

Agilent 16118A Tweezer Test Fixture
Operation and Service Manual



Agilent Technologies

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Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products.

If you need assistance, contact your nearest Agilent Technologies 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.

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February 1999	Second Edition (part number: 16118-90000)
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January 2000	Fourth Edition (part number: 16118-90010)

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.

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

Note



16118A 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. 16118A is an INDOOR USE product.

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.

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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.

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 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

Introduction

The purpose of this manual is to enable you to use your 16118A Tweezer Test Fixture efficiently and confidently. This manual contains both general and specific information.

Product Description

The 16118A has been designed to operate with the 4339A High Resistance Meter. The 16118A is used to measure the insulation resistance of chip components (floating measurement only). The 16118A has the following features:

- Easy to contact DUT by tweezer probe
- Low electrical noise effect by using shielded cable
- Safe for high-voltage by interlock function

Accessories Supplied

The accessory listed in Table 1-1 is supplied with the 16118A:

Table 1-1. Furnished Accessories

Description	Part Number	Quantity
Operation and Service Manual	P/N 16118-90000	1

Operating and Safety Precautions

Service

The voltage levels (up to 100 V) in this fixture warrants extreme care for operator safety. Service must be performed only by qualified personnel.

Specifications

This section lists the complete 16118A specifications. These specifications are the performance standards and limits against which the 16118A is tested. When shipped from the factory, the 16118A meets the specifications listed in this section.

Applicable Test Voltage	100 V maximum
Applicable Test Current ¹	0.87 mA maximum
Applicable Instrument	4339A
Interlock Circuit	furnished
Operating Temperature	0 to 55 °C
Operating Humidity	≤70% RH (@40°C)
Non-operating Temperature	-40 to 70 °C
Non-operating Humidity	≤95% RH (@40°C)

1. Maximum measurable current of the 4339A is 100 μ A.

Note



When used with the 16118A, the output current of the 4339A is limited up to 1 mA for safety.

Note



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

Supplemental Performance Characteristics

This section gives supplemental performance characteristics. Supplemental performance characteristics are not specifications, but are typical characteristics included as additional information for the operator. Supplemental performance characteristics are not guaranteed.

Resistance Measurement Range (when used with the 4339A) ^{1,2}	1×10^7 to $1 \times 10^{11} \Omega$
Measurable Component Parts	Chip Components
Measurable DUT size	≤10 mm
Current Limiting Resistance	115 k Ω
Isolation Resistance (When Opened)	≥ $10^{13} \Omega$
Cable Length	1 m

1. After compensation, measurement time is LONG, $23 \pm 5 \text{ }^\circ\text{C}$, $\leq 50 \text{ \% RH}$
2. When capacitive DUT is measured, upper limit of the measurable range is limited as follows.

$$C [\mu\text{F}] \times R [\text{G}\Omega] \leq 0.2 [\text{G}\Omega \cdot \mu\text{F}]$$

where, C : Capacitance of the DUT [μF]
 R : Isolation resistance of the DUT [$\text{G}\Omega$]

