SERIES

MG369XA

SYNTHESIZED CW GENERATOR

OPERATION MANUAL

NOTICE

This manual and the MG369XA Programming Manual, along with other product literature, are provided on a CD ROM (PN: 10920-00038) that is located in the inside-front cover pocket.

Anritsu

490 JARVIS DRIVE
MORGAN HILL, CA 95037-2809

P/N: 10370-10353
REVISION: D
PRINTED: MAY 2002

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DECLARATION OF CONFORMITY

Manufacturer's Name: ANRITSU COMPANY

Manufacturer's Address: Microwave Measurements Division
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

declares that the product specified below:

Product Name: Signal Generator

Model Number: MG369XA

conforms to the requirement of:

EMC Directive 89/336/EEC as amended by Council Directive 92/31/EEC & 93/68/EEC
Low Voltage Directive 73/23/EEC as amended by Council directive 93/68/EEC

Electromagnetic Interference:

Emissions:
CISPR 11:1990/EN55011: 1991 Group 1 Class A
EN 61000-3-2:1995 Class A
EN 61000-3-3:1995 Class A

Immunity:
EN 61000-4-2:1995/EN61326-1: 1997 - 4kV CD, 8kV AD
EN 61000-4-3:1997/ EN61326-1: 1997- 3V/m
EN 61000-4-4:1995/ EN61326-1997: 1997 - 0.5kV SL, 1kV PL
EN 61000-4-5:1995/ EN61326-1997: 1997 - 1kV L-L, 2kV L-E
EN 61000-4-6:1994/EN61326: 1998 – 3V
EN 61000-4-11:1994/EN61326: 1998 – 100% @ 20msec

Electrical Safety Requirement:

Product Safety: IEC 1010-1:1990 + A1/EN61010-1: 1993

Marcel Dubois, Corporate Quality Director

Morgan Hill, CA

16-MAY-01
Date

European Contact: For Anritsu product EMC & LVD information, contact Anritsu LTD, Rutherford Close, Stevenage Herts, SG1 2EF UK, (FAX 44-1438-740202)

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully BEFORE operating the equipment.

WARNING

WARNING indicates a hazard. It calls attention to a procedure that could result in personal injury or loss of life if not performed properly. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

CAUTION

CAUTION indicates a hazard. It calls attention to a procedure which, if not performed properly, could result in damage to or destruction of a component of the instrument. Do not proceed beyond a CAUTION note until the indicated conditions are fully understood and met.

The instrument is marked with this symbol to indicate that it is necessary for the user to refer to the instructions in the operation manual.

Indicates ground.

For Safety

WARNING

When supplying power to this equipment, ***always*** use a three-wire power cable connected to a three-wire power line outlet. If power is supplied without grounding the equipment in this manner, there is a risk of receiving a severe or fatal electric shock.

WARNING

Before changing the fuse, ***always*** remove the power cord from the power outlet. There is the risk of receiving a fatal electric shock if the fuse is replaced with the power cord connected.

Always use a new fuse of the type and rating specified by the fuse markings on the rear panel of the instrument.

WARNING

There are no operator serviceable components inside. Refer servicing of the instrument to qualified service technicians.

To prevent the risk of electrical shock or damage to precision components, ***do not*** remove the equipment covers.

WARNING

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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Chapter 1
General Information

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Figure 1-1. *Series MG369XA Synthesized CW Generator*

Chapter 1
General Information

1-1 Scope of Manual

This manual provides general information, installation, and operating information for the Anritsu Series MG369XA Synthesized CW Generator. (Throughout this manual, the terms *MG369XA* and *CW generator* will be used interchangeably to refer to the instrument.) Manual organization is shown in the table of contents.

1-2 Introduction

This chapter contains general information about the series MG369XA CW generators. It includes a general description of the instrument and information on its identification number, related manuals, options, and performance specifications. A listing of recommended test equipment is also provided.

1-3 Description

The Series MG369XA Synthesized CW Generators are microprocessor-based, synthesized signal sources with high resolution phase-lock capability. They generate both discrete CW frequencies and broad (full range) and narrow band step sweeps across the frequency range of 2 GHz to 65 GHz. Options are available to extend the low end of the frequency range to 0.1 Hz. All functions of the CW generator are fully controllable locally from the front panel or remotely (except for power on/standby) via the IEEE-488 General Purpose Interface Bus (GPIB). Table 1-1, page 1-5, lists models, frequency ranges, and maximum leveled output.

1-4 Identification Number

All Anritsu instruments are assigned a unique six-digit ID number, such as “875012”. The ID number is imprinted on a decal that is affixed to the rear panel of the unit. Special-order instrument configurations also have an additional *specials* number tag attached to the rear panel of the unit, such as SM1234.

When ordering parts or corresponding with Anritsu Customer Service, please use the correct serial number with reference to the specific instrument's model number (i.e., Model MG3693A Synthesized CW Generator, Serial No. 875012).

1-5 Electronic Manual

This manual is available on CD ROM as an Adobe Acrobat Portable Document Format (*.pdf) file. The file can be viewed using Acrobat Reader, a free program that is also included on the CD ROM. The file is "linked" such that the viewer can choose a topic to view from the displayed "bookmark" list and "jump" to the manual page on which the topic resides. The text can also be word-searched. The CD ROM, containing the MG369XA operation and programming manuals, is located in the binder pocket at the front of this manual.

1-6 Related Manuals

This is one of a three manual set that consists of an Operation Manual, a GPIB Programming Manual, and a Maintenance Manual.

GPIB Programming Manual This manual provides information for remote operation of the CW generator with Product Specific commands sent from an external controller via the IEEE 488 General Purpose Interface Bus (GPIB). It contains a general description of the GPIB and bus data transfer and control functions, a complete listing and description of all MG369XA GPIB Product Specific commands, and several programming examples. The Anritsu part number for the GPIB Programming Manual is 10370-10354.

Maintenance Manual The Maintenance Manual supplies service information for all models in the MG369XA series. The service information includes functional circuit descriptions, block diagrams, performance verification tests, calibration procedures, troubleshooting data, and assembly and component removal/replacement procedures. The Anritsu part number for the Maintenance Manual is 10370-10355.

1-7 Options

The MG369XA series synthesizer provides a wide array of instrument configurations through a series of base model and option configurations. Table 1-1, on the following page, is a sample list with performance specifications of the available models and options. Refer to Appendix B, MG3690A data sheet p/n: 11410-00262, for current information.

Table 1-1. *Series MG369XA Models*

Model Number	Configuration	Frequency Range	Max Leveled Output Power	Max Leveled Output Power w/Step Attenuator	Max Leveled Output Power w/Electronic Step Attenuator
MG3691A	w/opt 4	≥0.01 – ≤2.2 GHz	+17.0 dBm	+15.0 dBm	+13.0 dBm
	w/opt 5	≥0.01 – ≤2.0 GHz	+17.0 dBm	+15.0 dBm	+13.0 dBm
	Standard	≥2.0 – ≤8.4 GHz	+13.0 dBm	+11.0 dBm	+9.0 dBm
MG3692A	w/opt 4	≥0.01 – ≤2.2 GHz	+17.0 dBm	+15.0 dBm	+13.0 dBm
	w/opt 5	≥0.01 – ≤2.0 GHz	+17.0 dBm	+15.0 dBm	+13.0 dBm
	Standard	≥2.0 – ≤8.4 GHz	+13.0 dBm	+11.0 dBm	+9.0 dBm
	Standard	>8.4 – ≤20.0 GHz	+13.0 dBm	+11.0 dBm	+3.0 dBm
MG3693A	w/opt 4	≥0.01 – ≤2.2 GHz	+13.0 dBm	+11.0 dBm	Not Available
	w/opt 5	≥0.01 – ≤2.0 GHz	+13.0 dBm	+11.0 dBm	
	Standard	≥2.0 – ≤20.0 GHz	+9.0 dBm	+7.0 dBm	
	Standard	>20.0 – ≤30.0 GHz	+6.0 dBm	+3.0 dBm	
MG3694A	w/opt 4	≥0.01 – ≤2.2 GHz	+13.0 dBm	+11.0 dBm	Not Available
	w/opt 5	≥0.01 – ≤2.0 GHz	+13.0 dBm	+11.0 dBm	
	Standard	≥2.0 – ≤20.0 GHz	+9.0 dBm	+7.0 dBm	
	Standard	>20.0 – ≤40.0 GHz	+6.0 dBm	+3.0 dBm	
MG3695A	w/opt 4	≥0.01 – ≤2.2 GHz	+12.0 dBm	+10.0 dBm	Not Available
	w/opt 5	≥0.01 – ≤2.0 GHz	+12.0 dBm	+10.0 dBm	
	Standard	≥2.0 – ≤20.0 GHz	+10.0 dBm	+8.0 dBm	
	Standard	>20.0 – ≤50.0 GHz	+3.0 dBm	+0.0 dBm	
MG3696A	w/opt 4	≥0.01 – ≤2.2 GHz	+12.0 dBm	+10.0 dBm	Not Available
	w/opt 5	≥0.01 – ≤2.0 GHz	+12.0 dBm	+10.0 dBm	
	Standard	≥2.0 – ≤20.0 GHz	+10.0 dBm	+8.0 dBm	
	Standard	>20.0 – ≤65.0 GHz	+3.0 dBm	+0.0* dBm	
With Option 15 (High Power) Installed					
MG3691A	w/opt 4	≥0.01 – ≤2.2 GHz	+19.0 dBm	+18.0 dBm	+15.0 dBm
	w/opt 5	≥0.01 – ≤2.0 GHz	+19.0 dBm	+18.0 dBm	+15.0 dBm
	Standard	≥2.0 – ≤8.4 GHz	+19.0 dBm	+18.0 dBm	+13.0 dBm
MG3692A	w/opt 4	≥0.01 – ≤2.2 GHz	+19.0 dBm	+18.0 dBm	+15.0 dBm
	w/opt 5	≥0.01 – ≤2.0 GHz	+19.0 dBm	+18.0 dBm	+15.0 dBm
	Standard	≥2.0 – ≤10.0 GHz	+19.0 dBm	+18.0 dBm	+13.0 dBm
	Standard	>10.0 – ≤20.0 GHz	+17.0 dBm	+15.0 dBm	+7.0 dBm
MG3693A	w/opt 4	≥0.01 – ≤2.2 GHz	+15.0 dBm	+14.0 dBm	Not Available
	w/opt 5	≥0.01 – ≤2.0 GHz	+15.0 dBm	+14.0 dBm	
	Standard	≥2.0 – ≤10.0 GHz	+15.0 dBm	+14.0 dBm	
	Standard	>10.0 – ≤20.0 GHz	+12.0 dBm	+10.0 dBm	
	Standard	>20.0 – ≤30.0 GHz	+14.0 dBm	+12.0 dBm	
MG3694A	Option 4	≥0.01 – ≤2.2 GHz	+15.0 dBm	+14.0 dBm	Not Available
	Option 5	≥0.01 – ≤2.0 GHz	+15.0 dBm	+14.0 dBm	
	Standard	≥2.0 – ≤10.0 GHz	+15.0 dBm	+14.0 dBm	
	Standard	>10.0 – ≤20.0 GHz	+12.0 dBm	+10.0 dBm	
	Standard	>20.0 – ≤40.0 GHz	+14.0 dBm	+12.0 dBm	

Note: In models with Option 22, rated output power is reduced by 2 dB.
* Typical 60 - 65 GHz.

Option 1A: **Rack Mounting with Slides—**Rack mount kit containing a set of track slides (90° tilt capability), mounting ears, and front panel handles for mounting the instrument in a standard 19-inch equipment rack.

Option 1B: **Rack Mounting without Slides—**Modifies rack mounting hardware to install unit in a console that has mounting shelves. Includes mounting ears and front panel handles.

Option 2X: **110 dB Mechanical Step Attenuator—**Adds a 10 dB per step attenuator with a 110 dB range. Output power is selected directly in dBm on the front panel (or via GPIB). Rated RF output power is reduced. This option comes in different versions based on instrument configuration.

Option 2F: **120 dB Electronic Step Attenuator—**Adds a 10 dB per step attenuator with a 120 dB range for models having a high-end frequency of ≤20 GHz. Output power is selected directly in dBm on the front panel (or via GPIB). Rated RF output power is reduced.

Option 3: **Ultra-Low Phase Noise—**Adds new modules that significantly reduces Single-Sideband Phase Noise, ≥2 GHz.

Option 4: **Digital Down Converter—**Adds a Digital Down Converter for ultra-low phase noise, 0.01 to 2.2 GHz.

Option 5: **Analog Down Converter—**Adds an Analog Down Converter for 0.01 to 2 GHz RF coverage.

Option 7: **IF Up-Conversion—**Adds an internal 40 GHz mixer for up-converting an IF signal. Not available in MG3695A, MG3696A, or with option 18.

Option 9X: **Rear Panel RF Output—**Moves the RF output connector to the rear panel.

Option 13: **External Pulse Modulation—**Adds pulse modulation capability. Requires an external modulating signal input.

Option 15A: **High Power Output (Non-Pulse)—**Adds high-power RF components to the instrument providing increased RF output power in the 2–20 GHz frequency range.

Option 15B: **High Power Output (Pulse)—**Adds high-power RF components to the instrument providing increased RF output power in the 2–20 GHz frequency range for those units with Option 13 (External Pulse Modulation).

Option 16: **High-Stability Time Base—**Adds an ovenized, 10 MHz crystal oscillator with <5 x 10^{-10}/day frequency stability.

Option 17: **No Front Panel—**Deletes the front panel for use in remote control applications where a front panel display or keyboard control are not needed.

Option 18: **mmW Bias Output—**Adds a rear panel BNC Twainax connector to bias the 5400-xWRxx millimeter wave source modules.

Option 22: **0.1 Hz to 10.0 MHz Audio Frequency—**Adds frequency coverage below 10 MHz. The frequency resolution below 10 MHz is 0.02 Hz.

1-8 Performance Specifications

Series MG369XA Synthesized CW Generator performance specifications are provided in Appendix B.

1-9 Recommended Test Equipment

Table 1-2 lists the recommended test equipment for performing the series MG369XA Synthesized CW Generator operation verification tests in Chapter 5.

Table 1-2. *Recommended Test Equipment*

Instrument	Critical Specification	Recommended Manufacturer/Model
Frequency Counter or	*Range:* 0.01 to 40 GHz *Input Z: 50*Ω *Resolution:* 1 Hz *Other:* External Time Base Input	Anritsu Model MF2414B
Frequency Counter, with Cable Kit and External Mixer	*Range:* 0.01 to 65 GHz *Input Z: 50*Ω *Resolution:* 1 Hz *Other:* External Time Base Input	EIP Microwave, Inc. Models 538B, 548B, or 578B, with Cable Kit: Option 590 and External Mixer: Option 91 (26.5 to 40 GHz) Option 92 (40 to 60 GHz) Option 93 (60 to 90 GHz)
Power Meter, with Power Sensor	*Range:* –30 to +20 dBm (1μW to 100 mW)	Anritsu Model ML2437A or ML2438A, with Power Sensor: MA2474A (0.01 to 40 GHz) MA2575A (0.01 to 50 GHz)
Oscilloscope	*Bandwidth:* DC to 150 MHz *Vertical Sensitivity:* 2 mV/division *Horiz Sensitivity:* 50 ns/division	Tektronix, Inc. Model TAS485

Chapter 2
Installation

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Chapter 2
Installation

2-1 Introduction

This chapter provides installation instructions for the Series MG369XA Synthesized CW Generator. It includes information on initial inspection, preparation for use, storage, and reshipment, and General Purpose Interface Bus (GPIB) setup and interconnections.

2-2 Initial Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, retain until the contents of the shipment have been checked against the packing list and the CW generator has been checked for mechanical and electrical operation.

If the shipment is incomplete or if the CW generator is damaged mechanically or electrically, notify your local sales representative or Anritsu Customer Service. If either the shipping container is damaged or the cushioning material shows signs of stress, notify the carrier as well as Anritsu. Keep the shipping materials for the carrier's inspection.

2-3 Preparation For Use

Preparation for use consists of connecting the CW generator to the power source. The following paragraphs provide these procedures along with information about power requirements, warmup times, and the operating environment.

Power Requirements The CW generator accepts 90 to 264 Vac, 48 to 440 Hz, single-phase power. Power consumption is 300 VA maximum. The CW generator is intended for Installation Category (Over voltage Category) II.

WARNING

When supplying power to this equipment, ***always*** use a three-wire power cable connected to a three-wire power line outlet. If power is supplied without grounding the equipment in this manner, there is a risk of receiving a severe or fatal electric shock.

Power Connection To connect the MG369XA to the power source, plug the female end of the power cable into the input line voltage receptacle on the rear panel (Figure 2-1). Then plug the male end of the power cord into a three-wire power line outlet. Turn on the rear panel power switch. This automatically places the CW generator in operation (front panel OPERATE LED on).

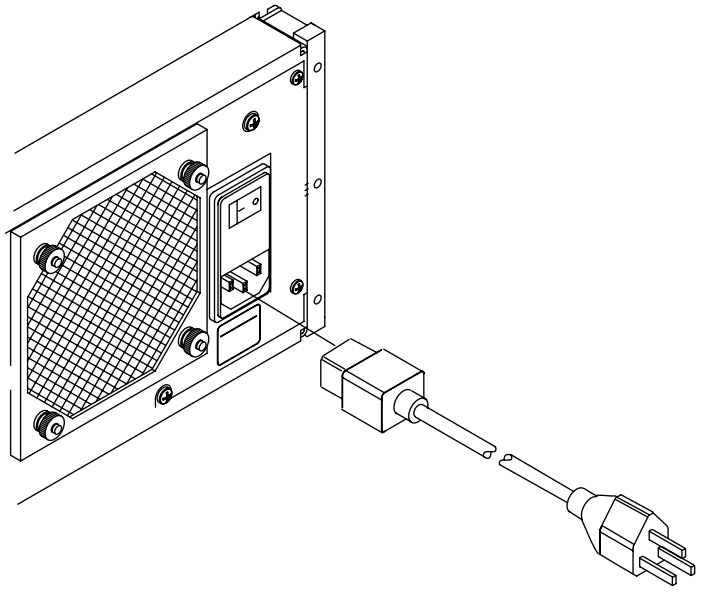
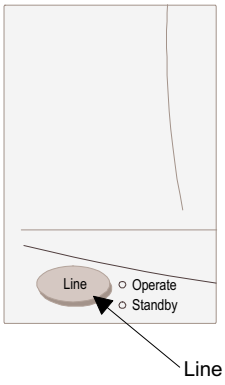


Figure 2-1. *CW Generator Rear Panel showing Power Connection*



Standby Operation

Whenever the CW generator is not being used it should be left connected to the power source and placed in standby. This keeps the internal timebase frequency reference at operating temperature.

On the front panel, press LINE to switch the MG369XA from OPERATE (green LED on) to STANDBY (orange LED on). (Hold the LINE key down for at least ½ second to prevent power-off of the unit.)

NOTE

During standby operation, the fan runs continuously.

Warmup Time

From Standby–When placing the MG369XA in operation from stand-by, allow 30 minutes warmup to assure stable operation.

From a Cold Start (0°C)–The CW generator requires approximately 120 hours (5 days) of warm up to achieve specified frequency stability with aging.

NOTE

Instruments disconnected from AC power for more than 72 hours require 30 days to return to specified aging.

Operating Environment

The MG369XA can be operated within the following environmental limits.

- **Temperature:** 0°C to 50°C
- **Humidity:** 5 to 95% relative at 40°C
- **Altitude:** up to 4600 meters
- **Cooling:** Internal cooling is provided by forced airflow from the fans mounted on the rear panel.

CAUTION

Before installing the MG369XA in its operating environment, ensure that all airflow passages at the sides and rear of the instrument are clear. This is of particular importance whenever the unit is being rack-mounted.

Keep the cooling fan filters clean so that the ventilation holes are not obstructed. A blocked fan filter can cause the instrument to overheat and shut down.

2-4 GPIB Setup and Interconnection

The MG369XA provides automated microwave signal generation via the GPIB. The following paragraphs provide information about interface connections, cable requirements, setting the GPIB operating parameters, and selecting the external interface language.

Interface Connector

Interface between the CW generator and other devices on the GPIB is via a 24-wire interface cable. This cable uses connector shells having two connector faces. These double-faced connectors allow for the parallel connection of two or more cables to a single device.

Cable Length Restrictions

The GPIB can accommodate up to 15 instruments at any one time. To achieve design performance on the bus, proper timing and voltage level relationships must be maintained. If either the cable length between separate instruments or the cumulative cable length between all instruments is too long, the data and control lines cannot be driven properly and the system may fail to perform. Cable length restrictions are as follows:

- No more than 15 instruments may be installed on the bus.
- Total cumulative cable length in meters may not exceed two times the number of bus instruments or 20 meters—whichever is less.

NOTE

For low EMI applications, the GPIB cable should be a fully shielded type, with well-grounded metal-shell connectors

GPIB Interconnection

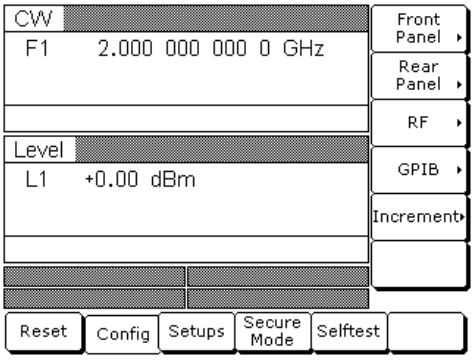
The only interconnection required for GPIB operation is between the CW generator and the controller. This interconnection is via a standard GPIB cable. The Anritsu part number for such a cable is 2100-1, -2, or -4 (1, 2, or 4 meters in length).

Setting the GPIB Address

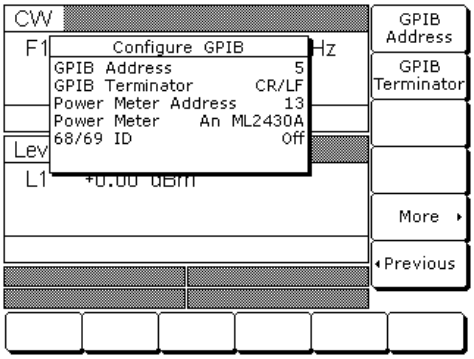
The default GPIB address is 5. If a different GPIB address is desired, it can be set from the front panel using the Configure GPIB Menu.

To change the GPIB address, first press the front panel main menu key labeled **System**. The System Menu (shown on the following page) is displayed.

Now press the menu soft-key Config. The System Configuration Menu (shown below) is displayed.



To go to the Configure GPIB menu from this menu, press the menu soft-key GPIB >. The Configure GPIB Menu (shown below) is displayed.



Press the menu soft-key GPIB Address [ADD] to change the current GPIB address of the CW generator. Enter a new address using the cursor control key or the data entry keypad and the terminator soft-key [ADR]. The new GPIB address will now appear on the display. The entry must be between 1 and 30 to be recognized as a valid GPIB address.

Selecting the Line Terminator

Data is delimited on the GPIB by either the carriage return (CR) ASCII character or both the carriage return and line feed (CR/LF) ASCII characters. Which character is used depends upon the requirements of the system controller. Most modern controllers can use either CR or CR/LF, while many older controllers require one or the other. Consult the controller's manual for its particular requirements.

From the Configure GPIB Menu display, you can select which GPIB terminator to use by pressing the menu soft-key GPIB Terminator. This menu soft-key toggles the GPIB terminator between CR and CR/LF. The current selection appears on the display.

Interface Language

Series MG369XA Synthesized CW Generators can be remotely operated via the GPIB using an external interface language—Native. The Native interface language uses a set of MG369XA GPIB Product Specific commands to control the instrument.

2-5 Rack Mounting Kit Installation

The rack mounting kit (Option 1A) contains a set of track slides (90° tilt capability), mounting ears, and front panel handles for mounting the CW generator in a standard equipment rack. The following procedure provides instructions for installing the rack mounting hardware on to the instrument. The rack mounting kit (Option 1B) uses the same inner assembly without the slide. This procedure may also be used for installing the Option 1B rack mount assembly. Refer to Figures 2-2 and 2-3 during this procedure.

Preliminary Disconnect the power cord and any other cables from the instrument.

Procedure Install the rack mounting hardware as follows:

Step 1 Using a Phillips screwdriver, remove the screws and the front handle assemblies from the instrument. (For instruments not having front handles, remove the screws and the front top and bottom feet from the instrument.) Retain the screws.

Step 2 Remove the four feet from the rear of the instrument. Retain the screws.

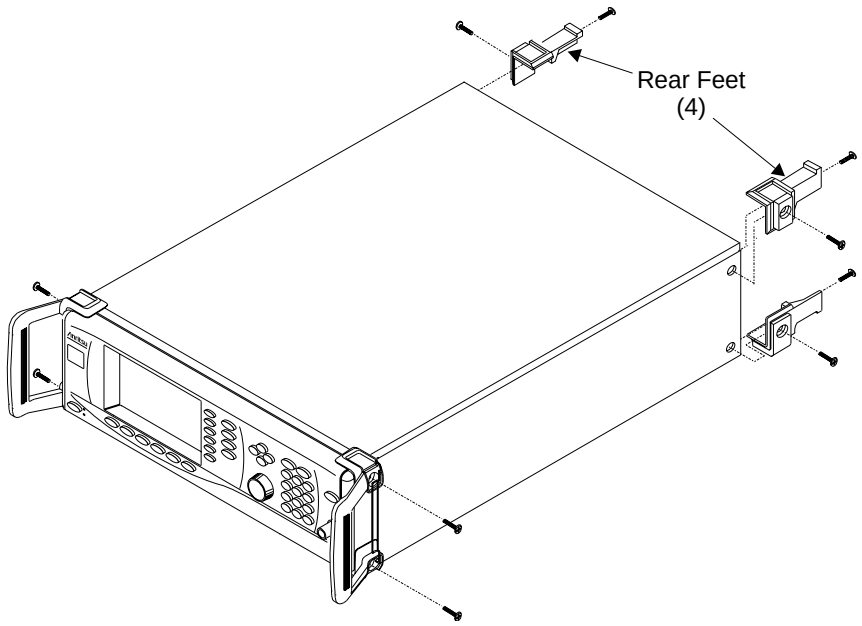


Figure 2-2. *Front Handle and Feet Removal*

NOTE

The screws with green heads have metric threads. When it becomes necessary to replace any of these screws, *always* use the exact replacement green-headed screws to avoid damage to the instrument. Anritsu P/N's: 905-8 (long); Z-951102 (short).

Step 3 Remove the inner slide assemblies from the outer slide assemblies.

Step 4 Place the left side inner slide assembly onto the instrument case with the handle towards the front of the instrument (Figure 2-3).

Step 5 Insert two green-headed screws through the holes in the slide assembly behind the handle and into the metric tapped holes in the side of the instrument.

Step 6 Insert two green-headed screws through the holes near the rear of the slide assembly and into the metric tapped holes in the side of the instrument.

Step 7 Insert the two SAE threaded screws (removed from the feet) through the 90° tabs on the rear of the slide assembly and into the rear panel of the instrument.

Step 8 Using the Phillips screwdriver, tighten all screws holding the left side slide assembly to the instrument chassis.

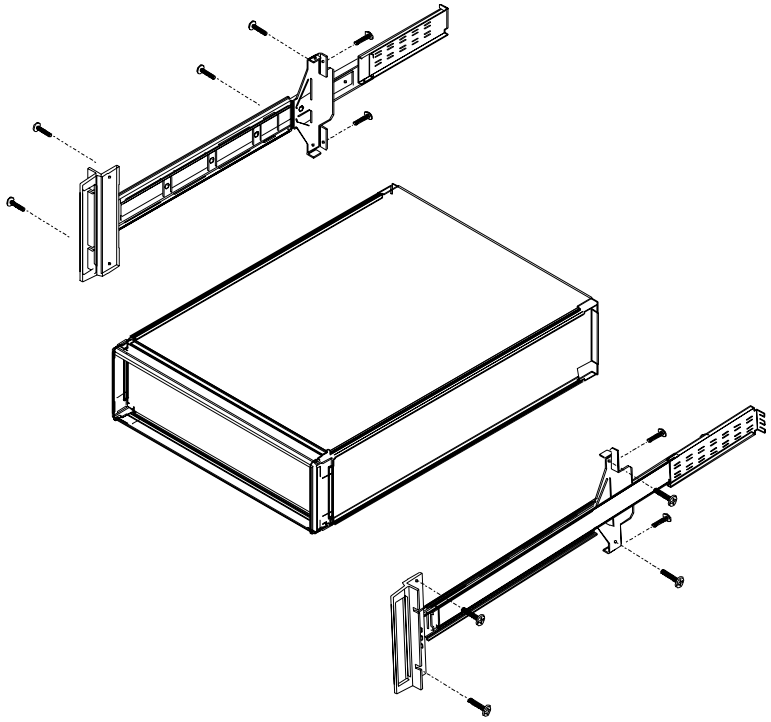


Figure 2-3. *Rack Mounting Hardware Installation*

Step 9 Place the right side inner slide assembly onto the instrument case with the handle towards the front of the instrument.

Step 10 Insert two green-headed screws through the holes in the slide assembly behind the handle and into the metric tapped holes in the side of the instrument.

Step 11 Insert two green-headed screws through the holes near the rear of the slide assembly and into the metric tapped holes in the side of the instrument.

Step 12 Insert the two SAE threaded screws (removed from the feet) through the 90° tabs on the rear of the slide assembly and into the rear panel of the instrument.

Step 13 Using the Phillips screwdriver, tighten all screws holding the right side slide assembly to the instrument chassis.

Step 14 Using the appropriate hardware, install the outer slide assemblies onto the equipment rack.

Step 15 Lift the CW generator into position. Align the inner and outer slide assemblies and slide the instrument into the rack. Realign the hardware as needed for smooth operation.

2-6 Preparation for Storage/Shipment

The following paragraphs give instructions for preparing the MG369XA for storage or shipment.

Preparation for Storage

Preparing the CW generator for storage consists of cleaning the unit, packing the inside with moisture-absorbing desiccant crystals, and storing the unit in a temperature environment that is maintained between –40°C and +75°C.

Preparation for Shipment

To provide maximum protection against damage in transit, the CW generator should be repackaged in the original shipping container. If this container is no longer available and the unit is being returned to Anritsu for repair, advise Anritsu Customer Service; they will send a new shipping container free of charge. In the event neither of these two options is possible, instructions for packaging and shipment are given below.

Use a Suitable Container.
Obtain a corrugated cardboard carton with a 125 kg test strength. This carton should have inside dimensions of no less than 15 cm larger than the unit dimensions to allow for cushioning.

Protect the Instrument.
Surround the unit with polyethylene sheeting to protect the finish.

Cushion the Instrument.
Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the unit. Provide at least three inches of dunnage on all sides.

Seal the Container.
Seal the carton by using either shipping tape or an industrial stapler.

Address the Container.
If the instrument is being returned to Anritsu for service, mark the address of the appropriate Anritsu service center (Table 2-1) and your return address on the carton in one or more prominent locations.

2-7 Anritsu Service Centers

Table 2-1 below lists the contact information for Anritsu service centers around the world.

Table 2-1. *Anritsu Service Centers*

UNITED STATES

ANRITSU COMPANY
490 Jarvis Drive
Morgan Hill, CA 95037-2809
Telephone: (408) 776-8300
1-800-ANRITSU
FAX: 408-776-1744

ANRITSU COMPANY
10 New Maple Ave., Unit 305
Pine Brook, NJ 07058
Telephone: (201) 227-8999, 1-800-ANRITSU
FAX: 201-575-0092

ANRITSU COMPANY
1155 E. Collins Blvd
Richardson, TX 75081
Telephone: 1-800-ANRITSU
FAX: 972-671-1877

AUSTRALIA

ANRITSU PTY. LTD.
Unit 3, 170 Foster Road
Mt Waverley, VIC 3149
Australia
Telephone: 03-9558-8177
FAX: 03-9558-8255

BRAZIL

ANRITSU ELECTRONICA LTDA.
Praia de Botafogo, 440, Sala 2401
CEP22250-040, Rio de Janeiro, RJ, Brasil
Telephone: 021-527-6922
FAX: 021-53-71-456

CANADA

ANRITSU INSTRUMENTS LTD.
700 Silver Seven Road, Suite 120
Kanata, Ontario K2V 1C3
Telephone: (613) 591-2003
FAX: (613) 591-1006

CHINA

ANRITSU ELECTRONICS (SHANGHAI) CO. LTD.
2F, Rm B, 52 Section Factory Building
No. 516 Fu Te Rd (N)
Shanghai 200131 P.R. China
Telephone:21-58680226, 58680227, 58680228
FAX: 21-58680588

FRANCE

ANRITSU S.A
9 Avenue du Quebec
Zone de Courtaboeuf
91951 Les Ulis Cedex
Telephone: 016-09-21-550
FAX: 016-44-61-065

GERMANY

ANRITSU GmbH
Grafenberger Allee 54-56
D-40237 Dusseldorf, Germany
Telephone: 0211-968550
FAX: 0211-9685555

INDIA

MEERA AGENCIES (P) LTD.
A23 Hauz Khas
New Delhi, India 110016
Telephone: 011-685-3959
FAX: 011-686-6720

ISRAEL

TECH-CENT, LTD.
4 Raul Valenberg St
Tel-Aviv 69719
Telephone: (03) 64-78-563
FAX: (03) 64-78-334

ITALY

ANRITSU Sp.A
Roma Office
Via E. Vittorini, 129
00144 Roma EUR
Telephone: (06) 50-99-711
FAX: (06) 50-22-4252

KOREA

ANRITSU CORPORATION LTD.

Head Office:
14F, Hyunjuk Building 832-41
Yeoksam-Dong, Kangnam-Ku
Seoul 135-080, South Korea
Telephone: 02-553-6603
FAX: 02-553-6604

Service Center:
8F Samwon Building
1329-8, Seocho-Dong
Seocho-Ku
Seoul, South Korea 137-070
Telephone: 02-581-6603
FAX: 02-582-6603

JAPAN

ANRITSU CUSTOMER SERVICE LTD.
1800 Onna Atsugi-shi
Kanagawa-Prf. 243 Japan
Telephone: 0462-96-6688
FAX: 0462-25-8379

SINGAPORE

ANRITSU (SINGAPORE) PTE LTD.
10, Hoe Chiang Road
#07-01/02 Keppel Towers
Singapore 089315
Telephone: 282-2400
FAX: 282-2533

SOUTH AFRICA

ETECSA
12 Surrey Square Office Park
330 Surrey Avenue
Ferndale, Randburt, 2194
South Africa
Telephone: 011-27-11-787-7200
FAX: 011-27-11-787-0446

SWEDEN

ANRITSU AB
Botivid Center
Fittja Backe 13A
145 84 Stockholmn
Telephone: (08) 534-707-00
FAX: (08) 534-707-30

TAIWAN

ANRITSU CO., LTD.
6F, No. 96, Section 3
Chien Kuo N. Road
Taipei, Taiwan, R.O.C.
Telephone: (02) 515-6050
FAX: (02) 509-5519

UNITED KINGDOM

ANRITSU LTD.
200 Capability Green
Luton, Bedfordshire
LU1 3LU, England
Telephone: 015-82-433200
FAX: 015-82-731303

Chapter 3
Local (Front Panel) Operation

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Chapter 3
Local (Front Panel) Operation

3-1 Introduction

This chapter provides information and instructions on operating the Series MG369XA Synthesized CW Generator using the front panel controls. It contains the following:

- Illustrations and diagrams of the front panel, data display area, and data entry area that identify and describe all front panel controls.
- An annotated diagram of the menu display format showing where the current frequency and power level information is displayed.
- Instructions for performing CW generator operations; namely, frequency and frequency sweep, fixed power level and power level sweep, leveling, system configuration, and saving and recalling instrument setups.

Typographic Conventions

The typographic conventions used throughout this chapter are as follows:

- The main function keys (Frequency, Level, Modulation, and System) are identified by using reverse text, for example: **Frequency**.
- Menu soft-keys are identified by using a grey background, for example: Edit F1.
- Related GPIB commands are listed in brackets immediately following the menu soft-key, for example:
  To turn on the CW Ramp,
  Press CW Ramp [CS1]
  Refer to the MG369XA GPIB Programming Manual, P/N 10370-10354, for information on using GPIB commands.

3-2 Front Panel Layout

The MG369XA front panel is divided into two main areas—the data display area and the data entry area. The following paragraphs provide a brief description of the front panel controls and data display and data entry areas as shown in Figure 3-1. Detailed descriptions of the data display and data entry areas are contained in paragraphs 3-3 and 3-4.

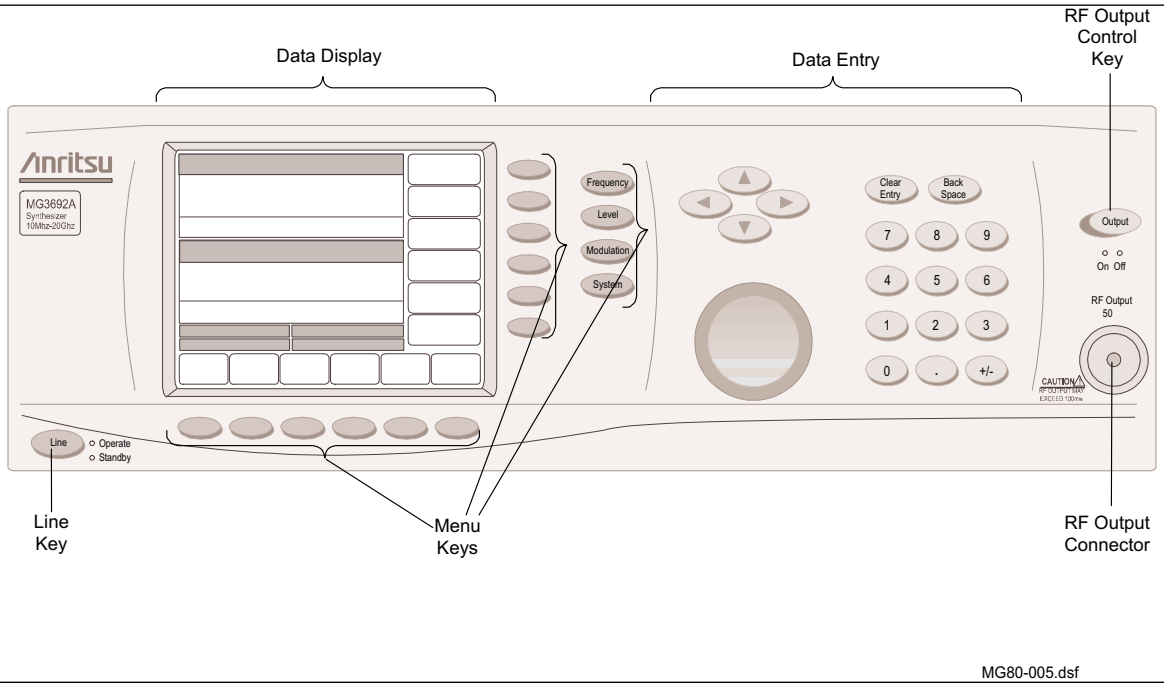


Figure 3-1. *Front Panel, MG369XA Synthesized CW Generator*

Line Key

The line key provides for turning the CW generator on and off. STANDBY (off) is indicated by an orange LED; OPERATE (on) by a green LED.

Data Display Area

The data display area consists of the data display and the surrounding menu keys.

Data Display

The data display provides information about the current status of the MG369XA in a menu display format. This information includes the operating mode of the instrument and the value of the active frequency and power level parameters.

Menu Keys

Menu keys provide for selecting the operating mode, parameters, and configuration of the CW generator.

Data Entry Area The data entry area consists of data entry keys and controls that provide for changing values for each MG369XA parameter.

RF Output Control Key The RF output control key provides for turning the RF output power on and off. OUTPUT OFF is indicated by a red LED; OUTPUT ON by a yellow LED.

RF Output Connector The RF output connector provides RF output from a 50Ω source.

NOTE

To prevent power losses due to an impedance mismatch, the mating connector and cable should also be rated at 50Ω.

3-3 Data Display Area

The data display area consists of the data display and the surrounding menu keys. The data display is a liquid crystal display (LCD). Information is presented on the LCD in the form of menu displays. The menu keys either select the main menu to be displayed, select a submenu of the current menu display, or control a function on the current menu display.

Figure 3-2 shows the format of the menu display and identifies the display elements. It also shows the placement of the menu keys in relation to the display. The paragraphs that follow provide descriptions of the menu display elements and the menu keys.

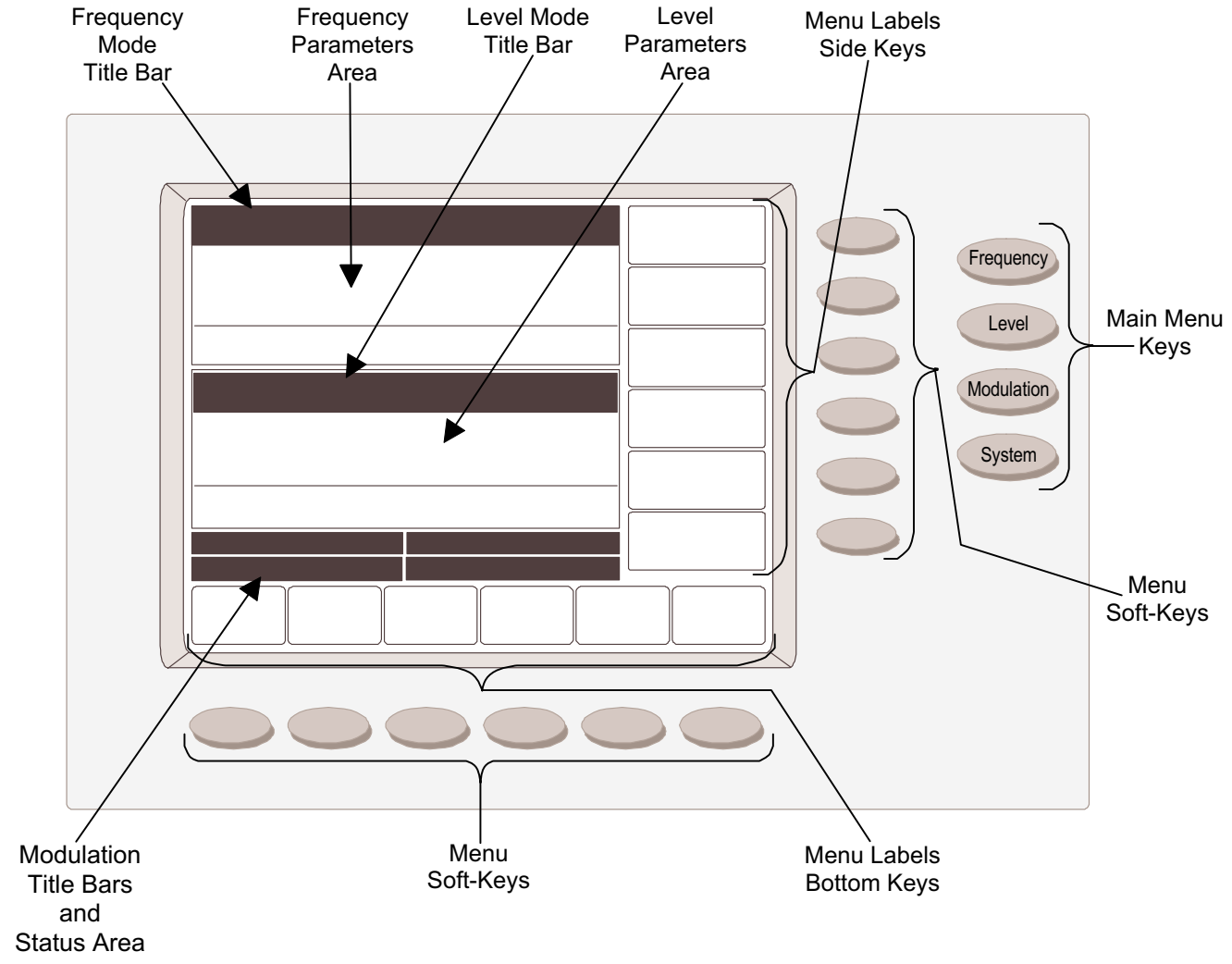


Figure 3-2. *Front Panel Data Display Area*

Menu Display Format

The menu display is divided into specific areas that show the frequency and power level information for the current CW generator setup. Menu labels for the current menu's soft-keys appear along the bottom and right side of the display.

