

User's and Service Guide

HP 11906A/B/C/D 7-16 Adapter Kits



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Warranty

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

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

Hewlett-Packard warrants that its software and firmware designated by Hewlett-Packard for use with an instrument will execute its programming instructions when properly installed on that instrument. Hewlett-Packard 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 of the environmental specifications for the product, or improper site preparation or maintenance.

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Contents

1 **General Information**

General Information

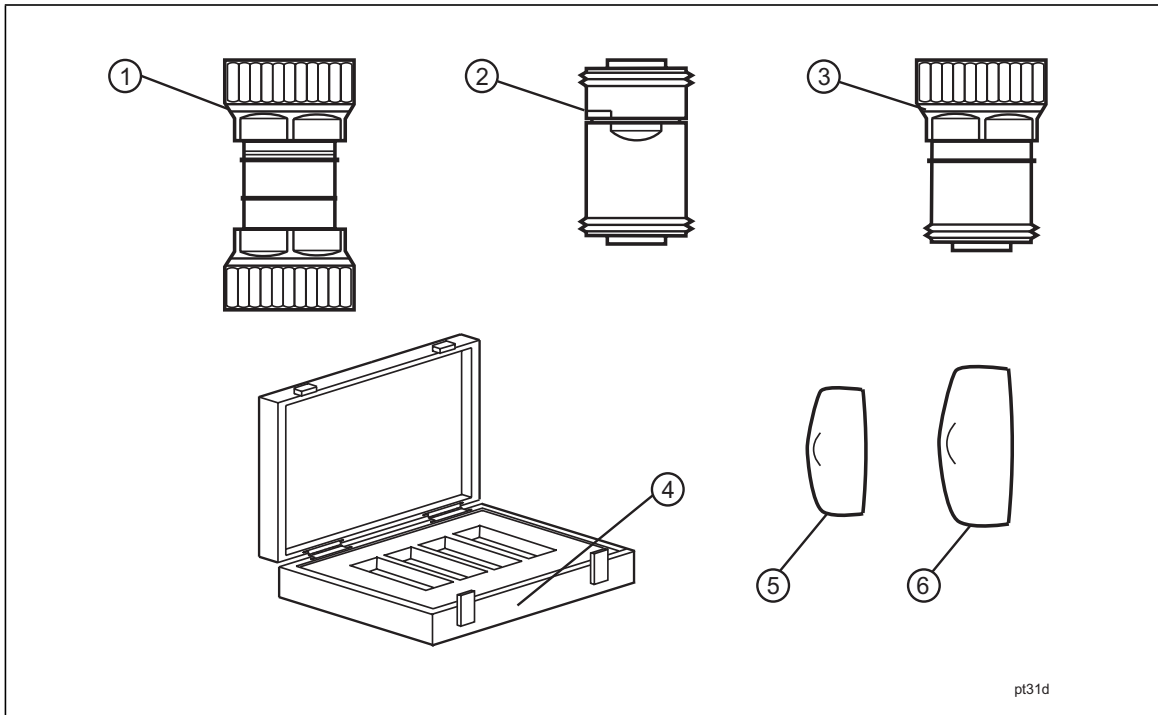
The HP 11906A/B/C/D 7-16 adapter kits contain adapters required for interconnections and test setups using 50 ohm 7-16, type-N, 7-mm, or 3.5-mm connectors and devices with 7-16 connectors.

Kit Contents

Refer to the following pages to verify that you have a complete and correct shipment. Contact Hewlett-Packard if the case or any of the adapters appear damaged. A list of HP sales and service offices is located on [page 1-9](#).

