

**Tektronix®**

**PG 506  
CALIBRATION  
GENERATOR**

**(SN B040000 AND UP)**

**INSTRUCTION MANUAL**





**PLEASE CHECK FOR CHANGE INFORMATION  
AT THE REAR OF THIS MANUAL.**

**PG 506  
CALIBRATION  
GENERATOR**

**(SN B040000 AND UP)**

**INSTRUCTION MANUAL**

**Tektronix, Inc.  
P.O. Box 500  
Beaverton, Oregon 97077  
070-3383-00  
Product Group 75**

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

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#### INSTRUMENT SERIAL NUMBERS

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

B000000	Tektronix, Inc., Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Islands
200000	Tektronix United Kingdom, Ltd., London
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<i>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.</i>	
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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.

### 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.

### 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 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 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.

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

#### **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.

#### **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.



3383-34

PG 506 Calibration Generator

# SPECIFICATION

## Performance Conditions

The electrical characteristics are valid only if the PG 506 has been calibrated at an ambient temperature between +20°C and +30°C and is operating at an ambient temperature between 0°C and +50°C. Forced air circulation is required for ambient temperatures above +40°C.

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

# SPECIFICATION

**Table 1-1  
ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirements	Supplemental Information
<b>STANDARD AMPLITUDE OUTPUT</b>		
Range (Peak-to-Peak)		
1 MΩ Load	200 µV to 100 V	
Accuracy	Within 0.25% ± 1 µV	
50 MΩ Load	100 µV to 5 V	
Accuracy	Within 0.25% ± 1 µV	
Period		Approximately 1 ms (1 kHz square wave, chopped DC)
Amplitude (dc)		
Range	200 mV to 100 V	
Accuracy	Within 0.25% ± 1 µV	
Deflection Error Readout		
Range	+ and - 7.5%	
Resolution	Within 0.1%	
<b>HIGH AMPLITUDE OUTPUT</b>		
Amplitude (Peak-to-Peak)		
Unterminated	<6 V to ≥60 V	
50 Ω Load	≤0.5 V to ≥5 V	
Polarity		Positive, measured from a negative potential to ground.

## Specification—PG 506 (SN B040000 &amp; up)

Table 1-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
600 $\Omega$ Output Resistance	Within 5%	
Output Period 1 $\mu$ s to 10 ms	Within 5%	
Variable		Extends output period to at least 100 ms. X1 to greater than X10 range for each decade step.
Duty Cycle		Approximately 50%.
Rise Time		
Unterminated	$\leq 100$ ns	
50 $\Omega$ Load	$\leq 10$ ns	
Leading Edge Aberrations during first 50 ns	Within 2% of signal peak-to-peak amplitude, or 50 mV, whichever is greater.	

## FAST RISE OUTPUTS

Amplitude (Peak-to-Peak) 50 $\Omega$ Load Polarity	$\leq 100$ mV to $>1$ V	Simultaneous positive and negative. Positive is measured from a negative potential to ground. Negative is measured from a positive potential to ground.
Output Resistance, 50 $\Omega$	Within 3%	At either Fast Rise connector.
Risetime, 50 $\Omega$ Load	$\leq 1$ ns	
Leading Edge Aberrations, first 10 ns	Within 2% of signal peak-to-peak amplitude, or 10 mV, whichever is greater.	
Flatness	Within 0.5% after first 10 ns	
Output Period	1 $\mu$ s to 10 ms	In decade steps.
Accuracy	Within 5%	
Variable		Extends output period to $>100$ ms. X1 to greater than X10 range for each decade step.
Duty Cycle		Approximately 50%.

## TRIGGER OUTPUT

+Trigger Out	$\geq 1$ V peak-to-peak into a 50 $\Omega$ load. Fixed amplitude.	Trigger out function available for HIGH AMPL and FAST RISE modes. Output signal leads HIGH AMPL pulse by about 18 ns and leads FAST RISE pulse by about 8 ns.
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**Table 1-2**  
**ENVIRONMENTAL CHARACTERISTICS**

Characteristics	Information
Temperature	Test to procedures of MIL-STD-810C Methods 502.1 and 501.1 using Procedure I as specified in MIL-T-28800B paragraph 4.5.5.1.3 and 4.5.5.1.4.
Operating	0°C to +50°C.
Non-operating	-55°C to +75°C.
Humidity	
Operating	+50°C to 95% relative humidity.
Non-operating	+60°C to 95% relative humidity. Test to MIL-STD-810C Method 507.1 Procedure IV, modified as specified in MIL-T-28800B paragraph 4.5.5.1.1.2.
Altitude	Test to MIL-STD-810C Method 500.1 Procedure I as specified in MIL-T-28800B paragraph 4.5.5.2.
Operating	To 15,000 feet.
Non-operating	To 50,000 feet.
Vibration	
Operating and Non-operating	With the instrument operating, the vibration frequency is swept from 10 to 55 to 10 Hz. Vibrate 15 minutes in each of the three major axes at 0.015" total displacement. Hold 10 minutes at any major resonance, or if none, at 55 Hz. Total time, 75 minutes.
Shock	
Non-operating	30 g's 1/2 sine, 11 ms duration, 3 shocks in each direction along 3 major axes, for a total of 18 shocks.
Transportation	Qualified under National Safe Transmit Committee Test Procedure 1 A, Category II.

**Table 1-3**  
**PHYSICAL CHARACTERISTICS**

Characteristics	Information
Maximum Overall Dimensions	
Height	4.969 inches (12.621 cm).
Width	2.638 inches (6.701 cm).
Length	12.088 inches (30.704 cm).
Front Panel	
Finish	Anodized aluminum.
Net Weight	≈2 lbs. 4 oz. (1.02 kg).

# OPERATING INSTRUCTIONS

## INTRODUCTION

### Description

The PG 506 Calibration Generator is designed to operate in a TM 500 Series Power Module. The instrument is a combination Amplitude Calibrator and Square Wave Pulse Generator intended for calibration and adjustments of oscilloscope amplifier systems with a  $50\ \Omega$  or  $1\ M\Omega$  input resistance.

The Amplitude Calibrator function provides either a + dc voltage or a 1 kHz square-wave output, as selected by an internal switch. Peak-to-peak amplitudes from 0.2 mV to 100 V across a  $1\ M\Omega$  load and amplitude of 100 mV to 5 V across a  $50\ \Omega$  load are available. Output amplitudes are selected in a 1,2,5 sequence.

Because errors are often stated as a percentage, an internal digital differential voltmeter with front-panel light-emitting diode (LED) readout is used to provide a display equal to oscilloscope vertical or horizontal deflection errors. If the indicated deflection on an oscilloscope graticule does not agree with the proper reference line, the output amplitude from the PG 506 Amplitude Calibrator can be varied until the proper alignment is obtained. In this operating mode, the front-panel readout is a direct display of the oscilloscope deflection error.

A 5 mA Current Loop is provided, which supplies current (dc or 1 kHz) for calibration of current probes.

The Pulse Generator provides three square-wave outputs: variable High Amplitude pulses and simultaneous positive and negative-going Fast Rise, variable-amplitude pulses. In the Pulse Generator mode, the Period is selectable from  $1\ \mu s$  to 10 ms in decade steps. A variable control extends the maximum period to at least 100 ms (for each decade step, the period is variable over a 10:1 range). A positive going pretrigger output is also provided for triggering external equipment.

### Installation and Removal

#### CAUTION

*Turn the power module off before inserting the plug-in; otherwise, damage may occur to the plug-in circuitry. Because of the high current drawn by the PG 506, it is also recommended that the power module be turned off before removing the PG 506. Refer to Fig. 2-1. Check to see that the plastic barriers on the interconnecting jack of the selected power module compartment match the cut-outs in the PG 506 circuit board rear edge connector.*

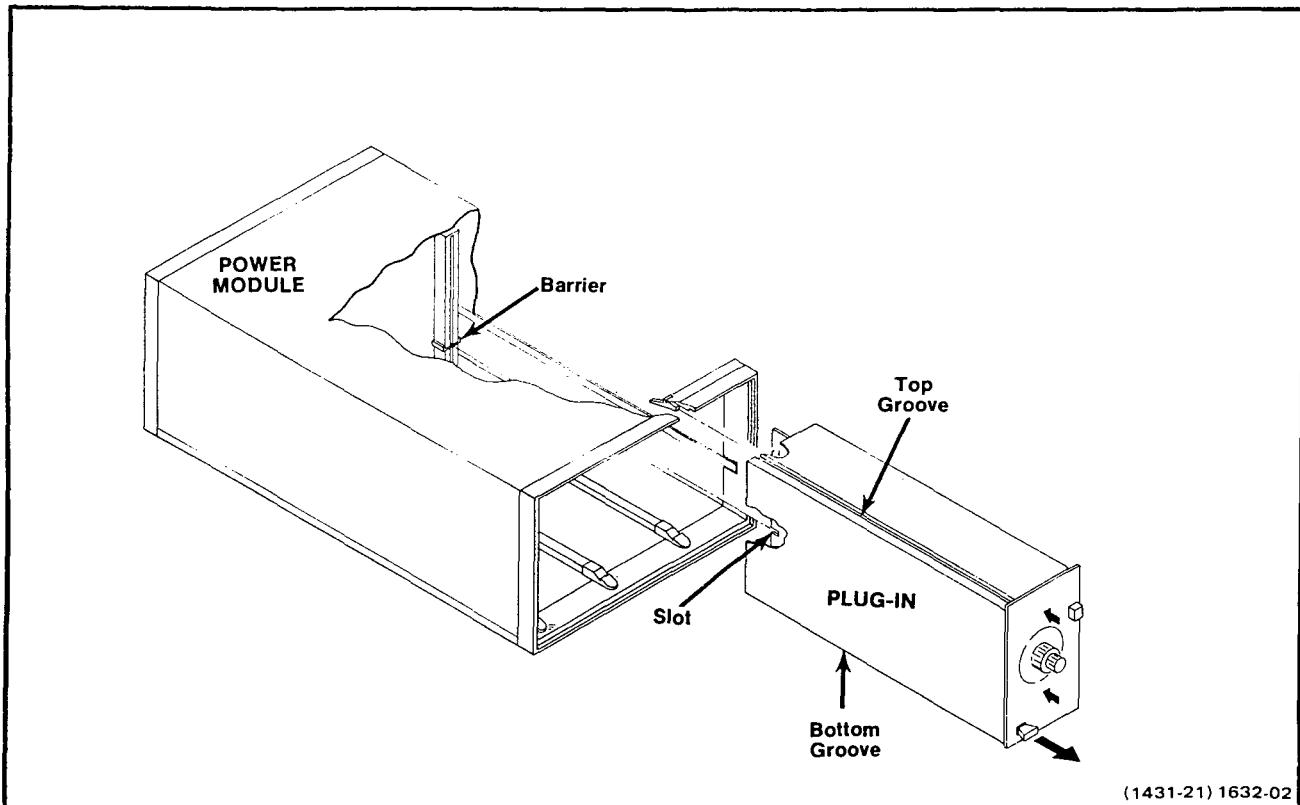


Fig. 2-1. Plug-in installation and removal.

## CONTROLS AND CONNECTORS

- ① DEFLECTION ERROR %: A direct display of output amplitude deflection error.
- ② AMPLITUDE: Selects calibrated output amplitudes across  $1 \text{ M}\Omega$  or  $50 \Omega$  load attached to AMPL OUTPUT (STD) connector.
- ③ VARIABLE (OUT): When released, operates in the standard amplitude mode. The deflection error readout indicates the error in percentages with 0.1% resolution.
- ④ PERIOD light: Illuminated when the function switch is in Fast Rise or High Ampl mode.
- ⑤ PERIOD: Selects the period of either the Fast Rise or High Ampl square-wave signals.
- ⑥ VAR: Extends the period range 10:1. The calibrated position is counterclockwise.

- ⑦ +TRIG OUT: Provides a signal source to pretrigger external equipment.
- ⑧ FAST RISE OUTPUTS: Provides for simultaneous positive and negative going square-waves as selected by the PERIOD/VAR controls.
- ⑨ Function switch: Determines whether the instrument is operated in STD AMPL, HIGH AMPL, or FAST RISE mode.
- ⑩ PULSE AMPLITUDE: Controls output amplitude in the High Amplitude or Fast Rise modes.
- ⑪ AMPL OUTPUT HIGH or STD: Common output for High Amplitude or Standard Amplitude modes. 1 kHz square-wave or dc for Standard amplitude. Period of the High Amplitude square-wave is set by the Period controls.
- ⑫ Current Loop: A dc or 1 kHz square-wave 5 mA current supply for calibration of current probes. The

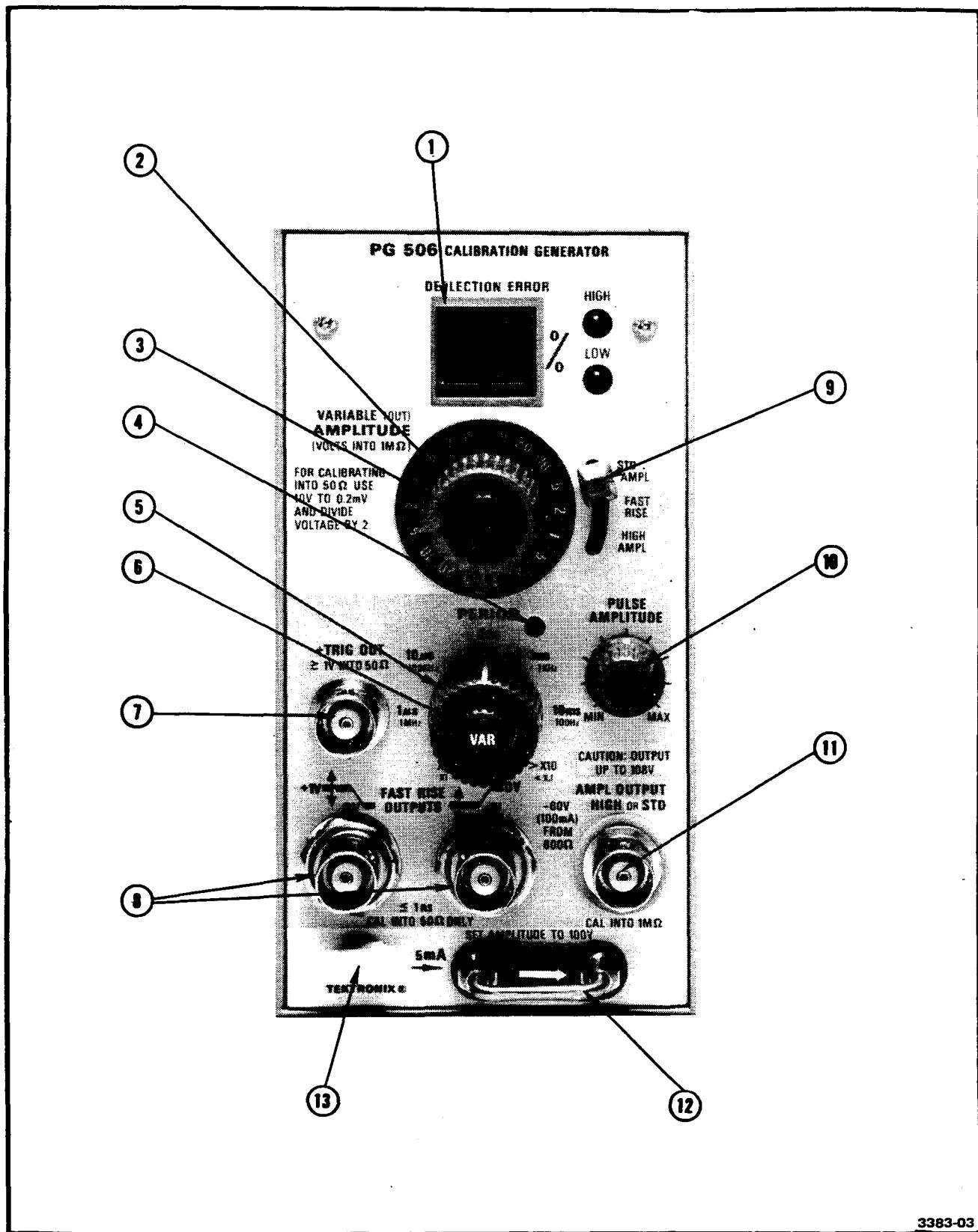


Fig. 2-2. PG 506 controls and connectors.

3383-03

**Operating Instructions—PG 506 (SN B040000 & up)**

VARIABLE (OUT) control will vary current through the loop, but DEFLECTION ERROR readout is not directly related to current deviations. The DEFLECTION ERROR readout must be off or adjusted to read 0.0% for a calibrated output.

**Release Latch:** Pull to remove the instrument from the power module.

**WARNING**

*Dangerous voltage may be present on the front-panel BNC connector labeled AMPL OUTPUT (HIGH or STD). Before installation, turn the control labeled AMPLITUDE (VOLTS INTO 1 MΩ) fully counterclockwise (ccw) and the control labeled PULSE AMPLITUDE to MIN.*

Align the upper and lower groove of the PG 506 chassis with the upper and lower guides of the selected compartment. Push the module in and press firmly to seat the circuit board in the interconnecting jack.

To remove the PG 506, pull on the release latch located in the lower left corner until the interconnecting jack disengages and the PG 506 will slide out.

**Preliminary Checks**

Make all desired connections to equipment under test before applying power to the PG 506. The power switch is on the Power Module. Power application to the PG 506 is indicated by the PERIOD light turning on, or the light behind the knob skirt of the AMPLITUDE control switch being lighted.

The front-panel LED can be tested (888 display) by setting the three-position Mode switch to STD AMPL position, then pushing and holding the VARIABLE knob concentric with the AMPLITUDE switch.

To test the digital voltmeter system, release the VARIABLE knob to the out position and rotate the control in both directions.

Allow 15 to 20 minutes warmup time for all equipment before using the PG 506.

**AMPLITUDE CALIBRATOR MODE****Connections and Terminations**

To use the PG 506 Amplitude Calibrator system, set the mode switch to the STD AMPL position. Connect the 1 kHz calibrated amplitude signal at the AMPL OUTPUT connector to the input of an oscilloscope through a coaxial cable that has a 50 Ω characteristic impedance (RG-58/U) with a maximum length of 42 inches (shorter cables can be used).

With a cable termination of 1 MΩ and the DEFLECTION ERROR display off, the 1 kHz signal peak-to-peak output amplitude will be equal to the indicated reading on the AMPLITUDE switch. If the cable is terminated into a 50 Ω load, use an output amplitude in the 10 V to 0.2 mV range; the output amplitude will then be one-half the indicated reading on the AMPLITUDE switch.

**Oscilloscope Controls**

The deflection factor (either vertical or horizontal) for oscilloscopes is the ratio of the amplitude of the input signal to the amount of beam deflection produced on the cathode-ray tube (crt), usually stated as volts per division of deflection (Volts/Div). Calibration procedures for some oscilloscopes require that the gain be set and the deflection accuracy be checked with a probe (properly compensated) connected between the PG 506 and the oscilloscope input connector.

For oscilloscope gain adjustments and checking of deflection accuracies, it is always best to set all oscilloscope controls exactly as called out in the calibration and performance sections of the oscilloscope instruction manual. However, it may be found desirable to set the oscilloscope sweep controls to a 0.1 ms/div (or faster) sweep rate and free-run the sweep when performing vertical deflection (amplitude) checks and adjustments. This procedure produces two horizontal traces that are separated vertically by an amount proportional to the peak-to-peak amplitude of the 1 kHz square-wave from the PG 506. At faster sweep rates, the display becomes more readable.

**Deflection Error Readout**

When performing gain adjustments on oscilloscope or amplifier systems, it is mandatory that the DEFLECTION ERROR readout be turned off in order to obtain calibrated output amplitudes. The PG 506 DEFLECTION ERROR readout feature finds its greatest use in its ability to allow an operator to verify the oscilloscope deflection accuracy associated with amplifier gain and input attenuators.

Gain adjustments for oscilloscope amplifiers are usually made at low levels, for example; at a 10 mV/div deflection factor and a 50 mV signal from the PG 506. This ratio corresponds to five major graticule divisions of beam deflection. If the gain of the oscilloscope amplifier system is low, the indicated deflection will be less than five major graticule divisions, for example; 4.8 major division. The VARIABLE AMPLITUDE (OUT) control on the PG 506 can then be used to increase the output amplitude until the total deflection is exactly five major divisions. At this point, the DEFLECTION ERROR readout will read 4.0% LOW. Conversely, if the oscilloscope amplifier system gain is too high, the indicated deflection on the crt will be above the proper reference line, for example; 5.2 major divisions. Using the VARIABLE AMPLITUDE control on the PG 506 to reduce the output amplitude for exactly five major divisions of deflection will produce a DEFLECTION ERROR readout of 4.0% HIGH.

For some oscilloscopes the deflection factor may not be constant throughout the full vertical dimensions of the graticule, due to compression or expansion nonlinearities. To check for this type of nonlinearity; center a two-division display, then position the display to the top of the graticule. Measure any deflection errors with the PG 506 VARIABLE AMPLITUDE control. Next, position the two-division display to the bottom of the graticule and measure the deflection errors. These nonlinearities should be taken into account when making measurements with full graticule deflection, or with the crt trace positioned towards the top or bottom graticule limits and using small deflection factors.

### Current Loop

One end of the Current Loop is grounded and terminates a precision voltage divider. The direction of the arrow is oriented for conventional current. To obtain a calibrated 5 mA from the Current Loop, set the mode switch to STD AMPL position and the AMPLITUDE control switch to the 100 V position. The DEFLECTION ERROR readout should be off, or adjusted to read 0.0%. The current signal can be either dc or 1 kHz square-wave current, as selected by an internal switch.

## PULSE GENERATOR MODE

### General

In order to ensure waveform fidelity when using the Pulse Generator function of the PG 506, the following precautions should be observed.

1. Use high quality 50  $\Omega$  coaxial cable, connectors, and terminations (where applicable). Make all connections as tight and short as possible.

2. Reduce capacitive and inductive loads to a minimum. Risetime degradation occurs with long cable lengths.

3. Minimum risetime and pulse aberrations are obtained with 50  $\Omega$  loads and loads must be capable of dissipating the power available at any output connector in any operating mode.

4. The external equipment is assumed to have no dc voltage across the load to which the PG 506 is connected. If a dc voltage exists, the output amplitude from the PG 506 will be in error by the amount of the dc offset. To prevent dc-offset errors, couple the PG 506 outputs through a dc blocking capacitor to the load. The time constant of the coupling capacitor and the total resistance in series must be long enough to maintain pulse flatness.

### High Amplitude Output

To use the PG 506 Pulse Generator system to produce high amplitude square-waves, set the mode switch to HIGH AMPL position and connect external equipment to the AMPL OUTPUT HIGH connector. Set the Period controls for the period or frequency desired. The output amplitude of this signal can be adjusted with the PULSE AMPLITUDE control.

This signal can be used to adjust oscilloscope amplifier input capacitance, attenuator compensation networks, and other internal frequency compensation networks. The AMPL OUTPUT HIGH signal is negative with respect to ground, with its risetime related to the rising portion (from a negative potential) of the waveform. Refer to Fig. 2-3. The absolute peak-to-peak value of the square-wave is determined by the load resistance and the setting of the PULSE AMPLITUDE control. Table 2-1 lists the *typical amplitudes* available when the PG 506 is terminated into three different load resistances.

Table 2-1  
OUTPUT LOAD VS. VOLTAGE OUT

HIGH AMPL OUTPUT	PULSE AMPLITUDE Control <sup>1</sup>	
Termination	MIN	MAX
50 $\Omega$ Load	0.3 V p-p	5.2 V p-p
600 $\Omega$ Load	1.9 V p-p	32.5 V p-p
1 M $\Omega$ Load	3.8 V p-p	$\geq 60.0$ V p-p

<sup>1</sup> Approximate amplitudes.

## Operating Instructions—PG 506 (SN B040000 &amp; up)

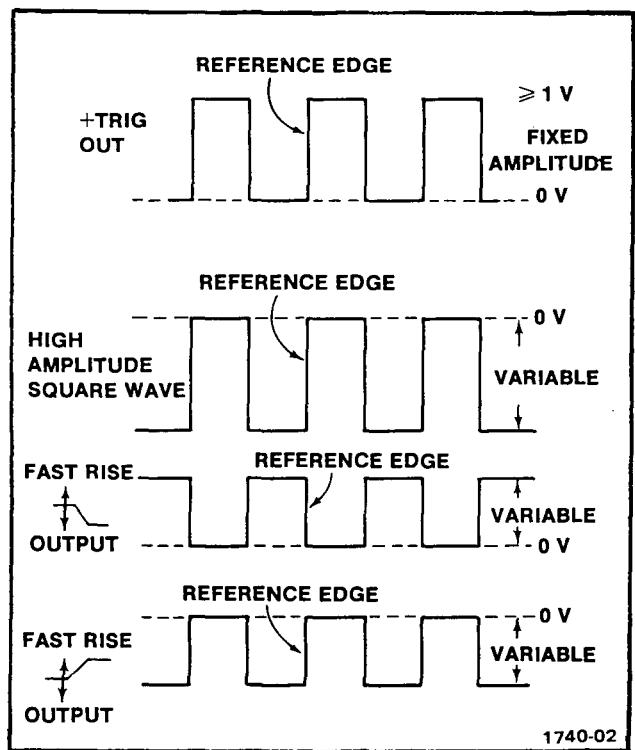


Fig. 2-3. Output signals from the PG 506 Calibration Generator.

**Fast Rise Outputs**

To use the PG 506 Pulse Generator system to produce low amplitude, fast-rise square-waves, set the mode switch to FAST RISE position and connect external equipment to the FAST RISE OUTPUTS connector(s). Set the PERIOD controls for the period or frequency desired. The output amplitude can be adjusted by the PULSE AMPLITUDE control.

These signals are usually used to adjust high-frequency compensation networks in oscilloscope amplifier circuits. The adjustments are made for optimum response (minimum aberrations). The risetime and amplitude specifications for the FAST RISE outputs apply only when they are terminated into a  $50\ \Omega$  load. Larger amplitudes (greater than 1 V peak-to-peak) can be obtained from these output connectors under unterminated conditions, but the risetime specification is no longer applicable.

**GENERAL INFORMATION****Risetime Considerations**

The PG 506 can be used in conjunction with an oscilloscope to determine the risetime of a device under test. Risetime is normally measured (unless otherwise specified) between the 10% and 90% amplitude levels on

the leading edge of a waveform. The risetime of a displayed waveform is illustrated in Fig. 2-4.

Before measuring the risetime of a device under test, the combined risetime of the PG 506 output signal and the oscilloscope vertical amplifier system must be known. Refer to Fig. 2-4 for the percentage error to be expected when the two devices are cascaded. Sweep timing accuracy should be verified before any risetime measurements are made. Inaccuracies in the sweep timing and display reading errors must be added algebraically to the percentage error obtained from computations related to Fig. 2-4.

The graph for Fig. 2-4 can be used as a guideline for the following general conclusions.

1. Oscilloscopes should have a vertical system risetime about one-seventh of the fastest signal applied to keep system errors to a minimum.

2. Conversely, if the signal risetime is at least seven times faster than the risetime of the oscilloscope vertical system, the displayed (observed) waveform will have a risetime that is very close to the risetime of the vertical system.

3. The displayed risetime as observed on any oscilloscope can never be faster than the risetime of the slowest device in the system.

Risetime of a displayed waveform is related to total system bandwidth. A system with limited high-frequency response will produce a displayed risetime that is slower than expected. If a fast-step signal produces a crt display with little or no overshoot or ringing, the product of oscilloscope risetime and oscilloscope bandwidth should result in a factor whose value lies between 0.329 and 0.350.

The following steps describe the procedure to follow in determining the risetime of a device under test.

1. Connect the appropriate output signal from the PG 506 to the oscilloscope vertical input with a short  $50\ \Omega$  coaxial cable terminated into a  $50\ \Omega$  load.

2. Set the oscilloscope controls to display the leading edge of the waveform. Risetime measurements should be made over the largest part of the graticule area possible. When the fastest sweep rate is relatively slow compared with the vertical system risetime (or the scale is small), measurements become confined to small sections of the graticule, and the probability of display reading errors becomes greater.

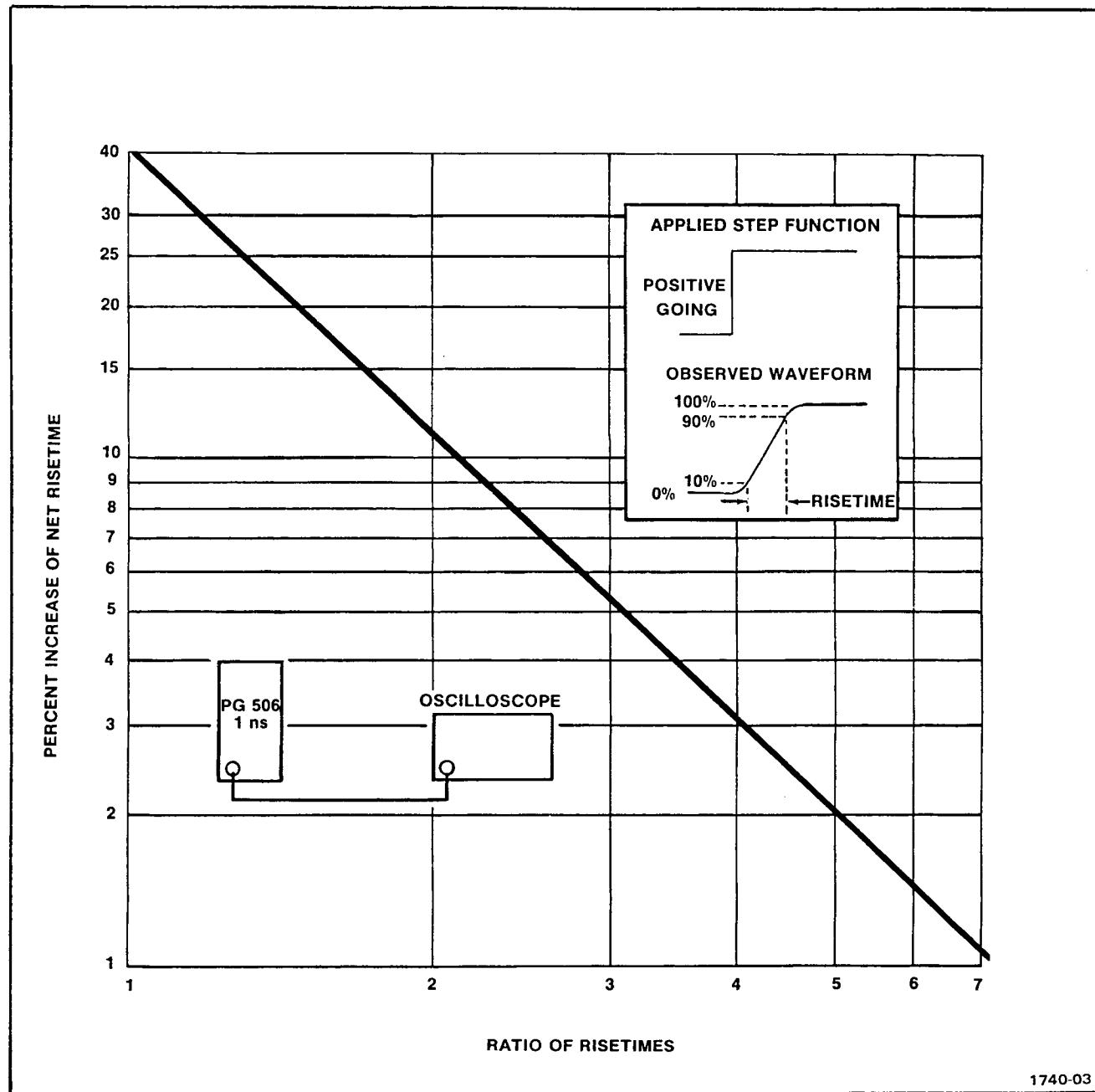


Fig. 2-4. Risetime derating graph.

3. Measure the time duration between the 10% and 90% amplitude levels. This is the combined risetime of the PG 506 and the oscilloscope ( $T_{rc}$ ).

4. Disconnect the coaxial cable and  $50 \Omega$  termination from the oscilloscope.

5. Connect the coaxial cable from the PG 506 to the input of the device under test and connect the output of

the device under test to the oscilloscope vertical input. Terminate the device under test in its characteristics impedance for optimum performance.

6. Set the oscilloscope controls to display the leading edge of the displayed waveform and measure the time duration between the 10% and 90% amplitude levels (over the same graticule area, if possible). This is the total system risetime ( $T_n$ ).

**Operating Instructions—PG 506 (SN B040000 & up)**

7. Calculate the risetime of the device under test (dut) using the following formula:

$$T_r (\text{dut}) = (T_{\text{ns}})^2 - (T_{\text{rc}})^2$$

1/2

$$F_L (3 \text{ dB}) = \frac{159 \times 10^{-3}}{RC}$$

For example; if the applied frequency,  $F_a$ , is 10 Hz and the amplitude values shown in Fig. 2-6 are used, the lower cut-off frequency is calculated to be about 1.6 Hz.

**Checking Amplifier Response**

The square-wave output signals from the PG 506 can be used to check the response of active or passive systems. Because the characteristics of a pulse from the PG 506 is known (see ELECTRICAL CHARACTERISTICS), distortion of the waveform beyond these limits is due to the device under test.

The compensation of an ac-voltage divider, such as used in the input attenuator of an oscilloscope or a passive attenuator probe, can be checked by observing its response when a square-wave signal is applied. Correct response is shown by optimum square corner on the displayed waveform. If the waveform has overshoot, rolloff, or front-corner rounding, the system is not correctly compensated. Figure 2-5 shows typical waveforms illustrating correct and incorrect compensation adjustments. When performing these compensation checks, the repetition rate of the applied square-wave signal should be at least 3 to 4 decades above the low-frequency cutoff point (frequency where the equivalent sine-wave amplitude is 30% down).

The low end cut-off frequency (due to RC coupling) for an amplifier can be approximated very closely by using the following procedure.

1. Apply a square-wave at a repetition rate that is not affected by the low-frequency limit.

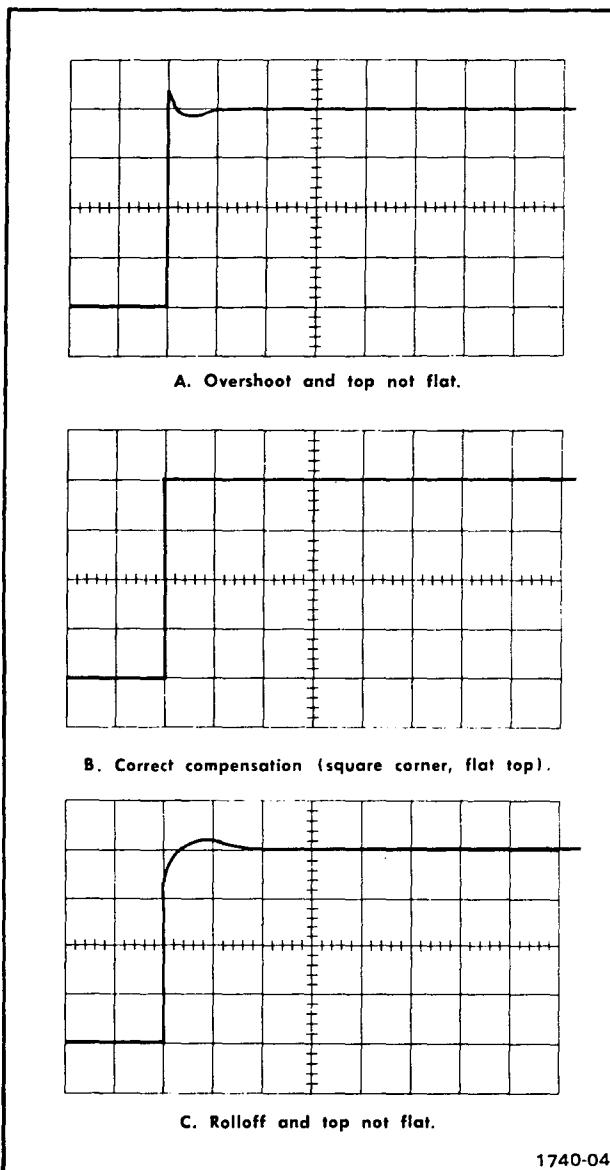
2. Slowly reduce the square-wave frequency and adjust the oscilloscope (amplifier) controls to display a signal similar to Fig. 2-6.

3. Determine the ratio between the amplitude levels,  $V_1$  and  $V_2$ . Note that  $V_1$  and  $V_2$  are peak values above the zero-volt reference level.