Preparation for Use

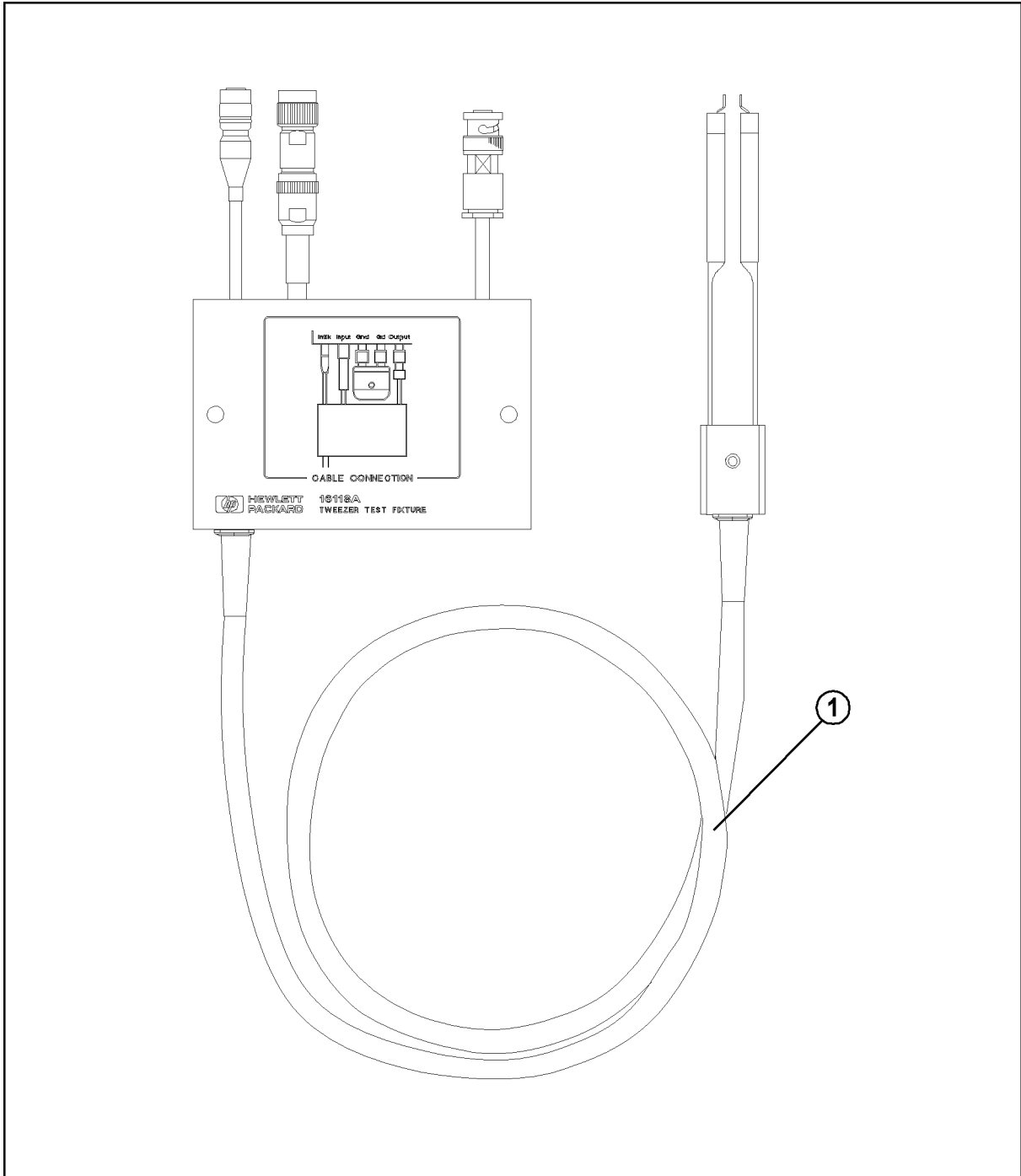
Introduction

This chapter explains how to install the 16118A Tweezer Test Fixture. The topics covered include initial inspection, ambient environmental considerations, connecting the fixture for use, and repackaging the fixture for shipment.

Initial Inspection

The fixture 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 fixture 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 16118A for any signs of damage.



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Figure 2-1. Product Overview

Table 2-1. Contents

Description	Agilent Part Number	Quantity
① Test Fixture	16118A	1
② Operation and Service Manual ¹	16118-90000	1

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

2-2 Preparation for Use

Ambient Environmental Considerations

Operating and Storage

The 16118A 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 16118A 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 Fixture

