Service Manual

Tektronix

A6902B
Isolator

070-5615-03

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Warning
The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to the Safety Summary prior to performing service.

Please check for change information at the rear of this manual.

First Printing: July 1993

Instrument Serial Numbers

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

B010000	Tektronix, Inc., Beaverton, Oregon, USA
E200000	Tektronix United Kingdom, Ltd., London
J300000	Sony/Tektronix, Japan
H700000	Tektronix Holland, NV, Heerenveen, The Netherlands

Instruments manufactured for Tektronix by external vendors outside the United States are assigned a two digit alpha code to identify the country of manufacture (e.g., JP for Japan, HK for Hong Kong, IL for Israel, etc.).

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

Printed in U.S.A.

WARRANTY

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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OPERATORS SAFETY SUMMARY

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

OPERATOR

Terms in This Manual

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

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

As Marked on Equipment

WARNING—HIGH VOLTAGE or **DANGER** indicates a personal injury hazard immediately accessible as you read the marking.

CAUTION indicates either a personal injury hazard not immediately accessible as you read the marking or a hazard to property including the equipment itself.

SYMBOLS

As Marked on Equipment

DANGER — High Voltage

Protective ground (earth) terminal.

PRECAUTIONS

Power Source

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

Grounding the Product

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

Use the Proper Power Cord

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

Use only a power cord that is in good condition.

For detailed information on power cords and connectors, see Figure 2-1 in this manual.

Use the Proper Fuse

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

Do Not Operate in Explosive Atmospheres

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

Do Not Remove Covers or Panels

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

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 or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

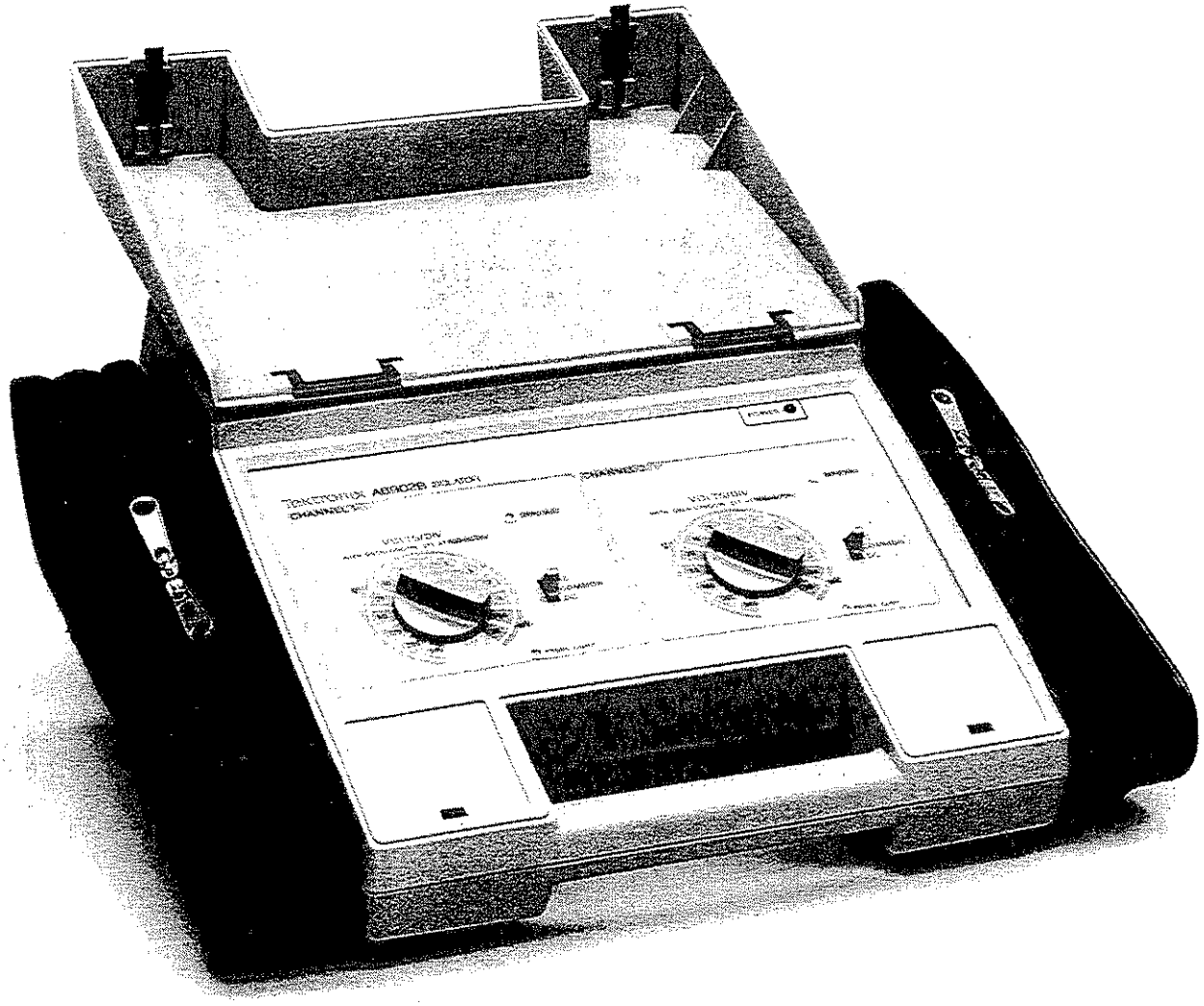
Use Care When Servicing With Power On

Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections or 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 does not apply more than 250 volts rms between the supply conductors. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.



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The A6902B Isolator.

CHARACTERISTICS

INTRODUCTION

The Tektronix A6902B Isolator is a two-channel instrument which will permit safe floating measurements of voltages up to 3000 V (dc + peak ac) above or below ground. It substitutes for the vertical amplifier of an oscilloscope when either high-voltage signals, or small signals at a high voltage level, are to be measured. These signals are isolated from the oscilloscope by a combination of optical and transformer coupling. This type of isolation, together with the all-plastic construction of the external controls, protects the operator from exposure to high voltage levels when using controls on the A6902B front panel.

Signals to be measured are applied between the A6902B input probe tip and its common lead. When using the smaller probes (supplied as standard accessories with the instrument), the maximum differential voltage between channels is 1000 V (dc + peak ac). With the larger probes (supplied with Option 2), the maximum differential voltage between channels is 6000 V (dc + peak ac).

All measurements must be made with an oscilloscope having an input impedance of 1 MΩ and less than 47 pf, and a vertical deflection factor of 100 mV per division. (If it is necessary to use a connecting cable longer than that supplied, an oscilloscope with a deflection factor of 50 mV/division may be used in conjunction with a 50 Ω termination; a gain error of up to ±10% may result from the use of this method).

The A6902B includes the following features:

- DC to 20 MHz bandwidth.
- Floating inputs that meed the requirements of UL1244, IEC 348, and CSA Electronic Bulletin No. 556B.
- Two Isolated channels that may be used at the same time, either at different points in the same circuit or on separate circuits with different reference voltages.

ACCESSORIES

The A6902B is provided with the following standard accessories:

- Two 500 V probes provided as standard accessories. These probes are easily removed and replaced with other probes (available as options) with different voltage ratings and physical configurations.
- Plastic case and controls to provide a wide margin of operator safety.
- Two removable storage pouches for probes and cables.
- Two output cables.

PERFORMANCE CONDITIONS

The electrical characteristics listed in Table 1-1 are valid under the following conditions:

- the A6902B Isolator was adjusted at an ambient temperature within ±10° C of the current ambient temperature,
- the ambient temperature is between 10° C and 40° C,
- the Isolator has been warmed up for 30 minutes.

Table 1-1: Warranted Electrical Characteristics		
Characteristic	**Minimum Standards**	**Supplemental Information**
Deflection factor		
Sensitivity	20 mV/div to 500 V/div in a 1, 2, 5 sequence with the oscilloscope set to 100 mV/div.	
Accuracy	±5% of indicated volts/div switch setting.	±0.1%/°C deviation from 25° C
Maximum working voltage [a]		
Large probe (3000 V UL)		
Probe center tip to earth ground	3000 V (dc + peak ac), UL [b]	
Probe center tip to probe common (DC)	3000 V (dc + peak ac), to 450 kHz, UL [b]	For above 450 kHz, see figure 1-1. With AC/COMMON/DC switch in DC.
Probe common to earth ground	3000 V (dc + peak ac), to 250 kHz, UL [b]	For above 250 kHz, see figure 1-2.
Small probe (500 V)		
Probe center tip to earth ground	500 V (dc + peak ac)	
Probe center tip to probe common	500 V (dc + peak ac), to 3 MHz	For above 3 MHz, see figure 1-1.
Probe common to earth ground	500 V (dc + peak ac), to 6 MHz	For above 250 kHz, see figure 1-2.
Channel isolation [a]		
Maximum voltage		
Two 3000 V probes	6000 V (dc + peak ac), UL [b]	
Two 500 V probes	1000 V (dc + peak ac)	
Bandwidth, −3 dB		
DC coupled	DC to ≥20 MHz	50 V to 500 V not specified
AC coupled	≤5 Hz to ≥20 MHz	50 V to 500 V not specified
Rise time	≤17.5 ns	Calculated from bandwidth 50 V to 500 V not specified
Delay difference between channels	≤4 ns	

[a] *Performance Verification Procedure not included in service manual.*

[b] *U.S. version UL Listed only.*

Table 1-2: Typical Electrical Characteristics		
Characteristic	**Typical Standards**	**Supplemental Information**
Aberrations		
20 mV/div to 1 V/div	±5%, ±8% p-p ±0.3%/°C from 25° C	100 V·ns maximum $^{dv}/_{dt}$
5 V/div to 10 V/div	±8%, ±12% p-p ±0.3%/°C from 25° C	
20 V/div	±10%, ±14% p-p ±0.3%/°C from 25° C	
Input impedance (with probe)		
Resistance	10 MΩ	
Nominal capacitance		
Large probe	19 pF	
Small probe	19 pF	
Output impedance	50 Ω	Output cable not 50 Ω terminated; calibrated on a 1 MΩ oscilloscope input.
Common-mode capacitance	<100 pF typical from probe common to earth ground.	
Overdrive recovery	≤0.5 µs to recover to within one division of initial location after removing overdrive signal. The overdrive signal may be the equivalent of up to ±25 divisions regardless of duration.	
Channel delay	52 ns typical delay from probe tip to output BNC (when used with an oscilloscope having a 1 MΩ input resistance with up to 47 pF input capacitance, using 72" output cables, and when both probes are the same type and properly compensated).	
Common-lead signal feedthrough	−106 dB (DC to 500 Hz) from probe input to output BNC when used with an oscilloscope having an input impedance of 1 MΩ input with up to 47 pF capacitance.	Above 100 Hz, refer to figure 1-3. Measured with volt/div switch set to 20 mV, and AC/COMMON/DC switch in COMMON position.
Line voltage ranges (rms)		
Low	90 V to 132 V	
High	180 V to 250 V	
Line frequency range	50 Hz to 60 Hz	
Power consumption	20 watts at 115 V, 60 Hz	

Table 1-3: Warranted Environmental Characteristics		
Characteristic	**Minimum Standards**	**Supplemental Information**
Temperature		
Operating	+10° C to +40° C, nominal	Probe compensation and DC zero are accurate only within ±10° C of adjustment temperature.
Nonoperating (storage)	–55° C to +75° C	
Altitude		
Operating	to 4.5 km (15,000 ft)	
Nonoperating (storage)	to 15 km (50,000 ft)	
Humidity (operating and nonoperating)	Five cycles (120 hour total) with equipment tested nonoperating at 90% to 95% relative humidity at 30° C to 60° C.	MIL-STD-810C, method 507.1
Vibration (operating)	0.64 mm (0.025 in) p-p, 10 to 55 Hz sine wave.	Total test time: 75 minutes
Shock	50 g, half-sine, 11 ms duration	Total shocks: 18
Bench handling	Will withstand a drop from approximately 100 mm (3.9 in) at an angle of 45°.	
Transportation		
Vibration	25 mm (1 in) at 270 vpm	
Drop	Package will withstand10 drops from a height of 1 m (3.3 ft).	

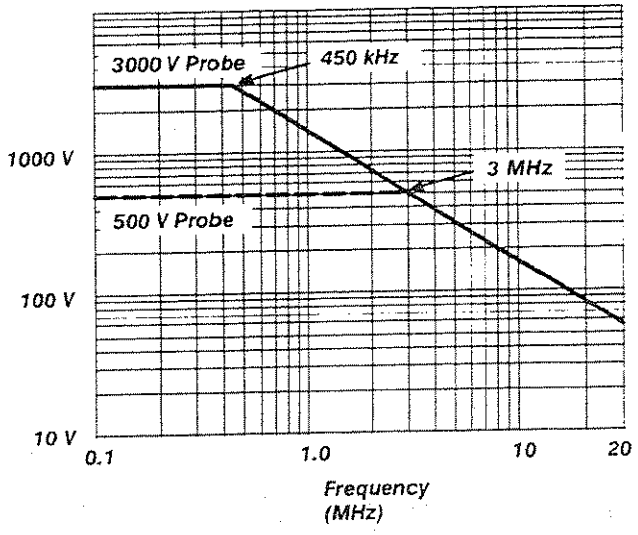


Figure 1-1: Maximum working voltage between probe input and probe common (all temperature).

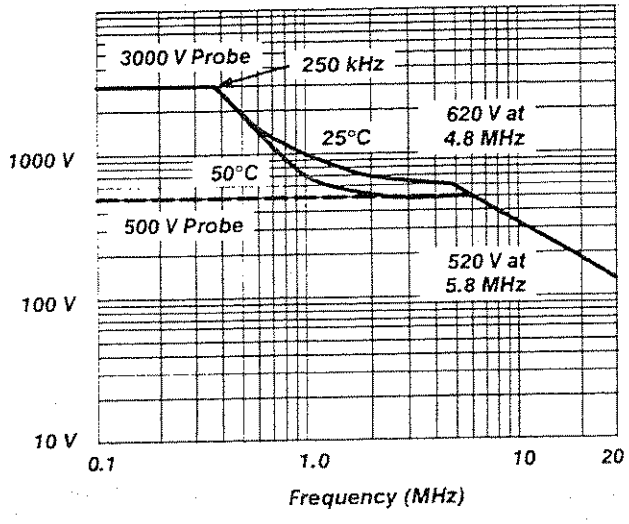


Figure 1-2: Maximum working voltage between probe common and earth ground.

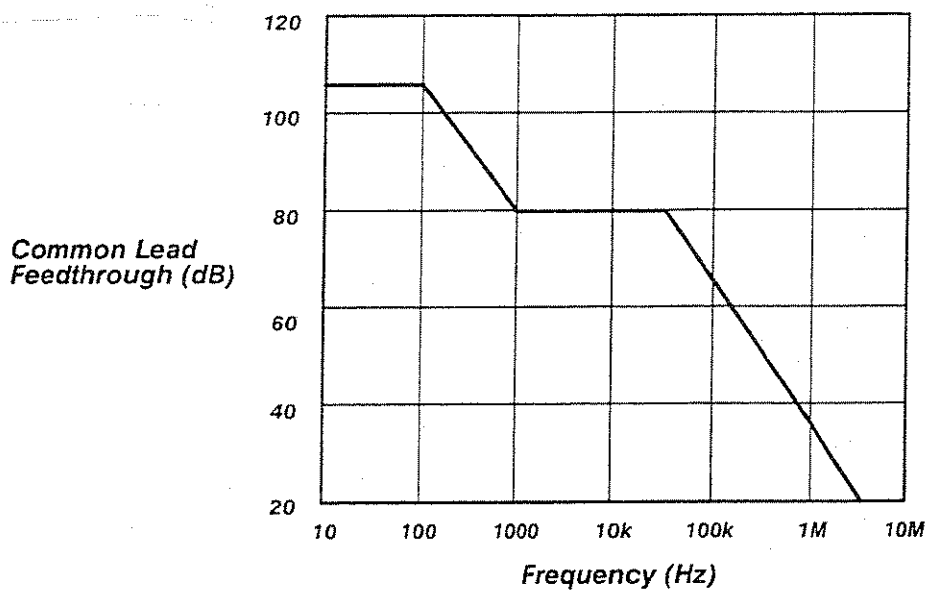


Figure 1-3: Common-lead feedthrough characteristics

Table 1-4: Physical Characteristics

Characteristic	Values	
Weight with accessories	6.2 kg	(13.7 lb)
Shipping weight	8.0 kg	(17.7 lb)
Dimensions (see figure 1-4)		
Large probes (3000 V)		
Cable length	1.7 m	(5.5 ft)
Head length	200 mm	(7.9 in)
Common lead length	300 mm	(11.8 in)
Small probes (500 V)		
Cable length	2.0 m	(6.6 ft)
Head length	64 mm	(2.5 in)
Common lead length	300 mm	(11.8 in)
Power cable length	3.0 m	(9.8 ft)
Output cable lead length	1.8 m	(6.0 ft)

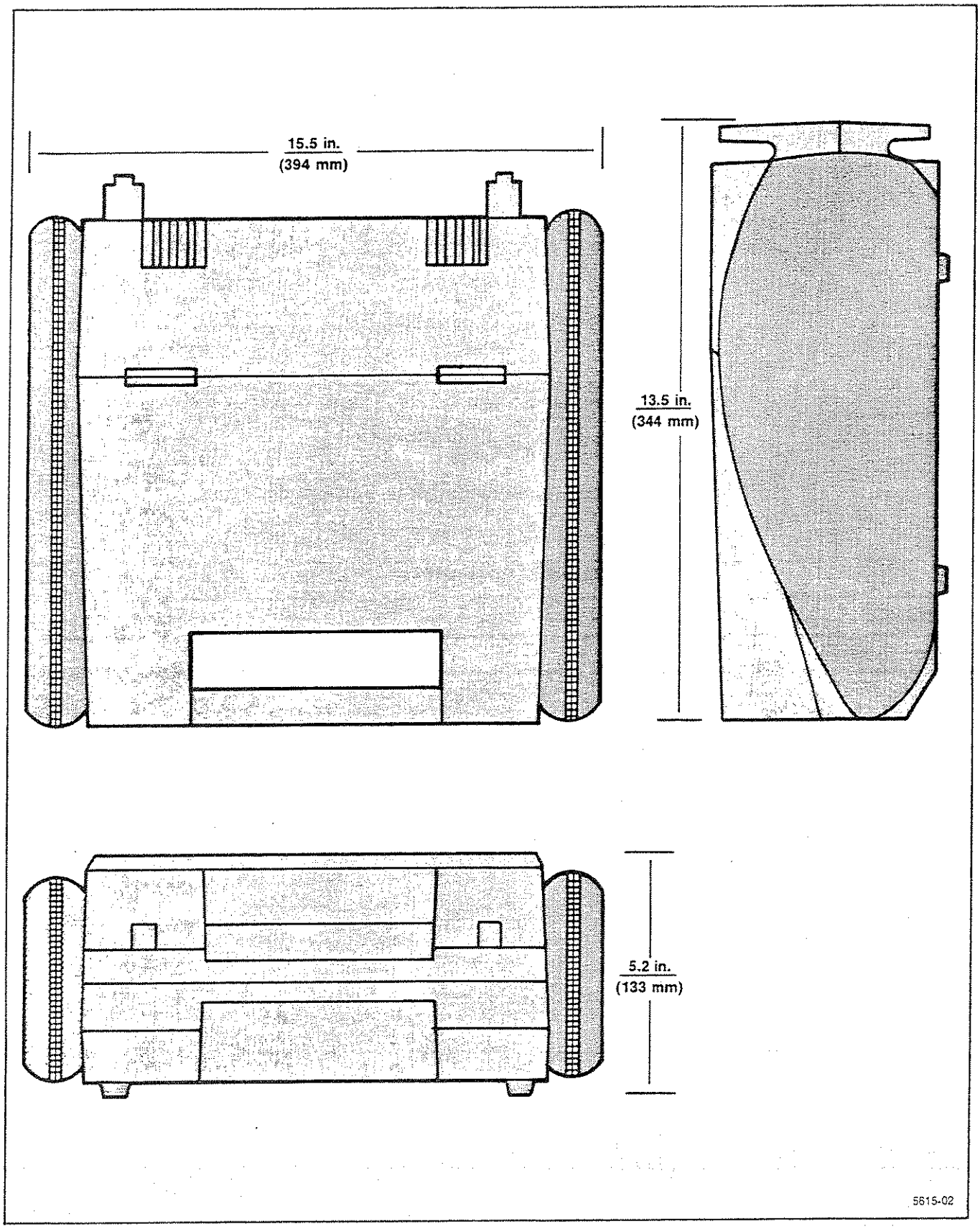


Figure 1-4: A6902B dimensional drawing

OPERATING INSTRUCTIONS

This section of the manual provides information on installation and power requirements. The functions of the controls, connectors, and indicators are also described.

PREPARATION FOR USE

INSTALLATION

Installation of the A6902B consists of verifying the proper power cord, performing the "Line Voltage Selection" procedure, connecting the input probe(s) to the circuit under test, and connecting the output BNC connector(s) to an oscilloscope.

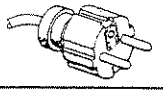
POWER CORDS

The A6902B has a detachable three-wire power cord with a three-terminal, polarized plug for connection to a power source. The grounding terminal of the plug is connected directly to the instrument frame as recommended by national and international safety codes. For electrical shock protection, this plug should only be inserted into a power-source socket that had a securely grounded protective ground contact. Qualified service personnel should verify the protective-ground system.

The power cord is detachable and when not in use should be wrapped around the cord storage lugs on the bottom of the A6902B. Instruments are factory equipped with a standard 120-V power cord unless otherwise ordered. Other power cords that can be used with the A6902B are shown in Figure 2-1. Part numbers for the power cords are listed in "Accessories" (Section 6). For more information on power cords, contact your Tektronix representative or your local Tektronix Field Office.

POWER REQUIREMENTS

The A6902B is designed to be used with a three-wire ac power system. It operates from either a 120-V or a 240-V nominal power source from 48 to 440 Hz. Before connecting the instrument to a power source, verify that the Line Voltage Selector is set for the line voltage being used, that the proper fuse is installed, and that the line cord matches the power source to be used. This procedure is described in the next paragraph and must be performed before operating the A6902B. Refer to the Safety Summary in the front of this manual for power source, grounding, and other safety considerations pertaining to the use of this instrument.

Plug Configuration	Usage	Line Voltage	Reference Standards	Option Number
	North American 120V/ 15A	120V	ANSI C73.11 NEMA 5-15-P IEC 83	Standard
	Universal Euro 240V/ 10-16A	240V	CEE (7),II,IV,VII IEC 83	A1
	UK 240V/ 13A	240V	BS 1363 IEC 83	A2
	Australian 240V/ 10A	240V	AS C112	A3
	North American 240V/ 15A	240V	ANSI C73.20 NEMA 6-15-P IEC 83	A4
	Switzerland 220V/ 6A	220V	SEV	A5

Abbreviations:
ANSI — American National Standards Institute
AS — Standards Association of Australia
BS — British Standards Institution
CEE — International Commission on Rules for the Approval of Electrical Equipment
IEC — International Electrotechnical Commission
NEMA — National Electrical Manufacturer's Association
SEV — Schweizevischer Elektrotechischer Verein

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Figure 2-1. Optional power cords and plugs.

LINE VOLTAGE SELECTION

CAUTION

This instrument may be damaged if operated with the Line Voltage Selection switch set for the wrong voltage or if the wrong line fuse is used.

The power-input module located on the rear panel of the instrument houses a Line Voltage Selector, two linefuses and a power cord connector. The present line voltage setting is indicated on the selector. The range in line voltage covered by each position is given in Table 2-1. If it

is necessary to convert the instrument for operation with a different line voltage, perform the following procedure (refer to Figure 2-2).

1. Ensure that the power cord is disconnected form both the power sorce and the instrument and that both of the input probes and their common leads are disconnected from any electrical source.

2. Using a flat-bladed screwdriver, pry out the Line Voltage Selector. (Refer to Figure 2-2.)

3. From Table 2-1, determine the range for your average line voltage. Opposite that range, read the correct Line Voltage Selector position.

NOTE

Fuses for both line-voltage settings are installed in the Line Voltage Selector when the instrument is shipped. When the Selector is rotated to the desired setting, the proper fuse is automatically installed in the circuit. Confirm that both fuses are installed in the Selector.

Table 2-1

Line Voltage Ranges

Line Voltage Range	Voltage Selector Switch Setting	Fuse Size
90 to 132 V	110 - 120	0.3A, 250V 3AG, SLOW
180 to 250 V	220 - 240	0.15A, 250V 3AG, SLOW

4. Rotate the Line Voltage Selector so the proper range lines up with the indicator on the frame of the power-input module (refer to Figure 2-2), and insert it back into the module.

WARNING

This instrument is designed for operation from a power-input source with its neutral at or very near earth (ground) potential with a separate safety-earth conductor.

5. Verify that your power cord matches the power source being used (see Figure 2-1).

6. Confirm that the POWER switch is set to OFF and connect the receptacle end of the power cord to the power-input module.

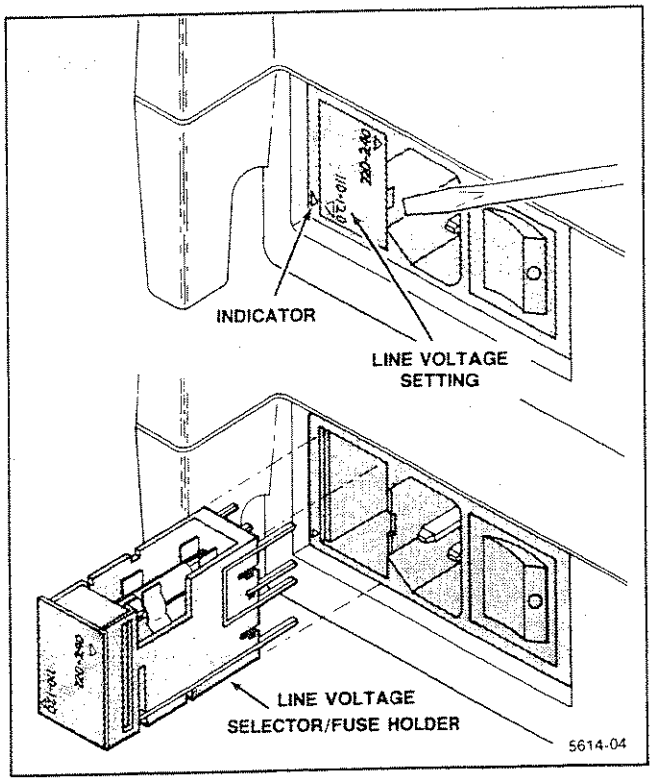


Figure 2-2. Fuse holder/line voltage selector.

CONNECTING THE A6902B ISOLATOR

WARNING

Before connecting any A6902B input probe(s) to a circuit under test, ensure that the Maximum Working Voltage limits and the Channel Isolation Maximum Voltage limits will not exceed those values listed in the Specification (Table 1-1).

Figure 2-3 shows an example of how to connect an A6902B input probe. Although this illustration shows the 3000-V probe, it is equally applicable for any A6902B probe.

The common lead of the probe should always be connected to the lowest impedance point (usually circuit common) in the circuit under test (relative to the probe tip) to obtain the most accurate waveform.

Whenever the type of input probe is changed (for example, changing from the 3000-V probe to the 500-V probe), a compensation adjustment must be made. Refer to the "Gain and Probe Compensation" procedure in "Operators Checks and Adjustments."

Figure 2-4 shows how the output BNC connectors are connected to an oscilloscope using the coaxial cables.

NOTE

If both outputs of the A6902B are to be used at the same time, both cables should be the same length and impedance. Cable length should not exceed two meters and should be of 50-Ω impedance. Do not use any termination with the cables.

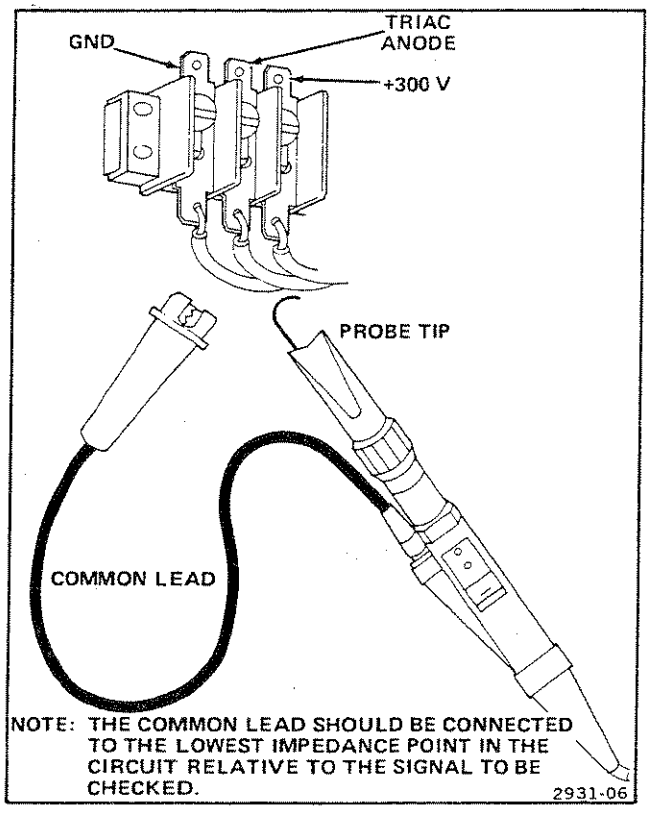


Figure 2-3. Example of connecting an input probe.

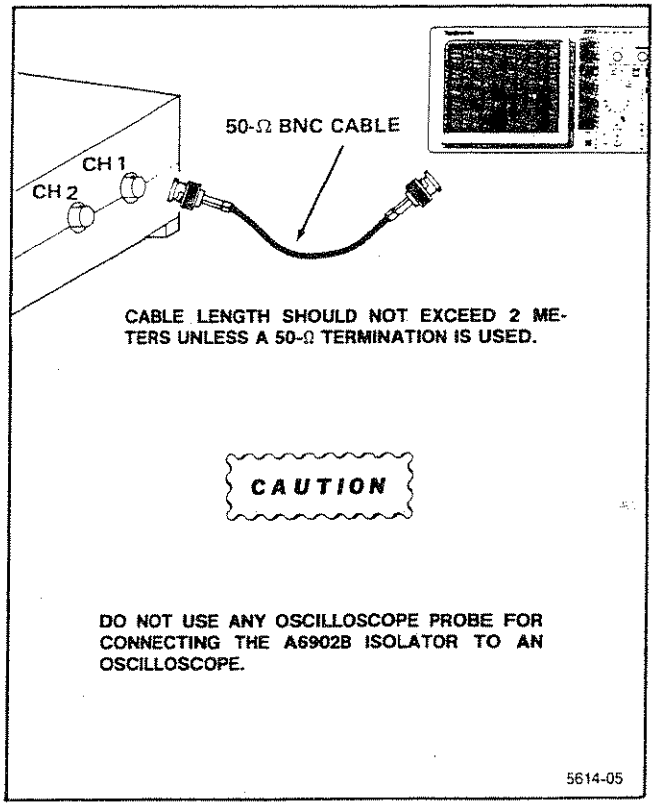


Figure 2-4. Connecting the A6902B outputs to an oscilloscope.

CONTROLS, CONNECTORS AND INDICATORS

FRONT PANEL

Refer to Figure 2-5 for the location of items 1 through 5.

NOTE

Only CHANNEL 2 controls (items 2 through 5) and the POWER indicator (item 1) are shown. CHANNEL 1 controls are identical to CHANNEL 2.

(1) **POWER** indicator is on whenever the Isolator is energized.

(2) **VOLTS/DIV** switches establish the sensitivity of the oscilloscope/Isolator system. The sensitivity is adjustable from 20 mV/division to 500 V/division in a 1, 2, and 5 sequence.

(3) **ZERO ADJ** controls are used for adjusting the output dc level to zero volts with zero volts input to the A6902B.

(4) **AC-COMMON-DC** switches select the coupling between the input probe and the input stage of the Isolator. In DC, the input is directly coupled; in AC the input is connected to the isolator through a capacitor; and in COMMON the input is connected to the electronic circuitry Common terminal within the Isolator. (COMMON is comparable to the GND position on a conventional oscilloscope. It connects the input to a reference level so the operator can set the position control).

(5) **PROBE COMP** controls are used to compensate the input stages of the Isolator when the input probes are changed.

REAR PANEL

Refer to Figure 2-6 for the location of items 6 through 9.

(6) **POWER SWITCH** controls application of ac power to the Isolator. An indicator light on the front panel is actuated when the power switch is in its "on" position (1).

(7) **POWER CONNECTOR/VOLTAGE SELECTOR** allows the connection of the ac power cord to the Isolator. The connector is an IEC connector, and includes the Voltage Selector/Indicator for alternative line voltage, (fully discussed in the "Preparation For Use" section of this manual.)

(8) **OUTPUT VOLTAGE** connectors make available the output of Isolator Channels 1 and 2.

(9) **CAUTION** label provides fuse replacement and line voltage information.

(10) **EARTH-GROUND CONNECTION** is a standard banana-plug connector attached to the Isolator chassis ground.

BOTTOM PANEL

(11) **CAUTION** label warns operators not to open the A6902B case.

Refer to Figure 2-6 for the location of item 11.

Refer to Figure 2-6 for the location of items 6 through 10. **CAUTION** label warns operators not to open the A6902B case.

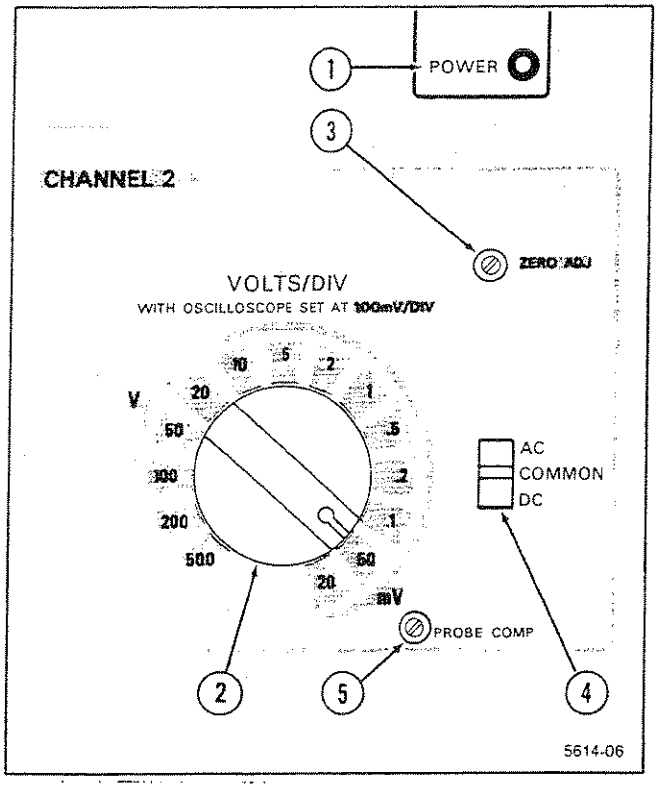


Figure 2-5. Front-panel controls and indicator.