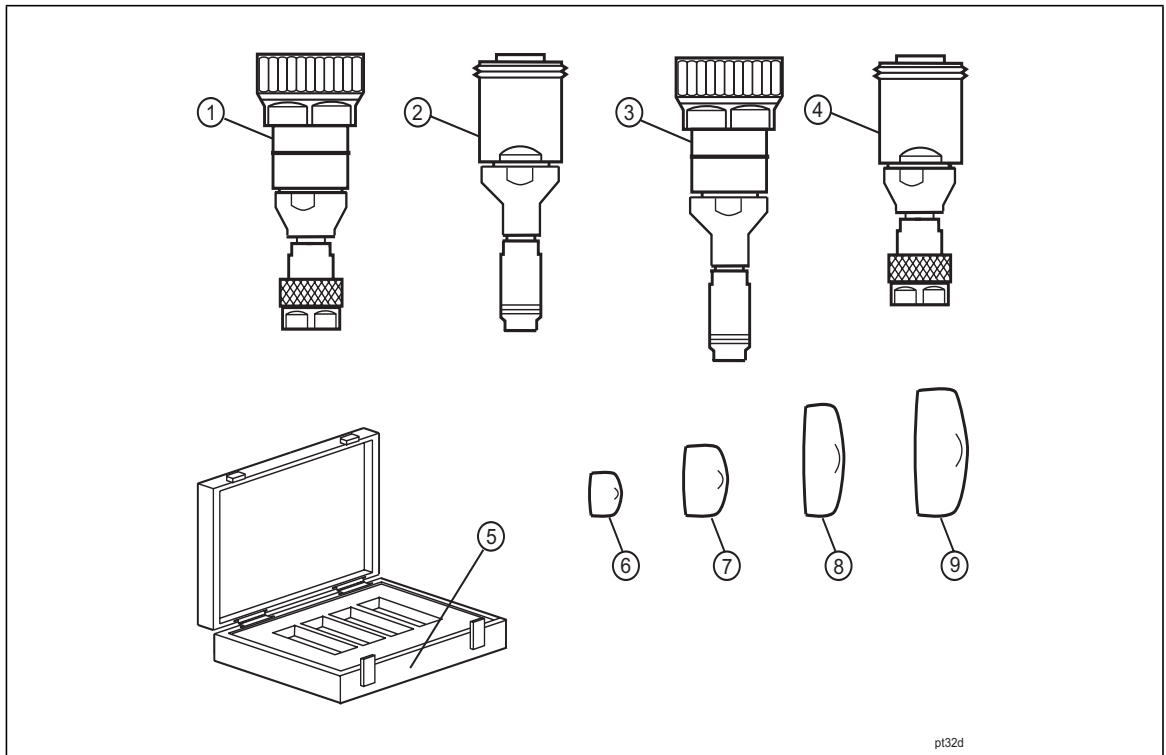
General Information
Kit Contents

Table 1-1 HP 11906A 7-16 to 7-16 Adapter Kit Contents



Item	Description	Quantity	HP Part Number
1	7-16 male to 7-16 male adapter	1	11906-80015
2	7-16 female to 7-16 female adapter	1	11906-80016
3	7-16 male to 7-16 female adapter	2	11906-80017
4	Storage case (with foam inserts)	1	85038-80019
5	Protective end cap (female connector)	4	1401-0418
6	Protective end cap (male connector)	4	1401-0417

