

Keysight 16047A Test Fixture

Operation and
Service Manual

NOTICE: This document contains references to Agilent Technologies. Agilent's former Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.



Keysight 16047A TEST FIXTURE
Operation and Service Manual
Manual Change

Keysight Part No. N/A

November 2014

Change 1

Add the note, under Figure 1-3 on page 13.

NOTE

This short bar is not included in 16047A. It is prepared as option of 16047A. Option number is 16047A-701.

Change 2

Change the part number in Table 2-1 in Page 18, and add footnote to Item 38.

Table 2-1. Replaceable Parts List

Reference Designator	Keysight Part Number	Quantity	Description
1	16047-04013	1	COVER-BOTTOM
2	2950-0043	4	NUT
3	2190-0016	4	WASHER
5	0515-1467	2	SCREW
7	16061-50022	1	BASE
10	16047-60016	2	CONNECTOR-BNC
11	16012-7122	2	CONNECTOR-BNC
12	16047-40000	1	STOPPER
13	2190-0206	1	WASHER
14	0515-1550	1	SCREW
15	0515-0914	2	SCREW
16	16047-04011	1	COVER-TOP
17	0515-0914	2	SCREW
18	16047-00618	1	SHIELD PLATE
20	16061-50024	2	SOCKET
21	0515-1467	2	SCREW
23	16061-50031	2	SOCKET-RADIAL
24	16061-10031	4	CONTACT-RADIAL
25	1460-0343	4	SPRING
27	16061-10026	4	CONTACT
28	16061-10033	2	CONTACT-AXIAL
29	16061-10032	2	CONTACT-AXIAL
30	16061-50032	2	SOCKET-AXIAL
31	16047-00604	2	CONTACT
34	16047-00605	2	CONTACT
33	16047-40001	2	SOCKET
35	16061-70021	2	SOCKET ASSEMBLY (23 and 24)
36	16061-70022	2	SOCKET ASSEMBLY (28,29 and 30)
37	16047-65001	2	SOCKET ASSEMBLY (31,32 and 33)
38	5000-4226	1	Short Bar ¹

¹ This short bar is not included in 16047A. It is prepared as option of 16047A. Option number is 16047A-701.

Notices

The information contained in this document is subject to change without notice.

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of the Keysight Technologies.

Copyright © 1985, 1998, 1999, 2014 Keysight Technologies

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 1985 First Edition (part number: 16047-90000)

December 1998 Second Edition (part number: 16047-90011)

December 1999 Third Edition (part number: 16047-90011)

November 2014 Fourth Edition (part number: 16047-90011)

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

NOTE

16047A comply with INSTALLATION CATEGORY I and POLLUTION DEGREE 2 in IEC61010-1. 16047A are INDOOR USE product.

- **Ground The Instrument**
To avoid electric shock hazard, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.
- **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 Keysight 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

Keysight Technologies certifies that this product met its published specifications at the time of shipment from the factory. Keysight 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.

Warranty

This Keysight 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. During the warranty period, Keysight 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 Keysight Technologies. Buyer shall prepay shipping charges to Keysight Technologies and Keysight 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 Keysight Technologies from another country.

Keysight Technologies warrants that its software and firmware designated by Keysight Technologies for use with an instrument will execute its programming instruction when properly installed on that instrument. Keysight 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

No other warranty is expressed or implied. Keysight Technologies specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

Exclusive Remedies

The remedies provided herein are buyer's sole and exclusive remedies. Keysight Technologies 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 Keysight Technologies products.

For any assistance, contact your nearest Keysight 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.

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.

Contents

1. Operation

Introduction 10

Product Description 10

Specifications 11

Typical Characteristics 12

Compensation for Fixture Residual Impedance Error 13

2. Service

Maintenance 16

1 **Operation**

Introduction

This chapter provides complete information of the 16047A Test Fixture.

Product Description

The 16047A Test Fixture is designed for use with 4 terminal-pair LCR Meters and Impedance Analyzers.

It is a direct attachment, 4-terminal pair configuration type test fixture for measurements on both axial and radial lead components. Three contact inserts (labelled 1, 2, and 3 in [Figure 1-1](#)) are available: (1), for measurements on axial components and (2) and (3), for measurements on radial lead components. These parts number is listed in [Table 1-1](#). The dimensions of the contact inserts are given in [Table 1-2](#).

Figure 1-1 16047A Test Fixture.

