HP 16454A Magnetic Material Test Fixture

Specification and Service Manual

HP Part No. 16454-90000
Printed in JAPAN February 1999

2nd Edition

Notice

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

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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 that are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

December 1993 ..... First Edition

February 1999 ..... Second 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 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 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.

The voltage levels found in this test fixture when used with the intended instruments do not warrant more than normal safety precautions for operator safety.

Operating Precaution

Do not exceed the operating input power, voltage, and current level and signal type appropriate for the instrument being used, refer to your instrument's operation manual.

Caution

Electrostatic discharge (ESD) can damage the highly sensitive microcircuits in your instrument. ESD damage is most likely to occur as the test fixtures are being connected or disconnected. Protect them from ESD damage by wearing a grounding strap that provides a high resistance path to ground. Alternatively, ground yourself to discharge any static charge built-up by touching the outer shell of any grounded instrument chassis before touching the test port connectors.

Never touch the test clip contacts.

Use a work station equipped with an anti-static work surface.

Certification

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 Institution's calibration facility, or to the calibration facilities of other International Standards Organization members.

Warranty

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from the date of shipment, except that in the case of certain components listed in *Instrument Specifications* of this manual, the warranty shall be for the specified period. During the warranty period, Hewlett-Packard Company 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 HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

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

No other warranty is expressed or implied. HP 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. 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.

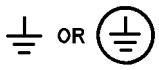
For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

Safety Symbols

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

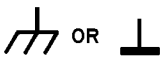
Instruction manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.

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



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with wiring terminals to indicate the terminal that 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 fault. 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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Contents

Tables

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General Information

Introduction

This manual contains the following information:

- The specifications of the HP 16454A (in this chapter).
- Initial inspection of the HP 16454A (see Chapter 2).
- Ordering replaceable parts for the HP 16454A (see Chapter 3).

For measurement procedures using the HP 16454A, see the *HP 4291A RF Impedance/Material Analyzer User's Guide*.

Product Description

The HP 16454A is used to measure the permeability of a toroidal core.

Applicable Instrument

The HP 16454A has been designed to operate specifically with the HP 4291A RF Impedance/Material Analyzer equipped with the Option 002 (which provides the permeably measurement function for magnetic material).

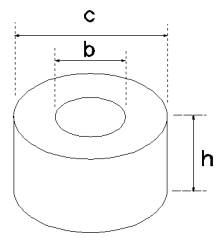
Specifications

This section lists the complete HP 16454A specifications. These specifications are the performance standards and limits against which the HP 16454A is tested. When shipped from the factory, the HP 16454A meets the following listed specifications. For the specifications when used with the HP 4291A, see the *HP 4291A RF Impedance/Material Analyzer Function Reference*.

Specifications describe the instrument's warranted performance over the temperature range of 0°C to 55°C (except as noted). Supplemental characteristics are intended to provide information that is useful in applying the instrument by giving non-warranted performance parameters. These are denoted as *typical*, *typically*, *nominal* or *approximate*.

Applicable MUT (Material Under Test) Size ..... See Table 1-1
Maximum DC Bias Current ..... ± 500 mA
Frequency Range ..... 1 MHz to 1.8 GHz typically
Operating Temperature ..... –55°C to +200°C
Operating Humidity (@ wet bulb temperature <40°C) ..... Up to 95% RH
Non-operating Temperature ..... –55°C to +200°C
Non-operating Humidity (@ wet bulb temperature <65°C) ..... Up to 90% RH
Weight
(Large Test Fixture) ..... 130 g typically
(Small Test Fixture) ..... 130 g typically
Dimension
(Large Test Fixture) ..... ϕ 40 mm × 30 mm H typically
(Small Test Fixture) ..... ϕ 40 mm × 30 mm H typically

Table 1-1. Applicable MUT Size



Fixture	Small		Large	
Holder	**A**	**B**	**C**	**D**
b	$\geq \phi$ 3.1 mm	$\geq \phi$ 3.1 mm	$\geq \phi$ 6 mm	$\geq \phi$ 5 mm
c	$\leq \phi$ 8 mm	$\leq \phi$ 6 mm	$\leq \phi$ 20 mm	$\leq \phi$ 20 mm
h	$\leq$ 3 mm	$\leq$ 3 mm	$\leq$ 10 mm	$\leq$ 10 mm

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Initial Inspection

Introduction

This chapter contains the following information:

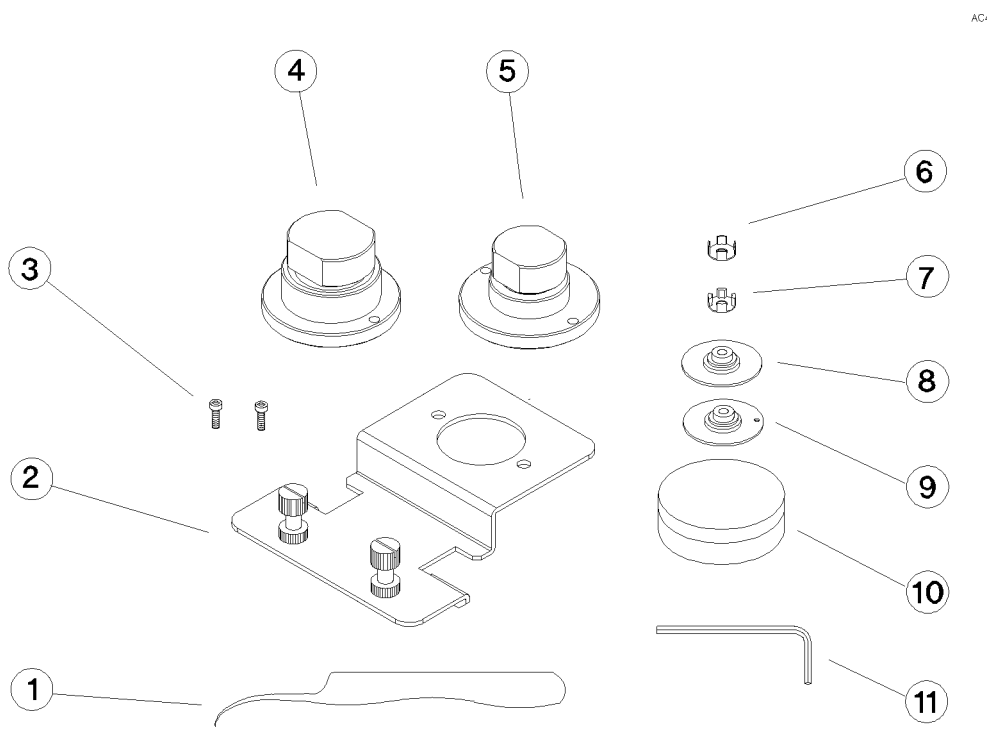
- Initial inspection.
- Repackaging the test fixture for shipment.

Initial Inspection

The magnetic material test fixture has been carefully inspected before being shipped from the factory. It should be in perfect physical condition, no scratches, dents or the like. It should also be in perfect electrical condition. Verify this by carefully performing an incoming inspection to check the magnetic material test fixture set 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.

- Inspect the shipping container for damage. Keep the shipping materials until the inspection is completed.
- Verify that the shipping container contains everything listed in Table 2-1.
- Inspect the exterior of the HP 16454A for any signs of damage.

Table 2-1. HP 16454A Contents



Reference Designator	Description	HP Part Number	Quantity
1	Tweezers	8710-2081	1
2	Fixture Holder	16454-00601	1
3	Screw, Hex Recess	0515-1050	2
4	Test fixture (Large)	(not assigned)	1
5	Test fixture (Small)	(not assigned)	1
6	Holder A	16454-25001	1
7	Holder B	16454-25002	1
8	Holder C	16454-25003	1
9	Holder D	16454-25004	1
10	Holder Case	1540-0622	1
11	Hex Key, 2.5mm Across Flats	8710-1181	1
–	Carrying Case[1]	16454-60101	1
–	Specification and Service Manual[1]	16454-90000	1

1 These parts are not shown in this figure.

Repackaging the Test Fixture For Shipment

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

If this material is not available, comparable packaging materials may be used. Wrap the magnetic material test fixture in heavy paper and pack in anti-static plastic packing material. Use sufficient shock absorbing material on all sides of the HP 16454A to provide a thick, firm cushion and to prevent movement. Seal the shipping container securely and mark it *FRAGILE*.

