

HP 41902A Economy PI-Network Test Fixture
Operation and Service Manual



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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.

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October 1996. . . . 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** 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 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 definite safety hazard.

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 Hewlett-Packard 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 present in this instrument. Use extreme caution when handling, testing, and adjusting this instrument.

Safety Symbols

General definitions of safety symbols used on equipment 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 instruction manual.



Alternating current.



Direct current.



On (Supply).



Off (Supply).

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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General Information

Introduction

The purpose of this manual is to enable you to use your HP 41902A Economy PI-Network Test Fixture efficiently and confidently. This manual contains the following:

- The specifications of the HP 41902A and HP 41902A Option 010 (see this chapter).
- Installing the HP 41902A and HP 41902A Option 010 (see chapter 2).
- Operating the HP 41902A and HP 41902A Option 010 (see chapter 3).
- Ordering replaceable parts for the HP 41902A and HP 41902A Option 010 (see chapter 4).

Specifications

This section lists the complete HP 41902A and HP 41902A Option 010 specifications. These specifications are the performance standards and limits against which the HP 41902A and HP 41902A Option 010 are tested. When shipped from the factory, the HP 41902A and HP 41902A Option 010 meet the following specifications:

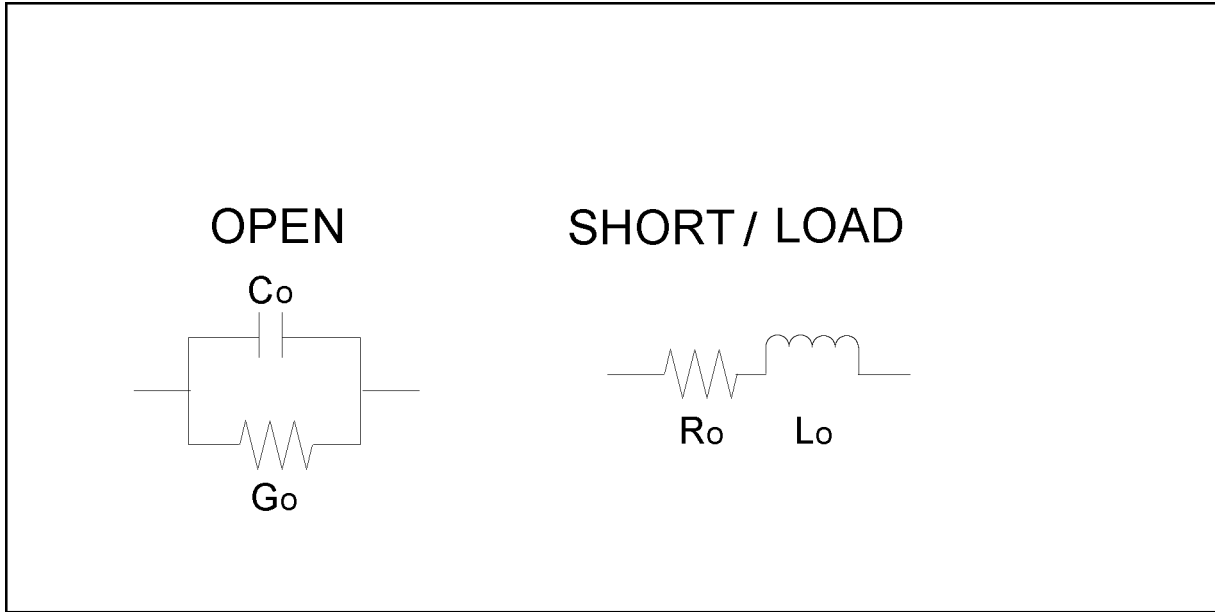
Available Test Device	Leaded Crystal Resonator
Available Measurement Configuration	Direct Measurement or Measurement with Load Capacitor (11 pF to 66 pF when only one C_L side is assembled, 7 pF to 33 pF when two C_L sides are assembled)
Operating Temperature	0°C to +55°C
Operating Humidity (@40 °C)	up to 95 % RH
Non-operating Temperature	-40°C to +70°C
Non-operating Humidity (@65 °C)	up to 90 % RH
Altitude	<4500 meters (15000 feet)
Dimensions	
PI-Network Test Fixture Main Assembly	approx. 50 (H) ×130 (W) × 120 (D) mm
Weight	
PI-Network Test Fixture Main Assembly	approx. 0.9 kg

For the HP 41902A used with the HP E4915A/E4916A

The following specifications show the performance when the HP 41902A is used with the HP 4915A Crystal Impedance Meter and HP 4916A Crystal Impedance/LCR Meter:

Calibration method 3-term calibration (OPEN/SHORT/LOAD)
 (at the measurement terminal to which a device under test (DUT) is connected)

Circuit model of the calibration standards



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Figure 1-1. Circuit model of the calibration standards

■ Parameters:

Table 1-1. Parameters

Standard	Value
OPEN	$G_o = 0 \text{ S}$ $C_o = 0.1 \text{ pF}$
SHORT	$R_o = 1 \mu\Omega$ $L_o = 3 \text{ nH}$
LOAD	$R_o = 50 \Omega$ $L_o = 18.8 \text{ nH}$

For the HP 41902A used with the HP E5100A/B

The following specifications show the performance when the HP 41902A is used with the HP E5100A/B Network Analyzer:

Circuit model of the calibration standards

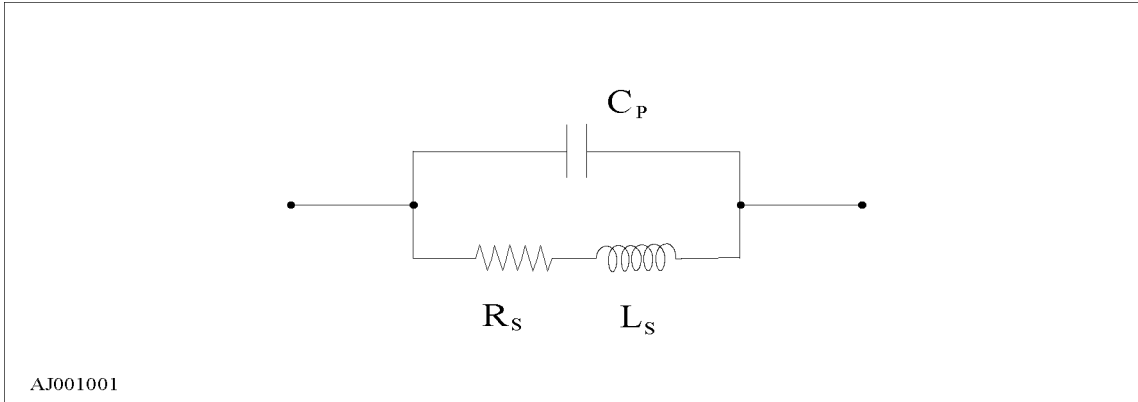


Figure 1-2. Circuit model of the calibration standards

Parameters:

Table 1-2. Parameters

Standard	Value
OPEN	$C_p = 0.1 \text{ pF}$
	$R_s = 1 \text{ T}\Omega$
	$L_s = 0 \text{ nH}$
SHORT	$C_p = 0.1 \text{ pF}$
	$R_s = 1 \text{ }\mu\Omega$
	$L_s = 3.0 \text{ nH}$
LOAD	$C_p = 0.5 \text{ pF}$
	$R_s = 50 \text{ }\Omega$
	$L_s = 20 \text{ nH}$

For the HP 41902A used with the HP 87510A

The following specifications show the performance when the HP 41902A is used with the HP 87510A Gain-Phase Analyzer:

Calibration method 3-term calibration (OPEN/SHORT/LOAD)
(at the measurement terminal to which a device under test (DUT) is connected)

Circuit model of the calibration standards

OPEN Capacitance : C_0

SHORT and LOAD Impedance @ frequency f :

$$R_0 + R_0 \left(\frac{f}{f_C} \right)^2 + j2\pi f L_0$$

Parameters:

Table 1-3. Parameters

Standard	Value
OPEN	$C_0 = 0.1 \text{ pF}$
SHORT	$R_0 = 1 \mu\Omega$
	$L_0 = 3 \text{ nH}$
	$f_C = 5.0 \text{ GHz}$
LOAD	$R_0 = 50 \Omega$
	$L_0 = 18.8 \text{ nH}$
	$f_C = 5.0 \text{ GHz}$

For the HP 41902A Option 010 SMD Attachment adapter

Available Test DeviceSMD Type Crystal Resonator

Available Measurement Configuration

.....Direct Measurement or Measurement with Load Capacitor
(11 pF to 66 pF when only one C_L side is assembled,7 pF to 33 pF when two C_L sides are assembled)

Operating Temperature 0°C to +55°C

Operating Humidity (@40 °C)..... up to 95 % RH

Non-operating Temperature -40°C to +70°C

Altitude<4500 meters (1500 feet)

