User's Guide

11766A DADE Switch
11767A TG Amplifier
11769A Return Loss Bridge

for the 859x Series
Spectrum Analyzers

Part Number 11767-90001
Printed in USA
October 1992

Notice

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.

Printed in USA March 2000

Certification

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, and to the calibration facilities of other International Standards Organization members.

Warranty

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error-free.

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The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

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Exclusive Remedies

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HP SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.

Safety Symbols

The following safety symbol is used throughout this manual. Familiarize yourself with the symbol and its meaning before operating this instrument.

Caution

The *caution* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a *caution* sign until the indicated conditions are fully understood and met.

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HP 11766A DADE Switch

The HP 11766A Diversity Antenna Delay Equalization (DADE) Switch can be used with an HP 859XA/E Spectrum Analyzer (fitted with the Option 111 Group Delay Measurements Card), to measure the group delay differences between two diversity antennae. The HP 11770A Link Measurement Personality is used to control the spectrum analyzer and group delay card.

Caution 

The HP 11766A DADE Switch is a static sensitive device. Take precautions against electrostatic discharges (ESD) to the RF In and RF Out connectors.

Using the DADE Switch

RF signals from two diversity antennae are fed into the radio receivers (down converters) as shown in Figure 1-1. By connecting the DADE switch to the IF outputs of the two receivers, you can simultaneously display the group delay characteristics of both paths. Any differences in the two characteristics can then be measured.

The HP 11766A DADE Switch has 5 connections. It has 2 input connections for the IF sources and 1 output which connects to the analyzer input. It also has a power supply connection which is fed by the analyzer's PROBE PWR output, and a control line which is connected to the analyzer's HIGH SWEEP IN/OUT (TTL) output. When operating, the set-up is as shown in Figure 1-1 and Figure 1-2.

