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

By internet, phone, or fax, get assistance with all your test and measurement needs.

Table 1-1 Contacting Agilent

Online assistance: www.agilent.com/find/assist

United States (tel) 1 800 452 4844	**Latin America** (tel) (305) 269 7500 (fax) (305) 269 7599	**Canada** (tel) 1 877 894 4414 (fax) (905) 282-6495	**Europe** (tel) (+31) 20 547 2323 (fax) (+31) 20 547 2390
New Zealand (tel) 0 800 738 378 (fax) (+64) 4 495 8950	**Japan** (tel) (+81) 426 56 7832 (fax) (+81) 426 56 7840	**Australia** (tel) 1 800 629 485 (fax) (+61) 3 9210 5947	

Asia Call Center Numbers

Country	Phone Number	Fax Number
Singapore	1-800-375-8100	(65) 836-0252
Malaysia	1-800-828-848	1-800-801664
Philippines	(632) 8426802 1-800-16510170 (PLDT Subscriber Only)	(632) 8426809 1-800-16510288 (PLDT Subscriber Only)
Thailand	(088) 226-008 (outside Bangkok) (662) 661-3999 (within Bangkok)	(66) 1-661-3714
Hong Kong	800-930-871	(852) 2506 9233
Taiwan	0800-047-866	(886) 2 25456723
People's Republic of China	800-810-0189 (preferred) 10800-650-0021	10800-650-0121
India	1-600-11-2929	000-800-650-1101

User's Guide

HP 85721A Cable TV Measurements and System Monitor Personality

HP part number: 85721-90039 Supersedes: 85721-90031
Printed in UK Sept 1996

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Regulatory Information.

The regulatory information is in the calibration guide for your analyzer.

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Warranty service may be obtained from the nearest Hewlett-Packard sales office or other location indicated in the owner's manual or service booklet.

Safety Symbols

The following safety symbols are used throughout this manual. Familiarize yourself with each of the symbols 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.

WARNING

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

General Safety Considerations

WARNING

Before the analyzer is switched on, make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact.

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal can result in personal injury.

CAUTION

Before the analyzer is switched on, make sure its primary power circuitry has been adapted to the voltage of the ac power source.

Failure to set the ac power input to the correct voltage could cause damage to the instrument when the ac power cable is plugged in.

The HP 85721A with Supported Analyzer

The HP 85721A with supported analyzer can perform tests channel-by-channel, or over multiple channels with multiple tests performed on each channel. (Refer to Chapter 1 for supported analyzer information.)

With the Option 107 TV receiver, the analyzer provides video testing and TV receiver capability. The HP 85721A with supported analyzer has three operating modes:

1. Spectrum analyzer.
2. Cable TV analyzer.
3. TV receiver.

1. The analyzer is a full-featured spectrum analyzer. Some key spectrum analysis features include the following:
   - Zoom window.
   - Analog+ display (digital implementation of an analog display).
   - Peak zoom.
   - Title, execute remote commands, and edit DLPs with a PC keyboard.
   - Adjacent channel power, occupied BW, and channel power.
   - Multiple markers and marker table.
   - Peak table.
   - % AM, TOI, and N dB bandwidth.
   - AM measurements with FFT menu.
   - Gate driver (Option 105 or 107 required).
2. The HP 85721A with supported analyzer is a cable TV analyzer. With the Option 107 added, the analyzer can also perform three video measurements: differential gain, differential phase, and chrominance-to-luminance delay inequality. In addition, the Option 107 allows the analyzer to perform previously interfering RF measurements in a non-interfering manner. That is, carrier-to-noise ratio, composite second order distortion, and in-channel frequency response tests can be performed without disrupting service.

There are two measurement modes within the cable TV analyzer mode of operation:

- Channel measurement mode.
- System measurement mode.

Channel measurement mode is used to perform channel-by-channel measurements. That is, you can execute a single measurement on a single channel.

System measurement mode is used to create test plans that allow you to execute selected (or all) measurements on a selected channel or range of channels. After setting up these test plans, system measurement mode is used to execute a test plan immediately, or schedule the tests to be performed at a later time. Measurement results can be stored to a RAM card, sent to the screen for viewing, or dumped to a printer.

3. The HP 85721A with supported analyzer is a TV receiver (Option 107 required). You can listen to the sound and see the picture simultaneously. This allows you to quickly identify picture quality problems such as noise, distortion, hum, and ingress.

In This Guide

- Chapter 1 explains how to install the personality and access channel or system measurement mode.
- Chapter 2 provides information about performing channel-by-channel cable TV measurements using the channel measurement mode.
- Chapter 3 provides information about performing cable TV measurements by creating and executing a test plan using the system measurement mode. In addition, information about storing and recalling test plans and test data to and from a RAM card is provided.
- Chapter 4 contains information about what to do if you have a problem.
- Chapter 5 contains menu maps and descriptions of softkey functions in the channel measurement mode.
- Chapter 6 contains menu maps and descriptions of softkey functions in the system measurement mode.
- Chapter 7 contains menu maps and descriptions of softkey functions in the Setup menu.
- Chapter 8 provides descriptions of all tests.
- Chapter 9 contains specifications and characteristics of the HP 85721A cable TV measurements and system monitor personality with supported analyzer. In addition, channel identification plans and a channel survey map for characterizing your system are provided as test aids.

Conventions

This guide uses the following conventions:

Front-Panel Key	A boxed, uppercase name in this typeface represents a key physically located on the instrument.
Softkey	A boxed word written in this typeface indicates a "softkey," a key whose label is determined by the instrument's firmware.
Softkey ON OFF (ON)	A boxed word written in this typeface with the words ON and OFF can turn a function on or off. The underlined function is shown in parenthesis.
Softkey AUTO MAN (AUTO)	A boxed word written in this typeface with the words AUTO and Man can either be auto-coupled or have its value manually changed. The underlined function is shown in parenthesis.
Screen Text	Text printed in this typeface indicates text displayed on the spectrum analyzer screen.

Analyzer Operation

NOTE

If you are not familiar with your analyzer, refer to the analyzer's installation and operation and programming manuals. These manuals describe analyzer preparation and verification, and tell you what to do if something goes wrong. Also, they describe analyzer features and tell you how to make spectrum analyzer measurements. Consult these manuals whenever you have a question about standard analyzer use.

Firmware Requirements

Your analyzer must have firmware that was released on September 23, 1993 or later to use the HP 85721A personality. To determine the firmware date for your analyzer:

- Turn on the analyzer.
- Read the firmware date that is displayed (the firmware date is displayed on the analyzer's display when the analyzer is first turned on). The date is displayed in a day, month, year format. For example, if `rev 930923` is displayed, the release date of the firmware was September 23, 1993.

If the release date for the analyzer's firmware was prior to September 23, 1993, the firmware must be updated to use the HP 85721A personality. Contact your HP sales office for more information about updating analyzer firmware.

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1

Getting Started

Getting Started

What You'll Find in This Chapter

This chapter provides step-by-step procedures for setting up an analyzer to perform cable TV measurements using the HP 85721A Cable TV Measurements and System Monitor Personality. This chapter contains the following sections:

- Spectrum analyzer compatibility requirements
- Setup for cable TV measurements
- Deleting the HP 85721A from the analyzer

Spectrum Analyzer Compatibility Requirements

The HP 85721A is designed to operate with the HP 8591C cable TV analyzer. However, certain spectrum analyzers can be used in place of the HP 8591C Cable TV analyzer. The hardware and firmware compatibiliy requirements and measurement capability for HP 8590E-Series and HP 8590L-Series spectrum analyzers are shown in the following tables.

Table 1-1. Spectrum Analyzer Requirements for Running the HP 85721A

- HP 8591C and HP 8590E-Series analyzers are supported with firmware dated 930923 or later
- Option 004 Precision Frequency Reference
- Option 043 RS-232 (or Option 041 HP-IB) Interface required for printer output and programming
- Option 301 TV Sync Trigger/FADC (or Options 101 and 102)
- Option 107 TV receiver required for video and gated measurements

NOTE

Options 004, 043, and 301 are standard with the HP 8591C Analyzer. Also, the HP 85721A personality is pre-loaded into the HP 8591C.

Table 1-2. Measurement Capabilty

Measurement	8591C	8590E-Series
Carrier Level & Frequency	•	•
Carrier-to-Noise (non-interfering)	Opt 107	Opt 301,107
Carrier-to-Noise (interfering)	•	•
Chroma/Luma Delay	Opt 107	Opt 101,107
Composite Second Order/Composite Triple Beat (non-interfering)	Opt 107	Opt 301,107
Composite Second Order/Composite Triple Beat (interfering)	•	•
Cross Modulation	•	•;
Depth of Video Modulation	•	•
Depth of Video Modulation (on individual line)	•	Opt 301
Differential Gain/Differential Phase	Opt 107	Opt 101,107
Digital Channel Power	•	•
FM Deviation	•	Opt 102
Hum	•	•
In-Channel Frequency Response	Opt 107	Opt 301,107
System Frequency Response	•	•
View Ingress	•	•
FM Radio	•	Opt 102
Key: **• No additional Options required.** **o Not available.**		

Setup for Cable TV Measurements

This section explains the steps that are necessary to prepare the analyzer for making a measurement and printing out the results.

The steps are as follows:

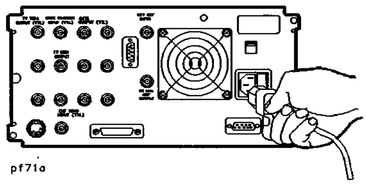
- Load the HP 85721A into analyzer memory (if necessary).
- Perform the self-calibration routines.
- Install a printer.
- Connect cable for non-interfering measurements.
- Start channel or system mode of operation.

NOTE

The HP 85721A is pre-loaded into the HP 8591C.

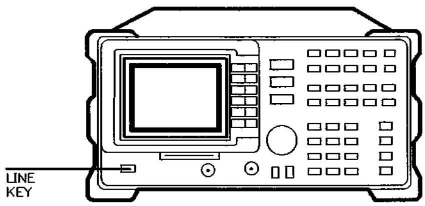
Step 1. Load the HP 85721A into analyzer memory

1 Plug the analyzer into an ac power supply.



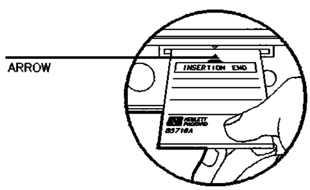
pf71a

2 Press the (LINE) key. If CABLE TV ANALYZER is displayed, skip to "Step 2. Perform the self-calibration routines."



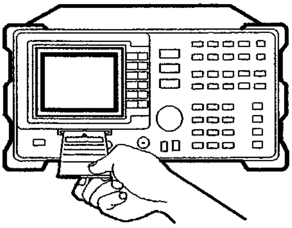
PY24A

3 Locate the arrow printed on the card label.



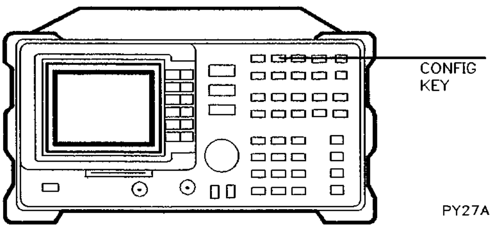
py25

4 Insert the card into the analyzer with the card's arrow matching the raised arrow on the bezel around the card-insertion slot.



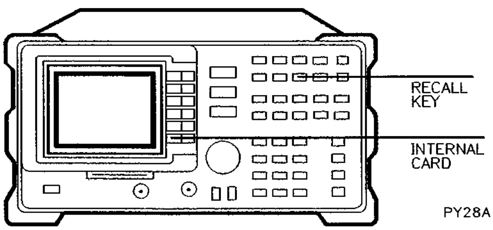
PY26A

5 Press (CONFIG), MORE 1 of 3, DISPOSE USER MEM, ERASE DLP MEM, ERASE DLP MEM. Press (PRESET).



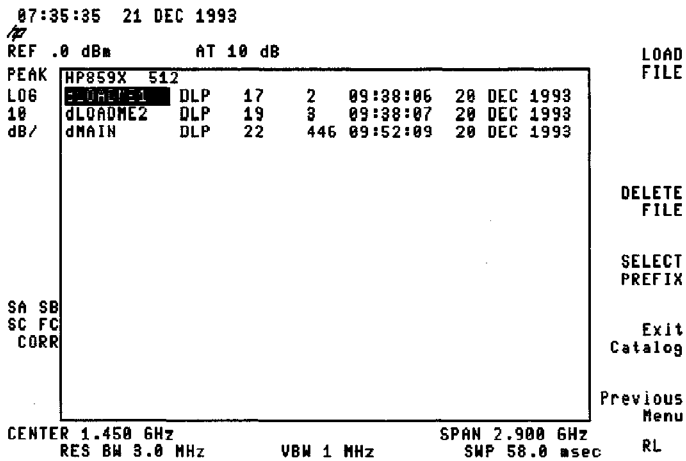
PY27A

6 Press (RECALL). Press the INTERNAL CARD softkey so that CARD is underlined.

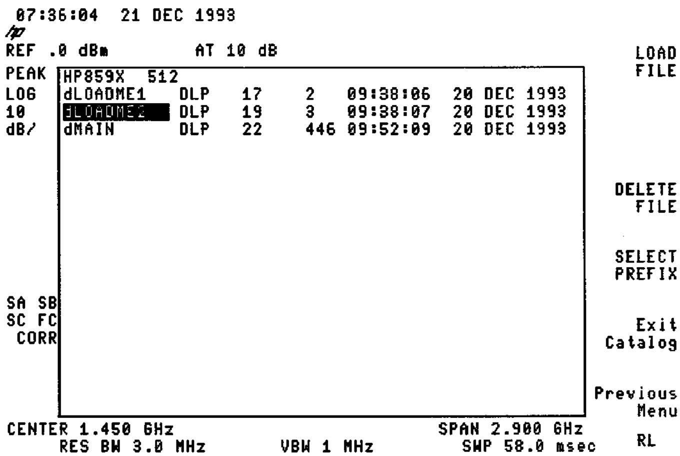


PY28A

7 The HP 85721A requires re-allocation of memory in the analyzer. Use the following procedure to load the HP 85721A: Press CATALOG CARD , CATALOG ALL . Use the front panel knob to ensure that dLOADME1 is highlighted. Press LOAD FILE .



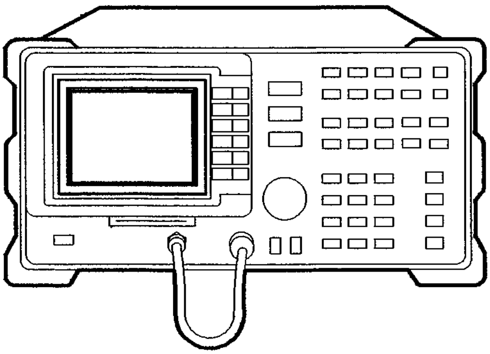
8 The message `MEMORY RE-ALLOCATED PLEASE CYCLE POWER AND LOAD dLOADME2 FROM THE MEMORY CARD` is displayed. Power the analyzer off and on again. Press (RECALL), INTERNAL CARD to underline CARD. Press CATALOG CARD , CATALOG ALL and use the front panel knob to ensure that dLOADME2 is highlighted.



9 Press LOAD FILE. The message `LOADING HP 85721A (dMAIN) PLEASE WAIT. (LOADING TIME 8 MIN)` is displayed. If `INVALID SYMTAB ENTRY: SYMTAB OVERFLOW` is displayed, refer to Chapter 4, "If You Have a Problem."

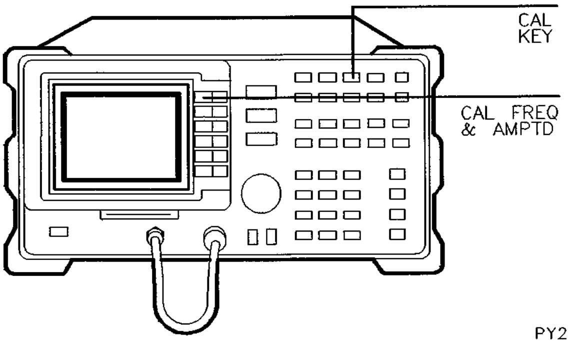
Step 2. Perform the self-calibration routines

	Allow the analyzer to warm up for 30 minutes before performing the following steps.
	For the analyzer to meet its specifications and characteristics, the self-calibration routines should be performed periodically or whenever the ambient temperature changes. See the operating manual for the analyzer to determine how often the self-calibration routines should be performed.
1	Attach the calibration cable from the CAL OUT connector to the INPUT connector with the appropriate adapters.



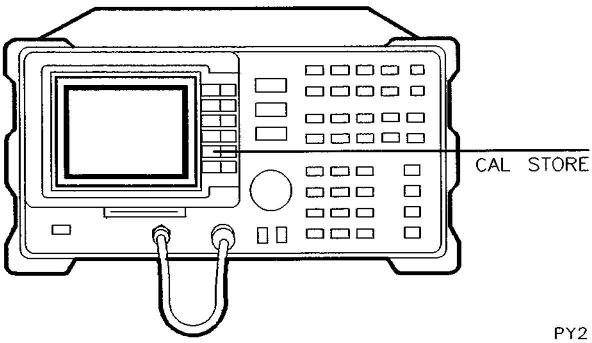
PY29A

2	Press (CAL), press CAL FREQ & AMPTD or, if the analyzer's amplitude calibration routine has been performed recently, press CAL FREQ instead of CAL FREQ & AMPTD. The analyzer's frequency and amplitude self-calibration routine take about 1.5 or 9 minutes to complete, respectively. If an error message is displayed, refer to the Installation and Verification Manual for the analyzer.



PY210A

3	Press CAL STORE.



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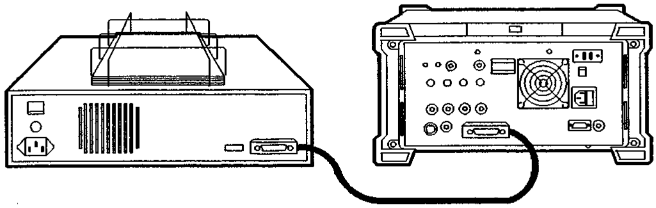
Step 3. Install a printer

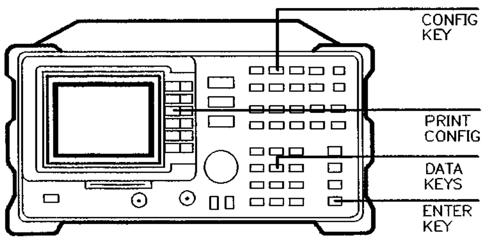
Steps 1 and 2 of this procedure apply to an analyzer with an HP-IB interface (Option 041) only. Skip to steps 3 and 4 if your analyzer has an RS-232 interface (Option 043).

1 Connect the analyzer to the printer, using an HP-IB cable. Turn the printer on.

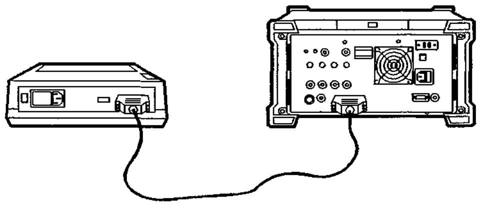
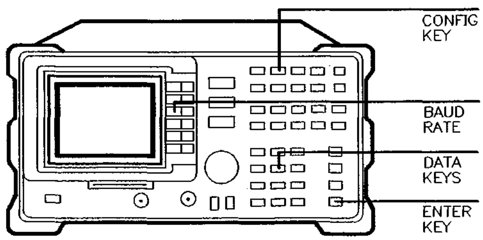


py213

2 Press (CONFIG), `PRINT CONFIG`, `PRINTER ADDRESS`. Enter address that your printer is set to (usually at 1) using the data keys, then press (ENTER). (See the printer's documentation for more information about the selection of the printer's address.) Then skip the following two steps and continue from the next step. (Step 4. Connect cable for non-interfering measurements.)



PF72A

	Steps 3 and 4 apply to an analyzer with an RS-232 interface only. Refer to the *HP 8590 E-Series Spectrum Analyzer Programmer' Guide*, "Appendix C," for more information about using the RS-232 interface.
3	Connect the analyzer to the printer, using an HP 13242G, RS-232 cable. Turn the printer on. **PLOTTERS ARE NOT SUPPORTED BY THE HP 85721A PERSONALITY.**
	 py215
4	Press (CONFIG), **MORE 1 of 3**, **BAUD RATE**, enter a baud rate with the data keys, then press (ENTER) to set the baud rate of the analyzer. (The baud rate of the analyzer must match the baud rate of the printer.)
	 PY25A

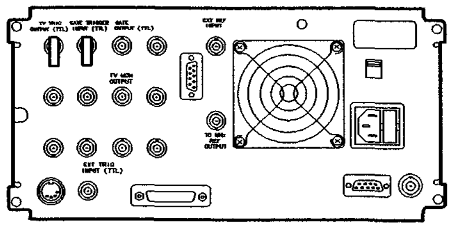
NOTE

If you are using an HP 2225D RS-232 Thinkjet printer, refer to "Printing and Plotting" chapter of the User's Guide for your spectrum analyzer, for information about Thinkjet switch settings.

Step 4. Connect cable for non-interfering measurements (optional)

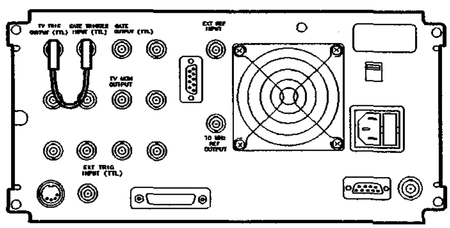
Perform this procedure if you have Option 107 installed in your analyzer. (Option 107 is required for video and non-interfering measurements, and TV receiver mode of operation.) Otherwise, proceed to the following procedure.

1 Attach one right-angle BNC adapter to the TV TRIG OUTPUT (TTL) connector, and another right-angle BNC adapter to the GATE TRIGGER INPUT (TTL).



pf73a

2 Connect a short BNC cable between the two adapters. Additional connections are required for non-interfering and video measurements as described in Chapters 2 and 3.



pf74a

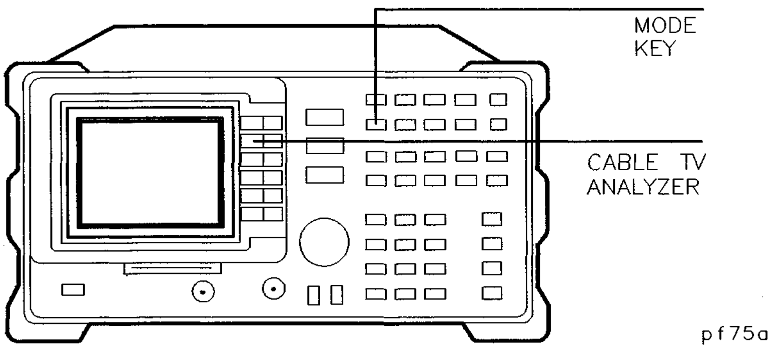
NOTE

- The above procedure is not required when the HP 8591C is purchased with Option 107 because the cable is pre-installed.
- When performing non-interfering measurements, the external coupler must also be connected. See Chapter 2, "Step 2. Connect the signal to the analyzer."

Step 5. Start channel or system mode of operation

- Press (MODE), **CABLE TV ANALYZER** to access the cable TV analyzer mode. Press **CHANNEL MEAS** to select measurements on a particular channel. Press **SYSTEM MEAS** to select measurements on groups of channels. Note that when the analyzer is in channel mode, **CHNL** is displayed in the upper right corner of the analyzer display; **SYSTEM** is displayed in the upper right corner of the analyzer display when in system mode.

  The softkeys accessed by pressing **Setup** allow you to customize the HP 85721A personality to your equipment and system. Chapters 2 and 3 contain information on how to use the **Setup** softkeys.



Deleting the HP 85721A from the Analyzer

The steps outlined below remove the HP 85721A tests and functions added to the analyzer by the ROM measurements card:

1. Press (PRESET). Wait for the preset routine to finish.
2. Press (CONFIG) `More 1 of 3`.
3. Press `DISPOSE USER MEM`, `ERASE DLP MEM`, `ERASE DLP MEM`.
4. Press (PRESET).

2

Channel Measurements

Channel Measurements

What You'll Find in This Chapter

This chapter describes how to make cable TV measurements using the channel measurements mode of operation (CHANNEL MEAS). This chapter contains the following sections:

- Channel measurements and related functions.
- Making a channel measurement.

Channel Measurements

The tests are listed below along with the softkey that activates them.

Table 2-1. Channel Measurements

To activate	Press
FM Deviation	FM DEV
View Ingress	VIEW INGRESS
Carrier Level and Frequency	CARRIER LVL&FRQ
Carrier to Noise	CARRIER/NOISE
Hum	HUM
Cross Modulation	CROSSMOD
Composite Second Order/Composite Triple Beat	CSO/CTB
Depth of Video Modulation	DEPTH MOD
System Frequency Response	SYSTEM FRQ RESP
In-Channel Frequency Response	IN-CHNL FRQ RSP
Differential Gain/Differential Phase	DIF GAIN DIF PHAZ
Chroma/Luma Delay	CLDI
FM Radio	FM RADIO
Digital Channel Power	DIGITAL CH POWER
* Option 107 required for non-interfering and video measurements.	

Making a Channel Measurement

This section explains the steps that are necessary to make channel measurements. The steps are as follows:

1. Set up the test system.
2. Connect the signal to the analyzer.
3. Make the measurements.
4. Access the spectrum analyzer mode (optional).
5. Access the TV receiver mode (optional).

Step 1. Configuring the test system

The `Setup` menu is used to set up channel tuning, amplitude units of dBμV or dBmV, an external preamplifier, and an external pad (50 Ω analyzers only). In addition, carrier-to-noise and beats defaults are setup.

The information is stored in non-volatile analyzer memory. This means that the analyzer retains the information, even when power is turned off, until you access the `Setup` menu again and change it.

Procedure

1. If it is displayed, press the `Setup` softkey. Otherwise, press (MODE), `CABLE TV ANALYZER`, `Setup`.

Configure the analyzer to tune to cable TV signals by entering the frequency of the visual carrier or by entering channel numbers as follows: (Channel Identification Plans are listed in Chapter 9.)

2. Press `Tune Config`.
   a. To tune the analyzer by entering channel numbers, press `TUNE BY CH FREQ` (CH). Continue from step 3.
   b. To tune the analyzer by entering the frequency of the visual carrier, press `TUNE BY CH FRQ` (FRQ).
   c. Press `TV CHNL SPAN`. Use the data keys to enter the channel span setting. The default is 8 MHz.

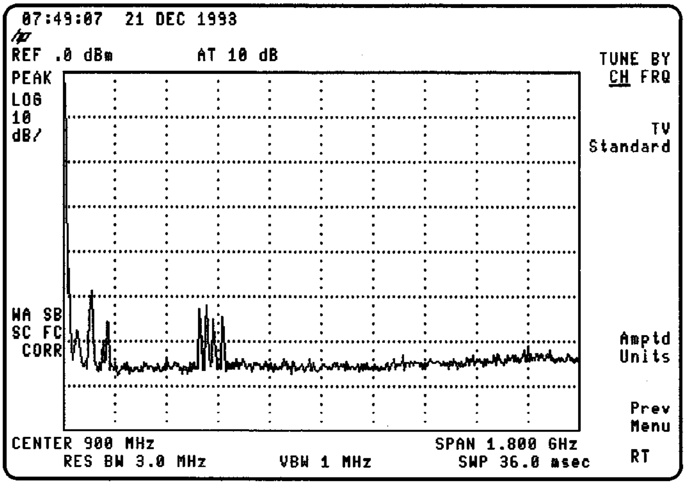


Figure 2-1. Tune Configuration Menu

Select the format of the TV signal as follows:

3. Press `TV Standard`.

   a. Choose from the menu by pressing `PAL-I`, `PAL-B/G`, `PAL-SCM D/K` or `PAL-B/G CABLE` to underline the required standard.

   b. Press `Prev Menu`.

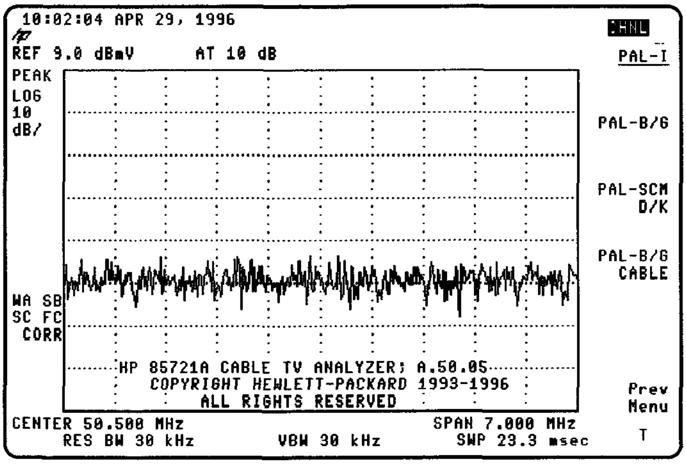


Figure 2-2. TV Standard Menu

Select the amplitude measurement units of dBmV or dBμV as follows:

4. Press `Amptd Units`.

   a. Choose from the menu by pressing `dBmV` or `dBµV` to underline the desired units.
   b. Press `Prev Menu` `Prev Menu` to return to the Setup menu.

Configure any required external matching pad or preamp as follows:

5. *For spectrum analyzers with a 50 Ω input:* Use an HP 8590 Series Option 711 external 50 Ω to 75 Ω matching pad for improved measurement accuracy. (The HP 8590 Series Option 711 external 50 Ω to 75 Ω matching pad also provides a 100 volt dc block.)

   a. Connect the matching pad to the spectrum analyzer input.
   b. Press `Analyzer Input`, `EXT PAD YES NO` (YES).
   c. Press `Prev Menu` to return to the Setup menu.

CAUTION D.C. voltages in excess of 25 V and AC power-line voltages in excess of 100 Vpeak can permanently damage the analyzer input.

6. *When using an external amplifier (preamp):* Use an external amplifier for the carrier/noise test. The carrier/noise test calculates the noise contribution of the external amplifer and reports that correction on the `MORE INFO` screen of the carrier/noise test.

   a. Connect the output of the external amplifier to the analyzer input.
   b. Press `Analyzer Input`, `EXT AMP YES NO` (YES).
   c. Press `EXT AMP GAIN` then enter the gain value of the external amplifier. The message `EXT PREAMP GAIN` and current setting is displayed. The default value is 20 dB for the HP 85905A preamplifier.
   d. Press `EXT AMP NZ FIG` then enter the noise figure value of the external amplifier. The message `EXT PREAMP NOISE FIGURE` and current setting is displayed. The default value is 7 dB for the HP 85905A preamplifier.
   e. Press `Prev Menu` to return to the Setup menu.

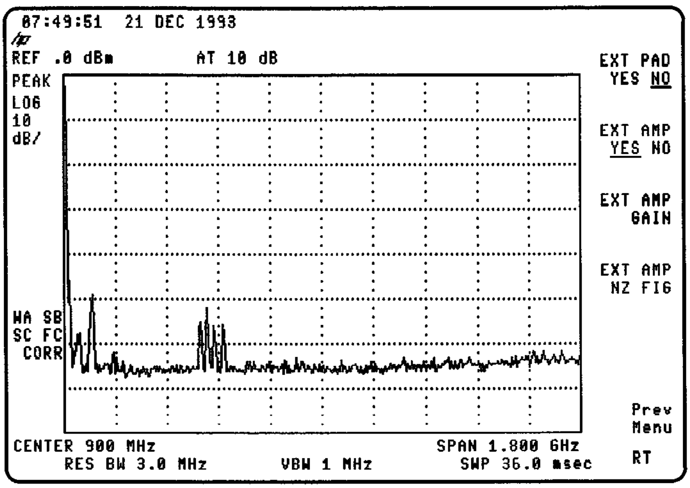


Figure 2-3. Analyzer Input Menu

> **NOTE**
>
> The HP 8591C is fitted with a 75Ω input. The EXT PAD YES NO softkey is NOT applicable to analyzers with a 75 Ω input.

Select the channel number and frequency offsets to be used in the CSO/CTB tests as follows:

7. Press Beats Setup.

   a. Press SYS BTS REF CH. Enter the channel number (if you have selected TUNE BY CH FREQ (CH)) or the frequency of the visual carrier (if you have selected TUNE BY CH FREQ (FREQ)) to be used for testing CTB.
   The default is channel 4 HRC.
   b. Press CSO FRQ OFFSET. Enter the frequency offset from the visual carrier selected in Step a. above where you wish to make the CSO measurement.
   The default is 8.75 MHz.
   c. Press CTB FRQ OFFSET. Enter the frequency offset from the visual carrier selected in Step a. above where you wish to make the CTB measurement. The default is 8.00 MHz.
   d. Press Prev Menu to return to the Setup menu.

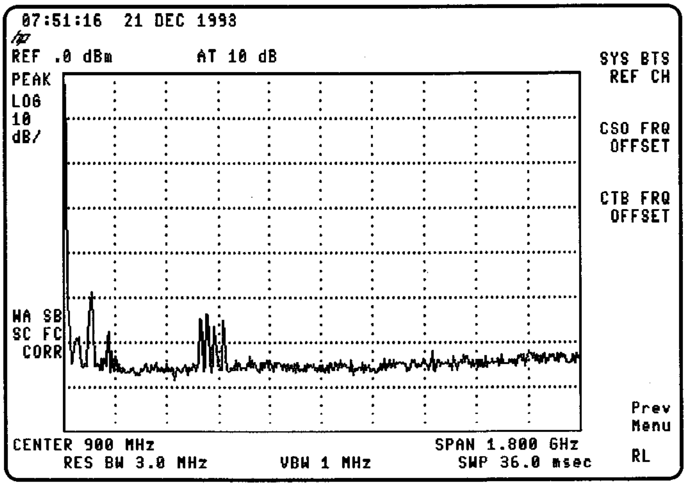


Figure 2-4. Beats Setup

Turn Gating On or Off as follows:

8. Press `GATING YES NO` (YES) for gated measurements or `GATING YES NO` (NO) for non-gated measurements. This function applies to the carrier-to-noise, in-channel frequency response, and CSO measurements only.

If you select `GATING YES NO` (NO), you are prompted to turn off modulation when executing carrier-to-noise, in-channel frequency response, and CSO measurements. The measurement is performed in an interfering manner.
If you select `GATING YES NO` (YES) you are prompted to select line numbers and test signals as required. The measurement is performed in a non-interfering manner. (Gating can be turned on during these measurements.)

Set the measurement bandwidth and marker frequency offset for the carrier-to-noise (C/N) test as follows:

9. Press `C/N Setup`.

   a. Press `MESMNT BW`. The message **Measurement BW** and current setting is displayed. The default is 5.00 MHz.
   b. Enter the required measurement bandwidth using the data entry keys.

c. Press `CN FRQ OFFSET`. Enter the offset frequency you wish to use in positioning the marker below the visual carrier for the non-gated carrier-to-noise measurement. The default is 1.25 MHz.

10. Connect the cable with the cable TV signal as shown in "Step 2. Connect the signal to the analyzer."

If you are using a spectrum analyzer with 50 Ω input impedance, you can use an external pad to compensate for the impedance mismatch between a 75 Ω impedance system and the spectrum analyzer's 50 Ω input impedance. If you use an external pad, the external pad causes approximately 5.8 dB of amplitude loss. The external pad function (`EXT PAD YES NO`) can be used to compensate for this amplitude loss.

If you are using a spectrum analyzer with 50 Ω input impedance but are not using an external matching pad, the cable TV system will compensate for most of the impedance mismatch, but amplitude measurements can have up to ±0.2 dB error caused by the uncompensated mismatch over the frequency range.

Step 2. Connecting the signal to the analyzer

CAUTION

To prevent the analyzer input from being overloaded, the total power at the analyzer input must be less than +72 dBmV (+132 dBμV). Use the following formula to find the total power when the visual carriers are equal in level:

Total Power (dBmV) = Visual Carrier Level (dBmV) +
10 Log (Number of Channels) – Input Attenuation (dB)

For systems with unequal carrier levels (system tilt), the total power must be calculated by summing the individual carriers. Total power at the input mixer can be reduced by increasing input attenuation. Press (AMPLITUDE), ATTEN, and make the adjustment. The analyzer retains a manually selected attenuation until you either select a new value or reset the analyzer power-on default conditions.

For all tests provided by the HP 85721A personality, the analyzer automatically selects the attenuator setting to meet the above requirements.

1. Use the necessary adapters to connect the cable TV signal to the analyzer. See Figure 2-5.
2. If your analyzer has Option 107 installed, you must use the coupler (provided) and connect the cable TV signal to the TV IN and analyzer input connectors as shown in Figure 2-6.

NOTE

The TV IN connector on the HP 8591C with Option 107 is located on the front panel. However, on HP 8590E series spectrum analyzers with Option 107, the TV IN connector is located on the rear panel.

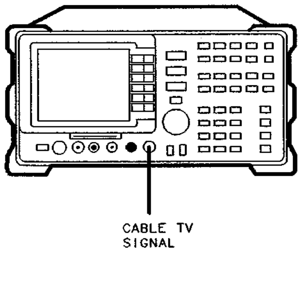


Figure 2-5. Connecting the Cable to the Input Connector

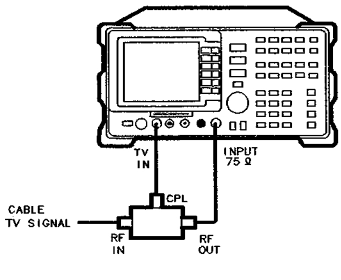


Figure 2-6. Connections for HP 8591C with Option 107 (RF and Video Measurements)

Step 3. Making the measurements

You should perform Steps 1. and 2. of this chapter before proceeding. If you have done so, you are now ready to make measurements. For each test you will find a procedure detailing the softkey selections you should make and the message prompts that appear on the analyzer display. The test may be carried out in any order.

More detailed descriptions of the measurements can be found in Chapter 8.

Selecting a signal

Before performing measurements, tune the analyzer to the TV signal to be tested. Frequency and channel allocations are listed in Chapter 9.

Procedure

1. From the `CABLE TV ANALYZER` menu press `CHANNEL MEAS`.
2. If you selected `TUNE BY CH FREQ` (CH) from the Setup menu, the message "CHANNEL ?" is displayed. (See Figure 2-7) Tune the analyzer as follows. Otherwise proceed from step 3.
   a. Press `CHANNEL SELECT`.
   b. Enter the number of the channel to be tested using the data keys. Terminate the entry by pressing (ENTER).

   The message **USE SOFTKEYS TO SELECT DESIRED BAND** is displayed.

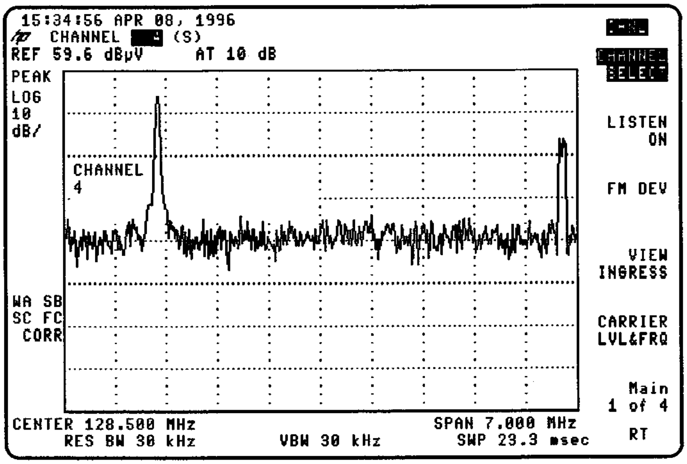


Figure 2-7. Channel Select

c. Select the desired channel band from the displayed menu. Pressing `More 1 of 2` displays more choices if available.

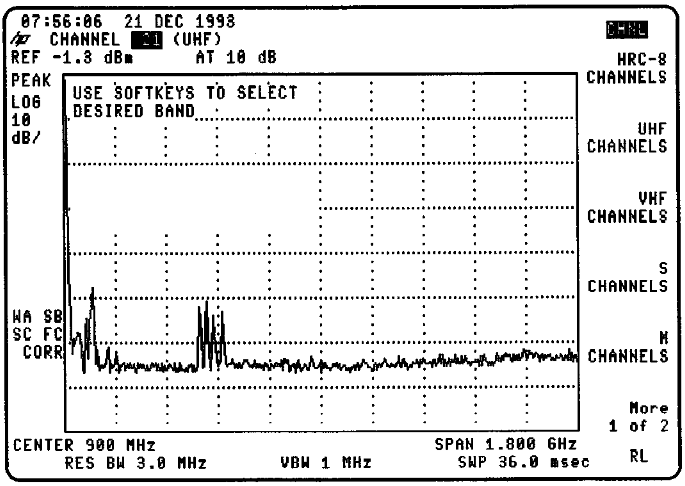


Figure 2-8. Band Selection (PAL-B/G)

Step 3. Making the measurements

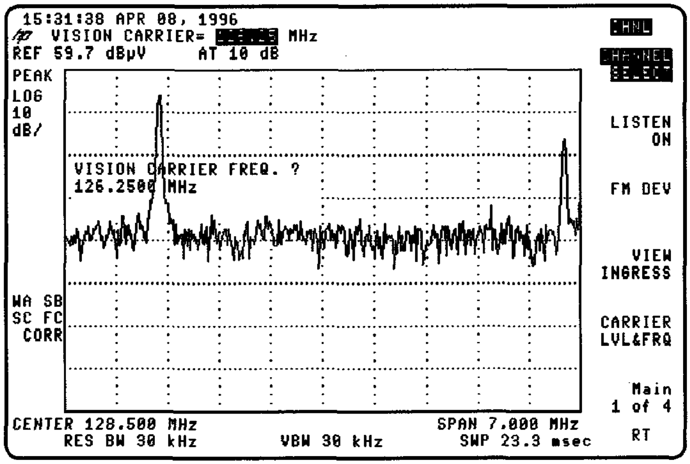


Figure 2-9. Channel Selected

3. If you selected TUNE BY CH FRQ (FREQ) from the Setup menu, the message `VISION CARRIER FREQ. ?` is displayed. Tune the analyzer as follows:
   a. Press CHANNEL SELECT .
   b. Enter the visual carrier frequency of the channel to be tested using the data keys.

Hints

1. If you accidentally use the wrong key sequence, reenter the channel. If CHANNEL SELECT is the active function, enter the channel number, then press (ENTER). Otherwise, press CHANNEL SELECT, enter the channel number, then press (ENTER).
2. If you wish to change the tuning method from what is currently selected, press (MODE), CABLE TV ANALYZER, Setup, Tune Config. Press TUNE BY CH FRQ to underline the method you want to use. Press (MODE), (MODE) to return to Channel Measurement mode.
3. If you leave the cable TV softkeys (to use markers, for example) or exit a test incorrectly you can return to the last used cable TV menu by pressing the mode key twice: (MODE), (MODE).
4. In either of the above cases, or if you are lost in the CABLE TV ANALYZER mode, press (MODE) to reenter the CABLE TV ANALYZER mode, then enter a channel number.
5. If you want to set the analyzer to the power-on default conditions after using the cable TV functions, you can either cycle the power or press (PRESET).
6. After exiting any test, you can step up or down to an adjacent numbered channel by pressing (⇧) (step up) or (⇩) (step down). You must also re-enter the channel band.

Carrier level and frequency test

The CARRIER LVL&FRQ test measures the visual carrier power level and frequency. The visual-to-sound frequency and power ratio is also measured. For systems with dual sound carriers (PAL-B/G) results for two sound carriers are displayed. For systems with NICAM (PAL-B/G and PAL-I), the visual-to-sound digital carrier power ratio is also measured.

Procedure

1. Select a channel, then press CARRIER LVL&FRQ. The peak visual carrier level and visual-to-sound carrier ratio are displayed in a table at the base of the screen. (See Figure 2-10.) For signals with dual (stereo) sound carriers (PAL-B/G) and NICAM (PAL-I and PAL-B/G), power ratios for both sound carriers are displayed.

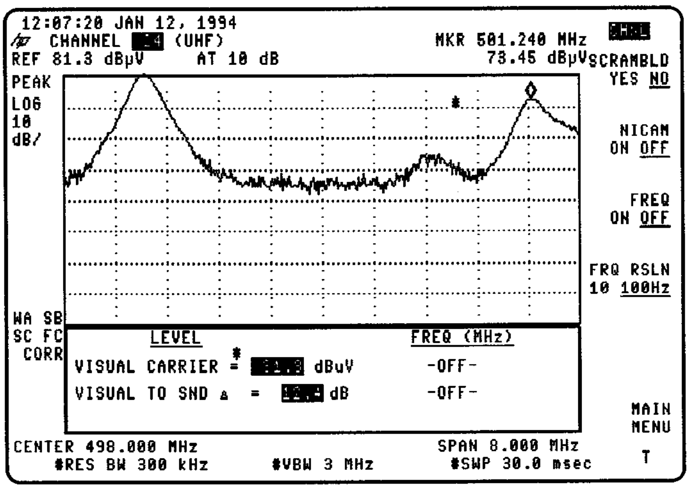


Figure 2-10. Carrier and Sound Levels

2. Press FREQ ON OFF (ON). The frequency of the vision carrier and the offset to the sound carrier(s) are now displayed. (See Figure 2-11.)

