

Agilent 16117B Low Noise Test Lead  
**Operation and Service Manual**



**Agilent Technologies**

**Agilent Part No. 16117-90040  
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If you need assistance, contact your nearest Agilent Technologies Sales and Service Office. Addresses are provided at the back of this manual.

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## 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.

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## 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** elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

*The Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.*

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### Note



16117B is designed for use in INSTALLATION CATEGORY I according to IEC 61010-1 and POLLUTION DEGREE 1 according to IEC 61010-1 and IEC 60664-1. 16117B is an INDOOR USE product.

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### 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 Agilent Technologies 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.

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### Warning



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

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## Safety Symbols

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



Instruction manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instruction manual.



Alternating current.



Direct current.



On (Supply).



Off (Supply).

### Warning



This **Warning** 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 in injury or death to personnel.

### Caution



This **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 in 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.



Affixed to product containing static sensitive devices use anti-static handling procedures to prevent electrostatic discharge damage to component.



Caution, risk of electric shock : Terminals which may be supplied from the interior of the equipment at a voltage exceeding 1 kV, or allow connection to a voltage exceeding 1 kV are marked with this symbol.

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## General Information

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### Introduction

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

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### Using the 16117B

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

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

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### Product Description

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

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

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### Accessories Supplied

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

**Table 1-1. Furnished Accessories**

Description	Part Number	Quantity
Operation and Service Manual	P/N 16117-90040	1

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## Options

The following options are supplied for the 16117B:

**Table 1-2. Supplied Options**

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

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## 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.

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## Specifications

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

Applicable Test Voltage .....	1000 V maximum
Applicable Test Current <sup>1</sup> .....	0.5 mA maximum
Applicable Instrument .....	4339B <sup>2</sup>
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 4339B is 100  $\mu$ A.
2. Also applicable to the 4339A.

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



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



## Preparation for Use

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### Introduction

This chapter explains how to install the 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.

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### 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 Agilent Technologies. Your Agilent Technologies 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 16117B for any signs of damage.



**Figure 2-1. Product Overview**

**Table 2-1. Contents**

Description	Agilent Part Number	Quantity
① Low Noise Test Lead	16117B	1
② Operation and Service Manual <sup>1</sup>	16117-90040	1

<sup>1</sup> Operation and Service Manual is not shown in Figure 2-1.

## 2-2 Preparation for Use

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

Option 001

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

Option 002

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

Option 009

Description		Agilent Part Number	Quantity
Alligator Clips	(Red)	8710-2405	(Deleted)
	(Black)	8710-2404	(Deleted)

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## Ambient Environmental Considerations

### Operating and Storage

The 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 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).

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## Repackaging the Adapter

If shipment to a Agilent Technologies 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 16117B to provide a thick, firm cushion and to prevent movement. Seal the shipping container securely and mark it *FRAGILE*.