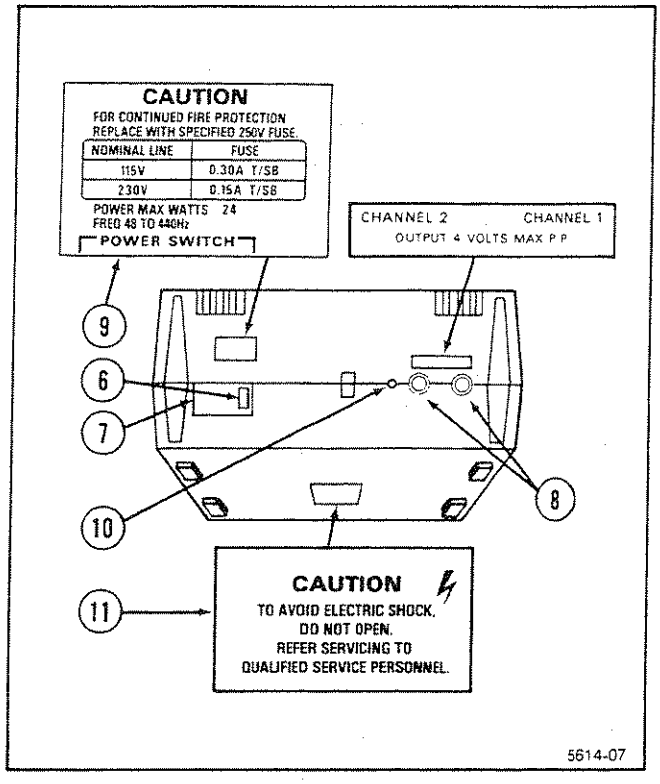


Figure 2-6. Rear- and bottom-panel controls, connectors, and labels.

INPUT PROBES

SETTING PROBE-TIP ANGLES

The angle of the 500-V probe tip is continuously variable and may be rotated to any desired position.

The angle of the 3000-V probe tip may be rotated in 90° increments, if necessary, to make it easier to attach the probe to the circuit under test. To change the probe tip angle, refer to Figure 2-7 and perform the following steps:

1. Hold the probe with one hand, placing your forefinger and thumb behind the slide to maintain the slide in the forward position.

2. Loosen the collar by rotating it in the direction shown until it disengages from the probe body.

3. While holding the probe tip, pull back on the slide until the indexing guides on the shaft of the probe tip disengage from the guide slots in the probe body (approximately one-fourth inch).

4. Rotate the probe tip to the desired position (0°, 90°, 180°, or 270°).

5. Move the slide forward to the position shown Figure 2-7 and verify that there is approximately one-eighth inch clearance between the indexing guides on the shaft of the probe tip and the threaded portion of the probe body. If necessary, loosen the probe tip to achieve the correct clearance.

6. Thread the collar onto the probe body until the collar is snugly seated.

7. The probe is now ready to be used.

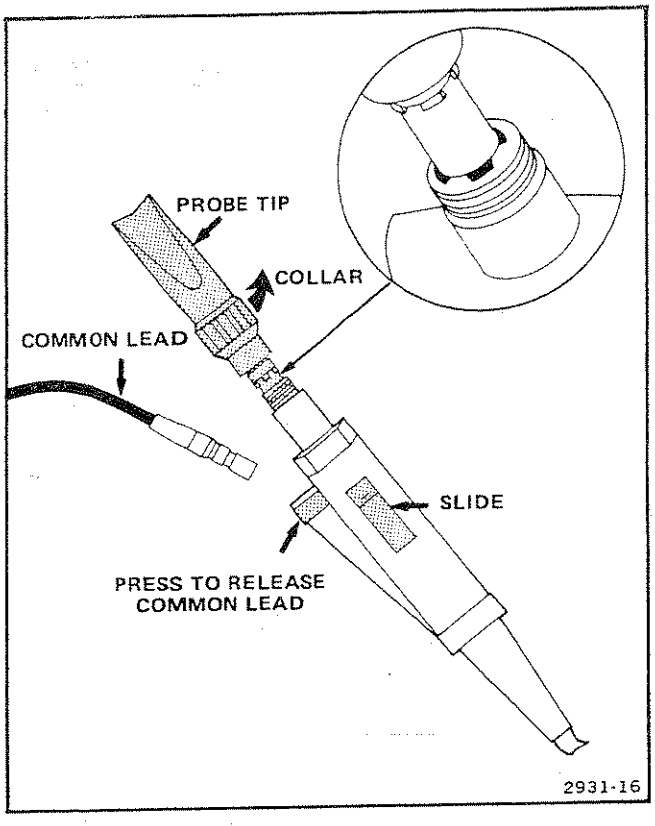


Figure 2-7. Setting the 3000-V probe tip angle and replacing the common lead.

CHANGING INPUT PROBES

The input probes are attached to the instrument via coaxial connectors located inside the zippered pouch. To remove an input probe, grasp each connector (one attached to the probe cable and one attached to the instrument cable) and carefully disconnect them by pulling apart. To install another input probe (either 500-V or 3000-V as required), align the two connectors and press them together until they snap into place and are firmly seated.

Whenever an input probe is changed, the PROBE COMP control must be adjusted. For these instructions, refer to the "Gain Check and Probe Compensation" procedure in the "Operator's Checks and Adjustments" part of this section.

To replace the common lead on the 3000-V Probe, press and hold the release point shown in Figure 2-7. Pull the lead out of the probe body and remove pressure from the release point. Install the new common lead by pushing the lead end into the probe body until an audible click is heard.

REPLACING COMMON LEADS

To replace the common lead on the 500-V Probe, grasp the end closest to the probe and pull straight away from the probe body. Install the new common lead by inserting the round end into the connector on the probe body.

REPLACING THE 3000-V PROBE TIP

To replace the 3000-V Probe tip with a new one, refer to Figure 2-8 and perform the following steps:

1. Loosen the collar by rotating it in the direction shown until it disengages from the probe body.

2. Retract the slide to the position shown in Figure 2-8. The slide will stay in this position, and the spring inside the probe tip should cause the probe tip to return to its original position. If this does not occur, hold the slide in the retracted position and pull the probe tip away from the probe body until it reaches its original position.

3. Hold the probe body with one hand and rotate the probe tip in the direction shown until the probe tip completely disengages from the probe body.

4. To install a new probe tip, hold the probe body with the slide in the retracted position and insert the new probe tip into the probe body as far as it will easily go.

5. Thread the probe tip into the probe body until it seats snugly.
6. Move the slide forward and verify that there is approximately one-eight inch clearance between the indexing guides on the shaft and the threaded portion of the probe body. If necessary, loosen the probe tip to achieve the correct clearance.
7. While holding the slide in the forward position, align the indexing guides with the guide slots in the probe body for the desired probe tip angle. Press the probe tip into the probe body until the indexing guides completely engage the guide slots.
8. Thread the collar onto the probe body until the collar is snugly seated.
9. The probe is now ready for use.

REMOVING THE SIDE POUCHES

Where space is a consideration, (such as installing the A6902B on a scope cart) the side pouches may be removed.

To remove the side pouches, first follow the procedure given in "Changing Input Probes" to remove the probes. The pouches may then be removed by unsnapping the four snaps holding them on the side of the instrument. The probes should then be reinstalled on their original channel inputs to avoid the need to readjust PROBE COMP.

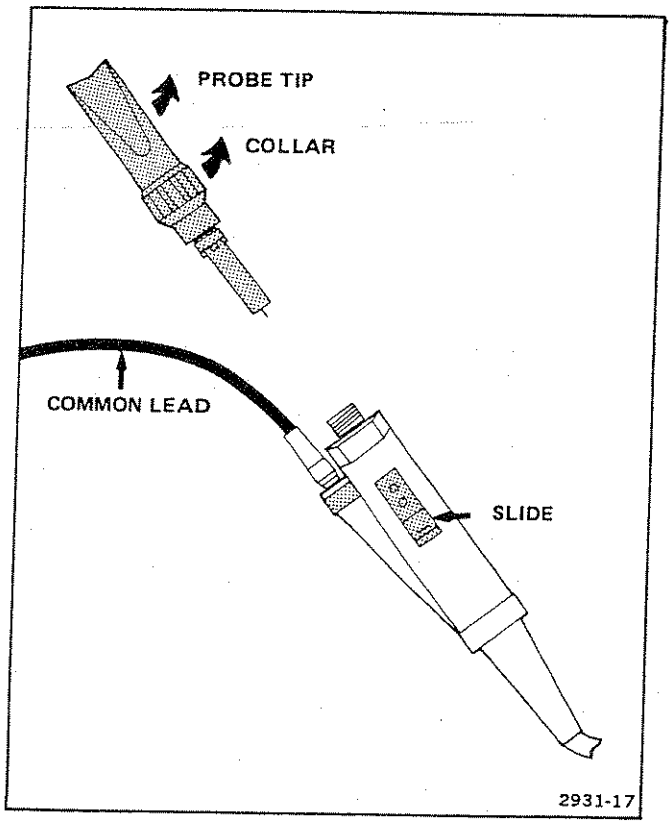


Figure 2-8. Replacing the 3000-V probe tip.

OPERATOR'S CHECKS AND ADJUSTMENTS

INTRODUCTION

By using the calibrator of an oscilloscope, the gain and probe compensation of each channel can be checked, and the probe compensation may be adjusted if necessary.

EQUIPMENT REQUIRED

In addition to the Isolator and its standard accessories, the only other equipment necessary to make these checks is an oscilloscope with a vertical deflection of 100 mV/division, an input impedance of 1 MΩ, an input capacitance of less than 47 pF, and a frequency response from dc to 100 MHz (for example, the TEKTRONIX 2235).

NOTE

An oscilloscope with a deflection factor of 50 mV/division may also be used in conjunction with a 50-Ω termination.

Detailed instructions for operating test equipment are not provided in this procedure. Refer to the appropriate test equipment instruction manual if more information is needed.

GAIN CHECK AND PROBE COMPENSATION

1. Ensure that the "Line Voltage Selection" procedure has been performed.

2. Connect the A6902B to the power input source, press the POWER SWITCH to ON, and allow 30 minutes for the A6902B to stabilize.

3. Set the A6902B CHANNEL 1 AC-COMMON- DC switch to COMMON and the CHANNEL 1 VOLTS/DIV switch to 0.1 V.

4. Set the oscilloscope controls as follows:

VOLTS/DIV	.1 V
AC-GND-DC	DC
Vertical	Channel 1
Triggering Mode	Auto
Coupling	DC
Source	Channel 1
Slope	+
Level	Midrange
POWER	On

5. Connect the PROBE ADJUST output to the oscilloscope Channel 1 input and set the oscilloscope Channel 1 Volts/Division variable for exactly 5 divisions.

6. Remove the connection between the PROBE ADJUST output and Channel 1, and center the trace vertically using the Position control.

7. Connect the A6902B CHANNEL 1 output BNC connector to the oscilloscope Channel 1 input BNC connector using the 50-Ω cable.

8. Use the A6902B OUTPUT DC LEVEL control to position the oscilloscope trace on the center graticule line.

9. Set the A6902B AC-COMMON-DC switch to DC.

10. Connect the A6902B CHANNEL 1 input probe tip to the oscilloscope PROBE ADJUST output and connect the common lead clip to the oscilloscope ground.

11. Adjust the PROBE COMP control for the best flat-top square-wave.

12. CHECK - That the oscilloscope display is 5 major divisions ± 2.5 minor divisions (± 5%) at approximately 1 kHz.

NOTE

This display is based on the PROBE ADJUST output of the TEKTRONIX 2235 Oscilloscope (500 mV at approximately 1 kHz) with the A6902B VOLTS/DIV control set for 0.1 V/DIV. If a different calibrator output voltage is used, set the controls to maintain the same input/output ratio and measure for ±5% accuracy.

13. Repeat parts 3 through 12 for CHANNEL 2 of the A6902B.

THEORY OF OPERATION

This section of the manual contains a functional description of the circuitry used in the A6902B Isolator. It is divided into two parts: General System Description and Detailed Circuit Description. A block diagram is included in the General System Description Section. Detailed schematics are located in the tabbed "Diagrams" section at the rear of this manual.

Both channels of the A6902B are identical in operation and are electrically isolated from earth ground and from each other. In the following discussion, any references to the operation of Channel 1 also apply to Channel 2.

GENERAL SYSTEM DESCRIPTION

Please refer to the block diagram (Figure 3-1). The A6902B consists of two separate amplifiers and a power supply. The block diagram shows one of these amplifiers and the power supply. The other amplifier is identical to the one shown. Each amplifier is divided by an Isolation Barrier which electrically isolates the Isolator inputs and input circuitry from the rest of the instrument. The power supply has three separate dc-outputs. Linear three-terminal regulators supply the cicuitry on the output side of the Isolation Barrier. A switch-mode power supply generates isolated supply voltages for the input side of the two separate Channels.

Each amplifier consists of a Preamplifier and a Main Amplifier. The Preamplifier amplifies the signal from the Input Probes and feeds it to the Main Amplifier. The Preamplifier also contains the Attenuators and circuitry which compensates for minor electrical differences in the input probes. The preamplifier splits the signal into a low-frequency path and a high-frequency path. The low-frequency signal goes through a LF Driver to the Opto-Isolator where it crosses the Isolation Barrier. The high-frequency signal goes through an HF Buffer, HF Driver, and Group Envelope Delay (where its delay is matched to that of the low-frequency signal), to the HF Transformer where it crosses the Isolation Barrier. On the other side of the Isolation Barrier, the low-frequency signal goes through the LF Receiver to the Output Mixer, where it joins up with the high-frequency signal. At this point, a common-mode error signal from the common on the input side of the Isolation Barrier is subtracted from the combined signal to improve the common-mode rejection ratio. The combined signal is then fed to the output through the Output Filter.

DETAILED CIRCUIT DESCRIPTION

INTRODUCTION

The following discussion provides a detailed description of the A6902B Isolator circuitry. While reading this section, refer to the schematics in the "Diagrams" section at the rear of this manual. Channel 2 is identical to Channel 1 unless noted. Channel 1 is described. Unless noted on the schematic, Channel 2 circuit designator numbers on the main board are 0500 higher than the corresponding circuit numbers for Channel 1. The Preamplifier boards for both channels are identical and have identical circuit designator numbers.

PREAMPLIFIER

For the following discussion, refer to Figure 3-1 (block diagram) and Diagram 3 (Preamplifier schematic).

Input Probes

The Input Probes (3000 V and 500 V) are passive 10X probes that are detachable from the A6902B. The 3000-V probe is of heavy-duty construction for use in high-voltage circuits. The 500-V Probe is similar to conventional oscilloscope probes. Both probes attenuate the input signal by 10X and provide low circuit loading.

AC/DC/COMMON Switch

The input signal is ac-coupled to the attenuator through capacitor C4049. In the DC position, the input is dc-coupled by resistor R2045. In the COMMON position, the input is connected to the floating ground. R1040 and R1041 limit the current for C4049 and the input FET and associated diode protection. R1041 controls high-frequency peaking.

Input Attenuator and Input Compensation

The input attenuator provides signal division by 10, 100, 1000, and 10,000 by way of four hybrids. C1040, C1041, C2040, C2041, C2048, C2049 and C3040 control "front corner" compensation. C4040 is adjusted for flat response for the probe in use.

FET Input

The FET input stage (Q2010 A & B, R2010, R2011, and R2012), provide a unity-gain, high-impedance buffer. Q2010B provides a constant-current load to Q2010A. R2011 adjusts the constant-current load for zero volts output when the input is zero volts.

Buffer and 1, 2, 5 Attenuator

U4020 A & B is a differential amplifier with U4020C providing a constant-current load. U4020A and U4020D is an emitter follower having a direct output to the 1, 2, and 5 attenuator, and an output divided by R4021 and R4023 feedback to the negative input of the differential amplifier. R1025 and C1025 compensate the amplifier for high frequencies. Buffer U4020 may be viewed as an operational amplifier with the negative input connected to the output through R4021 and to ground through R4023. The buffer gain would then be 1 + R4021/R4023 or approximately 5.5. However, since the voltage gain of U4020 is not infinite, the actual amplification of the buffer is approximately 4.

The 1, 2, and 5 attenuator (R1027, R1026, and R2019) divides the buffer output signal by factors of 1, 2, or 5.

AMPLIFIER (CHANNEL 1)

For the following discussion, refer to Figure 3-1 (Block Diagram) and Diagram 1 (Main Board, Channel 1 schematic).

LF Driver and Opto-Isolator

The signal from the preamp board is amplified by U2121B (gain approximately 4), and coupled to the opto-isolators U2147 and U2153 through U2121A and Q2230 (gain approximately 1). U2147 provides low-frequency and thermal feedback to U2121A. R2130/2131 and R2156/2159 provide dc loads for the opto-isolator transistors. R2130 is adjusted to set U2121A output to zero volts with no signal applied and R2339 output level control centered. R2156 zeros the isolator output at J2190.

LF Receiver, Output Mixer, and Common Mode Adjust

U2165A amplifies the signal (gain approximately 3) from the opto-isolator U2153. C2164 limits the lf-bandwidth to approximately 2.5 kHz. C2149 and C2159 form a voltage divider for ground difference signals, and with R2070 and R2071, allow for difference signal cancellation in U2170. U2165B is a unity-gain inverter. The outputs from U2165 are divided (gain approximately 1/200) by R2173 and R2175, and by R2172 and R2174 and coupled to the input of U2170.

HF Buffer, HF Driver, and HF Group Envelope Delay

U2221 provides a gain of 5 and a differential output to HF Driver Q2337 and Q2338. The HF Driver couples the signal to the HF Transformer T2160 (gain approximately 1/400) through the HF Group Envelope Delay (L2349, R2243 and R2242). The Group Envelope Delay elements provide a low-Q bandpass filter whose purpose is to provide a time delay to the hf-signal to approximate the time delay through the lf circuitry.

HF Transformer and Load

R2161, R2162 and R2163, with the inductance of transformer T2160, provide a bandpass filter whose low-frequency cutoff point is adjusted to the lf crossover frequency.

Output Amplifier

The hf signal is connected to the X100 gain-set inputs of U2170, and is combined with the lf and common-mode signals from the normal inputs of U2170. The differential outputs of U2170 are connected to the low-pass output filters (L2188, L2189, R2188, R2189, R2272, C2178), which are adjusted for best hf response. Q2182 and Q2194 provide a gain of approximately 2 and a level shift. Q2181 is a unity-gain inverter. The outputs of Q2181 and Q2194 are connected to Q2180 and Q2195, respectively, which provide an approximate 50-Ω output impedance.

POWER SUPPLY

For the following discussion, refer to Diagram 4 (Power Supply schematic).

The primary windings of the power transformer are connected in parallel (for 120-V operation) or in series (for 240-V operation) by the Line Voltage Selector. The secondaries supply filtered, unregulated voltages to the Switching Power Supply and the three-terminal, 5-volt regulators for the output amplifier.

The Switching Power Supply generates the isolated ± 5 volts for each of the floating preamps. The output side of the switcher is isolated from earth ground, and each preamp supply is isolated from the other.

Pulse width modulation control is performed by U2374 running at a nominal frequency of 30 kHz. Q2381 drives the gate of FET Q2398. Turn-on/turn-off times are controlled by R2388, R2384, and CR2384. VR2391 provides gate overvoltage protection. Q2398 drives transformer T2482 in the fly-back mode.

The output side of T2482 consists of diode rectifiers and LC choke networks. Winding 6-7 provides feedback voltage to U2374 to close the control loop. R2281 provides output voltage adjustment.

The output amplifiers are powered from a common (earth-referenced) power supply consisting of U2771, U2770, and associated filter and feedback components.

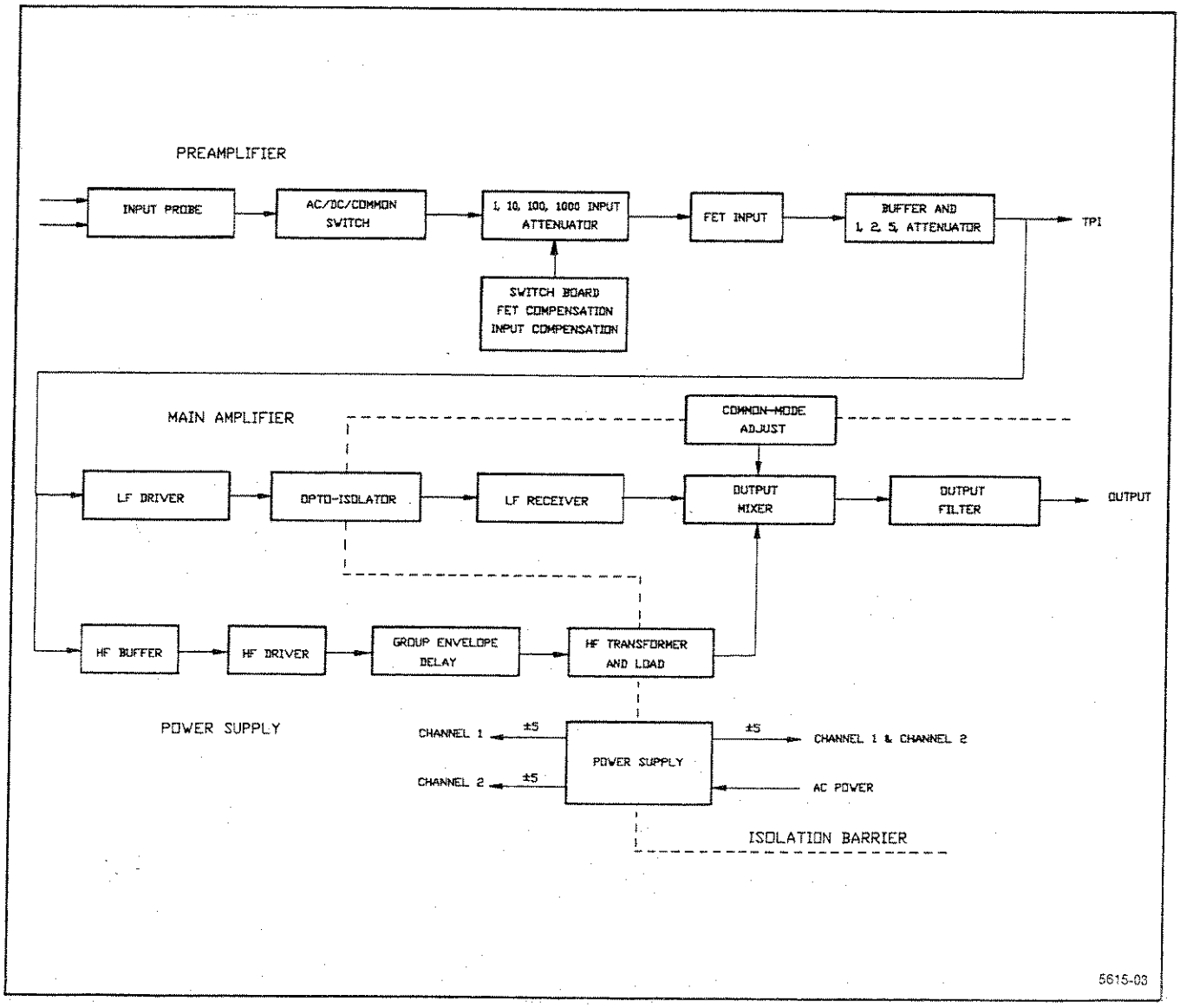


Figure 3-1. A6902B block diagram.

PERFORMANCE CHECK PROCEDURES

These procedures do not check every facet of the Isolator's operation; rather, they are concerned with the portions of the Isolator that are essential to measurement accuracy and correct operation. It is not necessary to remove the Isolator's cover to perform these procedures. All checks are performed using operator accessible front and rear panel controls and connectors.

TEST EQUIPMENT REQUIRED

The test equipment listed in Table 4-1 is the minimum required to complete the procedures in this section. The specific equipment required to complete each procedure is listed at the beginning of that procedure.

The equipment characteristics listed are the minimum necessary to provide accurate results. The equipment used must meet or exceed the listed characteristics.

When equipment other than that recommended is used, control settings or test setups may need to be altered. Detailed operating instructions for test equipment are not given in these procedures. If more operating information is needed, refer to the equipment's instruction manual.

PERFORMANCE CHECK INTERVAL

To ensure Isolator accuracy, check its performance every 1000 hours of operation, or every six months if used infrequently.

LIMITS AND TOLERANCES

Limits and tolerances given in these procedures are instrument characteristics only if they are listed in the Standards column of characteristics. Tolerances given are applicable only to the A6902B and do not include test equipment error.

INPUT PROBES

Some checks in these procedures describe and illustrate using the 500 V input probe. The 3000 V probe may also be used in any check steps when the proper adapters are used.

Table 4-1: Required Test Equipment

Item	Minimum Requirements	Application	Recommended Model
Oscilloscope	Bandwidth: 100 MHz Sensitivity: 5 mV	Bandpass and transient response	Tektronix 2245A
Calibration Generator	Rise time: 0.5 ns Repetition rates: 1 kHz to 100 kHz Output: 0.1 V to 100 V ±0.25%	Signal source for gain and transient response	Tektronix PG 506 [a]
Leveled Sine Wave Generator	Frequency: to 25 MHz Output: 0 to 5 V	Bandpass	Tektronix SG 503 [a]
Power Module		Power supply for Tektronix TM 500 series test equipment	Tektronix TM 503 or TM 506
Adapter	Probe tip to BNC male for 500 V input probes	Signal interconnection	Tektronix part number 013–0084–02 [b]
Termination	Impedance: 50 Ω Connectors: BNC	Signal interconnection	Tektronix part number 011–0049–01
Cable (two required)	Impedance: 50 Ω Connectors: BNC Length: 6 feet	Signal interconnection	Tektronix part number 012–0204–00

[a] *Requires a TM 500 series power module*

[b] *Fits the 500 V probes only*

PERFORMANCE CHECK STEPS

Each numbered step in this procedure is written so that it can be individually performed. The alphabetical parts in each step must be performed in the order presented. For steps 2 and 3, use properly compensated probes.

1. Check Gain and Probe Compensation

NOTE

This display is based on the STD AMPL output of the Tektronix PG 506 Calibration Generator. If a different calibration signal source is used, set the controls to maintain the same input/output ratio and measure for ±5% accuracy.

Equipment Required (see Table)

Oscilloscope

Calibration Generator

Probe Adapter

a. Set the instrument controls as follows:

A6902B Isolator

Volts/Div (both)	20 mV
AC/COMMON/DC (both)	COMMON
Power	ON

Oscilloscope

Volts/Div (channel 1)	100 mV
AC/GND/DC (both)	GND
Position (channel 1)	Midrange
Vertical mode	Channel 1
Time/Div	200 µs
Trigger mode	Auto
Source	Channel 1
Coupling	AC
Slope	+ (plus)
Level	Midrange
Power	ON

Calibration Generator

Standard Amplitude (No termination)	0.1 V

b. Allow 30 minutes for the A6902B and test equipment to stabilize.

c. Connect the A6902B Channel 1 output BNC connector to the oscilloscope input BNC connector through a 50 Ω BNC cable. Connect the Calibration Generator Standard Amplitude output to the A6902B Channel 1 input through the 500 V probe and probe adapter.

d. Use the oscilloscope Channel 1 position control to center the trace two major divisions below the horizontal center graticule line.

e. Set the oscilloscope Channel 1 AC/GND/DC switch to DC.

f. Use the A6902B OUTPUT DC LEVEL control to position the trace two major divisions below the horizontal center graticule line.

g. Set the A6902B Channel 1 AC/GND/DC switch to DC.

h. Check for a flat-top waveform display within ±0.25 minor divisions. Make adjustments as necessary as described in the Operators section of this manual.

i. Check that the amplitude of the waveform is five divisions ±1.25 minor divisions.

j. Step through all A6902B Volts/Div positions, varying the Calibration Generator Standard Amplitude output to display four or five divisions of display at the start. Verify that gain error is ≤5%

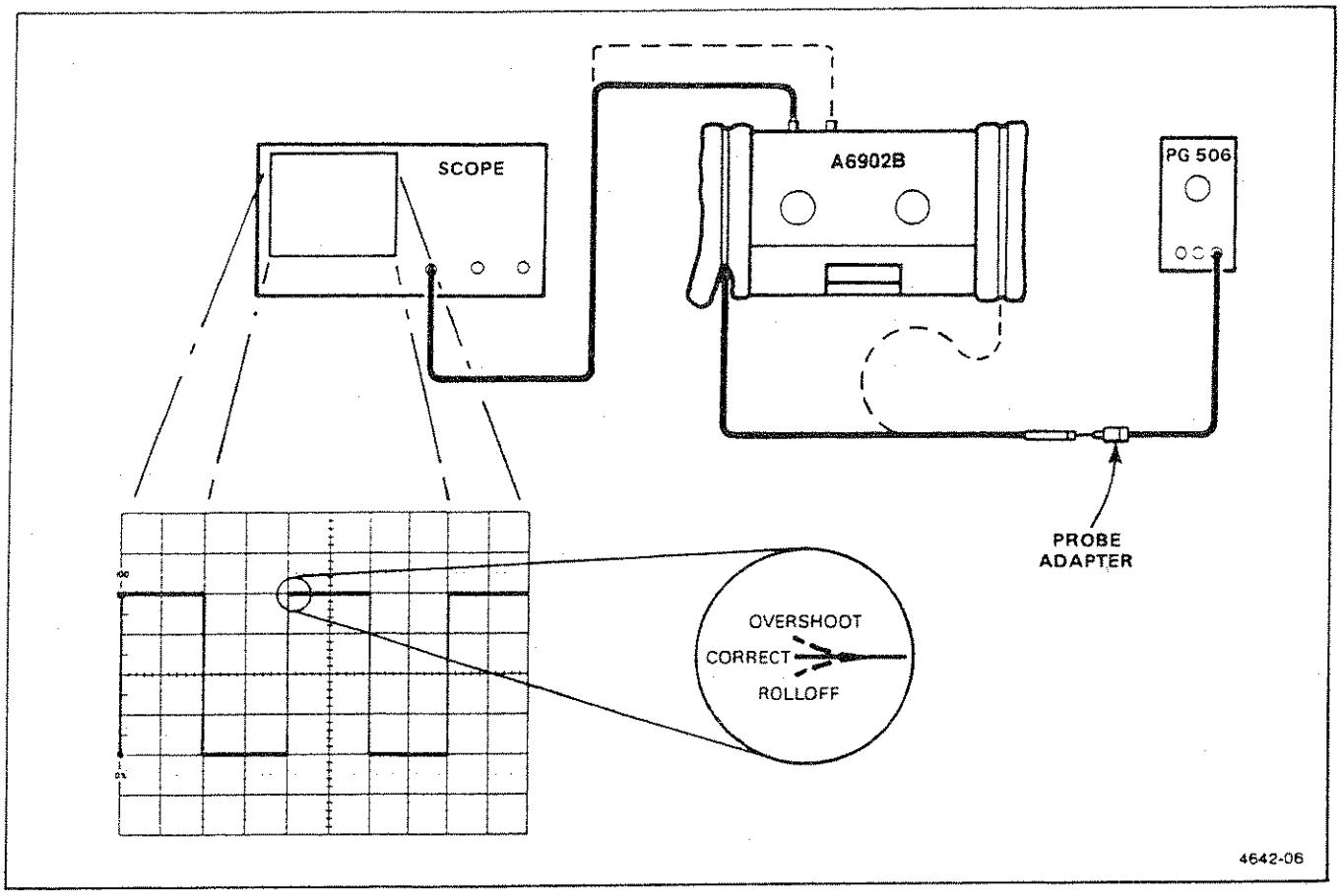


Figure 4-1: Gain and Probe Compensation Test Setup

2. Check Bandpass

Equipment Required (see Table)

Oscilloscope

Leveled Sine Wave Generator

Probe Adapter

50 Ω termination

Cable

a. Set the instrument controls as follows:

A6902B Isolator

Volts/Div (both)	100 mV
AC/COMMON/DC (both)	DC
Output DC Level (both)	Midrange
Power	ON

Oscilloscope

Volts/Div (channel 1)	100 mV
AC/GND/DC (both)	DC
Position (channel 1)	Midrange
Vertical mode	Channel 1
Time/Div	10 µs
Trigger mode	Auto
Source	Channel 1
Coupling	AC
Slope	+ (plus)
Level	Midrange
Bandwidth limit	OFF
Power	ON

Leveled Sine Wave Generator

Amplitude Multiplier	X1
Output Amplitude	0.6 Vp-p
Frequency Range (MHz)	REF (50 kHz)

b. Allow 30 minutes for the A6902B and test instruments to stabilize.

c. Connect the test setup as shown in figure 4-2. Use the A6902B Channel 1 connectors and the 500 V probes.

d. Adjust the Output Amplitude control of the leveled sine wave generator for six divisions of display on the oscilloscope.

e. Set the frequency range control of the generator to the 10–25 MHz position.

f. Use the frequency range control of the generator to increase the frequency until the oscilloscope display decreases to 4.2 divisions (adjust the oscilloscope time/div. control as needed).

g. Check that the output frequency of the generator is 20 MHz or greater.

h. Repeat steps d through g using the A6902B CHANNEL 2 controls and connectors. Start with the generator controls reset to 50 kHz.

i. If either A6902B channel does not meet standards, refer to the "Gain Adjustment" section of the "Adjustment Procedure" section of this manual for a readjustment method.

j. If no other checks are to be performed, set POWER to OFF and disconnect the test setup.