3. If it is available, press NICAM ON OFF (ON). A true RMS power measurement is made across the NICAM band and the visual-to-sound power ratios are displayed in the table.

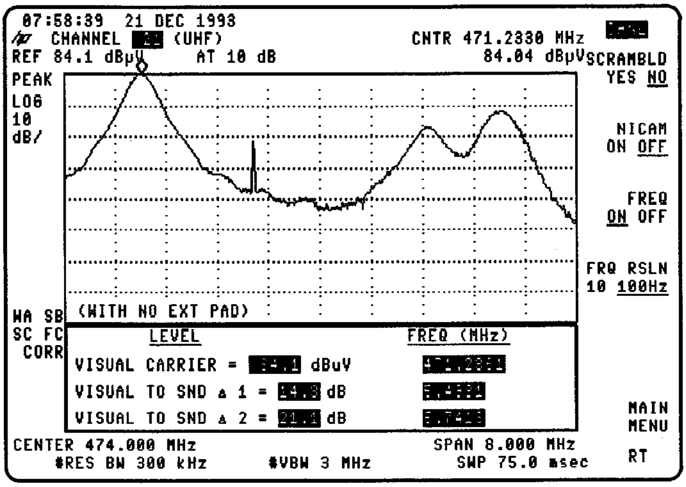


Figure 2-11. Carrier Level and Frequency

NOTE

1. The NICAM softkey is available only when PAL-I or PAL-B/G has been selected from the Setup menu. It is not an indication that a NICAM carrier is present in the channel.
2. If you are using a spectrum analyzer with a 50 Ω input and you have configured the analyzer to use an external pad from the Setup menu, the message (WITH EXT PAD) is displayed. Otherwise, the message (WITH NO EXT PAD) is displayed.
3. An * (asterisk) in the VISUAL CARRIER = line indicates that the internal amplifier is on.

4. Press FRQ RSLN 10 100 Hz to select between the readout resolution of 100 Hz or 10 Hz. The default setting is 100 Hz as 10 Hz significantly slows down the measurement.
5. Press SCRAMBLD YES NO (YES) when measuring sync-suppressed scrambled channels. The analyzer performs a maximum hold.
6. Turn the internal amplifier on or off as follows:
   a. Press (AMPLITUDE)
   b. Press INT AMP ON OFF to underline the required setting.
   c. Press (MODE), (MODE) to return to the Carrier Level and Frequency menu.
7. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), INTERNAL CARD (CARD), DISPLAY->CARD . Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
8. If you want to print the results, press (COPY).
9. Press MAIN MENU to exit the test.

Hint

For best results, the carrier-to-noise ratio (in 5 MHz BW) of the system should be 40 dB or greater, and the measured signal level should be 30 dB or greater above the displayed noise during the test.

Carrier-to-noise test

The CARRIER/NOISE test measures the ratio of the peak visual carrier level to the minimum noise level between channels. If your analyzer has Option 107 and Option 301 installed you can make a non-interfering measurement. The in-band noise accross the noise bandwidth you have selected (MESMNT BW) is measured.

Without Option 107 and Option 301 installed, the modulating signal must be removed or the measurement made outside the vestigial sideband. This point is slected from the C/N FRQ OFFSET and places the marker below the visual carrier.

The MESMNT BW and C/N FRQ OFFSET are selected from the Setup menu.

Procedure

1. Select a channel, then press Main 1 of 4, CARRIER/NOISE.

NOTE

If a channel is not selected before pressing CARRIER/NOISE the message PLEASE SELECT A CHANNEL will be displayed. A channel must be entered before continuing with the test.
Note that the test compares the noise level at the analyzer input to that of the analyzer itself. If these levels are within 3 dB of each other, the analyzer will display the message (See MORE INFO) next to the measurement result. See Figure 2-15. If the difference is less than 2.2 dB, the message is in inverse video. Refer to Chapter 8 for more detailed information about the carrier-to-noise measurement.

2. If your analyzer has Option 107 and Option 301 installed and you wish to make a non-interfering measurement, proceed from Step 3.
   If your analyzer has Option 107 and Option 301 installed and you selected YES from the GATING YES NO in the Setup menu, continue at Step 3b. Otherwise proceed as follows:

The messages *REMOVE MODULATION (or turn GATE ON) and *KNOB CONTROLS MARKER are displayed.

a. Remove signal to processor or modulator, then terminate with a 75 Ω load.

b. Move the marker using the front panel knob to the minimum noise level between the visual carrier and the sound carrier of the next lower channel.

The measurement result is displayed in the form
C/N (NRMLZD X.XX MHz) =YY.Y dB.
X.XX MHz is the measurement bandwidth selected from the MESMNT BW in the Setup menu and YY.Y dB is the carrier-to-noise ratio, normalized to that bandwidth. (See Figure 2-12.)

c. Continue from Step 4.

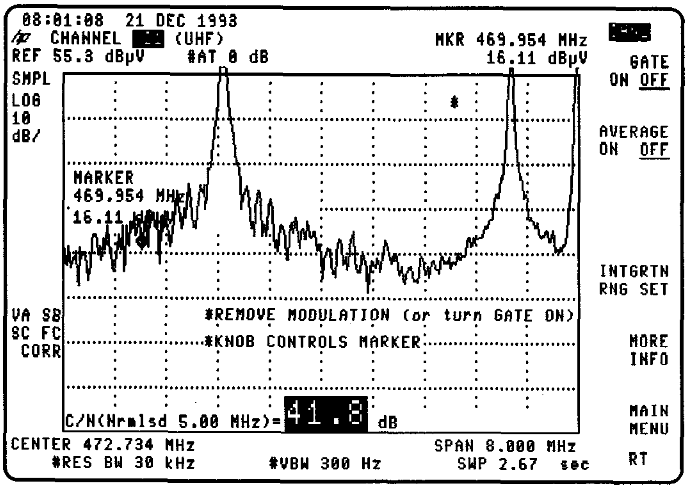


Figure 2-12. Carrier-to-Noise (Gate Off)

3. Perform the following steps to make a non-interfering measurement (signal turned on) if your analyzer has Option 107 and Option 301 installed.

   a. Following the messages *REMOVE MODULATION (or turn GATE ON) and *KNOB CONTROLS MARKER are displayed, press GATE ON OFF (ON).

The messages SELECT A QUIET LINE and LINE NUMBER and current value are displayed. The default is 22.

b. Enter a quiet line number using the data keys. Terminate the entry by pressing (ENTER).

c. Press FLD BOTH EVEN ODD until the desired field is underlined. The default is BOTH.

d. Press CONTINUE to complete the measurement and display the test result on the screen.

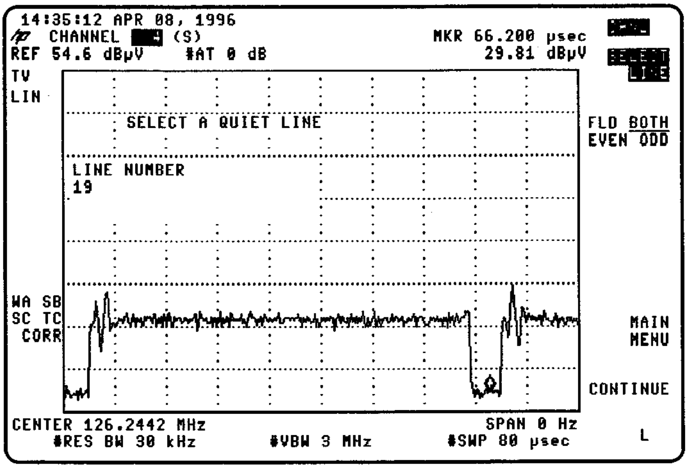


Figure 2-13. Quiet Line

The measurement result is displayed in the form
C/N (X.XX MHz) =YY.Y dB.
X.XX MHz is the measurement bandwidth selected from the MESMNT BW in the Setup menu and YY.Y dB is the RMS noise measured accross the X.XX MHz bandwidth. (See Figure 2-13.)

The following messages are displayed:
OUTER MARKERS DEFINE ACTUAL NOISE INTEGRATION RANGE and KNOB CONTROLS CENTER OF RANGE.

e. Move the measurement range to the desired position by using the front-panel knob while observing the two outer markers.

Step 3. Making the measurements

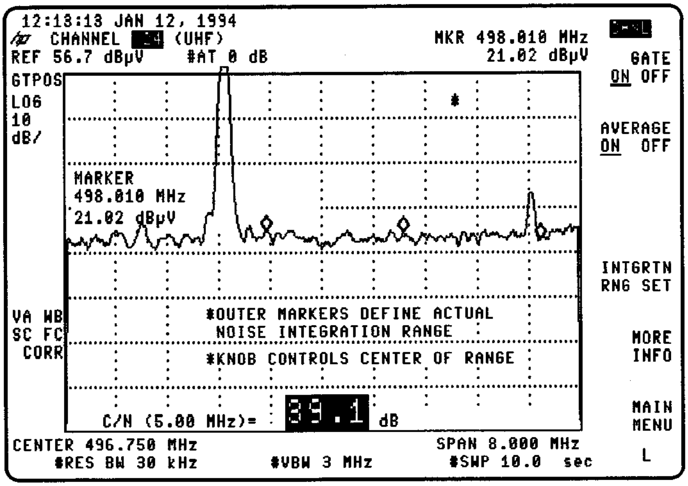


Figure 2-14. Carrier-to-Noise (Gate On)

The INTGRTN RNG SET softkey allows you to specify a range over which the measurement will be made. This accounts for the non-flatness of the noise floor.

f. Press INTGRTN RNG SET . The current value is displayed. To change this, enter a number using the data keys and press (ENTER). The default value is 85% of the measurement bandwidth (MESMNT BW).

g. Reposition the measurement range as required using the front-panel knob.

4. Press AVERAGE ON OFF to turn averaging on or off.

Note that the test compares the noise level at the analyzer input to that of the analyzer itself. If these levels are within 3 dB of each other, the analyzer will display the message (See MORE INFO) next to the measurement result. See Figure 2-15. If the difference is less than 2.2 dB, the message is in inverse video. Refer to Chapter 8 for more detailed information about the carrier-to-noise measurement.

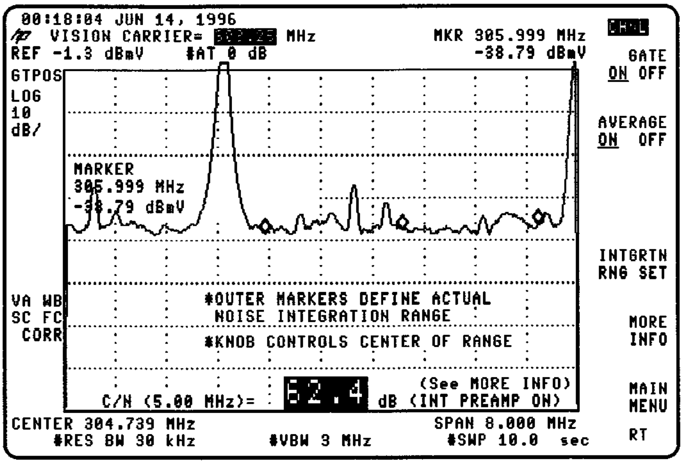


Figure 2-15. See More Info

> **NOTE**
>
> Refer to Step 6 of "Setting up the test system" at the beginning of this Chapter to configure the analyzer for use with an external preamplifier.

5. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), INTERNAL CARD (CARD), DISPLAY->CARD . Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
6. If you want to print the results, press (COPY).
7. Pressing MORE INFO displays the carrier/noise calculation. See Figure 2-16.

Step 3. Making the measurements

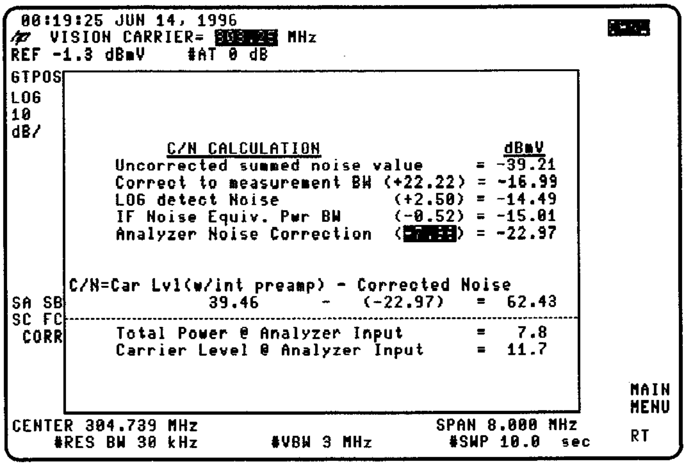


Figure 2-16. Carrier-to-Noise, More Information

8. Press MAIN MENU.

   If you have not selected GATE ON, the message **CHANNEL TURNED ON?** will be displayed when MAIN MENU is pressed. Be sure the carrier is turned on again, and press MAIN MENU again.

Note that when an external preamplifier is used and you have selected EXT AMP YES NO (YES), the noise contribution of the preamplifier is also included in the calculation. See Figure 2-17. The values for external amplifier gain and noise figure entered in the input configuration, as described in "Configure the test system", are used for this calculation. This is the only use made of the values entered with the external amplifier softkeys (EXT AMP YES NO, EXT AMP GAIN, or EXT AMP NZ FIG).

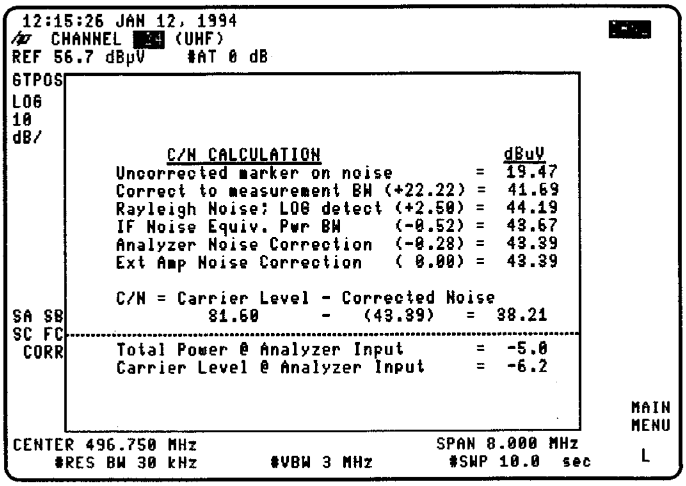


Figure 2-17. External Amplifier Calculation

Hints

1. When using a tunable bandpass filter, first peak the filter using CARRIER LVL&FRQ. Then press CARRIER/NOISE. Place the marker to measure the carrier-to-noise close enough to the carrier to minimize any roll-off effect of the bandpass filter.
2. Carrier-to-Noise Measurement Accuracy is degraded as the cable TV system noise approaches the analyzer noise. This is reflected in the magnitude of the Analyzer Noise Correction Value.
3. When in the carrier-to-noise measurement, press More, then MORE INFO. Note the analyzer noise correction value.

   if less than 0.5 dB, then C/N accuracy ±1 dB
   if equal to 0.5 dB, then C/N accuracy ±1.25 dB
   if equal to 3 dB, then C/N accuracy ±2 dB
   if equal to 7 dB, then C/N accuracy ±3.5 dB
   if greater than 7 dB it is out of measurement range
4. The analyzer input attenuator sets the noise floor of the analyzer. The attenuator is set to not overload the first mixer. For carrier to noise, the attenuator switch point from 0 to 10 dB is at +37 dBmV total power at the input.

Optimizing the Dynamic Range

Limiting the number of carriers input to the analyzer allows the measurement routine to select a lower attenuator value. Hence a lower noise floor. This can be done with individual channel filters, a high pass filter, a low pass filter or an adjustable bandpass filter.

When the attenuator switches to the next higher value, the noise floor raises 10 dB which degrades the signal to noise ratio by 10 dB. For C/N, the attenuator switches from 0 dB to 10 dB at +37 dBmV. Keeping the total power just below that will obtain the best signal to noise.

A 1 dB (or smaller than 10 dB) step attenuator used in conjunction with a filter will provide the best coverage of signal range for optimizing the total power at the input.

Chroma/luma delay test

The CLDI (Chrominance-Luminance Delay Inequality) test measures the delay between the chrominance and luminance signals. Your analyzer must have Option 107 installed to make this measurement. HP 8590E- Series analyzers additionally require Option 101 to make this measurement.

A CCIR Line 17 or UK ITS test signal is also required.

Procedure

1. Select a channel, then press Main 1 of 4, Main 2 of 4, CLDI.
2. Select a test line by pressing SELECT LINE. Enter the test line number using the data keys and terminate the entry by pressing ENTER. The default is line 19.
3. Press FIELD ODD EVEN to underline the desired field.

> **NOTE**
>
> These measurements cannot be performed without a test signal.

4. Press Select Test Sig.
5. Press CCIR LN 17 or UK ITS to underline the channel vertical insertion test signal.

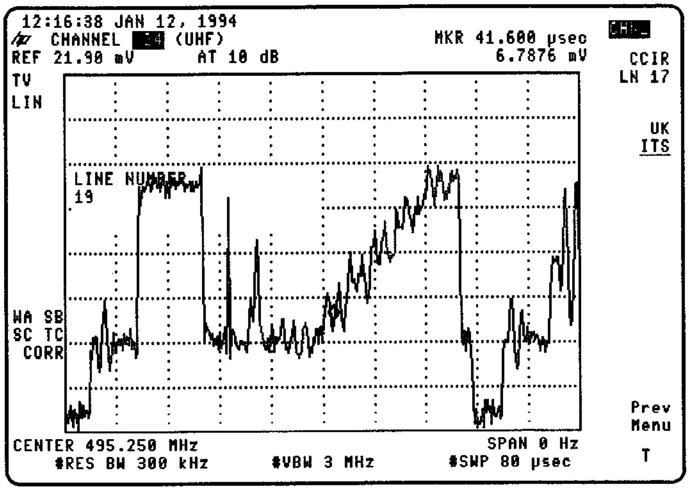


Figure 2-18. UK ITS Test Signal

6. Press `Prev menu` to return to the `CLDI` menu.
7. Pressing `CONTINUE` performs the test.

The messages **MEASURING LUMINANCE 100 AVERAGES** and **MEASURING CHROMINANCE 150 AVERAGES** are displayed during the test.

The measurement result is presented on the analyzer display as shown in Figure 2-19.

8. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), `INTERNAL CARD` (CARD), `DISPLAY->CARD`. Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
9. If you want to print the results, press (COPY).
10. Pressing `MORE INFO` displays more information about the measurement results.

Step 3. Making the measurements

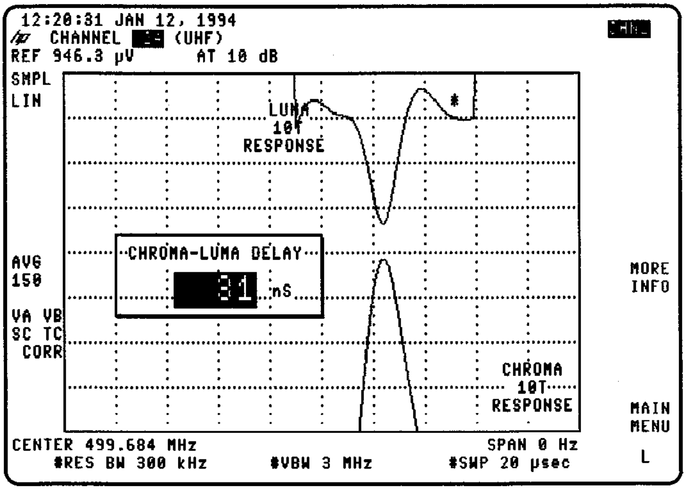


Figure 2-19. Chrominance-Luminance Delay Inequality (MORE INFO)

11. Press MAIN MENU to exit the test.

Composite Second Order/Composite Triple Beat test

The CSO/CTB test provides two measurements. The composite second order (CSO) test measures the relative level of second order intermodulation products that are offset from the carrier under test. The composite triple beat (CTB) test measures the relative level of third order intermodulation products that align in frequency with the carrier under test.

If your analyzer has Option 107 and Option 301 installed you can make a non interfering composite second order (CSO) test. The composite triple beat (CTB) test can also be performed in channel if the channel above or below is empty, otherwise the carrier must be turned off. Without Option 107 and Option 301 the carrier and/or modulation must be turned off.

NOTE

In System Measurement mode the analyzer assumes the channel above the selected channel is empty and performs the CTB measurement without the carrier under test being turned off.

Procedure

1. Select a channel, then press `Main 1 of 4`, `CSO/CTB`.

Note that if a channel is not selected before pressing `CSO/CTB` the message `PLEASE SELECT A CHANNEL` will be displayed. A channel must be entered before continuing with the test.
The messages `*TURN OFF CARRIER (or turn GATE ON)` and `*USE KNOB OR 'NEXT BEAT' KEY TO MOVE MARKERS` are displayed.
Proceed as follows:

2. If your analyzer does not have Option 107 and Option 301 installed, turn the carrier off at the headend and proceed from step 4.
3. If your analyzer has Option 107 and Option 301 installed and you want to perform a non-interfering measurement, leave the carrier on and perform the following steps:

a. Press GATE ON OFF (ON).

b. Select a quiet line by pressing SELECT LINE , entering a number using the data keys, then pressing (ENTER). The default line number is 22.

c. Press FLD BOTH EVEN ODD to change the field. The default is BOTH.

d. Press CONTINUE to complete the measurement.

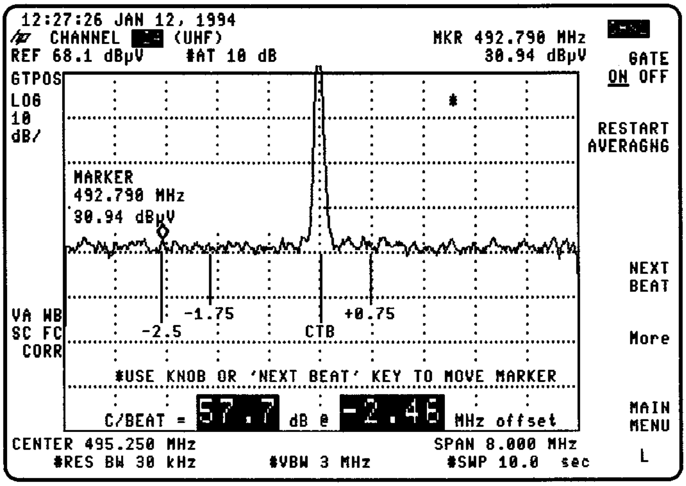


Figure 2-20. CSO Measurement (GATE ON)

4. Results for the current marker position are displayed on the screen as shown in Figure 2-20.

5. Move the marker by pressing NEXT BEAT or using the front-panel knob.

   (Pressing NEXT BEAT performs a selective peak search at −2.5 MHz, −1.75 MHz, 0 Hz and +0.75 MHz from the visual carrier.)

6. Press RESTART AVERAGNG as required.

7. Press More , ATTEN STEP DN or ATTEN STEP UP to switch the attenuator and check for analyzer generated beats when not using a

bandpass filter. Switch the attenuator up and down to check for changes in the beat level.

a. If the beat level does not change, then the beat is not generated in the analyzer.

b. If the beat level changes with attenuator changes, raise the attenuator setting until the beat level no longer changes.

Note that the analyzer automatically sets its attenuator to prevent overload.

8. If you have turned GATE ON and performed a non-interfering CSO measurement, proceed as follows to make the CTB measurement. Otherwise proceed from step 10.
9. Press `STEP UP CHANNEL` or `STEP DOWN CHANNEL` to view an empty channel.
10. Use `NEXT BEAT` or the front-panel knob to position the marker at the CTB point (as shown in Figure 2-21) and perform the CTB measurement.
11. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), `INTERNAL CARD` (CARD), `DISPLAY->CARD`. Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
12. If you want to print the results, press (COPY).

Step 3. Making the measurements

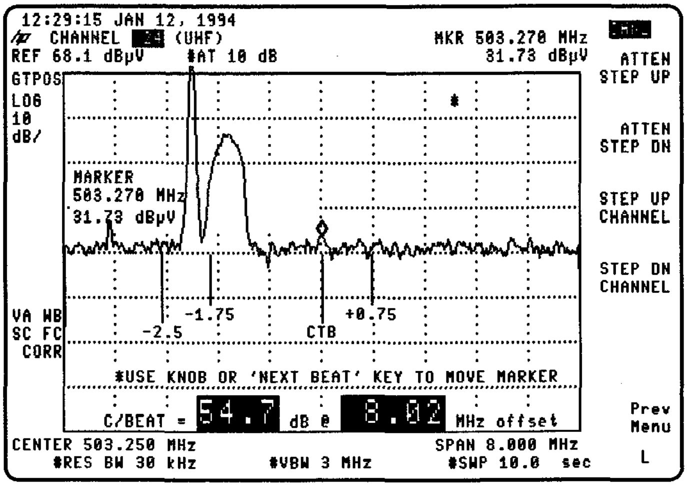


Figure 2-21. CTB Measurement (GATE ON)

13. Press `Prev Menu`, `MAIN MENU` to exit the test.
    If you have not selected GATE ON, the message CHANNEL TURNED ON? will be displayed when `MAIN MENU` is pressed. Be sure the carrier is turned on again, and press `MAIN MENU` again.

Hints

1. The most accurate measurements are made when the beat being measured is several dB above the analyzer or the cable noise floor. However, the analyzer automatically corrects for signal-near-noise, so valid results can be obtained as long as the beat is visible. If uncertain, try the measurement both with and without a bandpass filter or preamplifier.
2. Note that when using a bandpass filter, first peak the bandpass filter using `CARRIER LVL&FRQ`. Then press `CSO/CTB` and turn off the carrier. Record the CTB result. Press `NEXT BEAT` to place the marker on the desired CSO beat, then carefully adjust the bandpass filter to obtain a peak beat result.

Cross modulation test

The CROSSMOD (cross modulation) test measures the 15.625 kHz cross modulation relative to the unmodulated visual carrier of the channel.

> **NOTE**
>
> Channel modulation must be turned off to perform this measurement.

Procedure

1. Select a channel, turn off modulation, then press Main 1 of 4, CROSSMOD. The results appear as shown in Figure 2-22.

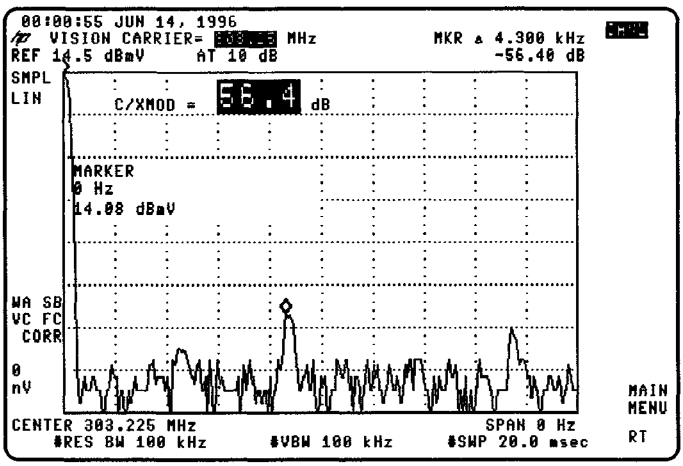


Figure 2-22. Cross Modulation

2. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), INTERNAL CARD (CARD), DISPLAY->CARD. Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
3. If you want to print the results, press (COPY).
4. Press MAIN MENU to exit the test.

Hints

For best results, the carrier-to-noise ratio of the system should be 40 dB or greater (in a 5 MHz noise bandwidth).

Depth of video modulation test

The DEPTH MOD (depth of modulation) test measures the modulation depth of a channel. Modulation depth is the ratio of the "white" level of a channel carrier relative to the peak sync pulse level.

Procedure

1. Select a channel, then press Main 1 of 4, DEPTH MOD.
2. The result is displayed at the bottom of the screen. This result is updated every 10 analyzer sweeps (approximately every 3 seconds) and continues until STOP MEAS or MAIN MENU is pressed.

NOTE

This test must have a white level present during the vertical interval because program video may not always have a white level available.

3. For spectrum analyzers with TV Sync (Option 102 or 301) and Fast Time-Domain Sweeps (Option 101), the test can also be performed on an individual TV line. This is used when making adjustments to a modulator.
4. Press TV LINE #. Line 19 appears as default line number.

Step 3. Making the measurements

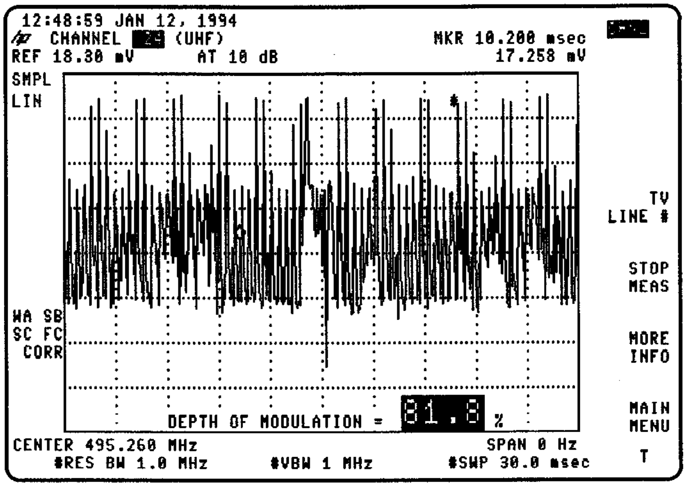


Figure 2-23. Video Modulation

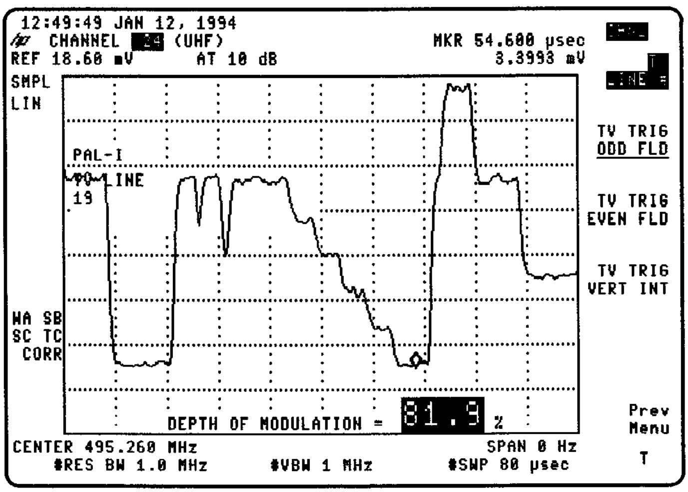


Figure 2-24. Video Modulation (Line 19 UK ITS)

5. To change the TV line number, either enter the new number and press (ENTER) or use the up and down arrow keys ((⇧) and (⇩)) to increment and decrement, respectively, the current line number by one. Note that line 19 appears in Figure 2-24.

6. Video average can be used to smooth a signal by pressing the following keys:
   a. (TRACE), MAIN 1 of 3, MAIN 2 OF 3
   b. VID AVG ON OFF (ON)
7. To return to the cable TV menu, press the following keys:
   a. VID AVG ON OFF (OFF)
   b. (MODE), (MODE)
8. To view multiple horizontal lines, change the sweep time by pressing:
   a. (SWEEP), enter the new sweep time value. (Use the (sec) (ms) or (μs) to terminate the entry.)
   b. (MODE), (MODE) (To return to the cable TV menu.)
   c. Return to the full-field display by pressing Main Menu.
9. Select the trigger point by pressing TV TRIG ODD FLD, TV TRIG EVEN FLD or TV TRIG VERT INT to underline the required method.
10. To stop all measurement activity, press Prev menu, STOP MEAS.

NOTE

You cannot re-start the depth of modulation measurement after pressing STOP MEAS. You must press MAIN MENU, then DEPTH MOD to re-start the measurement.

At this point, the analog display could be activated by pressing ANALOG+ ON OFF in the Display menu. The sweep time can be adjusted, using the knob, to obtain the desired display. In addition, the display line and display line delta functions may be used for setting depth of modulation. Press DISP LINE ON. Use the knob to place the display line on top of the horizontal sync pulses located at the top of the display. In addition, the delta display line can be activated by pressing

DL DELTA ON OFF. For further information about the delta display line, refer to the DL DELTA function description in Chapter 5.

11. Press MORE INFO to view the test result.
12. Press Prev Menu to go back to depth of modulation test.
13. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), INTERNAL CARD (CARD), DISPLAY->CARD. Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
14. If you want to print the results, press (COPY).
15. To stop the test, press MAIN MENU.

Hints

1. For most accurate results, the carrier-to-noise ratio of the system should be 40 dB or greater (in a 5 MHz noise bandwidth).
2. For this measurement to work correctly, the Vertical Interval Test Signals (VITS) must include a white signal level. In addition, you may need to turn off channel scrambling.

Differential gain/differential phase test

The amplitude of the chrominance signal determines the shade of a color. The differential gain test measures the amount of change in chrominance amplitude as the luminance level changes.

The phase of the chrominance sub-carrier determines the color represented. The differential phase test measures the amount of phase change that occurs in the chrominance signal as the luminance level changes.

The `DIF GAIN DIF PHAZ` Differential gain/differential phase test carries out these measurements at the same time. A CCIR line 330 or UK-ITS test signal is required. You must have Option 107 installed in you analyzer to make this measurement. HP 8590E-Series analyzers additionally require Option 101 to make this measurement.

Procedure

1. Select a channel, then press `Main 1 of 4`, `Main 2 of 4`, `DIF GAIN DIF PHAZ`.
2. Select the first line number of the test UK-ITS or CCIR line 330 test signal by pressing `SELECT LINE`, entering the first line number of the desired test signal, then pressing (ENTER). The default line number is 19.
3. Press `FIELD ODD EVEN` until the desired field is underlined.

NOTE

These measurements cannot be performed without a test signal.

4. Press `Select Test Sig`.
5. Press `CCIR LN 330` or `UK ITS` to select the composite test signal.
6. Press `Prev menu` to return to the `DIF GAIN DIF PHAZ` menu.

7. Press `# OF AVERAGES`, enter the desired number of averages, then press (ENTER). If you are testing with a 0 dBmV signal, you should set the number of averages to 50. The lower the test signal level, the higher the number of averages.

8. Press `CONTINUE` to perform the test.

   The result of the measurement is displayed on the analyzer display as shown in Figure 2-25.

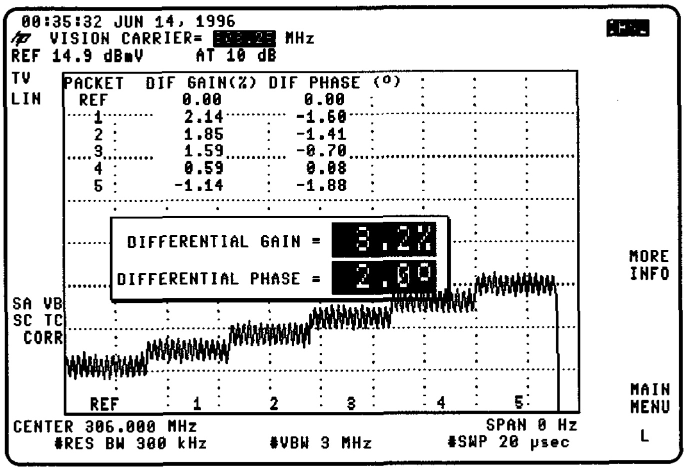


Figure 2-25. Differential Gain/Differential Phase (MORE INFO)

9. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), `INTERNAL CARD` (CARD), `DISPLAY->CARD`. Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.

10. If you want to print the results, press (COPY).

11. Press `MORE INFO` for more detailed results.

12. Press `MAIN MENU` to exit the test.

Digital Channel Power Measurement

The digital channel power measurement computes the total power within the specified bandwidth (between markers) of the selected channel. Before the digital channel power measurement can be accessed the channel measurement mode must be active with a channel selected.

Press the CHANNEL MEAS key in the main menu to select the channel measurement mode. Next press the CHANNEL SELECT key and enter any channel.

When tuning the channel to be measured, the channel edges must be within the display limits for accurate results. The default RBW and VBW assumes the channel bandwidth occupies at least 75% of the selected span.

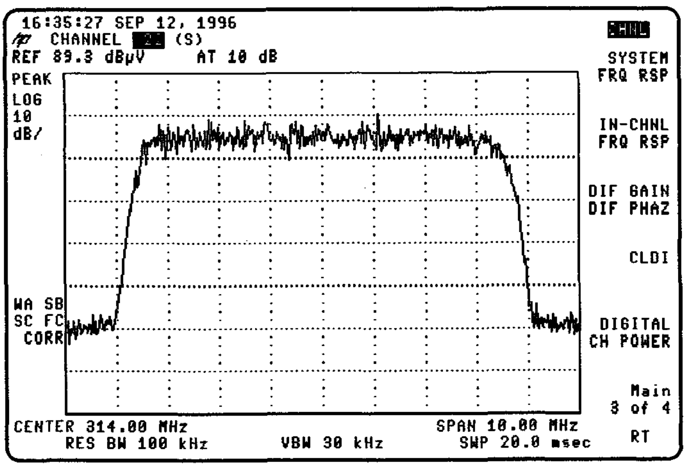


Figure 2-26. Tuned Digital Channel Display

Procedure

In the channel mode, two methods allow manual setting of the center frequency and span.

Method #1 - Tune by center frequency and frequency span

1. Press the (FREQUENCY), CENTER FREQ and enter the center frequency setting.

2. Press the (SPAN) front panel key, select SPAN and enter the frequency span setting then press (Enter).

Method #2 - Tune by start and stop frequencies

1. Press the (FREQUENCY) front panel key.
2. Select START FREQ and enter the start frequency setting, then (Enter).
3. Select STOP FREQ and enter the stop frequency setting, then (Enter).

Use the (AMPLITUDE) front panel key, REF LVL to set the reference level so the peak of the signal falls approximately 10 to 20 dB below the top of the display. Now make the measurement as follows:

1. Press (MODE), (MODE) once the amplitude and frequency are set.
2. Select Menu 3 of 4 .
3. Press DIGITAL CH POWER to enter the digital power measurement.

> **NOTE**
>
> If you have selected TUNE BY FRQ in the Tune Config menu, the visual carrier frequency will be used as the center frequency in the channel power measurement. If you try to manually set the center frequency to a value other than the visual carrier, it will be reset to the value of the visual carrier when running the test.

The markers are automatically placed at the estimated left and right edges of the selected channel. The total power between the two markers is calculated and the result displayed in current units.

If the automatic marker placement is not ideal, the markers may be moved.

Press MARKER 1 to change the position of the left marker.

Press MARKER 2 to change the position of the right marker.

The marker frequency position may be entered directly using the numeric keypad or adjusted using the knob control and step keys.

NOTE

If the left marker is placed to the right of the right marker, the message "MKR 2 > MKR 1 ?" is displayed. The measurement will not be performed until the markers are repositioned properly.

Use the AVERAGE key to turn averaging on or off. When averaging is enabled the previous measurement result is erased.

Use the # OF AVERAGES key to set the number of sweeps to be averaged to produce the final result. The input range is from 1 to 999 and the default is 10.

If averaging is off, the total power is recalculated and displayed automatically at the end of each sweep. With averaging on, the result is displayed after the number of specified sweeps have been reached. All results are displayed in current measurement units.

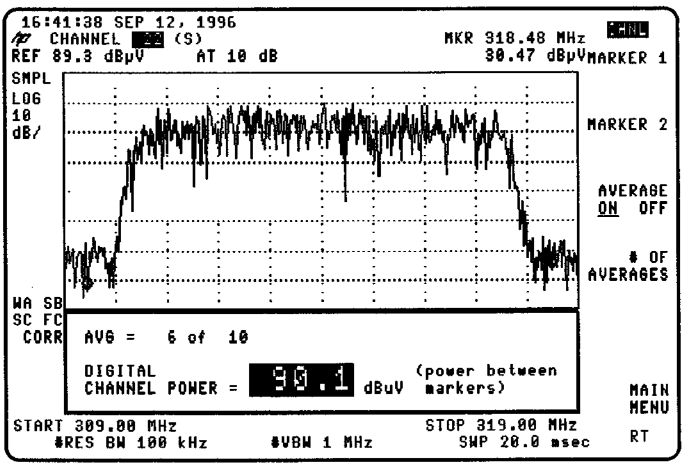


Figure 2-27. Results of Digital Channel Power Test

NOTE

The analyzer has been configured for maximum accuracy. Adjustment of VBW or RBW may degrade the measurement performance.

Press MAIN MENU to exit the test.

FM deviation test

The FM DEV (Frequency Modulation Deviation) test demodulates the FM sound carrier and displays the sound modulation in time domain on the analyzer display.

NOTE

To perform this measurement, Option 102 is required on HP 8590E-Series spectrum analyzers.

Procedure

1. Select a channel, then press FM DEV .
2. The result is displayed as shown in Figure 2-28.
3. If desired, change the number of cycles per measurement by pressing CYCLES/MSMT . The default is 25 cycles per measurement.

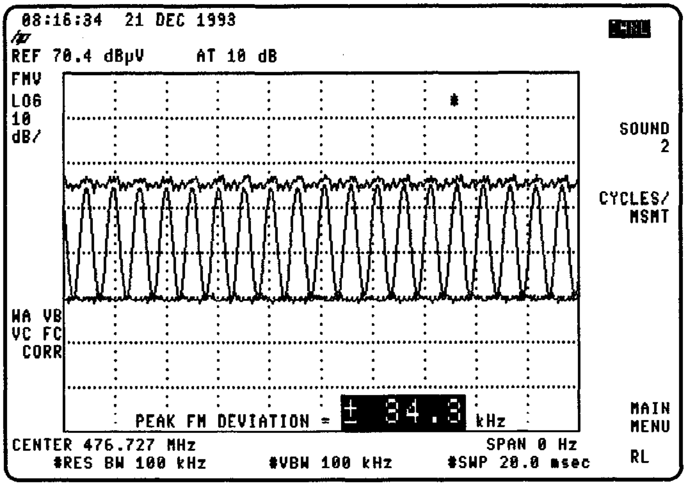


Figure 2-28. FM Deviation

4. If you are testing a PAL-B/G system and have selected PAL-B/G from TV STANDARD of the Setup menu, the SOUND 2 softkey is available. Press SOUND 2 to measure the FM deviation of the second sound carrier.
5. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), INTERNAL CARD (CARD), DISPLAY->CARD . Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
6. If you want to print the results, press (COPY).
7. Press MAIN MENU to exit the test.

Hum test

The HUM (Hum) test measures the percent amplitude modulation (%AM) for 50 Hz and 100Hz components.

Procedure

1. Select a channel or tune directly to the carrier to be measured. Make sure that the desired carrier is the highest on screen by adjusting the center frequency and/or span as needed. Turn off modulation (optional), then press Main 1 of 4, HUM.

Video Modulation Present

Note that after pressing HUM, the first thing the analyzer does is determine if video modulation is present. If the video modulation is found to be on and the test result is greater than 3 percent, an additional message appears advising you to re-test using a CW signal only.

2. Pressing MORE INFO results in the analyzer performing a single sweep of 200 ms and performs a Fast Fourier Transform (FFT) on it to separate the 50 Hz and 100 Hz components. The results are displayed as shown in Figure 2-29.

   50 Hz hum and 100 Hz hum are calculated using the analyzer FFT capability. These values are intended to be used as a troubleshooting aid. A high 50 Hz level implies inadequate grounding or stray power utility neutral currents. A high 100 Hz level implies poor filtering of a full-wave rectifier in a power supply.

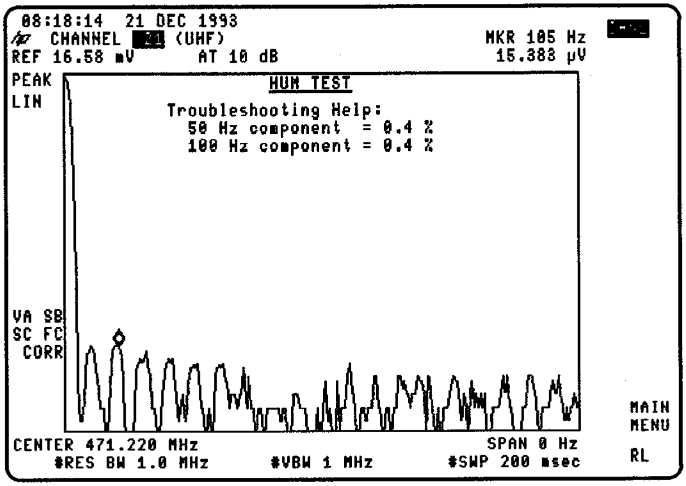


Figure 2-29. HUM (MORE INFO)

3. If you want to print the results, press (COPY).
4. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), `INTERNAL CARD` (CARD), `DISPLAY->CARD`. Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
5. If you want to print the results, press (COPY).
6. Press `MAIN MENU` to exit the test.

