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Agilent 16048G/H Test Leads

Operation and Service Manual

Third Edition



Agilent Technologies

Agilent Part No. 16048-90050

January 2001

Printed in: Japan

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Manual Printing History

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

April 1999	First Edition (part number: 16048-90050)
December 1999	Second Edition (part number: 16048-90050)
January 2001	Third Edition (part number: 16048-90050)

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.

NOTE 16048G/H comply with INSTALLATION CATEGORY I and POLLUTION DEGREE 2 in IEC61010-1. 16048G/H are 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 definite safety hazard.

- Keep Away From Live Circuits

  Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made 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 injuries, always disconnect power and discharge circuits before touching them.

- DO NOT Service Or Adjust Alone

  Do not attempt internal service or adjustment unless another person, 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 install 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 that 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 presenting this instrument. Use extreme caution when handling, testing, and adjusting this instrument.**

Certification

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

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This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period corresponding to the individual warranty periods of its component products. Instruments are warranted for a period of one year. Fixtures and adapters are warranted for a period of 90 days. During the warranty period, Agilent Technologies will, at its option, either repair or replace products that prove to be defective.

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

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

Limitation Of Warranty

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

IMPORTANT

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Assistance

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

For any assistance, contact your nearest Agilent Technologies Sales and Service Office. Addresses are provided at the back of this manual.

Safety Symbol

General definitions of safety symbols used on the instrument 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 instrument manual.

Alternating current.

Direct current.

On (Supply).

Off (Supply).


In position of push-button switch.


Out position of push-button switch.


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

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.

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1 Installation Guide

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Incoming Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the 16048G/H has been checked mechanically and electrically. The contents of the shipment should be as listed in Table 1-1. If the contents are incomplete, if there is mechanical damage or defect, notify the nearest Agilent Technologies office. If the shipping container is damaged, or the cushioning material shows signs of unusual stress, notify the carrier as well as the Agilent Technologies office. Keep the shipping materials for the carrier's inspection.

Table 1-1 Contents

Description	Part Number	Qty.
Test Lead (16048G or 16048H)	-	1
Mounting Plate	-	1
BNC Bracket[a]	16048-60003	1
Operation and Service Manual	16048-90050	1

a. Only furnished with option 001.

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Connecting the 16048G/H

Follow these steps below to connect the 16048G or 16048H to the 4294A.

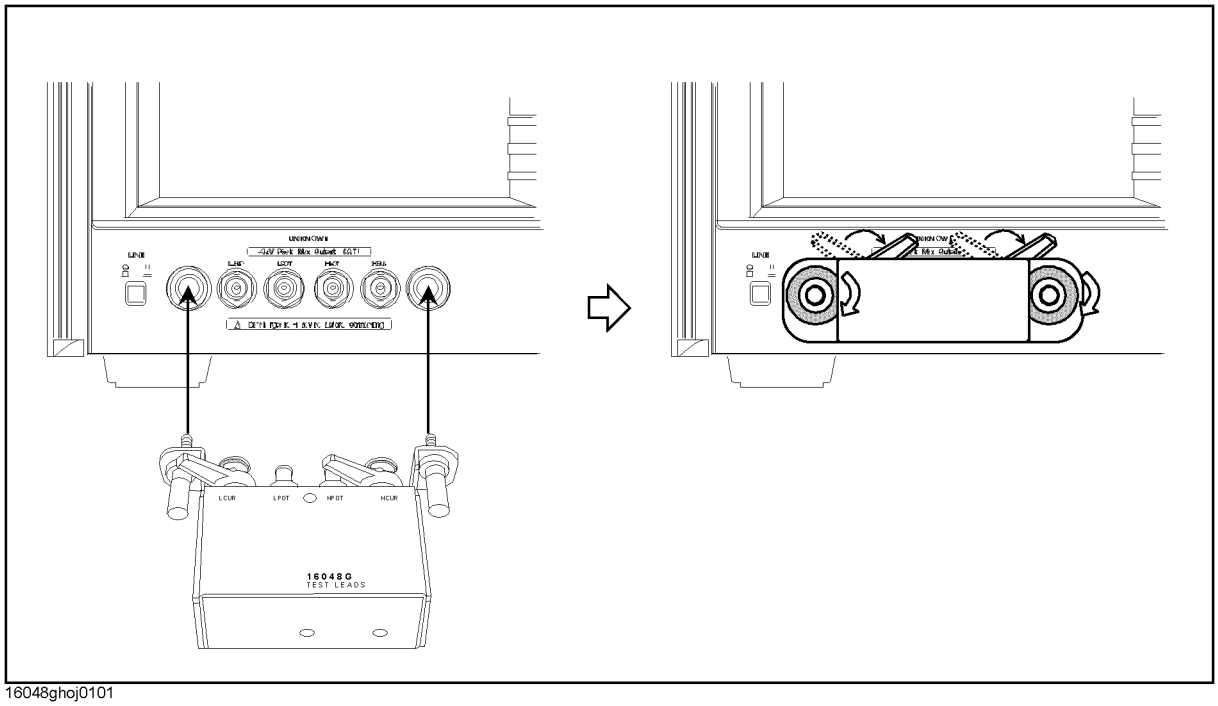
Step 1. Set the 16048G/H to the test connectors on the front panel of the HP 4294A by gradually coupling the four BNC connectors and fastening screws of the fixture with the test connectors and accessory mounting holes of the instrument until they come to complete contact.

