

7 GENERAL INFORMATION

Introduction

On the title page of this manual is a Microfiche Part Number. This number can be used to order 4 x 6 inch microfilm transparencies of the manual. Each microfiche contains up to 96 photo duplicates of the manual pages. A service manual is also supplied with each instrument which contains the information necessary to maintain and repair the 3708A.

Specification

Instrument specifications are listed in Table 7-1. These specifications are the performance standards or limits against which the instrument is tested.

Safety Consideration

This product is a Safety Class B instrument (provided with a protective earth terminal). The instrument and manual should be reviewed for safety markings and instructions before operation. Also read the Warning on Page ii.

Instruments Covered by Manual

Attached to the instrument is a serial number plate. This serial number is in the form XXXXUXXXXX. It is in two parts; the first four digits and the letter are the serial prefix and the last five are the suffix. The prefix is the same for all identical instruments, it changes only when a change is made to the instrument. The suffix however, is assigned sequentially and is different for each instrument. The contents of this manual apply to instruments with the serial number prefix(es) listed under SERIAL NUMBERS on the title page.

An instrument manufactured after the printing of this manual may have a serial number prefix that is not listed on the title page. This unlisted serial number prefix indicates that the instrument is different from those described in this manual. The manual for this new instrument is accompanied by a manual changes supplement. This supplement contains "change information" that explains how to adapt the manual to the newer instrument.

In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is identified with the manual print date and part number, both of which appear on the manual title page. Complimentary copies of the supplement are available from Hewlett-Packard.

For information concerning a serial number prefix that is not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

Description

The 3708A Noise and Interference Test Set is designed for operation in the IF section of a digital or FM radio, where it will add calibrated levels of white noise and/or interference signals to the radio IF carrier.

A built in power meter and microprocessor control enable constant carrier to noise (or carrier to interference) ratios to be maintained at the injection point, regardless of radio carrier power variations.

The 3708A can be used effectively to simplify performance testing in;

- (a) Digital radio systems
- (b) FDM/FM microwave radio links
- (c) Satellite TDMA ground stations
- (d) Secure communication systems

The main features of the 3708A are;

- (a) Noise Source - a value of noise can be selected and the 3708A will generate it accurately and it is available at the NOISE OUTPUT port.
- (b) Tracking Mode - This enables the 3708A to maintain selected C/N or C/I ratios with a variable carrier.
- (c) Power Meter - measures the received IF power and gives an accurate display on the front panel.
- (d) Reference Tone - provides a high stability, accurate OdBm level at the OdBm REF OUTPUT.
- (e) Noise Bandwidth Measurement - the 3708A can directly measure the radio IF filter noise bandwidth.
- (f) Full GPIB Programmability - all functions in the 3708A are available under remote calculator control.

Accessories Supplied

The accessories supplied with the 3708A are listed below.

- (a) The line power cable is supplied in one of six configurations depending upon the country of destination of the instrument (*see Power Cables on Page 76*).
- (b) A 200mm calibration cable.
- (c) The following manuals are supplied with each instrument.
 - (1) Service Manual HP03708-90000
 - (2) Operating Manual HP03708-90001

Options

The following option is available with the 3708A.

OPTION 001 - The input/output 75 ohm connectors are substituted with 50 ohm connectors.

Table 7-1 Specifications

Except where otherwise indicated, the following parameters are warranted performance specifications. Parameters described as "typical" or "nominal" are supplemental characteristics which provide a useful indication of typical, but non-warranted performance characteristics. All specifications are guaranteed over an ambient temperature of 0° to 55°C, except where otherwise stated.

NOISE GENERATION

Band-limited white noise, available as "noise only" (Noise Output connector) or as "noise + carrier" (IF Output connector).

Level range of noise

At Noise Output connector (max output 6 dB lower at IF Output).
 +6 to -80 dBm (filter-dependent, see table below);
 -70 dBm/Hz (filter-dependent, see table below) to -154 dBm/Hz.

Absolute accuracy of noise power

(Noise Output connector)
 After calibration of power meter with the 0 dBm reference tone (70 or 140 MHz).
 ± 0.25 dB in range +6 to -10 dBm output power at 23 ± 3°C;
 ± 0.5 dB in range +6 to -55 dBm output power.

