 508 controls as follows:

TRIGGERING	FREE RUN
MODE	UNDLY
PERIOD	20 $\mu$ s
DELAY	10 ns
DURATION	10 $\mu$ s
TRANSITION TIME	0.5 $\mu$ s
LEADING	Fully ccw
TRAILING	Fully ccw
OUTPUT VOLTS	NORM
HIGH LEVEL	0.0 V
LOW LEVEL	0.0 V

b. Set the oscilloscope sweep speed to 0.5  $\mu$ s.

c. Short the center terminals of the NORM/COMPLEMENT switch together. See the Internal Adjustments Locations fold-out at the rear of the manual for location of the switch contacts.

d. Increase the vertical gain of the oscilloscope by ten times.

e. Adjust N/C Bal, (R910), for minimum signal.

f. Remove the short from the switch terminals.

g. Connect the voltmeter to the bottom center terminal of the NORMAL/COMPLEMENT switch and to ground.

h. Adjust the OUTPUT (VOLTS) LOW LEVEL control for 1.33 V dc.

i. Connect the voltmeter to the top center pin of the NORM/COMPLEMENT switch.

j. Without moving the LOW LEVEL control, set the OUTPUT (VOLTS) HIGH LEVEL control for 3.87 V dc.

k. Adjust Gain (R885) for a peak-to-peak output amplitude of 10 V into 50  $\Omega$ .

14. Adjust Tracking and Offset

a. Set all controls the same as in step 13.

b. While observing the low level part of the waveform, vary the HIGH LEVEL control from 0 V to 10 V.

c. Adjust Hi Trk (R915) for minimum shift of the low level part of the waveshape.

d. Observe the high level part of the waveform.

e. Vary the LOW LEVEL control from 0 V to maximum amplitude.

f. Adjust Lo Trk, (R920) for minimum shift of the high level part of the waveform.

g. Connect the voltmeter to the bottom center pin of the NORM/COMPLEMENT switch. Connect the negative lead to ground.

h. Set the LOW LEVEL control for a voltmeter reading of 2.6 V.

i. Adjust Offset, (R925) until the waveform low level is at 0 V on the oscilloscope.

15. Adjust Output Impedance

a. Set the FG 508 controls as follows:

TRIGGERING	SYNC/GATE LEVEL cw
MODE	UNDLY
PERIOD	20 $\mu$ s
DELAY	10 ns
DURATION	10 $\mu$ s
TRANSITION TIME	0.5 $\mu$ s
LEADING	Fully ccw
TRAILING	Fully ccw
OUTPUT VOLTS	NORM
HIGH LEVEL	10.0 V
LOW LEVEL	0.0 V

b. Turn the TRIG/GATE LEVEL control clockwise enough to light the TRIG'D/GATED light.

c. Connect the PG 508 OUTPUT to the digital voltmeter through a coaxial cable and a bnc female to dual banana adapter.

d. Adjust the HIGH LEVEL for a reading of 10.0 V on the voltmeter.

e. Connect a 50  $\Omega$  terminating resistor between the coaxial cable and the adapter.

f. Adjust R1020 for a reading of 5.0 V on the voltmeter.

16. Adjust Output Amplifier Response.

a. Set the PG 508 controls as follows:

TRIGGERING	FREE RUN
MODE	UNDLY
PERIOD	0.2 $\mu$ s
DELAY	10 ns
DURATION	0.1 $\mu$ s

**Calibration Procedure—PG 508  
Adjustment Procedure**

TRANSITION TIME	5 ns
LEADING	Fully ccw
TRAILING	Fully ccw
OUTPUT VOLTS	NORM
HIGH LEVEL	+10 V
LOW LEVEL	-10 V

Adjust LEADING control cw until the amplitude of the waveform is reduced by 10%.

- c. Adjust C749 for a flashing indication of the CONTROL ERROR light.

**NOTE**

*If the CONTROL ERROR light does not flash, adjust LEADING control cw until the waveform amplitude is reduced by 5% more and adjust C749 again for a flashing indication. If the light still cannot be made to flash with adjustment of C749, continue adjusting the LEADING control cw in 5% intervals until it flashes. Do not exceed a 50% decrease in waveform amplitude.*

- b. Install the sampling plug-ins and set the vertical to 0.2 V/Div.
- c. Connect the OUTPUT terminal of the PG 508 through a coaxial cable and a 10 X attenuator to the input of the sampling plug-in.
- d. Adjust R1050, C1024, and R1024 for the fastest rise time and least aberrations on the trailing transition and corner of the pulse.
- e. Remove the sampling plug-ins and re-install the real-time plug-ins.

- d. Readjust C749 to a point where the CONTROL ERROR light is just extinguished.

**17. Adjust Control Error Light**

- a. Set the PG 508 controls as follows:

TRIGGERING	FREE RUN
MODE	UNDLY
PERIOD	20 ns
DELAY	10 ns
DURATION	10 ns
TRANSITION TIME	5 ns
LEADING	Fully ccw
TRAILING	Fully ccw
OUTPUT VOLTS	NORM
HIGH LEVEL	+5 V
LOW LEVEL	-5 V

- e. Return the LEADING control to its fully ccw position.
- f. Adjust the TRAILING control cw to where the amplitude is reduced by 10%.
- g. Adjust C744 for a flashing indication of the CONTROL ERROR light.
- h. If the light does not flash, use the same procedure as for the LEADING control adjustment above. Do not exceed a 50% reduction in amplitude.
- i. Readjust C744 to a point where the CONTROL ERROR light is just extinguished.

- b. Connect a coaxial cable through a 50 Ω attenuator to the input of the oscilloscope.

This completes the adjustment procedure.

# MAINTENANCE

## GENERAL

### Introduction

This section of the manual is meant to support the entire TM 500 Series family with a general coverage of the most commonly needed service information pertinent to preventive maintenance, troubleshooting, ordering parts, and replacing components and sub-assemblies.

### Cabinet Removal

#### WARNING

*Dangerous potentials may exist at several points throughout the system. When the system must be operated with the cabinet removed, do not touch exposed connections or components. Some transistors have voltage present on their cases. Disconnect power before cleaning the system or replacing parts.*

### Cleaning

#### CAUTION

*Avoid using chemical cleaning agents which might damage plastic parts. Avoid chemicals containing benzene, toluene, xylene, acetone, or similar solvents.*

**Exterior.** Loose dust may be removed with a soft cloth or a dry brush.

**Interior.** Cleaning the interior of a unit should precede calibration since the cleaning processes could alter the settings of calibration adjustments. Use low-velocity compressed air to blow off accumulated dust. Hardened dirt can be removed with a soft brush, cotton-tipped swab, or a cloth dampened in a solution of water and mild detergent.

### Preventive Maintenance

Preventive maintenance steps performed on a regular basis will enhance the reliability of the instrumentation systems. However, periodic checks of the semiconductors in the absence of a malfunction are not recommended as preventive maintenance measures. See the semiconductor checking information under Troubleshooting Techni-

ques which follow. A convenient time to perform preventive maintenance is just before instrument calibration.

### Calibration

To ensure accurate signal generation and measurement, the performance of individual units in the system should be checked periodically. Refer to the Instruction Manual calibration and verification procedures.

## TROUBLESHOOTING AIDS

### Introduction

The following is provided to augment information contained elsewhere in this and other TM 500 series family manuals when troubleshooting becomes necessary.

### Circuit Description

Each manual has a section devoted to explaining circuit operating theory. Used with the schematics, this can be a powerful analytic tool.

### Diagrams

Block diagrams and detailed circuit schematics are located on foldout pages in the service section of most of the TM 500 Series Family manuals. The schematic diagrams show the component values and assigned circuit reference numbers of each part necessary to the circuit design. Usually the first page of the service section defines the circuit symbols and reference designators used in that particular instrument. Major circuits are usually identifiable by a series of component numbers. Important waveforms and voltages may be shown within the diagrams or on adjoining aprons. Those portions of the circuits located on circuit boards are enclosed with a dark outline.

### Cam Switch Charts

Cam switches shown on the diagrams are coded on charts to locate the cam number of the switch contact in the complete switch assembly, counting from the front, or knob end, toward the rear of the switch. The charts indicate with a solid dot when each contact is closed.

**Circuit Board Illustrations**

Line illustrations showing component locations keyed with a grid scheme for each circuit board are usually placed on the back of a foldout page and sequenced as close as possible to an associated schematic. The GRID LOC columns, located near the Parts Location Grid, keys each component to easy location on the board.

**Component and Wiring Color Codes**

Color stripes or dots on electrical components signify electrical values, tolerances, etc., according to EIA standards. Components not color-coded usually have information printed on the body. The wiring coding follows the same EIA standards with the exception of the ac power cord of the Power Modules. It is coded like this:

**Power Cord Conduction Identification**

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

**Testing Equipment**

Generally, a wide-band oscilloscope, a probe, and a multimeter are all that is needed to perform basic waveform and voltage checks for diagnostic purposes. The calibration procedures list specific test equipment and the features necessary to adequately check out the module.

**TROUBLESHOOTING TECHNIQUES**

**Introduction**

This troubleshooting procedure is arranged in an order which checks the simple trouble possibilities before proceeding to extensive troubleshooting.

**Control Settings**

Incorrect control settings can appear to be trouble that does not exist. If there is any question about the correct function or operation of any control, see the Operating Instructions section of the manual for the instrument involved.

**System and Associated Equipment**

Before proceeding with troubleshooting the TM 500 Series system, check that the instruments in the system are operating correctly. Check for proper interconnection between the power module and the plug-in modules. Check the line voltage at the power source. Verify that the signal is properly connected and that the interconnecting cables and signal source are not defective.

The associated plug-in modules can be checked for proper operation quickly by substituting other like units known to be operating properly. If the trouble persists after substitution, then the power module is probably at fault. Moving a properly operating plug-in from compartment to compartment will help determine if one or more compartments have a problem.

**Visual Check**

Inspect the portion of the system in which the trouble is suspected. Many troubles can be located by visual clues such as unsoldered connections, broken wires, damaged circuit board, damaged components, etc.

**Instrument Calibration**

Check the calibration of the suspected plug-in module or the affected circuit if the trouble is obviously in a certain circuit. The trouble may only be a result of misadjustment or may be corrected by re-calibration. Complete calibration instructions are given in the manual for each instrument in the system.

**Circuit Isolation**

Note the trouble symptoms. These often identify the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, check the affected circuits by making waveform and voltage measurements.

Incorrect operation of all circuits often means trouble in the power supplies. Using a multimeter, check first for correct voltages of the individual regulated supplies according to the plug-in module schematics and calibration procedures. Then check the unregulated supplies of the power modules. Defective components elsewhere in the instruments can appear as power supply problems. In these instances, suspected circuits should be disconnected from apparently bad power supplies one at a time to narrow the search.

**Voltages and Waveforms**

Often defective components can be located by using waveform and voltage indications when they appear on the schematic or in the calibration procedures. Such waveforms and voltage labels are typical indications and will vary between instruments. To obtain operating conditions similar to those used to take these readings, refer to the first diagram in the service sections.

**Component Checking**

If a component cannot be disconnected from its circuit, then the effects of the associated circuitry must be

considered when evaluating the measurement. Except for soldered-in transistors and integrated circuits, most components can be lifted at one end from the circuit board.

**Transistors and IC's.** Turn the power switch off before removing or replacing any semiconductor.

A good check of transistor operation is actual performance under operating conditions. A transistor can most effectively be checked by substituting a new component for it (or one which has been checked previously). However, be sure that circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic tester. Static-type testers are not recommended, since they do not check operation under simulated operating conditions. An anti-static suction-type desoldering tool must be used to remove soldered-in transistors; see component replacement procedure for details.

Integrated circuits can be checked with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of the circuit description is essential to troubleshooting circuits using IC's. Operating waveforms, logic levels, and other operating information for the IC's are given in the circuit description information of the appropriate manual. Use care when checking voltages and waveforms around the IC's so that the adjacent leads are not shorted together. A convenient means of clipping a test probe to the 14- and 16-pin in-line IC's is with an integrated circuit test clip. This device also doubles as an extraction tool.

**Diodes.** Do not use an ohmmeter that has a high internal current. High currents may damage a diode.

A diode may be checked for an open or shorted condition by measuring the resistance between terminals. With an ohmmeter scale having an internal source of between 8 mV, and 3 V, the resistance should be very high in one direction and very low when the leads are reversed. (A few diode types may even be damaged by 3 V.)

**Resistors.** Check the resistors with an ohmmeter. Resistor tolerances are given in the Electrical Parts List in every manual. Resistors do not normally need to be replaced unless the measured value varies widely from the specified value.

**Capacitors.** A leaky or shorted capacitor can be detected by checking resistance with an ohmmeter on the highest scale. Use an ohmmeter that will not exceed the voltage rating of the capacitor. The resistance reading should be high after initial charge of the capacitor. An

open capacitor can best be detected with a capacity meter, or by checking whether it passes ac signals.

## PARTS ORDERING AND REPLACING

### Ordering

**Obtaining Replacement Parts.** Most electrical and mechanical parts can be obtained through your local Tektronix field office or representative. However, you should be able to obtain many of the standard electronic components from a local commercial source in your area. Before you purchase or order a part from a source other than Tektronix, Inc., please check the electrical parts list for the proper value, rating tolerance and description.

**Special Parts.** Some parts are manufactured or selected by Tektronix, Inc., to satisfy particular requirements, or are manufactured for Tektronix, Inc., to our specifications. Most of the mechanical parts used in this system have been manufactured by Tektronix, Inc. Order all special parts directly from the local Tektronix Field Office or representative.

**Ordering Procedure.** When ordering replacement parts from Tektronix, Inc., please include the following information:

1. Instrument Type (PS 501, SG 502, DC 501, etc.).
2. Instrument Serial Number (for example, B010251).
3. A description of the part (if electrical include the circuit number).
4. Tektronix part number.

Please do not return any instruments or parts before receiving directions from Tektronix, Inc.

A listing of Tektronix Field Offices, Service Centers and Representatives can be found in the Tektronix Product Catalog and Supplements.

### Replacing

The exploded view drawings associated with the Mechanical Parts List, located to the rear of most manuals, may be especially helpful when disassembling or reassembling individual components or sub-assemblies.

**Circuit Boards.** If a circuit board is damaged beyond repair, either the entire assembly including all soldered-on components, or the board only, can be replaced.

To remove or replace a board, proceed as follows:

1. Disconnect all leads connected to the board (both soldered lead connections and solderless pin connections).

2. Remove all screws holding the board to the chassis or other mounting surface. Some boards may be held fast by plastic mounting clips around the board edges. For these, push the mounting clips away from the circuit board edges to free the board. Also, remove any knobs, etc, that would prevent the board from being lifted out of the instrument.

3. Lift the circuit board out of the unit. Do not force or bend the board.

4. To replace the board, reverse the order of removal. Use care when replacing pin connectors. If forced into place incorrectly positioned, the pin connectors may be damaged.

**Transistors and IC's.** Transistors and IC's should not be replaced unless they are actually defective. If removed from their sockets during routine maintenance, return them to their original sockets. Unnecessary replacement or switching of semiconductor devices may affect the calibration of the instruments. When a transistor is replaced, check the operation of the part of the instrument that may be affected.

Replacement semiconductors should be of the original type or a direct replacement. Figure 5-1 shows the lead configurations of the semiconductors used in this instrument system. When removing soldered-in transistors, use a suction-type desoldering tool to remove the solder from the holes in the circuit board.

An extracting tool should be used to remove the 14- and 16-pin integrated circuits to prevent damage to the pins. This tool is available from Tektronix, Inc. If an extracting tool is not available, use care to avoid damaging the pins. Pull slowly and evenly on both ends of the IC. Try to avoid having one end of the IC disengage from the socket before the other end.

### Static-Sensitive Components



*Static discharge can damage any semiconductor component in this instrument.*

This instrument contains electrical components that are susceptible to damage from static discharge. See Table 5-1 for relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV are common in unprotected environments.

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.

2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or a conductive foam. Label any package that contains static-sensitive assemblies or components.

3. Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified service personnel.

4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.

5. Keep the component leads shorted together whenever possible.

6. Pick up components by the body, never by the leads.

7. Do not slide the components over any surface.

8. Avoid handling components in areas that have a floor or work surface covering capable of generating a static charge.

9. Use a soldering iron that is connected to earth ground.

10. Use only special antistatic suction type or wick type desoldering tools.

### Test Equipment

Before using any test equipment to make measurements on static-sensitive components or assemblies, be certain that any voltage or current supplied by the test equipment does not exceed the limits of the component to be tested.



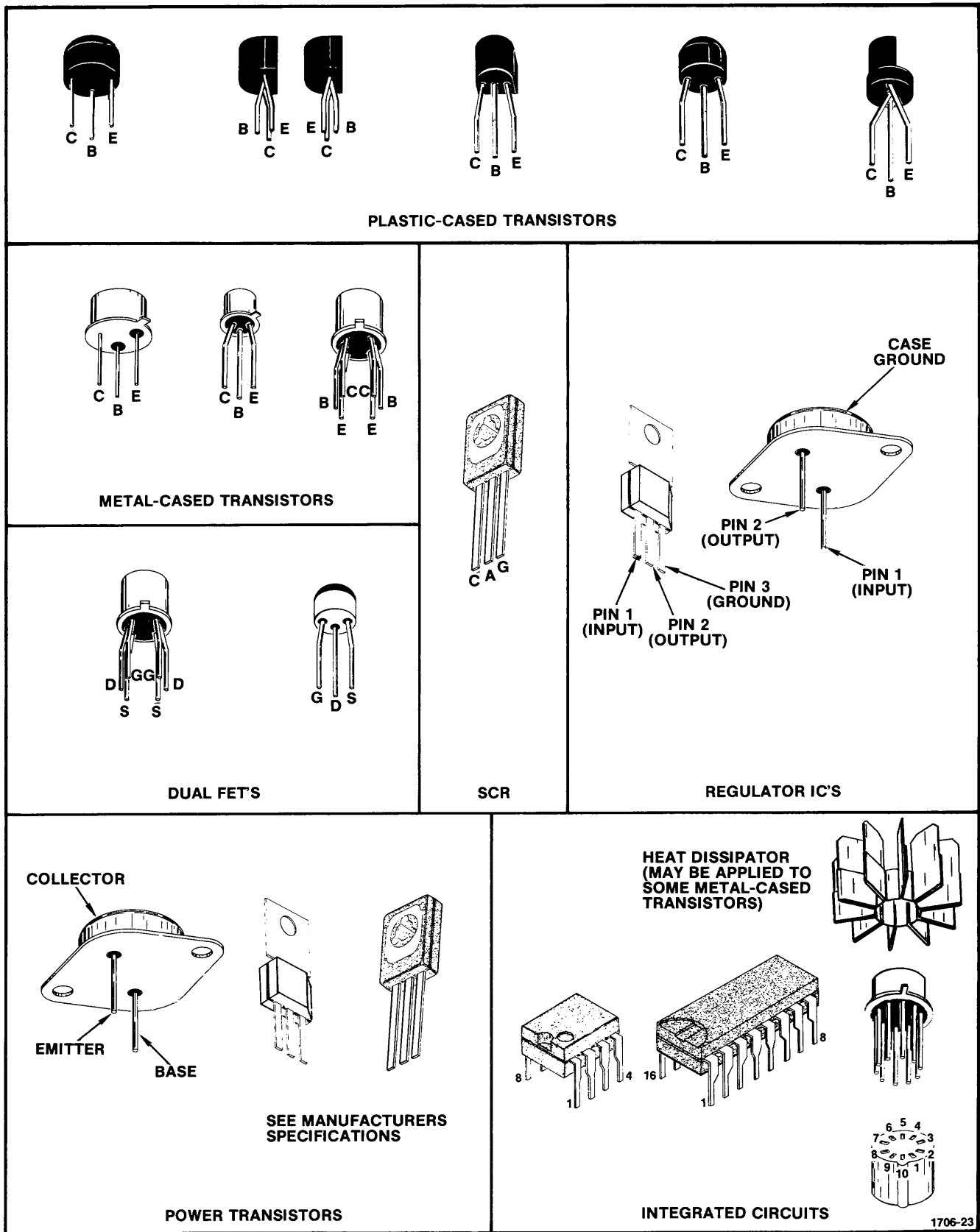


Fig. 5-1. Semiconductor device lead configurations found in the TM 500 family.

**Interconnecting Pins.** To replace a pin that is mounted on a circuit board, first disconnect any pin connectors. Then, unsolder the damaged pin and pull it out of the board with a pair of pliers. Be careful not to damage the wiring on the board with too much heat. Ream out the hole in the circuit board with a 0.031-inch drill. Remove the ferrule from the new interconnecting pin and press the new pin into the hole in the circuit board. Position the pin in the same manner as the old pin and solder it in. If the old pin was bent at an angle to mate with a connector, bend the new pin to match the associated pins.

**NOTE**

*A pin replacement kit including necessary tools, instructions, and replacement pins is available from Tektronix, Inc.*

**Table 5-1  
RELATIVE SUSCEPTIBILITY TO  
STATIC DISCHARGE DAMAGE**

<b>Semiconductor Classes</b>	<b>Relative Susceptibility Levels<sup>a</sup></b>
MOS or CMOS microcircuits or discretes, or linear microcircuits with MOS inputs (Most Sensitive)	1
ECL	2
Schottky signal diodes	3
Schottky TTL	4
High-frequency bipolar transistors	5
JFETs	6
Linear Microcircuits	7
Low-power Schottky TTL	8
TTL (Least Sensitive)	9

<sup>a</sup> Voltage equivalent for levels:

1 = 100 to 500 V    4 = 500 V    7 = 400 to 1000 V (est.)  
 2 = 200 to 500 V    5 = 400 to 600 V    8 = 900 V  
 3 = 250 V    6 = 600 to 800 V    9 = 1200 V

(Voltage discharged from a 100 pF capacitor through a resistance of 100 ohms.)

**Table 5-2**  
**MAINTENANCE AIDS**

The following maintenance aids include items required for some maintenance procedures in this instrument. Equivalent products may be substituted for examples given providing characteristics are similar.

<b>Description</b>	<b>Specifications</b>	<b>Use</b>	<b>Example</b>
1. Soldering Iron	15 Watt	General soldering and unsoldering	ANTEX PRECISION Model C
2. Screwdriver	Phillips #1 tip	Assembly and Disassembly	Xcelite Model X108
3. Screwdriver	Phillips #2 tip	Assembly and Disassembly	Xcelite Model X102
4. Screwdriver	Three-inch shaft; 3/32 inch flat bit	General	Xcelite R3323
5. Torque Screwdriver	1.5 inch-pounds	FUNCTION switch assembly	Sturtevant-Richmont Torque Products Model PM-5-Roto-Torq
6. Nutdrivers	1/4 inch, 5/16 inch 3/8 inch, 7/16 inch	General	Xcelite #8, #10, #12 & #14
7. Open End Wrench	11/16 inch	General	
8. Solder Wick		Unsoldering	Hex Wik #887-10
9. Lubricant	Versilube	FUNCTION switch lubrication	Tektronix Part No. 006-1353-00
10. Spray Cleaner	No Noise	FUNCTION switch pad cleaning	Tektronix Part No. 006-0442-02
11. Vacuum Desoldering Tool	Antistatic	General	Tektronix Part No. 003-0795-00
12. I.C. Extracting Tool		General	Tektronix Part No. 003-0619-00
13. Cam Switch Repair Kit		Cam switches	Tektronix Part No. 040-0541-00
14. Extender Cables		General	Tektronix Part No. 067-0645-02

# REAR INTERFACE CONNECTOR ASSIGNMENTS

Recommended Loads	Output or Input	Pin B		Pin A	Output or Input	Recommended Loads
	Trigger Out Common	28	Barrier Slot	28		
50 Ω	Trigger Out	27		27		
		26		26	Amplitude Monitor Ground	
	Trig/Gate Input Common	25		25	Amplitude Monitor	>1 MΩ
	Trig/Gate Input	24		24		
		23		23		
	External High Level Control Input	22		22	External Low Level Control Input	
		21		21		
		20		20		
		19		19		
		18		18		
		17		17		
		16		16		
		15	15			
		14	14			
	25 V ac winding	*13	TM 500 Barrier Slot	*13	25 V ac winding	
	+33.5 V filtered dc	*12		*12	+33.5 V filtered dc	
	Collector lead of pnp series-pass	**11		**11	Base lead of pnp series-pass	
	Transformer shield	10		**10	Emitter lead of pnp series-pass	
	±33.5 V common return	*9		*9	±33.5 V common return	
	-33.5 V filtered dc	*8		*8	-33.5 V common return	
	Collector lead of npn series-pass	**7		**7	Emitter lead of npn series-pass	
	No connection	6		**6	Base lead of npn series-pass	
	17.5 V ac winding	*5		*5	17.6 V ac winding	
	+11.5 V common return	4		4	+11.5 V common return	
	+11.5 V common return	*3		*3	+11.5 V common return	
	+11.5 V filtered dc	*2		*2	+11.5 V filtered dc	
	25 V ac winding	*1		*1	25 V ac winding	
		B		A		

Rear View of plug-in

Assignments listed for pins 1A — 13A and 1B — 13B are available in all power modules; however only those pins marked with an asterisk (\*) are used by the PG 508. Those connections marked with a double asterisk (\*\*) are the only connections used on the E board.

Fig. 5-3. Rear interface connector assignments.

## Using the Rear Interface Connectors

See the accompanying chart for rear interface connector assignments. For other functions not detailed here the small auxiliary board (E) has numerous connectors available. Use the connections to make custom inputs or outputs to the PG 508 through the Power Module.

### Amplitude Monitor

These pins (25A) are connected to the OUTPUT terminal through a 27 k resistor and ground (26A). To use this function place the PERIOD control in the EXT TRIG OR MAN position and connect an accurate voltmeter to these terminals. Now adjust the TRIG/GATE LEVEL control cw for the high steady state output voltage and ccw for the low steady state output voltage. In this manner the output pulse amplitude levels may be precisely monitored.

### External Level Control Inputs

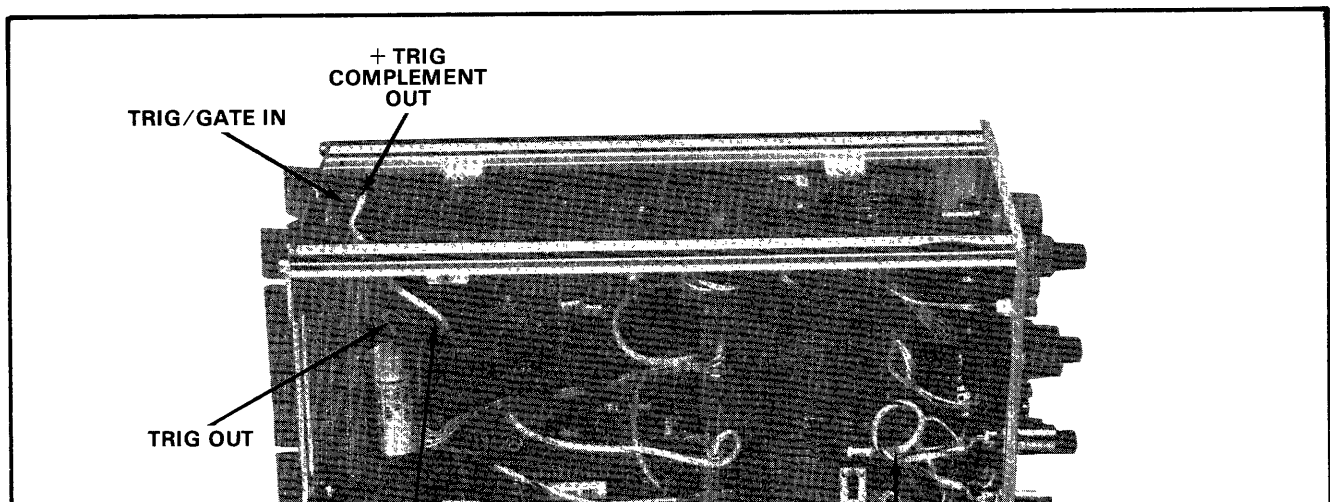
See the discussion under the heading External Voltage Control in Section 1 of this manual for use of these terminals.

### Trig/Gate Input

These assignments provide rear interface input capabilities for the front panel TRIG/GATE IN input. The signal lead (24B) must be user installed but the ground (25B) is factory wired. To make the proper connections remove the cable extending from the TRIG/GATE IN connector to the input board by pulling the end from the socket on the board. Install a twelve inch cable with the proper connectors, Tektronix Part No. 175-1827-00, from the connector on the input circuit board labeled Trig/Gate in to the other connector on the output board labeled Trig/Gate In as shown in the illustration.

### Trigger Output

The signal lead (27B) and ground connection (28B) are factory wired. The signal available at pin 27B is the complement (180° out of phase) of the front panel OUTPUT. To obtain the + TRIG OUT signal at the rear interface connector and the complement at the front panel change the position of both coaxial cables, with respect to the Trig Out and Trig Comp jacks on the rear of the circuit board, as shown in the illustration. The normal trigger input may be used simultaneously with the complement without disturbing the operation of either. See Fig. 5-2.



**Selected Parts**

Some parts in the PG 508 are selected to compensate for parts tolerances and other component variations. Nominal values are installed and only changed if necessary.

**R354.** This resistor is selected for tolerances of R355. It is selected to provide overlap on the delay ranges. (Nominal value 120 K.)

**R473.** This resistor is selected to compensate for tolerances in R475. It is selected to provide overlap between the duration ranges. (Nominal value 120 K.)

**L240** is selected to compensate the trigger out waveform high frequency aberrations.

**R362 and R370** are selected for a 23 nsec delay from the trigger out to the pulse out, an increase in resistance causes an increase in delay. (470  $\Omega$  nominal.)

**R1005** is selected if the aberrations from the output amplifier are out of specifications. It is selected for the best compromise waveform. (43  $\Omega$  nominal.)

**R850, R852, R854, R856, C850, C852, C854, C856** are selected to allow the output of the PG 508 to make

aberration and risetime specifications. Changing values will change the risetime and/or aberrations.

