SERIES
MG3692A, MG3693A, MG3694A
SYNTHESIZED CW GENERATOR

GPIB PROGRAMMING MANUAL

Anritsu

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Table of Contents

Table of Contents (Continued)

Chapter 1
General GPIB Information

Table of Contents

Chapter 1
General GPIB Information

1-1 SCOPE OF MANUAL

This manual provides information for remote operation of the Series MG369XA Synthesized CW Generator using commands sent from an external controller via the IEEE-488 General Purpose Interface Bus (GPIB). It includes the following:

- A general description of the GPIB and the bus data transfer and control functions.
- A listing of the IEEE-488 Interface Function Messages recognized by the CW generator with a description of its response.
- A complete listing and description of all MG369XA GPIB commands (i.e., Product Specific Commands) that can be used to control CW generator operation with programming examples.

This manual is intended to be used in conjunction with the Series MG369XA Synthesized CW Generator Operation Manual, P/N 10370-10353. Refer to that manual for general information about the MG369XA, including equipment set up and front panel (manual mode) operating instructions.

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 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 the MG369XA Operation Manual, P/N 10370-10353.

1-2 INTRODUCTION

This chapter provides a general description of the GPIB and the bus data transfer and control functions. It also contains a listing of the MG369XA's GPIB interface function subset capability and response to IEEE-488 interface function messages.

The GPIB information presented in this chapter is general in nature. For complete and specific information, refer to the following documents: ANSI/IEEE Std 488.1-1987 *IEEE Standard Digital Interface for Programmable Instrumentation* and ANSI/IEEE Std 488.2-1987 *IEEE Standard Codes, Formats, Protocols and Common Commands.*

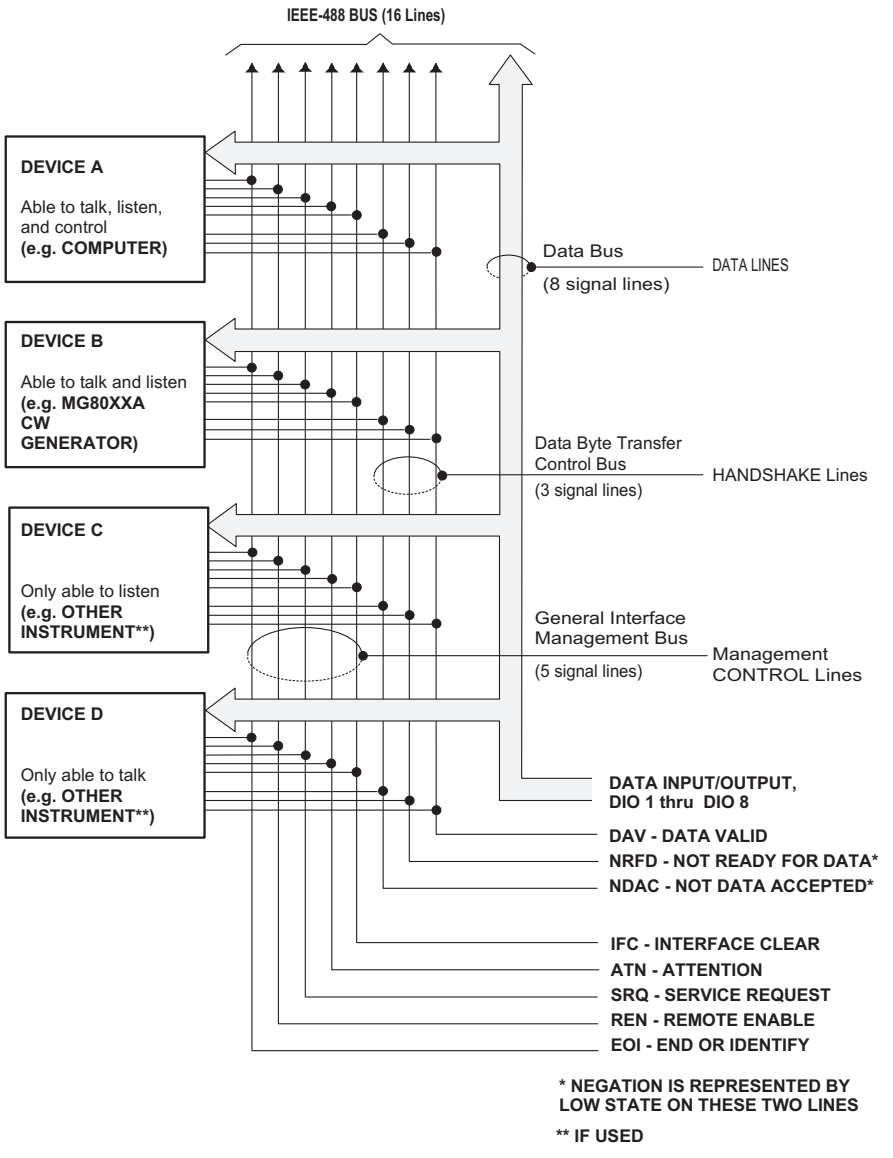


Figure 1-1. *Interface Connections and GPIB Bus Structure*

These documents precisely define the total specification of the mechanical and electrical interface, and of the data transfer and control protocols.

1-3 IEEE-488 INTERFACE BUS DESCRIPTION

The IEEE-488 General Purpose Interface Bus (GPIB) is an instrumentation interface for integrating instruments, computers, printers, plotters, and other measurement devices into systems. The GPIB uses 16 signal lines to effect transfer of information between all devices connected on the bus.

The following requirements and restrictions apply to the GPIB.

- No more than 15 devices can be interconnected by one contiguous bus; however, an instrumentation system may contain more than one interface bus.
- The maximum total cumulative cable length for one interface bus may not exceed twice the number of devices connected (in meters), or 20 meters—whichever is less.
- A maximum data rate of 1 Mb/s across the interface on any signal line.
- Each device on the interface bus must have a unique address, ranging from 00 to 30.

The devices on the GPIB are connected in parallel, as shown in Figure 1-1. The interface consists of 16 signal lines and 8 ground lines in a shielded cable. Eight of the signal lines are the data lines, DIO 1 thru DIO 8. These data lines carry messages (data and commands), one byte at a time, among the GPIB devices. Three of the remaining lines are the handshake lines that control the transfer of message bytes between devices. The five remaining signal lines are referred to as interface management lines.

The following paragraphs provide an overview of the GPIB including a description of the functional elements, bus structure, bus data transfer process, interface management bus, device interface function requirements, and message types.

Functional Elements

Effective communications between devices on the GPIB requires three functional elements; a *talker*, a *listener*, and a *controller*. Each device on the GPIB is categorized as one of these elements depending on its current interface function and capabilities.

Talker
A talker is a device capable of sending device-dependent data to another device on the bus when addressed to talk. Only one GPIB device at a time can be an active talker.

Listener
A listener is a device capable of receiving device-dependent data from another device on the bus when addressed to listen. Any number of GPIB devices can be listeners simultaneously.

Controller
A controller is a device, usually a computer, capable of managing the operation of the GPIB. Only one GPIB device at a time can be an active controller. The active controller manages the transfer of device--dependent data between GPIB devices by designating who will talk and who will listen.

System Controller
The system controller is the device that always retains ultimate control of the GPIB. When the system is first powered-up, the system controller is the active controller and manages the GPIB. The system controller can pass control to a device, making it the new active controller. The new active controller, in turn, may pass control on to yet another device. Even if it is not the active controller, the system controller maintains control of the Interface Clear (IFC) and Remote Enable (REN) interface management lines and can thus take control of the GPIB at anytime.

Bus Structure

The GPIB uses 16 signal lines to carry data and commands between the devices connected to the bus. The interface signal lines are organized into three functional groups.

- Data Bus (8 lines)
- Data Byte Transfer Control Bus (3 lines)
- General Interface Management Bus (5 lines)

The signal lines in each of the three groups are designated according to function. Table 1-1 lists these designations.

Table 1-1. *Interface Bus Signal Line Designations*

Bus Type	Signal Line Name	Function
Data Bus	DIO1–DIO8	Data Input/Output, 1 thru 8
Data Byte Transfer Control Bus	DAV	Data Available
	NRFD	Not Ready For Data
	NDAC	Not Data Accepted
General Interface Management Bus	ATN	Attention
	IFC	Interface Clear
	SRQ	Service Request
	REN	Remote Enable
	EOI	End Or Identify

Data Bus Description

The data bus is the conduit for the transfer of data and commands between the devices on the GPIB. It contains eight bi-directional, active-low signal lines —DIO 1 thru DIO 8. Data and commands are transferred over the data bus in byte-serial, bit-parallel form. This means that one byte of data (eight bits) is transferred over the bus at a time. DIO 1 represents the least-significant bit (LSB) in this byte and DIO 8 represents the most-significant bit (MSB). Bytes of data are normally formatted in seven-bit ASCII (American Standard Code for Information Interchange) code. The eighth (parity) bit is not used.

Each byte placed on the data bus represents either a command or a data byte. If the Attention (ATN) interface management line is TRUE while the data is transferred, then the data bus is carrying a bus command which is to be received by every GPIB device. If ATN is FALSE, then a data byte is being transferred and only the active listeners will receive that byte.

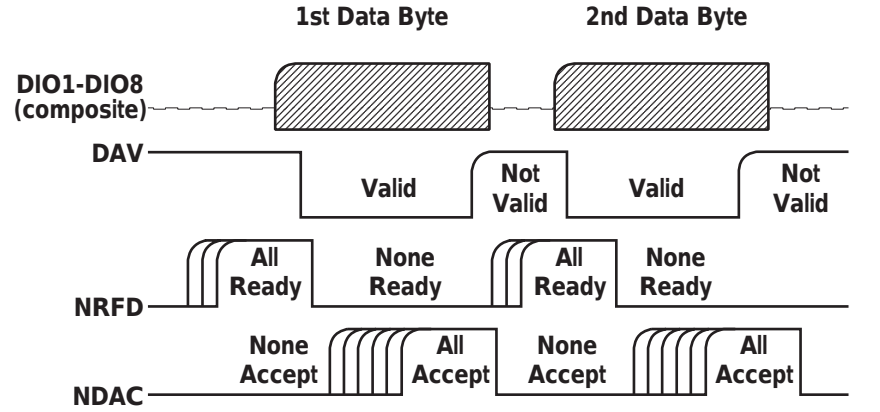


Figure 1-2. *Typical GPIB Handshake Operation*

Data Byte Transfer Control Bus Description

Control of the transfer of each byte of data on the data bus is accomplished by a technique called the "three-wire handshake", which involves the three signal lines of the Data Byte Transfer Control Bus. This technique forces data transfers at the speed of the slowest listener, which ensures data integrity in multiple listener transfers. One line (DAV) is controlled by the talker, while the other two (NRFD and NDAC) are wired-OR lines shared by all active listeners. The handshake lines, like the other GPIB lines, are active low. The technique is described briefly in the following paragraphs and is depicted in Figure 1-2. For further information, refer to ANSI/IEEE Std 488.1.

DAV (Data Valid)
This line is controlled by the active talker. Before sending any data, the talker verifies that NDAC is TRUE (active low) which indicates that all listeners have accepted the previous data byte. The talker then places a byte on the data lines and waits until NRFD is FALSE (high) which indicates that all addressed listeners are ready to accept the information. When both NRFD and NDAC are in the proper state, the talker sets the DAV line TRUE (active low) to indicate that the data on the bus is valid (stable).

NRFD (Not Ready For Data)
This line is used by the listeners to inform the talker when they are ready to accept new data. The talker must wait for each listener to set the NRFD

line FALSE (high) which they will do at their own rate. This assures that all devices that are to accept the data are ready to receive it.

NDAC (Not Data Accepted)
This line is also controlled by the listeners and is used to inform the talker that each device addressed to listen has accepted the data. Each device releases NDAC at its own rate, but NDAC will not go FALSE (high) until the slowest listener has accepted the data byte.

General Interface Management Bus Description

The general interface management bus is a group of five signal lines used to manage the flow of information across the GPIB. A description of the function of each of the individual control lines is provided below.

ATN (Attention)
The active controller uses the ATN line to define whether the information on the data bus is a command or is data. When ATN is TRUE (low), the bus is in the command mode and the data lines carry bus commands. When ATN is FALSE (high), the bus is in the data mode and the data lines carry device-dependent instructions or data.

EOI (End or Identify)
The EOI line is used to indicate the last byte of a multibyte data transfer. The talker sets the EOI line TRUE during the last data byte.

The active controller also uses the EOI line in conjunction with the ATN line to initiate a parallel poll sequence.

IFC (Interface Clear)
Only the system controller uses this line. When IFC is TRUE (low), all devices on the bus are placed in a known, quiescent state (unaddressed to talk, unaddressed to listen, and service request idle).

REN (Remote Enable)
Only the system controller uses this line. When REN is set TRUE (low), the bus is in the remote mode and devices are addressed either to listen or to talk. When the bus is in remote and a device is addressed, it receives instructions from the GPIB rather than from its front panel. When REN is set FALSE (high), the bus and all devices return to local operation.

SRQ (Service Request)
The SRQ line is set TRUE (low) by any device requesting service by the active controller.

Device Interface Function Capability

An interface function is the GPIB system element which provides the basic operational facility through which a device can receive, process, and send messages. Each specific interface function may only send or receive a limited set of messages within particular classes of messages. As a result, a set of interface functions is necessary to achieve complete communications among devices on the GPIB. ANSI/IEEE Std 488.1 defines each of the interface functions along with its specific protocol.

ANSI/IEEE Std 488.2 specifies the minimum set of IEEE 488.1 interface capabilities that each GPIB device must have. This minimum set of interface functions assures that the device is able to send and receive data, request service, and repond to a device clear message. Table 1-2 lists the interface function capability of the series MG369XA CW generator.

Table 1-2. *MG369XA Interface Function Capability*

Function Identifier	Function	MG369XA Capability
AH1	Acceptor Handshake	Complete Capability
SH1	Source Handshake	Complete Capability
T6	Talker	No Talk Only (TON)
L4	Listener	No Listen Only (LON)
SR1	Service Request	Complete Capability
RL1	Remote/Local	Complete Capability
PP1	Parallel Poll	Complete Capability
DC1	Device Clear	Complete Capability
DT1	Device Trigger	Complete Capability
C0, C1, C2, C3, C28	Controller Capability Options	C0, No Capability; C1, System Controller; C2, Send IFC and Take Charge; C3, Send REN; C28, Send IF Messages
E2	Tri--State Drivers	Three-state bus drivers

Message Types

There are three types of information transmitted over the GPIB—interface function messages, device--specific commands, and data and instrument status messages.

Interface Function Messages
The controller manages the flow of information on the GPIB using interface function messages, usually called *commands* or *command messages*. Interface function messages perform such functions as initializing the bus, addressing and unaddressing devices, and setting device modes for remote or local operation.

There are two types of commands—multiline and uniline. Multiline commands are bytes sent by the active controller over the data bus (DIO1-DIO8) with ATN set TRUE. Uniline commands are signals carried by the individual interface management lines.

The user generally has control over these commands; however, the extent of user control depends on the implementation and varies with the specific GPIB interface hardware and software used with the external controller.

Device-Specific Commands
These commands are keywords or mnemonic codes sent by the external controller to control the setup and operation of the addressed device or instrument. The commands are normally unique to a particular instrument or class of instruments and are described in its documentation.

Device-specific commands are transmitted over the data bus of the GPIB to the device in the form of ASCII strings containing one or more keywords or codes.They are decoded by the device's *internal controller* and cause the various instrument functions to be performed.

Data and Instrument Status Messages
These messages are sent by the device to the external controller via the GPIB. They contain measurement results, instrument status, or data files that the device transmits over the data bus in response to specific requests from the external controller. The contents of these messages are instrument specific and may be in the form of ASCII strings or binary data.

In some cases data messages will be transmitted from the external controller to the device. For example, messages to load calibration data.

An SRQ (service request) is an interface function message sent *from the device* to the external controller to request service from the controller, usually due to some predetermined status condition or error. To send this message, the device sets the SRQ line of the General Interface Management Bus true, then sends a status byte on the data bus lines.

An SRQ interface function message is also sent by the device in response to a serial poll message from the controller, or upon receiving an Output Status Byte(s) command from the controller. The protocols associated with the SRQ functions are defined in the ANSI/IEEE Std 488.2 document.

The manner in which interface function messages and device-specific commands are invoked in programs is implementation specific for the GPIB interface used with the external controller. Even though both message types are represented by mnemonics, they are implemented and used in different ways.

Normally, the interface function messages are sent automatically by the GPIB driver software in response to invocation of a software function. For example, to send the IFC (Interface Clear) interface function message, one would call the ibsic function of the National Instruments software driver. On the other hand, the command ∗RST (Reset) is sent in a command string to the addressed device. In the case of the National Instruments example, this would be done by using the ibwrt function call.

1-4 MG369XA GPIB OPERATION

All Series MG369XA Synthesized CW Generator functions, settings, and operating modes (except for power on/standby) are controllable using commands sent from an external controller via the GPIB. When in the remote (GPIB) mode, the CW generator functions both as a listener and a talker. The GPIB interface function capability of the MG369XA is listed in Table 1-2 (page 1-10).

Setting GPIB Operating Parameters

The MG369XA leaves the factory with the GPIB address value set to 5 and the data delimiting terminator set to carriage return and line feed (CR/LF). A different address value can be entered from the front panel using the Configure GPIB menu. Using this same menu, the data delimiting terminator can be changed to carriage return (CR) only. Refer to Chapter 2 of the Series MG369XA Synthesized CW Generator Operation Manual for the procedure.

Selecting the Interface Language

Series MG369XA Synthesized CW Generators with Option 19 can be remotely operated using one of two external interface languages—Native or SCPI. The Native interface language uses a set of MG369XA GPIB Product-Specific commands to control the instrument; the SCPI interface language uses a set of the Standard Commands for Programmable Instruments commands to control the unit. Selecting which of these external interface languages is to be used can be done from the front panel using the Configure GPIB menu. Refer to Chapter 2 of the Series MG369XA Synthesized CW Generators Operation Manual for the procedure.

Response to GPIB Interface Function Messages

Table 1-3 (page 1-14) lists the GPIB Interface Function Messages that the MG369XA will recognize and respond to. With the exception of the Device Clear and Selected Device Clear messages, these messages affect only the operation of the MG369XA GPIB interface. The MG369XA response for each message is indicated.

Interface function messages are transmitted on the GPIB data lines and interface management lines as either unaddressed or addressed commands. The manner in which these messages are invoked in programs is implementation dependent. For programming information, refer to the documentation included with the GPIB Interface for the external controller used.

Table 1-3. *MG369XA Response to GPIB Interface Function Messages*

Interface Function Message	Addressed Command	MG369XA Response
Device Clear (DCL) Selected Device Clear (SDC)	No Yes	Resets the MG369XA to its default state. (Equivalent to sending the ∗RST command.)
Go To Local (GTL)	Yes	Returns the MG369XA to local (front panel) control.
Group Execute Trigger (GET)	Yes	Executes a string of commands, if programmed.
Interface Clear (IFC)	No	Stops the MG369XA GPIB interface from listening or talking. (The front panel controls are not cleared.)
Local Lockout (LLO)	No	Disables the front panel menu RETURN TO LOCAL soft-key.
Remote Enable (REN)	No	Places the MG369XA under remote (GPIB) control when it has been addressed to listen.
Serial-Poll Enable (SPE)	No	Outputs the serial-poll status byte.
Serial-Poll Disable (SPD)	No	Disables the serial-poll function.
Parallel-Poll Configure (PPC)	Yes	Responds to a parallel-poll message (PPOLL) by setting assigned data bus line to the logical state (1,0) that indicates its correct SRQ status.
Parallel-Poll Unconfigure (PPU)	No	Disables the parallel-poll function.

Chapter 2
Programming with GPIB Commands

Table of Contents

Table of Contents (Continued)

Chapter 2 Programming with GPIB Commands

2-1 INTRODUCTION

This chapter provides information for remote operation of MG3692A, MG3693A and MG3694A Synthesized CW Generator via the GPIB using MG369XA GPIB commands. All GPIB Product-Specific commands that are accepted and implemented by the MG369XA are listed and described by function. Sample programs showing usage of the commands are also included. Throughout this book, MG369XA will be used to reference the three covered models.

2-2 COMMAND CODES

There are over three hundred GPIB Product-Specific commands that are accepted and implemented by the MG369XA. These GPIB commands allow the user to program all front panel and menu functions (except for power on/standby). Each GPIB command is a two- or three-character mnemonic code that represents an instrument command or parameter; for example: RST (reset).

Table 2-1, beginning on page 2-4, is a listing of all MG369XA GPIB command mnemonic codes grouped into functional categories. The listing for each category includes references to the paragraph and page number in this chapter where a complete description of that group of commands can be found.

NOTES

A quick way to determine the function of any of the GPIB command codes listed in Table 2-1 is to look up the command code of interest in Chapter 3 of this manual. Chapter 3 is a command dictionary providing alphabetically-ordered listings and descriptions of all MG369XA command mnemonic codes.

Appendix A, GPIB Quick Reference, also presents the GPIB commands grouped into functional categories. These groups list all commands associated with a particular MG369XA function. A brief description of the function of each command is also included.

Table 2-1. *MG369XA GPIB Command Codes Listed by Function (1 of 2)*

GPIB Command Group Function	Command Codes	Para.	Page
Parameter Entry Commands	F0, F1, F2, F3, F4, F5, F6, F7, F8, F9, M0, M1, M2, M3, M4, M5, M6, M7, M8, M9, XL0, XL1, XL2, XL3, XL4, XL5, XL6, XL7, XL8, XL9, DLF, DFF, DFM, SLF0, SLF1, SLF2, SLF3, SLF4, SLF5, SLF6, SLF7, SFL8, SLF9, SLM0, SLM1, SLM2, SLM3, SLM4, SLM5, SLM6, SLM7, SLM8, SLM9, SLDF, SDT, SNS, SWT, LOS, PDT, PNS, EGI, SOF, SLV, SLL1, SLL2, ADD, FRS, LDT, SYZ, UP, DN, CLO	2-4	2-7
Data Entry/ DataTerminator Commands	0 thru 9, –, ., ADR, CLR, DB, DM, GH, MH, KH, HZ, SEC, MS, US, NS, PCT, GV, MV, KV, DV, PCV, SPS, TMS, VT	2-4	2-10
CW Frequency Commands	CF0, CF1, CF2, CF3, CF4, CF5, CF6, CF7, CF8, CF9, CM0, CM1, CM2, CM3, CM4, CM5, CM6, CM7, CM8, CM9, SQF, SQU, SQD, ACW	2-5	2-13
Step Sweep Commands	SF1, SF3, FUL, DF0, DF1, DF5, DF6, AFU, AF1, AF3, AD1, AD5, AD6, AUT, HWT, EXT, TRG, TRS, RSS, SSP, LIS, LGS, MAN, DU1, DU0, TSS, SP1, SP0	2-6	2-14
Frequency Marker Commands	ME1, ME0, MK0, VM1	2-7	2-20
Power Leveling Commands	LOG, LIN, L0, L1, L2, L3, L4, L5, L6, L7, L8, L9, AL0, AL1, AL2, AL3, AL4, AL5, AL6, AL7, AL8, AL9, RF1, RF0, LO1, LO0, IL1, DL1, PL1, LV0, LSP, AT0, AT1, ATT(xx), EGO	2-8	2-21
Pulse Modulation Commands	EP0. EP1, P0, XP	2-9	2-25
Output Commands	∗IDN?, OI, OFL, OFH, OF0, OF1, OF2, OF3, OF4, OF5, OF6, OF7, OF8, OF9, OM0, OM1, OM2, OM3, OM4, OM5, OM6, OM7, OM8, OM9, OL0, OL1, OL2, OL3, OL4, OL5, OL6, OL7, OL8, OL9, OLO, ODF, OPD, OPS, OSD, OSS, OST, OVN, OWT, OSE, OEM, OES, OSB,OSM, OSR	2-10	2-25
Stored Setup Commands	SAF, SAM, SM, SSN(M_{1-9}), RCF, RCM, RSN(M_{1-9})	2-11	2-28

Table 2-1. *MG369XA GPIB Command Codes Listed by Function (2 of 2)*

GPIB Command Group Function	Command Codes	Para.	Page
Service Request and Status Byte Commands	ES1, ES0, FB1, FB0, LE1, LE0, MB0, MB1, MB2, PE1, PE0, SB1, SB0, SE1, SE0, SQ1, SQ0, UL1, UL0, LS1, LS0, LA1, LA0, EL1, EL0, II1, II0, CSB	2-12	2-30
Configuration Commands	BPN, BPP, FRS, PPO, PPC, RC0, RC1, RT0, RT1, RO0, RO1, TR0, TR1	2-13	2-35
Group Execute Trigger (GET) Commands	GTC, GTD, GTF, GTL, GTO, GTS, GTT, GTU, Y	2-14	2-37
List Sweep Commands	LST, ELI(xxxx), ELN(x), LF, LP, LIB(xxxx), LIE(xxxx), AUT, HWT, EXT, TRG, MNT, UP, DN, LEA, CTL	2-15	2-38
Fast-Frequency-Switching Commands	ZL($X_{000-999}$), ZEL, ZS($X_{000-999}$), ZPN(bbbb), ZTL(bbbbnnnnD8D8D8.....D8)	2-16	2-42
Power-Offset-Table Commands	PT0, PT1, PTC, PTL	2-17	2-46
User Level Calibration Commands	LU0, LU1, LU2, LU3, LU4, LU5, LUS, LUR	2-18	2-49
Master-Slave Operation Commands	S0, S1	2-19	2-57
Self Test Commands	TST	2-20	2-58
Miscellaneous Commands	ADD, CS0, CS1, DS0, DS1, RL, RST, SNR	2-21	2-60

2-3 DATA INPUT RESTRICTIONS

The MG369XA CW generator does ***not*** accept parameter or data entries in an exponential or scientific notation format. The accepted data formats are as follows:

- A decimal or integer format for entering parameters and data.
- A binary-byte format for entering the status byte mask commands (paragraph 2-11), the RCF and RCM stored-setup commands (paragraph 2-10), the ZTL fast-frequency-switching command (paragraph 2-16), the power-offset-table commands (paragraph 2-17), and the LUR user level calibration command (paragraph 2-18).

