HP 11770A Link Measurement Personality

HEWLETT PACKARD

Technical Data

Cost effective group delay and amplitude flatness integrated with your spectrum analyzer.

Portability and Integration to save you Time and Money

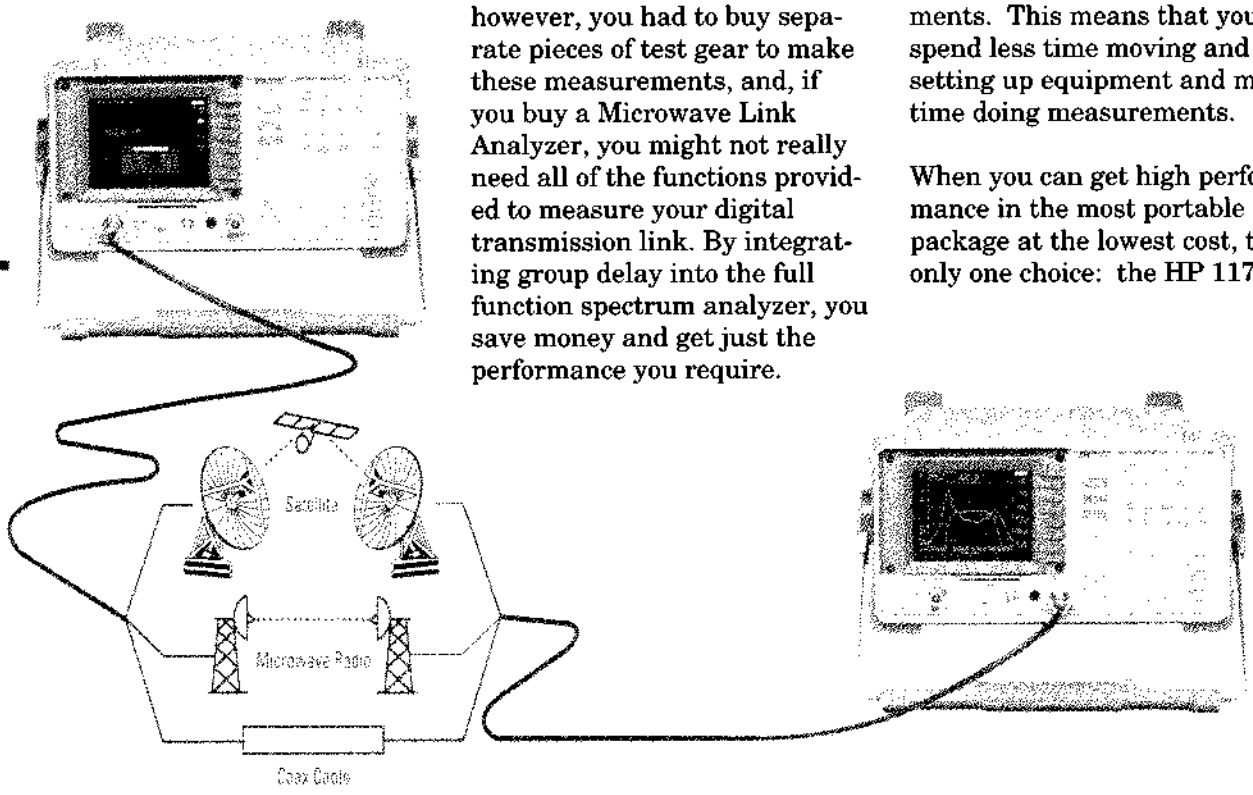
Integration Saves You Money

You can add group delay and amplitude flatness to an HP 8590 series spectrum analyzer at about 50% of the cost of alternative solutions. End-to-end link analysis and spectrum analysis are two important test requirements for microwave radio, satellite, cable and other systems. Until now, however, you had to buy separate pieces of test gear to make these measurements, and, if you buy a Microwave Link Analyzer, you might not really need all of the functions provided to measure your digital transmission link. By integrating group delay into the full function spectrum analyzer, you save money and get just the performance you require.

