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Tektronix®

DC POWER SUPPLY
PS 501
PS 501-1
PS 501-2

INSTRUCTION MANUAL

Tektronix®
COMMITTED TO EXCELLENCE

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

DC POWER SUPPLY
PS 501
PS 501-1
PS 501-2

INSTRUCTION MANUAL

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

Serial Number _____

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INSTRUMENT SERIAL NUMBERS

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

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

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OPERATORS SAFETY SUMMARY

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

Terms In This Manual

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

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

Terms As Marked on Equipment

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

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

Symbols In This Manual



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

Symbols As Marked on Equipment



DANGER — High voltage.



Protective ground (earth) terminal.



ATTENTION — refer to manual.

Power Source

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

Grounding the Product

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Danger Arising From Loss of Ground

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

Use the Proper Power Cord

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

Use only a power cord that is in good condition.

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

Refer cord and connector changes to qualified service personnel.

Use the Proper Fuse

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

Refer fuse replacement to qualified service personnel.

Do Not Operate in Explosive Atmospheres

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

Do Not Remove Covers or Panels

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

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SERVICE SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

Refer also to the preceding Operators Safety Summary.

Do Not Service Alone

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

Use Care When Servicing With Power On

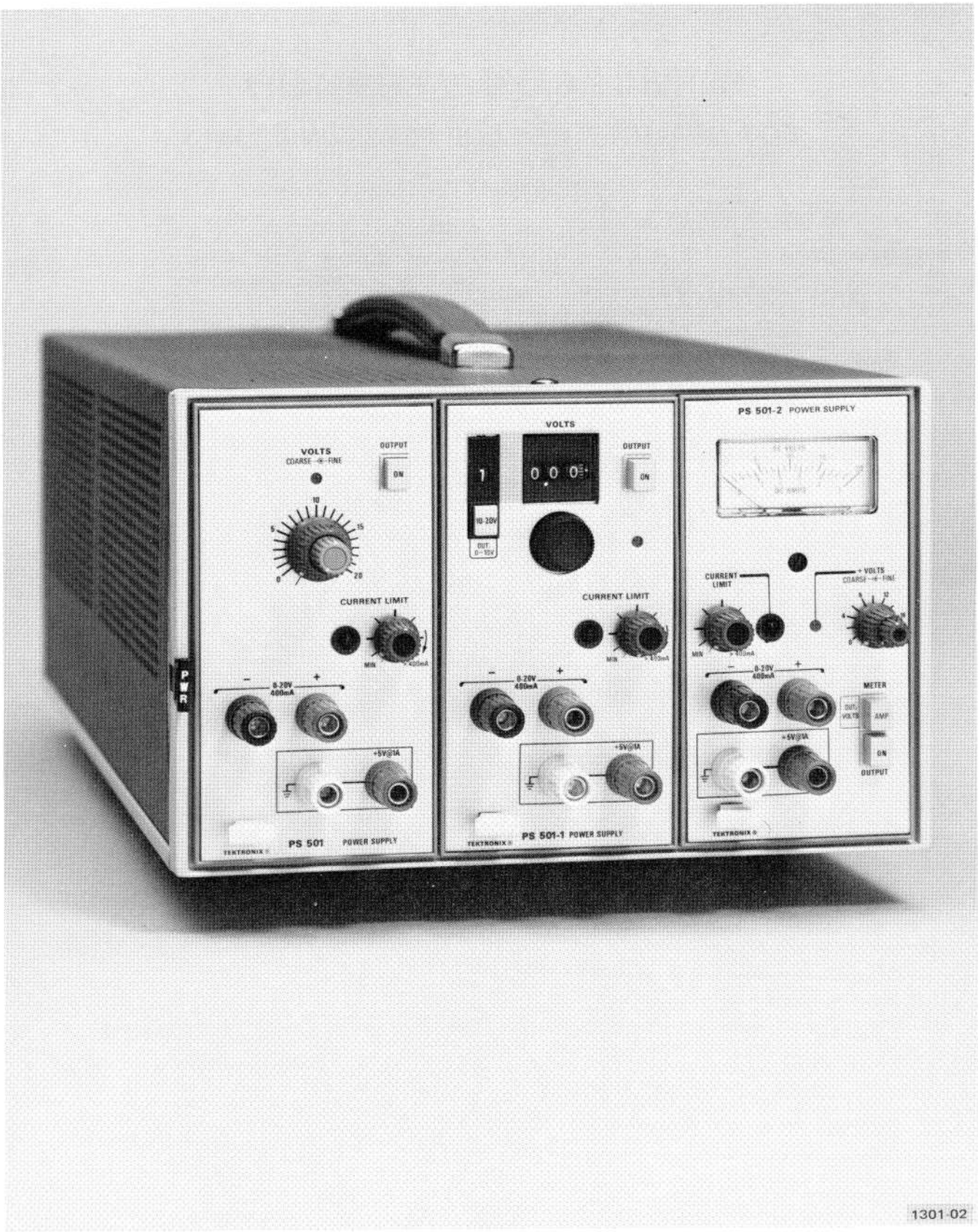
Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

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

Power Source

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

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PS 501 (-1, -2) Power Supplies.

SPECIFICATION

Introduction

The PS 501 is a constant-voltage, current-limiting, 0 to 20 Vdc power supply designed to operate in any compartment of a TM 500 Series Power Module. The PS 501 is a floating power supply in which either terminal may be grounded, or floated to 350 Vdc + peak ac. Front-panel controls provide continuously variable voltage selection, as well as current limiting from 0 to at least 400 mA.

The floating supply is suited for powering discrete transistor circuitry, or acting as a bias or reference supply. Several PS 501's or other suitable supplies can be combined for applications involving complementary circuitry, linear integrated circuits, or any circuitry requiring cascaded DC levels.

A ground-referenced +5 V auxiliary supply is also included that is suitable for bipolar logic, light-emitting diodes, incandescent displays and similar applications. With the floating supply available for powering discrete interface circuits and level shifting, the PS 501 can be used for many digital/analog applications.

NOTE

Instrument differences between the PS 501-2 and the PS 501 (-1) are listed in this manual at various places. Where no differences are indicated, the PS 501 information applies to the PS 501-2.

The electrical characteristics in this specification are valid with the following conditions:

1. The instrument must have been adjusted at an ambient temperature between +20° C and +30° C.
2. The instrument must be in a non-condensing environment whose limits are described under Environmental.
3. Allow twenty minutes warm-up time for operation to specified accuracy; sixty minutes after exposure to or storage in a high humidity (condensing) environment.

The electrical and environmental performance limits together with their related validation procedures comprise a complete statement of the electrical and environmental performance of a calibrated instrument.

SUPPLEMENTAL INFORMATION

The supplemental information listed here represents limits that ensure optimum instrument operation. They are not instrument specifications, but are intended to be used only as maintenance or operational aids.

Table 1-1

ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
20 Volt Floating Supply		
Voltage Range	0 V to at least 20 V.	19.99 V in PS 501-1.
Rated Output Current		400 mA, 0° C to +30° C, derating linearly, to 300 mA at +50° C.
Overload Protection		Automatic current limiting and over-temperature shutdown, continuous operation at rated output current at low voltages may actuate a Power Module thermal cutout. *NOTE* *Ripple and noise increase unpredictably when current is being limited.*
Current Limit Range	≤10 mA to at least 400 mA.	Current limiting is indicated by front panel LED.
Maximum Floating Voltage		350 Vdc + peak ac.
Display Accuracy		
PS 501-1	± (0.5% of reading + 10 mV).	Digital dial readout.
PS 501-2	± 0.4 V.	Analog meter readout.
Resolution (Setability)		
PS 501-1		Typically 1.6 mV determined by a 10-turn potentiometer.
PS 501-2		Typically 10 mV.
Load Effect (Regulation)	±1 mV for a 400 mA load change measured at output terminals.	
Source Effect (Line Regulation)	±5 mV for a ±10% line voltage change.	
Stability		Typically less than 0.1% +5 mV for 8 hours at constant line, load, and temperature.
Temperature Coefficient		Typically less than (0.01% + 0.1 mV) 1° C.
PARD (Ripple & Noise) (Periodic and Random Deviations)	≤0.5 mV peak-to-peak with 400 mA load.	10 Hz to 5 MHz, supply not in current limiting.
Transient Recovery Time		20 μs or less to recover within 20 mV of final output voltage after a 400 mA change in output current.

Table 1-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
5 V Supply		
Output Voltage	+4.75 V to +5.25 ground referenced.	LM309K 5 V regulator integrated circuit.
Rated Output Current		1 A.
Current Limit		Non-adjustable and typically 1.5 A to 3 A.
Load Effect (Regulation)	±100 mV for a 1 A load change.	
Source Effect (Line Regulation)	±50 mV for a 10% line voltage change.	
Stability		Typically less than 30 mV (0.5%) for 8 hours at constant line, load, and temperature.
Temperature Coefficient		Typically less than 0.5 mV/°C.
PARD (Ripple & Noise)	≤5 mV peak-to-peak with 1 A load.	10 Hz to 5 MHz, supply not in current limiting.
Rear Interface Inputs/ Outputs[a]		
20 V Floating Supply		Pins 22A (+), 21A (−). Same as front panel output terminals.
Remote Sense		Pin 23A.
Reference Common		Pins 24A, 24B.
Current Monitor		Pins 19B, 22A. Voltage is 2 Ω times the actual output current, ±5%. Pin 22A is same as + output. Pin 19B is same as emitter of NPN series pass transistor.
Slaving Connections		Pin 26B for current limit slaving. Pin 25B for voltage slaving.

[a] **Warning—Floating potentials will appear superimposed on all rear interface inputs and outputs.**

Table 1-2

ENVIRONMENTAL CHARACTERISTICS

Characteristics	Information
Temperature	
Operating	0° C to 30° C (with derating to 50° C)
Storage	−40° C to +75° C.
Altitude	
Operating	To 15,000 feet. Maximum operating temperature decreased by 1° C/100 feet from 5000 to 15,000 feet.
Storage	To 50,000 feet.
Vibration	
Operating and non-operating	With the instrument complete, vibration frequency swept from 10 to 55 to 10 Hz at 1 minute per sweep. Vibrate 15 minutes in each of the three major axes at 0.015 inch total displacement. Hold 10 minutes at any major resonance; or, if none, at 55 Hz. Total time, 75 minutes.
Shock	
Operating and non-operating	30 g, 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 Transit Committee Test Procedure 1A, Category II.

Table 1-3

PHYSICAL CHARACTERISTICS

Characteristics	Dimensions
Overall Size (measured at maximum points)	
Height	4.96 in (126 mm)
Width	2.6 in (66.8 mm)
Length	11.65 in (296 mm)
Net Weight (Instrument only)	2 lbs (0.906 kg)

OPERATING INSTRUCTIONS

PREPARATION

The PS 501 (-1) (-2) is calibrated and ready for use when received. It is designed to operate in any compartment of a TM 500 Series Power Module. Refer to the Power Module Instruction Manual for line voltage requirements.

To install the PS 501 (-1) (-2), align the upper and lower rails of the plug-in with the Power Module tracks and insert until the plug-in panel is flush with the Power Module panel (see Fig. 2-1). To remove, pull the release latch to disengage the PS 501 (-1) (-2) from the Power Module.

CAUTION

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

The following procedure is intended to prepare the instrument for immediate use and demonstrate the basic function of the unit. Operation of the Power Module and other plug-ins in this system are described in their respective instruction manuals. Functions of front-panel controls, indicators and connectors are described in Fig. 2-2 and Fig. 2-3.

NOTE

Before using the PS 501 (-1) (-2) read the Operating Considerations in this section regarding proper techniques for connecting various loads, etc.

The presence of output voltage is verified by a voltage indicator light on the front panel. The brightness of this light varies with output voltage.

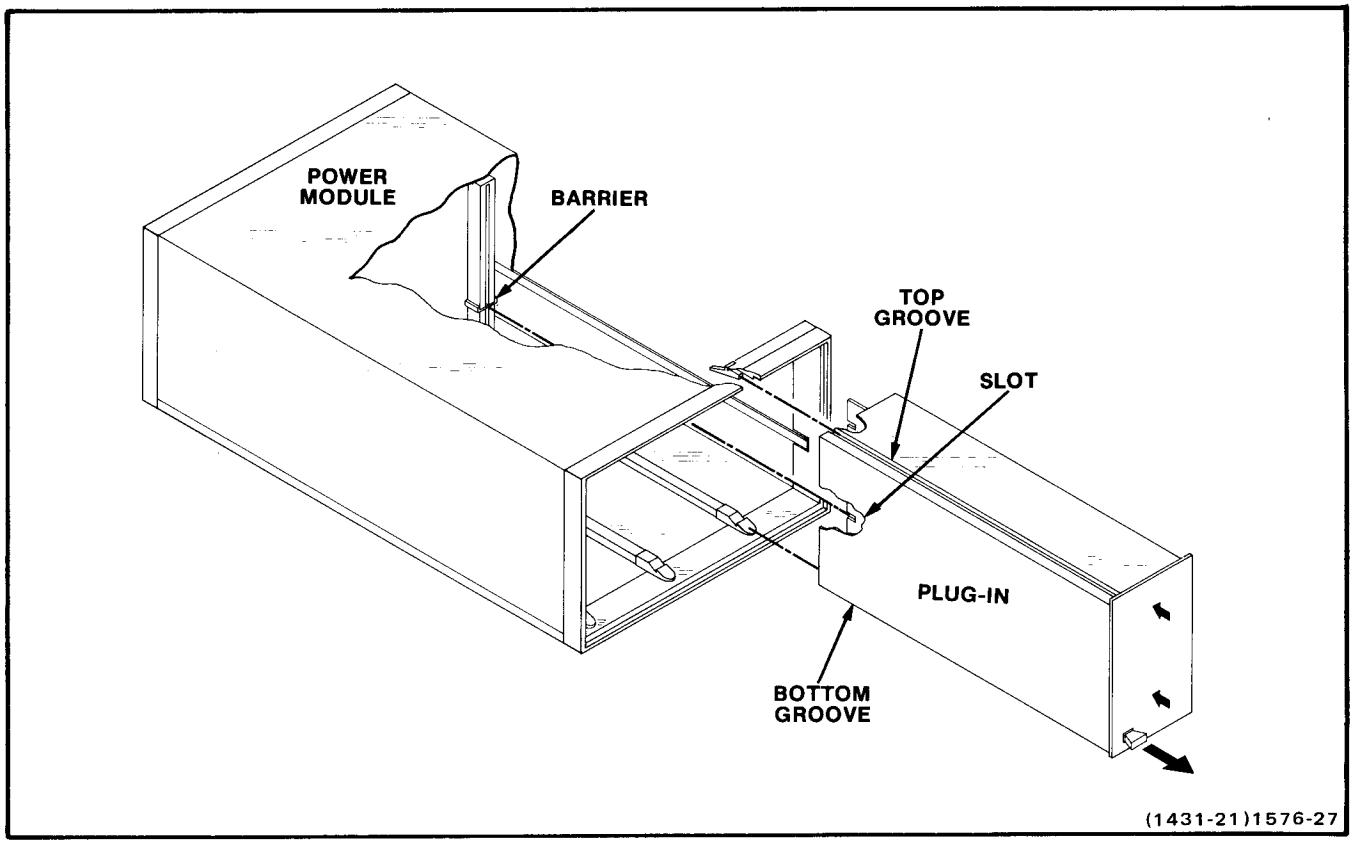


Fig. 2-1. PS 501 (-1, -2) Installation and removal.

A panel-mounted, light-emitting diode lights when the PS 501 goes into current-limiting. This is a very sensitive indicator that starts to glow before hard limiting occurs. Hard limiting is indicated by maximum brightness of the light-emitting diode as well as a dimming of the voltage indicator light. These functions are easily evaluated by momentarily shorting the output of the supply.

PS 501-1 is identical to the PS 501 except that the output voltage is selected by a 10-turn precision potentiometer with a 3-digit in-line dial and a range pushbutton. The turns-counting dial allows the output of the PS 501-1 to be set accurately without an expensive external meter. The dial provides accuracy equivalent to that obtained with a 3 1/2 digit DVM.

The PS 501-2 is identical to the PS 501 except that a front-panel meter is provided to aid in accurately setting the output current or voltage of the PS 501-2. See Figs. 2-2 and 2-3, Controls and Connectors.

Constant Voltage/Current Limited Output

1. Press the OUTPUT button to apply power to the plug-in. Observe that the VOLTS indicator light comes on (the light will be very dim at low voltages).

2. Adjust the VOLTS control for approximately 2 V.

NOTE

The use of an external meter is not required for the PS 501-2. The PS 501-2 internal meter can perform the function described in step 3.

3. Set the CURRENT LIMIT control fully ccw (to protect the ammeter). Connect an ammeter across the + and − terminals and adjust the CURRENT LIMIT control for the maximum desired current output.

4. Remove the ammeter, connect the load to the + and − terminals and adjust the VOLTS control for the desired output.

Series Operation

The outputs of two or more supplies can be connected in series as shown in Fig. 2-4 to obtain an output voltage equal to the sum of the output voltages from each supply. The maximum output is limited to 350 Vdc + peak ac (i.e., the isolation voltage rating between the output terminals and ground). Each supply must be adjusted individually to obtain the desired output voltage.

NOTE

The PS 501 (-1) (-2) has internal diodes connected across the output to protect any of the series-connected supplies against reverse polarity if the load is shorted, or one of the supplies is not on.

Parallel Operation

The outputs of two or more current-limiting, automatic-crossover supplies can be connected in parallel as shown in Fig. 2-5 to obtain an output current equal to the sum of the output currents from each supply. Each supply must be adjusted individually to obtain the desired output current.

One supply should be set for the desired output voltage and the other should be set for a slightly higher voltage. The supply set for the desired voltage will then become a constant voltage source, while the supply with the higher voltage output becomes a current-limited source (due to automatic crossover) which results in their output voltage decreasing to that of the supply with the lowest output voltage.

APPLICATIONS

Differential Voltage Measurements

Very small dc voltage changes or unknown voltages can be measured by connecting the PS 501-1, a null detector, and the source under test in a differential configuration as shown in Fig. 2-6. Inexpensive comparison measurements at nearly the accuracy and sensitivity of costly differential voltmeters can be made with the PS 501-1. The ultimate accuracy and sensitivity of the measurement depends on the PS 501-1 and the type of null detector used. A calibrated dc amplifier in a high-gain oscilloscope such as the TEKTRONIX 5100-Series Oscilloscope with a 5A20N Differential Amplifier plug-in will serve as a convenient null detector, or a sensitive milliammeter with a series resistor is also satisfactory.

NOTE

Examine the circuit for ground loops when using a null detector with one input terminal grounded (see Grounded and Floating Operation).

