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# User's Guide

# Agilent Technologies
# PSG Family Signal Generators

**This guide applies to the signal generator models and associated serial number prefixes listed below. Depending on your firmware revision, front panel operation may vary from descriptions in this guide.**

**E8241A: US4124**
**E8244A: US4124**

**E8251A: US4124**
**E8254A: US4124**




**Part Number: E8251-90023**

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# Contents

**1. Signal Generator Overview . . . . . 1**
Signal Generator Models and Features . . . . . 2
PSG-L Series Features . . . . . 2
PSG-A Series Features . . . . . 3
Options . . . . . 4
Front Panel . . . . . 5
1. Display . . . . . 6
2. Softkeys . . . . . 6
3. Knob . . . . . 6
4. Amplitude Key . . . . . 6
5. Frequency Key . . . . . 6
6. Save Key . . . . . 6
7. Recall Key . . . . . 7
8. Trigger Key . . . . . 7
9. Menu Keys . . . . . 7
10. Help Key . . . . . 7
11. EXT 1 INPUT (PSG-A only) . . . . . 7
12. EXT 2 INPUT (PSG-A only) . . . . . 8
13. LF OUTPUT (PSG-A only) . . . . . 8
14. Mod On/Off Key (PSG-A only) . . . . . 8
15. ALC INPUT . . . . . 8
16. RF On/Off Key . . . . . 8
17. Numeric Keypad . . . . . 8
18. RF OUTPUT . . . . . 9
19. PULSE SYNC OUT (PSG-A only) . . . . . 9
20. PULSE VIDEO OUT (PSG-A only) . . . . . 9
21. Line Power LED . . . . . 9
22. Power Switch . . . . . 9
23. Standby LED . . . . . 9
24. Incr Set Key . . . . . 9
25. PULSE/TRIGGER GATE INPUT (PSG-A only) . . . . . 10
26. Arrow Keys . . . . . 10
27. Hold Key . . . . . 10
28. Return Key . . . . . 10
29. Display Contrast Decrease Key . . . . . 10
30. Display Contrast Increase Key . . . . . 10
31. Local Key . . . . . 10
32. Preset Key . . . . . 10

# Contents


Front Panel Display . . . . . 11
1. Active Entry Area . . . . . 12
2. Frequency Area . . . . . 12
3. Annunciators . . . . . 12
4. Amplitude Area . . . . . 14
5. Error Message Area . . . . . 14
6. Text Area . . . . . 14
7. Softkey Label Area . . . . . 14
Rear Panel . . . . . 15
1. AC Power Receptacle . . . . . 15
2. GPIB . . . . . 15
3. AUXILIARY INTERFACE . . . . . 16
4. 10 MHz IN . . . . . 16
5. LAN . . . . . 16
6. 10 MHz OUT . . . . . 16
7. SWEEP OUT . . . . . 16
8. SOURCE MODULE . . . . . 16
9. TRIGGER OUT . . . . . 17
10. TRIGGER IN . . . . . 17
11. SOURCE SETTLED OUTPUT . . . . . 17

**2. Fundamental Operation . . . . . 19**
Configuring the RF Output . . . . . 20
Configuring a Continuous Wave RF Output . . . . . 20
Configuring a Swept RF Output . . . . . 24
Using the Signal Generator with a MM-Wave Source Module . . . . . 29
Configuring Analog Modulation (PSG-A Series Only) . . . . . 33
AM, FM, and ΦM Sources . . . . . 33
Pulse Sources . . . . . 34
Configuring AM . . . . . 35
Configuring FM . . . . . 37
Configuring ΦM . . . . . 38
Configuring Pulse Modulation . . . . . 40
Configuring the LF Output (PSG-A Series Only) . . . . . 41
Configuring the LF Output with an Internal Modulation Source . . . . . 42
Configuring the LF Output with a Function Generator Source . . . . . 43

Using Data Storage Functions . . . . . 44
Using the Memory Catalog. . . . . 44
Using the Instrument State Register . . . . . 46
Using Table Editors . . . . . 49
Table Editor Softkeys . . . . . 50
Modifying Items in the Table Editor . . . . . 50
Configuring for Remote Control . . . . . 51
Configuring for a GPIB Interface. . . . . 51
Configuring for a LAN (10BASE-T) Interface. . . . . 51
Configuring for an RS-232 Interface . . . . . 52

**3. Optimizing Performance . . . . . 53**
Using External Leveling . . . . . 54
Leveling with Detectors and Couplers/Splitters . . . . . 54
Leveling with a Millimeter-Wave Source Module . . . . . 58
Creating and Applying User Flatness Correction . . . . . 59
Creating a User Flatness Correction Array . . . . . 59
Creating a User Flatness Correction Array Using a MM-Wave Source Module. . . . 66
ALC Bandwidth Selection . . . . . 74

**4. Solving Problems . . . . . 75**
If You Encounter a Problem. . . . . 76
Can't Turn Off Help Mode . . . . . 76
No RF Output . . . . . 76
No Modulation at the RF Output. . . . . 76
RF Output Power too Low . . . . . 77
Signal Loss Occurs While Working with Mixers. . . . . 78
Signal Loss Occurs While Working with Spectrum Analyzers. . . . . 80
Sweep Appears to be Stalled . . . . . 82
Cannot Turn Off Sweep Mode . . . . . 82
Incorrect List Sweep Dwell Time. . . . . 83
Recalled a Register and Sweep List is Missing. . . . . 83
All of the Registers Where You Previously Stored Instrument States are Empty . . 84
Saved an Instrument State in a Register but the Register is Empty or Contains the Wrong State. . . . . 84
The Power Supply has Shut Down . . . . . 84
Signal Generator is Locked Up . . . . . 85
Upgrading Firmware . . . . . 87
Returning a Signal Generator to Agilent Technologies . . . . . 88

# Contents

**5. Key Reference . . . . . 91**
Symbols . . . . . 92
# Points . . . . . 92
ΦM Dev . . . . . 92
ΦM Dev Couple . . . . . 93
ΦM Off On . . . . . 93
ΦM Path 1 2 . . . . . 94
ΦM Rate . . . . . 94
ΦM Source . . . . . 95
ΦM Start Rate . . . . . 95
ΦM Stop Rate . . . . . 96
ΦM Sweep Rate . . . . . 96
ΦM Sweep Trigger . . . . . 97
ΦM Tone 1 Rate . . . . . 97
ΦM Tone 2 Ampl Percent Of Peak . . . . . 98
ΦM Tone 2 Rate . . . . . 98
ΦM Waveform . . . . . 99
Numerics . . . . . 100
1 kHz . . . . . 100
10 kHz . . . . . 100
100 Hz . . . . . 100
100 kHz . . . . . 101
125 Hz . . . . . 101
25 Hz . . . . . 101
55 Hz . . . . . 102
300 . . . . . 102
300 Hz . . . . . 102
1200 . . . . . 103
2400 . . . . . 103
4800 . . . . . 103
650 Hz . . . . . 104
9600 . . . . . 104
19200 . . . . . 104
38400 . . . . . 105
57600 . . . . . 105

A . . . . . 106
Abort . . . . . 106
Abort Cal . . . . . 106
Add Comment To Seq[n] Reg[nn] . . . . . 106
Adjust Phase . . . . . 107
ALC BW . . . . . 107
ALC Off On . . . . . 108
All . . . . . 108
AM . . . . . 108
AM Depth . . . . . 109
AM Depth Couple Off On . . . . . 109
AM Mode Normal Deep . . . . . 109
AM Off On . . . . . 110
AM Path 1 2 . . . . . 110
AM Rate . . . . . 111
AM Source . . . . . 111
AM Start Rate . . . . . 112
AM Stop Rate . . . . . 112
AM Sweep Rate . . . . . 112
AM Sweep Trigger . . . . . 113
AM Tone 1 Rate . . . . . 113
AM Tone 2 Ampl Percent Of Peak . . . . . 113
AM Tone 2 Rate . . . . . 114
AM Type Lin Exp . . . . . 114
AM Waveform . . . . . 114
Ampl . . . . . 115
Ampl Offset . . . . . 115
Ampl Ref Off On . . . . . 116
Ampl Ref Set . . . . . 116
Ampl Start . . . . . 117
Ampl Stop . . . . . 117
Amplitude . . . . . 118
Atten/ALC Control . . . . . 118
Atten Hold Off On . . . . . 119
Auto . . . . . 119

# Contents


B . . . . . 120
Binary . . . . . 120
Black Pixels Screen Test . . . . . 120
Brightness . . . . . 120
Bus . . . . . 121
C . . . . . 122
Catalog Type . . . . . 122
Clear Error Queue(s) . . . . . 122
Clear Text . . . . . 123
Configure Cal Array . . . . . 123
Configure List Sweep . . . . . 124
Configure Step Array . . . . . 124
Configure Step Sweep . . . . . 125
Confirm Delete . . . . . 125
Confirm Delete Of All files . . . . . 125
Confirm Load From Step Sweep . . . . . 126
Confirm Preset . . . . . 126
Copy File . . . . . 126
D . . . . . 127
DC . . . . . 127
DCFM/DCΦM Cal . . . . . 127
Delete All Binary Files . . . . . 128
Delete All <catalog type> Files . . . . . 128
Delete All Files . . . . . 129
Delete All List Files . . . . . 129
Delete All Regs in Seq [n] . . . . . 129
Delete All Sequences . . . . . 130
Delete All State Files . . . . . 130
Delete All UFLT Files . . . . . 130
Delete File . . . . . 131
Delete Item . . . . . 131
Delete Row . . . . . 131
Delete Seq[n] Reg[nn] . . . . . 132
Diagnostic Info . . . . . 132
Display . . . . . 133
Do Cal . . . . . 134

Done . . . 134
Do Power Search . . . 134
Dual-Sine . . . 135
Dwell Type List Step . . . 135
E . . . 136
E4416A . . . 136
E4417A . . . 136
E4418B . . . 136
E4419B . . . 137
Edit Comment In Seq[n] Reg[nn] . . . 137
Edit Item . . . 137
Editing Keys . . . 138
Editing Mode Insert Replace . . . 138
Error Info . . . 138
Ext . . . 139
Ext Coupling DC AC . . . 139
Ext Detector . . . 140
Ext Detector Coupling Factor . . . 140
Ext Impedance 50 Ohm 600 Ohm . . . 140
Ext Polarity Normal Inverted . . . 141
Ext Pulse . . . 141
Ext1 . . . 141
Ext2 . . . 142
External Ref Bandwidth . . . 142
F . . . 143
Flatness Off On . . . 143
FM/ΦM . . . 143
FM ΦM Normal High BW . . . 144
FM Dev . . . 145
FM Dev Couple Off On . . . 146
FM Off On . . . 146
FM Path 1 2 . . . 147
FM Rate . . . 147
FM Source . . . 148
FM Start Rate . . . 148
FM Stop Rate . . . 149
FM Sweep Rate . . . 149
FM Sweep Trigger . . . 149

# Contents


FM Tone 1 Rate . . . . . 150
FM Tone 2 Ampl Percent Of Peak . . . . . 150
FM Tone 2 Rate . . . . . 150
FM Waveform . . . . . 151
Free Run . . . . . 151
Freq . . . . . 152
Freq Multiplier . . . . . 152
Freq Offset . . . . . 153
Freq Ref Off On . . . . . 153
Freq Ref Set . . . . . 154
Freq Start . . . . . 154
Freq Stop . . . . . 154
Freq & Ampl . . . . . 155
Frequency . . . . . 155
Function Generator 1 . . . . . 155
Function Generator 2 . . . . . 156
G . . . . . 157
Gaussian . . . . . 157
Goto Bottom Row . . . . . 157
Goto Middle Row . . . . . 157
Goto Row . . . . . 158
Goto Top Row . . . . . 158
GPIB Address . . . . . 158
GPIB/RS-232 LAN . . . . . 159
GPIB Listener Mode . . . . . 159
H . . . . . 160
Help . . . . . 160
Help Mode Single Cont . . . . . 160
Hold . . . . . 161
Hostname . . . . . 161
I . . . . . 162
Incr Set . . . . . 162
Insert Item . . . . . 162
Insert Row . . . . . 162
Installed Board Info . . . . . 163
Instrument Adjustments . . . . . 164

Instrument Info/Help Mode . . . . . 164
Int Doublet . . . . . 165
Int Free-Run . . . . . 165
Int Gated . . . . . 166
Int Triggered . . . . . 167
Internal . . . . . 167
Internal 1. . . . . 168
Internal 2. . . . . 168
Internal Monitor 1 . . . . . 168
Internal Monitor 2 . . . . . 169
Internal Ref Bandwidth . . . . . 169
Internal Square. . . . . 169
Inverse Video Off On. . . . . 170
IP Address . . . . . 170
K . . . . . 171
Keep Previous Comment . . . . . 171
L . . . . . 172
LAN Setup. . . . . 172
Leveling Mode . . . . . 172
LF Out . . . . . 172
LF Out Amplitude Into 50 Ohms. . . . . 173
LF Out Freq . . . . . 173
LF Out Off On . . . . . 173
LF Out Source. . . . . 174
LF Out Start Freq. . . . . 175
LF Out Stop Freq . . . . . 175
LF Out Sweep Rate. . . . . 176
LF Out Sweep Trigger . . . . . 176
LF Out Tone 1 Freq. . . . . 177
LF Out Tone 2 Ampl % Of Peak . . . . . 177
LF Out Tone 2 Freq. . . . . 178
LF Out Waveform . . . . . 178
List. . . . . 179
Load Cal Array From Step Array . . . . . 179
Load From Selected File. . . . . 179
Load List From Step Sweep . . . . . 180
Load/Store . . . . . 180
Local . . . . . 180
Loop Selected Tests. . . . . 181

# Contents


M . . . . . 182
Manual Mode Off On . . . . . 182
Manual Point . . . . . 182
Meter Address . . . . . 183
Meter Channel A B . . . . . 183
Meter Timeout . . . . . 183
Memory Catalog . . . . . 184
Mod On/Off . . . . . 184
Mod Status Info Off On . . . . . 185
N . . . . . 186
Negative . . . . . 186
Noise . . . . . 186
Numeric Keypad . . . . . 187
O . . . . . 188
Off . . . . . 188
Options Info . . . . . 189
P . . . . . 190
Page Down . . . . . 190
Page Up . . . . . 190
Phase Ref Set . . . . . 190
Point Trigger . . . . . 191
Positive . . . . . 191
Power Meter . . . . . 191
Power On Last Preset . . . . . 192
Power On/Preset . . . . . 192
Power Search . . . . . 193
Power Search Manual Auto . . . . . 193
Preset . . . . . 193
Preset List . . . . . 194
Preset Normal User . . . . . 194
Pulse . . . . . 194
Pulse Delay . . . . . 195
Pulse Off On . . . . . 195
Pulse Period . . . . . 196
Pulse Rate . . . . . 196
Pulse Source . . . . . 197
Pulse Width . . . . . 197

R . . . . . 198
Ramp . . . . . 198
Recall . . . . . 198
Recall Ref Osc Setting . . . . . 199
Recall Reg . . . . . 199
Ref Osc Coarse . . . . . 199
Ref Osc Fine . . . . . 200
Ref Oscillator Source Auto Off On . . . . . 200
Reference Oscillator Adjustment . . . . . 200
Rename File . . . . . 201
Re-SAVE Seq[n] Reg [n] . . . . . 201
Reset RS-232 . . . . . 201
Restore Factory Defaults . . . . . 202
Return . . . . . 202
RF On/Off . . . . . 202
RS-232 Baud Rate . . . . . 203
RS-232 Echo Off On . . . . . 203
RS-232 Setup . . . . . 203
RS-232 Timeout . . . . . 204
Run Complete Self Test . . . . . 204
Run Highlighted Tests . . . . . 204
Run Selected Tests . . . . . 205
S . . . . . 206
Save . . . . . 206
Save Reg . . . . . 206
Save Seq[n] Reg[nn] . . . . . 207
Save User Preset . . . . . 207
Screen Saver Delay: . . . . . 208
Screen Saver Mode . . . . . 208
Screen Saver Off On . . . . . 209
Select/Deselect All . . . . . 209
Select/Deselect Test . . . . . 209
Select Reg . . . . . 210
Select Reg: . . . . . 210
Select Seq: . . . . . 211
Self Test . . . . . 211
Set ALC Level . . . . . 211
Set Atten . . . . . 212

# Contents


Sine . . . . . 212
Single Sweep . . . . . 212
Source Module . . . . . 213
Source Module Off On . . . . . 213
Square . . . . . 213
State . . . . . 214
Step Dwell . . . . . 214
Step/Knob Ratio . . . . . 215
Store to File . . . . . 215
Store Ref Osc Setting . . . . . 216
Sweep . . . . . 216
Sweep Direction Down Up . . . . . 216
Sweep Repeat Single Cont . . . . . 217
Sweep Trigger . . . . . 217
Sweep Type List Step . . . . . 218
Sweep/List . . . . . 218
Swept-Sine . . . . . 219
T . . . . . 220
Trans/Recv Pace None Xon . . . . . 220
Triangle . . . . . 220
Trigger . . . . . 221
Trigger Key . . . . . 221
Trigger In Polarity Neg Pos . . . . . 222
Trigger Out Polarity Neg Pos . . . . . 222
U . . . . . 223
Uniform . . . . . 223
Utility . . . . . 223
Update in Remote Off On . . . . . 224
User Flatness . . . . . 224
V . . . . . 225
View Details . . . . . 225
View Next Error Message . . . . . 225
View Previous Error Message . . . . . 226
View Test Info . . . . . 226
W . . . . . 227
White Pixels Screen Test . . . . . 227

**6. Menu Maps . . . . . 229**
AM. . . . . 230
Amplitude . . . . . 232
*FM/ΦM . . . . . 235
FM/ΦM* . . . . . 237
Frequency . . . . . 239
LF Output . . . . . 240
Pulse Modulation . . . . . 242
Recall . . . . . 243
Save . . . . . 244
Sweep/List . . . . . 245
Utility . . . . . 247

# Contents

# 1 Signal Generator Overview

# Signal Generator Models and Features

The PSG Family comprises two series, the PSG-A and PSG-L. The PSG-A Series provides analog modulation in addition to continuous wave (CW) signals. The PSG-L Series provides CW signals only. Table 1-1 lists the PSG-A and PSG-L Series model numbers and their frequency ranges.

**Table 1-1 Signal Generator Model Numbers**

| PSG-A Series | PSG-L Series | Frequency Range |
|---|---|---|
| E8251A | E8241A | 250 kHz to 20 GHz |
| E8254A | E8244A | 250 kHz to 40 GHz |

## PSG-L Series Features

The PSG-L Series includes the following features:

- CW output from 250 kHz to 20 GHz (E8241A) or 40 GHz (E8244A)
- list and step sweep of frequency and amplitude, with multiple trigger sources
- external diode detector leveling
- user flatness correction
- automatic leveling control (ALC) on and off modes; power calibration in ALC-off mode is available, even without power search
- 10 MHz reference oscillator with external output
- GPIB, RS-232, and 10 base-T LAN input/output interfaces
- a millimeter head interface that is compatible with Agilent 83550 Series millimeter heads (for frequency extension up to 110 GHz)

## PSG-A Series Features

The PSG-A Series provides all the functionality of the PSG-L and adds the following features:

- closed-loop AM
- dc-synthesized FM to 10 MHz rates; deviation depends on the carrier frequency
- phase modulation
- pulse modulation
- a dual function generator that includes the following features:
  - — 50Ω low frequency output, 0 to 3 $V_p$
  - — selectable waveforms: sine, square, positive ramp, negative ramp, triangle, gaussian noise, uniform noise, swept-sine, and dual-sine
  - — variable frequency modulation rates
  - — variable triggering in list and step sweep modes: auto, external, single, or remote
- a pulse generator that includes the following features:
  - — external pulse
  - — internal square wave
  - — selectable internal pulse modes: free-run, triggered (with delay), doublet, and gated; triggered (with delay), doublet, and gated require an external trigger source
  - — adjustable pulse width
  - — adjustable pulse period
  - — adjustable pulse delay
- external modulation inputs for AM, FM, and ΦM
- simultaneous modulation configurations

# Options

Table 1-2 and Table 1-3 show the available hardware and accessory options for both the PSG-A and PSG-L Series signal generators.

**Table 1-2 Signal Generator Hardware Options**

| Option | Description |
|---|---|
| 1E1 | add output step attenuator |
| 1EA | add high RF output power |
| 1ED | add Type-N RF output connector (20 GHz models only) |
| UNJ | add improved close-in phase noise |
| W50 | add 5-year warranty |

**Table 1-3 Signal Generator Accessory Options**

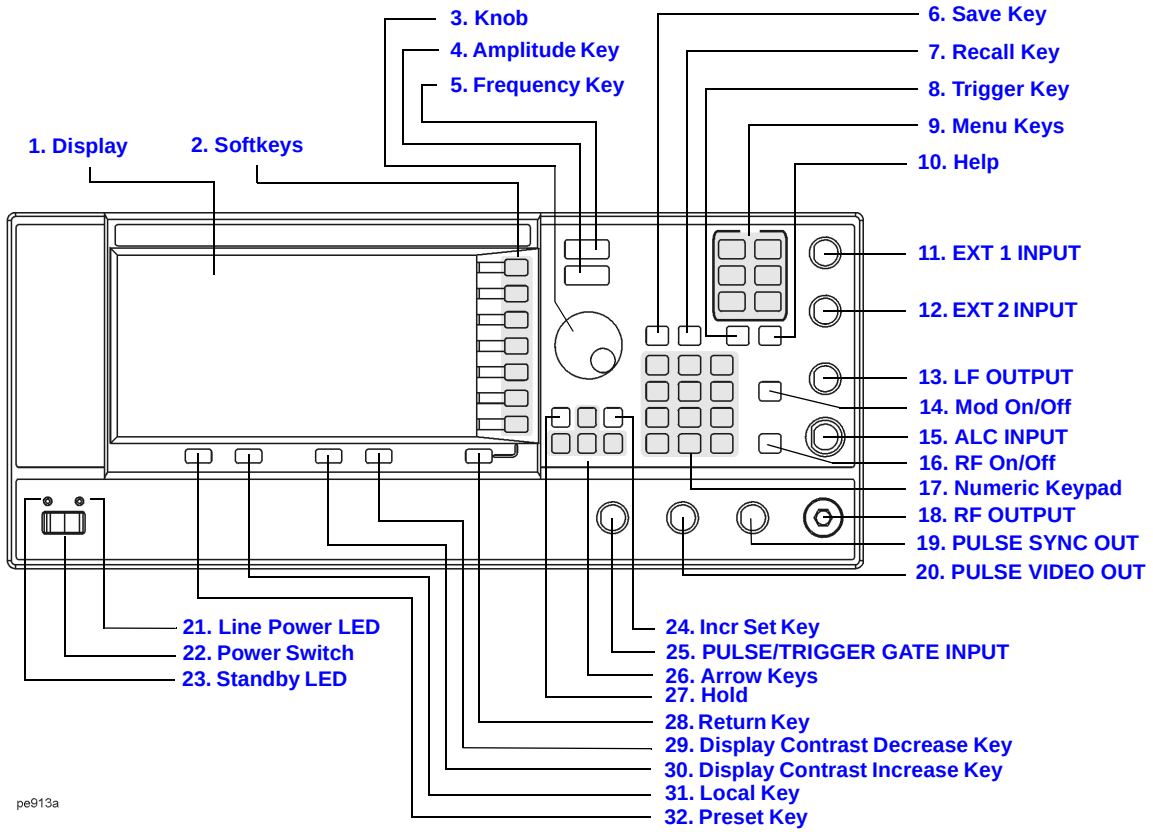
| Option | Description |
|---|---|
| ABA | PSG Documentation Set (English Language) |
| CD1 | CD-ROM Documentation (PDFs of Options ABA & OBW) |
| 0BW | add assembly-level service manual |
| 1CM | add rack mount kit |
| 1CN | add front handle kit |
| 1CP | add rack mount kit with handles |
| UK6 | commercial calibration certificate with test data |

# Front Panel

Figure 1-1 shows the PSG-A signal generator front panel. This interface enables you to define, monitor, and manage input and output characteristics. Although Figure 1-1 shows the PSG-A Series front panel, descriptions are valid for both PSG Series.

The PSG-L Series front panel has fewer connectors and menu hardkeys. Connector descriptions that do not apply to the PSG-L Series front panel are specified as “PSG-A only”.

**Figure 1-1 Front Panel Diagram (PSG-A Series shown)**



## 1. Display

The LCD screen provides information on the current function. Information can include status indicators, frequency and amplitude settings, and error messages. Labels for the softkeys are located on the right-hand side of the display. For further description of the front panel display, refer to "Front Panel Display" on page 11.

## 2. Softkeys

These softkeys activate the function indicated by the corresponding label on the display. Corresponding menu labels appear directly to the left of each key.

## 3. Knob

Rotating the knob increases or decreases a numeric value or changes a highlighted digit or character. You can also use the knob to step through lists or select items in a row.

## 4. Amplitude Key

Pressing this hardkey makes amplitude the active function. You can change the RF output amplitude or use the menus to configure amplitude attributes such as power search, user flatness, and leveling mode.

## 5. Frequency Key

Pressing this hardkey makes frequency the active function. You can change the RF output frequency or use the menus to configure frequency attributes such as frequency multiplier, offset, and reference.

## 6. Save Key

This hardkey accesses a menu of choices enabling you to save data in the instrument state register. The instrument state register is a section of memory divided into 10 sequences (numbered 0 through 9) each containing 100 registers (numbered 00 through 99). It is used to store and recall frequency, amplitude, and, for PSG-A Series signal generators, modulation settings. It provides a quick alternative to reconfiguring the signal generator via the front panel or SCPI commands when switching between different signal configurations. Once an instrument state has been saved, all of the frequency, amplitude, and modulation settings can be recalled with the **Recall** hardkey.

## 7. Recall Key

This hardkey restores any instrument state that you previously saved in a memory register.

## 8. Trigger Key

This hardkey initiates an immediate trigger event, for a function such as a list or step sweep. The trigger mode must be set to **Trigger Key** prior to initiating a trigger event with this hardkey.

## 9. Menu Keys

These hardkeys access softkey menus enabling configuration of list and step sweeps, utility functions, the LF output, and various analog modulation types.

## 10. Help Key

Press this hardkey to view a short description of any hardkey or softkey. There are two help modes available on the signal generator, single and continuous; single mode is the factory preset condition.

- In single mode, when you press the **Help** key, help text is provided for the next key you press without activating the key's function. Any key pressed afterward exits the help mode and its function is activated.
- In continuous mode, when you press the **Help** key, help text is provided for each subsequent key press until you press the **Help** key again or change to single mode. In addition, each key is active, meaning that the key function is executed (except for the Preset key).

Toggle between single and continuous mode by pressing **Utility > Instrument Info/Help Mode > Help Mode Single Cont**.

## 11. EXT 1 INPUT (PSG-A only)

This BNC input connector accepts a ±1 $V_p$ signal for AM, FM, and ΦM. For all these modulations, ±1 $V_p$ produces the indicated deviation or depth. When ac-coupled inputs are selected for AM, FM, or ΦM and the peak input voltage differs from 1 $V_p$ by more than 3%, the HI/LO annunciators light on the display. The input impedance is selectable as either 50Ω or 600Ω and the damage levels are 5 $V_{rms}$ and 10 $V_p$.

## 12. EXT 2 INPUT (PSG-A only)

This BNC input connector accepts a ±1 $V_p$ signal for AM, FM, ΦM, and pulse modulation. With AM, FM, or ΦM, ±1 $V_p$ produces the indicated deviation or depth. With pulse modulation, +1 V is on and 0 V is off.

When ac-coupled inputs are selected for AM, FM, or ΦM and the peak input voltage differs from 1 $V_p$ by more than 3%, the HI/LO annunciators light on the display. The input impedance is selectable as either 50Ω or 600Ω and damage levels are 5 $V_{rms}$ and 10 $V_p$.

## 13. LF OUTPUT (PSG-A only)

This BNC connector is the output for modulation signals generated by the low frequency (LF) source function generator. This output is capable of driving 3 $V_p$ (nominal) into a 50Ω load.

## 14. Mod On/Off Key (PSG-A only)

This hardkey toggles the operating state of all modulation signals. Although you can set up and enable various modulation states, the RF carrier is not modulated until **Mod On/Off** is set to On. An annunciator is always present in the display to indicate whether modulation is turned on or off.

## 15. ALC INPUT

This connector is used for negative external detector leveling. This connector accepts an input of –0.2 mV to –0.5 V. The nominal input impedance is 120 kΩ and the damage level is ±15 V.

## 16. RF On/Off Key

This hardkey toggles the operating state of the RF signal present at the RF OUTPUT connector. An annunciator is always visible in the display to indicate whether the RF is turned on or off.

## 17. Numeric Keypad

The numeric keypad consists of the 0 through 9 hardkeys, a decimal point hardkey, and a backspace hardkey ( +/– ← ). The backspace hardkey enables you to backspace or specify a negative value. When specifying a negative numeric value, the negative sign must be entered prior to entering the numeric value.

## 18. RF OUTPUT

This connector is the output for RF signals. The nominal output impedance is 50Ω. The damage levels are 0 Vdc, 0.5 watts nominal.

## 19. PULSE SYNC OUT (PSG-A only)

This connector outputs a sychronizing TTL-compatible signal that is nominally 50 ns wide during internal and triggered pulse modulation. The nominal source impedance is 50Ω.

## 20. PULSE VIDEO OUT (PSG-A only)

This connector outputs a TTL-level compatible signal that follows the RF output envelope in all pulse modes. The nominal source impedance is 50Ω.

## 21. Line Power LED

This green LED indicates when the signal generator power switch is set to the on position.

## 22. Power Switch

This switch activates full power to the signal generator when set to the on position, and deactivates all signal generator functions when in standby mode. In standby mode, the signal generator remains connected to the line power and power is supplied to some internal circuits.

## 23. Standby LED

This yellow LED indicates when the signal generator power switch is set to the standby condition.

## 24. Incr Set Key

This hardkey enables you to set the increment value of the current active function. When this hardkey is pressed, the increment value of the current active function will appear in the active entry area of the display. Use the numeric keypad, arrow hardkeys, or the knob to adjust the increment value.

## 25. PULSE/TRIGGER GATE INPUT (PSG-A only)

This connector accepts an externally supplied TTL-compatible signal for use as a pulse or trigger input. The damage levels are ±5 $V_{rms}$ and 10 $V_p$. The nominal input impedance is 50Ω.

## 26. Arrow Keys

The up and down arrow hardkeys are used to increase or decrease a numeric value, step through displayed lists, or to select items in a row of a displayed list. Individual digits or characters may be highlighted using the left and right arrow hardkeys. Once an individual digit or character is highlighted, its value can be changed using the up and down arrow hardkeys.

## 27. Hold Key

This hardkey blanks the softkey label area and text areas on the display. Softkeys, arrow hardkeys, the knob, the numeric keypad, and the **Incr Set** hardkey have no effect once this hardkey is pressed.

## 28. Return Key

This hardkey will return you one level back from your current softkey menu level to the previous softkey menu level. It enables you to step back through the menus until you reach the first menu you selected.

## 29. Display Contrast Decrease Key

This hardkey, when pressed or held, causes the display background to darken.

## 30. Display Contrast Increase Key

This hardkey, when pressed or held, causes the display background to lighten.

## 31. Local Key

This hardkey is used to deactivate remote operation and return the signal generator to front panel control.

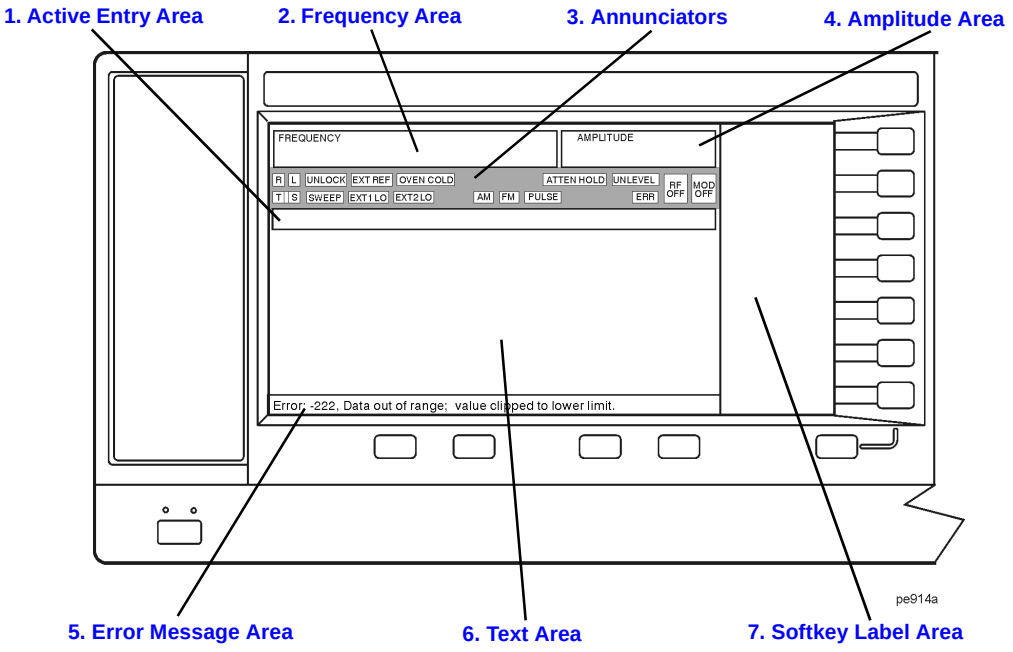
## 32. Preset Key

This hardkey is used to set the signal generator to a known state (factory or user-defined).

# Front Panel Display

Figure 1-2 shows the front panel display. The LCD screen will display data fields, annotations, key press results, softkey labels, error messages, and annunciators that represent various active functions of the signal generator. Descriptions are provided for each feature of this interface.

**Figure 1-2 Front Panel Display Diagram**



## 1. Active Entry Area

The current active function is shown in this area. For example, if frequency is the active function, the current frequency setting will be displayed here. If the current active function has an increment value associated with it, that value is also displayed.

## 2. Frequency Area

The current frequency setting is shown in this portion of the display. Indicators are also displayed in this area when the frequency offset or multiplier is used, the frequency reference mode is turned on, a source module is enabled, or an external frequency is used.

## 3. Annunciators

The display annunciators show the status of some of the signal generator functions, and indicate any error conditions. An annunciator position may be used by more than one function. This does not create a problem, because only one function that shares an annunciator position can be active at a time.

| | |
|---|---|
| ΦM | This annunciator appears when phase modulation is turned on. If frequency modulation is turned on, the FM annunciator will replace ΦM. |
| ALC OFF | This annunciator appears when the ALC circuit is disabled. A second annunciator, UNLEVEL, will appear in the same position if the ALC is enabled and is unable to maintain the output level. |
| AM | This annunciator appears when amplitude modulation is turned on. |
| ARMED | This annunciator appears when a sweep has been initiated and the signal generator is waiting for the sweep trigger event. |
| ATTEN HOLD | This annunciator appears when the attenuator hold function is turned on. When this function is on, the attenuator is held at its current setting. |
| ERR | This annunciator appears when an error message is placed in the error queue. This annunciator will not turn off until you have either viewed all of the error messages or cleared the error queue. You can access error messages by pressing **Utility > Error Info**. |
| EXT | This annunciator appears when external leveling is turned on. |
| EXT1 LO/HI | This annunciator is displayed as either EXT1 LO or EXT1 HI. This annunciator appears whenever the ac-coupled signal to the EXT 1 INPUT is less than 0.97 $V_p$ or greater than 1.03 $V_p$. |

| | |
|---|---|
| EXT2 LO/HI | This annunciator is displayed as either EXT2 LO or EXT2 HI. This annunciator appears whenever the ac-coupled signal to the EXT 2 INPUT is less than 0.97 $V_p$ or greater than 1.03 $V_p$. |
| EXT REF | This annunciator appears when an external frequency reference is applied. |
| FM | This annunciator appears when frequency modulation is turned on. If phase modulation is turned on, the ΦM annunciator will replace FM. |
| L | This annunciator appears when the signal generator is in listener mode and is receiving information or commands over the GPIB interface. |
| MOD ON/OFF | This annunciator indicates if the RF carrier is modulated (MOD ON), or if the modulation is off (MOD OFF). Either condition of this annunciator is always visible in the display. |
| OVEN COLD | This annunciator appears when the temperature of the internal oven reference oscillator has dropped below an acceptable level. When this annunciator is on, frequency accuracy is degraded. This condition should occur only if the signal generator is disconnected from line power. The annunciator is timed, and automatically turns off after a specified period. |
| PULSE | This annunciator appears when pulse modulation is turned on. |
| R | This annunciator appears when the signal generator is in remote GPIB operation. |
| RF ON/OFF | This annunciator indicates when the RF signal is present (RF ON) at the RF OUTPUT, or if the RF signal is not present (RF OFF) at the RF OUTPUT. Either condition of this annunciator is always visible in the display. |
| S | This annunciator appears when the signal generator has generated a service request (SRQ) over the GPIB interface. |
| SWEEP | This annunciator appears when the signal generator is sweeping in list or step mode. |
| T | This annunciator appears when the signal generator is in talker mode and is transmitting information over the GPIB interface. |
| UNLEVEL | This annunciator appears when the signal generator is unable to maintain the correct output level. The UNLEVEL annunciator is not necessarily an indication of instrument failure. Unleveled conditions can occur during normal operation. A second annunciator, ALC OFF, will appear in the same position when the ALC circuit is disabled. |
| UNLOCK | This annunciator appears when any of the phase locked loops are unable to maintain phase lock. You can determine which loop is unlocked by examining the error messages. |

## 4. Amplitude Area

The current output power level setting is shown in this portion of the display. Indicators are also displayed in this area when amplitude offset is used, amplitude reference mode is turned on, external leveling mode is enabled, a source module is enabled, and when user flatness is enabled.

## 5. Error Message Area

Abbreviated error messages are reported in this space. When multiple error messages occur, only the most recent message remains displayed. Reported error messages with details can be viewed by pressing **Utility** > **Error Info**.

## 6. Text Area

This area of the display is used to show status information about the signal generator such as the modulation status, sweep lists, and file catalogs. This area also enables you to perform functions such as managing information, entering information, and displaying or deleting files.

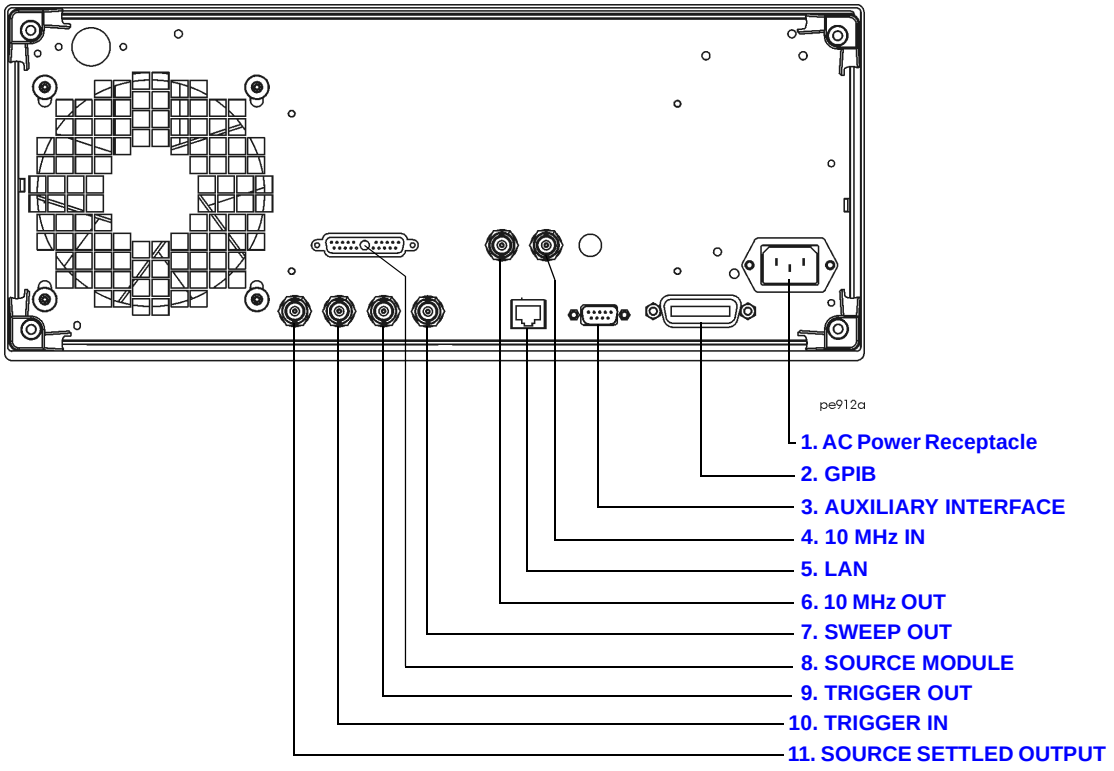
## 7. Softkey Label Area

The labels in this area define the function of the softkeys located immediately to the right of the label. The softkey label will change depending upon the function selected.

# Rear Panel

Figure 1-3 shows the signal generator rear panel. The signal generator rear panel provides input, output, and remote interface connections. Descriptions are provided for each characteristic of the rear panel.

**Figure 1-3 Rear Panel Diagram**




## 1. AC Power Receptacle

The line voltage is connected here. The power cord receptacle accepts a three-pronged power cable that is shipped with the signal generator.

## 2. GPIB

The GPIB interface allows listen and talk capability with compatible IEEE 488.2 devices.

## 3. AUXILIARY INTERFACE

This male DB-9 connector is an RS-232 serial port that can be used for controlling the signal generator remotely.

## 4. 10 MHz IN

This BNC connector accepts an external timebase reference input signal level of greater than –3 dBm. The reference must be 1, 2, 2.5, 5, or 10 MHz, within ±1 ppm. The signal generator detects when a valid reference signal is present at this connector and automatically switches from internal to external reference operation. The nominal input impedance is 50Ω.

For Option UNJ, this BNC connector accepts a signal with a nominal input level of 5 ±5 dBm. The external frequency reference must be 10 MHz, within ±1 ppm. The nominal input impedance is 50Ω with a damage level of ≥ 10 dBm.

## 5. LAN

The LAN interface allows ethernet local area network communication through a 10 base-T LAN cable. The yellow LED on the interface illuminates when data transmission (transfer/receive) is present. The green LED illuminates when there is a delay in data transmission or no data transmission is present.

## 6. 10 MHz OUT

This BNC connector outputs a nominal signal level of > +4 dBm and has an output impedance of 50Ω. The accuracy is determined by the timebase used, whether internal or external.

## 7. SWEEP OUT

This BNC connector provides a voltage range of 0 to +10 V. When the signal generator is in list or step sweep mode, the SWEEP OUT signal ranges from 0 V at the beginning of the sweep to +10 V at the end of the sweep regardless of the sweep width. In CW mode this connector has no output. The output impedance is less than 1Ω and can drive a 2 kΩ load.