4. The equivalent RC product can be determined by using the following formula; where  $F_a$  is the applied frequency for a given ratio of  $V_1/V_2$  (greater than unity).

$$\frac{1}{1 F_a \ln V_1/V_2} = RC \text{ (for square-waves only)}$$

5. Using the RC product obtained in step 4, calculate the low-end cut-off frequency.



**Fig. 2-5. Typical waveforms showing correct and incorrect compensation adjustments.**

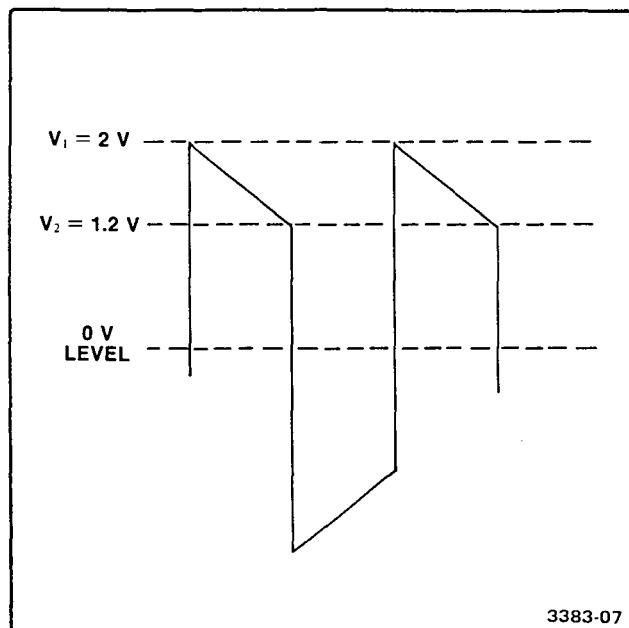


Fig. 2-6. Typical low frequency response curve.

Figure 2-8 illustrates waveform distortion due to incorrect high-frequency compensations. Ringing indicates incorrect peaking adjustments or undesired inductive effects, while excessive overshoot and rolloff indicates incorrect capacitive adjustments. Limited high-frequency response is also indicated by risetime measurements that are much slower than expected (see Risetime Considerations). Impedance mismatching will usually show up at excessive aberrations somewhere along the flat portion of the waveform.

#### Repackaging Information

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing the owner (with address) and the name of an individual at your firm that can be contacted. Include the 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, repack 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 the carton with shipping tape or an industrial stapler.

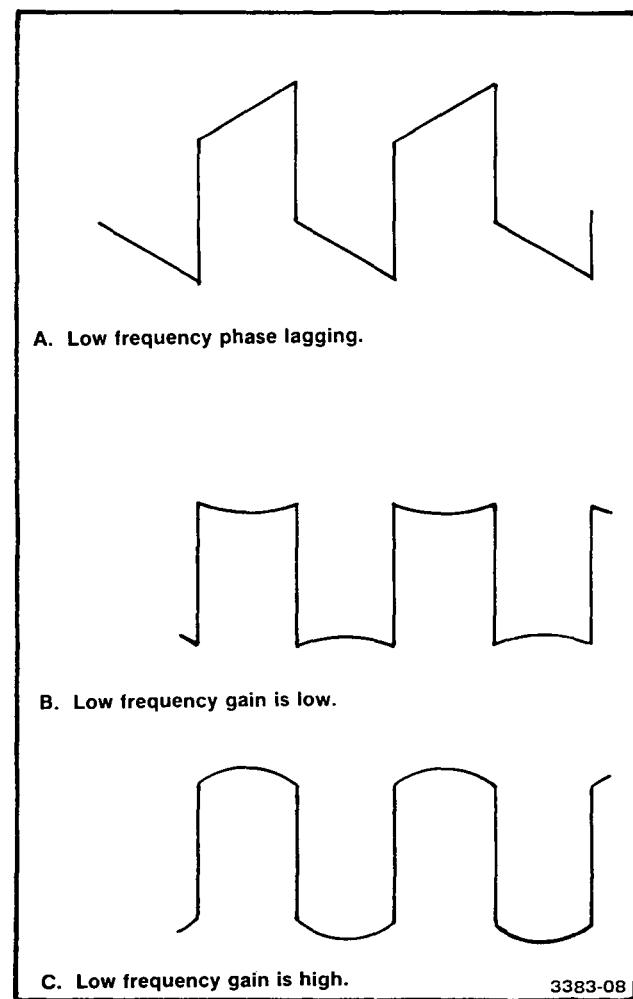


Fig. 2-7. Distortion of square waves caused by low frequency effects.

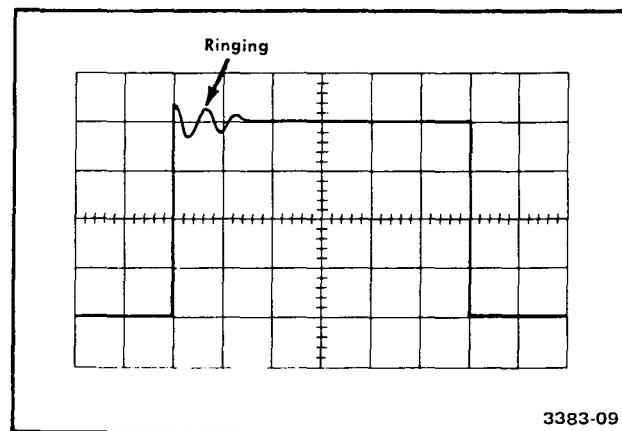


Fig. 2-8. Typical waveform showing ringing at front corner.

The carton test strength for this instrument is 200 pounds per square inch.

## **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. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

# THEORY OF OPERATION

## Primary Power 1

The 120 V dc supply is the main power source for the Standard Amplitude system.

The + and -16.5 V dc supply is the main power source for the Digital Voltmeter circuitry, the Fast Rise stages, and two operational amplifier circuits in the Standard Amplitude system.

The -72 V, variable dc supply is the main power source for the High Amplitude section. This supply can vary from about -10 V to about -72 V, dependent upon operating conditions.

All of the above dc supplies are produced by conventional full-wave bridge rectifier circuits that are driven by an inverter system that changes a dc voltage to approximately 25 kHz power in the primary and secondaries of T130. Each supply is switched on or off, dependent upon the operating modes.

The 5.2 V dc supply is derived from a 11.5 V dc source in the power module and is distributed mainly to the Period Generator, Counter circuits, and certain logic gates. This supply is also used as a return for the High Amplitude circuits.

CR10 and CR11, together with C10, convert 25 V ac (rms) from two transformer secondaries in the power module to about 35 V dc. VR10 sets and regulates the base voltage of emitter-follower Q15 to about 15 V, establishing a fixed 14 V supply for the 25 kHz free-running multivibrator (Q90-Q100).

The free-running multivibrator collector output has a peak-to-peak amplitude of about 5 V, and the positive swing is limited to about +5.8 V by CR86 and CR105. This signal drives the bases of Q85 and Q120 for the inverter system. The feedback connections from the collectors of Q80 and Q125, through CR80 and CR125, ensures that both transistors are never on at the same time.

The maximum voltage swing at the collectors of Q80 and Q125 is about twice the dc level established at the junction of L35 and C36 in any operating mode. For the High Amplitude mode, this dc level is dependent on the

setting of the PULSE AMPLITUDE control and the external load that terminates the PG 506. With a 1 MΩ (unterminated) load, the dc level will be about 3.5 V for the MIN position and about 20 V for the MAX position.

Remote voltage sensing to regulate the -72 V variable supply originates in the High Amplitude circuit and is applied through CR27 to pin 4 of voltage regulator U20.

When in the Standard Amplitude or Fast Rise mode, the junction of L35 and C36 is about 20 V dc, with the -72 V variable supply disconnected from the High Amplitude circuitry.

Voltage regulation for the Standard Amplitude and Fast Rise modes is dependent upon the peak voltage (about 10 V) developed across C75 by the half-wave rectifier action of CR78, which obtains its ac voltage from a sense winding of T130. The peak level across C75 is applied to a voltage divider composed of R31, R30, and R29. The quiescent level set on pin 4 of U20 by the adjustment of R30 determines the quiescent current through the NPN series-pass transistor. Pin 4 of U20 is the inverting input terminal for an internal comparator, and any voltage change on pin 4 causes a voltage change in the opposite direction on pin 10. A potential difference of 33.0 V across the + and -16.5 V supplies is accomplished by adjusting R30.

Current limiting for the 35 V dc input is controlled by the voltage drop across R22. If pin 2 of U20 goes about 0.6 V more positive than pin 3, pin 10 goes negative to limit current through the NPN series-pass transistor and the load. CR22 protects a transistor internal to U20. C22 frequency compensates the voltage regulator. VR30 is not normally on; it protects the supply from over-voltage conditions if the potential difference across it exceeds 12 V.

U20 sets its own reference voltage of about 7 V on pin 6, with pin 5 being the non-inverting input to an internal comparator. The reference voltage on pin 6 is divided down by R40 and R42 to set a reference level of 5.2 V on pin 2 of error amplifier U50.

Voltage regulation of the 5.2 V supply is accomplished by comparing the voltage level on pin 3 of U50 with the

**Theory of Operation—PG 506 (SN B040000 & up)**

voltage reference on pin 2. If the voltage on pin 3 is higher than the reference level, the output of U50 goes positive. This voltage increase is applied through emitter-follower Q60 to the base of the PNP series-pass transistor. This action decreases the current in the PNP series-pass transistor and the load, returning the 5.2 V supply to its original level.

VR55 and CR55 operate as current limiting control devices. The normal operating potential at the base of Q60 is about 9.2 V, with VR55 and CR55 not conducting. If the load current increases (due to lower load resistance), pin 3 of U50 goes negative. This drives the base of Q60 negative to about 8.3 V. The action is sufficient to cause VR55 and CR55 to conduct, clamping the emitter of Q60 and the base of the PNP series-pass transistor to about 9 V. R65 limits the load current to about 1.5 A.

An over-voltage condition of about 1 V on the 5.2 V supply causes VR45 to conduct, developing an SCR firing pulse across R45. If Q45 turns on, the output level is clamped to about 0.2 V. (This feature was removed in instruments with serial numbers above B059053. See parts list.).

**Standard Amplitude**  2

The Standard Amplitude system consists of two sections, a high-voltage section and a 50 Ω source section. Output amplitudes of 100 V, 50 V and 20 V originate directly from a precision voltage divider composed of R278, R277, R276, R275, and the 5 mA Current Loop. For these three output amplitudes, the input to the 50 Ω source section is disconnected and pin 2 of U375 is grounded through R380. With pin 2 of U375 grounded, its output locks the base of Q365 to +16 V, disabling the current drive for the 50 Ω source section.

The Primary Power section applies 120 V to the emitter of Q280, a 10 mA current source. This 10 mA is split between two branches containing matched diodes; 5 mA through CR280A and the precision divider and 5 mA through CR280B from the 100 V bus. In the dc mode, Q255 and Q270 are cut off (due to saturation of U255) and the quiescent level at the anodes of the matched diodes is about 100.7 V.

With S225 closed, (VARIABLE AMPLITUDE control pushed in and DEFLECTION ERROR readout off), a 100 V bus is established across a voltage divider composed of R237 and R234. The reference source for the 100 V bus originates with VR210, which produces a 9 V drop when drawing 7.5 mA through R210. The 9 V level across R210 also serves as a reference voltage for the Digital Voltmeter circuit.

When R205 has been adjusted to produce 100.0 V across an external 1 MΩ load, pins 2 and 3 of U200 will be

essentially at the same potential (9 V) and pin 6 of U200 is at a quiescent level of about 4 V. The emitter of Q190 will be at 18 V and this point serves as a regulated voltage source to power operational amplifiers in the 50 Ω source section. Because Q190 is included in the feedback loop around U200, the current through VR210 and R210 remains constant.

One mA through R237 and R234 sets a 9 V level on pin 2 of U240. Pin 3 of U240 is returned to the 9 V zener reference through R225A and R215. With almost equal potentials on each side of R225A, the current through this network is in the low mA range. R225A tracks with R225B and serves only as a variable Thevenin input impedance for the non-inverting input terminal of U240, which aids in stabilizing the offset bias current.

U240 and the circuitry associated with Q245 and Q290 operate as a voltage regulating circuit for the 100 V bus. Any voltage change on the 100 V bus is sensed across R237 (or through C237) and applied to pin 2 of U240. Q245 operates as a level shifter and signal inversion through Q290 returns the 100 V bus to its calibrated level. CR290 and CR291 operate to limit turn-on surge current through Q290.

When the VARIABLE AMPLITUDE control is released to the out position, R237 is disconnected from ground and R227 is inserted in series with R225B. The 100 V bus now becomes a variable level. R225B can adjust the 100 V bus over a range of approximately 92–108 V, and the regulating circuit will hold the selected level. The difference in potential between the adjustable level on the 100 V bus and the 9 V zener reference is applied to the Digital Voltmeter circuitry for DEFLECTION ERROR readout (100 V equals 0.0%).

When the 1 kHz (calibrated amplitude) mode is selected, a 1 kHz squarewave is applied to the base of Q270 through U255 and emitter follower Q255. The positive step on the base of Q270 saturates this transistor, pulling its collector below 0.4 V. This action disconnects CR280A and CR280B, allowing the voltage swing across the precision divider to start from ground and rise to the level selected on the variable bus when Q270 is cut off by the negative step of the 1 kHz signal.

The 50 Ω source section must drive either a 1 MΩ or 50 Ω external load resistance. This requirement is met by using a constant-current supply; which, by definition, will alter its output voltage by just the proper amount to maintain its total output current at a constant value when the load resistance changes. The 50 Ω source section operates only when amplitude settings of 10 V or lower are selected.

A nominal 14 V input to the  $50\ \Omega$  source section is derived from the precision divider at the junction of R275 and R276 and applied to pin 2 of U375 (R380 is disconnected from ground). This input voltage will always be a dc level proportional to the dc level established on the 100 V bus. U375 and Q365 operate as a tracking voltage source. If the input to U375 changes by 5%, the collector voltage of Q365 changes by 5%.

The constant-current supply is programmed by current-setting resistors in series with the emitter of Q325 and the collector of Q365 to produce three selected output current levels through CR320. Selected calibrated currents of 200 mA, 100 mA, or 40 mA split between three branches consisting of R316, the symmetrical pi (ladder) attenuator network, and the external load. With R340 properly adjusted, three voltage levels (10 V, 5 V, or 2 V) can be selected to appear across R316 for an external termination of  $1\ M\Omega$ . With an external termination of  $50\ \Omega$ , the three selected levels across R316 will drop to 5 V, 2.5 V, or 1 V. Each section of the ladder attenuator divides by 10 and if the level across R316 is considered to be a 0 dB reference, the total attenuation is 80 dB (20 dB per section). The attenuator presents an output impedance of  $50\ \Omega$  at any voltage take-off point.

Regulation for the constant-current supply is provided by the operational amplifier feedback connections from the current-setting resistors low level end through U330 to the base of Q326. Q320 is cut off for the dc mode and operates as a saturating switch for the 1 kHz mode.

### Digital Voltmeter 3

The Digital Voltmeter circuitry is an analog-to-digital converter, that operates on the principle of a modified dual-slope integrating system. A change in input current to integrator U460 causes a ramp voltage to appear at pin 6. At a given time during the ramp, C462 is discharged by a reference current of opposite polarity. At the time the discharge current is applied, a counter is at a count of 200 (00). When the integrated waveform on pin 3 of differential comparator U470 (zero crossing detector) reaches zero, a number in the counter is stored. The accumulated counts are displayed as being proportional to the value of the input voltage applied; a higher input voltage means a longer time to zero crossing, thus a higher count. It takes a few cycles of dual-slope integration for the analog-to-digital convertor system to settle down for a stable readout.

A non-linear reciprocal relationship exists between the Standard Amplitude output from the PG 506 and the actual deflection error of an oscilloscope amplifier system. Consequently, to indicate a deflection error that is 6.8% LOW, the output from the PG 506 must be adjusted to be 7.3% high (variable 100 V bus set to 107.3 V). For an

indicated deflection error of 7.3% HIGH, the variable 100 V bus must be adjusted for 93.2 V. It is the voltage changes on the variable 100 V bus that result in a DEFLECTION ERROR readout.

Assume that the Latch Pulse for the counter has just occurred. The nominal calibrated level (0.0%) on pin 3 of U460 is 9 V. A decrease in voltage on the 100 V bus pulls pin 3 of U470 negative below zero and C462 begins to charge through R460, producing the first ramp after the Latch Pulse. During this charge time, the output of U470 is high and the counter is counting up to a count of 200 (00). Q475 is turned on and light-coupled through U480 to the base of Q480. The collector of Q480 is high, turning on CR480 and HIGH indicator light DS480.

The system contains two reference current sources; a  $+I_r$  source from the collector of Q415 and a  $-I_r$  source from the collector of Q400. Only one of these current sources is switched on at a given time, dependent on the polarity of the voltage change on the 100 V bus. For a ramp that is negative, pin 5 of U400B is set high and pin 1 of U400A is set to a low. Pins 2 and 4 of these NAND gates connect to a common control line and, while the counter is counting up to a count of 200 (00), pin 8 of U400C is at a low level. During the first ramp period, the output levels of U400A and U400B are high and both reference current sources are cut off. See Fig. 3-1.

When the counter has reached a count of 200 (00), a negative-going Full Pulse appears on pin 9 of U400C. This Full Pulse switches the common control line (pin 8) to a high level. Pin 3 of U400A remains high while pin 6 of U400B goes low, turning off Q410. Q415 is switched on for the  $+I_r$  discharge current to C462. The ramp on pin 3 of U470 switches polarity (runs toward zero). The counter begins to accumulate the necessary counts for display. Q535 has been turned on by the Full Pulse and coupled through T532 to the base of Q560 cutting this transistor off.

When the ramp crosses the 0 V level, a negative-going Latch Pulse occurring on pin 7 of U470 is transmitted through C506 and CR502 to pin 13 of U400D. This Latch Pulse switches pin 8 (common control line) of U400C to a low, locking out both reference current sources and turning off Q535. A positive-going Latch Pulse appears at the collector of Q565 to store the count in the counters for display. After the Latch Pulse has been produced at zero crossing, C462 again starts to charge through R460 (ramp increases in a negative direction) and the cycle repeats.

For input voltages above 100 V, the circuit action is similar to the action just discussed; except that the dual ramps on pin 3 of U470 are positive, DS482 is turned on for a LOW indication DEFLECTION ERROR, and the  $-I_r$ ,

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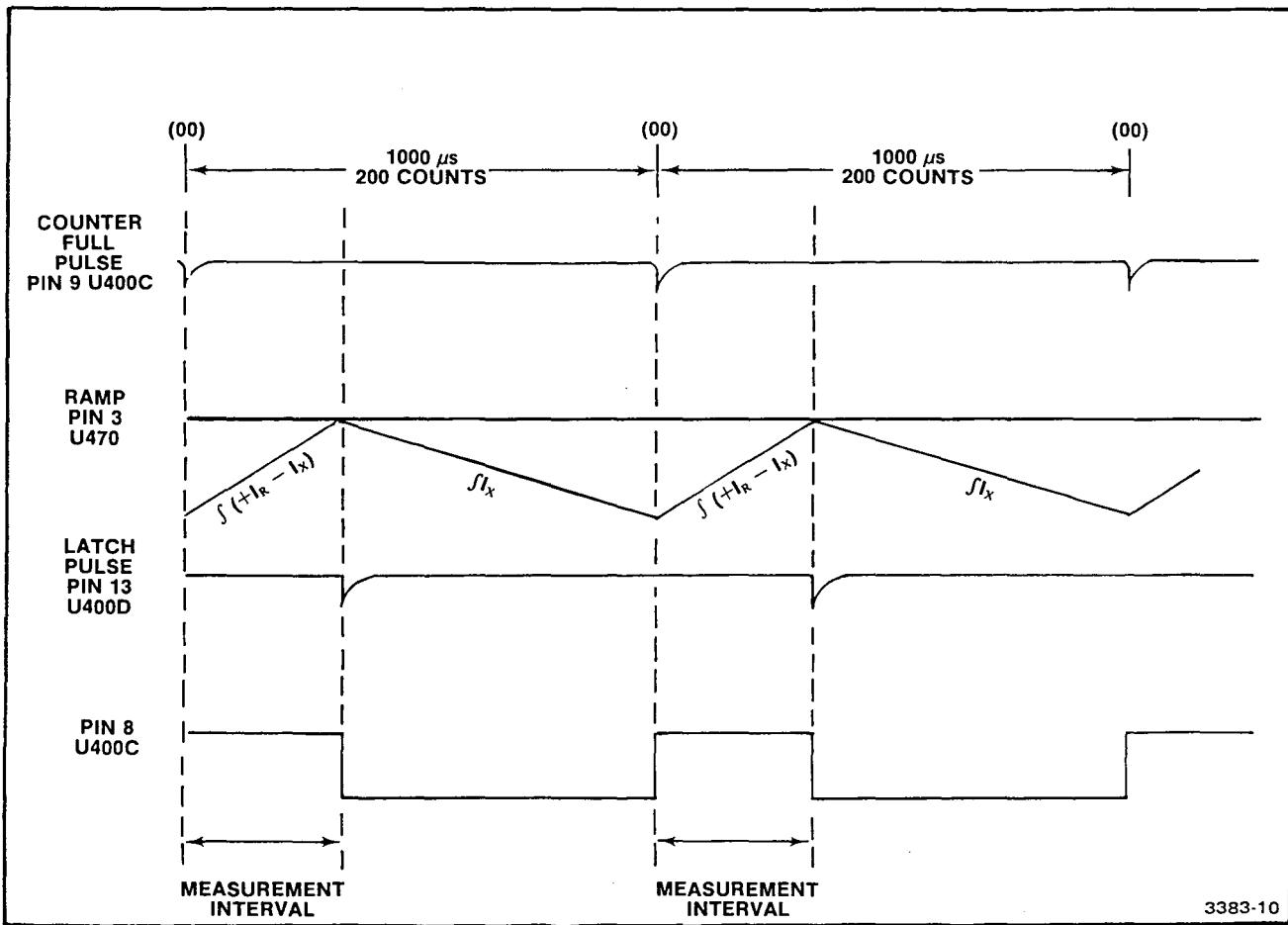


Fig. 3-1. DVM timing diagram for a negative input to the integrator U460.

reference current source is used to discharge C462. For positive ramps, the Latch Pulse occurring at zero crossing is transmitted through C500 and CR500 to pin 13 of U400D.

Reference currents from both reference sources track with changes on the 100 V bus and in the same direction, allowing the instrument to be calibrated directly for oscilloscope deflection error rather than output amplitude from the PG 506. The adjustment of R415 calibrates the HIGH indication, while the adjustment or R425 calibrates the LOW indication.

CR395 and CR397 protect components in the DVM circuitry if the + and -16.5 V input connections are accidentally reversed.

Period Generator and Display 4

The Period Generator circuit consists of six transistors (Q575, Q580, Q585, Q595, Q605, and Q610) and timing

capacitor C580 in series with main timing resistors R587, R590, and R593. These components set a basic 0.5  $\mu$ s period (2 MHz square-wave signal) for the entire instrument.

The timing capacitor and resistor(s) have a common connection at the base of Q580. The signal on the base of Q580 is basically a linear ramp (with switching transients) that causes the output level at the collector of Q605 to go high and low when the ramp crosses the hysteresis limits of the circuit.

Assume that when power is applied, Q575 turns on and Q580 turns off. This action also turns off Q595, setting one end of the timing resistors to the saturated level at the collector of Q595. The base of Q580 now begins a ramp rundown toward the lower limit of the hysteresis window. C580 is charging toward a 5 V supply through R582 and the timing resistors. When the ramp at the base of Q580 crosses the lower limit of the hysteresis window, Q580 turns on and Q575 turns off. This action turns Q585 on and

Q595 off. R593 is now disconnected from essentially a ground potential and connected to a 5 V supply through Q610. The effective voltage across the timing resistors has now changed polarity and C580 begins to discharge because the emitter of Q585 is essentially at zero. The base of Q580 begins a ramp runup toward the upper limit of the hysteresis window. When the ramp crosses the upper limit, Q580 is again turned off and Q575 turned on, reconnecting the timing resistors to the collector level of Q595. The voltage swing across R600 (caused by Q580 turning on and off) are inverted by Q605 and applied as TTL levels to pin 14 of U665.

U665, U666, U667, and U668 operate as a divide-by-ten frequency dividers (multiplies input period by ten) with a 0.2 kHz (5 ms) square-wave on pin 11 of U668 and a 5  $\mu$ s (200 kHz) square-wave on pin 11 of U665. Input data for the counter latch circuits originates on pins 1, 12, 9, 8, and 11 of U666 and U667, respectively. BCD data from the counter latches (U670-U671) is decoded by U673 and U675 to drive the seven-segment LED displays (DS700-DS702).

U610A and U610B are each one-half of a dual J-K master-slave flip-flop. The input to pin 1 of U610A is always a 2 kHz signal, obtained from pin 11 of U667. Pin 12 of U610 is a Q terminal and the 1 kHz output signal is used to drive the diode section of U255 in the Standard Amplitude circuitry. To remove the 1 kHz drive to the Standard Amplitude circuitry when it is not needed, pin 2 of U610A is held low, which sets pin 12 to a logical zero. The Standard Amplitude circuitry is in a dc mode when pin 2 is grounded by the closure of S660. For the High Amplitude mode, pin 2 is grounded through CR661; for the Fast Rise mode, through CR660. CR656 and CR657 provide ground connections for the PERIOD light when the PG 506 is used as a Pulse Generator.

The input signals to U610B (as selected by the PERIOD control) are obtained from the frequency dividers (pin 11) or directly from the 2 MHz Period Generator. The period of the output signals on pins 8 and 9 of U610B are twice the selected input period. These signals are applied to NAND gates U615B and U615C to drive the High Amplitude or Fast Rise circuits. The drive signals on one input terminal of a NAND logic device are gated through with inverted polarity if the other input terminal is held high. The +TRIG OUT signals are supplied by inverter connections of U615A and U615D. To remove (lockout) drive signals through both NAND gates when they are not needed (Standard Amplitude mode), pin 6 of U610B is held low by the closure of S180A-5B. This action sets pin 9 of U610B to a logical zero (low) and pin 8 to a logical one (high).

The closure of S180A-7B locks out drive signals to the High Amplitude circuitry when the instrument is in a Fast

Rise mode; for the High Amplitude mode, the closure of S180A-6B locks out signals to the Fast Rise circuitry.

To disable the High Amplitude power supply when operating in a Standard Amplitude mode, CR616 is grounded through S180A-5B. When operating in a Fast Rise mode, CR615 is grounded through S180A-7B.

## High Amplitude 5

The negative-going output, with Q745 and Q758 supplying the current, is developed across resistor R805 and the external load. CR755 and CR756 operate as disconnect diodes at the 0 V output levels. The specified reference is the positive-going edge of the output waveform, requiring that Q745 be switched off for the output to swing from a negative potential to ground. Q760 serves as a 2 mA current shunt through disconnect diodes CR766 and CR767. This circuit absorbs the leakage currents from Q745 and Q758 during transitions and adds a slight amount of reverse bias to the output disconnect diodes, improving the risetime and ensuring very sharp corners for the output voltage swing.

The transistors Q745 and Q758 are connected in cascode and the voltage transitions at the base of Q745 determines the output current swing. A negative transition at the base of Q745 requires a negative-going transition at the base of Q715 to saturate Q730 and cut off the output current.

The High Amplitude circuitry is floating on a variable power supply with limits of about -10 V to a maximum of about -72 V. The collectors of Q725, Q740, and Q790 translate the dc (and signal) levels from ground to a negative supply for the output stages and amplitude control circuitry. Q790 is a 4 mA current source that floats the amplitude control circuitry at about 6 V more positive than the variable supply voltage level.

R736 in the emitter of Q736, along with R746 in the emitter of Q745, are chosen so that the current into these nodes is a function of the actual supply voltage. The actual current that enters Q745 is controlled by the base voltage and the voltage drop across R745. The emitter of Q736 is a low-impedance driving point that controls the output current limits. Q736 also temperature-compensates the base junction of Q745. The base of Q736 (and the collector of Q782) is considered to be a zero temperature coefficient voltage point.

The PULSE AMPLITUDE control is R785A, located in the base circuit of Q784. This control obtains its reference voltage from across VR790. Q780 and Q784 form a differential circuit with Q780 connected as a diode for

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temperature compensation. Q736 is driven by Q782, which adds additional gain to set the base of Q780 equal to the base of Q784. R784 sets the minimum output current limit and R790 is adjusted to set a 5.2 V output amplitude across a  $50\ \Omega$  load. CR734, connected between the variable supply and the most negative level of the amplitude control circuitry, allows an additional 0.7 V voltage drop across Q780 and Q782, thereby improving the amplitude linearity.

The sensing point to regulate any one level of the variable supply is at the collector of Q790. A drift in the supply voltage is level shifted through VR790 and applied to pin 2 of U840. CR27 is turned on to control the level at pin 4 of U20, the voltage regulator in the Primary Power supply.

The actual voltage of the variable supply is made a function of the negative peak levels of the output signal. The negative peaks are sampled through CR800 and emitter-follower Q800 to store a charge on memory capacitor C800. If the output signal amplitude is increased (larger negative peaks), pin 3 of U840 goes negative. A negative charge on pin 4 of U840 results in a larger dc supply for the inverter system in the Primary Power circuit and the variable supply to the High Amplitude circuit goes more negative. The net result is that the voltage drop across the output transistors remains relatively constant. The variable supply tracks with the selected output amplitude and in the same direction. The emitter of Q745 is connected through VR790 to pin 2 of U840; the drain of Q758 is connected through Q800 to U840 pin 3. Because an operational amplifier (U840) always attempts to reduce the voltage difference between its input terminals to zero, the constant voltage drop across the output transistor network is essentially equal to the drop across VR790 plus about 2 to 7 V across other components in the feedback loop.

**Fast Rise 6**

The Fast Rise circuit produces two output signals that occur simultaneously. Q935 and Q995 operate as non-saturated current-mode switching sources for the output signals. CR944 and CR1004 are disconnect diodes that have very low leakage current characteristics at zero-bias levels. These levels occur when Q935 and Q995 are cut off.

In order to produce 1 V across a  $25\ \Omega$  load ( $50\ \Omega$  termination in parallel with either R950 or R1010) it requires 40 mA. This current is available through resistors

in series with the emitters of Q935 and Q995. A negative transition occurs at J950 when Q935 is turned off and a positive transition occurs at J1010 when Q995 is turned off. Both transistors turn off simultaneously with R935 and R995 providing return paths for leakage currents. C940 and C1000 are provided to reduce excessive overshoot and ringing. R940 and R1000 are selected for minimum aberrations and maximum risetime with an optimum value of  $120\ \Omega$ .

Simultaneous amplitude control of the output signals is accomplished by diverting current from the emitters of Q935 and Q995 through the series path of Q1036 and Q1045. The voltage drop across R1040 is controlled by the adjustable voltage level at the emitter of Q1030, a low impedance source for the base of Q1036. Q1020 operates as a current switch to set the collector of Q1030 to about 5 V when the Fast Rise mode is selected. R1025 sets the minimum amplitude available at the output and R785B controls the minimum and maximum amplitudes.

When the Fast Rise mode is switched off, the + and -16.5 V supplies are switched off. The collectors of Q1020 and Q1030 drop to about zero, driving the base of Q1036 negative. This action completely cuts off the leakage currents that might have existed in the collectors of Q935, Q1036, Q995, and Q1045 if the collector of Q1030 had been tied to a fixed 5 V source. This arrangement ensures that the output connectors rest at a 0 V level with the instrument is not in a Fast Rise mode.

Q860 and Q862 operate as a Schmitt trigger for the Fast Rise circuit, with VR866 providing positive feedback and Q850 serving as a constant-current source. A positive-going pulse at the base of Q860 results in a negative-going pulse at the collector of Q880 and a positive-going pulse at the collector of Q890, where the transitions are speeded up and translated to ground levels by R882 and R892. At this point, the signal currents are split into two paths through differential amplifiers (Q900-Q910 and Q960-Q970). For a positive-going input to the base of Q960, the emitter of Q935 is driven negative by the saturation of Q920 and the emitter of Q995 is driven positive by the saturation of Q980.

CR1062 and CR1067 protect the Fast Rise circuit components if the wiring plug to the circuit board is accidentally reversed. The diodes in the base circuits of Q1030 and Q1045 are for temperature compensation.

# CALIBRATION PROCEDURE

## PERFORMANCE CHECK PROCEDURE

### Introduction

The performance check procedure checks the electrical performance requirements listed in the Specification section in this manual. Perform the Adjustment procedure if the instrument fails to meet these checks. If recalibration does not correct the discrepancy, troubleshooting is indicated. This procedure may be used to determine acceptability of performance in an incoming inspection facility.

For convenience, many steps in the procedure check the performance of this instrument at only one value in the specified performance range. Performance requirements for various temperature ranges are listed in this procedure. When performing the procedure, use only the limits listed for the ambient temperature that the instrument is operating in.

### Calibration Interval

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

### Services Available

Tektronix, Inc. provides complete instrument repair and adjustment at local field service centers and at the factory service center. Contact your local Tektronix field office or representative for further information.

### Test Equipment Required

The following test equipment or equivalent is suggested to perform the Performance Check and Adjustment Procedure.

Table 4-1

#### TEST EQUIPMENT REQUIRED

Description	Performance Requirements	Applications	Example
Oscilloscope System	200 MHz vertical bandwidth 1 mV/div at 60 Hz; 5 mV/div to 5 V/div	Waveshape and amplitude measurements, Risetime	TEKTRONIX 7704A TEKTRONIX 7A16A <sup>a</sup> TEKTRONIX 7B80 <sup>a</sup> TEKTRONIX 7A11 <sup>a</sup>
Sampling System	Risetime—30 ps or less, 2 mV to 200 mV sensitivity; Time/Div 10 ps to 5 ms.	Risetime and aberration measurements	TEKTRONIX 7S11 <sup>a</sup> TEKTRONIX S-6 TEKTRONIX 7T11 <sup>a</sup>
Precision Volt/Ohmmeter	100 Vdc to 100 mV +0.025% accuracy; resistance from 50 Ω to 1 kΩ within ±0.05%	Dc voltage and resistance measurements	JOHN FLUKE Model 8375A
50 Ω Termination	0.1% accuracy, bnc connectors		Tektronix Part No. 011-0129-00
Power Module		All tests	Compartments for the PG 506 (1) and other TM 500-Series equipment used.

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Performance Check**

**Table 4-1 (cont)****TEST EQUIPMENT REQUIRED**

Description	Performance Requirements	Applications	Example
50 Ω Termination (2 required)	Bnc connectors		Tektronix Part No. 011-0049-01
50 Ω Termination	Sma connectors		Tektronix Part No. 015-1022-00
50 Ω Attenuator	10X, bnc connectors		Tektronix Part No. 011-0059-02
50 Ω Attenuator	10X, sma connectors		Tektronix Part No. 015-1003-00
Cable	18", 50 Ω, bnc connectors		Tektronix Part No. 012-0076-00
Cable	42", 50 Ω bnc connectors		Tektronix Part No. 012-0057-01
Cable, Precision (2 required)	36", 50 Ω, bnc connectors		Tektronix Part No. 012-0482-00
Adapter	Female to female, bnc connectors		Tektronix Part No. 103-0028-00
Adapter (2 required)	Male to male, sma connectors		Tektronix Part No. 015-1011-00
Adapter	Male sma to female bnc connector		Tektronix Part No. 015-1018-00
Tunnel Diode Pulser		Sampling system verification	Tektronix Part No. 067-0681-01
Extender Cable	To match power module and PG 506 connectors		Tektronix Part No. 067-0645-02
20 mA Constant Current Source	See the Maintenance Section for details	Attenuator Accuracy	
Time-mark Generator	1 ns, within 0.1%	Sampling system verification	TEKTRONIX TG 501 <sup>b</sup>

<sup>a</sup>Requires a TEKTRONIX 7000-Series Mainframe.<sup>b</sup>Requires a TEKTRONIX TM 500-Series power module.

**Preliminary Procedure**

1. Ensure that all power switches are off.
2. Ensure that all test equipment and the power module into which the PG 506 under test will be installed are suitably adapted to the line voltage to be applied.

**PERFORMANCE CHECK  
PROCEDURE****1. Check High Amplitude Output Resistance:  
within 5%**

- a. Connect the precision volt/ohmmeter to the AMPL OUTPUT HIGH or STD connector.
- b. Set the function switch to HIGH AMPL.
- c. CHECK—that the output resistance is  $600, \pm 30 \Omega$ .

**2. Check Std Ampl Output Resistance: within 0.5%**

- a. Set the function switch to STD AMPL.
- b. Set the AMPLITUDE (VOLTS INTO  $1 M\Omega$ ) to the counterclockwise position.
- c. CHECK—that the resistance is  $50, \pm 0.25 \Omega$ .

**3. Check Fast Rise Output Resistance: within 5%**

- a. Connect the precision volt/ohmmeter to the FAST RISE OUTPUTS left hand connector.
- b. CHECK—that the output resistance is  $50, \pm 1.5 \Omega$ .
- c. Connect the precision volt/ohmmeter to the FAST RISE OUTPUTS right hand connector.
- d. Repeat part b.

**4. Check Standard Amplitude dc Voltages (into  $1 M\Omega$ )**

- a. Remove the PG 506 side cover to gain access to the internal DC—Pulse switch. Pull the rear end of the side cover outward from the instrument side (the cover snaps into place).

b. Set the internal DC—Pulse (S660) switch to DC (up).

c. Replace the side cover on the PG 506 and install the PG 506 into the power module.

d. Connect the power module(s) and test equipment to a suitable line voltage source. Turn all equipment on and allow at least 20 minutes for the equipment to warm up and stabilize.

e. Set the precision volt/ohmmeter to measure 100 Vdc.