Portability Saves You Time

The HP 11770A Link Measurement Personality and the group delay card add less than 1 kg to the weight of the portable spectrum analyzer. We've harnessed the versatility and performance of the HP 8590 series Portable Spectrum Analyzer to give you group delay and amplitude flatness measurement capabilty without the need for extra instruments. This means that you will spend less time moving and setting up equipment and more time doing measurements.

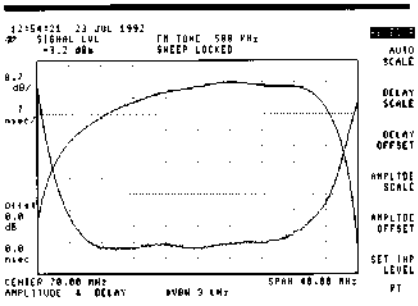
When you can get high performance in the most portable package at the lowest cost, there's only one choice: the HP 11770A.



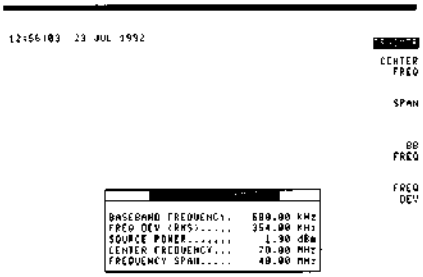
End-to-end Measurements

With the HP 11770A, you can measure group delay and amplitude flatness even if the input and output of the device under test are miles apart. This is because the HP 11770A allows the spectrum analyzer to act as a source and/or receiver so that one instrument can input a signal at one location while a second can receive, track and demodulate the signal at another. Measurements can be made across radio or satellite links, cables or any electronic transmission medium.

Even on end-to-end measurements, you get a clear stable display of the group delay and amplitude flatness ideal for making adjustments to your system. At the touch of a button, your measurements can be printed out or, if you prefer, results can be stored for later printout. The measurement set-up can also be stored and later recalled to simplify repeated measurements.



The quality of service available from a transmission network depends on the adjustment of the amplitude and group delay responses. Here we show the response of a digital microwave radio.

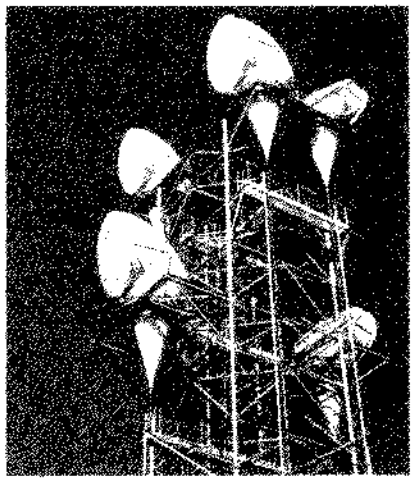


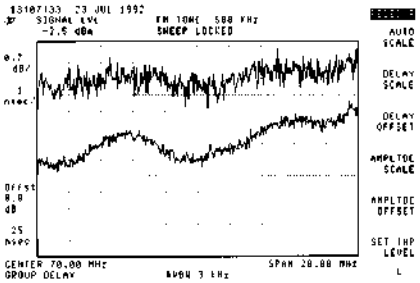
On the transmit end, the parameters of the instrument are clearly displayed and easily adjusted.

Digital Microwave Radio

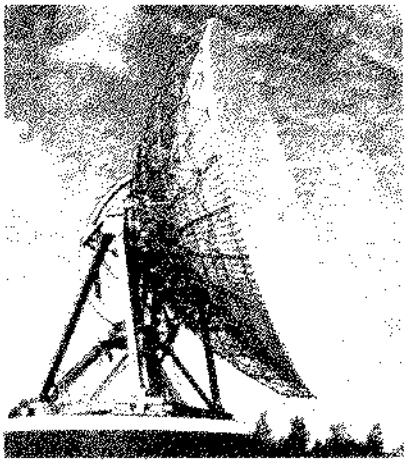
Group Delay and Amplitude Flatness are key tests which must be made during radio installation. End-to-end measurements test the up and down converters, antennas, feed networks and the transmission path. Several other important measurements can also be made such as Diversity Antenna Delay Equalization (DADE) and IF return loss. To help you make these measurements, HP offers a line of accessory products: the HP 11766A DADE switch, the HP 11767A IF amplifier, the HP 11769A Return Loss Bridge and the HP 11852B 50/75 Ω Minimum Loss Pad.