Hint

For most accurate results, the channel carrier-to-noise ratio should be 40 dB or greater (in a 5 MHz noise bandwidth).

In-channel frequency response test

The IN-CHNL FRQ RSP (in-channel frequency response) test sets the analyzer to view full-field test signals such as multi-burst or sinX/X. In addition, it can view an in-channel sweep signal. The sweep signal can either be continuously or manually swept.

Procedure

1. Select a channel, then press Main 1 of 4, Main 2 of 4, IN-CHNL FRQ RSP.
2. If sin X/X or multiburst test signals are available on the channel under test proceed from step 3, otherwise use a sweep generator and proceed as follows:
   a. Adjust the sweep generator to produce the following output from the processor:
      - Amplitude similar to the in service signal.
      - Frequency end points sufficient to sweep the full channel under test.

   b. Press SWP TEST SETUP.
   c. Press MAX HOLD ON OFF (ON) to catch and hold the maximum over multiple analyzer sweeps.
   d. Position a marker at the highest point on the trace.
   e. Press MARKER Δ
   f. Reposition the marker at the lowest point on the trace.

   The marker Δ nows displays the frequency and amplitude difference between the two markers. Continue at step 4.
3. Press VITS TEST to use the in-channel test signals.
   a. Press Select Test Sig.
   b. Choose the available test signal by pressing MULTI-BURST or SIN X/X.
   c. Press Prev Menu.

d. Press SELECT LINE. Use the data keys to enter the line number of the test signal. Terminate the entry by pressing (ENTER). The default is line 19.
e. Press FIELD BOTH ODD EVEN to underline the desired field.
f. Press CONTINUE.
g. Press MARKER 1 or MARKER 2 to display the marker values.

4. If you want to print the results, press (COPY).
5. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), INTERNAL CARD (CARD), DISPLAY->CARD. Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
6. Press MAIN MENU to exit the test.

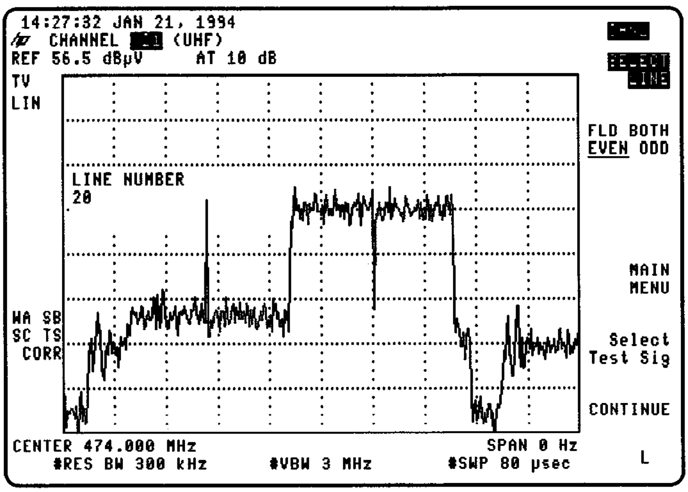


Figure 2-30. Sin X/X Line

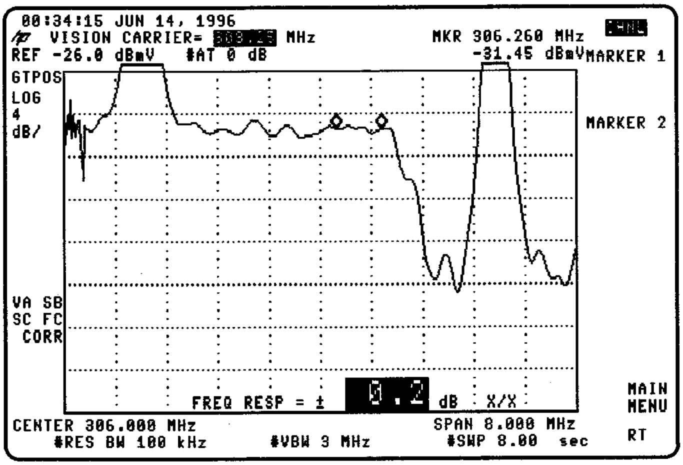


Figure 2-31. Sin X/X In-channel Response

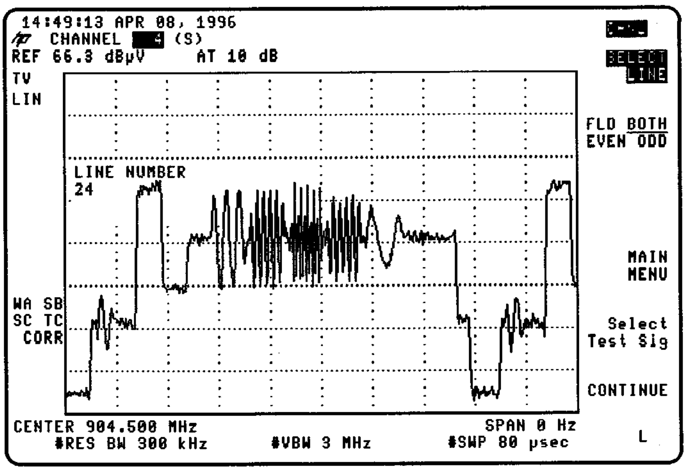


Figure 2-32. Multi-burst Signal

System frequency response test

The frequency response measurement compares a spectrum stored at a reference point to a spectrum at any other point in the system where you want to evaluate the frequency response. The signal level and amplitude slope should be approximately the same as the reference trace.

Procedure

1. If you have a trace stored in analyzer memory continue from step 2, otherwise proceed as follows:

   a. Press `Main 1 of 4`, `Main 2 of 4` and `SYSTEM FRQ RESP`.

   b. Press `ENTER STRT FRQ` and enter the start frequency.

   c. Press `ENTER STOP FRQ` and enter the stop frequency.

   d. Press `CONTINUE`.

   e. Press `TAKE REF TRACE`.

   The messages `FAST SWEEP = 2 SEC (GENERAL USE)` and `SLOW SWEEP = 8 SEC (HELPS SMOOTH SCRAMBLING)` are displayed.

   f. After the reference trace appears on screen, select `FAST SWEEP` or `SLOW SWEEP`.

   The message `SETUP FINISHED. SAVE THIS REFERENCE TRACE` is displayed.

   g. Press `SAVE TRB TO INT`.

   The messages `(ENTER 0-5 OR 11 THRU 'MAX REG #') and` `MAX REG = 39` are displayed.

   h. Enter the number you want to use to save this trace using the data keys. Terminate the entry by pressing (ENTER).

   i. Press `Prev Menu`.

   A reference trace has now been taken and stored.

2. Select a point in the system where you wish to make a comparison with the reference trace previously stored. Proceed as follows:

> **NOTE**
>
> You should ensure that the start and stop frequencies are identical to those used for the reference trace.

a. Press `ENTER STRT FRQ` and enter the start frequency.

b. Press `ENTER STOP FRQ` and enter the stop frequency.

c. Press `RECALL FRM INT` and enter the register number of the saved reference trace you want using the data keys. Terminate the entry by pressing (ENTER).

d. Press `CONTINUE`.

e. Press `DO FRQ RESP TST` to perform the measurement.

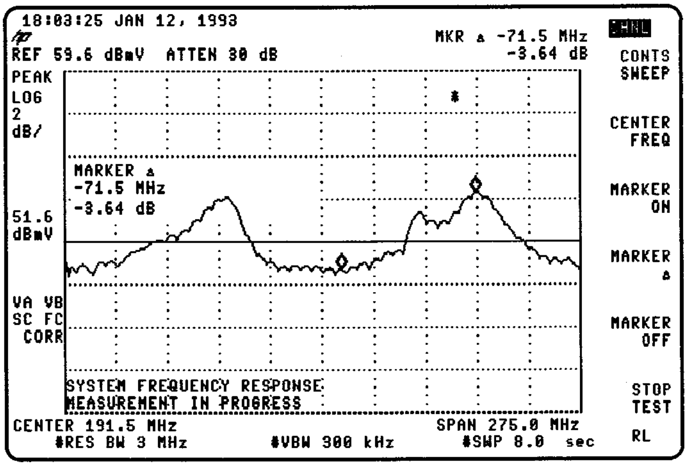


Figure 2-33. System Frequency Response

3. Press CENTER FREQ and use the ⇧ or ⇩ to align the frequency of the measurement trace with that of the reference trace.
4. Press MARKER ON to turn the marker on. The front panel knob now controls the marker.
5. Use MARKER Δ to determine the difference in frequency and amplitude relative to the first marker position as shown in Figure 2-33.
6. Press MARKER OFF to turn marker off.
7. Press STOP TEST to stop the measurement.
8. Press Prev menu, Main Menu to exit the test.

View ingress test

The VIEW INGRESS test allows you to observe and examine unwanted random products which may be present in the channel band.

Procedure

1. Select a channel, then press VIEW INGRESS . A marker is placed on the peak of the carrier, and the delta marker is activated.
2. After the displayed modulation and noise are reduced, use the knob to position the delta marker. The frequency and amplitude differences between the peak carrier level and the marker appear in the active function block. See Figure 2-4.

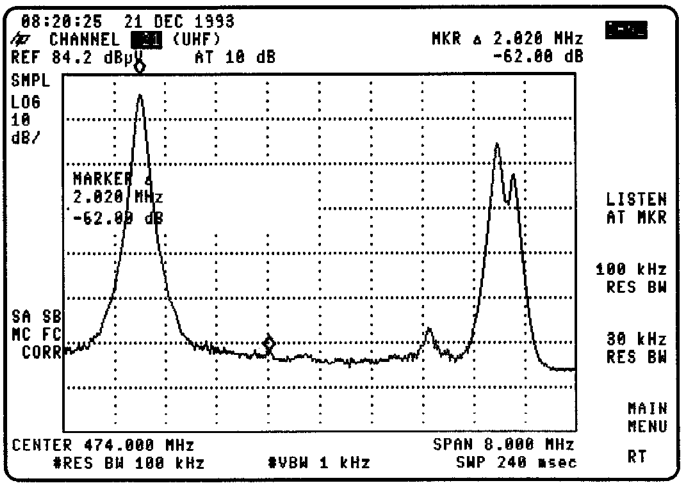


Figure 2-34. View Ingress

3. During the test, you can change the default 100 kHz resolution bandwidth (RBW). For example, you might select 30 kHz RES BW to improve resolution of signals close to the visual carrier. Return to 100 kHz RBW by selecting 100 kHz RES BW .
4. Selecting either 100 kHz RES BW or 30 kHz RES BW resets the modulation and noise reduction part of this function.

5. Option 102 allows you to demodulate the signal in AM or FM by pressing the LISTEN AT MKR then DEMOD AM FM. Press LISTEN OFF to return to the previous menu.
6. Press MAIN MENU to exit the test.

NOTE

Because of the minimum hold function used in this measurement, the delta marker display is approximately 3 dB lower than the actual signal level. For example, if the marker displays −50 dB, the actual signal level is closer to −47 dB.

FM Radio test

The FM RADIO test demodulates an FM radio signal and displays the sound modulation, in time domain, on the analyzer display. The demodulated audio signal can be heard on the analyzer loudspeaker.

NOTE

*To perform this measurement, Option 102 is required on HP 8590E-Series spectrum analyzers.

Procedure

1. Press Main 1 of 4, Main 2 of 4, Main 3. of 4.
2. To use the FM Radio function, press FM RADIO.
3. Tune the analyzer by entering by entering the frequency of the FM radio signal.
4. The result is displayed as shown in Figure 2-35.
5. If desired, change the number of cycles per measurement by pressing CYCLES/MSMT. The default is 25 cycles per measurement.

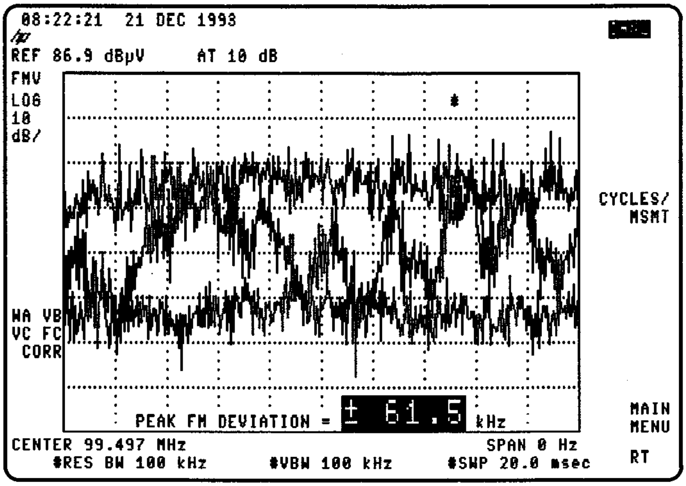


Figure 2-35. FM Radio

6. If you want to store the results to a RAM card, insert a formatted RAM card into the analyzer's card-insertion slot, press (SAVE), INTERNAL CARD (CARD), DISPLAY->CARD. Press (MODE) (MODE) to return to channel measurement mode. "Formatting a RAM card" in Chapter 3 details the formatting procedure.
7. If you want to print the results, press (COPY).
8. Press MAIN MENU to exit the test.

Step 4. Access the spectrum analyzer mode (optional)

If you want to use the spectrum analyzer functions after using the cable TV test system, you need to access the spectrum analyzer mode. When the analyzer is in the spectrum analyzer mode, `CHNL` is no longer displayed in the upper right corner of the analyzer display.

Procedure

1. Press the desired spectrum analyzer front panel hardkey function.

   or

2. Press (PRESET).

To reaccess the cable TV test system, press the mode front panel hardkey twice: (MODE) (MODE).

Step 5. Access the TV receiver mode (optional)

TV receiver mode (Option 107 required) allows you to listen to the sound and see the picture simultaneously. This allows you to quickly identify picture quality problems such as noise, distortion, hum, and ingress.

Procedure

1. Select a channel as described in "Selecting a signal" in Step3. of this Chapter and press WINDOWS (ON). (The WINDOWS keys are immediately above the front panel knob.)
   The TV demodulator (Option 107) tunes to the currently selected channel.
2. Adjust the volume and intensity knobs for the desired volume level and picture intensity.
3. Press WINDOWS (ON) again or (DISPLAY) to reaccess the cable TV test system.

3

System Measurements

System Measurements

What You'll Find in This Chapter

This chapter describes how to make cable TV measurements using the system measurements mode of operation (SYSTEM MEAS). This chapter contains the following sections:

- Making system measurements.
- Making timed system measurements.
- Creating a test plan.
- Editing the current test plan.
- Clearing the current test plan.
- Cataloging analyzer memory.
- Recalling a test plan from a RAM card.
- Recalling test data from the RAM card.
- Cataloging a RAM card.
- Formatting a RAM card.
- Deleting all the files from a RAM card.
- Deleting individual files from a RAM card.

The following tests can be performed in SYSTEM MEAS mode:

- Visual/sound carrier levels.
- Visual/sound carrier frequencies.
- Depth of modulation.
- Hum.
- CSO.
- Carrier-to-noise ratio.
- DG, DP, CLDI.
- In-channel frequency response.
- FM deviation.

If a test fails in the SYSTEM MEAS mode, confirm the failure using CHANNEL MEAS mode. This may involve disabling carriers or modulation.

Making System Measurements

The system measurement mode of operation allows you to create and save test plans that contain the following setup information:

- Channel numbers.
- Tests to run.
- Scrambling status.
- Vertical interval test (VIT) signal.
- VIT line number.
- Field—odd, even, or both.

NOTE

Appropriate vertical interval test signals (VITS) must be present for meaningful results in some tests. Commercial insertion equipment may cause these signals to be deleted during their active time.

Use the `CHANNEL MEAS` mode to survey the system under test and use the Channel Survey Map in Chapter 9 to record details of channel frequencies, test signals and other information you require to create a test plan.

Once all test plans have been created and saved to internal memory or RAM card, the measurement process is a simple six step operation:

1. Configuring the test system.
2. Connecting the signal to the analyzer.
3. Enter the location code.
4. Enter the temperature.
5. Recall a test plan from internal memory or RAM card.
6. Make the measurement (select between immediate or timed measurements).

You can also access the spectrum analyzer mode.

Step 1. Configuring the test system

The Setup menu is used to set up channel tuning, amplitude units of dBμV or dBmV, an external preamplifier, and an external pad (50 Ω analyzers only). In addition, carrier-to-noise and beats defaults are setup.

The information is stored in non-volatile analyzer memory. This means that the analyzer retains the information, even when power is turned off, until you access the Setup menu again and change it.

Procedure

1. If it is displayed, press Setup softkey. Otherwise, press (MODE), CABLE TV ANALYZER , Setup .

Configure the analyzer to tune by entering the frequency of the vision carrier or by entering channel numbers as follows: (Channel Identification Plans are listed in Chapter 9.)

2. Press Tune Config .
   a. To tune the analyzer by entering channel numbers, press TUNE BY CH FREQ (CH). Continue from step 3.
   b. To tune the analyzer by entering the frequency of the vision carrier, press TUNE BY CH FRQ (FRQ).
   c. Press TV CHNL SPAN . Use the data keys to enter the channel span setting. The default is 8 MHz.

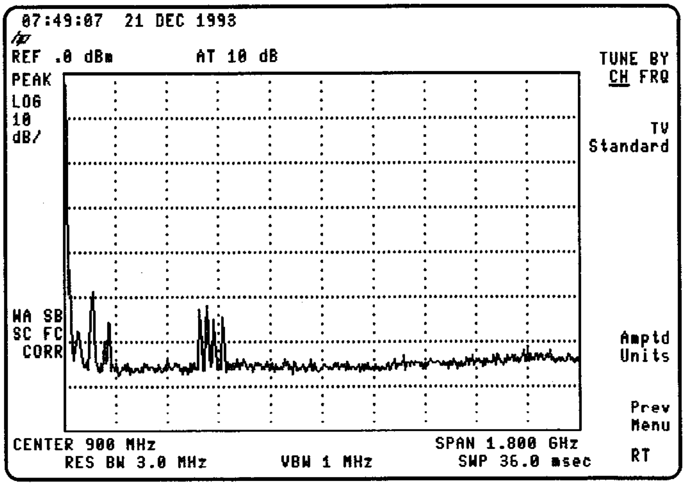


Figure 3-1. Tune Configuration Menu

Select the format of the TV signal as follows:

3. Press TV Standard.

   a. Choose from the menu by pressing PAL-I, PAL-B/G or PAL-SCM D/K to underline the required standard.

   b. Press Prev Menu.

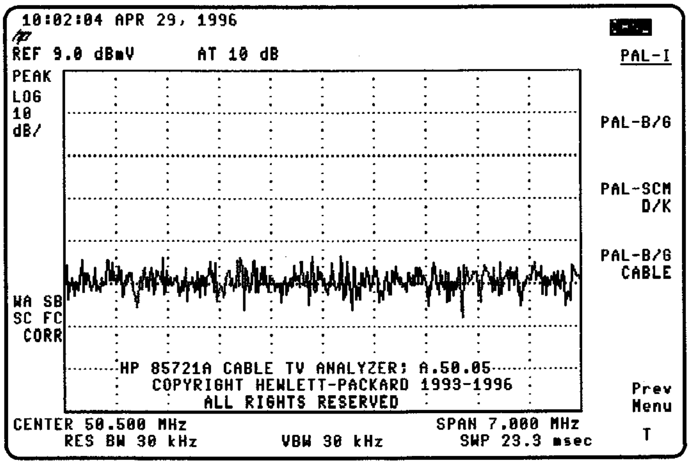


Figure 3-2. TV Standard Menu

Select the amplitude measurement units of dBmV or dBμV as follows:

4. Press `Amptd Units`.
   a. Choose from the menu by pressing `dBmV` or `dBμV` to underline the desired units.
   b. Press `Prev Menu` `Prev Menu` to return to the Setup menu.

Configure any required external matching pad or preamp as follows:

5. *For spectrum analyzers with a 50 Ω input:* Use an HP 8590 Series Option 711 external 50 Ω to 75 Ω matching pad for improved measurement accuracy. (The HP 8590 Series Option 711 external 50 Ω to 75 Ω matching pad also provides a 100 volt dc block.)
   a. Connect the matching pad to the spectrum analyzer input.
   b. Press `Analyzer Input`, `EXT PAD YES NO` (YES).
   c. Press `Prev Menu` to return to the Setup menu.

CAUTION

D.C. voltages in excess of 25 V and AC power-line voltages in excess of 100 Vpeak can permanently damage the analyzer input.

6. *When using an external amplifier (preamp):* Use an external amplifier for the carrier/noise test. The carrier/noise test calculates the noise contribution of the external amplifer and reports that correction on the `MORE INFO` screen of the carrier/noise test.
   a. Connect the output of the external amplifier to the analyzer input.
   b. Press `Analyzer Input`, `EXT AMP YES NO` (YES).
   c. Press `EXT AMP GAIN` then enter the gain value of the external amplifier. The message **EXT PREAMP GAIN** and current setting is displayed. The default value is 20 dB for the HP 85905A preamplifier.
   d. Press `EXT AMP NZ FIG` then enter the noise figure value of the external amplifier. The message **EXT PREAMP NOISE FIGURE** and current setting is displayed. The default value is 7 dB for the HP 85905A preamplifier.
   e. Press `Prev Menu` to return to the Setup menu.

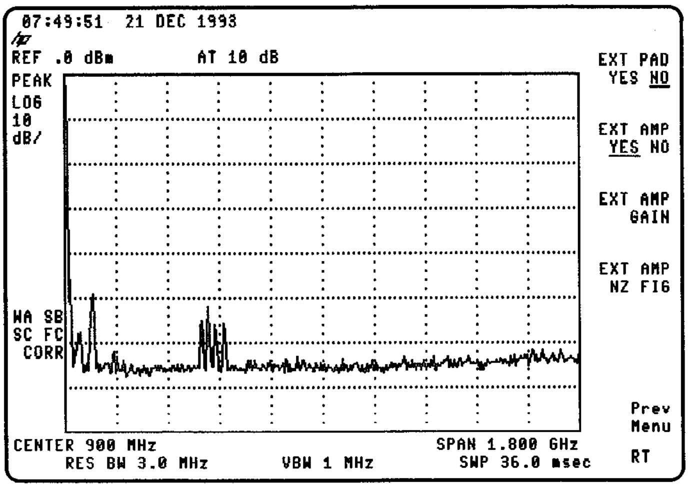


Figure 3-3. Analyzer Input Menu

NOTE

The HP 8591C is fitted with a 75Ω input. The EXT PAD YES NO softkey is NOT applicable to analyzers with a 75 Ω input.

Select the channel number and frequency offsets to be used in the CSO/CTB tests as follows:

7. Press Beats Setup.
   a. Press SYS BTS REF CH. Enter the channel number (if you have selected TUNE BY CH FREQ (CH)) or the frequency of the visual carrier (if you have selected TUNE BY CH FREQ (FREQ)) to be used for testing CTB.
   The default is channel 4 HRC.
   b. Press CSO FRQ OFFSET. Enter the frequency offset from the visual carrier selected in Step a. above where you wish to make the CSO measurement.
   The default is 8.75 MHz.
   c. Press CTB FRQ OFFSET. Enter the frequency offset from the visual carrier selected in Step a. above where you wish to make the CTB measurement. The default is 8.00 MHz.
   d. Press Prev Menu to return to the Setup menu.

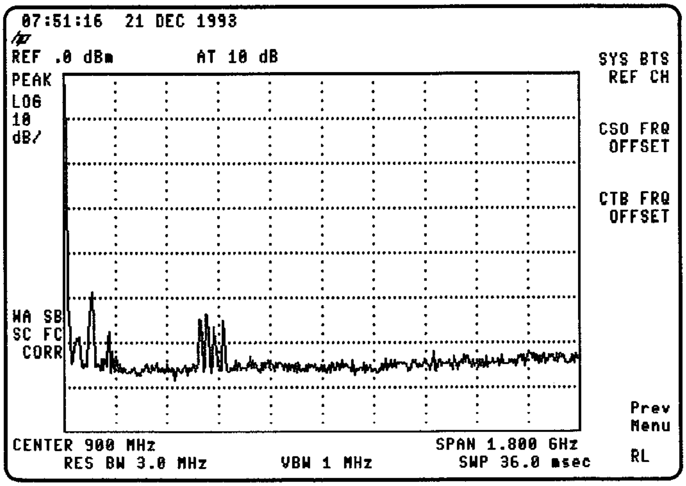


Figure 3-4. Beats Setup

Set the measurement bandwidth and marker frequency offset for the carrier-to-noise (C/N) test as follows:

8. Press `C/N Setup`.
   a. Press `MESMNT BW`. The message **`Measurement BW`** and current setting is displayed. The default is 5.00 MHz.
   b. Enter the required measurement bandwidth using the data entry keys.
9. Connect the cable with the cable TV signal as shown in "Step 2. Connect the signal to the analyzer."

If you are using a spectrum analyzer with 50 Ω input impedance, you can use an external pad to compensate for the impedance mismatch between a 75 Ω impedance system and the spectrum analyzer's 50 Ω input impedance. If you use an external pad, the external pad causes approximately 5.8 dB of amplitude loss. The external pad function (`EXT PAD YES NO`) can be used to compensate for this amplitude loss.

If you are using a spectrum analyzer with 50 Ω input impedance but are not using an external matching pad, the cable TV system will compensate for most of the impedance mismatch, but amplitude measurements can have up to ±0.2 dB error caused by the uncompensated mismatch over the frequency range.

Step 2. Connecting the signal to the analyzer

CAUTION

To prevent the analyzer input from being overloaded, the total power at the analyzer input must be less than +72 dBmV (+132 dBμV).

For systems with unequal carrier levels (system tilt), the total power must be calculated by summing the individual carriers.

Total power at the input mixer can be reduced by increasing input attenuation. Press (AMPLITUDE) ATTEN, and make the adjustment. The analyzer retains a manually selected attenuation until you either select a new value or reset the analyzer power-on default conditions.

For all tests provided by the HP 85721A personality, the analyzer automatically selects the attenuator setting to meet the above requirements.

1. Use the necessary adapters to connect the cable TV signal to the analyzer. See Figure 3-5.
2. If your analyzer has Option 107 installed, you must use the coupler (provided) and connect the cable TV signal to the TV IN and analyzer input connectors as shown in Figure 3-6.

NOTE

The TV IN connector on the HP 8591C with Option 107 is located on the front panel. However, on HP 8590E series spectrum analyzers with Option 107, the TV IN connector is located on the rear panel.

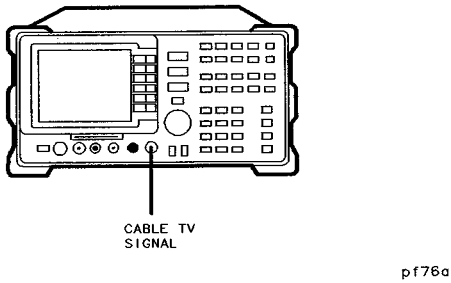


Figure 3-5. Connecting the Cable to the Input Connector

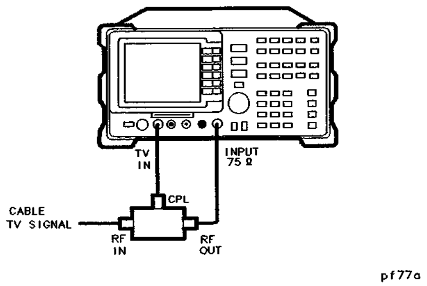


Figure 3-6. Connections for HP 8591C with Option 107 (RF and Video Measurements)

Step 3. Entering the location code

ENTER LOCATION allows you to enter a location code. The location code is only for your convenience; it is meant to help you keep track of where the data originated. The location code you enter will be stored and printed with the data.

Procedure

1. Press SYSTEM MEAS.
2. Press ENTER LOCATION.
3. Press the data keys to enter the location code. The location code can be up to seven digits long. If you make a mistake, you can use the back space key to correct the location code. The back space key ((BK SP)) is on the lower right corner of the analyzer's front panel, next to the (ENTER) key.
4. Press (ENTER) when the location code has been entered.

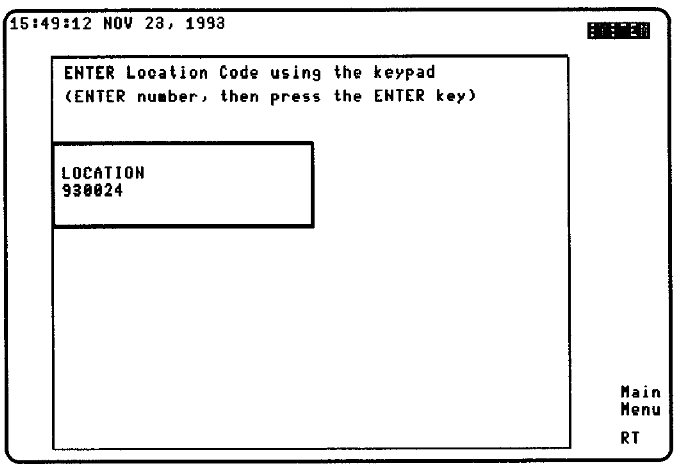


Figure 3-7. Enter Location Menu

Step 4. Entering the temperature

ENTER TEMP allows you to enter the ambient temperature without the Celsius or Fahrenheit units. This function is only for your convenience; it is not necessary to enter the temperature when making a measurement. The temperature you enter will be stored and printed with the data. (The analyzer does not measure the temperature; you must provide the temperature reading.)

Procedure

1. Press ENTER TEMP .
2. Press the data keys to enter the temperature. If you make a mistake, you can use the back space key to correct the location code. The back space key ((BK SP)) is on the lower right corner of the analyzer's front panel, next to the (ENTER) key.
3. Press (ENTER) when the temperature has been entered.

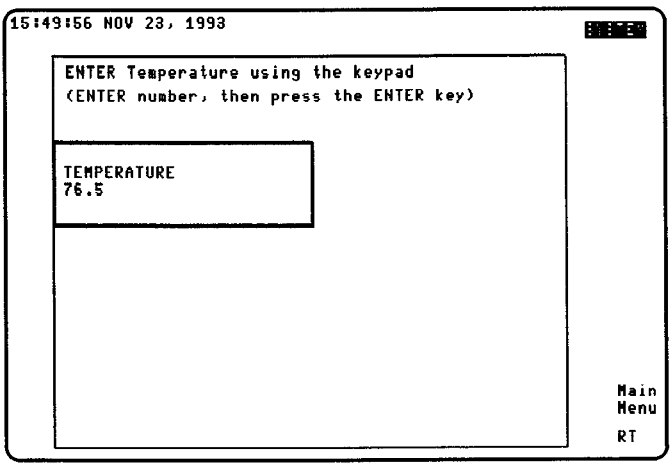


Figure 3-8. Enter Temperature Menu

Step 5. Recalling a test plan

You can recall a test plan that was previously saved in analyzer memory. Recalling a test plan will overwrite the current test plan. If you do not want the current test plan overwritten, save the current test plan before recalling a test plan. See "Step 3. Saving the current test plan in internal memory" in "Creating a Test Plan" in this chapter for more information.

For information on recalling a test plan from a RAM card, refer to "Recalling a Test Plan from a RAM Card" later in this chapter.

Procedure

1. Press `Recall TstPlan`.
2. Press `RECALL FRM INT` to recall a test plan from the analyzer's internal memory, or `RECALL FRM CARD` to recall a test plan from a RAM card.

> **NOTE**
>
> If you have not created a test plan, refer to "Creating a Test Plan" later in this chapter.

3. If you selected `RECALL FRM INT`, select the test plan number under which the test plan was saved, then press `DONE`.

   For example, if the test plan was saved under test plan 1, press `PLAN 1`.

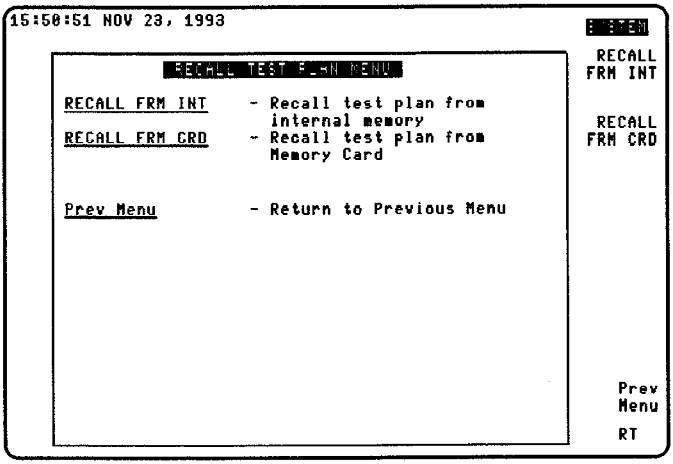


Figure 3-9. Recall from Internal Analyzer Memory

Step 6. Making Immediate System Measurements

This procedure describes how to initiate immediate testing. For information on making measurements at a later time, refer to "Making Timed System Measurements" later in this chapter.

Procedure

1. Press `Measure Now`.
2. Press `Yes` if you want to measure system CTB or `No` if not. If `Yes` is selected, system CTB will be measured in the channel specified by `SYS BTS REF CH` at the offset specified by `CTB FRQ OFFSET`. System CSO will be measured at the offset specified by `CSO FRQ OFFSET` from the reference channel.

   The `SYS BTS REF CH`, `CTB FRQ OFFSET` and `CSO FRQ OFFSET` are selected from the `Setup` menu. The defaults are channel 4 HRC, CTB 8 MHz offset and CSO 8.75 MHz offset.
3. You can select whether results are to be printed (if you have a printer connected to the analyzer), stored on a RAM card, or sent to the screen:
   a. If you want the data sent to the screen, press `DUMP to SCREEN`.
   b. If you want the data printed, press `DUMP to PRINTER`.

      For information about connecting the printer to the analyzer, see "Step 3. Install a printer," located in Chapter 1.
   c. If you want the data to be saved on a RAM card, insert a RAM card in the card reader, ensure that the RAM card has been formatted and the write-protect switch is set so the RAM card is not write protected, then press `DUMP TO RAM CARD`.

      See "Formatting a RAM Card" later in this chapter for information about formatting a RAM card.

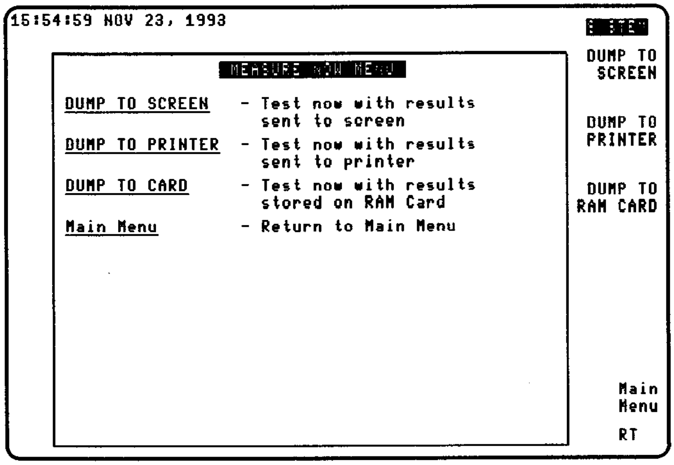


Figure 3-10. Dump Options Menu

4. If you want to stop the testing, press ABORT. It takes a few seconds for the testing to stop after ABORT is pressed.

   After measurements are completed, the following screen is displayed.

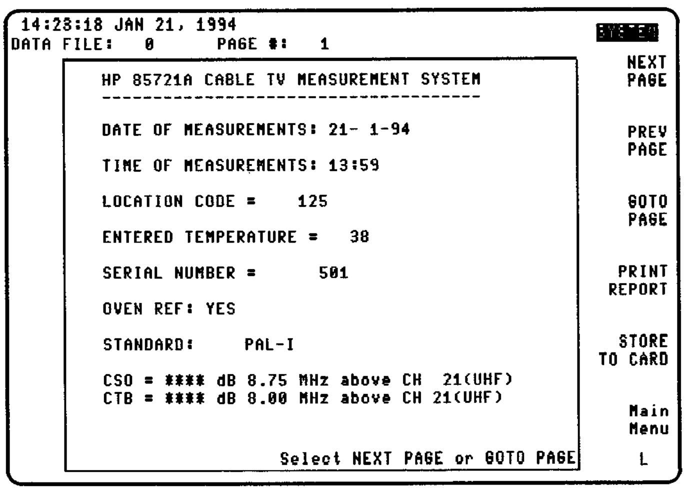
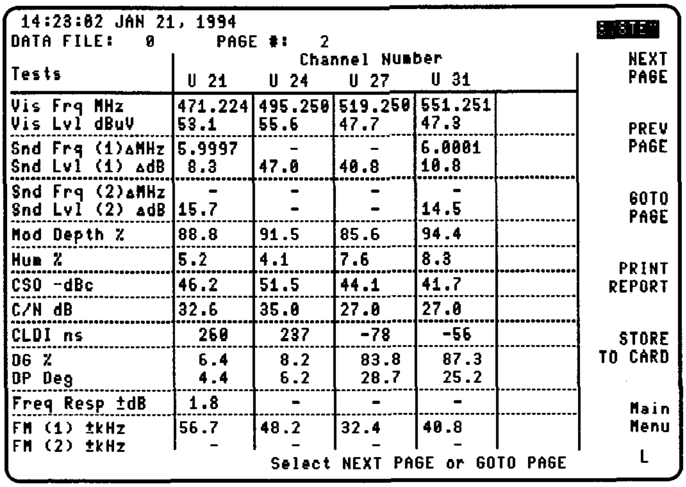


Figure 3-11. Tests Results Screen—Page 1 (example)


14:23:02 JAN 21, 1994
DATA FILE: 0 PAGE #: 2

SYSTEM

Tests	Channel Number U 21	U 24	U 27	U 31	
Vis Frq MHz	471.224	495.250	519.250	551.251	
Vis Lvl dBuV	53.1	55.6	47.7	47.3	
Snd Frq (1)ΔMHz	5.9997	-	-	6.0001	
Snd Lvl (1) ΔdB	8.3	47.0	40.8	10.8	
Snd Frq (2)ΔMHz	-	-	-	-	
Snd Lvl (2) ΔdB	15.7	-	-	14.5	
Mod Depth %	88.8	91.5	85.6	94.4	
Hum %	5.2	4.1	7.6	8.3	
CSO -dBc	46.2	51.5	44.1	41.7	
C/N dB	32.6	35.0	27.0	27.0	
CLDI ns	260	237	-78	-56	
DG %	6.4	8.2	83.8	87.3	
DP Deg	4.4	6.2	28.7	25.2	
Freq Resp ±dB	1.8	-	-	-	
FM (1) ±kHz	56.7	48.2	32.4	40.8	
FM (2) ±kHz	-	-	-	-	

Select NEXT PAGE or GOTO PAGE

NEXT PAGE
PREV PAGE
GOTO PAGE
PRINT REPORT
STORE TO CARD
Main Menu
L

Figure 3-12. Tests Results Screen—Page 2 (example)

5. Press NEXT PAGE to view the next page or PREV PAGE to view the previous page.
6. Press GOTO PAGE to go to a specified page of test results.
7. Press PRINT REPORT to print the test results.
8. Press STORE TO CARD to store test data to a formatted RAM card.

Step 7. Access the spectrum analyzer mode (optional)

If you want to use the spectrum analyzer functions after using the cable TV measurement system, you need to access the spectrum analyzer mode. When the analyzer is in the spectrum analyzer mode, `SYSTEM` is no longer displayed in the upper right corner of the analyzer display.

Procedure

1. Press (MODE), `SPECTRUM ANALYZER`.

   or

2. Press (PRESET).

To reaccess the cable TV measurement system, press (MODE), `CABLE TV ANALYZER`.

Making Timed System Measurements

If you do not want to make immediate system measurements, this procedure describes how to make tests at a later time. Tests at a later time can also be repeated.

Procedure

1. If `Timed Measure` is not displayed, press (MODE) `CABLE TV ANALYZER` `SYSTEM MEAS`.
2. Press `Timed Measure`.
3. Press `START TIME`.
4. Enter the date that you want testing to begin. To enter the date, use the data keys to enter the date in a year, month, day format, then press (ENTER).
   - Or, press `TODAY'S DATE` if you want to use the current date as the start date.
   - Or, press `TODAY'S TIMEDATE` if you want to use the current date and time as the start date and time.
5. Enter the time that you want testing to begin. To enter the time, use the data keys to enter the date in a 24-hour, hour, minute format, then press (ENTER).
6. Press `STOP TIME`.
7. Enter the date that you want testing to end. Enter the date (in year, month, day format) using the data keys, then press (ENTER). Or, press `TODAY'S DATE` if you want to use the current date as the end date.
8. Enter the time (in 24-hour, hour, minute format) you want the testing to end using the data keys, then press (ENTER).

9. Press TIME INTERVAL, then enter the time interval between the start of each test using the data keys. Press (ENTER) to terminate the entry. Enter the time interval in an hour, minute, 24-hour format.
10. If you want the results to be printed, press DUMP TO PRINTER. For information about connecting the printer to the analyzer, see "Step 3. Install a printer" in Chapter 1.
11. If you want the results to be stored on the RAM card, press DUMP TO RAM CARD. You will be prompted for a file number under which the data will be stored. Enter a number from 1 to 12, then press (ENTER).
12. If you want to stop the testing, press ABORT. (It will take several seconds for the testing to stop.)

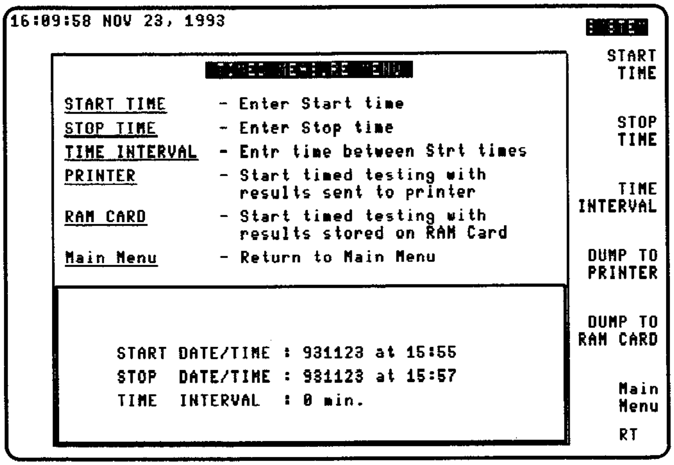


Figure 3-13. Timed System Measurements

Creating a Test Plan

A test plan consists of the channels that you want to measure and the tests you want to make on those channels. This section contains the procedure used to create a test plan. The procedure includes the following steps:

1. Select an individual channel.
2. Select a range of channels.
3. Save the current test plan in internal memory.
4. Save the current test plan to a RAM card.

The `Create Tstplan` softkey is used to access the functions necessary to create a test plan. `CLEAR TST PLAN` clears the currently loaded test plan.

If You Make a Mistake

If you make a mistake when entering a number with the data keys, you can use the back space key to correct the mistake. The back space key (BK SP) is on the lower right corner of the spectrum analyzer's front panel, next to the ENTER key.

It is very important to survey your system before creating a test plan. You must be familiar with the location of quiet lines, test signals available on a given channel, test signal location (line number), and appropriate field. To facilitate this survey, use the chart provided in Chapter 9.

Use the channel measurements mode to survey each channel, then record the information in the chart.

Step 1. Selecting an individual channel

Procedure

1. If ENTER BY CHANNEL or ENTER BY CH FREQ is not displayed, press MODE, CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2, Create TstPlan.
2. Press ENTER BY FREQ RANGE or ENTER BY CH FREQ.
   - If you are tuning the analyzer by channel number entry, use the data keys to enter the channel number. Press ENTER.
   - If you are tuning the analyzer by frequency entry, use the data keys to enter the frequency of the visual carrier.
3. If the channel that you have entered is a scrambled channel, press YES. If the channel is not scrambled, press NO.
4. Select the tests for the channel.
   - If you want to delete all of the tests for the channel, press CLEAR TESTS.
   - If you want to select all the tests, press ALL TESTS.
   - If you want to specify which tests are to be performed, use the data keys to enter the number of the test and press ENTER. Repeat this step for all of the test numbers that you want to select.
   - If you selected the carrier-to-noise and/or CSO test, enter the quiet line number and odd, even, or both fields when prompted.
   - If you selected a video test (differential gain, differential phase, and/or chroma luma delay), enter the line number of the test signal, odd or even field, and the desired test signal type when prompted.

> **NOTE**
>
> If you select both fields, differential gain/ differential phase is measured in the odd field and chroma luma delay is measured in the even field.

- If you selected the in-channel frequency response test, enter the frequency response line number, odd, even, or both fields, and the desired test signal type when prompted.

5. After you have selected the test or tests, press `DONE`.
6. If you want to enter another channel, repeat steps 3 through 6. If you do not want to enter another channel, press `Prev Menu`.
7. If you want to check the channels you have selected, press `VIEW CH SEL`.

You can enter channels into the test plan as individual channels or as a range of channels. This procedure describes how to enter channels individually into the test plan. The next procedure describes how to enter a range of channels into the test plan.