Step 2. Fasten two of the four BNC connectors to the mating test connectors by gradually turning the BNC connectors' rotation levers until each pair of connectors are securely connected. Be sure to align the grooves on both sides.

Step 3. Turn clockwise the fixture's two fastening screws together, so that the fixture is secured to the instrument.

Step 4. Finally, secure the remaining two BNC connectors of the fixture by turning clockwise their rotation levers.

Figure 1-1 Connecting the fixture to the instrument



16048ghoj0101

NOTE Using the connection block securing screws enables the 16048G/H to connect the GND of the 4294A.

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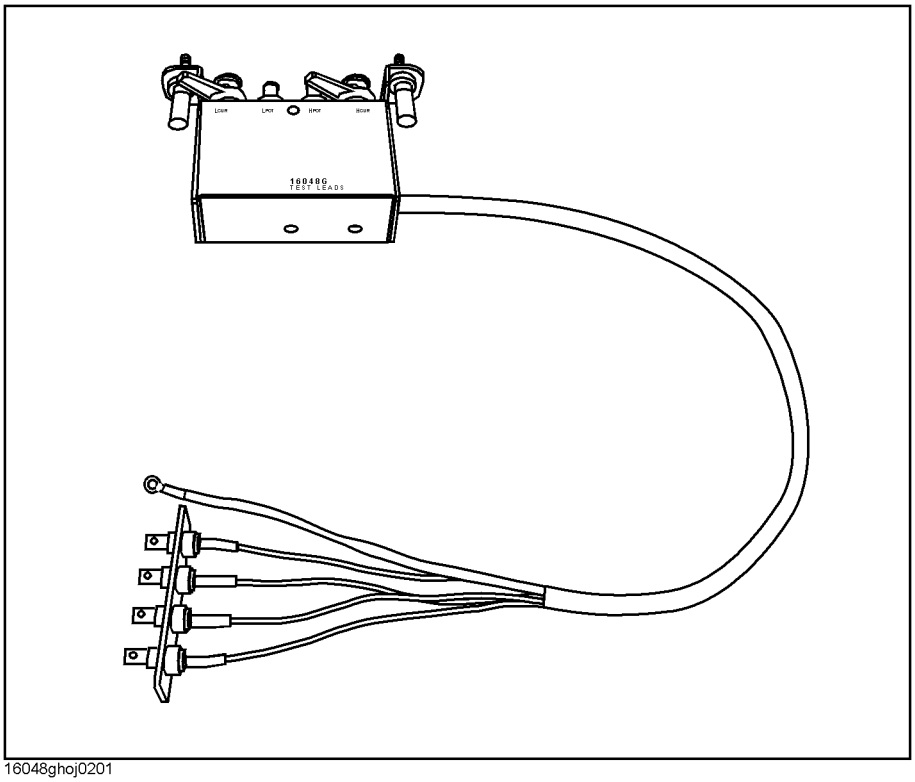
2 Overview

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Product Overview

The 16048G/H consists of a direct attachment, 4-terminal pair interface which is equipped with four BNC (f) connectors. These test leads are used to attach user-fabricated test fixtures. Cable length of the 16048G is 1 meter, the 16048H is 2 meter.