Table 1-2 HP 11906B 7-16 to Type-N 50 Ohm Adapter Kit Contents

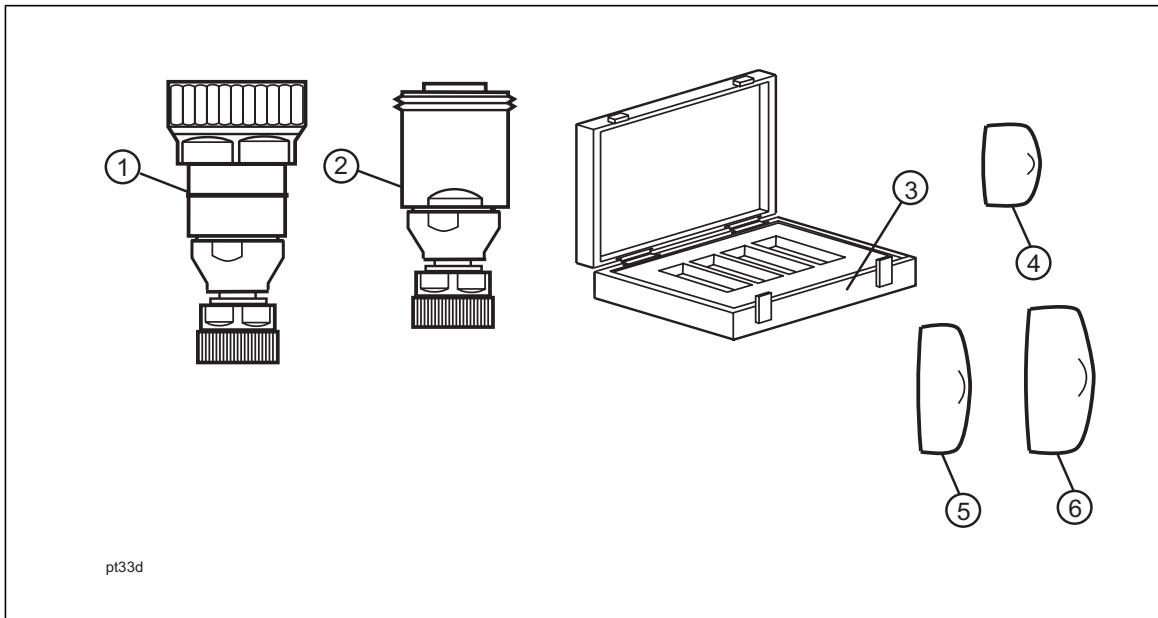


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Item	Description	Quantity	HP Part Number
1	7-16 male to type-N male adapter	1	11906-80007
2	7-16 female to type-N female adapter	1	11906-80008
3	7-16 male to type-N female adapter	1	11906-80009
4	7-16 female to type-N male adapter	1	11906-80010
5	Storage case (with foam inserts)	1	85038-80019
6	Protective end cap (type-N female connector)	2	1401-0225
7	Protective end cap (type-N male connector)	2	1401-0214
8	Protective end cap (7-16 female connector)	2	1401-0418
9	Protective end cap (7-16 male connector)	2	1401-0417