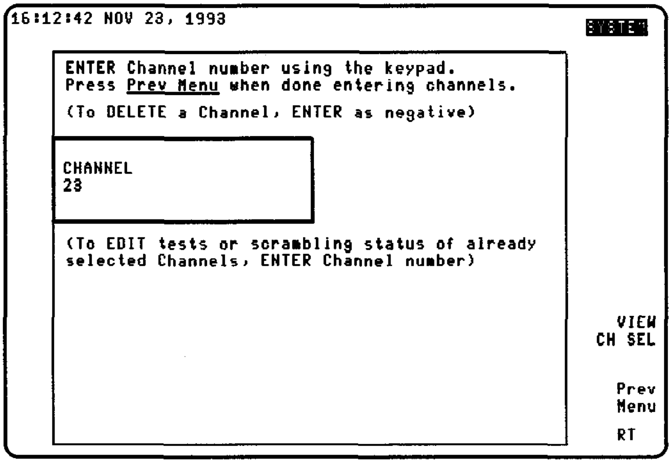


Figure 3-14. Enter by Channel

Step 2. Selecting a range of channels (optional)

Procedure

1. If ENTER BY CH FREQ or ENTER BY FRQ RNGE is not displayed, press MODE, CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2, Create TstPlan.
2. Press ENTER BY FREQ RANGE.
3. Enter the number of the first channel or frequency in the range you want to measure.
4. Enter the number of the last channel or frequency in the range you want to measure.
5. After the range has been entered, you need to press YES if the range of channels is scrambled, or press NO if the range of channels is not scrambled.

NOTE

The scrambled or unscrambled channel status applies to the range of channels that you have just entered.

6. Select the tests for the range of channels.
   - If you want to delete all of the tests, press CLEAR TESTS.
   - If you want to select all the tests, press ALL TESTS.
   - If you want to specify which tests are to be performed, use the data keys to enter the number of the test, then press ENTER. Repeat this step for all of the test numbers that you want to select.

- If you selected the carrier-to-noise and/or CSO test, enter the quiet line number and odd, even, or both fields when prompted.
- If you selected the in-channel frequency response test, enter the frequency response line number, odd, even, or both fields, and the desired test signal type when prompted.
- If you selected a video test (differential gain, differential phase, and/or chroma luma delay), enter the line number of the test signal, odd or even field, and the desired test signal type when prompted.

NOTE

1. If you select both fields, differential gain/ differential phase is measured in the odd field and chroma luma delay is measured in the even field.
2. The same quiet line and test signal numbers selected here will be used for all selected channels when using `ENTER BY RANGE`.

7. After you have selected the test or tests, press `DONE`.
8. If you want to check the channels you have selected, press `VIEW CH SEL`.

You can enter channels into the test plan as individual channels or as a range of channels. This procedure described how to enter a range of channels into the test plan.

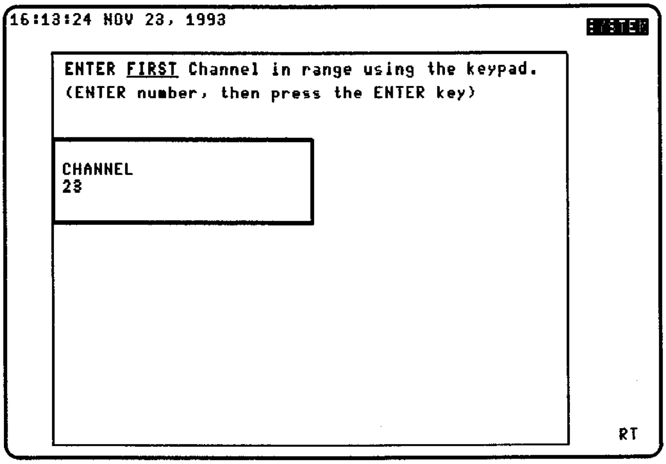


Figure 3-15. Enter by Range—First Channel Number

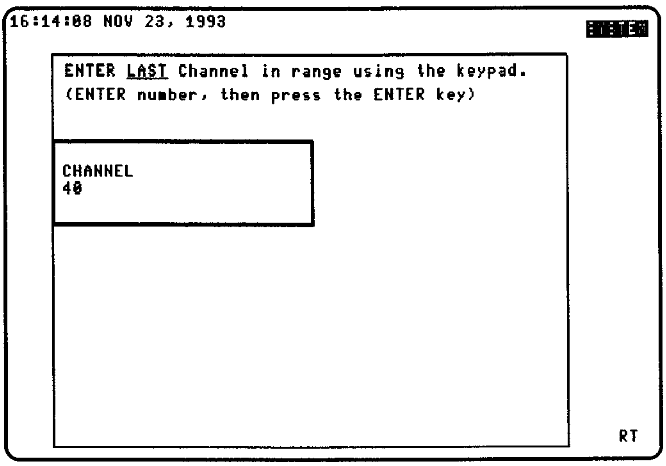


Figure 3-16. Enter by Range—Last Channel Number

Step 3. Saving the current test plan in internal memory

You can save up to five different test plans in analyzer memory. The test plans are stored in memory even if the analyzer is unplugged from a line power source.

The channel numbers, tests, scrambling status, channel tuning configuration, quiet line number, frequency response line number, color test line number, test signal type, and field information are stored for each test number of each channel with the test plan.

Saving a test plan overwrites any previously saved test plan for the same test plan number.

NOTE

Test plans 1 through 5 are saved in trace registers 6 through 10 in the analyzer. Do not save traces in trace registers 6 through 10 or your test plans will be overwritten.

Procedure

1. If `Save TstPlan` is not displayed, press (MODE) `CABLE TV ANALYZER` `SYSTEM MEAS` `More 1 of 2` `Create TstPlan`.
2. Press `Save TstPlan`.
3. Press `SAVE TO INT MEM`.
4. Because there can be up to five different test plans saved in analyzer memory, you need to select a number under which to save the test plan. Press the softkey with the plan number under which you want the test plan saved. For example, press `PLAN 1` to save the test plan in plan number 1.
5. Press `DONE`.

Step 4. Saving the current test plan to a RAM card (optional)

Procedure

1. If `SAVE TO MEM CRD` is not displayed, press (MODE) `CABLE TV ANALYZER` `SYSTEM MEAS` `More 1 of 2` `Create TstPlan` `Save TstPlan`.
2. Press `SAVE TO MEM CRD`.
3. Because there can be up to five different test plans saved in analyzer memory, you need to select a number under which to save the test plan. Press the softkey with the plan number under which you want the test plan saved. For example, press `PLAN 1` to save the test plan in plan number 1.
4. Press `DONE`.

Editing the Current Test Plan

This procedure describes how you can edit and modify the current test plan.

Procedure

1. If `Create TstPlan` is not displayed, press (MODE) `CABLE TV ANALYZER` `SYSTEM MEAS` `More 1 of 2`.
2. Press `Create TstPlan` to access the menu functions for creating a test plan.
3. Press `ENTER BY FRQ RANGE` or `ENTER BY CH FRQ`.
4. If you want to delete a channel, enter the channel number as a negative number. (To enter a negative number, use the (BK SP) key to enter the minus sign, then use the data keys to enter the channel number.)
5. If you want to change the scrambling status for the channel, enter the channel number using the data keys. You will be prompted for the scrambling status of the channel and the tests that you want performed on the channel. Press `DONE` after all of the desired tests have been selected.
6. If you want to edit the tests, enter the channel number using the data keys. You will be prompted for the scrambling status of the channel and the tests that you want performed on the channel. If you want to delete a test, enter the test number as a negative number. (To enter a negative number, use the (BK SP) key to enter the minus sign, then use the data keys to enter the test number.) Press (ENTER) after the test number has been entered. Press `DONE` after all of the desired tests have been selected.
7. If you want to edit another channel, repeat steps 4 through 6. If you do not want to enter another channel, press `Prev Menu`.
8. Save the edited test plan as described in Steps 3 or 4 of the "Creating a Test Plan" procedure.

You can delete a channel, change the tests for a channel, or change the scrambling status of a channel with `ENTER BY FRQ RANGE` or `ENTER BY CH FRQ`.

Clearing the Current Test Plan

This procedure describes how you can clear the current test plan. The current test plan is the test plan that is displayed when you press `VIEW CH SEL`, and it is the test plan that is used when making a measurement.

Procedure

1. If `Create TstPlan` is not displayed, press (MODE) `CABLE TV ANALYZER` `SYSTEM MEAS` `More 1 of 2`.
2. Press `Create TstPlan`.
3. Press `CLEAR TST PLAN` `YES`.
4. Press `Prev Menu` to return to the main menu.

This procedure describes how you can clear the current test plan. The current test plan is the test plan that is displayed when you press `VIEW CH SEL`, and it is the test plan that is used when making a measurement.

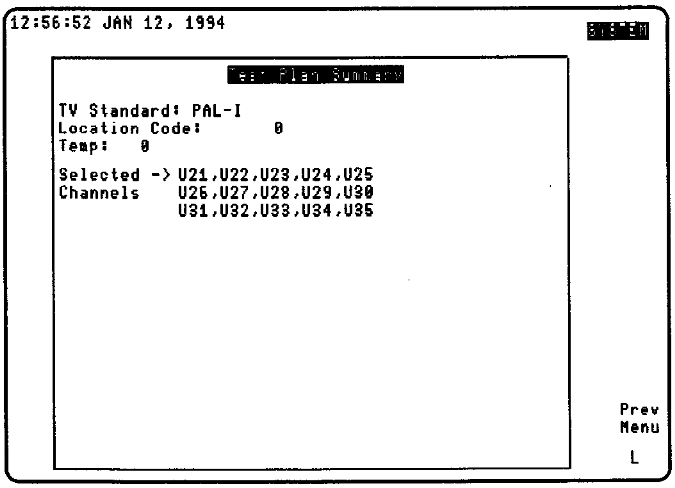


Figure 3-17. View Current Test Plan

Cataloging Analyzer Memory

You may need to catalog analyzer memory if you are unsure of how many test plans have been saved in analyzer memory.

Procedure

1. Press (SAVE) or (RECALL).
2. Press INTRNL CRD (INTRNL).
3. Press Catalog Internal, CATALOG REGISTER.
4. Turn the large knob on the analyzer's front panel to scroll down the catalog entries displayed on the analyzer screen. The test plans are saved in trace registers (TR) 6 through 10.
5. If SYSTEM is still displayed in the upper-right corner of the analyzer display, you can press (MODE) (MODE) to return to the current cable TV measurement system menu.

If a test plan has been saved in analyzer memory, the trace register's catalog entry shows the date that the test plan was saved. The date is displayed after the trace register (TR) number and "TL:". If the test plan was saved with a title, the title will be displayed also.

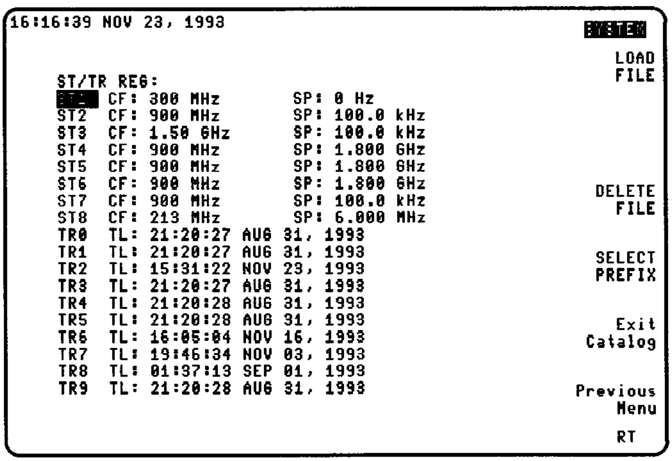


Figure 3-18. Catalog Analyzer Internal Memory

Recalling a Test Plan from a RAM Card

This procedure describes how you can recall a previously stored test plan from a RAM card.

Procedure

1. If RECALL FRM CRD is not displayed, press (MODE), CABLE TV ANALYZER, SYSTEM MEAS, Recall TstPlan.
2. Press RECALL FRM CRD.
3. Press the softkey with the plan number you want to recall. For example, press PLAN 1 to recall the test plan in plan number 1.
4. Press DONE.

Recalling Test Data from the RAM Card

This procedure describes how you can recall previously stored test data from a RAM card.

Procedure

1. If you have not done so already, connect the printer to the analyzer as described in "Step 3. Install a printer," located in Chapter 1.
2. If `Recall Data` is not displayed, press (MODE), `CABLE TV ANALYZER`, `SYSTEM MEAS`, `More 1 of 2`.
3. Press `Recall Data`.
4. Use the large knob on the analyzer's front panel to select the file that you want. To select a file, turn the knob until the file that you want is highlighted.
5. Press `DATA TO PRINTER` to print the test data.
6. Press `DATA TO SCREEN` to display test data on the screen.

Cataloging a RAM Card

This procedure describes how you can catalog the contents of a RAM (or ROM) card.

Procedure

1. If CATALOG CARD is not displayed, press (MODE), CABLE TV ANALYZER SYSTEM MEAS More 1 of 2.
2. Press CATALOG CARD.

CATALOG CARD displays a catalog listing of all the files on a RAM or ROM card.

Formatting a RAM Card

Before you use the RAM card for the first time, you must format the RAM card. Once the RAM card has been formatted, the test plan and test data can be saved on it.

Procedure

1. Check that the switch on the RAM card to be formatted is set so the card is not write protected.
2. Insert the RAM card into the analyzer with the card's arrow matching the raised arrow on the bezel around the card-insertion slot.
3. Press (CONFIG), MORE 1 of 3, Card Config.
4. Press FORMAT CARD, FORMAT CARD. This formats the RAM card.
5. If SYSTEM is still displayed in the upper-right corner of the analyzer display, you can press (MODE) (MODE) to return to the current cable TV measurements menu.

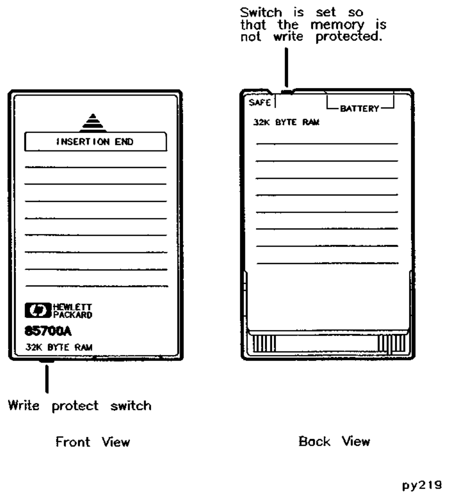


Figure 3-19. A RAM Card

Deleting All the Files from a RAM Card

This procedure describes how you can delete all the files from a RAM card.

Procedure

1. Ensure the write-protect switch is set so that the RAM card is not write protected.
2. Insert the RAM card in the card reader.
3. Press (CONFIG), MORE 1 of 3, Card Config.
4. Press BLANK CARD BLANK CARD.
5. If SYSTEM is still displayed in the upper-right corner of the analyzer display, you can press (MODE) (MODE) to return to the current cable TV measurements menu.

Deleting Individual Files from a RAM Card

You may want to delete one or more files from the RAM card to make room for new files to be stored on the RAM card.

Procedure

1. Ensure the write-protect switch is set so that the RAM card is not write protected.
2. Insert the RAM card in the card reader.
3. Press (SAVE) or (RECALL).
4. Press `INTERNAL CARD` (CARD).
5. Press `Catalog Card` `CATALOG ALL`.
6. Turn the large knob on the analyzer's front panel until the file that you want to delete is highlighted.
7. Press `DELETE FILE` `DELETE FILE`.
8. If **SYSTEM** is still displayed in the upper-right corner of the analyzer display, you can press (MODE) (MODE) to return to the current cable TV measurements menu.

4

If You Have a Problem

If You Have a Problem

The purpose of this chapter is to help you if you have a problem operating in cable TV analyzer mode. If the problem is related to the spectrum analyzer mode of operation, consult the documentation for the analyzer.

This chapter is divided into the following sections:

- Problems indicated by error messages that appear on the analyzer display.
- Other types of problems (problems that are not indicated by error messages).
- How to contact Hewlett-Packard.

Error Messages

NOTE

If you press a softkey or a front-panel key while an error message is displayed, the analyzer may "remember" each key press. Therefore, we recommend that you do not press any keys while the error message is displayed on the analyzer display.

The error messages are listed alphabetically by the first word in the message.

ALREADY ENTERED

This message is a warning that the channel number or test number has already been selected.

To solve this problem:

- If you want to delete the channel or edit the tests for the channel, use `ENTER BY CHANNEL`.
- If you do not want to select any tests press `DONE` to return to the `Create TstPlan` menu.

CAUTION - Recalled Test Plan Corrupted Selected Test Plan Cleared

This message can be caused by the following:

- A test plan was not saved in the test plan number that you are trying to recall.
  - If you are not sure of the test plan number, catalog the trace registers of analyzer memory as described in "Cataloging analyzer memory" in Chapter 3. The catalog listing will show if a test plan has been saved in the trace register.
- A trace has been stored in the trace register for the test plan, overwriting the test plan. (Remember that the test plans are stored in trace registers 6 through 10.)
  - If a trace has been saved in the trace register for the test plan, you will need to reenter the test plan.

CAUTION - STOP TIME ALREADY PASSED

This message indicates that testing did not begin before the stop time occurred.

To solve this problem:

- Reenter the start date and time and the stop date and time.

CAUTION - STOP TIME LESS THAN START TIME. SET STOP TIME AND TRY AGAIN

This message indicates that the ending date or time occurs before the starting date and time.

To solve this problem:

- Reenter the stop date and time. Remember that the time is entered in a 24-hour, hour, minute format.

CHECK CARD IN SLOT (SAVE OFF?)

This message indicates that the analyzer cannot write to the RAM card because the RAM card has not been inserted into the memory card reader or the write-protect switch on the RAM card is set to the write-protect position.

To solve this problem:

- Insert the RAM card in the analyzer's memory card reader.
- Move the write-protect switch away from the "SAFE" position. See "Formatting a RAM Card" in Chapter 3 for more information.

ILLEGAL COMMAND

If you see this message while loading the HP 85721A personality into analyzer memory, it indicates that the analyzer's firmware must be updated before the personality can be used.

☐ Check the firmware date for your analyzer:

  - Turn on the analyzer. The firmware date is displayed on the analyzer's display when the analyzer is first turned on. The date is displayed in a year, month, day, format. For example, if `rev 93.09.23` is displayed, the release date of the firmware was September 23, 1993.

To solve this problem:

- If the release date for the analyzer's firmware was prior to September 23, 1993, the firmware must be updated to use the HP 85721A personality. Contact your HP sales office for more information about updating analyzer firmware.

INVALID SYMTAB ENTRY: SYMTAB OVERFLOW

This error message indicates that there was not enough available analyzer memory.

To solve this problem, you must delete the other programs in the analyzer memory as follows:

1. Press (PRESET).
2. Press (CONFIG), `MORE 1 of 3`, `DISPOSE USER MEM`, `ERASE DLP MEM`, `ERASE DLP MEM`, (PRESET).
3. Reload the HP 85721A personality using the procedure "Step 1. Load the HP 85721A into analyzer memory" in Chapter 1.

INVALID FILE NO ROOM

The message `INVALID FILE NO ROOM` indicates that there is not enough space available on the RAM card to save the file.

To solve this problem, you can delete one or all unwanted files from the RAM card.

- To delete files individually from the RAM card, follow the procedure in "Deleting Individual Files from a RAM Card" in Chapter 3.
- To delete all the files from the RAM card, follow the procedure in "Deleting All the Files from a RAM Card" in Chapter 3.

MUST BE > FIRST

This message indicates that the last channel number entered for a range of channel numbers is less than the first channel number.

To solve this problem:

- Enter a channel number for the last channel number that is greater than the first channel number.

NO CARD FOUND

This message indicates that a memory card has not been inserted into the analyzer's memory card reader.

To solve this problem, insert the appropriate RAM or ROM card into the memory card reader.

- If you want to load the HP 85721A personality, insert the HP 85721A personality's ROM card into the memory card reader.
- If you want to store or recall data, insert a RAM card into the memory card reader.

NO TEST PLAN SELECTED

This message indicates that there is not a current test plan to test.

To solve this problem, you need to create a test plan or recall a saved test plan.

- For information about creating a test plan, see "Creating a Test Plan" in Chapter 3.
- For information about recalling a previously saved test plan, see "Recalling a Test Plan from a RAM Card" in Chapter 3.

OUT OF RANGE

The message **OUT OF RANGE** indicates that the value that you entered was not within the range for the function.

To solve this problem:

- Enter values within the range for the function. See Chapter 3 for more information about using the cable TV analyzer functions. See Table 4-1 for information about the range of values for the cable TV analyzer functions.

Table 4-1. Ranges for the Cable TV System Monitor Functions

Function	Range
ENTER LOCATION	Up to seven digits long
ENTER TEMP	−999 to +999
Test number	1 to 9 (or −1 to −9 for deleting a test number)
Channel number	1 to 158 (or −1 to −158 for deleting a channel number)
File number	1 to 12

PLEASE CAL FREQ & STORE

This indicates that the analyzer's self-calibration routines need to be performed.

To solve this problem:

- Perform the analyzer's self-calibration routines. See "Step 3. Perform the self-calibration routines" in Chapter 1 for more information.

PLEASE SELECT A CHANNEL

This message indicates that a channel was not selected before executing a measurement.

To solve this problem:

- Press `CHANNEL SELECT` in the `CHANNEL MEAS` `Main 1 of 3` menu, enter a channel number using the data keys, then press (ENTER).

PRINTER IS NOT CONNECTED, NOT TURNED ON, OR A CONTROLLER CONFLICT EXISTS

This message indicates that the analyzer cannot "talk" to the printer.

NOTE

Plotters are not supported.

To solve this problem:

1. Make sure that the printer is turned on.
2. Make sure that the analyzer is connected to the printer correctly. See "Step 4. Install a printer" in Chapter 1 for more information.
3. *For Option 021 only:* If you have both a computer and a printer connected to the analyzer, you need do one of the following:
   - Disconnect the computer from the analyzer.
   - Send the BASIC commands `ABORT 7`, then send `LOCAL 7` to the analyzer before trying to print.

RAM CARD REQUIRED

This message indicates that you have instructed the HP 85721A personality to write information to a ROM card. A ROM card can only be read; a RAM card can both be read and written to.

To solve this problem:

- Remove the ROM card from the analyzer's memory card reader and insert a formatted RAM card. If the RAM card needs to be formatted, see "Formatting a RAM Card" in Chapter 3.

RAM CARD IS NOT FORMATTED,FORMAT RAM CARD AND TRY AGAIN

This message indicates that the RAM card is unformatted.

To solve this problem:

- Format the RAM card as described in "Formatting a RAM Card" in Chapter 3.

Other Problems

This section lists problems that are not indicated by an error message.

If a test fails in SYSTEM MEAS mode

If a test fails in the SYSTEM MEAS mode, confirm the failure using CHANNEL MEAS mode. This may involve disabling carriers or modulation. Relative measurements showing cable TV equipment contributions may also be helpful.

If files are missing from a RAM card

A RAM card is able to store files because the RAM card's memory is refreshed by a battery. The battery needs to be replaced periodically or the RAM card can "forget" the files.

□ Check that the battery in a 128 kilobyte RAM card has been replaced within the last year. Check that the battery in a 32 kilobyte RAM card has been replaced within the 2 last years. (See the analyzer documentation for information about the replacement date of the RAM card's battery.) If the battery has not been replaced within the recommended time period, change the battery.

To change the battery:

- See the analyzer documentation for information about replacing the battery.

If a "-" appears in the data fields

A "-" appears in the data field if the test was not selected.

- If the test data for a channel is missing, check that the test has been selected. To check that the test has been selected:
  1. If necessary, recall the test plan.
  2. Press ENTER BY CHANNEL , enter the channel number, and select the scrambling status. The tests selected for the channel will be displayed.
  3. If necessary, enter the test number for the test that you want to select and repeat the testing.
- If the test data for a channel is missing and the test had been selected, check that the test could be performed on the channel.
  - For example, if the test measures both the visual and sound carriers, check that there is a vision or sound carrier present.
- If the system composite second order (CSO) and composite triple beat (CTB) test data is missing, ensure that YES was selected when the CSO and CTB testing prompt appeared. (The selection for CSO and CTB testing is not saved with the test plan.)

  To check and select CSO and CTB testing:
  1. Press Measure Now YES . CSO and CTB testing will be performed on the channel specified by the SYS BTS REF CH softkey in the Setup menu.
  2. If NO is selected after pressing Measure Now , CSO and CTB testing will not be performed.

If the test results are not what you expected

If the test results are not what you expected, it could be because of one of the following:

CAUTION Do not exceed the specified power input limit for the analyzer.

- ☐ The input signal was not connected.
  - Ensure that the signal is present at the analyzer input.
- ☐ The input signal is too low to be measured.
  - If the input signal is too low, use a preamplifier to boost the input signal (ensure that the voltage and power of the input signal does not exceed the specified input limits for the analyzer). See "Cable TV Measurement Specifications and Characteristics" in Chapter 9 for more information about the minimum carrier level needed.
- ☐ The wrong band or frequency was selected.
  - Ensure that the correct band or frequency has been selected.
- ☐ The external pad function was selected, but an external pad was not used.
  - If you are not using an external pad, ensure that `EXT PAD YES NO` softkey label has NO underlined. See "Step 1. Configure the test system" in Chapter 3 for more information.

If the wrong date or time is displayed

The analyzer has a real-time clock that is powered by an internal battery.

If the real-time clock is set to the wrong time or date, use the following procedure to reset the time and date:

1. Press (CONFIG), TIMEDATE.
2. If the time and date are not displayed in the upper-left corner of the analyzer screen, press TIMEDATE ON OFF so that ON is underlined.
3. To reset the time, press SET TIME, enter the time (in 24-hour format) in the hour, minute, second format using the data keys, then press (ENTER). For example, entering 133010 corresponds 1:30:10 PM.
4. To reset the date, press SET DATE, enter the date in the year, month, day format, then press (ENTER). For example, entering 910305 corresponds to March 5, 1991.

How to Contact Hewlett-Packard

In the unlikely event something goes wrong with your analyzer, refer to the documentation for the analyzer about returning it for service. If you need to contact Hewlett- Packard for a problem with the HP 85721A personality, you can call your nearest Hewlett-Packard Sales and Service office listed in the following table.

Table 4-2. Hewlett-Packard Sales and Service Offices

US FIELD OPERATIONS			
Headquarters Hewlett-Packard Company 19320 Pruneridge Avenue Cupertino, CA 95014, USA (800) 752-0900	**California, Northern** Hewlett-Packard Co. 301 E. Evelyn Mountain View, CA 94041 (415) 694-2000	**California, Southern** Hewlett-Packard Co. 1421 South Manhattan Ave. Fullerton, CA 92631 (714) 999-6700	**Colorado** Hewlett-Packard Co. 24 Inverness Place, East Englewood, CO 80112 (303) 649-5000
Georgia Hewlett-Packard Co. 2000 South Park Place Atlanta, GA 30339 (404) 955-1500	**Illinois** Hewlett-Packard Co. 5201 Tollview Drive Rolling Meadows, IL 60008 (708) 255-9800	**New Jersey** Hewlett-Packard Co. 120 W. Century Road Paramus, NJ 07653 (201) 599-5000	**Texas** Hewlett-Packard Co. 930 E. Campbell Rd. Richardson, TX 75081 (214) 231-6101
EUROPEAN FIELD OPERATIONS			
Headquarters Hewlett-Packard S.A. 150, Route du Nant-d'Avril 1217 Meyrin 2/Geneva Switzerland (41 22) 780.8111	**France** Hewlett-Packard France 1 Avenue Du Canada Zone D'Activite De Courtaboeuf F-91947 Les Ulis Cedex France (33 1) 69 82 60 60	**Germany** Hewlett-Packard GmbH Berner Strasse 117 6000 Frankfurt 56 West Germany (49 69) 500006-0	**Great Britain** Hewlett-Packard Ltd. Eskdale Road, Winnersh Triangle Wokingham, Berkshire RF11 5DZ England (44 734) 696622
INTERCON FIELD OPERATIONS			
Headquarters Hewlett-Packard Company 3495 Deer Creek Rd. Palo Alto, California 94304-1316 (415) 857-5027	**Australia** Hewlett-Packard Australia Ltd. 31-41 Joseph Street Blackburn, Victoria 3130 (61 3) 895-2895	**Canada** Hewlett-Packard (Canada) Ltd. 17500 South Service Road Trans- Canada Highway Kirkland, Quebec H9J 2X8 Canada (514) 697-4232	**China** China Hewlett-Packard Company 38 Bei San Huan X1 Road Shuang Yu Shu Hai Dian District Beijing, China (86 1) 256-6888
Japan Yokogawa-Hewlett-Packard Ltd. 1-27-15 Yabe, Sagamihara Kanagawa 229, Japan (81 427) 59-1311	**Singapore** Hewlett-Packard Singapore (Pte.) Ltd 1150 Depot Road Singapore 0410 (65) 273-7388	**Taiwan** Hewlett-Packard Taiwan 8th Floor, H-P Building 337 Fu Hsing North Road Taipei, Taiwan (886 2) 712-0404	

5

Channel Measurements Menu Map and Softkey Descriptions

Channel Measurements Menu Map and Softkey Descriptions

What You'll Find in This Chapter

This chapter contains the menu map and descriptions of the softkey functions used in channel measurements mode. This chapter contains the following sections:

- Channel measurements menu map.
- Channel measurements softkey descriptions.

Channel Measurements Menu Map

The following menu map shows all channel measurement mode softkeys and how they are accessed.

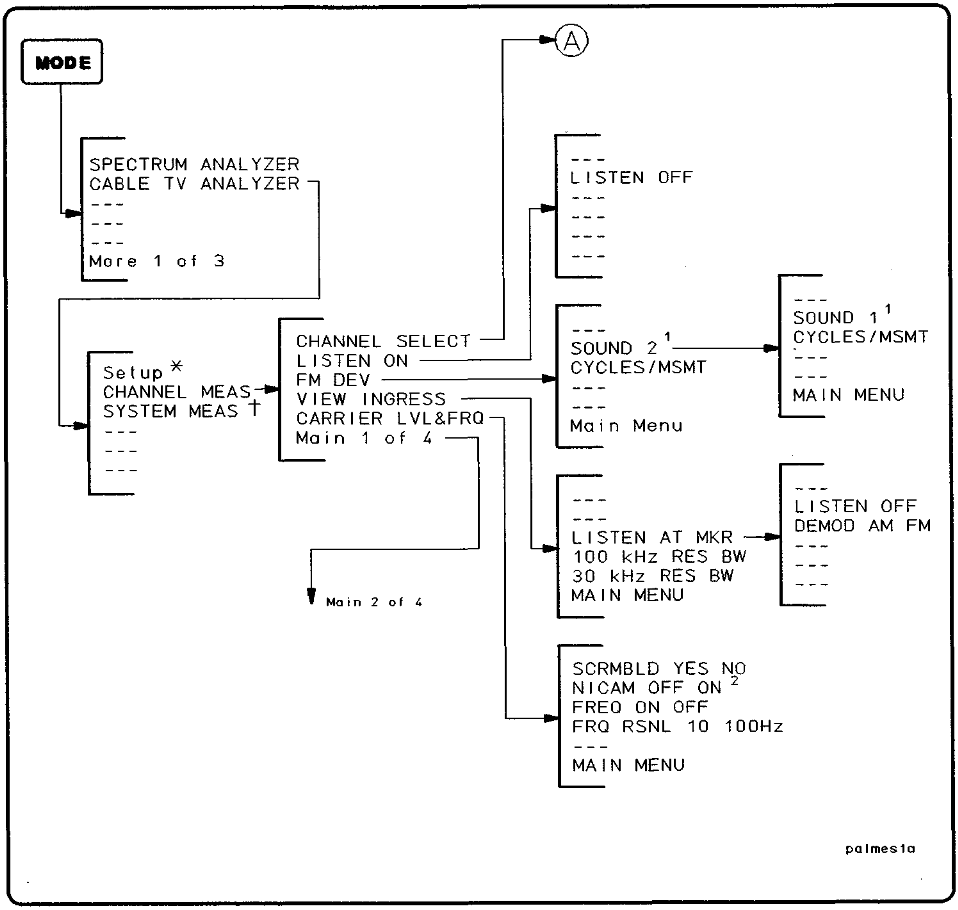


Figure 5-1. Channel Measurements Main Menu 1 of 4

* The `Setup` softkey menu is found in Chapter 7.

† The `SYSTEM MEAS` softkey menus are found in Chapter 6.

1 Only available for dual sound carrier systems (PAL-B/G)

2 Only available for PAL-B/G and PAL-I systems

Channel Measurements Menu Map

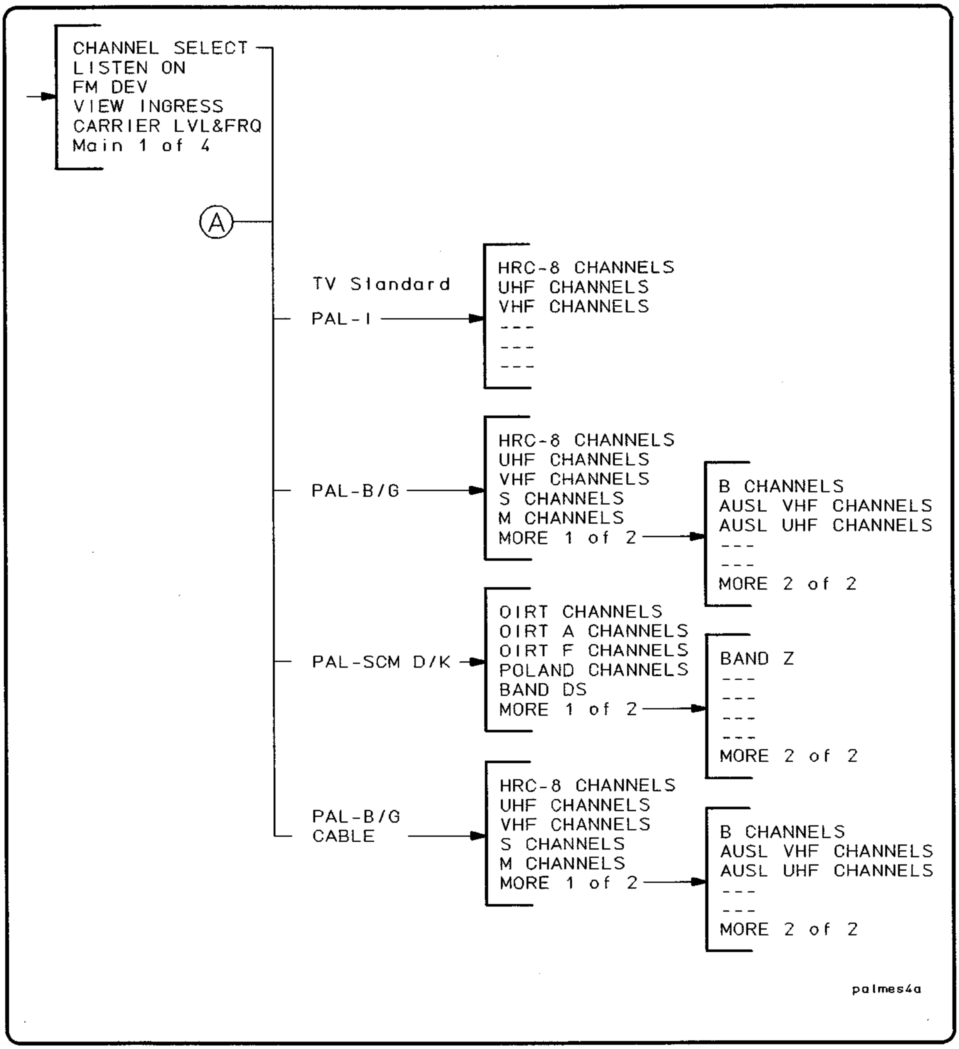


Figure 5-2. Band Selection

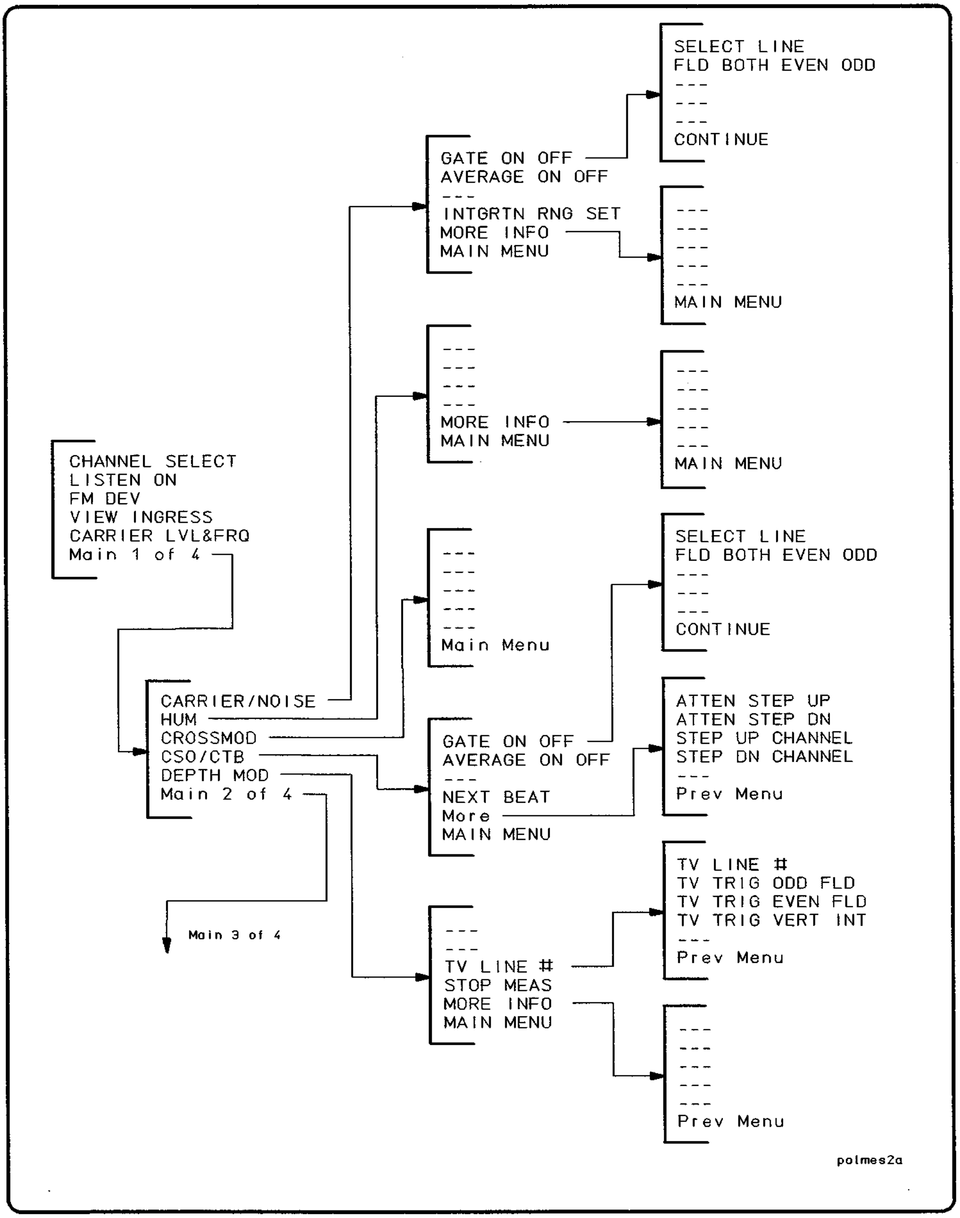


Figure 5-3. Channel Measurements Main Menu 2 of 4

Channel Measurements Menu Map

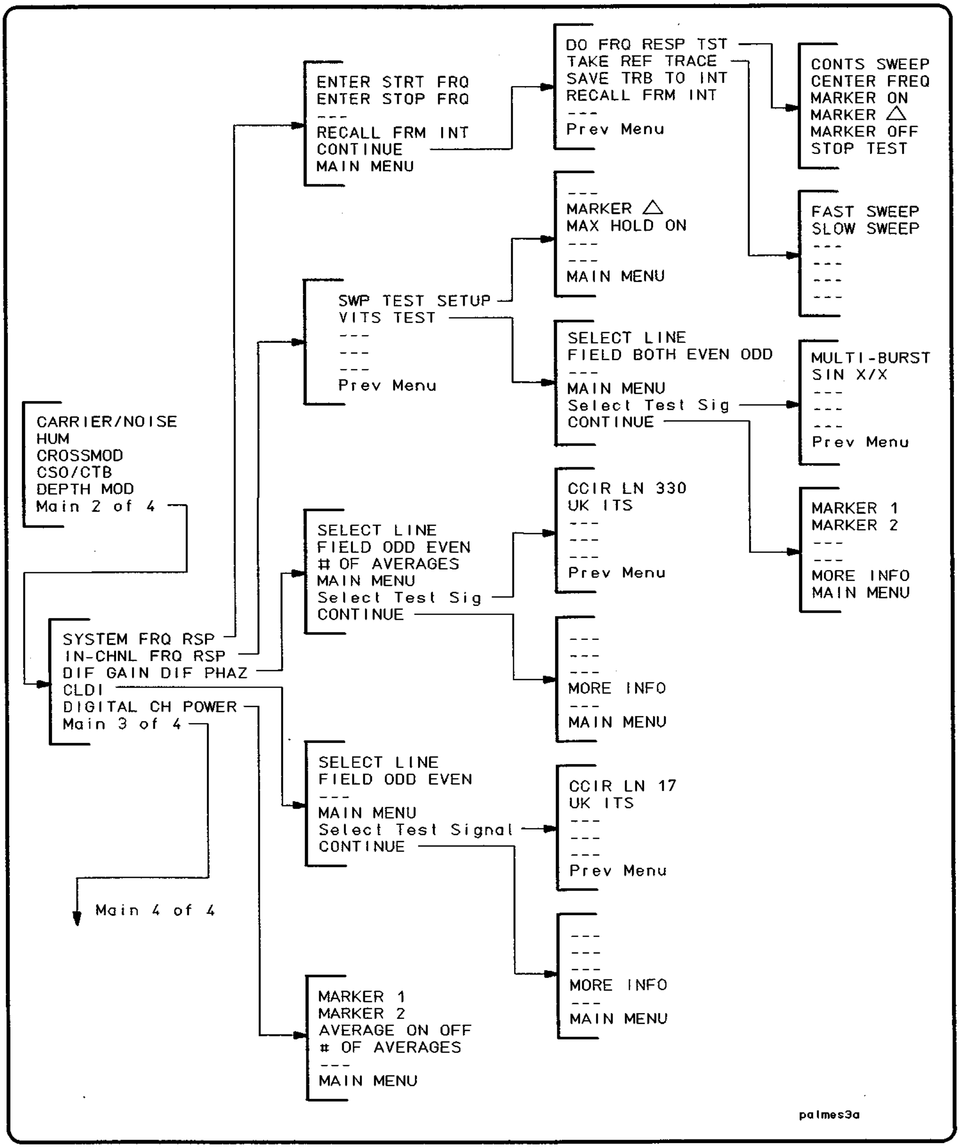


Figure 5-4. Channel Measurements Main Menu 3 of 4

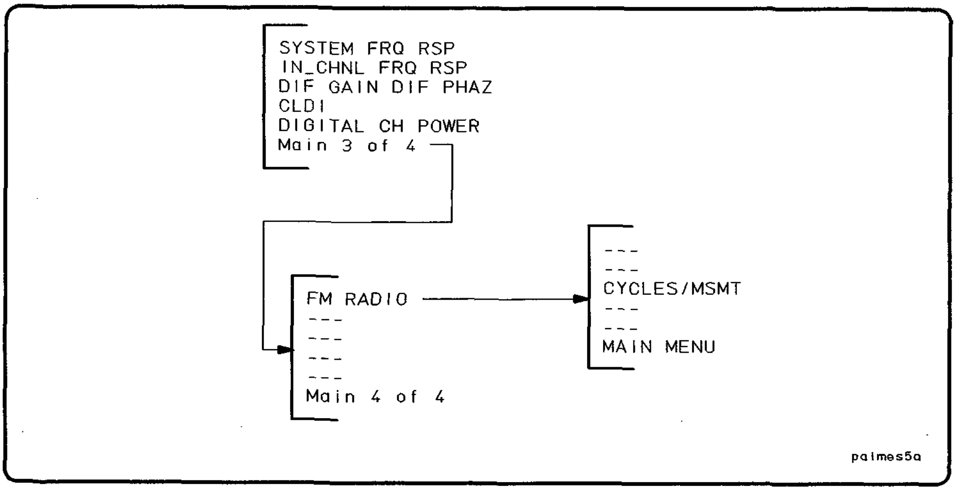


Figure 5-5. Channel Measurements Main Menu 4 of 4

Channel Measurements Softkey Function Descriptions

This section contains the descriptions of the channel measurements softkey functions. The functions are listed alphabetically according to the softkey labels.