**NOTE**

*A shunt of the voltmeter input terminals is required that ensures that the total load resistance on the AMPL OUTPUT connector is  $1 M\Omega$  within 0.1%; e.g., 1.11  $\Omega$  load resistor with a voltmeter that has a  $10 M\Omega$  input impedance.*

f. Connect the PG 506 AMPL OUTPUT HIGH or STD to the  $1 M\Omega$  voltmeter input.

g. Set the PG 506 AMPLITUDE switch as listed in Table 4-2.

h. CHECK—that the voltmeter reads within the given limits as listed in Table 4-2.

**Table 4-2**  
**STANDARD AMPLITUDE (INTO  $1 M\Omega$ )**  
**WITHIN 0.25%,  $\pm 1 \mu V$**

AMPLITUDE Setting	Limits		
100	99.75 V	to	100.25 V
50	49.875 V	to	50.125 V
20	19.95 V	to	20.05 V
10	9.975 V	to	10.025 V
5	4.9875 V	to	5.0125 V
2	1.995 V	to	2.005 V
1	0.9975 V	to	1.0025 V
.5	0.49875 V	to	0.50125 V
.2	0.1995 V	to	0.2005 V
.1	0.09975 V	to	0.10025 V

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Performance Check**

- i. RECORD—the voltmeter reading for the .1 Amplitude setting.
- j. Turn off the power module and remove the PG 506.
- k. Connect the variable 20 mA current source positive lead to the top or R308. See Fig. 4-1.
- l. Connect the variable 20 mA current source negative lead to the common floating ground. See Fig. 4-1.
- m. Set the 20 mA variable current source output to obtain a voltmeter reading exactly ten times the 6-digit voltage recorded in part i.
- n. Set the PG 506 AMPLITUDE control to 10 mV.
- o. CHECK—that the voltmeter reading is 0.10025 to 0.09975 V.
- p. RECORD—the actual voltmeter reading for the 10 mV range.
- q. Connect the variable 20 mA current source positive lead to the top of R304. See Fig. 4-1.
- r. Set the current source output to obtain a voltmeter reading exactly ten times the 6-digit voltage recorded in part p.
- s. Set the PG 506 AMPLITUDE control to 1 mV.
- t. CHECK—that the voltmeter reading is 0.10025 to 0.09975 V.
- u. Disconnect the 20 mA variable current source and plug the PG 506 into the power module.
- v. Turn on the power module and allow 20 minutes warm-up before continuing.

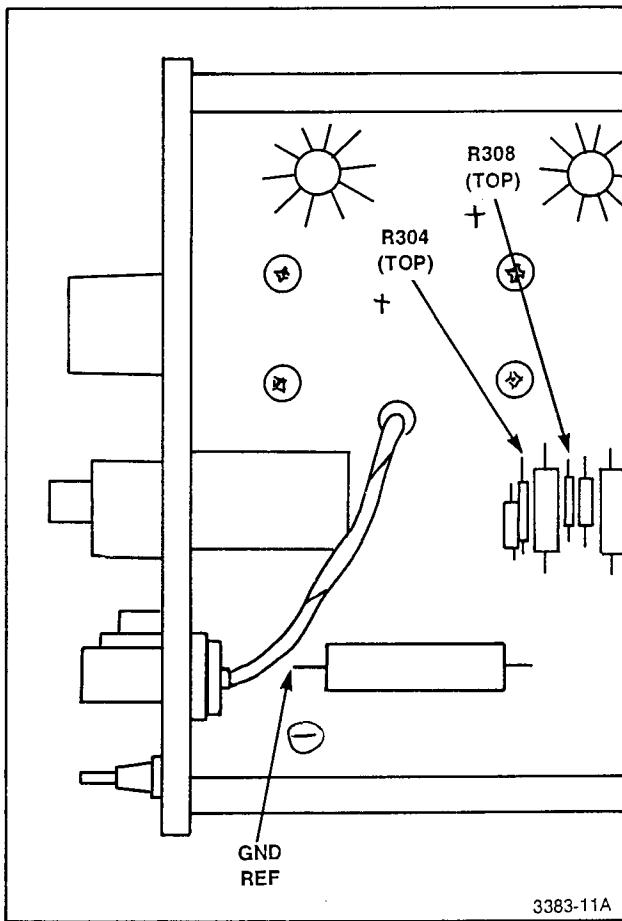


Fig. 4-1. Attenuator connections for current source.

**5. Check DEFLECTION ERROR Range; + & -7.5%, resolution within 0.1%**

- a. Set the precision volt/ohmmeter to measure 100 Vdc.
- b. Set the AMPLITUDE control to 100.
- c. Press and release the VARIABLE (OUT) control.
- d. Set the VARIABLE (OUT) control for a reading on the precision volt/ohmmeter as listed in Table 4-3.

- e. CHECK—that the DEFLECTION ERROR % readout display is within the display tolerance listed in Table 4-3.

Table 4-3

**100 V dc RANGE DEFLECTION ERROR %  
RESOLUTION TOLERANCES**

Voltmeter Reading	Display Tolerance
108.5 V	7.7% to 7.9% LOW lamp lit
107.3 V	6.6% to 7.0% LOW lamp lit
106.5 V	5.9% to 6.3% LOW lamp lit
105.6 V	5.1% to 5.5% LOW lamp lit
104.6 V	4.2% to 4.6% LOW lamp lit
103.2 V	2.9% to 3.3% LOW lamp lit
100.0 V	0.0% to 0.2% LOW or HIGH lamp lit
96.9 V	3.0% to 3.4% HIGH lamp lit
95.6 V	4.4% to 4.8% HIGH lamp lit
94.7 V	5.4% to 5.8% HIGH lamp lit
93.9 V	6.3% to 6.7% HIGH lamp lit
93.2 V	7.1% to 7.5% HIGH lamp lit
92.8 V	7.7% to 7.9% HIGH lamp lit

- f. Set the AMPLITUDE control to 10.

- g. CHECK—that the DEFLECTION ERROR % readout display is within 0.1% as listed in Table 4-4.

Table 4-4

**10 V dc RANGE DEFLECTION ERROR %  
RESOLUTION TOLERANCES**

Voltmeter Reading	Display Tolerance
10.81 V	7.3% to 7.7% LOW lamp lit
10.56 V	5.1% to 5.5% LOW lamp lit
10.00 V	0.0% to 0.2% HIGH or LOW lamp lit
9.47 V	5.4% to 5.8% HIGH lamp lit
9.30 V	7.3% to 7.7% HIGH lamp lit

- h. Press in and turn-off the VARIABLE (OUT) control.

**6. Check Standard Amplitude Voltages (into 50 Ω load)**

- a. Set the precision volt/ohmmeter to measure 5 V dc.

- b. Connect the precision 50 Ω termination to the AMPL OUTPUT HIGH or STD connector.

- c. Connect the precision coaxial cable from the termination to the precision volt/ohmmeter input.

**NOTE**

The Standard Amplitude output voltage accuracy (operating into a 50 Ω load) is highly dependent on the total load resistance. The total load consists of the coaxial cable resistance, all contact resistance, and the termination accuracy. Total load resistance error must not exceed 0.1%.

- d. CHECK—that the voltage readings for the AMPLITUDE settings are within the limits listed in Table 4-5.

**Table 4-5  
STANDARD AMPLITUDE INTO A  
50 Ω LOAD**

AMPLITUDE Setting	Voltage Reading	Limits	
10	5 V	4.9875 V	to 5.0125 V
5	2.5 V	2.49375 V	to 2.50625 V
2	1 V	0.9975 V	to 1.0025 V
1	0.5 V	0.498749 V	to 0.50125 V
.5	0.25 V	0.249374 V	to 0.250626 V
.2	0.1 V	0.099749 V	to 0.100251 V

- e. Remove all connections.

- f. Turn off the power module and remove the PG 506.

- g. Remove the PG 506 side cover to gain access to the internal DC—Pulse switch (S660). Pull the rear end of the side cover outward from the instrument side (the cover snaps into place).

- h. Set the DC—Pulse switch (S660) to Pulse (down).

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Performance Check**

- i. Replace the side cover and install the PG 506 into the power module.
- j. Turn on the power module power.
- k. Allow for a 20 minute stabilization period.
- b. Set the monitor oscilloscope triggering controls for a stable display.
- c. CHECK—for approximately 5 V peak-to-peak of output signal.

**7. Check Standard Amplitude Period Accuracy**

Set the following controls as indicated:

**PG 506**

AMPLITUDE	20
VARIABLE (OUT)	in
Function	STD AMPL

**Monitor Oscilloscope**

Volts/Div	5 V
Time/Div	.2 ms

a. Using a 50 Ω coaxial cable, connect the PG 506 AMPL OUTPUT HIGH or STD to the vertical input of the monitor oscilloscope.

b. Set the monitor oscilloscope triggering controls for a stable display.

c. CHECK—for one complete cycle in 5 divisions, ±0.25 divisions.

d. Disconnect the PG 506 from the monitor oscilloscope.

**8. Check Standard Amplitude Output (into 50 Ω)**

Set the following controls as indicated:

**PG 506**

AMPLITUDE	10
VARIABLE (OUT)	in

**Monitor Oscilloscope**

Volts/DIV	1 V
-----------	-----

a. Using the 50 Ω coaxial cable and 50 Ω termination, connect the PG 506 AMPL OUTPUT HIGH or STD to the vertical input of the monitor oscilloscope.

**9. Check High Amplitude Output (into 50 Ω)**

Set the following controls as indicated:

**PG 506**

Function	HIGH AMPL
PERIOD	1 μs    1 MHz
VAR	ccw
PULSE AMPLITUDE	cw

**Monitor Oscilloscope**

Volts/Div	1 V
Time/Div	.5 μs

a. Using the 50 Ω coaxial cable and 50 Ω termination, connect the PG 506 AMPL OUTPUT HIGH or STD to the vertical input of the monitor oscilloscope.

b. CHECK—that the display amplitude is ≥5 V.

**10. Check Trigger Out Amplitude**

a. Using the 50 Ω coaxial cable and 50 Ω termination, connect the +TRIG OUT to the vertical input of the monitor oscilloscope.

b. Change the Volts/Div to .5 V.

c. CHECK—that the display amplitude is ≥1 V.

d. Remove all connections.

**11. Check High Amplitude Output (open ckt)**

Set the following controls as indicated:

**PG 506**

Function	HIGH AMPL
PULSE AMPLITUDE	MAX
PERIOD	1 μs    1 MHz

**Monitor Oscilloscope**

Volts/Div	2 V
-----------	-----

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## Calibration Procedure—PG 506 (SN B040000 & up) Performance Check

- a. Using a 10X probe connected to the vertical input, connect the tip to the AMPL OUTPUT HIGH or STD.
- b. Use a probe ground lead and ground the probe.
- c. CHECK—that the high amplitude is  $\geq 60$  V.
- d. Rotate the PULSE AMPLITUDE counterclockwise.
- e. Change the monitor oscilloscope Volts/Div to 50 mV (deflection factor with probe of 0.5 V/div).
- f. CHECK—that the High Amplitude output is  $\leq 6$  V.
- g. Remove the probe.

### 12. Check High Amplitude Output Period

Set the following controls as indicated:

#### PG 506

Function	HIGH AMPL
PULSE AMPLITUDE	midrange
PERIOD	1 $\mu$ s      1 MHz
VAR	ccw

#### Monitor Oscilloscope

Volts/Div	1 V
Time/Div	.2 $\mu$ s

- a. Using a 50  $\Omega$  coaxial cable and 50  $\Omega$  termination, connect the AMPL OUTPUT HIGH or STD output to the vertical input of the monitor oscilloscope.

- b. Set the monitor oscilloscope triggering controls for a stable display.
- c. CHECK—that the High Amplitude output period display for one full cycle is within the limits listed in Table 4-6.

### 13. Check Fast Rise Output Period

Set the following controls as indicated:

#### PG 506

Function	FAST RISE
PULSE AMPLITUDE	mid range
PERIOD	1 $\mu$ s      1 MHz
VAR	ccw

#### Monitor Oscilloscope

Volts/Div	.1 V
Time/Div	.2 $\mu$ s

- a. Using a 50  $\Omega$  coaxial cable and 50  $\Omega$  termination, connect the positive-going FAST RISE OUTPUTS to the vertical input of the monitor oscilloscope.

- b. Set the monitor oscilloscope triggering controls for a stable display.

- c. CHECK—that the fast rise output period display for one cycle is within the limits listed in Table 4-6.

- d. Change the PG 506 connection to the negative-going FAST RISE OUTPUTS connector and repeat parts b and c.

Table 4-6  
FAST RISE AND HIGH AMPLITUDE OUTPUT PERIOD

#### PG 506 Controls

#### Monitor Oscilloscope

PERIOD Setting	VAR	Time/Div	Display Limits
1 $\mu$ s	ccw	.2 $\mu$ s	4.75 to 5.25 divisions
10 $\mu$ s	ccw	2 $\mu$ s	4.75 to 5.25 divisions
.1 ms	ccw	20 $\mu$ s	4.75 to 5.25 divisions
1 ms	ccw	.2 ms	4.75 to 5.25 divisions
10 ms	ccw	2 ms	4.75 to 5.25 divisions
10 ms	cw	20 ms	>5 divisions

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Performance Check**

**14. Check Fast Rise Output Amplitude**

Set the following controls as indicated:

**PG 506**

Function	FAST RISE	
PULSE AMPLITUDE	MAX	
PERIOD	1 $\mu$ s	1 MHz
VAR	ccw	

**Monitor Oscilloscope**

Volts/Div	.2 V
Time/Div	1 $\mu$ s

- a. Center the display on the monitor oscilloscope.
- b. CHECK—that the display amplitude is  $\geq 5$  divisions.
- c. Change the PG 506 connection to the positive-going FAST RISE OUTPUTS.
- d. Repeat part b.
- e. Set PULSE AMPLITUDE to MIN and the monitor oscilloscope Volts/Div to 20 mV.
- f. CHECK—that the display amplitude is  $\leq 5$  divisions.
- g. Change the PG 506 connection to the negative-going FAST RISE OUTPUTS.
- h. Repeat part f.

**NOTE**

*The following step is used for determining the timing accuracy and response to a voltage step of the sampling system. The procedure need not be accomplished if the sampling system timing accuracy and step response are known.*

**15. Sampling System Timing Accuracy and Step Response**

Set the following controls as indicated:

**Sampling System**

**7S11**

mV/Div	100
Variable	in
+Up	in
Delay (10 ns range)	midrange
Dot Response	midrange
Normal (pushbutton)	in
Dc Offset	midrange

**7T11**

Slope	+
Sequential	in
Scan	midrange
Rep (pushbutton)	in
Time Pos Rng	50 ns
Time/Div	1 ns
Trig Input	Ext 50 $\Omega$ 2 V max

**TG 501**

Marker (Sec)	5-2-in
Variable	in
1 ns (pushbutton)	in

a. Install the S-6 Sampling Head in the 7S11.

b. Make the following connections as indicated:

Sma male to bnc female adapter to the S-6 sampling head upper connector.

TG 501 1 ns Only output through a 50  $\Omega$  coaxial cable and 50  $\Omega$  termination to the S-6 upper connector.

Sma 50  $\Omega$  terminator to the S-6 sampling head lower connector.

Sma male to bnc female adapter to 7T11 Trig Input.

TG 501 +Trigger Out through a 50  $\Omega$  coaxial cable to the 7T11 Trigger input.

c. Using the 7S11 Dc Offset, center the display.

d. Using the 7T11 Time Position, place the 50% point of the positive-going sinewave on the second horizontal graticule line.

e. CHECK—that the ninth positive-going sinewave 50% point crosses the tenth horizontal graticule line.

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## Calibration Procedure—PG 506 (SN B040000 & up) Performance Check

f. Adjust—7T11 Sweep Cal only if necessary to ensure the 50% point crosses the tenth horizontal graticule line.

g. Remove the TG 501 connections to the sampling system.

h. Using a  $50\ \Omega$  coaxial cable, connect the PG 506 AMPL OUTPUT HIGH or STD to the TD Pulser input.

i. Connect the TD Pulser to the upper S-6 input connector.

j. Using the necessary adapters and a 10X attenuator, connect the lower S-6 connector (loop thru) output to the 7T11 Trig Input.

k. Using the 7T11 triggering controls, obtain a stable display.

l. Set the 7T11 Time Pos Rng to  $.5\ \mu s$  and Time/Div to 1 ns.

m. Adjust the TD Pulser triggered level slowly clockwise to the point where the tunnel diode fires.

n. Using the 7T11 triggering controls and time position, locate the leading pulse edge.

o. Using the 7S11 Variable and DC Offset, obtain a peak-to-peak display of 5 divisions.

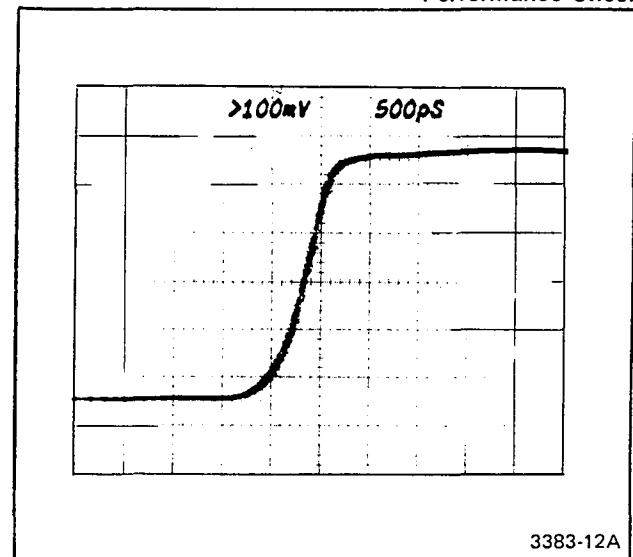
p. Using the 7T11 Time Position control, set the leading edge of the pulse at the second horizontal graticule division.

### NOTE

*Each vertical division now represents 2% of the total pulse amplitude.*

q. Using the 7S11 Dc Offset, center the step top in the display area. Refer to Fig. 4-2.

r. Using the 7T11 Scan control, adjust for a scan rate with minimum display flicker.



3383-12A

Fig. 4-2. Typical response curve of sampling system.

s. The sampling system aberrations can now be determined, and noted (for use in checking risetime and aberrations). Refer to Fig. 4-2.

## 16. Check Fast Rise Output Aberrations and Risetime

Set the following controls as indicated:

### PG 506

Function	FAST RISE	
PERIOD	1 $\mu s$	1 MHz
VAR	ccw	

### 7T11

Time Pos Rng	0.5 $\mu s$
Time/Div	50 ns

### 7S11

mV/div	100 mV
Variable	in

a. Using the 7T11 triggering controls, obtain a stable display.

b. Using the PG 506 PULSE AMPLITUDE control, obtain a 5 division peak-to-peak display.

c. Set the 7T11 Time/Div to 1 ns.

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Performance Check**

- d. Using the 7T11 Time Position control, maintain the display on screen.
- e. Set the 7S11 mV/Div to 10 mV.
- f. Using the 7S11 Dc Offset control, position the top of the pulse in the display area.
- g. CHECK—that the aberrations are within 2% (1 div). Refer to Fig. 4-3.

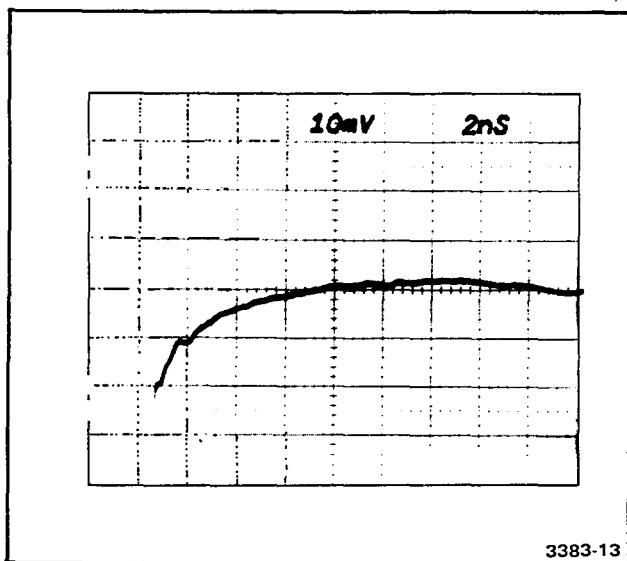


Fig. 4-3. Typical sampling oscilloscope response display.

- h. Disconnect the coaxial cable from the positive-going FAST RISE OUTPUTS connector and connect it to the negative-going FAST RISE OUTPUTS connector.
- i. Set the 7S11 mV/Div to 100 mV and the +Up/Invert switch to Invert.
- j. Repeat parts a through f of this step.
- k. CHECK—that the aberrations are within 2% (1 div). Refer to Fig. 4-4.

- l. Set the following controls as indicated:

7S11 mV/div	100 mV
7T11 Time/Div	0.5 ns

- m. Using the PG 506 PULSE AMPLITUDE control, obtain 5 divisions display amplitude.

- n. Position the display to measure the risetime. Refer to Fig. 4-2.

- o. CHECK—that risetime between the 10% and 90% point on the waveform is  $\leq 1$  ns.

- p. Disconnect the coaxial cable from the negative-going FAST RISE OUTPUTS connector and connect it to the positive-going FAST RISE OUTPUTS connector.

- q. Set the 7S11 +Up/Invert switch to +Up.

- r. Using the PG 506 PULSE AMPLITUDE control, obtain 5 divisions display amplitude.

- s. Position the display to measure the waveform risetime. Refer to Fig. 4-4.

- t. CHECK—that the risetime between the 10% and 90% point is  $\leq 1$  ns.

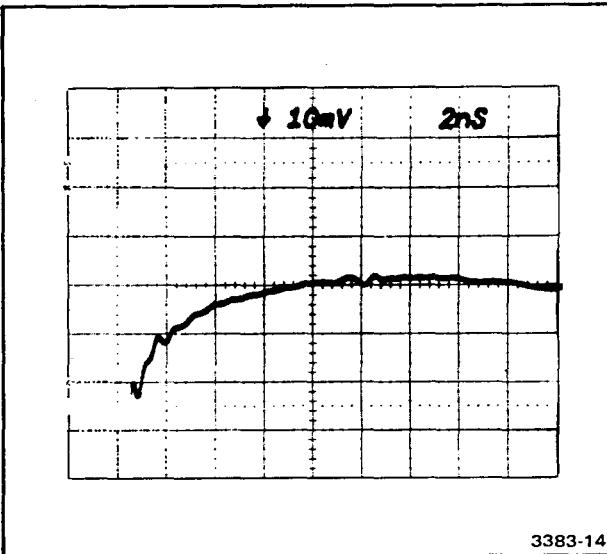


Fig. 4-4. Typical sampling oscilloscope response display.

## 17. Check Fast Rise Output Flatness

- a. Set the 7T11 Time Pos Rng to 5 s and Time/Div to 50 ns.

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## Calibration Procedure—PG 506 (SN B040000 & up) Performance Check

b. Using the 7T11 Time Position, set the rising edge of the display waveform on the first vertical graticule line.

c. CHECK—that the display waveform (following the first 10 ns or 0.2 div) flatness is within 0.25 divisions.

d. Disconnect the coaxial cable from the positive-going FAST RISE OUTPUTS connector and connect it to the negative-going FAST RISE OUTPUTS connector.

e. Set the 7S11 +Up/Invert to Invert.

f. Repeat parts b and c for the negative-going Fast Rise output.

### 18. Check High Amplitude Output Risetime and Aberrations

Set the following controls as indicated:

#### PG 506

Function	HIGH AMPL
PERIOD	1 $\mu$ s      1 MHz
VAR	ccw
PULSE AMPLITUDE	MAX

#### 7S11

mV/Div	100
+Up/Invert	+Up
Dot Response	midrange
Normal	in
Sequential	in

#### 7T11

Time Pos Rng	5 $\mu$ s
Time/Div	.1 $\mu$ s
Sequential	in
Slop —	in
Trig Input	Ext 50 $\Omega$ 2 V Max
Trig Amp	X1

a. Using a 50  $\Omega$  precision coaxial cable, 10X attenuator, and sma to bnc female adapter, connect the AMPL OUTPUT HIGH or STD connector to the S-6 upper connector.

b. Using the 7S11 Variable and dc Offset controls, obtain a 5 division peak-to-peak amplitude display.

c. Set the 7T11 Time/Div to 50 ns.

d. Using the 7T11 Time Position and 7S11 dc Offset, place the 50% point of the positive-going waveform at the first vertical graticule line.

e. Set the 7S11 mV/Div to 10.

f. Using the 7S11 dc Offset, align the waveform with the vertical graticule.

g. CHECK—that the aberrations are  $\leq 2\%$  in the first 50 ns.

h. Set the 7S11 mV/Div to 100 and the 7T11 Time/Div to 5 ns.

i. Using the 7S11 dc Offset and 7T11 Time Position, center the display.

j. CHECK—that risetime between the 10% and 90% point is  $\leq 10$  ns.

k. Remove the sampling system connections and plug-ins from the 7000-Series oscilloscope and install the real-time oscilloscope plug-ins.

l. Using an FET probe, connect the test oscilloscope vertical input directly to the AMPL OUTPUT HIGH or STD connector.

m. Set the following controls as indicated:

#### Test Oscilloscope

Volts/Div	20
Time/Div	50 ns

n. Using the test oscilloscope triggering controls, obtain a stable display.

o. Using the vertical variable sensitivity and horizontal controls, place a 5 division positive-going waveform at midscreen.

p. CHECK—that risetime between the 10% and 90% point is  $\leq 100$  ns.

This completes the Performance Check.

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Adjustment Procedure**

# **ADJUSTMENT PROCEDURE**

## **Introduction**

This adjustment procedure is to be used to restore the PG 506 to original performance specifications. Adjustment need not be performed unless the instrument fails to meet the Performance Requirements of the Electrical Characteristics listed in the Specification section, or the Performance Check cannot be completed satisfactorily.

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

## **Adjustment Instructions**

The alphabetical instructions under each step (a, b, c, etc.) may contain Check, Examine, or Adjust as the first word of the instruction. These terms are defined as follows:

1. Check—indicates that the instruction accomplishes a performance requirement check. Each performance requirement is derived from the instrument specification as listed in the Electrical Characteristics in Section 1.

2. Examine—usually precedes an Adjust instruction and describes how to determine whether the adjustment is necessary. Measurement limits following the word Examine are not to be interpreted at performance limits derived from the instrument specifications. They are provided as indicators of a properly functioning instrument and to aid in the adjustment process.

3. Adjust—describes which adjustment to use to make the desired result. We recommend that adjustments not be made if a previous Check or Examine instruction indicates that no adjustment is necessary.

## **Adjustment Interval**

To maintain instrument accuracy, check the performance of the Calibration Generator every 500 hours of operation, or every three months if used infrequently.

## **Services Available**

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

## **Preparation**

a. Remove the side covers of the PG 506 to gain access to the adjustments. Pull the rear end of the side cover outward from the side of the instrument (the cover snaps into place).

b. Be sure that the power module power switch is off. Set the power module for the line voltage to be applied and connect it to the line voltage source.

c. Install the other TM 500-Series equipment into the power module.

d. Connect the extender cable to the power module and connect the PG 506 to the extender cable.

e. Turn on all test equipment and allow 30 minutes for warm up and stabilization.

### **1. Adjust Primary Power Voltage**

Set the following controls as indicated:

#### **PG 506**

Function	FAST RISE
AMPLITUDE	100
VARIABLE (OUT)	in
PULSE AMPLITUDE	MIN
PERIOD	1 $\mu$ s      1 MHz
VAR	ccw

a. Connect the voltmeter high input lead to the +16.5 V test point. Refer to Fig. 4-5.

b. Connect the voltmeter low input lead to the -16.5 V test point.

c. Examine—that the voltmeter indicates +32.8 Vdc to +33.2 Vdc.

d. Adjust—Primary Pwr, R30 for 33.0 Vdc.

e. Disconnect the leads.

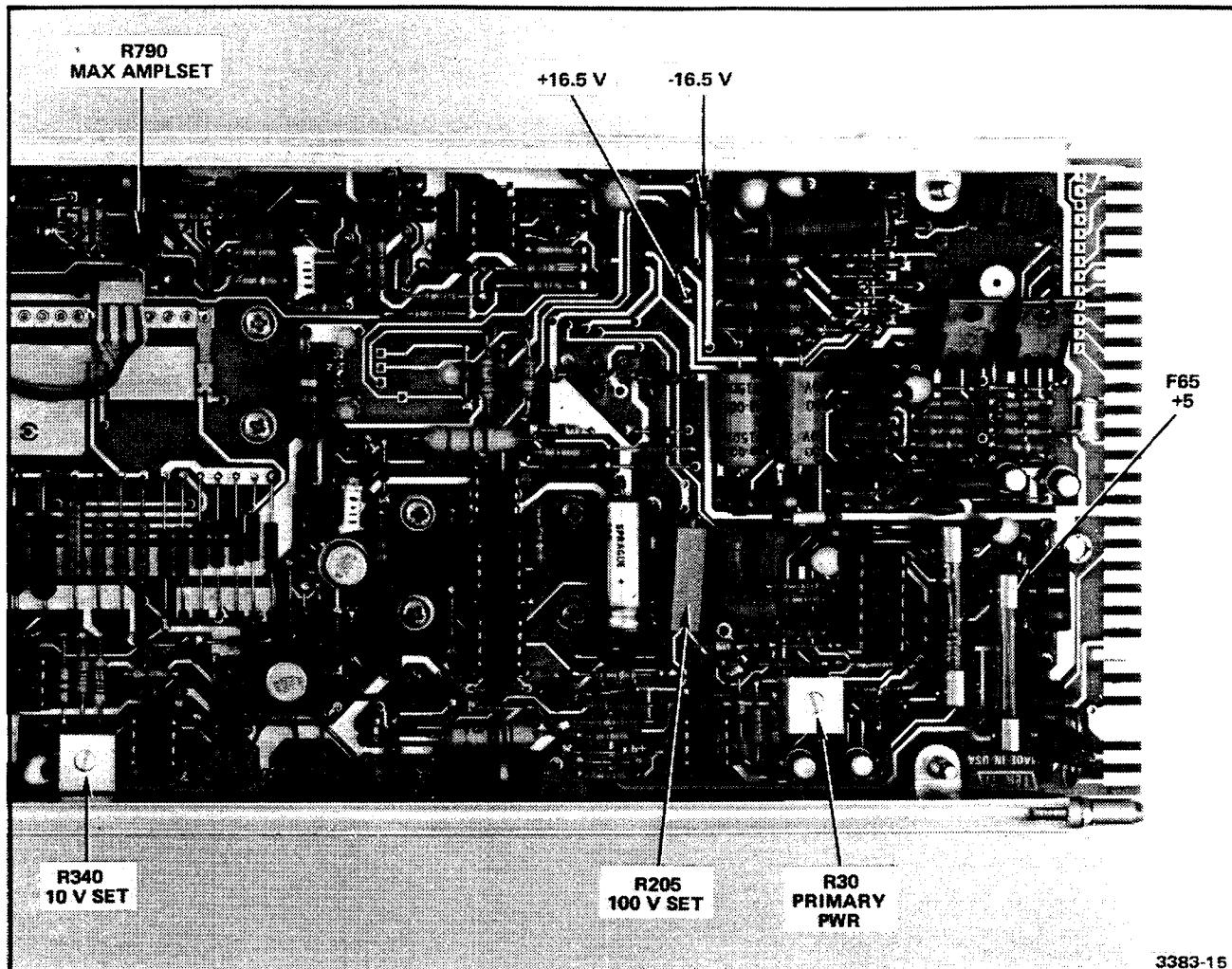


Fig. 4-5. Adjustment locations for the A1 Main circuit board.

**2. Check +5 V Power Supply**

- Connect the voltmeter low input lead to a convenient ground.
- Connect the voltmeter high input lead to the top end of F65. Refer to Fig. 4-5.
- Check—that the +5 V supply voltage is +4.75 Vdc to +5.25 Vdc.
- Disconnect the leads.

**3. Adjust 100 V and 10 V Set**

Set the following controls as indicated:

**PG 506**

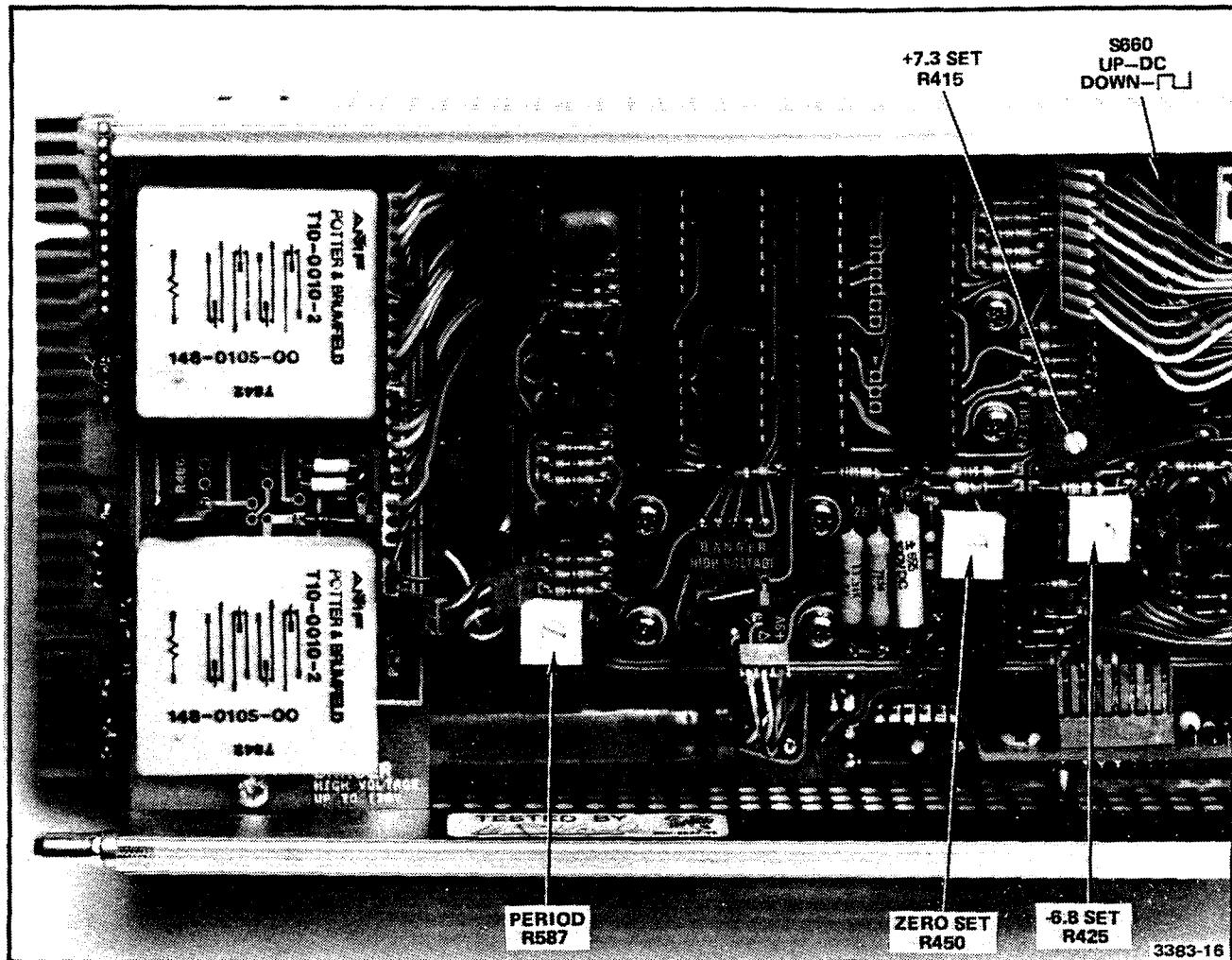
Function	STD AMPL
AMPLITUDE	100
VARIABLE (OUT)	in
DC— (S660)	DC (up) Refer to Fig. 4-6.

- Set the precision volt/ohmmeter to measure 100 Vdc.

**NOTE**

A shunt of the voltmeter input terminals is required that ensures that the total load resistance on the AMPL OUTPUT HIGH or STD connector is 1 MΩ within 0.1%, e.g., 1.11 MΩ load resistor with a voltmeter that has a 10 MΩ input impedance.

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Adjustment Procedure**



**Fig. 4-6. Adjustment locations for the A2 DVM/Period circuit board.**

b. Using a precision  $50\ \Omega$  coaxial cable, connect the PG 506 AMPL OUTPUT HIGH or STD to the  $1\ M\Omega$  voltmeter input.

c. Examine—for a reading of +99.99 Vdc to +100.01 Vdc.

d. Adjust—100 V Set (R205) for 100.00 Vdc.

e. Set the PG 506 AMPLITUDE control to 10.

f. Adjust—10 V Set (R340) for 10.00 Vdc.

g. Set the precision volt/ohmmeter to read 100 Vdc.

h. Repeat parts c thru f to minimize the effect of interaction.

#### **4. Adjust DEFLECTION ERROR % Readout**

Set the following controls as indicated:

##### **PG 506**

Function	STD AMPL
AMPLITUDE	100
VARIABLE (OUT)	out

a. Set the precision volt/ohmmeter to measure 100 Vdc.