Programming Note: The CW generator only recognizes the following 65 characters:

- The 52 upper- and lower-case alphabetic characters. (The MG369XA accepts both upper- and lower-case characters without distinguishing between the cases).
- The minus sign (–).
- The comma (,).
- The decimal point (.).
- The numerals between 0 and 9.

All characters other than the 65 listed above are ignored and can be interspersed between meaningful characters without ill effect. This use of other characters can improve readability. For example, the two command strings below are valid and interchangable.

"**F12.754GHF27.792GHSF1SWPMK0L12DM**"

"**F1=2.754 GH, F2=7.792 GH, SF1, SWP, MK0, L1=2 DM**"

2-4 PARAMETER AND DATA ENTRY COMMANDS

Table 2-2 lists the command mnemonic codes that open parameters for data entry. The table also provides the range of values permitted for each parameter and the data terminator mnemonic codes for each. Tables 2-3 and 2-4 (pages 2-10 and 2-11) list the data entry and data terminator command mnemonic codes.

Opening a Parameter

All of the commands listed in Table 2-2 open a parameter for data entry. Once opened, a parameter remains open until one of the following occurs:

- Another parameter is opened.
- A function other than video markers or output power leveling is commanded.
- The CLO (close open parameter) command is received.

Data Entry

When a parameter is open for data entry, its value can be changed as follows:

- By sending a numeric value followed by the appropriate terminator code.
- By incrementing or decrementing its value using an associated step size.

NOTE

An appropriate data terminator *must* be used to terminate a numeric-parameter entry, and it *must* immediately follow the numeric value. If it does not, a parameter entry error will result.

The parameter and data entry commands do not affect the CW generator's output unless the parameter being changed is also the current output parameter. The commands, therefore, may be used to change the preset values of parameters without altering the MG369XA's output.

Example: Assume that the MG369XA is executing an F3-F4 sweep from 3 GHz to 10 GHz. Changing the value of F1 to 3 GHz with the command string "**`F1 3 GH`**" does not affect the current output of the CW generator. However, changing the value of F4 with the command string "**`F4 16.01 GH`**" alters the output of the MG369XA because it changes the end point of the F3-F4 sweep to 16.01 GHz.

Table 2-2. *Parameter Entry Commands (1 of 3)*

MNEMONIC CODE	PARAMETER	VALUES	TERMINATOR
F0	Opens the F0 parameter	Dependent on the	GH
F1	Opens the F1 parameter	frequency range of	MH
F2	Opens the F2 parameter	the instrument	KH
F3	Opens the F3 parameter		HZ
F4	Opens the F4 parameter		
F5	Opens the F5 parameter		
F6	Opens the F6 parameter		
F7	Opens the F7 parameter		
F8	Opens the F8 parameter		
F9	Opens the F9 parameter		
M0	Opens the M0 parameter	Dependent on the	GH
M1	Opens the M1 parameter	frequency range of	MH
M2	Opens the M2 parameter	the instrument	KH
M3	Opens the M3 parameter		HZ
M4	Opens the M4 parameter		
M5	Opens the M5 parameter		
M6	Opens the M6 parameter		
M7	Opens the M7 parameter		
M8	Opens the M8 parameter		
M9	Opens the M9 parameter		
XL0	Opens the L0 parameter	Dependent on the	DM
XL1	Opens the L1 parameter	power level range	(Logarithmic)
XL2	Opens the L2 parameter	of the instrument	VT
XL3	Opens the L3 parameter		(Linear)
XL4	Opens the L4 parameter		
XL5	Opens the L5 parameter		
XL6	Opens the L6 parameter		
XL7	Opens the L7 parameter		
XL8	Opens the L8 parameter		
XL9	Opens the L9 parameter		
DLF	Opens the ΔF parameter	Dependent on the	GH
DFF	Opens the ΔF parameter	frequency range of	MH
DFM	Opens the ΔF parameter	the instrument	KH
			HZ
	Slave Unit Frequencies		
SLF0	Opens the F0 parameter	Dependent on the	GH
SLF1	Opens the F1 parameter	frequency range of	MH
SLF2	Opens the F2 parameter	the instrument	KH
SLF3	Opens the F3 parameter		HZ
SLF4	Opens the F4 parameter		
SLF5	Opens the F5 parameter		
SLF6	Opens the F6 parameter		
SLF7	Opens the F7 parameter		
SLF8	Opens the F8 parameter		
SLF9	Opens the F9 parameter		

Table 2-2. *Parameter Entry Commands (2 of 3)*

MNEMONIC CODE	PARAMETER	VALUES	TERMINATOR
	Slave Unit Frequencies		
SLM0	Opens the M0 parameter	Dependent on the frequency range of the instrument	GH MH KH HZ
SLM1	Opens the M1 parameter		
SLM2	Opens the M2 parameter		
SLM3	Opens the M3 parameter		
SLM4	Opens the M4 parameter		
SLM5	Opens the M5 parameter		
SLM6	Opens the M6 parameter		
SLM7	Opens the M7 parameter		
SLM8	Opens the M8 parameter		
SLM9	Opens the M9 parameter		
SLDF	Opens the ΔF parameter for the slave unit	Dependent on the frequency range of the instrument	GH MH KH HZ
SDT	Opens the step sweep dwell time parameter	1 ms to 99 sec	MS SEC
SNS	Opens the step sweep number of steps parameter	1 to 10,000	SPS
SWT	Opens the step sweep time parameter	30 ms to 99 sec	MS SEC
LOS	Opens the level offset parameter	+100 dB to –100 dB	DB
PDT	Opens the power sweep dwell time parameter	1 ms to 99 sec	MS SEC
PNS	Opens the power sweep number of steps parameter	1 to 10,000	SPS
EGI	Opens the Reference Level DAC setting parameter (in external power leveling mode)	0 to 255	SPS
SOF	Opens the frequency offset parameter for the slave unit (in a 360B VNA configuration)	Dependent on the frequency range of the instrument	GH MH KH HZ
SLV, SLL1	Opens the main power level parameter (L1) for the slave unit	Dependent on the power level range of the instrument	DM (Log) VT(Linear)

Table 2-2. *Parameter Entry Commands (3 of 3)*

MNEMONIC CODE	PARAMETER	VALUES	TERMINATOR
SLL2	Opens the alternate sweep power level parameter (L2) for the slave unit	Dependent on the power level range of the instrument	DM (Log) VT (Linear)
ADD	Opens the GPIB address parameter	1 to 30	ADR
FRS	Opens the frequency scaling reference multiplier parameter	0.1 to 14	TMS
LDT	Opens the list sweep dwell time parameter	1 ms to 99s	MS SEC
SYZ	Opens the step-size parameter for updating	Dependent on the open parameter	N/A
UP	Increments the open parameter by the step size	N/A	N/A
DN	Decrements the open parameter by the step size	N/A	N/A
CLO	Closes the previously opened parameter	N/A	N/A

Table 2-3. *Data Entry Commands*

MNEMONIC CODE	DESCRIPTION
0, 1, 2, 3, 4, 5, 6, 7, 8, 9	Numerals for parameter value entries
–	Change sign of input
.	Decimal point
CLR	Clear data entry

Table 2-4. *Data Terminator Codes*

MNEMONIC CODE	DESCRIPTION
ADR	GPIB Address
DB	Decibels (dB)
DM	dBm
GH	GHz
MH	MHz
KH	kHz
HZ	Hertz (Hz)
SEC	Seconds
MS	Milliseconds (ms)
US	Microseconds (μs)
NS	Nanoseconds (ns)
PCT	Percent (%)
GV	GHz per volt (GHz/V)
MV	MHz per volt (MHz/V)
KV	kHz per volt (kHz/V)
DV	Decibel per volt (dB/V)
PCV	Percent per volt (%/V)
SPS	Steps
TMS	Times
VT	Volts

Using the SYZ Command

Each MG369XA parameter has an associated step size that can be used to increment or decrement its value. Parameters that have common units share a common step size. For example, the frequency parameters (F0-F9, M0-M9, and ΔF) have a common step size as do the power level parameters (XL0-XL9, L0-L9, and Level Offset). Other parameters, such as step sweep dwell time, have individual step sizes.

To set the step size for a parameter, first send the command code to open the parameter, then send the SYZ command. Now set the step size by sending a numeric string with the proper terminator. When the terminator is received, the step size is accepted and the original parameter is again open for entry.

Figure 2-1 shows how the SYZ command can be used to increment a parameter. In this example, the F1 frequency parameter is set to 4 GHz, the step size is set to 10 MHz, and F1 frequency is incremented three times by the value of the step size.

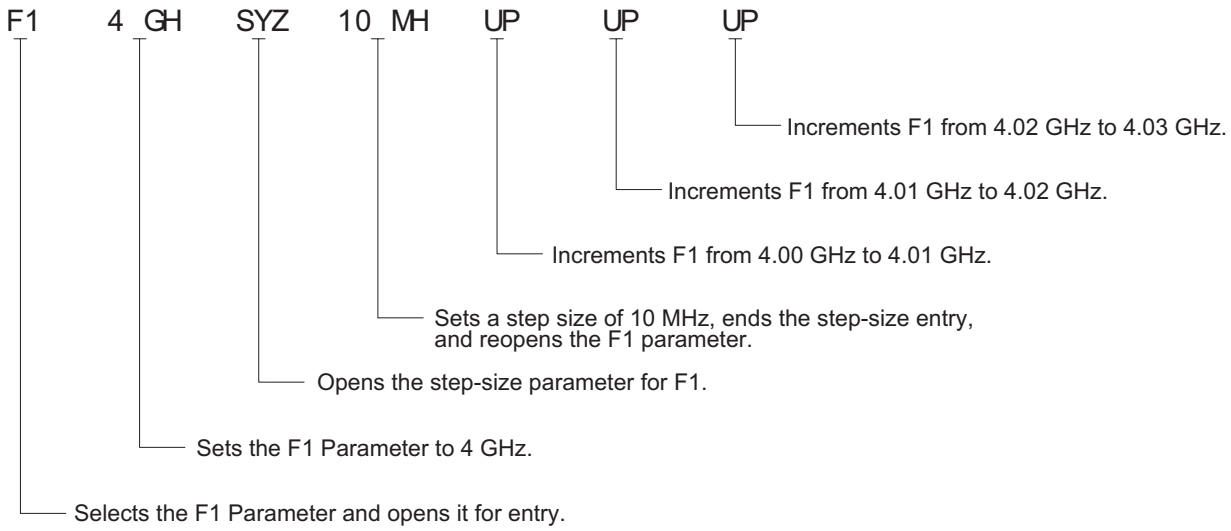


Figure 2-1. *Using the SYZ (Step Size) Command*

2-5 CW FREQUENCY COMMANDS

Table 2-5 lists the CW frequency command mnemonic codes. These commands call up each of the 20 preset (or previously set) CW frequencies. Each command causes its associated CW frequency to be output and opens that frequency's parameter for data entry.

The command, SQF, accesses the preset frequencies in sequential order—that is, F0 to F9 and M0 to M9.

Table 2-5. *CW Frequency Commands*

MNEMONIC CODE	FUNCTION	OPENS FOR ENTRY
CF0	Set CW mode at F0	F0 parameter
CF1	Set CW mode at F1	F1 parameter
CF2	Set CW mode at F2	F2 parameter
CF3	Set CW mode at F3	F3 parameter
CF4	Set CW mode at F4	F4 parameter
CF5	Set CW mode at F5	F5 parameter
CF6	Set CW mode at F6	F6 parameter
CF7	Set CW mode at F7	F7 parameter
CF8	Set CW mode at F8	F8 parameter
CF9	Set CW mode at F9	F9 parameter
CM0	Set CW mode at M0	M0 parameter
CM1	Set CW mode at M1	M1 parameter
CM2	Set CW mode at M2	M2 parameter
CM3	Set CW mode at M3	M3 parameter
CM4	Set CW mode at M4	M4 parameter
CM5	Set CW mode at M5	M5 parameter
CM6	Set CW mode at M6	M6 parameter
CM7	Set CW mode at M7	M7 parameter
CM8	Set CW mode at M8	M8 parameter
CM9	Set CW mode at M9	M9 parameter
SQF	Scan to the next higher preset CW frequency.	CW frequency parameter then selected
SQU	Scan up to the next higher preset CW frequency.	CW frequency parameter then selected
SQD	Scan down to the next lower preset CW frequency.	CW frequency parameter then selected
ACW	Activates the currently scanned frequency as CW.	CW frequency parameter then selected

Programming Note: CW generator response to a SQF command depends on the state the instrument is in at the time the command is received. For example, if the MG369XA is in a CW mode of operation with the current output frequency open for entry, the SQF command (1) causes the output to change to the next sequential frequency and (2) opens that frequency's parameter for data entry. However, if the instrument is in any other mode of operation, the SQF command causes it to switch to the last CW frequency that was output and opens that parameter for data entry.

Figure 2-2 is an example of a CW frequency command string.

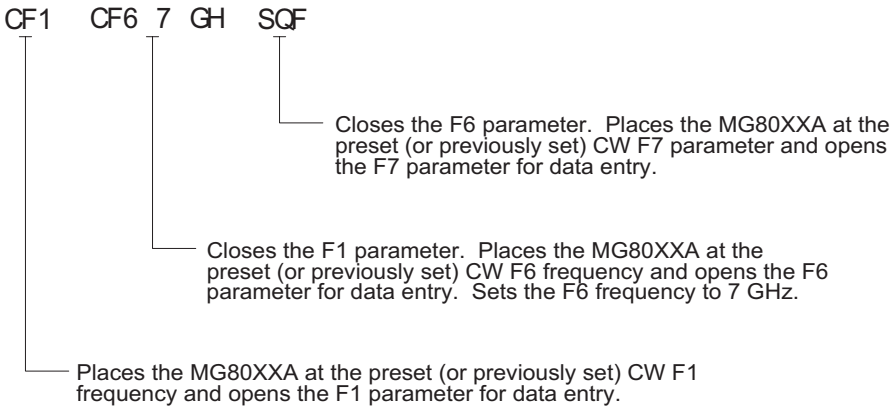


Figure 2-2. *Example of a CW Frequency Command String*

2-6 STEP SWEEP COMMANDS

Table 2-6 (page 2-16) lists the step sweep command mnemonic codes. These commands are divided into five subclasses and are described in the following paragraphs.

Step Sweep Range

Seven step sweep ranges are available. The SF1 and SF3 commands select the sweep ranges of F1-F2 and F3-F4 respectively; the FUL command selects a full band sweep from the CW generator's low frequency limit to its high frequency limit.

The DF0, DF1, DF5, and DF6 commands each select a symmetrical frequency sweep around F0, F1, F5, and F6 respectively. The width of the sweep is determined by the ΔF frequency parameter.

Programming Examples:
Programming "**`F1 2 GH F2 8 GH SF1`**" sets F1 to 2 GHz, F2 to 8 GHz, and implements a F1-F2 frequency sweep.

Programming "**DLF 6 GH F5 7 GH DF5**" sets ΔF to 6 GHz, F5 to 7 GHz, and implements a F5-ΔF frequency sweep.

Programming Note:
If the commanded step sweep range is invalid, a parameter error (para. 2-21) will be generated, and the output of the CW generator will not be altered.

A step sweep range is invalid if the ΔF frequency parameter results in a sweep that is outside the range of the instrument.

Alternate Step Sweep

Six alternate step sweep commands are available. If the MG369XA is sweeping when the alternate sweep command is received, the CW generator's output will alternate between the commanded sweep and the sweep then being executed.

Programming Example:
Assume that the MG369XA had been previously programmed and was then executing an F1-F2 sweep. Programming "**AF3**" would then activate the F3-F4 sweep and cause it to alternate with the F1-F2 sweep.

Programming Note:
An alternate step sweep command will only be recognized when the MG369XA has been programmed to sweep. It will be ignored at all other times.

Sweep Triggering

Three modes of sweep triggering are available over the bus—Automatic, External, and Single. The AUT command selects automatic sweep triggering; the HWT command selects external triggering; and the EXT command selects single sweep triggering.

When automatic sweep triggering is selected, the sweep continually sweeps from its start frequency (or power level) to its stop frequency (or power level) with optimal retrace time.

When external sweep triggering is selected, a single sweep occurs when triggered by an external TTL-compatible clock pulse to the rear panel AUX I/O connector.

When single sweep triggering is selected, a single sweep starts when the TRG or TRS command is received. The RSS command resets the sweep to its start frequency (or power level), whenever the command is received while a single sweep is in progress.

Table 2-6. *Step Sweep Commands*

MNEMONIC CODE	FUNCTION	OPENS FOR ENTRY
	Step Sweep Range	
SF1	Selects the F1-F2 step sweep mode	None
SF3	Selects the F3-F4 step sweep mode	None
FUL	Selects the Full Range step sweep mode	None
DF0	Selects the F0-ΔF step sweep mode	None
DF1	Selects the F1-ΔF step sweep mode	None
DF5	Selects the F5-ΔF step sweep mode	None
DF6	Selects the F6-ΔF step sweep mode	None
	Alternate Step Sweep	
AFU	Selects Full Range alternate step sweep	None
AF1	Selects F1-F2 alternate step sweep	None
AF3	Selects F3-F4 alternate step sweep	None
AD1	Selects F1-ΔF alternate step sweep	None
AD5	Selects F5-ΔF alternate step sweep	None
AD6	Selects F6-ΔF alternate step sweep	None
	Sweep Triggering	
AUT	Selects Auto Trigger	None
HWT	Selects External Trigger	None
EXT	Selects Single Trigger	None
TRG	Triggers a Single Sweep	None
TRS	Triggers a Single Sweep	None
RSS	Resets a Sweep if in progress	None
	Step Sweep Select	
SSP	Selects Step Sweep (Linear)	None
LIS	Selects Linear Step Sweep (Default Mode)	None
LGS	Selects Logarithmic Step Sweep	None
MAN	Selects Manual (Step) Sweep	None
DU1	Selects Dual Step Sweep mode	None
DU0	Deselects Dual Step Sweep mode	None
TSS	Steps to next point in DU1 mode	None
	Special Step Sweep (Steps Not Equally Spaced)	
SP1	Selects non-equally spaced step sweep	None
SP0	Deselects non-equally spaced step sweep	None

Step Sweep Select

Four commands are available—SSP and LIS select a linear step sweep, LGS selects a logarithmic step sweep, and MAN selects a manual (step) sweep. The selected step sweep mode applies to all sweep ranges. Figure 2-3 shows an example of a step sweep command string.

Programming Note:
The MAN command only provides for setting up the CW generator for a manual (step) sweep. It must be accompanied by the RL command to return the instrument to local (front panel) control in order for the operator to perform the manual (step) sweep.

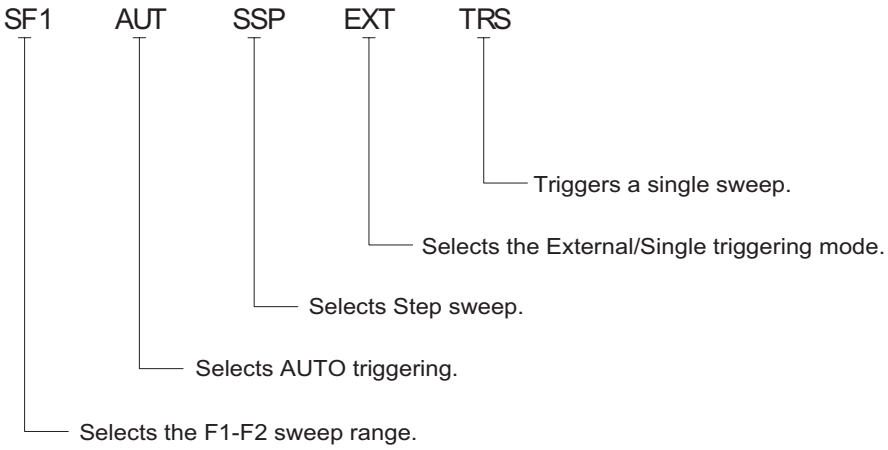


Figure 2-3. *Example of a Sweep Command String*

Dual Step Sweep Mode
The dual step sweep mode provides for generating synchronized, step sweep outputs from two MG369XAs at a frequency offset. Figure 2-4 shows an example of dual step sweep programming.

```
 10 !     "DUAL"
 20 CLEAR
 30 DISP "ENTER # OF STEPS"
 40 INPUT S
 50 DISP "ENTER WAIT TIME [mS]
 60 INPUT W
 70 WAIT 100
 80 DISP "ENTER 'LO' START FREQ [GHz]"
 90 INPUT F1
100 DISP "ENTER 'LO' STOP FREQ [GHz]
110 INPUT F2
120 DISP "ENTER OFFSET [GHz]
130 INPUT F3
140 !
150 ! Initialize both MG369XA's
160 !
170 OUTPUT 705 ;"CF1F1";F1;"GHF2";F2;
    "GHSNS";S;"SPSSSPEXTCLO"
180 OUTPUT 706 ;"CF1F1";F1+F3;"GHF2";
    F2+F3;"GHSNS";S;"SPSSSPEXTCLO"
190 WAIT 1000
200 !
210 ! Set both to dual mode and enable
    GET to end DWELL
220 !
230 SEND 7 ; CMD "%&" DATA "GTLDU1SF1"
    EOL
240 WAIT 100
250 ! Trigger the sweep and wait for
    retrace to finish
260 SEND 7 ; CMD "%&" DATA "TRS" EOL
270 WAIT 100
280 ! Listen address both MG369XA's
290 SEND 7 ; CMD "%&"
300 FOR C+1 TO S+1
310 WAIT W
320 ! Trigger both to next point
330 TRIGGER 7
340 NEXT C
350 GOTO 260
```

Figure 2-4. *Dual Step Sweep Programming Example*

Special Step Sweep

This special step sweep provides for a step sweep that has non-equally spaced steps. It can be used in any of the available sweep ranges (F1-F2, F3-F4, Full, F0-ΔF, F1-ΔF, F5-ΔF, and F6-ΔF). The start frequency in this sweep must be equal to the first frequency programmed with the ZL($X_{000-999}$) command (para. 2-16). The intermediate steps can be programmed to be any frequency within the range of the programmed sweep.

Programming Note:
The SP1 command can be used with the dual step sweep mode.

Figure 2-5 shows an example of special step sweep programming.

For this example, assume a frequency sweep of 3 GHz to 10 GHz, with steps at 3, 6, 8, 9, and 10 GHz.

Sample Coding in BASIC

```
10 OUTPUT 705; "ZL000 3GH 6GH 8GH 9GH 10GH ZEL"
20 OUTPUT 705; "F1 3GH F2 10GH SNS 4SPS"
30 OUTPUT 705; "SP1 SSP SF1"
```

Explanation of Code

Line 10 sets up the step frequencies.
Line 20 sets start and stop frequencies and number of steps (frequency points – 1).
Line 30 set the CW generator to SP1, Step Sweep, and F1-F2 sweep range.

Figure 2-5. *Special Step Sweep Programming Example*

2-7 FREQUENCY MARKER COMMANDS

Table 2-7 lists the frequency marker command mnemonic codes. These commands provide for (1) selecting a CW frequency as a potential marker, (2) selecting a potential marker as an active marker, and (3) individually turning markers on and off.

The ME1 command will enable a marker at the current frequency that is open for update; the ME0 command will disable the same marker. If a frequency parameter is not open, no action will be taken. The VM1 command will turn on video markers. The MK0 command will turn all markers off.

Figure 2-6 shows an example of a frequency marker command string.

Table 2-7. *Frequency Marker Commands*

MNEMONIC CODE	FUNCTION	OPENS FOR ENTRY
ME1	Enables a marker at the active frequency (F0-F9 or M0-M9).	None
ME0	Disables the marker at the active frequency.	None
MK0	Turns off markers. Enabled markers remain enabled, but are not active.	None
VM1	Turns on the video marker mode.	None

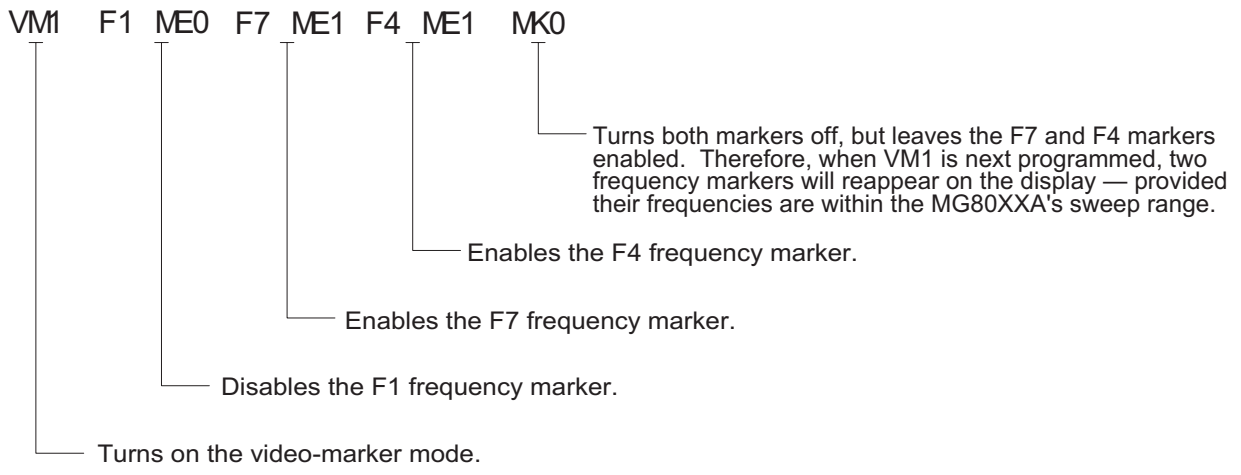


Figure 2-6. *Example of a Frequency Marker Command String*

2-8 OUTPUT POWER LEVELING COMMANDS

Table 2-8 lists the output power leveling command mnemonic codes. These commands provide for (1) selecting linear or logarithmic power level operation, (2) selecting an RF output power level, (3) leveling the output power, and (4) turning the output power leveling off. In addition, commands are provided for the level offset, power level sweep, ALC power slope, and step attenuator decoupling functions. Figure 2-7 (page 2-24) shows an example of an output power level command string.