Dimensions

SMD Attachment Adapter Main Assembly

..... approx. 50 (H) ×50 (W) × 150 (D) mm

Lever Open

..... approx.140 (H) ×50 (W) × 150 (D) mm

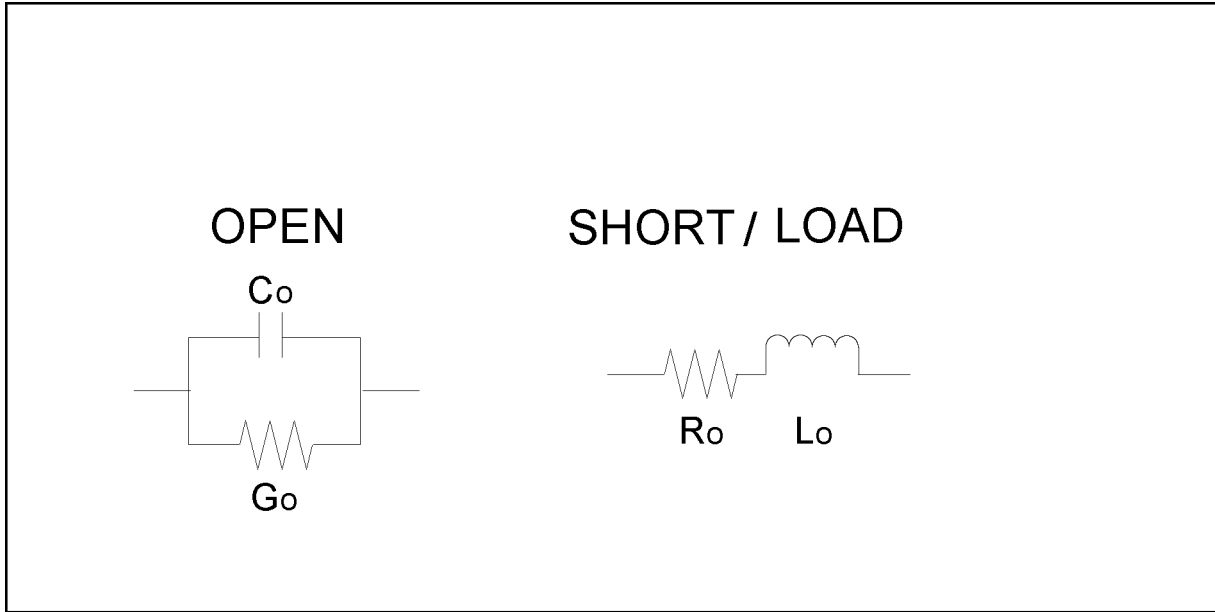
Weight

SMD Attachment Adapter Main Assembly approx. 0.3 kg

For the HP 41902A Option 010 used with the HP E4915A/E4916A

The following specifications show the performance when the HP 41902A Option 010 is used with the HP 4915A Crystal Impedance Meter and HP 4916A Crystal Impedance/LCR Meter:

Calibration method 3-term calibration (OPEN/SHORT/LOAD)
 (at the measurement terminal to which a device under test (DUT) is connected)
Circuit model of the calibration standards



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Figure 1-3. Circuit model of the calibration standards

■ Parameters:

Table 1-4. Parameters

Standard	Value
OPEN	$G_o = 0 \text{ S}$ $C_o = 0.1 \text{ pF}$
SHORT	$R_o = 1 \mu\Omega$ $L_o = 0.1 \text{ nH}$
LOAD	$R_o = 50 \Omega$ $L_o = 3.4 \text{ nH}$

For the HP 41902A Option 010 used with the HP E5100A/B

The following specifications show the performance when the HP 41902A Option 010 is used with the HP E5100A/B Network Analyzer:

- Calibration method** 3-term calibration (OPEN/SHORT/LOAD)
(at the measurement terminal to which a device under test (DUT) is connected)
- Circuit model of the calibration standards**

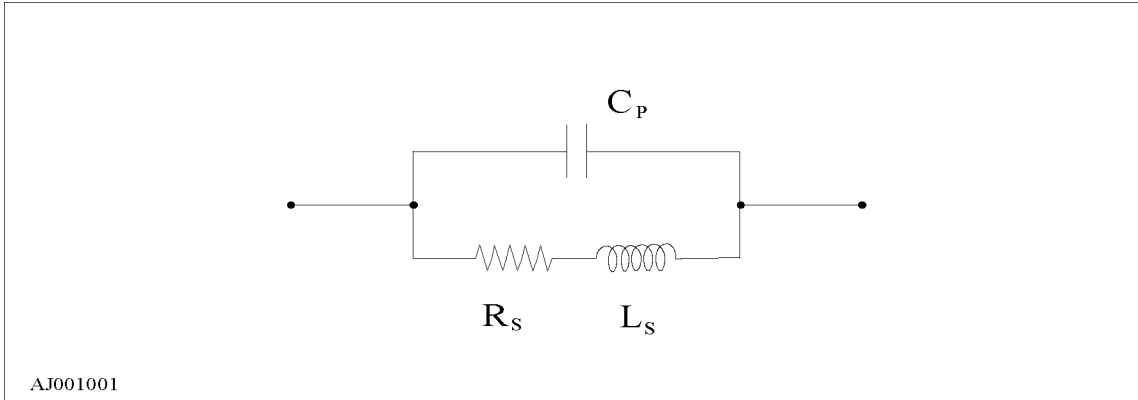


Figure 1-4. Circuit model of the calibration standards

■ Parameters:

Table 1-5. Parameters

Standard	Value
OPEN	$C_p = 0.1 \text{ pF}$
	$R_s = 1 \text{ T}\Omega$
	$L_s = 0 \text{ nH}$
SHORT	$C_p = 0 \text{ pF}$
	$R_s = 1 \text{ }\mu\Omega$
	$L_s = 0.1 \text{ nH}$
LOAD	$C_p = 0.14 \text{ pF}$
	$R_s = 50 \text{ }\Omega$
	$L_p = 3.75 \text{ nH}$

For the HP 41902A Option 010 used with the HP 87510A

The following specifications show the performance when the HP 41902A Option 010 is used with the HP 87510A Gain-Phase Analyzer:

Calibration method 3-term calibration (OPEN/SHORT/LOAD)
(at the measurement terminal to which a device under test (DUT) is connected)

Circuit model of the calibration standards

OPEN Capacitance : C_0

SHORT and LOAD Impedance @ frequency f :

$$R_0 + R_0 \left(\frac{f}{f_C} \right)^2 + j2\pi f L_0$$

Parameters:

Table 1-6. Parameters

Standard	Value
OPEN	$C_0 = 0.1 \text{ pF}$
SHORT	$R_0 = 1 \mu\Omega$
	$L_0 = 0.1 \text{ nH}$
	$f_C = 5.0 \text{ GHz}$
LOAD	$R_0 = 50 \Omega$
	$L_0 = 3.4 \text{ nH}$
	$f_C = 5.0 \text{ GHz}$

Supplemental Performance Characteristics

This section lists supplemental performance characteristics. Supplemental performance characteristics are not specifications, but do provide additional information for the operator. Supplemental performance characteristics are not guaranteed.

For the HP 41902A

Maximum Input Level 500 mW @ Input BNC Connector
(approx. 7 mW @ device under test)

Frequency Range 1 MHz to 180 MHz

Repeatability

Connection to the Shorting Plate $\pm (0.3 \Omega + 0.6 \text{ nH})$

Connection of a leaded Device $\pm (3 \Omega + 3 \text{ nH})$

Connection of a CL-Board $\pm (0.5 \Omega + 1 \text{ nH})$

Fr¹ 1 ppm

Cl¹ $\pm 1 \%$

1 at 40.98MHz Fundamental wave

For the HP 41902A Option 010

Repeatability

Connection to the Shorting Plate	$\pm (0.05 \Omega + 0.1 \text{ nH})$
Fr ¹	0.5 ppm
Cl ¹	$\pm 0.5 \%$

1 at 20MHz Fundamental wave

Options Available for HP 41902A Option 010

The following options are supplied for HP 41902A

- Option 011 Attachment Kit QIAJ-QS06 4-Terminal type
- Option 012 Attachment Kit QIAJ-QS06 2-Terminal type
- Option 013 Attachment Kit QIAJ-QS07 4-Terminal type
- Option 014 Attachment Kit QIAJ-QS07 2-Terminal type
- Option 015 Attachment Kit QIAJ-QS08 4-Terminal type
- Option 016 Attachment Kit QIAJ-QS08 2-Terminal type

Applicable DUT size and contact pin position

Figure 1-5 shows applicable DUT size and contact pin position for option 011 to option 016.

