

HP 41901A SMD Type PI-Network Test Fixture
Operation and Service Manual



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

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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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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 41901A SMD Type PI-Network Test Fixture efficiently and confidently. This manual contains the following:

- The specifications of the HP 41901A (see this chapter).
- Installing the HP 41901A (see chapter 2).
- Operating the HP 41901A (see chapter 3).
- Ordering replaceable parts for the HP 41901A (see chapter 4).

Specifications

This section lists the complete HP 41901A specifications. These specifications are the performance standards and limits against which the HP 41901A is tested. When shipped from the factory, the HP 41901A meets the following specifications:

For the HP 41901A

Available Test Device	SMD Type Crystal Resonator
Available Measurement Configuration	Direct Measurement or Measurement with Load Capacitor (3 pF to 33 pF)
Operating Temperature	0°C to +55°C
Operating Humidity (@wet bulb temperature <40°C).....	up to 95 % RH
Non-operating Temperature	-40°C to +70°C
Non-operating Humidity (@wet bulb temperature <65°C).....	up to 90 % RH
Altitude	<4500 meters (15000 feet)
Dimensions	
SMD Type PI-Network Test Fixture Main Assembly	approx. 60 (H) ×110 (W) × 60 (D) mm
Weight	
SMD Type PI-Network Test Fixture Main Assembly	approx. 0.3 kg

For the HP 41901A used with the HP 87510A

The following specifications show the performance when the HP 41901A 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 1-1. 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	$R_0 = 50 \Omega$
	$L_0 = 3.4 \text{ nH}$
	$f_C = 5.0 \text{ GHz}$

For the HP 41901A used with the HP E5100A/B

The following specifications show the performance when the HP 41901A is used with the HP E5100A/B Network Analyzer:

Circuit model of the calibration standards

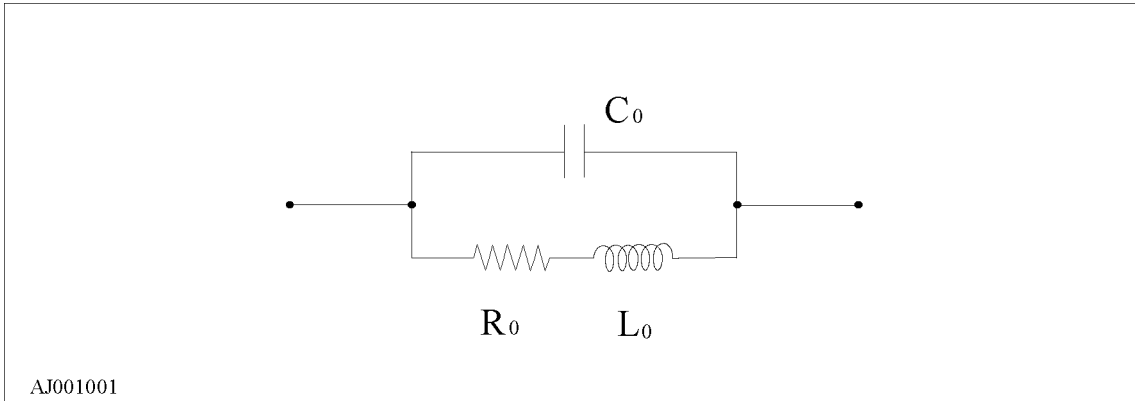


Figure 1-1. Circuit model of the calibration standards

Parameters:

Table 1-2. Parameters

Standard	Value
OPEN	$C_0 = 0.1 \text{ pF}$
	$R_0 = 1 \text{ T}\Omega$
	$L_0 = 0 \text{ nH}$
SHORT	$C_0 = 0 \text{ pF}$
	$R_0 = 1 \text{ }\mu\Omega$
	$L_0 = 0.1 \text{ nH}$
LOAD	$C_0 = 0.14 \text{ pF}$
	$R_0 = 50 \text{ }\Omega$
	$L_0 = 3.75 \text{ nH}$

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 41901A

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

Frequency Range 1 MHz to 300 MHz

Repeatability

Connection of the Shorting Plate $\pm (0.05 \text{ }\Omega + 0.1 \text{ nH})$

Connection of C_L Adapter Board $\pm (0.05 \text{ }\Omega + 0.1 \text{ nH} // 0.02 \text{ pF})$

Options Available

The following options are supplied for HP 41901A

- Option 010 Attachment Kit QIAJ-QS06 4-Terminal type (fixed)
- Option 020 Attachment Kit QIAJ-QS06 2-Terminal type (fixed)
- Option 030 Attachment Kit QIAJ-QS07 4-Terminal type (fixed)
- Option 040 Attachment Kit QIAJ-QS07 2-Terminal type (fixed)
- Option 050 Attachment Kit QIAJ-QS08 4-Terminal type (fixed)
- Option 060 Attachment Kit QIAJ-QS08 2-Terminal type (fixed)

- Option 011 Attachment Kit QIAJ-QS06 4-Terminal type (variable)
- Option 021 Attachment Kit QIAJ-QS06 4-Terminal type (variable)
- Option 031 Attachment Kit QIAJ-QS06 4-Terminal type (variable)
- Option 041 Attachment Kit QIAJ-QS06 4-Terminal type (variable)
- Option 051 Attachment Kit QIAJ-QS06 4-Terminal type (variable)
- Option 061 Attachment Kit QIAJ-QS06 4-Terminal type (variable)

Applicable DUT size and contact pin position

Figure 1-2 shows applicable DUT size and contact pin position for option 001 ~ option 006.

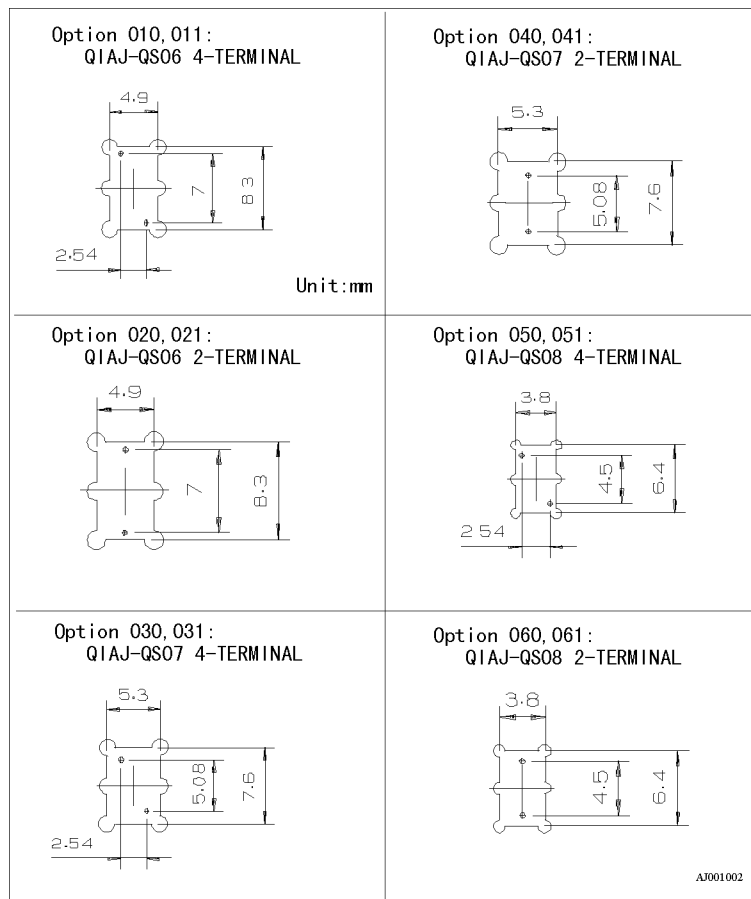


Figure 1-2. Applicable DUT size and contact pin position

The dimension of HP 41901A main block

Figure 1-3 shows the dimension of HP 41901A main block.