Linear or Logarithmic Power Level Selection

Power level operations can be linear or logarithmic. The command, LOG, selects logarithmic power level operation. In logarithmic mode, power level entries and outputs are in dBm and power level sweeps are logarithmic. This is the default mode.

The command, LIN, selects linear power level operation. In linear mode, power level entries and outputs are in mV and power level sweeps are linear.

RF Output Power Level Selection

The commands, L0 thru L9, call up each of the preset (or previously set) output power levels. Each command causes its associated RF power level to be output and opens that power level's parameter for data entry. Each command will also deselect any other previously programmed power level and will turn off a power level sweep, if active.

Alternate Sweep RF Output Power Level Selection

In the alternate sweep mode, the commands, AL0 thru AL9, call up each of the preset (or previously set) L0 to L9 output power levels. Each command causes its associated RF power level to be output during the alternate sweep. Each command will also deselect any other previously programmed alternate sweep power level. The commands do ***not*** open the L1 to L9 power level parameters for data entry. Use the commands, XL0 thru XL9 or L0 thru L9, to enter new power level values.

Output Power Leveling

There are three output power leveling modes of operation—internal, external (detector or power meter), and fixed gain (leveling off). The IL1 command selects the internal leveling mode. In this mode, a signal from an internal level detector is used to level the output power. This is the default mode.

The DL1 command selects the external (detector) leveling mode; the PL1 command selects the external (power meter) leveling mode. In this mode, the output power is leveled using a signal from an exter-

nal detector (power meter) connected to the EXTERNAL ALC IN connector. In the external power leveling mode, the EGI command provides for entering a setting for the Reference Level DAC to control the ALC gain. The LVO command selects the fixed gain (leveling off) mode. Each command will also deselect any other previously programmed output power leveling mode.

Programming Example:
Programming "**`PL1 EGI 140 SPS`**" selects external leveling of the output power using a signal from an external power meter and sets the Reference Level DAC to 140.

Table 2-8. *Power Leveling Commands (1 of 2)*

MNEMONIC CODE	FUNCTION	OPENS FOR ENTRY
LOG	Selects logarithmic power level operation. (This is the default mode.)	None
LIN	Selects linear power level operation.	None
L0	Set RF output power level to L0	L0
L1	Set RF output power level to L1	L1
L2	Set RF output power level to L2	L2
L3	Set RF output power level to L3	L3
L4	Set RF output power level to L4	L4
L5	Set RF output power level to L5	L5
L6	Set RF output power level to L6	L6
L7	Set RF output power level to L7	L7
L8	Set RF output power level to L8	L8
L9	Set RF output power level to L9	L9
AL0	Set alternate sweep RF output level to L0	None
AL1	Set alternate sweep RF output level to L1	None
AL2	Set alternate sweep RF output level to L2	None
AL3	Set alternate sweep RF output level to L3	None
AL4	Set alternate sweep RF output level to L4	None
AL5	Set alternate sweep RF output level to L5	None
AL6	Set alternate sweep RF output level to L6	None
AL7	Set alternate sweep RF output level to L7	None
AL8	Set alternate sweep RF output level to L8	None
AL9	Set alternate sweep RF output level to L9	None
RF1	Turns on the RF output. (This is the default mode.)	None
RF0	Turns off the RF output.	None

Table 2-8. *Power Leveling Commands (2 of 2)*

MNEMONIC CODE	FUNCTION	OPENS FOR ENTRY
LO1	Turns on the Level Offset function. The value of the Level Offset parameter is added to the level measured by the internal leveling loop. The resultant power level value is displayed.	None
LO0	Turns off the Level Offset function.	None
IL1	Selects internal leveling of the output power. (This is the default mode.) Deselects the DL1 or PL1 leveling modes, if previously programmed.	None
DL1	Selects external leveling of the output power, using a signal from an external detector connected to the EXTERNAL ALC IN connector. Deselects the IL1 or PL1 leveling modes, if previously programmed.	None
PL1	Selects external leveling of the output power using a signal from an external power meter connected to the EXTERNAL ALC IN connector. Deselects the IL1 and DL1leveling modes, if previously programmed.	None
LV0	Turns off leveling of the output power.	None
LSP	Selects the Power Sweep mode. The power level will sweep as determined by the preset (or previously set) dwell-time and number-of-steps parameters.	None
AT1	Selects ALC step attenuator decoupling.	None
AT0	Deselects ALC step attenuator decoupling.	None
ATT(xx)	Sets step attenuator value to xx (×10 dB) in the ALC step attenuator decouple mode. xx is an unsigned integer between 00 (0 dB attenuation) and 11 (110 dB attenuation).	None
EGO	Outputs the value of the Reference Level DAC setting in external power leveling mode.	None

Attenuator Decoupling

The attenuator decoupling function provides for decoupling of the step attenuator (if equipped) from the ALC system. The AT1 command decouples the step attenuator, the ATT(xx) command provides for setting the step attenuator value for 0 to 110 dB in 10 dB increments, and the AT0 command deselects the attenuator decoupling function.

Programming Example:
Programming "**AT1 ATT08**" decouples the step attenuator from the ALC system and sets the step attenuator value to 80 dB.

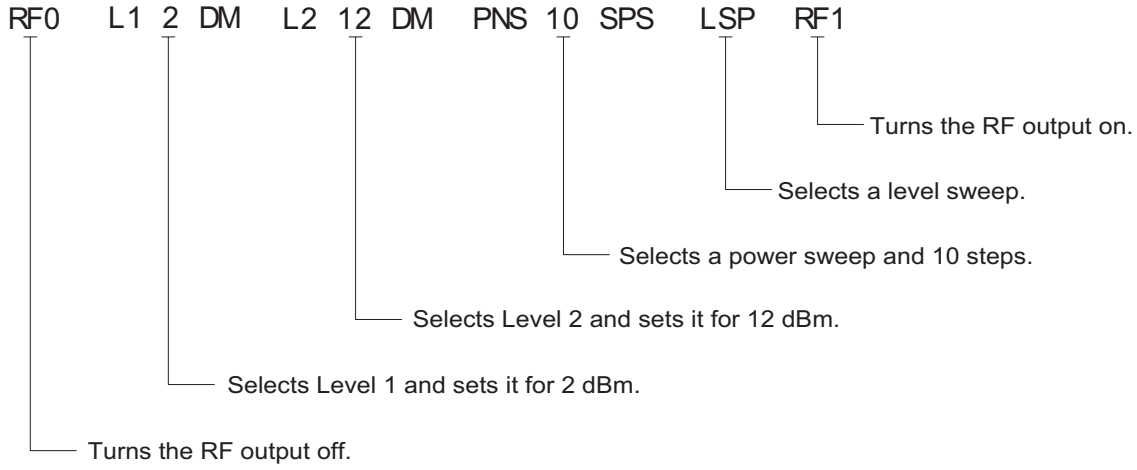


Figure 2-7. *Example of an Output Power Level Command String*

2-9 PULSE MODULATION COMMANDS

Table 2-9 lists the pulse modulation command mneomonic codes. In units with Option 13, these commands provide for pulse modulation of the CW generator's output signal using modulating signals from an external source.

NOTE

If Option 13 is not installed, these commands produce syntax errors.

Table 2-9. *Pulse Modulation Commands*

MNEMONIC CODE	FUNCTION
EP0	Selects TTL-low to turn RF on during pulse modulation.
EP1	Selects TTL-high to turn RF on during puse modulation.
P0	Turns off the external pulse modulation function.
XP	Turns on the external pulse modulation function.

2-10 OUTPUT COMMANDS

Table 2-10 lists the output command mnemonic codes. These commands provide for the output of data from the CW generator to the controller. Figure 2-8 (page 2-28) shows examples of output command programming.

Table 2-10. *Output Commands (1 of 4)*

MNEMONIC CODE	FUNCTION
∗IDN?	Causes the CW generator to return an identification string in IEEE-488.2 specified <NR1> format (four fields separated by commas). The fields are:<Manufacturer>, <Model>, <Serial #>, <Firmware revision level>; where the actual model number, serial number, and firmware revision of the MG369XA will be passed.
OI	Causes the CW generator to identify itself by sending the following parameter information over the bus; model number, low-end frequency, high-end frequency, minimum output power level, maximum output power level, software revision number, serial number, model prefix (A or B), and a space (ASCII 20 max). This command can be used to send parameter information to the controller automatically, thus relieving the operator from having to input the information manually. The string is 36 characters long.

Table 2-10. *Output Commands (2 of 4)*

MNEMONIC CODE	FUNCTION
OFL	Returns the low-end frequency value (in MHz) to the controller.
OFH	Returns the high-end frequency value (in MHz) to the controller.
OF0	Returns the F0 frequency value (in MHz) to the controller.
OF1	Returns the F1 frequency value (in MHz) to the controller.
OF2	Returns the F2 frequency value (in MHz) to the controller.
OF3	Returns the F3 frequency value (in MHz) to the controller.
OF4	Returns the F4 frequency value (in MHz) to the controller.
OF5	Returns the F5 frequency value (in MHz) to the controller.
OF6	Returns the F6 frequency value (in MHz) to the controller.
OF7	Returns the F7 frequency value (in MHz) to the controller.
OF8	Returns the F8 frequency value (in MHz) to the controller.
OF9	Returns the F9 frequency value (in MHz) to the controller.
OM0	Returns the M0 frequency value (in MHz) to the controller.
OM1	Returns the M1 frequency value (in MHz) to the controller.
OM2	Returns the M2 frequency value (in MHz) to the controller.
OM3	Returns the M3 frequency value (in MHz) to the controller.
OM4	Returns the M4 frequency value (in MHz) to the controller.
OM5	Returns the M5 frequency value (in MHz) to the controller.
OM6	Returns the M6 frequency value (in MHz) to the controller.
OM7	Returns the M7 frequency value (in MHz) to the controller.
OM8	Returns the M8 frequency value (in MHz) to the controller.
OM9	Returns the M9 frequency value (in MHz) to the controller.
OL0	Returns the L0 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OL1	Returns the L1 power value (in dBm when in log mode; in mV when in linear mode) to the controller.

Table 2-10. *Output Commands (3 of 4)*

MNEMONIC CODE	FUNCTION
OL2	Returns the L2 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OL3	Returns the L3 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OL4	Returns the L4 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OL5	Returns the L5 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OL6	Returns the L6 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OL7	Returns the L7 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OL8	Returns the L8 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OL9	Returns the L9 power value (in dBm when in log mode; in mV when in linear mode) to the controller.
OLO	Returns the Level Offset power value (in dB when in log mode; in mV when in linear mode) to the controller.
ODF	Returns the ΔF frequency value (in MHz) to the controller.
OPD	Returns the dwell time of the power sweep (in ms) to the controller.
OPS	Returns the number-of-steps of the power sweep to the controller.
OSD	Returns the dwell time of the step sweep (in ms) to the controller.
OSS	Returns the number-of-steps of the step sweep to the controller.
OST	Returns the sweep time value (in ms) to the controller.
OVN	Returns the ROM version number to the controller.
OWT	Returns the GPIB termination status to the controller. (0=CR; 1=CRLF)
OSE	Returns the last GPIB syntax error to the controller.

Table 2-10. *Ouput Commands (4 of 4)*

MNEMONIC CODE	FUNCTION
OEM	Returns the Extended SRQ Mask bytes (3 binary bytes) to the controller.
OES	Returns the GPIB Status bytes (3 binary bytes) to the controller.
OSB	Returns the Primary GPIB Status byte to the controller.
OSM	Returns the Primary SRQ Mask byte to the controller.
OSR	Returns the self-test results (6 binary bytes) to the controller.

```
760 OUTPUT 705;"OF1"
770 ENTER 705;A
780 PRINT "F1 is set at ";A;" MHz"


1050 OUTPUT 705;"OSS"
1060 ENTER 705;A
1070 PRINT "Step Sweep has ";A;" Steps"
```

Figure 2-8. *Output Command Programming Examples*

2-11 STORED SETUP COMMANDS

Table 2-11 lists the stored setup command mnemonic codes. These commands provide for saving instrument setups and recalling them for use.

A current instrument setup can be saved to internal setup memory using the SSN($M_{1\ to\ 9}$) command, where M = memory locations 1 to 9. Up to nine instrument setups can be stored in this manner. The command RSN($M_{1\ to\ 9}$) recalls a stored instrument setup from internal setup memory locations 1 to 9.

If more than nine instrument setups are needed, or if it is desirable to store the setups in the controller instead of the CW generator memory, the MG369XA can be commanded to output and accept stored setups over the bus.

The SAF command outputs the current instrument setup to the controller in a 4100-byte (approximately) binary data string. The controller stores the instrument setup. The RCF command readies the CW generator to receive a new instrument setup recalled from the controller. Figure 2-9 shows an example of SAF and RCF command programming.

The SAM and RCM commands perform the same functions as described for the SAF and RCF commands, except that all of the stored instrument setups are included in the binary data string along with the current instrument setup. For these commands, the binary data string is approximately 41000 bytes long.

Table 2-11. *Stored Setup Commands*

MNEMONIC CODE	FUNCTION
SAF	Outputs the current instrument setup to the controller.
SAM	Outputs both the current instrument setup and all stored instrument setups to the controller.
SM	Recalls the next stored instrument setup in sequence.
SSN(M_{1--9})	Saves the current instrument setup to internal setup memory location M, where M = 1 to 9.
RCF	Readies the MG369XA to receive a new instrument setup recalled from the controller.
RCM	Readies the MG369XA to receive a new instrument setup and new stored setups recalled from the controller.
RSN(M_{1--9})	Recalls the instrument setup stored in internal setup memory location M, where M = 1 to 9.

Programming Note: The SAF and SAM commands output binary data. The data string is terminated with "EOI" on the last byte sent (no CR or LF is sent).

```
10 DIM A$ [300]
20 OUTPUT 705; "SAF"
30 ENTER 705 USING "#%, #%K"; A$ (Requires EOI
    to be the terminator of the read.)
40 OUTPUT 705; "RCF"; A$ (A$ must follow the SAF.)
```

Figure 2-9. *SAF and RCF Commands Programming Example*

2-12 SRQ AND STATUS BYTE COMMANDS

Table 2-12 (page 2-32) lists the Service Request (SRQ) and Status Byte command mnemonic codes. These commands enable the CW generator to request service from the controller when certain, predefined conditions exist.

Status Bytes

The MG369XA has three GPIB status bytes—the primary and two extended status bytes. Figure 2-10 shows the three status bytes and identifies the status reporting function of each status byte bit.

Each status reporting bit, with the exception of primary status byte bit 6 (SRQ), is set when the condition on which it reports is detected. These changes in status byte bit settings can be read by the controller as follows:

- The contents of the primary status byte is returned to the controller in response to a serial poll or the OSB command.
- The contents of the primary status byte and the two extended status bytes are returned to the controller in response to the OES command. Figure 2-11 (page 2-34) shows an example of OES command programming.

SRQ Generation

The CW generator can generate GPIB service requests (SRQs) to report instrument status and syntax errors to the controller. The CW generator will generate an SRQ if:

1. The SRQ generation function has been enabled using the SQ1 command *and*,
2. One (or more) of the status reporting functions is true *and*,
3. The primary status byte bit associated with the true status reporting function has been enabled.

Bits in the primary status byte can be enabled by either of two methods. The first uses the FB1/FB0, ES1/ES0, UL1/UL0, LE1/LE0, PE1/PE0, SE1/SE0, and SB1/SB0 commands, described in Table 2-11, to individually enable or disable each bit. The second method uses a single 8-bit status byte mask (MB0) to enable any or all of the primary status byte bits.

Figure 2-12 (page 2-34) shows examples of status byte mask programming.

NOTE

All status byte bits are latched except for those indicated with the "*". Once set, an OES or OSB command must be received before the condition will be reset. The primary status byte bit 6 (SRQ) is cleared by a serial poll only.

Primary Status Byte

Extended Status Byte 2	SRQ	Syntax Error	Parameter Range Error	Lock Error	RF Unleveled	End of Sweep	Extended Status Byte 1
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Primary status byte bit 0 is set whenever one of the status conditions reported by an extended status byte 1 is true and the associated status bit is enabled. This bit is cleared when the controller sends the OES command.

Primary status byte bit 7 is set whenever one of the status conditions reported by an extended status byte 2 is true and the associated status bit is enabled. This bit is cleared when the controller sends the OES command.

Primary status byte bit 6 (SRQ) is not maskable. This bit is set by the SQ1 command and cleared by a serial poll.

Extended Status Byte 1

RF* Leveled	Not Used	Not Used	Not Used	RF* Locked	Self Test Completed	Not Used	Self Test Failed
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Extended status byte 1 bits are enabled by the extended status byte 1 mask command, MB1.

Extended status byte 1 bit 0 (SelfTest Failed) and bit 2 (Self Test Complete) should not be unmasked at the same time.

Extended status byte 1 bit 3 (RF Locked) is only used with the Model 360B interface. The setting of this bit is blocked or unblocked by the commands, LS0 and LS1 (See Table 2-11).

The setting of extended status byte 1 bit 7 (RF Leveled) is blocked or unblocked by the commands LA0 and LA1 (See Table 2-11).

Extended Status Byte 2

Parameter* Changed	Calibrate Function Finished	Not Used	RF* Unlocked	Crystal Oven Failure	Calibrate Function Failed	Not Used	Not Used
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Extended status byte 2 bits are enabled by the extended status byte 2 mask command, MB2.

The setting of extended status byte 2 bit 4 (RF Unlocked) is blocked or unblocked by the commands, EL0 and EL1 (See Table 2-11).

Extended status byte 2 bit 7 (Parameter Changed) is only used with the Model 56100A interface. The setting of this bit is blocked or unblocked by the commands, II0 and II1 (See Table 2-11).

Figure 2-10. *Primary and Extended Status Bytes*

Table 2-12. *SRQ and Status Byte Commands (1 of 2)*

MNEMONIC CODE	FUNCTION
ES1	Enables an SRQ to be generated when Primary Status Byte bit 1 (End of Sweep) is set and SQ1 has been programmed.
ES0	Inhibits an SRQ from being generated when the End of Sweep bit is set. This is the default mode.
FB1	Enables an SRQ to be generated when Primary Status Byte bit 0 (Extended Status Byte 1) is set and SQ1 has been programmed. The Extended Status Byte 1 bit is set whenever one (or more) of the unmasked status reporting functions in Extended Status Byte 1 is true.
FB0	Inhibits an SRQ from being generated when the Extended Status Byte 1 bit is set. This is the default mode.
LE1	Enables an SRQ to be generated when Primary Status Byte bit 3 (Lock Error) is set and SQ1 has been programmed.
LE0	Inhibits an SRQ from being generated when the Lock Error bit is set. This is the default mode.
MB0	Sets an 8-bit data mask that is used to enable specific bits of the Primary Status Byte (Figure 2-12). This enables any or all of the bits (except for bit 6) in the Primary Status Byte to generate an SRQ using one 8-bit byte. This command can be equivalent to sending ES1, FB1, LE1, PE1, SE1, SB1, and UL1.
MB1	Sets the enable mask byte for Extended Status Byte 1.
MB2	Sets the enable mask byte for Extended Status Byte 2.
PE1	Enables an SRQ to be generated when Primary Status Byte bit 4 (Parameter Range Error) is set and SQ1 has been programmed.
PE0	Inhibits an SRQ from being generated when the Parameter Range Error bit is set. This is the default mode.
SB1	Enables an SRQ to be generated when Primary Status Byte bit 7 (Extended Status Byte 2) is set and SQ1 has been programmed. The Extended Status Byte 2 bit is set whenever one (or more) of the unmasked status reporting functions in Extended Status Byte 2 is true.
SB0	Inhibits an SRQ from being generated when the Extended Status Byte 2 bit is set. This is the default mode.
SE1	Enables an SRQ to be generated when Primary Status Byte bit 5 (Syntax Error) is set and SQ1 has been programmed.

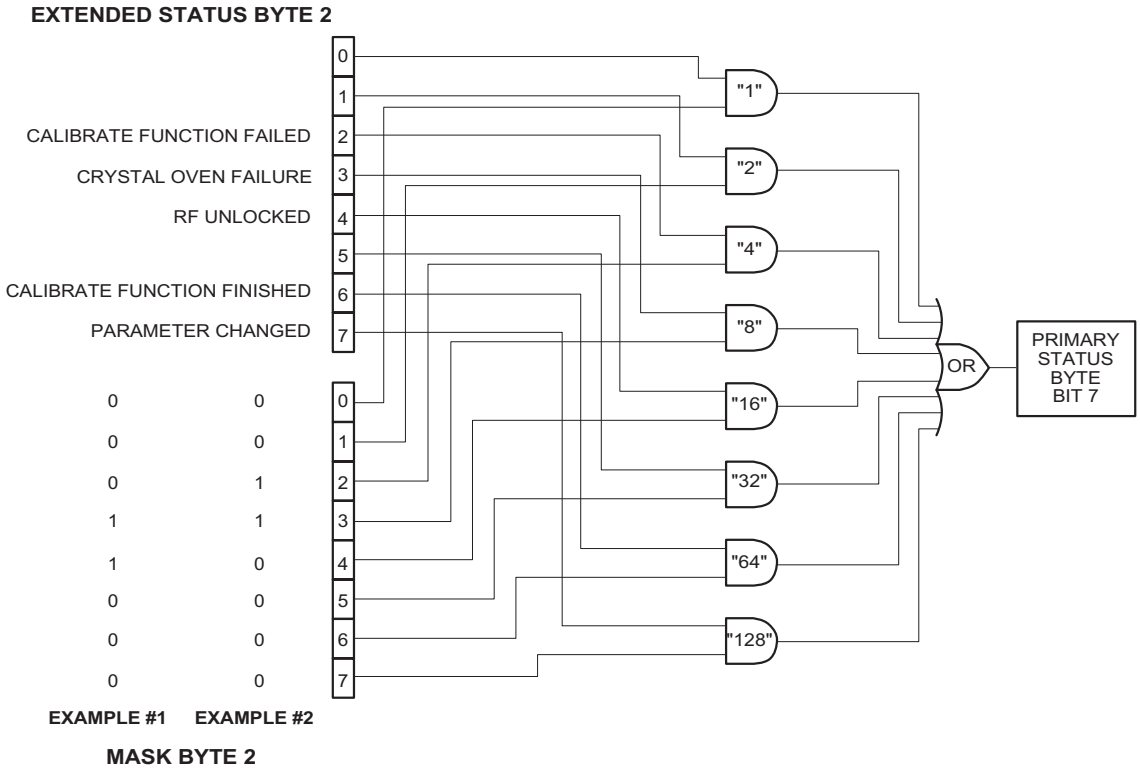
Table 2-12. *SRQ and Status Byte Commands (2 of 2)*

MNEMONIC CODE	FUNCTION
SE0	Inhibits an SRQ from being generated when the Syntax Error bit is set. This is the default mode.
SQ1	Enables the SRQ generation function. This command allows a status reporting function, that is true and enabled, to pull the SRQ line LOW (true) and request service from the controller.
SQ0	Disables the SRQ generation function. This is the default mode.
UL1	Enables an SRQ to be generated when Primary Status Byte bit 2 (RF Unleveled) is set and SQ1 has been programmed.
UL0	Inhibits an SRQ from being generated when the RF Unleveled bit is set. This is the default mode.
LS1	Unblocks updating of the Extended Status Byte 1 bit 3 (RF Locked). This bit is only used with the Model 360B interface.
LS0	Disables updating of the Extended Status Byte 1 bit 3. This is the default setting.
LA1	Unblocks updating of the Extended Status Byte 1 bit 7 (RF Leveled).
LA0	Blocks updating of the Extended Status Byte 1 bit 7. This is the default setting.
EL1	Unblocks updating of the Extended Status Byte 2 bit 4 (RF Unlocked).
EL0	Blocks updating of the Extended Status Byte 2 bit 4. This is the default setting because it is normal for the RF to be momentarily unlocked during sweeps and sweep retrace.
II1	Unblocks updating of the Extended Status Byte 2 bit 7 (Parameter Changed). This bit is only used with the Model 56100A interface. This bit is cleared when the 56100A sends the OCP command (Output Last Parameter Changed).
II0	Disables updating of the Extended Status Byte2 bit 7. This is the default setting.
CSB	Clears all GPIB status bytes.

```
OUTPUT 705; "OES"
ENTER 705 USING "#, B"; A, B, C
MAIN = A
1 EXT = B
2 EXT = C
```

Figure 2-11. *OES Command Programming Example*

The MG369XA has a software mask that permits manipulation of the three status bytes over the bus. This manipulation is accomplished by sending the command codes MB0, MB1, MB2, or all three at once, followed by an argument that assigns an on/off condition for each bit in the byte. Two examples are shown below:



EXAMPLE #1: **"MB2" (CHR $(24))**

Sets bits 3 and 4 in Mask Byte 2 to 1 and all other bits to 0, thus enabling bits 3 and 4 in Extended Status Byte 2 to be read from the bit 7 position of the Primary Status Byte.

EXAMPLE #2: **"MB2" (CHR $(12))**

Sets bits 2 and 3 in Mask Byte 2 to 1 and all other bits to 0, thus enabling bits 2 and 3 in Extended Status Byte 2 to be read from the bit 7 position of the Primary Status Byte.

