

Instructions

Tektronix

**P6134C
10X Passive Probe
for DSA600/11000 Series**

070-7676-01

SPECIFICATIONS

Description

The P6134C is a **compact** tip, 1.5 meter, 10X, passive voltage probe designed specifically for use with the TEKTRONIX DSA600/11000 Series oscilloscopes. It is fully compatible with the Tektronix family of **compact** probe accessories.

Electrical Characteristics (Probe installed on 11402A, 11A32)

Attenuation: $10X \pm 1\%$ at DC.

Input Impedance (System): $10\text{ M}\Omega$ shunted by 10.5 pF at DC. (See Figure 10.)

Compensation Range: 12 pF to 18 pF .

Signal Delay: $6.93\text{ ns} \pm 100\text{ ps}$.

System Bandwidth (-3dB): $\geq 400\text{ MHz}$ when used with an 11A32 vertical amplifier in an 11402A mainframe.

Maximum Nondestructive Input Voltage: 500 V (DC + peak AC) to 1.3 MHz . (See Figure 11 for voltage derating curve.)

System Aberrations less oscilloscope's 50Ω , DC-coupled aberrations: $\pm 5\%$ overshoot, during first 2 ns , $\leq \pm 4\%$, 6% p-p in the following 30 ns , $\leq \pm 1\%$, 1% p-p thereafter.

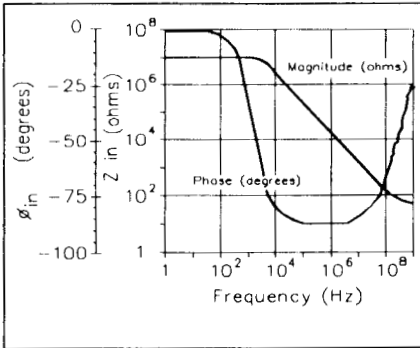


Figure 10. Typical Input Impedance.

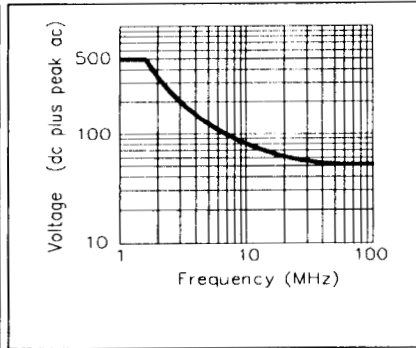


Figure 11. Typical voltage derating versus frequency.

Environmental Characteristics

Temperature Range (Operating): -15°C to $+75^{\circ}\text{C}$ ($+5^{\circ}\text{F}$ to $+167^{\circ}\text{F}$).

(Nonoperating): -62°C to $+85^{\circ}\text{C}$ (-80°F to $+185^{\circ}\text{F}$).

Humidity: Five cycles (120 hr) at 95% to 97% relative humidity. Per Tek Standard 062-2847-00, Class 3. Reference MIL-T-28800.

Physical Characteristics

Net Weight (Includes Accessories): 203 g (7.2 oz).

Probe Cable Length: 1.5 m ($\approx 5\text{ ft}$).

Safety

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

This product is UL 1244 listed.

OPERATING CONSIDERATIONS

Probe Compensation

Due to variations in oscilloscope input characteristics, probe low-frequency compensation should be checked and adjusted after moving the probe from one input to another. To adjust low-frequency compensation, apply a 1 kHz square-wave signal (such as an oscilloscope calibrator output) to the probe tip. Using a low-reactance alignment tool, adjust the probe's com-

pensation capacitor through the hole in the compensation box to obtain the squarest waveform front corner. High-frequency compensation seldom requires adjustment. However, if the probe has excessive h-f aberrations, insufficient bandwidth, or cannot be l-f compensated, h-f adjustments can be made. (See "P6134C Service Information" for more details.)