**REPACKAGING FOR SHIPMENT**

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

No options are 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
01002	GENERAL ELECTRIC COMPANY, INDUSTRIAL AND POWER CAPACITOR PRODUCTS DEPARTMENT	JOHN STREET	HUDSON FALLS, NY 12839
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01282	PARKER STEARNS AND CO., INC.	300 SHEFFIELD AVENUE	BROOKLYN, NY 11207
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
12697	CLAROSTAT MFG. CO., INC.	LOWER WASHINGTON STREET	DOVER, NH 03820
13511	AMPHENOL CARDRE DIV., BUNKER RAMO CORP.		LOS GATOS, CA 95030
14433	ITT SEMICONDUCTORS	3301 ELECTRONICS WAY P O BOX 3049	WEST PALM BEACH, FL 33402
14552	MICRO SEMICONDUCTOR CORP.	2830 F FAIRVIEW ST.	SANTA ANA, CA 92704
14752	ELECTRO CUBE INC.	1710 S. DEL MAR AVE.	SAN GABRIEL, CA 91776
18324	SIGNETICS CORP.	811 E. ARQUES	SUNNYVALE, CA 94086
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
53184	KCITON CORPORATION	5 HEMLOCK STREET	LATHAM, NY 12110
55210	GETTIG ENG. AND MFG. COMPANY	PO BOX 85, OFF ROUTE 45	SPRING MILLS, PA 16875
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
79727	C-W INDUSTRIES	550 DAVISVILLE RD., P O BOX 96	WARMINSTER, PA 18974
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E. WASHINGTON STREET P. O. BOX 372	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-4273-00	B010100	B020244	CKT BOARD ASSY: INPUT	80009	670-4273-00
A1	670-4273-01	B020245		CKT BOARD ASSY: INPUT	80009	670-4273-01
A2	670-4274-00	B010100	B020244	CKT BOARD ASSY: TIMING	80009	670-4274-00
A2	670-4274-01	B020245	B029999	CKT BOARD ASSY: TIMING	80009	670-4274-01
A2	670-4274-02	B030000	B043259	CKT BOARD ASSY: TIMING	80009	670-4274-02
A2	670-4274-03	B043260		CKT BOARD ASSY: TIMING	80009	670-4274-03
A3	670-4275-00	B010100	B020244	CKT BOARD ASSY: TRANSITION TIMING	80009	670-4275-00
A3	670-4275-01	B020245	B029999	CKT BOARD ASSY: TRANSITION TIMING	80009	670-4275-01
A3	670-4275-02	B030000		CKT BOARD ASSY: TRANSITION TIMING	80009	670-4275-02
A4	670-4276-00	B010100	B020698	CKT BOARD ASSY: OUTPUT	80009	670-4276-00
A4	670-4276-01	B020699	B043259	CKT BOARD ASSY: OUTPUT	80009	670-4276-01
A4	670-4276-02	B043260	B043269	CKT BOARD ASSY: OUTPUT	80009	670-4276-02
A4	670-4276-03	B043270		CKT BOARD ASSY: OUTPUT	80009	670-4276-03
A5	670-4272-00			CKT BOARD ASSY: AUXILIARY	80009	670-4272-00
C14	281-0518-00			CAP., FXD, CER DI: 47PF, +/-9.4PF, 500V	72982	301-000U2J0470M
C36	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C40	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C55	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C70	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C76	283-0000-00			CAP., FXD, CER DI: 0.001UF, +100-0%, 500V	72982	831-516E102P
C104	283-0000-00			CAP., FXD, CER DI: 0.001UF, +100-0%, 500V	72982	831-516E102P
C106	290-0535-00			CAP., FXD, ELCTLT: 33UF, 20%, 10V	56289	196D336X0010KA1
C110	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C140	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C142	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C154	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C170	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C171	281-0540-00	B010100	B010124X	CAP., FXD, CER DI: 51PF, 5%, 500V	72982	301-000U2J0510J
C172	283-0111-00			CAP., FXD, CER DI: 0.1UF, 20%, 50V	72982	8121-N088Z5U104M
C177	283-0663-00			CAP., FXD, MICA D: 16.8PF, +/-0.5PF, 500V	00853	D155C16.8D0
C180	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C200	290-0722-00			CAP., FXD, ELCTLT: 100UF, 20%, 10V	56289	196D107X0010PE3
C201	290-0722-00			CAP., FXD, ELCTLT: 100UF, 20%, 10V	56289	196D107X0010PE3
C202	290-0722-00			CAP., FXD, ELCTLT: 100UF, 20%, 10V	56289	196D107X0010PE3
C203	290-0722-00			CAP., FXD, ELCTLT: 100UF, 20%, 10V	56289	196D107X0010PE3
C205	290-0536-00			CAP., FXD, ELCTLT: 10UF, 20%, 25V	90201	TDC106M025FL
C206	290-0536-00			CAP., FXD, ELCTLT: 10UF, 20%, 25V	90201	TDC106M025FL
C207	290-0536-00			CAP., FXD, ELCTLT: 10UF, 20%, 25V	90201	TDC106M025FL
C208	290-0536-00			CAP., FXD, ELCTLT: 10UF, 20%, 25V	90201	TDC106M025FL
C210	285-0576-00			CAP., FXD, PLSTC: 1UF, 10%, 100V	56289	410P10591
C212	285-0703-00			CAP., FXD, PLSTC: 0.1UF, 5%, 100V	56289	410P10451
C214	285-0598-00			CAP., FXD, PLSTC: 0.01UF, 5%, 100V	01002	61F10AC103
C216	283-0645-00			CAP., FXD, MICA D: 790PF, 1%, 100V	00853	D151E791F0
C218	281-0540-00			CAP., FXD, CER DI: 51PF, 5%, 500V	72982	301-000U2J0510J
C244	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C260	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C270	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C275	283-0636-00	B010100	B010124	CAP., FXD, MICA D: 36PF, 1.4%, 100V	00853	D155F360G0
C275	283-0634-00	B010125		CAP., FXD, MICA D: 65PF, 1%, 100V	00853	D151E650F0
C277	283-0000-00			CAP., FXD, CER DI: 0.001UF, +100-0%, 500V	72982	831-516E102P
C279	283-0000-00			CAP., FXD, CER DI: 0.001UF, +100-0%, 500V	72982	831-516E102P
C296	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C300	281-0509-00			CAP., FXD, CER DI: 15PF, +/-1.5PF, 500V	72982	301-000C0G0150K
C304	283-0634-00	B010100	B020244X	CAP., FXD, MICA D: 65PF, 1%, 100V	00853	D151E650F0
C317	281-0516-00			CAP., FXD, CER DI: 39PF, +/-3.9PF, 500V	72982	301-000U2J0390K
C325	281-0504-00			CAP., FXD, CER DI: 10PF, +/-1PF, 500V	72982	301-055C0G0100F

Replaceable Electrical Parts—PG 508

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C326	283-0677-00			CAP., FXD, MICA D:82PF, 1%, 500V	00853	D155E820F0
C328	283-0594-00			CAP., FXD, MICA D:0.001UF, 1%, 100V	00853	D151F102F0
C330	285-1049-00			CAP., FXD, PLSTC:0.01UF, 1%, 200V	14752	230B1C103F
C332	285-0703-00			CAP., FXD, PLSTC:0.1UF, 5%, 100V	56289	410P10451
C334	285-0576-00			CAP., FXD, PLSTC:1UF, 10%, 100V	56289	410P10591
C336	290-0536-00			CAP., FXD, ELCTLT:10UF, 20%, 25V	90201	TDC106M025FL
C338	290-0722-00			CAP., FXD, ELCTLT:100UF, 20%, 10V	56289	196D107X0010PE3
C346	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C360	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C366	283-0635-00	B010100	B010124	CAP., FXD, MICA D:51PF, 1%, 100V	00853	D151E510F0
C366	283-0634-00	B010125		CAP., FXD, MICA D:65PF, 1%, 100V	00853	D151E650F0
C375	283-0635-00	B010100	B010124	CAP., FXD, MICA D:51PF, 1%, 100V	00853	D151E510F0
C375	283-0634-00	B010125		CAP., FXD, MICA D:65PF, 1%, 100V	00853	D151E650F0
C378	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	72982	831-516E102P
C382	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	72982	831-516E102P
C385	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C386	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C389	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C400	283-0111-00			CAP., FXD, CER DI:0.1UF, 20%, 50V	72982	8121-N088Z5U104M
C415	281-0509-00			CAP., FXD, CER DI:15PF, +/-1.5PF, 500V	72982	301-000C0G0150K
C418	283-0634-00	B010100	B020244X	CAP., FXD, MICA D:65PF, 1%, 100V	00853	D151E650F0
C432	281-0516-00	B010100	B010124	CAP., FXD, CER DI:39PF, +/-3.9PF, 500V	72982	301-000U2J0390K
C432	281-0509-00	B010125	B020244	CAP., FXD, CER DI:15PF, +/-1.5PF, 500V	72982	301-000C0G0150K
C432	281-0516-00	B020245	B029999	CAP., FXD, CER DI:39PF, +/-3.9PF, 500V	72982	301-000U2J0390K
C432	281-0504-00	B030000	B043259	CAP., FXD, CER DI:10PF, +/-1PF, 500V	72982	301-055C0G0100F
C432	281-0167-00	B043260		CAP., VAR, CER DI:9-45PF, 200V	72982	538-011-D 9-45
C433	283-0111-00	XB010125		CAP., FXD, CER DI:0.1UF, 20%, 50V	72982	8121-N088Z5U104M
C435	283-0634-00			CAP., FXD, MICA D:65PF, 1%, 100V	00853	D151E650F0
C436	281-0504-00			CAP., FXD, CER DI:10PF, +/-1PF, 500V	72982	301-055C0G0100F
C438	283-0594-00			CAP., FXD, MICA D:0.001UF, 1%, 100V	00853	D151F102F0
C439	281-0513-00			CAP., FXD, CER DI:27PF, +/-5.4PF, 500V	72982	301-000P2G0270M
C442	285-1049-00			CAP., FXD, PLSTC:0.01UF, 1%, 200V	14752	230B1C103F
C444	285-0703-00			CAP., FXD, PLSTC:0.1UF, 5%, 100V	56289	410P10451
C446	285-0576-00			CAP., FXD, PLSTC:1UF, 10%, 100V	56289	410P10591
C448	290-0536-00			CAP., FXD, ELCTLT:10UF, 20%, 25V	90201	TDC106M025FL
C450	290-0722-00			CAP., FXD, ELCTLT:100UF, 20%, 10V	56289	196D107X0010PE3
C460	283-0111-00			CAP., FXD, CER DI:0.1UF, 20%, 50V	72982	8121-N088Z5U104M
C462	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C480	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C485	283-0111-00	B010100	B010169X	CAP., FXD, CER DI:0.1UF, 20%, 50V	72982	8121-N088Z5U104M
C487	290-0530-00			CAP., FXD, ELCTLT:68UF, 20%, 6V	90201	TDC686M006NLF
C493	283-0000-00	XB010170	B029999X	CAP., FXD, CER DI:0.001UF, +100-0%, 500V	72982	831-516E102P
C500	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	72982	831-516E102P
C502	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C503	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C505	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	56289	36C600
C532	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C544	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C555	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C563	281-0653-00			CAP., FXD, CER DI:3.3PF, 30%, 200V	72982	374000C0J0339F
C569	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N06125U0103M
C580	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N06125U0103M
C581	290-0527-00			CAP., FXD, ELCTLT:15UF, 20%, 20V	90201	TDC156M020FL
C586	285-0934-00			CAP., FXD, PLSTC:2.2UF, 10%, 200V	56289	430P238
C588	285-0633-00			CAP., FXD, PLSTC:0.22UF, 20%, 100V	56289	410P22491
C590	285-0566-00			CAP., FXD, PLSTC:0.022UF, 10%, 200V	56289	410P22392
C592	283-0694-00			CAP., FXD, MICA D:2240PF, 0.5%, 300V	00853	D193F2241E0

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C594	283-0625-00			CAP., FXD, MICA D:220PF, 1%, 500V	00853	D105F221F0
C596	281-0544-00			CAP., FXD, CER DI:5.6PF, 10%, 500V	72982	301-000C0H0569D
C600	290-0527-00			CAP., FXD, ELCTLT:15UF, 20%, 20V	90201	TDC156M020FL
C601	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C622	281-0653-00			CAP., FXD, CER DI:3.3PF, 30%, 200V	72982	37400C0J0339F
C630	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C643	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C647	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C662	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C665	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C675	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C680	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C682	283-0648-00			CAP., FXD, MICA D:10PF, 5%, 100V	00853	D151C100D0
C697	283-0065-00			CAP., FXD, CER DI:0.001UF, 5%, 100V	72982	805-518-25D0102J
C701	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C708	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C720	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C724	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C734	290-0530-00			CAP., FXD, ELCTLT:68UF, 20%, 6V	90201	TDC686M006NLF
C735	283-0024-00	XB030000		CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C736	283-0000-00	XB020245	B029999X	CAP., FXD, CER DI:0.001UF, +100-0%, 500V	72982	831-516E102P
C740	283-0024-00			CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C744	281-0187-00	XB030000		CAP., VAR, PLSTC:4-40PF, 250V	72982	538-011D9-45
C749	283-0648-00	B010100	B029999	CAP., FXD, MICA D:10PF, 5%, 100V	00853	D151C100D0
C749	281-0187-00	B030000		CAP., VAR, PLSTC:4-40PF, 250V	72982	538-011D9-45
C778	283-0204-00	XB043260		CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C780	283-0178-00			CAP., FXD, CER DI:0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C782	283-0177-00	XB043260		CAP., FXD, CER DI:1UF, +80-20%, 25V	56289	273C5
C788	283-0204-00	XB043260		CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C800	283-0178-00			CAP., FXD, CER DI:0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C814	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	72982	831-516E102P
C820	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C834	281-0604-00			CAP., FXD, CER DI:2.2PF, +/-0.25PF, 500V	72982	301-000C0J0229C
C836	283-0187-00			CAP., FXD, CER DI:0.047UF, 10%, 400V	72982	8131N401X5R0473K
C840	290-0527-00			CAP., FXD, ELCTLT:15UF, 20%, 20V	90201	TDC156M020FL
C850	283-0752-00	B010100	B020698	CAP., FXD, MICA D:345PF, 1%, 500V	00853	D155E3450F0
C850	283-0638-00	B020699		CAP., FXD, MICA D:130PF, 1%, 100V (NOMINAL INSTALLED, TEST SELECTED AS A SET)	00853	D151F131F0
C852	283-0752-00	B010100	B020698	CAP., FXD, MICA D:345PF, 1%, 500V	00853	D155E3450F0
C852	283-0638-00	B020699		CAP., FXD, MICA D:130PF, 1%, 100V (NOMINAL INSTALLED, TEST SELECTED AS A SET)	00853	D151F131F0
C854	283-0752-00	B010100	B020698	CAP., FXD, MICA D:345PF, 1%, 500V	00853	D155E3450F0
C854	283-0638-00	B020699		CAP., FXD, MICA D:130PF, 1%, 100V (NOMINAL INSTALLED, TEST SELECTED AS A SET)	00853	D151F131F0
C856	283-0752-00	B010100	B020698	CAP., FXD, MICA D:345PF, 1%, 500V	00853	D155E3450F0
C856	283-0638-00	B020699		CAP., FXD, MICA D:130PF, 1%, 100V (NOMINAL INSTALLED, TEST SELECTED AS A SET)	00853	D151F131F0
C860	283-0002-00			CAP., FXD, CER DI:0.01UF, +80-20%, 500V	72982	811-546E103Z
C863	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	72982	831-516E102P
C879	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C880	283-0002-00			CAP., FXD, CER DI:0.01UF, +80-20%, 500V	72982	811-546E103Z
C895	283-0178-00			CAP., FXD, CER DI:0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C930	283-0178-00			CAP., FXD, CER DI:0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C938	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C945	283-0024-00	XB043260		CAP., FXD, CER DI:0.1UF, +80-20%, 50V	72982	8121N083Z5U0104Z
C958	283-0204-00			CAP., FXD, CER DI:0.01UF, 20%, 50V	72982	8121N061Z5U0103M
C962	283-0178-00			CAP., FXD, CER DI:0.1UF, +80-20%, 100V	72982	8131N145651 104Z

Replaceable Electrical Parts—PG 508

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C964	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C966	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C975	283-0204-00			CAP., FXD, CER DI: 0.01UF, 20%, 50V	72982	8121N06125U0103M
C985	290-0573-00			CAP., FXD, ELCTLT: 2.7UF, 20%, 50V	56289	196D275X0050JA1
C989	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C992	283-0204-00			CAP., FXD, CER DI: 0.01UF, 20%, 50V	72982	8121N06125U0103M
C997	283-0204-00			CAP., FXD, CER DI: 0.01UF, 20%, 50V	72982	8121N06125U0103M
C1017	283-0669-00			CAP., FXD, MICA D: 360PF, 1%, 500V	00853	D155F361F0
C1024	281-0092-00			CAP., VAR, CER DI: 9-35PF, 200V	72982	538-011 D9-35
C1048	285-0598-00			CAP., FXD, PLSTC: 0.01UF, 5%, 100V	01002	61F10AC103
C1055	283-0204-00			CAP., FXD, CER DI: 0.01UF, 20%, 50V	72982	8121N06125U0103M
C1065	290-0573-00			CAP., FXD, ELCTLT: 2.7UF, 20%, 50V	56289	196D275X0050JA1
C1072	283-0204-00			CAP., FXD, CER DI: 0.01UF, 20%, 50V	72982	8121N06125U0103M
C1075	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C1077	283-0204-00			CAP., FXD, CER DI: 0.01UF, 20%, 50V	72982	8121N06125U0103M
C1097	290-0573-00			CAP., FXD, ELCTLT: 2.7UF, 20%, 50V	56289	196D275X0050JA1
C1202	290-0633-00	B010100	B043259	CAP., FXD, ELCTLT: 2400UF, +75-10%, 30V	56289	39D360
C1202	290-0786-00	B043260		CAP., FXD, ELCTLT: 1500UF, +50-10%, 75VDC	56289	39D793
C1205	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C1207	283-0081-00	B010100	B043259	CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C1207	283-0080-00	B043260		CAP., FXD, CER DI: 0.022UF, +80-20%, 25V	56289	19C611
C1211	290-0527-00			CAP., FXD, ELCTLT: 15UF, 20%, 20V	90201	TDC156M020FL
C1217	283-0000-00			CAP., FXD, CER DI: 0.001UF, +100-0%, 500V	72982	831-516E102P
C1219	283-0081-00	B010100	B043259	CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C1219	283-0080-00	B043260		CAP., FXD, CER DI: 0.022UF, +80-20%, 25V	56289	19C611
C1220	290-0527-00			CAP., FXD, ELCTLT: 15UF, 20%, 20V	90201	TDC156M020FL
C1240	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C1242	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C1244	283-0081-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C1246	290-0527-00			CAP., FXD, ELCTLT: 15UF, 20%, 20V	90201	TDC156M020FL
C1248	290-0527-00			CAP., FXD, ELCTLT: 15UF, 20%, 20V	90201	TDC156M020FL
C1250	290-0527-00			CAP., FXD, ELCTLT: 15UF, 20%, 20V	90201	TDC156M020FL
C1259	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C1280	283-0103-00			CAP., FXD, CER DI: 180PF, 5%, 500V	56289	40C638
C1307	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C1308	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C1310	290-0117-00			CAP., FXD, ELCTLT: 50UF, +75-10%, 50V	56289	30D506G050DD9
C1327	290-0633-00	B010100	B043259	CAP., FXD, ELCTLT: 2400UF, +75-10%, 30V	56289	39D360
C1327	290-0786-00	B043260		CAP., FXD, ELCTLT: 1500UF, +50-10%, 75VDC	56289	39D793
C1335	283-0081-00	B010100	B043259	CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C1335	283-0080-00	B043260		CAP., FXD, CER DI: 0.022UF, +80-20%, 25V	56289	19C611
C1337	283-0081-00	B010100	B043259	CAP., FXD, CER DI: 0.1UF, +80-20%, 25V	56289	36C600
C1337	283-0080-00	B043260		CAP., FXD, CER DI: 0.022UF, +80-20%, 25V	56289	19C611
C1340	290-0527-00			CAP., FXD, ELCTLT: 15UF, 20%, 20V	90201	TDC156M020FL
C1342	290-0527-00			CAP., FXD, ELCTLT: 15UF, 20%, 20V	90201	TDC156M020FL
C1344	290-0527-00			CAP., FXD, ELCTLT: 15UF, 20%, 20V	90201	TDC156M020FL
C1359	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C1380	283-0103-00			CAP., FXD, CER DI: 180PF, 5%, 500V	56289	40C638
C1407	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C1408	283-0178-00			CAP., FXD, CER DI: 0.1UF, +80-20%, 100V	72982	8131N145651 104Z
C1410	290-0117-00			CAP., FXD, ELCTLT: 50UF, +75-10%, 50V	56289	30D506G050DD9
CR16	152-0141-02			SEMICOND DEVICE: SILICON, 30V, 150MA	01295	1N4152R
CR17	152-0141-02			SEMICOND DEVICE: SILICON, 30V, 150MA	01295	1N4152R
CR25	152-0141-02			SEMICOND DEVICE: SILICON, 30V, 150MA	01295	1N4152R
CR26	152-0141-02			SEMICOND DEVICE: SILICON, 30V, 150MA	01295	1N4152R
CR80	152-0141-02			SEMICOND DEVICE: SILICON, 30V, 150MA	01295	1N4152R
CR82	152-0141-02			SEMICOND DEVICE: SILICON, 30V, 150MA	01295	1N4152R

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR84	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR86	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR145	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR147	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR220	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR222	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR224	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR226	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR228	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR296	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR304	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR305	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR378	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR382	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR493	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR495	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR584	152-0536-00			SEMICON D DEVICE:SILICON,HOT CARRIER,4V	80009	152-0536-00
CR600	152-0536-00			SEMICON D DEVICE:SILICON,HOT CARRIER,4V	80009	152-0536-00
CR604	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR782	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR790	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR792	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR794	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR805	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR876	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR885	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR958	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR990	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR991	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR1200	152-0488-00			SEMICON D DEVICE:SILICON, 200V, 1500MA	04713	3N55 FAMILY
CR1202	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1207	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1219	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1225	152-0488-00			SEMICON D DEVICE:SILICON, 200V, 1500MA	04713	3N55 FAMILY
CR1240	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1242	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1244	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1246	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1248	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1250	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1272	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR1282	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1283	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1306	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR1310	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1325	152-0488-00			SEMICON D DEVICE:SILICON, 200V, 1500MA	04713	3N55 FAMILY
CR1327	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1337	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1340	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1342	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1344	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1372	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR1382	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1383	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016
CR1406	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR1410	152-0066-00			SEMICON D DEVICE:SILICON, 400V, 750MA	14433	LG4016

Replaceable Electrical Parts—PG 508

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
DL480	119-0755-00	B010100	B020244X	DELAY LINE, ELEC:4.75NS, 50 OHMS	80009	119-0755-00
DS110	150-1029-00			LT EMITTING DIO:GREEN,565NM,35A	53184	XC209G
DS500	150-1031-00			LT EMITTING DIO:RED,650NM,40MA MAX	53184	XC209R
DS1250	150-1029-00			LT EMITTING DIO:GREEN,565NM,35A	53184	XC209G
J10	131-0955-00			CONNECTOR, RCPT, :CKT BD, 28/56 CONTACT	13511	31-279
J12	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J90	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J140	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J254	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J255	131-0955-00			CONNECTOR, RCPT, :CKT BD, 28/56 CONTACT	13511	31-279
J260	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J305	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J450	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J452	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J480	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J481	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J485	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J520	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J522	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J1024	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J1025	131-1315-00			CONN, RCPT, ELEC: BNC, FEMALE	80009	131-1315-00
J1200	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
J1201	131-1003-00			CONN, RCPT, ELEC:CKT BD MT, 3 PRONG	80009	131-1003-00
L240	276-0569-00			CORE, TOROID: (NOMINAL VALUE, TEST SELECTED)	80009	276-0569-00
L507	108-0114-00	B010100	B029999X	COIL, RF:47UH (L507, ABOVE S/N B030000 REPLACED WITH A #22 WIRE STRAP)	80009	108-0114-00
L980	108-0543-00			COIL, RF:FIXED, 1.1UH	80009	108-0543-00
L1060	108-0543-00			COIL, RF:FIXED, 1.1UH	80009	108-0543-00
LR682	108-0328-00			COIL, RF:0.3UH	80009	108-0328-00
Q20	151-1042-00			SEMICON DVC SE:MATCHED PAIR FET	27014	SF50031
Q22						
Q25	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q26	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q30	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q100	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
Q102	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
Q110	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q150	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q160	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q175	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
Q178	151-0221-00	XB010125		TRANSISTOR:SILICON,PNP	04713	SPS246
Q240	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q244	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q290	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q294	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q320	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q342	151-0225-00			TRANSISTOR:SILICON,NPN	80009	151-0225-00
Q406	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q410	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q435	151-0424-00	B010100	B043259	TRANSISTOR:SILICON,NPN	04713	SPS8246
Q435	151-0427-00	B043260		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q460	151-0225-00			TRANSISTOR:SILICON,NPN	80009	151-0225-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q525	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q530	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q545	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q550	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q560	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q565	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q575	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q580	151-0301-00			TRANSISTOR:SILICON,PNP	<b>27014</b>	<b>2N2907A</b>
Q600	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q608	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q625	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q630	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q635	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q640	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q660	151-0282-00			TRANSISTOR:SILICON,NPN	80009	151-0282-00
Q675}	151-1042-00			SEMICOND DVC SE:MATCHED PAIR FET	27014	SF50031
Q680}						
Q685}	151-0282-00			TRANSISTOR:SILICON,NPN	80009	151-0282-00
Q690	151-0282-00			TRANSISTOR:SILICON,NPN	80009	151-0282-00
Q700}	151-1042-00			SEMICOND DVC SE:MATCHED PAIR FET	27014	SF50031
Q701}						
Q704	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
Q706	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	04713	SPS1752
Q715	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q820	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q825	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q840	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q845	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q900	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q945	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q950	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q954	151-0221-00			TRANSISTOR:SILICON,PNP	04713	SPS246
Q975	151-0438-00			TRANSISTOR:SILICON,PNP,SEL FROM SPS6927	80009	151-0438-00
Q980	151-0211-00			TRANSISTOR:SILICON,NPN	01282	2N3866
Q990	151-0285-00			TRANSISTOR:SILICON,PNP	80009	151-0285-00
Q995	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q1000	151-0302-00			TRANSISTOR:SILICON,NPN	07263	S038487
Q1010	151-0411-00			TRANSISTOR:SILICON,NPN	80009	151-0411-00
Q1015	151-0411-00			TRANSISTOR:SILICON,NPN	80009	151-0411-00
Q1055	151-0424-00			TRANSISTOR:SILICON,NPN	04713	SPS8246
Q1060	151-0285-00			TRANSISTOR:SILICON,PNP	80009	151-0285-00
Q1070	151-0211-00			TRANSISTOR:SILICON,NPN	01282	2N3866
Q1075	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q1080	151-0301-00			TRANSISTOR:SILICON,PNP	<b>27014</b>	<b>2N2907A</b>
Q1090	151-0450-00			TRANSISTOR:SILICON,PNP,SEL FROM 2N5583	80009	151-0450-00
Q1095	151-0450-00			TRANSISTOR:SILICON,PNP,SEL FROM 2N5583	80009	151-0450-00
Q1255	151-0432-00			TRANSISTOR:SILICON,NPN	80009	151-0432-00
Q1265	151-0432-00			TRANSISTOR:SILICON,NPN	80009	151-0432-00
Q1270	151-0432-00			TRANSISTOR:SILICON,NPN	80009	151-0432-00
Q1280	151-0463-00			TRANSISTOR:SILICON,PNP	80009	151-0463-00
Q1285	151-0350-00			TRANSISTOR:SILICON,PNP	04713	SPS6700
Q1295	151-0350-00			TRANSISTOR:SILICON,PNP	04713	SPS6700
Q1300	151-0347-00			TRANSISTOR:SILICON,NPN	56289	2N5551
Q1355	151-0453-00			TRANSISTOR:SILICON,PNP	80009	151-0453-00
Q1365	151-0453-00			TRANSISTOR:SILICON,PNP	80009	151-0453-00
Q1370	151-0453-00			TRANSISTOR:SILICON,PNP	80009	151-0453-00
Q1380	151-0439-00			TRANSISTOR:SILICON,NPN	80009	151-0439-00



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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Discont	Name & Description	Mfr Code	Mfr Part Number
Q1385	151-0347-00			TRANSISTOR:SILICON,NPN	56289	2N5551
Q1395	151-0347-00			TRANSISTOR:SILICON,NPN	56289	2N5551
Q1400	151-0453-00			TRANSISTOR:SILICON,PNP	80009	151-0453-00
R12	301-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.50W	01121	EB5105
R14	315-0913-00			RES.,FXD,CMPSN:91K OHM,5%,0.25W	01121	CB9135
R16	315-0914-00			RES.,FXD,CMPSN:910K OHM,5%,0.25W	01121	CB9145
R20	301-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.50W	01121	EB4715
R22	301-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.50W	01121	EB4715
R25	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R28	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R30	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R32	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R33	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R36	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R38	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R40	321-0302-00			RES.,FXD,FILM:13.7K OHM,1%,0.125W	91637	MFF1816G13701F
R42	321-0327-00			RES.,FXD,FILM:24.9K OHM,1%,0.125W	91637	MFF1816G24901F
R43	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R45	321-0290-00			RES.,FXD,FILM:10.2K OHM,1%,0.125W	91637	MFF1816G10201F
R48	311-1484-00			RES.,VAR, NONWIR:PNL,2.5K OHM,1W	01121	11M110
R52	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R53	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R55	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R56	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R57	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R60	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R62	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R64	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R66	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R70	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R72	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R73	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R75	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R76	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R78	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R90	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R92	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R95	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R100	301-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.50W	01121	EB1525
R102	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R104	315-0161-00			RES.,FXD,CMPSN:160 OHM,5%,0.25W	01121	CB1615
R106	321-0297-00	B010100	B020244	RES.,FXD,FILM:12.1K OHM,1%,0.125W	91637	MFF1816G12101F
R106	321-0322-00	B020245		RES.,FXD,FILM:22.1K OHM,1%,0.125W	91637	MFF1816G22101F
R110	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R112	321-0217-00			RES.,FXD,FILM:1.78K OHM,1%,0.125W	91637	MFF1816G17800F
R113	321-0255-00	B010100	B020244	RES.,FXD,FILM:4.42K OHM,1%,0.125W	91637	MFF1816G44200F
R113	321-0269-00	B020245		RES.,FXD,FILM:6.19K OHM,1%,0.125W	91637	MFF1816G61900F
R140	315-0131-00			RES.,FXD,CMPSN:130 OHM,5%,0.25W	01121	CB1315
R142	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R145	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R147	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R150	315-0121-00			RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R152	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
R154	301-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.50W	01121	EB1325
R156	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
R160	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R162	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R165	311-1561-00			RES., VAR, NONWIR: 2.5K OHM, 20%, 0.50W	73138	91-83-0
R167	315-0112-00			RES., FXD, CMPSN: 1.1K OHM, 5%, 0.25W	01121	CB1125
R169	315-0362-00			RES., FXD, CMPSN: 3.6K OHM, 5%, 0.25W	01121	CB3625
R170	311-1560-00			RES., VAR, NONWIR: 5K OHM, 20%, 0.50W	73138	91-82-0
R171	315-0430-00	B010100	B010124X	RES., FXD, CMPSN: 43 OHM, 5%, 0.25W	01121	CB4305
R172	315-0152-00			RES., FXD, CMPSN: 1.5K OHM, 5%, 0.25W	01121	CB1525
R175	315-0431-00			RES., FXD, CMPSN: 430 OHM, 5%, 0.25W	01121	CB4315
R177	315-0680-00			RES., FXD, CMPSN: 68 OHM, 5%, 0.25W	01121	CB6805
R178	315-0271-00	XB010125		RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R180	311-1560-00			RES., VAR, NONWIR: 5K OHM, 20%, 0.50W	73138	91-82-0
R182	315-0683-00			RES., FXD, CMPSN: 68K OHM, 5%, 0.25W	01121	CB6835
R185	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R186	311-1567-00			RES., VAR, NONWIR: TRMR, 100 OHM, 0.50W	73138	91-89-0
R190	311-1832-00			RES., VAR, NONWIR: 5K OHM, 10%, 0.50W	01121	14M395
R192	315-0123-00			RES., FXD, CMPSN: 12K OHM, 5%, 0.25W	01121	CB1235
R194	315-0432-00			RES., FXD, CMPSN: 4.3K OHM, 5%, 0.25W	01121	CB4325
R195	311-1566-00			RES., VAR, NONWIR: 200 OHM, 20%, 0.50W	73138	91-88-0
R214	307-0113-00			RES., FXD, CMPSN: 5.1 OHM, 5%, 0.25W	01121	CB51G5
R218	315-0180-00			RES., FXD, CMPSN: 18 OHM, 5%, 0.25W	01121	CB1805
R219	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R224	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R230	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R232	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R234	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R240	315-0220-00			RES., FXD, CMPSN: 22 OHM, 5%, 0.25W	01121	CB2205
R242	301-0431-00			RES., FXD, CMPSN: 430 OHM, 5%, 0.50W	01121	EB4315
R244	301-0431-00			RES., FXD, CMPSN: 430 OHM, 5%, 0.50W	01121	EB4315
R248	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R249	315-0510-00			RES., FXD, CMPSN: 51 OHM, 5%, 0.25W	01121	CB5105
R252	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R253	315-0510-00			RES., FXD, CMPSN: 51 OHM, 5%, 0.25W	01121	CB5105
R270	315-0271-00			RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R272	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R274	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R275	315-0680-00			RES., FXD, CMPSN: 68 OHM, 5%, 0.25W	01121	CB6805
R280	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R284	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R290	315-0271-00			RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R292	315-0111-00			RES., FXD, CMPSN: 110 OHM, 5%, 0.25W	01121	CB1115
R294	315-0302-00			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W	01121	CB3025
R296	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R300	315-0121-00			RES., FXD, CMPSN: 120 OHM, 5%, 0.25W	01121	CB1215
R304	315-0430-00	B010100	B020244X	RES., FXD, CMPSN: 43 OHM, 5%, 0.25W	01121	CB4305
R306	315-0151-00	B010100	B020244X	RES., FXD, CMPSN: 150 OHM, 5%, 0.25W	01121	CB1515
R310	315-0271-00			RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R312	315-0271-00	B010100	B020244X	RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R315	315-0390-00			RES., FXD, CMPSN: 39 OHM, 5%, 0.25W	01121	CB3905
R317	315-0510-00			RES., FXD, CMPSN: 51 OHM, 5%, 0.25W	01121	CB5105
R320	315-0220-00			RES., FXD, CMPSN: 22 OHM, 5%, 0.25W	01121	CB2205
R325	315-0270-00			RES., FXD, CMPSN: 27 OHM, 5%, 0.25W	01121	CB2705
R328	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R342	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R346	315-0202-00			RES., FXD, CMPSN: 2K OHM, 5%, 0.25W	01121	CB2025
R348	315-0201-00			RES., FXD, CMPSN: 200 OHM, 5%, 0.25W	01121	CB2015
R350	315-0621-00			RES., FXD, CMPSN: 620 OHM, 5%, 0.25W	01121	CB6215
R352	311-1562-00	B010100	B029999	RES., VAR, NONWIR: 2K OHM, 20%, 0.50W	73138	91-84-0
R352	311-1560-00	B030000		RES., VAR, NONWIR: 5K OHM, 20%, 0.50W	73138	91-82-0