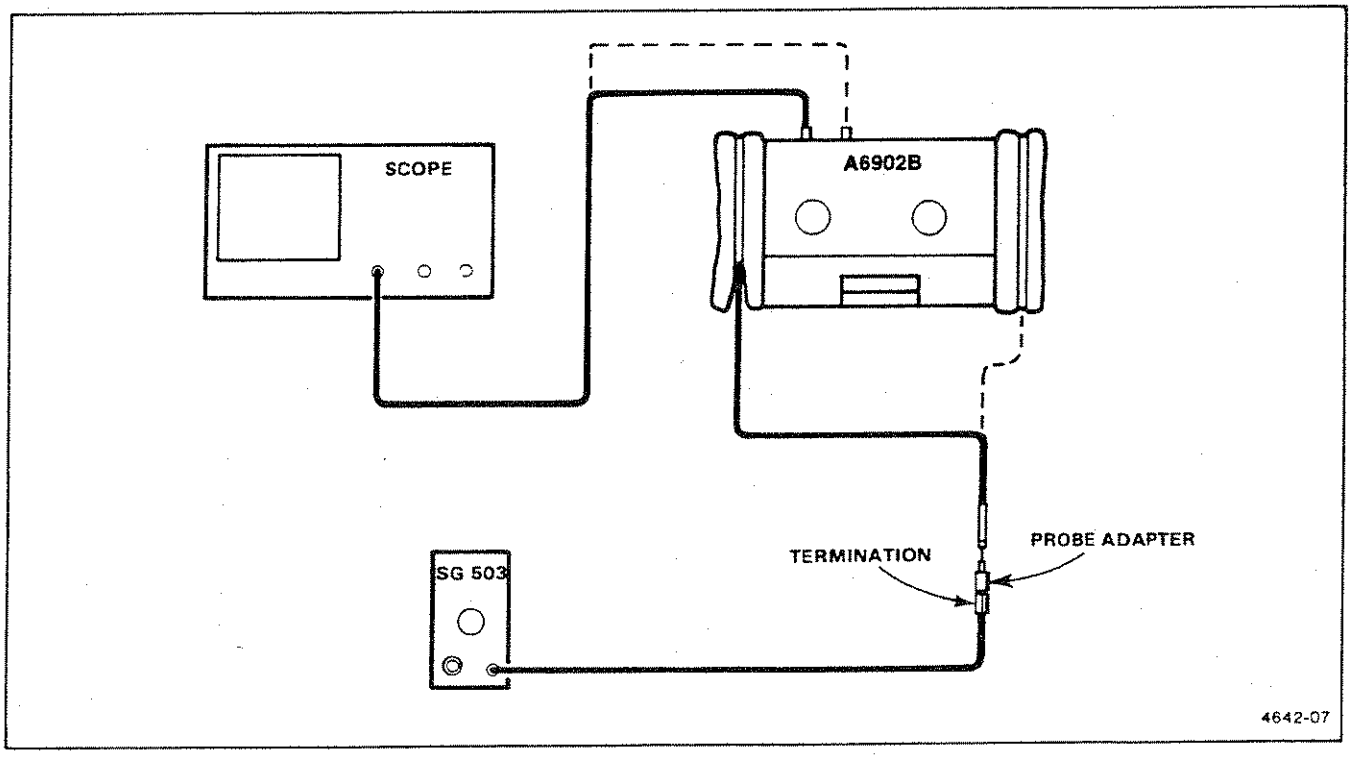


Figure 4-2: Bandpass Check Test Setup

ADJUSTMENT PROCEDURES

These adjustment procedures are used to return the Isolator to conformation with standards as listed in the characteristics table in section one. These adjustments should be performed only after the checks in the performance check procedure (section four) have indicated a need for adjustment of the Isolator.

INTRODUCTION

IMPORTANT – PLEASE READ THIS BEFORE STARTING PROCEDURES

TEST EQUIPMENT REQUIRED

The test equipment listed in Table 5-1 is a complete list of the equipment required to accomplish the adjustment procedures. The specific equipment required to perform each individual process is listed at the beginning of the procedure.

The recommended test equipment characteristics are the minimum necessary to provide accurate results; therefore, the equipment used must meet or exceed the listed characteristics.

These procedures are based on using the recommended test equipment in Table 5-1. When other equipment is substituted, the control settings or the calibration setups may need to be altered. Detailed operating instructions for test equipment are not given in this procedure. If more operation information is required, refer to the appropriate test equipment instruction manual.

LIMITS AND TOLERANCES

The limits and tolerances given in these procedures are only for the A6902B under test. Test equipment error is not included unless noted.

INPUT PROBES

Unless noted, either the 3000 V or 500 V probes may be used in any of the steps listed. Caution must be taken not to exceed the voltage rating of any probe used.

ADJUSTMENT SEQUENCE

Adjustments must be performed in the order given; because of interaction between adjustments, miscalibration may occur if the order is not followed.

At the beginning of each procedure is a list of all front-panel control presets. Each step within the procedure should be performed in order to ensure that any control settings will be correct for that step.

ADJUSTMENT LOCATION

Adjustment locations are shown in figure 5-1. Only adjustments are shown in this illustration.

PREPARATION FOR ADJUSTMENT

Before performing these procedures, ensure that the proper line voltage has been selected, and that the proper fuse is installed.

Adjustment of the instrument should be performed at an ambient temperature within ±10° C of the anticipated operating temperature.

It is necessary to remove the top cabinet half, top main shield half, and the top of the preamplifier shield to perform these procedures. See the removal instructions in the Maintenance section of this manual.

The A6902B must be allowed a warmup period of at least thirty minutes before performing these adjustments. The preamp shields and top cover of the A6902B should be set over the instrument while it is warming up. Steps 1a through 1e should be performed immediately after removing the instrument shields.

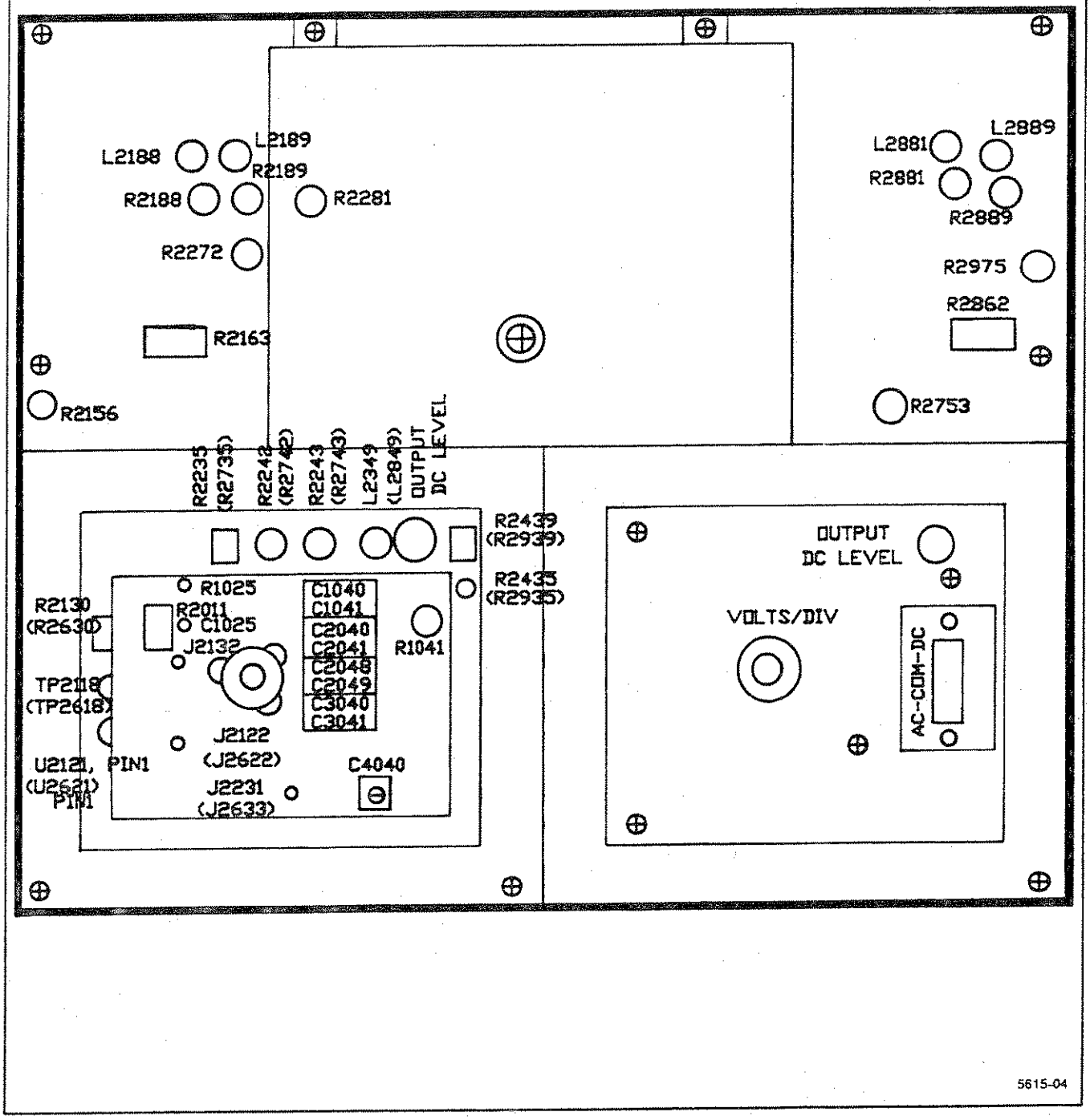


Figure 5-1: A6902B Adjustment Locations

Table 5-1: Required Test Equipment			
Item	**Minimum Requirements**	**Application**	**Recommended Model**
Oscilloscope	Bandwidth: 100 MHz Sensitivity: 5 mV	Bandpass and transient response	Tektronix 2245A
Digital Multimeter	DC volts to 20 V Accuracy: 1%	DC adjustment	Tektronix DM 504A [ad]
Calibration Generator	Rise time: 0.5 ns Repetition rates: 1 kHz to 100 kHz Output: 0.1 V to 100 V ±0.25%	Signal source for gain and transient response	Tektronix PG 506 [a]
Power Module		Power supply for Tektronix TM 500 series test equipment	Tektronix TM 503 or TM 506
Termination	Impedance: 50 Ω Connectors: BNC	Signal interconnection	Tektronix part number 011–0049–01
Cable (two required)	Impedance: 50 Ω Connectors: BNC Length: 6 feet	Signal interconnection	Tektronix part number 012–0204–00
Alignment Tool	Bit size: 3/32 inch	Adjust resistors and capacitors	Tektronix part number 003–0675–00
Alignment Tool	Bit: hexagonal	Adjust coils	Tektronix part number 003–0310–00
Probe	X1–X10, 100 MHz	General purpose	Tektronix P6129
Probe Adapter	Probe tip to BNC male for 500 V input probes	Signal interconnection	Tektronix part number 013–0084–02 [b]
Probe Adapter	Retractable hook-tip	Pre-amp calibration	Tektronix part number 013–0084–02 [c]

[a] *Requires a TM 500 series power module*
[b] *Fits the 500 V probes only*
[c] *Fits the 3000 V probe only*
[d] *The Tektronix 2236 with DMM option is an acceptable replacement for the multimeter.*

ADJUSTMENT PROCEDURE STEPS

NOTE

In the following procedures, all test points and component numbers are given first for Channel 1, followed by the corresponding number for Channel 2 in parentheses. The preamplifier circuit boards are identical, so the component and test points that are located on these boards have only one component number that refers to both channels. With the exception of steps 1b and 1c below, the procedure steps should be done first for Channel 1 and then repeated for Channel 2.

1. DC Adjustment

Equipment Required (see Table)

Oscilloscope

Digital Multimeter

Calibration Generator

Probe Adapter

NOTE

When adjusting 20-turn variable resistors, lightly tap them to center the backlash.

a. Set the instrument controls as follows:

Digital Multimeter

DC VOLTS

Oscilloscope

Volts/Div	50 mV
Position	Midrange
Vertical Mode	Channel 1
Time/Div	200 µs
Trigger Mode	Auto

A6902B Isolator

Volts/Div (both)	20 mV
AC/COMMON/DC (both)	COMMON
Power	ON

b. Connect the multimeter VOLTS/Ω/TEMP (high) lead to J2132, and the LOW lead to J2231 (floating common).

c. Adjust R2881 for 5 V ±0.5 V.

d. Connect the multimeter high lead to TP2118 (TP2618).

e. Adjust R2011 for the same multimeter reading (±3 mV) while switch the Isolater VOLTS/DIVISION switch between 100 mV and 20 mV.

f. Adjust the ZERO ADJ control for a multimeter reading of 0 V (±3 mV).

g. Connect the multimeter high lead to U2121 (U2621), pin 1.

h. Adjust R2130 (R2630) for a 0 V (±3 mV) indication. Disconnect the multimeter.

i. Connect the A6902B output to the oscilloscope vertical input.

j. Set the oscilloscope input coupling to GND, and center the trace on the screen.

k. Set the oscilloscope input coupling to DC.

l. Adjust R2156 (R2753) to recenter the trace on the screen.

2. Preamplifier Calibration

Equipment Required (see Table)

Oscilloscope

Calibration Generator

Power Module

Termination

Alignment tool (003–0675–00)

Probe (P6129)

Probe Adapter (013–0107–00)

a. Set the instrument controls as follows:

Calibration Generator

Mode	Fast Rise
Period	1 ms (1 kHz)

Oscilloscope

Volts/Div	100 mV
Position	Midrange
Vertical Mode	Channel 1
Time/Div	200 µs
Trigger Mode	Auto

A6902B Isolator

Volts/Div (both)	100 mV
AC/COMMON/DC (both)	AC

b. Using the oscilloscope probe and the retractable hoot-tip adapter, connect the oscilloscope to J2122 (J2622) with the probe ground lead attached to J2231 (J2633).

c. Install the 50 Ω termination on the positive-going, fast-rise output of the calibration generator. Using the probe-tip-to-BNC adapter, connect the A6902B probe to the termination.

d. Set the oscilloscope triggering controls for a stable display and center the display on the screen.

e. Adjust C4040 for the squarest waveform front corner. (Disregard AC line noise if present. Using the BW LIMIT on the oscilloscope may be helpful.)

f. Adjust R1041 to its center-point.

3. Gain Adjustment

Equipment Required (see Table)

Oscilloscope

Calibration Generator

Power Module

Termination

Alignment tool (003–0310–00)

Alignment tool (003–0675–00)

Probe (P6129)

Probe Adapter (013–0107–00)

NOTE

When adjusting 20-turn variable resistors, lightly tap them to center the backlash.

a. Set the instrument controls as follows:

Calibration Generator

Mode	Standard Amplitude
Amplitude	0.5 V
Period	1 ms (1 kHz)

Oscilloscope

Volts/Div	100 mV
Position	Midrange
Vertical Mode	Channel 1
Time/Div	200 µs
Trigger Mode	Auto

A6902B Isolator

Volts/Div (both)	100 mV
AC/COMMON/DC (both)	AC

b. Connect the A6902B output to the oscilloscope vertical input.

c. Using the probe-tip-to-BNC adapter, connect the A6902B probe to the standard amplitude output of the calibration generator.

d. Set the oscilloscope triggering controls for a stable display and center the display on the screen.

e. Adjust R2235 (R2735) for an exact five-division display referenced to the trailing edge of the square wave. See figure 5-2.

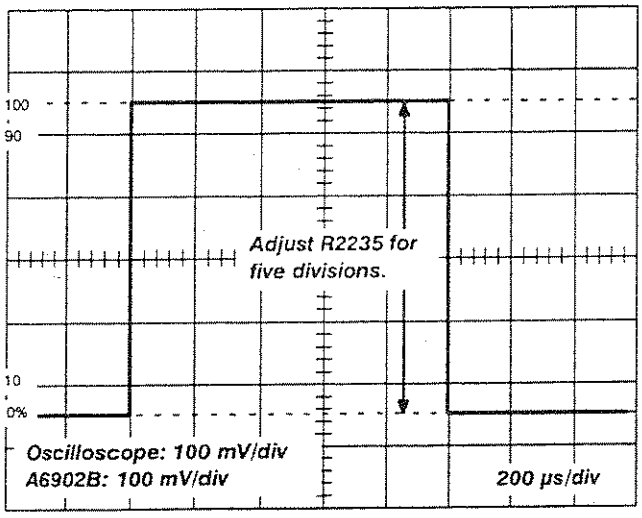


Figure 5-2: Gain adjustment R2235 (R2735)

f. Set the calibration generator mode switch to Fast Rise, and the pulse amplitude to minimum.

g. Install the 50 Ω termination on the positive-going, fast-rise output of the calibration generator. Using the probe-tip-to-BNC adapter, connect the A6902B probe to the termination.

h. Set the calibration generator pulse amplitude for an exact five-division display referenced to the trailing edge of the square wave. Change the oscilloscope time/div to 50 µs/div.

NOTE

The adjustments in parts i and j interact and should be repeated until the best overall response is achieved.

i. Adjust R2439 (R2939) and R2163 (R2862) for a flat-topped square wave. R2439 (R2939) affects the first 50 µs of the pulse. R2163 (R2862) affects the first 25 µs of the pulse. Readjustment of C4040 (part 2e) may be necessary at this point for the best overall leveling of the square wave. See figure 5-3.

j. Adjust R2242 (R2742), R2243 (R2743), and L2349 (L2849) for the squarest waveform corner. R2242 (R2742) affects the first 20 µs; R2243 (R2743) affects the first 40 µs; L2349 (L2849) affects the bottom of the dip at 30 µs. See figure 5-3.

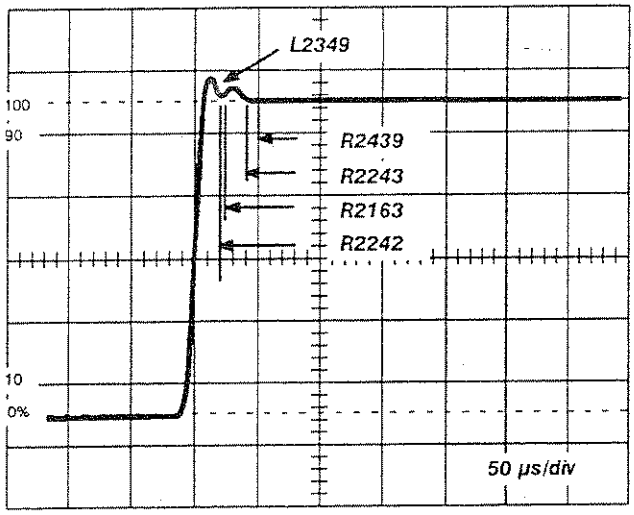


Figure 5-3: Portions of waveform affected by mid-frequency adjustments.

k. Set the calibration generator mode switch to High Amplitude, and the pulse amplitude to minimum.

l. Using the probe-tip-to-BNC adapter, connect the A6902B probe to the High Amplitude output of the calibration generator.

m. Set the A6902B volts/division to 1 V and set the calibration generator pulse amplitude for a five division display.

n. Adjust C1040 and C1041 for a flat-topped square wave.

o. Set the A6902B volts/division to 10 V and set the calibration generator pulse amplitude for a five division display.

p. Adjust C2040 and C2041 for a flat-topped square wave.

q. Set the A6902B volts/division to 100 V, set the oscilloscope volts/division to 20 mV, and set the calibration generator pulse amplitude to maximum.

r. Adjust C2048 and C2049 for a flat-topped square wave.

s. Set the A6902B volts/division to 200 V.

t. Adjust C3040 and C3041 for a flat-topped square wave.

u. Set the calibration generator pulse amplitude to minimum. Set the A6902B volts/division to 100 mV, and set the oscilloscope volts/division to 100 mV.

v. Repeat steps f through j as necessary.

w. Set the calibration generator period to 1 µs (1 MHz), and set the oscilloscope time/division to 100 ns.

x. Adjust R2188 (R2881), L2188 (L2881), R2189 (R2889), L2189 (L2889), R2345 (R2935), and R2435 (R2935) for the best front-corner response. Adjust R2272 (R2975) for minimum oscillation (ringing). Refer to figure 5-4 for identification of the waveform affected by each adjustment.

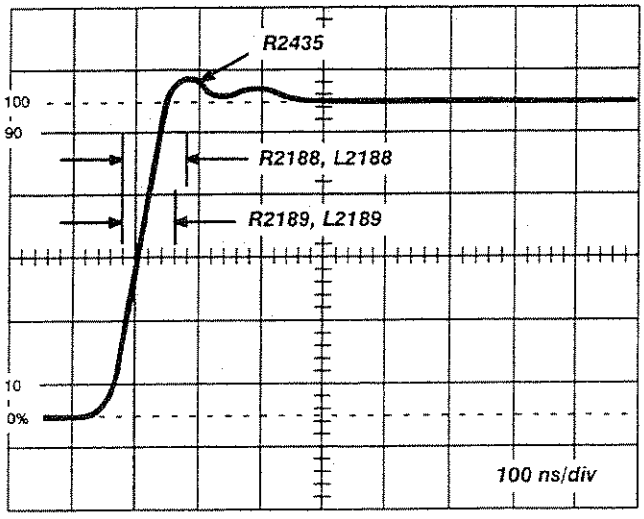


Figure 5-4: Portions of waveform affected by high-frequency adjustments.

y. Set the oscilloscope time/division to 10 ns.

z. Check that the pulse rise time is less than or equal to 17.5 ns. If the rise time is excessive, repeat steps i through l; if the rise time meets standards, go on to step aa.

aa. Set the oscilloscope time/division to 100 ns. Set the A6902B volts/division to 50 mV. Readjust the calibration generator pulse amplitude for a five division display.

ab. Adjust R1025 and C1025 for the best front-corner response. Do not readjust any output filter settings (listed in step x.)

ac. Check that the signal delay difference between the two channels is less than or equal to 4 ns. (See figure 5-5) If the delay difference is not within standards, go on to step ad; otherwise, the adjustment procedure is complete.

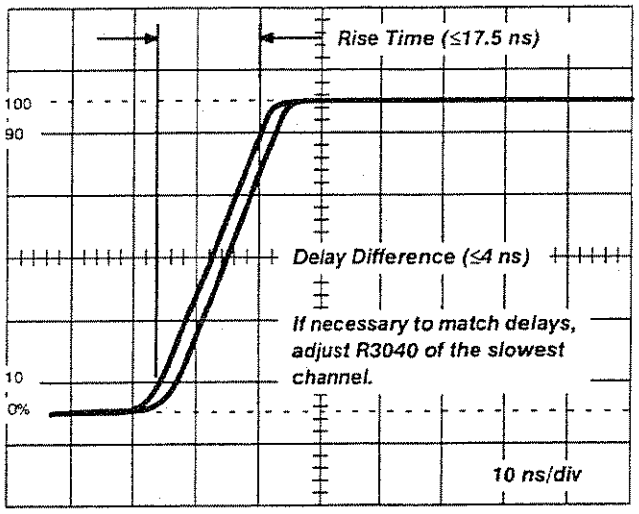


Figure 5-5: Rise time and signal delay differences.

ad. Adjust R1041 (of the slowest channel first) until the signal delay difference is less than 4 ns. Repeat parts x through ac.

MAINTENANCE

This section of the manual contains information for conducting preventive maintenance, troubleshooting, and corrective maintenance on your A6902B Isolator.

STATIC-SENSITIVE COMPONENTS

The following precautions are applicable when performing any maintenance involving internal access to the instrument.

PRECAUTIONS

CAUTION

Static discharge can damage any semiconductor component in this instrument.

This instrument contains electrical components that are susceptible to damage from static discharge. Table 6-1 lists the relative susceptibility of various classes of semiconductors. Static voltages of 1 kilovolt to 30 kilovolts are common in unprotected environments.

When performing maintenance, observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.

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

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

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

5. Keep the component leads shorted together whenever possible.

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

Table 6-1

Relative Susceptibility to Static Discharge Damage

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

[a]Voltage equivalent for levels:

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

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

7. Do not slide the components over any surface.

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

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

10. Use only approved antistatic vacuum-type desoldering tools for component removal.

PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning and visual inspection. Preventive maintenance performed regularly may prevent instrument malfunction and enhance instrument reliability. The severity of the environment in which the instrument is used determines the frequency of maintenance. An appropriate time to accomplish preventive maintenance is just before adjustment.

CLEANING

The A6902B should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause overheating and component breakdown. Dirt on components acts as an insulating blanket, preventing efficient heat dissipation. It also provides an electrical conduction path that could result in instrument failure, especially under high humidity conditions.

CAUTION

Avoid the use of chemical cleaning agents which might damage the plastics used in this instrument. Use a nonresidue-type cleaner, preferably isopropyl alcohol. Before using any other type of cleaner, consult your Tektronix Service Center or representative.

WARNING

Water or moisture inside the A6902B can be very hazardous to personnel and damaging to the instrument. To avoid this possibility, use only a MODERATELY DAMP cloth or swab for external cleaning.

Exterior

Loose dust on the outside of the instrument can be removed with a soft cloth or small brush. The brush is particularly useful for dislodging dirt on and around the controls. Dirt that remains can be removed with a soft cloth dampened in a mild detergent and water solution. Abrasive cleaners should not be used.

Interior

To clean the interior, blow off dust with dry, low-pressure air. Remove any remaining dust with a soft brush or cloth dampened with a solution of mild detergent and water. Use a cotton swab for cleaning in narrow spaces. Do not use a cotton swab on switch contacts since they tend to snag, possibly causing damage. Strands of cotton caught by the contacts can also cause intermittent electrical contact. If these methods do not remove all the dust or dirt, the instrument may be spray washed using a 5% solution of water and mild detergent as follows:

1. Access the interior parts to be cleaned (refer to "Removal and Replacement Instructions").

2. Remove easily accessible shields and covers.

3. Spray wash and thoroughly rinse the parts.

4. Dry all parts with low-pressure air.

5. Spray all switch contacts with isopropyl alcohol, wait for 60 seconds, and dry with low-velocity air.

6. Dry all components in an oven or compartment using low-temperature (125° or 150° F) circulating air.

VISUAL INSPECTION

CAUTION

Instruments that appear to have been dropped or otherwise abused should be checked thoroughly to verify correct operation and adjustment.

External

Table 6-2 lists external items that should be inspected for damage or wear. Items that could cause injury to personnel or further damage to the instrument should be repaired immediately.

Internal

Inspect the instrument for internal damage or wear as outlined in Table 6-3.

Table 6-2

External Inspection Checklist

Item	Inspect For	Repair Action
Cabinet, front-panel cover, front panel	Cracks, deformations and damaged hardware.	Replace defective parts.
Accessories	Missing items or parts of items, bent pins, broken or frayed cables, damaged connectors.	Repair frayed cables and defective parts. Replace damaged or missing items.
Front-panel controls	Missing, damaged, or loose control knobs.	Repair or replace missing or defective items.
Connectors	Broken shells, cracked insulation and deformed contacts. Dirt in connectors.	Replace defective parts. Clean or wash out dirt.
Side pouches	Tears, broken snaps, and broken zippers.	Replace damaged pouch.

Table 6-3

Internal Inspection Checklist

Item	Inspect For	Repair Action
Circuit boards	Loose, broken, or corroded solder connections. Burned circuit boards. Burned, broken, or cracked circuit-run plating.	Clean solder corrosion with an eraser and flush with isopropyl alcohol. Resolder defective connections. Determine cause of burned items and repair. Repair defective circuit runs.
Chassis	Dents, deformation, and damaged hardware.	Straighten, repair, or replace defective hardware.
Resistors	Burned, cracked, broken, or blistered.	Replace defective resistors.
Solder connections	Cold solder or rosin joints.	Resolder joint and clean with isopropyl alcohol.
Wiring and cables	Loose plugs or connectors. Burned, broken, or frayed wiring.	Firmly seat connectors. Repair or replace defective wires or cables.
Capacitors	Damaged or leaking cases. Corroded solder on terminals or leads.	Replace defective capacitors. Clean solder connections and flush with isopropyl alcohol.

TROUBLESHOOTING

Preventive maintenance performed on a regular basis should reveal most potential problems before an instrument malfunctions. However, should troubleshooting be required, the following information is provided to assist with problem finding. In addition, the technical material and troubleshooting charts located in the "Theory of Operation" and "Diagrams" sections of this manual may be helpful for troubleshooting.

TROUBLESHOOTING AIDS

Schematic Diagrams

Complete schematic diagrams are contained on tabbed foldout pages in the "Diagrams" section. The portions of circuitry that are mounted on each circuit board are enclosed within heavy black lines. Also within the black lines, near either the top or bottom edge, is the assembly number and name of the circuit board.

The component number and electrical value of each component in this instrument are shown on the schematic diagrams. See the first page of the "Diagrams" section for definition of the reference designators and symbols used to identify components.

Troubleshooting Charts

The troubleshooting charts located in the "Diagrams" section may be an aid to quick diagnosis of a problem. Although not intended to be an extensive circuit diagnosis tool, it provides a step-by-step procedure for areas of probable concern.

Circuit Board Illustrations

Circuit board illustrations are provided for use in conjunction with each schematic diagram. These illustrations are found in the "Diagrams" section near the schematic diagram to which it relates.

Each component shown on a schematic diagram is identified on the circuit board illustration by its component number.

Circuit Board Location

The location of each circuit board within the instrument is illustrated in the "Diagrams" section.

Grid Coordinate System

Each schematic diagram and circuit board illustration has a grid border. A table located adjacent to each schematic diagram lists the grid coordinates of each component shown on that diagram. To aid in cross-referencing component location, this table also lists the grid coordinates of the component on the circuit board illustration.

Component Color Coding

Information regarding color codes and markings of resistors and capactiors is located in Figure 9-1 in the "Diagrams" section.

RESISTOR COLOR CODE. Resistors used in this instrument are either composition or precision metal-film resistors. They are color-coded with the EIA color code (some metal-film resistors may have the value printed on the body). The color code is read starting with the stripe nearest the end of the resistor. Composition resistors have four stripes which consist of two significant figures, a multiplier, and a tolerance value. Metal-film resistors have five stripes consisting of three significant figures, a multiplier, and a tolerance value.

CAPACITOR MARKINGS. The capacitance values of common disc capacitors and small electrolytics are marked on the side of the component body. White ceramic capacitors are color-coded in picofarads, using a modified EIA code.

The dipped tantalum capacitors are color-coded in microfarads. The color dot indicates the positive lead and the voltage rating.

Since capacitors are easily destroyed by reversed or excessive voltages, be careful to observe the polarity and voltage ratings.

DIODE COLOR CODE. The cathode end of each glass-encased diode is indicated by a stripe, a series of stripes, or a dot. For most silicon or germanium diodes with a series of stripes, the color code identifies the three significant digits of the Tektronix Part Number, using the resistor color-code system (e.g., a diode color-coded pink or blue at the cathode end, then brown-gray-green, indicates Tektronix Part Number 152-0185-00). The cathode and anode ends of metal-encased diodes can be identified by the diode symbol marked on the body.

Semiconductor Lead Configurations

Figure 9-2 in the Diagrams section shows the lead configurations of semiconductor devices used in the A6902B.

Multi-Connector Holders

Multi-connector holders are keyed with two index triangles, one on the holder and one on the circuit board. Slot numbers are usually molded into the holder. When a connection is made perpendicular to a circuit board surface, ensure that the triangle on the holder and the triangle on the circuit board are aligned pointing toward each other (see Figure 6-1).

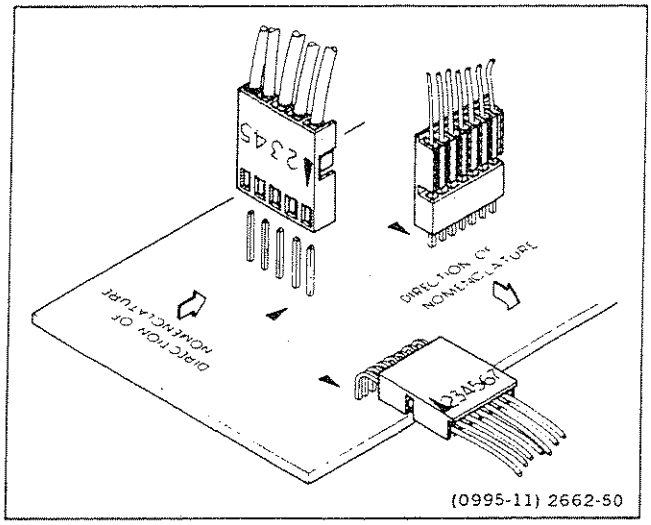


Figure 6-1. Multiconnector holder orientation.

TROUBLESHOOTING EQUIPMENT

CAUTION

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

The following equipment, or equivalent equipment, may be useful when troubleshooting the A6902B.

Oscilloscope

Description:	Frequency response: dc to 150 MHz. Deflection factor: 5 mV to 5 V/div. A 10X, 10 MΩ probe should be used to reduce circuit loading.
Purpose:	Check waveforms.
Equipment Example:	TEKTRONIX 2235 Oscilloscope.

Digital Multimeter

Description:	Voltmeter: Input impedance of 10 MΩ. Range from 0 to 20 V dc. Accuracy within 0.15%. Display at least 3 1/2 digits. Ohmmeter: Range from 0 to 20 MΩ. The probes should be insulated to prevent accidental shorting.
Purpose:	To measure voltages and resistances.
Equipment Example:	TEKTRONIX DM 501A Digital Multimeter.

Pulse Generator

Description:	Repetition rate: 10 Hz to 1 MHz. Risetime: 1 ns or less. Output amplitude: 0 to 100 V.
Purpose:	Signal source.
Equipment Example:	TEKTRONIX PG506 Calibration Generator

Variable Autotransformer

Description:	Variable ac output from 0 to 140 V, 1.2 A. Equipped with three-wire power cord, plug, and receptacle.
Purpose:	Vary input line voltage when troubleshooting the power supply.
Equipment Example:	General Radio W8MT3VM or W10MT3W Metered Variac Autotransformer.

TROUBLESHOOTING TECHNIQUES

The following checklist is arranged in an order that enables checking simple trouble possibilities before more extensive troubleshooting is required. The first four checks ensure proper control settings, connection, operation, and adjustment. If the trouble is not located by these checks, the remaining steps will aid in locating the defective component. When the defective component is located, replace it using the appropriate replacement procedure given under "Corrective Maintenance" in this section.

1. Check Control Settings

Incorrect control settings can give a false indication of an instrument malfunction. If there is any question about the correct function or operation of any control, refer to either the "Operating Instructions" (Section 2) in this manual or the A6902B Operators Manual.

2. Check Associated Equipment

Before proceeding, ensure that any equipment used with the A6902B is operating correctly. Verify that input signals are properly connected and that the interconnecting cables are not defective. Check the power source voltages.

3. Visual Check

Perform a visual inspection. This check may reveal broken connections, damaged components, semiconductors not firmly mounted, damaged circuit boards, or other clues.

4. Check Instrument Adjustment

Check the adjustment of either the entire instrument, or of the affected circuit, if the trouble exists in one circuit. The apparent trouble may only be a result of misadjustment. Complete adjustment instructions are given in the "Adjustment Procedure" section of this manual.

5. Isolate Trouble to a Circuit

To isolate trouble to a particular circuit note the trouble symptom; the sympton often identifies the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, first check the power supplies, then check the affected circuits by taking voltage and waveform readings (refer to the troubleshooting charts in the "Diagrams" section).

Incorrect operation of all circuits often indicates trouble in the power supplies. Check first for the correct output voltage of the individual supplies. A defective component elsewhere in the instrument can appear as a power-supply trouble and may also affect the operation of other circuits. These voltages are measured between the power-supply test points and ground or circuit return (see the schematic diagrams and circuit board illustrations in the "Diagrams" section for test-point locations). If power-supply voltages and ripple are within the listed ranges, the supply can be assumed to be working correctly. If they are outside the range, the supply may be operating incorrectly. Troubleshoot the supply, replace any defective components, and recheck the supply voltage and ripple.

6. Check Circuit Board Interconnections

After the trouble has been isolated to a particular circuit, again check for loose or broken connections, improperly seated transistors, and heat-damaged components.

7. Check Voltages and Waveforms

Often the defective component can be located by checking for the correct voltage or waveform in the circuit. Typical voltages are listed on the schematic diagrams. Test waveforms are also located near the schematics.

NOTE

Voltages and waveforms given on schematic diagrams are not absolute and may vary slightly between instruments. To obtain operating conditions similar to those used to take these readings, see the voltage and waveform setup procedures in the "Diagrams" section for the preliminary equipment setup. Note the recommended test equipment, front-panel control settings, voltage and waveform conditions, and test equipment cable-connection instructions. Oscilloscope control settings required to obtain the given waveforms and voltages are located next to the waveform diagrams. Changes to the control settings from the preliminary setup, other than those given, are usually not required.

8. Check Individual Components

The following procedures describe methods of checking individual components. Two-lead components that are soldered in place are most accurately checked by first disconnecting one end. This isolates the measurement from the effects of surrounding circuitry.

