

Introduction to New Features

of the

HP 8510C Revision 6.XX (Revisions 6.30 and Greater)



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Introduction to this Document

This is a quick introduction to new features of the revision 6.30 or greater firmware, first appearing in the HP 8510C. The presentation consists of keystroke sequences to execute the feature with explanation of the result and its impact on the measurement process. A working knowledge of the HP 8510 and basic familiarity with front panel operation is assumed, so only new features are explained. Demonstration sequences assume that you are using an HP 8510C (color display) executing firmware revision **C.06.30** or higher.

Turn Power On

There are now two line power switches. First turn on all other system instruments, then switch the LINE rocker switch on the bottom box to ON, then press the latching pushbutton LINE switch on the top box to ON. The self-test sequence will execute, the HP 8510 issues a device preset to instruments on the HP 8510 System Bus, then HP 8510 internal user-defined Instrument State 8 is recalled.

Since the previous user may have stored a personal favorite instrument state in register 8, the network analyzer may “wake up” making any possible measurement. In order to start this demonstration at a known state, let’s first do an initial set up.

Initial Setup

These steps simply set the HP 8510 to a known state in preparation for the following demonstrations. Because the previous user may have changed the predefined color assignments, press:



This sets the color assigned to each (**DISPLAY**) element to the factory-defined value.

Connect **Thru**

Connect Port 1 to Port 2.



Recalls factory-defined state.

FACTORY PRESET always initializes all System Bus instruments, then recalls the same factory-defined state. Elapsed time for **FACTORY PRESET** depends on the system configuration.



Now we are certain about the contents of Instrument State 8.

USER PRESET

Green key on bottom box.

The function of this key changes in the 6.0 firmware. Pressing this key recalls instrument State 8 but does not initialize system bus instruments. This sets the HP 8510 to a known state without disturbing devices connected to the system bus. Since instrument state 8 is defined by the user, it provides a convenient means to return the system to a state that you prefer.



Functions the same as **USER PRESET** (green key). This simple recall is faster than **FACTORY PRESET** and probably accomplishes the same purpose. You can save any Instrument State at any time in any of the 8 Instrument State memories. All eight instrument states are preserved in non-volatile memory,

The following steps guide a simple set of Response calibrations used later to show operating features of the HP 8510. As an alternative, perform a Pull **2-Port** or TRL **2-Port** calibration.

Connect Short at Port 1

S11
CAL
CAL 2 2.4 mm
CALIBRATE: RESPONSE
SHORT
DONE RESPONSE
CAL SET 1

Start S_{11} calibration.

(or any appropriate cal kit)

Correction Turns On, C appears.

Connect Thru

S21
LOG MAG
CAL
CAL 2 2.4 mm
CALIBRATE: RESPONSE
THRU
DONE RESPONSE
CAL SET 2

Start S_{21} calibration.

(or any appropriate cal kit)

Correction Turns On, C appears.

S_{12}

LOG MAG
CAL
CAL 2 2.4 mm
CALIBRATE: RESPONSE
THRU
DONE RESPONSE
CAL SET 3

Start S_{12} cal.

(or any appropriate cal kit).

Correction Turns On, C appears.

Connect Short at Port 2

S_{22}
LOG MAG
CAL
CAL 2 2.4 mm
CALIBRATE: RESPONSE
SHORT
DONE RESPONSE
CAL SET 4

Start S_{22} cal.

(or any appropriate cal kit).

Correction Turns On, C appears.

CAL

Switch parameters

CORRECTION ON label shows Cal Set.

Now we have:

S_{11} cal set 1,

S_{21} cal set 2,

S_{12} cal set 3, and

S_{22} cal set 4.

SAVE

INST. STATE 1

Select Channel

The HP 8510 uses two identical, independent data acquisition and processing channels.

CHANNEL 1

AUTO

CHANNEL 2

AUTO

Switch Channel

Switch Parameter

Each channel can acquire, process, and display data for either one parameter, or four parameters. Any parameter can be measured on either channel. If the channels are Coupled, then the data processing and display program can share data between the channels; if the channels are Uncoupled, then each channel acquires and processes data separately.