Title Bars

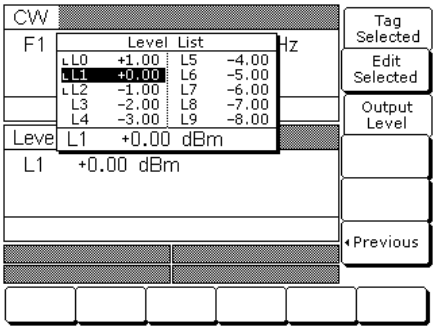
A shaded title bar identifies each parameter area. Mode information is displayed on the title bars.

- **Frequency Mode Title Bar**—The current frequency mode (CW, Step Sweep, Manual Sweep, or List Sweep) appears on the left side of the bar. In the step and list sweep mode, the type of sweep trigger appears on the right side.
- **Level Mode Title Bar**—The current power level mode (Level or Level Sweep) appears on the left side of the bar. In a level sweep mode, the type of sweep trigger appears on the right side of the bar.
- **Modulation Title Bars**—When Option 13 is installed, External Pulse Modulation has a separate title bar on the display.

Parameter Areas

The parameter areas show the frequency and power level information for the current MG369XA setup.

- **Frequency Parameters Area**—The current CW frequency in GHz, the start and stop frequencies of the current frequency sweep range in GHz, the current list index and frequency, or the start and stop indexes for the list sweep are displayed in this area.
- **Power Level Parameters Area**—The current power level in dBm or mV, or the start and stop levels of the current power level sweep range in dBm or mV are displayed in this area.
- **Modulation Status Areas**—When Option 13 is installed, the pulse modulation area displays On or Off to indicate the status of external pulse modulation for the current setup.



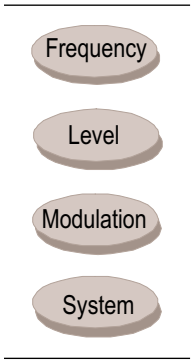
Menu Labels
Each of the menu soft-keys, located below and to the right of the display, has a corresponding menu label area on the display. These labels identify the function of the soft-keys for the current menu display. In most cases, when a menu soft-key is pressed, its menu label changes appearance to visually show the On/Off condition.

Window Display
A window display that overlays a portion of the current menu display is used to (1) show the parameter being edited; (2) display selection lists of preset frequencies, power levels, markers, etc.; (3) show the system configuration choices and current selections; or (4) show self-test error messages. A typical window display is shown on the left.

Menu Keys

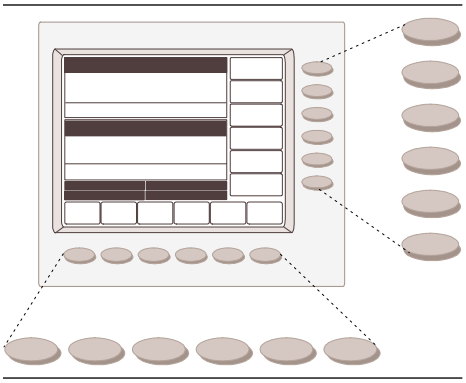
As shown in Figure 3-2, there are two types of menu keys that affect the data display—main menu keys and menu soft-keys. The main menu keys are positioned to the far right of the data display. The menu soft-keys are located next to the data display at the bottom and to the right of the display.

Main Menu Keys
Each of the main menu keys, shown on the left, selects a main (top-level) menu display. These menus let you select the operating mode and configuration of the instrument. Main menu keys are identified throughout this manual by using reverse text, for example: **Frequency**. A brief functional description of each main menu follows.



- **Frequency**—This menu lets you select between CW, Step, Manual, and List Sweep frequency modes.
- **Level**—This menu lets you select power level and ALC modes (Level, Level Sweep, Level Offset, ALC on or off, internal or external ALC, ALC/attenuator decoupling, ALC slope, and user level flatness correction).
- **Modulation**—This menu lets you select external pulse modulation when Option 13 is installed.
- **System**—This menu provides you with access to sub-menus that let you (1) reset the instrument to factory-selected default values; (2) configure the front panel, rear panel, RF, and GPIB; (3) set incremental sizes for editing fre-

quency, power level, and time parameters; (4) save or recall instrument setups; (5) disable front panel data display; (6) perform instrument self-test; and (7) perform reference oscillator calibration.



Menu Soft-Keys

As shown on the left, six menu soft-keys are located below the data display and six menu soft-keys are located to the right of the data display. In general, the menu soft-keys located below the data display select a sub-menu of the current main (top-level) menu display; the menu soft-keys located to the right of the data display either control a function on the current menu display or select an additional sub-menu. Menu labels that identify the current function of each soft-key are shown on the menu display adjacent to the soft-keys. Menu soft-keys are identified throughout this manual by using a gray background, for example: Edit F1.

3-4 Data Entry Area

The value of a selected MG369XA parameter can be changed using the rotary data knob and/or keys of the data entry area. Each element of the data entry area is identified in Figure 3-3 and described in the following paragraphs.

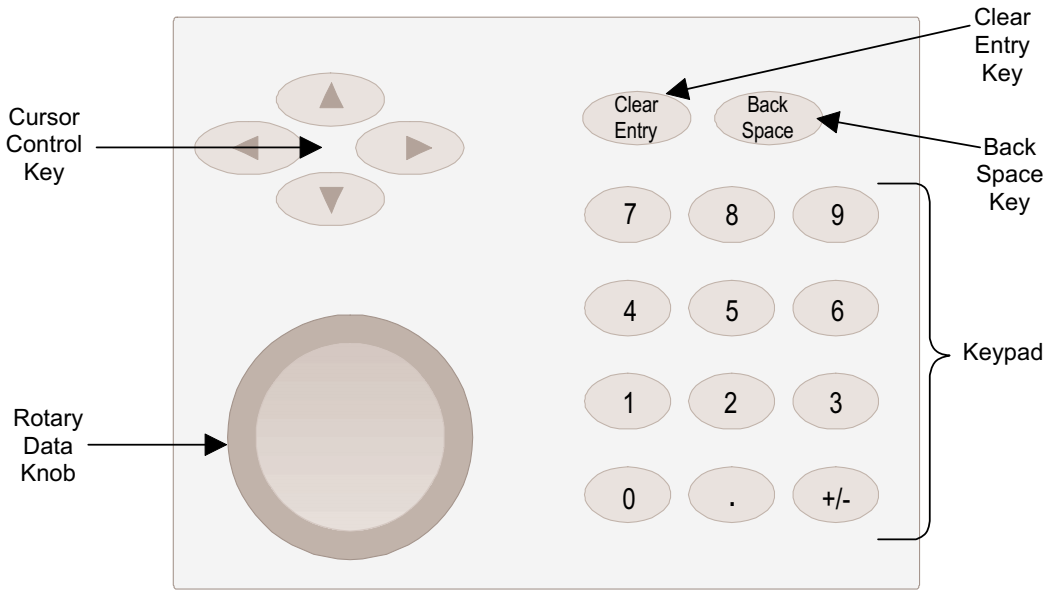


Figure 3-3. *Front Panel Data Entry Area*

Cursor Control Key
In general, this diamond-shaped key controls the movement of the cursor on the display. When a parameter is opened for editing, a cursor appears under the open parameter. Each time the < or > pad is pressed, the cursor moves left or right by one digit. The ∧ or ∨ pad can then be used to increase or decrease the value of the parameter. The unit size of the increase or decrease that occurs each time the ∧ or ∨ pad is pressed is determined by the cursor position.

In addition, when editing frequency, power level, and time parameters, the incremental size can be set to a specific value using the system configuration increment menu (paragraph 3-12). Once set and activated, each time the ∧ or ∨ pad is pressed, the parameter's value increases or decreases by the set amount.

NOTE
The cursor does not appear with increment mode toggled ON. The increment mode is selected via system | config | RF.

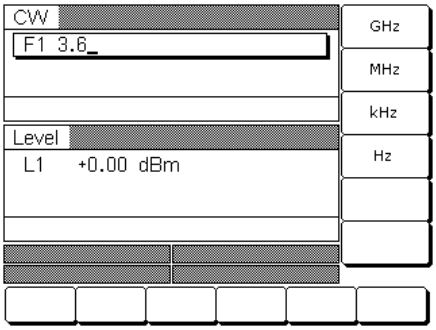
Rotary Data Knob
The *rotary data knob* can be used to change the value of a parameter that is open for editing. The cursor is moved under the open parameter using the < and > pads of the cursor control key. Then, by slowly turning the knob clockwise or counterclockwise the value of the parameter is increased or decreased by the unit size. The unit size is determined by the cursor placement. Turning the knob rapidly changes the value of the parameter in larger steps.

When editing frequency, power level, and time parameters, the incremental size can be set to a specific value using the system configuration increment menu (paragraph 3-12). Once set and activated, each time the knob is turned clockwise or counter-clockwise, the parameter's value increases or decreases by the set amount.

Keypad
The numeric *keypad* provides for entering frequency, power level, time, and number-of-steps parameters and GPIB address values. The "+/–" key functions as a "change sign" key during any keypad entry.

Clear Entry Key
When a parameter is open for editing, the *clear entry key* is used to clear the parameter entry.

Back Space Key
The *back space key* is used to correct keypad data entry errors by deleting the last number, "–", or decimal point entered.



Termination Soft-Keys
Termination soft-keys are used to terminate keypad data entries and change the parameter values in memory. As shown on the left, termination soft-keys are located on the right side of the menu display. If the entered value is outside the allowable range of the open parameter, an error message will be displayed along with an audible "beep". The frequency, time, and power level termination soft-keys are:

GHz / MHz / KHz / Hz
Sec / ms / μs / ns
dB / dBm (in log power level mode)
V / mV / μV (in linear power level mode)

3-5 Instrument Start-Up

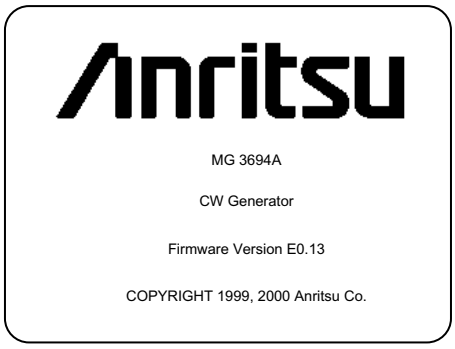
Now that you have familiarized yourself with the layout of the CW generator's front panel controls and data display, you are ready to begin operating the instrument. Begin by powering it up.

Powering Up the MG369XA

Connect the MG369XA to an ac power source by following the procedure in the Installation chapter. This automatically places the instrument in operation (front panel OPERATE LED on).

Start-Up Display

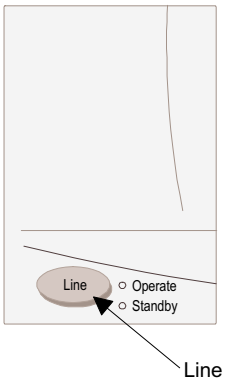
During power up, the message **`Please Wait... LOADING PROGRAMS`** appears on the data display. When all programs have been loaded, the start-up screen (below) is displayed. It provides you with the model number of the CW generator and the revision level of the installed firmware.



The MG369XA then returns to the exact configuration it was in when last turned off.

Standby Operation

Whenever the CW generator is not being used, it should be left connected to the power source and placed in standby. Standby operation provides power to keep the internal time base at operating temperature. This assures specified frequency accuracy and stability when the MG369XA is placed in operation.



NOTE

During standby operation, the fans run continuously at low speed.

Press LINE(for ½ second min) to switch from OPERATE (green LED on) to STANDBY (orange LED).

NOTE

When switching to operate from standby, allow at least a *30-minute warmup* before beginning CW generator operations.

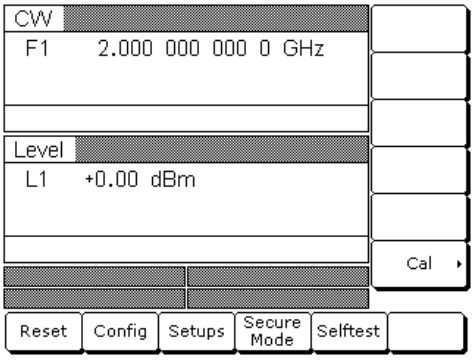
Self-Testing the MG369XA

The MG369XA firmware includes internal diagnostics that self-test the instrument. These self-test diagnostics perform a brief go/no-go test of most of the PCBs and other internal assemblies. If the CW generator fails self-test, an error message is displayed on the data display. Error messages and descriptions are listed in the Operator Maintenance chapter of this manual.

CAUTION

During self-test with RF OUTPUT set to ON, the output power level is set to 0 dBm. Always disconnect sensitive equipment from the unit before performing self-test.

You can perform a self-test of the CW generator at any time during normal operation. To perform a self-test from any menu, press **System**. Then, when the System Menu (shown below) is displayed, press Self-test.



Resetting to Default Parameters

You can reset the MG369XA to the factory-selected default parameter values at any time during normal operation. Table 3-1, page 3-16, lists the default parameters for all MG369XA models.

NOTE

Resetting the instrument clears the current setup parameters. If these parameter values are needed for future testing, save them as a stored setup before resetting the CW generator. (For information on saving/recalling instrument setups, refer to paragraph 3-13.)

To reset the CW generator, press **System**. When the System Menu (above) is displayed, press Reset.

Table 3-1. *Reset (Default) Parameters*

MODEL NUMBER	FREQUENCY PARAMETERS (GHz)																				
	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	ΔF
MG3691A	3.5	2.0*	8.4	2.0*	5.0	8.0	8.4	8.4	8.4	8.4	3.5	2.0*	8.4	2.0*	5.0	8.0	8.4	8.4	8.4	8.4	1.0
MG3692A	3.5	2.0*	20.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	3.5	2.0*	20.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	1.0
MG3693A	3.5	2.0*	30.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	3.5	2.0*	30.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	1.0
MG3694A	3.5	2.0*	40.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	3.5	2.0*	40.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	1.0
MG3695A	3.5	2.0*	50.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	3.5	2.0*	50.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	1.0
MG3696A	3.5	2.0*	65.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	3.5	2.0*	65.0	2.0*	5.0	8.0	11.0	14.0	17.0	20.0	1.0

** Units with option 4, replace 2.0 GHz with 2.2 GHz*

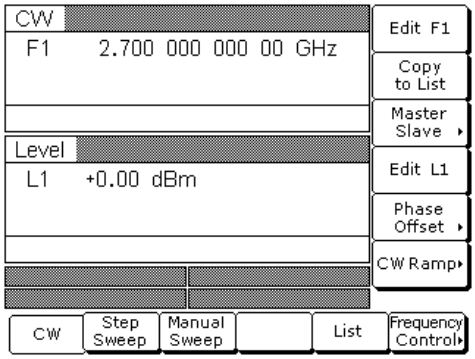
MODEL NUMBER	POWER LEVEL PARAMETERS (dBm)									
	L0	L1	L2	L3	L4	L5	L6	L7	L8	L9
MG3691A	+1.0	0.0	–1.0	–2.0	–3.0	–4.0	–5.0	–6.0	–7.0	–8.0
MG3692A	+1.0	0.0	–1.0	–2.0	–3.0	–4.0	–5.0	–6.0	–7.0	–8.0
MG36943	+1.0	0.0	–1.0	–2.0	–3.0	–4.0	–5.0	–6.0	–7.0	–8.0
MG3694A	+1.0	0.0	–1.0	–2.0	–3.0	–4.0	–5.0	–6.0	–7.0	–8.0
MG3695A	+1.0	0.0	–1.0	–2.0	–3.0	–4.0	–5.0	–6.0	–7.0	–8.0
MG3696A	+1.0	0.0	–1.0	–2.0	–3.0	–4.0	–5.0	–6.0	–7.0	–8.0

MODEL NUMBER	SWEEP TIME	STEP SWEEP		LEVEL SWEEP		LEVEL OFFSET
		DWELL TIME	NUMBER OF STEPS	DWELL TIME	NUMBER OF STEPS	
MG3691A	50 ms	1 ms	50	50 ms	50	0.0 dB
MG3692A	50 ms	1 ms	50	50 ms	50	0.0 dB
MG3693A	50 ms	1 ms	50	50 ms	50	0.0 dB
MG3694A	50 ms	1 ms	50	50 ms	50	0.0 dB
MG3695A	50 ms	1 ms	50	50 ms	50	0.0 dB
MG3696A	50 ms	1 ms	50	50 ms	50	0.0 dB

3-6 Entering Data

Before proceeding to the various modes of CW generator operation, you need to know how to enter data from the front panel. Entering data refers to changing a parameter's value by editing its current value or entering a new value to replace the current value. The following instructions describe how to (1) open a parameter, (2) edit its current value, and (3) enter a new value.

A typical MG369XA menu display (below) is used throughout the data entry instructions. At this menu display, you can edit both the CW frequency and the output power level parameters.

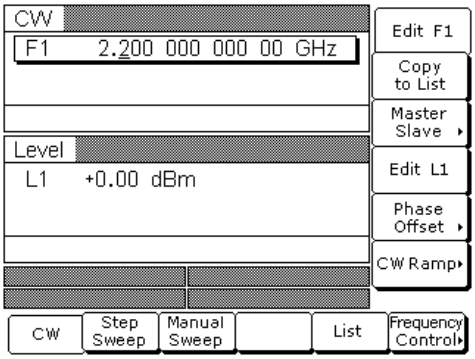


If you wish to follow along on your MG369XA, you can obtain this same menu display by resetting your instrument (press **System**, then press Reset).

Opening the Parameter

In order for the value of a parameter to be changed, the parameter must first be opened.

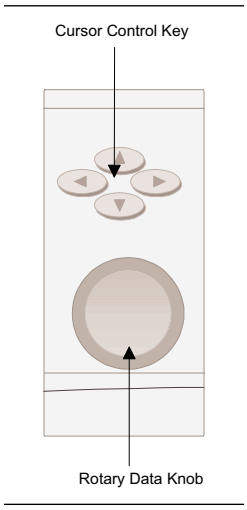
To open the frequency parameter from the above menu, press Edit F1. The menu display now changes to show that the menu soft-key Edit F1 has been pressed and that the frequency parameter has been opened. An open parameter is indicated by placing it in a window with a movable cursor under its digits.



Only one parameter can be open at a time. If you press Edit L1, then the frequency parameter will close and the power level parameter will open.

Editing the Current Value

To change the current value of a parameter by editing, you can use either the cursor control key or the rotary data knob.



Using the Cursor Control Key

Using the < and > pads of the cursor control key, move the cursor under the digit where you want to begin editing. Then increase or decrease the value of the parameter using the ∧ or ∨ pad of the cursor control key. The unit size of the increase or decrease that occurs each time the ∧ or ∨ pad is pressed is determined by the cursor position.

Using the Rotary Data Knob

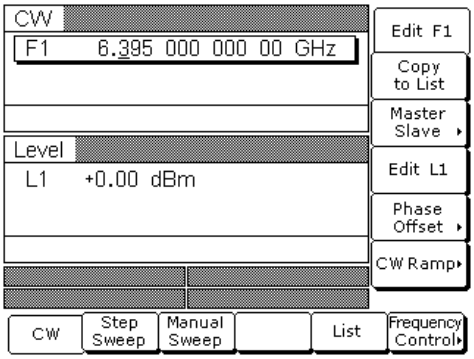
You can also increase or decrease the value of the parameter using the rotary data knob. Once you have positioned the cursor under the digit where you want to begin editing, slowly turn the knob clockwise or counter-clockwise to increase or decrease the value of the parameter by the unit size. Turning the knob rapidly changes the value of the parameter in larger steps.

Using a Set Increment

When editing frequency, power level, and time parameters, you can increase or decrease the parameter's value by a set amount each time the ∧ or ∨ pad is pressed or the rotary data knob is turned clockwise or counter-clockwise. For instructions on setting the increment size, refer to paragraph 3-12.

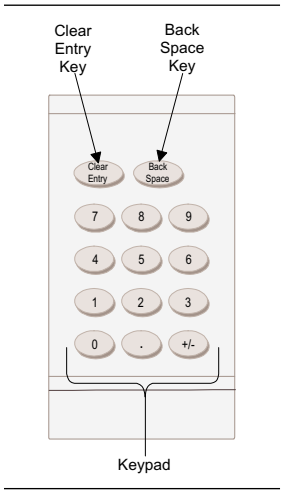
Now, try changing the current value of the CW frequency displayed on your instrument from 2.0 GHz to 6.395 GHz. Use both the cursor control keys ∧ and ∨ pads and the rotary data knob to make the value changes. When you are finished, your menu display should look like the example on the following page.

To close the open parameter when you are finished editing, press Edit F1 or make another menu selection.



Entering a New Value

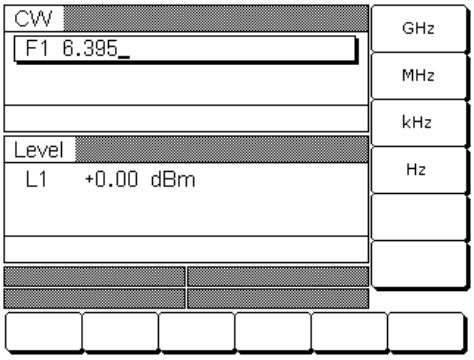
To change the current value of a parameter by entering a new value for the parameter, use the data entry keypad and termination keys.



As soon as you press one of the keys on the data entry keypad, the current parameter display clears for entry of a new value. Enter the new value for the parameter, then press the appropriate terminator soft-key to store it in memory. If the entered value is outside the allowable range of the open parameter, the entry is not accepted and the previous value for the parameter is displayed.

If you make an error during data entry, either (1) press Back Space to delete the entry one character at a time starting from the last character entered, or (2) delete the entire entry by pressing Clear Entry. Then, re-enter the correct value.

Now, try entering a new value for the CW frequency displayed on your MG369XA using the data entry keypad and termination soft-keys.



To close the open parameter when you are finished entering data, press Edit F1 or make another menu selection.

NOTE

A frequency entry may be terminated in GHz, MHz, KHz, or Hz; however, it is always displayed on the data display in GHz. A time entry may be terminated in Sec, ms, µs, or ns; however, it is always displayed on the data display in Sec.

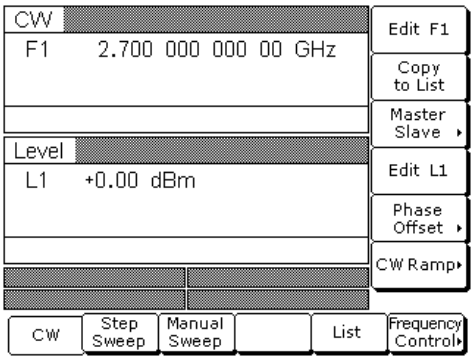
3-7 CW Frequency Operation

One of the CW generator's major functions is to produce discrete CW frequencies across the frequency range of the instrument. The following paragraphs describe how to place the MG369XA in the CW frequency mode, select a CW frequency and power level for output, and activate the CW ramp and Phase Offset menus and functions. Use the CW Frequency Mode menu map (Chapter 4, Figure 4-2) to follow the menu sequences.

Selecting CW Mode

To place the MG369XA in the CW frequency mode, press **Frequency**. At the resulting menu display, press CW. The CW Menu (below) is displayed.

NOTE
When the CW generator is reset, it automatically comes up operating in the CW frequency mode.



This menu lets you perform the following:

- Select a CW frequency for output.
- Copy the current frequency and power level information to the current list index. (Refer to page 3-39 for the list sweep frequency mode operating instructions.)
- Go to the master-slave menu. (Refer to Chapter 7, paragraph 7-2 for Master-Slave mode operating instructions.)
- Select an output power level for the CW frequency.
- Select the Phase Offset menu.
- Select the CW Ramp menu.

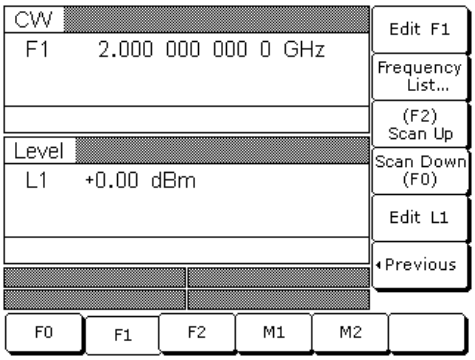
Selecting a CW Frequency

There are several ways to select a CW frequency for output. You can (1) edit the current frequency, (2) enter a new frequency, or (3) select one of the 20 preset frequency parameters.

Editing the Current Frequency
Press Edit F1 [F1] to open the frequency parameter, then edit the current CW frequency using the cursor control key or the rotary data knob. To close the open frequency parameter, press Edit F1 or make another menu selection.

Entering a New Frequency
Press Edit F1 [F1] to open the frequency parameter, then enter the new CW frequency using the keypad and appropriate terminator key. To close the open frequency parameter, press Edit F1 or make another menu selection.

Selecting a Preset Frequency
To select one of the preset frequencies for output, press the soft-key Frequency Control >. The CW Frequency Control Menu, shown below, is displayed.

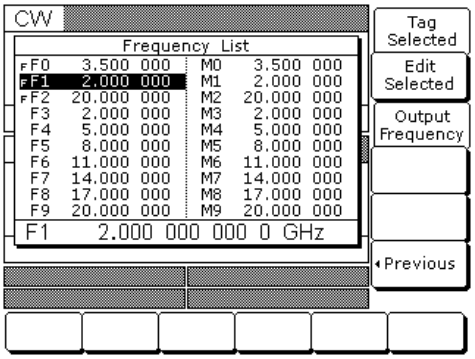


This menu lets you perform the following:

- Select preset frequencies F0 [CF0], F1 [CF1], F2 [CF2], M1 [CM1], or M2 [CM2] for output.
- Edit each preset frequency.
- Go to the Frequency List menu (to tag, edit, or output a frequency from the list).
- Select a tagged frequency from the Frequency List (tagging is described below) for output using the Scan Up or Scan Down keys.
- Select an output power level for the CW frequency.

Press < Previous to return to the CW menu display.

Frequency List–To go to the Frequency List Menu (below), press Frequency List.... This menu lets you tag, edit, or output a frequency from the list.



Use the cursor control key to select a frequency from the frequency list. The selected frequency is highlighted in reverse video and displayed in full below the frequency list.

Press Tag Selected to mark a selected frequency (place an **F** in front of it). If the frequency is already tagged, pressing Tag Selected will untag it (remove the **F**). Tagging selected frequencies lets you quickly switch between them using the scan soft-keys of the CW Frequency Control menu.

Press Edit Selected to edit the selected frequency or enter a new frequency.

Press Output Frequency to output the selected frequency. On the frequency list, the output frequency selection is marked by a black square or, if tagged, an **F** highlighted in reverse video. This frequency is output until you select another frequency from the list and press Output Frequency.

Return to the CW Frequency Control Menu display by pressing < Previous.

Selecting a Power Level

While in the CW frequency mode, you can edit the current CW frequency output power level or enter a new output power level.

Editing the Current Power Level

Press Edit L1 [XL1] to open the power level parameter, then edit the current power level using the cursor control key or rotary data knob. To close the open power level parameter, press Edit L1 or make another menu selection.

Entering a New Power Level

Press Edit L1 [XL1] to open the power level parameter, then enter the new power level using the keypad and appropriate terminator key. To close the open power level parameter, press Edit L1 or make another menu selection.

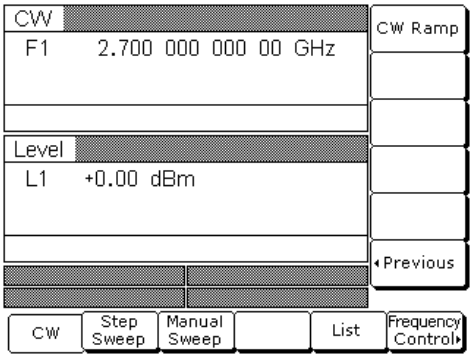
NOTE

You can also select any of the preset power levels or a power level sweep for a CW frequency. For instructions, refer to paragraphs 3-9 (Fixed Power Level Operation) and 3-10 (Power Level Sweep Operation).

CW Ramp

When active, the MG369XA's CW ramp provides a repetitive 0V to 10V ramp output to the rear panel HORIZ OUT BNC connector and AUX I/O connector, pin 1. The CW ramp is used to drive a scalar analyzer display.

To turn on the CW ramp from the CW Menu, press CW Ramp> to go to the CW Ramp display menu (below) and press CW Ramp [CS1].



While the CW ramp is on, the message **CW Ramp** appears on the right side of frequency title bar on all CW menus.

Press CW Ramp [CS0] again to turn the CW ramp off.

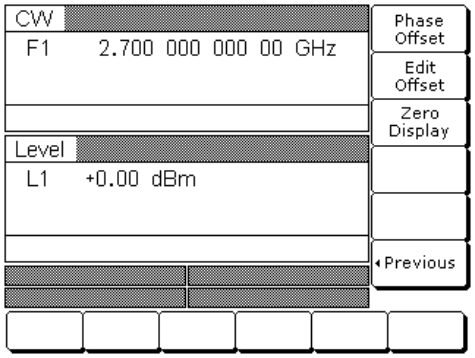
Phase Offset

When active, the MG369XA's RF output will be phase shifted by the specified amount displayed in the phase offset parameter. The phase offset range is -360° to +360° with a resolution of 0.1°.

NOTE

The phase offset is available in CW operating mode only.

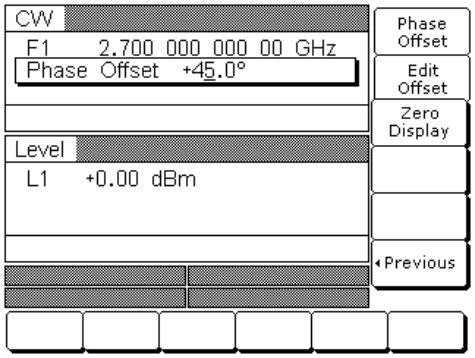
To activate the phase offset from the CW menu, press Phase Offset> to go to the Phase Offset display menu (below) and press Phase Offset [PS1].



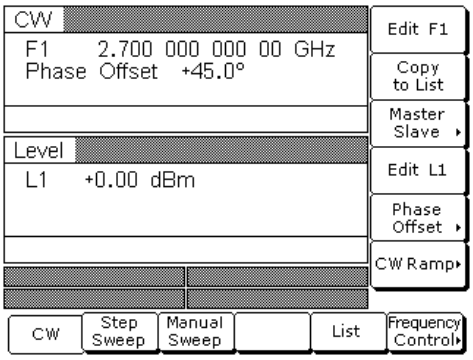
To turn off the phase offset, press Phase Offset. [PS0] from the phase offset menu.

To edit the phase offset value, press Edit Offset [PSO] button from the phase offset menu (below), then use the cursor keys or rotary knob to edit the phase offset.

To enter a new phase offset value, press Edit Offset [PSO] button from the phase offset menu (below), then use the key pad to enter a new phase offset.

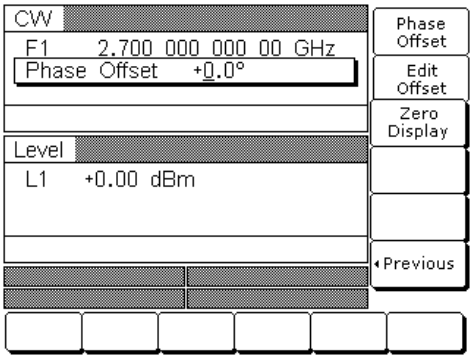


While the phase offset is on, the phase offset value is displayed in the CW menu (below).



The phase offset value may be zeroed. This allows the user to normalize the phase offset display as appropriate.

To zero the phase offset display from the phase offset menu, press Zero Display [PSZ] (below).



NOTE

Adjusting the phase offset zero display does not affect the phase shift of the RF output.

3-8 Sweep Frequency Operation

The CW generator can generate broad (full range) and narrow band sweeps across the frequency range of the instrument. The MG369XA has three sweep frequency modes—step sweep, manual sweep, and list sweep. Descriptions and operating instructions for the step and manual sweep frequency modes begin on this page. List sweep frequency mode descriptions and operating instructions begin on page 3-39. Use the Step Sweep, Manual Sweep, and List Sweep Frequency Mode menu maps (Chapter 4, Figures 4-3, 4-4, and 4-5) to follow the menu sequences.

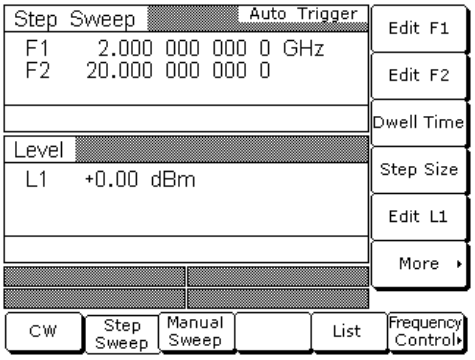
Step Sweep Mode

In step sweep frequency mode, the output frequency changes in discrete, synthesized steps between selected start and stop frequencies. Step sweeps can be from a low frequency to a high frequency and from a high frequency to a low frequency. Step sweeps can be selected to be linear or logarithmic. Sweep width can be set from 0.01 Hz to the full frequency range of the instrument.

The step size or number of steps between the sweep start and stop frequencies, the dwell-time-per-step, the sweep time, and the type of step sweep (linear or logarithmic) and sweep trigger are controllable from step sweep menus.

Selecting Step Sweep Mode

To place the MG369XA in step sweep frequency mode, press **Frequency**. At the resulting menu display, press Step Sweep [SSP]. The Step Sweep Menu (below) is then displayed.



This menu lets you perform the following:

- Select a sweep range (edit the sweep start and stop frequency parameters).
- Set the dwell-time-per-step.
- Set the step size.
- Select an output power level for the sweep.
- Go to the additional step sweep menu (set the sweep time, set the number of steps, select log

or linear sweep, select a sweep trigger, and go to the alternate sweep menu).

Setting Step Size, Dwell Time, and Sweep Time

In linear step sweep the sweep is linearly incremented (or decremented) by the step size from the start frequency to the stop frequency. There are two ways to set the size of each step of the linear step sweep—set the step size or set the number of steps. The step size range is 0.01 Hz to the full frequency range of the instrument; the number of steps range is 1 to 10,000. If the step size does not divide into the frequency range, the last step is truncated.

In logarithmic step sweep, step size increases logarithmically with the frequency and is determined by a logarithmic curve fitted between the sweep start and stop frequencies and the number of steps. The number of steps range is 1 to 10,000.

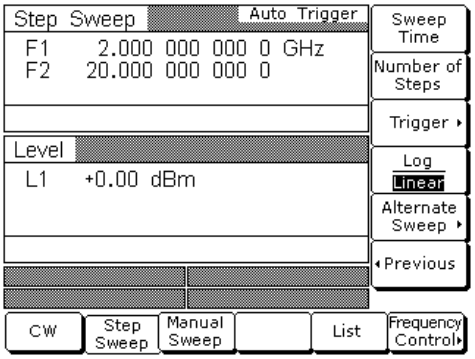
The dwell-time-per-step of the step sweep can be set for any time in the range of 1 ms to 99 sec. When dwell-time-per-step and step size or number of steps is set, the sweep time equals dwell-time-per-step times the number of steps plus the total phase-locking time for all step frequencies. If sweep time is set, then dwell-time-per-step is the result of the sweep time divided by the number of steps. In this case, the resultant minimum dwell time must be ≥10 ms to allow for phase-locking of each step frequency. The sweep time of the step sweep can be set for any time in the range of 20 ms to 99 sec.

Press Dwell Time [SDT] to open the dwell time-per-step parameter.

Press Step Size to open the step size parameter.

Open the parameter you wish to change, then edit the current value using the cursor control key or the rotary data knob or enter a new value using the key pad and appropriate termination soft-key. When you have finished setting the open parameter, close it by pressing its menu soft-key or make another menu selection.

Press More > to go to the Additional Step Sweep Menu (following page).



This menu lets you perform the following:

- Set the sweep time.
- Set the number of steps.
- Select a sweep trigger.
- Select log or linear sweep.
- Go to the alternate sweep menu.

Press Sweep Time [SWT] to open the sweep time parameter.

Press Num of Steps [SNS] to open the number of steps parameter.

Open the parameter you wish to change, then edit the current value using the cursor control key or the rotary data knob or enter a new value using the key pad and appropriate termination soft-key. When you have finished setting the open parameter, close it by pressing its menu soft-key or make another menu selection.

Press Log/Linear [LGS/LIS] to select logarithmic or linear step sweep operation. The soft-key label is highlighted (in reverse video) to reflect your selection.

Press Trigger > to go to the Step Sweep Trigger menu. The trigger menu lets you select a sweep trigger.

Press < Previous to return to the Step Sweep Menu display.

RANGE

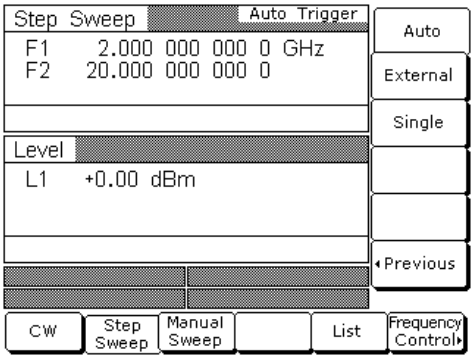
This error message is displayed when (1) the step size value entered is greater than the sweep range, (2) the number of steps entered results in a step size of less than 0.01 Hz, or (3) the sweep time entered divided by the number of steps entered results in a dwell time of <10 ms. Entering valid values will clear the error.

Selecting a Sweep Trigger

There are three modes of sweep triggering for step frequency sweep—automatic, external, and single. The sweep trigger is selectable from the trigger menu. The following is a description of each mode.

- **Auto (Automatic)**–The sweep continually sweeps from its start frequency to its stop frequency with optimal retrace time.
- **External**–The sweep recurs when triggered by an external TTL-compatible clock pulse to the rear panel AUX I/O connector.
- **Single**–A single sweep starts when the trigger key is pressed. If a sweep is in progress when the key is pressed, it aborts and resets.

To go to the Step Sweep Trigger Menu (below) from the Additional Step Sweep Ramp Menu, press Trigger >.



To select a sweep trigger mode, press its menu soft-key.

- Press Auto [AUT] to select automatic triggering.
- Press External [HWT] to select external triggering.
- Press Single [EXT] to select single sweep triggering.

A message showing the sweep trigger mode selected appears on the right side of frequency title bar.

If you select the single sweep trigger mode, the menu display adds the menu soft-key Trigger. Pressing Trigger [TRG *or* TRS] starts a single sweep. If a single sweep is in progress, pressing Trigger [RSS] causes the sweep to abort and reset.

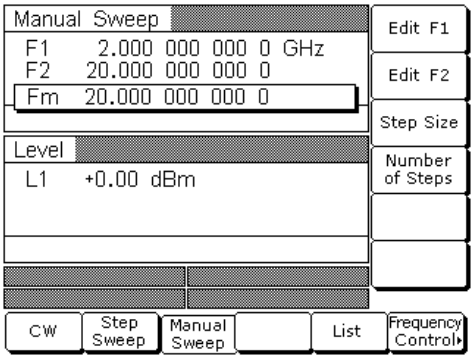
Press < Previous to return to the Additional Step Sweep Menu.

Manual Sweep Mode

In manual sweep frequency mode, the output frequency can be manually tuned in phase-locked steps between the selected start and stop frequencies using the rotary data knob. As the knob is turned, the current output frequency is displayed on the data display as Fm. The step size or number of steps between the start and stop frequencies are controllable from the manual sweep menu. The step size range is 0.01 Hz to the full frequency range of the instrument; the number of steps range is 1 to 10,000.

Selecting Manual Sweep Mode

To place the MG369XA in manual sweep frequency mode, press **Frequency**. At the resulting menu display, press Manual Sweep [MAN]. The Manual Sweep Menu (below) is then displayed.



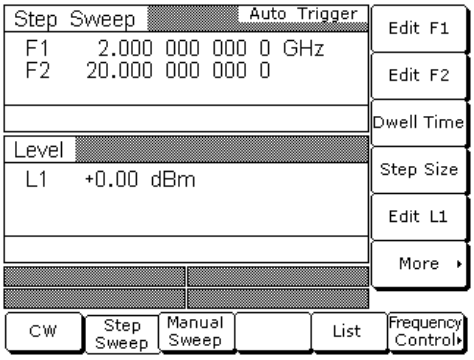
This menu lets you perform the following:

- Select a sweep range (edit the start and stop frequency parameters).
- Set the step size or number of steps (previously described on pages 3-27 and 3-28).

Selecting a Sweep Range

Selecting a sweep range involves choosing a start and a stop frequency for the frequency sweep. The sweep range selection process is identical for both the step and manual sweep frequency modes. There are several ways you can select a sweep range, including:

- Editing the current start and stop frequency parameter values.
- Entering new start and stop frequency parameter values.
- Selecting one of the preset sweep range parameters (F1-F2, F3-F4, F5-dF, or F6-dF).



Editing the Current Start / Stop Frequencies

To edit the current frequency sweep range, open either the start or stop frequency parameter. In the display above, Edit F1 [F1] opens the start frequency parameter; Edit F2 [F2] opens the stop frequency parameter.

Edit the open frequency parameter using the cursor control key or the rotary data knob. When you are finished, close the open parameter by pressing its menu edit soft-key or by making another menu selection.

Entering New Start / Stop Frequencies

To enter a new frequency sweep range, open either the start or stop frequency parameter (press Edit F1 [F1] or Edit F2 [F2]).

Enter a new frequency using the keypad and appropriate termination soft-key. When you are finished, close the open parameter by pressing its menu edit soft-key or by making another menu selection.

RANGE

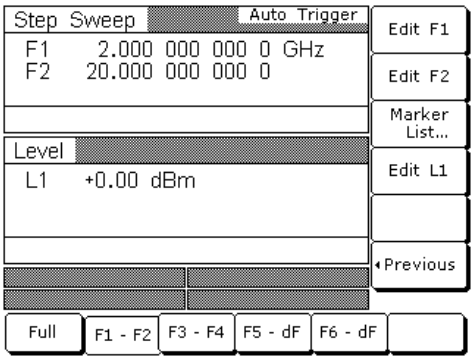
This error message is displayed when the dF value entered results in a sweep outside the range of the MG369XA. Entering a valid value will clear the error.