Series- and Parallel-Connected Stair-Step Operation

Series- and parallel-connected PS 501 (-1) (-2)'s can be operated to provide a "stair-step" output characteristic by choosing proper load limits and control settings. For example, Fig. 2-7 shows the stair-step output from two series-connected supplies. With each supply set for

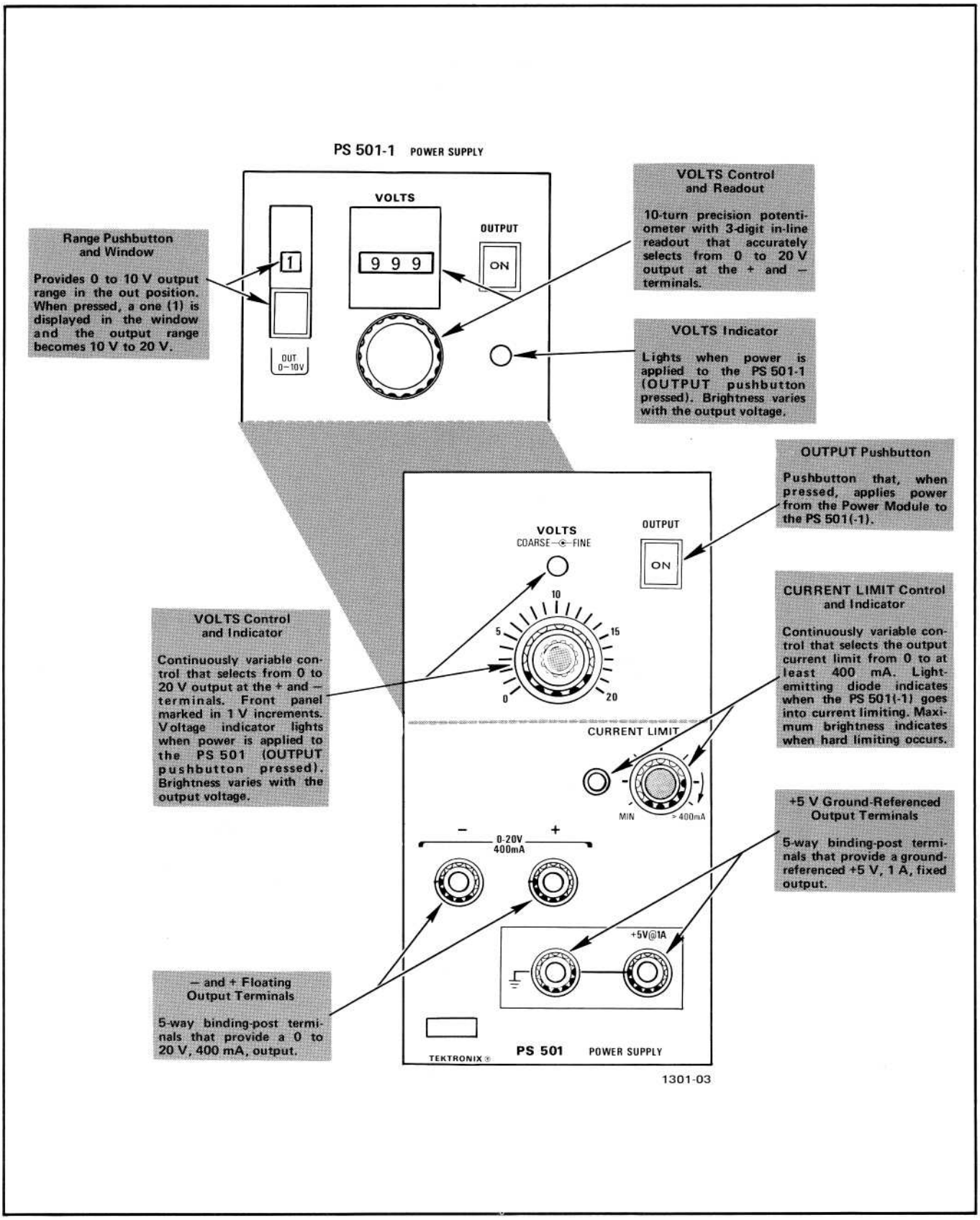
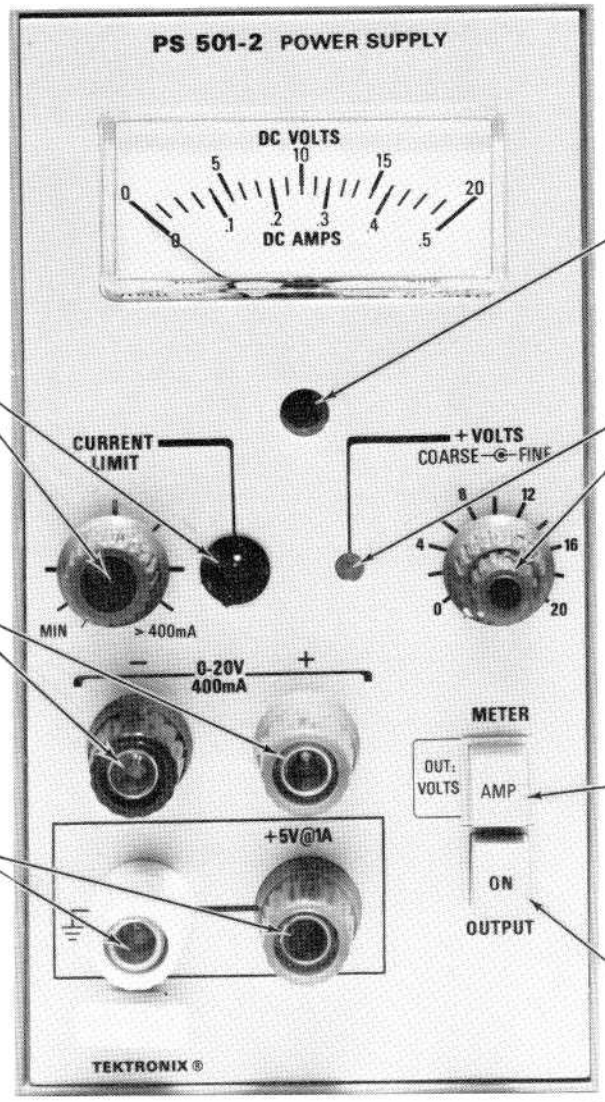


Fig. 2-2. Controls and Connectors.



CURRENT LIMIT Control and Indicator

Continuously variable control that selects the output current limit from 0 to at least 400 mA. Light-emitting diode indicates when the PS 501-2 goes into current limiting. Maximum brightness indicates when hard limiting occurs.

– and + Floating Output Terminals

5-way binding-post terminals that provide a 0 to 20 V, 400 mA, output.

+5 V Ground Referenced Output Terminals

5-way binding-post terminals that provide a ground-referenced +5 V, 1A, fixed output.

Meter Zero Adjustment

Mechanically aligns the meter needle with the zero meter indication.

VOLTS Control and Indicator

Continuously variable control that selects from 0 to 20 V output at the + and – terminals. Front panel marked in 2 V increments. Voltage indicator lights when power is applied to the PS 501 (OUTPUT pushbutton pressed). Brightness varies with the output voltage.

METER Pushbutton

Pushbutton that changes the monitoring meter from DC volts to DC amps.

OUTPUT Pushbutton

Pushbutton that, when pressed, applies power from the Power Module to the PS 501-2.

Fig. 2-3. Controls and Connectors.

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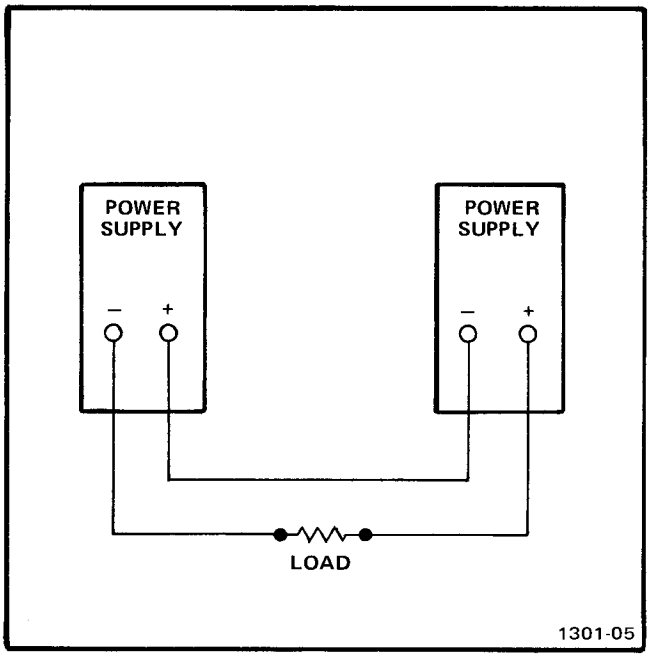


Fig. 2-4. Series-connected supplies.

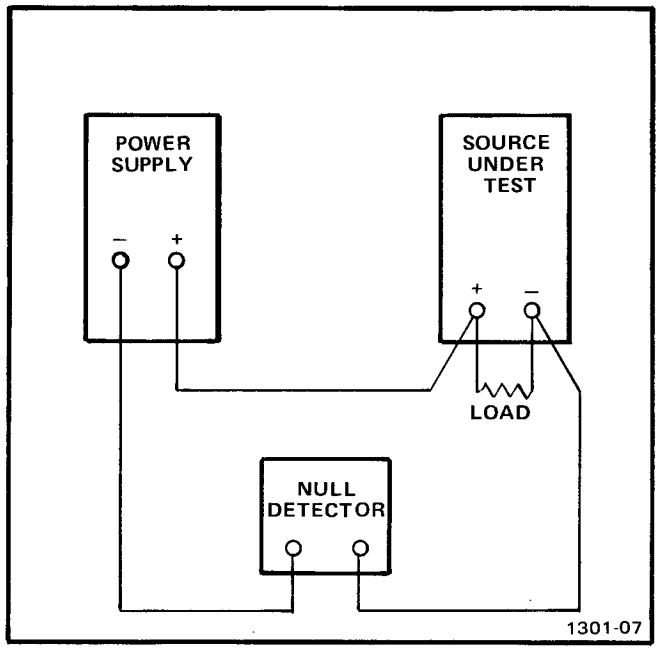


Fig. 2-6. Differential measurement connections.

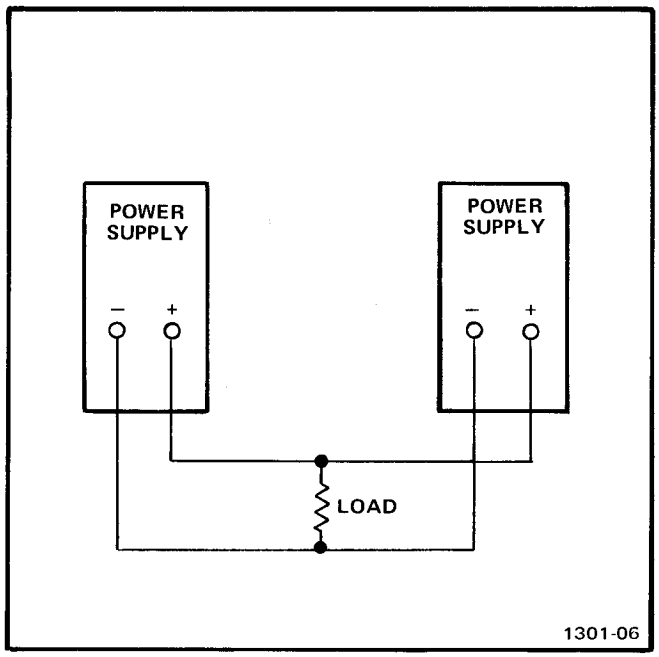


Fig. 2-5. Parallel-connected supplies.

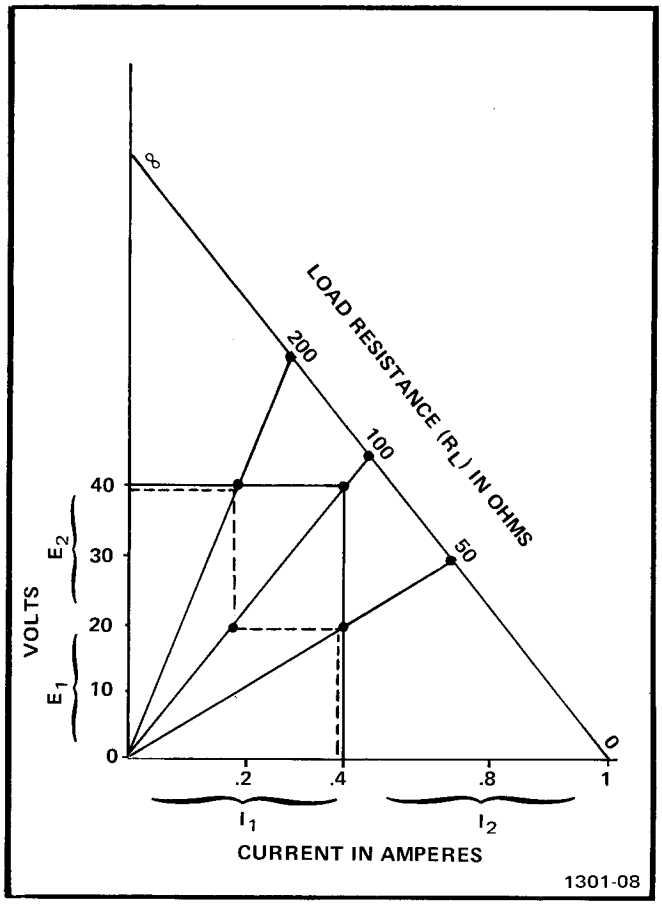


Fig. 2-7. Stair-step output characteristics of series and parallel connected supplies.

maximum voltage and current (20 V, 400 mA) the output voltage remains constant from open-circuit (∞) until the load reaches approximately 100 Ω (as illustrated by the solid line in Fig. 2-7). At this crossover point the output voltage decreases with the load and the output current is limited at 400 mA. Therefore, with resistances below approximately 100 Ω, both supplies act as current sources with output voltage variable with the load. Since both supplies are set for the same output voltage, each supply shares equally in the power output (I^2R). If one supply is set for a lower output voltage than the other, output power is shared at the same ratio as the output voltage.

Now, by setting supply E_2 for a current limit of 200 mA and varying the load over the same range, the supplies act as constant voltage sources until the load reaches approximately 200 Ω. At that crossover point, the supply set for 200 mA (E_2) becomes a current source and its output voltage decreases with the load (as illustrated by the dotted line in Fig. 2-7). At approximately 100 Ω and 20 V, supply E_2 no longer contributes to the power output. Subsequently, supply E_1 supplies all the output power and operates as a constant voltage source with output current variable with the load. Then, at approximately 50 Ω, supply E_1 crosses over and becomes a current source at its maximum output of 400 mA. Thus, by choosing the appropriate load limits and control settings, any of the four operating characteristics is possible.

Parallel-connected supplies exhibit the same "stair-step" characteristic as in series-connected operation. However, the maximum voltage available is the highest setting of either supply while the maximum current is $I_1 + I_2$.

OPERATING CONSIDERATIONS

Overheating

The PS 501 (-1) (-2) is designed to operate at an ambient temperature from 0° C to +50° C. However, when operating several power supplies in a multi-plug-in Power Module, especially at low output voltages, or when operating close to other heat-producing equipment, internal temperature may exceed safe limits and actuate a thermal cutout. Refer to the Power Module Instruction Manual for more complete information.

Load and Monitor Connections

Improper connections between the power supply output and the load(s) and/or monitoring device(s) are a common cause of errors. Multiple loads must be connected with separate pairs of leads as shown in Fig. 2-8. Monitoring devices must also be connected with separate leads as shown in Fig. 2-9. Avoid using clip leads, since their contact resistance can exceed the output impedance of the PS 501 (-1) (-2) and cause significant measurement error.

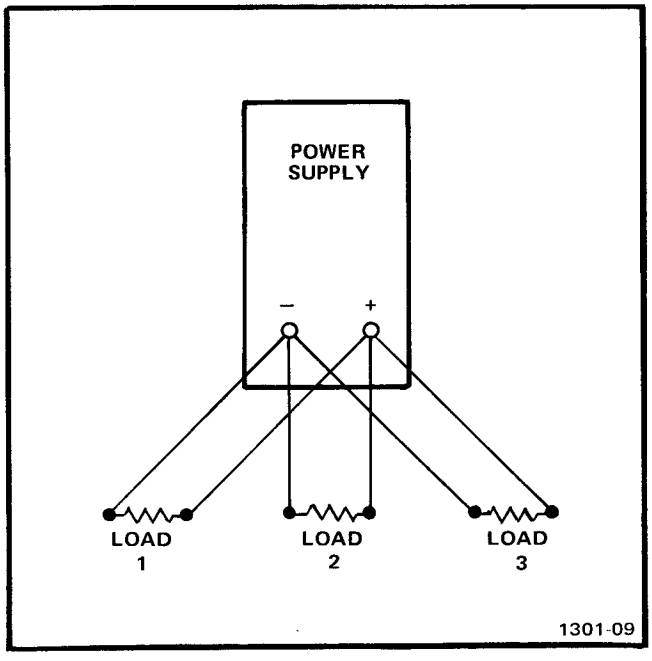


Fig. 2-8. Multiple load connections.

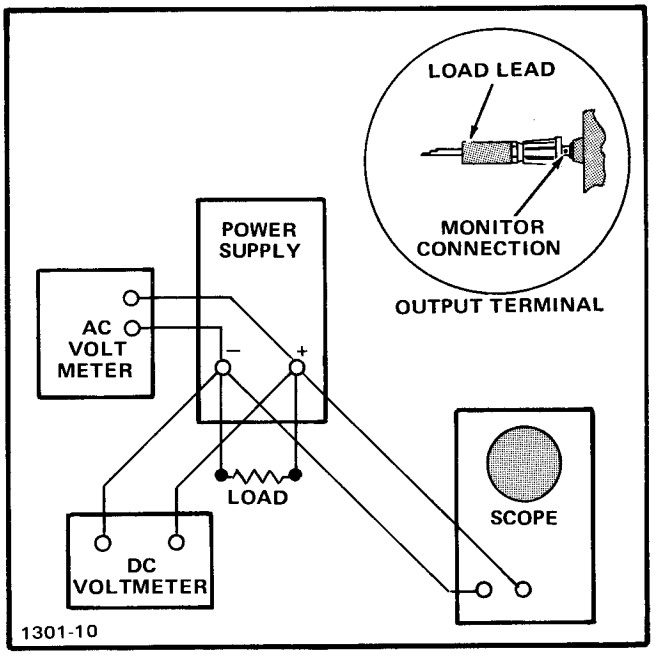


Fig. 2-9. Monitor connections.

Grounded and Floating Operation

The PS 501 (-1) (-2) is a "floating" supply since no internal connections are made to either the chassis or ground. The supply can thus be used as a positive or negative supply by simply grounding the negative or positive output terminal. However, there may be undesirable effects caused by grounding the supply to the

chassis while the load is grounded at some point removed from the supply chassis. For example, if a remote load is connected as shown in Fig. 2-10, ground currents containing the power line frequency could result and create excessive noise and ripple in series with the load. Thus, floating operation is recommended to insure against problems caused by undersirable ground currents.

Reverse Current Loading

In some bias supply and digital circuitry applications the load might behave as a current source for part of its operating cycle. Since the output circuit of a series regulated supply is unidirectional, current will not pass in the opposite direction except through undesirable paths. The internal reverse-current diodes conduct only when the PS 501 (-1) (-2) terminal voltage reverses and therefore will not work when the voltage is correctly polarized. Connecting a shunt resistor (R_s) as shown in Fig. 2-11 provides an external reverse current path so the power supply sources or delivers current only.

Overvoltage

The PS 501 (-1) (-2) is not protected from overvoltage conditions. Component failure in the PS 501 (-1) (-2) could result in a load damage if external protection is not provided. Likewise, if the load (or other instruments connected to the load) produce a voltage across the PS 501 (-1) (-2) terminals which is the same polarity but of greater amplitude, damage may result depending on the amount of overvoltage and the impedance of the load (source).

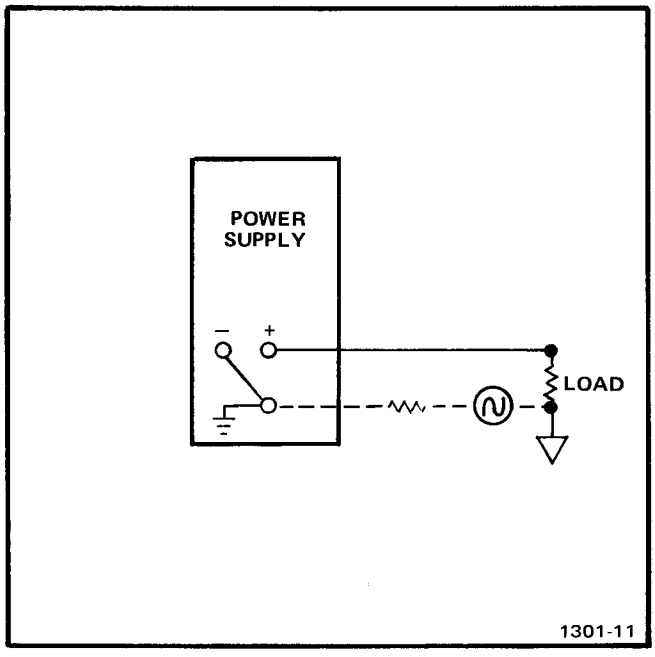


Fig. 2-10. Ground-loop current caused by remote grounded load.

