

HP 16117B Low Noise Test Lead
Operation and Service Manual



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Warranty

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For warranty service or repair, this product must be returned to a service facility designed by HP. The Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to the Buyer. However, the Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designed by HP for use with an instrument will execute its programming instruction when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

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The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

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The Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, or to the calibration facilities of other International Standards Organization members.

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The remedies provided herein are the buyer's sole and exclusive remedies. HP shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

If you need assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

Manual Printing History

The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

December 1991	First Edition
February 1995	Second Edition
March 1996	Third Edition

Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific *WARNINGS* given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument.

The Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

Do NOT operate in an Explosive Atmosphere

Do *not* operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a safety hazard.

Keep Away from Live Circuits

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injury, always disconnect power and discharge circuits before touching them.

Do NOT Service or Adjust While Alone

Do *not* attempt internal service or adjustment unless another person, capable of turning off power and capable of rendering first aid and resuscitation, is present.

Do NOT Substitute Parts or Modify Instrument

Because of the danger of introducing additional hazards, do *not* substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure the safety features are maintained.

Dangerous Procedure Warnings

Warnings, such as the example below, precede *POTENTIALLY DANGEROUS PROCEDURES* throughout this manual. Instructions contained in the **warnings** must be followed.

Warning



Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting this instrument.

Safety Symbols

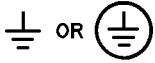
General definitions of safety symbols used on equipment or in manuals.



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.



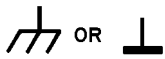
Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).



Protective ground terminal. For protection against electrical shock in case of a fault in the instrument. Used with wiring terminals to indicate the terminal which must be connected to ground before operating equipment.



Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault in the instrument. A terminal marked with this symbol must be connected to ground in the manner described in the installation (Operation) manual, and before operating the equipment.



Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.



Alternating current (power line).



Direct current (power line).



Alternating or direct current (power line).

Warning



Warning denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in *injury* or *death* to personnel.

Caution



Caution sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result *damage* to or *destruction* of part or all of the product.

Note



Note denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.

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General Information

Introduction

The purpose of this manual is to enable you to use your HP 16117B Low Noise Test Lead efficiently and confidently. This manual contains both general and specific information. To use the HP 16117B to perform a specific function (without having to read the entire manual), follow the directions in “Using the HP 16117B”.

Using the HP 16117B

The HP 16117B has been designed to operate specifically with the HP 4339B High Resistance Meter.

- To install the HP 16117B, turn to Chapter 2.
- To operate the HP 16117B, turn to Chapter 3.
- To order replaceable parts for the HP 16117B, turn to “Replaceable Parts” in Chapter 4.

Product Description

The HP 16117B has been designed to operate specifically with the HP 4339B High Resistance Meter. The HP 16117B is used to measure the resistance of insulation materials. The HP 16117B has the following features:

- Reducing electrical noise effects by using shielded cable
- High-voltage safety designed using an interlock circuit

Accessories Supplied

The accessories listed in Table 1-1 are supplied with the HP 16117B:

Table 1-1. Furnished Accessories

Description	Part Number	Quantity
Operation and Service Manual	P/N 16117-90030	1

Options

The following options are supplied for the HP 16117B:

Table 1-2. Supplied Options

Option Number	Description
Option 001	Add Pin Probes
Option 002	Add Soldering Sockets
Option 009	Delete Alligator Clips

Operating and Safety Precautions

Service

The voltage levels (up to 1000 V) in this adapter warrants extreme care for operator safety. Service must be performed only by qualified personnel.

Specifications

This section lists the complete HP 16117B specifications. These specifications are the performance standards and limits against which the HP 16117B is tested. When shipped from the factory, the HP 16117B meets the specifications listed in this section.

Applicable Test Voltage	1000 V maximum
Applicable Test Current ¹	0.5 mA maximum
Applicable Instrument	HP 4339B ²
Operating Temperature	0 to 55 °C
Operating Humidity	≤70% RH (@40°C)
Cable Length	1 m (connector to clip)
Non-operating Temperature	−40 to 70 °C
Non-operating Humidity	≤95% RH (@40°C)

1. Maximum measurable current of the HP 4339B is 100 μ A.
2. Also applicable to the HP 4339A.

Note

When used with the HP 16117B, the output current of the HP 4339B is limited up to 0.5 mA for safety.