Figure 2-1 **Product Overview**



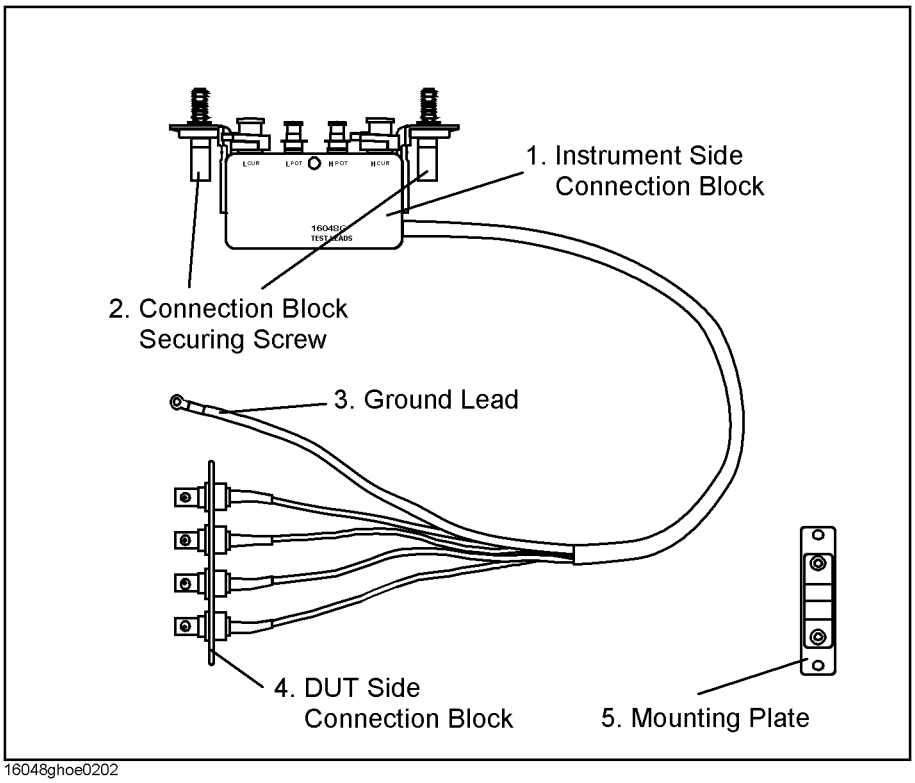
16048ghoj0201

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Functions

Figure 2-2 shows name of each part of the 16048G/H and Table 2-2 shows their function.

Figure 2-2 **16048G/H Parts**



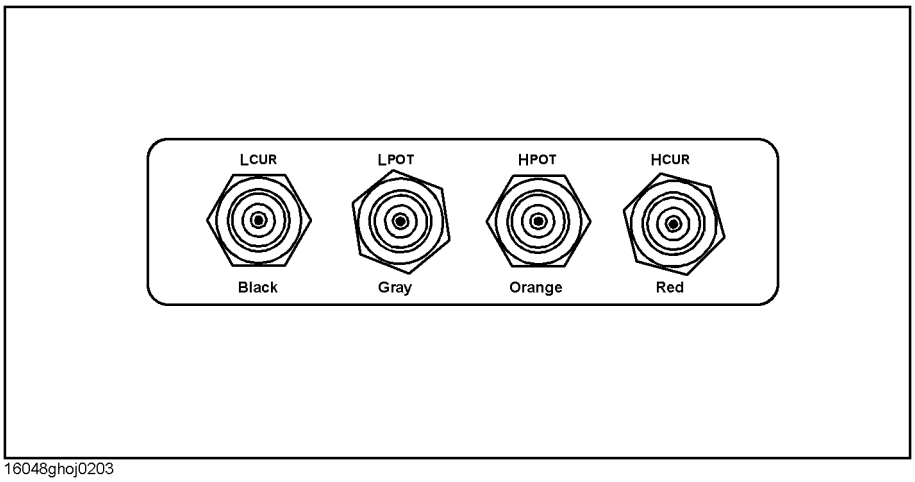
16048ghoe0202

Table 2-1 **16048G/H Function**

No.	NAME	FUNCTION
1	Instrument Side Connection Block	Connect to the instrument's UNKNOWN terminal.
2	Connection Block Securing Screw	Secures the connection block to the 4294A.
3	Ground Lead	Connect to the chassis or grounded part of the measurement target.
4	DUT Side Connection Block	Used to attach BNC Bracket or user-fabricated test fixtures.
5	Mounting Plate	Mounts on the measurement target to stabilize the cable.

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Figure 2-3 **Cable Assignment**



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3 Operation

This chapter describes the proper methods for setting the 4294A, fixture compensation with the 16048G/H.

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4294A Setting

Before you begin your measurement, you should perform the adapter setup in the 4294A. Also refer to the operation manual of the 4294A about the adapter setup.