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Adjustment Procedure**

- b. Using the VARIABLE (OUT) control, set the output voltage reading on the precision volt/ohmmeter to 100.00 Vdc.
- c. Examine—the DEFLECTION ERROR % readout is 0.1, with the HIGH or LOW lamp lit.
- d. Adjust—Zero Set (R450) for a 0.0% reading. Refer to Fig. 4-6.
- e. Using the VARIABLE (OUT) control, set the output voltage reading to 107.3 Vdc.
- f. Examine—the DEFLECTION ERROR % readout is 6.7 to 6.9 with the LOW lamp lit.
- g. Adjust—6.8 Set (R425) for a 6.8 reading. Refer to Fig. 4-6.
- h. Using the VARIABLE (OUT) control, set the output voltage reading to 93.2 Vdc.
- i. Examine—the DEFLECTION ERROR % readout is 7.2 to 7.4, with the HIGH lamp lit.
- j. Adjust—+7.3 Set (R415) for a 7.3 reading. Refer to Fig. 4-6.
- k. Disconnect the precision volt/ohmmeter connections.
- l. Return the DC—Pulse switch (S660) to Pulse (down).

**5. Adjust STD AMPL Output Period**

Set the following controls as indicated:

**PG 506**

Function	STD AMPL
AMPLITUDE	20
VARIABLE (OUT)	in

**Test Oscilloscope**

Volts/Div	5
Time/Div	.2 ms

- a. Using a 50 Ω coaxial cable, connect the AMPL OUTPUT HIGH or STD to the test oscilloscope vertical input.

**6. Adjust Max Ampl Output Set**

Set the following controls as indicated:

**PG 506**

Function	HIGH AMPL
PERIOD	1 μs
VAR	ccw
PULSE AMPLITUDE	MAX

**Test Oscilloscope**

Volts/Div	1 V
Time/Div	1 μs

- a. Using a 50 Ω coaxial cable and 50 Ω termination, connect the AMPL OUTPUT HIGH or STD to the test oscilloscope vertical input.

- b. Examine—the peak-to-peak amplitude is 5.2 to 5.3 divisions.

- c. Adjust—Max Ampl Set (R790) for a peak-to-peak amplitude of 5.2 divisions.

**7. Adjust Fast Rise Output Amplitude**

Set the following controls as indicated:

**PG 506**

Function	FAST RISE
PULSE AMPLITUDE	MIN

**Test Oscilloscope**

Volts/Div	50 mV
Time/Div	1 μs

- a. Using a 50 Ω coaxial cable and 50 Ω termination, connect the positive-going FAST RISE OUTPUTS connector to the test oscilloscope vertical input. Note the peak-to-peak signal amplitude.

**Calibration Procedure—PG 506 (SN B040000 & up)**  
**Adjustment Procedure**

b. Change the connection to the negative-going FAST RISE OUTPUTS connector. Note the peak-to-peak signal amplitude.

c. Examine—the two noted peak-to-peak signal amplitudes are  $\geq 50$  mV and  $\leq 100$  mV.

d. Adjust—Min Ampli (R1025) so the larger of the two outputs is just under 60 mV p-p. Refer to Fig. 4-7.

e. Set PULSE AMPLITUDE to MAX.

f. Examine—positive-going and negative-going FAST RISE OUTPUTS are  $\geq 1$  V peak-to-peak.

### 8. Adjust Fast Rise Output Aberrations

Set the following controls as indicated:

#### PG 506

Function	FAST RISE	
PERIOD	1 $\mu$ s	1 MHz
VAR	ccw	
PULSE AMPLITUDE	MAX	

<b>Sampling System</b>	
mV/Div	100
Variable (CAL in)	in
+Up	in
Dot Response	midrange
Normal	in
Time Pos Rng	.5 $\mu$ s
Time/Div	1 ns
Sequential	in
Slope	— (minus in)
Trig Amp	X1
Trig Input	Ext 50 $\Omega$ 2 V Max

a. Using a precision 50  $\Omega$  coaxial cable, a 50  $\Omega$  2X attenuator, and a bnc female to sma male adapter, connect the positive-going FAST RISE OUTPUTS connector to the S-6 input.

b. Using the necessary adapters and 18" 50  $\Omega$  coaxial cable, connect the S-6 loop thru to the 7T11 external trigger input.

c. Using the 7T11 triggering and time position controls, locate the positive-going step in the display area.

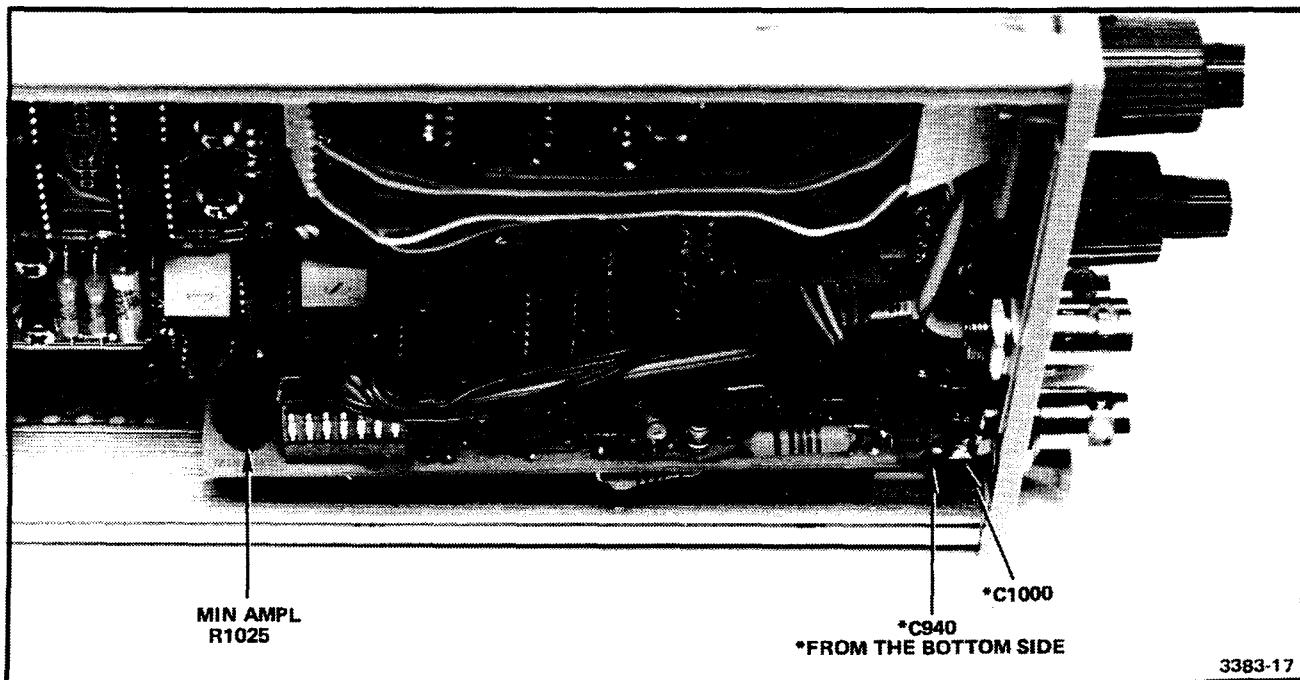


Fig. 4-7. Adjustment locations for the A3 Fast Rise Output circuit board.

## Scan by Zenith

### Calibration Procedure—PG 506 (SN B040000 & up)

#### Adjustment Procedure

- d. Using the 7S11 vertical deflection variable control, obtain a display peak-to-peak amplitude of 5 divisions.
- e. Set the mV/Div to 10. Do not change the variable setting.
- f. Using the 7S11 Dc Offset, align the waveform near the center of the display area.
- g. Examine—the positive-going pulse aberrations are 1 division. Refer to Fig. 4-8.
- h. Adjust—C1000 for minimum aberrations with risetime  $\leq 1$  ns. A slight amount of front-corner overshoot is desirable.

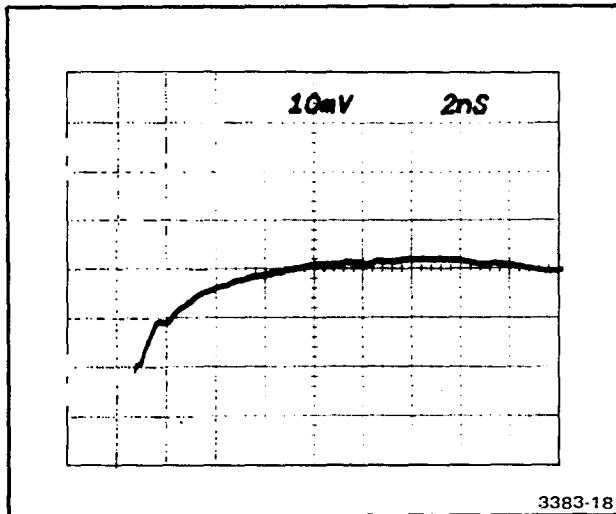


Fig. 4-8. Typical response curve as displayed on the sampling system.

- i. Disconnect the precision coaxial cable from the positive-going FAST RISE OUTPUTS connector and connect it to the negative-going FAST RISE OUTPUTS connector.

- j. Set the 7S11 mV/Div to 100 mV and the +Up/Invert switch to Invert.

- k. Repeat parts c thru g of this step.

- l. Adjust—C940 for minimum aberrations with risetime  $\leq 1$  ns. A slight amount of front-corner overshoot is desirable. Refer to Fig. 4-9.

This completes the Adjustment Procedure.

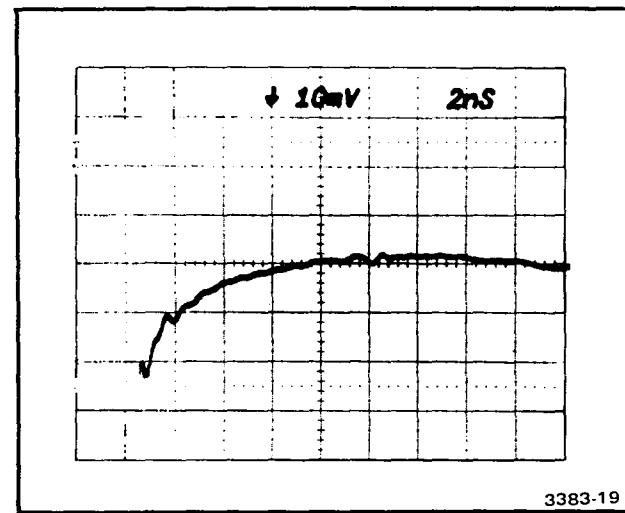


Fig. 4-9. Typical response curve as displayed on the sampling oscilloscope.

# MAINTENANCE

## Preventive Maintenance

There are no special preventive maintenance procedures, other than care during handling, calibration, installation, and removal.

## Corrective Maintenance

**General.** For general corrective maintenance procedures and instructions refer to the power module instruction manual.

**J950 or J1010 Replacement.** If either J950 or J1010 is to be replaced, the resistor that is soldered to the rear of the connector (R950 and R1010 respectively) should also be

replaced. Attempts to remove these resistors usually result in damage to their disc-type body. If J950 or J1010 is replaced without the resistor there will probably be a termination aberration visible approximately 9 ns from the front corner of the output pulse.

## Selected Components Criteria

During initial calibration selected values of the following components may have been installed to meet certain performance requirements for this instrument. If, during recalibration following corrective maintenance or hours-of-service performance checks, it is determined that one or more of these components needs replacement the following criteria (Table 5-1) should be used.

Table 5-1  
SELECTED COMPONENT CRITERIA

Component	Circuit Involved	Range of Values	Criteria/Effects
R940, R1000	Fast Rise Outputs	68 Ω to 220 Ω	Selected for optimum risetime and minimum aberrations. An increase of resistance increases risetime.
R937	Fast Rise Outputs	24 Ω to 220 Ω	Matches maximum negative-going output to maximum positive-going output within 20 mV. Maximum negative-going output increases as resistance increases.
R757	High Amplitude Output	68 Ω to 330 Ω	Selected for optimum risetime and minimum aberrations. A decrease of resistance decreases risetime.
C755	High Amplitude Output	5 pF to 33 pF	A decrease of capacitance decreases risetime.
R315	Standard Amplitude Output	7 kΩ to 25 kΩ	Use a precision ohmmeter between the AMPL OUTPUT HIGH or STD connector and chassis ground with AMPLITUDE set to 10 V and mode set to STD AMPL. Select resistor for a reading of 50 Ω within 0.5%.

**Maintenance—PG 506 (SN B040000 & up)****20 mA Current Source**

A 20 mA current source is needed for the adjustment of the PG 506. Another PG 506, if available, can be used for this purpose by using the AMPL OUTPUT connector, setting the AMPLITUDE control to 2 V, and adjusting the VARIABLE (OUT) control in STD AMPL mode.

If another PG 506 is not available a 20 mA current source approximation can be constructed by inserting a  $931\ \Omega$ , 1% resistor and a  $50\ \Omega$  potentiometer in series with a 20 V supply.

**Circuit Board Removal**

**A2-DVM.** Note the location of all connectors attached to the front of the board and remove. Remove the ten screws that hold the board to the MAIN board-A1. Lift the board up and out of the mainframe. Note the location of the connectors attached to the rear of the board and remove. To replace the board reverse this procedure.

**A5-Relay.** Note the location of all connectors attached to the board and remove. Remove the two screws that attach the board to the spacers from the frame. Reverse the procedure to replace the board.

**A1-Main.** To remove A1, first remove A2 and A5. With A2 and A5 removed, remove the PULSE AMPLITUDE knob, PERIOD knob, and mode switch knob. Note the location of all connectors and disconnect. Remove the screw that attaches the heat sink for Q758 to the top of the frame. Remove the two spacer screws at the rear of the instrument and the two screws towards the front of the instrument. Remove the board through the rear of the instrument. Reverse this procedure to replace the board.

**A3-Fast Rise.** Note the location of the connectors and remove. Remove the retaining nuts on the front-panel bnc connectors labeled FAST RISE OUTPUTS. Slide the board back until the bnc connectors clear the front panel. Remove the board from the frame. Reverse this procedure to replace the board.

**A4-Display.** Note the location of all connectors and remove. Remove the two screws that attach the board to the front panel. Remove the five screws that attach A1 to the frame and slide A1 towards the rear of the instrument. Pull A4 out through the side of the frame. Reverse this procedure to replace the board.

**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. Before you purchase or order a part from a source other than Tektronix, Inc., please check the Replaceable Electrical Parts list for the proper value, rating, tolerance, and description.

**Ordering Parts**

When ordering parts form Tektronix, Inc., it is important that all of the following information be included to ensure receiving the proper parts.

1. Instrument type (including modification or option numbers).
2. Instrument serial number.
3. A description of the part (if electrical, include circuit number).
4. Tektronix part number.

**Troubleshooting Aids**

Refer to the power module instruction manual for a general discussion of aids in troubleshooting TM 500 Series equipment.

**Interface Notes**

The following information will aid the user in performing both corrective maintenance and in customizing the instrument.

**Pin Assignments.** Besides those pins used to connect the PG 506 to the power module (1-15, A & B), other pins are available to output signals to the interface so that they may be connected to other plug-ins through the interface. Fig. 5-1 shows the pins and their assignments.



*When specialized rear interface wiring has been added to a Power Module compartment, the PG 506 may not be fully compatible with all other members of the signal source family. Trigger output (27B and 28B) and main output (28A and 27A) are compatible, as is the ground on 26B. The ground on 22A is not compatible with certain instruments, nor is the bcd information on 17B through 24B and the HIGH-LOW output on 16B. A plastic barrier (Tektronix Part Number 214-1593-02) should be installed in the key slot between contacts 23 and 24 on the power module. However, before inserting any other TM 500 signal source in a compartment with PG 506 interface wiring, check the diagrams in this book for pin-by-pin compatibility. Likewise, do not insert a PG 506 into a slot with rear interface wiring for any other signal source family connection without making the same compatibility check.*

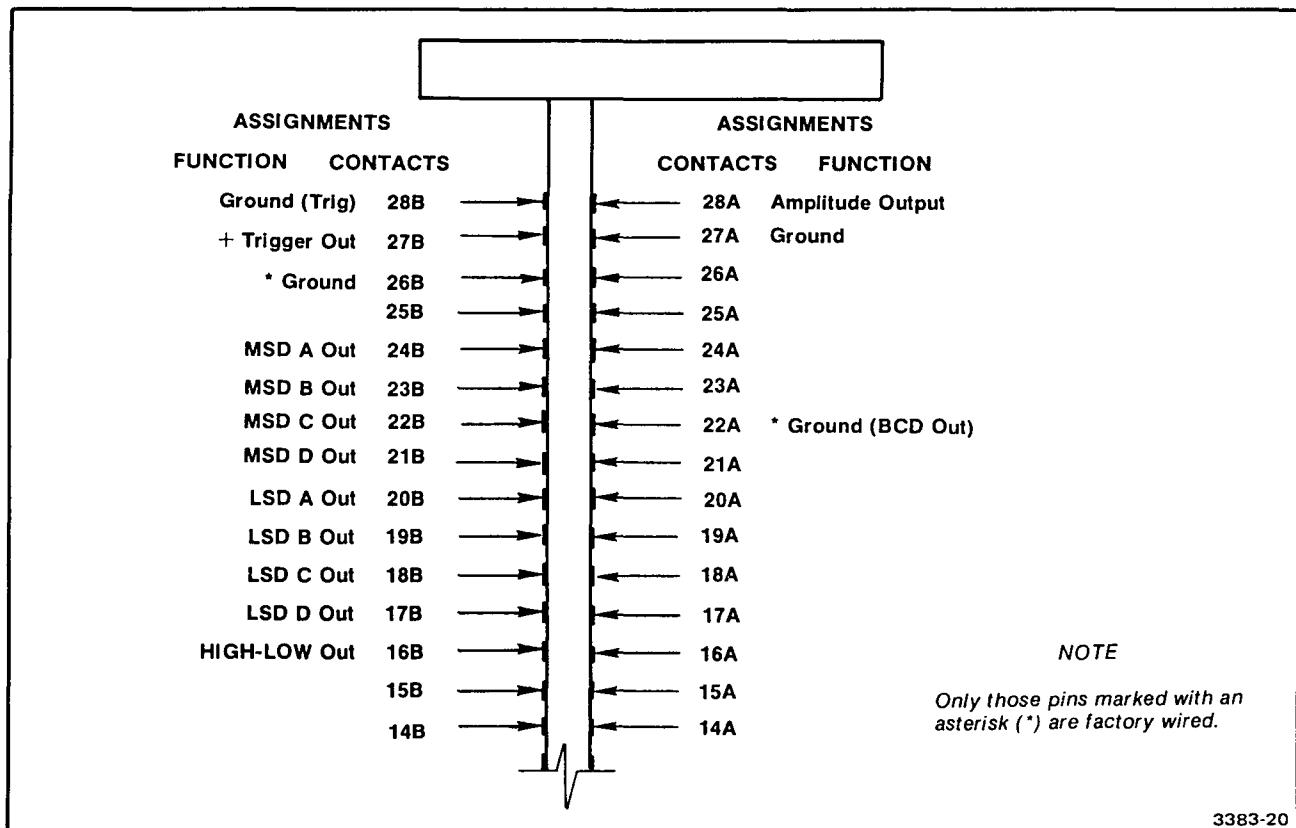


Fig. 5-1. Pin assignments for the PG 506 (rear view, partial).

**Amplitude Output.** To obtain the AMPL OUTPUT signal at the rear interface connectors, disconnect the coaxial cable from the main board (located in the lower left corner of the B side). Replace this cable with a miniature 50 Ω coaxial cable (Tektronix Part No. 175-1827-00). Remove the coaxial connector from the other end, and solder the cable to the rear interface connector as follows:

Shield to 27A (3rd hole down from top on the B side)

Center conductor to 28A (4th hole down on the B side)

See Fig. 5-2 for pictorial interface connection detail.

#### NOTE

*Connecting front panel signals to the rear interface will degrade their performance slightly.*

**Trigger Output.** To connect TRIG OUT to the rear interface, disconnect the coaxial 50 Ω lead to the front panel at the DVM board end (located in the upper right corner as viewed from the rear). Replace this cable with a miniatriue 50 Ω coaxial cable (Tektronix Part Number 175-1826-00). Remove the coaxial connector from the other end, and solder the cable to the rear interface connector as follows:

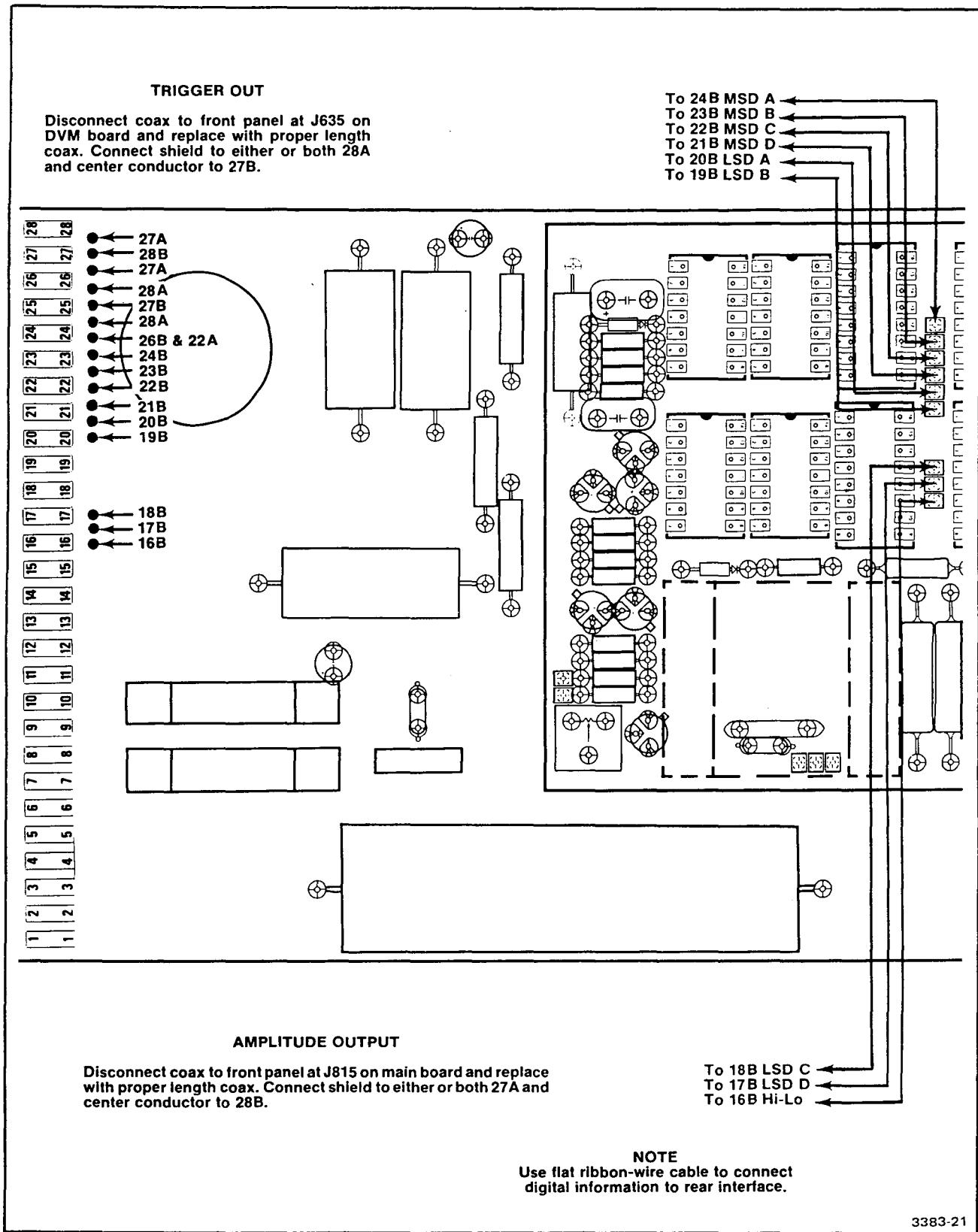
Shield to 28 B (2nd hole down from top on the A side)

Center Conductor to 27B (5th hole down on the A side)

See Fig. 5-2 for pictorial interface connection detail.

#### NOTE

*Ground connections to 26B and 22A are the only rear interface signal connections that are factory wired.*



3383-21

Fig. 5-2. Main interface board (partial) showing amplitude and trigger output cable connections.

**MSD & LSD Outputs.** To obtain readout information at the interface, use flat ribbon-wire to connect this digital information to the through-plated holes as shown in Fig. 5-2 and according to the following list:

MSD A to 24B	}	6 lead flat ribbon-wire
MSD B to 23B		
MSD C to 22B		
MSD D to 21B		
LSD A to 20B	}	3 lead flat ribbon-wire
LSD B to 19B		
LSD C to 18B		
LSD D to 17B		
Hi-Lo to 16B		

#### NOTE

*Each of the MSD and LSD outputs is only capable of driving one TTL load. The active level of each output is high.*

*For the Hi-Lo Output, output is low when the HIGH display light on the front panel is on.*

#### 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 5-2 for relative susceptibility of various classes of semiconductors. Static voltages of 1 kB to 30 kB 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 on 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 com-

ponents. 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.

Table 5-2

#### RELATIVE SUSCEPTIBILITY TO STATIC DISCHARGE DAMAGE

Semiconductor Classes	Relative Susceptibility Levels*
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

\*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 discharge from a 100 pF capacitor through a resistance of 100 ohms.)

## OPTIONS

There are no options for the PG 506 at the time of this printing.

# 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.

### 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
ELCLTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00853	SANGAMO WESTON INC SANGAMO CAPACITOR DIV	SANGAMO RD P O BOX 128	PICKENS SC 29671
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPRESSWAY P O BOX 225012 M/S 49	DALLAS TX 75265
02111	SPECTROL ELECTRONICS CORP SUB OF CARRIER CORP	17070 E GALE AVE P O BOX 1220	CITY OF INDUSTRY CA 91749
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
03888	KDI PYROFILM CORP	60 S JEFFERSON RD	WHIPPANY NJ 07981
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR GROUP	5005 E McDOWELL RD	PHOENIX AZ 85008
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
05828	GENERAL INSTRUMENT CORP GOVERNMENT SYSTEMS DIV	600 W JOHN ST	HICKSVILLE NY 11802
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV	464 ELLIS ST	MOUNTAIN VIEW CA 94042
07716	TRW INC TRW ELECTRONICS COMPONENTS TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
08806	GENERAL ELECTRIC CO MINIATURE LAMP PRODUCTS DEPT	NELA PK	CLEVELAND OH 44112
12697	CLAROSTAT MFG CO INC	LOWER WASHINGTON ST	DOVER NH 03820
12969	UNITRODE CORP	580 PLEASANT ST	WATERTOWN MA 02172
14433	ITT SEMICONDUCTORS DIV	2830 S FAIRVIEW ST	WEST PALM BEACH FL
14552	MICRO/SEMICONDUCTOR CORP	2201 LAURELWOOD RD	SANTA ANA CA 92704
17856	SILICONIX INC	811 E ARQUES	SANTA CLARA CA 95054
18324	SIGNETICS CORP	900 FOLLIN LANE S E	SUNNYVALE CA 94086
19396	ILLINOIS TOOL WORKS INC PAKTRON DIVISION	900 FOLLIN LANE S E	VIENNA VA 22180
19701	MEPCO/ELECTRA INC A NORTH AMERICAN PHILIPS CO	P O BOX 760	MINERAL WELLS TX 76067
24546	CORNING GLASS WORKS	550 HIGH ST	BRADFORD PA 16701
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
25403	AMPEREX ELECTRONIC CORP SEMICONDUCTOR AND MICROCIRCUITS DIV	PROVIDENCE PIKE	SLATERSVILLE RI 02876
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051
32159	WEST-CAP ARIZONA	2201 E ELVIRA ROAD	TUCSON AZ 85706
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507
44655	OHMITE MFG CO	3601 W HOWARD ST	SKOKIE IL 60076
50434	HEWLETT-PACKARD CO OPTOELECTRONICS DIV	640 PAGE MILL RD	PALO ALTO CA 94304
52763	STETTNER ELECTRONICS INC	6135 AIRWAYS BLVD PO BOX 21947	CHATTANOOGA TN 37421
54583	TDK ELECTRONICS CORP	755 EASTGATE BLVD	GARDEN CITY NY 11530
56289	SPRAGUE ELECTRIC CO	87 MARSHALL ST	NORTH ADAMS MA 01247
57668	ROHM CORP	16931 MILLIKEN AVE	IRVINE CA 92713
58361	GENERAL INSTRUMENT CORP OPTOELECTRONICS DIV	3400 HILLVIEW AVE	PALO ALTO CA 94304
59660	TUSONIX INC	2155 N FORBES BLVD	TUCSON, ARIZONA 85705
71400	BUSSMANN MFG CO	114 OLD STATE RD	ST LOUIS MO 63178
75042	MCGRAW EDISION CO TRW INC TRW ELECTRONIC COMPONENTS	PO BOX 14460 401 N BROAD ST	PHILADELPHIA PA 19108
77342	IRC FIXED RESISTORS PHILADELPHIA DIV AMF INC POTTER AND BRUMFIELD DIV	200 RICHLAND CREEK DR	PRINCETON IN 47670
79727	C-W INDUSTRIES	550 DAVISVILLE RD P O BOX 96	WARMINSTER PA 18974
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077

## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
90201	MALLORY CAPACITOR CO DIV P R MALLORY AND CO INC	4760 KENTUCKY AVE P O BOX 372	INDIANAPOLIS IN 46206
91637	DALE ELECTRONICS INC	P O BOX 609	COLUMBUS NE 68601
S0545	NIPPON ELECTRIC CO LTD		TOKYO JAPAN
TK1345	ZMAN AND ASSOCIATES	7633 S 180TH	KENT WA 98032

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Replaceable Electrical Parts - PG 506  
(SN B040000 & up)

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Discont.	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-3230-08	B040000	B049999		CIRCUIT BD ASSY:MAIN	80009	670-3230-08
A1	670-3230-09	B050000	B058179		CIRCUIT BD ASSY:MAIN	80009	670-3230-09
A1	670-3230-10	B058180	B058399		CIRCUIT BD ASSY:MAIN	80009	670-3230-10
A1	670-3230-12	B058400	B059053		CIRCUIT BD ASSY:MAIN	80009	670-3230-12
A1	670-3230-14	B059054			CIRCUIT BD ASSY:MAIN	80009	670-3230-14
A2	670-3234-04	B040000	B049999		CIRCUIT BD ASSY:DVM/PERIOD	80009	670-3234-04
A2	670-3234-06	B050000			CIRCUIT BD ASSY:DVM/PERIOD	80009	670-3234-06
A3	670-3452-02	B040000	B058179		CIRCUIT BD ASSY:FAST RISE	80009	670-3452-02
A3	670-3452-03	B058180			CIRCUIT BD ASSY:FAST RISE	80009	670-3452-03
A4	670-3314-00	B040000	B049999		CIRCUIT BD ASSY:DISPLAY	80009	670-3314-00
A4	670-3314-01	B050000			CIRCUIT BD ASSY:DISPLAY	80009	670-3314-01
A5	670-4328-00				CIRCUIT BD ASSY:RELAY	80009	670-4328-00
A1	670-3230-08	B040000	B049999		CIRCUIT BD ASSY:MAIN	80009	670-3230-08
A1	670-3230-09	B050000	B058179		CIRCUIT BD ASSY:MAIN	80009	670-3230-09
A1	670-3230-10	B058180	B058399		CIRCUIT BD ASSY:MAIN	80009	670-3230-10
A1	670-3230-12	B058400	B059053		CIRCUIT BD ASSY:MAIN	80009	670-3230-12
A1	670-3230-14	B059054			CIRCUIT BD ASSY:MAIN	80009	670-3230-14
A2	670-3234-04	B040000	B049999		CIRCUIT BD ASSY:DVM/PERIOD	80009	670-3234-04
A2	670-3234-06	B050000			CIRCUIT BD ASSY:DVM/PERIOD	80009	670-3234-06
A3	670-3452-02	B040000	B058179		CIRCUIT BD ASSY:FAST RISE	80009	670-3452-02
A3	670-3452-03	B058180			CIRCUIT BD ASSY:FAST RISE	80009	670-3452-03
A4	670-3314-00	B040000	B049999		CIRCUIT BD ASSY:DISPLAY	80009	670-3314-00
A4	670-3314-01	B050000			CIRCUIT BD ASSY:DISPLAY	80009	670-3314-01
A5	670-4328-00				CIRCUIT BD ASSY:RELAY	80009	670-4328-00
C3	283-0178-00				CAP, FXD, CER DI:0.1UF, 20%, 100V	05397	C330C104Z1U1CA
C10	290-0714-00				CAP, FXD, ELCTLT:2000UF, +75-10%, 40V	56289	390641
C15	283-0134-00				CAP, FXD, CER DI:0.47UF, 80-20%, 50V	05397	C330C474Z5U1CA
C20	283-0194-00	B040000	B058179		CAP, FXD, CER DI:4.7UF, 20%, 50V	04222	SR505E475MAA
C20	283-0179-00	B058180			CAP, FXD, CER DI:0.68UF, 10%, 100V	04222	SR501C684KAA
C22	281-0814-00				CAP, FXD, CER DI:100 PF, 10%, 100V	04222	MA101A101KAA
C27	290-0525-00				CAP, FXD, ELCTLT:4.7UF, 20%, 50V	05397	T368B475M050AS
C30	283-0167-00				CAP, FXD, CER DI:0.1UF, 10%, 100V	04222	3430-100C-104K
C32	290-0559-00				CAP, FXD, ELCTLT:22UF, 20%, 35V	05397	T368C226M035AS
C34	290-0559-00				CAP, FXD, ELCTLT:22UF, 20%, 35V	05397	T368C226M035AS
C36	290-0117-00				CAP, FXD, ELCTLT:50UF, +75-10%, 50V	56289	30D5066G050DD9
C40	283-0134-00				CAP, FXD, CER DI:0.47UF, 80-20%, 50V	05397	C330C474Z5U1CA
C42	283-0198-00				CAP, FXD, CER DI:0.22UF, 20%, 50V	05397	C330C224M5U1CA
C45	281-0775-00				CAP, FXD, CER DI:0.1UF, 20%, 50V	04222	MA205E104MAA
C46	283-0177-00	B046760	B059053		CAP, FXD, CER DI:1UF, +80-20%, 25V	04222	SR302E105ZAATR
C65	290-0529-00				CAP, FXD, ELCTLT:47UF, 20%, 20V	05397	T362C476M020AS
C67	290-0529-00				CAP, FXD, ELCTLT:47UF, 20%, 20V	05397	T362C476M020AS
C75	283-0134-00				CAP, FXD, CER DI:0.47UF, 80-20%, 50V	05397	C330C474Z5U1CA
C78	290-0525-00				CAP, FXD, ELCTLT:4.7UF, 20%, 50V	05397	T368B475M050AS
C80	281-0810-00				CAP, FXD, CER DI:5.6PF, +/-0.5PF, 100V	04222	MA101A5R60AA
C90	283-0051-00				CAP, FXD, CER DI:0.0033UF, 5%, 100V	04222	SR301A332JAA
C100	281-0775-00				CAP, FXD, CER DI:0.1UF, 20%, 50V	04222	MA205E104MAA
C125	281-0810-00				CAP, FXD, CER DI:5.6PF, +/-0.5PF, 100V	04222	MA101A5R60AA
C135	290-0405-00				CAP, FXD, ELCTLT:10UF, +50-10%, 150V	00853	556DD100T150B
C140	283-0057-00				CAP, FXD, CER DI:0.1UF, +80-20%, 200V	04222	SR306E104ZAA
C145	290-0159-00				CAP, FXD, ELCTLT:2UF, +50-10%, 150V	56289	30D205F150BB2
C150	290-0159-00				CAP, FXD, ELCTLT:2UF, +50-10%, 150V	56289	30D205F150BB2
C154	283-0167-00				CAP, FXD, CER DI:0.1UF, 10%, 100V	04222	3430-100C-104K
C165	290-0525-00				CAP, FXD, ELCTLT:4.7UF, 20%, 50V	05397	T368B475M050AS
C170	290-0719-00				CAP, FXD, ELCTLT:47UF, 20%, 25V	56289	196D476X0025TE3
C175	290-0525-00				CAP, FXD, ELCTLT:4.7UF, 20%, 50V	05397	T368B475M050AS
C180	290-0719-00				CAP, FXD, ELCTLT:47UF, 20%, 25V	56289	196D476X0025TE3

