Operating and Service Manual

85131E/F 3.5 mm to 3.5 mm Test Port Return Cables

Agilent Technologies

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Hewlett-Packard to Agilent Technologies Transition

This documentation supports a product that previously shipped under the Hewlett-Packard company brand name. The brand name has now been changed to Agilent Technologies. The two products are functionally identical, only our name has changed. The document still includes references to Hewlett-Packard products, some of which have been transitioned to Agilent Technologies.

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HP 85131E/F Return Cables

GENERAL INFORMATION

To obtain optimum performance from this cable set, observe these simple precautions:

- Make connections carefully to avoid misalignment and connector damage, which will result in inaccurate measurements.
- Keep the connectors free of dirt and any particles.
- When you clean the connectors, try clean compressed air first. Do not use abrasives. Apply Freon TF to a clean foam swab. Hold the connector to be cleaned pointing down while wiping the connector so the Freon TF does not seep into the connector. Never spray the Freon TF into the connectors.
- For more information, refer to the Microwave Connector Care manual.

DESCRIPTION

Both the HP 85131E and HP 85131F are test port return cables designed specifically for the 3.5 mm test sets of the HP 8510 network analyzer system. All cables have a "NMD-3.5 (f)" connector on the test set end and a male or slotless female 3.5 mm connector on the Device Under Test (DUT) end.

The HP 85131E consists of a single cable, 96.5 cm (38 inches) long, fitted with a 3.5 mm slotless female connector on the DUT end and a NMD-3.5 (f) connector on the test set end. This cable is used primarily with Reflection/Transmission test sets.

The HP 85131F consists of two cables, each 62.2 cm (24.5 inches) long. The 85131-60012 cable has a 3.5 mm male connector on the DUT end and a NMD-3.5 (f) connector on the test set end. The 85131-60013 cable has a slotless 3.5 mm female connector on the DUT end and a NMD-3.5 (f) connector on the test set end. Any of these two individual cables can be used to make a set. These cables are primarily used with full S-parameter test sets.

SMA CONNECTOR COMPATABILITY

SMA connectors will mate with precision 3.5 mm connectors. The tolerances for SMA connectors are less stringent than the tolerances for precision 3.5 mm connectors. So if an SMA connector is to be mated to a 3.5 mm connector, gage the SMA connector to make sure that it will not damage the 3.5 mm connector. Also, use only a 5 lb-in (60 N-cm) torque wrench to tighten any connection involving an SMA connector. Please refer to your Microwave Connector Care manual for specifics on SMA/ precision 3.5 mm tolerances.

SPECIFICATIONS

Hewlett-Packard guarantees that the performance of your cables will equal or exceed the following specifications, at frequencies ≤26.5 GHz:

SWR	≤1.38 (15.94 dB return loss)	
Insertion Loss$_{(\text{in dB})}$	≤[0.35$\sqrt{f}$ +0.3] HP 85131E	where f is in GHz
	≤[0.25$\sqrt{f}$ +0.2] HP 85131F	

Recession of center conductor shoulder behind outer conductor mating plane, of 3.5 mm connector.

NMD-3.5 mm	0.005 to 0.056 mm (0.0002 to 0.0022 inch)
precision 3.5 mm male/female	0.0025 to 0.013 mm (0.001 to 0.0005 inch)

Protrusion is **never allowable** on any 3.5 mm connector.

SUPPLEMENTAL PERFORMANCE DATA

The following data gives further information about the typical performance of HP 85131E/F cables.

Magnitude stability (dB)	≤0.22 dB change, HP 85131E	
and Phase stability (degrees)	≤0.12 dB change, HP 85131F	where f is in GHz
with a 90 degree 3 inch bend	≤0.16 (f) +0.8, HP 85131E	
radius	≤0.13 (f) +0.5, HP 85131F	

Electrical length of the HP 85131E cable is approximately 1.150m, while it is approximately 0.74m for the HP 85131F cable.

PERFORMANCE TESTS

Using an HP 8510 Network Analyzer perform the following tests upon your cables as soon as you receive them, and periodically repeat the tests to determine if their performance is still satisfactory or if the cables need to be replaced.

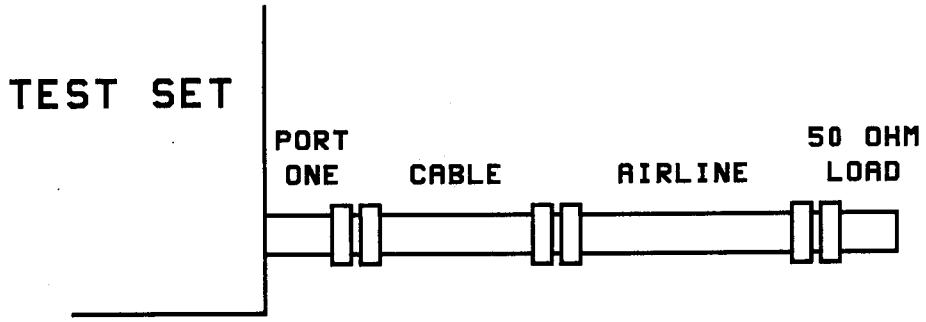

Figure 1. Return Loss set-up

Return loss is measured by connecting a 50-ohm fixed load termination through a 7.5 cm airline to the test cable, then attaching the cable to port one of the test set (see *Figure 1*).