OF AVERAGES Description

Allows you to select the number of averages used in the differential gain/differential phase test. The default is 50. Generally, signals lower than 0 dBmV (+60 dBμV) require a higher number of averages.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3, DIF GAIN DIF PHAZ to access # OF AVERAGES.

See Also "Differential gain/differential phase test" in Chapter 2.

100 kHz RES BW and 30 kHz RES BW Descriptions

Allow you to select the analyzer resolution bandwidth during the view ingress test. The default bandwidth setting for this test is 100 kHz, selecting 30 kHz can improve the resolution of signals close to the visual carrier.

Press CABLE TV ANALYZER, CHANNEL MEAS, VIEW INGRESS to access 100 kHz RES BW and 30 kHz RES BW.

See Also "View ingress test" in Chapter 2.

ATTEN STEP DN and ATTEN STEP UP Descriptions

Allow you to reduce (ATTEN STEP DN) or increase (ATTEN STEP UP) the analyzer input attenuation during the CSO/CTB test. This can be helpful in determining the source of beat products.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, CSO/CTB, More to access ATTEN STEP DN and ATTEN STEP UP

See Also "Composite Second Order/Composite Triple Beat test" in Chapter 2.

AUSL UHF CHANNELS Description

Allows you to enter channel numbers in the "AUSL" UHF channel range if you selected PAL-B/G from the Setup menu. Channel numbers entered outside the range are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER, CHANNEL MEAS, CHANNEL SELECT and enter a channel number to access AUSL UHF CHANNELS.

See Also "Selecting a signal" in Chapter2.

AUSL VHF CHANNELS Description

Allows you to enter channel numbers in the "AUSL" VHF channel range if you selected PAL-B/G from the Setup menu. Channel numbers entered outside the range are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER, CHANNEL MEAS, CHANNEL SELECT and enter a channel number to access AUSL VHF CHANNELS.

See Also "Selecting a signal" in Chapter2.

AVERAGE ON OFF Description

Allows you to select averaging during the CSO/CTB test. This can be helpful in viewing the beat products.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, CSO/CTB to access AVERAGE ON OFF.

See Also "Composite Second Order/Composite Triple Beat test" in Chapter 2.

B CHANNELS Description

Allows you to enter channel numbers in the "B" channel range if you selected PAL-B/G from the Setup menu. Channel numbers entered outside the range are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER , CHANNEL MEAS , CHANNEL SELECT and enter a channel number to access B CHANNELS .

See Also

"Selecting a signal" in Chapter2.

BAND DS and BAND Z Descriptions

Allow you to enter channel numbers in the "DS" or "Z" channel ranges if you selected PAL-SCM D/K from the Setup menu. Channel numbers entered outside the ranges are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER , CHANNEL MEAS , CHANNEL SELECT and enter a channel number to access BAND DS and BAND Z .

See Also

"Selecting a signal" in Chapter2.

CCIR LN 17 and CCIR LN 330 Descriptions

Allow you to configure the analyzer to use CCIR lines 17 and 330 test signals for the differential gain/differential phase and chrominance-luminance delay inequality tests.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3, CLDI, Select Test Sig to access CCIR LN 17 and CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3, DIF GAIN DIF PHAZ, Select Test Sig to access CCIR LN 330.

See Also

"Differential gain/differential phase test" and "Chroma/luma delay test" in Chapter2.

CENTER FREQ Description

Allows you to align the frequency of the measurement trace with that of the reference trace in the system frequency response test. Use the ⇧ or ⇩ to align the traces.

You must carry out the measurement procedure to access this key.

See Also

"System frequency response test" in Chapter 2.

CONTINUE Description

Allows you to proceed with the system frequency response test following the selection of start and stop frequencies (ENTER STRT FRQ and ENTER STOP FRQ).

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3 and SYSTEM FRQ RESP to access CONTINUE.

See Also

"System frequency response test" in Chapter 2.

CONTS SWEEP Description

Allows you to select continuous sweeps to allow the alignment of the measurement trace with that of the reference trace in the system frequency response test.

You must carry out the measurement procedure to acces this key.

See Also "System frequency response test" in Chapter 2.

CYCLES/MSMT Description

Allows you to select the number of samples used to measure FM deviation in the FM deviation and FM Radio tests. The default value is 5.

Press CABLE TV ANALYZER, CHANNEL MEAS, FM DEV or CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3, FM RADIO to access CYCLES/MSMT.

See Also "FM deviation test" and "FM Radio test" in Chapter 2.

CHANNEL SELECT Description

Channel select is a function used in conjunction with measurements. It sets up the analyzer state for cable TV tests, lets you select a specific channel number, and centers the specific channel on the analyzer screen.

The channel is selected based on one of the three channel formats available in the Setup menu as described in Chapter 2: PAL-I, PAL-B/G and PAL-SCM D/K.

The channel is displayed on screen to show both the visual and sound carriers. The span is 8 MHz except for VHF channels which are displayed in a 7 MHz span. The visual carrier is positioned just below the reference level.

All measurements except system frequency response require that you select a channel, either by channel number or visual carrier frequency entry, before proceeding with the test.

Press CABLE TV ANALYZER, CHANNEL MEAS to access CHANNEL SELECT.

See Also "Selecting a signal" in Chapter 2.

DEMOD AM FM Description

Allows you to select amplitude or frequency demodulation for any signal present at the marker in the view ingress test. The demodulated signal can be heard on the analyzer loudspeaker.

Press CABLE TV ANALYZER, CHANNEL MEAS, VIEW INGRESS, LISTEN AT MKR to access DEMOD AM FM.

See Also — "View ingress test" in Chapter 2.

DO FRQ RESP TST Description

Allows you to proceed with the system frequency response test after first recalling (or setting up) and displaying a reference trace.

You must carry out the measurement procedure to access this key.

See Also — "System frequency response test" in Chapter 2.

ENTER STOP FRQ and ENTER STRT FRQ Descriptions

Allow you to enter the frequency range over which you wish to measure the response of the system in the system frequency response test.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3 and SYSTEM FRQ RESP to access ENTER STOP FRQ and ENTER STRT FRQ.

See Also — "System frequency response test" in Chapter 2.

FAST SWEEP Description

Allows you to select a 2 second sweep in taking a reference trace in the system frequency response test. If scrambling is present a slower, 8 second sweep is used (SLOW SWEEP).

You must follow the procedure for taking a reference trace to access FAST SWEEP

See Also "System frequency response test" in Chapter 2.

FIELD ODD EVEN Description

Allows you to configure the analyzer to use the odd or even fields when using available test signals for the chroma/luma delay and differential gain/differential phase tests.

Press CABLE TV ANALYZER , CHANNEL MEAS , Main 1 of 3 , Main 2 of 3 , CLDI or DIF GAIN DIF PHAZ to access FIELD ODD EVEN .

See Also "Chroma/luma delay test" in Chapter 2.

FLD BOTH EVEN ODD Description

Allows you to configure the analyzer to use the even, odd or both fields when using available vertical insertion test signals for the in-channel frequency response test.

Press CABLE TV ANALYZER , CHANNEL MEAS , Main 1 of 3 , Main 2 of 3 , IN-CHAN FRQ RSP to access FLD BOTH EVEN ODD .

See Also "In-channel frequency response test" in Chapter 2.

FREQ ON OFF Description

Allows you to measure and display the frequency difference from the visual to sound carriers in the carrier level and frequency test. Where dual sound carriers are available, results for both are shown.

Press CABLE TV ANALYZER, CHANNEL MEAS, CARRIER LVL&FRQ to access FREQ ON OFF.

See Also

"Carrier level and frequency test" in Chapter 2.

FRQ RSLN 10 100HZ Description

Allows you to improve the resolution of the frequency displays in the carrier level and frequency test. The default setting is 100 Hz, the 10 Hz setting significantly slows down the measurement.

Press CABLE TV ANALYZER, CHANNEL MEAS, CARRIER LVL&FRQ to access FRQ RSLN 10 100HZ.

See Also

"Carrier level and frequency test" in Chapter 2.

GATE ON OFF Description

Allows you to make non-interfering carrier-to-noise and composite second order measurements if your analyzer has Option 107 and Option 301 installed. Press GATE ON OFF to underline ON during these measurements or press GATING YES NO from the Setup menu.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, CARRIER/NOISE or CSO/CTB to access GATE ON OFF.

See Also

"Carrier to noise test" and "Composite Second Order/Composite Triple Beat test" in Chapter 2.

HRC-8 CHANNELS Description

Allows you to enter channel numbers in the "HRC-8" range if PAL-I or PAL-B/G is selected from the Setup menu. Channel numbers entered outside the ranges are rejected and you are prompted to re-enter a channel number. Note that channel 1 corresponds to a visual carrier frequency of 5 MHz.

Press CABLE TV ANALYZER, CHANNEL MEAS, CHANNEL SELECT and enter a channel number to access HRC-8 CHANNELS.

See Also "Selecting a signal" in Chapter 2.

INTGRTN RANGE SET Description

Allows you to to select the proportion of the channel band over which you wish to measure carrier-to-noise. The default is 85%. This only applies to a non-interfering carrier-to-noise test and your analyzer must have Option 107 and Option 301 installed.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, CARRIER/NOISE to access INTGRTN RANGE SET.

See Also "Carrier to noise test" in Chapter 2.

LISTEN AT MRKR Description

Helps you to identify the source of unwanted spurious products found during the view ingress test. You can listen to any FM or AM demodulated signals at the marker frequency on the analyzer loudspeaker. Use the front panel knob to scan the band while monitoring the loudspeaker output.

Press CABLE TV ANALYZER, CHANNEL MEAS, VIEW INGRESS to access LISTEN AT MRKR.

See Also "View ingress test" in Chapter 2.

LISTEN ON and LISTEN OFF Descriptions

Allow you to demodulate the sound carrier so that it is audible through the built-in speaker. Option 102 is required for this function. Select a channel, press LISTEN ON and adjust volume with the front-panel volume knob.

Press LISTEN OFF to exit the function.

MAIN MENU Description

Allows you to return to the main menu of tests accessed from the CHANNEL MEAS softkey. Alternatively, you can re-access the main menu by pressing (MODE) CABLE TV ANALYZER, CHANNEL MEAS.

MARKER 1 and MARKER 2 Descriptions

Allow you to position the markers in the in-channel frequency response test. By pressing MARKER 1 or MARKER 2 you can then use the front panel knob to position the markers at the points of maximum and minimum response.

You must carry out the in-channel frequency response procedure to gain access to MARKER 1 and MARKER 2

See Also

"In-channel frequency response test" in Chapter 2.

MARKER Δ Description

Allows you to determine the amplitude difference between the maximum and minimum marker positions during the system frequency response test. Press MARKER Δ and use the front panel knob to reposition the marker.

You must carry out the tests to gain access to MARKER Δ.

See Also

"System frequency response test" in Chapter 2.

MARKER OFF and MARKER ON Descriptions

Allow you to turn the marker on off and on during the system frequency response test. Press MARKER ON , MARKER Δ and use the front panel knob to reposition the marker. Press MARKER OFF to release control of the marker from the front panel knob.

You must carry out the system frequency response test to gain access to MARKER OFF and MARKER ON .

See Also "System frequency response test" in Chapter 2.

MAX HOLD ON OFF Description

Allows you to use multiple sweeps to build up both reference and measurement traces during the swept in-channel frequency response test.

You must carry out the swept in-channel frequency response test to gain access to MAX HOLD ON OFF .

See Also "In-channel frequency response test" in Chapter 2.

More Description

Allows you to access ATTEN STEP DN , ATTEN STEP UP , STEP UP CHANNEL and STEP DOWN CHANNEL during the CSO/CTB tests. Use ATTEN STEP DN and ATTEN STEP UP to eliminate beat products caused by the analyzer. Use STEP UP CHANNEL and STEP DOWN CHANNEL and use an empty channel to perform the CTB measurement.

Press CABLE TV ANALYZER , CHANNEL MEAS , Main 1 of 3 , CSO/CTB to access More .

See Also "Composite Second Order/Composite Triple Beat test" in Chapter 2.

MORE INFO Description

Displays more comprehensive test results for the hum, carrier-to-noise, depth of video modulation, in-channel frequency response, differential gain/differential phase and chrominance-luminance delay inequality tests.

Completion of any of these test procedures accesses MORE INFO.

See Also

"Chroma/luma delay test", "Hum test", "Carrier to noise test", "Differential gain/differential phase test", "Depth of video modulation test" and "In-channel frequency response test" in Chapter 2.

MULTI-BURST Description

Allows you to configure the analyzer to use a multiburst test signal for the non-interfering in-channel frequency response test.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3, IN-CHNL FRQ RSP, VITS TEST, Select Test Sig to access MULTI-BURST.

See Also

"In-channel frequency response test" in Chapter 2.

NEXT BEAT Description

Allows you to step the marker through the CSO measurement points of −2.5 MHz, −1.75 MHz and +0.75 MHz during the CSO/CTB test.

Press CABLE TV ANALYZER, CHANNEL MEAS, CSO/CTB to access NEXT BEAT

See Also

"Composite Second Order/Composite Triple Beat test" in Chapter 2.

NICAM ON OFF Description

Allows you to perform a true RMS power measurement of the NICAM band if the NICAM carrier is available on your system during the carrier level and frequency test. You must select PAL-I or PAL-B/G from the Setup menu.

Press CABLE TV ANALYZER, CHANNEL MEAS, CARRIER LVL&FRQ to access NICAM ON OFF.

See Also

"Carrier level and frequency test" in Chapter 2.

OIRT CHANNELS, OIRT A CHANNELS and OIRT F CHANNELS Descriptions

Allow you to enter channel numbers in the "OIRT", "OIRT A" and "OIRT F" ranges if PAL-SCM D/K is selected from the Setup menu. Channel numbers entered outside the ranges are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER, CHANNEL MEAS, CHANNEL SELECT and enter a channel number to access OIRT CHANNELS, OIRT A CHANNELS and OIRT F CHANNELS.

See Also

"Selecting a signal" in Chapter 2.

POLAND CHANNELS Description

Allows you to enter channel numbers in the "POLAND" range if PAL-SCM D/K is selected from the Setup menu. Channel numbers entered outside the ranges are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER, CHANNEL MEAS, CHANNEL SELECT and enter a channel number to access POLAND CHANNELS.

See Also

"Selecting a signal" in Chapter 2.

RECALL FRM INT Description

Allows you to recall a trace into trace B for use as a reference trace or to recall a system frequency response trace for the system frequency response test. This function simplifies recalling a trace from the analyzers internal memory. A trace can also be recalled from a memory card using procedures provided in the spectrum analyzer reference guide.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3 and SYSTEM FRQ RESP to access RECALL FRM INT.

See Also "System frequency response test" in Chapter 2.

SAVE TRB TO INT Description

Allows you to save a reference trace made during the system frequency response test into the analyzer's internal memory. This trace can also be saved to a memory card using procedures provided in the spectrum analyzer reference guide.

You should carry out the System frequency response procedure to save a trace.

See Also "System frequency response test" in Chapter 2.

S CHANNELS Description

Allows you to enter channel numbers in the "S" range if PAL-B/G is selected from the Setup menu. Channel numbers entered outside the range are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER, CHANNEL MEAS, CHANNEL SELECT and enter a channel number to access S CHANNELS.

See Also "Selecting a signal" in Chapter 2.

SCRMBLD YES NO Description

Allows you to perform a more accurate carrier level and frequency test when measuring sync-suppressed scrambled channels. When this key is selected, the analyzer performs a maximum hold on the visual carrier.

Press CABLE TV ANALYZER, CHANNEL MEAS, CARRIER LVL&FRQ to access SCRMBLD YES NO.

See Also "Carrier level and frequency test" in Chapter 2.

SELECT LINE Description

Allows you to select an individual TV line number to be tested in the carrier-to-noise, CSO/CTB, differential gain/differential phase, chrominance to luminance delay inequality and in-channel frequency response tests. Your analyzer must have Option 107 and Option 301 installed.

The SELECT LINE softkey is available during the above measurement procedures.

See Also "Carrier-to-noise test", "Composite Second Order/Composite Triple Beat test", "Differential gain/differential phase test", "Chroma/luma delay test" and "In-channel frequency response test" in Chapter 2.

Select Test Sig Description

Allows you to choose the CCIR LN 17, CCIR LN 330, UK ITS, MULTI-BURST or SIN X/X keys and configure the analyzer accordingly.

The Select Test Sig key is accessed during the differential gain/differential phase, in-channel frequency response and chrominance to luminance delay inequality tests.

See Also "Chroma/luma delay test", "Differential gain/differential phase test" and "In-channel frequency response test" in Chapter 2.

SIN X/X Description

Allows you to configure the analyzer to use a sin X/X test signal during the in-channel frequency response test.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3, IN-CHNL FRQ RSP, VITS TEST, Select Test Sig to access SIN X/X.

See Also — "In-channel frequency response test" in Chapter 2.

SLOW SWEEP Description

Allows you to select an 8 second sweep to take a reference trace during the system frequency response test. If no scrambling is present a faster, 2 second sweep can be used (FAST SWEEP).

You must follow the procedure for taking a reference trace to access SLOW SWEEP

See Also — "System frequency response test" in Chapter 2.

SOUND 1 and SOUND 2 Descriptions

Allow you to monitor the channel sound modulation on the analyzer loudspeaker during the FM deviation test. Dual sound carriers are only available on PAL-B/G systems. These softkeys are not available if PAL-I or PAL SCM D/K is selected from the Setup menu.

Press CABLE TV ANALYZER, CHANNEL MEAS, FM DEV to access SOUND 1 and SOUND 2.

See Also — "FM deviation test" in Chapter 2.

STEP DN CHANNEL and STEP UP CHANNEL Descriptions

Allow you to step up or down channels and carry out a CTB measurement in an empty channel.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, CSO/CTB, More to access STEP DN CHANNEL and STEP UP CHANNEL.

See Also "Composite Second Order/Composite Triple Beat test" in Chapter 2.

STOP MEAS Description

During the depth of video modulation test, the measurement result is updated every 10 analyzer sweeps and continues until STOP MEAS is pressed.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, DEPTH MOD to access STOP MEAS.

See Also "Depth of video modulation test" in Chapter 2.

STOP TEST Description

Allows you to terminate the system frequency response test and return to the main menu.

STOP TEST can only be accessed by performing the system frequency response test procedure.

See Also "System frequency response test" in Chapter 2.

SWP TEST SETUP Description

Allows you to access the MARKER Δ and MAX HOLD ON OFF keys during the swept in-channel frequency response test.

Press CABLE TV ANALYZER, CHANNEL MEAS Main 1 of 3, Main 2 of 3, IN-CHNL FRQ RSP to access SWP TEST SETUP.

See Also

"In-channel frequency response test" in Chapter 2.

TAKE REF TRACE Description

A reference trace measurement can be made at any point in the system that you want to use as the "reference." For example, typical reference spectrums can be set up at the output of the headend or AML hub. Reference traces can be saved to internal analyzer memory or to memory card.

Press CABLE TV ANALYZER, CHANNEL MEAS Main 1 of 3, Main 2 of 3, SYSTEM FRQ RESP, CONTINUE to access TAKE REF TRACE.

See Also

"System frequency response test" in Chapter 2.

TV LINE # Description

Allows you to select a specific line to test during the depth of video modulation test if you analyzer has TV Sync (Option 102 or 301) and Fast Time-Domain Sweeps (Option 101) installed. The default line number is 19.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, DEPTH MOD to access TV LINE #.

See Also

"Depth of video modulation test" in Chapter 2.

TV TRIG EVEN FLD and TV TRIG ODD FLD Descriptions

Allow you to select the even or odd field to trigger the depth of video modulation test if you analyzer has TV Sync (Option 102 or 301) and Fast Time-Domain Sweeps (Option 101) installed.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, DEPTH MOD, TV LINE # to access TV TRIG EVEN FLD and TV TRIG ODD FLD.

See Also "Depth of video modulation test" in Chapter 2.

TV TRIG VERT INT Description

Allows you to select the vertical interval to trigger the depth of video modulation test if you analyzer has TV Sync (Option 102 or 301) and Fast Time-Domain Sweeps (Option 101) installed.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, DEPTH MOD, TV LINE # to access TV TRIG VERT INT.

See Also "Depth of video modulation test" in Chapter 2.

UHF CHANNELS Description

Allows you to enter channel numbers in the "UHF" range if PAL-B/G or PAL-I is selected from the Setup menu. Channel numbers entered outside the range are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER, CHANNEL MEAS, CHANNEL SELECT and enter a channel number to access UHF CHANNELS.

See Also "Selecting a signal" in Chapter 2.

UK ITS Description

Allows you to configure the analyzer to use a UK ITS test signal for the differential gain/differential phase and chrominance-luminance delay inequality tests.

Press CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3, CLDI, Select Test Sig or CABLE TV ANALYZER, CHANNEL MEAS, Main 1 of 3, Main 2 of 3, DIF GAIN DIF PHAZ, Select Test Sig to access UK ITS.

See Also

"Differential gain/differential phase test" and "Chroma/luma delay test" in Chapter2.

VHF CHANNELS Description

Allows you to enter channel numbers in the "VHF" range if PAL-B/G or PAL-I is selected from the Setup menu. Channel numbers entered outside the range are rejected and you are prompted to re-enter a channel number.

Press CABLE TV ANALYZER, CHANNEL MEAS, CHANNEL SELECT and enter a channel number to access VHF CHANNELS.

See Also

"Selecting a signal" in Chapter 2. Allows you to

VITS TEST Description

Allows you to access the softkeys to set up and execute a non-interfering in-channel frequency response test if suitable test signals are available on your system.

Press CABLE TV ANALYZER, CHANNEL MEAS Main 1 of 3, Main 2 of 3, IN-CHNL FRQ RSP to access VITS TEST.

See Also

"In-channel frequency response test" in Chapter 2.

6

System Measurements Menu Map and Softkey Descriptions

System Measurements Menu Map and Softkey Descriptions

What You'll Find in This Chapter

This chapter contains the menu map and descriptions of the softkey functions used in system measurements mode. This chapter contains the following sections:

- System measurements menu map.
- System measurements softkey descriptions.

System Measurements Menu Map

The following menu maps are a graphic representation of all system measurement softkeys and how they are accessed.

System Measurements Menu Map

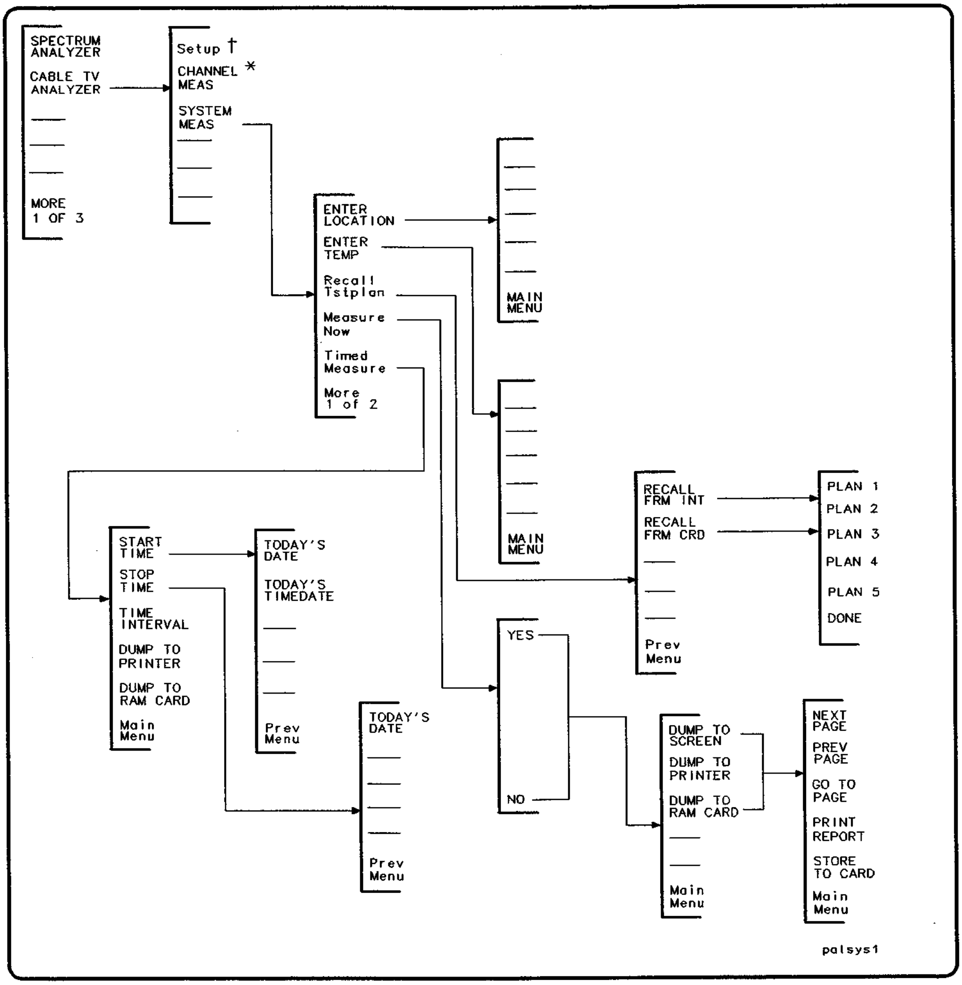


Figure 6-1. System Measurements Menu 1 of 2

† The `Setup` softkey menu is found in Chapter 7.

* The `CHANNEL MEAS` softkey menus are found in Chapter 5.

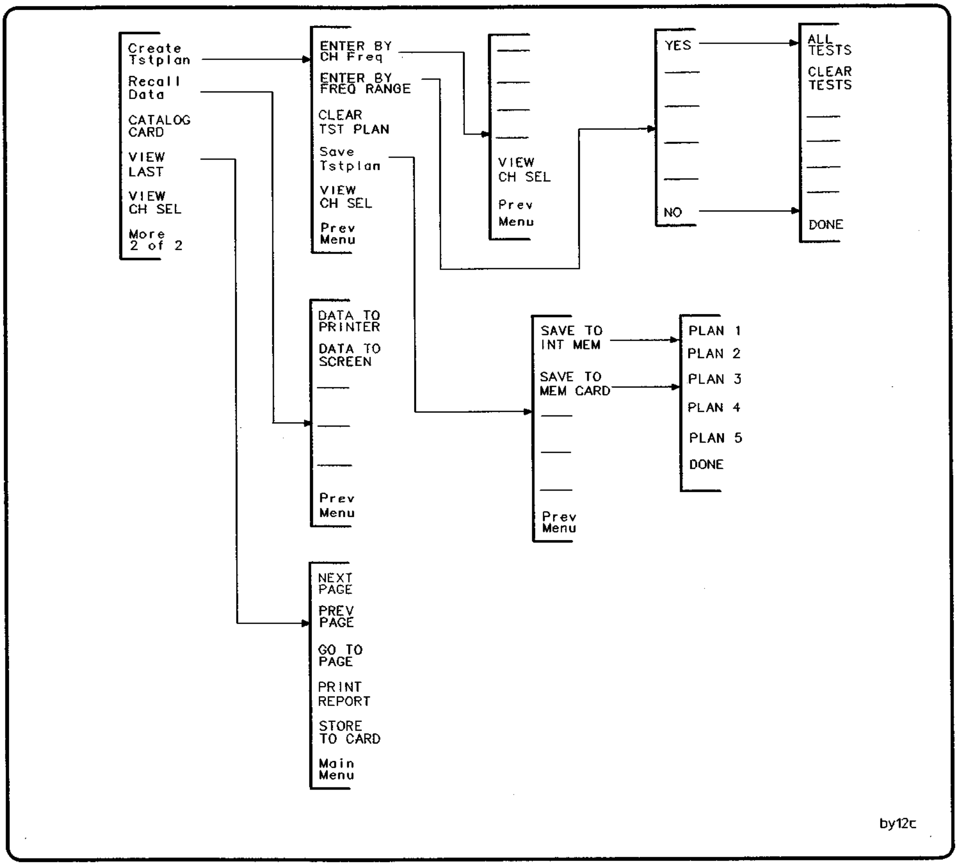


Figure 6-2. System Measurements Menu 2 of 2

System Measurements Softkey Function Descriptions

This section contains the descriptions of the system measurements softkey functions. The functions are listed alphabetically according to the softkey labels.

ABORT Description

Allows you to stop the measurement.

It may take several seconds for the measurement to end after ABORT has been pressed.

ALL TESTS Description

Allows you to select all tests for the currently selected channel.

Press CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2, Create TstPlan, ENTER BY CHANNEL or ENTER BY RANGE, enter channels or range and band, YES or NO to access ALL TESTS.

CATALOG CARD Description

Allows you to view a listing of the files stored on a RAM card or a ROM card.

Figure 6-3 shows the catalog listing of a RAM card with test data files stored on it. Table 6-1 explains the different items in the catalog listing.

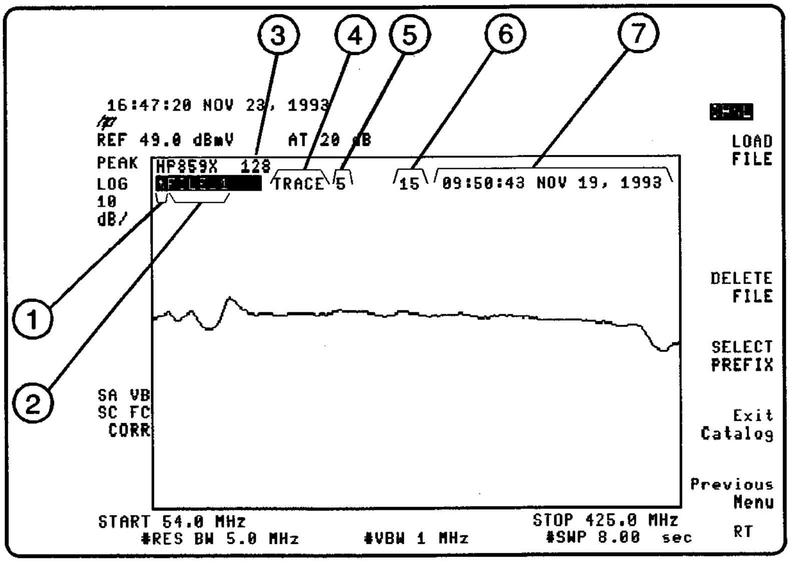


Figure 6-3. An Example of Cataloging a RAM Card

Table 6-1. Cataloging a Memory Card

Number	Item	Description
1	File type	A file type is assigned to every file that is saved on a RAM card. The "t" indicates the file is a trace data file. (The test data and test plans are stored as trace data files.) The "d" indicates the file is a downloadable program file. (The HP 85721A is stored as a downloadable program file.)
2	File name	Every file on the RAM card has a file name. The file name consists of the file type, a prefix, and the file number. When you store test data, the prefix is set to "FILE."
3	Total number of records	Displays the total number of records on the memory card. The number of records times 256 (bytes per record), divided by 1024 (bytes per kilobyte) yields the size of the memory card in kilobytes.
4	Data type	This field describes the file type as follows: "AMP" is for the amplitude correction factor file type. "DLP" is for the downloadable program file type. "LIMIT" is for the limit-line file type. "STATE" is for the instrument state file type. "TRACE" is for the trace data file type.
5	Starting address	This is the RAM card address for the beginning of the file.
6	File length	The file length number represents the number of records in the file. To determine the available space left on a memory card, subtract the sum of this column from the total number of records. For example, the sum of the number of records for the 3 files that are shown in Figure 6-1 is 187. The total number of records for the memory card is 512, so the available number of records on the memory card is approximately 325.
7	Time of creation	The time and date that the file was created.

Press `CABLE TV ANALYZER`, `SYSTEM MEAS`, `More 1 of 2` to access `CATALOG CARD`.

See Also "Cataloging a RAM Card" in Chapter 3.

CLEAR TESTS Description

Allows you to clear all selected tests for the current channel. Press CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2, Create TstPlan, ENTER BY CHANNEL or ENTER BY RANGE, enter channels or range and band, YES or NO to access CLEAR TESTS.

CLEAR TST PLAN Description

Allows you to clear the current test plan.

CLEAR TST PLAN clears the current test plan by removing the channel numbers and the tests for those channels from the current test plan. CLEAR TST PLAN does *not* do any of the following:

- Delete any of the test plans that have been saved in analyzer memory (plans 1 through 5).
- Delete any of the test plans that have been saved on a RAM card.
- Delete the location code (if one was entered).
- Delete the temperature entry (if one was entered).

Press CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2, Create TstPlan to access CLEAR TST PLAN.

See Also "Clearing the Current Test Plan" in Chapter 3.

Create TstPlan Description

Allows you to access the functions used for building a test plan. Pressing Create TstPlan accesses ENTER BY CHANNEL, ENTER BY RANGE, Save TstPlan, VIEW CH SEL, and Prev Menu.

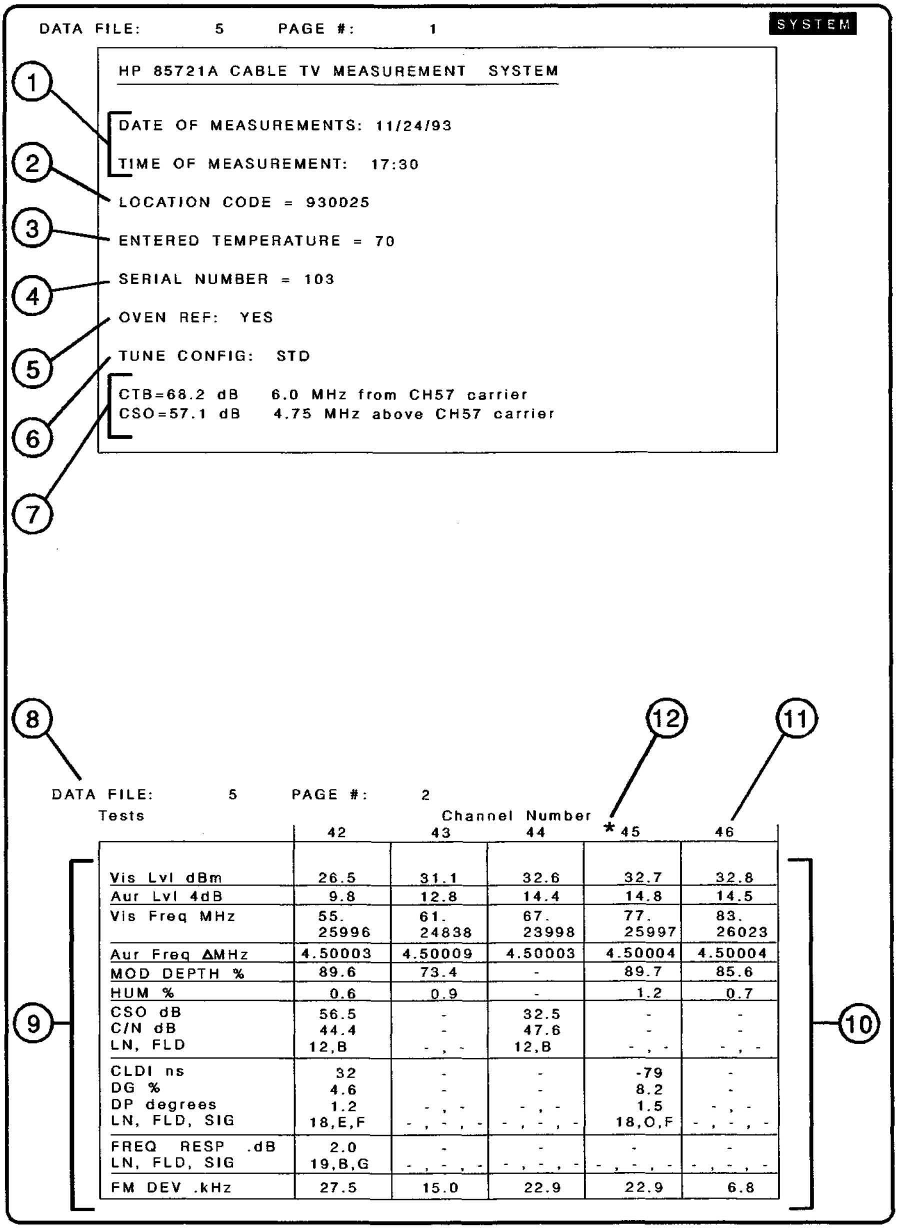
Pressing CABLE TV ANALYZER SYSTEM MEAS, More 1 of 2 accesses Create TstPlan.

DATA TO PRINTER Description

Allows you to retrieve the test data from a RAM card file and send it to a printer to be printed. (The printer needs to be connected to the analyzer.)

Figure 6-4 shows an example printout. Table 6-2 explains the different items on a printout.

System Measurements Softkey Function Descriptions



DATA FILE: 5 PAGE #: 1 SYSTEM

HP 85721A CABLE TV MEASUREMENT SYSTEM

DATE OF MEASUREMENTS: 11/24/93

TIME OF MEASUREMENT: 17:30

LOCATION CODE = 930025

ENTERED TEMPERATURE = 70

SERIAL NUMBER = 103

OVEN REF: YES

TUNE CONFIG: STD

CTB=68.2 dB 6.0 MHz from CH57 carrier
CSO=57.1 dB 4.75 MHz above CH57 carrier

DATA FILE: 5 PAGE #: 2

Tests	Channel Number 42	43	44	*45	46
Vis Lvl dBm	26.5	31.1	32.6	32.7	32.8
Aur Lvl 4dB	9.8	12.8	14.4	14.8	14.5
Vis Freq MHz	55.25996	61.24838	67.23998	77.25997	83.26023
Aur Freq ΔMHz	4.50003	4.50009	4.50003	4.50004	4.50004
MOD DEPTH %	89.6	73.4	-	89.7	85.6
HUM %	0.6	0.9	-	1.2	0.7
CSO dB C/N dB LN, FLD	56.5 44.4 12,B	- - - , -	32.5 47.6 12,B	- - - , -	- - - , -
CLDI ns DG % DP degrees LN, FLD, SIG	32 4.6 1.2 18,E,F	- - - , - - , - , -	- - - , - - , - , -	-79 8.2 1.5 18,O,F	- - - , - - , - , -
FREQ RESP .dB LN, FLD, SIG	2.0 19,B,G	- - , - , -	- - , - , -	- - , - , -	- - , - , -
FM DEV .kHz	27.5	15.0	22.9	22.9	6.8

Figure 6-4. An Example Printout (NTSC data shown)

Table 6-2. Information Contained in a Printout

Number	Description
1	Date and time the measurements were begun.* (Time is given in a 24-hour format.)
2	The location code.*
3	The temperature.*
4	The analyzer serial number.†
5	Whether or not the spectrum analyzer had an oven reference.† The oven reference is available as an option (Option 004) for frequency-synthesized spectrum analyzers only.
6	The tune configuration.
7	The results of the composite triple beat testing (if CTB testing was selected when the testing was performed). CTB testing is available only for frequency-synthesized spectrum analyzers.
8	The file number of test data file.
9	The tests.
10	The test results. An entry with a dash ('-') indicates that the test was not performed.
11	The channel number.
12	The asterisk indicates that the channel was selected as a scrambled channel.

* The location code and temperature entry are entered by the operator.
† The information for this entry is from the analyzer used to do the testing.

Press `CABLE TV ANALYZER`, `SYSTEM MEAS`, `More 1 of 2`, `Recall Data` to access `DATA TO PRINTER`.

See Also

"Step 3. Install a printer" in Chapter 1.

DONE Description

Allows you to indicate that you have finished making your selection.

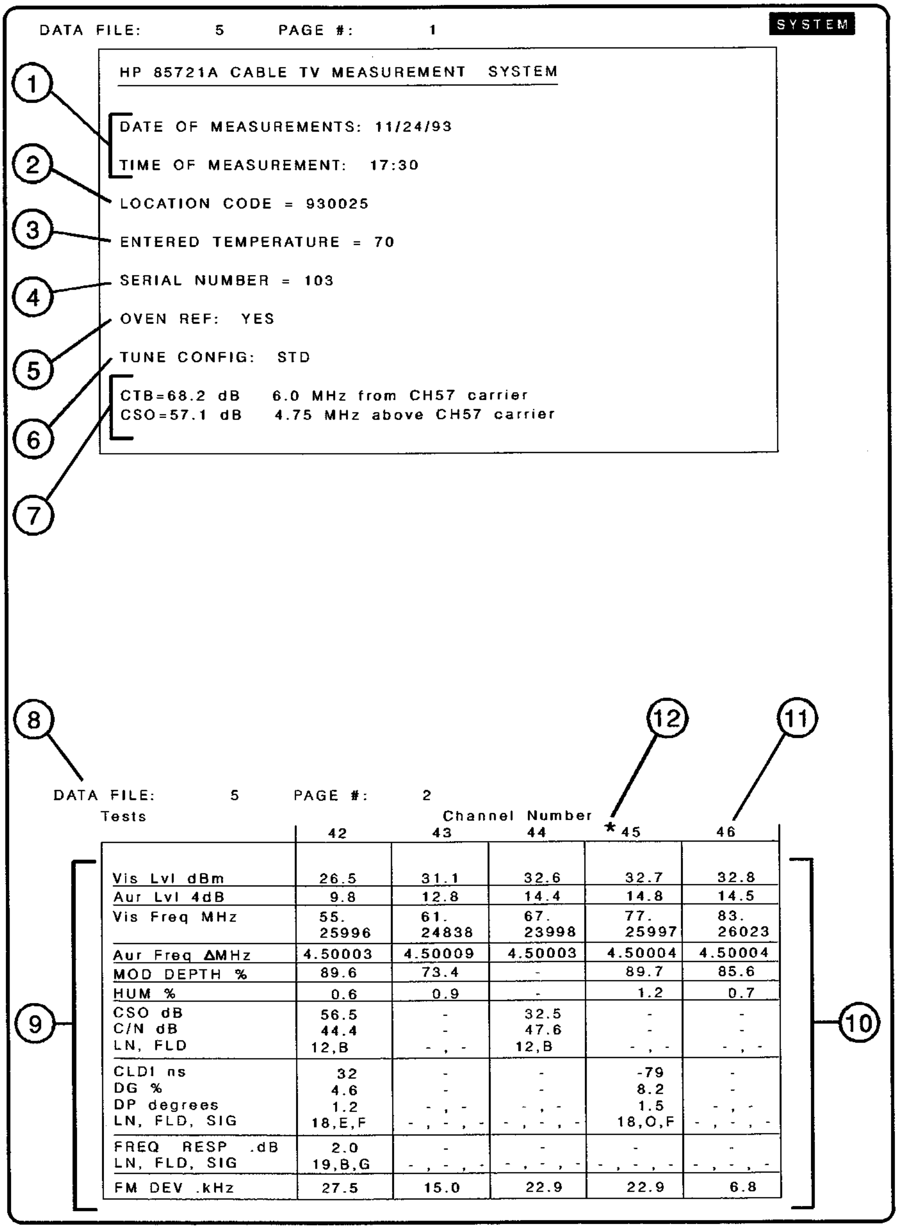
(The DONE softkey should not be confused with the DONE programming command.)

DUMP TO PRINTER Description

Allows you to have the test results sent to a printer when using Measure Now or Timed Measure . The printer needs to be connected to the analyzer.

Figure 6-5 shows an example printout. Table 6-3 explains the different items on a printout.

Press Measure Now , Yes or No , or Timed Measure to access DUMP TO PRINTER .



DATA FILE: 5 PAGE #: 1

HP 85721A CABLE TV MEASUREMENT SYSTEM

DATE OF MEASUREMENTS: 11/24/93
TIME OF MEASUREMENT: 17:30
LOCATION CODE = 930025
ENTERED TEMPERATURE = 70
SERIAL NUMBER = 103
OVEN REF: YES
TUNE CONFIG: STD
CTB=68.2 dB 6.0 MHz from CH57 carrier
CSO=57.1 dB 4.75 MHz above CH57 carrier

DATA FILE: 5 PAGE #: 2

Tests	Channel Number 42	43	44	*45	46
Vis Lvl dBm	26.5	31.1	32.6	32.7	32.8
Aur Lvl 4dB	9.8	12.8	14.4	14.8	14.5
Vis Freq MHz	55. 25996	61. 24838	67. 23998	77. 25997	83. 26023
Aur Freq ΔMHz	4.50003	4.50009	4.50003	4.50004	4.50004
MOD DEPTH %	89.6	73.4	-	89.7	85.6
HUM %	0.6	0.9	-	1.2	0.7
CSO dB	56.5	-	32.5	-	-
C/N dB	44.4	-	47.6	-	-
LN, FLD	12,B	- , -	12,B	- , -	- , -
CLDI ns	32	-	-	-79	-
DG %	4.6	-	-	8.2	-
DP degrees	1.2	- , -	- , -	1.5	- , -
LN, FLD, SIG	18,E,F	- , - , -	- , - , -	18,O,F	- , - , -
FREQ RESP .dB	2.0	-	-	-	-
LN, FLD, SIG	19,B,G	- , - , -	- , - , -	- , - , -	- , - , -
FM DEV .kHz	27.5	15.0	22.9	22.9	6.8

Figure 6-5. An Example Printout (NTSC data shown)

Table 6-3. Information Contained in a Printout

Number	Description
1	Date and time the measurements were begun.* (Time is given in a 24-hour format.)
2	The location code.*
3	The temperature.*
4	The analyzer serial number.†
5	Whether or not the spectrum analyzer had an oven reference.† The oven reference is available as an option (Option 004) for frequency-synthesized spectrum analyzers only.
6	The tune configuration.
7	The results of the composite triple beat testing (if CTB testing was selected when the testing was performed). CTB testing is available only for frequency-synthesized spectrum analyzers.
8	The file number of test data file.
9	The tests.
10	The test results. An entry with a dash ('-') indicates that the test was not performed.
11	The channel number.
12	The asterisk indicates that the channel was selected as a scrambled channel.

