

FCC TEST EQUIPMENT

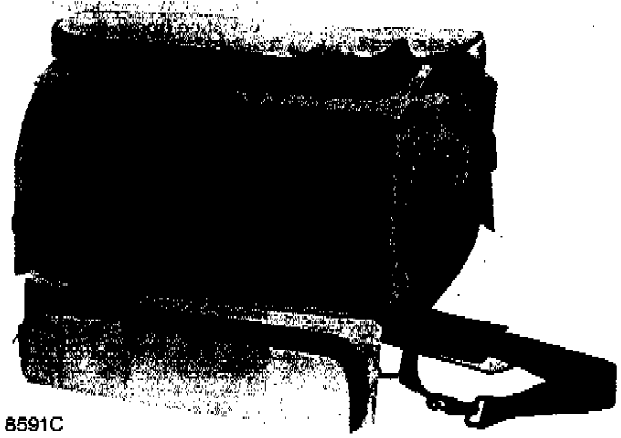
Cable TV Analyzer, Accessories

HP CaLan 8591C, 85721A, 85905A, 85921A

501

- Dedicated cable TV analyzer
- Portable and easy to use
- Noninterfering RF and video measurements

- Custom cable TV measurement personalities
- PC interface and FCC report generator software
- 75 Ω preamplifier



HP CaLan 8591C

HP CaLan 8591C Cable TV Analyzer

Industry's Only Cable TV Analyzer that Keeps Pace with Changing Regulations

The HP CaLan 8591C cable TV analyzer (1 MHz to 1.8 GHz) is the first economical, portable, one-box solution for making automatic, non-interfering cable TV RF and video measurements. The analyzer features a flexible hardware and software architecture that can be upgraded easily to protect your investment as new test requirements are introduced.

Included in the cable TV analyzer are the features you need for cable TV testing that is compatible with worldwide formats and standards, including all FCC proof-of-performance tests:

- HP CaLan 85721A cable TV RF/video measurement personality to simplify channel and system cable TV measurements
- 75 Ω input matches analyzer to trunk cable
- Built-in, internally switched preamplifier for improved carrier to noise measurements
- Precision frequency reference to accurately measure carrier frequency
- Fast time-domain sweeps for displaying individual TV lines
- TV trigger for selecting TV lines by number
- RS-232 and parallel interfaces for PC and printer operation respectively
- HP CaLan 85702A 128K RAM card for storing test data
- Rugged, yellow, soft carrying case

Options add even greater measurement capability to the analyzer. These include a 75 Ω tracking generator, narrow resolution bandwidths, and noninterfering RF and video measurements.

Non-Interfering Measurements

Option 107 for the HP CaLan 8591C and the HP CaLan 8590 E-series spectrum analyzers adds the hardware needed to make noninterfering RF and video measurements. Noninterfering measurements let you perform required tests on multiple channels at multiple locations with no impact on customer programming. The video measurement capability allows you to perform required FCC color tests. Option 107 also enables simultaneous viewing of TV pictures and listening to program sound. The hardware demodulates NTSC-format television signals as well as versions of PAL and SECAM.

Measurement Personality for RF and Video Testing

The HP CaLan 85721A measurement personality card (included with the HP CaLan 8591C) customizes the HP CaLan 8591C and 8590 E-series analyzers for easy, noninterfering proof-of-performance measurements on NTSC-, PAL-, or SECAM-format signals. This software adds dedicated cable TV test functions and measurements that you can perform with the push of single keys.

- Measurements include the following functions and tests:
- Automatic tuning of cable TV and TV broadcast carriers
 - Visual and aural carrier levels and frequencies
 - System channel survey

- Depth of modulation
- TV aural and FM broadcast carrier deviation
- Carrier-to-noise ratio (C/N)
- In-channel frequency response
- Hum/low frequency disturbances
- System frequency response
- Baseband TV line and field viewing
- TV aural and FM broadcast carrier demodulation
- Distortion (CSO/CTB)
- Crossmodulation
- Ingress and co-channel viewing

System monitor capability automates measurements, allowing the analyzer to test without assistance from the operator. It also allows you to design test plans and to turn test data into reports instantly. With Option 107 added to the cable TV analyzer, noninterfering measurements of carrier-to-noise, in-channel frequency response, and distortions can be made, as well as video measurements:

- Differential gain
- Differential phase
- Chrominance-luminance delay inequality

Painless FCC Reports

Take the pain out of your semi-annual cable TV FCC reports with the HP CaLan 85921A FCC report generator software. Running on IBM compatible PCs, it downloads test data from your HP CaLan 8591C cable TV analyzer (or HP CaLan 8590 E-series analyzer with HP CaLan 85721A personality) into a PC database for making reports and archiving data. The software compares measurement results to FCC specifications and displays pass/fail messages for each test. Test data can also be exported to a word processor or spreadsheet for other analysis, such as graphs.