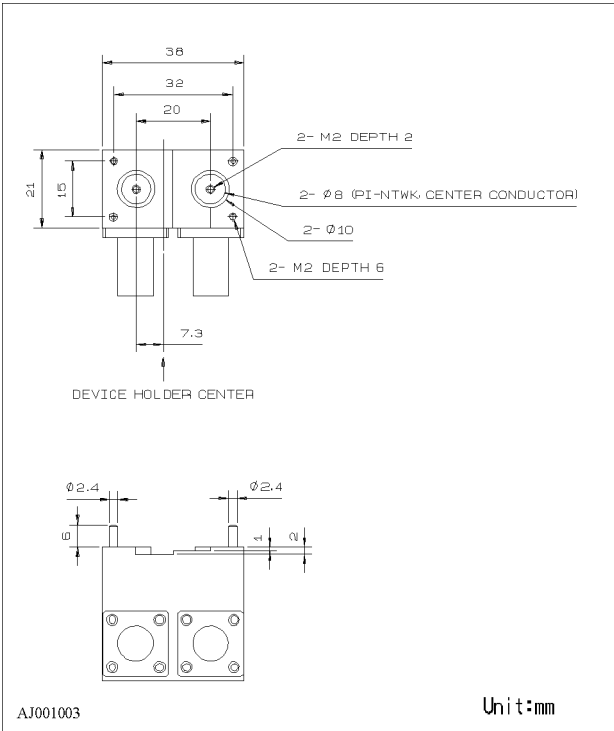


Figure 1-3. The dimension of HP 41901A main block

Preparation for Use

Introduction

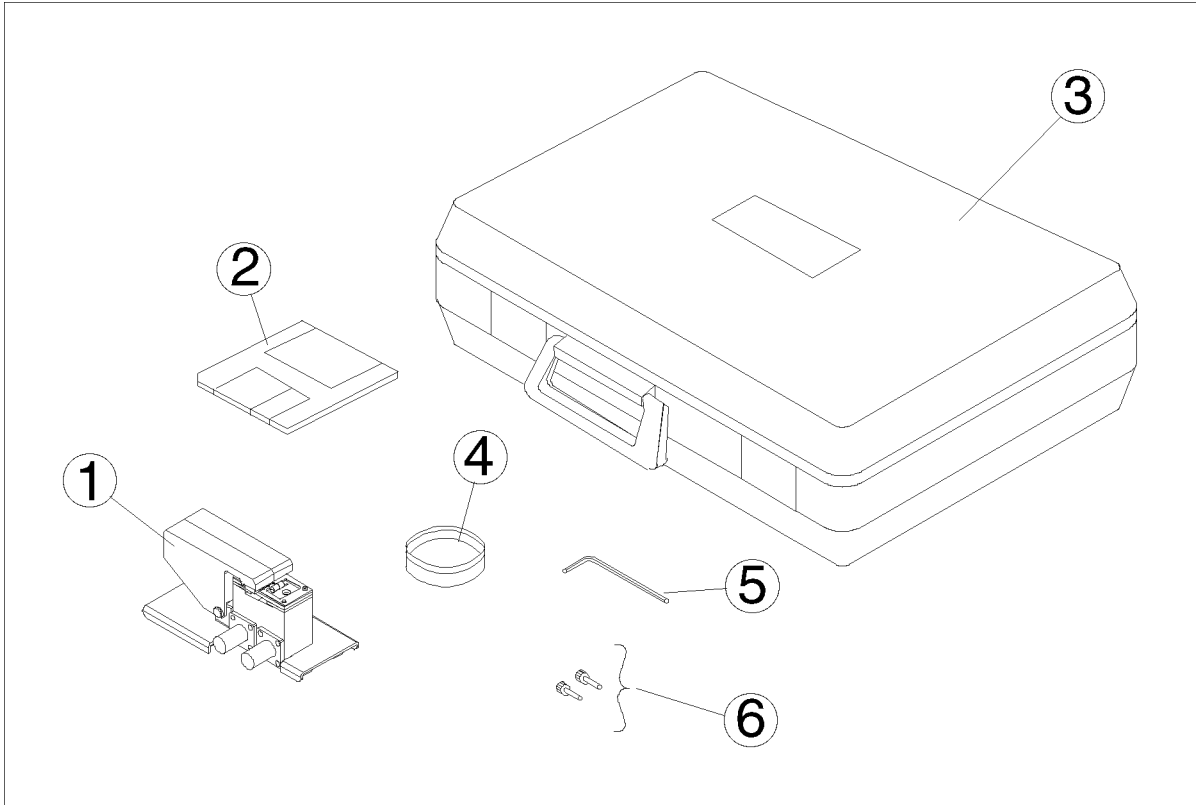
This chapter describes how to prepare the HP 41901A SMD Type PI-Network Test Fixture for use. The topics include the following:

- Initial inspection.
- Repackaging the HP 41901A for shipment.

Initial Inspection

The HP 41901A 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 41901A is ordered with Option 001 ~ 006, it should also contain the parts shown in Figure 2-3 and listed in Table 2-8 ~ Table 2-14.
3. Inspect the exterior of the HP 41901A for any signs of damage.



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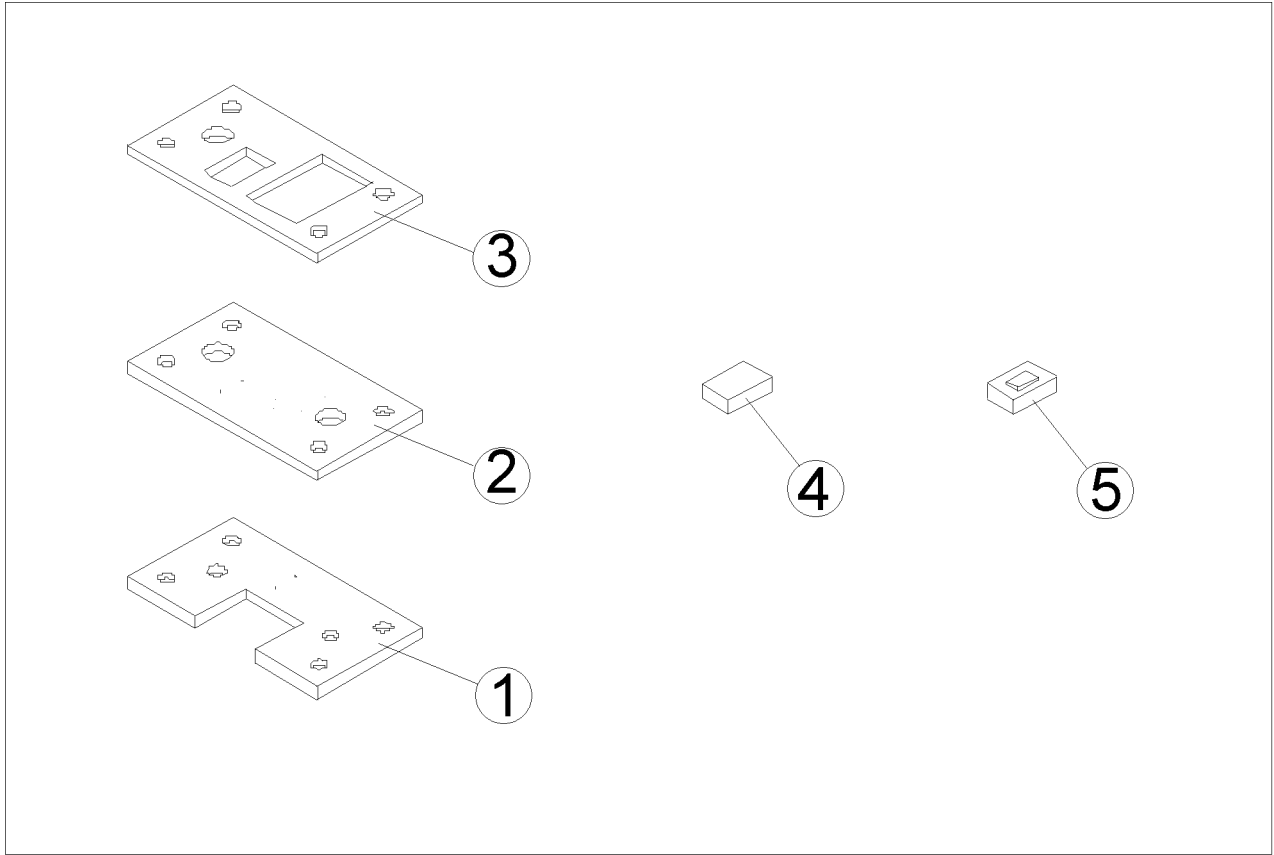
Figure 2-1. HP 41901A SMD Type PI-Network Test Fixture Product Overview