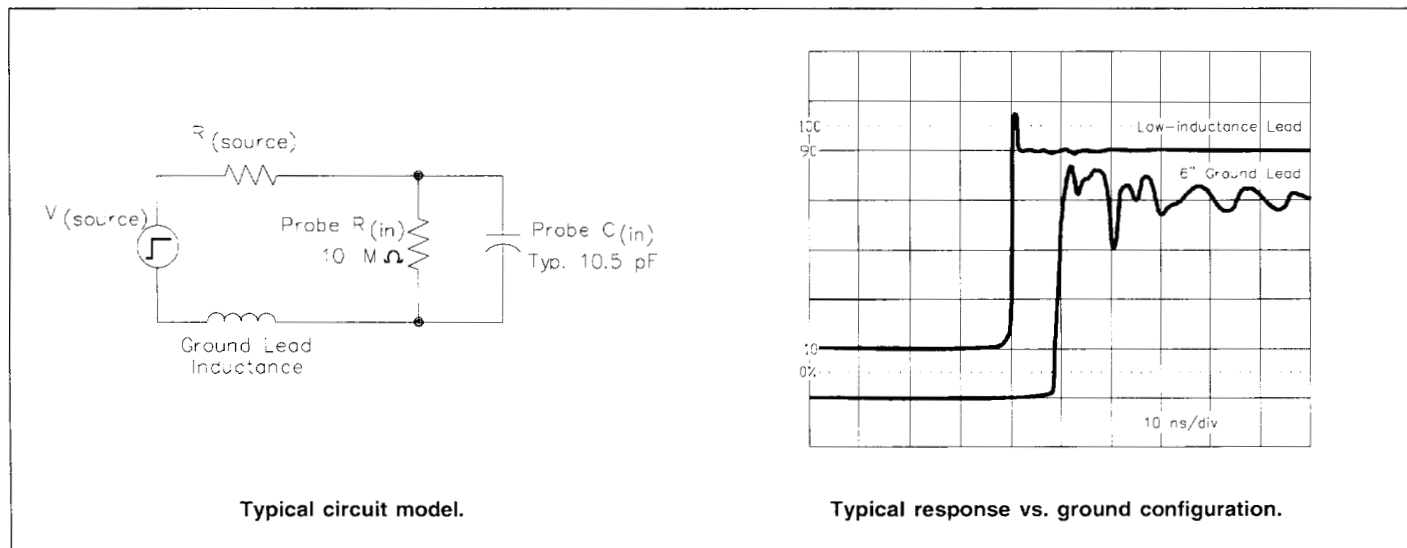


Figure 1. Effects of Ground Lead Inductance.

Ground Lead inductance can significantly reduce the performance of a probe. As shown in the model above, the ground lead inserts a series inductance into the signal path forming a series-resonant circuit between C_{in} of the probe and ground lead L , with only R_{source} as damping. This forms a resonant circuit with $f_0 = 1 / (2\pi \sqrt{LC})$. A six-inch ground lead has ≈ 140 nH of inductance causing an f_0 of ≈ 130 MHz, which is

within the frequency response of the instrument. This greatly degrades risetime, bandwidth, and transient accuracy (see illustration). For best results, make sure that the ground lead inductance is at a minimum.

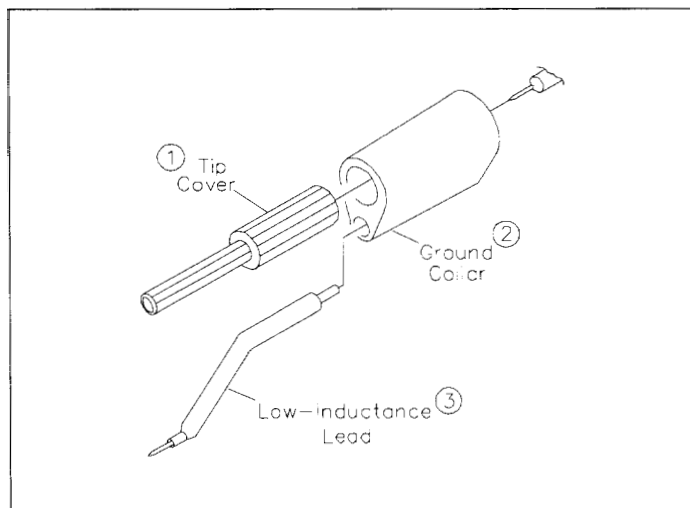


Figure 3. Low-Inductance Lead.

The Low-Inductance Lead provided with all Tek P6134C probes allows for a substantial reduction of ground-lead L (≈ 32 nH instead of 140 nH). Remove the ribbed plastic tip cover (1). Install the ground collar (2) so that the socket is pointing toward the probe tip. Reinstall the ribbed cover. Insert the Low-Inductance Lead (3) into the ground socket.