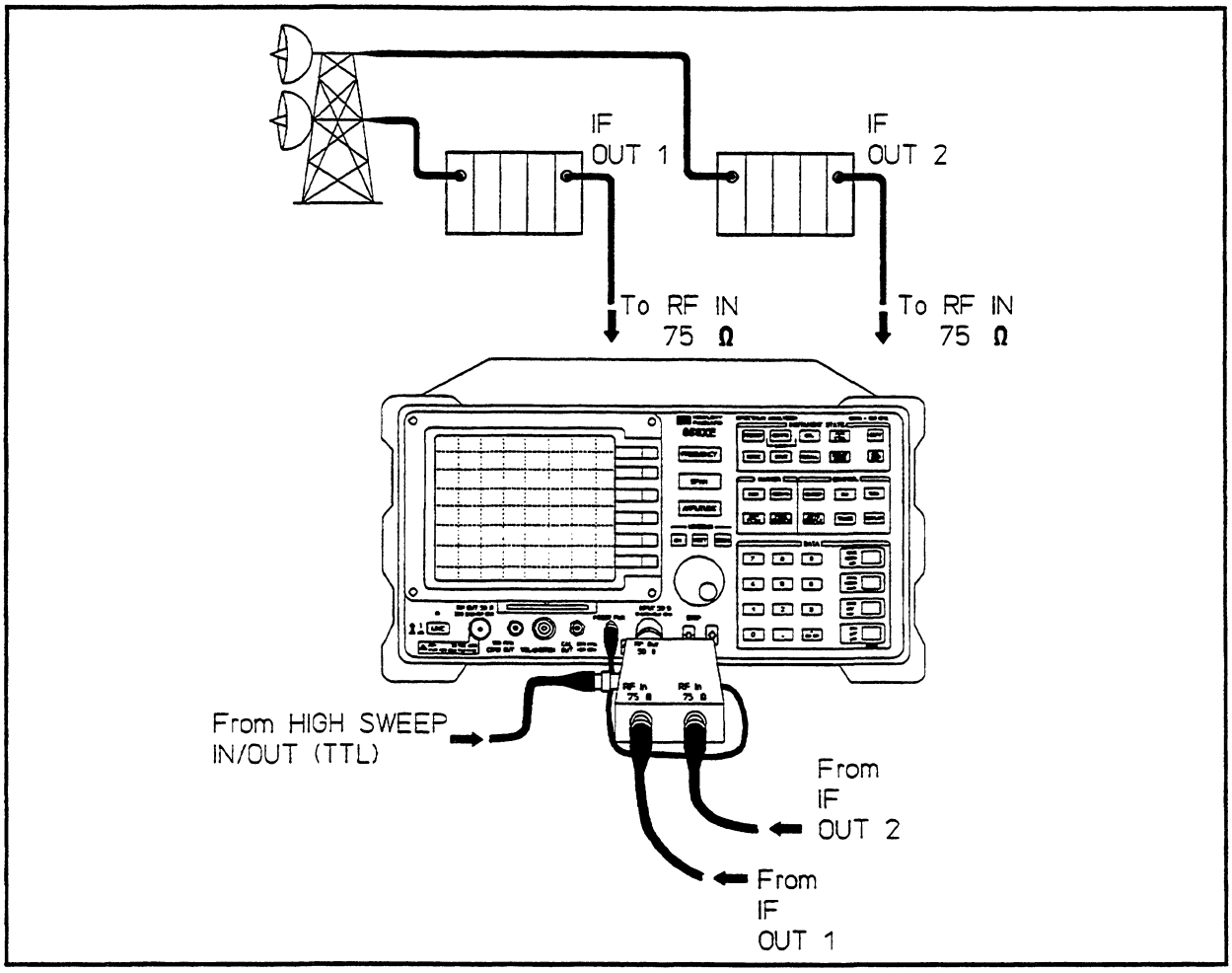

Figure 1-1. DADE Switch Connections

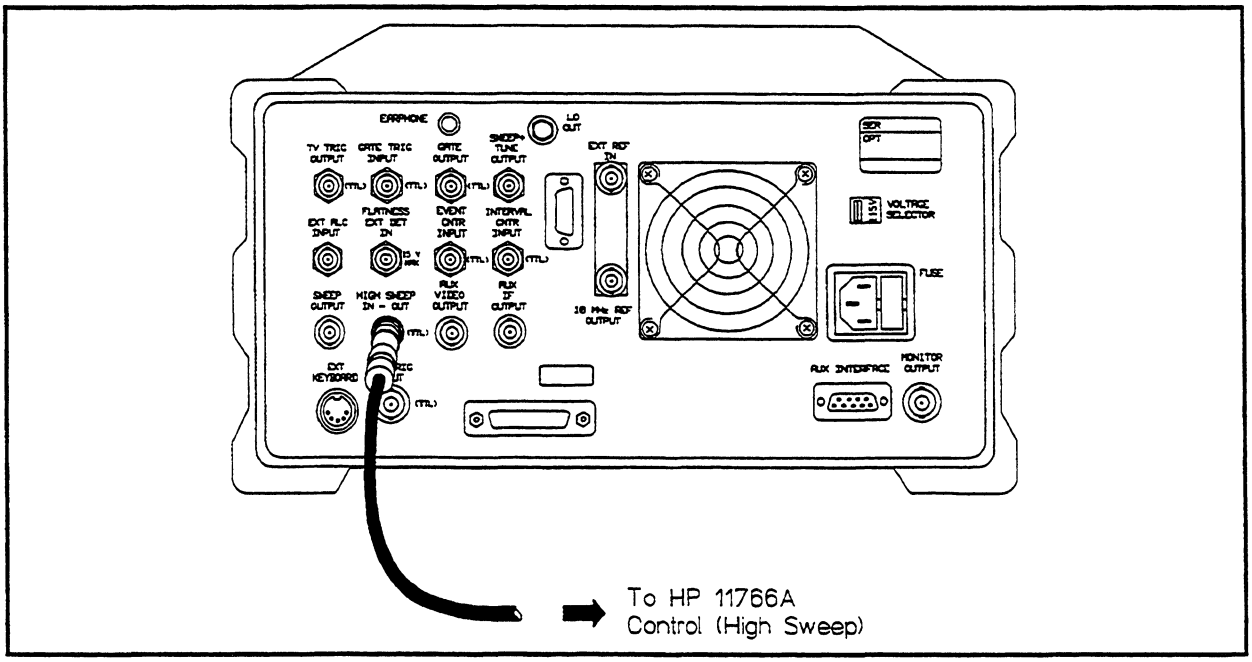

Figure 1-2. High Sweep Output Connection

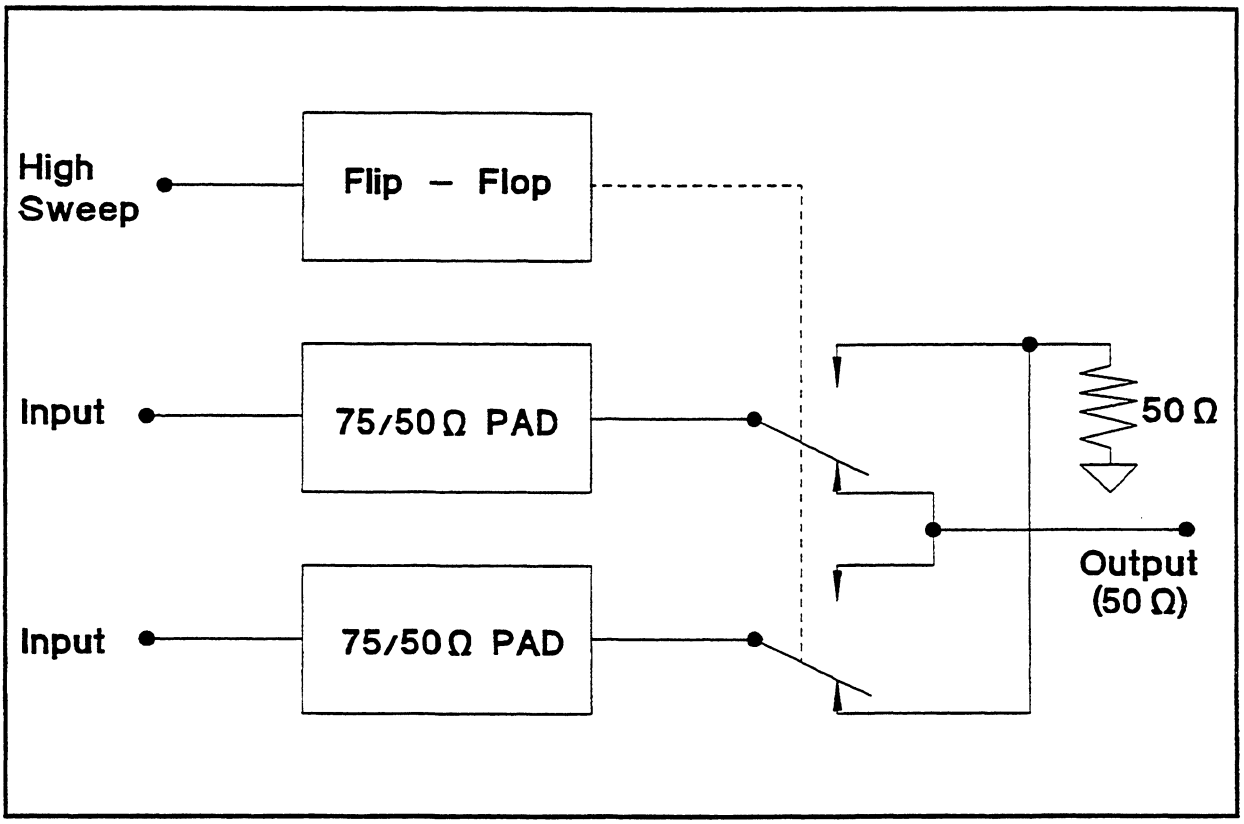

Figure 1-3. HP 11766A DADE Switch Block Diagram

For details on using the HP 11770A Link Measurement Personality with the DADE switch, refer to the *HP 11770A Link Measurement Personality User's Guide*.

DADE Switch Technical Specifications

All specifications apply after 2 hours storage at a constant temperature between 0°C and 50°C, 30 minutes after turn on.

In addition to guaranteed specifications, supplemental, or typical characteristics are shown. Typical characteristics provide useful, but nonwarranted information about the instrument's performance.

Frequency Range	25 MHz to 190 MHz
Differential Delay	± 0.1 ns
Power Rating	+ 15 dBm
Input Connectors	75 Ω Type BNC (f)
Input Return Loss	> 26 dB
Isolation	> 40 dB typical (25 MHz - 190 MHz)
Output Connector	50 Ω Type N (m)

DADE Switch Verification Tests

This section describes how the HP 11766A DADE Switch can be tested to check that it meets its specifications.

The section contains procedures that test the following specifications:

- Differential Delay
- Isolation
- Input Return Loss

Differential Delay

This test verifies that the difference in signal propagation delay between the two switch positions meets the following specification:

Differential Delay: ±0.1 ns (25 MHz - 190 MHz)

Equipment

Network Analyzer	HP 8753C
S-Parameter Test Set	HP 85047A
50 Ω Calibration Kit	HP 85032B
75 Ω Calibration Kit	HP 85036B
50 Ω / 75 Ω Mechanical Adaptor	Part No. 1250-0597
50 Ω / 75 Ω Minimum Loss Pad	HP 11852B
75 Ω N-BNC (Male-Male) adaptor (×2)	Part No. 1250-1533
TTL Pulse Source	see note

Note

A TTL pulse is needed to drive the DADE switch Control (High Sweep) input. One method is to use the HIGH SWEEP IN-OUT connector on an HP 859X spectrum analyzer. The analyzer should be set to single sweep and the trigger pulse is generated by pressing [SGL SWP].

Procedure

1. Set up the network analyzer as follows:
   - Press [PRESET].
   - Press [START], then enter a start frequency of 25 MHz. Press [STOP], then enter a stop frequency of 190 MHz.
   - Press [AVG]. If the video averaging function is OFF, press `AVERAGING on OFF` so that it changes to `AVERAGING ON off`. Press `AVERAGING FACTOR` then enter 16. This sets the number of averaging samples to 16.
   - Press `IF BW` then select a bandwidth of 300 Hz.
2. Connect a 7 mm test port cable (HP Part No. 8120-4779) to PORT 1 on the S-Parameter test set. Using the 50 Ω calibration kit adaptors, connect a 50 Ω N-type male adaptor to the other end of the cable and a 50 Ω N-type female adaptor to PORT 2 on the S-Parameter test set.
3. Perform a full 2 port calibration with this setup. Refer to the *HP 8753C Operating Manual* for details.