Table 2-1. HP 41901A Contents

Reference Designator	HP Part Number	Qty.	Description
1	(Not assigned)	1	SMD Type PI-Network Test Fixture
2	41901-87001	1	Sample Program Disk
3	41901-60001	1	Carrying Case
4	1540-0622	1	Plastic Case
5	8710-0909	1	Wrench
6	0515-1046	2	Screw M2
-	41901-90010	1	Operation and Service Manual ¹

¹ Not shown in the figure.

2.2 Preparation for Use



AJ002003

Figure 2-2. Option 010,020,030,040,050,060 Attachment Kit Product Overview

Table 2-2. Option 010 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66501	1	Contact Board
2	41901-66001	1	C _L Adapter Board Kit
		1	3.0pF Fixed CL Board
		1	3.3pF Fixed CL Board
		1	3.6pF Fixed CL Board
		1	4.0pF Fixed CL Board
		1	4.3pF Fixed CL Board
		1	4.6pF Fixed CL Board
2	41901-66002	1	C _L Adapter Board Kit
		1	5.0pF Fixed CL Board
		1	5.5pF Fixed CL Board
		1	6.0pF Fixed CL Board
		1	7.0pF Fixed CL Board
2	41901-66003	1	C _L Adapter Board Kit
		1	8.0pF Fixed CL Board
		1	9.0pF Fixed CL Board
		1	10.0pF Fixed CL Board
		1	11.0pF Fixed CL Board
2	41901-66004	1	C _L Adapter Board Kit
		1	12.0pF Fixed CL Board
		1	13.0pF Fixed CL Board
		1	14.0pF Fixed CL Board
		1	16.0pF Fixed CL Board
2	41901-66005	1	C _L Adapter Board Kit
		1	18.0pF Fixed CL Board
		1	20.0pF Fixed CL Board
		1	24.0pF Fixed CL Board
		1	32.0pF Fixed CL Board
3	41901-25002	1	DUT Positioning Plate
4	41901-29003	1	Shorting Plate for Calibration
5	41901-66503	1	50 Ω Resistor Board for Calibration
-	41900-87101	1	Label ¹

¹ Not shown in the figure.

Table 2-3. Option 020 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66501	1	Contact Board
2	41901-66011	1	C _L Adapter Board Kit
		1	3.0pF Fixed CL Board
		1	3.3pF Fixed CL Board
		1	3.6pF Fixed CL Board
		1	4.0pF Fixed CL Board
		1	4.3pF Fixed CL Board
		1	4.6pF Fixed CL Board
2	41901-66012	1	C _L Adapter Board Kit
		1	5.0pF Fixed CL Board
		1	5.5pF Fixed CL Board
		1	6.0pF Fixed CL Board
		1	7.0pF Fixed CL Board
2	41901-66013	1	C _L Adapter Board Kit
		1	8.0pF Fixed CL Board
		1	9.0pF Fixed CL Board
		1	10.0pF Fixed CL Board
		1	11.0pF Fixed CL Board
2	41901-66014	1	C _L Adapter Board Kit
		1	12.0pF Fixed CL Board
		1	13.0pF Fixed CL Board
		1	14.0pF Fixed CL Board
		1	16.0pF Fixed CL Board
2	41901-66015	1	C _L Adapter Board Kit
		1	18.0pF Fixed CL Board
		1	20.0pF Fixed CL Board
		1	24.0pF Fixed CL Board
		1	32.0pF Fixed CL Board
3	41901-25002	1	DUT Positioning Plate
4	41901-29003	1	Shorting Plate for Calibration
5	41901-66503	1	50 Ω Resistor Board for Calibration
-	41900-87101	1	Label ¹

¹ Not shown in the figure.

Table 2-4. Option 030 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66501	1	Contact Board
2	41901-66021	1	C _L Adapter Board Kit
		1	3.0pF Fixed CL Board
		1	3.3pF Fixed CL Board
		1	3.6pF Fixed CL Board
		1	4.0pF Fixed CL Board
		1	4.3pF Fixed CL Board
		1	4.6pF Fixed CL Board
2	41901-66022	1	C _L Adapter Board Kit
		1	5.0pF Fixed CL Board
		1	5.5pF Fixed CL Board
		1	6.0pF Fixed CL Board
		1	7.0pF Fixed CL Board
2	41901-66023	1	C _L Adapter Board Kit
		1	8.0pF Fixed CL Board
		1	9.0pF Fixed CL Board
		1	10.0pF Fixed CL Board
		1	11.0pF Fixed CL Board
2	41901-66024	1	C _L Adapter Board Kit
		1	12.0pF Fixed CL Board
		1	13.0pF Fixed CL Board
		1	14.0pF Fixed CL Board
		1	16.0pF Fixed CL Board
2	41901-66025	1	C _L Adapter Board Kit
		1	18.0pF Fixed CL Board
		1	20.0pF Fixed CL Board
		1	24.0pF Fixed CL Board
		1	32.0pF Fixed CL Board
3	41901-25002	1	DUT Positioning Plate
4	41901-29003	1	Shorting Plate for Calibration
5	41901-66503	1	50 Ω Resistor Board for Calibration
-	41900-87101	1	Label ¹

¹ Not shown in the figure.