P6134C SERVICE INFORMATION

WARNING

The following servicing instructions are for use by qualified personnel only. To avoid electric shock, do not disassemble the probe or perform any probe maintenance while the probe is connected to a signal source.

Table 1
Test Equipment Required

Item Number and Description	Minimum Specification	Test Equipment
1. Oscilloscope	Input Resistance: 1 M Ω \pm 0.5% Input Capacitance: 12 pF-18 pF Specified Bandwidth \geq 400.	Tektronix 11402A and 11A32 plug-in or equivalent.
2. Calibration Generator	Amplitude: > 60V Rep rate: 100 kHz.	Tektronix PG506A or equivalent.
3. Calibration Fixture: Tunnel Diode Pulser	Pulse risetime: \leq 125 ps Amplitude: \geq 0.25V into 50 Ω .	Tektronix Part Number: 067-0681-01 or equivalent.
4. Leveled Sine-Wave Generator.	Amplitude adjustable up to at least 1V p-p into 50 Ω . Frequency range must exceed 400 MHz. Fixed 50 kHz reference.	Tektronix SG504A or equivalent.
5. Precision Coaxial Cable	50 Ω , 36 inch, BNC.	Tektronix Part Number: 012-0482-00 or equivalent.
6. 10X Attenuator	50 Ω , \pm 1 Ω BNC.	Tektronix Part Number: 011-0059-02 or equivalent.
7. Adapters	For Compact tips use: compact-to-BNC, 50 Ω terminated.	Tektronix Part Number: 013-0227-00.
8. Low Reactance Adjustment Tool	Insulated, Low reactance.	Tektronix Part Number: 003-1433-01 or equivalent.

Adjustment Procedure

Refer to Table 1 for equipment requirements.

Refer to Figure 4 & 5 for Adjustment Locations and Control.

1. Adjust Low-Frequency Compensation.

a. Connect the P6134C to the CH 1 input. Set the oscilloscope controls for 100 mV (includes probe 10X attenuation), 1 ms and DC coupling. Connect the probe tip through the probe-tip-to-BNC 50 Ω adapter (# 7) to the calibration generators (# 2) FAST RISE output. Set the calibration generator PERIOD CONTROL to 1 ms. Set the TRIGGERING controls for a stable display, approximately 5 cycles of square wave, and an amplitude of 4-6 divisions (centered on the screen).

b. ADJUST—Low-Frequency compensation (LF COMP) using a low-reactance non-conductive adjustment tool for the squarest waveform front corner. Disconnect the test setup.

2. Check/Adjust High-Frequency Compensation.

a. Connect the AMPL OUTPUT (HIGH) of the calibration generator (# 2) to the input of the calibration fixture, and the output of the calibration fixture (# 3), through the 10X attenuator (# 6), to the oscilloscope CH 1 input. Set the oscilloscope controls for 5 mV and 20 ns, 50 Ω DC coupling. Adjust the PULSE AMPLITUDE controls and the calibration fixture to produce a 5-division display on the oscilloscope. Set the TRIGGERING controls for a stable display and center the display. Store the waveform for comparison in part b.

b. Disconnect the signal from the oscilloscope input. Remove the 10X attenuator from the calibration fixture. Connect the probe to the oscilloscope CH 1 input. Connect the probe tip through the probe-tip-to-BNC 50 Ω adapter (or the BNC-to-GR and the 50 Ω GR-to-probe tip adapter) to the output of the calibration fixture. Set the oscilloscope coupling to the 1 M Ω DC position. Recall the waveform stored in part 2a. Check high frequency aberrations in the first 30 ns (in addition to system aberrations noted in part 2a). If probe aberrations are excessive (typical aberrations= \pm 5%, first 2 ns, \leq \pm 4%, 6% p-p thereafter for 30 ns) proceed to part 2c. If they are acceptable, proceed with part 2e.

c. Disconnect the probe from the scope input and signal source. Remove the top cover from the compensation box using the enclosed adjustment tool. Reconnect the probe (as in part 2b). See Figure 4 for the location of all adjustments, and Figure 5 for identification of the waveform area affected by each adjustment.

d. Remove the probe from the BNC input, Then remove the top cover from the compensation box using the enclosed adjustment tool. Set Time/Div to 5 ns/Div for better resolution of adjustments. Refer to Figure 5. ADJUST R1 and R3 for the best overall flat response. ADJUST R2 and C1 for the best flatness and corner response. Readjust R1 (or R2, R3 and C1) as required. The high-frequency adjustments affect the probe bandwidth. A small overshoot on the leading edge of the pulse may be necessary to meet the bandwidth specification. Reinstall the compensation box cover by reversing the procedure described above.

e. Disconnect the test setup.

