

Keysight 42941A Impedance Probe Kit

Operation and
Service Manual

Notices

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CAUTION

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WARNING

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Contents

1 Installation Guide

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 42941A has been checked mechanically and electrically. The shipment should contain everything listed in **Table 1-1**. If the contents are incomplete or if there is mechanical damage or defect, notify the nearest Keysight Technologies office. If the shipping container is damaged or the cushioning material shows signs of unusual stress, notify the carrier as well as the Keysight Technologies office. Keep the shipping materials for the carrier's inspection.

Table 1-1

Contents

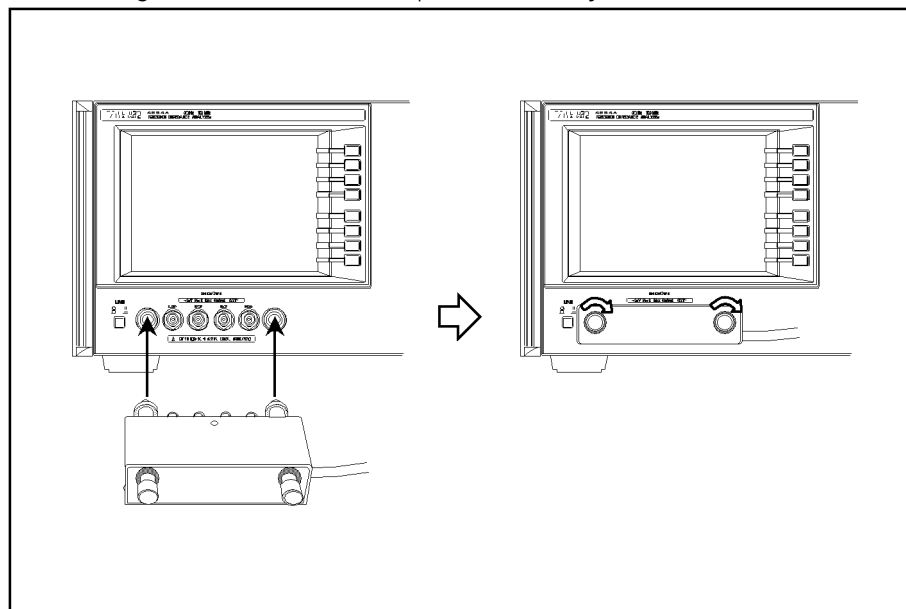
Description	Keysight Part Number	Qty.
Probe and Four-terminal Pair Connection Block	-	1
Pin Probe	42941-60002	1
Spare Pin Set (includes 3 spare pins)	42941-60004	1
3.5-mm Short	1250-2840	1
3.5-mm Load	0955-1105	1
Operation and Service Manual (this document)	Option ABA	1
BNC Adapter	1250-2375	1
Clip Lead	8121-0003	1
Ground Lead	04193-61679	1
Carrying Case	42941-60011	1

Connecting the 42941A

Follow the steps below to connect the 42941A to an Impedance Analyzer.

1. Join the 42941A four-terminal pair connection block to the test connectors on the front panel of the Impedance Analyzer by gently matching the four BNC connectors and securing screws of the block with the test connectors and accessory mounting holes of the instrument until they come into complete contact.
2. Turn the block's two fastening screws clockwise at the same time until the four-terminal pair connection block is secured firmly to the instrument.

Figure 1-1 Connecting the 42941A to an Impedance Analyzer



42941aaj0101

Serial Number

Keysight Technologies uses a ten-character serial number that is stamped on the serial number plate attached to the bottom of the four-terminal pair connection block. The first two characters shows the made-in country, the next three digits are assigned as the serial prefix and the last five digits are the suffix.

Installation Guide
Serial Number

2 Overview

Product Overview

The 42941A is an impedance probe kit designed for an Impedance Analyzer. This kit allows impedance measurement and analysis in a wide frequency range of up to 120 MHz. Its 1.5-meter cable for Impedance Analyzer probing allows you to evaluate implemented circuits and mounted devices.

Figure 2-1 Product Overview

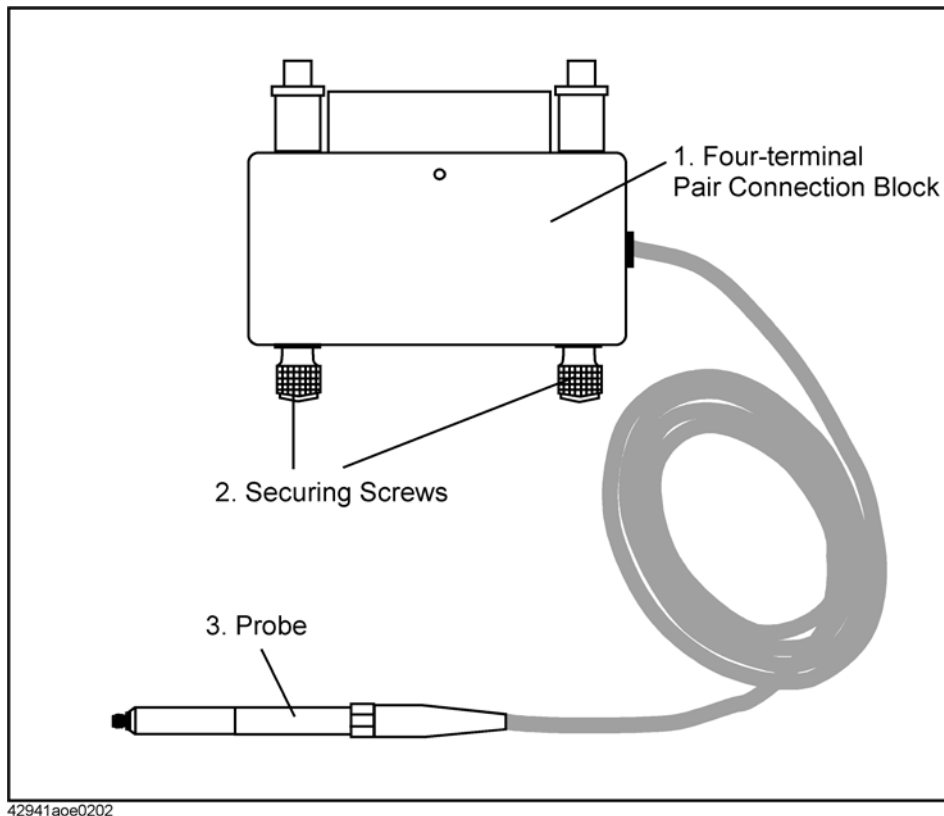


Functions

Figure 2-2 and **Figure 2-3** show the names of the 42941A's parts and probe adapters, respectively.

