A6901

Operators Information

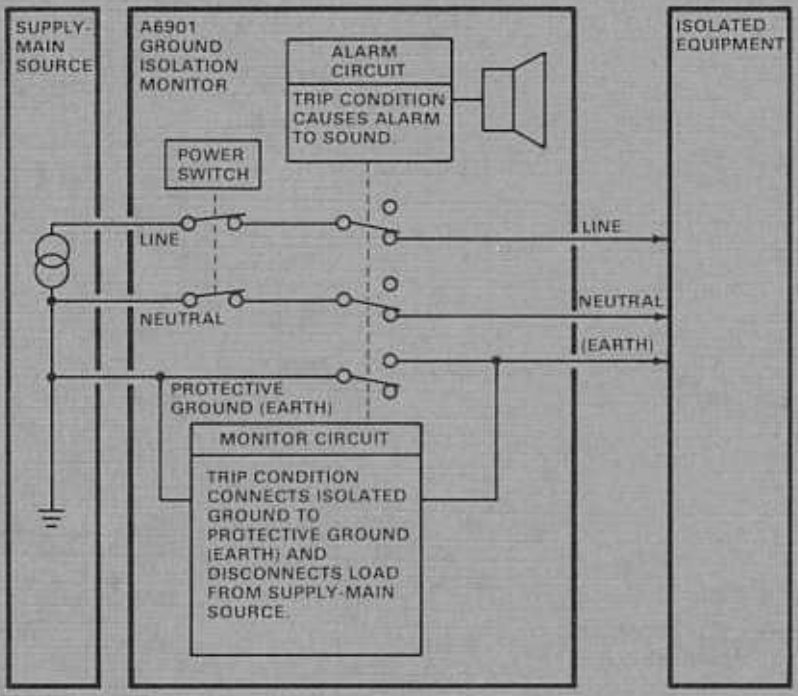


TABLE OF CONTENTS

TABLE OF CONTENTS (CONT)

SECTION 3 THROUGH 10 (SERVICING INFORMATION)

QUALIFIED SERVICE PERSONNEL SHOULD REFER TO SERVICING INFORMATION TABLE OF CONTENTS FOLLOWING THE GOLDENROD DIVIDER PAGE.

SECTION 3 THROUGH 10 OF THIS MANUAL CONTAINS SERVICING INFORMATION. THIS SERVICING INFORMATION IS FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CALLED OUT IN THE GENERAL INFORMATION OR OPERATING INSTRUCTION SECTIONS UNLESS QUALIFIED TO DO SO.

LIST OF ILLUSTRATIONS

LIST OF TABLES

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. Also, refer to Section 1, General Information, for information about electrical shock and its effect on the human body.

The A6901 is protection Class I equipment

TERMS

IN THIS MANUAL

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

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

AS MARKED ON EQUIPMENT

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

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

SYMBOLS

IN THIS MANUAL


Static-Sensitive Devices


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

AS MARKED ON EQUIPMENT


DANGER—High voltage.


Protective ground (earth) terminal.


ATTENTION—refer to manual.

WARNINGS

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 (earth) connection by way of the grounding conductor in the power cord is essential for safe operation.

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, see Figure 1-4 in Section 1, General Information.

Refer cord and connector changes to qualified personnel.

GROUNDING THE PRODUCT

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

USE THE PROPER FUSE

To avoid fire hazard, use only the fuse specified in the parts list for your product, and which is identical in type, voltage rating, and current rating.

Refer fuse replacement to qualified service personnel.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

To avoid explosion, do not operate this product in an atmosphere of explosive gases 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.

Section 1

The A6901 Ground Isolation Monitor is an indirect grounding device that connects between the power source and test equipment, and allows you to reference your measurement to a low voltage rather than ground. Should an excessive voltage level be applied to the test instrument common lead, the A6901 will interrupt the line and neutral poles to the supply-main source and connect the protective ground (earth) green-yellow conductor from the supply-main source to the isolated grounding system. The A6901 Ground Isolation Monitor confirms a functional protective ground (earth) connection in the supply-main source and allows elevated measurements.

The A6901 does not limit test equipment performance.

This section contains a basic content description of both the Operators and Service portions of the Instruction Manual, information on instrument installation, power requirements, electric shock, packaging for shipment, and specifications. The Specification portion consists of three tables; Electrical, Environmental, and Physical Characteristics.

A Standard Accessories list and full-page instrument Dimensional Drawing is also contained in this section.

General Information

The A6901 allows limited elevation of the test-equipment chassis to voltage levels above or below protective ground (earth). The primary application for voltage elevation is for ground-loop noise measurements and chassis elevation to logic circuit levels for digital troubleshooting.

The A6901 also provides for normal (grounded) operation simply by setting the GROUNDING MODE switch to GROUNDED.

The A6901 Ground Isolation Monitor is an indirect grounding device which is connected in series with the supply-main source and an oscilloscope or other test equipment. It performs the following functions:

ISOLATES EQUIPMENT FROM PROTECTIVE GROUND (EARTH)

Isolates the protective grounding (earth) system and allows elevation of the test equipment chassis both above and below protective ground (earth). See Figure 1-1. Continuously monitors the voltage and current on the isolated grounding system and when the voltage exceeds 40 V peak from protective ground (earth) or the current exceeds the selected value (0.5, 3.5, or 5 milliamperes), the A6901 will disconnect power to the isolated equipment, re-establish the protective grounding (earth) system, and sound an audible alarm.

Monitors Supply-Main Polarity and Checks for an Open Ground Conductor. At initial turn-on, tests for open protective ground (earth) conductor and for line-and-neutral conductor reversal of the A6901 to the supply-main source. An audible alarm indicates a ground-fault condition. See Figure 1-2.

Monitors Ground Impedance. When activated, continuously tests the impedance of the protective ground (earth) conductor between the Monitor and the supply-main source. An audible alarm indicates an impedance in the protective ground (earth) conductor. See Figure 1-3.

NOTE

For further information, refer to Section 2, Operating Instructions.

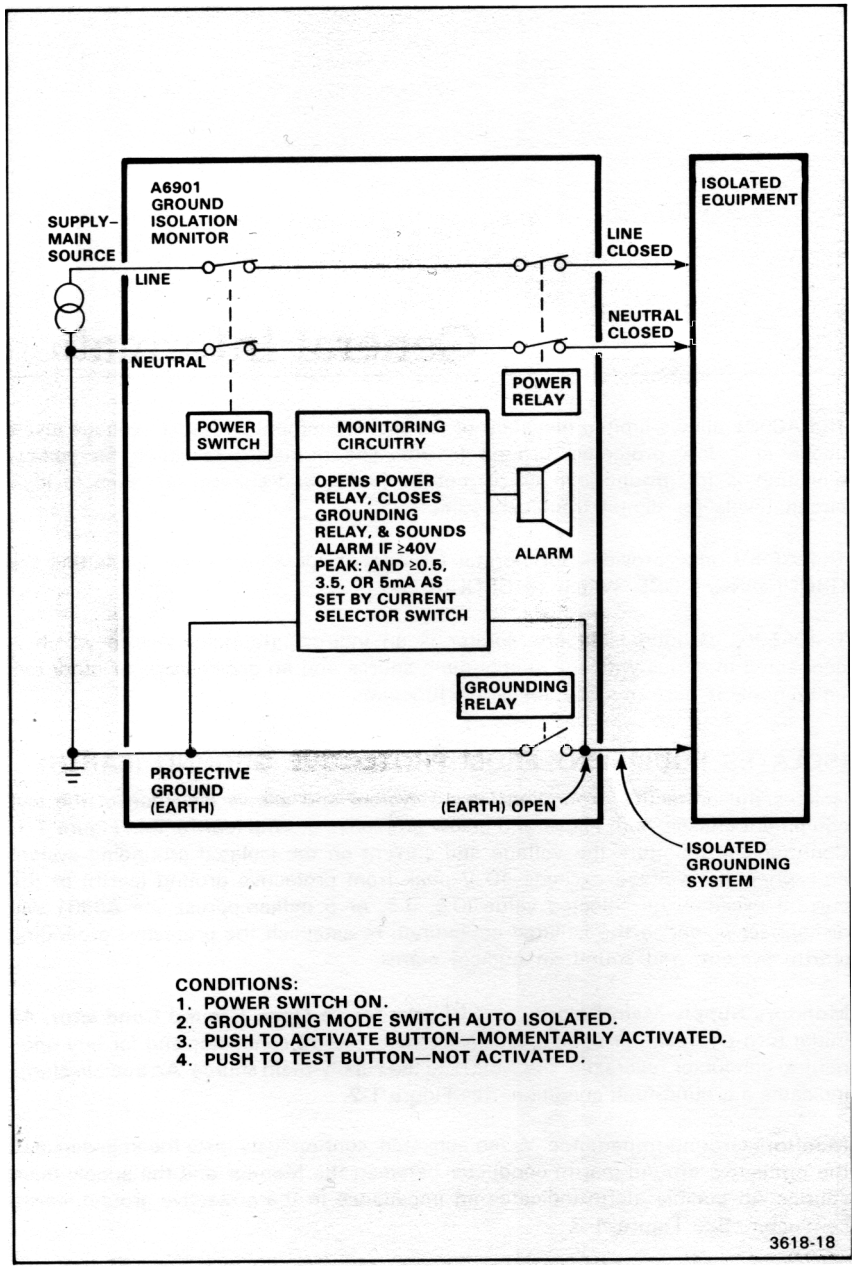
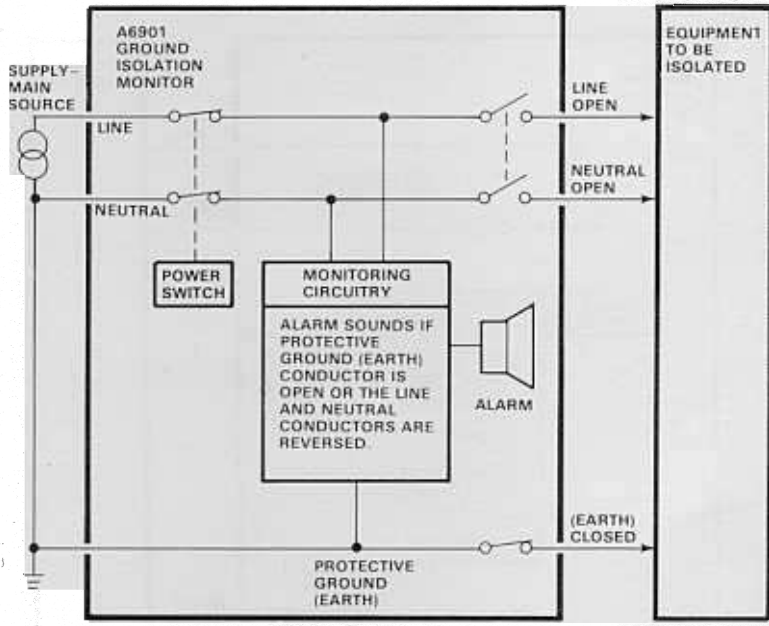


Figure 1-1. The A6901 isolates equipment from protective-ground (earth) and monitors the isolated grounding system.



CONDITIONS FOR TESTING GROUND CONTINUITY:

1. **POWER SWITCH ON.**
2. **GROUNDING MODE SWITCH GROUNDED.**
3. **PUSH TO ACTIVATE BUTTON—NOT ACTIVATED.**
4. **PUSH TO TEST BUTTON—NOT ACTIVATED.**

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Figure 1-2. The A6901 tests for ground continuity and for line-and-neutral conductor reversal.

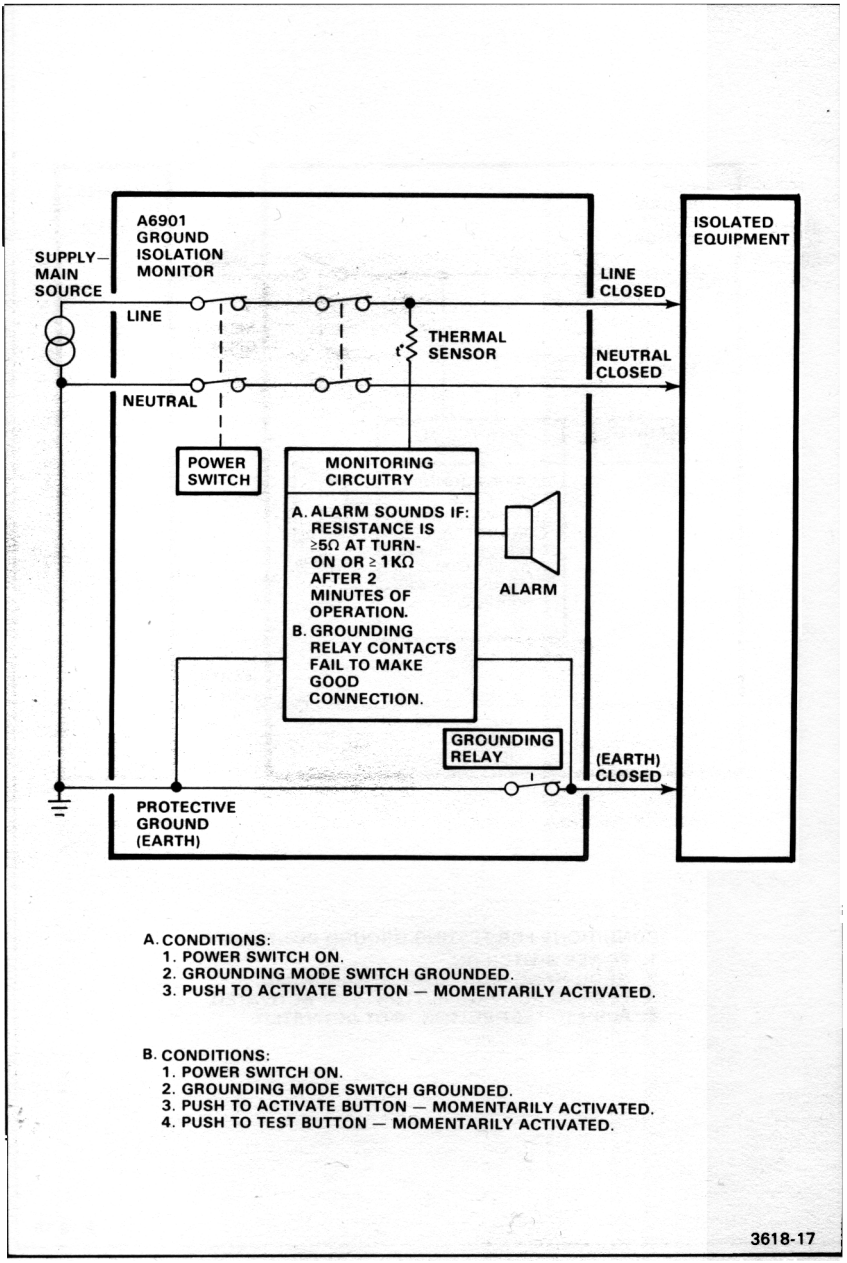


Figure 1-3. The A6901 tests protective ground (earth) conductor impedance between Monitor and supply-main source.

INSTRUCTION MANUAL

The Instruction Manual is composed of two parts; the Operators Information and the Service Information as defined below.

OPERATORS INFORMATION

The Operators portion of this manual is contained in the first two sections

Section 1—General Information contains the Instruction Manual content description, electric shock, operators installation instructions, packaging for shipment instructions, electrical, environmental, and physical characteristics, and a Standard Accessories list.

Section 2—Operating Instructions contains information relative to operating and checking instrument operation. Typical applications are also included in this section.

SERVICING INFORMATION

The Servicing Information of this manual contains the following sections

WARNING

THE REMAINING PORTIONS OF THE INSTRUCTION MANUAL CONTAIN SERVICING INSTRUCTIONS. THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED SERVICE PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK OR OTHER PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT DESCRIBED IN THE OPERATORS PORTION OF THIS MANUAL UNLESS YOU ARE QUALIFIED TO DO SO.

Section 3—Installation, contains instructions for installation and setup to be used by qualified service personnel only.

Section 4—Theory of Operation, contains basic and general circuit analysis that may be useful for servicing the instrument.

Section 5—Maintenance, describes routine and corrective maintenance procedures with detailed instructions for replacing assemblies, subassemblies, and individual components.

Section 6—Performance Check, contains procedures to check the electrical characteristics of the A6901 Ground Isolation Monitor.

Section 7—Instrument Options, contains a description of available options and locations of incorporated information for those options.

Section 8—Replaceable Electrical Parts, contains information necessary to order replaceable parts and assemblies related to the electrical functions of the instrument.

Section 9—Diagrams and Circuit Board Illustrations, includes a detailed circuit schematic, circuit board component locator, and locations of test points to aid in performing the Performance Check procedure.

Section 10—Replaceable Mechanical Parts, includes information necessary to order replaceable mechanical parts and shows exploded drawings which identify assemblies.

WHAT IS ELECTRIC SHOCK?

The A6901 allows potentials up to 40 volts peak (28 volts rms) to be present on accessible parts of the isolated test equipment. While the A6901 controls and limits this potential to that accepted as safe by national and international standards, some persons may, nevertheless, be susceptible to this potential. To avoid electric shock we recommend that you, and persons in the vicinity of the isolated equipment, refrain from unnecessary contact with the isolated equipment.

The A6901 does not limit the current when isolating potentials are less than 40 volts peak.

According to Stedman's Medical Dictionary, electric shock is "a sudden violent impression caused by the passage of a current of electricity through any part of the body." It says nothing about the magnitude of that current.

The human body is electrically controlled, that is, it operates in response to its own minute electrical signals. Different persons will have different resistances and sensitivities to electricity.

The threshold of current perception is about 1/2 mA for 99.9% of the population, according to Charles F. Dalziel, writing in the February 1972 IEEE spectrum. In other words, 999 persons out of a thousand will perceive a current of 1/2 mA; one will not.

The let-go current is the "maximum current a person can tolerate and at which he can still release the conductor by using the muscles directly stimulated by that current. The **maximum** uninterrupted safe values are 9 mA and 6 mA for normal men and women," respectively. (Emphasis added.) From "Electric Shock Hazard," by Charles F. Dalziel, Feb. 1972 IEEE spectrum. The "conductor" is the source of current which the subject has grasped.

"Further increase in current up to values that are not well-defined but thought to be on the order of 100 mA may cause a fibrillation of the heart," wrote K.S. Geiges in the February 1957 AIEE Transactions, Part III-Power Apparatus and Systems, Volume 75, 1956, in an article entitled "Electric Shock Hazard Analysis." In this article, Geiges specified six important parameters as follows:

Lowest Resistance of the Body	
Wet Skin, Outdoors	..... 500 Ω
Dry Skin, Indoors.....	..... 1,500 Ω
Threshold of Perception..	..... 0.2 mA
Let-Go Current, Adults ..	..... 6-20 mA ac, depending on the person.
Safe Current, Adults	
AC	5 mA rms @ 30 V
DC	.....5 mA @ 40 V

"Current caused by ordinary household voltage (120 V, North America; and 240 V, Europe) will be 240 mA (120 V/500 Ω) and 480 mA (240 V/500 Ω), showing that lethal shock can occur in the home."

"Currents above those possible from ordinary household voltage across a body impedance of 500 Ω (usually in the ampere range) can affect the nerve centers, causing paralysis. The most common effect of paralysis is respiratory failure. (Power linemen are subject to this.) Such current passing through the body causes hemorrhages and burns." (K.S. Geiges, Feb. 1957 AIEE Transactions, "Electric Shock Hazard Analysis.")

SUMMARY EFFECTS OF ELECTRIC SHOCK

- Currents above the reaction-current level may cause an involuntary movement and trigger a serious accident.

- If long continued, currents in excess of one's let-go current passing through the chest may produce collapse, unconsciousness, asphyxia, and death.

- It is believed that ventricular fibrillation in a normal adult worker is unlikely if the shock intensity is less than $116/t^{1/2}$ mA, when t is in seconds.

- An alternating current of 20 μA may produce ventricular fibrillation if injected directly into the human heart. Deaths are currently ascribed to medical apparatus in which minute stray currents are alleged to cause fatalities.

- Currents in the order of milliamperes flowing through nerve centers controlling breathing may produce respiratory inhibition that may last for a considerable period, even after interruption of the current.

- Cardiac arrest may be caused by relatively high currents flowing in the region of the heart.

  Current in the order of amperes may produce fatal damage to the central nervous system.

- Electric currents may produce deep burns, and currents sufficient to raise body temperature substantially produce immediate death.

- Delayed death may result from serious burns or other complications

- Capacitor discharges in excess of 50 joules (watt-seconds) are likely to be hazardous.

From "Electric Shock Hazard," by Charles F. Dalziel, in Feb. 1972, IEEE Spectrum

INSTALLATION

INITIAL INSPECTION

This instrument was inspected both mechanically and electrically before shipment. It should be free of mars or scratches and should meet or exceed all electrical specifications. To confirm this, inspect the instrument for physical damage incurred in transit and test the electrical performance by following the Power-Up Sequence procedure in Section 2, Operating Instructions. Verify Performance Requirements by referring a qualified service person to the servicing sections of this manual. If there is damage or deficiency, contact your local Tektronix Field Office or representative.

OPERATING-POWER INFORMATION

The A6901 Ground Isolation Monitor can be operated from either a 115-volt or 230-volt nominal grounded neutral supply-main source, 48 to 66 hertz. Fuse installation information is printed on the bottom of the Monitor.

CAUTION

To ensure proper operation of the Monitor, always check for the proper setting on the VOLTAGE SELECTOR RANGE switch located on the bottom of the Monitor before connecting the Monitor to the supply-main source. See Operating Voltage Selection below.

Operating Voltage Selection

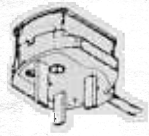
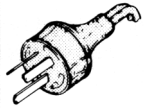
The VOLTAGE SELECTOR RANGE switch (located on the bottom panel) allows selection of 115-volt or 230-volt nominal line voltage operation.

POWER CORD INFORMATION

The A6901, standard Ground Isolation Monitor is shipped from the factory with the proper power cord and the fuses installed for North American 120 V operation. See Figure 1-4 if your Monitor is equipped with optional accessories, rather than standard accessories. Refer power cord and fuse substitution to qualified service personnel.

OPERATING TEMPERATURE

The A6901 can be operated where the ambient air temperature is between −15 degrees to +55 degrees C and can be stored in ambient temperatures from −62 degrees to +85 degrees C. After storage at temperatures outside the operating limits, allow the chassis temperature to reach the operating value before applying power.

Plug Configuration	Usage	Nominal Line-Voltage (AC)	Reference Standards	Option #
	North American 120V/15A	120 V	[1]ANSI C73.11 [2]NEMA 5-15-P [3]IEC 83	STANDARD
	Universal Euro 240V/10-16A	240 V	[4]CEE (7), II, IV, VII [3]IEC 83	A1
	UK 240V13A	240 V	[5]BS 1363 [3]IEC 83	A2
	Australian 240V/10A	240 V	[6]AS C112	A3
	North American 240V/15A	Not available on the A6901 due to the lack of a grounded neutral connection in the 240 V North American system.		A4
	Switzerland 220V/ 6A	220 V	[7]SEV	A5

[1]ANSI—American National Standards Institute
[2]NEMA—National Electrical Manufacturer's Association
[3]IEC—International Electrotechnical Commission
[4]CEE—International Commission on Rules for the Approval of Electrical Equipment
[5]BS—British Standards Institute
[6]AS—Standards Association of Australia
[7]SEV—Schweizevischer Elektrotechischer Verein

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Figure 1-4. Power cord and plug identification information

PACKAGING FOR SHIPMENT

If this instrument is to be shipped for long distances by commercial transportation, it is recommended that the instrument be packaged in the original manner. The carton and packaging material in which your instrument was shipped should be saved and used for this purpose.

Also, if this instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag to the instrument showing the following: Owner of the instrument (with address), the name of a person at your firm who can be contacted, complete instrument type and serial number, and a description of the service required.

If the original packaging is unfit for use or not available, package the instrument as follows:

1. Obtain a corrugated cardboard shipping carton having inside dimensions at least six inches greater than the instrument dimensions; refer to Table 1-1 for carton test strength requirements.

2. Enclose the instrument with polyethylene sheeting or equivalent to protect the finish of the instrument.

3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the instrument, allowing three inches on each side.

4. Seal the carton with shipping tape or with an industrial stapler.

5. Mark the address of the Tektronix Service Center and your return address on the carton in one or more prominent locations.

TABLE 1-1
Shipping Carton Test Strength

Gross Weight (lb)	Carton Test Strength (lb)
0-10	200
10-30	275
30-120	375
120-140	500

SPECIFICATION

The Electrical Characteristics listed in Table 1-2 apply when the following conditions are met:

(1) The line voltage must be 109V, 60 Hz, within the limits of 90V and 128V, (2) all specifications are valid at an ambient operating temperature between -15 degrees and +55 degrees C, unless otherwise stated, and (3) the instrument must be in an environment that meets the limits described in Table 1-3.

Any conditions that are unique to a particular characteristic are expressly stated as a part of that characteristic. Environmental characteristics are listed in Table 1-3, and Physical characteristics are listed in Table 1-4.

TABLE 1-2
Electrical Characterisitics

Characteristic	Performance Requirement
SENSE CIRCUIT	
Trip Voltage	28 V ac rms (40 V pk), or + or - 40 V dc within 5%. Refer to Figure 1-5.
DC Voltage Trip Delay	Less than 20 ms
DC Current Trip (CURRENT SELECTOR)	
Range	
0.5 mA	0.47 to 0.53 mA.
3.5 mA	2.5 to 3.5 mA, maximum
5.0 mA	4.0 to 5.0 mA, maximum
Source Ground Continuity (Protective Ground [Earth] to Neutral)	
POWER Switch	
OFF	
-15° to +25°C (ambient)	5 ohms or less with A6901 cold (off for at least 10 minutes) to obtain operation (ACTIVATE).
+25° to +55°C (ambient)	10 ohms or less with A6901 cold (off for at least 10 minutes) to obtain operation (ACTIVATE).

TABLE 1-2 (CONT)
Electrical Characterisitics

Characteristic	Performance Requireme
Source Ground Continuity (Cont)	
POWER Switch (cont)	
ON	1 k ohms or less after 2 minutes operation to sustain operation (remain ACTIVATED).
Leakage Current (A6901 not activated)	Less than 0.5 mA rms (with 1.5 kilohm leakage current meter).
Neutral-to-Ground Continuity	Must trip between 3 V and 10 V rms (8.5–28.3 V p-p), 50 Hz, at TP440 with J440 removed and a 5 megohm ±1% source
POWER SOURCE	
Line Voltage Ranges (RMS)	90 to 128 V. 180 to 250 V.
Line Frequency Range	48 to 66 Hz.
Maximum Power Consumption (No External Load)	12 W at 115 V, 60 Hz.
Power Supply Fuse	
Line Voltage Range	
90 to 128 V ac	0.1 A slow, 250 V, 3AG or, 0.1 A fast, 250 V, DIN Metric
180 to 250 V ac	0.062 A slow, 250 V, 3AG or, 0.05 A medium, 250 V, DIN Metric.
Line Fuse	
Line Voltage Range	
90 to 128 V ac	6.0 A fast 250 V, 3AG or 6.3 A fast, 250 V, DIN Metric.
180 to 250 V ac	3 A fast, 250 V, 3AG or, 3 A fast, 250 V, DIN Metric

TABLE 1-2 (CONT)
Electrical Characterisitics

Characteristic	Performance Requirement
Neutral Fuse	
Line Voltage Range	
90 to 250 V ac	8 A Medium, 250 V
Load Power	
90 to 128 V ac	500 W maximum.
180 to 250 V ac	500 W maximum.

TABLE 1-3
Environmental Characteristics

Characteristic	Information
Temperature	Meets MIL-T-28800B, class 3.
Operating	-15 degrees to +55 degrees C (+5 degrees to +131 degrees F)
Nonoperating	-62 degrees to +85 degrees C (-80 degrees to +185 degrees F)
Altitude	Exceeds MIL-T-28800B, class 3
Operating	To 4,500 m (15,000 ft).
Nonoperating	To 15,000 m (50,000 ft)
Humidity (Operating and Nonoperating)	Exceeds MIL-T-28800B, class 3 Five cycles (120 hr total), referenced to MIL STD-810C Method 507.1. Procedure IV, modified as specified in MIL-T-28800B paragraph 4.5.5.1.1.2 at 95% to 97% relative humidity and at 30 degrees C to 60 degrees C.
Vibration (Operating)	Meets or exceeds MIL-T-28800B, class 3. 0.64 mm (0.025 in.) p-p, 10 to 55 Hz sine wave. Total time of test-75 minutes.

TABLE 1-3 (CONT)
Environmental Characteristics

Characteristic	Information
Shock	Meets MIL-T-28800B, class 3. 50 g, 1/2-sine, 11-ms duration, for a tota of 18 shocks.
Bench Handling	Meets MIL-T-28800B, class 3. Instrument will withstand a drop from approximately 10 cm (4 in.) at an angle of 45 degrees.
Transportation Package	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2.
Vibration	25 mm (1 in.) at 270 rpm.
Drop	Package will withstand 10 drops from a height of 1 m (3.3 ft).
EMC	Per MIL-STD-461A and MIL-STD-462.
Electrostatic Discharge	20 kV discharged from 500 pF through 1 k ohms.

TABLE 1-4
Physical Characteristics

Characteristic	Information
Weight	
Without Accessories	1.4 kg (3.0 lb).
Shipping Weight	
Domestic	2.3 kg (5.0 lb).
Export	2.95 kg (6.5 lb).
Overall Dimensions	Refer to Figure 1-6.