WARNING

To avoid electrical shock, always disconnect the A6902B from the power source before removing or replacing components.

CAUTION

When checking semiconductors, observe the static-sensitivity precautions located at the beginning of this section.

TRANSISTORS. A good check of transistor operation is actual performance under operating conditions. A transistor can be most effectively checked by substituting a new component (or one which has been checked previously). However, be sure that circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic tester. Static-type testers are not recommended, since they do not check operation under simulated operating conditions.

When troubleshooting transistors in the circuit with a voltmeter, measure the emitter-to-base and emitter-to-collector voltages to determine whether the voltages are consistent with normal circuit voltages. Voltages across a transistor vary with the type of device and its circuit function. Some of these voltages are predictable. The emitter-to-base voltages of a conducting silicon transistor will normally be from 0.6 to 0.8 volt. The emitter-to-collector voltage of a saturated transistor is about 0.2 volt.

Because these values are small, the best way to check them is by connecting a sensitive voltmeter across the junction rather than by comparing two voltages taken with respect to ground (both leads of the voltmeter must be isolated from ground if this method is used).

If values less than these are obtained, either the device is short-circuited or no current is flowing in the circuit. If values exceed the base-emitter values given, the junction is either back biased or the device is defective. Voltages exceeding those given for typical emitter-collector values could indicate either a nonsaturated device operating normally or a defective (open circuited) transistor. If the device is conducting, voltage will be developed across resistances in series with it; if it is open, no voltage will be developed across resistances in series with it, unless current is being supplied by a parallel path.

When troubleshooting a field-effect transistor, the voltage across its elements can be checked in the same manner as previously described for other transistors. However, remember that in the normal depletion mode of operation, the gate-to-source junction is reverse biased; in the enhanced mode, the junction is forward biased.

INTEGRATED CIRCUITS. Integrated circuits (IC) can be checked either with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of circuit operation is essential to troubleshooting a circuit having an IC. Use care when checking voltages and waveforms around the IC so that adjacent leads are not shorted together. Typical semiconductor lead configurations are shown in Figure 9-2 in the "Diagrams" section.

CAUTION

When checking diodes, do not use an ohmmeter scale that has a high internal current. High current can damage the diode. Do not measure tunnel diodes with an ohmmeter; use a dynamic tester (such as a TEKTRONIX Type 576 Transistor-Curve Tracer). Checks on diodes can be performed in much the same manner as on transistor emitter-to-base junctions. Silicon diodes should have 0.6 to 0.8 V across the junction when conducting. Higher readings indicate that they are either back biased or defective, depending on polarity.

DIODES. A diode can be checked for an open or a shorted condition by measuring the resistance between terminals with an ohmmeter set on a scale having a low internal source current, such as the R X 1k scale. The diode resistance should be very high in one direction and very low when the meter leads are reversed. Do not check tunnel diodes or back diodes with an ohmmeter.

RESISTORS. Check resistors with an ohmmeter. Refer to the "Replaceable Electrical Parts" for tolerances of resistors used in this instrument. A resistor normally does not require replacement unless its measured value exceeds its specified value and tolerance.

INDUCTORS. Check for open inductors by checking continuity with an ohmmeter. Shorted or partially shorted inductors can usually be found by checking the waveform response when high-frequency signals are passed through the circuit.

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

9. Repair and Readjust the Circuit

If any defective parts are located, follow the replacement procedures given under "Corrective Maintenance" in this section. Check the performance of any circuit that was repaired or that had any electrical component replaced. Readjustment of the affected circuit may be necessary. Refer to the "Performance Check" and "Adjustment Procedure" (sections 4 and 5).

CORRECTIVE MAINTENANCE

Corrective maintenance consists of component replacement and instrument repair. Special techniques and procedures required to replace components in the A6902B are described in this part of the manual. If it is necessary to ship your instrument to a Tektronix Service Center for repair or service, refer to the repackaging instructions at the end of this section.

OBTAINING REPLACEMENT PARTS

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

NOTE

Physical size and shape of a component may affect instrument performance, particularly at high frequencies. Always use direct-replacement components, unless it is known that a substitute will not degrade instrument performance.

In addition to the standard electronic components, some special parts are used in the A6902B. These components are manufactured or selected by Tektronix, Inc. to meet specific performance requirements, or are manufactured for Tektronix, Inc. in accordance with our specifications (see "Cross Index-Manufacture's Code Number to Manufacture" in the "Replaceable Electrical Parts" list for code numbers). Most of the mechanical parts are manufactured by Tektronix, Inc. Order all special parts directly from your local Tektronix Field Office or representative.

Ordering Parts

When ordering replacement parts from Tektronix, Inc., be sure to include all of the following information in your order to ensure receiving the proper parts.

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

MAINTENANCE AIDS

The maintenance aids listed in Table 6-4 include items required for some of the maintenance procedures in this instrument. Equivalent products may be substituted for the examples given, provided the characteristics are similar.

SOLDERING TECHNIQUES

WARNING

Before soldering, always turn the instrument off and disconnect it from the power source.

The reliability and accuracy of this instrument can be maintained only if proper soldering techniques are used to remove or replace parts.

Use rosin-core wire solder containing 63% tin and 37% lead. Contact your local Tektronix, Inc. Field Office or representative to obtain the names of approved solder types.

When soldering on circuit boards or small insulated wires, use only a 15-Watt (600° maximum) soldering iron. A higher wattage soldering iron can cause etched circuit conductors to separate from the board base material and melt the insulation on small wires. Always keep the soldering-iron tip prop-

erly tinned to ensure the best heat transfer from the iron tip to the solder joint. To protect heat sensitive components, either hold the component lead with a pair of long-nose pliers, or place a heat block between the component body and the solder joint.

Circuit boards in this instrument have as many as four conductive layers. Conductive paths between the top and bottom board layers may connect one or more of the inner layers. If any inner-layer conductive path becomes broken due to poor soldering practices, the circuit board becomes unusable and must be replaced. Damage of this nature can void the instrument warranty.

Table 6-4

Maintenance Aids

Description	Specifications	Usage	Example
1. Desoldering Tool	No Static Retention.	Unsoldering static-sensitive devices and components.	Soldapullit® AS196.
2. Diagonal Cutters		Disassembly.	Diamond MS54.
3. Nut Driver	3/16, 9/32, 5/16	Assembly and disassembly.	Xcelite® No. 6, 9, and 10.
4. Screwdriver	Magnetic holding.	Assembly and disassembly.	Magna Products 37033-4.
5. Bits, Screwdriver	Posidriv® No. 1 and 2. Torx® No. 9, 10 and 15.	Assembly and disassembly.	Tektronix Part Number: (No. 1) 003-0443-00 (No. 2) 003-0444-00 (No. 9) 003-0965-00 (No. 10) 003-0814-00 (No. 15) 003-0966-00
6. Screwdriver	1/8-inch flat bit.	Assembly and disassembly.	Xcelite® R-182
7. Soldering Iron	15 Watt (600° max.).	General soldering.	Weller Model WTCPN (Tip: PTA6)
8. Open-end Wrench	1/2-inch.	Assembly and disassembly.	
9. Isopropyl Alcohol		Cleaning.	

Desoldering and removing parts from multilayer circuit boards is especially critical and should be done only with a vacuum-type solder extractor. Many of the integrated circuits are static sensitive and can be damaged by a static charge that may be generated by some types of solder extractors. Use only an antistatic vacuum-type of solder extractor approved by a Tektronix, Inc. Service Center for work involving static-sensitive devices.

CAUTION

Attempts to unsolder, remove and resolder leads from the component side of the circuit board may cause damage to the reverse side of the circuit board.

CAUTION

Follow precautions for static-sensitive components. Be sure that voltage or current supplied by equipment or tools does not exceed component limits.

The following technique should be used to replace a component on any of the circuit boards:

1. Touch the vacuum desoldering tool to the lead at the solder connection. Never place the iron directly on the board; doing this may damage the board.

NOTE

Some components are difficult to remove from the circuit board due to a bend placed in each lead during machine insertion of the component. The purpose of the bent leads is to hold the component in position during a flow-solder manufacturing process that solders all the components at once. To make removal of machine-inserted components easier, straighten the component leads on the reverse side of the circuit board with a small screwdriver or pliers. It may be necessary to remove the circuit board to gain access to the component leads on the reverse side of the circuit boards. Circuit-board removal and reinstallation procedures are discussed later in this section.

2. When removing a multipin component, especially an IC, do not heat adjacent conductors consecutively. Apply heat to pins at alternate sides and ends of the IC as solder is removed. Allow a moment for the circuit board to cool before proceeding to the next pin.

CAUTION

Excessive heat can cause the etched circuit conductors to separate from the circuit board. Never allow the solder extractor tip to remain in one place on the board for more than three seconds. Solder wick, spring-actuated or squeeze-bulb solder suckers, and heat blocks (for desoldering multipin components) must not be used. Damage caused by poor soldering techniques can void the instrument warranty.

3. Bend the leads of the replacement component to fit the holes in the circuit board. If the component is replaced while the board is installed in the instrument, cut the leads so they only just protrude through the reverse side of the circuit board. Excess lead length may cause shorting to other conductive parts.

4. Insert the leads into the holes of the board so that the replacement component is positioned the same as the original component. Most components should be firmly seated against the circuit board.

CAUTION

Do not allow solder or solder flux to flow beneath etched circuit board switches. The etched switch contacts on the circuit board are an integral part of the switch, and intermittent operation can occur if the contacts become contaminated.

5. Touch the soldering iron to the connection and apply enough solder to make a firm solder joint. Do not move the component while the solder hardens.

6. Cut off any excess leads protruding through the circuit board (if not clipped to size in step 3).

7. Clean the area around the solder connection with an approved flux-removing solvent. Be careful not to remove any of the printed information from the circuit board.

If it becomes necessary to solder in the general area of any of the high-frequency contacts in the instrument, clean the contacts immediately upon completion of the soldering.

REMOVAL AND REPLACEMENT INSTRUCTIONS

WARNING

To avoid electric shock, disconnect the instrument from the power source before removing or replacing any component or assembly.

Read these instructions completely and carefully before attempting any corrective maintenance.

These instructions are for disassembly only. To reassemble, reverse the procedures as given.

Front Panel Lid

To remove the Front Panel Lid, proceed as follows (Refer to Figure 6-2):

1. Press in the two Latch-Releasing Buttons on the Front Panel Lid and swing the lid open.

2. Use a 1/8-inch flat-blade screwdriver to carefully pry the four hinge corner tabs up and out of their locking recesses.

3. Pull the lid away from the hinge center tabs.

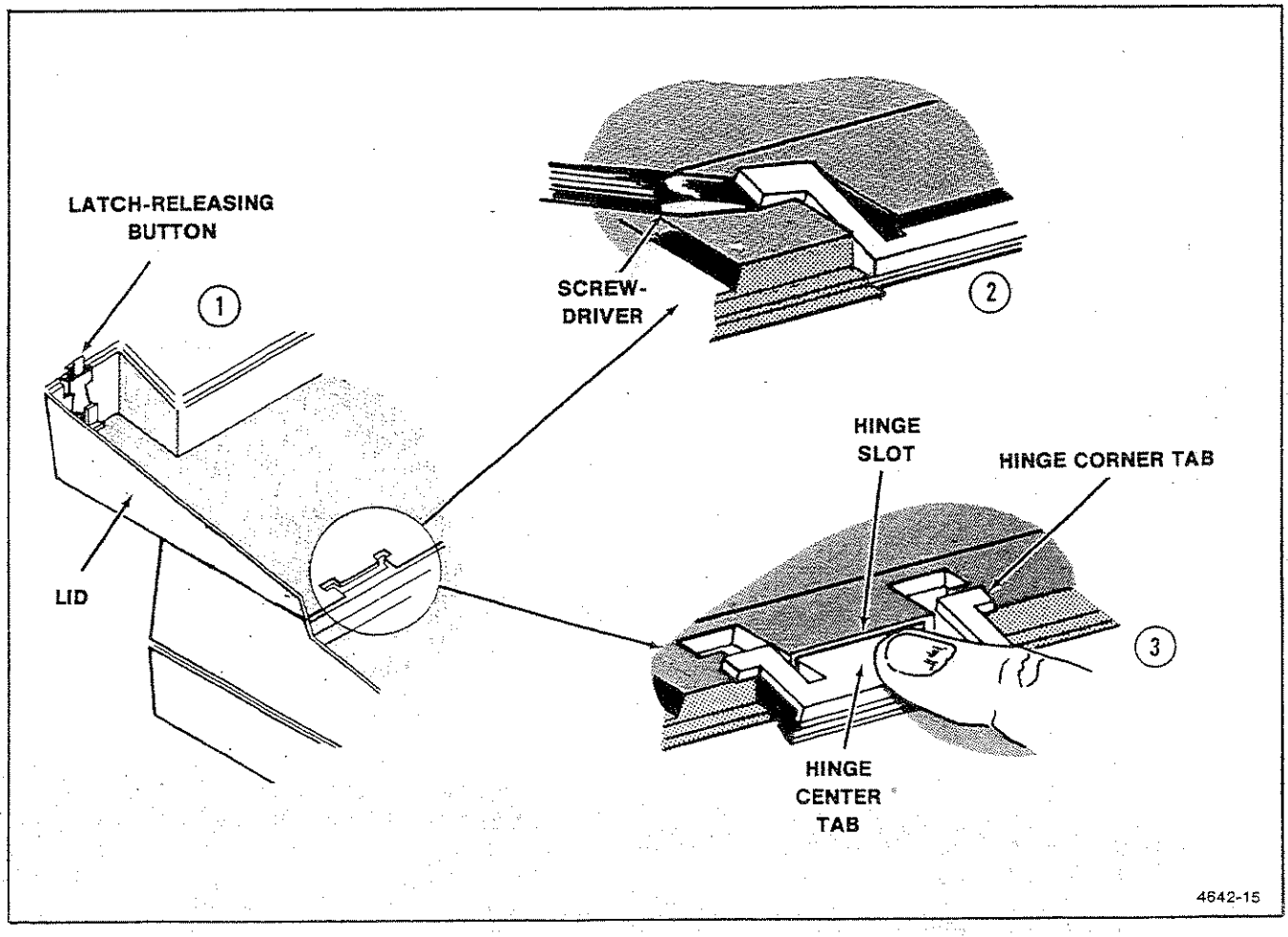


Figure 6-2. A6902B front cover removal.

Side Pouches and Top Cabinet Half

To remove the Side Pouches and Top Cabinet Half (including the Front Panel Lid), proceed as follows (refer to Figure 6-3):

1. Disconnect and remove the Probes. Unsnap the four snap fasteners on each Pouch (located at each end of the Pouch near the top and bottom edges). Carefully pull the Pouch away from the cabinet until free of the input probe lead.

2. Place the A6902B on its feet as shown in Figure 6-3 and remove six Torx® screws as shown.

3. Return the A6902B to a horizontal position and lift the Top Cabinet Half from the instrument.

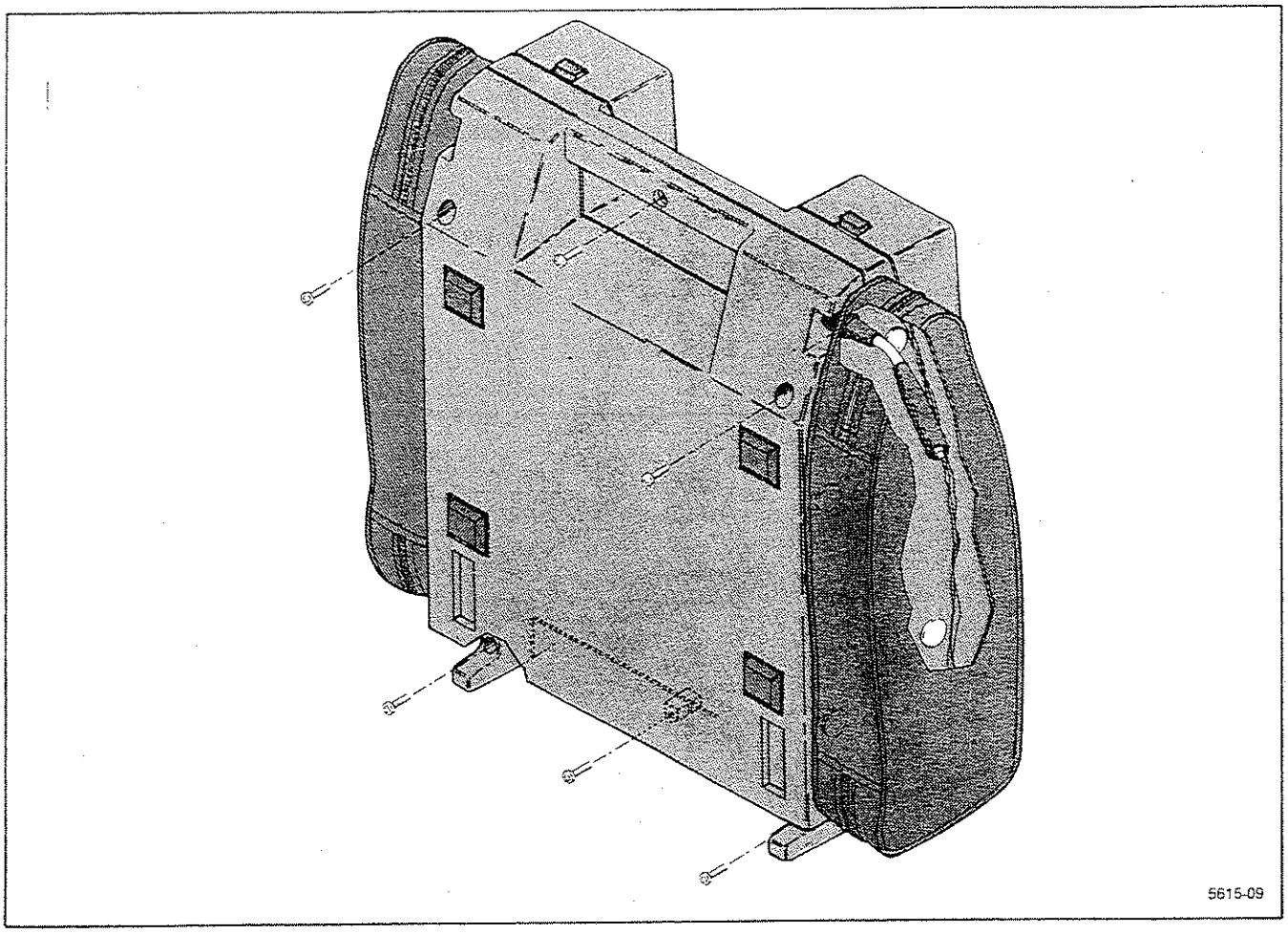


Figure 6-3. Top cabinet half removal.

Top Main Shield and Front Panel

NOTE

The Front Panel is a permanent part of the Top Main Shield and is not separately customer-available or replaceable.

To remove the Top Main Shield/Front Panel assembly, proceed as follows (refer to Figure 6-4):

1. Remove the Top Cabinet Half (see above).

2. Remove the two VOLTS/DIV knobs by gently pulling them away from the Front Panel.

3. Loosen the two Torx® screws (labeled "A") on each side of the Bottom Main Shield.

4. Remove the six Posidriv® screws (labeled "B") from around the perimeter of the top of the Front Panel, partially lift the panel and disconnect the indicator lamp, then lift the shield clear of the instrument. (During reassembly, make certain that all control shafts are properly located before attempting to seat the Main Shield/Front Panel Assembly.)

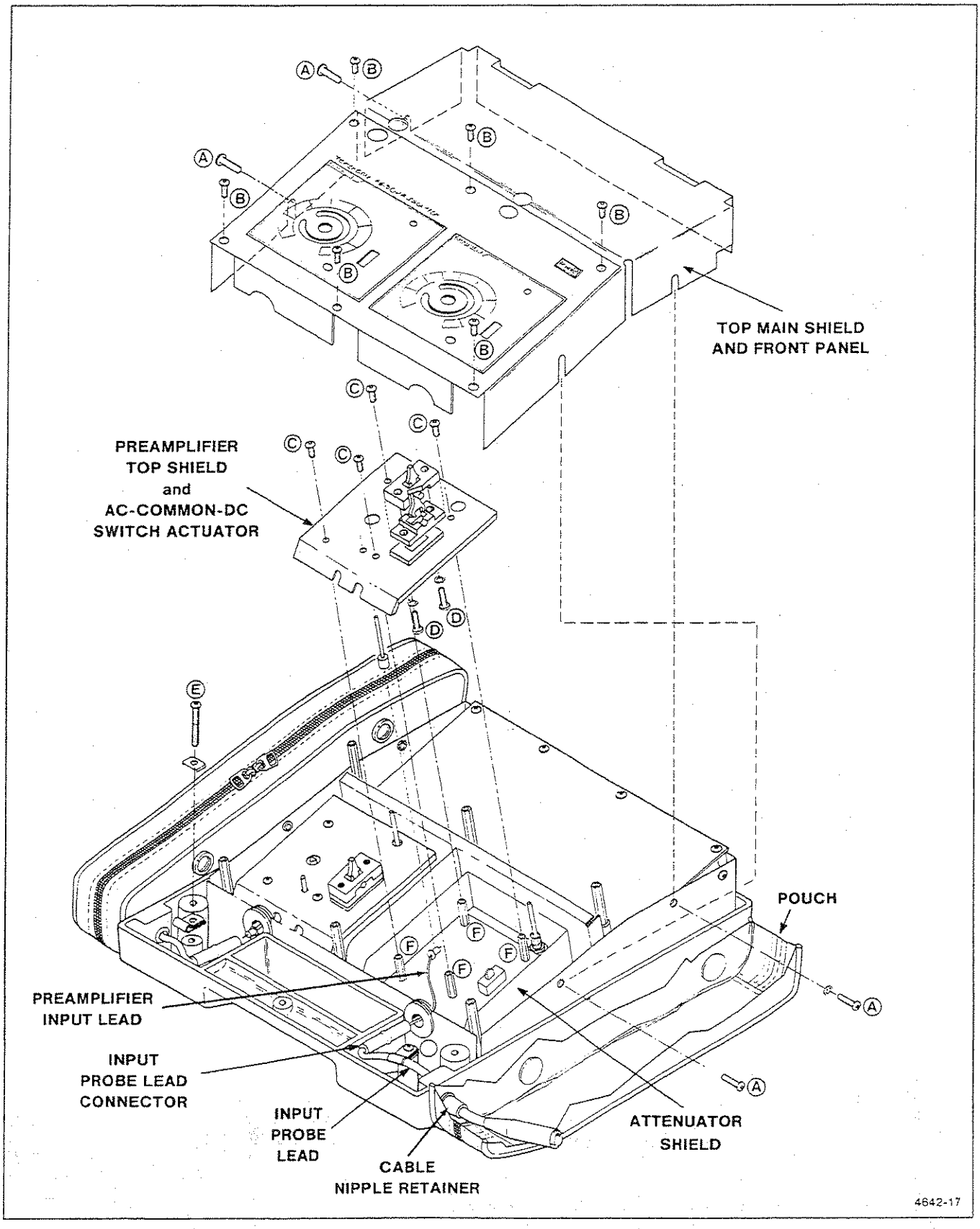


Figure 6-4. Removal of shield and preamplifier assembly.

Preamplifier Top Shield and AC-COMMON-DC Switch Actuator

1. The Preamplifier Top Shield can be removed by removing the four screws (labeled "C", Figure 6-4) from the top of the shield.

2. The AC-COMMON-DC Switch Actuator Assembly can be removed by removing the two black plastic screws and associated lock washers (Figure 6-4, labeled "D"), and lifting the Actuator Assembly from the cover.

Input Probe/Preamplifier Input Leads

1. Remove the Probe, Pouch, Top Cabinet Half, Top Main Shield and the appropriate Preamplifier Top Shield (see instructions above).

2. Remove the Torx® screw and the cable clamp (Figure 6-4, labeled "E"). Note the position of the cable clamp as reference for reinstallation.

3. Carefully disconnect the Preamplifier Input Lead from the Preamplifier Circuit Board by gently pulling straight up.

4. Thread the Preamplifier Input Lead with small rubber grommet through the large shield and grommet (during reinstallation, make certain that the grommets are properly installed to prevent damage to the cable assembly).

5. Firmly grasp the Cable Nipple Retainer (through which the lead assembly passes) and pull it through until it disengages from the cabinet half.

6. Separate the Input Probe Lead from the Preamplifier Input Lead by pulling them straight away from each other.

Preamplifier Circuit Board and Rotary-Switch Assembly

The Preamplifier Circuit Board is mounted on the Main Circuit Board, and can be removed independently of the Main Circuit Board. (If removal of the Main Circuit Board is necessary, the procedure can be found later in this section.)

To remove the Preamplifier Circuit Board Assembly:

1. Remove the Top Cabinet Half, Top Main Shield and the Preamplifier Top Shield.

2. Remove the four hexagonal stand-off posts (Figure 6-4, labeled "F"). (During reinstallation, torque the stand-off posts to 4 inch-pounds maximum.)

3. Remove the Preamplifier Circuit Board from the Main Circuit Board by carefully pulling straight up. (During reassembly, make certain that the long square-pins are properly aligned before attempting to seat the Preamplifier Circuit Board.)

To remove the Rotary Switch Assembly from the Preamplifier Circuit Board, proceed as follows:

NOTE

There are two sets of electrical contacts that mate with the Preamplifier Circuit Board (one on each side). There are also other small parts such as housings, the Detent Roller and Spring, and push-on nuts. While disassembling the Rotary Switch, exercise care not to drop, lose or damage any parts. Note the position of all parts as reference to reassembly.

4. Use diagonal cutters (WITH CAUTION TO AVOID CUTTING OFF THE SWITCH MOUNTING POST), or a similar tool to carefully pry off the three plastic push-on nuts which hold the Bottom Housing to the Switch Circuit Board (Figure 6-5).

5. Gently remove the Bottom Housing and Bottom Rotor.

6. Note the position of the Top Housing relative to the top of the Preamplifier Circuit Board (for reference during reassembly), and carefully remove the Top Housing, Top Rotor, and the Rotary Shaft from the Preamplifier Circuit Board.

7. Set aside the Detent Roller and remove the Detent Spring from the Top Housing. (The Detent Roller and the Detent Spring should be replaced only AFTER the switch assembly is reassembled and remounted on the Preamplifier board. Check and make certain of the proper position of the Rotary Shaft and Top Contact Rotor before reinstallation of the Detent Roller and Spring.) Clean the Switch Circuit Board and rotor contact areas on the Preamplifier Switch Board with isopropyl alcohol before reassembly.

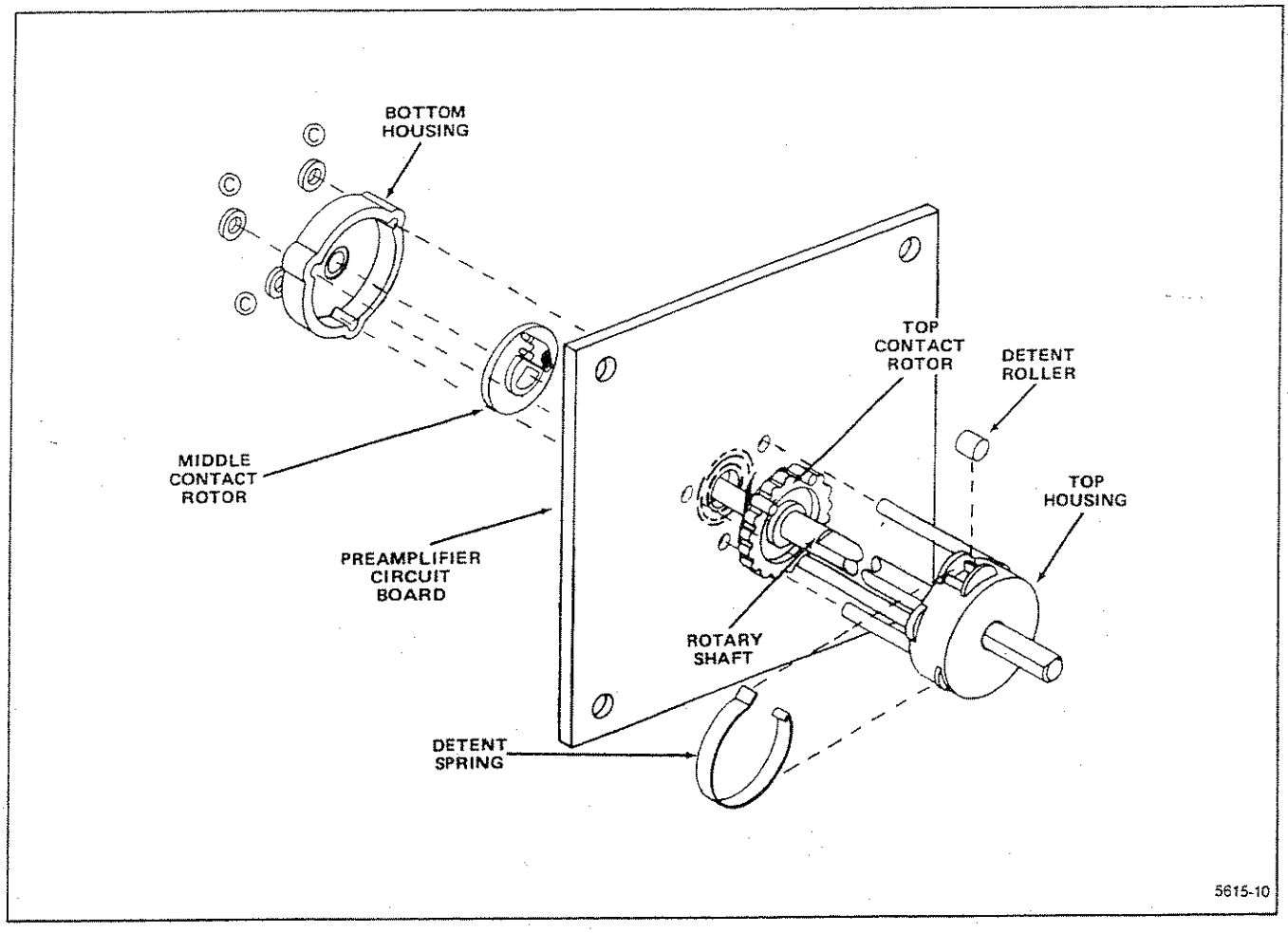


Figure 6-5. Preamplifier rotary switch assembly.

Main Circuit-Board/Rear Panel and Transformer Assembly

The Main Circuit Board/Rear Panel may be removed as a single unit (including Preamplifier Circuit Board and Rotary Switch Assembly), and can make bench-top troubleshooting more efficient. After removing the assembly, the power cord can be connected and the unit operated on an insulated surface. BEFORE ANY FURTHER DISASSEMBLY, MAKE CERTAIN THAT THE POWER IS DISCONNECTED FROM THE MAIN CIRCUIT-BOARD/REAR PANEL ASSEMBLY!

WARNING

To prevent electric shock when the Main circuit-board assembly is removed from the instrument cabinet, ensure that the Main circuit-board assembly is placed on a safely insulated surface before connecting the input power source.

To remove the Main Circuit-Board Assembly:

1. Remove the Top Cabinet Half and the Top Main Shield (see the above procedures. Should it become necessary to remove other parts or assemblies, refer to the appropriate procedure).

2. Disconnect the Preamplifier Input Leads from the Input Probe Leads by gently pulling them straight away from each other (refer to Figure 6-4).

3. Remove the six screws; two Torx® screws on the Main Circuit-Board, and two Posidriv® screws each on the side panel and rear panel (labeled "A" in Figure 6-6).

4. Remove the six hexagonal spacers (labeled "B" in Figure 6-6) using a 9/32-inch nut driver or wrench. During reinstallation, torque the spacers to 4 inch-pounds maximum.

5. Grasp the Back Panel Assembly and lift the Main Circuit-Board/Back Panel Assembly from the Bottom Main Shield, taking care not to damage connectors, panels or other components.

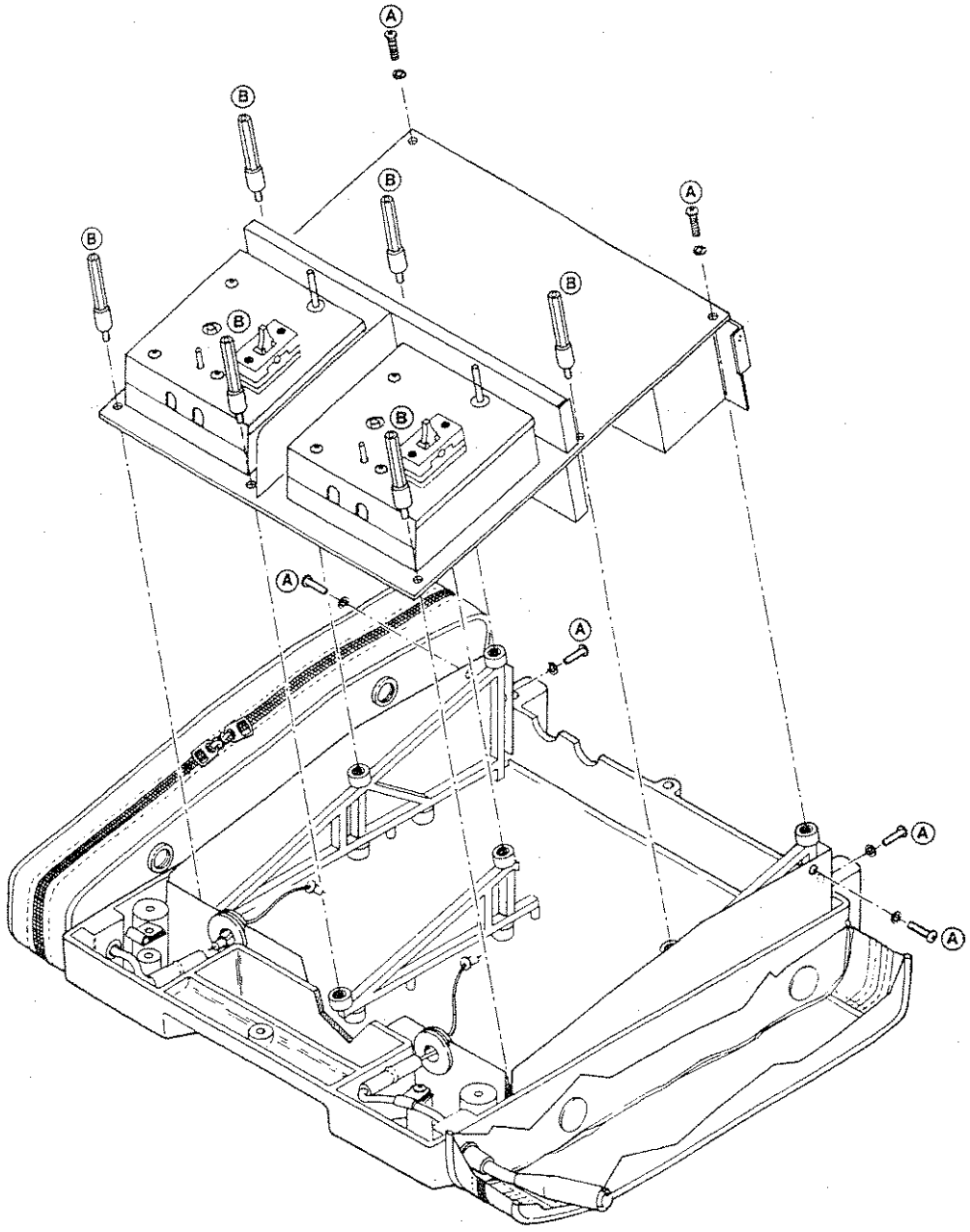


Figure 6-6. Removal of main circuit board/back subpanel assembly.