Band-limiting filters

The noise bandwidth of each instrument filter set is individually measured and stored in non-volatile memory. Values given below are typical and individual instruments will show different values on the front panel display.

Noise bandwidth accuracy: ± 0.15 dB ± 2.5%.

Frequency Bands (MHz)	Flatness (wrt centre frequency) (dB)	Noise Bandwidth* (MHz)	Typical Temperature Stability (dB/°C)	Max No* (dBm/Hz)	Min N* (dBm)
70 ± 5	± 0.3	18	0.001	-67	-81
70 ± 20	± 0.4	60	0.001	-72	-75
140 ± 40	± 0.5	125	0.001	-75	-73
10 to 200	± 0.8	215	0.0015	-78	-70

*Nominal values, will vary for individual instruments.

Crest factor

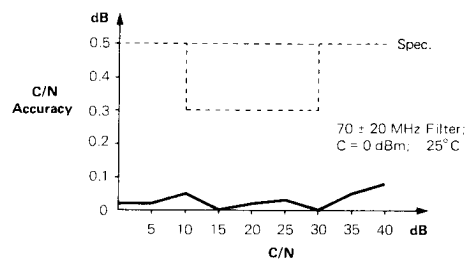
Typically ≥ 15 dB.

C/N power ratio (IF Output connector)

Range: -10 to 60 dB.

Accuracy:

Over range C = +1 to -5 dBm, C/N = 10 to 30 dB, 23 ± 3°C.
 ± 0.3 dB for 70 ± 20 MHz filter;
 ± 0.35 dB for 140 ± 40 MHz filter.
 Over range C = +5 to -40 dBm, N = 0 to -45 dBm, C/N = 0 to 40 dB.
 ± 0.5 dB for all filters.
 Typical results as shown in graph below.



Response time (tracking speed)

Typically 10 ms for a carrier power change ≤ ± 5 dB.

INTERFERENCE SIGNAL INPUTS

The HP 3708A offers two distinct facilities for interference tests. Both are broadband inputs, with a frequency range of 10 to 200 MHz.

AUXILIARY INTERFERER INPUT (rear panel)

Provides a fixed-loss path to the IF Output (but not to the Noise Output).

Flatness

70 ± 20 MHz: ± 0.2 dB with respect to 70 MHz.
 140 ± 40 MHz: ± 0.6 dB with respect to 140 MHz.

Loss to IF Output

Typically 15 dB.

INTERFERER (I) INPUT (front panel, common to Ext Filter Input)

Valid interferer input power

-30 dBm typical (indicated by I Level lamps on front panel).

C/I power ratio

Range: -10 to 60 dB.

Accuracy:

Over range C = +1 to -5 dBm, C/I = 10 to 30 dB, 23 ± 3°C.

± 0.3 dB for 70 ± 10 MHz interferer;

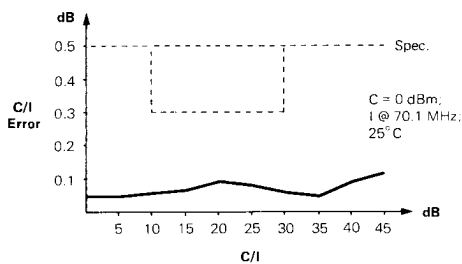
± 0.35 dB for 140 ± 10 MHz interferer.

Over range C = +5 to -40 dBm, I = 0 to -45 dBm, C/I = 0 to 40 dB.

± 0.5 dB for interferer tone 70 ± 20 MHz;

± 0.6 dB for interferer tone 140 ± 40 MHz.

Typical results as shown in graph below



Flatness of interference path

70 ± 5 MHz: ± 0.1 dB with respect to 70 MHz.

70 ± 20 MHz: ± 0.4 dB with respect to 70 MHz.

140 ± 40 MHz: ± 0.4 dB with respect to 140 MHz

10 to 200 MHz: 1 dB pk-pk

Response time

Typically 10 ms for a carrier power change ± 5 dB.

CARRIER PATH

The carrier path is specified from IF Input to IF Output.