Figure 2-12. *Status Byte Mask Programming Examples*

2-13 CONFIGURATION COMMANDS

Table 2-13 lists the configuration command mnemonic codes. These commands permit selection/setting of the following system configuration items via the bus:

- A +5V or –5V level for the rear panel retrace and bandswitch blanking outputs.
- Setting the frequency scaling reference multiplier value.
- Normally-open or normally-closed contacts on the internal penlift relay.
- RF on or RF off during frequency switching in CW, step sweep, and list sweep modes.
- RF on or RF off during sweep retrace.
- RF on or RF off at reset.
- 40 dB or 0 dB of attenuation when RF is switched off in units with a step attenuator (Option 2).

The system configuration selections made with GPIB commands remain in effect when the instrument is returned to local control.

Table 2-13. *Configuration Commands (1 of 2)*

MNEMONIC CODE	FUNCTION
BPN	Selects a –5V level for the retrace and bandswitch blanking outputs. (The retrace blanking output signal is available at pin 6 of the AUX I/O connector; the bandswitch blanking output signal at pin 20 of the AUX I/O connector.)
BPP	Selects a +5V level for the retrace and bandswitch blanking outputs.
FRS	Permits setting the frequency scaling reference multiplier value. The multiplier value must be between 0.1 and 14 and must be terminated with TMS. ***Programming Example:*** Programming "**`FRS 3 TMS`**" sets the frequency scaling reference multiplier to 3. This command affects all entered and displayed frequencies, but does not affect the output of the instrument.
PPO	Selects normally-open contacts on the internal penlift relay. (The penlift relay output, optionally available at the rear panel, is used to lift a plotter pen during retrace.)
PPC	Selects normally-closed contacts on the internal penlift relay.
RC0	Selects RF to be off during frequency switching in CW, step sweep, and list sweep modes.
RC1	Selects RF to be on during frequency switching in CW, step sweep, and list sweep modes.

Table 2-13. *Configuration Commands (2 of 2)*

MNEMONIC CODE	FUNCTION
RT0	Selects RF to be off during retrace.
RT1	Selects RF to be on during retrace.
RO0	Selects RF to be on at reset. (This is the default mode.)
RO1	Selects RF to be off at reset.
TR0	Sets 0 dB of attenuation when RF is switched off in units with a step attenuator (Option 2) installed. If Option 2 is not installed, this command produces a syntax error.
TR1	Sets 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. If Option 2 is not installed, this command produces a syntax error.

2-14 GROUP EXECUTE TRIGGER COMMANDS

Table 2-14 lists the group execute trigger (GET) command mnemonic codes. These commands let a GET bus message (Table 1-3) be used to trigger certain CW generator functions and thus speed up bus operations.

In the default state, the MG369XA responds to a GET message by triggering a single sweep.

Table 2-14. *Group Execute Trigger Commands*

MNEMONIC CODE	FUNCTION
GTC	Configures the MG369XA to execute an SQF command (scan to the next higher preset CW frequency) each time a GET message is received.
GTD	Configures the MG369XA to execute a DN command (steps the open parameter down by the step size) each time a GET message is received.
GTF	Configures the MG369XA to execute a fast-frequency-switching step (Table 2-16) each time a GET message is received.
GTL	Configures the MG369XA to execute a TSS command (steps to the next point in a dual step sweep mode) each time a GET message is received.
GTO	Disables the GET functions.
GTS	Configures the MG369XA to execute a TRS command (trigger a single sweep) each time a GET message is received. This is the default mode.
GTT	Configures the MG369XA to execute a TST command (execute a complete CW generator self test) each time a GET message is received.
GTU	Configures the MG369XA to execute a UP command (steps the open parameter up by the step size) each time a GET message is received.
Y	Sending a “Y” is equivalent to sending a GET.

2-15 LIST SWEEP COMMANDS

Table 2-15 lists the list sweep command mnemonic codes. These commands provide for (1) placing the CW generator in list sweep mode, (2) accessing up to four lists of 2000 frequency/power level sets, and (3) generating a phase-locked step sweep of the list frequency/power level sets.

In list sweep mode, up to four lists of 2000 non-sequenctial frequency/power level sets can be stored and accessed. A list index (0 thru 1999) identifies each frequency/power level set in a list. When commanded, the CW generator generates a phase-locked step sweep between the specified list start index and list stop index.

Accessing and Editing a List

The command, LST, places the CW generator in list sweep mode. The ELN(x) command is used to select which of the four lists is to be accessed. The first list (list number 0) is the same list that is available via local (front panel) control. This list is stored in non-volatile RAM to perserve any settings after the instrument is powered off. The other three lists (list numbers 1, 2, and 3) are all stored in volatile RAM and all settings are lost when power to the CW generator is turned off. At power up, list numbers 1, 2, and 3 are set to their default state of 2000 index entries of 5 GHz at 0 dBm.

The ELI(xxxx) command sets the list index for the current list. Use the LF command to set the list frequencies starting at the list index and the LP command to set the list power levels starting at the list index. Any number of frequencies and power levels can follow these commands.

Another method of entering frequency and power level information into the current list index is to use the command, CTL, which copies the current CW frequency and power level to the current list index.

Programming Example:
Programming "**`LST ELN1 ELI1234 LF 2 GH, 5 GH, 1 GH, 8 GH LP 2 DM, 9 DM, –3 DM, –10 DM`**" places the CW generator in list sweep mode, selects list number 1, and sets the list index to 1234. List index 1234 is set to 2 GHz at 2 dBm, list index 1235 is set to 5 GHz at 9 dBm, list index 1236 is set to 1 GHz at –3 dBm, and list index 1237 is set to 8 GHz at –10 dBm

Table 2-15. *List Sweep Commands*

MNEMONIC CODE	FUNCTION
LST	Places the MG369XA in List Sweep mode.
ELI(xxxx)	Sets list index to xxxx, where xxxx = 4-digit integer between 0000 and 1999.
ELN(x)	Sets list number to x, where x = 1-digit integer between 0 and 3.
LF	Sets list frequencies starting at the list index. Any number of frequencies can follow. This command does ***not*** change the value of the list index.
LP	Sets list power levels starting at the list index. Any number of power levels can follow. This command does ***not*** change the value of the list index.
LIB(xxxx)	Sets the list start index to xxxx, where xxxx = 4-digit integer between 0000 and 1999.
LIE(xxxx)	Sets the list stop index to xxxx, where xxxx = 4-digit integer between 0000 and 1999.
AUT	Selects Auto Trigger
HWT	Selects External Trigger
EXT	Selects Single Trigger
TRG	Triggers a Single Sweep (*only* in Single Trigger mode)
MNT	Selects Manual Trigger
UP	Increases list index by one (*only* in Manual Trigger mode)
DN	Decreases list index by one (*only* in Manual Trigger mode)
LEA	Learn List (This command initiates a process that examines every index in the list and performs all calculations necessary to set the frequency and power levels.)
CTL	Copy current CW frequency and power level to the current list index.

List Sweep Triggering

Four different modes of triggering are available in list sweep mode—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 using the UP command or an external TTL trigger and is decremented using the DN command.

The AUT command selects automatic sweep triggering and the HWT command selects external sweep triggering. When external sweep trigger mode is selected, the output sweep recurs when triggered by an external TTL-compatible clock pulse to the rear panel AUX I/O connector. The EXT command selects single list sweep triggering. When single sweep trigger mode is selected, a single list sweep starts when the TRG command is received.

The MNT command selects the manual trigger mode. In manual trigger mode, the list index is incremented by one each time the UP command is received or each time an external TTL trigger is received. The list index is decremented by one each time the DN command is received.

Generating a List Sweep

Generating a list sweep involves selecting a sweep range, a dwell-time-per-step, and a sweep trigger. The sweep range is defined by a list start index and a list stop index. Use the LIB(xxxx) command to set the list start index and the LIE(xxxx) command to set the list stop index. The dwell-time-per-step of the list sweep is changed using the LDT parameter entry command. Select a trigger for the list sweep using the list sweep trigger commands perviously described.

Programming Example:
Programming "**`LIB1234 LIE1237 EXT LDT 10 MS TRG`**" implements a list sweep from the current list index 1234 to index 1237 in single trigger mode with a 10 ms dwell-time-per-step, then triggers a single sweep.

List Calculations

During the initial sweep, the CW generator performs calculations to set the frequency and power levels. This causes the initial list sweep to take longer than each subsequent sweep. The command, LEA, initiates a process that examines every index in the current list and performs all the calculations necessary to set the frequency and power levels. This lets the initial list sweep be as fast as each subsequent sweep.

The list calculations are for the current list only. Any changes to the current list or selection of another list requires the calculations to be performed again. The calculations are stored only in volatile RAM and are lost when power to the CW generator is turned off.

2-16 FAST-FREQUENCY-SWITCHING COMMANDS

Table 2-16 lists the fast-frequency-switching command mnemonic codes. These commands provide for reducing the time that it takes to switch between CW frequencies.

In the fast-frequency-switching mode, up to 3202 frequencies can be loaded into a table. A table pointer can then be set to point to a specific frequency in the table and the CW generator commanded to switch from that frequency through the following frequencies to the bottom of the table.

Loading the Frequency Table

To load the frequency table, use the command ZTLbbbbnnnnD8D8D8.....D8, where "bbbb" is the table location where the frequency points are to start loading, "nnnn" is the number of frequency points to be loaded, and "D8" is the frequency of the frequency point. Both "bbbb" and "nnnn" are 4 binary byte integers and "D8" is 8 binary bytes of an IEEE-754 double precision floating point number. The order of the bytes in each field is most significant byte first.

NOTE

Use of the commands ZL($X_{000-999}$), ZEL, and ZS($X_{000-999}$) limits the number of frequency points in the table to 1000.

Figures 2-13 thru 2-13b show an example of fast-frequency-switching mode programming.

Table 2-16. *Fast-Frequency-Switching Commands*

MNEMONIC CODE	FUNCTION
ZPN	Sets the table pointer (ZPNbbbb), where bbbb is the location the pointer is to point to.
ZTL	Loads the frequency table (ZTLbbbbnnnnD8D8D8.....D8), where bbbb is the table location where the frequency points are to start loading, nnnn is the number of frequencies to be loaded, and D8 is the frequency of the frequency point.
ZL($X_{000-999}$)	Loads a CW frequency into the stack at location X. The location is a number from 000 to 999.
ZEL	Ends frequency loading.
ZS($X_{000-999}$)	Sets the stack pointer to point to location X. The location is a number from 000 to 999.

The following is an example of fast-frequency-switching mode programming. This is a IBM-PC based program using the National Instruments NI-488.2 C language interface library (mcib.lib) and header (decl.h).

```
#include <stdio.h>
#include "decl.h"

#define BOARD_ID        0

void main()
{
Addr4882_t      source_addr = 5,
                device_addr[2] = {5, NOADDR};
double          freq_list[2] = {600e6, 8e9},
                *double_ptr;
int             start_index,
                num_freqs = 2,
                *integer_ptr;
char            command_str[50];

/** Clear the bus and take control.
**/
SendIFC(BOARD_ID);
if (ibsta & ERR)
    {
    exit (-1);
    }

/** Set the remote enable line.
**/
EnableRemote(BOARD_ID, device_addr);
if (ibsta & ERR)
    {
    exit (-1);
    }

/** Set the start index to an arbitrary starting point.
**/
start_index = 12;

/** Begin constructing the command.
**/
command_str[0] = 'Z';                               /** Start with the ZTL command. **/
command_str[1] = 'T';
command_str[2] = 'L';

integer_ptr = &start_index;                         /** Point to the start index. **/
command_str[3] = (char)(*(integer_ptr + 3));        /** Get the value of the fourth byte. **/
                                                    /** Data is LSB first on Intel based PCs. **/
command_str[4] = (char)(*(integer_ptr + 2));        /** Get the value of the third byte. **/
command_str[5] = (char)(*(integer_ptr + 1));        /** Get the value of the second byte. **/
command_str[6] = (char)(*integer_ptr);              /** Get the value of the first byte. **/
```

NOTE: This program is continued in Figure 2-13a.

Figure 2-13. *Fast-Frequency-Switching Programming Example (1 of 3)*

```
integer_ptr = &num_freqs;                          /** Point to the number of frequencies. **/
command_str[7] = (char)(*(integer_ptr + 3));       /** Get the value of the fourth byte. **/
command_str[8] = (char)(*(integer_ptr + 2));       /** Get the value of the third byte. **/
command_str[9] = (char)(*(integer_ptr + 1));       /** Get the value of the second byte. **/
command_str[10] = (char)(*integer_ptr);            /** Get the value of the first byte. **/

double_ptr = &(freq_list[0])                       /** Point to the first frequency. **/
command_str[11] = (char)(*(double_ptr + 7));       /** Get the value of byte 7. **/
                                                   /** Data is LSB first on Intel based PCs. **/
command_str[12] = (char)(*(double_ptr + 6));       /** Byte 6. **/
command_str[13] = (char)(*(double_ptr + 5));       /** Byte 5. **/
command_str[14] = (char)(*(double_ptr + 4));       /** Byte 4. **/
command_str[15] = (char)(*(double_ptr + 3));       /** Byte 3. **/
command_str[16] = (char)(*(double_ptr + 2));       /** Byte 2. **/
command_str[17] = (char)(*(double_ptr + 1));       /** Byte 1. **/
command_str[18] = (char)(*double_ptr );            /** Byte 0. **/

double_ptr = &(freq_list[1])                       /** Point to the second frequency. **/
command_str[19] = (char)(*(double_ptr + 7));       /** Get the value of byte 7. **/
command_str[20] = (char)(*(double_ptr + 6));       /** Byte 6. **/
command_str[21] = (char)(*(double_ptr + 5));       /** Byte 5. **/
command_str[22] = (char)(*(double_ptr + 4));       /** Byte 4. **/
command_str[23] = (char)(*(double_ptr + 3));       /** Byte 3. **/
command_str[24] = (char)(*(double_ptr + 2));       /** Byte 2. **/
command_str[25] = (char)(*(double_ptr + 1));       /** Byte 1. **/
command_str[26] = (char)(*double_ptr );            /** Byte 0. **/

/** Send the command.
**/
Send(BOARD_ID, source_addr, command_str, 27, DABend);
if (ibsta & ERR)
    {
    exit (-1);
    }

/** Set the pointer back to the start index.
**/
command_str[0] = 'Z';                              /** ZPN command. **/
command_str[1] = 'P';
command_str[2] = 'N';

integer_ptr = &start_index;                        /** Point to the start index. **/
command_str[3] = (char)(*(integer_ptr + 3));       /** Get the value of the fourth byte. **/
command_str[4] = (char)(*(integer_ptr + 2));       /** Get the value of the third byte. **/
command_str[5] = (char)(*(integer_ptr + 1));       /** Get the value of the second byte. **/
command_str[6] = (char)(*integer_ptr);             /** Get the value of the first byte. **/

/** Send the command.
**/
Send(BOARD_ID, source_addr, command_str, 7, DABend);
if (ibsta & ERR)
    {
    exit (-1);
    }
```

NOTE: This program is continued in Figure 2-13b.

Figure 2-13a. *Fast-Frequency-Switching Programming Example (2 of 3)*

```
/** Send a trigger.
**/
Trigger(BOARD_ID, source_addr);
if (ibsta & ERR)
    {
    exit (-1);
    }

/** Source is now outputting 600 MHz. **/

/** Send a trigger.
**/
Trigger(BOARD_ID, source_addr);
if (ibsta & ERR)
    {
    exit (-1);
    }

/** Source is now outputting 8 GHz. **/

exit(0);

} /** End of main **/
```

Figure 2-13b. *Fast-Frequency-Switching Programming Example (3 of 3)*

2-17 POWER-OFFSET-TABLE COMMANDS

Table 2-17 lists the power-offset-table command mnemonic codes. These commands provide for maintaining a consistent power level at a point within a test setup across the measurement frequencies. 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.

The power-offset mode works in conjunction with the fast-frequency-switching mode (para. 2-16). The frequency stack must be loaded before loading the power-offset table because the frequency loading sets the upper limit for the number of entries in the power-offset table. The same pointer is used for both the frequency stack and the power-offset table. Once the power-offset table is loaded, the PT1 command turns on the power-offset mode; the PT0 command turns it off.

Loading the Power-Offset Table

To load the power-offset table, use the command, PTL clch dldh....., where "clch" is the number of power-offset words and "dldh" is a power-offset word. Both "clch" and "dldh" are two-byte binary words sent LOW byte first and HIGH byte second. The power-offset word is in hundreths of a dB. Negative power offsets use 2's complement representation.

To change a power-offset word in the table, use the PTC dldh command, where "dldh" is the new power-offset word for the current power level setting.

Programming Note:
Care must be taken to send the exact number of power-offset words specified in the wordcount, "clch". If to few words are sent, the GPIB interface may not respond properly.

Figures 2-14 and 2-14a show an example of power-offset mode programming.

Table 2-17. *Power-Offset-Table Commands*

MNEMONIC CODE	FUNCTION
PT0	Disable the Power Offset Table
PT1	Enable the Power Offset Table
PTC	Change a Power Offset Table entry (PTC dldh), where dldh is the new offset word for the current table entry.
PTL	Load a Power Offset Table (PTL clch dldh ...), where clch is the data word count and dldh is the data word.

The following is an example of power-offset mode programming. This program is written for use with an IBM-PC type computer/controller containing an IOtech GPIB interface.

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

/* IOtech Driver488/LIB Subroutine Interface definitions... */
#include "\ieee488\iotlib.h"
#include "\ieee488\iot_main.h"

/* Define the device handles */
DevHandleT Synth,ieee;

void main()
{
  char CmdString[10], DataString[40], String[40];
  unsigned char XString[160];

  int  next_step,i,j;

  /*************************************************************************/
  /* Initialize the IOtech interface board and */
  /* obtain the interface's handle.            */

  #define  ADDRESS 5

  if((ieee=InitIeee488(btMP488CT, 21, -1, 0x02e1, 7, 5, 1, 10000,0))==-1)
     {
     printf("Cannot initialize IEEE 488 system.\n")
     exit(1);
     }

  if(( Synth=CreateDevice( ADDRESS, -1 ) )==-1)
     {
     printf("Cannot create Synth device.\n");
     exit(1);

  /* Set the device timeout so you don't wait forever if there's a problem */
  TimeOut(Synth, 2000);

  /* Handle the errors in the program */
  Error(Synth,OFF);

  /*************************************************************************/

  /* Address the Synthesizer to listen */
```

NOTE: This program is continued in Figure 2-14a.

Figure 2-14. *Power-Offset Mode Programming Example (1 of 2)*

```
    strcpy(XString,"_?U%");
    SendCmd(Synth,XString,strlen(XString));

    Output(Synth,"RST");
    Output(Synth,"GTF");
    Output(Synth,"ZL000");
    Output(Synth,"1 GH 2 GH 3 GH 4 GH 5 GH 6 GH 7 GH 8 GH 9 GH 10 GH");
    Output(Synth,"ZEL");

    /* Make a data array with the PTL command, the word count */
    /* and the binary data in low-byte, high-byte order.      */
    DataString[0]='P';
    DataString[1]='T';
    DataString[2]='L';
    DataString[3]=10;       /* Low byte  --  ten words */
    DataString[4]=0;        /* High byte --            */
    DataString[5]=0;        /* 0 */
    DataString[6]=0;
    DataString[7]=20;       /* 276 */
    DataString[8]=1;
    DataString[9]=30;       /* 542 */
    DataString[10]=2;
    DataString[11]=40;      /* 808 */
    DataString[12]=3;
    DataString[13]=50;      /* 1074 */
    DataString[14]=4;
    DataString[15]=60;      /* 1340 */
    DataString[16]=5;
    DataString[17]=70;      /* 1606 */
    DataString[18]=6;
    DataString[19]=80;      /* 1872 */
    DataString[20]=7;
    DataString[21]=90;      /* 2138 */
    DataString[22]=8;
    DataString[23]=100;     /* 2404 */
    DataString[24]=9;

    /* Send the data with an EOI on the last byte */
    SendEoi(Synth,DataString,25);

    Output(Synth,"PT1");
    Output(Synth,"ZS000");

    for(next_step=0;next_step<10;next_step++)
      {
        Output(Synth,"Y");
        printf("Press Enter for Next Frequency");
        getchar();
      }

} /* End of main() */
```

Figure 2-14a. *Power-Offset Mode Programming Example (2 of 2)*

2-18 USER LEVEL CALIBRATION COMMANDS

Table 2-18 lists the user level calibration commands. These commands provide for (1) activating individual user level calibration tables, (2) sending the tables to the controller, and (3) recalling the tables from the controller.

The user level (flatness correction) calibration function provides for calibrating out path variations in a test setup. This is accomplished by means of an entered power-offset table from a GPIB power meter or calculated data. When the user level calibration table is activated, the set power level is delivered to the point in the test setup where the calibration was performed. Up to five user level calibration tables from 2 to 801 frequency points/table can be created and stored in MG369XA memory for recall. (Refer to "Leveling Operations" in Chapter 3 of the MG369XA Operation Manual for user level calibration procedures.)

The commands, LU1 thru LU5, each activate an individual user level calibration table (#1 thru #5). The LU0 command turns off the active user level calibration table. The LUS command sends all five tables of user level calibration data to the controller where they are stored in a binary data file. While stored in the file, the data can be edited (see page 2-52). The LUR command readies the MG369XA to receive the five tables of user level calibration data from the controller. Figures 2-15 thru 2-15b show an example program for saving and recalling user level calibration tables.

Table 2-18. *User Level Calibration Commands.*

MNEMONIC CODE	FUNCTION
LU0	Turns off the active user level calibration table.
LU1	Activates user level calibration table #1. Turns off any other active user level calibration table.
LU2	Activates user level calibration table #2. Turns off any other active user level calibration table.
LU3	Activates user level calibration table #3. Turns off any other active user level calibration table.
LU4	Activates user level calibration table #4. Turns off any other active user level calibration table.
LU5	Activates user level calibration table #5. Turns off any other active user level calibration table.
LUR	Readies the MG369XA to receive five tables of user level calibration data from the controller.
LUS	Sends all five tables of user level calibration data to the controller.

The following is an example program for saving and recalling user level calibration tables. This program uses the National Instruments NI-288.2 C language interface library (mcib.lib) and header (decl.h).

