Agilent Technologies
8510C Network Analyzer System

Service Quick Reference Guide

Manufacturing Part Number: 08510-90317

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Typeface Conventions

Italics

- Used to emphasize important information:
  Use this software *only* with the Agilent Technologies xxxxxX system.
- Used for the title of a publication:
  Refer to the *Agilent Technologies xxxxxX System-Level User's Guide.*
- Used to indicate a variable:
  Type `LOAD BIN` *filename*.

`Instrument Display`

- Used to show on-screen prompts and messages that you will see on the display of an instrument:
  The Agilent Technologies xxxxxX will display the message **CAL1 SAVED.**

Keycap

- Used for labeled keys on the front panel of an instrument or on a computer keyboard:
  Press **Return**.

[Softkey]

- Used for simulated keys that appear on an instrument display:
  Press [Prior Menu].

User Entry

- Used to indicate text that you will enter using the computer keyboard; text shown in this typeface must be typed *exactly* as printed:
  Type LOAD PARMFILE
- Used for examples of programming code:
  #endif//ifndef NO_CLASS

Path name

- Used for a subdirectory name or file path:
  Edit the file *usr/local/bin/sample.txt*

Computer Display

- Used to show messages, prompts, and window labels that appear on a computer monitor:
  The **Edit Parameters** window will appear on the screen.
- Used for menus, lists, dialog boxes, and button boxes on a computer monitor from which you make selections using the mouse or keyboard:
  Double-click **EXIT** to quit the program.

Contacting Agilent

This information supersedes all prior HP contact information.

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(tel) = primary telephone number; *(alt)* = alternate telephone number; *(fax)* = FAX number; * = in country number 11/16/04

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1 Agilent 8510C Installation

8510C Installation

"Preflight Checkout"

Be sure security key is installed on A8 board for Network Analyzer Std., Opt. 010, or Antenna software. Note: Opt. 010 also requires firmware key.

Security Keys for 85101C Security Board A8

85101-69268 < Opt. 010 85101-80091
08530-69001 < Antenna 08530-80004
CRT Only
85101-69273 < Rev. 6.XX – Rev. 8.XX
85101-80114

Rev. C.06.60 85101-80132 CRT Only
Rev. C.07.XX 85101-80116 CRT Only
Rev. C.08.XX 85101-80116 LCD Only

Reference extensions A and B are used to phase balance a sweeper to make an uncalibrated measurement. At the port use 08512-20019 short. With a cable(s) use 08514-20013 long. If in doubt, always use the short links.

83621A & 51A or others need 16 Aug 91 or later to work with performance verification or else unable to match frequency points messages.

Firmware Rev. March 8, 1991 for complete compatibility (If not, you may lose quick step)

8516A is compatible with 8510B Rev. 4.0 or higher and with 8340/41/A/B with Rev. May 11, 88 or later. If not use Upgrade Kit 11875A for 8340/41/A/B with serial numbers 2513 and above.
Use Upgrade Kit 08340-60334 for serial numbers 2504A and below.

8517B Opt. 007 will display spikes if the amplifiers are overdriven from the RF Source. Reduce RF power to 0 dBm to increase dynamic range, You may need to raise the power > than 0 dBm. The factory preset puts it at +10 dBm.
NOTE:
-20 dBm will cause "NO IF FOUND".

PRINTER ADDRESS 1 (OPTIONAL)
PLOTTER ADDRESS 5

PRINTERS		PLOTTERS
2225A	33447A	7440A
2225D	33440A	7475A
D2106A	33471A	7550A
3630A	33449A	7550B

For a complete list of compatible printers/plotters see the 8510C Ordering Guide.

9153C OPT 010/020
9122C DISK DRIVE (ADDRESS 0)

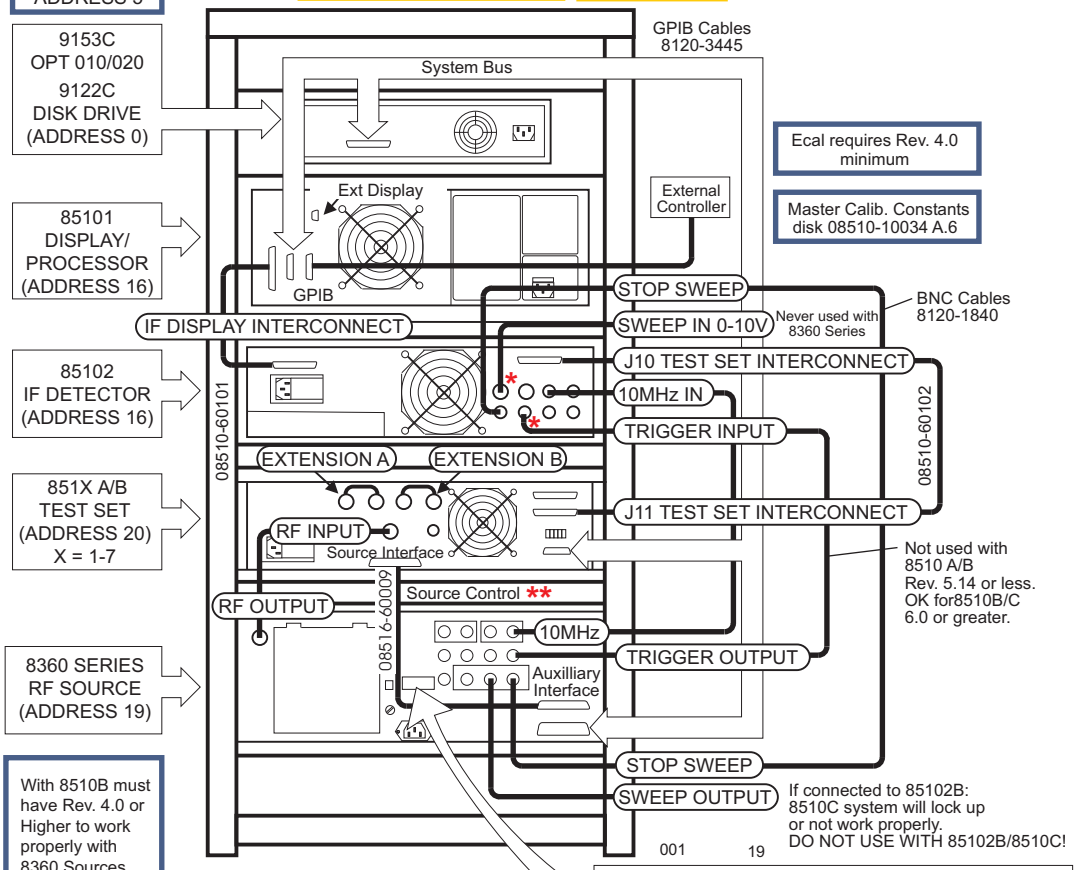
85101 DISPLAY/ PROCESSOR (ADDRESS 16)

85102 IF DETECTOR (ADDRESS 16)

851X A/B TEST SET (ADDRESS 20) X = 1-7

8360 SERIES RF SOURCE (ADDRESS 19)

With 8510B must have Rev. 4.0 or Higher to work properly with 8360 Sources.



Ecal requires Rev. 4.0 minimum

Master Calib. Constants disk 08510-10034 A.6

** Source Control Cable used with 8516A only

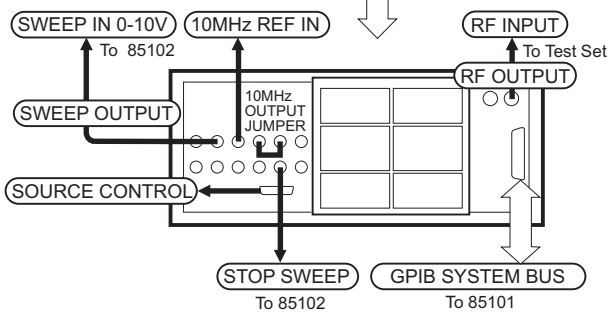
* Note:

For 8340 or 8350, a BNC open must be connected to the 85102 trigger input.

For 8360, a BNC open 1250-0053 should be connected to the 85102 SWEEP IN 0-10V.

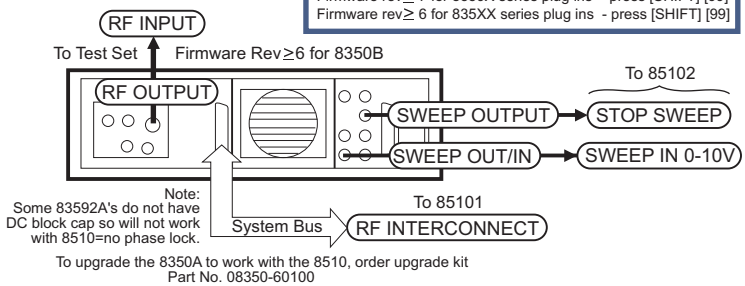
8340 * SOURCE (ADDRESS 19)

* Note: Cannot be mixed with 8360s.



8350B SOURCE (ADDRESS 19)

Firmware rev≥ 6 for 8350B main frame - press [SHIFT] [49]
Firmware rev≥ 7 for 8359X series plug ins - press [SHIFT] [99]
Firmware rev≥ 6 for 835XX series plug ins - press [SHIFT] [99]



To upgrade the 8350A to work with the 8510, order upgrade kit Part No. 08350-60100

Exceptions andNo tes:

1. A 9000 series 200 or 300 computer with 2.5 MB of memory is recommended; not 9826A. 9816 limited to 2 megabytes.
2. Connect the reference port extension cables as shown above. (Not applicable for 85110, 8516, 8517.)
3. Only use factory preset (not user preset) during service. Be sure multi-source, phase lock external or phase lock none are turned off.
4. An 8340 or 8360 requires a source interconnect cable (Part No. 08510-60009) connection when the test set is used as an 8516. 8350 cannot be used with 8516 above 20 GHz.
5. Instrument power-on sequence: Source, Test Set, 85102, 85101. Check power line modules for local line voltage. Check GPIB addresses of all instruments. For 8360, set language switch to 001. For 8340/41 set FREQUENCY STANDARD switch to INTERNAL.

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2 Instrument Compatibility

Upgrading an 8340/8350 Source

8340/41 and 8350 series sources are out of support life and are no longer recommended for use in 8510C systems.

Not all 8340/41 sources are compatible with the 8510B/C. If the serial prefix is not 2505A or greater, or previously upgraded, the firmware may need to be upgraded to get full performance (within feature limitations) and a minimum of bugs. For example, with Nov.82 firmware, if you program CW Single Point, and then change to step or ramp and back to CW, you will get exactly 5 GHz offset in the RF source frequency.

8340/41 sources with serial prefix 2505A or greater may also need to be upgraded depending on the 8510C operating system revision used. 8340/41 sources can work with the newer revisions of 8510C firmware C.07.xx and C.08.xx (within feature limitations and with a minimum of bugs) provided they have a source firmware date of 1992 or later.

Please consult with your Agilent customer engineer for more information on upgrading a network analyzer and/or source firmware.

Upgrading an 8360 Source

All 8360 series instruments are compatible, but not all allow use of quick-step, test-port power flatness correction, receiver calibration, and power domain functions without upgrading them. Refer to Table 2-1 for upgrades required for these functions.

8510C revision C.07.00 or greater firmware requires use of an 8360 series source for complete compatibility. Revision C.06.xx firmware does not support receiver calibration or power domain functions.

Table 2-1 8360 Upgrade Summary

Agilent Model	Serial Prefix	Required for Test Port Flatness Correction[4] or Receiver Cal[6]	Required for Quick Step[5]
83630A 83650A 83651A	All	No modification required[1]	
83621A 83631A	< 3103A	83601A upgrade kit[2,5]	
	3103A	08360-60167 firmware kit[5]	
	3104A to 3111A	08360-60201 firmware kit[5]	
	≥ 3112A	No modification required[1]	
83620A 83622A 83623A 83624A 83640A 83642A	≤ 3103A	08360-60167 firmware kit[4]	note 3
	3104A to 3111A	08360-60201 firmware kit[4]	note 3
	3112A to 3144A	No modification required[1]	note 3
	≥ 3145A	No modification required[1]	

1. Fully compatible at time of shipment
2. Includes installation
3. Quick Step cannot be retrofitted to these models.
4. 8360 series requires firmware ≥ 23 Oct. 90.
5. 8360 series requires firmware ≥ 06 Mar. 91.
6. Receiver Cal requires 8510C rev. C.07.00 or greater.

8360 Series Coupler to Bridge Detector

All 8510B/C systems when used with an 8360 series source that have a bridge detector inside will potentially cause an over-modulation running error message. If your 8510C has Rev.7.0 or greater, an RF unleveled caution message will also be displayed.