Selecting a Preset Sweep Range

There are four preset sweep range parameters, selectable in the step sweep and manual sweep frequency modes. The following is a description of each preset sweep range.

- **F1-F2** [SF1] –provides a frequency sweep between the start frequency, F1, and the stop frequency, F2.
- **F3-F4** [SF3]–provides a frequency sweep between the start frequency, F3, and the stop frequency, F4.
- **F5-dF** [DF5]–provides a symmetrical frequency sweep about the center frequency, F5. The sweep width is determined by the dF frequency parameter.
- **F6-dF** [DF6]–provides a symmetrical frequency sweep about the center frequency, F6. The sweep width is determined by the dF frequency parameter.

To select one of the preset sweep ranges from any sweep frequency mode menu, press the soft-key Frequency Control >. The Sweep Frequency Control Menu (below) is displayed.



This menu lets you perform the following:

- Select a full range sweep (Fmin–Fmax) [FUL] or one of the preset sweep ranges for the sweep frequency mode.
- Select the frequency parameters for each preset sweep range.
- Select an output power level for the sweep.
- Go to the marker list menu (described on page 3-34).

Setting a Preset Sweep Range–At the menu, select the sweep range (F1-F2, F3-F4, F5-dF, or F6-dF) that you wish to set. The menu then displays the current frequency parameters for the selected sweep range. Now, use the menu edit soft-keys to open the frequency parameters for editing.

Edit the current frequency parameters or enter new frequency parameter values for the sweep range. To close the open frequency parameter when you are finished, press its menu edit soft-key or make another menu selection.

You can set all the preset sweep ranges in this manner.

Selecting a Power Level

While at the Sweep Frequency Control menu, you can edit the current output power level or enter a new output power level for the frequency sweep.

Editing the Current Power Level
Press Edit L1 [XL1] to open the power level parameter, then edit the current power level using the cursor control key or rotary data knob. To close the open power level parameter, press Edit L1 or make another menu selection.

Entering a New Power Level
Press Edit L1 [XL1] to open the power level parameter, then enter the new power level using the keypad and appropriate termination soft-key. To close the open power level parameter, press Edit L1 or make another menu selection.

NOTE

You can also select any of the preset power levels for a frequency sweep or a power level step for a step sweep. For instructions, refer to paragraphs 3-9 (Fixed Power Level Operation) and 3-10 (Power Level Sweep Operation).

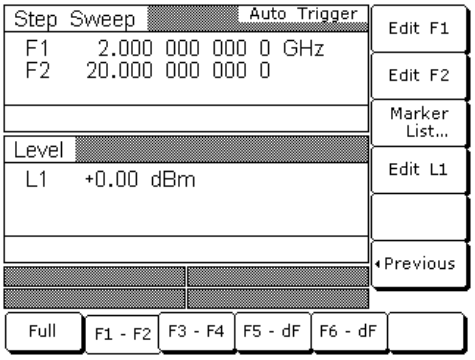
Frequency Markers

The CW generator provides up to 20 independent, pre-settable markers, F0-F9 and M0-M9, that can be used in the step sweep frequency mode for precise frequency identification. Marker frequency accuracy is the same as sweep frequency accuracy. The markers are visible on a CRT display.

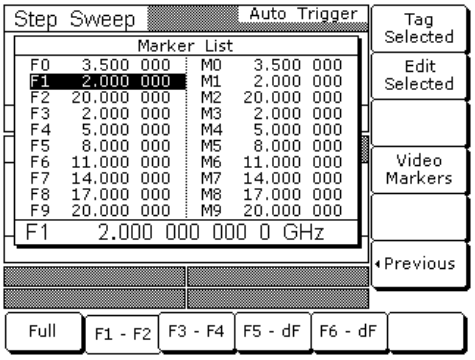
The MG369XA generates video markers that produce a pulse on a CRT display at each marker frequency. The video marker is either a +5V or a –5V pulse at the rear panel AUX I/O connector. Pulse polarity is selectable from a system configuration menu.

To output markers during a sweep you must first select (tag) the marker frequencies from the Marker List menu, then turn on the marker output.

To go to the Marker List menu from a sweep frequency menu, press Frequency Control >. The Sweep Frequency Control Menu (below) is displayed.



Now press the menu soft-key Marker List.... The Marker List Menu (below) is displayed. This menu lets you tag or edit marker list frequencies and turn the markers on/off.



Use the cursor control key to select a frequency parameter from the marker list. The selected frequency parameter is highlighted in reverse video and displayed in full below the marker list.

Editing a Marker List Frequency
If you want to change a selected marker list frequency parameter's value, press Edit Selected to open the frequency parameter, then edit the current frequency or enter a new frequency.

Tagging a Marker List Frequency
Only frequencies on the marker list that have been tagged can be output as markers during a sweep. Press Tag to tag a selected frequency parameter (place an **m** in front of it). If a frequency parameter is already tagged, pressing Tag will untag it (remove the **m**).

Activating Markers
Press Video Markers [VM1] to output the tagged marker frequencies as video markers during a step sweep. Video markers will be displayed on the CRT for all tagged marker frequencies that are within the sweep frequency range.

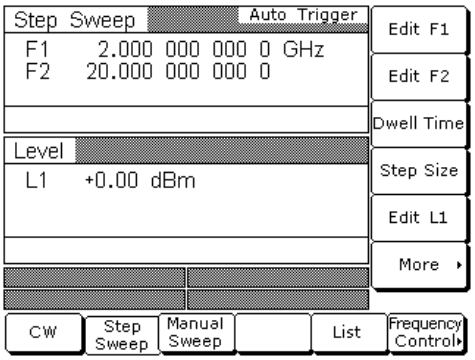
To turn the markers off, press Video Markers [MK0] again.

Press < Previous to return to the Sweep Frequency Control Menu display.

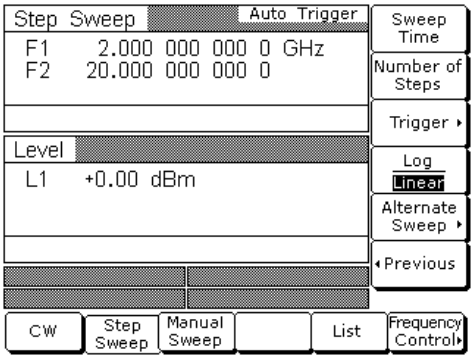
Selecting Alternate Sweep Mode

In alternate sweep frequency mode, the CW generator's output frequency sweeps alternately between any two sweep ranges in step sweep.

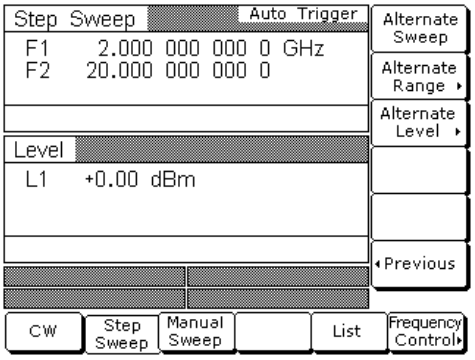
To select the alternate sweep mode, start with the Step Sweep Menu display (below).



Press More > to go to the Additional Step Sweep Menu display (below).



Press Alternate Sweep > to go to the Alternate Sweep Menu display (below).



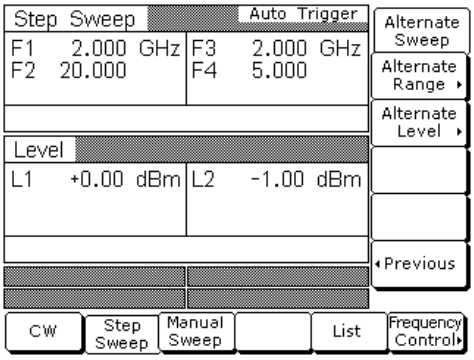
This menu lets you perform the following:

- Turn the alternate sweep mode on/off.
- Go to the alternate range menu to select a sweep range for the alternate sweep.
- Go to the alternate level menu to select a power level for the alternate sweep.

Activating the Alternate Sweep

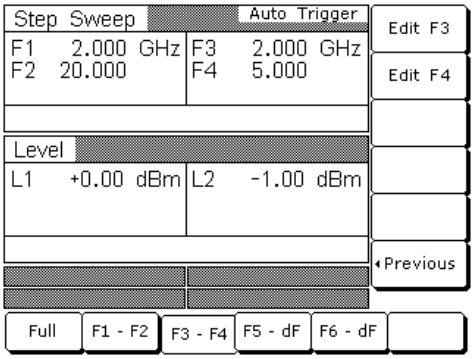
The soft-key Alternate Sweep toggles the alternate sweep mode on and off.

Press Alternate Sweep to turn on the alternate sweep mode. Notice that the Alternate Sweep menu (below) changes to show that the alternate sweep is now active.



Selecting an Alternate Sweep Range

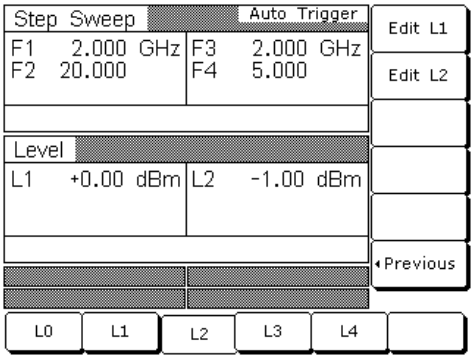
Press Alternate Range > to go to the Alternate Range Menu display (below).



Select the alternate sweep range (Full [AFU], F1-F2 [AF1], F3-F4 [AF3], F5-dF [AD5], or F6-dF [AD6]). The menu then displays the current frequency parameters for the selected sweep range. If you wish to change a frequency parameter, use the menu edit soft-key to open the parameter, then edit it.

When you are done selecting the alternate sweep range, press < Previous to return to the Alternate Sweep Menu display.

Selecting an Alternate Sweep Power Level
Press Alternate Level > to go to the Alternate Level Menu display (below).



Select the power level for the alternate sweep range (L0 [AL0], L1 [AL1], L2 [AL2], L3 [AL3], or L4 [AL4]). The menu then displays the current level parameter for the selected power level. If you wish to change the level, press Edit L2 to open the parameter, then edit it.

The Edit L1 soft-key is provided to let you change the power level of the main sweep.

CAUTION

Performing alternate sweeps using power levels that cross step attenuator switch points can cause excessive wear on the switches and reduce the life expectancy of the step attenuator.

When you are done selecting the power level for the alternate sweep range and editing the power level of the main sweep, press < Previous to return to the Alternate Sweep Menu display.

List Sweep Mode

In list sweep frequency mode, the output is a step sweep of up to 2000 phase-locked, non-sequential frequencies. Each frequency can have a different power level setting. The list index (0 thru 1999) identifies each frequency/power level set in the list. The list sweep is defined by a list start index and list stop index.

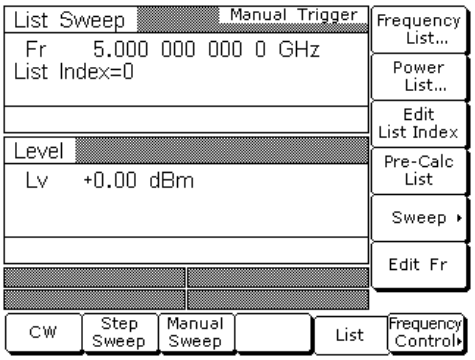
There are four modes of sweep triggering in list sweep—automatic, external, single, and manual. When automatic, external, or single trigger mode is selected, the output sweeps between the specified list start and stop indexes, dwelling at each list index for the specified dwell time. When manual trigger mode is selected, the list start index, list stop index, and dwell time parameter are not used. Instead, the list index is incremented or decremented by using the front panel cursor control key. In manual trigger mode, the list index can also be incremented by using an external trigger input. Each TTL trigger increments the list index by one.

After a reset, the list sweep defaults to manual trigger mode. The data display shows the trigger mode, the list index, current frequency, and current power level. The list index specifies the current location within the list. The current frequency is preceded by the text “Fr”. The current power level is preceded by the text “Lv”. When automatic, external, or single trigger mode is selected, the data display changes to show the trigger mode and list sweep start and stop index values only.

The list of up to 2000 frequency/power level sets is stored in non-volatile RAM to preserve any settings after the instrument is powered off. The list is ***not*** stored with the other setup information in the instrument. After a master reset, the list is reset to its default state of 2000 index entries of 5 GHz at 0 dBm.

Selecting List Sweep Mode

To place the MG369XA in list sweep frequency mode, press **Frequency**. At the resulting menu display, press List [LST]. The List Sweep Menu (below) is displayed.



This menu lets you perform the following:

- Go to the Frequency List menu (edit list index frequency parameters and insert and delete list index entries).
- Go to the Power List menu (edit list index power level parameters and insert and delete list index entries).
- Edit the list index parameter.
- Calculate all list index frequency and power level settings.
- Go to the Sweep menu (set sweep start index, stop index, and dwell time and select a sweep trigger).
- Edit the current list index frequency, Fr.

Editing the List Index

Press Edit List Index [ELI(xxxx)] to open the list index parameter for editing. Edit the current list index value using the cursor control key or rotary data knob or enter a new value using the key pad and termination soft-key. When you have finished setting the open parameter, close it by pressing Edit List Index again or by making another menu selection.

The Edit List Index soft-key is not the only way to change the list index. In the list sweep mode with manual trigger selected, each time the ∧ or ∨ pad of the cursor control key is pressed the list index increments or decrements by one. The Edit List Index soft-key is used if a larger change in the list index is desired. The only time the cursor control key will not change the list index is when a different parameter, such as frequency, power level, etc., is

open. The cursor control key will then change the value of the open parameter. Once the open parameter is closed, the cursor control key will again change the list index.

Performing List Calculations

The Pre-Calc List soft-key [LEA] initiates a process that examines every index in the list and performs all the calculations necessary to set the frequency and power levels. The soft-key does *not* have to be pressed every time the list changes. The instrument will perform the calculations to set the frequency and power levels as it performs the initial list sweep. This causes the initial list sweep to take longer than each subsequent sweep. Using the Pre-Calc List soft-key lets the initial list sweep be as fast as each subsequent sweep. The calculations are stored in volatile RAM and are lost at instrument power-off.

Press Pre-Calc List to perform list calculations. The soft-key image depresses to show that calculations are in progress. When the calculations are completed, the soft-key returns to normal appearance.

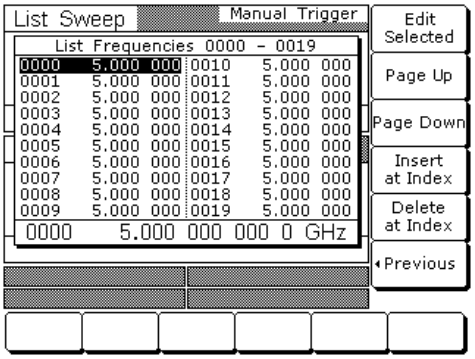
Editing the Current List Index Frequency

Press Edit Fr to open the current list index frequency parameter for editing. Edit the current frequency using the cursor control key or rotary data knob or enter a new value using the key pad and termination soft-key. When you have finished setting the open parameter, close it by pressing Edit Fr again or by making another menu selection.

List Frequency Editing

List frequency editing consists of editing the list index frequency parameters and inserting and deleting list index entries.

At the List Sweep menu, press Frequency List.... The List Frequency Edit Menu (following page) is displayed.



This menu lets you (1) scroll through the list frequencies and edit selected frequencies and (2) insert and delete entries from the list.

The menu displays a total of 20 frequencies. The index range of the displayed frequencies is shown at the top of the list. Use the cursor control key to select a frequency from the list. The selected frequency is highlighted in reverse video and displayed in full below the frequency list.

Press Edit Selected to edit the highlighted frequency or enter a new frequency.

Press Page Up to scroll the displayed frequencies to the previous 20 in the list. Press Page Down to scroll the displayed frequencies to the next 20 in the list.

Press Insert at Index to insert the default frequency (5 GHz) at the current list index.

NOTE

Because the list size is fixed, inserting a new index will cause the last index to be lost. Whatever frequency and power level are at list index 1999 will be deleted and cannot be recovered.

Press Delete at Index to delete the current list index.

NOTE

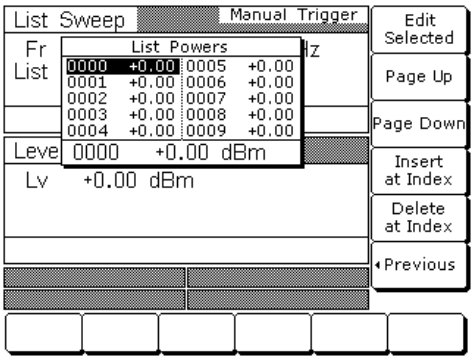
Delete entry cannot be undone. Once a list index is deleted, the only recovery is to re-enter the deleted frequency and power level.

Press < Previous to return to the List Sweep Menu display.

List Power Editing

List power editing consists of editing the list index power level parameters and inserting and deleting list index entries.

At the List Sweep menu, press Power List.... The List Power Edit Menu (below) is displayed.



This menu lets you (1) scroll through the list power levels and edit selected power levels and (2) insert and delete entries from the list.

The menu displays a total of 10 power levels. Use the cursor control key to select a power level from the list. The selected power level is highlighted in reverse video and displayed in full below the power level list.

Press Edit Selected to edit the highlighted power level or enter a new power level.

Press Page Up to scroll the displayed power levels to the previous 10 in the list. Press Page Down to scroll the displayed power levels to the next 10 in the list.

Press Insert at Index to insert the default power level (0 dBm) at the current list index.

NOTE

Because the list size is fixed, inserting a new index will cause the last index to be lost. Whatever frequency and power level are at list index 1999 will be deleted and cannot be recovered.

Press Delete at Index to delete the current list index.

NOTE

Delete entry cannot be undone. Once a list index is deleted, the only recovery is to re-enter the deleted frequency and power level.

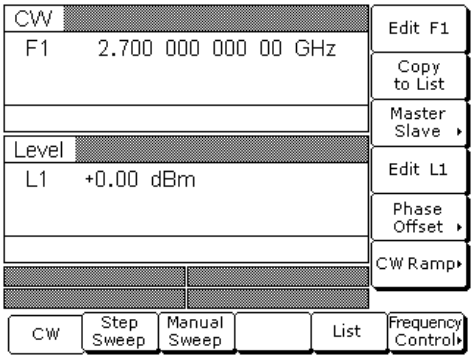
Press < Previous to return to the List Sweep Menu display.

Copying Data from the CW Menu

An easy method of entering frequency and power level information into the current list index is to copy the data from the CW Menu.

First, go to the main List Sweep menu and press the Edit List Index soft-key to open the list index parameter. Then, select the list index that you want the data to be added to.

Next, press the CW soft-key at the bottom of the display. The CW Menu (below) is displayed.



Use the Edit F1 and Edit L1 soft-keys to set the frequency and power level to the values you wish to enter into the current list index.

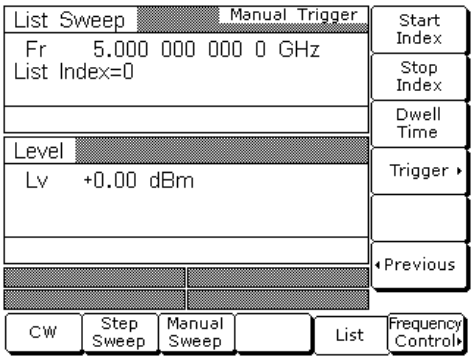
Press the Copy to List soft-key to copy the data to the current list index.

Once the frequency and power level information has been entered into the current list index, the list index is incremented by one.

Selecting a List Sweep Range

Selecting a sweep range involves choosing a start index and a stop index for the list sweep.

To go to the Sweep Menu (below) from the main List Sweep Menu, press Sweep >.



This menu lets you select a list sweep range, set dwell-time-per-step, and go to the trigger menu.

Press Start Index [LIB(xxxx)] to open the list sweep start index parameter.

Press Stop Index [LIE(xxxx)] to open the list sweep stop index parameter.

Press Dwell Time [LDT] to open the dwell-time-per-step parameter.

Open the parameter you wish to change, then edit the current value using the cursor control key or rotary data knob or enter a new value using the key pad and appropriate termination soft-key. When you have finished setting the open parameter, close it by pressing its menu soft-key or by making another menu selection.

To go to the List Sweep Trigger Menu from this menu, press Trigger >. The trigger menu lets you select a sweep trigger.

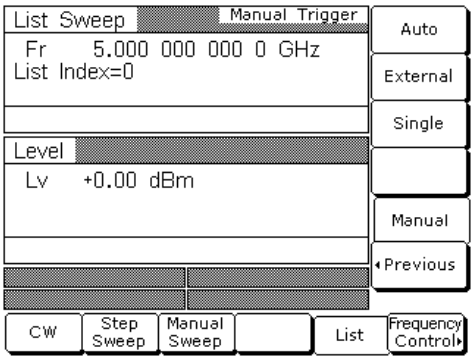
Press < Previous to return to the main List Sweep Menu display.

Selecting a List Sweep Trigger

There are four modes of sweep triggering in list sweep frequency mode, each selectable from the trigger menu. The following is a description of each mode.

- **Auto (Automatic)**–The output sweeps between the specified list start and stop indexes, dwelling at each list index for the specified dwell time.
- **External**–The output sweep recurs when triggered by an external TTL-compatible clock pulse to the rear panel AUX I/O connector.
- **Single (Trig)**–A single output sweep starts when the trigger key is pressed. If a sweep is in progress when the key is pressed, it aborts and resets.
- **Manual**–*(list sweep default trigger mode)* The list index is incremented or decremented by using the front panel cursor control key. The list index can also be incremented using an external trigger input. Each trigger increments the list index by one.

To go to the List Sweep Trigger Menu (below) from the Sweep Menu, press Trigger >.



To select a sweep trigger mode, press its menu softkey.

- Press Auto [AUT] to select automatic triggering.
- Press External [HWT] to select external triggering.
- Press Single [EXT] to select single sweep triggering.
- Press Manual [MNT] to select manual triggering.

A message showing the sweep trigger mode selected appears on the right side of frequency title bar.

If you select the single sweep trigger mode, the menu display adds the menu soft-key Trigger. Pressing Trigger [TRG] starts a single sweep. If a single sweep is in progress, pressing Trigger [RSS] causes the sweep to abort and reset.

Press < Previous to return to the Sweep Menu display.

NOTE

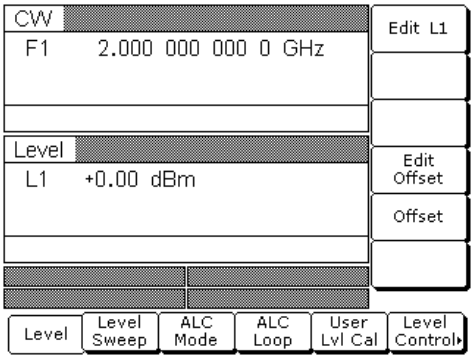
With Auto trigger selected and the dwell-time-per-step set to a small value, display updating slows down. This ensures that the sweep speed is not adversely affected. Because of this potential display update slow down, when leaving List Sweep mode with Auto trigger selected for another mode, Auto trigger is automatically turned off and Manual trigger is selected. Thus, when List Sweep mode is entered, the display updating will be back to normal speed.

3-9 Fixed Power Level Operation

The MG3692A provides main band leveled output power over a maximum range of up to 33 dB (up to 133 dB with option 2) for CW and sweep frequency operations. Instruments with option 15 provide leveled output power over a maximum range of up to 29 dB (up to 134 dB with option 2). The following paragraphs describe how to place the CW generator in fixed (non-swept) power level mode, select a power level for output, select logarithmic or linear units, and activate level offset. Use the Fixed (Non-Swept) Power Level Mode menu map (Chapter 4, Figure 4-6) to follow the menu sequences.

Selecting Fixed Power Level Mode

To place the MG369XA in a fixed power level mode from a CW or sweep (step or manual) frequency menu, press **Level**. At the resulting menu display, press Level. The Level Menu (below) is displayed.



This menu lets you perform the following:

- Edit the power level parameter.
- Edit the level offset parameter.
- Turn level offset on/off.

Selecting a Power Level

There are several ways to select a power level for output. You can (1) edit the current power level, (2) enter a new power level, or (3) select one of the 10 preset power level parameters.

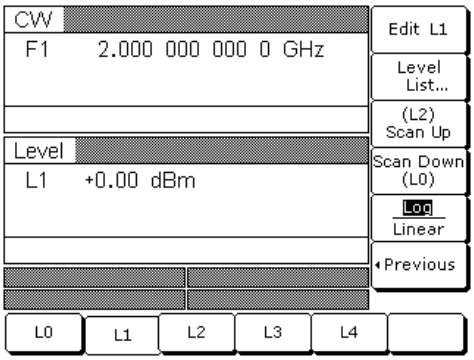
Editing the Current Power Level

Press Edit L1 [XL1] to open the power level parameter, then edit the current power level using the cursor control key or the rotary data knob. To close the open power level parameter, press Edit L1 or make another menu selection.

Entering a New Power Level

Press Edit L1 [XL1] to open the power level parameter, then enter the new power level using the keypad and appropriate termination soft-key. To close the open power level parameter, press Edit L1 or make another menu selection.

Selecting a Preset Power Level
To select one of the preset power levels for output, press Level Control >. The Level Control Menu (below) is displayed.



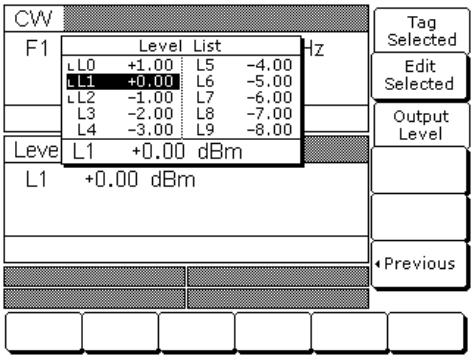
This menu lets you perform the following:

- Select one of the preset power levels L0 [L0], L1 [L1], L2 [L2], L3 [L3], or L4 [L4] for output.
- Edit each preset power level.
- Go to the Level List menu (to tag, edit, or output a power level from the list).
- Select a tagged power level from the Level List (tagging is described below) for output using the Scan Up or Scan Down keys.
- Select Logarithmic or Linear units.

Press Log/Linear [LOG/LIN] to select power level units. When Log is selected, units are dBm; when Linear is selected, units are mV. The soft-key label is highlighted (in reverse video) to reflect your selection.

Press < Previous to return to the Level Menu display.

Level List– To go to the Level List Menu (below), press Level List.... This menu lets you select a power level from the list to tag, edit, or output.



Use the cursor control key to select a power level from the level list. The selected power level is highlighted in reverse video and displayed in full below the level list.

Press Tag Selected to mark the selected power level (place an **L** in front of it). If a power level is already tagged, pressing Tag Selected will untag it (remove the **L**). Tagging selected power levels lets you quickly switch between them using the scan softkeys of the Level Control menu.

Press Edit Selected to edit the selected power level or enter a new power level.

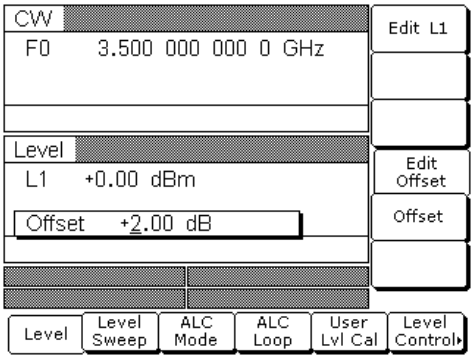
Press Output Level to output the selected level. On the level list, the output power level selection is marked by a black square or, if tagged, an **L** highlighted in reverse video. This power level is output until you select another level from the list and press Output Level.

When you are finished , press < Previous to return to the Level Control Menu display.

Level Offset

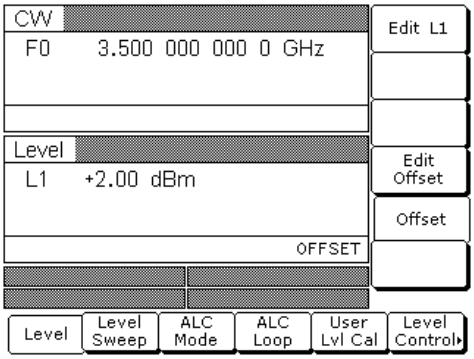
Level offset lets you compensate for a device on the CW generator's output that alters the RF output power level at the point of interest. For example, the power level at the test device may be less or more than the displayed power level because of the loss through an external transmission line or the gain of an amplifier located between the MG369XA RF output and the test device. Using the level offset function, you can apply a constant to the displayed power level that compensates for this loss or gain. The displayed power level will then reflect the actual power level at the test device.

To enter an offset value and apply it to the displayed power level, go to the Level Menu. Then press Edit Offset [LOS]. As shown in the menu on the following page, this opens the offset parameter for editing.



Edit the current offset value using the cursor control key or rotary data knob or enter a new offset value using the keypad and appropriate termination soft-key. To close the open offset parameter when you are done, press Edit Offset or make another menu selection.

Press Offset [LO1] to apply the offset to the displayed power level. In this example, a+2.00 dB offset is applied to L1. L1 then displays a power level of +2.00 dBm.



When Offset is selected ON, the message **OFFSET** is displayed on all menu displays to remind the operator that a constant (offset) has been applied to the displayed power level.

Press Offset [LO0] again to remove the offset from the displayed power level.

3-10 Power Level Sweep Operation

The CW generator provides leveled output power sweeps at CW frequencies and in conjunction with step frequency sweeps. Power level sweeps can be from a high level to a low level or vice versa. Power level sweeps can be selected to be linear or logarithmic. The following paragraphs provide descriptions and operating instructions for the CW power sweep mode and the sweep frequency/step power modes. Use the CW Power Sweep Mode and Sweep Frequency/Step Power Mode menu maps (Chapter 4, Figures 4-7 and 4-8) to follow the menu sequences.

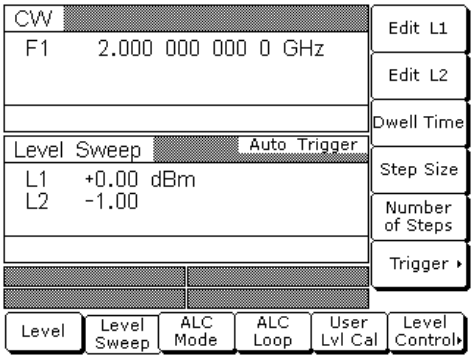
CAUTION

Performing power level sweeps that cross step attenuator switch points can cause excessive wear on the switches and reduce the life expectancy of the step attenuator.

Selecting CW Power Sweep Mode

In the CW power sweep mode, output power steps between any two power levels at a single CW frequency. Available menus let you set or select the sweep range, the step size, the dwell time-per-step, and the type of power sweep (linear or logarithmic) and sweep trigger.

To place the MG369XA in a CW power sweep mode from a CW frequency menu, press **Level**. At the resulting menu display, press Level Sweep. The CW Level Sweep Menu (below) is displayed.



This menu lets you perform the following:

- Select a power level sweep range (edit the sweep start and stop power level parameters).
- Set the dwell time-per-step.
- Set the step size.
- Set the number of steps.
- Go to the trigger menu (select a sweep trigger).

Setting CW Power Sweep Step Size and Dwell Time

There are two ways to set the size of each step of the CW power sweep—set the step size or set the number of steps. The step size range is 0.01 dB (Log) or 0.001 mV (Linear) to the full power range of the CW generator; the number of steps range is 1 to 10,000. The dwell time-per-step of the CW power sweep can be set for any time in the range of 1 ms to 99 sec. If the sweep crosses a step attenuator setting, there will be a sweep dwell of approximately 20 ms to allow setting of the step attenuator.

Press Dwell Time [PDT] to open the dwell time-per-step parameter.

Press Step Size to open the step size parameter.

Press Num of Steps [PNS] to open the number of steps parameter.

Open the parameter you wish to change, then edit the current value using the cursor control key or rotary data knob or enter a new value using the key pad and appropriate termination soft-key. When you have finished setting the open parameter, close it by pressing its menu soft-key or by making another menu selection.

To go to the CW Level Sweep Trigger menu from this menu, press Trigger >.

RANGE

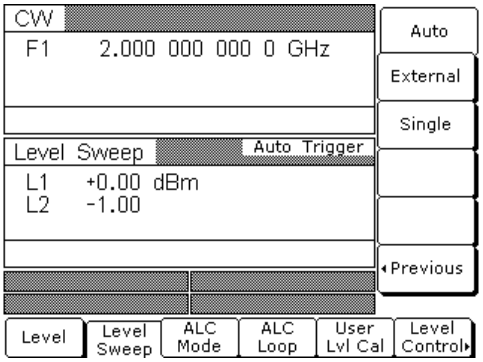
This error message is displayed when (1) the step size value entered is greater than the level sweep range or (2) the number of steps entered results in a step size of less than 0.01 dB (Log) or 0.001 mV (Linear). Entering a valid step size will clear the error.

Selecting a CW Power Sweep Trigger

There are three modes of triggering provided for the CW power sweep—automatic, external, and single. The sweep trigger is selectable from the CW Level Sweep Trigger menu. The following is a description of each trigger mode.

- **Auto (Automatic)**–The CW power sweep continually sweeps from its start power level to its stop power level with optimal retrace time.
- **External**–The CW power sweep recurs when triggered by an external TTL-compatible clock pulse to the rear panel AUX I/O connector.
- **Single**–A single CW power sweep starts when the trigger key is pressed. If a sweep is in progress when the key is pressed, it aborts and resets.

To go to the CW Level Sweep Trigger Menu from the CW Level Sweep Menu, press Trigger >.



To select a CW power sweep trigger mode, press its menu soft-key.

- Press Auto [AUT] to select automatic triggering.
- Press External [HWT] to select external triggering.
- Press Single [EXT] to select single sweep triggering.

A message showing the CW power sweep trigger mode selected appears on the right side of the level mode title bar.

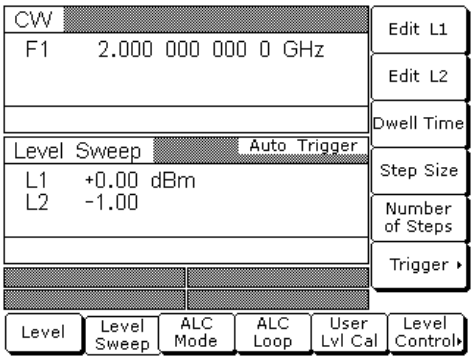
If you select the single sweep trigger mode, the menu display adds the menu soft-key Trigger. Pressing Trigger [TRG *or* TRS] starts a single CW power sweep. If a single CW power sweep is in progress, pressing Trigger [RSS] causes the sweep to abort and reset.

Press < Previous to return to the CW Level Sweep Menu display.

Selecting a Power Level Sweep Range

Selecting a power level sweep range consists of choosing a start and stop level for the power level sweep. The power level sweep range selection process is identical for all power level sweep modes —CW power sweep and step sweep frequency/step power. You can select a power level sweep range as follows:

- Edit the current start and stop power level parameter values.
- Enter new start and stop power level parameter values.
- Select one of the preset power level sweep range parameters (L1-L2, L3-L4, L5-L6, L7-L8, or L9-L0).



Editing the Current Start / Stop Power Levels
To edit the current power level sweep range, open either the start or stop power level parameter. In the display above, Edit L1 [XL1] opens the start power level parameter and Edit L2 [XL2] opens the stop power level parameter.

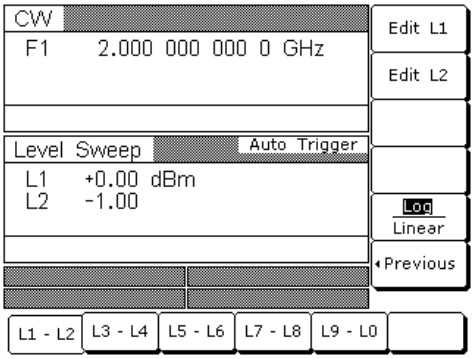
Edit the open power level parameter using the cursor control key or the rotary data knob. When you are finished, close the open parameter by pressing its menu edit soft-key or by making another menu selection.

Entering New Start / Stop Power Levels
To enter a new power level sweep range start by opening either the start or stop power level parameters (press Edit L1 [XL1] or Edit L2 [XL2]).

Enter a new power level using the keypad and appropriate terminator soft-key. When you are finished, close the open parameter by pressing its menu edit soft-key or by making another menu selection.

Selecting a Preset Power Level Sweep Range
There are five preset power level sweep range parameters selectable in the power level sweep modes. These preset power level sweep range parameters are L1-L2, L3-L4, L5-L6, L7-L8, and L9-L0.

To select one of the preset power level sweep ranges from a Level Sweep menu, press the Level Control > soft-key. The Level Sweep Control Menu (below) is displayed.



In addition to letting you select one of the preset sweep ranges for the power level sweep, this menu lets you select logarithmic or linear power level sweep and set the start and stop power level parameters for each preset sweep range.

Setting a Preset Power Level Sweep Range–At the Level Sweep Control menu, select the power level sweep range (L1-L2, L3-L4, L5-L6, L7-L8, or L9-L0) that you wish to set. The menu then displays the current frequency parameters for the selected power level sweep range. Now, use the menu edit soft-keys to open the power level parameters for editing.

Edit the current power level parameter values or enter new power level parameter values for the power level sweep range. To close the open power level parameter when you are finished, press its menu edit soft-key or make another menu selection.

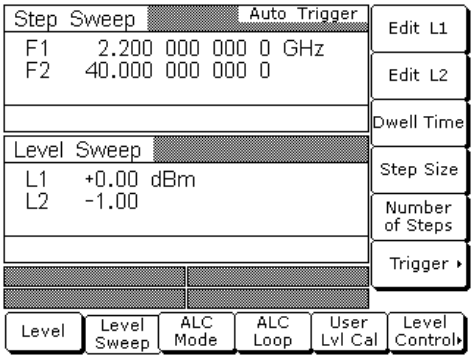
Selecting Type of Power Level Sweep–Press Log/Linear [LOG / LIN] to select logarithmic or linear power level sweep. When Log is selected, power levels are in dBm; when Linear is selected, power levels are in mV. The soft-key label is highlighted (in reverse video) to reflect your selection.

Selecting a Sweep Frequency/Step Power Mode

In step sweep frequency/step power mode, a power level step occurs after each frequency sweep. The power level remains constant for the length of time required to complete each frequency sweep. Available menus let you control the type of power level sweep (linear or logarithmic), the power level sweep range, and the step size.

To select a step sweep frequency/step power mode, start with a step sweep menu display. Then press **Level**.

At the resulting menu display, press Level Sweep. The Level Sweep Menu (below) is displayed.



This menu lets you perform the following:

- Select a power level sweep range (edit the sweep start and stop power level parameters).
- Set the step size.
- Set the number of steps.

NOTE

To select logarithmic or linear power level sweep or to select a power level sweep range, refer to the procedures on pages 3-55 and 3-56.

Setting Power Level Step Size

There are two ways to set the step size of the power level step that occurs after each frequency sweep —set the step size or set the number of steps. The step size range is 0.01 dB (Log) or 0.001 mV (Linear) to the full power range of the CW generator; the number of steps range is 1 to 10,000. The power level step size is set from the Level Sweep Ramp menu.

Press Step Size to open the step size parameter.

Press Num of Steps[PNS] to open the number of steps parameter.

Open the parameter you wish to change, then edit the current value using the cursor control key or rotary data knob or enter a new value using the keypad and appropriate termination soft-key. When you have finished setting the open parameter, close it by pressing its menu soft-key or by making another menu selection.

RANGE

This error message is displayed when (1) the step size value entered is greater than the level sweep range or (2) the number of steps entered results in a step size of less than 0.01 dB (Log) or 0.001 mV (Linear). Entering a valid step size will clear the error.

3-11 Leveling Operations

The MG3692A generates main band leveled output power over a maximum range of up to 33 dB (up to 133 dB with option 2). Instruments with option 15 provide leveled output power over a maximum range of up to 29 dB (up to 134 dB with option 2). An automatic level control (ALC) system controls the amplitude and power level of the RF output. The operator can select the ALC mode of operation—internal, external (detector or power meter), or fixed gain (ALC off). In addition, the CW generator provides a decouple function that allows decoupling of the step attenuator (if equipped) from the ALC system and a user level (flatness correction) calibration function that provides compensation for path-variations-with-frequency in a test setup.

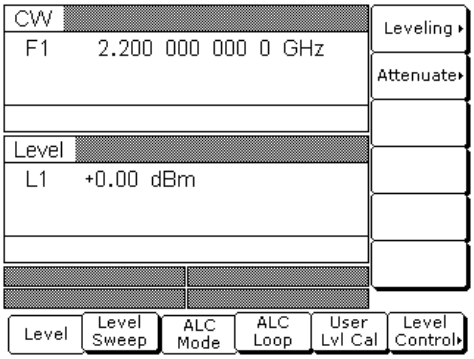
The following paragraphs provide descriptions and operating instructions for the leveling modes and functions. Use the Leveling Modes menu map (Chapter 4, Figure 4-9) to follow the menu sequences.

Selecting a Leveling Mode

The ALC system is a feedback control system, in which the output power is measured at a detector and compared with the expected power level. If the output and desired power levels do not equal, the ALC adjusts the power output until they do. The ALC feedback signal can come from either the internal detector or an external detector or power meter. Alternatively, the output power can be set to a fixed level without using the normal feedback (ALC off). The ALC mode menu lets you make the selection of a leveling mode.

To go to the ALC Mode menu, first press **Level**.

At the Level/ALC Select Menu display, press ALC Mode. The ALC Mode Menu (below) is displayed.

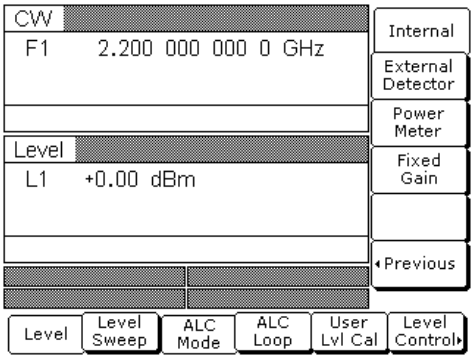


The ALC Mode menu lets you perform the following:

- Go to the leveling menu (select the ALC mode of operation).
- Go to the attenuation menu (decouple the attenuator, if equipped, from the ALC system and set the power level and attenuation).

Internal Leveling
This is the normal (default) leveling mode. Output power is sensed by the internal detector in the MG369XA. The detector output signal is fed back to the ALC circuitry to adjust the output power level. Internal ALC is selected from the leveling menu.

To go to the Leveling Menu from the ALC Mode Menu, press Leveling >. The Leveling Menu (below) is displayed.



To select internal ALC, press Internal [IL1].

Pressing one of the other leveling menu soft-keys External Detector [DL1], Power Meter [PL1], or Fixed Gain [LV0] will turn off internal leveling.

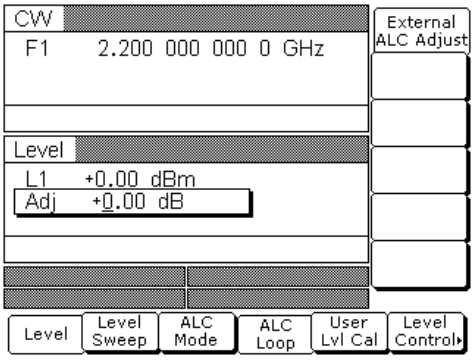
Press < Previous to return to the ALC Mode menu.