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
C190	290-0442-00			CAP, FXD, ELCTLT:120UF,+75-10%,150V	00853	066GL121V150B
C196	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C198	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C200	290-0117-00			CAP, FXD, ELCTLT:50UF,+75-10%,50V	56289	30D506G050DD9
C210	290-0534-00			CAP, FXD, ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
C212	283-0167-00			CAP, FXD, CER DI:0.1UF,10%,100V	04222	3430-100C-104K
C237	283-0208-00			CAP, FXD, CER DI:0.22UF,10%,200V	04222	SR506C224KAA
C240	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C247	281-0523-00			CAP, FXD, CER DI:100PF,20%,350V	52763	2RDPLZ007 100PMU
C294	290-0405-00			CAP, FXD, ELCTLT:10UF,+50-10%,150V	00853	556DD100T150B
C295	283-0057-00			CAP, FXD, CER DI:0.1UF,+80-20%,200V	04222	SR306E104ZAA
C315	283-0198-00			CAP, FXD, CER DI:0.22UF,20%,50V	05397	C330C224M5U1CA
C317	281-0638-00			CAP, FXD, CER DI:240PF,5%,500V	52763	2RDPLZ007 240PMO
C318	281-0773-00			CAP, FXD, CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C330	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C365	290-0529-00			CAP, FXD, ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C370	290-0215-00			CAP, FXD, ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C375	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C380	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C390	283-0211-00			CAP, FXD, CER DI:0.1UF,10%,200V	04222	SR406C104KAA
C392	283-0024-00			CAP, FXD, CER DI:0.1UF,+80-20%,50V	04222	SR215C104MAA
C400	290-0519-00			CAP, FXD, ELCTLT:100UF,20%,20V	90201	TDC107M020WLD
C420	290-0536-00			CAP, FXD, ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
C435	290-0536-00			CAP, FXD, ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
C460	290-0536-00			CAP, FXD, ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
C462	285-0683-00			CAP, FXD, PLASTIC:0.022UF,5%,100V	19396	223J01PT485
C465	290-0536-00			CAP, FXD, ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
C470	290-0536-00			CAP, FXD, ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
C474	290-0536-00			CAP, FXD, ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
C480	290-0536-00			CAP, FXD, ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
C500	283-0065-00			CAP, FXD, CER DI:0.001UF,5%,100V	59660	0835-591Y5E0102J
C506	283-0065-00			CAP, FXD, CER DI:0.001UF,5%,100V	59660	0835-591Y5E0102J
C520	283-0065-00			CAP, FXD, CER DI:0.001UF,5%,100V	59660	0835-591Y5E0102J
C558	281-0543-00			CAP, FXD, CER DI:270PF,10%,500V	52763	2RDPLZ007 27POMO
C580	283-0666-00			CAP, FXD, MICA DI:890PF,2%,100V	00853	D151F891G0
C582	290-0574-00			CAP, FXD, ELCTLT:47UF,10%,20V	05397	T368C476K0202AS
C615	290-0519-00			CAP, FXD, ELCTLT:100UF,20%,20V	90201	TDC107M020WLD
C718	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C732	290-0159-00			CAP, FXD, ELCTLT:2UF,+50-10%,150V	56289	30D205F150BB2
C734	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C736	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C752	281-0540-00			CAP, FXD, CER DI:51PF,5%,500V	59660	301-000U2J0510J
C755	281-0504-00			CAP, FXD, CER DI:10PF,+-1PF,500V (NOMINAL VALUE, SELECTED)	54583	TCC20CH2H100FYA
C764	283-0057-00			CAP, FXD, CER DI:0.1UF,+80-20%,200V	04222	SR306E104ZAA
C782	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C785	283-0057-00			CAP, FXD, CER DI:0.1UF,+80-20%,200V	04222	SR306E104ZAA
C792	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C800	281-0773-00			CAP, FXD, CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C818	281-0773-00			CAP, FXD, CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C840	281-0775-00			CAP, FXD, CER DI:0.1UF,20%,50V	04222	MA205E104MAA
C886	281-0618-00			CAP, FXD, CER DI:4.7PF,+-0.5PF,500V	52763	2RDPLZ007 4P70DC
C904	283-0156-00			CAP, FXD, CER DI:0.001 UF,+80-20%,200V	05397	C315C102Z2R5CA
C906	281-0613-00			CAP, FXD, CER DI:10PF,1%,500V	59660	374-018C0G0100F
C914	283-0024-00			CAP, FXD, CER DI:0.1UF,+80-20%,50V	04222	SR215C104MAA
C928	283-0024-00			CAP, FXD, CER DI:0.1UF,+80-20%,50V	04222	SR215C104MAA
C938	283-0324-00			CAP, FXD, CER DI:0.01UF,+80-20%,50V	04222	08055C103ZA2055
C940	281-0213-00			CAP, VAR,CER DI:0.8-3.5PF,400V	52763	311804141

Scan by Zenith

Replaceable Electrical Parts - PG 506  
 (SN B040000 & up)

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Discount	Name & Description	Mfr. Code	Mfr. Part No.
C962	283-0156-00				CAP, FXD, CER DI:0.001 UF,+80-20%, 200V	05397	C315C102Z2R5CA
C966	281-0613-00				CAP, FXD, CER DI:10PF, 1%, 500V	59660	374-018COG0100F
C974	283-0024-00				CAP, FXD, CER DI:0.1UF,+80-20%, 50V	04222	SR215C104MAA
C988	283-0024-00				CAP, FXD, CER DI:0.1UF,+80-20%, 50V	04222	SR215C104MAA
C998	283-0324-00				CAP, FXD, CER DI:0.01UF,+80-20%, 50V	04222	08055C103ZA2055
C1000	281-0213-00				CAP, VAR, CER DI:0.8-3.5PF, 400V	52763	311804141
C1026	290-0512-00				CAP, FXD, ELCLTLT:22UF, 20%, 15V	05397	T368B226M015AS
C1028	290-0512-00				CAP, FXD, ELCLTLT:22UF, 20%, 15V	05397	T368B226M015AS
C1034	283-0156-00				CAP, FXD, CER DI:0.001 UF,+80-20%, 200V	05397	C315C102Z2R5CA
C1045	283-0156-00				CAP, FXD, CER DI:0.001 UF,+80-20%, 200V	05397	C315C102Z2R5CA
C1060	283-0024-00				CAP, FXD, CER DI:0.1UF,+80-20%, 50V	04222	SR215C104MAA
C1062	290-0527-00				CAP, FXD, ELCLTLT:15UF, 20%, 20V	05397	T368B156M020AS
C1065	283-0024-00				CAP, FXD, CER DI:0.1UF,+80-20%, 50V	04222	SR215C104MAA
C1067	290-0527-00				CAP, FXD, ELCLTLT:15UF, 20%, 20V	05397	T368B156M020AS
C1070	290-0527-00				CAP, FXD, ELCLTLT:15UF, 20%, 20V	05397	T368B156M020AS
CR1	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR2	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR10	152-0198-00				SEMICOND DVC,DI:RECT,SI,200V,3A,A249	03508	1N5624
CR11	152-0198-00				SEMICOND DVC,DI:RECT,SI,200V,3A,A249	03508	1N5624
CR22	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR27	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR38	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR55	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR67	152-0066-00				SEMICOND DVC,DI:RECT,SI,400V,1A,D0-41	05828	GP10G-020
CR70	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR78	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR80	152-0574-00				SEMICOND DVC,DI:SW,SI,120V,0.15A,D0-35	12969	NDP566
CR85	152-0574-00				SEMICOND DVC,DI:SW,SI,120V,0.15A,D0-35	12969	NDP566
CR86	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR105	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR120	152-0574-00				SEMICOND DVC,DI:SW,SI,120V,0.15A,D0-35	12969	NDP566
CR125	152-0574-00				SEMICOND DVC,DI:SW,SI,120V,0.15A,D0-35	12969	NDP566
CR135	152-0586-00				SEMICOND DVC,DI:RECT,SI,600V,0.5A	25403	BYV96D OR BYV95C
CR136	152-0586-00				SEMICOND DVC,DI:RECT,SI,600V,0.5A	25403	BYV96D OR BYV95C
CR137	152-0586-00				SEMICOND DVC,DI:RECT,SI,600V,0.5A	25403	BYV96D OR BYV95C
CR138	152-0586-00				SEMICOND DVC,DI:RECT,SI,600V,0.5A	25403	BYV96D OR BYV95C
CR140	152-0586-00				SEMICOND DVC,DI:RECT,SI,600V,0.5A	25403	BYV96D OR BYV95C
CR145	152-0574-00				SEMICOND DVC,DI:SW,SI,120V,0.15A,D0-35	12969	NDP566
CR146	152-0574-00				SEMICOND DVC,DI:SW,SI,120V,0.15A,D0-35	12969	NDP566
CR147	152-0574-00				SEMICOND DVC,DI:SW,SI,120V,0.15A,D0-35	12969	NDP566
CR148	152-0574-00				SEMICOND DVC,DI:SW,SI,120V,0.15A,D0-35	12969	NDP566
CR165	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR166	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR167	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR168	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR170	152-0107-03				SEMICOND DVC,DI:RECT,SI,400V,400MA,A1	04713	1N4004
CR190	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR196	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR235	152-0246-00				SEMICOND DVC,DI:SW,SI,40V,200MA,D0-7	14433	WG1537TK
CR245	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR275	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012
CR280	153-0039-00	B040000	B059053		SEMICOND DVC,SE: SIGNAL, PR	80009	153-0039-00
CR280	152-0061-00	B059054			SEMICOND DVC,DI:SW,SI,175V,0.1A,D0-35	07263	FDH2161
CR281	152-0061-00	B059054			SEMICOND DVC,DI:SW,SI,175V,0.1A,D0-35	07263	FDH2161
CR290	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR291	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35	03508	DA2527 (1N4152)
CR294	152-0066-00				SEMICOND DVC,DI:RECT,SI,400V,1A,D0-41	05828	GP10G-020
CR320	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,D0-35	07263	FDH-6012

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
CR395	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR397	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR465	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR466	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR480	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR484	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR485	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR500	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR502	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR520	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR535	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR576	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR615	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR616	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR630	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR656	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR657	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR660	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR661	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR668	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR734	152-0066-00				SEMICOND DVC,DI:RECT,SI,400V,1A,DO-41	05828	GP10G-020
CR755	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR756	152-0536-00				SEMICOND DVC,DI:SW,4V,C132	04713	SMV1110 (MBD101)
CR764	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR766	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR767	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR800	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR810	152-0233-00				SEMICOND DVC,DI:SW,SI,80V,75MA,DO-7	03508	DA2737
CR825	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR944	152-0536-00				SEMICOND DVC,DI:SW,4V,C132	04713	SMV1110 (MBD101)
CR1004	152-0536-00				SEMICOND DVC,DI:SW,4V,C132	04713	SMV1110 (MBD101)
CR1028	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR1047	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR1048	152-0141-02				SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
CR1062	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR1067	152-0333-00				SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
DS480	150-1001-01				LT EMITTING DIO:RED,650NM,100MA MAX	50434	HLMP-3200
DS482	150-1001-01				LT EMITTING DIO:RED,650NM,100MA MAX	50434	HLMP-3200
DS650	150-0048-00	B040000	B049999		LAMP, INCAND:5V,0.06A,#683, WIRE LEAD	08806	683
DS650	150-1036-00	B050000			LT EMITTING DIO:RED,650NM,40MA MAX	58361	Q6878/MV5074C
DS700	150-1011-01	B032000	B049999		LAMP, LED RDOUT:RED,7 SEG,1.0 DIGIT	58361	FND-357
DS700	150-1011-02	B050000			LAMP, LED RDOUT:RED,7 SEG,1.0 DIGIT	58361	FND-367
DS702	150-1011-01	B032000	B049999		LAMP, LED RDOUT:RED,7 SEG,1.0 DIGIT	58361	FND-357
DS702	150-1011-02	B050000			LAMP, LED RDOUT:RED,7 SEG,1.0 DIGIT	58361	FND-367
DS704	150-0048-00	B040000	B049999		LAMP, INCAND:5V,0.06A,#683, WIRE LEAD	08806	683
DS704	150-1036-00	B050000			LT EMITTING DIO:RED,650NM,40MA MAX	58361	Q6878/MV5074C
F30	159-0022-00				FUSE, CARTRIDGE:3AG,1A,250V, MEDIUM BLOW	71400	AGC-CW-1
F65	159-0003-00				FUSE, CARTRIDGE:3AG,1.6A,250V,25SEC	71400	MDX 1 6/10
J640	131-1315-01				CONN,RCPT,ELEC:BNC,FEMALE	80009	131-1315-01
J820	131-1315-01				CONN,RCPT,ELEC:BNC,FEMALE	80009	131-1315-01
J950	131-1727-00				CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR262-1
J1010	131-1727-00				CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR262-1
K2	148-0105-00				RELAY,ARMATURE:4 FORM C,3A,30VDC,COIL 5VDC 52 OHM	77342	T10-0010-2
K4	148-0105-00				RELAY,ARMATURE:4 FORM C,3A,30VDC,COIL 5VDC 52 OHM	77342	T10-0010-2
L35	108-0317-00				COIL,RF:FIXED,15 UH	32159	71501M+10PERCENT
L38	108-0574-00				COIL,RF:FIXED,30UH	80009	108-0574-00

## Scan by Zenith

Replaceable Electrical Parts - PG 506  
 (SN B040000 & up)

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Discount	Name & Description	Mfr. Code	Mfr. Part No.
L65	108-0808-00				COIL,RF:FIXED,500UH	80009	108-0808-00
L135	108-0808-00				COIL,RF:FIXED,500UH	80009	108-0808-00
L145	108-0317-00				COIL,RF:FIXED,15 UH	32159	71501M+10PERCENT
L150	108-0317-00				COIL,RF:FIXED,15 UH	32159	71501M+10PERCENT
L165	108-0317-00				COIL,RF:FIXED,15 UH	32159	71501M+10PERCENT
L175	108-0317-00				COIL,RF:FIXED,15 UH	32159	71501M+10PERCENT
L582	108-0317-00				COIL,RF:FIXED,15 UH	32159	71501M+10PERCENT
Q15	151-0302-00				TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q45	151-0515-01	B040000	B059053		SCR:SI,MU-10	04713	SCR1256K
Q60	151-0301-00				TRANSISTOR:PNP,SI,TO-18	04713	ST898
Q70	151-0301-00				TRANSISTOR:PNP,SI,TO-18	04713	ST898
Q80	151-0473-00				TRANSISTOR:NPN,SI,TO-220	03508	X44CR388
Q85	151-0302-00				TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q90	151-0188-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q100	151-0188-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q120	151-0302-00				TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q125	151-0473-00				TRANSISTOR:NPN,SI,TO-220	03508	X44CR388
Q190	151-0347-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS7951
Q245	151-0347-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS7951
Q255	151-0190-00				TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q270	151-0347-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS7951
Q280	151-0280-00				TRANSISTOR:PNP,SI,TO-39	04713	SS8065
Q290	151-0280-00				TRANSISTOR:PNP,SI,TO-39	04713	SS8065
Q320	151-0260-00				TRANSISTOR:PNP,SI,TO-39	04713	ST1083
Q325	151-0462-00				TRANSISTOR:PNP,SI,TO-220	04713	SJE491
Q326	151-0276-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS8025
Q365	151-0440-00				TRANSISTOR:SELECTED	03508	X41E603
Q410	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q415	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q435	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q440	151-0221-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q445	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q475	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q480	151-0221-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q490	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q535	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q560	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q565	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q575	151-0221-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q580	151-0221-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q585	151-0221-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q595	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q605	151-0223-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q610	151-0221-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q715	151-0424-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8246
Q725	151-0350-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS6700
Q730	151-0424-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8246
Q736	151-0410-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS6765
Q740	151-0350-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS6700
Q745	151-0446-00				TRANSISTOR:NPN,SI,TO-39	04713	SRF2320
Q758	151-1108-00				TRANSISTOR:FE,N-CHANNEL,SI,TO-39	17856	VA1006
Q760	151-0406-00				TRANSISTOR:PNP,SI,TO-39	04713	ST1264
Q780	151-0410-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS6765
Q782	151-0190-00				TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q784	151-0410-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS6765
Q790	151-0350-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS6700
Q800	151-0350-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS6700
Q850	151-0190-00				TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Discount	Name & Description	Mfr. Code	Mfr. Part No.
Q860	151-0225-00				TRANSISTOR:NPN,SI,TO-106	04713	SPS7890
Q862	151-0225-00				TRANSISTOR:NPN,SI,TO-106	04713	SPS7890
Q880	151-0434-00				TRANSISTOR:PNP,SI,TO-72	04713	SS7144
Q890	151-0434-00				TRANSISTOR:PNP,SI,TO-72	04713	SS7144
Q900	151-0441-00				TRANSISTOR:NPN,SI,TO-72	04713	SRF501
Q910	151-0441-00				TRANSISTOR:NPN,SI,TO-72	04713	SRF501
Q920	151-0271-00	B040000	B047129		TRANSISTOR:PNP,SI,TO-92	04713	SPS8236
Q920	151-0271-03	B047130			TRANSISTOR:SELECTED	04713	SPS8521
Q935	151-0271-00	B040000	B047129		TRANSISTOR:PNP,SI,TO-92	04713	SPS8236
Q935	151-0271-03	B047130			TRANSISTOR:SELECTED	04713	SPS8521
Q960	151-0271-00	B040000	B047129		TRANSISTOR:PNP,SI,TO-92	04713	SPS8236
Q960	151-0271-03	B047130			TRANSISTOR:SELECTED	04713	SPS8521
Q970	151-0271-00				TRANSISTOR:PNP,SI,TO-92	04713	SPS8236
Q980	151-0447-00				TRANSISTOR:NPN,SI,TO-72	04713	SRF502-1
Q995	151-0658-00				TRANSISTOR:NPN,SI	S0545	NE02103-D
Q1020	151-0221-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q1030	151-0190-00				TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q1036	151-0424-00				TRANSISTOR:NPN,SI,TO-92	04713	SPS8246
Q1045	151-0221-00				TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
R10	315-0332-00				RES,FXD,FiLM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R15	315-0102-00				RES,FXD,FiLM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R20	315-0103-00				RES,FXD,FiLM:10K OHM,5%,0.25W	19701	5043CX10K00J
R21	315-0470-00				RES,FXD,FiLM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R22	308-0755-00				RES,FxD,WW:0.75 OHM,5%,2W	75042	BWH-R7500J
R23	315-0470-00				RES,FxD,FiLM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R25	321-0290-00				RES,FxD,FiLM:10.2K OHM,1%,0.125W,TC=T0	19701	5043ED10K20F
R27	321-0251-00				RES,FxD,FiLM:4.02K OHM,1%,0.125W,TC=T0	19701	5033ED4K020F
R29	321-0154-00				RES,FxD,FiLM:392 OHM,1%,0.125W,TC=T0	07716	CEAD392R0F
R30	311-1223-00				RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3386F-T04-251
R31	321-0222-00				RES,FxD,FiLM:2.00K OHM,1%,0.125W,TC=T0	19701	5033ED2K00F
R40	315-0431-00				RES,FxD,FiLM:430 OHM,5%,0.25W	19701	5043CX430R0J
R45	315-0470-00	B040000	B059053		RES,FxD,FiLM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R52	315-0102-00				RES,FxD,FiLM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R54	315-0202-00				RES,FxD,FiLM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R57	315-0103-00				RES,FxD,FiLM:10K OHM,5%,0.25W	19701	5043CX10K00J
R60	315-0131-00				RES,FxD,FiLM:130 OHM,5%,0.25W	19701	5043CX130R0J
R65	308-0677-00				RES,FxD,WW:1 OHM,5%,2W	75042	ORDER BY DESC
R70	315-0103-00				RES,FxD,FiLM:10K OHM,5%,0.25W	19701	5043CX10K00J
R72	315-0221-00				RES,FxD,FiLM:220 OHM,5%,0.25W	57668	NTR25J-E220E
R75	301-0511-00				RES,FxD,FiLM:510 OHM,5%,0.5W	19701	5053CX510R0J
R80	315-0101-00				RES,FxD,FiLM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R82	315-0330-00				RES,FxD,FiLM:33 OHM,5%,0.25W	19701	5043CX33R00J
R85	315-0472-00				RES,FxD,FiLM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R86	315-0392-00				RES,FxD,FiLM:3.9K OHM,5%,0.25W	57668	NTR25J-E03K9
R90	315-0822-00				RES,FxD,FiLM:8.2K OHM,5%,0.25W	19701	5043CX8K200J
R94	315-0623-00				RES,FxD,FiLM:62K OHM,5%,0.25W	19701	5043CX62K00J
R96	315-0913-00				RES,FxD,FiLM:91K OHM,5%,0.25W	19701	5043CX91K00J
R98	315-0913-00				RES,FxD,FiLM:91K OHM,5%,0.25W	19701	5043CX91K00J
R100	315-0822-00				RES,FxD,FiLM:8.2K OHM,5%,0.25W	19701	5043CX8K200J
R104	315-0623-00				RES,FxD,FiLM:62K OHM,5%,0.25W	19701	5043CX62K00J
R105	315-0392-00				RES,FxD,FiLM:3.9K OHM,5%,0.25W	57668	NTR25J-E03K9
R108	315-0472-00				RES,FxD,FiLM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R120	315-0330-00				RES,FxD,FiLM:33 OHM,5%,0.25W	19701	5043CX33R00J
R122	315-0101-00				RES,FxD,FiLM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R135	315-0124-00				RES,FxD,FiLM:120K OHM,5%,0.25W	19701	5043CX120K0J
R154	315-0683-00				RES,FxD,FiLM:68K OHM,5%,0.25W	57668	NTR25J-E68K0
R170	315-0103-00				RES,FxD,FiLM:10K OHM,5%,0.25W	19701	5043CX10K00J
R190	305-0512-00				RES,FxD,CMPSN:5.1K OHM,5%,2W	01121	HB5125

## Scan by Zenith

Replaceable Electrical Parts - PG 506  
(SN B040000 & up)

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Discount	Name & Description	Mfr. Code	Mfr. Part No.
R194	315-0104-00				RES, FXD, FILM: 100K OHM, 5%, 0.25W	57668	NTR25J-E100K
R196	315-0203-00				RES, FXD, FILM: 20K OHM, 5%, 0.25W	57668	NTR25J-E 20K
R200	321-0289-07				RES, FXD, FILM: 10.0K OHM, 0.1%, 0.125W, TC=T9	19701	5033RE10K00B
R205	311-1340-00				RES, VAR, NONMW: TRMR, 1K OHM, 0.75W	02111	43P102T672
R207	321-0289-07				RES, FXD, FILM: 10.0K OHM, 0.1%, 0.125W, TC=T9	19701	5033RE10K00B
R210	323-1200-07				RES, FXD, FILM: 1.20K OHM, 0.1%, 0.5W, TC=T9	19701	5053RE1K20B
R212	321-0264-00				RES, FXD, FILM: 5.49K OHM, 1%, 0.125W, TC=T0	07716	CEAD54900C
R215	321-0279-00				RES, FXD, FILM: 7.87K OHM, 1%, 0.125W, TC=T0	07716	CEAD78700F
R220	321-0213-00	B040000	B046759		RES, FXD, FILM: 1.62K OHM, 1%, 0.125W, TC=T0	07716	CEAD16200F
R220	321-0216-00	B046760			RES, FXD, FILM: 1.74K OHM, 1%, 0.125W, TC=T0	07716	CEAD17400F
R225	311-1586-00				RES, VAR, NONMW: PNL, 2 X 20K OHM, 0.5W (PART OF S225)	01121	12M271
R227	321-1649-07				RES, FXD, FILM: 8.32K OHM, 0.1%, 0.125W, TC=T9	91637	MFF1816C83800B
R230	321-0213-00	B040000	B046759		RES, FXD, FILM: 1.62K OHM, 1%, 0.125W, TC=T0	07716	CEAD16200F
R230	321-0216-00	B046760			RES, FXD, FILM: 1.74K OHM, 1%, 0.125W, TC=T0	07716	CEAD17400F
R234	323-0381-07				RES, FXD, FILM: 90.9K OHM, 0.1%, 0.5W, TC=T9	19701	5053RE90K90B
R237	321-1650-07				RES, FXD, FILM: 8.99K OHM, 0.1%, 0.125W, TC=T9	07716	CEAE89900B
R238	315-0391-00				RES, FXD, FILM: 390 OHM, 5%, 0.25W	57668	NTR25J-E390E
R245	315-0102-00				RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R247	301-0513-00				RES, FXD, FILM: 51K OHM, 5%, 0.5W	19701	5053CX51K00J
R250	315-0102-00				RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R255	315-0221-00				RES, FXD, FILM: 220 OHM, 5%, 0.25W	57668	NTR25J-E220E
R256	315-0203-00				RES, FXD, FILM: 20K OHM, 5%, 0.25W	57668	NTR25J-E 20K
R257	315-0103-00				RES, FXD, FILM: 10K OHM, 5%, 0.25W	19701	5043CX10K00J
R258	315-0102-00				RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R260	315-0241-00				RES, FXD, FILM: 240 OHM, 5%, 0.25W	19701	5043CX240R0J
R265	315-0241-00				RES, FXD, FILM: 240 OHM, 5%, 0.25W	19701	5043CX240R0J
R267	315-0202-00				RES, FXD, FILM: 2K OHM, 5%, 0.25W	57668	NTR25J-E 2K
R275	325-0193-00				RES SET, MATCHED: (4) RES R FROM 0-60 DEG C	03888	A3DT28
R276	-----				(PART OF R275)		
R277	-----				(PART OF R275)		
R278	-----				(PART OF R275)		
R280	321-0154-00				RES, FXD, FILM: 392 OHM, 1%, 0.125W, TC=T0	07716	CEAD392R0F
R287	303-0223-00				RES, FXD, CMPSN: 22K OHM, 5%, 1W	01121	GB2235
R290	315-0130-00				RES, FXD, FILM: 13 OHM, 5%, 0.25W	01121	CB1305
R295	315-0203-00				RES, FXD, FILM: 20K OHM, 5%, 0.25W	57668	NTR25J-E 20K
R300	308-0787-00				RES SET, MATCHED: 4,495 OHM, 0.1%, .3W	91637	SPR993
R302	-----				(PART OF R300)		
R304	-----				(PART OF R300)		
R306	-----				(PART OF R300)		
R308	-----				(PART OF R300)		
R310	-----				(PART OF R300)		
R312	-----				(PART OF R300)		
R314	-----				(PART OF R300)		
R315	321-0291-00	B040000	B058399		RES, FXD, FILM: 10.5K OHM, 1%, 0.125W, TC=T0	19701	5033ED10K50F
R315	321-0306-00	B058400			RES, FXD, FILM: 15.0K OHM, 1%, 0.125W, TC=T0	19701	5033ED15J00F
R317	315-0510-00				RES, FXD, FILM: 51 OHM, 5%, 0.25W	19701	5043CX51R00J
R330	315-0102-00				RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R332	321-0189-00				RES, FXD, FILM: 909 OHM, 1%, 0.125W, TC=T2	19701	5033ED909R0F
R338	321-0296-07				RES, FXD, FILM: 11.8K OHM, 0.1%, .125W; TC=T9 MI	07716	CEAE11801B
R340	311-1221-00				RES, VAR, NONMW: TRMR, 50 OHM, 0.5W	32997	3386F-T04-500
R342	321-0188-09				RES, FXD, FILM: 887 OHM, 1%, 0.125W, TC=T9	19701	5033RE887R0F
R350	308-0786-00				RES SET, MATCHED: 7,15 OHM, 0.1%, 0.5W	91637	SPR993-1
R352	-----				(PART OF R350)		
R354	-----				(PART OF R350)		
R356	308-0786-00				RES SET, MATCHED: 7,15 OHM, 0.1%, 0.5W	91637	SPR993-1
R358	-----				(PART OF R350)		
R360	-----				(PART OF R350)		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R362	-----			(PART OF R350)		
R375	315-0102-00			RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R377	321-0230-00			RES, FXD, FILM: 2.43K OHM, 1%, 0.125W, TC=T0	19701	5043ED2K430F
R380	315-0242-00			RES, FXD, FILM: 2.4K OHM, 5%, 0.25W	57668	NTR25J-E02K4
R382	315-0431-00			RES, FXD, FILM: 430 OHM, 5%, 0.25W	19701	5043CX430R0J
R400	315-0242-00			RES, FXD, FILM: 2.4K OHM, 5%, 0.25W	57668	NTR25J-E02K4
R405	315-0242-00			RES, FXD, FILM: 2.4K OHM, 5%, 0.25W	57668	NTR25J-E02K4
R407	315-0132-00			RES, FXD, FILM: 1.3K OHM, 5%, 0.25W	57668	NTR25J-E01K3
R410	315-0163-00			RES, FXD, FILM: 16K OHM, 5%, 0.25W	57668	NTR25J-E 16K
R415	311-1225-00			RES, VAR, NONNW: TRMR, 1K OHM, 0.5W	32997	3386F-T04-102
R417	321-0287-00			RES, FXD, FILM: 9.53K OHM, 1%, 0.125W, TC=T0	19701	5033ED9K530F
R420	321-0260-00			RES, FXD, FILM: 4.99K OHM, 1%, 0.125W, TC=T0	19701	5033ED4K990F
R423	321-0229-00			RES, FXD, FILM: 2.37K OHM, 1%, 0.125W, TC=T0	19701	5043ED2K37F
R425	311-1224-00			RES, VAR, NONNW: TRMR, 500 OHM, 0.5W	32997	3386F-T04-501
R427	321-0227-09			RES, FXD, FILM: 2.26K OHM, 1%, 0.125W, TC=T9	19701	5033RE2K260F
R430	321-0261-00			RES, FXD, FILM: 5.11K OHM, 1%, 0.125W, TC=T0	19701	5033ED5K110F
R435	315-0102-00			RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R440	315-0102-00			RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R445	315-0272-00			RES, FXD, FILM: 2.7K OHM, 5%, 0.25W	57668	NTR25J-E02K7
R447	315-0562-00			RES, FXD, FILM: 5.6K OHM, 5%, 0.25W	57668	NTR25J-E05K6
R450	311-1224-00			RES, VAR, NONNW: TRMR, 500 OHM, 0.5W	32997	3386F-T04-501
R452	323-0796-07			RES, FXD, FILM: 11.34K OHM, 0.1%, 0.5W, TC=T9	24546	NE65E11.34KB
R454	323-0796-07			RES, FXD, FILM: 11.34K OHM, 0.1%, 0.5W, TC=T9	24546	NE65E11.34KB
R460	321-0223-00			RES, FXD, FILM: 2.05K OHM, 1%, 0.125W, TC=T0	19701	5033ED2K05F
R465	315-0332-00			RES, FXD, FILM: 3.3K OHM, 5%, 0.25W	57668	NTR25J-E03K3
R470	315-0242-00			RES, FXD, FILM: 2.4K OHM, 5%, 0.25W	57668	NTR25J-E02K4
R475	315-0332-00			RES, FXD, FILM: 3.3K OHM, 5%, 0.25W	57668	NTR25J-E03K3
R477	315-0181-00			RES, FXD, FILM: 180 OHM, 5%, 0.25W	57668	NTR25J-E180E
R480	315-0102-00			RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R482	317-0102-00			RES, FXD, CMPSN: 1K OHM, 5%, 0.125W	01121	BB1025
R484	315-0392-00			RES, FXD, FILM: 3.9K OHM, 5%, 0.25W	57668	NTR25J-E03K9
R486	315-0202-00			RES, FXD, FILM: 2K OHM, 5%, 0.25W	57668	NTR25J-E 2K
R490	315-0102-00			RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R495	315-0431-00			RES, FXD, FILM: 430 OHM, 5%, 0.25W	19701	5043CX430R0J
R500	315-0133-00			RES, FXD, FILM: 13K OHM, 5%, 0.25W	19701	5043CX13K00J
R502	315-0822-00			RES, FXD, FILM: 8.2K OHM, 5%, 0.25W	19701	5043CX8K200J
R506	315-0133-00			RES, FXD, FILM: 13K OHM, 5%, 0.25W	19701	5043CX13K00J
R508	315-0822-00			RES, FXD, FILM: 8.2K OHM, 5%, 0.25W	19701	5043CX8K200J
R510	315-0273-00			RES, FXD, FILM: 27K OHM, 5%, 0.25W	57668	NTR25J-E27K0
R514	315-0202-00			RES, FXD, FILM: 2K OHM, 5%, 0.25W	57668	NTR25J-E 2K
R516	315-0272-00			RES, FXD, FILM: 2.7K OHM, 5%, 0.25W	57668	NTR25J-E02K7
R520	315-0102-00			RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R524	315-0391-00			RES, FXD, FILM: 390 OHM, 5%, 0.25W	57668	NTR25J-E390E
R530	315-0472-00			RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	57668	NTR25J-E04K7
R532	315-0392-00			RES, FXD, FILM: 3.9K OHM, 5%, 0.25W	57668	NTR25J-E03K9
R535	315-0391-00			RES, FXD, FILM: 390 OHM, 5%, 0.25W	57668	NTR25J-E390E
R560	315-0472-00			RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	57668	NTR25J-E04K7
R563	315-0472-00			RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	57668	NTR25J-E04K7
R565	315-0102-00			RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0
R575	315-0242-00			RES, FXD, FILM: 2.4K OHM, 5%, 0.25W	57668	NTR25J-E02K4
R576	315-0132-00			RES, FXD, FILM: 1.3K OHM, 5%, 0.25W	57668	NTR25J-E01K3
R578	315-0511-00			RES, FXD, FILM: 510 OHM, 5%, 0.25W	19701	5043CX510R0J
R582	315-0241-00			RES, FXD, FILM: 240 OHM, 5%, 0.25W	19701	5043CX240R0J
R585	315-0100-00			RES, FXD, FILM: 10 OHM, 5%, 0.25W	19701	5043CX10R00J
R587	311-1223-00			RES, VAR, NONNW: TRMR, 250 OHM, 0.5W	32997	3386F-T04-251
R590	311-1747-00			RES, VAR, NONNW: PNL, 10K OHM, 0.25W	80009	311-1747-00
R593	315-0471-00			RES, FXD, FILM: 470 OHM, 5%, 0.25W	57668	NTR25J-E470E
R595	315-0102-00			RES, FXD, FILM: 1K OHM, 5%, 0.25W	57668	NTR25JE01K0

## Scan by Zenith

Replaceable Electrical Parts - PG 506  
(SN B040000 & up)

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R597	315-0102-00				RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R600	315-0102-00				RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R602	315-0102-00				RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R605	315-0102-00				RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R606	315-0271-00				RES, FXD, FILM:270 OHM,5%,0.25W	57668	NTR25J-E270E
R615	315-0103-00				RES, FXD, FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R618	315-0511-00				RES, FXD, FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R620	315-0273-00				RES, FXD, FILM:27K OHM,5%,0.25W	57668	NTR25J-E27K0
R625	315-0100-00				RES, FXD, FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R627	301-0131-00				RES, FXD, FILM:130 OHM,5%,0.5W	19701	5053CX130R0J
R630	315-0100-00				RES, FXD, FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R635	315-0102-00				RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R650	315-0100-00	B040000		B049999	RES, FXD, FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R650	315-0621-00	B050000			RES, FXD, FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R654	315-0511-00				RES, FXD, FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R656	315-0103-00				RES, FXD, FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R660	315-0103-00				RES, FXD, FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R680	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R681	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R682	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R683	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R684	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R685	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R686	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R690	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R691	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R692	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R693	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R694	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R695	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R696	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R700	315-0681-00				RES, FXD, FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R705	315-0200-00	B040000		B049999	RES, FXD, FILM:20 OHM,5%,0.25W	19701	5043CX20R00J
R705	315-0621-00	B050000			RES, FXD, FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R715	315-0102-00				RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R716	315-0102-00				RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R718	315-0621-00				RES, FXD, FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R724	315-0152-00				RES, FXD, FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R730	315-0392-00				RES, FXD, FILM:3.9K OHM,5%,0.25W	57668	NTR25J-E03K9
R736	301-0223-00				RES, FXD, FILM:22K OHM,5%,0.5W	19701	5053CX22K00J
R738	315-0330-00				RES, FXD, FILM:33 OHM,5%,0.25W	19701	5043CX33R00J
R740	315-0112-00				RES, FXD, FILM:1.1K OHM,5%,0.25W	19701	5043CX1K100J
R745	301-0240-00				RES, FXD, FILM:24 OHM,5%,0.5W	19701	5053CX24R00J
R746	303-0682-00				RES, FXD, CMPSN:6.8K OHM,5%,1W	01121	GB6825
R752	315-0390-00				RES, FXD, FILM:39 OHM,5%,0.25W	57668	NTR25J-E39E0
R757	315-0221-00				RES, FXD, FILM:220 OHM,5%,0.25W (NOMINAL VALUE, SELECTED)	57668	NTR25J-E220E
R760	315-0271-00				RES, FXD, FILM:270 OHM,5%,0.25W	57668	NTR25J-E270E
R762	315-0222-00				RES, FXD, FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R764	315-0222-00				RES, FXD, FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R780	315-0182-00				RES, FXD, FILM:1.8K OHM,5%,0.25W	57668	NTR25J-E1K8
R782	315-0122-00				RES, FXD, FILM:1.2K OHM,5%,0.25W	57668	NTR25J-E01K2
R784	315-0561-00				RES, FXD, FILM:560 OHM,5%,0.25W	19701	5043CX560R0J
R785	311-1473-00	B040000		B057989	RES, VAR, NONMW:PNL,2 X 5K OHM,0.5W	01121	11M079
R785	311-2214-00	B057990			RES, VAR, NONMW: PANEL,5K OHM,20%,0.5W	12697	CM43458
R787	315-0272-00	B040000		B058399	RES, FXD, FILM:2.7K OHM,5%,0.25W	57668	NTR25J-E02K7
R787	315-0202-00	B058400			RES, FXD, FILM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R790	311-1562-00				RES, VAR, NONMW:TRMR,2K OHM,0.5W	32997	3352T-DY7-202