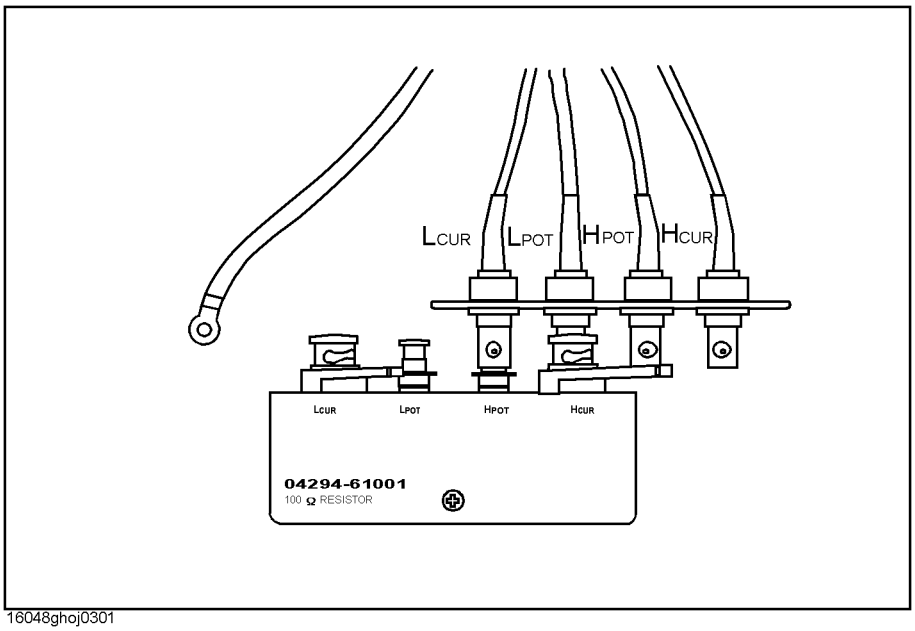
Adapter Setup

Connect the 16048G/H to the 4294A and perform the adapter setup described below.

NOTE For adapter setup, use the 100 Ω Resistor furnished with the 4294A (Agilent P/N 04294-61001).

1. More than 30 minutes warm-up time is required after turning on the 4294A.
2. Press **[Cal]** key to bring up the Calibration Menu.
3. Press **ADAPTER [ ]** key to bring up the adapter setup Menu. [ ] shows current settings.
4. Select **4TP 1M** in the case of 16048G, **4TP 2M** in the 16048H. When the selection is completed, the softkey label will be underlined.
5. Press **SETUP** key to bring up the Adapter Setup Menu.
6. Connect the Lcur terminal and Lpot terminal on the 16048G or 16048H to the Hpot terminal and Hcur terminal of the 100 Ω Resistor furnished with the 4294A. The Hcur and Hpot terminal on the 16048G/H should remain open (nothing should be connected).

Figure 3-1 Connecting 100 Ω Resister (Phase Compensation Data Measurement)

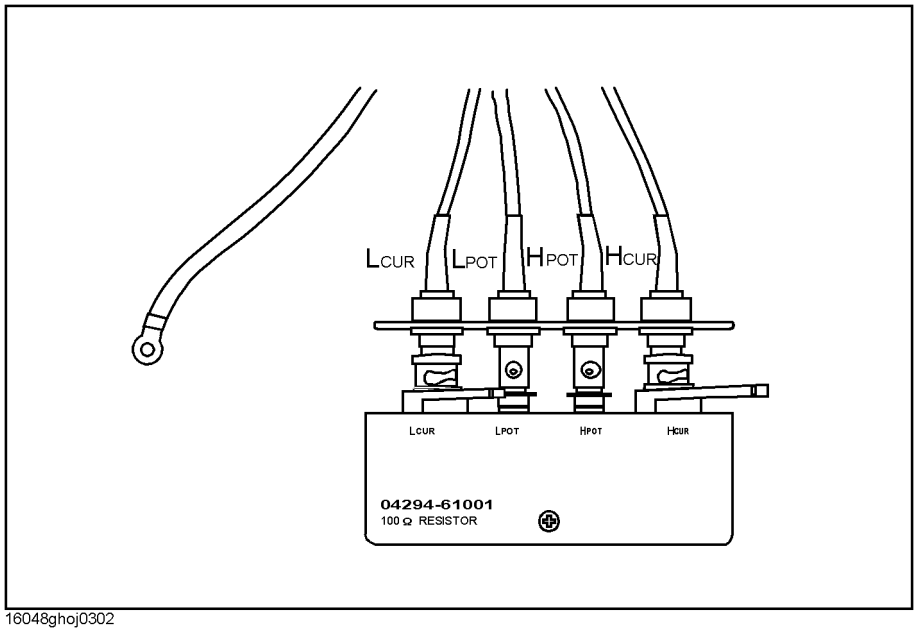


16048ghoj0301

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7. Press **PHASE COMP [-]** key to start the phase compensation data measurement. About 1 minutes later, phase compensation data measurement is completed and the softkey label changes to **PHASE COMP [DONE]**.
8. Connect the Lcur, Lpot, Hcur, Hpot terminal on the 16048G or 16048H to the Lcur, Lpot, Hcur, Hpot terminal of the 100 Ω Resistor respectively.