The HP 11770A provides all this necessary measurement capability, eliminating the need for separate link analysis equipment. The cost and size savings can be significant. In addition, to capture even more benefit from integration, look at the HP 11758V Digital Radio Test System which combines an extensive collection of critical Digital Microwave Radio measurement capabilities in two portable instruments.



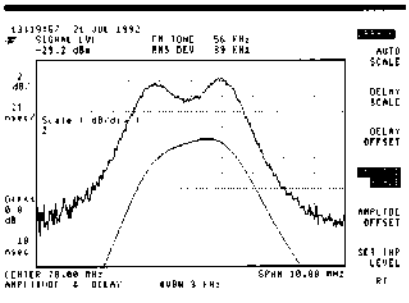


DADE—one of the many adjustments made on a digital microwave radio. Using the HP 11766A DADE switch with the HP 11770A, this measurement is simple.



Satellite

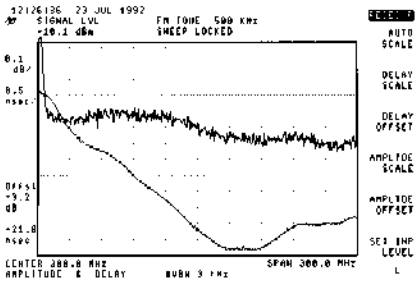
Satellite earth station testing presents a unique set of problems for link analysis. Two HP 11770As in "end-to-end" mode meet the challenges of satellite testing and then go further to give you measurement capability that you've always wanted but couldn't get from MLAs. A pair of analyzers equipped with the HP 11770A measure group delay and amplitude flatness across a satellite link even under low C/N conditions. They can also measure the link characteristics of one channel without disturbing or being disturbed by closely spaced adjacent channels. The HP 11770A measures IF to RF group delay so that you can isolate problems to the transmitter without a test loop translator.



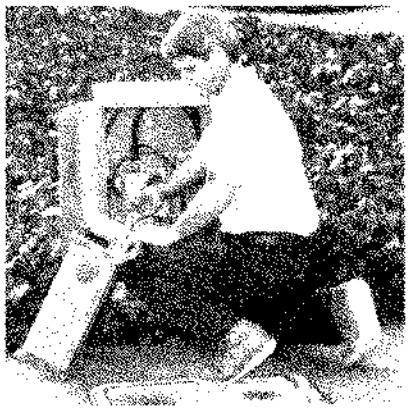
Even under difficult C/N and adjacent channel conditions, the HP 11770A provides a stable measurement.

Cable Test

When you are out on-the-road maintaining cable networks you can't afford to carry racks of expensive and bulky test gear. Unfortunately, you often need just the sort of test capability provided by these dedicated instruments. The HP 11770A gives you the key measurement capabilities of this dedicated test gear, but it does so without the need for a separate instrument. The HP 11770A makes end-to-end and return loss measurements to help you troubleshoot the cable and keep it providing top quality service.

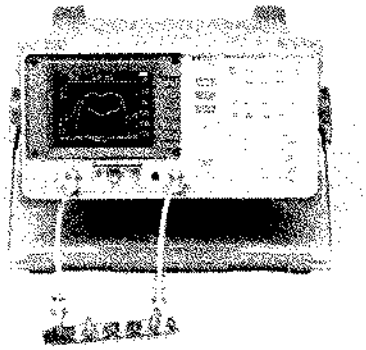


With the HP 11770A, the response of a coax cable can be measured between head-end and the subscriber output. This measurement will include the effects of amplifiers and frequency translators in the path.



General Device Test

The applications of the HP 11770A extend well beyond those just described. The group delay and amplitude response of many devices can be tested using the HP 11770A. If the input and output frequencies are the same and the total delay is less than 1 ms, then only a single analyzer is required. Alternatively, it is possible to measure the transmission characteristics of a frequency translation device by using two group delay equipped spectrum analyzers.