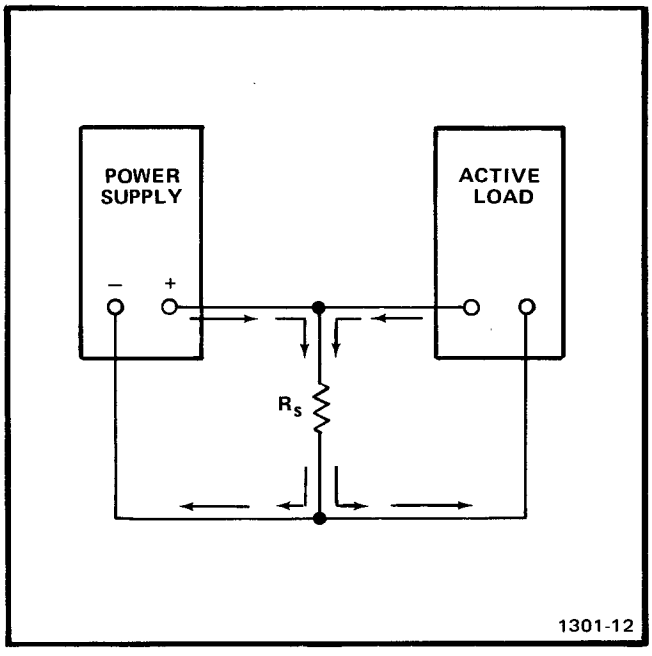


Fig. 2-11. Reverse-current shunt (R_s) with active load.

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

Introduction

This section contains a discussion of the operating modes of the PS 501, PS 501-1, and PS 501-2 Power Supplies. Circuit operation for obtaining the constant voltage and current limited output with automatic crossover, line and load regulation and 5 V ground-referenced output is described. Refer to the schematic diagram on the foldout page at the rear of this manual while reading this section.

Automatic Crossover

The PS 501 (-1) (-2) employs two operational amplifiers; U40 and U70. Amplifier U40 controls output voltage while U70 controls output current. For any value of load resistance the power supply acts either as a constant-voltage source or a current source—but never both. Automatic crossover is accomplished by combining the outputs from pin 6 of U40 and U70 in a negative-true, "OR" gate configuration (see Fig. 3-1). The amplifier with the lower output voltage at pin 6 will cause its associated diode (CR40 or CR71) to conduct, which eventually reverse biases the other diode. A portion of the current available from R51 is then diverted away from the base of Q50 and to the amplifier with the lower output. The remainder of the current drives the base of Q50 which, in turn, controls the current through the series-pass transistor to the load.

Constant Voltage/Current Limited Output

Output current or voltage varies when an imbalance occurs between the comparison voltage at pin 2 and 3 of either U40 or U70. This imbalance is caused by a change in the load resistance or in the reference voltage selected by R65, the front-panel CURRENT LIMIT potentiometer, or by R42, the front-panel VOLTS potentiometer. Fig. 3-2 illustrates the output characteristics of the power supply with various current and voltage settings and load resistances.

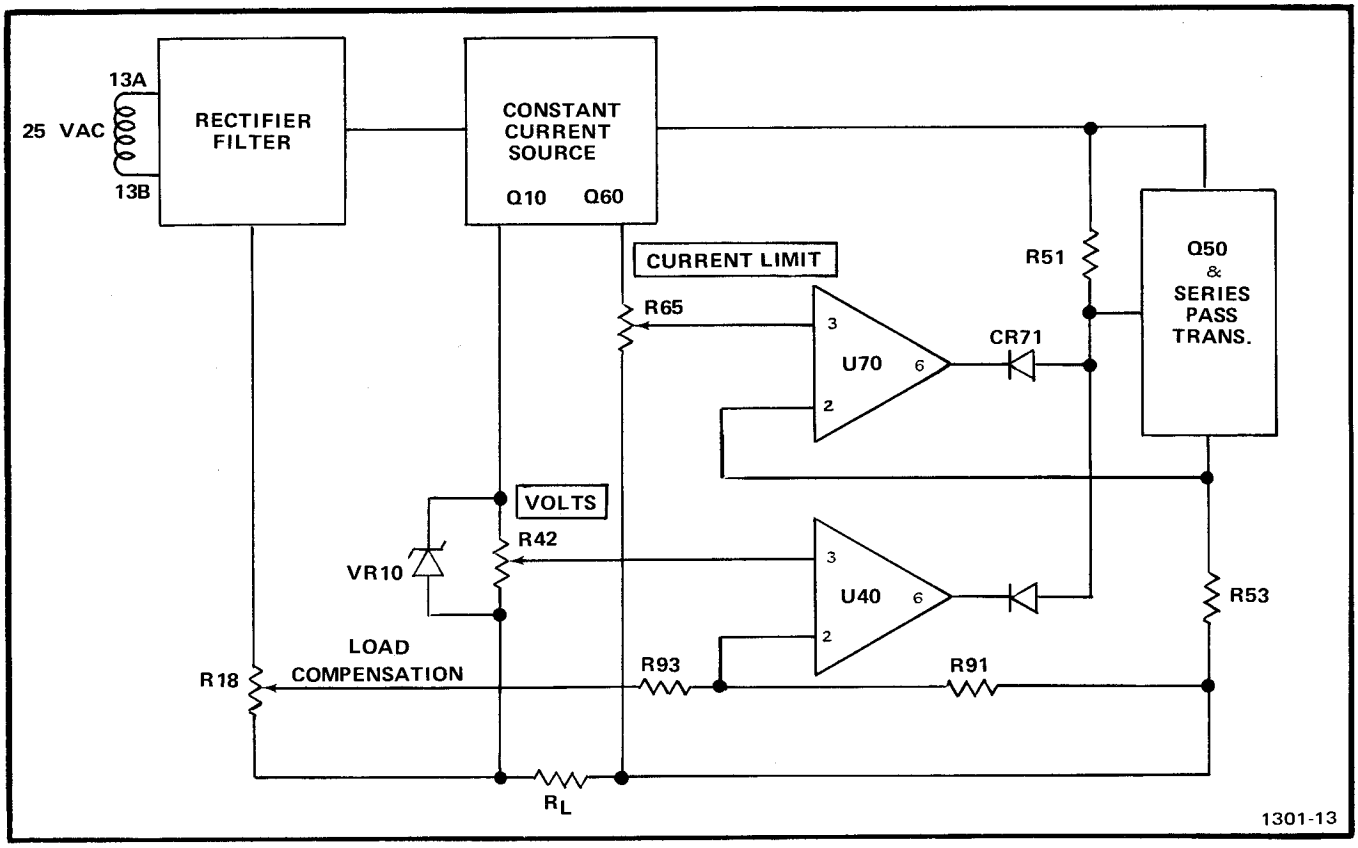


Fig. 3-1. Simplified diagram of PS 501 (-1, -2).

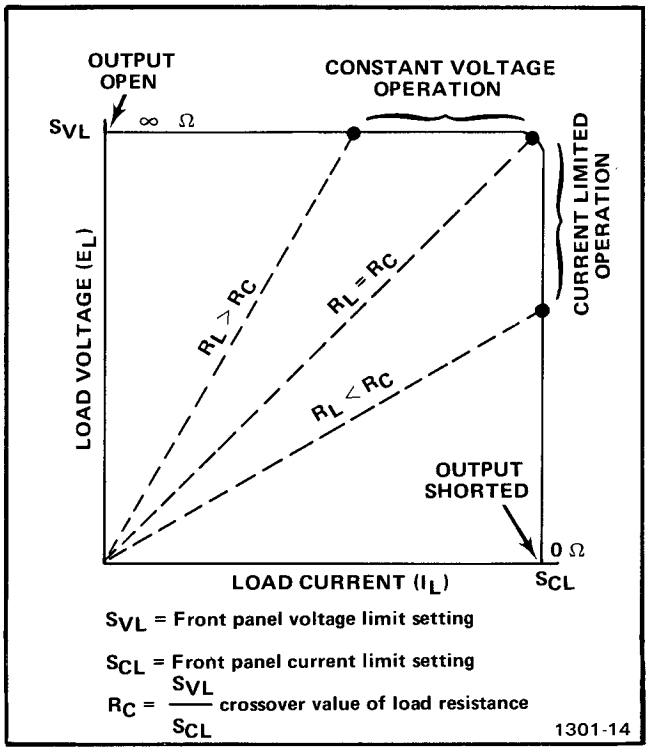


Fig. 3-2. Operating characteristics with varying currents, voltages, and loads.

Voltage and current references are generated from two constant-current sources. Q10 and Zener diode VR10 provide a constant-current to VOLTS potentiometer R42 which then establishes the non-inverting reference input to pin 3 of U40, the voltage control amplifier. The collector of Q60 provides constant current to CURRENT LIMIT potentiometer R65 which establishes the non-inverting reference input to pin 3 of U70, the current control amplifier.

With no load connected to the output terminals, $R_L = \infty$, $I_L = 0$ and $E_L = S_{SL}$, the front-panel voltage limit setting (see Fig. 3-2). When a load is connected to the power supply output terminals, output current increases and results in an increase in the voltage drop across current-sensing resistor R55. This drop provides the inverting input to pin 2 of U70. If the voltage at pin 2 exceeds the reference voltage at pin 3, then the voltage at pin 6 drops to a level where CR71 turns on, and CR40 is reverse biased; thus, control crosses over to U70, the current-controlling amplifier. U70 holds the voltage at pin 2 to that set at pin 3 by R65, the CURRENT LIMIT potentiometer (S_{CL}). The supply is now in current-limited operation (see Fig. 3-2).

Load Regulation

With no load connected to the output terminals of the PS 501 (-1) (-2), all of the output current flows through feedback divider R81/R83 (approximately 1 mA/V). When a load is connected to the output terminals, output current must increase to maintain a constant output voltage.

An increase in output current cannot occur unless the drive to the base of Q50 and the series pass transistor is also increased. The increase in the voltage differential between pin 2 and 3 of U40 necessary to drive Q50 and the series pass transistor (refer to the discussion of constant voltage/current-limited operation) is obtained by applying a small negative voltage developed by the load current through R15 in parallel with Load Compensation resistor R18. By adjusting R18, the proper feedback is developed through divider R81/R83 to increase the output current and subsequently hold the output voltage constant regardless of the load.

Line Regulation

Resistors R12, R13, and R14 enhance the stability of zener reference VR10 by establishing the zener current at approximately 7.5 mA. R12 stabilizes the zener current with respect to the line voltage. VR11 and R11 provide a reference voltage to constant current source Q10.

If the line voltage varies, a corresponding voltage change occurs across C10. This voltage change would normally affect the collector current through Q10. However, the self-bias generated across R13 and R14 partially stabilizes the collector current; further stabilization occurs when the current through R12 is added to the self-bias from R13 and R14. The nearly constant voltage drop across R14 provides bias for constant current source Q60, while CR66 provides temperature compensation.

+5 V Ground-Referenced Supply

The Power Module supplies +5 V through pins 2A and 3A on the plug-in rear connector to pin 1 and 3 of integrated circuit U2. U2 provides a regulated +5 V output limited at 1A from pin 2 and 3 to output connectors J5 and J6 on the front panel.

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, some 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 at 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

Performance Description	Requirement	Application	Example
Oscilloscope	2 mV/Div, 5 MHz	Ripple Check	TEKTRONIX T921, T922
Power Module		All Checks	TEKTRONIX TM 503, TM 504
Digital Voltmeter	0 to 25 Vdc; 0 to 2 Adc 0.1% accuracy	Voltage and current checks	TEKTRONIX DM 501A, DM 502A
Load Resistors	2 kΩ 5 W; 50 Ω 25 W; 5 Ω 25 W	Current Checks	Tektronix Part Numbers 308-0003-00 308-0164-00 308-0177-00
Variable Transformer	100 V to 130 V	Line Voltage Checks	

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PRELIMINARY PROCEDURE

1. Ensure that the power module regulating range selected includes the applied line voltage. Refer to the installation section of the power module manual.

2. Ensure that all test equipment is suitably adapted to the applied line voltage.

3. Install the PS 501 into the power module and, if applicable, install the TM 500-Series test equipment into the test equipment power module.

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

1. Check Output Voltage Range

a. Connect the output of the variable supply to the digital voltmeter.

b. CHECK that the VOLTS control can vary the output voltage from 0 V to 20 V. (19.99 V for PS 501-1.)

2. CHECK Current Limit Range

a. Connect the output of the variable supply to the digital voltmeter.

b. Set the output voltage to 20 V.

c. Set the CURRENT LIMIT control to minimum.

d. Connect the 2 kΩ resistor across the output of the power supply and CHECK that the limit light comes on. Remove the resistor.

e. Set the CURRENT LIMIT control to maximum.

f. Connect the 50 Ω resistor across the output.

g. CHECK that the current limit light comes on when the CURRENT LIMIT control is rotated towards minimum. Remove the resistor.

3. CHECK Output Accuracy (PS 501-1 and PS 501-2)

a. Connect the output of the variable supply to the digital voltmeter.

b. CHECK the output voltage when the supply is set to 5 V, 10 V, 15 V, and 20 V. (±0.4 V for the PS 501-2, ±0.5% for the PS 501-1).

4. CHECK Line and Load Regulation

a. Connect the output of the variable supply to the digital voltmeter. Connect the variable transformer in series with the power module input power. Set the voltage to 117 V.

b. Set the output VOLTAGE to 20 V.

c. Set the CURRENT LIMIT to maximum (fully cw).

d. Connect the 50 Ω resistor to the output and CHECK that the output voltage does not change more than 1 mV.

e. Vary the input line voltage to 105 V and then to 129 V.

f. CHECK that the output voltage does not vary more than ±5 mV.

g. Remove the digital voltmeter and connect the oscilloscope to the power supply output. Do not remove the 50 Ω resistor.

h. CHECK that the ripple and noise is 5 mV or less. Remove the 50 Ω resistor.

5. CHECK Output Voltage of 5 V Supply

a. Connect the digital voltmeter to the output of the 5 V supply.

b. CHECK that the voltage is between +4.75 and +5.25 V.

c. CHECK that the output voltage varies 100 mV or less when the 5 Ω resistor is connected across the output.

d. CHECK that the output voltage varies 50 mV or less as the line voltage is changed from 117 V to 105 V and that

it also varies 50 mV or less as the line voltage is changed from 117 V to 129 V.

e. Remove the digital voltmeter and connect the oscilloscope to the output of the 5 V supply. Do not remove the 5 Ω resistor.

f. CHECK that there is 5 mV or less ripple (peak-to-peak) with the 1 A load.

g. Remove the test equipment. This completes the performance check.

ADJUSTMENT PROCEDURE

Preliminary Information

Read the Operating Instructions in Section 2 before calibrating the instrument.

This instrument should be calibrated in an ambient temperature between +20°C and +30°C (+68°F and +86°F) for specified accuracy.

Do not preset internal controls unless they are known to be significantly out of adjustment, or if repairs have been made in the circuit. In these instances, the internal adjustments can be set to mid-range.

Preparation

a. Remove the cover from the left side of the PS 501 (-1) (-2) and if necessary, blow off accumulated dust with low pressure air.

b. Insert the PS 501 (-1) (-2) into the left compartment of the power module. It may be more convenient to use the flexible plug-in extender, to make the internal adjustments, but it is not mandatory. If the flexible extender is not used, it will be necessary to remove the power module cover.

c. Refer to the fold-out adjustments page for the location of internal adjustments.

1. ADJUST Load Compensation (R18)

a. Connect the 50 Ω resistor across the PS 501 (-1) (-2) variable supply output terminals.

b. Ac couple the Test Oscilloscope to the output terminals and turn the front panel VOLTS and CURRENT LIMIT controls fully clockwise. Note the displayed level on the Test Oscilloscope.

c. Remove the load resistor and note the shift in the displayed level.

d. ADJUST R18 (Load Compensation) for no shift in the displayed level as the load resistor is connected and disconnected.

2. ADJUST Zero Volts (PS 501 and PS 501-2) (R38)

a. Connect the digital voltmeter to the variable power supply output terminals.

b. Set the front panel VOLTS control for zero volts (fully ccw).

c. ADJUST R38 for 0.00 V on the digital voltmeter.

d. Remove the digital voltmeter.

3. ADJUST One Volt Output (R38) (PS 501-1 only)

a. Connect the digital voltmeter to the variable power supply output terminals.

b. Set the front panel VOLTS control to 1.00 with the range pushbutton out (0—10 V).

c. ADJUST R38 for 1.000 V at the output.

4. ADJUST +10 V and +20 V Outputs (PS 501-1 only) (R42B and R45)

a. Connect the digital voltmeter to the PS 501-1 output terminals.

b. Set the front panel VOLTS control fully cw to 0.00. Don't set it beyond 0.00.

c. Press the range push button in (10—20 V).

d. ADJUST R42B (+20 V) for 20.03 on the digital voltmeter.

e. Release the range push button to the out position (0—10 V).

f. ADJUST R45 (+10 V) for 10.00 V on the digital voltmeter.

g. INTERACTION Repeat adjustments of R38 (One Volt Adjust), R42B (+20 V), and R45 (+10 V) until interaction is minimized.

h. Remove the digital voltmeter.

i. This completes the adjustment procedure.

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MAINTENANCE

GENERAL

Introduction

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

Cabinet Removal

WARNING

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

Cleaning

CAUTION

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

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

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

Preventive Maintenance

Preventive maintenance steps performed on a regular basis will enhance the reliability of the instrumentation systems. However, periodic checks of the semiconductors in the absence of a malfunction are not recommended as preventive maintenance measures. See the semiconductor checking information under Troubleshooting Techniques, which follow. A convenient time to perform preventive maintenance is just before instrument calibration.

Calibration

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

TROUBLESHOOTING AIDS

Introduction

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

Circuit Description

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

Diagrams

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

Cam Switch Charts

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

Circuit Board Illustrations

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

Component and Wiring Color Codes

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

POWER CORD CONDUCTOR IDENTIFICATION

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

Testing Equipment

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

TROUBLESHOOTING TECHNIQUES

Introduction

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

Control Settings

An apparent trouble may only be incorrect control settings. If there is any question about the correct function or operation of any control, see the Operating Instructions section of the manual.

System and Associated Equipment

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

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

Visual Check

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

Instrument Calibration

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

Circuit Isolation

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

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

Voltages and Waveforms

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

Component Checking

If a component cannot be disconnected from its circuit, then the effects of the associated circuitry must be considered when evaluating the measurement. Except for soldered-in transistors and integrated circuits, most components can be unsoldered and lifted at one end from the circuit board.

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

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

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

Diodes. A diode can be checked for an open or shorted condition by measuring the resistance between terminals with an ohmmeter on a scale having a low internal source current, such as the R X 1k scale. The resistance should be very high in one direction and very low when the meter leads are reversed.

CAUTION

When checking diodes, do not use an ohmmeter scale that has a high internal current since high currents may damage the diodes under test.

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

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

PARTS ORDERING AND REPLACING

Ordering

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

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

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

1. Instrument Type (PS 501, SG 502, DC 501, etc.)

2. Instrument Serial Number (For example, B010251.)

3. A description of the part (if electrical include the circuit number).

4. Tektronix part number.

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

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

Replacing

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

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

To remove or replace a board, proceed as follows:

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

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

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

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

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

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

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

Static-Sensitive Components

CAUTION

Static discharge can damage any semiconductor component in this instrument.

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

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.