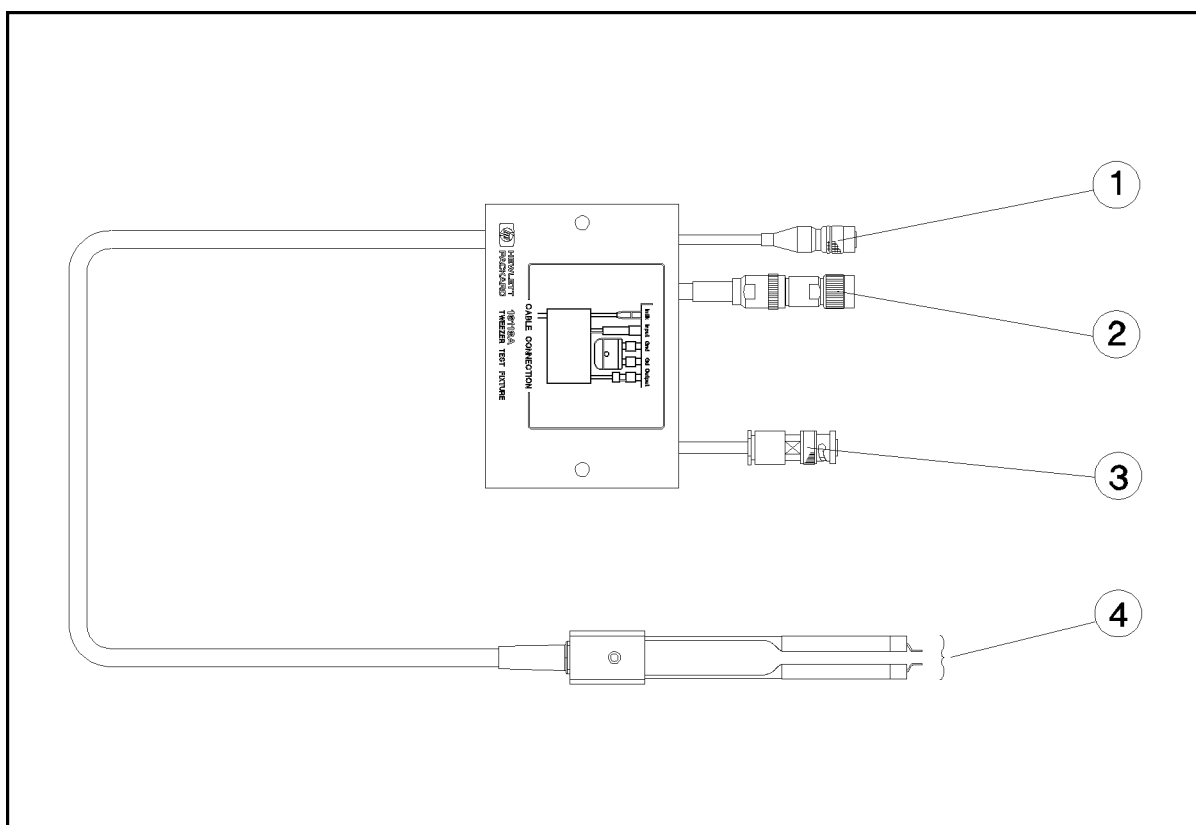
If shipment to a Agilent Technologies service center is required, each fixture should be repackaged using the original factory packaging materials.

Alternatively, comparable packaging materials may be used. Wrap the fixture in heavy paper and pack in anti-static plastic packing material. Use sufficient shock absorbing material on all sides of the 16118A 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 16118A (see Figure 3-1), and its connection to the 4339A and DUT.



AA003001

Figure 3-1. Fixture Features

1. *Interlock connector:* This connector enables the interlock function which enables and disables the source voltage from the 4339A. When the interlock connector is disconnected, the source voltage will not be applied. The current limit function and the output voltage limit function are automatically set at 1 mA maximum and 100 V maximum by the interlock circuit, respectively.
2. *Triaxial connector:* The measured signal is applied to the center conductor of this connector.
3. *BNC connector:* This connector provides the source voltage to the 16118A. This is a high voltage BNC connector and is not compatible with standard BNC connectors.

4. *Tweezer Electrodes.* The Electrode labeled **HIGH** side provides a source voltage of up to 100 V. The another side Electrode becomes the measurement signal path.

Connecting the Fixture for Use

This fixture only provides floating DUT measurement configuration, although the 4339A has the capability to measure either floating or grounded DUTs. The connection is as shown in Figure 3-2. See also the 4339A Operation Manual, “Theory of Operation” in Chapter 3.