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R792	315-0112-00			RES, FXD, FILM:1.1K OHM,5%,0.25W	19701	5043CX1K100J
R800	315-0102-00			RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R805	308-0392-00			RES, FXD, FILM:600 OHM,2%,14W	44655	77FNR600R0J62023
R825	315-0273-00			RES, FXD, FILM:27K OHM,5%,0.25W	57668	NTR25J-E27K0
R827	315-0104-00			RES, FXD, FILM:100K OHM,5%,0.25W	57668	NTR25J-E100K
R830	321-0256-00			RES, FXD, FILM:4.53K OHM,1%,0.125W,TC=T9	19701	5033ED4K530F
R832	321-0385-00			RES, FXD, FILM:100K OHM,1%,0.125W,TC=T0	19701	5033ED100K0F
R835	321-0256-00			RES, FXD, FILM:4.53K OHM,1%,0.125W,TC=T9	19701	5033ED4K530F
R837	321-0385-00			RES, FXD, FILM:100K OHM,1%,0.125W,TC=T0	19701	5033ED100K0F
R840	315-0104-00			RES, FXD, FILM:100K OHM,5%,0.25W	57668	NTR25J-E100K
R842	315-0102-00			RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R850	322-0164-00			RES, FXD, FILM:499 OHM,1%,0.25W,TC=T0	75042	CEBT0-4990F
R854	321-0251-00			RES, FXD, FILM:4.02K OHM,1%,0.125W,TC=T0	19701	5033ED4K020F
R855	321-0239-00			RES, FXD, FILM:3.01K OHM,1%,0.125W,TC=T0	19701	5043ED3K010F
R857	315-0511-00			RES, FXD, FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R860	307-0106-00			RES, FXD, CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
R862	307-0106-00			RES, FXD, CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
R865	315-0822-00			RES, FXD, FILM:8.2K OHM,5%,0.25W	19701	5043CX8K200J
R866	315-0101-00			RES, FXD, FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R870	315-0390-00			RES, FXD, FILM:39 OHM,5%,0.25W	57668	NTR25J-E39E0
R871	315-0360-00			RES, FXD, FILM:36 OHM,5%,0.25W	19701	5043CX36R00J
R874	322-0164-00			RES, FXD, FILM:499 OHM,1%,0.25W,TC=T0	75042	CEBT0-4990F
R876	315-0750-00			RES, FXD, FILM:75 OHM,5%,0.25W	57668	NTR25J-E75E0
R880	315-0243-00			RES, FXD, FILM:24K OHM,5%,0.25W	57668	NTR25J-E24K0
R882	321-0069-00			RES, FXD, FILM:51.1 OHM,1%,0.125W,TC=T0	91637	CMF55116G51R10F
R884	315-0911-00			RES, FXD, FILM:910 OHM,5%,0.25W	57668	NTR25J-E910E
R886	317-0220-00			RES, FXD, CMPSN:22 OHM,5%,0.125W	01121	BB2205
R890	315-0911-00			RES, FXD, FILM:910 OHM,5%,0.25W	57668	NTR25J-E910E
R892	321-0069-00			RES, FXD, FILM:51.1 OHM,1%,0.125W,TC=T0	91637	CMF55116G51R10F
R900	317-0220-00			RES, FXD, CMPSN:22 OHM,5%,0.125W	01121	BB2205
R902	315-0162-00			RES, FXD, FILM:1.6K OHM,5%,0.25W	19701	5043CX1K600J
R904	315-0162-00			RES, FXD, FILM:1.6K OHM,5%,0.25W	19701	5043CX1K600J
R906	317-0100-00			RES, FXD, CMPSN:10 OHM,5%,0.125W	01121	BB1005
R910	317-0220-00			RES, FXD, CMPSN:22 OHM,5%,0.125W	01121	BB2205
R914	315-0101-00			RES, FXD, FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R916	321-0150-00			RES, FXD, FILM:357 OHM,1%,0.125W,TC=T0	07716	CEAD357R0F
R918	315-0151-00			RES, FXD, FILM:150 OHM,5%,0.25W	57668	NTR25J-E150E
R920	315-0100-00			RES, FXD, FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R924	307-0106-00			RES, FXD, CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
R928	323-0097-00			RES, FXD, FILM:100 OHM,1%,0.5W,TC=T0	91637	CMF65116G100R0F
R930	323-0099-00			RES, FXD, FILM:105 OHM,1%,0.5W,TC=T0	19701	5053RD105R0F
R935	317-0471-00			RES, FXD, CMPSN:470 OHM,5%,0.125W	01121	BB4715
R937	315-0330-00			RES, FXD, FILM:33 OHM,5%,0.25W (NOMINAL VALUE,SELECTED)	19701	5043CX33R00J
R938	315-0431-00			RES, FXD, FILM:430 OHM,5%,0.25W	19701	5043CX430R0J
R940	317-0121-00			RES, FXD, CMPSN:120 OHM,5%,0.125W (NOMINAL VALUE,SELECTED)	01121	BB1215
R944	317-0180-00			RES, FXD, CMPSN:18 OHM,5%,0.125W	01121	BB1805
R950	307-0086-00			RES, FXD, FILM:50 OHM,1%	03888	A3FT08-5050F
R960	317-0220-00			RES, FXD, CMPSN:22 OHM,5%,0.125W	01121	BB2205
R962	315-0162-00			RES, FXD, FILM:1.6K OHM,5%,0.25W	19701	5043CX1K600J
R964	315-0162-00			RES, FXD, FILM:1.6K OHM,5%,0.25W	19701	5043CX1K600J
R966	317-0100-00			RES, FXD, CMPSN:10 OHM,5%,0.125W	01121	BB1005
R970	317-0220-00			RES, FXD, CMPSN:22 OHM,5%,0.125W	01121	BB2205
R974	315-0101-00			RES, FXD, FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R976	323-0150-00			RES, FXD, FILM:357 OHM,1%,0.5W,TC=T0	91637	MFF1226G357R0F
R978	315-0151-00			RES, FXD, FILM:150 OHM,5%,0.25W	57668	NTR25J-E150E
R980	315-0100-00			RES, FXD, FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J

## Scan by Zenith

Replaceable Electrical Parts - PG 506  
(SN B040000 & up)

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
R984	307-0106-00				RES, FXD, CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
R988	323-0099-00				RES, FXD, FILM:105 OHM,1%,0.5W,TC=T0	19701	5053RD105R0F
R990	323-0097-00				RES, FXD, FILM:100 OHM,1%,0.5W,TC=T0	91637	CMF65116G100R0F
R995	317-0471-00				RES, FXD, CMPSN:470 OHM,5%,0.125W	01121	BB4715
R997	315-0330-00				RES, FXD, FILM:33 OHM,5%,0.25W	19701	5043CX33R00J
R998	315-0431-00				RES, FXD, FILM:430 OHM,5%,0.25W	19701	5043CX430R0J
R1000	317-0121-00				RES, FXD, CMPSN:120 OHM,5%,0.125W (NOMINAL VALUE, SELECTED)	01121	BB1215
R1004	317-0180-00				RES, FXD, CMPSN:18 OHM,5%,0.125W	01121	BB1805
R1010	307-0086-00				RES, FXD, FILM:50 OHM,1%	03888	A3FT08-5050F
R1020	315-0102-00				RES, FXD, FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R1021	315-0123-00				RES, FXD, FILM:12K OHM,5%,0.25W	57668	NTR25J-E12K0
R1025	311-1562-00				RES, VAR, NOMW:TRMR,2K OHM,0.5W	32997	3352T-DY7-202
R1026	315-0332-00				RES, FXD, FILM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R1028	315-0133-00				RES, FXD, FILM:13K OHM,5%,0.25W	19701	5043CX13K00J
R1030	315-0332-00				RES, FXD, FILM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R1034	315-0273-00				RES, FXD, FILM:27K OHM,5%,0.25W	57668	NTR25J-E27K0
R1036	315-0100-00				RES, FXD, FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R1040	315-0270-00	B040000	B058179		RES, FXD, FILM:27 OHM,5%,0.25W	19701	5043CX27R00J
R1040	315-0240-00	B058180			RES, FXD, FILM:24 OHM,5%,0.25W	57668	NTR25J-E24E0
R1045	315-0100-00				RES, FXD, FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R1047	315-0272-00				RES, FXD, FILM:2.7K OHM,5%,0.25W	57668	NTR25J-E02K7
S180	263-1098-03	B034921	B049999		ACTR ASSY,CAM S:MODE/AMPLITUDE	80009	263-1098-03
S180	263-1098-04	B050000			ACTR ASSY,CAM S:MODE/AMPLITUDE (PART OF R225)	80009	263-1098-04
S225	-----				SW CAM ACTR AS:PERIOD	80009	263-1101-00
S610	263-1101-00						
S660	260-0723-00				SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
T75	120-0951-00				TRANSFORMER,RF:BALUN	TK1345	120-0915-00
T130	120-0953-00				TRANSFORMER,RF:POT CORE	80009	120-0953-00
T520	120-0952-00				TRANSFORMER,RF:TOROID	TK1345	120-0952-00
T532	120-0952-00				TRANSFORMER,RF:TOROID	TK1345	120-0952-00
U20	156-0071-00	B040000	B058399		MICROCKT,LINEAR:VOLTAGE REGULATOR	04713	MC1723CL
U20	156-0071-03	B058400			MICROCKT,LINEAR:VOLTAGE REGULATOR	27014	LM723J
U50	156-0067-00				MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
U200	156-0067-00				MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
U240	156-0067-00				MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
U255	156-0399-00				CPLR,OPTOELECTR:LED,1500V ISLN,10% XFR	04713	4N27
U330	156-0067-00	B040000	B046759		MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
U330	156-0067-11	B046760			MICROCKT,LINEAR:OPNL AMP	80009	156-0067-11
U375	156-0067-00	B040000	B046759		MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
U375	156-0067-11	B046760			MICROCKT,LINEAR:OPNL AMP	80009	156-0067-11
U400	156-0113-03				MICROCKT,DGTL:QUAD 2 INP NAND GATE,SCRN,	01295	SN74L00NP3
U430	156-0067-00				MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
U460	156-0067-00				MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
U470	156-0134-00				MICROCKT,LINEAR:DIFFERENTIAL COMPARATOR	01295	TL710CP
U480	156-0399-00				CPLR,OPTOELECTR:LED,1500V ISLN,10% XFR	04713	4N27
U610	156-0039-02				MICROCKT,DGTL:DUAL J-K MA-SLAVE FF,SCRN	01295	SN7473NP3
U615	156-0186-02				MICROCKT,DGTL:QUAD 2-INP NAND GATE,	18324	N7403(NB OR FB)
U665	156-0079-02				MICROCKT,DGTL:DECade COUNTER,SCREENED	01295	SN7490ANP3
U666	156-0079-02				MICROCKT,DGTL:DECade COUNTER,SCREENED	01295	SN7490ANP3
U667	156-0079-02				MICROCKT,DGTL:DECade COUNTER,SCREENED	01295	SN7490ANP3
U668	156-0079-02				MICROCKT,DGTL:DECade COUNTER,SCREENED	01295	SN7490ANP3
U670	156-0040-02				MICROCKT,DGTL:QUAD LATCH,SCRN	18324	N7475(NB OR FB)
U671	156-0040-02				MICROCKT,DGTL:QUAD LATCH,SCRN	18324	N7475(NB OR FB)
U673	156-0379-00				MICROCKT,DGTL:BCD TO 7-SEG DCOR/DRV	18324	N8T06 N OR F
U675	156-0379-00				MICROCKT,DGTL:BCD TO 7-SEG DCOR/DRV	18324	N8T06 N OR F
U840	156-0067-00				MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
VR10	152-0243-00				SEMICOND DVC,DI:ZEN,SI,15V,5%,0.4W,DO-7	04713	SZ13203 (1N965B)

Component No.	Tektronix Part No.	Serial/Assembly No.	Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
VR30	152-0168-00				SEMICOND DVC,DI:ZEN,SI,12V,5%,0.4W,DO-763B	14552	TD331689
VR42	152-0662-00				SEMICOND DVC,DI:ZEN,SI,5V,1%,400MW,DO-7	04713	SZG195RL
VR45	152-0175-00	B040000		B059053	SEMICOND DVC,DI:ZEN,SI,5.6V,5%,0.4W,DO-7	14552	TD3810976
VR55	152-0278-00				SEMICOND DVC,DI:ZEN,SI,3V,5%,0.4W,DO-7	04713	SZG35009K20
VR170	152-0195-00				SEMICOND DVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	04713	SZ11755RL
VR210	152-0174-00				SEMICOND DVC,DI:ZEN,SI,9V,5%,0.5W,DO-7	80009	152-0174-00
VR280	152-0195-00				SEMICOND DVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	04713	SZ11755RL
VR395	152-0055-00				SEMICOND DVC,DI:ZEN,SI,11V,5%,0.4W,DO-7	14433	Z5407
VR430	152-0195-00				SEMICOND DVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	04713	SZ11755RL
VR470	152-0395-00				SEMICOND DVC,DI:ZEN,SI,4.3V,5%,0.4W	04713	SZG35009K18
VR790	152-0195-00				SEMICOND DVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	04713	SZ11755RL
VR792	152-0667-00				SEMICOND DVC,DI:ZEN,SI,3.0V # 2% AT 2MA	04713	SZG30025RL
VR866	152-0195-00				SEMICOND DVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	04713	SZ11755RL
W100	131-0566-00				BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07
W540	131-0566-00				BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07
W558	131-0566-00				BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07
W814	131-0566-00				BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07

# 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:

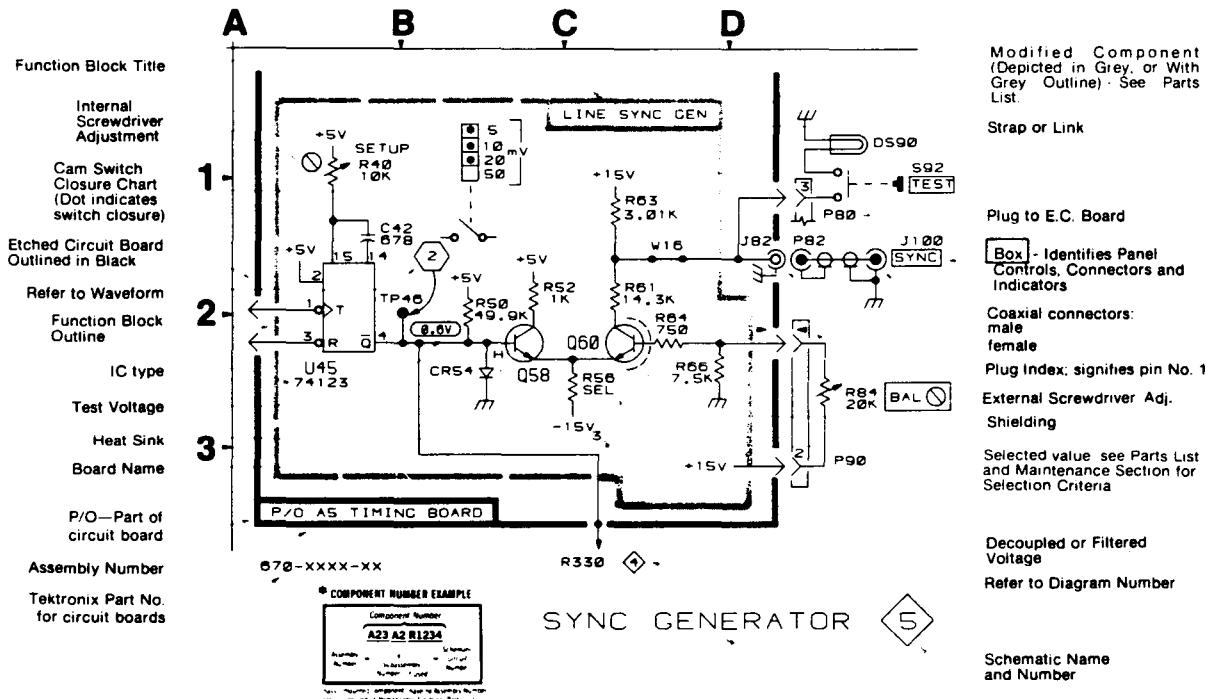
- Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads ( $\mu$ F).
- Resistors = Ohms ( $\Omega$ ).

## — 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 location 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.



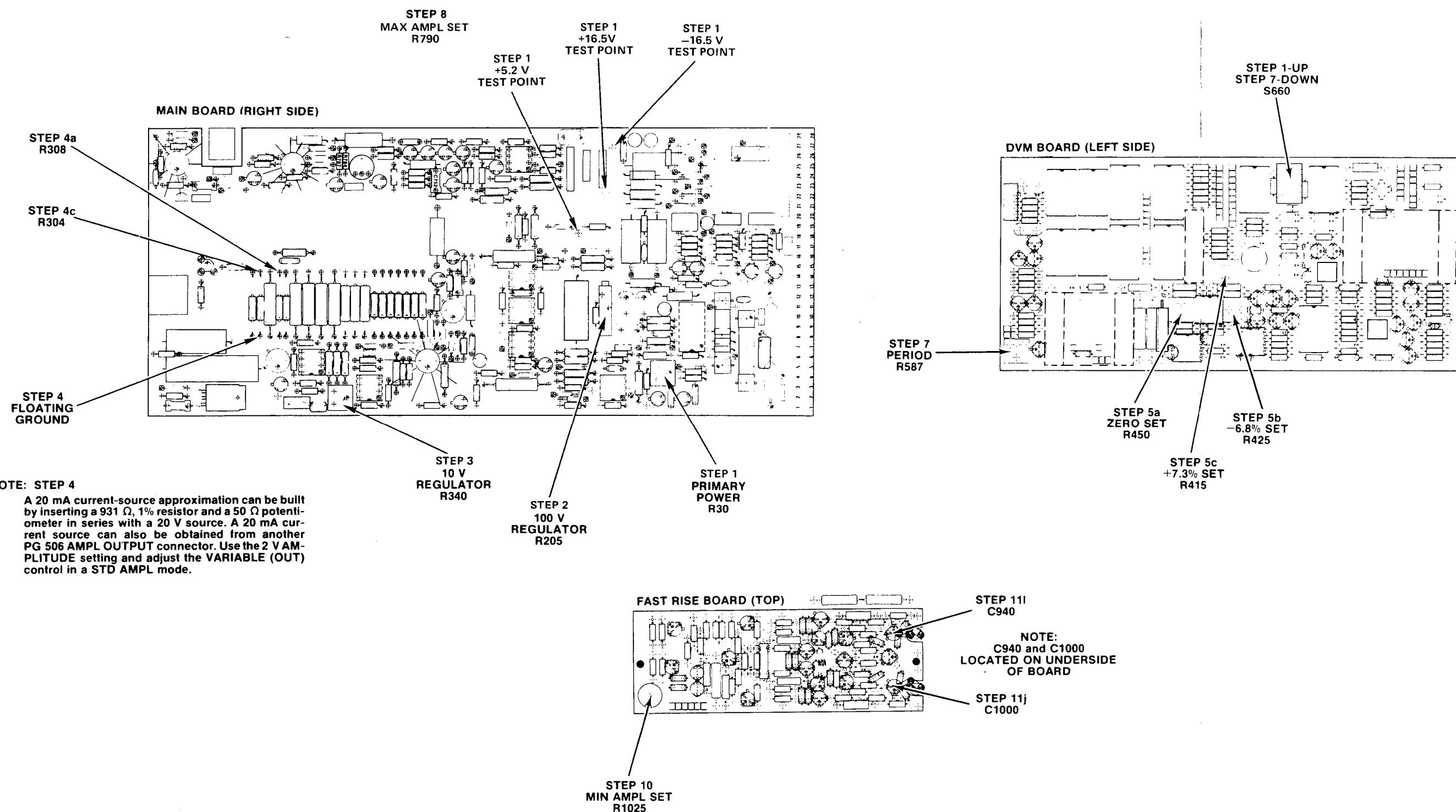
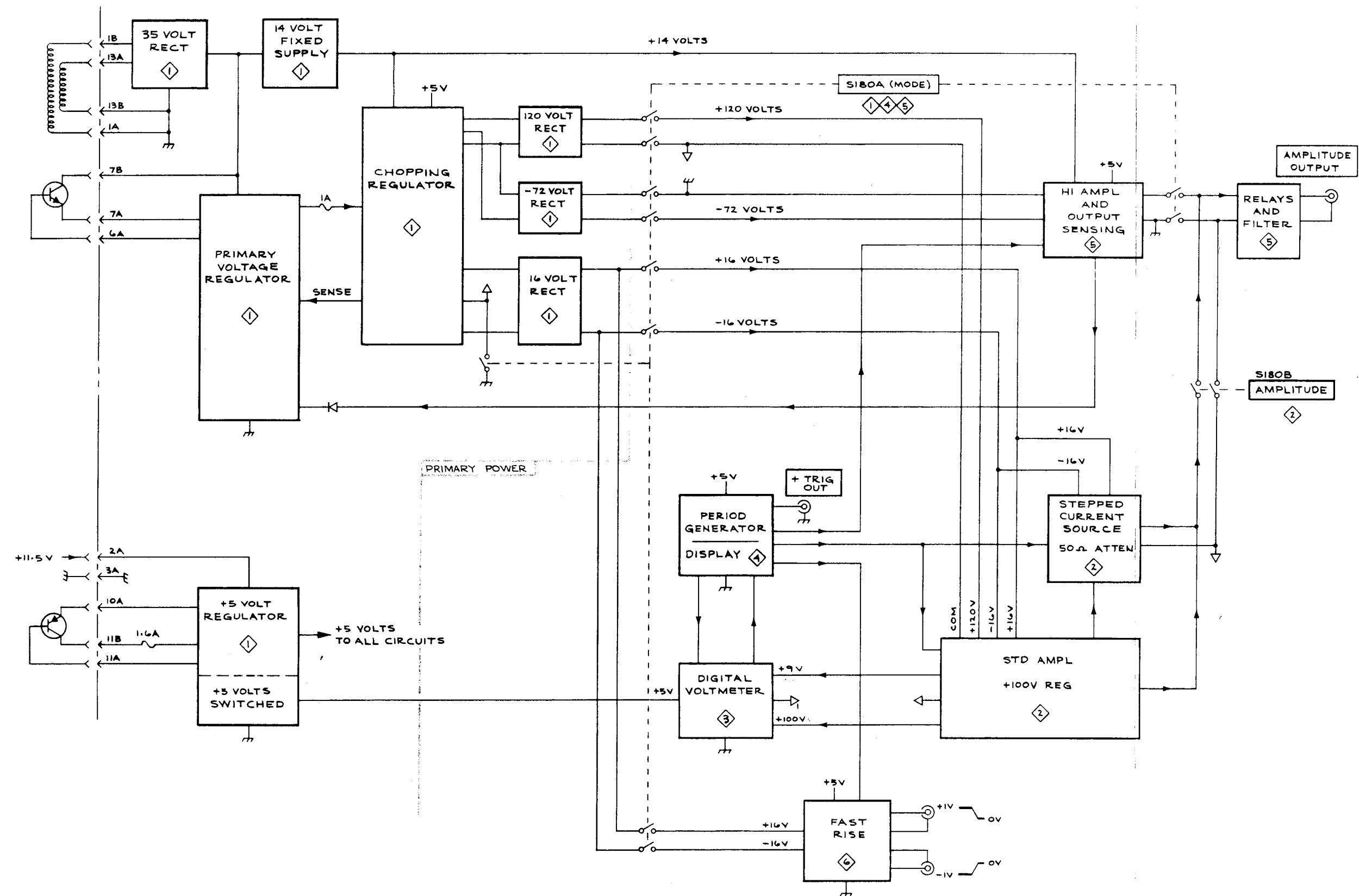
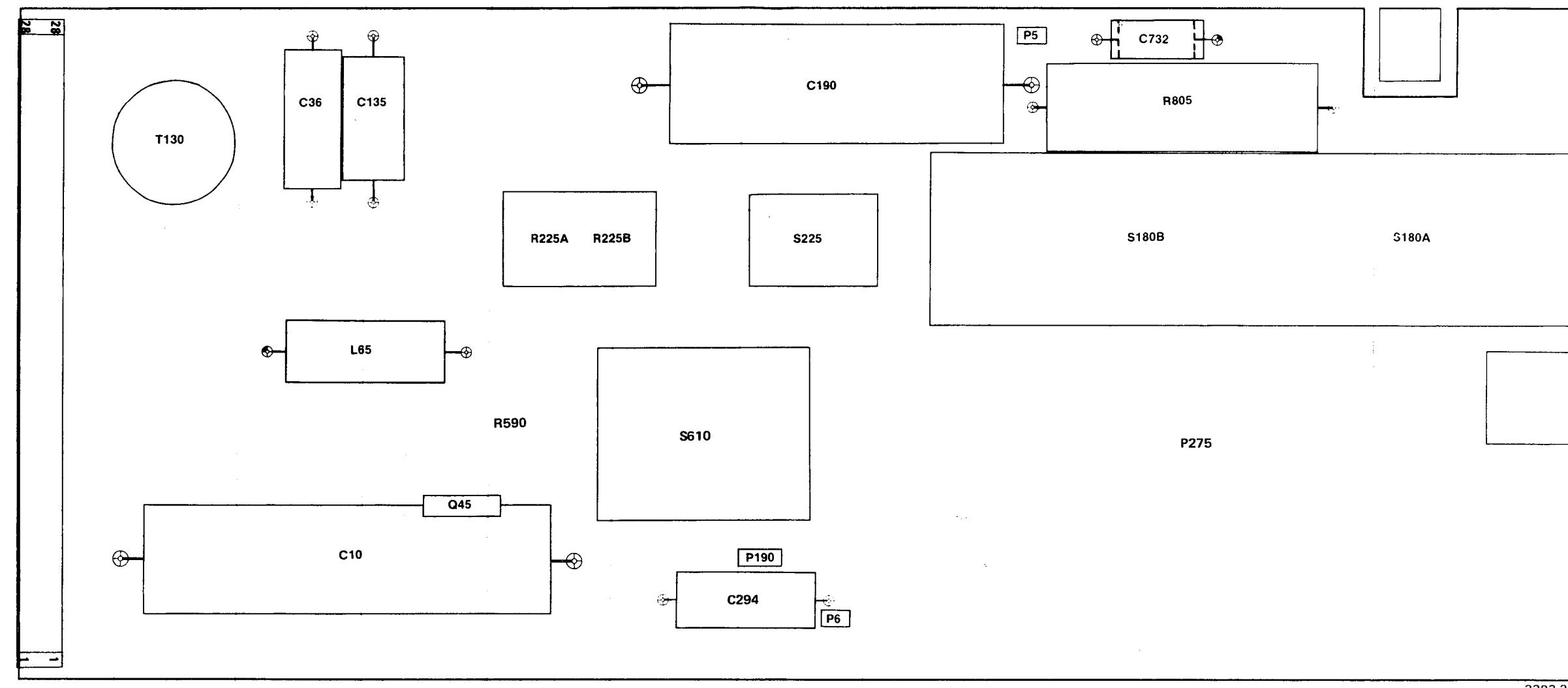
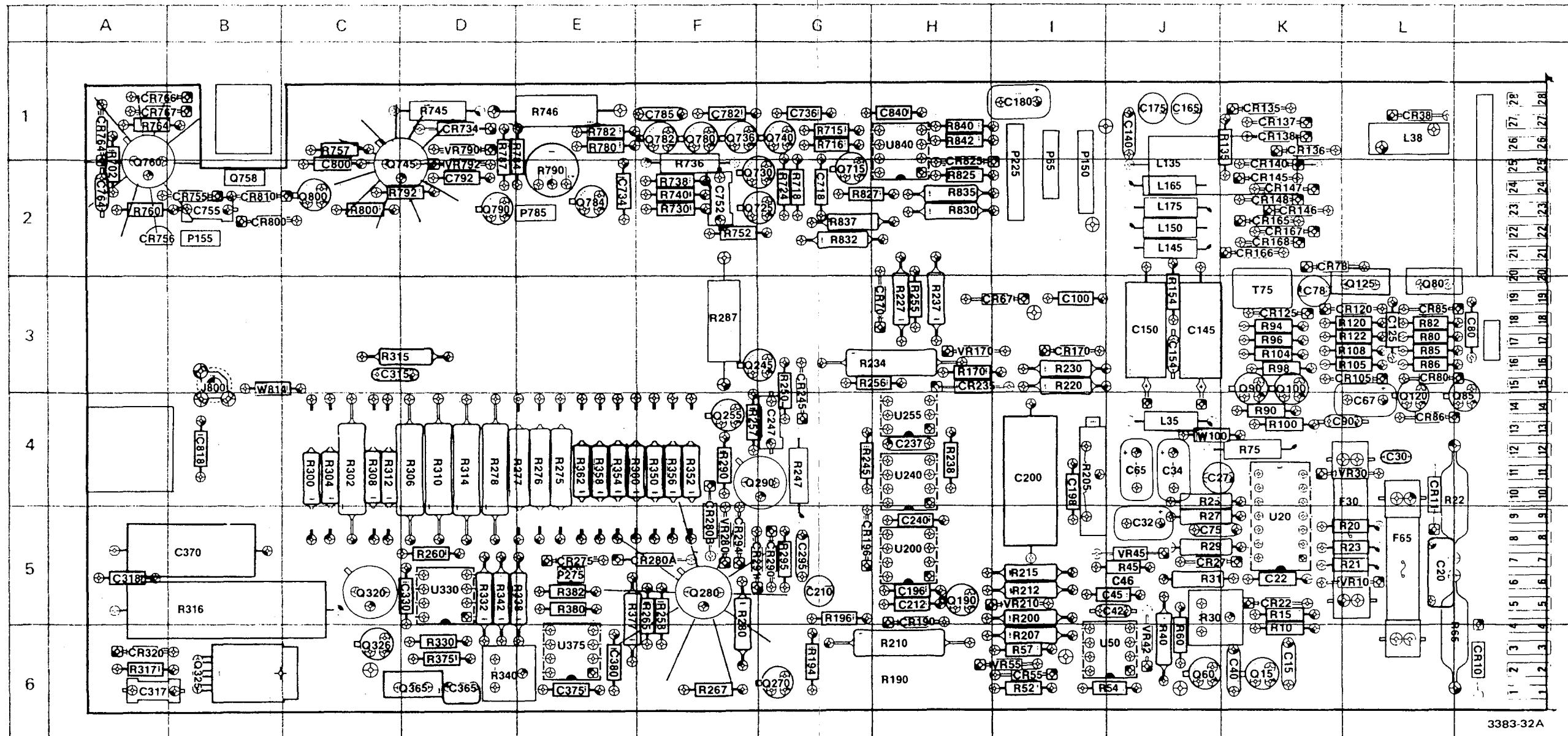


Fig. 8-1. Adjustment locations.





A1 MAIN BOARD  
COMPONENT LOCATIONS



 Static Sensitive Devices  
See Maintenance Section

**Fig. 8-3.** A1—Main Board component locations

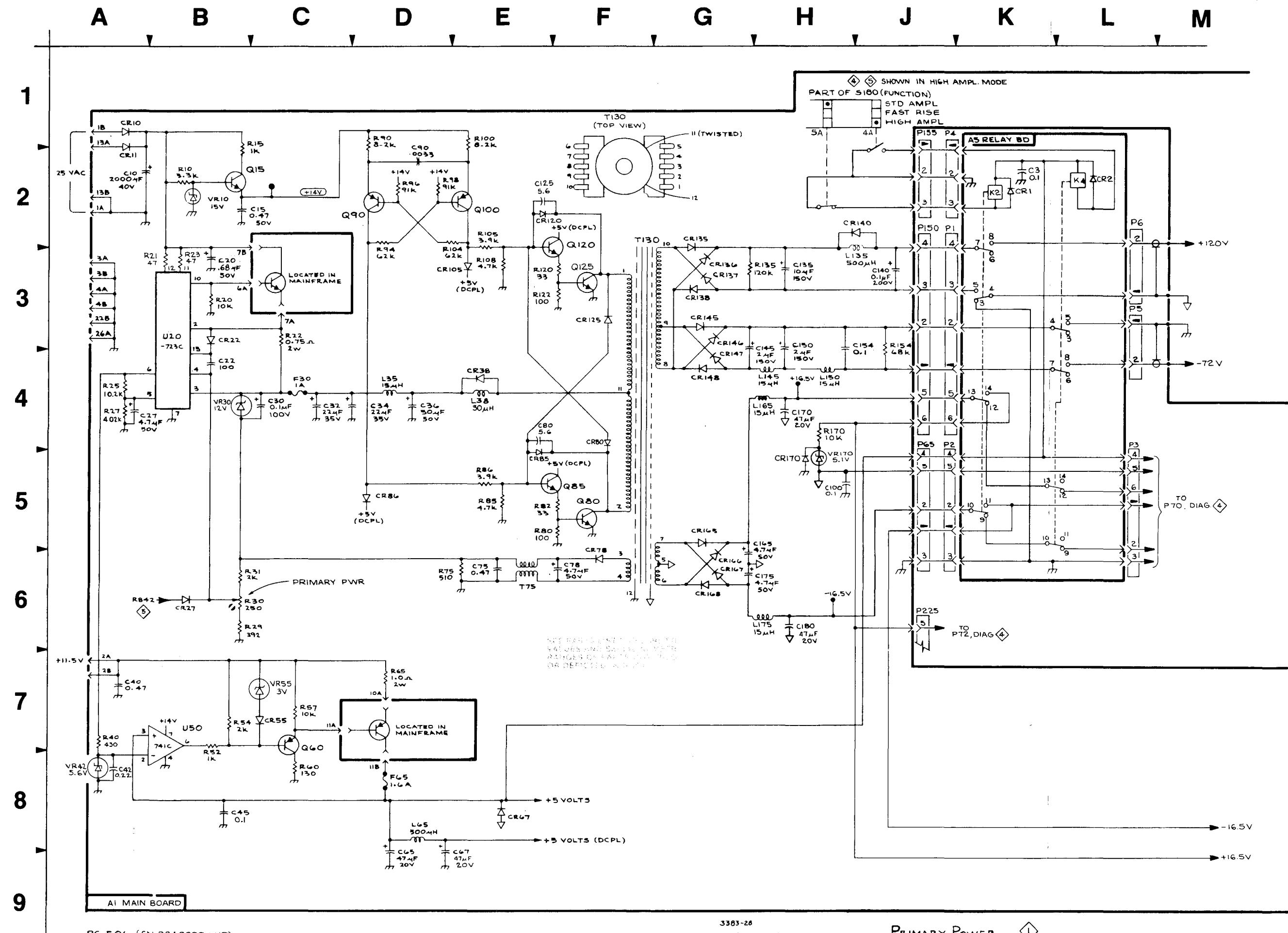
P/O A1 Assy						Primary Power <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">1</span>		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C10†	A2	K5	CR85	E5	L3	R20	B3	L5
C15	B2	K6	CR105	E3	L3	R21	B3	L5
C20	B3	L5	CR120	E2	L3	R22	C3	L4
C22	B4	K5	CR125	F3	K3	R23	B3	L5
C27	A4	J4	CR135	G3	K1	R25	A4	J4
C30	C4	L4	CR136	G3	K1	R27	A4	J5
C32	C4	J5	CR137	G3	K1	R29	B6	J5
C34	C4	I4	CR138	G3	K1	R30	B6	J6
C36†	D4	K2	CR140	H3	K2	R31	B6	J5
C40	A7	K6	CR145	G4	K2	R40	A7	J6
C42	A8	J5	CR146	G4	K2	R45 *	A9	J5
C46*	A8	J5	CR147	G4	K2	R52	B8	I6
C65	D9	J4	CR148	G4	K2	R54	B7	J6
C67	D9	L4	CR165	G6	K2	R57	C7	I6
C75	E6	J4	CR166	G6	K2	R60	C8	J6
C78	E6	K3	CR167	G6	K2	R65	D7	M6
C80	E5	M3	CR168	G6	K2	R75	D6	L4
C90	D2	K4	CR170	H5	I3	R80	E5	L3
C100	H5	I3				R82	E5	L3
C125	E2	L3	F30	C4	L4	R85	E5	L3
C135†	H3	J2	F65	D8	L5	R90	D1	K4
C140	J3	J1	L35	C4	J4	R94	D3	K3
C145	G4	J3	L38	D4	L1	R96	D2	K3
C150	H4	J2	L65†	D8	K4	R98	D2	K3
C154	H4	J2	L135	H3	J2	R100	E2	K4
C165	H6	J1	L145	G4	J2	R104	E3	K3
C170	H4	I1	L150	H4	J2	R105	E3	L3
C175	G6	J1	L165	G4	J2	R108	E3	L3
C180	H6	I1	L175	H6	J2	R120	E3	L3
CR10	A1	M6	P65	J5	I2	R122	E3	L3
CR11	A1	L4	P155	J2	B2	R135	G3	K1
CR22	B4	K5	P225	H4	J2	R154	J4	J2
CR27	B6	J5				R170	H5	H3
CR38	E4	L1	Q15	B2	K6	T75	K3	E6
CR55	C7	I6	Q45† *	A8	J5	T130†	F3	L2
CR67	E8	I3	Q60	C7	J6			
CR78	F6	K2	Q80	F5	L3	U20 *	B3	L5
CR80	F4	L3	Q85	F5	M4	U50	B7	J6
			Q90	D2	K2	VR10	B2	L5
			Q100	E2	E2	VR30	B4	L4
			Q120	E3	L4	VR42	A8	J6
			Q125	F3	L3	VR45 *	A8	J5
			R10	B2	K6	VR55	C7	I6
			R15	B2	K5	VR170	H5	H3

P/O A1 ASSY also shown on <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">2</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">5</span>					
A5 ASSY	Located on Fig. 8-4	Primary Power <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">1</span>			
C3	K2	J3			
CR2	L2	K4			
K2	L2	J4			
K4	L2	J2			

† Located on back of board.