External Leveling
In external leveling, the output power from the MG369XA is detected by an external detector or power meter. The signal from the detector or power meter is returned to the ALC circuitry. The ALC adjusts the output power to keep the power level constant at the point of detection. The external ALC source input is selected from the leveling menu.

To select the external ALC input from an external detector, press External Detector [DL1].

To select the external ALC input from a power meter, press Power Meter [PL1].

After you have selected the sensor type, press ALC Loop. The ALC Loop Menu (below) is displayed.



While monitoring the power level at the external detection point, first press Ext ALC Adjust [EGI], then use the cursor control key or rotary data knob to adjust the ALC signal to obtain the set power level.

To return to the Leveling Menu, press ALC Mode then press Leveling >.

At the Leveling menu, pressing either Internal [IL1] or Fixed Gain [LV0] will turn off external leveling.

Press < Previous to return to the ALC Mode Menu display.

Fixed Gain

In the fixed gain mode, the ALC is disabled. The RF Level DAC and step attenuator (if installed) are used to control the relative power level. Power is not detected at any point, and the absolute power level is uncalibrated. Fixed gain mode is selected from the leveling menu.

To select fixed gain mode, go to the Leveling Menu, then press Fixed Gain [LV0].

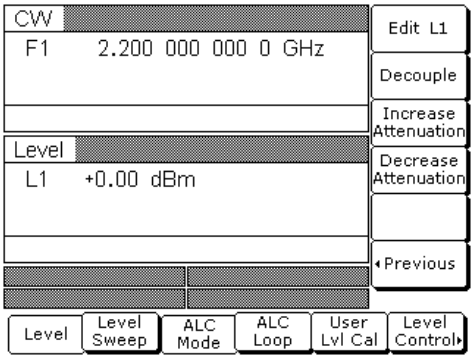
To return to normal ALC operation, press Internal [IL1].

Press < Previous to return to the ALC Mode Menu display.

Attenuator Decoupling

In MG369XAs equipped with option 2 step attenuators, the ALC and attenuator work in conjunction to provide leveled output power down to –140 dBm. In the normal (coupled) leveling mode, when the desired power level is set, the correct combination of ALC level and attenuator setting is determined by the instrument firmware. In some applications, such as receiver sensitivity testing, it is desirable to control the ALC level and attenuator setting separately by decoupling the step attenuator from the ALC. The ALC mode menu lets you select attenuator decoupling.

At the ALC Mode Menu, press Attenuation >. The Attenuator Menu (below) is displayed.



This menu lets you decouple the step attenuator from the ALC, set the power level, and set the attenuation in 10 dB steps.

Press Decouple [AT1] to decouple the step attenuator from the ALC.

NOTE

The set power level may not be maintained when switching between attenuator coupling modes.

Press Edit L1 [XL1] to open the power level parameter for editing. Edit the current level using the cursor control key or rotary data knob or enter a new value using the key pad and appropriate termination soft-key. When you have finished setting the power level, press Edit L1 to close the open parameter.

When decoupled, pressing Increase Attenuation [ATT(xx)] or Decrease Attenuation [ATT(xx)] changes the attenuation in 10 dB steps.

Press Decouple again [AT0] to recouple the step attenuator.

Press < Previous to return to the ALC Mode menu.

User Cal (User Power Level Flatness Calibration)

The User Cal (user power level flatness correction) function lets you compensate for path-variations-with -frequency that are caused by external switching, amplifiers, couplers, mixers, multipliers, dividers, and cables in the test setup. This is done by means of an entered power-offset table from a GPIB power meter or calculated data. When user level flatness correction is activated, the set power level is delivered at the point in the test setup where the calibration was performed. This “flattening” of the test point power level is accomplished by summing a power-offset word (from the power-offset table) with the CW generator's normal power level DAC word at each frequency point.

Up to five user level flatness correction power-offset tables from 2 to 801 frequency points/table can be created and stored in MG369XA memory for recall. The GPIB power meters supported are the Anritsu Models ML2437A, ML2438A, and ML4803A and the Hewlett-Packard Models 437B, 438A, and 70100A.

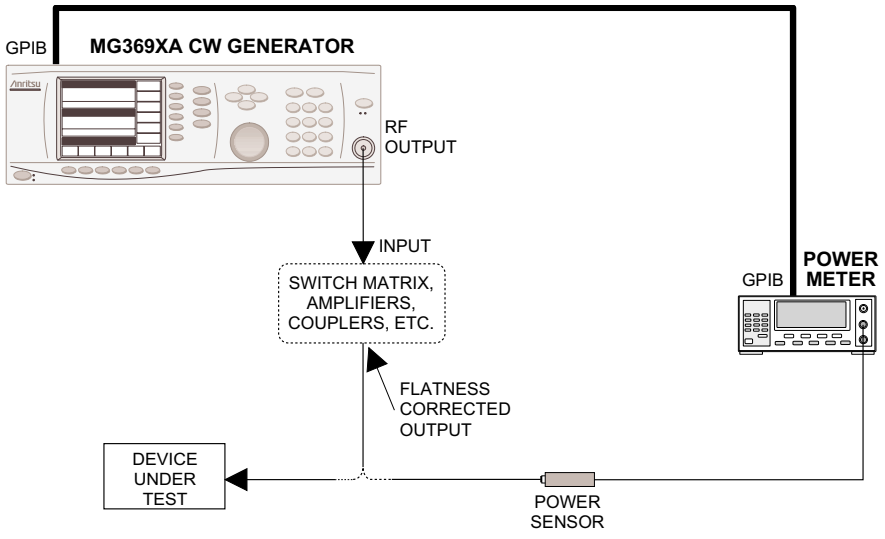


Figure 3-4. *Setup for Creating a Power-Offset Table (User Level Flatness Correction)*

Equipment Setup
To create a power-offset table for user level flatness correction, connect the equipment (shown in Figure 3-4) as follows:

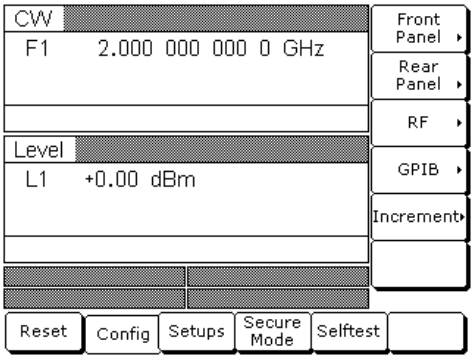
Step 1 Using a GPIB cable, connect the Power Meter to the MG369XA.

Step 2 Calibrate the Power Meter with the Power Sensor.

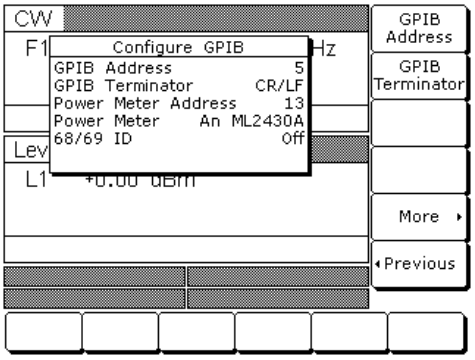
Step 3 Connect the Power Sensor to the point in the test setup where the corrected power level is desired.

Power Meter Model and GPIB Address
In order for the MG369XA to control the power meter, the GPIB address and power meter model must be selected from the Configure GPIB menu.

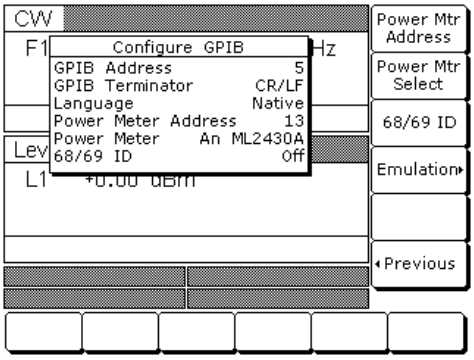
Press **System** to go to the System Menu display. At the System Menu display, press Config. The System Configuration Menu (below) is displayed.



Next, press GPIB >. The Configure GPIB Menu (below) is displayed.



At the Configure GPIB Menu, press More > to go to the Additional Configure GPIB Menu (below).



Press Power Meter Address to change the address of the power meter on the GPIB (the power meter's default address is 13). Enter the new address, between 1 and 30, using the cursor control key or the data entry key pad. The new GPIB address will appear on the display.

Press Power Meter Select to select the power meter model being used. (Supported power meters are the Anritsu ML2437A, ML2438A, and ML4803A and Hewlett-Packard 437B, 438A, and 70100A.)

Press < Previous to return to the main Configure GPIB Menu display.

At the Configure GPIB Menu, press < Previous to return to the System Configuration Menu display.

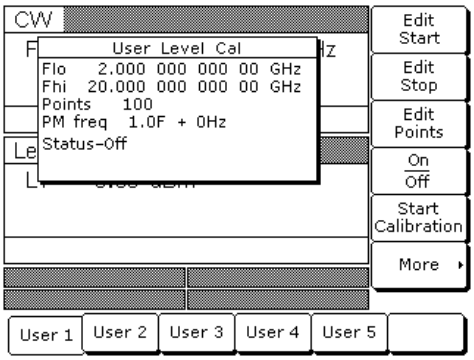
Creating a Power-Offset Table

The MG369XA must be in CW frequency mode and fixed (non-swept) power level mode in order to create a power-offset table for user level flatness correction.

Place the CW generator in CW frequency mode by pressing **Frequency**. At the resulting menu display, press CW. The MG369XA is now in CW frequency mode.

Place the CW generator in a fixed power level mode by pressing **Level**. At the resulting menu display, press Level. The MG369XA is now in fixed (non-swept) power level mode.

At the Level Menu, press User Lvl Cal. The User Level Cal Menu (below) is displayed.



This menu lets you perform the following:

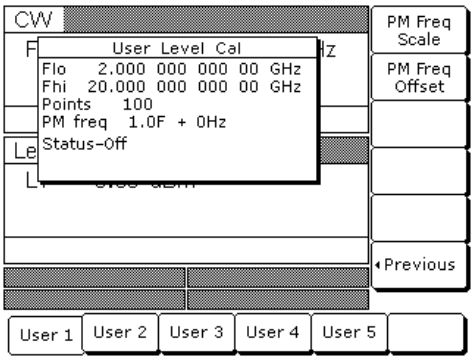
- Create a power-offset table.
- Select a measurement frequency range (edit the start and stop frequency parameters).
- Select the number of points at which correction information is to be taken.
- Apply a power-offset table to the test setup.
- Access the frequency scaling and offset menus.

First, press the menu soft-key to select the power-offset table (User 1, User 2, User 3, User 4, or User 5) that you wish to create.

Next, set the measurement frequency range by pressing Edit Start or Edit Stop to open the start (Flo) or stop (Fhi) frequency parameter for editing. Edit the current frequency using the cursor control key or rotary data knob or enter a new value using the keypad and appropriate termination soft-key. When you have finished setting the open parameter, close it by pressing its menu soft-key or by making another menu selection.

Then, select the number of frequency points at which correction information is to be taken by pressing Edit Points to open the number-of-points parameter for editing. Edit the current number-of- points using the cursor control key or rotary data knob or enter a new value using the keypad and the termination soft-key. (The number-of-points range is 2 to 801.) When you have finished setting the open number-of-points parameter, close it by pressing Edit Points or by making another menu selection.

If any frequency scaling or offset appears at the leveling point, press More > to access the power meter frequency scaling and offset menu below.



Then press PM Freq Scale or PM Freq Offset and edit the frequency scaling or offset value using the cursor, keypad, or rotary knob. The scaling factor range is - 10 to + 10 and the offset frequency range is -150 to +150 GHz. Press < Previous to return to the user level cal menu.

Now, press Start Calibration to begin automatically taking power level correction information at each frequency point. During this process the menu displays the status: Calibrating along with the current measurement frequency point.

NOTE

To terminate the measurement process at any time before completion, press Abort.

Once the power-offset table has been created, it is stored in non-volatile memory. The power-offset table is now ready to be applied to the test setup. Disconnect the Power Sensor and Power Meter from the test setup.

Applying User Level Flatness Correction

Whenever user level flatness correction is applied to the test setup by activating the power-offset table, the set power level is delivered at the point where the calibration was performed.

To activate the selected power-offset table and apply user level flatness correction to the test setup, press On/Off. The User Level Cal menu will display the status: On.

When a power-offset table is selected ON, the message **USER 1...5** is displayed on all menu displays to remind the operator that user level flatness correction has been applied to the ALC.

To turn off the selected power-offset table and remove user level flatness correction from the test setup, press On/Off again. The User Level Cal menu will display the status: Off.

Entering a Power-Offset Table via GPIB
User level flatness correction can be applied to the test setup using a power-offset table created from calculated data and entered via the GPIB. Refer to the MG369XA GPIB Programming Manual (P/N 10370-10354) for information and instructions on creating a power-offset table and entering it via the GPIB.

Erasing the Power-Offset Tables from Memory
The power-offset tables are stored in non-volatile memory. A master reset is required to erase the contents of the tables and reprogram them with default data.

To perform a master reset, proceed as follows:

Step 1 With the MG369XA in standby, press and hold the RF OUTPUT ON/OFF key.

Step 2 Press the LINE OPERATE/STANDBY key to turn the instrument on.

Step 3 When the first menu is displayed (after the start-up display), release the RF OUTPUT ON/OFF key.

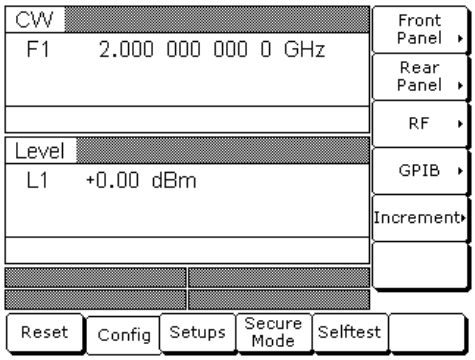
The contents of non-volatile memory have now been erased and reprogrammed with default data.

NOTE
The master reset function overwrites all information stored in the non-volatile memory with default values. This includes the nine stored front panel setups and the table of 2000 frequency/power level sets used for list sweep mode.

3-12 System Configuration

The system configuration function provides menus that let you set or select instrument configuration items; for example, display contrast, polarity of blanking and video marker outputs, RF on or off during retrace or between steps, frequency scaling, GPIB operating parameters, external interface language, and increment sizes for frequency, power level, and time parameters. Use the System Configuration menu map (Chapter 4, Figure 4-10) to follow the menu sequences.

To go to the System Configuration menu, first press **System**. At the System Menu display, press Config. The System Configuration Menu (below) is displayed.

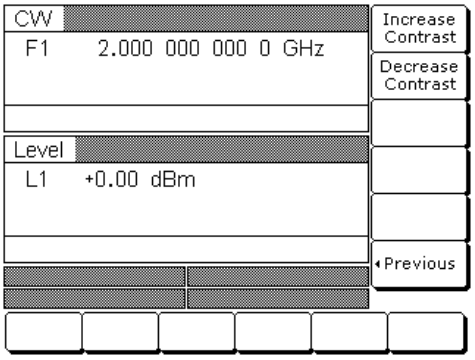


This menu lets you go to the Front Panel, Rear Panel, RF, GPIB, and Increment Configuration menus.

Configuring the Front Panel

Configuring the front panel of the CW generator involves adjusting the display contrast for ease of viewing.

To go to the Configure Front Panel menu from the System Configuration menu, press Front Panel >. The Configure Front Panel Menu (below) is displayed.



Press Increase Contrast (repeatedly) to increase the display contrast to the desired level.

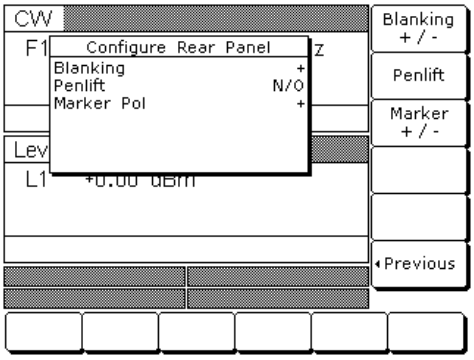
Press Decrease Contrast (repeatedly) to decrease the display contrast.

Press < Previous to return to the System Configuration Menu display.

Configuring the Rear Panel

Configuring the rear panel of the CW generator consists of selecting the polarity of the retrace blanking, bandswitch blanking, retrace penlift, and video marker outputs.

To go to the Configure Rear Panel Menu from the System Configuration Menu, press Rear Panel >. The Configure Rear Panel Menu (below) is displayed.



Press Blanking +/– [BPP/BPN] to select a +5V or –5V level for the retrace and bandswitch blanking outputs. The retrace and bandswitch blanking signal outputs are both available at the rear panel AUX I/O connector (retrace blanking at pin 6; bandswitch blanking at pin 20). The display will reflect your selection.

Press Penlift to select normally-open (N/O) [PPO] or normally-closed (N/C) [PPC] contacts on the internal penlift relay. The penlift relay output, available at the rear panel AUX I/O connector pin 12, is used to lift a plotter pen at bandswitch points, at filter switch points, and during sweep retrace. The display will reflect your selection.

Press Marker +/– to select a +5V or –5V level for the video marker output when video markers are selected ON. The video marker signal output is available at the rear panel AUX I/O connector pin 5. The display will reflect your selection.

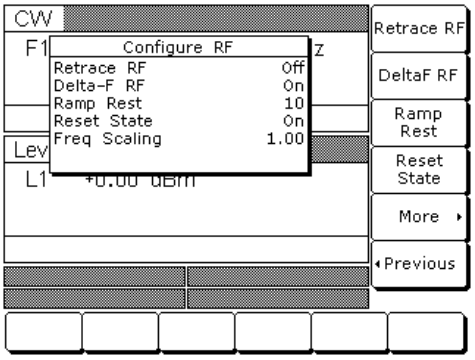
Press < Previous to return to the System Configuration Menu display.

Configuring the RF

Configuring the RF of the MG369XA involves the following:

- Selecting RF on or off during retrace.
- Selecting RF on or off during frequency switching in CW, step sweep, and list sweep modes.
- Selecting whether a sweep triggered by a single or external trigger should rest at the top or bottom of the sweep ramp.
- Selecting RF on or off at reset.
- Setting the reference multiplier value for frequency scaling.
- Selecting 40 dB or 0 dB of attenuation when RF is switched off in units with a step attenuator (Option 2) installed.

To go to the Configure RF Menu (below) from the System Configuration Menu, press RF >.



Press Retrace RF to select RF on [RT1] or off [RT0] during retrace. The display will reflect your selection.

Press Delta-F RF to select RF on [RC1] or off [RC0] during frequency switching in CW, step sweep, and list sweep modes. The display will reflect your selection.

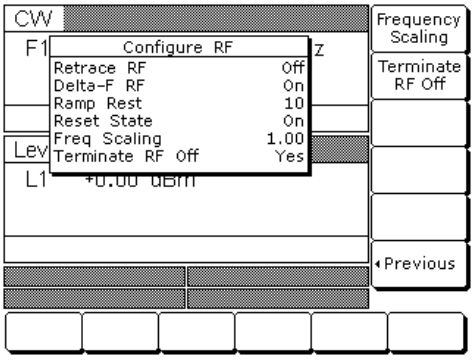
Press Ramp Rest to select 0 or 10 for the ramp rest point for sweeps that are triggered by a single trigger or external trigger. 0 indicates that the sweep will rest at the bottom of the sweep ramp; 10 indicates that the sweep will rest at the top of the sweep ramp. The display will reflect your selection.

Press Reset State to select RF on [RO0] or off [RO1] at reset. The display will reflect your selection.

Press More > to go to the additional Configure RF menu for more selections.

Press < Previous to return to the System Configuration Menu display.

Additional Configure RF Menu
When you press More >, the Additional Configure RF Menu (below) is displayed.



Frequency Scaling – Lets you set a reference multiplier value and apply it to all frequency parameters. The reference multiplier can be any value between 0.1 and 14. Changing the multiplier value changes the entered and displayed frequencies, but does not affect the output of the CW generator.

For example:
Frequency scaling set to 4
CW frequency set to 20 GHz
MG369XA output is 5 GHz (20 GHz ÷ 4)

Press Frequency Scaling [FRS] to open the reference multiplier parameter, then edit the current value using the cursor control key or rotary data knob or enter a new value using the data entry key pad and the terminator soft-key. To close the open multiplier parameter, press Frequency Scaling or make another menu selection.

NOTE
Resetting the MG369XA sets the frequency scaling reference multiplier value to 1.

Press Terminate RF Off [TR1] to select 40 dB (minimum) of attenuation when RF is switched off in units with a step attenuator (Option 2) installed. This provides a better output source match. The display will reflect Yes to indicate the 40 dB of attenuation is applied. Press Terminate RF Off [TR0] again to select 0 dB of attenuation when RF is switched off. The display will reflect No to indicate 0 dB of attenuation is applied.

NOTE
The Terminate RF Off selection is **only** available in those MG369XA models having Option 2 installed.

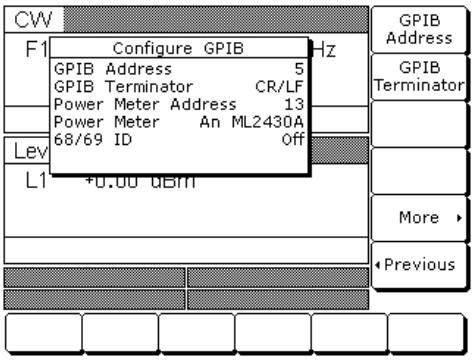
Press < Previous to return to the main Configure RF Menu display.

Configuring the GPIB

The GPIB configuration menus let you perform the following:

- Set the GPIB address and select the GPIB line terminator for the CW generator.
- Select the model and set the GPIB address for the power meter that is used to create a user level flatness correction power-offset table.
- Select scalar mode of operation with a Wiltron Model 562 or Anritsu Model 56100A Scalar Network Analyzer.
- Select scalar mode of operation with a Gigatronics Model 8003, a Hewlett Packard Model 8757D or a Hewlett Packard Model 8757E Scalar Network Analyzer. (Only available in units with Option 13 - External Pulse Modulation installed)

To go to the Configure GPIB Menu from the System Configuration Menu, press GPIB. The Configure GPIB Menu (below) is displayed.



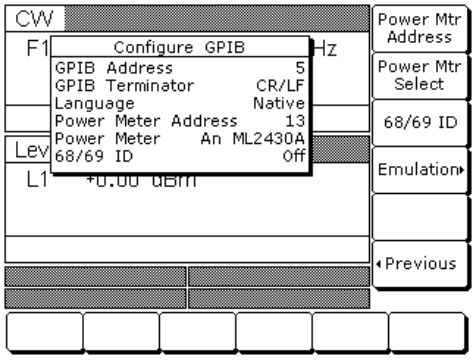
Press GPIB Address [ADD] to change the address of the MG369XA on the bus (the CW default GPIB address is 5). Enter a new address, between 1 and 30, using the cursor control key or the data entry keypad and the terminator key. The new GPIB address will appear on the display.

Press Line Terminator to select a carriage return (CR) or a carriage return and line feed (CR/LF) as the GPIB data delimiter. Consult the GPIB controller's manual to determine which data delimiter is required.

Press More > to go to the Additional Configure GPIB menu for more selections.

Press < Previous to return to the System Configuration Menu display.

First Additional Configure GPIB Menu
When you press More > the First Additional Configure GPIB Menu (below) is displayed.



This menu lets you select the model and set the GPIB address for the power meter that is used to create a user level flatness correction power-offset table. (Refer to page 3-63 for a description of this function.)

Press Power Meter Address to change the address of the power meter on the GPIB (the power meter's default GPIB address is 13). Enter a new address, between 1 and 30, using the cursor control key or the data entry keypad and the terminator soft-key. The new GPIB address will appear on the display.

Press Power Meter Select to select the power meter model being used. (Supported power meters are the Anritsu ML2437A, ML2438A, and ML4803A and Hewlett-Packard 437B, 438A, and 70100A.)

Press 68/69 ID to enable operations with a Wiltron Model 562 or Anritsu Model 56100A Scalar Network Analyzer. (Refer to paragraph 7-2 for procedures.) Press 68/69 ID again to disable the operation.

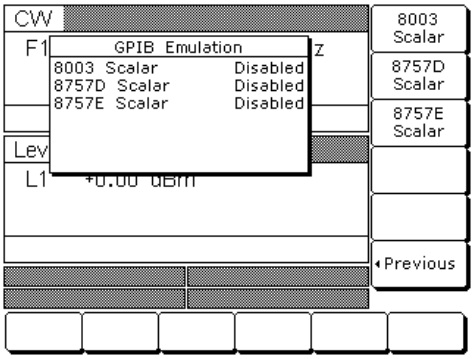
Press Emulation > to go to the Second Additional Configure GPIB menu for more scalar mode of operation choices.

Press < Previous to return to the main Configure GPIB Menu display.

NOTE

The Emulation > selection *only* appears on this menu display in units with Option 13 (External Pulse Modulation) installed.

Second Additional Configure GPIB Menu
When you press Emulation > the Second Additional GPIB Menu (below) is displayed.



Press 8003 Scalar to enable operations with a Giga-tronics Model 8003 Scalar Network Analyzer. Press8003 Scalar again to disable the operation.

Press 8757D Scalar to enable operations with a Hewlett Packard Model 8757D Scalar Network Analyzer. Press 8757D Scalar again to disable the operation.

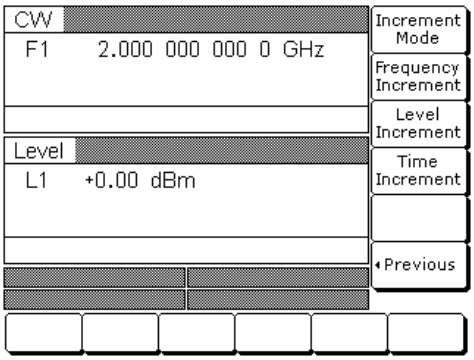
Press 8757E Scalar to enable operations with a Hewlett Packard Model 8757D Scalar Network Analyzer. Press8757E Scalar again to disable the operation.

Press < Previous to return to the First Additional Configure GPIB Menu display.

Setting Increment Sizes

The Increment menu lets you set the incremental size for editing frequency, power level, and time parameters. When the increment mode is selected on, these parameter values will increase or decrease by the set amount each time the ∧ or ∨ pad is pressed or the rotary data knob is turned clockwise or counter-clockwise. The menu also lets you turn the increment mode on and off.

To go to the Increment Menu from the System Configuration Menu, press Increment >. The Increment Menu (below) is displayed.



Press Frequency Increment to open the frequency increment parameter.

Press Level Increment to open the power level increment parameter.

Press Time Increment to open the time increment parameter.

Open the parameter you wish to change, then edit the current value using the cursor control key or rotary data knob or enter a new value using the key pad and appropriate termination key. When you have finished setting the open parameter, close it by pressing its menu soft-key or by making another menu selection.

Press Increment Mode to turn the increment mode on. Press again to turn it off.

Press < Previous to return to the System Configuration Menu display.

3-13 Saving/Recalling Instrument Setups

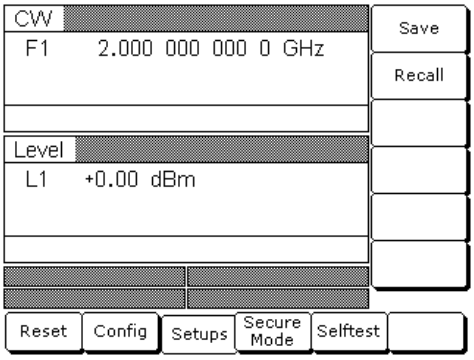
The MG369XA offers the capability to store up to ten complete front panel setups. The setups are numbered 0 through 9. The following paragraphs describe how to save and recall front panel setups.

Saving Setups

Once you have decided that an instrument setup should be retained for future use, follow the procedure below to save it.

First, press **System** to display the System Menu.

Now, press Setups. The Setups Menu (below) is displayed.



Press Save [SSN(M_{1-9})], then enter the desired setup number (between 0 and 9) on the keypad. The setup is now saved.

NOTE

Setup #0 automatically saves the current front panel settings when the instrument is shutdown using the front panel LINE key. Therefore, it is recommended that you use only setups #1 through #9 to save front panel setups.

When MG369XA shutdown occurs because of main power interruptions, the current front panel settings are not saved.

Recalling Setups

To recall a previously saved setup, first access the Setups Menu as described above.

At the Setups Menu, press Recall [RSN(M_{1-9})], then enter the setup number on the keypad.

The MG369XA resets itself to the recalled configuration.

Erasing Stored Setups

The front panel setups are stored in non-volatile memory. A master reset is required to erase the contents of the setups and reprogram them with default data.

To perform a master reset, proceed as follows:

Step 1 With the MG369XA in standby, press and hold the RF OUTPUT ON/OFF key.

Step 2 Press the LINE OPERATE/STANDBY key to turn the instrument on.

Step 3 When the first menu is displayed (after the start-up display), release the RF OUTPUT ON/OFF key.

The contents of non-volatile memory have now been erased and reprogrammed with default data.

NOTE

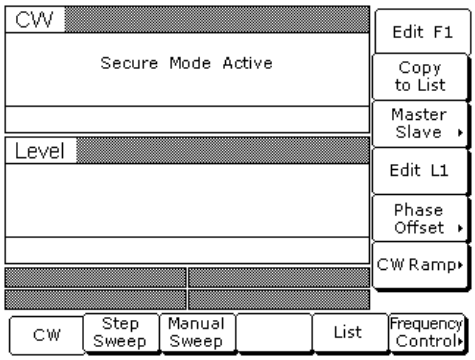
The master reset function overwrites all information stored in the non-volatile memory with default values. This includes the table of 2000 frequency/power level sets used for the list sweep mode and the five power-offset tables used for the user level flatness correction function.

3-14 Secure Operation

The MG369XA can be operated in a secure mode of operation. In this secure mode, the display of all frequency and power level parameters is disabled during both local (front panel) and remote (GPIB) operations. The instrument will continue to function normally in all other respects. The following paragraphs describe how to place the CW generator in secure mode and how to return to normal operation.

To place the MG369XA in the secure mode, first press **System** to display the System Menu.

Next, press Secure [DS0]. This places the CW generator in the secure mode and the Secure Menu (below) is displayed.



NOTE

During secure mode, all main menu keys and menu soft-keys operate normally. The menu soft-key labels are displayed and change with menu selections. Only the parameter display is disabled.

To return the MG369XA to unsecured (normal) operation, press **System**, then press Reset.

3-15 Reference Oscillator Calibration

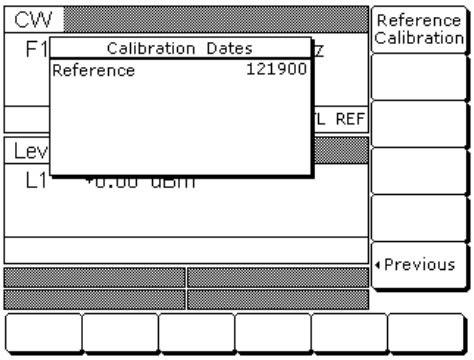
The reference oscillator calibration function lets you calibrate the internal 100 MHz crystal reference oscillator of the MG369XA using an external 10 MHz, 0 to +10 dBm reference signal.

NOTE

Before beginning calibration, always let the MG369XA warm up for a minimum of 120 hours.

To perform calibration of the internal reference oscillator, first connect the external 10 MHz reference signal to the MG369XA rear panel 10 MHz REF IN connector.

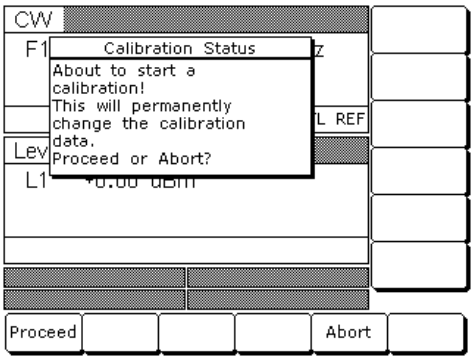
Next, press the **System** main menu key. At the System Menu display, press Cal > to go to the Calibration Menu (below).



Press Reference Calibration to begin calibration.

Press < Previous to return to the System Menu display.

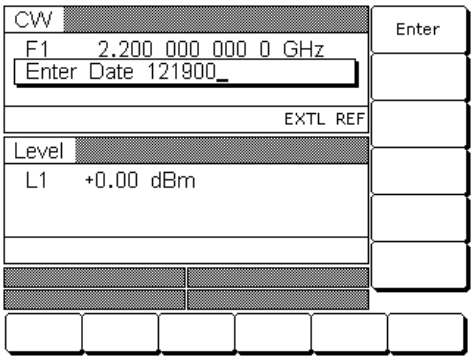
When Reference Calibration is pressed, the Calibration Status Menu (below) is displayed.



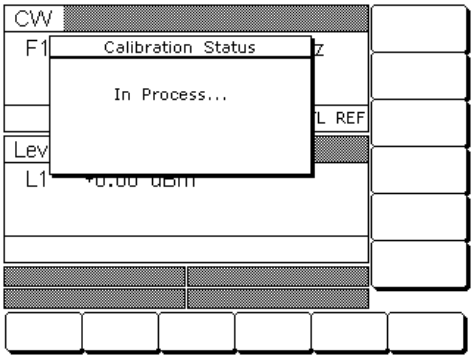
Press Proceed to start the calibration.

Press Abort to cancel the calibration and return to the Calibration Menu display.

When Proceed is pressed, the date parameter opens for data entry.



Using the key pad, enter the current date (in any desired format). Then, press any terminator soft-key. The Calibration Status Menu display changes to indicate calibration is in progress.



When the reference calibration is complete, the Calibration Menu is displayed.

External Reference Not Connected

If calibration is attempted without an external 10 MHz reference signal connected to the rear panel 10 MHz REF IN connector, the Calibration Status Menu displays the following message:

No External Reference is connected!!!

3-16 External Pulse Modulation (Option 13)

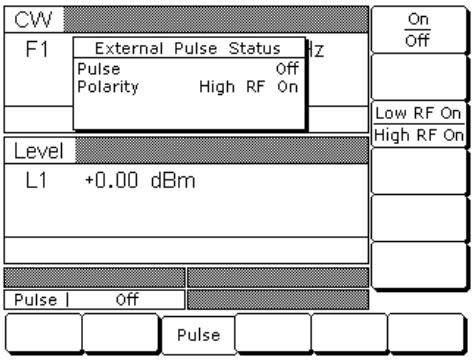
The external pulse modulation function, added by Option 13, enables pulse modulation of the output signal using a modulating signal from an external source.

The MG369XA accepts modulating signals from an external signal generator that are TTL-compatible.

Providing Pulse Modulation

To provide pulse modulation of the output signal using a modulating signal from an external source, first set up the external pulse generator and connect it to the MG369XA rear panel PULSE TRIG IN connector.

Next, press **Modulation**. At the resulting menu display, press Pulse. The External Pulse Status Menu (below) is displayed.



Press Low RF On / High RF On [EP0 / EP1] to select the polarity of the signal that triggers the RF on.

Press On / Off [XP / PO] to turn external pulse modulation on and off. Both the External Pulse status display and the Pulse modulation status area will reflect your selection.

Chapter 4
Local Operation–
Menu Maps

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Chapter 4
Local Operation–
Menu Maps

4-1 Introduction

This chapter provides menu maps that support the MG369XA front panel operating instructions found in Chapter 3. It includes menu maps for all of the frequency and power level modes of operation. In addition, a menu map for system configuration is also provided.

4-2 Menu Map Description

A menu map shows the menu key selections and instrument menu displays for a particular mode of CW generator operation. The menu displays are shown as they appear on the instrument and are linked together to show the sequence of menu selection. A brief description of the function of each menu's soft-keys is provided. If a menu soft-key selects another menu, then it is shown linked to that menu.
Figure 4-1, on page 4-5, is a sample menu map annotated to identify the key elements.

The following is a list of the menu maps contained in this chapter.

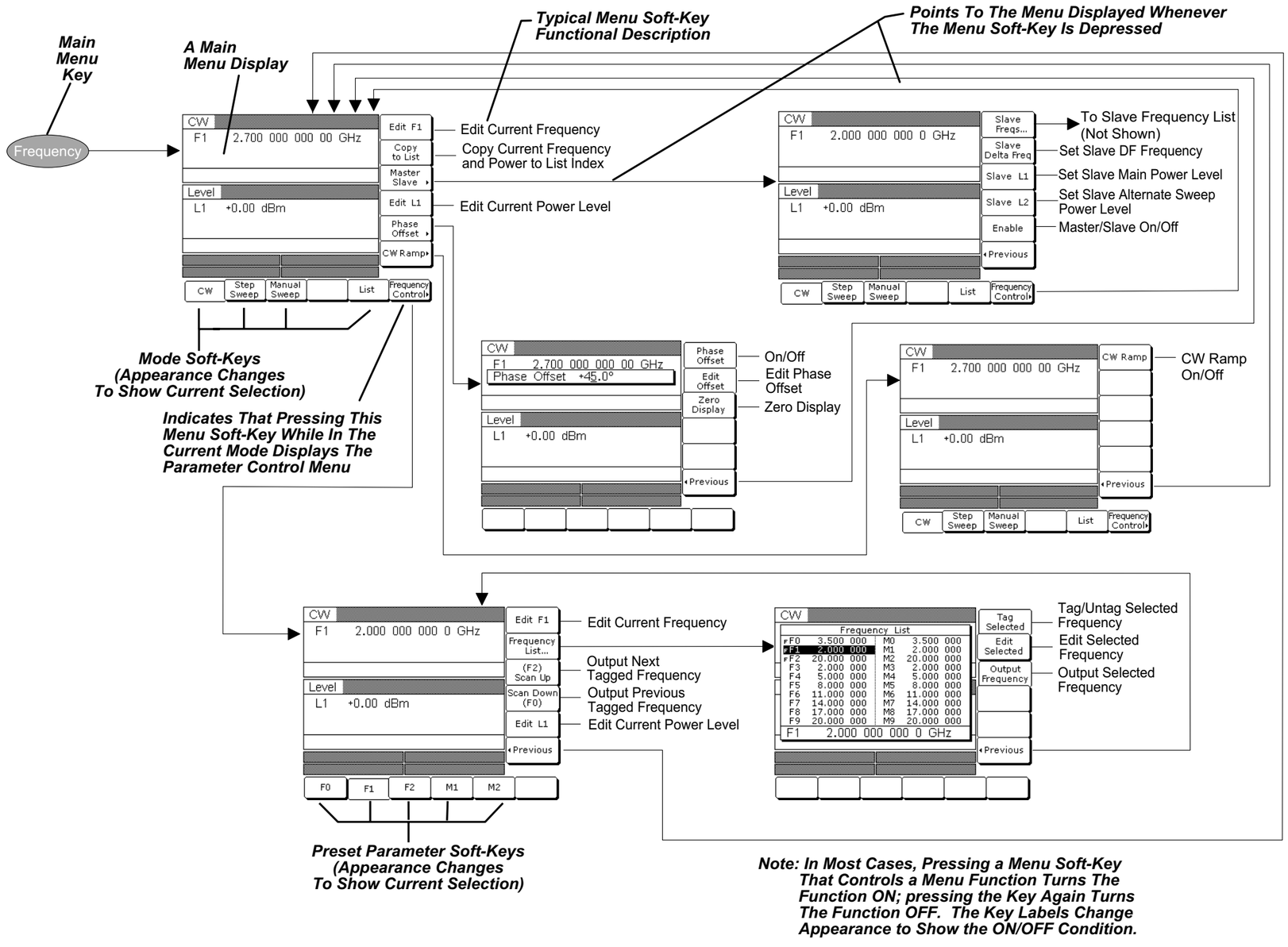


Figure 4-1. Sample Menu Map (Annotated)

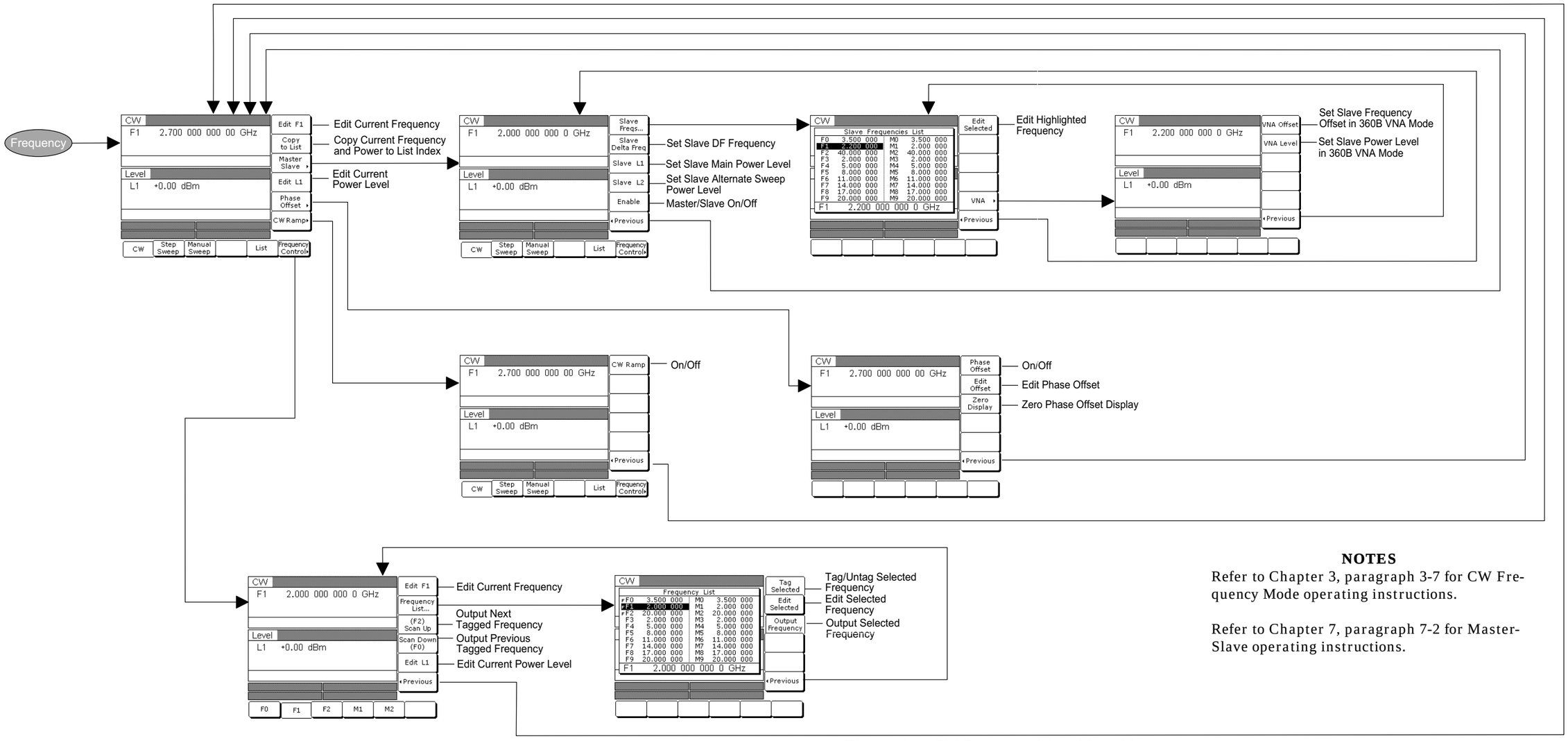


Figure 4-2. CW Frequency Mode Menu Map

NOTES

Refer to Chapter 3, paragraph 3-7 for CW Frequency Mode operating instructions.