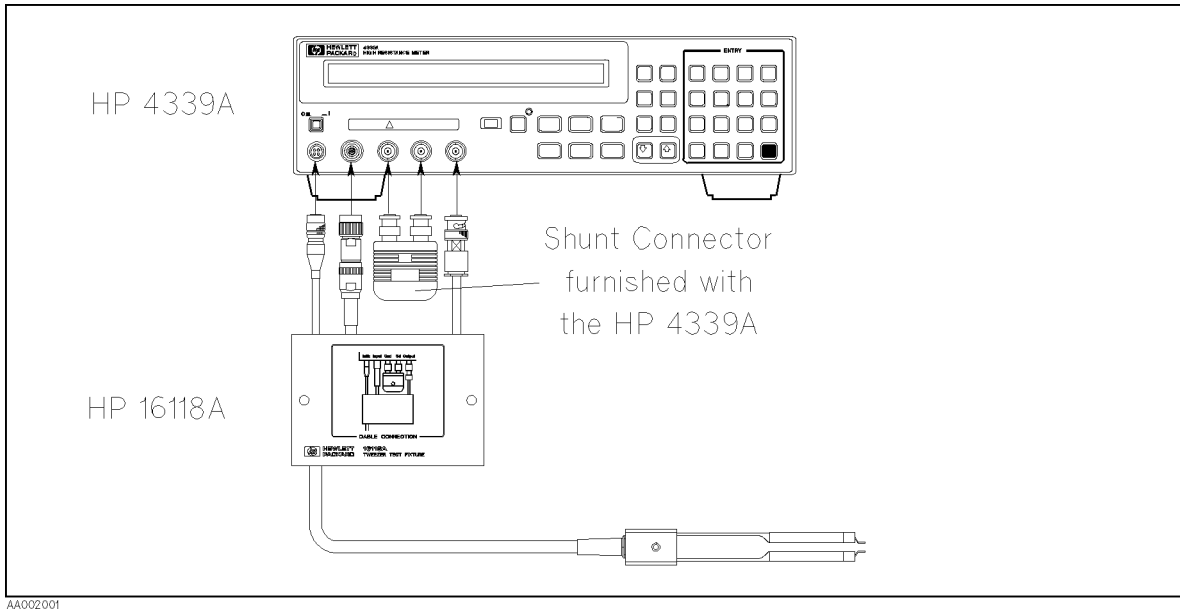




Figure 3-2. Connecting the Test Fixture

OPEN Correction

The OPEN correction function cancels measurement errors caused by residuals and stray capacitance of the test fixture. The OPEN correction procedure is as follows:

OPEN Correction Procedure

1. Leave the electrodes open and separated from each other.
2. Set and apply source voltage for your measurement requirement at the 4339A.
3. Wait until the measurement value is stabilized.
4. Press   of the 4339A 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 16118A and 4339A, the following items must be carefully observed when performing the OPEN correction:

- Do NOT allow vibration to reach the 16118A 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.

Note

When using the Contact Check Function of the 4339A, the electrodes spacing should be kept at the same as the DUT size during performing the OPEN correction.

Operation

Step-by-step instructions on how to make a measurement with the 16118A are as follows:

1. Connect the 16118A to the UNKNOWN terminals of the 4339A. Refer to “Connecting the Fixture for Use”.
 2. Perform an OPEN correction as described in “OPEN Correction”.
 3. Connect the Tweezer Electrodes to the DUT.
 4. Follow the measurement instructions described in the *4339A Operating Manual* to do the measurement.
-

Note

Variation in measurement results can be caused by power-line noise pickup, adjacent electro-magnetic fields of excessive strength, flexing the test leads beyond reasonable limits, or by changing the position of the leads relative to their surroundings. Most noise problems of this type are transient, and contribute more inconvenience than error. When using sensitive measurement ranges, lead movement or operator proximity will affect the stability of the measurement.

Note

When using the Contact Check Function of the 4339A, DUT must be satisfy the following condition.