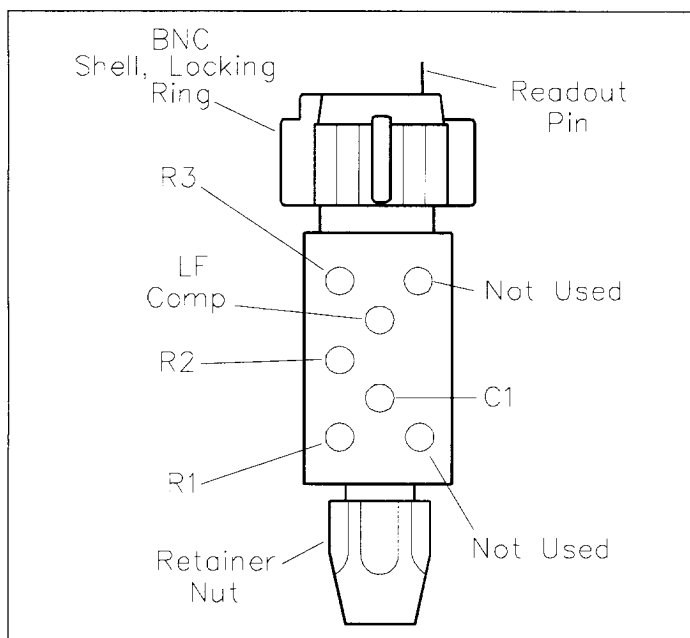


Figure 4. High-Frequency Adjustment Locations.

3. Bandwidth Check

a. Connect the P6134C probe output to the oscilloscope CH 1 input. Connect the probe tip through the 50 Ω adapters (used in part 2b) to the output of the Leveled Sine Wave Generator (# 4) described in Table 1. Set the oscilloscope controls for 100 mV (includes probe 10X attenuation), 1 ms, and 1 MΩ DC coupling. Set the leveled sinewave generator frequency to 50 kHz. Adjust the generator output amplitude to produce a 6-division display on the oscilloscope. Center the display on the screen

b. Set the generator frequency-range switch to the high-frequency position and slowly increase the setting of the variable frequency control until the display amplitude decreases to 4.2 divisions (-3dB). Check the sine-wave generator frequency readout. The frequency must be ≥ 400 MHz. If the reading is less than the required value, repeat the adjustments in part 2.

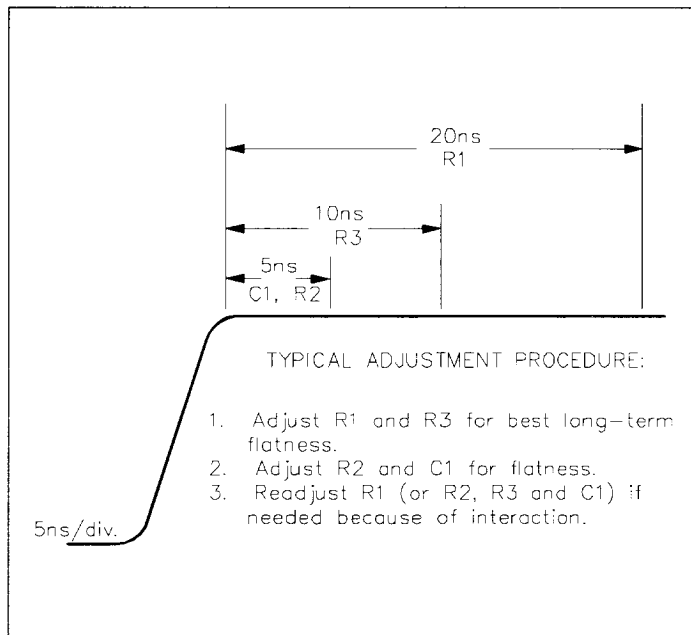


Figure 5. High-Frequency Adjustments Relative To Affected Areas Of The Waveform.

