

OPERATING NOTE 2 MAR 66

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Figure 1. Model 11507A Termination

1. DESCRIPTION.

2. The Model 11507A Output Termination (Figure 1) is a feed-through device having a 50-ohm input impedance. A three-position rotary switch controls attenuation and output impedance. One position of the switch selects a dummy antenna (see IRE Standards on Radio Receivers, "Methods of Testing Amplitude Modulation Broadcast Receivers", 1948).

3. APPLICATIONS.

4. The 11507A Output Termination is designed to maintain output level calibration of the 606 Signal Generator when working into load impedances other than 50 ohms. For high (500 ohms or greater) impedance loads, the termination provides proper impedance to the generator with less than 1 dB

attenuation. For low impedance loads, a 10:1 resistive divider reduces the generator output 20 dB while establishing a source (output) impedance of 5 ohms. When switched to the dummy antenna position, the termination simulates a single wire antenna at 4 meters height (including lead in) for frequencies of 540 to 1600 kc.

5. PERFORMANCE CHECKS.

6. **TEST EQUIPMENT.** The test equipment recommended for use in checking performance of the Model 11507A Output Termination is listed in Table 2. Equipment having similar characteristics can be substituted for the equipment listed. Performance check procedures given in Paragraphs 9 through 11 include only general settings for test equipment. For more detail, the operator should refer to the respective equipment manual.

7. INSERTION LOSS MEASUREMENT.

- a. Connect crystal detectors to SWR indicators.
- b. Set controls of test equipment as follows:

Signal Generator:
FREQUENCY 10 Mc
MODULATION 1000 cps

SWR Indicators #1 and #2:
INPUT SELECTOR 200 ohm xtal
METER SCALE normal
RANGE 50 dB

Attenuators #1 and #2: 40 dB

Table 1. Specifications

Selector Position	Attenuation	Impedance		Frequency Range	Reflection Coefficient	SWR
		Input	Output			
0 dB	1.0 dB	50 ohms	25 ohms	50 kc to 65 Mc	0.11 max	1.25 max
20 dB	20 ± 1 dB	50 ohms	5 ohms	50 kc to 65 Mc	0.11 max	1.25 max
Dummy Antenna	20 ± 1 dB	50 ohms	*	540 kc to 23 Mc		
* Dummy Antenna Output Impedance: 2000 ohms reactive at 400 kc 1000 ohms reactive at 700 kc 220 ohms reactive at 2 Mc 400 ohms resistive at 20 Mc ±10% of nominal values				Maximum Input Power: 180 milliwatts (3 volts across 50 ohms). Dimensions: Length: 4-3/8 in (11,1 mm) Diameter: 1-7/16 in (3,8 mm) Net Weight: 4 oz (110 g)		

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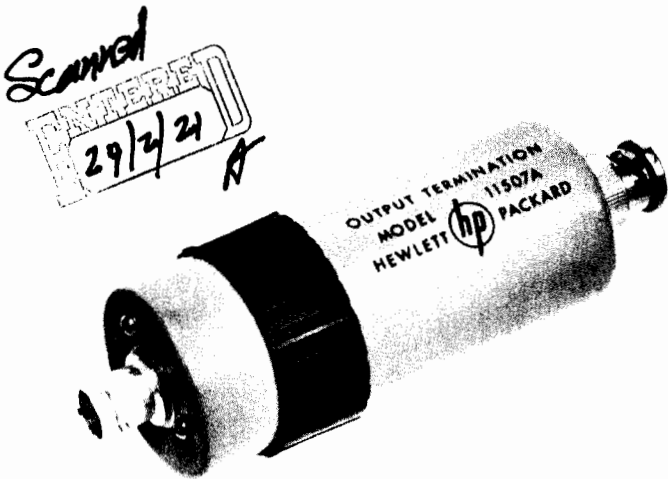


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METER SCALE normal
RANGE 50 dB

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Table 2. Recommended Test Equipment