Preamplifier Section Bottom Covers

The Preamplifier Section Bottom Shields are part of the Main Circuit-Board Assembly. No components are located under these covers. If it becomes necessary to remove these shields to access transformer connections or connections of components mounted to the top of the Main Circuit Board, the four Posidriv® screws holding each cover (not illustrated), are accessible after removing the Main Circuit-Board Assembly (see the above procedure).

Rear Panel Assembly

The Rear Panel Assembly is a subpart of the Main Circuit-Board Assembly. The procedures for disassembly of the Rear Panel and its components assumes that the above procedure for the Main Circuit-Board removal has been followed. As in the above procedures, reinstallation and assembly can be achieved by reversing the disassembly steps.

To separate the Rear Panel Assembly from the Main Circuit-Board:

1. Remove the two Posidriv® self-tapping screws (labeled "A" in Figure 6-7).

2. Disconnect the Peltola Cables from the Rear Panel BNC connectors.

3. Unbolt Q2398 from the Rear Panel.

To remove a defective Power Switch/Line Selector Module:

NOTE

Carefully note the position of all wires to be disconnected to insure that they are properly located during reinstallation. Failure to do so may cause serious damage to the A6902B (refer to Figure 6-7 during reinstallation.)

4. Remove the two screws and carefully lift the Power Module straight up and clear of the wiring.

To remove either BNC Output Connector:

5. Disconnect the coaxial lead from the connector by carefully pulling it straight out of the threaded end.

6. Use a 1/2-inch wrench to remove the retaining nut.

7. Pull the BNC connector out of the Rear Panel Retainer and solder lug.

Bottom Main Shield and Circuit Board Brackets

To remove the Bottom Main Shield:

1. Remove the 7 Torx® screws and 1 Posidrive® screw which hold the Bottom Main Shield to the Lower Body Half.

2. Lift the Bottom Main Shield straight up and out of the Lower Body Half.

To remove the Circuit Board Brackets:

3. Remove the Torx® screws (which hold each Circuit Board Bracket), from the bottom of the Bottom Main Shield.

4. Remove each bracket by pushing the guide pins through the bottom of the Bottom Main Shield.

3000-V Input Probe Tip and Special BNC-to-Probe-Tip Adapter

The 3000-V Input Probe tip may be replaced either with a new tip or with special adapters. Observe voltage ratings on any new adapters installed. The BNC-to-probe-tip adapter should be used ONLY for testing and adjustment. Refer to Figure 6-8 and perform the following steps:

WARNING

The special BNC-to-probe-tip adapter is designed to fit only the 3000-V Input Probe bodies and should be used only when testing or adjusting the A6902B. To prevent an electrical shock hazard and equipment damage, do not use the adapter with voltages greater than 500 V (dc + peak ac).

1. Loosen the collar by rotating it in the direction shown until it disengages from the probe body.

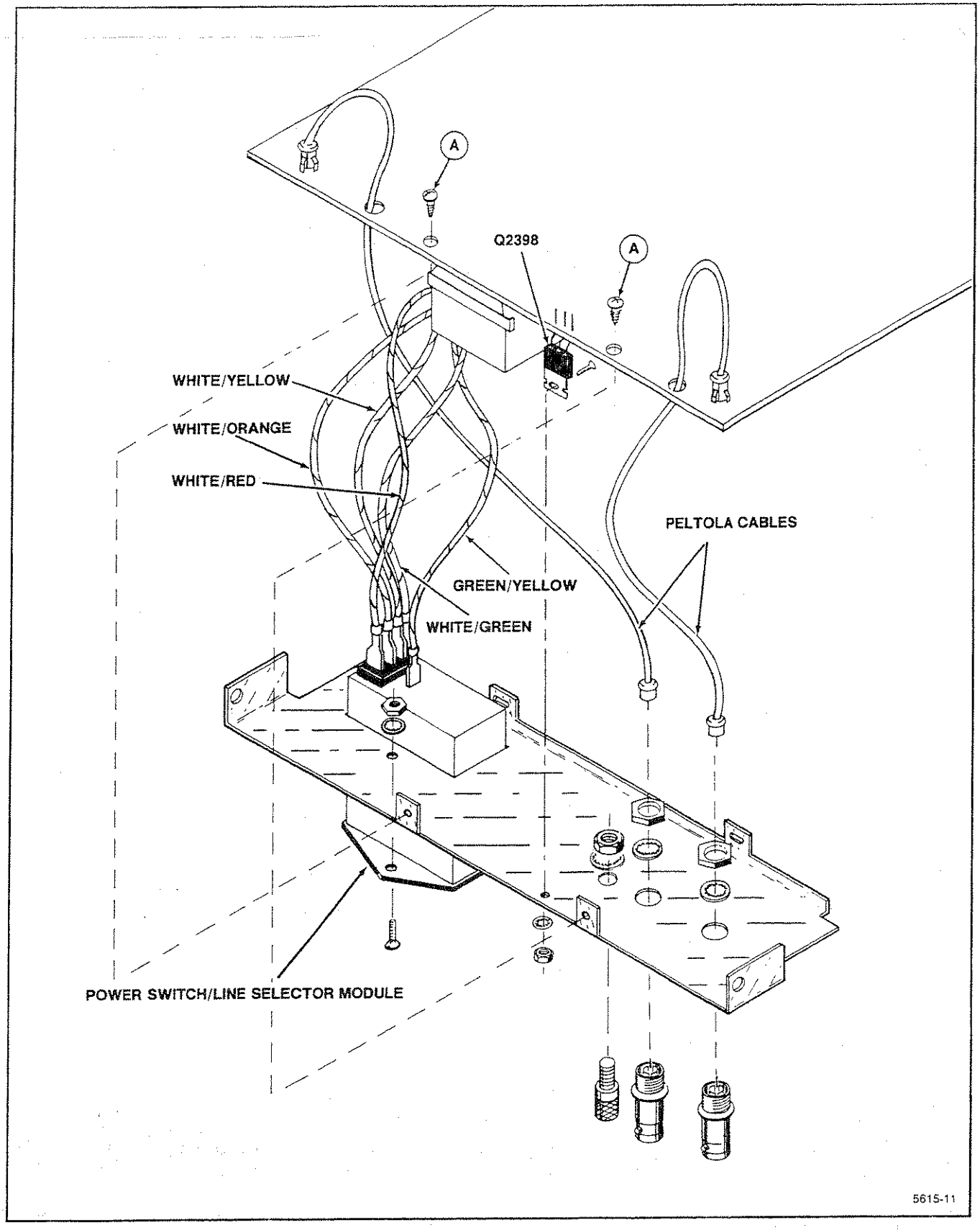


Figure 6-7. Rear subpanel disassembly.

2. Retract the slide to the position shown in Figure 6-8. The slide should stay in this position, and the spring inside the probe tip should cause the probe tip to return to its original position. If this does not occur, hold the slide in the retracted position and pull the probe tip away from the probe body until it reaches its original position.

3. Hold the probe body with one hand and rotate the probe tip in the direction shown until the probe tip completely disengages from the probe body. Proceed to step 4 if a new probe tip is to be installed; proceed to step 9 if the special BNC-to-probe-tip adapter is to be installed.

4. To install a new probe tip, hold the probe body, with the slide in the retracted position, and insert the new probe tip into the body as far as it will easily go.

5. Thread the probe tip onto the probe body until it seats snugly.

6. Move the slide completely forward and verify that there is approximately 1/8-inch clearance between the indexing guides on the probe tip shaft and the threaded portion of the probe body. If necessary, loosen the probe tip to achieve correct clearance.

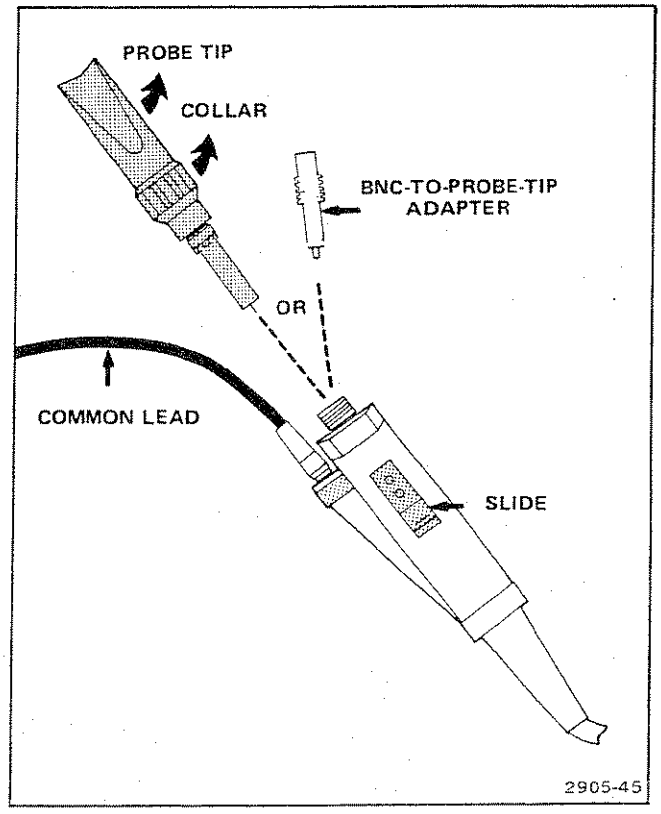


Figure 6-8. 3000-V probe tip adapter.

7. While holding the slide in the forward position, align the indexing guides (on the probe tip) with the guide slots (in the probe body) for the desired angular relationship. Press the probe tip into the probe body until the indexing guides completely engage the guide slots.

8. Thread the collar onto the probe body until the collar is snugly seated.

9. To install the special BNC-to-probe-tip adapter, hold the slide in the retracted position and insert the adapter into the probe body.

10. While holding the probe body with one hand and the BNC-to-probe-tip adapter in the other, move the slide completely forward, engaging the adapter and leaving only the ribbed area and the BNC connector part of the adapter exposed.

To remove the special adapter, use the following steps:

11. While holding the probe body with one hand and the BNC-to-probe-tip adapter in the other, retract and hold the slide to the position shown in Figure 6-8.

12. Pull the adapter from the probe body.

INSTRUMENT REPACKAGING

Should reshipment become necessary, reuse the original carton in which your instrument was shipped. If original packaging is unfit for use or is not available, repackage the instrument as follows:

1. Obtain a corrugated cardboard carton having inside dimensions of no less than six inches more than the instrument dimensions; this will allow for cushioning. Use a carton having a test strength of at least 200 pounds.

2. If the instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag containing the following information:

a. Owner's name and address, with the name of an individual at your firm that can be contacted.

b. Complete instrument serial number.

c. Description of the services required.

3. Surround the instrument with protective polyethylene sheeting.

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

5. Seal carton with shipping tape or industrial stapler.

OPTIONS AND ACCESSORIES

STANDARD ACCESSORIES

1	Pouch	016-0708-00
2	Probes, Input, 500 V (with Accessories)	010-0411-15
2	Tips, Hook	013-0107-06
2	Sleeves, Ground Cover	166-0404-01
2	Leads, Ground	196-3286-00
1	Fuse, 0.3 A T/SB (Standard)	159-0029-00
1	Fuse, 0.15 A T/SB (Options A1 to A5)	159-0054-00
1	Manual, Operators	070-5614-00
2	Cables, Output, 50 Ω	012-0204-00
1	Cable Assembly, Power	161-0104-00
1	IC Test Tip	015-0201-06

OPTIONAL POWER CORDS

(Descriptions of various power cords may be found in Figure 2-1.)

Option A1, Universal European, 2.5 meters	161-0104-06
Option A2, United Kingdom, 3 meters	161-0133-00
Option A3, Australia, 3 meters	161-0135-00
Option A4, North American, 3 meters	161-0134-00
Option A5, Switzerland, 2.5 meters	161-0154-00

OPTIONAL ACCESSORIES

1	Manual, Service	070-5615-01
2	Probes, Input, 3,000-V	010-0409-01
1	Adapter, BNC-to-Probe Tip (for 3000-V Probes)	015-0405-00
1	Banana-to-Probe Tip Adapter Kit (for 3000-V Probes)	013-0224-00
1	Adapter Kit, BNC-to-Probe tip (for 500-V Probes)	013-0084-01
1	Cable Marker Band (White)	334-2794-01
1	Cable Marker Band (Green)	334-2794-07

OPTIONS

Option 2: UL version includes (2) 3-kV Probes and (2) Common Leads.

Option 9: UL version includes (2) 3-kV Probes, (2) Common Leads, and (2) Banana-to-Probe Tip Adapters.

Option 10: VDE version includes (2) 1.5-kV Probes and (2) Common Leads.

Option 19: VDE version includes (2) 1.5-kV Probes, (2) Common Leads, and (2) Banana-to-Probe Tip Adapters.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

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

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

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

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

LIST OF ASSEMBLIES

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

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

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

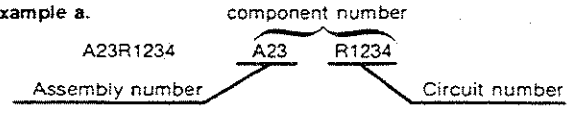
ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

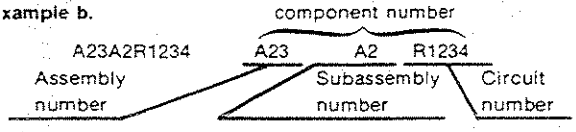
A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.



Read: Resistor 1234 of Assembly 23

Example b.



Read: Resistor 1234 of Subassembly 2 of Assembly 23

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

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

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

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

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

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

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

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

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

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

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

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

indicates actual manufacturers part number.

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
D5243	ROEDERSTEIN E SPEZIALFABRIK FUER KONDENSATOREN GMBN	LUDMILLASTRASSE 23–25	8300 LANDSHUT GERMANY
TK0891	MICONICS	1 FAIRCHILD AVE	PLAINVIEW NY 11803
TK1727	PHILIPS NEDERLAND BV AFD ELONCO	POSTBUS 90050	5600 PB EINDHOVEN THE NETHERLANDS
TK1743	UNITRODE (UK) LTD	6 CRESSWELL PARK BLACKHEATH	LONDON SE 3 9RD ENGLAND
0GV52	SCHAFFNER	325 LEHIGH	UNION NJ 07083
0H1N5	MARCON AMERICA CORP	998 FIRST EDGE DRIVE	VERNON HILLS IL 60061
0JR03	ZMAN MAGNETICS INC	7633 S 180th	KENT WA 98032
0MS63	QUALITY TECHNOLOGIES CORP	610 N MARY AVENUE	SUNNYVALE CA 94086
0P569	BARKER MICROFARADS INC	PO BOX 697	HILLSVILLE VA 24343
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655303	DALLAS TX 75262–5303
03911	CLAIREX ELECTRONICS DIV OF CLAIREX CORP	560 S THIRD AVE	MT VERNON NY 10550
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008–4229
1CH66	PHILIPS SEMICONDUCTORS	811 E ARQUES AVENUE PO BOX 3409	SUNNYVALE CA 94088–3409
1W344	UNITED CHEMI–CON INC	9801 W HIGGINS SUITE 430	ROSEMONT IL 60018–4704
12697	CLAROSTAT MFG CO INC	LOWER WASHINGTON ST	DOVER NH 03820
14552	MICROSEMI CORP	2830 S FAIRVIEW ST	SANTA ANA CA 92704–5948
14936	GENERAL INSTRUMENT CORP DISCRETE SEMI CONDUCTOR DIV	600 W JOHN ST	HICKSVILLE NY 11802
17856	SILICONIX INC	2201 LAURELWOOD RD	SANTA CLARA CA 95054–1516
18796	MURATA ERIE NORTH AMERICAN INC STATE COLLEGE OPERATIONS	1900 W COLLEGE AVE	STATE COLLEGE PA 16801–2723
19701	PHILIPS COMPONENTS DISCRETE PRODUCTS DIV RESISTIVE PRODUCTS FACILITY AIRPORT ROAD	PO BOX 760	MINERAL WELLS TX 76067–0760
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
24165	SPRAGUE ELECTRIC CO	267 LOWELL ROAD	HUDSON NH 03051
24546	BRADFORD ELECTRONICS	550 HIGH ST	BRADFORD PA 16701–3737
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051–0606
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507–2114
34371	HARRIS CORP HARRIS SEMICONDUCTOR PRODUCTS GROUP	200 PALM BAY BLVD PO BOX 883	MELBOURNE FL 32919

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Mfr. Code	Manufacturer	Address	City, State, Zip Code
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195–4526
59660	TUSONIX INC	7741 N BUSINESS PARK DR PO BOX 37144	TUCSON AZ 85740–7144
61857	SAN–0 INDUSTRIAL CORP	91–3 COLIN DRIVE	HOLBROOK NY 11741
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
73138	BECKMAN INDUSTRIAL CORP BECKMAN ELECTRONIC TECHNOLOGIES SUB OF EMERSON ELECTRIC	4141 PALM ST	FULLERTON CA 92635
75498	MULTICOMP INC	3005 SW 154TH TERRACE #3	BEAVERTON OR 97006
79727	C–W INDUSTRIES	130 JAMES WAY	SOUTHAMPTON PA 18966–3818
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
80031	MEPCO/ELECTRA INC	22 COLUMBIA RD	MORRISTOWN NJ 07960
84411	AMERICAN SHIZUKI CORP OGALLALA OPERATIONS	301 WEST O ST	OGALLALA NE 69153–1844
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601–3632

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-9089-02	B021512	B022124	CIRCUIT BD ASSY:PREAMP	80009	670908902
A1	670-9089-03	B022125		CIRCUIT BD ASSY:PREAMP	80009	670908903
A2	670-9088-02			CIRCUIT BD ASSY:MAIN	80009	670908802
A1	670-9089-02	B021512	B022124	CIRCUIT BD ASSY:PREAMP	80009	670908902
A1	670-9089-03	B022125		CIRCUIT BD ASSY:PREAMP	80009	670908903
A1AT1040	307-1013-03			ATTENUATOR,FXD:10X	80009	307101303
A1AT2040	307-1013-03			ATTENUATOR,FXD:10X	80009	307101303
A1AT2048	307-1013-03			ATTENUATOR,FXD:10X	80009	307101303
A1AT3040	307-1013-03			ATTENUATOR,FXD:10X	80009	307101303
A1C1005	290-0524-00			CAP,FXD,ELCTLT:4.7UF,20%,10V	D5243	ETP-1B 4.7UF 10
A1C1019	290-0524-00			CAP,FXD,ELCTLT:4.7UF,20%,10V	D5243	ETP-1B 4.7UF 10
A1C1025	281-0219-00			CAP,VAR,CER DI:5-35PF,+2 -2.5%,100V	59660	513-O11 A 5-35
A1C1026	283-0193-00			CAP,FXD,CER DI:510PF,2%,100V	04222	SR201A511GAA
A1C1029	283-0107-00			CAP,FXD,CER DI:51PF,5%,200V	04222	SR292A510JAA
A1C1030	281-0851-00			CAP,FXD,CERAMIC:MLC;180PF,5%,100VDC	04222	SA101A181JAA
A1C1031	283-0154-00			CAP,FXD,CER DI:22PF,5%,50V	04222	SR155A220JAA
A1C1040				(PART OF A1AT1040)		
A1C1041				(PART OF A1AT1040)		
A1C2010	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A1C2040				(PART OF A1AT2040)		
A1C2041				(PART OF A1AT2040)		
A1C2048				(PART OF A1AT2048)		
A1C2049				(PART OF A1AT2048)		
A1C3010	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A1C3011	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A1C3013	283-0331-00			CAP,FXD,CER DI:43PF,2%,100V	18796	DD106B10NP0430J
A1C3022	283-0645-00			CAP,FXD,MICA DI:790PF,1%,300V	TK0891	RDM15FC791F03
A1C3040				(PART OF A1AT3040)		
A1C3041				(PART OF A1AT3040)		
A1C4011	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A1C4029	281-0851-00			CAP,FXD,CERAMIC:MLC;180PF,5%,100VDC	04222	SA101A181JAA
A1C4031	283-0193-00			CAP,FXD,CER DI:510PF,2%,100V	04222	SR201A511GAA
A1C4032	283-0213-00			CAP,FXD,CER DI:300PF,5%,100V	04222	SR201A301JAA
A1C4040	281-0187-00			CAP,VAR,PLASTIC:4-40PF,250V	80031	2810D00440QN02F
A1C4041	281-0787-00			CAP,FXD,CER DI:15PF,5%,500V	04222	MA407A150JAA
A1C4048	283-0676-00			CAP,FXD,MICA DI:82PF,1%,500V	TK0891	RDM10ED820F03
A1C4049	285-0697-06			CAP,FXD,PLASTIC:0.1UF,+5-15%,600V	75498	ORDER BY DESC
A1CR3020	152-0323-01			DIODE,SIG:,;50V,1.25VF,225MA,25PA,2.0PF,1.0 US	14552	MT5127

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1J4030	131-1003-00			CONN,RF JACK:PCB,PELTOLA;FEMALE,STR,0.141 ID,0.277 H X 0.094 TAIL,GOLD,0.295 PCB,GRD SHELL	80009	131100300
A1LR1043	108-0331-00			COIL,RF:FIXED,758NH	0JR03	108-0331-00
A1Q2010	151-1090-02			TRANSISTOR,SIG:JFET,N-CH;DUAL,3.5V,25MA, 6.5MS,VGS(1-2)<50MV	17856	DN1989/DN399
A1Q4011	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER	04713	2N3904
A1R1025	321-0165-00			RES,FXD,FILM:511 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-5
A1R1026	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A1R1027	321-0808-07			RES,FXD,FILM:300 OHM,0.1%,0.125W,TC=T9	19701	5033RE300R0B
A1R1028	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R1029	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R1030	315-0914-00			RES,FXD,FILM:910K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R1040	301-0121-00			RES,FXD,FILM:120 OHM,5%,0.5W	TK1727	SFR30 2322-182-
A1R1041	311-1567-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3352T-1-101
A1R1042	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R2010	321-0030-00			RES,FXD,FILM:20.0 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A1R2011	311-1639-00			RES,VAR,NONWW:TRMR,20OHM,10%,0.5W CERMET	73138	68WR20-205B
A1R2012	321-0001-00			RES,FXD,FILM:10 OHM,1%,0.125W,TC=T0	91637	CMF55116G10R00F
A1R2019	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A1R2045	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R3010	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R3011	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R3012	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R3013	321-0306-00			RES,FXD,FILM:15.0K OHM,1%,0.125W,TC=T0	19701	5043ED15K00F
A1R3014	321-0260-00			RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
A1R4011	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R4021	321-0143-00			RES,FXD,FILM:301 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A1R4023	321-0080-00			RES,FXD,FILM:66.5 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A1R4029	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R4030	321-0481-00			RES,FXD,FILM:1M OHM,1%,0.125W,TC=T0	TK1727	2322-151-1M
A1R4031	311-0643-00			RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3329H-L58-500
A1R4032	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1R4048	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A1S2020	263-0110-00			SWITCH,ROTARY:MINI PANCAKE	80009	263011000
A1S2040	260-0984-01	B021512	B022124	SWITCH,SLIDE:DPTT W/PLASTIC PLATE MOLDED BACK	79727	G-128-S-0095
A1S2040	260-0984-00	B022125		SWITCH,SLIDE:DPTT,0.5A,125V	79727	G-128-S-0012
A1U4020	156-1294-00			IC,LINEAR:BIPOLAR,TRANSISTOR ARRAY;FIVE, NPN,INDEPENDENT,15V,20MA,1.0GHZ	34371	CA3127E-98
A2	670-9088-02			CIRCUIT BD ASSY:MAIN	80009	670908802
A2C2119	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2C2121	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2123	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2124	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2130	283-0210-00			CAP,FXD,CER DI:0.0056UF,20%,100V	04222	SR301C562MAA
A2C2131	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2149	283-0291-00			CAP,FXD,CER DI:25PF,10%,6000V	18796	DHR23NP0250KGKV
A2C2163	283-0024-00			CAP,FXD,CERAMIC:MLC;0.1UF,20%,50V,X7R,0.200	04222	SR215C104MAA
A2C2164	285-0901-00			CAP,FXD,PLASTIC:0.047UF,5%,50V	84411	TEK34 .047 5 50
A2C2175	283-0363-00			CAP,FXD,CER DI:2.2PF,0.25%,2KV,DIP PHEN DISC	24165	40C311A5
A2C2176	283-0024-00			CAP,FXD,CERAMIC:MLC;0.1UF,20%,50V,X7R,0.200	04222	SR215C104MAA
A2C2178	281-0814-00			CAP,FXD,CERAMIC:MLC;100 PF,10%,100V	TK1743	CGB101KEN
A2C2184	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2190	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2193	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2194	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2196	283-0363-00			CAP,FXD,CER DI:2.2PF,0.25%,2KV,DIP PHEN DISC	24165	40C311A5
A2C2220	290-0524-00			CAP,FXD,ELCTLT:4.7UF,20%,10V	D5243	ETP-1B 4.7UF 10
A2C2221	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2228	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2229	290-0524-00			CAP,FXD,ELCTLT:4.7UF,20%,10V	D5243	ETP-1B 4.7UF 10
A2C2230	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2274	283-0238-00			CAP,FXD,CER DI:0.01UF,10%,50V	04222	SR075C103KAA
A2C2282	290-0942-00			CAP,FXD,ELCTLT:100UF,+100-10%,25V,,ALUMINUM	0H1N5	CEUFM1E101
A2C2283	290-0755-00			CAP,FXD,ELCTLT:100UF,+50%-20%,10WVDC	0H1N5	CEUSM1C101
A2C2290	281-0755-00			CAP,FXD,CER DI:1.8PF,+/-0.1PF,500V TUBULAR	04222	MA107A1R8CAA
A2C2291	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	0H1N5	CEUSM1E100
A2C2328	290-0134-00			CAP,FXD,TANT:DRY;22UF,20%,15V,TANT OXIDE, 0.305 X 0.778	0P569	150D226X0015B2
A2C2329	290-0134-00			CAP,FXD,TANT:DRY;22UF,20%,15V,TANT OXIDE, 0.305 X 0.778	0P569	150D226X0015B2
A2C2360	290-1108-00			CAP,FXD,ALUM:;1000UF,20%,10V,1.062 X 0.530	0H1N5	CESFM1A102
A2C2361	290-1108-00			CAP,FXD,ALUM:;1000UF,20%,10V,1.062 X 0.530	0H1N5	CESFM1A102
A2C2374	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2375	283-0119-00			CAP,FXD,CER DI:2200PF,5%,200V	59660	855-XXXY5EO222J
A2C2384	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2430	283-0213-00			CAP,FXD,CER DI:300PF,5%,100V	04222	SR201A301JAA
A2C2492	290-0942-00			CAP,FXD,ELCTLT:100UF,+100-10%,25V,,ALUMINUM	0H1N5	CEUFM1E101
A2C2560	290-1108-00			CAP,FXD,ALUM:;1000UF,20%,10V,1.062 X 0.530	0H1N5	CESFM1A102
A2C2561	290-1108-00			CAP,FXD,ALUM:;1000UF,20%,10V,1.062 X 0.530	0H1N5	CESFM1A102
A2C2619	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2621	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2623	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2C2624	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2630	283-0210-00			CAP,FXD,CER DI:0.0056UF,20%,100V	04222	SR301C562MAA
A2C2631	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2649	283-0291-00			CAP,FXD,CER DI:25PF,10%,6000V	18796	DHR23NP0250KGKV
A2C2664	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A2C2675	290-0919-00			CAP,FXD,ALUM:;470UF,+50-20%,35V	1W344	KME35VB471M10X2
A2C2692	290-0984-00			CAP,FXD,ELCTLT:1000UF,20%,50V	1W344	SME50T102M16X25
A2C2720	290-0524-00			CAP,FXD,ELCTLT:4.7UF,20%,10V	D5243	ETP-1B 4.7UF 10
A2C2721	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2728	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2729	290-0524-00			CAP,FXD,ELCTLT:4.7UF,20%,10V	D5243	ETP-1B 4.7UF 10
A2C2730	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A2C2772	285-0901-00			CAP,FXD,PLASTIC:0.047UF,5%,50V	84411	TEK34 .047 5 50
A2C2781	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A2C2790	290-0919-00			CAP,FXD,ALUM:;470UF,+50-20%,35V	1W344	KME35VB471M10X2
A2C2828	290-0134-00			CAP,FXD,TANT:DRY;22UF,20%,15V,TANT OXIDE, 0.305 X 0.778	0P569	150D226X0015B2
A2C2829	290-0134-00			CAP,FXD,TANT:DRY;22UF,20%,15V,TANT OXIDE, 0.305 X 0.778	0P569	150D226X0015B2
A2C2874	283-0024-00			CAP,FXD,CERAMIC:MLC;0.1UF,20%,50V,X7R,0.200	04222	SR215C104MAA
A2C2890	283-0363-00			CAP,FXD,CER DI:2.2PF,0.25%,2KV,DIP PHEN DISC	24165	40C311A5
A2C2893	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2894	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2930	283-0213-00			CAP,FXD,CER DI:300PF,5%,100V	04222	SR201A301JAA
A2C2960	283-0024-00			CAP,FXD,CERAMIC:MLC;0.1UF,20%,50V,X7R,0.200	04222	SR215C104MAA
A2C2975	281-0786-00			CAP,FXD,CERAMIC:MLC;150PF,10%,100V,0.100 X 0.170	04222	SA101A151KAA
A2C2981	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2983	283-0363-00			CAP,FXD,CER DI:2.2PF,0.25%,2KV,DIP PHEN DISC	24165	40C311A5
A2C2990	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2991	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2CR2190	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR2283	152-0400-00			DIODE,RECT:,FAST RCVRY;400V,1A,200NS	14552	MB2501
A2CR2360	152-0400-00			DIODE,RECT:,FAST RCVRY;400V,1A,200NS	14552	MB2501
A2CR2361	152-0400-00			DIODE,RECT:,FAST RCVRY;400V,1A,200NS	14552	MB2501
A2CR2384	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR2385	152-0400-00			DIODE,RECT:,FAST RCVRY;400V,1A,200NS	14552	MB2501
A2CR2495	152-0585-00			SEMICOND DVC,DI:RECT,SI,200V,1A	14936	W02G-1
A2CR2560	152-0400-00			DIODE,RECT:,FAST RCVRY;400V,1A,200NS	14552	MB2501
A2CR2561	152-0400-00			DIODE,RECT:,FAST RCVRY;400V,1A,200NS	14552	MB2501
A2CR2675	152-0585-00			SEMICOND DVC,DI:RECT,SI,200V,1A	14936	W02G-1
A2CR2894	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427

Component Number	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2DS2121	150-1043-00			DIODE,OPTO:,LED;RED,635NM,1.5MCD @ IF=20MA	0MS63	MV5774C
A2DS2621	150-1043-00			DIODE,OPTO:,LED;RED,635NM,1.5MCD @ IF=20MA	0MS63	MV5774C
A2F2581	159-0205-00			FUSE,WIRE LEAD:1A,125V,5 SECONDS	61857	SP7-1A
A2F2582	131-0566-00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A2F2620	159-0205-00			FUSE,WIRE LEAD:1A,125V,5 SECONDS	61857	SP7-1A
A2J2121	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2122	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2131	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2132	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2190	131-1003-00			CONN,RF JACK:PCB,PELTOLA;FEMALE,STR,0.141 ID,0.277 H X 0.094 TAIL,GOLD,0.295 PCB,GRD SHELL	80009	131100300
A2J2231	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2621	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2622	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2631	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2632	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2633	131-0592-00			TERMINAL,PIN:PCB/PRESSFIT,;MALE,STR,0.025 SQ,0.763 MLG X 0.137 TAIL,0.900 L,PHOS BRZ,50 GOLD	22526	47353-000
A2J2995	131-1003-00			CONN,RF JACK:PCB,PELTOLA;FEMALE,STR,0.141 ID,0.277 H X 0.094 TAIL,GOLD,0.295 PCB,GRD SHELL	80009	131100300
A2L2131	108-0598-00			COIL,RF:FIXED,200UH	0JR03	108-0598-00
A2L2188	114-0222-00			COIL,RF:VARIABLE,2-6UH ON FORM 276-0231-00 W/MODIFIED LEADS	0JR03	114-0222-00
A2L2189	114-0222-00			COIL,RF:VARIABLE,2-6UH ON FORM 276-0231-00 W/MODIFIED LEADS	0JR03	114-0222-00
A2L2231	108-0598-00			COIL,RF:FIXED,200UH	0JR03	108-0598-00
A2L2349	114-0343-00			COIL,RF:VARIABLE,200-400UH ON FORM 276-0096-00	0JR03	114-0343-00

Component Number	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2L2395	108-0422-00			COIL,RF:FIXED,80UH	0JR03	108-0422-00
A2L2631	108-0598-00			COIL,RF:FIXED,200UH	0JR03	108-0598-00
A2L2731	108-0598-00			COIL,RF:FIXED,200UH	0JR03	108-0598-00
A2L2849	114-0343-00			COIL,RF:VARIABLE,200-400UH ON FORM 276-0096-00	0JR03	114-0343-00
A2L2881	114-0222-00			COIL,RF:VARIABLE,2-6UH ON FORM 276-0231-00 W/MODIFIED LEADS	0JR03	114-0222-00
A2L2889	114-0222-00			COIL,RF:VARIABLE,2-6UH ON FORM 276-0231-00 W/MODIFIED LEADS	0JR03	114-0222-00
A2P2950	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE (QUANTITY OF 2)	22526	48283-018
A2Q2180	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER	04713	2N3904
A2Q2181	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER	04713	2N3904
A2Q2182	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2Q2194	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2Q2195	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2Q2230	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2Q2290	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2Q2337	151-0447-00			TRANSISTOR:NPN,SI,TO-72	04713	SRF502
A2Q2338	151-0447-00			TRANSISTOR:NPN,SI,TO-72	04713	SRF502
A2Q2381	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER	04713	2N3904
A2Q2398	151-1127-00			TRANSISTOR,PWR:MOS,N-CH;60V,4.0A,0.6 OHM	34371	IRF510R
A2Q2730	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2Q2837	151-0447-00			TRANSISTOR:NPN,SI,TO-72	04713	SRF502
A2Q2838	151-0447-00			TRANSISTOR:NPN,SI,TO-72	04713	SRF502
A2Q2889	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2Q2891	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER	04713	2N3904
A2Q2894	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER	04713	2N3904
A2Q2988	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2Q2989	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER	04713	2N3906
A2R2118	321-0260-00			RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K99CF