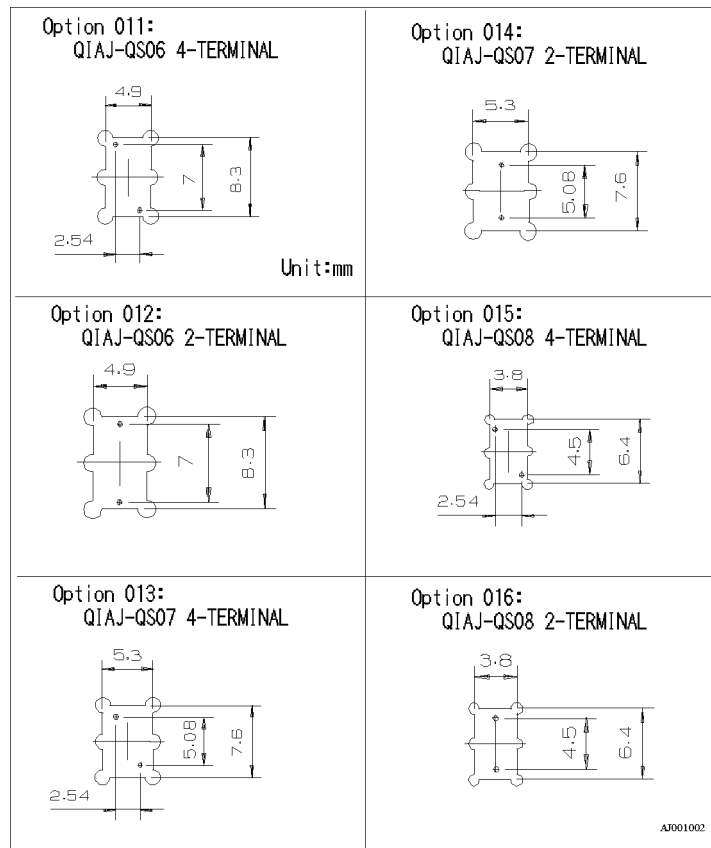


Figure 1-5. Applicable DUT size and contact pin position

Preparation for Use

Introduction

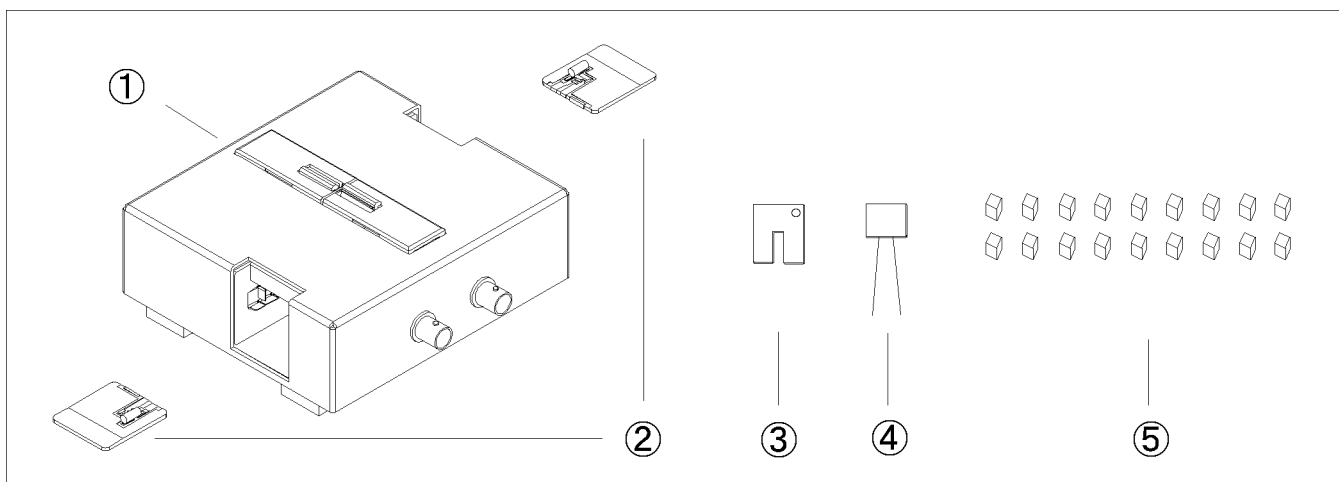
This chapter describes how to prepare the HP 41902A Economy PI-Network Test Fixture and HP 41902A Option 010 to 016 for use. The topics include the following:

- Initial inspection.
- Repackaging the HP 41902A for shipment.

Initial Inspection

The HP 41902A has been carefully inspected electrically and mechanically before being shipped from the factory. It should be in perfect physical condition, no scratches, dents or the like, and it should be in perfect electrical condition. Verify this by carefully performing an incoming inspection to check the fixture 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.

1. Inspect the shipping container for damage. Keep the shipping materials until the incoming inspection is completed.
2. Verify that the shipping container contains everything shown in Figure 2-1 and listed in Table 2-1. If the HP 41902A is ordered with Option 010 and Option 011 to 016, it should also contain the parts shown in Figure 2-2, Figure 2-3 and listed in Table 2-2 to Table 2-8.
3. Inspect the exterior of the HP 41902A for any signs of damage.



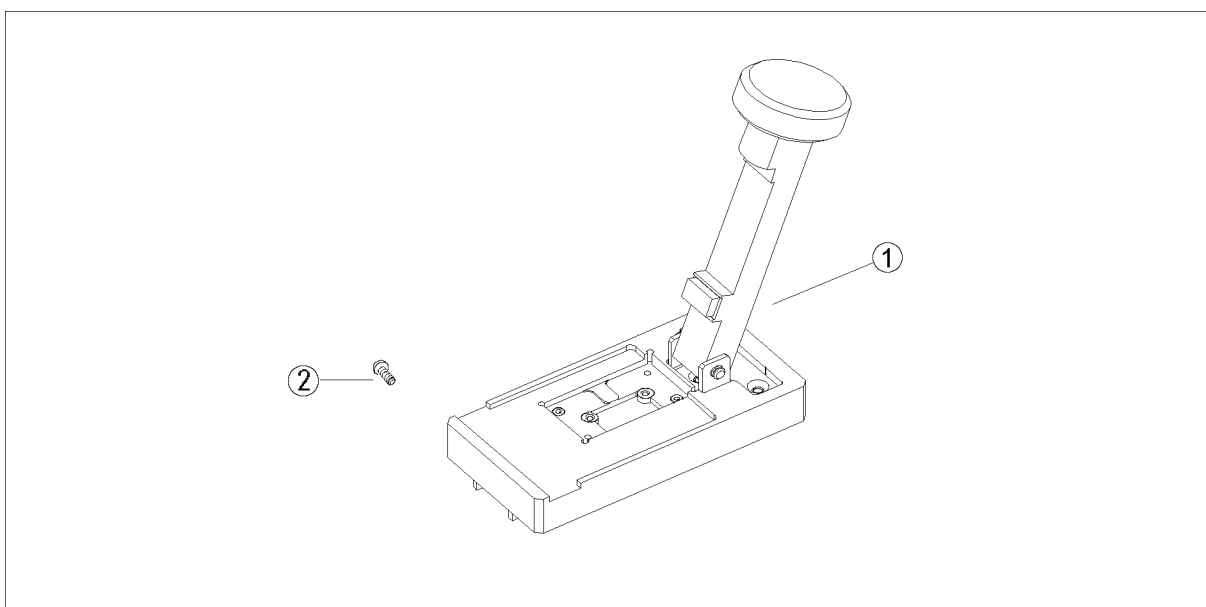
AJ102001

Figure 2-1. HP 41902A Economy PI-Network Test Fixture Product Overview

Table 2-1. HP 41902A Contents

Reference Designator	HP Part Number	Qty.	Description
1	(Not assigned)	1	Economy PI-Network Test Fixture
2	41902-66502	2	CL Adapter Board
3	5000-4226	1	Shorting Plate for Calibration
4	0699-2014	1	50 Ω Resistor for Calibration
5	0160-5942	2	Capacitor, 1 pF
5	0160-5978	2	Capacitor, 2.2 pF
5	0160-5971	2	Capacitor, 4.7 pF
5	0160-5973	2	Capacitor, 6.8 pF
5	0160-5975	2	Capacitor, 10 pF
5	0160-5962	2	Capacitor, 15 pF
5	0160-5961	2	Capacitor, 22 pF
5	0160-5959	2	Capacitor, 33 pF
5	0699-3752	2	Resistor, 0 Ω
-	41902-90000	1	Operation and Service Manual ¹