Agilent Model	Coupler to Detector Conversion Prefix	Determination
83620	Prefix equal to and greater than 3245A	will cause problem
83622	Prefix equal to and greater than 3245A	will cause problem
83630	Prefix equal to and greater than 3245A	will cause problem
83650	Prefix equal to and greater than 3245A	will cause problem
83621	Prefix equal to and greater than 3139A	will cause problem
83631	Prefix equal to and greater than 3139A	will cause problem
83651	Prefix equal to and greater than 3139A	will cause problem
83623	Couplers only	will not cause problem
83624	Couplers only	will not cause problem

Workaround

Increase your source power and use test set attenuators, or use a source that has a coupler in its leveling loop. The problem is caused by dc switching spikes from the test set RF pin diode switch getting back into the sources leveling loop and causing an unleveled condition. If this is not satisfactory, there are three upgrade kits available: the 8514B /8515A /85110A (08510-60119), 8517B (08510-60118), and the 85110L (08510-60121) test sets. The upgrade kit will eliminate the RF switching spikes from getting back into the source leveling loop by installing a dc return between the RF input and RF pin diode switch inside the test set. Contact an Agilent engineer for installation of these kits.

Dedicated 8510 System Source Models

Dedicated sources are optimized for use as 8510 system components. They are configured without modulation capabilities or front panel keyboard/displays. They have rear connectors, and one-year on-site service where available. Specifications for these models are the 8510 specifications with the following additions:

Frequency Range (all serial prefixes)	
83621A/B	45 MHz to 20 GHz
83631A/B	45 MHz to 26.5 GHz
83651A/B	45 MHz to 50 GHz
Resolution	1 Hz
Maximum Leveled Output Power (all serial prefixes)	
Frequencies ≤ 20 GHz	+ 10 dBm
Frequencies > 20 GHz and ≤ 26.5 GHz	+ 4 dBm
Frequencies > 26.5 GHz and ≤ 40 GHz	+ 3 dBm
Frequencies > 40 GHz	0 dBm
Minimum Settable	– 20 dBm

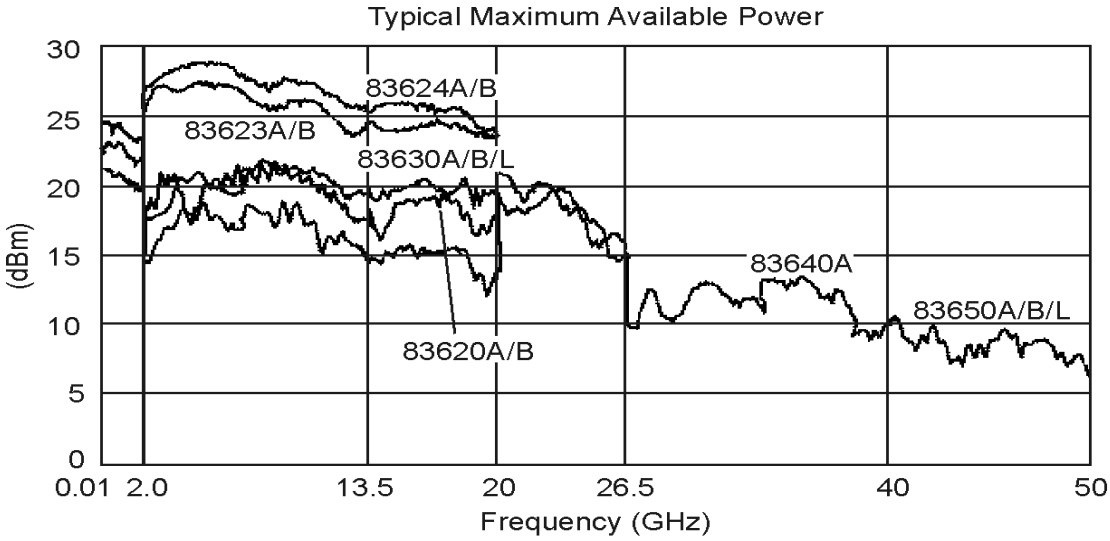
If your source does not meet these power requirements, you may need to retrack the YIG oscillator. When you look at power, also check for spikes, powerholes, and squegging.

Table 2-2 RF Output Power (Prefix ≥ 3145A)

Maximum Leveled (dBm)	Standard	Option 006
8360A/B, 83622A/B[1]	+13	+13
83623A/B	+17	+17
83624A/B	+20	+20
83630A/B/L		
Output frequencies < 20 GHz	+13	+13
Output frequencies ≥ 20 GHz	+10	+10
83640A/B/L		
Output frequencies < 26.5 GHz	+10	+10
Output frequencies ≥ 26.5 GHz	+6	+6
83650 A/B/L		
Output frequencies < 26.5 GHz	+10	+10
Output frequencies ≥ 26.5 GHz and < 40 GHz	+5	+5
Output frequencies ≥ 40 GHz	+2.5	+2.5

1. Specifications apply over the 0 to 35 ×C temperature range (0 to 25 °C for output frequencies > 20 GHz). Maximum leveled output power over the 35 to 55 ×C temperature range typically degrades by less than 2 dB.

Figure 2-1 Typical Maximum Available Power



With attenuator (Option 001): Maximum leveled output power is reduced by 1.5 dB to 20 GHz, 2 dB above 20 GHz, and 2.5 dB above 40 GHz.

Minimum Settable Output Power	Std: – 20 dBm Opt 001: – 110 dBm
Resolution	0.02 dB
Switching Time (without attenuator change)	10 ms, typical
Temperature Stability	0.01 dB / ^{o}C, typical

Compatible External Monitors

NOTE The original 85101C display/processor incorporated a cathode ray tube (CRT). The current design incorporates a liquid crystal display (LCD). Refer to the NOTE on page 2-9 for more information on determining the type of display.

Monitors for Models with a CRT Display

The 8510C with a CRT installed is designed to work with monitors that have these four specifications:

- Horizontal scan rate of 25.5 kHz must be supported.
- Vertical scan rate of 60 Hz must be supported.
- The monitor must accept separate RGB signals.
- The monitor must accept RGB signals at .7 volts.

Multisync monitors commonly meet all these requirements. The monitor can have one of two sync inputs (composite sync or separate H, V sync), and positive and negative sync is supported.

Some older monitors that may be available (resale) that can be run with the 8510C are listed below.

Manufacturer	Model
NEC	Multisync XL Multisync II Multisync Plus
Nanao	Flexscan 8060
Concorde Technologies	CT 5117 Multiflat Plus 17 CT 5121 Multiflat Plus 21
IIYAMA Electric Co.	MF 5117 Multiflat Plus 17

The HP 35741B monitor is compatible. However, this monitor has no sync connections as such. Sync pulses are superimposed on the green video signal. The 8510C cannot drive dedicated-format monitors such as CGA, EGA, VGA, or SVGA.

Monitors for Models Equipped with an LCD

The 8510C with an LCD installed is designed to work with VGA compatible monitors. There is a new VGA cable from the motherboard to the GSP board and a VGA connector on the back panel for direct connection to VGA compatible monitors.

Displays

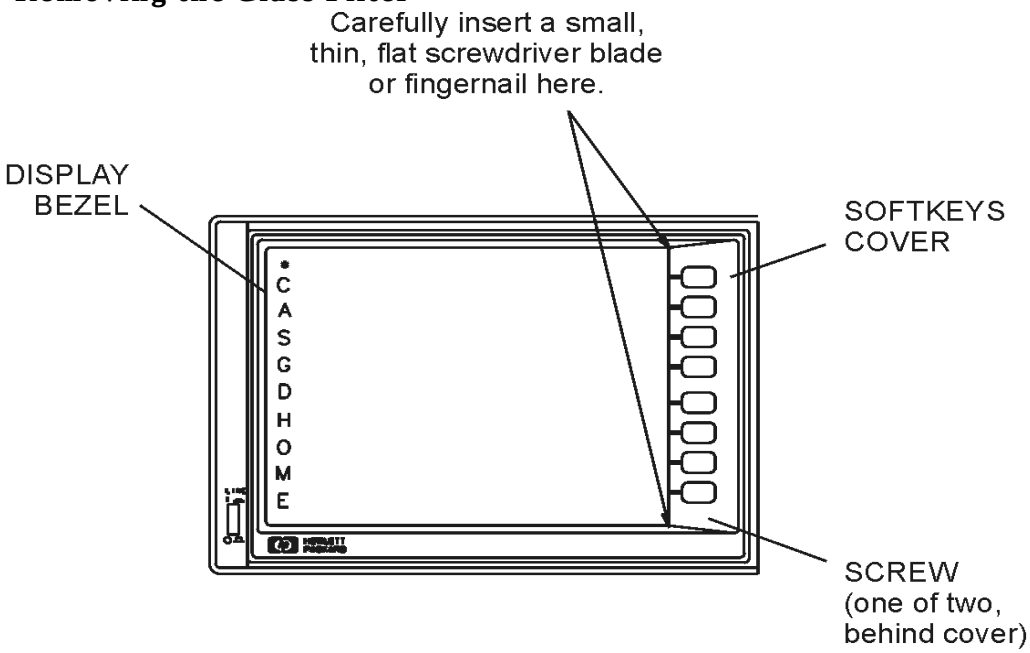
NOTE The original 85101C display/processor (8510C top box) incorporated a cathode ray tube (CRT). An 85101C with a CRT display has a serial prefix of 3936A and lower or a serial prefix of US4116, and uses 8510C firmware revision C.07.xx.

The current 85101C display/processor (8510C top box) incorporates a liquid crystal display (LCD). An 85101C with a LCD has a serial prefix of 4116A and higher, and uses 8510C firmware revision C.08.xx.

Cleaning the CRT

1. Remove the softkeys cover (a plastic cover through which the front panel softkeys protrude). Refer to figure 2.2. Carefully insert a thin, flat screwdriver blade (or your fingernail) between the upper left-hand corner of the softkeys cover and the glass filter. Be extremely careful not to scratch or break the glass. Pull the cover forward and off.
2. Remove the two screws that are now uncovered.
3. Remove the display bezel assembly by pulling the end that is now free. Pivot the bezel around its left edge until it is released.
4. Clean the CRT surface and the inner glass filter surface gently, using a clean, soft cloth and a cleaning solution recommended for optical-coated surfaces. Agilent part number 8500-2163 is one such solution. Camera lens cleaner or computer screen cleaner can also be used.
5. Allow the surfaces to dry and then reassemble the instrument.

Figure 2-2 Removing the Glass Filter



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Cleaning the LCD

Use a soft cloth and, if necessary, a cleaning solution recommended for optical coated surfaces. Agilent part number 8500-2163 is one such solution.

Enhancement Annotation Area

Along the left side of the screen, one-character labels appear when you select network analyzer functions that affect the accuracy or presentation of the measurement trace (see Figure 2-2).

* = Measurement Incomplete

C = Correction On

A = Averaging On

S = Smoothing On

G = Time Domain Gating On (optional feature)

D = Electrical Delay, Phase Offset, Magnitude Offset, or Magnitude Slope On

H = Hold

O = IF Overload

M = Multiple Source On

E = External Trigger

W = Wideband Detectors On (Pulse Mode On—optional feature)

3 8510C Adjustments

Most of the 8510C is self adjusting. Table 3-1 lists the adjustments most frequently needed for 8510C system service.

Table 3-1 Typically Used 8510C Adjustments

Title	Adjustment Function	Assembly Adjusted
Vertical Alignment Adjustment[a] (for CRT display only)	Aligns softkey labels and mechanical softkey buttons	A11
Degaussing the Display[a] (for CRT display only)	Demagnetizes the display	A11
8350B Plug-ins front panel FREQ CAL	RF frequency calibration	8350B plug-in
8360 Series Sources Full User Cal	Full user calibration	836XX Series Sources
Trim Sweep	Compensates for component tolerances in staircase generator	A20

a. The original 85101C display/processor incorporated a cathode ray tube (CRT). The current design incorporates a liquid crystal display (LCD). This adjustment is for an 85101C equipped with a CRT display. For information on determining the type of display, refer to the NOTE on page 2-9.