4. Disconnect the cable (with N-type male adaptor attached) from PORT 2.
5. Connect the DADE switch RF Out connector to PORT 2 on the S-Parameter test set, and the DADE switch DC power input to the PROBE POWER output on the network analyzer.
6. Connect the DADE switch Control (High Sweep) input to the TTL pulse source.
7. Connect a 50 Ω / 75 Ω Minimum Loss Pad to the unconnected end of the 7 mm cable and a 75 Ω N-BNC adaptor to the other side of the pad. Connect this to one of the DADE switch RF inputs and terminate the other RF input with a 75 Ω load via an N-BNC adaptor.
8. It is important that the DADE switch position is set to the same RF input as the test cable. The following steps describe how to ensure this:
   - Press (MEAS), then S_{21}(A/R).
   - Press (DISPLAY), then DATA.
   - Press (FORMAT), then LOG MAG.
   - Press (AVG). Turn off the video averaging by pressing AVERAGING ON off so it changes to AVERAGING on OFF.
   - Press (SCALE REF), then AUTOSCALE

   The display should show a signal with a magnitude of approximately −13 dBm. If this signal is not present, activate the TTL pulse to toggle the DADE switch to the opposite position, and recheck for the presence of the signal.
9. Set the network analyzer as follows:
   - Press (MEAS), then S_{21}(B/R).
   - Press (FORMAT), then DELAY.
   - Press (DISPLAY) then DATA.
   - Press (AVG), then turn video averaging on again.
   - Press SMOOTHING APERTURE, then enter 2. Press SMOOTHING ON off.
10. Press (AVG), then AVERAGING RESTART to begin the measurement and wait until the 16 sweeps have taken place (see the averaging counter at the left of the display).
11. Press (SCALE REF), then AUTOSCALE and store the trace in the analyzer's memory by pressing (DISPLAY) then DATA → MEMORY.
12. Swap the connections to the DADE switch 75 Ω RF Inputs and toggle the switch position using the TTL pulse generator.
13. Press (AVG), AVERAGING RESTART to begin the next measurement and wait until the 16 sweeps have taken place.
14. Press (DISPLAY), then DATA / MEMORY.
15. Press (SCALE REF) then AUTOSCALE.
16. Press REFERENCE VALUE, then enter a reference value of 0.
17. Check that the trace is within the specified limits.

DADE Switch Isolation

This test verifies that the isolation between the DADE switch RF inputs meets the following specification:

Isolation: >40 dB typical (25 MHz - 190 MHz)

Equipment

Network Analyzer	HP 8753C
S-Parameter Test Set	HP 85047A
50 Ω Calibration Kit	HP 85032B
75 Ω Calibration Kit	HP 85036B
50 Ω / 75 Ω Mechanical Adaptor	Part No. 1250-0597
50 Ω / 75 Ω Minimum Loss Pad	HP 11852B
75 Ω N-BNC (Male-Male) adaptor (x2)	Part No. 1250-1533
TTL Pulse Source	see note

Note

A TTL pulse is needed to drive the DADE switch Control (High Sweep) input. One method is to use the HIGH SWEEP IN-OUT connector on an HP 859X spectrum analyzer. The analyzer should be set to single sweep and the trigger pulse is generated by pressing (SGL SWP).

Procedure

1. If you are continuing from the "Differential Delay" verification test, go to step 9, otherwise continue this procedure from step 2.
2. Set up the network analyzer as follows:
   - Press (PRESET).
   - Press (START), then enter a start frequency of 25 MHz. Press (STOP), then enter a stop frequency of 190 MHz.
   - Press (AVG). If the video averaging function is OFF, press AVERAGING on OFF so that it changes to AVERAGING ON off. Press AVERAGING FACTOR then enter 16. This sets the number of averaging samples to 16.
   - Press IF BW then select a bandwidth of 300 Hz.
3. Connect a 7 mm test port cable (HP Part No. 8120-4779) to PORT 1 on the S-Parameter test set. Using the 50 Ω calibration kit adaptors, connect a 50 Ω N-type male adaptor to the other end of the cable and a 50 Ω N-type female adaptor to PORT 2 on the test set.
4. Perform a full 2 port calibration with this setup. Refer to the *HP 8753C Operating Manual* for details.
5. Disconnect the cable (with N-type male adaptor attached) from PORT 2.
6. Connect the DADE switch RF Out connector to PORT 2 on the S-Parameter test set, and the DADE switch DC power input to the PROBE POWER output on the network analyzer.
7. Connect the DADE switch Control (High Sweep) input to the TTL pulse source.
8. Connect a 50 Ω / 75 Ω Minimum Loss Pad to the unconnected end of the 7 mm cable and a 75 Ω N-BNC adaptor to the other side of the pad. Connect this to one of the DADE

switch RF input ports and terminate the other RF input with a 75 Ω load via an N-BNC adaptor.

9. It is important that the DADE switch position is set to the same RF input as the test cable. The following steps describe how to ensure this:
   - Press (MEAS), then S_{21}(A/R).
   - Press (DISPLAY), then DATA.
   - Press (FORMAT), then LOG MAG.
   - Press (AVG). Turn off the video averaging by pressing AVERAGING ON off so it changes to AVERAGING on OFF.
   - Press (SCALE REF), then AUTOSCALE

   The display should show a signal with a magnitude of approximately −13 dBm. If this signal is not present, activate the TTL pulse to toggle the DADE switch to the opposite position and recheck for the presence of the signal.
10. Set the network analyzer as follows:
    - Press (MEAS), then S_{12}(A/R)
    - Press (FORMAT), then LOG MAG
    - Press (AVG), then turn video averaging on again.
    - Press SMOOTHING APERTURE, then enter 2. Press SMOOTHING ON off.
11. Press (AVG), then AVERAGING RESTART to begin the measurement and wait until the 16 sweeps have taken place (see the averaging counter at the left of the display).
12. Press (SCALE REF), then AUTOSCALE and store the trace in the analyzer's memory by pressing (DISPLAY) then DATA → MEMORY.
13. Swap the connections to the DADE switch 75 Ω RF Inputs. *Do not toggle the switch position.*
14. Press (AVG), AVERAGING RESTART to begin the next measurement and wait until the 16 sweeps have taken place.
15. Press (DISPLAY), then DATA / MEMORY.
16. Press (SCALE REF), then AUTOSCALE.
17. Check that the trace meets the specification.