## 8. SOURCE MODULE

Use this interface for connecting to compatible Agilent 83550 Series mm-wave source modules.

## 9. TRIGGER OUT

This BNC connector outputs a TTL signal that is high at the start of a dwell sequence or when waiting for a point trigger in manual sweep mode. The signal is low when the dwell is over, or when a point trigger is received. The low-frequency (LF) sweep trigger output can be a high or low 4 µs pulse.

## 10. TRIGGER IN

This BNC connector accepts a TTL signal used for point-to-point triggering in manual sweep mode or a low-frequency (LF) sweep in external sweep mode. Triggering can occur on either the positive or negative edge of the TTL signal start. The damage level is ≤ –4 V or ≥ +10 V.

## 11. SOURCE SETTLED OUTPUT

This BNC connector provides an open-collector output indicating when the signal generator has settled to a new frequency or power level. A high pulse indicates that the source has settled.

# 2 Fundamental Operation

# Configuring the RF Output

This section will show you how to create continuous wave and swept RF outputs.

## Configuring a Continuous Wave RF Output

Using these procedures, you will learn how to set the following parameters:

- RF output frequency
- frequency reference and frequency offset
- RF output amplitude
- amplitude reference and amplitude offset

### Setting the RF Output Frequency

1. Press **Preset**.

   This returns the signal generator to the factory-defined instrument state.

**NOTE** You can change the preset conditions to a user-defined instrument state. However, for the purpose of these examples, use the factory-defined preset state (the **Preset Normal User** softkey in the Utility menu must be set to Normal).

2. Observe the FREQUENCY area of the display (in the upper left-hand corner).

   The value displayed is the maximum specified frequency of your signal generator.

3. Press **RF On/Off**.

   The **RF On/Off** hardkey must be pressed before the RF signal is available at the RF OUTPUT connector. The display annunciator changes from RF OFF to RF ON. The maximum specified frequency is now being output at the RF OUTPUT connector (at the signal generator's minimum power level).

4. Press **Frequency** > **700** > **MHz**.

   The new 700 MHz RF frequency is now displayed in the FREQUENCY area of the display and also in the active entry area.

5. Press **Frequency** > **Incr Set** > **1** > **MHz**.

   This changes the frequency increment value to 1 MHz.

6. Press the up arrow key.

   Each press of the up arrow key increases the frequency by the increment value last set with the **Incr Set** hardkey. The increment value is displayed in the active entry area.

7. The down arrow works like the up arrow. Practice stepping the frequency up and down in 1 MHz increments.

   You can also adjust the RF output frequency using the knob. As long as frequency is the active function (the frequency is displayed in the active entry area), the knob will increase and decrease the RF output frequency.

8. Use the knob to adjust the frequency back to 700 MHz.

### Setting the Frequency Reference and Frequency Offset

The following procedure sets the RF output frequency as a reference frequency to which all other frequency parameters are relative. The frequency initially shown on the display will be `0.00 Hz` (the frequency output by the hardware minus the reference frequency). Although the display changes, the frequency output does not change. Any subsequent frequency changes are shown as incremental or decremental to 0 Hz.

1. Press **Preset**.
2. Press **Frequency** > **700** > **MHz**.
3. Press **Freq Ref Set**.

   This activates the frequency reference mode and sets the current output frequency (700 MHz) as the reference value. The frequency displayed is `0.00 Hz` (the frequency output by the hardware, 700 MHz, minus the reference value, 700 MHz). The `REF` indicator is activated and the **Freq Ref Off On** softkey has toggled to On.

4. Press **RF On/Off**.

   The display annunciator has changed from `RF OFF` to `RF ON`. The RF frequency at the RF OUTPUT connector is 700 MHz.

5. Press **Frequency** > **Incr Set** > **1** > **MHz**.

   This changes the frequency increment value to 1 MHz.

6. Press the up arrow key.

   This increments the output frequency by 1 MHz. The frequency display changes to show 1 MHz (the frequency output by the hardware, 700 MHz + 1 MHz, minus the reference frequency, 700 MHz) and the output frequency changes to 701 MHz.

7. Press **Freq Offset** > **1** > **MHz**.

   This enters a 1 MHz offset. The frequency display shows `2.000 000 00 MHz` (the frequency output by the hardware, 701 MHz, minus the reference frequency, 700 MHz, plus the offset, 1 MHz). The `OFFS` indicator is activated. The frequency at the RF OUTPUT connector is still 701 MHz.

### Setting the RF Output Amplitude

1. Press **Preset**.
2. Observe the `AMPLITUDE` area of the display (in the upper middle of the display). The display reads the signal generator's minimum power level. This is the normal preset RF output amplitude.
3. Press **RF On/Off**.

   The display annunciator changes from `RF OFF` to `RF ON`. The RF signal is now being output at the minimum power level at the RF OUTPUT connector.

4. Press **Amplitude** > **–20** > **dBm**.

   This changes the amplitude to –20 dBm. The new –20 dBm RF output power is now displayed in the `AMPLITUDE` area of the display and also in the active entry area.

   Amplitude is still the active function until you press another front panel function key. You can also change the amplitude using the up and down arrow keys and the knob.

5. Practice changing the amplitude using the arrow keys and the knob.

### Setting the Amplitude Reference and Amplitude Offset

The following procedure sets the RF output power as an amplitude reference to which all other amplitude parameters are relative. The amplitude initially shown on the display will be 0 dB (the power output by the hardware minus the reference power). Although the display changes, the output power does not change. Any subsequent power changes are shown as incremental or decremental to 0 dB.

1. Press **Preset**.
2. Press **Amplitude** > **–20** > **dBm**.
3. Press **More (1 of 2)** > **Ampl Ref Set**.

   This activates the amplitude reference mode and sets the current output power (–20 dBm) as the reference value. The AMPLITUDE area displays 0.00 dB (the power output by the hardware, –20 dBm, minus the reference value, –20 dBm). The REF indicator is activated and the **Ampl Ref Off On** softkey has toggled to On.
4. Press **RF On/Off.**

   The display annunciator has changed from RF OFF to RF ON. The power at the RF OUTPUT connector is –20 dBm.
5. Press **Incr Set** > **10** > **dB**.

   This changes the amplitude increment value to 10 dB.
6. Use the up arrow key to increase the output power by 10 dB.

   The AMPLITUDE area displays 10.00 dB (the power output by the hardware, –20 dBm plus 10 dBm, minus the reference power, –20 dBm) and the output power changes to –10 dBm.
7. Press **Ampl Offset** > **10** > **dB**.

   This enters a 10 dB offset. The AMPLITUDE area displays 20.00 dB (the power output by the hardware, –10 dBm; minus the reference power, –20 dBm; plus the offset, 10 dB). The OFFS indicator is activated. The power at the RF OUTPUT connector is still –10 dBm.

## Configuring a Swept RF Output

The signal generator has two sweep types, step and list.

**NOTE** List sweep data cannot be saved within an instrument state, but *can* be saved to the memory catalog. For instructions on saving list sweep data, see "Storing Files" on page 45.

During swept RF output, the FREQUENCY and AMPLITUDE areas of the signal generator's display are deactivated, depending on what is being swept.

Following an explanation of the differences between step sweep and list sweep, you will learn two ways to configure the signal generator's RF output to sweep a defined set of frequency, amplitude, and dwell time points. You will create a step sweep and then you will use these points as the basis for a new list sweep.

### Step Sweep

Step sweep allows you to enter RF output start and stop frequencies and amplitudes, a number of equally spaced points (steps) to dwell upon, and the amount of dwell time at each point.

When a step sweep is activated, the signal generator will sweep the RF output based on the values entered for the parameters listed above. The frequency, amplitude, or frequency *and* amplitude of the RF output will sweep from the start amplitude/frequency to the stop amplitude/frequency, dwelling at equally spaced intervals defined by the **# Points** softkey value for the configured step dwell time.

Step sweep provides a linear progression through the start-to-stop frequency and/or amplitude values. You can toggle the direction of the sweep up or down. When the **Sweep Direction Down Up** softkey is set to Up, values are swept from the start frequency/amplitude to the stop frequency/amplitude. Set to Down, values are swept from the stop frequency/amplitude to the start frequency/amplitude.

### List Sweep

List sweep allows you to create a list of arbitrary frequency, amplitude, and dwell time values and sweep the RF output based on the entries in the List Mode Values table.

Unlike a step sweep that contains linear ascending/descending frequency and amplitude values spaced at equal intervals throughout the sweep, list sweep frequencies and amplitudes can be entered at unequal intervals and nonlinear ascending/descending or random order.

For convenience, the List Mode Values table can be copied from a previously configured step sweep. Each step sweep point's associated frequency, amplitude and dwell time values are entered into a row in the List Mode Values table, as the following example illustrates.

### Configuring and Activating a Single Step Sweep

In this procedure, you will create a step sweep with nine, equally spaced points and the following parameters:

- frequency range from 500 MHz to 600 MHz
- amplitude from –20 dBm to 0 dBm
- dwell time 500 ms at each point

1. Press **Preset**.
2. Press **Sweep/List**.

   This opens a menu of sweep softkeys.
3. Press **Sweep Repeat Single Cont**.

   This toggles the sweep repeat from continuous to single.
4. Press **Configure Step Sweep.**
5. Press **Freq Start** > **500** > **MHz**.

   This changes the start frequency of the step sweep to 500 MHz.
6. Press **Freq Stop** > **600** > **MHz**.

   This changes the stop frequency of the step sweep to 600 MHz.
7. Press **Ampl Start** > **–20** > **dBm**.

   This changes the amplitude level for the start of the step sweep.
8. Press **Ampl Stop** > **0** > **dBm**.

   This changes the amplitude level for the end of the step sweep.

9. Press **# Points** > **9** > **Enter**.

   This sets the number of sweep points to nine.

10. Press **Step Dwell** > **500** > **msec**.

    This sets the dwell time at each point to 500 milliseconds.

11. Press **Return** > **Sweep** > **Freq & Ampl**.

    This sets the step sweep to sweep both frequency and amplitude data. Selecting this softkey returns you to the previous menu and turns on the sweep function.

12. Press **RF On/Off**.

    The display annunciator changes from RF OFF to RF ON.

13. Press **Single Sweep**.

    A single sweep of the frequencies and amplitudes configured in the step sweep is executed and available at the RF OUTPUT connector. On the display, the SWEEP annunciator appears for the duration of the sweep and a progress bar shows the progression of the sweep. The **Single Sweep** softkey can also be used to abort a sweep in progress.

### Activating Continuous Step Sweep

Press **Sweep Repeat Single Cont**.

This toggles the sweep from single to continuous. A continuous repetition of the frequencies and amplitudes configured in the step sweep are now available at the RF OUTPUT connector. The SWEEP annunciator appears, indicating that the signal generator is sweeping, and progression of the sweep is shown by a progress bar.

### Configuring a List Sweep Using Step Sweep Data

In this procedure, you will leverage the step sweep points and change the sweep information by editing several points in the List Mode Values table editor. For information on using table editors, see "Using Table Editors" on page 49.

1. Press **Sweep Repeat Single Cont**.

   This toggles the sweep repeat from continuous to single. The SWEEP annunciator is turned off. The sweep will not occur until it is triggered.

2. Press **Sweep Type List Step**.

   This toggles the sweep type from step to list.

3. Press **Configure List Sweep**.

   This opens another menu displaying softkeys that you will use to create the sweep points. The display shows the current list data. (When no list has been previously created, the default list contains one point set to the signal generator's maximum frequency, minimum amplitude, and a dwell time of 2 ms.)

4. Press **More (1 of 2)** > **Load List From Step Sweep** > **Confirm Load From Step Sweep**.

   The points you defined in the step sweep are automatically loaded into the list.

### Editing List Sweep Points

1. Press **Return** > **Sweep** > **Off**.

   Turning the sweep off allows you to edit the list sweep points without generating errors. If sweep remains on during editing, errors occur whenever one or two point parameters (frequency, power, and dwell) is undefined.

2. Press **Configure List Sweep**.

   This returns you to the sweep list table.

3. Use the arrow keys to highlight the dwell time in row 1.

4. Press **Edit Item**.

   The dwell time for point 1 becomes the active function.

5. Press **100** > **msec**.

   This enters 100 ms as the new dwell time value for row 1. Note that the next item in the table (in this case, the frequency value for point 2) becomes highlighted after you press the terminator softkey.

6. Using the arrow keys, highlight the frequency value in row 4.

7. Press **Edit Item** > **545** > **MHz**.

   This changes the frequency value in row 4 to 545 MHz.

8. Highlight any column in the point 7 row and press **Insert Row**.

   This adds a new point between points 7 and 8. A copy of the point 7 row is placed between points 7 and 8, creating a new point 8, and renumbering the successive points.

9. Highlight the frequency item for point 8, then press **Insert Item**.

   Pressing **Insert Item** shifts frequency values down one row, beginning at point 8. Note that the original frequency values for both points 8 and 9 shift down one row, creating an entry for point 10 that contains only a frequency value (the power and dwell time items do not shift down).

   The frequency for point 8 is still active.

10. Press **590** > **MHz**.

11. Press **Insert Item** > **–2.5** > **dBm**.

    This inserts a new power value at point 8 and shifts down the original power values for points 8 and 9 by one row.

12. Highlight the dwell time for point 9, then press **Insert Item**.

    A duplicate of the highlighted dwell time is inserted for point 9, shifting the existing value down to complete the entry for point 10.

### Activating List Sweep for a Single Sweep

1. Press **Return** > **Sweep** > **Freq & Ampl**

   This turns the sweep on again. No errors should occur if all parameters for every point have been defined in the previous editing process.

2. Press **Single Sweep**.

   The signal generator will sweep the points in your list once. The SWEEP annunciator is activated during the sweep.

3. Press **More (1 of 2)** > **Sweep Trigger** > **Trigger Key**.

   This sets the sweep trigger to occur when you press the **Trigger** hardkey.

4. Press **More (2 of 2)** > **Single Sweep**.

   This arms the sweep. The ARMED annunciator has activated.

5. Press the **Trigger** hardkey.

   The signal generator will sweep the points in your list once and the SWEEP annunciator is activated during the sweep.

### Using Sweep with the Step Attenuator (Option 1E1)

The signal generator protects the step attenuator from overuse during swept operation by automatically switching to attenuator hold mode whenever you select an amplitude sweep (**Ampl** or **Freq & Ampl** softkeys). The ATTN HOLD annunciator appears on the display when this mode is activated. The usable life of the attenuator is preserved, as the amplitude sweep range is limited to 45 dB, thereby preventing mechanical switching. The available amplitude range is displayed in the lower right corner of the Sweep/List Status Information screen. Changing the attenuator setting moves this range. To disable this attenuator protection, press **Amplitude** > **Atten/ALC Control** > **Atten Hold On Off** until Off is highlighted. The protection will be re-enabled the next time you select an amplitude sweep.

## Using the Signal Generator with a MM-Wave Source Module

The RF output frequency of the signal generator can be multiplied using an Agilent 83550 Series millimeter-wave source module. The signal generator/mm-wave source module's output is *automatically leveled* when the instruments are connected. The output frequency range depends on the specific mm-wave source module.

An Agilent 8349B microwave amplifier is required for signal generators without Option 1EA.

Option 1EA signal generators can drive the output of millimeter-wave source modules to maximum specified power without a microwave amplifier.

---

**NOTE** To ensure adequate RF amplitude at the mm-wave source module RF input when using an Option 1EA signal generator, maximum amplitude loss through the adapters and cables connected between the signal generator's RF output and the mm-wave source module's RF input should be less than 1.5 dB.

---

### Required Equipment

- Agilent 83550 Series millimeter-wave source module
- Agilent 8349B microwave amplifier (required for signal generators without Option 1EA)
- cables and adapters as required

### Connect the Equipment

**CAUTION** To prevent damage to the signal generator, turn off the line power to the signal generator before connecting the source module interface cable to the rear panel SOURCE MODULE interface connector.

1. Turn off the signal generator's line power.
2. Connect the equipment as shown. Use the setup in Figure 2-1 for signal generators *without* Option 1EA. Use the setup in Figure 2-2 for Option 1EA signal generators.

**Figure 2-1 Using a Millimeter-Wave Source Module with a Signal Generator without Option 1EA**

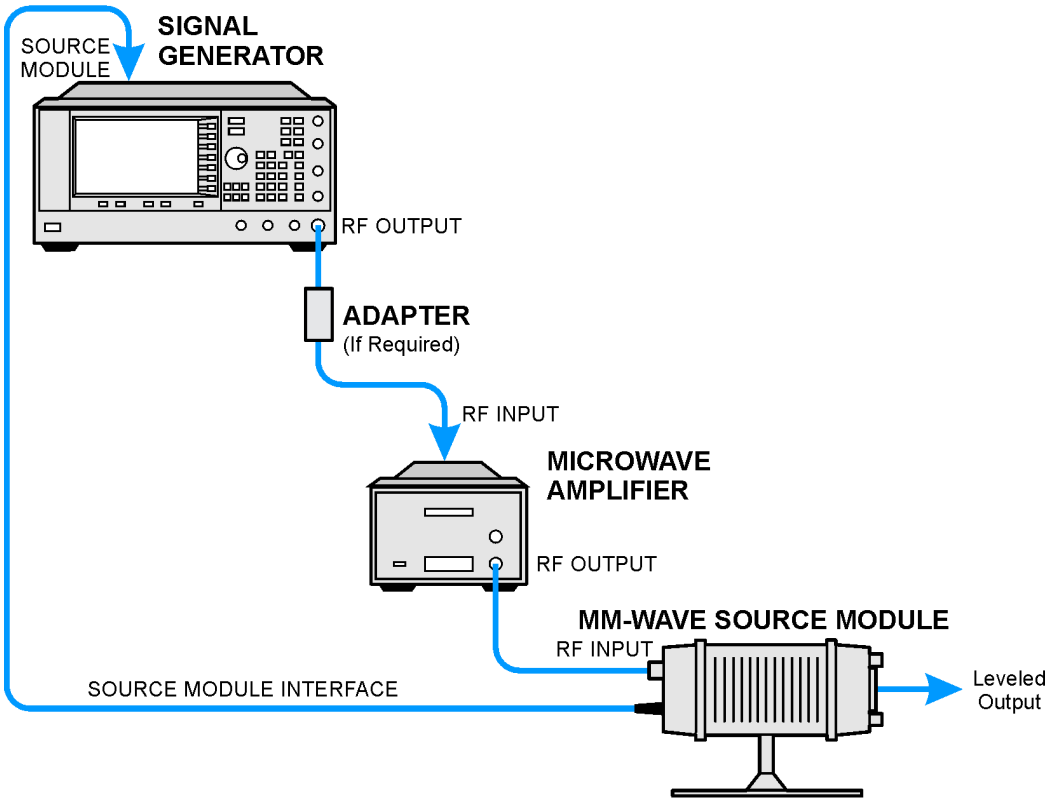
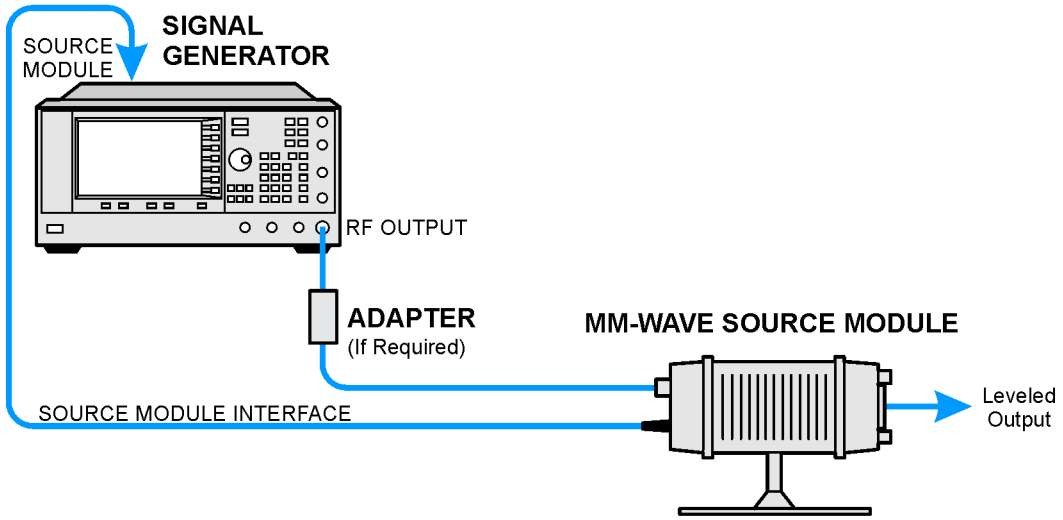


**Figure 2-2 Using a Millimeter-Wave Source Module with an Option 1EA Signal Generator**




### Configure the Signal Generator

1. Turn on the signal generator's line power.

   Upon power-up, the signal generator automatically:

   - senses the mm-wave source module,
   - switches the signal generator's leveling mode to external/source module (power is leveled at the mm-wave source module output),
   - sets the mm-wave source module frequency and amplitude to the source module's preset values, and
   - in the FREQUENCY and AMPLITUDE areas of the signal generator, displays the RF output frequency and amplitude values available at the mm-wave source module output.

   The MMMOD indicator in the FREQUENCY area and the MM indicator in the AMPLITUDE area of the signal generator's display indicate that the mm-wave source module is active.

**NOTE** Refer to the mm-wave source module specifications for the specific frequency and amplitude ranges.

2. If the RF OFF annunciator is displayed, press **RF On/Off**.

Leveled power is now available at the output of the millimeter-wave source module.

To obtain flatness-corrected power, refer to "Creating and Applying User Flatness Correction" on page 59.

# Configuring Analog Modulation (PSG-A Series Only)

PSG-A signal generators can modulate the RF carrier with four types of analog modulation: amplitude, frequency, phase, and pulse.

## AM, FM, and ΦM Sources

- AM, FM, and ΦM have two source paths each. These multiple source paths are summed internally for composite modulation of the RF carrier.
- Each path can be supplied by one of four sources: Internal 1, Internal 2, External 1 or External 2.
- Only one path can be active for each source. For example, if AM Path 1 is on, AM Path 2 is on, and AM Path 1 source is set to Internal 1, AM Path 2 source must be set to Internal 2, External 1 or External 2. Different paths cannot use the same source at the same time.
- Waveforms available from Internal 1 and Internal 2 include:

| | |
|---|---|
| Sine | sinewave with adjustable amplitude and frequency |
| Dual-Sine | dual sinewaves with individually adjustable frequencies and a percent-of- peak-amplitude setting for the second tone (available from function generator 1 only) |
| Swept-Sine | a swept sinewave with adjustable start and stop frequencies, sweep time, and sweep trigger settings (available from function generator 1 only) |
| Triangle | triangle wave with adjustable amplitude and frequency |
| Ramp | ramp with adjustable amplitude and frequency |
| Square | square wave with adjustable amplitude and frequency |
| Noise | noise, in a uniform or Gaussian distribution, with adjustable amplitude generated as a peak-to-peak value (RMS value is approximately 80% of the displayed value) |
| DC | constant adjustable amplitude |

For a detailed description of the ranges and limitations of a specific waveform's parameters, see that waveform's softkey description in Chapter 5, "Key Reference," on page 91.

## Pulse Sources

The following list summarizes the different sources available for pulse modulation.

| | |
|---|---|
| External Pulse | modulates by following an external pulse signal connected to the signal generator's PULSE/TRIGGER GATE INPUT connector. |
| Internal Doublet | produces two pulses at the RF OUTPUT connector for each trigger event at the TRIGGER IN connector. The first pulse will follow the external trigger signal. The second pulse will have user-defined delay and width parameters. |
| Internal Free-Run | produces internal, free-run, pulse modulation with user-defined period, width, and delay. |
| Internal Gated | produces an internal, gated, pulse modulation. When a valid gate signal is applied to the TRIGGER IN connector, a pulse train (with user-defined width parameters) will occur at the RF OUTPUT connector. |
| Internal Trigger | produces an internal, triggered, pulse modulation. An RF pulse (with user-defined width and delay parameters) will occur at the RF OUTPUT connector whenever a valid trigger signal occurs at the TRIGGER IN connector. |
| Internal Square | produces internal, square, pulse modulation. This is a form of internal free-run pulse with a 50% duty cycle. The period is determined by rate. |

For a detailed description of the behavior, ranges, and limitations of a specific pulse source, see that waveform's softkey description in Chapter 5, "Key Reference," on page 91.

## Configuring AM

Using this procedure, you will learn how to create a multipath amplitude-modulated RF carrier with the following characteristics:

- RF output frequency set to 15 GHz
- RF output amplitude set to 0 dBm
- AM Path 1 depth set to 90%
- AM Path 1 rate set to 10 kHz
- AM Path 1 waveform set to sine
- AM Path 2 depth set to 40%
- AM Path 2 waveform set to triangle

### Setting the RF Output Frequency

1. Press **Preset**.
2. Press **Frequency** > **15** > **GHz**.

The FREQUENCY area of the display now reads `15.000 000 000 00 GHz`.

### Setting the RF Output Amplitude

Press **Amplitude** > **0** > **dBm**.

The AMPLITUDE area of the display now reads `0.00 dBm`.

### Setting the AM Depth and Rate

1. Press the **AM** hardkey.

   The first level menu of softkeys is displayed.
2. Press **AM Depth** > **90** > **%**.

   `90.0 %` is displayed below the **AM Depth** softkey.
3. Press **AM Rate** > **10** > **kHz**.

   `10.0000 kHz` is displayed below the **AM Rate** softkey.

### Creating a Multipath AM Configuration

Use the following steps to configure a multipath AM configuration. AM Path 1 and AM Path 2 are summed internally for composite modulation. Either path can be switched to any one of the modulation sources (internal 1 or 2, external 1 or 2), but any given source can only be routed to one modulation type at a time.

Note that the AM Source for AM Path 1 is set to Internal 1 as a default setting. Therefore, the AM Source for AM Path 2 must be set to another source, as explained in the following procedure.

1. Press **AM Path 1 2** to toggle to AM Path 2.

   This opens a menu of softkeys where you can define a second unique amplitude modulation configuration.

2. Press **AM Depth** > **40** > **%**.

   The AM Path 2 AM depth is set to `40.0 %`, as displayed below the **AM Depth** softkey.

3. Press **More (1 of 2)** > **AM Waveform** > **Triangle**.

   The AM Path 2 AM waveform is set to `Triangle`, as displayed below the **AM Waveform** softkey.

4. Press **More (2 of 2)** > **AM Source** > **Internal 2**.

   The AM Path 2 source is set to `Internal 2`, as displayed below the **AM Waveform** softkey.

The signal generator is now configured to output a 0 dBm, multipath amplitude-modulated carrier at 15 GHz. AM Path 1 is a sinewave with 90% depth and a 10 kHz rate. AM Path 2 is a triangle wave with 40% depth and a 400 Hz (default) rate.

### Activating a Multipath AM Configuration

Follow these remaining steps to output the amplitude-modulated signal.

1. Press **AM Off On**.

   This activates the modulation on AM Path 2. The `AM` annunciator is activated indicating that you have enabled amplitude modulation on AM Path 2.

2. Press **AM Path 1 2** > **Amp Off On**.

   This toggles back to AM Path 1 and activates the modulation on AM Path 1.

3. Press **RF On/Off**.

   The `RF ON` annuciator is activated, indicating that the multipath AM signal is now available at the RF OUTPUT connector.

## Configuring FM

Using this procedure, you will learn how to create a frequency-modulated RF carrier with the following characteristics:

- RF output frequency set to 12 GHz
- RF output amplitude set to 0 dBm
- FM deviation set to 75 kHz
- FM rate set to 10 kHz

### Setting the RF Output Frequency

1. Press **Preset**.
2. Press **Frequency** > **12** > **GHz**.

   The FREQUENCY area of the display now reads `12.000 000 000 00 GHz`.

### Setting the RF Output Amplitude

Press **Amplitude** > **0** > **dBm.**

The AMPLITUDE area of the display now reads `0.00 dBm`.

### Setting the FM Deviation and Rate

1. Press **FM/ΦM**.

   The first level menu of FM softkeys is displayed.
2. Press **FM Dev** > **75** > **kHz**.

   `75.0000 kHz` is displayed below the **FM Dev** softkey.
3. Press **FM Rate** > **10** > **kHz**.

   `10.0000 kHz` is displayed below the **FM Rate** softkey.

The signal generator is now configured to output a 0 dBm, frequency-modulated carrier at 12 GHz with a 75 kHz deviation and a 10 kHz rate. The shape of the waveform is a sinewave. (Notice that sine is the default for the **FM Waveform** softkey. Press **More (1 of 2)** to see the softkey.)

### Activating FM

Follow these remaining steps to output the frequency-modulated signal.

1. Press **FM Off On**.

   The FM annunciator is activated indicating that you have enabled frequency modulation.

2. Press **RF On/Off**.

   The RF ON annuciator is activated, indicating that the signal is now available at the RF OUTPUT connector.

## Configuring ΦM

Using this procedure, you will learn how to create a phase-modulated RF carrier with the following characteristics:

- RF output frequency set to 20.0 GHz
- RF output amplitude set to 0 dBm
- ΦM deviation set to 0.25 π radians
- ΦM rate set to 30 kHz

### Setting the RF Output Frequency

1. Press **Preset**.
2. Press **Frequency** > **20** > **GHz**.

   The FREQUENCY area of the display now reads 20.000 000 000 00 GHz.

### Setting the RF Output Amplitude

Press **Amplitude** > **0** > **dBm**.

The AMPLITUDE area of the display now reads 0.00 dBm.

### Setting the ΦM Deviation and Rate

1. Press the **FM/ΦM** *hardkey*.
2. Press the **FM ΦM** *softkey*.

   The first level menu of ΦM softkeys is displayed.

3. Press ΦM **Dev** > **.25** > **pi rad**.

   This changes the ΦM deviation to 0.25 π radians.

4. Press ΦM **Rate** > **10** > **kHz**.

   This sets the ΦM rate to 10 kHz.

The signal generator is now configured to output a 0 dBm, phase-modulated carrier at 20 GHz with a 0.25 π radian deviation and 10 kHz rate. The shape of the waveform is a sinewave. (Notice that sine is the default for the ΦM **Waveform** softkey. Press **More (1 of 2)** to see the softkey.)

### Activating ΦM

Follow these remaining steps to output the phase-modulated signal.

1. Press ΦM **Off On**.

   The ΦM annunciator is activated, indicating that you have enabled phase modulation.

2. Press **RF On/Off**.

   The RF ON annunciator is activated, indicating that the signal is now available at the RF OUTPUT connector.

The signal generator is now configured to output a 0 dBm, pulse-modulated carrier at 18 GHz with a 100-microsecond pulse period and 24-microsecond pulse width. The pulse source is set to internal free-run. (Notice that internal free-run is the default for the **Pulse Source** softkey.)

## Configuring Pulse Modulation

Using the following procedure you will learn how to create a pulse-modulated RF carrier with the following characteristics:

- RF output frequency set to 18 GHz
- RF output amplitude set to 0 dBm
- pulse period set to 100.0 µsec
- pulse width set to 24.0 µsec
- pulse source set to internal free-run

### Setting the RF Output Frequency

1. Press **Preset**.
2. Press **Frequency** > **18** > **GHz**.

   The FREQUENCY area of the display now reads `18.000 000 000 00 GHz`.

### Setting the RF Output Amplitude

Press **Amplitude** > **0** > **dBm**.

The AMPLITUDE area of the display now reads `0.00 dBm`.

### Setting the Pulse Period and Width

1. Press **Pulse** > **Pulse Period** > **100** > **usec**.

   This sets the pulse period to 100 microseconds.

2. Press **Pulse** > **Pulse Width** > **24** > **usec**.

   This sets the pulse period to 24 microseconds.

### Activating Pulse Modulation

Follow these remaining steps to output the pulse-modulated signal.

1. Press **Pulse Off On**.

   This activates pulse modulation. The Pulse annunciator is activated indicating that you have enabled pulse modulation.

2. Press **RF On/Off**.

   The RF ON annuciator is activated, the signal is now available at the RF OUTPUT.

# Configuring the LF Output (PSG-A Series Only)

The PSG-A Series signal generator has a low frequency (LF) output. The LF output's source can be switched between an internal modulation source (internal monitor 1 or 2) or an internal function generator (function generator 1 or 2).

Using internal monitor 1 or 2 as the LF output source, the LF output provides a replica of the signal from either internal source (1 or 2) that is being used to modulate the RF output. The specific modulation parameters for this signal are configured through the AM, FM, or ΦM menus.

Using function generator 1 or 2 as the LF output source, the function generator section of the internal modulation source (1 or 2) drives the LF output directly. Frequency and waveform are configured from the LF output menu, not through the AM, FM, or ΦM menus. You can select the waveform shape from the following choices:

| | |
|---|---|
| Sine | sinewave with adjustable amplitude and frequency |
| Dual-Sine | dual sinewaves with individually adjustable frequencies and a percent-of-peak-amplitude setting for the second tone (available from function generator 1 only) |
| Swept-Sine | a swept sinewave with adjustable start and stop frequencies, sweep time, and sweep trigger settings (available from function generator 1 only) |
| Triangle | triangle wave with adjustable amplitude and frequency |
| Ramp | ramp with adjustable amplitude and frequency |
| Square | square wave with adjustable amplitude and frequency |
| Noise | noise, in a uniform or Gaussian distribution, with adjustable amplitude generated as a peak-to-peak value (RMS value is approximately 80% of the displayed value) |
| DC | direct current with adjustable amplitude |

**NOTE** The **LF Out Off On** softkey controls the operating state of the LF output when the LF output source is set to function generator 1 or 2. The **Mod On/Off** softkey controls the operating state of the LF OUTPUT connector when the LF output source is set to internal monitor 1 or 2.

The **RF On/Off** softkey does not apply to the LF OUTPUT connector.

## Configuring the LF Output with an Internal Modulation Source

In this example, the internal FM modulation is the LF output source.

### Configuring the Internal Modulation as the LF Output Source

1. Press **Preset**.
2. Press the **FM/ΦM** hardkey.
3. Press **FM Dev** > **75** > **kHz**.

   This sets the FM deviation to 75 kHz.
4. Press **FM Rate** > **10** > **kHz**.

   This sets the FM rate to 10 kHz.
5. Press **FM Off On**.

   The FM annunciator is activated indicating that you have enabled frequency modulation.

### Configuring the Low Frequency Output

1. Press the **LF Out** hardkey.

   This opens the Low Frequency Output menu. The LF output source is set to internal modulation 1 by default.
2. Press **LF Out Amplitude Into 50 Ohms** > **3** > **Vp**.

   This sets the LF output amplitude to 3 Vp. `3.000 Vp` is displayed below the **LF Out Amplitude** softkey.
3. Press **LF Out Off On**.

   The LF output is a 3 Vp frequency modulated sinewave (the default signal shape), with a 75 kHz FM deviation and 10 kHz rate.

## Configuring the LF Output with a Function Generator Source

In this example, function generator 1 is the LF output source.

### Configuring the Function Generator as the LF Output Source

1. Press **Preset**.
2. Press the **LF Out** hardkey.
3. Press **LF Out Source** > **Function Generator 1**.

   Function generator 1 becomes the LF output source and FuncGen 1 is displayed below the **LF Out Source** softkey.

### Configuring the Waveform

1. Press **LF Out Waveform** > **Swept-Sine**.

   This creates a swept-sine output and opens a menu that configures the sweep parameters of the swept-sine signal.

2. Press **LF Out Start Freq** > **100** > **Hz**.

   This sets the swept-sine start frequency to 100 Hz.

3. Press **LF Out Stop Freq** > **1** > **kHz**.

   This sets the swept-sine stop frequency to 1 kHz.

4. Press **LF Out Sweep Rate** > **350** > **Hz**.

   This sets the swept-sign sweeps-per-second to 350.

5. Press **Return** > **Return**.

   This returns you to the LF Output menu. The start frequency for the swept-sine waveform is displayed below the **LF Out Freq** softkey.

### Configuring the Low Frequency Output

1. Press **LF Out Amplitude Into 50 Ohms** > **3** > **Vp**.

   This sets the LF output amplitude to 3 Vp.

2. Press **LF Out Off On**.

   This activates the LF output. The LF output is a 3 Vp swept-sine waveform, sweeping from 100 Hz to 1 kHz with a sweep rate of 350 Hz.

# Using Data Storage Functions

This section explains how to use the two forms of signal generator data storage: the memory catalog and the instrument state register.

## Using the Memory Catalog

The signal generator's interface for stored files is the memory catalog. From there, you can view, copy, rename and delete files, either from the signal generator's front panel or via remote controller. (For information on performing these tasks remotely, see the programming guide.)

The memory catalog may contain the following file types and their associated data:

| | |
|---|---|
| `BIN` | bitmap data |
| `LIST` | sweep data from the List Mode Values table including frequency, amplitude, and dwell time |
| `STAT` | instrument state data, controlling instrument operating state parameters, such as frequency, amplitude, and mode |
| `UFLT` | user flatness calibration correction pair data (user-defined frequency and corresponding amplitude correction values) |

### Viewing Stored Files

1. Press **Utility** > **Memory Catalog** > **Catalog Type**.

   The default catalog type is All (all files in the memory catalog are listed in alphabetical order, regardless of type). When viewing all files, file name listings include their file type, such as `<file name>@STATE` or `<file name>@LIST`.

2. Press **List**.

   The Catalog of List Files is displayed.

3. Press **Catalog Type** > **State**.

   The Catalog of State Files is displayed.

4. Press **Catalog Type** > **User Flatness**.

   The Catalog of USERFLAT Files is displayed.

### Storing Files

To store a file to the memory catalog, first create a file. For this example, use the default list sweep table.

1. Press **Preset**.
2. Press **Sweep/List** > **Configure List Sweep** > **More (1 of 2)** > **Load/Store**.

   This opens the Catalog of List Files.
3. Press **Store to File**.

   This displays a menu of alphabetical softkeys for naming the file. `Store to:` is displayed in the active function area.
4. Enter the file name `LIST1` using the alphabetical softkeys and the numeric keypad.
5. Press **Enter**.

   The file is now displayed in the Catalog of List Files, showing the file name, type, and size.

### Copying Stored Files

1. Highlight the desired file.
2. Press **Copy File**.

   This opens the file naming text editor.
3. Press **Editing Keys** > **Clear Text**.

   This clears the old file name.
4. Input the new file name using the alphabetical softkeys and the numeric keypad. (Additional characters are available by turning the knob.)
5. Press **Enter**.

### Renaming Stored Files

1. Highlight the desired file.
2. Press **More (1 of 2)** > **Rename File**.
3. Press **Editing Keys** > **Clear Text**.
4. Input the new file name using the alphabetical softkeys and the numeric keypad. (Additional characters are available by turning the knob.)
5. Press **Enter**.

### Deleting Stored Files

1. Highlight the desired file.
2. Press **Delete File**.

   The **Confirm Delete** softkey appears.
3. Press **Confirm Delete**.

## Using the Instrument State Register

The instrument state register is a section of memory divided into 10 sequences (numbered 0 through 9) each containing 100 registers (numbered 00 through 99). It is used to store and recall frequency, amplitude, and for PSG-A Series signal generators, modulation settings. It provides a quick method to reconfigure the signal generator when switching between different signal configurations. Once an instrument state has been saved, all of the frequency, amplitude, and modulation settings can be recalled with minimum effort.

**NOTE** List sweep data is not saved within an instrument state. For instructions on saving list sweep data, see "Storing Files" on page 45.

### Saving an Instrument State

Using this procedure, you will learn how to save current instrument settings to the instrument state register.

1. Press **Preset**.
2. Configure the signal generator with the following settings:
   a. Press **Frequency** > **800** > **MHz**.
   b. Press **Amplitude** > **0** > **dBm**.
   c. Press **AM** > **AM Off On**.

      This enables amplitude modulation (AM annunciator is on).
3. Press **Save** > **Select Seq**.

   The sequence number becomes the active function. The signal generator displays the last sequence that you have used. Set the sequence to 1 using the arrow keys.

4. Press **Select Reg**.

   The register number in sequence 1 becomes the active function. The signal generator displays either the last register used, accompanied by the text: (in use), or (if no registers are in use) register 00, accompanied by the text: (available). Use the arrow keys to select register 01.

5. Press **Save Seq[1] Reg[01]**.

   This will save this instrument state in sequence 1, register 01 of the instrument state register.

6. Press **Add Comment to Seq[1] Reg[01]**.

   This allows you to add a descriptive comment to sequence 1 register 01. Enter your comment using the alphanumeric softkeys or the knob and press **Enter**.

7. Press **Edit Comment In Seq[1] Reg[01]**.

   This allows you to change the descriptive comment for sequence 1 register 01, if desired. Change your comment using the alphanumeric softkeys and press **Enter**.

After making changes to an instrument state, you may save it back to a specific register by highlighting that register and pressing **Re-SAVE Seq[n] Reg[nn]**.

### Recalling an Instrument State

Using this procedure, you will learn how to recall instrument settings saved to an instrument state register.

1. Press **Preset**.
2. Press the **Recall** hardkey.

   Notice that the **Select Seq** softkey shows sequence 1. (This is the last sequence that you used.)

3. Press **RECALL Reg**.

   The register to be recalled in sequence 1 becomes the active function. Press the up arrow key once to select register 1. Your stored instrument state settings have now been recalled.

### Deleting Registers and Sequences

Using this procedure, you will learn how to delete registers and sequences saved to an instrument state register.

### To Delete a Specific Register within a Sequence

1. Press **Preset**.
2. Press the **Recall** or **Save** hardkey.

   Notice that the **Select Seq** softkey shows the last sequence that you used.
3. Press **Select Seq** and enter the sequence number containing the register you want to delete.
4. Press **Select Reg** and enter the register number you want to delete.

   Notice that the **Delete Seq[n] Reg[nn]** is now loaded with the sequence and register you want to delete.
5. Press **Delete Seq[n] Reg[nn]**.

   This deletes the chosen register.

### To Delete All Registers within a Sequence

1. Press **Preset**.
2. Press the **Recall** or **Save** hardkey.

   Notice that the **Select Seq** softkey shows the last sequence that you used.
3. Press **Select Seq** and enter the sequence number containing the registers you want to delete.
4. Press **Delete all Regs in Seq[n]**.

   This deletes all registers in the selected sequence.

### To Delete All Sequences

**CAUTION** This will delete the entire contents of all registers and all sequences contained in the instrument state register.

1. Press **Preset**.
2. Press the **Recall** or **Save** hardkey.

   Notice that the **Select Seq** softkey shows the last sequence that you used.
3. Press **Delete All Sequences**.

   This deletes all of the sequences saved in the instrument state register.