```
#include <stdio.h>
#include "decl.h"

void gpiberr(char *);

#define BOARD_ID        0
#define USER_LVL_SAVE       1
#define USER_LVL_RECALL     2
#define USER_LVL_NUM_BYTES  8232

void main()
{

Addr4882_t     source_addr = 5
               device_addr[2] = {5, NOADDR};
unsigned char  user_lvl_tables[USER_LVL_NUM_BYTES];
init           user_lvl_received,
              user_input;
FILE           *fp_user_lvl_data:


/** Clear the bus and take control.
 **/
SendIFC(BOARD_ID);
if(ibsta & ERR)
     gpiberr("SendIFC error");


/** Set the remote enable line.
 **/
EnableRemote(BOARD_ID, device_addr);
if(ibsta & ERR)
     gpiberr("EnableRemote error");


/** Prompt the user to save or recall the data.
 **/
printf("1. Save the data from the source\n");
printf("2. Recall the data to the source\n");
printf("Option: ");

scanf("%d",&user_input);

if(user_input == USER_LVL_SAVE)
     {
```

NOTE: This program is continued in Figure 2-15a.

Figure 2-15. *Programming Example of Saving and Recalling User Level Calibration Tables (1 of 3)*

```
        /** The LUS command tells the source to send the user level
          ** table data over the bus.
         **/
        Send(BOARD_ID, source_addr, "LUS\r\n", 5L, DABend);
        if(ibsta & ERR)
             gpiberr("Send error");

        /** Receive the user level table data.
         **/
        printf("Receiving data from the source\n");
        Receive(BOARD_ID, source_addr, user_lvl_tables,
                  (long)USER_LVL_NUM_BYTES, STOPend);
        if(ibsta & ERR)
             gpiberr("Receive error");

        user_lvl_received = ibcntl;
        printf("Received %d bytes of user level data\n",
                 user_lvl_received);

        /** Open binary data file and output the data.
         **/
        if((fp_user_lvl_data = fopen("userlvl.dat","w+b")) == NULL)
             {
             printf("Can't open the userlvl.dat data file\n");
             }
        else
             {
             printf("Outputting to userlvl.dat in the current
                       directory\n");
             fwrite(user_lvl_tables, sizeof(user_lvl_tables[0]),
                        USER_LVL_NUM_BYTES, fp_user_lvl_data);
             }
        }
   else
        {
        /** Open the binary data file and read the data.
         **/
        if((fp_user_lvl_data = fopen("userlvl.dat","rb")) == NULL)
             {
             printf("Can't open the userlvl.dat data file\n");
             }
        else
             {
             printf("Inputting from userlvl.dat in the current
                       directory\n");
             fread(user_lvl_tables, sizeof(user_lvl_tables[0]),
                      USER_LVL_NUM_BYTES, fp_user_lvl_data);
             }
```

NOTE: This program is continued in Figure 2-15b.

Figure 2-15a. *Programming Example of Saving and Recalling User Level Calibration Tables (2 of 3)*

```
        /** The LUR command readies the source to receive the user
          ** level table data. Notice that there is no carriage
          ** return, line feed, or EOI sent with the LUR command.
         **/
        Send(BOARD_ID, source_addr, "LUR", 3L, NULLend);
        if(ibsta & ERR)
             gpiberr("Send error; LUR");

        /** The data is sent to the source immediately following the
          ** LUR command.
         **/
        printf("Sending %d bytes of data to the source\n",
                 USER_LVL_NUM_BYTES);
        Send(BOARD_ID, source_addr, user_lvl_tables,
             (long)USER_LVL_NUM_BYTES, DABend);
        if(ibsta & ERR)
             gpiberr("Send error; data");
        }

    fclose(fp_user_lvl_data);
    exit(0);
    }/** end of main **/



    /*****************************************************************************************
    ***Name: gpiberr
    **Desc: Display error code and message for all GPIB operation
    **Receives: errsta - the error string to display
    **Returns: nothing
    **/
    void gpiberr(char *errstr)
    {
    printf("\n%s\nError code = %d\n",errstr,iberr);
    }/** end of gpiberr **/
```

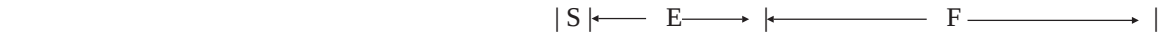
Figure 2-15b. *Programming Example of Saving and Recalling User Level Calibration Tables (3 of 3)*

Editing the Table Data

While stored in the binary data file of the controller, the data of the five user level calibration tables can be edited. An editor that can display the data file in hexadecimal will be needed to perform the edit.

Types of Data Storage Methods
There are three types of data storage methods used for user level calibration data. Each is described in the following paragraphs. (The data item descriptions will refer back to these data types.)

Double:
8 bytes. Most significant byte first.
ANSI/IEEE-754 64-bit floating point format.



where:
S (1 bit) = sign bit, 0 positive, 1 negative
E (11 bits) = exponent, biased by 1023 base 10
F (52 bits) = fraction, $0 \leq F < 1$

value = [(–1) raised to the S power] ×
[2 raised to the (E – 1023) power] ×
[1 + F]

Example:
801 is stored as 40 89 08 00 00 00 00 00, base 16.
S = 0
E = 408 base 16 = 1032 base 10
F = .908 base 16 = .564453125 base 10
801 = 1 × 512 × 1.564453125

Integer:
4 bytes. Most significant byte first.
Stored as a signed integer. The sign bit is the most significant bit. Negative numbers are stored in 2's complement form.

Example:
7025 is stored as 00 00 1B 71, base 16.
–7025 is stored as FF FF D4 8F, base 16 2's complement.

Short:
2 bytes. Most significant byte first.
Stored as a signed short. The sign bit is the most significant bit. Negative numbers are stored in 2's complement form.

Example:
350 is stored as 01 5E, base 16.
–350 is stored as FE A2, base 16.

Data Item Descriptions
Each data item contained in the binary data file is described below with the following information:

- Data name
- Description
- Type of data storage
- Offset into the data file for each user level calibration table
- Data units

Figure 2-16 (page 2-56) shows a printout of a section of the data file that contains each of these data items for user level calibration table #2.

Name: Start Frequency
Description: The starting frequency for each user level calibration.
Type: Double
Offsets (base 16): Table #1 **0006**
Table #2 **0674**
Table #3 **0CE2**
Table #4 **1350**
Table #5 **19BE**
Units: mHz (millihertz)

Name: Stop Frequency
Description: The ending frequency for each user level calibration.
Type: Double
Offsets (base 16): Table #1 **000E**
Table #2 **067C**
Table #3 **0CEA**
Table #4 **1358**
Table #5 **19C6**
Units: mHz (millihertz)

Name: Frequency Increment
Description: The frequency increment for 1 point. This value = (stop frequency – start frequency) divided by the number of points.
Type: Double
Offset (base 16): Table #1 **0016**
Table #2 **0684**
Table #3 **0CF2**
Table #4 **1360**
Table #5 **19CE**
Units: mHz (millihertz)

Name: Number of Points
Description: The number of frequency points.
Type: Double
Offsets (base 16): Table #1 **001E**
Table #2 **068C**
Table #3 **0CFA**
Table #4 **1368**
Table #5 **19D6**
Units: a value of 1 = 1 point

Name: Level Correction Offset
Description: This is the power level that is added to the front panel power before the level correction point table power levels are subtracted. It represents the maximum power deviations read during the calibration.
Type: Integer
Offsets (base 16): Table #1 **0026**
Table #2 **0694**
Table #3 **0D02**
Table #4 **1370**
Table #5 **19DE**
Units: mdB (milli-dB)

Name: Level Correction Point Table
Description: These are the power level correction values with respect to the maximum power deviation read during the calibration.
Type: Short (Array of 801 Points)
Offsets (base 16): Table #1 **002A**
Table #2 **0698**
Table #3 **0D06**
Table #4 **1374**
Table #5 **19E2**
Units: mdB (milli-dB)

```
000640   00 00 00 00  00 00 00 00  00 00 00 00  00 00 00 00
000650   00 00 00 00  00 00 00 00  00 00 00 00  00 00 00 00
000660   00 00 00 00  00 00 00 00  00 00 00 00  00 00 BA BE
000670   00 00 DA BE  42 7D 1A 94  A2 00 00 00  42 A2 30 9C
000680   E5 40 00 00  42 6D 1A 94  A2 00 00 00  40 22 00 00
000690   00 00 00 00  00 00 17 83  FF 11 FF 56  FF 56 FF 74
0006A0   FF 93 FF 9C  FF F6 00 00  FF C4 D1 21  E8 37 00 00
0006B0   00 00 00 00  00 00 00 00  00 00 00 00  00 00 00 00
0006C0   00 00 00 00  00 00 00 00  00 00 00 00  00 00 00 00
0006D0   00 00 00 00  00 00 00 00  00 00 00 00  00 00 00 00
```

Printout Explanation

The printout shows a section of the user level calibration data file, in hexadecimal, that contains each of the data items for user level calibration table #2. The offset into the data file is shown at the left in the printout.

Offset **0674**: Start Frequency
42 7D 1A 94 A2 00 00 00 = 2 GHz

Offset **067C**: Stop Frequency
42 A2 30 9C E5 40 00 00 = 10 GHz

Offset **0684**: Frequency Increment
42 6D 1A 94 A2 00 00 00 = 1 GHz

Offset **068C**: Number of Points
40 22 00 00 00 00 00 00 = 9 points

Offset **0694**: Level Correction Offset
00 00 17 83 = 6.016 dB

Offset **0698**: Level Correction Point Table (9 points)
FF 11 = –.239 dB
FF 56 = –.170 dB
FF 56 = –.170 dB
FF 74 = –.140 dB
FF 93 = –.109 dB
FF 9C = –.100 dB
FF F6 = –.010 dB
00 00 = 0 dB
FF C4 = –.060 dB

Figure 2-16. *Printout of a Section of the User Level Calibration Binary Data File*

2-19 MASTER-SLAVE OPERATION COMMANDS

Table 2-19 lists the master-slave operation command mnemonic codes. These commands provide for enabling two instruments that are connected in a master-slave configuration to produce CW and synchronized, swept output signals at a frequency offset.

In a master-slave configuration, 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. (Refer to the MG369XA Operation Manual, Chapter 7—Use With Other Instruments, for master-slave interconnection and operating instructions.)

The parameter entry commands, SLF0 - SLF9 and SLM0 - SLM9, are used to set the F0 - F9 and M0 - M9 frequencies for the Slave unit; the SLDF parameter entry command is used to set the ΔF parameter for the Slave unit. The main output power level (L1) for the Slave unit is set using the SLV or SLL1 parameter entry command; the alternate sweep power level (L2) for the Slave unit is set using the SLL2 parameter entry command. The S1 command turns on the master-slave mode of operation; the S0 command turns off the Master-Slave mode of operation.

Programming Example:
Programming "**`SLF1 5 GH SLF2 8 GH SLL1 3 DM S1`**" sets the Slave unit F1 frequency to 5 GHz, its F2 frequency to 8 GHz, and its output power level to 3 dBm and turns on the master-slave mode of operation. Now, when the Master unit is programmed to perform a F1 to F2 sweep, the Slave unit will produce a synchronous 5 GHz to 8 GHz frequency sweep that has an output power level of 3 dBm.

Programming Note:
Use the SOF parameter entry command *only* to set the frequency offset for a Slave unit that is (1) slave to a Master unit that is connected to a 360B VNA in a source or dual-source configuration or (2) slave to a Master unit that is programmed to perform non-sequential frequency step sweeps (refer to Special Step Sweep on page 2-19).

Table 2-19. *Master-Slave Operation Commands*

MNEMONIC CODE	FUNCTION
S0	Turns off the Master-Slave mode of operation.
S1	Turns on the Master-Slave mode of operation.

2-20 SELF TEST COMMAND

Table 2-20 lists the self test command mnemonic code. This command provides for executing a CW generator self test.

When a TST command is received, the CW generator performs a self test, then places a "P" (for pass) or a "F" (for fail) on the bus. It also generates six self test results bytes. Figure 2-18 shows the six self test results bytes and identifies the reporting function of each bit.

When self test is completed, bit 7 of Self Test Results Byte 6 and bit 2 of Extended Status Byte 1 are both set. If a failure(s) occurs during self test, the Self Test Results Byte bit(s) reporting the failure(s) and bit 0 of Extended Status Byte 1 are set.

The OSR command returns the six self test results bytes to the controller. Figure 2-17 provides an example of self test command programming.

Programming Note: The "P or "F" character placed on the bus by the CW generator self test must be cleared from the output buffer (read by the controller) before another output command, such as OSR, is sent. If it is not cleared, the first character of the next output will be missing. Line 30 (Figure 2-17) shows clearing of the "P" or "F" character.

Table 2-20. *Self Test Command*

MNEMONIC CODE	FUNCTION
TST	Executes a CW generator self test. Extended Status Byte 1 bit 0 is set if self test fails; bit 2 is set when self test is complete.

```
10 OUTPUT 705; "CSB"
20 OUTPUT 705; "TST"
30 ENTER 705; D$
40 DISP D$
50 OUTPUT 705; "OSR"
60 ENTER 705 USING "#,B"; A, B, C, D, E, F
70 DISP A; B; C; D; E; F
80 END
```

Figure 2-17. *Self Test Command Programming Example*

Self Test Results Byte 1

Not Used	Not Used	Not Used	Not Used	Not Used	DVM –10 Volt Reference Check Failed	DVM +10 Volt Reference Check Failed	DVM Ground Offset Check Failed
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Self Test Results Byte 2

Not Locked Indicator Check Failed	Down Converter is Not Locked	YIG Loop Circuitry is Not Locked	Coarse Loop Circuitry is Not Locked	Not Used	High Stability Crystal is Not Locked	Ext 10 MHz is Not Locked	Oven is Not Ready
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Self Test Results Byte 3

Detector Log Amp Circuitry Failed	Level Reference Circuitry Failed	Not Leveled Detector Circuitry Failed	Not Used	Center Frequency Circuitry Failed	Marker Switch Point Circuitry Failed	Not Used	Not Used
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Self Test Results Byte 4

3.3 - 5.5 GHz Switch Filter Section or Level Detector Circuitry Failed	2-3.3 GHz Switch Filter Section or Level Detector Circuitry Failed	Switch Filter or Level Detector Circuitry Failed	0.01 - 2 GHz Range Unleveled	Level Detector Input Circuitry Failed	2 - 8.4 GHz Range Unleveled and Not Locked	8.4 - 20 GHz Range Unleveled and Not Locked	2 - 20 GHz Range Unleveled and Not Locked
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Self Test Results Byte 5

32 - 40 GHz Section of Switched Doubler Module Failed	Switched Doubler Module or Driver Circuitry Failed	Not Used	Not Used	Modulator or Driver Circuitry Failed	13.25 - 20 GHz Switch Filter Section or Level Detector Circuitry Failed	8.4 - 13.25 GHz Switch Filter Section or Level Detector Circuitry Failed	5.5 - 8.4 GHz Switch Filter Section or Level Detector Circuitry Failed
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Self Test Results Byte 6

Self Test is Complete	Not Used	Not Used	RF Was Off When Self Test Started	Not Used	Not Used	20 - 25 GHz Section of Switched Doubler Module Failed	25 - 32 GHz Section of Switched Doubler Module Failed
Bit 7 (128)	*Bit 6* (64)	*Bit 5* (32)	*Bit 4* (16)	*Bit 3* (8)	*Bit 2* (4)	*Bit 1* (2)	*Bit 0* (1)

Figure 2-18. *Self Test Results Bytes*

2-21 MISCELLANEOUS COMMANDS

Table 2-21 is a list of miscellaneous command mnemonic codes that do not fit into any of the other classifications. These commands provide the following operations:

- GPIB Address Change
- CW Ramp
- Secure Mode
- Returning the MG369XA to local control
- Instrument Reset
- Serial Number Entry

Table 2-21. *Miscellaneous Commands*

MNEMONIC CODE	FUNCTION
ADD	Permits changing of the instrument GPIB address. The address must be between 1 and 30 and must be terminated with ADR. ***Programming Example:*** Programming "**ADD 13 ADR**" changes the instrument GPIB address to 13.
CS0	Turns off the CW ramp.
CS1	Turns on the CW ramp. This produces a repetitive 0V to 10V ramp output to the rear panel HORIZ OUT connector and pin 1 of the AUX I/O connector.
DS0	Turns on the secure mode. This blanks the front panel display of all frequency, power level, and modulation parameters.
DS1	Turns off the secure mode and restores the front panel display of all frequency, power level, and modulation parameters.
RL	Returns the MG369XA to local (front panel) control.
RST	Resets the MG369XA to its default settings. **NOTE** Sending this command clears the current instrument setup. If this setup is needed for future testing, save it as a stored setup (para. 2-10) before sending RST.
SNR	Permits entry of the instrument serial number (SNRnnnnnnX). The serial number, represented by nnnnnn, must be six characters in length.

2-22 PROGRAM ERRORS

Two types of errors can occur in bus programming—invalid-parameter and syntax. These two error types are described in the following paragraphs.

Invalid-Parameter

Invalid-parameter errors are those that cause the CW generator to beep. These errors include:

- Attempting to enter a frequency, time, or power level parameter that exceeds the limits of the CW generator.
- Failing to properly end a parameter entry with a suitable terminator such as MH, DB, MS, etc.

Syntax

Syntax errors are those that occur in the formulation of a program statement, such as writing "**EXTTFS**" instead of "**EXTTRS**".

To prevent misinterpretation of command statements, the CW generator ignores all portions of the command statement following the syntax error.

All commands are ignored until the CW generator receives the Unlisten command (ASCII 63; "?" character) over the bus or until the CW generator is addressed to talk.

2-23 RESET PROGRAMMING AND DEFAULT CONDITIONS

Table 2-22 describes the five methods that can be used to reset the CW generator. They provide a means for quickly returning the MG369XA to its default (preprogrammed) operational state.

The default settings for the numeric frequency, sweep time, and power level parameters are the same as those listed in Table 3-1 on page 3-16 of the Series MG369XA Synthesized CW Generator Operation Manual (P/N 10370-10353).

Figure 2-19 (page 2-63) provides an example of a recommended sequence for programming a reset command. Using this command sequence ensures that all parameters and commands assume their preprogrammed state each time reset is desired.

Table 2-23. *Resetting the MG369XA GPIB Interface Circuits*

Methods of Resetting GPIB Interface Circuits	Functions Affected	Default Conditions
1. Pressing the front panel menu RETURN TO LOCAL soft-key.	Bus Messages	Local
2. Pressing the front panel System menu RESET soft-key.	Service Request Modes	ES0, FB0, PE0, SB0, SE0, SQ0, UL0, SB0 GTS Local and Local Lockout
3. Sending the RST command over the bus.	Same as 2 above	Same as 2 above except that the local bus message is not reset.
4. Executing the interface message Device Clear.	Same as 2 above.	Same as 2 above except that the local bus message is not reset.
5. Turning power on and off.	Same as 2 above.	Places the GPIB into the power-on state. Instrument state does not change.

Sample Coding In Basic

```
10 CLEAR 705
20 OUTPUT 705; "FUL IL1 L1 10DM"
```

Explanation of Code

Line 10 sends the Device Clear bus message.This message clears the CW generator GPIB interface.

Line 20 sends new front panel settings: Full Sweep, Internal Leveling, and Output Power Level of 10 dBm.

Figure 2-19. *Reset Programming Example*

2-24 PROGRAMMING EXAMPLES

Figures 2-20 thru 2-22, on the following pages, provide three examples of GPIB programming using MG369XA command codes.

The following subroutine uses the output identify (OI) command to identify the CW generator's model number, serial number, minimum and maximum frequencies, minimum and maximum power level, and software revision level. This subroutine is used in the example programs in Figures 2-21 and 2-22 to read the limits of the CW generator.

```
 10 !   "GET OI"
 20 ! Gets the output id string
 30 ! from a MG80XX Synthesizer
100 OUTPUT 705; "OI"
110 DIM A$[36]
120 ENTER 705; A$
130 M$=A$[1,2] ! Model
140 M1$=A$[3,4] ! Model Number
150 F1$=A$[5,9] ! Freq Low
160 F2$=A$[10,14] ! Freq High
170 L2$=A$[15,20] ! Min Power
180 L1$=A$[21,24] ! Max Power
190 S$=A$[25,28] ! Software Ver
200 S1$=A$[29,34] ! Serial Number
210 P$=A$[35,35] ! Model Prefix
220 S2$=A$[36] ! Series
230 PRINT "Model Number :";M$;S2$;M1$;P$
240 PRINT "Serial Number :";S1$
250 PRINT "Low Freq :";F1$
260 PRINT "High Freq :";F2$
270 PRINT "Max Power :";L1$
280 PRINT "Min Power :";L2$
290 PRINT "Software Ver :";S$
300 END
```

Program Explanation

Line 100: Sends the "OI" command.
Line 110: Dimensions the variable.
Line 120: Gets the "OI" string.
Line 130: Sets M$ to the model (80).
Line 140: Sets M1$ to the model number.
Line 150: Sets F1$ to the CW generator low-end frequency.
Line 160: Sets F2$ to the CW generator high-end frequency.
Line 170: Sets L2$ to the minimum power point.
Line 180: Sets L1$ to the maximum power point.
Line 190: Sets S$ to the software version number.
Line 200: Sets S1$ to the serial number.
Line 210: Sets P$ to the model prefix number (0,1, or 2).
Line 220: Sets S2$ to the model series (A or B).
Lines 230-290: Prints the data obtained.

Figure 2-20. *Using the Output Identify (OI) Command*

The following program (1) receives entries from the keyboard to set intial frequency and step-size parameters, and (2) activates the soft keys on the controller so that they can step the frequency up or down.

```
 20 ! PARAMETER ENTRY, SYZ, UP, AND DN COMMANDS
 30 Address=705
 40 CALL Iddev(Address,Model,Fmin,Fmax,Pmin,Pmax)
 50 OFF KEY
 60 DISP "ENTER FREQUENCY IN GHz";
 70 INPUT Freq
 80 IF Freq>Fmax OR Freq<Fmin THEN
 90   DISP "FREQUENCY OUT OF RANGE - ";
100   GOTO 60
110 END IF
120 DISP "ENTER STEP SIZE IN GHz";
130 INPUT Stepsize
140 IF Stepsize>Fmax-Fmin OR Stepsize<.000001 THEN
150   DISP "ILLEGAL STEP SIZE - ";
160   GOTO 120
170 END IF
180 OUTPUT Address;"CF1";Freq;"GH SYZ";Stepsize;"GH"
190 ON KEY 0 LABEL "STEP" GOTO 300
200 ON KEY 5 LABEL " UP " GOTO 300
210 ON KEY 1 LABEL "STEP" GOTO 320
220 ON KEY 6 LABEL "DOWN" GOTO 320
230 ON KEY 2 LABEL "NEW " GOTO 50
240 ON KEY 7 LABEL "FREQ" GOTO 50
250 GOTO 250
300 OUTPUT Address;"UP"
310 GOTO 250
320 OUTPUT Address;"DN"
330 GOTO 250
340 END
1010 SUB Iddev(Address,Model,Fmin,Fmax,Pmin,Pmax)
1020 DIM Ident$[36]
1030 OUTPUT Address;"OI"
1040 ENTER Address;Ident$
1050 Model=VAL(Ident$[1,2])
1060 Model Number=VAL(Ident$[3,4])
1070 Fmin=VAL(Ident$[5,9])
1080 Fmax=VAL(Ident$[10,14])
1090 Pmin=VAL(Ident$[15,20])
1100 Pmax=VAL(Ident$[21,24])
1110 Model Prefix=Ident$[35,35]
1120 Series=VAL(Ident$[36])
1130 SUBEND
```

Program Explanation

Line 30: Sets the address of the CW generator.
Line 40: Calls the device identification subroutine described in Line 1010.
Line 50: Turns off the key definitions.
Lines 60-110: Accept the starting frequency entry and checks its validity.
Lines 120-170: Accept the step size entry and checks its validity.
Line 180: Sets the CW generator to the starting frequency and step size.
Lines 190-240: Set up keys and key labels.
Line 250: Waits for a key to be pressed.
Line 300: Reports that the STEP UP key was pressed; sends the UP command.
Line 310: Waits for the next key.
Line 320: Reports that the STEP DOWN key was pressed; send the DN command.
Line 330: Waits for the next key.
Line 340: Ends the main program.
Lines 1010-1120: Identify the CW generator address, model, frequency range, and power range.

Figure 2-21. *Controlling CW Frequency/Parameter Entries*

The following program accepts user inputs for (1) power sweep starting and ending levels, (2) number of steps in the sweep, and (3) sweep dwell times. After accepting such imputs, the program then commands the CW generator to obtain a display of the power sweep.

NOTE: The CW generator should be connected to a scalar network analyzer.