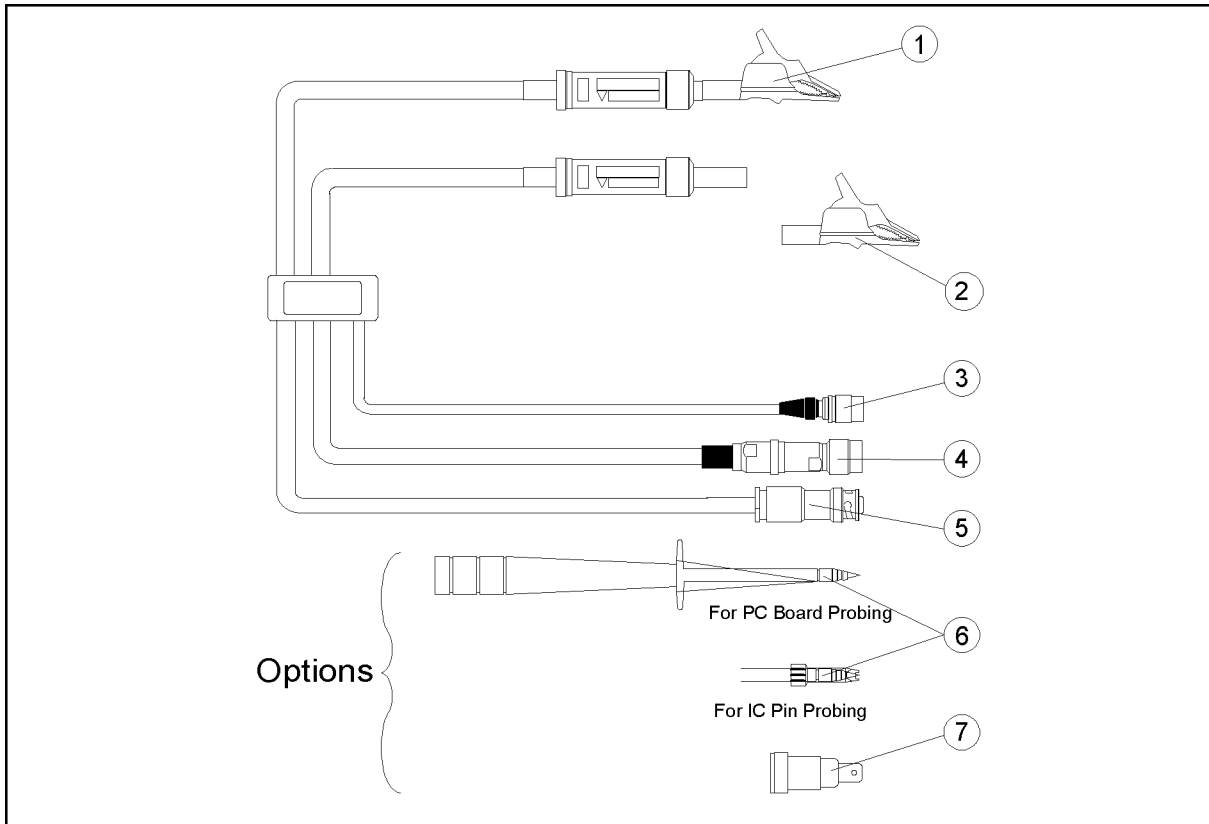


## Operation

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### Introduction

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



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**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 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 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.





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## OPEN Correction

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

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### Warning



**Do NOT touch the electrode and UNKNOWN connector while the High Voltage indicator is lit which shows the 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 4339B.
3. Wait until the measurement value has stabilized.
4. Press   of the 4339B to perform the OPEN correction.

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### 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.

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### Note



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

- Do NOT allow vibration to reach the 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.

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## Operation

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

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### Warning



**Do NOT touch the electrode and UNKNOWN connector while the High Voltage indicator is lit which shows the 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.**

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1. Connect the 16117B to the UNKNOWN terminals of the 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 *4339B Operating Manual* to do the measurement.

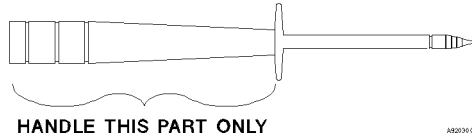
## Pin Probes (Option 001)

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

### Warning



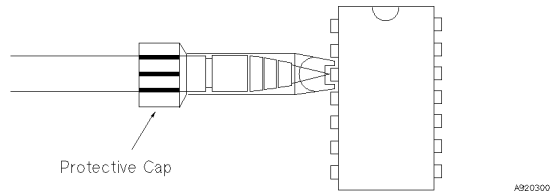
You must handle between guard collar and socket (see figure below) to prevent an electrical shock when the V output indicator on the front panel of the 4339B is ON.



### 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



- Agilent Technologies shall NOT LIABLE for any damages or dangers to the operator incurred on use of a customized product except for the 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.

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## Checking Procedure

The 16117B and the 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.

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### Warning



**Do NOT touch the electrode and UNKNOWN connector while the High Voltage indicator is lit which shows the 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.**

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### Daily Safety Verification Procedure

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

If you encountered any errors in checking procedure, contact your nearest Agilent Technologies Office.

## Service

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### Introduction

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

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### Replaceable Parts

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

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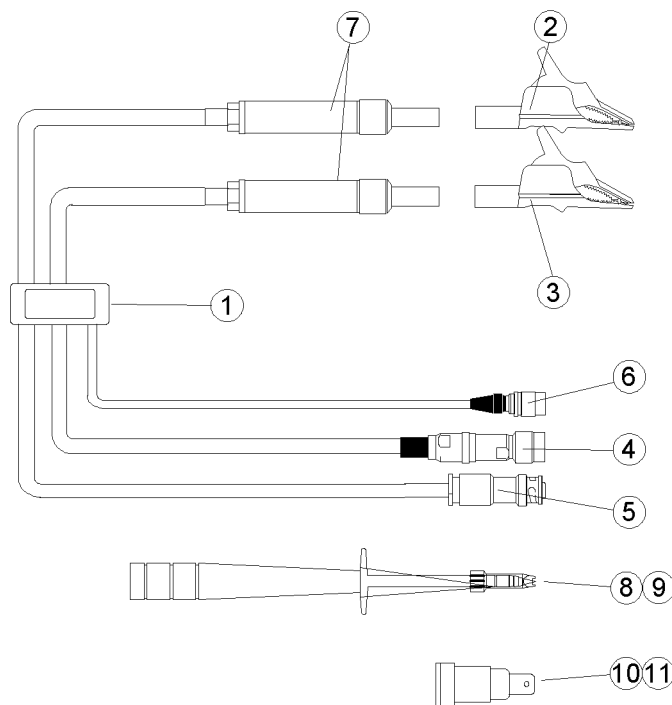
#### Warning



**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.**

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**Table 4-1. Replaceable Parts List**



a920s003

Reference Designator	Agilent Part Number	Qty.	Description	Note
1	16117-87101	1	Model Label	
	16117-40001	1	Holder	
	16117-40002	1	Holder (with Nuts) <sup>1</sup>	
	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	8710-2405	1	Clip (Red)	
3	8710-2404	1	Clip (Black)	
4	16117-61601	1	Cable Assembly (Triaxial) <sup>2</sup>	
5	16117-61602	1	Cable Assembly (BNC) <sup>2</sup>	
6	16117-61603	1	Cable Assembly (Interlock) <sup>3</sup>	
7	16117-25006	2	Black Cover	
8	8710-2302	1	Pin Probe (Red) <sup>4</sup>	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
-	16117-90040	1	Operation and Service Manual <sup>5</sup>	

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