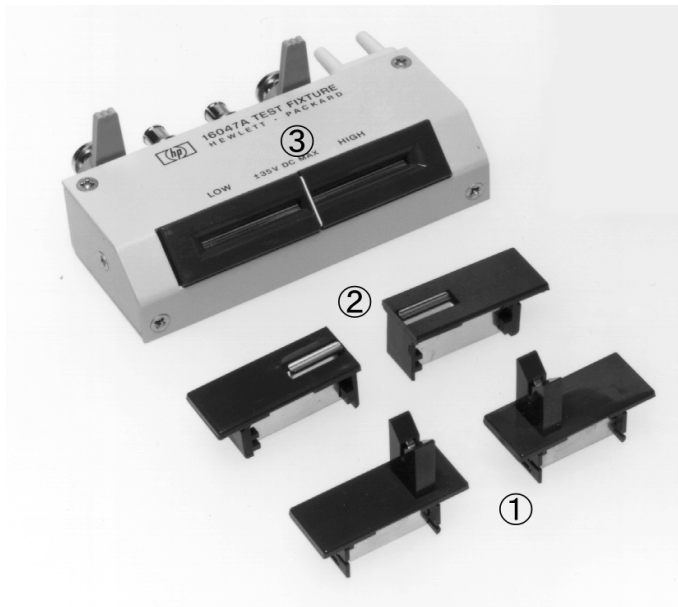


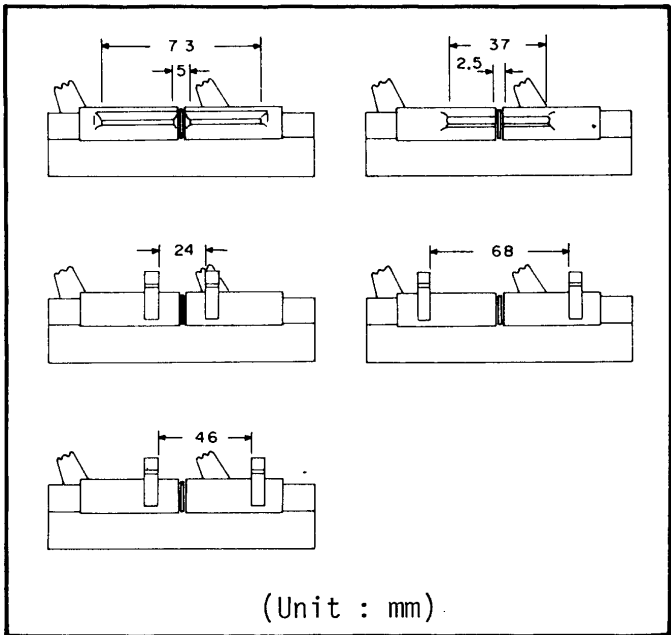
Table 1-1 Parts number

	Keysight Part No.
1	16061-70022
2	16047-65001
3	16061-70021

Specifications

Table 1-2

Specification of the 16047A

Function:	For use with 4 terminal-pair LCR Meters and Impedance Analyzers.
Measurable components:	Axial and radial lead components.
Contact inserts:	Three kinds: one for axial lead components, one for radial lead components, and one for radial short lead components.
Dimensions of Test Fixture Contacts:	 <p>(Unit : mm)</p>
Frequency:	≤ 13 MHz
Maximum Voltage:	± 40V peak max. (AC+DC)
Dimensions of test fixture:	124 (W) × 31 (D) × 62 (H) mm
Weight:	205 g
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

Typical Characteristics

Table 1-3

Typical characteristics

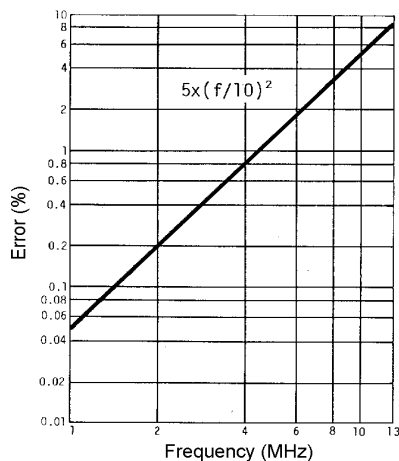
Incremental Error at $f \geq 1$ MHz	
Parameter reading error	Offset Value for D
$\pm 5 \times \left(\frac{f}{10}\right)^2$	$\pm 0.02 \times \left(\frac{f}{10}\right)^2$

NOTE

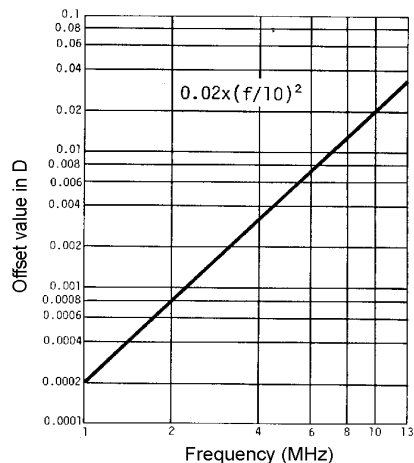
f is the measurement frequency in MHz. The incremental errors calculated from the equation in the table for measurements at frequencies above 1 MHz are additive.