```
 30 Address=705
 40 CALL Iddev(Address,Model,Fmin,Fmax,Pmin,Pmax)
 60 DISP "ENTER POWER SWEEP STARTING LEVEL (dBm)";
 70 INPUT Powerstart
 80 IF Powerstart>Pmax OR Powerstart<Pmin THEN
 90   DISP "POWER OUT OF RANGE - ";
100   GOTO 60
110 ENDIF
120 DISP "ENTER POWER SWEEP ENDING LEVEL (dBm)";
130 INPUT Powerstop
140 IF Powerstop>Pmax OR Powerstop<Pmin THEN
150   DISP "POWER OUT OF RANGE - ";
160   GOTO 120
170 END IF
180 DISP "ENTER NUMBER OF STEPS";
190 INPUT Noofsteps
200 IF Noofsteps<1 OR Noofsteps>10000 THEN
210   DISP "NUMBER OF STEPS OUT OF RANGE - ";
220   GOTO 180
230 END IF
240 DISP "ENTER DWELL TIME AT EACH STEP (mS)";
250 INPUT Dwell
260 IF Dwell<1 OR Dwell>99000 THEN
270   DISP "DWELL TIME OUT OF RANGE - ";
280   GOTO 240
290 END IF
300 OUTPUT Address;"L1";Powerstart:"DM L2";Powerstop;
    "DM PNS";Noofsteps;"SPS"
310 OUTPUT Address;"PDT";Dwell;"MS LSP"
340 END
1010 SUB Iddev(Address,Model,Fmin,Fmax,Pmin,Pmax)
1020 DIM Ident$[36]
1030 OUTPUT Address;"OI"
1040 ENTER Address;Ident$
1050 Model=VAL(Ident$[1,2])
1060 Model Number=VAL(Ident$[3,4])
1070 Fmin=VAL(Ident$[5,9])
1080 Fmax=VAL(Ident$[10,14])
1090 Pmin=VAL(Ident$[15,20])
1100 Pmax=VAL(Ident$[21,24])
1110 Model Prefix=Ident$[35,35]
1120 Series=VAL(Ident$[36])
1130 SUBEND
```

Program Explanation

Line 30: Set the address of the CW generator.
Line 40: Call the device identification subroutine described in line 1010.
Lines 60-110: Accept the starting power level entry and checks its validity.
Lines 120-170: Accept the ending power level entry and checks its validity.
Lines 180-230: Accept the power sweep number-of-steps entry and checks it validity.
Lines 240-290: Accept the power sweep dwell time entry and checks its validity.
Lines 300-310: Sets the CW generator to perform the above defined power sweep.
Line 340: Ends the main program.
Lines 1010-1120: Identify the CW generator address, model, frequency range, and power range.

Figure 2-22. *Controlling Power Level and Power Sweep*

Chapter 3
Command Dictionary

Table of Contents

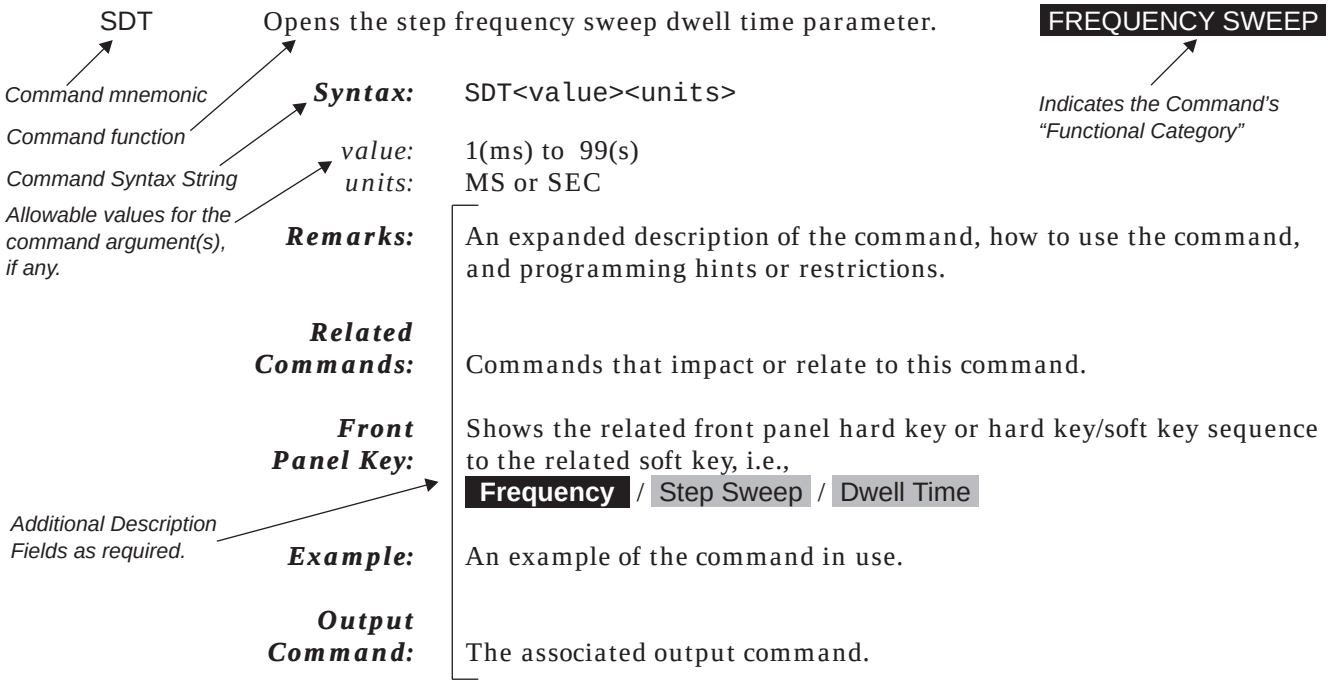


Figure 3-1. *Typographic Conventions for the Command Listings*

Chapter 3
Command Dictionary

3-1 INTRODUCTION

This chapter provides alphabetically-ordered listings and descriptions of all MG369XA GPIB programming commands.

3-2 TYPOGRAPHIC CONVENTIONS

The typographic conventions, abbreviations, and syntax legend used throughout this chapter to define the GPIB commands are described in Figure 3-1.

3-3 FUNCTIONAL CATEGORIES

Throughout this chapter, the distinctive, white on black test, in the upper corner of each command's descriptive area, is the functional category to which the command belongs (see Figure 3-1). The MG369XA's GPIB functional categories are described in Chapter 2; they provide descriptive details and tabular data that apply to the category as a whole.

3-4 COMMANDS

The remaining pages in this chapter provide an alphabetical listing of the commands (mnemonics) used to program the Series MG369XA Synthesized CW Generator.

ACW Activates the currently scanned frequency as CW. CW FREQUENCY

Syntax: ACW

Remarks: Activates the currently scanned frequency as CW, outputs the frequency, and opens the frequency's parameter for data entry.

Related Commands: F0-F9, M0-M9

Front Panel Key: N/A

AD1 Selects F1-ΔF alternate frequency sweep. STEP SWEEP

Syntax: AD1

Remarks: Selects an alternate symmetrical frequency sweep around F1. The width of the sweep is determined by the ΔF frequency parameter. If the MG369XA is sweeping when AD1 is received, the instrument's output will alternate between the commanded sweep and the sweep being executed.

An alternate sweep command will *only* be recognized when the MG369XA has been programmed to sweep. It will be ignored at all other times.

Related Commands: F1, DLF, DFF, DFM

Front Panel Key: N/A

AD5 Selects F5-ΔF alternate frequency sweep. STEP SWEEP

Syntax: AD5

Remarks: Selects an alternate symmetrical frequency sweep around F5. The width of the sweep is determined by the ΔF frequency parameter. If the MG369XA is sweeping when AD5 is received, the instrument's output will alternate between the commanded sweep and the sweep being executed.

An alternate sweep command will *only* be recognized when the MG369XA has been programmed to sweep. It will be ignored at all

other times.

Related Commands: F5, DLF, DFF, DFM

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Range / F5-dF

AD6 Selects F6-ΔF alternate frequency sweep. STEP SWEEP

Syntax: AD6

Remarks: Selects an alternate symmetrical frequency sweep around F6. The width of the sweep is determined by the ΔF frequency parameter. If the MG369XA is sweeping when AD6 is received, the instrument's output will alternate between the commanded sweep and the sweep being executed.

An alternate sweep command will *only* be recognized when the MG369XA has been programmed to sweep. It will be ignored at all other times.

Related Commands: F6, DLF, DFF, DFM

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Range / F6-dF

ADD Opens the GPIB address parameter. MISCELLANEOUS

Syntax: ADD<value><unit>

Value: 1-30
Unit: ADR

Remarks: Permits changing the instrument's GPIB address. The address must be between 1 and 30 and must be terminated with ADR.

Once the address is changed, the MG369XA will no longer respond to the old address. The CW generator's default address is 5.

Front Panel Key: **System** / Config / GPIB > / GPIB Address

ADR GPIB address terminator DATA TERMINATORS

Syntax: ADR

AF1 Selects F1-F2 alternate frequency sweep STEP SWEEP

Syntax: AF1

Remarks: Selects an alternate F1-F2 frequency sweep. If the MG369XA is sweeping when AF1 is received, the instrument's output will alternate between the commanded sweep and the sweep being executed.

An alternate sweep command will *only* be recognized when the MG369XA has been programmed to sweep. It will be ignored at all other times.

Related Commands: F1, F2

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Range / F1 - F2

AF3 Selects F3-F4 alternate frequency sweep STEP SWEEP

Syntax: AF3

Remarks: Selects an alternate F3-F4 frequency sweep. If the MG369XA is sweeping when AF3 is received, the instrument's output will alternate between the commanded sweep and the sweep being executed.

An alternate sweep command will *only* be recognized when the MG369XA has been programmed to sweep. It will be ignored at all other times.

Related Commands: F3, F4

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Range / F3 - F4

AFU Selects Full Range alternate frequency sweep STEP SWEEP

Syntax: AFU

Remarks: Selects an alternate full range frequency sweep. If the MG369XA is sweeping when AFU is received, the instrument's output will alternate between the commanded sweep and the sweep being executed.

An alternate sweep command will *only* be recognized when the MG369XA has been programmed to sweep. It will be ignored at all other times.

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Range / Full

AL0 Sets the alternate frequency sweep RF output to L0 POWER LEVELING

Syntax: AL0

Remarks: Causes the preset (or previously set) L0 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L0 power level parameter for data entry. Use the parameter entry commands, XL0 or L0, to enter a new power level.

Related Commands: L0, XL0

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Level / L0

AL1 Sets the alternate frequency sweep RF output to L1 POWER LEVELING

Syntax: AL1

Remarks: Causes the preset (or previously set) L1 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L1 power level parameter for data entry. Use the parameter entry commands, XL1 or L1, to enter a new power level.

Related Commands: L1, XL1

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Level / L1

AL2 Sets the alternate frequency sweep RF output to L2 POWER LEVELING

Syntax: AL2

Remarks: Causes the preset (or previously set) L2 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L2 power level parameter for data entry. Use the parameter entry commands, XL2 or L2, to enter a new power level.

Related Commands: L2, XL2

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Level / L2

AL3 Sets the alternate frequency sweep RF output to L3 POWER LEVELING

Syntax: AL3

Remarks: Causes the preset (or previously set) L3 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L3 power level parameter for data entry. Use the parameter entry commands, XL3 or L3, to enter a new power level.

Related Commands: L3, XL3

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Level / L3

AL4 Sets the alternate frequency sweep RF output to L4 POWER LEVELING

Syntax: AL4

Remarks: Causes the preset (or previously set) L4 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L4 power level parameter for data entry. Use the parameter entry commands, XL4 or L4, to enter a new power level.

Related Commands: L4, XL4

Front Panel Key: **Frequency** / Step Sweep / More > / Alternate Sweep > / Alternate Level / L4

AL5 Sets the alternate frequency sweep RF output to L5 POWER LEVELING

Syntax: AL5

Remarks: Causes the preset (or previously set) L5 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L5 power level parameter for data entry. Use the parameter entry commands, XL5 or L5, to enter a new power level.

Related Commands: L5, XL5

Front Panel Key: N/A

AL6 Sets the alternate frequency sweep RF output to L6 POWER LEVELING

Syntax: AL6

Remarks: Causes the preset (or previously set) L6 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L6 power level parameter for data entry. Use the parameter entry commands, XL6 or L6, to enter a new

power level.

Related Commands: L6, XL6

Front Panel Key: N/A

AL7 Sets the alternate frequency sweep RF output to L7 POWER LEVELING

Syntax: AL7

Remarks: Causes the preset (or previously set) L7 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L7 power level parameter for data entry. Use the parameter entry commands, XL7 or L7, to enter a new power level.

Related Commands: L7, XL7

Front Panel Key: N/A

AL8 Sets the alternate frequency sweep RF output to L8 POWER LEVELING

Syntax: AL8

Remarks: Causes the preset (or previously set) L8 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L8 power level parameter for data entry. Use the parameter entry commands, XL8 or L8, to enter a new power level.

Related Commands: L8, XL8

Front Panel Key: N/A

AL9 Sets the alternate frequency sweep RF output to L9 POWER LEVELING

Syntax: AL9

Remarks: Causes the preset (or previously set) L9 RF power level to be output during the alternate frequency sweep. The command will also deselect any other previously programmed alternate sweep power level.

The command does *not* open the L9 power level parameter for data entry. Use the parameter entry commands, XL9 or L9, to enter a new power level.

Related Commands: L9, XL9

Front Panel Key: N/A

AT0 Deselects ALC step attenuator decoupling . POWER LEVELING

Syntax: AT0

Remarks: Deselects the ALC step attenuator decoupling function. This returns the MG369XA to its normal (coupled) leveling mode. In this mode, when the desired power level is set, the correct combination of ALC level and step attenuator setting is determined by the instrument firmware.

Related Commands: AT1, ATT(xx)

Front Panel Key: **Level** / ALC Mode / Attenuate > / Decouple

AT1 Selects ALC step attenuator decoupling. POWER LEVELING

Syntax: AT1

Remarks: This function decouples the step attenuator (if equipped) from the ALC system. This permits separate setting the ALC level and step attenuator.

Related Commands: AT0, ATT(xx)

Front Panel Key: **Level** / ALC Mode / Attenuate > / Decouple

AT(xx) Sets the step attenuator value to xx (×10 dB). POWER LEVELING

Syntax: ATT(xx)

xx: unsigned integer between 00 (0 dB attenuation) and 11 (110 dB attenuation)

Remarks: Permits setting the step attenuator value to xx (×10 dB) in the ALC step attenuator decoupling mode.

Related Commands: AT0, AT1

Front Panel Key: **Level** / ALC Mode / Attenuate > / Decouple / Increase Attenuation / *or* / Decrease Attenuation

Example: AT1 ATT08 decouples the step attenuator from the ALC system and sets the step attenuator value to 80 dB.

AUT Selects automatic sweep triggering STEP SWEEP

Syntax: AUT

Remarks: Selects automatic sweep triggering for frequency, power level, or list sweeps. When automatic sweep triggering is selected, the sweep continually sweeps from its start frequency, power level, or list index to its stop frequency, power level, or list index with optimal retrace time.

Front Panel Key: **Frequency** / Step Sweep / More > / Trigger > / Auto *or*
Frequency / List / Sweep > / Trigger > / Auto *or*
Level / Level Sweep / Trigger > / Auto

BPN Selects –5V for retrace and bandswitch blanking outputs. CONFIGURATION

Syntax: BPN

Remarks: Selects a –5V level for the rear panel retrace and bandswitch blanking outputs. The retrace blanking output signal is available at pin 6 of the AUX I/O connector. The bandswitch blanking output signal is available at pin 20 of the AUX I/O connector.

Front Panel Key: **System** / Config / Rear Panel > / Blanking +/–

BPP — Selects +5V for retrace and bandswitch blanking outputs. CONFIGURATION

Syntax: BPP

Remarks: Selects a +5V level for the rear panel retrace and bandswitch blanking outputs. The retrace blanking output signal is available at pin 6 of the AUX I/O connector. The bandswitch blanking output signal is available at pin 20 of the AUX I/O connector.

Front Panel Key: **System** / Config / Rear Panel > / Blanking +/–

CF0 — Set CW mode at F0, Opens F0 parameter CW FREQUENCY

Syntax: CF0 **or** CF0<value><unit>

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F0 frequency and causes F0 to be output. Also permits setting the F0 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / F0

Example: CF0 5.5 GH places the MG369XAA at the preset (or previously set) CW F0 frequency and opens the F0 parameter for data entry. Sets the F0 frequency to 5.5 GHz.

CF1 — Set CW mode at F1, Opens F1 parameter CW FREQUENCY

Syntax: CF1 **or** CF1<value><unit>

value: frequency range of the MG369XAA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XAA in CW mode at the preset (or previously set) F1 frequency and causes F1 to be output. Also permits setting the F1 parameter. The frequency setting is determined by the frequency range of the particular MG369XAA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / F1

CF2 Set CW mode at F2, Opens F2 parameter CW FREQUENCY

Syntax: `CF2` **or** `CF2<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F2 frequency and causes F2 to be output. Also permits setting the F2 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / F2

CF3 Set CW mode at F3, Opens F3 parameter CW FREQUENCY

Syntax: `CF3` **or** `CF3<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F3 frequency and causes F3 to be output. Also permits setting the F3 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight F3, then press Edit Selection *or* Output Frequency

CF4 Set CW mode at F4, Opens F4 parameter CW FREQUENCY

Syntax: `CF4` **or** `CF4<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F4 frequency and causes F4 to be output. Also permits setting the F4 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight F4, then press Edit Selection *or* Output Frequency

CF5 Set CW mode at F5, Opens F5 parameter CW FREQUENCY

Syntax: `CF5` **or** `CF5<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F5 frequency and causes F5 to be output. Also permits setting the F5 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight F5, then press Edit Selection *or* Output Frequency

CF6 Set CW mode at F6, Opens F6 parameter CW FREQUENCY

Syntax: `CF6` **or** `CF6<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F6 frequency and causes F6 to be output. Also permits setting the F6 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight F6, then press Edit Selection *or* Output Frequency

CF7 Set CW mode at F7, Opens F7 parameter CW FREQUENCY

Syntax: `CF7` **or** `CF7<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F7 frequency and causes F7 to be output. Also permits setting the F7 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight F7, then press Edit Selection *or* Output Frequency

CF8 Set CW mode at F8, Opens F8 parameter — CW FREQUENCY

Syntax: `CF8` **or** `CF8<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F8 frequency and causes F8 to be output. Also permits setting the F8 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight F8, then press Edit Selection *or* Output Frequency

CF9 Set CW mode at F9, Opens F9 parameter — CW FREQUENCY

Syntax: `CF9` **or** `CF9<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) F9 frequency and causes F9 to be output. Also permits setting the F9 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight F9, then press Edit Selection *or* Output Frequency

CLO Closes the previously opened parameter. — PARAMETER ENTRY

Syntax: `CLO`

CLR Clear data entry — DATA ENTRY

Syntax: `CLR`

Front Panel Key: Clear Entry Key

CM0 Set CW mode at M0, Opens M0 parameter CW FREQUENCY

Syntax: `CM0` **or** `CM0<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M0 frequency and causes M0 to be output. Also permits setting the M0 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight M0, then press Edit Selection *or* Output Frequency

Example: `CM0 5.5 GH` places the MGxxxxA at the preset (or previously set) CW M0 frequency and opens the M0 parameter for data entry. Sets the M0 frequency to 5.5 GHz.

CM1 Set CW mode at M1, Opens M1 parameter CW FREQUENCY

Syntax: `CM1` **or** `CM1<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M1 frequency and causes M1 to be output. Also permits setting the M1 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / M1

CM2 Set CW mode at M2, Opens M2 parameter CW FREQUENCY

Syntax: `CM2` **or** `CM2<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M2 frequency and causes M2 to be output. Also permits setting the M2 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / M2

CM3 Set CW mode at M3, Opens M3 parameter CW FREQUENCY

Syntax: `CM3` **or** `CM3<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M3 frequency and causes M3 to be output. Also permits setting the M3 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight M3, then press Edit Selection *or* Output Frequency

CM4 Set CW mode at M4, Opens M4 parameter CW FREQUENCY

Syntax: `CM4` **or** `CM4<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M4 frequency and causes M4 to be output. Also permits setting the M4 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight M4, then press Edit Selection *or* Output Frequency

CM5 Set CW mode at M5, Opens M5 parameter CW FREQUENCY

Syntax: `CM5` **or** `CM5<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M5 frequency and causes M5 to be output. Also permits setting the M5 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight M5, then press Edit Selection *or* Output Frequency

CM6 Set CW mode at M6, Opens M6 parameter CW FREQUENCY

Syntax: `CM6` **or** `CM6<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M6 frequency and causes M6 to be output. Also permits setting the M6 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight M6, then press Edit Selection *or* Output Frequency

CM7 Set CW mode at M7, Opens M7 parameter CW FREQUENCY

Syntax: `CM7` **or** `CM7<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M7 frequency and causes M7 to be output. Also permits setting the M7 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight M7, then press Edit Selection *or* Output Frequency

CM8 Set CW mode at M8, Opens M8 parameter CW FREQUENCY

Syntax: `CM8` **or** `CM8<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M8 frequency and causes M8 to be output. Also permits setting the M8 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight M8, then press Edit Selection *or* Output Frequency

CM9 Set CW mode at M9, Opens M9 parameter — CW FREQUENCY

Syntax: `CM9 or CM9<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Places the MG369XA in CW mode at the preset (or previously set) M9 frequency and causes M9 to be output. Also permits setting the M9 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List .... / highlight M9, then press Edit Selection *or* Output Frequency

CS0 Turns off the CW ramp. — MISCELLANEOUS

Syntax: `CS0`

Related Commands: CS1

Front Panel Key: **Frequency** / CW / CW Ramp

CS1 Turns on the CW ramp. — MISCELLANEOUS

Syntax: `CS1`

Remarks: This command produces a repetitive 0V to 10V ramp output to the rear panel HORIZ OUT connector and pin 1 of the AUX I/O connector. The CW ramp is used to drive a scalar analyzer display.

Related Commands: CS0

Front Panel Key: **Frequency** / CW / CW Ramp

CSB Clears all GPIB status bytes. — STATUS

Syntax: `CSB`

CTL — Copy current CW frequency and power level to current list index. LIST SWEEP

Syntax: CTL

Remarks: The command copies the current CW frequency and power level to the current list index. This is another method of entering frequency and power level information into the current list index.

The MG369XA must be list sweep mode and the desired list selected and list index set before invoking this command. The command, LST, places the unit in list sweep mode; the command, ELN(x), is used to select which of the four lists is to be accessed; and the command, ELI(xxxx), sets the list index for the current list.

Related Commands: LST, ELN(x), ELI(xxxx)

Front Panel Key: **Frequency** / CW / Copy to List

Example: LST ELN2 ELI1023 CTL places the MG369XA in list sweep mode, selects list number 2, sets the list index to 1023, and copies the current CW frequency and power level to list index 1023.

DB — Decibel (dB) data terminator DATA TERMINATOR

Syntax: DB

DF0 — Selects F0-ΔF frequency sweep mode. STEP SWEEP

Syntax: DF0

Remarks: Selects a symmetrical frequency sweep around F0. The width of the sweep is determined by the ΔF frequency parameter.

Related Commands: F0, DLF, DFF, DFM

Front Panel Key: N/A

DF1 Selects F1-ΔF frequency sweep mode. STEP SWEEP

Syntax: DF1

Remarks: Selects a symmetrical frequency sweep around F1. The width of the sweep is determined by the ΔF frequency parameter.

Related Commands: F1, DLF, DFF, DFM

Front Panel Key: N/A

DF5 Selects F5-ΔF frequency sweep mode. STEP SWEEP

Syntax: DF5

Remarks: Selects a symmetrical frequency sweep around F5. The width of the sweep is determined by the ΔF frequency parameter.

Related Commands: F5, DLF, DFF, DFM

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / F5 - dF

DF6 Selects F6-ΔF frequency sweep mode. STEP SWEEP

Syntax: DF6

Remarks: Selects a symmetrical frequency sweep around F6. The width of the sweep is determined by the ΔF frequency parameter.

Related Commands: F6, DLF, DFF, DFM

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / F6 - dF

DFF Opens the ΔF parameter. PARAMETER ENTRY

Syntax: `DFF<value><unit>`

value: frequency range of the MG369XA model
units: GH, MH, KH, HZ

Remarks: Permits setting the ΔF frequency parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

The commands, DFM and DLF, are the same as DFF.

Front Panel Key: N/A

Output Command: ODF returns the DF frequency value (in MHz) to the controller.

DFM Opens the ΔF parameter. PARAMETER ENTRY

Syntax: `DFM<value><unit>`

value: frequency range of the MG369XA model
units: GH, MH, KH, HZ

Remarks: Permits setting the ΔF frequency parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

The commands, DFF and DLF, are the same as DFM.

Front Panel Key: N/A

Output Command: ODF returns the DF frequency value (in MHz) to the controller.

DL1 Selects external detector leveling of output power. POWER LEVELING

Syntax: `DL1`

Remarks: Selects external leveling of the output power using a signal from an external detector connected to the EXT ALC IN connector. Deselects the internal leveling mode or external leveling mode using a signal from an external power meter, if r previously programmed.

In external power leveling mode, use the parameter entry command EGI to enter a setting for the Reference Level DAC to control the ALC gain.

Related Commands: EGI, IL1, PL1, LV0

Front Panel Key: **Level** / ALC Mode / Leveling > / External Detector

Example: `DL1 EGI 128 SPS` selects external leveling of the output power using a signal from an external detector and sets the Reference Level DAC to 128.

DLF — Opens the ΔF parameter. PARAMETER ENTRY

Syntax: `DLF<value><unit>`

value: frequency range of the MG369XA model
units: GH, MH, KH, HZ

Remarks: Permits setting the ΔF frequency parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

The commands, DFF and DFM, are the same as DLF.

Front Panel Key: N/A

Output Command: ODF returns the DF frequency value (in MHz) to the controller.

DM — dBm data terminator DATA TERMINATOR

Syntax: `DM`

DN — Decrements the open parameter by the step size. PARAMETER ENTRY

Syntax: `DN`

Remarks: Each MG369XA parameter has an associated step size that can be used to increment or decrement its value. The command, SYZ, is used to set the step size for a parameter. The commands, UP and DN, can then be used to increment and decrement the parameter by the step size.

In the list sweep mode with manual trigger selected, DN decrements the list index by one.

Related Commands: SYZ, UP

Front Panel Key: Use the keys **System** / Config / Increment > to access the increment menu. The soft-key Frequency Increment sets frequency increment value, the soft-key Level Increment sets power level increment value, and the soft-key Time Increment sets time increment value. The soft-key Increment Mode turns increment mode on. Use the front panel ∧ or ∨ cursor control keys or the rotary data knob to increment or decrement the open frequency, power level, or time parameter by the increment value.

DS0 Turns on the secure mode. MISCELLANEOUS

Syntax: `DS0`

Remarks: In the secure mode, the front panel display of all frequency, power level, and modulation parameters is disabled. The instrument continues to function normally in all other respects.

Front Panel Key: **System** / Secure Mode

DS1 Turns off the secure mode. MISCELLANEOUS

Syntax: `DS1`

Remarks: Restores the front panel display of all frequency, power level, and modulation parameters.

Front Panel Key: **System** / Reset

DU0 Deselects Dual Step sweep mode. STEP SWEEP

Syntax: `DU0`

Related Commands: DU1, TSS

Front Panel Key: N/A

DU1 Selects Dual Step sweep mode. STEP SWEEP

Syntax: DU1

Remarks: The dual step sweep mode provides for generating synchronized, step sweep outputs from two MG369XAs at a frequency offset. When operating in the dual step sweep mode, the command, TSS, steps the sweep to the next point.

Related Commands: DU0, TSS

Front Panel Key: N/A

DV Decibel per volt (dB/V) data terminator. DATA TERMINATOR

Syntax: DV

EGI Opens the Reference Level DAC setting parameter. PARAMETER ENTRY

Syntax: EGI<value><unit>

value: 0 to 255
unit: SPS

Remarks: Permits setting of the Reference Level DAC to control the ALC gain when in external power leveling mode. Use the command, DL1 or PL1, select the external power leveling mode.

Related Commands: DL1, PL1, EGO

Front Panel Key: **Level** / ALC Mode / Leveling > / press External Detector or Power Meter to select type of external sensor.
Press ALC Loop / External ALC Adj to set power level.

Example: PL1 ELR EGI 140 SPS selects external leveling of the output power using a signal from an external power meter, selects the rear panel ALC input, and sets the Reference Level DAC to 140.

Output Command: EGO returns the value of the Reference Level DAC setting in external power leveling mode to the controller.

EGO Outputs the value of the Reference Level DAC setting. POWER LEVELING

Syntax: EGO

Remarks: EGO returns the value of the Reference Level DAC setting in external power leveling mode to the controller.

Related Commands: DL1, PL1, EGI

Front Panel Key: N/A

EL0 Inhibits updating of the ESB2 bit 4. STATUS

Syntax: EL0

Remarks: Blocks updating of the Extended Status Byte 2 bit 4 (RF Unlocked). This is the default setting because it is normal for the RF to be momentarily unlocked during sweeps and sweep retrace.

Front Panel Key: N/A

EL1 Enables updating of the ESB2 bit 4. STATUS

Syntax: EL1

Remarks: Unblocks updating of the Extended Status Byte bit 4 (RF Unlocked).

Front Panel Key: N/A

ELI(xxxx) Sets list index to xxxx. LIST SWEEP

Syntax: ELI(xxxx)

xxxx: 4-digit integer between 0000 and 1999

Remarks: In list sweep mode, permits setting the list index for the current list.

Related Commands: LST, ELN(x)

Front Panel Key: **Frequency** / List / Edit List Index

Example: `LST ELN3 ELI1263` places the MG369XA in list sweep mode, selects list number 3, and sets the list index to 1263.

