

Errata

Title & Document Type: 905A Coaxial Sliding Load Operating and Service Manual

Manual Part Number: 00905-90009

Revision Date: June 1984

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OPERATING AND SERVICE MANUAL

HP 905A

**COAXIAL
SLIDING
LOAD**



**HEWLETT
PACKARD**

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COAXIAL SLIDING LOAD

HP 905A

Serials 100 and Above.

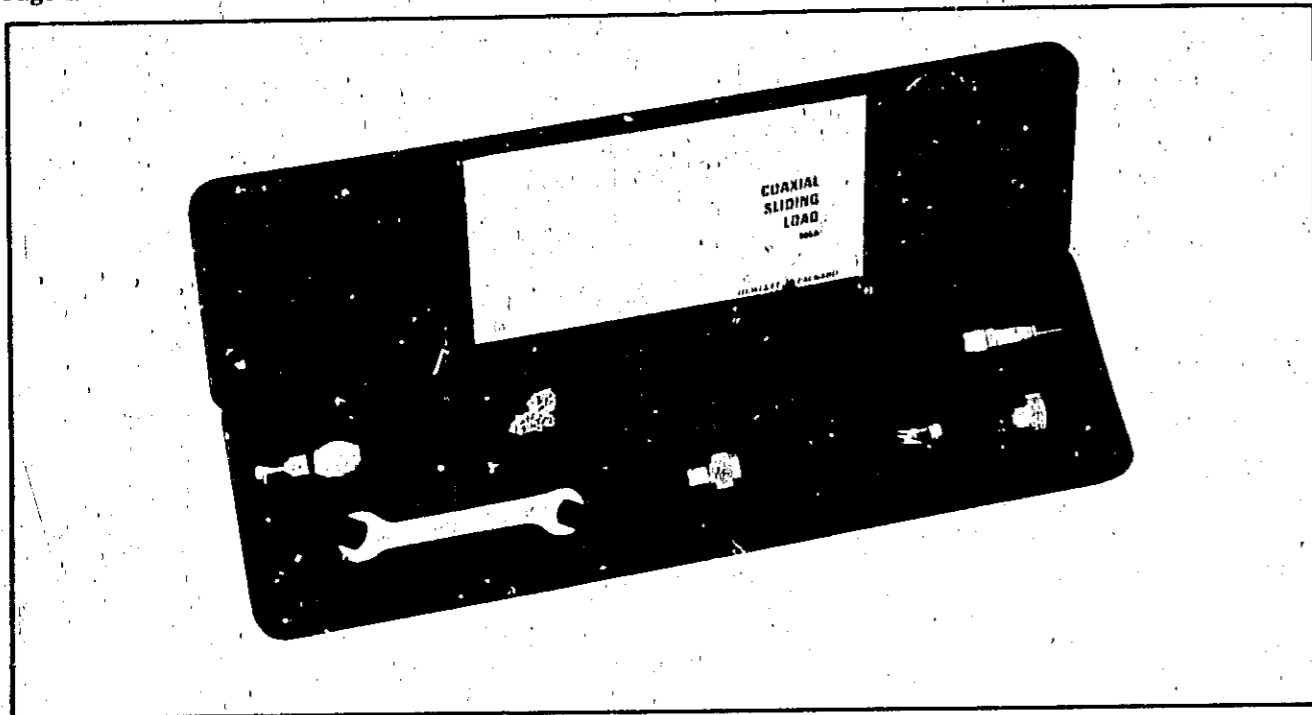
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**HEWLETT
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HP 905A Coaxial Sliding Load

Table 1. Specifications

Frequency Range: 1.8 to 18 GHz.

Impedance: $50\Omega \pm 0.15\Omega$

Load Element Reflection Coefficient: 1.8 to 18 GHz;
0.024 (1.05 SWR, 32.2 dB return loss).

Power Rating: 1 W average, 5 kW peak.

Load Travel: Greater than $1/2$ wavelength at 1.8 GHz.

Length: 44 cm ($17\frac{1}{4}$ inches).

Connectors Supplied: Interchangeable connector bodies and center pins for use with APC-7 and Type N male and female connectors (two of each type pin supplied). The Type N combinations are compatible with Type N connectors whose dimensions conform to MIL-C-39012 or MIL-C-71.

Weight: Net, 196 g (7 oz.). Shipping 0.91 kg (2 lb).

Accessories Furnished: Carrying case and wrench for changing connector bodies.