Figure 2-2

42941A Parts



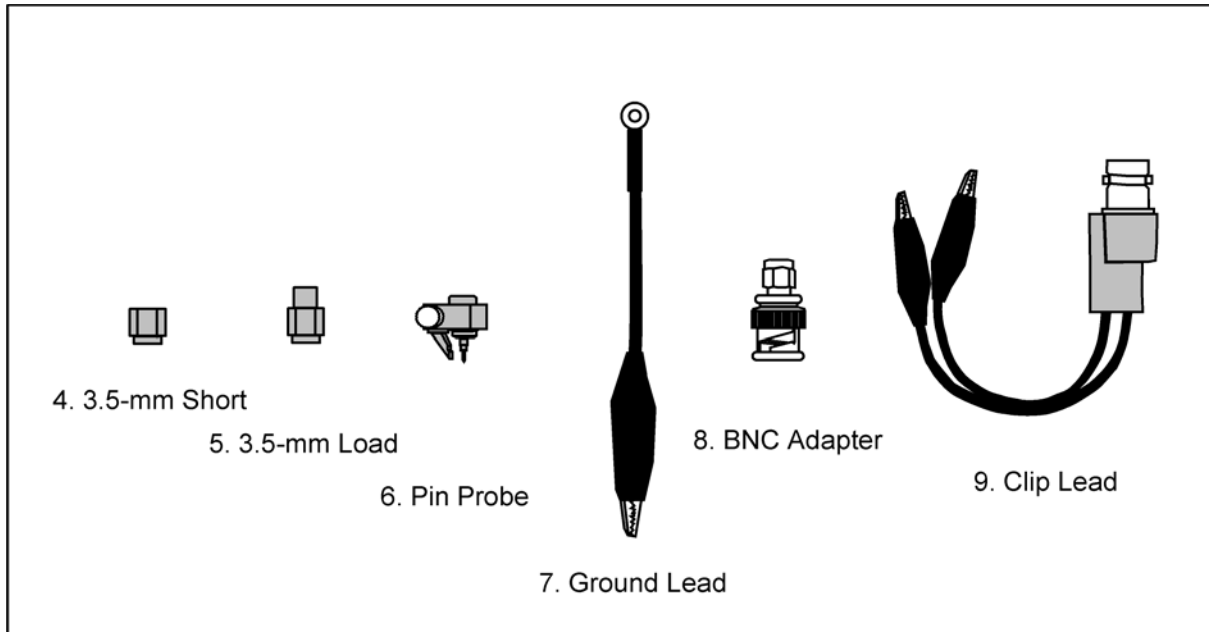
42941a0e0202

Table 2-1

42941A Function

No.	NAME	FUNCTION
1	Four-terminal Pair Connection Block	Connects the 42941A to the Impedance Analyzer.
2	Securing Screws	Secures the 42941A to the Impedance Analyzer.
3	Probe	Attaches to various probe adapters for measurement.

Figure 2-3 Probe Adapters



42941a0e0203

Table 2-2 Probe Adapters

No.	NAME	FUNCTION
4	3.5-mm Short	A short device used for the adapter setup.
5	3.5-mm Load	A load device (50 Ω) used for the adapter setup.
6	Pin Probe	Attached to the probe to measure implemented circuits, mounted devices, and printed circuit patterns.
7	Ground Lead	Attached to the pin probe to connect to the GND of the DUT.
8	BNC Adapter	Attached to the probe to measure devices and cables that have BNC connectors.
9	Clip Lead	Attached to the top of the BNC adapter by the probe to measure mounted lead components or large devices.

Overview
Functions

3 Operation

This chapter describes the proper methods for setting up the Impedance Analyzer, connecting the probe adapter, fixture compensation with the 42941A, and DUT measurement.

Impedance Analyzer Setup

Before beginning measurements, you should perform the adapter setup to extend the calibration plane from the surface of the four-pair terminal to the tip of the probe. Also refer to the Operation Manual of the Impedance Analyzer for more information on the adapter setting.

NOTE

For adapter setup, use the furnished short and load devices.

CAUTION

When handling the 42941A, care must be taken not to give it any mechanical shock, which may cause damage to the fixture. Never give any mechanical shock to the probe.

Adapter Setup

Connect the 42941A to the Impedance Analyzer as shown in [Figure 3-1](#) and perform the adapter setup described below.

1. Leave the Impedance Analyzer for more than 30 minutes after turning it on to allow the Impedance Analyzer to warm-up.
2. Press the **[Cal]** key to bring up the Calibration Menu.
3. Press the **Adapter []** key to bring up the Adapter Setup Menu. **[]** should indicate current settings.
4. Select **PROBE 42941A**. When selected, the softkey label will change to **Adapter [42941A]**.
5. Press the **Adapter Setup** key to bring up the Adapter Setup Menu.
6. Leave the 3.5-mm port of the 42941A open (no connection). There is no OPEN standard for the 42941A.
7. Press the **Phase [-]** key to start the phase compensation data measurement. About 1 minute later, the phase compensation data measurement is completed and the softkey label changes to **Phase [Done]**. Press **[Save Phase]**.

Operation
Impedance Analyzer Setup

8. With nothing connected to the 3.5-mm port, press the **Open [-]** key to start open data measurement. When the open data measurement is completed, the softkey label changes to **Open [Done]**.
9. Connect the SHORT to the 3.5-mm port.
10. Press the **Short [-]** key to start the short data measurement. When the short data measurement is completed, the softkey label changes to **Short [Done]**.
11. Remove the SHORT from the 3.5-mm port of the 42941A. Then connect the LOAD to the 3.5-mm port.
12. Press the **Load [-]** key to start the load data measurement. When the load data measurement is completed, the softkey label changes to **Load [Done]**.
13. Press the **Save Impedance** key.

Connecting the Probe Adapter

The probe adapters are furnished with the 42941A to measure DUTs of various shapes and characteristics. Attach the appropriate probe adapter for your DUT.