Note

If the interlock connector is not connected, the HP 4339B will not output the source voltage.

Preparation for Use

Introduction

This chapter explains how to install the HP 16117B Low Noise Test Lead. The topics covered include initial inspection, ambient environmental considerations, connecting the adapter for use, and repackaging the adapter for shipment.

Initial Inspection

The adapter has been carefully inspected electrically and mechanically before being shipped from the factory. It should be in perfect physical condition, no scratches, dents or the like, and it should be in perfect electrical condition. Verify this by carefully performing an incoming inspection to check the adapter for signs of physical damage and missing contents. If any discrepancy is found, notify the carrier and Hewlett-Packard. Your HP sales office will arrange for repair and replacement without waiting for the claim to be settled.

1. Inspect the shipping container for damage, and keep the shipping materials until the incoming inspection is completed.
2. Verify that the shipping container contains everything shown in Figure 2-1 and listed in Table 2-1.
3. Inspect the exterior of the HP 16117B for any signs of damage.



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Figure 2-1. Product Overview

Table 2-1. Contents

Description	HP Part Number	Quantity
① Low Noise Test Lead	HP 16117B	1
② Operation and Service Manual ¹	16117-90030	1

¹ Operation and Service Manual is not shown in Figure 2-1.

When an option is ordered with the HP 16117B, the following items are included:

Option 001

Description	HP Part Number	Quantity
③ Pin Probes (Red)	8710-2302	1
(Black)	8710-2301	1

Option 002

Description	HP Part Number	Quantity
④ Soldering Sockets (Red)	1200-1904	1
(Black)	1200-1903	1

Option 009

Description	HP Part Number	Quantity
Alligator Clips (Red)	8710-1981	(Deleted)
(Black)	8710-1993	(Deleted)

Ambient Environmental Considerations

Operating and Storage

The HP 16117B must be operated within an ambient temperature range of 0°C to +55°C and relative humidity up to 70% RH at 40°C (non-condensing).

The HP 16117B may be stored within a temperature range of -40°C to +70°, and at a relative humidity up to 95% at +40°C (non-condensing).

Repackaging the Adapter

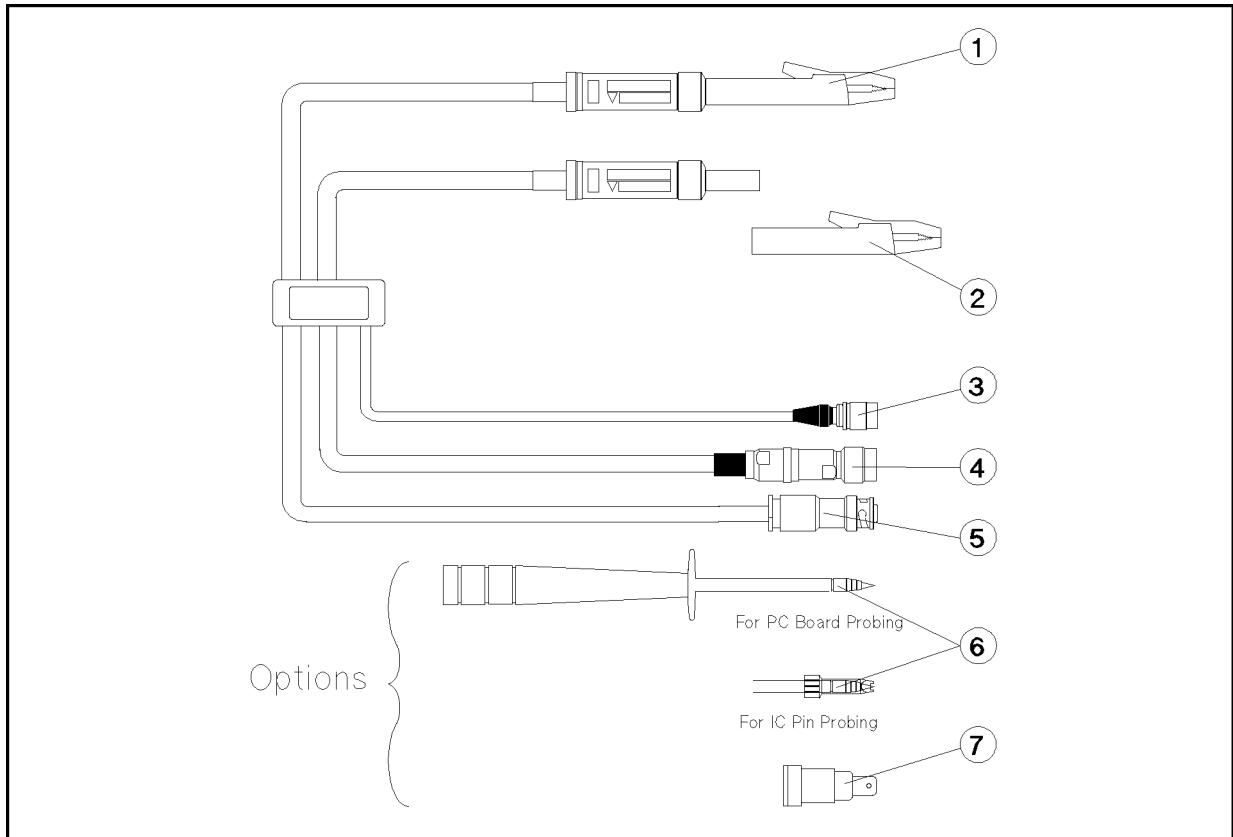
If shipment to a Hewlett-Packard service center is required, each adapter should be repackaged using the original factory packaging materials.