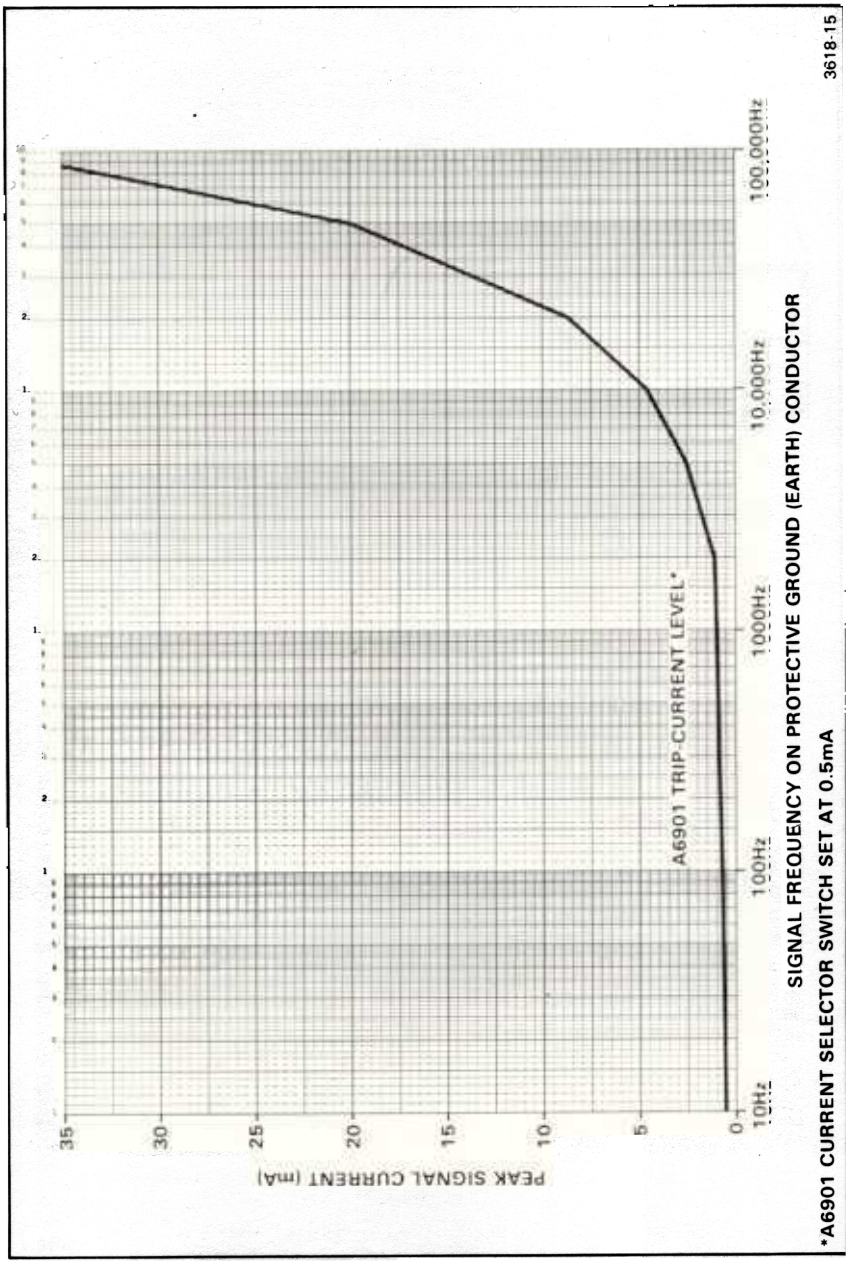


Figure 1-5. A6901 trip-current level with relation to the frequency of the applied current.

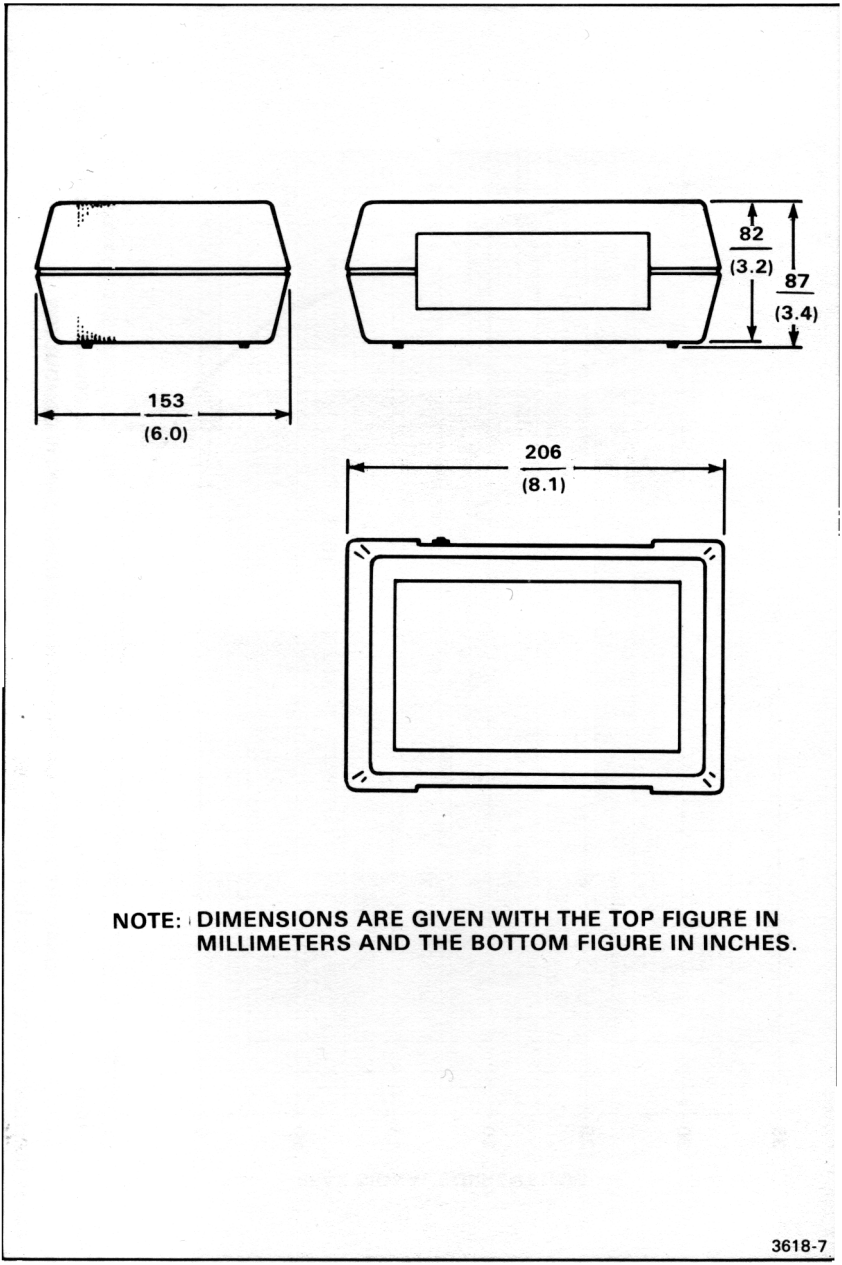


Figure 1-6. A6901 dimensional drawing

STANDARD ACCESSORIES

1 ea	..... Instruction Manual (multilingual)
1 ea	..... Power Cord, 3 meters[1]
1 ea	..... Load Cord 17.5 cm IEC to NA Female 120 V[1]
1 ea	..... Fuse, 3AF DIN Metric
1 ea	..... Fuse, 0.062 A Slowblowing 3AG (for North American 240 V operation)[1]

NOTE

Standard Accessories for instruments equipped with Options A1, A2, A3, and A5 will differ from those listed above.

For detailed information on standard accessories or Option A1, A2, A3 or A5 Accessories refer to the Accessories page at the rear of Section 10, Replaceable Mechanical Parts, and to Section 8, Replaceable Electrical Parts.

OPTIONAL ACCESSORIES

Carrying case.

2. Power Cord, 2.2 M, IEC-male-to-IEC-female. (Eliminates the need for Load Cord when powering test instruments having a detachable IEC female power cord.)

For detailed information refer to the Accessories page at the rear of Section 10, Replaceable Mechanical Parts.

[1]These accessories are standard for North American (120 volt) operation only; refer to Section 7, Instrument Options to determine the standard accessories necessary for operation in countries other than North America.

Section 2

This section will familiarize you with the capabilities and operation of your A6901 Ground Isolation Monitor. A thorough understanding of this information will help you to use the applications suggested here, and may inspire some of your own.

Familiarization begins with a description of the controls, connectors, and indicators, and continues with a discussion of the sequence of events necessary for proper checkout and operation each time the A6901 is powered up. An Audible Alarm Signal Code table provides a quick reference to the conditions that cause an alarm to sound. The Detailed Operating Information portion of this section concerns specific features of the A6901, and how those features react to various conditions. The section concludes with a few general applications with suggested equipment configurations.

NOTE

Information concerning the service of this instrument begins with section 3 to the end of the manual, and is for use by Qualified Service Personnel Only.

The A6901 Ground Isolation Monitor has been designed and tested in accordance with IEC Publication 348, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. This instruction manual contains some information and warnings which have to be followed by the user to ensure safe operation and to retain the A6901 in safe condition.

Operating Instructions

CONTROLS, CONNECTORS AND INDICATORS

The A6901 front- and rear-panels are shown in Figure 2-1 and Figure 2-3 and the bottom-panel fuses and switches are shown in Figure 2-2. A brief, functional description of each control, connector, and indicator is included in the illustration. Refer to Detailed Operating Information for additional information.

POWER-UP SEQUENCE

The following procedure details the sequence of events necessary for proper operation each time the A6901 Ground Isolation Monitor is powered up. Table 2-1 lists the audible alarm signals that will occur with various conditions. Also refer to Detailed Operating Information later in this section.

TABLE 2-1
Audible Alarm Signal Code

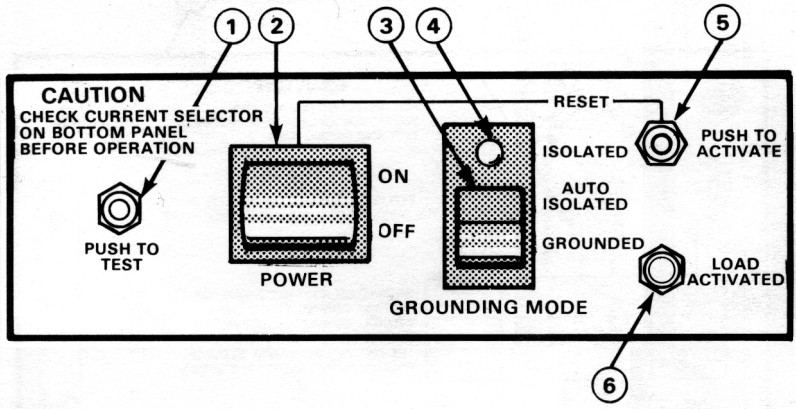
A6901 Operator Action	Alarm Status	Condition
Set POWER switch to ON.	Alarm Sounds	FAULT CONDITION: Line and neutral conductors reversed or open protective ground (earth) conductor in the supply-main source to the A6901 Monitor.
	Alarm Silent	Normal operation.

TABLE 2-1 (CONT)
Audible Alarm Signal Code

A6901 Operator Action	Alarm Status	Condition
Press PUSH TO ACTIVATE button. (AUTO ISOLATED Mode)	Alarm Sounds	FAULT CONDITION: Impedance in the protective ground (earth) conductor in the supply-main source to the A6901 Monitor.
	Alarm Silent	Normal operation
Set GROUNDING MODE switch to GROUNDED. Press PUSH TO TEST button.	Alarm Sounds	FAULT CONDITION: A6901 Malfunction
	Alarm Silent	Normal operation
Set GROUNDING MODE switch to AUTO ISOLATED. Press PUSH TO TEST button.	Alarm Sounds	Normal Operation. (The ISOLATED and LOAD ACTIVATED indicators should extinguish).
	Alarm Silent	FAULT CONDITION: A6901 Malfunction

WARNING

To ensure safe operation of the A6901 and the instrument to which the A6901 is supplying power, this Power-Up Sequence must be performed each time power is applied.



(1) **PUSH TO TEST SWITCH**—Provides a means to check the A6901 for proper operation by applying a voltage and current (exceeding the trip level) to the isolated ground.

(2) **POWER Switch**—Applies or removes source power to the A6901.

(3) **GROUNDING MODE Switch**—
AUTO ISOLATED—Isolates the load's protective grounding system from ground. (earth)
GROUNDED—Connects the load's protective grounding system directly to ground. (earth)

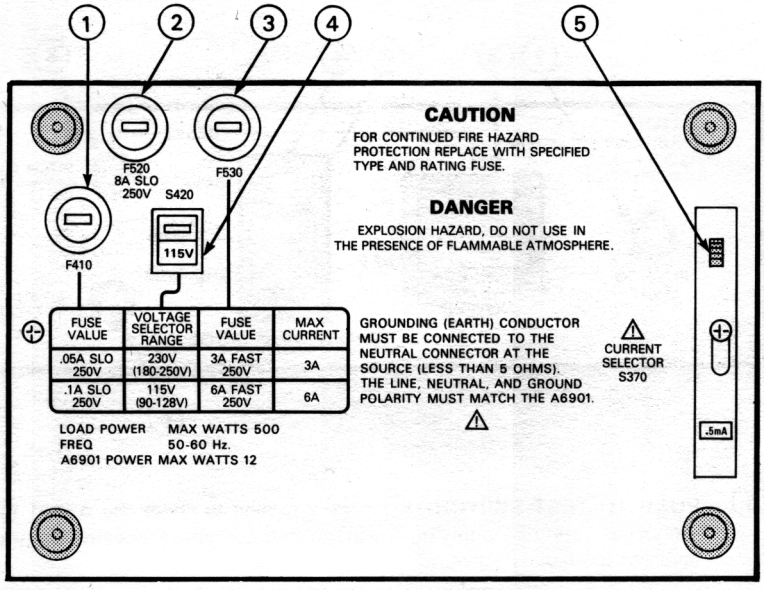
(4) **ISOLATED Indicator**—Indicates when the load's protective grounding system is isolated from ground. (earth)

(5) **PUSH TO ACTIVATE Switch**—Activates the A6901 circuits to their monitoring mode, and provides power to the load.

(6) **LOAD ACTIVATED Indicator**—Indicates when power is being applied to the load.

3618-2

Figure 2-1. Front-panel controls and indicators



(1) **F410**—Provides fuse protection for the ac line input to the internal power supply.

(2) **F520**—Provides fuse protection for the ac neutral input.

(3) **F530**—Provides fuse protection for the ac line input.

(4) **Line Voltage Selector**—Sets Monitor for 115-volt or 230-volt operation.

(5) **CURRENT SELECTOR Switch**—Allows selection of three load-leakage-current magnitudes at which the Monitor will interrupt the load's power. See warning note below.

WARNING

To avoid electrical shock hazard, refer the setting of the CURRENT SELECTOR switch to qualified service personnel only.

3618-8

Figure 2-2. A6901 bottom-panel fuses and switches.

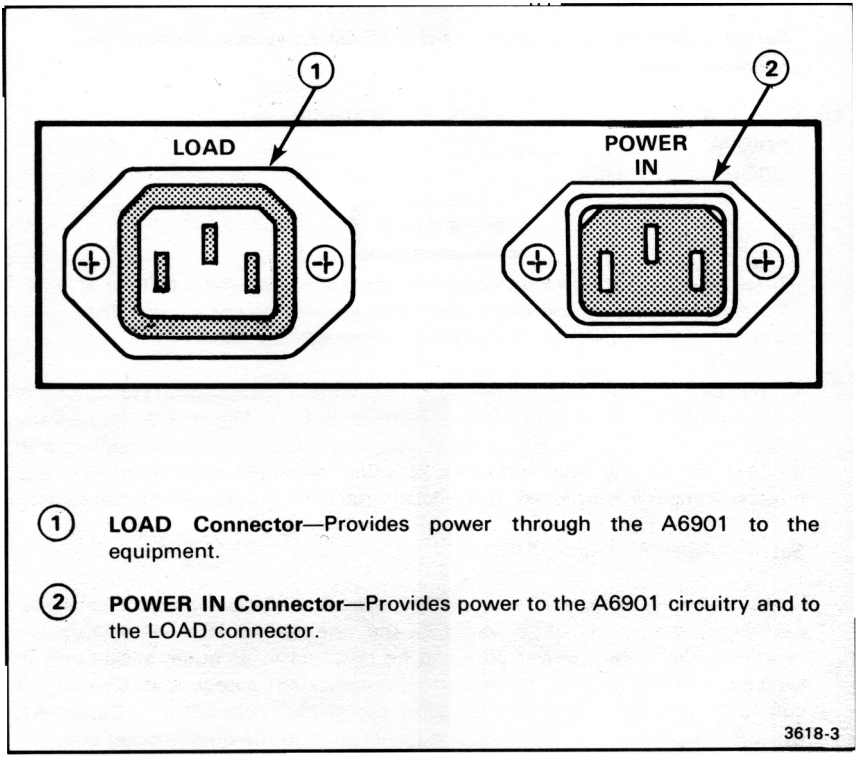


Figure 2-3. Rear-panel connectors.

PRELIMINARY SETUP

WARNING

To avoid a dangerous electrical-shock hazard, do not operate this Monitor if you have exposed broken skin (e.g., open cuts or skin punctures). The body resistance below your skin is relatively low, which greatly increases the possibility of allowing dangerous current levels to flow.

To avoid electrical-shock hazard, do not touch any ground-referenced potentials while touching the isolated device. Devices isolated with the A6901 can have potentials of up to -40 volts to +40 volts peak on accessible parts.

NOTE

Before connecting any device to the LOAD connector, perform the following steps:

1. Set the A6901 front-panel switches as follows:

   POWER ....OFF
   GROUNDING MODE ..... GROUNDED

WARNING

To avoid electrical-shock hazard, allow the A6901 to remain OFF for at least 10 minutes before connecting it to another power source. This allows time for the internal sensing thermistor to cool.

2. Set the Line Voltage Selector switch (on the bottom of the A6901) to match the voltage of the supply-main source to be used. Refer to Figure 2-2. Connect the A6901 POWER IN to the supply-main source, via the power cord supplied with the unit. The supply-main source socket must match the power-cord plug, and must be properly connected to the local protective ground (earth) conductor.

3. Set the POWER switch to ON.

   If the alarm sounds, the supply-main source protective ground (earth)-to-neutral connection is either open or the line and neutral conductors are reversed. The A6901 power plug can be reversed in its outlet socket only in systems that, (1) utilize a nonpolarized supply-main source and, (2) that are equipped with outlet sockets that allow power-plug reversal (i.e., Option A1, Universal European). If reversing the power plug in the outlet socket does not solve the problem, refer repairs of the supply-main source to a qualified electrician.

4. Press the PUSH TO ACTIVATE button. If the LOAD ACTIVATED indicator lights, it indicates proper protective grounding (earth) connection to the A6901; proceed to step 5. If the audible alarm sounds, the protective ground (earth) has an impedance between the supply-main source and the A6901 POWER IN connector. Set the POWER switch to OFF, and refer repairs of the supply-main source protective ground (earth) to a qualified electrician.

WARNING

To avoid electric shock hazard, do not repeatedly press the ACTIVATE button. This action results in a warming of the internal sensing thermistor and could cause the A6901 to activate on a high-impedance ground-to-neutral connection.

If the A6901 does not activate the first time the ACTIVATE button is pressed, the protective grounding (earth) impedance is greater than specified. Refer repairs of the supply-main source protective ground to a qualified electrician.

5. Press the PUSH TO TEST button.

WARNING

When the A6901 is operated in the Isolated Mode, the following criteria must be followed to avoid electrical-shock hazard:

a. *The A6901 must only be used by persons of normal adult stature. Children and very small stature adults are more susceptible to small currents than persons of normal adult stature.*

b. *The A6901 must only be used by persons in good health. Persons of the class "Population at Risk" (i.e., cardiac patients, users of medications and drugs, or persons requiring metallic braces for support) are more susceptible to small currents than other persons.*

c. *The A6901 must be operated in a dry, low-humidity environment; persons are more susceptible to small currents in moist or wet environments.*

6. Set the GROUNDING MODE switch to the AUTO ISOLATED position, and check that the ISOLATED indicator lights.

7. Press the PUSH TO TEST button. The alarm should sound (and the ISOLATED and LOAD ACTIVATED indicators should extinguish) to indicate the A6901 circuitry is functioning. If the alarm does not sound, the A6901 is faulty and should not be used until the problem has been corrected. Refer repairs to qualified service personnel. Set the POWER switch to OFF, and return the GROUNDING MODE switch to the GROUNDED position.

WARNING

An improper (or open) protective ground connection between the A6901 and the isolated equipment can cause an electrical-shock hazard. Verify the continuity of the protective ground (earth) lead in the interconnecting power cable between the A6901 LOAD connector and the equipment to be isolated.

8. Connect the equipment to be isolated to the LOAD connector.

9. Set the POWER switch to ON.

10. Press the PUSH TO ACTIVATE button.

11. Set the GROUNDING MODE switch to AUTO ISOLATED.

WARNING

Some people may perceive electric shock when operating test equipment powered by the A6901 within the elevated voltage and current limits of the A6901. This is normal for a minority of the population and the extent of perception will vary with operating conditions. Care must be taken when you perceive a voltage to avoid secondary injuries caused from spontaneous reaction.

This completes the Power-Up Sequence.

DETAILED OPERATING INFORMATION

AUDIBLE ALARM

An audible alarm indicates a "trip" condition in the A6901; that is, the protective ground (earth) connection is re-established and the power to the load is disconnected. There are three modes in which the A6901 alarm will sound to indicate a trip condition:

Connecting to the Supply. In this mode, the supply-main source is checked for ground continuity and neutral/line conductor reversal. The audible alarm indicates a "trip" condition has occurred (due to a problem in the supply-main source).

2. **Verifying A6901 Operation.** In this mode, the PUSH TO TEST feature verifies proper operation of the A6901. The audible alarm indicates a "trip" condition has occurred (due to excessive voltage and current applied to the isolated protective ground (earth) conductor caused by a simulated fault condition in the load).

3. **Monitoring the Isolated Ground.** In this mode, the isolated protective ground (earth) voltage and current are continuously monitored. The audible alarm indicates a "trip" condition has occurred (due to excessive voltage and current on the isolated ground).

The A6901 Ground Isolation Monitor POWER switch must be set to the OFF position for 2 to 3 seconds to disable and reset the audible alarm.

The audible alarm will sound when any of the following conditions exist

The protective grounding (earth) conductor of the supply-main source is open (not connected to the grounded supply (neutral) conductor).

This occurs because the leakage current of the A6901 will allow the voltage on the A6901 chassis to approach one-half the supply voltage. This voltage

difference between the grounded supply (neutral) conductor and the A6901 chassis will generate a ground continuity trip signal, causing the alarm to sound.

2. The grounded (neutral) and ungrounded (line) supply conductors are interchanged. The voltage difference between the ungrounded (line) supply conductor and the A6901 chassis will generate a ground continuity trip signal (as if the protective grounding (earth) conductor was open) and cause the alarm to sound.

3. Both of the aforementioned conditions exist at turn-on. The potential difference between the ungrounded (line) supply conductor and chassis will generate a ground continuity trip signal, and cause the alarm to sound.

GROUNDING MODE SWITCH

The GROUNDING MODE switch has two positions; AUTO ISOLATED (active) and GROUNDED (passive).

Grounded Mode

If the Mode switch is set to the GROUNDED position, the load's protective grounding (earth) conductor remains connected to the supply-main source's protective grounding (earth) conductor, with an impedance of less than 0.1 ohm at a current of 25 amperes. Regardless of the load conditions, the A6901 will remain passive; power will continue to be supplied to the load, limited only by the A6901 line fuse, F530.

Auto Isolated Mode

If the Mode switch is set to the AUTO ISOLATED position, the load's protective grounding (earth) conductor is disconnected (isolated) from the supply-main source's protective grounding (earth) conductor; the A6901 is now active (monitoring).

CAUTION

Component damage in the equipment under test can occur when the probe-ground lead of an isolated test instrument is connected to a test circuit as a result of stray capacitance discharge of the load's primary (supply-main source) wiring. See Precautions to Avoid Circuit Damage.

The A6901 will continue to provide power to the load and isolate the load's protective grounding (earth) system as long as: (1) leakage current of the load remains less than the preselected current magnitude (0.5, 3.5 or 5.0 milliamperes), and (2) the voltage difference between the protective grounding system (earth) and the isolated equipment chassis is less than 40 V peak.

WARNING

⚠ *Do Not attempt to change the bottom-panel CURRENT SELECTOR switch setting. To avoid electrical-shock hazard, refer the setting of this switch to qualified service personnel only.*

If the leakage current of the load exceeds the preselected magnitude (0.5, 3.5, or 5.0 milliamperes) the A6901 will generate a voltage/current trip signal. This trip signal will simultaneously disconnect the load from the supply-main source, connect the load's protective grounding (earth) conductor to the supply-main source's protective grounding (earth) conductor, and sound the audible alarm.

PRECAUTIONS TO AVOID CIRCUIT DAMAGE

Instruments powered from the A6901, when in the AUTO ISOLATED mode, are subject to damage if the proper precautions are not observed. A discussion of the three potential sources of instrument damage follows:

1. Potential Circuit Damage From a 40-Volt or Greater Point In a Test Circuit

CAUTION

Do not connect a probe-ground lead from an isolated test instrument to any potential greater than 40 volts peak when operating the test instrument from the A6901 in the AUTO ISOLATED mode. Damage can occur, both to the circuit under test, and to the isolated testing instrument.

Installation of a probe ground lead fuse, will reduce the possibility of circuit damage.

A potential of 40-volts or greater (i.e., a 50-volt supply) connected to the isolated test instrument's probe-ground lead will trip the A6901 and establish the protective-ground (earth) connection. Refer to Figure 2-4. This will short the 50-volt supply directly to earth ground through the A6901. The A6901 will disconnect power from the test instrument approximately 20 milliseconds after the protective-ground (earth) contact has been established. Instrument damage can occur during this 20-millisecond interval. Therefore, to reduce the possibility of instrument damage, it is extremely important that a fuse be connected in series with the probe-ground lead; refer a qualified service person to the Installation section of this manual (Section 3).

2. Potential Circuit Damage Resulting From a Loss of Power In the A6901

A fault condition in the A6901, the test instrument, or the instrument under test can cause circuit damage when the test instrument is isolated from protective ground (earth). Refer to Figure 2-5. An instrument fault condition, such as a shorted

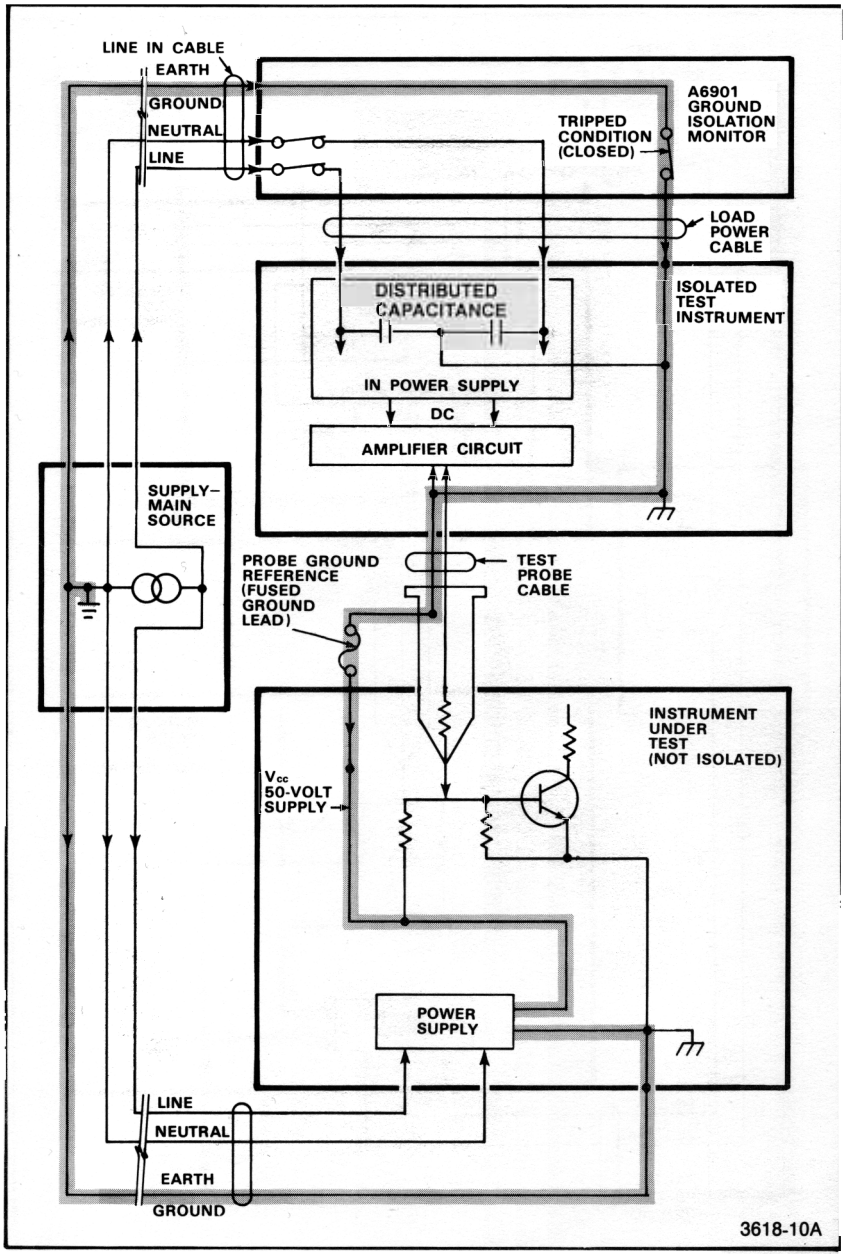


Figure 2-4. Typical instrument power-source configuration showing the probe-ground reference-voltage current path.