Connecting the Pin Probe

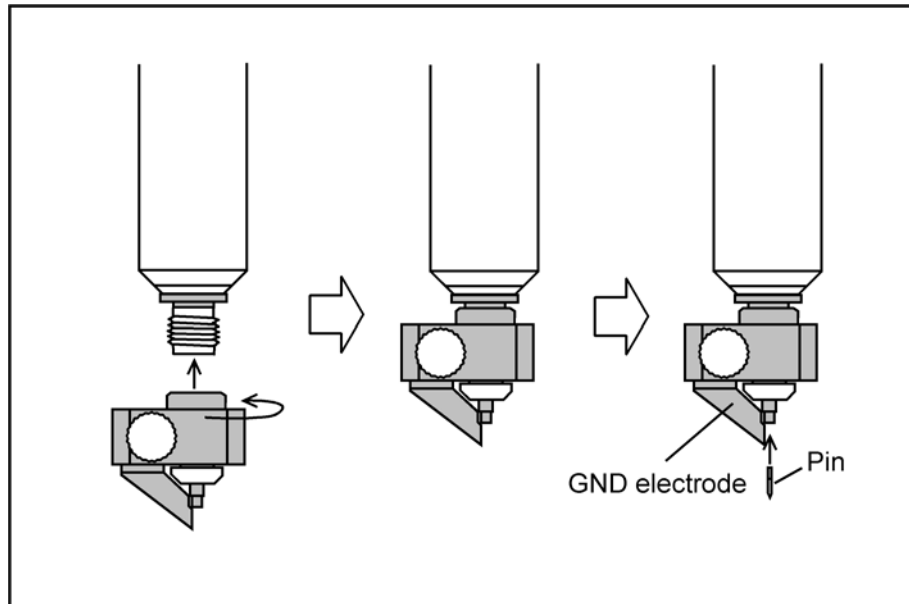
Attach the pin probe to the 3.5-mm connector top of the probe and insert the pin.

WARNING

The pin is sharp and potentially hazardous to personnel. When using or changing, handle the pin probe with care to prevent injury.

Figure 3-1

Connecting the Pin Probe



42941a0e0301

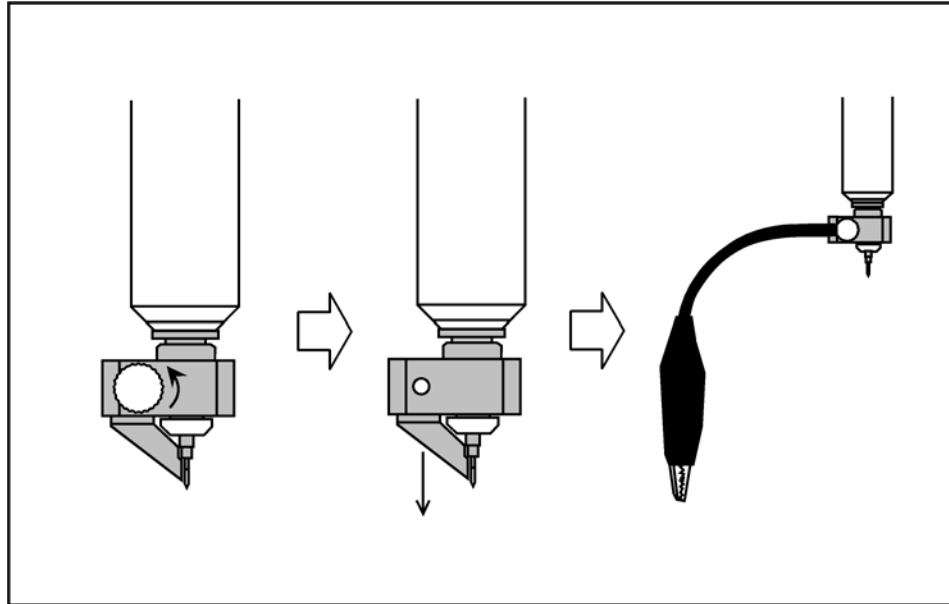
Operation
Connecting the Probe Adapter

Connecting the Ground Lead

Remove the screw fixing the ground contact to detach the contact. Use the removed screw to attach the ground lead to the pin probe.

Figure 3-2

Connecting the Ground Lead



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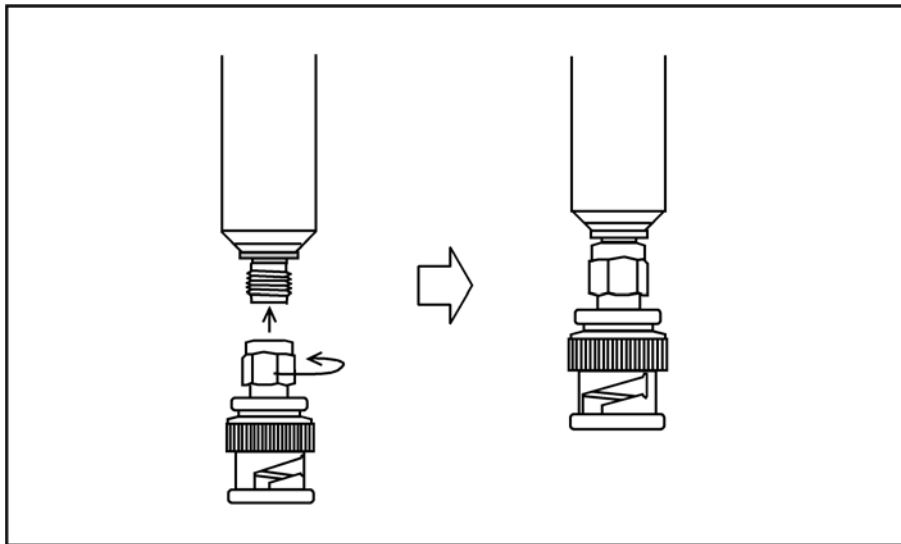
Operation
Connecting the Probe Adapter

Connecting the BNC Adapter

Attach the BNC adapter to the 3.5-mm connector on top of the probe.