1. INTRODUCTION

2. The Hewlett-Packard Model 905A Coaxial Sliding Load is a movable, low-reflection load for use in precision microwave measurements. By moving the load, you can phase the load reflection to separate it from the other reflections in the system. This technique enables you to measure such quantities as the directivity of coaxial directional couplers and the residual SWR of coaxial slotted lines. The low SWR (standing-wave ratio) of the HP 905A also makes it an excellent fixed termination for the 50 ohm coaxial systems.

3. Equipment Supplied

4. The following equipment is supplied:

- 1 Coaxial Sliding Load complete with load element
- 1 Center conductor with threaded hole to receive center pins (see below)
- 1 Male Type N connector shell with 2 screw-on center pins (pointed)

- 1 Female Type N connector shell with 2 screw-on center pins (female)
- 1 Amphenol APC-7® sexless connector shell complete with 2 screw-on center pins (blunt)
- 1 Double headed open-end wrench 9/16" x 1/2"
- 1 Case with cover

5. Initial Inspection

6. **Mechanical Check.** If damage to the shipping carton is evident, ask that the carrier's agent be present when the instrument is unpacked. Inspect the instrument for mechanical damage such as scratches or dents. Also check the cushioning material for signs of severe stress (compacting).

7. **Performance Check.** The electrical performance of the HP 905A should be verified as soon as possible

after receipt. A performance check suitable for incoming inspection is given under PERFORMANCE TESTS.

8. **Claim for Damage.** If the HP 905A is mechanically damaged or fails to meet specifications on receipt, notify the carrier and the nearest Hewlett-Packard office (a list of field offices is at the back of this manual). Retain the shipping carton and the padding material for the carrier's inspection. The field office will arrange for the repair or replacement of your instrument without waiting for the claim against the carrier to be settled.

9. HANDLING PRECAUTIONS

10. Do not remove the center conductor unnecessarily since bowing the center conductor will cause the SWR to vary with center conductor orientation and load position. Several loose connectors and center pins have been furnished with this load to enable you to connect to various kinds of connectors. These items should be kept in their original

package when not in use to avoid loss. If you have more than one load, the connectors should be kept with the loads with which they have been tested. Specifications are guaranteed only when loads are used with their matched connectors.

11. CONNECTORS

12. This load has a single center conductor with 3 types of interchangeable center conductor pins and 3 outer shells to enable the load to be connected to each of the following connectors:

Male Type N connector (mates with female center conductor pin).

Female Type N connector (mates with pointed male center conductor pin).

APC-7 sexless connector (blunt center conductor pin). Note that this connector uses a pin socket contact arrangement unlike standard APC-7's which use end to end contact (see Figure 2 and 3 for mating connector information).

13. The Type N connectors are stainless steel and mate compatibly with Type N connectors whose dimensions conform to MIL-C-39012 and MIL-C-71. These are standard Type N connectors held to a tighter tolerance for better performance. Figure 1 gives the dimensions of the Type N connectors. These connectors mate with all other Type N connectors with the following exception.

CAUTION

Do NOT mate with HP "precision" male Type N connectors. Damage will occur. This connector may be identified by slots in the outer conductor (0.071" pin). Connectors used on the load will mate with all other male or female connectors without damage.