Display Modes

The HP 8510C provides two new DISPLAY modes, Four Parameter Split and Four Parameter Overlay. Each Channel can now measure and display either one or four parameters. The menu structure differs from the HP 8510B because the HP 8510B cannot produce the Four Parameter display.

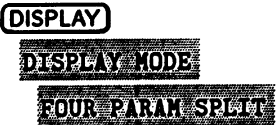


Switch Channel
Switch Parameter

FACTORY PRESET selects Single Parameter, in which the display shows the current parameter on the selected channel.

Four Parameter Displays

The Four Parameter Overlay and Split Displays show all four basic parameters of the selected channel.

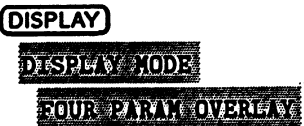


This selects the four parameter display on the current channel. In this split display, the parameters are plotted in the same relative position as the PARAMETER keys.

Select Each Parameter

Note the Selected Parameter indicator which is an arrow-type annotation near the parameter label. Press a Parameter key, then select and change its Format and Response settings.

(CAL)
Select Each Parameter CORRECTION ON label shows Cal Set.



All four basic parameters are plotted in an overlay format. Press a Parameter key, then select and change its Format and Response settings.

Dual Channel Display

The Dual Channel Overlay and Split displays are unchanged except for the menu labels.

CHANNEL 1
S21
CHANNEL 2
S12
DISPLAY
DISPLAY MODE
DUAL CHAN SPLIT

The Dual Channel Split and Dual Channel Overlay display modes show the selected measurement of a single parameter on both channels. To change the display of a channel, first select **CHANNEL 1** or **CHANNEL 2** then use the controls to set up the measurement for that channel. When Coupled Channels is selected, the Stimulus characteristics (Sweep Mode, Source Power, Number of Points, etc.) are always the same for both channels, but almost all other functions (Parameter/Format/Response and Display and Domain) can be set independently for each channel.

CHANNEL 1
CAL
Switch Channels
Switch Parameters
CHANNEL 1
S21
CHANNEL 2
S21
DOMAIN
TIME BAND PASS

CORRECTION ON label shows Cal Set.
Notice Test Set forward/reverse indicators.

Channel 1 displays the Frequency Domain response; Channel 2 displays the Time Low Pass Domain response. Either channel can independently display either the Frequency or the Time Domain.

Coupled and Uncoupled Channels

When Coupled Channels is selected, turning on a **cal** set applies the correction to that parameter on both channels. By selecting Uncoupled Channels you can, for instance, apply a different **2-Port** cal set to each channel. Uncoupled Channels can be used in any display mode. This **allows** many of the Stimulus functions, including frequency range and cal set assignments, to be set independently for each channel. Only certain of the Stimulus functions are always coupled (Sweep Mode and Number of Points).

CHANNEL 1

S₂₁

STIMULUS MENU MORE

UNCOUPLED CHANNELS

CHANNEL 2

(CAL)

CORRECTION OFF

DISPLAY

DISPLAY MODE

DUAL CHAN SPLIT

(CAL)

CORRECTION ON label shows the Cal Set.

Switch Channel

Switch Parameter

Correction is now On for Channel 1, S₂₁ and Off for Channel 2, S₂₁.

Alternate Sweep

The HP 8510 can alternately measure and display two different frequency ranges by selecting Uncoupled Channels with a Dual Channel display.

CHANNEL 2

STIMULUS MENU MORE

UNCOUPLED CHANNELS

START 2 G/n

STOP 10 G/n

DISPLAY

DISPLAY MODE

SINGLE PARAMETER

Shows Alternate Sweep

Select Single Parameter for Calibration

Connect Thru

Connect Port 1 to Port 2.

(CAL)

CAL 2 2.4 GHz

(or any appropriate cal kit).