1 Not shown in the figure.



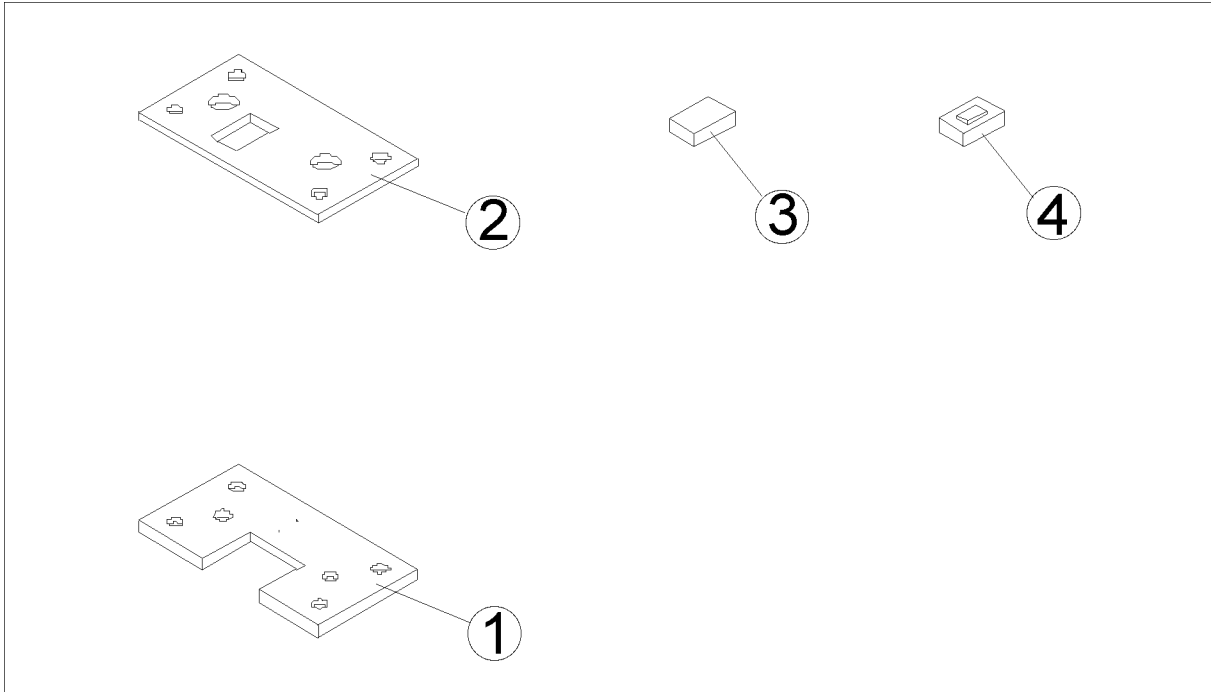
AJ102002

Figure 2-2. Option 010 Product Overview

Table 2-2. Option 010 Contents

Reference Designator	HP Part Number	Qty.	Description
1	(Not assigned)	1	SMD Attachment Adapter
2	0515-2479	2	Screw M2

2.2 Preparation for Use



AJ102003

Figure 2-3. Option 011 to 016 Attachment Kit Product Overview

Table 2-3. Option 011 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66501	1	Contact Board(Refer to Figure 1-5)
2	41902-25051	1	DUT Positioning Plate
3	41901-29003	1	Shorting Plate for Calibration
4	41901-66503	1	50 Ω Resistor for Calibration

Table 2-4. Option 012 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66511	1	Contact Board(Refer to Figure 1-5)
2	41902-25051	1	DUT Positioning Plate
3	41901-29003	1	Shorting Plate for Calibration
4	41901-66503	1	50 Ω Resistor for Calibration

Table 2-5. Option 013 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66521	1	Contact Board(Refer to Figure 1-5)
2	41902-25052	1	DUT Positioning Plate
3	41901-29004	1	Shorting Plate for Calibration
4	41901-66504	1	50 Ω Resistor for Calibration

Table 2-6. Option 014 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66531	1	Contact Board(Refer to Figure 1-5)
2	41902-25052	1	DUT Positioning Plate
3	41901-29004	1	Shorting Plate for Calibration
4	41901-66504	1	50 Ω Resistor for Calibration

Table 2-7. Option 015 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66541	1	Contact Board(Refer to Figure 1-5)
2	41902-25053	1	DUT Positioning Plate
3	41901-29005	1	Shorting Plate for Calibration
4	41901-66505	1	50 Ω Resistor for Calibration

Table 2-8. Option 016 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66551	1	Contact Board(Refer to Figure 1-5)
2	41902-25053	1	DUT Positioning Plate
3	41901-29005	1	Shorting Plate for Calibration
4	41901-66505	1	50 Ω Resistor for Calibration

Repackaging the HP 41902A for Shipment

If shipment to a Hewlett-Packard service center is required, the HP 41902A should be repackaged using the original factory packaging materials.

If this material is not available, comparable packaging materials may be used. Wrap the HP 41902A in heavy paper and pack in anti-static plastic packing material. Use sufficient shock absorbing material on all sides of the HP 41902A to provide a thick, firm cushion and to prevent movement. Seal the shipping container securely and mark it *FRAGILE*.

Operation

Introduction

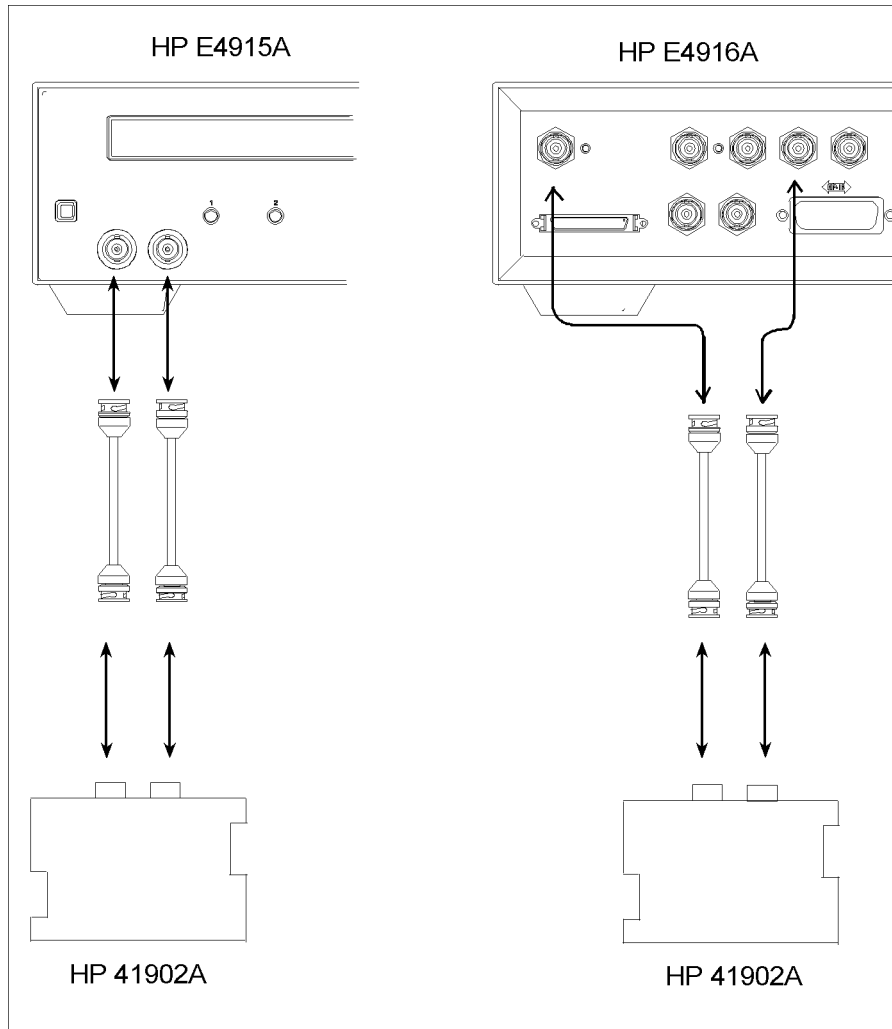
This chapter describes how to use the HP 41902A. The topics include the following:

- Connecting the HP 41902A to the HP 4915A Crystal Impedance Meter and HP 4916A Crystal Impedance/LCR Meter
- Connecting the HP 41902A to HP E5100A/B Network Analyzer, HP 87510A Gain-Phase Analyzer
- Procedures for using HP 41902A
- Connecting the Option 010 to 016 to HP 41902A
- Instruction for cleaning

Connecting the HP 41902A for Use

Connecting to the the HP 4915A Crystal Impedance Meter and HP 4916A Crystal Impedance/LCR Meter

Figure 3-1 shows how to connect the HP 41902A to the the HP 4915A Crystal Impedance Meter and HP 4916A Crystal Impedance/LCR Meter.