Table 2-5. Option 040 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66501	1	Contact Board
2	41901-66031	1	C _L Adapter Board Kit
		1	3.0pF Fixed CL Board
		1	3.3pF Fixed CL Board
		1	3.6pF Fixed CL Board
		1	4.0pF Fixed CL Board
		1	4.3pF Fixed CL Board
		1	4.6pF Fixed CL Board
2	41901-66032	1	C _L Adapter Board Kit
		1	5.0pF Fixed CL Board
		1	5.5pF Fixed CL Board
		1	6.0pF Fixed CL Board
		1	7.0pF Fixed CL Board
2	41901-66033	1	C _L Adapter Board Kit
		1	8.0pF Fixed CL Board
		1	9.0pF Fixed CL Board
		1	10.0pF Fixed CL Board
		1	11.0pF Fixed CL Board
2	41901-66034	1	C _L Adapter Board Kit
		1	12.0pF Fixed CL Board
		1	13.0pF Fixed CL Board
		1	14.0pF Fixed CL Board
		1	16.0pF Fixed CL Board
2	41901-66035	1	C _L Adapter Board Kit
		1	18.0pF Fixed CL Board
		1	20.0pF Fixed CL Board
		1	24.0pF Fixed CL Board
		1	32.0pF Fixed CL Board
3	41901-25002	1	DUT Positioning Plate
4	41901-29003	1	Shorting Plate for Calibration
5	41901-66503	1	50 Ω Resistor Board for Calibration
-	41900-87101	1	Label ¹

¹ Not shown in the figure.

Table 2-6. Option 050 Attachment Kit Contents

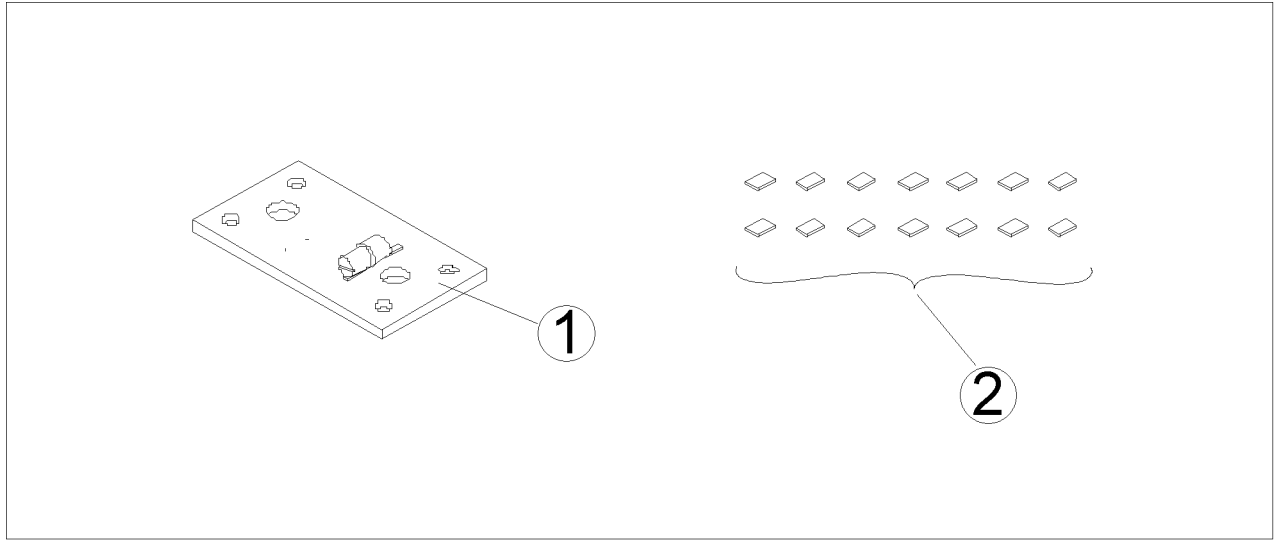
Reference Designator	HP Part Number	Qty.	Description
1	41901-66501	1	Contact Board
2	41901-66041	1	C _L Adapter Board Kit
		1	3.0pF Fixed CL Board
		1	3.3pF Fixed CL Board
		1	3.6pF Fixed CL Board
		1	4.0pF Fixed CL Board
		1	4.3pF Fixed CL Board
		1	4.6pF Fixed CL Board
2	41901-66042	1	C _L Adapter Board Kit
		1	5.0pF Fixed CL Board
		1	5.5pF Fixed CL Board
		1	6.0pF Fixed CL Board
		1	7.0pF Fixed CL Board
2	41901-66043	1	C _L Adapter Board Kit
		1	8.0pF Fixed CL Board
		1	9.0pF Fixed CL Board
		1	10.0pF Fixed CL Board
		1	11.0pF Fixed CL Board
2	41901-66044	1	C _L Adapter Board Kit
		1	12.0pF Fixed CL Board
		1	13.0pF Fixed CL Board
		1	14.0pF Fixed CL Board
		1	16.0pF Fixed CL Board
2	41901-66045	1	C _L Adapter Board Kit
		1	18.0pF Fixed CL Board
		1	20.0pF Fixed CL Board
		1	24.0pF Fixed CL Board
		1	32.0pF Fixed CL Board
3	41901-25002	1	DUT Positioning Plate
4	41901-29003	1	Shorting Plate for Calibration
5	41901-66503	1	50 Ω Resistor Board for Calibration
-	41900-87101	1	Label ¹

¹ Not shown in the figure.

Table 2-7. Option 060 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66501	1	Contact Board
2	41901-66051	1	C _L Adapter Board Kit
		1	3.0pF Fixed CL Board
		1	3.3pF Fixed CL Board
		1	3.6pF Fixed CL Board
		1	4.0pF Fixed CL Board
		1	4.3pF Fixed CL Board
		1	4.6pF Fixed CL Board
2	41901-66052	1	C _L Adapter Board Kit
		1	5.0pF Fixed CL Board
		1	5.5pF Fixed CL Board
		1	6.0pF Fixed CL Board
		1	7.0pF Fixed CL Board
2	41901-66053	1	C _L Adapter Board Kit
		1	8.0pF Fixed CL Board
		1	9.0pF Fixed CL Board
		1	10.0pF Fixed CL Board
		1	11.0pF Fixed CL Board
2	41901-66054	1	C _L Adapter Board Kit
		1	12.0pF Fixed CL Board
		1	13.0pF Fixed CL Board
		1	14.0pF Fixed CL Board
		1	16.0pF Fixed CL Board
2	41901-66055	1	C _L Adapter Board Kit
		1	18.0pF Fixed CL Board
		1	20.0pF Fixed CL Board
		1	24.0pF Fixed CL Board
		1	32.0pF Fixed CL Board
3	41901-25002	1	DUT Positioning Plate
4	41901-29003	1	Shorting Plate for Calibration
5	41901-66503	1	50 Ω Resistor Board for Calibration
-	41900-87101	1	Label ¹

¹ Not shown in the figure.



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Figure 2-3. Option 011,021,031,041,051,061 Attachment Kit Product Overview

Table 2-8. Option 011 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66502	1	Blank C _L Adapter Board
2	-	-	Capacitor ¹
-	41900-87101	1	Label ²

1 See Table 2-8.

2 Not shown in the figure.

Table 2-9. Option 021 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66512	1	Blank C _L Adapter Board
2	-	-	Capacitor ¹
-	41900-87101	1	Label ²

1 See Table 2-8.

2 Not shown in the figure.

Table 2-10. Option 031 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66522	1	Blank C _L Adapter Board
2	-	-	Capacitor ¹
-	41900-87101	1	Label ²

1 See Table 2-8.

2.10 Preparation for Use

2 Not shown in the figure.

Table 2-11. Option 041 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66532	1	Blank C _L Adapter Board
2	-	-	Capacitor ¹
-	41900-87101	1	Label ²

1 See Table 2-8.

2 Not shown in the figure.

Table 2-12. Option 051 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66542	1	Blank C _L Adapter Board
2	-	-	Capacitor ¹
-	41900-87101	1	Label ²

1 See Table 2-8.

2 Not shown in the figure.

Table 2-13. Option 061 Attachment Kit Contents

Reference Designator	HP Part Number	Qty.	Description
1	41901-66552	1	Blank C _L Adapter Board
2	-	-	Capacitor ¹
-	41900-87101	1	Label ²

1 See Table 2-8.

2 Not shown in the figure.

Table 2-14. Option 011,021,031,041,051,061 Capacitors Contents

Reference Designator	HP Part Number	Qty.	Description
6	0160-5942	2	Capacitor, 1 pF
6	0160-5978	2	Capacitor, 2.2 pF
6	0160-5971	2	Capacitor, 4.7 pF
6	0160-5973	2	Capacitor, 6.8 pF
6	0160-5975	2	Capacitor, 10 pF
6	0160-5962	2	Capacitor, 15 pF
6	0160-5961	2	Capacitor, 22 pF

Repackaging the HP 41901A for Shipment

If shipment to a Hewlett-Packard service center is required, the HP 41901A should be repackaged using the original factory packaging materials.