Alternatively, comparable packaging materials may be used. Wrap the adapter in heavy paper and pack in anti-static plastic packing material. Use sufficient shock absorbing material on all sides of the HP 16117B to provide a thick, firm cushion and to prevent movement. Seal the shipping container securely and mark it *FRAGILE*.

Operation

Introduction

This chapter describes the features of the HP 16117B (see Figure 3-1), and its connection to the HP 4339B and DUT.



A9203002

Figure 3-1. Adapter Features

1. *Alligator Clip (Red)*. When making a floating DUT configuration measurement, the Red test clip provides a source voltage of up to 1000 V. In the grounded DUT measurement configuration, the Red test clip is connected to ground.
2. *Alligator Clip (Black)*. When making a floating DUT configuration measurement, the Black test clip becomes the measurement signal path. In the grounded DUT measurement configuration, the Black test clip provides a source voltage of up to 1000 V.
3. *Interlock connector*: This connector enables the interlock function which enables and disables the application of the source voltage from the HP 4339B. When the interlock connector is disconnected, the source voltage will not be applied. The current limit function is automatically set at 0.5 mA maximum by the interlock circuit.
4. *Triaxial connector*: The measured signal is carried on the center conductor of this connector.
5. *BNC connector*: This connector provides the source voltage to the HP 16117B. This is a high voltage BNC connector and is not compatible with standard BNC connectors.
6. *Pin Probes (Option 001)*. The probes enable to measure flat or small DUTs such as PC boards and IC sockets. It can be attached to the ends of the low noise test leads in place of the Alligator Clips. The Protective Cap avoids making contact with adjacent IC pins.
7. *Soldering Sockets (Option 002)*. The sockets help make simple custom-made test leads.