Cleaning

Accumulated dirt can be removed with a soft cloth dampened with a nonresidue type cleaner, preferably isopropyl alcohol. Before using any other type of cleaner, consult your Tektronix Service Center or representative. In particular, avoid benzene, toluene, xylene, acetone, or similar solvents.

Compensation Box/Cable Assembly Replacement

NOTE

*Probe adjustment may be necessary after assembly replacement.
(See "Adjustment Procedure.")*

The probe tip assembly, compensation box, and cable are available as separate units through your local Tektronix Field Office or representative. Individual components within the compensation box are not replaceable.

Compensation Box/Cable Assembly Disassembly and Replacement

Use the following procedure to disassemble and replace the compensation box or the cable assembly (refer to Figure 6 for parts nomenclature).

- Loosen the cable-retainer nut and pull it back onto the cable assembly.
- Use the adjustment tool included in the accessory pack to remove the top and bottom plastic covers. Insert the adjustment tool into the side of the compensation box and pry upward and outward.
- Pry off the BNC connector shell with a wide-blade screwdriver. **GENTLY** pry the BNC shell away from the compensation box.

Note

A new BNC shell comes with the replacement cable/compensation box assemblies.

- Remove the retainer spring.

- Lift the top half of the compensation box off.
- Remove the cable assembly.

Note

If you are replacing the cable assembly, you need to use the cable-retainer nut from your old cable assembly.

- Use a new cable or a new compensation box, and snap the cable assembly into place in the bottom half of the compensation box.
- Place the top half of the compensation box onto the lower half. Slide the cable-nut up and tighten.
- Replace the retainer spring. Press the new BNC shell onto the compensation box, making sure the identification pin goes through the oval slot in the shell. (See Figure 6.)
- Snap the plastic covers back in place.

Compact Probe Tip Assembly Replacement

Pull off the retractable hook tip. Unscrew the plastic tip cover. Then unscrew the old probe tip assembly from the probe head/cable assembly. Screw the new probe tip assembly into the probe head/cable assembly. Screw the plastic tip cover on. Push the retractable hook tip on.

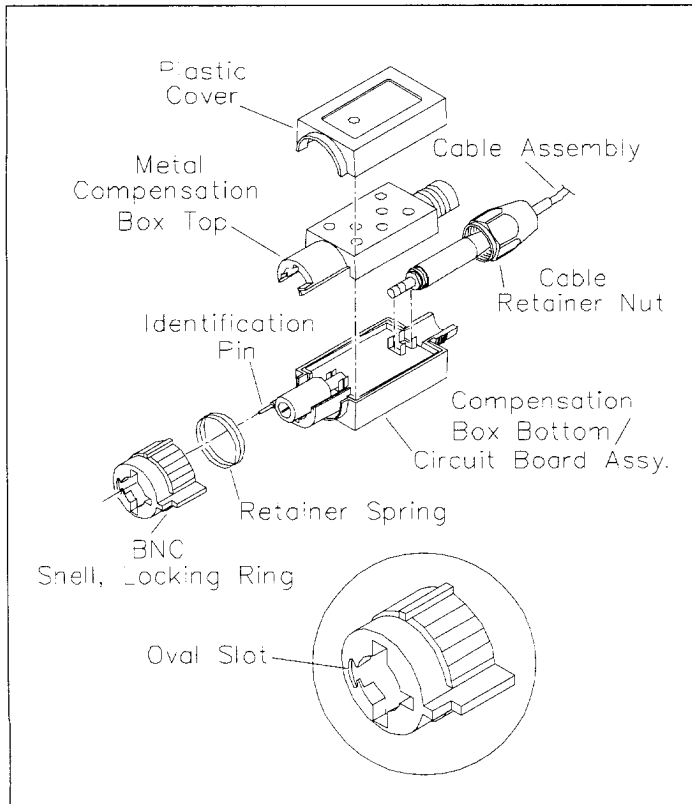


Figure 6. Compensation Box/Cable Assembly Replacement.