If this material is not available, comparable packaging materials may be used. Wrap the HP 41901A in heavy paper and pack in anti-static plastic packing material. Use sufficient shock absorbing material on all sides of the HP 41901A 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 41901A. The topics include the following:

- Connecting the HP 41901A for Use.
- Assembling the C_L Adapter Board . (OPT,011,021,031,041,051,061)
- Using the Sample Programs .

Connecting the HP 41901A for Use

Figure 3-1 shows how to connect the HP 41901A to the HP 87510A Gain-Phase Analyzer, HP E5100A/B Network Analyzer. If the instrument is the HP E5100A with option 600, the connection of the 20dB ATT is not necessary.

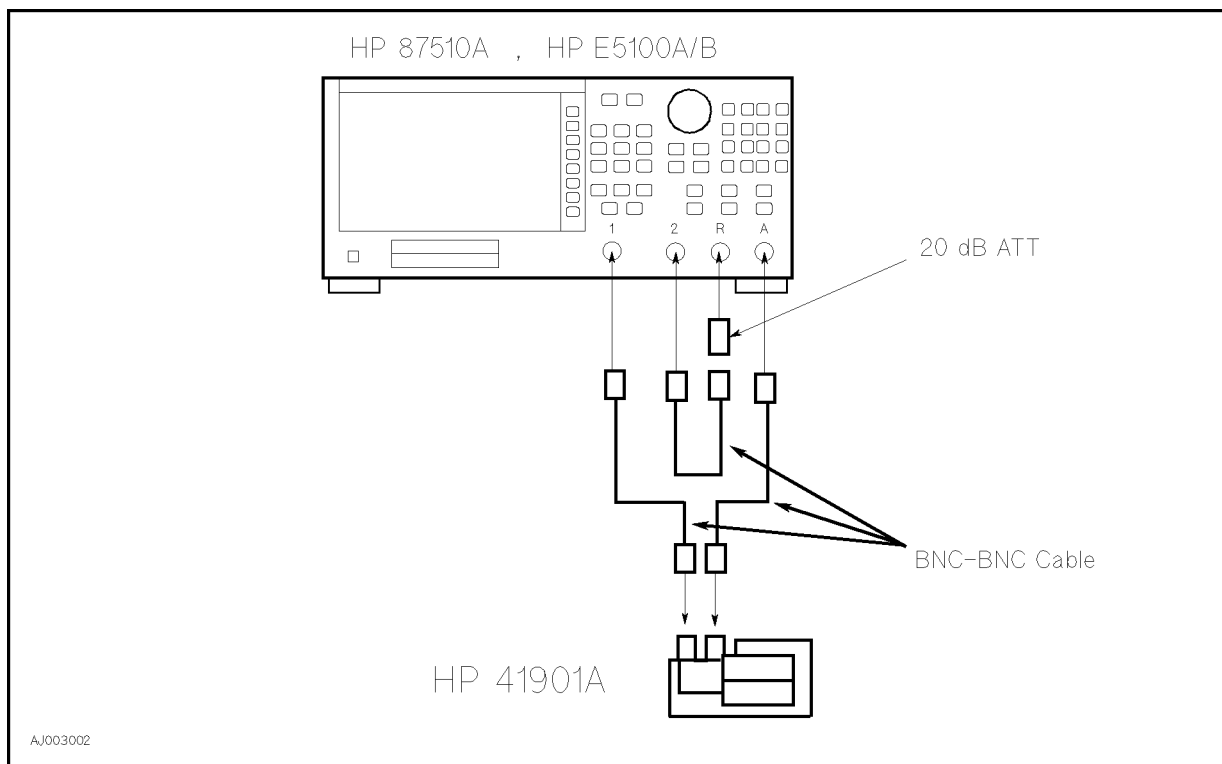


Figure 3-1. Connecting the HP 41901A to the HP 87510A, HP E5100A/B

Assembling the C_L Adapter Board

The C_L Adapter Board initially has only a trimmer capacitor on it. It is necessary to choose the appropriate capacitors and then solder them on the board to provide the required load capacitance (C_L). Figure 3-2 shows a circuit diagram of the C_L Adapter Board and Table 3-1 lists an example of the C_1 , C_2 combinations to obtain the required load capacitance.