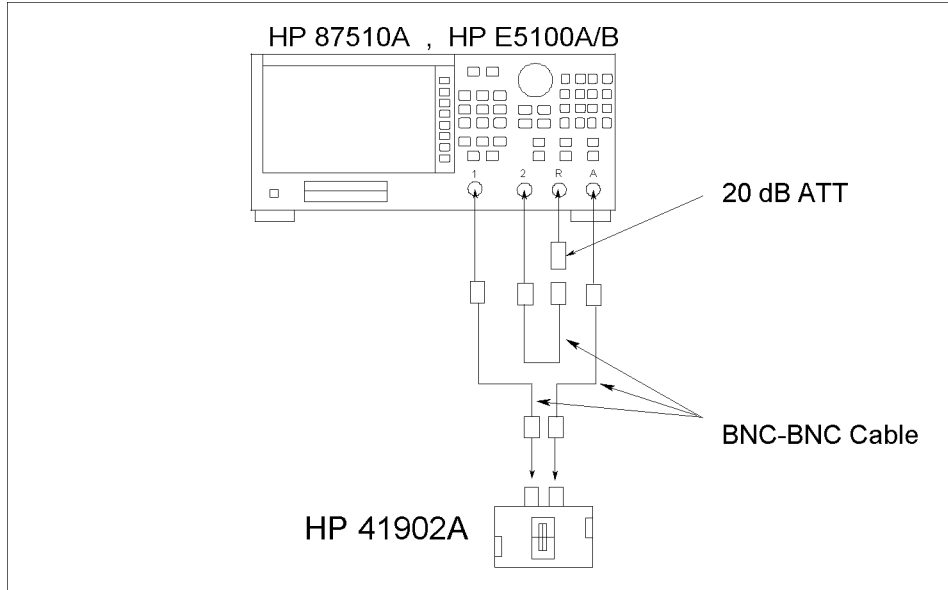


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Figure 3-1. Connecting the HP 41902A to the HP E4915A/E4916A

Connecting to the HP E5100A/B Network Analyzer, HP 87510A Gain-Phase Analyzer

Figure 3-2 shows how to connect the HP 41902A to the HP E5100A/B Network Analyzer, HP 87510A Gain-Phase Analyzer. If the instrument is the HP E5100A with option 600, the connection of the 20dB ATT is not necessary.

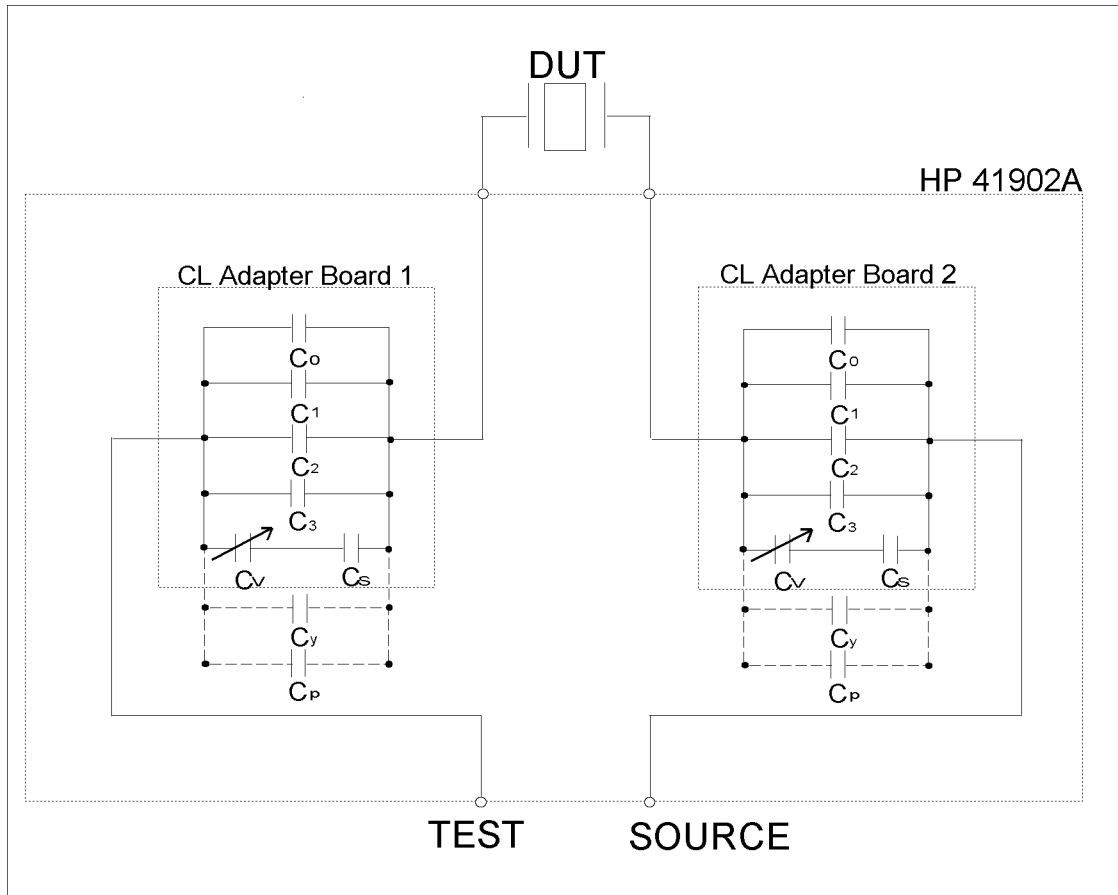


AJ103001

Figure 3-2. Connecting the HP 41902A to the HP E5100A/B, HP 87510A

Procedures for using HP 41902A

Figure 3-3 shows the circuit when C_L sides are assembled to both test and source sides of HP 41902A. Either C_L side or Thru side of the C_L adapter board must be inserted at the source and test sides during measurement.



AJ103003

Figure 3-3. C_L Adapter Board Circuit Diagram

When only one C_L side is assembled

1. Choose the appropriate capacitor chips from Table 3-1 and solder them on the C_L Adapter Board as shown in Figure 3-4 to form the required load capacitance (C_L). The C_L value is calculated, considering C_p (capacitance which is parallel to C_L adapter board, C_y (stray capacitance between C_L board and measurement terminal), in addition to the capacitances soldered on the C_L adapter board as shown in Figure 3-3. The values of both C_p and C_y are separately approximately 5pF.
2. Connect 41902A to measuring instrument
3. Set the C_L side of C_L adapter board with soldered capacitors to either test or source side of HP 41902A and set the Thru side of the other C_L adapter board to the other side of HP 41902A.

If standard crystal resonator with known Fl is used to adjust the load capacitance

- 4a. Connect the standard crystal resonator to the measurement terminal of HP 41902A.
- 5a. Adjust the trimmer capacitor(C_v) so that the measured Fl or Fr become the desiring frequency.
- 6a. Replace the standard crystal resonator with resonator under test and measure the resonator under test.

If the capacitance is actually measured to adjust the load capacitance

- 4b. Connect the short bar to the measurement terminal of HP 41902A.
- 5b. Measure the load capacitance. Adjust the trimmer capacitor(C_v) in order to get the load capacitance 5pF smaller than the required value.¹
- 6b. Replace the short bar with resonator under test and measure the resonator under test.

¹ C_y cannot be detected when short bar is connected. So, the load capacitance displayed in the measuring instrument should be 5pF smaller than the load capacitance when the resonator under test is connected.

When C_L sides are assembled to both test and source sides

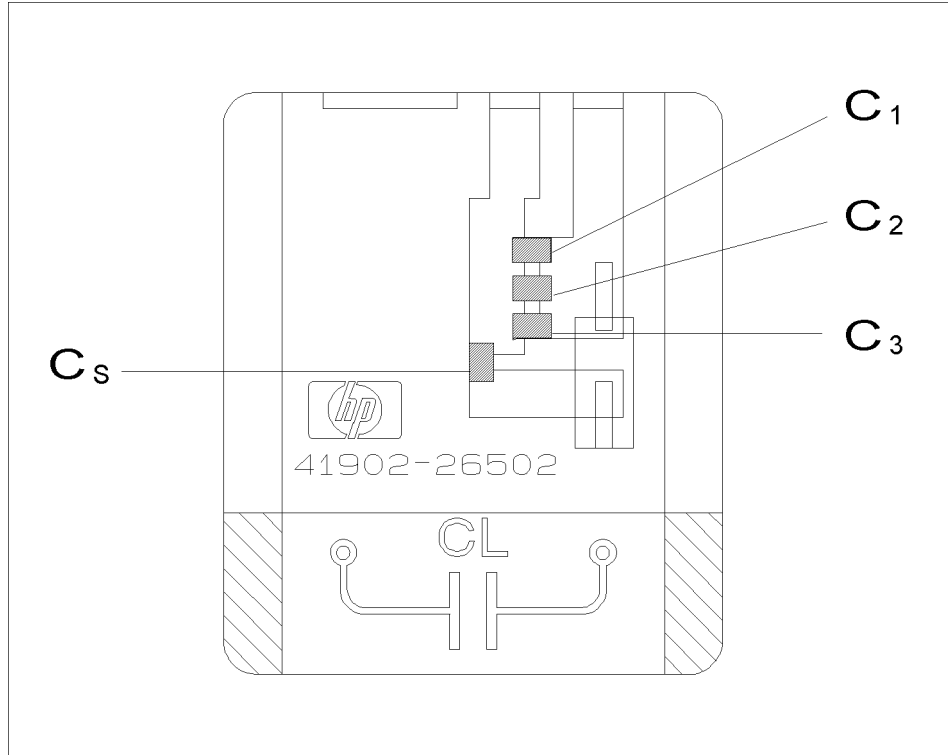
1. When two C_L sides are assembled, the capacitances of both the test and source sides are seperately double of the total load capacitance. Combine the chip capacitors from Table 3-1 and solder them on the C_L Adapter Board to form the required load capacitance(C_L).
2. Connect 41902A to measuring instrument