CALIBRATE RESPONSE

THRU

DONE RESPONSE

CAL SET 5

Correction Turns On, C appears.

DISPLAY

DISPLAY MODE

DUAL CHAN SPLIT

CAL

CORRECTION ON label shows Cal Set.

Switch Channel

Switch Parameter

Because Uncoupled Channels allows different stimulus settings for each channel, the cal set assignments are also uncoupled.

Measurement Markers

A list of one to five measurement markers can now be displayed in the menu area. The **PRIOR MENU** key is used to control display of this Marker Value List. When a top level menu is displayed, pressing **PRIOR MENU** now causes display of the Marker Value List instead of blanking the menu area.

MARKER **MORE** **MORE**

MKR LIST ON

Select display of Marker Value List.

MARKER

Last Marker On, Value in Channel **ID** area.

PRIOR MENU

Marker Value List displayed in menu area.

PRIOR MENU or **MARKER**

Marker menu displayed.

MARKER 1, move Knob

MARKER 2, move Knob

MARKER 3, move Knob

Markers 1, 2, 3 displayed.

PRIOR MENU

Move Knob

PRIOR MENU

Back to Marker menu.

MARKER 4, move Knob

MARKER 5, move Knob

Five Marker List displayed.

PRIOR MENU

MARKER **MORE** **MORE**

MKR LIST OFF

MARKER	
PRIOR MENU	Marker Value List Not displayed.
MARKER MORE MORE	
MKR LIST ON , move Knob	Select display of Marker Value List.
MARKER , move Knob	
Select Marker, move Knob	Selected Marker moves.
PRIOR MENU , move knob	Selected Marker moves.
Change Parameter	Markers for Current Parameter displayed.
CHANNEL 2	Marker Value List displayed.

For all Single Parameter and Dual Channel displays, the Marker Value List shows the value of all On markers. In the Four Parameter displays, the Marker Value List can either be a list of all On markers or a list showing the value of the active marker on all four parameters.

DISPLAY	
DISPLAY MODE	
FOUR PARAM SPLIT	Channel 1, Four Parameter; Channel 2, Single Parameter.
PRIOR MENU	

Now the Marker Value List shows the value of the single active marker for each parameter. Select a different active marker.

CHANNEL 2	Single Parameter Marker Value List.
CHANNEL 1	Shows one Active marker for each parameter.
MARKER MORE MORE	
FOUR PARAM 5 MARKERS	
MKR LIST ON	Marker Value List shows all On markers.
MARKER	
MARKER 2	Select another Marker.
PRIOR MENU , use Knob	
Select Other Parameters	Marker remains Active.
MARKER MORE MORE	
FOUR PARAM 1 MARKER/	
MKR LIST ON	Select Four Parameter, 1 Marker/Parameter.
MARKER	
MARKER 3	
PRIOR MENU	
Use Knob to move Marker	

The one marker per parameter Marker Value List can only be selected for the four parameter displays.

Ramp and Step Sweep Modes

Operation of the HP 8510C when using the HP **8350-series** and HP 834x-series sources is not changed. Using the HP **8360-series** sources offers a very significant upgrade to the network analyzer system due to the improved data acquisition capability. In addition to improved frequency accuracy in the normal Ramp sweep mode and slightly improved speed in **the** Normal Step sweep mode, design synergism between the new dedicated HP **8360-series** source and the HP **8510C** provides a much faster fully-synthesized Quick Step sweep. The following steps show advantages of each of these sweep types with the HP **8360-series** sources.

STIMULUS MENU

RAMP

The Ramp mode remains the fastest data acquisition mode. Using the HP **8360-series** source, the first sweep learns the source/receiver Ramp tuning data. The second and following sweeps then have better frequency accuracy than the first sweep. Change the Start frequency to see this effect. This is why the data may change slightly from the first sweep to the second and subsequent sweeps.