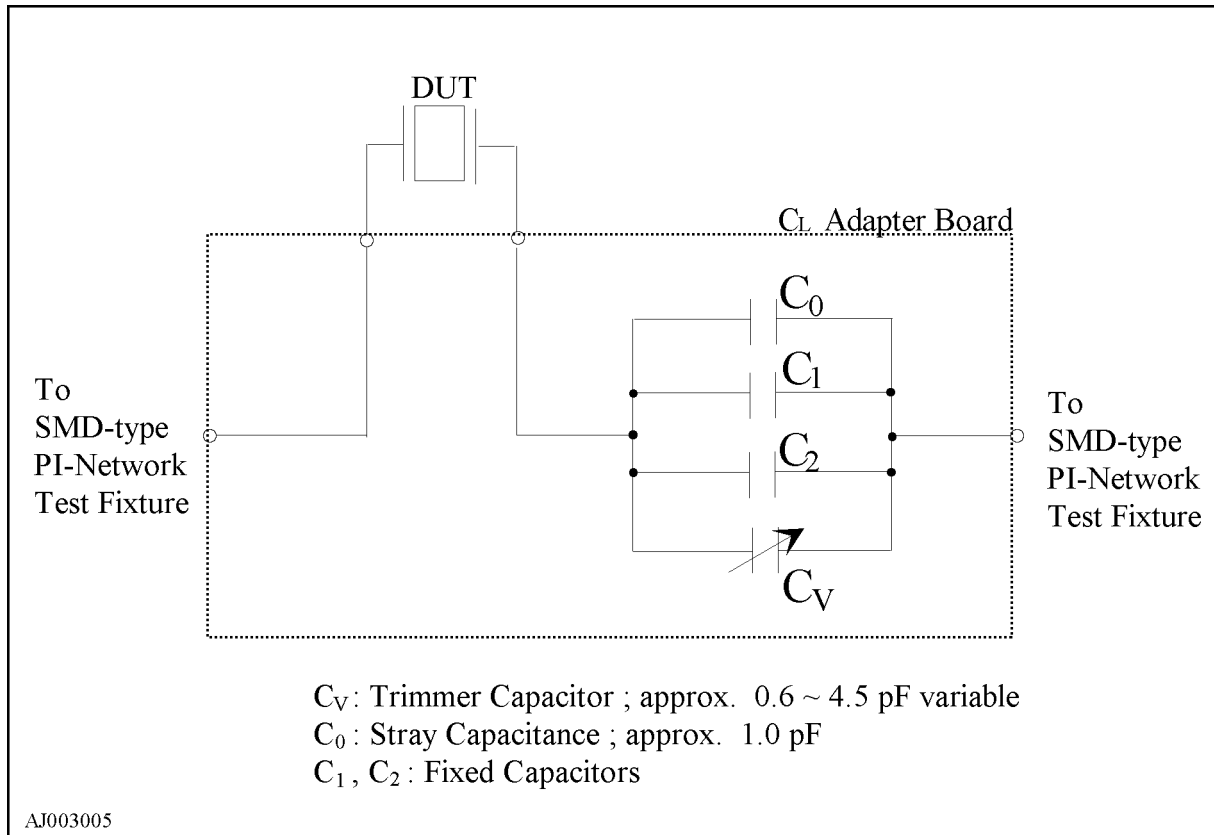
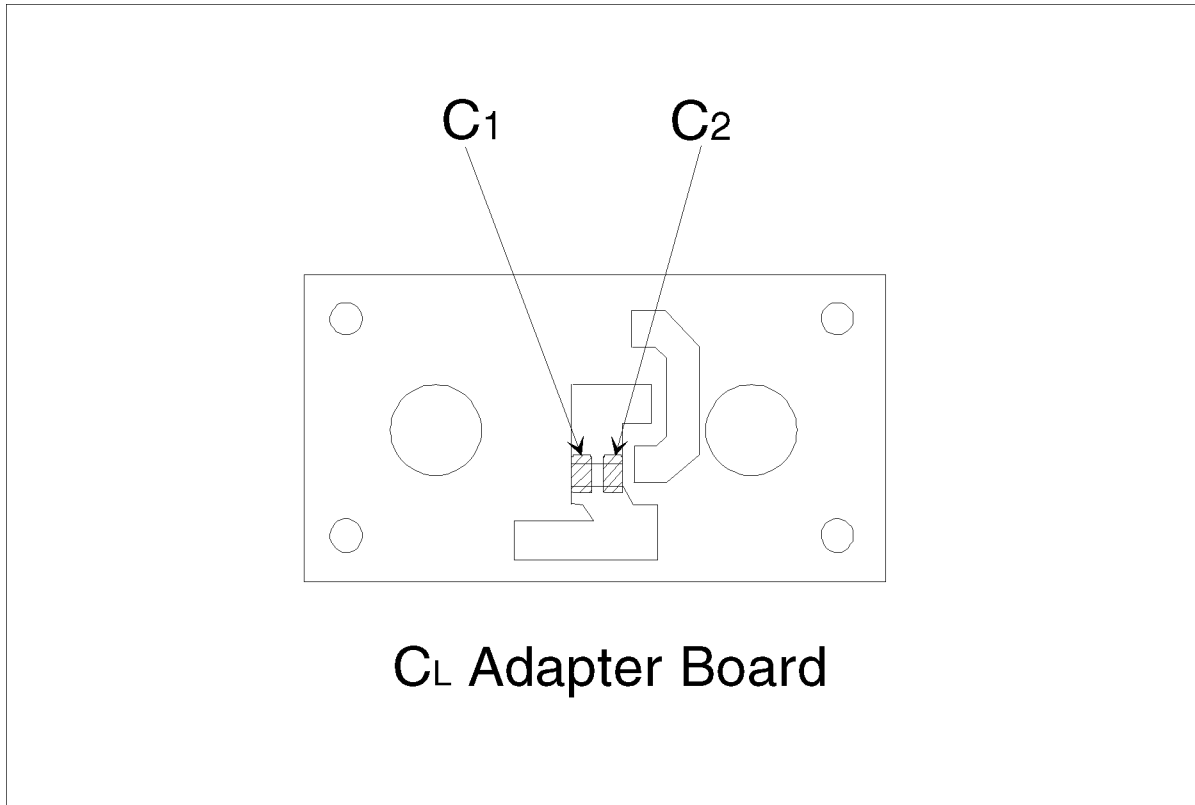


Figure 3-2. C_L Adapter Board Circuit Diagram

Table 3-1. Example of C₁, C₂ Combinations

C_L [pF]	C₁ [pF]	C₂ [pF]	C_{Lmin} [pF]	C_{Lmax} [pF]
33	22	6.8	30.4	34.3
32	22	6.8	30.4	34.3
31	22	4.7	28.3	32.2
30	22	4.7	28.3	32.2
29	15	10	26.6	30.5
28	22	2.2	25.8	29.7
27	22	1	24.6	28.5
26	22	(open)	23.6	27.5
25	15	6.8	23.4	27.3
24	10	10	21.6	25.5
23	15	4.7	21.3	25.2
22	15	2.2	18.8	22.7
21	15	2.2	18.8	22.7
20	10	6.8	18.4	22.3
19	15	1	17.6	21.5
18	10	4.7	16.3	20.2
17	6.8	6.8	15.2	19.1
16	10	2.2	13.8	17.7
15	6.8	4.7	13.1	17.0
14	10	(open)	11.6	15.5
13	6.8	2.2	10.6	14.5
12	6.8	2.2	10.6	14.5
11	6.8	1	9.4	13.3
10	6.8	(open)	8.4	12.3
9	4.7	1	7.3	11.2
8	2.2	2.2	6.0	9.9
7	2.2	1	4.8	8.7
6	2.2	(open)	3.8	7.7
5	1	(open)	2.6	6.5
4	(open)	(open)	1.6	5.5
3	(open)	(open)	1.6	5.5



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Figure 3-3. C₁, C₂ Location

Note



To open the C₁ or C₂ location on the C_L Adapter Board, do not mount any components.

Instruction for Cleaning

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

Using the Sample Programs

The sample programs included in the disk (HP Part Number 41901-87001) are used to perform the 3-Term Calibration and the load capacitance (C_L) adjustment for the HP 41901A SMD Type PI-Network Test Fixture. The programs which file name is "FLCI_EQV" and "CAP_ADJ" should be used with the HP 87510A Gain-Phase Analyzer. The programs which is "FLCI_EQV.BAS" and "CAP_ADJ.BAS" should be used with the HP E5100A/B Network Analyzer.

The file names of the sample programs contained in the sample program disk are as follows:

Table 3-2. Contents of Disk

Filename	File Type	Description
FLCI_EQV	ASCII	3-Term Calibration and C_L Adjustment Program including measurement setup and equivalent circuit analysis routine.
FLCI_EQV.BAS	DOS	ibid.
CAP_ADJ	ASCII	3-Term Calibration and C_L Adjustment Program (an extract of "FLCI_EQV").
CAP_ADJ.BAS	DOS	ibid. (an extract of "FLCI_EQV.BAS").
PI_DATA	BDAT	Calibration Data File (used in "FLCI_EQV" and "CAP_ADJ").
E5100a.DAT	BDAT	Calibration Data File (used in "FLCI_EQV.BAS" and "CAP_ADJ.BAS").

Connecting the HP 41901A to the HP 87510A, HP E5100A/B.

1. Turn the HP 87510A, HP E5100A/B ON.
2. Connect the HP 41901A to the HP 87510A, HP E5100A/B as shown in Figure 3-1.

Executing the Sample Program

Note

The sample program can be used with or without an external keyboard. However, it is recommended that you use an external keyboard to enter the required parameters.