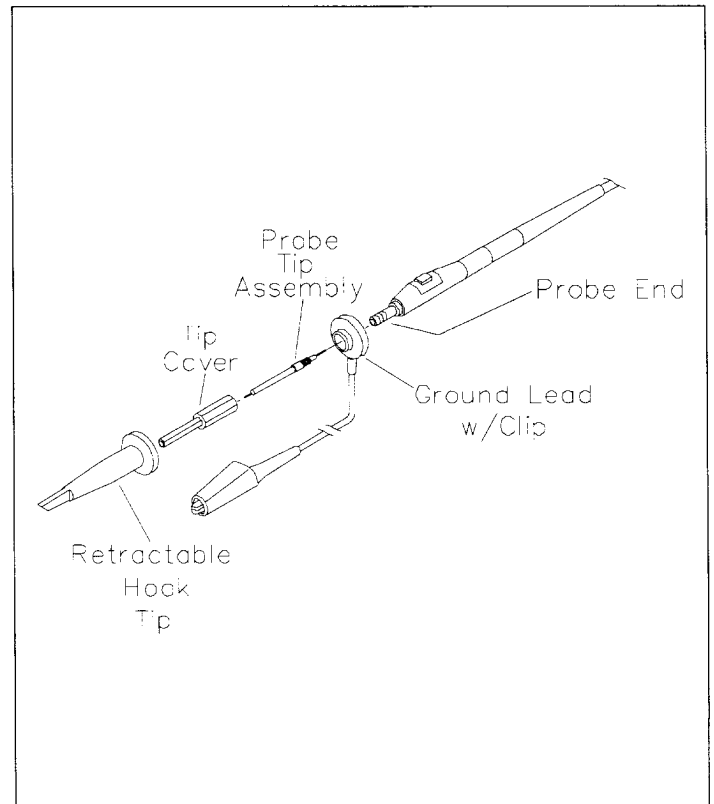


Figure 7. Probe Tip Assembly Replacement.

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 or date code 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

Abbreviations conform to American National Standards Institute Y1.1.

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
TK1556	CONSOLIDATED VINYL SALES	1237 S SAN GABRIEL BLVD	SAN GABRIEL CA 91776