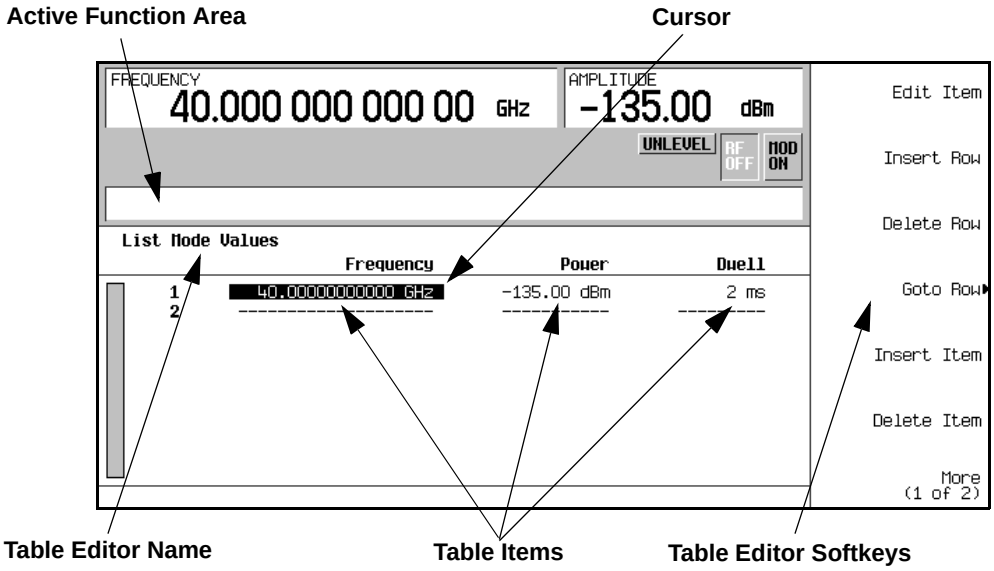
# Using Table Editors

The PSG signal generator uses table editors to simplify configuration tasks such as creating a list sweep.

Using the List Mode Values table editor, the following section familiarizes you with basic table editor functionality.

Press **Preset** > **Sweep/List** > **Configure List Sweep**.

The signal generator displays the List Mode Values table editor, as shown below.




| | |
|---|---|
| Active Function Area | an area that displays the active table item while its value is edited |
| Cursor | an inverse video identifier used to highlight specific table items for selection and editing |
| Table Editor Softkeys | keys that select table items, preset table values and modify table structures |
| Table Items | values arranged in numbered rows and titled columns |

## Table Editor Softkeys

The following table editor softkeys are used to load, navigate, modify, and store table item values. Press **More (1 of 2)** to view additional table editor softkeys.

| | |
|---|---|
| **Edit Item** | displays the selected item in the active function area of the display where the item's value can be modified |
| **Insert Row** | inserts an identical row of table items above the currently selected row |
| **Delete Row** | deletes the currently selected row |
| **Insert Item** | inserts an identical item in a new row below the currently selected item |
| **Delete Item** | deletes the item from the bottom row of the currently selected column |
| **Goto Row** | opens a menu of softkeys (**Goto Top Row**, **Goto Middle Row**, **Goto Bottom Row**, **Page Up**, and **Page Down**) used to quickly navigate through the table items |
| **Page Up** and **Page Down** | display table items that occupy rows outside the limits of the ten-row table display area |
| **Load/Store** | opens a menu of softkeys (**Load From Selected File**, **Store To File**, **Goto Row**, **Page Up**, and **Page Down**) used to load table items from a file in the memory catalog, or to store the current table items as a file in the memory catalog<br><br>For more information on loading and storing files, see "Using Data Storage Functions" on page 44. |

## Modifying Items in the Table Editor

To modify existing table items:

1. Use the arrow keys or the knob to move the table cursor over the desired item.
2. Press **Edit Item**.

   The selected item is displayed in the active function area of the display.
3. Use the knob, arrow keys, or the numeric keypad to modify the value.
4. Press **Enter**.

   The modified item is now displayed in the table.

# Configuring for Remote Control

This section will show you how to configure the signal generator to interface with a remote controller. For more information refer to the programming guide.

**NOTE** Front panel keys are locked when using a remote controller. Only the **Local** key is active. To unlock the front panel keypad, press the **Local** key.

## Configuring for a GPIB Interface

1. Press **Utility** > **GPIB/RS-232** > **GPIB Address**.
2. Use the numeric keypad, arrow keys, or front panel knob to set the desired address.
3. Press **Enter**.

The signal generator's GPIB address is set to 19 at the factory. The acceptable range of addresses is 0 through 30. Each device on a GPIB bus must have a unique address. However, it is not advisable to use address 21, as this is often reserved as a controller talk/listen address. The GPIB address is not affected by a signal generator preset or by a power cycle.

## Configuring for a LAN (10BASE-T) Interface

1. Obtain a hostname and IP address from your system administrator or IT department.
2. Press **Utility** > **GPIB/RS-232 LAN** > **LAN Setup**.
3. Press **Hostname**.

   Use the alphanumeric softkeys to enter a hostname. For lowercase letters, use the knob.
4. Press **Enter**.
5. Press **IP Address**.

   Use the left and right arrow keys to move the cursor. Use the up and down arrow keys, the front panel knob or the numeric keypad to enter an IP address. Use the backspace key to delete digits in the address.
6. Press **Enter**.

This assigns a hostname and IP address to the signal generator. The hostname and IP address are not affected by an instrument preset or by a power cycle.

## Configuring for an RS-232 Interface

1. Press **Utility** > **GPIB/RS-232 LAN** > **RS-232 Setup**.
2. Press **RS-232 Baud Rate**.

   Press the desired baud rate softkey to set the baud rate.
3. Press **RS-232 Echo Off On**.

   This toggles the state of the SCPI echoing on the RS-232 connection. Set as desired.
4. Press **Trans/Recv Pace None Xon**.

   This toggles from no handshaking (**Trans/Recv Pace None**) to XON/XOFF handshaking (**Trans/Recv Pace Xon**) when transmitting or receiving data via RS-232. Set as desired.
5. Press **Reset RS-232**.

   This deletes the data from the RS-232 buffer. Pressing this key will discard any unprocessed SCPI input received over RS-232.
6. Press **RS-232 Timeout**.

   This allows you to enter a value in seconds before the instrument generates an RS-232 timeout after not receiving data on the serial bus.

These RS-232 parameters are not affected by an instrument preset or by a power cycle.

# 3 Optimizing Performance

# Using External Leveling

The PSG signal generator can be externally leveled by connecting an external sensor at the point where leveled RF output power is desired. This sensor detects changes in RF output power and returns a compensating voltage to the signal generator's ALC input. The ALC circuitry raises or lowers (levels) the RF output power based on the voltage received from the external sensor, ensuring constant power at the point of detection.

There are two types of external leveling available on the PSG. You can use external leveling with a detector and coupler/power splitter setup, or a millimeter-wave source module.

## Leveling with Detectors and Couplers/Splitters

Figure 3-1 illustrates a typical external leveling setup. The power level feedback to the ALC circuitry is taken from the external negative detector, rather than the internal signal generator detector. This feedback voltage controls the ALC system, leveling the RF output power at the point of detection.

To use detectors and couplers/splitters for external leveling at an RF output frequency of 10 GHz and an amplitude of 0 dBm, follow the instructions in this section.

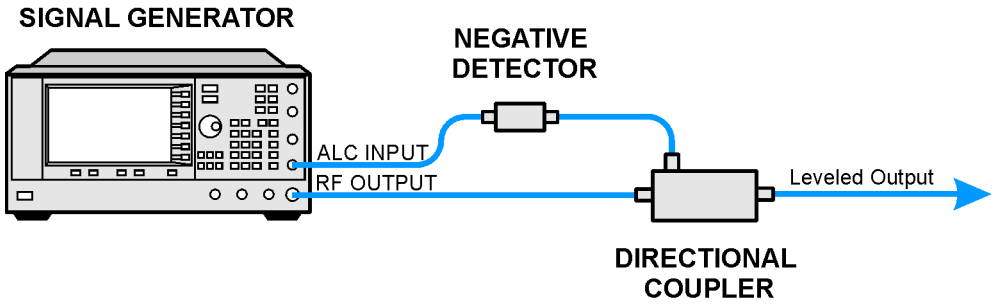
### Required Equipment

- Agilent 8474E negative detector
- Agilent 87301D directional coupler
- cables and adapters, as required

### Connect the Equipment

Set up the equipment as shown in Figure 3-1.

**Figure 3-1 External Detector Leveling with a Directional Coupler**




### Configure the Signal Generator

1. Press **Preset**.
2. Press **Frequency** > **10** > **GHz**.
3. Press **Amplitude** > **0** > **dBm**.
4. Press **RF On/Off**.
5. Press **Leveling Mode** > **External Detector**.

   This deactivates the internal ALC detector and switches the ALC input path to the front panel ALC INPUT connector. The EXT indicator is activated in the AMPLITUDE area of the display.

---

**NOTE** For signal generators with Option 1E1, notice that the ATTN HOLD (attenuator hold) annunciator is displayed. During external leveling, the signal generator automatically uncouples the attenuator from the ALC system for *all* external leveling points. While in this mode, RF output amplitude adjustment is limited to –20 to +25 dBm, the adjustment range of the ALC circuitry. For more information, see "External Leveling with Option 1E1 Signal Generators" on page 58.

---

6. Observe the coupling factor printed on the directional coupler at the detector port. Typically, this value is –10 to –20 dB.

   Enter the *positive* dB value of this coupling factor into the signal generator.

7. Press **More (1 of 2)** > **Ext Detector Coupling Factor** > **16** (or the positive representation of the value listed at the detector port of the directional coupler) > **dB**.

   Leveled output power is now available at the output of the directional coupler.

---

**NOTE** While operating in external leveling mode, the signal generator's displayed RF output amplitude is affected by the coupling factor value, resulting in a calculated approximation of the actual RF output amplitude.

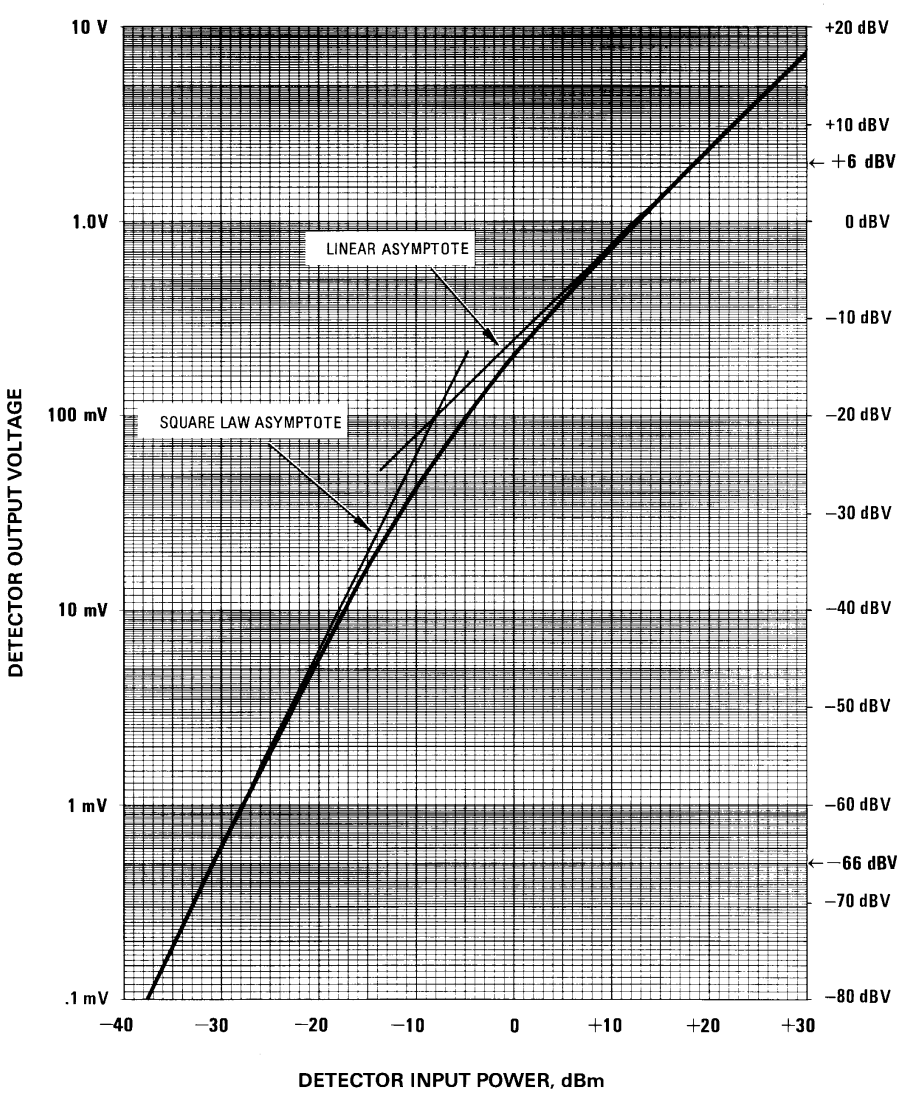
To determine the actual RF output amplitude at the point of detection, measure the voltage at the external detector output and refer to Figure 3-2 or you measure the power directly with a power meter.

---

### Determining the Leveled Output Power

Figure 3-2 shows the input power versus output voltage characteristics for typical Agilent Technologies diode detectors. Using this chart, you can determine the leveled power at the diode detector input by measuring the external detector output voltage. You must then add the coupling factor to determine the leveled output power. The range of power adjustment is approximately –20 to +25 dBm.

**Figure 3-2 Typical Diode Detector Response at 25° C**



### External Leveling with Option 1E1 Signal Generators

Signal generators with Option 1E1 contain a step attenuator prior to the RF output connector. During external leveling, the signal generator automatically holds the present attenuator setting (to avoid power transients that may occur during attenuator switching) as the RF amplitude is changed. A balance must be maintained between the amount of attenuation and the optimum ALC level to achieve the required RF output amplitude. For optimum accuracy and minimum noise, the ALC level should be greater than –10 dBm.

For example, leveling the CW output of a 30 dB gain amplifier to a level of –10 dBm requires the output of the signal generator to be approximately –40 dBm when leveled. This is beyond the amplitude limits of the ALC modulator alone, resulting in an unleveled RF output. Inserting 45 dB of attenuation results in an ALC level of +5 dBm, well within the range of the ALC modulator.

**NOTE** In the example above, 55 dB is the preferred attenuation choice, resulting in an ALC level of +15 dBm. This provides adequate dynamic range for AM or other functions that vary the RF output amplitude.

To achieve the optimum ALC level at the signal generator RF output of –40 dBm for an unmodulated carrier, follow these steps:

1. Press **Set Atten** > **45** > **dB.**
2. Press **Set ALC Level** > **5** > **dBm**.

This sets the attenuator to 45 dB and the ALC level to +5 dBm, resulting in an RF output amplitude of –40 dBm, as shown in the AMPLITUDE area of the display.

To obtain flatness-corrected power, refer to "Creating and Applying User Flatness Correction" on page 59.

## Leveling with a Millimeter-Wave Source Module

Millimeter-wave source module leveling is similar to external detector leveling. The power level feedback signal to the ALC circuitry is taken from the millimeter-wave source module, rather than the internal signal generator detector. This feedback signal levels the RF output power at the mm-wave source module output through the signal generator's rear panel SOURCE MODULE interface connector.

For instructions and setups, see "Using the Signal Generator with a MM-Wave Source Module" on page 29.

# Creating and Applying User Flatness Correction

User flatness correction allows the digital adjustment of RF output amplitude for up to 1601 frequency points in any frequency or sweep mode. Using an Agilent E4416A/17A or E4418B/19B power meter (controlled by the signal generator through GPIB) to calibrate the measurement system, a table of power level corrections is created for frequencies where power level variations or losses occur. These frequencies may be defined in sequential linear steps or arbitrarily spaced.

If you do not have an Agilent E4416A/17A or E4418B/19B power meter, or if your power meter does not have a GPIB interface, the correction values can be manually entered into the signal generator.

To allow different correction arrays for different test setups or different frequency ranges, you may save individual user flatness correction tables to the signal generator's memory catalog and recall them on demand.

Follow the steps in the next sections to create and apply user flatness correction to the signal generator's RF output.

Afterward, follow the steps in "Recalling and Applying a User Flatness Correction Array" on page 64 to recall a user flatness file from the memory catalog and apply it to the signal generator's RF output.

## Creating a User Flatness Correction Array

In this example, you will create a user flatness correction array. The flatness correction array contains ten frequency correction pairs (amplitude correction values for specified frequencies), from 1 to 10 GHz in 1 GHz intervals.

An Agilent E4416A/17A/18B/19B power meter (controlled by the signal generator via GPIB) and E4413A power sensor are used to measure the RF output amplitude at the specified correction frequencies and transfer the results to the signal generator. The signal generator reads the power level data from the power meter, calculates the correction values, and stores the correction pairs in the user flatness correction array.

If you do not have the required Agilent power meter, or if your power meter does not have a GPIB interface, you can enter correction values manually.

### Required Equipment

- Agilent E4416A/17A/18B/19B power meter
- Agilent E4413A E Series CW power sensor
- GPIB interface cable
- adapters and cables, as required

**NOTE** If the setup has an external leveling configuration, the equipment setup in Figure 3-3 assumes that the steps necessary to correctly level the RF output have been followed. If you have questions about external leveling, refer to "Using External Leveling" on page 54.

### Configure the Power Meter

1. Select SCPI as the remote language for the power meter.
2. Zero and calibrate the power sensor to the power meter.
3. Enter the appropriate power sensor calibration factors into the power meter as appropriate.
4. Enable the power meter's cal factor array.

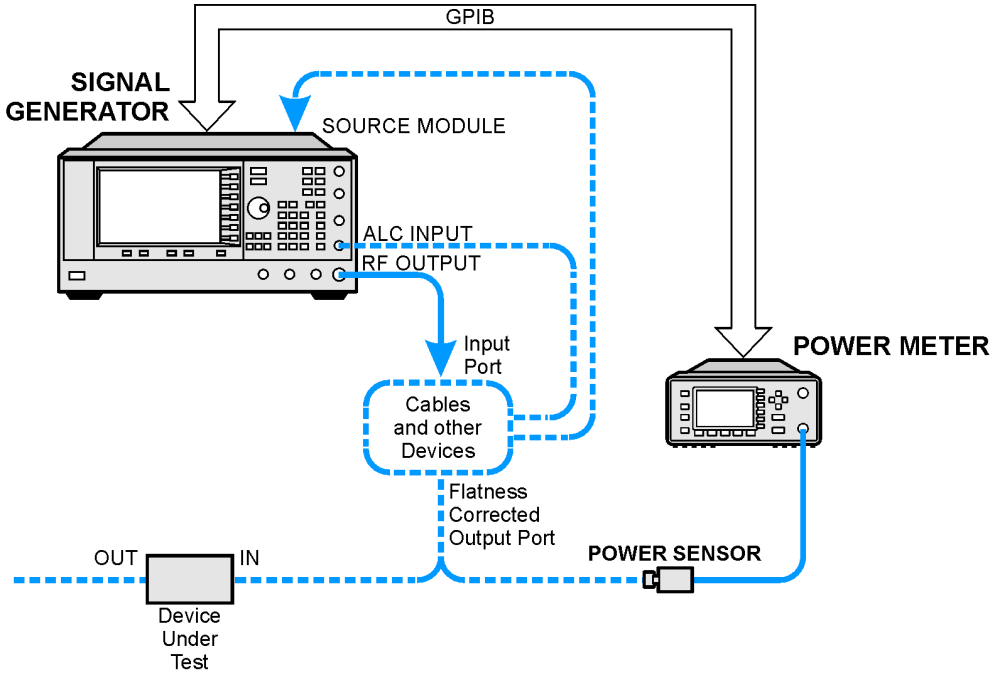
**NOTE** For operating information on your particular power meter/sensor, refer to its operating guide.

### Connect the Equipment

Connect the equipment as shown in Figure 3-3.

**NOTE** During the process of creating the user flatness correction array, the power meter is slaved to the signal generator via GPIB. No other controllers are allowed on the GPIB interface.

**Figure 3-3 User Flatness Correction Equipment Setup**




### Configure the Signal Generator

1. Press **Preset**.
2. Configure the signal generator to interface with the power meter.
   a. Press **Amplitude** > **More (1 of 2)** > **User Flatness** > **More (1 of 2)** > **Power Meter** > **E4416A**, **E4417A**, **E4418B**, or **E4419B**.
   b. Press **Meter Address** > enter the power meter's GPIB address > **Enter**.
   c. For E4417A and E4419B models, press **Meter Channel A B** to select the power meter's active channel.
   d. Press **Meter Timeout** to adjust the length of time before the instrument generates a timeout error if unsuccessfully attempting to communicate with the power meter.
3. Press **More (2 of 2)** > **Configure Cal Array** > **More (1 of 1)** > **Preset List** > **Confirm Preset**.

   This opens the User Flatness table editor and presets the cal array frequency/correction list.

4. Press **Configure Step Array**.

   This opens a menu for entering the user flatness step array data.

5. Press **Freq Start** > **1** > **GHz**.

6. Press **Freq Stop** > **10** > **GHz**.

7. Press **# of Points** > **10** > **Enter**.

   Steps 4, 5, and 6 enter the desired flatness-corrected frequencies into the step array.

8. Press **Return** > **Load Cal Array From Step Array** > **Confirm Load From Step Sweep**.

   This populates the user flatness correction array with the frequency settings defined in the step array.

9. Press **Amplitude** > **0** > **dBm**.

10. Press **RF On/Off**.

    This activates the RF output and the RF ON annunciator is displayed on the signal generator.

### Perform the User Flatness Correction

**NOTE** If you are not using an Agilent E4416A/17A/18B/19B power meter, or if your power meter does not have a GPIB interface, you can perform the user flatness correction manually. For instructions, see "Performing the User Flatness Correction Manually" on page 63.

1. Press **More (1 of 2)** > **User Flatness** > **Do Cal**.

   This creates the user flatness amplitude correction value table entries. The signal generator enters the user flatness correction routine and a progress bar is shown on the display.

2. When prompted, press **Done**.

   This loads the amplitude correction values into the user flatness correction array.

   If desired, press **Configure Cal Array**.

   This opens the user flatness correction array, where you can view the stored amplitude correction values. The user flatness correction array title displays `User Flatness: (UNSTORED)` indicating that the current user flatness correction array data has not been saved to the memory catalog.

### Performing the User Flatness Correction Manually

If you are not using an Agilent E4416A/17A/18B/19B power meter, or if your power meter does not have a GPIB interface, complete the steps in this section and then continue with the user flatness correction tutorial.

1. Press **More (1 of 2)** > **User Flatness** > **Configure Cal Array**.

   This opens the User Flatness table editor and places the cursor over the frequency value (1 GHz) for row 1. The RF output changes to the frequency value of the table row containing the cursor and `1.000 000 000 00` is displayed the `AMPLITUDE` area of the display.

2. Observe and record the measured value from the power meter.
3. Subtract the measured value from 0 dBm.
4. Move the table cursor over the correction value in row 1.
5. Press **Edit Item** > enter the difference value from step 3 > **dB**.

   The signal generator adjusts the RF output amplitude based on the correction value entered.

6. Repeat steps 2 through 5 until the power meter reads 0 dBm.
7. Use the down arrow key to place the cursor over the frequency value for the next row. The RF output changes to the frequency value of the table row containing the cursor, as shown in the `AMPLITUDE` area of the display.
8. Repeat steps 2 through 7 for every entry in the User Flatness table.

### Save the User Flatness Correction Data to the Memory Catalog

This process allows you to save the user flatness correction data as in the signal generator's memory catalog. With several user flatness correction files saved to the memory catalog, any file can be recalled, loaded into the correction array, and applied to the RF output to satisfy specific RF output flatness requirements.

1. Press **Load/Store**.
2. Press **Store to File**.
3. Enter the file name FLATCAL1 using the alphanumeric softkeys, numeric keypad, or the knob.
4. Press **Enter**.

The user flatness correction array file FLATCAL1 is now stored in the memory catalog as a UFLT file.

### Applying a User Flatness Correction Array

Press **Return** > **Return** > **Flatness Off On**.

This applies the user flatness correction array to the RF output. The UF indicator is activated in the AMPLITUDE section of the signal generator's display and the frequency correction data contained in the correction array is applied to the RF output amplitude.

### Recalling and Applying a User Flatness Correction Array

Before performing the steps in this section, complete "Creating a User Flatness Correction Array" on page 59.

1. Press **Preset**.
2. Press **Amplitude** > **More (1 of 2)** > **User Flatness** > **Configure Cal Array** > **More (1 of 2)** > **Preset List** > **Confirm Preset**.
3. Press **More (2 of 2)** > **Load/Store**.
4. Ensure that the file FLATCAL1 is highlighted.
5. Press **Load From Selected File** > **Confirm Load From File**.

   This populates the user flatness correction array with the data contained in the file FLATCAL1. The user flatness correction array title displays User Flatness: FLATCAL1.
6. Press **Return** > **Flatness Off On**.

   This applies the user flatness correction data contained in FLATCAL1.

### Returning the Signal Generator to GPIB Listener Mode

During the user flatness correction process, the power meter is slaved to the signal generator via GPIB, and no other controllers are allowed on the GPIB interface. The signal generator operates in GPIB talker mode, as a device controller for the power meter. In this operating mode, it cannot receive SCPI commands via GPIB.

---

**NOTE** If the signal generator is to be interfaced to a remote controller after performing the user flatness correction, its GPIB controller mode must be changed from GPIB talker to GPIB listener. This is accomplished by presetting the signal generator.

If an RF carrier has been previously configured, you must save the present instrument state before returning the signal generator to GPIB listener mode.

---

1. Save your instrument state to the instrument state register.

   For instructions, see "Saving an Instrument State" on page 46.

2. Press **GPIB Listener Mode**.

   This presets the signal generator and returns it to GPIB listener mode. The signal generator can now receive remote commands executed by a remote controller connected to the GPIB interface.

3. Recall your instrument state from the instrument state register.

   For instructions, see "Recalling an Instrument State" on page 47.

## Creating a User Flatness Correction Array Using a MM-Wave Source Module

In this example, a user flatness correction array is created to provide flatness-corrected power at the output of an Agilent 83554A millimeter-wave source module driven by an E8241A signal generator.

The flatness correction array contains 28 frequency correction pairs (amplitude correction values for specified frequencies), from 26.5 to 40 GHz in 500 MHz intervals. This will result in 28 evenly spaced flatness corrected frequencies between 26.5 GHz and 40 GHz at the output of the 83554A millimeter-wave source module.

An Agilent E4416A/17A/18B/19B power meter (controlled by the signal generator via GPIB) and R8486A power sensor are used to measure the RF output amplitude of the millimeter-wave source module at the specified correction frequencies and transfer the results to the signal generator. The signal generator reads the power level data from the power meter, calculates the correction values, and stores the correction pairs in the user flatness correction array.

If you do not have the required Agilent power meter, or if your power meter does not have a GPIB interface, you can enter correction values manually.

### Required Equipment

- Agilent 83554A millimeter-wave source module
- Agilent E4416A/17A/18B/19B power meter
- Agilent R8486A power sensor
- Agilent 8349B microwave amplifier (required for signal generators without Option 1EA)
- GPIB interface cable
- adapters and cables as required

**NOTE** The equipment setups in Figure 3-4 and Figure 3-5 assume that the steps necessary to correctly level the RF output have been followed. If you have questions about leveling with a millimeter-wave source module, refer to "Leveling with a Millimeter-Wave Source Module" on page 58.

### Configure the Power Meter

1. Select SCPI as the remote language for the power meter.
2. Zero and calibrate the power sensor to the power meter.
3. Enter the appropriate power sensor calibration factors into the power meter as appropriate.
4. Enable the power meter's cal factor array.

**NOTE** For operating information on your particular power meter/sensor, refer to their operating guides.

### Connect the Equipment

**CAUTION** To prevent damage to the signal generator, turn off the line power to the signal generator before connecting the source module interface cable to the rear panel SOURCE MODULE interface connector.

1. Turn off the line power to the signal generator.
2. Connect the equipment. For standard signal generators, use the setup in Figure 3-4. For Option 1EA signal generators, use the setup in Figure 3-5.

**NOTE** During the process of creating the user flatness correction array, the power meter is slaved to the signal generator via GPIB. No other controllers are allowed on the GPIB interface.

**Figure 3-4** **User Flatness with MM-Wave Source Module for a Signal Generator without Option 1EA**

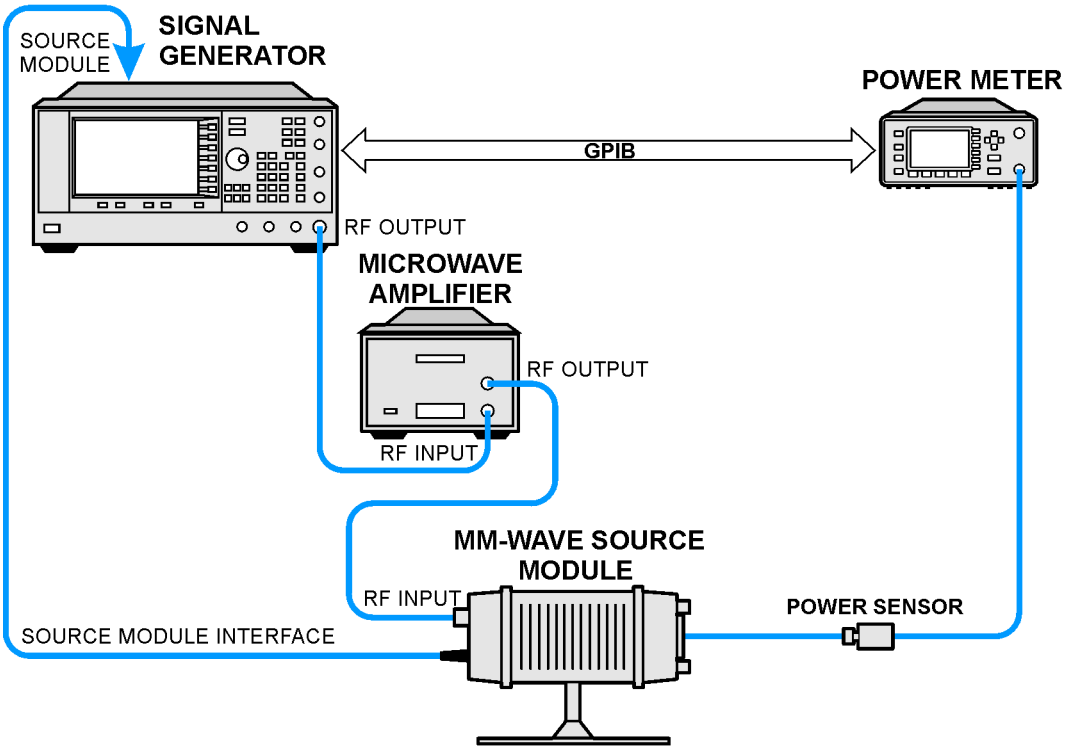
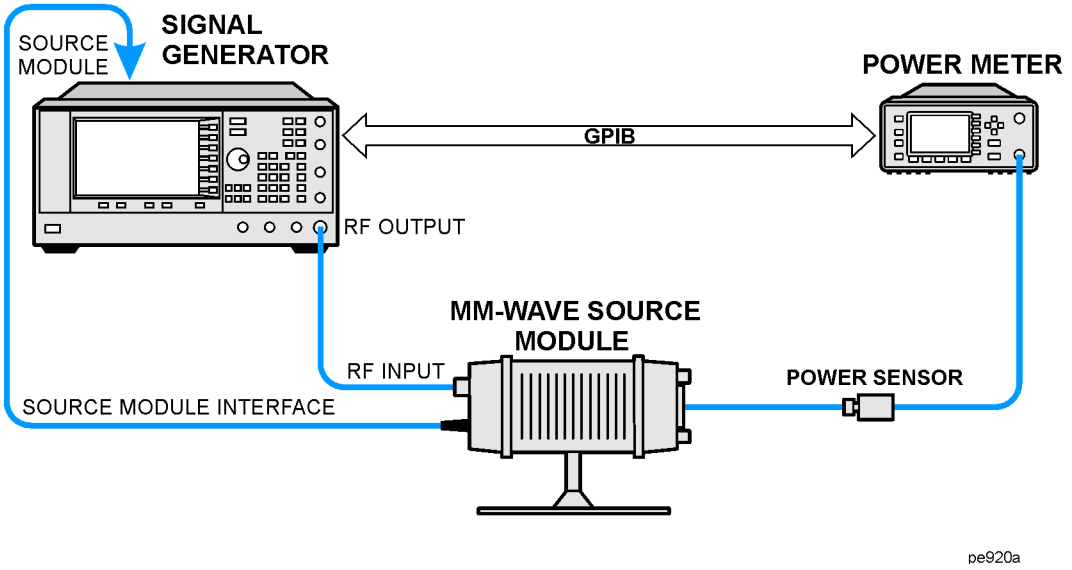



**Figure 3-5** **User Flatness with MM-Wave Source Module and Option 1EA**

**Signal Generator**




**NOTE** To ensure adequate RF amplitude at the mm-wave source module RF input when using Option 1EA signal generators, maximum amplitude loss through the adapters and cables connected between the signal generator's RF output and the mm-wave source module's RF input should be less than 1.5 dB.

### Configure the Signal Generator

1. Turn on the signal generator's line power.

   Upon power-up, the signal generator automatically does the following:

   - senses the mm-wave source module
   - switches the signal generator's leveling mode to external/source module
   - sets the mm-wave source module frequency and amplitude to the source module's preset values
   - displays the RF output frequency and amplitude values available at the mm-wave source module output

   The MMMOD indicator in the FREQUENCY area and the MM indicator in the AMPLITUDE area of the signal generator's display indicate that the mm-wave source module is active

---

**NOTE** Refer to the mm-wave source module specifications for the specific frequency and amplitude ranges.

---

2. Configure the signal generator to interface with the power meter.

   a. Press **Amplitude** > **More (1 of 2)** > **User Flatness** > **More (1 of 2)** > **Power Meter** > **E4416A**, **E4417A**, **E4418B**, or **E4419B**.

   b. Press **Meter Address** > enter the power meter's GPIB address > **Enter**.

   c. For E4417A and E4419B models, press **Meter Channel A B** to select the power meter's active channel.

   d. Press **Meter Timeout** to adjust the length of time before the instrument generates a timeout error if unsuccessfully attempting to communicate with the power meter.

3. Press **More (2 of 2)** > **Configure Cal Array** > **More (1 of 2)** > **Preset List** > **Confirm Preset**.

   This opens the User Flatness table editor and resets the cal array frequency/correction list.

4. Press **Configure Step Array**.

   This opens a menu for entering the user flatness step array data.

5. Press **Freq Start** > **26.5** > **GHz**.

6. Press **Freq Stop** > **40** > **GHz**.

7. Press **# of Points** > **28** > **Enter**.

   This enters the desired flatness-corrected frequencies (26.5 GHz to 40 GHz in 500 MHz intervals) into the step array.

8. Press **Return** > **Load Cal Array From Step Array** > **Confirm Load From Step Sweep**.

   This populates the user flatness correction array with the frequency settings defined in the step array.

9. Press **Amplitude** > **0** > **dBm**.

10. Press **RF On/Off**.

    This activates the RF output and the `RF ON` annunciator is displayed on the signal generator.

### Perform the User Flatness Correction

---

**NOTE** If you are not using an Agilent E4416A/17A/18B/19B power meter, or if your power meter does not have a GPIB interface, you can perform the user flatness correction manually. For instructions, see "Performing the User Flatness Correction Manually" below.

---

1. Press **More (1 of 2)** > **User Flatness** > **Do Cal**.

   This creates the user flatness amplitude correction value table entries. The signal generator begins the user flatness correction routine and a progress bar is shown on the display.

2. When prompted, press **Done**.

   This loads the amplitude correction values into the user flatness correction array.

   If desired, press **Configure Cal Array**.

   This opens the user flatness correction array, where you can view the list of defined frequencies and their calculated amplitude correction values. The user flatness correction array title displays `User Flatness: (UNSTORED)` indicating that the current user flatness correction array data has not been saved to the memory catalog.

### Performing the User Flatness Correction Manually

If you are not using an Agilent E4416A/17A/18B/19B power meter, or if your power meter does not have a GPIB interface, complete the steps in this section and then continue with the user flatness correction tutorial.

1. Press **More (1 of 2)** > **User Flatness** > **Configure Cal Array**.

   This opens the User Flatness table editor and places the cursor over the frequency value (26.5 GHz) for row 1. The RF output changes to the frequency value of the table row containing the cursor and `26.500 000 000 00` is displayed the `AMPLITUDE` area of the display.

2. Observe and record the measured value from the power meter.
3. Subtract the measured value from 0 dBm.
4. Move the table cursor over the correction value in row 1.
5. Press **Edit Item** > enter the difference value from step 3 > **dB**.

   The signal generator adjusts the RF output amplitude based on the correction value entered.

6. Repeat steps 2 through 5 until the power meter reads 0 dBm.
7. Use the down arrow key to place the cursor over the frequency value for the next row. The RF output changes to the frequency value highlighted by the cursor, as shown in the `AMPLITUDE` area of the display.
8. Repeat steps 2 through 7 for every entry in the User Flatness table.

### Save the User Flatness Correction Data to the Memory Catalog

This process allows you to save the user flatness correction data as a file in the signal generator's memory catalog. With several user flatness correction files saved to the memory catalog, specific files can be recalled, loaded into the correction array, and applied to the RF output to satisfy various RF output flatness requirements.

1. Press **Load/Store**.
2. Press **Store to File**.
3. Enter the file name `FLATCAL2` using the alphanumeric softkeys and the numeric keypad.
4. Press **Enter**.

The user flatness correction array file `FLATCAL2` is now stored in the memory catalog as a `UFLT` file.

### Applying the User Flatness Correction Array

1. Press **Return** > **Return** > **Flatness Off On**.

   This applies the user flatness correction array to the RF output. The UF indicator is activated in the AMPLITUDE section of the signal generator's display and the frequency correction data contained in the correction array is applied to the RF output amplitude of the mm-wave source module.

### Recalling and Applying a User Flatness Correction Array

Before performing the steps in this section, complete the section "Creating a User Flatness Correction Array Using a MM-Wave Source Module" on page 66.

1. Press **Preset**.
2. Press **Amplitude** > **More (1 of 2)** > **User Flatness** > **Configure Cal Array** > **More (1 of 2)** > **Preset List** > **Confirm Preset**.
3. Press **More (2 of 2)** > **Load/Store**.
4. Ensure that the file FLATCAL2 is highlighted.
5. Press **Load From Selected File** > **Confirm Load From File**.

   This populates the user flatness correction array with the data contained in the file FLATCAL2. The user flatness correction array title displays User Flatness: FLATCAL2.

6. Press **Return** > **Flatness Off On**.

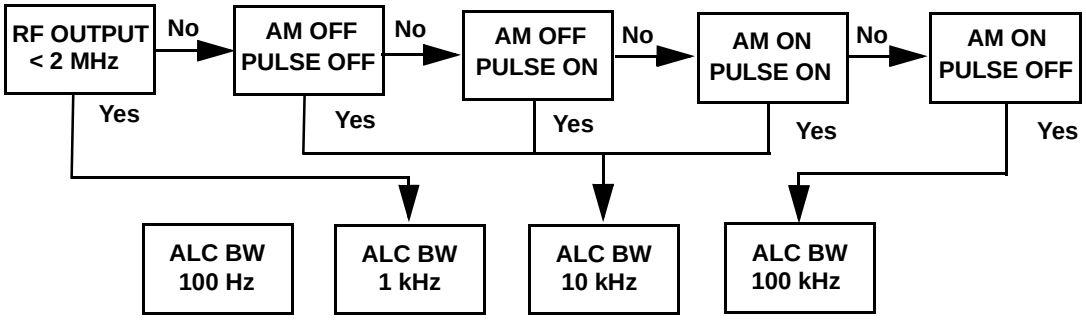
   This activates flatness correction using the data contained in the file FLATCAL2.

# ALC Bandwidth Selection

For internal leveling, the signal generator uses automatic leveling control (ALC) circuitry prior to the RF output. ALC bandwidth has five selections: automatic, 100 Hz, 1 kHz, 10 kHz, and 100 kHz.

At signal generator preset, the ALC bandwidth selection is set to Auto. In this configuration, the signal generator automatically adjusts the ALC bandwidth between three of the four possible settings, depending on which functions are currently active. Figure 3-6 shows the signal generator's automatic ALC bandwidth selection decision tree.

**Figure 3-6 Decision Tree for Automatic ALC Bandwidth Selection**




To select an ALC bandwidth, press **Amplitude** > **ALC BW** > **100 Hz**, **1 kHz**, **10 kHz**, or **100 kHz**.

This overrides the automatic ALC bandwidth selection with your specific selection.

# 4 Solving Problems

# If You Encounter a Problem

If the signal generator is not operating as you expect, look for help in the following list of symptoms and possible solutions. If you do not find a solution here, refer to the service guide.

## Can't Turn Off Help Mode

1. Press **Utility** > **Instrument Info/Help Mode**.
2. Press **Help Mode Single Cont** softkey until Single is highlighted.

There are two help modes (single and continuous) available on the signal generator.

In single mode (the factory preset condition) when you press the **Help** key, help text is provided for your next key press. Now press any key and you will exit the help function and the function of the key you pressed is also executed.

In continuous help mode, when you press the **Help** key, help text is provided for your next key press and that key's function is also executed (except for the **Preset** key). You will stay in help mode until you press the **Help** key again or you toggle back to single mode.

## No RF Output

Check the RF ON/OFF annunciator on the display. If it reads RF OFF, press **RF On/Off** to toggle the RF output on.

## No Modulation at the RF Output

Check the MOD ON/OFF annunciator on the display. If it reads MOD OFF, press **Mod On/Off** to toggle the modulation on.

Although you can set up and enable various modulations, the RF carrier is modulated only when you have also set **Mod On/Off** to On.

## RF Output Power too Low

1. Look for an OFFS or REF indicator in the AMPLITUDE area of the display.

   OFFS tells you that an amplitude offset has been set. An amplitude offset changes the value shown in the AMPLITUDE area of the display but does not affect the output power. The amplitude displayed is equal to the current power output by the signal generator hardware plus the value for the offset.

   To eliminate the offset, do the following:

   Press **Amplitude** > **More (1 of 2)** > **Ampl Offset** > **0** > **dB**.

   REF tells you that the amplitude reference mode is activated. When this mode is on, the displayed amplitude value is *not* the output power level. Rather, it is the current power output by the signal generator hardware minus the reference value set by the **Ampl Ref Set** softkey.

   To exit the reference mode, follow these steps:

   a. Press **Amplitude** > **More (1 of 2)**.

   b. Press **Ampl Ref Off On** until Off is highlighted.

   You can then reset the output power to the desired level.

2. If you are using the signal generator with an external mixer, see "Signal Loss Occurs While Working with Mixers" on page 78.