Refer to Chapter 7, paragraph 7-2 for Master-Slave operating instructions.

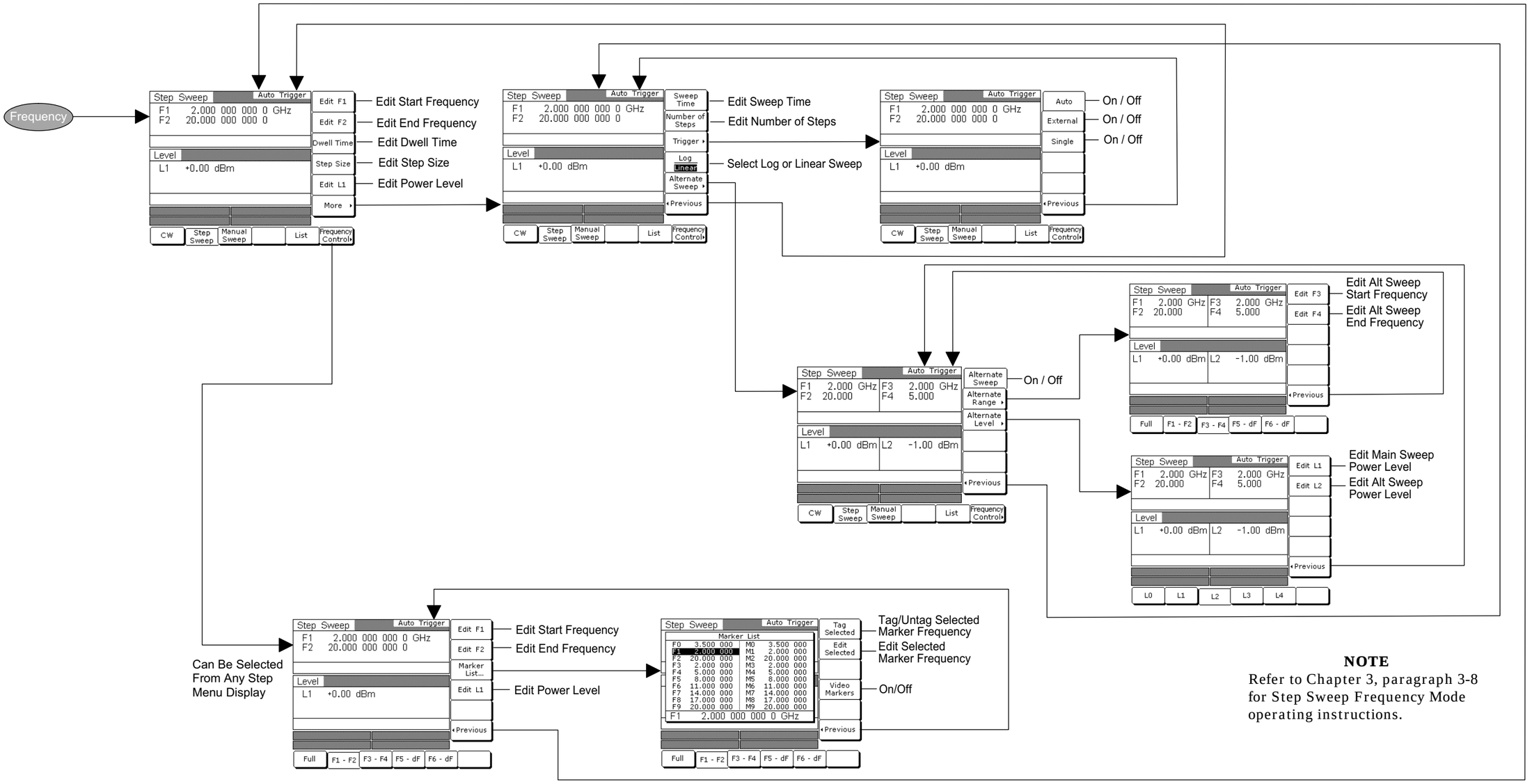
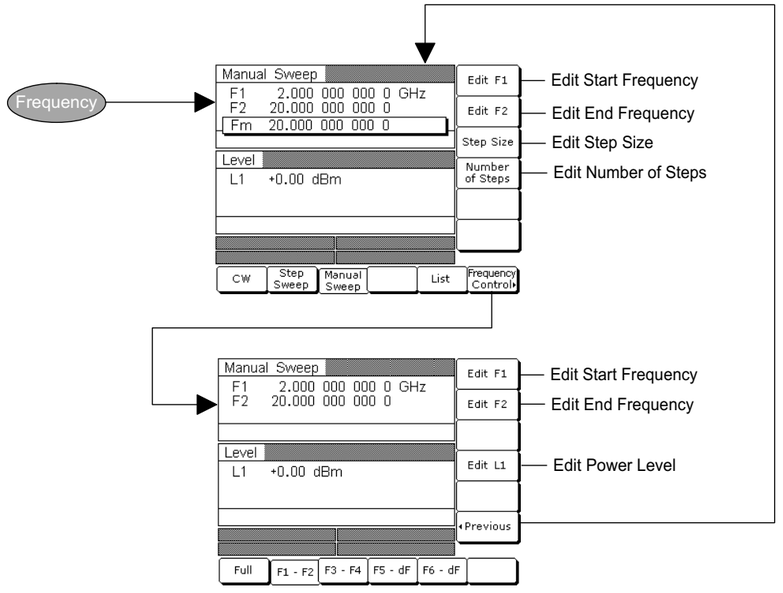
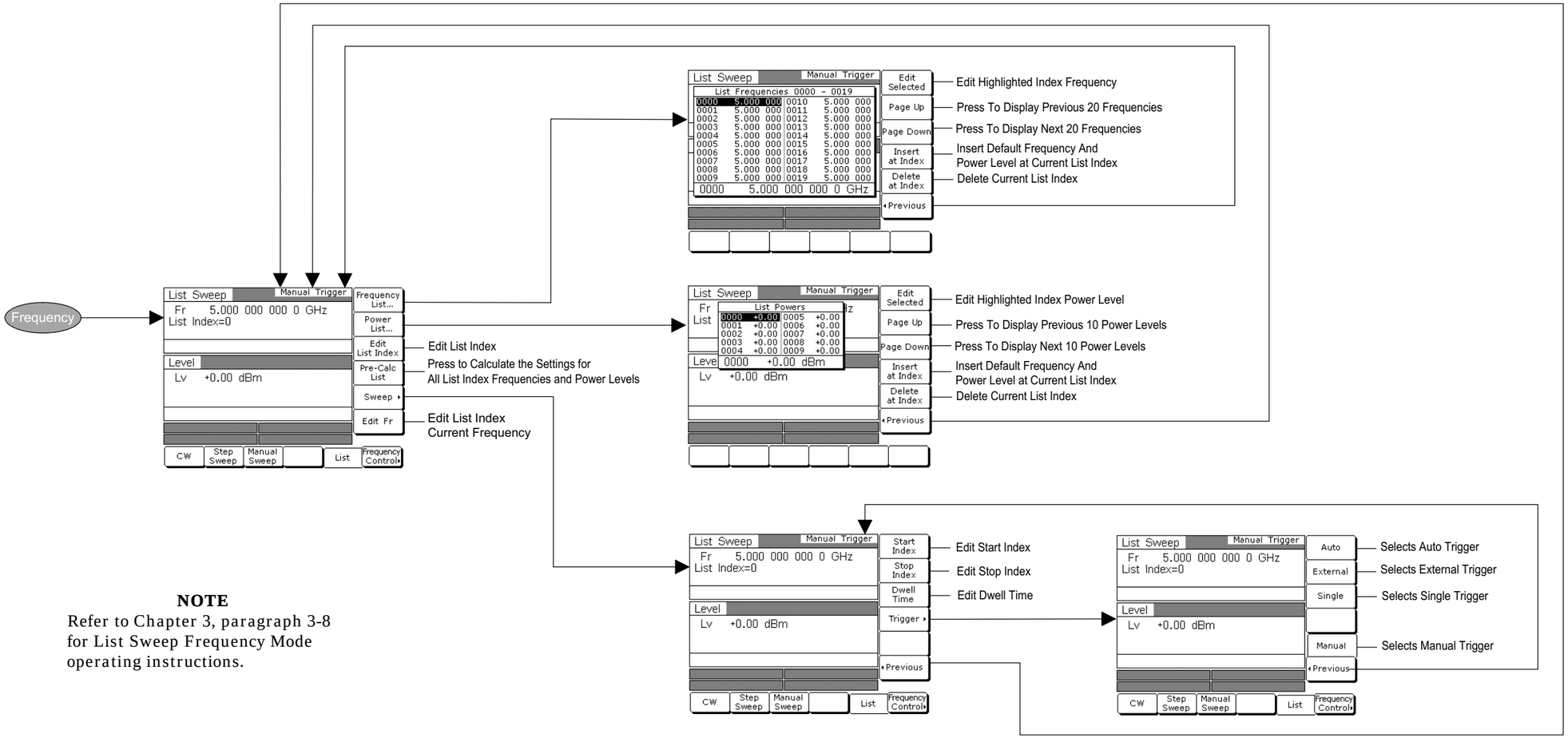


Figure 4-3. Step Sweep Frequency Mode Menu Map



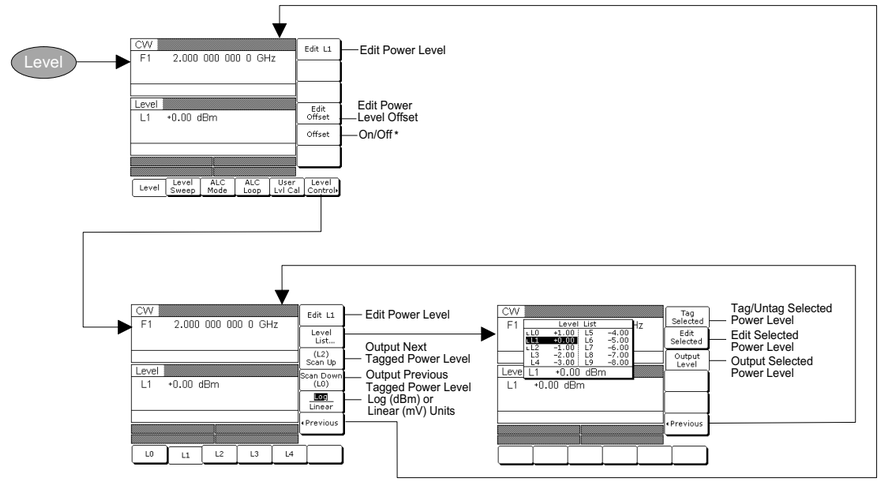
NOTE
Refer to Chapter 3, paragraph 3-8 for Manual Sweep Frequency Mode operating instructions.

Figure 4-4. Manual Sweep Frequency Mode Menu Map



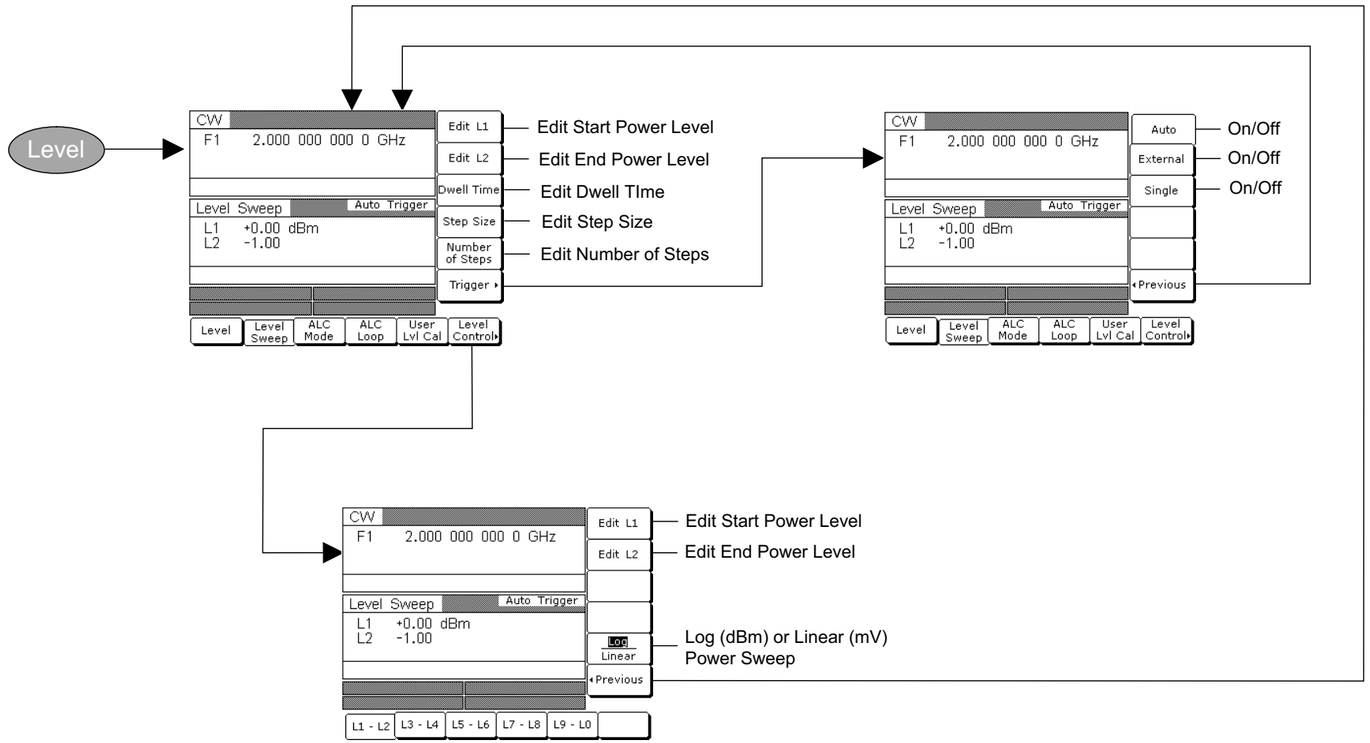
NOTE
Refer to Chapter 3, paragraph 3-8 for List Sweep Frequency Mode operating instructions.

Figure 4-5. List Sweep Frequency Mode Menu Map



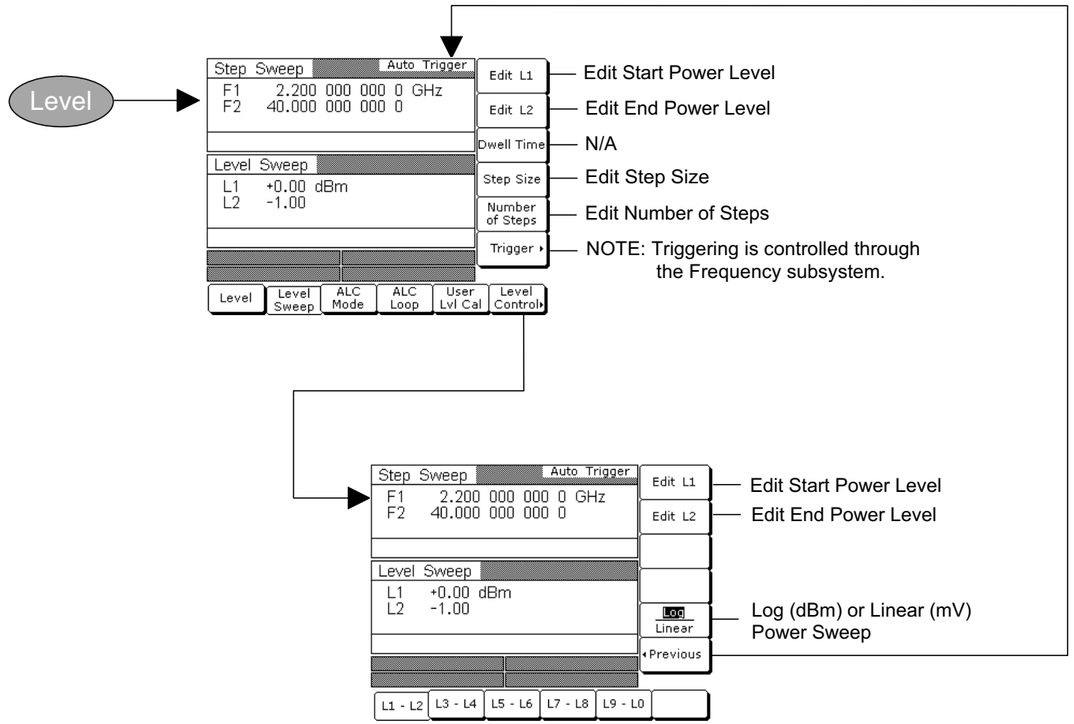
NOTE
Refer to Chapter 3, paragraph 3-9 for Fixed Power Level Mode operating instructions.

Figure 4-6. Fixed Power Level Mode Menu Map



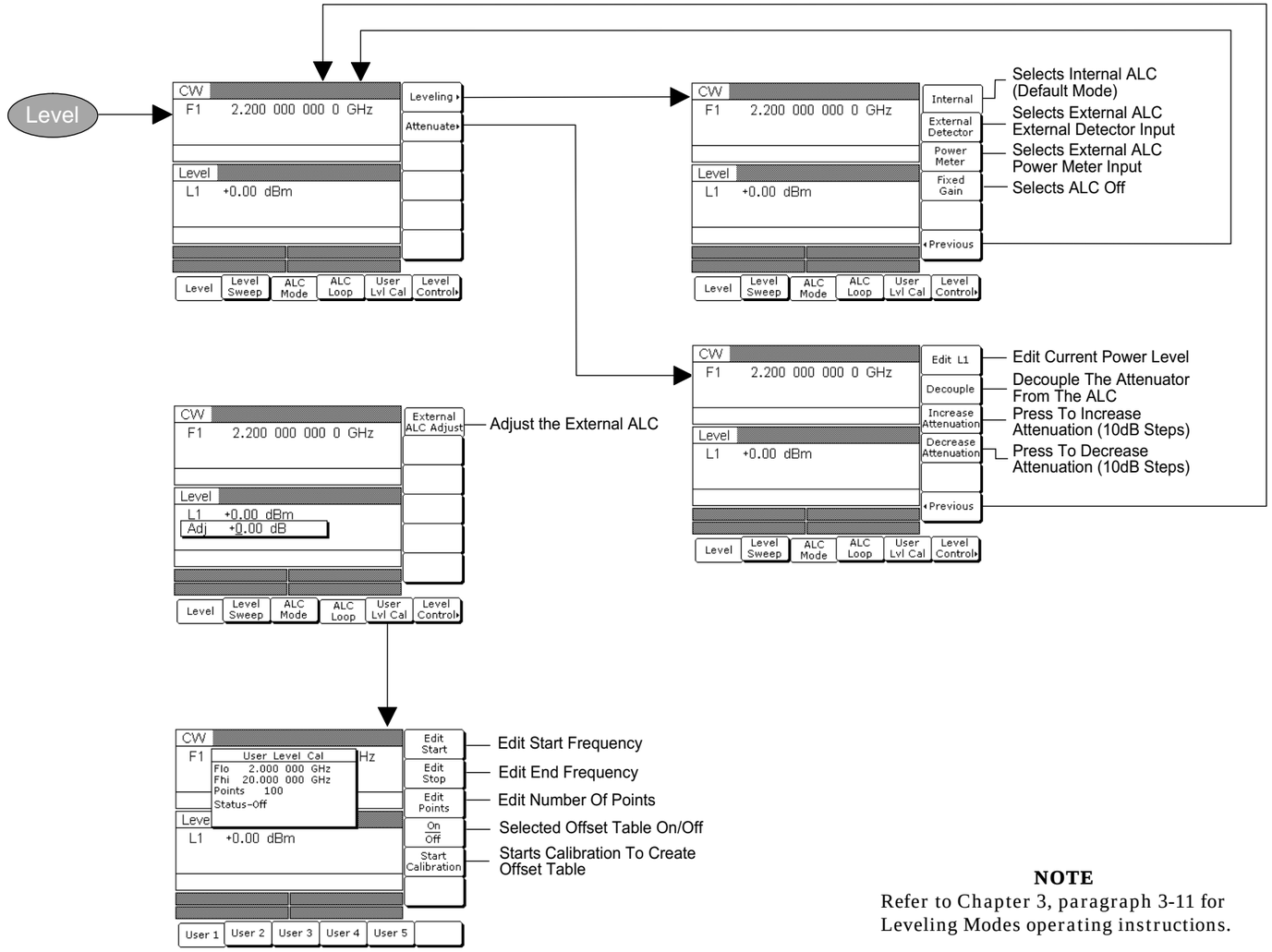
NOTE
Refer to Chapter 3, paragraph 3-10 for CW Power Sweep Mode operating instructions.

Figure 4-7. CW Power Sweep Mode Menu Map



NOTE
Refer to Chapter 3, paragraph 3-10 for Sweep Frequency/Step Power Mode operating instructions.

Figure 4-8. Sweep Frequency/Step Power Mode Menu Map



NOTE
Refer to Chapter 3, paragraph 3-11 for Leveling Modes operating instructions.

Figure 4-9. Leveling Modes Menu Map

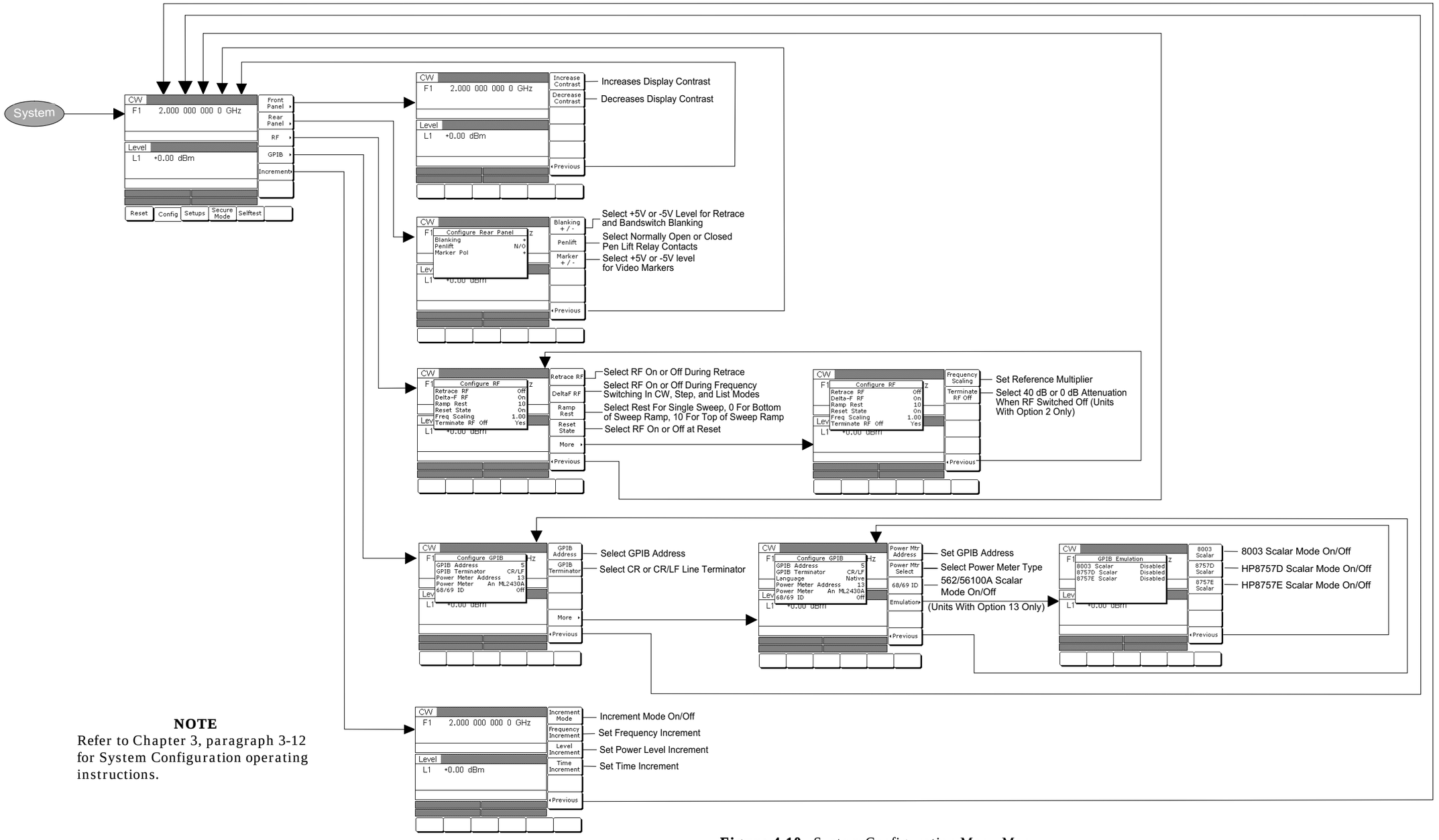


Figure 4-10. System Configuration Menu Map

NOTE
Refer to Chapter 3, paragraph 3-12 for System Configuration operating instructions.

Chapter 5
Operation Verification

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NOTE

Specifications shown in this chapter and in other chapters are for reference only. Refer to the performance specifications for the MG369XA in the data sheet, part number 11410-00262, located in the back of this manual.

Chapter 5
Operation Verification

5-1 Introduction

This chapter contains three operation verification tests that can be used to verify Series MG369XA Synthesized CW Generator operation.

Setup instructions and performance procedures are included for each test. The results can be compared with the specified limits that are shown on the test record forms that are provided for each test.

5-2 Test Equipment

Table 5-1 lists the recommended test equipment for performing the operation verification tests in this chapter.

Table 5-1. *Recommended Test Equipment*

Instrument	Critical Specification	Recommended Manufacturer/Model
Frequency Counter or	*Range:* 0.01 to 40 GHz *Input Z: 50*Ω *Resolution:* 1 Hz *Other:* External Time Base Input	Anritsu Model MF2414B
Frequency Counter, with Cable Kit and External Mixer	*Range:* 0.01 to 65 GHz *Input Z: 50*Ω *Resolution:* 1 Hz *Other:* External Time Base Input	EIP Microwave, Inc. Models 538B, 548B, or 578B, with Cable Kit: Option 590 and External Mixer: Option 91 (26.5 to 40 GHz) Option 92 (40 to 60 GHz) Option 93 (60 to 90 GHz)
Power Meter, with Power Sensor	*Range:* –30 to +20 dBm (1μW to 100 mW)	Anritsu Models ML2437A or ML2438A, with Power Sensor: MA2474A (0.01 to 40 GHz) MA2575A (0.01 to 50 GHz)
Oscilloscope	*Bandwidth:* DC to 150 MHz *Vertical Sensitivity:* 2 mV/division *Horiz Sensitivity:* 50 ns/division	Tektronix, Inc. Model TAS485

5-3 Test Records

Tables 5-2 and 5-3 contain test record forms that can be photocopied and used to record the results of operational verification testing of your MG369XA. These tables are included as part of the operational verification test procedures and contain test information for all MG369XA models.

5-4 Initial MG369XA Checkout

Before starting the operation verification tests in this chapter, perform an initial checkout of the MG369XA to be tested. This initial checkout consists of applying power to the CW generator, verifying that it passes self-test, and resetting it to the factory default parameters.

Power Up

Connect the MG369XA to the power source and turn on the rear panel power switch. This automatically places the CW generator in operation (front panel OPERATE LED on).

During power up, the CW generator loads its operating program then returns to the exact setup it was in when last turned off.

Self Test

Next, perform a self-test of the MG369XA to insure proper operation of the instrument PCBs and other internal assemblies.

To self-test the CW generator, press **System**. Then, press the System Menu soft-key Self-test. When the self-test is complete, the instrument displays the main CW menu.

NOTE

Error conditions detected during self-test are displayed as error messages on the data display. They should be corrected before continuing. Refer to Chapter 6 for a listing of error messages and descriptions.

Resetting the MG369XA

The CW generator should be reset to the factory-selected default parameters before commencing operation verification testing.

To reset the MG369XA, first press **System**, then press Reset. The CW generator resets to the CW frequency mode and displays the CW Menu.

Warmup Time

When the CW generator is turned on, allow one hour of warmup time before performing operational verification testing. This will assure stable operation of the instrument.

5-5 CW Frequency Accuracy Test

The following test verifies that the CW frequency output of the MG369XA is within accuracy specifications. Table 5-2, beginning on page 5-7, contains standard test records that you can copy and use to record test results for this test.

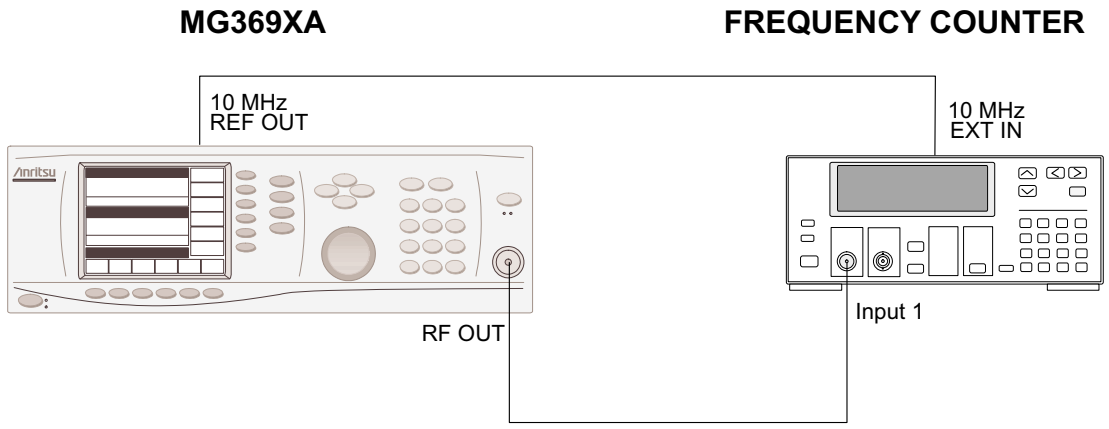


Figure 5-1. *Equipment Setup for CW Frequency Accuracy Test*

Test Setup Connect the equipment, shown in Figure 5-1, as follows:

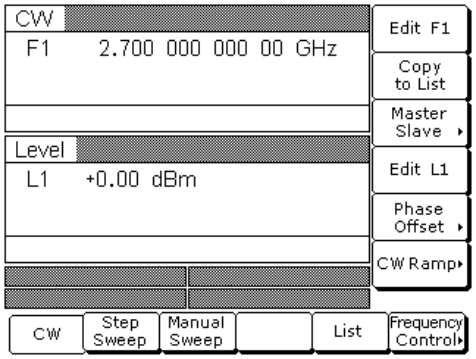
Step 1 Connect the MG369XA rear panel 10 MHz REF OUT to the Frequency Counter 10 MHz External Reference input.

Step 2 Connect the MG369XA RF OUTPUT to the Frequency Counter RF Input 1.

Test Procedure The following procedure tests both the coarse and fine loops to verify the accuracy of the CW frequency output.

Step 1 Set up the MG369XA as follows:

a. Reset the instrument by pressing System, then Reset. Upon reset, the CW Menu is displayed (following page).



b. Press Edit F1 to open the current frequency parameter for editing.

c. Set F1 to the first test frequency for the model being tested.

Step 2 Verify that the Frequency Counter reading meets specifications.

Step 3 Record the Frequency Counter reading on the test record.

NOTE

The Frequency Counter reading is typically within ±1 Hz. Differences of a few Hertz can be caused by noise or counter limitations. Differences of ≥±10 Hz indicate a frequency synthesis problem.

Step 4 Set F1 to the next test frequency on the test record and record the Frequency Counter reading.

Step 5 Repeat step 4 until all frequencies listed on the test record have been recorded.

Table 5-2. *CW Frequency Accuracy Test Record (1 of 3)*

Model MG369 _ A **Serial No. _____** **Date _____**

MG3691A		MG3692A	
2.000 000 000 00*	_____	2.000 000 000 00*	_____
5.000 000 000 00	_____	5.000 000 000 00	_____
8.000 000 000 00	_____	8.000 000 000 00	_____
8.400 000 000 00	_____	11.000 000 000 00	_____
		14.000 000 000 00	_____
		17.000 000 000 00	_____
		20.000 000 000 00	_____
2.000 000 100 00	_____	2.000 000 100 00	_____
2.000 000 200 00	_____	2.000 000 200 00	_____
2.000 000 300 00	_____	2.000 000 300 00	_____
2.000 000 400 00	_____	2.000 000 400 00	_____
2.000 000 500 00	_____	2.000 000 500 00	_____
2.000 000 600 00	_____	2.000 000 600 00	_____
2.000 000 700 00	_____	2.000 000 700 00	_____
2.000 000 800 00	_____	2.000 000 800 00	_____
2.000 000 900 00	_____	2.000 000 900 00	_____
2.000 001 000 00	_____	2.000 001 000 00	_____

* Specification for all frequencies listed above is ±10 Hz. All frequencies are in GHz.

Table 5-2. *CW Frequency Accuracy Test Record (2 of 3)*

Model MG369 _ A **Serial No. _____** **Date _____**

MG3693A		MG3694A	
2.000 000 000 00*	_____	2.000 000 000 00*	_____
5.000 000 000 00	_____	5.000 000 000 00	_____
8.000 000 000 00	_____	8.000 000 000 00	_____
11.000 000 000 00	_____	11.000 000 000 00	_____
14.000 000 000 00	_____	14.000 000 000 00	_____
17.000 000 000 00	_____	17.000 000 000 00	_____
20.000 000 000 00	_____	20.000 000 000 00	_____
23.000 000 000 00	_____	23.000 000 000 00	_____
26.000 000 000 00	_____	26.000 000 000 00	_____
29.000 000 000 00	_____	29.000 000 000 00	_____
30.000 000 000 00	_____	32.000 000 000 00	_____
		35.000 000 000 00	_____
		38.000 000 000 00	_____
		40.000 000 000 00	_____
2.000 000 100 00	_____	2.000 000 100 00	_____
2.000 000 200 00	_____	2.000 000 200 00	_____
2.000 000 300 00	_____	2.000 000 300 00	_____
2.000 000 400 00	_____	2.000 000 400 00	_____
2.000 000 500 00	_____	2.000 000 500 00	_____
2.000 000 600 00	_____	2.000 000 600 00	_____
2.000 000 700 00	_____	2.000 000 700 00	_____
2.000 000 800 00	_____	2.000 000 800 00	_____
2.000 000 900 00	_____	2.000 000 900 00	_____
2.000 001 000 00	_____	2.000 001 000 00	_____

* Specification for all frequencies listed above is ±10 Hz. All frequencies are in GHz.

Table 5-2. *CW Frequency Accuracy Test Record (3 of 3)*

Model MG369 _ A **Serial No. _____** **Date _____**

MG3695A		MG3696A	
2.000 000 000 00*	_____	2.000 000 000 00*	_____
5.000 000 000 00	_____	5.000 000 000 00	_____
8.000 000 000 00	_____	8.000 000 000 00	_____
11.000 000 000 00	_____	11.000 000 000 00	_____
14.000 000 000 00	_____	14.000 000 000 00	_____
17.000 000 000 00	_____	17.000 000 000 00	_____
20.000 000 000 00	_____	20.000 000 000 00	_____
23.000 000 000 00	_____	23.000 000 000 00	_____
26.000 000 000 00	_____	26.000 000 000 00	_____
29.000 000 000 00	_____	29.000 000 000 00	_____
32.000 000 000 00	_____	32.000 000 000 00	_____
35.000 000 000 00	_____	35.000 000 000 00	_____
38.000 000 000 00	_____	38.000 000 000 00	_____
40.000 000 000 00	_____	40.000 000 000 00	_____
50.000 000 000 00	_____	65.000 000 000 00	_____
2.000 000 100 00	_____	2.000 000 100 00	_____
2.000 000 200 00	_____	2.000 000 200 00	_____
2.000 000 300 00	_____	2.000 000 300 00	_____
2.000 000 400 00	_____	2.000 000 400 00	_____
2.000 000 500 00	_____	2.000 000 500 00	_____
2.000 000 600 00	_____	2.000 000 600 00	_____
2.000 000 700 00	_____	2.000 000 700 00	_____
2.000 000 800 00	_____	2.000 000 800 00	_____
2.000 000 900 00	_____	2.000 000 900 00	_____
2.000 001 000 00	_____	2.000 001 000 00	_____

* Specification for all frequencies listed above is ±10 Hz. All frequencies are in GHz.

5-6 Level Accuracy and Flatness Tests

These tests verify that the power level accuracy and flatness of the MG369XA meet specifications. Table 5-3, beginning on page 5-14, contains test records that you can copy and use to record test results for these tests. Test records are provided for each MG369XA model configuration.

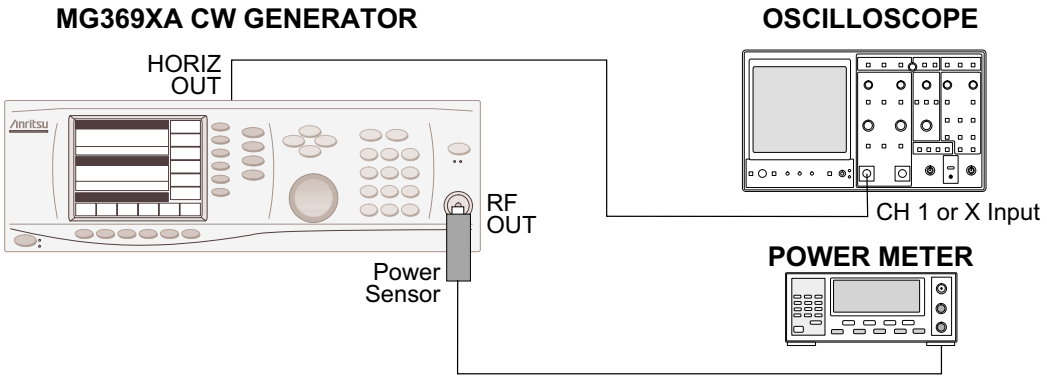


Figure 5-2. *Equipment Setup for Power Level Accuracy and Flatness Tests*

Test Setup Connect the equipment, shown in Figure 5-2, as follows:

Step 1 Calibrate the Power Meter with the Power Sensor.

Step 2 Connect the Power Sensor to the RF OUTPUT of the MG369XA.

Step 3 Connect the MG369XA rear panel HORIZ OUT to the Oscilloscope CH.1 input (X input).

NOTE

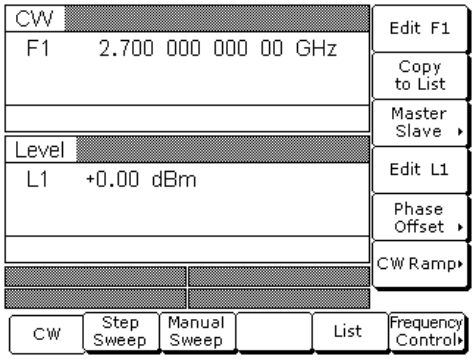
Before starting these procedures, locate the test record in Table 5-3 for the particular MG369XA model configuration being tested.

Power Level Accuracy Test Procedure

Power level accuracy is checked by stepping the power down in 1 dB increments from its maximum rated power level.

Step 1 Set up the MG369XA as follows:

a. Reset the instrument by pressing **System**, then Reset. The CW Menu is displayed.



b. Press Edit F1 to open the current frequency parameter for editing.

c. Set F1 to the CW frequency noted on the test record for the model being tested.

d. Press Edit L1 to open the current power level parameter for editing.

e. Set L1 to the power level noted on the test record.

Step 2 Measure the output power level with the Power Meter and record the reading on the test record.

Step 3 Verify that the Power Meter reading meets the specifications stated on the test record.

Step 4 Set L1 to the next test power level. Record the Power Meter reading on the test record.

Step 5 Repeat step 4 for the other levels listed on the test record for the current CW frequency.

Step 6 Repeat steps 1 thru 5 for all CW frequencies listed on the test record.

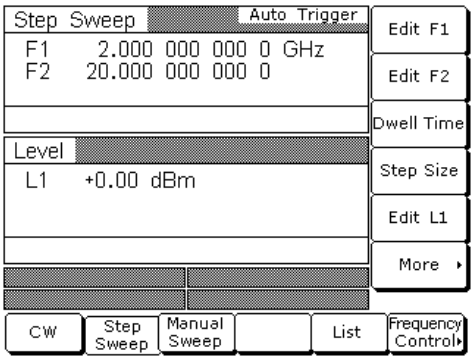
Power Level Flatness Test Procedure

Power level flatness is checked by measuring the power level variation during a full band step sweep.

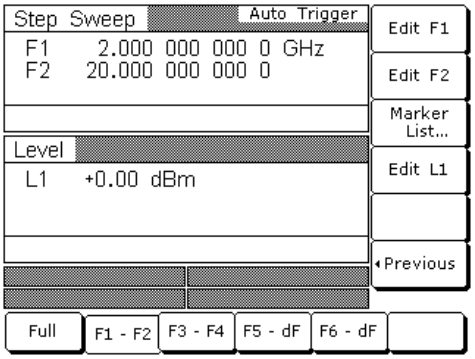
Step 1 Set up the MG369XA as follows for a step sweep power level flatness test:

a. Reset the instrument by pressing System, then Reset. The CW Menu is displayed.

b. Press Step Sweep to place the unit in the step sweep frequency mode and display the Step Sweep Menu (below).



c. With the Step Sweep menu displayed, press the Frequency Control > soft-key. The Sweep Frequency Control menu, shown below, is displayed.



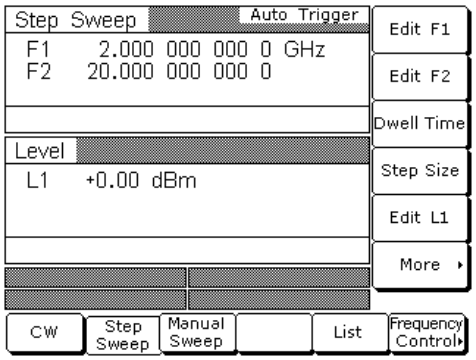
d. Press Full to select a full range frequency sweep.

e. Press Edit L1 to open the current power level parameter for editing.

f. Set L1 to the power level noted on the test record.

g. Now, return to the Step Sweep menu by pressing the < Previous soft-key.

h. At the Step Sweep menu, press Dwell Time to open the dwell-time-per-step parameter for editing..



i. Set the dwell time to 1 second.

NOTE

Monitor the MG369XA's Horizontal Output on the Oscilloscope to determine sweep start and stop.

Step 2 As the MG369XA steps through the full frequency range, measure the maximum and minimum Power Meter readings and record the values on the test record. Verify that the variation (difference between the maximum and minimum readings) does not exceed the value noted on the test record.