Input Return Loss

This test verifies that the return loss measured at the DADE switch RF inputs meets the following specification.

Input Return Loss: >26 dB (25 MHz - 190 MHz)

Equipment

Network Analyzer	HP 8753C
S-Parameter Test Set	HP 85047A
50 Ω Calibration Kit	HP 85032B
75 Ω Calibration Kit	HP 85036B
50 Ω / 75 Ω Mechanical Adaptor	Part No. 1250-0597
50 Ω / 75 Ω Minimum Loss Pad	HP 11852B
75 Ω N-BNC adaptor (Male-Male)	Part No. 1250-1533
TTL Pulse Source	see note

Note

A TTL pulse is needed to drive the DADE switch Control (High Sweep) input. One method is to use the HIGH SWEEP IN-OUT connector on an HP 859X spectrum analyzer. The analyzer should be set to single sweep and the trigger pulse is generated by pressing (SGL SWP).

Procedure

1. Using an adaptor from the 75 Ω calibration kit, connect the 50 Ω / 75 Ω Mechanical Adaptor to PORT 2 of the S-Parameter test set.
2. On the network analyzer, press (AVG), and check that `AVERAGING on OFF` is displayed.
3. Set up the network analyzer to use a 75 Ω calibration kit by pressing (CAL), `CAL KIT`, `N 75 Ω`.
4. Refer to the *HP 8753C Operating Manual* and perform an S_{22} 1 port calibration.
5. Terminate the DADE switch RF output with a 50 Ω load from the 50 Ω calibration kit. Connect one of the DADE switch 75 Ω RF inputs to the adaptor on PORT 2 using a 75 Ω N-BNC adaptor.
6. Terminate the other RF input using a 75 Ω load from the 75 Ω calibration kit.
7. Connect the DADE switch Control input to the TTL pulse source.
8. Set the network analyzer as follows:
   - Press (FORMAT), then `LOG MAG`
   - Press (DISPLAY), then `DATA`
   - Press (SCALE REF), then `AUTOSCALE`
9. Verify that the trace meets the specification.
10. Toggle the DADE switch with a TTL pulse.
11. Press (SCALE REF), then `AUTOSCALE` and check that the trace meets the specification.
12. Swap the connections to the DADE switch RF inputs and repeat steps 8 to 11.

2

HP 11767A Tracking Generator Amplifier

This product can be used with an HP 859X Spectrum Analyzer (with the tracking generator option) to increase the output power from the tracking generator by approximately 8.2 dB.

Caution The HP 11767A TG Amplifier is a static sensitive device. Take precautions against electrostatic discharges (ESD) to the RF In and RF Out connectors.

Using the Tracking Generator Amplifier

1. Connect the HP 11767A RF IN connector to the analyzer's RF OUT connector.
2. Connect the Probe Power lead to the analyzer's PROBE PWR output. The Probe Power female connector is required if more than one accessory is being used at once, for example if the amplifier is used with the HP 11766A DADE Switch.
3. The amplified tracking generator signal is taken from the HP 11767A RF OUT connector as shown in Figure 2-1.