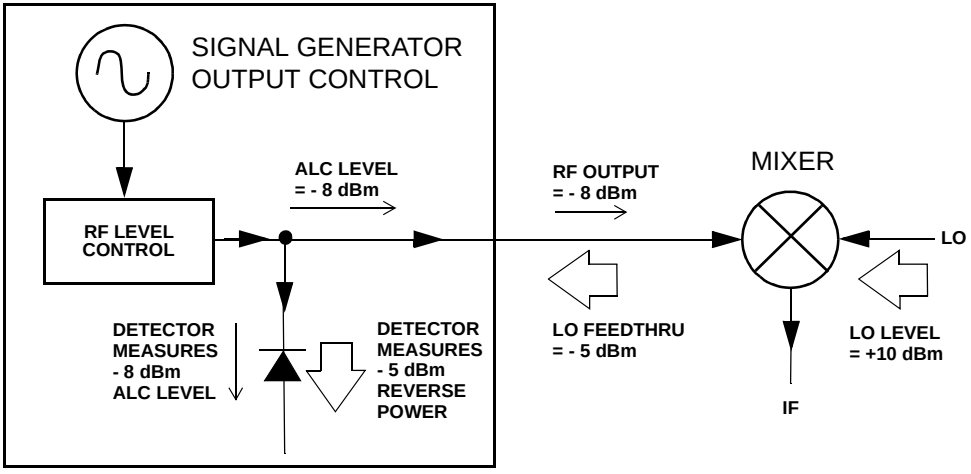
3. If you are using the signal generator with a spectrum analyzer, see "Signal Loss Occurs While Working with Spectrum Analyzers" on page 80.

## Signal Loss Occurs While Working with Mixers

If you experience signal loss at the signal generator's RF output during low-amplitude, coupled operation with a mixer, you can solve the problem by adding attenuation and increasing the RF output amplitude of the signal generator.

Figure 4-1 shows a hypothetical configuration in which the signal generator provides a low amplitude signal to a mixer.

**Figure 4-1 Effects of Reverse Power on ALC**

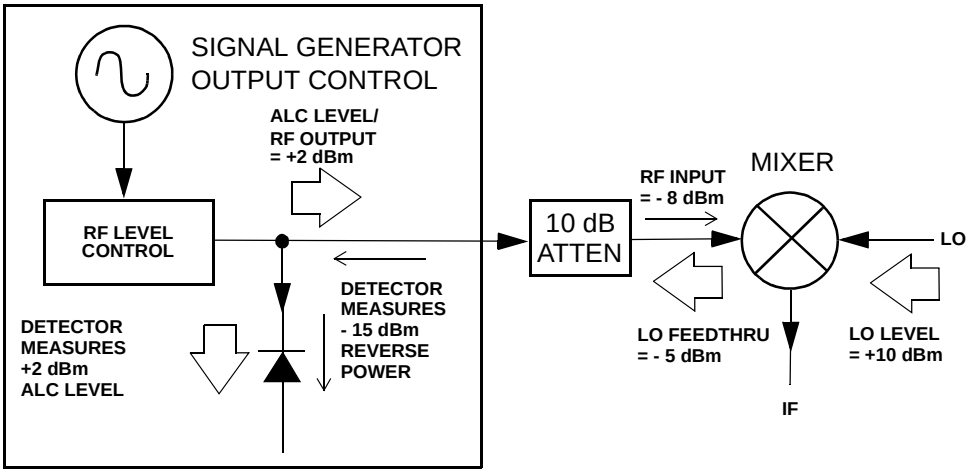



The internally leveled signal generator RF output (and ALC level) is –8 dBm. The mixer is driven with an LO of +10 dBm and has an LO-to-RF isolation of 15 dB. The resulting LO feedthrough of –5 dBm enters the signal generator's RF output connector and arrives at the internal detector.

Depending on frequency, it is possible for most of this LO feedthrough energy to enter the detector. Since the detector responds to its total input power regardless of frequency, this excess energy causes the ALC to reduce the RF output of the signal generator. In this example, the reverse power across the detector is actually greater than the ALC level, which may result in loss of signal at the RF output.

Figure 4-2 shows a similar configuration with the addition of a 10 dB attenuator connected between the RF output of the signal generator and the input of the mixer. The signal generator's ALC level is increased to +2 dBm and transmitted through a 10 dB attenuator to achieve the required –8 dBm amplitude at the mixer input.

**Figure 4-2 Reverse Power Solution**




As compared to the original configuration, the ALC level is 10 dB higher while the attenuator reduces the LO feedthrough (and the RF output of the signal generator) by 10 dB. Using the attenuated configuration, the detector is exposed to a +2 dBm desired signal versus the –15 dBm undesired LO feedthrough. This 17 dB difference between desired and undesired energy results in a maximum 0.1 dB shift in the signal generator's RF output level.

## Signal Loss Occurs While Working with Spectrum Analyzers

The effects of reverse power, when using the signal generator with a spectrum analyzer that does not have preselection capability, can cause problems with the signal generator's RF output.

Some spectrum analyzers have as much as +5 dBm LO feedthrough at their RF input port at some frequencies. If the frequency difference between the LO feedthrough and the RF carrier is less than the ALC bandwidth (typically 10 kHz CW and 100 kHz for modulated signals), the LO's reverse power can cause amplitude modulation of the signal generator's RF output. The rate of the undesired AM equals the difference in frequency between the spectrum analyzer's LO feedthrough and the RF carrier of the signal generator.

Reverse power problems can be solved by using one of two unleveled operating modes, ALC off mode or power search mode.

### ALC Off Mode

ALC off mode deactivates the automatic leveling circuitry prior to the signal generator's RF output. In this mode, a power meter is required to measure the output of the signal generator and assist in achieving the required output power at the point of detection.

To set the signal generator to the ALC off mode, follow these steps:

1. Press **Preset**.
2. Press **Frequency**, enter the required frequency, and terminate the entry with the appropriate terminator softkey.
3. Press **Amplitude**, enter the required amplitude, and terminate the entry with the appropriate terminator softkey.
4. Press **RF On/Off**.
5. Press **Amplitude** > **ALC Off On**.

   This deactivates the signal generator's automatic leveling control.
6. Monitor the RF output amplitude as measured by the power meter.
7. Press **Amplitude** and adjust the signal generator's RF output amplitude until the desired power is measured by the power meter.

### Power Search Mode

Power search mode executes a power search routine that momentarily activates the ALC, calibrates the power of the current RF output, and then disconnects the ALC circuitry.

To set the signal generator to manual, fixed power search mode, follow these steps:

1. Press **Preset**.
2. Press **Frequency**, enter the required frequency, and terminate the entry with the appropriate terminator softkey.
3. Press **Amplitude**, enter the required amplitude, and terminate the entry with the appropriate terminator softkey.
4. Press **ALC Off On**.

   This deactivates the ALC circuitry.
5. Press **RF On/Off**.
6. Press **Do Power Search**.

   This executes the manual, fixed power search routine.

There are two power search modes, manual and automatic.

In manual power search mode (**Power Search Manual Auto** set to Manual), pressing **Do Power Search** executes the power search calibration routine for the current RF frequency and amplitude. In this mode, a change in RF frequency or amplitude necessitates another calibration (press **Do Power Search** again).

In automatic power search mode (**Power Search Manual Auto** set to Auto), the calibration routine is executed whenever the frequency or amplitude of the RF output is changed.

## Sweep Appears to be Stalled

The current status of the sweep is indicated as a shaded rectangle in the progress bar. You can use the progress bar to determine if the sweep is proceeding or is waiting. If the sweep appears to have stalled, check the following:

- ❏ Have you turned on the sweep by pressing either **Sweep** > **Freq**, **Sweep** > **Ampl**, or **Sweep** > **Freq & Ampl**
- ❏ Is the sweep in continuous mode? If the sweep is in single mode, be sure that you have pressed the **Single Sweep** softkey at least once since completion of the prior sweep. Try setting the mode to continuous to determine if the missing single sweep is blocking the sweep.
- ❏ Is the signal generator receiving the appropriate sweep trigger? Try setting the **Sweep Trigger** key to Free Run to determine if a missing sweep trigger is blocking the sweep.
- ❏ Is the signal generator receiving the appropriate point trigger? Try setting the **Point Trigger** key to Free Run to determine if a missing point trigger is blocking the sweep.
- ❏ Is the dwell time reasonable? Try setting the dwell time to one second to determine if you had set the dwell time to a value which was too slow or too fast for you to see.
- ❏ Do you have at least two points in your step sweep or list sweep?

## Cannot Turn Off Sweep Mode

Press **Sweep/List** > **Sweep** > **Off**.

In the sweep mode menu you can choose to set the sweep to various sweep types or to turn sweep off.

## Incorrect List Sweep Dwell Time

If the signal generator does not dwell for the correct period of time at each sweep list point, do the following:

1. Press **Sweep/List** > **Configure List Sweep**.

   This displays the sweep list values.

2. Check the sweep list dwell values for accuracy.

3. Edit the dwell values if they are incorrect.

---

**NOTE** The effective dwell time at the RF OUTPUT connector is the sum of the value set for the dwell plus processing time, attenuator switching time, and settling time. This additional time added to the dwell is generally a few milliseconds. The TTL output, however, available at the TRIGGER OUT connector, is asserted high only during the actual dwell time.

---

   If the list dwell values are correct, continue to the next step.

4. Observe if the **Dwell Type List Step** softkey is set to Step.

   When Step is selected, the signal generator will sweep the list points using the dwell time set for step sweep rather than the sweep list dwell values.

   To view the step sweep dwell time, follow these steps:

   a. Press **Configure Step Sweep**.

   b. Observe the value set for the **Step Dwell** softkey.

## Recalled a Register and Sweep List is Missing

List sweep information is not stored as part of the instrument state in an instrument state register. Only the current list sweep is available to the signal generator. List sweep data can be stored to the instrument catalog. For instructions, see "Storing Files" on page 45.

## All of the Registers Where You Previously Stored Instrument States are Empty

The save/recall registers are backed-up by a battery when line power to the signal generator is not connected. The battery may need to be replaced.

To verify that the battery has failed, do the following:

1. Turn off line power to the signal generator.
2. Unplug the signal generator from line power.
3. Plug in the signal generator.
4. Turn on the signal generator.
5. Observe the display for error messages.

   If either error message –311 or –700 is stored in the error message queue, the signal generator's battery has failed.
6. Refer to the service guide for battery replacement instructions.

## Saved an Instrument State in a Register but the Register is Empty or Contains the Wrong State

If you have, intentionally or unintentionally, selected a register number that is greater than 99, the signal generator will automatically select register 99 to save your instrument state.

If the register number you intended to use is empty or contains the wrong instrument state, do the following:

Press **Recall** > **99** > **Enter**.

This recalls register 99. The lost instrument state may be saved there.

## The Power Supply has Shut Down

If the power supply is not working, it requires repair or replacement. There is no user-replaceable power supply fuse. Refer to the service guide for instructions.

## Signal Generator is Locked Up

If your signal generator is locked up, try the following suggestions for resolution:

- Make sure that the signal generator is not in remote mode. (In remote mode, the R annunciator will be displayed.) Press **Local** to exit remote mode and unlock the front panel keypad.
- Make certain that the signal generator is not in a local lockout condition.
- Check for a progress bar on the signal generator display which indicates that an operation is in progress.
- Try an instrument preset.
- Try cycling power.

### Fail-Safe Recovery Sequence

If none of the previous suggestions resolves the problem, you can try the fail-safe recovery sequence. This sequence should only be used as a last resort.

This process will reset the signal generator, but the process will destroy the following types of data:

- all user files (instrument state and data files)
- DCFM/DCΦM calibration data
- the persistent state

Do not attempt to perform any other front panel or remote operations during the fail-safe sequence.

To run the fail-safe sequence, follow these steps:

1. Hold down the **Preset** key while cycling power.
2. Continue to hold down the **Preset** key until the following message is displayed:

   ```
   WARNING! You are entering the diagnostics menu which can cause
   unpredictable instrument behavior. Are you sure you want to continue?
   ```

**CAUTION** Carefully read the entire message! It may list additional risks with the procedure beyond the risks documented here.

3. Release the **Preset** key.

4. Press **Continue** to continue with the sequence (or **Abort** to abort with no lost files).

At the conclusion of the sequence, perform the following steps:

1. Cycle power once again.

   Cycling power restores all previously installed options. You should expect to see several error messages resulting from calibration files being restored from EEPROM.

2. Perform the DCFM/DCΦM calibration.

   Refer to the **DCFM/DCΦM Cal** softkey description in Chapter 5, "Key Reference," in this manual.

3. Agilent Technologies is interested in the circumstances that caused you to have to initiate this procedure. Please contact us at the appropriate telephone number listed in Table 4-1. We would like to help you eliminate any repeat occurrences.

# Upgrading Firmware

The PSG signal generator's firmware may be upgraded as new firmware is developed and released. Subsequent firmware releases may contain new signal generator features and functionality not available in previous firmware releases.

Periodically, Agilent Technologies will make this improved PSG signal generator firmware available to customers.

To make an inquiry as to the availability of new PSG signal generator firmware releases, contact Agilent on the Internet at `www.agilent.com/find/assist` or call the appropriate number listed in Table 4-1 on page 89.

# Returning a Signal Generator to Agilent Technologies

To return your signal generator to Agilent Technologies for servicing, follow these steps:

1. Be prepared to give your service representative as much information as possible regarding the signal generator's problem.
2. Call the phone number listed in Table 4-1 appropriate to the signal generator's location. After sharing information regarding the signal generator and its condition, you will receive information regarding where to ship your instrument for repair.
3. Ship the signal generator in the original factory packaging materials, if they are available. If not, use similar packaging to properly protect the instrument.

**Table 4-1 Contacting Agilent**

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

**United States**
(tel) 1 800 452 4844

**Latin America**
(tel) (305) 269 7500
(fax) (305) 269 7599

**Canada**
(tel) 1 877 894 4414
(fax) (905) 282-6495

**Europe**
(tel) (+31) 20 547 2323
(fax) (+31) 20 547 2390

**New Zealand**
(tel) 0 800 738 378
(fax) (+64) 4 495 8950

**Japan**
(tel) (+81) 426 56 7832
(fax) (+81) 426 56 7840

**Australia**
(tel) 1 800 629 485
(fax) (+61) 3 9210 5947

**Asia Call Center Numbers**

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

# 5 Key Reference

# Symbols

## # Points

**Supported** All

This softkey enables you to define the number of points in a step sweep. When you press this key, the current value is shown in the active entry area.

**Preset** 2

**Range** 2–1601

**Location** Page 233, Page 245

**Remarks** None

## ΦM Dev

**Supported** PSG-A Series

This softkey enables you to set the deviation of the phase modulation for the currently selected modulation path.

**Preset** 0.000 rad

**Choices** pi rad rad deg

**Ranges**

| *Frequency* | *Normal Bandwidth* | *High Bandwidth* |
|---|---|---|
| 100 kHz–250 MHz | 0–10 RAD | 0–1 RAD |
| > 250–500 MHz | 0–5 RAD | 0–0.5 RAD |
| > 500 MHz–1 GHz | 0–10 RAD | 0–1 RAD |
| > 1–2 GHz | 0–20 RAD | 0–2 RAD |
| > 2–3.2 GHz | 0–40 RAD | 0–4 RAD |
| > 3.2–10 GHz | 0–80 RAD | 0–8 RAD |
| > 10–20 GHz | 0–160 RAD | 0–16 RAD |
| > 20–40 GHz | 0–320 RAD | 0–32 RAD |

**Location** Page 237, Page 238

**Remarks** The deviation limits are dependent upon the carrier frequency. This limiting occurs only when the modulation is turned on.

## ΦM Dev Couple

**Supported** PSG-A Series

This softkey toggles the operating state of the coupled deviation for phase modulation.

**Preset** Off

**Choices** Off or On

**Location** Page 237

**Remarks** If the modulation values are coupled, any change made to the modulation value for one standard path is applied to both standard paths.

## ΦM Off On

**Supported**

PSG-A Series

This softkey toggles the phase modulation off or on for the currently selected modulation path.

When phase modulation is on, the Φ annunciator is displayed.

**Preset** Off

**Choices** Off or On

**Location** Page 237

**Remarks** None

## ΦM Path 1 2

**Supported**

PSG-A Series

This softkey toggles the selection between ΦM Path 1 and ΦM Path 2. ΦM Path 1 and ΦM Path 2 define two standard phase modulation configurations which can be used together. Configure the modulation characteristics (such as deviation, source, rate, and waveform) using the remaining keys in the ΦM menu. Then enable ΦM by setting **ΦM Off On** to On.

ΦM Path 1 and ΦM Path 2 are summed internally for composite modulation. Either path can be switched to any one of the modulation sources: Internal 1, Internal 2, Ext1, or Ext2.

**Preset** 1

**Choices** 1 or 2

**Location** Page 237

**Remarks** ΦM Path 2 must be set to a deviation less than ΦM Path 1.

## ΦM Rate

**Supported**

PSG-A Series

This softkey enables you to change the frequency of the currently selected phase modulation.

**Preset** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (Sine)
0.5 Hz–100 kHz (other waveforms)

**Location** Page 237

**Remarks** None

## ΦM Source

**Supported**

PSG-A Series

Use this softkey to access a menu of choices that enables you to select either an internally generated or an externally applied modulation input for the phase modulation source. The internal modulation is always ac-coupled. For externally applied signals, you can choose between ac- and dc-coupled modulation.

**Preset** Internal 1

**Choices** Internal 1 Internal 2 Ext1 Ext2

**Location** Page 237

**Remarks** A 1.0 volt peak voltage input is required for calibrated ΦM deviation settings. The `EXT 1 LO/HI` and `EXT 2 LO/HI` display annunciators will turn on if the peak input voltage differs from 1.0 by more than 3%. (The LO/HI annunciators function only for ac-coupled external inputs.)

## ΦM Start Rate

**Supported**

PSG-A Series

This softkey enables you to change the starting frequency of the internally generated modulation source for swept-sine phase modulation.

**Preset** 400.0 Hz

**Range** 0.5 Hz–1 MHz (minimum increment allowed is 0.5 Hz)

**Location** Page 238

**Remarks** This softkey is coupled to the **ΦM Rate** softkey in the initial AM menu and the **ΦM Tone 1 Rate** softkey in the ΦM Dual-Sine menu. Any value set for ΦM Start Rate is reflected in the **ΦM Rate** and **ΦM Tone 1 Rate** softkeys.

## ΦM Stop Rate

**Supported**

PSG-A Series

This softkey enables you to change the ending frequency of the internally generated modulation source for swept-sine phase modulation.

**Preset** 400.0 Hz

**Range** 1 Hz–1 MHz (minimum increment allowed is 1 Hz)

**Location** Page 238

**Remarks** This softkey is coupled to the **ΦM Tone 2 Rate** softkey in the ΦM Dual-Sine menu. Any value set for ΦM Stop Rate is reflected in the **ΦM Tone 2 Rate** softkey.

## ΦM Sweep Rate

**Supported**

PSG-A Series

This softkey enables you to set the sweep rate for swept-sine phase modulation.

**Preset** 400.0 Hz

**Range** 1 Hz–100.0 kHz

**Location** Page 238

**Remarks** N/A

## ΦM Sweep Trigger

**Supported**

PSG-A Series

Use this softkey to access a menu of choices that enables you to select the triggering mode for the swept-sine phase modulation.

**Preset** Free Run

**Choices** Free Run Trigger Key Bus Ext

**Location** Page 238

**Remarks** You can also configure the polarity of the TTL signal output at the TRIGGER IN connector using the **Trigger In Polarity Neg Pos** softkey on this menu. Refer to "Trigger In Polarity Neg Pos" on page 222.

## ΦM Tone 1 Rate

**Supported**

PSG-A Series

This softkey enables you to set the internal modulation frequency for the phase modulation tone 1 rate of the dual-sine waveform.

**Preset** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (minimum increment is 0.5 Hz)

**Location** Page 238

**Remarks** This key is coupled to the **ΦM Rate** softkey in the initial ΦM menu and the **ΦM Start Rate** softkey in the ΦM swept-sine menu. Any value set for **ΦM Tone 1 Rate** is reflected in the **ΦM Rate** and **ΦM Start Rate** softkeys.

## ΦM Tone 2 Ampl Percent Of Peak

**Supported** PSG-A Series

This softkey enables you to adjust the amplitude of the alternate frequency as a percentage of the peak LF analog modulation amplitude. For example, if the tone 2 amplitude is set to 30.0% of the total amplitude, then the primary frequency is 70.0% of the total amplitude.

**Default** 50.0%

**Range** 0.1%–99.9%

**Location** Page 238

**Remarks** This is applicable for the dual-sine function only.

## ΦM Tone 2 Rate

**Supported** PSG-A Series

This softkey enables you to set the internal modulation frequency for the phase modulation tone 2 rate of the dual-sine waveform.

**Default** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (minimum increment is 0.5 Hz)

**Location** Page 238

**Remarks** This key is coupled to the **ΦM Stop Rate** softkey in the ΦM swept-sine menu. Any value set for **ΦM Tone 2 Rate** is reflected in the **ΦM Stop Rate** softkey.

## ΦM Waveform

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select the waveform of the internally generated source for phase modulation.

**Preset** Sine

**Choices**

| | | | |
|---|---|---|---|
| Sine | Noise | Triangle | Square |
| Dual-Sine | Ramp | Swept-Sine | |

**Location** Page 237

**Remarks** Dual-Sine and Swept-Sine are not available for the Internal 2 source.

# Numerics

## 1 kHz

**Supported** All

This softkey enables you to select an automatic leveling control bandwidth of 1.0 kHz.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## 10 kHz

**Supported** All

This softkey enables you to select an automatic leveling control bandwidth of 10.0 kHz.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## 100 Hz

**Supported** All

This softkey enables you to select an automatic leveling control bandwidth of 100.0 Hz.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## 100 kHz

**Supported** All

This softkey enables you to select an automatic leveling control bandwidth of 100.0 kHz.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## 125 Hz

**Supported** PSG-A Series with Option UNJ

This softkey enables you to select an internal or external reference oscillator bandwidth of 125 Hz.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** None.

## 25 Hz

**Supported** PSG-A Series with Option UNJ

This softkey enables you to select an internal or external reference oscillator bandwidth of 25 Hz.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** None.

## 55 Hz

**Supported** PSG-A Series with Option UNJ

This softkey enables you to select an internal or external reference oscillator bandwidth of 55 Hz.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** None.

## 300

**Supported** All

This softkey selects 300 as the baud rate in bits per seconds for the rear panel RS-232 connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** The baud rate is not affected by a preset or by a power cycle.

## 300 Hz

**Supported** PSG-A Series with Option UNJ

This softkey enables you to select an internal or external reference oscillator bandwidth of 300 Hz.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** None.

## 1200

**Supported** All

This softkey selects 1200 as the baud rate in bits per second for the rear panel RS-232 connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** The baud rate is not affected by a preset or by a power cycle.

## 2400

**Supported** All

This softkey selects 2400 as the baud rate in bits per second for the rear panel RS-232 connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** The baud rate is not affected by a preset or by a power cycle.

## 4800

**Supported** All

This softkey selects 4800 as the baud rate in bits per second for the rear panel RS-232 connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** The baud rate is not affected by a preset or by a power cycle.

## 650 Hz

**Supported** PSG-A Series with Option UNJ

This softkey enables you to select an internal or external reference oscillator bandwidth of 650 Hz.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** None.

## 9600

**Supported** All

This softkey selects 9600 as the baud rate in bits per second for the rear panel RS-232 connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** The baud rate is not affected by a preset or by a power cycle.

## 19200

**Supported** All

This softkey selects 19200 as the baud rate in bits per second for the rear panel RS-232 connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** The baud rate is not affected by a preset or by a power cycle.

## 38400

**Supported** All

This softkey selects 38400 as the baud rate in bits per second for the rear panel RS-232 connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** The baud rate is not affected by a preset or by a power cycle.

## 57600

**Supported** All

This softkey selects 57600 as the baud rate in bits per second for the rear panel RS-232 connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** The baud rate is not affected by a preset or by a power cycle.

# A

## Abort

**Supported** All

Use this softkey to stop the selected test.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** None

## Abort Cal

**Supported** All

Use this softkey to stop the calibration routine.

**Preset** N/A

**Range** N/A

**Location** Page 233

**Remarks** None

## Add Comment To Seq[*n*] Reg[*nn*]

**Supported** All

This softkey enables you to add a comment that is associated with a register in use. The register number is listed in the text area of the display and the comment is shown immediately following the register.

**Preset** N/A

**Range** N/A

**Location** Page 244

**Remarks** The comment line is limited to 55 alpha-numeric and special characters.

## Adjust Phase

**Supported** All

This softkey enables you to change the phase of the RF output signal. The change is relative to whatever phase the signal generator locked to the last time a frequency change was performed. For this reason, the phase adjustment does not survive changes in frequency and must be readjusted. If you first press **Phase Ref Set**, the current output phase is set as a zero reference and any subsequent phase adjustment is displayed as relative to the zero reference.

**Preset** 0.000 radians

**Range** ±3.141 radians or ±180 degrees

**Location** Page 239

**Remarks** Phase adjustment cannot be used with frequency or phase modulation. Adjustments to phase can be made in 0.1 degree increments.

## ALC BW

**Supported** All

Use this softkey to access a menu of choices that enables you to select the bandwidth of the automatic leveling control (ALC) loop.

**Preset** Auto

**Choices** Auto 100 Hz 1 kHz 10 kHz
100 kHz

**Location** Page 232

**Remarks** A wider bandwidth will give faster settling time. A narrower bandwidth improves residual AM noise.

## ALC Off On

**Supported** All

This softkey toggles the operating state of the automatic leveling control (ALC) circuit.

The RF output power of the signal generator is constantly monitored and controlled by the ALC circuit. Its purpose is to hold output power at the desired level in spite of drift due to temperature and time.

**Preset** On

**Range** Off or On

**Location** Page 232

**Remarks** An alternative to setting the ALC off is to set the ALC to a narrow bandwidth. ALC off is used for pulse widths less than 1.0 usec.

## All

**Supported** All

This softkey enables you to specify that all file types in the user file system be listed.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## AM

**Supported** PSG-A Series

Use this hardkey to access a menu of choices that enables you to configure the amplitude modulation type, path, depth and depth coupling, rate, source, mode, and waveform.

**Preset** N/A

**Range** N/A

**Location** Page 230

**Remarks** None

## AM Depth

**Supported** PSG-A Series

This softkey enables you to set the amplitude modulation depth, in percent, for the currently selected modulation path.

**Preset** 0.1%

**Range** 0.1–100.0% (minimum increment allowed is 0.1%)

**Location** Page 230

**Remarks** The new value of AM depth applies only to whichever AM path configuration you have currently selected.

## AM Depth Couple Off On

**Supported** PSG-A Series

This softkey toggles the operating state of the AM depth coupling. AM depth coupling links the AM depth values of AM Path 1 and AM Path 2.

**Preset** Off

**Choices** Off or On

**Location** Page 230

**Remarks** When the values are coupled, any change you make to one AM depth value is applied to both.

This softkey is not active when EXP is the selected AM type.

## AM Mode Normal Deep

**Supported** PSG-A Series

This softkey toggles the amplitude modulation mode between normal and deep. Normal mode maintains the amplitude modulation standard behavior. Deep mode provides an amplitude modulation depth with greater dynamic range when the ALC enabled.

**Preset** Normal

**Choices** Normal or Deep

**Location** Page 230

**Remarks** Deep AM is used for depths > 20 dB when the modulation rate is > 1.0 Hz. This mode is limited to repetitive AM and will not work with a dc modulation signal.

## AM Off On

**Supported** PSG-A Series

This softkey toggles the operating state of the amplitude modulation for whichever AM path configuration you have selected.

There are two paths for amplitude modulation which can be simultaneously enabled as long as they use different sources (Internal 1, Internal 2, Ext1, or Ext2). The modulation signals from both paths are summed internally for composite modulation.When amplitude modulation is on, the AM annunciator is turned on in the display.

**Preset** Off

**Choices** Off or On

**Location** Page 230

**Remarks** Although you can enable amplitude modulation with this key, the RF carrier is modulated by the enabled modulation only when you have also set **Mod On/Off** to On.

## AM Path 1 2

**Supported** PSG-A Series

This softkey enables you to select an amplitude modulation path. AM Path 1 and 2 define two standard amplitude modulation configurations which can be used together.

**AM Path 1** and **AM Path 2** are summed internally for composite modulation. Either path can be switched to any one of the modulation sources: Internal 1, Internal 2, Ext1, or Ext2. All modulation types can be simultaneously enabled, except FM with ΦM. AM, FM, and ΦM can sum simultaneous inputs from any two sources. Any given source can only be routed to one activated modulation type.

**Preset** AM Path 1

**Choices** AM Path 1 AM Path 2

**Location** Page 230

**Remarks** The RF carrier is available at the RF OUTPUT connector when you set **RF On/Off** to On. Set **Mod On/Off** to On to modulate the RF carrier with the modulations that you have enabled.

## AM Rate

**Supported** PSG-A Series

This softkey enables you to change the frequency for the internally generated modulation source.

**Preset** 400.0 Hz

**Range** 0.5 Hz–100.0 kHz (minimum increment allowed is 0.5 Hz)
0.5 Hz–1.0 MHz if sinewave is selected as the internal waveform

**Location** Page 230

**Remarks** The new value of AM rate applies only to the AM configuration you have currently selected.

## AM Source

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select either an internally generated or an externally applied source for amplitude modulation. The internal modulation is always ac-coupled.

**Preset** Internal 1

**Choices** Internal 1 Internal 2 Ext1 Ext2

**Location** Page 230

**Remarks** A 1.0 volt peak voltage input is required for calibrated AM depth settings. The `EXT 1 LO/HI` and `EXT 2 LO/HI` display annunciators will turn on if the peak input voltage differs from 1.0 by more than 3%. (The LO/HI annunciators only function for ac-coupled external inputs.)

## AM Start Rate

**Supported** PSG-A Series

This softkey enables you to change the starting frequency of the internally generated modulation source for swept-sine amplitude modulation.

**Preset** 400.0 Hz

**Range** 1.0 Hz–1.0 MHz (minimum increment allowed is 1.0 Hz)

**Location** Page 231

**Remarks** This softkey is coupled to the **AM Rate** softkey in the initial AM menu and the **AM Tone 1 Rate** softkey in the AM Dual-Sine menu. Any value set for AM Start Rate is reflected in the **AM Rate** and **AM Tone 1 Rate** softkeys.

## AM Stop Rate

**Supported** PSG-A Series

This softkey enables you to change the ending frequency of the internally generated modulation source for swept-sine amplitude modulation.

**Preset** 400.0 Hz

**Range** 1.0 Hz–1.0 MHz (minimum increment allowed is 0.1 Hz)

**Location** Page 231

**Remarks** This softkey is coupled to the **AM Tone 2 Rate** softkey in the AM Dual-Sine menu. Any value set for AM Stop Rate is reflected in the **AM Tone 2 Rate** softkey.

## AM Sweep Rate

**Supported** PSG-A Series

This softkey enables you to set the sweep rate for swept-sine amplitude modulation.

**Preset** 400.0 Hz

**Range** 0.1 Hz–100.0 kHz

**Location** Page 231

**Remarks** N/A

## AM Sweep Trigger

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select the triggering mode for the swept-sine amplitude modulation.

**Preset** Free Run

**Choices** Free Run Trigger Key Bus Ext

**Location** Page 231

**Remarks** You can also configure the polarity of the TTL signal output at the TRIGGER OUT connector using the **Trigger Out Polarity Neg Pos** softkey on this menu. Refer to "Trigger Out Polarity Neg Pos" on page 222.

## AM Tone 1 Rate

**Supported** PSG-A Series

This softkey enables you to set the internal modulation frequency for the AM tone 1 of the dual-sine AM waveform.

**Preset** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (minimum increment allowed is 0.5 Hz)

**Location** Page 231

**Remarks** This softkey is coupled to the **AM Rate** softkey in the AM menu and the **AM Start Rate** softkey in the AM Dual-Sine menu. Any value set for **AM Tone 1 Rate** is reflected in the **AM Rate** and **AM Start Rate** softkeys.

## AM Tone 2 Ampl Percent Of Peak

**Supported** PSG-A Series

This softkey enables you to adjust the amplitude of the alternate frequency as a percentage of the total amplitude. For example, if the tone 2 amplitude is set to 30% of the total amplitude, then the primary frequency is 70% of the total amplitude.

**Preset** 50.0%

**Range** 0.1%–99.9%

**Location** Page 231

**Remarks** This is applicable for the dual-sine function only.

## AM Tone 2 Rate

**Supported** PSG-A Series

This softkey enables you to set the internally generated modulation frequency for the amplitude modulation tone 2 of the dual-sine AM waveform.

**Preset** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (minimum increment allowed is 0.5 Hz)

**Location** Page 231

**Remarks** None

## AM Type Lin Exp

**Supported** PSG-A Series

This softkey enables you to set the amplitude modulation type to linear (percent/volt) or exponential (dB/volt).

**Preset** Lin

**Choices** Lin or Exp

**Location** Page 230

**Remarks** None

## AM Waveform

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select an amplitude modulation waveform that can be produced by the internal modulation source.

**Preset** Sine

**Choices**

| | | | |
|---|---|---|---|
| Sine | Noise | Triangle | Square |
| Dual-Sine | Ramp | Swept-Sine | |

**Location** Page 230

**Remarks** The waveform selection applies only to whichever AM path configuration you have currently selected. Dual-Sine and Swept-Sine are available for Internal 1 source only.

## Ampl

**Supported** All

This softkey enables you to set the signal generator to sweep amplitude data only. The frequency is set at a constant value determined by the **Frequency** hardkey.

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** You can define a sweep containing both amplitude and frequency information and still choose to sweep only amplitude.

## Ampl Offset

**Supported** All

This softkey enables you to change the value for amplitude offset. An amplitude offset changes the value shown in the amplitude area of the display but does not affect the output power. For example, if the current output power is 0.0 dBm and you enter an amplitude offset of –3.0 dBm, the output power will remain at 0.0 dBm but the display will show an amplitude of –3.0 dBm. This feature lets you simulate the power level at a test point beyond the RF OUTPUT connector.

An amplitude offset can be entered at any time during normal operation and also when you are operating in amplitude reference mode.

**Preset** 0.00 dB

**Range** –200 dB to 200 dB

**Location** Page 232

**Remarks** Changes to this value affect the displayed amplitude value only, the actual RF output power amplitude is not changed.

## Ampl Ref Off On

**Supported** All

This softkey toggles the operating state of the amplitude reference mode. When amplitude reference mode is turned on, the amplitude value displayed is equal to the current hardware output power minus the reference value set by the **Ampl Ref Set** softkey. All subsequent amplitude parameters are then relative to the reference value.

Amplitude offsets can be used with amplitude reference mode. In this situation, the display will show the amplitude calculated as the current hardware output power minus the reference value plus the amplitude offset.

**Preset** Off

**Choices** Off or On

**Location** Page 232

**Remarks** Amplitude reference mode changes the display only, it does not change the RF output power.

## Ampl Ref Set

**Supported** All

This softkey enables you to set the current output power as an amplitude reference value. It also causes the **Ampl Ref Off On** key to toggle to the On position, turning on amplitude reference mode. All subsequent output power settings are then relative to the reference value.

**Preset** 0.00 dB

**Range** 0.00 to –135 dBm

**Location** Page 232

**Remarks** This key sets the reference value equal to the current output power. If you have not yet set the reference value, the normal preset value for amplitude reference is 0.0 dBm.

## Ampl Start

**Supported** All

This softkey enables you to set the amplitude of the first point in the sweep. When you press **Ampl Start**, amplitude becomes the active function for the first point in the step sweep.

**Preset** –135.00 dBm (for instruments with Option 1E1)

**Range** You can set the value anywhere in the range of the signal generator's specified output power.

**Location** Page 245

**Remarks** None

## Ampl Stop

**Supported** All

This softkey enables you to set the amplitude of the last point in the sweep. When you press **Ampl Stop**, amplitude becomes the active function for the last point in the step sweep.

**Preset** –135.00 dBm (for instruments with Option 1E1)

**Range** You can set the value anywhere in the range of the signal generator's specified output power.

**Location** Page 245

**Remarks** None

## Amplitude

**Supported** All

This hardkey enables you to change the RF output power. In addition, the key accesses a menu of choices that enables you to configure the automatic leveling control (ALC), power search, user flatness, external detector coupling factor, and amplitude options. The current RF output power level is always shown in the amplitude area of the display except under the following conditions:

- amplitude reference mode is turned on
- an offset is applied
- a step or list amplitude sweep is in process

The amplitude area of the display is blanked whenever an amplitude sweep is selected.

**Preset** –135.00 dBm (for instruments with Option 1E1)

**Range** The output power range depends on your signal generator model. For more information, refer to the data sheet.

**Location** Page 232

**Remarks** None

## Atten/ALC Control

**Supported** All with Option 1E1

Use this softkey to access a menu of keys that enables you to control the attenuator and the automatic leveling control (ALC) power level.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## Atten Hold Off On

**Supported** All with Option 1E1

This softkey toggles the operating state of the attenuator hold function. Turn attenuator hold on to freeze the attenuator at its current setting. Use this function at any time you want to guarantee that there will be no power discontinuity normally associated with the attenuator switching during power adjustments.

**Preset** Off

**Choices** Off or On

**Location** Page 232

**Remarks** There will be no attenuator switching during power adjustments. The maximum power adjustment range will vary. However, you will have at least +4 dB and at least –13 dB range.

## Auto

**Supported** All

This softkey sets the state of the automatic leveling control bandwidth capability.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

# B

## Binary

**Supported** All

This softkey enables you to specify that only signal generator instrument binary files be listed in the catalog of files currently displayed.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Black Pixels Screen Test

**Supported** All

This softkey enables you to set all the pixels on the display to black. Pressing the **Local** hardkey returns the display to normal signal generator operation.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** This key is provided for factory use in testing the display.

## Brightness

**Supported** All

Use this softkey to adjust the display brightness (intensity). The current value shown in the active entry area is a relative value for brightness. Increasing the number increases the brightness; decreasing the number decreases the brightness.

**Preset** N/A

**Range** 1–50

**Location** Page 247

**Remarks** The brightness intensity is not affected by a preset or by a power cycle.

## Bus

**Supported** All

This softkey is one of the choices in both the Sweep Trigger menu and the Point Trigger menu. Choosing **Bus** in the Sweep Trigger menu allows you to trigger a list or step sweep using the GPIB. Choosing **Bus** in the Point Trigger menu allows you to trigger a sweep point-by-point using the GPIB.

**Preset** N/A

**Range** N/A

**Location** Page 231, Page 236, Page 241, Page 245

**Remarks** None

# C

## Catalog Type

**Supported** All

Use this softkey to access a menu of choices that enables you to select the catalog type for displaying files. When you have made your selection, the display is updated and your choice appears below the **Catalog Type** softkey.

**Preset** N/A

**Choices** All State List User Flatness Binary

**Location** Page 249

**Remarks** Catalog type selection is not affected by a preset or by a power cycle.

## Clear Error Queue(s)

**Supported** All

This softkey enables you to delete all messages that are stored in the error message queues. When the error message queue is empty, the **ERR** annunciator is turned off.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** You cannot recover from this action; once the messages are deleted, they are permanently gone.

## Clear Text

**Supported** All

Use this softkey to delete all characters and digits in the active entry area. This key is especially useful when you want to clear the current entry so you can create a new entry.

**Preset** N/A

**Range** N/A

**Location** Page 234, Page 246, Page 249

**Remarks** None

## Configure Cal Array

**Supported** All

Use this softkey to access a menu of softkeys for defining a user flatness list sweep. Each point in this sweep will contain a frequency and amplitude correction pair.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## Configure List Sweep

**Supported** All

Use this softkey to access a menu of softkeys for defining a list sweep. In this menu you can insert and delete points in a sweep. Each point can contain frequency, amplitude, and dwell time information.

---

**NOTE** The dwell time does not begin until the signal generator has settled for the current frequency and/or amplitude change. When the signal generator has settled, a trigger signal is transmitted through the rear panel SOURCE SETTLED OUTPUT connector.

---

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** None

## Configure Step Array

**Supported** All

Use this softkey to access a menu of softkeys that enables you to define a user flatness step sweep. In this menu you can set the start frequency, stop frequency, and the number of points for the sweep.

**Preset** N/A

**Range** N/A

**Location** Page 233

**Remarks** None

## Configure Step Sweep

**Supported** All

Use this softkey to access a menu of softkeys for defining a step sweep. In this menu you can set the start and stop frequencies for a sweep, set the start and stop power levels, and you can set the number of points in the sweep with the dwell time at each point.

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** None

## Confirm Delete

**Supported** All

Use this softkey to continue to delete the selected file.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Confirm Delete Of All files

**Supported** All

Use this softkey to confirm that all of the files in the catalog you have selected should be deleted. If you do not wish to delete all of the files, press the **Return** hardkey instead.

**Preset** N/A

**Range** N/A

**Location** Page 251

**Remarks** None

## Confirm Load From Step Sweep

**Supported** All

Use this softkey to proceed with setting up a table that includes the start frequency, stop frequency, and number of points that are defined in the Configure User Flatness Step Array and the Sweep List menus.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 246

**Remarks** None

## Confirm Preset

**Supported** All

Use this softkey to confirm that you want the delete the current list and replace it with a new list.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 246

**Remarks** None

## Copy File

**Supported** All

This softkey enables you to copy and rename a file in the displayed catalog of files.

When you have entered the new file name, press the **Enter** terminator softkey. If you have changed your mind, press the **Return** hardkey. Once you press **Enter**, the new file is stored and displayed immediately in the catalog list.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

# D

## DC

**Supported** PSG-A Series

Use this softkey to specify dc as the modulation waveform for the internally generated signal.

**Preset** N/A

**Range** N/A

**Location** Page 240

**Remarks** This key is only active when you have selected the internal source to operate as a function generator.

## DCFM/DCΦM Cal

**Supported** PSG-A Series

This softkey enables you to initiate a DCFM or a DCΦM calibration, depending upon which type of modulation is currently active. This calibration eliminates the offset in DCFM or DCΦM so that the carrier frequency remains the same with no modulation applied.

**NOTE** If the calibration is performed with a dc signal applied, any deviation provided by the dc signal will be removed and the new zero reference point will be at the applied dc level. The calibration will have to be performed again when the dc signal is disconnected to reset the carrier signal to the correct zero reference.

**Preset** N/A

**Range** N/A

**Location** Page 235, Page 237

**Remarks** Use this calibration for externally applied signals. While the calibration can also be performed for internally generated signals, dc offset is not a normal characteristic for them.