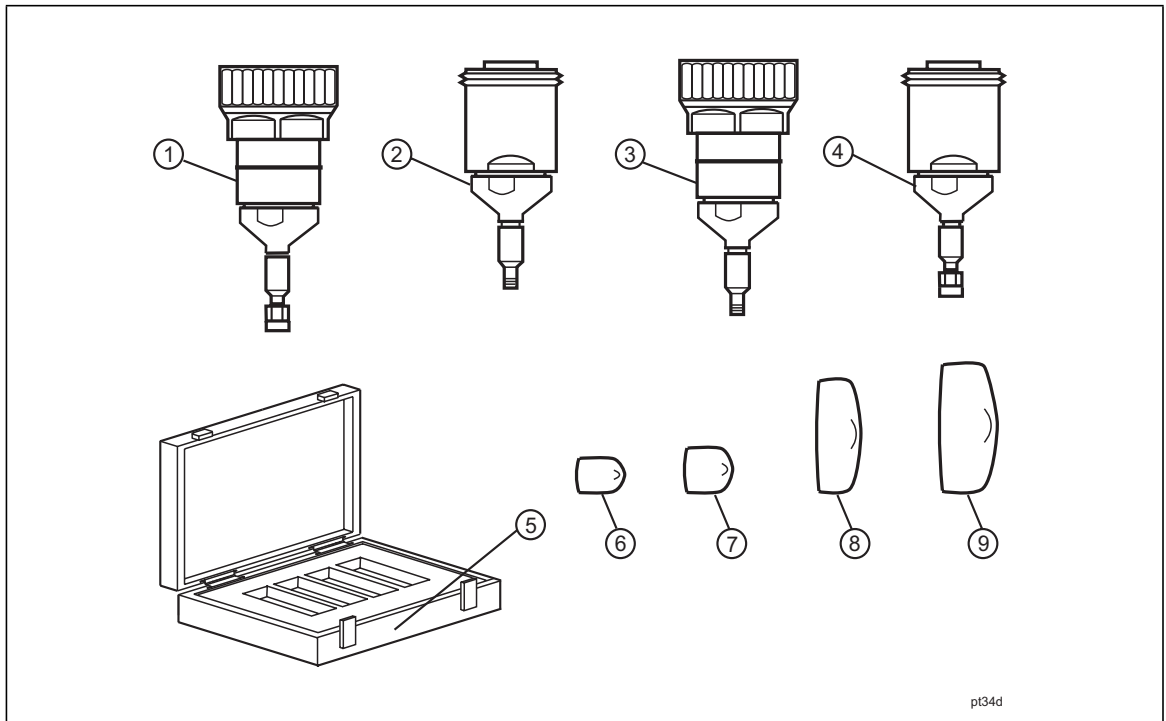
General Information
Kit Contents

Table 1-3 HP 11906C 7-16 to 7-mm Adapter Kit Contents



Item	Description	Quantity	HP Part Number
1	7-16 male to 7-mm adapter	2	11906-80012
2	7-16 female to 7-mm adapter	2	11906-80013
3	Storage case (with foam inserts)	1	85038-80019
4	Protective end cap (7-mm connector)	4	1401-0214
5	Protective end cap (7-16 female connector)	2	1401-0418
6	Protective end cap (7-16 male connector)	2	1401-0417

Table 1-4 HP 11906D 7-16 to 3.5-mm Adapter Kit Contents



pt34d

Item	Description	Quantity	HP Part Number
1	7-16 male to 3.5-mm male adapter	1	11906-80002
2	7-16 female to 3.5-mm female adapter	1	11906-80003
3	7-16 male to 3.5-mm female adapter	1	11906-80004
4	7-16 female to 3.5-mm male adapter	1	11906-80005
5	Storage case (with foam inserts)	1	85038-80019
6	Protective end cap (3.5-mm female connector)	2	1401-0202
7	Protective end cap (3.5-mm male connector)	2	1401-0208
8	Protective end cap (7-16 female connector)	2	1401-0418
9	Protective end cap (7-16 male connector)	2	1401-0417

Contacting Hewlett-Packard

Refer to the table on the next page if you need to contact Hewlett-Packard regarding your adapter kit.

Table 1-5 Hewlett-Packard Sales and Service Offices

UNITED STATES		
Instrument Support Center Hewlett-Packard Company (800) 403-0801		
EUROPEAN FIELD OPERATIONS		
Headquarters Hewlett-Packard S.A. 150, Route du Nant-d'Avril 1217 Meyrin 2/ Geneva Switzerland (41 22) 780.8111	France Hewlett-Packard France 1 Avenue Du Canada Zone D'Activite De Courtaboeuf F-91947 Les Ulis Cedex France (33 1) 69 82 60 60	Germany Hewlett-Packard GmbH Hewlett-Packard Strasse 61352 Bad Homburg v.d.H Germany (49 6172) 16-0
Great Britain Hewlett-Packard Ltd. Eskdale Road, Winnersh Triangle Wokingham, Berkshire RG41 5DZ England (44 734) 696622		
INTERCON FIELD OPERATIONS		
Headquarters Hewlett-Packard Company 3495 Deer Creek Rd. Palo Alto, CA 94304-1316 USA (415) 857-5027	Australia Hewlett-Packard Australia Ltd. 31-41 Joseph Street Blackburn, Victoria 3130 (61 3) 895-2895	Canada Hewlett-Packard (Canada) Ltd. 17500 South Service Road Trans-Canada Highway Kirkland, Quebec H9J 2X8 Canada (514) 697-4232
Japan Hewlett-Packard Japan, Ltd. 9-1 Takakura-Cho, Hachioji Tokyo 192, Japan (81 426) 60-2111	Singapore Hewlett-Packard Singapore (Pte.) Ltd. 150 Beach Road #29-00 Gateway West Singapore 0718 (65) 291-9088	Taiwan Hewlett-Packard Taiwan 8th Floor, H-P Building 337 Fu Hsing North Road Taipei, Taiwan (886 2) 712-0404
China China Hewlett-Packard Co. 38 Bei San Huan X1 Road Shuang Yu Shu Hai Dian District Beijing, China (86 1) 256-6888		

General Information
Contacting Hewlett-Packard

2 **Specifications**

Electrical Specifications

The electrical specifications in [Table 2-1](#) apply to the adapters in your calibration kit when connected with an HP precision interface.