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

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

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

5. Keep the component leads shorted together whenever possible.

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

7. Do not slide the components over any surface.

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

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

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

Test Equipment

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

Interconnecting Pins. To replace a pin that is mounted on a circuit board, first disconnect any pin connectors. Then, unsolder the damaged pin and pull it out of the board with a pair of pliers. Be careful not to damage the wiring on the board with too much heat. Ream out the hole in the circuit board with a 0.031-inch drill. Remove the ferrule from the new interconnecting pin and press the new pin into the hole in the circuit board. Position the pin

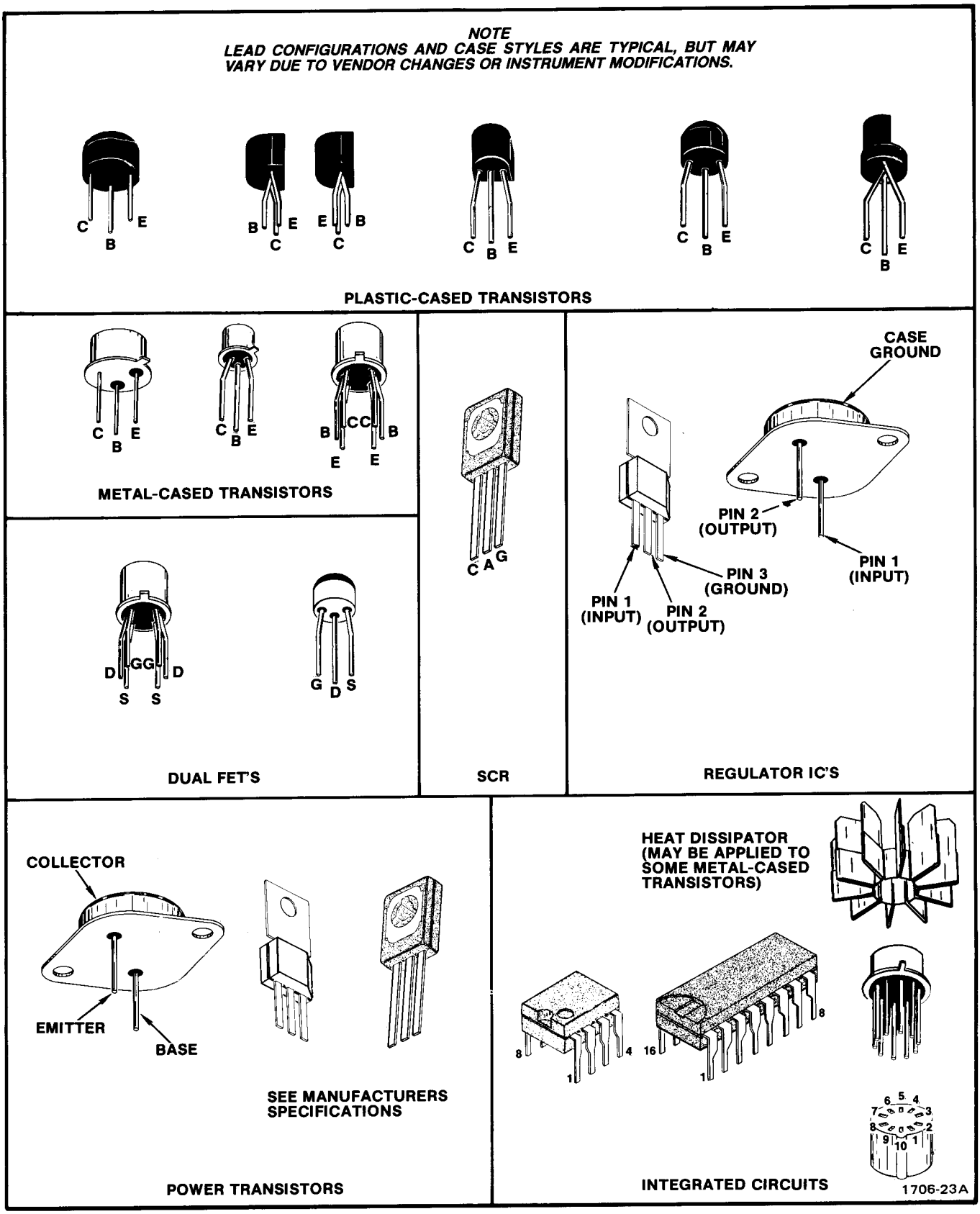
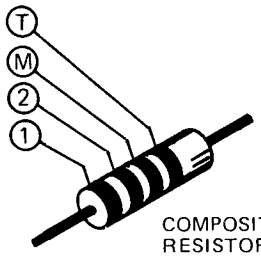
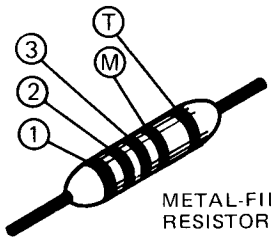


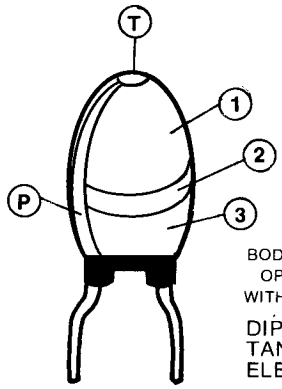
Fig. 5-1. Semiconductor device lead configurations found in the TM 500 family.



COMPOSITION RESISTORS



METAL-FILM RESISTORS



BODY COLOR OPTIONAL WITH VENDOR

DIPPED TANTALUM ELECTROLYTICS

(1) (2) and (3) - 1ST, 2ND, AND 3RD SIGNIFICANT FIGS. (T) AND/OR (TC) COLOR CODE MAY NOT BE PRESENT ON SOME CAPACITORS;
(M) - MULTIPLIER (T) - TOLERANCE;
(TC) - TEMPERATURE COEFFICIENT. (P) - POLARITY AND VOLTAGE RATING

COLOR	SIGNIFICANT FIGURES	RESISTORS		CAPACITORS		
		MULTIPLIER (OHMS)	TOLERANCE	MULTIPLIER (pF)	TOLERANCE	VOLTAGE RATING
BLACK	0	1	---			4VDC
BROWN	1	10	±1%			6VDC
RED	2	10^2 or 100	±2%			10VDC
ORANGE	3	10^3or 1 K	±3%			15VDC
YELLOW	4	10^4 or 10K	±4%	10^4 or 10,000		20VDC
GREEN	5	10^5 or 100 K	±1/2%	10^5or 100,000		25VDC
BLUE	6	10^6 or 1 M	±1/4%	10^6 or 1,000,000		35VDC
VIOLET	7	---	±1/10%	10^7 or 10,000,000		50VDC
GRAY	8	---	---			---
WHITE	9	---	---			
GOLD	---	10^{-1} or 0.1	±5%	---	±5%	---
SILVER	---	10^{-2} or 0.01	±10%	---	±10%	---
NONE	---	---	±20%	---	–20%	---

2815-05 (C1862-74)

Fig. 5-2. Color code for resistors and capacitors.

in the same manner as the old pin and solder it in. If the old pin was bent at an angle to mate with a connector, bend the new pin to match the associated pins.

NOTE

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

Table 5-1

RELATIVE SUSCEPTIBILITY TO STATIC DISCHARGE DAMAGE

Semiconductor Classes	Relative Susceptibility Levels[a]
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

[a] Voltage equivalent for levels:

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

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

Table 5-2

MAINTENANCE AIDS

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

Description	Specifications	Use	Example
1. Soldering Iron	15 Watt	General soldering and unsoldering	ANTEX PRECISION Model C
2. Screwdriver	Phillips #1 tip	Assembly and Disassembly	Xcelite Model X108
3. Screwdriver	Phillips #2 tip	Assembly and Disassembly	Xcelite Model X102
4. Screwdriver	Three-inch shaft; 3/32 inch flat bit	General	Xcelite R3323
5. Torque Screwdriver	1.5 inch-pounds	FUNCTION switch assembly	Sturtevant-Richmont Torque Products Model PM-5-Roto-Torq
6. Nutdrivers	1/4 inch, 5/16 inch 3/8 inch, 7/16 inch	General	Xcelite #8, #10, #12 & #14
7. Open End Wrench	11/16 inch	General	
8. Solder Wick		Unsoldering	Hex Wik #887-10
9. Lubricant	Versilube	FUNCTION switch lubrication	Tektronix Part Number 006-1353-00
10. Spray Cleaner	No Noise	FUNCTION switch pad cleaning	Tektronix Part Number 006-0442-02
11. Vacuum Desoldering Tool	Antistatic	General	Tektronix Part Number 003-0795-00
12. I.C. Extracting Tool		General	Tektronix Part Number 003-0619-00
13. Cam Switch Repair Kit		Cam switches	Tektronix Part Number 040-0541-00
14. Extender Cables		General	Tektronix Part Number 067-0645-02
15. Wrist Strap		Handling static sensitive devices	Tektronix Part Number 006-2404-01

@ NOV 1980

Table 5-3

REAR CONNECTOR PIN ASSIGNMENTS

	B		A	
	28	Power	28	
	27	supply	27	
Pin 3 of U70	26	plug-in	26	
Pin 3 of U40	25	barrier slot	25	
Reference Common	24		24	Reference Common
	23		23	Sense
	22		22	Output
Unregulated Common	21		21	Unregulated Common
	20		20	
Emitter of Series Pass Transistor	19		19	
	18		18	
	17		17	
	16		16	
	15		15	
	14		14	
25 VAC Winding	13		13	25 VAC Winding
+33.5 V Filtered DC	12		12	+33.5 V Filtered DC
Collector lead of PNP Series-Pass Transistor	11		11	Base lead of PNP Series-Pass Transistor
Transformer Shield	10	TM 500	10	Emitter lead of PNP Series-Pass Transistor
33.5 V Common	9	barrier	9	33.5 V Common
−33.5 V Filtered DC	8	slot	8	−33.5 V Filtered DC
Collector lead of NPN Series-Pass Transistor	7		7	Emitter lead of NPN Series-Pass Transistor
Not Used	6		6	Base lead of NPN Series-Pass Transistor
17.5 VAC Winding	5		5	17.5 VAC Winding
+11.5 V Common	4		4	+11.5 V Common
+11.5 V Common	3		3	+11.5 V Common
+11.5 V Filtered DC	2		2	+11.5 V Filtered DC
25 VAC Winding	1		1	25 VAC Winding
	B		A	

Rear-view of plug-in

Assignments listed for pins 1A—13A and 1B—13B are available in all power modules.

PS 501, PS 501-1, REAR INTERFACE INPUT-OUTPUT CONTACT ASSIGNMENTS

The key-slot between contacts 19 and 20 identify the PS 500 Power Supplies as member of TM 500 Series Family "C". Once a Power Module compartment has been wired with specialized interconnections for these Power Supply plug-ins, a barrier should be installed in that compartment to match the key-slot. For extra barriers, order Tektronix part number 214-1593-02.

All of the assigned pads of these power supplies are connected to circuitry by ECB runs. Unassigned pins are available at the rear connector for routing signals to and from the PS 501's for specialized applications. One or more compartments of a Power Module can be wired with barriers installed to provide specific functions between compartments.

The reference commons and the load commons (sometimes referred to unregulated commons) are all floating. Grounding of the plus or minus terminal determines the output voltage polarity.

Remote voltage programming is possible through the PS 501 and PS 501-1 rear interface contacts. 25B is the positive rear interface input voltage contact, and 24A or 24B is the minus return. (Ref. commons.) A one volt input will produce approximately 3 V at the front panel output. A single precaution should be taken. Disconnect the COARSE VOLTS potentiometer center-tap lead to avoid overloading the external voltage source.

No external load should be provided for the remote voltage input.

The rear interface contact 26B assignment is plus Input Remote Current Limit. The minus end of the input voltage is tied to contact 22A. In remote current limiting, lift the center-tap of the front panel CURRENT LIMIT potentiometer. The current limiting control voltage factor is 2 V/A, up to the maximum output capability of the Power Supply, which typically exceeds it's 400 mA spec by about another 100 mA.

If an operator desires output current monitoring, connect a voltmeter from rear I/O contacts 19B and 22A. (The current limiting output is developed between these contacts.) The internal 2 Ω resistor will drop 1 V per 500 mA.

Some operators may wish to use rear interface connection 23A for remote sensing, in which case the front panel connection must be lifted. The sense connections then will provide proper regulation to external equipment wired to the Power Module. The sense leads should be connected to an Op Amp, so for remote sensing through the rear interface, the Op Amp senses the voltage at the load. Keep the wiring as short as possible.

When using a PS 500 Series Power Supply rear interface for remote sensing, it is good practice to connect a filter capacitor across the load. (Approximately 100 μfd.) This is to prevent oscillations and spurious signals from occurring.

For remote sensing, the positive side of the external load is connected to rear interface I/O contact 23A. Contact 24A or 24B (the minus return) is connected to the negative side of the load.

It is possible to use remote sensing while using remote voltage programming via the rear interface.

The positive regulated output is obtained from 22A, with 24A-B, the reference common.

REPACKAGING FOR SHIPMENT

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

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

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

The carton test strength for your instrument is 200 pounds.

OPTIONS

None available at this time.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

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

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

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

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

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

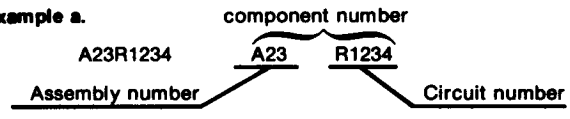
ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

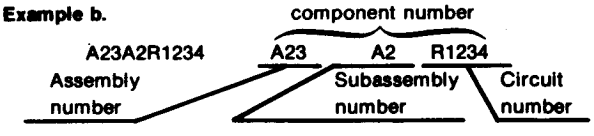
A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.



Read: Resistor 1234 of Assembly 23

Example b.



Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

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.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
12697	CLAROSTAT MFG. CO., INC.	LOWER WASHINGTON STREET	DOVER, NH 03820
14433	ITT SEMICONDUCTORS	3301 ELECTRONICS WAY P O BOX 3049	WEST PALM BEACH, FL 33402
15238	ITT SEMICONDUCTORS, A DIVISION OF INTER NATIONAL TELEPHONE AND TELEGRAPH CORP.	P.O. BOX 168, 500 BROADWAY	LAWRENCE, MA 01841
31918	IEE/SCHADOW INC.	8081 WALLACE ROAD	EDEN PRAIRIE, MN 55343
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
33005	JEWELL ELECTRICAL INSTRUMENTS, INC.	GRENIER FIELD	MANCHESTER, NH 03105
50434	HEWLETT-PACKARD COMPANY	640 PAGE MILL ROAD	PALO ALTO, CA 94304
50522	MONSANTO CO., ELECTRONIC SPECIAL PRODUCTS	3400 HILLVIEW AVENUE	PALO ALTO, CA 94304
56289	SPRAGUE ELECTRIC CO.	87 MARSHALL ST.	NORTH ADAMS, MA 01247
58474	SUPERIOR ELECTRIC CO.	383 MIDDLE ST.	BRISTOL, CT 06010
71450	CTS CORP.	905 N. WEST BLVD	ELKHART, IN 46514
71744	CHICAGO MINIATURE LAMP WORKS	4433 RAVENSWOOD AVE.	CHICAGO, IL 60640
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
87034	ILLUMINATED PRODUCTS INC., A SUB OF OAK INDUSTRIES, INC.	2620 SUSAN ST, PO BOX 11930	SANTA ANA, CA 92711
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E. WASHINGTON STREET P. O. BOX 372	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2012-00			CKT BOARD ASSY:MAIN	80009	670-2012-00
A1	----- -----			(PS501 ONLY)		
A1	670-2116-00	B010100	B051569	CKT BOARD ASSY:MAIN	80009	670-2116-00
A1	----- -----			(PS501-1 ONLY)		
A1	670-2116-01	B051570	B052649	CKT BOARD ASSY:MAIN	80009	670-2116-01
A1	----- -----			(PS501-1 ONLY)		
A1	670-2116-02	B052650	056209	CKT BOARD ASSY:MAIN	80009	670-2116-02
A1	----- -----			(PS501-1 ONLY)		
A1	670-2116-03	B056210		CKT BOARD ASSY:MAIN		670-2116-03
A1	----- -----			(PS501-1 ONLY)		
A1	670-2673-00	B010100	B041139	CKT BOARD ASSY:MAIN	80009	670-2673-00
A1	----- -----			(PS501-2 ONLY)		
A1	670-2673-01	B041140		CKT BOARD ASSY:MAIN	80009	670-2673-01
A1	----- -----			(PS501-2 ONLY)		
A2	670-2089-00			CKT BOARD ASSY:SECONDARY	80009	670-2089-00
A2	----- -----			(PS501-1 ONLY)		
C2	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	56289	1C10Z5U223M050B
C3	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C10	290-0520-00	B010100	B029999	CAP.,FXD,ELCTLT:4500UF,+100-0%,40V	56289	68D10474
C10	290-0509-00	B030000		CAP.,FXD,ELCTLT:3000UF,+100-10%,50V	56289	68D10454
C20	290-0324-00	B010100	B050409	CAP.,FXD,ELCTLT:750UF,+75-10%,40V	56289	D46454
C20	---- ----			(PS501 ONLY)		
C20	290-0509-00	B050410		CAP.,FXD,ELCTLT:3000UF,+100-10%,50V	56289	68D10454
C20	---- ----			(PS501 ONLY)		
C20	290-0324-00	B010100	B050529	CAP.,FXD,ELCTLT:750UF,+75-10%,40V	56289	D46454
C20	---- ----			(PS501-1 ONLY)		
C20	290-0509-00	B050530		CAP.,FXD,ELCTLT:3000UF,+100-10%,50V	56289	68D10454
C20	---- ----			(PS501-1 ONLY)		
C35	290-0524-00			CAP.,FXD,ELCTLT:4.7UF,20%,10V	90201	TDC475M010EL
C55	290-0519-00			CAP.,FXD,ELCTLT:100UF,20%,20V	90201	TDC107M020WLD
C81	290-0517-00	B010100	B010201	CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
C81	---- ----			(PS501, PS501-1 ONLY)		
C81	283-0111-00	B010202		CAP.,FXD,CER DI:0.1UF,20%,50V	56289	273C11
C81	---- ----			(PS501, PS501-1 ONLY)		
C81	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	56289	273C11
C81	---- ----			(PS501-2 ONLY)		
CR10	152-0488-00			SEMICOND DEVICE:SILICON,200V,1500MA	04713	SDA317
CR20	152-0488-00			SEMICOND DEVICE:SILICON,200V,1500MA	04713	SDA317
CR40	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR55	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
CR66	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR70	150-1001-01	B010100	B029999	LAMP,LED:RED,2V,100MA	50434	HLMP-3200
CR70	150-1001-00	B030000		LT EMITTING DIO:RED,66ONM,100MA MAX	50522	MV5024
CR71	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR74	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
DS70	150-0107-00	B010100	B051569	LAMP,INCAND:12V,0.04A,T-1	87034	227AS25
DS70	---- ----			(PS501-1 ONLY)		
DS70	150-0109-00	B051570		LAMP,INCAND:18V,26MA	71744	CM7220
DS70	---- ----			(PS501-1 ONLY)		
DS70	150-0107-00	B010100	B041139	LAMP,INCAND:12V,0.04A,T-1	87034	227AS25
DS70	---- ----			(PS501-2 ONLY)		
DS70	150-0109-00	B041140		LAMP,INCAND:18V,26MA	71744	CM7220
DS70	---- ----			(PS501-2 ONLY)		