Available DUT type: Capacitive DUT only
DUT capacitance ≥ 3 pF

Note

Required charging time is figured as the following formula.

$$t_c = -\tau \times \ln \left(\frac{X}{100} \times \frac{R_s + R_i + R_o}{R_x} \right)$$

where,

t_c : Charge time [s]

X : Measurement Error [%]

$\tau = C_x \times (R_s + R_i + R_o)$

R_s : Output resistance of the 4339A (1 k Ω)

R_i : Input resistance of the 4339A (1 k Ω)

R_o : Additional series output resistance of the 16118A (115 k Ω)

R_x : Parallel resistance of the DUT

C_x : Parallel capacitance of the DUT

Daily Safety Verification

The 16118A and the 4339A is operated with high voltages of up to 100 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.

Daily Safety Verification Procedure

1. Connect the 16118A to the 4339A.
2. Confirm that the source voltage can be set only up to 100 V even the source voltage is set to 101 V.
3. Set the source voltage to 42 V.
4. Press the V output key of the 4339A.
Confirm that the V output indicator and the High Voltage indicator turns on.
5. Disconnect the interlock connector of the 16118A from the 4339A.
Confirm that the High Voltage indicator turns off immediately.
6. Reconnect the interlock connector to the 4339A.
Confirm that the High Voltage indicator still turns off.

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

Service

Introduction

This chapter gives the schematics and replaceable parts information for the 16118A.

Replaceable Parts

Table 4-1, Table 4-2, and Table 4-3 identifies the replaceable parts. Do not disassemble the 16118A any further than listed on the replaceable parts lists in this chapter. The listed parts can be ordered from your nearest Agilent Technologies Office. Ordering information should include the Agilent part number and the quantity required.