ELN(x) Sets the list number to x. LIST SWEEP

Syntax: `ELN(x)`

x: 1-digit integer between 0 and 3

Remarks: In list sweep mode, permits selection of which of the four lists is to be accessed.

Front Panel Key: N/A

EP0 Selects TTL-low to turn RF on during pulse modulation. MODULATION

Syntax: `EP0`

Remarks: Permits selection of a TTL-low signal to turn the RF on during pulse modulation (Option 13).

If Option 13 is not installed, this command produces a syntax error.

Related Commands: EP1, P0, XP

Front Panel Key: **Modulation** / Pulse / L RF On

EP1 Selects TTL-high to turn RF on during pulse modulation. MODULATION

Syntax: `EP1`

Remarks: Permits selection of a TTL-high signal to turn the RF on during pulse modulation.

If Option 13 is not installed, this command produces a syntax error.

Related Commands: EP0, P0, XP

Front Panel Key: **Modulation** / Pulse / H RF On

ES0 Inhibits End-of-Sweep SRQ generation. STATUS

Syntax: ES0

Remarks: Inhibits an SRQ from being generated when Primary Status Byte 1 (End of Sweep) is set. This is the default mode.

Front Panel Key: N/A

ES1 Enables End-of-Sweep SRQ generation. STATUS

Syntax: ES1

Remarks: Enables an SRQ to be generated when Primary Status Byte bit 1 (End of Sweep) is set and SQ1 has been programmed. SQ1 enables the SRQ generation function.

Front Panel Key: N/A

EXT Selects single sweep triggering. STEP SWEEP

Syntax: EXT

Remarks: Selects single sweep triggering for frequency, power level, or list sweeps. When single sweep triggering is selected, a single sweep starts when a TRG or TRS command is received. The RSS command resets the sweep to its start frequency, power level, or list index whenever the command is received while a single sweep is in progress.

Related Commands: TRG, TRS, RSS

Front Panel Key: **Frequency** / Step Sweep / More > / Trigger > / Single *or*
Frequency / List / Sweep > / Trigger > / Single *or*
Level / Level Sweep / Trigger > / Single

F0 Opens the F0 parameter PARAMETER ENTRY

Syntax: `F0<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F0 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / F0 / Edit F0

Output Command: OF0 returns the F0 frequency value (in MHz) to the controller.

F1 Opens the F1 parameter PARAMETER ENTRY

Syntax: `F1<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F1 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Edit F1

Output Command: OF1 returns the F1 frequency value (in MHz) to the controller.

F2 Opens the F2 parameter PARAMETER ENTRY

Syntax: `F2<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F2 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / F2 / Edit F2

Output Command: OF2 returns the F2 frequency value (in MHz) to the controller.

F3 Opens the F3 parameter PARAMETER ENTRY

Syntax: `F3<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F3 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List... / highlight F3, press Edit Selected

Output Command: OF3 returns the F3 frequency value (in MHz) to the controller.

F4 Opens the F4 parameter PARAMETER ENTRY

Syntax: `F4<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F4 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List... / highlight F4, press Edit Selected

Output Command: OF4 returns the F4 frequency value (in MHz) to the controller.

F5 Opens the F5 parameter PARAMETER ENTRY

Syntax: `F5<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F5 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List... / highlight F5, press Edit Selected

Output Command: OF5 returns the F5 frequency value (in MHz) to the controller.

F6 Opens the F6 parameter PARAMETER ENTRY

Syntax: `F6<value><unit>`

value: frequency range of the MG369XAA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F6 parameter. The frequency setting is determined by the frequency range of the particular MG369XAA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List... / highlight F6, press Edit Selected

Output Command: OF6 returns the F6 frequency value (in MHz) to the controller.

F7 Opens the F7 parameter PARAMETER ENTRY

Syntax: `F7<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F7 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List... / highlight F7, press Edit Selected

Output Command: OF7 returns the F7 frequency value (in MHz) to the controller.

F8 Opens the F8 parameter PARAMETER ENTRY

Syntax: `F8<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F8 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List... / highlight F8, press Edit Selected

Output Command: OF8 returns the F8 frequency value (in MHz) to the controller.

F9 Opens the F9 parameter PARAMETER ENTRY

Syntax: `F9<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F9 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequency List... / highlight F9, press Edit Selected

Output Command: OF9 returns the F9 frequency value (in MHz) to the controller.

FB0 Inhibits Extended Status Byte 1 SRQ generation. STATUS

Syntax: `FB0`

Remarks: Inhibits an SRQ from being generated when the Extended Status Byte 1 bit is set. This is the default mode.

Front Panel Key: N/A

FB1 Enables Extended Status Byte 1 SRQ generation. STATUS

Syntax: `FB1`

Remarks: Enables an SRQ to be generated when Primary Status Byte bit 0 (Extended Status Byte 1) is set and SQ1 has been programmed. The Extended Status Byte 1 bit is set whenever one (or more) of the unmasked status reporting functions in Extended Status Byte 1 is true. SQ1 enables the SRQ generation function.

Front Panel Key: N/A

FRS — Opens the frequency scaling reference multiplier parameter. CONFIGURATION

Syntax: FRS<value><unit>

value: 0.1 to 14
unit: TMS

Remarks: Permits setting the frequency scaling reference multiplier value. This command affects all entered and displayed frequencies, but does not affect the output of the instrument.

Front Panel Key: **System** / **Config** / RF > / More > / Frequency Scaling

Example: FRS 3 TMS sets the frequency scaling reference multiplier to 3.

FUL — Selects the Full Range sweep mode. STEP SWEEP

Syntax: FUL

Remarks: Selects a full band frequency sweep from the MG369XA's low frequency limit to its high frequency limit.

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / Full *or* **Frequency** / Manual Sweep / Frequency Control > / Full

Output Command: OFL returns the low-end frequency value (in MHz) to the controller; OFH returns the high-end frequency value (in MHz) to the controller.

GH — GHz data terminator DATA TERMINATOR

Syntax: GH

GTC — Execute a SQF command on receipt of a GET GROUP EXECUTE TRIGGER

Syntax: GTC

Remarks: Configures the MG369XA to execute a SQF command (scan to the next higher preset CW frequency) each time a GET message is received.

Front Panel Key: N/A

GTD Execute a DN command on receipt of a GET GROUP EXECUTE TRIGGER

Syntax: GTD

Remarks: Configures the MG369XA to execute a DN command (steps the open parameter down by the step size) each time a GET message is received.

Front Panel Key: N/A

GTF Execute a fast-frequency-switching step on receipt of a GET. GROUP EXECUTE TRIGGER

Syntax: GTF

Remarks: Configures the MG369XA to execute a fast-frequency-switching step each time a GET message is received. (See ZPL and ZPN commands)

Front Panel Key: N/A

GTL Execute a TSS command on receipt of a GET. GROUP EXECUTE TRIGGER

Syntax: GTL

Remarks: Configures the MG369XA to execute a TSS command (steps to the next point in a dual step sweep mode) each time a GET message is received.

Front Panel Key: N/A

GTO Disables the GET functions. GROUP EXECUTE TRIGGER

Syntax: GTO

Front Panel Key: N/A

GTS Execute a TRS command on receipt of a GET. GROUP EXECUTE TRIGGER

Syntax: GTS

Remarks: Configures the MG369XA to execute a TRS command (trigger a single

sweep) each time a GET is received. This is the default mode.

Front Panel Key: N/A

GTT — Execute a TST command on receipt of a GET. GROUP EXECUTE TRIGGER

Syntax: GTT

Remarks: Configures the MG369XA to execute a TST command (execute a complete instrument self test) each time a GET message is received.

Front Panel Key: N/A

GTU — Execute a UP command on receipt of a GET. GROUP EXECUTE TRIGGER

Syntax: GTU

Remarks: Configures the MG369XA to execute a UP command (steps the open parameter up by the step size) each time a GET message is received.

Front Panel Key: N/A

GV — GHz per volt (GHz/V) data terminator DATA TERMINATOR

Syntax: GV

HWT — Selects external sweep trigger. STEP SWEEP

Syntax: HWT

Remarks: Selects external sweep triggering for frequency, power level, or list sweeps. When external sweep triggering is selected , a single sweep occurs when triggered by an external TTL-compatible clock pulse to the rear panel AUX I/O connector

Front Panel Key: **Frequency** / Step Sweep / More > / Trigger > / External *or*
Frequency / List / Sweep > / Trigger > / External *or*
Level / Level Sweep / Trigger > / External

HZ Hz data terminator DATA TERMINATOR

Syntax: HZ

*IDN? Requests device identification OUTPUT

Syntax: *IDN?

Remarks: Returns an identification string in IEEE 488.2 specified <NR1> format (four fields sparated by commas). The fields are <manufacturer>, <model>, <serial #>, <firmware version>.

Front Panel Key: N/A

II0 Inhibits updating of the ESB2 bit 7. STATUS

Syntax: II0

Remarks: Blocks updating of the Extended Status Byte 2 bit 7 (Parameter Changed). This bit is only used with the 56100A interface. This bit is cleared when the 56100A sends an OCP command (Output Last Parameter Changed). This is the default setting.

Front Panel Key: N/A

II1 Enables updating of the ESB2 bit 7. STATUS

Syntax: II1

Remarks: Unblocks updating of the Extended Status Byte 2 bit 7(Parameter Changed).

Front Panel Key: N/A

IL1 Selects internal leveling of output power. POWER LEVELING

Syntax: IL1

Remarks: Selects internal leveling of the output power using a signal from an internal level detector. This is the default mode. Deselects the external leveling mode using a signal from a power meter or the external leveling mode using a signal from an external detector, if previously programmed.

Related Commands: DL1, PL1, LV0

Front Panel Key: **Level** / ALC Mode / Leveling > / Internal

KH kHz data terminator DATA TERMINATOR

Syntax: KH

KV kHz per volt (kHz/V) data terminator DATA TERMINATOR

Syntax: KV

L0 Sets RF output power level to L0, Opens L0 parameter POWER LEVELING

Syntax: L0 **or** L0<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L0 power level. Also permits setting the L0 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Fr ont Panel Key: **Level** / Level / Level Control > / L0

Example: L0 5 DM places the RF output power level at the preset (or previously set) L0 power level and opens the L0 parameter for data entry. Sets the

L0 power level to 5 dBm.

Output Command: OL0 returns the L0 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L1 Sets RF output power level to L1, Opens L1 parameter POWER LEVELING

Syntax: `L1 or L1<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L1 power level. Also permits setting the L1 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L1

Output Command: OL1 returns the L1 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L2 Sets RF output power level to L2, Opens L2 parameter POWER LEVELING

Syntax: `L2 or L2<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L2 power level. Also permits setting the L2 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L2

Output Command: OL2 returns the L2 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L3 Sets RF output power level to L3, Opens L3 parameter POWER LEVELING

Syntax: `L3 or L3<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L3 power level. Also permits setting the L3 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L3

Output Command: OL3 returns the L3 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L4 Sets RF output power level to L4, Opens L4 parameter POWER LEVELING

Syntax: `L4 or L4<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L4 power level. Also permits setting the L4 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L4

Output Command: OL4 returns the L4 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L5 Sets RF output power level to L5, Opens L5 parameter POWER LEVELING

Syntax: `L5` **or** `L5<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L5 power level. Also permits setting the L5 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L5, then press Edit Selected or Output Level

Output Command: OL5 returns the L5 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L6 Sets RF output power level to L6, Opens L6 parameter POWER LEVELING

Syntax: `L6` **or** `L6<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L6 power level. Also permits setting the L6 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L6, then press Edit Selected or Output Level

Output Command: OL6 returns the L6 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L7 Sets RF output power level to L7, Opens L7 parameter POWER LEVELING

Syntax: `L7 or L7<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L7 power level. Also permits setting the L7 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L7, then press Edit Selected or Output Level

Output Command: OL7 returns the L7 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L8 Sets RF output power level to L8, Opens L8 parameter POWER LEVELING

Syntax: `L8 or L8<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L8 power level. Also permits setting the L8 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L8, then press Edit Selected or Output Level

Output Command: OL8 returns the L8 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

L9 Sets RF output power level to L9, Opens L9 parameter POWER LEVELING

Syntax: `L9 or L9<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Causes the RF output power level to be set to the preset (or previously set) L9 power level. Also permits setting the L9 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L9, then press Edit Selected or Output Level

Output Command: OL9 returns the L9 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

LA0 Inhibits updating of ESB1 bit 7. STATUS

Syntax: LA0

Remarks: Blocks updating of the Extended Status Byte 1 bit 7 (RF Leveled). This is the default setting.

Front Panel Key: N/A

LA1 Enables updating of ESB1 bit 7. STATUS

Syntax: LA1

Remarks: Unblocks updating of the Extended Status Byte 1 bit 7 (RF Leveled).

Front Panel Key: N/A

LDT Opens the list sweep dwell time parameter. LIST SWEEP

Syntax: `LDT<value><unit>`

value: 1 ms to 99s
unit: MS, SEC

Remarks: Permits setting the dwell-time-per-step of the list sweep.

Related Commands: LIB(xxxx), LIE(xxxx)

Front Panel Key: **Frequency** / List / Sweep > / Dwell Time

Example: `LIB1234 LIE1237 EXT LDT 10 MS TRG` implements a list sweep from current list index 1234 to index 1237 in single trigger mode with a 10 ms dwell-time-per-step, then triggers a single sweep.

LE0 Inhibits Lock Error SRQ generation. STATUS

Syntax: `LE0`

Remarks: Inhibits an SRQ from being generated when the Lock Error bit (Primary Status Byte bit 3) is set. This is the default mode.

Front Panel Key: N/A

LE1 Enables Lock Error SRQ generation. STATUS

Syntax: `LE1`

Remarks: Enables an SRQ to be generated when Primary Status Byte bit 3 (Lock Error) is set and SQ1 has been programmed.

Front Panel Key: N/A

LEA Learn List (in List Sweep mode) LIST SWEEP

Syntax: LEA

Remarks: During the initial list sweep, the MG369XA performs calculations to set the frequency and power levels. This causes the initial list sweep to take longer than each subsequent sweep. The command LEA initiates a process that examines every index in the current list and performs all the calculations necessary to set the frequency and power levels. This lets the initial list sweep be as fast as each subsequent sweep.

The list calculations are for the current list *only*. Any changes to the current list or selection of another list requires the calculations to be performed again. The calculations are stored only in volatile RAM and are lost when power to the instrument is turned off.

Related Commands: LST, ELN(x)

Front Panel Key: **Frequency** / List / Pre-calc List

LF Sets list frequencies starting at the list index. LIST SWEEP

Syntax: `LF<value><unit>, <value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the list frequencies of the selected list starting at the list index specified by the command ELI(xxxx). Any number of frequencies can follow this command. This command does ***not*** change the value of the list index.

Related Commands: LST, ELN(x), ELI(xxxx)

Front Panel Key: **Frequency** / List / Frequency List... / Edit Selected

Example: `LST ELN1 ELI1234 LF 2 GH, 5 GH, 1 GH, 8 GH LP 2 DM, 9 DM, -3 DM, -10 DM` places the instrument in list sweep mode, selects list number 1, and sets the list index to 1234. List index 1234 is set to 2 GHz at 2 dBm, list index 1235 is set to 5 GHz at 9 dBm, list index 1236 is set to 1 GHz at –3 dBm, and list index 1237 is set to 8 GHz at –10 dBm.

LGS Selects logarithmic step sweep STEP SWEEP

Syntax: LGS

Remarks: LGS, by itself, does not provide a swept-frequency output. It only determines that the swept-frequency output will be a logarithmic step sweep. If, on the other hand, a frequency sweep is being output by the instrument when LGS is received, the sweep will become a logarithmic step sweep.

Related Commands: SWP, SSP, LIS, MAN

Front Panel Key: **Frequency** / Step Sweep / More > / Log

Example: `SDT 3 MS SNS 100 SPS LGS SF1 AUT` initiates a continuous logarithmic step frequency sweep between F1 and F2. The sweep consists on 100 steps with a dwell-time-per-step of 3 ms.

Output Commands: OSD returns the dwell time of the step sweep (in ms) to the controller. OSS returns the number of steps of the step sweep to the controller. OST returns the sweep time value (in ms) to the controller.

LIB(xxxx) Sets the list start index to xxxx LIST SWEEP

Syntax: LIB(xxxx)

xxxx: 4-digit integer between 0000 and 1999

Remarks: In list sweep mode, permits setting the list start index for a list sweep of the current list.

Related Commands: LST, ELN(x), LIE(xxxx)

Front Panel Key: **Frequency** / List / Sweep > / Start Index

Example: `LST ELN1 LIB1097 LIE1197 EXT LDT 10 MS TRG` places the unit in list sweep mode and implements a list sweep from list 1 index 1097 to index 1197 in single trigger mode with a 10 ms dwell-time-per-step, then triggers a single sweep.

LIE(xxxx) Sets the list stop index to xxxx — LIST SWEEP

Syntax: `LIE(xxxx)`

xxxx: 4-digit integer between 0000 and 1999

Remarks: In list sweep mode, permits setting the list stop index for a list sweep of the current list.

Related Commands: LST, ELN(x), LIB(xxxx)

Front Panel Key: **Frequency** / List / Sweep > / Stop Index

Example: `LST ELN1 LIB1097 LIE1197 EXT LDT 10 MS TRG` places the unit in list sweep mode and implements a list sweep from list 1 index 1097 to index 1197 in single trigger mode with a 10 ms dwell-time-per-step, then triggers a single sweep.

LIN Selects linear power level operation — POWER LEVELING

Syntax: `LIN`

Remarks: In linear power level operation, power level entries and outputs are in mV and power level sweeps are linear.

Related Commands: LOG

Front Panel Key: **Level** / Level / Level Control > / Linear

LIS Selects linear step sweep — STEP SWEEP

Syntax: `LIS`

Remarks: This is the default mode.

LIS, by itself, does not provide a swept-frequency output. It only determines that the swept-frequency output will be a linear step sweep. If, on the other hand, a frequency sweep is being output by the instrument when LIS is received, the sweep will become a linear step sweep.

Related Commands: SWP, SSP, LGS, MAN

Front Panel Key: **Frequency** / Step Sweep / More > / Linear

Example: `SDT 3 MS SNS 100 SPS LIS SF1 AUT` initiates a continuous linear step frequency sweep between F1 and F2. The sweep consists on 100 steps with a dwell-time-per-step of 3 ms.

Output Commands: OSD returns the dwell time of the step sweep (in ms) to the controller.
OSS returns the number of steps of the step sweep to the controller.
OST returns the sweep time value (in ms) to the controller.

LO0

Turns off the Level Offset function. POWER LEVELING

Syntax: `LO0`

Related Commands: LO1, LOS

Front Panel Key: **Level** / Level / Offset to Off

LO1

Turns on the Level Offset function. POWER LEVELING

Syntax: `LO1`

Remarks: The Level Offset function lets you compensate for a device on the MG369XA's output that alters the RF output power level at the point of interest. Using the LOS command, you can apply a constant to the level measured by the internal leveling loop that compensates for this loss or gain. The displayed power level will then reflect the actual power level at the test device.

Related Commands: LO0, LOS

Front Panel Key: **Level** / Level / Offset to On

Output Command: OLO returns the Level Offset value (in dB when in Log mode; in mV when in Linear mode) to the controller.

LOS — Opens the Level Offset parameter. PARAMETER ENTRY

Syntax: `LOS<value><unit>`

value: +100 dB to –100 dB (logarithmic); +xxx mV to –xxx mV (linear)
unit: DB (logarithmic); VT (linear)

Remarks: Permits setting the Level Offset constant to be applied to the level measured by the internal leveling loop by the LO1 command.

Related Commands: LO0, LO1

Front Panel Key: **Level** / Level / Edit Offset

Output Command: OLO returns the Level Offset value (in dB when in Log mode; in mV when in Linear mode) to the controller.

LOG — Selects logarithmic power level operation. POWER LEVELING

Syntax: `LOG`

Remarks: In logarithmic power level operation, power level entries and outputs are in dBm and power level sweeps are logarithmic. This is the default mode.

Related Command: LIN

Front Panel Key: **Level** / Level / Level Control > / Log

LP — Sets list power levels starting at the list index. LIST SWEEP

Syntax: `LP<value><unit>, <value><unit>`

value: power level range of the MG369XA model
unit: DM

Remarks: Permits setting the power levels of the selected list starting at the list index specified by the command ELI(xxxx). Any number of power levels can follow this command. This command does ***not*** change the value of the list index.

Related Commands: LST, ELN(x), ELI(xxxx)

Front Panel Key: **Frequency** / List / Power List... / Edit Selected

Example: `LST ELN1 ELI1234 LF 2 GH, 5 GH, 1 GH, 8 GH LP 2 DM, 9 DM, -3 DM, -10 DM` places the instrument in list sweep mode, selects list number 1, and sets the list index to 1234. List index 1234 is set to 2 GHz at 2 dBm, list index 1235 is set to 5 GHz at 9 dBm, list index 1236 is set to 1 GHz at –3 dBm, and list index 1237 is set to 8 GHz at –10 dBm.

LS0

Inhibits updating of the ESB1 bit 3 — STATUS

Syntax: `LS0`

Remarks: Blocks updating of the Extended Status Byte 1 bit 3 (RF Locked). This is the default setting.

Front Panel Key: N/A

LS1

Enables updating of the ESB1 bit 3 — STATUS

Syntax: LS1

Remarks: Unblocks updating of the Extended Status Byte 1 bit 3 (RF Locked). This bit is only used with the Model 360B interface.

Front Panel Key: N/A

LSP

Selects the Power Level Sweep mode. — POWER LEVELING

Syntax: LSP

Remarks: In Power Level Sweep mode, the power level will sweep as determined by the preset (or previously set) dwell-time and number-of-steps parameters.

Related Commands: LOG, LIN, PDT, PNS

Front Panel Key: **Level** / Level Sweep

LST — Places the MG369XA in list sweep mode. LIST SWEEP

Syntax: LST

Remarks: In list sweep mode, up to four lists of 2000 non-sequential frequency/power level sets can be stored and acccessed. A list index (0 thru 1999) identifies each frequency/power level set in a list. When commanded, the MG369XA generates a phase-locked step sweep between the specified list start index and list stop index.

Related Commands: ELI(xxxx), ELN(x), LF, LP, LIB(xxxx), LIE(xxxx), LEA

Front Panel Key: **Frequency** / List

LUR — Readies the MG369XA to receive 5 tables of user level cal data from the controller. USER LEVEL CAL

Syntax: LUR

Remarks: This commands readies the MG369XA to receive the five tables of user level (flatness correction) calibration data that were stored in the controller by the LUS command.

Related Command: LUS

Front Panel Key: N/A

LUS — Sends all five tables of user level cal data to the controller. USER LEVEL CAL

Syntax: LUS

Remarks: This command sends all five tables of user level (flatness correction) calibration data to the controller where they are stored in a binary data file. The tables are recalled using the LUR command.

Related Command: LUR

Front Panel Key: N/A

LU0 Turns off the active user level calibration table. USER LEVEL CAL

Syntax: LU0

Front Panel Key: **Level** / User Cal / Off

LU1 Activates user level calibration table #1. USER LEVEL CAL

Syntax: LU1

Remarks: Turns off any other active user level calibration table.

Front Panel Key: **Level** / User Cal / User Cal 1 / On

LU2 Activates user level calibration table #2. USER LEVEL CAL

Syntax: LU1

Remarks: Turns off any other active user level calibration table.

Front Panel Key: **Level** / User Cal / User Cal 2 / On

LU3 Activates user level calibration table #3. USER LEVEL CAL

Syntax: LU1

Remarks: Turns off any other active user level calibration table.

Front Panel Key: **Level** / User Cal / User Cal 3 / On

LU4 Activates user level calibration table #4. USER LEVEL CAL

Syntax: LU1

Remarks: Turns off any other active user level calibration table.

Front Panel Key: **Level** / User Cal / User Cal 4 / On

LU5 Activates user level calibration table #5. USER LEVEL CAL

Syntax: LU1

Remarks: Turns off any other active user level calibration table.

Front Panel Key: **Level** / User Cal / User Cal 5 / On

LV0 Turns off leveling of the output power. POWER LEVELING

Syntax: LV0

Remarks: This places the MG369XA in a fixed gain mode. 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 output power level is uncalibrated.

Related Commands: DL1, IL1, PL1

Front Panel Key: **Level** / ALC Mode / Leveling > / Fixed Gain

M0 Opens the M0 parameter. PARAMETER ENTRY

Syntax: M0<value><unit>

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M0 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequecy List... / highlight M0, press Edit Selected

Output Command: OM0 returns the M0 frequency value (in MHz) to the controller.

M1 Opens the M1 parameter. PARAMETER ENTRY

Syntax: `M1<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M1 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / M1 / Edit M1

Output Command: OM1 returns the M1 frequency value (in MHz) to the controller.

M2 Opens the M2 parameter. PARAMETER ENTRY

Syntax: `M2<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M2 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / M2 / Edit M2

Output Command: OM2 returns the M2 frequency value (in MHz) to the controller.

M3 Opens the M3 parameter. PARAMETER ENTRY

Syntax: `M3<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M3 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequecy List... / highlight M3, press Edit Selected

Output Command: OM3 returns the M3 frequency value (in MHz) to the controller.

M4 Opens the M4 parameter. PARAMETER ENTRY

Syntax: `M4<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M4 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequecy List... / highlight M4, press Edit Selected

Output Command: OM4 returns the M4 frequency value (in MHz) to the controller.

M5 Opens the M5 parameter. PARAMETER ENTRY

Syntax: `M5<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M5 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequecy List... / highlight M5, press Edit Selected

Output Command: OM5 returns the M5 frequency value (in MHz) to the controller.

M6 Opens the M6 parameter. PARAMETER ENTRY

Syntax: `M6<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M6 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequecy List... / highlight M6, press Edit Selected

Output Command: OM6 returns the M6 frequency value (in MHz) to the controller.

M7 Opens the M7 parameter. PARAMETER ENTRY

Syntax: `M7<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M7 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequecy List... / highlight M7, press Edit Selected

Output Command: OM7 returns the M7 frequency value (in MHz) to the controller.

M8 Opens the M8 parameter. PARAMETER ENTRY

Syntax: `M8<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M8 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequecy List... / highlight M8, press Edit Selected

Output Command: OM8 returns the M8 frequency value (in MHz) to the controller.

M9 Opens the M9 parameter. PARAMETER ENTRY

Syntax: `M9<value><unit>`