Replaceable Electrical Parts—PG 508

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R354	315-0124-00	B010100	B020244	RES., FXD, CMPSN: 120K OHM, 5%, 0.25W	01121	CB1245
R354	315-0124-00	B020245	B029999	RES., FXD, CMPSN: 120K OHM, 5%, 0.25W (NOMINAL VALUE, SELECTED)	01121	CB1245
R354	315-0184-00	B030000		RES., FXD, CMPSN: 180K OHM, 5%, 0.25W	01121	CB1845
R355	311-1834-00			RES., VAR, NONWIR: 50K OHM, 10%, 0.50W	01121	73M4G040L503A
R360	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R362	315-0471-00	B010100	B020244	RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R362	315-0471-00	B020245		RES., FXD, CMPSN: 470 OHM, 5%, 0.25W (NOMINAL VALUE, SELECTED)	01121	CB4715
R364	315-0680-00			RES., FXD, CMPSN: 68 OHM, 5%, 0.25W	01121	CB6805
R366	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R368	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R370	315-0471-00	B010100	B020244	RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R370	315-0471-00	B020245		RES., FXD, CMPSN: 470 OHM, 5%, 0.25W (NOMINAL VALUE, SELECTED)	01121	CB4715
R372	315-0680-00			RES., FXD, CMPSN: 68 OHM, 5%, 0.25W	01121	CB6805
R375	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R380	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R400	315-0471-00	B010100	B010124	RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R400	315-0271-00	B010125		RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R402	315-0471-00	B010100	B010124	RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R402	315-0271-00	B010125		RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R406	315-0271-00			RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R408	315-0111-00			RES., FXD, CMPSN: 110 OHM, 5%, 0.25W	01121	CB1115
R410	315-0302-00			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W	01121	CB3025
R412	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R415	315-0121-00			RES., FXD, CMPSN: 120 OHM, 5%, 0.25W	01121	CB1215
R420	315-0430-00	B010100	B020244X	RES., FXD, CMPSN: 43 OHM, 5%, 0.25W	01121	CB4305
R422	315-0151-00	B010100	B020244X	RES., FXD, CMPSN: 150 OHM, 5%, 0.25W	01121	CB1515
R425	315-0271-00			RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R426	315-0271-00	B010100	B020244X	RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R430	315-0390-00			RES., FXD, CMPSN: 39 OHM, 5%, 0.25W	01121	CB3905
R432	315-0510-00			RES., FXD, CMPSN: 51 OHM, 5%, 0.25W	01121	CB5105
R434	317-0100-00	XB043260		RES., FXD, CMPSN: 10 OHM, 5%, 0.125W	01121	BB1005
R436	315-0270-00			RES., FXD, CMPSN: 27 OHM, 5%, 0.25W	01121	CB2705
R439	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R455	315-0220-00	B010100	B020244X	RES., FXD, CMPSN: 22 OHM, 5%, 0.25W	01121	CB2205
R456	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R460	315-0202-00	B010100	B020244	RES., FXD, CMPSN: 2K OHM, 5%, 0.25W	01121	CB2025
R460	315-0162-00	B020245		RES., FXD, CMPSN: 1.6K OHM, 5%, 0.25W	01121	CB1625
R465	311-1561-00			RES., VAR, NONWIR: 2.5K OHM, 20%, 0.50W	73138	91-83-0
R462	315-0201-00	B010100	B043259	RES., FXD, CMPSN: 200 OHM, 5%, 0.25W	01121	CB2015
R462	315-0391-00	B043260		RES., FXD, CMPSN: 390 OHM, 5%, 0.25W	01121	CB3915
R467	315-0621-00	B010100	B043259	RES., FXD, CMPSN: 620 OHM, 5%, 0.25W	01121	CB6215
R467	315-0391-00	B043260		RES., FXD, CMPSN: 390 OHM, 5%, 0.25W	01121	CB3915
R470	311-1562-00			RES., VAR, NONWIR: 2K OHM, 20%, 0.50W	73138	91-84-0
R473	315-0124-00	B010100	B020244	RES., FXD, CMPSN: 120K OHM, 5%, 0.25W	01121	CB1245
R473	315-0124-00	B020245	B029999	RES., FXD, CMPSN: 120K OHM, 5%, 0.25W	01121	CB1245
R473	315-0184-00	B030000		RES., FXD, CMPSN: 180K OHM, 5%, 0.25W	01121	CB1845
R475	311-1834-00			RES., VAR, NONWIR: 50K OHM, 10%, 0.50W	01121	73M4G040L503A
R482	315-0102-00	XB010125	B020244	RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R482	315-0820-00	B020245		RES., FXD, CMPSN: 82 OHM, 5%, 0.25W	01121	CB8205
R483	315-0820-00	XB030000		RES., FXD, CMPSN: 82 OHM, 5%, 0.25W	01121	CB8205
R484	315-0131-00	XB020245		RES., FXD, CMPSN: 130 OHM, 5%, 0.25W	01121	CB1315
R485	315-0102-00	B010100	B029999	RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R485	315-0131-00	B030000		RES., FXD, CMPSN: 130 OHM, 5%, 0.25W	01121	CB1315
R487	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Discont	Name & Description	Mfr Code	Mfr Part Number
R490	315-0152-00	B010100	B020244	RES., FXD, CMPSN: 1.5K OHM, 5%, 0.25W	01121	CB1525
R490	315-0751-00	B020245		RES., FXD, CMPSN: 750 OHM, 5%, 0.25W	01121	CB7515
R492	315-0102-00	XB010125	B020244	RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R492	315-0820-00	B020245		RES., FXD, CMPSN: 82 OHM, 5%, 0.25W	01121	CB8205
R493	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R494	315-0131-00	XB020245		RES., FXD, CMPSN: 130 OHM, 5%, 0.25W	01121	CB1315
R495	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R500	315-0151-00			RES., FXD, CMPSN: 150 OHM, 5%, 0.25W	01121	CB1515
R520	315-0131-00			RES., FXD, CMPSN: 130 OHM, 5%, 0.25W	01121	CB1315
R522	315-0820-00			RES., FXD, CMPSN: 82 OHM, 5%, 0.25W	01121	CB8205
R525	315-0510-00			RES., FXD, CMPSN: 51 OHM, 5%, 0.25W	01121	CB5105
R527	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R528	315-0220-00			RES., FXD, CMPSN: 22 OHM, 5%, 0.25W	01121	CB2205
R530	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R534	315-0820-00			RES., FXD, CMPSN: 82 OHM, 5%, 0.25W	01121	CB8205
R536	315-0131-00			RES., FXD, CMPSN: 130 OHM, 5%, 0.25W	01121	CB1315
R538	315-0510-00			RES., FXD, CMPSN: 51 OHM, 5%, 0.25W	01121	CB5105
R540	311-1833-00			RES., VAR, NONWIR: 50K OHM, 10%, 0.50W	01121	73A1G040L503A
R542	311-1248-00			RES., VAR, NONWIR: 500 OHM, 10%, 0.50W	73138	72X-23-0-501K
R544	315-0111-00			RES., FXD, CMPSN: 110 OHM, 5%, 0.25W	01121	CB1115
R545	315-0111-00			RES., FXD, CMPSN: 110 OHM, 5%, 0.25W	01121	CB1115
R547	315-0391-00			RES., FXD, CMPSN: 390 OHM, 5%, 0.25W	01121	CB3915
R550	315-0271-00			RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R552	315-0332-00			RES., FXD, CMPSN: 3.3K OHM, 5%, 0.25W	01121	CB3325
R554	321-0225-00			RES., FXD, FILM: 2.15K OHM, 1%, 0.125W	91637	MFF1816G21500F
R555	321-0297-00			RES., FXD, FILM: 12.1K OHM, 1%, 0.125W	91637	MFF1816G12101F
R560	317-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.125W	01121	BB4705
R563	317-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.125W	01121	BB4705
R565	317-0220-00			RES., FXD, CMPSN: 22 OHM, 5%, 0.125W	01121	BB2205
R569	315-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.25W	01121	CB7515
R570	311-1237-00			RES., VAR, NONWIR: 1K OHM, 10%, 0.50W	32997	3386X-T07-102
R571	315-0512-00			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W	01121	CB5125
R575	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R578	301-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.50W	01121	EB4715
R585	317-0150-00			RES., FXD, CMPSN: 15 OHM, 5%, 0.125W	01121	BB1505
R586	317-0150-00			RES., FXD, CMPSN: 15 OHM, 5%, 0.125W	01121	BB1505
R600	315-0221-00	XB010125		RES., FXD, CMPSN: 220 OHM, 5%, 0.25W	01121	CB2215
R604	315-0161-00			RES., FXD, CMPSN: 160 OHM, 5%, 0.25W	01121	CB1615
R608	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R614	315-0152-00			RES., FXD, CMPSN: 1.5K OHM, 5%, 0.25W	01121	CB1525
R615	311-1237-00			RES., VAR, NONWIR: 1K OHM, 10%, 0.50W	32997	3386X-T07-102
R616	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
R620	315-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.25W	01121	CB7515
R622	317-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.125W	01121	BB4705
R625	315-0220-00			RES., FXD, CMPSN: 22 OHM, 5%, 0.25W	01121	CB2205
R630	315-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.25W	01121	CB7515
R631	317-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.125W	01121	BB4705
R635	315-0220-00			RES., FXD, CMPSN: 22 OHM, 5%, 0.25W	01121	CB2205
R637	315-0332-00			RES., FXD, CMPSN: 3.3K OHM, 5%, 0.25W	01121	CB3325
R640	315-0271-00			RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R643	321-0297-00			RES., FXD, FILM: 12.1K OHM, 1%, 0.125W	91637	MFF1816G12101F
R644	321-0225-00			RES., FXD, FILM: 2.15K OHM, 1%, 0.125W	91637	MFF1816G21500F
R647	315-0111-00			RES., FXD, CMPSN: 110 OHM, 5%, 0.25W	01121	CB1115
R648	315-0111-00			RES., FXD, CMPSN: 110 OHM, 5%, 0.25W	01121	CB1115
R650	311-1248-00			RES., VAR, NONWIR: 500 OHM, 10%, 0.50W	73138	72X-23-0-501K
R655	311-1833-00			RES., VAR, NONWIR: 50K OHM, 10%, 0.50W	01121	73A1G040L503A
R660	321-0173-00			RES., FXD, FILM: 619 OHM, 1%, 0.125W	91637	MFF1816G619R0F

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R662	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R667	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R668	321-0282-00			RES., FXD, FILM: 8.45K OHM, 1%, 0.125W	91637	MFF1816G84500F
R670	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R671	321-0282-00			RES., FXD, FILM: 8.45K OHM, 1%, 0.125W	91637	MFF1816G84500F
R678	317-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.125W	01121	BB1015
R682	315-0151-00			RES., FXD, CMPSN: 150 OHM, 5%, 0.25W	01121	CB1515
R685	321-0069-00			RES., FXD, FILM: 51.1 OHM, 1%, 0.125W	91637	MFF1816G51R10F
R687	315-0220-00			RES., FXD, CMPSN: 22 OHM, 5%, 0.25W	01121	CB2205
R690	321-0069-00			RES., FXD, FILM: 51.1 OHM, 1%, 0.125W	91637	MFF1816G51R10F
R692	315-0220-00			RES., FXD, CMPSN: 22 OHM, 5%, 0.25W	01121	CB2205
R695	321-0199-00			RES., FXD, FILM: 1.15K OHM, 1%, 0.125W	91637	MFF1816G11500F
R697	317-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.125W	01121	BB1015
R698	321-0153-00			RES., FXD, FILM: 383 OHM, 1%, 0.125W	91637	MFF1816G383R0F
R700	315-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.25W	01121	CB7515
R702	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R704	315-0162-00			RES., FXD, CMPSN: 1.6K OHM, 5%, 0.25W	01121	CB1625
R706	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R708	315-0271-00			RES., FXD, CMPSN: 270 OHM, 5%, 0.25W	01121	CB2715
R710	321-0153-00			RES., FXD, FILM: 383 OHM, 1%, 0.125W	91637	MFF1816G383R0F
R712	321-0199-00			RES., FXD, FILM: 1.15K OHM, 1%, 0.125W	91637	MFF1816G11500F
R715	315-0431-00			RES., FXD, CMPSN: 430 OHM, 5%, 0.25W	01121	CB4315
R722	315-0561-00			RES., FXD, CMPSN: 560 OHM, 5%, 0.25W	01121	CB5615
R724	315-0561-00			RES., FXD, CMPSN: 560 OHM, 5%, 0.25W	01121	CB5615
R728	315-0152-00	B010100	B020244	RES., FXD, CMPSN: 1.5K OHM, 5%, 0.25W	01121	CB1525
R728	315-0751-00	B020245		RES., FXD, CMPSN: 750 OHM, 5%, 0.25W	01121	CB7515
R730	315-0561-00	B010100	B029999X	RES., FXD, CMPSN: 560 OHM, 5%, 0.25W	01121	CB5615
R732	315-0151-00			RES., FXD, CMPSN: 150 OHM, 5%, 0.25W	01121	CB1515
R734	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R742	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R743	315-0680-00	XB030000		RES., FXD, CMPSN: 68 OHM, 5%, 0.25W	01121	CB6805
R744	315-0301-00			RES., FXD, CMPSN: 300 OHM, 5%, 0.25W	01121	CB3015
R748	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R749	315-0680-00			RES., FXD, CMPSN: 68 OHM, 5%, 0.25W	01121	CB6805
R750	315-0301-00			RES., FXD, CMPSN: 300 OHM, 5%, 0.25W	01121	CB3015
R770A, B	311-1162-00			RES., VAR, NONWIR: 2 X 10K OHM, 10%, 1W	12697	381-CM39691
R775	311-1245-00			RES., VAR, NONWIR: 10K OHM, 10%, 0.50W	73138	72-28-0
R777	315-0105-00			RES., FXD, CMPSN: 1M OHM, 5%, 0.25W	01121	CB1055
R778	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R780	315-0182-00			RES., FXD, CMPSN: 1.8K OHM, 5%, 0.25W	01121	CB1825
R782	317-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.125W	01121	BB1005
R785	311-1245-00			RES., VAR, NONWIR: 10K OHM, 10%, 0.50W	73138	72-28-0
R787	315-0105-00			RES., FXD, CMPSN: 1M OHM, 5%, 0.25W	01121	CB1055
R788	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R790	315-0302-00			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W	01121	CB3025
R794	315-0302-00			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W	01121	CB3025
R796	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R798	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R800	315-0183-00			RES., FXD, CMPSN: 18K OHM, 5%, 0.25W	01121	CB1835
R802	315-0223-00			RES., FXD, CMPSN: 22K OHM, 5%, 0.25W	01121	CB2235
R804	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R810	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R811	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R814	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R815	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R817	321-0182-00			RES., FXD, FILM: 768 OHM, 1%, 0.125W	91637	MFF1816G768R0F
R820	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015

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R825	321-0107-00			RES., FXD, FILM: 127 OHM, 1%, 0.125W	91637	MFF1816G127ROF
R827	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R830	321-0142-00			RES., FXD, FILM: 294 OHM, 1%, 0.125W	91637	MFF1816G294ROF
R832	321-0142-00			RES., FXD, FILM: 294 OHM, 1%, 0.125W	91637	MFF1816G294ROF
R834	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W	01121	CB1535
R836	315-0303-00			RES., FXD, CMPSN: 30K OHM, 5%, 0.25W	01121	CB3035
R840	321-0107-00			RES., FXD, FILM: 127 OHM, 1%, 0.125W	91637	MFF1816G127ROF
R842	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R845	322-0119-00			RES., FXD, FILM: 169 OHM, 1%, 0.25W	91637	MFF1421G169ROF
R847	323-0145-00			RES., FXD, FILM: 316 OHM, 1%, 0.50W	91637	MFF1226G316ROF
R850	321-0114-00	B010100	B020698	RES., FXD, FILM: 150 OHM, 1%, 0.125W	91637	MFF1816G150ROF
R850	321-0121-00	B020699		RES., FXD, FILM: 178 OHM, 1%, 0.125W	91637	MFF1816G178ROF
	-----			(NOMINAL VALUE, TEST SELECTED AS A SET)		
R852	321-0114-00	B010100	B020698	RES., FXD, FILM: 150 OHM, 1%, 0.125W	91637	MFF1816G150ROF
R852	321-0121-00	B020699		RES., FXD, FILM: 178 OHM, 1%, 0.125W	91637	MFF1816G178ROF
	-----			(NOMINAL VALUE, TEST SELECTED AS A SET)		
R854	321-0114-00	B010100	B020698	RES., FXD, FILM: 150 OHM, 1%, 0.125W	91637	MFF1816G150ROF
R854	321-0121-00	B020699		RES., FXD, FILM: 178 OHM, 1%, 0.125W	91637	MFF1816G178ROF
	-----			(NOMINAL VALUE, TEST SELECTED AS A SET)		
R856	321-0114-00	B010100	B020698	RES., FXD, FILM: 150 OHM, 1%, 0.125W	91637	MFF1816G150ROF
R856	321-0121-00	B020699		RES., FXD, FILM: 178 OHM, 1%, 0.125W	91637	MFF1816G178ROF
	-----			(NOMINAL VALUE, TEST SELECTED AS A SET)		
R860	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R861	315-0222-00			RES., FXD, CMPSN: 2.2K OHM, 5%, 0.25W	01121	CB2225
R863	315-0201-00			RES., FXD, CMPSN: 200 OHM, 5%, 0.25W	01121	CB2015
R865	315-0222-00			RES., FXD, CMPSN: 2.2K OHM, 5%, 0.25W	01121	CB2225
R866	315-0222-00			RES., FXD, CMPSN: 2.2K OHM, 5%, 0.25W	01121	CB2225
R868	315-0222-00			RES., FXD, CMPSN: 2.2K OHM, 5%, 0.25W	01121	CB2225
R869	315-0222-00			RES., FXD, CMPSN: 2.2K OHM, 5%, 0.25W	01121	CB2225
R875	315-0301-00			RES., FXD, CMPSN: 300 OHM, 5%, 0.25W	01121	CB3015
R876	315-0272-00			RES., FXD, CMPSN: 2.7K OHM, 5%, 0.25W	01121	CB2725
R878	315-0510-00			RES., FXD, CMPSN: 51 OHM, 5%, 0.25W	01121	CB5105
R883	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R885	311-1566-00			RES., VAR, NONWIR: 200 OHM, 20%, 0.50W	73138	91-88-0
R887	321-0097-00			RES., FXD, FILM: 100 OHM, 1%, 0.125W	91637	MFF1816G100ROF
R888	321-0097-00			RES., FXD, FILM: 100 OHM, 1%, 0.125W	91637	MFF1816G100ROF
R892	321-0271-00			RES., FXD, FILM: 6.49K OHM, 1%, 0.125W	91637	MFF1816G64900F
R893	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R895	321-0271-00			RES., FXD, FILM: 6.49K OHM, 1%, 0.125W	91637	MFF1816G64900F
R897	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R898	323-0133-00			RES., FXD, FILM: 237 OHM, 1%, 0.50W	75042	CECTO-2370F
R900	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R904	321-0223-00			RES., FXD, FILM: 2.05K OHM, 1%, 0.125W	91637	MFF1816G20500F
R905	321-0324-00			RES., FXD, FILM: 23.2K OHM, 1%, 0.125W	91637	MFF1816G23201F
R908	321-0223-00			RES., FXD, FILM: 2.05K OHM, 1%, 0.125W	91637	MFF1816G20500F
R910	311-1562-00			RES., VAR, NONWIR: 2K OHM, 20%, 0.50W	73138	91-84-0
R911	321-0322-00			RES., FXD, FILM: 22.1K OHM, 1%, 0.125W	91637	MFF1816G22101F
R914	315-0203-00			RES., FXD, CMPSN: 20K OHM, 5%, 0.25W	01121	CB2035
R915	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R918	315-0203-00			RES., FXD, CMPSN: 20K OHM, 5%, 0.25W	01121	CB2035
R920	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R924	315-0273-00			RES., FXD, CMPSN: 27K OHM, 5%, 0.25W	01121	CB2735
R925	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R930	315-0432-00			RES., FXD, CMPSN: 4.3K OHM, 5%, 0.25W	01121	CB4325
R932	321-0287-00			RES., FXD, FILM: 9.53K OHM, 1%, 0.125W	91637	MFF1816G95300F
R934	321-0260-00			RES., FXD, FILM: 4.99K OHM, 1%, 0.125W	91637	MFF1816G49900F
R936	321-0260-00			RES., FXD, FILM: 4.99K OHM, 1%, 0.125W	91637	MFF1816G49900F

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R938	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R942	321-0289-00			RES., FXD, FILM: 10K OHM, 1%, 0.125W	91637	MFF1816G10001F
R944	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R945	315-0821-00	B010100	B043269	RES., FXD, CMPSN: 820 OHM, 5%, 0.25W	01121	CB8215
R945	315-0302-00	B043270		RES., FXD, CMPSN: 3K OHM, 5%, 0.25W	01121	CB3025
R947	323-0157-00			RES., FXD, FILM: 422 OHM, 1%, 0.50W	91637	MFF1226G422R0F
R950	317-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.125W	01121	BB1005
R954	317-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.125W	01121	BB1005
R956	317-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.125W	01121	BB1015
R958	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R975	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R977	315-0160-00			RES., FXD, CMPSN: 16 OHM, 5%, 0.25W	01121	CB1605
R978	301-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.50W	01121	EB7515
R982	321-0001-00			RES., FXD, FILM: 10 OHM, 1%, 0.125W	75042	CEATO-10R00F
R985	322-0051-00			RES., FXD, FILM: 33.2 OHM, 1%, 0.25W	75042	CEBT0-33R20F
R990	307-0110-00			RES., FXD, CMPSN: 3 OHM, 5%, 0.25W	01121	CB30G5
R992	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R995	301-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.50W	01121	EB4725
R1000	321-0218-00			RES., FXD, FILM: 1.82K OHM, 1%, 0.125W	91637	MFF1816G18200F
R1002	321-0136-00			RES., FXD, FILM: 255 OHM, 1%, 0.125W	91637	MFF1816G255R0F
R1005	315-0430-00			RES., FXD, CMPSN: 43 OHM, 5%, 0.25W (NOMINAL VALUE, SELECTED)	01121	CB4305
R1014	307-0114-00			RES., FXD, CMPSN: 6.2 OHM, 5%, 0.25W	01121	CB62G5
R1017	315-0821-00			RES., FXD, CMPSN: 820 OHM, 5%, 0.25W	01121	CB8215
R1018	307-0114-00			RES., FXD, CMPSN: 6.2 OHM, 5%, 0.25W	01121	CB62G5
R1019	301-0132-00			RES., FXD, CMPSN: 1.3K OHM, 5%, 0.50W	01121	EB1325
R1020	311-1563-00			RES., VAR, NONWIR: 1K OHM, 20%, 0.50W	73138	91-85-0
R1021	303-0391-00			RES., FXD, CMPSN: 390 OHM, 5%, 1W	01121	GB3915
R1024	311-1567-00			RES., VAR, NONWIR: TRMR, 100 OHM, 0.50W	73138	91-89-0
R1026	305-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 2W	01121	HB4705
R1027	305-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 2W	01121	HB4705
R1028	303-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 1W	01121	GB1005
R1029	303-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 1W	01121	GB1005
R1030	305-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 2W	01121	HB4705
R1031	305-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 2W	01121	HB4705
R1032	303-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 1W	01121	GB1005
R1033	303-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 1W	01121	GB1005
R1035	315-0273-00			RES., FXD, CMPSN: 27K OHM, 5%, 0.25W	01121	CB2735
R1040	315-0105-00			RES., FXD, CMPSN: 1M OHM, 5%, 0.25W	01121	CB1055
R1042	322-0222-00			RES., FXD, FILM: 2K OHM, 1%, 0.25W	75042	CEBT0-2001F
R1044	315-0105-00			RES., FXD, CMPSN: 1M OHM, 5%, 0.25W	01121	CB1055
R1048	315-0390-00			RES., FXD, CMPSN: 39 OHM, 5%, 0.25W	01121	CB3905
R1050	311-1568-00			RES., VAR, NONWIR: 50 OHM, 20%, 0.50W	73138	91-90-0
R1055	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R1057	315-0160-00			RES., FXD, CMPSN: 16 OHM, 5%, 0.25W	01121	CB1605
R1058	301-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.50W	01121	EB7515
R1062	321-0001-00			RES., FXD, FILM: 10 OHM, 1%, 0.125W	75042	CEATO-10R00F
R1065	322-0051-00			RES., FXD, FILM: 33.2 OHM, 1%, 0.25W	75042	CEBT0-33R20F
R1072	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R1075	301-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.50W	01121	EB4725
R1080	321-0218-00			RES., FXD, FILM: 1.82K OHM, 1%, 0.125W	91637	MFF1816G18200F
R1082	321-0136-00			RES., FXD, FILM: 255 OHM, 1%, 0.125W	91637	MFF1816G255R0F
R1085	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R1094	307-0114-00			RES., FXD, CMPSN: 6.2 OHM, 5%, 0.25W	01121	CB62G5
R1098	307-0114-00			RES., FXD, CMPSN: 6.2 OHM, 5%, 0.25W	01121	CB62G5
R1202	315-0272-00	B010100	B043259	RES., FXD, CMPSN: 2.7K OHM, 5%, 0.25W	01121	CB2725
R1202	315-0273-00	B043260		RES., FXD, CMPSN: 27K OHM, 5%, 0.25W	01121	CB2735

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1205	308-0179-00			RES., FXD, WW: 5 OHM, 5%, 5W	91637	CW5-5RD00J
R1209	321-0209-00			RES., FXD, FILM: 1.47K OHM, 1%, 0.125W	91637	MFF1816G14700F
R1210	311-1562-00			RES., VAR, NONWIR: 2K OHM, 20%, 0.50W	73138	91-84-0
R1211	321-0265-00			RES., FXD, FILM: 5.62K OHM, 1%, 0.125W	91637	MFF1816G56200F
R1214	301-0101-00	XB043260		RES., FXD, CMPSN: 100 OHM, 5%, 0.50W	01121	EB1015
R1215	308-0245-00			RES., FXD, WW: 0.6 OHM, 5%, 2W	91637	CW-2B30.60HM 5%
R1217	315-0182-00			RES., FXD, CMPSN: 1.8K OHM, 5%, 0.25W	01121	CB1825
R1230	315-0123-00			RES., FXD, CMPSN: 12K OHM, 5%, 0.25W	01121	CB1235
R1232	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R1234	315-0123-00			RES., FXD, CMPSN: 12K OHM, 5%, 0.25W	01121	CB1235
R1236	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R1250	315-0221-00			RES., FXD, CMPSN: 220 OHM, 5%, 0.25W	01121	CB2215
R1255	315-0182-00			RES., FXD, CMPSN: 1.8K OHM, 5%, 0.25W	01121	CB1825
R1257	315-0752-00	B010100	B010149	RES., FXD, CMPSN: 7.5K OHM, 5%, 0.25W	01121	CB7525
R1257	315-0512-00			B010150	RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W	01121
R1259	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R1260	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R1265	321-0246-00			RES., FXD, FILM: 3.57K OHM, 1%, 0.125W	91637	MFF1816G35700F
R1266	321-0246-00			RES., FXD, FILM: 3.57K OHM, 1%, 0.125W	91637	MFF1816G35700F
R1270	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R1272	321-0238-00			RES., FXD, FILM: 2.94K OHM, 1%, 0.125W	91637	MFF1816G29400F
R1273	321-0254-00			RES., FXD, FILM: 4.32K OHM, 1%, 0.125W	91637	MFF1816G43200F
R1275	321-0296-00			RES., FXD, FILM: 11.8K OHM, 1%, 0.125W	91637	MFF1816G11801F
R1276	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R1280	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R1282	308-0767-00			RES., FXD, WW: 1.1 OHM, 5%, 1W	75042	BW20-1R100J
R1285	315-0272-00			RES., FXD, CMPSN: 2.7K OHM, 5%, 0.25W	01121	CB2725
R1287	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R1290	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R1295	301-0152-00			RES., FXD, CMPSN: 1.5K OHM, 5%, 0.50W	01121	EB1525
R1297	321-0124-00			RES., FXD, FILM: 191 OHM, 1%, 0.125W	91637	MFF1816G191ROF
R1298	315-0392-00			RES., FXD, CMPSN: 3.9K OHM, 5%, 0.25W	01121	CB3925
R1300	321-0164-00			RES., FXD, FILM: 499 OHM, 1%, 0.125W	91637	MFF1816G499ROF
R1302	321-0326-00			RES., FXD, FILM: 24.3K OHM, 1%, 0.125W	91637	MFF1816G24301F
R1305	321-0290-00			RES., FXD, FILM: 10.2K OHM, 1%, 0.125W	91637	MFF1816G10201F
R1306	321-0211-00			RES., FXD, FILM: 1.54K OHM, 1%, 0.125W	91637	MFF1816G15400F
R1310	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
R1327	315-0272-00	B010100	B043259	RES., FXD, CMPSN: 2.7K OHM, 5%, 0.25W	01121	CB2725
R1327	315-0273-00			B043260	RES., FXD, CMPSN: 27K OHM, 5%, 0.25W	01121
R1330	305-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 2W	01121	HB4715
R1355	315-0182-00			RES., FXD, CMPSN: 1.8K OHM, 5%, 0.25W	01121	CB1825
R1357	321-0277-00			RES., FXD, FILM: 7.5K OHM, 1%, 0.125W	91637	MFF1816G75000F
R1359	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R1360	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R1365	321-0246-00			RES., FXD, FILM: 3.57K OHM, 1%, 0.125W	91637	MFF1816G35700F
R1366	321-0246-00			RES., FXD, FILM: 3.57K OHM, 1%, 0.125W	91637	MFF1816G35700F
R1370	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R1372	321-0236-00			RES., FXD, FILM: 2.8K OHM, 1%, 0.125W	91637	MFF1816G28000F
R1373	321-0278-00			RES., FXD, FILM: 7.68K OHM, 1%, 0.125W	91637	MFF1816G76800F
R1375	321-0303-00			RES., FXD, FILM: 14K OHM, 1%, 0.125W	91637	MFF1816G14001F
R1376	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R1380	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R1382	308-0767-00			RES., FXD, WW: 1.1 OHM, 5%, 1W	75042	BW20-1R100J
R1385	315-0272-00			RES., FXD, CMPSN: 2.7K OHM, 5%, 0.25W	01121	CB2725
R1387	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R1390	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R1395	301-0152-00			RES., FXD, CMPSN: 1.5K OHM, 5%, 0.50W	01121	EB1525



Replaceable Electrical Parts—PG 508

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1397	321-0124-00			RES., FXD, FILM: 191 OHM, 1%, 0.125W	91637	MFF1816G191ROF
R1398	315-0392-00			RES., FXD, CMPSN: 3.9K OHM, 5%, 0.25W	01121	CB3925
R1400	321-0164-00			RES., FXD, FILM: 499 OHM, 1%, 0.125W	91637	MFF1816G499ROF
R1402	321-0321-00			RES., FXD, FILM: 21.5K OHM, 1%, 0.125W	91637	MFF1816G21501F
R1405	321-0306-00			RES., FXD, FILM: 15K OHM, 1%, 0.125W	91637	MFF1816G15001F
R1406	321-0204-00			RES., FXD, FILM: 1.3K OHM, 1%, 0.125W	91637	MFF1816G13000F
R1410	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
S12	260-0723-00			SWITCH, SLIDE: DPDT, 0.5A, 125VAC	79727	GF126-0028
S75A-C	260-1723-00			SWITCH, PUSH: 3 BUTTON, 2 POLE	80009	260-1723-00
S200	263-1142-00			SW CAM ACTR AS: PERIOD	80009	263-1142-00
S330A, B	263-1141-00			SW CAM ACTR AS: DELAY	80009	263-1141-00
S380A, B	260-1801-00			SWITCH, PUSH: DPDT, 2 BUTTON	80009	260-1801-00
S450	263-1144-00			SW CAM ACTR AS: DURATION	80009	263-1144-00
S590	263-1143-00			SW CAM ACTR AS: RANGE	80009	263-1143-00
S785	260-1453-00			SWITCH, PUSH: 1 BUTTON	80009	260-1453-00
S865	260-1453-00			SWITCH, PUSH: 1 BUTTON	80009	260-1453-00
TP36	214-0579-00			TERM, TEST POINT: BRS CD PL	80009	214-0579-00
U40	156-0067-00			MICROCIRCUIT, LI: OPERATIONAL AMPLIFIER	02735	85145
U60	156-0197-00			MICROCIRCUIT, LI: 5 TRANSISTOR ARRAY	80009	156-0197-00
U70	156-0182-00			MICROCIRCUIT, DI: TRIPLE 2-3-2 INPUT GATE	80009	156-0182-00
U140	156-0182-00			MICROCIRCUIT, DI: TRIPLE 2-3-2 INPUT GATE	80009	156-0182-00
U270	156-0205-00			MICROCIRCUIT, DI: QUAD 2-INPUT NOR GATE	80009	156-0205-00
U300	156-0182-00			MICROCIRCUIT, DI: TRIPLE 2-3-2 INPUT GATE	80009	156-0182-00
U360	156-0205-00			MICROCIRCUIT, DI: QUAD 2-INPUT NOR GATE	80009	156-0205-00
U400	156-0182-00			MICROCIRCUIT, DI: TRIPLE 2-3-2 INPUT GATE	80009	156-0182-00
U480	156-0230-00	B010100	B029999	MICROCIRCUIT, DI: DUAL D MA-SLAVE FLIP-FLOP	80009	156-0230-00
U480	156-0880-00	B030000		MICROCIRCUIT, DI: DUAL D MASTER SLAVE FF	80009	156-0880-00
U665	156-0067-00			MICROCIRCUIT, LI: OPERATIONAL AMPLIFIER	02735	85145
U720	156-0230-00	B010100	B029999	MICROCIRCUIT, DI: DUAL D MA-SLAVE FLIP-FLOP	80009	156-0230-00
U720	156-0880-00	B030000		MICROCIRCUIT, DI: DUAL D MASTER SLAVE FF	80009	156-0880-00
U740	156-0205-00			MICROCIRCUIT, DI: QUAD 2-INPUT NOR GATE	80009	156-0205-00
U780	156-0158-00			MICROCIRCUIT, LI: DUAL OPERATIONAL AMPLIFIER	18324	MC1458V
U800	156-0158-00			MICROCIRCUIT, LI: DUAL OPERATIONAL AMPLIFIER	18324	MC1458V
U850	155-0078-10			MICROCIRCUIT, LI: ML, VERTICAL AMPLIFIER	80009	155-0078-10
U895	156-0158-00			MICROCIRCUIT, LI: DUAL OPERATIONAL AMPLIFIER	18324	MC1458V
U930	156-0158-00			MICROCIRCUIT, LI: DUAL OPERATIONAL AMPLIFIER	18324	MC1458V
U1205	156-0312-00			MICROCIRCUIT, LI: VOLTAGE REGULATOR, 15V, 1A	27014	LM340T-15
U1210	156-0071-00			MICROCIRCUIT, LI: VOLTAGE REGULATOR	04713	MC1723CL
U1335	156-0527-00			MICROCIRCUIT, LI: NEG VOLTAGE REGULATOR, 15V	04713	MC7915CT
VR20	152-0127-00			SEMICONV DEVICE: ZENER, 0.4W, 7.5V, 5%	04713	SZG35009K2
VR22	152-0127-00			SEMICONV DEVICE: ZENER, 0.4W, 7.5V, 5%	04713	SZG35009K2
VR65	152-0217-00			SEMICONV DEVICE: ZENER, 0.4W, 8.2V, 5%	04713	SZG20
VR172	152-0279-00			SEMICONV DEVICE: ZENER, 0.4W, 5.1V, 5%	80009	152-0279-00
VR620}	153-0063-00			SEMICONV DVC SE: MATCHED, 50MV AT 10 MA	80009	153-0063-00
VR630}						
VR944	152-0279-00			SEMICONV DEVICE: ZENER, 0.4W, 5.1V, 5%	80009	152-0279-00
VR975	152-0149-00			SEMICONV DEVICE: ZENER, 0.4W, 10V, 5%	80009	152-0149-00
VR1000	152-0278-00			SEMICONV DEVICE: ZENER, 0.4W, 3V, 5%	04713	SZG35009K20
VR1080	152-0278-00			SEMICONV DEVICE: ZENER, 0.4W, 3V, 5%	04713	SZG35009K20
VR1257	152-0280-00	XB010150		SEMICONV DEVICE: ZENER, 0.4W, 6.2V, 5%	80009	152-0280-00
VR1330	152-0395-00			SEMICONV DEVICE: ZENER, 0.4W, 4.3V, 5%	14552	TD332317
W306	131-0566-00	XB020245		BUS CONDUCTOR: DUMMY RES, 2.375, 22 AWG	55210	L-2007-1
W422	131-0566-00	XB020245		BUS CONDUCTOR: DUMMY RES, 2.375, 22 AWG	55210	L-2007-1
W455	131-0566-00	XB020245		BUS CONDUCTOR: DUMMY RES, 2.375, 22 AWG	55210	L-2007-1
W1210	131-0566-00			BUS CONDUCTOR: DUMMY RES, 2.375, 22 AWG	55210	L-2007-1

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
W1220	131-0566-00			BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	55210	L-2007-1
W1240	131-0566-00			BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	55210	L-2007-1
W1310	131-0566-00			BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	55210	L-2007-1
W1410	131-0566-00			BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	55210	L-2007-1

# DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

## Symbols

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

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

The overline on a signal name indicates that the signal performs its intended function when it is in the low state.

Abbreviations are based on ANSI Y1.1-1972.

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

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

American National Standard Institute  
1430 Broadway  
New York, New York 10018

## Component Values

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

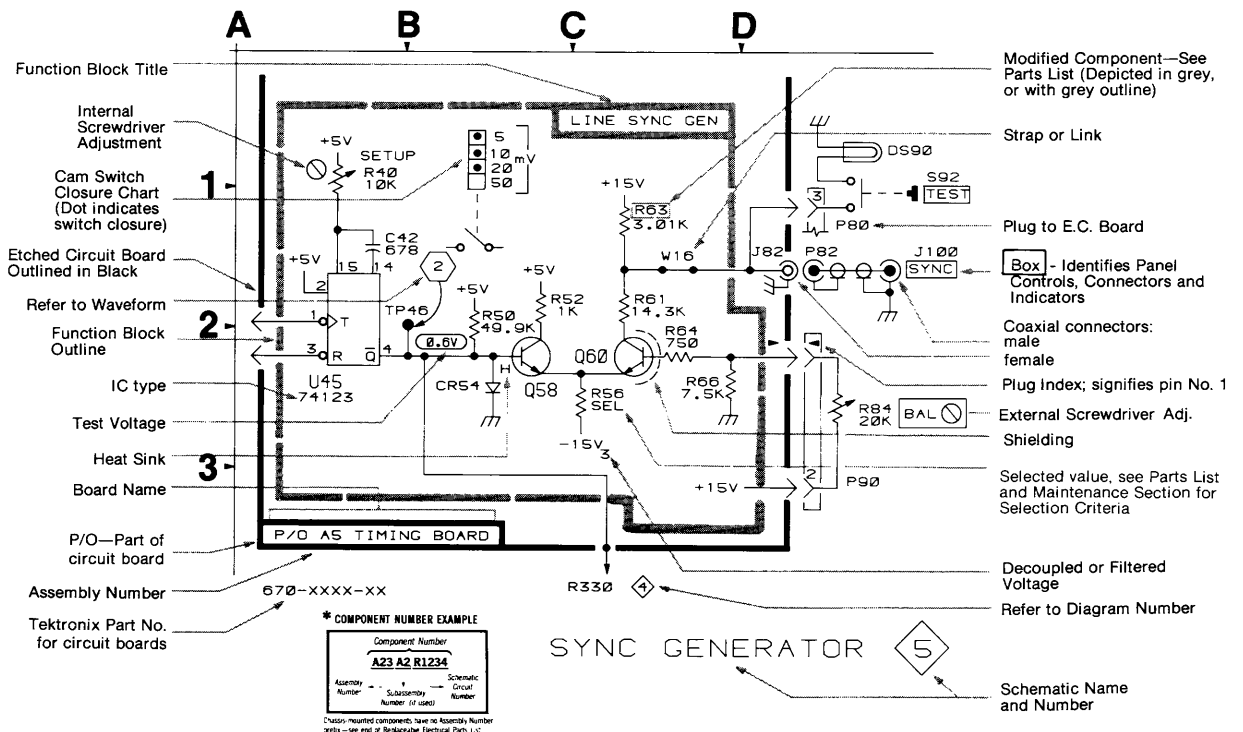
- Capacitors = Values one or greater are in picofarads (pF).  
Values less than one are in microfarads ( $\mu$ F).
- Resistors = Ohms ( $\Omega$ ).