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
J5	129-0064-01			POST,BDG,ELEC:RED,5-WAY MINIATURE	58474	A207799-G2
J6	129-0064-02			POST,BDG,ELEC:WHITE,5-WAY,MINIATURE	58474	207784-G5
J50	129-0064-01			POST,BDG,ELEC:RED,5-WAY MINIATURE	58474	A207799-G2
J52	129-0064-00			POST,BDG,ELEC:CHARCOAL,5-WAY MINIATURE	58474	A207799-G7
M55	149-0036-00			AMMETER:DC,0-1 MA,77 OHM,+/-10%	33005	MODEL 81T
M55	----- -----			(PS501-2 ONLY)		
Q10	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
Q50	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q60	151-0188-00			TRANSISTOR:SILICON,PNP	04713	SPS6868K
R3	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R11	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R12	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
R13	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R14	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R18	311-1120-00			RES.,VAR,NONWIR:100 OHM,30%,0.25W	71450	201-YA5531
R19	301-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.50W	01121	EB4715
R26	303-0751-00			RES.,FXD,CMPSN:750 OHM,5%,1W	01121	GB7515
R35	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R38	311-1363-00			RES.,VAR,NONWIR:TRMR,50K OHM,0.25W	71450	201-YA5553
R39	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R41	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R42	311-1343-00			RES.,VAR,NONWIR:PNL,20K X 50 OHM,0.5W	01121	10M791
R42	----- -----			(PS501, PS501-2 ONLY)		
R42	311-1341-00			RES.,VAR,WW:10K OHM,5%,0.25%	01121	534-9608103J
R42	----- -----			(PS501-1 ONLY)		
R42	311-1120-00	B010100	B052649	RES.,VAR,NONWIR:100 OHM,30%,0.25W	71450	201-YA5531
R42	----- -----			(PS501-1 ONLY)		
R42	311-1124-00	B052650		RES.,VAR,NONWIR:TRMR,250 OHM,0.25W	71450	201-YA5533
R42	----- -----			(PS501-1 ONLY)		
R44	321-0286-00			RES.,FXD,FILM:9.31K OHM,1%,0.125W	91637	MFF1816G93100F
R44	----- -----			(PS501-1 ONLY)		
R45	311-1264-00			RES.,VAR,NONWIR:1.5K OHM,10%,0.50W	32997	3329P-L58-152
R45	----- -----			(PS501-1 ONLY)		
R51	301-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.50W	01121	EB3025
R52	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R53	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
R54	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R55	308-0240-00			RES.,FXD,WW:2 OHM,5%,3W	91637	RS2B-D2R000J
R56	308-0751-00			RES.,FXD,WW:0.175 OHM,5%,1W	80009	308-0751-00
R56	----- -----			(PS501-2 ONLY)		
R57	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
R57	----- -----			(PS501-2 ONLY)		
R61	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R63	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R65	311-1311-00	B010100	B019999	RES.,VAR,NONWIR:1K OHM,20%,1W	01121	73M4G048L102M
R65	----- -----			(PS501, PS501-1 ONLY)		
R65	311-1369-00	B020000	056209	RES.,VAR,NONWIR:PNL,1K OHM,1W	01121	12M887
R65	----- -----			(PS501, PS501-1 ONLY)		
R65	311-1095-00	B056210		RES.,VAR,NONWIR:10K OHM,20%,0.50W	12697	382-CM40386
R65	----- -----			(PS501, PS501-1 ONLY)		
R65	311-1369-00			RES.,VAR,NONWIR:PNL,1K OHM,1W	01121	12M887
R65	----- -----			(PS501-2 ONLY)		
R66	321-0193-07	B056210		RES.,FXD,FILM:1K OHM,0.1%,0.125W	91637	MFF1816C10000B
R66	----- -----			(PS501-1 ONLY)		

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R68	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R74	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R76	315-0122-00	B010100	B051569	RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R76	----- -----			(PS501-1 ONLY)		
R76	301-0122-00	B051570		RES.,FXD,CMPSN:1.2K OHM,5%,0.50W	01121	EB1225
R76	----- -----			(PS501-1 ONLY)		
R76	315-0122-00	B010100	B041139	RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R76	----- -----			(PS501-2 ONLY)		
R76	301-0122-00	B041140		RES.,FXD,CMPSN:1.2K OHM,5%,0.50W	01121	EB1225
R76	----- -----			(PS501-2 ONLY)		
R81	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
R83	321-0166-00			RES.,FXD,FILM:523 OHM,1%,0.125W	91637	MFF1816G523R0F
R83	----- -----			(PS501, PS501-2 ONLY)		
R83	321-0191-00	B010100	B052649	RES.,FXD,FILM:953 OHM,1%,0.125W	91637	MFF1816G953R0F
R83	----- -----			(PS501-2 ONLY)		
R83	321-0188-00	B052650		RES.,FXD,FILM:887 OHM,1%,0.125W	91637	MFF1816G887R0F
R83	----- -----			(PS501-1 ONLY)		
S10	260-1209-00			SWITCH,PUSH:4PDT,1A,25VDC	31918	601347
S42	260-1209-00			SWITCH,PUSH:4PDT,1A,25VDC	31918	601347
S42	----- -----			(PS501-1 ONLY)		
S55	260-1445-00			SWITCH,PUSH:1 STA,NON-SHORT	80009	260-1445-00
S55	----- -----			(PS501-2 ONLY)		
U2	156-0176-00			MICROCIRCUIT,LI:5V REGULATOR	07263	UA309KC
U40	156-0067-00	B010100	B010198	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	01295	MICROA741CP
U40	----- -----			(PS501 ONLY)		
U40	156-0067-06	B010199		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,SEL	02735	CA741CJG
U40	----- -----			(PS501 ONLY)		
U40	156-0067-06	B010100	B010137	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,SEL	02735	CA741CJG
U40	----- -----			(PS501-1 ONLY)		
U40	156-0067-06	B010138		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,SEL	02735	CA741CJG
U40	----- -----			(PS501-1 ONLY)		
U40	156-0067-06			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,SEL	02735	CA741CJG
U40	----- -----			(PS501-2 ONLY)		
U70	156-0067-00	B010100	B010198	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	01295	MICROA741CP
U70	----- -----			(PS501 ONLY)		
U70	156-0067-06	B010199		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,SEL	02735	CA741CJG
U70	----- -----			(PS501 ONLY)		
U70	156-0067-00	B010100	B010137	MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	01295	MICROA741CP
U70	----- -----			(PS501-1 ONLY)		
U70	156-0067-06	B010138		MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,SEL	02735	CA741CJG
U70	----- -----			(PS501-1 ONLY)		
U70	156-0067-06			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER,SEL	02735	CA741CJG
U70	----- -----			(PS501-2 ONLY)		
VR10	152-0461-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	04713	SZG25002K2
VR10	----- -----			(PS501, PS501-2 ONLY)		
VR10	152-0212-00			SEMICOND DEVICE:ZENER,0.5W,9V,5%	04713	SZ50646RL
VR10	----- -----			(PS501-1 ONLY)		
VR11	152-0212-00			SEMICOND DEVICE:ZENER,0.5W,9V,5%	04713	SZ50646RL
VR19	152-0304-00			SEMICOND DEVICE:ZENER,0.4W,20V,5%	15238	Z5411
VR26	152-0279-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	04713	SZG35010RL

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:

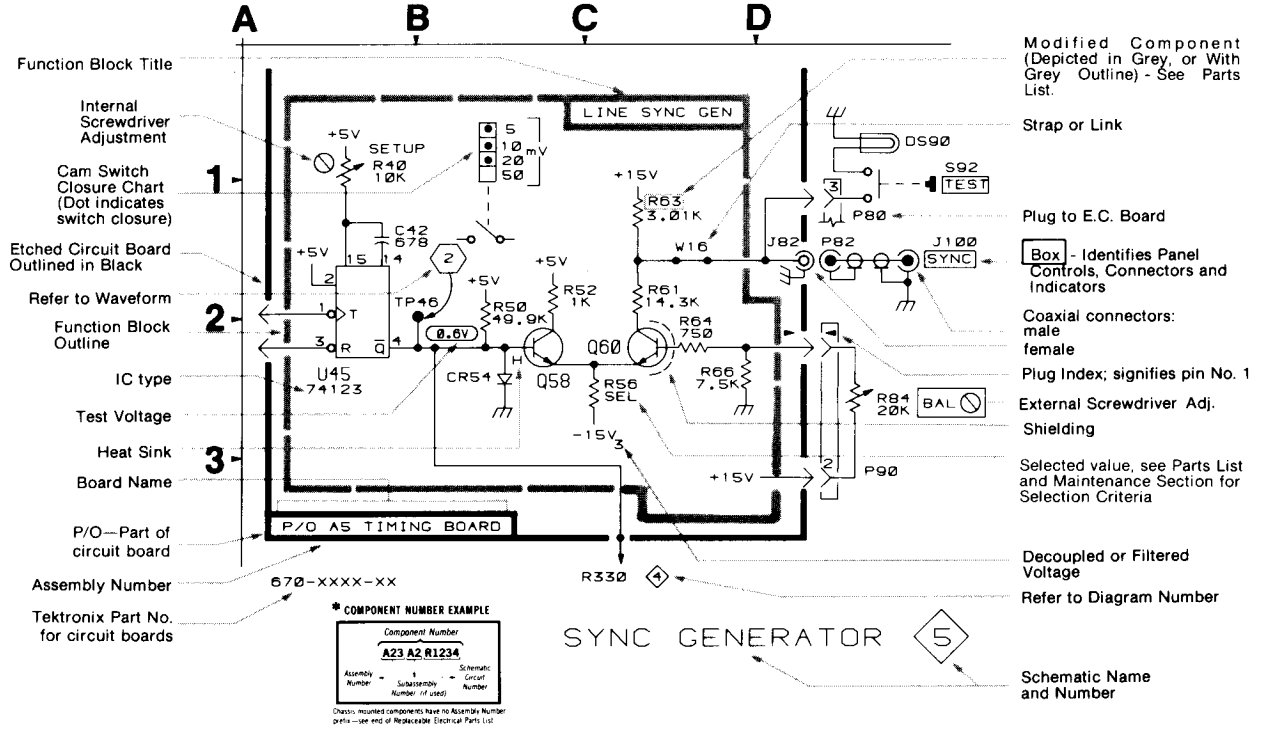
Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads (μF).
Resistors = Ohms (Ω).

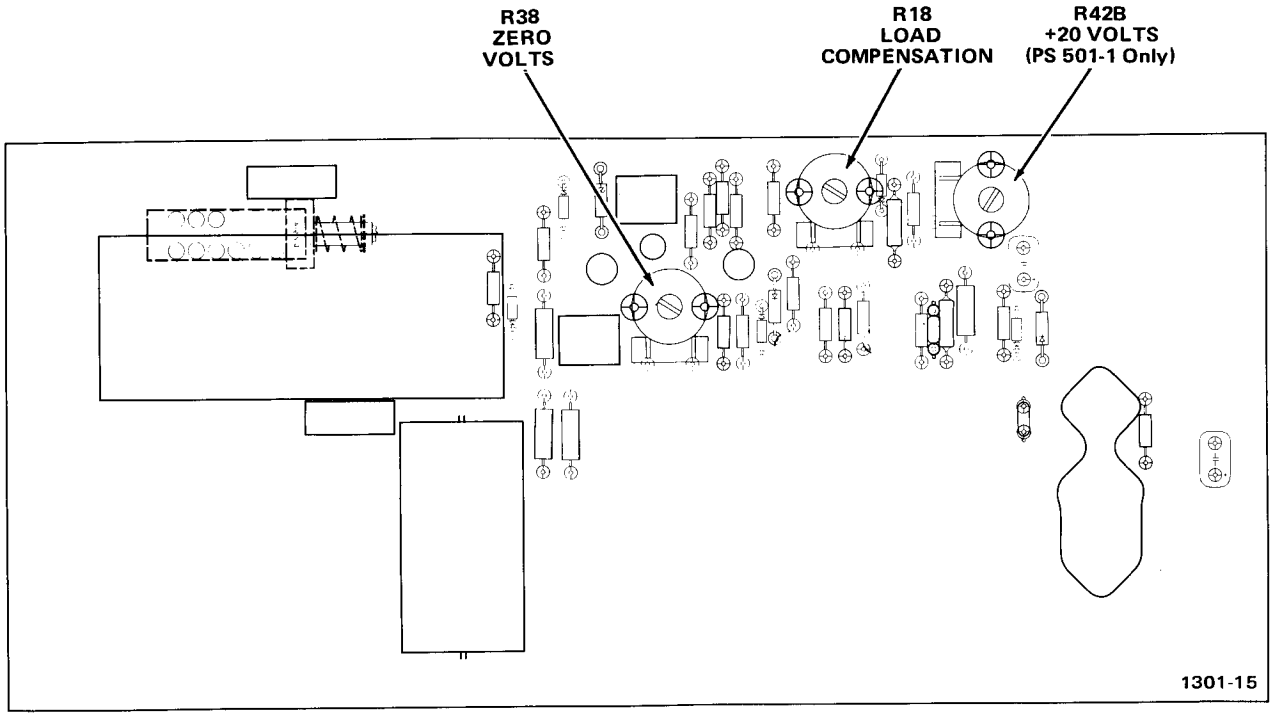
The information and special symbols below may appear in this manual.

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.





Static Sensitive Devices
See Maintenance Section

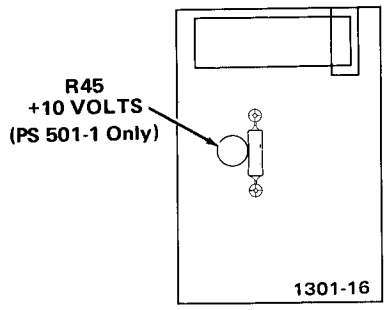


Fig. 8-1. Internal adjustments.

PS 501/PS 501-1
COMPONENT LOCATIONS

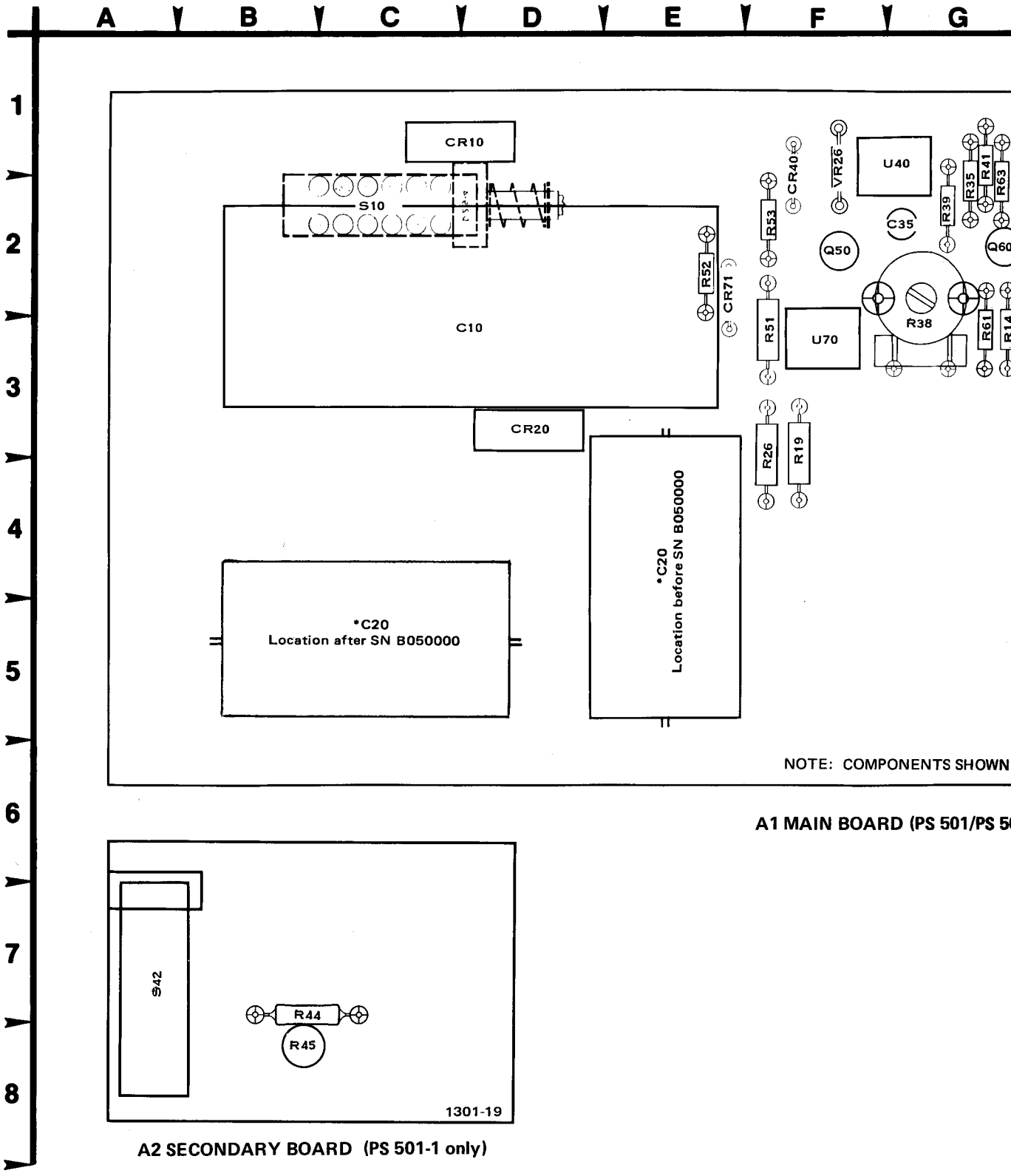
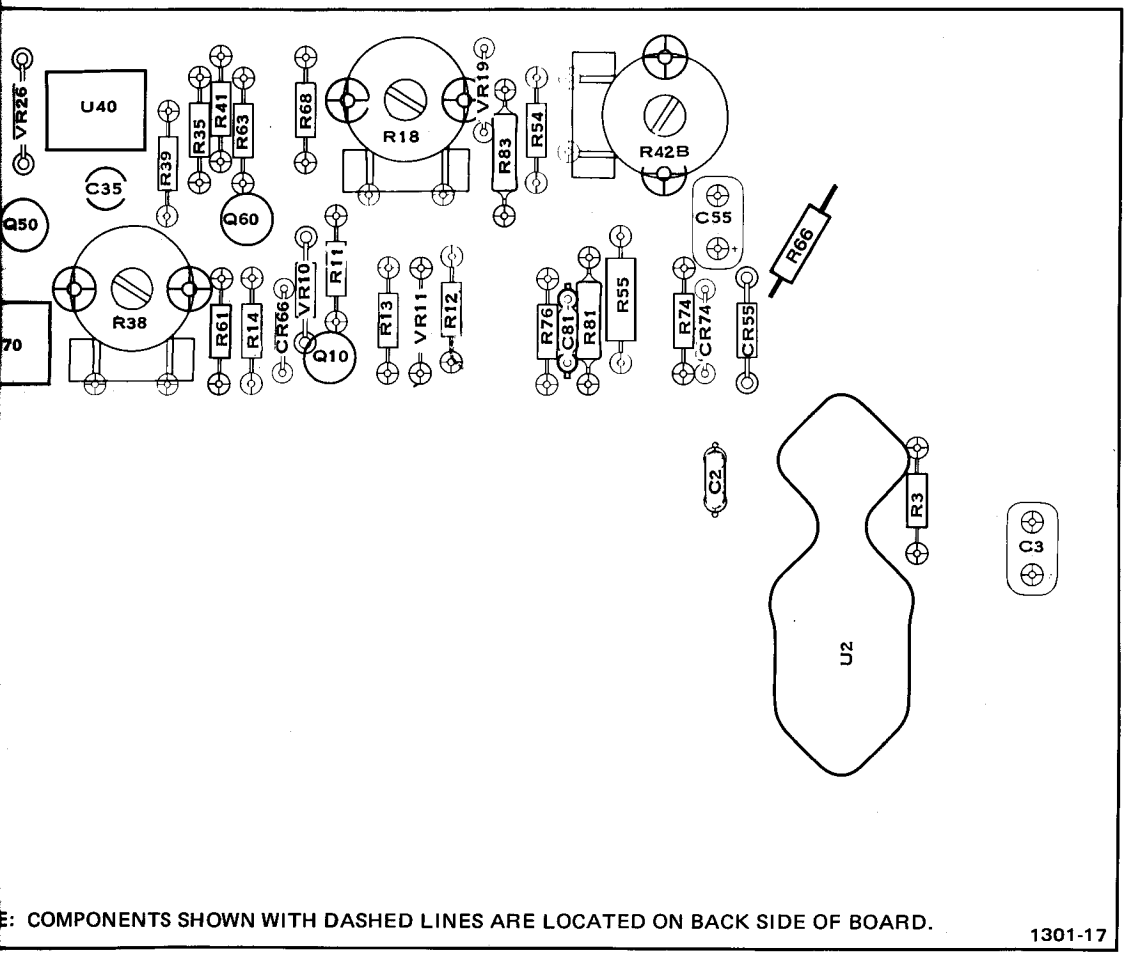


Fig. 8-2. PS 501/PS 501-1 Com

G H J K L M



E: COMPONENTS SHOWN WITH DASHED LINES ARE LOCATED ON BACK SIDE OF BOARD.