Table 2-1 **Electrical Specifications**

HP Model Number	Adapter Type ¹	Parameter: Specification ²
HP 11906A	7-16 to 7-16	Return Loss: ≥ 38 dB
HP 11906B	7-16 to type-N	Return Loss: ≥ 36 dB
HP 11906C	7-16 to 7-mm	Return Loss: ≥ 36 dB
HP 11906D	7-16 to 3.5-mm	Return Loss: ≥ 34 dB

1. Electrical specifications apply to both male and female devices.
2. All specifications apply from DC to 7.5 GHz. These devices may be used (but are not specified) up to 8.0 GHz.

7-16 Mechanical Characteristics

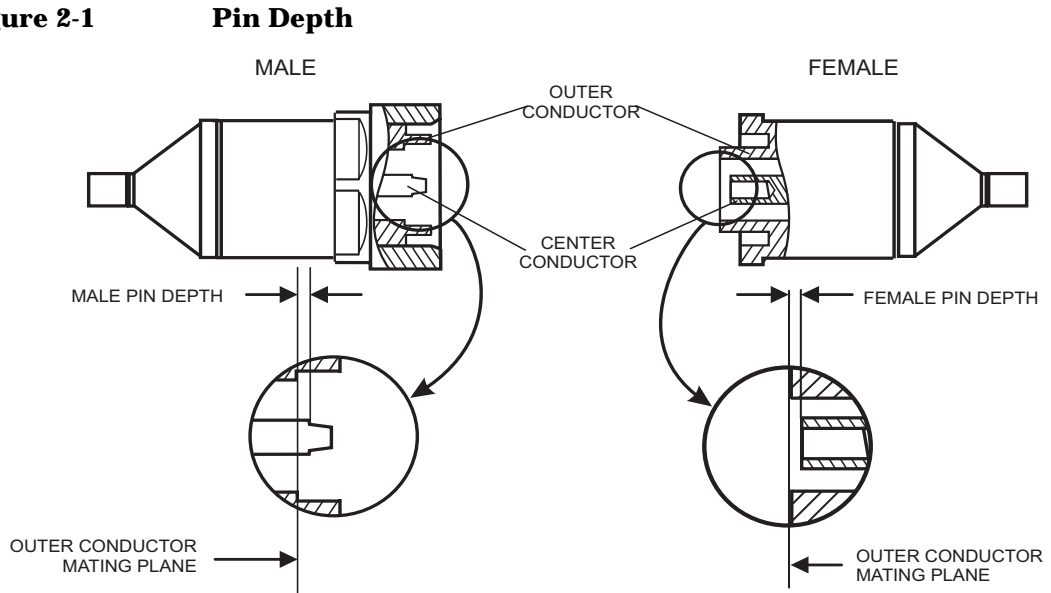
Mechanical characteristics are provided as additional information that may be helpful in applying the devices. These characteristics are typical, but are not warranted.

Table 2-2 **7-16 Mechanical Characteristics**

Dimension	Typical Value
Inside diameter of outer conductor	16.060 ±0.008 mm
Outside diameter of center conductor	6.975 ±0.005 mm
Pin depth ¹ : male devices	1.732 to 1.770 mm
Pin depth ¹ : female devices	1.770 to 1.808 mm

1. See [Figure 2-1](#).

Figure 2-1



Pn42m

Connector Standards

The 7-16 connectors in your calibration kit conform to or exceed the requirements for:

- IEC 169-4 reference grade
- EN 122190 grade 0

Performance Verification

The performance of your adapter kit can only be verified by returning the kit to Hewlett-Packard for recertification. The equipment required to verify the specifications of the adapters has been specially manufactured and is not commercially available. Refer to [Table 1-5](#) for a list of Hewlett-Packard sales and service offices.