Warning

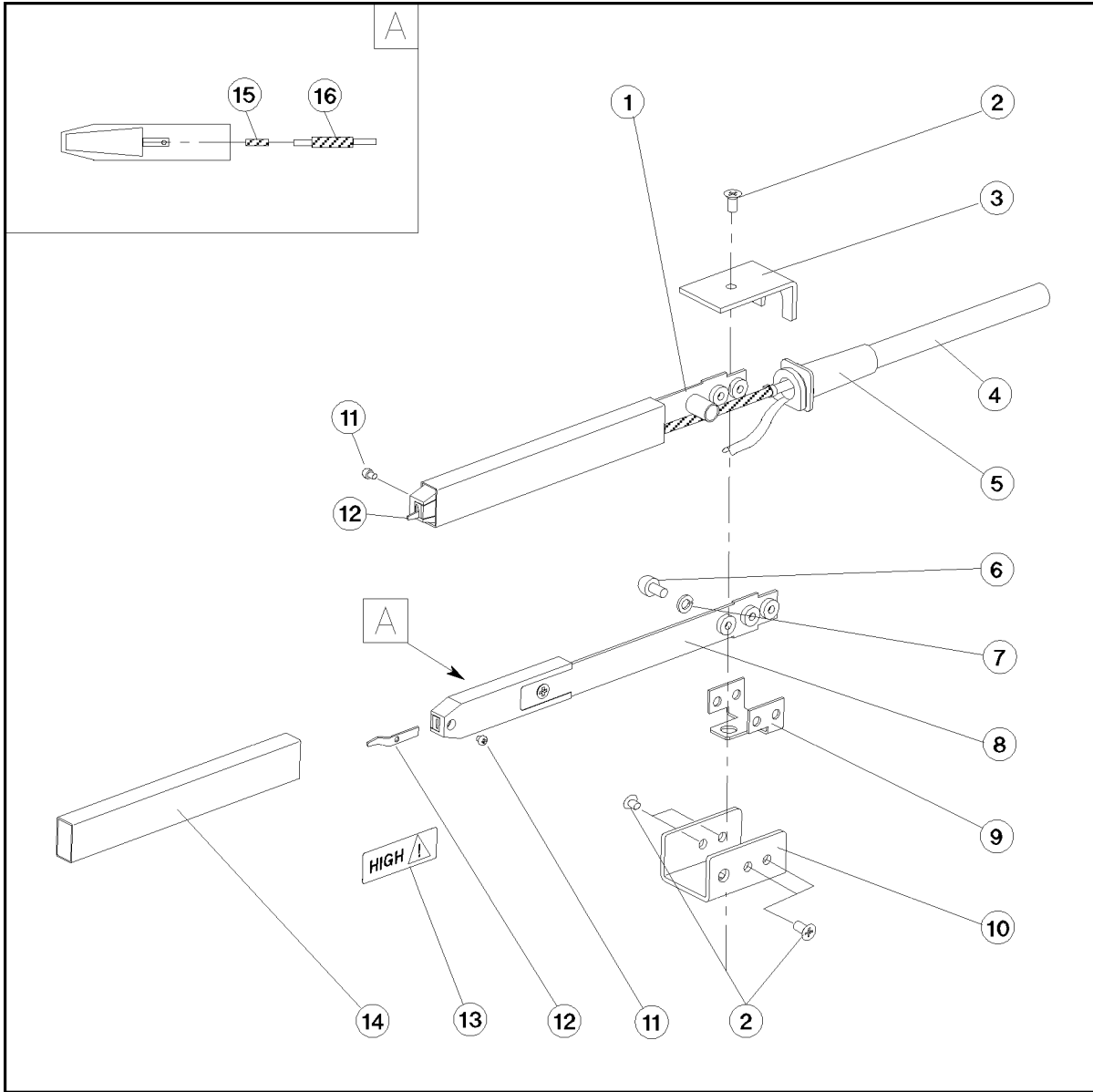


These servicing instructions are for use by qualified personnel only. Do NOT perform any servicing other than that contained in the operating section unless you are qualified to do so.

Table 4-1. Replaceable Mechanical Parts (1 of 2)

Reference Designator	Agilent Part Number	Qty.	Description
	16118-61601	1	Tweezer Cable Assembly ¹
1	16118-65602	1	Arm Assembly, L
2	0515-0914	5	Screw M3 (SRM)
3	16334-01202	1	Cover
4	16118-61611	1	Cable Assembly
5	16334-40003	1	Bushing
6	16334-24002	1	Screw M3
7	2190-0584	1	Washer
8	16118-65601	1	Arm Assembly, H
9	16334-01213	1	Bracket
10	16334-01211	1	Bracket
11	0515-1872	2	Machine Screw (SRM)
12	16334-09002	2	Contact
13	16118-87101	1	Label
14	0890-0273	103mm×2	TBS-HS .5IN-D (SRM)
15	0890-1480	5mm	TBS-HS 2MM-D (SRM)
16	0890-1497	20mm	TBS-HS RED (SRM)

¹ The entire cable assembly (1 through 16).