Table 3-2 Required Test Equipment for 8510C System Adjustments

Equipment	Recommended Model	Substitute
CRT demagnitizer or bulk tape eraser	Radio shack Model 44-233 Techni-Tool (in USA) or Nietronix (in Europe) 692PR022	1 to 2 amp pencil sharpener motor base held near CRT with motor on, or electric drill.
Flat-head screwdriver	At lease 2-inches long, non-conductive	none
10 dB pad	8493C	8360 Series source with built-in attenuator
85102 service adjustment disk	08510-10024 Rev. A.01.10	
Mat Kit ASTAT	85034-80013	
Work Surface	46298S for 85043C cabinet	
Work Surface (Large for XF)	85106-60038 for 85043C cabinet	
5-1/4 in drawer	46298S for 85043C cabinet	
Screws/nut holder	E7797A for 85043C cabinet	

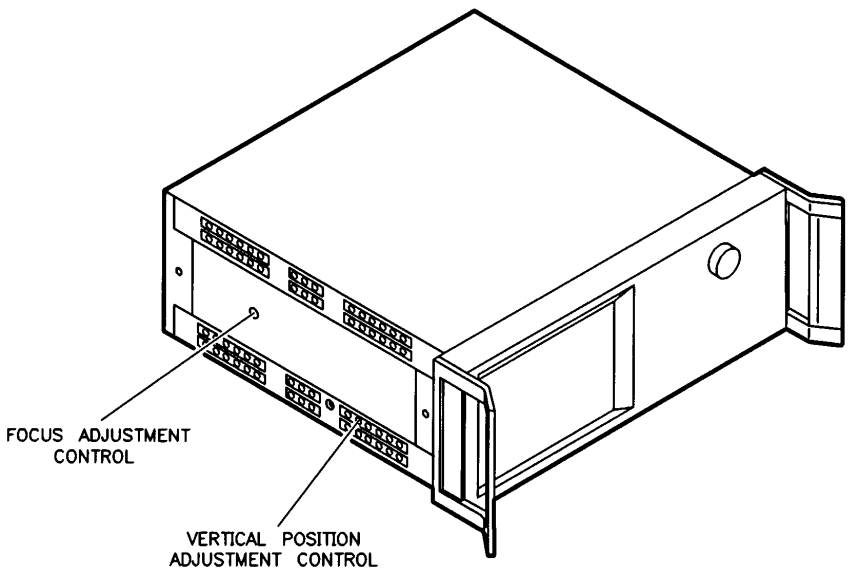
Procedure 1. Vertical Alignment Adjustment (CRT)

The original 85101C display/processor incorporated a cathode ray tube (CRT). The current design incorporates a liquid crystal display (LCD). This procedure applies only to instruments that are equipped with a CRT.

NOTE The vertical alignment can be adversely affected by magnetic interference. Before adjusting the vertical position, be sure the analyzer is in a non-magnetic environment and the CRT is degaussed.

1. Switch on the system and allow it to warm up for 60 minutes.
2. To access the vertical position and focus controls, remove the side panel nearest the display.
3. Insert a narrow, non-conductive, flat-head screwdriver (2 or more inches long) into the vertical position hole.
4. Adjust the control until the softkey labels align with the softkeys.

Figure 3-1 Vertical Adjustment Location



Procedure 2. Degaussing (Demagnetizing) the CRT Display

NOTE This procedure applies only to instruments equipped with a CRT.

The color monitor display is very susceptible to external magnetic fields, such as metal frame tables, welded cabinet, the earth, unshielded motors, and other sources. The usual symptom is discoloration or slight dimming of the display (usually near a top corner of the CRT). In extreme cases, a total color shift may be observed; for example, a trace that was red may shift to green. This shift does not suggest a problem with the display; it is characteristic of color displays needing demagnetizing.

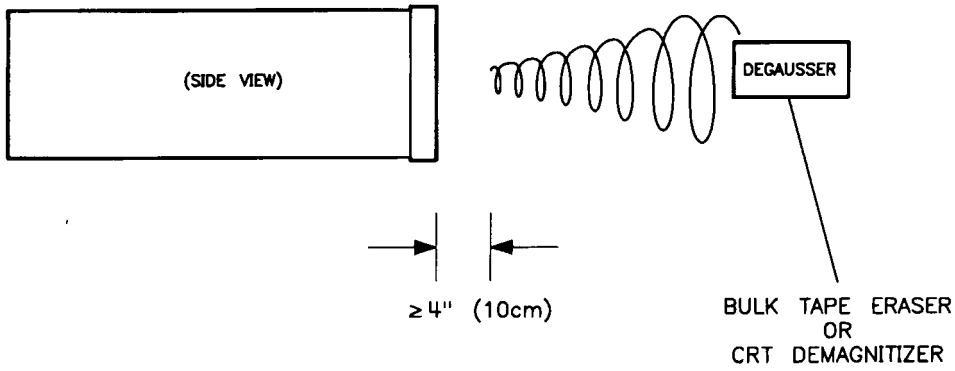
If the display becomes magnetized, or if color purity is a problem, cycle the power several times. Leave the instrument off for at least 15 seconds before turning it on. This activates the automatic degaussing circuit in the analyzer display.

If this is insufficient to achieve color purity, a commercially available demagnetizer must be used (either a CRT demagnetizer of a bulk tape eraser can be used). Follow the manufacturer's instructions keeping in mind the following: it is imperative when demagnetizing a display that at first it be placed not closer than four inches (10 cm) from the face of the CRT while demagnetizing the display. If this distance is too far to completely demagnetize the CRT, try again a a slightly closer distance until the CRT is demagnetized. Generally, degaussing is accomplished with a slow rotary motion of the degausser, moving it in a circle of increasing radius while simultaneously moving away from the CRT.

CAUTION Applying an excessively strong magnetic field to the CRT face can destroy the CRT.

Like most displays, the CRT can be sensitive to large magnetic fields generated from unshielded motors. In countries using 50 Hz, some 10 Hz jitter may be observed. If this problem is observed, remove the device causing the magnetic field. Figure 3-2 shows the motion for degaussing the display.

Figure 3-2 Motion for Degaussing the Display



NOTE In an emergency, you can use a running electric drill or a pencil sharpener that draws one to two amps through its AC motor winding.

Procedure 3. 8350B/Plug-ins Front Panel FREQ CAL

1. Press 8350B **INSTR PRESET, CW, 50, MHz**.
2. Connect the external frequency counter through a 10 dB attenuator to the RF OUTPUT.
3. Adjust the FREQ CAL control for a frequency counter indication of 50.0 MHz.

Alternate Procedure

This alternate FREQ CAL procedure is not as accurate as using an external counter, but normally calibrates the Band 0 frequency accuracy within specifications.

1. Press 8350B **INSTR PRESET, CW, 0, MHz**.
2. Adjust the FREQ CAL control through its range and note the portion of its range where the UNLEVELD light is turned on.
3. Set the FREQ CAL control to the center of this lighted range.

Procedure 4. 8360 Series Sources Full User CAL

Full User Cal initiates a full synthesizer calibration. The calibration performed is instrument state dependent. For example, if the synthesizer is in ramp sweep mode, a sweep span and an auto track calibration are done. if the synthesizer has amplitude modulation active on an SW signal, then RF peaking and AM bandwidth calibrations are performed. For 8510C purposes only, ramp sweep mode is needed. Perform the following calibration procedure:

1. On the 8360, press **PRESET, USER CAL**.
2. Select **[Full User CAL]**. Wait for the calibration to complete (usually ≤ one minute).

Attenuation Needed

If your 8360 Series source does not have a built-in attenuator, you are prompted to connect a 10 dB attenuator to the RF output port of the 8360. Auto track is done as part of Full User Cal.

Procedure 5. Trim Sweep

Trim Sweep performs a different function for 8340/41 and 8350 sources. For 8340 sources set for ramp sweep mode, it is used to adjust the band-switch points to minimize the frequency difference between the end frequency of one band and the start frequency of the next higher band. Trim Sweep is not used in the step-sweep mode.

For 8350 sources, trim sweep is adjusted to provide the best frequency accuracy. The trim sweep setting is saved as part of the instrument state when you press **SAVE, [INSTRUMENT STATE n]**, and as part of the limited instrument state saved when you save a calibration set. Trim sweep is set to zero by **[FACTORY PRESET]**.

NOTE In an extreme case you may need to use the 85102 test set adjustment software to adjust A20, the 85102 Sweep Board (part number 08510-10024, Rev A.01.10).

Adjusting the 8340/41 Trim Sweep

If you select ramp sweep mode using an 8340/41 source, set TRIM SWEEP to provide the minimum frequency difference between the band switch points in ramp mode as follows:

1. Press **RECALL, [MORE], [FACTORY PRESET]**. Set **S21** for display.
2. Connect measurement PORT 1 to measure PORT 2 (through connection). Press **PHASE**.
3. Set the **START**, **STOP, CENTER, SPAN** controls to sweep the frequency range of interest.
4. Press **STIMULUS MENU, [STEP].** When the sweep is complete, press **DISPLAY.**
5. Press **[DATA→MEMORY 1]**, [**MATH (/)]**. When the next sweep is complete, the trace should be a flat line at 0 °.
6. Press **STIMULUS MENU, [RAMP]**. The displayed trace may exhibit a sharp phase transition at the band switch points. Sharp transition indicate the need to adjust trim sweep.
7. Press **CAL, [MORE], [TRIM SWEEP]**. Then use the knob to adjust the phase trace for minimum phase change at the band switch points. When the best (flattest) phase trace is achieved, press **SAVE, [INSTRUMENT n]** to save this setting. Now proceed with the appropriate measurement calibration.

Adjusting the 8350 Trim Sweep

Set TRIM SWEEP to provide the best frequency accuracy as follows:

1. Press **RECALL, [MORE], [FACTORY PRESET]**. Set **S21** for display.
2. Connect measurement PORT 1 to measure PORT 2 (through connection). Press **PHASE**.
3. Set the **START**, **STOP, CENTER, SPAN** controls to sweep the frequency range of interest.
4. Press [**DATA→MEMORY 1]**, [**MATH (/)]**. When the next sweep is complete, the trace should

be a flat line at 0 °.

5. Connect an electrical delay of known length between measurement PORT 1 and measurement PORT 2. The device should have a low loss and exhibit a precisely known electrical delay, as do the air lines in the 3.5 mm and 7 mm verification kits.
6. Enter the electrical delay of the air line by pressing **RESPONSE MENU, [ELECTRICAL DELAY]**. The phase transitions should disappear, leaving a phase trace with some slope. Any residual slope indicates a need to adjust trim sweep.
7. Press **CAL, [MORE], [TRIM SWEEP]**. Use the knob to adjust the phase for a flat phase trace. When the best (flattest) phase trace is achieved, press **SAVE, [INSTRUMENT STATE n]** to save this setting. Now proceed with the appropriate measurement calibration.

NOTE In the 8350 plug-in firmware at 7 GHz Band Cross 201 MHz span only, phase measurements after trim sweep correction can still result in a ≥ 75° step at the band cross points due to switching of the RF to the wrong band.

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4 Performance Verification

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Preparation for Performance Verification

Table 4-1 lists the equipment needed to run the tests.

Table 4-1 Equipment Required[a]

- 8510C network analyzer and accessories
- test set
- source[b]
- For PC based Performance Verification

— Laptop or PC running BASIC for Windows (Rev. 6.32 or greater under Windows 95/98/NT).

— GPIB card for PCs (National Instruments or Agilent)

— PCMIA card for Laptops (National Instruments)

- For workstation based Performance Verification

— 200 or 300 series controller (except 9826[c] and 9816[d]) with 4 megabytes of available memory after loading BASIC (1 megabyte memory boards are available for all 200 and 300 series computers)

Other controllers include:

— HP Vectra 386 with an HP 82300C BASIC language processor card

— UNIX based workstation with Rocky Mountain BASIC (RMB)

— Various workstations with BASIC 5.0 or higher, drivers, and language extensions disks (uses approximately 0.6 megabytes of memory)

- 8510 Specification Performance Verification software (08510-10033, Revision A.05.01, DOS and LIF formats)
- Compatible printer or plotter
- Cables:

  test port cables (2)

  coax 3.5 mm (m to f)
- Adapters:

  2.4 mm (f) to 3.5 mm (f) for 50 GHz system)

  3.5 mm (f) to BNC (m)
- 5343 option 001, 10 Hz to 26.5 GHz frequency counter
- Calibration kit (customer supplied)
- Verification kit (customer supplied)

Note: It is not required to have the 8510 system connected to the computer/controller when generating specifications, or measurement uncertainties. All that is required is the software and computer/controller. A printer is required for hardcopy output.

a. All of the equipment listed is required for performance verification.
b. 8360 source with 1 Hz resolution needed to pass performance verification.
c. Wrap around display problem
d. Only 2.0 Mb of memory

Prepare for Performance Verification tests by completing the following steps:

- Do a good installation “preflight” checkout on the 8510 system.
- Measure the environment temperature and humidity. The temperature must be between +20 °C and +26 °C. Then the temperature cannot vary more than ±1 °C after calibration.
- Turn on the system components in the following order and allow one hour warm-up time.

  1. Source
  2. Test set
  3. 8510C
  4. Controller

NOTE For the 8516, use only 834X016 or 8360X016. Older 8340 sources may require modification before they work on the 8516. (Use upgrade kit 11875A, if firmware is earlier than May 11, 1988.)