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2R2119	321-0147-00			RES,FXD,FILM:332 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2122	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2123	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2125	321-0135-00			RES,FXD,FILM:249 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-2
A2R2126	315-0161-00			RES,FXD,FILM:160 OHM,5%,0.25W	19701	5043CX160ROJ
A2R2130	311-1944-00			RES,VAR,NONWW:TRMR,1K OHM,10%,0.5W	32997	3299W-R27-102
A2R2131	321-0159-00			RES,FXD,FILM:442 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2134	321-0159-00			RES,FXD,FILM:442 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2156	311-1895-00			RES,VAR,NONWW:TRMR,2K OHM,10%,0.5,LINEAR	32997	3299W-1-202
A2R2159	321-0159-00			RES,FXD,FILM:442 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2161	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	TK1727	SFR25 2322-182-
A2R2162	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	TK1727	SFR25 2322-182-
A2R2163	311-2197-00			RES,VAR,NONWW:TRMR,10 OHM,10%,0.5WLINEAR,20	73138	68WR'10-175A
A2R2165	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5043ED10K00F
A2R2166	321-0193-00			RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-1
A2R2172	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5043ED10K00F
A2R2173	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5043ED10K00F
A2R2174	321-0069-00			RES,FXD,FILM:51.1 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2175	321-0069-00			RES,FXD,FILM:51.1 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2178	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5043ED10K00F
A2R2181	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2183	321-0164-00			RES,FXD,FILM:499 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2185	321-0172-00			RES,FXD,FILM:604 OHM,1%,0.125W,TC=T0	91637	CMF55116D604ROF
A2R2186	321-0150-00			RES,FXD,FILM:357 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2187	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2188	311-1561-00			RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3352T-DY7-252
A2R2189	311-1561-00			RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3352T-DY7-252
A2R2190	321-0164-00			RES,FXD,FILM:499 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2191	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2192	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2193	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2194	321-0143-00			RES,FXD,FILM:301 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2195	321-0172-00			RES,FXD,FILM:604 OHM,1%,0.125W,TC=T0	91637	CMF55116D604ROF
A2R2196	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W,,MI	TK1727	SFR25 2322-181-
A2R2197	321-0150-00			RES,FXD,FILM:357 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2221	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2233	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2234	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2235	311-1943-00			RES,VAR,NONWW:TRMR,10K OHM,10%,0.5W	73138	68WR10K-10B
A2R2236	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2R2242	311-1567-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3352T-1-101
A2R2243	311-1568-00			RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3352T-1-500
A2R2272	311-1563-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3352T-DY7-102
A2R2274	315-0274-00			RES,FXD,FILM:270K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2275	315-0273-00			RES,FXD,FILM:27K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2276	321-0310-00			RES,FXD,FILM:16.5K OHM,1%,0.125W,TC=T0	19701	5043ED16K50F
A2R2280	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2281	311-1944-00			RES,VAR,NONWW:TRMR,1K OHM,10%,0.5W	32997	3299W-R27-102
A2R2283	315-0390-00			RES,FXD,FILM:39 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2289	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2290	321-0155-00			RES,FXD,FILM:402 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2331	321-0105-00			RES,FXD,FILM:121 OHM 1%,0.125W,TC=T0	TK1727	MR25 2322-151-1
A2R2332	321-0105-00			RES,FXD,FILM:121 OHM 1%,0.125W,TC=T0	TK1727	MR25 2322-151-1
A2R2333	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2339	311-1637-00			RES,VAR,NONWW:PNL,10K OHM,20%,0.5W	12697	CM43463
A2R2374	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2383	315-0752-00			RES,FXD,FILM:7.5K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2384	315-0332-00			RES,FXD,FILM:3.3K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2385	301-0221-00			RES,FXD,FILM:220 OHM,5%,0.5W	TK1727	SFR30 2322-182-
A2R2388	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2391	308-0808-00			RES,FXD,WW:0.15 OHM,5%,3W	91637	LVR-3 0.15 OHM
A2R2435	311-0643-00			RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3329H-L58-500
A2R2439	311-1175-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	73138	68WR100-77A
A2R2618	321-0260-00			RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
A2R2619	321-0147-00			RES,FXD,FILM:332 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2622	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2623	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2625	321-0135-00			RES,FXD,FILM:249 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-2
A2R2626	315-0161-00			RES,FXD,FILM:160 OHM,5%,0.25W	19701	5043CX160ROJ
A2R2630	311-1944-00			RES,VAR,NONWW:TRMR,1K OHM,10%,0.5W	32997	3299W-R27-102
A2R2631	321-0159-00			RES,FXD,FILM:442 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2634	321-0159-00			RES,FXD,FILM:442 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2665	321-0151-00			RES,FXD,FILM:365 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2666	321-0105-00			RES,FXD,FILM:121 OHM 1%,0.125W,TC=T0	TK1727	MR25 2322-151-1
A2R2721	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2733	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2734	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2735	311-1943-00			RES,VAR,NONWW:TRMR,10K OHM,10%,0.5W	73138	68WR10K-10B
A2R2736	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2742	311-1567-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3352T-1-101
A2R2743	311-1568-00			RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3352T-1-500

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2R2751	321-0159-00			RES,FXD,FILM:442 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2752	303-0221-00			RES,FXD,CMPSN:220 OHM,5%,1W	24546	FP32 OR FP1 220
A2R2753	311-1895-00			RES,VAR,NONWW:TRMR,2K OHM,10%,0.5,LINEAR	32997	3299W-1-202
A2R2772	321-0193-00			RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-1
A2R2780	321-0180-00			RES,FXD,FILM:732 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-7
A2R2781	321-0134-00			RES,FXD,FILM:243 OHM,1%,0.125W,TC=T0	19701	5043ED243R0F
A2R2782	303-0221-00			RES,FXD,CMPSN:220 OHM,5%,1W	24546	FP32 OR FP1 220
A2R2831	321-0105-00			RES,FXD,FILM:121 OHM 1%,0.125W,TC=T0	TK1727	MR25 2322-151-1
A2R2832	321-0111-00			RES,FXD,FILM:140 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-1
A2R2833	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2839	311-1637-00			RES,VAR,NONWW:PNL,10K OHM,20%,0.5W	12697	CM43463
A2R2860	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	TK1727	SFR25 2322-182-
A2R2861	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	TK1727	SFR25 2322-182-
A2R2862	311-2197-00			RES,VAR,NONWW:TRMR,10 OHM,10%,0.5WLINEAR,20	73138	68WR'10-175A
A2R2870	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5043ED10K00F
A2R2872	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5043ED10K00F
A2R2873	321-0069-00			RES,FXD,FILM:51.1 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2874	321-0069-00			RES,FXD,FILM:51.1 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2878	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5043ED10K00F
A2R2879	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5043ED10K00F
A2R2881	311-1561-00			RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3352T-DY7-252
A2R2889	311-1561-00			RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3352T-DY7-252
A2R2890	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2891	321-0150-00			RES,FXD,FILM:357 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2892	321-0172-00			RES,FXD,FILM:604 OHM,1%,0.125W,TC=T0	91637	CMF55116D604ROF
A2R2893	321-0164-00			RES,FXD,FILM:499 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2894	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2895	321-0164-00			RES,FXD,FILM:499 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2935	311-0643-00			RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3329H-L58-500
A2R2939	311-1175-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	73138	68WR100-77A
A2R2950	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2951	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	TK1727	SFR25 2322-181-
A2R2975	311-1563-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3352T-DY7-102
A2R2981	321-0155-00			RES,FXD,FILM:402 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-4
A2R2982	321-0150-00			RES,FXD,FILM:357 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2983	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W,,MI	TK1727	SFR25 2322-181-
A2R2990	321-0172-00			RES,FXD,FILM:604 OHM,1%,0.125W,TC=T0	91637	CMF55116D604ROF
A2R2991	321-0143-00			RES,FXD,FILM:301 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-3
A2R2992	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2993	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9
A2R2994	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-9

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2RV2682	307-0456-00			RES,V SENSITIVE:250VAC,20W,METAL OXIDE	34371	V250LA20A
A2T2160	120-1478-01			TRANSFORMER,RF:TOROIDAL	0JR03	120-1478-01
A2T2482	120-1664-01			TRANSFORMER,RF:FLYBACK POT CORE W/INSTRUCTION SHEET	80009	120166401
A2T2689	120-1665-00			XFMR,PWR,STPDN:LF	75498	120-1665-00
A2T2850	120-1478-01			TRANSFORMER,RF:TOROIDAL	0JR03	120-1478-01
A2TP2118	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE	22526	48283-018
A2TP2164	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE	22526	48283-018
A2TP2188	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE	22526	48283-018
A2TP2189	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE	22526	48283-018
A2TP2618	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE	22526	48283-018
A2TP2772	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE	22526	48283-018
A2TP2890	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE	22526	48283-018
A2TP2983	131-0608-00			TERMINAL,PIN:PRESSFIT/PCB,;MALE,STR,0.025 SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/ FERRULE	22526	48283-018
A2U2121	156-1191-00			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CP
A2U2147	156-3312-01			CPLR,OPTOELECTR:LED & PHOTOTRANSISTOR, 7K ISOLATION,SCRN,MATCHED PAIR (MATCHED WITH A2U2153)	80009	156331201
A2U2153	156-3312-01			CPLR,OPTOELECTR:LED & PHOTOTRANSISTOR, 7K ISOLATION,SCRN,MATCHED PAIR (MATCHED WITH A2U2147)	80009	156331201
A2U2165	156-1191-00			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CP
A2U2170	153-0077-01			SEMICOND DVC,DI:MATCHED PAIR (MATCHED WITH A2U2221)	80009	153007701
A2U2221	153-0077-01			SEMICOND DVC,DI:MATCHED PAIR (MATCHED WITH A2U2170)	80009	153007701
A2U2374	156-1799-00			IC,LINEAR:BIPOLAR,SW-REGULATOR CONTROLLER;PWM,SINGLE-ENDED OC OUTPUT	1CH66	NE5561N
A2U2621	156-1191-00			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CP
A2U2647	156-3312-01			CPLR,OPTOELECTR:LED & PHOTOTRANSISTOR, 7K ISOLATION,SCRN,MATCHED PAIR (MATCHED WITH A2U2653)	80009	156331201

Component Number	Tektronix Part No.	Serial No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2U2653	156-3312-01			CPLR,OPTOELECTR:LED & PHOTOTRANSISTOR, 7K ISOLATION,SCRN,MATCHED PAIR (MATCHED WITH A2U2653)	80009	156331201
A2U2721	153-0077-01			SEMICOND DVC,DI:MATCHED PAIR (MATCHED WITH A2U2874)	80009	153007701
A2U2770	156-1451-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR: NEGATIVE,ADJUSTABLE,1.5A,4%	04713	LM337T
A2U2771	156-1161-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR: POSITIVE,ADJUSTABLE,1.5A,4%	04713	LM317T
A2U2870	156-1191-00			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CP
A2U2874	153-0077-01			SEMICOND DVC,DI:MATCHED PAIR (MATCHED WITH A2U2721)	80009	153007701
A2VR2274	152-0243-00			DIODE,ZENER:,;15V,5%,0.4W	04713	SZ13203 (1N965B
A2VR2391	152-0243-00			DIODE,ZENER:,;15V,5%,0.4W	04713	SZ13203 (1N965B
DS2950	150-1054-05			LT EMITTING DIO:GRN	80009	150105405
F2224	159-0029-00			FUSE,CARTRIDGE:3AG,0.3A,250V,20SEC	71400	MDL 3/10
F2224	159-0054-00			FUSE,CARTRIDGE:3AG,0.15A,250V,25SEC (OPTION A1,A2,A3,A5 ONLY)	71400	MDL 15/100
FL2224	119-2043-00			FILTER,RFI:6A,115-230V,48-440HZW/FUSES,SW AND V SELECTOR	0GV52	FN393-6-05-11
J1	131-1315-01			CONN,RF JACK:BNC/PNL,;50 OHM,FEMALE,STR, PELTOLA/REAR PNL,SILVER/BRIGHT ALLOY,0.576 MLG	24931	28JR306-1
J2	131-1315-01			CONN,RF JACK:BNC/PNL,;50 OHM,FEMALE,STR, PELTOLA/REAR PNL,SILVER/BRIGHT ALLOY,0.576 MLG	24931	28JR306-1
P2950				(PART OF DS2950)		

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols

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

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

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

Abbreviations are based on ANSI Y1.1-1972.

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

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

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

Component Values

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

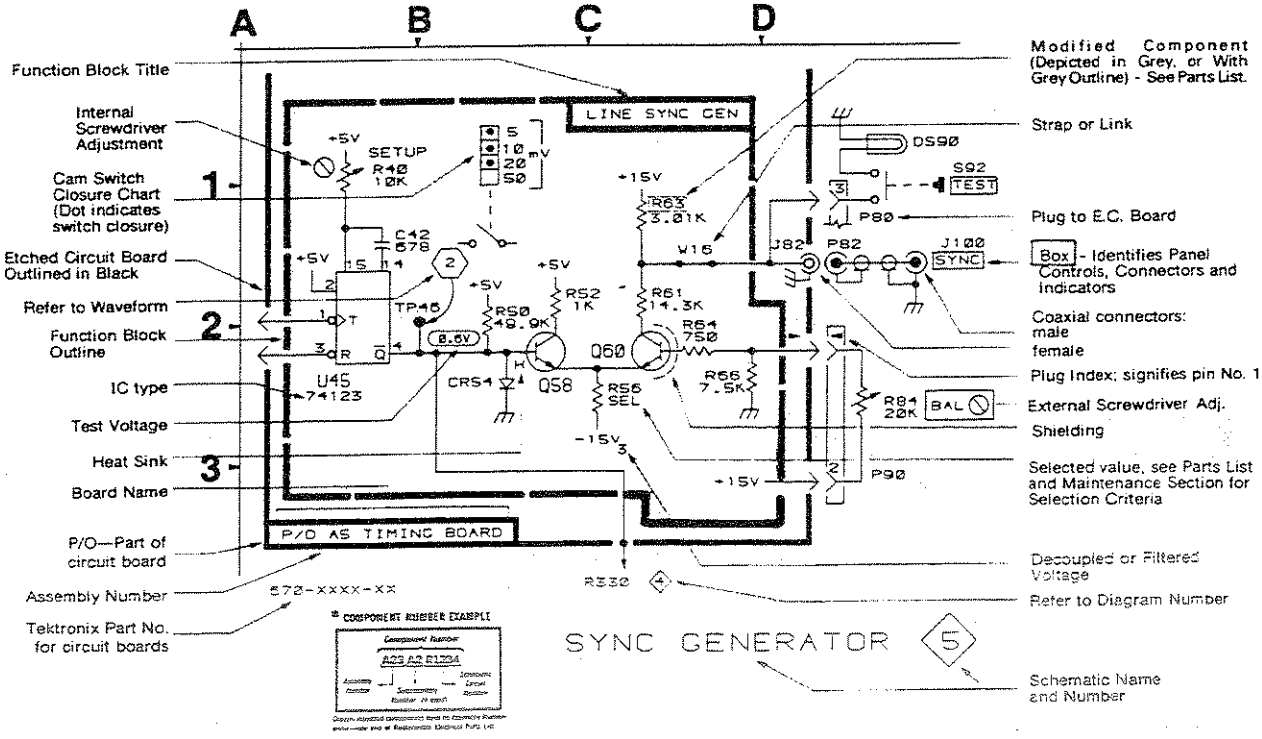
Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads (μF).
Resistors = Ohms (Ω).

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

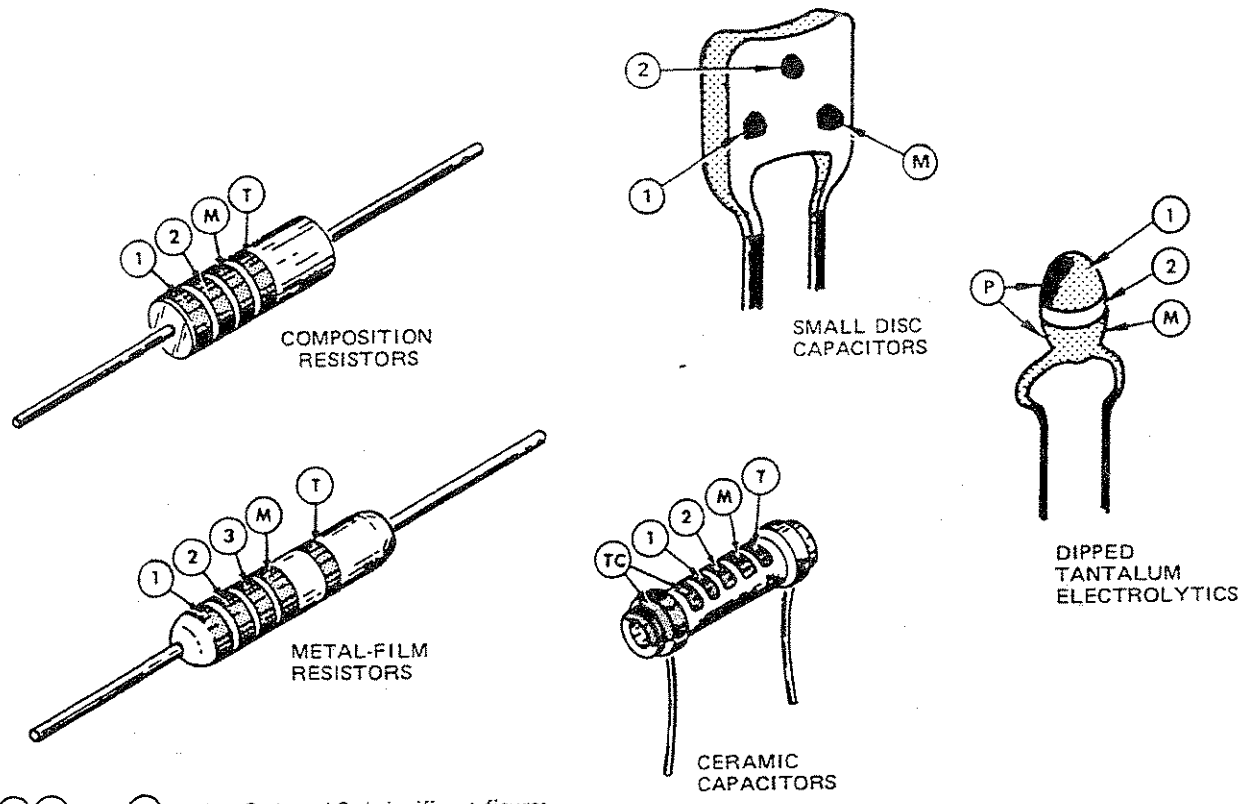
Assembly Numbers and Grid Coordinates

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

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



COLOR CODE



(1) (2) and (3) – 1st, 2nd, and 3rd significant figures

(M) –multiplier (T) –tolerance

(TC) –temperature coefficient

(P) –polarity and voltage rating

(T) and/or (TC) color code may not be present on some capacitors

COLOR	SIGNIFICANT FIGURES	RESISTORS		CAPACITORS			DIPPED TANTALUM VOLTAGE RATING
		MULTIPLIER	TOLERANCE	MULTIPLIER	TOLERANCE		
					over 10 pF	under 10 pF	
BLACK	0	1	–––	1	±20%	±2 pF	4 VDC
BROWN	1	10	±1%	10	±1%	±0.1 pF	6 VDC
RED	2	10^2 or 100	±2%	10^2 or 100	±2%	–––	10 VDC
ORANGE	3	10^3 or 1 K	±3%	10^3 or 1000	±3%	–––	15 VDC
YELLOW	4	10^4 or 10 K	±4%	10^4 or 10,000	+100% –9%	–––	20 VDC
GREEN	5	10^5 or 100 K	±½%	10^5 or 100,000	±5%	±0.5 pF	25 VDC
BLUE	6	10^6 or 1 M	±¼%	10^6 or 1,000,000	–––	–––	35 VDC
VIOLET	7	–––	±1/10%	–––	–––	–––	50 VDC
GRAY	8	–––	–––	10^{-2} or 0.01	+80% –20%	±0.25 pF	–––
WHITE	9	–––	–––	10^{-1} or 0.1	±10%	±1 pF	3 VDC
GOLD	–	10^{-1} or 0.1	±5%	–––	–––	–––	–––
SILVER	–	10^{-2} or 0.01	±10%	–––	–––	–––	–––
NONE	–	–––	±20%	–––	±10%	±1 pF	–––

(1861-20A) 2662-48

Figure 9-1. Typical capacitor and resistor color codes.

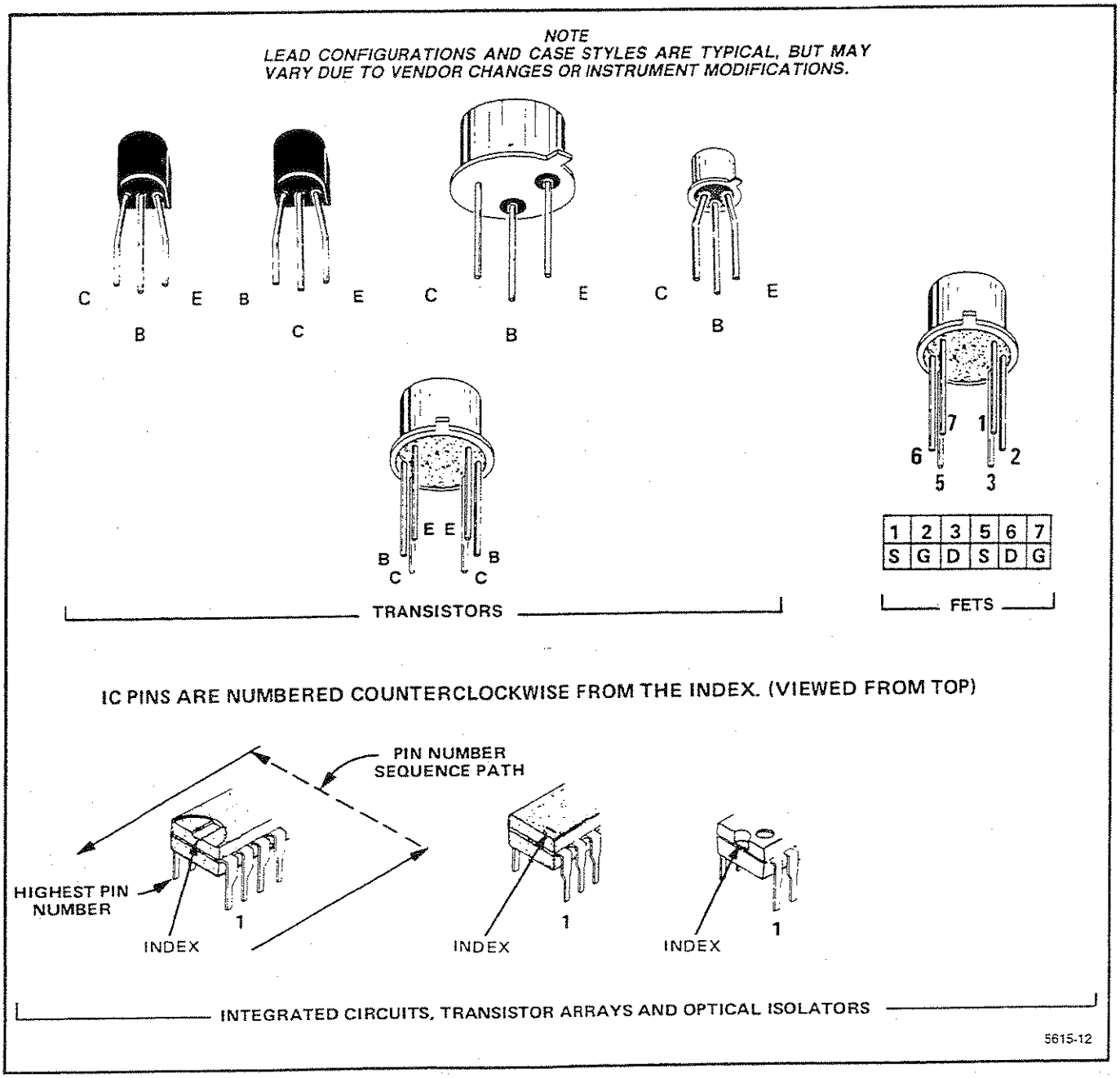


Figure 9-2. Semiconductor lead configurations.

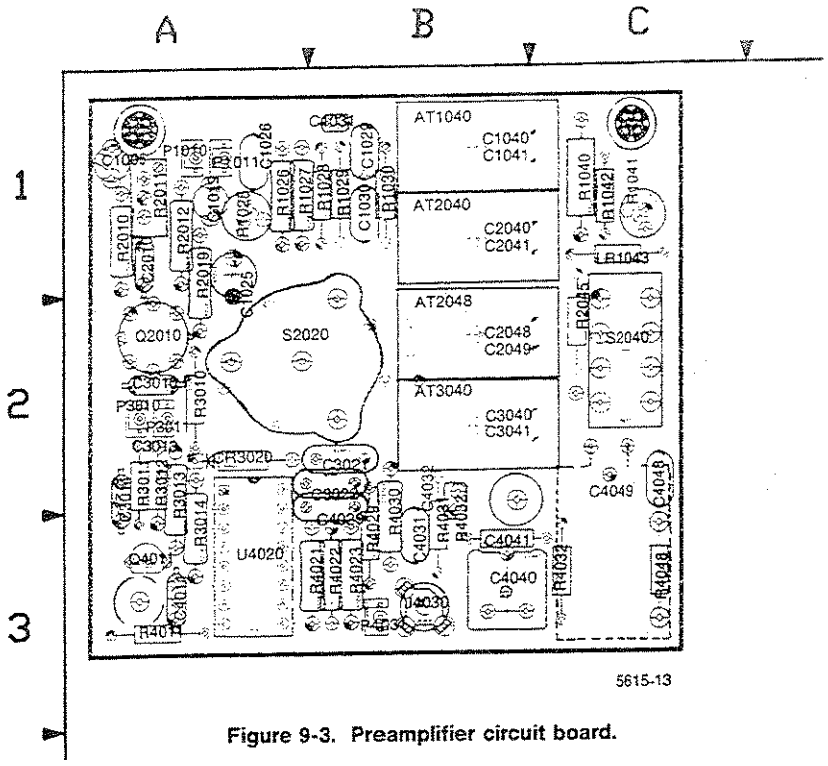
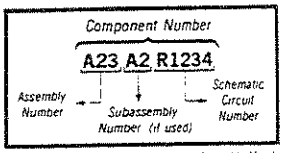


Figure 9-3. Preamplifier circuit board.

COMPONENT NUMBER EXAMPLE



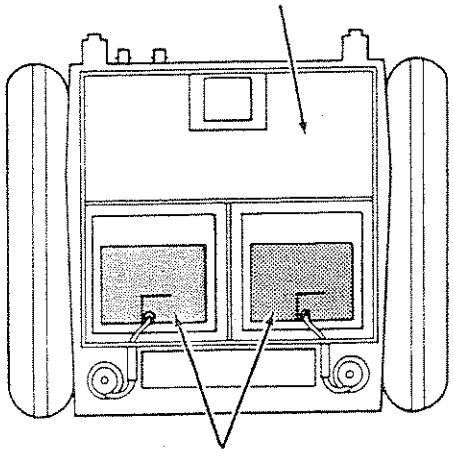
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List

Static Sensitive Devices
See Maintenance Section

PREAMPLIFIER BOARD DIAGRAM 1

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
AT1040	2C	1B	P3011	1H	2A
AT2040	2C	1B	P4031	4H	3B
AT2048	3C	2B			
AT3040	4C	2B	Q2010A	1E	2A
			Q2010B	2E	2A
C1005	2A	1A	Q4011	2F	3A
C1019	2A	1A			
C1025	2G	1A	R1025	2G	1A
C1026	3D	1A	R1026	2G	1A
C1029	3D	1B	R1027	2G	1A
C1030	2C	1B	R1028	2G	1B
C1031	2D	1B	R1029	3D	1B
C1040	2C	1B	R1030	2C	1B
C1041	2C	1B	R1040	1B	1C
C2010	3F	1A	R1041	1B	1C
C2040	2C	1B	R1042*	2C	1C*
C2041	2C	1B	R2010	2E	1A
C2048	3C	2B	R2011	2E	1A
C2049	3C	2B	R2012	2E	1A
C3010	1E	2A	R2019	3G	1A
C3011	1F	2A	R2045	1B	2C
C3013	2F	2A	R3010	1E	2A
C3021	2G	2B	R3011	1G	2A
C3022	4D	2B	R3012	1F	2A
C3040	4C	2B	R3013	2F	2A
C3041	4C	2B	R3014	2F	3A
C4011	2F	3A	R4011	2F	3A
C4029	4D	3B	R4021	2G	3B
C4031	3D	3B	R4022	2G	3B
C4032	3D	2B	R4023	2F	3B
C4040	2B	3B	R4029	4D	3B
C4041*	2B	3B*	R4030	4D	3B
C4048*	2B	2C*	R4031	3D	3B
C4049	1B	2C	R4032*	1B	3C*
			R4048*	1B	3C*
CR3020	2E	2A			
			S2020	1H	2A
J4030	1A	3B	S2040	1A	2C
LR1043*	1C	1C*	U4020A	1G	3A
			U4020B	2F	3A
P1010	2A	1A	U4020C	2F	3A
P1011	2A	1A	U4020D	1G	3A
P3010	2H	2A	U4020E	2F	3A

MAIN BOARD



PREAMPLIFIER BOARDS

*Located on the back of the board.

MAIN BOARD DIAGRAM 2 3 4

AMPLIFIER CHANNEL 1

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2119	5B	1C
C2121	5A	2C
C2123	2A	2C
C2124	4B	2C
C2130	1C	2D
C2149	3D	2E
C2163	5E	2H
C2164	2E	3G
C2175	3F	2J
C2176	5E	2H
C2178	4F	2J
C2184	3G	1J
C2190	2F	1K
C2193	2F	2K
C2194	5G	2K
C2196	4F	2L
C2220	5B	4C
C2221	5B	4C
C2228	4B	3C
C2229	4B	4D
C2290	4G	3K
C2328	3C	4D
C2329	4C	4D
C2430	4C	5D
CR2121	1C	3C
CR2190	2G	1K

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J2121	3A	2C
J2122	4A	2C
J2131	4A	2D
J2132	4A	2D
J2190	3G	1L
J2231	4A	3B
L2188	3F	2K
L2189	4F	3K
L2349	5C	4E
Q2180	2G	1K
Q2181	3G	1K
Q2182	3G	2K
Q2194	4F	2K
Q2195	4G	2L
Q2230	1D	3D
Q2337	3C	4D
Q2338	4C	4D
R2118	1B	2D
R2119	1B	2D
R2122	2A	2C
R2123	1A	2C
R2125	2A	2D
R2126	1C	2D
R2130	2C	2D
R2131	2C	2D
R2134	1D	2D

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R2156	1D	1G
R2159	1D	2G
R2161	4D	2G
R2162	4E	2F
R2163	4E	2H
R2165	2E	2G
R2166	2E	3G
R2172	3E	1H
R2173	3E	1H
R2174	3E	1H
R2175	3E	1H
R2178	3E	3H
R2181	2G	1J
R2183	3G	1J
R2185	3G	2J
R2186	3F	2J
R2187	3F	2J
R2188	3F	2J
R2189	4F	3J
R2190	2G	1K
R2191	3G	1K
R2192	4G	1K
R2193	5G	2K
R2194	2F	2K
R2195	5F	2K
R2196	4F	2K
R2197	4F	3K
R2221	4B	3C
R2233	3C	4D

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R2234	3C	3D
R2235	2B	3E
R2236	5C	3D
R2242	4C	3E
R2243	5C	4E
R2272	4F	3J
R2290	4F	3K
R2331	3C	5D
R2332	4C	5D
R2333	4C	5D
R2339	1A	5E
R2435	4C	5D
R2439	4C	5E
T2160	4D	2F
TP2118	1B	1D
TP2119	1C	1C
TP2164	2E	2G
TP2188	2F	2K
TP2189	4F	2K
U2121	1B	2C
U2147	2C	2E
U2153	2D	2E
U2165	2D	3G
U2170	3E	2H
U2221	4B	4C

AMPLIFIER CHANNEL 2

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2619	5B	7C
C2621	5A	7C
C2623	2A	8C
C2624	4B	8C
C2630	1C	7D
C2649	3D	7F
C2720	5B	9B
C2721	5B	9C
C2728	4B	9C
C2729	4B	9D
C2772	2E	9H
C2828	3C	9D
C2829	4C	10D
C2874	5D	10H
C2890	3F	10K
C2893	3G	10L
C2894	2G	10L
C2930	4C	11D
C2960	5D	11G
C2975	4F	11H
C2981	4G	11J
C2983	4F	11J
C2990	5F	11K
C2991	2F	11K
CR2621	1C	8C
CR2894	3G	10L

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J2621	4A	7C
J2622	4A	7C
J2631	4A	7D
J2632	4A	8D
J2633	4A	8B
J2995	3G	10L
L2849	5C	9E
L2881	3F	10K
L2889	4F	10J
Q2730	1D	8D
Q2837	3C	9D
Q2838	4C	10D
Q2889	3G	10K
Q2891	3G	10K
Q2894	3G	10L
Q2988	4F	11K
Q2989	4G	11K
R2618	1B	7D
R2619	1B	7D
R2622	2B	8C
R2623	1A	8C
R2625	2B	8D
R2626	1C	8D
R2630	2C	7D
R2631	2C	8D

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R2634	1D	8D
R2721	4B	8C
R2733	3C	9D
R2734	3C	9D
R2735	2B	8E
R2736	5C	9D
R2742	4C	9E
R2743	5C	9E
R2751	1D	9F
R2753	1D	9G
R2772	2E	9H
R2831	3C	10D
R2832	4C	10D
R2833	4C	10D
R2839	1A	10E
R2860	4D	10G
R2861	4D	10G
R2862	4E	10G
R2870	3E	9H
R2872	3E	10H
R2873	3E	10H
R2874	3E	10H
R2878	2E	10J
R2879	3E	10J
R2881	3F	10J
R2889	4F	10J
R2890	3F	10K
R2891	3F	10K
R2892	3G	10K

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R2893	3G	10K
R2894	2G	10L
R2895	2G	10L
R2935	4C	10D
R2939	4C	10E
R2975	4F	11J
R2981	4F	11J
R2982	4F	11J
R2983	4F	11J
R2990	4F	11K
R2991	2G	11K
R2992	5G	11K
R2993	4G	11K
R2994	3G	11K
T2850	4D	10G
TP2618	1B	7D
TP2619	1C	7C
TP2772	2E	9J
TP2890	2F	10K
TP2983	4F	11K
U2621	1B	7C
U2647	2C	7E
U2653	1D	8F
U2721	4B	9C
U2870	2D	10H
U2874	3E	10H