* The location code and temperature entry are entered by the operator.
† The information for this entry is from the analyzer used to do the testing.

See Also

"Step 3. Install a printer" in Chapter 1.
"Step 6. Make the measurements now" in Chapter 3.
"Making Timed System Measurements" in Chapter 3.

DUMP TO RAM CARD Description

Allows you to store the test results on a RAM card when using `Measure Now` or `Timed Measure`. The RAM card must be formatted and ready for use to store the test data. A test data file is stored on the RAM card for each instance of a measurement set for `Timed Measure`. Up to 34 files of test data can be stored on a 128 kilobyte or 8 files on a 32 kilobyte RAM card.

A file name is created for each file of test data stored on a RAM card. The file name for the test data consists of a "t", "FILE," an underscore ("_"), and a number (between 1 and 40) that you enter. If you use the same number as an existing file stored on a RAM card, it overwrites the file on the RAM card. For `Timed Measure`, file numbers begin with the number you enter and are automatically incremented with each measurement set.

Overwriting a file does not change the time and date entry shown when the RAM card is cataloged. If you want the time and date to reflect when the new file was written to the RAM card, you need to delete the existing file, then save the new file.

If there is not enough room on the RAM card, you need to delete unwanted files from the RAM card. To delete files from the RAM card, use `DELETE FILE` (deletes a single file from the RAM card). `DELETE FILE` is found under the (RECALL) hardkey.

The RAM card can be cataloged by using `CATALOG CARD`.

Press `Measure Now`, `Yes` or `No`, or `Timed Measure` to access `DUMP TO RAM CARD`.

See Also

"Formatting a RAM card" in Chapter 3.
"Step 6. Make the measurements now" in Chapter 3.
The description of `Recall Data` in this chapter.
"Making Timed System Measurements" in Chapter 3.

DUMP TO SCREEN Description

Allows you to send test results to the analyzer screen. If data is sent to the screen, the following options are available:

- `NEXT PAGE` displays the next page of test results.
- `PREV PAGE` displays the previous page of test results.
- `GOTO PAGE` displays selected page number.

- PRINT REPORT prints a test results report.
- STORE TO CARD stores test results to a RAM card.

Press CABLE TV ANALYZER, SYSTEM MEAS, Measure Now, Yes or No to access DUMP TO SCREEN.

See Also

“Step 6. Make the measurements now” in Chapter 3.

ENTER BY CHANNEL and ENTER BY CH FRQ Descriptions

Allow you to enter channels individually or to edit the test plan. A maximum of 80 channels can be entered into a test plan.

Press CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2, Create TstPlan to access ENTER BY CHANNEL or ENTER BY RANGE.

See Also

“Step 1. Select an individual channel” in Chapter 3.

ENTER BY RANGE Description

Allows you to enter channels as a range of channel numbers. Unlike ENTER BY CHANNEL and ENTER BY CH FRQ, you cannot use ENTER BY RANGE to edit or delete a channel. A maximum of 80 channels can be entered into a test plan.

Press Test Plan to access ENTER BY CHANNEL or ENTER BY RANGE.

See Also

“Step 2. Select a range of channels” in Chapter 3.

ENTER LOCATION Description

Allows you to enter a location code. You do not have to enter a location code; it is only for your convenience to help you keep track of where the test data originated. The location code can be up to seven digits long.

If you do not enter a location code, the default location code will be either the location code that was previously entered or, if a location code was not previously entered, a "0."

On the RAM card, the location code is stored in the test data file. The location code is printed when the test data is printed.

In analyzer memory, the location code is not stored with the current test plan in plans 1 through 5. The location code is stored in nonvolatile analyzer memory, however. Storing the location code in nonvolatile memory means that once a location code is entered, it will be used as the location code until a new location code is entered or the HP 85721A program is deleted from analyzer memory.

Pressing `CABLE TV ANALYZER`, `SYSTEM MEAS` accesses `ENTER LOCATION`.

See Also

"Step 3. Enter the location code" in Chapter 3.

ENTER TEMP Description

Allows you to enter the temperature. You can enter a number from −999 to +999. The temperature is entered without Celsius or Fahrenheit units. The analyzer does not measure the temperature. You must provide the temperature reading.

You do not have to enter a temperature; it is only for your convenience. If you do not enter a temperature, the default temperature entry will either be the temperature that was previously entered or, if a temperature reading was not previously entered, a "0."

On the RAM card, the temperature entry is stored in the test data file. The temperature entry is printed when the test data is printed.

In analyzer memory, the temperature entry is not stored with the current test plan in plans 1 through 5. The temperature entry is stored in nonvolatile analyzer memory, however. Storing the temperature entry in nonvolatile memory means that once a temperature is entered, it will be used as the temperature until a new temperature is entered or the HP 85721A program is deleted from analyzer memory.

Pressing `CABLE TV ANALYZER`, `SYSTEM MEAS` accesses `ENTER TEMP`.

See Also

"Step 4. Enter the temperature" in Chapter 3.

`GOTO PAGE` Description

Allows you to select a specific page of on-screen test results to view.

Press `CABLE TV ANALYZER`, `SYSTEM MEAS`, `Measure Now`, `Yes` or `No`, `DUMP TO SCREEN` to access `GOTO PAGE`, or press `More 1 of 2`, `VIEW LAST` (if a measurement was previously made).

See Also

"Step 6. Make the measurements now" in Chapter 3.

Main Menu Description

Allows you to access the main menu of the system measurement mode. The main menu contains the following softkeys: ENTER LOCATION, ENTER TEMP, Recall TstPlan, Measure Now, Timed Measure, Create TstPlan, Recall Data, CATALOG CARD, VIEW LAST, VIEW CH SEL.

The main menu of the system measurement mode can also be accessed by pressing (MODE), CABLE TV ANALYZER, SYSTEM MEAS.

Measure Now Description

Accesses the functions that allow you to initiate the testing immediately (instead of initiating testing at a later time) and send the test results to the screen, a printer, or to a RAM card.

Pressing Measure Now will display a screen that allows the option of selecting CTB testing. Then, the DUMP TO SCREEN, DUMP TO PRINTER, DUMP TO CARD, and Main Menu softkeys are accessed.

Pressing CABLE TV ANALYZER, SYSTEM MEAS accesses Measure Now.

See Also “Step 3. Install a printer” in Chapter 1.

NEXT PAGE Description

Allows you to select the next page of on-screen test results.

Press CABLE TV ANALYZER , SYSTEM MEAS , Measure Now , Yes or No , DUMP TO SCREEN to access NEXT PAGE .

See Also

"Step 6. Make the measurements now" in Chapter 3.

NO Description

Allows you to not do the function you have selected. For example, if you press CLEAR TST PLAN and press NO , the current test plan is not cleared from analyzer memory. If you enter a channel by using ENTER BY CHANNEL or ENTER BY RANGE and press NO , the channel or range of channels will be treated as channels that are not scrambled.

NO is accessed either by pressing CLEAR TST PLAN or by entering a channel number with ENTER BY CHANNEL , ENTER BY CH FRQ or ENTER BY RANGE .

PLAN 1 Description

Allows you to select test plan 1 as the test plan number for either saving the current test plan or recalling a previously saved test plan.

Saving the current test plan in plan 1

Saving the current test plan overwrites any test plan previously saved in plan 1. When you save the current test plan in test plan 1, it is stored in trace register 6 or to RAM card tTSTP_1.

The channel numbers, tests, scrambling status, channel tuning configuration, quiet line number, frequency response line number, test signal line number, and field selection are saved in the test plan.

The location code, the temperature, the selection of CTB testing, and the setting for an external pad (EXT PAD YES NO) are not stored with the test plan but are stored in nonvolatile analyzer memory and are retained until changed.

Recalling a test plan from plan 1

Recalling a test plan overwrites the current test plan. If you do not want the current test plan to be overwritten, save the current test plan before recalling a test plan. When you recall the a test plan from test plan 1, it is recalled from trace register 6 or from RAM card tTSTP_1.

The location code, the temperature, the selection of CTB testing, and the setting for an external pad (EXT PAD YES NO) are not recalled with the test plan. Before initiating testing with a recalled test plan, you may want to do the following:

- Enter the location code.
- Enter the temperature reading.
- Change the setting of the CTB testing (in Setup menu).
- Change the setting of the external pad compensation (in Setup menu).

Press CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2, Create TstPlan, Save TstPlan, then SAVE TO INT MEM to access PLAN 1. Or, press CABLE TV ANALYZER, SYSTEM MEAS, Recall TstPlan, RECALL FRM INT to access PLAN 1.

See Also

"Step 3. Save the current test plan in internal memory" in Chapter 3.
"Step 5. Recall a test plan" in Chapter 3.

PLAN 2 Description

Allows you to select test plan 2 as the test plan number for either saving the current test plan or recalling a previously saved test plan.

The operation of PLAN 2 is identical to PLAN 1 except that the test plan is stored in and recalled from trace register 7 and RAM card tTSTP_2.

PLAN 3 Description

Allows you to select test plan 3 as the test plan number for either saving the current test plan or recalling a previously saved test plan.

The operation of PLAN 3 is identical to PLAN 1 except that the test plan is stored in and recalled from trace register 8 and RAM card tTSTP_3.

PLAN 4 Description

Allows you to select test plan 4 as the test plan number for either saving the current test plan or recalling a previously saved test plan.

The operation of PLAN 4 is identical to PLAN 1 except that the test plan is stored in and recalled from trace register 9 and RAM card tTSTP_4.

PLAN 5 Description

Allows you to select test plan 5 as the test plan number for either saving the current test plan or recalling a previously saved test plan.

The operation of PLAN 5 is identical to PLAN 1 except that the test plan is stored in and recalled from trace register 10 and RAM card tTSTP_5.

Prev Menu Description

Allows you to access the previous system measurement menu.

PREV PAGE Description

Allows you to select the previous page of on-screen test results.

Press CABLE TV ANALYZER, SYSTEM MEAS, Measure Now, Yes or No, DUMP TO SCREEN to access PREV PAGE.

See Also

"Step 6. Make the measurements now" in Chapter 3.

PRINT REPORT Description

Allows you to print a report of the currently displayed test results.

Press CABLE TV ANALYZER, SYSTEM MEAS, Measure Now, Yes or No, DUMP TO SCREEN to access PRINT REPORT.

See Also

"Step 6. Make the measurements now" in Chapter 3.

Recall Data Description

Allows you to access DATA TO PRINTER and DATA TO SCREEN.

DATA TO PRINTER sends the test results from a file on a RAM card to a printer. DATA TO SCREEN sends the test results from a file on a RAM card to the screen.

Press CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2 to access Recall Data.

See Also

"Recalling Test Data from the RAM Card" in Chapter 3.

RECALL FRM CRD Description

Allows you to recall a previously saved test plan from a RAM card.

Recalling a test plan overwrites the current test plan. If you do not want the current test plan to be overwritten, save the current test plan before recalling a test plan.

Press CABLE TV ANALYZER, SYSTEM MEAS, Recall TstPlan to access RECALL FRM CRD.

See Also

"Recalling a Test Plan from a RAM Card" in Chapter 3.

RECALL FRM INT Description

Allows you to recall a previously saved test plan (from plans 1 through 5) from analyzer memory.

Recalling a test plan overwrites the current test plan. If you do not want the current test plan to be overwritten, save the current test plan before recalling a new one. See "Step 3. Save the current test plan in internal memory" in Chapter 3 for more information.

The test plans are saved in trace registers 6 through 10.

The channel numbers, tests, scrambling status, channel tuning configuration, quiet line number, frequency response line number, test signal line number, and field selection are saved in the test plan.

The location code, the temperature, the selection of CTB testing, and the setting for an external pad (EXT PAD YES NO) are not stored with the test plan but are stored in nonvolatile analyzer memory and are retained until changed.

Before initiating testing with a recalled test plan, you may want to do the following:

- Enter the location code.
- Enter the temperature reading.
- Change the setting of the external pad function (in Setup menu).

Pressing CABLE TV ANALYZER, SYSTEM MEAS, Recall TstPlan accesses RECALL FRM INT.

See Also

"Step 5. Recall a test plan" in Chapter 3.

`Recall TstPlan` Description

Allows you to access the softkeys used to recall a previously saved test plan from analyzer memory, or from a RAM card.

Recalling a test plan overwrites the current test plan. If you do not want the current test plan to be overwritten, save the current test plan before recalling a new one. Press `CABLE TV ANALYZER`, `SYSTEM MEAS` to access `Recall TstPlan`.

See Also

"Step 5. Recall a test plan" in Chapter 3.
"Recalling a Test Plan from a RAM Card" in Chapter 3.

`SAVE TO INT MEM` Description

Allows you to save the current test plan in analyzer memory.

Saving a test plan overwrites any previously saved test plan of the same test plan number.

Up to five test plans can be saved in analyzer memory. The test plans are saved in nonvolatile analyzer memory, in trace registers 6 through 10.

The channel numbers, tests, scrambling status, channel tuning configuration, quiet line number, frequency response line number, test signal line number, and field selection are saved in the test plan.

The location code, the temperature, the selection of CTB testing, and the setting for an external pad (`EXT PAD YES NO`) are not stored with the test plan but are stored in nonvolatile analyzer memory and are retained until changed.

Pressing `CABLE TV ANALYZER`, `SYSTEM MEAS`, `More 1 of 2`, `Save TstPlan` accesses `SAVE TO INT MEM`.

See Also

"Step 3. Save the current test plan in internal memory" in Chapter 3.

SAVE TO MEM CRD Description

Allows you to store the on-screen test results to a RAM card. Press CABLE TV ANALYZER, SYSTEM MEAS, Measure Now, Yes or No, DUMP TO SCREEN to access STORE TO CARD.

See Also "Step 6. Make the measurements now" in Chapter 3.

Save TstPlan Description

Allows you to access SAVE TO INT MEM and SAVE TO MEM CRD.

Pressing CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2, Create TstPlan accesses Save TstPlan.

See Also "Step 3. Save the current test plan in internal memory" in Chapter 3.

START TIME Description

Allows you to specify the time and the date when testing is to begin for timed measurements. The time is specified in 24-hour, hour, minute format; the date is specified in year, month, and day format. If you do not specify a time, the current time is used. If you do not specify a date, the current date is used. If you specify a time earlier than the current time, the current time is used. If you specify a date earlier than the current date, the current date is used. If the date or time setting of the analyzer is incorrect, see "If the wrong date or time is displayed" in Chapter 4.

Pressing CABLE TV ANALYZER, SYSTEM MEAS, Timed Measure accesses START TIME.

See Also "Making Timed System Measurements" in Chapter 3.

STOP TIME Description

Allows you to specify the time and the date to end the testing for a timed measurement. The time is specified in 24-hour, hour, minute format; the date is specified in year, month, and day format. If you enter a stop time that is 24 hours or greater, the stop time will be set to 23 hours and 59 minutes.

Pressing CABLE TV ANALYZER, SYSTEM MEAS, Timed Measure accesses STOP TIME.

See Also

"Making Timed System Measurements" in Chapter 3.

SYSTEM MEAS Description

Accesses the system measurement mode. When the analyzer is in the system measurement mode, SYSTEM is displayed in the upper right corner of the analyzer display.

Pressing SYSTEM MEAS accesses the following: ENTER LOCATION, ENTER TEMP, Recall TstPlan, Measure Now, Timed Measure, Create TstPlan, Recall Data, CATALOG CARD, VIEW LAST, and VIEW CH SEL.

Accessing the system measurement mode automatically changes the input impedance setting of a spectrum analyzer to 75 Ω. (The setting of the input impedance is usually controlled by INPUT Z 50 75.) For spectrum analyzer's with 50 Ω impedance, changing the input impedance with INPUT Z 50 75 minimizes the impedance mismatch, but does not eliminate the impedance mismatch unless a 50 Ω to 75 Ω external matching pad is used.

Press (MODE), CABLE TV ANALYZER to access SYSTEM MEAS.

See Also

"Step 5. Start channel or system mode of operation" in Chapter 1.

Timed Measure Description

Allows you to access the functions that you can use to initiate the testing at a later time.

When you press Timed Measure, you access a menu with the following softkeys: START TIME, STOP TIME, TIME INTERVAL, DUMP TO PRINTER, DUMP TO RAM CARD, and Main Menu.

Pressing CABLE TV ANALYZER SYSTEM MEAS accesses Timed Measure.

See Also "Making Timed System Measurements" in Chapter 3.

TIME INTERVAL Description

Allows you to specify the time interval between the starting of testing for a timed measurement. The time interval is specified in 24-hour, hour, minute format. The maximum time interval is 99 hours.

If you do not specify a time interval, the time interval is set to zero. When the time interval is set to zero, testing will begin immediately after the previous tests have been completed.

When specifying a time interval, you need to specify a time interval that is at least long enough to allow the analyzer to complete the testing before beginning testing again. Here are some general guidelines for estimating how long it takes the analyzer to test one channel:

- It takes approximately 5 minutes to test a channel that is not scrambled with all of the tests selected for that channel.
- It takes approximately 2 minutes to test a scrambled channel with tests 1, 2, 3, 6, and 9 selected for that channel.

So the time interval that you specify (in minutes) should, at the least, exceed the number of channels that you are testing plus 10 minutes.

Press CABLE TV ANALYZER, SYSTEM MEAS, Timed Measure to access TIME INTERVAL.

See Also "Making Timed System Measurements" in Chapter 3.

TODAY'S DATE Description

Allows you to select the current date as the start date or stop date for timed measurements.

When you press TODAY'S DATE, the analyzer uses the date setting of the spectrum analyzer. If the date or time setting of the analyzer is incorrect, see "If the wrong date or time is displayed" in Chapter 4.

Press CABLE TV ANALYZER, SYSTEM MEAS, Timed Measure, START TIME to access TODAY'S DATE as the start date for the timed measurement. Press Timed Measure, STOP TIME to access TODAY'S DATE as the stop date for the timed measurement.

See Also "Making Timed System Measurements" in Chapter 3.

TODAY'S TIMEDATE Description

Allows you to select the current time and date as the start time and date for timed measurements.

When you press TODAY'S TIMEDATE, the analyzer uses the time and date setting of the analyzer. If the date or time setting of the analyzer is incorrect, see "If the wrong date or time is displayed" in Chapter 4.

Press CABLE TV ANALYZER, SYSTEM MEAS, Timed Measure, START TIME to access TODAY'S TIMEDATE.

See Also "Making Timed System Measurements" in Chapter 3.

VIEW CH SEL Description

Allows you to view the selected channels of the current test plan.

VIEW LAST Description

Allows you to view the last test results on the analyzer screen. Upon being sent to the screen, the following options are available:

- NEXT PAGE displays the next page of test results.
- PREV PAGE displays the previous page of test results.
- GOTO PAGE displays selected page number.
- PRINT REPORT prints a test results report.
- STORE TO CARD stores test results to a RAM card.

Press CABLE TV ANALYZER, SYSTEM MEAS, More 1 of 2 to access VIEW LAST.

YES Description

Allows you to confirm that you want to perform the function. If you press CLEAR TST PLAN and then press YES, you have selected to clear the current test plan from analyzer memory. If you enter a channel by using ENTER BY CHANNEL or ENTER BY RANGE and then press YES, the channel or range of channels will be treated as scrambled channels. If you press Measure Now and then press YES, CTB testing will be performed.

YES is accessed by pressing CLEAR TST PLAN, or entering a channel number with ENTER BY CHANNEL or ENTER BY RANGE, or by pressing Measure Now.

7

Setup Menu Map and Softkey Descriptions

Setup Menu Map and Softkey Descriptions

What You'll Find in This Chapter

This chapter contains the menu map and descriptions of the default configuration softkeys. This chapter contains the following sections:

- Setup menu map.
- Softkey descriptions.

Setup Menu Map

The following menu map shows the default configuration softkeys and how they are accessed.

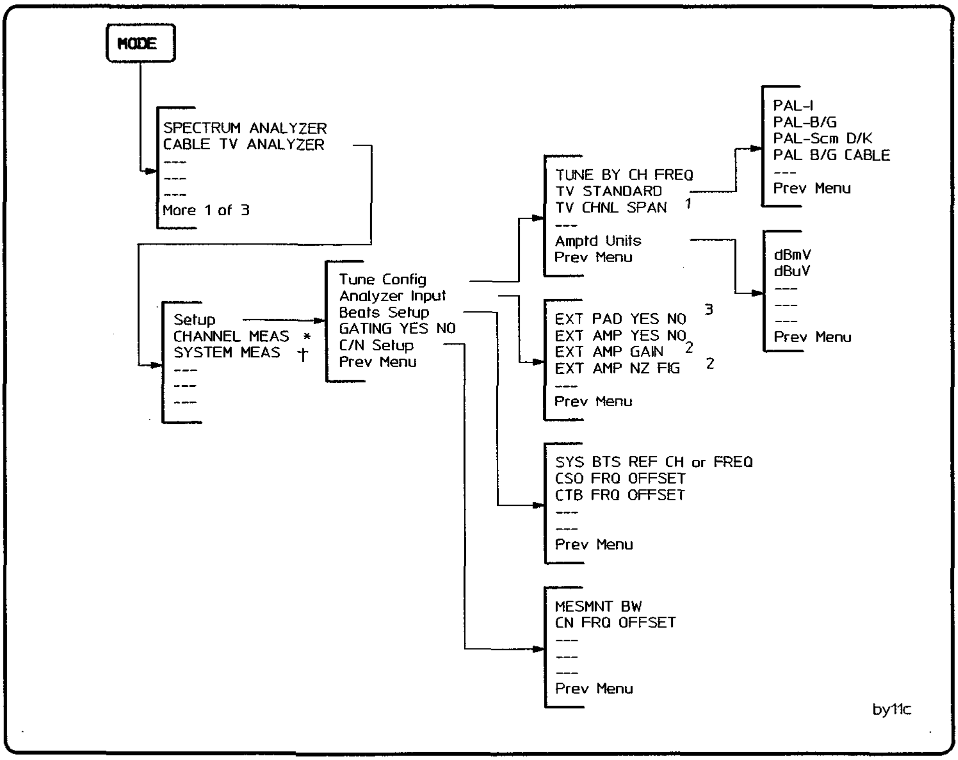


Figure 7-1. Setup Configuration Menu Map

* The CHANNEL MEAS softkey menus are found in Chapters 5.

† The SYSTEM MEAS softkey menus are found in Chapters 6.

1 This softkey only appears when TUNE BY CH FREQ is set to FREQ.

2 These softkeys only appear when EXT AMP YES NO is set to YES.

3 This softkey is not applicable to analyzers with a 75 Ω input.

Softkey Descriptions

This section contains the descriptions of the Setup softkey functions. The functions are listed alphabetically according to the softkey labels.

Amptd Units Description

Allows you to choose the displayed measurement units of dBmV or dBμV. Select these by pressing dBmV or dBμV to highlight your choice. The analyzer retains the selection, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER, Setup, Tune Config to access Amptd Units.

See Also

"Step 1. Configure the test system" in Chapter 2 or 3.

Analyzer Input Description

Allows you to select an external pad, an external preamplifier, and total power at the input to the analyzer. An external 50 Ω to 75 Ω pad is used for analyzers with 50 Ω input impedances. The EXT PAD YES NO function compensates for amplitude loss caused by an external pad.

An external preamplifier (or the internal preamplifier in HP 8591C) is used for the carrier-to-noise test.

The external pad and preamplifier settings are stored in non-volatile analyzer memory. This means that the analyzer retains the selection, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER, Setup to access Analyzer Input.

See Also

"Step 1. Configure the test system" in Chapter 2 or 3.

Beats Setup Description

The Beats Setup softkey is used to specify the channel you wish to use as the SYS BTS REF CH . The default channel is 4 HRC. The default measurement frequency offset for CTB is 8 MHz from the system beats reference channel; the default measurement frequency offset for CSO is 8.75 MHz. These values can be changed using CTB FRQ OFFSET and CSO FRQ OFFSET .

These settings are stored in nonvolatile analyzer memory. This means that the analyzer retains the selections, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER , Setup to access Beats Setup .

See Also

Descriptions for above mentioned softkeys in this chapter.
"Step 1. Configure the test system" in Chapter 2 or 3.

CN FRQ OFFSET Description

Allows you to change the visual carrier to marker offset for the non-gated carrier-to-noise measurement. The default offset is 1.25 MHz. To change this, press CN FRQ OFFSET and enter a new value. The analyzer retains this value, even when the power is turned off, until a new selection is made.

Press CABLE TV ANALYZER , Setup , C/N Setup to access CN FRQ OFFSET .

See Also

"Step 1. Configure the test system" in Chapter 2 or 3.

C/N Setup Description

Allows you to specify the measurement bandwidth for the carrier-to-noise measurement. The default measurement bandwidth is 5 MHz. To change this, press MESMNT BW and enter a new value.

For non-gated carrier-to-noise measurements, the marker is placed below the visual carrier. The default offset is 1.25 MHz . To change this, press CN FRQ OFFSET and enter a new value.

The analyzer retains the selection, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER , Setup to access C/N Setup .

See Also

Descriptions for above mentioned softkeys in this chapter.
"Step 1. Configure the test system" in Chapter 2 or 3.

CSO FRQ OFFSET and CTB FRQ OFFSET Descriptions

Allow you to specify the location above or below a visual carrier to measure system CSO and system CTB. The defaults are channel 4 HRC, CTB 8 MHz from the visual carrier, and CSO 8.75 MHz from the visual carrier of the system beats reference channel (SYS BTS REF CH).

Simply press CSO FRQ OFFSET (CSO) and/or CTB FRQ OFFSET (CTB), enter a positive frequency to measure above the reference channel or a negative frequency to measure below the reference channel. The analyzer retains the selection, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER , Setup , Beats Setup to access CSO FRQ OFFSET and CTB FRQ OFFSET .

See Also

"Step 1. Configure the test system" in Chapter 2 or 3.

dBmV and dBμV Descriptions

Allow you to measure and display results in units of dBmV or dBμV. Press dBmV or dBμV to highlight your choice.

The analyzer retains the selection, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER, Setup, Tune Config, Amptd Units to access dBmV and dBμV.

See Also

"Step 1. Configure the test system" in Chapter 2 or 3.

EXT AMP GAIN Description

Allows you to select the gain value of an external preamplifier for the carrier-to-noise test. The default value is 20 dB for the HP 85905A preamplifier.

The preamplifier selection is stored in nonvolatile analyzer memory. This means that the analyzer retains the selection, even when power is turned off, until a new selection is made.

This function can also be used with the internal preamplifier in the HP 8591C.

Press CABLE TV ANALYZER, Setup, Analyzer Input to access EXT AMP GAIN.

See Also

"Step 1. Configure the test system" in Chapter 2 or 3.

EXT AMP NZ FIG Description

Allows you to select the noise figure value of an external preamplifier for the carrier-to-noise test. The default value is 7 dB for the HP 85905A preamplifier.

The preamplifier selection is stored in nonvolatile analyzer memory. This means that the analyzer retains the selection, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER, Setup, Analyzer Input to access EXT AMP NZ FIG.

This function can also be used with the internal preamplifier in the HP 8591C.

See Also "Step 1. Configure the test system" in Chapter 2 or 3.

EXT AMP YES NO Description

Allows you to select an external preamplifier for the carrier-to-noise test. The preamplifier selection is stored in nonvolatile analyzer memory. This means that the analyzer retains the selection, even when power is turned off, until a new selection is made.

When EXT AMP YES NO is set to YES, the carrier-to-noise test uses the values entered using the EXT AMP GAIN EXT AMP NZ FIG for the calculation.

Press CABLE TV ANALYZER, Setup, Analyzer Input to access EXT AMP YES NO.

This function can also be used with the internal preamplifier in the HP 8591C.

See Also "Step 1. Configure the test system" in Chapter 2 or 3.

EXT PAD YES NO Description

EXT PAD YES NO can be used to compensate for the amplitude loss caused by using a 50 Ω to 75 Ω external matching pad. (A 50 Ω to 75 Ω external matching pad is used to match the signal from a 75 Ω impedance system to a spectrum analyzer with a 50 Ω impedance input.) The external pad function compensates for the 5.8 dB amplitude loss of the external pad by setting the spectrum analyzer's reference level offset to 5.8 dB.

If you are using a spectrum analyzer with 50 Ω input impedance but are not using an external matching pad, the cable TV analyzer mode will compensate for most of the impedance mismatch, but amplitude measurements can have up to ±0.2 dB error caused by the uncompensated mismatch over the frequency range.

This function is set to NO when the HP 85721A is loaded into analyzer memory.

In spectrum analyzer memory, the setting of the external pad function entry is not stored with the current test plan in plans 1 through 5. The setting of the external pad function is stored in nonvolatile spectrum analyzer memory, however. Storing the setting in nonvolatile memory means that once the external pad function is set to YES, it will remain set to YES until you change the setting or delete the HP 85721A program from analyzer memory.

Press CABLE TV ANALYZER, Setup, Analyzer Input to access EXT PAD YES NO.

See Also

"Step 2. Connect the signal to the analyzer" in Chapter 2 or 3.

GATING YES NO Description

The gating function allows you to make carrier-to-noise and composite second order (CSO) distortion measurements without turning off modulation (Option 107 required).
This function also applies to in-channel frequency response, and the video measurements: differential gain, differential phase, and chroma/luma delay inequality. Gating may be turned on or off during the tests if required. The default setting is no but the analyzer retains your selection, even when the power is turned off, until a new selection is made.

Press CABLE TV ANALYZER, Setup to access GATING YES NO.

See Also "Step 1. Configure the test system" in Chapter 2 or 3.

MESMNT BW Description

Allows you to specify the measurement bandwidth for the carrier-to-noise measurement. The default measurement bandwidth is 5 MHz. To change this, press MESMNT BW and enter a new value. The analyzer retains this value, even when the power is turned off, until a new selection is made.

Press CABLE TV ANALYZER, Setup, C/N Setup to access MESMNT BW.

See Also "Step 1. Configure the test system" in Chapter 2 or 3.

PAL-B/G, PAL-B/G CABLE, PAL-I, PAL-SCM D/K and PAL-B/G CABLE Descriptions

Allow you to select the TV Standard in use on the system under test. The analyzer retains this selection, even when the power is turned off, until a new selection is made.

Press CABLE TV ANALYZER, Setup, Tune Config, TUNE BY CH FREQ to underline CH to access PAL-B/G, PAL-I, PAL-SCM D/K and PAL-B/G CABLE.

See also

"Step 1. Configure the test system" in Chapter 2 or 3.

Setup Description

Allows you to access the softkeys used to set up defaults for channel tuning configuration, input configuration, non-interfering RF and video measurement configurations, and channel to test for system beats.

The channel tuning configuration softkeys include TUNE BY CH FREQ, TV STANDARD TV CHNL SPAN, PAL-B/G, PAL-I and PAL-SCM D/K.

The analyzer input configuration softkeys include EXT PAD YES NO and EXT AMP YES NO. (The EXT PAD YES NO is only applicable to spectrum analyzers with a 50 Ω input.)

The non-interfering RF and video measurement configuration softkey is GATING YES NO. This softkey function applys to channel measurement (CHANNEL MEAS) mode only.

The Beats Setup softkey is used to specify the channel you wish to use for testing beats. The default measurement frequency for CTB is 8 MHz from the visual carrier; the default measurement frequency for CSO is 8.75 MHz from the visual carrier. These values can be changed using CTB FRQ OFFSET and CSO FRQ OFFSET.

These settings are stored in nonvolatile analyzer memory. This means that the analyzer retains the selections, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER to access Setup.

See Also

Descriptions for above mentioned softkeys in this chapter.
"Step 1. Configure the test system" in Chapter 2 or 3.

SYS BTS REF CH Description

Allows you to select a channel to perform system beats testing. The default is channel 4 HRC.

If YES is selected after selecting Measure Now, system beats will be measured in the channel specified by SYS BTS REF CH. The results are displayed on the first page of the measurement data.

System beats testing is selected independently of the test plan and is not stored with the test plan. The analyzer retains the channel selection, even when power is turned off, until a new selection is made.

Pressing CABLE TV ANALYZER, Setup, Beats Setup accesses SYS BTS REF CH.

See Also

"Step 6. Make the measurements now" in Chapter 3.

TUNE BY CH FREQ Description

Allows you to tune the analyzer by entering the channel number or the center frequency of the TV signal.

Press TUNE BY CH FREQ to underline CH to tune by channel number entry.

Press TUNE BY CH FREQ to underline FREQ to tune by center frequency entry. In this mode, the TV CHNL SPAN softkey is available to allow you to enter the span of the TV channel.The analyzer retains the channel selection mode, even when power is turned off, until a new selection is made.

You must tune by entering frequency for the FM Radio test.

Press CABLE TV ANALYZER, Setup, Tune Config to access TUNE BY CH FREQ.

See Also

"Step 1. Configure the test system" in Chapter 2 or 3.

Tune Config Description

Allows you to access TUNE BY CH FREQ, TV STANDARD, Amptd Units and TV CHNL SPAN. (TV CHNL SPAN only avaliable if FREQ underlined by pressing TUNE BY CH FREQ).

Press CABLE TV ANALYZER, Setup to access Tune Config.

See also

"Step 1. Configure the test system" in Chapter 2 or 3.

TV CHNL SPAN Description

Allows you to enter the span of the TV channel when you have underlined FREQ by pressing TUNE BY CH FREQ). The default is 8 MHz. The span setting is used by the analyzer to display both the visual and sound carriers when a channel is selected.

The analyzer retains the value, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER , Setup , Tune Config , TUNE BY CH FREQ to underline FREQ to access TV CHNL SPAN .

See also

"Step 1. Configure the test system" in Chapter 2 or 3.

TV STANDARD Description

Allows you to access the 3 TV standards PAL-B/G , PAL-I and PAL-SCM D/K supported by the HP 85721A Cable TV Measurements Personality.
The analyzer retains the TV standard selected, even when power is turned off, until a new selection is made.

Press CABLE TV ANALYZER , Setup , Tune Config to access TV STANDARD .

See also

"Step 1. Configure the test system" in Chapter 2 or 3.

8

Test Descriptions

Test Descriptions

What You'll Find in This Chapter

This chapter describes the cable TV tests found in the Channel and System modes of operation. The test descriptions are as follows:

- Visual carrier level and visual-to-sound level difference test.
- Visual carrier frequency and visual-to-sound frequency difference test.
- Carrier-to-noise test.
- Composite second order (CSO) test.
- Composite triple beat (CTB) test.
- Hum test.
- Depth of modulation test.
- Digital Channel Power Test
- Color tests (chroma-luma delay inequality, differential gain, differential phase).
- In-channel frequency response test.
- FM deviation test.
- Cross modulation test.
- System frequency response test.
- View ingress test.
- FM Radio test.

NOTE

The Cross Modulation, System Frequency Response and View Ingress tests can only be done in Channel mode.

Visual Carrier Level and Visual-to-Sound Level Difference Test Description

The visual carrier level test measures the peaks of the visual carrier, as well as the visual-to-sound level difference.

To perform the visual carrier level and visual-to-sound level difference test, the analyzer does the following:

1. Changes the resolution bandwidth, video bandwidth, and sweep time of the analyzer to capture the levels accurately.
2. Measures the visual amplitude level and sound carrier difference.

Figure 8-1 shows the analyzer measuring the visual carrier level and sound carrier difference.

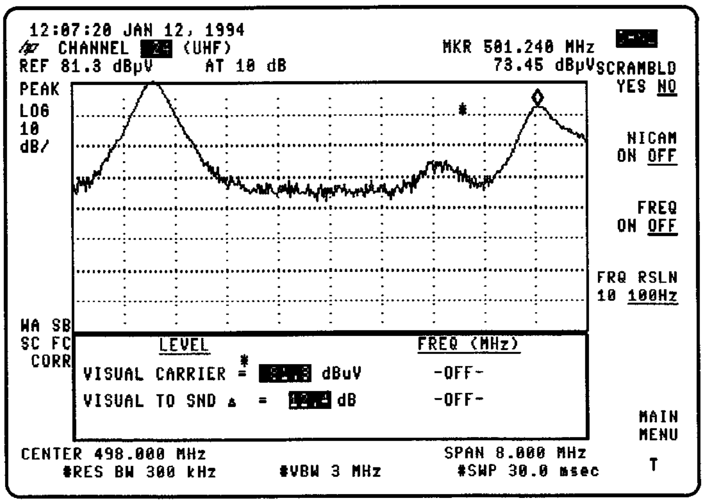


Figure 8-1. Measuring the Visual Level and Aural Carrier Difference

With NICAM ON OFF (ON) selected, a true RMS measurement is made of the NICAM band.

If the sound carrier cannot be detected, the visual-to-sound frequency difference measurement cannot be done and a "-" will appear in the system measurement test data for the channel.

Visual Carrier Frequency and Visual-to-Sound Frequency Difference Test Description

The visual carrier frequency test measures the frequency of the visual carrier, as well as the visual-to-sound frequency difference. In channel measurement mode, this test is executed by pressing the FREQ ON softkey after a visual carrier level and visual-to-sound level difference test has been completed.

To perform the visual carrier frequency and visual-to-sound frequency difference test, the analyzer does the following:

1. Enables counting of the visual and sound carriers and calculates the sound carrier difference.
2. In channel measurement mode, the frequency counter resolution can be changed to 10 Hz without affecting measurement accuracy. Refer to the specifications in the HP 8591C User's Guide.

Figure 8-2 shows the analyzer measuring the visual and sound carriers.

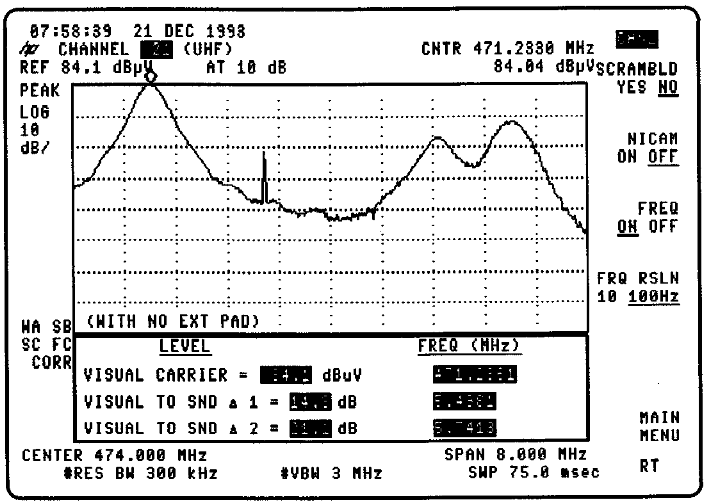


Figure 8-2. Measuring the Visual Frequency and Aural Frequency Difference

NOTE

Due to the nature of the NICAM signal, detecting and measuring its center frequency is not possible.

If the aural carrier cannot be detected, the visual-to-sound frequency difference measurement cannot be done and a "-" will appear in the system measurement test data for the channel.

Carrier-to-Noise Ratio Test Description

The result of the carrier-to-noise measurement is the ratio of the peak visual carrier level (modulated or unmodulated) to the minimum noise level between channels. This ratio is normalized to a 5 MHz noise-power bandwidth.

There are two methods of measuring carrier-to-noise:

1. In-between channels.
2. Non-interfering gated in-channel using Option 107.

1. In-between channels

In the first method, the peak carrier level is measured first, then continuously reports the carrier-to-noise ratio for the marker position. The marker can be moved as desired and the result is updated to reflect the most current test result. At the end of each sweep, the marker does a local minimum search as well as a local trace average.

The analyzer initially measures the total power of the entire cable system. This is done to set the attenuator to avoid overload of the input mixer and noise floor lift due to internally generated distortion.

The analyzer then measures its own noise figure and uses this for calculating the final carrier-to-noise value.

The analyzer's input attenuation is set to both prevent input mixer compression and minimize the noise level of the analyzer.

Initially, the marker is placed according the the values selected from the `C/N Setup` in the `Setup` menu. This provides an indication of the distribution system noise level without having to remove modulation. The minimum noise level is measured and compared with the noise level of the analyzer. If the difference between the minimum noise level and the noise floor is less than 10 dB, the minimum noise value cannot be measured directly, it is instead calculated by using the following formula:

$$System\ noise = 10Log\left[10^{DN} - 10^{AN}\right]$$

where
DN = displayed noise ÷ 10
AN = analyzer noise ÷ 10

Figure 8-3 shows the analyzer measuring the minimum noise level.

To find the ratio of the visual carrier level to the noise level, the minimum noise level value is subtracted from the carrier peak level. The ratio is then normalized to a noise-power bandwidth value selected from `MESMNT BW` in the `C/N Setup` menu.

The message **See MORE INFO** is displayed if the system noise is within 3 dB of the analyzer noise. This can be the case when carrier-to-noise is >50 dB and carrier levels are less than 20 dBmV. Refer to the graphs in the specifications located in the HP 8591C Calibration Guide.

NOTE

External preamplifier usage can be enhanced by entering amplifier gain and noise figure values in the `Setup` menu. By selecting an external preamplifier in the `Setup` menu, errors caused by the preamplifier can be accounted for in the carrier-to-noise calculation. When the internal preamplifier automatically turns on, its gain and noise figure area automatically accounted for and requires no operator attention.

Averaging minimizes the measurement-to-measurement variation of the system noise determination.

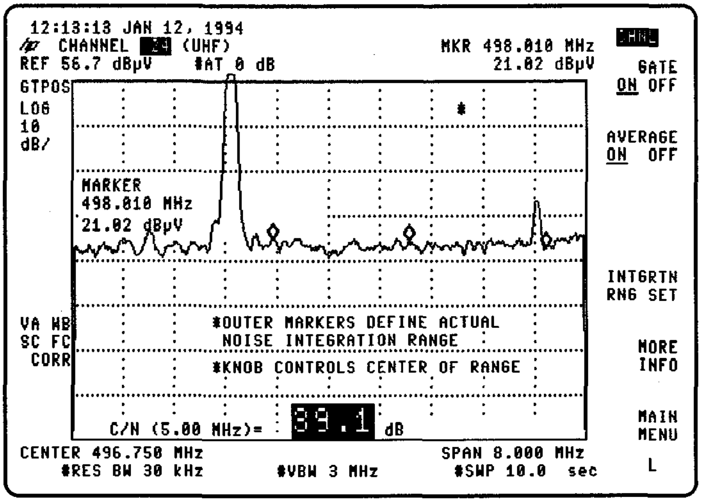


Figure 8-3. Carrier-to-Noise Measurement

In channel measurement mode, pressing More MORE INFO shows the raw data and all corrections used for this measurement.

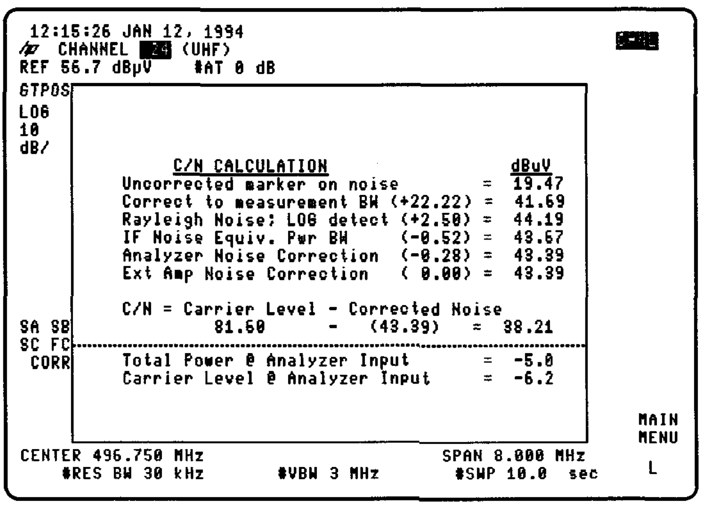


Figure 8-4. MORE INFO Screen

2. Non-interfering gated in-channel using Option 107

The second method is called in-channel non-interfering carrier-to-noise measurements (Option 107 required) in which the gating function is used with modulation on. A line with no test signals or data within the active line time is found (quiet line). In channel measurement mode, the `CONTINUE` softkey is then pressed to execute the measurement.

The minimum level noise is not found. Instead, noise can be measured over a range to account for possible non-flatness of the noise floor.

The outer markers in this test show the range over which the noise is integrated. Because of the carrier, integration over the full 5 MHz cannot be done. However, almost the entire range is integrated.