## Delete All Binary Files

**Supported** All

This softkey enables you to delete all binary files in the displayed catalog of files. The files will not be deleted until you press the **Confirm Delete Of Binary Files**. If you change your mind and do not want to delete the files, press the **Return** hardkey before confirming the deletion.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Delete All <*catalog type*> Files

**Supported** PSG-A Series

Use this softkey to delete all of the files in the displayed catalog of files of a selected catalog type. The files will not be deleted until you press the **Confirm Delete All <catalog type> Files**. If you change your mind and do not want to delete the files, press the **Return** hardkey before confirming the deletion.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Delete All Files

**Supported** All

Use this softkey to delete all of the files in the displayed catalog of files. The files will not be deleted until you press the **Confirm Delete All Files**. If you change your mind and do not want to delete the files, press the **Return** hardkey before confirming the deletion.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** This key does not affect the instrument state or calibration information. If power on mode is set to last, a new last state file will be created when the instrument idles.

## Delete All List Files

**Supported** All

This softkey enables you to delete all list files. The files will not be deleted until you press the **Confirm Delete Of List Files**. If you change your mind and do not want to delete the files, press the **Return** hardkey.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Delete All Regs in Seq [*n*]

**Supported** All

This softkey enables you to delete the data saved in all of the registers of the selected sequence. Do not press this key until you have selected the correct sequence using the **Select Seq** key.

**Preset** N/A

**Range** N/A

**Location** Page 243, Page 244

**Remarks** You cannot recover data after this step. If you change your mind and do not wish to delete the data, press the **Return** hardkey

## Delete All Sequences

**Supported** All

This softkey enables you to delete all of the data in all saved registers of all sequences.

**Preset** N/A

**Range** N/A

**Location** Page 243, Page 244

**Remarks** You cannot recover data after this step. If you change your mind and do not wish to delete the data, press the **Return** hardkey.

## Delete All State Files

**Supported** All

This softkey enables you to delete all instrument state files. The files will not be deleted until you press the **Confirm Delete Of State Files**. If you change your mind and do not want to delete the files, press the **Return** hardkey.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Delete All UFLT Files

**Supported** All

This softkey enables you to delete all of the user flatness correction files.The files will not be deleted until you press the **Confirm Delete Of UFLT Files**. If you change your mind and do not want to delete the files, press the **Return** hardkey.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Delete File

**Supported** All

This softkey enables you to delete a file in the catalog listing. Use the up and down arrow keys until the file you wish to delete is highlighted. Press **Delete File** and then press the **Confirm Delete** softkey. If you do not want to delete the file, press **Return** instead of **Confirm Delete**.

**Preset** N/A

**Range** N/A

**Location** Page 234, Page 246, Page 249

**Remarks** None

## Delete Item

**Supported** All

This softkey enables you to delete an item in the displayed list. Use the arrow keys until the desired item is highlighted. Then press **Delete Item** to eliminate this item from the list. If the last item in a list is deleted, it is replaced by the default value.

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** You cannot recover the item after this step. If you change your mind and do not wish to delete the item, press the **Return** hardkey.

## Delete Row

**Supported** All

This softkey enables you to delete a selected row in the list. Use the up and down arrow keys until any item is selected in the row you wish to delete. Press **Delete Row** and the entire row is deleted. If the last row in a list is deleted, it is replaced by the default value.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 245

**Remarks** You cannot recover data after this step. If you change your mind and do not wish to delete the row, press the **Return** hardkey.

## Delete Seq[*n*] Reg[*nn*]

**Supported** All

Use this softkey to delete the contents of a specified register in a specified sequence. Do not press this key until you have selected the correct sequence and register using the **Select Seq** and **Select Reg** softkeys.

**Preset** N/A

**Range** N/A

**Location** Page 243, Page 244

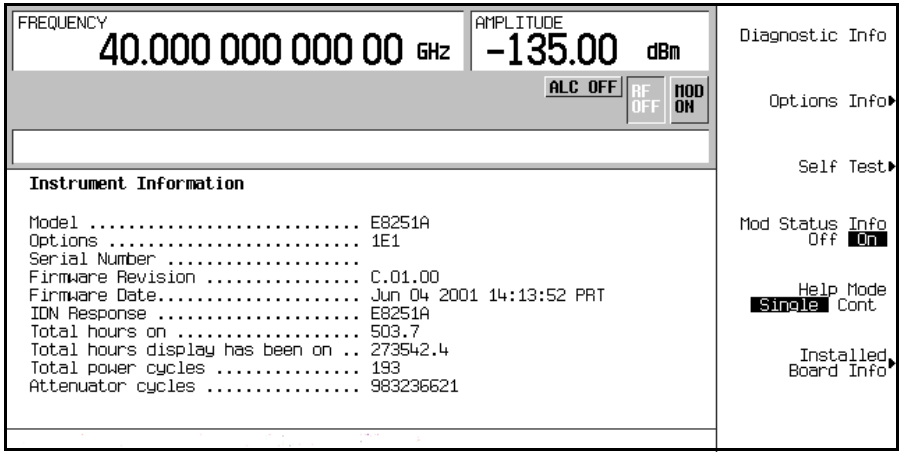
**Remarks** You cannot recover the data after this step. If you change your mind and do not wish to delete the data, press the **Return** hardkey.

## Diagnostic Info

**Supported** All

Use this softkey to access a display of diagnostic information about the signal generator. Refer to Figure 5-1 for information about what is included in the display.

**Figure 5-1 Diagnostic Instrument Information**




| | |
|---|---|
| Model | the model number of the signal generator |
| Options | a list of the installed hardware and software options |
| Serial Number | the factory assigned serial number |

| | |
|---|---|
| Firmware Revision | the revision number for the signal generator's firmware |
| IDN Response | the characters returned after a remote *IDN query |
| Total hours on | the number of hours that the signal generator has been powered on |
| Total hours display has been on | the number of hours the display has been active (value does not include hours using the screen saver) |
| Total power cycles | the number of times the line power has been switched on |
| Attenuator cycles | the number of times the attenuator has been switched |

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** None

## Display

**Supported** All

Use this softkey to access a menu for adjusting and testing the display. In this menu you set up the screen saver, change the display brightness, and perform black and white pixel screen tests.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** None

## Do Cal

**Supported** All

This softkey enables you to start a flatness calibration using the information from the user flatness list sweep table.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## Done

**Supported** All

Use this softkey to return to the Flatness menu once the calibration routine is complete.

**Preset** N/A

**Range** N/A

**Location** Page 233

**Remarks** None

## Do Power Search

**Supported** All

Use this softkey to execute the power search calibration routine one time. Power search is an internal calibration routine used to achieve calibrated output power when the ALC is off. You can execute a power search at any time by pressing this softkey.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** The routine will execute only if RF is on and ALC is off.

## Dual-Sine

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to set the dual-sine amplitude modulation waveform for the internally generated, ac-coupled signal. You can set the rates for two separate tones according to modulation type.

- In the AM menu, you can set the depth for Internal 1, and also set a ratio of the tone 2 depth to the tone 1 depth.
- In the FM menu, you can set the deviation for the selected modulation path and also set a ratio of the tone 2 FM deviation to the tone 1 FM deviation.
- In the ΦM menu, you can set the frequencies for two separate tones.
- In addition you can set a ratio of the tone 2 LF amplitude to the tone 1 LF amplitude.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** None

## Dwell Type List Step

**Supported** All

This softkey toggles the dwell time for the list sweep points between the values defined in the list sweep and the value set for step sweep. Choose List to sweep with dwell times that you have defined in the list sweep. Choose Step and you will sweep each point in the list with a dwell time set by the **Step Dwell** softkey in the Configure Step Sweep menu.

**NOTE** The dwell time does not begin until the signal generator has settled for the current frequency and/or amplitude change. When the signal generator has settled, a trigger signal is transmitted through the rear panel SOURCE SETTLED OUTPUT connector.

**Preset** List

**Choices** List or Step

**Location** Page 246

**Remarks** When you are sweeping using the step sweep dwell time, the list sweep dwell time values are grayed out to indicate that they are not being used.

# E

## E4416A

**Supported** All

This softkey enables you to select an Agilent E4416A power meter to perform the automated user flatness correction process.

**Preset** N/A

**Range** N/A

**Location** Page 233

**Remarks** None

## E4417A

**Supported** All

This softkey enables you to select an Agilent E4417A power meter to perform the automated user flatness correction process.

**Preset** N/A

**Range** N/A

**Location** Page 233

**Remarks** None

## E4418B

**Supported** All

This softkey enables you to select an Agilent E4418B power meter to perform the automated user flatness correction process.

**Preset** N/A

**Range** N/A

**Location** Page 233

**Remarks** None

## E4419B

**Supported** All

This softkey enables you to select an Agilent E4419B power meter to perform the automated user flatness correction process.

**Preset** N/A

**Range** N/A

**Location** Page 233

**Remarks** None

## Edit Comment In Seq[*n*] Reg[*nn*]

**Supported** All

This softkey enables you to edit a comment that is associated with a register in use. The register number is listed in the text area of the display and the comment is shown immediately following the register.

**Preset** N/A

**Range** N/A

**Location** Page 244

**Remarks** This softkeys appears only after a comment has been added to a register.

## Edit Item

This softkey enables you to change an item in the displayed table or list.

**Supported** All

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 245

**Remarks** None

## Editing Keys

**Supported** All

Use this softkey to access a menu of choices that enables you to create and edit text. In this menu you can delete the existing text in the active entry area, and you can toggle the editing mode from inserting text to replacing text.

**Preset** N/A

**Range** N/A

**Location** Page 234, Page 246, Page 249, Page 251

**Remarks** None

## Editing Mode Insert Replace

**Supported** All

This softkey toggles the editing mode between inserting text or replacing text. Insertion mode causes text to be entered in the position directly to the right of the cursor. Replacement mode causes the text to be entered in the position held by the cursor, overwriting any existing text in that position.

**Preset** Insert

**Choices** Insert or Replace

**Location** Page 234, Page 246, Page 249, Page 251

**Remarks** None

## Error Info

**Supported** All

Use this softkey to access a menu of choices that enables you to view and clear error messages. In this menu you can view any of the error messages in the queue, and you can clear all of the error messages in the queue.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** The error queue will hold up to 30 error messages before deleting the oldest error message to make room for the 31st error message.

## Ext

**Supported** All

This softkey is one of the choices in the Sweep Trigger, Point Trigger, and AM, FM and ΦM Sweep Trigger menus. Your available settings depend on which trigger menu you have selected.

- In the Sweep Trigger menu, choosing **Ext** enables you to trigger a full sweep on either the negative or positive edge of a signal applied to the TRIGGER IN rear panel connector.
- In the Point Trigger menu, choosing **Ext** enables you to trigger a point-by-point sweep on either the negative or positive edge of a signal applied to the TRIGGER IN rear panel connector.
- In the AM, FM, and ΦM sweep trigger menus, choosing **Ext** enables you to trigger a swept-sine amplitude, frequency, or phase modulation on either the negative or positive edge of a signal applied to the TRIGGER IN rear panel connector.

**Preset** N/A

**Range** N/A

**Location** Page 231, Page 236, Page 238, Page 241, Page 245

**Remarks** Set the polarity of the trigger signal using the **Trigger In Polarity Neg Pos** softkey.

## Ext Coupling DC AC

**Supported** All

Use this key to toggle the coupling for the externally applied modulation input signal between dc and ac.

**Preset** DC

**Choices** DC or AC

**Location** Page 230, Page 235, Page 237

**Remarks** The command does not change the currently active source or switch the current modulation on or off. The modulating signal may be the sum of several signals, either internal or external sources.

## Ext Detector

**Supported** All

This softkey enables you to select an external diode detector leveling mode. This enables you to connect a detector and a coupler or splitter to the RF output and level the RF signal at a point external to the RF output connector.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## Ext Detector Coupling Factor

**Supported** All

This softkey enables you to set the external detector coupling factor.

**Preset** 16.0 dB

**Range** –200.0 dB to 200.0 dB

**Location** Page 232

**Remarks** N/A

## Ext Impedance 50 Ohm 600 Ohm

**Supported** All

This softkey toggles the external input impedance between 50 ohms and 600 ohms.

**Preset** 50 Ohm

**Choices** 50 Ohm or 600 Ohm

**Location** Page 230, Page 235, Page 237

**Remarks** None

## Ext Polarity Normal Inverted

**Supported** PSG-A Series

This softkey toggles the external pulse polarity between normal and inverted.

**Preset** Normal

**Choices** Normal or Inverted

**Location** Page 242

**Remarks** N/A

## Ext Pulse

**Supported** PSG-A Series

This softkey enables you to activate the pulse modulation mode with an external pulse source.

**Preset** N/A

**Range** N/A

**Location** Page 242

**Remarks** N/A

## Ext1

**Supported** PSG-A Series

Use this softkey to select an externally applied signal for the modulation waveform once you have connected the signal source to the EXT 1 INPUT connector.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237

**Remarks** The externally applied, ac-coupled input signal is tested for a voltage level and a display annunciator will report a high or low condition if that voltage is > ±3% of 1 $V_p$.

## Ext2

**Supported** PSG-A Series

This softkey enables you to select an externally applied signal for the modulation waveform once you have connected the signal source to the EXT 2 INPUT connector.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237

**Remarks** The externally applied, ac-coupled input signal is tested for a voltage level and a display annunciator will report a high or low condition if that voltage is > ±3% of 1 $V_p$.

## External Ref Bandwidth

**Supported** PSG-A Series with Option UNJ

This softkey enables you to adjust the bandwidth of the external reference oscillator.

**Preset** N/A

**Choices** 25.0 Hz 55.0 Hz 125.0 Hz 300.0 Hz 650.0 Hz

**Location** Page 248

**Remarks** None.

# F

## Flatness Off On

**Supported** All

This softkey toggles the operating state of the application of the user flatness corrections to the output power.

**Preset** Off

**Choices** Off or On

**Location** Page 232

**Remarks** None

## FM/ΦM

**Supported** PSG-A Series

Use this hardkey to access a menu of choices that enables you to configure modulation type (FM, normal phase modulation, or wideband phase modulation), path, deviation and deviation coupling, source, rate, waveform, and DCFM/DCΦM calibration.

**Preset** N/A

**Range** N/A

**Location** Page 235

**Remarks** None

## FM ΦM Normal High BW

**Supported** PSG-A Series

This softkey toggles between the menus for frequency modulation (FM), normal phase modulation (ΦM), and wideband phase modulation (ΦM High BW).

- Normal ΦM lets you set the phase deviation as high as N x 80 radians with a 3.0 dB bandwidth at 100.0 kHz. Refer to Table 5-1 on page 145 for N values.
- High BW ΦM provides increased bandwidth while restricting the maximum deviation to deviation settings up to N x 8 radians. Refer to Table 5-1 for N values.

**Preset** FM

**Choices** FM ΦM Normal ΦM High BW

**Location** Page 237

**Remarks** The deviation limits are dependent upon the carrier frequency. This limiting occurs only when the modulation is turned on.

## FM Dev

**Supported** PSG-A Series

This softkey enables you to set the frequency modulation deviation for the currently selected modulation path. The range of values allowed depends on the carrier frequency. The maximum peak deviation for a frequency is calculated by multiplying N times 8.0 MHz. (Table 5-1 lists the values for N and the resulting maximum peak deviations.)

**Table 5-1**

| *Carrier Frequency* | *N* | *Maximum Peak Deviation* |
|---|---|---|
| 250 kHz to ≤ 250 MHz | 1/8 | 1.0 MHz |
| > 250 MHz to ≤ 500 MHz | 1/16 | 0.5 MHz |
| > 500 MHz to ≤ 1 GHz | 1/8 | 1 MHz |
| > 1 GHz to ≤ 2 GHz | 1/4 | 2 MHz |
| > 2 GHz to 3.2 GHz | 1/2 | 4 MHz |
| > 3.2 GHz to 10 GHz | 1 | 8 MHz |
| > 10 GHz to 20 GHz | 2 | 16 MHz |
| > 20 GHz to 40 GHz | 4 | 32 MHz |

For example, if you choose a carrier frequency of 950 MHz, multiply 1/8 by 8 MHz resulting in a 1.0 MHz maximum peak deviation.

**Preset** 1.0 kHz

**Range** N/A

**Location** Page 235, Page 236

**Remarks** The new value of FM deviation applies only to whichever FM path configuration you have currently selected. Also, whenever FM Path 1 is used with FM Path 2, the deviation for FM Path 1 must be greater than or equal to the deviation for FM Path 2

## FM Dev Couple Off On

**Supported** PSG-A Series

This softkey toggles the operating state of the frequency modulation deviation coupling. Turning on FM deviation coupling links the FM deviation values of FM Path 1 and FM Path 2.

**Preset** Off

**Choices** Off or On

**Location** Page 235

**Remarks** When the values are coupled, any change you make to one FM deviation value is applied to both.

## FM Off On

**Supported** PSG-A Series

This softkey toggles the operating state of the currently selected frequency modulation.

Whenever frequency modulation is enabled, the FM annunciator is turned on in the display.

**Preset** Off

**Choices** Off or On

**Location** Page 235

**Remarks** Although you can turn on frequency modulation with this key, the RF carrier is modulated by the enabled modulation only when you have also set **Mod On/Off** to On.

## FM Path 1 2

**Supported** PSG-A Series

Use this softkey to select FM Path 1 or FM Path 2. FM Path 1 and FM Path 2 define two standard frequency modulation configurations which can be used together. Configure the modulation characteristics (such as deviation, source, rate, and waveform) using the remaining softkeys in the FM menu. Then enable FM by setting **FM Off On** to On.

FM Path 1 and FM Path 2 are summed internally for composite modulation. Either path can be switched to any one of the modulation sources: Internal 1, Internal 2, Ext1, or Ext2.

**Preset** FM Path 1

**Choices** FM Path 1 or FM Path 2

**Location** Page 235

**Remarks** FM Path 2 is limited to a maximum rate of 1 MHz. FM Path 2 must be set to a deviation less than FM Path 1.

## FM Rate

**Supported** PSG-A Series

This softkey enables you to change the internal modulation frequency for the FM Path 1 and FM Path 2 configurations.

**Preset** Off

**Range** 0.5 Hz–100.0 kHz (minimum increment is 0.5 Hz)
0.5 Hz–1.0 MHz (if sinewave is selected as the internal waveform)

**Location** Page 235

**Remarks** The new value of FM rate applies only to whichever FM path configuration you have currently selected.

## FM Source

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select an internally generated or externally applied modulation input for the frequency modulation source. The internal modulation is always ac-coupled. For externally applied signals, you can choose between ac- and dc-coupled modulation.

**Preset** Internal 1

**Choices** Internal 1 Internal 2 Ext1 Ext2

**Location** Page 235

**Remarks** A 1.0 peak voltage input is required for calibrated FM deviation settings. The `EXT 1 LO/HI` and `EXT 2 LO/HI` display annunciators will turn on if the peak input voltage differs from 1.0 volt by more than 3.0%. (The LO/HI annunciators only function for ac-coupled external inputs.)

## FM Start Rate

**Supported** PSG-A Series

This softkey enables you to change the starting frequency of the internally generated modulation source for swept-sine frequency modulation.

**Preset** 400.0 Hz

**Range** 1.0 Hz–1.0 MHz (minimum increment is 1.0 Hz)

**Location** Page 236

**Remarks** This key is coupled to the **FM Rate** softkey in the initial FM menu and the **FM Tone 1 Rate** softkey in the FM dual-sine menu. Any value set for **FM Start Rate** is reflected in the **FM Rate** and **FM Tone 1 Rate** softkeys.

## FM Stop Rate

**Supported** PSG-A Series

This softkey enables you to change the ending frequency of the internally generated modulation source for swept-sine frequency modulation.

**Preset** 400.0 Hz

**Range** 1.0 Hz–1.0 MHz (minimum increment is 1.0 Hz)

**Location** Page 236

**Remarks** This key is coupled to the **FM Tone 2 Rate** softkey in the FM dual-sine menu. Any value set for **FM Stop Rate** is reflected in the **FM Tone 2 Rate** softkey.

## FM Sweep Rate

**Supported** PSG-A Series

This softkey enables you to set the sweep rate for swept-sine frequency modulation.

**Preset** 400.0 Hz

**Range** 0.5 Hz–100.0 kHz

**Location** Page 236

**Remarks** N/A

## FM Sweep Trigger

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select the triggering mode for the swept-sine frequency modulation.

**Preset** Free Run

**Choices** Free Run Trigger Key Bus Ext

**Location** Page 236

**Remarks** You can also configure the polarity of the TTL signal output at the TRIGGER IN connector using the **Trigger In Polarity Neg Pos** softkey on this menu. Refer to "Trigger In Polarity Neg Pos" on page 222.

## FM Tone 1 Rate

**Supported** PSG-A Series

This softkey enables you to set the internal modulation frequency for the FM tone 1 rate of the dual-sine FM waveform.

**Preset** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (minimum increment is 0.5 Hz)

**Location** Page 236

**Remarks** This key is coupled to the **FM Rate** softkey in the initial FM menu and the **FM Start Rate** softkey in the FM swept-sine menu. Any value set for **FM Tone 1 Rate** is reflected in the **FM Rate** and **FM Start Rate** softkeys.

## FM Tone 2 Ampl Percent Of Peak

**Supported** PSG-A Series

This softkey enables you to adjust the amplitude of the alternate frequency as a percentage of the peak analog modulation amplitude. For example, if the tone 2 amplitude is set to 30.0% of the total amplitude, then the primary frequency is 70.0% of the total amplitude.

**Default** 50.0%

**Range** 0.1%–99.9%

**Location** Page 236

**Remarks** This is applicable only for the dual-sine function.

## FM Tone 2 Rate

**Supported** PSG-A Series

This softkey enables you to set the internal modulation frequency for the FM tone 2 of the dual-sine FM waveform.

**Default** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (minimum increment is 0.5 Hz)

**Location** Page 236

**Remarks** This key is coupled to the **FM Stop Rate** softkey in the FM swept-sine menu. Any value set for **FM Tone 2 Rate** is reflected in the **FM Stop Rate** softkey.

## FM Waveform

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select the frequency modulation waveform that can be produced by the internal modulation source.

**Preset** Sine

**Choices**

| | | | |
|---|---|---|---|
| Sine | Noise | Triangle | Square |
| Dual-Sine | Ramp | Swept-Sine | |

**Location** Page 235

**Remarks** The waveform selection applies only to whichever FM path configuration you have currently selected. Dual-Sine and Swept-Sine are available with Internal 1 only.

## Free Run

**Supported** All

This softkey is one of the choices in both the Sweep Trigger menu and the Point Trigger menu. Choosing **Free Run** in the Sweep Trigger menu immediately triggers the current sweep when you press the **Single Sweep** softkey. When sweep repeat is continuous and **Free Run** is chosen for the sweep trigger, then sweeps are triggered consecutively (a new sweep is triggered as soon as the current sweep ends). Choosing **Free Run** in the Point Trigger menu causes the sweep to pause for the dwell time at each point after the hardware has been set up for that point's frequency and amplitude.

**Preset** N/A

**Range** N/A

**Location** Page 231, Page 236, Page 238, Page 241, Page 245

**Remarks** To stop the sweep, choose a different trigger such as **Ext**, or set the waveform to something other than **Swept-Sine**.

## Freq

**Supported** All

This softkey enables you to set the signal generator to sweep frequency data only. The amplitude is set at a constant level determined by the **Amplitude** hardkey. You can define a sweep containing both amplitude and frequency information and still choose to sweep frequency only.

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** None

## Freq Multiplier

**Supported** All

This softkey enables you to multiply the frequency shown on the display without changing the frequency output at the RF OUTPUT connector (simulating the frequency at the output of a harmonic multiplier).

For any multiplier other than 1, the MULT indicator is shown in the frequency area of the display.

**Preset** 1

**Range** –100 to +1000 (excluding 0)

**Location** Page 239

**Remarks** The displayed frequency value is equal to the actual frequency, minus the reference frequency, times the multiplier, plus the offset frequency.

## Freq Offset

**Supported** All

This softkey enables you to set a value for frequency offset. For example, if the current output frequency is 1.0 MHz and you enter a frequency offset of 3.0 MHz, the output frequency will remain at 1.0 MHz but the display will show a frequency of 4.0 MHz. This feature enables you to simulate the frequency at the output of a frequency translating device. When an offset has been entered, the OFFSET indicator is turned on in the frequency area of the display.

**Preset** 0.00 Hz

**Range** *20 GHz Models*: 0HZ–20GHZ

*40 GHz Models*: 0HZ–40GHZ

**Location** Page 239

**Remarks** A frequency offset can be entered at any time during normal operation and also when you are operating in frequency reference mode. When and offset has been entered, the OFFS indicator is turned on in the frequency area of the display.

A frequency offset changes the value shown in the frequency area of the display but does not affect the output frequency.

## Freq Ref Off On

**Supported** All

This softkey toggles the operating state of the frequency reference mode. When frequency reference mode is turned on, the frequency value displayed is equal to the current hardware output frequency minus the reference value set by the **Freq Ref Set** softkey. All frequency parameters will now be set as relative to the reference value.

Frequency offsets can be used with frequency reference mode. In this situation, the display will show the frequency calculated as the current hardware output frequency minus the reference value plus the frequency offset.

**Preset** Off

**Choices** Off or On

**Location** Page 239

**Remarks** Frequency reference mode only changes the display; it does not change the RF output frequency.

## Freq Ref Set

**Supported** All

Use this softkey to set the current output frequency plus the offset frequency as the frequency reference value. It also causes the **Freq Ref Off On** softkey to toggle to the On position, turning on frequency reference mode. All frequency parameters are then set as relative to the reference value.

**Preset** 0.00 Hz

**Range** 100 kHz–highest frequency

**Location** Page 239

**Remarks** None

## Freq Start

**Supported** All

This softkey enables you to set the frequency of the first point in the sweep.

**Preset** Maximum frequency

**Range** 100 kHz–highest frequency

**Location** Page 233, Page 245

**Remarks** None

## Freq Stop

**Supported** All

This softkey enables you to set the frequency of the last point in the sweep.

**Preset** Maximum frequency

**Range** 100 kHz–highest frequency

**Location** Page 233, Page 245

**Remarks** None

## Freq & Ampl

**Supported** All

Use this softkey to set the signal generator to sweep both frequency and amplitude data.

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** Both the frequency and the amplitude lists must have the same number of points or one must have only one point. If a list has only one point, then that point is used for each of the other list's points.

## Frequency

**Supported** All

This hardkey enables you to change the RF output frequency. In addition, the key accesses a menu of softkeys that enables you to configure the reference frequency and the phase, and specify the oscillator source.

**Preset** 20.0 GHz or 40.00 GHz (depends on the signal generator)

**Range** The output frequency range allowed depends on your signal generator model. Refer to the data sheet.

**Location** Page 239

**Remarks** None

## Function Generator 1

**Supported** PSG-A Series

This softkey enables you to select the internal source 1 as a function generator.

**Preset** N/A

**Range** N/A

**Location** Page 240

**Remarks** When you use the internal source in this capacity, any modulation with the internal source selected is turned off.

## Function Generator 2

**Supported** PSG-A Series

This softkey enables you to select internal source 2 as a function generator.

**Preset** N/A

**Range** N/A

**Location** Page 240

**Remarks** When you use the internal source in this capacity, any modulation with the internal source selected is turned off.

# G

## Gaussian

**Supported** PSG-A Series

This softkey enables you specify noise with a Gaussian distribution as the modulation waveform for the internally generated, ac-coupled signal.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** None

## Goto Bottom Row

**Supported** All

This softkey enables you to move the selection bar to the last row in the table.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 234, Page 245, Page 246, Page 249

**Remarks** None

## Goto Middle Row

**Supported** All

This softkey enables you to move the selection bar to the middle row of the list.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 234, Page 245, Page 246, Page 249

**Remarks** None

## Goto Row

**Supported** All

Use this softkey to access a menu of softkeys that enables you to move the selection bar to a specific row in the list.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 234, Page 245, Page 246, Page 249

**Remarks** None

## Goto Top Row

**Supported** All

This softkey enables you to move the selection bar to the top row in the list.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 234, Page 245, Page 246, Page 249

**Remarks** None

## GPIB Address

**Supported** All

This softkey enables you to change the signal generator's GPIB address. The GPIB address is set to 19 at the factory.

**Preset** N/A

**Range** 0–30

**Location** Page 247

**Remarks** The GPIB address setting is not affected by a preset or by a power cycle.

## GPIB/RS-232 LAN

**Supported** All

Use this softkey to access a menu of choices for GPIB, RS-232, and LAN configuration.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** None

## GPIB Listener Mode

**Supported** All

Use this softkey to return the GPIB back to the listener mode after a user flatness calibration.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

# H

## Help

**Supported** All

Press this hardkey to display a help text box. Then press a hardkey, softkey, or turn the knob and a short description of the function which will appear in the text area.

**Preset** N/A

**Range** N/A

**Remarks** N/A

## Help Mode Single Cont

**Supported** All

Use this hardkey to view a short description of any hardkey or softkey. There are two help modes available on the signal generator: single and continuous.

- In single mode, when you press the **Help** key, help text is provided for your next key press. Pressing any key afterward will enable you to exit the help function and will activate the function of the key.
- In continuous mode, when you press the **Help** key, help text is provided for each key press in addition to activating the function of each key (except for the **Preset** key). You will remain in continuous mode until either the **Help** key is pressed again or the signal generator help mode is toggled back to single mode.

**Preset** N/A

**Choices** Single or Cont

**Location** Page 250

**Remarks** The help mode is not affected by a preset or by a power cycle.

## Hold

**Supported** All

This hardkey deactivates the current active function and blanks the softkey menu. Once hold has been pressed, the front panel knob, arrow keys, and the numeric keypad have no effect until another function becomes active.

**Preset** N/A

**Range** N/A

**Remarks** None

## Hostname

**Supported** All

This softkey enables you to enter the hostname for the local area network connection. No hostname is entered at the factory.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** The hostname setting is not affected by a preset or by a power cycle.

# I

## Incr Set

**Supported** All

This hardkey enables you to set the incremental value of the up and down arrow keys, and the front panel knob, for the current active function. The incremental value will appear in the active entry area of the display.

**Preset** N/A

**Range** N/A

**Remarks** The increment set value is not affected by a preset or by a power cycle.

## Insert Item

**Supported** All

This softkey enables you to insert a copy of the highlighted item directly below that item in a table or list.

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** None

## Insert Row

**Supported** All

Use this softkey to insert a copy of the highlighted row directly above that row in a table or list.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 245

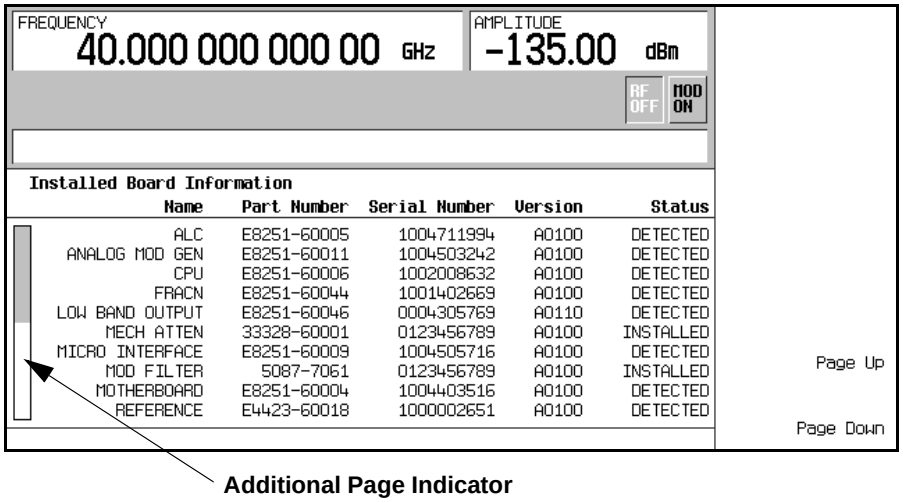
**Remarks** None

## Installed Board Info

**Supported** All

Use this softkey to display information about the installed boards in the signal generator. Refer to Figure 5-2.

**Figure 5-2 Installed Board Information**




The gray and white vertical bar on the left side of the display indicates that there is an additional page of information. Use the **Page Down** softkey to display the next page. Use the **Page Up** softkey to return to the previous page.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** A status of DETECTED means that the installed board was automatically detected by the internal computer.

A status of INSTALLED means that the installed board is available for use and is not normally automatically detected.

## Instrument Adjustments

**Supported** All

Use this softkey to access a menu of front panel adjustments for the signal generator. This menu enables you to adjust the reference oscillator, and set the value of the step keys and the front panel knob.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** None

## Instrument Info/Help Mode

**Supported** All

Press this softkey to display a menu of softkeys for the following functions:

- display diagnostic information about your signal generator
- display all available options and the associated hardware
- display the self test control menu
- toggle the modulation status display on and off
- toggle the help mode between single and continuous
- display information about the installed boards

**Preset** N/A

**Range** N/A

**Location** Page 247

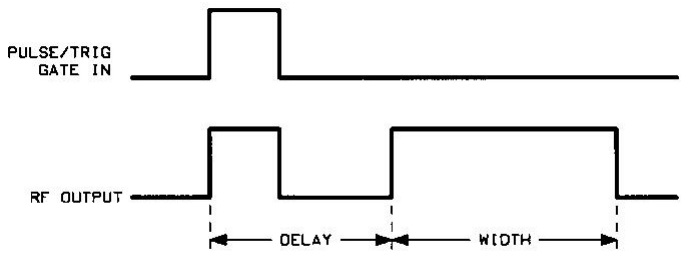
**Remarks** None

## Int Doublet

**Supported** PSG-A Series

Use this softkey to select an internal doublet pulse modulation. When doublet pulse is enabled, each trigger event will produce two pulses at the RF OUTPUT connector. The first pulse will follow the external trigger signal that is applied to the TRIGGER IN connector. The second pulse will have delay and width parameters as set via the front panel or with programming commands. Pulse delay is measured from the leading edge of the external trigger signal. Refer to Figure 5-3.

**Figure 5-3**




**Preset** N/A

**Range** N/A

**Location** Page 242

**Remarks** This modulation source requires an external trigger source.

## Int Free-Run

**Supported** PSG-A Series

Use this softkey to select an internal, free-run, pulse modulation. When free-run pulse is enabled, the internal pulse modulation runs continuously.

**Preset** N/A

**Range** N/A

**Location** Page 242

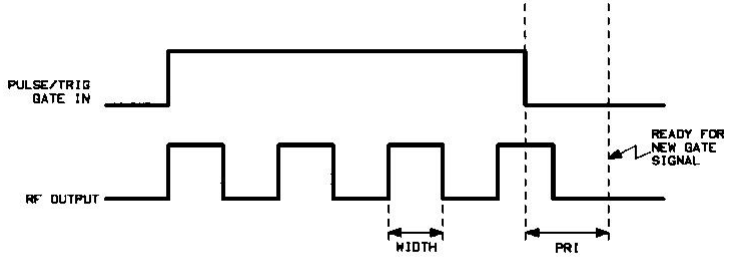
**Remarks** None

## Int Gated

**Supported** PSG-A Series

Use this softkey to select an internal, gated, pulse modulation. When the rising edge of a valid gate signal is applied to the TRIGGER IN connector, a pulse train will occur at the RF OUTPUT connector. Pulse width and pulse repetition frequency parameters are set by way of the front panel or with programming commands. When the falling edge of the gate signal is sensed at the TRIGGER IN connector, the pulse train will cease. If the falling edge of the gate signal occurs in the middle of a pulse at the RF OUTPUT connector, the last pulse will complete before the pulse train ceases. Once the falling edge of the gate signal is sensed, a time interval equal to the pulse repetition interval must elapse before another rising edge at the TRIGGER IN connector will be valid. Refer to Figure 5-4.

**Figure 5-4**




**Preset** N/A

**Range** N/A

**Location** Page 242

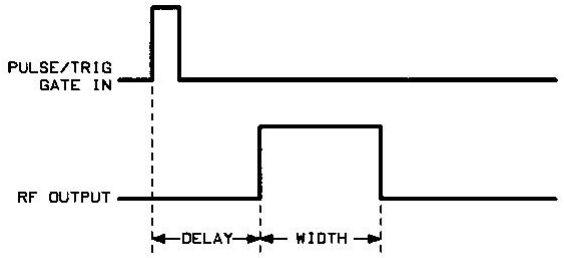
**Remarks** This modulation source requires an external trigger source.

## Int Triggered

**Supported** PSG-A Series

Use this softkey to select an internal, triggered, pulse modulation. When internal triggered pulse is enabled, an RF pulse will occur at the RF OUTPUT connector whenever a valid trigger signal occurs at the TRIGGER IN connector. The RF pulse will have pulse width and delay as set by way of the front panel or with programming commands. Refer to Figure 5-5.

**Figure 5-5**




**Preset** N/A

**Range** N/A

**Location** Page 242

**Remarks** None

## Internal

**Supported** All

This softkey enables you select an internal mode for the automatic leveling control.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** None

## Internal 1

**Supported** PSG-A Series

This softkey enables you to internally generate an ac-coupled, frequency modulation signal.

**Preset** 400.0 Hz sine-wave with 0.1% depth

**Range** N/A

**Location** Page 230, Page 235, Page 237

**Remarks** The internal source has multiple uses, but can be used for only one modulation at a time.

## Internal 2

**Supported** PSG-A Series

This softkey enables you to internally generate an ac-coupled, frequency modulation signal.

**Preset** 400.0 Hz sine-wave with 0.1% depth

**Range** N/A

**Location** Page 230, Page 235, Page 237

**Remarks** The internal source has multiple uses, but can be used for only one modulation at a time.

## Internal Monitor 1

**Supported** PSG-A Series

This softkey enables you to output a signal at the LF OUTPUT connector. The frequency and shape of the signal is set by the internal source as it is being used by a modulation.

**Preset** N/A

**Range** N/A

**Location** Page 240

**Remarks** None

## Internal Monitor 2

**Supported** PSG-A Series

This softkey enables you to output a signal at the LF OUTPUT connector. The frequency and shape of the signal is set by the internal source as it is being used by a modulation.

**Preset** N/A

**Range** N/A

**Location** Page 240

**Remarks** None

## Internal Ref Bandwidth

**Supported** PSG-A Series with Option UNJ

This softkey enables you to adjust the bandwidth of the internal reference oscillator.

**Preset** N/A

**Choices** 25.0 Hz 55.0 Hz 125.0 Hz 300.0 Hz
650.0 Hz

**Location** Page 248

**Remarks** None.

## Internal Square

**Supported** PSG-A Series

This softkey enables you to internally generate squarewave pulse modulation.

**Preset** N/A

**Range** 0.1 Hz–10.0 MHz

**Location** Page 242

**Remarks** For additional specifications, refer to the data sheet.

## Inverse Video Off On

**Supported** All

This softkey toggles the operating state of the inverse video. When inverse mode is on, light text on a dark background is displayed. The normal display mode for the signal generator, inverse off, is dark text on a light background.

**Preset** N/A

**Range** Off or On

**Location** Page 247

**Remarks** The inverse video state is not affected by a preset or by a power cycle.

## IP Address

**Supported** All

This softkey enables you to enter the IP address for your TCP/IP network connection. No IP address is entered at the factory.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** The IP address setting is not affected by a preset or by a power cycle.

# K

## Keep Previous Comment

**Supported** All

This softkey enables you to keep the comments of the previously saved register instead of over-writing them.

**Preset** N/A

**Range** N/A

**Location** Page 244

**Remarks** None

# L

## LAN Setup

**Supported** All

Use this softkey to access a menu that enables you to enter a local area network (LAN) host name and IP address for communication through the LAN cable.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** None

## Leveling Mode

**Supported** All

Use this softkey to access a menu of choices that enables you to select a leveling mode for automatic leveling control.

**Preset** Internal

**Choices** Internal Ext Detector Source Module

**Location** Page 232

**Remarks** None

## LF Out

**Supported** PSG-A Series

Use this hardkey to access a menu of softkeys that enables you to configure the internal, low frequency output.

**Preset** N/A

**Range** N/A

**Location** Page 240

**Remarks** None

## LF Out Amplitude Into 50 Ohms

**Supported** PSG-A Series

This softkey enables you to scale the output of the signal at the LF OUTPUT connector.

**Preset** 0.0 V

**Range** 0.0–3.5 $V_p$

**Location** Page 240

**Remarks** None

## LF Out Freq

**Supported** PSG-A Series

This softkey enables you to set the modulating frequency for the LF output signal when you have selected the internal source as a function generator.

**Preset** 400.0 Hz

**Range** 0.5 Hz–100.0 kHz
0.5 Hz to 1.0 MHz (if sinewave is selected as the internal waveform)

**Location** Page 240

**Remarks** This softkey is active only when you have selected the internal source to operate as a function generator.

## LF Out Off On

**Supported** PSG-A Series

This softkey toggles the operating state of the output of the selected source at the LF OUTPUT connector. Refer to the "LF Out Source" softkey in this section for more information on choosing the source.

**Preset** Off

**Choices** Off or On

**Location** Page 240

**Remarks** Once you have toggled this state on, the signal is immediately available at the LF OUTPUT connector. The **RF On/Off** hardkey does not apply to this state.The **Mod On/Off** softkey does apply to this state.

## LF Out Source

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select an internally generated source for the low frequency output. You can choose to output the signal from one of the internal sources as it is being used by a modulation or you can use the internal source as a function generator and select that signal to output at the LF OUTPUT connector.

If you choose an internal source, the frequency and shape of the signal at the LF OUTPUT connector is set by the internal source as it is being used by a modulation. For example, if the internal source is currently assigned to an AM path configuration and AM is turned on, the signal output at the LF OUTPUT connector will have the frequency and shape of the amplitude modulating signal. You can scale the amplitude of the output signal using the **LF Out Amplitude** softkey.

If you choose to set the internal source as a function generator, you can select a frequency and shape in addition to selecting the amplitude for the LF output signal.

**Preset** Internal 1 Monitor

**Choices**

| | |
|---|---|
| Internal 1 Monitor | Internal 2 Monitor |
| Function Generator 1 | Function Generator 2 |

**Location** Page 240

**Remarks** When you use an internal source as a function generator, any modulation with the internal source selected is turned off.

## LF Out Start Freq

**Supported** PSG-A Series

This softkey enables you to change the starting frequency for swept-sine low frequency output. This key is coupled to the **LF Out Freq** softkey in the initial LF Out menu and the **LF Out Tone 1 Freq** softkey in the LF Out dual-sine menu. Any value set for **LF Out Start Freq** is reflected in the **LF Out Freq** and **LF Out Tone 1 Freq** softkeys. Conversely, if you change the value for either the **LF Out Freq** softkey or the **LF Out Tone 1 Freq** softkey, the value for **LF Out Start Freq** is changed to match.

**Preset** 400.0 Hz

**Range** 1.0 Hz–1.0 MHz (minimum increment is 1.0 Hz)

**Location** Page 240

**Remarks** This softkey is active only when you have selected the internal source to operate as Function Generator 1.

## LF Out Stop Freq

**Supported** PSG-A Series

This softkey enables you to change the ending frequency for swept-sine low frequency output.