-
1. Insert the disk into the disk drive of the HP 87510A, HP E5100A/B.
 2. Get the program, "FLCI_EQV" or "FLCI_EQV.BAS".
 3. Run the program.
 4. "Center frequency ? (MHz)" is displayed on the bottom of the display. Enter the required center frequency in MHz and press **(X1)** on the HP 87510A's front panel, **(Enter)** on the HP E5100A/B's front panel or **(Return)** on the external keyboard.
 5. "Span frequency" is displayed on the bottom of the display. Enter the required span frequency in kHz and press **(X1)** on the HP 87510A's front panel, **(Enter)** on the HP E5100A/B's front panel or **(Return)** on the external keyboard.
 6. "POWER (μW)" is displayed on the bottom of the display. Enter the required test signal power in μW that should be applied to the DUT (device under test). Press **(X1)** on the HP 87510A's front panel **(Enter)** on the HP E5100A/B's front panel or **(Return)** on the external keyboard. To enter the default power (10 μW), just press **(X1)**, **(Enter)** or **(Return)**.

7. "RESISTANCE (OHM)" is displayed on the bottom of the display. Enter the resonant resistance of the DUT in Ω and press **(X1)** of the HP 87510A's front panel, **(Enter)** on the HP E5100A/B's front panel or **(Return)** on the external keyboard. This resistance is used to set the signal power at the output connector of the HP 87510A, HP E5100A/B. To enter the default resistance (15 Ω), just press **(X1)**, **(Enter)** or **(Return)**.
8. Predefined standard values for the calibration and "MODIFY ? (Yes=1, No=0, DEFAULT=0)" are displayed on the bottom half of the display.

To change the constants:

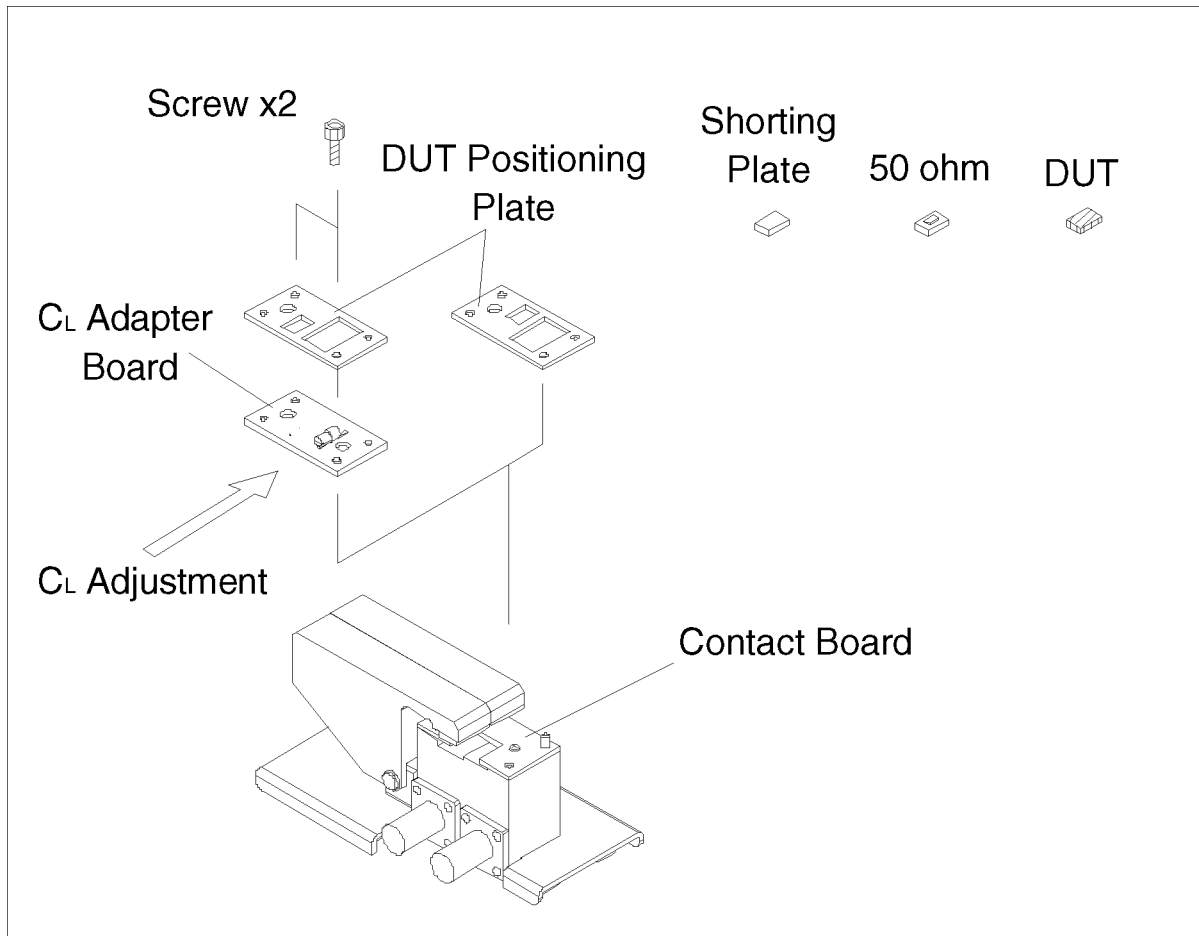
- a. Type 1 and then press **(X1)** on the HP 87510A's front panel, **(Enter)** on the HP E5100A/B's front panel or **(Return)** on the external keyboard to modify the standard values.
- b. The HP 87510A, HP E5100A/B asks for a new standard value for each parameter. Enter a new value using the numeric keys and then press **(X1)**, **(Enter)** or **(Return)**.

If you do not want to change the value, just press **(X1)** on the HP 87510A's front panel, **(Enter)** on the HP E5100A/B's front panel or **(Return)** on the external keyboard for each standard.

- c. After modifying the standard values, the HP 87510A, HP E5100A/B asks you to save the new data to the data file. If you want to save the modified data, press **(X1)** on the HP 87510A's front panel, **(Enter)** on the HP E5100A/B's front panel or **(Return)** of the external keyboard. The saved data is used as the default setting the next time you run the program. If you want to use the predefined data, purge the file "PI_DATA" for the HP 87510A or "E5100a.DAT" for the HP E5100A/B from the disk.

9. Set the positioning plate as shown in Figure 3-4. Connect the standards as follows and make the measurements:

OPEN	Verify that nothing is connected to the electrodes of the HP 41901A, then press OPEN on the HP 87510A's or HP E5100A/B's front panel. When completed, double parentheses enclose the OPEN softkey label.
SHORT	Connect the Shorting Plate as shown in Figure 3-4, then press SHORT on the HP 87510A's or HP E5100A/B's front panel. When completed, double parentheses enclose the SHORT softkey label.
LOAD	Connect the 50 Ω Resistor as shown in Figure 3-4, then press LOAD on the HP 87510A's or HP E5100A/B's front panel. When completed, double parentheses enclose the LOAD key label.



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Figure 3-4. Calibration, C_L Adapter Board, C_L Adjustment

To abort the calibration, press **CAL BREAK**. The program is terminated by this key.

10. After completing the measurement of the standards, press **DONE: 3 TERM CAL** on the HP 87510A's or HP E5100A/B's front panel to complete the calibration.
 "COMPUTING CAL COEFFICIENTS" is displayed while the HP 87510A, HP E5100A/B' is calculating the calibration coefficients.
11. Enter the frequency for the load capacitance adjustment in MHz and press **(x1)** on the HP 87510A's front panel, **(Enter)** on the HP E5100A/B's front panel or **(Return)** on the external keyboard.
12. Set the C_L Adapter Board, Positioning Plate and Shorting Plate as shown in Figure 3-4, and then press softkey **Continue** on the HP 87510A, HP E5100A/B or **(F2)** of the external keyboard.
13. Load capacitance C_L is measured continuously and the result is displayed on the display.
14. Adjust the load capacitance with a screw driver as shown in Figure 3-4.