Figure 3-3

Connecting the BNC Adapter



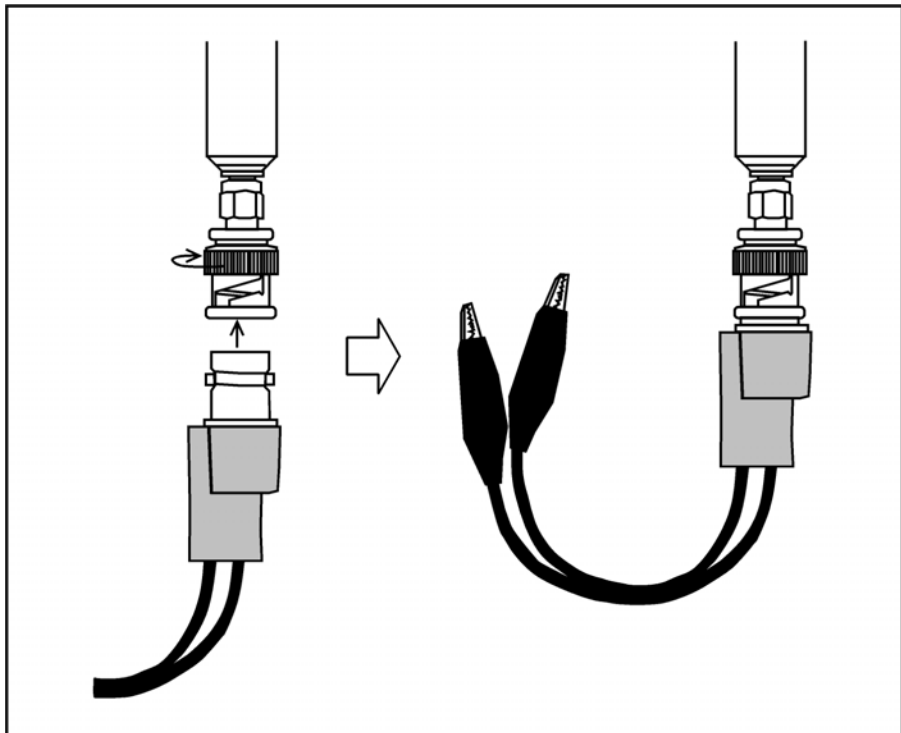
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Connecting the Clip Lead

Attach the BNC adapter to the probe and then attach the clip lead to the adapter.

Figure 3-4

Connecting the Clip Lead



42941a0e0304

Fixture Compensation

In an actual measurement, a probe adapter is attached to the probe. Fixture compensation is required for compensating residual impedance and admittance. The fixture compensation includes OPEN and SHORT compensation measurements. For more information on fixture compensation, also refer to the Operation Manual of the Impedance Analyzer.

NOTE

Generally, there is no need to perform load compensation. However, if you have a suitable standard device and require extremely accurate measurements, perform load compensation as needed.

The following procedure is for measurement of the compensation data with the 42941A.

Performing Fixture Compensation

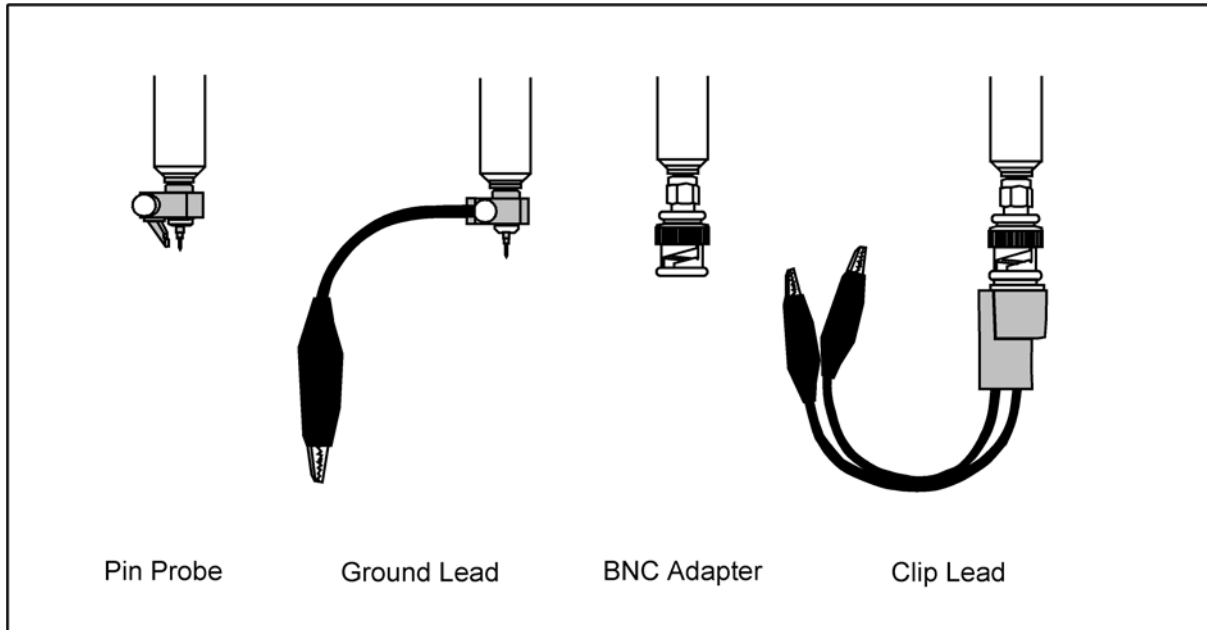
Attach the probe adapter to be used for your measurement and perform fixture compensation.

1. Press the **[Cal]** key to bring up the Calibration Menu.
2. Press the **Fixture Comp** key to bring up the Fixture Compensation Menu.

Performing Open Compensation

1. Attach the probe adapter to the probe but leave it disconnected from a device.

Figure 3-5 Performing Open Compensation



42941a0e0305

2. Press the **OPEN** key to start the OPEN compensation data measurement. When the OPEN compensation data measurement is completed, the softkey label **Open [OFF]** (if it is off) changes to **Open [ON]**.