\*See Parts List for serial number ranges.



P/O A1 Assy						Standard Amplitude <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">2</span>		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C190†	C5	G1	R210	C7	H6	R382	G1	E5
C196	C6	H5	R212	C7	I5	S225†	B9	G3
C198	C6	I4	R215	D7	I5	S225†	E8	G3
C200	B6	I4	R220 *	D7	I3			
C210	D8	G5	R225A†	D7	G3	U200	D6	H5
C212	D7	H5	R225B†	D7	G3	U240	F7	H4
C237	F6	H4	R230 *	D7	I3	U255	G8	H4
C240	F7	H5	R234	E6	H3	U330 *	H4	D5
C247	F7	G4	R237	E7	H3	U375 *	H2	E6
C294†	F6	G6	R238	F7	H4	VR210	C7	I5
C295	F6	G5	R245	F7	G4	VR280	H6	F5
C315	L5	C3	R247	G7	G4			
C317	J5	A6	R250	G7	G4			
C318	J5	A5	R255	F9	H3			
C330	J4	D5	R256	F8	H3			
C365	K3	D6	R257	F8	F4			
C370	K1	B5	R258	G9	F5			
C375	H2	E6	R260	H8	D5			
C380	H2	E6	R265	H8	F5			
			R267	H8	F6			
CR70	C8	H3	R275	J8	E4			
CR190	C6	H5	R276	J7	E4			
CR196	D6	G5	R277	J7	E4			
CR235	E7	H5	R278	J6	D4			
CR245	F7	G4	R280	H6	F5			
CR275	J8	E5	R287	H6	F3			
CR280 *	J6	F5	R290	G6	F4			
CR281 *	H6	F5	R295	F6	G5			
CR290	F6	G5	R300	L5	C4			
CR291	F6	F5	R302	L5	C4			
CR294	F6	F5	R304	K5	C4			
CR320	K4	A6	R306	K5	D4			
P190†	M7	G5	R308	K5	C4			
P225	C8	I2	R310	K5	D4			
P225	C9	I2	R312	K5	C4			
			R314	K4	D4			
			R315 *	L5	C3			
Q190	C6	H5	R316	K5	B5			
Q245	G7	G3	R317	J5	A6			
Q255	G8	F4	R330	J4	D4			
Q270	H8	G6	R332	H4	D5			
Q280	H6	F5	R338	H4	E5			
Q290	G6	G4	R340	H4	D6			
Q320	J4	C5	R342	H4	D5			
Q325	K4	B6	R350	H2	F4			
Q326	J4	C6	R352	H3	E2			
Q365	K2	D6	R354	J2	E4			
R190	C5	H6	R356	J3	F4			
R194	D5	G6	R358	J3	E4			
R196	D6	G5	R360	J3	E4			
R200	B6	I5	R375	J2	D6			
R205	C6	I4	R377	H2	E5			
R207	B6	I6	R380	G2	E5			

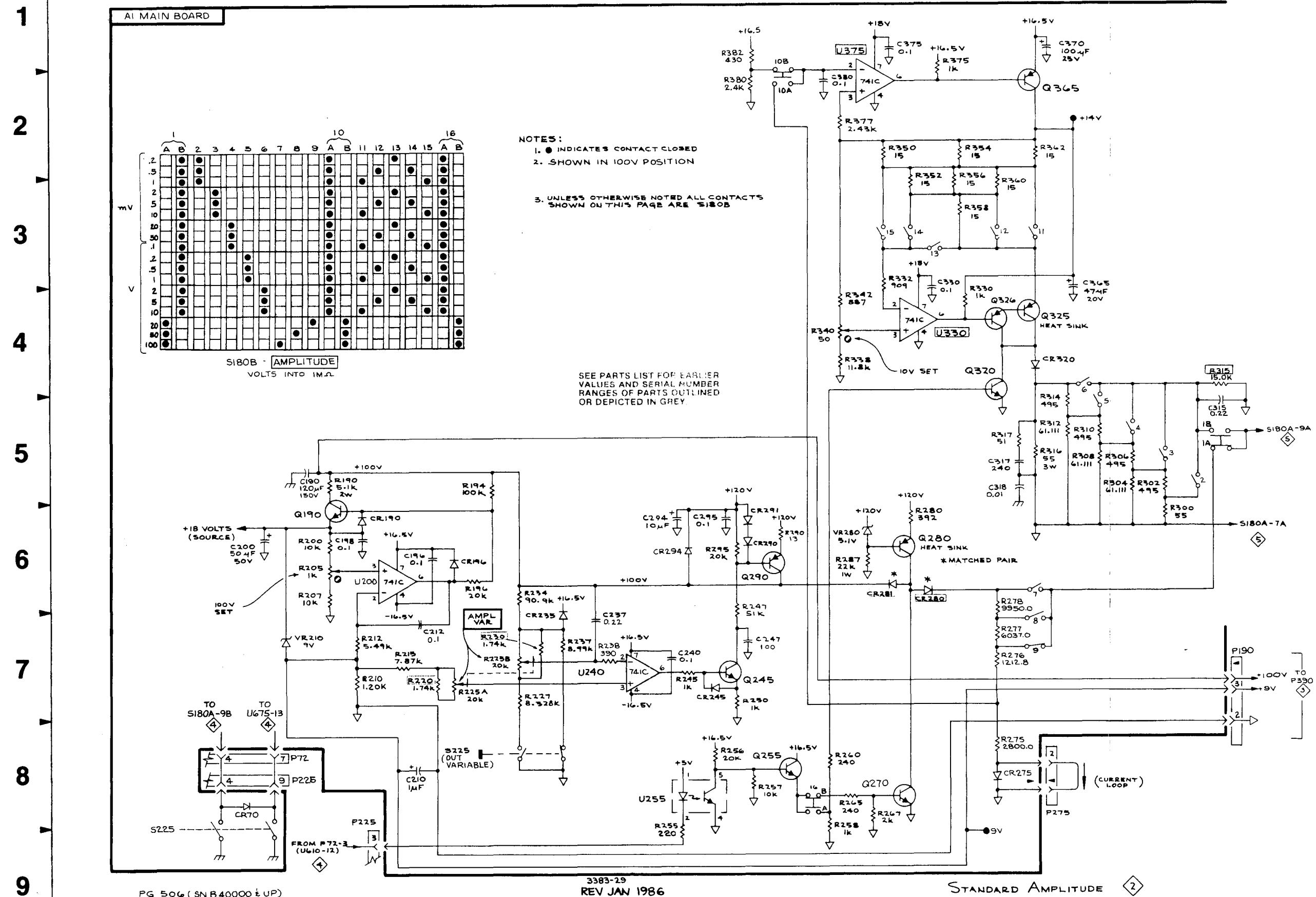
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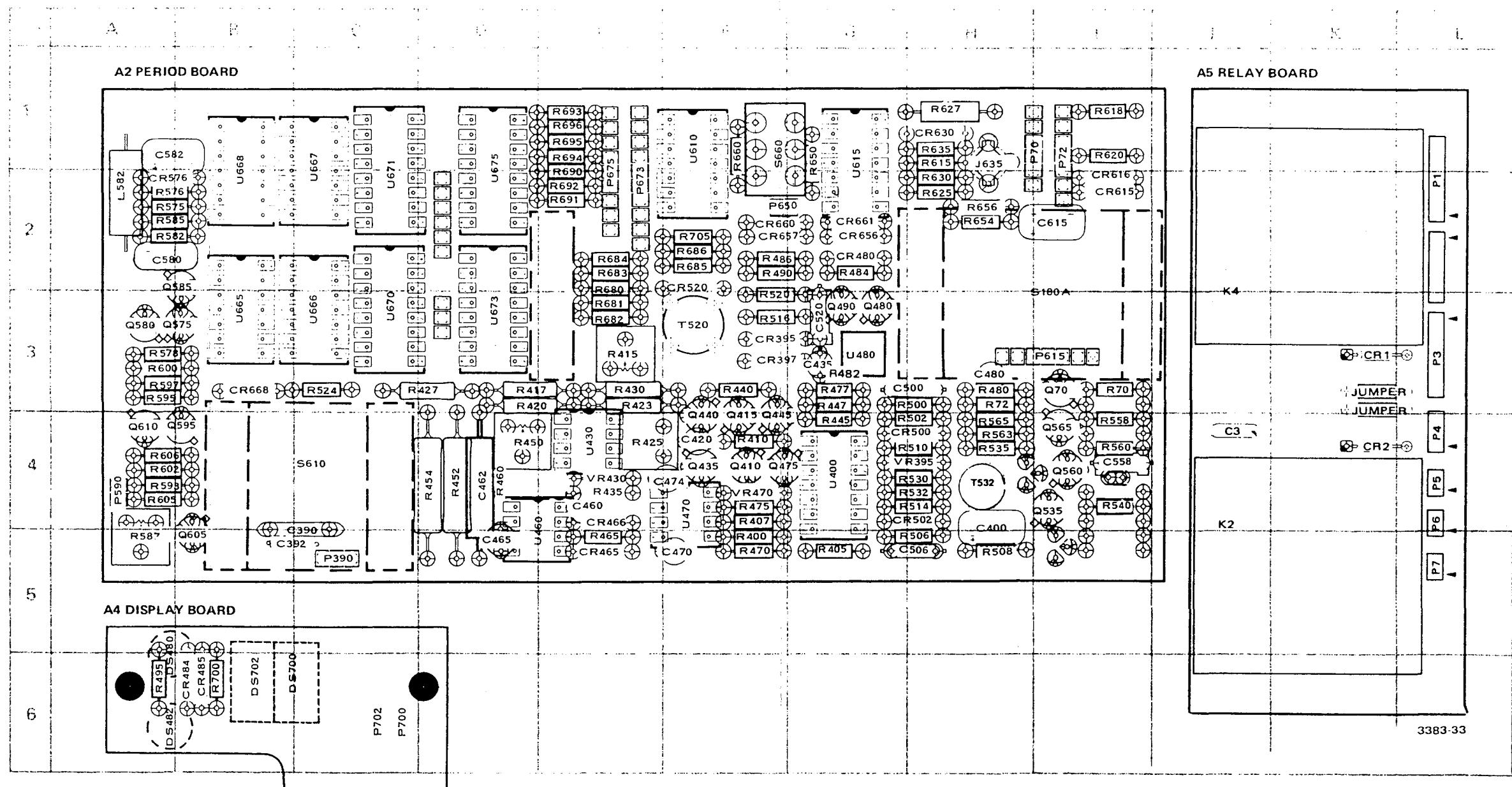
1 5

† Located on back of board.

\*See Parts List for serial number ranges.

A      B      C      D      E      F      G      H      J      K      L      M

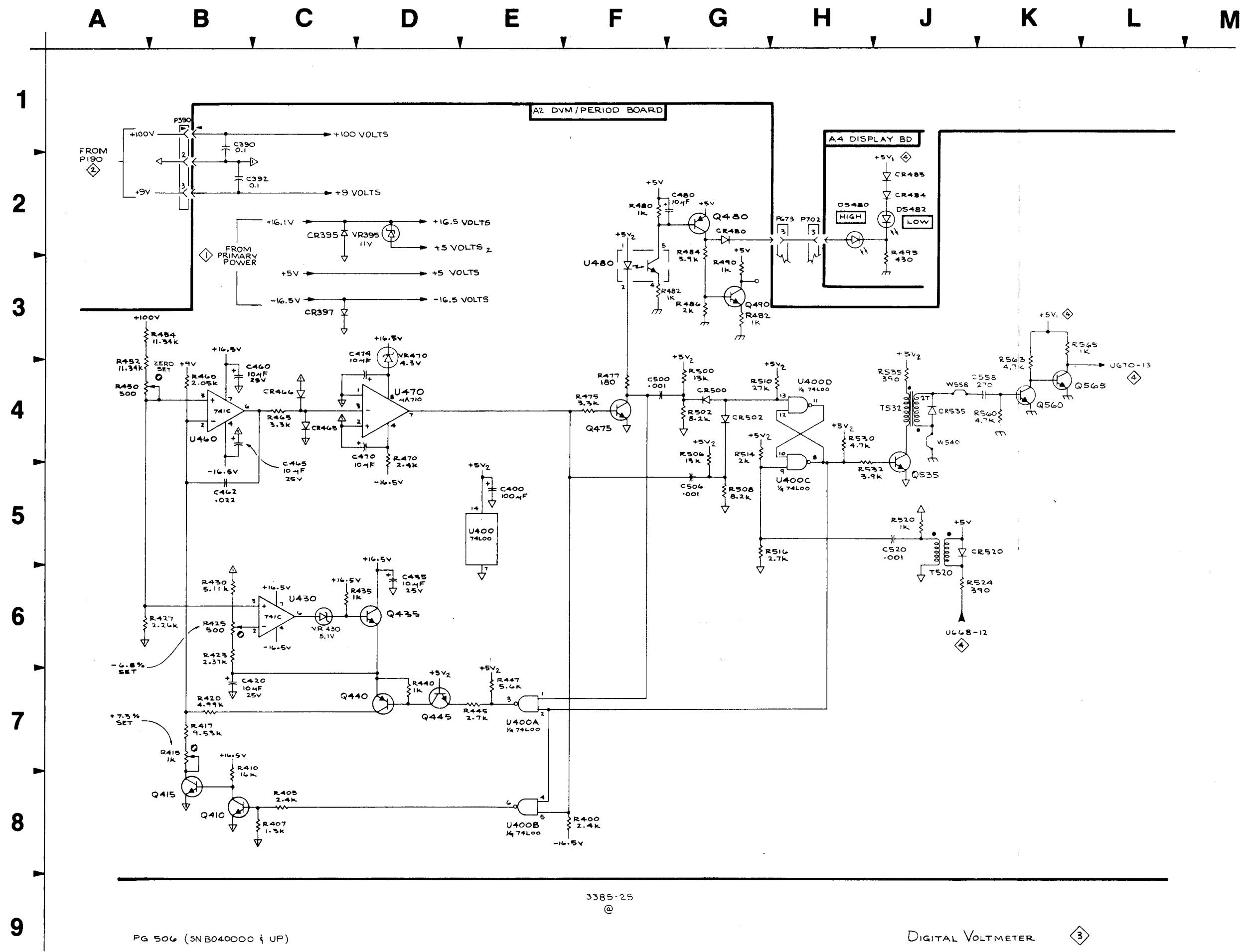




P/O A2 Assy			Digital Voltmeter 3		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C390	B1	C4	R440	D7	F3
C392	B2	C5	R445	D7	G4
C400	E5	H4	R447	E6	G3
C420	B7	F4	R450	A3	D4
C435	D6	G3	R452	A4	D4
C460	B4	E4	R454	A3	D4
C465	B5	D4	R460	B4	D4
C470	C4	F5	R465	C4	E5
C474	C3	F4	R470	F5	F4
C480	G2	H3	R475	F4	F4
C500	F4	H3	R477	F4	G3
C506	G5	H5	R480	F2	H3
C520	J5	G3	R482	F3	G3
C558	K4	I4	R484	G2	G2
CR395	C2	F3	R486	G3	F2
CR397	C3	F3	R490	G3	F2
CR465	C4	E5	R495	J2	A6
CR466	C4	E4	R500	G4	H3
CR480	G2	G2	R502	G4	H4
CR484	J2	B6	R506	G4	H5
CR485	J2	B6	R508	G5	H5
CR500	G4	H4	R510	G4	H4
CR520	J5	F2	R514	G4	H4
DS480	H2	A6	R516	H5	F3
DS482	J2	A6	R520	J5	F3
			R524	K6	C3
			R530	H4	H4
P390	B1	C5	R532	H4	H4
P673	H2	E2	R535	J4	H4
P702	H2	C6	R560	K4	I4
Q410	B8	F4	R563	K3	H4
Q415	B8	F4	R565	L3	H4
Q435	D6	F4	T520	J5	F3
Q440	D7	F3	T532	J4	H4
Q445	D7	F3			
Q475	F4	G4	U400A	E7	G4
Q480	G2	G3	U400B	E8	G4
Q490	G3	G3	U400C	H4	G4
Q535	H5	I4	U400D	H5	G4
Q560	K4	I4	U430	C6	E4
Q565	K4	I4	U460	B4	D4
R400	E8	F5	U470	D4	F4
R405	B8	G5	U480	F3	G3
R407	B8	F4	VR395	D2	H4
R410	B7	F4	VR430	C6	E4
R415	B7	E3	VR470	D4	F4
R417	B7	D3	W540	J4	I4
R420	B7	D3	W558	J4	I4
R423	B6	E3			
R425	B6	E4			
R427	B6	D3			
R430	B6	E3			
R435	D6	E4			

P/O A2 ASSY also shown on 4

P/O A4 ASSY			Digital Voltmeter 3		
CR484	J2	B6	R495	J3	A6
CR485	J2	B6	P702	H2	C6
DS480	H2	A5			
DS482	J2	A6			

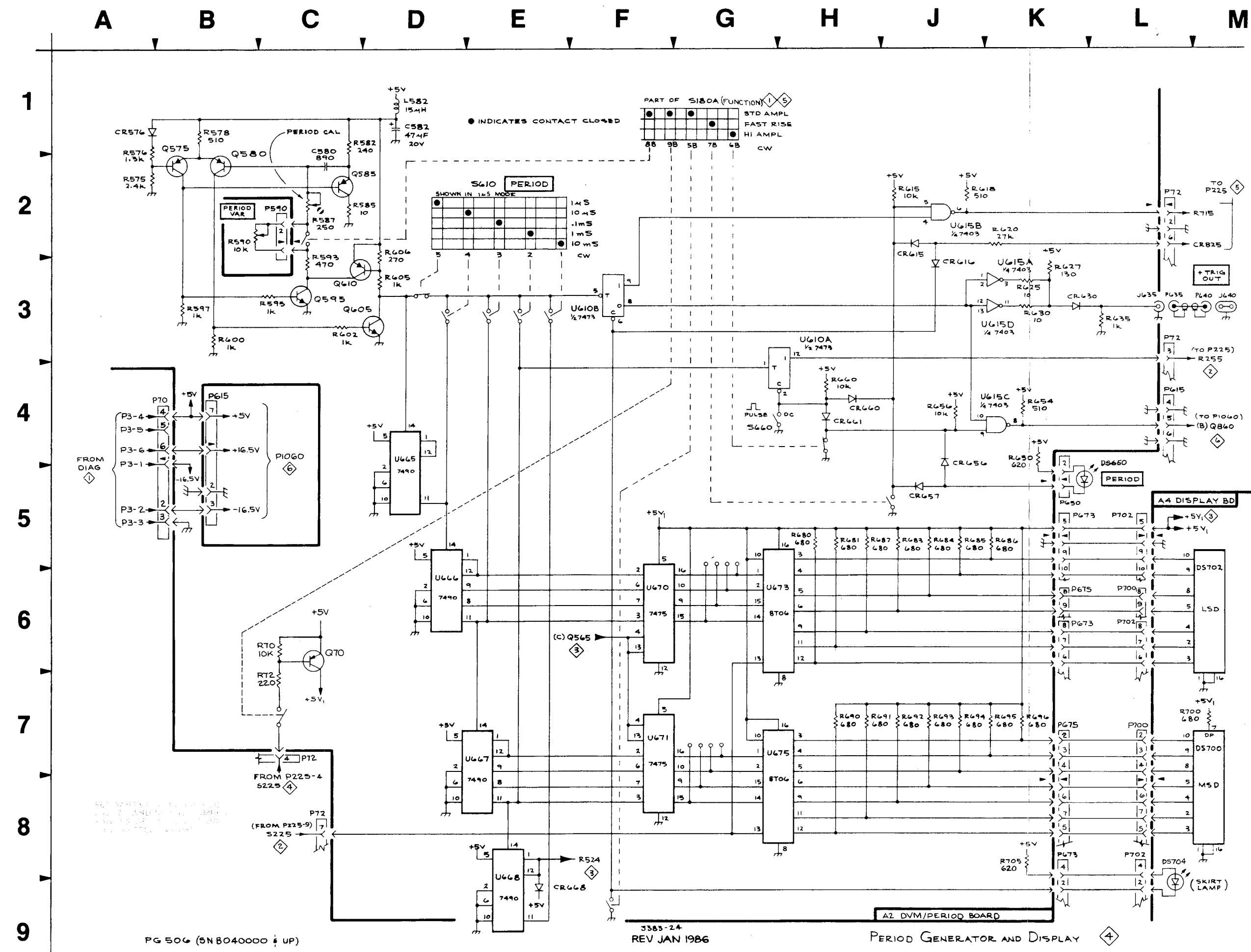
3385-25  
©

P/O A2 Assy			DVM Period Board <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">4</span>		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C580	C2	A2	R615	J2	H1
C582	D1	B1	R618	J2	I1
CR576	A1	A2	R620	K2	I1
CR615	J2	I2	R625	K2	H2
CR616	J2	I2	R627	K2	H1
CR630	L3	H1	R630	K3	H1
CR656	J4	G2	R635	L3	H1
CR657	J4	F2	R650 *	K4	G1
CR660	H4	F2	R654	K3	H2
CR661	H4	G2	R656	J4	H2
CR668	F8	B3	R660	H3	F1
J635	L3	H1	R680	H5	E2
L582	D1	A2	R681	H5	E3
P70	B4	I1	R682	H5	E3
P72	L2	I1	R683	J5	E2
P72	L3	I1	R684	J5	E2
P72	C8	I1	R685	J5	F2
P590	C2	A4	R686	J5	F2
P615	B4	I3	R690	H7	E1
P650	K5	G2	R691	H7	E2
P673	K5	E2	R692	J7	E2
P675	K7	E1	R693	J7	E1
Q70	C6	I3	R694	K7	E1
Q575	B1	B3	R695	K7	E1
Q580	B1	A3	R696	K7	E1
Q585	C2	B2	S180A *	G1	I2
Q595	C3	B4	S610	E2	C4
Q605	C3	B5	S660	G4	F1
Q610	C3	A4	U610	F3	F1
R70	C6	I3	U610	H3	F1
R72	C7	H3	U615	K2	G1
R575	A2	B2	U665	D5	B3
R576	A2	B2	U666	D6	C3
R578	B1	A3	U667	D7	C1
R582	D1	A2	U668	E8	B1
R585	C2	A2	U670	F6	C3
R587	C2	A5	U671	F7	C2
R593	C2	A4	U673	G6	D3
R595	C3	A3	U675	G7	D1
R597	B3	A3			
R600	B3	A3			
R602	C3	A4			
R605	D3	A4			
R606	D2	A4			

P/O A2 ASSY also shown on <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">3</span>				
P/O A4 ASSY <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">4</span>				
DS700 *	M5	C6		
DS702 *	M7	C6		
R700	M7	B6		

\*See Parts List for  
serial number ranges.

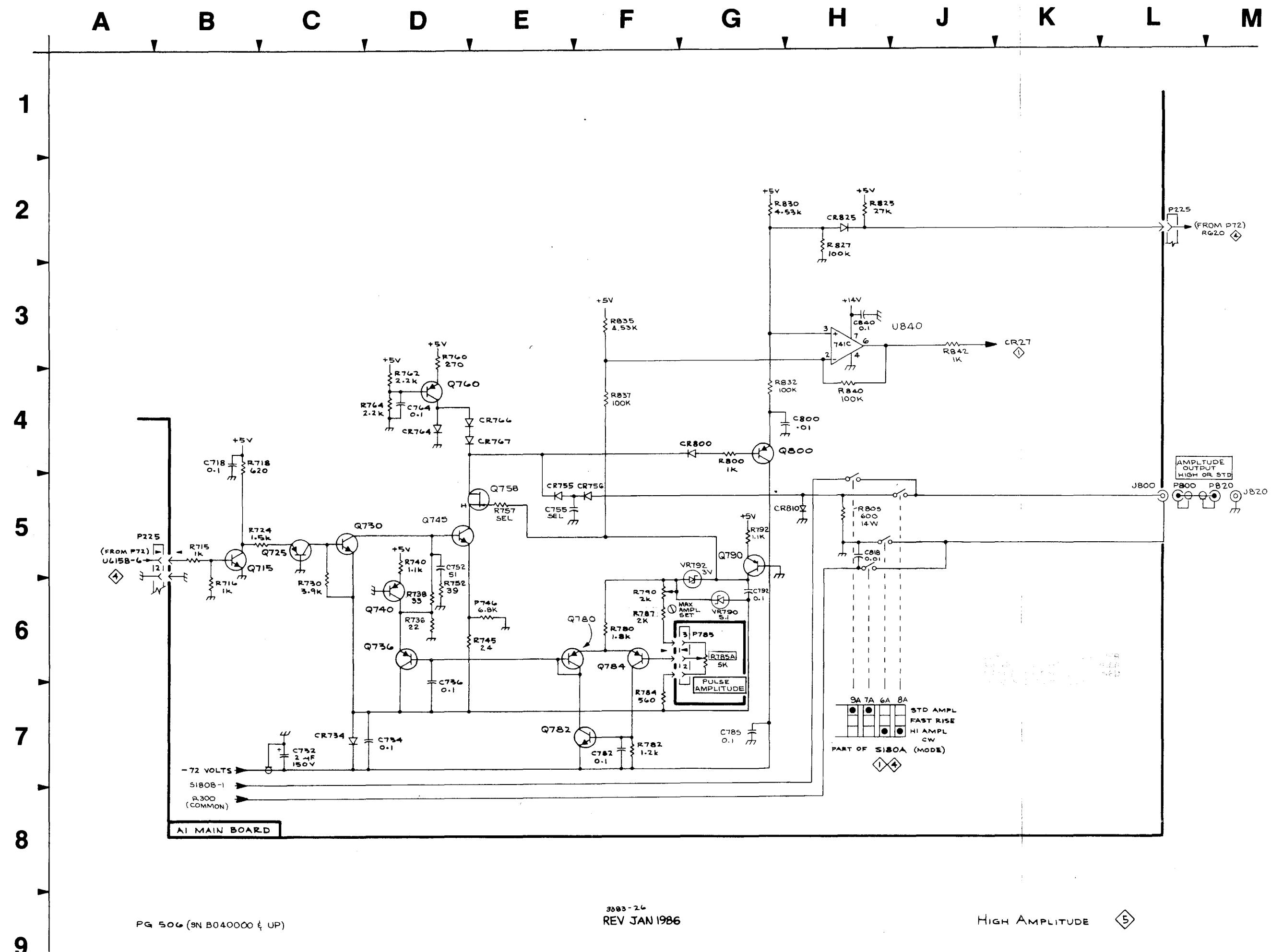


P/O A1 Assy			High Amplitude <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">5</span>		
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C718	B4	G2	R715	B5	G1
C732	B7	D1	R716	B6	G1
C734	C7	E2	R718	B4	G2
C736	D7	G2	R724	B5	G2
C752	D6	F2	R730	C6	F2
C755	E5	B2	R736	D6	F2
C764	D4	A2	R738	D6	F2
C782	F7	F1	R740	D6	F2
C785	G7	F1	R745	D6	D1
C792	G6	D2	R746	D6	E1
C800	G4	C2	R752	D6	F2
C818†	H6	B4	R757	E5	C1
C840	H3	H1	R760	D3	A2
CR734	C7	D1	R762	D4	A2
CR755	E5	B2	R764	C4	A1
CR756	E5	A2	R780	E6	E1
CR764	B4	A1	R782	E7	E1
CR766	D4	A1	R784	F7	E1
CR767	D4	A1	R787 *	F6	D1
CR800	G4	B2	R790	F5	E2
CR810	H5	B2	R792	G5	C2
CR825	H2	H2	R800	G4	C2
J800	L5	B3	R805†	H5	D2
P225	A5	I2	R825	H2	H2
			R827	H3	G7
Q715	B5	G2	R830	G2	H7
Q725	C5	G2	R832	G4	G2
Q730	C5	G2	R835	F3	F3
Q736	D6	F1	R837	F4	G2
Q740	D6	G1	R840	H4	H1
Q745	D5	C2	R842	J4	H1
Q758	D5	B2	U840	H3	H1
Q760	D4	A2	VR790	G6	D1
Q780	E6	F2	VR792	G6	D2
Q782	E7	F2	R785A	G6	CHASSIS
Q784	F6	E2	P785	G6	CHASSIS
Q790	G6	D2	R785 *	G6	CHASSIS
Q800	G5	C2			

P/O A1 ASSY also shown on 1 2

† Located on back of board.

\*See Parts List for  
serial number ranges.



### A3 FAST RISE BOARD COMPONENT LOCATIONS

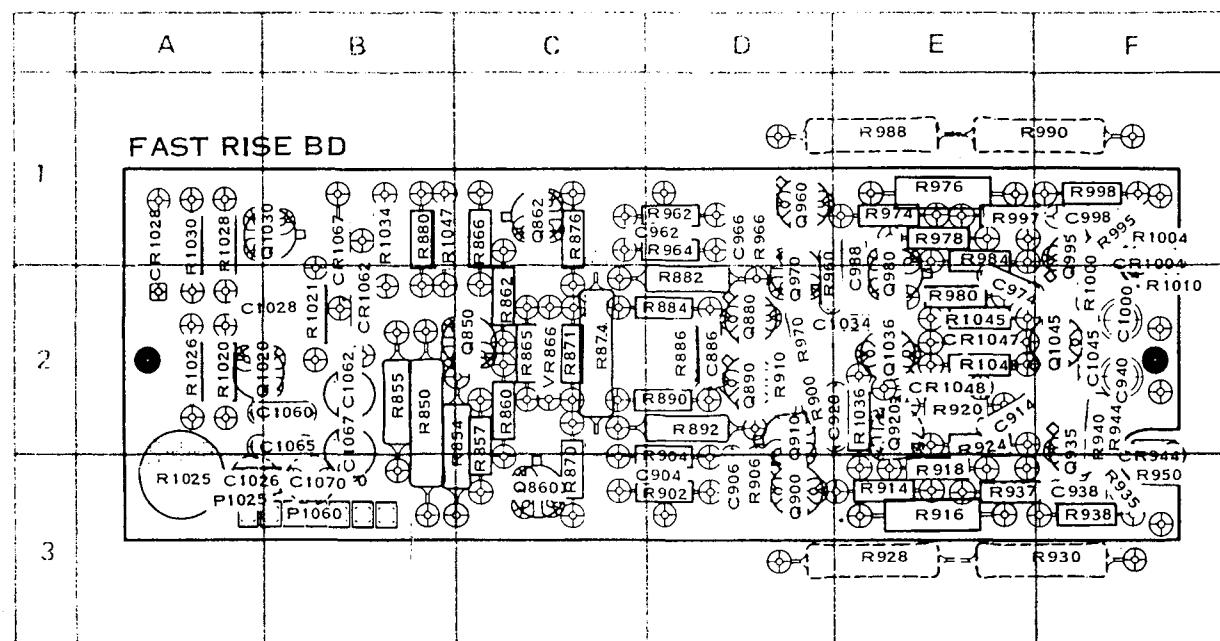


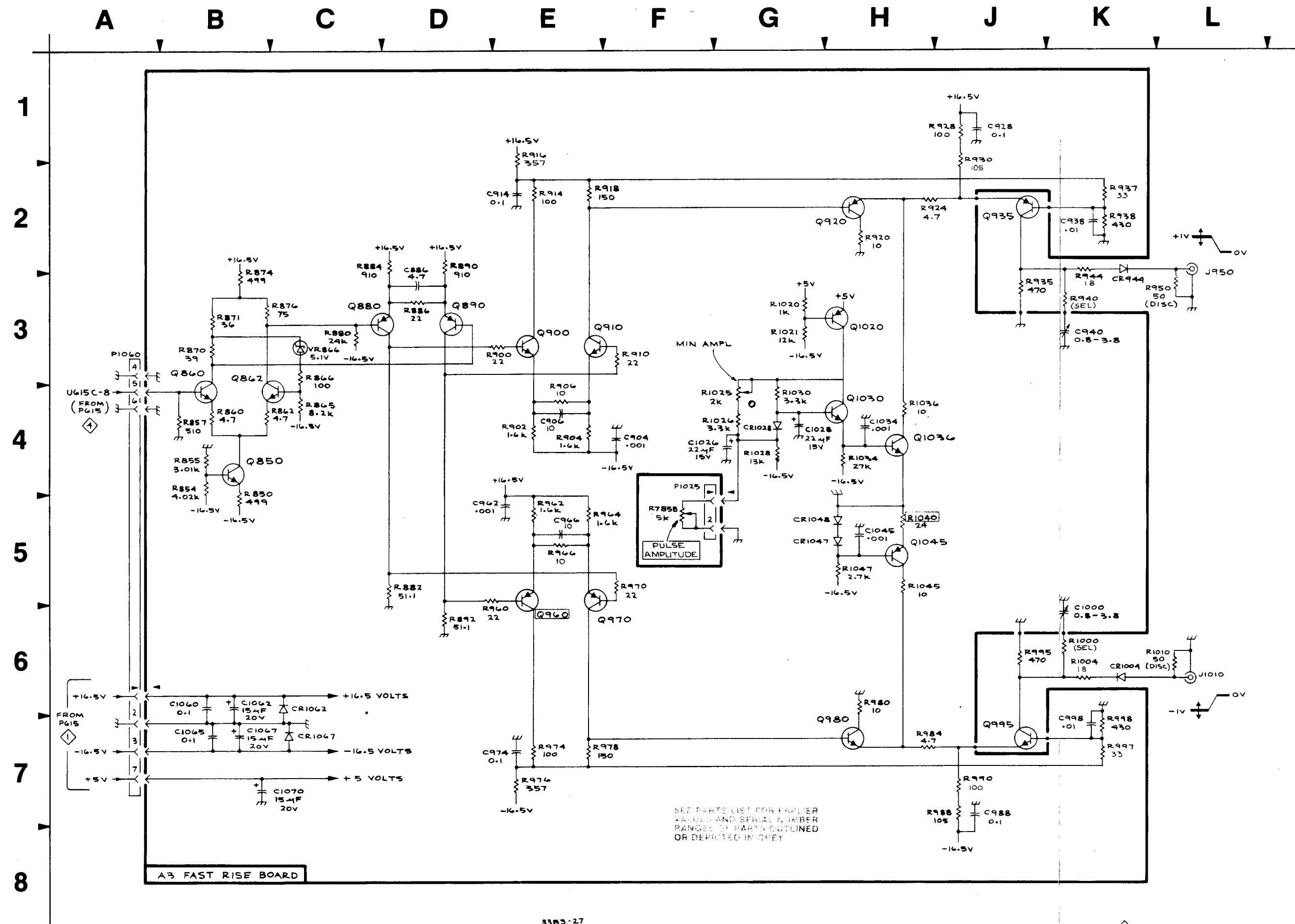
Fig. 8-5. A3—Fast Rise Board component locations

 Static Sensitive Devices  
See Maintenance Section

\*See Parts List for  
serial number ranges

† Located on back of board.