The effects of an imperfect load may be gated out using the HP 8510 time domain option as follows:

1. Press **[INSTR PRESET]**, the HP 8510 will be set to a predetermined state.
2. Under STIMULUS, press **[START] [4] [5] [M/μ]**, this sets the start frequency to 45 MHz.
3. Under STIMULUS, press **[STOP] [2] [6] [.] [5] [G/n]**, this sets the stop frequency to 26.5 GHz.
4. Perform a 3.5 mm one port S11 calibration with 32 averaging at port one of your test set, as described in the Operating and Programming manual. Save the calibration.
5. Under MENUS, press **[DOMAIN]**. This brings up a set of time domain and frequency functions to the softkeys. Select **[TIME BANDPASS]**. This puts you in time domain mode.
6. Under STIMULUS, press **[START] [-] [.] [0] [5] [G/n]**. This sets the start time of the sweep to −.05 nano-seconds.
7. Under STIMULUS, press **[STOP] [6] [.] [5] [G/n]** (for the 85131F cables) or **[STOP] [9] [.] [5] [G/n]** (for the 85131E cables). This sets the stop time of the sweep to either 6.5 or 9.5 nano-seconds, respectively.
8. Under RESPONSE, press **[AUTO]**. This brings the trace on screen.
9. Under the softkey functions, press **[SPECIFY GATE]**. A new menu should appear that will allow you to press **[STOP]** softkey.
10. Using the RPG, adjust the stop gate to the center of the airline (see *Figure 2*).
11. Under the softkey functions press **[GATE ON]**. The HP 8510 will now compute the gate coefficients to gate out everything but the cable.
12. Press the **[PRIOR MENU]** button just to the right of the softkeys and a new menu should appear that will allow you to press **[FREQUENCY]** softkey.

13. Under RESPONSE, press **[MENU]**. This brings up a set of functions to the softkeys. Select **[SMOOTHING ON] [2] [x1]**.

14. Under MENUS, press **[MARKER]**. This brings up a set of functions to the softkeys. Select **[MORE] [MAXIMUM]** softkeys.

15. You can now read the return loss value from the screen marker value.

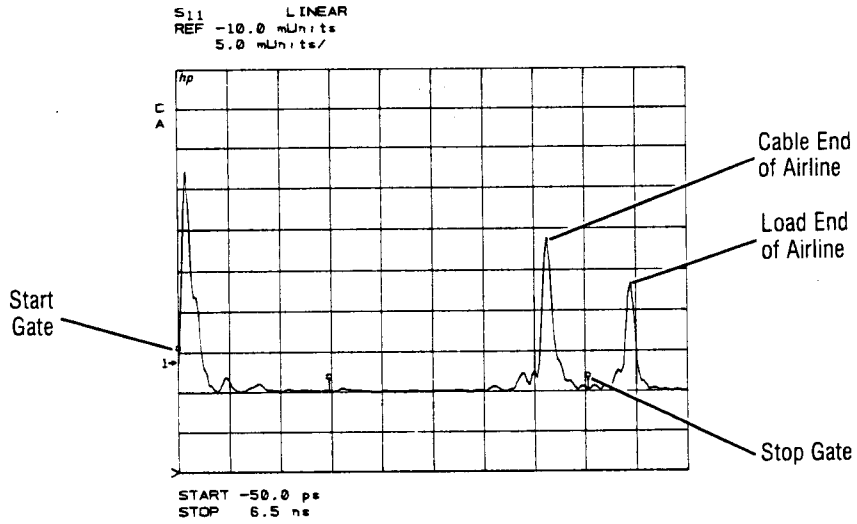

Figure 2. Location of Gates and Airline

Insertion loss is measured by terminating the cable with a short and then measuring return loss. Measure with the one port calibration, made in step 4 of the above procedure, turned on. The values shown on the CRT represent an out-and-back path for the signal, which is twice the insertion loss for the cable. Therefore, it is necessary to divide your worst case insertion loss by 2 before comparing it to the specifications in the beginning of this manual (see *Figure 3*).

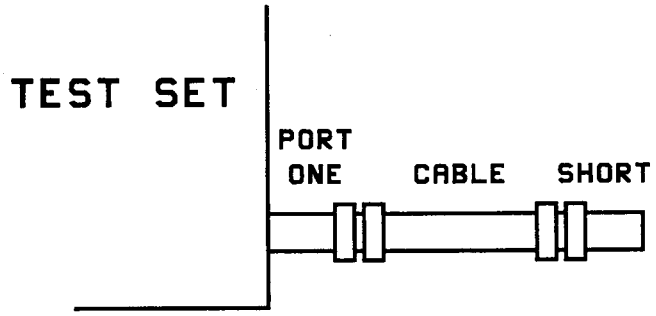

Figure 3. Insertion Loss set-up

REPLACEABLE PARTS

The following parts are replaceable on your HP 85131E/F cables.

A **single** HP 85131F Cable
NMD-3.5mm to Male 3.5mm 85131-60012
NMD-3.5mm to Female 3.5mm 85131-60013

EQUIPMENT AND SUPPLIES

The following equipment and supplies are required for the maintenance and use of, but are not supplied with, your HP 85131E/F cables.

3.5mm gage kit 85052-80010

Microwave Connector Care Manual 08510-90064

Male 50-ohm fixed load termination 85052-60010

Female 50-ohm fixed load termination 85052-60011

7.5cm airline 85053-60005

Male short 85052-60006

Female short 85052-60007

Connector cleaning kit 92193Z

3.5mm torque wrench 8710-1765

Spanner wrench 08513-20014

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