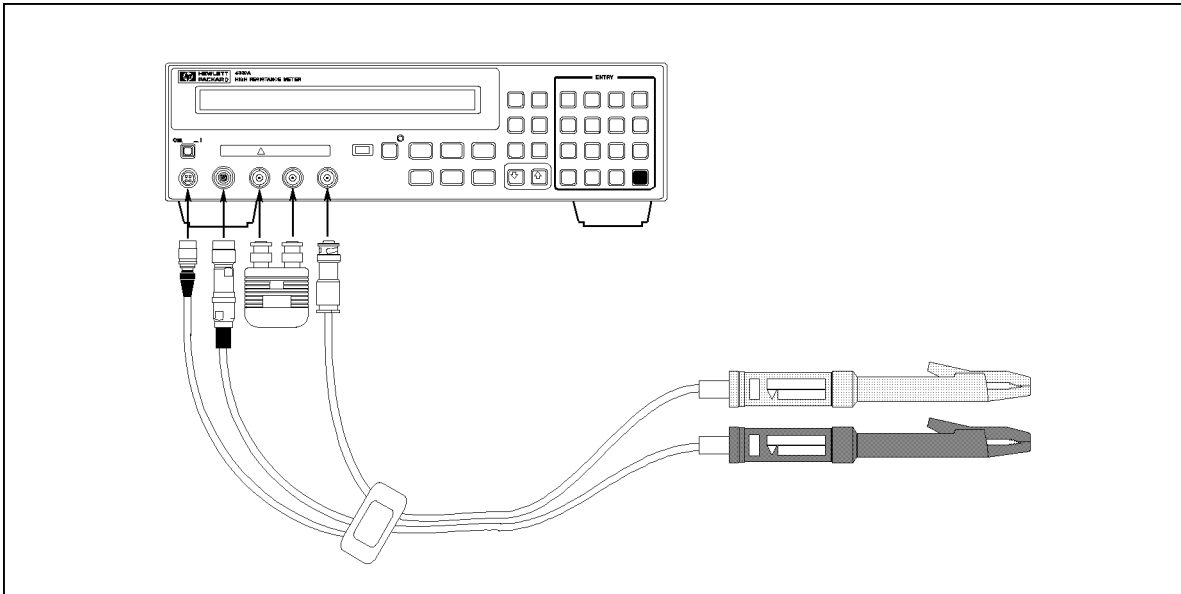
Connecting the Adapter for Use

The HP 4339B connection with HP 16117B has two configurations: floating and grounded DUT measurement configurations. The connections are different for each configuration. The connections are as shown in Figure 3-2 and Figure 3-3.

Warning

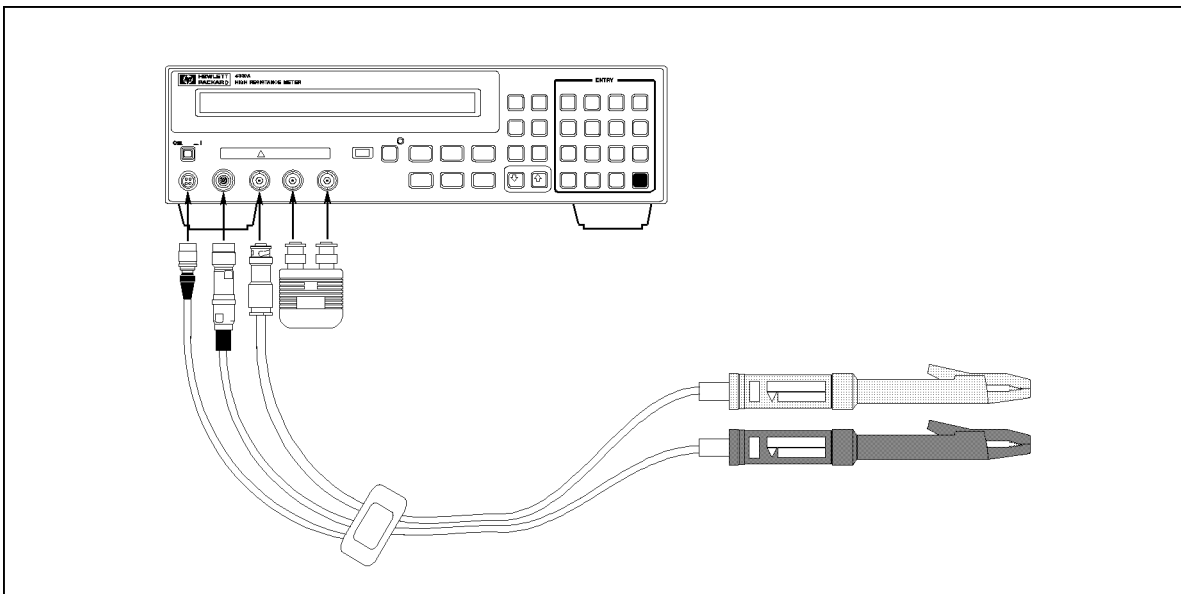


Do NOT touch the electrode and UNKNOWN connector while the High Voltage indicator is lit which shows the HP 4339B's output is a high voltage of up to 1000 Vdc maximum. You must operate after turning off the voltage source output and you have confirmed the high voltage indicator is turned off.