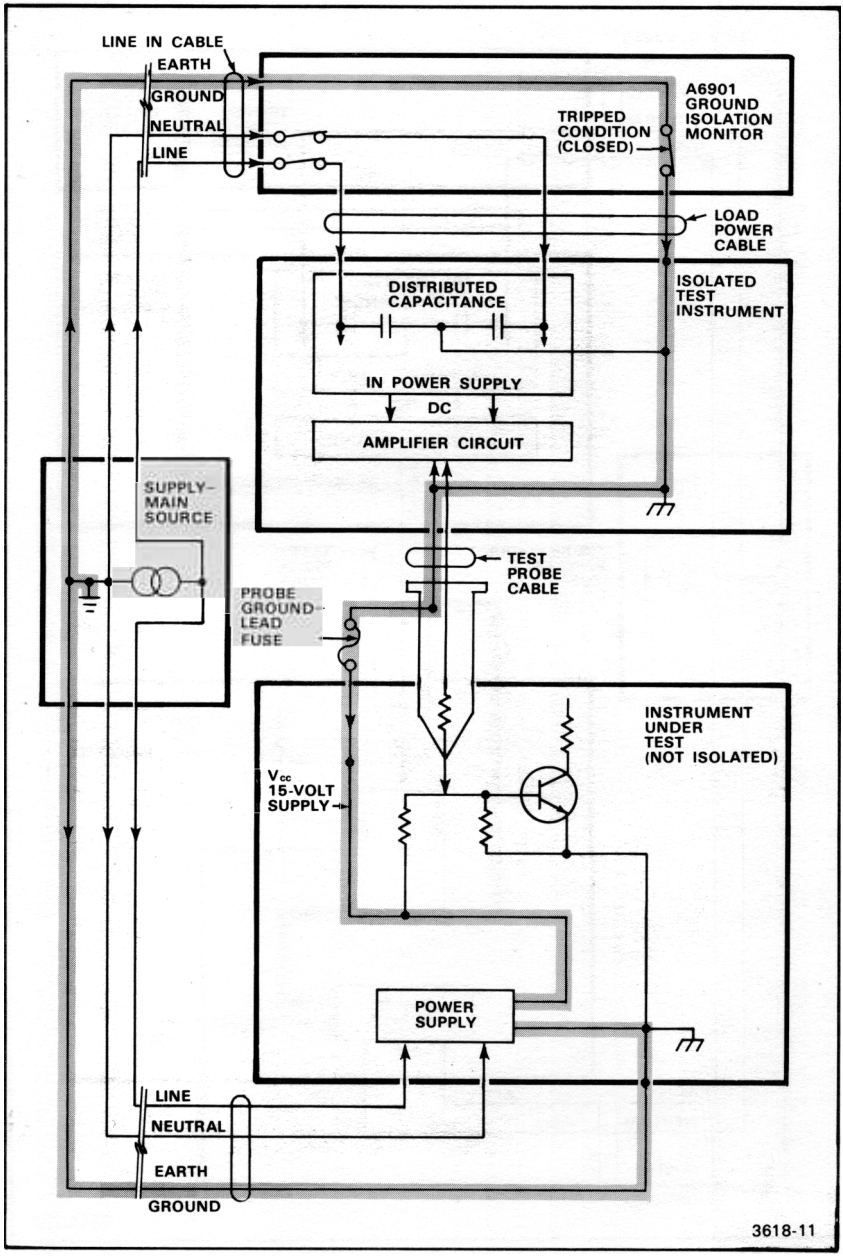


Figure 2-5. Typical instrument power-source configuration showing the fault-condition current path.

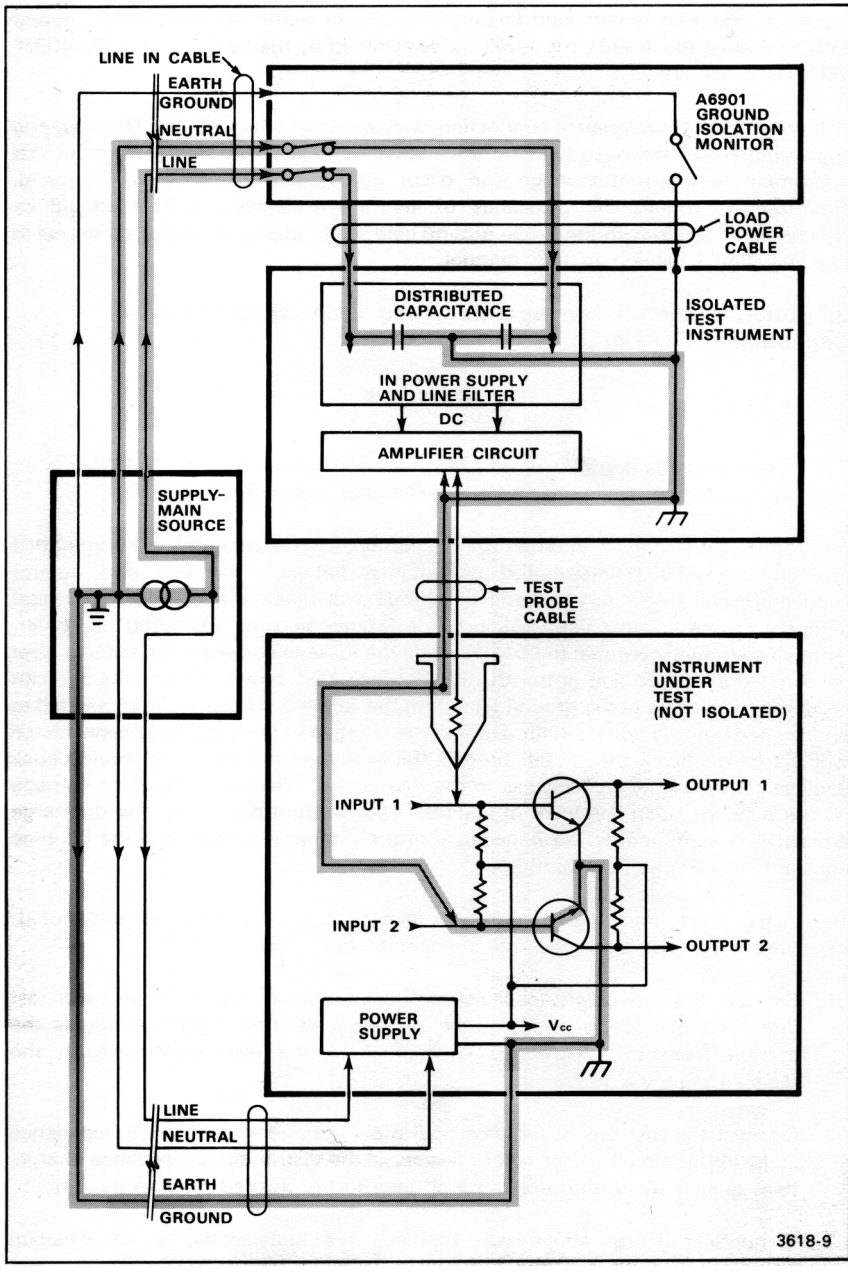


Figure 2-6. Typical instrument power-source configuration showing the distributed-capacitance discharge path.

capacitor, could apply sufficient voltage and current to the isolated chassis ground path to exceed the A6901 trip level, as determined by the bottom-panel CURRENT SELECTOR switch.

The protective ground (earth) connection is established when the A6901 trips, and approximately 20 milliseconds later the A6901 will disconnect power from the test instrument. Instrument damage can occur during this 20-millisecond interval. Therefore, to reduce the possibility of instrument damage, a fuse should be connected in series with the probe ground lead. Refer qualified service personnel to the Installation section in this manual.

3. Potential Circuit Damage Resulting From Distributed-Capacitance Discharge

CAUTION

Component damage can occur when the probe-ground lead of an isolated test instrument is connected to a test circuit. Refer to Figure 2-6.

When a test instrument, such as an oscilloscope, is isolated (indirectly grounded through the A6901) distributed capacitance between the line and neutral conductors will begin to charge. This charge will reach a maximum theoretical potential of one-half the voltage source via leakage current. The A6901 however, limits this charged potential to 40-volts peak; the leakage current is limited to a level determined by the setting of the CURRENT SELECTOR switch. Circuit damage can occur when the test-probe ground lead from the isolated instrument is connected to an elevated point in a test circuit. The voltage charged in the distributed capacitance will discharge to earth ground through the probe-ground lead, and could cause damage to semiconductor devices in the test circuit. Whether component damage occurs depends upon the level of instantaneous current discharge. The discharge current is determined by the impedance of the discharge circuit, and the RC time constant of the discharge path.

There are three precautions you can take to limit the effect of distributed capacitance current discharge into the circuit under test:

Connect the instrument (oscilloscope) test probe tip to the circuit under test first, and then connect the probe ground lead. This sequence allows the current from the distributed capacitance to be discharged through the resistance in the probe tip.

2. Connect the instrument (oscilloscope) probe-ground lead to a low-impedance point in the circuit under test to discharge the distributed-capacitance charge, then quickly move the probe-ground lead to the desired point in the circuit.

3. If neither of the above two methods are satisfactory, a 1:1 isolation transformer, with a grounded shield (screen) between the primary and secondary windings, may be connected between the A6901 and the instrument under test. This method should eliminate the problem.

TRIP-CURRENT FREQUENCY RESPONSE

The signal current level at which the A6901 will trip, is a function of the signal frequency present on the protective ground (earth) conductor. As shown in Figure 2-7, a signal current level approaching 4.5 milliamperes at 10 kilohertz could flow in the protective ground (earth) conductor before the A6901 sensing circuitry would trip; this could occur even while the A6901 CURRENT SELECTOR switch is in the 0.5 mA position.

APPLICATIONS

The A6901 Ground Isolation Monitor provides a means to elevate an electrical equipment chassis up to 40 volts above or below ground. This capability can be utilized in logic circuit measurements, or in systems exhibiting ground-loop noise problems. The following basic examples illustrate some of the applications possible using the A6901 Ground Isolation Monitor. Contact your local Tektronix Field Office or representative for additional assistance.

TELEPHONE EXCHANGE EQUIPMENT

Telephone exchange test equipment must often be connected to measure signals where the exchange operates from a local Utility Power Source and control signals come from a distant exchange (or PBX) powered by a different supply-main source, each with separate grounds. See Figure 2-8A.

Voltage readings taken with test equipment grounds connected as shown in Figure 2-8A may be erroneous. This is because of the potential difference that can exist between the separate earth grounds of the two exchanges.

The problem can be eliminated by connecting the A6901 Ground Isolation Monitor between the test equipment and the local supply-main source at any exchange. See Figure 2-8B. Connected in this manner, the A6901 effectively isolates the test equipment from local protective ground (earth), and allows voltage measurements to be referenced to their source.

GROUND CONTINUITY TESTING

The A6901 Ground Isolation Monitor will automatically test the ground continuity of the power source to which it is connected. The A6901 will not activate if the impedance between the protective-grounding (earth) conductor and the neutral conductor exceeds the specification. Refer to Electrical Characteristics, Table 1-2.

GROUND LOOP NOISE

Ground loops (unwanted ground currents) are often introduced into measurements simply by inserting the test instrument into the system. Refer to Figure 2-9A. The A6901 Ground Isolation Monitor will interrupt the return protective-ground path that the test instrument has inserted into the system. Refer to Figure 2-9B. This application will prevent unwanted ground currents from adversely affecting measurements.

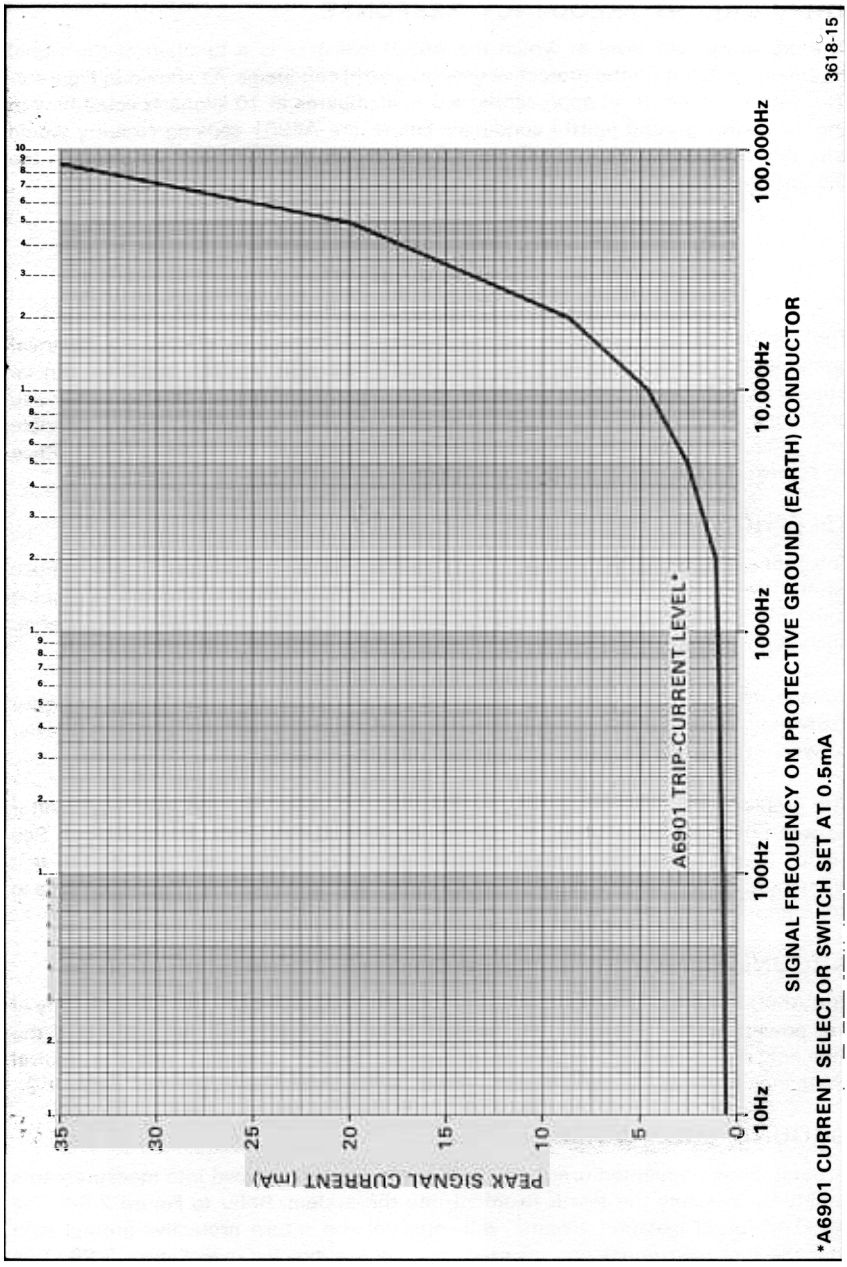


Figure 2-7. A6901 trip-current level with relation to the frequency of the applied current.

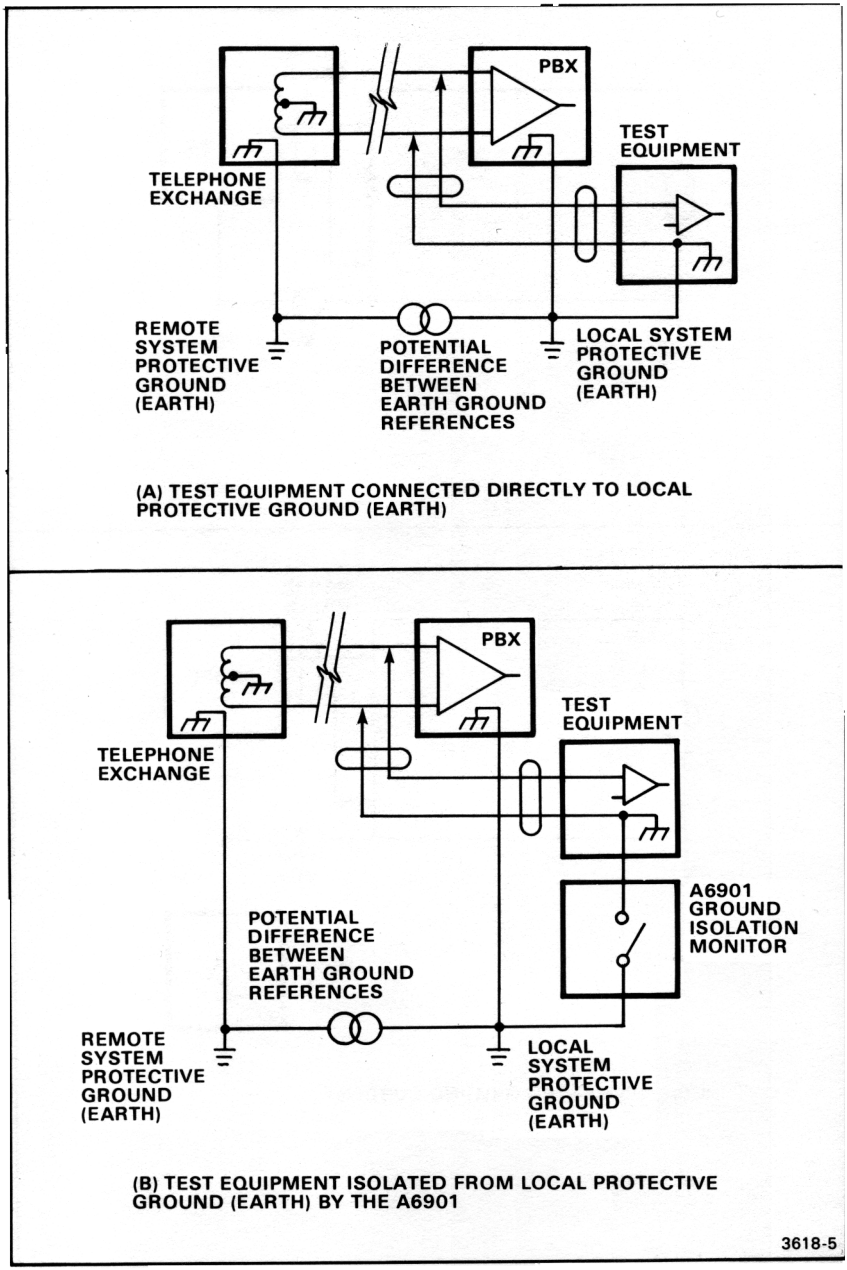


Figure 2-8. Test equipment ground isolation in systems using separate earth grounds

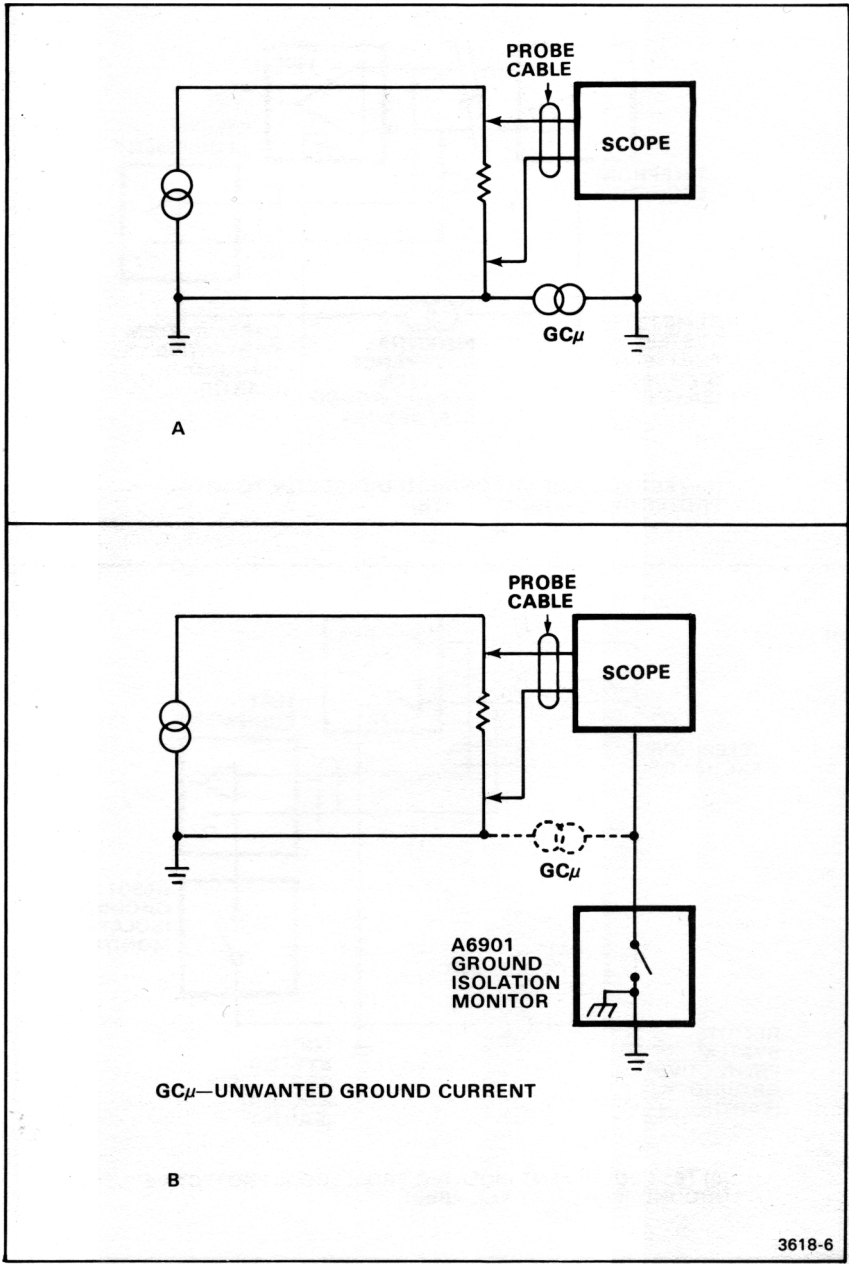


Figure 2-9. A6901 interrupts unwanted ground-loop currents (GCμ)

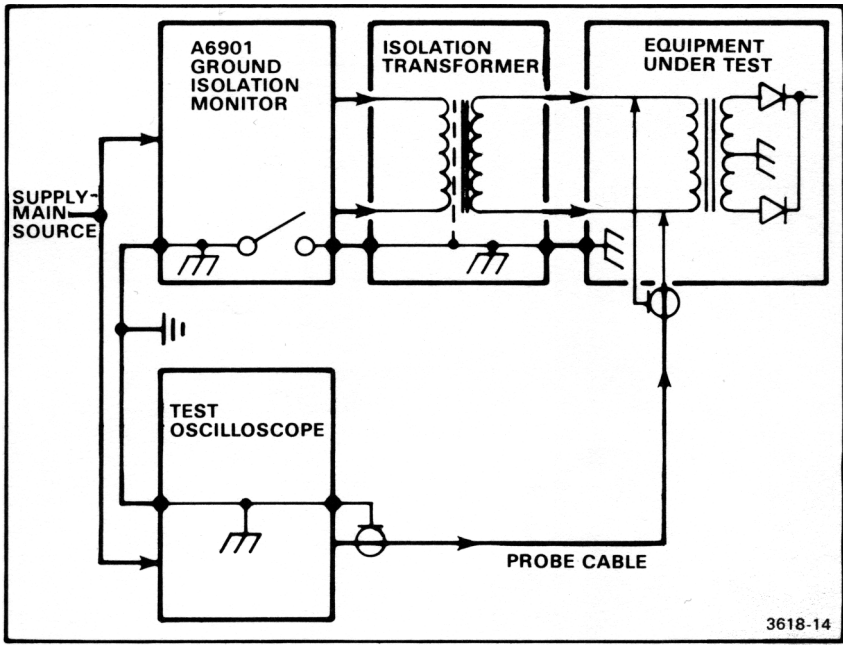


Figure 2-10. Typical equipment setup for measuring the primary circuits of the equipment under test.

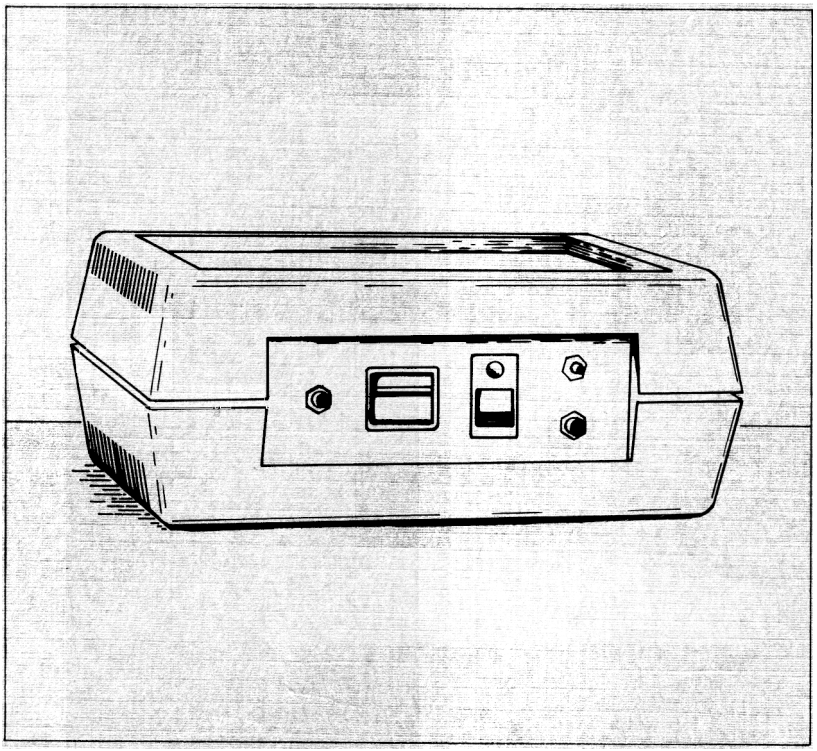
PRIMARY CIRCUIT MEASUREMENTS

An isolation transformer (with grounded shield) must be used with the A6901 when measuring primary circuits (i.e., power-supply circuits). Refer to Figure 2-10. The equipment under test, not the test oscilloscope, must be isolated from ground by the A6901. The isolation transformer isolates the supply-main source from protective ground (earth) for measurements referenced to the primary circuits. This equipment configuration will allow the A6901 to "trip", thereby interrupting power to the equipment under test and re-establishing protective ground (earth) if the isolation transformer fails. This equipment configuration will also eliminate stray signal-pickup from the supply-main source.

This concludes the Operators portion of this manual. The remaining sections are for use by qualified service personnel only.

A6901

Servicing Information



Sections 3 through 10 of this manual are for use by service personnel only

TABLE OF CONTENTS

WARNING

THIS PORTION OF THE TABLE OF CONTENTS LISTS SERVICING INSTRUCTIONS. THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED SERVICE PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CALLED OUT IN THE OPERATING INSTRUCTIONS UNLESS QUALIFIED TO DO SO.

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LIST OF ILLUSTRATIONS

The illustrations in section 9 are located near their associated diagrams on the foldout page.

LIST OF TABLES

SERVICING SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

Refer also to the preceding Operators Safety Summary

DO NOT SERVICE ALONE

Do not perform internal service on 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 protective ground, and where one of the supply conductors is grounded. A protective ground (earth) connection by way of the grounding conductor in the power cord is essential for safe operation.

NOTE

Refer to "What is Electric Shock?" in the General Information Section for additional safety information.

Sections 3 thru 10

Sections 3 through 10 contain information necessary for the service technician to properly maintain the A6901. Briefly, those sections and their content are as follows:

First, the Installation section (3) discusses operating power setup, fusing information, and current-selector switch settings. The Installation section also describes a simple method of installing a fuse in the probe ground lead of an isolated oscilloscope to prevent possible damage to the oscilloscope.

Next, the Theory of Operation section (4) relates directly to a block diagram superimposed on the schematic diagram. Component locators near the schematic diagram aid in relating the symbols on the schematic to the corresponding components on the circuit board.

The Maintenance section (5) provides general maintenance information and more detailed information, such as identification of component pins.

The Performance Check section (6) provides a means of verifying that the A6901 meets the electrical specifications given in Section 1.

The Instrument Options section (7) describes the available options and tells where they are mentioned in this manual.

The Replaceable Electrical Parts list section (8) permits identification of electrical parts for replacement purposes.

The Diagrams and Circuit Board Illustrations section (9) show the schematic of the electrical circuitry in the A6901, and illustrations show the locations of its parts.

The Replaceable Mechanical Parts section (10) gives information needed to order replacement mechanical parts and exploded views of the A6901 to aid in identifying parts.

Servicing Information

INSTALLATION

This section contains installation instructions for servicing personnel. Operating power requirements, power cord information, line voltage selection, cutoff-current selection, and other installation instructions unique to the A6901 are included here.

OPERATING POWER INFORMATION

This instrument can be operated from either a 120-volt or 240-volt nominal line voltage source, 48 to 66 hertz. See Section 7, Instrument Options.

LINE VOLTAGE SELECTION

The Monitor's operating Voltage Selector switch, S420, (located on the Monitor bottom panel) allows selection of 115-volt or 230-volt nominal line voltage operation. To select the correct nominal line voltage, first change the power cord and plug to match the supply-main source receptacle (if necessary). Then, use a small screwdriver to move the Voltage Selector switch toggle to the desired range.

CAUTION

To ensure proper operation of the Monitor, always check the settings of the Voltage Selector switch (S420) located on the bottom panel of the Monitor before connecting the Monitor to the supply-main source. If the Monitor Voltage Selector switch is set for 120 volts, and the A6901 is connected to 240 volts, the alarm will sound.

POWER CORD AND FUSE INFORMATION

The A6901 Ground Isolation Monitor is shipped from the factory with a 120-volt power cord, and the fuses installed are for North American 120-volt operation, unless the Monitor is equipped with an Option (see Section 7, Instrument Options).

NORTH AMERICAN 240-VOLT OPERATION

The Monitor can be operated from a North American 240-volt power source only with a separate isolating transformer.

1. A 1:1 isolation transformer is connected between the Monitor and the 240-volt supply-main source, with one pole of the 1:1 isolation transformer secondary connected to protective ground (earth).

2. A 2:1 isolation transformer (240 to 120-volts) is connected between the Monitor and the 240-volt power source, with one pole of the 2:1 isolation transformer secondary connected to protective ground (earth).

To convert the Monitor for 240-volt operation

Replace the 6 A, 3AG 120-volt fuse (located in fuseholder F530 on the bottom panel) with the 3AF, 240-volt fuse furnished.

2. Replace the 0.1 A, 3AG 120-volt fuse (located in fuseholder F410 on the bottom panel) with the 0.062, 3AG 240-volt fuse furnished.

POWER-CORD PLUGS AND CONNECTOR IDENTIFICATION

The power-cord plug required depends upon the ac input voltage and the country in which the Monitor is to be used. Refer to Figure 1-4 in Section 1, General Information. Should you require a power plug other than that supplied with your instrument, refer to the standards illustrated in Figure 1-4, and to Section 7, Instrument Options.

The standard color code for power-cord conductors is shown in Table 3-1

TABLE 3-1
Power-Cord Conductor Color Code

Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Light Blue	White
Protective Ground (Earth)	Green/Yellow	Green/Yellow

CURRENT SELECTOR SWITCH SETTINGS ⚠

The CURRENT SELECTOR switch, located on the bottom-panel of the Monitor, allows selection of three leakage-current magnitudes at which the Monitor will interrupt load power. The following information is provided to help you determine which setting to use for your application. Before changing the CURRENT SELECTOR switch setting be certain the POWER switch is OFF.

0.5 mA POSITION

The CURRENT SELECTOR switch has been preset and secured at the factory to limit leakage current to 0.5 mA, which will be adequate for most applications. If the leakage current between the neutral line and protective ground (earth) line exceeds 0.5 mA, the Monitor will simultaneously interrupt the power to the load and re-establish connection to protective ground (earth).

3.5 mA POSITION

The CURRENT SELECTOR switch can also be set to interrupt the load power when the leakage current exceeds 3.5 mA.

Test equipment using power-line filters may generate more leakage current than the Monitor's preset value of 0.5 mA, and thereby cause the Monitor to interrupt the load's power. If this condition exists, the CURRENT SELECTOR switch can be set to the 3.5 mA position. Loosen the securing screw and position the slide switch so that 3.5 mA shows through the slide window; retighten the securing screw.