8350s may not pass phase on the 25 ohm mismatch verification standard. Try Trim Sweep first or do a limited calibration.

CW Frequency Accuracy Test

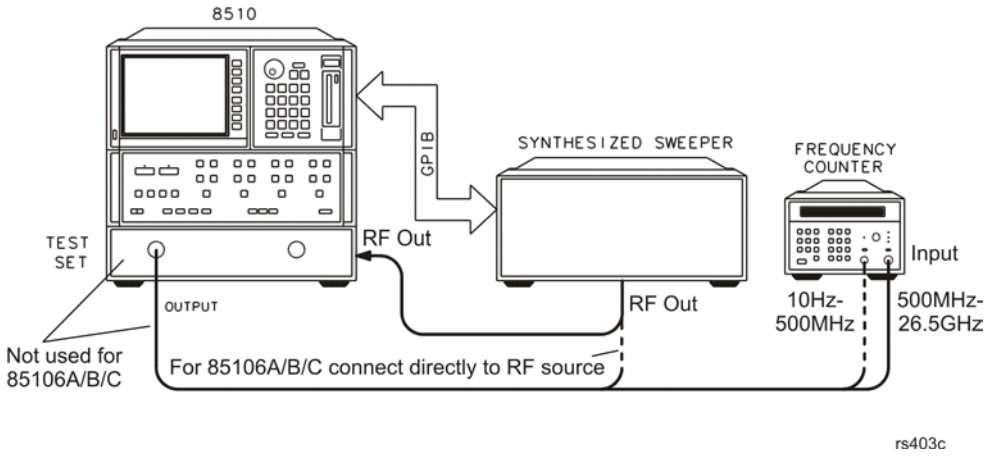
Source frequency accuracy is tested across the entire sweep range for 8340/8360 sources only. Measure CW frequency accuracy with a frequency counter. The 8350 source frequency accuracy is tested during the total system uncertainty test.

Front panel emulation software (included in the 8510 operating system disk) is required to test an 83621/31/51. The emulator kit (part number 08510-60022) contains an analyzer keypad overlay and instructions.

NOTE If the source and test set operate below 500 MHz, connect the test set output to the 10 Hz – 500 MHz BNC connector on the frequency counter. The input switch on the frequency counter must also be in the 10 Hz – 500 MHZ position.

1. Connect the equipment as shown in Figure 4-1.

Figure 4-1 CW Frequency Accuracy Equipment Setup



2. To preset the instruments, press **INSTRUMENT STATE RECALL, [MORE], [FACTORY PRESET].**
3. To set the frequency using the analyzer front panel, press **STIMULUS CENTER, MENU, [SINGLE POINT]. Enter** the start frequency of the source or test set, whichever is higher.
4. Measure the frequency with the counter, and record this value on the test record as in Table 4-2.
5. From the analyzer front panel, enter the stop frequency of the source or test set, whichever is lower. (For an 83640 or 83651, refer to the *8510C On-Site Service Manual, Chapter 8, "Performance Verification and Specifications"*, in the frequency test procedure section for specific instruction about disabling the source doubler.)

NOTE Be sure to connect the test set output to the 500 MHz – 26.5 GHz position input on the frequency counter. Also set the input switch to the 500 MHz – 26.5 GHz position.

6. Measure the frequency with the counter, and record the value on the test record as in Table 4-2.

Table 4-2 Performance Test Record for CW Frequency Accuracy Test

Instrument Model		**Report Number**		**Date**
Frequency	**Minimum Specification**	**Recorded Results**	**Maximum Specification**	**Uncertainty[a]**
45 MHz[b]	44.999955 MHz		45.000045 MHz	± 10 Hz
2 GHz[c]	1.999998 GHz		2.000002 GHz	± 10 Hz
20 GHz[d]	19.99998 GHz		20.00002 GHz	± 4 kHz
26.5 GHz[e]	26.4999735 GHz		26.5000256 GHz	± 5 kHz
40 GHz[f,g]	39.999996 GHz		40.000004 GHz	± 5 kHz
50 GHz[g,h]	49.9999756 GHz		50.0000256 GHz	± 5 kHz

a. The measurement uncertainty is quoted for these performance tests using only the recommended models specified in Table 8-1 of the *On-Site Service Manual*. The quoted uncertainty represents limits of ± 3 times the equivalent standard deviation (3 σ) and is intended to represent a 90% confidence level.
b. For all sources except the 83622A/B and 83624A/B.
c. For 83622A/B / 24A/B only.
d. For 83620A/B / 21A/B / 22A/B / 23A/B / 24A/B only.
e. For 83631A/B / 40A/B / 51A/B and 8340 only.
f. For 83640A/B only
g. For 83650A/B / 51A/B only.
h. 40 GHz and 50 GHz can be measured with a 26.5 GHz counter to verify 40 or 50 GHz due to double function in source.

In Case of Difficulty

If the measured values do not meet the specifications listed on the test record, refer to your source manual for adjustment and troubleshooting instructions.

Automated Performance Tests

This test requires the following disks:

- BASIC 5.0 or greater
- Language extension disks (Clock, MAT, Graph, and I/O)
- Drivers disk (GPIB)
- Performance Verifications Software, Revision A.05.01 (part number 08510-10033)

Loading the Language Disks and Software

1. Load BASIC 5.0 or higher into the disk drive for autostart on your controller. Press **SHIFT, PAUSE or** cycle the power of the controller to activate autostart.

NOTE You must have 4 Mb of memory for the program to run. Check by typing `SYSTEM $(AVAILABLE MEMORY)`. Press **RETURN**.

2. After BASIC is loaded, the disk drive LED goes off, and a `BASIC READY` prompt appears on the controller display. Remove the disk.
3. Insert the language extensions disk in the right-hand drive and load the following files one at a time using the 9836A keyboard. Type:

   LOAD BIN “ERR”, then press **EXECUTE**. Repeat to load the remaining language extension and drivers.

   LOAD BIN “CLOCK”, then press **EXECUTE**.

   LOAD BIN “GRAPH”, then press **EXECUTE**.

   LOAD BIN “MAT”, then press **EXECUTE**.

   LOAD BIN “I/O”, then press **EXECUTE**.

4. Remove the language extensions and insert the drivers disk into the right-hand drive.

   Type LOAD BIN “HPIB”.

   Press **EXECUTE**.

   Remove the drivers disk.

   Type MSI“:,700,0”.

   Press **EXECUTE** to specify mass storage device on the external disk drive.

5. Insert the performance verification disk (08510-10033) into the right-hand drive 0. Type: "LOAD SPECS_8510", then press **EXECUTE**.

NOTE There is no need to connect the 8510 to generate system specification; therefore, ignore display prompts about connecting the 8510.

NOTE Remember for sliding load cal that lowband or broadband loads can be used for lowband. Do not perform broadband cal if doing sliding load cal.

Running the Program

When the LED turns off, the program disk loading is completed. Note that the part number and software revision number appear on the display. Confirm that the number represents the latest version.

1. Set the date and time as instructed by the display. Type YES when the settings are correct.
2. From the Hardware Configuration Menu file, select the equipment you plan to use.
3. Use **[NEXT]** and **[PREVIOUS]**, and the up and down arrow keys to select equipment. Refer to the example list below.

Table 4-3.

Network Analyzer	Test Set	Source	Cal Kit	Cal Type	Cables	Ver Kit
8510C	8515A	83631A	85052B	SL (sliding load cal)	85131D/F 3.5 mm pair of short cables	85053B 3.5 mm

4. Press **[done]** when equipment selection is completed. Wait for the files to load for each piece of equipment.
5. From the main menu select **[Verify System]**, then follow the CRT step by step instructions.

Optional Swept Frequency Accuracy Check

For Swept-Frequency/Ramp Mode Only

This procedure is helpful for systems that are primarily operated in ramp mode. Typically step mode is used. If only step mode is used, you may skip this check.

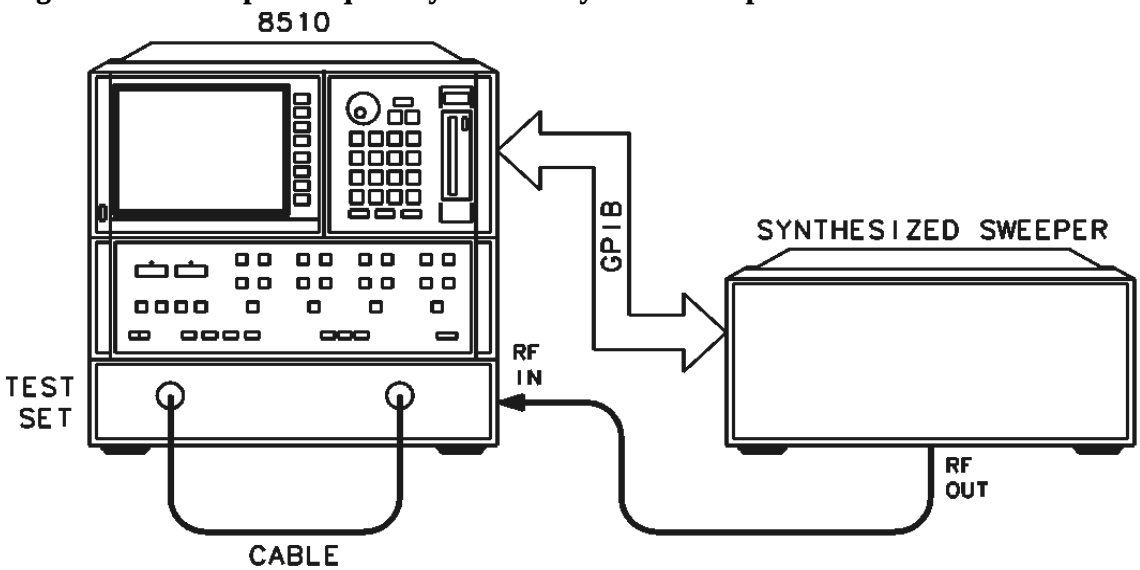
This procedure is not part of Performance Verification. Performance Verification requires step mode. This procedure is not for 8350 series sources.

Front panel emulation software (included in the 8510 operating system disk) is required to test an 83621/31/51. The emulator kit (08510-60022) contains an analyzer keypad overlay and instructions.

Preparation

1. Connect the equipment as shown in Figure 4-2..

Figure 4-2. Swept Frequency Accuracy Test Setup



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2. Press **INSTRUMENT STATE RECALL, [MORE], [FACTORY PRESET]** to preset the system.

NOTE 8514/15 test sets must have the test and reference ports unbalanced for this test to function properly. Connect long test port cables between the front panel ports and short reference lines between the back panel ports (or vice versa). To insure unbalancing you may use one short and one long reference link on the test set rear panel.

Procedure

For 8360 Synthesizers

From the front panel or the emulator program (see kit for instructions):

1. To initiate an auto track, press the following synthesizer keys:

   PRESET, USER CAL, [**Tracking Menu], [Auto Track], [Proceed**]

2. To initiate a sweep span calibration, press the following synthesizer keys:

   PRESET, USER CAL, FREQ CAL MENU, [ONCE]

   (No visual response is displayed after pressing the **[ONCE]** key.)

For 8340/41 Synthesizers

Run the network analyzer program.

1. To initiate an auto track, press the following synthesizer keys:

   PRESET, SHIFT, PEAK

   (This aligns the system tracking over the full range of frequencies (takes about 5 seconds).

For All Synthesizers

Run the network analyzer program.

1. Press the following network analyzer keys:

   PARAMETER S21, FORMAT PHASE, STIMULUS MENU, [STEP]

   (After several sweeps, the asterisk in the upper right-hand corner disappears.)

2. To normalize the measurement, press the following synthesizer keys:

   MENUS DISPLAY, [DATA →MEMORY 2]. Wait one sweep, then press **[MATH (/)**] to make a flat line from the phase-unbalanced trace.

3. To offset the center frequency by 5 MHz, press **STIMULUS CENTER** and increase the displayed value by 5 MHz.

4. To adjust the scale factor and shift the flat trace to the bottom or the top graticule (where trace variations are about halfway above and below the last graticule), press **RESPONSE SCALE** and then adjust the position with the front-panel knob.

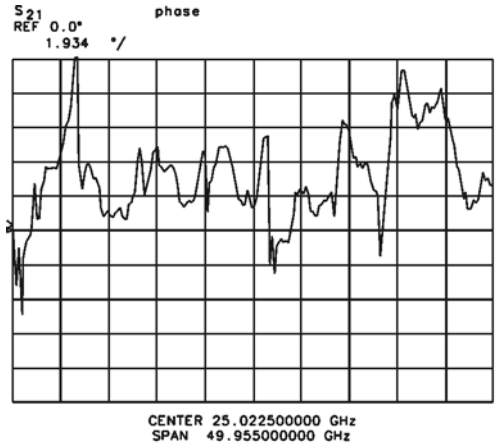
5. To place the trace on the opposite side of the display, press **STIMULUS CENTER** and change the display frequency by –10 MHz.