1301-17

N BOARD (PS 501/PS 501-1)

Static Sensitive Devices
See Maintenance Section

2. PS 501/PS 501-1 Component Locations.

A1 ASSY (PS 501/PS 501-1) — **POWER SUPPLY** ◇1

Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
C2	B1	K3	R35	F4	G2
C3	C1	L3	R38	D5	G3
C10	C2	D3	R39	E5	G2
C20	C6	C5	R41	F5	G1
C35	F5	G2	R42A	F4	
C55	J7	K2	R42B[a]	E7	J2
C81	F7	J3	R51	G5	F3
			R52	K5	E2
CR10	B2	D1	R53	K5	F2
CR20	B6	D3	R54	K5	J2
CR40	G5	F2	R55	K7	J2
CR55	J7	K2	R61	J5	G3
CR66	H5	H3	R63	J5	G2
CR70	G5		R66[a]*	K6	K2
CR71	G5	E2	R68	H6	H2
CR74	H7	K3	R74	G7	K3
			R76[a]	G7	J3
DS70[a]	F7		R81	F7	J2
			R83	E7	J2
Q10	D2	H3			
Q50	K5	F2	S10	B7	C2
Q60	J5	G2			
			U2	B1	L4
R3	C1	L3	U40	F5	G1
R11	C2	H3	U70	G6	F3
R12	D2	H2			
R13	D2	H3	VR10	D4	H2
R14	D2	G3	VR11	D2	H3
R18	D7	H2	VR19	D6	J1
R19	D6	F3	VR26	D6	F1
R26	D6	F3			

A2 ASSY (PS 501-1 only) — **POWER SUPPLY** ◇1

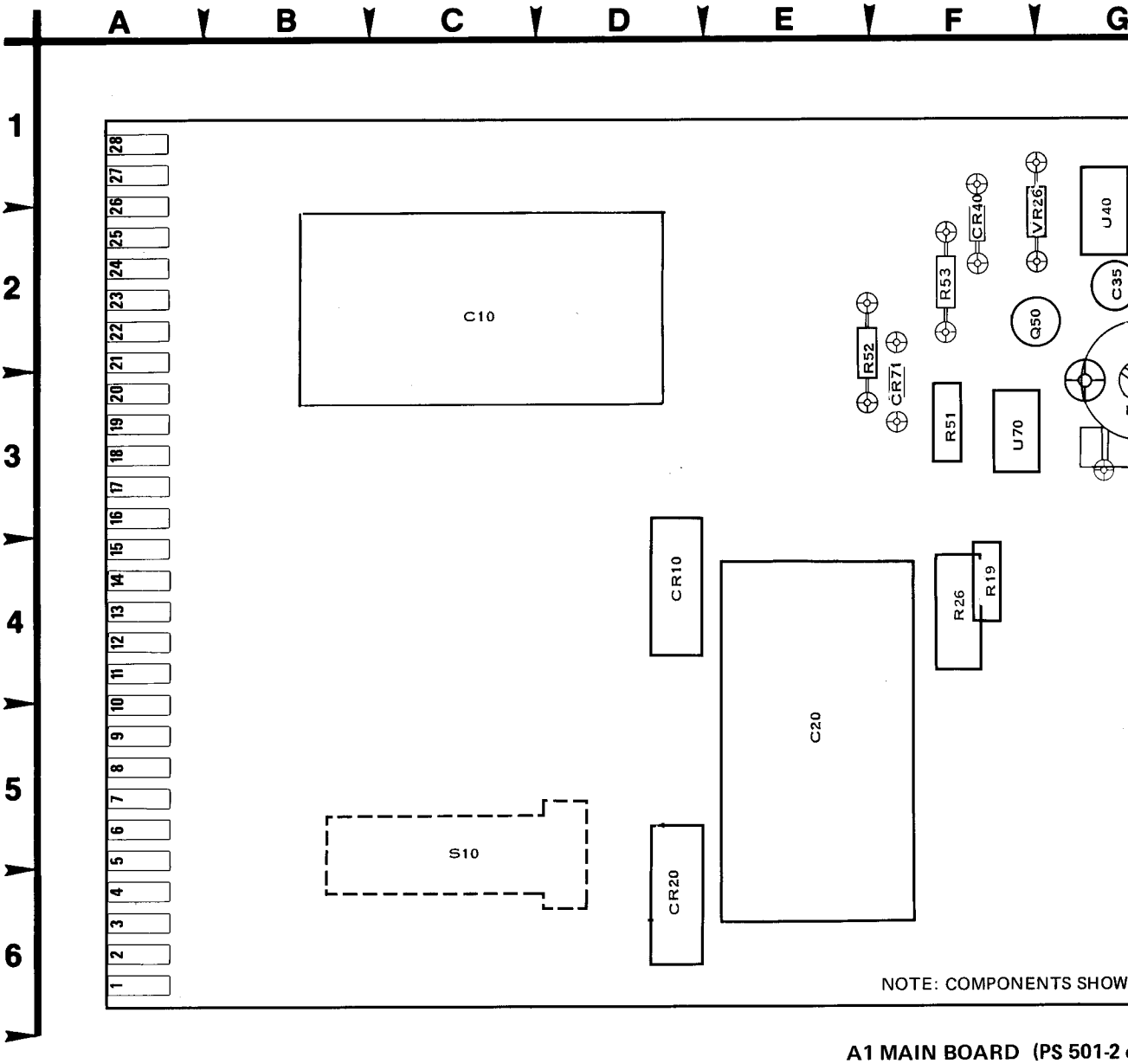
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
R44	F3	B7	S42	F4	B7
R45	F3	B8			

[a] **PS 501-1 only.**

***See Parts List for serial number ranges.**

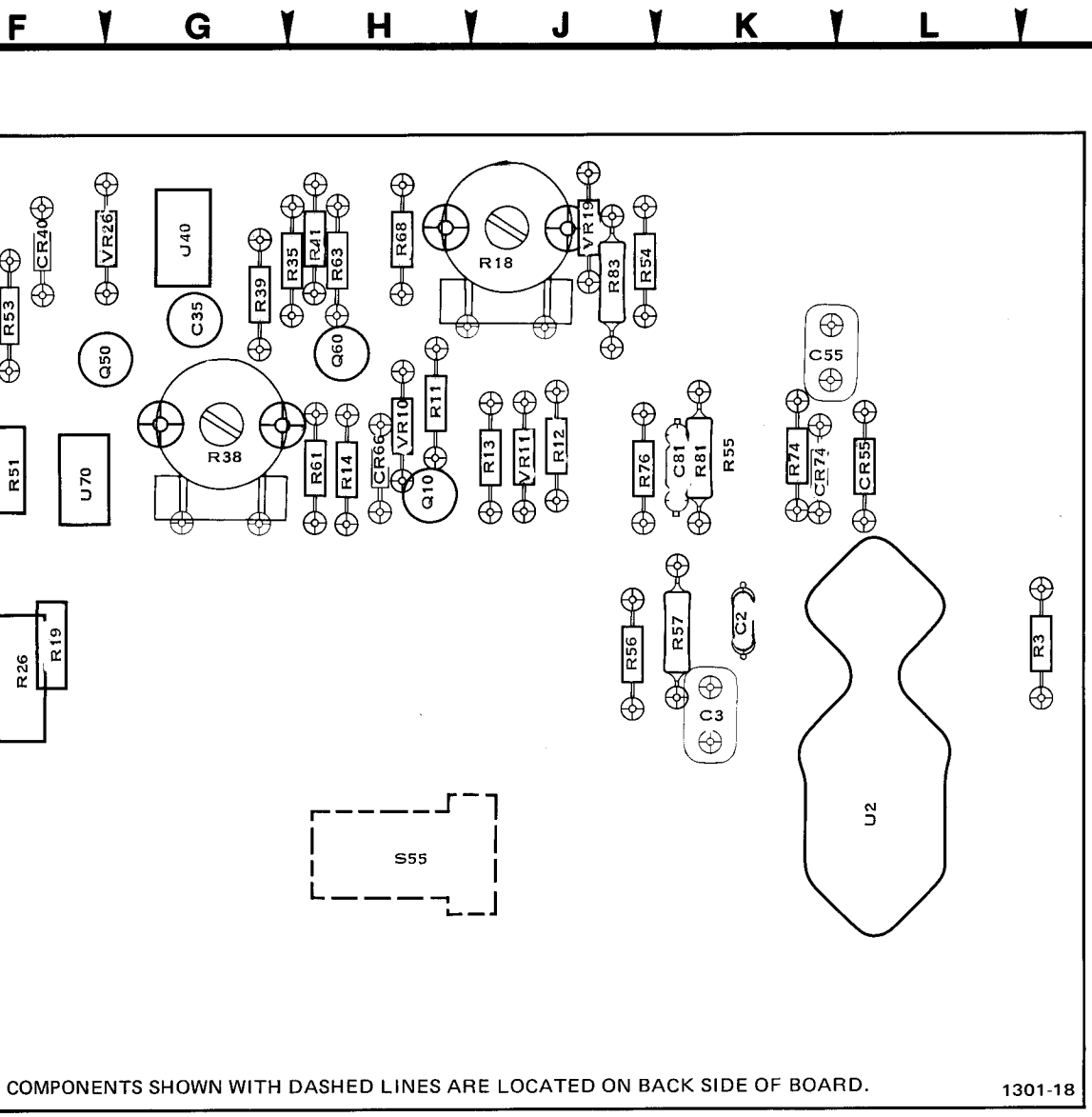
A1 ASSY (PS 501-2 only) **POWER SUPPLY** ◇1

Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
C2	B1	K4	R35	F4	H2
C3	C1	K4	R38	D5	G3
C10	C2	C2	R39	D5	G2
C20	C6	E5	R41	F5	H2
C35	F5	G2	R42A	F4	
C55	J7	K2	R51	G5	F3
C81	F7	K3	R52	K5	E2
			R53	K5	F2
CR10	C2	D4	R54	K5	J2
CR20	B6	D6	R55	K7	K3
CR40	G5	F2	R56	J8	J4
CR55	J7	L3	R57	H8	K4
CR66	H5	H3	R61	J5	H3
CR71	G5	F3	R63	J5	H2
CR74	G6	K3	R68	H6	H2
			R74	G7	K3
DS70	F7		R76	G7	J3
			R81	F7	K3
M55	G8		R83	E7	J2
Q10	D2	H3	S10	B7	C5
Q50	K4	F2	S55	H8	H5
Q60	J5	H2			
			U2	B1	L5
R3	C1	M4	U40	F5	G2
R11	C2	H2	U70	G6	F3
R12	D2	J3			
R13	D2	J3	VR10	D4	H3
R14	D2	H3	VR11	D2	J3
R18	D7	J2	VR19	D6	J1
R19	D6	F4	VR26	D6	F2
R26	D6	F4			



A1 MAIN BOARD (PS 501-2

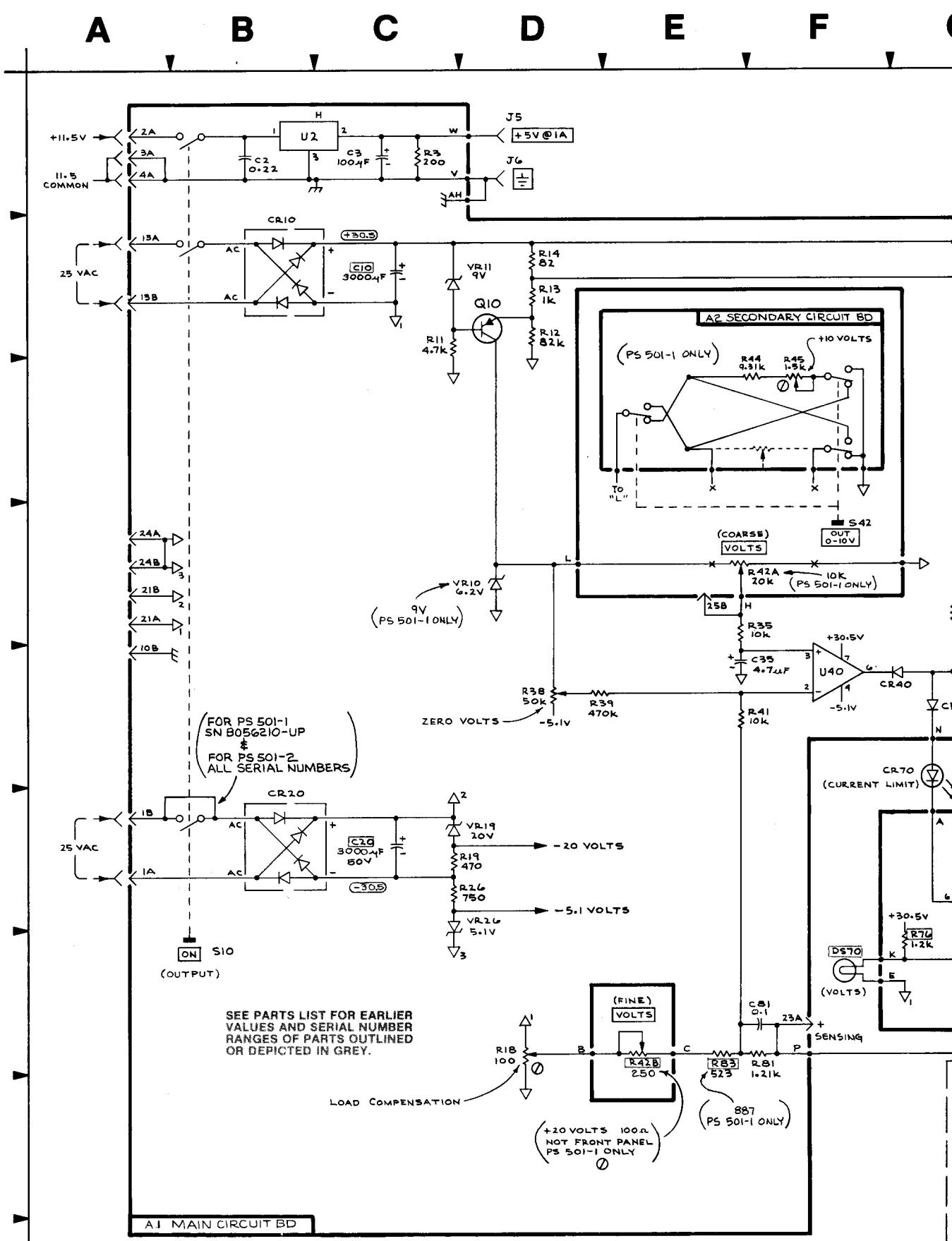
Fig. 8-3. PS 501-2 Component L



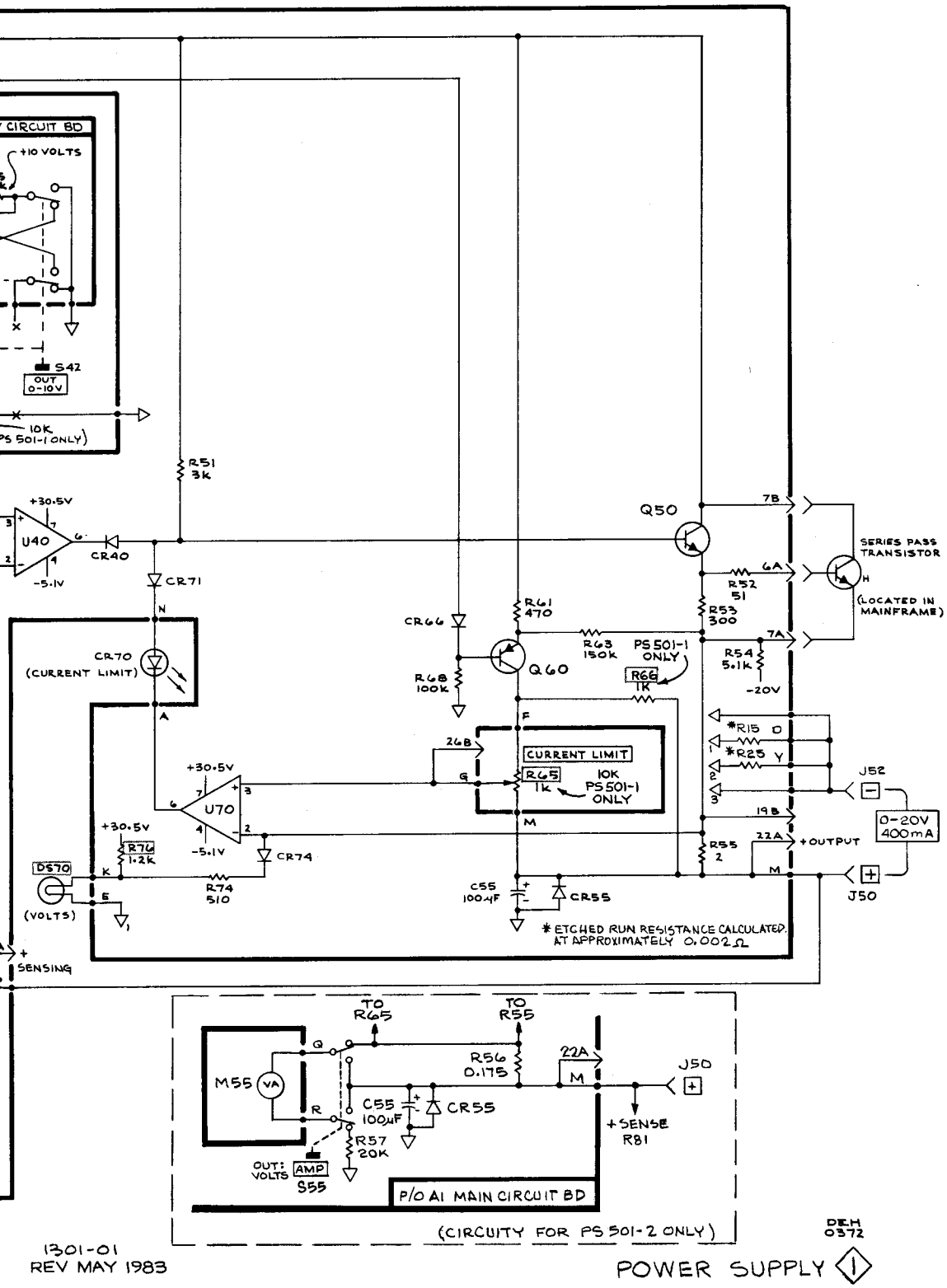
BOARD (PS 501-2 only)

Static Sensitive Devices
See Maintenance Section

501-2 Component Locations.