Type	Qty	Required Characteristics	Recommended Instrument
HF Signal Generator	1	Frequency range: 500 kc to 65 Mc Output impedance: 50 ohms Modulation capability: 1000 cps	hp 606A /B
SWR Indicator	2	Frequency: 1000 cps Input: (for crystal detector)	hp 415B or hp 415C or hp 415D or hp 415E
RF Millivolt-meter	1	Frequency: 65 Mc Decibel scale	hp 411A
Attenuators, Coaxial	2	Attenuation adjustable from 10 to 50 dB BNC connectors	hp 355B or hp 355D
Resistive Load	1	Frequency range: 500 kc to 65 Mc Output impedance: 50 ohms Connector: BNC male	
Crystal Detectors	2	Frequency range: 500 kc to 65 Mc Nominal impedance: 50 ohms	
RF Bridge	1	Frequency: 65 Mc	
Cable Assembly	2	Male BNC to male BNC	hp 10503A
Tee Connector	3	Male BNC to female BNC	UG-274A /U
Adapter	1	Female BNC to female BNC	UG-914 /UN
Adapter	3	Male BNC to male BNC	UG-419A /U
Cable, Shielded	1	Impedance: 50 ohms Male BNC to female BNC	hp 540A-16M
VHF Bridge	1	Frequency: 65 Mc	hp 803A
VHF Detector	1	Frequency: 65 Mc	hp 417A

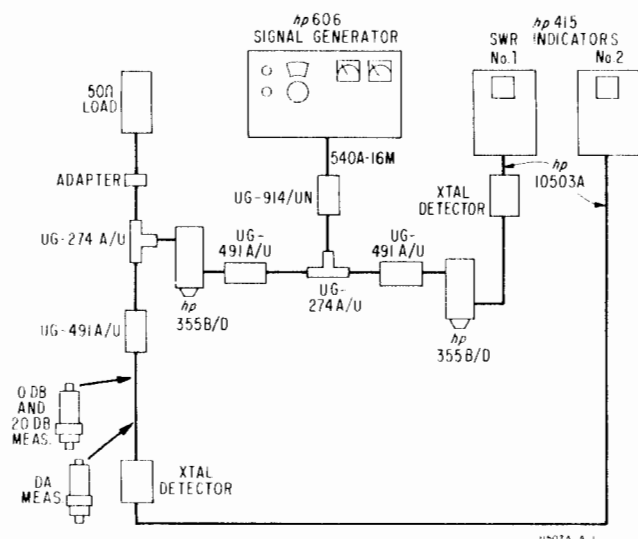


Figure 2. Insertion Loss Setup Diagram

c. Connect test setup as shown in Figure 2.

d. Adjust the 606 Attenuator and SWR indicator GAIN controls to references of -50 dB on the SWR indicators. (After references are set, do not change SWR indicator GAIN; adjust power level with 606 ATTENUATOR control.)

e. Adjust 606 FREQUENCY control to 560 kc. Adjust 606 ATTENUATOR control to maintain -50 dB reading on SWR indicator #1. Record reading of SWR indicator #2.

f. Find the difference between the reading recorded in step e and the -50 dB reference set in step d. Difference is system tracking error for 560 kc. Record.

g. Using frequencies of 50 Mc and 65 Mc, repeat steps e and f to measure system tracking error for those frequencies.

h. Remove the 50-ohm load and its associated UG-274A/U and UG-491A/U connectors from the circuit. Set the termination to 0 dB and connect between attenuator and the termination detector as indicated in Figure 2.

i. Adjust 606 FREQUENCY control to 10 Mc and ATTENUATOR control to a reading of -50 dB (reference) on SWR indicator #1.

j. Observe reading on SWR indicator #2 for insertion loss. Specification: Insertion loss for the 0 dB position shall not exceed 1 dB.

k. Repeat steps i and j for frequencies of 560 kc, 50 Mc, and 65 Mc.

Note

SWR indicator #2 reading must be corrected with the respective tracking error for these frequencies as determined in steps e through g.

m. Set Model 11507A Termination to 20 dB. Reduce attenuator #2 20 dB.

n. Repeat step i.

p. Observe reading on SWR indicator #2; change of indicator needle from reference point should not exceed ± 1 dB. Specification: insertion loss for 20 dB position shall be 20 ± 1 dB.

q. Repeat steps n and p for frequencies of 560 kc, 50 Mc, and 65 Mc.

Note

SWR indicator #2 reading for these frequencies must be corrected with the respective system tracking error as determined in steps e through g.