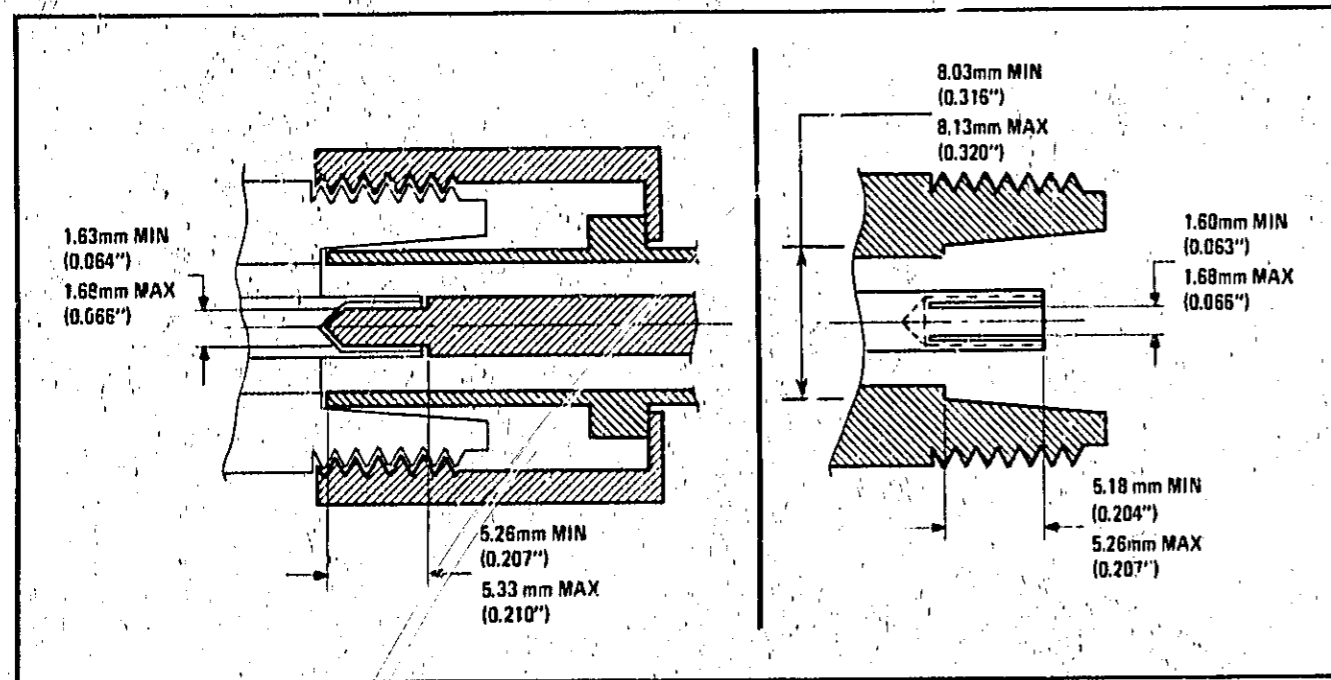


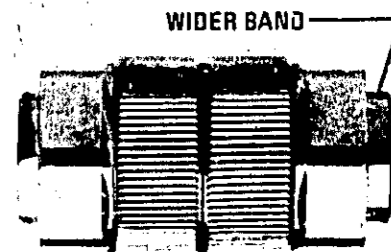
Figure 1. Type N Connector Dimensions

To Connect:

1. On one connector, retract the coupling sleeve by turning the coupling nut counterclockwise until the sleeve and nut disengage.
2. On the other connector, fully extend the coupling sleeve by turning the coupling nut clockwise. To engage coupling sleeve and coupling nut when the sleeve is fully retracted, press back lightly on the nut while turning it clockwise.
3. Push the connectors firmly together, and thread the coupling nut of the connector with retracted sleeve over the extended sleeve.
4. Do NOT tighten the other coupling nut since this will tend to loosen the electrical connection.

To Disconnect:

1. Loosen the coupling nut of the connector showing the wider gold band.



2. **IMPORTANT:** Part the connectors carefully to prevent striking the inner conductor contact.

Figure 2. Use of APC-7 Connectors

1. Keep contacting surfaces smooth and clean. Irregularities and foreign particles can degrade electrical performance.
2. Protect the contacting surfaces when the connector is not in use by leaving the coupling sleeve extended.
3. Use lintless material and/or firm-bristled brush such as tooth brush for cleaning. If a cleaning fluid is needed use isopropyl alcohol. **IMPORTANT:** Do not use aromatic or chlorinated hydrocarbons, esters, ethers, terpenes, higher alcohols, ketones, or ether-alcohols such as benzene, toluene, turpentine, dioxane, gasoline, cellosolve acetate, or carbon tetrachloride. Keep exposure of the connector parts to both the cleaning fluid and its vapors as brief as possible.

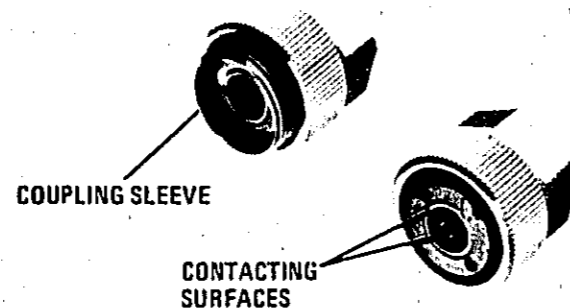


Figure 3. Care of APC-7 Connectors

14. CHANGING CONNECTORS

15. To change the connector on the load, refer to Figure 5 and proceed as follows:

a. Loosen the lock (3) by turning lock in the direction which will align the setscrew in the lock and the setscrew in the body and retract the center conductor (2).

b. With the thin 1/2" wrench supplied with the load, remove body (14, 15, or 16) from the load.

c. Remove the center contact pin by grasping the pin (11, 12, or 13) in one hand and turning the knob (1) counterclockwise with the other. Do NOT use pliers or wrenches to hold the center conductor pin.

d. Select appropriate center conductor pin. The tapered male pin fits Type N female connectors while the blunt male pin fits APC-7 connectors.

e. Screw the center conductor pin on by turning the knob on the opposite end of the load clock-

wise. Do NOT use pliers or wrenches to hold center conductor pin.

f. Retract the center conductor to protect the center conductor pin.

g. Screw on the proper connector shell with the 1/2" wrench supplied with the load as follows:

(1) Female pin (13) and female body (14) constitute a female Type N connector.