The outer markers that are used to determine the range are set by pressing the `INTGRTN RNG SET` in channel measurements mode. Gated carrier-to-noise shows in-channel noise delivered in the video in addition to RF noise of amplifiers and headend equipment. Troubleshooting can be done without interrupting service. Commercial insertion equipment may yield different results when active.

More Discussion about the Carrier-to-Noise Test

The carrier-to-noise test is very flexible and can handle a wide variety of testing conditions. It provides feedback messages to assist you in achieving the optimum test setup.

Like any cable TV active device, a spectrum analyzer has an ideal operating point which balances carrier-to-noise and carrier beats. When a spectrum analyzer is operating at its optimum point it has its greatest testing dynamic range. However, to achieve acceptable results it is not always necessary to operate the spectrum analyzer exactly at its optimum point. To achieve acceptable results only 2 conditions are needed:

1. The total power at the analyzer input is below overloading the analyzer.
2. The noise floor being measured is equal to or greater than the noise floor of the analyzer.

Channel loading forces down the highest acceptable level of each individual channel carrier which gives rise to the need to preselect the channel of interest. This is necessary when the noise floor being measured is less than the analyzer noise floor when the total input power is near overload. The only way to raise the noise floor without overloading the analyzer is to reduce channel loading through preselection.

When `CARRIER/NOISE` is pressed the analyzer measures the total power at the input, the level of the channel to be measured, and the analyzer noise floor. Based on this information it decides whether to turn on the internal preamp, and what the analyzer attenuator setting should be. In addition, it alerts you when it thinks additional attention is needed. This is indicated by the presence of message `(See MORE INFO)` in the lower right hand corner of the screen. This message occurs when the cable noise floor is within 3 dB or the analyzer noise floor. It is intended to alert the operator that the analyzer noise-near-noise correction is kicking in. In addition, the message is presented in inverse video when the cable noise floor is within 2.2 dB of the analyzer noise. This indicates the analyzer is correcting the result by more than 3 dB and measurement uncertainty of the result is rising. It is intended that you raise the input level and preselect if necessary.

Once the optimum input power level is achieved, it does not need to be readjusted for each channel. All channels can be measured without further adjustments to the input level.

The internal preamp is controlled automatically. It is only turned on at levels low enough to prevent overload. Under some conditions the internal attenuator is set to 10 dB to prevent preamplifier overload. When the internal preamplifier is turned on, a message to that effect is displayed at the lower right hand corner of the screen.

The carrier-to-noise test has 2 variations. The first is the traditional method where the video modulation is either left on and the noise is measured at the lower channel boundary, or the video modulation is turned off and the noise is measured in the video channel. The second variation is measuring the noise during the vertical interval on a single horizontal line that has no modulation. This is referred to as a “quiet line”. The analyzer defaults to line 22, but any quiet line can be used. Line 22 is quiet on most channels.

Measuring noise on a quiet line is called a “gated” measurement. That is, the analyzer gates its frequency domain measurement during a specific time slot; that slot being during the selected quiet line. Option 107 is required to make this measurement.

Pressing `CARRIER/NOISE` can have different results depending on 2 keys in the setup menu, `GATING YES/NO` and `PAUSE YES/NO`. GATING set to NO and PAUSE set to YES are the best settings for initially becoming familiar with carrier-to-noise test. GATING set to NO causes the carrier- to-noise test to initially enter the first variation of the test as described above. At this point you can observe the noise at the lower channel boundary. If there is a composite second order product at the lower channel boundary, the marker will move slightly above it. This noise value is the system noise from the output of the headend to the point of measurement. It does not include noise contributed by headend active components or converters. Thus noise measured the lower channel boundary must be added to the noise contributions of headend components and converters (if used).

When GATING is set to YES, pressing `CARRIER/NOISE` results in bypassing of variation 1. Then, if PAUSE is set to NO, the analyzer will move directly to the gated test. It is intended that you will select this configuration of GATING and PAUSE after becoming familiar with the operation of the test.

Another difference between the non-gated and the gated variations of the test is the frequency range over which the noise is measured. The non- gated test measures the noise at the current marker position averaged with 1 position on either side. In the selected channel span 3 measurement buckets is (Channel Span/401) * 3 Hz. The range is then mathematically converted to the chosen (ideally the video) bandwidth. This assumes the noise floor is flat which is almost always true when using the method of turning modulation off to make the measurement. The gated measurement has the added flexibility of being able to measure over a much wider frequency range. This is necessary when measuring with a video signal present because the noise floor is very often not flat. Therefore measuring at a single point and converting to the measurement bandwidth can give incorrect results. If the noise floor is not flat than it should be integrated or summed. The gated carrier-to-noise test integrates over as wide a range as it can. It defaults to 85% of the measurement range. It cannot be 100% because the carrier is always present and cannot be gated away. However, the noise below the carrier is almost always equal to or less than the noise in the rest of the channel so it is conservative to assume the integrated value also applies to the noise under the carrier. You can change the range of 85%. Entering 1% replicates the non-gated noise measurement range.

Refer to "Carrier-to-noise test" in Chapter 2 for information on how to make a measurement.

Composite Second Order (CSO) Test Description

Three methods of measuring CSO are described here:

1. Channel CSO.
2. CSO using gating function.
3. System CSO.

Distortion near noise corrections are used to more accurately measure distortion products less than 10 dB above the displayed noise.

1. Channel CSO

The composite second order (CSO) test measures the relative level of second order intermodulation products that are offset from the carrier under test by −2.5 MHz, −1.75 MHz and +0.75 MHz.

The trace is a time averaged display appropriate for measuring beats. The marker does a local peak search to assure it is measuring the peak of the beat.

2. CSO using gating function

With the Option 107 installed, the carrier does not have to be turned off. A quiet line should be selected and the measurement is performed. In this way, measurements can be made without interrupting service.

3. Sytem CSO

This test is performed on the channel specified using the `SYS BTS REF CH` softkey in the `Setup` menu. This applies to the system measurements mode.

The CSO test measures the beat product at 8.75 MHz from the test channel set by `CSO FRQ OFFSET`. Figure 8-5 shows the analyzer measuring the level of the beat product and noise level for CSO beat products.

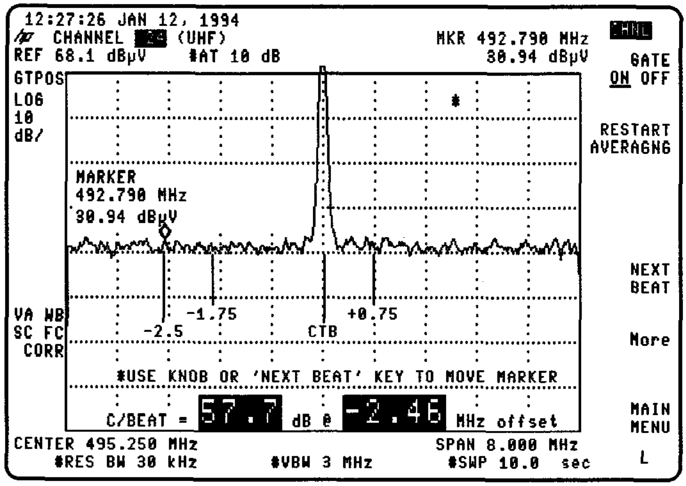


Figure 8-5. Determining the Level of the Beat Product and Noise Level

With this method of measuring CSO, a preamplifier is not generally needed for accurate testing.

Composite Triple Beat (CTB) Test Description

Two methods of measuring CTB are described here:

1. Channel CTB.
2. System CTB.

Distortion near noise corrections are used to more accurately measure distortion products less than 10 dB above the displayed noise.

1. Channel CTB

The CTB beat appears directly under the visual carrier. Therefore, turning modulation off during the channel CSO/CTB test is currently the only method of testing the CTB of each channel.

The marker does a local peak search to assure it is measuring the peak of the beat.

2. System CTB

The composite triple beat (CTB) test measures the relative level of third order intermodulation products that align in frequency with the carrier under test. System CTB testing is intended to be performed on only one channel and is performed at 6 MHz above either a selected channel (channel measurement mode), or on the channel specified using the `SYS BTS TST CHNL` softkey in the `Setup` menu.

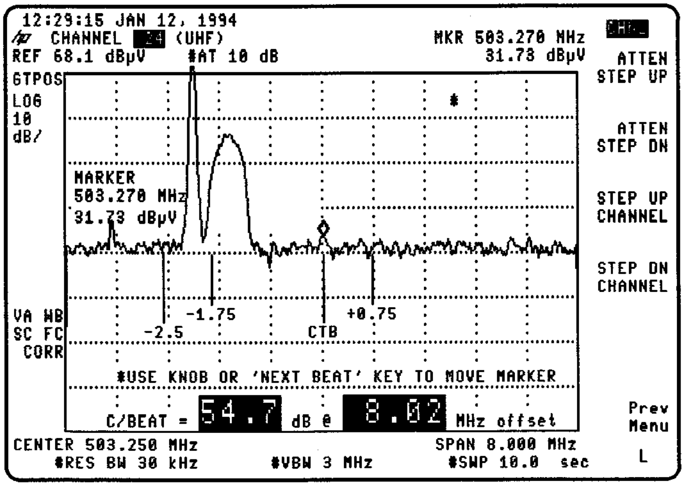


Figure 8-6. CTB Measurement (GATE ON)

Setting CTB FREQ OFFSET to −8 MHz will allow testing 8 MHz below the beats test channels.

In system measurement mode, the analyzer first measures the peak level of the reference channel (selected from SYS BTS REF CH). Any composite triple beat products are measured 8 MHz from the reference channel. The offset is selected from CTB FRQ OFFSET . *If there is a signal within ±200 kHz of the CTB test channel, the CTB results will be inaccurate.* If you are broadcasting a signal between channels 4 and 5, you must either turn off the signal or change the frequency at which CTB is tested.

The CTB measurement is done as follows:

1. The visual carrier peak level of the test channel (default is channel 4 HRC) is measured.
2. Control line B of the analyzer's auxiliary interface is set to a TTL-high level.
3. The center frequency of the analyzer is increased to the frequency of the test channel plus the CTB offset of 8 MHz (default setting of CTB FRQ OFFSET).
4. The beat level is measured.

5. The beat level is subtracted from the visual carrier peak level.
6. Control line B of the analyzer's auxiliary interface is set to 0 volts dc.

The visual carrier peak level of the test channel is measured

The peak of the visual carrier is measured.

To find the beat products, the analyzer's center frequency is changed so that any beat products in the gap between channels 4 and 5 can be measured. To avoid measuring the skirts of the visual carrier, the resolution bandwidth and frequency span of the analyzer are decreased. To optimize the distortion measurement capability of the analyzers, the reference level is decreased to bring the noise level within the first six divisions of the graticule, and input attenuation is adjusted for the best dynamic range.

At this point in the CTB test, the control B line of the analyzer's auxiliary interface is set to a TTL high level. If you wish to momentarily turn off the carrier, you may find it useful to use control line B (with additional circuitry) to turn off the carrier.

The beat level is measured

To accurately determine beat amplitude, the beat level is measured and compared with the level of the displayed noise. If the difference between the beat level and the minimum noise displayed is less than 10 dB, the beat value cannot be measured directly; it is instead calculated by using the formula:

$$Beat\ Level = 10Log\left[10^{BP} - 10^{NL}\right]$$

where
BP = Beat product ÷ 10
NL = Noise level ÷ 10

With this method of measuring CTB, a preamplifier is not generally needed for accurate testing.

The beat level is subtracted from the visual carrier peak level

To find the value for CTB, the beat level is subtracted from the visual carrier peak level.

Hum Test Description

The hum test measures the percentage of amplitude modulation for low frequency disturbances (hum) in two ways, peak-to-peak variation for total hum and Fast Fourier Transform (FFT).

Total hum is measured by reading the peak-to-peak variation in the visual signal level caused by low frequency disturbances (hum or repetitive transients).

The hum test automatically configures the analyzer for measuring with or without video modulation on the carrier. Other analyzer settings can be used to compensate for the presence of video modulation, then the measurement can be made.

When video modulation is on, the video bandwidth is set to 1 MHz to allow the analyzer to measure only the values of the sync tips. When the video bandwidth is set to 1 MHz, significant noise is also present. This noise is digitally minimized, then several peak-to-peak measurements are taken and averaged. Using the average of these measurements gives the best consistency with visual oscilloscope measurements. However, the effects of noise cannot be completely eliminated and the results reported have slightly more uncertainty (usually less than 1 percent larger) than when video modulation is off. The reverse, however, is not true. That is, when adding modulation to a carrier wave signal, results will increase, not decrease. If a channel does exceed 3 percent, it may still pass by testing again without video modulation.

When video modulation is not present a setting of zero span with a sweep time of 5 ms/div acts as a signal level meter and oscilloscope display, and a video bandwidth of 1 kHz functions as a 1 kHz low pass filter. Several peak-to-peak measurements are taken, then the average measurement is reported.

Obtaining meaningful results even in the presence of video modulation is a great benefit. No one needs to be present at the headend to temporarily insert a carrier wave signal, and subscribers are not deprived of service. On a properly operating system, results with video modulation present will usually be under 3 percent. Low frequency disturbances on channels above the limit are often a combination of video field time distortion on the received signal and cable system hum. The dominant contributor may be identified by removing the signal input to the headend, inserting a clean carrier wave signal on that input, and retesting.

More than 3 percent field time distortion on off-air signals has been observed, but it also has been seen to be caused by multi-path interference between the transmitter and the headend antenna. Field time distortion on the signal can also be qualitatively separated from cable hum by observing whether the distortions vary with time or picture level since cable hum won't change with picture level.

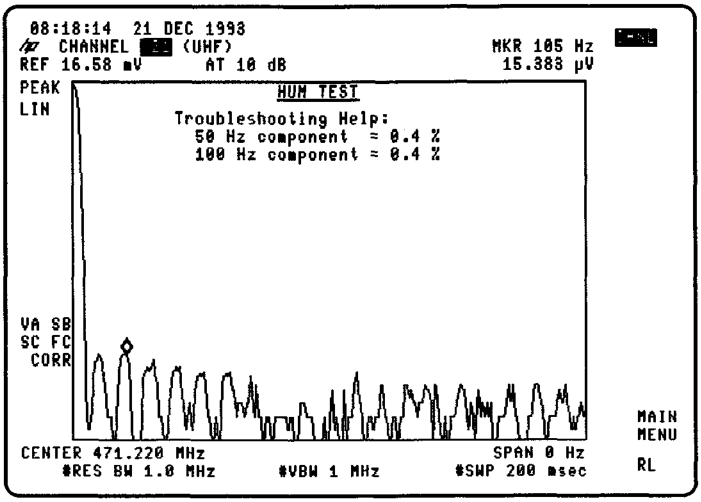


Figure 8-7. HUM, More Information

Depth of Modulation Test Description

The depth of modulation test measures the percentage (50 to 93 percent measurement range) of amplitude modulation (AM) on the visual carrier. The analyzer measures the horizontal synchronization-pulse level and vertical interval test signal (VITS) white level from which it calculates the percentage of AM.

Scrambled Channels

The visual carrier AM modulation depth test may not be valid for scrambled channels, depending on the method used to scramble the channel's signal. So, when testing a scrambled channel, you may want to momentarily turn off scrambling for the channel while the channel is being tested for AM modulation depth. You can use control line A of the analyzer's auxiliary interface to determine when the analyzer is testing a scrambled channel. When testing a scrambled channel, the control A line (pin 1) of the analyzer's auxiliary interface is set high in transistor-to-transistor logic (TTL).

To perform the depth of modulation measurement, the analyzer does the following:

1. Changes the center frequency and reference level of the analyzer.
2. Changes the amplitude scale and span of the analyzer.
3. Measures the minimum level and the maximum level and calculates the percentage of AM modulation depth.

Changes the center frequency and reference level of the analyzer

The visual carrier is centered on the analyzer screen and a 1 MHz resolution bandwidth is used to capture the entire modulation signal. For better accuracy, the reference level of the analyzer is changed to the level of the visual carrier.

Changes the amplitude scale and span of the analyzer

The amplitude scale is changed from logarithmic (dB) to linear (volts) and the span is set to 0 Hertz to demodulate the signal and display time domain characteristics.

Measures the minimum level and the maximum level and calculates the percentage of AM modulation depth

The analyzer measures the minimum level and the maximum level. The minimum level corresponds to the vertical interval test signal (VITS) white level and the maximum level corresponds to the horizontal synchronization-pulse (H-sync) level. The ratio of the minimum level (the VITS white level) to the maximum level (the H-sync pulse level) subtracted from a value of 1 and multiplied by 100 gives the percentage of modulation:

$$\left[1 - \frac{minimum}{maximum}\right] \times 100 = \%AM$$

Figure 8-8 shows the analyzer measuring the minimum and maximum levels.

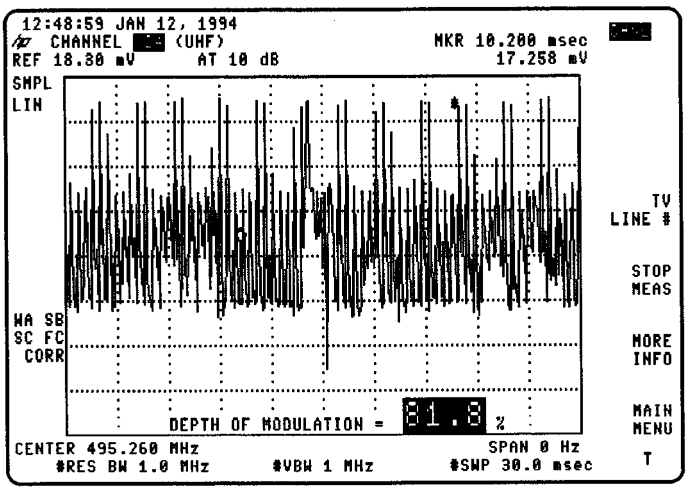


Figure 8-8. Measuring the Depth of Modulation

The depth of modulation result is displayed at the bottom of the screen.

Digital Channel Power Measurement Description

The digital channel power measurement computes the total power within the specified bandwidth (between markers) of the selected channel. The result is recomputed after each sweep (if averaging is off) and displayed in current measurement units. With averaging on, the result is displayed after the number of specified sweeps has been reached.

The user must first tune to the desired channel before executing the test. The channel edges must reside within the display limits, and occupy at least 75% of the selected span for best results. The reference level should also be set so that the peak of the signal falls approximately 10 to 20 dB below the top of the display. Refer to the digital channel power test description, in the channel measurement section, for operating instructions.

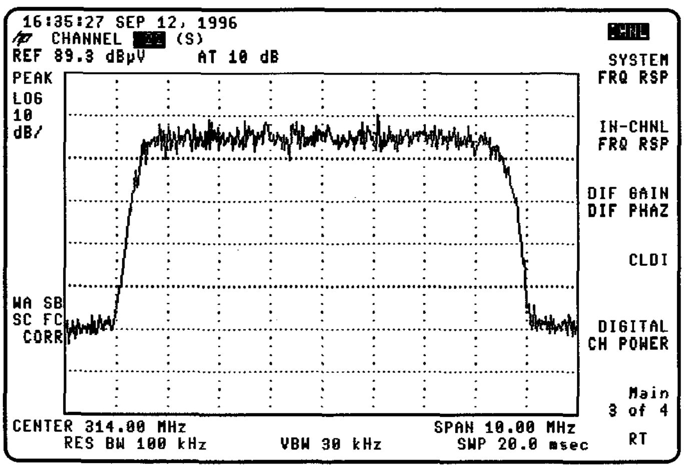


Figure 8-9. Tuned Digital Channel Display

The test automatically locates the estimated left and right edges of the channel using the marker minimum peak function. If the automatic marker placement is not ideal, the markers may be repositioned by the user.

The resolution and video bandwidths settings are automatically set according to the frequency span setting when the test is entered.

We assume that the channel BW is at least 75% of the selected frequency span.

Table 8-1.
Auto Resolution Bandwidth (RBW) and Video Bandwidth (VBW) selection

Freq Span	RBW(kHz)	VBW(kHz)
SPAN >= 12 MHz	300	3000
12 MHz > SPAN >= 4 MHz	100	1000
4 MHz > SPAN >= 1.2 MHz	30	300
1.2 MHz > SPAN >= 0.4 MHz	10	100
SPAN < 0.4 MHz	3	30

Please note the analyzer has been configured for maximum accuracy. Adjustment of VBW or RBW may degrade measurement performance.

The following steps are performed to determine channel power:

The logarithmic trace is converted to linear units (volts) and the RMS average is computed. The value is then converted back to logarithmic measurement units.

The power result is then normalized to a power spectral density in a 1 Hz bandwidth and scaled to the desired channel bandwidth.

The formula is:

Channel power = (Noise equivalent BW) x (RMS power spectral density in a 1 Hz BW)

Where:

Noise equivalent BW = IBW / 1.128 x RBW

Power spectral density in a 1 Hz BW = total power / total BW

IBW = Channel BW or integration BW

RBW = Resolution bandwidth

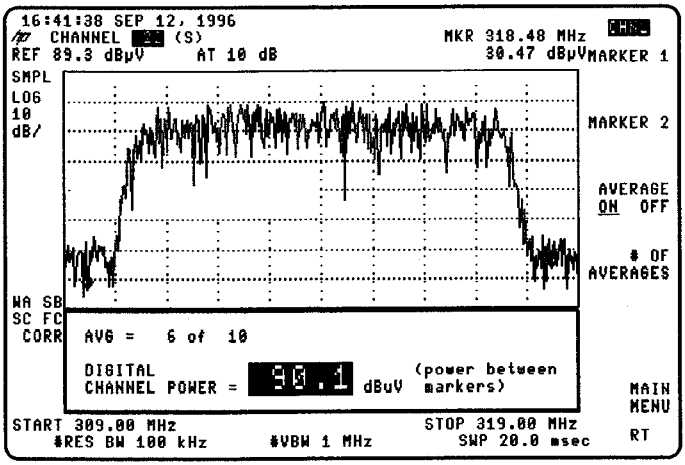


Figure 8-10. Results of Digital Channel Power Test

Color Test Descriptions (Chroma-Luma Delay Inequality, Differential Gain, Differential Phase)

The color tests measure the chrominance-to-luminance delay inequality, differential gain, and differential phase (Option 107 required).

The following steps must be considered when performing these measurements:

1. An appropriate test signal must be present or the test will not return meaningful results. Refer to Figure 8-11.
2. Multiple test signals may be present and may return different results due to their point of origin.
3. Commercial insertion equipment may cause test signals to not be transmitted. If this occurs during a test, the results will not be valid.
4. Visual signal levels greater than +20 dBmV (+80 dBμV) will provide best results.
5. Non-standard timing in signal composition may not yield specified accuracy.
6. Large amounts of non-linear distortion, group delay, or ghosting may yield results different from other test methods.

Surveying your system for test signal types and locations for each channel will simplify test plan generation. Blank charts are located in Appendix A. Copy these charts and fill in appropriate information using channel measurement mode.

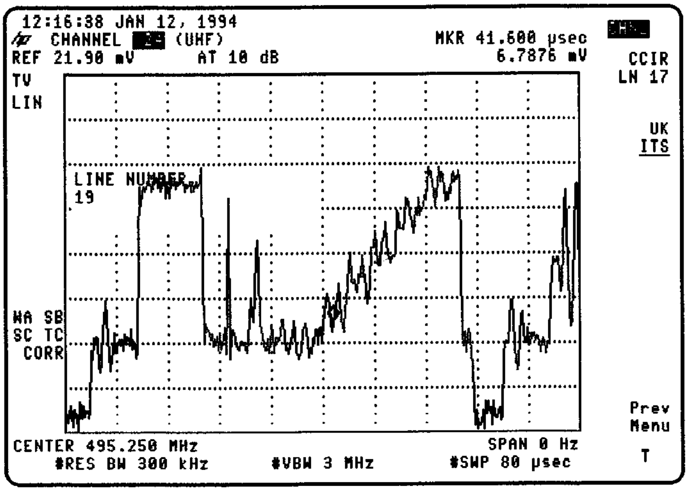


Figure 8-11. UK ITS Test Signal

Chroma/Luma Delay Inequality Test Description

> **NOTE**
>
> The analyzer's internal frequency calibration routine should be done at the temperature the test will be performed for best accuracy.

Non-standard timing between the 2T and 10T pulses will return values that are offset by up to 25 ns. The "T" in PAL systems is 100 ns. A 2T pulse has a half amplitude duration of 200 ns; a 10T pulse has a half amplitude duration of 1 μs; a 20T pulse has a half amplitude duration of 2 μs.

The chroma-luma delay inequality test measures the time delay between the low frequency luminance component and the high frequency chrominance component of the 10T modulated pulse in the composite test signal. Refer to Figure 8-12.

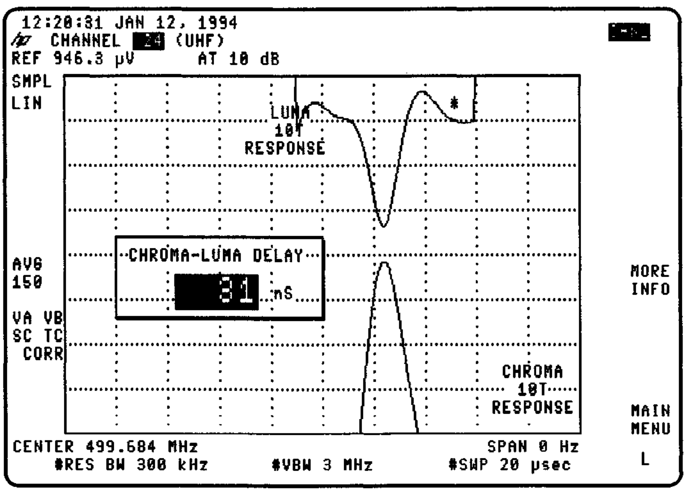


Figure 8-12. Chrominance-to-Luminance Delay

You must select a CCIR line 17 or UK ITS test signal. The analyzer then tunes to the luminance component and switches to 0 Hz span. Video averaging is performed and the center of the luminance component is found and converted to time.

Next, the analyzer tunes to the chrominance component and performs video averaging. The center of the chrominance component is found and converted to time. The time difference between the two components is then computed.

For PAL-B/G, an offset of 170 ns is added to the result so that it will agree with tests done using a demodulator with sound trap in.

Differential Gain Test Description

The differential gain test measures the change in amplitude of the chrominance subcarrier as the luminance changes from a blanking level towards white level. The five-step riser portion of the test signal is used to perform this measurement.

A fast fourier transform is performed on the reference burst and each step in the five-step riser. Each step is normalized to the reference burst. Averaging is employed to minimize noise contribution to the reading.

The peak-to-peak amplitude of the largest riser step is found. Then, the riser step with the smallest peak-to-peak amplitude is found. The difference between the two amplitudes is computed and expressed as a percentage of the largest amplitude. The `MORE INFO` softkey shows the normalized values of each packet. This is useful for relative measurements.

Differential Phase Test Description

The differential phase test measures the change in phase of the chrominance subcarrier as the luminance changes from a blanking level towards white level.

The five-step riser portion of the test signal is used to perform this measurement.

Again a fast fourier transform is performed on the reference burst and each step in the five-step riser. Each step is normalized to the reference burst.

The largest phase difference between any two riser steps is calculated and displayed. `MORE INFO` shows the normalized values of each packet. This is useful for relative measurements.

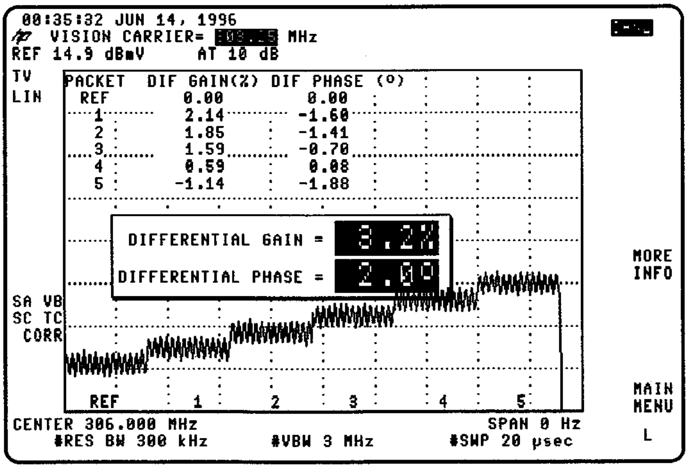


Figure 8-13. Differential Gain/Differential Phase

In-Channel Frequency Response Test Description

The in-channel frequency response test sets the analyzer to view full-field test signals such as multi-burst, sinX/X, or line sweep. In addition, it can view an in-channel sweep signal. The sweep signal can either be continuously or manually swept.

Multi-burst is a popular signal but it has some limitations.

Note that the 0.5 MHz burst packet cannot be resolved in a resolution bandwidth of 300 kHz. However, 300 kHz is the minimum bandwidth required for the analyzer to accurately measure burst packets greater than 4.25 μs.

If all the burst packets were the same time duration, a resolution bandwidth of 100 kHz could be used. The burst height would not be accurate but they all have the same relative amplitude.

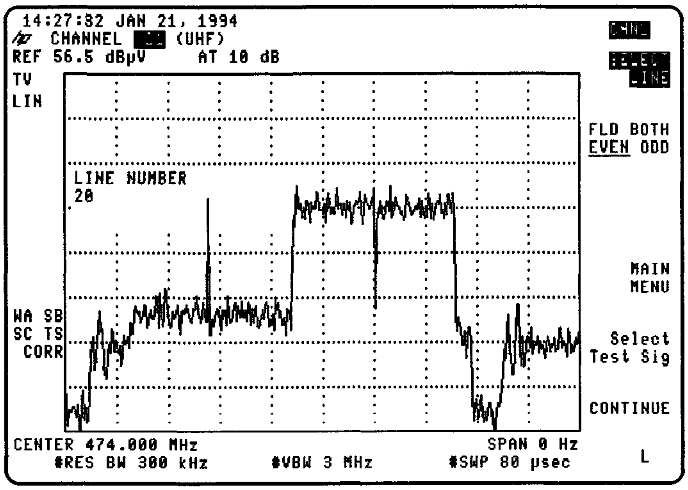


Figure 8-14. Sin X/X

Single Line VITS Testing

Single line vits testing can be performed on multiburst and sin X/X.

The sin X/X is a continuous signal in the frequency domain when using 100 kHz resolution bandwidth for detection.

Multiburst can be used but it does not provide a continuous display across the channel as does sin X/X.

The following steps must be considered when performing these measurements:

1. An appropriate test signal must be present or the test will not return meaningful results.
2. Multiple test signals may be present and may return different results due to their point of origin.
3. Commercial insertion equipment may cause test signals to not be transmitted. If this occurs during a test, the results will not be valid.
4. Visual signal levels greater than +20 dBmV will provide best results.
5. Non-standard timing in signal composition may not yield specified accuracy.

Surveying your system for test signal types and locations for each channel will simplify test plan generation. Blank charts are located in Appendix A. Copy these charts and fill in appropriate information using channel measurement mode.

Relative Measurements

A channel could be measured coming into the headend processing equipment and compared to that leaving the headend to determine the headend equipment's effect.

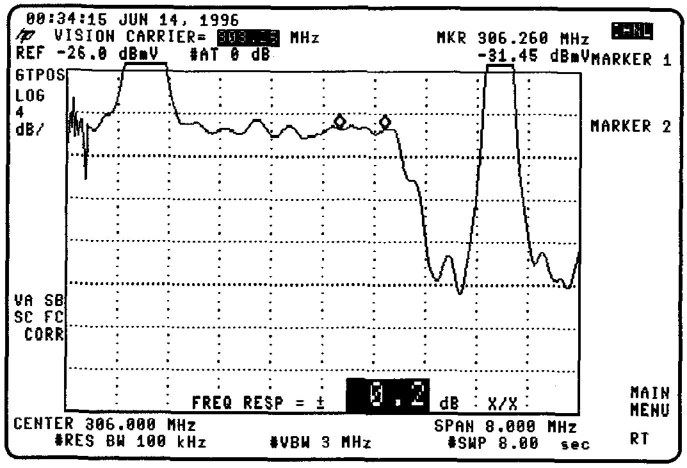


Figure 8-15. Sin X/X In-channel Response

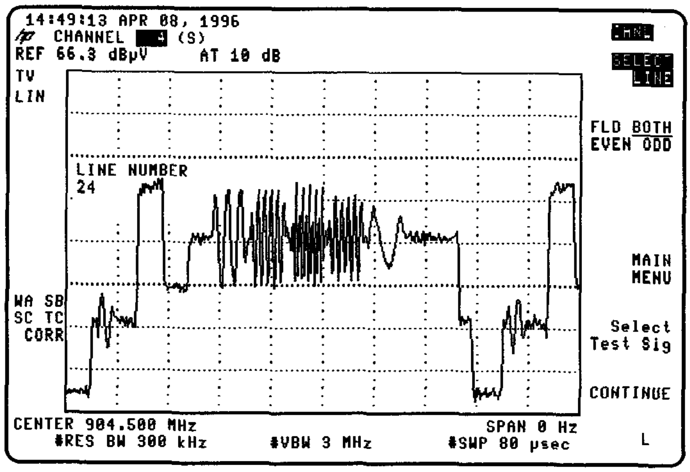


Figure 8-16. Multi-burst Signal

FM Deviation Test Description

To perform this measurement, Option 102 is required on HP 8590E-Series spectrum analyzers.

The FM deviation test reports the maximum peak deviation found during 25 sweeps (or cycles). The number of cycles per measurement can be adjusted by pressing CYCLES/MSMT in Channel mode.

The maximum and minimum deviations are held for the number of sweeps set in CYCLES/MSMT. The peak-to-peak result is calculated then divided by 2 to get peak deviation. If a test signal were used, the peak deviation could be measured in one sweep. Live audio is normally used with CYCLES/MSMT set to 25 or more to ensure that peak deviations are found and results are consistant.

The peak FM deviation result is the sum of all the components of the FM signal at an instant in time. This is controlled by the program material and whether it is mono, stereo, second audio program, etc.

Cross Modulation Test Description

The cross modulation test measures the first 15.625 kHz cross modulation sideband relative to the visual carrier of the channel.

Note that this test is only available in Channel mode.

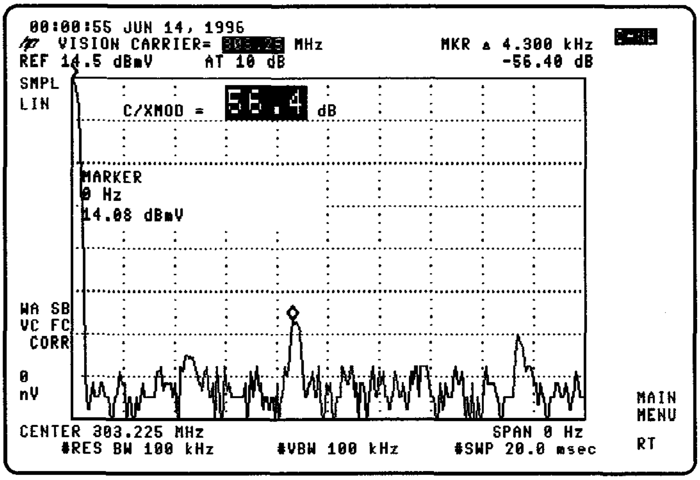


Figure 8-17. Cross Modulation

Modulation must be turned off in order to perform this test.

The analyzer is tuned to the carrier frequency and put in zero span. A fast fourier transform is performed on the signal and the magnitude of the 15.625 kHz incidental modulation is measured relative to the carrier.

System Frequency Response Test Description

This test is used to compare the frequency response at a reference point in the system to any other points in the system. It can also be used to see how the frequency response changes with time or temperature.

Start frequency, stop frequency, resolution bandwidth, video bandwidth, and reference level should be the same for the reference trace as the measurement trace. If two points are compared that have greater than 8 dB gain difference, the reference level can be adjusted to position the trace on the display.

The system frequency response test measures cable TV distribution system flatness without the need for a sweep generator or other signal source. This measurement technique does not require shutting down the system, does not interfere with any signals on the system, and works on systems with or without horizontal-sync suppression scrambling. If channels are scrambled, any time-varying scrambling should be disabled.

Note that this test is only available in Channel mode.

View Ingress Test Description

The view ingress test measures any unwanted signals from outside the cable TV system which can cause degradation of the receiver's quality.

The view ingress test places a reference marker at the peak carrier level and activates the delta marker so that you can position it on the unwanted signal. The LISTEN AT MKR function allows you to listen to the signal to help determine the source.

Note that this test is only available in Channel mode.

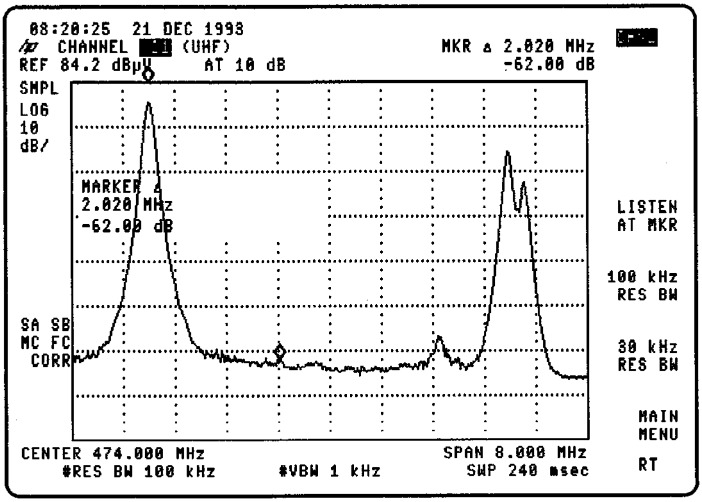


Figure 8-18. View Ingress

FM Radio Test Description

To perform this measurement, Option 102 is required on HP 8590E-Series spectrum analyzers.

The FM Radio test reports the maximum peak deviation of a selected FM radio signal found during 25 sweeps (or cycles). The number of cycles per measurement can be adjusted by pressing `CYCLES/MSMT` in Channel mode.

The maximum and minimum deviations are held for the number of sweeps set in `CYCLES/MSMT`. The peak-to-peak result is calculated then divided by 2 to get peak deviation. Audio is normally used with `CYCLES/MSMT` set to 25 or more to ensure that peak deviations are found and results are consistant.

The analyzer must be configured to tune by entering the center frequency of the signal of interest by pressing `TUNE BY CH FREQ` in the Setup menu to underline FREQ.

9

Specifications and Test Aids

Specifications and Test Aids

What You'll Find in This Chapter

This chapter outlines the specifications and characteristics HP 85721A cable TV measurements and system monitor personality with supported analyzers. In addition, test aids are provided. This chapter contains the following sections:

- Cable TV measurement specifications and characteristics.
- Channel identification plans.
- Channel survey map.

Cable TV Measurement Specifications and Characteristics

Specifications describe the warranted performance of the HP 85721A cable TV measurements and system monitor personality with supported analyzer over the temperature range of 0 °C to 55 °C,. The analyzer will meet its specifications after 2 hours of storage at a constant temperature within the operating temperature range, 30 minutes after the analyzer is turned on, and after CAL FREQ, CAL AMPTD have been run.

Characteristics provide useful, but non-warranted, information in the form of typical, nominal, or approximate values for analyzer performance.

Input Configuration Select input conditions of spectrum analyzer.	
75 Ω Spectrum Analyzer	No selection required
50 Ω Spectrum Analyzer	Measurements converted to 75 Ω values
50 Ω Spectrum Analyzer Selections:	
HP 8590 Series Option 711 Ext Pad	Amplitude offset set to 5.8 dB
No Ext Pad	Amplitude offset set to zero

Channel Selection	Analyzer tunes to specified channels based upon selected tune configuration.
Tune Configuration	CCIR VHF, S, UHF as standard plus country variations by option.
Channel Range	1 to 99 (both channel mode and system mode)
Frequency Range	5 to 900 MHz (channel mode) 47 to 898 MHz (system mode)
Amplitude Range	−15 to +70 dBmV for S/N > 30 dB

Visual-Carrier Frequency	Visual-carrier frequency is counted

Cable TV Measurement Specifications and Characteristics

Precision Frequency Reference (Standard)	
Resolution	100 Hz
Accuracy	$\pm(1.2 \times 10^{-7} \times$ carrier frequency + 110 Hz)
@55.25 MHz	±117 Hz
@325.25 MHz	±149 Hz
@643.25 MHz	±187 Hz

Option 704 Frequency Reference	
Resolution	1 kHz
Accuracy	$\pm(7.5 \times 10^{-6} \times$ carrier frequency + 110 Hz)
@55.25 MHz (Ch. 2)	±524 Hz
@325.25 MHz (Ch. 41)	±2.55 kHz
@643.25 MHz (Ch. 94)	±4.93 kHz

Visual-to-Aural Carrier Frequency Difference	Frequency difference between visual and sound carriers is counted
Difference Range	5.0 to 6.5 MHz
Resolution	100 Hz
Accuracy	±221 Hz for precision frequency ref (std) ±254 Hz for Option 704 frequency ref

Visual-Carrier Level	The peak amplitude of the visual carrier is measured to an absolute standard traceable to the National Institute of Standards and Technology.
Amplitude Range	−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	The difference between peak amplitudes of the visual and sound carrier is measured.
Difference Range	0 to 25 dB
Resolution	0.1 dB
Accuracy	±0.75 dB for S/N > 30 dB

Digital Channel Power	Measurement Characteristic
Accuracy	±1.0 dB for 8 Mhz channel bandwidth and 10 averages

Depth of Modulation (characteristic)	Percent AM is measured from horizontal sync tip to maximum video level; measurement requires a white-reference VITS and may not be valid for scrambled channels.
AM Range	50 to 93%
Resolution	0.1%
Accuracy	±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	Power-line frequency and low-frequency disturbance measured on modulated and/or unmodulated carriers. May not be valid for scrambled channels.
AM Range	0.5 to 10%
Resolution	0.1%
Accuracy	±0.4% for hum ≤3% ±0.7% for hum ≤5% ±1.3% for hum ≤10%

Visual Carrier-to-Noise Ratio (C/N)[1]	The C/N is calculated from the visual-carrier peak level and the minimum noise level, normalized to 4 MHz noise bandwidth.
Optimum Input Range	See Graphs
Maximum C/N Range	Input level dependent - See graphs
C/N Resolution	0.1 dB
C/N Accuracy	Input level and measured C/N dependent ±1.0 to ±3.5 dB over optimum input range

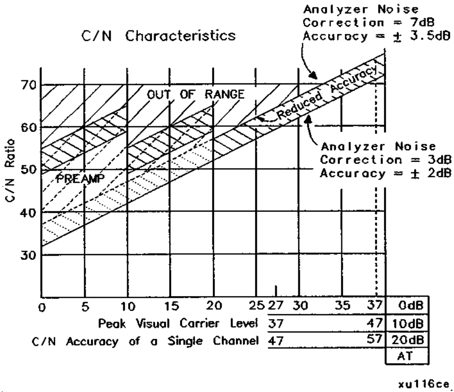
1 A preamplifier and preselector filter may be required to achieve specifications.

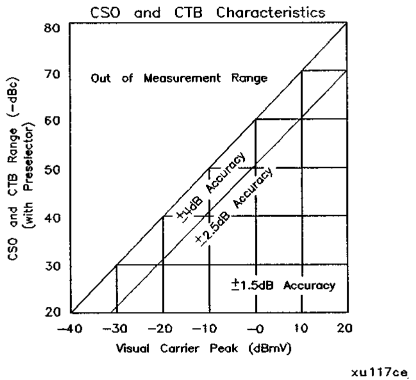
CSO and CTB Distortion[1]	Manual composite second order (CSO) and composite triple beat (CTB) distortions are measured relative to the visual carrier peak and require momentary disabling of the carrier. Automatic measurements are made in the channel above the channel selected and assumes that it is unused. If the analyzer has Option 107, a non-interfering CSO measurement can be made.
Optimum Input Range	See Graphs
Maximum CSO/CTB Range	Input level dependent - See graphs 66 to 73 dB over optimum input range
Manual CSO/CTB Resolution	0.1 dB
System CSO/CTB Resolution	1 dB
CSO/CTB Accuracy	Input level and measured CSO/CTB dependent - See graphs ±1.5 dB to ±4.0 dB over optimum input range

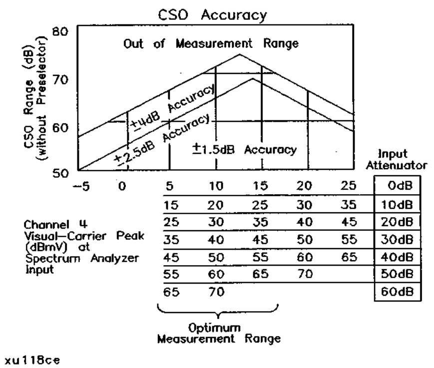
1 A preamplifier and preselector filter may be required to achieve specifications.