SWEEP TIME

Change Sweep Time

Use the step keys and numeric entry to change the sweep time and USE (MEASUREMENT RESTART) to restart the sweep. (Rule for setting for Sweep Time: Start fastest then slow until device response no longer changes with slower sweep time.) The HP 8510 automatically selects the minimum recommended sweep time, unless increased by the user. In general, depending upon the frequency span, best ramp mode frequency accuracy and repeatability is achieved with sweep times from **300** to **500** milliseconds per sweep.

NUMBER of POINTS: 51

SWEEP TIME 0 x1

Note minimum Sweep Time selection. Increase Number of Points to see minimum sweep time for each number of points. The minimum sweep time value for a certain number of points depends on the system configuration.

STIMULUS MENU

STEP

With an HP **8360-series** source, the first sweep is relatively slow because the source and receiver are learning the source step tuning data. The second sweep is faster. Press:

DWELL TIME

Dwell time sets the interval between phase-lock at the measurement frequency and the **actual measurement**. Use the Step keys and numeric entry to see the effect of changing Dwell Time. (The rule for setting Dwell Time is the same as for Sweep Time: Start at 0 seconds, then increase dwell time until the device response no longer changes due to longer dwell time.) For most applications set the dwell time to 0 seconds

SYSTEM MORE

SYSTEM PHASELOCK

Notice the new keys, labeled **STEP TYPE: NORMAL** and **STEP TYPE: QUICK**. Only HP dedicated 8360-series sources can use Quick Step; a message will be displayed if your source cannot execute Quick Step. The following steps show differences between Normal and Quick. Press:

STEP TYPE: QUICK

DISPLAY

DISPLAY MODE

DUAL CHANNEL SPLIT

CHANNEL 1

S11

CHANNEL 2

S22

In Quick Step, measurements for the forward and the reverse parameters are taken on separate sweeps
(1 Group=2 Sweeps).

SYSTEM MORE

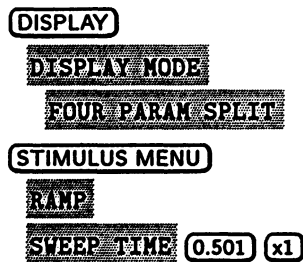
SYSTEM PHASELOCK

STEP TYPE: NORMAL

In Normal Step, measurements for the forward and the reverse parameters are taken on the same sweep
(1 Group=1 Sweep) unless Uncoupled Channels is selected.

Note: **LOCK SPEED FAST** should always be selected with HP 834x-series or HP 836x-series synthesized sweepers.

Now use the Four Parameter display to further visualize the data acquisition process.

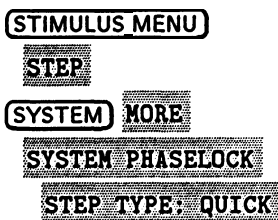


Ramp mode sweep times slower than 500 ms
cause display of a moving sweep indicator
at the bottom of the lower graticules.

The data acquisition cycle is the same for this Four Parameter display and when **2-Port** correction is turned On.



One parameter per sweep is measured, then the traces are updated on the last sweep (**1 Group = 4 Sweeps**).



The first sweep measures the forward parameters, then the second sweep measures the reverse parameters. The traces are updated on the second sweep (**1 Group = 2 Sweeps**).



All four parameters are measured and updated in a single sweep (**1 Group = 1 Sweep**).

In Ramp sweep, at the beginning of the sweep the source tunes to the lowest frequency, the receiver phaselocks, then the source is swept continuously from the lowest frequency to the highest frequency. When the source needs to switch bands, or the receiver needs to retune its local oscillator, the sweep is stopped, phaselock is reestablished, then the sweep is resumed. HP **8360-series** sources provide much-improved frequency accuracy **in Ramp sweep because the** source controls the measurement by issuing a measurement trigger when the source is at the appropriate frequency. For HP **8350-series** and HP 834x-series sources, the receiver monitors the **0-10V** sweep ramp output by the source to determine the appropriate measurement frequency.