Note

Use a screwdriver with a ceramic or plastic blade to adjust the trimmer capacitor. *VESSEL*[®] *Ceramic Adjustment Screwdriver No.9000 (-) 1.8×30* is recommended.

15. Press softkey **ADJUSTMENT END** on the HP 87510A or HP E5100A/B after completing the adjustment.
16. Replace the Shorting Plate with the DUT as shown in Figure 3-4.
This is the end of the C_L adjustment procedure. If it is necessary to obtain the equivalent circuit parameters of the DUT, perform the remaining steps.
17. Press softkey **Continue** on the HP 87510A, HP E5100A/B or **(F2)** on the external keyboard. Frequency characteristics and the following parameters of the DUT are displayed:

Table 3-3. Parameters Measured

Parameter	Unit
Resonance Frequency (F_r)	MHz
Resonance Impedance CI (Z_r)	Ω
Shunt Capacitance (C_0)	pF
Motional Capacitance (C_1)	pF
Motional Inductance (L_1)	mH
Motional Resistance (R_1)	Ω

18. Connect a new DUT and press softkey **Continue** on the HP 87510A, HP E5100A/B or **(F2)** on the external keyboard.

Note

To skip the steps 4 through 7 and 17 through 18, use the program “CAP_ADJ” or “CAP_ADJ.BAS”.

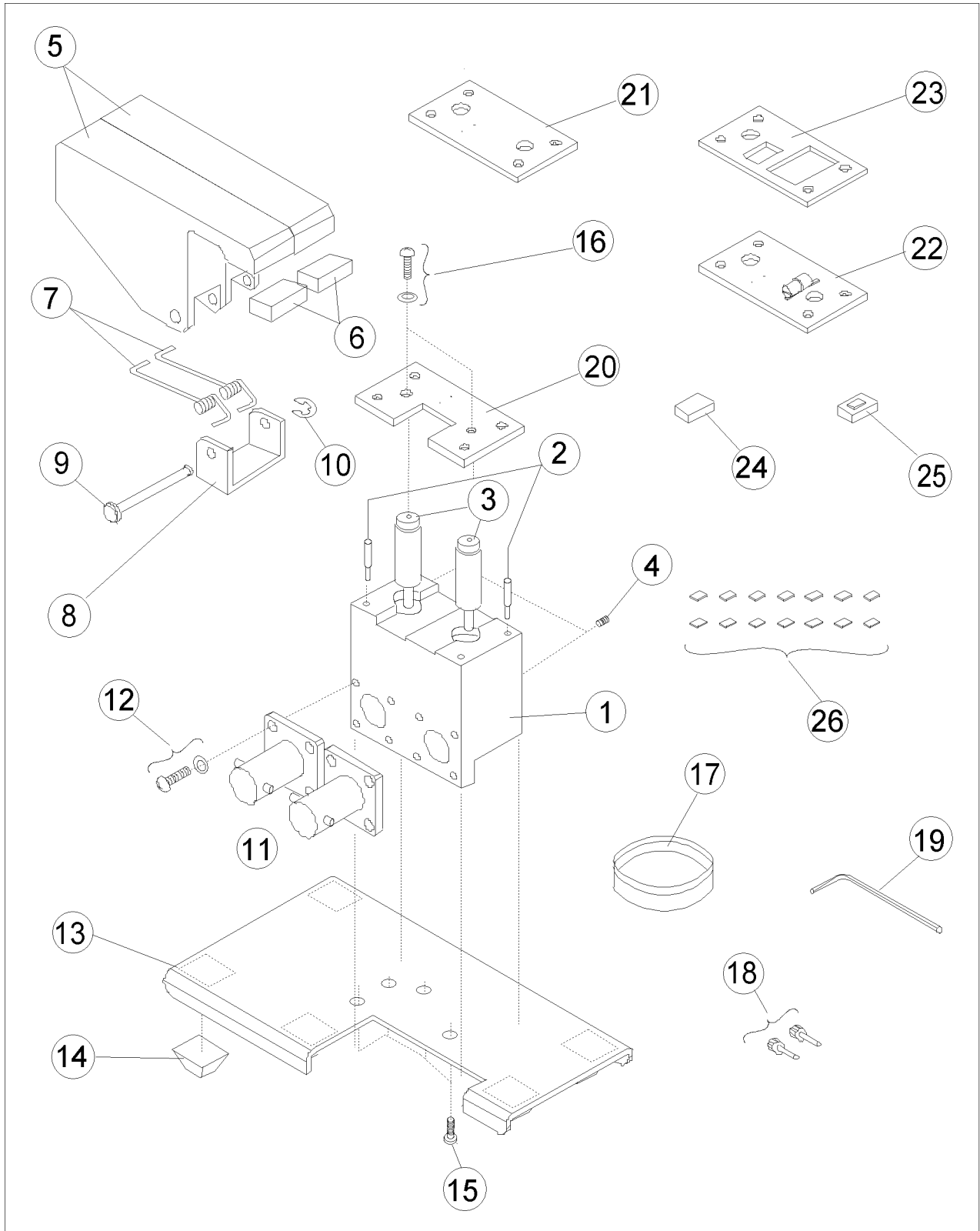
Service

Introduction

This chapter covers the replaceable parts information for the HP 41901A.

HP 41901A Replaceable Parts

Table 4-1 lists the replaceable parts for the HP 41901A. The parts listed can be ordered from your nearest Hewlett-Packard Office. Ordering information must include the HP part number and the quantity required.



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Figure 4-1. Replaceable Parts

Table 4-1. Replaceable Parts

Reference Designator	HP Part Number	Qty.	Description
1	41901-24002	1	Housing
2	41901-23001	2	Guide Pin
3	1810-1843	2	Network PI Resistor
4	0515-0154	2	Set-Screw
5	41901-25001	2	Lever
6	41901-29002	2	Bushing
7	41901-29001	2	Spring
8	41901-01202	1	Angle
9	41901-23002	1	Shaft
10	0510-0015	1	E-ring
11	1250-2722	2	BNC Connector
12	0515-0905	8	Screw
	2190-0583	8	Washer
13	04191-01201	1	Table
14	0403-0285	5	Bumper Foot
15	0515-1550	4	Screw
16	0515-0977	2	Screw
	2190-0654	2	Washer
17	1540-0622	1	Plastic Case
18	0515-1046	2	Screw
19	8710-0909	1	Wrench
20	See chapter 2	-	Contact Board
21	See chapter 2	-	Fixed C _L Adapter Board
22	See chapter 2	-	Blank C _L Adapter Board
23	See chapter 2	-	DUT Positioning Plate
24	See chapter 2	-	Shorting Plate
25	See chapter 2	-	50 Ω Resistor Board for Calibration
26	See chapter 2	-	Capacitor
-	41901-60001	1	Carrying Case ¹
-	41901-87001	1	C _L Adjustment Sample Program Disk ¹
-	41901-90010	1	Operation and Service Manual ¹
-	41900-87101	-	Label Set for Capacitor ¹

¹ Not shown in the figure.

Note



Repair of the HP 41901A SMD Type PI-Network Test Fixture is limited to the replacement of the parts listed in Table 4-1.