5 mA POSITION

A 5 mA setting of the CURRENT SELECTOR switch is available for use in cases where the load circuit leakage exceeds the 0.5 mA and 3.5 mA settings as described above.

INSTALLING A PROBE GROUND-LEAD FUSE

To protect the isolated testing instrument (i.e., an oscilloscope) and the instrument under test, the testing instrument probe ground must be fused (refer to "Precautions To Avoid Circuit Damage" in Section 2, Operating Instructions). Figure 3-1 illustrates one method of installing a fuse in series with the test instrument's probe ground-lead.

The fuse holder is opened by pressing the two halves together and twisting counter clockwise approximately 1/4 turn and then pulling the halves apart.

CAUTION

The small pointed spacer may fall out.

To change between 3AG and DIN metric (5 x 20 mm) fuses, use the enclosed small pointed spacer for the DIN metric (5 x 20 mm) fuses only.
Insert the spacer's pointed end first, into the fuse holder half which does not have the ground wire attached.

NOTE

The spacer must be removed when using 3AG fuses.

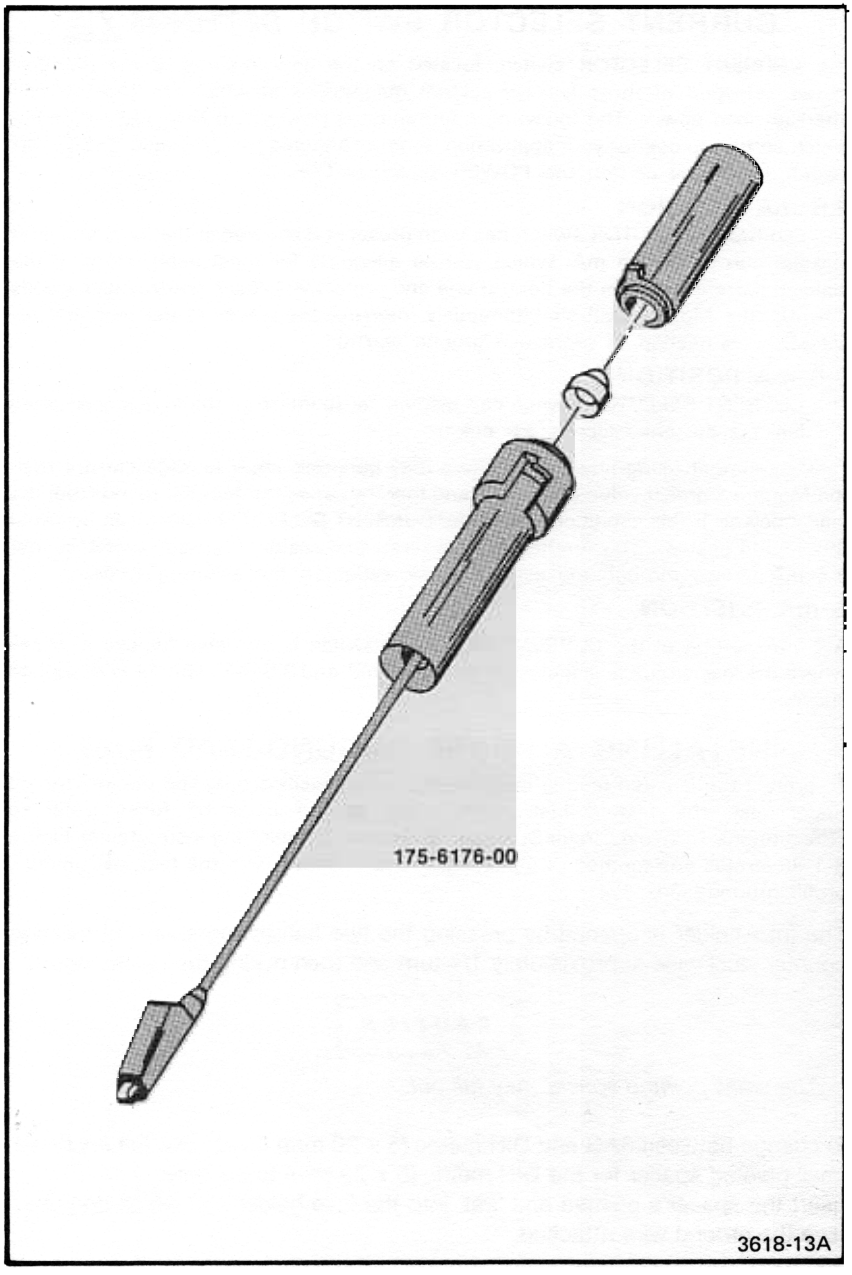

Figure 3-1. Construction of a simple probe ground-lead fuse

THEORY OF OPERATION

This section of the manual describes the circuitry in the A6901 Ground Isolation Monitor. When reading this description, refer to the schematic diagram in Section 9, Diagrams and Circuit Board Illustrations. The major circuits are outlined on the schematic diagram with wide shaded lines and labeled in shaded boxes. These labels match the headings in the following description.

POWER SUPPLY

The Power Supply circuit provides an unregulated dc voltage source. This voltage (V_R) supplies power to the rest of the circuitry and also serves as a power-line overvoltage indicator.

The secondary winding of transformer T220 produces about 20 V rms which is full-wave rectified by CR140 and filtered by capacitors C140 and C220. The filtered dc output voltage (V_R) is approximately +30 V dc at nominal line voltage.

GROUND CONTINUITY

The Ground Continuity circuit indirectly disconnects the power to the load instrument if the voltage between the neutral and protective ground (earth) leads of the supply-main source exceeds approximately 9 V (peak).

When jumper J440 is in the On position, capacitor C340 is normally charged to about +5 V through resistor R341 from V_R. If the voltage difference between neutral and protective ground (earth) exceeds about 9 V (peak), C340 will charge up to about +13 volts, triggering the programmable unijunction transistor (PUT) Q350. When Q350 triggers, capacitor C340 discharges into the gates of Triacs Q454 and Q464 causing them to turn on.

Thermal resistor RT410 produces a current surge to ground, which will cause Q350 to trigger if the ground line is defective (more than specified). Refer to Electrical Characteristics, Table 1-2.

DISABLE/ACTIVATE

The Disable/Activate circuit consists of two relays, two triacs and a push-button switch. When switch S560 is pressed, V_R (from the power supply) is applied to relays K350 and K360. Once the relays are energized, S560 can be released to connect V_R to the Relay Drive circuit.

If an error condition occurs (e.g., excessive voltage on the isolated instrument chassis, bad power-line ground continuity, etc.) triacs Q454 and Q464 are triggered into conduction, de-energizing relays K350 and K360, and disconnecting V_R from the Relay Drive circuit.

PEAK DETECTOR

The Peak Detector circuit is the primary protection circuit for the A6901

The Peak Detector monitors the peak voltage on the isolated chassis. Although the isolated chassis is not connected directly to protective ground (earth), it is not completely floating either. The isolated chassis is connected to protective ground (earth) through a resistance determined by the CURRENT SELECTOR switch position. In the 0.5 mA position, the effective resistance between the isolated chassis and protective ground (earth) is 80 KΩ. The Peak Detector circuit will disable the load power and ground the isolated chassis if the peak voltage drop across the chassis-to-ground resistance exceeds 40 Volts (0.5 mA x 80 kΩ).

The maximum current may also be set to 3.5 mA or 5 mA by CURRENT SELECTOR switch S370 which switches in either one resistor, or two resistors in parallel, with the normal chassis-to-ground resistance of 80 KΩ for a total resistance of 11.5 kΩ (3.5 mA) or 8 KΩ (5 mA).

Zener diode VR360 (Peak Detector circuit) maintains a nominal of 10 volts on the gate of programmable unijunction transistor (PUT) Q460. If the voltage at the anode of Q460 exceeds 10.6 volts, then Q460 will trigger, discharging capacitors C361 and C460 through pulse transformer T460. The pulse at the output of T460 triggers Q466 which in turn triggers Triacs Q250, Q454, and Q464 to disable the load power and connect the isolated chassis to protective ground (earth).

FAST PEAK DETECTOR

The Fast Peak Detector will immediately trigger triacs Q454, Q464, and Q250 if the peak voltage on the isolated chassis exceeds approximately 60 Volts (positive or negative) with at least 5 mA of current. This circuit is a back-up for the Peak Detector Circuit described above.

LINE OVERVOLTS PROTECTION

The Line Overvolts Protection circuit consists of a 36 V zener diode, VR570. If V_R exceeds +36 V due to excessive line voltage, VR570 will conduct, triggering triacs Q454, Q464, and Q250.

EARLY GROUND CLAMP

The Early Ground Clamp, triac Q250, reconnects the isolated chassis to protective ground (earth) through R170 in the event of a fault condition, until relay K270 releases.

RELAY DRIVE

The Relay Drive circuit controls relays K270 and K430. Relay K270 isolates the load chassis from ground, and relay K430 connects the line voltage to the load. Transistors Q450 and Q452 form a protection circuit which will turn off relay K430 in case the LOAD ACTIVATED lamp or the ISOLATED LED should fail (open).

AUDIBLE ALARM

The Audible Alarm sounds any time a fault condition triggers an automatic disable of the Relay Drive circuit. Buzzer LS420 sounds when transistor Q130 conducts due to triacs Q454 and Q464 (Disable/Activate circuit) being triggered.

MAINTENANCE

This section of the manual contains information for performing preventive maintenance, troubleshooting, and corrective maintenance for this instrument.

PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning, visual inspection, etc. Preventive maintenance performed on a regular basis may prevent instrument breakdown and will improve the reliability of the instrument. The severity of the environment to which this instrument is subjected determines the frequency of maintenance. A convenient time to perform preventive maintenance is preceding the performance check of the instrument.

CLEANING

This instrument should be cleaned as often as operating conditions require. Accumulation of dirt on components acts as an insulating blanket and prevents efficient heat dissipation which can cause overheating and component breakdown.

CAUTION

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

EXTERIOR

Loose dust accumulated on the front panel can be removed with a soft cloth or small brush. Dirt that remains can be removed with a soft cloth dampened with a mild detergent and water solution. Abrasive cleaners should not be used.

INTERIOR

Dust in the interior of the instrument should occasionally be removed due to its electrical conductivity under high-humidity conditions. The best way to clean the interior is to blow off the accumulated dust with dry, low-pressure air. Remove any dirt which remains with a soft brush or a cloth dampened with a mild detergent and water solution. A cotton-tipped applicator is useful for cleaning in narrow spaces.

VISUAL INSPECTION

This instrument should be inspected occasionally for such defects as broken connections, damaged circuit boards, and heat-damaged parts.

The corrective procedure for most visible defects is obvious; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates other trouble in the instrument; therefore, it is important that the cause of overheating be corrected to prevent recurrence of the damage.

SEMICONDUCTOR CHECKS

Periodic checks of the semiconductors in this instrument are not recommended. The best check of semiconductor performance is actual operation in the instrument. More details on checking semiconductor operation are given under Troubleshooting.

PERFORMANCE CHECK AFTER REPAIR

After any electrical component has been replaced, the operation of that particular circuit should be checked, as well as the operation of other closely related circuits. The Performance Check procedure in this manual provides a quick and convenient means of checking instrument operation.

TROUBLESHOOTING

The following information is provided to help troubleshoot this instrument. Information contained in other sections of this manual should be used along with the following information to aid in locating the defective component. An understanding of the circuit operation is very helpful in locating troubles.

TROUBLESHOOTING AIDS

CIRCUIT DIAGRAM

A circuit diagram is given on a foldout page in section 9. The component number and electrical value of each component in this instrument is shown on the diagrams. Components that are mounted on the circuit board are outlined on the diagram with a heavy black line.

CIRCUIT-BOARD ILLUSTRATIONS

A circuit-board illustration is shown on the foldout page preceding the diagram. Each board-mounted electrical component is identified by its circuit number, as are interconnecting wires and connectors.

DIODE COLOR CODE

The cathode end of each glass-encased diode is indicated by a stripe, a series of stripes, or a dot. The cathode and anode ends of metal-encased diodes are identified by the diode symbol marked on the case. For most silicon or germanium diodes with a series of stripes, the color code identifies the four significant digits of the JEDEC or vendor number using the resistor color-code system (e.g., a diode color-coded yellow-brown-green-red indicates a 1N-4152 diode).

WIRING COLOR CODE

Insulated wire and cable used in this instrument is color-coded to facilitate circuit tracing.

SEMICONDUCTOR LEAD CONFIGURATIONS

Figure 5-1 illustrates the lead configurations for all semiconductors used in this instrument.

PERFORMANCE CHECK

The Performance Check procedure, given in section 6 of this manual, provides a quick and convenient means of checking instrument operation.

TROUBLESHOOTING TECHNIQUES

The following troubleshooting procedure is arranged to check the simple trouble possibilities before proceeding with extensive troubleshooting. The first few checks ensure proper connection and operation. If the trouble is not located by these checks, the remaining steps aid in locating the defective component. When the defective component is located, it should be replaced using the replacement procedure given under Corrective Maintenance.

TROUBLESHOOTING PROCEDURE

1. **Check Control Settings.** Incorrect control settings can indicate a trouble that does not exist. If there is any question about the correct function or operation of any control, see Operating Instructions, Section 2.

2. **Check Associated Equipment.** Before troubleshooting, check that the equipment used with this instrument is operating correctly. Check that the load is properly connected and that the interconnecting cables are not defective. Also, check the power source.

3. **Visual Check.** Visually check the portion of the instrument in which the trouble is located. Many troubles can be located by visible indications such as unsoldered connections, broken wires, damaged circuit board, damaged components, etc.

4. **Check Instrument Operation.** Check the operation of this instrument, or the affected circuit if the trouble appears in one circuit. Complete instructions are given in the Performance Check, Section 6.

5. **Isolate Trouble to a Circuit.** To isolate trouble to a circuit, note the trouble symptom. The symptom often identifies the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, check the affected circuits by taking voltage readings. Incorrect operation of all circuits often indicates trouble in the power supply. Check first for correct voltages of the individual supplies. However, a defective component elsewhere in the instrument can appear as a power-supply trouble and may also affect the operation of other circuits.

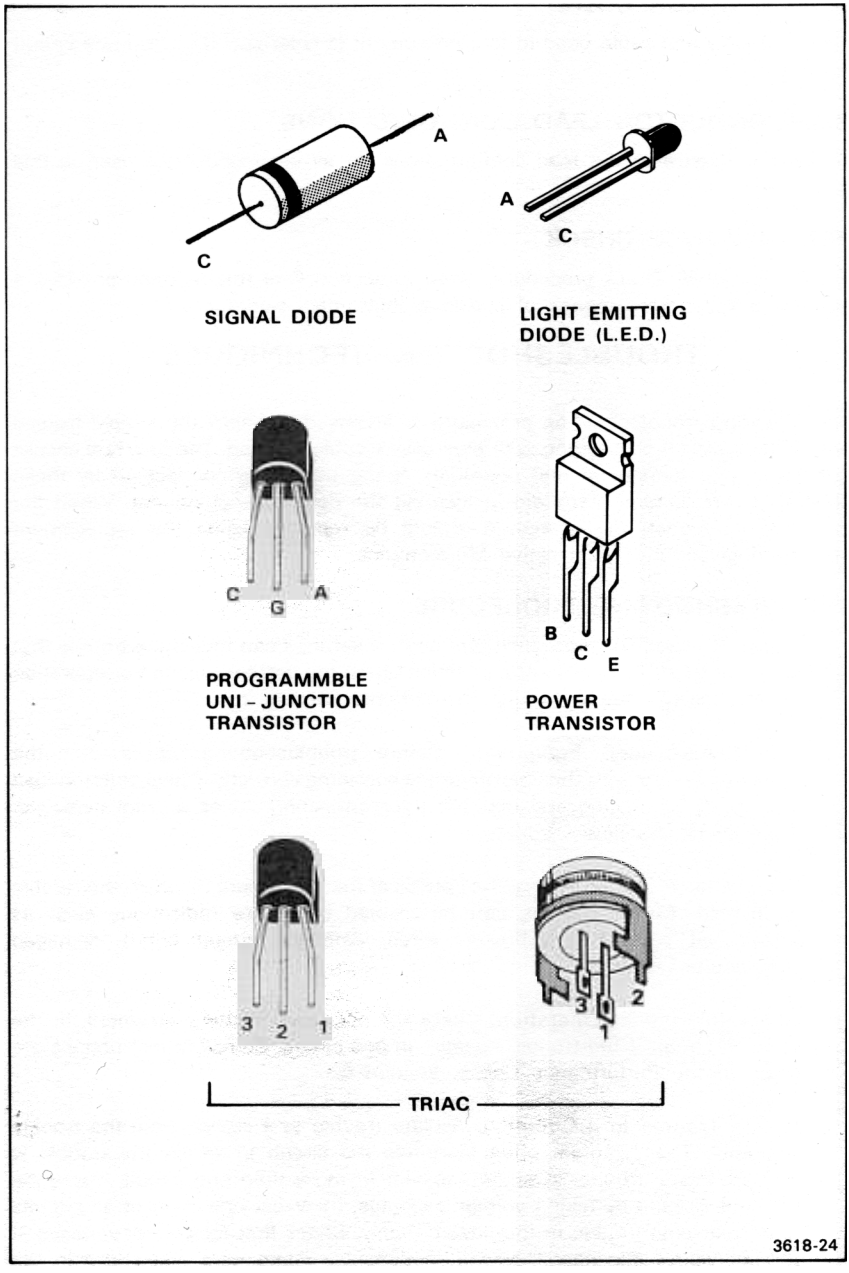

Figure 5-1. Semiconductor Lead Configurations.

CORRECTIVE MAINTENANCE

Corrective maintenance consists of component replacement and instrument repair. Special techniques required to replace components in this instrument are given here.

OBTAINING REPLACEMENT PARTS

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

NOTE

When selecting replacement parts, remember that the physical size and shape of a component may affect the performance of the instrument, particularly at high frequencies. All parts should be direct replacements unless a different component will not adversely affect instrument performance.

Some parts are manufactured or selected by Tektronix, Inc. to satisfy particular requirements, or are manufactured to specifications for Tektronix, Inc. Most of the mechanical parts used in this instrument have been manufactured by Tektronix, Inc. To determine the manufacturer of parts, first refer to parts list, then to the Cross Index—Mfr. Code Number to Manufacturer.

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

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

SOLDERING TECHNIQUES

WARNING

To avoid electrical shock, disconnect the instrument from the power source before soldering.

The reliability and accuracy of this instrument can be maintained only if proper soldering techniques are used when repairing or replacing parts. General soldering techniques, which apply to maintenance of any precision electronic equipment, should be used when working on this instrument. Use only 60/40 rosin-core, electronic-grade solder. The choice of soldering iron is determined by the repair to be made. When soldering on circuit boards, use a 15- to 40-watt pencil-type soldering iron with a 1/8-inch wide, wedge-shaped tip. A higher wattage soldering iron may separate the printed wiring from its base material. Keep the tip properly tinned for best heat transfer to the solder joint. Avoid excessive heat; apply only enough heat to remove the component or to make a good solder joint. Also, apply only enough solder to make a firm solder joint; do not apply too much solder.

CAUTION

The circuit board, in this instrument is a multilayer type board with a conductive path(s) laminated between the top and bottom board layers. All soldering on this board should be done with extreme care to prevent breaking the connections to the center conductor(s); only experienced maintenance personnel should attempt repair of this board.

For metal terminals (e.g., switch terminals, connector terminals, etc.) a higher wattage-rating soldering iron may be required. Match the soldering iron to the work being done. For example, if the component is connected to the chassis or other large heat-radiating surface, it will require a 75-watt or larger soldering iron.

The following techniques should be used to replace a component on a circuit board:

1. Grip the component lead with long-nose pliers. Touch the soldering iron to the lead at the solder connection. Do not lay the iron directly on the board, as it may damage the board.

2. When the solder begins to melt, gently pull the lead out. If unable to pull out the lead without using force try the other end of the component as it may be more easily removed.

NOTE

The reason some component leads are troublesome to remove is due to a bend placed on each lead during the manufacturing process. The bent leads hold components in place during a process that solders many components at one time.

If a component lead is extremely difficult to remove, it may be helpful to straighten the leads on the back side of the board with a small screwdriver or pliers while heating the soldered connection.

Use only enough heat to remove the component lead without removing the solder from the board. If it is desired to remove solder from a circuit-board hole for easier installation of a new component, a solder-removing wick should be used.

3. Bend the leads of the new component to fit the holes in the board. If the component is replaced while the board is mounted in the instrument, cut the leads so they will just protrude through the board. Insert the leads into the holes so the component is firmly seated against the board (or as positioned originally). If it does not seat properly, heat the solder and gently press the component into place.

4. Touch the iron to the connection and apply a small amount of solder to make a firm solder-joint. To protect heat-sensitive components, hold the lead between the component body and the solder joint with a pair of long-nose pliers or other heat sink.

5. Clip any excess lead protruding through the board (if not clipped in step 3).

6. Clean the area around the solder connection with a flux-removing solvent. Be careful not to remove information printed on the board.

COMPONENT REMOVAL AND REPLACEMENT

WARNING

To avoid electrical shock, disconnect the instrument from the supply main source before replacing components.

The exploded-view drawing associated with the Replaceable Mechanical Parts list may be helpful in the removal or disassembly of individual components or subassemblies. Component location and circuit board locations are shown in the diagrams section.

CIRCUIT BOARD

If the circuit board is damaged beyond repair, the entire assembly, including all soldered-on components, can be replaced. The part number for a completely wired board is given in Section 8, Replaceable Electrical Parts.

How To Remove The A1 Circuit Board

1. Remove the 2 screws and CURRENT SELECTOR indicator plate from the bottom of the A6901.

   Turn the A6901 upright, and carefully work the upper-half of the case loose from the lower half. Set the top cover aside.

3. Remove the 2 screws and hex-nut that secures the clear plastic shield. Lift the shield out and set it aside.

   Remove the 3 hexagon shield-spacer posts, noting that the hex-nut goes on the center post.

5. Unsolder the 2 wire straps from the fuseholder (F410) terminals.

6. Unsolder the 4 wires connected to fuseholder F520 and F530; note the color codes and where they are connected.

   Remove the screw and washers securing resistor R170. Remove the remaining screw and lockwasher (near TP570).

8. Remove the chassis ground-terminal nut (located near R170 on backplate).

9. Carefully work the 2 side panels loose from the plastic housing, and lift the circuit board over the terminals of the 3 fuseholders. Remove the side panels and circuit board assembly from the housing.

10. To reassemble, reverse the order of removal.

How To Remove Relay K270

1. Remove the circuit board, as described in "How To Remove The A1 Circuit Board."

   Unsolder the 2 insulated wires (going to the top of K270) at the ground tab.

   Unsolder the strap wire from the top terminal of resistor R170.

4. Remove the plastic relay cover.

CAUTION

Be very careful that solder, rosin, or cleaning materials are not allowed to flow toward the relay contacts. Do not use excessive solder.

Unsolder the 2 insulated wires on relay K270.

6. Unsolder the strap wires that connecct the relay terminals to the circuit board.

   Remove the 4 screws and lockwashers that hold the relay to the circuit board.

8. To reassemble, reverse the order of removal.

SEMICONDUCTORS

CAUTION

To avoid component damage, power must be turned off before removing or replacing semiconductors.

Semiconductors should not be replaced unless actually defective. If semiconductors are removed during routine maintenance, return them to their original sockets.

Unnecessary replacement of semiconductors may affect the performance of this instrument. When semiconductors are replaced, check the operation of that part of the instrument which may be affected.

Replacement devices should be of the original type or a direct replacement. Figure 5-1 shows the lead configurations of the semiconductor devices used in this instrument.

PERFORMANCE CHECK AFTER REPAIR

After any electrical component has been replaced, the operation of that particular circuit should be checked, as well as other closely related circuits, as detailed in the following procedure, Operation Check After Repair. Also, see Section 6 for a complete Performance Check procedure.

INSTRUMENT REPACKAGING

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

Obtain a corrugated cardboard carton having inside dimensions of no less than six inches more than the instrument dimensions; this will allow for cushioning. The shipping carton test strength for this instrument is 200 lbs.

2. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.

3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between carton and instrument, allowing three inches on all sides.

4. Seal carton with shipping tape or industrial stapler.

OPERATION CHECK AFTER REPAIR

This sub-section contains procedures for checking the operation of the A6901 after the replacement of any semiconductor component.

USING THIS PROCEDURE

NOTE

In this procedure, capital letters within the body of the text identify front-panel controls, indicators, and connectors on the A6901 (e.g., PUSH TO TEST). Initial capitals identify all the associated test equipment and its controls, indicators, and connectors (e.g., Amplitude) used in the procedure.

This procedure is divided into subsections by major functional circuits (e.g., A. Earth Ground Continuity, B. Diodes CR350 and CR362, etc.). The order in which the the subsections and procedures appear is the recommended sequence for a complete operational check of the instrument.

The first step in each subsection (A1, B1, C1, etc.) contains reference information and control settings that must be performed before proceeding.

The Setup Conditions provide equipment connection information and control settings for both this instrument and any associated test equipment. Also, the Setup Conditions are written so that if desired, each subsection (A, B, C, etc.) or step (A2, B2, etc.) can be performed independently.

OPERATION CHECK SUMMARY

Table 5-1 provides a convenient means of locating the procedures that check the applicable circuit parameters. For example, if the Peak Detector has been repaired, use Table 5-1 to locate the circuit parameter affected by the repair. Then note the title of the procedure in which those parameters are checked. Use the index at the beginning of the Operation Check to find the desired procedure.

TEKTRONIX FIELD SERVICE

Tektronix Field Service Centers and the Factory Service Center provide instrument repair and adjustment services. Contact your Tektronix Field Office or representatives for further information.

TABLE 5-1
Operation Check Summary

Perform Step	Circuit Parameters	Operation Check Procedure Title
After any major repair.	Resistance of 1 Ω or less between ground terminals of POWER IN and LOAD connectors.	A. Earth Ground Continuity
If A6901 does not trip properly or after any major repair.	Verifies that diodes are not shorted or open.	B. Diodes CR350 and CR362
If A6901 will not activate or de-activate, or after any major repair.	Verifies that K350 and K360 are open with no power applied.	C. Relays K350 and K360

TABLE 5-1 (CONT)
Operation Check Summary

Perform Step	Circuit Parameters	Operation Check Procedure Title
After any A6901 malfunction.	Verifies (1) that the power supply is operating properly, (2) that relays K270 and K430 operate, (3) that the audible buzzer operates, and (4) that the ISOLATED and LOAD ACTIVATED indicators illuminate.	D. Power Supply
If A6901 will not trip, or after any major repair.	Verifies that each of these transistors operates.	E. Q454, Q464 Functional Check
After replacing VR470, VR472, or Q250	Checks that leakage current, between third-wire isolated ground and earth ground, is less than 20 μA.	F. Leakage Current
After any major repair.	Checks that Fast Peak Detector does not trip on + and −40 V, and that it does trip on + and −60 V.	G. Zener Trip Voltage
After any A6901 malfunction.	Checks that, if the ISOLATED indicator fails, K430 will not apply power to the LOAD connector. Checks that if the LOAD ACTIVATED inidicator fails, K430 will not apply power to the LOAD connector.	H. ISOLATED and LOAD ACTIVATED Indicators

TEST EQUIPMENT REQUIRED

The test equipment listed in Table 5-2 is required for a complete Operation Check of the instrument.

The specifications for test equipment given in Table 5-2 are the minimum required to meet the circuit parameters. Detailed operating instructions for test equipment are omitted in these procedures. Refer to the test equipment instruction manual if more information is needed.

TEST EQUIPMENT ALTERNATIVES

All of the listed test equipment is required to completely check the circuit parameters of this instrument. However, complete checking may not always be necessary or desirable. You may be satisfied with checking only selected parameters thereby reducing the amount of test equipment actually required.

The Operation Check is based on the first item of equipment given as an example. When other equipment is substituted, control settings or setups may need to be altered. If the exact item of equipment given as an example in Table 5-2 is not available, first check the Minimum Specifications column carefully to see if other equipment might suffice. Then check the Purpose column to see why this item is used. If used for a check that is of little or no importance for your repair requirements, the item and corresponding step(s) can be deleted.

TABLE 5-2

Test Equipment

Description	Minimum Specifications	Purpose	Example of Applicable Equipment
1. Test Oscilloscope	Bandwidth, dc-50 MHz; min defl. factor, 0.2 V/div; accuracy, within 3%.	Measure pulse width when checking Zener Trip Voltage.	a. TEKTRONIX 5440 Oscilloscope with 5A48 Dual Trace Amplifier 5B40 Time Base and P6008 Probe (see items 2, 3, and 18). b. TEKTRONIX 465B Oscilloscope with P6105 Probe. c. See the Tektronix Products Catalog for an oscilloscope system.

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TABLE 5-2 (CONT)
Test Equipment

Description	Minimum Specifications	Purpose	Example of Applicable Equipment
2. Amplifier Plug-In	Tektronix 5A-series instrument.	Measure pulse width when checking Zener Trip Voltage.	a. TEKTRONIX 5A48 Dual Trace Amplifier (and P6008 Probe—see item 18).
3. Time Base	Tektronix 5B-series instrument.	Measure pulse width when checking Zener Trip Voltage.	a. TEKTRONIX 5B40 Time Base.
4. Digital Multimeter (two required)	Range, −75 to ±200 V; accuracy, within 0.1%.	Used throughout procedure.	a. TEKTRONIX DM 502A Auto-ranging DMM.
5. Pulse Generator	Frequency range, dc-1 KHz; voltage, 0-±40 V; single-shot capability.	Q454, Q464 Functional Check; Zener Trip Voltage, Trip Time, Leakage Current.	a. TEKTRONIX PG 505 Pulse Generator.
6. Amplifier	Output voltage range, ±30 V.	Check Zener Trip Voltage.	a. TEKTRONIX AM 501 Operational Amplifier.
7. Power Supply	Output, + and − 20 V, current limited to 1A max.	Check Zener Trip Voltage.	a. TEKTRONIX PS 503A Dual Power Supply.
8. Power Module	Capable of housing and powering five TM500-series test instruments.	Operate function and pulse generators and digital multimeters.	a. TEKTRONIX TM 506 Power Module.
9. Trigger Generator	Provide single input pulse for PG 505.	Check Zener Trip voltage and Trip Time.	a. Tektronix Part 016-0597-00.
10. Adapter (two required)	Bnc male to dual binding post.	Connect output of Pulse Generator to DMM.	a. Tektronix Part 103-0035-00.