———— The information and special symbols below may appear in this manual. ————

## Assembly Numbers and Grid Coordinates

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the circuit board outline on the diagram, in the title for the circuit board component location illustration, and in the lookup table for the schematic diagram and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assemblies in numerical sequence; the components are listed by component number \*(see following illustration for constructing a component number).

The schematic diagram and circuit board component illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table. When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram on which it was illustrated; the lookup table will list the diagram number of other diagrams that the circuitry of the circuit board appears on.



# ADJUSTMENT LOCATIONS

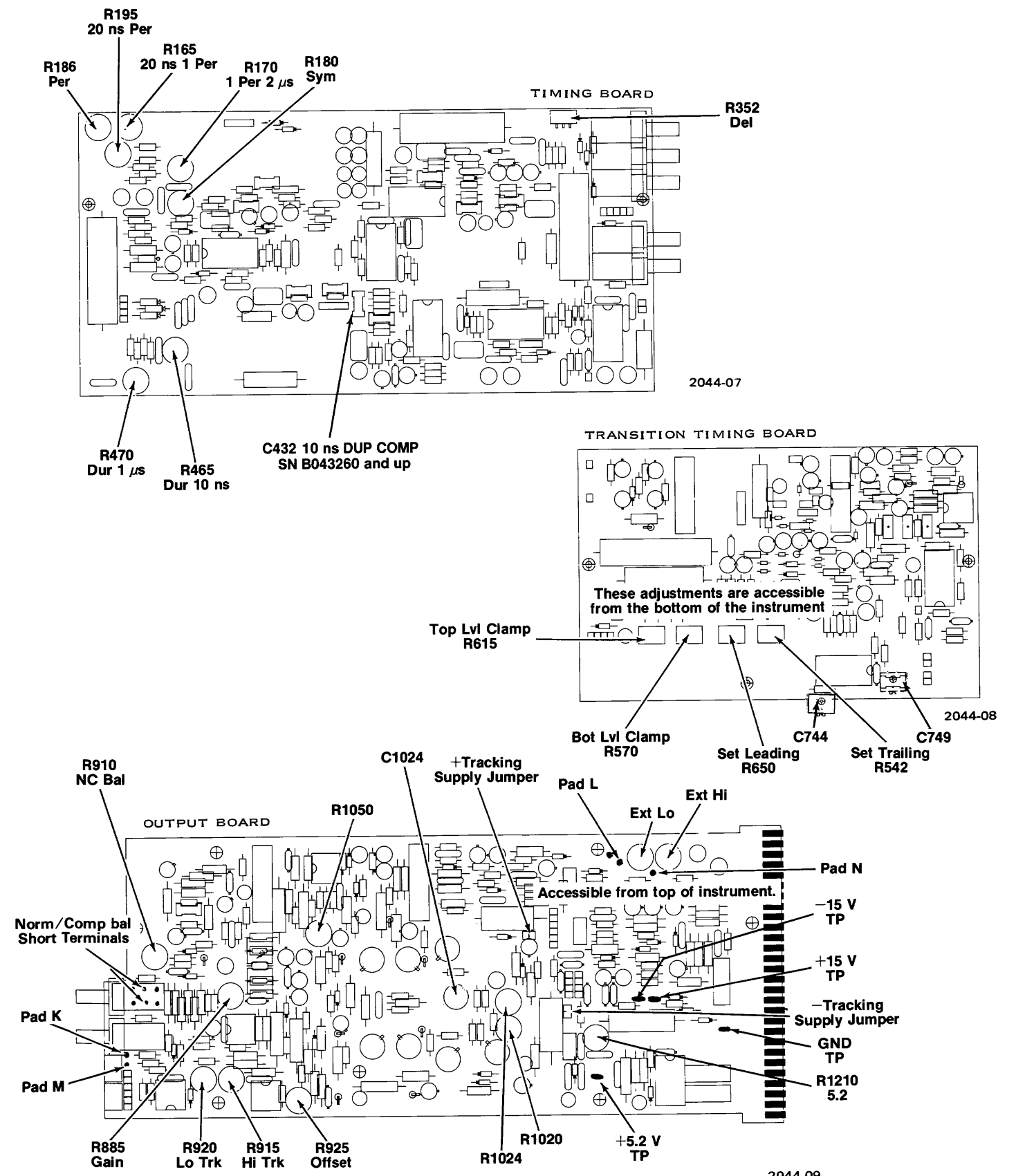
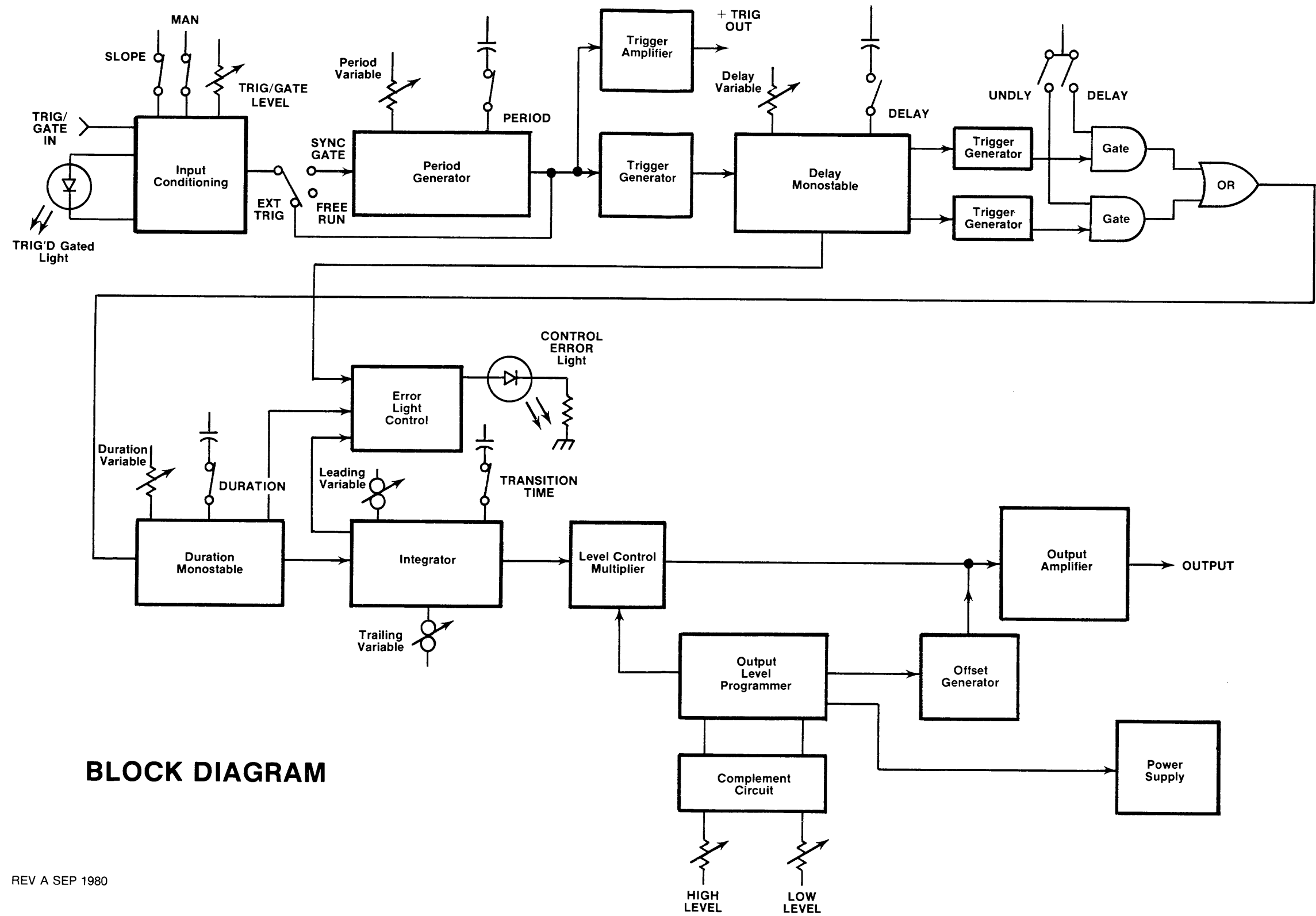


Fig. 8-1. Adjustment Locations.



REV A SEP 1980

# PARTS LOCATION GRID

INPUT BOARD (A1)

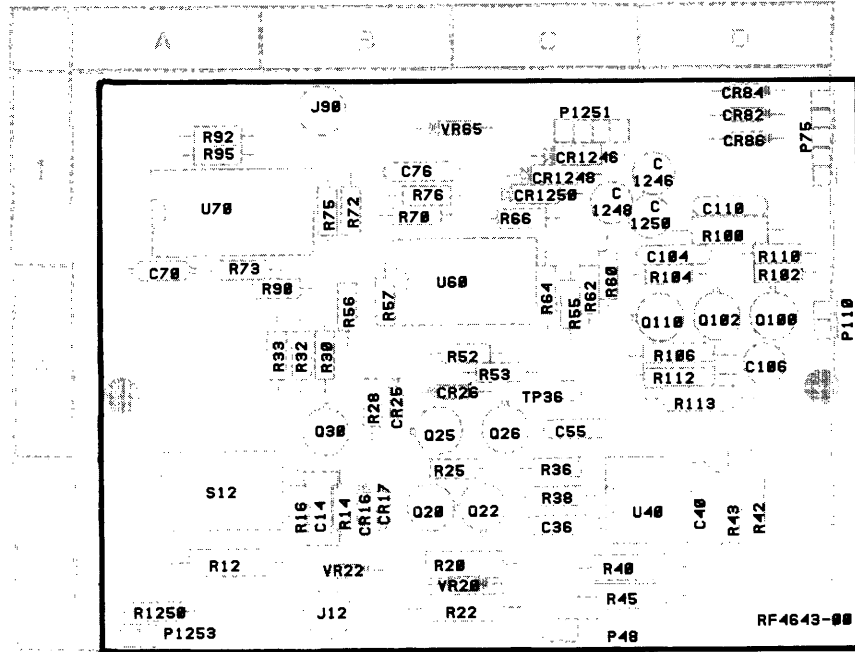


Fig. 8-2. Input Board A1.

A1 BOARD ASSY			INPUT 1		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C14	B2	B3	R42	F2	D3
C36	E3	C3	R43	F3	D3
C40	F4	D3	R45	F2	C3
C55	D8	C2	R52	C7	B2
C70	J8	A2	R53	D7	C2
C76	G6	B1	R55	D8	C2
C104	K2	D1	R56	D8	B2
C106	J3	D2	R57	E7	B2
C110	K2	D1	R60	E7	C2
			R62	E6	C2
CR16	B2	B3	R64	F7	C2
CR17	B2	B3	R66	F7	C1
CR25	D2	B2	R70	G7	B1
CR26	D2	B2	R72	G7	B1
CR82	H6	D1	R73	H7	A1
CR84	H6	D1	R75	G6	B1
CR86	J6	D1	R76	G6	B1
			R90	H7	A2
J12	A2	B3	R92	J7	A1
J90	L6	B1	R95	L6	A1
			R100	K3	D1
P12	A2	B3	R102	K3	D2
P48	G2	C3	R104	K3	D2
P75	J5	D1	R106*	J3	D2
P90	L6	B1	R110	K1	D1
P110	J2	D2	R112	J3	D2
			R113*	J3	D2
Q20	C2	B3	S12	B3	A3
Q22	C3	C3			
Q25	C2	B2	TP36	E2	C2
Q26	D2	C2			
Q30	D1	B2			
Q100	K3	D2	U40	F2	C3
Q102	K3	D2	U60A	F7	B2
Q110	J3	D2	U60B	E7	B2
			U60C	E6	B2
			U60D	F6	B2
			U60E	E8	B2
R12	B3	A3	U70A	H6	A1
R14	B2	B3	U70B	G6	A1
R16	B2	B3	U70C	H6	A1
R20	C1	B3			
R22	C3	B3			
R25	C2	B3	VR20	C2	B3
R28	D2	B2	VR22	C3	B3
R30	D1	B2	VR65	F6	B1
R32	C1	B2			
R33	C2	B2			
R36	E2	C3			
R38	E2	C3			
R40	F3	C3			

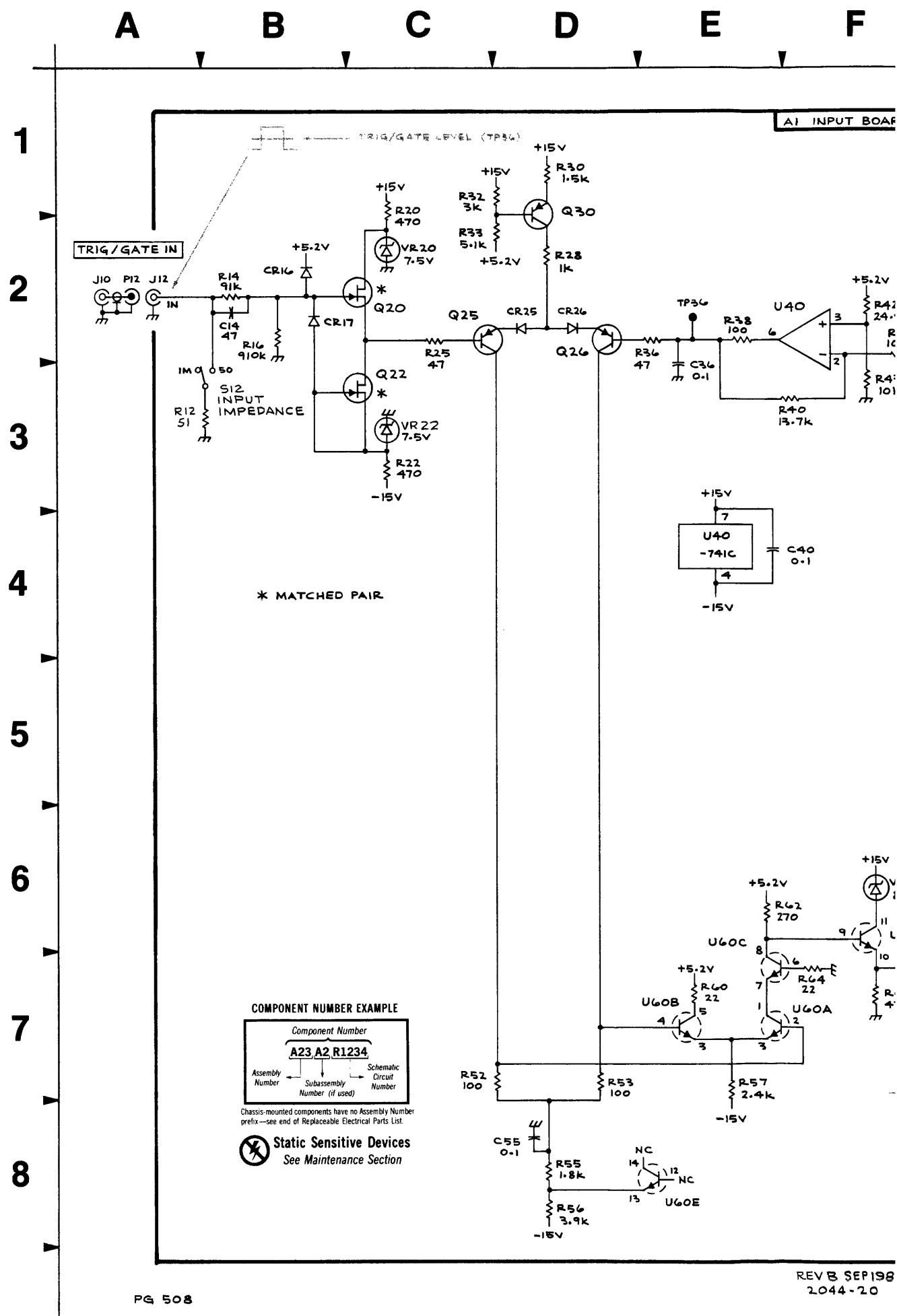
  

A1 Board Assy also shown on 9		
A2 BOARD ASSY		
CR80	H4	I1
P76	J5	I2
R78	G4	I1
S75A	G4	I1
S75B	H4	I2

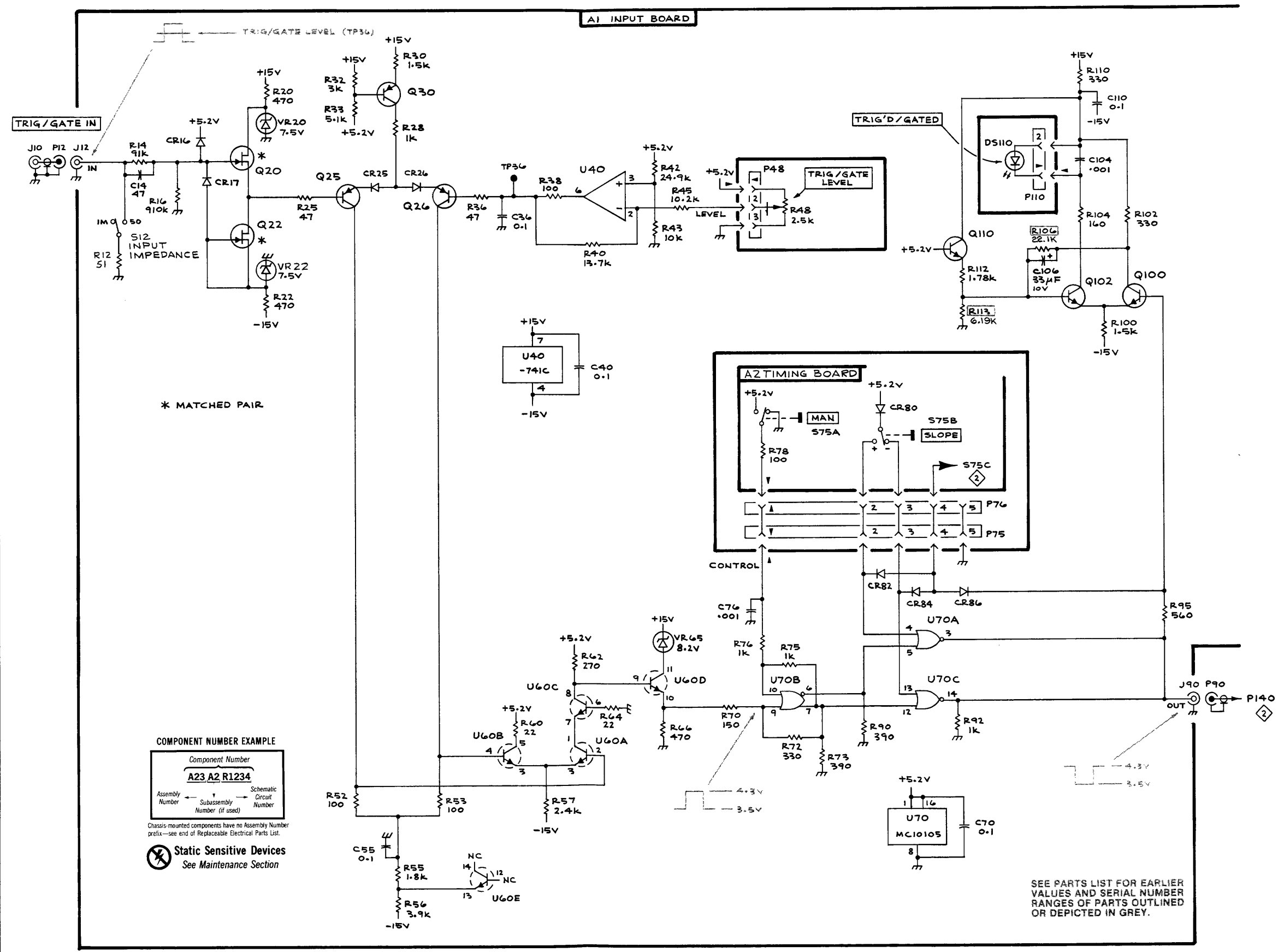
A2 Board Assy also shown on 2, 3, 4 & 9		
CHASSIS		
DS110	J2	
J10	A2	
R48	G2	

\*See Parts List for serial number ranges.



A B C D E F G H J K L

1  
2  
3  
4  
5  
6  
7  
8



**COMPONENT NUMBER EXAMPLE**

Component Number	
A23 A2 R1234	
Assembly Number	Schematic Circuit Number
1	234
Subassembly Number (if used)	

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**Static Sensitive Devices**  
See Maintenance Section

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

REV B SEP 1980  
2044-20

See Parts List for serial number ranges.



# PARTS LOCATION GRID

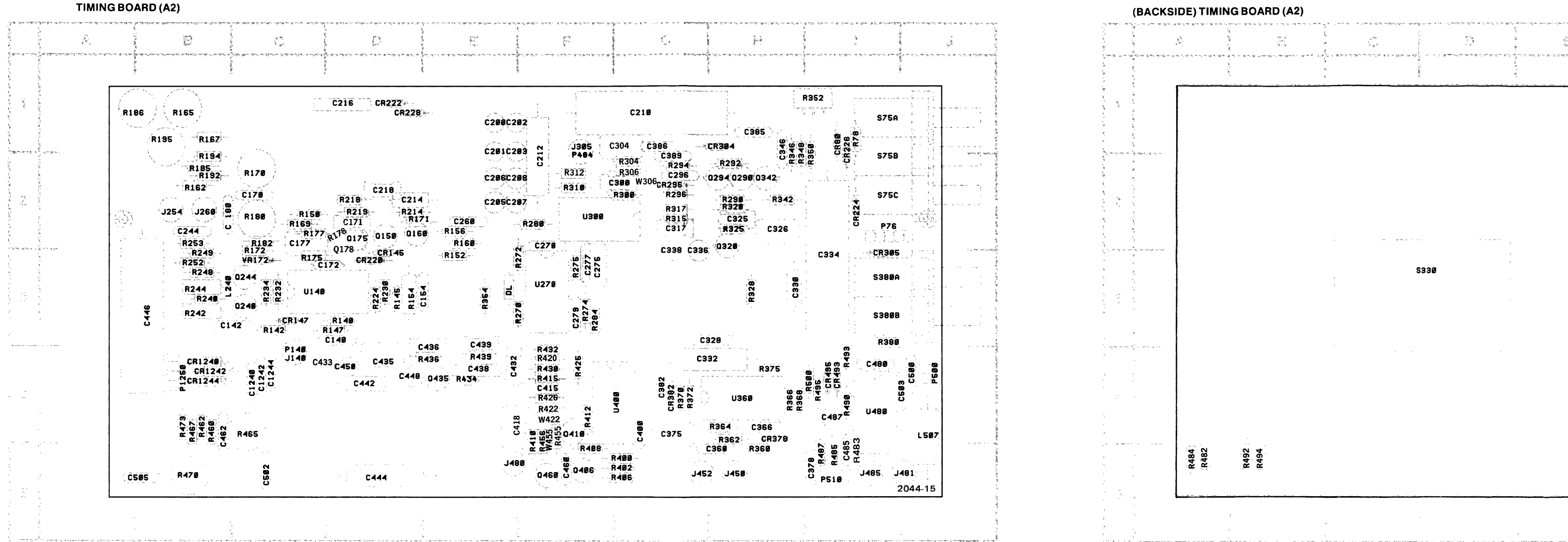
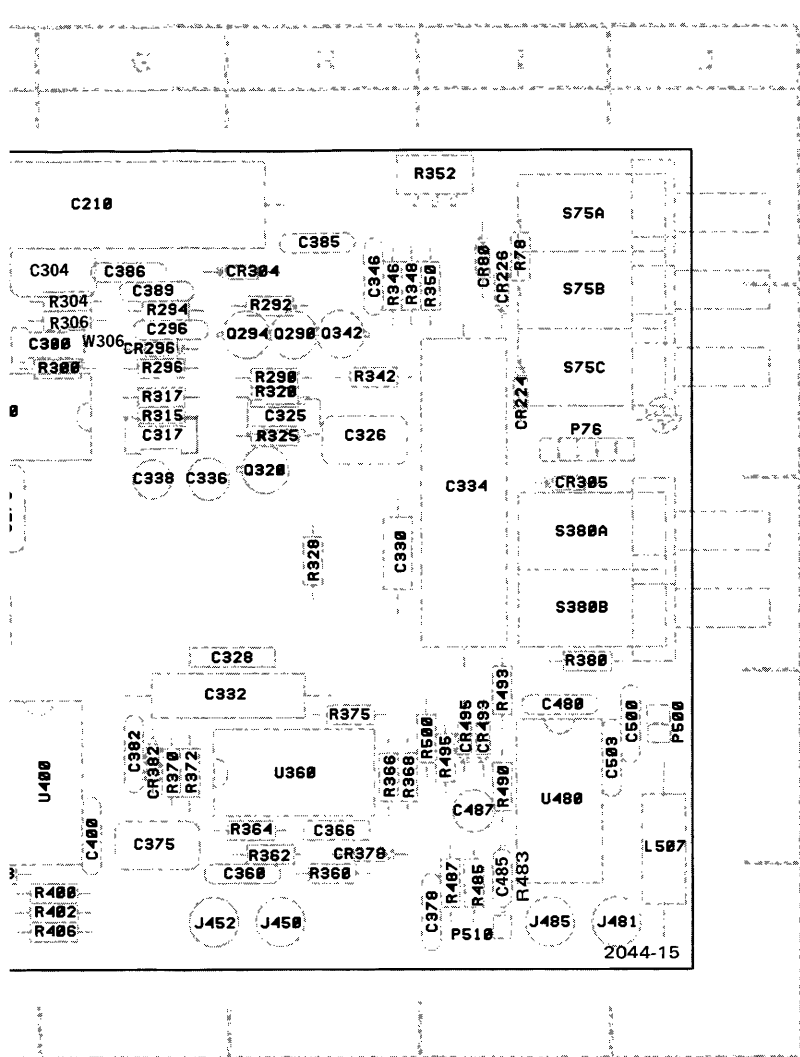


Fig. 8-3. Timing Board A2.

# I GRID



## (BACKSIDE) TIMING BOARD (A2)

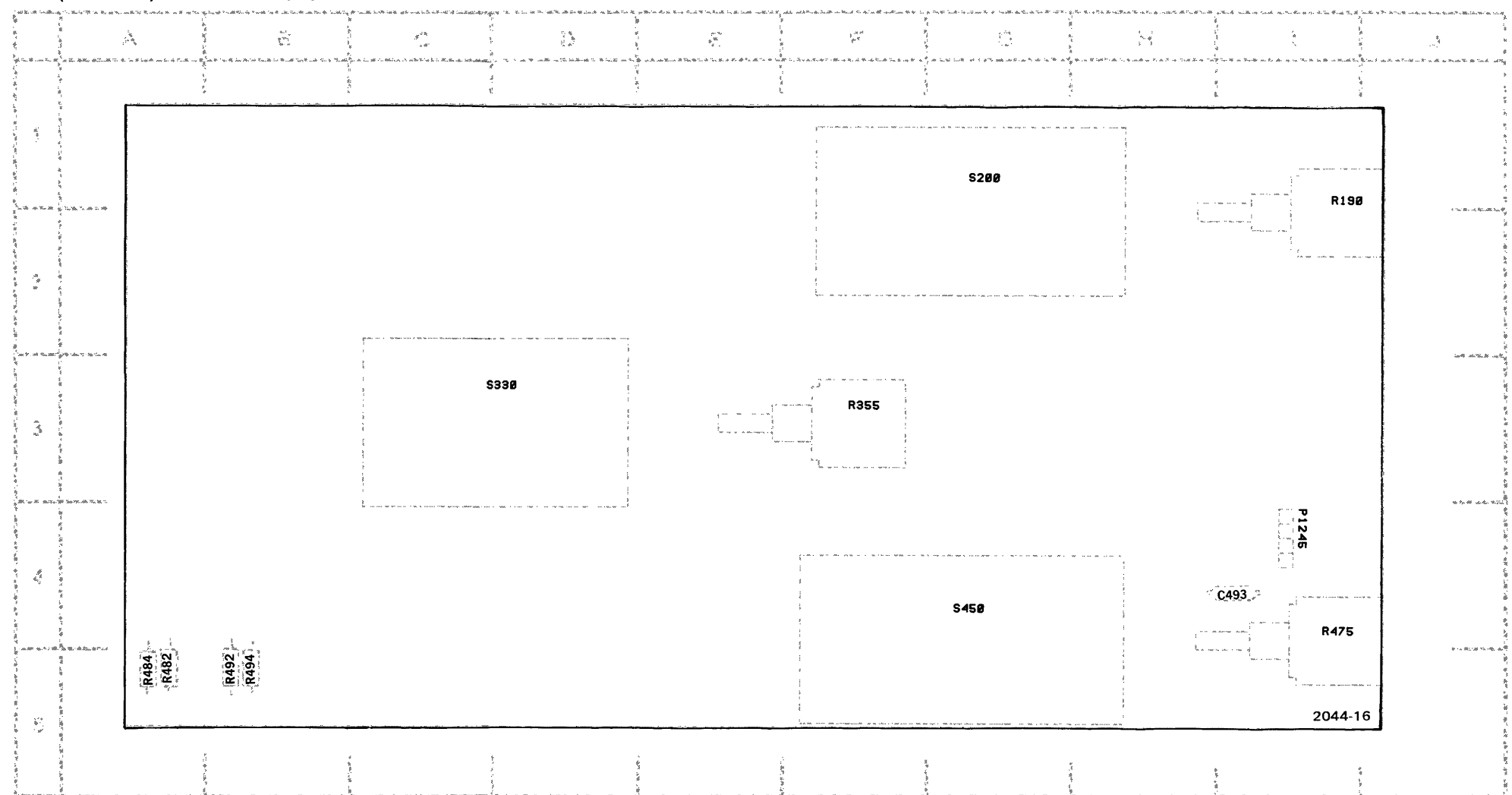


Fig. 8-3. Timing Board A2.