Operation in Normal Step is unchanged. The source tunes to the new measurement frequency, the receiver achieves phase-lock, then all necessary measurements are made. Notice that in Normal Step, if four parameters are measured, the receiver is locked to the forward reference signal, the forward parameters are measured, then the receiver locks to the reverse reference, for measurement of the reverse parameters. This means that at each point, the receiver must

achieve phaselock twice at the measurement frequency. Select `LOCK SPEED FAST` for all HP synthesized sweepers.

In Quick Step, the source is tuned from one measurement frequency to the next in **small steps** allowing the receiver to track the source without breaking phaselock. This eliminates the need to break phaselock, then re-lock at every measurement frequency. Since the time required for the receiver to achieve phaselock is a major portion of the measurement cycle time for each point, this reduces the step sweep time considerably. Notice that the forward and reverse parameters are always measured on separate sweeps to avoid the loss of receiver phaselock when switching between forward and reverse reference signals. The result is that Quick Step sweeps are much faster than Normal Step sweeps with no penalty in the frequency accuracy and repeatability specifications.

Channel/Domain/Parameter/Format/Response Memory

Operation of the HP 8510 is simplified by this limited instrument state memory. This structure defines a hierarchal memory that lets you set the network analyzer up for your measurement, then return to the settings easily. In operation, when you select a Channel, the last Domain, Parameter, Format, and Response settings are automatically recalled. This extends downward so that when you select a Parameter, the last Format and Response settings for that parameter on that channel, in that domain, are automatically recalled. In revision 06.00 firmware, this memory hierarchy is extended so that **all** Response functions and the **Trace** Memory functions can now be set and saved independently for each parameter on each channel.

CHANNEL 1

S11

SMITH CHART

AUTO

S21

DELAY

AUTO

S12

PHASE

AUTO

S22

SMITH CHART

AUTO

Select each parameter

See that selecting the parameter recalls the last Format and Response settings for that parameter. Also notice the test set switching between the forward parameters, **S₁₁** and **S₂₁**, and the reverse parameters, **S₁₂** and **S₂₂**.

CHANNEL 2

Select each parameter

This shows how the format and response settings can be defined independently for each parameter on each channel, then are recalled by selecting the channel- and parameter. Now the appropriate Response functions are individually coupled to the Parameter instead of the Channel.

CHANNEL 1

RESPONSE MENU

AVERAGING ON/restart

SMOOTHING ON

ELECTRICAL DELAY

AUTO DELAY

PHASE OFFSET

MORE

MAGNITUDE SLOPE

MAGNITUDE OFFSET

COAXIAL DELAY, WAVEGUIDE DELAY

TABLE DELAY

Switch parameters to see effect.

Applies to all parameters on this channel.

Same

Applies only to selected parameter.

Same

Same

Same

Same

Same

Apply to both Channels.

Separate for each Channel

When you save an instrument state, all current settings, including the complete C/D/P/F/R limited instrument state, are saved.

Parameter-Dependent Trace Memory

Revision 6.0 and greater couples the display memory to the Parameter instead of to the Channel. Now, each memory display or trace math operation can be independent for each parameter.

CHANNEL 1

DISPLAY

Select Each Parameter

Observe the **DATA -> MEMORY** annotation. Now each basic parameter is assigned a separate **trace memory**. The Factory Preset condition is that Channel 1 parameters **S₁₁**, **S₂₁**, **S₁₂**, and **S₂₂** are assigned non-volatile memories 1-4, respectively.

(CHANNEL 2)

Select Each Parameter

Observe **DATA -> MEMORY** annotation. The Factory Preset condition is that Channel 2 parameters **S₁₁**, **S₂₁**, **S₁₂**, and **S₂₂** are assigned volatile (contents lost with power Off) memories 5-8, respectively. .

SELECT DEFAULTS

Switch channel

Switch parameter

Observe the **DEFAULT to MEMORY** annotation. Using the **MORE** key and the **PRIOR MENU** key, notice that any trace memory can be assigned to any basic parameter on either channel.