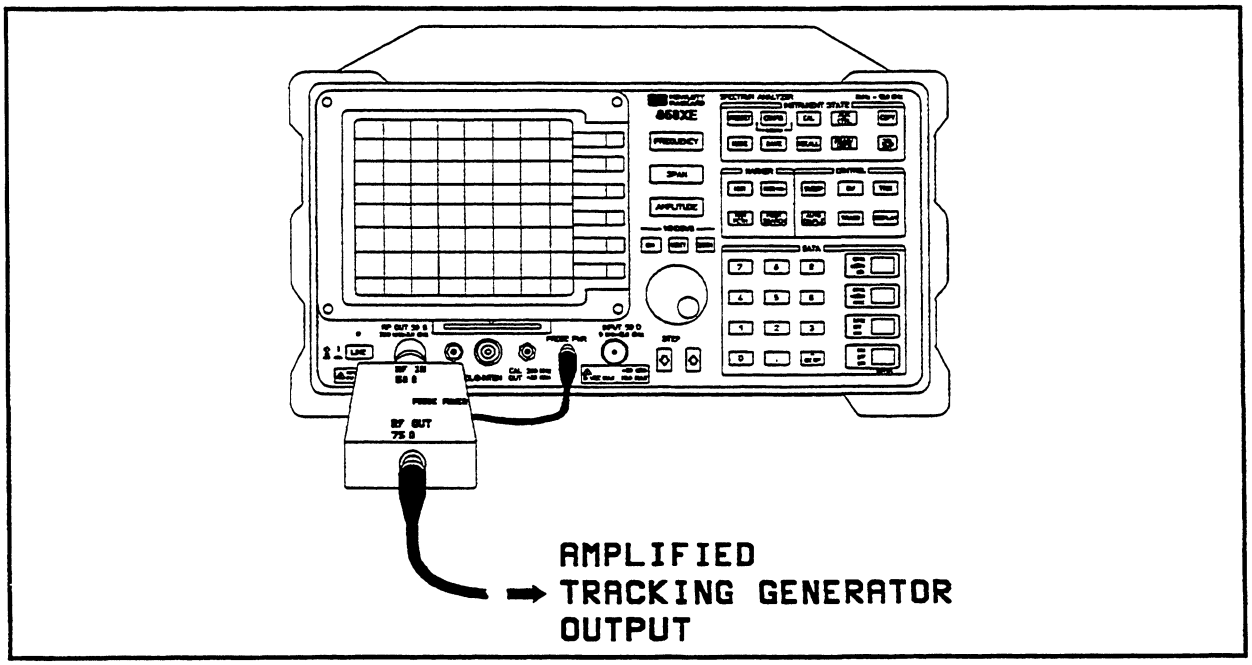

Figure 2-1. TG Amplifier Connections

TG Amplifier Technical Specifications

All specifications apply after 2 hours storage at a constant temperature between 0°C and 50°C, 30 minutes after turn on.

In addition to guaranteed specifications, supplemental, or typical characteristics are shown. Typical characteristics provide useful, but nonwarranted information about the instrument's performance.

Frequency Range	45 MHz to 190 MHz
Gain	8.2 dB Typical
Flatness	± 0.1 ns ± 0.1 dB
1 dB Compression Point	10 dBm Output typical
Input Connector	50 Ω Type N (m)
Output Connector	75 Ω Type BNC (f) (> 26 dB Return Loss)

TG Amplifier Verification Tests

Amplifier Gain and Flatness

This test verifies that the amplifier meets the following specifications:

Gain: 8.2 dB typical (25 MHz - 190 MHz)

Flatness: ±0.1 dB

Equipment

Network Analyzer ..... HP 8753C
S-Parameter Test Set ..... HP 85047A
50 Ω Calibration Kit ..... HP 85032B
50 Ω / 75 Ω Mechanical Adaptor ..... Part No. 1250-0597
50 Ω / 75 Ω Minimum Loss Pad ..... HP 11852B
75 Ω N-BNC (Male-Male) adaptor ..... Part No. 1250-1533

Procedure

1. Set up the network analyzer as follows:
   - Press [PRESET].
   - Press [START], then enter a start frequency of 25 MHz. Press [STOP], then enter a stop frequency of 190 MHz.
   - Press [AVG]. If the video averaging function is OFF, press `AVERAGING on OFF` so that it changes to `AVERAGING ON off`. Press `AVERAGING FACTOR` then enter 16. This sets the number of averaging samples to 16.
   - Press `IF BW` then select a bandwidth of 300 Hz.

2. Connect a 7 mm test port cable (HP Part No. 8120-4779) to PORT 1 on the S-Parameter test set. Using the 50 Ω calibration kit adaptors, connect a 50 Ω N-type male adaptor to the other end of the cable and a 50 Ω N-type female adaptor to PORT 2 on the S-Parameter test set.
3. Perform a full 2 port calibration with this setup. Refer to the *HP 8753C Operating Manual* for details.
4. Connect the amplifier RF input to the S-Parameter test set PORT 2 and it's DC power input to the network analyzer's PROBE POWER output.
5. Connect a 50 Ω / 75 Ω Minimum Loss Pad to the unconnected end of the 7 mm cable and a 75 Ω N-BNC adaptor to the other side of the pad. Connect this to the amplifier's RF output port.
6. Set the network analyzer as follows:
   - Press (MEAS), then S_{12}(A/R)
   - Press (FORMAT), then LOG MAG
   - Press (DISPLAY), then DATA
   - Press (SCALE REF), then AUTOSCALE
7. To begin the measurement, press (AVG) then AVERAGING RESTART, and wait until the 16 sweeps have taken place (see the averaging counter at the left of the display).
8. The 50 Ω / 75 Ω Minimum Loss Pad has a loss of approximately 5.7 dB. The gain that is measured by the the network analyzer will therefore be reduced from 8.2 dB to approximately 2.5 dB. Press (SCALE REF), then REFERENCE VALUE and verify that the reference value is approximately 2.5 dB.
9. Press (SCALE REF), then SCALE / DIV and enter a scale of 0.1 dB/div. Check that the flatness meets the specification.

Amplifier Output Return Loss

This test verifies that the return loss measured at the amplifier's RF output meets the following specification.