Figure 3-2 Connecting 100 Ω Resister (Load Data Measurement)



16048ghoj0302

9. Press **LOAD [-]** key to start the load data measurement. When the load data measurement is completed, the softkey label changes to **LOAD [DONE]**.
10. Press **done** key.

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Performing Fixture Compensation

To compensate stray capacitance and residual impedance, fixture compensation should be performed. When you use the optional BNC Bracket (Agilent P/N 16048-60003) or an user fabricated test fixture, fixture compensation is required. Refer to the 4294A Operation Manual for the fixture compensation procedure.

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4 Specifications

This chapter provides specifications of the 16048G/H Test Leads.

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Specifications

Applicable Instruments		LCR meters and Impedance Analyzers with four-terminals
Maximum Voltage		± 42V peak max. (AC+DC)
Operating Environment	temp.	-20°C to +150°C (Exclude up to 20 cm from four terminal pair connection block)
	humidity	15% to 95%RH(@ wet bulb temp. < 40°C)
Non Operating Environment.	temp.	-40°C to +70°C
	humidity	≤ 90 % RH (@ wet bulb temp. <65°C)
Cable length (Nominal)		1 m (16048G) / 2 m (16048H)
Weight		Approximately 460 g (16048G) Approximately 690 g (16048H)
Safety Standards		EN61010-1:1993 +A2:1995 IEC61010-1:1990 +A1:1992 +A2:1995 CSA C22.2 No.1010.1:1992 INSTALLATION CATEGORY I POLLUTION DEGREE 2 INDOOR USE

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5 Service

This chapter provides information on servicing and proper maintenance.

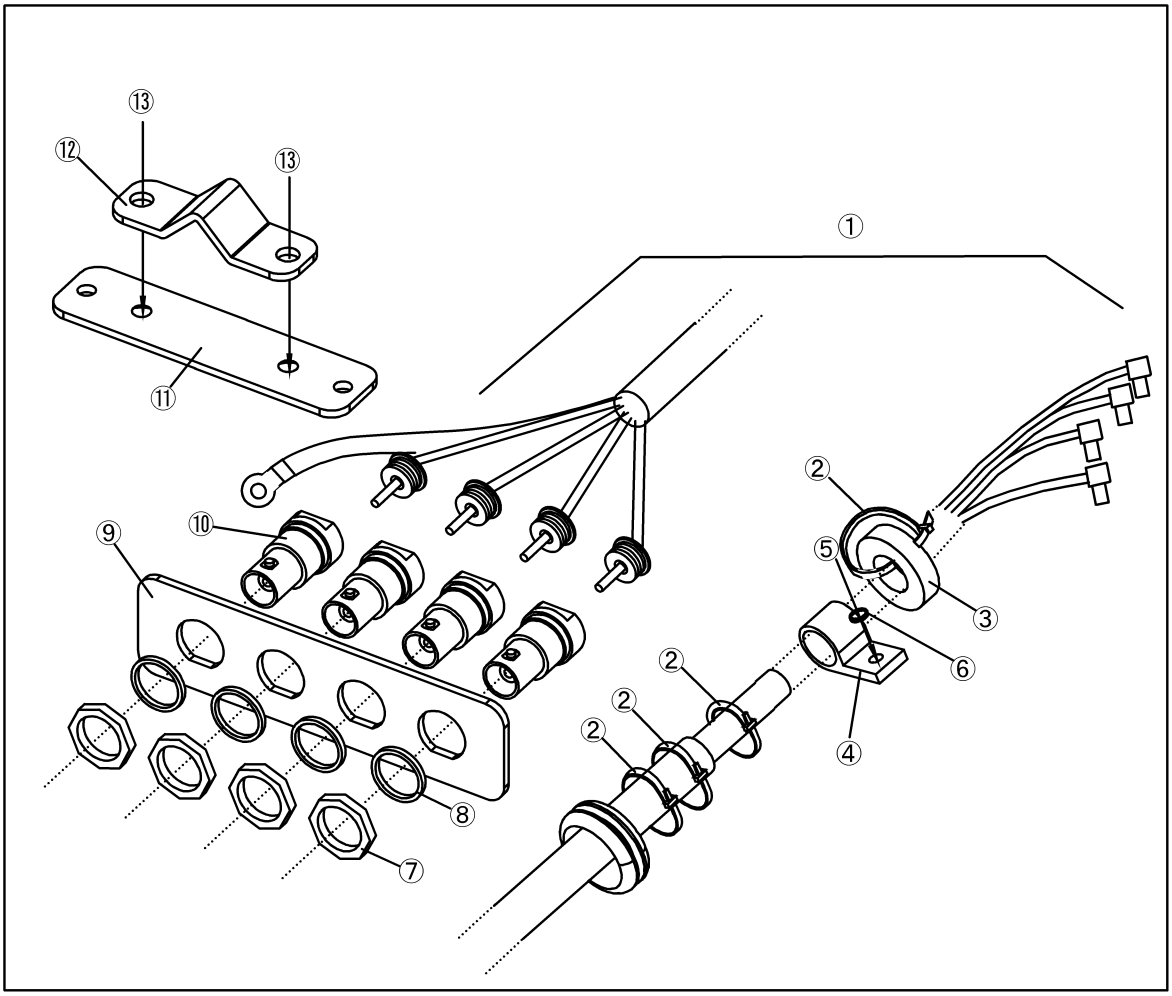
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Maintenance