TABLE 5-2 (CONT)
Test Equipment

Description	Minimum Specifications	Purpose	Example of Applicable Equipment
11. Test Lead	Length, 2-1/2 ft.; connectors, alligator clip and banana plug; color, black.	To connect DMM to A6901.	a. Tektronix Part 012-0014-00.
12. Test Lead	Length, 2-1/2 ft.; connectors, alligator clip and banana plug; color, red.	To connect DMM to A6901.	a. Tektronix Part 012-0015-00.
13. Cable, Coaxial (two required)	Length, 42 inches; impedance, 50 Ω; Connectors, bnc male.	Connect output of Function Generator to DMM.	a. Tektronix Part 012-0057-01.
14. Patch Cord (two required)	Length, 18 inches; connectors, banana plug; color, red.	Miscellaneous connections.	a. Tektronix Part 012-0031-00.
15. Patch Cord (three required)	Length, 18 inches; connectors, banana plug; color, black.	Miscellaneous connections.	a. Tektronix Part 012-0039-00.
16. Meter Leads	Connections, banana plug.	Check Ground Continuity; Diodes CR350 & CR362 and Relays K350 & K360.	a. Tektronix Part 003-0120-00.
17. Alligator Clip	Jaw opening at least 1/4 inch.	Short terminals NO and NC of switch S560 for the F. Leakage Current Check.	a. Tektronix Part 344-0045-00.
18. Probe	Attenuation, 10X; resistance, 10 MΩ.	Furnish input to test oscilloscope.	a. Tektronix Part 010-0129-00.

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OPERATION CHECK

This procedure verifies electrical parameters after circuit repair. All circuit parameters given are as specified in the Operation Check Summary, Table 5-1.

INDEX

OPERATION CHECK INITIAL SETUP PROCEDURE

NOTE

The operation of this instrument can be checked at any ambient temperature from −15°C to +55°C unless otherwise stated.

Be sure the A6901 is not connected to an ac power source.

Remove the two case-retaining screws shown in Figure 5-2

Pull the top section of the case off, and set it aside.

Remove the two screws and one nut that fasten the clear plastic shield to its supports.

5. Set the shield to one side, being careful that the connector to the buzzer on the shield stays connected.

6. Check that the VOLTAGE SELECTOR RANGE switch is set for the correct input line voltage, and that a suitable line cord and plug is available.

7. Set the CURRENT SELECTOR switch to 0.5 mA

8. Set the GROUNDING MODE switch to the AUTO ISOLATED position

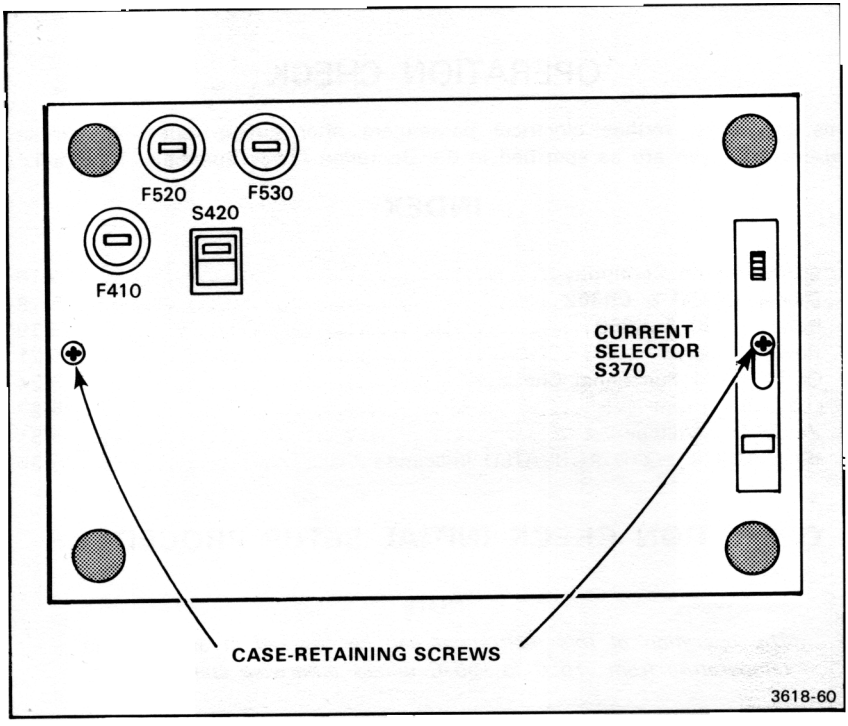

Figure 5-2. Bottom view of A6901

A. EARTH GROUND CONTINUITY

This check should be performed if the A6901 will not activate, or after any major repairs on the instrument.

Equipment Required: (Numbers correspond to those used in Table 5-2, Test Equipment.)

4. Digital Multimeter

8. Power Module

16. Meter Leads

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A1. EARTH GROUND CONTINUITY PRELIMINARY SETUP

a. Perform the Operation Check Initial Setup Procedure given at the beginning of the Operation Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

A2. CHECK EARTH GROUND CONTINUITY

NOTE

First perform step A1, then proceed.

a. Set DMM to 200 ohms range.

b. Connect the DMM leads between the ground terminals of the POWER IN and LOAD connectors. See Figure 5-3.

c. Check that the resistance is less than one ohm.

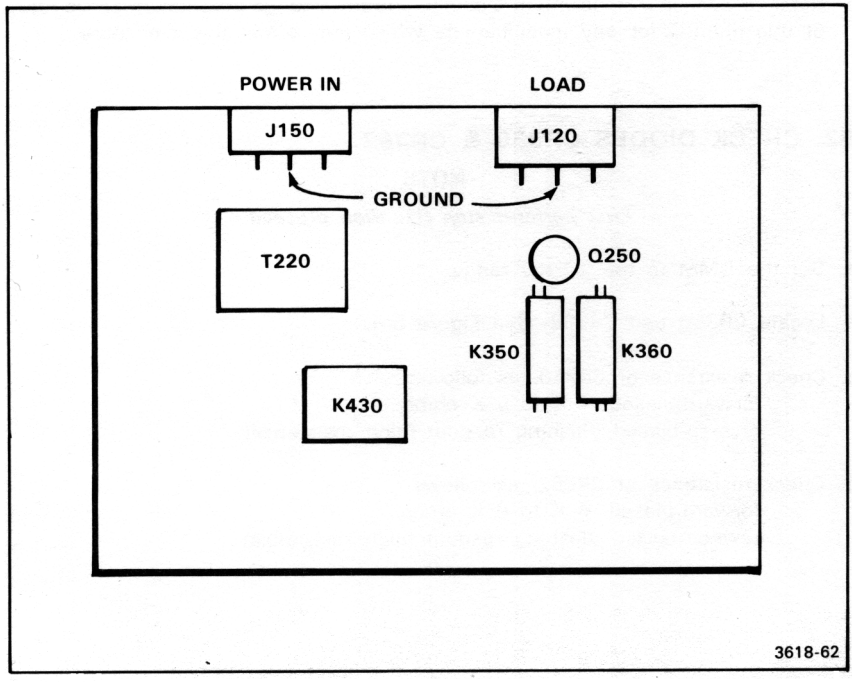


Figure 5-3. Location of grounds on POWER IN and LOAD connectors.

B. DIODES CR350 & CR362

This check should be performed if the A6901 does not trip properly, or after any major repairs on the instrument.

Equipment Required: (Numbers correspond to those used in Table 5-2, Test Equipment.)

4. Digital Multimeter

8. Power Module

16. Meter Leads

B1. DIODES CR350 & CR362 PRELIMINARY SETUP

a. Perform the Operation Check Initial Setup Procedure given at the beginning of the Operation Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

B2. CHECK DIODES CR350 & CR362

NOTE

First perform step B1, then proceed.

a. Set the DMM to the 20 KΩ range.

b. Locate CR350 and CR362. See Figure 5-4.

c. Check resistance of CR350, as follows:
forward-biased, 4 K to 6 K ohms,
reverse-biased, flashing readout (high resistance).

d. Check resistance of CR362, as follows:
forward-biased, 4 K to 6 K ohms,
reverse-biased, flashing readout (high resistance).

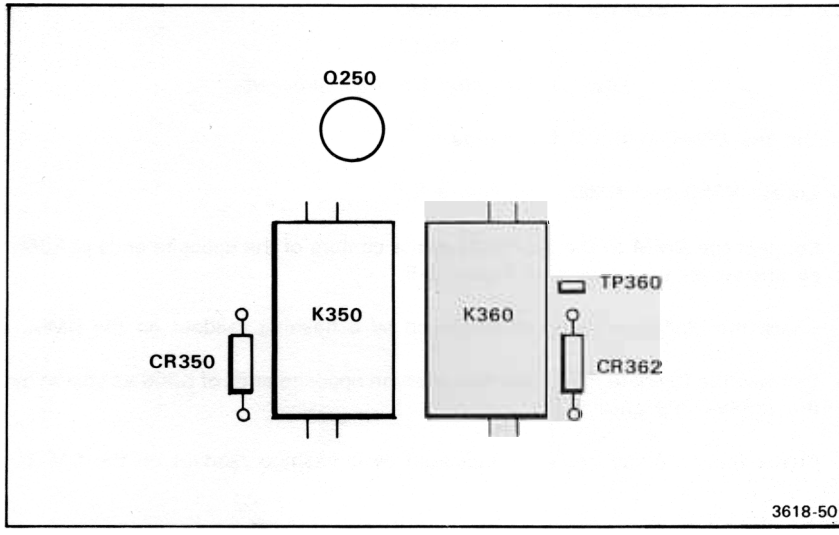


Figure 5-4. Location of CR350 and CR362

C. RELAYS K350 & K360

This check should be performed if the A6901 will not activate or deactivate, or after any major repairs on the instrument.

Equipment Required: (Numbers correspond to those used in Table 5-2, Test Equipment.)

4. Digital Multimeter

8. Power Module

16. Meter Leads

C1. RELAYS K350 & K360 PRELIMINARY SETUP

a. Perform the Operation Check Initial Setup Procedure given at the beginning of the Operation Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

C2. CHECK RELAYS K350 & K360

NOTE

First perform step C1, then proceed.

a. Set the DMM to the 2 MΩ range.

b. Locate K350 and K360. See Figure 5-5.

c. Connect the DMM to the terminals in the centers of the opposite ends of K350 as shown by the arrows in Figure 5-5.

d. Check that K350 is open, as evidenced by a flashing readout on the DMM

Connect the DMM to the center terminals on opposite ends of K360 as shown by the arrows in Figure 5-5.

f. Check that K360 is open, as indicated by a flashing readout on the DMM

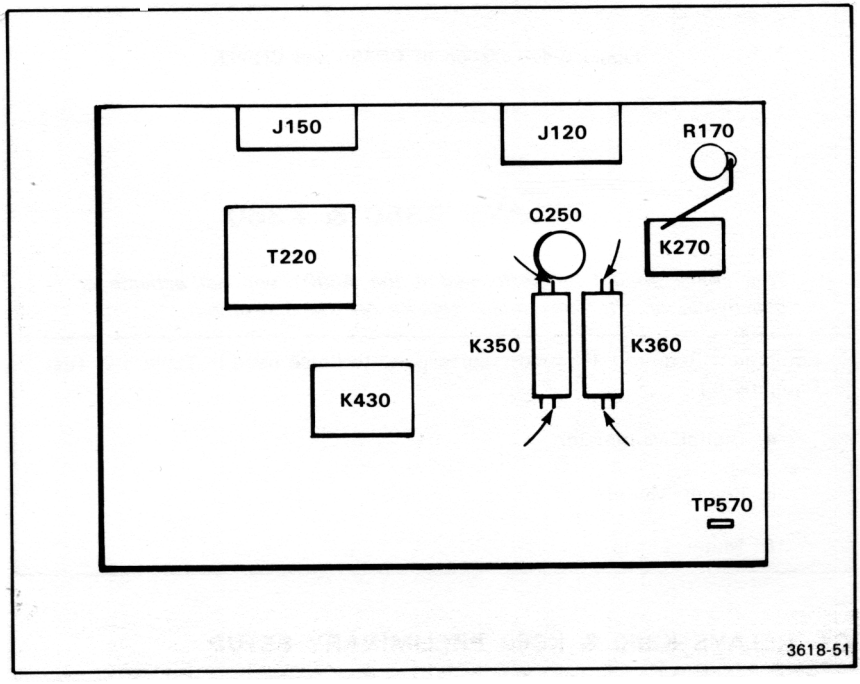


Figure 5-5. Location of K350 and K360.

D. POWER SUPPLY

This check should be performed after any A6901 malfunction and repair.

Equipment Required: (Numbers correspond to those used in Table 5-2, Test Equipment.)

4. Digital Multimeter
16. Meter Leads
8. Power Module

D1. POWER SUPPLY PRELIMINARY SETUP

a. Perform the Operation Check Initial Setup Procedure given at the beginning of the Operation check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

D2. CHECK POWER SUPPLY

NOTE

First perform step D1, then proceed.

Configure the equipment as shown in D2 Setup Conditions.

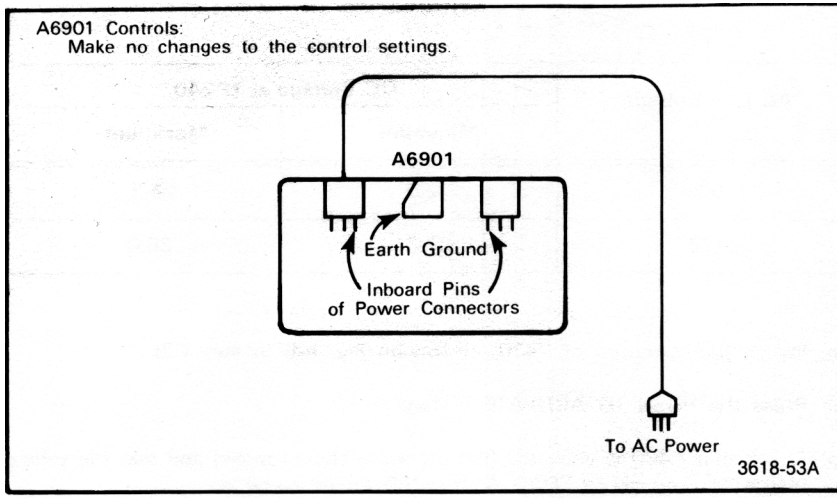


Figure 5-5A. D2. Setup conditions.

b. Verify that the A6901 VOLTAGE SELECTOR RANGE switch is set to 115 V.

c. Connect the Low terminal of the DMM to Earth Ground of the A6901. See Figure 5-6.

d. Set the DMM to 200 V ac.

e. Connect ac power to the A6901

Turn the A6901 POWER switch to ON.

g. Press the PUSH TO ACTIVATE button.

h. Measure the ac voltage present at the inboard terminal of the POWER IN and LOAD connectors, to TP570 (earth ground). It should be line voltage.

Turn the A6901 POWER off.

j. Set the DMM to 200 V dc.

k. Connect the DMM Volts/Ω lead to TP240 and the DMM low lead to TP570. See Figure 5-6.

l. Turn the A6901 POWER on.

m. Check that the dc voltage at TP240 is within the limits given in Table 5-3.

TABLE 5-3
DC Voltage Limits

AC Line Voltage	DC Voltage at TP240	
	Minimum	Maximum
90	22.0	25.3
128	31.3	36.0

n. Watch the armature of K430 (shown on Fig. 5-5 in step C2).

o. Press the PUSH TO ACTIVATE button.

p. Check that K430 is activated (the armature should move) and that the yellow ISOLATED and green LOAD ACTIVATED lamps come on.

q. Press the PUSH TO TEST button.

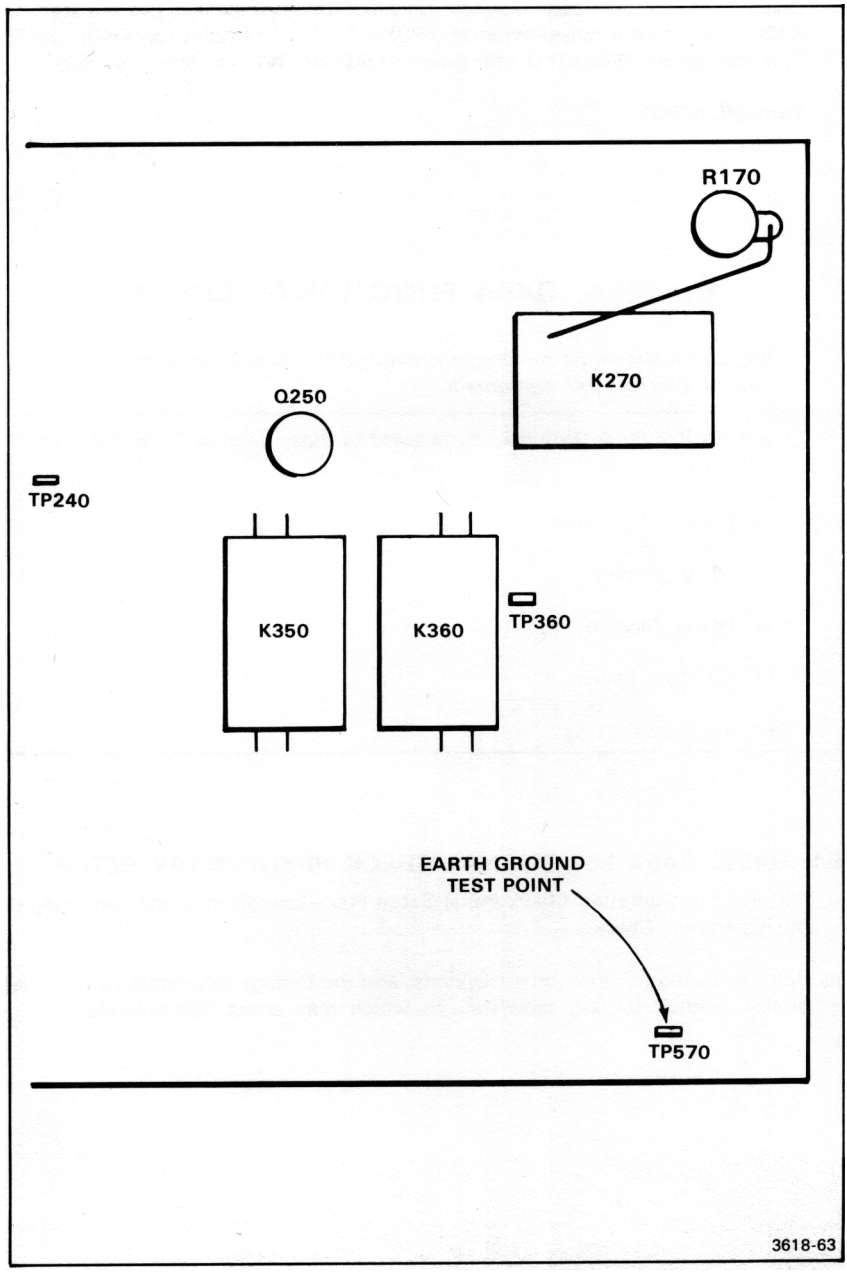


Figure 5-6. Location of test points.

r. Check that: (1) the buzzer sounds; (2) K430 releases (watch the armature of K430 to see that it moves when the PUSH TO TEST button is pressed), and (3) that the yellow ISOLATED and green LOAD ACTIVATED lamps go out.

Turn off A6901.

E. Q454, Q464 FUNCTIONAL CHECK

This check should be performed if the A6901 will not trip or after any major repair on the instrument.

Equipment Required: (Numbers correspond to those used in Table 5-2, Test Equipment.)

4. Digital Multimeter

7. Power Supply

8. Power Module

11, 12. Test Leads

14, 15. Patch Cords

E1. Q454, Q464 FUNCTIONAL CHECK PRELIMINARY SETUP

a. Perform the Operation Check Initial Setup Procedure given at the beginning of the Operation Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

E2. CHECK FUNCTION OF Q454 & Q464

NOTE

First perform step E1, then proceed.

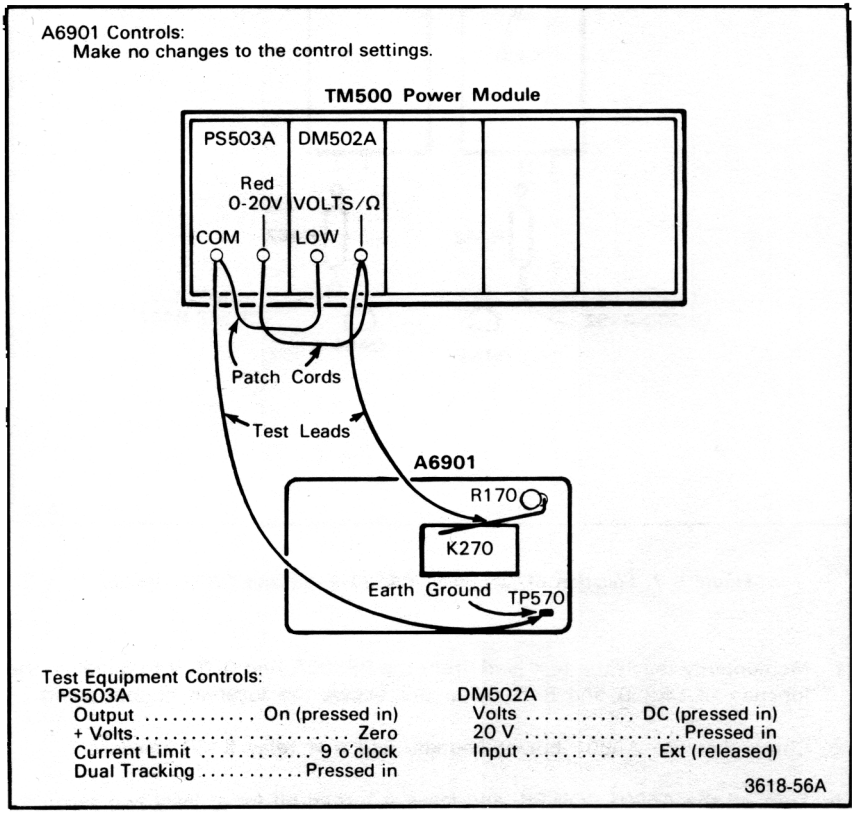


Figure 5-6A. E2. Setup conditions.

Disconnect the test lead from R170.

b. With the PS503A + Volts controls, set the output between +2.0 and +2.1 V as indicated on the DM502A.

Connect ac power to the A6901

d. Turn on the A6901 POWER.

e. Press the PUSH TO ACTIVATE button.

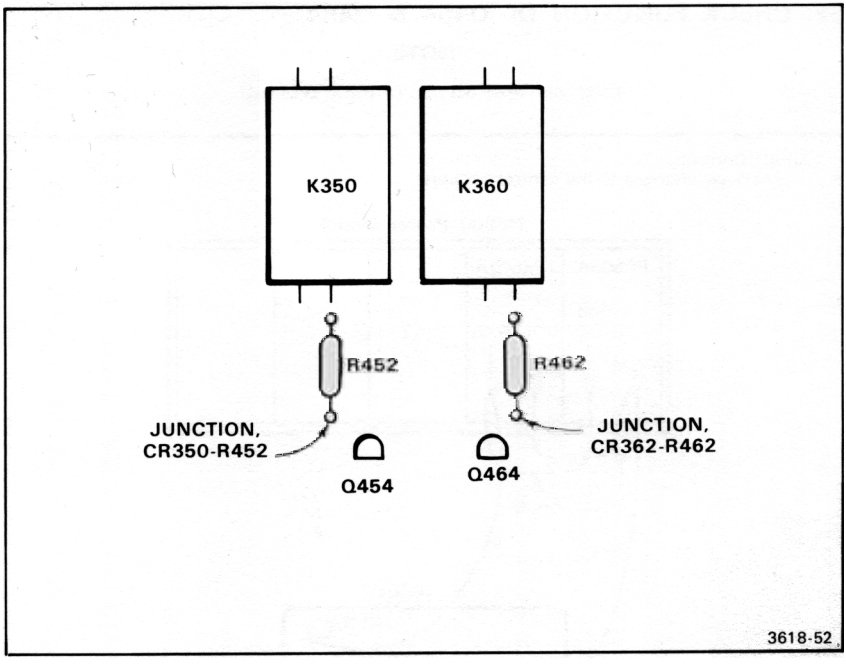


Figure 5-7. Location of junctions, CR350-R452 and CR362-R462

Momentarily touch the test lead, from the PS503A Red 0-20 V terminal, to the junction of CR350 and R452. (Fig. 5-7 shows the location of this point).

g. Check that the A6901 buzzer sounds, and that relay K430 releases.

h. Turn off the A6901 POWER, and leave it turned off for at least two seconds.

Turn the A6901 POWER

Press the PUSH TO ACTIVATE button.

k. Momentarily touch the test lead, from the PS503A Red 0-20 V terminal, to the junction of CR362 and R462. (See Fig. 5-7.)

Check that the A6901 buzzer sounds, and that relay K430 releases.

m. Turn off the A6901 POWER

F. LEAKAGE CURRENT

This check should be performed after replacing semiconductors VR470, CR364, CR370, VR472, or Q250.

Equipment Required: (Numbers correspond to those used in Table 5-2, Test Equipment.)

4. Digital Multimeter (two needed)
5. Pulse Generator
7. Power Supply
8. Power Module
10. Adapter, bnc male to dual binding post
11, 12. Test Leads
14. Patch Cords (red, two needed)
15. Patch Cords (black, three needed)
17. Alligator Clip

F1. LEAKAGE CURRENT PRELIMINARY SETUP

a. Perform the Operation Check Initial Setup Procedure given at the beginning of the Operation Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

c. Place alligator clip across NO and NC terminals of switch S560. Figure 5-8 shows S560 position and terminal locations.

d. Remove jumper J360. Figure 5-8 shows the location of J360.

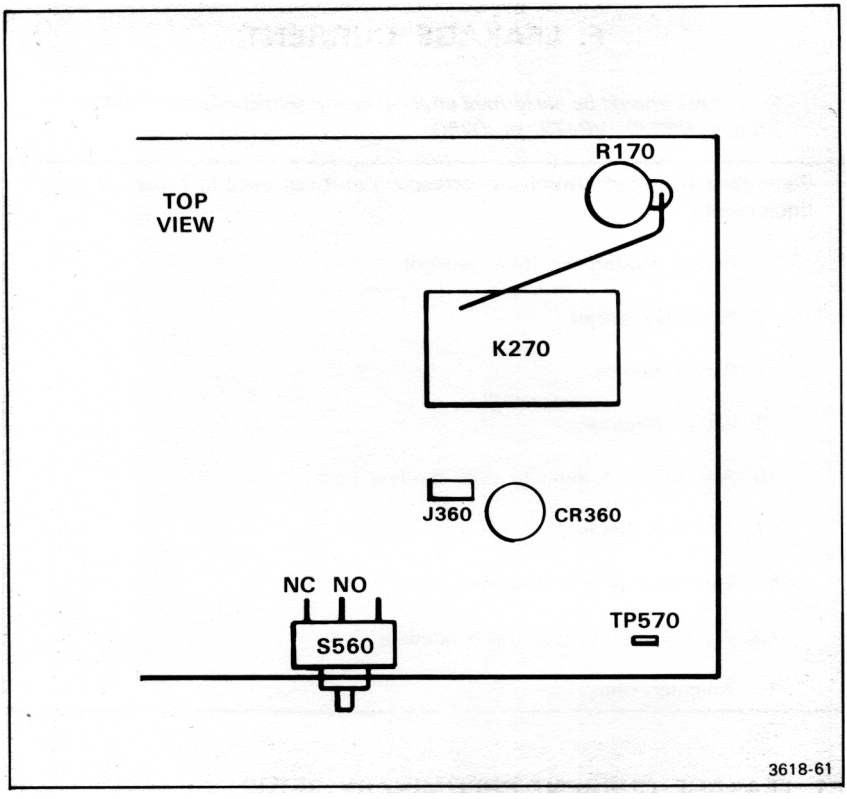


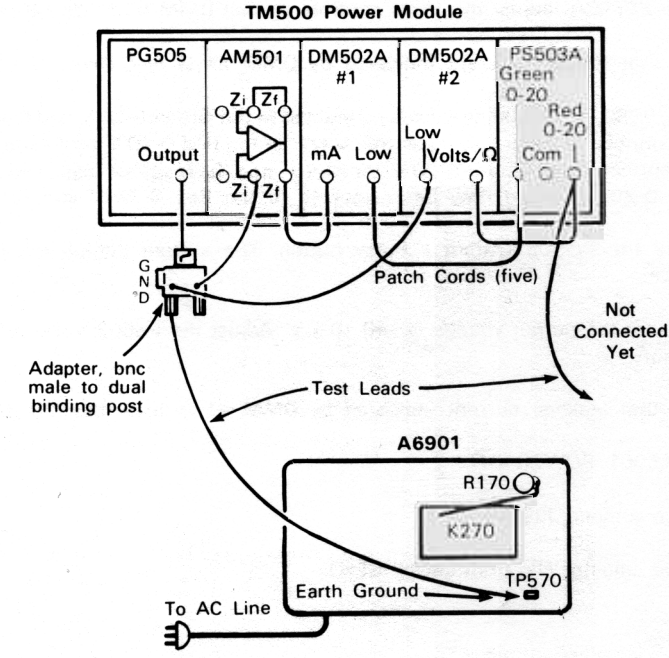
Figure 5-8. Location of J360.

F2. CHECK LEAKAGE CURRENT

NOTE

First perform step F1, then proceed.

A6901 Controls:
Make no changes to the control settings.



Test Equipment Controls:

DM502A #1
- mA ..... DC (pressed in)
- 200 μA ..... Pressed in
- Input ..... Ext (released)

DM502A #2
- Volts ..... DC (pressed in)
- 200 V ..... Pressed in
- Input ..... Ext (released)

PS503A
- Output ..... On (pressed in)
- Volts (both) ..... Zero
- Current Limit (both) ..... 9 o'clock
- Dual Tracking ..... Pressed in

AM501
- Gnd Selector ..... Off

PG505
- Pulse Duration ..... Locked on
- Output + Pulse ..... Pressed in
- Output Amplitude ..... 30 V, ±2 V (as read on DMM #2)

3618-54A

Figure 5-9. F2. Setup conditions.

a. Turn A6901 power on, and connect the test lead from the PS 503A Red 0-20 connector to the top terminal of R170.