A9202001

Figure 3-2. Floating DUT Measurement



A9202002

Figure 3-3. Grounded DUT Measurement

OPEN Correction



OPEN correction cancels the residual inductance effects for resistance measurements. The OPEN procedure is as follows:

Warning



Do NOT touch the electrode and UNKNOWN connector while the High Voltage indicator is lit which shows the HP 4339B's output is a high voltage of up to 1000 Vdc maximum. You must operate after turning off the voltage source output and you have confirmed the high voltage indicator is turned off.

OPEN Correction Procedure

1. Leave the test clips (or probes) open and separated from each other.
2. Set and apply source voltage for your measurement requirement at the HP 4339B.
3. Wait until the measurement value has stabilized.
4. Press   of the HP 4339B to perform the OPEN correction.

Note



When the OPEN correction is performed, the electrodes must be separated enough to prevent leakage current from occurring which will lead to OPEN correction instability.

Note



To realize the best performance of the HP 16117B and HP 4339B, the following items must be carefully observed when performing the OPEN correction:

- Do NOT allow vibration to reach the HP 16117B when performing an OPEN correction. Vibration will result in OPEN correction instability.
- Perform the OPEN correction in an environment free of external electrical noise.

If these items are not satisfied, the OPEN correction will not completely cancel the residual effects.

Operation

Step-by-step instructions on how to make a measurement with the HP 16117B are as follows:

Warning



Do NOT touch the electrode and UNKNOWN connector while the High Voltage indicator is lit which shows the HP 4339B's output is a high voltage of up to 1000 Vdc maximum. You must operate after turning off the voltage source output and you have confirmed the high voltage indicator is turned off.

1. Connect the HP 16117B to the UNKNOWN terminals of the HP 4339B. Refer to “Connecting the Adapter for Use”.
2. Perform an OPEN correction as described in “OPEN Correction”.
3. Connect the test clips (or probes) to the DUT.
4. Follow the measurement instructions described in the *HP 4339B Operating Manual* to do the measurement.

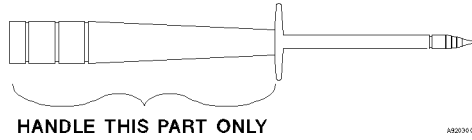
Pin Probes (Option 001)

The Pin Probes (opt.001) enables to measure flat or small DUTs such as PC boards and IC sockets.

Warning



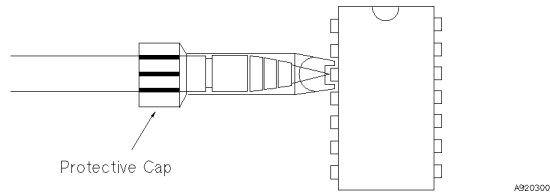
You must handle between guard collar and socket (see figure below) to prevent an electrical shock when the V output indicator on the front panel of the HP 4339B is ON.



Note



The protective cap avoids making contact with adjacent pins. When measuring IC pins, attach the protective cap to the tip of the probe.



Soldering Sockets (Option 002)

The Soldering Sockets (opt.002) helps make simple custom-made test leads.

Warning



- Hewlett-Packard shall NOT LIABLE for any damages or dangers to the operator incurred on use of a customized product except for the HP 16117B itself.
- Test fixtures designed by users are exposed to voltages up to 1 kV. An operator may receive an electrical shock if he/she makes contact with test fixture components. Design all components/test fixtures so that an operator can use the fixture safely, without being exposed to electrical shock hazard.

For example:

- Insulate all connections, solder joints, bare conductors.
- Design the fixture so that an operator cannot touch the measurement terminals when making the measurement.
- Provide warning labels to warn the operator of the high-voltage danger, and to avoid touching any connections, terminals, or DUT when the measurement is in process or when the high voltage is turned on.

Checking Procedure

The HP 16117B and the HP 4339B is operated with high voltages of up to 1000 V. These products are designed so that the operator can make safe measurements. To maintain this safe condition, you must periodically perform the following safety verification procedure.

Warning



Do NOT touch the electrode and UNKNOWN connector while the High Voltage indicator is lit which shows the HP 4339B's output is a high voltage of up to 1000 Vdc maximum. You must operate after turning off the voltage source output and you have confirmed the high voltage indicator is turned off.