Table 5-3. *Power Level Accuracy and Flatness Test Record (1 of 14)*

Model MG3691A/MG3692A **Serial No. _____** **Date _____**

Model MG3691A or MG3692A
(without Option 2A Step Attenuator)

Power Level Accuracy *
(CW Frequency = 5.0 GHz)

Set Power	Measured Power
+13 dBm	_____dBm
+12 dBm	_____dBm
+11 dBm	_____dBm
+10 dBm	_____dBm
+ 9 dBm	_____dBm
+ 8 dBm	_____dBm
+ 7 dBm	_____dBm
+ 6 dBm	_____dBm
+ 5 dBm	_____dBm
+ 4 dBm	_____dBm
+ 3 dBm	_____dBm
+ 2 dBm	_____dBm
+ 1 dBm	_____dBm

* Specification is ±1.0 dB.

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+ 13 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (2 of 14)*

Model MG3691A/MG3692A **Serial No. _____** **Date _____**

Model MG3691A or MG3692A
(with Option 2A Step Attenuator)

Power Level Accuracy *
(CW Frequency = 5.0 GHz)

Set Power	Measured Power
+11 dBm	_____dBm
+10 dBm	_____dBm
+ 9 dBm	_____dBm
+ 8 dBm	_____dBm
+ 7 dBm	_____dBm
+ 6 dBm	_____dBm
+ 5 dBm	_____dBm
+ 4 dBm	_____dBm
+ 3 dBm	_____dBm
+ 2 dBm	_____dBm
+ 1 dBm	_____dBm
+ 0 dBm	_____dBm
– 1 dBm	_____dBm

* Specification is ±1.0 dB.

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+11 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (3 of 14)*

Model MG3691A/MG3692A **Serial No.** _____ **Date** _____

Model MG3691A or MG3692A
(with Option 2F Step Attenuator)

Power Level Accuracy *
(CW Frequency = 5.0 GHz)

Set Power	Measured Power
+ 9 dBm	_____dBm
+ 8 dBm	_____dBm
+ 7 dBm	_____dBm
+ 6 dBm	_____dBm
+ 5 dBm	_____dBm
+ 4 dBm	_____dBm
+ 3 dBm	_____dBm
+ 2 dBm	_____dBm
+ 1 dBm	_____dBm
+ 0 dBm	_____dBm
– 1 dBm	_____dBm
– 2 dBm	_____dBm
– 3 dBm	_____dBm

* Specification is ±1.0 dB.

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+ 3 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (4 of 14)*

Model MG3691A/MG3692A **Serial No.** _____ **Date** _____

Model MG3691A or MG3692A with Option 15 High Power (without Option 2A Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)

Set Power	Measured Power
+19 dBm	_____dBm
+18 dBm	_____dBm
+17 dBm	_____dBm
+16 dBm	_____dBm
+15 dBm	_____dBm
+14 dBm	_____dBm
+13 dBm	_____dBm
+12 dBm	_____dBm
+11 dBm	_____dBm
+10 dBm	_____dBm
+ 9 dBm	_____dBm
+ 8 dBm	_____dBm
+ 7 dBm	_____dBm

* Specification is ±1.0 dB.

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+ 17 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (5 of 14)*

Model MG3691A/MG3692A **Serial No.** _____ **Date** _____

Model MG3691A or MG3692A with Option 15 High Power (with Option 2A Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)

Set Power	Measured Power
+18 dBm	_____dBm
+17 dBm	_____dBm
+16 dBm	_____dBm
+15 dBm	_____dBm
+14 dBm	_____dBm
+13 dBm	_____dBm
+12 dBm	_____dBm
+11 dBm	_____dBm
+10 dBm	_____dBm
+ 9 dBm	_____dBm
+ 8 dBm	_____dBm
+ 7 dBm	_____dBm
+ 6 dBm	_____dBm

. * Specification is ±1.0 dB.

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+15 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (6 of 14)*

Model MG3691A/MG3692A **Serial No.** _____ **Date** _____

Model MG3691A or MG3692A with Option 15 High Power (with Option 2F Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)

Set Power	Measured Power
+13 dBm	_____dBm
+12 dBm	_____dBm
+11 dBm	_____dBm
+10 dBm	_____dBm
+ 9 dBm	_____dBm
+ 8 dBm	_____dBm
+ 7 dBm	_____dBm
+ 6 dBm	_____dBm
+ 5 dBm	_____dBm
+ 4 dBm	_____dBm
+ 3 dBm	_____dBm
+ 2 dBm	_____dBm
+ 1 dBm	_____dBm

* Specification is ±1.0 dB.

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+ 7 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (7 of 14)*

Model MG3693A/MG3694A **Serial No.** _____ **Date** _____

Model MG3693A or MG36994A
(without Option 2B Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)		**Power Level Accuracy * (CW Frequency = 25.0 GHz)**	
Set Power	**Measured Power**	**Set Power**	**Measured Power**
+ 9 dBm	_____dBm	+ 6 dBm	_____dBm
+ 8 dBm	_____dBm	+ 5 dBm	_____dBm
+ 7 dBm	_____dBm	+ 4 dBm	_____dBm
+ 6 dBm	_____dBm	+ 3 dBm	_____dBm
+ 5 dBm	_____dBm	+ 2 dBm	_____dBm
+ 4 dBm	_____dBm	+ 1 dBm	_____dBm
+ 3 dBm	_____dBm	+ 0 dBm	_____dBm
+ 2 dBm	_____dBm	– 1 dBm	_____dBm
+ 1 dBm	_____dBm	– 2 dBm	_____dBm
+ 0 dBm	_____dBm	– 3 dBm	_____dBm
– 1 dBm	_____dBm	– 4 dBm	_____dBm
– 2 dBm	_____dBm	– 5 dBm	_____dBm
– 3 dBm	_____dBm	– 6 dBm	_____dBm
* Specification is ±1.0 dB.		* Specification is ±1.0 dB.	

Power Level Flatness (Step Sweep)

Set Power	**Max Power**	**Min Power**	**Variation ****
+ 6 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (8 of 14)*

Model MG3693A/MG3694A **Serial No.** _____ **Date** _____

Model MG3693A or MG3694A (with Option 2B Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)		**Power Level Accuracy * (CW Frequency = 25.0 GHz)**	
Set Power	**Measured Power**	**Set Power**	**Measured Power**
+ 7 dBm	_____dBm	+ 3 dBm	_____dBm
+ 6 dBm	_____dBm	+ 2 dBm	_____dBm
+ 5 dBm	_____dBm	+ 1 dBm	_____dBm
+ 4 dBm	_____dBm	+ 0 dBm	_____dBm
+ 3 dBm	_____dBm	– 1 dBm	_____dBm
+ 2 dBm	_____dBm	– 2 dBm	_____dBm
+ 1 dBm	_____dBm	– 3 dBm	_____dBm
+ 0 dBm	_____dBm	– 4 dBm	_____dBm
– 1 dBm	_____dBm	– 5 dBm	_____dBm
– 2 dBm	_____dBm	– 6 dBm	_____dBm
– 3 dBm	_____dBm	– 7 dBm	_____dBm
– 4 dBm	_____dBm	– 8 dBm	_____dBm
– 5 dBm	_____dBm	– 9 dBm	_____dBm
* Specification is ±1.0 dB.		* Specification is ±1.0 dB.	

Power Level Flatness (Step Sweep)

Set Power	**Max Power**	**Min Power**	**Variation ****
+ 3 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (9 of 14)*

Model MG3693A/MG3694A **Serial No.** _____ **Date** _____

Model MG3693A or MG3694A with Option 15 High Power (without Option 2B Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)		Power Level Accuracy * (CW Frequency = 25.0 GHz)	
Set Power	**Measured Power**	**Set Power**	**Measured Power**
+15 dBm	_____dBm	+14 dBm	_____dBm
+14 dBm	_____dBm	+13 dBm	_____dBm
+13 dBm	_____dBm	+12 dBm	_____dBm
+12 dBm	_____dBm	+11 dBm	_____dBm
+11 dBm	_____dBm	+10 dBm	_____dBm
+10 dBm	_____dBm	+ 9 dBm	_____dBm
+ 9 dBm	_____dBm	+ 8 dBm	_____dBm
+ 8 dBm	_____dBm	+ 7 dBm	_____dBm
+ 7 dBm	_____dBm	+ 6 dBm	_____dBm
+ 6 dBm	_____dBm	+ 5 dBm	_____dBm
+ 5 dBm	_____dBm	+ 4 dBm	_____dBm
+ 4 dBm	_____dBm	+ 3 dBm	_____dBm
+ 3 dBm	_____dBm	+ 2 dBm	_____dBm
* Specification is ±1.0 dB.		* Specification is ±1.0 dB.	

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+ 6 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (10 of 14)*

Model MG3693A/MG3694A **Serial No.** _____ **Date** _____

Model MG3693A or MG3694A with Option 15 High Power (with Option 2B Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)		Power Level Accuracy * (CW Frequency = 25.0 GHz)	
Set Power	**Measured Power**	**Set Power**	**Measured Power**
+14 dBm	_____dBm	+12 dBm	_____dBm
+13 dBm	_____dBm	+11 dBm	_____dBm
+12 dBm	_____dBm	+10 dBm	_____dBm
+11 dBm	_____dBm	+ 9 dBm	_____dBm
+10 dBm	_____dBm	+ 8 dBm	_____dBm
+ 9 dBm	_____dBm	+ 7 dBm	_____dBm
+ 8 dBm	_____dBm	+ 6 dBm	_____dBm
+ 7 dBm	_____dBm	+ 5 dBm	_____dBm
+ 6 dBm	_____dBm	+ 4 dBm	_____dBm
+ 5 dBm	_____dBm	+ 3 dBm	_____dBm
+ 4 dBm	_____dBm	+ 2 dBm	_____dBm
+ 3 dBm	_____dBm	+ 1 dBm	_____dBm
+ 2 dBm	_____dBm	+ 0 dBm	_____dBm
* Specification is ±1.0 dB.		* Specification is ±1.0 dB.	

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+ 3 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (11 of 14)*

Model MG3695A **Serial No. _____** **Date _____**

Model MG3695A
(without Option 2C Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)		**Power Level Accuracy * (CW Frequency = 25.0 GHz)**		**Power Level Accuracy * (CW Frequency = 50.0 GHz)**	
Set Power	**Measured Power**	**Set Power**	**Measured Power**	**Set Power**	**Measured Power**
+ 10 dBm	_____dBm	+ 3 dBm	_____dBm	+ 3 dBm	_____dBm
+ 9 dBm	_____dBm	+ 2 dBm	_____dBm	+ 2 dBm	_____dBm
+ 8 dBm	_____dBm	+ 1 dBm	_____dBm	+ 1 dBm	_____dBm
+ 7 dBm	_____dBm	– 1 dBm	_____dBm	– 1 dBm	_____dBm
+ 6 dBm	_____dBm	– 2 dBm	_____dBm	– 2 dBm	_____dBm
+ 5 dBm	_____dBm	– 3 dBm	_____dBm	– 3 dBm	_____dBm
+ 4 dBm	_____dBm	– 4 dBm	_____dBm	– 4 dBm	_____dBm
+ 3 dBm	_____dBm	– 5 dBm	_____dBm	– 5 dBm	_____dBm
+ 2 dBm	_____dBm	– 6 dBm	_____dBm	– 6 dBm	_____dBm
+ 1 dBm	_____dBm	– 7 dBm	_____dBm	– 7 dBm	_____dBm
+ 0 dBm	_____dBm	– 8 dBm	_____dBm	– 8 dBm	_____dBm
– 1 dBm	_____dBm	– 9 dBm	_____dBm	– 9 dBm	_____dBm
– 2 dBm	_____dBm	– 10 dBm	_____dBm	– 10 dBm	_____dBm
* Specification is ±1.0 dB.		* Specification is ±1.0 dB.		* Specification is ±1.5 dB.	

Power Level Flatness (Step Sweep)

Set Power	**Max Power**	**Min Power**	**Variation ****
+ 2.5 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (12 of 14)*

Model MG3695A **Serial No. _____** **Date _____**

Model MG3695A
(with Option 2C Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)		**Power Level Accuracy * (CW Frequency = 25.0 GHz)**		**Power Level Accuracy * (CW Frequency = 50.0 GHz)**	
Set Power	**Measured Power**	**Set Power**	**Measured Power**	**Set Power**	**Measured Power**
+ 8 dBm	_____dBm	+ 0 dBm	_____dBm	+ 0 dBm	_____dBm
+ 7 dBm	_____dBm	– 1 dBm	_____dBm	– 1 dBm	_____dBm
+ 6 dBm	_____dBm	– 2 dBm	_____dBm	– 2 dBm	_____dBm
+ 5 dBm	_____dBm	– 3 dBm	_____dBm	– 3 dBm	_____dBm
+ 4 dBm	_____dBm	– 4 dBm	_____dBm	– 4 dBm	_____dBm
+ 3 dBm	_____dBm	– 5 dBm	_____dBm	– 5 dBm	_____dBm
+ 2 dBm	_____dBm	– 6 dBm	_____dBm	– 6 dBm	_____dBm
+ 1 dBm	_____dBm	– 7 dBm	_____dBm	– 7 dBm	_____dBm
+ 0 dBm	_____dBm	– 8 dBm	_____dBm	– 8 dBm	_____dBm
– 1 dBm	_____dBm	– 9 dBm	_____dBm	– 9 dBm	_____dBm
– 2 dBm	_____dBm	– 10 dBm	_____dBm	– 10 dBm	_____dBm
– 3 dBm	_____dBm	– 11 dBm	_____dBm	– 11 dBm	_____dBm
– 4 dBm	_____dBm	– 12 dBm	_____dBm	– 12 dBm	_____dBm
* Specification is ±1.0 dB.		* Specification is ±1.0 dB.		* Specification is ±1.5 dB.	

Power Level Flatness (Step Sweep)

Set Power	**Max Power**	**Min Power**	**Variation ****
– 1 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (13 of 14)*

Model MG3696A **Serial No. _____** **Date _____**

Model MG3696A
(without Option 2C Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)		Power Level Accuracy * (CW Frequency = 25.0 GHz)		Power Level Accuracy * (CW Frequency = 50.0 GHz)	
Set Power	**Measured Power**	**Set Power**	**Measured Power**	**Set Power**	**Measured Power**
+10 dBm	_____dBm	+ 3 dBm	_____dBm	+ 3 dBm	_____dBm
+9 dBm	_____dBm	+ 2 dBm	_____dBm	+ 2 dBm	_____dBm
+8 dBm	_____dBm	+ 1 dBm	_____dBm	+ 1 dBm	_____dBm
+7 dBm	_____dBm	– 1 dBm	_____dBm	– 1 dBm	_____dBm
+ 6 dBm	_____dBm	– 2 dBm	_____dBm	– 2 dBm	_____dBm
+ 5 dBm	_____dBm	– 3 dBm	_____dBm	– 3 dBm	_____dBm
+ 4 dBm	_____dBm	– 4 dBm	_____dBm	– 4 dBm	_____dBm
+ 3 dBm	_____dBm	– 5 dBm	_____dBm	– 5 dBm	_____dBm
+ 2 dBm	_____dBm	– 6 dBm	_____dBm	– 6 dBm	_____dBm
+ 1 dBm	_____dBm	– 7 dBm	_____dBm	– 7 dBm	_____dBm
+ 0 dBm	_____dBm	– 8 dBm	_____dBm	– 8 dBm	_____dBm
– 1 dBm	_____dBm	– 9 dBm	_____dBm	– 9 dBm	_____dBm
– 2 dBm	_____dBm	– 10 dBm	_____dBm	– 10 dBm	_____dBm
* Specification is ±1.0 dB.		* Specification is ±1.0 dB.		* Specification is ±1.5 dB.	

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
– 2 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Table 5-3. *Power Level Accuracy and Flatness Test Record (14 of 14)*

Model MG3693A/94A w/Option 15 Serial No. _____ Date _____

Model MG3696A
(with Option 2D Step Attenuator)

Power Level Accuracy * (CW Frequency = 5.0 GHz)		Power Level Accuracy * (CW Frequency = 25.0 GHz)		Power Level Accuracy * (CW Frequency = 50.0 GHz)	
Set Power	**Measured Power**	**Set Power**	**Measured Power**	**Set Power**	**Measured Power**
+ 8 dBm	_____dBm	+ 3 dBm	_____dBm	+ 0 dBm	_____dBm
+ 7 dBm	_____dBm	+ 2 dBm	_____dBm	– 1 dBm	_____dBm
+ 6 dBm	_____dBm	+ 1 dBm	_____dBm	– 2 dBm	_____dBm
+ 5 dBm	_____dBm	+ 0 dBm	_____dBm	– 3 dBm	_____dBm
+ 4 dBm	_____dBm	– 1 dBm	_____dBm	– 4 dBm	_____dBm
+ 3 dBm	_____dBm	– 2 dBm	_____dBm	– 5 dBm	_____dBm
+ 2 dBm	_____dBm	– 3 dBm	_____dBm	– 6 dBm	_____dBm
+ 1 dBm	_____dBm	– 4 dBm	_____dBm	– 7 dBm	_____dBm
+ 0 dBm	_____dBm	– 5 dBm	_____dBm	– 8 dBm	_____dBm
– 1 dBm	_____dBm	– 6 dBm	_____dBm	– 9 dBm	_____dBm
– 2 dBm	_____dBm	– 7 dBm	_____dBm	– 10 dBm	_____dBm
– 3 dBm	_____dBm	– 8 dBm	_____dBm	– 11 dBm	_____dBm
– 4 dBm	_____dBm	– 9 dBm	_____dBm	– 12 dBm	_____dBm
* Specification is ±1.0 dB.		* Specification is ±1.0 dB.		* Specification is ±1.5 dB.	

Power Level Flatness (Step Sweep)

Set Power	Max Power	Min Power	Variation **
+ 3 dBm	_____dBm	_____dBm	_____dB

** Maximum variation is 1.6 dB.

Chapter 6
Operator Maintenance

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Chapter 6
Operator Maintenance

6-1 Introduction

This chapter provides the information necessary for operator maintenance of the CW generator. Operator maintenance is limited to troubleshooting and repairs that can be made without removing the instrument covers.

6-2 Error and Warning/Status Messages

During normal operation, the MG369XA generates error messages to indicate internal malfunctions, abnormal signal generator operations, or invalid signal inputs or data entries. It also displays warning messages to alert the operator to conditions that could result in inaccurate CW generator output. In addition, status messages are displayed to remind the operator of current menu selections or settings.

Self-Test Error Messages

The MG369XA firmware includes internal diagnostics that self-test the instrument. These self-test diagnostics perform a brief go/no-go test of most of the instrument PCBs and other internal assemblies.

CAUTION

During self-test with RF OUTPUT set to ON, the output power level is set to 0 dBm. Always disconnect sensitive equipment from the unit before performing self-test.

You can perform a CW generator self-test at any time during normal operation by pressing **System** and then the System Menu soft-key Self-test.

If the CW generator fails self-test, an error message(s) is displayed on the front panel data display. These error messages describe the malfunction and, in most cases, provide an indication of what has failed. Table 6-1, next page, is a summary listing of the self-test error messages. Included for each is a description of the probable cause(s), whether or not the MG369XA is still operable, and if operable, what operational degradation can be expected.

WARNING

Self-test error messages normally indicate the failure of an internal component or assembly of the CW generator. There are no operator serviceable components inside. Refer servicing of the instrument to qualified service technicians.

To prevent the risk of electrical shock or damage to precision components, ***do not*** remove the equipment covers.

Table 6-1. *Self-Test Error Messages (1 of 3)*

Error Message	Description/Remarks
Error 100 DVM Ground Offset Failed	Indicates a calibration-related problem. **Do Not Attempt to Operate!** Refer the instrument to a qualified service technician.
Error 101 DVM Positive 10V Reference	Indicates either a calibration-related problem or a defective+10 Volt reference. **Do not Attempt to Operate!** Refer the instrument to a qualified service technician.
Error 102 DVM Negative 10V Reference	Indicates either a calibration-related problem or a defective –10 Volt reference . **Do not Attempt to Operate!** Refer the instrument to a qualified service technician.
Error 108 Crystal Oven Cold	Indicates the 100 MHz crystal oven or the Option 16 high-stability 10 MHz crystal oscillator has not reached operating temperature. The MG369XA is still operable, but frequency accuracy and stability may be degraded.
Error 109 The 100MHz Reference is not Locked to the External Reference	Indicates the reference loop is not phase-locked to the external 10 MHz reference. The reference loop may phase-lock to the internal 100 MHz time base; consequently, the MG369XA would continue to operate normally.
Error 110 The 100MHz Reference is not Locked to the High Stability 10MHz Crystal Oscillator	Indicates the reference loop is not phase-locked to the optional, high stability 10 MHz crystal oscillator. The reference loop may phase-lock to the internal 100 MHz time base; consequently, the MG369XA would continue to operate normally.
Error 112 Coarse Loop Osc Failed	Indicates the coarse loop B oscillator is not phase-locked. The MG369XA is still operable but the accuracy and stability of the frequency outputs are greatly reduced.
Error 113 Yig Loop Osc Failed	Indicates the YIG loop is not phase-locked. The MG369XA is still operable but the accuracy and stability of the frequency outputs are greatly reduced.
Error 114 Down Converter LO not Locked	Indicates the local oscillator in the down converter assembly is not phase-locked. The MG369XA is still operable but the accuracy and stability of frequency outputs below 2 GHz is greatly reduced.

Table 6-1. *Self-Test Error Messages (2 of 3)*

Error Message	Description/Remarks
Error 115 Not Locked Indicator Failed	Indicates failure of the not phase-locked indicator circuit. The MG369XA is still operable but an error message will not appear on the data display when the output frequency is not phase-locked.
Error 118 Switchpoint DAC Failed	Indicates a failure of the Switchpoint DAC. The MG369XA is still operable but will not generate a CW Ramp.
Error 119 Center Frequency Circuits Failed	Indicates a failure of the center frequency circuitry. **Do Not Attempt to Operate!** Refer the instrument to a qualified service technician.
Error 121 Unleveled Indicator Failed	Indicates failure of the not leveled detector circuitry. The MG369XA is still operable but a warning message will not appear when the RF output goes unleveled.
Error 122 Level Reference Failed	Indicates a failure of the level reference circuitry. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 123 Detector Log Amp Failed	Indicates a failure of the level detector log amplifier circuitry. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 124 Full Band Unlocked and Unleveled	Indicates a failure of both YIG-tuned oscillators. **Do Not Attempt to Operate!** Refer the instrument to a qualified service technician.
Error 125 8.4 – 20 GHz Unlocked and Unleveled	Indicates a failure of the 8.4 to 20 GHz YIG-tuned oscillator. **Do Not Attempt to Operate!** Refer the instrument to a qualified service technician.
Error 126 2 – 8.4 GHz Unlocked and Unleveled	Indicates a failure of the 2 to 8.4 GHz YIG-tuned oscillator. **Do Not Attempt to Operate!** Refer the instrument to a qualified service technician.
Error 127 Detector Input Circuit Failed	Indicates a failure of the level detector input circuitry. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 128 .01 – 2 GHz Unleveled	Indicates a failure of the Down Converter leveling circuitry. The MG369XA operates normally but will have unleveled RF output in the 0.01 - 2 GHz frequency range.
Error 129 Switched Filter or Level Detector Failed	Indicates a failure of either the switched filter or level detector circuitry. The MG369XA may or may not produce an RF output. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 130 2 – 3.3 GH Switched Filter	Indicates a failure in the 2 - 3.3 GHz switched filter path within the switched filter assembly. The MG369XA may or may not produce an RF output in this frequency range. Use caution and always determine the output power level when operating the MG369XA in this condition.

Table 6-1. *Self-Test Error Messages (3 of 3)*

Error Message	Description/Remarks
Error 131 3.3 – 5.5 GH Switched Filter	Indicates a failure in the 3.3 - 5.5 GHz switched filter path within the switched filter assembly. The MG369XA may or may not produce an RF output in this frequency range. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 132 5.5 – 8.4 GH Switched Filter	Indicates a failure in the 5.5 - 8.4 GHz switched filter path within the switched filter assembly. The MG369XA may or may not produce an RF output in this frequency range. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 133 8.4 – 13.25 GH Switched Filter	Indicates a failure in the 8.4 - 13.25 GHz switched filter path within the switched filter assembly. The MG369XA may or may not produce an RF output in this frequency range. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 134 13.25 – 20 GH Switched Filter	Indicates a failure in the 13.25 - 20 GHz switched filter path within the switched filter assembly. The MG369XA may or may not produce an RF output in this frequency range. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 135 Modulator or Driver Failed	Indicates a failure of the modulator in the switched filter assembly or the modulator driver circuitry. The MG369XA may or may not produce an RF output. Use caution and always determine the output power level when operating the MG369XA in this condition.
Error 136 SQM Unit or Driver Failed	Indicates a failure of the source quadrupler module (SQM) or SQM bias regulator circuitry. The MG369XA is still operable but it may not produce an RF output in the frequency range above 40 GHz.
Error 138 SDM Unit or Driver Failed	Indicates a failure of the switched doubler module (SDM) or SDM bias regulator circuitry. The MG369XA is still operable but it will not produce an RF output in the 20 - 40 GHz frequency range.
Error 139 32 – 40 GHz SDM Section Failed	Indicates a failure in the 32 - 40 GHz switched doubler filter path within the SDM. The MG369XA is still operable but it will not produce an RF output in the 32 - 40 GHz frequency range.
Error 140 25 – 32 GHz SDM Section Failed	Indicates a failure in the 25 - 32 GHz switched doubler filter path within the SDM. The MG369XA is still operable but it will not produce an RF output in the 25 - 32 GHz frequency range.
Error 141 20 – 25 GHz SDM Section Failed	Indicates a failure in the 20 - 25 GHz switched doubler filter path within the SDM. The MG369XA is still operable but it will not produce an RF output in the 20 - 25 GHz frequency range.
Error 144 RF was Off when Self-test started. Some tests were not performed.	Indicates that some self-tests were not performed because RF Output was selected OFF on the MG369XA front panel. Press the OUTPUT key to turn RF Output ON and run the instrument self-test again.

Normal Operation Error and Warning/Status Messages

When an abnormal condition is detected during operation, the MG369XA displays an error message to indicate that the output is abnormal or that a signal input or data entry is invalid. It also displays warning messages to alert the operator to conditions that could cause an inaccurate signal generator output. Status messages to remind the operator of current menu selections or settings are also generated.

Table 6-2 is a summary list of possible error messages that can be displayed during normal operations. Table 6-3 is a summary list of possible warning/status messages.

Table 6-2. *Possible Error Messages during Normal Operation*

Error Message	Description
ERROR	Displayed (on the frequency mode title bar) when (1) the output frequency is not phase-locked or (2) an invalid frequency parameter entry causes a frequency range error.
LOCK ERROR	Displayed (in the frequency parameters area) when the output frequency is not phase-locked. The frequency accuracy and stability of the RF output is greatly reduced. Normally caused by an internal component failure. Run self-test to verify malfunction.
RANGE	Displayed (in the frequency parameters area) when (1) the dF value entered results in a sweep outside the range of the instrument, (2) the step size value entered is greater than the sweep range, (3) the number of steps entered results in a step size of less than 0.01 Hz or 0.01 dB (0.001 mV in linear mode), or (4) the step sweep time entered divided by the number of steps entered results in a dwell time of <10 ms. Entering valid values usually clears the error.

Table 6-3. *Possible Warning/Status Messages during Normal Operations*

Warning/Status Message	Description
COLD	This warning message indicates that the 100 MHz Crystal oven (or the 10 MHz Crystal oven if Option 16 is installed) has not reached operating temperature. Normally displayed during a cold start of the MG369XA. If the message is displayed during normal operation, it could indicate a malfunction. Run self-test to verify.
UNLEVELED	Displayed when the RF output goes unleveled. Normally caused by exceeding the specified leveled-power rating. Reducing the power level usually clears the warning message.
EXTL REF	This status message indicates that an external 10 MHz signal is being used as the reference signal for the MG369XA.
OFFSET	This status message indicates that a constant (offset) has been applied to the displayed power level.
CW RAMP	This status message appears on all CW menu displays to indicate that the CW ramp has been turned on.

6-3 Troubleshooting

Table 6-4 provides procedures for troubleshooting common malfunctions encountered during operation of the CW generator. Included are procedures for troubleshooting faults that do not produce error messages, such as, failure to power up and unexpected shutdown.

Table 6-4. *Troubleshooting (1 of 3)*

CW Generator will not turn on (OPERATE light is OFF)

Normal Operation: When the MG369XA is connected to the power source and the rear panel power switch turned on, the OPERATE light should illuminate and the instrument should power up.

Step 1 Disconnect the MG369XA from the power source, then check the line fuses on the rear panel.

- ❑ If a fuse is defective, replace (see page 6-13).
- ❑ If the fuses are good, go to the next step.

Step 2 Check to see if power is available at the power receptacle.

- ❑ If not, move to a working receptacle.
- ❑ If power is available, go to the next step.

Step 3 Check the power cable.

- ❑ If defective, replace.
- ❑ If good, call a service technician.

CW Generator will not turn on (OPERATE light is ON)

Normal Operation: When the MG369XA is connected to the power source and the rear panel power switch turned on, the OPERATE light should illuminate and the instrument should power up.

- ❑ If the OPERATE light illuminates but the unit fails to power up, the MG369XA has an internal component failure. Call a service technician.

Table 6-4. *Troubleshooting (2 of 3)*

CW Generator Quits During Operation (OPERATE light remains on)

Trouble Description: The CW generator operates for some time, then shuts down (OPERATE light remains on). After a short period, the CW generator resumes normal operation. This is an indication that the MG369XA has reached an excessive operating temperature.

Step 1 Check that the fan is still operating during the time that the instrument is shut down.

- ❑ If the fan is still operating, clean the air filter (see page 6-12).
- ❑ If the fan is not operating, call a service technician.

LOCK ERROR is Displayed

Trouble Description: This message is displayed in the frequency parameters area to indicate that the output frequency is not phase-locked. It is normally caused by an internal component failure.

Step 1 Perform a self-test of the CW generator by pressing the System Menu soft-key Self-test.

- ❑ If self-test does not result in an error message(s), resume normal operation.
- ❑ If an error message(s) is displayed, call a service technician.

Table 6-4. *Troubleshooting (3 of 3)*

UNLEVELED is Displayed

Trouble Description: This message is displayed to indicate that the RF output is unleveled.

Step 1 Check that the output power does not exceed the specified leveled-power rating and that the RF OUTPUT connector is terminated into a 50Ω load.

- ❑ Reduce the power level to not exceed the specified leveled-power rating or terminate the RF OUTPUT connector with a 50Ω load.
- ❑ If error message remains displayed, call a service technician.

RANGE is Displayed

Trouble Description: This message is displayed in the frequency parameters area to indicate that (1) the ΔF value entered results in a sweep outside the range of the instrument, (2) the step size value entered is greater than the sweep range, (3) the number of steps entered results in a step size of less than 0.01 Hz or 0.01 dB (0.001 mV in linear mode), or (4) the step sweep time entered divided by the number of steps entered results in a dwell time of <10 ms.

Step 1 Check that (1) the dF value entered does not try to set the frequency sweep outside the range of the MG369XA, (2) the step size entered is not greater than F2 minus F1, (3) the number of steps entered does not result in a step size that is smaller than the resolution of the instrument, or (4) the step sweep time and number of steps does not result in a dwell time of <10 ms.

- ❑ Enter a valid dF value, step size, number of steps, or step sweep time.
- ❑ If the error message remains displayed, call a service technician.

6-4 Routine Maintenance

Routine maintenance that can be performed by the operator consists of cleaning the fan filters, cleaning the data display, and replacing a defective line fuse(s).

Cleaning the Fan Filters

The CW generator must always receive adequate ventilation. A blocked fan filter can cause the instrument to overheat and shut down. Check and clean the rear panel fan filters periodically. Clean the fan filters more frequently in dusty environments. Clean the filters as follows:

Step 1 Disconnect the MG369XA from the power source.

Step 2 Carefully vacuum the fan filters from the outside to clean them.

Cleaning the Data Display

The data display of the CW generator is protected by a plastic display filter. To clean the display filter, use mild soap or detergent and water, or a commercial window cleaner. Do *not* use abrasive cleaners, tissues, or paper towels which can scratch the plastic surface.

Replacing the Line Fuses

The line fuses used in the MG369XA are 2.5A, type T fuses. The line fuse value is printed on the rear panel next to the power connector.

WARNING

Before changing the fuse, ***always*** remove the power cord from the power outlet. There is the risk of receiving a fatal electric shock if the fuse is replaced with the power cord connected.

Always use a new fuse of the type and rating specified by the fuse markings on the rear panel of the instrument.

To replace the line fuse, proceed as follows:

Step 1 Turn off the rear panel power switch and disconnect the MG369XA from the power source.

Step 2 Using a small flat-blade screwdriver, carefully pry under the tab next to the rear panel power switch to open the cover and gain access to the fuse holders.

Step 3 Slide out the fuse holders.

Step 4 Replace the fuses in the fuse holders.

Step 5 Install the fuse holders in the rear panel.

Step 6 Close the cover to secure the fuse holders in place. It will close with an audible snap.

Step 7 Reconnect the CW generator to the power source and turn on the rear panel power switch.

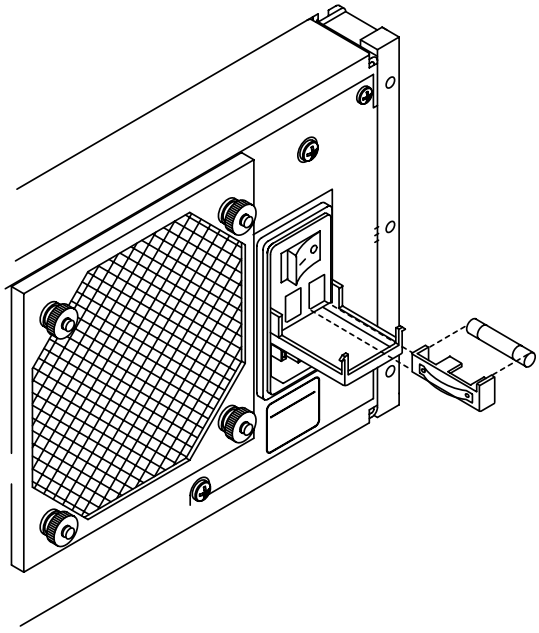


Figure 6-2. *Replacing the Line Fuse*

Chapter 7
Use With Other Instruments

Table of Contents

Chapter 7
Use With Other Instruments

7-1 Introduction

This chapter provides information and instructions for using the Series MG369XA Synthesized CW Generator with other instruments. It contains the following:

- Instructions for interconnecting and operating any two MG369XA instruments in a master-slave configuration.
- Instructions for connecting the MG369XA to a Anritsu Model 56100A Scalar Network Analyzer so that it can be used as a signal source for the analyzer.
- Instructions for connecting the MG369XA to a Anritsu Model 360B Vector Network Analyzer so that it can be used as a signal source for the analyzer operating in the tracking receiver mode.
- Instructions for connecting a MG369XA that has Option 13 installed to a Giga-tronics Model 8003 Scalar Network Analyzer and setting up the CW generator so that it can be used as a signal source for the analyzer.
- Instructions for connecting a MG369XA that has Option 13 installed to a Hewlett Packard Model 8757D or 8757E Scalar Network Analyzer and setting up the CW generator so that it can be used as a signal source for the analyzer.
- Instructions for connecting and operating option 7.

7-2 Master-Slave Operation

Master-slave operation consists of connecting any two MG369XA instruments together and configuring them so that they produce CW and synchronized, swept output signals at an operator-selectable frequency offset. One instrument (the Master) controls the other (the Slave) via interface cables between their rear panel AUX I/O and SERIAL I/O connectors. The two units are phase-locked together by connecting them to the same 10 MHz reference time base.

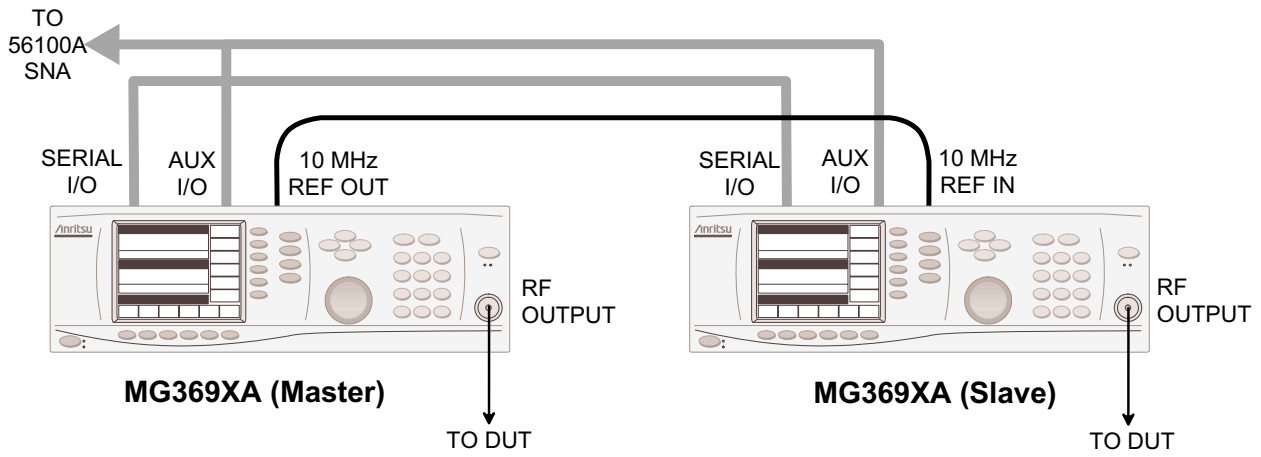


Figure 7-1. *MG369XA Configuration for Master-Slave Operation*

NOTES

When connecting two instruments together for Master-Slave operations, ***always*** use a Anritsu Master-Slave interface cable set, Part No. ND36329.

If a Model 56100A Scalar Network Analyzer is being used with the master-slave configuration, (1) connect the AUX I/O cable end labeled "SNA" to the rear panel AUX I/O connector on the 56100A SNA and (2) connect a dedicated system bus cable (P/N 2100-1) between the Master instrument rear panel IEEE-488 GPIB connector and the 56100A SNA rear panel DEDICATED GPIB connector.

Connecting the Instruments

Connect the two instruments, shown in Figure 7-1, as follows:

Step 1 Connect the 3-port AUX I/O cable end labeled "MASTER" to the rear panel AUX I/O connector on the Master instrument. Connect the AUX I/O cable labeled "SLAVE" to the rear panel AUX I/O connector on the Slave instrument.

Step 2 Connect the ends of the flat interface cable to the rear panel Serial I/O connectors on the Master and Slave instruments.

Step 3 Connect one end of a coaxial cable to the rear panel 10 MHz REF OUT connector on the Master instrument. Connect the other end to the rear panel 10 MHz REF IN connector on the Slave instrument.

Step 4 Connect the Master unit RF OUTPUT and the Slave unit RF OUTPUT to the appropriate connections on the DUT.

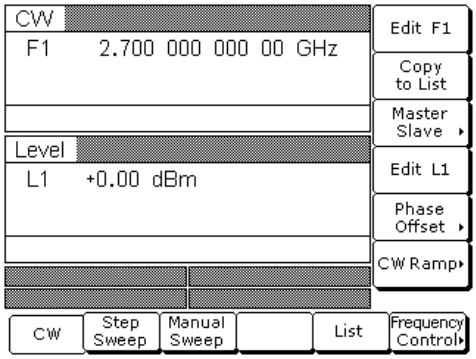
Initiating Master-Slave Operation

The following paragraphs describe how to set up both instruments to perform master-slave operations. Use the CW Frequency Mode menu map (Chapter 4, Figure 4-2) to follow the menu sequences.

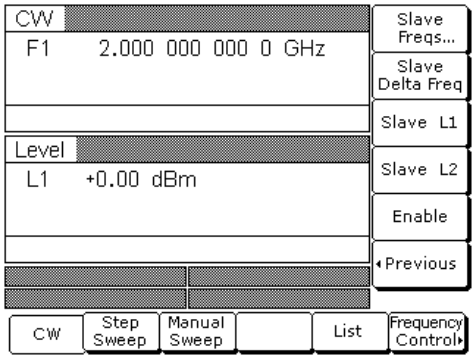
To initiate master-slave operation, turn on both instruments and place them in CW mode. The CW Menu (below) is displayed.

NOTE

Master-slave operations are always initiated in the CW frequency mode. Once initiated, you then can change to a sweep frequency mode of operation by selecting the desired frequency mode on the Master instrument.



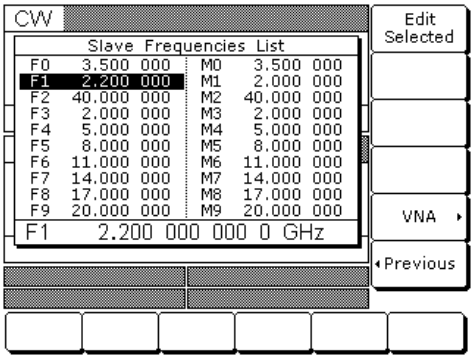
On the Master unit, press Master Slave > to go to the Master-Slave Menu display (below).



This menu lets you perform the following:

- Go to the Slave Frequencies List menu.
- Set the delta frequency for the Slave unit.
- Set the Slave unit's main power level (L1).
- Set the alternate sweep power level (L2) for the Slave unit.
- Turn master-slave operation on and off.

Press Slave Freqs... to go to the Slave Frequencies List menu (next page).



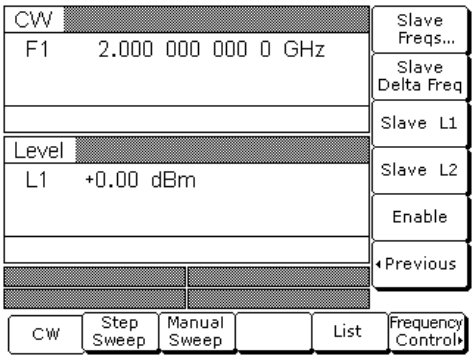
This menu lets you edit the listed frequencies for the Slave instrument [SLF0-SLF, SLM0-SLM9].

Use the cursor control key to select a frequency parameter from the list, then press Edit Selected to edit its value. Edit the current frequency parameter value using the cursor control key or rotary data knob or enter a new value using the key pad and appropriate termination soft-key. Press Edit Selected again to close the open frequency parameter.

When you are finished editing the slave frequencies, press < Previous to return to the Master-Slave menu (below).

NOTE

Upon reset, the slave frequencies (F0 - F9 and M0 - M9) return to the default values shown here.



The Master-Slave menu lets you set the delta frequency and L1 and L2 power level parameters for the Slave unit.

Press Slave Delta Freq [SLDF] to open the dF frequency parameter.

Press Slave L1 [SLL1] to open the main power level parameter.

Press Slave L2 [SLL2] to open the alternate sweep power level parameter.

Open the parameter you wish to change, then edit the current value using the cursor control key or rotary data knob or enter a new value using the key pad and appropriate termination soft-key. When you have finished setting the open parameter, close it by pressing its menu soft-key or by making another menu selection.

Press Enable [S1] to begin master-slave operation.

Press < Previous to return to the CW menu.

Master-Slave Operation

During master-slave operation, the Slave unit is in remote mode under the direct control of the Master unit. The Slave unit displays the following:

- Its output CW frequency or sweep frequency range.
- Its output power level.
- The messages Remote and Local Lockout.

NOTE

The 56100A SNA, when being used with the master-slave configuration, will not display markers.