If standard crystal resonator with known Fl is used to adjust the load capacitance

- 3c. Insert the C_L adapter boards to test and source sides of the C_L adapter boards. Then connect the standard crystal resonator to the measurement terminal.
- 4c. Adjust the trimmer capacitors(C_v) of C_L adapter boards so that the measured Fl or Fr become the desiring frequency.
- 5c. Replace the standard crystal resonator with resonator under test and measure the resonator under test.

If the capacitance is actually measured to adjust the load capacitance

- 3d. Set the C_L side of C_L adapter board 1 to the source side and Thru side of C_L adapter board 2 to the test side of the HP 41902A. Then connect the short bar to the measurement terminal.
- 4d. Measure the capacitance. Adjust the trimmer capacitor(C_v) in order to get the measured capacitance which is 5pF smaller than the double of the required total load capacitance.
- 5d. Set Thru side of C_L adapter board 1 to source side and C_L side of C_L adapter board 2 to test side of HP 41902A.
- 6d. Refer to procedures 4d.
- 7d. Set C_L side of C_L adapter board 1 to source side. Then replace the short bar with resonator under test and measure the resonator under test.



AJ103004

Figure 3-4. C₁, C₂, C₃, C_s Location

Table 3-1. Example of Capacitance Combination

C_L^1 [pF]	C_t^2 [pF]	C_1 [pF]	C_2 [pF]	C_3 [pF]	C_s [pF]	C_{Lmin} [pF]	C_{Lmax} [pF]
76	66	22	6.8	33	short	73.0	76.9
75	65	22	6.8	33	short	73.0	76.9
74	64	22	4.7	33	short	70.9	74.8
73	63	22	4.7	33	short	70.9	74.8
72	62	15	10	33	short	69.2	74.1
71	61	22	2.2	33	short	68.4	72.3
70	60	22	1	33	short	67.2	71.1
69	59	22	open	33	short	66.2	70.1
68	58	15	6.8	33	short	66.0	70.1
67	57	10	10	33	short	64.2	68.1
66	56	15	4.7	33	short	63.9	67.8
65	55	15	4.7	33	short	63.9	67.8
64	54	10	6.8	33	short	61.2	64.9
63	53	15	1	33	short	60.2	64.1
62	52	15	1	33	short	60.2	64.1
61	51	10	4.7	33	short	58.9	62.8
60	50	10	4.7	33	short	58.9	62.8
59	49	10	2.2	33	short	56.4	60.3
58	48	6.8	4.7	33	short	55.7	59.6
57	47	6.8	4.7	33	22	55.7	58.8
56	46	4.7	4.7	33	22	53.6	56.7
55	45	6.8	2.2	33	22	53.2	56.3
54	44	6.8	1	33	22	52.0	55.1
53	43	6.8	open	33	22	51.0	54.1
52	42	4.7	1	33	22	49.9	53.0
51	41	4.7	1	33	22	49.9	53.0
50	40	2.2	2.2	33	22	48.4	51.3
49	39	2.2	1	33	15	47.4	50.2
48	38	2.2	open	33	15	46.4	49.2
47	37	1	open	33	15	45.2	48.0
46	36	open	open	33	15	44.2	47.0
45	35	15	10	6.8	short	43.0	46.9

Table 3-1. Example of Capacitance Combination (continued)

C_L^1 [pF]	C_t^2 [pF]	C_1 [pF]	C_2 [pF]	C_3 [pF]	C_s [pF]	C_{Lmin} [pF]	C_{Lmax} [pF]
44	34	15	10	2.2	short	42.2	46.1
43	33	22	6.8	1	short	41.0	44.9
42	32	22	6.8	open	short	40.0	43.9
41	31	22	4.7	1	short	38.9	42.8
40	30	22	4.7	open	short	37.9	41.8
39	29	15	10	open	short	36.2	41.1
38	28	22	2.2	open	short	35.4	39.3
37	27	22	1	open	short	34.2	38.1
36	26	22	open	open	short	33.2	37.1
35	25	15	6.8	open	short	33.0	37.1
34	24	10	10	open	short	31.2	35.1
33	33	15	4.7	open	short	30.9	34.8
32	22	15	4.7	open	short	30.9	34.8
31	21	10	6.8	open	short	28.2	31.9
30	20	15	1	open	short	27.2	31.1
29	19	15	1	open	short	27.2	31.1
28	18	10	4.7	open	short	25.9	29.8
27	17	10	4.7	open	short	25.9	29.8
26	16	10	2.2	open	short	23.4	27.3
25	15	6.8	4.7	open	short	22.7	26.6
24	14	6.8	4.7	open	22	22.7	25.8
23	13	4.7	4.7	open	22	20.6	23.7
22	12	6.8	2.2	open	22	20.2	23.3
21	11	6.8	1	open	22	19.0	22.1
20	10	6.8	open	open	22	18.0	21.1
19	9	4.7	1	open	22	16.9	20.0
18	8	4.7	1	open	22	16.9	20.0
17	7	2.2	2.2	open	22	15.4	18.3
16	6	2.2	1	open	15	14.4	17.2
15	5	2.2	open	open	15	13.4	16.2
14	4	1	open	open	15	12.2	15.0
13	3	open	open	open	15	11.2	14.0

$${}^1C_L:C_t + C_p + C_y$$
$${}^2C_t:C_1 + C_2 + C_3 + C_s$$

Connecting the HP 41902A Option 010 to 016 to HP 41902A

1. Install the SMD attachment adapter to HP 41902A

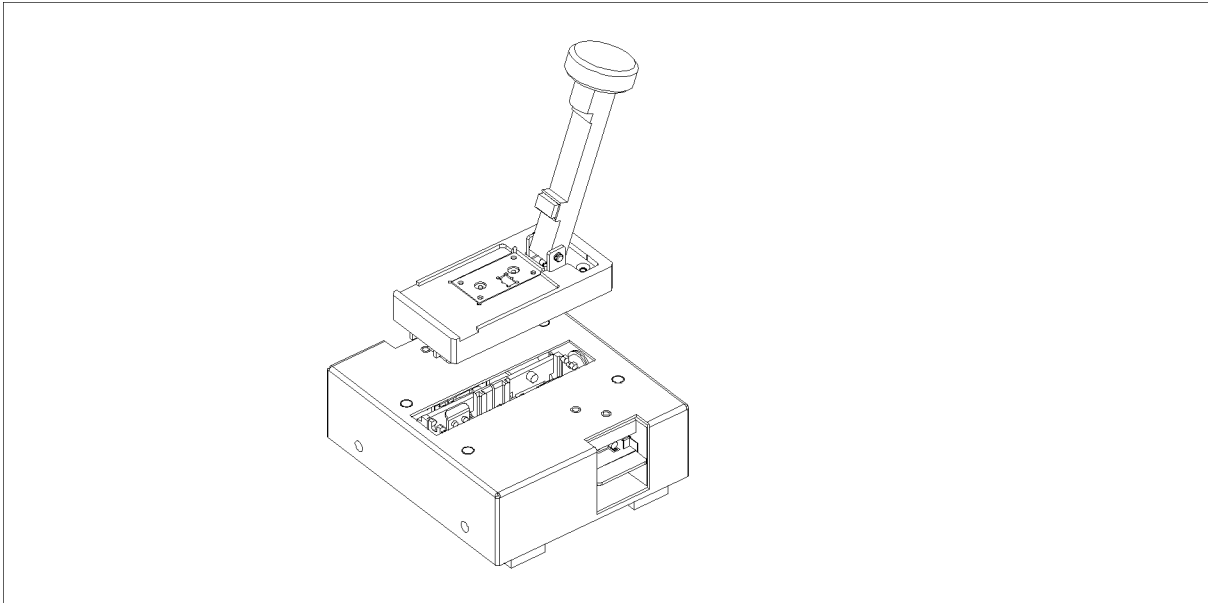
Remove the sockets used for leaded crystal resonator of HP 41902A. Then install the SMD attachment adapter to HP 41902A. The lever must be positioned with the same side of the BNC. Refer to Figure 3-5.