Specifications

All specifications apply over 0°C to +55°C, (see note 1). In addition to guaranteed specifications, supplemental, or typical, characteristics are shown. Typical characteristics provide useful, but nonwarranted information about the instrument's performance.

End-to-End

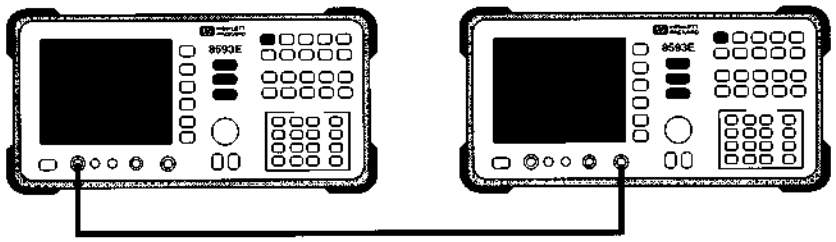
End-to-End performance refers to measurements made between any two spectrum analyzers equipped with the group delay option.

Amplitude:

Max Range: 16 dB
Max Sensitivity: 0.1 dB/div
Residual Flatness:
± 0.1 dB
(70/140 MHz ± 20 MHz)

Delay:

Max Range:
± 2000 ns (55 kHz tone)
± 200 ns (555 kHz tone)
Max Sensitivity: 0.1 ns/div
Residual Flatness:
± 0.1 ns Typical
(70/140 MHz ± 20 Mz)
Noise: < 0.1 ns Typical
(rms, 250 kHz tone,
200 kHz dev)



Loop-Back

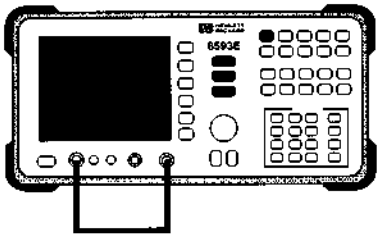
This data applies to measurements made using a single instrument in the loop-back mode.

Amplitude:

Max Range: 16 dB
Max Sensitivity: 0.1 dB/div
Residual Flatness:
± 0.1 dB (70/140 MHz
± 20 MHz)

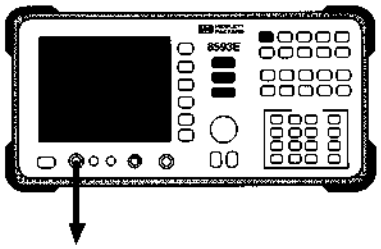
Delay:

Max Range:
± 2000 ns (55 kHz tone)
± 200 ns (555 kHz tone)
Max Sensitivity: 0.1 ns/div
Residual Flatness:
± 0.1 ns (70/140 MHz
± 20 MHz)
Noise: < 0.1 ns (rms,
250 kHz tone, 200 kHz
dev)



Transmitter

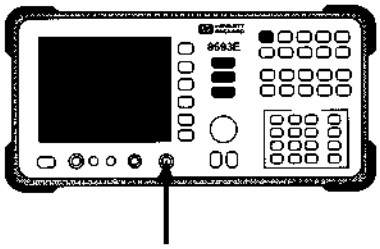
This data describes the characteristics of the tracking generator when it is used as the group delay measurements source.



Center Frequency:
Range: 300 KHz - 2.9 GHz
Span: 0.5 MHz to 100 MHz
Output Level:
–1 dBm to –66 dBm
+2 dBm typical (<200 MHz)
FM Characteristics:
Rate:
55.56, 66.67, 83.33, 92.59, 200, 250, 277.778, 500 and 555.56 kHz
Deviation: < 2.1 x rate kHz rms
Harmonics: < 25 dBc
Sweep:
Time: 50 ms fixed
Shape: Sawtooth
Output: 50 Ω N (f)

Receiver

This data describes the characteristics of the spectrum analyzer when it is used as the receiver for a group delay measurement.