An exploded view of the 16048G/H for parts identification is shown in Figure 5-1 to Figure 5-4. Do not disassemble any further than shown. Maintenance consists principally of cleaning contacts and replacing worn or damaged parts. Take special care when cleaning contacts.

To order parts, use the Agilent part numbers listed in Table 5-1 to Table 5-4. If a faulty part is located in an assembly that cannot be disassembled, order the next higher assembly or return the fixture to the nearest Agilent Technologies Sales/Service Office for repair or replacement.

Figure 5-1 Replacable Parts (part 1 of 4)



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Table 5-1 Replacable Parts (part 1 of 4)

Reference Designator	Agilent Part No.	Qty.	Description
1	16048-61620	1	CBL ASSY 16048G (Excludes 2,3,4,5,6)
	16048-61623	1	CBL ASSY 16048H (Excludes 2,3,4,5,6)
2	1400-0493	4	CABLE TIE
3	9170-1465	1	CORE
4	-	1	CBL CLANP
5	0515-1550	1	SCR M3-L 8 P-H
6	3050-0891	1	WASHER M3
7	2950-0035	4	NUT-HEX-DBL-CHAM
8	2190-0102	4	WASHER
9	16048-00623	1	GUIDE
10	1250-0252	4	CONN-RF BNC
11	16048-00626	1	PLATE
12	16048-00627	1	ANGLE
13	0515-1012	2	SCR FL M4L8

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Figure 5-2 **Replacable Parts (part 2 of 4)**