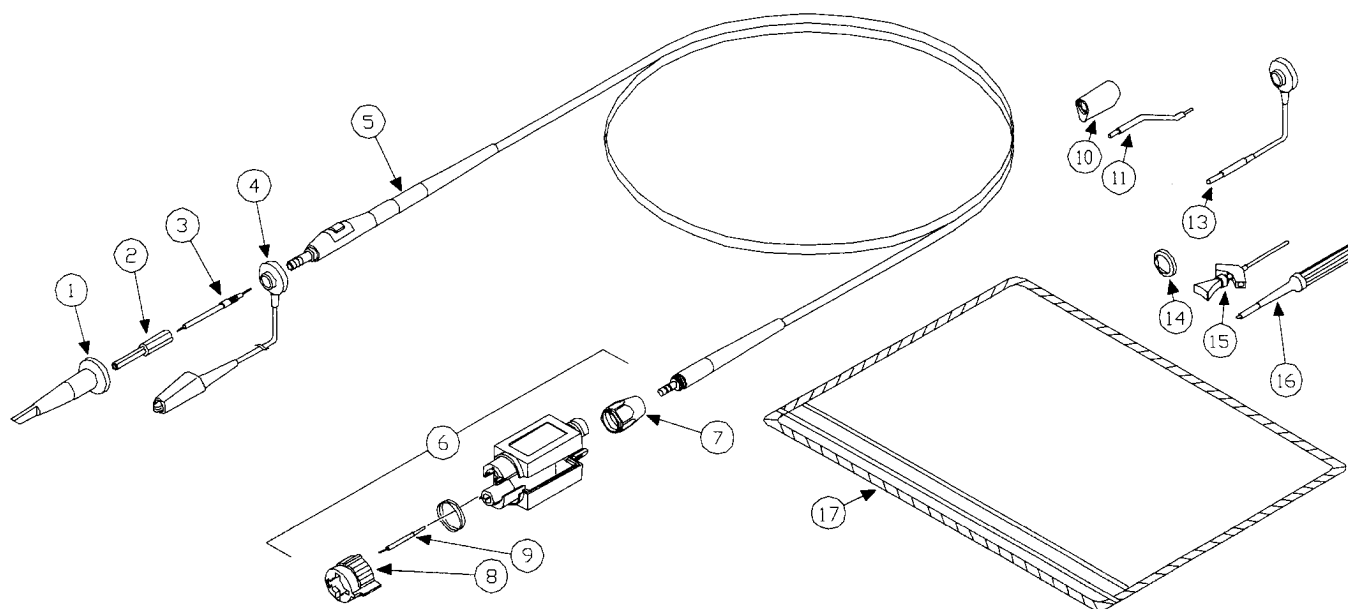


Figure 8. Exploded View

Fig. Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
8-						
1	013-0107-06	9139	1	TIP,PROBE:MINIATURE/COMPACT SIZE, RETRACTABLE HOOK ASSY	80009	013-0107-06
	013-0107-07	9140	1	TIP,PROBE:MINIATURE/COMPACT SIZE,	80009	013-0107-07
-2	204-1049-00		1	BODY SHELL,PROB:STANDARD	80009	204-1049-00
-3	206-0418-00		1	TIP,PROBE:HYBRID ASSY,10.7PF,BLK TIP,RED TAIL	80009	206-0418-00
-4	196-3305-00		1	LEAD ELECTRICAL:STRD,22 AWG,GND STRAP ASSY	80009	196-3305-00
-5	174-1081-04		1	CABLE ASSY,RF:50 OHM COAX,1.5 L,W/CONN SHELL	80009	174-1081-04
-6	206-0420-00		1	COMP BOX ASSY:P6134C	80009	206-0420-00
-7	220-0099-00		1	.NUT,RETAINING:CABLE/COMP BOX	80009	220-0099-00
-8	205-0192-01		1	.SHELL,ELEC CONN:BNC,ACETAL,DOVE GRAY	80009	205-0192-01
-9	131-3685-01		1	.CONTACT,ELEC:SPRING TIP,GOLD PLATED	80009	131-3685-01
STANDARD ACCESSORIES						
-10	343-1003-01		1	COLLAR,GND:	80009	343-1003-01
-11	195-4240-00		1	LEAD,ELECTRICAL:0.025 DIA,COPPER,2.3 L	80009	195-4240-00
-13	196-3113-02		1	LEAD,ELECTRICAL:STRD,22 AWG,6.0 L,8-N	80009	196-3113-02
-14	-----	-----	2	BAND,MARKER:0.371 DIA,WHITE,PLASTIC		
	-----	-----	2	BAND,MARKER:0.371 DIA,GRAY,PLASTIC		
	-----	-----	2	BAND,MARKER:0.371 DIA,RED,PLASTIC		
	-----	-----	2	BAND,MARKER:0.371 DIA,GREEN,PLASTIC		
	-----	-----	2	BAND,MARKER:0.371 DIA,BLACK,PLASTIC		
	-----	-----	2	BAND,MARKER:0.371 DIA,SILVER,PLASTIC		
	-----	-----	2	BAND,MARKER:0.371 DIA,YELLOW,PLASTIC		
	-----	-----	2	BAND,MARKER:0.371 DIA,ORANGE,PLASTIC		
	-----	-----	2	BAND,MARKER:0.371 DIA,BLUE,PLASTIC		
	-----	-----		(SEE FIGURE 9-6)		
-15	206-0364-00		1	TIP,PROBE:MICROCKT TEST 0.05 CTR	80009	206-0364-00
-16	003-1433-00		1	SCREWDRIVER:ADJUSTMENT TOOL,METAL TIP	80009	003-1433-00
-17	016-0708-00		1	POUCH,ACCESSORY	TK1556	ZIP-6.25X9.25ID
	070-7676-00		1	MANUAL,TECH:INSTR,P6134C PROBE	80009	070-7676-00