8. DUMMY ANTENNA INSERTION LOSS MEASUREMENT.

a. Connect crystal detectors to SWR indicators;

b. Set controls of test equipment as follows:

Signal Generator:	
FREQUENCY	500 kc
MODULATION	1000 cps
SWR Indicator #1:	
INPUT SELECTOR	200 ohm xtal
METER SCALE	normal
RANGE	50 dB
SWR Indicator #2:	
INPUT SELECTOR	200 ohm xtal
METER SCALE	normal
RANGE	60 dB
Attenuator #1:	40 dB
Attenuator #2:	50 dB

c. Connect test setup as shown in Figure 2.

d. Adjust 606 FREQUENCY control to 500 kc.

e. Adjust 606 ATTENUATOR and SWR indicator GAIN controls for references of -50 dB on SWR indicator #1 and -60 dB on SWR indicator #2. (After references are set, do not change SWR indicator GAIN; adjust power level with 606 ATTENUATOR controls).

f. Set the termination to DA and insert it as indicated in Figure 2 (output end toward generator). Leave the 50-ohm load connected.

g. Reduce attenuator #2 attenuation to approach the -60 dB references of SWR indicator #2, with -50 dB on SWR indicator #1.

h. Record change of attenuator #2. Add pointer shift of SWR indicator #2 from its -60 dB reference. This sum is the dummy antenna insertion loss. Specification: Nominal, 49.6 dB; minimum, 47.5 dB; maximum, 51.5 dB.

i. Set attenuator #2 to 50 dB and 606 FREQUENCY control to 2.2 Mc. Repeat steps f and g to obtain dummy antenna insertion loss at 2.2 Mc. Specification: Nominal, 33.8 dB; minimum, 31.5 dB; maximum, 36.0 dB.

j. Set attenuator #2 to 50 dB and 606 FREQUENCY control to 10 Mc. Repeat steps f and g to obtain dummy antenna insertion loss at 10 Mc. Specification: Nominal, 39.1 dB; minimum, 36.5 dB; maximum, 41.5 dB.

Note

System tracking error is negligible at these frequencies. This insertion loss test effectively measures the Dummy Antenna impedance.

9. REFLECTION COEFFICIENT MEASUREMENT.

a. Set controls of test equipment as follows:

Signal Generator:	
FREQUENCY	65 Mc
MODULATION	1000 cps
modulation percent	100
Attenuator:	± 10 dB

VHF Bridge:	
PHASE	0
MAGNITUDE	55

VHF Detector:	
TUNING	65 Mc
VOLUME	mid-range

b. Connect test setup as shown in Figure 3.

c. Set termination selector knob to 0 dB.

d. Adjust 803A and 417A controls for a sharp null. Read impedance as indicated on impedance dial of bridge. The impedance should be not more than 62.4 ohms; equivalent to a reflection coefficient of 0.11 or an SWR of 1.25. Specification: reflection coefficient shall be 0.11 or less; SWR shall be 1.25 or less.

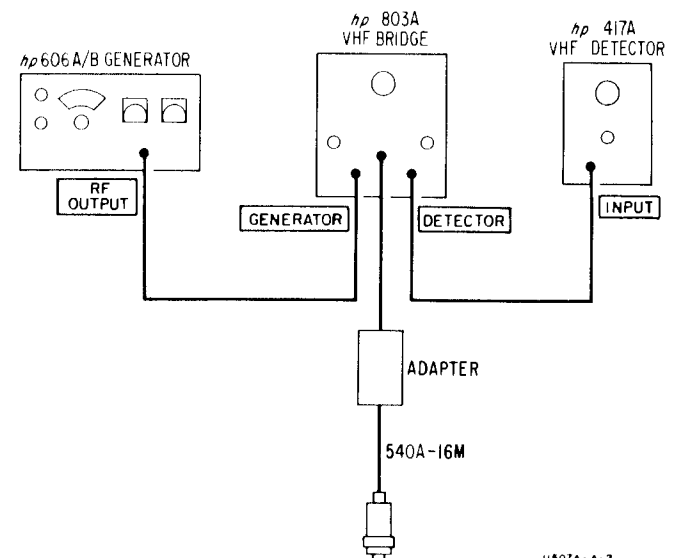


Figure 3. Reflection Coefficient Setup Diagram

e. Set termination selector to 20 dB and repeat step d.