6. Return the frequency to the original setting (remove 5 MHz offset), press **STIMULUS CENTER**. The phase measurement should return to 0 °.

7. To display the difference between step and ramp mode, press **STIMULUS MENU, [RAMP], [SWEEP TIME], 0.5, x1**. Refer to Figure 4-3 for an example of a full band measurement at 1 MHz per division.

8. Measure the trace variation at 1 MHz per division scale, and then record the results on the test record at the end of this procedure.

Figure 4-3 Full Span Response at 1 MHz per Division



For 8340/41 Series Synthesizers

Position the highest frequency bandswitch transition point on to the reference line. Press synthesizer keys:

CAL, [MORE], [TRIM SWEEP] and then adjust the front panel knob. Record the maximum trace variation on the test record. Figure 4-4 shows a typical display.

Figure 4-4 Trace Variation Display

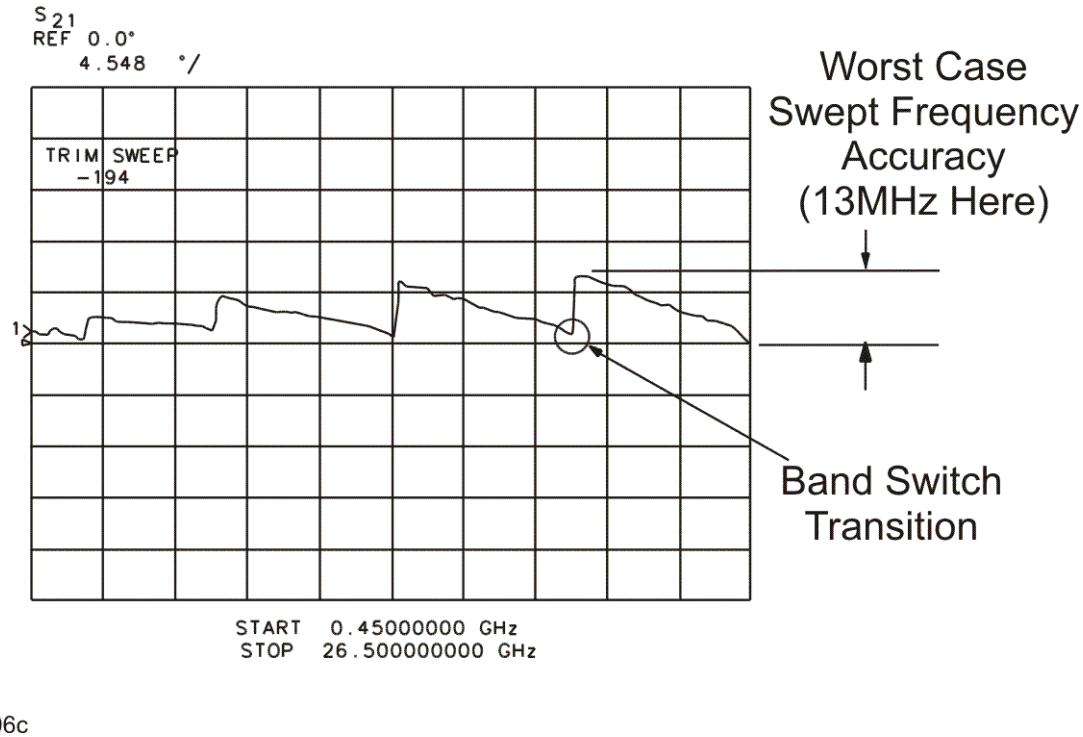


Table 4-4 Performance Test Record for Optional Test

Instrument Model	Report Number		Date
_____	_____		_____
Test Description	**Recorded Results**	**Maximum Specification**	**Measurement Uncertainty[a]**
Swept Frequency Accuracy Start Frequency: _____	_____	0.1% of sweep (for 8360)	± 150 kHz
Stop Frequency: _____	_____	1% of sweep	± 150 kHz

a. The measurement uncertainty is quoted for these performance tests using only the recommended models specified in Table 8-1 of the *On-Site Service Manual*. The quoted uncertainty represents limits of ± 3 times the equivalent standard deviation (3 σ) and is intended to represent a 90% confidence level.

In Case of Difficulty

If the measured values do not meet the specifications listed on the test record, refer to your source manual for adjustment and troubleshooting instructions.

A Troubleshooting Flowchart and Block Diagrams

Figure A-1 System Flow Chart (1 of 2)

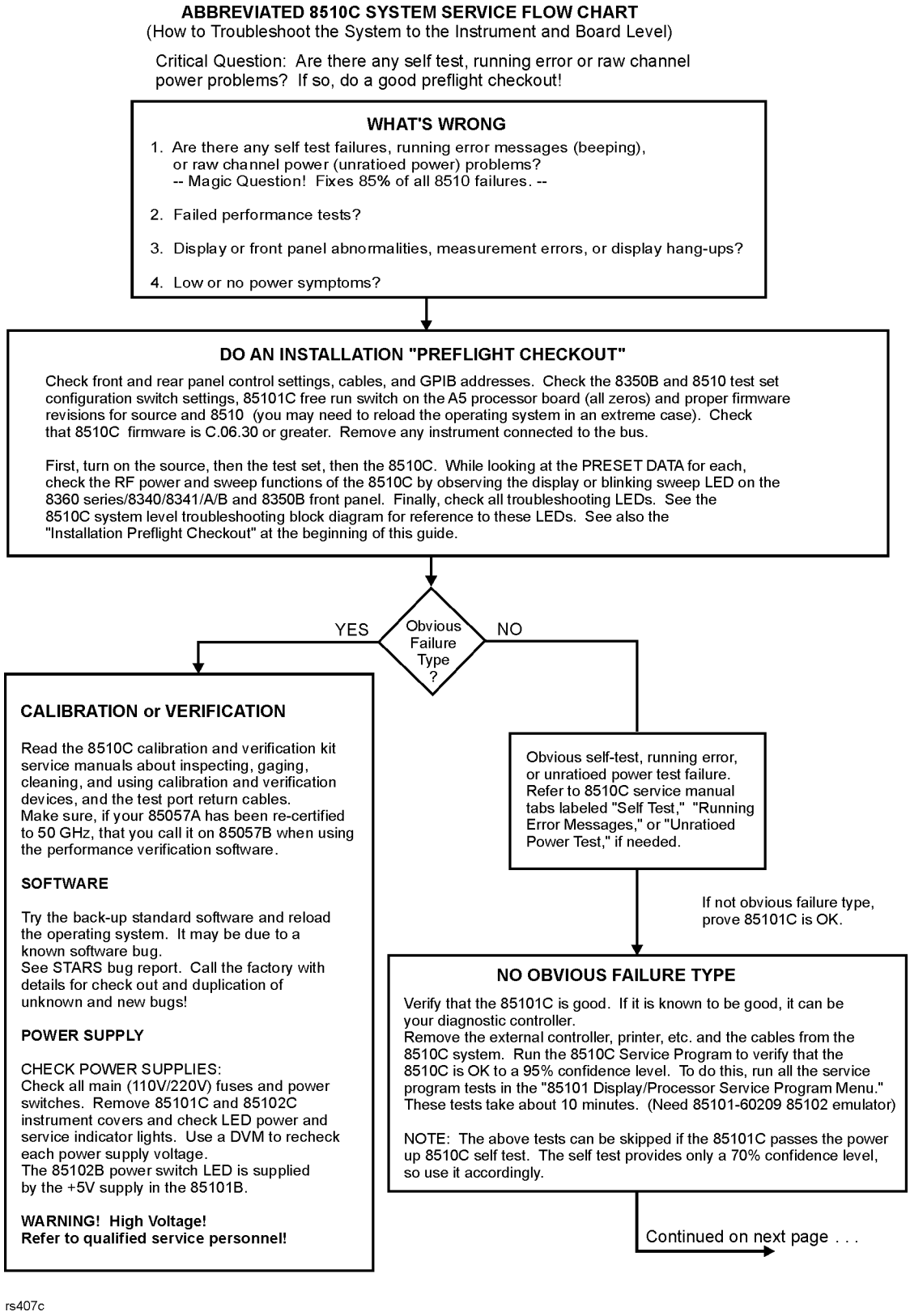
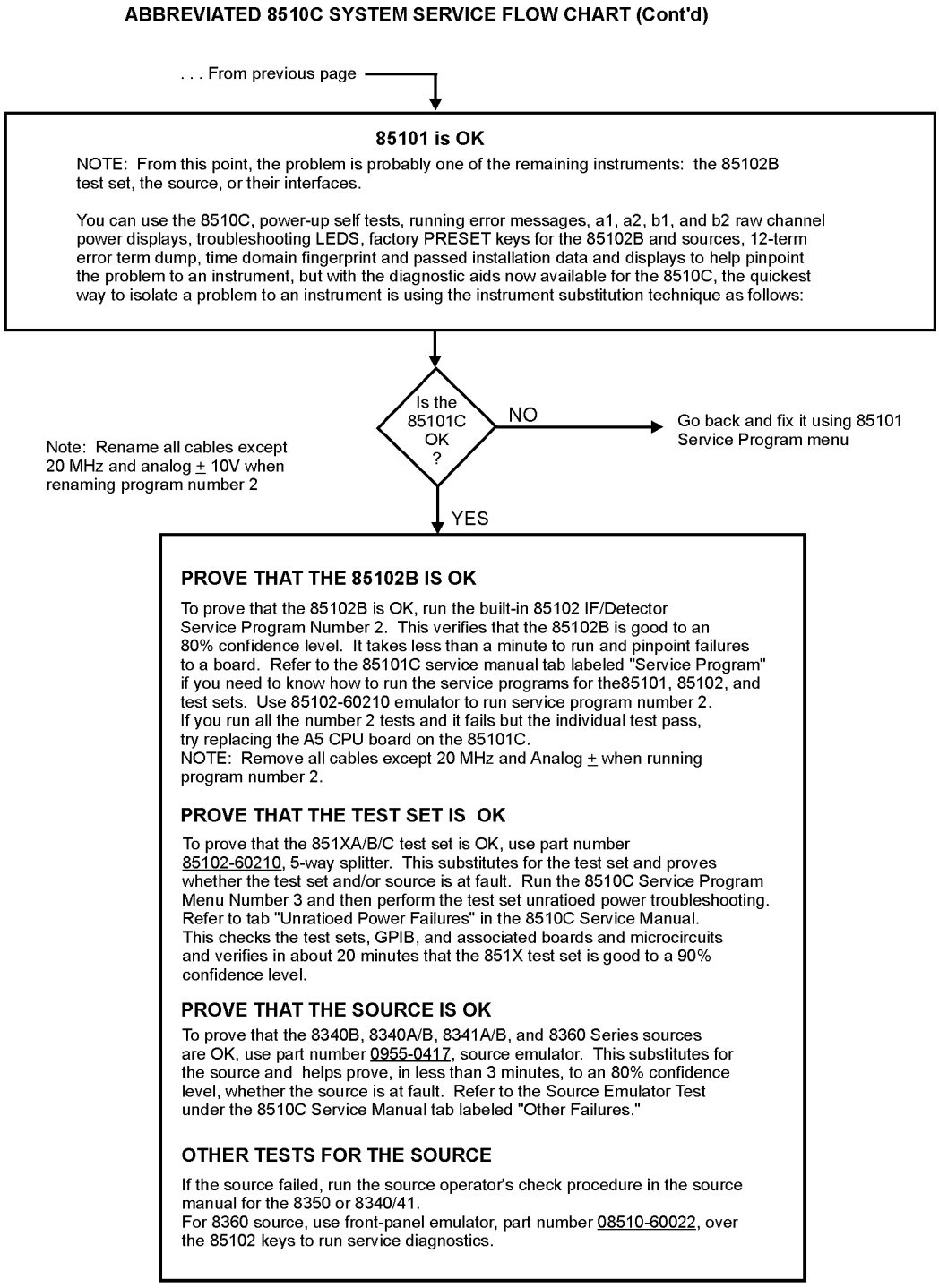


Figure A-2 System Flow Chart (2 of 2)



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AUXILLARY MENUS

SYSTEM

SYSTEM MENU

DISPLAY FUNCTIONS

HP-IB ADDRESSES

CRT OFF

FREQUENCY OFF

BEEPER ON / OFF

RESET IF CORRECTION

MORE

SYSTEM MORE MENU

PULSE CONFIG

EDIT MULT. SRC.