DISPLAY

DATA -> MEMORY

DISPLAY: DATA and MEMORY

Change port connection

For the standard memory and color assignments, the trace memory is displayed using a different color than the measurement trace. Notice the annotation following the parameter label. The parameter label shows the trace color and the following label shows the trace memory color.

PARAMETER MENU

Select User Parameter

Notice that the user parameters share memory assignments with the basic parameters: **S₁₁** with a1; **S₂₁** with b2; **S₁₂** with a2, and **S₂₂** with b1.

Parameter-Dependent Trace Math

Revision 6.0 couples the trace math to the parameter instead **of to the Channel. Now, each** parameter can display independent trace math operation.

MATH OPERATIONS

Change Channel

Change Parameter

Using the **MORE** key and the **PRIOR MENU** key, notice that any math operation can be **assigned to** any basic parameter on either channel. Note that the **DATA from CHANNEL 1** or **DATA from CHANNEL 2** selection applies only in either of the Dual Channel display modes.

Date/Time Display

The HP 8510C now shows the current date and time. It is displayed whenever a menu is not displayed. Press or **PRIOR MENU** until the menu area is blank or replaced by the marker value list, then the date/time display will appear. Set the time and date as follows.

SYSTEM

DISPLAY FUNCTIONS

DATE/TIME FUNCTIONS

DATE/TIME ON

DATE/TIME OFF

Press any **SET** softkey

(set date and time)

Date/Time displayed when menus Off.

Date/Time never displayed.

Shows date/time.

SET MINUTES, **x1** sets seconds to zero.

Hardcopy Measurement Results

The HP 8510C adds two fully buffered RS-232 ports to allow connection of hardcopy devices, and the revision 6.30 or greater firmware can support either a line printer, graphics plotter, or graphics printer.

COPY

PLOT TO PRINTER

Output to Graphics Printer

PLOT TO PLOTTER

Output to Digital Plotter

LIST TRACE VALUES

Output to Line Printer or Graphics Printer

These three choices select the output device. Plot to Printer selects output of the current CRT display to the graphics printer. Plot to Plotter selects output of the current CRT to a digital plotter. List Trace Values selects output of a formatted list of values to a line printer.

The measurement process halts until output to the buffer (RS-232 port) or device (HP-IB) is complete. A message such as PLOT COMPLETE is displayed, then the HP 8510 resumes the measurement process.

The hardcopy devices can be connected to the HP 8510 system bus. Connect the hardcopy device, then use the Local menu to identify the location of the device.

LOCAL MORE

ADDRESS of PRINTER HP-IB

8510 System Bus (not buffered)

RS-232 PORT #1

Larger memory buffer (400 kBytes)

RS-232 PORT #2

Smaller memory buffer (100 kBytes)

ADDRESS of PLOTTER HP-IB

RS-232 PORT #1

RS-232 PORT #2

Each RS-232 port is output-only and can accommodate a single device. If the Printer is connected to RS-232 port 2, then press **ADDRESS of PRINTER RS-232 PORT #2**. If the device is on the HP 8510 System Bus, press **ADDRESS of PRINTER HP-IB** and enter the printer address.

The Copy menu also lets you define certain details about the printing and plotting output.

COPY

DEFINE PRINT

Output to Graphics Printer.

DEFINE PLOT

Graphics Printer or Digital Plotter.

DEFINE LIST

Line Printer or Graphics Printer.

Use these menu structures to define the printing, plotting and list options.

Using an Internal or External Disc

The HP 8510C can store files to and load files from any standard DOS or LIF format disc on either the internal or external drive. It incorporates a built-in disc drive instead of the built-in tape drive of the HP 8510B. The HP 8510C built-in disc drive is used in exactly the same way as the external disc drive with the HP 8510B except that either LIF or DOS format discs may be used.

(DISC)

STORAGE is INTERNAL

STORAGE is EXTERNAL

If you select **STORAGE is EXTERNAL** then you must connect the disc drive to the HP 8510 system bus and define its HP-IB address using the Local menu.