NOTE

With terminals NO and NC of switch S560 shorted, the green LOAD ACTIVATED and yellow ISOLATED indicators will light and relays K430 and K270 will be activated.

b. On the PS503A, adjust the Volts controls so that DMM #2 reads +40 ±0.1 V.

c. Check that leakage current indicated by DMM #1 is less than 20 μA.

d. On the PS503A, reverse the leads connected to the Green 0-20 V and the Red 0-20 V connectors. (The two leads that were on the Red 0-20 V connector should now connect to the Green 0-20 V connector, and the lead that was connected to Green 0-20 V should now be connected to the Red 0-20 V connector.)

e. Release the PG505 Output + Pulse button. The system output will now be negative.

f. Verify that the output voltage is −40 ±0.1 V. Adjust the PS503 Volts controls if necessary.

g. Check that leakage current indicated by DMM #1 is less than 20 μA.

h. Turn A6901 POWER OFF.

Replace jumper J360.

Remove alligator clip from switch S560.

G. ZENER TRIP VOLTAGE

This check should be performed after any major repair to the instrument.

Equipment Required: (Numbers correspond to those used in Table 5-2, Test Equipment.)

1. Test Oscilloscope
2. Amplifier (for Oscilloscope)
3. Time Base
4. Digital Multimeter (two needed)
5. Pulse Generator
6. Amplifier
7. Power Supply
8. Power Module
9. Trigger Generator
10. Adapter, bnc male to dual binding post
11, 12. Test Leads
13. Cable, Coaxial
14. Patch Cord, red (two required)
15. Patch Cord, black (three required)
18. Probe

G1. ZENER TRIP VOLTAGE PRELIMINARY SETUP

a. Perform the Operation Check Initial Setup Procedure given at the beginning of the Operation Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

c. Remove jumper J360. Figure 5-8, in step F1, shows J360.

G2. CHECK ZENER TRIP VOLTAGE

NOTE

First perform step G1, then proceed.

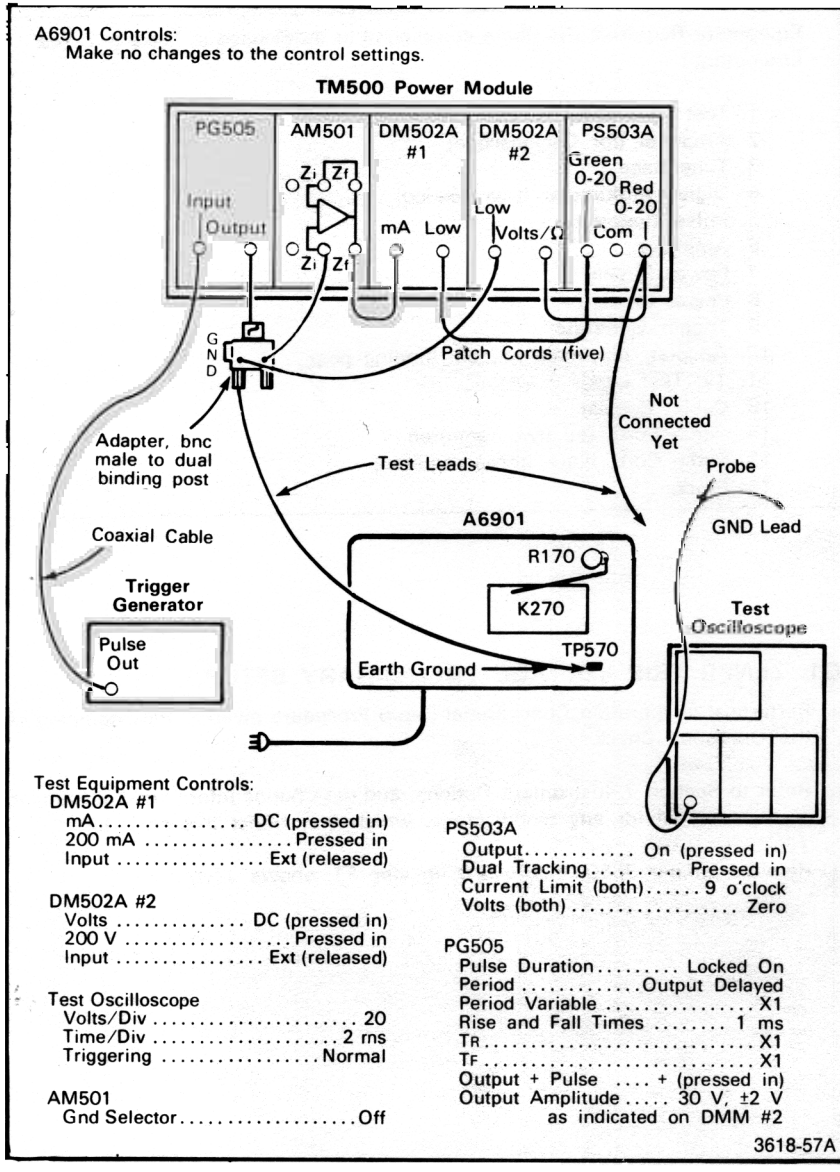


Figure 5-10. G2. Setup conditions.

a. Verify that the output voltage is +40.0 (+0, −0.2) V as shown on DMM #2. If necessary, adjust the PS503A + Volts control.

b. Set PG505 Pulse Duration control to 5 ms, and press the Push for Output button on the Trigger Generator.

c. Connect oscilloscope probe to test lead from PS503A (Red 0-20) connector. Using test oscilloscope to view the PG505 output pulse, repeatedly press the Push for Output button on the Trigger Generator and adjust the PG505 Pulse Duration Variable to set duration of positive pulse to 10 (+0, −1) ms between the 50% amplitude points.

d. Disconnect the probe from the test lead, and connect the test lead to R170.

Turn A6901 POWER on.

f. Press the PUSH TO ACTIVATE button.

g. Check that, when the Push for Output button on the Trigger Generator is pressed, the A6901 does not trip.

Turn the A6901 POWER off.

Disconnect the test lead from R170.

Set the PG505 Pulse Duration to Locked On.

k. Set the + and − Volts output of the PS503A to display 60 V ±1 V on DMM #2.

Set the PG505 Pulse Duration to 5 ms.

m. Press Push for Output button on Trigger Generator.

n. Connect the test lead back to R170.

o. Turn A6901 POWER on.

p. Press A6901 PUSH TO ACTIVATE button.

q. Check that pressing the Push for Output button on the Trigger Generator trips the A6901. Its buzzer should sound, and the ISOLATED and LOAD ACTIVATED indicators should go out.

Turn the A6901 POWER off, and disconnect test lead from R170.

s. Set the PG505 to negative output (release the + Pulse button).

On the PS503A, reverse the leads connected to the Green 0-20 V and the Red 0-20 V terminals. (The two leads that were connected to the Red 0-20 V connector should now connect to the Green 0-20 V connector, and the single lead that was connected to Green 0-20 V should now be connected to the Red 0-20 V connector.)

u. Turn the A6901 POWER on, and reconnect test lead to R170.

Press the A6901 PUSH TO ACTIVATE button.

w. Check that pressing the Push for Output button on the Trigger Gen trips the A6901. Its buzzer should sound and the ISOLATED and LOAD ACTIVATED indicators should go out.

Turn the A6901 POWER off.

y. Disconnect the test lead from R170.

z. Set the PS503A + Volts and - Volts controls to zero.

aa. Set the PG505 Pulse Duration to Locked On.

bb. Adjust the PS503A Volts controls, and if necessary, the PG505 Output Amplitude Control so that DMM #2 reads -40 (-0, +0.2) V.

cc. Set the PG505 Pulse Duration to 5 ms, and press the Push for Output button on the Trigger Generator.

dd. Connect the test lead back to R170.

ee. Turn the A6901 POWER on.

Press the A6901 PUSH TO ACTIVATE button.

gg. Check that pressing the Push for Output button on the Trigger Generator does not trip the A6901.

Turn the A6901 POWER off.

ii. Replace jumper J360.

H. ISOLATED & LOAD ACTIVATED INDICATORS

This check should be performed after any A6901 malfunction has been repaired.

Equipment Required:

None.

H1. ISOLATED & LOAD ACTIVATED INDICATORS PRELIMINARY SETUP

a. Perform the Operation Check Initial Setup Procedure given at the beginning of the Operation Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

H2. CHECK ISOLATED INDICATOR

NOTE

First perform step H1, then proceed.

Turn A6901 POWER on.

b. Being careful to remember the orientation of the connector, remove the connector from the ISOLATED lamp.

c. Watch the armature of relay K430, which is shown in Figure 5-3 in step A2

d. Check that relay K430 does not actuate when the PUSH TO ACTIVATE button is pressed. (Its armature should not move.)

e. Check that K430 actuates (its armature should move) when the connector to the ISOLATED lamp is replaced.

H3. CHECK LOAD ACTIVATED INDICATOR

NOTE

If the preceding step was not performed, first perform step H1, then proceed.

a. Turn the A6901 POWER ON.

b. Unscrew the LOAD ACTIVATED lamp.

c. Watch the armature of relay K430 (shown in Fig. 5-3 in step A2).

d. Check that K430 does not actuate when the PUSH TO ACTIVATE button is pressed. (Its armature should not move.)

Turn the A6901 POWER off.

f. Replace the LOAD ACTIVATED lamp.

g. Turn the A6901 POWER on.

h. Check, visually that K430 now operates (its armature should move) when the PUSH TO ACTIVATE button is pressed.

PERFORMANCE CHECK

This section contains a procedure for checking the operation of the A6901 and for verifying that it meets its applicable electrical specifications.

USING THIS PROCEDURE

NOTE

In this procedure, capital letters within the body of the text identify front-panel controls, indicators, and connectors on the A6901 (e.g., PUSH TO TEST). Initial capitals identify all the associated test equipment and its controls, indicators, and connectors (e.g., Amplitude) used in the procedure.

This procedure is divided into subsections by major functional circuits (e.g., A. Source Ground Continuity, B. DC Trip Current and Voltage, etc.). The order in which the subsections and procedures appear is the recommended sequence for a complete operational check of the instrument.

The first step in each subsection (A1, B1, C1, etc.) contains reference information and control settings that must be performed before proceeding.

The Setup Conditions provide equipment connection information and control settings for both this instrument and any associated test equipment. Also, the Setup Conditions are written so that if desired, each subsection (A, B, C, etc.) or step (A2, B2, etc.) can be performed independently.

The term CHECK when used as the first word of an instruction is defined as follows:

1. **CHECK**—indicates the instruction accomplishes an electrical specification check. Each electrical specification checked is listed in Table 6-1, Performance Check Summary (see the following Performance Check Summary discussion for more information).

PERFORMANCE CHECK SUMMARY

Table 6-1, Performance Check Summary, lists the electrical specifications that are checked. Table 6-1 is intended to provide a convenient means of locating the procedures, in the Performance Check, that check the applicable electrical specifications. For example, if the Peak Detector has been repaired, use Table 6-1 to locate the electrical specifications affected by the repair. Then note the title of the procedure in which those specifications are checked. Use the index at the beginning of the Performance Check to find the desired procedure.

PERFORMANCE CHECK INTERVAL

To maintain instrument accuracy, check performance every 1,000 hours of operation, or every six months if used infrequently.

TABLE 6-1
Performance Check Summary

Characteristic	Performance Requirement		Performance Check Procedure Title
SENSE CIRCUIT			
Source Ground Continuity			A. Source Ground Continuity
POWER Switch			
OFF			
−15° to +25° C	5 ohms or less with A6901 cold. (OFF for at least 10 min.) to obtain operation (ACTIVATE).		
+25° to +55° C	10 ohms or less with A6901 cold. (OFF for at least 10 min.) to obtain operation (ACTIVATE).		
ON	1 K ohm or less after 2 minutes operation (remain activated).		
Trip Voltage	28 V rms or ±40 V dc ±5%. See Figure 1-5.		B. DC Trip Current and Voltage
Neutral-to-Ground Continuity	Must trip between 3 and 10 V rms (8.5 to 28.3 V p-p), 50 Hz.		D. Neutral-to-Ground Continuity
DC Voltage Trip Delay	Less than 20 ms.		C. Trip Time
DC Current Trip	Current Selector	Trip Current	B. DC Trip Current and Voltage
	0.5 mA	.47-.53 mA	
	3.5 mA	2.5-3.5 mA	
	5.0 mA	4.0-5.0 mA	

TEKTRONIX FIELD SERVICE

Tektronix Field Service Centers and the Factory Service Center provide instrument repair and adjustment services. Contact your Tektronix Field Office or representatives for further information.

TEST EQUIPMENT REQUIRED

The test equipment listed in Table 6-2 is required for a complete Performance Check of the instrument.

The specifications for test equipment given in Table 6-2 are the minimum required to meet the Performance requirements. Detailed operating instructions for test equipment are omitted in these procedures. Refer to the test equipment instruction manual if more information is needed.

SPECIAL FIXTURES

Special fixtures are used only where they facilitate instrument performance checkout. These fixtures are available from Tektronix, Inc. Order by part number from Tektronix Field Offices or representatives.

TEST EQUIPMENT ALTERNATIVES

All of the listed test equipment is required to completely check this instrument. However, complete checking may not always be necessary or desirable. You may be satisfied with checking only selected characteristics, thereby reducing the amount of test equipment actually required.

The Performance Check Procedure is based on the first item of equipment given as an example. When other equipment is substituted, control settings or setups may need to be altered. If the exact item of equipment given as an example in Table 6-2 is not available, first check the Minimum Specifications column carefully to see if other equipment might suffice. Then check the Purpose column to see why this item is used. If used for a performance check that is of little or no importance for your repair requirements, the item and corresponding step(s) can be deleted.

TABLE 6-2
Test Equipment

Description	Minimum Specifications	Purpose	Example of Applicable Equipment
1. Test Oscilloscope	Bandwidth, dc-50 MHz; min defl. factor, 0.2 V/div; accuracy, within 3%.	Measure pulse width when checking Trip Time.	a. TEKTRONIX 5440 Oscilloscope (with 5A48 Dual Trace Amplifier, 5B40 Time Base and P6008 Probe—see items 2, 3, and 20).

TABLE 6-2 (CONT)
Test Equipment

Description	Minimum Specifications	Purpose	Example of Applicable Equipment
1. Test Oscilloscope (Cont)			b. TEKTRONIX 465B Oscilloscope with P6105 Probe. c. See the Tektronix Products Catalog for an oscilloscope system.
2. Amplifier	Tektronix 5A-series plug-in instrument.	Measure pulse width when checking Trip Time.	a. TEKTRONIX 5A48 Dual Trace Amplifier (and P6008 Probe—see item 20).
3. Time Base	Tektronix 5B-series instrument.	Measure pulse width when checking Trip Time.	a. TEKTRONIX 5B40 Time Base.
4. Sine-Wave Generator	Frequency, 50-60 Hz; amplitude, 30 V p-p.	Check Neutral-to-Ground Continuity.	a. TEKTRONIX FG 501A Function Generator
5. Digital Multimeter (two required)	Range, -75 to +200 V; accuracy within 0.1%.	Used throughout procedure	a. TEKTRONIX DM 502A Auto ranging DMM.
6. Pulse Generator	Frequency range, dc-1 KHz; voltage, 0-±40 V; single-shot capability.	DC Trip Current Current and Voltage, Trip Time.	a. TEKTRONIX PG 505 Pulse Generator.
7. Amplifier	Output Voltage range ±30 V.	Check DC Trip Current and Voltage.	a. TEKTRONIX AM 501 Operational Amplifier
8. Power Supply	Output, + and - 20 V, current limited to 1A max.	Check DC Trip Current and Voltage	a. TEKTRONIX PS 503A Dual Power Supply.

TABLE 6-2 (CONT)
Test Equipment

Description	Minimum Specifications	Purpose	Example of Applicable Equipment
9. Power Module	Capable of housing and powering five TM 500-series test instruments.	Operate function and pulse generators and digital multimeters	a. TEKTRONIX TM 506 Power Module.
10. Trigger Generator	Provide single input pulse for PG 505.	Check DC Trip Current and Voltage, and Trip Time.	a. Tektronix Part 016-0597-00 Trigger Generator
11. Adapter	Bnc female to two EZ clip-on connectors.	Check Neutral-to-Ground Continuity.	a. Tektronix Part 013-0076-01.
12. Adapter	Bnc female to dual banana.	Connect DMM to output of Function Generator.	a. Tektronix Part 103-0090-00.
13. Adapter (two required)	Bnc male to dual binding post.	Connect output of Pulse Generator to DMM.	a. Tektronix Part 103-0035-00.
14. Adapter	Connectors, bnc T, male 1, female 2.	Connect output of Function Generator to DMM and to A6901.	a. Tektronix Part 103-0030-00.
15. Test Lead	Length, 2-1/2 ft.; connectors, alligator clip and banana plug; color, black.	To connect DMM to A6901.	a. Tektronix Part 012-0014-00.
16. Test Lead	Length, 2-1/2 ft.; connectors, alligator clip and banana plug; color, red.	To connect DMM to A6901.	a. Tektronix Part 012-0015-00.
17. Cable, Coaxial (two required)	Length, 42 inches; impedance, 50 Ω; Connectors, bnc male.	Connect output of Function Generator to DMM.	a. Tektronix Part 012-0057-01.

TABLE 6-2 (CONT)
Test Equipment

Description	Minimum Specifications	Purpose	Example of Applicable Equipment
18. Patch Cord (two required)	Length, 18 inches; connectors, banana plug; color, red.	Miscellaneous connections.	a. Tektronix Part 012-0031-00.
19. Patch Cord (three required)	Length, 18 inches; connectors, banana plug; color, black.	Miscellaneous connections.	a. Tektronix Part 012-0039-00.
20. Probe	Attenuation, 10X; resistance, 10 MΩ.	Furnish input to test oscilloscope.	a. P6008 Probe, Tektronix Part 010-0129-00.
21. Soldering Iron	Power, 15-25 W.	Disconnect resistor in Neutral-to-Ground Continuity Check.	a. Tektronix Part 003-0338-01.
22. Alligator Clip	Jaw opening at least 1/4 inch.	Short terminals NO and NC of switch S560, for the B2. DC Trip Current and Voltage check.	a. Tektronix Part 344-0045-00.

PERFORMANCE CHECK PROCEDURE

This procedure verifies electrical specifications. All circuit tolerances given are as specified in the Performance Check Summary, Table 6-1.

INDEX TO PERFORMANCE CHECK

PERFORMANCE CHECK INITIAL SETUP PROCEDURE

NOTE

The performance of this instrument can be checked at any ambient temperature from −15°C to +55°C unless otherwise stated.

Be sure the A6901 is OFF and not connected to an ac power source

2. Remove the two case-retaining screws shown in Figure 6-1

3. Pull the top section of the case off, and set it aside.

4. Remove the two screws and one nut that fasten the clear plastic shield to its supports.

5. Set the shield to one side, being careful that the connector to the buzzer on the shield stays connected.

6. Check that the VOLTAGE SELECTOR RANGE switch is set for the correct input line voltage, and that a suitable line cord and plug is available.

7. Set the CURRENT SELECTOR switch to 0.5 mA.

8. Set the GROUNDING MODE switch to the AUTO ISOLATED position.

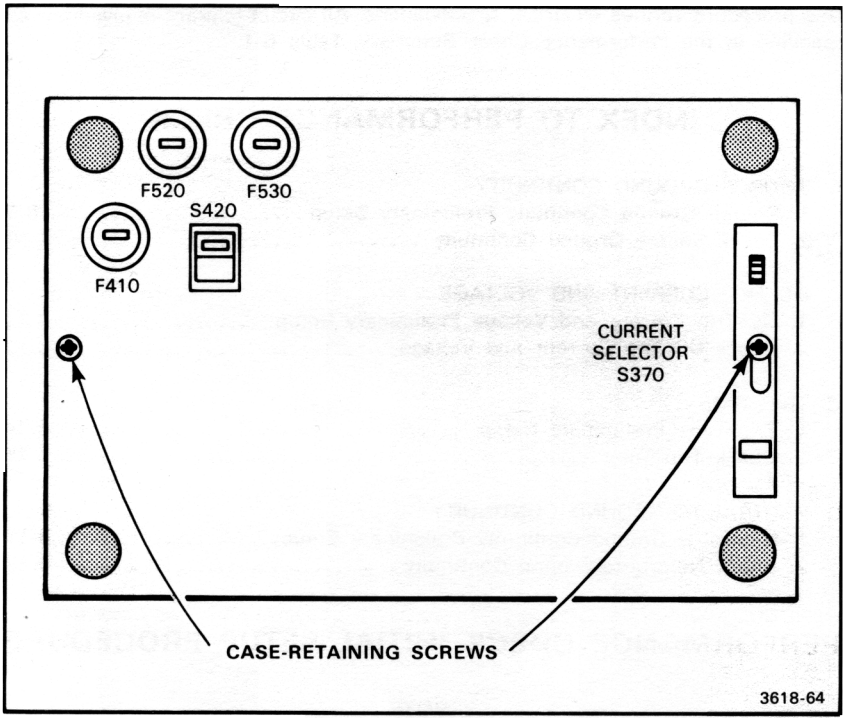


Figure 6-1. Bottom view of A6901

A. SOURCE GROUND CONTINUITY

Equipment Required: (Numbers correspond to those used in Table 6-2, Test Equipment.)

5. Digital Multimeter

9. Power Module

15, 16. Test Leads

Shaded lines identify Performance Requirement CHECK.

NOTE

This check must be performed at an ambient temperature of +20° 30°C.

A1. SOURCE GROUND CONTINUITY PRELIMINARY SETUP

a. Perform the Performance Check Initial Setup Procedure given at the beginning of the Performance Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

A2. CHECK SOURCE GROUND CONTINUITY

NOTE

First perform step A1, then proceed.

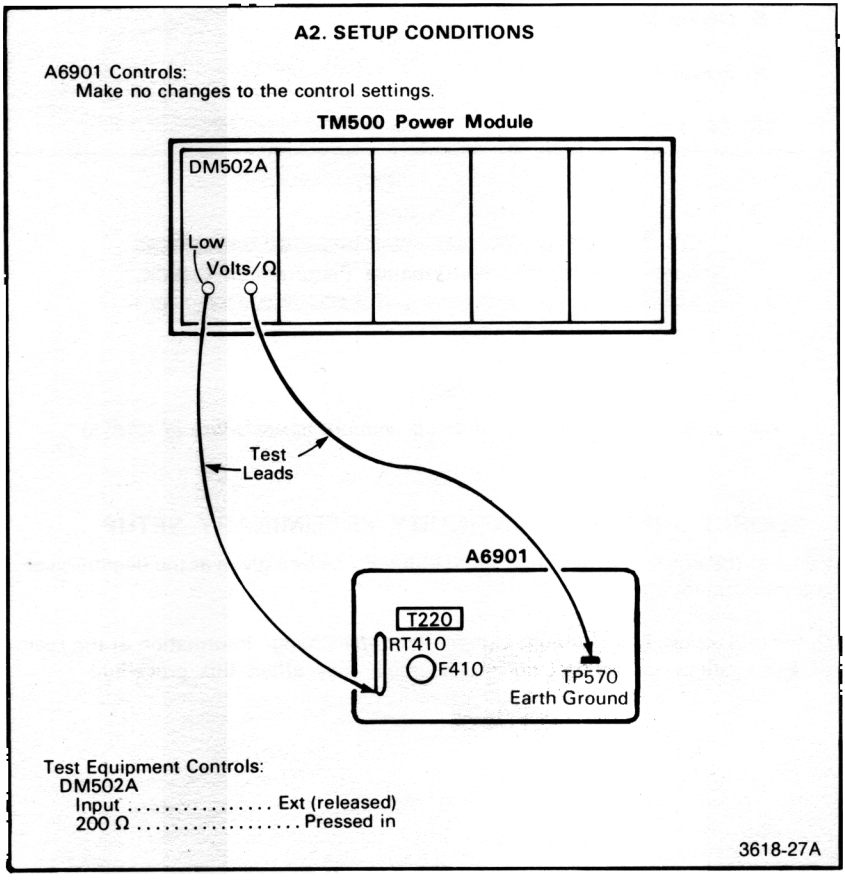


Figure 6-2. A2. Setup conditions.

a. Be sure the A6901 has been turned off for at least 10 minutes.

b. **CHECK**—that the Source Ground Continuity indicated on the DMM is 100 Ω or less.

B. DC TRIP CURRENT AND VOLTAGE

Equipment Required: (Numbers correspond to those used in Table 6-2, Test Equipment.)

5. Digital Multimeter (two needed)
6. Pulse Generator
8. Power Supply
9. Power Module
13. Adapter (bnc male to dual binding post)
15, 16. Test Leads
18. Patch Cords (red, two needed)
19. Patch Cords (black, three needed)

Shaded lines identify Performance Requirement CHECK.

B1. DC TRIP CURRENT AND VOLTAGE PRELIMINARY SETUP

a. Perform the Performance Check Initial Setup Procedure given at the beginning of the Performance Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

c. Desolder one end of R352 and one end of CR364 (see Fig. 9-1 in foldout section for component locations).

B2. CHECK DC TRIP CURRENT AND VOLTAGE

NOTE

First perform step B1, then proceed.

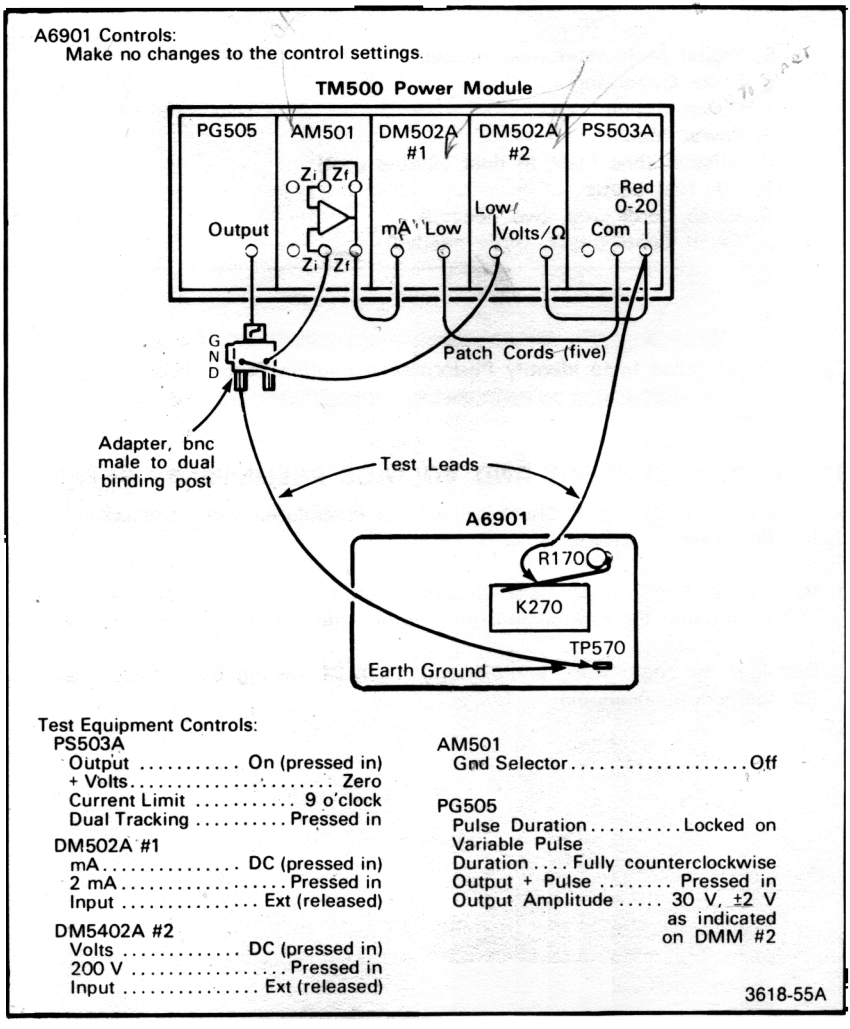


Figure 6-3. B2. Setup conditions.

Verify that the A6901 CURRENT SELECTOR switch is set to 0.5 mA.

b. Connect the ac line to the POWER IN connector and turn the A6901 POWER on.

Press the PUSH TO ACTIVATE button.

d. Use the PS 503A + Volts controls to gradually increase the output voltage (DM502A #2) until the A6901 trips and sounds the audible alarm.

e. Place alligator clip across NO and NC terminals of switch S560. Figure 5-8 in Maintenance section shows S560 Position and terminal locations.

f. **CHECK**—that trip current (DM502A #1) and voltage (DM502A #2) are within limits given in Table 6-3.

g. Turn the A6901 off, and remove alligator clip from S560.

h. Turn PS 503A Volt control to zero.

TABLE 6-3
Trip Current & Voltage Ranges

A6901 Current Selector	Acceptable Trip Range	
	Current	Voltage
0.5 mA	0.47 - 0.53 mA	38.8 - 41.2 V
3.5 mA	2.5 - 3.5 mA	38.8 - 41.2 V
5.0 mA	4.0 - 5.0 mA	38.8 - 41.2 V

On the PS 503A, reverse the leads connected to the Black Common and Red 0-20 V connectors (the two leads that are on the Red 0-20 V connector should connect to the Black Common connector, and the single lead that is connected to Black Common should connect to the Red 0-20 V connector.)

j. Release the PG 505 Output + Pulse button. The system output will now be negative.

k. Repeat steps b through h.

Set the A6901 CURRENT SELECTOR switch to 3.5 mA.

m. Set DMM #1 to 20 mA dc.

n. Repeat steps b through k, using the setup shown in B2. Setup Conditions.

Set the A6901 CURRENT SELECTOR switch to 5 mA.

Repeat steps b through k, using the setup shown in B2. Setup Conditions.

Turn the A6901 POWER off and resolder CR364. If you intend to proceed to the next step, leave R352 unsoldered. If not, resolder R352.

C. TRIP TIME

Equipment Required: (Numbers correspond to those used in Table 6-2, Test Equipment.)

1. Test Oscilloscope
2. Amplifier (for Oscilloscope)
3. Time Base
5. Digital Multimeter (two needed)
6. Pulse Generator
7. Amplifier
8. Power Supply
9. Power Module
10. Trigger Generator
13. Adapter (bnc male to dual binding post)
15, 16. Test Leads
17. Cable, Coaxial
18. Patch Cord, red (two required)
19. Patch Cord, black (three required)
20. Probe

Shaded lines identify Performance Requirement CHECK.

C1. TRIP TIME PRELIMINARY SETUP

a. Perform the Performance Check Initial Setup Procedure given at the beginning of the Performance Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

c. Desolder one end of R352 (see Fig. 9-1 in foldout section for component locations).

C2. CHECK TRIP TIME

NOTE

First perform step C1, then proceed.