Figure 1-2

Incremental error at frequency above 1 MHz.



Parameter reading error vs frequency

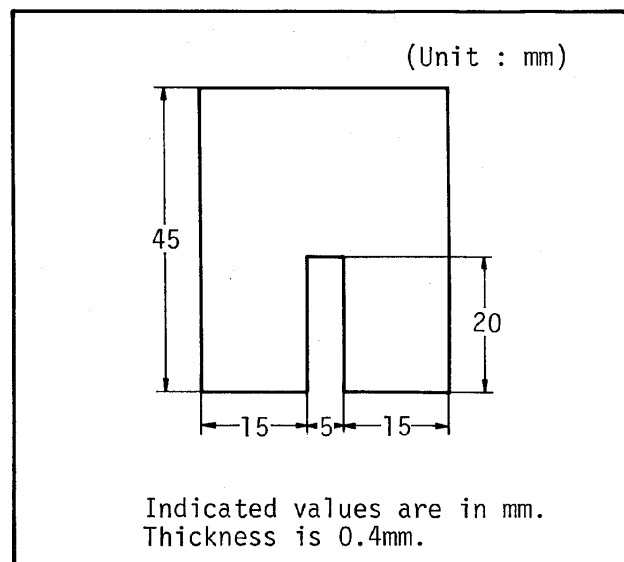


Offset value in D vs frequency

Compensation for Fixture Residual Impedance Error

The 16047A has inherent stray capacitance, residual inductance, and residual resistance that affect the accuracy of measured values. To compensate for, or negate, these residuals to minimize measurement error, the instrument's Open/Short compensation procedure should be performed. The procedure is given in the instrument's operating manual. For SHORT compensation a low impedance copper or phosphor bronze shorting bar such as the one shown in Figure 1-3 is recommended.

Figure 1-3 Shorting-bar dimensions.



Operation
Introduction

2 **Service**

Maintenance

The internal wiring of the 16047A is shown in [Figure 2-1](#) and an exploded View (for parts identification) in [Table 2-2](#). 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 Keysight Technologies part numbers listed in [Table 2-1](#). If a faulty part is located in an assembly that cannot be disassembled, order the next higher assembly or return the whole device to the nearest Keysight Technologies Sales/Service Office for repair or replacement.

Figure 2-1 Internal Wiring of 16047A.