This key is coupled to the **LF Out Tone 2 Freq** softkey in the LF Out Dual-Sine menu. Any value set for **LF Out Stop Freq** is reflected in the **LF Out Tone 2 Freq** softkey.

**Preset** 400.0 Hz

**Range** 1.0 Hz–1.0 MHz (minimum increment is 1.0 Hz)

**Location** Page 240

**Remarks** This softkey is active only when you have selected the internal source to operate as Function Generator 1.

## LF Out Sweep Rate

**Supported** PSG-A Series

This softkey enables you to set the sweep rate for low frequency swept-sine output. The signal generator will sweep from the specified start frequency to the stop frequency at the rate set with this key.

**Preset** 400.0 Hz

**Range** 500.0 mHz–100 kHz (minimum increment is 1.0 Hz)

**Location** Page 240

**Remarks** This softkey is active only when you have selected the internal source to operate as Function Generator 1.

## LF Out Sweep Trigger

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select the triggering mode for the swept-sine low frequency output. You can choose triggering that occurs immediately, triggering that is supplied by the GPIB, triggering on either a positive or negative level of a signal supplied to the TRIGGER IN connector, or triggering by the **Trigger** hardkey.

**Preset** Free Run

**Choices** Free Run Trigger Key Bus Ext

**Location** Page 240

**Remarks** This softkey is active only when you have selected the internal source to operate as Function Generator 1.

You can also configure the polarity of the TTL signal output at the TRIGGER IN connector using the **Trigger In Polarity Neg Pos** softkey on this menu. Refer to "Trigger In Polarity Neg Pos" on page 222.

## LF Out Tone 1 Freq

**Supported** PSG-A Series

This softkey enables you to set the frequency for the LF output tone 1.

This key is coupled to the **LF Out Freq** softkey in the initial LF Out menu and the **LF Out Start Freq** softkey in the LF Out Swept-Sine menu. Any value set for **LF Out Tone 1 Freq** is reflected in the **LF Out Freq** and **LF Out Start Freq** softkeys.

**Preset** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (minimum increment allowed is 0.5 Hz)

**Location** Page 240

**Remarks** This softkey is active only when you have selected the internal source to operate as Function Generator 1.

## LF Out Tone 2 Ampl % Of Peak

**Supported** PSG-A Series

This softkey enables you to set the ratio of the peak amplitude of LF Out tone 2 to the peak amplitude of LF Out as a percent. The sum of the two LF Out amplitudes results in the total LF Out amplitude set by the **LF Out Amplitude** softkey in the initial LF Out menu.

For example, if the total LF Out amplitude is 300 $mV_p$ and you set **LF Out Tone 2 Ampl % Of Peak** to 33%, then the amplitude of LF Out tone 1 will be 200.0 $mV_p$ and the amplitude of LF Out tone 2 will be 100.0 $mV_p$ (33% of 300.0 $mV_p$) so that the amplitude of the two tones equals 300.0 $mV_p$ (200.0 $mV_p$ plus 100.0 $mV_p$).

**Preset** 50.0%

**Range** 0.0–100% (minimum increment is 0.1%)

**Location** Page 240

**Remarks** This softkey is active only when you have selected the internal source to operate as Function Generator 1.

## LF Out Tone 2 Freq

**Supported** PSG-A Series

This softkey enables you to change the alternate frequency of the internally generated modulation source. The alternate frequency is the second frequency in dual-sine or the stop frequency in swept-sine.This key is coupled to the **LF Out Freq** softkey in the initial LF Out menu and the **LF Out Stop Freq** softkey in the LF Out Swept-Sine menu.

**Preset** 400.0 Hz

**Range** 0.5 Hz–1.0 MHz (minimum increment allowed is 0.5 Hz)

**Location** Page 240

**Remarks** This softkey is active only when you have selected the internal source to operate as Function Generator 1.

## LF Out Waveform

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select the LF output waveform for your LF function generator.

**Preset** Sine

**Choices**

| | | | |
|---|---|---|---|
| Sine | Noise | Triangle | Square |
| Dual-Sine | Ramp | Swept-Sine | DC |

**Location** Page 240

**Remarks** This key is active only when you have selected the internal source to operate as a function generator. Dual-Sine and Swept-Sine are available only when you have selected the internal source to operate as Function Generator 1.

## List

**Supported** PSG-A Series

This softkey enables you to specify that only list sweep files be included in the catalog of files currently displayed.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Load Cal Array From Step Array

**Supported** All

This softkey enables you to set up a table that includes the start frequency, stop frequency, and number of points that are defined in the Configure User Flatness Step Array menu.

**Preset** N/A

**Range** N/A

**Location** Page 233

**Remarks** None

## Load From Selected File

**Supported** All

This softkey enables you to load the list sweep data from a file into the current sweep list. Use the arrow hardkeys to highlight the desired sweep list file. Press **Load From Selected File** and the list sweep data from the selected file is loaded into the current list sweep. You can only have one list sweep at a time so the existing list sweep data will be lost unless it is first stored to a file.

**Preset** N/A

**Range** N/A

**Location** Page 234, Page 246

**Remarks** This key is inactive unless at least one list sweep data file has been stored to memory.

## Load List From Step Sweep

**Supported** All

This softkey enables you to copy the step sweep data points into the list sweep data points.

**Preset** N/A

**Range** N/A

**Location** Page 246

**Remarks** You can have only one sweep list at a time so be certain that you wish to overwrite the existing list.

## Load/Store

**Supported** All

Use this softkey to access a menu of choices that enables you to load from and store tables to user files. In this menu you can also delete files.

**Preset** N/A

**Choices** Load From Selected File | Store to File | Delete File
Goto Row | Page Up | Page Down

**Location** Page 233, Page 246

**Remarks** None

## Local

**Supported** All

Use this hardkey to return the signal generator to local (front panel) control after using remote operation.

**Preset** N/A

**Range** N/A

**Remarks** None

## Loop Selected Tests

**Supported** All

This softkey is provided for self test diagnostics. Refer to the troubleshooting chapter of the service guide.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This key is included for use by service personnel.

# M

## Manual Mode Off On

**Supported** All

This softkey toggles the operating state of the manual mode selection for the current sweep point. When Manual Mode is on, the selected sweep point controls the frequency and amplitude according to the sweep type.

**Preset** Off

**Choices** Off or On

**Location** Page 245

**Remarks** This key is disabled when **Sweep Off On** is set to Off.

## Manual Point

**Supported** All

This softkey enables you to choose a point in the sweep list. When Manual Mode is on, the selected point controls the output parameters (frequency and/or amplitude) according to the sweep type.

**Preset** 1

**Range** N/A

**Location** Page 245

**Remarks** This key is disabled when **Manual Mode Off On** is set to Off.

If list or step mode is controlling frequency and/or power, then the indexed point in the respective list(s) will be used.

If the point selected is beyond the length of the longest enabled list, then the point will be set to the maximum possible point, and an error will be generated.

## Meter Address

**Supported** All

This softkey enables you to select the external power meter GPIB address for use during the user flatness calibration.

**Preset** N/A

**Range** 0–30

**Location** Page 232

**Remarks** The meter address is not affected by a preset or by a power cycle.

The power meter is controlled only through a GPIB cable.

## Meter Channel A B

**Supported** All

This softkey toggles between channels A and B when you are using an external power meter that has two channels.

**Preset** N/A

**Choices** A or B

**Location** Page 232

**Remarks** The meter channel selection is not affected by a preset or by a power cycle.

The power meter is controlled only through a GPIB cable.

## Meter Timeout

**Supported** All

This softkey enables you to select the remote timeout length of the external power meter during user flatness calibration.

**Preset** N/A

**Range** 1.0 msec–100.0 sec

**Location** Page 232

**Remarks** The meter timeout setting is not affected by a preset or by a power cycle. The power meter is controlled only through a GPIB cable.

## Memory Catalog

**Supported** All

Use this softkey to access a menu of choices that enables you to display a catalog of user files. In addition, the menu displays file management functions and a menu for choosing the file type.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** None

## Mod On/Off

**Supported** PSG-A Series

This hardkey toggles the operating state of the RF carrier modulation function.

**Preset** Off

**Choices** Off or On

**Remarks** All modulation types can be simultaneously enabled, except for FM with ΦM and linear AM with exponential AM. AM, FM, and ΦM can sum simultaneous inputs from any two sources (Ext1, Ext2, Internal 1, Internal 2). A given source may be routed to only one activated modulation type.

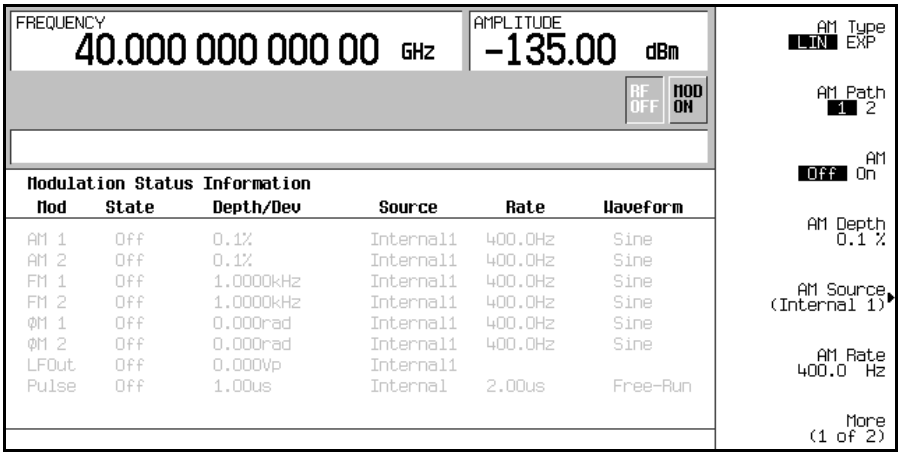
An annunciator on the signal generator is always displayed to indicate whether modulation is switched on or off.

## Mod Status Info Off On

**Supported** PSG-A Series

This softkey toggles the operating state of the modulation status display. When the modulation status is set to on, information about the status of all of the modulations available is shown at any time that you have accessed one of the modulation menus. Refer to Figure 5-6. When the modulation status is set to off, the information about the status of all the modulations is not displayed.

**Figure 5-6 Modulation Status Information**




**Preset** On

**Choices** On or Off

**Location** Page 250

**Remarks** None

# N

## Negative

**Supported** PSG-A Series

This key enables you to select a negatively sloped ramp, or sawtooth, as the modulation waveform for the internally generated, ac-coupled, signal.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** None

## Noise

**Supported** PSG-A Series

Use this softkey to access a menu that enables you to specify a noise type as the modulation waveform for the internally generated, ac-coupled signal.

**Preset** Uniform

**Choices** Uniform or Gaussian

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** The selected waveform applies only to the path configuration you have currently selected.

Noise is generated as a peak to peak value; the RMS value is about 80.0% of the displayed value.

## Numeric Keypad

**Supported** All

The numeric keypad enables you to enter both positive and negative values. In addition, the backspace key, [+/−←] is used to delete and change the sign of a value. These keys, with the exception of the period, have autorepeat capability. Hold a key down and the function is continuously executed until you release it.

**Preset** N/A

**Range** N/A

**Remarks** N/A.

# O

## Off

**Supported** All

Use this softkey to turn off all sweep functions. The output signal is then set according to the current frequency and amplitude settings defined by the **Frequency** and **Amplitude** hardkeys.

**Preset** N/A

**Range** N/A

**Location** Page 245

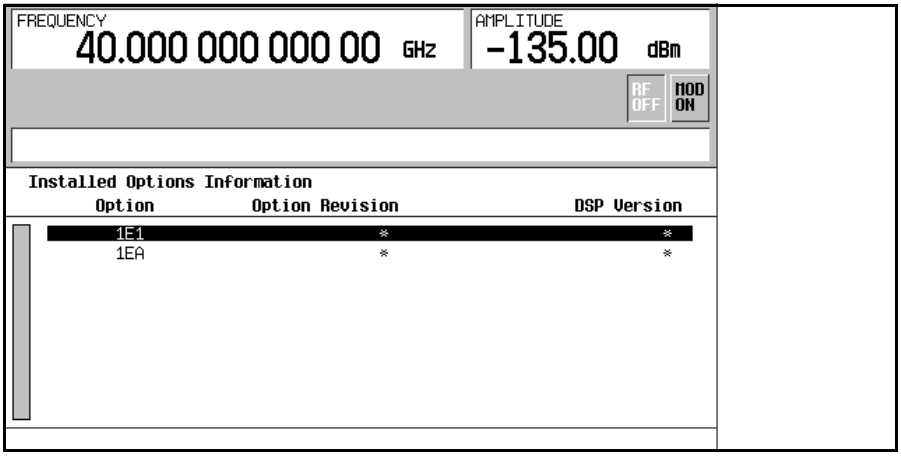
**Remarks** None

## Options Info

**Supported** All

Use this softkey to display all available options and the associated hardware. Refer to Figure 5-7.

**Figure 5-7 Installed Option Information**




| | |
|---|---|
| Option | the option number |
| Option Revision | an alphabetic representation of the option revision |
| DSP Version | version number of additional DSP code used with some hardware options |

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** None

# P

## Page Down

**Supported** All

This softkey enables you to move down in the display one page at a time.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 234, Page 245, Page 246, Page 249

**Remarks** None

## Page Up

**Supported** All

This softkey enables you to move up in the display one page at a time.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 234, Page 245, Page 246, Page 249

**Remarks** None

## Phase Ref Set

**Supported** All

This softkey enables you to set the relative phase of the RF output signal to zero. Then all phase parameters are set relative to this zero reference.

**Preset** N/A

**Range** N/A

**Location** Page 239

**Remarks** None

## Point Trigger

**Supported** All

Use this softkey to access a menu of choices that enables you to select a triggering mode for point-by-point sweep.

**Preset** Free Run

**Choices** Free Run Trigger Key Bus Ext

**Location** Page 245

**Remarks** You can also configure the polarity of the TTL signal output at the TRIGGER IN connector using the **Trigger In Polarity Neg Pos** softkey on this menu. Refer to "Trigger In Polarity Neg Pos" on page 222.

## Positive

**Supported** PSG-A Series

This key enables you to select a positively sloped ramp as the modulation waveform for the internally generated, ac-coupled signal.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** None

## Power Meter

**Supported** All

Use this softkey to access a menu of choices that enables you to select the external power meter model for use during the user flatness calibration.

**Preset** N/A

**Choices** E4418B E4419B E4416A E4417A

**Location** Page 232

**Remarks** The power meter selection is not affected by a preset or by a power cycle.

The power meter is controlled only through a GPIB cable.

## Power On Last Preset

**Supported** All

This softkey toggles the power-on state of the signal generator between last and preset.

If you choose Last, each time you cycle power to the signal generator it will turn on in the same condition as when you turned power off.

If you choose Preset, each time you cycle power to the signal generator it will turn on in either the factory-defined preset condition or in a user-defined preset condition. You make the choice between factory- and user-defined preset with the **Preset Normal User** softkey.

**Preset** N/A

**Choices** Last or Preset

**Location** Page 247

**Remarks** If last is active, the signal generator must not receive commands for at least 3 seconds before the power is turned off to guarantee that the most recent state is saved.

The power-on state is not affected by a preset or by a power cycle.

## Power On/Preset

**Supported** All

Use this softkey to access a menu of choices for power on and preset conditions. Refer to "Power On Last Preset" on page 192, "Preset Normal User" on page 194, and "Save User Preset" on page 207.

**Preset** N/A

**Choices** Power On Last Preset Preset Normal User

Save User Preset

**Location** Page 247

## Power Search

**Supported** All

Use this softkey to access the **Power Search Manual Auto** softkey. Power search is an internal calibration routine that improves output power accuracy when the ALC is off.

**Preset** N/A

**Range** N/A

**Location** Page 232

**Remarks** The **ALC Off On** softkey must be set to Off in order to engage power search mode.

## Power Search Manual Auto

**Supported** All

This softkey toggles the power search mode between auto and manual. Power search is an internal calibration routine that improves output power accuracy when the ALC is off. When you set Power Search to Auto, power search will execute automatically with each change to the RF frequency or power. When you set Power Search to Manual, the power search routine is executed when the **Do Power Search** softkey is pressed.

**Preset** Manual

**Choices** Manual Auto

**Location** Page 232

**Remarks** The **ALC Off On** softkey must be set to Off in order to engage either power search mode.

## Preset

**Supported** All

This hardkey enables you to set the signal generator to a known state which can be either the factory-defined state or a user-defined state. Refer to "Preset Normal User" on page 194.

**Preset** N/A

**Range** N/A

**Remarks** None

## Preset List

**Supported** All

This softkey enables you to delete the current sweep list and replace it with a new list consisting of one point at a default frequency, amplitude, and dwell time.

**Preset** N/A

**Range** N/A

**Location** Page 233, Page 246

**Remarks** Be certain that you want to delete the current sweep list; you cannot recover the information once you press **Preset List**.

## Preset Normal User

**Supported** All

This softkey toggles the preset state between the factory-defined and the user-defined states. If you choose Normal, preset conditions will be a factory-defined state. If you choose User, the preset conditions will be a defined and saved by the user with **Save User Preset**.

**Preset** N/A

**Choices** Normal or User

**Location** Page 247

**Remarks** None

## Pulse

**Supported** PSG-A Series

Use this hardkey to access a menu of choices that enables you to configure the pulse modulation.

**Preset** N/A

**Range** N/A

**Location** Page 242

**Remarks** None

## Pulse Delay

**Supported** PSG-A Series

This softkey enables you to change the pulse delay of the internally generated pulse modulation source.

**Preset** 0.0 sec

**Range** The range is dependent upon the value set for the pulse period.

*Internal Free Run*: –(pulse period – 20 nS) to (pulse period – 20 nS)

*Internal Triggered & Doublet*: 70nS to (pulse period – 20 nS)

**Location** Page 242

**Remarks** None

## Pulse Off On

**Supported** PSG-A Series

This softkey toggles the operating state for the currently selected pulse source.

When pulse modulation is on, the PULSE annunciator is shown in the display

**Preset** Off

**Choices** Off or On

**Location** Page 242

**Remarks** The RF carrier is modulated by the enabled modulation only when you have also set **Mod On/Off** to On.

## Pulse Period

**Supported** PSG-A Series

This softkey enables you to change the pulse period for internally generated pulse modulation.

**Preset** 2.00 µsec

**Range** 70.00 nsec–42.00 sec

**Location** Page 242

**Remarks** If the value for pulse period is less than the value for pulse width, pulse width is changed to be 20 us less than pulse period.

The pulse period applies only to Int Free Run Pulse Modulation and Int Gated.

## Pulse Rate

**Supported** PSG-A Series

This softkey enables you to change the pulse rate for the internal square pulse modulation.

**Preset** 400.0 Hz

**Range** 100.0 mHz–10.0 MHz

**Location** Page 242

**Remarks** The new value of pulse rate applies only to internal square pulse modulation. When external pulse modulation or internal pulse modulation is selected, this key is disabled.

## Pulse Source

**Supported** PSG-A Series

Use this softkey to access a menu of choices that enables you to select the pulse source for internally generated and externally applied modulation inputs.

**Preset** Int Free-Run

**Choices**

| | | |
|---|---|---|
| Int Free-Run | Internal Square | Ext Pulse |
| Int Triggered | Int Doublet | Int Gated |

**Location** Page 242

**Remarks** None

## Pulse Width

**Supported** PSG-A Series

This softkey enables you to change the pulse width for internally generated pulse modulation source.

**Preset** 1.00 µsec

**Range** 10.00 nsec–41.99 sec

**Location** Page 242

**Remarks** If the value for pulse period is less than the value for pulse width, pulse width is changed to be 20 ns less than pulse period.

The pulse width applies only to internal pulse modulation; when external pulse modulation or internal square pulse modulation is selected, this key is disabled.

# R

## Ramp

**Supported** PSG-A Series

This softkey enables you to specify ramp, either positive or negative, as the modulation waveform for the internally generated, ac-coupled signal.

**Preset** Positive

**Choices** Positive or Negative

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** This key is active only when you have selected the internal source to operate as a function generator.

## Recall

**Supported** All

Use this hardkey to access a menu of softkeys that enables you to select or delete registers and sequences.

**Preset** RECALL Reg

**Choices**

| | | |
|---|---|---|
| RECALL Reg | Select Seq | Delete Seq[0] Reg[0] |
| Delete All Reg in Seq[0] | | Delete All Sequences |

**Location** Page 243

**Remarks** None

## Recall Ref Osc Setting

**Supported** All

Use this softkey to recall the last saved reference oscillator coarse and fine adjustment setting.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** This adjustment is intended for use by service personnel. Refer to the calibration guide for more information.

## Recall Reg

**Supported** All

Use this softkey to recall an instrument state from a saved register. Recalling a register also selects that register number for all keys which specify a register number in this menu. You can also use the front panel knob and the up and down arrow keys to scroll through all saved registers for the selected sequence.

**Preset** N/A

**Range** N/A

**Location** Page 243

**Remarks** None

## Ref Osc Coarse

**Supported** All

This softkey is provided for adjusting the internal reference oscillator. Refer to the calibration guide for more information.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** This adjustment is intended for use by service personnel.

## Ref Osc Fine

**Supported** All

This softkey is provided for adjusting the internal reference oscillator. Refer to the calibration guide for more information.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** This adjustment is intended for use by service personnel.

## Ref Oscillator Source Auto Off On

**Supported** All

This softkey toggles the operating state for the automatic source selecting function. When this function is turned on, the signal generator detects when a valid reference signal is present at the 10 MHz IN connector and automatically switches from internal to external reference operation. When this function is turned off, the signal generator uses the internal reference only, even if an external reference is connected.

**Preset** On

**Choices** Off or On

**Location** Page 239

**Remarks** None

## Reference Oscillator Adjustment

**Supported** All

Use this softkey to access a menu of keys that are provided for adjusting the internal reference oscillator.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** This adjustment is intended for use by service personnel. Refer to the calibration guide for more information.

## Rename File

**Supported** All

This softkey enables you to rename the highlighted file in the displayed catalog of files. When you have entered the new file name, press the **Enter** terminator softkey. If you have changed your mind, press the **Return** hardkey. Once you press **Enter**, the new file is stored and displayed immediately in the catalog list.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Re-SAVE Seq[*n*] Reg [*n*]

**Supported** All

This softkey enables you to save the current instrument state to the selected register and sequence. If data has already been stored to this location, it will be overwritten. The signal generator state includes all parameter selections except list sweep data and selections which are kept as states that are not affected by a preset or a power cycle.

**Preset** N/A

**Range** N/A

**Location** Page 244

**Remarks** None

## Reset RS-232

**Supported** All

Use this softkey to perform a clean-up on the RS-232 buffer. This clean-up discards any unprocessed SCPI input received over RS-232 and places the RS-232 connection in a mode which can detect the optional remote interface.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** All other RS-232 communication parameters are unaffected.

## Restore Factory Defaults

**Supported** PSG-A Series with Option UNJ

This softkey re-sets the bandwidth of the reference oscillator to the factory-defined default state. The default value for the internal reference bandwidth is 125 Hz. The default value for the external reference bandwidth is 25 Hz

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** None.

## Return

**Supported** All

Use this hardkey to move from your current softkey menu to the menu that precedes it or to cancel an active function entry. When you are at the preset state, the **Return** hardkey has no function.

**Preset** N/A

**Range** N/A

**Remarks** The return key has autorepeat capability. Hold it down and you are moved repeatedly back through the menus until you either release the key or you reach the preset state.

## RF On/Off

**Supported** All

This hardkey toggles the operating state of the RF signal at the RF OUTPUT connector. Although you can configure and engage various modulations, no signal is available at the RF OUTPUT connector until **RF On/Off** is set to On. An annunciator is always turned on in the display to indicate whether RF is turned on or off.

**Preset** Off

**Range** On or Off

**Remarks** None

## RS-232 Baud Rate

**Supported** All

Use this softkey to access a menu of choices that enables you to set the baud rate in bits per second for the rear panel RS-232 connector, labeled AUXILIARY INTERFACE.

**Preset** N/A

**Choices**

| | | | |
|---|---|---|---|
| 57600 | 38400 | 19200 | 9600 |
| 4800 | 2400 | 1200 | 300 |

**Location** Page 247

**Remarks** Once set, the baud rate is not affected by a preset or by a power cycle.

## RS-232 Echo Off On

**Supported** All

This softkey toggles the operating state of the RS-232 serial port, AUXILIARY INTERFACE connector, echo function. When this function is set to on, every character sent to the signal generator is immediately sent back. No editing capability is available.

**Preset** N/A

**Range** Off or On

**Location** Page 248

**Remarks** The echo state is not affected by a preset or by a power cycle.

## RS-232 Setup

**Supported** All

Use this softkey to access a menu of choices that enables you to configure the rear panel RS-232, AUXILIARY INTERFACE, connector.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** None

## RS-232 Timeout

**Supported** All

This softkey enables you to change the value for the RS-232 serial port timeout. If further input is not received within the assigned timeout period while a SCPI command is being processed, then the command is aborted and the input buffer is cleared.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** Once set, timeout is not affected by a preset or by a power cycle.

## Run Complete Self Test

**Supported** All

Use this softkey to run an automated, internal diagnostic test that checks for detectable hardware failures. If there are probable hardware failures in the signal generator, refer to the troubleshooting section of the service guide.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This key is included for use by service personnel.

## Run Highlighted Tests

**Supported** All

This softkey is provided for self test diagnostics. Refer to the troubleshooting section of the service guide.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This key is included for use by service personnel.

## Run Selected Tests

**Supported** All

This softkey is provided for self test diagnostics. Refer to the troubleshooting section of the service guide.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This key is included for use by service personnel.

# S

## Save

**Supported** All

Use this hardkey to access a menu of choices that enables you to select, delete, and re-save registers and sequences. The menu shows the registers in use and any comments associated with the registers for the last sequence accessed. The menu is updated whenever you make any changes to the registers or to the comments.

**Preset** N/A

**Range** N/A

**Location** Page 244

**Remarks** Up to 100 storage registers and 10 register sequences are available, depending on the number and size of files.

## Save Reg

**Supported** All

Use this softkey to save the current instrument state in the specified register.

**Preset** N/A

**Range** N/A

**Location** Page 244

**Remarks** None

## Save Seq[*n*] Reg[*nn*]

**Supported** All

This softkey enables you to save the current instrument state in the specified register within the specified sequence. The instrument state includes all of your setup selections except list sweep data and functions that do not change by the preset function or by a power cycle.

**Preset** N/A

**Range** N/A

**Location** Page 244

**Remarks** Do not press this key until you have specified the correct sequence and register using the **Select Seq** and **Select Reg** softkey.

## Save User Preset

**Supported** All

This softkey enables you to establish your user-defined preset state. Set up all of the instrument state conditions that you want for your unique preset state. When you have defined the instrument state to suit your needs, press **Save User Preset**. Only one user-defined preset state is allowed, so when you save the instrument state you will save over any previously saved state. Your instrument state will be recalled by the signal generator any time you press **Preset** as long as you have set the **Preset Normal User** key to User.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** The instrument state definition is a state file and is not affected by a preset or by a power cycle.

## Screen Saver Delay:

**Supported** All

This softkey enables you to set the period of time before the screen saver is activated when there has been no input from the front panel.

**Preset** N/A

**Range** 1–12 hours

**Location** Page 247

**Remarks** The screen saver delay state is not affected by a preset or by a power cycle.

## Screen Saver Mode

**Supported** All

This softkey toggles the operating mode for the screen saver between Light Only and Light & Text. When you set the screen saver to Light Only, only the display light is turned on and off. When you set the screen saver to Light & Text, the display light and the text are turned on and off.

**Preset** N/A

**Choices** Light Only or Light & Text

**Location** Page 247

**Remarks** The screen saver mode is not affected by a preset or by a power cycle. To prevent the text from burning the display, if you are leaving the display unchanged for long periods of time, set the mode to light and text.

## Screen Saver Off On

**Supported** All

This softkey toggles the operating state of the screen saver. With the screen saver on, the display is turned off after a period of time with no input from the front panel. The display turns back on when any key is pressed.

**Preset** N/A

**Choices** Off or On

**Location** Page 247

**Remarks** The screen saver mode is not affected by a preset or by a power cycle.

## Select/Deselect All

Supported All

This softkey is provided for self test diagnostics. Refer to the troubleshooting section of the service guide.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This key is intended for use by service personnel.

## Select/Deselect Test

**Supported** All

This softkey is provided for self test diagnostics. Refer to the troubleshooting section of the service guide.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This key is intended for use by service personnel.

## Select Reg

**Supported** All

Use this softkey to select a specific register to be highlighted in the list of saved states.

**Preset** N/A

**Range** N/A

**Location** Page 244

**Remarks** None

## Select Reg:

**Supported** All

This softkey enables you to select a register for all softkeys that specify a register in this menu. For example, if you want to select register 5, press **Select Reg:**. The currently selected register is displayed in the active entry area. Change the number to 5 and press the **Select Reg** terminator softkey. Register 5 is now displayed in all softkeys which specify a register in this menu.

You can also use this softkey to select a register and save the current instrument state to that register. For example, if you want to select and save to register 6, press **Select Reg:**. The currently selected register is displayed in the active entry area. Change the number to 6 and press the **Save Reg** terminator softkey. Register 6 is now displayed in all softkeys which specify a register in this menu and the current instrument state has been saved to register 6.

**Preset** 0

**Range** 00–99

**Location** Page 244

**Remarks** None

## Select Seq:

**Supported** All

This softkey enables you to select a sequence for all softkeys which specify a sequence in this menu. For example, if you want to select sequence 4, press **Select Seq:**. The currently selected sequence is displayed in the active entry area. Change the number to 4 and press the **Enter** terminator softkey. Sequence 4 is now displayed in all softkeys that specify a sequence in this menu.

**Preset** 0

**Range** 0–9

**Location** Page 243, Page 244

**Remarks** None

## Self Test

**Supported** All

This softkey accesses an automatic, internal diagnostic test that checks for detectable hardware failures. If there are hardware failures in the signal generator, refer to the troubleshooting section of the service guide.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This key is intended for use by service personnel.

## Set ALC Level

**Supported** All with Option 1E1

This softkey enables you to change the ALC level. The output power is the ALC level minus the attenuator setting.

**Preset** –20.00 dBm

**Range** –20.00 dBm to 25.00 dBm

**Location** Page 232

**Remarks** This key is active only when you have toggled the **Atten Hold Off On** key to On.

## Set Atten

**Supported** All with Option 1E1

This softkey enables you to change the amount of attenuation in 5.0 dB steps. The output power is the ALC level minus the attenuator setting.

**Preset** 105.00 dB

**Range** 0.00 dB–105.00 dB

**Location** Page 232

**Remarks** This key is active only when you have toggled the **Atten Hold Off On** key to On.

## Sine

**Supported** PSG-A Series

This softkey enables you to specify sine as the modulation waveform for the internally generated, ac-coupled, signal.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** The selected waveform applies only to whichever path configuration you have currently selected.

## Single Sweep

**Supported** All

Use this softkey to arm the sweep. The ARMED annunciator will turn on in the display. The signal generator will begin the sweep as soon as the sweep trigger is received. Single Sweep sets the power and the frequency to the first point of the sweep while it is not initiated or is waiting for the sweep trigger. If you have set the sweep trigger to **Immediate**, a sweep is initiated as soon as you arm the sweep.

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** This key is disabled when **Sweep** is set to Off.

## Source Module

**Supported** All

This softkey enables you to use an external source module. When you enable the source module it also enables the external leveling mode.

**Preset** Off

**Choices** Off or On

**Location** Page 232

**Remarks** None

## Source Module Off On

**Supported** All

This softkey enables and disables the external source module. When you enable the source module it also enables the external leveling mode for the automatic leveling control.

**Preset** Off

**Choices** Off or On

**Location** Page 239

**Remarks** None

## Square

**Supported** PSG-A Series

This softkey enables you specify square as the modulation waveform for the internally generated, ac-coupled signal.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** The selected waveform applies only to whichever path configuration you have currently selected.

## State

**Supported** All

This softkey enables you to specify that only signal generator instrument state files be listed in the catalog of files currently displayed.

**Preset** N/A

**Range** N/A

**Location** Page 249

**Remarks** None

## Step Dwell

**Supported** All

This softkey enables you to set the dwell time for each point of a step sweep. The dwell time is the amount of time the sweep is guaranteed to pause after setting the frequency and power for the current sweep/list point.

---

**NOTE** The dwell time does not begin until the signal generator has settled for the current frequency and/or amplitude change. When the signal generator has settled, a trigger signal is transmitted through the rear panel SOURCE SETTLED OUTPUT connector.

---

**Preset** 2.0 msec

**Range** 1.0 msec–60.0 sec (in 1.0 msec increments)

**Location** Page 245

**Remarks** Dwell time is used when the point trigger is set to **Immediate**.

## Step/Knob Ratio

**Supported** All

This softkey enables you to set the ratio between the increment value of the step keys and the front panel knob. For example, if you set the increment value for frequency to 1.0 MHz and set the step/knob ratio to 10/1, when frequency is the active function the up and down arrow keys will change the frequency in 1.0 MHz steps and the front panel knob will change the frequency in 1/10th of 1.0 MHz steps.

When you press **Step/Knob Ratio** the number displayed in the active entry area represents the arrow keys step size in the ratio. To enter a new value, rotate the front panel knob until the desired value is displayed, use the up and down arrow keys, or enter the value using the numeric keypad and press the **Enter** terminator key.

**Preset** N/A

**Range** 1–10,000

**Location** Page 248

**Remarks** This ratio applies only when you have a function active that has an associated increment value. The step/knob ratio is not affected by a preset or by a power cycle.

## Store to File

**Supported** All

This softkey accesses a menu that enables you to create a file name and store the current data to a file in the internal non-volatile memory.

**Preset** N/A

**Range** N/A

**Location** Page 234, Page 246

**Remarks** The file name can consist of up to 23 alpha-numeric and special characters.

## Store Ref Osc Setting

**Supported** All

This softkey enables you to store the current coarse and fine reference oscillator adjustment settings. Refer to the calibration guide for more information.

**Preset** N/A

**Range** N/A

**Location** Page 248

**Remarks** This adjustment is intended for use by service personnel.

## Sweep

**Supported** All

Use this softkey to access a menu of choices that enables you to configure the sweep parameters. In this menu you can choose to sweep frequency only, amplitude only, or both frequency and amplitude. You can also choose to turn off all sweep functions.

**Preset** Off

**Choices** Off Freq Ampl Freq & Ampl

**Location** Page 245

**Remarks** None

## Sweep Direction Down Up

**Supported** All

This softkey enables you to change the direction of the sweep. Choose Up to sweep from the first point in the list sweep to the last point, or from the step sweep start frequency and amplitude to the stop frequency and amplitude. Choose Down to reverse the direction of the sweep.

**Preset** Up

**Choices** Down or Up

**Location** Page 245

**Remarks** None

## Sweep Repeat Single Cont

**Supported** All

This softkey toggles the sweep repetition between single sweep and continuous sweep types. The sweep and point triggers will then trigger the sweep. See "Point Trigger" on page 191 and "Sweep Trigger" on page 217.

**Preset** Cont

**Choices** Single or Cont

**Location** Page 245

**Remarks** None

## Sweep Trigger

**Supported** All

Use this softkey to access a menu of choices that enables you to select a triggering mode for a sweep. You can choose triggering that, once a sweep is armed, occurs immediately, is supplied by the GPIB, occurs on either the positive or negative edge of a signal supplied to the TRIGGER IN connector, or is initiated by the **Trigger** hardkey.

**Preset** Free Run

**Choices** Free Run Trigger key Bus Ext

**Location** Page 245

**Remarks** You can also configure the polarity of the TTL signal output at the TRIGGER IN connector using the **Trigger In Polarity Neg Pos** softkey on this menu. Refer to "Trigger In Polarity Neg Pos" on page 222.

## Sweep Type List Step

**Supported** All

This softkey toggles the sweep type between list sweep and step sweep. You create a list sweep by supplying the frequency, amplitude, and dwell time for each point in the sweep. You create a step sweep by supplying the start and stop frequency and amplitude, the number of points, and a dwell time. The signal generator then calculates the points between the first and last point in a linear manner.

**Preset** List

**Choices** List or step

**Location** Page 245

**Remarks** None

## Sweep/List

**Supported** All

Use this hardkey to access a menu of softkeys that enables you to define a series of points containing frequency, amplitude, and dwell time information for the signal generator to sweep.

**Preset** N/A

**Range** N/A

**Location** Page 245

**Remarks** None

## Swept-Sine

**Supported** PSG-A Series

This softkey enables you to specify a swept sinewave as the modulation waveform for the internally generated, ac-coupled signal, and displays a menu of choices for setting the parameters. In this menu you can set the start and stop rate and the sweep time. You can set the signal generator to a single, externally triggered sweep on either a negative or positive TTL level or you can choose continuous sweep, triggered immediately. In this menu you can also select either a positive or negative polarity for the TRIGGER OUT signal.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** Internal 2 is not available for use with the swept-sine function.

# T

## Trans/Recv Pace None Xon

**Supported** All

This softkey enables you to determine whether any pacing is acknowledged by the RS-232 transmit channel. If Xon pacing is used, the system will suspend transmitting data upon receiving an Xoff character until an Xon character is received. The signal generator may not be responsive to other channels, or to the front panel, while transmission is suspended. Xon pacing is not recommended if binary data will be sent to the signal generator via RS-232 as errors may occur. Toggle **Trans/Recv Pace None Xon** to None to turn off Xon pacing.

**Preset** N/A

**Choices** None or Xon

**Location** Page 247

**Remarks** The pace state is not affected by a preset or by a power cycle.

## Triangle

**Supported** PSG-A Series

This softkey enables you to specify a triangle wave as the modulation waveform for the internally generated, ac-coupled signal.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** The selected waveform applies only to the path configuration you have currently selected.

## Trigger

**Supported** All

Use this hardkey to initiate an immediate trigger event, if the trigger mode is set to **Trigger Key**.

**Preset** N/A

**Range** N/A

**Remarks** The trigger key has autorepeat capability. Hold it down and you will repeatedly trigger sweeps until you release the key.

## Trigger Key

**Supported** All

This softkey enables you to trigger an event by pressing the **Trigger** hardkey. The **Trigger Key** is located in the Sweep Trigger menu and in the Point Trigger menu. Choosing **Trigger Key** in the Sweep Trigger menu immediately triggers an armed sweep when you press the **Trigger** front panel key. Choosing **Trigger Key** in the Point Trigger menu immediately triggers the next point in the current sweep.

**Preset** N/A

**Range** N/A

**Location** Page 231, Page 236, Page 238, Page 241, Page 245

**Remarks** None

## Trigger In Polarity Neg Pos

**Supported** All

This softkey toggles the polarity of the TTL signal at the TRIGGER IN connector that triggers an event. When **Trigger In Polarity Neg Pos** is set to Pos, the output signal is asserted high (+5.0 V) at the rising edge of the swept-sine modulation sweep and low (0.0 V) when the sweep is concluded. Setting **Trigger In Polarity Neg Pos** to Neg reverses the polarity, where the output signal is high at the falling edge (0.0 V) and low at +5.0 V.

**Preset** Pos

**Choices** Neg or Pos

**Location** Page 231, Page 236, Page 238, Page 241, Page 245

**Remarks** This key is coupled to the **Trigger In Polarity Neg Pos** key for swept-sine FM, ΦM, and LF Out, and the Sweep/List menu. When the polarity is toggled for this key in any one of these menus, it affects all locations of the key.

## Trigger Out Polarity Neg Pos

**Supported** All

This softkey toggles the polarity of the TTL signal output at the rear panel TRIGGER OUT connector. When **Trigger Out Polarity Neg Pos** is set to Pos, the output signal is asserted high (+5.0 V) at the rising edge of the swept-sine modulation sweep and low (0.0 V) when the sweep is concluded. Setting **Trigger Out Polarity Neg Pos** to Neg reverses the polarity, where the output signal is high at the falling edge (0.0 V) and low at +5.0 V.

**Preset** Pos

**Choices** Neg or Pos

**Location** Page 231, Page 236, Page 238, Page 240, Page 245

**Remarks** This key is coupled to the **Trigger Out Polarity Neg Pos** key for swept-sine FM, ΦM, and LF Out, and the Sweep/List menu. When the polarity is toggled for this key in any one of these menus, it affects all locations of the key.

This key is active only when you have selected the internal source to operate as a function generator.

# U

## Uniform

**Supported** PSG-A Series

This softkey enables you specify noise with a uniform distribution as the modulation waveform.

**Preset** N/A

**Range** N/A

**Location** Page 230, Page 235, Page 237, Page 240

**Remarks** None

## Utility

**Supported** All

Use this softkey to access a menu of choices that enables you to view and erase error messages, access the GPIB/RS-232 LAN menu, adjust the display, access a menu of adjustments for the signal generator, set the help mode and power on state, and access the memory catalog menu.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** None

## Update in Remote Off On

**Supported** All

This softkey toggles the operating state of the display updating when the remote control bus is in remote mode. When toggled on, commands executed via the remote control bus will update the signal generator display accordingly. When toggled off, commands executed via the remote control bus will not update the display.

**Preset** Off

**Choices** Off or On

**Location** Page 247

**Remarks** This key is not affected by a preset. However, it resets to off when the power is cycled.

## User Flatness

**Supported** All

This softkey enables you to specify that only user flatness correction files be listed in the catalog of files currently displayed.

**Preset** N/A

**Range** N/A

**Location** Page 232, Page 249

**Remarks** None

# V

## View Details

**Supported** All

This softkey enables you to view detailed information about the highlighted test. Refer to the troubleshooting section in the service guide for more information.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This is intended for use by service personnel.

## View Next Error Message

**Supported** All

Use this softkey to display the next error message in the queue. (The first error message is the oldest error.) There may be more than one error message in the queue; the number of error messages is displayed along with the first message. Press any key to exit the Error Info menu.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** None

## View Previous Error Message

**Supported** All

Use this softkey to display the newest error message first. Continue pressing this key to view additional error messages in order of newest to oldest. Press any key to exit the Error Info menu.

**Preset** N/A

**Range** N/A

**Location** Page 247

**Remarks** N/A

## View Test Info

**Supported** All

Use this softkey to display more details of the self tests. Refer to the calibration guide for more information.

**Preset** N/A

**Range** N/A

**Location** Page 250

**Remarks** This is intended for use by service personnel.

# W

## White Pixels Screen Test

**Supported** All

This softkey enables you to set all of the pixels on the display to white. Press the **Local** hardkey to return the display to normal operation.