The CW/sweep frequency settings on the Master unit define the master sweep, and the corresponding frequency settings on the Slave unit define the slave sweep. For example, if slave frequency F1 is set to 4 GHz and slave frequency F2 is set to 12 GHz, then the Slave unit will sweep from 4 to 12 GHz whenever the F1-F2 sweep range is selected on the Master unit. The Master unit will sweep from F1-F2 with the values of F1 and F2 defined in the Master unit's frequency list.

7-3 IF Up-Conversion (Option 7)

Option 7 adds an internal mixer that can be used for the generic up-conversion of an IF signal. The mixer's RF, LO, and IF ports are made available at the rear panel of the MG369XA via three female K-Connectors. The typical application will feed the MG369XA microwave output, which can be moved to the rear panel via option 9K, to the mixer's LO port. The user's external IF signal will be fed to the mixer's IF port. The new up-converted signal will be available at the mixer's RF port. Figure 7-2 shows a block diagram of a QPSK up-conversion using the MG369XA with an MG3681A QPSK source.

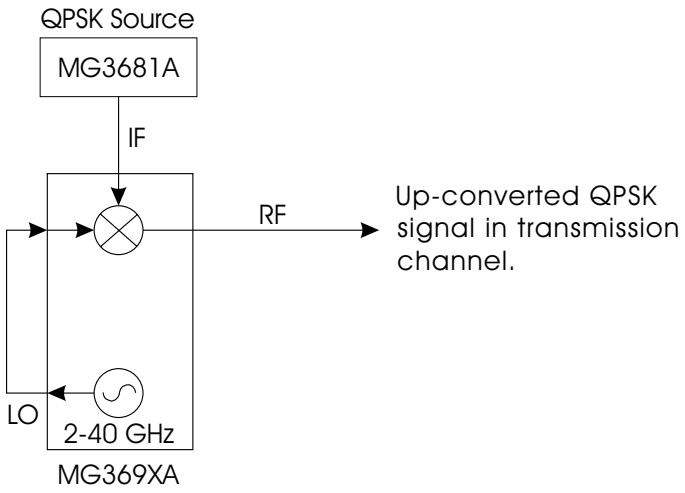


Figure 7-2. *QPSK Up-conversion*

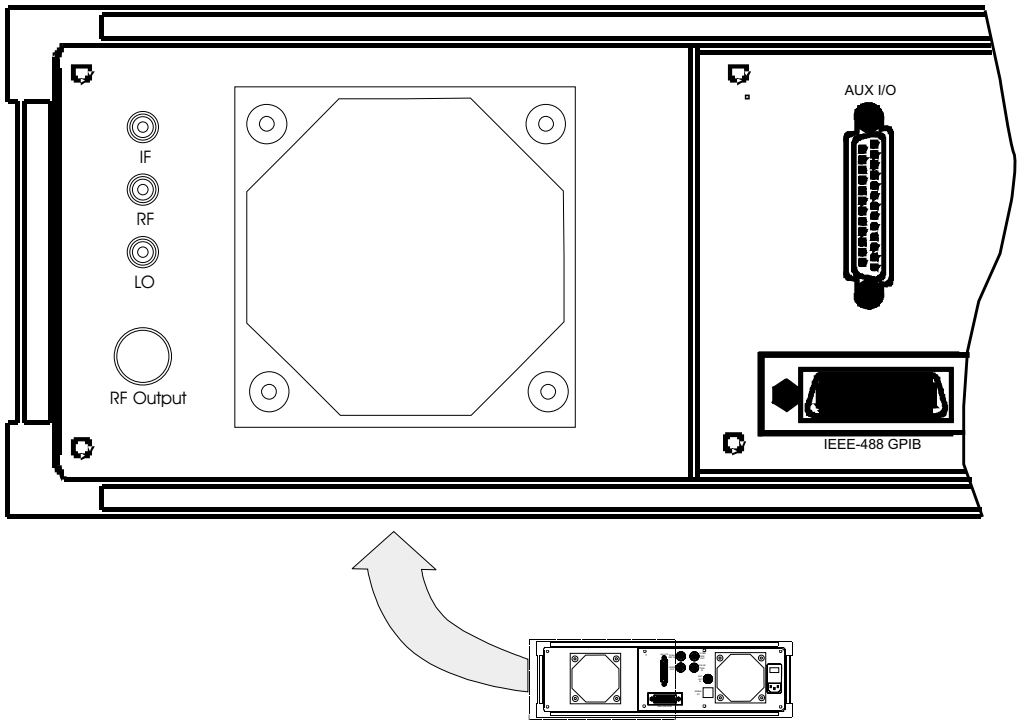


Figure 7-3. *MG369XA Rear Panel IF Up-conversion Connectors.*

MG369XA Mixer Setup

Setup the MG369XA as follows:

Step 1 Connect the MG369XA RF output to the MG369XA rear panel LO input.

Step 2 Connect an IF source output to the MG369XA rear panel IF input.

Step 3 Set the MG369XA power level to +13 dBm.

Step 4 Set the desired up-conversion frequency on the MG369XA.

Step 5 Connect the MG369XA rear panel mixer RF output to your transmission channel.

The MG369XA is now configured to up-convert the IF input to the microwave frequency set on the instruments front panel display.

Appendix A
Rear Panel Connectors

A-1 Introduction

This appendix provides descriptions for the rear panel connectors on a typical Series MG369XA Synthesized CW Generator.

A-2 Rear Panel Connectors

Figure A-1 provides a illustration of the rear panel and describes the rear panel connectors.

A-3 Connector Pinout Diagrams

Figures A-2 and A-3 provide pinout diagrams and descriptions for the AUX I/O and IEEE-488 GPIB multipin connectors on the rear panel.

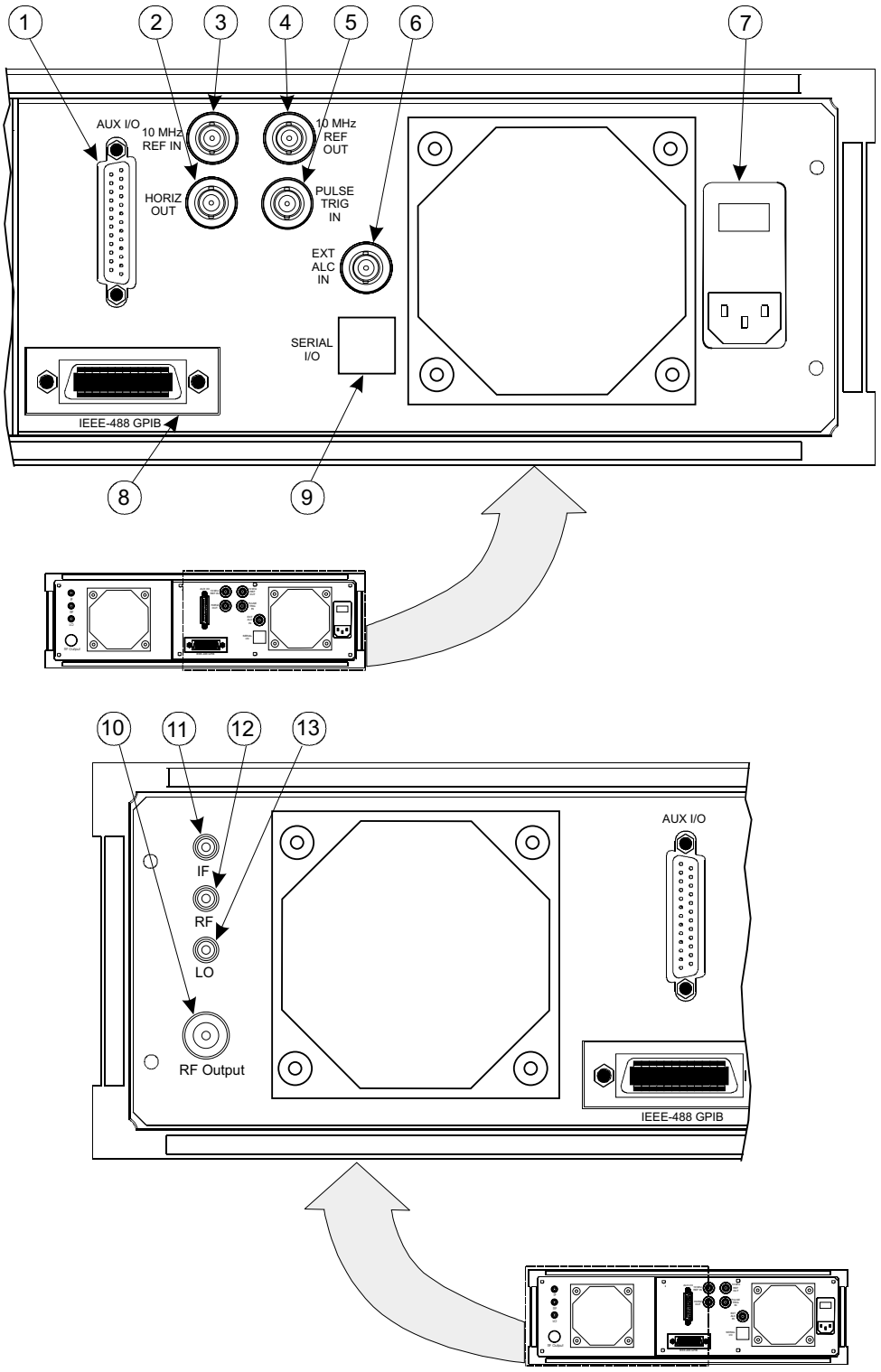
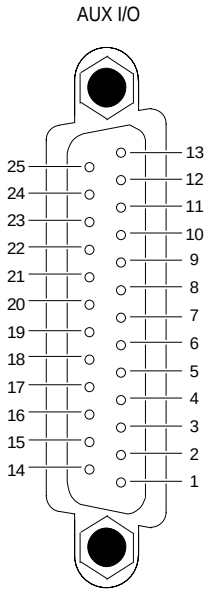


Figure A-1. *Rear Panel, Series MG369XA Synthesized CW Generator (1 of 2)*

1. **AUX I/O:** 25-pin connector that provides for single cable interface with another MG369XA (master-slave operation) or with other Anritsu instruments such as the Anritsu 56100A Scalar Network Analyzer. A pin-out diagram for this connector is shown in Figure A-2.
2. **HORIZ OUT:** Provides a 0V to 10V ramp during all sweep modes, regardless of sweep width. In the CW mode, provides a voltage between 0V and 10V proportional to the full frequency range of the instrument. When the CW Ramp is enabled, connector provides a repetitive 0V to 10V ramp. BNC connector, 50Ω impedance.
3. **10 MHz REF IN:** Accepts an external 10 MHz ±100 Hz, 0 to 10 dBm time-base signal. Automatically disconnects the internal high-stability, time-base option, if installed. BNC connector, 50Ω impedance.
4. **10 MHz REF OUT:** Provides a 0.5 Vp-p, AC coupled, 10 MHz signal derived from the internal frequency standard of the CW generator. BNC connector, 50Ω impedance.
5. **PULSE TRIG IN:** Accepts an external TTL level signal to pulse modulate the RF output. BNC connector.
6. **EXT ALC IN:** Provides for leveling the RF output signal externally with either a remote detector or a power meter. Connector accepts a positive or negative 0.5mV to 500 mV signal from a remote detector or a ±1V signal from a remote power meter. BNC connector.
7. **Input Line Voltage Module:** Contains an input receptacle for connecting line voltage to the MG369XA, two 2.5A, type T line fuses that provide over-voltage/current protection for CW generator circuits during operation and standby, and an On/Off power switch for applying line power to the MG369XA.
8. **IEEE-488 GPIB:** 24-pin connector that provides for remotely controlling the CW generator from an external controller via the IEEE488 bus (GPIB). A pinout diagram for this connector is shown in Figure A-3.
9. **SERIAL I/O:** Provides access to two RS-232 terminal ports to support service and calibration functions and master-slave operations. RJ45 connector.
10. **RF Output Connector (Option 9):** Provides RF output at the rear panel of the instrument.
11. **Mixer IF Input (Option 7):** Accepts an external IF input from DC to 500 MHz.
12. **Mixer RF Output (Option 7):** Provides an up-converted IF signal from 1 to 40 GHz.
13. **Mixer LO Input (Option 7):** Accepts an external RF input from 1 to 40 GHz.

Figure A-1. *Rear Panel, Series MG369XA Synthesized CW Generator (2 of 2)*



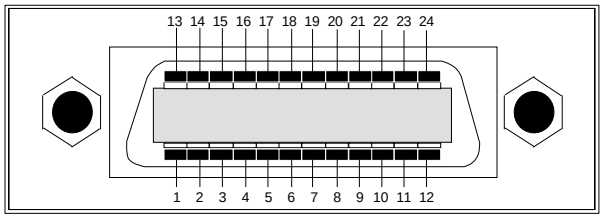
PIN	SIGNAL NAME	SIGNAL DESCRIPTION
1	HORIZ OUTPUT	*Horizontal Sweep Output:* Provides a 0V at beginning and +10V at end of sweep for all sweep modes, regardless of sweep width. In the CW mode, the voltage is proportional to frequency between 0V at low end and +10V at the high end of range. In CW mode, if CW Ramp is enabled, a repetitive, 0V to +10V ramp is provided. The ramp speed is adjusted by the Sweep Time function.
2	GND	Chassis Ground
3	SEQ SYNC	*Sequential Sync Output:* Provides a +5V signal during sweep retrace, at bandswitching points, and during each frequency step in step sweep mode, –5V during markers, and –10V during the selected marker.
4	L ALT ENABLE	*L-Alternate Enable Output:* Provides a TTL low-level signal which indicates that the alternate sweep mode is active.
5	MARKER OUTPUT	*Marker Output:* Provides a +5V or –5V signal during a marker. Signal polarity selected from a front panel menu.
6	RETRACE BLANKING	*Retrace Blanking Output:* Provides a +5V or –5V signal coincident with sweep retrace. Signal polarity selected from a front panel menu.
7	L ALT SWP	*L-Alternate Sweep Output:* Provides a TTL low-level signal to indicate that the primary sweep is in progress or a TTL high-level signal to indicate that the alternate sweep is in progress.
8	Shield	Cable Shield/Chassis Ground
9	TRIGGER OUTPUT	*Trigger Output:* Provides a TTL low-level trigger signal for external devices or instruments.
10	SWP DWELL OUT	*Sweep Dwell Output:* Provides an open-collector output which goes to ground when the sweep is dwelled at the start, stop, and bandswitching frequencies, and at the markers.

Figure A-2. *Pinout Diagram, AUX I/O Connector (1 of 2)*

PIN	SIGNAL NAME	SIGNAL DESCRIPTION
11	LOCK STATUS	*Lock Status Output:* Provides a TTL high-level signal when the frequency is phase-locked.
12	N/A	This pin not used
13	EXT TRIGGER	*External Trigger:* Accepts a TTL low-level signal of 1 μs width to trigger a sweep.
14	V/GHz	*V/GHz Output:* Provides a reference voltage relative to the RF output frequency (1.0 V/GHz for Model MG3692A; 0.5 V/GHz for Model MG3694A).
15	EOS INPUT	*End-of-Sweep Input:* Accepts a TTL high-level signal to tell the CW generator to begin the end of sweep dwell.
16	EOS OUTPUT	*End-of-Sweep Output:* Provides a TTL high-level signal when the CW generator has begun the end of sweep dwell.
17	AUX 1	*Aux 1:* Auxiliary input/output to the processor (PB6).
18	SWP DWELL IN	*Sweep Dwell Input:* Permits a TTL low-level signal to pause the sweep. The sweep resumes when the signal is removed.
19	AUX 2	*Aux 2:* Auxiliary input/output to the processor (PC3).
20	BANDSWITCH BLANK	*Bandswitch Blanking Output:* Provides a +5V or –5V signal coincident with band-switching points. Signal polarity is selected from a front panel menu.
21	SPARE	
22	HORIZ IN	*Horizontal Sweep Input:* Accepts a 0V to 10V external sweep ramp from a Master MG369XA. This input is automatically selected when the CW generator is in the Slave Mode.
23	Return	Horizontal Sweep Input return.
24	GND	Chassis Ground
25	MEMORY SEQ	*Memory Sequencing Input:* Accepts a TTL low-level signal to sequence through ten stored, front panel setups.

Figure A-2. *Pinout Diagram, AUX I/O Connector (2 of 2)*

IEEE-488 GPIB



PIN	SIGNAL NAME	SIGNAL DESCRIPTION
1-4	DIO 1 thru DIO 4	*Data Input/Output:* Bits are HIGH when the data is logical 0 and LOW when the data is logical 1.
5	EOI	*End or Identify:* A low-true state indicates that the last byte of a multibyte message has been placed on the line.
6	DAV	*Data Valid:* A low-rue state indicates that the active talker has (1) sensed that NRFD is high-false and NDAC is low-true, (2) placed the data byte on the bus, and (3) waited an appropriate length of time for the data to settle.
7	NRFD	*Not Ready For Data:* A high-false state indicates that all active listeners are ready to accept new data.
8	NDAC	*Not Data Accepted:* A low-true state indicates that all addressed listeners have accepted the current data byte for internal processing.
9	IFC	*Interface Clear:* A low-true state places all bus instruments in a known, quiescent state—unaddressed to talk, unaddressed to listen, and service request idle.
10	SRQ	*Service Request:* A low-true state indicates that a bus instrument desires the immediate attention of the controller.
11	ATN	*Attention:* A low-true state indicates that the bus is in the command mode (data lines are carrying bus commands). A high-false state indicates that the bus is in the data mode (data lines are carrying device-dependent instructions or data).
12	Shield	Chassis Ground
13-16	DIO5 thru DIO6	*Data Input/Output:* Bits are HIGH when the data is logical 0 and LOW when the data is logical 1.
17	REN	*Remote Enable:* A low-true state enables bus instruments to be operated remotely, when addressed.

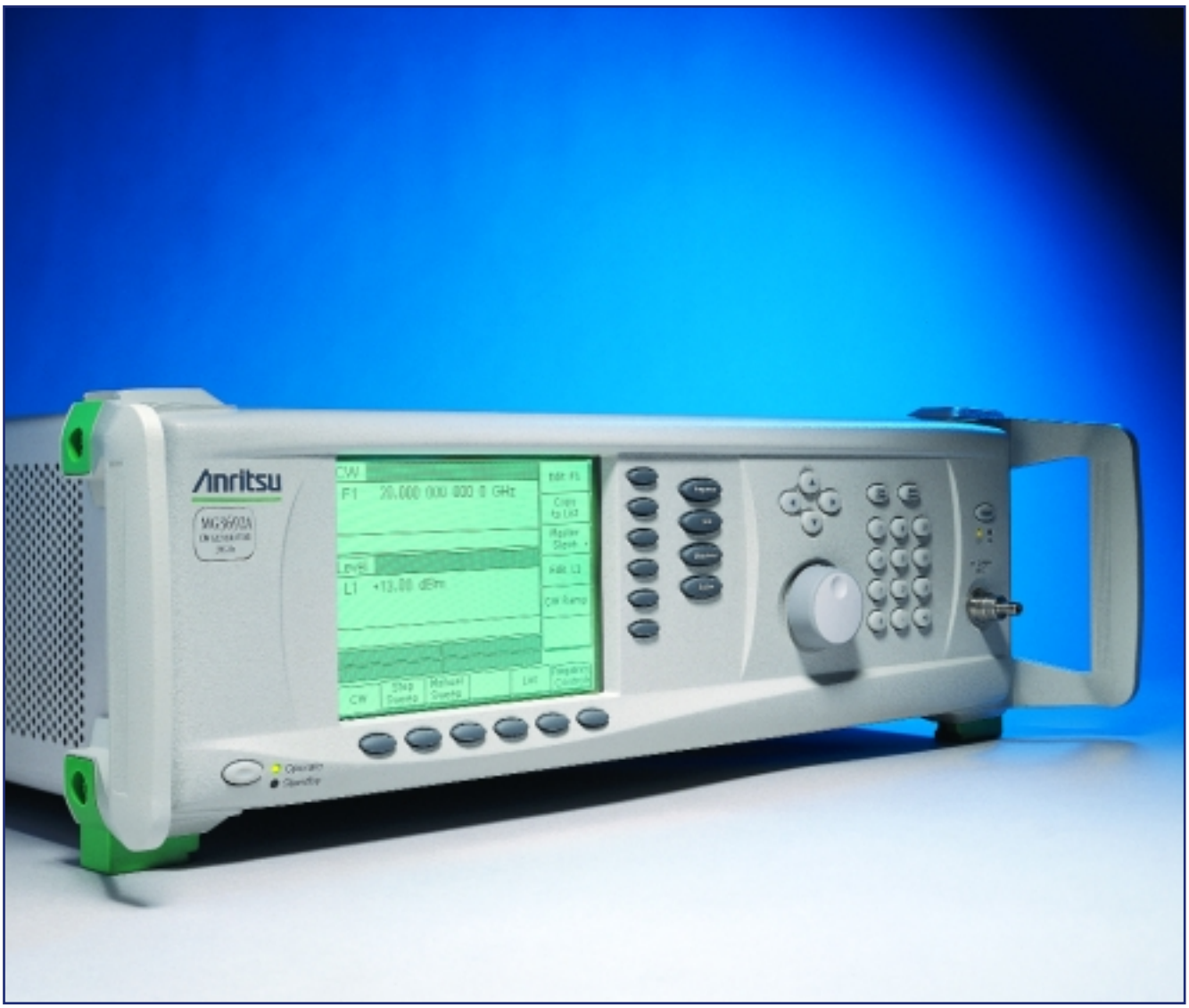
Figure A-3. *Pinout Diagram, IEEE-488 GPIB Connector*

Anritsu

MG3690A

RF/Microwave CW Generators

0.1 Hz to 65 GHz



The Ideal Local Oscillator

VALUE WITHOUT COMPROMISE

Your microwave signal generation requirements have never been tougher, and yet your capital equipment budget has never been tighter. You need the most value you can get in a synthesizer, but you can't compromise performance. You need a synthesizer that meets today's needs yet can be upgraded at a reasonable cost to satisfy future requirements without shattering your test equipment budget. Anritsu's MG3690A series of synthesizers deliver the highest performance and the highest value available today.

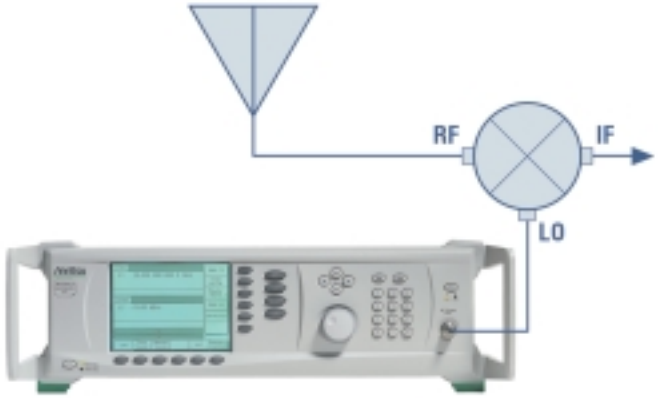
THE MG3690A SYNTHESIZED CW GENERATOR

These basic signal sources provide accurate outputs over a wide frequency and power range for Local Oscillator duty and other CW applications.

- Broad frequency coverage including 0.1 Hz to 65 GHz in a single coax output
- Ultra-low SSB phase noise and spurious
- +17 dBm guaranteed leveled power to 20 GHz
- 0.1 Hz optional frequency resolution
- <5 ms switching time for <100 MHz sweep steps
- Digital frequency sweep and digital power sweep
- Wide dynamic range with accurate output levels
- Intuitive, menu-driven front panel

BASIC LO APPLICATION

In local oscillator and other basic-signal applications, you need high output power, low phase noise, excellent frequency stability and low spurious signal levels. The MG3690A with High Power Option provides +17 dBm output power while ultra-low SSB phase noise and spurious signals below –60 dBc preserve signal fidelity. Oven-stabilized internal reference oscillators with $<5x10^{-10}$ per day frequency stability keep you on channel. When you need to add broader frequency coverage, modulation, or frequency and power sweep, simply upgrade to the performance you need.

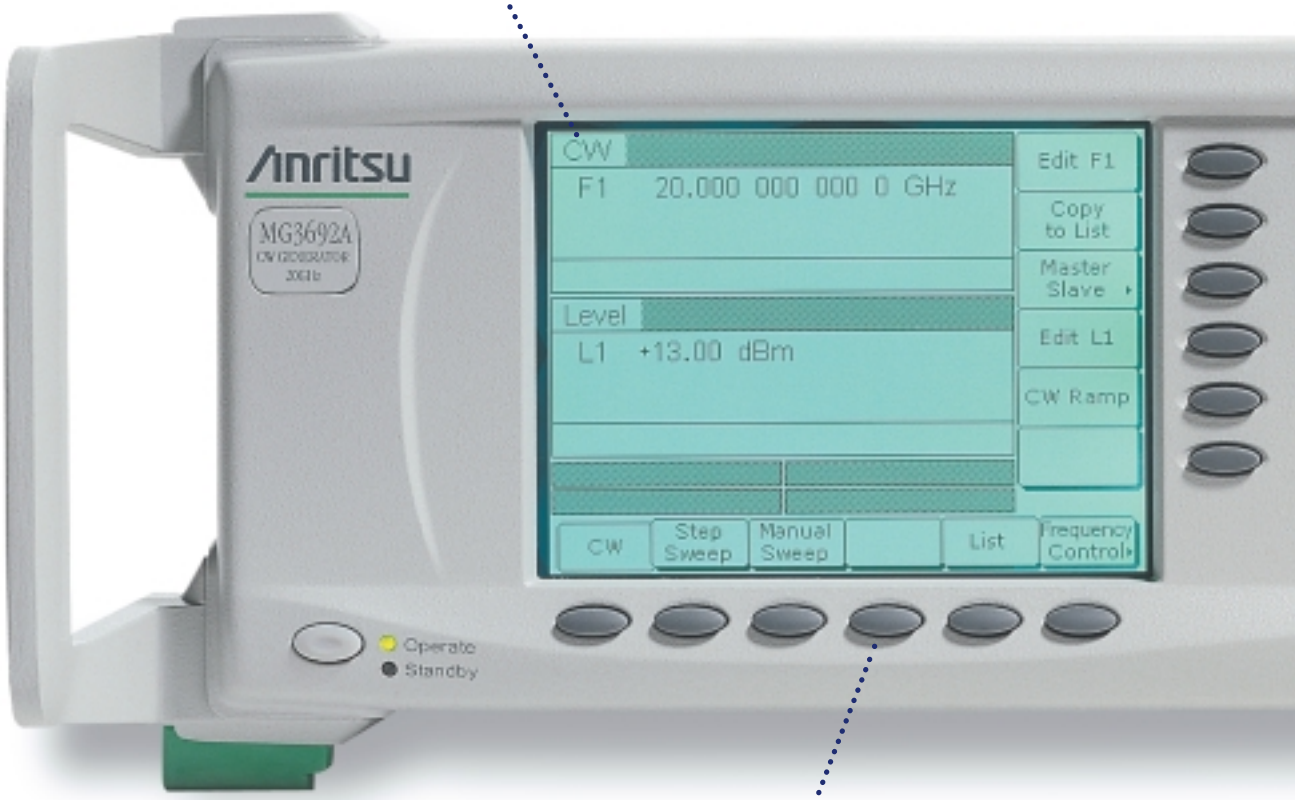


6 MODELS, FULLY CONFIGURABLE, FULLY UPGRADABLE

- MG3691A 2 to 8.4 GHz
- MG3692A 2 to 20 GHz
- MG3693A 2 to 30 GHz
- MG3694A 2 to 40 GHz
- MG3695A 2 to 50 GHz
- MG3696A 2 to 65 GHz

The MG3690A series offers six basic models that cover the frequency ranges of 2 to 8.4, 20, 30, 40, 50, or 65 GHz. Options can easily be added to configure these models to meet your specific needs. As your needs change, your unit can be upgraded in frequency or options, minimizing your capital equipment investment risks. Option 3, Ultra-Low Phase Noise, adds high performance lock loops that deliver unrivaled phase noise performance. Options 4 and 5 add RF frequency coverage down to 10 MHz. Option 4 adds a Digital Down Converter with the best RF phase noise performance. Option 5 adds an Analog Down Converter. Option 7 adds an internal mixer that allows the up-conversion of an external IF signal. When used with an IQ modulated RF source, an MG3690A with option 7 allows IQ modulated measurements up to 40 GHz. For audio frequency coverage down to 0.1 Hz, Option 22 adds a Direct Digital Synthesizer. Option 13 offers external pulse capabilities. Check the last page of this brochure for the remaining traditional synthesizer options.

Easy to Read
backlit 1/4 VGA LCD display presents instrument status and measurement setup menus.



Softkey Menus
lead you quickly to the desired instrument setup. Intuitive menu flow virtually eliminates opening the operating manual! (Open it anyway, there's other good information in it.)

MG3690A FAMILY

Function Keys

group instrument functions for simple operation. Configure GPIB interface and input/output connectors. Initiate security mode and self-test diagnostics. Save and recall up to 10 front panel instrument states.

Conveniently Enter and Edit Parameters

with the numeric keypad, cursor/increment-decrement key, or rotary data knob.

A Low Profile 13.3 cm Height

coupled with 45 cm depth, you get maximum performance in the minimum A.T.E. rack space.

Set Frequency from 0.1 Hz to 65 GHz in .01 Hz Steps.

Set power levels from +17 to –120 dBm in 0.01 dB steps.

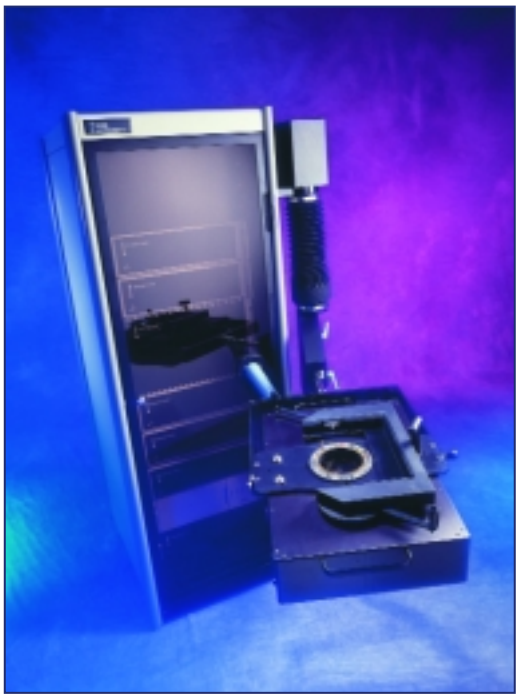
CW GENERATORS

THE MG3690A – A NEW SYNTHESIZER FOR THE NEW MILLENNIUM

The MG3690A leverages the proven design of earlier Anritsu synthesizers, adding new features to meet the latest needs of the new millennium. The MG3690A builds on a proven reliability record of >49,000 hours MTBF. This allows the MG3690A to offer a standard 3-year warranty. From the sleek new lines of the front panel, the larger $^{1}/_{4}$ VGA LCD, the reduced front panel buttons and menu depth, to the 10 kg lighter and 15 cm shallower depth, the MG3690A meets the new millennium value-based needs.

AUTOMATIC TEST EQUIPMENT

The MG3690A is an ideal CW generator for an A.T.E. It packs the highest performance available in a 13.3 cm (3u) package, with a 450 mm depth that minimizes rack space. High output power assures adequate signal strength to the device under test even after A.T.E. switching and cabling losses. Accurately leveled output power to –120 dBm in 0.01 dB steps facilitates receiver sensitivity measurements. For improved MTBF, an electronic step attenuator replaces the traditional mechanical step attenuator. Fast 5 ms switching time maximizes system throughput. Internal list mode frees the A.T.E. controller to perform measurement analysis tasks. Free application drivers, including the IVI-COM driver and National Instruments LabView® drivers, save you time and money in code generation and maintenance. For additional cost savings, Option 17 eliminates the complete front panel including circuitry.



The Roos Instruments 7100A RFIC Tester with five Anritsu Synthesizers

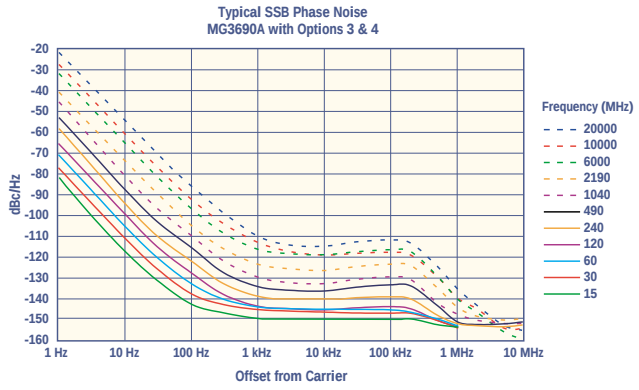
INTERCHANGEABLE VIRTUAL INSTRUMENTS STANDARD

The IVI standard defines a standard instrument driver model that enables instrument interchangeability and interoperability without software changes. Anritsu's IVI-driver supported synthesizer minimizes instrument development and maintenance cost through the use of IVI-standard interfaces as well as instrument-specific interfaces for unique instrument features. The IVI standard provides a single driver that supports the common application development environments such as Visual Basic, Visual C++, and Labview. The flexible I/O model supports new communication technologies such as USB, Ethernet, and Firewire.

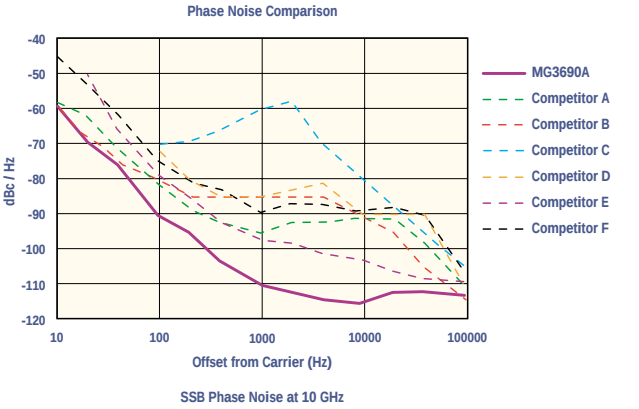
Anritsu Corporation leads the way with IVI technology, having released the first COM-based IVI driver supporting the Signal Generator instrument class, and includes the driver with every MG3690A series synthesizer. As an active member of the IVI Foundation, Anritsu supports the Foundation's drive toward instrument driver standardization as a powerful means of delivering interchangeable ATE instrumentation solutions.

INTERCHANGEABLE IVI™ VIRTUAL INSTRUMENTS

PERFORMANCE WITHOUT PEER



Phase Noise Performance typically only seen on narrow-band sources



Anritsu's phase noise eclipses the competition

CLEANER PHASE NOISE MEANS MORE ACCURATE MEASUREMENTS

Anritsu provides this high level of performance so that our customers can develop their own state-of-the-art products. With communications systems and modulation techniques becoming more complex, the low noise aspect of the MG3690A series becomes more important. For example, when the MG3690A is used as a clock source for Bit Error Rate Testing (BERT), the low SSB phase noise translates to precise clocks, with edges that are consistent period after period. The benefit is clear, a wider eye diagram with sharper transitions. The lower the SSB phase noise of the source, the less error the frequency source introduces into the measurement; it's as simple as that.

ONE-BOX, ULTRA-CLEAN RF AND MICROWAVE SIGNAL SOLUTIONS

Anritsu's MG3690A series of synthesizers utilize state-of-the-art technology to achieve extremely low phase noise over the full frequency spectrum.

Below 10 MHz, these synthesizers utilize Direct Digital Synthesis (DDS) techniques to achieve ultra-fine frequency resolution coupled with outstanding phase noise performance.

From 10 MHz to 2.2 GHz, the new Digital Down Converter (DDC) is available offering ultra-low SSB phase noise performance on a par with the best RF synthesizers on the market and typically 30-50 dB better than other microwave synthesizers. In this frequency range, this stellar SSB phase noise performance is important because the highly congested communications bands require extra clean signals. The DDC produces frequencies by successive binary division, eliminating the addition of non-harmonic spurious common with mixer-based down conversion schemes.

Above 2.2 GHz, Anritsu uses patented techniques that allow us to achieve the best possible phase noise performance. Where other manufacturers typically use only three or four phase locked loops for frequency synthesis, Anritsu adds additional loops optionally to provide the best SSB phase noise on the market today.

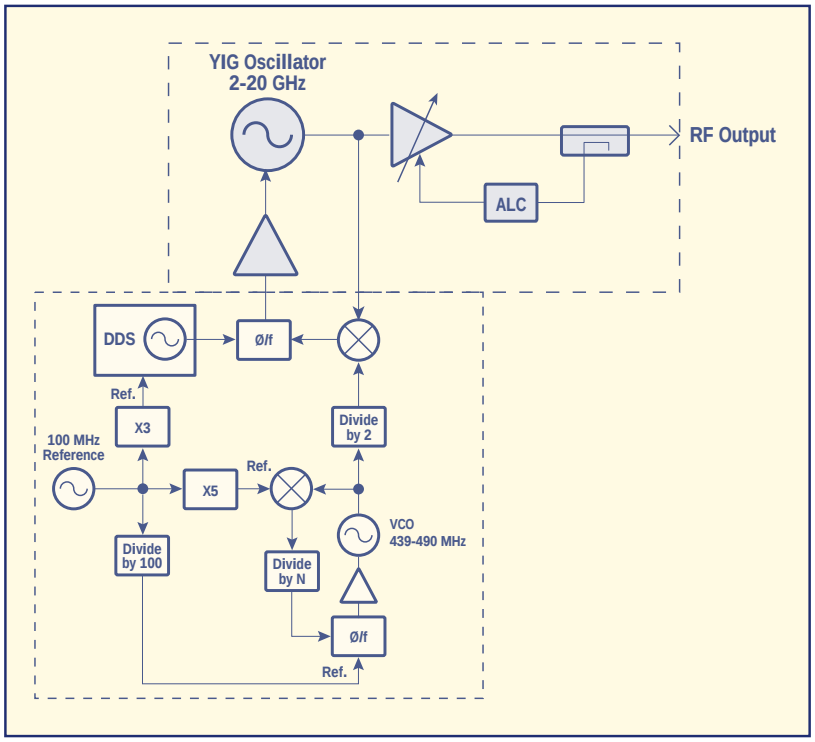
Anritsu synthesizers can truly provide a one-box solution for clean audio frequency, ultra-clean RF, and microwave signal generation, offering outstanding performance in applications that would have previously required a separate RF synthesizer. The phase noise plots included show the MG3690A's superb performance from 15 MHz to 20 GHz, with offsets from 1 Hz to 10 MHz. Another plot compares the MG3690A's performance at 10 GHz with that of the major broadband synthesizers on the market. When it comes to clean broadband signals, the MG3690A eclipses the competition.

The MG3690A is the ideal clock source for BERTS, such as the Anritsu MP1632A or MP1763B/MP1764A combo.

INNOVATIONS IN SIGNAL SYNTHESIS

Many technologies come together in the Anritsu MG3690A series of synthesizers to provide an excellent price to performance ratio.

Several innovative technologies are incorporated into the frequency synthesis sections. By utilizing a 100 MHz crystal oscillator instead of the traditional 5 or 10 MHz references, the MG3690A is able to provide better SSB phase noise through lower Phase Locked Loop (PLL) multiplication ratios. New technology that has recently become available has allowed the use of a single Direct Digital Synthesizer (DDS) to provide the required fine frequency steps. Previous technologies forced the use of several PLL's in association with a DDS in order to provide acceptable spurious performance. This clearly allows a win-win situation where performance is not compromised yet complexity is reduced improving reliability as well as decreasing the cost of ownership.

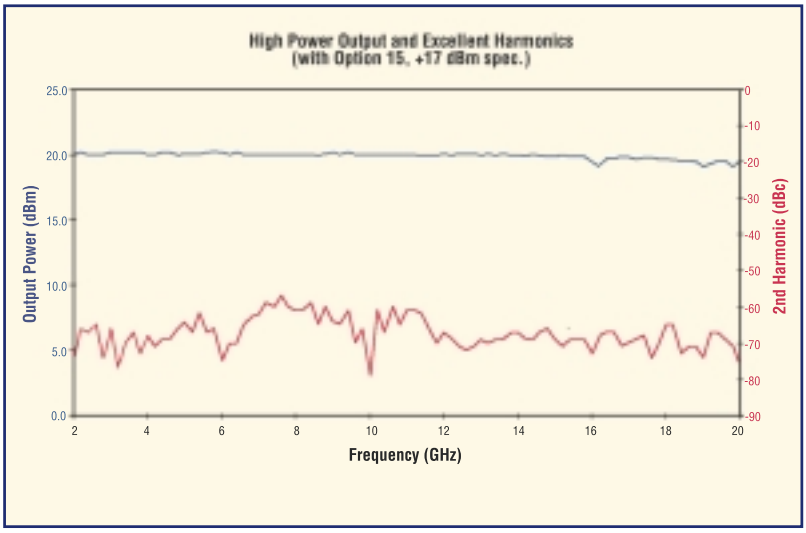


MG3690A Frequency Synthesis Block Diagram

The main output chain for the microwave frequencies also includes important performance enhancing technology. By using a single 2-20 GHz YIG oscillator in conjunction with a switched-filter bank, spectral purity can be maintained over the full frequency range. Other manufacturers often use frequency multiplication techniques for some of the frequency range which leads to degraded spurious and/or harmonic performance.

Even with all the new technology in the MG3690A series of synthesizers, these new sources still provide all of the reliability you've come to expect from Anritsu.

- **Complex ATE Setups**
- **Lengthy Cable Runs**
- **Coax Switch Arrays**
- **Power Splitters**
- **Couplers**



Typical performance of 20 dBm power with >60 dBc harmonics

These are important pieces of your measurement puzzle – and they all rob you of precious power needed to test the last device at the end of the line. You need full spectrum 2-20 GHz microwave power at that last device, but you can't afford to compromise signal purity. You need the MG3692A with Option 15. With the MG3692A/15 you get guaranteed +17 dBm with –50 dBc harmonics. But, with Anritsu's conservative power spec, the MG3692A/15 will give you typical output power of +19 dBm and –60 dBc. That margin is priceless when fighting those lossy components with less than perfect matches typical of complex test setups.

SPECIFICATIONS

CW Mode

Output: Twenty independent, presettable CW frequencies (F0 – F9 and M0 – M9).

Accuracy: Same as internal or external 10 MHz time base.

Internal Time Base Stability:

With Aging: <2 x 10^{-9}/day
(<5 x 10^{-10}/day with Option 16)

With Temperature: <2 x 10^{-8}/deg C over 0˚C to 55˚C
(<5 x 10^{-9}/C with Option 16)

Resolution: 0.01 Hz

External 10 MHz Reference Input: Accepts external 10 MHz ±100 Hz, –10 to +20 dBm time base signal. Automatically disconnects the internal high-stability time-base option, if installed. BNC, rear panel, 50 ohm impedance.

10 MHz Reference Output: 0.5 Vp-p into 50 ohms, AC coupled. Rear panel BNC; 50 ohm impedance.

Switching Time (typical maximum): <40 ms to be within 1 kHz of final frequency.

Phase Offset: Adjustable in 0.1 degree steps

Phase-Locked Step Sweep Mode

Sweep Width: Independently selected, 0.01 Hz to full range. Every frequency step in sweep range is phase-locked.