(2) Blunt male pin (12) and APC-7 body (15) constitute a sexless APC-7 connector.

(3) Pointed male pin (11) and male body (16) constitute a male Type N connector.

h. Mate the center conductor pin and connect the body to the connector of the unit under test.

i. Push the knob at the opposite end to butt the center conductor pin tightly to the connector

of the unit under test and tighten the body. Tighten the lock (3). The load is now ready for operation.

16. OPERATION

17. Principles of Operation

18. The load connector and body has a fixed reflection and must be considered when making measurements. The magnitude of the load element's reflection does not change with position of the load, but the phase does. The phase is what determines how the load element's reflection will combine vectorially with the fixed reflection of the system. By sliding the load element, all phase combinations of the system's fixed reflections with the load elements are obtained. As the load element is moved, its reflection vector rotates in a circle about the tip of the system's connector and transmission line vector (see Figure 4). The load element reflection error can be eliminated and extremely small reflection quantities can be measured.

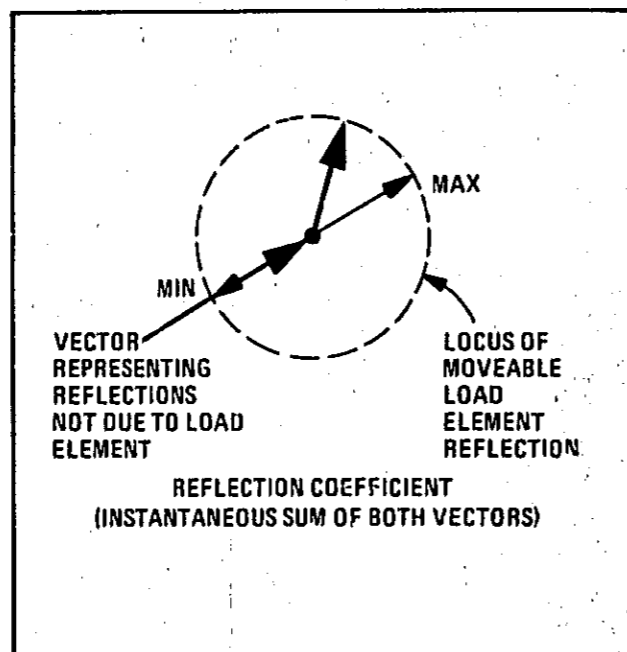


Figure 4. Reflection Coefficient Vector Relationship

19. The primary application for the sliding load is to determine the magnitude of reflection due to the load, and the magnitude of fixed reflections due to the system. By moving the load element, the reflection from the load can be separated from other reflections in the system. This enables quantities such as the directivity of coaxial directional couplers or residual SWR of coaxial slotted lines to be measured.

20. Maintenance

21. Periodically inspect and clean the load's center and outer conductor surfaces where they mate with the removable connector parts. Also inspect and clean the removable connector parts. After cleaning, use a dry lubricant on the load element which is item 7 in the illustrated parts breakdown. Use Molykote dry lubricant, HP Part No. 6040-0001.

22. Disconnecting the Load

23. To avoid damage to the center conductor female pin, retract the center conductor before disconnecting the load at the connector body.

24. PERFORMANCE TESTS

25. The load can be tested to the accuracy of the specifications in Table 1 with an Automatic Network Analyzer or equivalent equipment of suitable accuracy. If an Automatic Network Analyzer is available, test the load using the procedures in the analyzer's operating manual.

26. Reflection Coefficient

27. Suggested procedures for making swept-frequency reflection measurements are given in Application Note 117-1. Copies are available upon request.

28. The most convenient way for measuring reflection coefficient at single frequencies is with the Hewlett-Packard Network Analyzer and the Polar Display unit. A short or open circuit is used to calibrate the full scale presentation of the polar display CRT and reflection coefficient is read directly off the calibrated face.