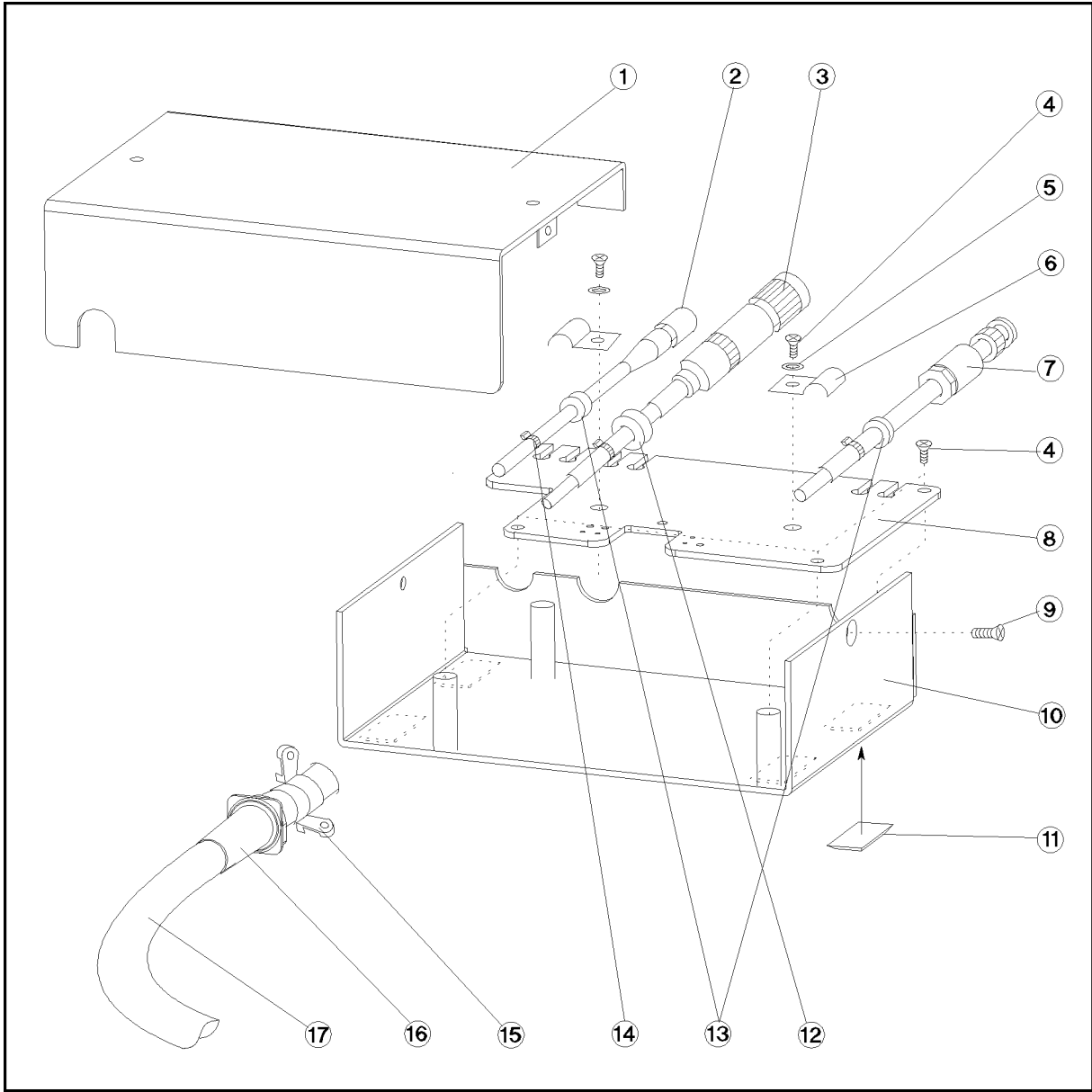


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Figure 4-1. Replaceable Mechanical Parts Identifier (1 of 2)

Table 4-2. Replaceable Mechanical Parts (2 of 2)

Reference Designator	Agilent Part Number	Qty.	Description
1	16118-04001	1	Cover Top
2	16118-61612	1	Cable Assembly
3	16118-61614	1	Cable Assembly TRIAX
4	0515-1550	6	Screw M3 (SRM)
5	3050-0891	2	Washer FL (SRM)
6	1400-0054	2	Clamp, Cable
7	16118-61613	1	Cable Assembly BNC
8	16118-66501	1	PC Board
9	0515-0914	2	Screw M3 (SRM)
10	16118-04002	1	Cover Bottom
11	0403-0285	4	Bumper Foot
12	0400-0306	1	Grommet RND
13	0400-0010	2	Grommet RND (SRM)
14	1400-0249	3	Cable Tie (SRM)
15	1400-0719	2	Cable Tie
16	16334-40003	1	Bushing
(17)	16118-61601	1	Tweezer Cable Assembly



AA004003

Figure 4-2. Replaceable Mechanical Parts Identifier (2 of 2)