You can print the results of every test run at each specified location in the cable system. The printout will list all the channels tested, as well as additional required information such as the date of the testing, the name and qualifications of the person who ran the test, and the serial number of the equipment used. The final report is automatically generated in a format compliant with the FCC regulations. All RF and video tests (except leakage) currently required by the FCC are included.

Cable TV Measurements with the HP CaLan 8590 Series Spectrum Analyzers

The HP CaLan 8590 E-series analyzers offer hardware and software flexibility similar to that of the HP CaLan 8591C. If you need only a basic RF or microwave analyzer, the HP CaLan 8590 L-series provides lower-cost alternatives. (For more information on the HP CaLan 8590 series, see page 231.)

Boost the signal level of the HP CaLan 8590 series analyzers by adding an HP CaLan 85905A 75 Ω preamplifier. It is powered by the analyzer and is stored in the analyzer's front cover. A similar preamplifier is built into the HP CaLan 8591C.

FCC TEST EQUIPMENT

Cable TV Analyzer

HP CaLan 8591C

Specification Summary

Specifications apply to HP CaLan 8591C cable TV analyzer with pre-loaded HP CaLan 85721A measurements personality, and to HP CaLan 8591E spectrum analyzer with Options 001, 004, and 301, and HP CaLan CaLan 85721A personality.

General

Channel Selection: Analyzer tunes to specified channels.
Input: 75 Ω , BNC
Frequency Range: 5 to 1002 MHz for channel model
 54 to 896 MHz for system mode
 1 MHz to 1.8 GHz for spectrum analyzer mode

Amplitude Range: -15 to +70 dBmV for S/N > 30 dB
Displayed Average Noise Level (1 kHz RBW, 0 dB atten.)
Without preamplifier: ≤ -63 dBmV (1 to 1500 MHz)
With internal preamplifier: ≤ -83 dBmV (1 to 1000 MHz)
With external preamplifier: ≤ -83 dBmV (1 to 1000 MHz)

Cable TV Measurements

Visual Carrier Frequency (visual carrier freq. is counted)

Precision frequency reference

Resolution: 100 Hz
Accuracy: $\pm(1.2 \times 10^2 \times \text{carrier freq} + 110 \text{ Hz})$
 At 55.25 MHz (ch. 2): ± 117 Hz
 At 325.25 MHz (ch. 41): ± 149 Hz
 At 643.25 MHz (ch. 94): ± 187 Hz

Visual-to-Aural Carrier Frequency Difference [counted frequency difference between visual (vision) and aural (sound) carriers]

Difference Range:

4.1 to 4.9 MHz
Resolution: 100 Hz
Accuracy: ± 221 Hz for precision frequency reference

Visual-Carrier Peak Level (measured to an absolute standard)

Amplitude: -15 to +70 dBmV

Resolution: 0.1 dB

Absolute Accuracy: ± 2.0 dB for S/N > 30 dB

Relative Accuracy: ± 1.0 dB relative to adjacent channels in

frequency; ± 1.5 dB relative to all other channels

Visual-to-Aural Carrier Level Difference [measured difference between peak amplitudes of visual (vision) and aural (sound) carriers]

Difference Range: 0 to 25 dB

Resolution: 0.1 dB

Accuracy: ± 0.75 dB for S/N > 30 dB

Depth of Modulation, characteristic (percent difference from horizontal sync tip to max. video level)

AM Range: 50 to 93%

Resolution: 0.1%

Accuracy: $\pm 2.0\%$ for C/N > 40 dB

FM Deviation, characteristic (peak reading of FM deviation)

Range: ± 100 kHz

Resolution: 100 Hz

Accuracy: ± 1.5 kHz

Hum/Low Frequency Disturbance (measured for power-line frequency and low-frequency disturbance)

AM range: 0.5 to 10%

Resolution: 0.1%

Accuracy: $\pm 0.7\%$ for hum $\leq 5\%$

Visual Carrier-to-Noise Ratio, C/N (calculated from visual-carrier peak level; min. noise level normalized to 4 MHz for NTSC format)