29. ADJUSTMENTS

30. The load has no internal adjustments.

31. PARTS REPLACEMENT

32. Most parts, with the exception of the load element assembly, are individually replaceable. Since the parts are cemented together the load element assembly must be replaced as an assembly. To disassemble, refer to Figure 5 and proceed as follows:

- a. First loosen the lock (3).
- b. Remove completely the setscrew (7) in the body. Do NOT remove the setscrew in the lock at the very end.
- c. Remove completely the capcrew (8) in the barrel (9). The load element may now be removed. Do not remove the setscrew in the lock unless it is necessary to work on the lock itself as the setscrew is so small it can easily be lost.

d. When assembling, be sure lock is unlocked and assemble to align with setscrew in the body (so that the lock tightens when it is turned either way from alignment with the setscrew in the body). This will enable you to determine which way to turn the lock to unlock when it is locked.

CAUTION

If it is necessary to remove the setscrew (4) in the lock, you will notice that it is Loctited in. When replacing this setscrew use a small amount of Sealant Grade 277, product number 27731, made by Loctite Corp. on the setscrew. Screw setscrew in only until it is flush with the outer surface of the lock. Do not screw in tight as the lock will not work properly.*

*Registered trademark of Loctite Corp., Newington, Conn.

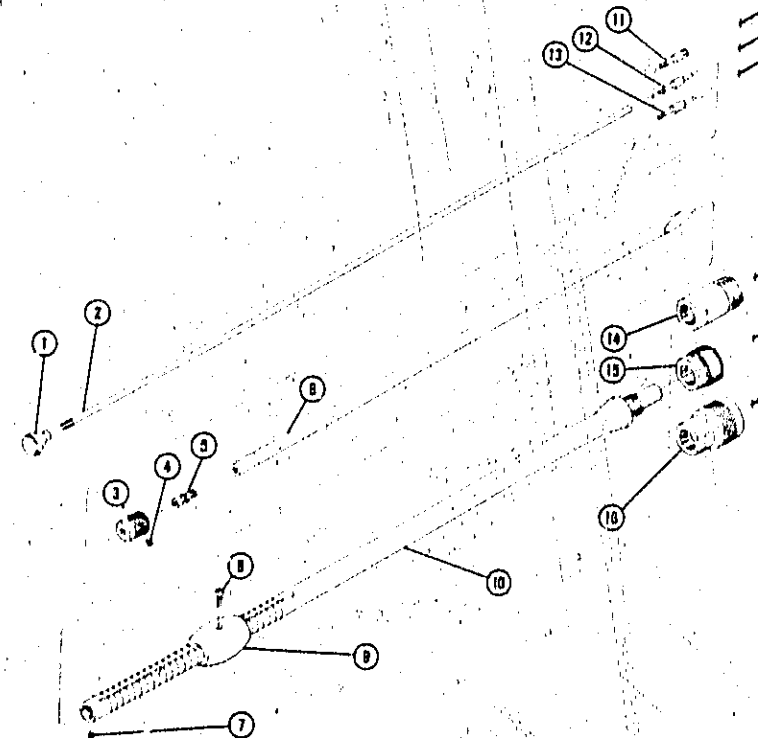


Figure 5. HP 905A Exploded View

Table 2. Parts List

Reference Designation	HP Part No.	Description No.	CD
(See Figure 5)			
1	906A-12	KNOB	9
2	00905-2001	CENTER CONDUCTOR	8
3	00905-2004	LOCK	4
4	3030-C057	SETSCREW 2-56 x 3/32 HEX SLOT	5
5	00905-2003	GUIDE	2
6	00905-60001	LOAD ELEMENT	7
7	3030-0007	SETSCREW 4-40 x 1/8" HEX SLOT	5
8	0570-0180	CAPSCREW 4-40 x 5/16" HEX SLOT	6
9	00905-2002	BARREL	0
10	00905-2000	BODY	6
11	5021-0854	CONTACT: FEMALE	3
12	00907-20004	CONTACT ASSEMBLY: APC-7	8
13	1250-0917	CONTACT: MALE	0
14	1250-0914	BODY: FEMALE TYPE N	7
15	1250-1466	BODY ASSY: APC-7	6
16	1250-0916	BODY: MALE TYPE N	9
Not Shown	8710-0877	WRENCH: DOUBLE OPEN END 1/2 x 9/16"	4
Not Shown	1540-0680	WOOD CASE	9
Not Shown	4206-0341	FOAM PAD (TOP)	8
Not Shown	9220-3378	FOAM PAD (BOTTOM)	8

MANUAL CHANGES

MANUAL CHANGES

COAXIAL SLIDING LOAD

MANUAL IDENTIFICATION

Model Number: HP 905A

Date Printed: June 1984

Part Number: 00905-90009

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

ERRATA

Page 14, Table 2:

For Reference Designation 12, change the HP Part Number to 00907-2004.