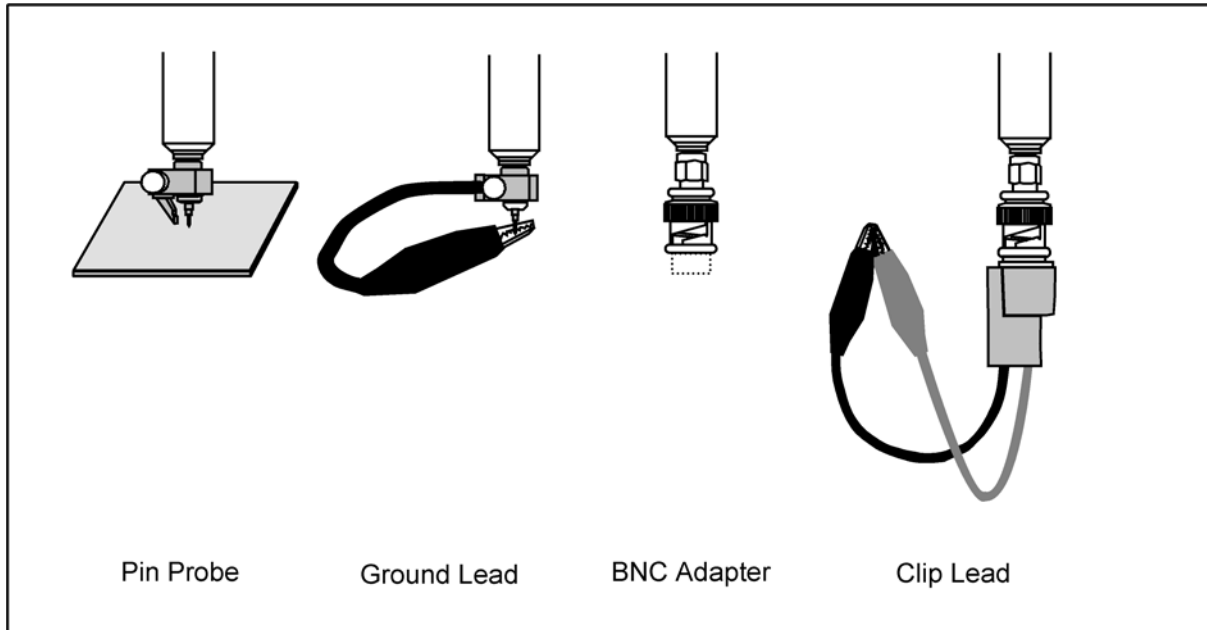
Performing Short Compensation

1. Put the probe adapter into the SHORTed state as shown in **Figure 3-6**. Use an appropriate device for shorting since no short device is supplied with the BNC adapter.

NOTE

For short compensation, we recommend using a short device with gold-plated surfaces, which provide stable contact resistance.

Figure 3-6 Performing Short Compensation



42941a0e0306

2. Press the **SHORT** key to start the SHORT compensation data measurement. When the SHORT compensation data measurement is completed, the softkey label **Short [OFF]** (if it is off) changes to **Short [ON]**.

DUT Measurement

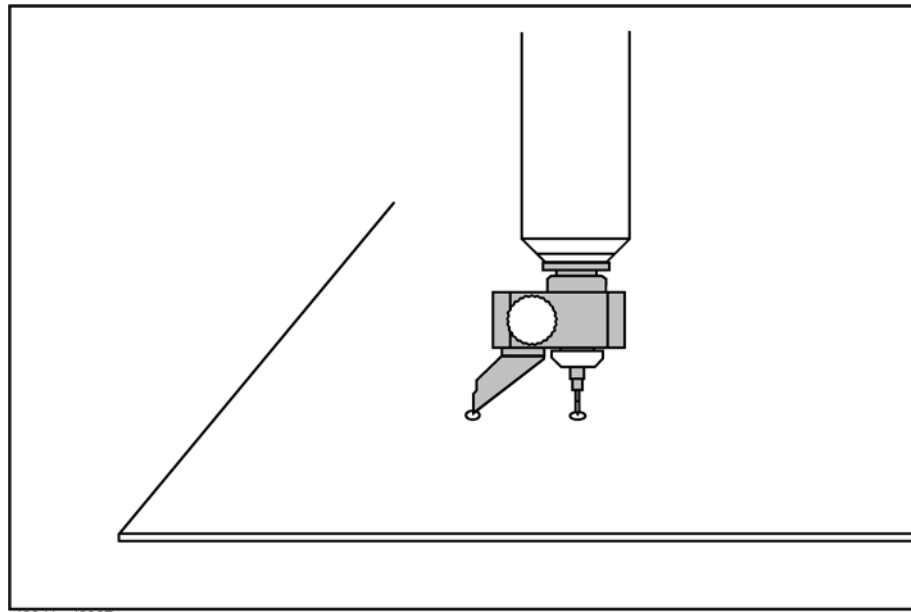
Before performing DUT measurement, open and short compensation should be done as described in the previous sections.

DUT Measurement Using the Pin Probe

When measuring implemented circuits, mounted devices, and printed circuit patterns, use the pin probe.

Figure 3-7

DUT Measurement Using the Pin Probe



42941aaj0307

NOTE

The pin of the pin probe is replaceable. Replace it when damaged or dirty.

Adjusting the Pin-to-GND Gap

The gap between the pin and the GND contact is adjustable for DUT, ranging from 0.5 mm to 13.5 mm. To adjust the gap, release the screw fastening the GND contact and then rotate the contact (**Figure 3-8**).

CAUTION

The probe is grounded 25 Ω (nominally). Do not connect the probe directly to the circuit with a DC output. If you connect a circuit with a DC output, resulting in as follows.