A2 BOARD ASSY			PERIOD GENERATOR 2		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C140	K3	D3	R171*	D3	D2
C142	B5	B3	R172	E3	C3
C154	C5	D3	R175	E4	C3
C170	D3	C2	R177	E4	C2
C171*	E4	D2	R178*	F4	D2
C172	E3	D3	R180	F3	C2
C177	F4	C2	R182	F4	C2
C180	F3	B2	R185	E5	B2
C200	G1	E1	R186	E5	A1
C201	G1	E1	R190†	D5	I1
C202	G1	E1	R192	E5	B2
C203	G1	E1	R194	F5	B2
C205	G2	E2	R195	F5	B1
C206	G2	E2	R214	G3	D2
C207	G3	E2	R218	G4	D2
C208	G2	E2	R219	F4	D2
C210	G2	G1	R224	H4	D3
C212	G3	F2	R230	G7	D3
C214	G3	D2	R232	H6	C3
C216	G3	D1	R234	H8	C3
C218	G4	D2	R240	J7	B3
C244	K6	B2	R242	H6	B3
C260	K2	E2	R244	J6	B3
			R248	J8	B3
			R249	J8	B3
CR145	B5	D3	R252	J8	B3
CR147	B5	C3	R253	J8	B2
CR220	G4	D3			
CR222	G5	D1			
CR224	H5	I2	S75C	K5	I2
CR226	H5	I1	S200†	C1	G1
CR228	J5	D1	S200-1†	H4	G1
			S200-2†	G4	G1
J140	A5	C4	S200-3,6,5†	G2	G1
J254	K8	B2	S200-4,7,8,9†	G3	G1
J260	L8	B2	S200-10†	D4	G1
			S200-11†	E5	G1
L240	J7	B3	S200-12†	E6	G1
			S200-13†	G1	G1
Q150	B4	D2	U140A	B5	C3
Q160	D4	D2	U140B	G4	C3
Q175	E4	D2	U140C	H7	C3
Q178*	F3	D3			
Q240	H7	C3	VR172	E3	C3
Q244	J7	C3			
R140	B5	D3			
R142	B5	C3			
R145	D5	D3			
R147	B4	D3			
R150	C4	C2			
R152	C5	E3			
R154	C5	D3			
R156	C5	E2			
R160	C4	E2			
R162	D4	B2			
R165	D5	B1			
R167	E4	B1			
R169	D4	C2			
R170	D3	C2			

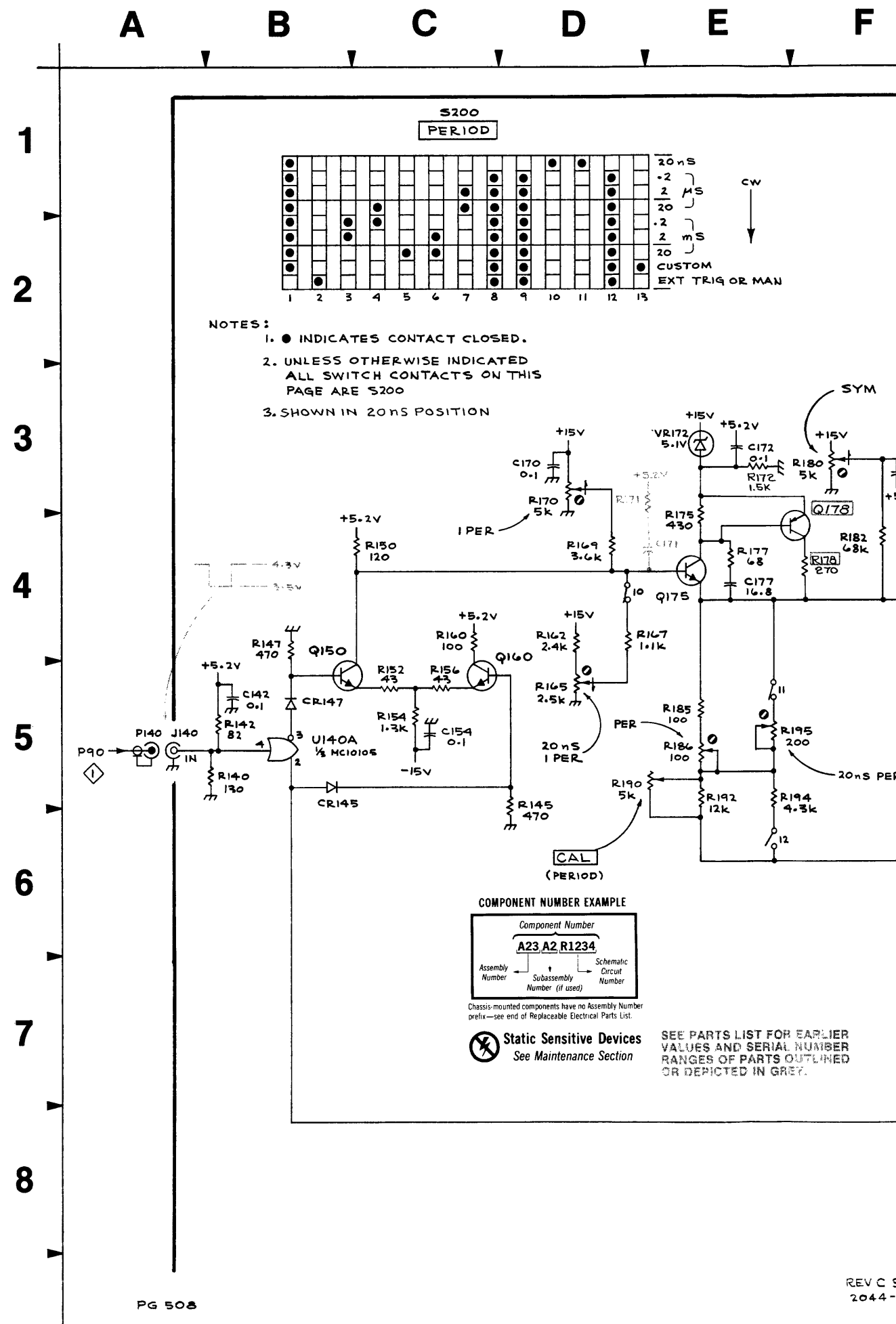
A2 Board Assy also shown on 1, 3, 4, & 9

CHASSIS

J255 L8

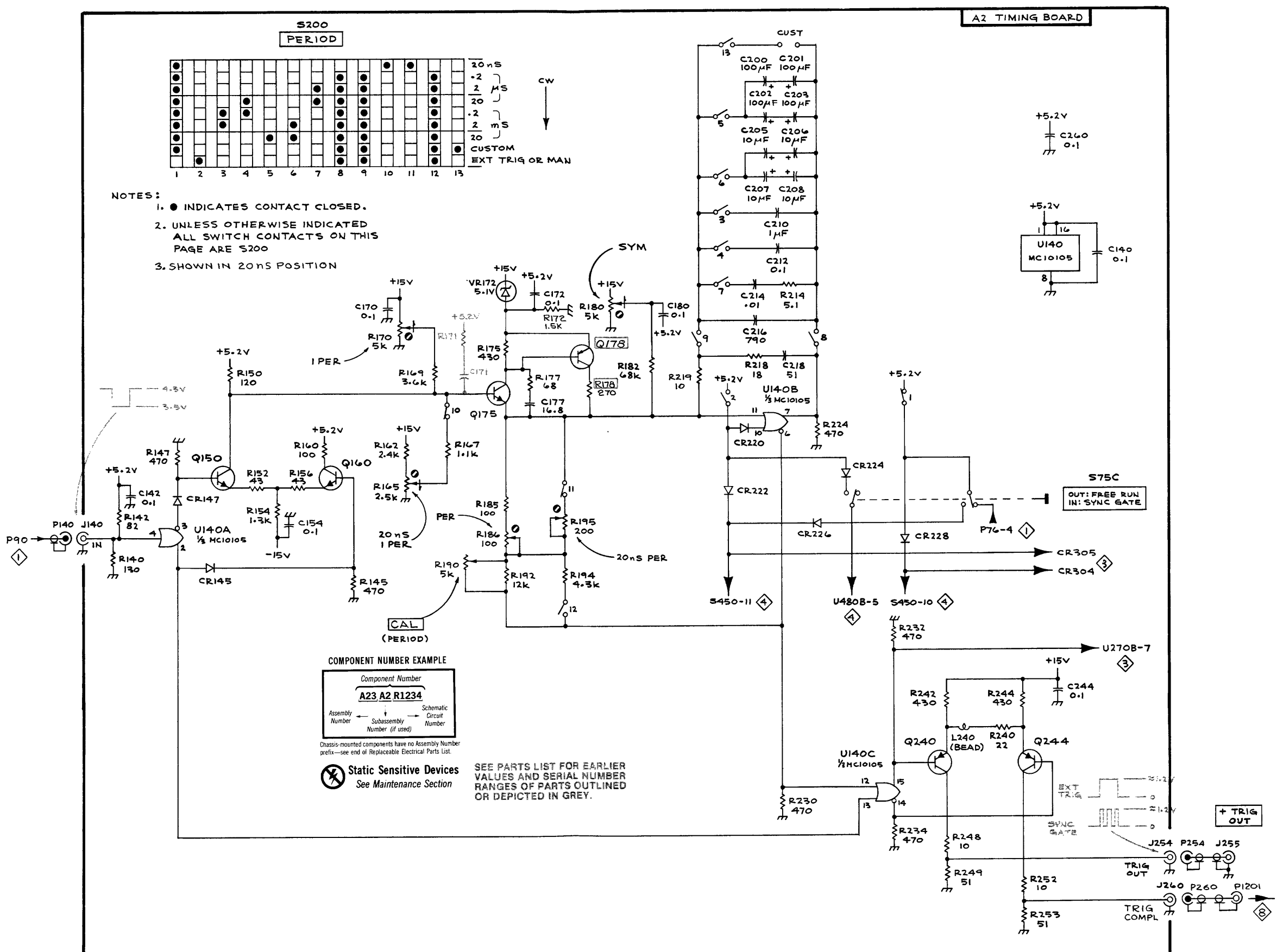
\*See Parts List for serial number ranges.

†Located on back of board.



A B C D E F G H J K L

1  
2  
3  
4  
5  
6  
7  
8



NOTES:  
1. ● INDICATES CONTACT CLOSED.  
2. UNLESS OTHERWISE INDICATED ALL SWITCH CONTACTS ON THIS PAGE ARE S200  
3. SHOWN IN 20NS POSITION

COMPONENT NUMBER EXAMPLE  
Component Number  
A23 A2 R1234  
Assembly Number    Subassembly Number (if used)    Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

⚡ Static Sensitive Devices  
See Maintenance Section

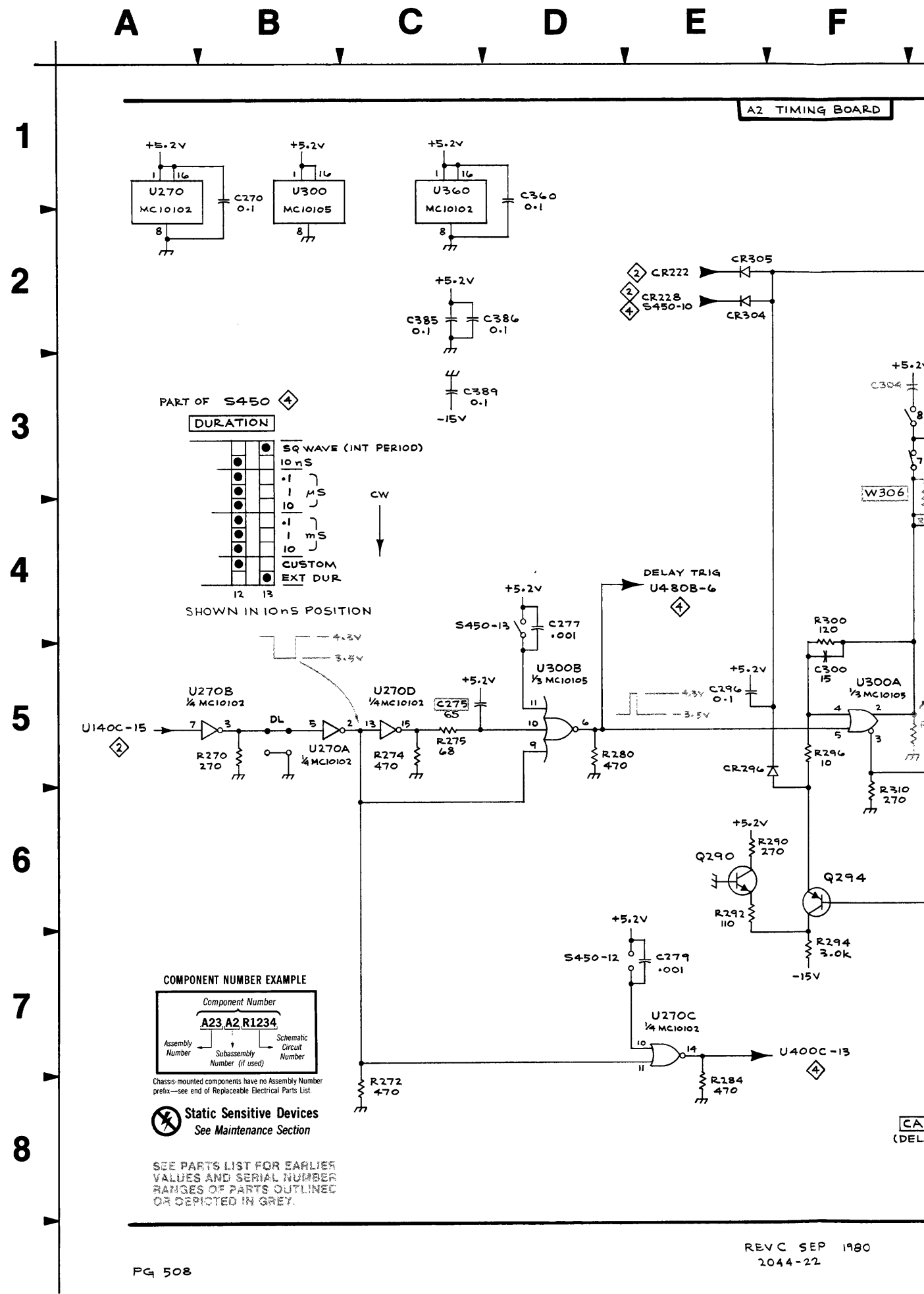
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

\*See Parts List for serial number ranges.  
†Located on back of board.

A2 BOARD ASSY			DELAY GENERATOR <span style="border: 1px solid black; padding: 2px;">3</span>		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C270	B1	F2	R320	H6	H2
C275*	C5	F3	R325	H6	H2
C277	D4	F3	R328	J6	H3
C279	E7	F3	R342	H6	H2
C296	E5	G2	R346	H7	H1
C300	F5	G2	R348	H7	H1
C304*	G3	G1	R350	H7	I2
C317	G5	G2	R352*	H8	I1
C325	H6	H2	R354*	H8	E3
C326	H5	H2	R355†	G8	F3
C328	J5	H3	R360	H4	H5
C330	J5	H3	R362*	J4	H4
C332	J5	G4	R364	J4	H4
C334	K5	I3	R366	K4	H4
C336	K5	G3	R368	H3	H4
C338	L5	G3	R370*	J3	G4
C346	G7	H1	R372	J3	G4
C360	D1	H5	R375	K3	H4
C366*	K4	H4	R380	L2	I3
C375*	K3	G4			
C378	J2	I5	S330†	J6	D3
C382	J1	G4	S330-1,6†	J6	D3
C385	C2	H1	S330-2,4,5†	K6	D3
C386	D2	G1	S330-3†	H6	D3
C389	C3	G2	S330-7,8†	G3	D3
			S330-9†	H7	D3
CR296	E5	G2	S330-10†	L6	D3
CR304	E2	H1	S380A	J1	I3
CR305	E2	I3	S380B	L1	I3
CR378	J2	H4	S450-12†	C4	G4
CR382	J2	G4	S450-13†	E7	G4
J305	G3	F1	U270A	B5	F3
			U270B	B5	F3
Q290	E6	H2	U270C	E7	F3
Q294	F6	H2	U270D	C5	F3
Q320	H6	H2	U300A	F5	F2
Q342	H7	H2	U300B	D5	F2
			U300C	G4	F2
R270	B5	E3	U360A	J4	H4
R272	C8	E3	U360B	J3	H4
R274	C5	F3	U360C	K4	H4
R275	C5	F3	U360D	K3	H4
R280	D5	F2			
R284	E8	F3	W306*	G3	G2
R290	F6	H2			
R292	E6	H2			
R294	F7	G2			
R296	F5	G2			
R300	F4	G2			
R304*	F4	G2			
R306*	G3	G2			
R310	F6	F2			
R312*	G5	F2			
R315	G5	G2			
R317	G5	G2			

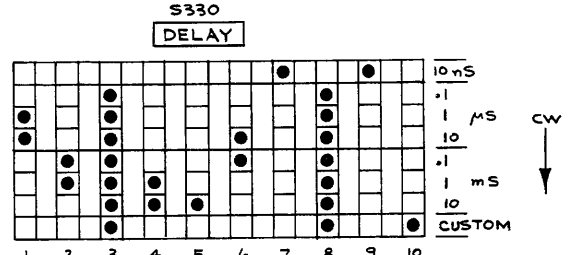
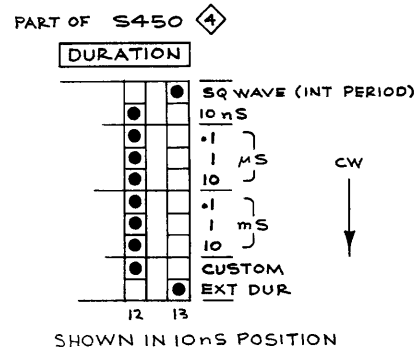
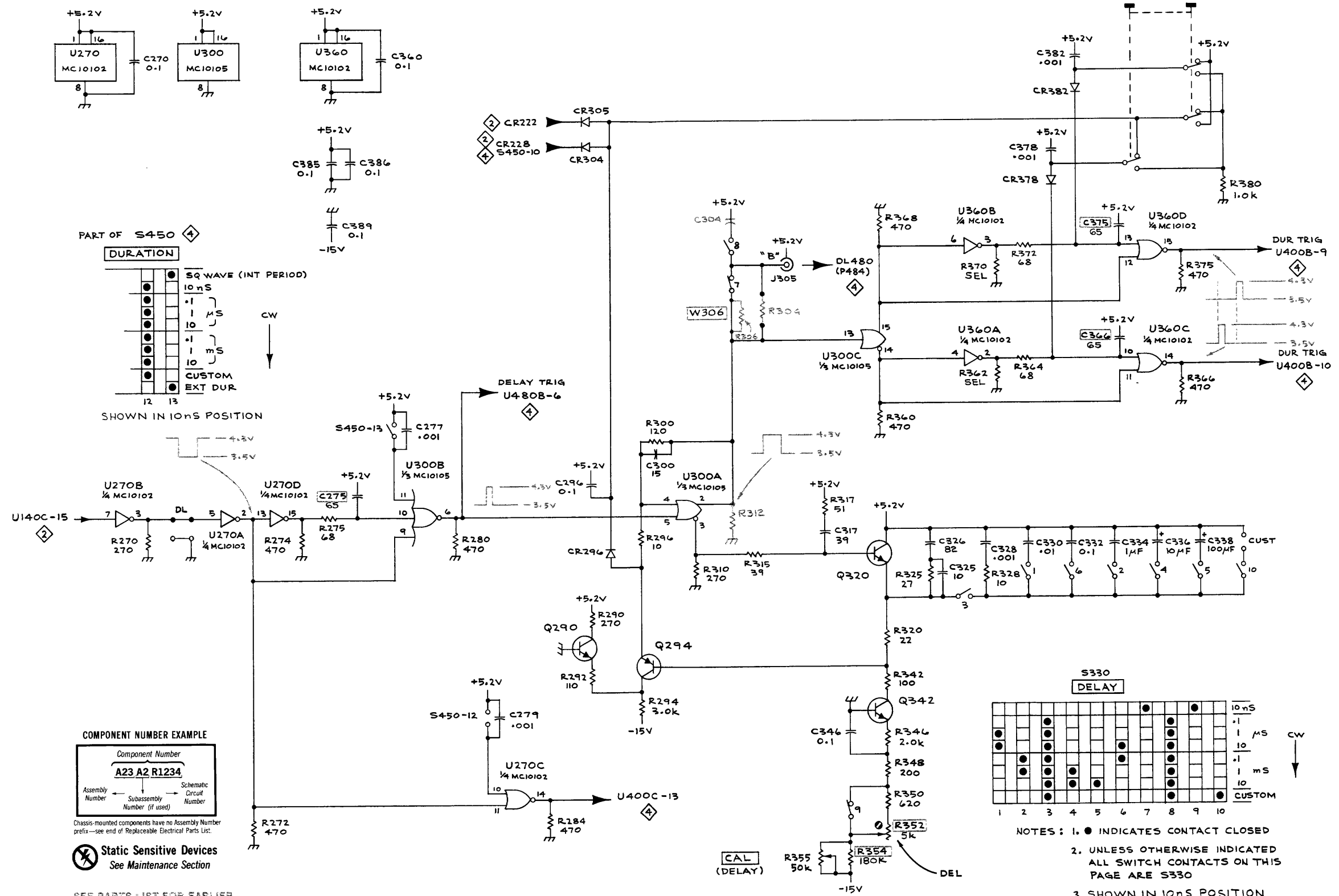
A2 Board Assy also shown on 1, 2, 4 & 9

\*See Parts List for serial number ranges.  
†Located on back of board.



1  
2  
3  
4  
5  
6  
7  
8

A2 TIMING BOARD



NOTES: 1. ● INDICATES CONTACT CLOSED  
2. UNLESS OTHERWISE INDICATED ALL SWITCH CONTACTS ON THIS PAGE ARE S330  
3. SHOWN IN 10nS POSITION

**COMPONENT NUMBER EXAMPLE**

Component Number: A23 A2 R1234

Assembly Number: A23  
Subassembly Number (if used): A2  
Schematic Circuit Number: R1234

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**Static Sensitive Devices**  
See Maintenance Section

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

Parts List for number ranges. ated on back of board.

A2 BOARD ASSY			DURATION GENERATOR <span style="border: 1px solid black; padding: 2px;">4</span>		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C400	B8	G4	R425	E5	F4
C415	D5	F4	R426*	E5	F4
C418*	E3	E4	R430	E5	F4
C432*	F5	E4	R432	F5	F4
C433*	J5	C4	R434*	F5	E4
C435	G5	D4	R436	F5	E4
C436	G5	E4	R439	G5	E4
C438	G5	E4	R455*	F6	F4
C439	G5	E3	R456	F6	F4
C442	H5	D4	R460*	F7	B4
C444	H5	D5	R462*	F7	B4
C446	H5	B3	R465	F7	C4
C448	J5	D4	R467*	F8	B4
C450	J5	D4	R470	F8	B5
C460	F7	F5	R473*	F8	B4
C462	F7	B4	R475†	F8	I4
C480	C8	I4	R482*§	F3	A5
C485*	G3	I5	R483*	H3	I5
C487	H3	I4	R484*†	F3	A5
C493*†	G3	I4	R485*	H3	I5
C500	J2	J4	R487	J3	I5
C502	D7	C5	R490*	H3	I4
C503	D7	J4	R492*§	G2	B5
C505	D8	B5	R493	H2	I4
CR493	H2	I4	R494*†	F2	B5
CR495	J2	I4	R495	J2	I4
R500	J2	I4	R500	J2	I4
DL480*	E2		S450*	J6	G4
J450	K4	H5	S450-1†	G6	G4
J452	K5	G5	S450-2,3†	E4	G4
J480	E3	E5	S450-4,7,8†	H5	G4
J481	F3	J5	S450-5,6,14†	J5	G4
J485	F2	I5	S450-9†	F8	G4
L507*	D8	J4	S450-10†	H1	G4
P484	E2	F2	S450-11†	G1	G4
P500	K2	J4	U400A	E5	G4
P510	K1	I5	U400B	C5	G4
Q406	D6	F5	U400C	J4	G4
Q410	E6	F4	U480A*	G3	I4
Q435*	F5	E4	U480B*	G2	I4
Q460	G6	F5	W422*	E4	F4
R400*	C5	G5	W455*	F6	F4
R402*	C3	G5			
R406	D6	G5			
R408	D6	F5			
R410	D6	F4			
R412	D6	F4			
R415	D4	F4			
R420*	E4	F4			
R422*	E4	F4			

A2 Board Assy also shown on 1, 2, 3 & 9

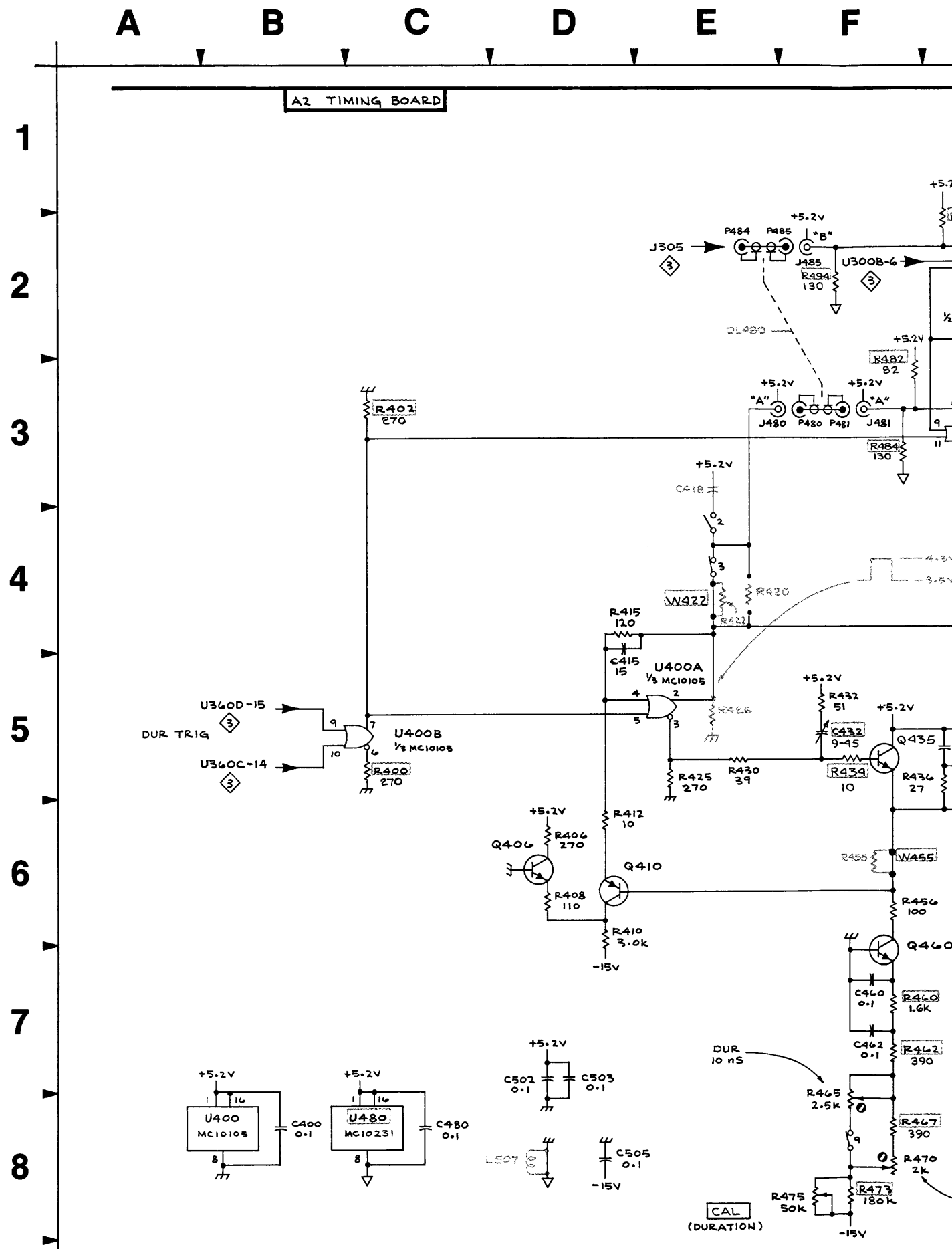
**CHASSIS**

DS500	L2				
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\*See Parts List for serial number ranges.

†Located on back of board.

§R482 & R492 moved to back of board effective SN B020245.



A B C D E F G H J K L

1

2

3

4

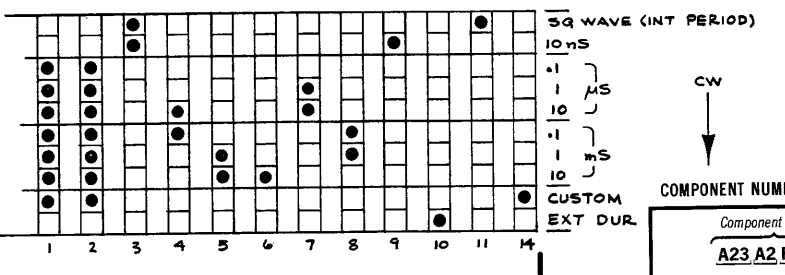
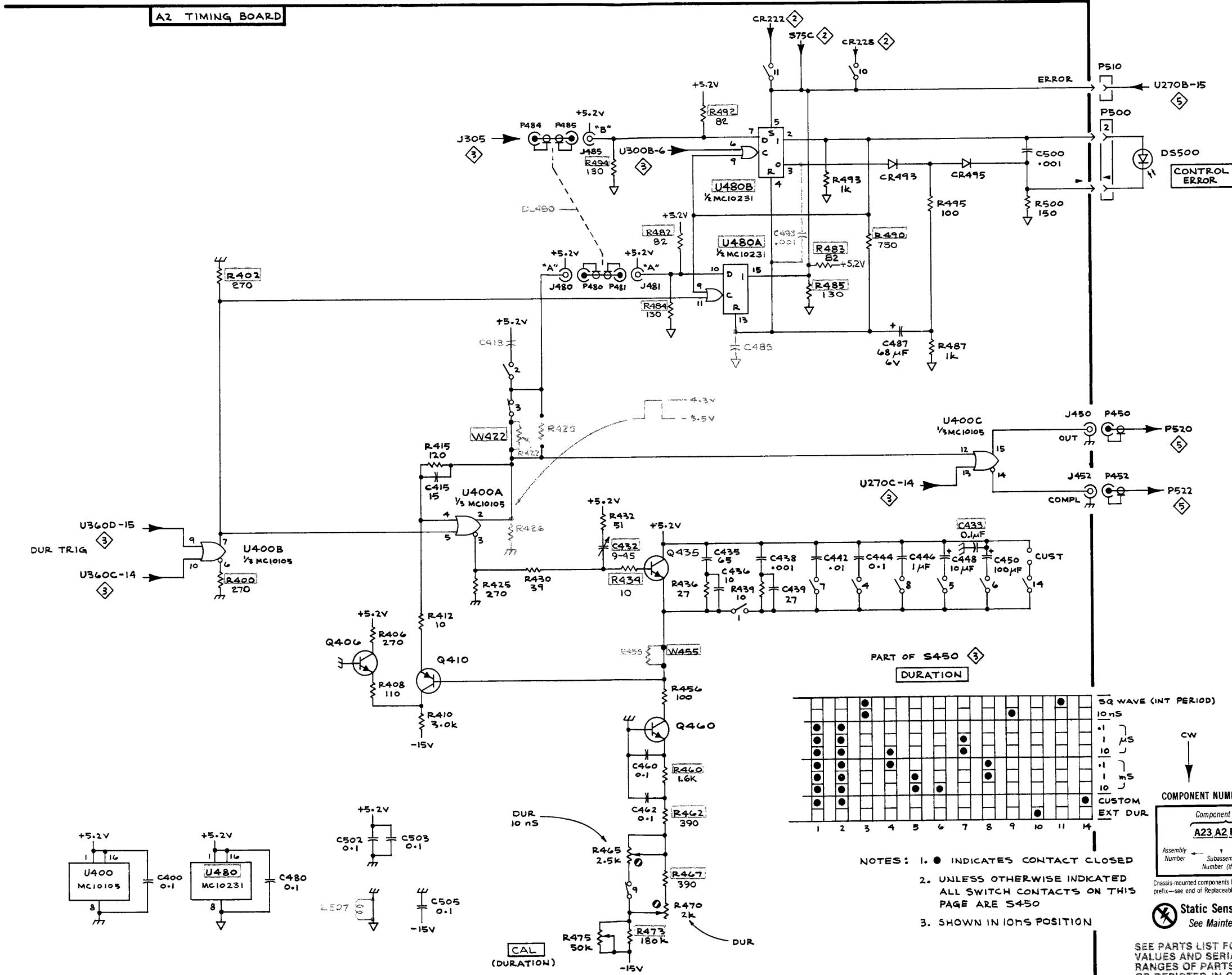
5

6

7

8

A2 TIMING BOARD



- NOTES:
1. ● INDICATES CONTACT CLOSED
  2. UNLESS OTHERWISE INDICATED ALL SWITCH CONTACTS ON THIS PAGE ARE S450
  3. SHOWN IN 10NS POSITION

COMPONENT NUMBER EXAMPLE

Component Number			
A23	A2	R1234	
Assembly Number	Subassembly Number (if used)	Schematic Circuit Number	

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**Static Sensitive Devices**  
See Maintenance Section

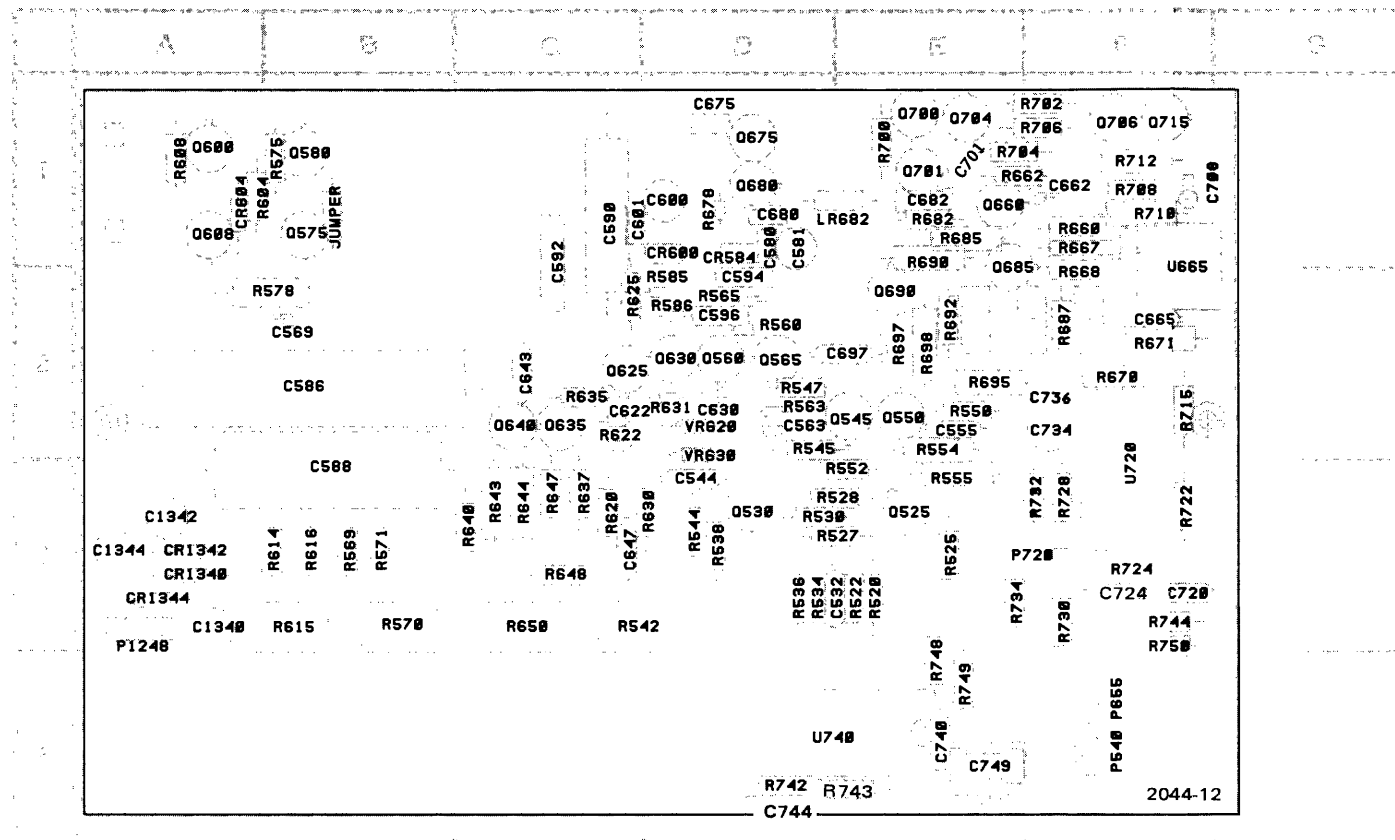
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

Parts List for number ranges. Located on back of board. R492 & R493 moved to back and effective SN B020245.



# PARTS LOCATION GRID

TRANSITION TIMING BOARD (A3)



(BACKSIDE) TRANSITION TIMING BOARD (A3)

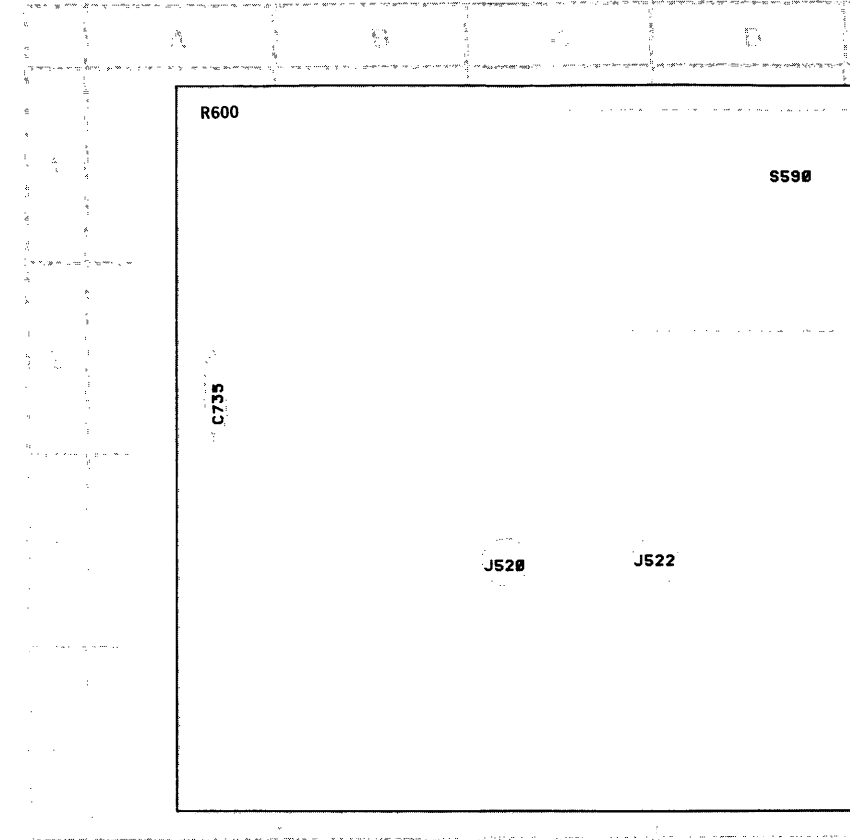
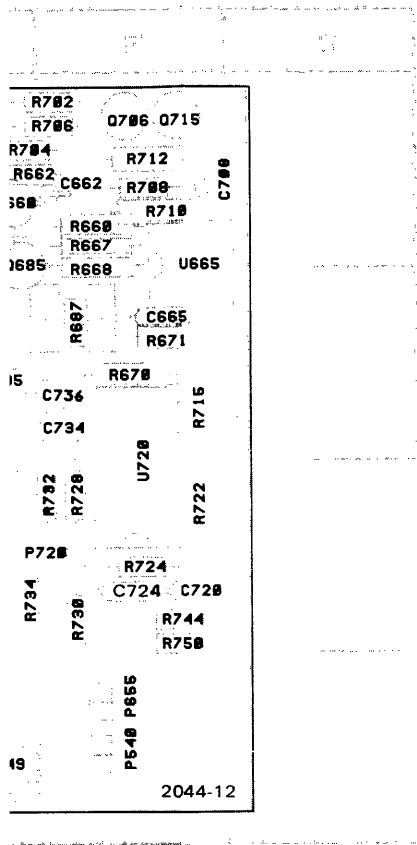


Fig. 8-4. Transition Timing Board A3.