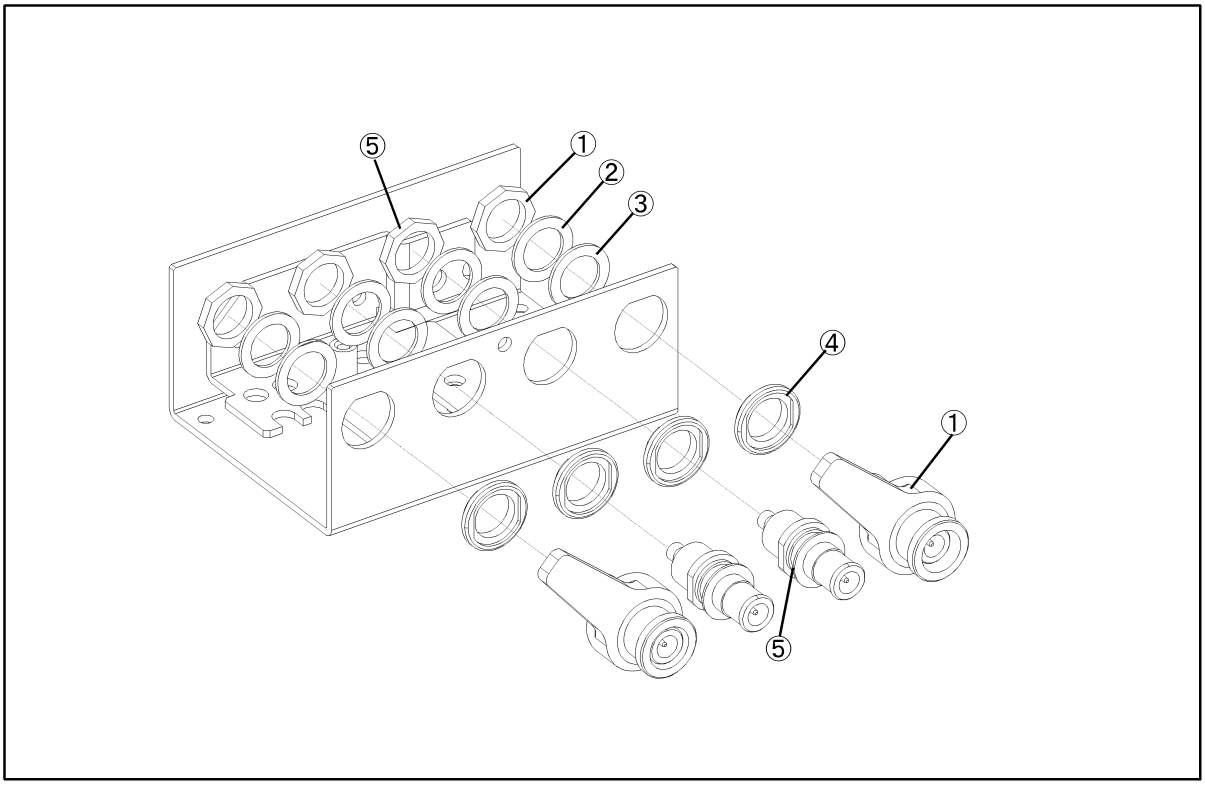


Table 5-2 **Replacable Parts (part 2 of 4)**

Reference Designator	Agilent Part No.	Qty.	Description
1	16044-60001	2	CONN BNC-SMB
2	3050-0067	4	WSHR-FL MTLC
3	3050-0789	4	WSHR-FL NM
4	16047-40002	4	INSULATOR
5	1253-0476	2	ADPT BNC-SMB

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Figure 5-3 **Replacable Parts (part 3 of 4)**