Return Loss: >26 dB (25 MHz - 190 MHz)

Equipment

Network Analyzer	HP 8753C
S-Parameter Test Set	HP 85047A
50 Ω Calibration Kit	HP 85032B
75 Ω Calibration Kit	HP 85036B
50 Ω / 75 Ω Mechanical Adaptor	Part No. 1250-0597
50 Ω / 75 Ω Minimum Loss Pad	HP 11852B
75 Ω N-BNC adaptor (Male-Male)	Part No. 1250-1533

Procedure

1. Using an adaptor from the 75 Ω calibration kit, connect the 50 Ω / 75 Ω Mechanical Adaptor to PORT 2 of the S-Parameter Test.
2. On the network analyzer, press (AVG), and check that `AVERAGING on OFF` is displayed.
3. Set up the network analyzer to use a 75 Ω calibration kit by pressing (CAL), `CAL KIT`, `N 75 Ω`.
4. Refer to the *HP 8753C Operating Manual* and perform an S_{22} 1 port calibration.
5. Terminate the amplifier RF input with a 50 Ω load from the 50 Ω calibration kit. Connect the RF output to the adaptor on PORT 2 using a 75 Ω N-BNC adaptor.
6. Set the network analyzer as follows:
   - Press (FORMAT), then `LOG MAG`
   - Press (DISPLAY), then `DATA`
   - Press (SCALE REF), then `AUTOSCALE`
7. Verify that the trace meets the specification.

3

HP 11769A Return Loss Bridge

This product can be used with an HP 859X Series Spectrum Analyzer to measure the return loss of a DUT (such as the IF input to a radio transmitter).

Using the Return Loss Bridge

The block diagram in Figure 3-1 shows the HP 11769A Return Loss Bridge measuring the return loss of a device. The example shows the power levels at each point in the setup for an input power of 0 dBm and a return loss of 20 dB. PORT 1 on the Return Loss Bridge should be terminated with a 75 Ω load as shown.

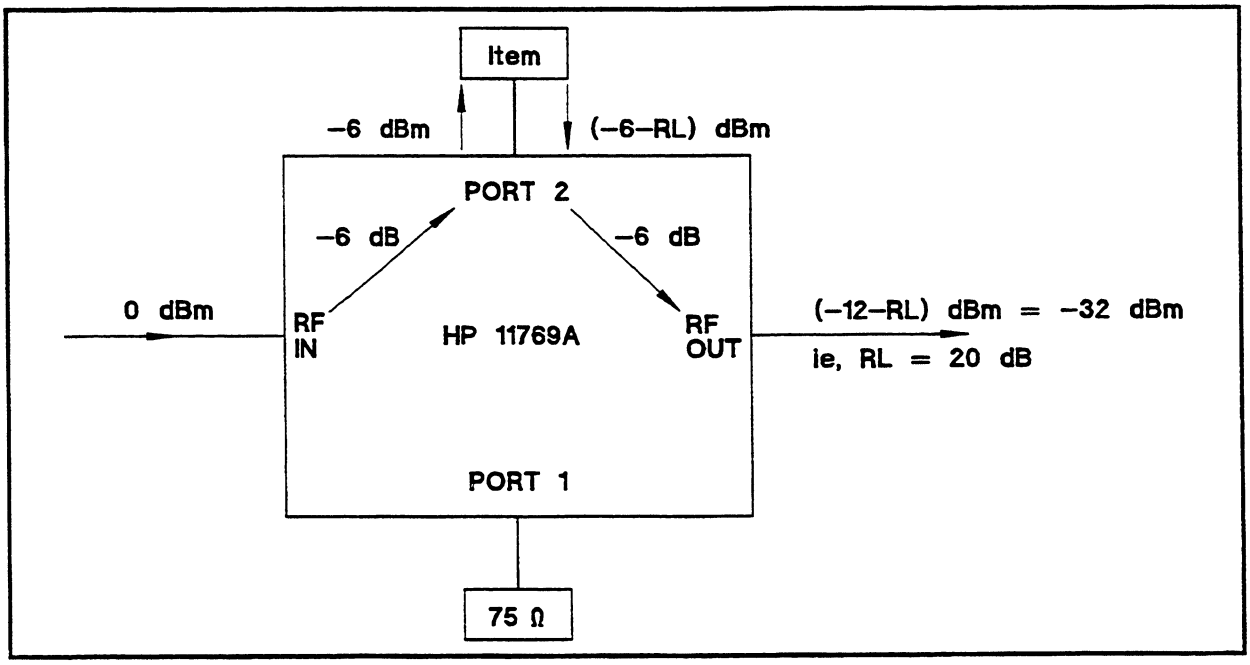

Figure 3-1. Return Loss Bridge Measurement

Return Loss Bridge Technical Specifications

Frequency Range	25 MHz to 190 MHz
Directivity	> 40 dB
Coupling	6 dB

Return Loss Bridge Verification Tests

Directivity

This test verifies that the directivity of the return loss bridge meets the following specification.