(BACKSIDE) TRANSITION TIMING BOARD (A3)

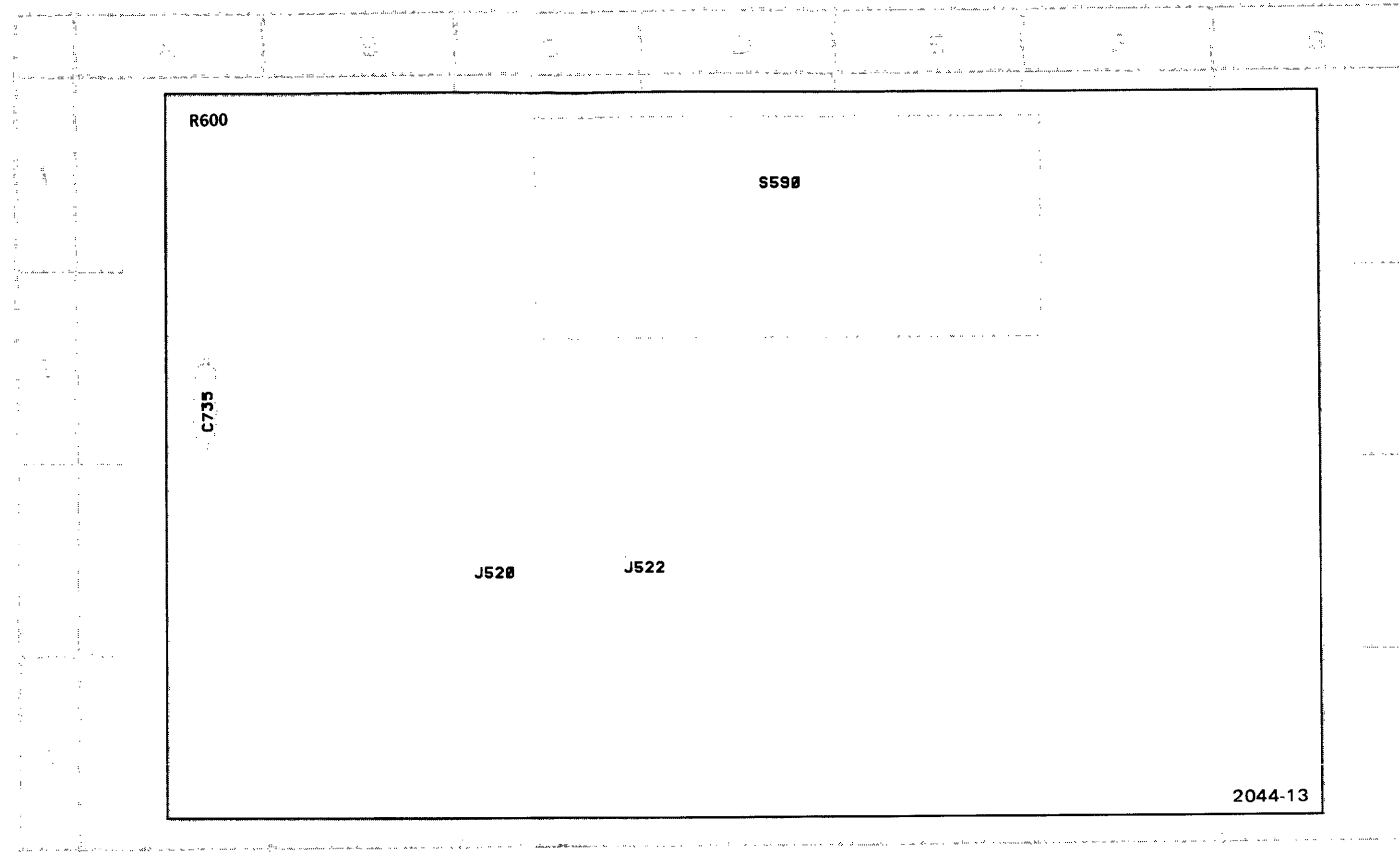


Fig. 8-4. Transition Timing Board A3.

@ SEP 1980



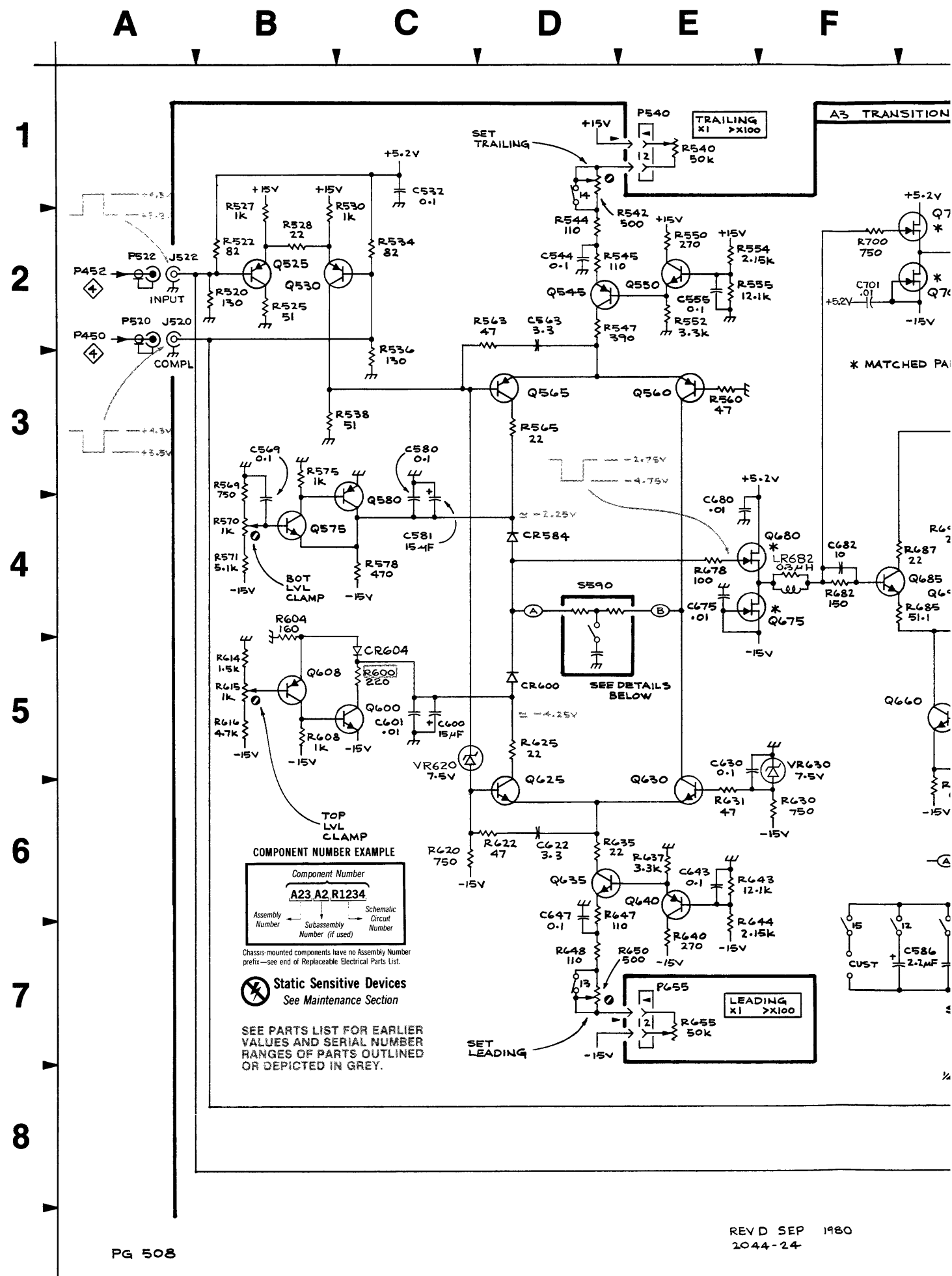
A3 BOARD ASSY			VARIABLE TRANSITION TIME GENERATOR			5		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C532	C1	E3	Q680	F4	D1	R671	H5	F2
C544	D2	D3	Q685	G4	E1	R678	H5	D1
C555	E2	E2	Q690	G4	E2	R682	F4	E1
C563	D2	D2	Q700	G2	E1	R685	G4	E1
C569	B3	B2	Q701	G2	E1	R687	G4	F2
C580	C3	D1	Q704	G2	E1	R690	G4	E1
C581	C4	D1	Q706	H2	F1	R692	G4	E2
C586	G7	B2	Q715	J1	F1	R695	H4	E2
C588	G7	B3				R697	H4	E1
C590	G7	C1	R520	B2	E3	R698	G4	E2
C592	H7	C1	R522	B2	E3	R700	F2	E1
C594	H7	D2	R525	B2	E3	R702	G2	F1
C596	H7	D2	R527	B1	E3	R704	H2	E1
C600	C5	D1	R528	B2	E3	R706	H2	F1
C601	C5	C1	R530	C1	D3	R708	H1	F1
C622	D6	C2	R534	C2	D3	R710	H2	F1
C630	E5	D2	R536	C3	D3	R712	H2	F1
C643	E6	C2	R538	C3	D3	R715	J2	F2
C647	D6	C3	R542	E2	C3	R722	K2	F3
C662	G5	F1	R544	D2	D3	R724	K2	F3
C665	L4	F2	R545	E2	D2	R728*	K3	F3
C675	E4	D1	R547	E2	D2	R730*	L3	F3
C680	F4	D1	R550	E2	E2	R732	K3	F3
C682	F4	E1	R552	E2	E2	R734	K3	E3
C697	H4	E2	R554	E2	E2	R742	G8	D4
C701	F2	E1	R555	E2	E3	R743*	K3	E4
C708	H1	F1	R560	E3	D2	R744	J8	F3
C720	L5	F3	R563	D2	D2	R748	H8	E4
C724	K2	F3	R565	D3	D2	R749	J8	E4
C734	K3	F2	R569	B3	B3	R750	K8	F3
C735*†	J3	A2	R570	B4	B3			
C736*	K3	F2	R571	B4	B3	S590†	K7	D1
C740	L6	E4	R575	B3	B1	S590†	D4	D1
C744*	H8	D4	R578	C4	B2	S590-4.9†	H6	D1
C749*	J8	E4	R585	G6	D2	S590-8†	G6	D1
			R586	H6	D2	S590-11,12†	G7	D1
CR584	D4	D1	R600*†	C5	A1	S590-13†	D7	D1
CR600	D5	D1	R604	B4	A1	S590-14†	D1	D1
CR604	C5	A1	R608	B5	A1	S590-15†	F7	D1
			R614	B5	B3			
J520†	A3	C3	R615	B5	B3	U665	H5	F2
J522†	A2	B3	R616	B5	B3	U720A*	J1	F3
			R620	C6	C3	U720B*	J2	F3
LR682	F4	E1	R622	D6	C2	U740A	H8	E4
			R625	D5	C2	U740B	G8	E4
Q525	B2	E3	R630	F6	D3	U740C	H8	E4
Q530	B2	D3	R631	E6	D2	U740D	H8	E4
Q545	D2	E2	R635	E6	C2			
Q550	E2	E2	R637	E6	C3			
Q560	E3	D2	R640	E7	C3			
Q565	D3	D2	R643	E6	C3			
Q575	B4	B1	R644	E7	C3			
Q580	C4	B1	R647	E6	C3			
Q600	C5	A1	R648	D7	C3			
Q608	B5	A1	R650	E7	C3			
Q625	D6	C2	R660	G6	F1			
Q630	E6	D2	R662	G5	E1			
Q635	D6	C2	R667	H6	F1			
Q640	E6	C2	R668	H6	F2			
Q660	G5	E1	R670	H5	F2			
Q675	F4	D1						

A3 Board Assy also shown on 9

CHASSIS

R540	E1
R655	E7

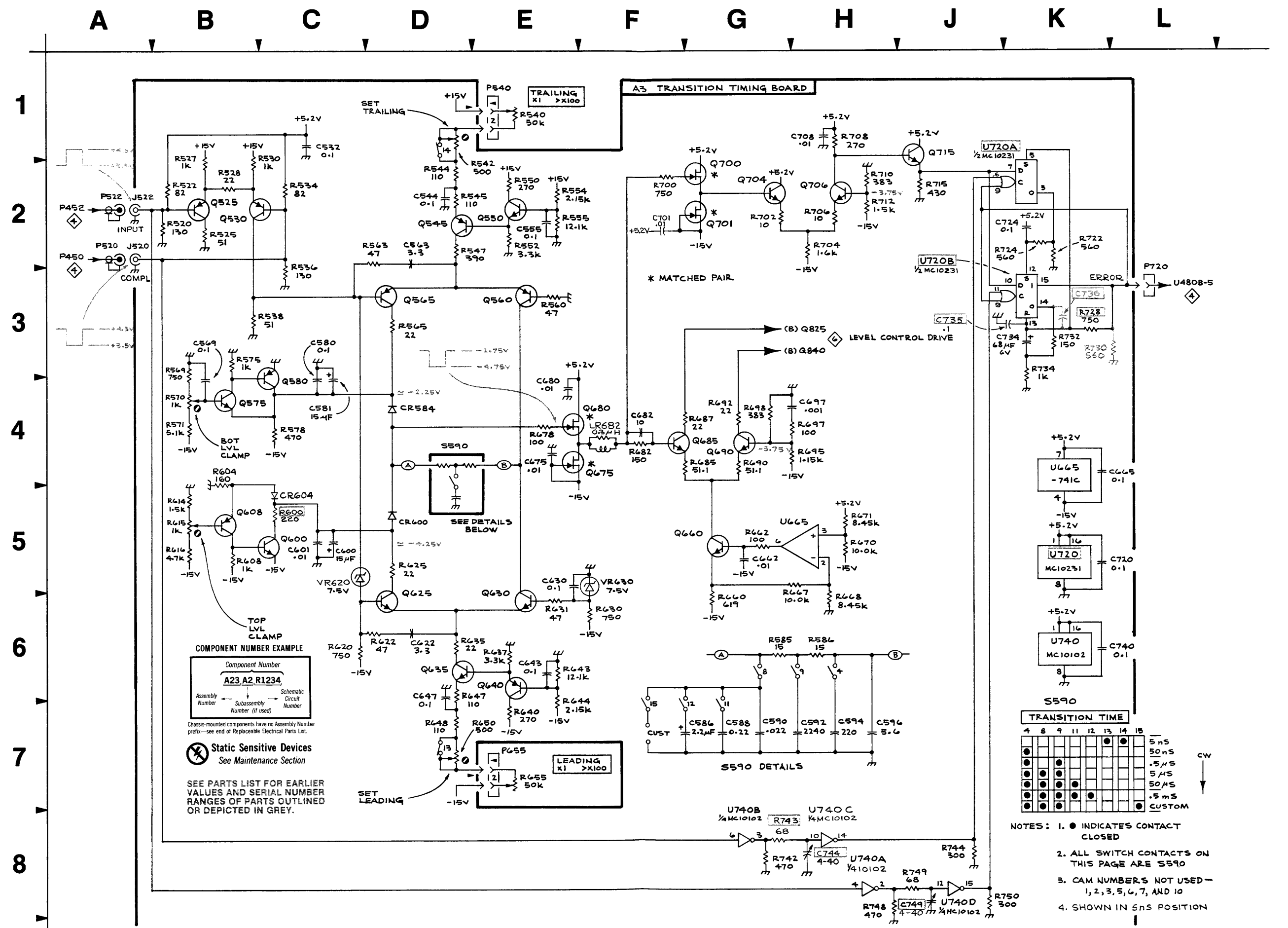
\*See Parts List for serial number ranges.  
† Located on back of board.



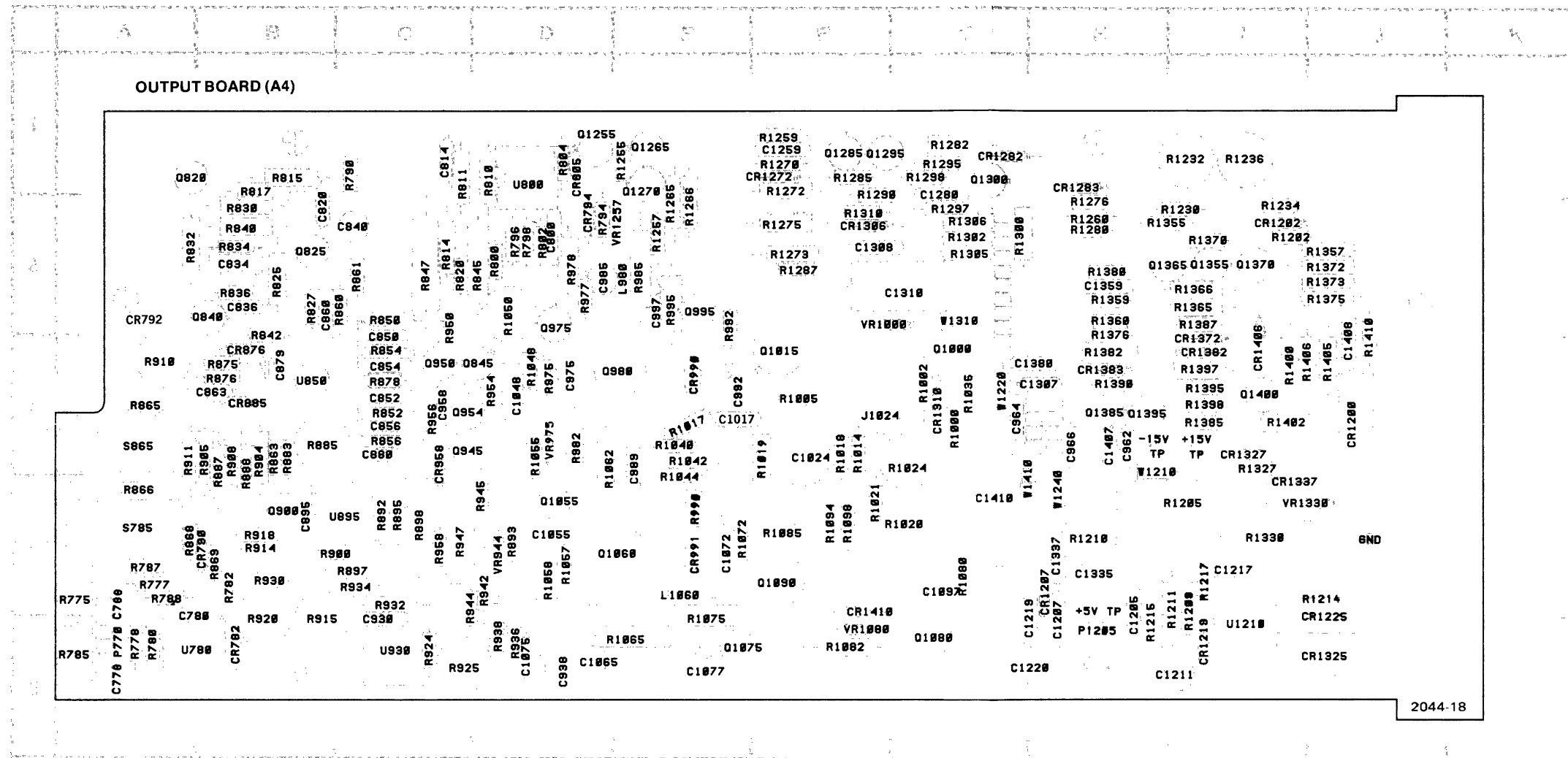
**VARIABLE TRANSITION GENERATOR**

SCHEMATIC LOCATION	BOARD LOCATION
H5	F2
E4	D1
F4	E1
G4	F1
G4	F2
H4	E1
H4	E2
H4	E1
G2	F1
H2	E1
H2	F1
H2	F1
J2	F2
K2	F3
K2	F3
K3	F3
K3	F3
K3	E3
G8	D4
G8	E4
J8	F3
H8	E4
H8	E4
K8	F3
K7	D1
D4	D1
H6	D1
G6	D1
G7	D1
D7	D1
D1	D1
F7	D1
H5	F2
J1	F3
J2	F3
H8	E4
G8	E4
H8	E4

Parts List for number ranges.  
located on back of board.



# PARTS LOCATION GRID



## (BACKSIDE) OUTPUT BOARD (A4)

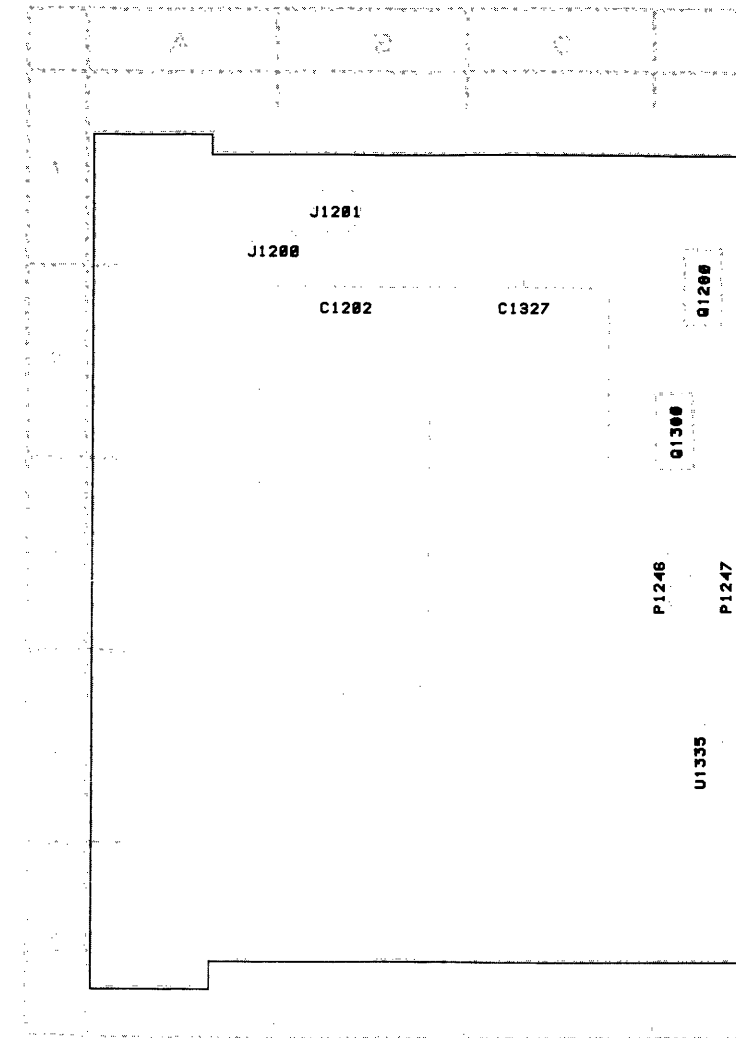
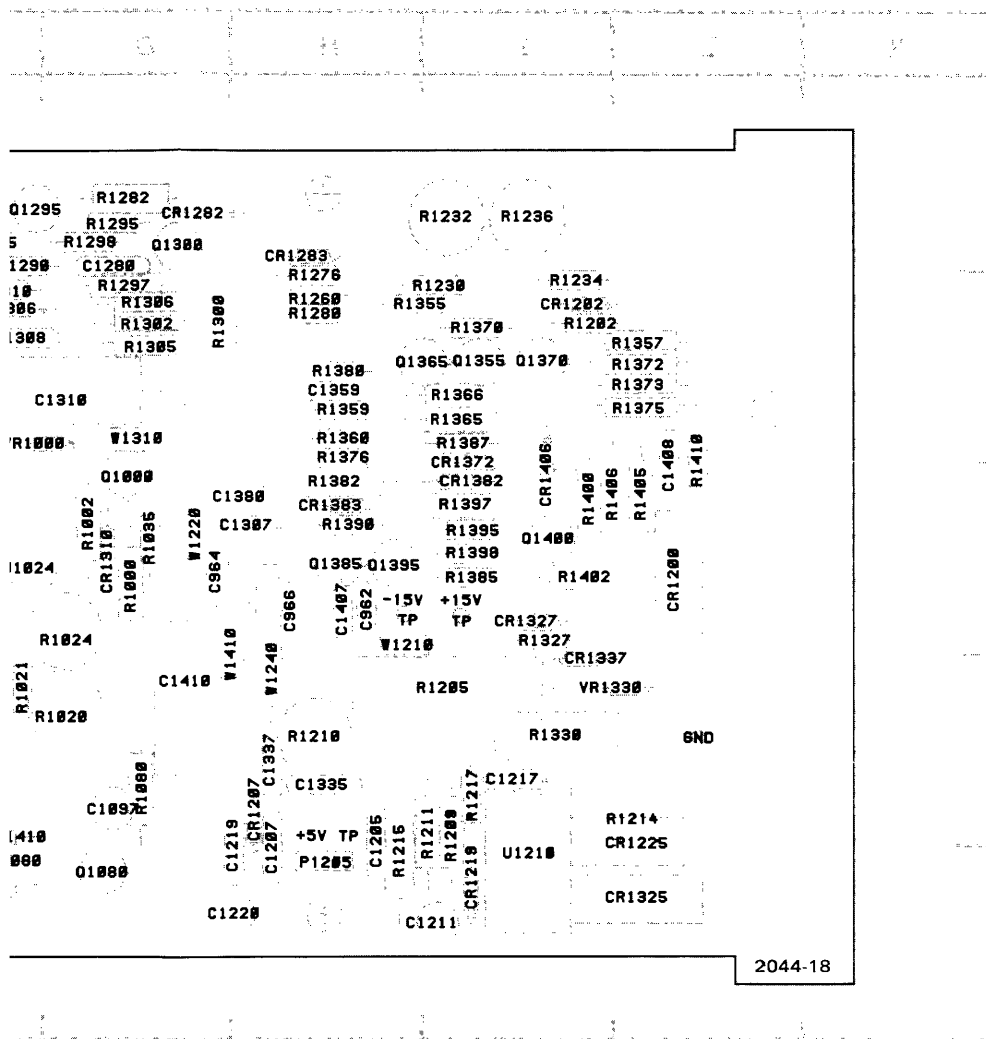


Fig. 8-5. Output Board A4.

ON GRID



(BACKSIDE) OUTPUT BOARD (A4)

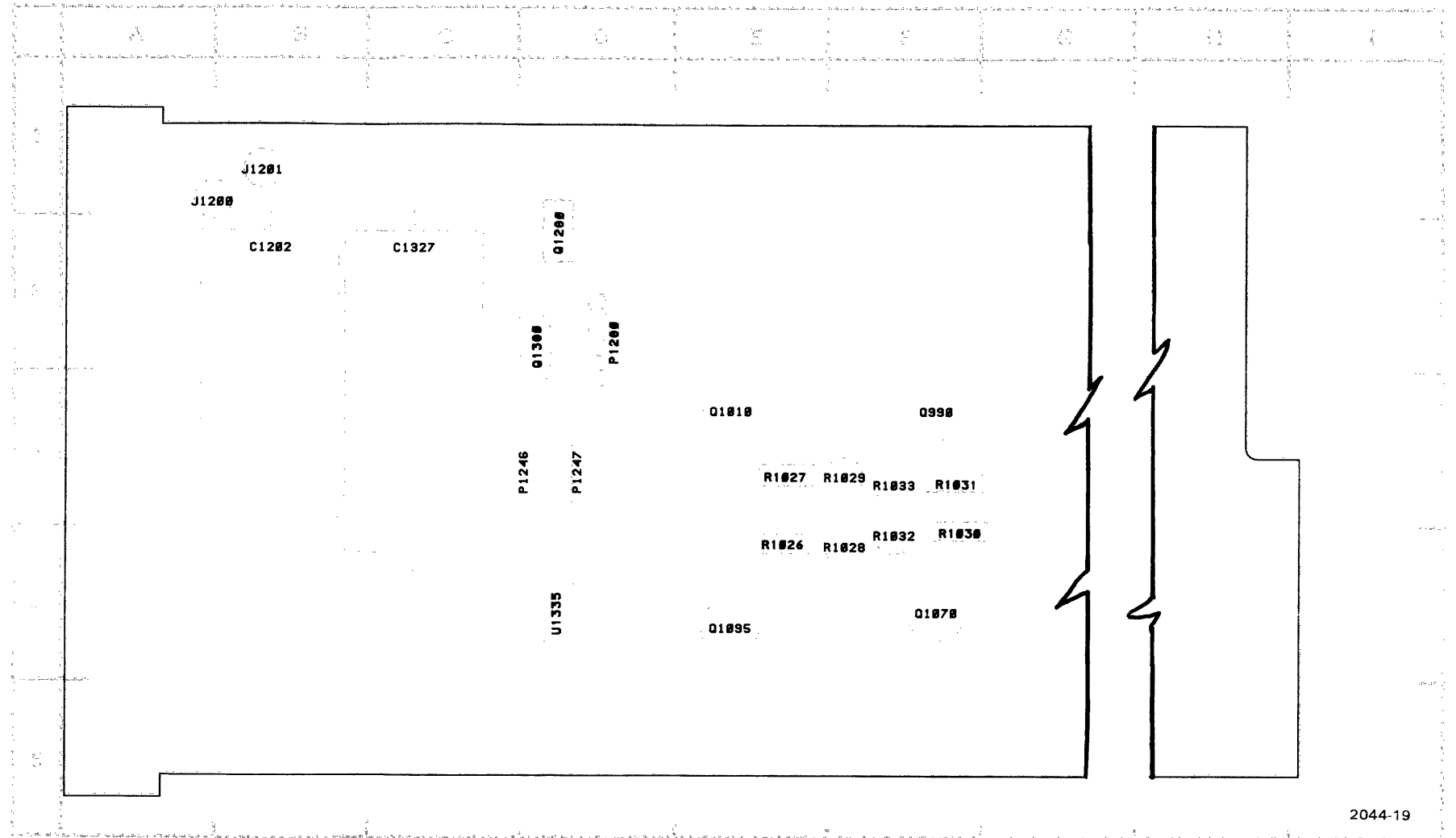
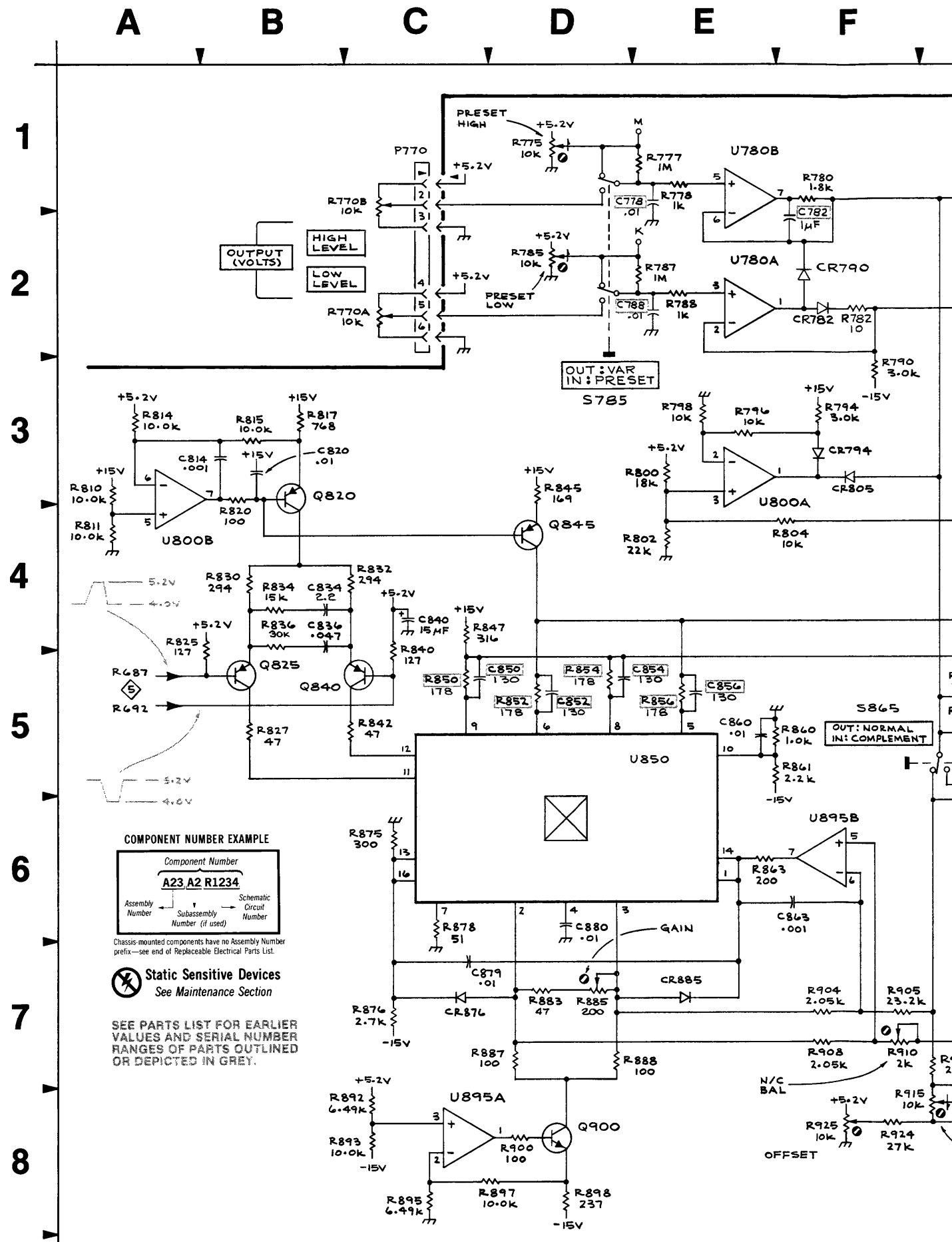


Fig. 8-5. Output Board A4.