Table 4-3. Replaceable Parts on PC Board

Reference Designator	Agilent Part Number	C	D	Qty.	Description
C1	0160-3456	6	1	1	CAP-FXD 1000pF $\pm 10\%$ 1 kV CER X5E
CR1	1902-1540	0	1	1	DIODE-ZNR 47V 10% PD=2W IR=5UA
CR2	1902-1540	0	1	1	DIODE-ZNR 47V 10% PD=2W IR=5UA
CR3	1902-1540	0	1	1	DIODE-ZNR 47V 10% PD=2W IR=5UA
CR4	1902-1540	0	1	1	DIODE-ZNR 47V 10% PD=2W IR=5UA
CR5	1902-1540	0	1	1	DIODE-ZNR 47V 10% PD=2W IR=5UA
CR6	1902-1540	0	1	1	DIODE-ZNR 47V 10% PD=2W IR=5UA
R1	0698-3449	6	1	1	RESISTOR 28.7K $\pm 1\%$.125W TF TC=0 \pm 100
R2	0698-3449	6	1	1	RESISTOR 28.7K $\pm 1\%$.125W TF TC=0 \pm 100
R3	0698-3449	6	1	1	RESISTOR 28.7K $\pm 1\%$.125W TF TC=0 \pm 100
R4	0698-3449	6	1	1	RESISTOR 28.7K $\pm 1\%$.125W TF TC=0 \pm 100

Schematics

Figure 4-3 gives the schematics of the 16118A.

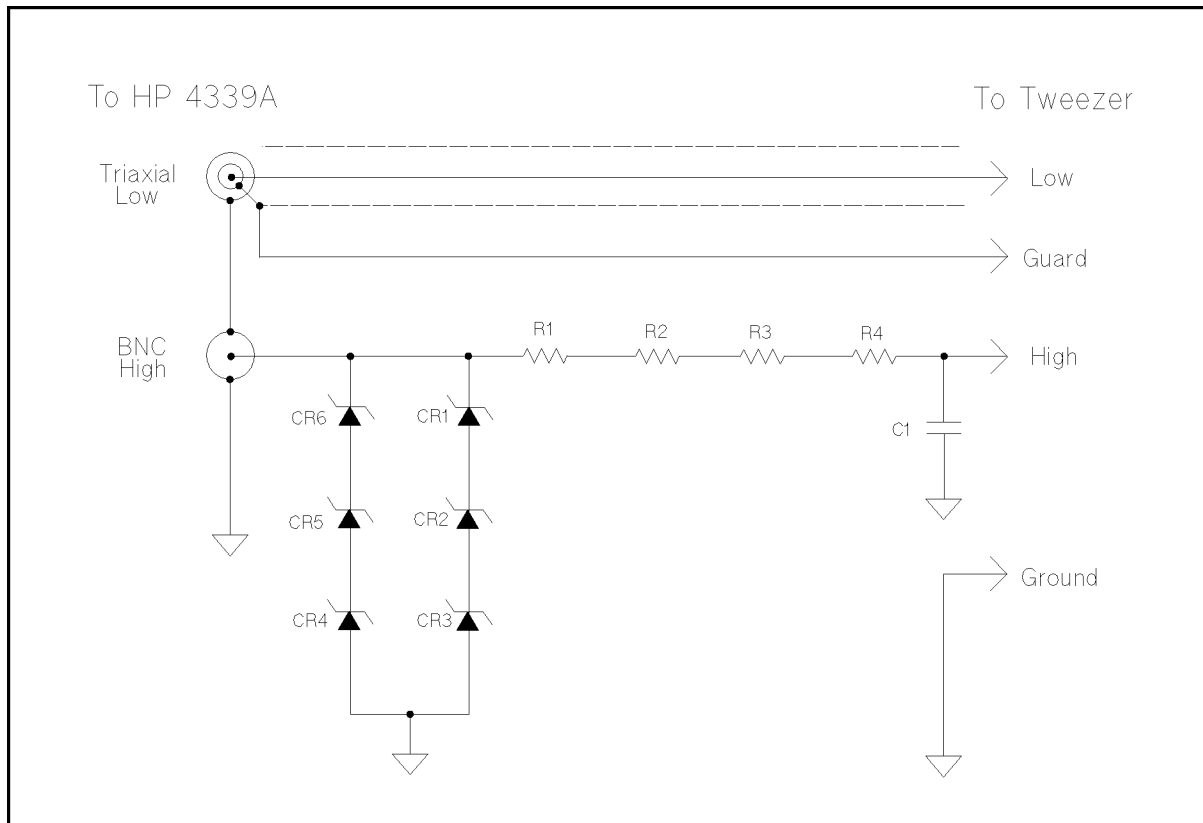


Figure 4-3. Schematic Diagram of the 16118A