DATE/TIME FUNCTIONS

SYSTEM PHASELOCK

POWER LEVELING

ANALOG OUT ON / OFF

SERVICE FUNCTIONS

SERVICE FUNCTIONS MENU

TEST MENU

SYSTEM BUS 'LOCAL' / 'REMOTE'

IF GAIN

PEEK/POKE LOCATION / PEEK / POKE

SOFTWARE REVISION

MAIN SERVICE FUNCTIONS MENU

LOOPING SELF TESTS	SYSTEM COMMANDS
1 A5 PROCESSOR EPROM	15 RUN MAIN PROGRAM
2 A5 PROCESSOR RAM	16 MEMORY OPERATIONS
3 A7 DATA BUS	17 RERUN SELF TEST
4 A4 DISPLAY PROCESSOR	18 REPEAT TEST LOOP
5 A4 DISPLAY RAM	
6 A7 TIMER/CLOCK/RS-232	DISC COMMANDS
7 A7 PUBLIC HP-IB	19 LOAD PROGRAM DISC
8 A7 SYSTEM BUS	20 RECORD PROGRAM DISC
9 INTERRUPT SYSTEM	21 INITIALIZE DISC
10 A5 MULTIPLIER	
11 A7 DISC CONTROLLER	SERVICE COMMANDS
12 A6 NON-VOLATILE MEMORY	22 RUN SERVICE PROGRAM
13 IF DETECTOR DATA	23 DIAGNOSE A FAILURE
14 KEYBOARD	

ENTER SELECTION, THEN PRESS =MARKER

HP8510 SERVICE PROGRAM MENU

HP85101 DISPLAY/PROCESSOR SERVICE PROGRAM	1
HP85102 IF/DETECTOR SERVICE PROGRAM	2 (See next page)
TEST SET HP-IB SERVICE PROGRAM	3 (See next page)
HP8360 SERVICE PROGRAM	4 (See next page)
RETURN TO MAIN SERVICE FUNCTIONS MENU	F (see note 1)

NOTES: (1) Hex digits A thru F are assigned to [G/n], [M/u], [k/m], [X1], [+/-], and [.] respectively.

(2) To make a selection, type the number indicated, then press =MARKER.

(3) The default value on data entry is zero.

HP85101 DISPLAY/PROCESSOR SERVICE PROGRAM MENU

CPU BOARD TESTS (A5)	1
I/O BOARD AND FRONT PANEL TESTS (A1, A2, A7)	2
DISPLAY BOARD AND CRT TESTS (A4, A11)	3
NON-VOLATILE MEMORY BOARD TESTS (A6)	4
RETURN TO HP8510 SERVICE PROGRAM MENU	F [.]

HP85101
CPU BOARD TESTS (A5)

DRAM REFRESH TEST	1
READ/WRITE/SHIFT ACCUMULATOR TEST	2
MULTIPLIER TEST	3
COMPLEX MULTIPLY TEST	4
CIRCLE TEST (EXERCISES MULTIPLIER)	5
*SIGNATURE ANALYSIS - MULTIPLIER	6
*SIGNATURE ANALYSIS - ADDRESS BUS	7
*SIGNATURE ANALYSIS - DATA BUS	8
RETURN TO HP85101 SERVICE PROGRAM MENU	F [.]

* - For factory use only.

TO RETURN TO THIS MENU AFTER COMPLETING A TEST, PRESS THE =MARKER KEY

HP85101
I/O BOARD AND FRONT PANEL TESTS (A1, A2, A7)

DISC CONTROLLER BUS TEST (A7)	1
DISC WRITE/READ TEST (A2, A7)	2
TIMER TEST (A7)	3
SERIAL I/O TEST (A7)	4
TIMER CLOCK PERIPHERAL (TCP) TESTS (A7)	5
CPU TO HP-IB TEST (A7)	6
BIDIRECTIONAL HP-IB TEST (A7)	7
STATIC INTERRUPT SYSTEM TEST (A7)	8
RPG TEST (A1, A7)	9
KEYBOARD AND LEDS TEST (A1, A7)	A [G/n]
HP85102 INTERFACE TEST (A7)	B [M/u]
*DYNAMIC INTERRUPT SYSTEM TEST (A7)	C [k/m]
*SECURITY KEYS INTERFACE TEST (A7)	D [X1]
WATCHDOG TIMER TEST (A7)	E [+/-]
RETURN TO HP85101 SERVICE PROGRAM MENU	F [.]

* - For factory use only.

TO RETURN TO THIS MENU AFTER COMPLETING A TEST, PRESS THE =MARKER KEY

HP85101
DISPLAY BOARD AND CRT TESTS (A4, A11)

GSP ADDRESS DECODER STIMULUS CRT LOOP	1
GSP DATA LINE STIMULUS LOOP	2
RAMP BACKGROUND DAC LOOP	3
RAMP INTENSITY DAC LOOP	4
CALIBRATE BACKGROUND AND INTENSITY	5
RECALL BACKGROUND AND INTENSITY CALIBRATION	6
SCREEN TEST PATTERNS	7
SOFTKEY LABEL ALIGNMENT PATTERN	8
RETURN TO HP85101 SERVICE PROGRAM MENU	F [.]

TO RETURN TO THIS MENU AFTER COMPLETING A TEST, PRESS THE =MARKER KEY

PASSWORD ENTRY *

CAUTION: The following tests will erase non-volatile memory. To access these tests, enter the password, then press =MARKER. To exit, just press =MARKER.

(Refer to the Service Manual for the password)

*NOTE:

Password is: '8515'
Be sure to have a backup of the operating system.

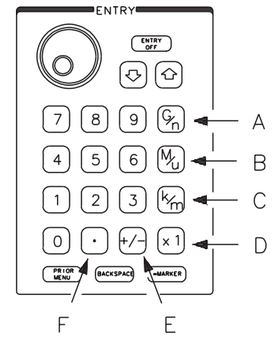
HP85101
NON-VOLATILE MEMORY BOARD (A6) TESTS

INITIALIZE MEMORY BOARD	1
COMPLETE MEMORY BOARD UNFORMATTED WRITE/READ TEST	2
COMPLETE MEMORY BOARD FORMATTED WRITE/READ TEST	3
READ/VERIFY TEST 3 DATA AGAIN	4
WRITE UNFORMATTED DATA TO SELECTED MEMORY LOCATIONS	5
READ/VERIFY TEST 5 DATA AGAIN	6
READ LOCATIONS WHERE HARDWARE CAL DATA IS STORED	7
SHOW NON-VOLATILE MEMORY PARAMETERS	8
*RESET MEMORY TO DEFAULT HARDWARE CAL DATA	9
RETURN TO HP85101 SERVICE PROGRAM MENU	F [.]

* - For factory use only.

TO RETURN TO THIS MENU AFTER COMPLETING A TEST, PRESS THE =MARKER KEY

ENTRY AREA
HEX KEYS



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8510C SERVICE PROGRAM MENU (CRT) (1 OF 2)

HP8510 SERVICE PROGRAM MENU

HP85101 DISPLAY/PROCESSOR SERVICE PROGRAM	1 (See prev. page)
HP85102 IF/DETECTOR SERVICE PROGRAM	2
TEST SET HP-IB SERVICE PROGRAM	3
HP8360 SERVICE PROGRAM	4
RETURN TO MAIN SERVICE FUNCTIONS MENU	F (see note 1)

NOTES: (1) Hex digits A thru F are assigned to [G/n], [M/u], [k/m], [X1], [+/-], and [.] respectively.

(2) To make a selection, type the number indicated, then press =MARKER.

(3) The default value on data entry is zero.

TEST SET HP-IB SERVICE PROGRAM MENU

PRESET TEST SET	1
SWITCH ACTIVE LIGHT	2
*SWITCH PORT 1,2 LIGHTS	3
*ACTIVATE PORT 1,2 ATTENUATOR	4
*INCREMENT ACTIVE ATTENUATOR	5
SELECT NEW HP-IB ADDRESS	6
RETURN TO HP8510 SERVICE PROGRAM MENU	F [.]

* - For test sets with appropriate feature.

NOTES: (1) To repeat a function, press =MARKER.
(2) The default Test Set HP-IB address is 20.

HP8360 SERVICE PROGRAM MENU

HP-IB TEST	1
FRONT PANEL EMULATOR	2
CHANGE HP-IB ADDRESS (default is 19)	3
RETURN TO HP8510 SERVICE PROGRAM MENU	F

On the HP85102 rear panel, connect '20 MHz OUT' to 'J1 TEST SET INTERCONNECT' using the service adapter and a BNC cable. Also, connect 'ANALOG + - 10V' to 'SWEEP IN 0-10V' using another BNC cable. Failure to do so will result in false error messages.**

PRESS =MARKER TO CONTINUE . . .

** NOTE:
Disconnect BNC cables from 85102 to source when running tests. Failure to do so will result in false error messages.

HP85102 IF/DETECTOR SERVICE PROGRAM MENU

ADC CONTROL TEST (A19)	1
SWEEP ADC TEST (A20)	2
ADC TEST (A18)	3
CAL DAC TEST (A17)	4
100 kHz IF AMPLIFIER TEST (A10, A12)	5
SYNCHRONOUS DETECTOR TEST (A5, A7)	6
20 MHz MIXER TEST (A9, A11, A13, A14)	7
PRETUNE PHASE LOCK TEST (A22)	8
MAIN PHASE LOCK TEST (A23)	9
IF COUNTER TEST (A21)	A [G/n]
RUN ALL THE ABOVE TESTS ***	B [M/u]
HP85102 FRONT PANEL TEST	C [k/m]
RETURN TO HP8510 SERVICE PROGRAM MENU	F [.]

NOTE: Always check cables leading to and from boards with suspected problems.

*** NOTE:
May fail tests 1 or 2 due to processor speed issue when running all tests. If tests 1 and 2 pass individually then assume the instrument is OK.

AUXILLARY MENUS

SYSTEM

SYSTEM MENU

DISPLAY FUNCTIONS

HP-IB ADDRESSES

HP-IB CONFIGURE

BEEPER ON / OFF

RESET IF CORRECTION

MORE

SYSTEM MORE MENU

PULSE CONFIG

EDIT MULT. SRC.

SYSTEM PHASELOCK

POWER LEVELING

ANALOG OUT ON / OFF

SERVICE FUNCTIONS

SERVICE FUNCTIONS MENU

TEST MENU

SYSTEM BUS 'LOCAL' / 'REMOTE'

IF GAIN

PEEK/POKE LOCATION

PEEK

POKE

SOFTWARE REVISION

MAIN SERVICE FUNCTIONS MENU

LOOPING SELF TESTS

1 A5 PROCESSOR EPROM
2 A5 PROCESSOR RAM
3 A7 DATA BUS
4 A14 DISPLAY PROCESSOR
5 A14 DISPLAY RAM
6 A7 TIMER/CLOCK/RS-232
7 A7 PUBLIC GPIB
8 A7 SYSTEM BUS
9 INTERRUPT SYSTEM
10 A5 MULTIPLIER
11 A7 DISC CONTROLLER
12 A6 NON-VOLATILE MEMORY
13 IF DETECTOR DATA
14 KEYBOARD

SYSTEM COMMANDS

15 RUN MAIN PROGRAM
16 MEMORY OPERATIONS
17 RERUN SELF TEST
18 REPEAT TEST LOOP

DISC COMMANDS

19 LOAD PROGRAM DISC
20 RECORD PROGRAM DISC
21 INITIALIZE DISC

SERVICE COMMANDS

22 RUN SERVICE PROGRAM
23 DIAGNOSE A FAILURE

ENTER SELECTION, THEN PRESS =MARKER

8510 SERVICE PROGRAM MENU

85101 DISPLAY/PROCESSOR SERVICE PROGRAM	1
85102 IF/DETECTOR SERVICE PROGRAM	2 (See next page)
TEST SET GPIB SERVICE PROGRAM	3 (See next page)
8360 SERVICE PROGRAM	4 (See next page)
RETURN TO MAIN SERVICE FUNCTIONS MENU	F (see note 1)

NOTES: (1) Hex digits A thru F are assigned to [G/n], [M/u], [k/m], [X1], [+/-], and [.] respectively.

(2) To make a selection, type the number indicated, then press =MARKER.

(3) The default value on data entry is zero.

85101 DISPLAY/PROCESSOR SERVICE PROGRAM MENU

CPU BOARD TESTS (A5)	1
I/O BOARD AND FRONT PANEL TESTS (A1, A2, A7)	2
DISPLAY BOARD AND LCD TESTS (A14, A15)	3
NON-VOLATILE MEMORY BOARD TESTS (A6)	4
RETURN TO 8510 SERVICE PROGRAM MENU	F [.]