To initialize a disc:

(DISC)

STORAGE is INTERNAL

STORAGE is EXTERNAL

SETUP DISC

INITIALIZE DOS DISC

For standard MS-DOS® format, or,

INITIALIZE LIF DISC

For standard HP Series 200/300 LIF format, then

INIT LIF or DOS? YES

The term DOS refers to the Disc Operating System used by most personal computers. The HP 8510 can only initialize using the DOS format on the Internal disc drive. The term LIF refers to the Logical Interchange Format which is the standard disc format used with HP Series 200/300 computers.

DIRECTORY

ASCII (CITIfile) and Binary file formats

A directory listing all files is shown

RESTORE DISPLAY

A notation at the bottom of the directory listing identifies the disc as either DOS or LIF format.

There is no longer a choice of storage using Binary or ASCII format. All Memory, Cal Set, Data, and Delay Table file types are stored using ASCII (CITIfile) format. Other file types are stored using Binary format. To store a disc file:

(DISC)

STORE

Directory of this file type is displayed.

(Select file type to store)

Directory of this file type is displayed.

(Enter File Name)

Use the knob to move the small up-arrow to the desired character, then press **SELECT LETTER**. When the name is complete, press **STORE FILE**. Notice that the file name for the last file to be stored is displayed, allowing you to use the **BACK SPACE** key and **SELECT LETTER** key to change the file name rather than entering the entire file name. To clear the file name, press **ERASE NAME**. To load a disc file:

DISC

LOAD

(Select file type to load)

Directory of this file type is displayed.

A directory listing all files of this type **●** is shown. Use the Knob or Step keys and move the box to the desired file name then press **LOAD FILE**.

Define Non-Standard Display Colors

The HP 8510C uses **16** predefined display colors out of the 4096 possible colors available. The appearance of each element of the display is defined as a specific combination of three attributes: Tint, the actual hue; Color, the percentage of tint; and Brightness, the relative intensity of the color.

DISPLAY

ADJUST DISPLAY

MODIFY COLORS

Select display element

Define color

You may select one of the **16** predefined colors for the current display element, or define a different color using the COLOR, TINT, and BRIGHTNESS functions.

SAVE COLORS

Save user-defined colors

DEFAULT COLORS

Recall factory predefined colors

RECALL COLORS

Recall user-defined colors

There are two sets of color memories, the User Colors memory and the Default Colors memory. Both color memories are part of the hardware state. When you select **SAVE COLORS**, the **current color assignments for each display** element are saved. You can switch back to the **standard colors** by pressing **DEFAULT COLORS**. Switch back to the factory predefined colors by pressing **RECALL COLORS**. Colors are not changed by **USER PRESET** or by **FACTORY PRESET**.

Test Port Power Flatness

This new feature is only available with HP **8360-series** sources. Within the leveled power limits of the source, it allows the user to select a value for constant power output versus frequency at the point at which the device under test will be connected. It is important to recognize that variations in loss versus frequency in the signal path between the source output and the test port are removed, but the power level will vary according to the impedance of the device under test because the source is leveled at its output, not the test port. The flatness calibration process consists of connecting a power meter to the point at which flat power is desired, then measuring the difference between the source leveled output power and the power meter reading. This difference is stored as an offset. When flatness is turned on, the source adds this offset to its set power level, thus achieving constant power level versus frequency at the test port (assuming constant device-under-test input impedance).

Detailed information on this feature is contained in HP Product Note 851046. The following is a general sequence for using the feature,

RECALL MORE
FACTORY PRESET

Set desired frequency range

In general, perform the procedure using the widest frequency range you will use in following tests. After the flatness calibration is performed, you can select any subset of this frequency range. Although the signal path loss is measured only at the specific points included in this calibration step, the system interpolates the loss at frequencies between the measured points.