Specifications
Performance Verification

3 Maintenance and Care of the Adapters

Electrostatic Discharge

Protection against ESD (electrostatic discharge) is essential while connecting, inspecting, or cleaning connectors attached to a static-sensitive circuit.

Static electricity can build up on your body and can easily damage sensitive internal circuit elements when discharged. Static discharges too small to be felt can cause permanent damage. Devices such as calibration components and devices under test can also carry an electrostatic charge. To prevent damage to your components and devices:

- *always* wear a grounded wrist strap having a 1 M Ω resistor in series with it when handling components and devices or when making connections to the test set.
- *always* have a grounded antistatic mat in front of your test equipment.
- wear a heel strap when working in an area with a conductive floor.

Table 3-1 ESD Protection Supplies Available from HP

Description	HP Part or Model Number
Grounding wrist strap	9300-1367
5 ft. grounding cord for wrist strap	9300-0980
2 × 4 ft. conductive table mat and 15 ft. ground wire	9300-0797
ESD heel strap (for conductive floors)	9300-1126

Visual Inspection

Visual inspection and, if necessary, cleaning should be done every time a connection is made. Metal particles from the connector threads may fall into the connector when it is disconnected. One connection made with a dirty or damaged connector can damage both connectors beyond repair.

In some cases, magnification is necessary to see damage on a connector. Not all defects that are visible only under magnification will affect the electrical performance of the connector. Use the following guidelines when evaluating the integrity of a connector.

Look for Obvious Defects and Damage First

Examine the connectors first for obvious defects and damage: badly worn plating on the connector interface, deformed threads, or bent, broken, or misaligned center conductors.

CAUTION

Adapters with damaged connectors should immediately be discarded or clearly marked and set aside for repair. A damaged adapter will in turn damage any good connector to which it is attached. Try to determine the cause of damage before connecting a new, undamaged connector in the same configuration.

Inspect the Mating Plane Surfaces

Flat contact between connectors at all points on their mating plane surfaces is required for a good connection. Look especially for deep scratches or dents, and for dirt and metal particles on the connector mating plane surfaces. Also look for signs of damage due to excessive or uneven wear or misalignment.

Light burnishing of the mating plane surfaces is normal, and is evident as light scratches or shallow circular marks distributed more or less uniformly over the mating plane surface. Other small defects and cosmetic imperfections are also normal. None of these affect electrical or mechanical performance.

Visual Inspection

If a connector shows deep scratches or dents, particles clinging to the mating plane surfaces, or uneven wear, clean and inspect it again. Adapters with damaged connectors should be discarded. Try to determine the cause of damage before connecting a new, undamaged connector in the same configuration.

Inspect Slotted Connectors

When using slotted connectors, pay special attention to the female center conductor contact fingers. These can be bent or broken, and damage to them is not always easy to see. A connector with damaged contact fingers will not make good electrical contact and must be replaced.

NOTE

This is particularly important when you are mating nonprecision to precision devices.

What Causes Connector Wear

Connector wear eventually degrades performance. The more use a connector gets, the faster it wears and degrades. The wear is greatly accelerated when connectors are not kept clean, or are connected incorrectly. Adapters should have a long life if their use is on the order of a few times per week. If a device's connectors show sign of wear, replace the device.

Cleaning Connectors

Clean connectors are essential for ensuring the integrity of RF and microwave coaxial connections. Use the following procedure to clean the connectors in your kit:

1. Use Compressed Air or Nitrogen

Use compressed air (or nitrogen) to loosen particles on the connector mating plane surfaces. Clean air cannot damage a connector, or leave particles or residues behind.

WARNING

Always use protective eyewear when using compressed air or nitrogen.

You can use any source of clean, dry, low-pressure compressed air or nitrogen that has an effective oil-vapor filter and liquid condensation trap placed just before the outlet hose. Ground the hose nozzle to prevent electrostatic discharge, and set the air pressure to less than 414 kPa (60 psi) to control the velocity of the air stream. High-velocity streams of compressed air can cause electrostatic effects when directed into a connector.