Accuracy: Same as internal or external 10 MHz time base.

Resolution (Minimum Step Size): 0.01 Hz

Linear/Log Sweep: User-selectable linear or log sweep. In log sweep, step size logarithmically increases with frequency.

Steps: User-selectable number of steps or the step size.

Number of Steps: Variable from 1 to 10,000

Step Size: 0.01 Hz to the full frequency range of the instrument. (If the step size does not divide into the selected frequency range, the last step is truncated.)

Dwell Time Per Step: Variable from 1 ms to 99 seconds

Fixed Rate Sweep: Allows the user to set the total time of the sweep, including lock time. Variable from 20 ms to 99 seconds.

Switching Time (typical maximum): <15 ms + 1 ms/GHz step size or <40 ms, whichever is less, to be within 1 kHz of final frequency.

Alternate Sweep Mode

Sweeps alternately in step sweep between any two sweep ranges. Each sweep range may be associated with a power level.

Manual Sweep Mode

Provides stepped, phase-locked adjustment of frequency between sweep limits. User-selectable number of steps or step size.

List Sweep Mode

Under GPIB control or via the front panel, up to 4 tables with 2000 non-sequential frequency/power sets can be stored and then addressed as a phase-locked step sweep. One table of 2000 points is stored in non-volatile memory, all other tables are stored in volatile memory.

Switching Time (typical maximum): <25 ms to be within 1 kHz of final frequency.

Programmable Frequency Agility

Under GPIB control, up to 3202 non-sequential frequency/ power sets can be stored and then addressed as a phase-locked step sweep. Data stored in volatile memory.

Switching Time (typical maximum): <25 ms to be within 1 kHz of final frequency.

Markers

Up to 20 independent, settable markers (F0 – F9 and M0 – M9).

Video Markers: +5V or –5V marker output, selectable from system menus. AUX I/O connector, rear panel.

Marker Accuracy: Same as sweep frequency accuracy.

Marker Resolution: 0.01 Hz

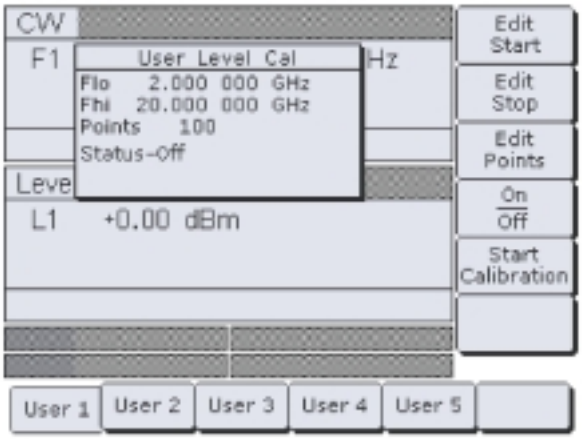
Sweep Triggering

Sweep triggering is provided for Step Frequency Sweep, List Frequency Sweep, and CW Power Sweep.

Auto: Triggers sweep automatically.

External: Triggers a sweep on the low to high transition of an external TTL signal. AUX I/O connector, rear panel.

Single: Triggers, aborts, and resets a single sweep. Reset sweep may be selected to be at the top or bottom of the sweep.



User Level Flatness Correction Screen

General

Stored Setups: Stores front panel settings and nine additional front-panel setups in a non-volatile RAM. A system menu allows saving and recalling of instrument setups. Whenever the instrument is turned on, control settings come on at the same functions and values existing when the instrument was turned off.

Memory Sequencing Input: Accepts a TTL low-level signal to sequence through ten stored setups. AUX I/O connector, rear panel.

Self-Test: Instrument self-test is performed when Selftest soft-key is selected. If an error is detected, an error message is displayed in a window on the LCD identifying the probable cause and remedy.

Secure Mode: Disables all frequency and power level state displays. Stored setups saved in secure mode remain secured when recalled. Mode selectable from a system menu and via GPIB.

Parameter Entry: Instrument-controlled parameters can be entered in three ways-keypad, rotary data knob, or the ^ and v touch pads of the cursor-control key. The keypad is used to enter new parameter values; the rotary data knob and the cursor-control key are used to edit existing parameter values. The < and > touch pads of the cursor-control key move the cursor left and right one digit under the open parameter. The rotary data knob or the < and > touch pads will increment or decrement the digit position over the cursor.

Controlled parameters are frequency, power level, sweep time, dwell time, and number of steps.

Keypad entries are terminated by pressing the appropriate soft key. Edits are terminated by exiting the edit menu.

Reset: Returns all instrument parameters to predefined default states or values. Any pending GPIB I/O is aborted. Selectable from the system menu.

Master/Slave Operation: Allows two output signals to be swept with a user-selected frequency offset. One instrument controls the other via AUX I/O and SERIAL I/O connections. Requires a Master/Slave Interface Cable Set (Part No. ND36329).

User Level Flatness Correction: Allows user to calibrate out path loss due to external switching and cables via entered power table from a GPIB power meter or calculated data. When user level correction is activated, entered power levels are delivered at the point where calibration was performed. Supported power meters are Anritsu ML2437A, ML2438A, and ML4803A and HP 437B, 438A, and 70100A. Five user tables are available with up to 801 points/table.

Warm Up Time:

From Standby: 30 minutes.

From Cold Start (0 deg C): 120 hours to achieve specified frequency stability with aging.

Instruments disconnected from ac line power for more than 72 hours require 30 days to return to specified frequency stability with aging.

Power: 85-264 Vac, 48-440 Hz, 250 VA maximum

Standby: With AC line power connected, unit is placed in standby when front panel power switch is released from the OPERATE position.

Weight: 18 kg maximum

Dimensions: 133 H x 429 W x 450 D mm

Remote Operation

All instrument functions, settings, and operating modes (except for power on/standby) are controllable using commands sent from an external computer via the GPIB (IEEE-488 interface bus).

GPIB Address: Selectable from a system menu

IEEE-488 Interface Function Subset:

Source Handshake: SH1

Acceptor Handshake: AH1

Talker: T6

Listener: L4

Service Request: SR1

Remote/Local: RL1

Parallel Poll: PP1

Device Clear: DC1

Device Trigger: DT1

Controller Capability: C0, C1, C2, C3, C28

Tri-State Driver: E2

GPIB Status Annunciators: When the instrument is operating in Remote, the GPIB status annunciators (listed below) will appear in a window on the front panel LCD.

Remote: Operating on the GPIB (all instrument front panel keys except for the SYSTEM key and the RETURN TO LOCAL soft-key will be ignored).

LLO (Local Lockout): Disables the RETURN TO LOCAL soft-key. Instrument can be placed in local mode only via GPIB or by cycling line power.

Emulations: The instrument responds to the published GPIB commands and responses of the Anritsu Models 6600, 6700, and 6XX00-series signal sources. When emulating another signal source, the instrument will be limited to the capabilities, mnemonics, and parameter resolutions of the emulated instrument.

Environmental

Storage Temperature Range: –40 to +75 deg C

Operating Temperature Range: 0 to +50 deg C

Relative Humidity: 5% to 95% at 40 deg C

Altitude: 4,600 meters, 43.9 cm Hg

EMI: Meets the emission and immunity requirements of
EN55011:1991/CISPR-11:1990 Group 1 Class A
EN50082-1:1997/
EN 61000-4-2:1995 – 4 kV CD, 8 kV AD
EN61000-4-3:1997 – 3 V/m
ENV50204 – 3 V/m
EN61000-4-4: 1995 – 0.5 kV SL, 1 kV PL
EN61000-4-5:1995 – 1 kV – 2 kV L-E
MIL-STD-461C Part 2 REO1, REO2, CEO1, CEO3, CSO1, CSO2, CSO6, RSO30 to +10 dBm time-base signal. Automatically disconnects the internal high-stability time-base option, if installed.
50 Ω impedance.enabled, a repetitive, 0V to +10V ramp is provided.

SPECTRAL PURITY

All specifications apply at the lesser of +10 dBm output or maximum specified leveled output power, unless otherwise noted.

Spurious Signals

Harmonic and Harmonic Related:

Frequency Range	Standard
0.1 Hz to 10 MHz (Option 22)	<–30 dBc
10 MHz to ≤100 MHz (Option 4)	<–40 dBc
>100 MHz to ≤2.2 GHz (Option 4)	<–50 dBc
10 MHz to ≤50 MHz (Option 5)	<–30 dBc
>50 MHz to ≤2 GHz (Option 5)	<–40 dBc
>2 GHz (2.2 GHz w/Option 4) to ≤20 GHz	<–60 dBc
>20 GHz to ≤40 GHz	<–40 dBc
>40 GHz to ≤50 GHz (MG3695A)	<–40 dBc
>40 GHz to ≤65 GHz (MG3696A)	<–25 dBc

Harmonic and Harmonic Related (for models with Option 15, at maximum specified leveled output power):

Frequency Range	Standard
10 MHz to ≤100 MHz (Option 4)	<–40 dBc
>100 MHz to ≤2.2 GHz (Option 4)	<–50 dBc
10 MHz to ≤50 MHz (Option 5)	<–30 dBc
>50 MHz to ≤2 GHz (Option 5)	<–40 dBc
>2 GHz (2.2 GHz w/Option 4) to ≤20 GHz	<–50 dBc
>20 GHz to ≤40 GHz	<–30 dBc*

*Typical (<21 GHz: <–20 dBc typical)

Nonharmonics:

Frequency Range	Standard
0.1 Hz to 10 MHz (Option 22)	<–30 dBc
10 MHz to ≤2.2 GHz (Option 4)	<–60 dBc
10 MHz to ≤2 GHz (Option 5)	<–40 dBc
>2 GHz (2.2 GHz w/Option 4) to ≤65 GHz	<–60 dBc

Power Line and Fan Rotation Spurious Emissions (dBc):

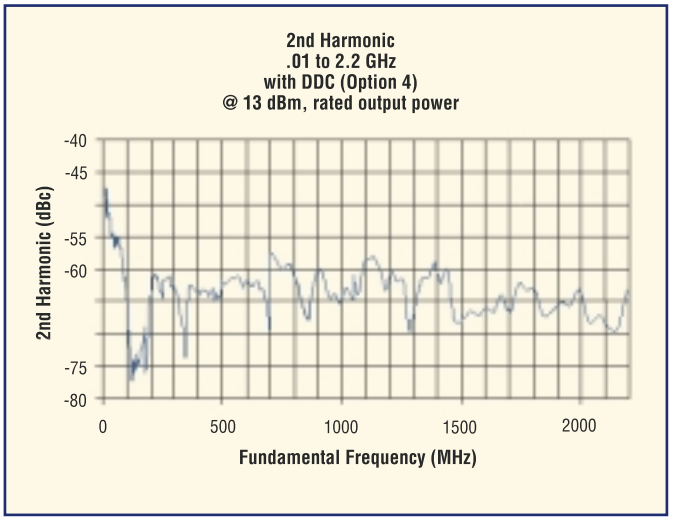
	Offset From Carrier		
Frequency Range	<300 Hz	300 Hz to 1 kHz	>1 kHz
≥10 to ≤500 MHz (Option 4)	<–68	<–72	<–72
>500 to ≤1050 MHz (Option 4)	<–62	<–72	<–72
>1050 to ≤2200 MHz (Option 4)	<–56	<–66	<–66
≥0.01 to ≤8.4 GHz	<–50	<–60	<–60
>8.4 to ≤20 GHz	<–46	<–56	<–60
>20 to ≤40 GHz	<–40	<–50	<–54
>40 to ≤65 GHz	<–34	<–44	<–48

Residual FM (CW and Step Sweep modes, 50 Hz - 15 kHz BW):

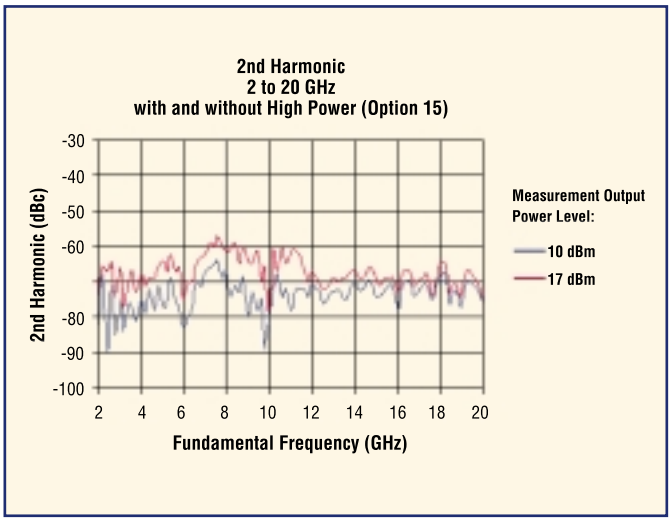
	Residual FM (Hz RMS)	
Frequency Range	Option 3, 4	Standard
≥0.01 to ≤8.4 GHz	<40	<120
>8.4 to ≤20 GHz	<40	<220
>20 to ≤40 GHz	<80	<440
>40 to ≤65 GHz	<160	<880

AM Noise Floor:

Typically <–145 dBm/Hz at 0 dBm output and offsets >5 MHz from carrier.



RF band harmonics with DDC option



Increase your output power without compromising your spectral purity

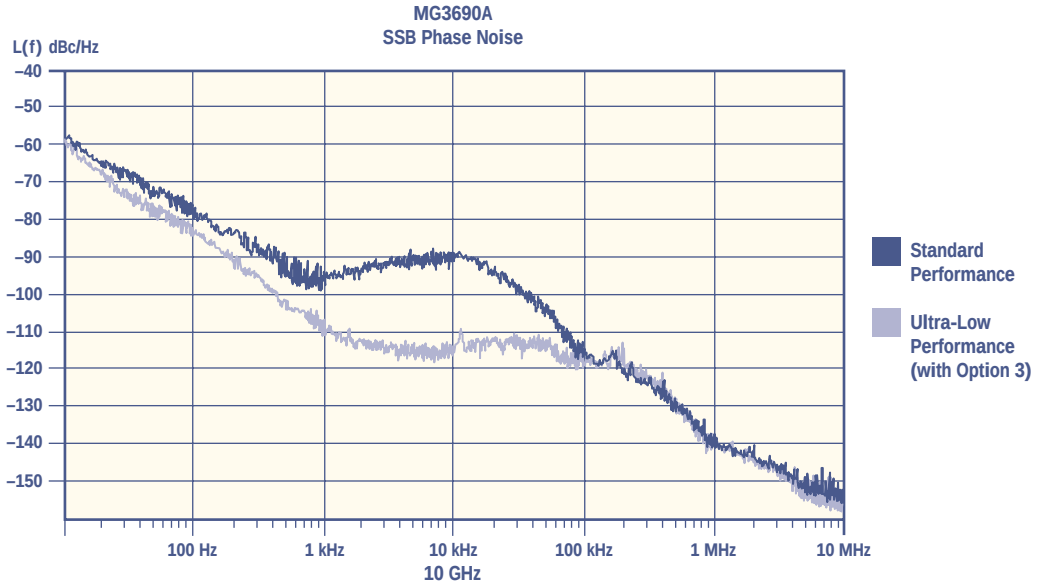
Single-Sideband Phase Noise

Single-Sideband Phase Noise (dBc/Hz):

Frequency Range	Offset From Carrier 100 Hz	1 kHz	10 kHz	100 kHz
≥0.1 Hz to <10 MHz (Option 22)	–90	–120	–130	–130
≥10 MHz to <500 MHz (Option 4)	–94	–106	–104	–120
≥500 MHz to <2200 MHz (Option 4)	–82	–94	–92	–108
≥10 MHz to <2 GHz (Option 5)	–77	–88	–85	–100
≥2 GHz to ≤6 GHz	–77	–88	–86	–102
>6 GHz to ≤10 GHz	–73	–86	–83	–102
>10 GHz to ≤20 GHz	–66	–78	–77	–100
>20 GHz to ≤40 GHz	–60	–75	–72	–94
>40 GHz to ≤65 GHz	–54	–69	–64	–88

Single-Sideband Phase Noise (dBc/Hz) – Option 3:

Frequency Range	Offset From Carrier 10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz
≥0.1 Hz to <10 MHz (Option 22)	–60	–90	–120	–130	–130	–130
≥10 MHz to ≤15.625 MHz (Option 4)	–105	–126	–139	–142	–141	–145
>15.625 MHz to ≤31.25 MHz (Option 4)	–99	–120	–134	–137	–137	–145
>31.25 MHz to ≤62.5 MHz (Option 4)	–90	–114	–129	–136	–136	–144
>62.5 MHz to ≤125 MHz (Option 4)	–84	–108	–127	–135	–133	–144
>125 MHz to ≤250 MHz (Option 4)	–88	–102	–125	–132	–130	–143
>250 MHz to ≤500 MHz (Option 4)	–77	–99	–123	–125	–124	–142
>500 MHz to ≤1050 MHz (Option 4)	–71	–93	–118	–121	–119	–138
>1050 MHz to ≤2200 MHz (Option 4)	–66	–86	–112	–115	–113	–135
≥10 MHz to <2 GHz (Option 5)	–64	–83	–100	–102	–102	–111
≥2 GHz to ≤6 GHz	–54	–77	–104	–108	–111	–130
>6 GHz to ≤10 GHz	–52	–73	–100	–107	–110	–128
>10 GHz to ≤20 GHz	–45	–68	–94	–102	–104	–125
>20 GHz to ≤40 GHz	–45	–63	–92	–98	–98	–119
>40 GHz to ≤65 GHz	–37	–57	–86	–92	–90	–113



Typical MG3690A single sideband phase noise at 10 GHz carrier. Standard and Ultra-Low performance with Option 3.

RF OUTPUT

Power level specifications apply at 25 ±10˚C.

Maximum Leveled Output Power:**

Model Number	Configuration	Frequency Range (GHz)	Output Power (dBm)	Output Power With Step Attenuator (dBm)	Output Power With Electronic Step Attenuator (dBm)
MG3691A	w/opt 4 w/opt 5 STD	≤2.2 GHz ≤2 GHz ≥2 to ≤8.4 GHz	+17.0 +17.0 +13.0	+15.0 +15.0 +11.0	+13.0 +13.0 +9.0
MG3692A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤8.4 GHz >8.4 to ≤20 GHz	+17.0 +17.0 +13.0 +13.0	+15.0 +15.0 +11.0 +11.0	+13.0 +13.0 +9.0 +3.0
MG3693A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz >20 to ≤30 GHz	+13.0 +13.0 +9.0 +6.0	+11.0 +11.0 +7.0 +3.0	Not Available
MG3694A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz >20 to ≤40 GHz	+13.0 +13.0 +9.0 +6.0	+11.0 +11.0 +7.0 +3.0	Not Available
MG3695A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz >20 to ≤50 GHz	+12.0 +12.0 +10.0 +3.0	+10.0 +10.0 +8.0 +0.0	Not Available
MG3696A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤20 GHz >20 to ≤65 GHz	+12.0 +12.0 +10.0 +3.0	+10.0 +10.0 +8.0 +0.0*	Not Available

*Typical 60 to 65 GHz

Maximum Leveled Output Power With Option 15 (High Power) Installed:**

Model Number	Configuration	Frequency Range (GHz)	Output Power (dBm)	Output Power With Step Attenuator (dBm)	Output Power With Electronic Step Attenuator (dBm)
MG3691A	w/opt 4 w/opt 5 STD	≤2.2 GHz ≤2 GHz ≥2 to ≤8.4 GHz	+19.0 +19.0 +19.0	+18.0 +18.0 +18.0	+15.0 +15.0 +13.0
MG3692A	w/opt 4 w/opt 5 STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤10 GHz >10 to ≤20 GHz	+19.0 +19.0 +19.0 +17.0	+18.0 +18.0 +18.0 +15.0	+15.0 +15.0 +13.0 +7.0
MG3693A	w/opt 4 w/opt 5 STD STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤10 GHz >10 to ≤20 GHz >20 to ≤30 GHz	+15.0 +15.0 +15.0 +12.0 +14.0	+14.0 +14.0 +14.0 +10.0 +12.0	Not Available
MG3694A	w/opt 4 w/opt 5 STD STD STD	≤2.2 GHz ≤2 GHz ≥2 to ≤10 GHz >10 to ≤20 GHz >20 to ≤40 GHz	+15.0 +15.0 +15.0 +12.0 +14.0	+14.0 +14.0 +14.0 +10.0 +12.0	Not Available

**For output power with Option 22, 0.1 Hz to 10 Hz, derate all specifications by 2 dB.

Leveled Output Power Range

Standard Units:

Without an Attenuator: Maximum leveled output power to –15 dBm (–20 dBm typical).

With an Attenuator: Maximum leveled output power to –120 dBm (MG3691A, MG3692A, MG3693A, MG3694A), to –105 dBm (MG3695A, MG3696A).

With an Electronic Attenuator: Maximum leveled output power to –140 dBm.

Units with Option 15, High Power:

Without an Attenuator: Maximum leveled output power to –5 dBm (–10 dBm typical).

With an Attenuator: Maximum leveled output power to –115 dBm.

With an Electronic Attenuator: Maximum leveled output power to –115 dBm.

Unleveled Output Power Range (typical):

Without an Attenuator: >40 dB below max power.

With an Attenuator: >130 dB below max power.

Power Level Switching Time (to within specified accuracy):

Without Change in Step Attenuator: <3ms typical

With Change in Step Attenuator: <20 ms typical

With Change in Electronic Step Attenuator: <3 ms typical.

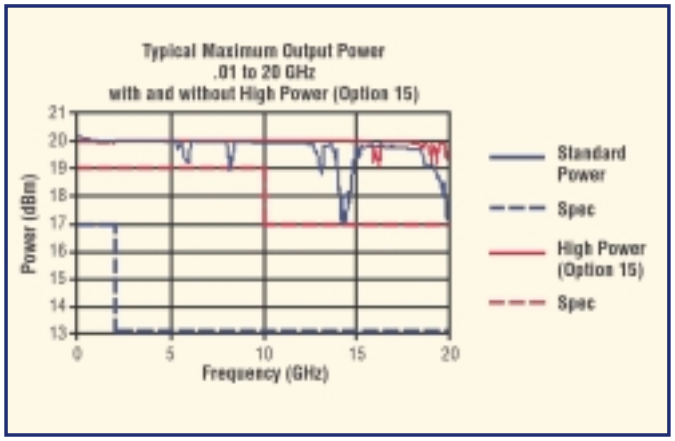
Power level changes across –70 dB step will result in 20 ms delay.

Accuracy and Flatness

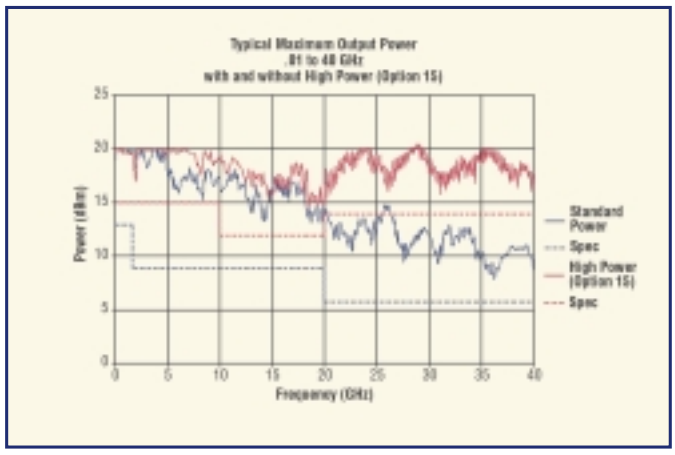
Accuracy specifies the total worst case accuracy. Flatness is included within the accuracy specification.

Atenuation Below Max Power	Frequency (GHz) ≤ 40	40-50	50-60	60-65
Accuracy:②				
0-25 dB	±1.0 dB	±1.5 dB	±1.5 dB	±1.5 dB
25-60 dB	±1.0 dB	±1.5 dB	±3.5 dB①	N/A
>60 dB	±1.0 dB	±1.5 dB①	±3.5 dB①	N/A
Flatness:②				
0-25 dB	±0.8 dB	±1.1 dB	±1.1 dB	±1.1 dB
25-60 dB	±0.8 dB	±1.1 dB	±3.1 dB①	N/A
>60 dB	±0.8 dB	±2.1 dB①	±3.1 dB①	N/A

① Typical
② 0 to 25 dB or to minimum rated power, whichever is higher



Typical maximum MG3692A available output power



Typical maximum MG3694A available output power

Other Output Power Specifications

Output Units: Output units selectable as either dBm or mV. Selection of mV assumes 50 ohm load. All data entry and display are in the selected units.
Output Power Resolution: 0.01 dB or 0.001 mV
Source Impedance: 50 ohms nominal
Source SWR (Internal Leveling): <2.0 typical
Power Level Stability with Temperature: 0.04 dB/deg C typical
Level Offset: Offsets the displayed power level to establish a new reference level.
Output On/Off: Toggles the RF output between an Off and On state. During the Off state, the RF oscillator is turned off. The On or Off state is indicated by two LEDs located below the OUTPUT ON/OFF key on the front panel.
RF On/Off Between Frequency Steps: System menu selection of RF On or RF Off during frequency switching in CW, Step Sweep, and List Sweep modes.
RF On/Off During Retrace: System menu selection of RF On or RF Off during retrace.
Internal Leveling: Power is leveled at the output connector in all modes.
External Leveling:

External Detector: Levels output power at a remote detector location. Accepts a positive or negative 0.5 mV to 500 mV input signal from the remote detector. EXT ALC ADJ adjusts the input signal range to an optimum value. BNC connector, front and rear panel.
External Power Meter: Levels output power at a remote power meter location. Accepts a ±1V full scale input signal from the remote power meter. EXT ALC ADJ adjusts the input signal range to an optimum value. BNC connector, rear panel.
External Leveling Bandwidth: 30 kHz typical in Detector mode. 0.7 Hz typical in Power Meter mode.
User Level Flatness Correction:

Number of points: 2 to 801 points per table
Number of tables: 5 available
Entry modes: GPIB power meter or computed data

CW Power Sweep

Range: Sweeps between any two power levels at a single CW frequency.
Resolution: 0.01 dB/step (Log) or 0.001 mV (Linear)
Accuracy: Same as CW power accuracy.
Log/Linear Sweep: Power sweep selectable as either log or linear. Log sweep is in dB; linear sweep is in mV.
Step Size: User-controlled, 0.01 dB (Log) or 0.001 mV (Linear) to the full power range of the instrument.
Step Dwell Time: Variable from 1 ms to 99 seconds. If the sweep crosses a step attenuator setting, there will be a sweep dwell of approximately 20 ms to allow setting of the step attenuator.

Sweep Frequency/Step Power

A power level step occurs after each frequency sweep. Power level remains constant for the length of time required to complete each sweep.

EXTERNAL PULSE MODULATION (OPTION 13)

Pulse modulation specifications apply at maximum rated power, unless otherwise noted.

On/Off Ratio: >80 dB

Rise/Fall Time (10 to 90%):

10 MHz to 1.0 GHz: 15 ns (<10 ns typical)
1.0 GHz to 65 GHz: 10 ns (<5 ns typical)

Minimum Leveled Pulse Width: 100 ns, ≥2 GHz
1µs, <2 GHz

Minimum Unleveled Pulse Width: <10 ns

Pulse Overshoot: 10%

Level Accuracy Relative to CW (100 Hz to 1 MHz PRF):

±0.5 dB, ≥1 µs pulse width
±1.0 dB, <1 µs pulse width

Video Feedthrough: < ±10 mV, ≥2 GHz

Pulse Width Compression: <8 ns typical

Pulse Delay (typical):

External Mode: 50 ns

PRF Range: DC to 10 MHz, unleveled
100 Hz to 5 MHz, leveled

External Input: Rear-panel BNC.

Drive Level: TTL compatible input

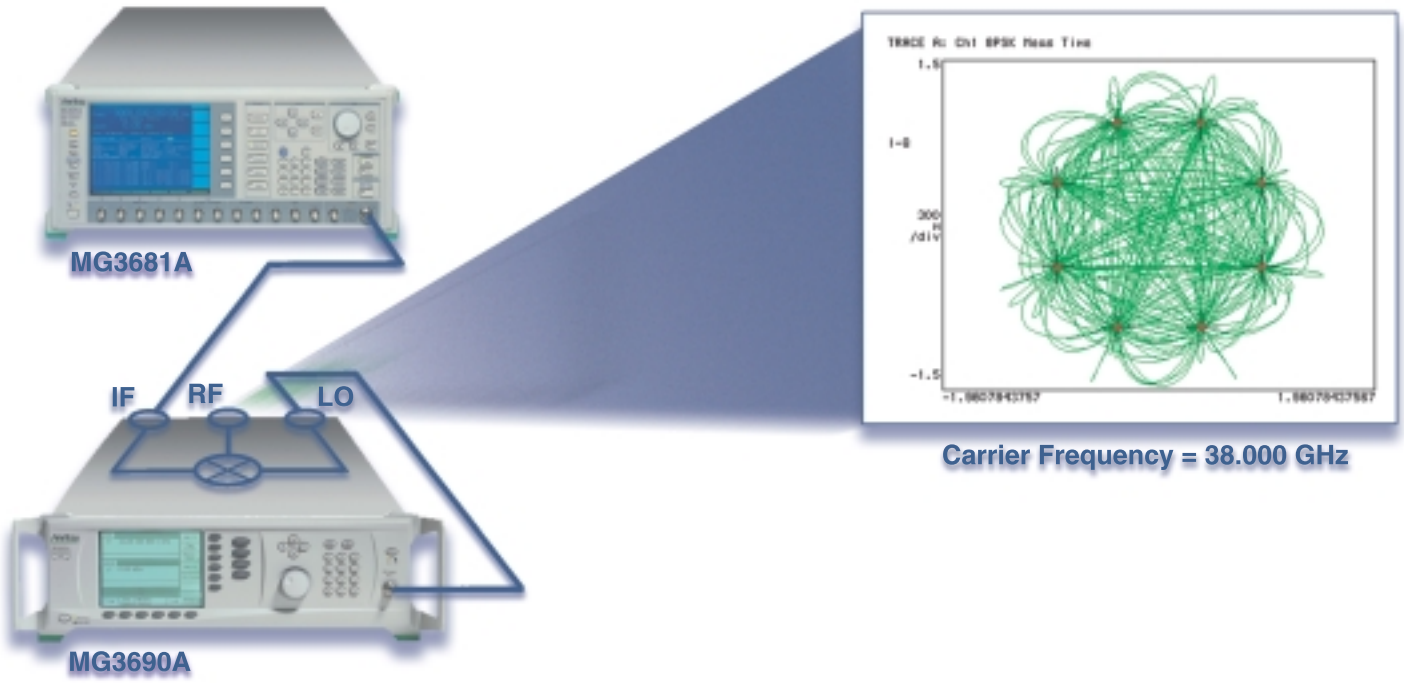
Input Logic: Positive-true or negative-true, selectable from modulation menu.

IF UP-CONVERSION (OPTION 7)

Option 7 adds an internal mixer that can be used for the generic up-conversion of an IF signal. The mixer's RF, LO, and IF ports are made available at the rear panel of the MG3690A, via three female K-Connectors. The typical application will feed the MG3690A microwave output, which can be moved to the rear panel via option 9K, to the mixer's LO port. An external IF signal will be fed to the mixer's IF port. The new up-converted signal will be available at the mixer's RF port.

Mixer Type	Double Balanced
RF, LO Range	1 to 40 GHz
IF Range	DC to 500 MHz
Conversion Loss	8 dB Typical
Isolation, RF to LO	30 dB Typical
Max Power into Any Port	23 dBm
LO Drive Level (recommended)	+10 to +13 dBm
Input P_{1dB}	+3 dBm Typical

The IF Up-Conversion option is particularly useful to create a microwave frequency IQ-modulated signal. Lower frequency IQ-modulated RF sources are readily available, such as the Anritsu MG3681A. Option 7's IF input can be used to feed in an IQ-modulated signal from an MG3681A, up-converting it to as high as 40 GHz with an MG3694A. A typical setup is shown below.



IF Up-Conversion Application and Setup

DIGITAL DOWN CONVERTER (OPTION 4)

MG3690A synthesizers with Option 4 DDC produce output frequencies from 10 MHz to 2.2 GHz by dividing the YTO frequency by 2^n. The divisor ranges from 2 at 2.2 GHz to 256 at 10-15.625 MHz.

Frequency Range	Divide Radio, n
≥10 to ≤15.625 MHz	256
>15.625 to ≤31.25 MHz	128
>31.25 to ≤62.5 MHz	64
>62.5 to ≤125 MHz	32
>125 to ≤250 MHz	16
>250 to ≤500 MHz	8
>500 to ≤1050 MHz	4
>1050 to ≤2200 MHz	2

RF Output

Frequency: 10-2200 MHz

Maximum Leveled Output Power: +13 dBm, typically +19 dBm

Spectral Purity

All specifications apply at maximum rated power, unless otherwise noted.

Harmonic and Harmonic Related:

–40 dBc, ≤100 MHz

–50 dBc, >100 MHz

Non-Harmonic Spurious:

–60 dBc

AM Noise:

Typically –145 dBm/Hz at 0 dBm output and offsets >5 MHz from carrier.

Power Line and Fan-Related Spurious (dBc)

Frequency Range	Offset from Carrier	
	<300 Hz	≥300 Hz
≥10 MHz to ≤500 MHz	–68	–72
>500 MHz to ≤1050 MHz	–62	–72
>1050 MHz to ≤2200 MHz	–56	–66

Pulse Modulation

Pulse modulation specifications apply at maximum rated power, unless otherwise noted.

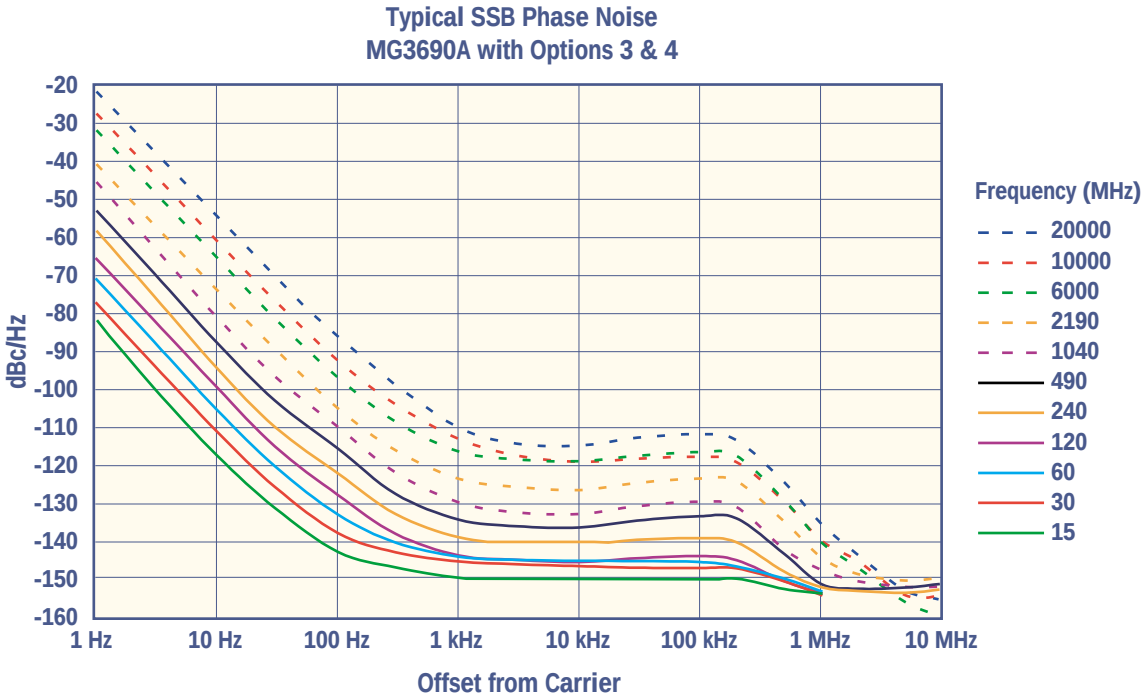
On/Off Ratio: >80 dB

Minimum Leveled Pulse Width: 1 µsec

Level Accuracy Relative to CW: ± 0.5 dB (100 Hz to 500 kHz PRF)

Frequency Range	Rise and Fall Time	Overshoot	Width Compression	Video Feedthrough
>500 to ≤2200 MHz	15 ns	10%	12 ns*	±15 mV*
>125 to ≤500 MHz	<33 ns*	<11%*	<12 ns*	±70 mV*
>31.25 to ≤125 MHz	<90 ns*	<22%*	<12 ns*	±130 mV*
≥10 to ≤31.25 MHz	<400 ns*	<33%*	<40 ns*	±70 mV*

* Typical



INPUTS AND OUTPUTS

Input/Output Connectors		
Nomenclature	**Type**	**Location**
PULSE TRIG IN	BNC	Rear Panel
EXT ALC IN	BNC	Rear Panel
RF OUTPUT	K-Connector (female) fmax ≤ 40 GHz V-Connector (female) fmax ≥ 40 GHz	Standard-Front Panel Option 9-Rear Panel
10 MHz REF IN	BNC	Rear Panel
10 MHz REF OUT	BNC	Rear Panel
HORIZ OUT	BNC	Rear Panel
AUX I/O	25-pin D-type	Rear Panel
SERIAL I/O	RJ45	Rear Panel
IEEE-488 GPIB	Type 57	Rear Panel
mmW Bias* (Option 18)	Twinax	Rear Panel
RF, LO, IF* (Option 7)	K-Connector (female) 3x	Rear Panel

*Option 7 and 18 are mutually exclusive, as they share the same rear panel space.

PULSE TRIG IN: Accepts an external TTL compatible signal to pulse modulate the RF output signal.

EXT ALC IN: Provides for leveling the RF output signal externally with either a detector or power meter. Signal requirements are shown in the RF Output specifications.

RF OUTPUT: Provides for RF output from 50 ohm source impedance. K Connector, female. Option 9 moves the RF Output connector to the rear panel.

10 MHz REF IN: Accepts an external 10 MHz ±100 Hz, 0 to +10 dBm time-base signal. Automatically disconnects the internal high-stability time-base option, if installed. 50 Ω impedance.

10 MHz REF OUT: Provides a 0.5 Vp-p, AC coupled, 10 MHz signal derived from the internal frequency standard. 50 Ω impedance.

HORIZ OUT (Horizontal Sweep Output): Provides 0V at beginning and +10V at end of sweep, regardless of sweep width. In CW mode, the voltage is proportional to frequency between 0V at low end and +10V at the high end of range. In CW mode, if CW RAMP is enabled, a repetitive, 0V to +10V ramp is provided.

AUX I/O (Auxiliary Input/Output): Provides for most of the rear panel BNC connections through a single, 25-pin, D-type connector. Supports master-slave operation with another synthesizer or allows for a single-cable interface with the Model 56100A Scalar Network Analyzer and other Anritsu instruments.

SERIAL I/O (Serial Input/Output): Provides access to RS-232 terminal ports to support service and calibration functions and master-slave operations.

IEEE-488 GPIB: Provides input/output connections for the General Purpose Interface Bus (GPIB).

ORDERING INFORMATION

Models

MG3691A 2 – 8.4 GHz CW Generator

MG3692A 2 – 20 GHz CW Generator

MG3693A 2 – 30 GHz CW Generator

MG3694A 2 – 40 GHz CW Generator

MG3695A 2 – 50 GHz CW Generator

MG3696A 2 – 65 GHz CW Generator

Options and Accessories

MG3690A/1A Rack Mount with slides – Rack mount kit containing a set of track slides (90 degree tilt capability), mounting ears, and front panel handles to let the instrument be mounted in a standard 19-inch equipment rack.

MG3690A/1B Rack Mount without slides – Modifies rack mounting hardware to install unit in a console that has mounting shelves. Includes mounting ears and front panel handles.

MG3690A/2X Mechanical Step Attenuator; Adds a 10 dB/step attenuator with 110 dB range. Rated RF output power is reduced. (This option comes in different versions, based on instrument configuration.)

MG3690A/2F Electronic Step Attenuator ≤20 GHz; Adds a 10 dB/step electronic attenuator with a 120 dB range for the MG3691A and MG3692A. Rated RF output power is reduced.

MG3690A/3 Ultra Low Phase Noise, main band, ≥2 GHz; Adds new modules to significantly reduce SSB phase noise.

MG3690A/4 10 MHz to 2.2 GHz RF coverage, Ultra-Low Phase Noise version – Uses a digital down converter to significantly reduce SSB phase noise.

MG3690A/5 10 MHz to 2 GHz RF coverage – Uses an analog down converter.

MG3690A/7 IF Up-Conversion – Adds an internal 40 GHz mixer for up-converting an IF signal. (Not available with MG3695A, MG3696A, or with Option 18).

MG3690A/9X Rear Panel Output – Moves the RF output connector to the rear panel. (This option comes in different versions, based on instrument configuration.)

MG3690A/13 External Pulse Modulation; rear panel BNC connector for connection of external pulse modulation signal.

MG3690A/15X High Power; Adds high-power RF components to the instrument to increase its output power level. (This option comes in different versions, based on instrument configuration.)

MG3690A/16 High Stability Time Base; Adds an ovenized, 10 MHz crystal oscillator as a high-stability time base.

MG3690A/17 Delete Front Panel – Deletes the front panel for use in remote control applications where a front panel display and keyboard control are not needed.

MG3690A/18 mmW Bias Output – Adds a rear panel BNC Twinax connector to bias the 5400-xWRxx millimeter wave source modules. (Not available with Option 7)

MG3690A/22 0.1Hz to 10 MHz Audio coverage – Uses a DDS for coverage down to approximately DC. When adding Option 22, the output power is derated by 2 dB. The frequency resolution below 10 MHz is 0.02 Hz. No modulation is available in the 0.1 Hz to 10 MHz band.

Accessories

34RKNF50 DC to 20 GHz, Ruggedized Type N female adapter for units with a K connector output

ND36329 MASTER/SLAVE interface cable set

760-212A Transit case

2300-469 IVI Driver, includes LabView® driver

806-97 Aux I/O Cable, 25 pin to BNC: Provides BNC access to V/GHz and Sequential Sync connections and other AUX I/O data lines

Millimeter Wave Accessories
(Requires MG3690A Option 18)

54000-4WR15 50 to 75 GHz, V Band X4 Multiplier-Source Module (includes A36599 power cable and 3 filters).

54000-5WR15 50 to 75 GHz, V Band X4 Multiplier-Source Module with internal reference coupler/detector (includes A36599 power cable, 3 filters, and 560-10BX-2 detector adapter cable).

54000-4WR10 75-110 GHz, W Band X6 Multiplier-Source Module (includes A36599 power cable and 3 filters).

54000-5WR10 75-110 GHz, W Band X6 Multiplier-Source Module with internal reference coupler/detector (includes A36599 power cable, 3 filters, and 560-10BX-2 detector adapter cable).

N120-6 Semi-rigid cable, N(m) to N(m), 15 cm long, connects synthesizer's RF output to multiplier's RF input. (Also requires 34RKNF50 or 34RVNF50 Adapter).

Upgrades

Economical upgrades are available to upgrade any model to any higher performing model. Consult Anritsu for details.

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MG3690A Microwave CW Generators Family Data Sheet /GIP

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