STIMULUS MENU
NUMBER of POINTS
POINTS 51

More points require more time for the calibration. Because the signal path loss is interpolated between measured points, you may also perform the calibration using a frequency list with fewer points.

POWER MENU
POWER SOURCE 1 **0** **x1**

Do not exceed the maximum leveled power rating of the source during the calibration step. If the source power is set so that it becomes unleveled at any frequency, the offset value measured for that frequency will not be correct.

MORE
FLATNESS OFF
CALIBRATE FLATNESS

(Turn Flatness Off before starting.)

(Wait to complete)

Observe the power meter reading as each point is measured. The Message area of the CRT shows the percentage complete. Pressing any key will abort the calibration process.

FLATNESS ON

Turn Flatness On.

With Flatness On, the **POWER SOURCE 1** active function applies to the power at the test port, not the power at the source output. Now the maximum flat power available at the test port will depend upon the source maximum leveled power capabilities and the loss in the signal path. For example, if the source maximum leveled power over the current frequency range is +10 dBm and the loss in the signal path between the source output and the test port is 15 dB, then the maximum flat power available at the test port will be -5 dBm.

PRIOR MENU

PRIOR MENU

STEP

DWELL TIME 1.0 x1

Allows time for power meter.

Observe Power meter readings, should be Source 1 Power Value. The following steps provide a means to verify that the power is flat at the test port.

DISPLAY

DATA -> MEMORY

MATH (/)

RESPONSE MENU MORE

MAGNITUDE OFFSET

(Set to same as Source 1 Power)

MARKER

Compare Power Meter, Marker, Test Port Power.

STIMULUS MENU

RAMP

SWEEP TIME 0.5 x1

Change Source Power

The trace should change dB/dB if flatness is maintained.

Change Number of Points

Source interpolates between points.

Change Frequency Range

For frequencies outside the calibrated range, **POWER SOURCE 1** active function applies to power at the source output, not at the test port.

Frequency List

The **Frequency** List capability has not changed from revision 06.0, in that the frequency list can consist of up to 792 points. Note that frequency list always uses Normal Step.

Change Cal Type

There are applications in which it is not possible to use a **2-port** calibration for measurement because automatic switching of the test set cannot be tolerated when the device is connected. For these applications, it is typical to perform a 1-port calibration for the reflection parameters and response or response and isolation calibrations for the transmission parameters. There is a subset of these applications where the automatic switching can be tolerated during calibration, but not during the measurement. For these applications, the HP 8510C includes the new Change Cal Type feature.

To use this feature, first perform a **FULL 2-PORT** or **TRL 2-PORT** calibration procedure, then proceed as follows.

Turn 2-Port Correction On

CAL **MORE**
MODIFY CAL SET
CHANGE CAL TYPE
2-PORT to: S11 1-PORT
CHANGE & SAVE

Select new cal set

Select a different cal set to hold the new 1-Port calibration; the new 1-Port cal set will be stored and turned **on**.

CORRECTION ON
Turn Original 2-Port Correction On
MORE
CHANGE CAL TYPE
2-PORT to: S22 1-PORT
CHANGE & SAVE

Select new **cal** set

Select a different cal set to hold the new 1-Port calibration; the new 1-Port cal set will be stored and turned on.

Cal Kit Definitions

All calibration algorithms are unchanged except that the TRL **2-Port** procedure can now use either a LINE or a MATCH standard. A match standard is a Load or Arbitrary Impedance type standard whose impedance becomes the system reference Z_0 . This allows use of fixed load type calibration standards for high frequency measurements in media other than coaxial or waveguide.

In coaxial TRL **cal** kits it also allows redefinition of the **cal** kit to use a Match standard (the **lowband** fixed load) at low frequencies instead of performing the **Lowband** Reflection part of the TRL **2-Port** calibration. To do this, modify the **cal** kit definition to add the **lowband fixed** load to the Line class for use over the frequency range specified for the **Lowband** Reflection part of the calibration. During the calibration, measure the load instead of performing the **Lowband** Reflection procedure.

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