**Preset** N/A

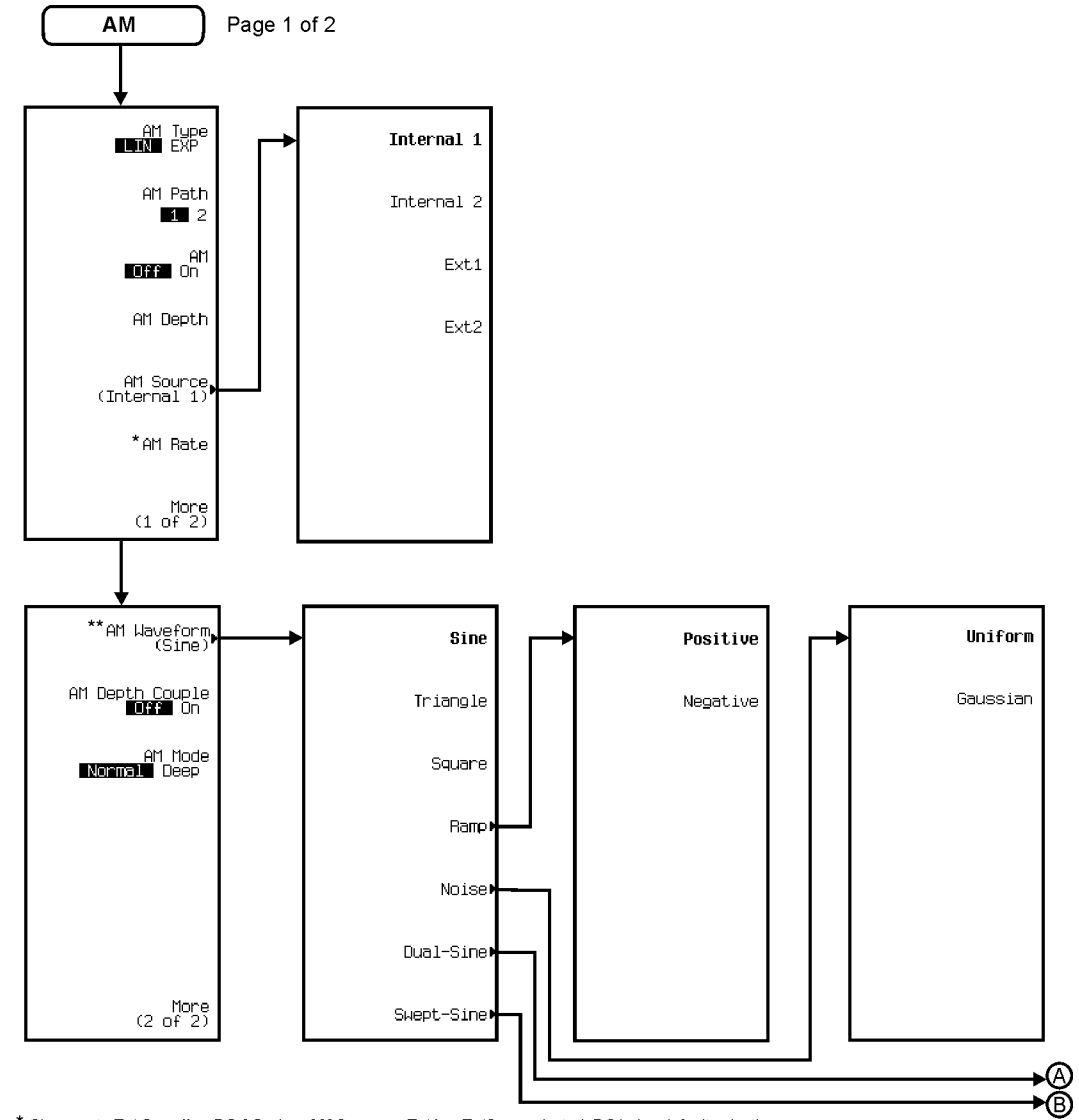
**Range** N/A

**Location** Page 247

**Remarks** This key is provided for factory use in testing the display.

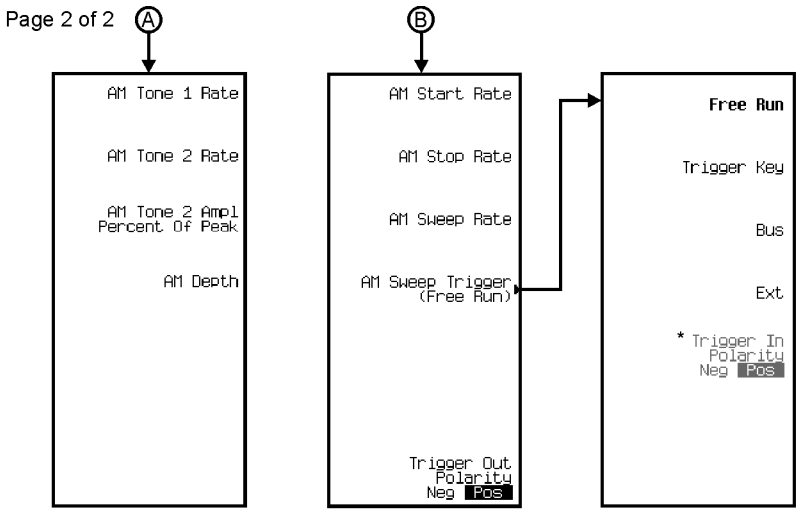
# 6 Menu Maps

# AM




* Changes to **Ext Coupling DC AC** when **AM Source** > **Ext1** or **Ext2** are selected. DC being default selection.
** Changes to **Ext Impedance** **50 Ohm** **600 Ohm** when **AM Source** > **Ext1** or **Ext2** are selected. **50 Ohm** being the default selection.

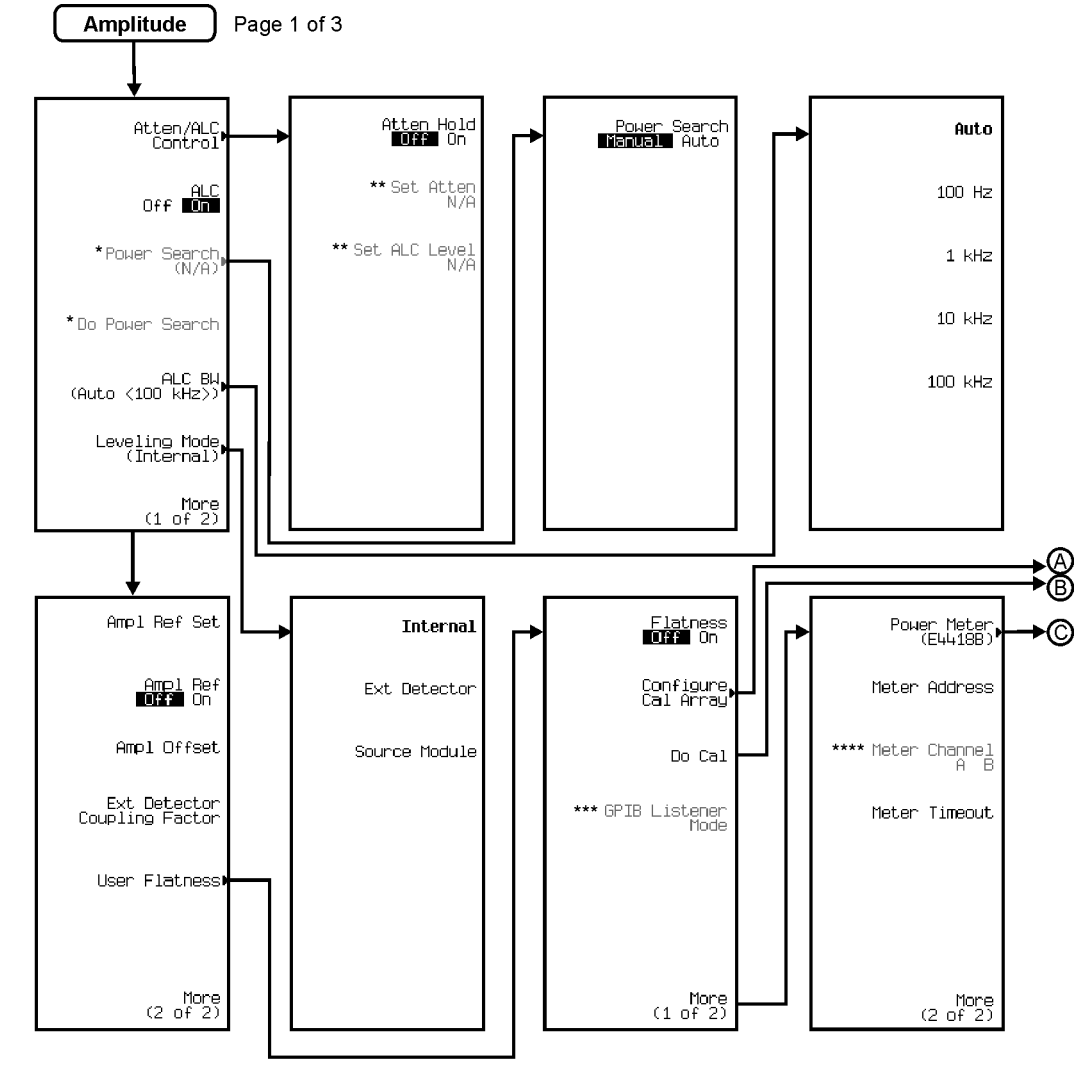
pe94a




* Active when **EXT** is selected.

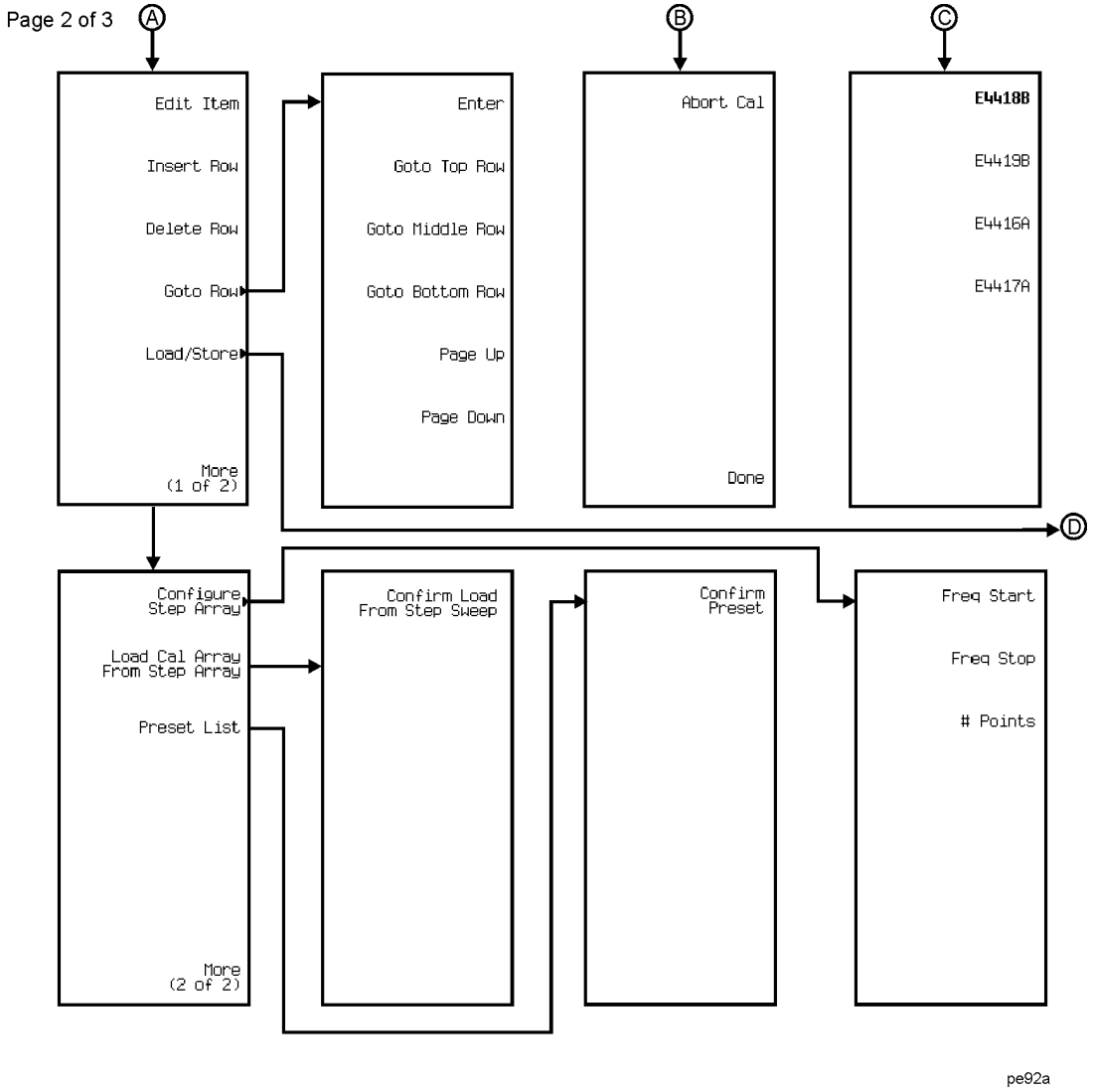
pe95a

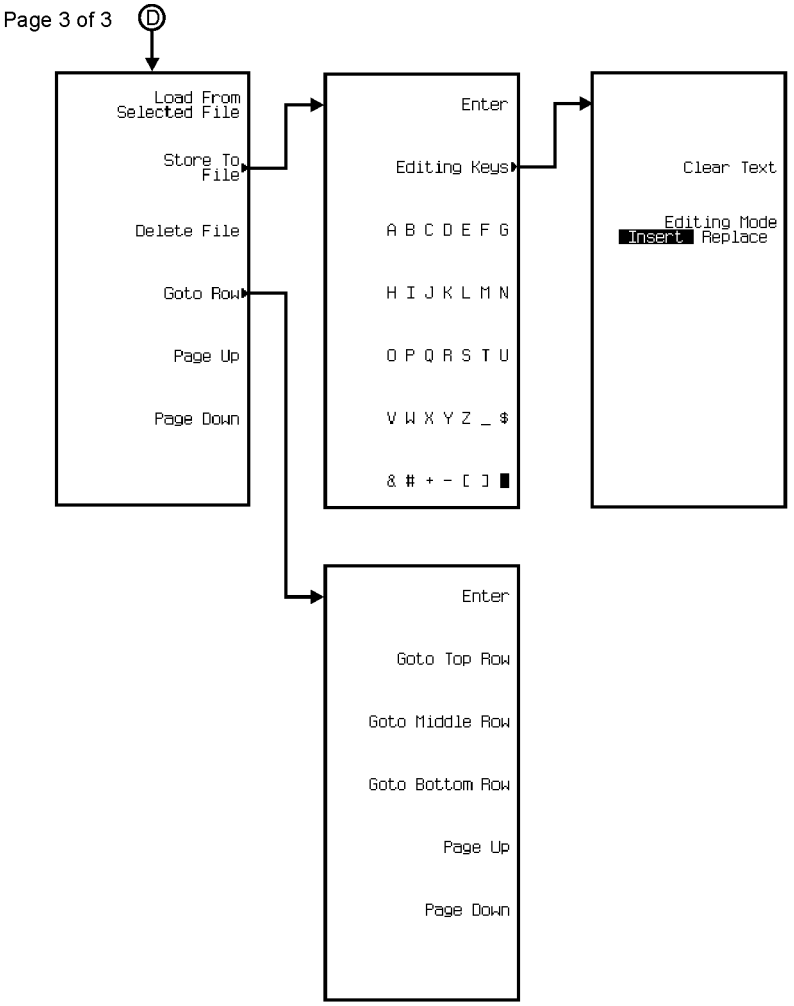
# Amplitude




* Active when **ALC** is Off.
** Active when **Atten Hold** is On.
*** Activate by pressing **Do Cal** >**Abort Cal**.
**** Activate by pressing **Power Meter** >**E4419B** or **E4417A**.

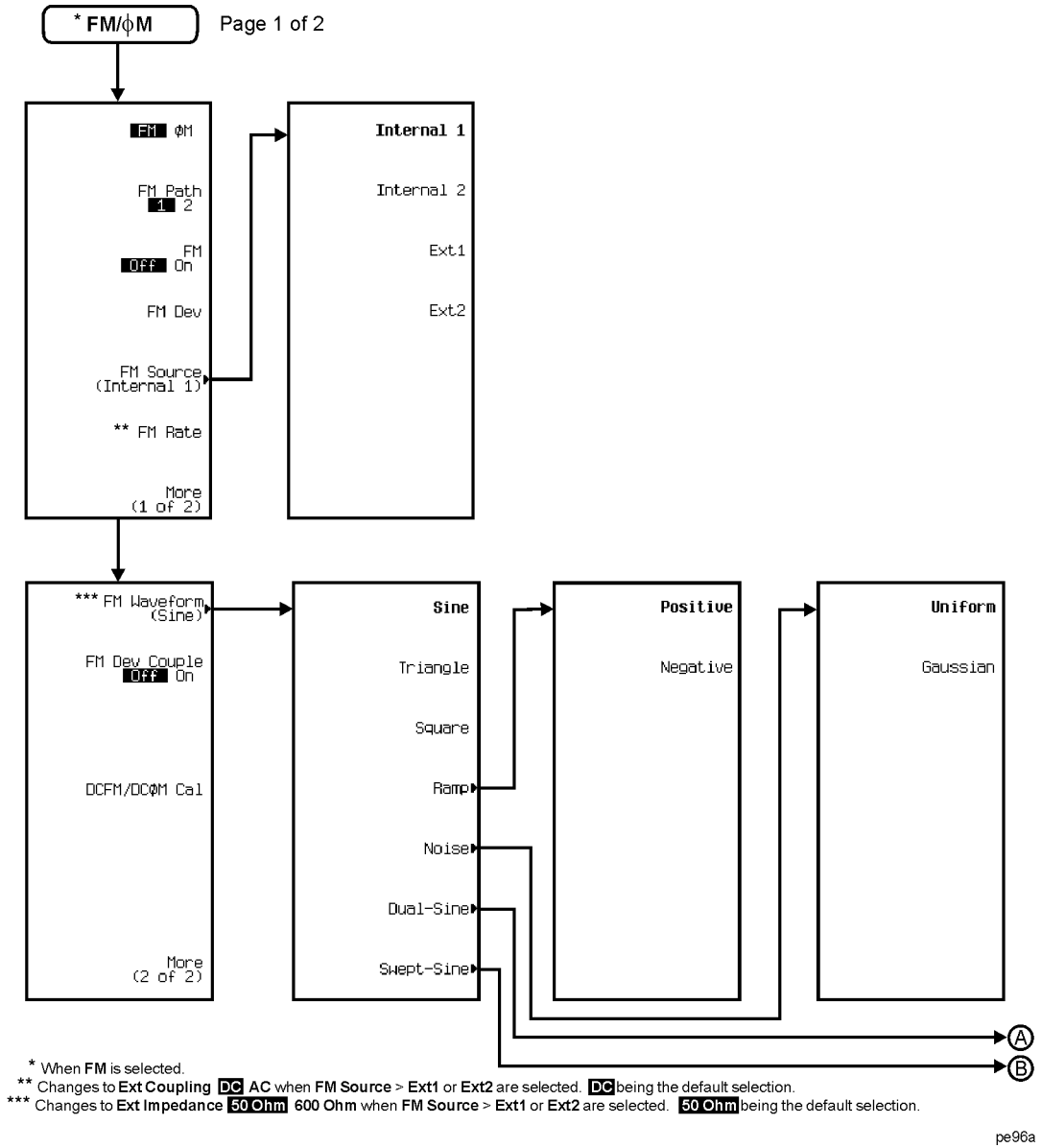
pe91a


Page 2 of 3
A
B
C
Edit Item
Insert Row
Delete Row
Goto Row
Load/Store
More
(1 of 2)
Enter
Goto Top Row
Goto Middle Row
Goto Bottom Row
Page Up
Page Down
Abort Cal
Done
E4418B
E4419B
E4416A
E4417A
D
Configure
Step Array
Load Cal Array
From Step Array
Preset List
More
(2 of 2)
Confirm Load
From Step Sweep
Confirm
Preset
Freq Start
Freq Stop
# Points
pe92a


Page 3 of 3
D
Load From Selected File
Store To File
Delete File
Goto Row
Page Up
Page Down
Enter
Editing Keys
A B C D E F G
H I J K L M N
O P Q R S T U
V W X Y Z _ $
& # + - [ ]
Clear Text
Editing Mode
Insert
Replace
Enter
Goto Top Row
Goto Middle Row
Goto Bottom Row
Page Up
Page Down

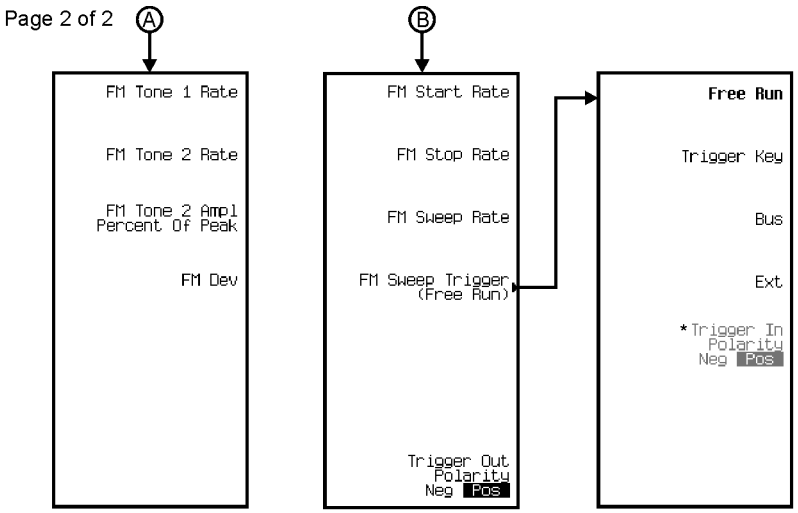
pe928a

# *FM/ΦM




* When **FM** is selected.
** Changes to **Ext Coupling** **DC** **AC** when **FM Source** > **Ext1** or **Ext2** are selected. **DC** being the default selection.
*** Changes to **Ext Impedance** **50 Ohm** **600 Ohm** when **FM Source** > **Ext1** or **Ext2** are selected. **50 Ohm** being the default selection.

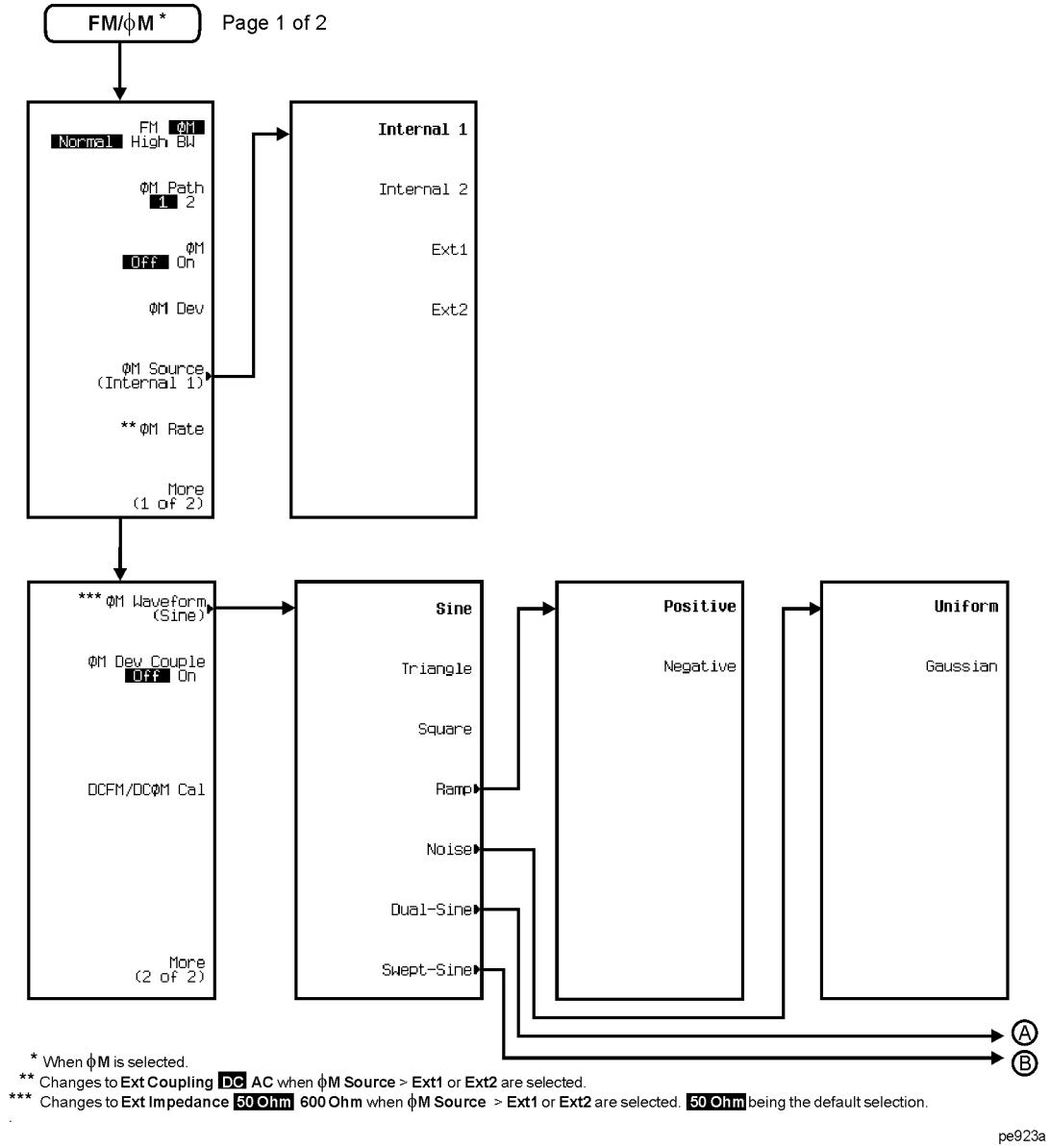
pe96a




* Active when **Ext** is selected.

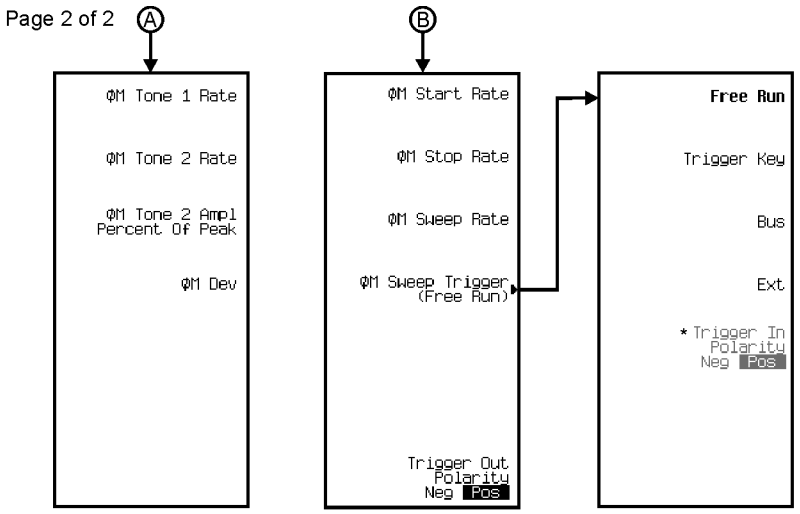
pe97a

# FM/ΦM*




* When ϕM is selected.
** Changes to **Ext Coupling** **DC** **AC** when **ϕM Source** > **Ext1** or **Ext2** are selected.
*** Changes to **Ext Impedance** **50 Ohm** **600 Ohm** when **ϕM Source** > **Ext1** or **Ext2** are selected. **50 Ohm** being the default selection.

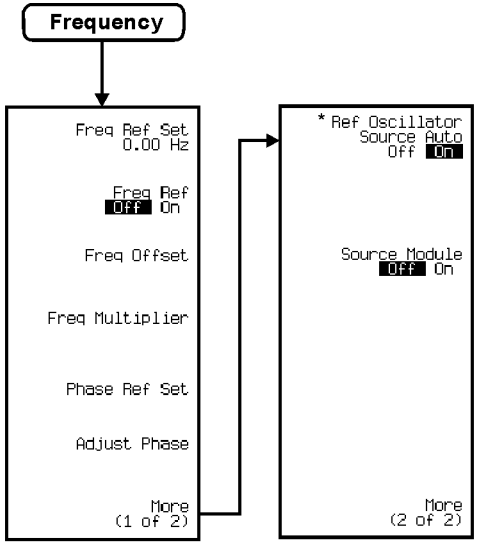
pe923a




* Active when **Ext** is selected.

pe924a

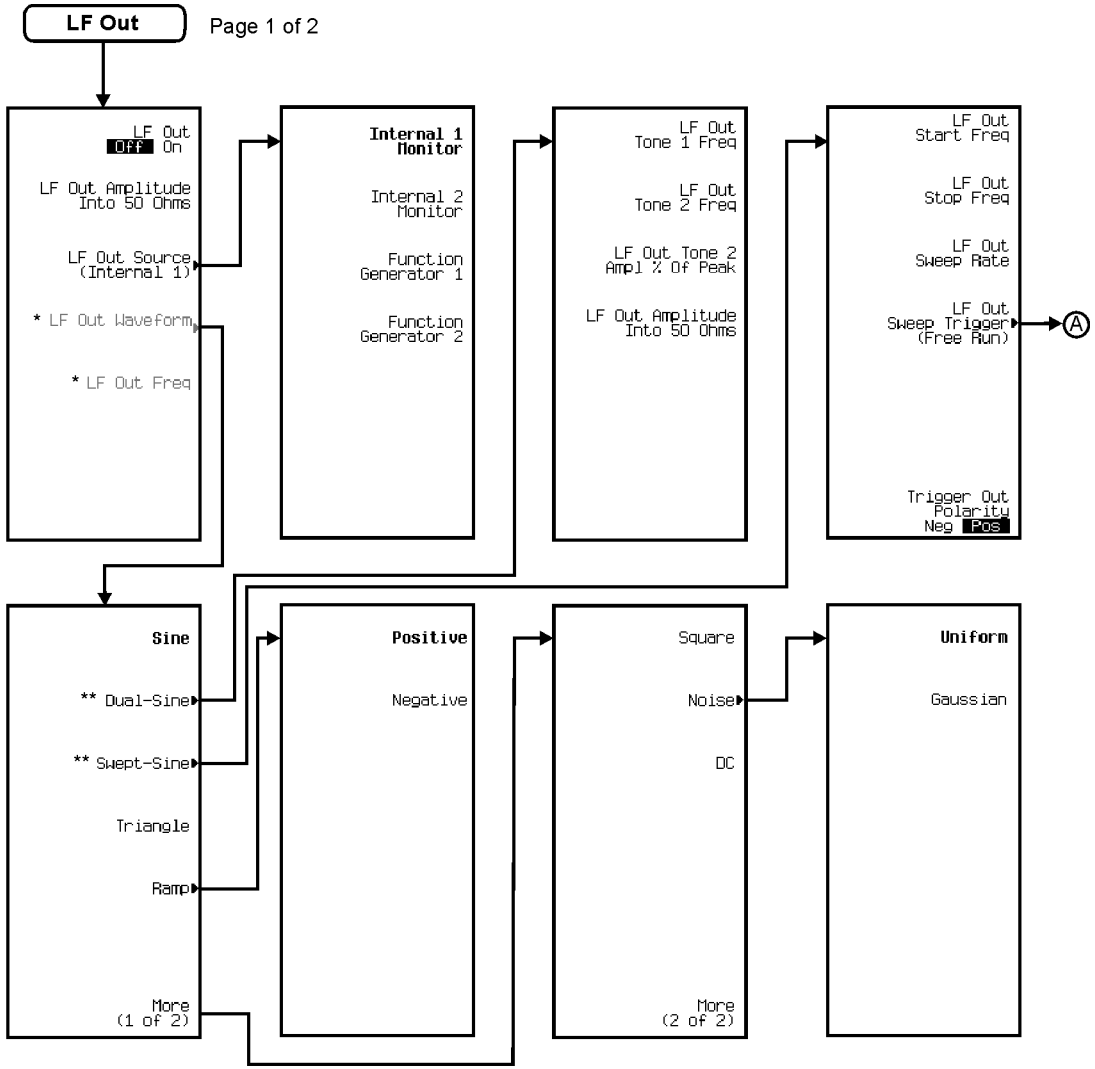
# Frequency




* This key is deleted with Option UNJ installed.

pe93a

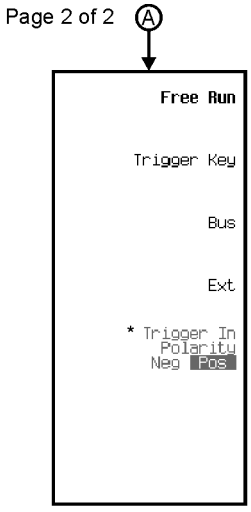
# LF Output




* Activate by pressing **LF Out Source** > **Function Generator 1** or **Function Generator 2**.

** Not active when **Function Generator 2** is selected.

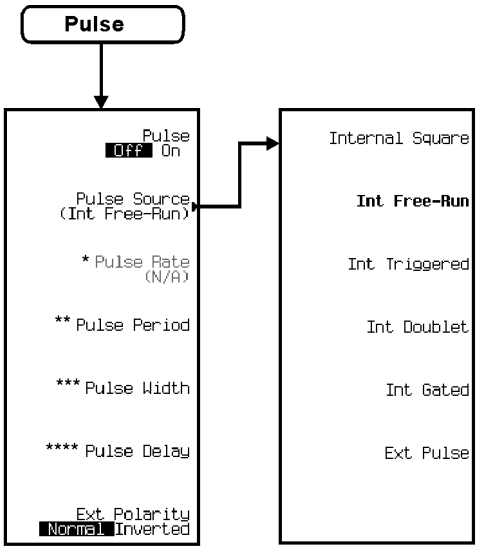
pe98a




* Active when **EXT** is selected.

pe922a

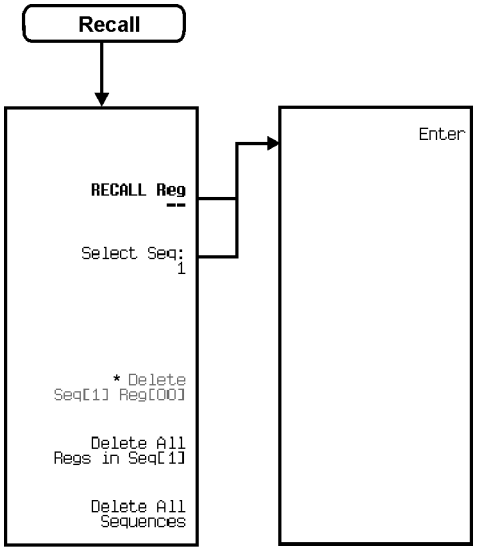
# Pulse Modulation




* Activate by pressing **Pulse Source** > **Internal Square**.
** Inactive when **Internal Square** or **Int Triggered** or **Int Doublet** or **Ext Pulse** is selected.
*** Inactive when **Internal Square** or **Ext Pulse** is selected.
**** Inactive when **Internal Square** or **Int Gated** or **Ext Pulse** is selected.

pe99a

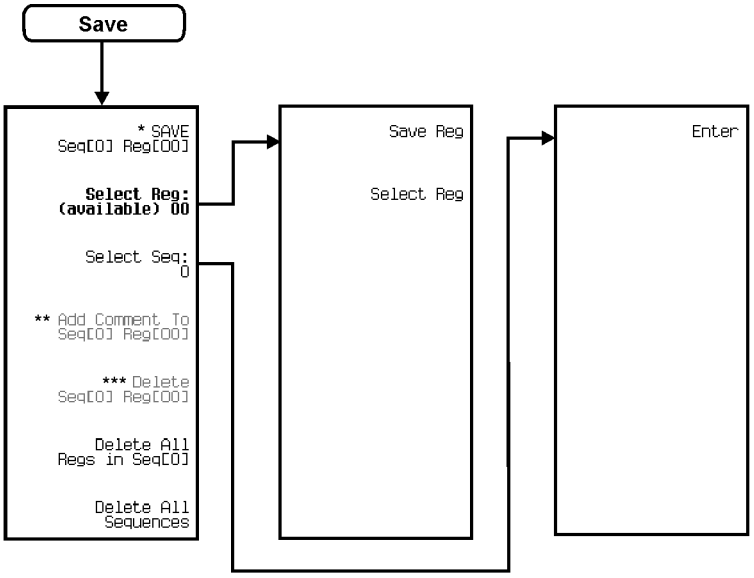
# Recall




* Active only when **Save** > **Select Reg:** > enter value > **Enter** are pressed.

pe932a

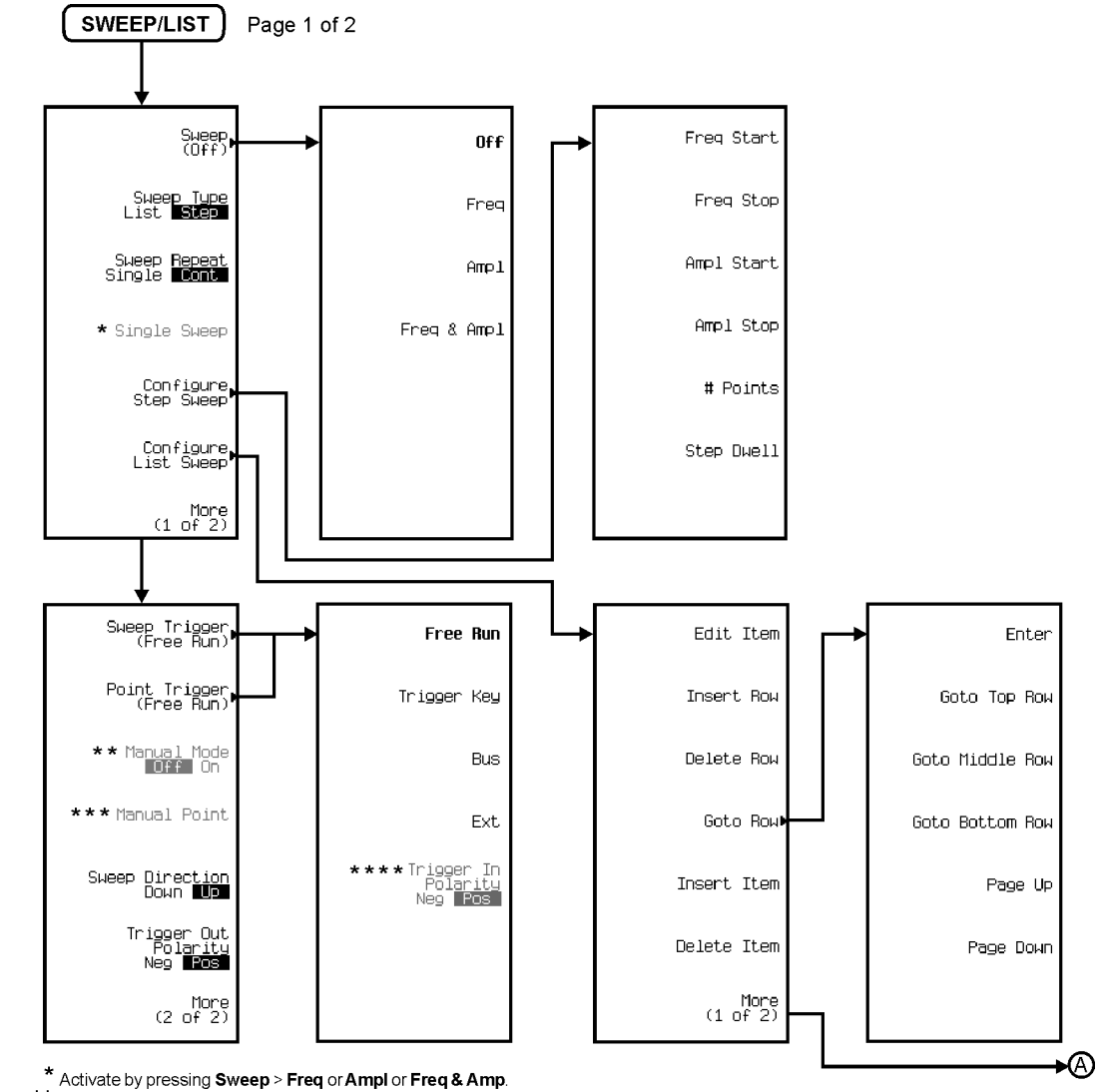
# Save




* Changes to **Re-SAVE Seq[0] Reg[00]** when pressed.
** Activate by pressing **Select Reg:** > enter value > **Enter**.
Switches to **Edit Comment In Seq[n] Reg[nn]** after adding a comment to a register.
*** Activate by pressing **Select Reg:** > enter value > **Enter**.