Range (input level dependent): 63 dB max. for +25 dBmV input

C/N resolution: 0.1 dB

C/N accuracy (input level and measured C/N dependent): $< \pm 1$ dB

for 50 dB C/N and +25 dBmV input with external preselector filter

Composite Second Order and Composite Triple Beat Distortion

(CSO and CTB measured relative to visual-carrier peak)

Range (input level dependent): 77 dB max. for 25 dBmV input

Resolution: 0.1 dB

Accuracy (input-level, measured-CSO/CTB dependent): $< \pm 1.5$ dB

for 60 dB CSO/CTB and +25 dBmV input

Crossmodulation characteristic (15.7 kHz horizontal-line related

AM measured on unmodulated visual carrier)

Range: 60 dB, usable to 65 dB

Resolution: 0.1 dB

Accuracy: ± 2.6 dB for xmod < 50 dB, C/N > 40 dB

System Frequency Response (system amplitude variations measured relative to a reference trace stored during the setup)

Frequency response setup: reference-trace storage for 50 traces including analyzer states

Frequency response test: trace-flatness accuracy is ± 0.1 dB per dB deviation from a flat line and ± 0.75 dB maximum cumulative error

Option 107 Operation

TV Receiver Input

Frequency range: 50 to 850 MHz

Amplitude range: 0 to 40 dBmV

Noninterfering Color Test (requires FCC composite or NTC-7 test signal for NTSC format)

Differential gain accuracy: $\leq \pm 4\%$ ¹

Differential phase accuracy: $\leq \pm 3^\circ$ ¹

Chrominance-luminance delay inequality accuracy: $\leq \pm 45$ ns, ± 32 ns typical

Noninterfering Tests with Gate ON:

C/N and CSO: Quiet line must be selected.

In-channel frequency response accuracy: $< \pm 0.5$ dB within channel (requires $\sin x/x$, Philips ghost canceling reference, or FCC/NTC-7 multiburst test signal for NTSC format)

Preamplifiers

HP CaLan 85905A 75 Ω Preamplifier (external)

Frequency range: 45 to 1000 MHz

Gain: 20 dB ± 1.0 dB

Noise figure: 7 dB maximum at midband

HP CaLan 8591C 75 Ω Preamplifier (internal)

Frequency range: 1 to 1000 MHz

Gain: ≥ 24 dB

Noise figure: ≤ 10 dB

Ordering Information

HP CaLan 8591C Cable TV Analyzer (includes HP CaLan 85921A)²

Option 107⁴ TV Receiver/Video Tester (includes 75- Ω coupler and cables)

Option 011 75- Ω Tracking Generator

Option 015 Change Yellow to Tan Soft Carrying Case

Option 040 Front Panel Cover (used without Soft Carrying Case)

Option 041⁶ HP-IB and Parallel⁶ Interfaces

Option 119 Noise Figure Card

Option 130 Narrow Resolution Bandwidths

Option 180⁷ TV Picture Display

Option 701 Delete TV Trigger, AM/FM Demodulator, Fast Time-Domain Sweeps

Option 704 Delete Precision Frequency reference

Option 908 Rack Mount without Handles

Option 909 Rack Mount with Handles

Option 915 Component Level Info. and Service Guide

Option W30 Two Additional Years Return-to-HP Service

Option W32 Two Additional Years Return-to-HP Calib.

Option R07 Retrofit Kit for Option 107

HP CaLan 85921A³ FCC Report Generator Software

Recommended Accessories

HP CaLan 85702A 128K RAM Card

HP CaLan 85721A³ Cable TV Measurements and System

Monitor Personality (for HP CaLan 8590 E-series)

HP CaLan 85901A Portable AC Power Source

HP CaLan 85905A 75 Ω Preamplifier

HP C2634A HP DeskJet 320 Portable Monochrome/

Color Printer (parallel interface)

HP C2162A HP DeskJet 540 Monochrome/Color Printer

(parallel interface)

HP C2164A HP DeskJet 660C Monochrome/Color

Printer (parallel interface)

HP 24542U RS-232 Nine-Pin Cable (analyzer to PC)

HP 24542G RS-232 Nine-Pin to 25-Pin Cable (analyzer to PC)

HP C2950A Parallel Cable (analyzer to printer)

HP 10833A HP-IB (GPIB) Cable

¹ 20° to 30° C, ≥ 20 dBmV input

² Gate ON synchronizes the measurement to the TV line selected.

³ NTSC format only, worldwide options available

⁴ Not compatible with Option 180

⁵ Replaces standard RS-232 and parallel interfaces

⁶ Print and plot control only

⁷ Not compatible with Option 107

⁸ NTSC format only