A4 BOARD ASSY			LEVEL CONTROL MULTIPLIER 6					
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C778*	D1	A5	R775	D1	A4	R898	D8	C4
C780	K3	A5	R777	E1	A4	R900	D8	C4
C782*	F2	A5	R778	E1	A5	R904	F7	B3
C788*	D2	A4	R780	F1	A5	R905	F7	B3
C800	L3	D2	R782	F2	B4	R908	F7	B3
C814	A3	C1	R785	D2	A5	R910	F7	A3
C820	B3	B2	R787	E2	A4	R911	G7	A3
C834	B4	B2	R788	E2	A4	R914	G7	B4
C836	B4	B2	R790	F3	C1	R915	F8	B5
C840	C4	C2	R794	F4	D2	R918	G7	B4
C850*	D5	C3	R796	E3	D2	R920	G8	B5
C852*	D5	C3	R798	E3	D2	R924	F8	C5
C854*	E5	C3	R800	E3	D2	R925	F8	C5
C856*	E5	C3	R802	E4	D2	R930	G8	B4
C860	E5	B2	R804	F4	D1	R932	H7	C4
C863	F6	B3	R810	A3	D1	R934	H8	C4
C879	C7	B3	R811	A4	C1	R936	J7	D5
C880	D6	C3	R814	A3	C2	R938	J8	D5
C895	K3	B4	R815	B3	B1	R942	K8	D4
C930	L3	C5	R817	B3	B1	R944	K8	C4
C938	H8	D5	R820	B4	C2	R945*	K8	D4
C945*	K8	D4	R825	A4	B2	R947	L8	C4
C958	L5	C3	R827	B5	B2	R950	K5	C2
C962	H3	H3	R830	B4	B2	R954	K4	D3
C964	J3	G3	R832	C4	A2	R956	L4	C3
C966	J3	H3	R834	B4	B2	R958	L4	C4
			R836	B4	B2			
CR782	F2	B5	R840	C4	B2	S785	D3	A4
CR790	F2	B4	R842	C5	B3	S865	F5	A3
CR792*	H3	A2	R845	D3	D2			
CR794	F3	D2	R847	D4	C2	U780A	E2	B5
CR805	F3	D1	R850*	C5	C2	U780B	E1	B5
CR876	C7	B3	R852*	D5	C3	U800A	F3	D1
CR885	E7	B3	R854*	D5	C3	U800B	A4	D1
CR958	L4	C3	R856*	E5	C3	U850	E5	B3
			R860	F5	C2	U895A	C8	C4
P770	C1	A5	R861	F5	C2	U895B	F6	C4
			R863	E6	B3	U930A	H8	C5
Q820	B3	A1	R865	G5	A3	U930B	J7	C5
Q825	B5	B2	R866	G5	A4			
Q840	B5	B2	R868	G5	A4	VR944	K8	D4
Q845	D4	D3	R869	G5	B4			
Q900	D8	B4	R875	C6	B3			
Q945	L8	C3	R876	C7	B3			
Q950	K5	C3	R878	C6	C3			
Q954	K4	C3	R883	D7	B3			
			R885	D7	B3			
			R887	C7	B3			
			R888	E7	B3			
			R892	C8	C4			
			R893	C8	D4			
			R895	C8	C4			
			R897	D8	C4			

A4 Board Assy also shown on 7, 8 & 9

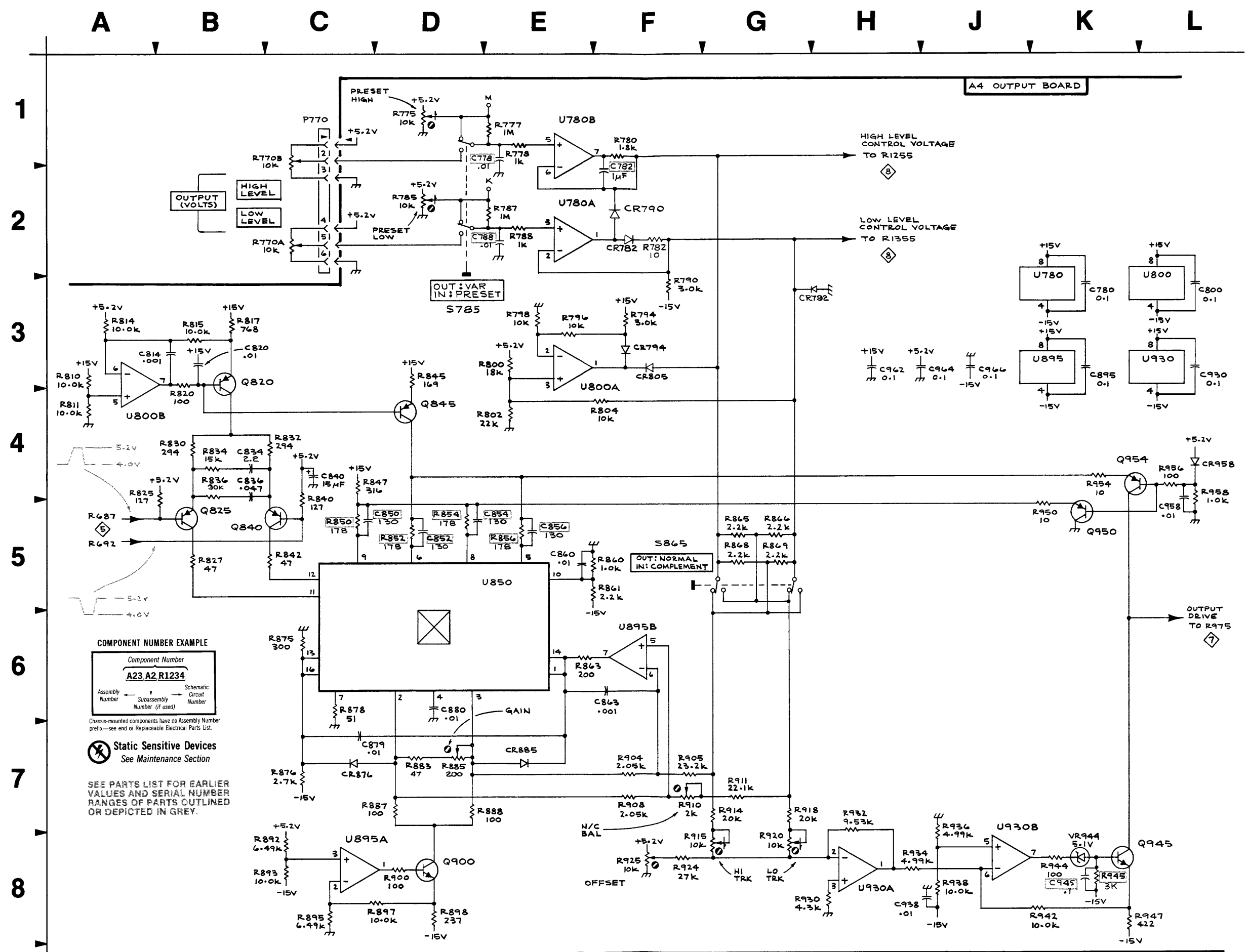
\*See Parts List for serial number ranges.



CONTROL MULTIPLIER 6

SCHEMATIC LOCATION	BOARD LOCATION
D8	C4
D8	C4
F7	B3
F7	B3
F7	A3
G7	A3
G7	B4
F8	B5
G8	B4
H8	C4
J8	D5
K8	D4
K8	D4
L8	C4
K5	C2
K4	D3
L4	C3
L4	C4
D3	A4
F5	A3
E2	B5
E1	B5
F3	D1
A4	D1
E5	B3
C8	C4
F6	C4
H8	C5
J7	C5
K8	D4

\*See Parts List for serial number ranges.



**COMPONENT NUMBER EXAMPLE**

Component Number: A23 A2 R1234

Assembly Number: 1

Subassembly Number: (if used)

Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**Static Sensitive Devices**  
See Maintenance Section

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



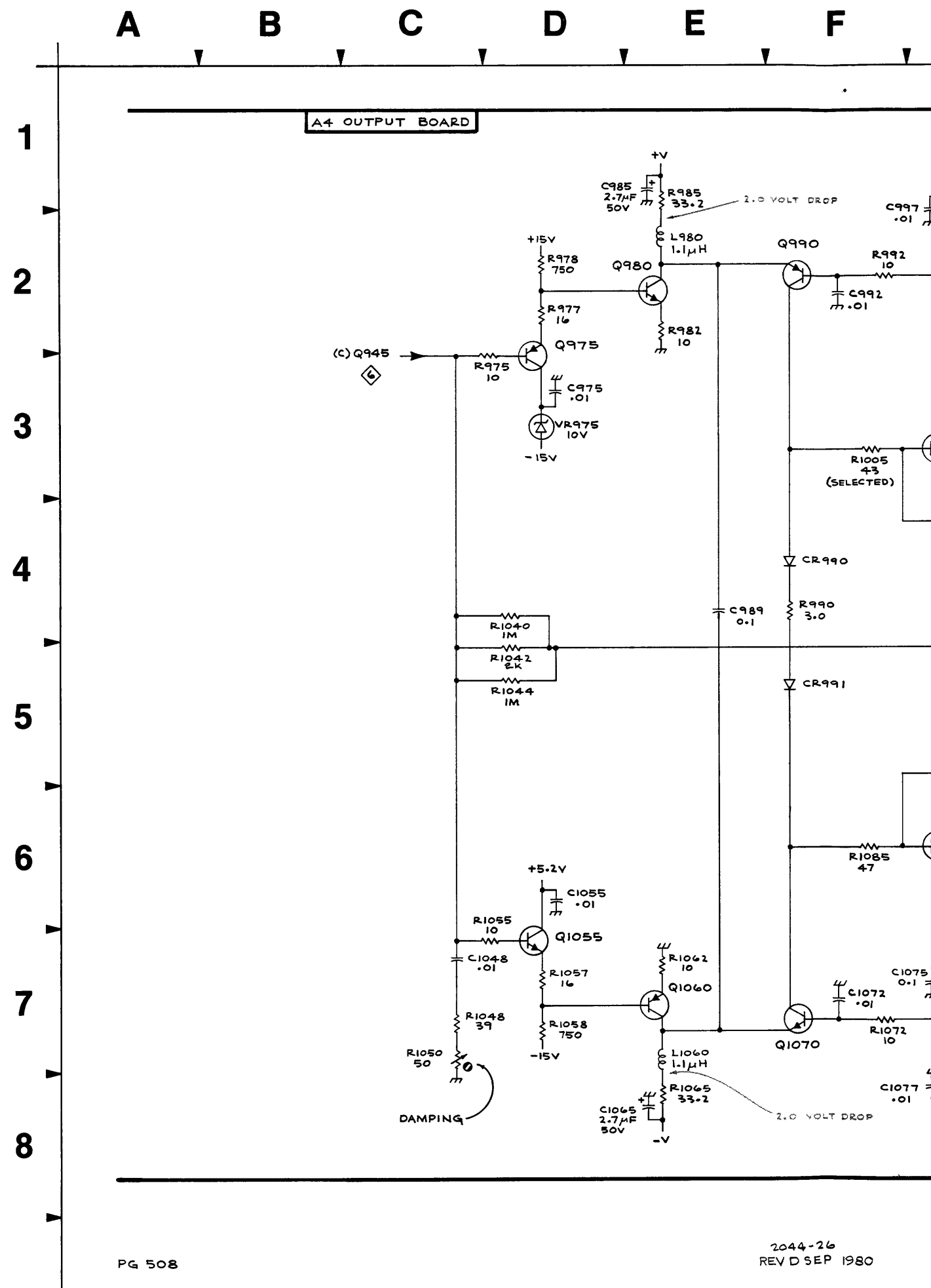
A4 BOARD ASSY			OUTPUT AMPLITUDE <span style="border: 1px solid black; padding: 2px;">7</span>		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C975	D3	D3	R992	F2	E2
C985	D1	D2	R995	G2	E2
C989	E4	E3	R1000	H2	G3
C992	F2	E3	R1002	H2	G3
C997	F1	E2	R1005	F3	F3
C1017*	J4	E3	R1014	G3	F3
C1024	H4	F3	R1017*	H4	E3
C1048	C7	D3	R1018	H4	F3
C1055	D6	D4	R1019	H4	F3
C1065	D8	D5	R1020	J4	G4
C1072	F7	E4	R1021	H4	F4
C1075	F7	D5	R1024	J4	G3
C1077	F8	E5	R1026†	H5	E4
C1097	H6	G4	R1027†	H5	E3
			R1028†	H5	F4
CR990	F4	E3	R1029†	J5	F3
CR991	F5	E4	R1030†	H5	F4
			R1031†	H5	F3
J1024	J4	F3	R1032†	H5	F4
			R1033†	J5	F3
L980	E2	E2	R1035	J5	G3
L1060	E7	E4	R1040	D4	E3
			R1042	D5	E3
			R1044	D5	E4
Q975	D2	D2	R1048	C7	D3
Q980	E2	E3	R1050	C7	D2
Q990†	F2	F3	R1055	D6	D3
Q995	G2	E2	R1057	D7	D4
Q1000	H2	G3	R1058	D7	D4
Q1010†	G3	E3	R1062	E7	D3
Q1015	H4	F3	R1065	E8	E5
Q1055	D7	D4	R1072	F7	E4
Q1060	E7	E4	R1075	G7	E5
Q1070†	F7	F4	R1080	G7	G4
Q1075	G7	E5	R1082	H7	F5
Q1080	H7	G5	R1085	F6	F4
Q1090	G6	F4	R1094	G6	F4
Q1095†	H5	E4	R1098	G5	F4
R975	D3	D3	VR975	D3	D3
R977	D2	D2	VR1000	G2	F2
R978	D2	D2	VR1080	H7	F5
R982	E2	D3			
R985	E1	E2			
R990	F4	E4			

A4 Board Assy also shown on 6, 8 & 9

**CHASSIS**

J1025	K4				
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\*See Parts List for serial number ranges.  
 †Located on back of board.



A B C D E F G H J K L

1

2

3

4

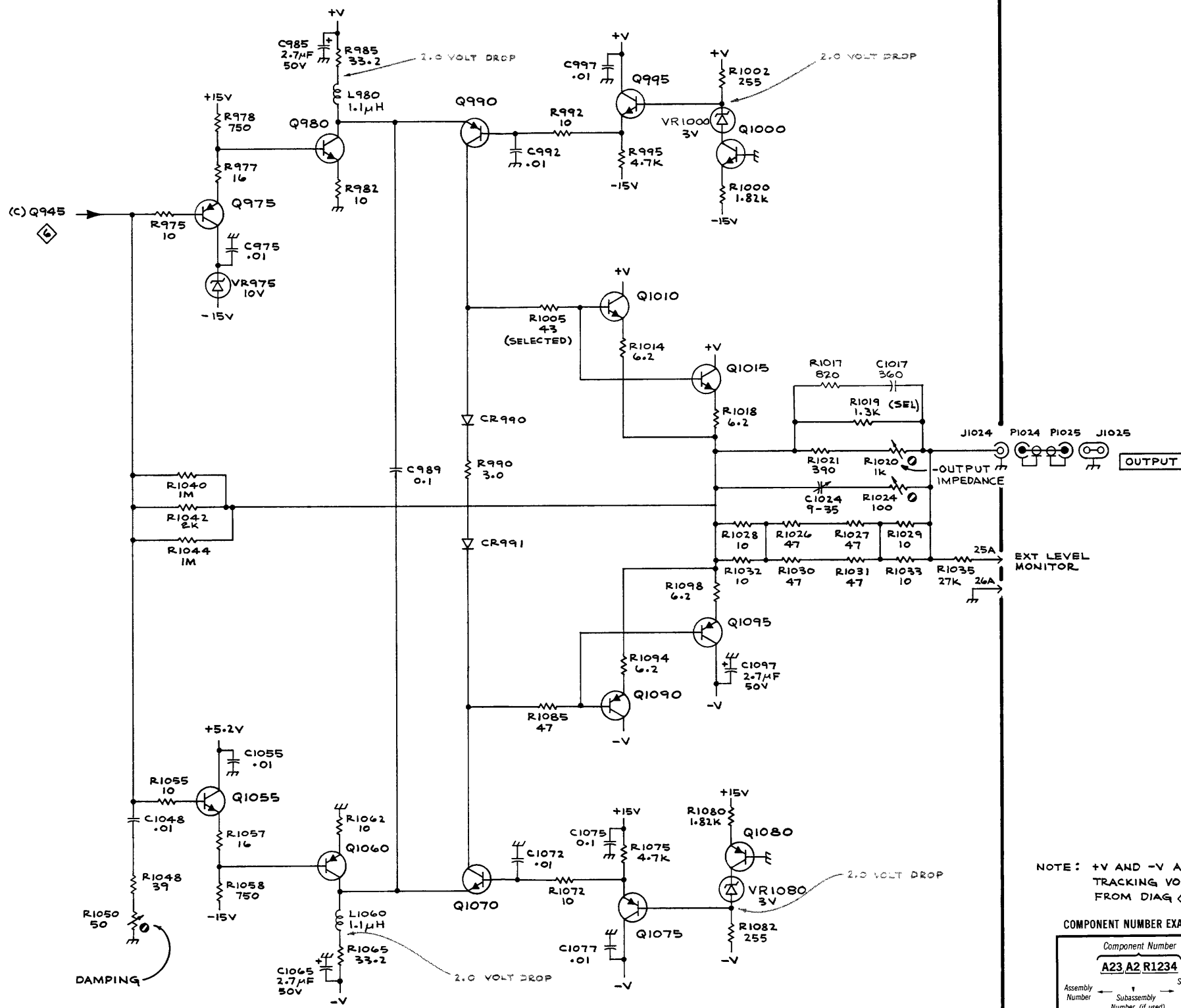
5

6

7

8

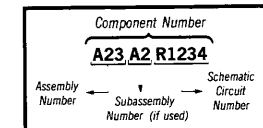
A4 OUTPUT BOARD



Parts List for  
all number ranges.  
located on back of board.

NOTE: +V AND -V ARE + AND -  
TRACKING VOLTAGES  
FROM DIAG 8

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number  
prefix—see end of Replaceable Electrical Parts List.

Static Sensitive Devices  
See Maintenance Section



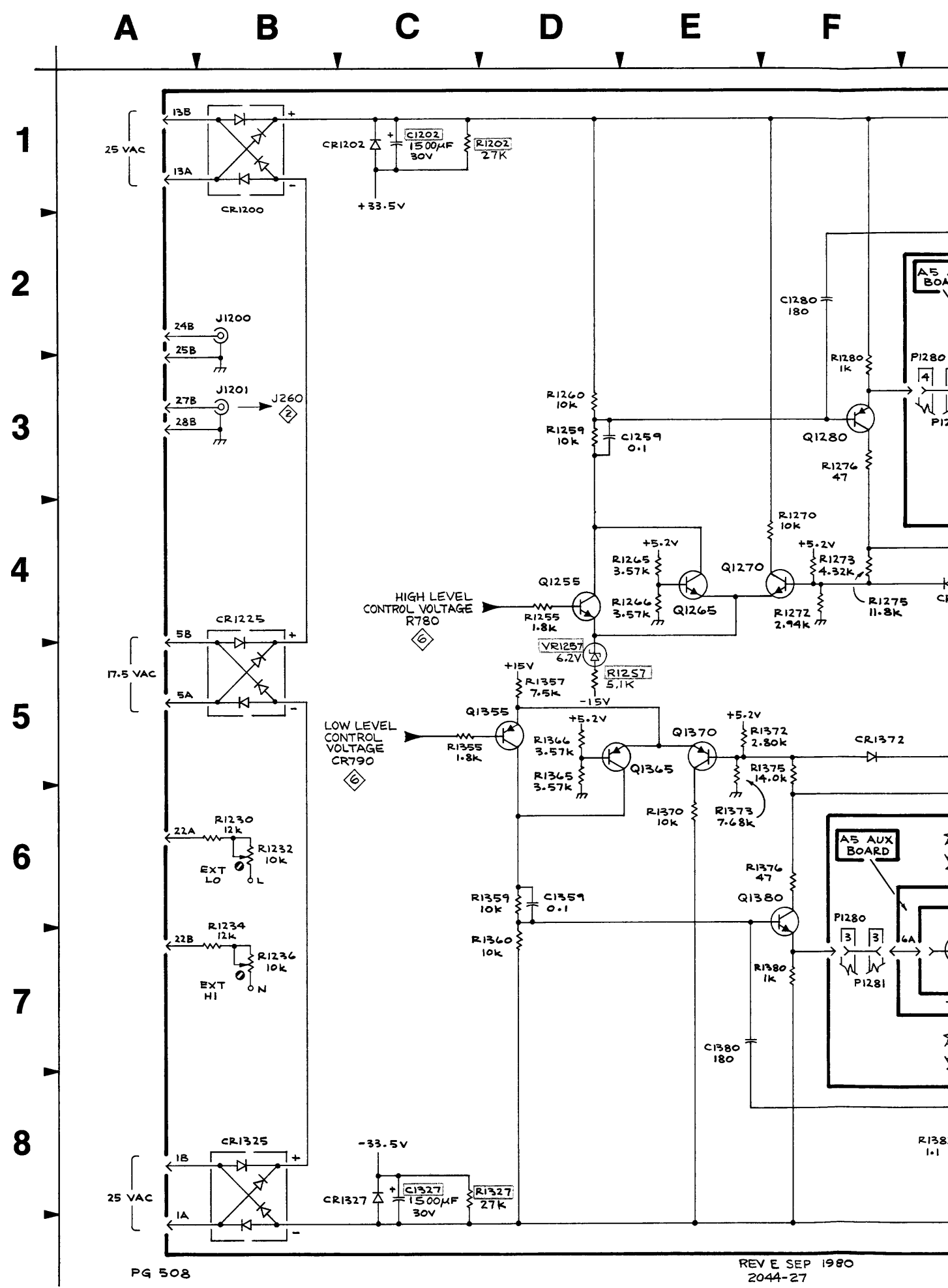
A4 BOARD ASSY			TRACKING VOLTAGE SUPPLIES 8		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C1202*†	C1	B2	R1236	B7	I1
C1259	E3	F1	R1255	D4	E1
C1280	F2	G1	R1257*	E5	E2
C1307	J4	H3	R1259	D3	F1
C1308	J4	F2	R1260	D3	H2
C1310	K4	G2	R1265	E4	E2
C1327*†	C8	C2	R1266	E4	E2
C1359	D6	H2	R1270	F4	F1
C1380	E7	H3	R1272	F4	F1
C1407	J5	H3	R1273	F4	F2
C1408	J5	J3	R1275	F4	F2
C1410	K5	G4	R1276	F3	H2
			R1280	F3	H2
CR1200	B1	J3	R1282	G1	G1
CR1202	C1	I2	R1285	J2	F1
CR1225	B4	J5	R1287	J4	F2
CR1272	G4	F1	R1290	J1	F2
CR1282	H1	G1	R1295	J2	G1
CR1283	H1	H1	R1297	K1	G2
CR1306	K2	F2	R1298	K2	G1
CR1310	K4	G3	R1300	J2	G2
CR1325	B8	J5	R1302	K3	G2
CR1327	C8	I3	R1305	K2	G2
CR1372	F5	I3	R1306	K2	G2
CR1382	G8	I3	R1310	J4	F2
CR1383	G8	H3	R1327*	D8	I3
CR1406	K7	I3	R1355	C5	H2
CR1410	K4	F4	R1357	D5	J2
			R1359	D6	H2
J1200†	B2	A1	R1360	D7	H2
J1201†	B3	B1	R1365	D5	I2
			R1366	D5	I2
P1280-1†	G7	D2	R1370	E6	I2
P1280-2†	G6	D2	R1372	F5	J2
P1280-3†	F6	D2	R1373	E6	J2
P1280-4†	G3	D2	R1375	F5	J2
P1280-5†	H4	D2	R1376	E6	H2
P1280-6†	H2	D2	R1380	F7	H2
			R1382	G8	H3
Q1255	D4	D1	R1385	H7	I3
Q1265	E4	E1	R1387	H5	I2
Q1270	E4	E1	R1390	H8	H3
Q1280†	F3	D2	R1395	J8	I3
Q1285	H1	F1	R1397	J8	I3
Q1295	J2	F1	R1398	J8	I3
Q1300	J2	G1	R1400	J7	I3
Q1355	D5	I2	R1402	J7	I3
Q1365	E5	I2	R1405	K8	J3
Q1370	E5	I2	R1406	K7	I3
Q1380†	E6	D2	R1410	J5	J3
Q1385	H8	H3			
Q1395	H8	H3	VR1257*	D5	E2
Q1400	J7	I3			
R1202*	D1	I2	W1310	K4	G2
R1230	B6	I2	W1410	K6	G4
R1232	B6	I1			
R1234	B7	I2			

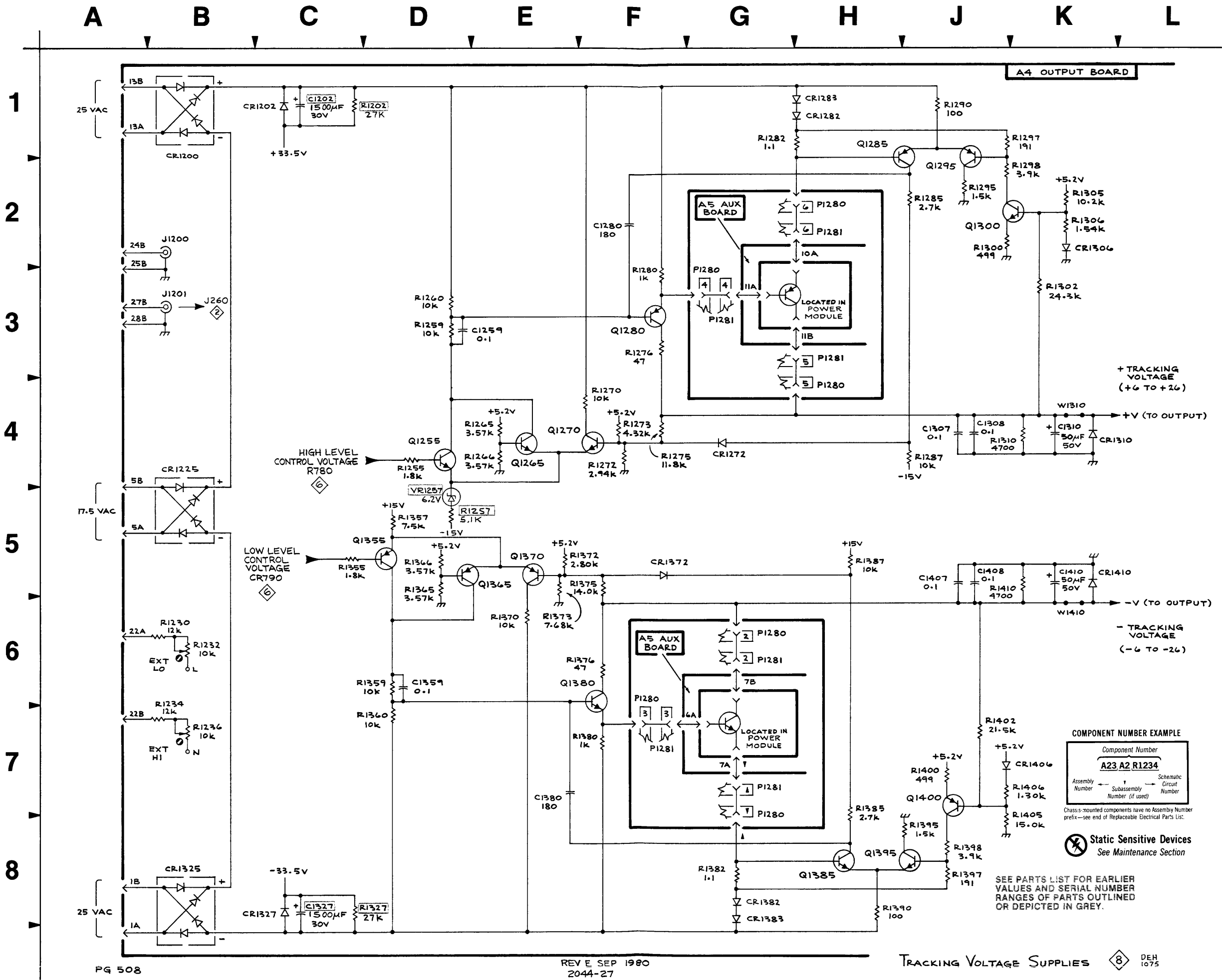
A4 Board Assy also shown on 6, 7, & 9

**A5 BOARD ASSY**

P1281-1	G7				
P1281-2	G6				
P1281-3	F7				
P1281-4	G3				
P1281-5	H3				
P1281-6	H2				

\* See Parts List for serial number ranges.  
† Located on back of board.





**A4 OUTPUT BOARD**

+ TRACKING VOLTAGE (+6 TO +26)

- TRACKING VOLTAGE (-6 TO -26)

**COMPONENT NUMBER EXAMPLE**

Component Number		
A23 A2 R1234		
Assembly Number	Subassembly Number (if used)	Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**Static Sensitive Devices**  
See Maintenance Section

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

Parts List for al number ranges. cated on back of board.

A4 BOARD ASSY			POWER SUPPLY 9		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C1205	B3	H5	R1205	B3	I4
C1207*	C3	H5	R1209	C4	I4
C1211	C5	I5	R1210	C4	H4
C1217	D5	I4	R1211	C5	I4
C1219*	D5	H5	R1214*	D4	J4
C1335*	B6	H4	R1215	D5	H5
C1337*	D6	H4	R1217	D5	I4
			R1330	D7	I4
CR1207	C3	H4	U1210	C5	I5
CR1219	D5	I5	U1335†	C6	D4
CR1337	D6	I4			
P1205-1-3	C2	H5	VR1330	D7	J4
P1246-1-4†	G1	D3	W1210	E3	H3
P1247-1-4†	H7	D3	W1220	F5	G3
			W1240	E6	H4

A4 Board Assy also shown on 6, 7 & 8

A1 BOARD ASSY					
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C1246	J3	D1	P1251	H4	C1
C1248	J3	C1	P1253	L3	A3
C1250	J4	D1			
CR1246	J3	C1	R1250	K3	A3
CR1248	J3	C1			
CR1250	J4	C1			

A1 Board Assy also shown on 1

A2 BOARD ASSY					
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C1240	J1	C4			
C1242	J1	C4			
C1244	J2	C4			
CR1240	J1	B4			
CR1241	J1	B4			
CR1244	J2	B4			
P1245-1-4†	C1	I4			

A2 Board Assy also shown on 1, 2, 3 & 4

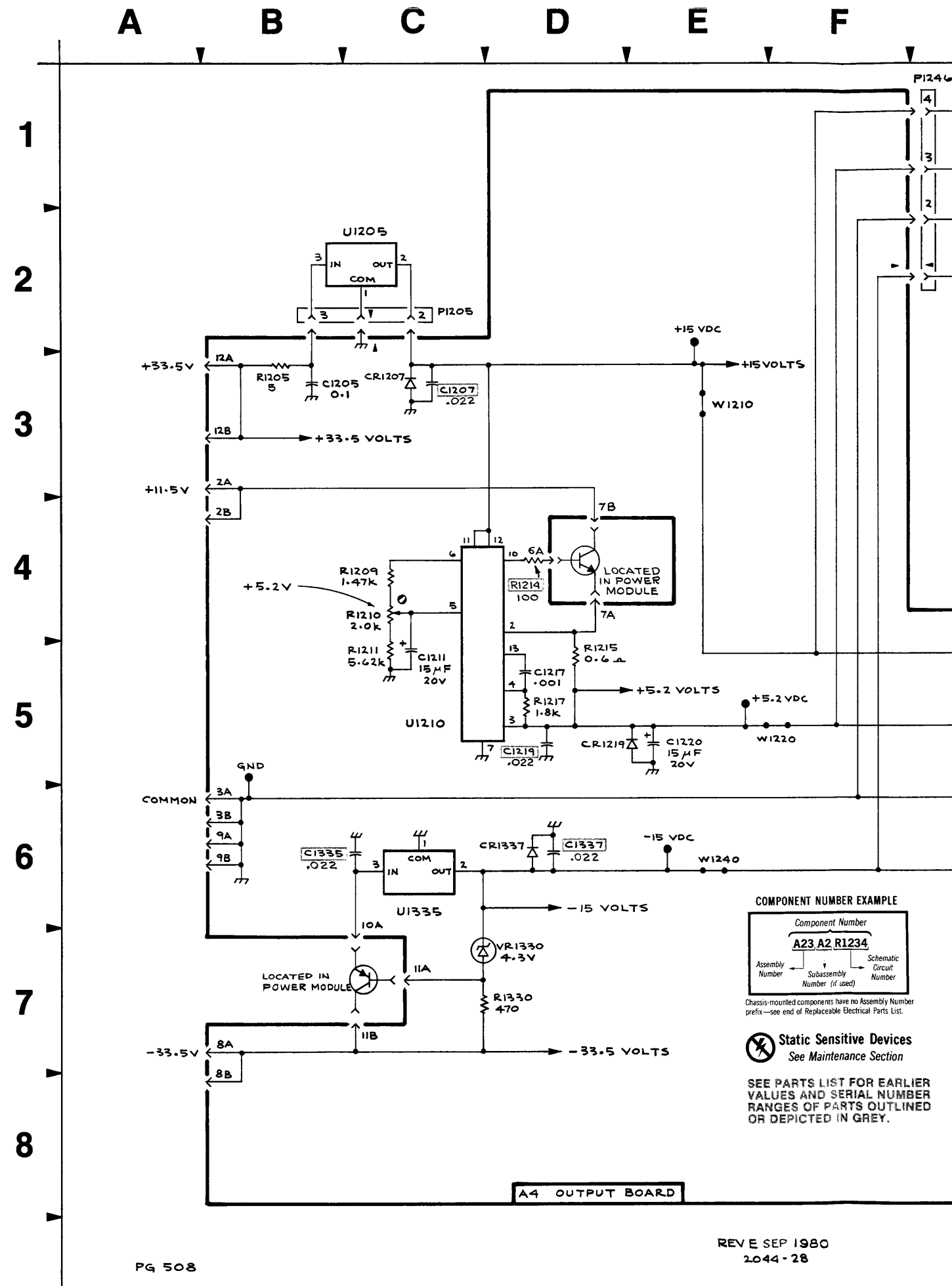
A3 BOARD ASSY					
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C1340	J7	A3			
C1342	J7	A3			
C1344	J8	A3			
CR1340	J7	A3			
CR1342	J7	A3			
CR1344	J8	A3			
P1248-1-4	H8	A3			

A3 Board Assy also shown on 5

CHASSIS					
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
DS1250	L3				
U1205	C2				

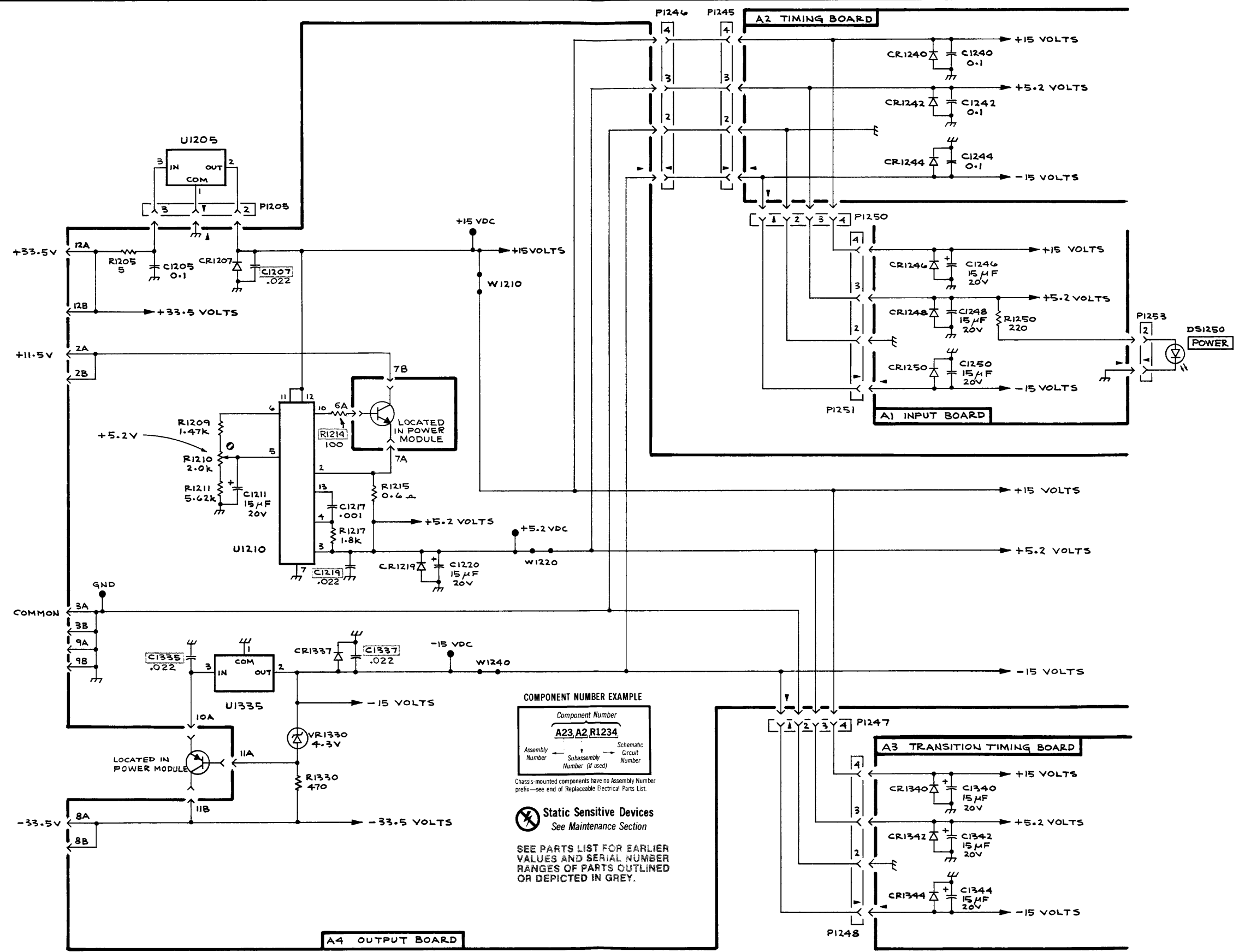
\*See Parts List for serial number ranges.