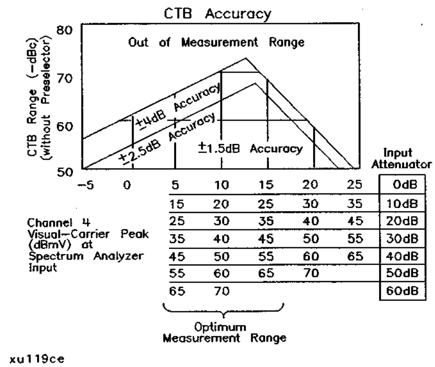
C/N, CSO, and CTB Measurements

The following four graphs summarize the HP 85721A characteristics for C/N, CSO, and CTB testing on cable TV systems with up to 99 channels and up to +9 dB amplitude tilt. C/N, CSO, and CTB measurement accuracies and ranges can be read from the relevant graphs. They depend upon the visual carrier peak level and the measurement reading. For C/N measurements with a preselector, there is no optimum range and the accuracy boundaries drop by the preselector's insertion loss (typically 2 dB).









Crossmodulation	Horizontal-line (15.625 kHz) related AM is measured on the unmodulated visual carrier.
Range	60 dB, usable to 65 dB
Resolution	0.1 dB
Accuracy	±2.0 dB for xmod. <40 dB, C/N >40 dB ±2.6 dB for xmod. <50 dB, C/N >40 dB ±4.6 dB for xmod. <60 dB, C/N >40 dB

System Frequency Response (flatness)

System amplitude variations are measured relative to a reference trace stored during the setup.

Frequency Response Setup	
Fast Sweep Time	2 s (default) for no scrambling
Slow Sweep Time	8 s (default) for fixed-amplitude scrambling
Reference-Trace Storage	50 traces that include analyzer states

Frequency Response Test	
Range	1.0 dB/Div to 20 dB/Div (2 dB default)
Resolution	0.05 dB
Trace-Flatness Accuracy	±0.1 dB per dB deviation from a flat line and ±0.75 dB maximum cumulative error
Trace-Position Accuracy	0.0 dB for equal temperature at test locations and ±0.4 dB max for different ambient temperatures

Video Measurements

(Option 107 required; appropriate TV line must be selected)

Non-interfering color	(requires CCIR lines 17 and CCIR 330 test signal or equivilant)
Differential Gain Accuracy	6% 50 averages (default)
Differential Phase Accuracy	4° 50 averages (default)
Chroma-Luminance Delay Inequality Accuracy	±40ns
Frequency Range	50 MHz to 850 MHz
Amplitude Range	+10 dBmV to +50 dBmV at coupler input (10 dB loss)
Coupler (HP part number 0955-0704)	Insertion loss: < 2 dB Coupled output: −10 dB ±0.5 dB

Non-Interfering Tests with Gate On[1]	
C/N and CSO (quiet line must be selected)	See graphs for accuracy
In-channel Frequency Response Accuracy (requires CCIR line 18 or equivilant)	±0.5 dB within channel (HP 8591C only) ±0.75 dB ≤85 MHz (HP 8591E) ±0.50 dB >85 MHz

1 A preamplifier and preselector filter may be required to achieve specifications.

Channel Identification Plans

This appendix contains channel and frequency information for the following cable TV standards:

- PAL
- SECAM-L
- SECAM-D/K

PAL Channels

Table 9-1.
Channel Identification Plan
CCLR S Channels PAL-B/G

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
IF	-	33.15-40.15	38.9	33.4
I	E2	47-54	48.25	53.75
-	E3	54-61	55.25	60.75
-	E4	61-68	62.25	67.75
III	E5	174-181	175.25	180.75
-	E6	181-188	182.25	187.75
-	E7	188-195	189.25	194.75
-	E8	195-202	196.25	210.75
-	E9	202-209	203.25	208.75
-	E10	209-216	210.25	215.75
-	E11	216-223	217.25	222.75
-	E12	223-230	224.25	229.75

Table 9-2.
Channel Identification Plan
PAL-B/G Standard
CCIR S Channels

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
IF	-	33.15-40.15	38.9	33.4
L2)	S1	104-111	105.25	110.75
-	S2	111-118	112.25	117.75
-	S3	118-125	119.25	124.75
-	S4	125-132	126.25	131.75
-	S5	132-139	133.25	138.75
-	S6	139-146	140.25	145.75
-	S7	146-153	147.25	152.75
-	S8	153-160	154.25	159.75
-	S9	160-167	161.25	166.75
-	S10	167-174	168.25	173.75
U2)	S11	230-237	231.25	236.75
-	S12	237-244	238.25	243.75
-	S13	244-251	245.25	250.75
-	S14	251-258	252.25	257.75
-	S15	258-265	259.25	264.75
-	S16	265-272	266.25	271.75
-	S17	272-279	273.25	278.75
-	S18	279-286	280.25	285.75
-	S19	286-293	287.25	292.75
-	S20	293-300	294.25	299.75
-	S21	302-310	303.25	308.75
	to			
-	S41	462-470	463.25	468.75

NOTE

S21-S41 spacing is 8 Mhz

**Table 9-3.
Channel Identification Plan
PAL-B/G Cable
CCIR S Channels**

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
IF	-	33.15-40.15	38.9	33.4
L2)	S1	104-111	105.25	110.75
-	S2	111-118	112.25	117.75
-	S3	118-125	119.25	124.75
-	S4	125-132	126.25	131.75
-	S5	132-139	133.25	138.75
-	S6	139-146	140.25	145.75
-	S7	146-153	147.25	152.75
-	S8	153-160	154.25	159.75
-	S9	160-167	161.25	166.75
-	S10	167-174	168.25	173.75
U2)	S11	230-237	231.25	236.75
-	S12	237-244	238.25	243.75
-	S13	244-251	245.25	250.75
-	S14	251-258	252.25	257.75
-	S15	258-265	259.25	264.75
-	S16	265-272	266.25	271.75
-	S17	272-279	273.25	278.75
-	S18	279-286	280.25	285.75
-	S19	286-293	287.25	292.75
-	S20	293-300	294.25	299.75
-	S21	300-307	301.25	306.75
	to			
-	S44	461-468	462.25	467.75

NOTE

S21-S44 spaced at 7Mhz

Table 9-4.
Channel Identification Plan
Standard G, H, I, K, L
(CCIR Standard 8 MHz)
UHF Channels

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)		
-	-	-	-	*G, H*	*I*	*K, L*
IF	same as VHF for corresponding country					
IV	21	470-478	471.25	476.75	477.25	477.75
-	22	478-486	479.25	484.75	485.25	485.75
-	23	486-494	487.25	492.75	493.25	493.75
-	24	494-502	495.25	500.75	501.25	501.75
-	25	502-510	503.25	508.75	509.25	509.75
-	26	510-518	511.25	516.75	517.25	517.75
-	27	518-526	519.25	524.75	525.25	525.75
-	28	526-534	527.25	532.75	533.25	533.75
-	29	534-542	535.25	540.75	541.25	541.75
-	30	542-550	543.25	548.75	549.25	549.75
-	31	550-558	551.25	556.75	557.25	557.75
-	32	558-566	559.25	564.75	565.25	565.75
-	33	566-574	567.25	572.75	573.25	573.75
-	34	574-582	575.25	580.75	581.25	581.75
-	35	582-590	583.25	588.75	589.25	589.75
-	36	590-598	591.25	596.75	597.25	597.75
-	37	598-606	599.25	604.75	605.25	605.75

**Table 9-4.
Channel Identification Plan
Standard G, H, I, K, L
(CCIR Standard 8 MHz)
UHF Channels (continued)**

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)		
V	38	606-614	607.25	612.75	613.25	613.75
-	39	614-622	615.25	620.75	621.25	621.75
-	40	622-630	623.25	628.75	629.25	629.75
-	41	630-638	631.25	636.75	637.25	637.75
-	42	638-646	639.25	644.75	645.25	645.75
-	43	646-654	647.25	652.75	653.25	653.75
-	44	654-662	655.25	660.75	661.25	661.75
-	45	662-670	663.25	668.75	669.25	669.75
-	46	670-678	671.25	676.75	677.25	677.75
-	47	678-686	679.25	684.75	685.25	685.75
-	48	686-694	687.25	692.75	693.25	693.75
-	49	694-702	695.25	700.75	701.25	701.75
-	50	702-710	703.25	708.75	709.25	709.75
-	51	710-718	711.25	716.75	717.25	717.75
-	52	718-726	719.25	724.75	725.25	725.75
-	53	726-734	727.25	732.75	733.25	733.75
-	54	734-742	735.25	740.75	741.25	741.75
-	55	742-750	743.25	748.75	749.25	749.75
-	56	750-758	751.25	756.75	757.25	757.75
-	57	758-766	759.25	764.75	765.25	765.75
-	58	766-774	767.25	772.75	773.25	773.75
-	59	774-782	775.25	780.75	781.25	781.75
-	60	782-790	783.25	788.75	789.25	789.75
-	61	790-798	791.25	796.75	797.25	797.75
-	68	846-854	847.25	852.75	853.25	853.75
-	69	854-862	855.25	860.75	861.25	861.75

Table 9-5.
Channel Identification Plan
Standard M (8 MHz)
B Channels

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
M1	114-122	115.25	120.75
M2	122-130	123.25	128.75
M3	130-138	131.25	136.75
M4	138-146	139.25	155.75
M5	146-154	147.25	152.75
M6	154-162	155.25	160.75
M7	162-170	163.25	168.75

Table 9-6.
Channel Identification Plan
Standard B (8 MHz)|B Channels

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
B1	230-238	231.25	236.75
B2	254-262	255.25	260.75
B3	262-270	263.25	268.75
B4	270-278	271.25	276.75
B5	278-286	279.25	284.75
B6	286-294	287.25	292.75
B7	294-302	295.25	300.75

Table 9-7. Channel Identification Plan Standard B (7 MHz) Australia VHF Channels

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
IF	-	33.15-40.15	38.9	33.4
I	0	45-52	46.25	51.75
-	1	56-63	57.25	62.75
-	2	63-70	64.25	69.75
(II)	3	85-92	86.25	91.75
-	4	94-101	95.25	100.75
-	5	101-108	102.25	107.75
III	6	174-181	175.25	180.75
-	7	181-188	182.25	187.75
-	8	188-195	189.25	194.75
-	9	195-202	196.25	201.75
-	10	208-215	209.25	214.75
-	11	215-222	216.25	221.75

Table 9-8. Channel Identification Plan Standard G (8 MHz) Australia UHF Channels

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
IV	21	470-478	471.25	476.75
-	22	478-486	479.25	484.75
-	23	486-494	487.25	492.75
-	24	494-502	495.25	500.75
-	25	502-510	503.25	508.75
-	26	510-518	511.25	516.75
-	27	518-526	519.25	524.75

**Table 9-9.
Channel Identification Plan
Standard B (7 MHz) Australia
UHF Channels**

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
IV	28	526-533	527.25	532.75
-	29	533-540	534.25	539.75
-	30	540-547	541.25	546.75
-	31	547-554	548.25	553.75
-	32	554-561	555.25	560.75
-	33	561-568	562.25	567.75
-	34	568-575	569.25	574.75
-	35	575-582	576.25	581.75
-	36	582-589	583.25	588.75
-	37	589-596	590.25	595.75
-	38	596-603	597.25	602.75
-	39	603-610	604.25	609.75
-	40	610-617	611.25	616.75
-	41	617-624	618.25	623.75
-	42	624-631	625.25	630.75
-	43	631-638	632.25	637.75
-	44	638-645	639.25	644.75
-	45	645-652	646.25	651.75
-	46	652-659	653.25	658.75
-	47	659-666	660.25	665.75
-	48	666-673	667.25	672.75
-	49	673-680	674.25	679.75
-	50	680-687	681.25	686.75
-	51	687-694	688.25	693.75
-	52	694-701	695.25	700.75
-	53	701-708	702.25	707.75
-	54	708-715	709.25	714.75

**Table 9-9.
Channel Identification Plan
Standard B (7 MHz) Australia
UHF Channels (continued)**

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
IV	55	715-722	716.25	721.75
-	56	722-729	723.25	728.75
-	57	729-736	730.25	735.75
-	58	736-743	737.25	742.75
-	59	743-750	744.25	749.75
-	60	750-757	751.25	756.75
-	61	757-764	758.25	763.75
-	62	764-771	765.25	770.75
-	63	771-778	772.25	777.75
-	64	778-785	779.25	784.75
-	65	785-792	786.25	791.75
-	66	792-799	793.25	798.75
-	67	799-806	800.25	805.75
-	68	806-813	807.25	812.75
-	69	813-820	814.25	819.75

Table 9-10.
Channel Identification Plan
OIRT SECAM-D/K (8 MHz)

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
TV-I	1	48.5-56.5	49.75	56.25
-	2	58.0-66.0	59.25	65.75
TV-II	3	76.0-84.0	77.25	83.75
-	4	84.0-92.0	85.25	91.75
-	5	92.0-100	93.25	99.75
TV-III	6	174-182	175.25	181.75
-	7	182-190	183.25	189.75
-	8	190-198	191.25	197.75
-	9	198-206	199.25	205.75
-	10	206-214	207.25	213.75
-	11	214-222	215.25	221.75
-	12	222-230	223.25	229.75
TV-IV	21	470-478	471.25	477.75
-	22	478-486	479.25	485.75
-	23	486-494	487.25	493.75
-	24	494-502	495.25	501.75
-	25	502-510	503.25	509.75
-	26	510-518	511.25	517.75
-	27	518-526	519.25	525.75
-	28	526-534	527.25	533.75
-	29	534-542	535.25	541.75
-	30	542-550	543.25	549.75
-	31	550-558	551.25	557.75
-	32	558-566	559.25	565.75
-	33	566-574	567.25	573.75
-	34	574-582	575.25	581.75
-	35	582-590	583.25	589.75
-	36	590-598	591.25	597.75
-	37	598-606	599.25	605.75
-	38	606-614	607.25	613.75
-	39	614-622	615.25	621.75

**Table 9-10.
Channel Identification Plan
OIRT SECAM-D/K (8 MHz) (continued)**

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
TV-V	40	622-630	623.25	629.75
-	41	630-638	631.25	637.75
-	42	638-646	639.25	645.75
-	43	646-654	647.25	653.75
-	44	654-662	655.25	661.75
-	45	662-670	663.25	669.75
-	46	670-678	671.25	677.75
-	47	678-686	679.25	685.75
-	48	686-694	687.25	693.75
-	49	694-702	695.25	701.75
-	50	702-710	703.25	709.75
-	51	710-718	711.25	717.75
-	52	718-726	719.25	725.75
-	53	726-734	727.25	733.75
-	54	734-742	735.25	741.75
-	55	742-750	743.25	749.75
-	56	750-758	751.25	757.75
-	57	758-766	759.25	765.75
-	58	766-774	767.25	773.75
-	59	774-782	775.25	781.75
-	60	782-790	783.25	789.75
-	61	790-798	791.25	797.75
-	62	798-806	799.25	805.75
-	63	806-814	807.25	813.75
-	64	814-822	815.25	821.75
-	65	822-830	823.25	829.75
-	66	830-838	831.25	837.75
-	67	838-846	839.25	845.75
-	68	846-854	847.25	853.75
-	69	854-862	855.25	861.75

**Table 9-10.
Channel Identification Plan
OIRT SECAM-D/K (8 MHz) (continued)**

Band	Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
TV-V	70	862-870	863.25	869.75
-	71	870-878	871.25	877.75
-	72	878-886	879.25	885.75
-	73	886-894	887.25	893.75
-	74	894-902	895.25	901.75
-	75	902-910	903.25	909.75
-	76	910-918	911.25	917.75
-	77	918-926	919.25	925.75
-	78	926-934	927.25	933.75
-	79	934-942	935.25	941.75
-	80	942-950	943.25	949.75

**Table 9-11.
Channel Identification Plan
OIRT A SECAM-D/K (8 MHz)**

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
A1	110-118	111.25	117.75
A2	118-126	119.25	125.75
A3	126-134	127.25	133.75
A4	134-142	135.25	141.75
A5	142-150	143.25	149.75
A6	150-158	151.25	157.75
A7	158-166	159.25	165.75
A8	166-174	167.25	173.75

**Table 9-12.
Channel Identification Plan
OIRT F SECAM-D/K (8 MHz)**

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
F1	230-238	231.25	237.75
F2	238-246	239.25	245.75
F3	246-254	247.25	253.75
F4	254-262	255.25	261.75
F5	262-270	263.25	269.75
F6	270-278	271.25	277.75
F7	278-286	279.25	285.75
F8	286-294	287.25	293.75
F9	294-302	295.25	301.75

Table 9-13.
Channel Identification Plan
CHINA SECAM-D/K (8 MHz)

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
DS-1	48.5-56.5	49.75	56.25
DS-2	56.5-64.5	57.75	64.25
DS-3	64.5-72.5	65.75	72.25
DS-4	76-84	77.25	83.75
DS-5	84-92	85.25	91.75
Z-1	111-119	112.25	118.75
Z-2	119-127	120.25	126.75
Z-3	127-135	128.25	134.75
Z-4	135-142	136.25	142.75
Z-5	142-151	144.25	150.75
Z-6	151-159	152.25	158.75
Z-7	159-167	160.25	166.75
DS-6	167-175	168.25	174.25
DS-7	175-183	176.25	182.75
DS-8	183-191	184.25	190.75
DS-9	191-199	192.25	198.75
DS-10	199-207	200.25	206.75
DS-11	207-215	208.25	214.75
DS-12	215-223	216.25	222.75
Z-8	223-231	224.25	230.75
Z-9	231-239	232.25	238.75
Z-10	239-247	240.25	246.75
Z-11	247-255	248.25	254.75
Z-12	255-263	256.25	262.75
Z-13	263-271	264.25	270.75
Z-14	271-279	272.25	278.75
Z-15	279-287	280.25	286.75
Z-16	287-295	288.25	294.75
Z-17	295-303	296.25	302.75
Z-18	303-311	304.25	310.75

**Table 9-13.
Channel Identification Plan
CHINA SECAM-D/K (8 MHz) (continued)**

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
Z-19	311-319	312.25	318.75
Z-20	319-327	320.25	326.75
Z-21	327-335	328.75	334.75
Z-22	335-343	336.25	342.75
Z-23	343-351	344.25	350.75
Z-24	351-359	352.25	358.75
Z-25	359-367	360.25	366.75
Z-26	367-375	368.25	374.75
Z-27	375-383	376.25	382.75
Z-28	383-391	384.25	390.75
Z-29	391-399	392.25	398.75
Z-30	399-407	400.25	406.75
Z-31	407-415	408.25	414.75
Z-32	415-423	416.25	422.75
Z-33	423-431	424.25	430.75
Z-34	431-439	432.25	438.75
Z-35	439-447	440.25	446.75
Z-36	447-455	448.25	454.75
Z-37	455-463	456.25	462.75
DS-13	470-478	471.25	477.75
DS-14	478-486	479.25	485.75
DS-15	486-494	487.25	493.75
DS-16	494-502	495.25	501.75
DS-17	502-510	503.25	509.75
DS-18	510-518	511.25	517.75
DS-19	518-526	519.25	525.75
DS-20	526-534	527.25	533.75
DS-21	534-542	535.25	541.75
DS-22	542-550	543.25	549.75

**Table 9-13.
Channel Identification Plan
CHINA SECAM-D/K (8 MHz) (continued)**

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
DS-23	550-558	551.25	557.75
DS-24	558-566	559.25	565.75
DS-25	606-614	607.25	613.75
DS-26	614-622	615.25	621.75
DS-27	622-630	623.25	629.75
DS-28	630-638	631.25	637.75
DS-29	638-646	639.25	645.75
DS-30	646-654	647.25	653.75
DS-31	654-662	655.25	661.75
DS-32	662-670	663.25	669.75
DS-33	670-678	671.25	677.75
DS-34	678-686	679.25	685.75
DS-35	686-694	687.25	693.75
DS-36	694-702	695.25	701.75
DS-37	702-710	703.25	709.75
DS-38	710-718	711.25	717.75
DS-39	718-726	719.25	725.75
DS-40	726-734	727.25	733.75
DS-41	734-742	735.25	741.75
DS-42	742-750	743.25	749.75
DS-43	750-758	751.25	757.75
DS-44	758-766	759.25	765.75
DS-45	766-764	767.25	773.75
DS-46	774-782	775.25	781.75
DS-47	782-790	783.25	789.75
DS-48	790-798	791.25	797.75
DS-49	798-806	799.25	805.75
DS-50	806-814	807.25	813.75
DS-51	814-822	815.25	821.75

**Table 9-13.
Channel Identification Plan
CHINA SECAM-D/K (8 MHz) (continued)**

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
DS-52	822-830	823.25	829.75
DS-53	830-838	831.25	837.75
DS-54	838-846	839.25	845.75
DS-55	846-854	847.25	853.75
DS-56	854-862	855.25	861.75
DS-57	862-870	863.25	869.75
DS-58	870-878	871.25	877.75
DS-59	878-886	879.25	885.75
DS-60	886-894	887.25	893.75
DS-61	894-902	895.25	901.75
DS-62	902-910	903.25	909.75
DS-63	910-918	911.25	917.75
DS-64	910-918	919.25	925.75
DS-65	918-926	927.25	933.75
DS-66	926-934	935.25	941.75
DS-67	934-942	943.25	949.75
DS-68	942-958	951.25	957.75

**Table 9-14.
Channel Identification Plan
POLAND SECAM-D/K (8 MHz)**

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
1	48-56	48.75	55.25
2	56-64	56.75	63.25
3	64-72	64.75	71.25
4	78.5-86.5	79.25	85.75
5	86.5-94.5	87.25	93.75
6	94.5-102.5	95.25	101.75
7	102.5-110.5	103.25	109.75
8	110.5-118.5	111.25	117.75
9	118.5-126.5	119.25	125.75
10	126.5-134.5	127.25	133.75
11	134.5-142.5	135.25	141.75
12	142.5-150.5	143.25	149.75
13	150.5-158.5	151.25	157.75
14	158.5-166.5	159.25	165.75
15	166.5-174.5	167.25	173.75
16	174.5-182.5	175.25	181.75
17	182.5-190.5	183.25	189.75
18	190.5-198.5	191.25	197.75
19	198.5-206.5	199.25	205.75
20	206.5-214.5	207.25	213.75
21	214.5-222.5	215.25	221.75
22	222.5-230.5	223.25	229.75
23	230.5-238.5	231.25	237.75
24	238.5-246.5	239.25	245.75
25	246.5-254.5	247.25	253.75
26	254.5-262.5	255.25	261.75
27	262.5-270.5	263.25	269.75
28	270.5-278.5	271.25	277.75
29	278.5-286.5	279.25	285.75
30	286.5-294.5	287.25	293.75
31	294.5-302.5	295.25	301.75

**Table 9-14.
Channel Identification Plan
POLAND SECAM-D/K (8 MHz) (continued)**

Channel	Channel Limits (MHz)	Vision Carrier (MHz)	Sound Carrier (MHz)
32	302.5-310.5	303.25	309.75
33	310.5-318.5	311.25	325.75
34	318.5-326.5	319.25	325.75
35	326.5-334.5	327.25	333.75
36	334.5-342.5	335.25	341.75
37	342.5-350.5	343.25	349.75
38	350.5-358.5	351.25	357.75
39	358.5-366.5	359.25	365.75
40	366.5-374.5	367.25	373.75
41	374.5-382.5	375.25	381.75
42	382.5-390.5	383.25	389.75
43	390.5-398.5	391.25	397.75
44	398.5-406.5	399.25	405.75
45	406.5-414.5	407.25	413.75
46	414.5-422.5	415.25	421.75
47	422.5-430.5	423.25	429.75
48	430.5-438.5	431.25	437.75
49	438.5-446.5	439.25	445.75
50	446.5-454.5	447.25	453.75
51	454.5-462.5	455.25	461.75
52	462.5-470.5	463.25	469.75
53	470.5-478.5	471.25	477.75
54	478.5-486.5	479.25	485.75
55	486.5-494.5	487.25	493.75
56	494.5-502.5	495.25	501.75
57	502.5-510.5	503.25	509.75
58	510.5-518.5	511.25	517.75
59	518.5-526.5	519.25	525.75
60	526.5-534.5	527.25	533.75
61	534.5-542.5	535.25	541.75
62	542.5-550.5	543.25	549.75

Channel Survey Map

The following channel survey map is intended to be used as a test aid. Line numbers of quiet lines and test signals should be documented for each channel in your system. This is especially useful when creating test plans in system measurement mode.

Make photocopies of a blank channel survey map and enter the line numbers and channel numbers corresponding to your system. Use the channel measurement mode of operation to gather this information by conducting the individual tests, noting where the proper test signals are found.

Channel Number		Line Number				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Channel Survey Map

Channel Number		Line Number				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Channel Number		Line Number				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Channel Survey Map

Channel Number		Line Number				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Channel Number		Line Number				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Channel Survey Map

Channel Number		Line Number				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Channel Number		**Line Number**				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Channel Survey Map

Channel Number		Line Number				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Channel Number		Line Number				
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					
	Odd Even					

Glossary

Glossary

active function

The active function is the instrument's feature currently selected for use. It may be a key selection or remote-programming command.

active function readout

The area of a display screen where the active function and its state are displayed. The active function is the one that was completed by the last key selection or remote-programming command.

active marker

The marker on a trace that can be repositioned by front-panel controls or programming commands.

active trace

The trace (commonly A, B, or C) that is being swept (updated) with incoming signal information.

amplitude accuracy

The general uncertainty of an analyzer amplitude measurement, whether relative or absolute.

ASCII

The acronym for American Standard Code for Information Interchange. It is an eight-part code (7 bits plus parity check) used for data (information) interchange. An ASCII value is a specific combination of bits ranging from 0 to 255 that represent characters in machine language that computers and controllers can understand.

attenuation

A general term used to denote a decrease of signal magnitude in transmission from one point to another. Attenuation may be expressed as a scalar ratio of the input to the output magnitude in decibels.

auxiliary interface

An analyzer rear-panel connector that provides control lines and power for external equipment. The auxiliary interface contains control lines A and B. The voltage levels of control lines A and B are changed by some of the HP 85721A's tests.

bandwidth selectivity

This is a measure of the analyzer's ability to resolve signals unequal in amplitude. It is the ratio of the 60 dB bandwidth to the 3 dB bandwidth for a given resolution filter (IF). Bandwidth selectivity tells us how steep the filter skirts are. Bandwidth selectivity is sometimes called shape factor.

battery-backed RAM

Random access memory (RAM) data retained by a battery. RAM memory cards can contain data that is maintained with a battery. Refer also to nonvolatile memory.

baud rate

A rate of transmission that is measured as signal events per time period. The baud rate is equal to or greater than bits per second, since one bit can consist of more than one signal event.

card reader

See memory card.

carrier-to-noise ratio

The ratio of the amplitude of the carrier to the noise power in the portion of the spectrum occupied by the carrier. Also referred to as the C/N ratio.

CATV

Abbreviation for community antenna television or cable television system. A cable television system is a broadband communications system that provides multiple channels from centralized antennas.

character set

The set of elementary symbols. These normally include both alpha and numeric codes, plus punctuation or any other symbol that may be read, stored, or written and used for organization, control, or representation of data.

chroma/luma delay inequality

This is the time delay between the low frequency luminance component and the high frequency chrominance component of the 12.5T pulse in the test signal. Positive chroma/luma delay is when chroma lags luma in time.

command

A set of instructions that are translated into instrument actions. The actions are usually made up of individual steps that together can execute an operation. Generally, for analyzers it is a sequence of code that controls some operation of an analyzer. These codes can be keyed in via a controller, or computer. Refer also to **function**.

composite second order beat

Composite second order beat (CSO) is the ratio of the composite second order beat products to the peak level of the visual carrier. For a system using the standard tune configuration, the composite second order beat products are the distortion products that occur at ±750 kHz and ±1.25 MHz around the visual carrier.

composite triple beat

Composite triple beat (CTB) is the ratio of the composite triple beat products to the peak level of the visual carrier. The composite triple beat products are distortion products that occur at the visual carrier frequency.

continuous sweep mode

The analyzer condition where traces are automatically updated each time trigger conditions are met.

CSO

Refer to **composite second order beat**.

CTB

Refer to **composite triple beat**.

current trace

The displayed trace on the analyzer screen.

default

The preset conditions, options, or parameters of an instrument. The default state may be changed by choosing key selections or writing programming commands to use other conditions.

delta marker

An analyzer mode in which a fixed reference marker is established, then a second active marker becomes available so it can be placed anywhere along the trace. A readout indicates the relative frequency separation and amplitude difference between the reference and active markers.

depth of modulation

Measures the percentage of amplitude modulation on the video carrier between the horizontal synchronization-pulse and the vertical interval test signal white level.

differential gain

This is the change in amplitude of the chrominance subcarrier as the luminance changes from a blanking level towards white level.

differential phase

This is the maximum peak-to-peak change in phase of the chrominance subcarrier as the luminance changes from a blanking level towards white level.

display dynamic range

The maximum dynamic range over which both the larger and smaller signal can be viewed simultaneously on the display. For analyzers with a maximum logarithmic display of 10 dB/division, the actual dynamic range may be greater than the display dynamic range. Refer also to **dynamic range**.

display fidelity

The measurement uncertainty of relative differences in amplitude on an analyzer. On purely analog analyzers (those analyzers that display trace information immediately and do not store, then recall the data to the screen), these differences are displayed on the screen and the graticule is used to evaluate the measurement. Many analyzers with digital displays (refer to digital display) have markers that can be used to measure the signal. As a result, measurement differences are stored in memory, and the ambiguity of the display is eliminated from the measurement.

DLP

The abbreviation for downloadable program. A single programming command or a sequence of programming commands used to perform specific operations. DLPs can be made up of several functions, variables, and traces defined by the program creator. The DLP can be downloaded from one electronic storage medium into another and executed without a controller.

dynamic range

The power ratio (dB) between the smallest and largest signals simultaneously present at the input of an analyzer that can be measured with some degree of accuracy. Dynamic range generally refers to measurement of distortion or intermodulation products.

end-of-line (EOL) readings
Measurements taken at the last tap on the distribution cable.

error message
A message displayed on the screen indicating missing or failed hardware, improper user operation, or other conditions that require additional attention. Generally, the requested action or operation cannot be completed until the condition is resolved.

FFT
The abbreviation for fast Fourier transform. It is a mathematical operation performed on a time-domain signal to yield the individual spectral components that constitute the signal.

file
An electronic means of storing data. The data is stored as a collection of related records. The records are organized in a file.

firmware
An assembly made up of hardware and instruction code that are integrated to form a functional set that cannot be altered during normal operation. The instruction code, permanently installed in the circuitry of the instrument, is classified as ROM (read-only memory). The firmware determines the operating characteristics of the instrument or equipment. Each firmware version is identified by a revision code number, or date code.

FM deviation
Peak deviation of the audio FM signal of a cable TV channel.

frequency accuracy
The uncertainty with which the frequency of a signal or spectral component is indicated, either in an absolute sense or relative to some other signal or spectral component. Absolute and relative frequency accuracies are specified independently.

frequency range
The range of frequencies over which the analyzer performance is specified. The maximum frequency range of many microwave analyzers can be extended with the application of external mixers.

frequency resolution
The ability of an analyzer to separate closely spaced spectral components and display them individually. Resolution of equal amplitude components is determined by resolution bandwidth. Resolution of unequal amplitude signals is determined by resolution bandwidth and bandwidth selectivity.

frequency response
The peak-to-peak variation in the displayed signal amplitude over a specified center frequency range. Frequency response is typically specified in terms of ±dB relative to the value midway between the extremes. It also may be specified relative to the calibrator signal.

frequency span
The magnitude of the displayed frequency component. Span is represented by the horizontal axis of the display. Generally, frequency span is given as the total span across the full display. Some analyzers represent frequency span (scan width) as a per-division value.

frequency stability
Stability is the ability of a frequency component to remain unchanged in frequency or amplitude over short- and long-term periods of time. Stability refers to the local oscillator's ability to remain fixed at a particular frequency over time. The sweep ramp that tunes the local oscillator influences where a signal appears on the display. Any long-term variation in local oscillator frequency (drift) with respect to the sweep ramp causes a signal to shift its horizontal position on the display slowly. Shorter-term local oscillator instability can appear as random FM or phase noise on an otherwise stable signal.

front-panel key
Keys, typically labeled, located on the front panel of an instrument. The key labels identify the function the key activities. Numeric keys and step keys are two examples of front-panel keys.

full span
A mode of operation in which the analyzer scans the entire frequency band of an analyzer.

function
The action or purpose that a specific item is intended to perform or serve. The analyzer contains functions that can be executed via front-panel key selections, or through programming commands. The characteristics of

these functions are determined by the firmware in the instrument. In some cases, a DLP (downloadable program) execution of a function allows you to execute the function from front-panel key selections.

gain compression
The signal level at the input mixer of an analyzer where the displayed amplitude of the signal is a specific number of dB too low due just to mixer saturation. The signal level is generally specified for 1 dB or 0.5 dB compression and is usually between −3 dBm and −10 dBm.

gated measurements
The tests requiring Option 107 that allow carrier-to-noise, CSO, and in-channel frequency response measurements to be performed without disrupting service.

hard copy
Information or data printed onto paper as opposed to its being stored on disk or in the instrument's memory.

hardkeys
Pushbutton keys on the analyzer front panel that control frequency, span, amplitude, instrument state, markers, controls, and data functions.

harmonically related carriers
Harmonically related carriers (HRC), is a tune configuration where each video carrier is a multiple of 8 MHz. This configuration masks composite triple beat distortion by zero-beating the composite triple beat distortion with the video carriers.

HP-IB
The abbreviation for Hewlett-Packard Interface Bus. It is a Hewlett-Packard proprietary parallel interface that allows you to connect more than one device to a port on a computer or instrument. The HP-IB bus is also called the IEEE-488 bus.

HRC
See **harmonically related carriers**.

in-channel frequency response
Frequency response test that measures the flatness of an individual cable TV channel.

input attenuator

An attenuator (also called an RF attenuator) between the input connector and the first mixer of an analyzer. The input attenuator is used to adjust the signal level incident to the first mixer, and to prevent gain compression due to high-level or broadband signals. It is also used to set the dynamic range by controlling the degree of internally-generated distortion. For some analyzers, changing the input attenuator settings changes the vertical position of the signal on the display, which then changes the reference level accordingly. In Hewlett-Packard microprocessor-controlled analyzers, the IF gain is changed to compensate for changes in input attenuator settings. Because of this, the signals remain stationary on the display, and the reference level is not changed.

input impedance

The terminating impedance that the analyzer presents to the signal source. The nominal impedance for RF and microwave analyzers is usually 50 Ω. For some systems, such as cable TV, 75 Ω is standard. The degree of mismatch between the nominal and actual input impedance is called the VSWR (voltage standing wave ratio).

integer number

A whole number with no decimal or fractional part.

limit line

A test limit made up of a series of line segments, positioned according to frequency and amplitude within the analyzer's measurement range. Two defined limit lines may be displayed simultaneously. One sets an upper test limit, the other sets a lower test limit. Trace data can be compared with the limit lines as the analyzer sweeps. If the trace data exceeds either the upper or lower limits, the analyzer displays a message or sounds a warning, indicating that the trace failed the test limits.

limit-line file

The user-memory file that contains the limit-line table entries. Limit lines are composed of frequency and amplitude components that make up a trace array and this data is stored in the file. The limit-line file feature is available on analyzers that are capable of limit-line operation. Refer also to **limit line**.

limit-line table

The line segments of a limit line are stored in the limit-line table. The table can be recalled to edit the line segments, then restored in the limit-line file. Refer also to **limit line**.

log display
The display mode in which vertical deflection is a logarithmic function of the input-signal voltage. Log display is also referred to as logarithmic mode. The display calibration is set by selecting the value of the top graticule line (reference level), and scale factor in volts per division. On Hewlett-Packard analyzers, the bottom graticule line represents 0 volts for scale factors of 10 dB/division or more. The bottom division, therefore, is not calibrated for those analyzers. Analyzers with microprocessors allow reference level and marker values to be indicated in dBm, dBmV, dBμV, volts, and occasionally in watts. Nonmicroprocessor-based analyzers usually offer only one kind of unit, typically dBm.

marker
A visual indicator we can place anywhere along the displayed trace. A marker readout indicates the absolute value of the trace frequency and amplitude at the marked point. The amplitude value is displayed with the currently selected units.

maximum input level
The maximum signal power that may be safely applied to the input of an analyzer. Typically 1 W (−30 dBm) for Hewlett-Packard analyzers.

measurement range
The ratio, expressed in dB, of the maximum signal level that can be measured (usually the maximum safe input level) to the lowest achievable average noise level. This ratio is almost always much greater than can be realized in a single measurement. Refer also to **dynamic range**.

memory
A storage medium, device, or recording medium into which data can be stored and held until some later time, and from which the entire original data may be retrieved.

memory card
A small, credit-card-shaped memory device that can store data or programs. The programs are sometimes called personalities and give additional capabilities to your instrument. Typically, there is only one personality per memory card. Refer also to **personality**.

menu
The analyzer functions that appear on the display and are selected by pressing front-panel keys. These selections may evoke a series of other related functions that establish groups called menus.

modem
A device that enables a computer to interface with another computer or analyzer over the telephone connection. Modem is an acronym for modulator and demodulator.

non-interfering measurements
Measurements made without turning off modulation or the carrier (Option 107 required).

nonvolatile memory
Memory data that is retained in the absence of an ac power source. This memory is typically retained with a battery. Refer also to **battery-backed RAM**.

normalized reference level
An amplitude level representing 0 dB deviation from a calibrated system's response. It is obtained by subtracting the system's response from itself.

normalized reference position
The position on a network analyzer's display of the normalized reference level.

oven reference
An analyzer that has an oven reference has increased absolute frequency-reference accuracy because the internal oscillators are phase-locked to an internal precision-frequency reference.

parameter units
Standard units of measure, which include the following:

Measured Parameter	Unit Name	Unit Abbreviation
frequency	hertz	Hz
power level	decibel relative to milliwatts	dBm
power ratio	decibel	dB
voltage	volt	V
time	second	s
electrical current	ampere	A
impedance (resistance)	ohm	Ω

personality

Applications available on a memory card or other electronic media that extends the capability of an instrument for specific uses. Examples include digital radio personalities and cable TV personalities.

preamplifier

An external, low-noise-figure amplifier that improves system (preamplifier/ analyzer) sensitivity over that of the analyzer itself.

query

Any analyzer programming command having the distinct function of returning a response. These commands may end with a question mark (?). Query commands return information either to the computer or to the analyzer display.

quiet line

A horizontal line with no video modulation used when performing non-interfering measurements of carrier-to-noise and CSO.

random-access memory

RAM (random-access memory) or read-write memory, is a storage area allowing access to any of its storage locations. Data can be written to or retrieved from RAM, but data storage is only temporary. When the power is removed, the information disappears. User-generated information appearing on a display is RAM data.

read-only memory

ROM (read-only memory) that is encoded into the analyzer's firmware. The data can be accessed (read) only; it cannot be altered by the user.

real number

A positive or negative number with both a decimal and a fractional part.

reference level

The calibrated vertical position on the display used as a reference for amplitude measurement in which the amplitude of one signal is compared with the amplitude of another regardless of the absolute amplitude of either.

reference trace

The trace previously taken and later compared to the currently displayed trace. For example, a trace taken at the headend for system frequency response measurements.

resolution

Refer to **frequency resolution**.

resolution bandwidth

The ability of an analyzer to display adjacent responses discretely (hertz, hertz decibel down). This term is used to identify the width of the resolution bandwidth filter of an analyzer at some level below the minimum insertion-loss point (maximum deflection point on the display). The 3 dB resolution bandwidth is specified; for others, it is the 6 dB resolution bandwidth.

RS-232

A means of communication between devices, such as printers, plotters, computers, modems, and analyzers. (The devices need to have RS-232 interfaces). Unlike the HP-IB interface bus, the RS-232 interface bus is used for serial (not parallel) transmission.

scale factor

The per-division calibration of the vertical axis of the display.

scrambled

To alter an electronic signal so that a decoding device is necessary to receive the signal.

shape factor

Refer to **bandwidth selectivity**.

single-sweep mode

The analyzer sweeps once when trigger conditions are met. Each sweep is initiated by pressing an appropriate front-panel key, or by sending a programming command.

softkey

Key labels displayed on a screen or monitor that are activated by mechanical keys surrounding the display or located on a keyboard. Softkey selections usually evoke menus that are written into the program software. Front-panel key selections determine which menu (set of softkeys) appears on the display.

sound carrier

The carrier that has the audio portion of a television channel. A television channel usually contains both a visual and sound carrier. An sound carrier is sometimes referred to as an audio carrier.

span

Span equals the stop frequency minus the start frequency. The span setting determines the horizontal-axis scale of the analyzer display.

span accuracy

The uncertainty of the indicated frequency separation of any two signals on the display.

spectrum analyzer

A device that effectively performs a Fourier transform and displays the individual spectral components (sine waves) that constitute a time-domain signal.

stop/start frequency

Terms used in association with the stop and start points of the frequency measurement range. Together they determine the span of the measurement range.

sweep time

The time it takes the local oscillator to tune across the selected span. Sweep time directly affects how long it takes to complete a measurement. It does not include the dead time between the completion of one sweep and the start of the next. It is usually a function of frequency span, resolution bandwidth, and video bandwidth. Resolution affects sweep time in that the IF filters are band-limited circuits requiring finite times to charge and discharge. The amount of time the mixing product remains in the IF filter passband is directly proportional to the bandwidth; inversely proportional to the sweep in Hz per unit of time. The rise time of a filter is inversely proportional to its bandwidth, and if the proportionality constant "k" is included, then we can make the rise time equal the "k" divided by resolution bandwidth. Mathematically, this is represented as:

$$Time\ in\ Passband = \frac{resolution\ bandwidth}{(spansweep\ time)}$$

$$= \frac{(resolution\ bandwidth \times sweep\ time)}{span}$$

$$Rise\ Time = \frac{k}{resolution\ bandwidth}$$

Solving for sweeptime:

$$Sweep\ Time = \frac{k \times span}{resolution\ bandwidth^2}$$

synchronization pulse

A transmitted pulse that is used to synchronize the electron beam of a picture monitor with the modulation of the transmission source.

syntax

The grammar rules that specify how commands must be structured for an operating system, programming language, or applications.

system frequency response

Frequency response test that measures the flatness of the entire system.

trace

A trace is made up of a series of data points containing frequency and amplitude information. The series of data points is often referred to as an array. Traces A, B, and C are the typical names of traces that the analyzer displays. The number of traces is specific to the instrument.

units

Dimensions on the measured quantities. Units usually refer to amplitude quantities because they can be changed. In analyzers with microprocessors, available units are dBm (dB relative to 1 mW dissipated in the nominal input impedance of the analyzer), dBmV (dB relative to 1 mV), dBμV (dB relative to 1 μV), volts, and, in some analyzers, watts.

unscrambled
A signal that has not been scrambled. An unscrambled signal does not need a decoder to receive the signal correctly.

update
To make existing information current; to bring information up to date.

variable
A variable can be assigned a value. The value assigned to a variable can be changed.

vertical interval test signal
The vertical interval test signal (VITS) is a signal that may be included during the vertical blanking interval to permit in-service testing and adjustment of video transmission.

video
A term describing the output of an analyzer's envelope detector. The frequency range extends from 0 Hz to a frequency that is typically well beyond the widest resolution bandwidth available in the analyzer. However, the ultimate bandwidth of the video chain is determined by the setting of the video filter. Video is also a term describing the television signal composed of visual carriers/modulation.

video average
The digital averaging of analyzer trace information. It is available only on analyzers with digital displays. Each point on the display is averaged independently and the average is computed based on the number of sweeps selected by the user. The averaging algorithm applies a factor to the amplitude value of a given point on the current sweep ($1/n$, where n is the number of the current sweep); applies another factor to the previously stored average [$(n - 1/n)$]; and combines the two for a current average. After the designated number of sweeps are completed, the factors remain constant, and the display becomes a running average.

video bandwidth
The cut-off frequency (3 dB point) of an adjustable low-pass filter in the video circuit. When the video bandwidth is equal to or less than the resolution bandwidth, the video circuit cannot fully respond to the more rapid fluctuations of the output of the envelope detector. The result is a smoothing of the trace, or a reduction in the peak-to-peak excursion, of broadband signals such as noise and pulsed RF when viewed in

broadband mode. The degree of averaging or smoothing is a function of the ratio of the video bandwidth to the resolution bandwidth.

video filter

A post-detection, low-pass filter that determines the bandwidth of the video amplifier. It is used to average or smooth a trace. Refer also to **video bandwidth**.

visual carrier

The visual carrier is the portion of a television signal that contains the picture. A television signal contains both a visual and a sound carrier.

white level

The level of a visual carrier that corresponds to the maximum level of the white area for a picture signal.

zero span

The case in which an analyzer's local oscillator remains fixed at a given frequency so that the analyzer becomes a fixed-tuned receiver. In this state, the bandwidth is equal to the resolution bandwidth. Signal amplitude variations are displayed as a function of time. To avoid loss of signal information, the resolution bandwidth must be as wide as the signal bandwidth. To avoid any smoothing, the video bandwidth must be set wider than the resolution bandwidth.

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