Center Frequency:
Range and Span: Same as Spectrum Analyzer
Input Level: –50 to +30 dBm
FM Characteristics:
Same as transmitter
Averaging of Traces:
1 - 16384
Scale:
0.1 dB/div to 2 dB/div
0.1 ns/div to 50 ns/div (555 kHz tone)
0.1 ns/div to 500 ns/div (55 kHz tone)

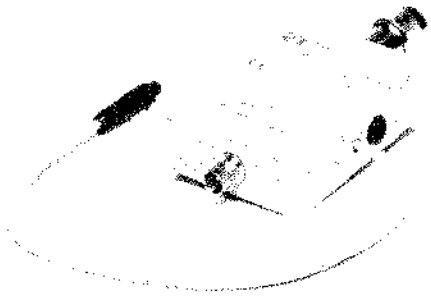
Note 1: Specifications will be met after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after turn on, after the analyzer's CAL FREQ, CAL AMPLTD, and CAL YTF have been run and after the Personality's CAL GRP DLY and CAL FLATNESS have been run.

Accessories

HP 11766A DADE Switch

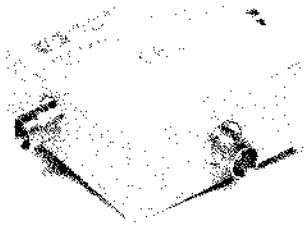
Frequency Range:
25 MHz to 190 MHz
Differential Delay:
± 0.1 ns
Power Rating::
+ 15 dBm
Connectors:
Inputs: 75 Ω Type BNC (f)
(> 26 dB Return Loss)
Output: 50 Ω Type N (m)

HP 11767A IF Amplifier



Frequency Range:
45 MHz to 190 MHz
Gain: 8.5 dB Typical
Flatness:
± 0.1 ns
± 0.1 dB
1 dB compression Point:
10 dBm input power
Typical
Connectors:
Input: 50 Ω Type N (m)
Output: 75 Ω Type BNC (f)
(> 26 dB Return Loss)

HP 11769A Return Loss Bridge



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

HP 11852B 50/75 Ω Minimum Loss Pad:

Freqency Range: 0 - 2.0 GHz
Insertion Loss: 5.7 dB
Connectors:
Input: 50 Ω Type N (f)
Output: 75 Ω Type N (m)

Ordering Information

To get the measurement capability described in this data sheet, your spectrum analyzer must be equiped with the following items:

1. Group Delay and Amplitude Flatness Card
2. Link Measurement Personality
3. Tracking Generator[1]

The diagram at right shows what you must order depending on the equipment your currently own or wish to purchase.

Product	Order Requirements	Retrofit[2]
HP 8593A	Not Available	HP 11768A[1]
HP 8593/4/5/6E	Opt 010 Tracking Generator Opt 111 Group Delay Card HP 11770A Link Measurement Personality	HP 11768A[1]
HP 11758T/U[3]	Not Available	HP 11768A[1]
HP 11758V[3]	Opt 201 Group Delay and Amplitude Flatness	HP 11768A[1] Opt 001

[1]Note: Tracking Generators are not retrofitable.
[2]The retrofit includes the Group Delay and Amplitude Flatness Card and the Link Measurement Personality (HP 11770A).
[3]The 11758 is equiped with a tracking generator
Consult your HP sales representative for more details on the retrofit.

HP 11768A Group Delay and Amplitude Flatness Retrofit Kit
Option 916 Extra Operating Manual

HP 11770A Link Measurement Personality
Option 916 Extra Operating Manual

HP 8590E Series Spectrum Analyzer
Option 111 Group Delay and Amplitude Flatness Card (HP 8593/4/5/6E only)
Option 010 Tracking Generator

HP 11758 Digital Radio Test System
Option 201 Group Delay and Amplitude Flatness

HP 11766A DADE Switch

HP 11767A IF Amplifier

HP 11769A 75 Ω Return Loss Bridge

HP 11852B 50 Ω/ 75 Ω Minimum Loss Pad

Literature

For more information on these and related products, consult the following information:

HP 8590 E-Series Portable Spectrum Analyzer, Technical Data Sheet, lit. number 5091-3271.

HP 11758 Digital Radio Test System, Technical Data Sheet, lit. number 5091-4651E.

Application Note 355A, "Digital Microwave Radio Theory and Measurements," lit. number 5091-4777E.

Application Note 355-1, "Tools for Digital Microwave Radio Installation and Maintenance," lit. number 5091-4653E.

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