85101
CPU BOARD TESTS (A5)

DRAM REFRESH TEST	1
READ/WRITE/SHIFT ACCUMULATOR TEST	2
MULTIPLIER TEST	3
COMPLEX MULTIPLY TEST	4
CIRCLE TEST (EXERCISES MULTIPLIER)	5
*SIGNATURE ANALYSIS - MULTIPLIER	6
*SIGNATURE ANALYSIS - ADDRESS BUS	7
*SIGNATURE ANALYSIS - DATA BUS	8
RETURN TO 85101 SERVICE PROGRAM MENU	F [.]

* - For factory use only.

TO RETURN TO THIS MENU AFTER COMPLETING A TEST, PRESS THE =MARKER KEY

85101
I/O BOARD AND FRONT PANEL TESTS (A1, A2, A7)

DISC CONTROLLER BUS TEST (A7)	1
DISC WRITE/READ TEST (A2, A7)	2
TIMER TEST (A7)	3
SERIAL I/O TEST (A7)	4
TIMER CLOCK PERIPHERAL (TCP) TESTS (A7)	5
CPU TO GPIB TEST (A7)	6
BIDIRECTIONAL GPIB TEST (A7)	7
STATIC INTERRUPT SYSTEM TEST (A7)	8
RPG TEST (A1, A7)	9
KEYBOARD AND LEDS TEST (A1, A7)	A [G/n]
85102 INTERFACE TEST (A7)	B [M/u]
*DYNAMIC INTERRUPT SYSTEM TEST (A7)	C [k/m]
*SECURITY KEYS INTERFACE TEST (A7)	D [X1]
WATCHDOG TIMER TEST (A7)	E [+/-]
RETURN TO 85101 SERVICE PROGRAM MENU	F [.]

* - For factory use only.

TO RETURN TO THIS MENU AFTER COMPLETING A TEST, PRESS THE =MARKER KEY

85101
DISPLAY BOARD AND LCD TESTS (A14, A15)

GSP ADDRESS DECODER STIMULUS LOOP	1
GSP DATA LINE STIMULUS LOOP	2
RAMP BACKLIGHT DAC LOOP	3
RAMP UNUSED DAC LOOP	4
SAVE TIME, DATE, AND LCD BACKLIGHT SETTINGS	5
RECALL TIME, DATE AND LCD BACKLIGHT SETTINGS	6
SCREEN TEST PATTERNS	7
SOFTKEY LABEL ALIGNMENT PATTERN (NOT USED)	8
RETURN TO 85101 SERVICE PROGRAM MENU	F [.]

TO RETURN TO THIS MENU AFTER COMPLETING A TEST, PRESS THE =MARKER KEY

PASSWORD ENTRY *

CAUTION: The following tests will erase non-volatile memory. To access these tests, enter the password, then press =MARKER. To exit, just press =MARKER.

(Refer to the Service Manual for the password)

*NOTE:

Password is: '8515'
Be sure to have a backup of the operating system.

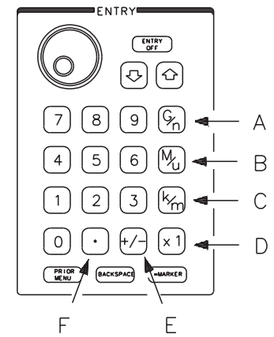
85101
NON-VOLATILE MEMORY BOARD (A6) TESTS

INITIALIZE MEMORY BOARD	1
COMPLETE MEMORY BOARD UNFORMATTED WRITE/READ TEST	2
COMPLETE MEMORY BOARD FORMATTED WRITE/READ TEST	3
READ/VERIFY TEST 3 DATA AGAIN	4
WRITE UNFORMATTED DATA TO SELECTED MEMORY LOCATIONS	5
READ/VERIFY TEST 5 DATA AGAIN	6
READ LOCATIONS WHERE HARDWARE CAL DATA IS STORED	7
SHOW NON-VOLATILE MEMORY PARAMETERS	8
*RESET MEMORY TO DEFAULT HARDWARE CAL DATA	9
RETURN TO 85101 SERVICE PROGRAM MENU	F [.]

* - For factory use only.

TO RETURN TO THIS MENU AFTER COMPLETING A TEST, PRESS THE =MARKER KEY

ENTRY AREA
HEX KEYS



rr511c

8510C SERVICE PROGRAM MENU (LCD) (1 OF 2)

8510 SERVICE PROGRAM MENU

85101 DISPLAY/PROCESSOR SERVICE PROGRAM	1 (See prev. page)
85102 IF/DETECTOR SERVICE PROGRAM	2
TEST SET GPIB SERVICE PROGRAM	3
8360 SERVICE PROGRAM	4
RETURN TO MAIN SERVICE FUNCTIONS MENU	F (see note 1)

NOTES: (1) Hex digits A thru F are assigned to [G/n], [M/u], [k/m], [X1], [+/−], and [.] respectively.

(2) To make a selection, type the number indicated, then press =MARKER.

(3) The default value on data entry is zero.

TEST SET GPIB SERVICE PROGRAM MENU

PRESET TEST SET	1
SWITCH ACTIVE LIGHT	2
*SWITCH PORT 1,2 LIGHTS	3
*ACTIVATE PORT 1,2 ATTENUATOR	4
*INCREMENT ACTIVE ATTENUATOR	5
SELECT NEW GPIB ADDRESS	6
RETURN TO 8510 SERVICE PROGRAM MENU	F [.]

* – For test sets with appropriate feature.

NOTES: (1) To repeat a function, press =MARKER.
(2) The default Test Set GPIB address is 20.

8360 SERVICE PROGRAM MENU

GPIB TEST	1
FRONT PANEL EMULATOR	2
CHANGE GPIB ADDRESS (default is 19)	3
RETURN TO 8510 SERVICE PROGRAM MENU	F

On the 85102 rear panel, connect '20 MHz OUT' to 'J1 TEST SET INTERCONNECT' using the service adapter and a BNC cable. Also, connect 'ANALOG + – 10V' to 'SWEEP IN 0–10V' using another BNC cable. Failure to do so will result in false error messages.**

PRESS =MARKER TO CONTINUE . . .

** NOTE:
Disconnect BNC cables from 85102 to source when running tests. Failure to do so will result in false error messages.

85102 IF/DETECTOR SERVICE PROGRAM MENU

ADC CONTROL TEST (A19)	1
SWEEP ADC TEST (A20)	2
ADC TEST (A18)	3
CAL DAC TEST (A17)	4
100 kHz IF AMPLIFIER TEST (A10, A12)	5
SYNCHRONOUS DETECTOR TEST (A5, A7)	6
20 MHz MIXER TEST (A9, A11, A13, A14)	7
PRETUNE PHASE LOCK TEST (A22)	8
MAIN PHASE LOCK TEST (A23)	9
IF COUNTER TEST (A21)	A [G/n]
RUN ALL THE ABOVE TESTS ***	B [M/u]
85102 FRONT PANEL TEST	C [k/m]
RETURN TO 8510 SERVICE PROGRAM MENU	F [.]

NOTE: Always check cables leading to and from boards with suspected problems.

*** NOTE:
May fail tests 1 or 2 due to processor speed issue when running all tests. If tests 1 and 2 pass individually then assume the instrument is OK.

8510C SYSTEM LEVEL TROUBLESHOOTING BLOCK DIAGRAM

SELF-TEST (1-14), RUNNING ERROR MESSAGES (15-41), UNRATIOED POWER TEST (42), LEDS, GPIB ADDRESSES AND CONFIGURATION SWITCH SETTINGS

HOW TO READ THIS BLOCK DIAGRAM:

THIS DIAGRAM SHOWS A TYPICAL 8510 SYSTEM CONFIGURATION. NOTE THAT THE CIRCUIT BOARDS AND ASSEMBLIES HAVE NUMBERS PRECEDED BY THE LETTER 'A'. THAT NUMBER IDENTIFIES THE ASSEMBLY. THE OTHER NUMBERS REFER TO THE LIST ON THE RIGHT OF THIS FOLDOUT.

USE THIS BLOCK DIAGRAM AS A QUICK REFERENCE GUIDE TO SYSTEM FAILURES AS WELL AS A GUIDE TO LED LOCATION AND MEANING. TEST SET ADDRESS AND CONFIGURATION SWITCH SETTINGS ARE ALSO SHOWN.

NUMBERS 1 - 14

THESE NUMBERS IDENTIFY THE SELF TEST THAT EXERCISES THE PARTICULAR ASSEMBLY, MOSTLY ON THE 85101 DISPLAY/PROCESSOR. FOR MORE INFORMATION, REFER TO 'SELF TEST FAILURES' IN THE ON-SITE SERVICE MANUAL.

NUMBERS 15 - 36

THESE NUMBERS IDENTIFY THE BUILT-IN RUNNING ERROR MESSAGE THAT WILL APPEAR ON THE 85101 CRT IF A SYSTEM FAILURE IS DETECTED, MOSTLY ON THE 85102 IF/DETECTOR, TEST SET, AND HP SOURCE. THE NUMBERS IDENTIFY THE ASSEMBLIES WHERE THE ERROR IS DETECTED OR GENERATED. FOR MORE INFORMATION, REFER TO 'RUNNING ERROR MESSAGES' IN THE ON-SITE SERVICE MANUAL.

NUMBERS 37 - 41, 46

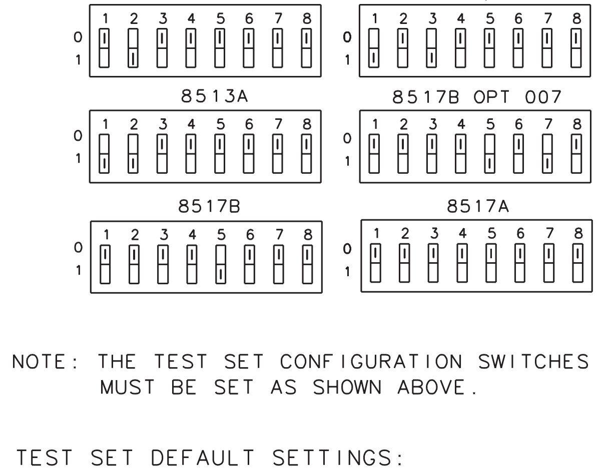
THESE NUMBERS IDENTIFY RUNNING ERROR MESSAGES ASSOCIATED WITH 8360-SERIES SOURCES ONLY AND APPEAR ON THE 85101 CRT.

NUMBERS 42 - 45

THESE ARE EXTRA TROUBLESHOOTING SUGGESTIONS.

TEST SET CONFIGURATION SWITCHES

LOCATED ON (A3) SUMMING AMP BOARD INSIDE TEST SET.



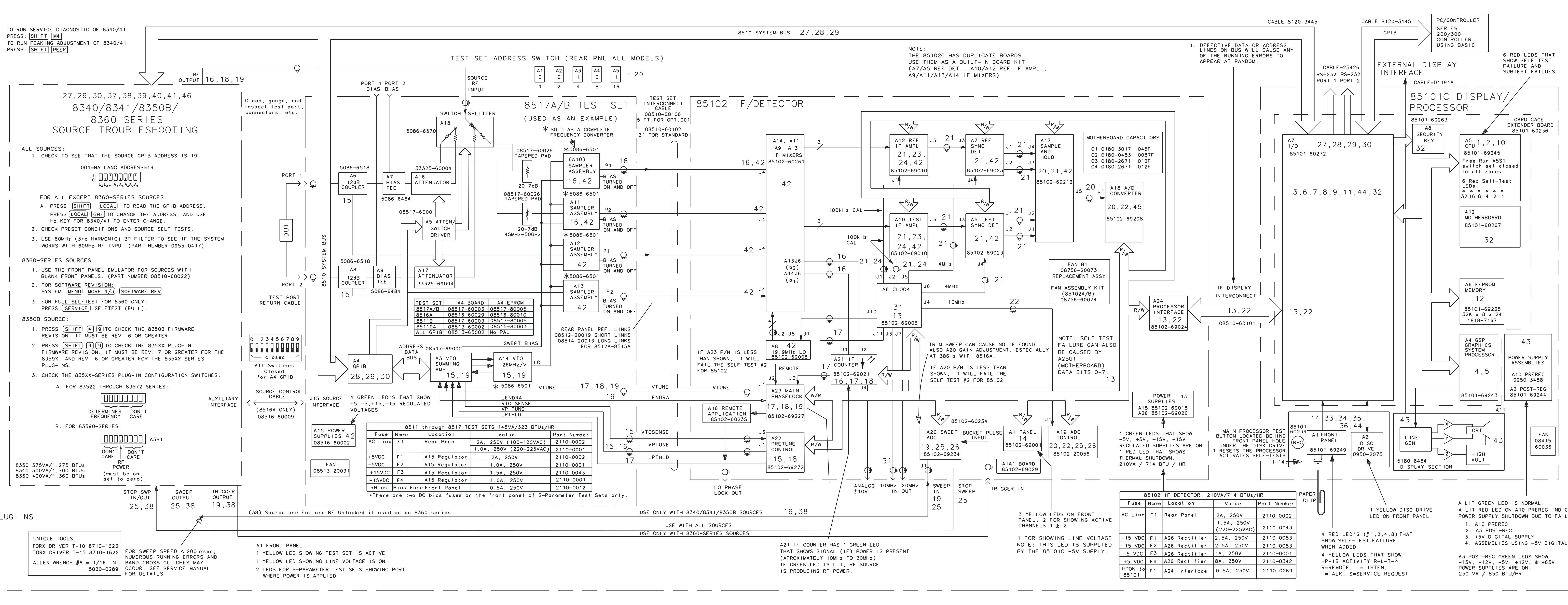
NOTE: THE TEST SET CONFIGURATION SWITCHES MUST BE SET AS SHOWN ABOVE.