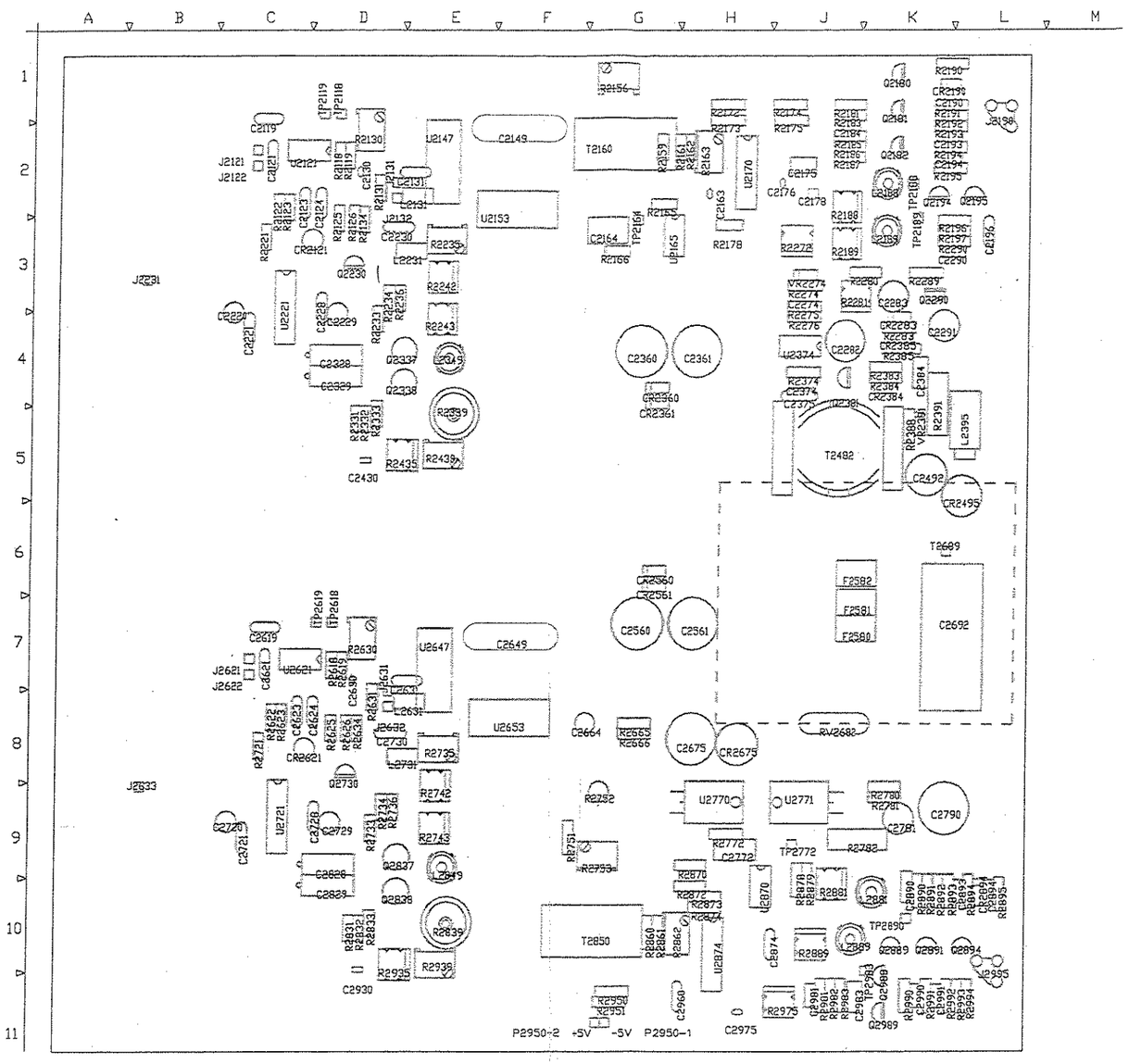
POWER SUPPLY

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C2131	1F	2D
C2230	1E	3D
C2274	2B	3J
C2282	1B	4J
C2283	3C	3K
C2291	2A	4K
C2360	1E	4G
C2361	1E	4H
C2374	2C	4J
C2375	2C	4J
C2384	1D	4K
C2492	1D	5K
C2560	2E	7G
C2561	3E	7H
C2631	3F	7D
C2664	5E	8F
C2675	5D	8H
C2692	3C	7K
C2730	2E	8D
C2781	4E	9K
C2790	4D	9K

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
CR2360	1E	4G
CR2361	2E	4G
CR2283	2C	4K
CR2384	1C	4K
CR2385	2D	4K
CR2495	3C	5L
CR2560	3E	6G
CR2561	2E	6G
CR2675	4C	8H
DS2950	4F	
L2131	2E	2D
L2231	1E	3D
L2395	1C	5L
L2631	3F	8D
L2731	2F	8D
P2560	4B	7J
P2581	5B	7J
P2582	3B	6J

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
Q2290	2B	3K
Q2381	2C	4J
Q2398	1D	
P2950-1	4F	11G
P2950-2	4F	11G
R2274	2B	3J
R2275	2B	3J
R2276	2C	3J
R2280	2B	3J
R2281	2C	3J
R2283	2D	4K
R2289	2B	3K
R2374	2D	4J
R2383	1C	4K
R2384	1C	4K
R2385	1B	4K
R2388	1C	5K
R2391	2D	5K
R2665	5D	8G

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R2666	5D	8G
R2752	6D	9G
R2780	5D	9K
R2781	5D	9K
R2782	4D	9J
R2950	4E	11G
R2951	3E	11G
RV2682	4B	8J
T2482	1E	5J
T2689	3B	6K
U2374	2C	4J
U2770	5D	9H
U2771	4D	9J
VR2274	1B	3J
VR2391	1D	5K



COMPONENT NUMBER EXAMPLE

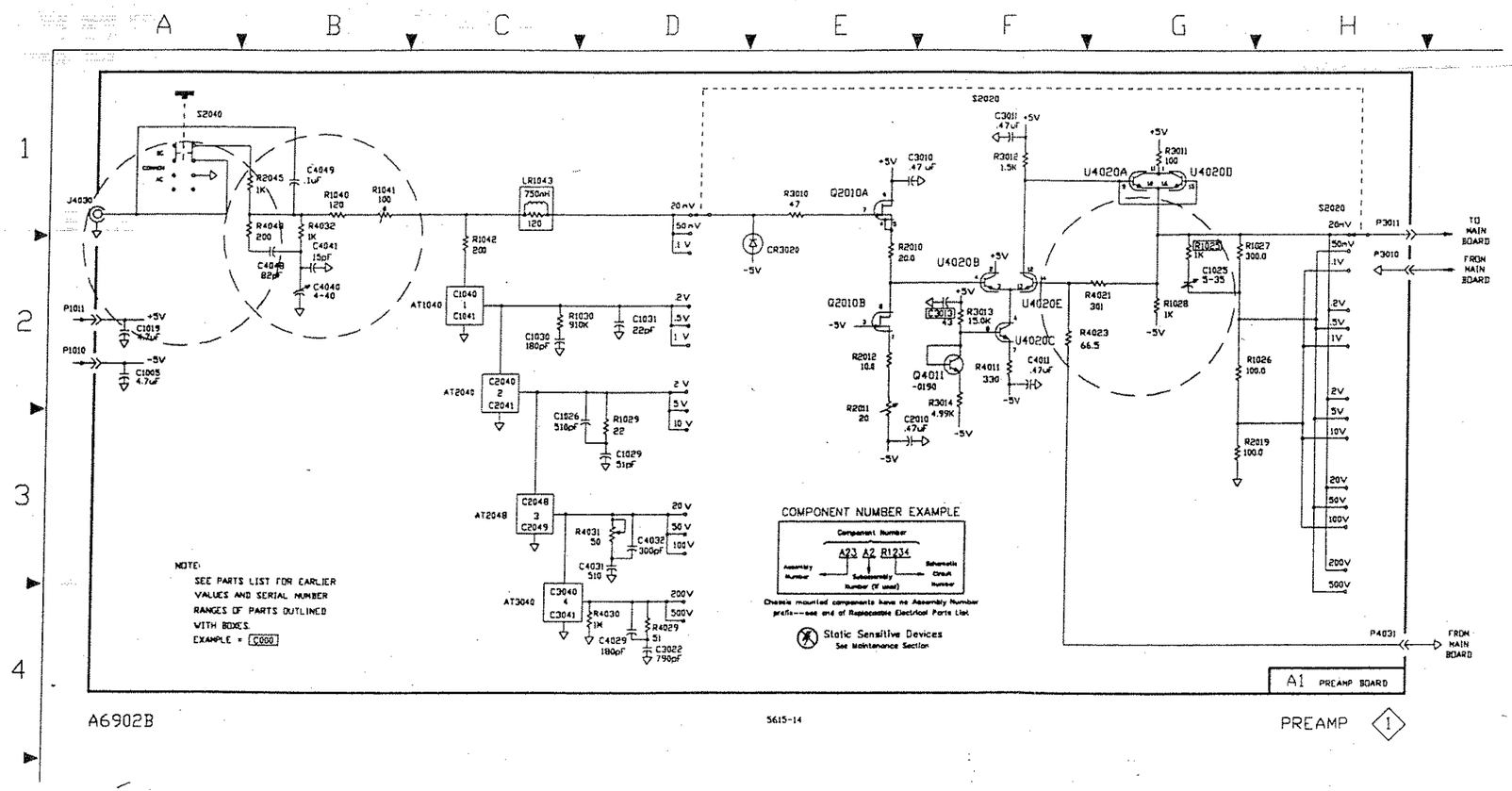
Component Number: A23 A2 R1234

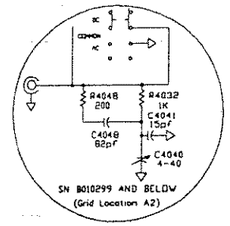
Assembly Number – Subassembly Number (if used) – Schematic Circuit Number

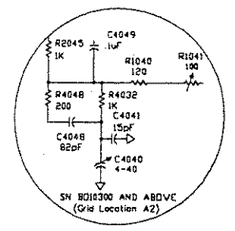
Chassis mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List

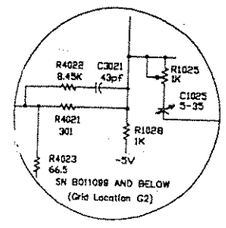
Static Sensitive Devices
See Maintenance Section

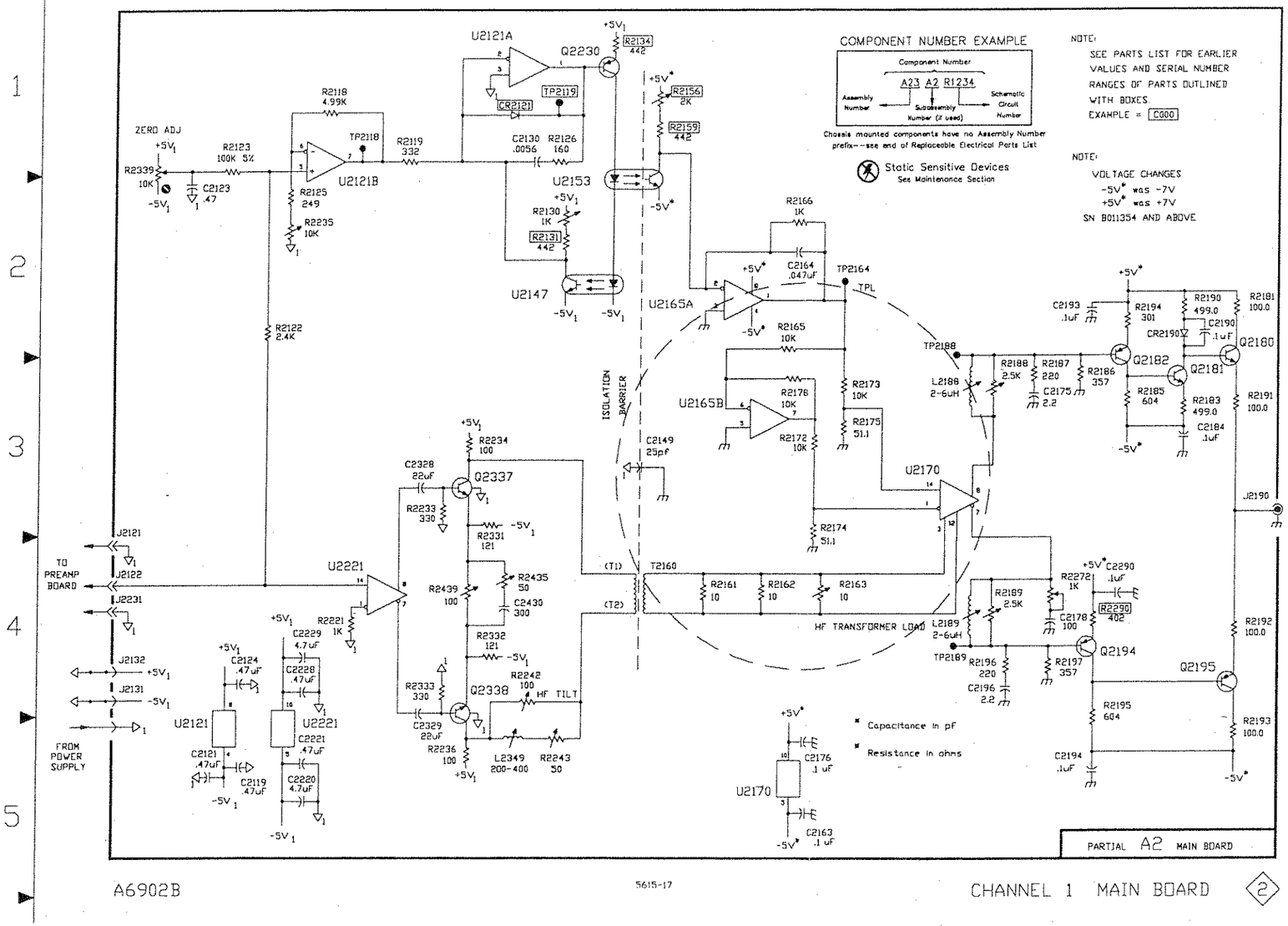
Figure 9-4. Main circuit board

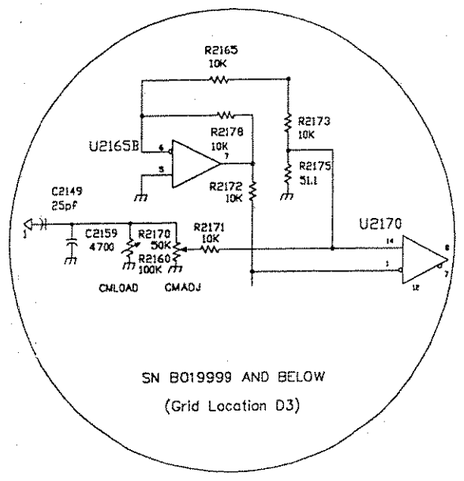

A
B
C
D
E
F
G
H
1
2
3
4
S2040
J4030
P1011
P1010
+5V
-5V
C1019
4.7uF
C1065
4.7uF
R2045
1K
C4049
.1uF
R1040
120
R1041
100
R4048
200
R4032
1K
C4041
15pF
C4048
82pF
C4040
4-40
R1042
200
LR1043
750nH
120
AT1040
C1040
C1041
R1030
910K
C1030
180pF
C1031
22pF
2V
.5V
1V
AT2040
C2040
2
C2041
C1026
510pF
R1029
22
C1029
51pF
5V
10V
AT2048
C2048
3
C2049
R4031
50
C4032
300pF
C4031
510
20V
50V
100V
AT3040
C3040
4
C3041
R4030
1K
C4029
180pF
R4029
51
C3022
790pF
200V
500V
20mV
50mV
1V
CR3020
R3010
47
S2020
Q2010A
Q2010B
C3010
.47uF
R2010
20.0
R2012
10.8
R2011
20
C2010
.47uF
C3011
.47uF
R3012
1.5K
R3011
100
U4020A
U4020D
U4020B
U4020E
U4020C
C3013
43
R3013
15.0K
R3014
4.99K
Q4011
-0190
R4011
330
C4011
.47uF
R4021
301
R4023
66.5
R1028
1K
R1025
1K
C1025
5-35
R1027
300.0
R1026
100.0
R2019
100.0
P3011
P3010
TO MAIN BOARD
FROM MAIN BOARD
P4031
FROM MAIN BOARD
A1 PREAMP BOARD
NOTE:
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED WITH BOXES.
EXAMPLE = C000
COMPONENT NUMBER EXAMPLE
Component Number
A23 A2 R1234
Assembly Number
Subassembly Number (if used)
Schematic Circuit Number
Chassis mounted components have no Assembly Number prefix--see end of Replaceable Electrical Parts List
Static Sensitive Devices
See Maintenance Section
A6902B
5615-14
PREAMP
1

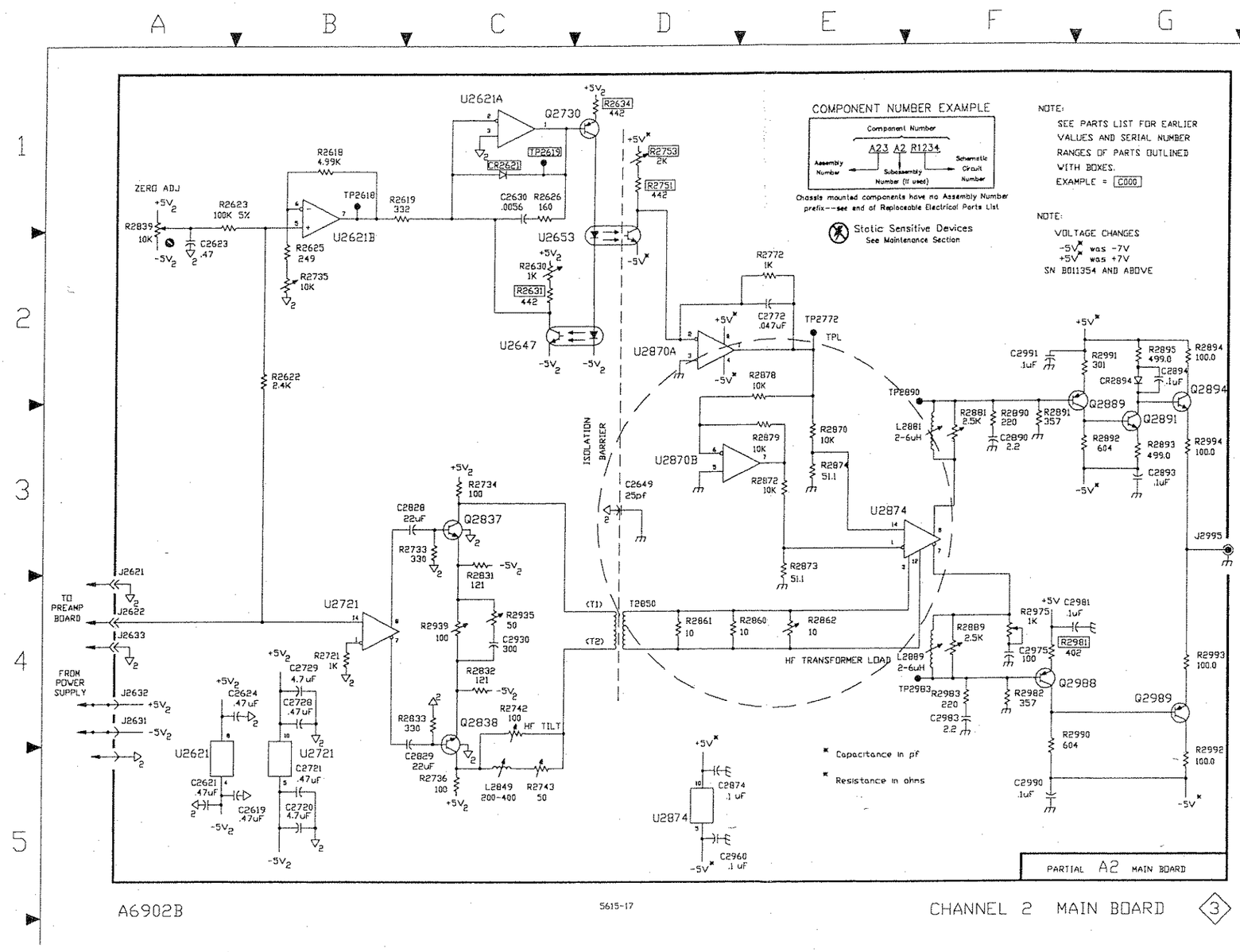

R4048
200
R4032
1K
C4041
15pF
C4048
82pF
C4040
4-40
SN B010299 AND BELOW
(Grid Location A2)

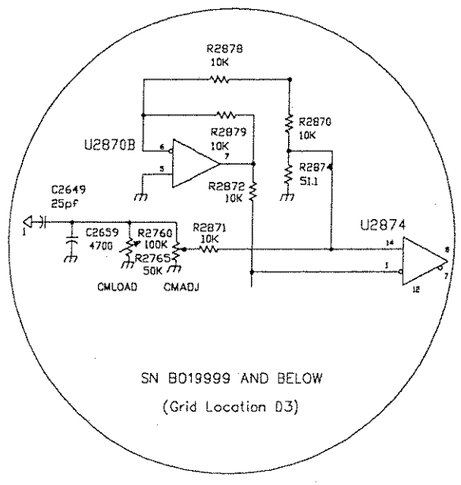

R2045
1K
C4049
.1uF
R1040
120
R1041
100
R4048
200
R4032
1K
C4041
15pF
C4048
82pF
C4040
4-40
SN B010300 AND ABOVE
(Grid Location A2)

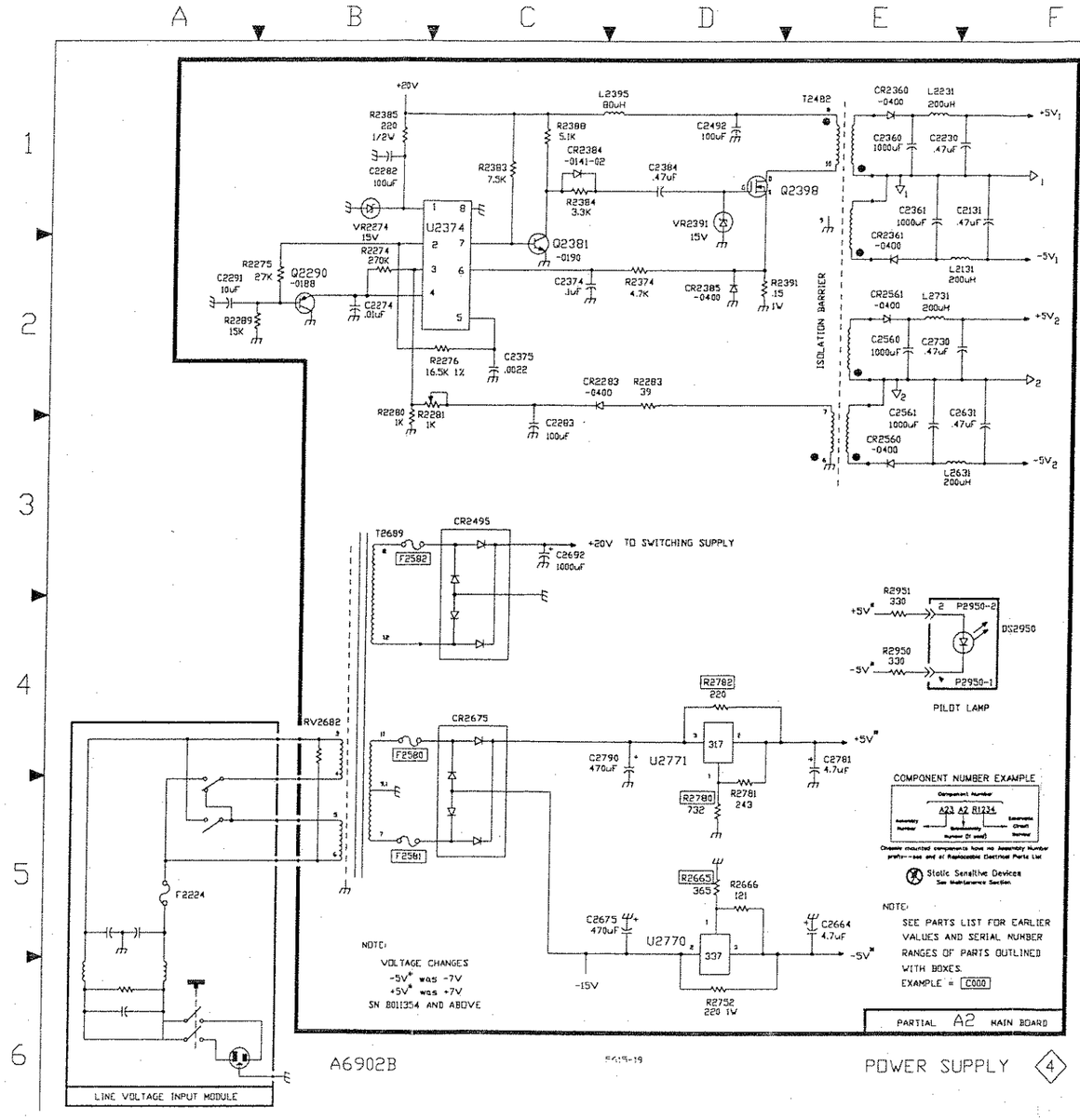

R4022
8.45K
C3021
43pF
R1025
1K
C1025
5-35
R4021
301
R1028
1K
-5V
R4023
66.5
SN B011099 AND BELOW
(Grid Location G2)


COMPONENT NUMBER EXAMPLE
Component Number
A23 A2 R1234
Assembly Number
Subassembly Number (if used)
Schematic Circuit Number
Chassis mounted components have no Assembly Number prefix--see end of Replaceable Electrical Parts List
Static Sensitive Devices
See Maintenance Section
NOTE:
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED WITH BOXES.
EXAMPLE = C000
NOTE:
VOLTAGE CHANGES
-5V* was -7V
+5V* was +7V
SN B011354 AND ABOVE
ISOLATION BARRIER
HF TRANSFORMER LOAD
HF TILT
TO PREAMP BOARD
FROM POWER SUPPLY
* Capacitance in pF
* Resistance in ohms
PARTIAL A2 MAIN BOARD
A6902B
5615-17
CHANNEL 1 MAIN BOARD
2


SN B019999 AND BELOW
(Grid Location D3)
CMLOAD
CMADJ


COMPONENT NUMBER EXAMPLE
Component Number
A23 A2 R1234
Assembly Number
Subassembly Number (if used)
Schematic Circuit Number
Chassis mounted components have no Assembly Number prefix--see end of Replaceable Electrical Parts List
Static Sensitive Devices
See Maintenance Section
NOTE:
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED WITH BOXES.
EXAMPLE = C000
NOTE:
VOLTAGE CHANGES
-5V was -7V
+5V was +7V
SN B011354 AND ABOVE
U2621A
Q2730
R2634 442
R2753 2K
R2751 442
TP2619
CR2621
R2618 4.99K
ZERO ADJ
R2623 100K 5%
R2839 10K
C2623 .47
TP2618
R2619 332
U2621B
C2630 .0056
R2626 160
U2653
R2625 249
R2735 10K
R2630 1K
R2631 442
U2647
R2622 2.4K
R2772 1K
C2772 .047uF
TP2772
TPL
U2870A
ISOLATION BARRIER
R2878 10K
U2870B
R2879 10K
R2872 10K
R2870 10K
R2874 51.1
C2649 25pf
R2734 100
C2828 22uF
Q2837
R2733 330
R2831 121
R2939 100
R2935 50
C2930 300
R2832 121
R2833 330
Q2838
C2829 22uF
R2736 100
R2742 100 HF TILT
L2849 200-400
R2743 50
U2874
R2873 51.1
TP2890
L2881 2-6uH
R2881 2.5K
R2890 220
C2890 2.2
R2891 357
C2991 .1uF
R2991 301
R2895 499.0
CR2894
C2894 .1uF
Q2889
Q2891
Q2894
R2892 604
R2893 499.0
C2893 .1uF
R2894 100.0
R2994 100.0
J2995
J2621
J2622
J2633
J2632
J2631
TO PREAMP BOARD
FROM POWER SUPPLY
U2721
U2621
C2624 .47uF
C2728 .47uF
C2729 4.7uF
R2721 1K
C2621 .47uF
C2619 .47uF
C2721 .47uF
C2720 4.7uF
(T1)
(T2)
T2850
R2861 10
R2860 10
R2862 10
HF TRANSFORMER LOAD
L2889 2-6uH
TP2983
R2889 2.5K
R2983 220
C2983 2.2
R2982 357
C2975 100
R2975 1K
C2981 .1uF
R2981 402
Q2988
Q2989
R2990 604
R2993 100.0
R2992 100.0
C2990 .1uF
C2874 .1 uF
C2960 .1 uF
* Capacitance in pf
* Resistance in ohms
PARTIAL A2 MAIN BOARD


R2878 10K
U2870B
R2879 10K
R2870 10K
R2872 10K
R2874 51.1
C2649 25pf
C2659 4700
R2760 100K
R2765 50K
CMLOAD
CMADJ
R2871 10K
U2874
SN B019999 AND BELOW
(Grid Location D3)


A
B
C
D
E
F
1
2
3
4
5
6
+20V
R2385 220 1/2W
C2282 100uF
VR2274 15V
R2275 27K
Q2290 -0188
C2291 10uF
R2289 15K
R2274 270K
C2274 .01uF
U2374
R2276 16.5K 1%
C2375 .0022
R2280 1K
R2281 1K
C2283 100uF
CR2283 -0400
R2283 39
R2383 7.5K
R2388 5.1K
R2384 3.3K
CR2384 -0141-02
C2384 .47uF
L2395 80uH
C2492 100uF
Q2381 -0190
C2374 .1uF
R2374 4.7K
CR2385 -0400
R2391 .15 1W
VR2391 15V
Q2398
T2482
ISOLATION BARRIER
CR2360 -0400
L2231 200uH
C2360 1000uF
C2230 .47uF
C2361 1000uF
C2131 .47uF
CR2361 -0400
L2131 200uH
CR2561 -0400
L2731 200uH
C2560 1000uF
C2730 .47uF
C2561 1000uF
C2631 .47uF
CR2560 -0400
L2631 200uH
+5V1
1
-5V1
+5V2
2
-5V2
T2689
F2582
CR2495
+20V TO SWITCHING SUPPLY
C2692 1000uF
R2951 330
+5V
P2950-2
DS2950
R2950 330
-5V
P2950-1
PILOT LAMP
R2782 220
CR2675
F2580
F2581
C2790 470uF
U2771
317
C2781 4.7uF
+5V*
R2780 732
R2781 249
R2665 365
R2666 121
C2675 470uF
U2770
337
C2664 4.7uF
-5V*
-15V
R2752 220 1W
RV2682
F2224
LINE VOLTAGE INPUT MODULE
NOTE:
VOLTAGE CHANGES
-5V* was -7V
+5V* was +7V
SN B011354 AND ABOVE
COMPONENT NUMBER EXAMPLE
Component Number
A23 A2 R1234
Assembly Number
Subdivision Number (if used)
Sequence Circuit Number
Chassis mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List
Static Sensitive Devices
See Maintenance Section
NOTE:
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED WITH BOXES.
EXAMPLE = C000
PARTIAL A2 MAIN BOARD
A6902B
POWER SUPPLY
4

AC WAVEFORMS

This section briefly describes the recommended equipment, control settings, and setup to obtain the troubleshooting waveforms illustrated adjacent to the schematic diagrams.

RECOMMENDED TEST EQUIPMENT

The recommended test equipment consists of a dc-to-100 MHz oscilloscope (ex. TEKTRONIX 2236), a calibration generator (ex. TEKTRONIX PG 506), and a general purpose 1X-10X probe (ex. TEKTRONIX P6062B). This equipment is listed in Table 5-1 as items 2, 3, and 10.

CONTROL SETTINGS

Set the instrument controls as follows:

Oscilloscope

Volts/Division (CH 1)	100 mV
AC-GND-DC	AC
Position	Midrange
Vertical Mode	Channel 1
Time/Division	200 μs
Trigger Mode	External

A6902B

VOLTS/DIV	100 mV
AC-COMMON-DC	AC

Calibration Generator

Mode	Fast Rise
Period	1 ms
Amplitude	0.5 V

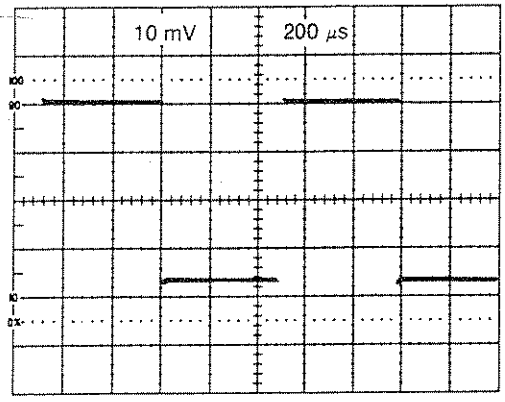
TEST SETUP

Connect the positive-going fast-rise signal from the calibration generator to the input probe of the A6902B channel to be tested. Connect the 1X-10X probe to the Channel 1 input connector of the oscilloscope. Use a 50-Ω cable to connect the trigger signal from the generator to the External Trigger input of the oscilloscope.

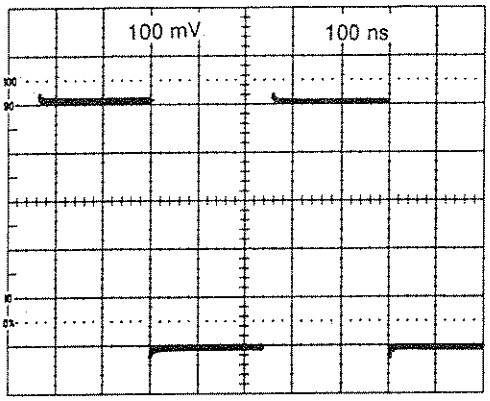
When using the probe to check the test-point waveforms, always use the common associated with the part of the circuit being probed for the probe ground connection.

Changes from the initial control settings may be necessary when viewing the different test points. Timing and amplitude settings are noted on the waveform drawings.