A3 Assy				Fast Rise	6
CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
C886	C2	D2	R874	B3	C2
C904	E4	D3	R876	B3	C1
C906	E4	D3	R880	C3	B1
C914	E2	E2	R882	D5	D2
C928	J1	E2	R884	C2	D2
C938	J1	E2	R886	C3	D2
C940	K3	F2	R890	D2	D2
C962	E5	D1	R892	D6	D2
C966	E5	D1	R900	D3	D2
C974	D7	E2	R902	D4	D3
C988	J7	E1	R904	E4	D2
C998	K7	F1	R910	F3	D2
C1000	K6	F2	R914	E2	E2
C1026	G4	A3	R916	E2	E3
C1028	G4	A2	R918	E2	E2
C1034	H4	E2	R920	H3	E2
C1045	H5	F2	R924	H2	E2
C1060	B6	B2	R928†	J1	E3
C1062	B7	B2	R930†	J2	F3
C1065	B7	B2	R935	J2	F3
C1067	B7	B2	R937	K2	F2
C1070	B7	B3	R938	K2	F3
			R940	K3	F2
CR944	K3	F2	R944	K3	F2
CR1004	K6	F1	R950	L3	F3
CR1028	G4	A1	R960	D6	D2
CR1047	G5	E2	R962	E5	D1
CR1048	H5	E2	R964	E5	D1
CR1062	B7	B2	R966	E5	D1
CR1067	B7	B1	R970	E6	D2
			R974	E7	E1
			R976	E7	E1
P1025	F5	A3	R978	E7	E1
P1060	A3	B3	R980	H7	E2
Q850	B4	C2	R984	H7	E1
Q860	B3	C3	R988†	H7	E1
Q862	B3	C1	R990†	J7	F1
Q880	C3	D2	R995	J6	F1
Q890	D3	D2	R997	K7	E1
Q900	D3	D3	R998	K7	F1
Q910	E3	D2	R1000	K6	F2
Q920† *	H2	E2	R1004	K6	F1
Q935 *	J2	F2	R1010	L6	F2
Q960 *	D6	D1	R1020	G3	A2
Q970	E6	D2	R1021	G3	B2
Q980	H7	E1	R1025	G4	A3
Q995	J7	F2	R1026	G4	A2
Q1020	H3	B2	R1028	G4	A1
Q1030	H4	B1	R1030	G4	A1
Q1036	H4	E2	R1034	H4	B1
Q1045	H5	F2	R1036	H4	E2
			R1040	H5	E2
			R1045	H6	E2
R850	B5	B2	R1047	G5	B1
R854	B5	C2			
R855	A4	B2	VR866	B3	C2
R857	A4	C2	VR866	D3	C2
R860	B4	B2			
R862	B4	C2			
R865	B4	C2			
R866	C3	C1			
R870	C3	B3	J950	L3	CHASSIS
R871	B3	C2	J1010	L6	CHASSIS



# 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.

## 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.

## 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	<i>Name &amp; Description</i>
	<i>Assembly and/or Component</i>
	<i>Attaching parts for Assembly and/or Component</i>
	---
	<i>Detail Part of Assembly and/or Component</i>
	<i>Attaching parts for Detail Part</i>
	---
	<i>Parts of Detail Part</i>
	<i>Attaching parts for Parts of Detail Part</i>
	---

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.**

## ABBREVIATIONS

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

## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
05820	EG AND G WAKEFIELD ENGINEERING	60 AUDUBON RD	WAKEFIELD MA 01880
06950	VSI CORP SCREWCORP DIVISION	13001 E TEMPLE AVE	CITY OF INDUSTRY CA 91746
08261	SPECTRA-STRIP AN ELTRA CO	7100 LAMPSON AVE	GARDEN GROVE CA 92642
08530	RELIANCE MICA CORP	341-39TH ST	BROOKLYN NY 11232
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125
13103	THERMALLOY CO INC	2021 W VALLEY VIEW LANE P O BOX 34829	DALLAS TX 75234
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT CONNECTOR SYSTEMS	30 HUNTER LANE	CAMP HILL PA 17011
24546	CORNING GLASS WORKS	550 HIGH ST	BRADFORD PA 16701
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
42838	NATIONAL RIVET AND MFG CO	21 EAST JEFFERSON ST	WAUPUN WI 53963
45722	USM CORP., PARKER-KALON FASTENER DIV		CAMPBELLSVILLE, KY 42718
55285	BERGQUIST CO INC THE ALLIED STEEL AND CONVEYORS, DIV. OF	5300 EDINA INDUSTRIAL BLVD 17333 HEALY	MINNEAPOLIS MN 55435 DETROIT, MI 48212
70278	SPARTON CORP.		
73743	FISCHER SPECIAL MFG CO	446 MORGAN ST	CINCINNATI OH 45206
77900	SHAKEPROOF	SAINT CHARLES RD	ELGIN IL 60120
78189	DIV OF ILLINOIS TOOL WORKS ILLINOIS TOOL WORKS INC	ST CHARLES ROAD	ELGIN IL 60120
79136	SHAKEPROOF DIVISION		
80009	WALDES KOHINOOR INC	47-16 AUSTEL PLACE	LONG ISLAND CITY NY 11101
	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
83330	KULKA SMITH INC	1913 ATLANTIC AVE	MANASQUAN NJ 08736
83385	A NORTH AMERICAN PHILIPS CO MICRODOT MANUFACTURING INC	3221 W BIG BEAVER RD	TROY MI 48098
	GREER-CENTRAL DIV		
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
86113	MICRODOT MFG INC CENTRAL SCREW- KEENE DIV	149 EMERALD ST	KEENE NH 03431
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201
89663	REESE, J. RAMSEY, INC.	71 MURRAY STREET	NEW YORK, NY 10007
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61101
TK0392	NORTHWEST FASTENER SALES INC	7923 SW CIRRUS DRIVE	BEAVERTON OR 97005
TK0433	PORTLAND SCREW CO	6520 N BASIN	PORTLAND OR 97217
TK0435	LEWIS SCREW CO	4114 S PEORIA	CHICAGO IL 60609
TK0507	O HARA METAL PRODUCTS CO	542 BRANNAN ST	SAN FRANCISCO CA 94107
TK1319	MORELLIS Q & D PLASTICS	1812 16-TH AVE	FOREST GROVE OR 97116
TK1326	NORTHWEST FOURLIDE INC	5858 WILLOW LANE	LAKE OSWEGO OR 97034
TK1617	CRAFT FACTORY PLASTICS	17145 SW ALEXANDER	ALOHA OR 97007

## Scan by Zenith

Replaceable Mechanical Parts - PG 506  
(SN B040000 & up)

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Discount	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-1	337-1399-04	B040000	B049999	2		SHIELD,ELEC-SIDE (SEE FIG. 2)	80009	337-1399-04
-2	366-1168-00			1		KNOB:RED,0.084 ID X 0.392 OD X 0.4 H	80009	366-1168-00
	213-0153-00			1		.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCRIPTOR
-3	366-1346-02	B040000	B049999	1		KNOB:RED,VAR,0.08 ID X 0.392 OD X 0.466 H	80009	366-1346-02
	366-1711-02	B050000		1		KNOB:GY,0.082 ID X 0.392 OD X 0.46 H	80009	366-1711-02
	213-0153-00			1		.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCRIPTOR
-4	366-1567-00	B040000	B049999	1		KNOB:GY,0.252 ID X 0.72 OD X 0.79 H	80009	366-1567-00
	366-2081-00	B050000		1		KNOB:MEDIUM GRAY,0.588 OD X 0.6 H	80009	366-2081-00
	213-0153-00			2		.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCRIPTOR
-5	366-1521-00	B040000	B049999	1		KNOB:GY,VOLTS/DIV,0.252 ID X 1.125 OD X 0.7 7 H	80009	366-1521-00
	366-2082-00	B050000		1		KNOB:MEDIUM GRAY,0.588 OD X 0.6 H	80009	366-2082-00
	213-0153-00			2		.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCRIPTOR
-6	366-0494-00	B040000	B049999	1		KNOB:GRAY WITH SETSCREW	80009	366-0494-00
	366-0494-05	B050000		1		KNOB:GY,0.127 ID X 0.5 OD X 0.531 H	80009	366-0494-05
	213-0153-00			1		.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCRIPTOR
-7	366-0215-02	B040000	B049999	1		KNOB:LEVER SWITCH	80009	366-0215-02
	366-0215-05	B050000		1		KNOB:GY,FOR LEVER,0.375 H,W/RTNR SPR	80009	366-0215-05
-8	366-1690-00	B040000	B049999	1		KNOB,LATCH:SIL GY,0.53 X 0.23 X 1.059 (SEE FIG. 2)	80009	366-1690-00
-9	131-1315-01			2		CONN,RCPT,ELEC:BNC,FEMALE	80009	131-1315-01
-9.1	210-0845-00	B050000		1		WASHER,FLAT:0.5 ID X 0.625 OD X 0.02,STL	89663	634-R
-10	342-0117-00			2		INSULATOR,BSHG:0.375 ID X 0.625 OD	80009	342-0117-00
-11	119-0238-00			1		COIL,CAL: (ATTACHING PARTS)	80009	119-0238-00
-12	210-0442-00			2		NUT,PLAIN,HEX:3-48 X 0.188,BRS CD PL	73743	3014-402
-13	210-0004-00			2		WASHER,LOCK:#4 INTL,0.015 THK,STL	77900	1204-00-00-0541C
-14	210-0994-00			2		WASHER,FLAT:0.125ID X 0.250D X 0.022	86928	A371-283-20
-15	210-0849-00			2		WASHER,SHLD:0.11 ID X 0.187 OD,FBR	83330	2151
-16	210-0593-00			2		NUT,FINISHING:3-48 X 0.25 HEX,BRS NP (END ATTACHING PARTS)	80009	210-0593-00
-17	361-0059-01			1		INSULATOR,PL:1.093 X 0.343 X 0.125,DELRIN	80009	361-0059-01
-18	358-0414-00			2		BUSHING,SLEEVE:0.125 ID X 0.312 OD X 0.21 L	80009	358-0414-00
-19	358-0378-00	B040000	B049999	2		BUSHING,SLV:0.131 ID X 0.18 OD X 0.125 L	80009	358-0378-00
-20	-----			1		RES.,VAR,NONWIR:(SEE R785 REPL) (ATTACHING PARTS)		
-21	210-0583-00			1		NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-22	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL (END ATTACHING PARTS)	12327	ORDER BY DESCRIPTOR
-23	-----			1		CKT BOARD ASSY:FAST RISE(SEE A3 REPL) (ATTACHING PARTS)		
-24	220-0497-00			2		NUT,PLAIN,HEX:0.5-28 X 0.562 HEX,BRS CD PL	80009	220-0497-00
-25	210-0406-00			1		NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL	73743	12161-50
-26	211-0109-00			1		SCREW,MACHINE:4-40 X 0.875,FLH,100 DEG,STL	TK0433	ORDER BY DESCRIPTOR
-27	361-0682-00			1		SPACER,SLEEVE:0.648 L X 0.157 ID,BRS (END ATTACHING PARTS)	80009	361-0682-00
						CKT BOARD ASSY INCLUDES: .CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR262-1
						.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-28	131-1727-00			2		PANEL,FRONT: (SEE FIGURE 2) (ATTACHING PARTS)	80009	333-1863-00
-29	131-0608-00			9				
-30	333-1863-00	B040000	B049999	1		NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL	73743	12157-50
						WASHER,LOCK:#2 INTL,0.013 THK,STL	77900	1202-00-00-0541C
						SCREW,MACHINE:2-56 X 0.5,PNH,STL (END ATTACHING PARTS)	06950	ORDER BY DESCRIPTOR
-31	210-0405-00	B040000	B049999	2		LAMPHOLDER:(1)T-2 UNBASED,WHITE	80009	352-0157-00
-32	210-0001-00	B040000	B049999	2		WASHER,FLAT:0.265 ID X 0.375 OD X 0.32,AL	86928	76430-000
-33	211-0034-00	B040000	B049999	2		BASE,LAMPHOLDER:0.29 OD X 0.19 L,BK PLSTC	80009	200-0935-00
-34	352-0157-00			1		LENS,LIGHT:BLUE	80009	378-0602-03
-34.1	210-1258-00	B050000		1		LATCH,RETAINING:PLUG-IN (SEE FIG. 2) (ATTACHING PARTS)	80009	105-0719-00
-35	200-0935-00			1		SCREW,TPG,TF:2-32 X 0.25,TYPE B,FLH (END ATTACHING PARTS)	45722	ORDER BY DESCRIPTOR
-36	378-0602-03	B040000	B049999	1		BAR,LATCH RLSE: (SEE FIG. 2)	80009	105-0718-01
-37	105-0719-00	B040000	B049999	1				
-38	213-0254-00	B040000	B049999	1				
-39	105-0718-01	B040000	B049999	1				

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Replaceable Mechanical Parts - PG 506  
(SN B040000 & up)

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-40	386-2843-00	B040000	1		SUBPANEL,FRONT: (SEE FIG. 2) (ATTACHING PARTS)	80009	386-2843-00
-41	213-0123-00	B040000	4		SCREW,TPG,TF:6-32 X 0.375,SPCL TYPE,FLH (SEE FIG. 2) (END ATTACHING PARTS)	93907	234-21940-026
-42	378-0742-00	B040000	1		LENS,LIGHT:CLEAR	TK1319	N/A
-43	337-1955-00	B040000	1		SHIELD,ELEC:REAR SUBPANEL (SEE FIG. 2)	80009	337-1955-00
-44	-----		1		CKT BOARD ASSY:DISPLAY(SEE A4 REPL)		
-45	-----		2		.LAMP,LED:(SEE DS480,DS482 REPL)		
-46	136-0252-04		4		.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-47	131-0608-00		19		.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-48	-----		1		CKT BOARD ASSY:DVM/PERIOD(SEE A2 REPL) (ATTACHING PARTS)		
-49	211-0292-00		10		SCR,ASSEM WSHR:4-40 X 0.29,PNH,BRS NI PL (END ATTACHING PARTS)	78189	51-040445-01
					CKT BOARD ASSY INCLUDES:		
-50	136-0252-04		13		.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-51	-----		1		.SWITCH,SLIDE:(SEE S660 REPL)		
-52	175-0825-00		AR		.CABLE,SP,ELEC:2,26 AWG,STRD,PVC JKT,RBN	80009	175-0825-00
-53	352-0169-07		1		.HLDL,TERM CONN:2 WIRE,VIOLET	80009	352-0169-07
-54	131-0566-00		3		.BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07
-55	131-0608-00		46		.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-56	131-1003-00		1		.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-57	136-0514-00	B040000	3		.SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP	09922	DILB8P-108
	136-0727-00	B047327	2		.SKT,PL-IN ELEK:MICROCKT,8 CONTACT	09922	DILB8P-108
-58	136-0269-02	B040000	7		.SKT,PL-IN ELEK:MICROCKT,14 DIP,PCB MT	09922	DILB14P-108T
	136-0728-00	B047327	2		.SKT,PL-IN ELEK:MICROCKT,14 CONTACT	09922	DILB14P-108
-59	136-0260-02	B040000	4		.SKT,PL-IN ELEK:MICROCKT,16 DIP,PCB MT	09922	DILB16P-108T
-60	131-0604-00		10		.CONTACT,ELEC:CKT BD SW,SPR,CU BE	80009	131-0604-00
-61	-----		1		CKT BOARD ASSY:RELAY(SEE A5 REPL) (ATTACHING PARTS)		
-62	213-0336-00		2		SCREW,TPG,TF:6-20 X 1.5,TYPE B,PNH,STL	86113	ORDER BY DESCRIPTOR
-63	210-0921-00		1		INSULATOR,WSHR:0.141 ID X 0.5 OD	08530	RM493X010MC
-64	361-0516-00		2		SPACER,SLEEVE:0.986 L X 0.157 ID,BRS (END ATTACHING PARTS)	80009	361-0516-00
					CKT BOARD ASSY INCLUDES:		
-65	131-0608-00		26		.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-66	131-0566-00		2		.BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07
-67	-----		1		CKT BOARD ASSY:MAIN (SEE A1 REPL) (ATTACHING PARTS)		
-68	213-0146-00		2		SCREW,TPG,TF:6-20 X 0.312,TYPE B,PNH,STL	83385	ORDER BY DESCRIPTOR
-69	211-0105-00	B040000	1		SCREW,MACHINE:4-40 X 0.188,FLH,100 DEG (END ATTACHING PARTS)	TK0435	ORDER BY DESCRIPTOR
					CKT BOARD ASSY INCLUDES:		
-70	384-1105-00		1		.EXTENSION SHAFT:8.241 L X 0.081 OD,SST	80009	384-1105-00
-71	376-0050-00		1		.CPLG,SHAFT,FLEX:0.081 & 0.127 ID,PP	80009	376-0050-00
					.SW CAM ACTR ASY:(SEE S610 REPL) (ATTACHING PARTS)		
-72	211-0292-00		4		SCR,ASSEM WSHR:4-40 X 0.29,PNH,BRS NI PL (END ATTACHING PARTS)	78189	51-040445-01
-73	210-0406-00		4		.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL	73743	12161-50
-74	401-0115-00		1		.BEARING,CAM SW:CTR,0.83 DIA CAM DBL BD	80009	401-0115-00
-75	105-0631-00		1		.ACTUATOR,CAM SW:PERIOD ..(ATTACHING PARTS)	80009	105-0631-00
-76	354-0391-00		1		..RING,RETAINING:BASIC EXT,U/O 0.438 DIA SFT ..(END ATTACHING PARTS)	79136	5100-43 MD
-77	210-0406-00		4		.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL	73743	12161-50
-78	214-1139-02		2		..SPRING,FLAT:0.885 X 0.156 CU BE GRN CLR	80009	214-1139-02
-79	214-1127-00		1		..ROLLER,DETENT:0.125 DIA X 0.125,SST	80009	214-1127-00
-80	401-0081-02		1		..BEARING,CAM SW:FRONT W/O MOUNTING BOSSES	80009	401-0081-02
-81	384-1323-00	B040000	1		..EXTENSION SHAFT:6.4 L X 0.081 OD,SST	80009	384-1323-00
	384-1066-00	B050000	1		..EXTENSION SHAFT:6.1 L X 0.081 OD,SST	80009	384-1066-00
-82	214-1190-02		1		..CPLG,SHAFT,RGD:0.125 OD TO 0.081 OD,AL	80009	214-1190-02
-83	214-1136-00		1		..ACTUATOR,SL SW:VARIABLE CAL .SW CAM ACTR AS:(SEE S180 REPL) (ATTACHING PARTS)	80009	214-1136-00

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(SN B040000 & up)

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Serial/Assembly No. Discont	Oty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-84	211-0292-00			4	.SCR,ASSEM WSHR:4-40 X 0.29,PNH,BRS NI PL		78189	51-040445-01
-85	211-0292-00			2	.SCR,ASSEM WSHR:4-40 X 0.29,PNH,BRS NI PL .END ATTACHING PARTS		78189	51-040445-01
-86	105-0243-00			1	.ACTUATOR,SWITCH:AC,DC (ATTACHING PARTS)		80009	105-0243-00
-87	213-0214-00			1	.SCREW,CAP:2-56 X 0.375,SKT HD,STL CD PL .END ATTACHING PARTS		70278	ORDER BY DESC
-88	131-1314-00			1	.CONTACT,ELEC:GROUNDING,MONEL		80009	131-1314-00
-89	210-0406-00			3	.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL		73743	12161-50
-90	131-0963-00			1	.CONTACT,ELEC:GROUNDING,PH BRZ,W/BRACKET		TK0507	ORDER BY DESC
-91	214-1139-02			1	.SPRING,FLAT:0.885 X 0.156 CU BE GRN CLR		80009	214-1139-02
	214-1139-03			1	.SPRING,FLAT:0.885 X 0.156 CU BE RED CLR		80009	214-1139-03
-92	214-1127-00			2	.ROLLER,DETENT:0.125 DIA X 0.125,SST		80009	214-1127-00
-93	401-0081-02			1	.BEARING,CAM SW:FRONT W/O MOUNTING BOSSES (ATTACHING PARTS)		80009	401-0081-02
-94	354-0391-00			1	.RING,RETAINING:BASIC EXT,U/O 0.438 DIA SFT .END ATTACHING PARTS		79136	5100-43 MD
-95	105-0632-01			1	.ACTUATOR,CAM SW:MODE		80009	105-0632-01
-96	210-0406-00			4	.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL		73743	12161-50
-97	401-0115-00			1	.BEARING,CAM SW:CTR,0.83 DIA CAM DBL BD		80009	401-0115-00
-98	105-0634-02	B040000	B049999	1	.ACTUATOR,CAM SW:AMPL,REAR		80009	105-0634-02
	105-0634-03	B050000		1	.ACTUATOR,CAM SW:AMPLITUDE,REAR (ATTACHING PARTS)		80009	105-0634-03
-99	354-0391-00			1	.RING,RETAINING:BASIC EXT,U/O 0.438 DIA SFT .END ATTACHING PARTS		79136	5100-43 MD
-100	105-0482-00			1	.STOP,DETENT:		TK1617	ORDER BY DESC
-101	210-0406-00			4	.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL		73743	12161-50
-102	214-1139-02			1	.SPRING,FLAT:0.885 X 0.156 CU BE GRN CLR		80009	214-1139-02
	214-1139-03			1	.SPRING,FLAT:0.885 X 0.156 CU BE RED CLR		80009	214-1139-03
-103	214-1127-00			2	.ROLLER,DETENT:0.125 DIA X 0.125,SST		80009	214-1127-00
-104	401-0081-02			1	.BEARING,CAM SW:FRONT W/O MOUNTING BOSSES		80009	401-0081-02
-105	214-2569-00			1	.HEAT SINK,XSTR:TO-5,CU BE		05820	260-4 TH58
-106	131-1031-00			16	.CONT ASSY,ELEC:CAM SWITCH,TOP (ATTACHING PARTS)		80009	131-1031-00
-107	210-0779-00			16	.RIVET,TUBULAR:0.115 X 0.05,DBL END .END ATTACHING PARTS		42838	RA-29952715
-108	131-1030-00			17	.CONT ASSY,ELEC:CAM SWITCH,BOTTOM		80009	131-1030-00
-109	131-0604-00			10	.CONTACT,ELEC:CKT BD SW,SPR,CU BE		80009	131-0604-00
-110	214-0579-00			6	.TERM,TEST POINT:BRZ CD PL		80009	214-0579-00
-111	344-0154-00			4	.CLIP,ELECTRICAL:FUSE,CKT BD MT		80009	344-0154-00
-112	-----			1	.RES.,VAR,NONWIR:(SEE R225 REPL)			
-113	361-0515-00			2	.SPACER,SWITCH:0.176 L,ACETAL		80009	361-0515-00
-114	-----			1	.RES.,VAR,NONWIR:(SEE R590 REPL) (ATTACHING PARTS)			
-115	210-0583-00			1	.NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL		73743	2X-20319-402
-116	210-0046-00			1	.WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL .END ATTACHING PARTS		77900	1214-05-00-0541C
-117	407-1393-00			1	.BRACKET,ANGLE:BRASS		80009	407-1393-00
-118	351-0180-00			1	.GUIDE,SLIDE SW:SWITCH ACTUATOR		80009	351-0180-00
-119	131-1003-00			1	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG		80009	131-1003-00
-120	136-0269-02	B040000	B047326	1	.SKT,PL-IN ELEK:MICROCKT,14 DIP,PCB MT		09922	DILB14P-108T
	136-0728-00	B047327		1	.SKT,PL-IN ELEK:MICROCKT,14 CONTACT		09922	DILB14P-108
-121	136-0514-00	B040000	B047326	6	.SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP		09922	DILB8P-108
	136-0727-00	B047327		4	.SKT,PL-IN ELEK:MICROCKT,8 CONTACT		09922	DILB8P-108
-122	131-0566-00			1	.BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L		24546	OMA 07
-123	214-1254-00			1	.HEAT SINK,XSTR:TO-5,CU BE		05820	209SB
-124	342-0324-00			3	.INSULATOR,DISK:TRANSISTOR,NYLON		13103	7717-5N-BLUE
-125	136-0252-07			1	.SOCKET,PIN CONN:W/O DIMPLE		22526	75060-012
-126	131-0608-00			29	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL		22526	48283-036
-127	214-1291-00			1	.HEAT SINK,XSTR:TO-5,SIL BRZ PTD BLACK		05820	207SB
-128	-----			1	.TRANSISTOR:(SEE Q325 REPL) (ATTACHING PARTS)			
-129	211-0097-00			1	.SCREW,MACHINE:4-40 X 0.312,PNH,STL		TK0435	ORDER BY DESC
	210-1178-00	B046760		1	.WASHER,SHLDRL:		13103	7721-7PPS
-130	210-0406-00			1	.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL .END ATTACHING PARTS		73743	12161-50
	342-0355-00	B046760		1	.INSULATOR,PLATE:TRANSISTOR,SILICONE RUBBER		55285	7403-09FR-51
	175-3535-00			1	.CABLE ASSY,RF:50 OHM COAX,5.5 L,9-2		80009	175-3535-00

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Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Discount	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-	352-0169-06			1	..HLDL,TERM CONN:2 WIRE,BLUE		80009	352-0169-06
	175-3536-00			1	..CABLE ASSY,RF:50 OHM COAX,7.0 L,9-5		80009	175-3536-00
	352-0169-05			1	..HLDL,TERM CONN:2 WIRE,GREEN		80009	352-0169-05
	198-4323-00			1	.WIRE SET,ELEC:		80009	198-4323-00
	352-0169-02			1	..HLDL,TERM CONN:2 WIRE,RED		80009	352-0169-02
-131	386-3657-01			2	SUPPORT,PLUG-IN:		93907	ORDER BY DESCRIPTOR
-132	210-1270-00	B040000	B049999	2	WASHER,FLAT:0.141 ID X 0.219 OD X 0.04,AL		80009	210-1270-00
-133	426-0724-06	B040000	B049999	1	FR SECT,PLUG-IN:BOTTOM (SEE FIG. 2)		80009	426-0724-06
-134	214-1061-00	B040000	B049999	1	CONTACT,ELEC:GROUNDING,CU BE (SEE FIG. 2)		80009	214-1061-00
-135	426-0725-22	B040000	B049999	1	FR SECT,PLUG-IN:TOP (SEE FIG. 2)		80009	426-0725-22
	198-2220-02			1	WIRE SET,ELEC:		80009	198-2220-02
-136	352-0169-01			1	.HLDL,TERM CONN:2 WIRE,BROWN		80009	352-0169-01
	352-0169-02			1	.HLDL,TERM CONN:2 WIRE,RED		80009	352-0169-02
-137	352-0161-03			2	.HLDL,TERM CONN:3 WIRE,ORANGE		80009	352-0161-03
	352-0161-04			2	.HLDL,TERM CONN:3 WIRE,YELLOW		80009	352-0161-04
-138	352-0163-02			2	.HLDL,TERM CONN:5 WIRE,RED		80009	352-0163-02
-139	352-0164-06			4	.HLDL,TERM CONN:6 WIRE,BLUE		80009	352-0164-06
	352-0164-01			2	.HLDL,TERM CONN:6 WIRE,BROWN		80009	352-0164-01
	352-0164-03			2	.HLDL,TERM CONN:6 WIRE,ORANGE		80009	352-0164-03
	352-0164-04			2	.HLDL,TERM CONN:6 WIRE,YELLOW		80009	352-0164-04
-140	352-0165-07			4	.HLDL,TERM CONN:7 WIRE,VIOLET		80009	352-0165-07
-141	352-0167-09			2	.HLDL,TERM CONN:9 WIRE,WHITE		80009	352-0167-09
-142	352-0168-00			2	.HLDL,TERM CONN:10 WIRE,BLACK		80009	352-0168-00
-143	210-0775-00			4	.EYELET,METALLIC:0.126 OD X 0.205 L		80009	210-0775-00
-144	210-0774-00			4	.EYELET,METALLIC:0.152 OD X 0.218 L		80009	210-0774-00
-145	131-0708-00			2	.CONTACT,ELEC:28-32 AWG,BRS,CU BE GLD PL		22526	47437-000
-146	131-0707-00	B040000	B046759	88	.CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL		22526	47439-000
	131-0707-00	B046760		90	.CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL		22526	47439-000
-147	175-0829-00			AR	.CABLE,SP,ELEC:6,26 AWG,STRD,PVC JKT,RBN		08261	111-2699-973
-148	175-0830-00			AR	.CABLE,SP,ELEC:7,26 AWG,STRD,PVC JKT,RBN		08261	111-2699-972
-149	175-0832-00			AR	.CABLE,SP,ELEC:9,26 AWG,STRD,PVC JKT,RBN		08261	111-2699-956
-150	175-0833-00			AR	.CABLE,SP,ELEC:10,26 AWG,STRD,PVC JKT,RBN		08261	111-2699-970
-151	175-0826-00			AR	.CABLE,SP,ELEC:3,26 AWG,STRD,PVC JKT,RBN		80009	175-0826-00
-152	175-0828-00			AR	.CABLE,SP,ELEC:5,26 AWG,STRD,PVC JKT,RBN		08261	111-2699-955

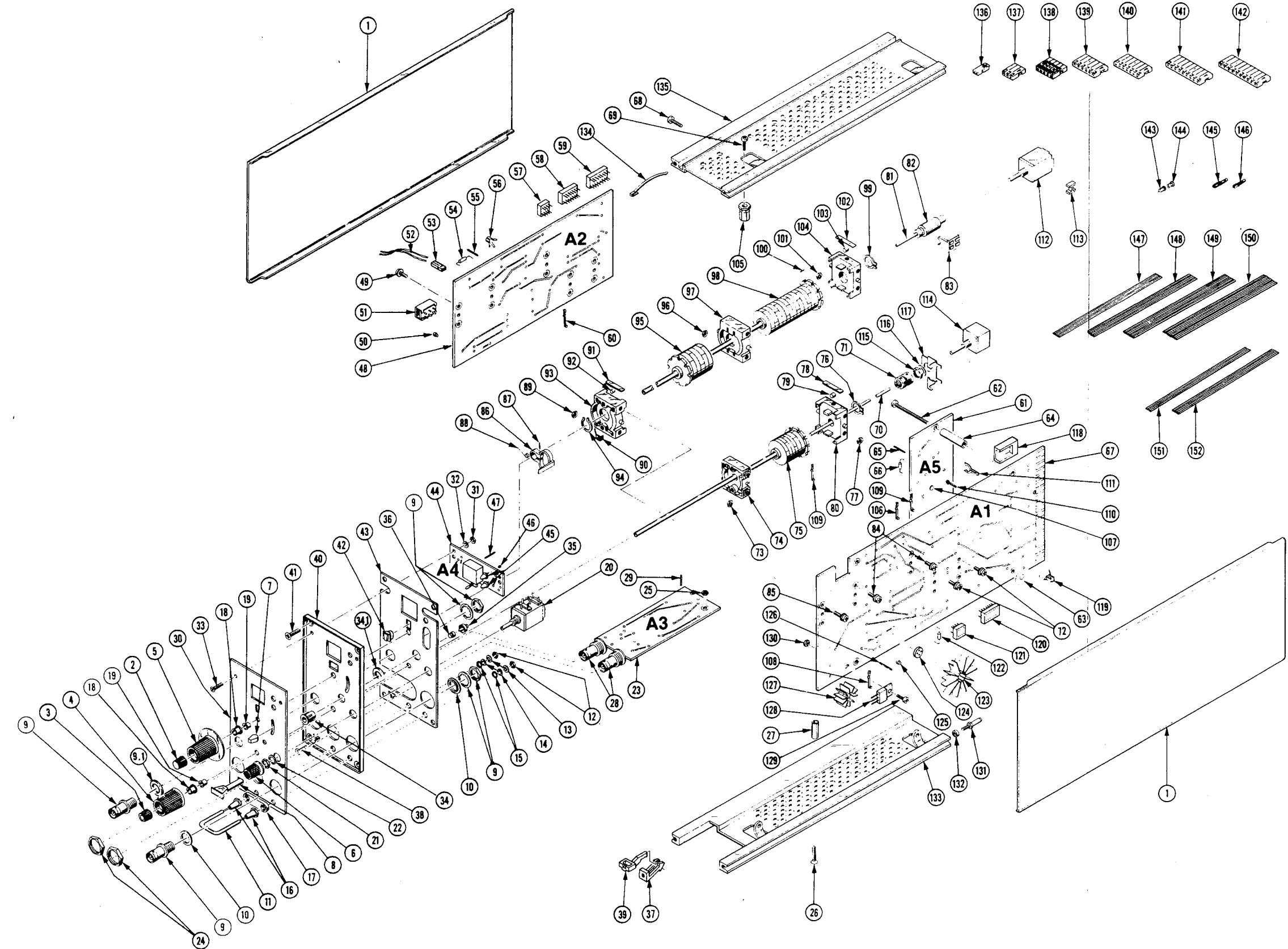
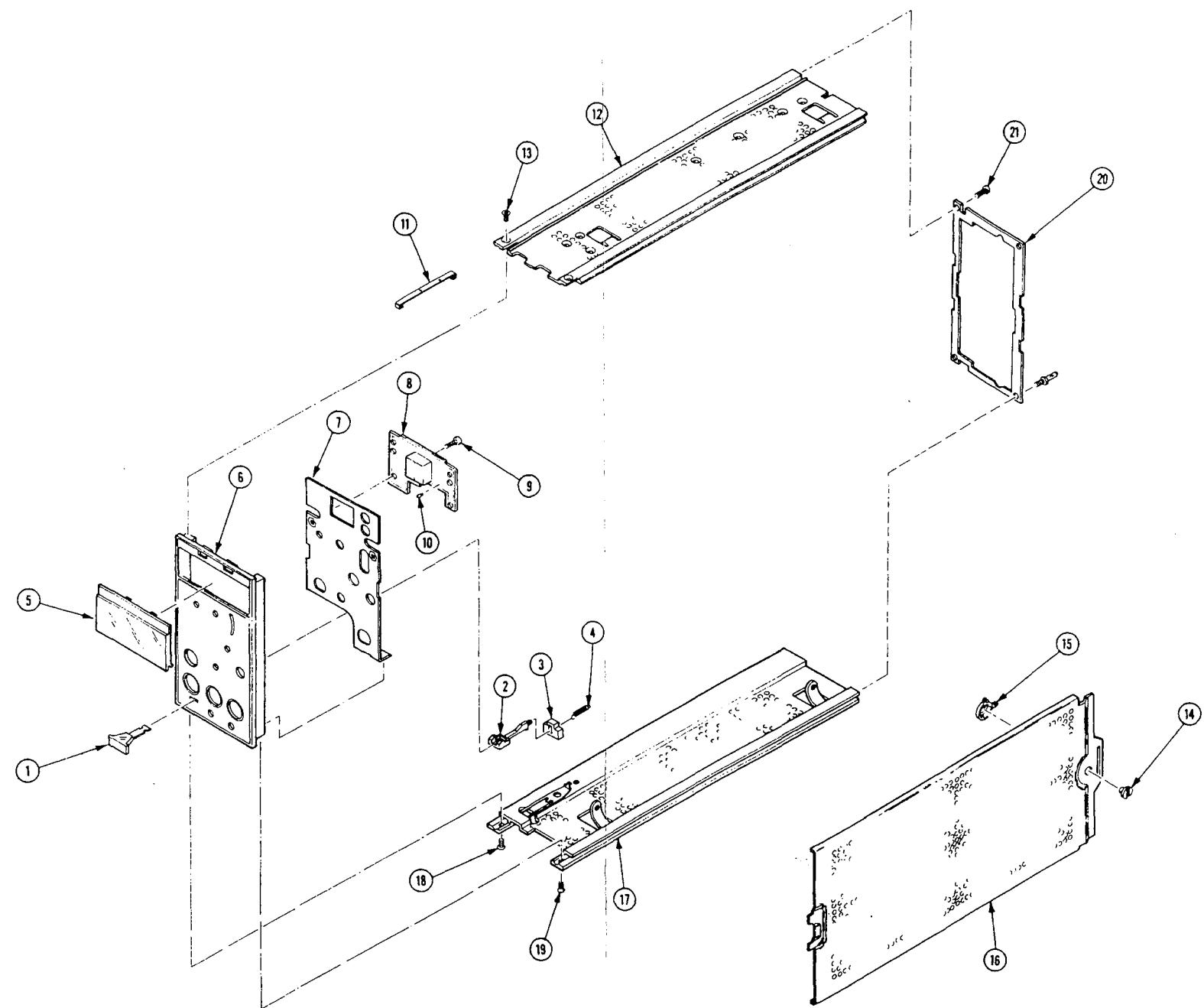


FIG. 2 CABINET



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Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective      Discnt	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
2-1	366-1851-01	B050000	1		KNOB,LATCH:IVORY GY,0.625 X 0.25 X 1.09	80009	366-1851-01
-2	105-0865-00	B050000	1		BAR,LATCH RLSE:	80009	105-0865-00
-3	105-0866-00	B050000	1		LATCH,RETAINING:SAFETY	80009	105-0866-00
-4	214-3143-00	B050000	1		SPRING,HLEXT:0.125 OD X 0.545 L,XLOOP	80009	214-3143-00
-5	378-2030-06	B050000	1		LENS,LED DSPL:RED,PRINTED	80009	378-2030-06
-6	333-3050-00	B050000	1		PANEL,FRONT:	80009	333-3050-00
-7	337-3075-00	B050000	1		SHIELD,ELEC:SUBPANEL	80009	337-3075-00
-8	-----		1		CKT BOARD ASSY:DISPLAY (SEE A4 REPL) (ATTACHING PARTS)		
-9	211-0244-00	B050000	2		SCR,ASSEM WSHR:4-40 X 0.312,PNH STL (END ATTACHING PARTS)	01536	ORDER BY DESCRIPTOR
					CKT BOARD ASSEMBLY INCLUDES:		
-10	136-0252-04	B050000	4		:SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
-11	214-3406-00	B050000	1		SPRING,FLAT:1.48 L X 0.125 W,CU BE	TKL326	ORDER BY DESCRIPTOR
-12	426-0725-24	B050000	1		FR SECT,PLUG-IN:TOP (ATTACHING PARTS)	80009	426-0725-24
-13	211-0101-00	B050000	2		SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TKD435	ORDER BY DESCRIPTOR
-14	105-0932-00	B050000	2		LATCH,PANEL:SIDE	80009	105-0932-00
-15	214-3364-00	B050000	2		FASTENER,LATCH:ACETAL,SIL GRAY	80009	214-3364-00
-16	337-3039-00	B050000	2		SHIELD,ELEC:SIDE	80009	337-3039-00
-17	426-0724-25	B050000	1		FR SECT,PLUG-IN:BOTTOM (ATTACHING PARTS)	80009	426-0724-25
-18	211-0101-00	B050000	1		SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	TKD435	ORDER BY DESCRIPTOR
-19	211-0025-00	B050000	1		SCREW,MACHINE:4-40 X 0.375,FLH,100 DEG,STL (END ATTACHING PARTS)	TKD435	ORDER BY DESCRIPTOR
-20	386-4866-00	B050000	1		SUPPORT,FRAME:REAR,AL (ATTACHING PARTS)	80009	386-4866-00
-21	213-0793-00	B050000	2		SCREW,TPG,TF:6-32 X 0.4375,TAPTITE,FILH (END ATTACHING PARTS)	83486	239-006-406043
					STANDARD ACCESSORIES		
	070-3383-00		1		MANUAL,TECH:INSTR,PG506	80009	070-3383-00
	012-0482-00		1		CABLE ASSY,RF:50 OHM COAX,36.0 L	80009	012-0482-00