10. MAINTENANCE.

11. Succeeding paragraphs give instruction for repair of the Model 11507A Termination. The schematic diagram is shown in Figure 4. Stock numbers required when ordering replacement parts are given in Table 3. To order a replacement part, address order or inquiry to your local Hewlett-Packard Sales and Service Office (see list at the rear of this Note).

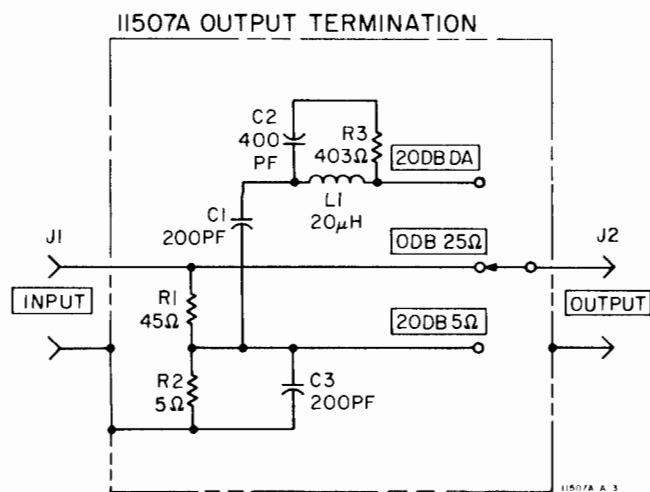


Figure 4. Schematic Diagram

12. SHIELD REMOVAL.

13. The input and output shields (see Table 3) are removed by taking out the retaining screws at the appropriate end of unit. The shield is then slipped over the coaxial connector.

14. ATTENUATOR SWITCH ASSEMBLY REMOVAL.

15. TOOLS REQUIRED.

- small soldering iron,
- pliers,
- screw driver,
- Allen wrench.

16. PROCEDURE.

- Remove both shields.
- Unsolder ground connection at output spacer.
- Unsolder input and output lead connections at assembly.
- Remove the three holding screws from input disc and spacers. Remove spacers and input disc with attached coaxial connector and cable.
- Loosen set screw on knob and remove knob.
- Remove the three holding screws from output disc and spacers. Remove spacers and output disc with attached coaxial connector and lead.
- Remove retaining hex nut from switch stem. Remove center disc.

Table 3. Parts List

Item	Description	hp Part Number	Total Quantity
C1	Cap, fxd disc cer 200 pf	0150-0072	2
C2	Cap, fxd disc cer 400 pf	0150-0071	1
C3	Same as C1		
J1	Conn, BNC female input Attaching Parts: Same as Item 7	1250-0045	1
J2	Conn, BNC male output Attaching Parts: Same as Item 7	1250-0045	1
L1	Coil, fxd 20 mH	9140-0047	1
R1	Res, fxd flm 45 ohm 1/2 W 1%	0727-0021	1
R2	Res, fxd flm 5 ohm 1/2 W 1%	0727-0004	1
R3	Res, fxd flm 403 ohm 1/2 W 1%	0727-0072	1

Table 3. Parts List (Cont'd)

Item	Description	hp Part Number	Total Quantity
1	MS, 2-56 x 3/16 sst rh	0520-0017	6
2	Lkwash No. 2 br ni-c int	2190-0014	12
3	Shield, input	11507-200	1
4	Disc, input end	11507-206	1
5	Knob	0370-0085	1
6	Disc, center	11507-202	1
7	Switch assy includes: C1, C2, C3, L1, R1, R2, R3, Attaching Parts: Lkwash, int, 3/8" ID x 1" OD Nut, pot, 3/8 x 32 x 1.2"	11507-600 2190-0016 2950-0001	1 3 3
8	Disc, output end	11507-203	1
9	Shield, output	11507-201	1
10	Same as Item 2		
11	Same as Item 1		
12	MS, 2-56 x 2-11/32 Attaching Parts: Same as Item 2	0520-0039	3
13	Spacer, output	11507-205	3
14	Cable, coax	11507-601	1
15	Spacer, input	11507-204	3
16	MS, 2-56 x 1-1/4 Attaching Parts: Same as Item 2	0520-0029	3

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