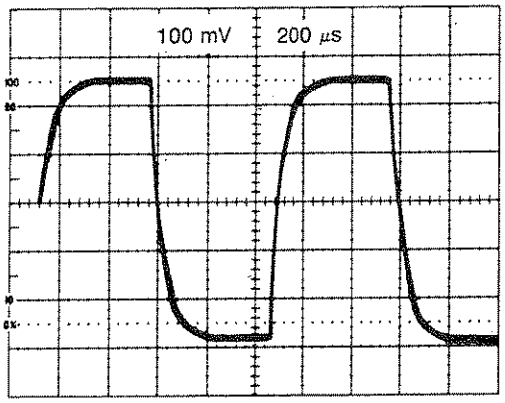
TEST WAVEFORMS



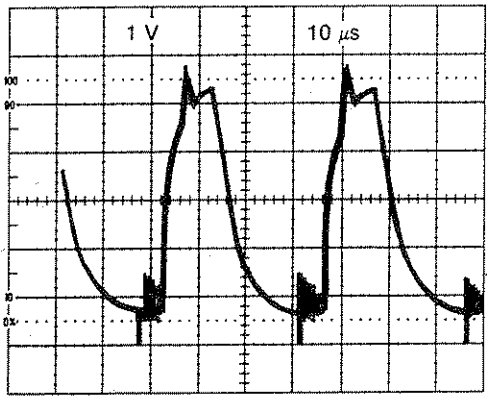
P3011



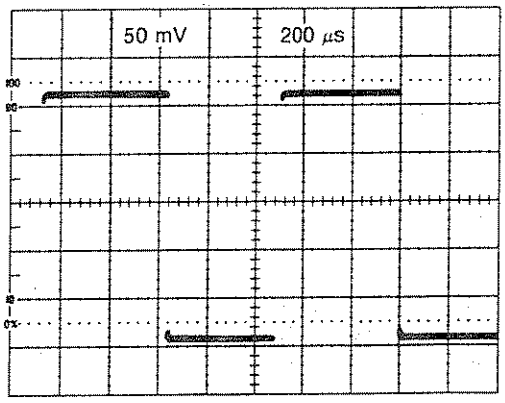
Q2180 AND Q2195, BASE



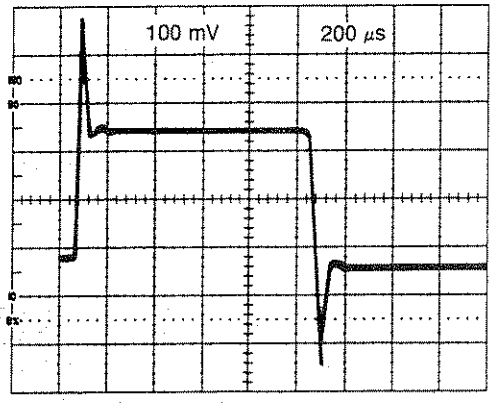
U2165, PIN 1



C2384 (EITHER END)



U2170, PIN 7 OR 8



U2170, PIN 7 OR 8

5615-18

Figure 9-5. Test waveforms.

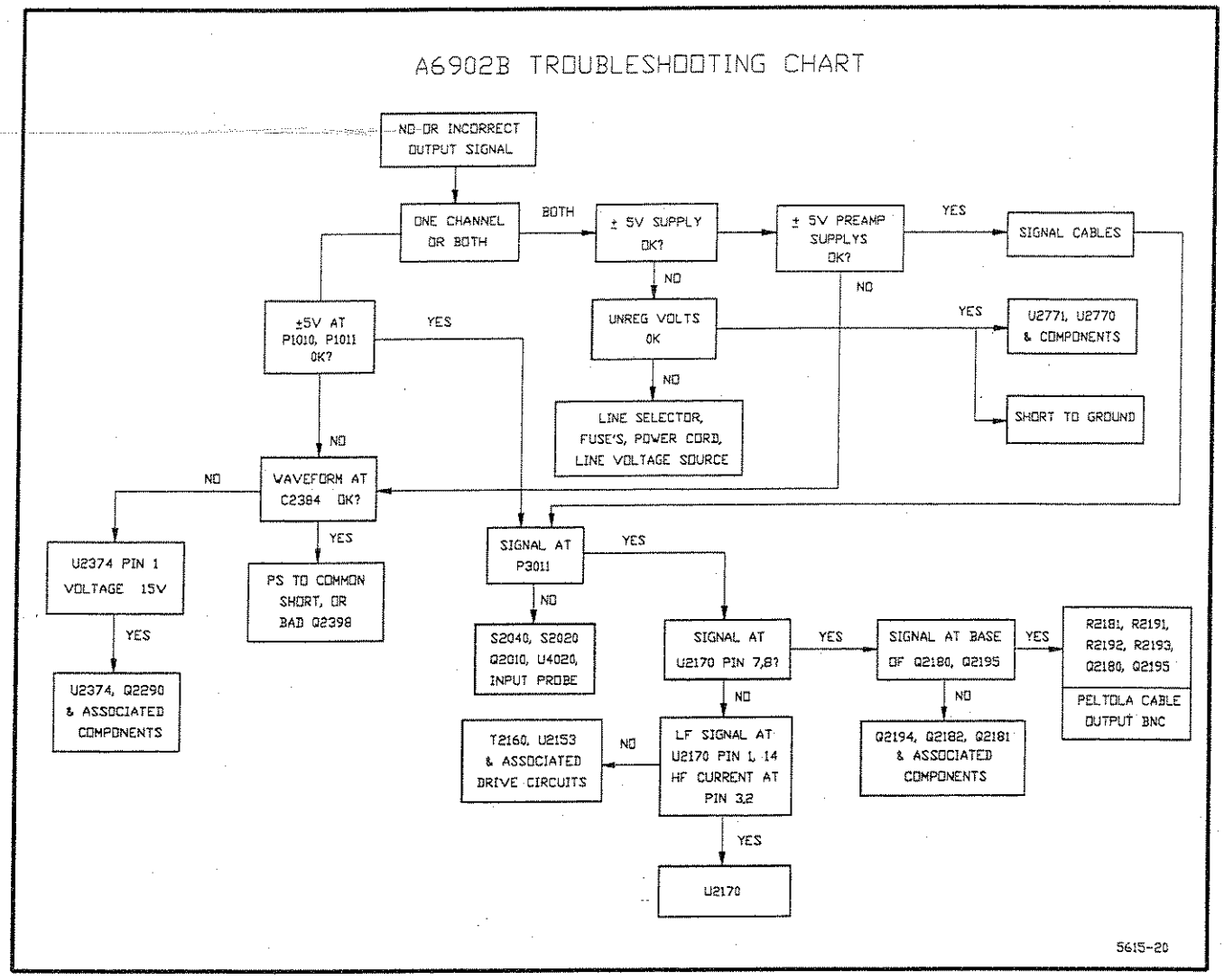


Figure 9-6. Troubleshooting chart.

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

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

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

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

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

ITEM NAME

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

FIGURE AND INDEX NUMBERS

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

INDENTATION SYSTEM

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

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

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.

Attaching parts must be purchased separately, unless otherwise specified.

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
S3109	FELLER	72 Veronica Ave Unit 4	Summerset NJ 08873
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0503	AIMSCO INC		
TK0588	UNIVERSAL PRECISION PRODUCTS	1775 NW 216TH	HILLSBORO OR 97123
TK1158	POWEL AND ASSOCIATES	111 S FINDLAY ST	SEATTLE WA 98108–2427
TK1556	CONSOLIDATED VINYL SALES	1237 S SAN GABRIEL BLVD	SAN GABRIEL CA 91776
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
0JRZ2	BADGLEY MFG CO	1620 NE ARGYLE	PORTLAND OR 97211
0JR05	TRIQUEST CORP	3000 LEWIS AND CLARK HWY	VANCOUVER WA 98661–2999
0J9P9	GEROME MFG CO INC	PO BOX 737 403 NORTH MAIN	NEWBERG OR 97132
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
06915	RICHCO PLASTIC CO	5825 N TRIPP AVE	CHICAGO IL 60646–6013
13103	THERMALLOY CO INC	2021 W VALLEY VIEW LN PO BOX 810839	DALLAS TX 75381
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
22670	G M NAMEPLATE INC	2040 15TH AVE WEST	SEATTLE WA 98119–2728
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
52152	MINNESOTA MINING AND MFG CO INDUSTRIAL SPECIALTIES DIV	3M CENTER	ST PAUL MN 55144–0001
53387	MINNESOTA MINING MFG CO	PO BOX 2963	AUSTIN TX 78769–2963
70903	COOPER BELDEN ELECTRONICS WIRE AND CABLE SUB OF COOPER INDUSTRIES INC		
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076–9749
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
85480	BRADY W H CO CORP H Q INDUSTRIAL PRODUCTS DIV	2221 W CAMDEN RD PO BOX 2131	MILWAUKEE WI 53209
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201–2431
91500	ASHEVILLE–SCHOONMAKER MICA CO	910 JEFFERSON AVE P O BOX 318	NEWPORT NEWS VA 23607–6120
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108–5181

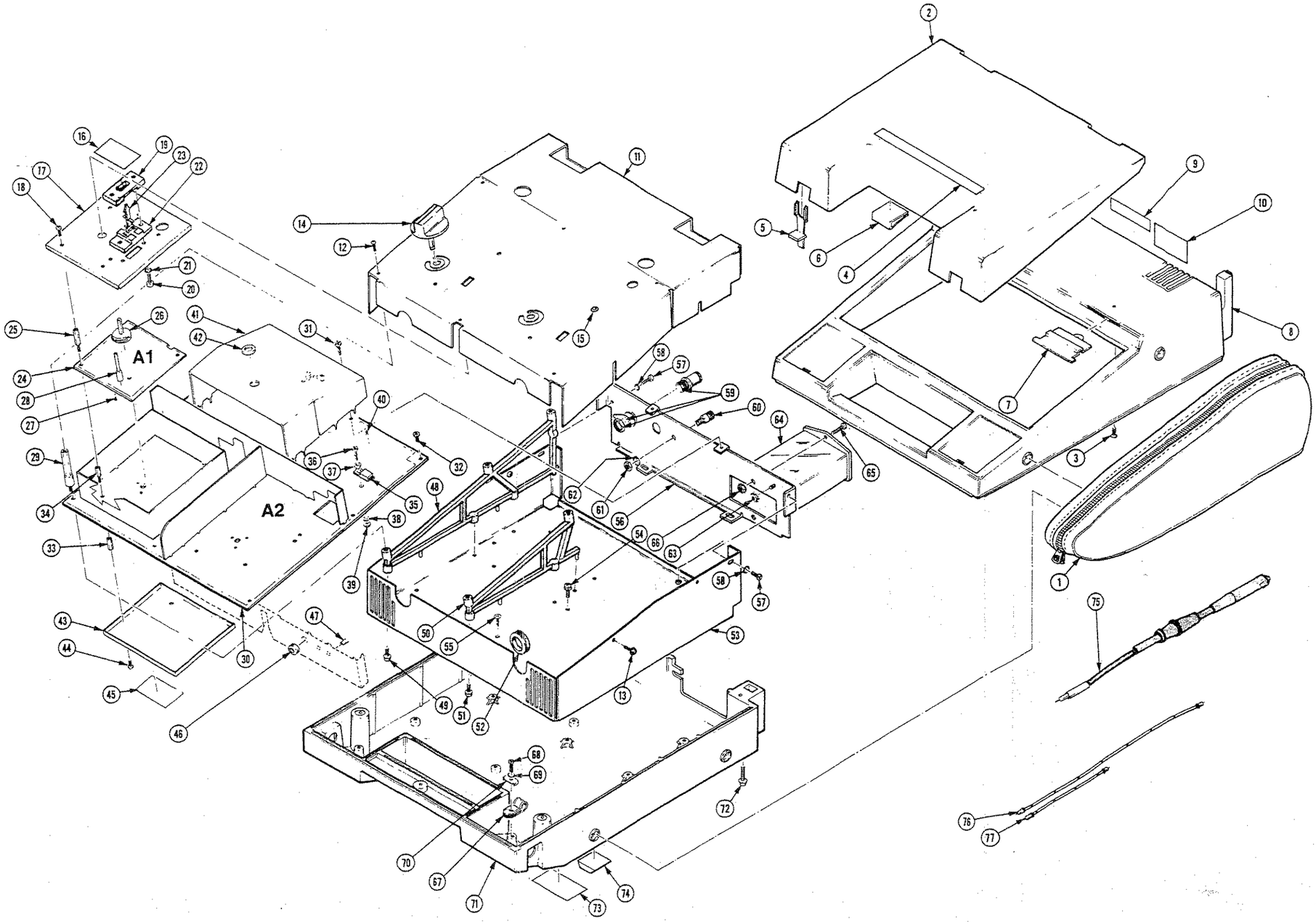
Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1–1	016–0453–01			1	POUCH,ACCESSORY:RIGHT	0JRZ2	ORDER BY DESC
	016–0454–01			1	POUCH,ACCESSORY:LEFT	0JRZ2	ORDER BY DESC
–2	200–2375–02			1	LID,ISOLATOR:W/HARDWARE ATTACHING PARTS	80009	200237502
–3	211–0718–00			2	SCREW,MACHINE:6–32 X 0.312,FLH,100 DEG,STL END ATTACHING PARTS	0KB01	ORDER BY DESC
–4	334–3768–02			1	.MARKER,IDENT:MKD TEKTRONIX	80009	334376802
	334–8331–00	B021600		1	.MARKER,IDENT:	80009	334833100
–5	105–0838–01			2	.LATCH,LID,ISLTR:ACETAL,SLATE GRAY	80009	105083801
–6	343–0775–00	B021512	B021600	2	.CLIP,SPR TNSN:	52152	3484–1000
–7	214–2743–03			2	.HINGE,COVER:SLATE GRAY,POLYPROPYLENE	80009	214274303
–8	390–0722–03			1	CAB.,TOP,ISLTR:POLYCARBONATE	0JR05	390–0722–03
–9	334–6268–00			1	.MARKER,IDENT:MKD CHANNEL 1/CHANNEL 2	80009	334626800
–10	334–3750–00			1	.MARKER,IDENT:MKD DANGER	22670	ORDER BY DESC
	352–0169–00			1	HLDR,TERM CONN:2 WIRE,BLACK (TO LED WIRES ON TOP CASE)	0JR05	ORDER BY DESC
–11	333–2619–04			1	PANEL,FRONT:W/LABEL ATTACHING PARTS	80009	333261904
–12	211–0303–00			6	SCREW,MACHINE:4–40 X 0.25,FLH 100 DEG,STL	93907	ORDER BY DESC
–13	211–0711–00			2	SCR,ASSEM WSHR:6–32 X..0.25,PNH,STL, TORX,T15 END ATTACHING PARTS	0KB01	ORDER BY DESC
–14	366–1815–02	B021512	B022329	2	KNOB:DOVE GRAY,0.122 ID X 1.5 DIA X 0.5 H	80009	366181502
	366–1815–03	B022330		2	KNOB:SMOKE TAN,0.122 ID X 1.5 DIA X 0.5 H	0JR05	366–1815–03
–15	358–0378–00			4	BUSHING,SLEEVE:0.131 ID X 0.18 OD X 0.125L	80009	358037800
–16	334–3750–00			3	MARKER,IDENT:MKD DANGER ATTACHING PARTS	22670	ORDER BY DESC
–17	337–2647–03			2	SHIELD,ELEC:ATTENUATOR	80009	337264703
–18	211–0324–00			6	SCR,ASSEM WSHR:4–40 X 0.188,PNH,T9 TORX	0KB01	ORDER BY DESC
	211–0028–00			2	SCREW,MACHINE:4–40 X 0.188,BDGH,NYL END ATTACHING PARTS	85480	ORDER BY DESC
–19	380–0609–01	B021512	B021799	2	HSG HALF,ACTR:TOP,POLYCARBONATE	80009	380060901
	380–0609–02	B021800		2	HSG HALF,ACTR:TOP,POLYCARBONATE ATTACHING PARTS	80009	380060902
–20	212–0066–00			4	SCREW,MACHINE:8–32 X 0.5,RDH,NYL	TK1158	010832R050
–21	210–0008–00			4	WASHER,LOCK:#8 INTL,0.02 THK,STL END ATTACHING PARTS	0KB01	ORDER BY DESC
–22	380–0610–02			2	HSG HALF,ACTR:BOTTOM,POLYCARBONATE	80009	380061002
–23	376–0194–01	B021512	B021599	2	ADPTR SW ACTR:SLIDE,DOVE GRAY, POLYCARBONATE	80009	376019401
	376–0194–02	B021600		2	ADAPTER SW ACTR:SLIDE,SMOKE TAN, POLYCARBONATE	80009	376019402
–24	––––––––			1	CIRCUIT BD ASSY:PREAMP (SEE A1 REPL) ATTACHING PARTS		
–25	129–0456–02			8	SPACER,POST:0.67 L,4–40 ONE END,BRS END ATTACHING PARTS	80009	129045602
					CIRCUIT BD ASSY INCLUDES:		

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
−26	380−0244−00			2	.HOUSING,SWITCH:POLYCARBONATE	0JR05	ORDER BY DESC
	384−1681−01			2	.SHAFT,ROTARY SW:2.09 L X 0.154 OD	80009	384168101
	401−0127−04			4	.W/CONTACT.ROTOR,ELEC SW:W/CONTACT	80009	401012704
−27	136−0252−07			2	.SOCKET,PIN TERM:SINGLE,PCB,T/G,0.030H, .0.054	22526	75060−012
	136−0263−07			10	.PCB,0.012−0.22 PIN SIZE,W/O DIMPLE,25000 .SOCKET,CONTACT:PCB,;FEMALE,STR,0.225H .ACCOM 0.062 PCB,GOLD,USE WITH 0.025 SQ .PIN,SIDE TO SIDE CARRIER	22526	76215−002
−28	384−1627−03			2	EXTENSION SHAFT:POT ADJUSTMENT,SLATE GRAY	80009	384162703
−29	129−0788−00			6	SPACER,POST:1.71 L,6−32 EXT/4−40 INT,NYL	80009	129078800
−30	−−−−−−−−−			1	CIRCUIT BD ASSY:MAIN (SEE A2 REPL) ATTACHING PARTS		
−31	213−0882−00			2	SCREW,TPG,TR:6−32 X 0.437 TAPTITE, PNH,STL	0KB01	ORDER BY DESC
−32	211−0711−00			2	SCR,ASSEM WSHR:6−32 X 0.25,PNH,STL, TORX,T15 END ATTACHING PARTS CIRCUIT BD ASSY INCLUDES:	0KB01	ORDER BY DESC
−33	220−0449−00			8	.NUT,SLEEVE:4−40 X 0.187 HEX,BRS CD PL ATTACHING PARTS	80009	220044900
−34	129−0791−00			8	.SPACER,POST:0.64 L,4−40 INT/4−40 EXT,BRS END ATTACHING PARTS	80009	129079100
−35	−−−−−−−−−			3	.TRANSISTOR:(SEE A2Q2398,U2770,U2771 .REPL) ATTACHING PARTS		
−36	211−0304−00			3	.SCR,ASSEM WSHR:4−40 X 0.312,PNH,STL,T9 .TORX	0KB01	ORDER BY DESC
−37	210−1178−00			1	.WASHER,SHLDR:U/W TO−220 TRANSISTOR	13103	7721−7PPS
−38	210−0054−00			3	.WASHER,LOCK:#4 SPLIT,0.025 THK STL	86928	ORDER BY DESC
−39	210−0406−00			3	.NUT,PLAIN,HEX:4−40 X 0.188,BRS CD PL END ATTACHING PARTS	73743	12161−50
	342−0202−00			1	.INSULATOR,PLATE:TRANSISTOR,MICA	91500	10−21−023−106
−40	136−0252−07			2	.SOCKET,PIN TERM:SINGLE,PCB,T/G,0.030H, .H,0.054.PCB,0.012−0.22 PIN SIZE,W/O .DIMPLE	22526	75060−012
−41	337−3271−00			1	.SHIELD,ELEC:PWR SUPPLY	80009	337327100
−42	210−1424−00			1	.WASHER,FLAT:0.33 ID X 0.5 OD X 0.16BLK .NYLON	80009	210142400
−43	337−2651−02			2	.SHIELD,ELEC:ATTENUATOR ATTACHING PARTS	80009	337265102
−44	211−0324−00			6	.SCR,ASSEM WSHR:4−40 X 0.188,PNH,T9	0KB01	ORDER BY DESC
	211−0028−00			2	.SCREW,MACHINE:4−40 X 0.188,BDGH,NYL END ATTACHING PARTS	85480	ORDER BY DESC
−45	334−3750−00			2	.MARKER,IDENT:MKD DANGER	22670	ORDER BY DESC
−46	348−0093−00			6	.GROMMET,RUBBER:BLACK,ROUND,0.15 ID	TK0503	1259
−47	348−0031−00			4	.GROMMET,PLASTIC:0.127 ID,GRAY ACETAL	0JR05	ORDER BY DESC
	196−3064−00			6	.LEAD ELECTRICAL:DESCRETE,;CUT,1,26 .AWG,4.0L,.1−N,TEFLON,CUT&STRIP BOTH .ENDS ATTACHING PARTS	TK2469	196−3064−00

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
-48	407-2404-02			2	BRACKET,CKT BD:OUTER,POLYAMIDE	80009	407240402
-49	211-0711-00			2	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,TORX,T15 END ATTACHING PARTS	0KB01	ORDER BY DESC
-50	407-2404-03			1	BRACKET,CKT BD:INNER,POLYAMIDE ATTACHING PARTS	80009	407240403
-51	211-0711-00			2	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,TORX,T15 END ATTACHING PARTS	0KB01	ORDER BY DESC
-52	348-0019-00			2	GROMMET,RUBBER:BLACK,ROUND,0.469 ID	TK0503	1862
-53	337-2696-02			1	SHIELD,ELEC:CIRCUIT BD ATTACHING PARTS	0J9P9	337-2696-02
-54	211-0711-00			4	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,TORX,T15	0KB01	ORDER BY DESC
-55	213-0881-00			4	SCREW,TPG,TR:6-32 X 0.25 TYPE TT,FILH,STL END ATTACHING PARTS	0KB01	ORDER BY DESC
-56	407-2402-03			1	BRACKET,CMPNT:ALUMINUM ATTACHING PARTS	0J9P9	407-2402-03
-57	211-0711-00			4	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,TORX,T15	0KB01	ORDER BY DESC
-58	210-0006-00			4	WASHER,LOCK:#6 INTL,0.018 THK,STL END ATTACHING PARTS	78189	1206-00-00-0541
-59	--------			2	CONN,RCPT,ELEC: (SEE J1,J2 REPL)		
-60	129-0103-00			1	POST,BDG,ELEC:ASSEMBLY ATTACHING PARTS	TK0588	ORDER BY DESC
-61	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-62	210-0046-00			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL END ATTACHING PARTS	78189	1214-05-00-0541
	198-5524-01			1	WIRE SET,ELEC:4,22 AWG,2,18 AWG (FROM FL2224 TO A2T2689) ATTACHING PARTS	80009	198552401
-63	210-0457-00			3	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL END ATTACHING PARTS	TK0435	ORDER BY DESC
-64	--------			1	FILTER,RFI: (SEE FL2224 REPL) ATTACHING PARTS		
-65	211-0451-00			2	SCREW,MACHINE:4-40 X 0.750,FLH,CD PL TORX	0KB01	ORDER BY DESC
-66	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL END ATTACHING PARTS	TK0435	ORDER BY DESC
-67	343-0003-00			2	CLAMP,LOOP:0.25 ID,PLASTIC ATTACHING PARTS	06915	E4 CLEAR ROUND
-68	211-0711-00			4	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,TORX,T15	0KB01	ORDER BY DESC
	211-0721-00			2	SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-69	210-0006-00			2	WASHER,LOCK:#6 INTL,0.018 THK,STL	78189	1206-00-00-0541
-70	210-0863-00			2	WSHR,LOOP CLAMP:0.091 ID U/W 0.5 W CLP,STLCD PL END ATTACHING PARTS	85480	C191
-71	390-0723-03			1	CAB.BOT,ISLTR:W/HARDWARE & LABELS ATTACHING PARTS	80009	390072303

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
–72	211–0720–00			6	SCR,ASSEM WSHR:6–32 X 0.50,PNH,STL, TORX,T15 END ATTACHING PARTS	0KB01	ORDER BY DESC
–73	334–3748–00			1	.MARKER,IDENT:MARKED CAUTION SHOCK	80009	334374800
–74	348–0902–00			4	.FOOT,CABINET:BLACK	53387	SJ5023 (BLACK)
–75	175–3777–04			2	CABLE ASSY,RF:39 OHM COAX,9.125 L	80009	175377704
–76	175–5542–00			1	CABLE ASSY,RF:50 OHM COAX,13.0 L,6–N (A2J2190 TO J1,CHANNEL 1)	80009	175554200
–77	175–3738–00			1	CABLE ASSY,RF:50 OHM COAX,5.0 L,6–N, PELTOLA EACH END (A2J2995 TO J2,CHANNEL 2)	80009	175373800

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2–					**STANDARD ACCESSORIES**		
–1	010–0411–15			2	PROBE,ISOLATOR:500V W/ACCESSORIES	80009	010041115
–2	196–3286–00			2	.LEAD,ELECTRICAL:26 AWG,10.222 L,0–N .W/ALLIGATOR CLIP	80009	196328600
–3	013–0107–07			2	.TIP,PROBE:MINIATURE/COMPACT SIZE	80009	013010707
–4	166–0404–01			2	.COVER,GROUND:	80009	166040401
–5	175–3766–03			2	.CABLE ASSY,RF:70 OHM,71.05 L,SLATE GRAY	80009	175376603
–6	206–0345–00			2	.PROBE HEAD:17.7PF	80009	206034500
–7	015–0201–03			2	.TIP,PROBE:IC TEST	80009	015020103
	016–0708–00			1	.POUCH,ACCESSORY:6.25 X 9.25	TK1556	ZIP–6.25X9.25ID
	013–0224–00			1	ADAPTER ASSY: (OPTION 09 ONLY)	80009	013022400
	070–5810–00			1	SHEET,TECHNICAL:INSTR (OPTION 09 ONLY)	80009	070581000
–8	012–0204–00			2	CA ASSY,RF:COAXIAL,;RFD,50 OHM,(175–0300–00),72L,BNC,MALE,STR, BOTH ENDS	80009	012020400
–9	161–0104–00			1	CABLE ASSY,PWR,:3,18 AWG,98L,SVT,GREY/ BLK,60 DEG C,BME X RTANG IEC,RECPT, 10A/250V	0B445	MC6 –3 CG86
–10	161–0104–06			1	CABLE ASSY,PWR,:3 X 0.75MM SQ,220V,98.0 L (OPTION A1 ONLY)	S3109	VIIGSOPO–HO5VVF
–11	161–0104–07			1	CABLE ASSY,PWR,:3,1.0MM SQ,240 VOLT,2.5 METERS,UNITED KINGDOM,RTANG IEC320 RCPT,13 AMP FUSED UK PLUG (OPTION A2 ONLY)	S3109	ORDER BY DESC
–12	161–0135–00			1	CABLE ASSY,PWR,:3,1.0MM SQ,250V,3.05M L,10A,AUSTRALIAN (OPTION A3 ONLY)	S3109	SAA/3–OD3CCFC3X
–13	161–0134–00			1	CABLE ASSY,PWR,:3,18 AWG,240V,120.0 L NORTH AMERICAN (OPTION A4 ONLY)	70903	ORDER BY DESC
–14	161–0154–00			1	CABLE ASSY,PWR,:3,1.00MM SQ,250V,10A,2.5METER SWISS (OPTION A5 ONLY)	S3109	12–H05VVF3G 00–
	070–5614–01			1	MANUAL,TECH:OPERATORS,A6902B	80009	070561401
					OPTIONAL ACCESSORIES		
	013–0084–02			1	ADAPTER,CONN:PROBE TO BNC	24931	28P230–1
	015–0405–00			1	ADPTR,PROBE TIP:	24931	ORDER BY DESC
–15	010–0409–02			1	PROBE,ISOLATOR:1500V,VDE,OPT 19 (OPTION 19 ONLY – NO LONGER REPLACEABLE)	80009	010040902
–16	195–0511–02			1	.LEAD,ELECTRICAL:18 AWG,12.75 L,4–N	80009	195051102
–17	013–0024–00			1	.TIP,PROBE:RETRACTABLE	80009	013002400
	334–2794–07			1	BAND,MARKER:0.371 DIA,GREEN,PLASTIC	80009	334279407
	334–2794–01			1	BAND,MARKER:0.371 DIA,WHITE,PLASTIC	80009	334279401
	070–5615–02			1	MANUAL,TECH:SERVICE,A6902B,ISOLATOR	80009	070561502
	070–5688–00			1	SHEET,TECHNICAL:INSTR,A6902B (PART OF 120–1664–01)	80009	070568800



A6902B Service

FIG. 1 EXPLODED VIEW

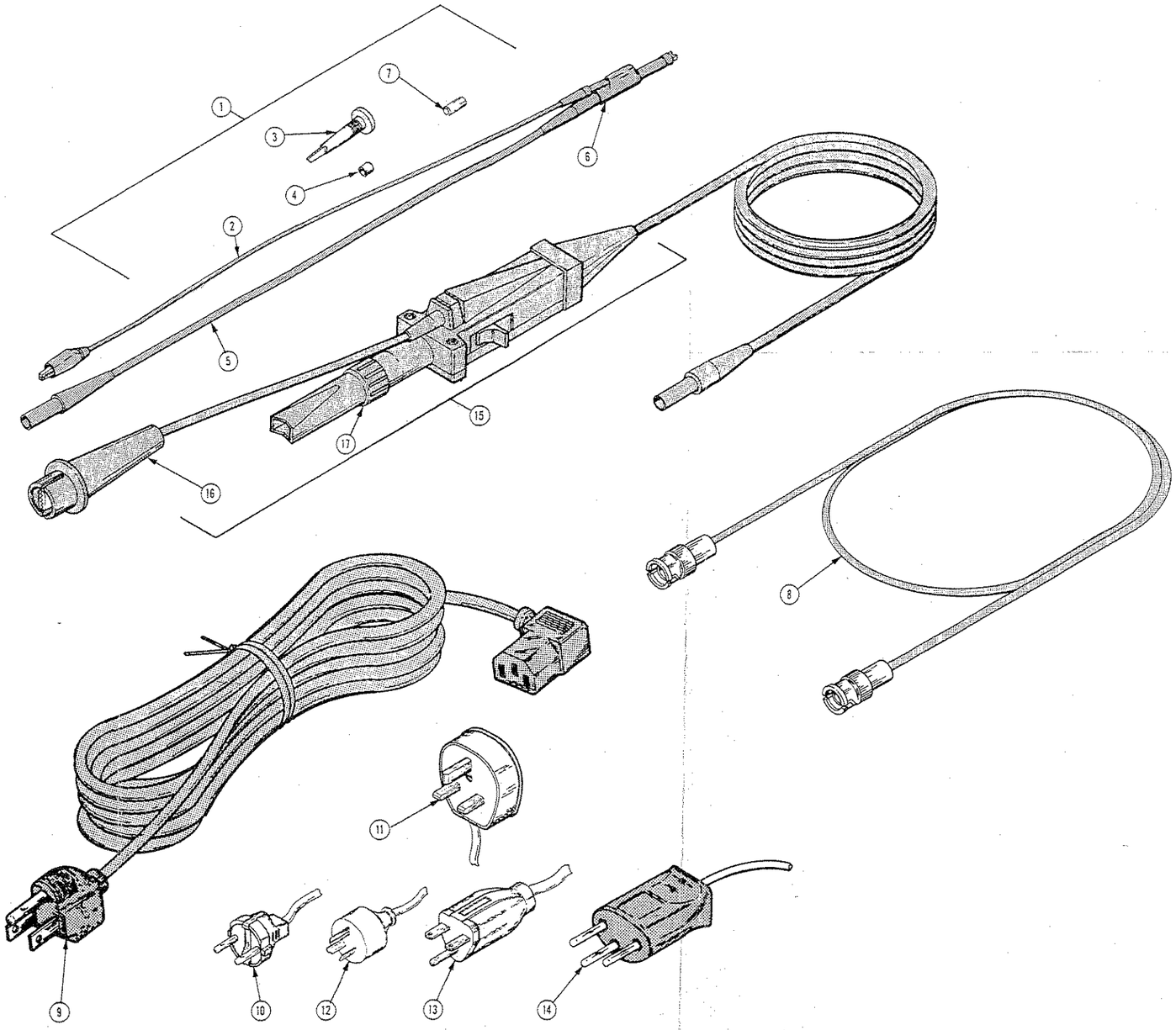


Figure 2: Accessories

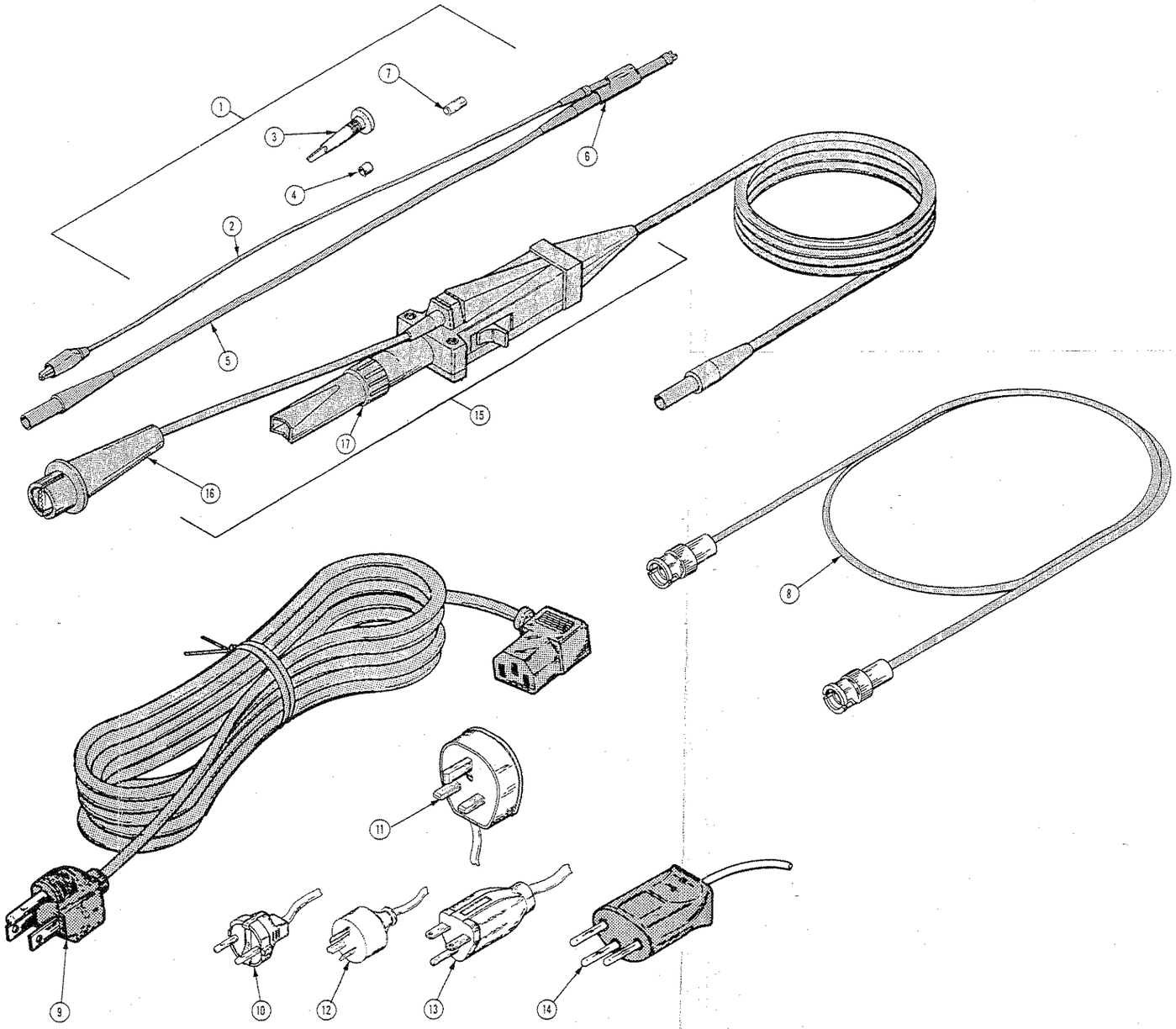


Figure 2: Accessories