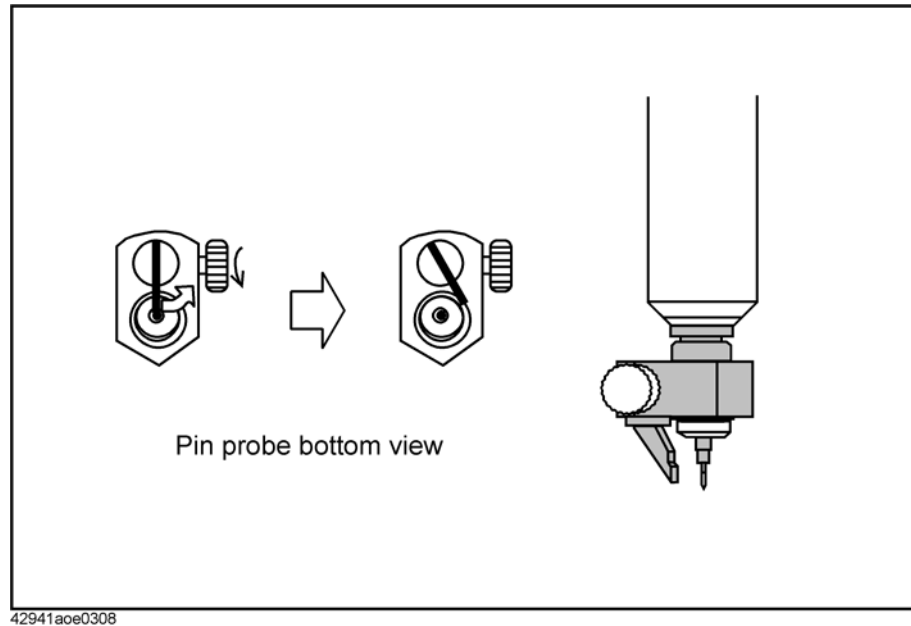
It may cause the probe to be damaged.

It may influence the circuit to not perform correctly or may damage it entirely. Measurement value will be incorrect.

In the case of measuring a circuit that could output a DC signal, connect an appropriate DC-blocking capacitor to the probe.

Figure 3-8

Adjusting the Pin-to-GND Gap

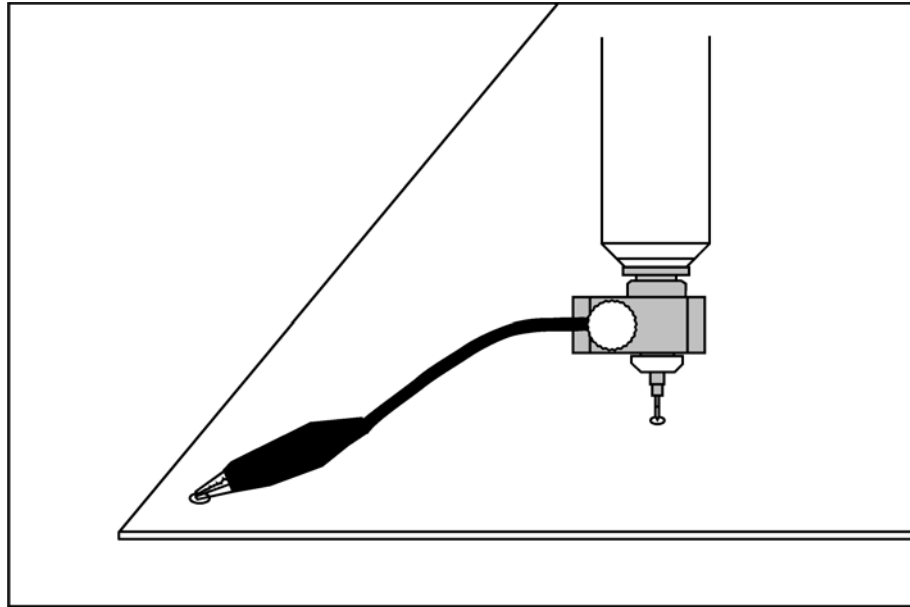


DUT Measurement Using the Ground Lead

Use the ground lead to ground the probe to a distant point (Figure 3-9). When you attach the ground lead to the pin probe, detach the ground contact (refer to Figure 3-2).

Figure 3-9

DUT Measurement Using the Ground Lead



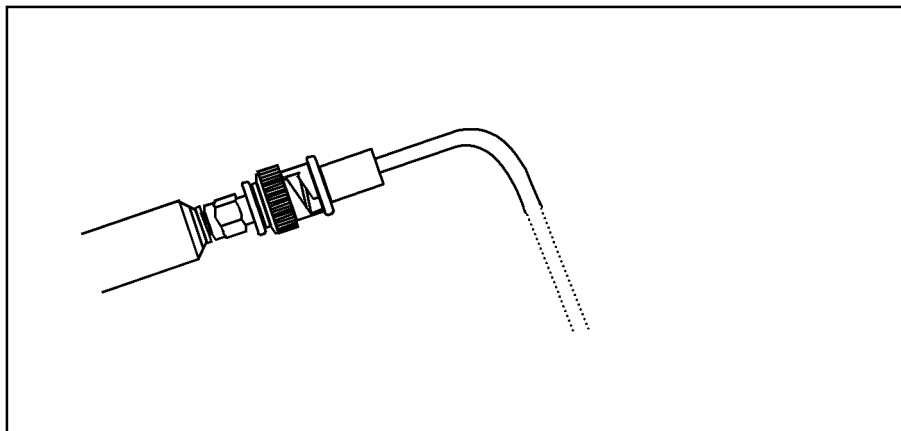
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DUT Measurement Using the BNC Adapter

The BNC adapter is used to measure I/O terminals or cables that have BNC connectors. It is also used as a mounting base for the alligator lead.

Figure 3-10

DUT Measurement Using the BNC Adapter



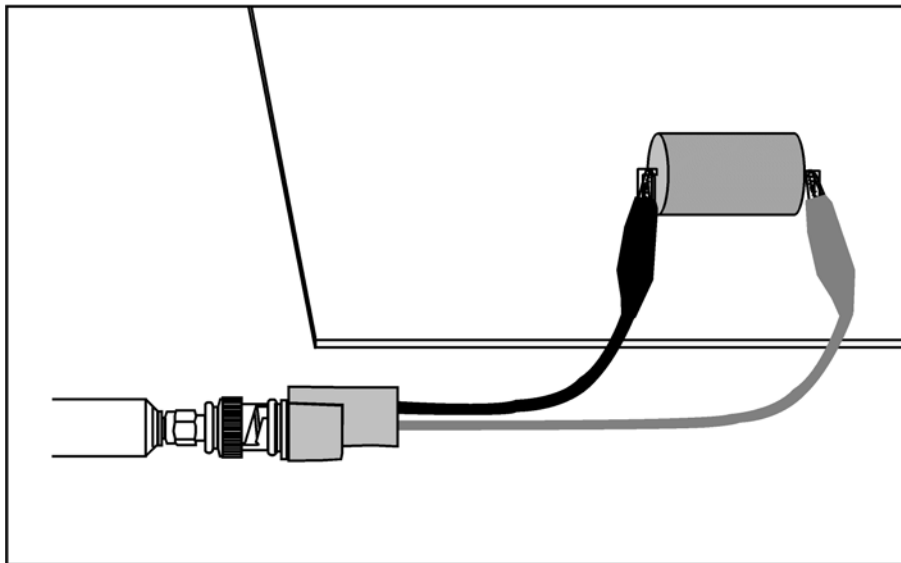
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DUT Measurement Using the Clip Lead

Use the clip lead to measure devices with leads that are large or mounted on the circuit board.