2. Clean the Connector Threads

Use a lint-free swab or cleaning cloth moistened with isopropyl alcohol to remove any dirt or stubborn contaminants on a connector that cannot be removed with compressed air or nitrogen.

- a. Apply a small amount of isopropyl alcohol to the lint-free cleaning swab.
- b. Clean the connector threads.
- c. Let the alcohol evaporate, then blow the threads dry with a gentle stream of clean, low-pressure compressed air or nitrogen.

WARNING

Isopropyl alcohol is extremely flammable, causes irritation, may cause eye damage, and is harmful if swallowed or inhaled. It may be harmful if absorbed through the skin. Keep away from heat, sparks, and flame. Avoid contact with eyes, skin, clothing. Avoid breathing vapor. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling. In case of fire, use alcohol foam, dry chemical, or carbon dioxide: water may be ineffective. In case of spill, soak up with sand or earth. Flush spill area with water.

Dispose of isopropyl alcohol in accordance with all applicable federal, state, and local environmental regulations

3. Clean the Mating Plane Surfaces

Apply a small amount of isopropyl alcohol to a new swab and clean the center and outer conductor mating plane surfaces. When cleaning a female connector, avoid snagging the swab on the center conductor contact fingers by using short strokes.

4. Dry the Connector

After cleaning, blow the connector dry with a gentle stream of clean compressed air or nitrogen. Always completely dry a connector before you reassemble or use it.

5. Reinspect

Inspect the connector again to make sure that no particles or residue are present.

Connections

Good connections require a skilled operator. *The most common cause of measurement error is poor connections.*

CAUTION

Do *not* use the standard commercial 7-16 connection torque of 20 ft-lbs on these devices. The Hewlett-Packard 7-16 devices and adapters are specially designed to be properly connected with 20 in-lbs of torque.

How to Make a Connection

1. Ground yourself and all devices. Wear a grounded wrist strap and work on an antistatic mat.
2. Visually inspect the connectors.
3. If necessary, clean the connectors.
4. Carefully align the connectors. The male connector center pin must slip concentrically into the contact fingers of the female connector.
5. Push the connectors straight together. Do *not* twist or screw them together. As the center conductors mate, there is usually a slight resistance.

CAUTION

Do **not** turn the device body. Only turn the connector nut. Damage to the center conductor can occur if the device body is twisted.

6. The preliminary connection is tight enough when the mating plane surfaces make uniform, light contact. Do not overtighten this connection.

At this point all you want is a connection in which the outer conductors make gentle contact at all points on both mating surfaces. Very light finger pressure is enough.

7. Make sure the connectors are properly supported. Relieve any side pressure on the connection from long or heavy devices or cables.

Maintenance and Care of the Adapters

Connections

8. Use an open-end wrench to keep the device from rotating when making the final connection with a torque wrench. Be sure to use the proper torque for the connector type you are using. 7-16 connections should be torqued to 226 N-cm (20 in-lb).

How to Separate a Connection

To avoid lateral (bending) force on the connector mating plane surfaces, always support the devices and connections.

1. Use an open-end wrench to prevent the device body from turning.
2. Use another open-end wrench to loosen the connector nut.
3. Complete the separation by hand, turning only the connector nut.

CAUTION

Turn the connector nut, **not** the device body. Major damage to the center conductor can occur if the device body is twisted.

CAUTION

Do not subject the connectors to withdrawal forces exceeding 40 N (9 lb).

4. Pull the connectors straight apart without twisting, rocking, or bending.

Handling and Storage

- Use the plastic end caps and store the calibration devices in the foam-lined storage case when not in use.
- Never store connectors loose in a box, in a desk, or in a bench drawer. This is the most common cause of connector damage during storage.
- Keep connectors clean.
- Do not touch mating plane surfaces. Natural skin oils and microscopic particles of dirt are easily transferred to a connector interface and are very difficult to remove.
- Do not set connectors contact-end down on a hard surface. The plating and the mating plane surfaces can be damaged if the interface comes in contact with any hard surface.

Maintenance and Care of the Adapters
Handling and Storage