Directivity: >40 dB (25 MHz - 190 MHz)

Equipment

Network Analyzer ..... HP 8753C
S-Parameter Test Set ..... HP 85047A
50 Ω Calibration Kit ..... HP 85032B
75 Ω Calibration Kit ..... HP 85036B
50 Ω / 75 Ω minimum loss pad (×2) ..... HP 11852B
75 Ω N-BNC (Female-Male) adaptor (×3) ..... Part No. 1250-1534
75 Ω N-BNC (Male-Male) adaptor ..... Part No. 1250-1533

Procedure

1. Set up the network analyzer as follows:
   - Press (PRESET).
   - Press (START), then enter a start frequency of 25 MHz. Press (STOP), then enter a stop frequency of 190 MHz.
   - Press (AVG). If the video averaging function is OFF, press AVERAGING on OFF so that it changes to AVERAGING ON off. Press AVERAGING FACTOR then enter 16. This sets the number of averaging samples to 16.
   - Press IF BW then select a bandwidth of 300 Hz.
2. Connect a 7 mm test port cable (HP Part No. 8120-4779) to PORT 1 on the S-Parameter test set. Using the 50 Ω calibration kit adaptors, connect a 50 Ω N-type male adaptor to the other end of the cable and a 50 Ω N-type female adaptor to PORT 2 on the S-Parameter test set.
3. Perform a full 2 port calibration with this setup. Refer to the *HP 8753C Operating Manual* for details.
4. Change the adaptor on the S-Parameter test set PORT 2 to present an N-type male connection. Connect this to a 50 Ω / 75 Ω minimum loss pad and a 75 Ω N-BNC adaptor to the other side of the pad. Connect this to the RF OUT connector on the return loss bridge.

5. Connect another 50 Ω / 75 Ω minimum loss pad to the cable attached to PORT 1 of the test set and a 75 Ω N-BNC adaptor to the other side of this pad. Connect this to the RF IN connector of the return loss bridge.
6. Terminate PORT 1 of the return loss bridge with a 75 Ω load from the calibration kit.
7. Set the network analyzer as follows:
   - Press (MEAS), then S_{21}(B/R).
   - Press (DISPLAY), then DATA.
   - Press (FORMAT), then LOG MAG.
8. Press (AVG), then AVERAGING RESTART to begin the measurement and wait until the 16 sweeps have taken place (see the averaging counter at the left of the display).
9. Press (DISPLAY), DATA → MEMORY, DATA / MEMORY.
10. Terminate PORT 2 of the bridge with the other 75 Ω load from the calibration kit and press (AVG), then AVERAGING RESTART to start the measurement. Wait for the 16 sweeps to be completed and then press (SCALE REF), AUTOSCALE.
11. Check that the trace is within the specified limits.

A

Regulatory Information

This appendix contains regulatory information for the following products:

- HP 11766A DADE Switch
- HP 11767A TG Amplifier
- HP 11769A Return Loss Bridge

HP 11766A Declaration of Conformity

DECLARATION OF CONFORMITY

Manufacturer's Name:	Hewlett-Packard Limited Queensferry Microwave Division
Manufacturer's Address:	South Queensferry West Lothian Scotland EH30 9TG

declares, that the product

Product Name :	D.A.D.E. Switch
Model Number(s):	HP 11766A
Product Options:	This declaration covers all options of the above product.

conforms to the following Product Specifications:

Safety:	IEC 348 (1978) CSA - C22.2 No. 231 Series - M89
EMC:	EN 55011 (1991) Group 1, Class A EN 50082-1 (1991)

South Queensferry, Scotland — Location

22nd Sept '92 — Date

P. Rigby / Quality Manager

HP 11767A Declaration of Conformity

DECLARATION OF CONFORMITY

Manufacturer's Name: Hewlett-Packard Limited
Queensferry Microwave Division

Manufacturer's Address: South Queensferry
West Lothian
Scotland EH30 9TG

declares, that the product

Product Name : T.G.A. (Tracking Generator Amplifier)

Model Number(s): HP 11767A

Product Options: This declaration covers all options of the above product.

conforms to the following Product Specifications:

Safety: IEC 348 (1978)
CSA - C22.2 No. 231 Series - M89

EMC: EN 55011 (1991) Group 1, Class A
EN 50082-1 (1991)

South Queensferry, Scotland — Location

2nd Sept '93 — Date

P A Rigby — P. Rigby / Quality Manager

HP 11769A Declaration of Conformity

DECLARATION OF CONFORMITY

Manufacturer's Name: Hewlett-Packard Limited
Queensferry Microwave Division

Manufacturer's Address: South Queensferry
West Lothian
Scotland EH30 9TG

declares, that the product

Product Name : R.L.B. (Return Loss Bridge)

Model Number(s): HP 11769A

Product Options: This declaration covers all options of the above product.

conforms to the following Product Specifications:

Safety: IEC 348 (1978)

EMC: EN 55011 (1991) Group 1, Class A
EN 50082-1 (1991)

South Queensferry, Scotland — Location
22nd Sept '92 — Date
P. Rigby / Quality Manager

Immunity Testing Degradation

Immunity to Fast Transients/Bursts	As specified in IEC 801-4, a pulse having the following parameters; Level = 0.5 kV, Tr = 5 ns, Th = 50 ns and Repetition Frequency = 5 kHz, when coupled onto "Port 1" or "Port 2" of the HP 11769A Return Loss Bridge, degradation of the return loss signal on the display of the HP 859X Option 111 Spectrum Analyzer will result. With a return loss signal of 45 MHz to 190 MHz, at −60 dBm and the HP 8593E Option 111 resolution bandwidth set to 1 MHz and the video bandwidth set to 300 Hz, the degradation takes the form of a 12 dB interference signal sweeping through the frequency spectrum.