Figure 3-11

DUT Measurement Using the Clip Lead



42941aoj0311

4 Specifications

This chapter provides specifications of the 42941A test fixture.

Specifications

Applicable Instruments	Impedance Analyzer	
Frequency	40 Hz to 120 MHz	
Maximum Voltage	± 42 V peak max. (AC+DC)	
Output Impedance	25 Ω (Nominal) DC coupled	
Operating Environment	temp.	-20 °C to +75 °C (except four-terminal pair connection block) 0 °C to +55 °C (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)
Dimensions	350 (W) × 100 (H) × 280 (D) mm (includes carrying case)	
Weight	2400 g (four-terminal pair connection block 1000 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	

For more information on impedance measurement accuracy at the 3.5-mm port and additional error factor, refer to the Operation Manual of the Impedance Analyzer.

Specifications
Specifications

5 Service

This chapter provides information on servicing and proper maintenance.

Serial Number for Non-RoHS 42941A: "MY431xxxxx and below" / "SG431xxxxx and below"

Serial Number for RoHS 42941A: "MY432xxxxx and above" / "SG432xxxxx and above"

Maintenance

An exploded view of the 42941A for parts identification is shown in **Figure 5-1** and **Figure 5-2**. Due to limited availability of RoHS compliance station and technical difficulties in RoHS soldering, only parts and support level that do not require RoHS soldering are supported. Replace all defective parts with the "RoHS Compliant Replacement Part No.". 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 5-1** and **Table 5-2**. 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 Keysight Technologies Sales/Service Office for repair or replacement.

Figure 5-1 Replaceable Parts (part 1 of 2)

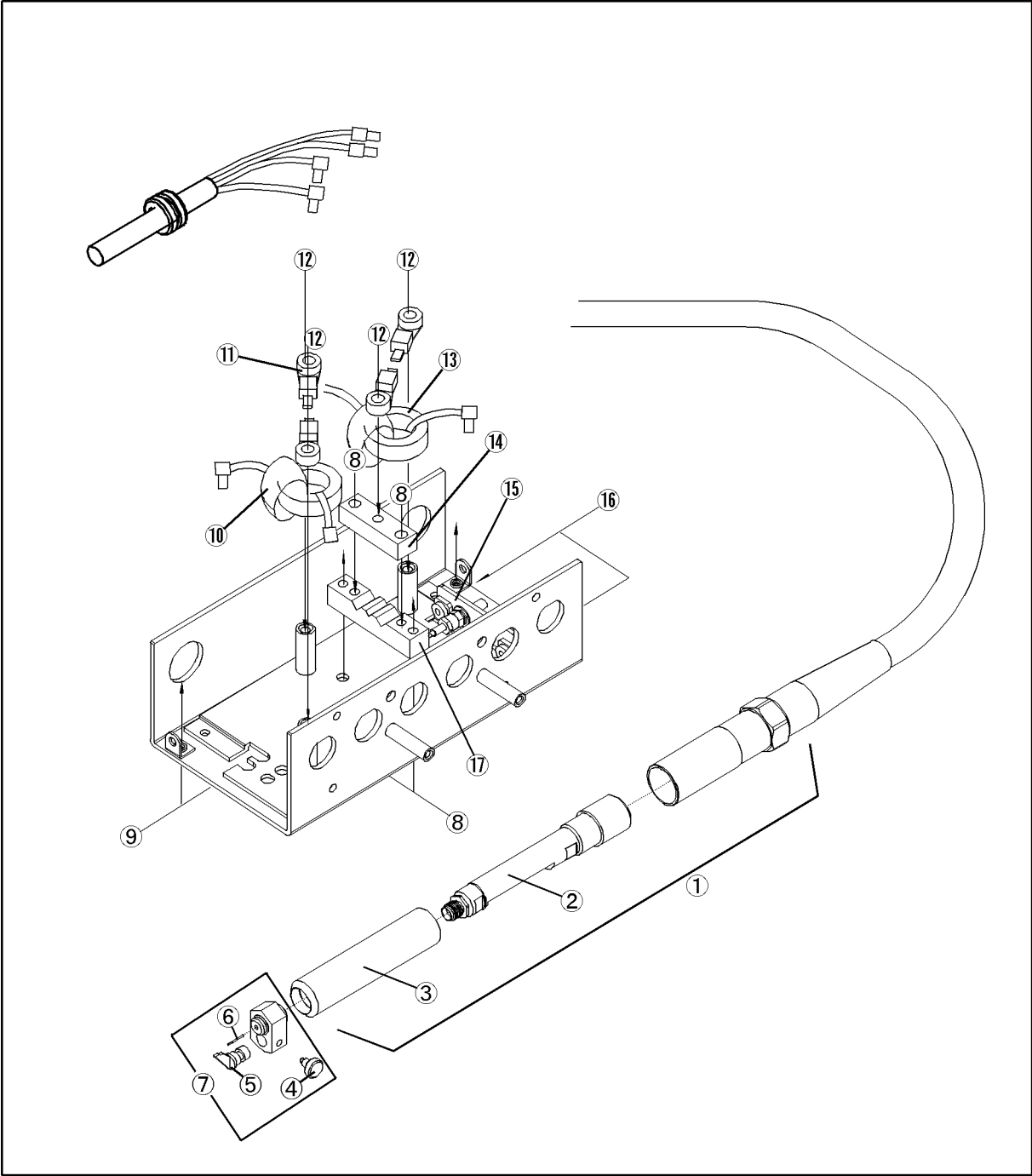


Table 5-1

Replaceable Parts (part 1 of 2)