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Service

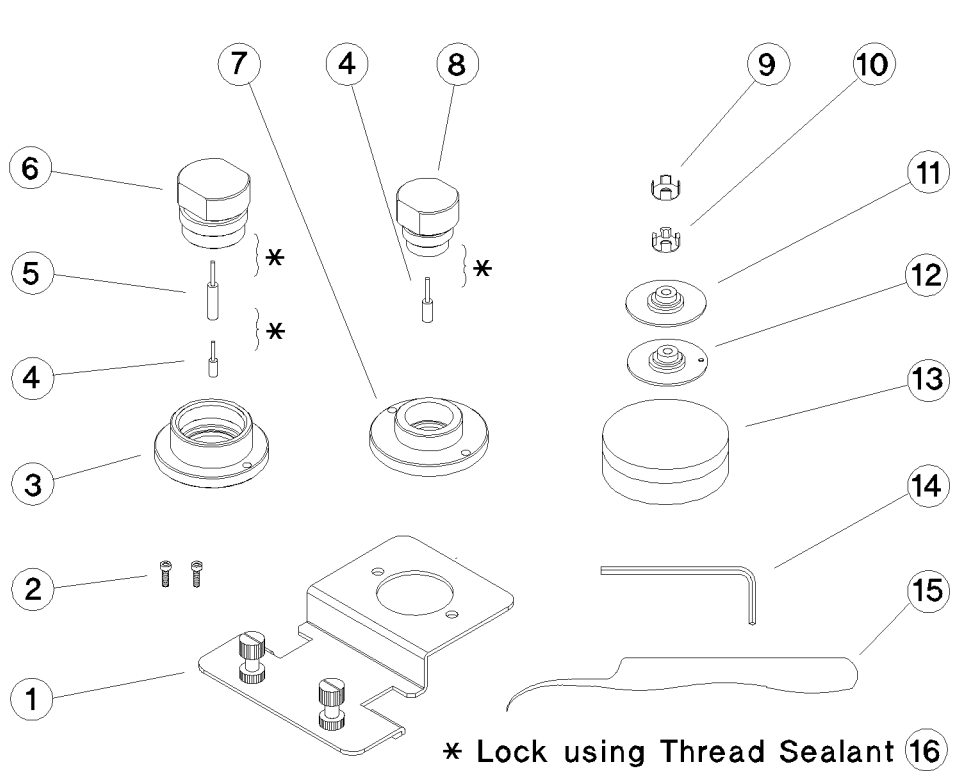
Introduction

This chapter gives the service information for the HP 16454A Magnetic Material Test Fixture.

Replaceable Parts

Table 3-1 lists the replaceable parts. The parts listed in this table can be ordered from your nearest Hewlett-Packard office. Ordering information should include the HP part number and the quantity required.

Table 3-1. Replaceable Parts List



Reference Designator	HP Part Number	Qty.	Description
1	16454-00601	1	Fixture Holder
2	0515-1050	2	Screw, Hex Recess
3	16454-23004	1	Fixture Flange (Large)
4	1250-0816	2	Conn-RF Conn
5	16454-23005	1	Center Pin
6	16454-23003	1	Fixture Cap (Large)
7	16454-23002	1	Fixture Flange (Small)
8	16454-23001	1	Fixture Cap (Small)
9	16454-25001	1	Holder A
10	16454-25002	1	Holder B
11	16454-25003	1	Holder C
12	16454-25004	1	Holder D
13	1540-0622	1	Case
14	8710-1181	1	Hex Key, 2.5mm Across Flats
15	8710-2081	1	Tweezers
16	0470-0013	1	Thread Sealant
–	16454-60101	1	Carrying Case[1]
–	16454-90000	1	Specification and Service Manual[1]

1 These parts are not shown in this figure.

Functional Test

This section provides the functional test procedure to check the HP 16454A performance. The functional test can be used for post repair function verification.

Fixture Impedance Check

1. Perform the HP 4291A calibration. (Refer to *HP 4291A RF Impedance/Material Analyzer User's Guide.*)
2. Place the fixture (small) on the calibraded APC-7® terminal of the HP 4291A RF Impedance/Material Analyzer.
3. Read L_S and R_S values for each test fixture. The guideline is as follows:

Table 3-2. Fixture Impedance Check Guideline

Fixture	Frequency	Parameter[1]	Guideline
Small	100 MHz	L_S	1 nH ± 0.5 nH
		R_S	< 100 mΩ
Large	100 MHz	L_S	5.5 nH ± 2.5 nH
		R_S	< 300 mΩ

1 The HP 4291A should be set to the impedance measurement mode.