Daily Safety Verification Procedure

1. Connect the HP 16117B to the HP 4339B.
2. Set the source voltage to 42 V.
3. Press the V output key of the HP 4339B.
Confirm that the V output indicator and the High Voltage indicator turns on.
4. Disconnect the interlock connector of the HP 16117B from the HP 4339B.
Confirm that the High Voltage indicator turns off immediately.
5. Reconnect the interlock connector to the HP 4339B.
Confirm that the High Voltage indicator still turns off

If you encountered any errors in checking procedure, contact your nearest Hewlett-Packard Office.

Service

Introduction

This chapter gives the replaceable parts information for the HP 16117B.

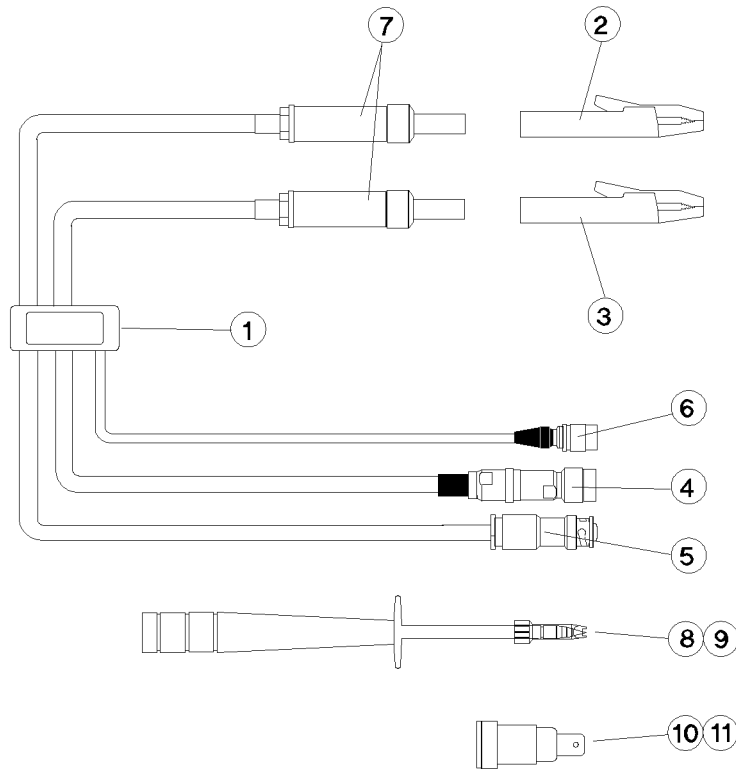
Replaceable Parts

Table 4-1 identifies the replaceable parts. Do not disassemble the HP 16117B any further than shown in Table 4-1. The listed parts can be ordered from your nearest Hewlett-Packard Office. Ordering information should include the HP part number and the quantity required.

Warning

These servicing instructions are for use by qualified personnel only. Do NOT perform any servicing other than that contained in the operating section unless you are qualified to do so.

Table 4-1. Replaceable Parts List



A920S002

Reference Designator	HP Part Number	Qty.	Description	Note
1	16117-87101	1	Model Label	
	16117-40001	1	Holder	
	16117-40002	1	Holder (with Nuts) ¹	
	16117-25001	1	Plug Hole for a holder	
	0515-1552	2	Screw Pan Head to fix a holder	
	3050-0891	2	Washer Flat to fix a holder	
2	8710-1981	1	Clip (Red)	
3	8710-1993	1	Clip (Black)	
4	16117-61601	1	Cable Assembly (Triaxial) ²	
5	16117-61602	1	Cable Assembly (BNC) ²	
6	16117-61603	1	Cable Assembly (Interlock) ³	
7	16117-25002	2	Black Cover	
8	8710-2302	1	Pin Probe (Red) ⁴	Option 001
9	8710-2301	1	Pin Probe (Black)	Option 001
10	1200-1904	1	Soldering Socket (Red)	Option 002
11	1200-1903	1	Soldering Socket (Black)	Option 002
-	16117-90030	1	Operation and Service Manual ⁵	

1 not including a model label.

2 including a cable tie, a warning label, a black cover and a contact plug.

3 including a cable tie

4 including protective cap.

5 This part is not shown in this figure.

4-2 Service