Gain (at 70 MHz)

0 ± 0.4 dB (typically 0 ± 0.1 dB).

Flatness

70 ± 20 MHz: ± 0.2 dB with respect to 70 MHz (typically ± 0.1 dB).

140 ± 40 MHz: ± 0.3 dB with respect to 140 MHz (typically ± 0.1 dB).

Group delay

0.2 ns for ranges 70 ± 20 MHz, 140 ± 40 MHz.

3rd order intercept point

Typically +29 dBm.

POWER MEASUREMENT

Specifications apply to Power Meter input only.

Measurement range

+6 to -55 dBm.

Absolute Accuracy

± 0.3 dB at 0 dBm, 70 MHz; (± 0.15 dB at 0 dBm, 23 ± 3°C, 70/140 MHz after calibration using reference tone — see below).

Flatness

10 to 180 MHz: ± 0.3 dB with respect to 70 MHz.

Resolution

0.01 dB.

Linearity

Measured at 70 MHz.

+5 to -35 dBm: ± 0.1 dB (typically ± 0.05 dB).

-35 to -45 dBm: ± 0.3 dB.

REFERENCE TONE OUTPUT

Frequency

70/140 MHz crystal-controlled oscillator, front-panel selectable. Other frequencies available on special order.

Level

0 dBm ± 0.15 dB.

Factory-set to 0 dBm ± 0.05 dB at 23 ± 3°C.

Harmonic content

< -25 dBc.

INSERTION LOSS MEASUREMENT

Accuracy

± 0.2 dB at 70 or 140 MHz.

Range

-5 to 35 dB.

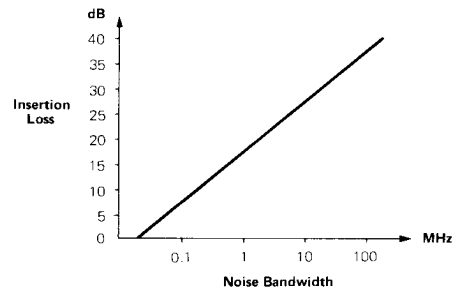
NOISE BANDWIDTH MEASUREMENT

Accuracy

$\pm 0.4 \text{ dB} \pm 10\%$ (includes insertion loss measurement accuracy of $\pm 0.2 \text{ dB}$).

Range

Function of insertion loss and filter bandwidth, see graph:-



HP-IB FACILITIES

Mode

Addressable; factory-preset address 8, selected by rear-panel switch.

Load

One bus load.

Local switch

Allows switching from remote to local control, except when controller has issued a local lockout command.

Interface functions subset

SH1, AH1, T6, L4, SR1, RL1, PPØ, DC1, DT1, CØ.

GENERAL

Connectors

All signal connectors in the HP 3708A are BNC type and

have a return loss $> 26 \text{ dB}$ (except the rear-panel Aux Interferer input, with a return loss of 18 dB , typically).

Power supply

Input voltages: 100/120/220/240V ac.

Tolerance: $+5$ to -10% .

Frequency: 48 to 66 Hz.

Power consumption: 150VA max.

Dimensions (including connectors and feet)

145mm (5.75 in) high; 425 mm (16.75 in) wide;

540 mm (21.2 in) deep.

Weight

16 kg (35 lb), net; 29 kg (63 lb), shipping.

Environment

0° to 55°C operating; -40° to 75°C , storage.

OPTIONS

In the HP 3708A standard instrument, all signal connectors impedances are 75Ω nominal, unbal to gnd. Reference tone oscillator frequency is 70/140 MHz, selectable from the front panel. Reference tone oscillator frequencies other than the standard values are available on a special order basis.

001: CONNECTORS: all signal connectors impedances are 50Ω nominal, unbal to gnd.

801: PROTECTIVE FRONT COVER.

907: FRONT HANDLE KIT: adds front handles to the HP 3708A. Options 801 and 907 cannot be fitted at the same time.

908: RACK FLANGE KIT: enables the HP 3708A to be secured in a 483 mm (19 in) rack.

909: RACK AND HANDLE KIT: combination of Options 907 and 908.

910: EXTRA SET OF MANUALS.