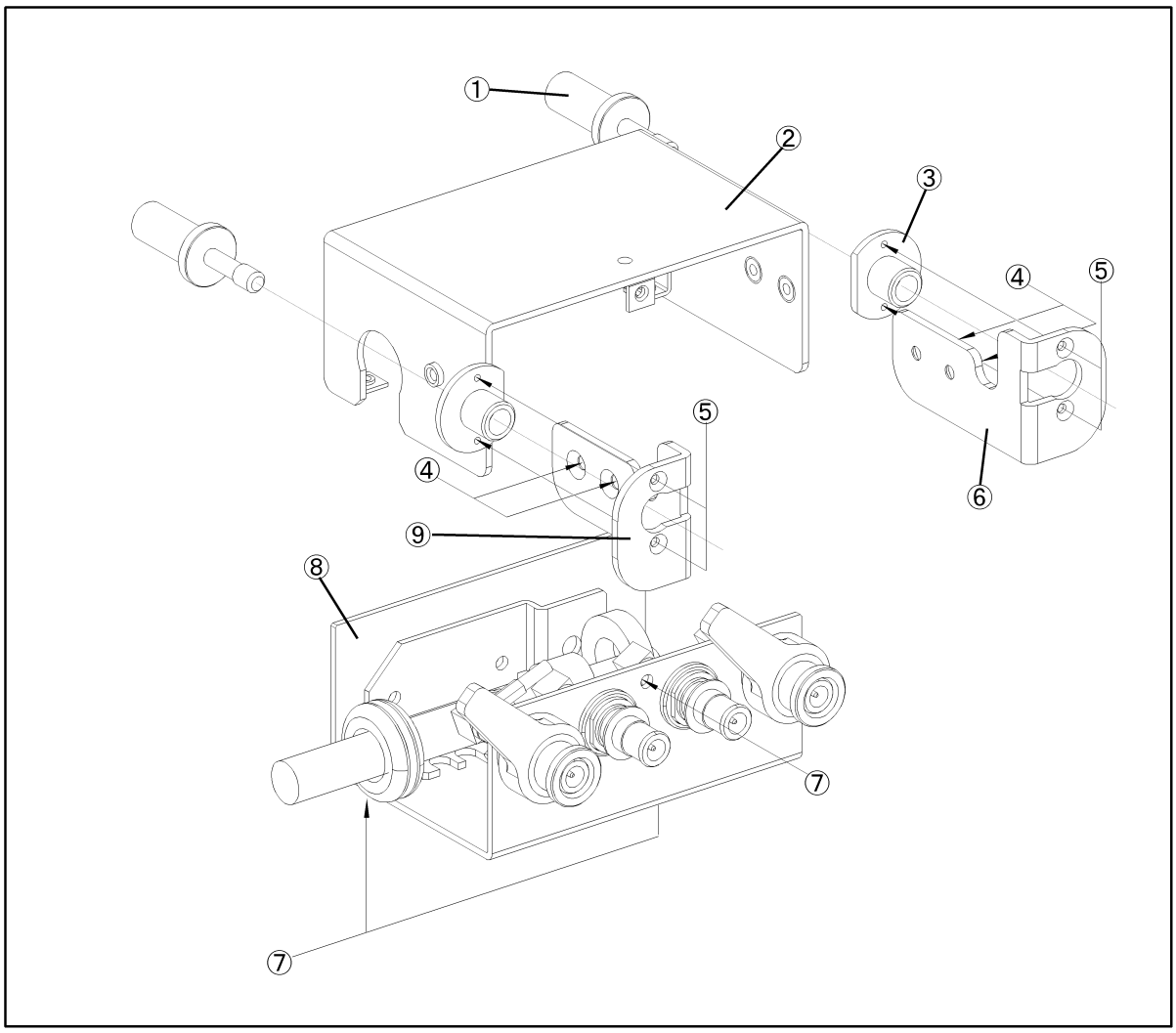


Table 5-3 **Replacable Parts (part 3 of 4)**

Reference Designator	Agilent Part No.	Qty.	Description
1	16047-24021	2	KNOB
2	16048-04021	1	COVER TOP (16048G)
	16048-04025	1	COVER TOP (16048H)
3	16047-24026	2	FLANGE
4	0515-0914	4	SCR-MACH M3X0.5
5	0515-0952	4	SCR-MACH M2X0.4
6	16048-00624	1	ANGLE
7	0515-0914	3	SCR-MACH M3X0.5

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Table 5-3 **Replacable Parts (part 3 of 4)**

Reference Designator	Agilent Part No.	Qty.	Description
8	16048-04022	1	COVER BOTTOM
9	16048-00625	1	ANGLE

Figure 5-4 **Replacable Parts (part 4 of 4)**

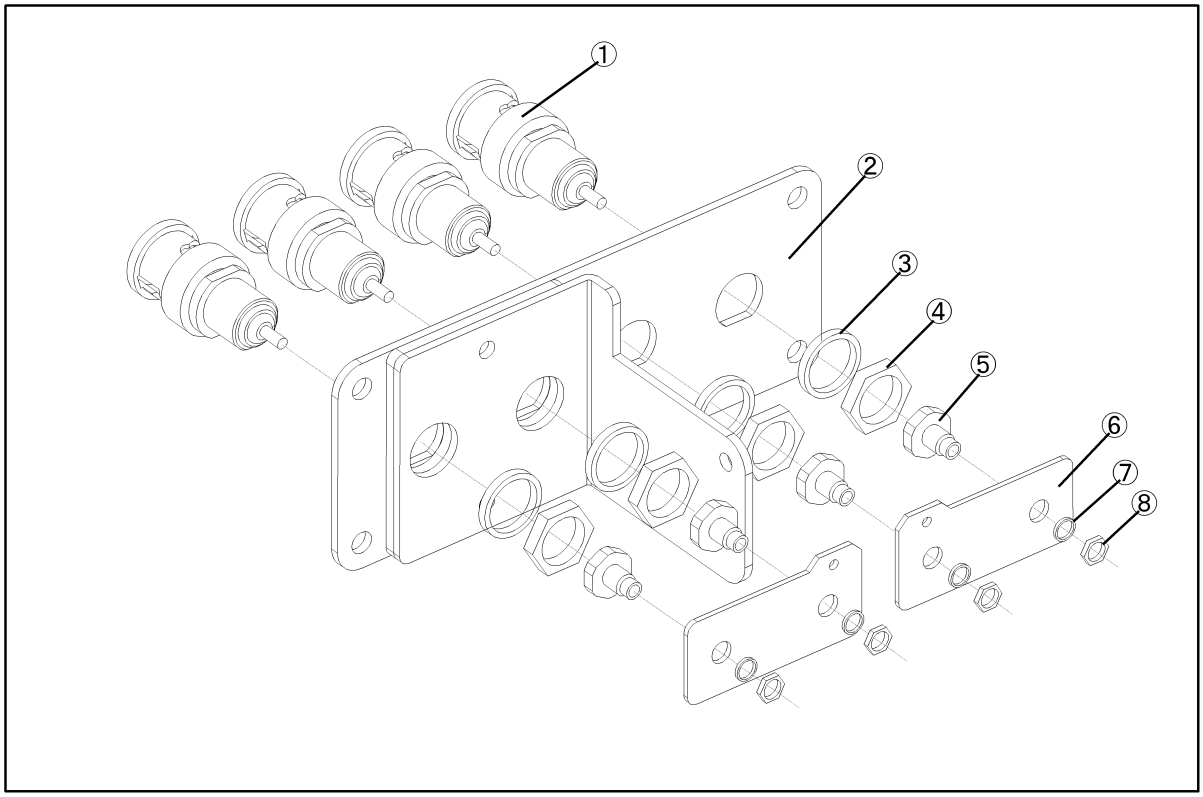


Table 5-4 **Replacable Parts (part 4 of 4)**

Reference Designator	Agilent Part No.	Qty.	Description
1	1250-1985	4	CONNECTOR-BNC
2	16048-00621	1	PLATE
3	2190-0016	4	WASHER
4	2950-0043	4	NUT-HEX-DBL-CHAM
5	16380-24001	4	TERMINAL
6	42036-00601	2	PLATE
7	3050-0893	4	WASHER
8	0535-0043	4	NUT

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