Reference Designator	Part No.	ROHS Compliant Replacement Part No.	Qty.	Description
1	42941-60001	42941-60601	1	PROBE
2	42941-65001	42941-60601	1	CHASSIS
3	42941-24001	42941-24001	1	COVER
4	42941-24015	42941-24015	1	KNOB
5	42941-24013	42941-24013	1	GND
6	-	-	1	CANTACT PROBE
7	42941-60002	42941-60002	1	CONTACT ASSY
8	0515-1718	0515-0382	4	SCR M4X12
9	0515-0914	0515-1946	2	SCR-MACH M3X0.5
10	42941-61602	42941-61672	1	RF CBL ASSY
11	1400-0719	1400-3284	4	CABLE TIE
12	0515-1718	0515-0382	4	SCR M4X12
	3050-0893	3050-0893	4	WSHR-FL
13	42941-61604	42941-61674	1	RF CBL ASSY
14	42941-24006	42941-24006	1	PLATE
15	42941-66501	42941-66601	1	BOARD
16	0515-1550	0515-0372	2	SCR M3-L 8 P-H
17	42941-24005	42941-24005	1	BLOCK

Figure 5-2 Replaceable Parts (part 2 of 2)

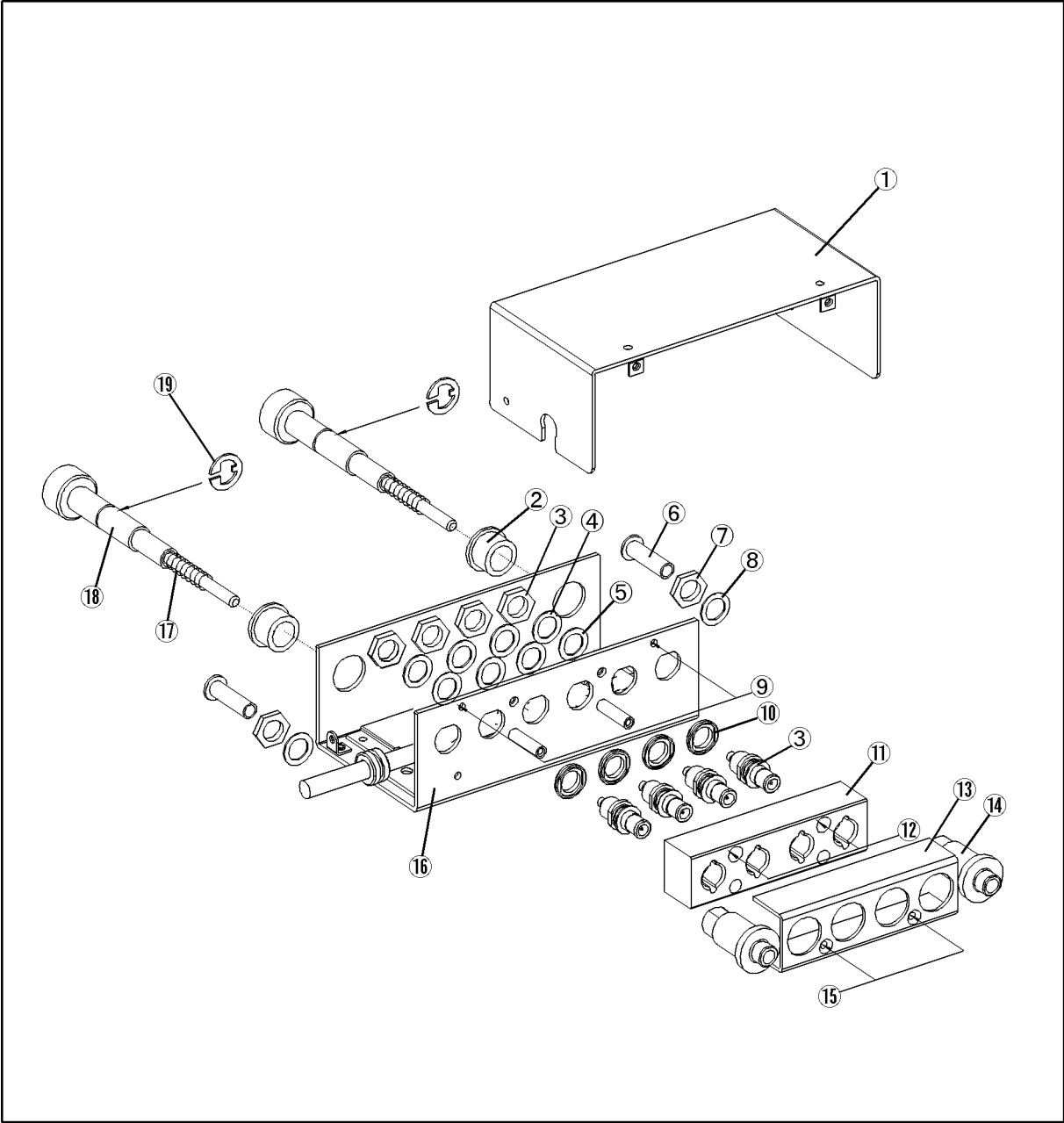


Table 5-2 Replaceable Parts (part 2 of 2)

Reference Designator	Part No.	ROHS Compliant Replacement Part No.	Qty.	Description
1	42941-00601	42941-00601	1	COVER TOP
2	42941-40002	42941-40002	2	BUSHING
3	1253-0476	5012-8630	4	ADPT BNC-SMB
4	3050-0067	3050-0067	4	WSHR-FL MTLC
5	3050-0789	3050-0789	4	WSHR-FL NM
6	42941-25002	42941-25002	2	SLEEVE
7	2950-0054	2950-0054	2	NUT-HEX-DBL-CHAM
8	2190-0054	2190-0054	2	WSHR-LK INTL T
9	0515-0914	0515-1946	2	SCR-MACH M3X0.5
10	16047-40002	16047-40002	4	INSULATOR
11	42942-25006	42942-25006	1	GUIDE BNC
12	0515-1551	0515-0374	2	SCR M3-L 8 P-H
13	42942-00603	42942-00603	1	COVER
14	42941-24003	42941-24003	2	GUIDE
15	0515-0914	0515-1946	2	SCR-MACH M3X0.5
16	42941-00602	42941-00602	1	COVER BOTTOM
17	1460-2615	1460-2615	2	SPRING
18	42941-24004	42941-24004	2	SHAFT
19	0510-0083	0510-0083	2	RTNR-R

Service
Maintenance

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