A
B
C
D
E
F
1
2
3
4
5
6
7
8
+11.5V
11.5 COMMON
2A
3A
4A
U2
C2 0.22
C3 100µF
R3 200
J5
+5V@1A
J6
CR10
+30.5
C10 3000µF
25 VAC
13A
13B
VR11 9V
Q10
R14 82
R13 1k
R12 82k
R11 4.7k
A2 SECONDARY CIRCUIT BD
(PS 501-1 ONLY)
+10 VOLTS
R44 9.31k
R45 1.5k
TO "L"
S42
OUT 0-10V
(COARSE) VOLTS
R42A 20k
10K (PS 501-1 ONLY)
VR10 6.2V
9V (PS 501-1 ONLY)
24A
24B
21B
21A
10B
25B
R35 10k
C35 4.7µF
U40
+30.5V
-5.1V
CR40
R38 50k
R39 470k
ZERO VOLTS
R41 10k
(FOR PS 501-1 SN B056210-UP & FOR PS 501-2 ALL SERIAL NUMBERS)
CR20
C20 3000µF 50V
VR19 20V
-20 VOLTS
R19 470
R26 750
-5.1 VOLTS
VR26 5.1V
-30.5
1B
1A
ON S10
(OUTPUT)
CR70 (CURRENT LIMIT)
+30.5V
R70 1.2k
DS70
(VOLTS)
(FINE) VOLTS
C81 0.1
23A
+ SENSING
R42B 250
R83 523
R81 1.21k
R18 100
LOAD COMPENSATION
887 (PS 501-1 ONLY)
+20 VOLTS 100Ω NOT FRONT PANEL PS 501-1 ONLY
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
A1 MAIN CIRCUIT BD

F G H J K L



DEH 0372

1301-01
REV MAY 1983

POWER SUPPLY 1

Static Sensitive Devices
See Maintenance Section

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

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

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

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

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

SPECIAL NOTES AND SYMBOLS

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

FIGURE AND INDEX NUMBERS

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

INDENTATION SYSTEM

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

1 2 3 4 5 *Name & Description*

Assembly and/or Component
Attaching parts for Assembly and/or Component
- - - * - - -
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
- - - * - - -
Parts of Detail Part
Attaching parts for Parts of Detail Part
- - - * - - -

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

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

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

ABBREVIATIONS

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

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRUS DRIVE	BEAVERTON, OR 97005
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
09922	BURNDY CORPORATION	RICHARDS AVENUE	NORWALK, CT 06852
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
33005	JEWELL ELECTRICAL INSTRUMENTS, INC.	GRENIER FIELD	MANCHESTER, NH 03105
45722	USM CORP., PARKER-KALON FASTENER DIV.		CAMPBELLSVILLE, KY 42718
58474	SUPERIOR ELECTRIC CO.	383 MIDDLE ST.	BRISTOL, CT 06010
70276	ALLEN MFG. CO.	P. O. DRAWER 570	HARTFORD, CT 06101
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83330	SMITH, HERMAN H., INC.	812 SNEDIKER AVE.	BROOKLYN, NY 11207
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
93907	TEXTRON INC. CAMCAR DIV	600 18TH AVE	ROCKFORD, IL 61101



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http://www.aa4df.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-1	366-1422-01	B010100	B052139	1		KNOB:LATCH	80009	366-1422-01
	----- -----			-		(PS501-1, PS501-2 ONLY)		
	366-1690-00	B052140		1		KNOB:SIL GY,0.53 X 0.23 X 1.059	80009	366-1690-00
	----- -----			-		(PS501-1, PS501-2 ONLY)		
						**********(ATTACHING PARTS)**********		
	214-1840-00	B010100	B052139	1		PIN,KNOB SECRG:0.094 OD X 0.120 INCH LONG	80009	214-1840-00
	----- -----			-		(PS501-1, PS501-2 ONLY)		
						**********(END ATTACHING PARTS)**********		
-2	366-1327-00			1		KNOB:GRAY	80009	366-1327-00
	----- -----			-		(PS501 ONLY)		
	213-0153-00			1		.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-3	366-1283-00			1		KNOB:GRAY	80009	366-1283-00
	----- -----			-		(PS501 ONLY)		
	213-0153-00			1		.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-4	366-0494-00			1		KNOB:GRAY WITH SETSCREW	80009	366-0494-00
	213-0153-00			1		.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-5	366-1257-74			1		PUSH BUTTON:GRAY--ON	80009	366-1257-74
-6	426-0681-00			1		FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00
-7	366-1402-40			1		PUSH BUTTON:SIL GY,10-20V	80009	366-1402-40
	----- -----			-		(PS501-1 ONLY)		
-8	337-1399-00			2		SHLD,ELECTRICAL:SIDE	80009	337-1399-00
	----- -----			-		(PS501, PS501-2 ONLY)		
	337-1399-00	B010100	B019999	2		SHLD,ELECTRICAL:SIDE	80009	337-1399-00
	----- -----			-		(PS501-1 ONLY)		
	337-1399-00	B020000		1		SHLD,ELECTRICAL:SIDE	80009	337-1399-00
	----- -----			-		(PS501-1 ONLY)		
	337-1399-03	B020000		1		SHIELD,ELEC:SIDE	80009	337-1399-03
	----- -----			-		(PS501-1 ONLY)		
-9	129-0064-01			2		POST,BDG,ELEC:RED,5-WAY MINIATURE	58474	A207799-G2
						**********(ATTACHING PARTS)**********		
-10	210-0457-00			1		NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
-11	358-0181-01			1		INSULATOR,BSHG:RED	58474	B207516-G2/INSUL
						**********(END ATTACHING PARTS)**********		
-12	129-0064-00			1		POST,BDG,ELEC:CHARCOAL,5-WAY MINIATURE	58474	A207799-G7
						**********(ATTACHING PARTS)**********		
-13	210-0457-00			1		NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
-14	358-0181-00			1		INSULATOR,BSHG:CHARCOAL	58474	B207516-G7/INSUL
						**********(END ATTACHING PARTS)**********		
-15	129-0064-02			1		POST,BDG,ELEC:WHITE,5-WAY,MINIATURE	58474	207784-G5
-16	---- ----			1		.INSULATOR BSHG:WHITE		
						.**********(ATTACHING PARTS)**********		
-17	210-0457-00			1		NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
						**********(END ATTACHING PARTS)**********		
-18	---- ----			1		RESISTOR,VAR:(SEE R65 REPL)		
						**********(ATTACHING PARTS)**********		
-19	210-0583-00			1		NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-20	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
	210-0046-00			1		WASHER,LOCK:0.261 ID,INTL,0.018 THK,BRS	78189	1214-05-00-0541C
						**********(END ATTACHING PARTS)**********		
-21	----- -----			1		RESISTOR,VAR:(SEE R42,R42 REPL)		
	----- -----			-		(PS501, PS501-2 ONLY)		
						**********(ATTACHING PARTS)**********		
-22	210-0583-00			1		NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-23	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
	210-0046-00			1		WASHER,LOCK:0.261 ID,INTL,0.018 THK,BRS	78189	1214-05-00-0541C
						**********(END ATTACHING PARTS)**********		
-24	---- ----			1		LAMP,LED:(SEE CR70 REPL)		
-25	333-1563-00			1		PANEL,FRONT:	80009	333-1563-00
	---- ----			-		(PS501 ONLY)		
-26	333-1561-00			1		PANEL,FRONT:	80009	333-1561-00
	---- ----			-		(PS501-1 ONLY)		
-27	200-0935-00			1		BASE,LAMPHOLDER:0.29 OD X 0.19 CASE	80009	200-0935-00
-28	378-0602-01			1		LENS,LIGHT:AMBER	80009	378-0602-01
-29	352-0157-00			1		LAMPHOLDER:WHITE PLASTIC	80009	352-0157-00

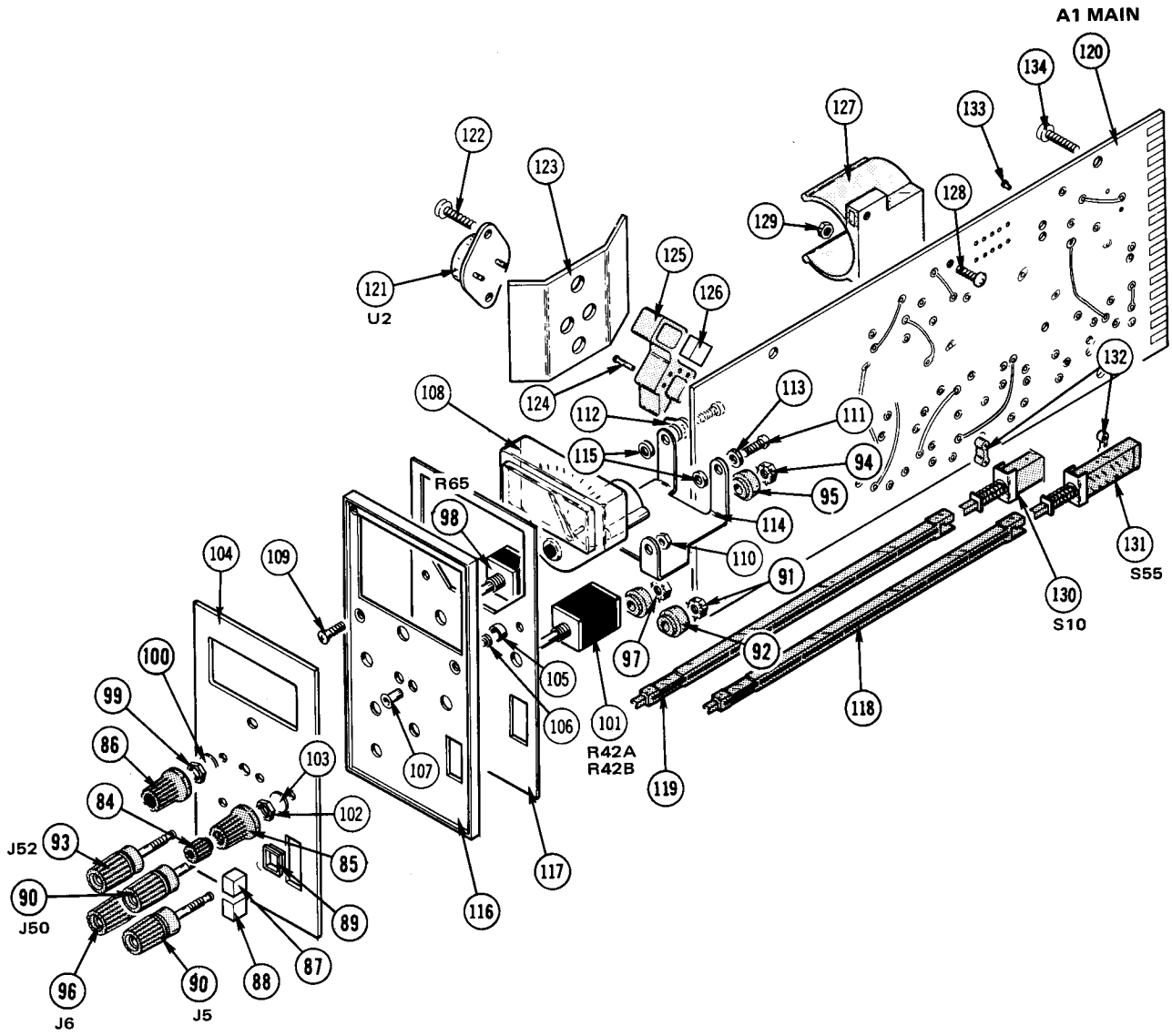
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
-30	214-1513-01	B010100	B052139	1	LCH,PLUG-IN RET:	80009	214-1513-01
	----- -----			-	(PS501-1, PS501-2 ONLY)		
	105-0719-00	B052140		1	LATCH,RETAINING:PLUG-IN	80009	105-0719-00
	----- -----			-	(PS501-1, PS501-2 ONLY)		
					**********(ATTACHING PARTS)**********		
-31	213-0254-00			1	SCREW,TPG,TF:2-32 X 0.250,100 DEG,FLH	45722	OBD
					**********(END ATTACHING PARTS)**********		
	105-0718-00	B052140	B053109	1	BAR,LATCH RLSE:	80009	105-0718-00
	----- -----			-	(PS501-1 ONLY)		
	105-0718-01	B053110		1	BAR,LATCH RLSE:	80009	105-0718-01
	----- -----			-	(PS501-1 ONLY)		
	105-0718-00	B010100	B041899	1	BAR,LATCH RLSE:	80009	105-0718-00
	----- -----			-	(PS501-2 ONLY)		
	105-0718-01	B041900		1	BAR,LATCH RLSE:	80009	105-0718-01
	----- -----			-	(PS501-2 ONLY)		
-32	426-0941-00			1	FRAME,INDICATOR:	80009	426-0941-00
	----- -----			-	(PS501-1 ONLY)		
-33	401-0189-00			1	GEAR,SECTOR:19 TEETH,PLASTIC	80009	401-0189-00
	----- -----			-	(PS501-1 ONLY)		
-34	401-0190-00			1	GEAR,SECTOR:7 TEETH,PLASTIC	80009	401-0190-00
	----- -----			-	(PS501-1 ONLY)		
	376-0051-00			1	CPLG,SHAFT,FLEX:0.127 ID X 0.375 ID DELRIN	80009	376-0051-00
	----- -----			-	(PS501-1 ONLY)		
	384-1171-00			1	EXTENSION SHAFT:1.05 L X 0.125 OD AL	80009	384-1171-00
	----- -----			-	(PS501-1 ONLY)		
-35	----- -----			1	RESISTOR,VAR:(SEE R42 REPL)		
	----- -----			-	(PS501-1 ONLY)		
					**********(ATTACHING PARTS)**********		
-36	210-0807-00			1	WASHER,FLAT:0.312 ID X 0.05 THK,STL	12327	OBD
					**********(END ATTACHING PARTS)**********		
-37	352-0338-00	B010100	B053929	1	HOLDER,DIAL:	80009	352-0338-00
	----- -----			-	(PS501-1 ONLY)		
	352-0338-02	B053930		1	HOLDER,DIAL:	80009	352-0338-02
	----- -----			-	(PS501-1 ONLY)		
					**********(ATTACHING PARTS)**********		
-38	211-0101-00			2	SCREW,MACHINE:4-40 X 0.25,100 DEG,FLH STL	83385	OBD
	210-0870-00			2	WASHER,FLAT:0.14 ID X 0.312 INCH OD STL	12327	OBD
	210-0586-00	B053930		2	NUT,PL,ASSEM WA:4-40 X 0.25,STL	83385	OBD
					**********(END ATTACHING PARTS)**********		
-39	331-0310-00			1	DIAL,CONTROL:10 TURNS,DIGITAL COUNTS		
	----- -----			-	(PS501-1 ONLY)		
-40	386-2348-00			1	SUBPANEL,FRONT:	80009	386-2348-00
	----- -----			-	(PS501-1 ONLY)		
					**********(ATTACHING PARTS)**********		
	213-0229-00	B010100	B053299	4	SCR,TPG,THD FOR:6-20 X0.375"100 DEG,FLH ST	93907	OBD
	----- -----			-	(PS501-1 ONLY)		
	213-0123-00	B053300		4	SCREW,TPG,TF:6-32 X 0.375,SPCL TYPE,FLH	93907	OBD
	----- -----			-	(PS501-1 ONLY)		
	213-0229-00	B010100	B041989	4	SCR,TPG,THD FOR:6-20 X0.375"100 DEG,FLH ST	93907	OBD
	----- -----			-	(PS501-2 ONLY)		
	213-0123-00	B041990		4	SCREW,TPG,TF:6-32 X 0.375,SPCL TYPE,FLH	93907	OBD
	----- -----			-	(PS501-2 ONLY)		
					**********(END ATTACHING PARTS)**********		
-41	337-1637-00			1	SHLD,ELECTRICAL:REAR SUBPANEL	80009	337-1637-00
	----- -----			-	(PS501-1 ONLY)		
-42	384-1101-01	B010100	B056059	1	SHAFT-GRK ASSY:	80009	384-1101-01
	----- -----			-	(PS501-1 ONLY)		
	384-1101-02	B056060		1	SHAFT-GRK ASSY:	80009	384-1101-02
	----- -----			-	(PS501-1 ONLY)		
-43	384-1058-00			1	EXTENSION SHAFT:8.157 INCH LONG	80009	384-1058-00
-44	386-2528-00			1	SUBPANEL,FRONT:	80009	386-2528-00
					**********(ATTACHING PARTS)**********		
-45	213-0229-00			4	SCR,TPG,THD FOR:6-20 X0.375"100 DEG,FLH ST	93907	OBD
					**********(END ATTACHING PARTS)**********		