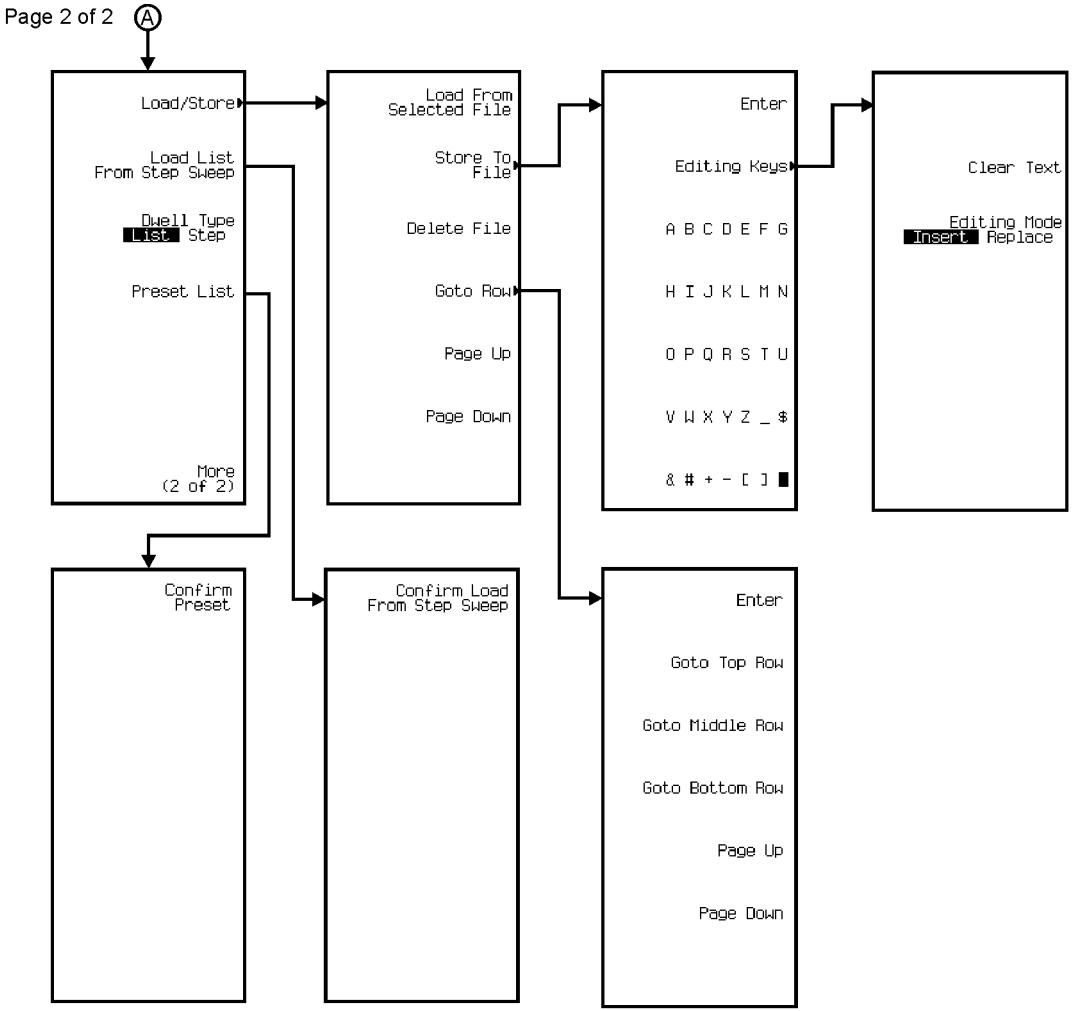
pe931a

# Sweep/List

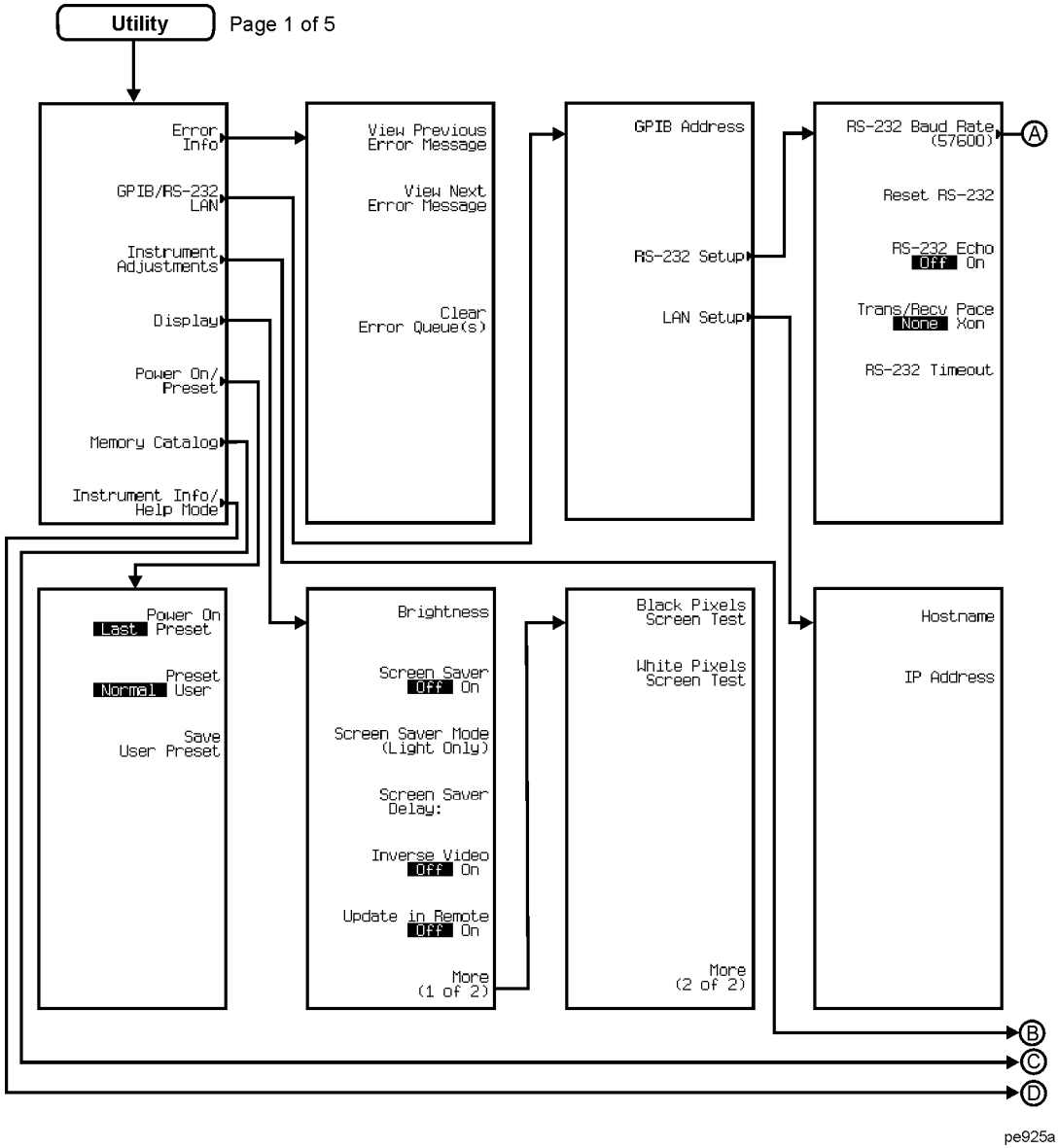



* Activate by pressing **Sweep** > **Freq** or **Ampl** or **Freq & Amp**.
** Activate by pressing **More (2 of 2)** > **Sweep** > **Freq** or **Ampl** or **Freq & Amp**.
*** Active when **Manual Mode** is On.
**** Active by pressing **Ext.**

pe910a


Page 2 of 2
A
Load/Store
Load List From Step Sweep
Dwell Type List Step
Preset List
More (2 of 2)
Load From Selected File
Store To File
Delete File
Goto Row
Page Up
Page Down
Enter
Editing Keys
A B C D E F G
H I J K L M N
O P Q R S T U
V W X Y Z _ $
& # + - [ ]
Clear Text
Editing Mode Insert Replace
Confirm Preset
Confirm Load From Step Sweep
Enter
Goto Top Row
Goto Middle Row
Goto Bottom Row
Page Up
Page Down
pe911a

# Utility




pe925a

**Figure 6-8**

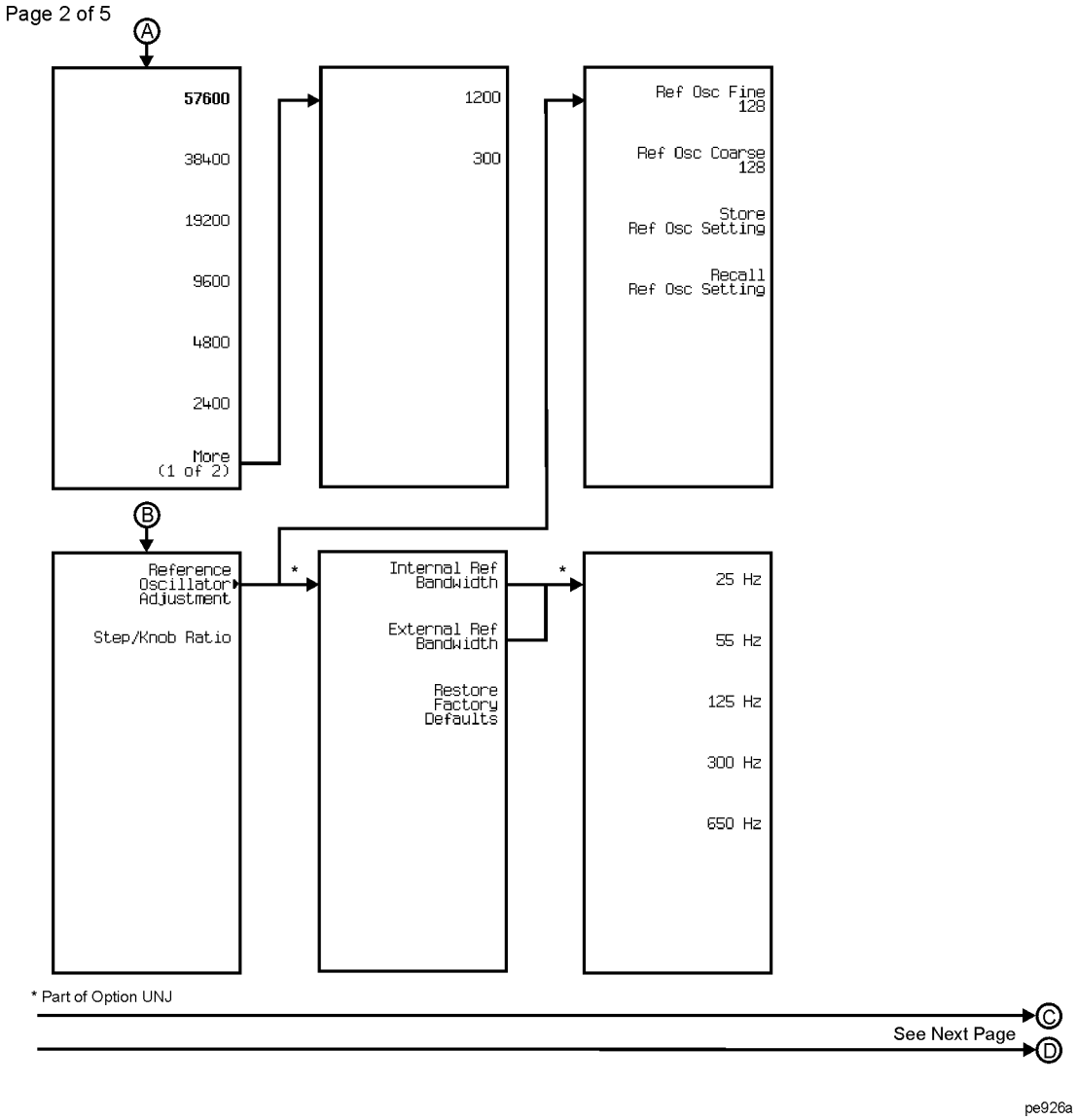

Page 2 of 5
A
57600
38400
19200
9600
4800
2400
More
(1 of 2)
1200
300
Ref Osc Fine
128
Ref Osc Coarse
128
Store
Ref Osc Setting
Recall
Ref Osc Setting
B
Reference
Oscillator
Adjustment
Step/Knob Ratio
*
Internal Ref
Bandwidth
External Ref
Bandwidth
Restore
Factory
Defaults
*
25 Hz
55 Hz
125 Hz
300 Hz
650 Hz
* Part of Option UNJ
See Next Page
C
D
pe926a

**Figure 6-9**

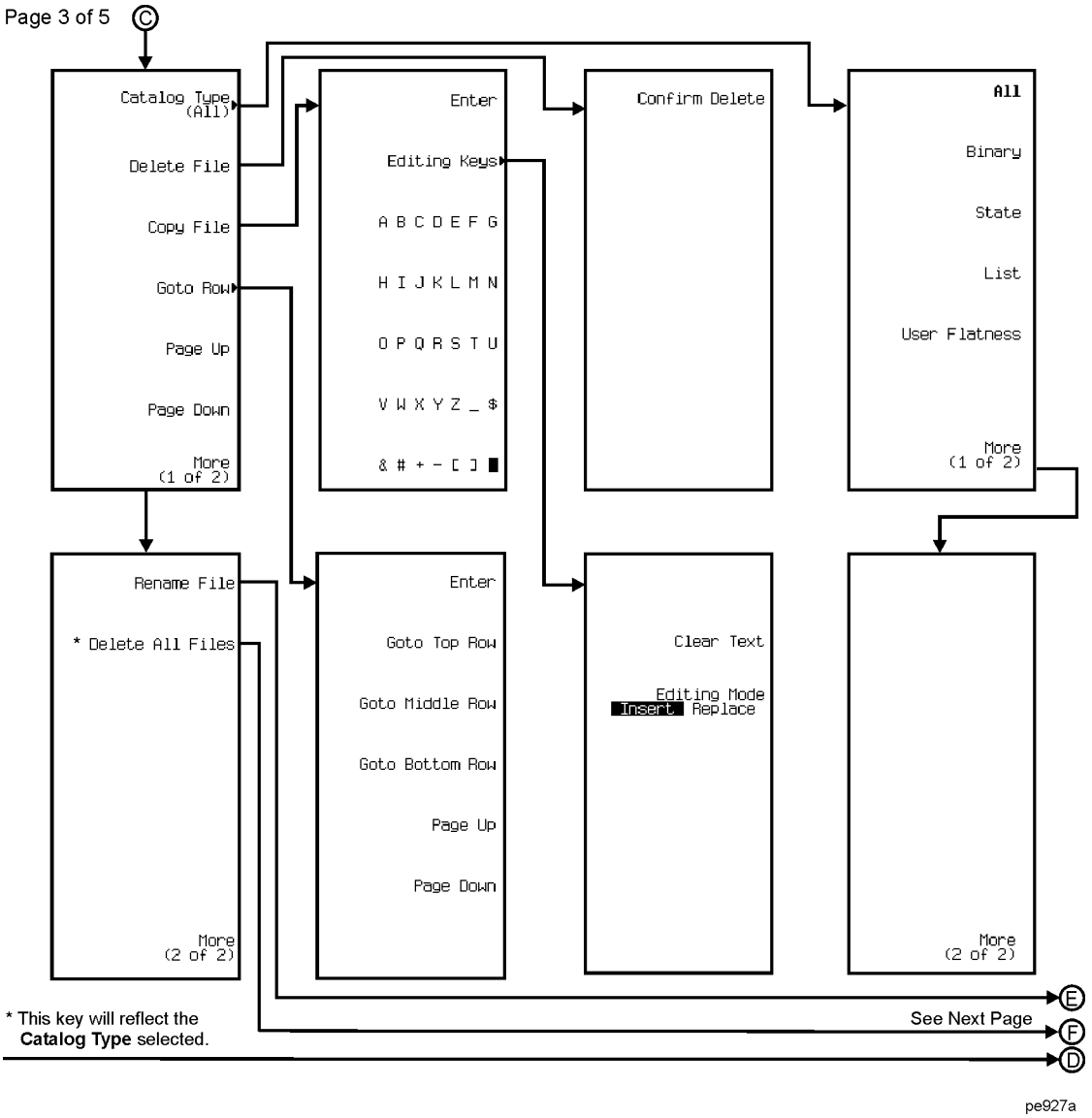
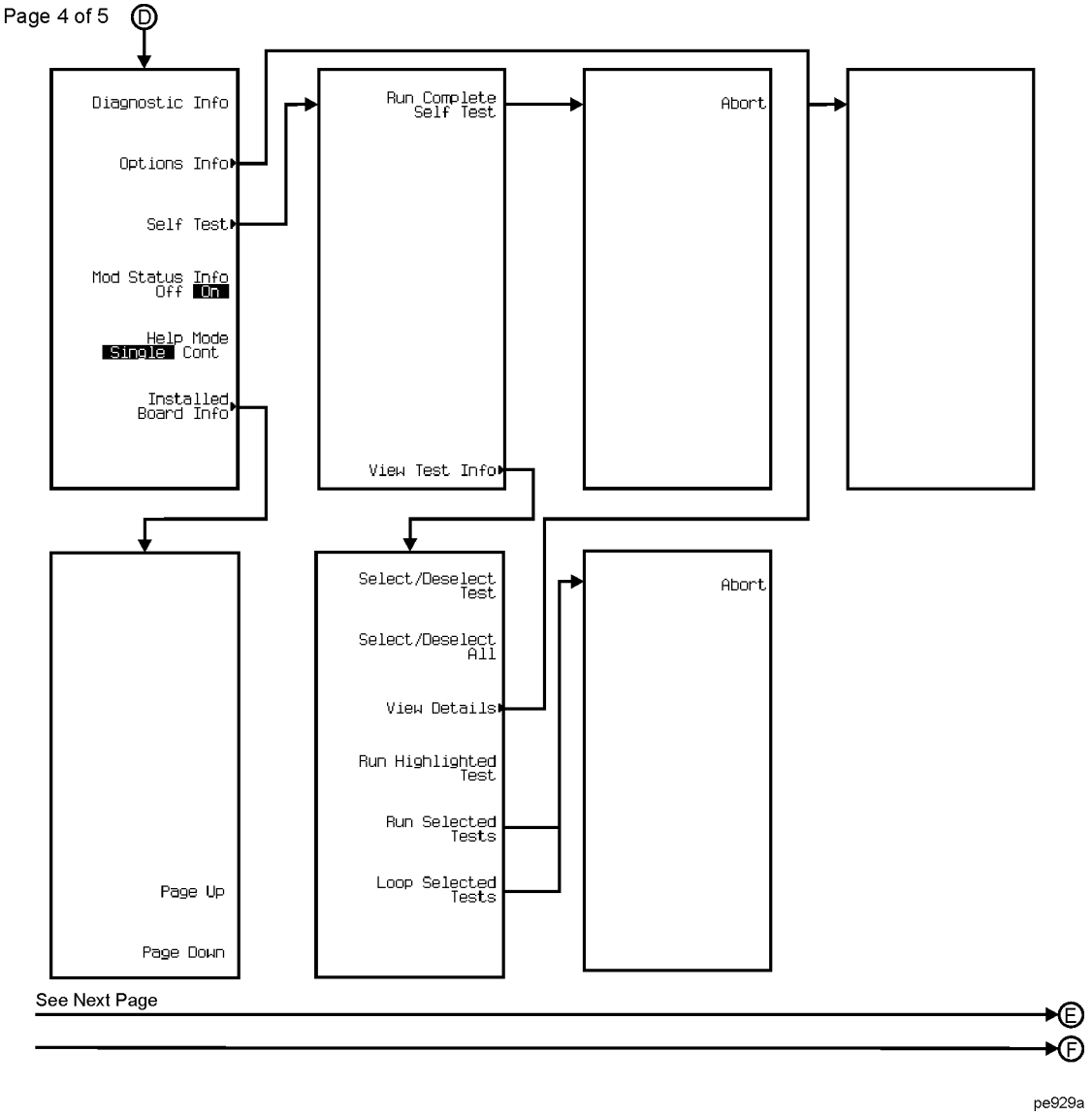
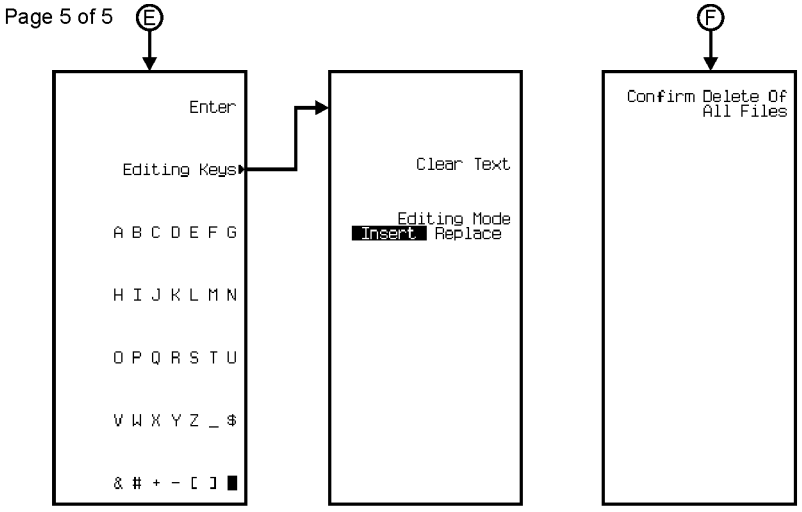

Page 3 of 5
C
Catalog Type
(All)
Delete File
Copy File
Goto Row
Page Up
Page Down
More
(1 of 2)
Enter
Editing Keys
A B C D E F G
H I J K L M N
O P Q R S T U
V W X Y Z _ $
& # + - [ ] ■
Confirm Delete
All
Binary
State
List
User Flatness
More
(1 of 2)
Rename File
* Delete All Files
More
(2 of 2)
Enter
Goto Top Row
Goto Middle Row
Goto Bottom Row
Page Up
Page Down
Clear Text
Editing Mode
Insert Replace
More
(2 of 2)
* This key will reflect the
Catalog Type selected.
See Next Page
E
F
D
pe927a

**Figure 6-10**


Page 4 of 5
D
Diagnostic Info
Options Info
Self Test
Mod Status Info
Off On
Help Mode
Single Cont
Installed
Board Info
Run Complete
Self Test
View Test Info
Abort
Page Up
Page Down
Select/Deselect
Test
Select/Deselect
All
View Details
Run Highlighted
Test
Run Selected
Tests
Loop Selected
Tests
Abort
See Next Page
E
F
pe929a


Page 5 of 5
E
Enter
Editing Keys
A B C D E F G
H I J K L M N
O P Q R S T U
V W X Y Z _ $
& # + - [ ]
Clear Text
Editing Mode
Insert Replace
F
Confirm Delete Of
All Files

pe930a

**Symbols**

ΦM
  annunciator, 12
  configuration example, 38
  coupling, external source, 139
  DCΦM calibration, 127
  description, 33
  deviation, 38, 92
  dual-sine
    amplitude, second tone, 98
    rate, first tone, 97
    rate, second tone, 98
  hardkey, 7, 143
  menu map, 237
  multipath
    deviation coupling, 93
    selection, 94
  operating state, 93
  rate, 39, 94
  source, 33, 95
  swept-sine
    start rate, 95
    stop rate, 96
    sweeps/second, 96
    trigger, 97
  type, normal/wideband, 144
  waveform, 99
    *See also* waveforms, function generator

**Numerics**

10 MHz
  IN connector, 16
  OUT connector, 16
10BASE-T. *See* LAN

**A**

AC power receptacle, 15
active entry area, 12
  clearing, 123
address
  GPIB, 51
  hostname, 51
  Internet Protocol. *See* IP address
  World Wide Web. *See* hostname
Agilent
  contacting, 89
  returning product to, 88
ALC
  annunciator, 12
  attenuation and ALC level, balancing, 58
  bandwidth selection, 74
  BW selections, 100, 101, 107, 119
  control, 118
  level, 58, 211
  limitations, amplitude, 55
  operating state, 108
AM
  annunciator, 12
  configuration example, 33
  coupling, external source, 139
  depth, 35, 109
  description, 33
  dual-sine
    amplitude, second tone, 113
    rate, first tone, 113
    rate, second tone, 114
  hardkey, 108
  menu map, 230
  mode, normal/deep, 109
  multipath, 36
    depth coupling, 109
    selection, 36, 110
  operating state, 36, 110
  rate, 35, 111
  source, 33, 111
  swept-sine
    start rate, 112
    stop rate, 112
    sweeps/second, 112
    trigger, 113
  type, linear/exponential, 114
  waveform, 36, 114
    *See also* waveforms, function generator
amplifier, microwave
  external leveling setup, 29
  mm-wave source module setup, 29
  user flatness calibration setup, 66

amplitude
  display area, 14
  hardkey, 6, 118
  LF output, 42, 43
  menu map, 232
  modulation. *See* AM
  reference, 116
  RF output, 22, 118
    increment, 162
    leveling mode, 172
    offset, 23, 115
    reference, 23, 116
    sweep, 115
annunciators
  ΦM, 12
  ALC OFF, 12
  AM, 12
  ARMED, 12
  ATTEN HOLD, 12
  behavior during
    AM, 111
    FM, 148
    ΦM, 95
  ERR, 12
  EXT, 12
  EXT REF, 13
  EXT1 LO, 95, 111, 148
  EXT1 LO/HI, 12
  EXT2 LO, 95, 111, 148
  EXT2 LO/HI, 13
  FM, 13
  L (listener mode), 13
  MOD ON/OFF, 13
  OVEN COLD, 13
  PULSE, 13
  R (remote), 13
  RF ON/OFF, 13
  S (service request), 13
  SWEEP, 13
  T (talker mode), 13
  UNLEVEL, 13
  UNLOCK, 13
ARMED annunciator, 12
arrow keys, 10
ATTEN HOLD annunciator, 12
attenuator
  configuration, 58, 118, 212
  hold present setting, 119
attenuator hold mode, 29
ATTN HOLD annunciator, 29
automatic leveling control. *See* ALC
AUXILIARY INTERFACE connector, 16

**B**

backspace key, 187
baud rate, 52, 102, 103, 104, 105, 203
buffer (RS-232) reset, 52

**C**

connectivity. *See* remote control
connectors
  input
    10 MHz IN, 16
    AC power receptacle, 15
    EXT 1 INPUT, 7
    EXT 2 INPUT, 8
    PULSE/TRIGGER GATE INPUT, 10
    TRIGGER IN, 17
  interface
    AUXILIARY INTERFACE, 16
    GPIB, 15
    LAN, 16
    RS-232, 16
    SOURCE MODULE, 16
  output
    10 MHz OUT, 16
    LF OUTPUT, 8
    PULSE SYNC OUT, 9
    PULSE VIDEO OUT, 9
    RF OUTPUT, 9
    SOURCE SETTLED OUTPUT, 17
    SWEEP OUT, 16
    TRIGGER OUT, 17
contrast hardkeys
  decrease, 10
  increase, 10
correction array (user flatness)
  configuration, 61
  load from step array, 62
  viewing, 63
  *See also* user flatness correction
correction, flatness. *See* user flatness correction

coupling
ΦM deviation, multipath, 93
AM depth, multipath, 109
external source, 139
factor, external detector, 55, 140
FM deviation, multipath, 146

**D**

data storage
description, 44
file types, 44
trouble. *See* problems
*See also* memory catalog *and* instrument state register
dead/no power, signal generator. *See* problems
detector, external
coupling factor configuration, 56
diode response, typical, 56
diagnostic information, 132
diagrams
display, 11
front panel, 5
rear panel, 15
digit keys, 187
display, 133
active entry area, 12
amplitude area, 14
annunciators, 12
brightness, 120
contrast
decrease hardkey, 10
increase hardkey, 10
diagram, 11
error message area, 14
frequency area, 12
inverse video, 170
modulation status, 185
pixel test, 120, 227
screen saver
delay, 208
mode, light/light&text, 208
operating state, 209
text area, 14
update in remote mode, 224
dwell
time, step sweep, 26, 214
type, list/step, 135

**E**

echo (RS-232), 52, 203
ERR annunciator, 12
error messages, 138
clear, 122
display area, 14
view next, 225
view previous, 226
examples
ΦM, configuring, 38
AM, configuring, 35
files, instrument state
deleting registers and sequences, 47
recalling, 47
saving, 46
files, memory catalog
copying, 45
deleting, 46
renaming, 45
storing, 45
viewing, 44
FM, configuring, 37
leveling, external
detectors and couplers/splitters, with, 54
mm-wave source module, with, 29, 58
LF output, configuring, 41
pulse modulation, configuring, 40
RF output
CW, configuring, 20
mm-wave source module, configuring with, 29
swept, configuring, 24
table editors, modifying items in, 50
user flatness correction
correction array, creating automatically, 59
correction array, creating manually, 63
description, 59
mm-wave source module, with, 66
recalling data from memory, 64
saving data to memory, 64
EXT 1 INPUT connector, 7
EXT 2 INPUT connector, 8
EXT annunciator, 12
EXT REF annunciator, 13
EXT1 annunciators
HI, 12, 95, 111, 148
LO, 12, 95, 111, 148

EXT2 annunciators
HI, 13, 95, 111, 148
LO, 13, 95, 111, 148

**F**

fail-safe recovery sequence, description, 85
failures. *See* problems
features
PSG-A, 3
PSG-L, 2
files
instrument state. *See* instrument state register
memory catalog. *See* memory catalog
firmware, upgrading, 87
flatness correction. *See* user flatness correction
FM
annunciator, 13
configuration example, 37
coupling, external source, 139
DCFM calibration, 127
description, 33
deviation, 37, 145
dual-sine
amplitude, second tone, 150
rate, first tone, 150
rate, second tone, 150
hardkey, 7, 143
menu map, 235
multipath
deviation coupling, 146
selection, 147
operating state, 146
rate, 37, 147
source, 33, 148
swept-sine
start rate, 148
stop rate, 149
sweeps/second, 149
trigger, 149
waveform, 151
*See also* waveforms, function generator
frequency
display area, 12
hardkey, 6, 155
LF output, 42
start and stop, swept-sine, 43
menu map, 239
modulation. *See* FM
multiplier, 152
RF output, 20, 155
increment, 21, 23, 162
offset, 22, 153
phase adjustment, 107
phase reference, 190
reference, 21, 153, 154
sweep, 151, 152
sweep, with amplitude sweep, 155
sweeping, 26
front panel
diagram, 5
display, 11
knob, 6
function generator
selection, 155, 156
waveforms. *See* waveforms, function generator

**G**

general purpose interface bus. *See* GPIB
GPIB
address, 51, 158
connector, 15
listener mode, 65, 159
setup, 51

**H**

hardkeys, 10
ΦM, 7, 143, 237
AM, 108, 230
Amplitude, 6, 118, 232
arrow, 10
contrast
decrease, 10
increase, 10
FM, 7, 143, 235
Frequency, 6, 155, 239
Help, 7, 160
Hold, 10, 161
Incr Set, 9, 162
LF Out, 172, 240

hardkeys (*continued*)
Local, 10, 180
MENUS group, 7
Mod On/Off, 8, 184
numeric, 8
Preset, 10, 193
Pulse, 242
Recall, 7, 198, 243
Return, 10, 202
RF On/Off, 8, 202
Save, 6, 206, 244
Sweep/List, 218, 245
Trigger, 7, 221
Utility, 223, 247
Help hardkey, 7, 160
help system mode, 160, 163
Hold hardkey, 10, 161
hostname, 51
*See also* IP address

**I**

IEEE 488.2. *See* GPIB
Incr Set hardkey, 9, 162
input connectors
10 MHz IN, 16
EXT 1 INPUT, 7
EXT 2 INPUT, 8
PULSE/TRIGGER GATE INPUT, 10
TRIGGER IN, 17
instrument state register
comment
add, 47, 106
edit, 47, 137
keep, 171
description, 46
instrument states
delete register, 48, 129
delete sequence, 48, 130, 132
recall, 47, 198, 199
re-save, 201
save, 46, 206, 207
select register, 210
select sequence, 211
trouble. *See* problems
*See also* memory catalog
interface connectors
AUXILIARY INTERFACE, 16
GPIB, 15
LAN, 16
RS-232, 16
SOURCE MODULE, 16
interface, remote
GPIB
address, 51, 158
listener mode, 65, 159
setup, 51, 159
LAN
hostname, 51, 161
IP address, 51, 170
setup, 51, 172
local area network. *See* LAN
local operation, 180
parallel. *See* GPIB
RS-232
baud rate, 52, 203
buffer reset, 52, 201
echo, 52, 203
pacing, transmit/receive, 220
setup, 52
timeout, 52, 204
transmit/receive pace, 52, 220
serial. *See* RS-232
internal source
limitations, 33
multipath configuration, 36
ΦM, 94
AM, 36, 110
FM, 147
waveforms, available, 33
Internet Protocol address, signal generator. *See* IP address
IP address, 51
*See also* hostname

**K**

key descriptions, signal generator, 91–227
keypad, numeric, 8
knob, 6

**L**

L (listener mode) annunciator, 13
label area, softkey, 14
LAN
  connector, 16
  hostname, 51, 161
  IP address, 51, 170
  setup, 51, 172
LEDs
  line power (green), 9
  standby (yellow), 9
leveling, external
  description, 54
  detector, 140
    coupling factor, 140
  detectors and couplers/splitters, using, 54
    attenuation and ALC level, balancing, 58
    connection diagram, 55
    diode detector response, typical, 56
    equipment required, 54
    external detector coupling factor configuration, 56
    leveling mode configuration, 55
    Option 1E1 signal generators, with, 58
    signal generator configuration, 55
  mm-wave source modules, using, 29, 58
    connection diagrams, 30, 31
    equipment, required, 29
    signal generator configuration, 31
  mode, 172
  source module, 213
leveling, internal, 167
  mode, 172
  *See also* ALC *and* power search
LF Out
  hardkey, 172
LF output
  amplitude, 42, 43, 173
  configuration example, 42, 43
  description, 41
  dual-sine
    amplitude, second tone, 177
    frequency, first tone, 177
    frequency, second tone, 178
  frequency, 42, 173
  menu map, 240
  operating state, 173
LF output (*continued*)
  source, 174
    function generator, 43, 155, 156
    internal modulation monitor, 42, 168, 169
  swept-sine
    start frequency, 43, 175
    stop frequency, 43, 175
    sweep rate, 43
    sweeps/second, 176
    trigger, 176
  waveform, 41, 43, 178
    *See also* waveforms, function generator
LF OUTPUT connector, 8
LFO. *See* LF output
line power LED, 9
listener mode annunciator, 13
local area network. *See* LAN
Local hardkey, 10, 180
locked up, signal generator. *See* problems
low frequency output. *See* LF output

**M**

memory catalog
  catalog type, 122
  description, 44
  file
    copy, 45, 126
    delete, 46, 125, 128, 129, 130, 131
    delete binary, 128
    load from selected file, 179
    load or store, 180
    rename, 45, 201
    store, 45, 215
    types, 44
    view, 44, 120, 179, 214, 224
  trouble. *See* problems
  type, 44
  *See also* instrument state register

menu
hardkey group, 7
maps
ΦM, 237
AM, 230
Amplitude, 232
FM, 235
Frequency, 239
LF output, 240
Pulse, 242
Recall, 243
Save, 244
Sweep/List, 245
Utility, 247
microwave amplifier
external leveling setup, 29
mm-wave source module setup, 29
user flatness calibration setup, 66
millimeter head. *See* mm-wave source module
millimeter-wave source module. *See* mm-wave source module
mm-wave source module
connection diagrams, 30, 31
external leveling with, 58
models, 29, 66
required equipment, 29
signal generator configuration with, 31
user flatness correction with, 66
MOD ON/OFF annunciator, 13
Mod On/Off hardkey, 8, 184
modulation
amplitude. *See* AM
annunciators, 13
configuring, 33
external waveform, 141, 142
frequency. *See* FM
internal, 168, 169
operating state, 184
phase. *See* ΦM
pulse, 40
status display, 185
multipath configuration
ΦM, 94
AM, 36, 110
FM, 147
multiplier, frequency, 152

**N**

numeric keypad, 8, 187

**O**

offset
amplitude, 23, 115
frequency, 21, 153
on/off switch, 9
operation, fundamental, 19–52
Option 1E1, 29
options
descriptions, hardware/software, 4
informational display, 189
output
amplitude, RF, 118
connectors
10 MHz OUT, 16
LF OUTPUT, 8
PULSE SYNC OUT, 9
PULSE VIDEO OUT, 9
RF OUTPUT, 9
SOURCE SETTLED OUTPUT, 17
SWEEP OUT, 16
TRIGGER OUT, 17
frequency, RF, 155
low frequency. *See* LF output
OVEN COLD annunciator, 13
overview, signal generator, 1–17

**P**

pacing, transmit/receive (RS-232), 220
performance, optimizing signal generator, 53–74
phase modulation. *See* ΦM
point trigger, 121, 139, 151, 221
power
meter
address, GPIB, 183
channel selection, 183
models, 59
selection, 191
timeout, 183
receptacle, AC, 15
search, 193
execute search, 134
mode, manual/auto, 193
sensor, models, 60, 66
switch, 9
Preset hardkey, 10, 193

problems
  data storage
    empty registers, 84
    register contains wrong state, 84
  fail-safe recovery sequence, 85
  help mode, cannot turn off, 76
  RF output
    low, 77
    low, while working with mixer, 78
    low, while working with spectrum analyzer, 80
    modulation, no, 76
    none, 76
  service contacts, 88
  signal generator
    locked up, 85
    returning to factory for repair, 88
    will not power up, 84
  sweep
    cannot turn off, 82
    dwell time incorrect, 83
    stalled, 82
    sweep list missing, 83
PSG-A features, 3
PSG-L features, 2
PULSE annunciator, 13
pulse modulation
  delay, 195
  description, 34
  menu map, 242
  operating state, 195
  period, 40, 196
  rate, 196
  source, external, 34, 141, 197
    polarity, 141
  source, internal, 34, 197
    doublet, 165
    free-run, 165
    gated, 166
    squarewave, 169
    triggered, 167
  width, 40, 197

**R**

R (remote) annunciator, 13
rear panel
  description, 15
  diagram, 15
Recall
  hardkey, 7, 198
  menu map, 243
recovery sequence. *See* fail-safe recovery sequence
reference
  amplitude, 23, 116
  frequency, 21, 153
  oscillator adjustment, internal, 199, 200
  oscillator adjustment, return to factory defaults, 202
  oscillator adjustment, store, 216
  oscillator bw adjustment, 101, 102, 104
  oscillator, external, bw adjustment, 142
  oscillator, internal, bw adjustment, 169
registers. *See* instrument state register
remote control
  GPIB
    address, 51, 158
    listener mode, 65, 159
    setup, 51, 159
  LAN
    hostname, 51, 161
    IP address, 51, 170
    setup, 51, 172
  local operation, 180
  RS-232
    baud rate, 52, 203
    buffer reset, 52, 201
    echo, 52, 203
    pacing, transmit/receive, 220
    setup, 52
    timeout, 52, 204
    transmit/receive pace, 52, 220
remote operation annunciator, 13
repair return instructions, 88
Return hardkey, 10, 202
RF ON/OFF annunciator, 13
RF On/Off hardkey, 8, 202

RF output
amplitude, 22
increment, 162
offset, 23, 115
reference, 23, 116
attenuator hold mode, 29
ATTN HOLD annunciator, 29
connector, 9
frequency, 20
increment, 21, 23, 162
multiplier, 152
offset, 22, 153
reference, 21, 153, 154
leveling, external
description, 54
detectors and couplers/splitters, using, 54
mm-wave source modules, using, 58
mm-wave source module, using, 29
multiplier, frequency, 152
operating state, 20, 202
phase
adjustment, 107
reference, 190
step attenuator, 29
swept, list
data, load from step sweep, 27, 126, 180
description, 25
points, 27, 92
single sweep, 28, 212
sweep trigger, 28, 217
sweep type, 26, 218
swept, step
amplitude, 25, 117
description, 24
frequency, 25, 154
step dwell, 26, 214
trouble. *See* problems
user flatness correction
creating and applying, 59
description, 59
mm-wave source module, using, 66
RF OUTPUT connector, 9
RS-232
baud rate, 52, 203
buffer reset, 52, 201
connector, 16
echo, 52, 203
pacing, transmit/receive, 220
setup, 52, 203
timeout, 52, 204
transmit/receive pace, 52, 220

## S

S (service request) annunciator, 13
Save
hardkey, 6, 206
menu map, 244
self tests, 211
abort, 106
details, viewing, 225, 226
loop selected, 181
run
complete, 204
highlighted, 204
selected, 205
select/deselect
all, 209
test, 209
sequences. *See* instrument state register
service request annunciator, 13
signal generator
adjustments, 164
reference oscillator, 199, 200, 202
reference oscillator BW, 101, 102, 104
reference oscillator BW, external, 142
reference oscillator BW, internal, 169
step/knob ratio, 215
features, 2
firmware, upgrading, 87
information, 164
diagnostic, 132
help system mode, 160, 163
modulation status, 185
options, 189
self tests, 181, 204, 205, 211
self tests, aborting, 106
key descriptions, 91–227
menu maps, 229–251
operation, fundamental, 19–52
options, 4
overview, 1–17

signal generator (*continued*)
performance, optimizing, 53–74
power-on configuration, 192
preset configuration, 194, 207
problems, solving, 75–89
repair return instructions, 88
signs, changing, 187
softkeys
individual. *See* Table of Contents
label area, 14
location
on front panel, 6
within menus. *See* Menu Maps
SOURCE MODULE connector, 16
SOURCE SETTLED OUTPUT connector, 17
standby LED, 9
step array (user flatness)
number of points configuration, 62
start and stop frequency configuration, 62
*See also* user flatness correction
step attenuator, 29
storage, data or file. *See* data storage
*See also* memory catalog *and* instrument state register
sweep
amplitude
start, 25, 117
stop, 25, 117
annunciator, 13
ATTN HOLD annunciator, 29
configuration examples
list, 26
step, 25
data
load list from step sweep, 27, 126, 180
save list, 45
description
list, 25, 124
step, 24, 125
direction, 216
dwell
time, step, 26, 214
type, list/step, 135
frequency
start, 25, 154
stop, 25, 154
manual mode
operating state, 182
point selection, 182
mode, amplitude/frequency, 216
sweep (*continued*)
operating state, 188
points, 26, 27, 92
preset, list sweep table values, 126, 194
repetition, 25, 217
single, 26, 28
single sweep, 212
trigger, 28
arming, 28
bus, 121
external, 139
free run, 151
point-by-point, 191
polarity, input, 222
polarity, output, 222
source, 28, 217
trigger key, 221
trouble. *See* problems
type, list/step, 26, 218
using step attenuator, 29
with Option 1E1, 29
SWEEP annunciator, 13
SWEEP OUT connector, 16
Sweep/List
hardkey, 218
menu map, 245
switch, power, 9

## T

T (talker mode) annunciator, 13
table editor
description, 49
functional overview, 50
navigation, 157, 158, 190
table items, deleting, 131
table items, modifying, 50, 162
text
editing mode, insert/replace, 138
erase, 123
text editing, 138
talker mode annunciator, 13
text area, 14
timeout (RS-232), 52, 204
transmit/receive pace (RS-232), 52, 220
TRIGGER
IN connector, 17
OUT connector, 17

trigger
arming, 28
bus, 121
connectors, 17
external, 139
free run, 151
hardkey, 7
point-by-point, 191
single sweep, 212
source, 217
trigger key, 221
Trigger hardkey, 221
troubleshooting. *See* problems

**U**

UNLEVEL annunciator, 13
UNLOCK annunciator, 13
user flatness correction
abort cal routine, 106
applying to the RF output, 64
array
cal, 123
step, 124
connection diagram, 61
correction arrays
automatic creation, 62
description, 59
manual creation, 63
correction data
recall from memory catalog, 64
save to memory catalog, 64
data
cal array, load from step array, 179
description, 59
equipment required, 60
execute cal routine, 134
GPIB listener mode, 65, 159
mm-wave source module, using
applying correction data, 73
calibration process, performing the, 71
connection diagrams, 68, 69
description, 66
equipment required, 66
power meter configuration, 67
recall correction data, 73
save correction data, 72
signal generator configuration, 70
operating state, 143
user flatness correction (*continued*)
power meter
address, GPIB, 183
channel selection, 183
configuration, 60
models, 59, 136, 137
selection, 191
timeout, 183
preset, list table values, 126, 194
return to flatness menu, 134
signal generator configuration, 61
Utility
hardkey, 223
menu map, 247

**W**

waveforms, external, 141, 142
waveforms, function generator
DC, 127
dual-sine, 135
amplitude, second tone, 98, 113, 150, 177
rate, first tone, 97, 113, 150, 177
rate, second tone, 98, 114, 150, 178
noise, 186
gaussian, 157
uniform, 223
ramp, 198
negative, 186
positive, 191
sine, 212
square, 213
swept-sine, 219
start rate/frequency, 95, 112, 148, 175
stop rate/frequency, 96, 112, 149, 175
sweeps/second, 96, 97, 112, 113, 149, 176
triangle, 220
World Wide Web address, signal generator. *See* hostname

# Index

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