†Located on back of board.



A B C D E F G H J K L

1  
2  
3  
4  
5  
6  
7  
8



**COMPONENT NUMBER EXAMPLE**

Component Number		
A23 A2 R1234		
Assembly Number	Subassembly Number (if used)	Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replacable Electrical Parts List.

**Static Sensitive Devices**  
See Maintenance Section

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

\* See Parts List for serial number ranges.

† Located on back of 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	OB	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
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRUS DRIVE	BEAVERTON, OREGON 97005
000EX	O'HARA METAL PRODUCT COMPANY	542 BRANNAN STREET	SAN FRANCISCO, CA 94107
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
05820	WAKEFIELD ENGINEERING, INC.	AUDUBON ROAD	WAKEFIELD, MA 01880
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
13103	THERMALLOY COMPANY, INC.	2021 W VALLEY VIEW LANE P O BOX 34829	DALLAS, TX 75234
13511	AMPHENOL CARDRE DIV., BUNKER RAMO CORP.		LOS GATOS, CA 95030
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
24931	SPECIALITY CONNECTOR CO., INC.	2620 ENDRESS PLACE	GREENWOOD, IN 46142
26365	GRIES REPRODUCER CO., DIV. OF COATS AND CLARK, INC.	125 BEECHWOOD AVE.	NEW ROCHELLE, NY 10802
42838	NATIONAL RIVET AND MFG. CO.	1-21 EAST JEFFERSON ST.	WAUPUN, WI 53963
55210	GETTIG ENG. AND MFG. COMPANY	PO BOX 85, OFF ROUTE 45	SPRING MILLS, PA 16875
59730	THOMAS AND BETTS COMPANY	36 BUTLER ST.	ELIZABETH, NJ 07207
71785	TRW, CINCH CONNECTORS	1501 MORSE AVENUE	ELK GROVE VILLAGE, IL 60007
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
78471	TILLEY MFG. CO.	900 INDUSTRIAL RD.	SAN CARLOS, CA 94070
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
87308	N. L. INDUSTRIES, INC., SOUTHERN SCREW DIV.	P. O. BOX 1360	STATESVILLE, NC 28677
93907	CAMGAR SCREW AND MFG. CO.	600 18TH AVE.	ROCKFORD, IL 61101



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	200-1837-00	B010100	B021213	2						COVER,PLUG-IN:TOP AND BOTTOM	80009	200-1837-00
	200-1837-01	B021214	B039999	2						COVER,PLUG-IN:TOP & BOTTOM	80009	200-1837-01
	200-1837-02	B040000		2						COVER,PLUG-IN:TOP & BOTTOM (ATTACHING PARTS)	80009	200-1837-02
-3	211-0503-00			2						SCREW,MACHINE:6-32 X 0.188 INCH,PNH STL	83385	OBD
										- - - - * - - - -		
-4	366-1520-02	B010100	B021102	1						KNOB:GRAY	80009	366-1520-02
	366-1690-00	B021103		1						KNOB,LATCH:SIL GY,0.53 X0.23 X 1.059 (ATTACHING PARTS)	80009	366-1690-00
-5	214-1840-00	B010100	B021102X	1						PIN,KNOB SECRG:0.094 OD X 0.120 INCH LONG	80009	214-1840-00
										- - - - * - - - -		
-6	366-1464-01			3						KNOB:GRAY	80009	366-1464-01
	-----			-						. EACH KNOB INCLUDES:		
	213-0153-00			1						. SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-7	366-1170-03			3						KNOB:GRAY,0.25 ID X 0.706 OD,0.6H	80009	366-1170-03
	-----			-						. EACH KNOB INCLUDES:		
	213-0153-00			2						. SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-8	366-1514-01			1						KNOB:GRAY,0.81 ID X 0.392 OD,0.466 H	80009	366-1514-01
	213-0048-00			1						. SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-9	366-1517-01			1						KNOB:GRAY,0.126 ID X 0.588 OD,0.6H	80009	366-1517-01
	213-0153-00			1						. SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-10	366-1190-02			1						KNOB:0.252 ID X0.706 OD,0.6H	80009	366-1190-02
	213-0153-00			1						. SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-11	366-0494-05			3						KNOB:GRAY,0.127 ID X 0.5 OD,0.531H	80009	366-0494-05
	-----			-						. EACH KNOB INCLUDES:		
	213-0153-00			1						. SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-12	366-1559-00			7						PUSH BUTTON:SIL GY,0.18 SQ X 0.43	80009	366-1559-00
-13	131-0955-00			2						CONNECTOR,RCPT,:CKT BD,28/56 CONTACT	13511	31-279
-14	210-0255-00			2						TERMINAL,LUG:0.391" ID INT TOOTH	80009	210-0255-00
-15	131-1315-00	B010100	B032669	1						CONN,RCPT,ELEC:BNC,FEMALE	80009	131-1315-00
	131-1315-01	B032670		1						CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR 306-1
-16	-----			1						RESISTOR,VAR:(SEE R48 REPL) (ATTACHING PARTS)		
-17	210-0583-00			1						NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-18	210-0940-00			1						WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
										- - - - * - - - -		
-19	-----			1						RESISTOR,VAR:(SEE R540 AND R655 REPL) (ATTACHING PARTS)		
-20	210-0583-00			2						NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-21	210-0940-00			2						WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
										- - - - * - - - -		
-22	-----			1						RESISTOR,VAR:(SEE R770A AND B REPL) (ATTACHING PARTS)		
-23	210-0583-00			1						NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
										- - - - * - - - -		
-24	358-0029-00			4						BSHG,MACH.THD:HEX,0.375-32 X 0.438"LONG (ATTACHING PARTS)	80009	358-0029-00
-25	210-0413-00			4						NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
-26	210-0978-00			3						WASHER,FLAT:0.375 ID X 0.50 INCH OD,STL	78471	OBD
-27	210-0012-00			1						WASHER,LOCK:INTL,0.375 ID X 0.50" OD STL	78189	1220-02-00-0541C
										- - - - * - - - -		
-28	344-0195-01			4						CLIP,ELECTRICAL:CAM SHAFT	80009	344-0195-01
-29	358-0378-00			2						BUSHING,SLEEVE:PRESS MOUNT	80009	358-0378-00
-30	426-1072-00			7						FRAME,PUSH BTN:PLASTIC	80009	426-1072-00
-31	333-2106-00			1						PANEL,FRONT:	80009	333-2106-00
-32	214-1513-01	B010100	B021102	1						LCH,PLUG-IN RET:	80009	214-1513-01
	105-0719-00	B021103		1						LATCH,RETAINING:PLUG-IN (ATTACHING PARTS)	80009	105-0719-00
-33	213-0113-00			1						SCR,TPG,THD FOR:2-32 X 0.312 INCH,PNH STL	93907	OBD
										- - - - * - - - -		
	105-0718-00	XB021103	B032369	1						BAR,LATCH RLSE:	80009	105-0718-00
	105-0718-01	B032370		1						BAR,LATCH RLSE:	80009	105-0718-01
-34	386-3468-00	B010100	B021213	1						SUBPANEL,FRONT:	80009	386-3468-00

Replaceable Mechanical Parts—PG 508

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-	386-3468-01	B021214	B039999	1		SUBPANEL, FRONT:	80009	386-3468-01
	386-3468-02	B040000		1		SUBPANEL, FRONT:	80009	386-3468-02
						(ATTACHING PARTS)		
-35	213-0229-00	B010100	B021213	4		SCR,TPG,THD FOR:6-20 X0.375"100 DEG,FLH STL	93907	OBD
	213-0227-00	B021214	B032539	8		SCR,TPG,THD FOR:6-32 X 0.50 DEG,FLH ST	83385	OBD
	213-0123-00	B032540		8		SCREW,TPG,TF:6-32 X 0.375,SPCL TYPE,FLH	93907	OBD
						- - - * - - -		
-36	200-0935-00			3		BASE, LAMPHOLDER:0.29 OD X 0.19 CASE	80009	200-0935-00
-37	352-0157-00			3		LAMPHOLDER:WHITE PLASTIC	80009	352-0157-00
-38	210-1258-00			3		WASHER,FLAT:0.265 ID X 0.375 OD INCH AL	86928	5712-71-32
-39	-----			2		LAMP,LED:(SEE DS110 AND DS1250 REPL)		
-40	-----			1		LAMP,LED:(SEE DS500 REPL)		
-41	337-2273-00	B010100	B021213	1		SHIELD,ELEC:REAR SUBPANEL	80009	337-2273-00
	337-2273-01	B021214	B039999X	1		SHIELD,ELEC:REAR SUBPANEL	80009	337-2273-01
-42	-----			1		CKT BOARD ASSY:AUXILIARY(SEE A5 REPL)		
-43	131-0608-00			6		. TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-44	351-0449-00			2		GUIDE,CKT BOARD:	80009	351-0449-00
						(ATTACHING PARTS)		
-45	211-0062-00			4		SCREW,MACHINE:2-56 X 0.312 INCH,RDH STL	83385	OBD
-46	210-0405-00			4		NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	2X12157-402
-47	210-0053-00	B010100	B043189	4		WASHER,LOCK:INTL,0.092 ID X 0.175"OD,STL	83385	OBD
	210-0001-00	B043190		4		WASHER,LOCK:INTL,0.092 ID X 0.18"OD,STL	78189	1202-00-00-0541C
						- - - * - - -		
-48	255-0334-00			FT		PLASTIC CHANNEL:12.75 X 0.175X 0.155,NYL	11897	122-37-2500
-49	334-2208-00			1		MARKER,IDENT:WARNING	80009	334-2208-00
-50	386-3356-00	B010100	B021213	1		PANEL,REAR:	80009	386-3356-00
	333-2380-00	B021214		1		PANEL,REAR:	80009	333-2380-00
						(ATTACHING PARTS)		
-51	213-0192-00			6		SCR,TPG,THD FOR:6-32 X 0.50 INCH,PNH STL	87308	OBD
						- - - * - - -		
-52	386-3657-00	XB021113	B032799	2		SUPPORT,PLUG-IN:	80009	386-3657-00
	386-3657-01	B032800		2		SUPPORT,PLUG IN:	93907	OBD
-53	-----			1		CKT BOARD ASSY:OUTPUT(SEE A4 REPL)		
						(ATTACHING PARTS)		
-54	211-0510-00			4		SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	OBD
-55	407-1693-00			4		BRACKET,COVER:ALUMINUM	80009	407-1693-00
-56	211-0244-00			4		SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
-57	211-0558-00			1		SCREW,MACHINE:6-32 X 0.250 BDGH,NYL,SLOT	26365	921-1150-0014
-58	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-59	210-0586-00			1		NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	83385	OBD
						- - - * - - -		
						. CKT BOARD ASSY INCLUDES:		
-60	-----			1		. MICROCIRCUIT,DI:(SEE U1205 REPL)		
-61	-----			1		. SWITCH,PUSH:(SEE S785 AND S865 REPL)		
-62	361-0385-00			4		. SPACER,PB SW:0.164 INCH LONG	80009	361-0385-00
-63	136-0514-00			4		. SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
-64	214-1291-00			4		. HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H	05820	207-AB
-65	342-0324-00			8		. INSULATOR,DISC:TO-5 TRANSISTOR	13103	7717-5N-BLUE
-66	214-1254-00			4		. HEAT SINK,ELEC:0.422 H X 1.240 INCH OD	05820	209-AB
-67	131-1003-00			3		. CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-68	136-0252-04			21		. SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-69	131-0608-00			27		. TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-70	136-0269-02			1		. SKT,PL-IN ELEC:MICROCIRCUIT,14 DIP,LOW CLE	73803	CS9002-14
-71	214-0579-00			4		. TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-72	131-0566-00			3		. BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	55210	L-2007-1
-73	131-0993-00			2		. BUS,CONDUCTOR:2 WIRE BLACK	00779	530153-2
-74	343-0149-00			2		. CLAMP,LOOP:NYLON	80009	343-0149-00
-75	214-1967-00			1		. HEAT SINK,DIODE:FINGER TYPE	13103	6107B-14
						(ATTACHING PARTS)		
-76	211-0008-00			1		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-77	210-0586-00			1		. NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	83385	OBD
						- - - * - - -		
-78	-----			1		. MICROCIRCUIT,L1:(SEE U1335 REPL)		
-79	131-0595-00			3		. CONTACT,ELEC:1.37 INCH LONG	22526	47355
-80	352-0161-02			1		. CONN BODY,PL,EL:3 WIRE RED	80009	352-0161-02
-81	131-0707-00			3		. CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-82	385-0016-00			1		SPACER,POST:1.0 L W/6-32 THD THRU,NYLON	80009	385-0016-00
						(ATTACHING PARTS)		
-83	211-0504-00			1		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		

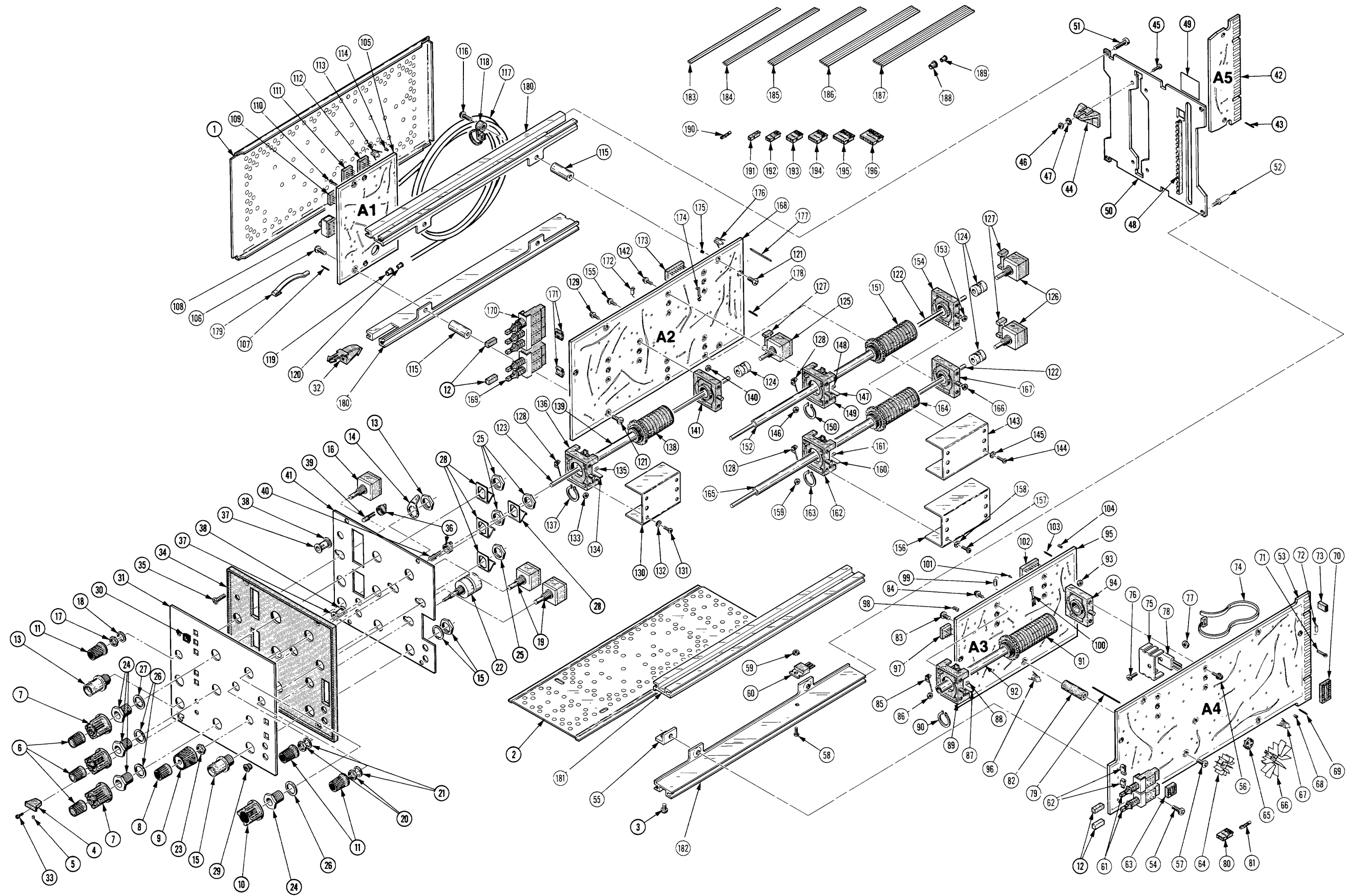
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-	672-0558-00	B010100	B029999	1						CKT BOARD ASSY:MAIN W/CAM SW	80009	672-0558-00
	672-0558-01	B030000		1						CKT BOARD ASSY:MAIN W/CAM SW	80009	672-0558-01
	131-0963-00			1						. CONTACT,ELEC:GROUNDING	000EX	OBD
	-----			1						. ACTR ASSY CAM S:RANGE(SEE S590 REPL)		
										(ATTACHING PARTS)		
-84	211-0244-00			4						. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
	-----									- - - * - - -		
										. . . ACTUATOR ASSEMBLY INCLUDES:		
-85	131-0963-00			1						. . . CONTACT,ELEC:GROUNDING	000EX	OBD
-86	210-0406-00			2						. . . NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-87	214-1139-02			1						. . . SPRING,FLAT:GREEN COLORED	80009	214-1139-02
	214-1139-03			1						. . . SPRING,FLAT:RED COLORED	80009	214-1139-03
-88	214-1752-00			2						. . . ROLLER,DETENT:	80009	214-1752-00
-89	401-0180-00			1						. . . BEARING,CAM SW:FRONT & REAR	80009	401-0180-00
										(ATTACHING PARTS)		
-90	354-0390-00			1						. . . RING,RETAINING:0.338 ID X 0.025" THK,STL	79136	5100-37MD
-91	105-0709-00			1						. . . ACTUATOR,CAM SW:RANGE	80009	105-0709-00
-92	384-0878-02			1						. . . SHAFT,CAM SW:	80009	384-0878-02
-93	210-0406-00			4						. . . NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-94	401-0178-00			1						. . . BEARING,CAM SW:CENTER	80009	401-0178-00
-95	-----			1						. . . CKT BOARD ASSY:TRANSITION TIMING(SEE A3 REPL)		
-96	131-1003-00			2						. . . CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-97	136-0514-00			1						. . . SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
-98	136-0263-04			3						. . . SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	22526	75377-001
-99	131-0566-00			1						. . . BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	55210	L-2007-1
-100	131-1031-00			8						. . . CONTACT ASSY,EL:CAM SWITCH,TOP	80009	131-1031-00
-101	210-0779-00	B010100	B043489	8						. . . RIVET,TUBULAR:0.051 OD X 0.115 INCH LONG	42838	RA-29952715
	210-3082-00	B043490		8						. . . EYELET,METALLIC:0.047 OD X 0.133 L,BRASS	80009	210-3082-00
-102	136-0260-02			2						. . . SKT,PL-IN ELEC:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
-103	131-0608-00			9						. . . TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-104	136-0252-04			6						. . . SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-105	-----			1						CKT BOARD ASSY:INPUT(SEE A1 REPL)		
										- - - * - - -		
-106	211-0507-00			2						SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
	-----									(ATTACHING PARTS)		
										. . . CKT BOARD ASSEMBLY INCLUDES:		
-107	131-0608-00			16						. . . TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-108	-----			1						. . . SWITCH,SLIDE:(SEE S12 REPL)		
-109	136-0514-00			1						. . . SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
-110	214-0579-00			1						. . . TERM,TEST POINT:BRZ CD PL	80009	214-0579-00
-111	136-0269-02			1						. . . SKT,PL-IN ELEC:MICROCIRCUIT,14 DIP,LOW CLE	73803	CS9002-14
-112	136-0260-02			1						. . . SKT,PL-IN ELEC:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
-113	131-1003-00			2						. . . CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-114	136-0252-04			2						. . . SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-115	385-0160-00			4						SPACER,POST:0.812 L W/6-32 THD THRU,AL	80009	385-0160-00
										(ATTACHING PARTS)		
-116	211-0510-00			2						SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	OBD
	-----									- - - * - - -		
-117	-----	B010100	B020244	1						DELAY LINE:(SEE DL480 REPL)		
-118	346-0121-00	B010100	B020244	2						. . . STRAP,ELEC COMP:TIE DOWN,5.0 LONG	59730	3Y-34M
-119	210-0775-00	B010100	B020244	4						. . . EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-120	210-0774-00	B010100	B020244	4						. . . EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
	175-1825-00	B020245		2						CABLE ASSY,RF:50 OHM COAX,8.0 LONG	80009	175-1825-00
	-----									. . . EACH CABLE ASSY INCLUDES:		
	210-0775-00	B020245		1						. . . EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
	210-0774-00	B020245		1						. . . EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
	672-0557-00	B010100	B029999	1						CKT BOARD ASSY:TIMING W/CAM SW	80009	672-0557-00
	672-0557-01	B030000		1						CKT BOARD ASSY:TIMING W/CAM SW	80009	672-0557-01
										(ATTACHING PARTS)		
-121	211-0504-00			4						SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
	-----									. . . CKT BOARD ASSY INCLUDES:		
-122	384-1415-00			2						. . . EXTENSION SHAFT:8.905 L X 0.125 DIA,AL,CRM	80009	384-1415-00
-123	384-1416-00			1						. . . EXTENSION SHAFT:5.58 L X 0.125 DIA,AL,CRM	80009	384-1416-00
-124	376-0051-01			3						. . . CPLG,SHAFT,FLEX:0.127 ID X 0.375 OD	80009	376-0051-01
	213-0048-00			4						. . . SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD

Replaceable Mechanical Parts—PG 508

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-125	-----		1	.	.	.	.	.	RESISTOR,VAR:(SEE R190 REPL)		
-126	-----		2	.	.	.	.	.	RESISTOR,VAR:(SEE R355 AND R475 REPL)		
-127	361-0515-00		3	.	.	.	.	.	SPACER,SWITCH:PLASTIC	80009	361-0515-00
-128	131-0963-00		3	.	.	.	.	.	CONTACT,ELEC:GROUNDING	000EX	OBD
	-----		1	.	.	.	.	.	ACTR ASSY CAM S:(SEE S200 REPL) (ATTACHING PARTS)		
-129	211-0244-00		4	.	.	.	.	.	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL - - - * - - -	78189	OBD
	-----		-	.	.	.	.	.	ACTR ASSY INCLUDES:		
-130	200-1935-00		1	.	.	.	.	.	COVER,CAM SW:1.85 L X 0.876 H,AL (ATTACHING PARTS)	80009	200-1935-00
-131	211-0008-00		4	.	.	.	.	.	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-132	210-0004-00		4	.	.	.	.	.	WASHER,LOCK:#4 INTL,0.015THK,STL CD PL - - - * - - -	78189	1204-00-00-0541C
	131-0963-00		1	.	.	.	.	.	CONTACT,ELEC:GROUNDING	000EX	OBD
-133	210-0406-00		2	.	.	.	.	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-134	214-1139-02		1	.	.	.	.	.	SPRING,FLAT:GREEN COLORED	80009	214-1139-02
	214-1139-03		1	.	.	.	.	.	SPRING,FLAT:RED COLORED	80009	214-1139-03
-135	214-1752-00		2	.	.	.	.	.	ROLLER,DETENT:	80009	214-1752-00
-136	401-0180-00		1	.	.	.	.	.	BEARING,CAM SW:FRONT & REAR (ATTACHING PARTS)	80009	401-0180-00
-137	354-0390-00		1	.	.	.	.	.	RING,RETAINING:0.338 ID X 0.025" THK,STL - - - * - - -	79136	5100-37MD
-138	105-0710-00		1	.	.	.	.	.	ACTUATOR,SWITCH:CAM SWITCH	80009	105-0710-00
-139	384-0878-10		1	.	.	.	.	.	SHAFT,CAM SW:OUTER CONCENTRIC,W/DRIVER	80009	384-0878-10
-140	210-0406-00		4	.	.	.	.	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-141	401-0178-01		1	.	.	.	.	.	BEARING,CAM SW:CENTER/REAR	80009	401-0178-01
	-----		1	.	.	.	.	.	SW CAM ACTR AS:(SEE S330A,B REPL) (ATTACHING PARTS)		
-142	211-0244-00		4	.	.	.	.	.	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL - - - * - - -	78189	OBD
	-----		-	.	.	.	.	.	ACTR ASSY INCLUDES:		
-143	200-1934-00		1	.	.	.	.	.	COVER,CAM SW:1.55 L X 0.876 H,AL (ATTACHING PARTS)	80009	200-1934-00
-144	211-0008-00		4	.	.	.	.	.	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-145	211-0004-00		4	.	.	.	.	.	SCREW,MACHINE:3-48 X 0.125,PNH,STL - - - * - - -	83385	OBD
	131-0963-00		1	.	.	.	.	.	CONTACT,ELEC:GROUNDING	000EX	OBD
-146	210-0406-00		2	.	.	.	.	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-147	214-1139-02		1	.	.	.	.	.	SPRING,FLAT:GREEN COLORED	80009	214-1139-02
	214-1139-03		1	.	.	.	.	.	SPRING,FLAT:RED COLORED	80009	214-1139-03
-148	214-1752-00		2	.	.	.	.	.	ROLLER,DETENT:	80009	214-1752-00
-149	401-0180-00		1	.	.	.	.	.	BEARING,CAM SW:FRONT & REAR (ATTACHING PARTS)	80009	401-0180-00
-150	354-0390-00		1	.	.	.	.	.	RING,RETAINING:0.338 ID X 0.025" THK,STL - - - * - - -	79136	5100-37MD
-151	105-0708-00		1	.	.	.	.	.	ACTUATOR,SWITCH:CAM SWITCH	80009	105-0708-00
-152	384-0878-09		1	.	.	.	.	.	SHAFT,CAM SW:3.364 L X 0.248 OD	80009	384-0878-09
-153	210-0406-00		4	.	.	.	.	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-154	401-0178-01		1	.	.	.	.	.	BEARING,CAM SW:CENTER/REAR	80009	401-0178-01
	-----		1	.	.	.	.	.	ACTR ASSY,CAM S:(SEE S450 REPL) (ATTACHING PARTS)		
-155	211-0244-00		4	.	.	.	.	.	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL - - - * - - -	78189	OBD
	-----		-	.	.	.	.	.	ACTR ASSY INCLUDES:		
-156	200-1936-00		1	.	.	.	.	.	COVER,CAM SW:1.95 L X 0.876 H,AL (ATTACHING PARTS)	80009	200-1936-00
-157	211-0008-00		4	.	.	.	.	.	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-158	210-0004-00		4	.	.	.	.	.	WASHER,LOCK:#4 INTL,0.015THK,STL CD PL - - - * - - -	78189	1204-00-00-0541C
	131-0963-00		1	.	.	.	.	.	CONTACT,ELEC:GROUNDING	000EX	OBD
-159	210-0406-00		2	.	.	.	.	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-160	214-1139-02		1	.	.	.	.	.	SPRING,FLAT:GREEN COLORED	80009	214-1139-02

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-	214-1139-03		1	.	SPRING,FLAT:RED COLORED	80009	214-1139-03
-161	214-1752-00		2	.	ROLLER,DETENT:	80009	214-1752-00
-162	401-0180-00		1	.	BEARING,CAM SW:FRONT & REAR (ATTACHING PARTS)	80009	401-0180-00
-163	354-0390-00		1	.	RING,RETAINING:0.338 ID X 0.025" THK,STL - - - * - - -	79136	5100-37MD
-164	105-0711-00		1	.	ACTUATOR,SWITCH:CAM SWITCH	80009	105-0711-00
-165	384-0878-11		1	.	SHAFT,CAM SW:OUTER CNCTRC,W/DRIVER	80009	384-0878-11
-166	210-0406-00		4	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-167	401-0178-01		1	.	BEARING,CAM SW:CENTER/REAR	80009	401-0178-01
-168	-----		1	.	CKT BOARD ASSY:TIMING(SEE A2 REPL)		
-169	-----		1	.	SWITCH,PUSH:(SEE S380A,B REPL)		
-170	-----		1	.	SWITCH,PUSH:(SEE S75A,B,C REPL)		
-171	361-0382-00		8	.	SPACER,PB SW:BROWN,0.275 INCH LONG	80009	361-0382-00
-172	131-0566-00	B010100 B020244	1	.	BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	55210	L-2007-1
	131-0566-00	B020245	4	.	BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	55210	L-2007-1
-173	136-0260-02		6	.	SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
-174	131-0604-00		37	.	CONTACT,ELEC:CKT BD SW,SPR,CU BE	80009	131-0604-00
-175	136-0252-07		9	.	SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-176	131-1003-00		9	.	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-177	131-0827-00		4	.	CONTACT,ELEC:0.55 INCH LONG	22526	47349
-178	131-0608-00		8	.	TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-179	214-1061-00		1	.	SPRING,GROUND:FLAT	80009	214-1061-00
-180	426-1245-00	B010100 B021223	2	.	FR SECT,PLUG-IN:LEFT SIDE,TOP AND BOTTOM	80009	426-1245-00
	426-1245-00	B021224	1	.	FR SECT,PLUG-IN:LEFT SIDE,TOP AND BOTTOM	80009	426-1245-00
	426-1245-01	B021224	1	.	FR SECT,PLUG-IN:TOP LEFT	80009	426-1245-01
-181	426-1246-00		1	.	FR SECT,PLUG-IN:RIGHT SIDE,TOP AND BOTTOM	80009	426-1246-00
-182	426-1246-01		1	.	FR SECT,PLUG-IN:RIGHT SIDE,TOP AND BOTTOM	80009	426-1246-01
-183	175-0825-00		FT	.	WIRE,ELECTRICAL:2 WIRE RIBBON	80009	175-0825-00
-184	175-0826-00		FT	.	WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-185	175-0827-00		FT	.	CABLE,SP,ELEC:4,26 AWG,STRD,PVC JKT,RBN	08261	SS04267(1061)0C
-186	175-0828-00		FT	.	WIRE,ELECTRICAL:5 WIRE RIBBON	08261	SS-0526-710610C
-187	175-0829-00		FT	.	WIRE,ELECTRICAL:6 WIRE RIBBON	08261	SS-0626-710610C
-188	210-0775-00		1	.	EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-189	210-0774-00		1	.	EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
-190	131-0707-00		81	.	CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-191	352-0171-01		2	.	CONN BODY,PL,EL:1 WIRE BROWN	80009	352-0171-01
-192	352-0169-00		1	.	HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
	352-0169-02		2	.	CONN BODY,PL,EL:2 WIRE RED	80009	352-0169-00
	352-0169-03		1	.	CONN BODY,PL,EL:2 WIRE ORANGE	80009	352-0169-03
-193	352-0161-04		1	.	CONN BODY,PL,EL:3 WIRE YELLOW	80009	352-0161-04
-194	352-0162-04		4	.	CONN BODY,PL,EL:4 WIRE YELLOW	80009	352-0162-04
	352-0162-05		2	.	CONN BODY,PL,EL:4 WIRE GREEN	80009	352-0162-05
-195	352-0163-05		2	.	CONN BODY,PL,EL:5 WIRE GREEN	80009	352-0163-05
-196	352-0164-06		3	.	CONN BODY,PL,EL:6 WIRE BLUE	80009	352-0164-06

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
ACCESSORIES												
	070-2044-01			1						MANUAL, TECH: INSTRUCTION	80009	070-2044-01



## **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 μs. 2901 - Separate trigger pulses, from 5 sec to 0.1 μs. 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.**

## DESCRIPTION

## TEXT CORRECTION

Page 2-6      Top of 2nd column

ADD radical sign

$$R_t = \sqrt{R_1^2 + R_2^2 + R_3^2 + \dots}$$

$R_t$  equals the overall rise or falltime of the entire measurement system and  $R_1$ ,  $R_2$ ,  $R_3$ , etc. are the risetimes or falltimes of the individual components in the system.

REMOVE part of line at bottom of 1st paragraph "in the system".

DESCRIPTION

EFF SN B043260

TEXT CORRECTION

Page 4-10 Step 9

ADD: New part 9g. and reletter old 9g. to read 9h.

- g. Adjust variable capacitor C432 (10 ns, DUR COMP)  
for maximum positive duration of the displayed  
signal. (SN B043260 and up)
- h. Adjust Dur 10 ns (R465) for a duration of 10 ns,  
measured at the 50% points on the waveform.

Date: 6-24-81 Change Reference: C3/681

Product: PG 508 50 MHz PULSE GENERATOR Manual Part No.: 070-2044-01

DESCRIPTION

TEXT ADDITION

Page 4-9

ADD Note after Step 7a:

NOTE

It is normal for the CONTROL  
ERROR light to be on for Steps  
7 and 8.