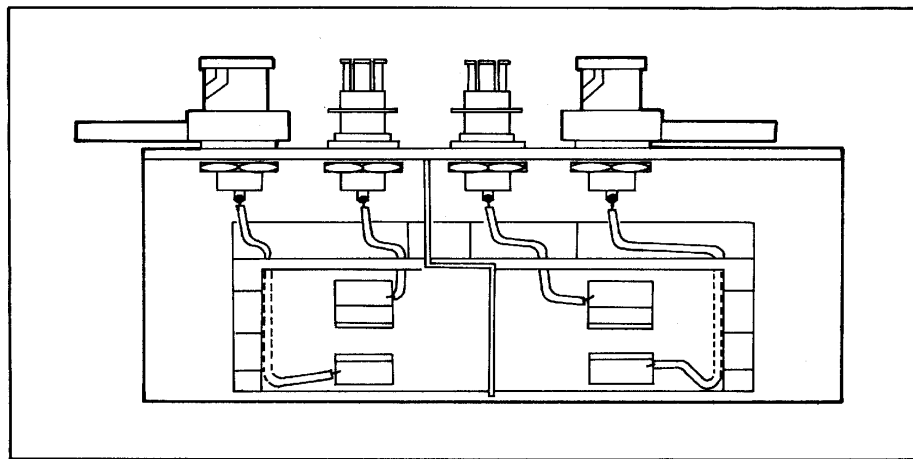
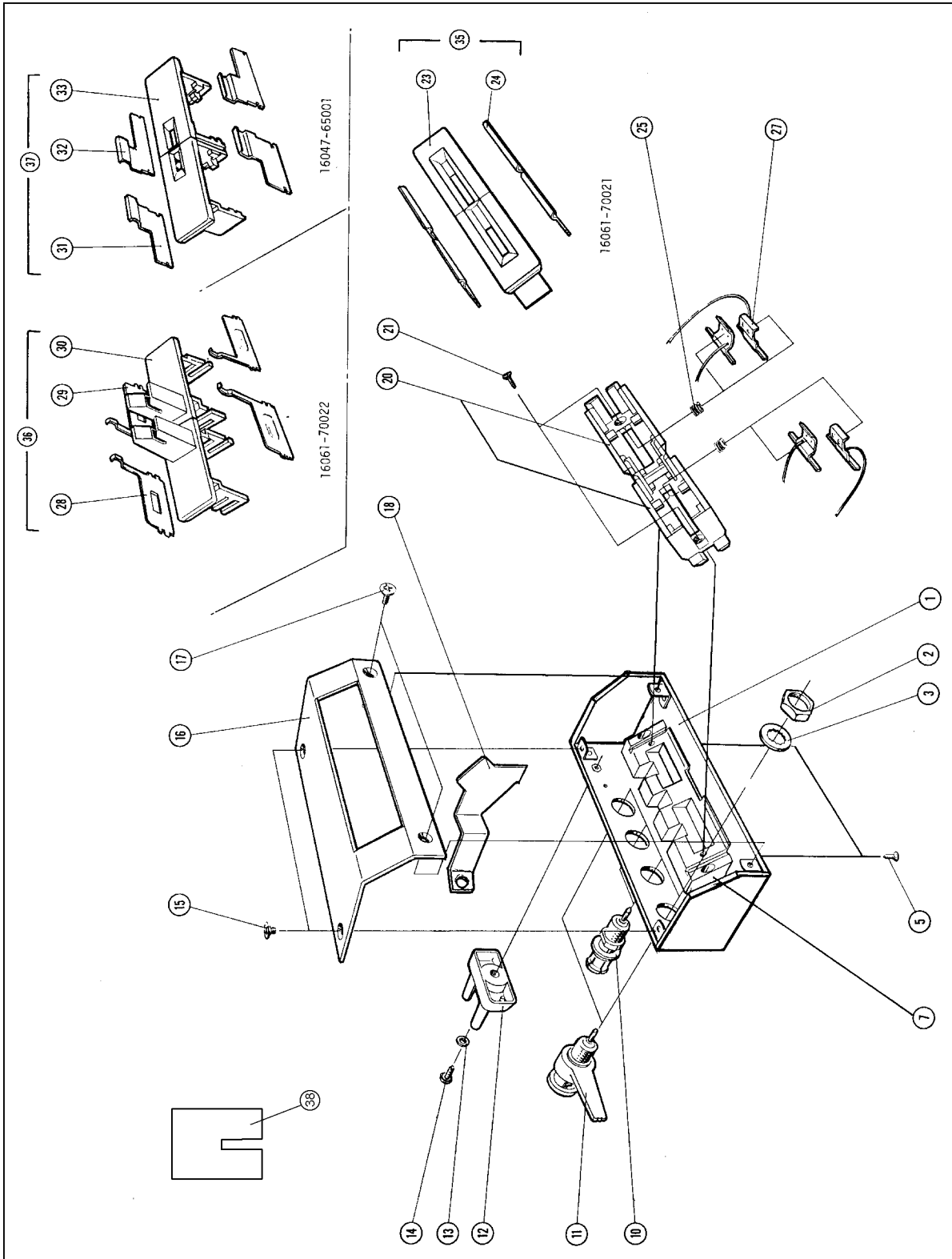


Figure 2-2 Parts Identification



Service
Maintenance

Table 2-1

Replaceable Parts List.

Reference	Keysight Part No.	Qty	Description
1	16047-04013	1	COVER-BOTTOM
2	2950-0043	4	NUT
3	2190-0016	4	WASHER
5	0515-1467	2	SCREW
7	16061-50022	1	BASE
10	1250-1798	2	CONNECTOR-BNC
11	16012-7122	2	CONNECTOR-BNC
12	16047-40000	1	STOPPER
13	2190-0206	1	WASHER
14	0515-1550	1	SCREW
15	0515-0914	2	SCREW
16	16047-04011	1	COVER-TOP
17	0515-0914	2	SCREW
18	16047-00618	1	SHIELD PLATE
20	16061-50024	2	SOCKET
21	0515-1467	2	SCREW
23	16061-50031	2	SOCKET-RADIAL
24	16061-10031	4	CONTACT-RADIAL
25	1460-0343	4	SPRING
27	16061-10026	4	CONTACT
28	16061-10033	2	CONTACT-AXIAL
29	16061-10032	2	CONTACT-AXIAL
30	16061-50032	2	SOCKET-AXIAL
31	16047-00604	2	CONTACT
32	16047-00605	2	CONTACT
33	16047-40001	2	SOCKET
35	16061-70021	2	SOCKET ASSEMBLY (23 and 24)
36	16061-70022	2	SOCKET ASSEMBLY (28,29 and 30)
37	16047-65001	2	SOCKET ASSEMBLY (31,32 and 33)
38	5000-4226	1	Short Bar

This information is subject to change without notice.

© Keysight Technologies 1985, 1998, 1999, 2014

Edition 4, November 2014



16047-90011
www.keysight.com