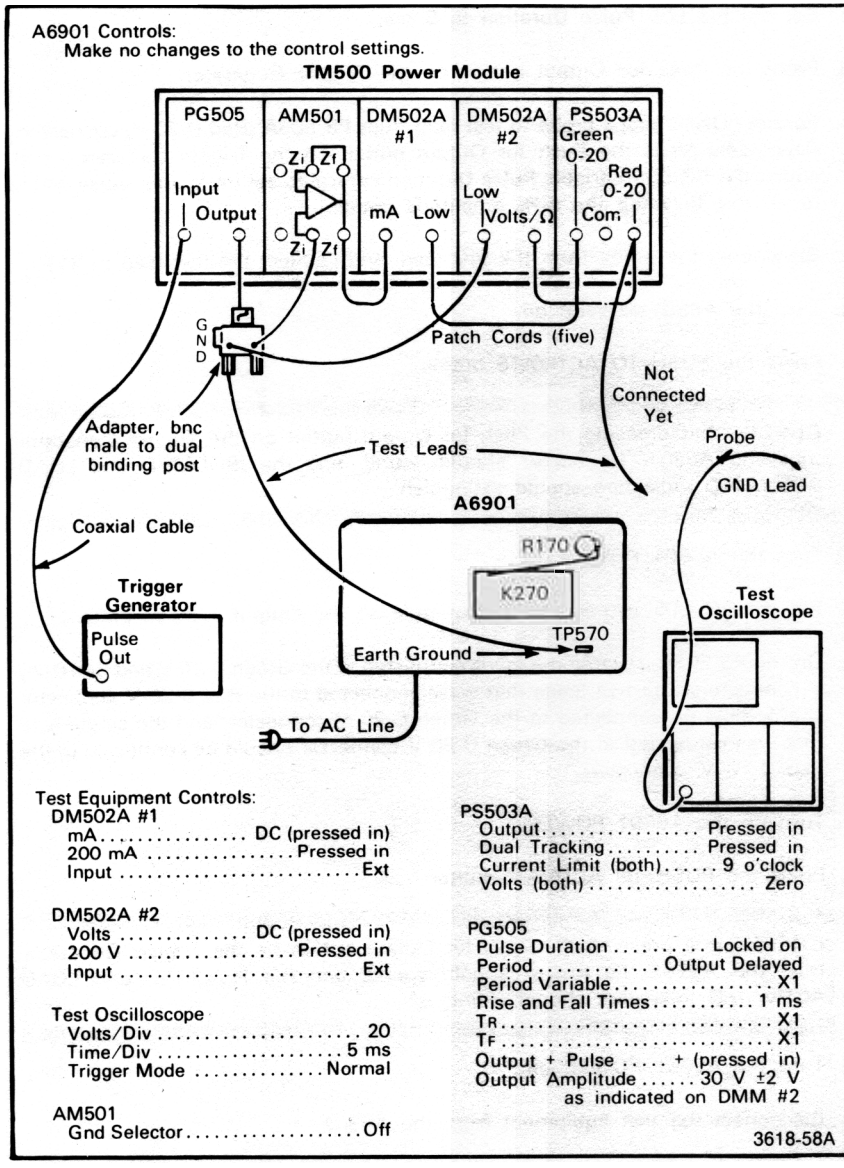


Figure 6-4. C2. Setup conditions.

a. Set PG 505 Pulse Duration to Locked On.

b. Use PS 503A Volts controls to set the output voltage to +50 (±0.1) V as indicated on DMM #2.

c. Set the PG 505 Pulse Duration to 5 ms.

d. Press the Push for Output button on the Trigger Generator.

e. Connect Oscilloscope probe to test lead from PS 503A (Red 0-20 V) connector. Repeatedly press the Push for Output button on the Trigger Generator, and adjust the PG 505 Variable Pulse Duration control to set the output pulse width to 15 ms, between the 50% amplitude points.

Disconnect the probe from the test lead, and connect the test lead to R170.

g. Turn the A6901 POWER on.

h. Press the PUSH TO ACTIVATE button.

i. **CHECK**—that pressing the Push for Output button on the Trigger Generator trips the A6901. Its buzzer should sound, and the ISOLATED and LOAD ACTIVATED indicators should extinguish.

j. Turn the A6901 POWER off.

k. Set the PG 505 to negative output (release the Output + Pulse button).

l. On the PS 503A, reverse the leads connected to the Green 0-20 V and Red 0-20 V connectors (the two leads that were connected to the Red 0-20 V connector should now be connected to the Green 0-20 V connector, and the single lead that was connected to the Green 0-20 V connector should be connected to the Red 0-20 V connector).

m. Turn on the A6901 POWER.

n. Press the PUSH TO ACTIVATE button.

o. **CHECK**—that pressing the Push for Output button on the Trigger Generator trips the A6901. Its buzzer should sound, and the ISOLATED and LOAD ACTIVATED indicators should extinguish.

p. Turn the A6901 POWER off.

q. Disconnect the test equipment from the A6901

Resolder R352.

D. NEUTRAL-TO-GROUND CONTINUITY

Equipment Required: (Numbers correspond to those used in Table 6-2, Test Equipment.)

4. Sine-Wave Generator
5. Digital Multimeter
9. Power Module
11. Adapter (bnc female to dual EZ clip)
12. Adapter (bnc female to dual banana)
14. Adapter (bnc T)
17. Coaxial Cable (two needed)
21. Soldering Iron

Shaded lines identify Performance Requirement CHECK.

D1. NEUTRAL-TO-GROUND CONTINUITY PRELIMINARY SETUP

a. Perform the Performance Check Initial Setup Procedure given at the beginning of the Performance Check.

b. Refer to Section 7, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.

D2. CHECK NEUTRAL-TO-GROUND CONTINUITY

NOTE

First perform step D1, then proceed.

WARNING

To avoid electric shock, the ac power must be disconnected from the A6901 before performing any soldering.

a. Disconnect the Power cord from the A6901

Unsolder the end of R540 opposite from J440 (see D2. Setup Conditions).

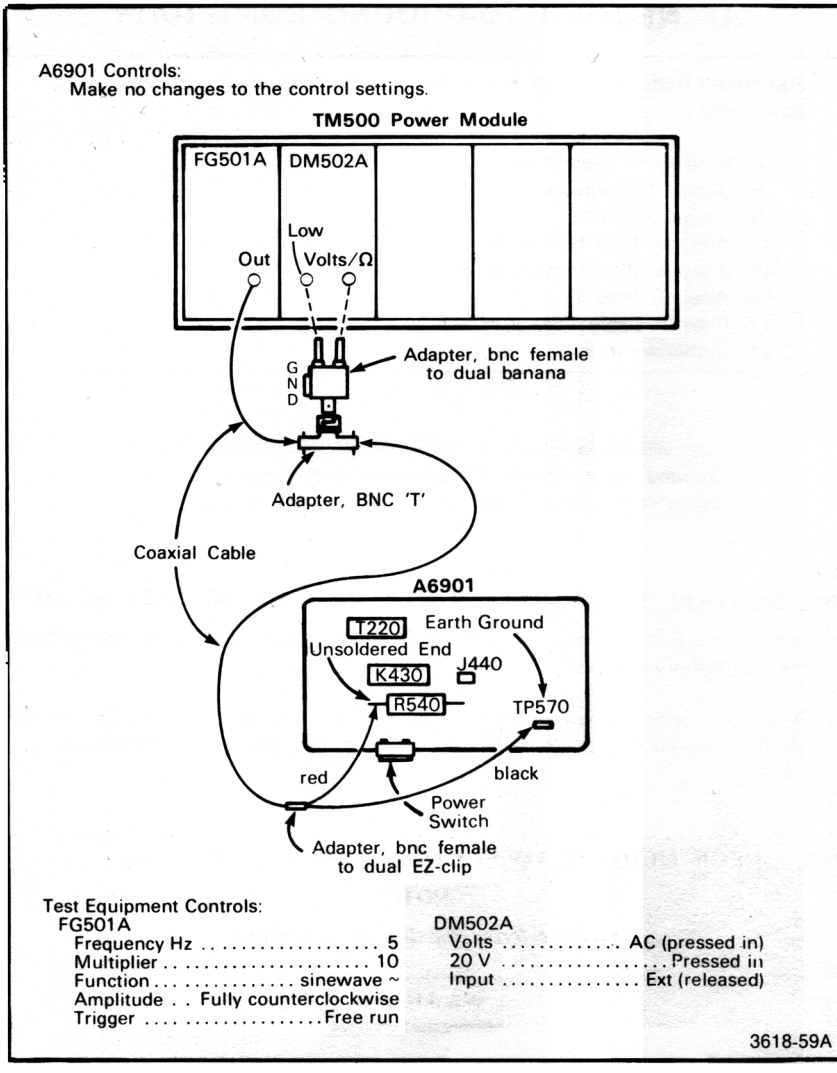


Figure 6-5. D2. Setup conditions.

c. Perform the D2. Setup Conditions.

d. Connect the A6901 POWER IN connector to a source of ac power.

e. Set the FG 501A Amplitude to 3 +0, -0. V ac as indicated on the DMM

Turn the A6901 POWER on.

g. **CHECK**—that the A6901 buzzer does not sound.

h. Turn the A6901 POWER off.

Set the FG 501A to produce between 9.9 and 10.0 V ac output

Turn the A6901 POWER on.

k. **CHECK**—that the A6901 buzzer sounds.

Turn the A6901 POWER off.

m. Disconnect the power cord from the ac power source.

n. Disconnect the signal from the A6901

Resolder R540 in its place.

p. Reassemble the cabinet, and perform the Preliminary Setup in Section 2, Operating Instructions.

This completes the Performance Check procedure.

INSTRUMENT OPTIONS

Your A6901 Ground Isolation Monitor may be equipped with one or more options. This section includes a brief description of each option, and an Option Information Locator Table. The Option Information Locator Table lists all the options and tells where they are mentioned in this manual. For further information about options, see your Tektronix Products catalog or contact your Tektronix Field Office.

OPTION A1

The standard (North American 120 V) power cord, load cord, line fuse, and power-supply fuse is replaced with the Universal European equivalent as follows: 1 each, load cord, 17.5 cm IEC to Euro female, 240 V; 1 each, power cord, 3 meters; 1 each, line fuse 3 A fast DIN Metric; 1 each, power-supply fuse, 0.05 A DIN Metric.

OPTION A2

The standard (North American 120 V) power cord, load cord, line fuse, and power-supply fuse is replaced with the United Kingdom equivalent as follows: 1 each, load cord, 17.5 cm IEC to UK female, 240 V; 1 each, power cord, 3 meters; 1 each, line fuse 3 A fast DIN Metric; 1 each, power-supply fuse, 0.05 A DIN Metric.

OPTION A3

The standard (North American 120 V) power cord, load cord, line fuse, and power-supply fuse is replaced with the Australian equivalent as follows: 1 each, load cord, 17.5 cm IEC to Australian female 240 V; 1 each, power cord, 3 meters; 1 each, line fuse 3 A fast DIN Metric; 1 each, power-supply fuse, 0.05 A DIN Metric.

OPTION A4

Not available on the A6901 due to the lack of a grounded neutral connection in the 240 V North American system.

OPTION A5

The standard (North American 120 V) power cord, load cord, line fuse, and power-supply fuse is replaced with the Switzerland equivalent as follows: 1 each, load cord, 17.5 cm IEC to Swiss female 240 V; 1 each, power cord, 3 meters; 1 each, line fuse, 3 A fast DIN Metric; 1 each, power-supply fuse, 0.05 A DIN Metric.

TABLE 7-1
Option Information Locator

Option	Location		Information
	Section	Heading	
A1	1 General Information	Power Cord Information (Fig. 1-4)	Lists power cord and plug configurations of Option A1
	2 Operating Instructions	Preliminary Setup	Gives possible solution for neutral-to-line conductor reversal.
	7 Instrument Options	Option A1	Gives a brief description of Option A1.
	8 Replaceable Electrical Parts	(Near End Of Section 8)	Provides a list of the Option A1 Monitor.
	10 Replaceable Mechanical Parts	Standard Accessories	Provides a list of power and load cord part numbers for the Option A1 Monitor.
A2	1 General Information	Power Cord Information (Fig. 1-4)	Lists power cord and plug configurations of Option A2.
	7 Instrument Options	Option A2	Gives a brief description of Option A2.
	8 Replaceable Electrical Parts	(Near End Of Section 8)	Provides a list of the Option A2 Monitor.
	10 Replaceable Mechanical Parts	Standard Accessories	Provides a list of power and load cord part numbers for the Option A2 Monitor.

TABLE 7-1 (CONT)
Option Information Locator

Option	Location		Information
	Section	Heading	
A3	1 General Information	Power Cord Information (Fig. 1-4)	Lists power cord and plug configurations of Option A3.
	7 Instrument Options	Option A3	Gives a brief description of Option A3.
	8 Replaceable Electrical Parts	(Near End Of Section 8)	Provides a list of the Option A3 Monitor.
	10 Replaceable Mechanical Parts	Standard Accessories	Provides a list of power and load cord part numbers for the Option A3 Monitor.
A4	Not available on the A6901 due to the lack of a grounded neutral connection in the 240 V North American system.		
A5	1 General Information	Power Cord Information (Fig. 1-4)	Lists power cord and plug configurations of Option A5.
	7 Instrument Options	Option A5	Gives a brief description of Option A5.
	8 Replaceable Electrical Parts	(Near End Of Section 8)	Provides a list of the Option A5 Monitor.
	10 Replaceable Mechanical Parts	Standard Accessories	Provides a list of power and load cord part numbers for the Option A5 Monitor.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or thorough 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.

Only the circuit number will appear on the diagrams and 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.

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.

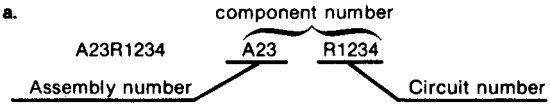
ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1

COMPONENT NUMBER
(column one of the Electrical Parts List)

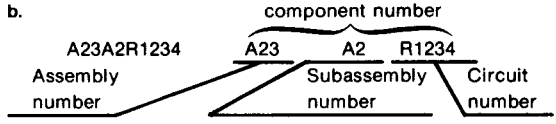
A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.



Read: Resistor 1234 of Assembly 23

Example b.



Read: Resistor 1234 of Subassembly 2 of Assembly 23

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 seriral 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 Code
00213	NYTRONICS COMPONENTS GROUP INC SUBSIDIARY OF NYTRONICS INC	ORANGE ST	DARLINGTON SC 29532
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
03888	KDI PYROFILM CORP	60 S JEFFERSON RD	WHIPPANY NJ 07981
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR GROUP	5005 E MCDOWELL RD	PHOENIX AZ 85008
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
07716	TRW INC TRW ELECTRONICS COMPONENTS TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
09353	C AND K COMPONENTS INC	15 RIVERDALE AVE	NEWTON MA 02158
12969	UNITRODE CORP	580 PLEASANT ST	WATERTOWN MA 02172
14552	MICRO/SEMICONDUCTOR CORP	2830 S FAIRVIEW ST	SANTA ANA CA 92704
14936	GENERAL INSTRUMENT CORP DISCRETE SEMI CONDUCTOR DIV	600 W JOHN ST	HICKSVILLE NY 11802
19701	MEPCO/ELECTRA INC A NORTH AMERICAN PHILIPS CO	P O BOX 760	MINERAL WELLS TX 76067
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT CONNECTOR SYSTEMS	30 HUNTER LANE	CAMP HILL PA 17011
50157	MIDWEST COMPONENTS INC	1981 PORT CITY BLVD P O BOX 787	MUSKEGON MI 49443
50434	HEWLETT-PACKARD CO OPTOELECTRONICS DIV	640 PAGE MILL RD	PALO ALTO CA 94304
51642	CENTRE ENGINEERING INC	2820 E COLLEGE AVE	STATE COLLEGE PA 16801
54473	MATSUSHITA ELECTRIC CORP OF AMERICA	ONE PANASONIC WAY	SECAUCUS NJ 07094

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195
57668	ROHM CORP	16931 MILLIKEN AVE	IRVINE CA 92713
58361	GENERAL INSTRUMENT CORP OPTOELECTRONICS DIV	3400 HILLVIEW AVE	PALO ALTO CA 94304
59660	TUSONIX INC	2155 N FORBES BLVD	TUCSON, ARIZONA 85705
59821	CENTRALAB INC SUB NORTH AMERICAN PHILIPS CORP	7158 MERCHANT AVE	EL PASO TX 79915
71400	MCGRAW-EDISON CO BUSSMANN MFG DIV	502 EARTH CITY PLAZA P O BOX 14460	ST LOUIS MO 63178
79727	C-M INDUSTRIES	550 DAVISVILLE RD P O BOX 96	WARMINSTER PA 18974
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
81073	GRAYHILL INC	561 HILLGROVE AVE P O BOX 373	LA GRANGE IL 60525
91637	DALE ELECTRONICS INC	P O BOX 609	COLUMBUS NE 68601
93410	HAMILTON STANDARD CONTROL ESSEX GROUP INC	45-55 PLYMOUTH ST P O BOX 1007	LEXINGTON OH 44904
95348	GORDOS CORP	250 GLENWOOD AVE	BLOOMFIELD NJ 07003
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK0002	ARROW-W CORP	250 SHEFFIELD ST	MOUNTAINSIDE NJ 07092
TK0935	MARQUARDT SWITCHES INC	MARQUARDT 67 ALBANY ST	CAZENOVIA NY 13035

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-7023-00	B010100	B010359	CIRCUIT BD ASSY:GROUND ISOLATION MONITOR	80009	670-7023 00
A1	670-7023-01	B010360		CIRCUIT BD ASSY:GROUND ISOLATION MONITOR	80009	670-7023-01
A1C140	290-0846-00			CAP,FXD,ELCTLT:47UF,+75-10%,35V	54473	ECE-A35V47LU
A1C240	290-0917-00			CAP,FXD,ELCTLT:220UF,+50-10%,35V	55680	TLB1V221TCAANA
A1C340	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJ0CEX
A1C360	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
A1C361	283-0051-00			CAP,FXD,CER DI:0.0033UF,5%,100V	04222	SR301A332JAA
A1C450	290-0746-00			CAP,FXD,ELCTLT:47UF,+50-10%,16V	54473	ECE-A6V47L
A1C460	283-0238-00			CAP,FXD,CER DI:0.01UF,10%,50V	04222	SR205C103KAA
A1C461	283-0196-00			CAP,FXD,CER DI:270PF,10%,50V	51642	150-050-X7R-271K
A1C462	283-0156-00			CAP,FXD,CER DI:0.001 UF,+80-20%,200V	05397	C315C102Z2R5CA
A1CR140	152-0585-00			SEMICOND DVC,DI:RECT,SI,200V,1A	14936	M02M-30
A1CR170	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
A1CR270	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
A1CR340	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
A1CR341	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR350	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR360	152-0585-00			SEMICOND DVC,DI:RECT,SI,200V,1A	14936	M02M-30
A1CR362	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR364	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
A1CR370	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
A1CR440	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
A1CR442	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR444	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR460	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1CR560	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A1J360	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
				(QUANTITY OF 2)		
A1J440	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 3)	22526	48283-036
A1K270	148-0137-01			RELAY,ARMATURE:FORM Y,50A,42.5VDC,COIL 18VDC 135 OHM	80009	148-0137-01
A1K350	148-0122-00			RELAY,REED:FORM A,5A,200V,COIL 5V,575 OHM	95348	F81-1050-4
A1K360	148-0122-00			RELAY,REED:FORM A,5A,200V,COIL 5V,575 OHM	95348	F81-1050-4
A1K430	148-0118-00			RELAY,ARMATURE:2 FORM C,3A,30VDC,COIL 12VDC 160 OHM	TK0002	HC2P12VDC(UL)
A1P240	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 2)	22526	48283-036
A1Q130	151-0432-00			TRANSISTOR:NPN,SI,TO-106	04713	SP58512
A1Q250	151-0540-00			THYRISTOR:TRIAC,SI,400V,25A	03508	SC261DX24
A1Q350	151-0508-00			TRANSISTOR:UJT,SI,TO-98	03508	X13T520
A1Q450	151-0462-00			TRANSISTOR:PNP,SI,TO-220	04713	SJE491
A1Q452	151-0464-00			TRANSISTOR:NPN,SI,TO-220	04713	SJE412
A1Q454	151-0539-00			THYRISTOR:TRIAC,SI,400V,0.8A	04713	MAC97-6
A1Q460	151-0508-00			TRANSISTOR:UJT,SI,TO-98	03508	X13T520
A1Q464	151-0539-00			THYRISTOR:TRIAC,SI,400V,0.8A	04713	MAC97-6
A1Q466	151-0508-00			TRANSISTOR:UJT,SI,TO-98	03508	X13T520
A1R130	315-0562-00			RES,FXD,FILM:5.6K OHM,5%,0.25M	57668	NTR25J-E05K6
A1R151	308-0450-00			RES,FXD,MM:70 OHM,1%,3M	00213	1240S-70-1
A1R170	308-0204-00			RES,FXD,MM:1 OHM,5%,10M CHASSIS MT	91637	HL1202Z71R000J
A1R230	315-0161-00			RES,FXD,FILM:160 OHM,5%,0.25M	57668	NTR25J-E 160E
A1R240	308-0076-00			RES,FXD,MM:300 OHM,5%,3M	00213	1240S 300-5
A1R340	315-0623-00			RES,FXD,FILM:62K OHM,5%,0.25M	19701	5043CX62K00J
A1R341	315-0226-00			RES,FXD,FILM:22M OHM,5%,0.25M	80009	315-0226-00
A1R350	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25M	57668	NTR25J-E100K

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1R352	301-0181-00			RES,FXD,FILM:180 OHM,5%,0.5M	19701	5053CX180R0J
A1R354	301-0202-00			RES,FXD,FILM:2K OHM,5%,0.5M	19701	5053CX2K000J
A1R360	321-0392-09			RES,FXD,FILM:118K OHM,1%,0.125M,TC=T9	07716	CEAE11802F
A1R362	321-1710-07			RES,FXD,FILM:43.5K OHM,0.1%,0.125M,TC=T9 (NOMINAL VALUE SELECTED)	07716	CEAE435018
A1R364	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25M	19701	5043CX10K00J
A1R370	321-0336-00			RES,FXD,FILM:30.9K OHM,1%,0.125M,TC=T0	19701	5043ED30K90F
A1R450	315-0562-00			RES,FXD,FILM:5.6K OHM,5%,0.25M	57668	NTR25J-E05K6
A1R451	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25M	57668	NTR25J-E680E
A1R452	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25M	57668	NTR25J-E680E
A1R454	315-0391-00			RES,FXD,FILM:390 OHM,5%,0.25M	57668	NTR25J-E390E
A1R461	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25M	57668	NTR25J-E680E
A1R462	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25M	57668	NTR25J-E680E
A1R464	315-0391-00			RES,FXD,FILM:390 OHM,5%,0.25M	57668	NTR25J-E390E
A1R466	308-0252-00			RES,FXD,MM:390 OHM,5%,3M	00213	1240S 390-5
A1R468	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25M	57668	NTR25J-E 2K
A1R470	321-0391-00			RES,FXD,FILM:115K OHM,1%,0.125M,TC=T0	07716	CEA011502F
A1R471	322-0306-00			RES,FXD,FILM:15.0K OHM,1%,0.25M,TC=T0	19701	5043R015K00F
A1R510	303-0123-00			RES,FXD,CMPSN:12K OHM,5%,1M	01121	GB1235
A1R540	325-0056-00			RES,FXD,FILM:5 MEG OHM,1%,0.5M,TC=T0	03888	PME70 5M OHM 1%
A1R550	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25M	57668	NTR25JE01K0
A1R552	303-0132-00			RES,FXD,CMPSN:1.3K OHM,5%,1M	01121	GB1325
A1R560	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25M	57668	NTR25JE01K0
A1R562	301-0101-00			RES,FXD,FILM:100 OHM,5%,0.5M	19701	5053CX100R0J
A1R570	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25M	57668	NTR25J-E 100E
A1RT410	307-0825-00			RES,THERMAL:35 OHM 20%,220V	50157	16505001

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1S170	260-0724-00			SW,THRMSTC:NC,OPEN 83.3,CL 66.7,10A,240V	93410	430-367
A1S370	260-0984-01			SWITCH,SLIDE:DPTT W/PLASTIC PLATE	79727	G-128-S-0095
A1S420	260-1980-01			SWITCH,SLIDE:DPDT,10A,125V,MKD 115V/230V	TK0935	4021.1913
A1T220	120-1252-00			XFMR,PWR,STPDN:	80009	120-1252-00
A1T460	120-0638-00			XFMR,TOROID:	80009	120-0638-00
A1TP150	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
A1TP240	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
A1TP340	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
A1TP360	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
A1TP361	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
A1TP460	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
A1TP570	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
A1VR240	152-0667-00			SEMICOND DVC,DI:ZEN,SI,3.0 V # 2% AT 2MA	04713	SZG30025RL
A1VR360	152-0514-00			SEMICOND DVC,DI:ZEN,SI,10V,1%,0.4W,DO-7	04713	SZG15RL
A1VR450	152-0175-00			SEMICOND DVC,DI:ZEN,SI,5.6V,5%,0.4W,DO-7	14552	TD3810976
A1VR470	152-0283-00			SEMICOND DVC,DI:ZEN,SI,43V,5%,0.4W,D-07	04713	SZ14257KRL
A1VR472	152-0283-00			SEMICOND DVC,DI:ZEN,SI,43V,5%,0.4W,D-07	04713	SZ14257KRL
A1VR560	152-0280-00			SEMICOND DVC,DI:ZEN,SI,6.2V,5%,0.4W,DO-7	04713	1N753A
A1VR570	152-0294-00			SEMICOND DVC,DI:ZEN,SI,36V,5%,1W,A31A	04713	1N3033B
DS540	150-1032-00			LT EMITTING DIO:YELLOW,585NM,30MA MAX	50434	HLMP3401
DS560	150-0045-00			LAMP,INCAND:5V,0.06A,#685,SUBMIDGET FLG	58361	CM-685
F410	159-0048-00			FUSE,CARTRIDGE:3AG,0.1A,250V,27SEC (120V,STANDARD INSTRUMENT ONLY)	71400	MDL 1/10
F410	159-0199-00			FUSE,CARTRIDGE:5MM X 20MM,0.05A,250V,2 MIN (240V,OPTION A1,A2,A3,A5 ONLY)	S3629	FST 034.3104
F520	159-0046-00			FUSE,CARTRIDGE:3AG,8A,250V,15SEC,CER	71400	ABC 8

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
F530	159-0013-00			FUSE,CARTRIDGE:3AG,6A,250V,MEDIUM BLOW (120V,STANDARD INSTRUMENT ONLY)	71400	MTH-CM-6
F530	159-0190-00			FUSE,CARTRIDGE:5 X 20MM,3.15A,250V,50MS (240V,OPTION A1,A2,A3,A5 ONLY)	71400	GDB3.15
LS420	119-1420-00			BUZZER:6-16V,23MA,90DB	TK1066	PMB-12
S520	260-0247-00			SWITCH,PUSH:SPST,1A,115VAC	81073	30YY1009
S530	260-1961-00			SWITCH,ROCKER:DPST,6(4)A,250V	TK0935	1802.1121
S540	260-1979-00			SWITCH,ROCKER:SPDT,0.4VA,20V	09353	7101J52ZB8E
S560	260-1285-00			SWITCH,PUSH:SPDT,1A,115AC,MOM	09353	P8121

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:

14.15, 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 diagram 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).

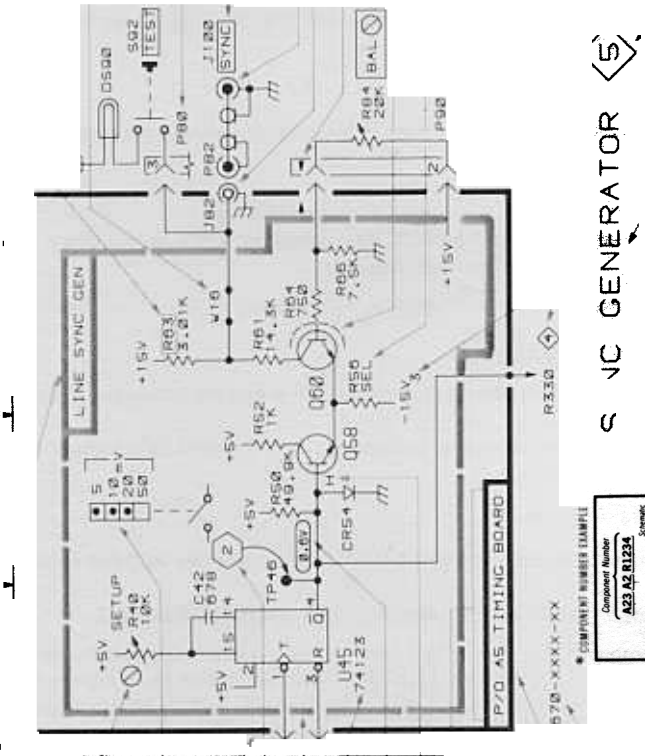
Resistors = Ohms (Ω).

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 the illustration on page 9-2 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.



Function Block Title

Internal Screwdriver Adjustment

Cam Switch Closure Chart (Dot indicates switch closure)

Etched Circuit Board Outlined in Black

Refer to Waveform

Function Block Outline

IC type

Test Voltage

Heat Sink

Board Name

P/O—Part of circuit board

Assembly Number

Tektronix Part No. for circuit boards

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

Strap or Link

Plug to E.C. Board

Box - Identifies Panel Controls, Connectors and Indicators

Coaxial connectors:
male
female

Plug Index; signifies pin No. 1

External Screwdriver Adj.

Shielding

Selected value, see Parts List and Maintenance Section for Selection Criteria

Decoupled or Filtered Voltage

Refer to Diagram Number

Schematic Name and Number

@

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or thorough 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.

IDENTATION 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.