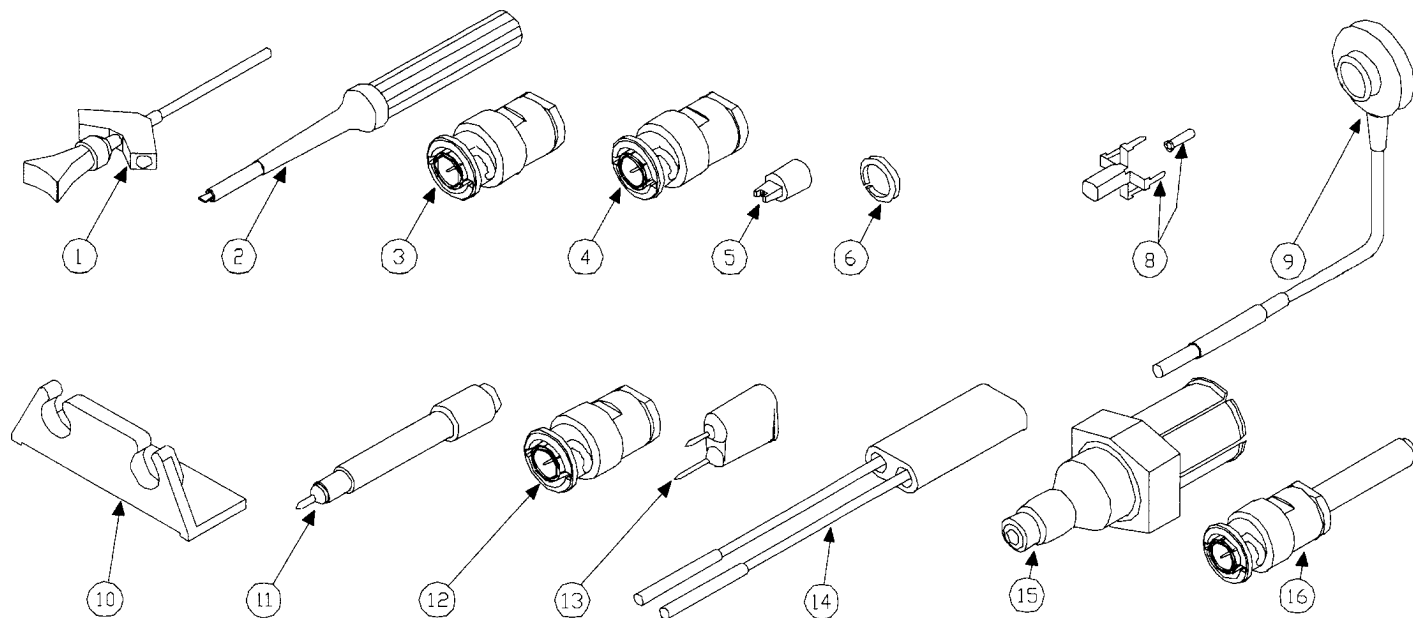


Figure 9. Optional Accessories

Fig. Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
9-				OPTIONAL ACCESSORIES		
-1	SMG50		1	SMT KLIPCHIP:20 ADAPTERS	80009	SMG50
-2	003-1433-01		1	SCREWDRIVER:ADJUSTMENT TOOL PKG OF 5	80009	003-1433-01
-3	013-0226-00		1	CONNECTOR,BNC:BNC TO PROBE TIP ADAPTER	80009	013-0226-00
-4	013-0227-00		1	CONNECTOR,BNC:50 OHM,BNC TO PROBE TIP ADAPTER	80009	013-0227-00
-5	015-0201-07		1	TIP,PROBE:IC TEST,PKG OF 10	80009	015-0201-07
	015-0201-08		1	TIP,PROBE:IC TEST,PKG OF 100	80009	015-0201-08
-6	016-0633-00		1	MARKER SET,CA:2 EA VARIOUS COLORS	80009	016-0633-00
-8	131-5031-00		1	CONNECTOR,PROBE:PKG OF 25,COMPACT	80009	131-5031-00
-9	196-3113-03		1	LEAD,ELECTRICAL:STRD,22 AWG,3.0 L,8-N	80009	196-3113-03
-10	352-0351-00		1	HOLDER,PROBE:BLACK ABS	80009	352-0351-00
-11	013-0202-02		1	ADAPTER,PROBE:SUBMINIATURE/COMPACT TO MIN	80009	013-0202-02
NOTE: THE FOLLOWING PARTS ARE USEABLE WHEN THE SUBMINIATURE/COMPACT TO MINIATURE PROBE TIP ADAPTER (FIGURE 9-11) IS USED.						
-12	013-0084-01		1	ADAPTER,CONN:BNC TO PROBE	24931	28P156-1
-13	013-0085-00		1	TIP,PROBE:GROUNDING	80009	013-0085-00
-14	015-0325-00		1	ADAPTER,PROBE:PROBE TO CONNECTOR PINS	80009	015-0325-00
-15	017-0088-00		1	CONNECTOR,PLUG,ELEC:50 OHM,GR	80009	017-0088-00
-16	013-0254-00	9307	1	ADAPTER,CONN:BNC TO PROBE TIP,MALE	80009	013-0254-00