2. Install the contact board and DUT positioning plate

Raise the lever, install contact board (Option 011 to 016) to adapter with M2 screws and washers. Then install positioning plate (Option 011 to 016) with M2 screw. Use contact board and DUT positioning plate assigned for the type of device under test. Refer to Figure 3-6.

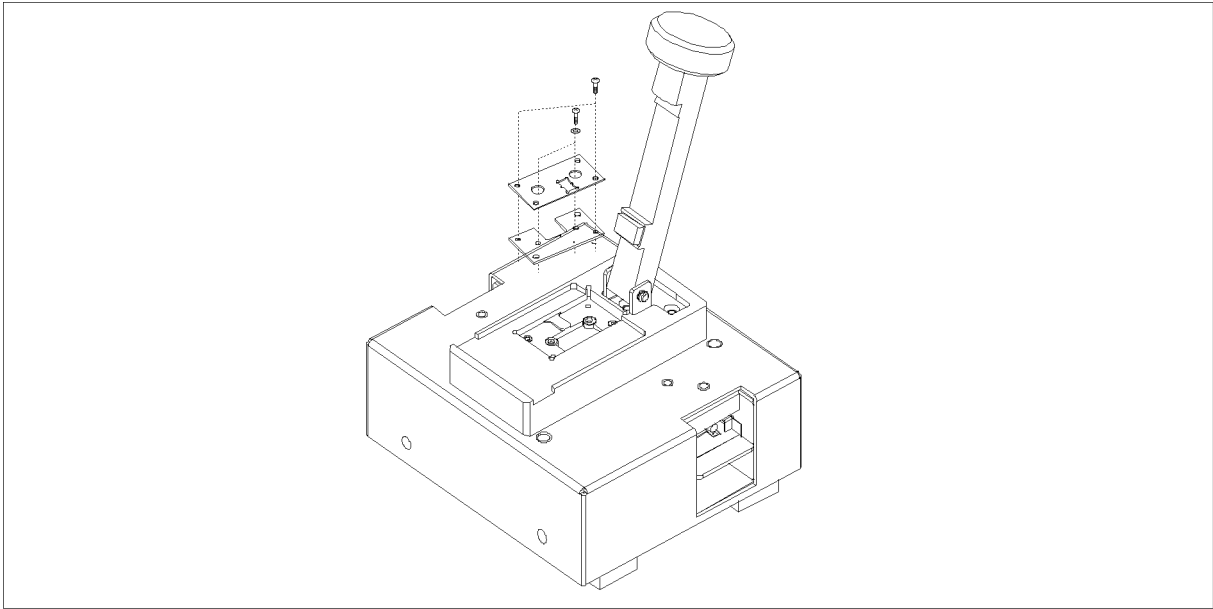
3. Calibration

Perform the 3-term calibration in the same way when measuring leaded crystal resonator, referring to procedures for using HP 41902A. Then, measure the resonator under test when the lever is down. Use the attached short plate and 50 ohm resistor board for the 3-term calibration. Refer to Figure 3-7.



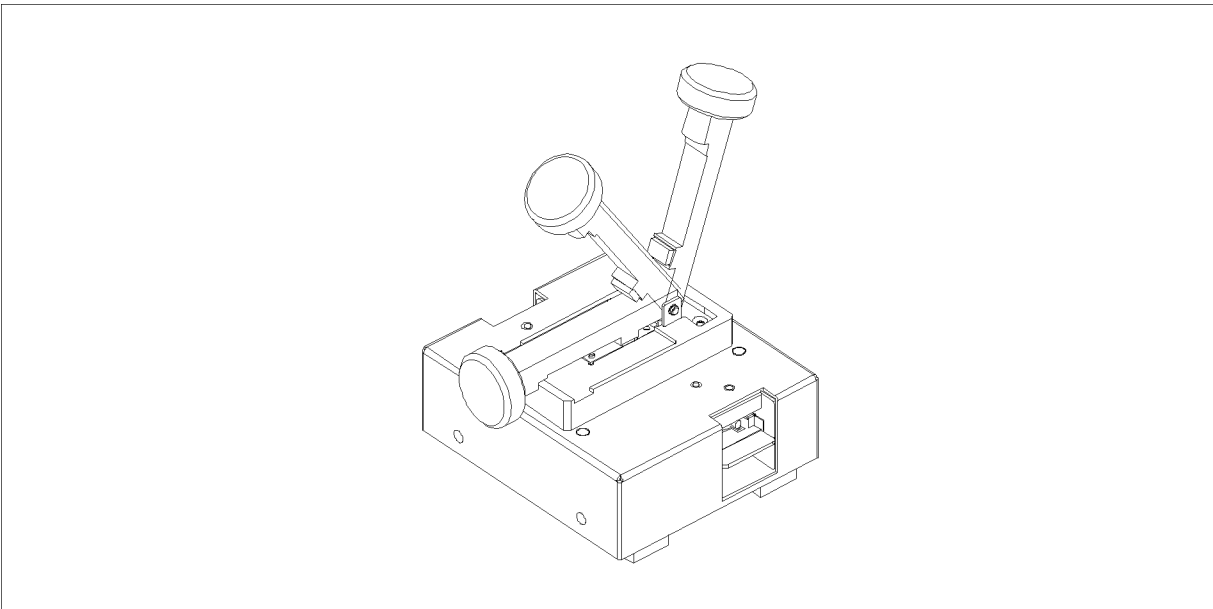
AJ103005

Figure 3-5. Install adapter to 41902A.



AJ103006

Figure 3-6. Install contact board and DUT positioning board to 41902A.



AJ103007

Figure 3-7. Measure when the lever is down.

Instruction for Cleaning

For cleaning, wipe with soft cloth that is soaked with water and wrung tightly without undue pressure.

Service

Introduction

This chapter covers the replaceable parts information for the HP 41902A and Option 010.

HP 41902A Replaceable Parts

Table 4-1 lists the replaceable parts for the HP 41902A. The parts listed can be ordered from your nearest Hewlett-Packard Office. Ordering information must include the HP part number and the quantity required.