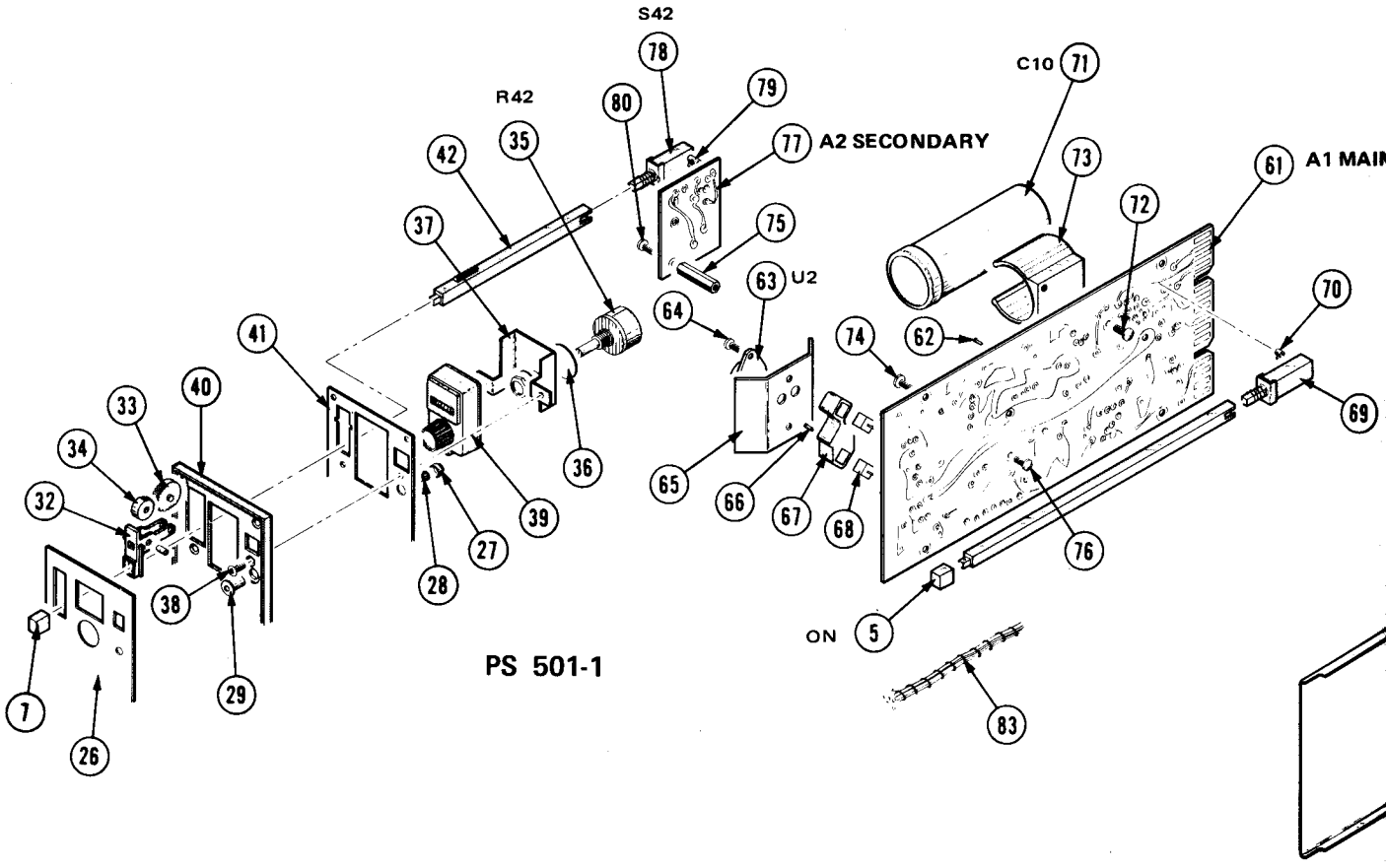
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-46	337-1638-00			1		SHLD,ELECTRICAL:REAR SUBPANEL	80009	337-1638-00
	----- -----			-		(PS501 ONLY)		
-47	----- -----			1		CKT BOARD ASSY:MAIN(SEE A1 REPL)		
	----- -----			-		(PS501 ONLY)		
-48	136-0252-04	B010100	B050409	25		.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-04	B050410		9		.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0514-00	B050410	B055949	2		.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
	----- -----			-		.(PS501-1 ONLY)		
	136-0727-00	B055950		2		.SKT,PL-IN ELEK:MICROCKT,8 CONTACT	09922	DILB8P-108
	----- -----			-		.(PS501-1 ONLY)		
	136-0514-00	B050410		2		.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
	----- -----			-		.(PS501-2 ONLY)		
-49	----- -----			1		.INTEGRATED CIRCUIT(SEE U2 REPL)		
						.**********(ATTACHING PARTS)**********		
-50	211-0510-00	B010100	B019999	2		.SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	OBD
	211-0511-00	B020000	B052649	2		.SCREW,MACHINE:6-32 X 0.500,PNH,STL,CD PL	83385	OBD
	211-0578-00	B052650		2		.SCREW,MACHINE:6-32 X 0.438 1NCH,PNH STL	83385	OBD
-51	214-1713-00			1		.HEAT SINK,ELEC:TRANSISTOR	80009	214-1713-00
						.**********(END ATTACHING PARTS)**********		
-52	136-0384-00			2		.SOCKET,PIN TERM:FOR 0.04 DIAMETER PIN	00779	52120
-53	136-0361-00			1		.SPACER,XSTR:	80009	136-0361-00
-54	131-0847-00			2		.TERMINAL STUD:6-32 X 0.435 INCH LONG	80009	131-0847-00
-55	----- -----			1		.SWITCH,PUSH:(SEE S10 REPL)		
-56	361-0384-00	B010100	B019999	2		.SPACER,PB SW:0.133 INCH LONG	80009	361-0384-00
	361-0385-00	B020000		1		.SPACER,PB SW:0.164 INCH LONG	80009	361-0385-00
-57	----- -----			1		.CAPACITOR:(SEE C10 REPL)		
						.**********(ATTACHING PARTS)**********		
-58	211-0534-00			2		.SCR,ASSEM,WSHR:6-32 X 0.312 INCH,PNH STL	83385	OBD
	210-0407-00			2		.NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
-59	352-0322-00			1		.RETAINER,CAP:1.375 DIA,HORIZ MOUNT	80009	352-0322-00
						.**********(END ATTACHING PARTS)**********		
						.**********(ATTACHING PARTS FOR CKT BD)		
-60	213-0146-00			4		SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
						**********(END ATTACHING PARTS)**********		
-61	----- -----			1		CKT BOARD ASSY:MAIN(SEE A1 REPL)		
	----- -----			-		(PS501-1 ONLY)		
-62	136-0252-04	B010100	B050529	25		.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-04	B050530		9		.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0514-00	B050530		2		.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
-63	----- -----			1		.MICROCIRCUIT:(SEE U2 REPL)		
						.**********(ATTACHING PARTS)**********		
-64	211-0510-00	B010100	B019999	2		.SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	OBD
	211-0511-00	B020000		2		.SCREW,MACHINE:6-32 X 0.500,PNH,STL,CD PL	83385	OBD
-65	214-1713-00	B020000		1		.HEAT SINK,ELEC:TRANSISTOR	80009	214-1713-00
						.**********(END ATTACHING PARTS)**********		
-66	136-0384-00			2		.SOCKET,PIN TERM:FOR 0.04 DIAMETER PIN	00779	52120
-67	136-0361-00	B010100	B054757	1		.SPACER,XSTR:	80009	136-0361-00
	136-0361-01	B054758		1		.SPACER,XSTR:TO-3 OR TO-66	80009	136-0361-01
-68	131-0847-00			2		.TERMINAL STUD:6-32 X 0.435 INCH LONG	80009	131-0847-00
-69	----- -----			1		.SWITCH,PUSH:(SEE S10 REPL)		
-70	361-0384-00	B010100	B010257	2		.SPACER,PB SW:0.133 INCH LONG	80009	361-0384-00
	361-0385-00	B010258		2		.SPACER,PB SW:0.164 INCH LONG	80009	361-0385-00
-71	----- -----			1		.CAPACITOR:(SEE C10 REPL)		
						.**********(ATTACHING PARTS)**********		
-72	211-0534-00			2		.SCR,ASSEM,WSHR:6-32 X 0.312 INCH,PNH STL	83385	OBD
	210-0407-00			2		.NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
-73	352-0322-00	B010100	B055199	1		.RETAINER,CAP:1.375 DIA,HORIZ MOUNT	80009	352-0322-00
	352-0322-01	B055200		1		.RETAINER,CAP.:1.375 DIA,HORIZ MOUNT	80009	352-0322-01
	----- -----			-		.(PS501-1 ONLY)		
						.**********(END ATTACHING PARTS)**********		
						.**********(ATTACHING PARTS FOR CKT BD)		
-74	213-0146-00			4		SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
						**********(END ATTACHING PARTS)**********		
-75	129-0089-00			2		POST,ELEC-MECH:6-32 X 0.25 X 0.83 INCH L	80009	129-0089-00
						**********(ATTACHING PARTS)**********		
-76	211-0504-00			2		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						**********(END ATTACHING PARTS)**********		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-77	----- -----			1		CKT BOARD ASSY:SECONDARY(SEE A2 REPL)		
	----- -----			-		(PS501-1 ONLY)		
-78	----- -----			1		.SWITCH,PUSH:(SEE S42 REPL)		
-79	361-0383-00			2		.SPACER,PB SW:CHARCOAL,0.33 INCH LONG	80009	361-0383-00
						.**********(ATTACHING PARTS FOR CKT BD)		
-80	211-0504-00			2		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						**********(END ATTACHING PARTS)**********		
	386-3657-00	B052160	B053489	2		SUPPORT,PLUG-IN:	80009	386-3657-00
	----- -----			-		(PS501-1 ONLY)		
	386-3657-01	B053490		2		SUPPORT,PLUG IN:	93907	OBD
	----- -----			-		(PS501-1 ONLY)		
	210-1270-00	B052160		2		WASHER,FLAT:0.141 ID X 0.04 THK,AL	80009	210-1270-00
	----- -----			-		(PS501-1 ONLY)		
	386-3657-00	B041480	B042069	2		SUPPORT,PLUG-IN:	80009	386-3657-00
	----- -----			-		(PS501-2 ONLY)		
	386-3657-01	B042070		2		SUPPORT,PLUG IN:	93907	OBD
	----- -----			-		(PS501-2 ONLY)		
	210-1270-00	B041480		2		WASHER,FLAT:0.141 ID X 0.04 THK,AL	80009	210-1270-00
	----- -----			-		(PS501-2 ONLY)		
-81	426-0724-00			1		FR SECT,PLUG-IN:BOTTOM	80009	426-0724-00
-82	426-0725-00			1		FR SECT,PLUG-IN:TOP	80009	426-0725-00
-83	179-1833-00			1		WIRING HARNESS,:MAIN	80009	179-1833-00
	----- -----			-		(PS501 ONLY)		
-84	366-1319-00			1		KNOB:GRAY	80009	366-1319-00
	----- -----			-		(PS501-2 ONLY)		
	213-0140-00			1		.SETSCREW:2-56 X 0.94 INCH,HEX SOC ST	70276	OBD
-85	366-1077-00			1		KNOB:GRAY	80009	366-1077-00
	----- -----			-		(PS501-2 ONLY)		
	213-0020-00			1		.SETSCREW:6-32 X 0.125 INCH,HEX.SOC S	70276	OBD
-86	366-0494-00			1		KNOB:GRAY WITH SETSCREW	80009	366-0494-00
	213-0153-00			1		.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-87	366-1257-74			1		PUSH BUTTON:GRAY--ON	80009	366-1257-74
-88	366-1489-03			1		PUSH BUTTON:SIL GY,AMP	80009	366-1489-03
	----- -----			-		(PS501-2 ONLY)		
-89	426-0681-00			2		FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00
-90	129-0064-01			2		POST,BDG,ELEC:RED,5-WAY MINIATURE	58474	A207799-G2
						**********(ATTACHING PARTS)**********		
-92	358-0181-00			4		INSULATOR,BSHG:CHARCOAL	58474	B207516-G7/INSUL
						**********(END ATTACHING PARTS)**********		
-93	129-0064-00			1		POST,BDG,ELEC:CHARCOAL,5-WAY MINIATURE	58474	A207799-G7
						**********(ATTACHING PARTS)**********		
-94	210-0457-00			1		NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
-95	358-0181-00			1		INSULATOR,BSHG:CHARCOAL	58474	B207516-G7/INSUL
						**********(END ATTACHING PARTS)**********		
-96	129-0064-02			1		POST,BDG,ELEC:WHITE,5-WAY,MINIATURE	58474	207784-G5
						**********(ATTACHING PARTS)**********		
-97	210-0457-00			1		NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
						**********(END ATTACHING PARTS)**********		
-98	----- -----			1		RESISTOR,VAR:(SEE R65 REPL)		
						**********(ATTACHING PARTS)**********		
-99	210-0583-00			1		NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-100	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
	210-0046-00			1		WASHER,LOCK:0.261 ID,INTL,0.018 THK,BRS	78189	1214-05-00-0541C
						**********(END ATTACHING PARTS)**********		
-101	----- -----			1		RESISTOR,VAR:(SEE R42,R42 REPL)		
	----- -----			-		(PS501-1, PS501-2 ONLY)		
						**********(ATTACHING PARTS)**********		
-102	210-0583-00			1		NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-103	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
	210-0046-00			1		WASHER,LOCK:0.261 ID,INTL,0.018 THK,BRS	78189	1214-05-00-0541C
						**********(END ATTACHING PARTS)**********		
-104	333-1714-00			1		PANEL,FRONT:	80009	333-1714-00
	----- -----			-		(PS501-2 ONLY)		
-105	200-0935-00			1		BASE,LAMPHOLDER:0.29 OD X 0.19 CASE	80009	200-0935-00
-106	378-0602-01			1		LENS,LIGHT:AMBER	80009	378-0602-01

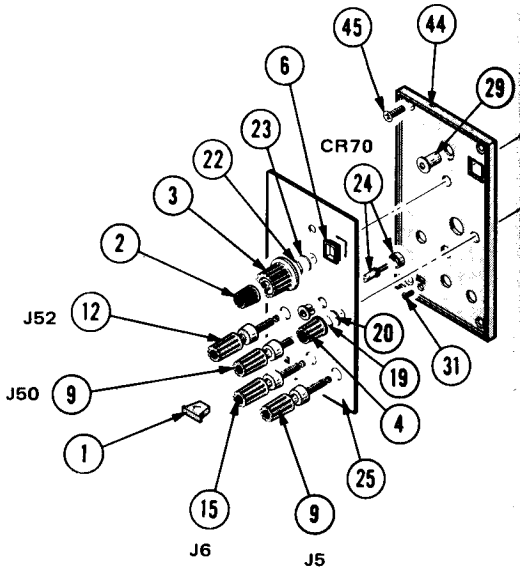
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-107	352-0157-00			1		LAMPHOLDER:WHITE PLASTIC	80009	352-0157-00
-108	149-0036-00			1		AMMETER:DC,0-1 MA,77 OHM,+/-10%	33005	MODEL 81T
	----- -----			-		(PS501-2 ONLY)		
						**********(ATTACHING PARTS)**********		
-109	211-0101-00			2		SCREW,MACHINE:4-40 X 0.25,100 DEG,FLH STL	83385	OBD
	----- -----			-		(PS501-2 ONLY)		
-110	210-0406-00			2		NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	12161-50
	----- -----			-		(PS501-2 ONLY)		
-111	211-0097-00			2		SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
	----- -----			-		(PS501-2 ONLY)		
-112	210-0201-00			1		TERMINAL,LUG:0.12 ID,LOCKING,BRZ TIN PL	86928	OBD
	----- -----			-		(PS501-2 ONLY)		
-113	210-0906-00			2		WASHER,NONMETAL:FIBER,0.125 ID X 0.203"OD	86928	OBD
	----- -----			-		(PS501-2 ONLY)		
-114	386-2527-00			1		SUPPORT,METER:	80009	386-2527-00
	----- -----			-		(PS501-2 ONLY)		
-115	210-0849-00			2		WSHR,SHOULDERED:0.11 ID X 0.188"OD,FIBER	83330	2151
	----- -----			-		(PS501-2 ONLY)		
						**********(END ATTACHING PARTS)**********		
-116	386-2528-00			1		SUBPANEL,FRONT:	80009	386-2528-00
	----- -----			-		(PS501-2 ONLY)		
-117	337-1783-00			1		SHIELD,ELEC:REAR SUBPANEL	80009	337-1783-00
	----- -----			-		(PS501-2 ONLY)		
-118	384-1058-00			1		EXTENSION SHAFT:8.157 INCH LONG	80009	384-1058-00
	----- -----			-		(PS501-2 ONLY)		
-119	384-1101-00			1		EXTENSION SHAFT:4.14 INCH LONG	80009	384-1101-00
	----- -----			-		(PS501-2 ONLY)		
-120	----- -----			1		CKT BOARD ASSY:MAIN(SEE A1 REPL)		
	----- -----			-		(PS501-2 ONLY)		
-121	----- -----			1		.MICROCIRCUIT:(SEE U2 REPL)		
						.**********(ATTACHING PARTS)**********		
-122	211-0510-00			2		.SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	OBD
-123	214-1713-00			1		.HEAT SINK,ELEC:TRANSISTOR	80009	214-1713-00
						.**********(END ATTACHING PARTS)**********		
-124	136-0384-00			2		.SOCKET,PIN TERM:FOR 0.04 DIAMETER PIN	00779	52120
-125	136-0361-00	B010100	B042679	1		.SPACER,XSTR:	80009	136-0361-00
	136-0361-01	B042680		1		.SPACER,XSTR:TO-3 OR TO-66	80009	136-0361-01
-126	131-0847-00			2		.TERMINAL STUD:6-32 X 0.435 INCH LONG	80009	131-0847-00
-127	352-0322-00			1		.RETAINER,CAP:1.375 DIA,HORIZ MOUNT	80009	352-0322-00
						.**********(ATTACHING PARTS)**********		
-128	211-0534-00			2		.SCR,ASSEM,WSHR:6-32 X 0.312 INCH,PNH STL	83385	OBD
-129	210-0407-00			2		.NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
						**********(END ATTACHING PARTS)**********		
-130	----- -----			1		.SWITCH,PUSH:(SEE S10 REPL)		
-131	----- -----			1		.SWITCH,PUSH:(SEE S55 REPL)		
-132	361-0384-00			4		.SPACER,PB SW:0.133 INCH LONG	80009	361-0384-00
-133	136-0252-04	B010100	B040349	25		.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-04	B040350		9		.SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0514-00	B040350		2		.SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
	179-1879-00			1		.WIRING HARNESS,:	80009	179-1879-00
	----- -----			-		.(PS501-1 ONLY)		
						.**********(ATTACHING PARTS FOR CKT BD)		
-134	213-0146-00			4		SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
						**********(END ATTACHING PARTS)**********		
-135	214-1061-00	B010105		1		SPRING,GROUND:FLAT	80009	214-1061-00
	----- -----			-		(PS501-2 ONLY)		

PS 501-2

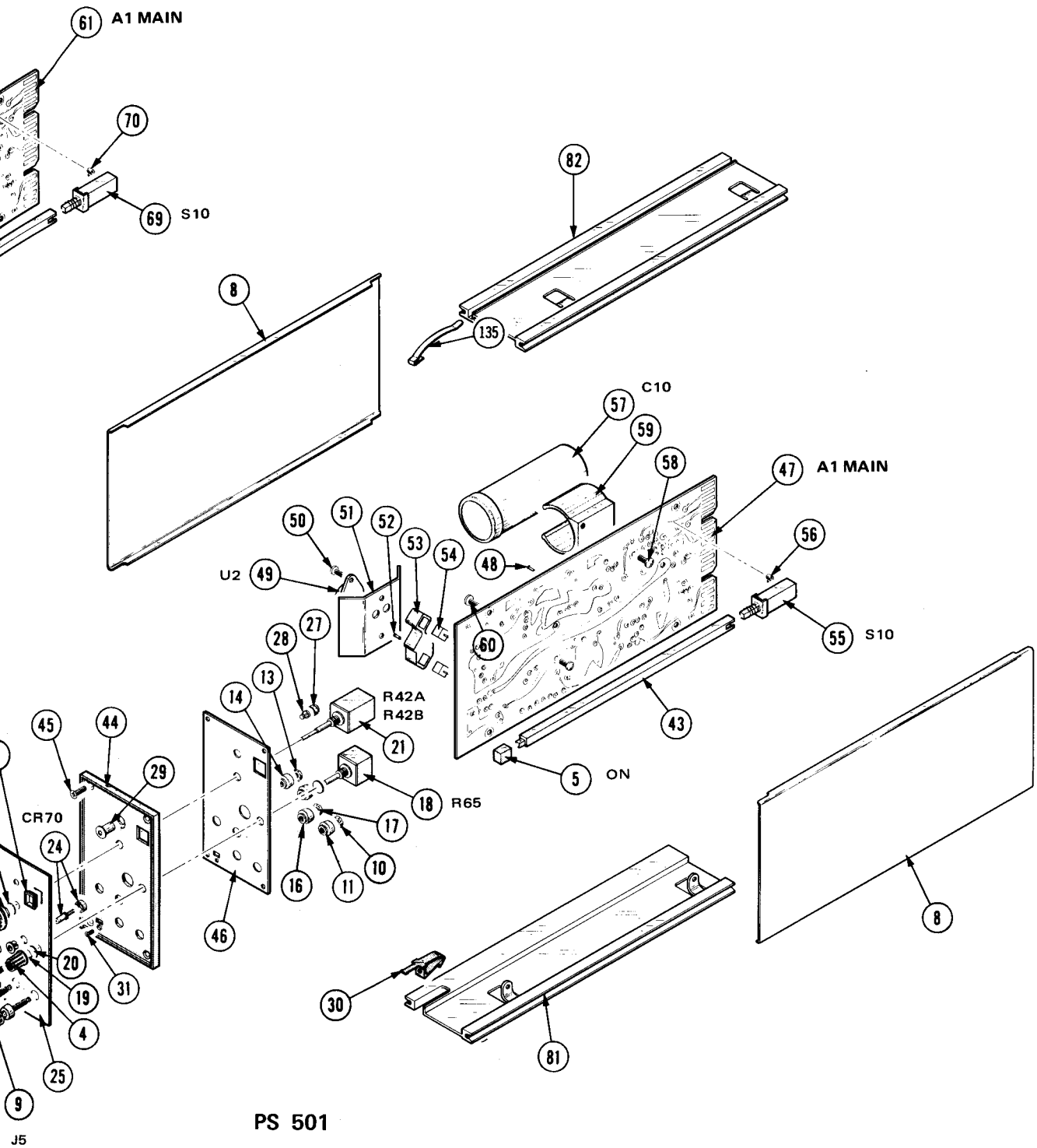

A1 MAIN
120
134
127
133
122
123
128
129
125
121
U2
126
124
132
108
113
112
111
115
94
R65
95
98
114
131
S55
104
109
110
91
130
S10
100
97
92
105
99
106
101
R42A
R42B
118
86
103
107
84
102
J52
93
85
119
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J50
89
117
116
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J6
90
J5
88



PS 501-1



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61 A1 MAIN
70
69 S10
82
8
135
C10
57
59
58
47 A1 MAIN
56
50
51
52
53
54
U2
49
48
55 S10
28
27
60
13
14
R42A
R42B
21
43
45
44
29
5 ON
18 R65
CR70
24
17
10
16
11
46
20
19
31
4
25
9
J5
30
81
8

PS 501

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
						ACCESSORIES		
	070-1301-02			1		MANUAL,TECH:INSTRUCTION	80009	070-1301-02

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MANUAL CHANGE INFORMATION

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

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

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

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MANUAL CHANGE INFORMATION

Date: 2/1/83 Change Reference: M49357

Product: PS 501-1 Manual Part No.: 070-1301-02

DESCRIPTION

EFF SN: B056210

REASON FOR CHANGE: To improve turn-on characteristics of the +20V and -5V supplies and to keep the extreme overload capabilities below the maximum current ratings of the main frame.

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

CHANGE:

A1	FROM:	670-2116-02	CKT BOARD ASSY: MAIN
	TO:	670-2116-03	CKT BOARD ASSY: MAIN
R65	FROM:	311-1369-00	RES,VAR,NONWIR: PNL,1K OHM,1W
	TO:	311-1095-00	RES,VAR,NONWIR: PNL,10K OHM,0.5W

ADD:

R66	321-0193-07	RES,FXD,FILM: 1K OHM,0.1%,0.125W

DIAGRAM CHANGES

DIAGRAM ◇1◇ POWER SUPPLY

CHANGE: R65 (location J6) to a 10KΩ variable resistor.

ADD: R66 (1KΩ) from the collector of Q60 to the cathode of CR55.

At location B6, part of S10 is shown as being shorted for PS 501-2 ONLY. This now also applies to PS 501-1 for the serial numbers noted above.

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