FIGURE AND INDEX NUMBERS

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

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 Code
03797	GENISCO TECHNOLOGY CORP ELDEMA DIV	18435 SUSANA RD	COMPTON CA 90221
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125
16428	BELDEN CORP ELECTRONIC DIV	2200 US HWY 27 SOUTH P O BOX 1980	RICHMOND IN 47374
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT CONNECTOR SYSTEMS	30 HUNTER LANE	CAMP HILL PA 17011
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
71400	MCGRAW-EDISON CO BUSSMANN MFG DIV	502 EARTH CITY PLAZA P O BOX 14460	ST LOUIS MO 63178
73743	FISCHER SPECIAL MFG CO	446 MORGAN ST	CINCINNATI OH 45206
75915	LITTELFUSE INC	800 E NORTHWEST HWY	DES PLAINES IL 60016
77900	SHAKEPROOF DIV OF ILLINOIS TOOL WORKS	SAINT CHARLES RD	ELGIN IL 60120
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIVISION	ST CHARLES ROAD	ELGIN IL 60120
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTRON AVE	CHICAGO IL 60630
83385	MICRODOT MANUFACTURING INC GREER-CENTRAL DIV	3221 W BIG BEAVER RD	TROY MI 48098
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201
S3109	FELLER ASA ADOLF AG C/O PANEL COMPONENTS CORP	355 TESCONI CIRCLE	SANTA ROSA CA 95401
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK0433	PORTLAND SCREW CO	6520 N BASIN	PORTLAND OR 97217
TK0435	LEWIS SCREW CO	4114 S PEORIA	CHICAGO IL 60609

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
TK0861	H SCHURTER AG DIST PANEL COMPONENTS	2015 SECOND STREET	BERKELEY CA 94170
TK1031	L AND M COMPONENTS DIV OF LAMB INDUSTRIES	PO BOX 25110	PORTLAND OR 97225
TK1105	J PHILLIP INDUSTRIES INC	5713 NORTHWEST HIGHWAY	CHICAGO IL 60646
TK1179	PANEL COMPONENTS CORP	355 TESCONI CIRCLE	SANTA ROSA CA 95401
TK1373	PATELEC-CEM (ITALY)	10156 TORINO	VAICENTALLO 62/455 ITALY

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	200-2331-00			1	COVER,PWR SPLY:PLASTIC	80009	200-2331-00
					(ATTACHING PARTS)		
-2	212-0014-00			2	SCREW,MACHINE:8-32 X 2.25,ROH,STL	TK0433	ORDER BY DESCR
-3	210-0008-00			2	WASHER,LOCK:#8 INTL,0.02 THK,STL	77900	1208-00-00-0541C
					(END ATTACHING PARTS)		
-4	386-4602-00			1	PANEL,TOP:7.2 X 4.75,AL	80009	386-4602-00
					(ATTACHING PARTS)		
-5	211-0504-00			8	SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
-6	210-0006-00			8	WASHER,LOCK:#6 INTL,0.018 THK,STL	77900	1206-00-00-0541C
					(END ATTACHING PARTS)		
-7	200-2585-00			1	COVER,HOLE:	80009	200-2585-00
-8	337-2910-00			1	SHIELD,ELEC:CIRCUIT BOARD	80009	337-2910-00
					(ATTACHING PARTS)		
-9	211-0504-00			2	SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
-10	210-0008-00			2	WASHER,LOCK:#8 INTL,0.02 THK,STL	77900	1208-00-00-0541C
-11	210-0457-00			1	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
					(END ATTACHING PARTS)		
-12	----- -----			1	BUZZER:6-16V,23MA,900B(SEE LS420 REPL)		
					(ATTACHING PARTS)		
-13	211-0097-00			2	SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
-14	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
					(END ATTACHING PARTS)		
	198-4494-00			1	WIRE SET,ELEC:	80009	198-4494-00
-15	131-0707-00			2	.CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	22526	47439-000
-16	352-0169-02			1	.HLDR,TERM CONN:2 WIRE,RED	80009	352-0169-02
-17	333-2781-00			1	PANEL,REAR:	80009	333-2781-00
-18	131-1234-00			1	CONN,RCPT,ELEC:PWR,FEMALE,250VAC,6A	82389	EAC-305
					(ATTACHING PARTS)		
-19	211-0012-00			2	SCREW,MACHINE:4-40 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
-20	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-					(END ATTACHING PARTS)		
-21	131-1084-02			1	CONN,RCPT,ELEC:PWR,MALE,250 VAC,6A	TK1031	NICON LII-NC174
					(ATTACHING PARTS)		
-22	211-0012-00			2	SCREW,MACHINE:4-40 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
-23	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
					(END ATTACHING PARTS)		
-24	210-0347-00			1	TERMINAL,LUG:BRASS,CU SN ZN PL	80009	210-0347-00
					(ATTACHING PARTS)		
-25	210-0408-00			1	NUT,PLAIN,HEX:6-32 X 0.312,BRS CD PL	73743	3040-402
-26	210-0006-00			1	WASHER,LOCK:#6 INTL,0.018 THK,STL	77900	1206-00-00-0541C
					(END ATTACHING PARTS)		
-27	334-2332-00			1	MARKER,IDENT:DANGER:VOLTAGE IN THIS AREA	80009	334-2332-00
-28	333-2780-00			1	PANEL,FRONT:	80009	333-2780-00
-29	210-0202-00			1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL	86928	A-373-158-2
					(ATTACHING PARTS)		
-30	210-0408-00			1	NUT,PLAIN,HEX:6-32 X 0.312,BRS CD PL	73743	3040-402
-31	210-0006-00			1	WASHER,LOCK:#6 INTL,0.018 THK,STL	77900	1206-00-00-0541C
					(END ATTACHING PARTS)		
-32	----- -----			1	LAMP,INCAND:(SEE DS560 REPL)		
-33	136-0223-00			1	LIGHT,INDICATOR:GREEN LENS	03797	HLA1010HL230GT
-34	210-0046-00			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL	77900	1214-05-00-0541C
-35	----- -----			1	SWITCH,PUSH:SPDT(SEE S560 REPL)		
-36	210-0562-00			1	NUT,PLAIN,HEX:0.25-40 X 0.312 BRS CD PL	73743	20224-402
-37	210-0046-00			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL	77900	1214-05-00-0541C
-38				AR	SWITCH,ROCKER:SPDT(SEE S540 REPL)		
	198-4493-00			1	WIRE SET,ELEC:	80009	198-4493-00
-39	131-0707-00			2	.CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	22526	47439-000
-40	352-0169-02			1	.HLDR,TERM CONN:2 WIRE,RED	80009	352-0169-02
					.(TO LED)		
-41				1	SWITCH,ROCKER:DPDT(SEE S530 REPL)		

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-42	----- -----			1	SWITCH,PUSH:SPST(SEE S520 REPL)		
-43	210-0905-00			1	WASHER,FLAT:0.256 ID X 0.438 OD X 0.05	83385	ORDER BY DESCR
-44	210-0046-00			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL	77900	1214-05-00-0541C
-45	334-2332-00			1	MARKER,IDENT:DANGER:VOLTAGE IN THIS AREA	80009	334-2332-00
-46	----- -----			1	CKT BOARD ASSY:(SEE A1 REPL)		
					(ATTACHING PARTS)		
-47	129-0908-00			2	SPACER,POST:2.069L,6-32 EXT/INT,AL,0.25HEX	80009	129-0908-00
-48	129-0890-00			1	SPACER,POST:2.377 L,6-32 EXT ONE END,AL,0.2 5 HEX	80009	129-0890-00
-49	211-0504-00			1	SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
-50	210-0006-00			1	WASHER,LOCK:#6 INTL,0.018 THK,STL	77900	1206-00-00-0541C
					(END ATTACHING PARTS)		
					CKT BOARD ASSY INCLUDES:		
-51	131-0993-00			2	.BUS,CONDUCTOR:SHUNT ASSEMBLY,BLACK	22526	65474-005
-52	214-0579-00			9	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-53	----- -----			1	.SWITCH:(SEE A1S170 REPL)		
					.(ATTACHING PARTS)		
-54	211-0007-00			2	.SCREW,MACHINE:4-40 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
-55	210-0406-00			2	.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL	73743	12161-50
					.(END ATTACHING PARTS)		
-56	407-2760-00			1	.BRACKET,CMPNT:THERMAL FUSE,AL	80009	407-2760-00
-57	----- -----			1	.RESISTOR:(SEE A1R170 REPL)		
					.(ATTACHING PARTS)		
-58	211-0623-00			1	.SCREW,MACHINE:6-32 X 2.25,PNH,STL	TK0435	ORDER BY DESCR
-59	210-0006-00			1	.WASHER,LOCK:#6 INTL,0.018 THK,STL	77900	1206-00-00-0541C
-60	210-0802-00			1	.WASHER,FLAT:0.15 ID X 0.312 OD X 0.032,STL	12327	ORDER BY DESCR
-61	210-0601-01			2	.EYELET,METALLIC:0.183 OD X 0.192 L,BRS CD .PL	80009	210-0601-01
					.(END ATTACHING PARTS)		
-62	-----			1	.RELAY:(SEE A1K270 REPL)		

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-					.(ATTACHING PARTS)		
-63	210-0054-00			4	.WASHER,LOCK:#4 SPLIT,0.025 THK STL	78189	ORDER BY DESCR
-64	211-0007-00			4	.SCREW,MACHINE:4-40 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-65	214-3321-00	B010100	B010359	1	.MASK,SOLDER:0.25 W X 1.125 L X 0.015 THK,F	80009	214-3321-00
					.IBER SHEET		
	200-2783-00	B010360		1	.COVER,RELAY:PLASTIC	80009	200-2783-00
-66	361-1111-00			2	SPACER,SLEEVE:2.513 L X 0.319 ID,AL	80009	361-1111-00
-67	386-4639-00			1	PANEL,BOTTOM:	80009	386-4639-00
					(ATTACHING PARTS)		
-68	211-0658-00			8	SCR,ASSEM WSHR:6-32 X 0.312,PNH,STL,POZ	78189	S51-060545-0X
					(END ATTACHING PARTS)		
-69	210-0202-00			1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL	86928	A-373-158-2
					(ATTACHING PARTS)		
-70	210-0408-00			1	NUT,PLAIN,HEX:6-32 X 0.312,BRS CD PL	73743	3040-402
					(END ATTACHING PARTS)		
-71	386-4687-00			1	PANEL,SWITCH:	80009	386-4687-00
-72	200-2585-00			1	COVER,HOLE:	80009	200-2585-00
-73	386-4688-00	B010100	B011049	1	PANEL,BOTTOM:	80009	386-4688-00
	334-5062-00	B011050		1	PLATE,IDENT:MKD CAUTION	80009	334-5062-00
-74	204-0832-00			3	BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	TK0861	031 1673
	210-1039-00			3	WASHER,LOCK:0.521 ID,INT,0.025 THK,SST	24931	ORDER BY DESCR
-75	200-2264-00			3	CAP,FUSEHOLDER:3AG FUSES	S3629	FEK 031 1666
	200-2265-00			2	CAP,FUSEHOLDER:5 X 20MM FUSES	TK0861	FEK 031.1663
					(OPTION A1,A2,A3,A5 ONLY)		
-76	348-0187-00			4	FOOT,CABINET:BLACK POLYURETHANE	80009	348-0187-00
					(ATTACHING PARTS)		
-77	211-0658-00			4	SCR,ASSEM WSHR:6-32 X 0.312,PNH,STL,POZ	78189	S51-060545-0X
					(END ATTACHING PARTS)		
-78	200-2331-00			1	COVER,PWR SPLY:PLASTIC	80009	200-2331-00

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-					STANDARD ACCESSORIES		
	159-0015-00			1	FUSE,CARTRIDGE:3AG,3A,250V,0.65SEC	75915	312 003
	159-0051-00			1	FUSE,CARTRIDGE:3AG,0.062A,250V,20SEC	71400	MDL 1/16
	159-0074-00			1	FUSE,CARTRIDGE:5 X 20MM,0.1A,250V,0.04 SEC (OPTION A1,A2,A3 & A5 ONLY)	75915	218.100
	159-0202-00			1	FUSE,CARTRIDGE:5 X 20MM,6.3A,250V,50MS (OPTION A1,A2,A3 & A5 ONLY)	53629	FSF 034-1524
	161-0066-00			1	CABLE ASSY,PWR,:3,18AWG,115V,98.0 L	16428	CH8481, FH8481
	161-0150-00			1	CABLE ASSY,PWR,:M3,18 AWG,6A,125V,5.0 L	TK1105	13A31,21E1FHM105
	161-0066-09			1	CABLE ASSY,PWR,:3,0.75MM SQ,220V,99.0 L (OPTION A1 EUROPEAN)	53109	B6511000
	161-0157-00			1	CABLE ASSY,PWR,:3 X 0.75MM SQ,250V,7.0 L (OPTION A1 EUROPEAN)	TK1179	ORDER BY DESCR
	161-0066-10			1	CABLE ASSY,PWR,:3,0.75MM SQ,240V,96.0 L (OPTION A2 UNITED KINGDOM)	TK1373	24230
	161-0159-00			1	CABLE ASSY,PWR,:3 X 0.75MM SQ,250V,8.0 L (OPTION A2 UNITED KINGDOM)	80009	161-0159-00
	161-0066-11			1	CABLE ASSY,PWR,:3,0.75MM,240V,96.0 L (OPTION A3 AUSTRALIAN)	53109	ORDER BY DESCR
	161-0158-00			1	CABLE ASSY,PWR,:3 X 0.75MM SQ,250V,8.0 L (OPTION A3 AUSTRALIAN)	80009	161-0158-00
	161-0154-00			1	CABLE ASSY,PWR,:3,0.75MM SQ,240V,6A,2.5M L (OPTION A5 SWITZERLAND)	53109	B6515000
	161-0160-00			1	CABLE ASSY,PWR,:3 X 0.75MM SQ,250V,8.0 L (OPTION A5 SWITZERLAND)	80009	161-0160-00
	070-3618-00			1	MANUAL,TECH:INSTRUCTION,A6901	80009	070-3618-00
	175-6176-00	B010293		1	GND LEAD,PROBE:24 AWG,3.5 L,FUSED	80009	175-6176-00

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No Effective	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr. Code	Mfr. Part No.
2-								
						OPTIONAL ACCESSORIES		
	016-0451-00					CASE,CARRYING:BLUE,VINYL	80009	016-0451-00
	161-0126-00					CABLE ASSY,PWR,:3,18 AWG,250 V,2 METER	16428	CH-9206

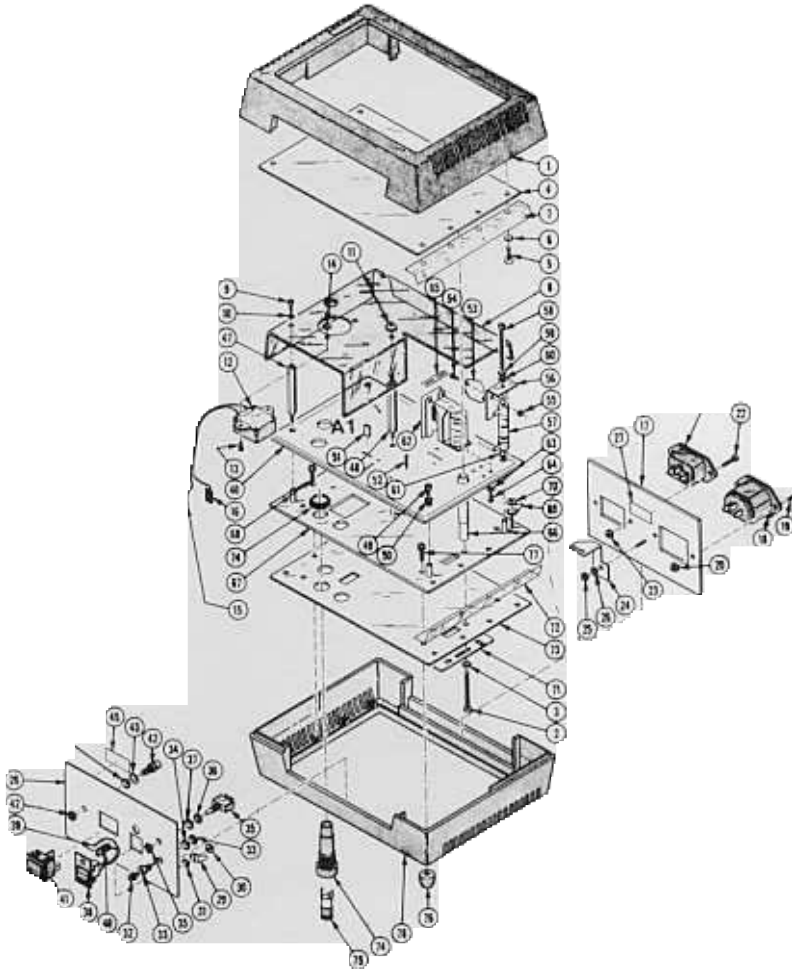
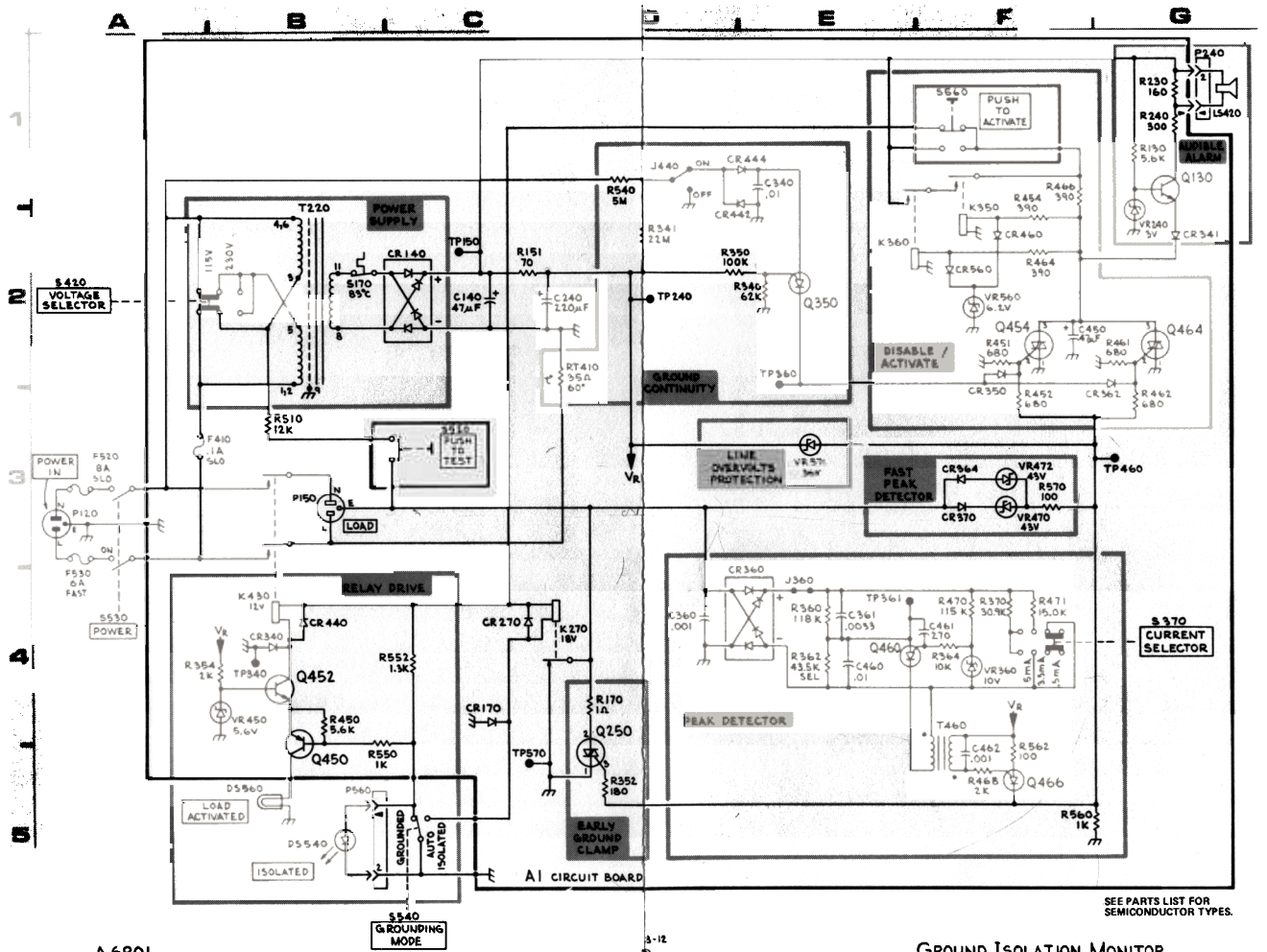


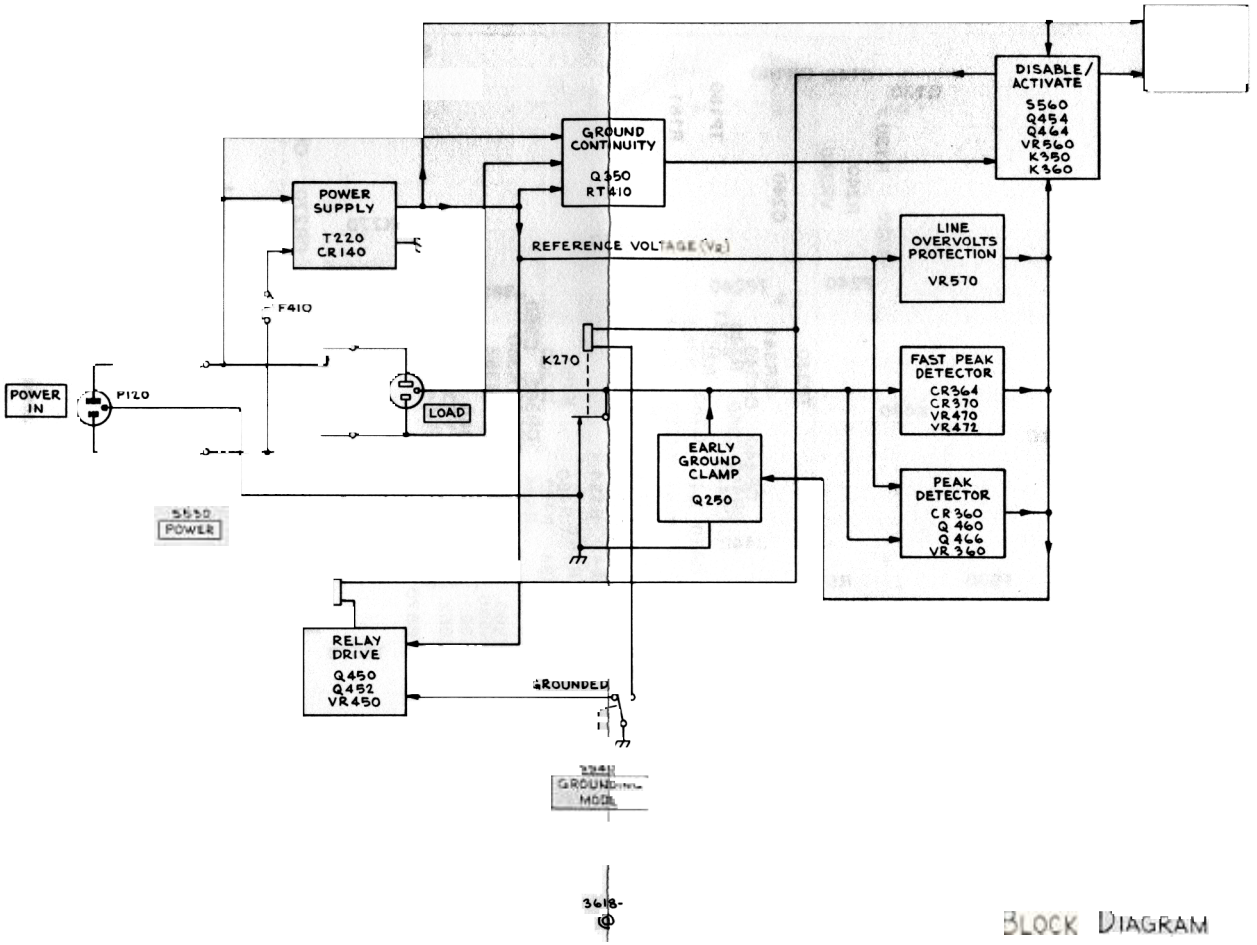
FIG. EXPLODED VIEW



A6901

3-12

GROUND ISOLATION MONITOR



3618-

BLOCK DIAGRAM

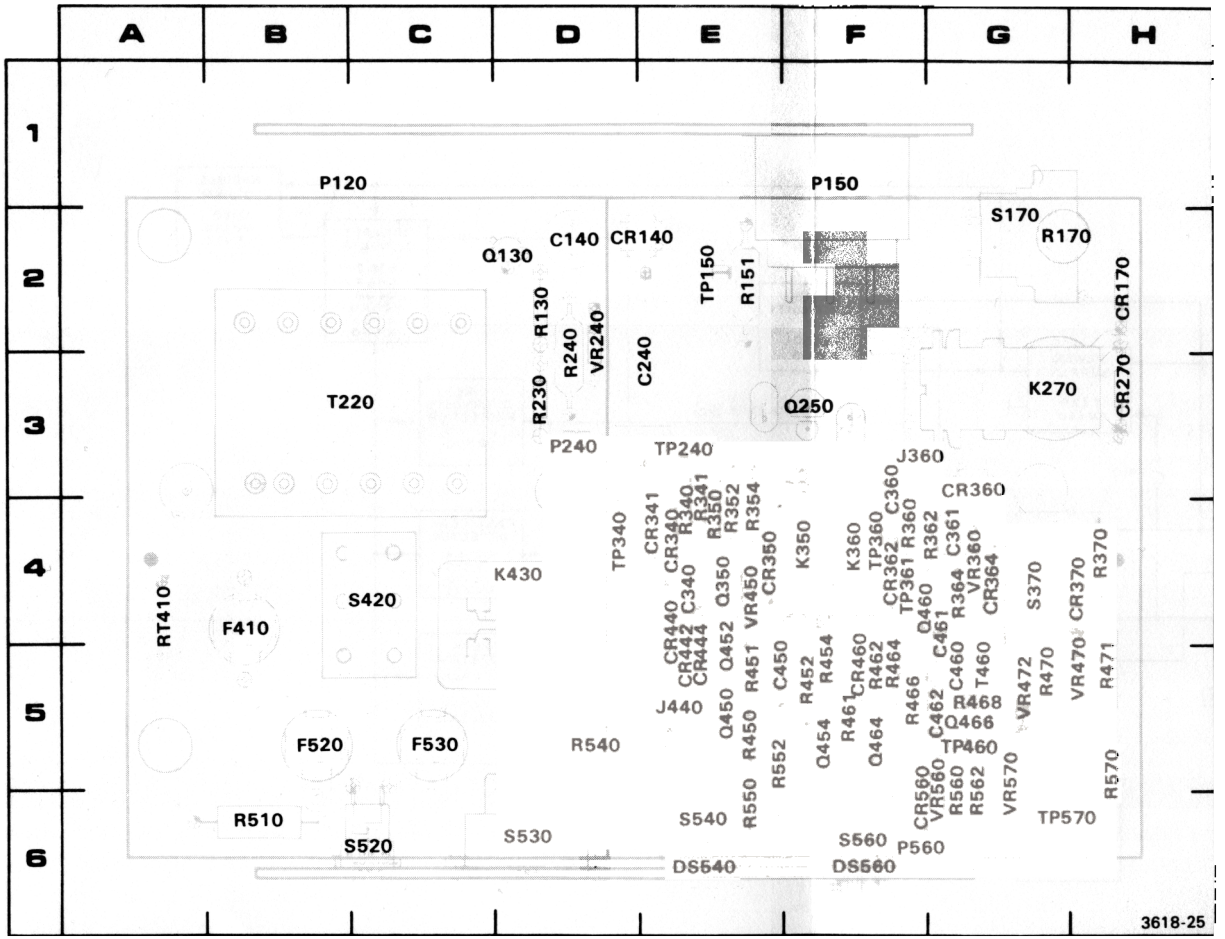
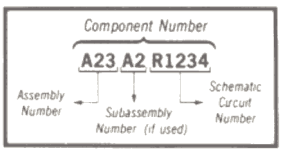


Figure 9-1. Component Locations for Instruments with Serial Numbers B010101 and Up

Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE



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

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A6901 DIAGRAM 1

ASSEMBLY A1

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C140	C2	D2
C240	C2	E3
C340	E1	E4
C360	D4	F3
C361	E4	G4
C450	G2	F5
C460	E4	G5
C461	F4	G4
C462	F5	G5
CR140	C2	E2
CR170	C4	H2
CR270	C4	H3
CR340	B4	E4
CR341	G2	E4
CR350	F2	E4
CR360	E4	G3
CR362	G3	F4
CR364	F3	G4
CR370	F3	H4
CR440	B4	E4
CR442	E2	E4
CR444	F1	E5
CR460	F2	F5
CR560	F2	F6
J360	E4	F3
J440	D1	E5
K270	D4	G3
K350	F2	F4
K360	E2	F4
K430	B4	D4
P240	G1	D3
Q130	G1	D2
Q250	D4	F3
Q350	E2	E4
Q450	B5	E5
Q452	B4	E4
Q454	F2	F5
Q460	E4	G4
Q464	G2	F5
Q466	F5	G5
R130	G1	D2
R151	C2	E2
R170	D4	G2
R230	G1	D3
R240	G1	D2
R340	E2	E4
R341	D2	E4
R350	D2	E4
R352	D5	E4
R354	B4	E4
R360	E4	F4
R362	E4	G4
R364	F4	G4
R370	F4	H4
R450	B4	E5
R451	F2	E5
R452	F3	F5
R454	F1	F5
R461	G2	F5
R462	G3	F5
R464	F2	F5
R466	F1	F5
R468	F5	G5
R470	F4	G5
R471	F4	H5
R510	B3	B6
R540	D1	D5
R550	B5	E6
R552	C4	E5
R560	F5	G5
R562	F5	G5
R570	F3	H5
RT410	D2	A4
S170	B2	G2
S370	G4	G4
S420	A2	C4
T220	B2	B3
T460	F4	G5
TP150	C2	E2
TP240	D2	E3
TP340	B4	D4
TP360	E2	F4
TP361	E4	F4
TP460	G3	G5
TP570	C5	G6
VR240	G2	D2
VR360	F4	G4
VR450	B4	E4
VR470	F3	H5
VR472	F3	G5
VR560	F2	G5
VR570	E3	G5

CHASSIS MOUNTED PARTS

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
DS540	B5	CHASSIS
DS560	B5	CHASSIS
F410	B2	CHASSIS
F520	A3	CHASSIS
F530	A4	CHASSIS
LS420	G1	CHASSIS
P120	A3	CHASSIS
P150	B3	CHASSIS
P240	G1	CHASSIS
P560	B5	CHASSIS
S520	C3	CHASSIS
S530	A4	CHASSIS
S540	C5	CHASSIS
S560	F1	CHASSIS

MANUAL CHANGE INFORMATION

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

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

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

SERVICE NOTE

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

Tektronix
COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Date: 9-3-86

Change Reference: C4/0886 REV

Product: A6901 Ground Isolation Monitor

Manual Part No.: 070-3618-00

DESCRIPTION PG 60

PERFORMANCE CHECK PROCEDURE CORRECTION

Step b of part A2 of the Performance Check, "Check Source Ground Continuity" on page 6-10, should read as follows:

b. **CHECK**----that the Source Ground Continuity indicated on the DMM is 10 Ω or less.

NOTE

The low side of the DMM is shown connected to the bottom of RT410. It should be connected to the top.