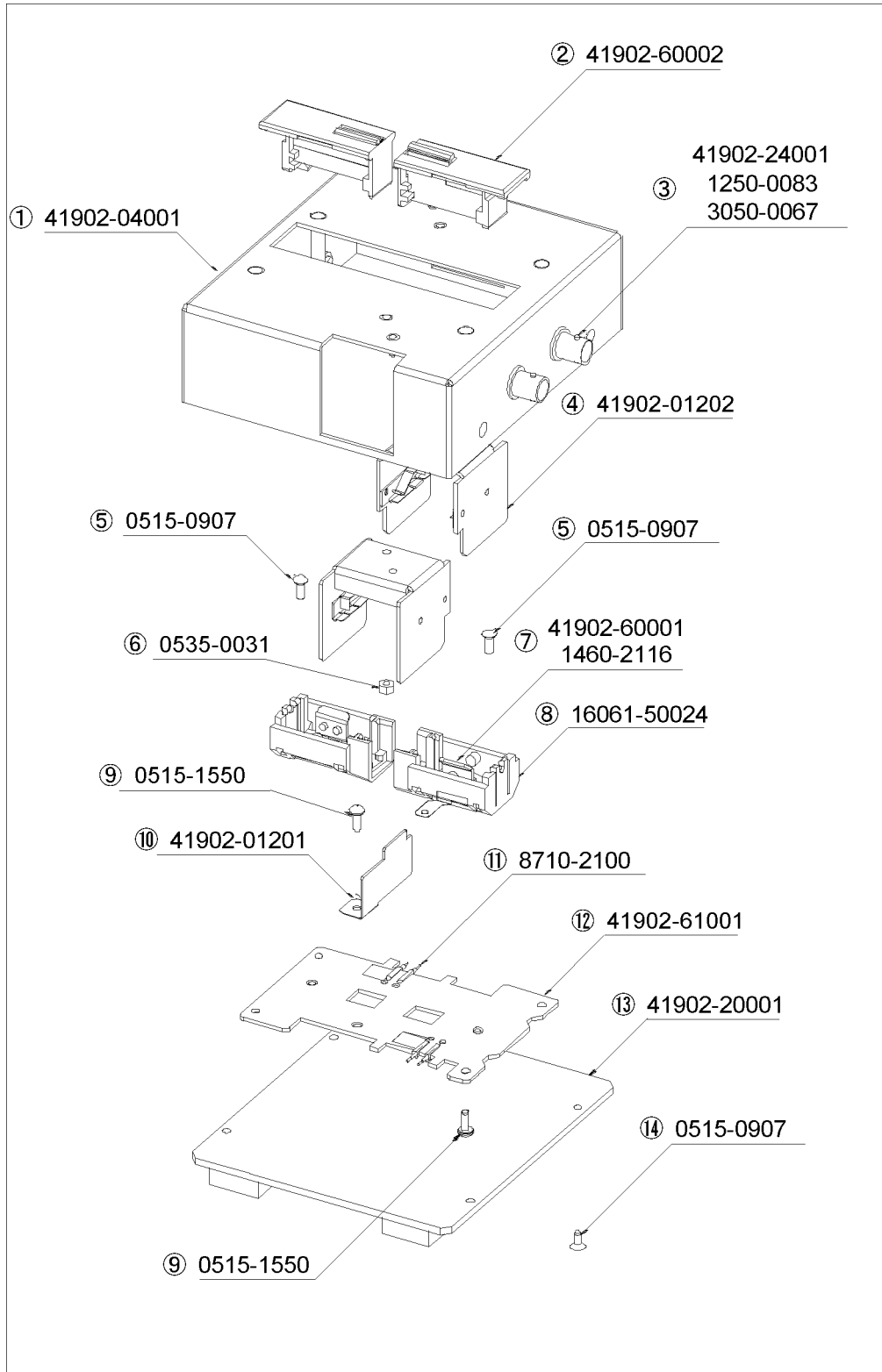


Figure 4-1. Replaceable Parts for HP 41902A

Table 4-1. Replaceable Parts for HP 41902A

Reference Designator	HP Part Number	Qty.	Description
1	41902-04001	1	COVER
2	41902-60002	2	SOCKET ASSY
3	42090-24001	2	NUT
	1250-0083	2	BNC CONNECTOR
	3050-0067	4	WSHR-FL MTL C
4	41902-01202	2	ANGLE
5	0515-0907	2	M3 SCREW
6	0535-0031	4	NUT
7	41902-60001	2	CONTACT ASSY
	1460-2116	2	SPRING
8	16061-50024	2	SOCKET
9	0515-1550	5	SCREW
10	41902-01201	1	ANGLE
11	8710-2100	4	CONTACT PIN
12	41902-61001	1	PI CIRCUIT ASSY
13	41902-20001	1	BLOCK
14	0515-0907	4	SCREW
-	0160-5942	2	CAPACITOR , 1pF ¹
-	0160-5959	2	CAPACITOR ,33pF ¹
-	0160-5961	2	CAPACITOR ,22pF ¹
-	0160-5962	2	CAPACITOR ,15pF ¹
-	0160-5971	2	CAPACITOR ,4.7pF ¹
-	0160-5973	2	CAPACITOR ,6.8pF ¹
-	0160-5975	2	CAPACITOR ,10pF ¹
-	0160-5978	2	CAPACITOR ,2.2pF ¹
-	0699-2014	1	RESISTOR ,50 Ω ¹
-	0699-3752	2	RESISTOR ,0 Ω ¹
-	41902-66502	2	CL ADAPTER BOARD ¹
-	5080-3135	1	LABEL ¹
-	9222-0222	11	P-BAG ¹

1 Not shown in the figure.

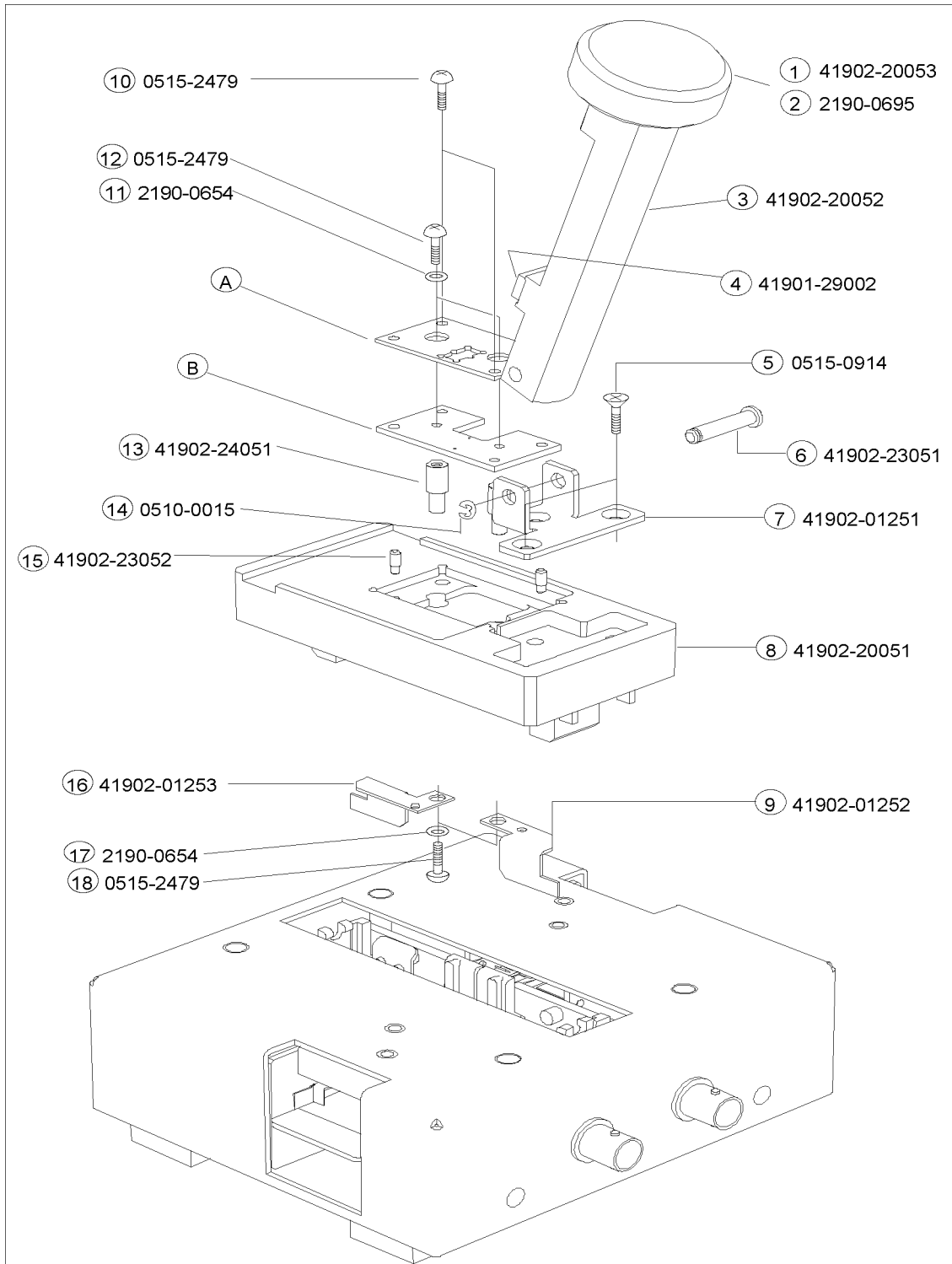
Note



Repair of the HP 41902A Economy PI-Network Test Fixture is limited to the replacement of the parts listed in Table 4-1.

HP 41902A Option 010 Replaceable Parts

Table 4-2 lists the replaceable parts for the HP 41902A Option 010.



AJ104002

Figure 4-2. Replaceable Parts for HP 41902A Option 010

Table 4-2. Replaceable Parts HP 41902A Option 010

Reference Designator	HP Part Number	Qty.	Description
1	41902-20053	1	BLOCK
2	2190-0695	1	M6 WASHER
3	41902-20052	1	LEVER
4	41090-29002	1	BUSHING
5	0515-0914	3	M3 SCREW
6	41902-23051	1	SHAFT
7	41902-01251	1	ANGLE
8	41902-20051	1	BLOCK
9	41902-01254	1	ANGLE
10	0515-2479	2	M2 SCREW
11	2190-0654	2	M2 WASHER
12	0515-2479	2	M2 SCREW
13	41902-24051	2	STANDOFF
14	0510-0015	1	E-RING
15	41902-23052	2	PIN
16	41902-01253	1	ANGLE
17	2190-0654	2	M2 WASHER
18	0515-2479	2	M2 SCREW

Table 4-3. Replaceable Parts for HP 41902A Option 011 to 016

Reference Designator	Description
A	DUT POSITIONING PLATE(REFER TO Table 2-3 to Table 2-8)
B	CONTACT BOARD(REFER TO Table 2-3 to Table 2-8)

Note

Repair of the HP 41902A Option 010 to 016 SMD Attachment Adapter is limited to the replacement of the parts listed in Table 4-2 and Table 4-3.