TEST SET DEFAULT SETTINGS:

THE DEFAULT STATE OF THE TEST SETS (TURN POWER OFF, PULL A4 GPIB BOARD AND TURN POWER BACK ON) IS TO HAVE ALL SAMPLERS ENABLED, A14'S VTO BIASED ON, PORT 1 AND 2 ATTENUATORS AT 0dB, AND THE SWITCH SPLITTER APPLYING RF POWER TO PORT 1.

FRONT PANEL FREQ CAL PROCEDURE FOR 8350 PLUG-INS

1. PRESS [INSTR PRESET] [CW] [0] [MHz]
2. ADJUST FREQ CAL CONTROL THROUGH ITS RANGE AND NOTE THE PORTION OF ITS RANGE THAT THE UNLEVELED LIGHT IS TURNED ON. SET THE FREQ CAL CONTROL TO THE CENTER OF THIS RANGE.
3. IF NOT ADJUSTED, IT CAN CAUSE THE 8510 TO LOSE PHASE-LOCK AT LOW FREQUENCIES.



8511 through 8517 TEST SETS 145VA/323 BTUs/HR				
Fuse	Name	Location	Value	Part Number
AC Line	F1	Rear Panel	2A, 250V (100-120VAC)	2110-0002
			1.0A, 250V (220-225VAC)	2110-0001
+5VDC	F1	A15 Regulator	2A, 250V	2110-0002
-5VDC	F2	A15 Regulator	1.0A, 250V	2110-0001
+15VDC	F3	A15 Regulator	1.5A, 250V	2110-0043
-15VDC	F4	A15 Regulator	1.0A, 250V	2110-0001
*Bias	Bias Fuse	Front Panel	0.5A, 250V	2110-0012

*There are two DC bias fuses on the front panel of S-Parameter Test Sets only.

85102 IF DETECTOR: 210VA/714 BTUs/HR				
Fuse	Name	Location	Value	Part Number
AC Line	F1	Rear Panel	2A, 250V	2110-0002
			1.5A, 250V (220-225VAC)	2110-0043
-15 VDC	F1	A26 Rectifier	2.5A, 250V	2110-0083
+15 VDC	F2	A26 Rectifier	2.5A, 250V	2110-0083
-5 VDC	F3	A26 Rectifier	1A, 250V	2110-0001
+5 VDC	F4	A26 Rectifier	8A, 250V	2110-0342
HPON to 85101	F1	A24 Interface	0.5A, 250V	2110-0269

SELF TESTS

1. A5 PROCESSOR EPROM (self test and service program PROM using checksum)
2. A5 PROCESSOR RAM (test processor memory using data complement technique)
3. A7 DATA BUS TEST (test I/O data bus)
4. A4 DISPLAY PROCESSOR
5. A4 DISPLAY RAM
6. A7 TIMER/CLOCK/RS-232
7. A7 PUBLIC GPIB (read-write test of GPIB register)
8. A7 SYSTEM BUS (read/write test of system bus register)
9. INTERRUPT SYSTEM (test interrupts)
10. A5 MULTIPLIER (performs a complex multiply)
11. A7 DISC CONTROLLER
12. A6 NON-VOLATILE MEMORY TEST (read/write test)
13. IF DETECTOR DATA (read/write test data and address lines)
14. KEYBOARD (read 85101C keyboard for a stuck key)

RUNNING ERROR MESSAGES

15. FAILED PRETUNE/LOST PRETUNE
16. NO IF FOUND (At high frequency 8340 squeg. will cause this (IF you ask for +10dBm.)
17. PHASE LOCK FAILURE
18. PHASE LOCK LOST
19. VTO OVER-RANGE
20. ADC CAL FAILED
21. IF CAL FAILED - REFERENCE
    IF CAL FAILED - TEST
    IF CAL FAILED - BOTH (channels)
22. ADC NOT RESPONDING
23. IF OVERLOAD (External level of 8360 can cause this.)
24. AUTORANGE CAL FAILED
25. SOURCE SWEEP SYNC ERROR
26. SWEEP TIME TOO FAST
27. SOURCE (GPIB) SYNTAX ERROR
28. TEST SET (GPIB) SYNTAX ERROR
29. SYSTEM BUS ADDRESS ERROR
30. SYSTEM BUS SRQ ERROR
31. UNABLE TO LOCK TO EXT 10 MHz REF
32. ERROR: SYSTEM KEY NOT INSTALLED, CAUSED BY SECURITY KEY MISSING, BAD I/O, BAD A8 CONNECTOR, BAD MOTHERBOARD.
    CAUTION: OPTIONAL FUNCTION : NOT INSTALLED
    CAUTION: TIME DOMAIN KEY NOT INSTALLED
33. DISC HARDWARE PROBLEM
34. DISC COMMUNICATION ERROR
35. INITIALIZATION FAILED
36. DISC MEDIA WEARING OUT - REPLACE SOON

8360-SERIES SOURCES RUNNING ERROR MESSAGES

37. FAILURE - FAULT INDICATOR ON
38. FAILURE - RF UNLOCKED
39. FAILURE - OVERMODULATION
40. FAILURE - SELF TEST FAILURE
41. INVALID SETUP - CHECK SYSTEM BUS CONFIGURATION (associated with incorrect power level flatness correction only)
46. RF unleveled Rev.C.07.00 or > only.

OTHER TROUBLESHOOTING HINTS

42. Perform the unratioed power test for a1, a2, b1, and b2. Refer to 'Unratioed Power Failures' in the On-Site Service Manual, 08510-90282.
43. The A4 GSP and the A11 CRT must be working for a trace to be visible.
44. If self test 11 passes, try to initialize a blank disc to further test the A2 disc drive.
45. A18 (85102) ANALOG TO DIGITAL CONVERTER TEST
    Whenever the noise on the trace is greater than 1 dB when you first turn the instrument ON, it means that the A18 board may be faulty.

    If you cycle the AC power (Off, then On), the noise may go away. If it does, there is probably a malfunction with the A18 A/D board although no apparent syptoms are present. There may also be no Running Error Messages. Self Test Failures, or Service Program test failures.

    If this trace noise disappears when the power is cycled, the test has failed and the A18 board should be replaced.

85101 DISPLAY/PROCESSOR: 250VA/850 BTUs/HR				
Fuse	Name	Location	Value	Part Number
	A3F1		1.5A 125V	2110-0333
	A3F2		2A 125V	2110-0425
	A3F3		2A 125V	2110-0425
	A10F1		3.15 A 250V	2110-0655

8510C SYSTEM LEVEL TROUBLESHOOTING BLOCK DIAGRAM (LCD)

SELF-TEST (1–14), RUNNING ERROR MESSAGES (15–41), UNRATIOED POWER TEST (42), LEDS, GPIB ADDRESSES AND CONFIGURATION SWITCH SETTINGS

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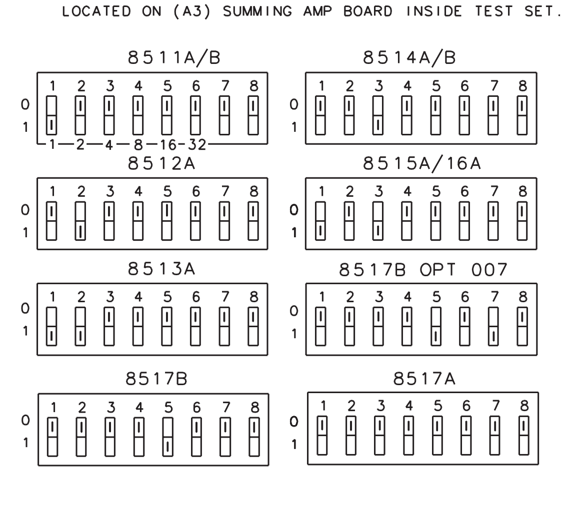

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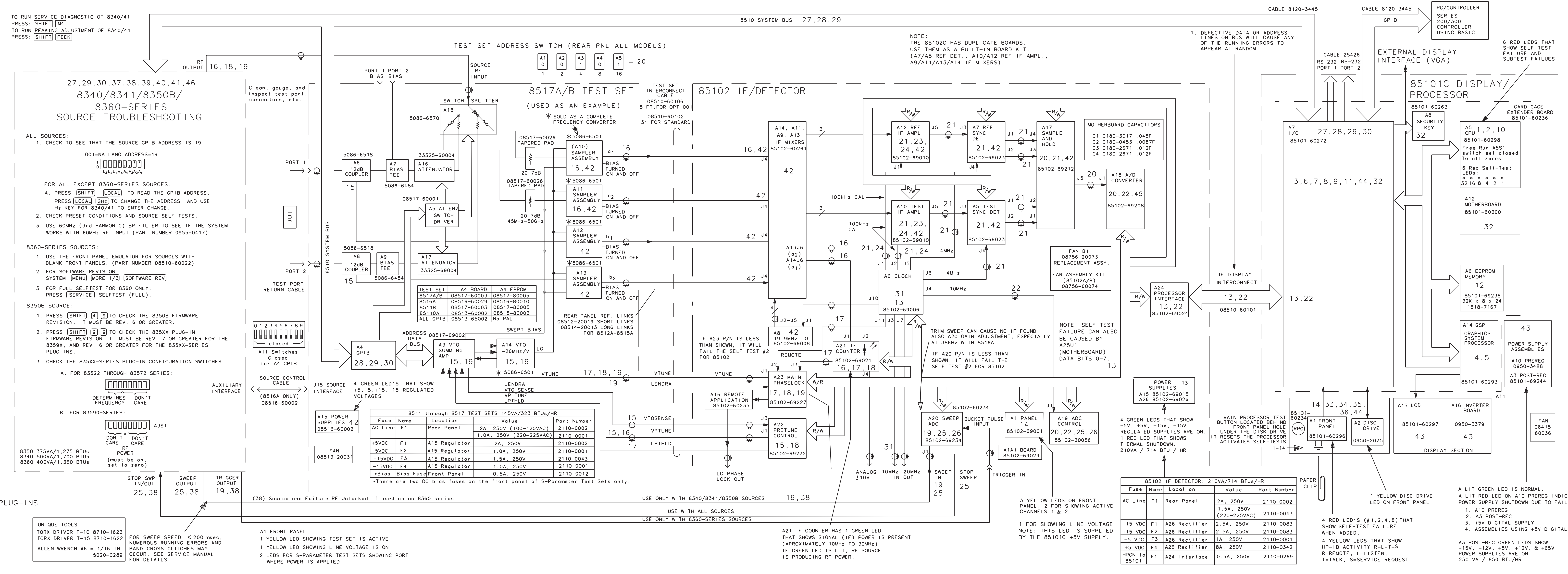

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*Bias	Bias Fuse	Front Panel	0.5A, 250V	2110-0012

*There are two DC bias fuses on the front panel of S-Parameter Test Sets only.

85102 IF DETECTOR: 210VA/714 BTUs/HR				
Fuse	Name	Location	Value	Part Number
AC Line	F1	Rear Panel	2A, 250V	2110-0002
			1.5A, 250V (220–225VAC)	2110-0043
–15 VDC	F1	A26 Rectifier	2.5A, 250V	2110-0083
+15 VDC	F2	A26 Rectifier	2.5A, 250V	2110-0083
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30. SYSTEM BUS SRQ ERROR
31. UNABLE TO LOCK TO EXT 10 MHz REF
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40. FAILURE – SELF TEST FAILURE
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	A3F2		2A 125V	2110-0425
	A3F3		2A 125V	2110-0425
	A10F1		3.15 A 250V	2110-0655

rs413c