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M9 parameter. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Frequency Control > / Frequecy List... / highlight M9, press Edit Selected

Output Command: OM9 returns the M9 frequency value (in MHz) to the controller.

MAN Selects manual (step) frequency sweep. STEP SWEEP

Syntax: MAN

Remarks: The MAN command only provides for setting up the MG369XA for a manual frequency sweep. It must be accompanied by the RL command to return the instrument to local (front panel) control in order for the operator to perform the manual sweep.

Front Panel Key: **Frequency** / Manual Sweep

MB0 Sets the enable mask byte for the Primary Status Byte STATUS

Syntax: MB0

Remarks: Sets an 8-bit data mask that is used to enable specific bits of the Primary Status Byte. This enables any or all of the bits (except for bit 6) in the Primary Status Byte to generate an SRQ using one 8-bit byte. This command can be equivalent to sending ES1, FB1,LE1,PE1, SE1, SB1, and UL1.

Front Panel Key: N/A

Output Command: OSM returns the Primary SRQ Mask byte to the controller.

MB1 Sets the enable mask byte for Extended Status Byte 1. STATUS

Syntax: MB1

Remarks: Sets an 8-bit data mask that is used to enable specific bits of the Extended Status Byte 1. This enables any or all of the bits in the Extended Status Byte 1 to generate an SRQ using one 8-bit byte.

Front Panel Key: N/A

Output Command: OEM returns the Extended SRQ Mask bytes (3 binary bytes) to the controller.

MB2 Sets the enable mask byte for Extended Status Byte 2. STATUS

Syntax: `MB2`

Remarks: Sets an 8-bit data mask that is used to enable specific bits of the Extended Status Byte 2. This enables any or all of the bits in the Extended Status Byte 2 to generate an SRQ using one 8-bit byte.

Front Panel Key: N/A

Output Command: OEM returns the Extended SRQ Mask bytes (3 binary bytes) to the controller.

ME0 Disables the marker at the active frequency. MARKERS

Syntax: `ME0`

Related Command: ME1

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / Marker List... / highlight the active marker frequency / Tag Selected

Example: `F1 ME0` disables the F1 frequency marker.

ME1 Enables a marker at the active frequency. FREQUENCY MARKER

Syntax: `ME1`

Remarks: This command will enable a marker at the current frequency that is open for update (F0-F9 or M0-M9).

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / Marker List... / highlight the active marker frequency / Tag Selected

Example: `F6 ME1` enables the F6 frequency marker.

MH MHz data terminator DATA TERMINATOR

Syntax: `MH`

MKO Turns off markers. FREQUENCY MARKER

Syntax: MKO

Remarks: Enabled markers remain enabled, but are not active.

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / Marker List... / Video Markers – Off

MNT Selects manual trigger (list sweep mode) LIST SWEEP

Syntax: MNT

Remarks: In manual trigger mode, the list index is incremented by one each time the UP command is received or each time an external TTL trigger is received. The list index is decremented by one each time the DN command is received.

Related Commands: DN, UP

Front Panel Key: **Frequency** / List / Sweep > / Trigger > / Manual

MS Milliseconds (ms) data terminator DATA TERMINATOR

Syntax: MS

MV MHz per volt (MHz/V) data terminator DATA TERMINATOR

Syntax: MV

NS nanoseconds (ns) data terminator DATA TERMNATOR

Syntax: NS

ODF — Returns the ΔF frequency value (in MHz) to the controller. OUTPUT

Syntax: `ODF`

Related Commands: DLF, DFF, DFM

Front Panel Key: N/A

OEM — Returns the Extended SRQ Mask bytes (3 binary bytes) to the controller. OUTPUT

Syntax: `OEM`

Related Commands: MB0, MB1, MB2

Front Panel Key: N/A

OES — Returns the GPIB Status bytes (3 binary bytes) to the controller. OUTPUT

Syntax: `OES`

Remarks: Returns the contents of the primary status byte and the two extended status bytes to the controller.

Front Panel Key: N/A

OF0 — Returns the F0 frequency value (in MHz) to the controller. OUTPUT

Syntax: `OF0`

Related Command: F0

Front Panel Key: N/A

OF1 — Returns the F1 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF1

Related Command: F1

Front Panel Key: N/A

OF2 — Returns the F2 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF2

Related Command: F2

Front Panel Key: N/A

OF3 — Returns the F3 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF3

Related Command: F3

Front Panel Key: N/A

OF4 — Returns the F4 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF4

Related Command: F4

Front Panel Key: N/A

OF5 — Returns the F5 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF5

Related Command: F5

Front Panel Key: N/A

OF6 — Returns the F6 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF6

Related Command: F6

Front Panel Key: N/A

OF7 — Returns the F7 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF7

Related Command: F7

Front Panel Key: N/A

OF8 — Returns the F8 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF8

Related Command: F8

Front Panel Key: N/A

OF9 Returns the F9 frequency value (in MHz) to the controller. OUTPUT

Syntax: OF9

Related Command: F9

Front Panel Key: N/A

OFH Returns the high-end frequency value (in MHz) to the controller. OUTPUT

Syntax: OFH

Front Panel Key: N/A

OFL Returns the low-end frequency value (in MHz) to the controller. OUTPUT

Syntax: OFL

Front Panel Key: N/A

OI Returns the instrument identification string to the controller. OUTPUT

Syntax: OI

Remarks: The instrument identification string provides the following information: model number, low-end frequency, high-end frequency, minimum output power level, maximum output power level, software revision number, serial number, model prefix, and series. The string is 36 characters long.

Front Panel Key: N/A

OL0 Returns the L0 power level value to the controller. OUTPUT

Syntax: OL0

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L0, XL0

Front Panel Key: N/A

OL1 Returns the L1 power level value to the controller. OUTPUT

Syntax: OL1

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L1, XL1

Front Panel Key: N/A

OL2 Returns the L2 power level value to the controller. OUTPUT

Syntax: OL2

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L2, XL2

Front Panel Key: N/A

OL3 Returns the L3 power level value to the controller. OUTPUT

Syntax: OL3

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L3, XL3

Front Panel Key: N/A

OL4 Returns the L4 power level value to the controller. OUTPUT

Syntax: OL4

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L4, XL4

Front Panel Key: N/A

OL5 Returns the L5 power level value to the controller. OUTPUT

Syntax: OL5

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L5, XL5

Front Panel Key: N/A

OL6 Returns the L6 power level value to the controller. OUTPUT

Syntax: OL6

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L6, XL6

Front Panel Key: N/A

OL7 Returns the L7 power level value to the controller. OUTPUT

Syntax: OL7

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L7, XL7

Front Panel Key: N/A

OL8 Returns the L8 power level value to the controller. OUTPUT

Syntax: OL8

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L8, XL8

Front Panel Key: N/A

OL9 Returns the L9 power level value to the controller. OUTPUT

Syntax: OL9

Remarks: Returned power level value is in dBm when in log mode and in mV when in linear mode.

Related Command: L9, XL9

Front Panel Key: N/A

OLO Returns the Level Offset power value to the controller. OUTPUT

Syntax: OLO

Remarks: Returned level offset power value is in dBm when in log mode and in mV when in linear mode.

Related Command: LOS

Front Panel Key: N/A

OM0 Returns the M0 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM0

Related Command: M0

Front Panel Key: N/A

OM1 Returns the M1 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM1

Related Command: M1

Front Panel Key: N/A

OM2 — Returns the M2 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM2

Related Command: M2

Front Panel Key: N/A

OM3 — Returns the M3 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM3

Related Command: M3

Front Panel Key: N/A

OM4 — Returns the M4 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM4

Related Command: M4

Front Panel Key: N/A

OM5 — Returns the M5 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM5

Related Command: M5

Front Panel Key: N/A

OM6 — Returns the M6 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM6

Related Command: M6

Front Panel Key: N/A

OM7 — Returns the M7 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM7

Related Command: M7

Front Panel Key: N/A

OM8 — Returns the M8 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM8

Related Command: M8

Front Panel Key: N/A

OM9 — Returns the M9 frequency value (in MHz) to the controller. OUTPUT

Syntax: OM9

Related Command: M9

Front Panel Key: N/A

OPD — Returns the power sweep dwell time (in ms) to the controller. OUTPUT

Syntax: OPD

Related Commands: PDT

Front Panel Key: N/A

OPS — Returns the power sweep number-of-steps to the controller. OUTPUT

Syntax: OPS

Related Command: PNS

Front Panel Key: N/A

OSB — Returns the Primary GPIB Status byte to the controller. OUTPUT

Syntax: OSB

Front Panel Key: N/A

OSD — Returns the step sweep dwell time (in ms) to the controller. OUTPUT

Syntax: OSD

Related Command: SDT

Front Panel Key: N/A

OSE Returns the last GPIB syntax error to the controller. OUTPUT

Syntax: OSE

Remarks: Syntax errors are those that occur in the formulation of a program statement, such as writing "EXTTFS" instead of "EXTTRS".

Front Panel Key: N/A

OSM Returns the Primary SRQ Mask byte to the controller. OUTPUT

Syntax: OSM

Related Command: MB0

Front Panel Key: N/A

OSR Returns the self-test results (6 binary bytes) to the controller. OUTPUT

Syntax: OSR

Related Command: TST

Front Panel Key: N/A

OSS Returns the step sweep number-of-steps to the controller. OUTPUT

Syntax: OSS

Related Command: SNS

Front Panel Key: N/A

OST — Returns the step sweep time value (in ms) to the controller. OUTPUT

Syntax: OST

Related Command: SWT

Front Panel Key: N/A

OVN — Returns the ROM version number to the controller. OUTPUT

Syntax: OVN

Front Panel Key: N/A

OWT — Returns the GPIB termination status to the controller. OUTPUT

Syntax: OWT

Remarks: Return of 0 indicates carriage return (CR); return of 1 indicates carriage return and line feed (CR/LF).

Front Panel Key: N/A

P0 — Turns off the pulse modulation function. MODULATION

Syntax: P0

Remarks: Turns off the pulse modulation function (Option 13).

If Option 13 is not installed, this command produces a syntax error.

Related Command: EP0, EP1, XP

Front Panel Key: **Modulation** / Pulse / On/Off to Off

PCT Percent (%) data terminator DATA TERMINATOR

Syntax: PCT

PCV Percent per volt (%/V) data terminator DATA TERMINATOR

Syntax: PCV

PDT Opens the power sweep dwell time parameter. PARAMETER ENTRY

Syntax: PDT<value><unit>

value: 1 ms to 99s
unit: MS, SEC

Remarks: Permits setting the dwell-time-per-step of the power level sweep.

Front Panel Key: **Level** / Level Sweep / Dwell Time

Output Command: OPD returns the power sweep dwell time (in ms) to the controller.

PE0 Inhibits Parameter Range Error SRQ generation. STATUS

Syntax: PE0

Remarks: Inhibits an SRQ from being generated when the Primary Status Byte bit 4 (Parameter Range Error) is set. This is the default mode.

Front Panel Key: N/A

PE1 Enables Parameter Range Error SRQ generation. STATUS

Syntax: PE1

Remarks: Enables an SRQ to be generated when Primary Status Byte bit 4 (Parameter Range Error) is set and SQ1 has been programmed. SQ1 enables the SRQ generation function.

Front Panel Key: N/A

PL1 — Selects external power meter leveling of the output power. POWER LEVELING

Syntax: PL1

Remarks: Selects external leveling of the output power using a signal from an external power meter connected to the EXTERNAL ALC IN connector. Deselects the internal leveling mode or external leveling mode using a signal from an external detector, if previously programmed.

In external power leveling mode, use the parameter entry command EGI to enter a setting for the Reference Level DAC to control the ALC gain.

Related Commands: EGI, DL1, IL1, LV0

Front Panel Key: **Level** / ALC Mode / Leveling > / Power Meter

PNS — Opens the power sweep number of steps parameter. PARAMETER ENTRY

Syntax: PNS<value><unit>

value: 1 to 10,000
unit: SPS

Remarks: Permits setting the number of steps for a power sweep.

Related Commands: LSP, PDT

Front Panel Key: **Level** / Level Sweep / Number of Steps

Output Command: OPS returns the number of steps of the power sweep to the controller.

PPO — Selects normally-open contacts on the internal penlift relay. CONFIGURATION

Syntax: PP0

Remarks: The penlift relay output, optionally available at the rear panel, is used to lift a plotter pen during retrace.

Front Panel Key: **System** / Config / Rear Panel / Penlift – N/O

PPC — Selects normally-closed contacts on the internal penlift relay. CONFIGURATION

Syntax: PPC

Front Panel Key: **System** / Config / Rear Panel / Penlift – N/C

PT0 — Disables the Power Offset Table POWER-OFFSET-TABLE

Syntax: PT0

Related Commands: PT1, PTC, PTL

Front Panel Key: N/A

PT1 — Enables the Power Offset Table POWER-OFFSET-TABLE

Syntax: PT1

Remarks: Power-offset-table commands provide for maintaining a consistent power level at a point within a test setup across the measurement frequencies. This "flattening" of the test point power level is accomplished by summing a power offset word (from the power offset table) with the MG369XA's normal power level DAC word at each frequency point.

The command PTL is used to load the power offset table with power offset words.

Related Commands: PT0, PTL, PTC

Front Panel Key: N/A

PTC — Changes a Power Offset Table entry POWER-OFFSET-TABLE

Syntax: PTC<dldh>

dldh: power offset word

Remarks: dldh is the new power offset word for the current table entry. dldh is a two-byte binary word sent LOW byte first and HIGH byte second. The power offset word is in hundredths of a dB. Negative power offsets use

twos-complement representation.

Related Commands: PT0, PT1, PTL

Front Panel Key: N/A

PTL Loads a Power Offset Table POWER-OFFSET-TABLE

Syntax: `PTL<clch><dldh......>`

clch: number of power offset words
dldh: power offset word

Remarks: The power-offset mode works in conjunction with the fast-frequency -switching mode. The frequency stack must be loaded before loading the power offset table because the frequency loading sets the upper limit for the numberof entries in the power offset table. The same pointer is used for both the frequency stack and the power offset table.

Both `clch` and `dldh` are two-byte binary words sent LOW byte first and HIGH byte second. The power offset word is in hundredths of a dB. Negative power offsets use twos-complement representation.

NOTE: Care must be taken to send the exact number of power offset words specified in the word count, `clch`. If too few words are sent, the GPIB interface may not respond properly.

Related Commands: PT0, PT1, PTC

Front Panel Key: N/A

Front Panel Key: **Level** / ALC Loop / Edit Pivot

RO0 Selects RF to be on at reset. CONFIGURATION

Syntax: `RO0`

Remarks: This is the default mode.

Front Panel Key: **System** / Config / RF / Reset State - On

RO1 Selects RF to be off at reset. CONFIGURATION

Syntax: RO1

Front Panel Key: System / Config / RF / Reset State - Off

RC0 Selects RF to be off during frequency switching in CW, step sweep, and list sweep modes. CONFIGURATION

Syntax: RC0

Front Panel Key: System / Config / RF / DeltaF RF - Off

RC1 Selects RF to be on during frequency switching in CW, step sweep, and list sweep modes. CONFIGURATION

Syntax: RC1

Front Panel Key: System / Config / RF / DeltaF RF - On

RCF Readies the MG369XA to receive a new instrument setup recalled from the controller. STORED SETUP

Syntax: RCF

Related Commands: SAF, SAM, RCM

Front Panel Key: N/A

RCM Readies the MG369XA to receive a new instrument setup and new stored setups recalled from the controller. STORED SETUP

Syntax: RCM

Related Commands: SAF, SAM, RCF

Front Panel Key: N/A

RF0 Turns off the RF output. POWER LEVELING

Syntax: RF0

Front Panel Key: **Output** - Off (red LED on)

RF1 Turns on the RF output. POWER LEVELING

Syntax: RF1

Remarks: This is the default mode.

Front Panel Key: **Output** - On (yellow LED on)

RL Returns the instrument to local (front panel) control. MISCELLANEOUS

Syntax: RL

Front Panel Key: **System** / Return to Local *or* **System** / Reset

RSN(M_{1-9}) Recalls the instrument setup stored in internal setup memory location M. STORED SETUP

Syntax: RSN(M_{1-9})

M_{1-9}: memory locations 1 to 9

Remarks: Recalls a stored instrument setup from internal setup memory locations 1 to 9.

Related Command: SSN(M_{1-9})

Front Panel Key: **System** / Setups / Recall (enter setup number to be recalled)

RSS Resets a sweep if in progress. STEP SWEEP

Syntax: RSS

Remarks: Resets the sweep to its start frequency (or power level), whenever the command is received while a single sweep is in progress.

Related Commands: TRG, TRS

Front Panel Key: **Frequency** / Step Sweep / More > / Trigger > / Single / Trigger to start single sweep / Trigger to reset sweep *or* **Frequency** / List / Sweep > / Trigger > / Single / Trigger to start single sweep / Trigger to reset sweep *or* **Level** / Level Sweep / Trigger > / Single / Trigger to start single sweep / Trigger to reset sweep

RST Resets the MG369XA to its default settings. MISCELLANEOUS

Syntax: RST

Remarks: Sending this command clears the current instrument setup. If this setup is needed for future testing, save it as a stored setup using the command SSN(M_{1-9}) or SAF before sending RST.

Front Panel Key: **System** / Reset

RT0 Selects RF to be off during retrace. CONFIGURATION

Syntax: RT0

Front Panel Key: **System** / Config / RF / Retrace RF - Off

RT1 Selects RF to be on during retrace. CONFIGURATION

Syntax: RT1

Front Panel Key: **System** / Config / RF / Retrace RF - On

S0 Turns off the Master-Slave mode of operation MASTER-SLAVE OPS

Syntax: S0

Related Commands: SL1

Front Panel Key: **Frequency** / CW / Master Slave > / Enable - Off

S1 Turns on the Master-Slave mode of operation. MASTER-SLAVE OPS

Syntax: S1

Remarks: Master-slave operation provides for enabling two MG369XAs that are connected in a master-slave configuration to produce CW and synchronized, swept output signals at a frequency offset. In a master-slave configuration, 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.

Related Commands: SLF0-SLF9, SLM0-SLM9, SLDF, SLV, SLL1, SLL2, SOF

Front Panel Key: **Frequency** / CW / Master Slave > / Enable - On

SAF Outputs the current instrument setup to the controller. STORED SETUP

Syntax: SAF

Remarks: The current instrument setup is output to the controller in a 4100-byte (approximately) binary data string. The controller stores the setup.

Related Commands: RCF, SAM, RCM

Front Panel Key: N/A

SAM — Outputs both the current instrument setup and all stored instrument setups to the controller. STORED SETUP

Syntax: SAM

Remarks: The current instrument setup and all stored instrument setups are output to the controller in a 41000-byte (approximately) binary data string. The controller stores the data.

Related Commands: RCM, RCF, SAF

Front Panel Key: N/A

SB0 — Inhibits Extended Status Byte 2 SRQ generation. STATUS

Syntax: SB0

Remarks: Inhibits an SRQ from being generated whe the Extended Status Byte 2 bit is set. This is the default mode.

Front Panel Key: N/A

SB1 — Enables Extended Status Byte 2 SRQ generation. STATUS

Syntax: SB1

Remarks: Enables an SRQ to be generated when Primary Status Byte bit 7 (Extended Status Byte 2) is set and SQ1 has been programmed. The Extended Status Byte 2 bit is set whenever one (or more) of the unmasked status reporting functions in Extended Status Byte 2 is true.

Front Panel Key: N/A

SDT Opens the step sweep dwell time parameter. PARAMETER ENTRY

Syntax: `SDT<value><unit>`

value: 1 ms to 99s
unit: MS, SEC

Remarks: Permits setting the dwell-time-per-step value for the step sweep.

Related Commands: LIS, LGS, SSP, SNS, SWT

Front Panel Key: **Frequency** / Step Sweep / Dwell Time

Output Command: OSD returns the dwell time of the step sweep (in ms) to the controller.

SE0 Inhibits Syntax Error SRQ generation. STATUS

Syntax: `SE0`

Remarks: Inhibits an SRQ from being generated when the Syntax Error bit is set. This is the default mode.

Front Panel Key: N/A

SE1 Enables Syntax Error SRQ generation. STATUS

Syntax: `SE1`

Remarks: Enables an SRQ to be generated when Primary Status Byte bit 5 (Syntax Error) is set and SQ1 has been programmed.

Front Panel Key: N/A

SEC Seconds data terminator DATA TERMINATOR

Syntax: `SEC`

SF1 Selects the F1-F2 sweep mode. STEP SWEEP

Syntax: SF1

Remarks: Selects a frequency sweep between F1 and F2.

Related Commands: F1, F2

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / F1-F2 *or* **Frequency** / Manual Sweep / Frequency Control > / F1-F2

SF3 Selects the F3-F4 sweep mode. STEP SWEEP

Syntax: SF3

Remarks: Selects a frequency sweep between F3 and F4.

Related Commands: F3, F4

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / F3-F4 *or* **Frequency** / Manual Sweep / Frequency Control > / F3-F4

SLDF Opens the ΔF parameter for the slave unit. PARAMETER ENTRY

Syntax: SLDF<value><unit>

value: frequency range of the slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the ΔF frequency parameter for the slave MG369XA unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Related Commands: SLF0-SLF9, S1

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Delta Freq

Example: SLF1 4 GH SLDF 2 GH SLL1 3 DM S1 sets the Slave unit F1 frequency to 4 GHz, its ΔF frequency to 2 GHz, and its output power level to 3 dBm and turns on the master-slave mode of operation. Now, when the Master unit is programmed to perform a symmetrical sweep around frequency F1, the Slave unit will produce a synchronous symmetrical frequency sweep around 4 GHz with a power level of 3 dBm.

SLF0 Opens the F0 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLF0<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F0 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F0, then press Edit Selected

SLF1 Opens the F1 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLF1<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F1 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F1, then press Edit Selected

SLF2 Opens the F2 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLF2<value><unit>`

value: frequency range of the Slave M80XXA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F2 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F2, then press Edit Selected

SLF3 Opens the F3 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLF3<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F3 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F3, then press Edit Selected

SLF4 Opens the F4 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLF4<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F4 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F4, then press Edit Selected

SLF5 Opens the F5 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLF5<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F5 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F5, then press Edit Selected

SLF6 Opens the F6 parameter of the Slave unit. PARAMETER ENTRY

Syntax: SLF6<value><unit>

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F6 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F6, then press Edit Selected

SLF7 Opens the F7 parameter of the Slave unit. PARAMETER ENTRY

Syntax: SLF7<value><unit>

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F7 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F7, then press Edit Selected

SLF8 Opens the F8 parameter of the Slave unit. PARAMETER ENTRY

Syntax: SLF8<value><unit>

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F8 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F8, then press Edit Selected

SLF9 Opens the F9 parameter of the Slave unit. PARAMETER ENTRY

Syntax: SLF9<value><unit>

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the F9 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight F9, then press Edit Selected t

SLL1 Opens the main power level parameter (L1) for the Slave unit. PARAMETER ENTRY

Syntax: SLL1<value><unit>

value: power level range of the Slave MG369XA model
unit: DM (Log), VT (Linear)

Remarks: Same as SLV. Permits setting the L1 parameter for the Slave unit. The power level setting is determined by thepower level range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave L1

SLL2 Opens the alternate sweep power level parameter (L2) for the Slave unit. PARAMETER ENTRY

Syntax: SLL2<value><unit>

value: power level range of the Slave MG369XA model
unit: DM (Log), VT (Linear)

Remarks: Permits setting the L2 parameter for the Slave unit. The power level setting is determined by thepower level range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave L2

SLM0 Opens the M0 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLM0<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M0 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M0, then press Edit Selected

SLM1 Opens the M1 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLM1<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M1 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M1, then press Edit Selected

SLM2 Opens the M2 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLM2<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M2 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M2, then press Edit Selected

SLM3 Opens the M3 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLM3<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M3 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M3, then press Edit Selected

SLM4 Opens the M4 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLM4<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M4 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M4, then press Edit Selected

SLM5 Opens the M5 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLM5<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M5 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M5, then press Edit Selected

SLM6 Opens the M6 parameter of the Slave unit. PARAMETER ENTRY

Syntax: SLM6<value><unit>

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M6 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M6, then press Edit Selected

SLM7 Opens the M7 parameter of the Slave unit. PARAMETER ENTRY

Syntax: SLM7<value><unit>

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M7 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M7, then press Edit Selected

SLM8 Opens the M8 parameter of the Slave unit. PARAMETER ENTRY

Syntax: SLM8<value><unit>

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M8 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M8, then press Edit Selected

SLM9 Opens the M9 parameter of the Slave unit. PARAMETER ENTRY

Syntax: `SLM9<value><unit>`

value: frequency range of the Slave MG369XA model
unit: GH, MH, KH, HZ

Remarks: Permits setting the M9 parameter of the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / highlight M9, then press Edit Selected

SLV Opens the power level parameter (L1) for the Slave unit. PARAMETER ENTRY

Syntax: `SLV<value><unit>`

value: power level range of the Slave MGxxxxA model
unit: DM (Log), VT (Linear)

Remarks: Same as SLL1. Permits setting the L1 parameter for the Slave unit. The power level setting is determined by the power level range of the particular MGxxxxA model.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave L1

SM Recalls the next stored instrument setup in sequence. STORED SETUP

Syntax: `SM`

Remarks: Recalls, in sequence, the next instrument setup stored in internal setup memory.

Related Commands: RSN(M_{1-9}), SSN(M_{1-9})

Front Panel Key: N/A

SNR Enter the instrument serial number. MISCELLANEOUS

Syntax: SNRnnnnnnX

nnnnnn: the serial number must be six characters in length

Output Commands: The commands, *IDN? and OI, return the instrument serial number as part of the identification string sent to the controller.

Front Panel Key: N/A

SNS Opens the step sweep number of steps parameter. PARAMETER ENTRY

Syntax: SNS<value><unit>

value: 1 to 10,000
unit: SPS

Remarks: Permits setting the number of steps for the step sweep.

Related Commands: LIS, LGS, SDT, SSP, SWT

Front Panel Key: **Frequency** / Step Sweep / More > / Number of Steps

Output Command: OSS returns the number of steps of the step sweep to the controller.

SOF Opens the frequency offset parameter for the Slave unit. PARAMETER ENTRY

Syntax: SOF<value><unit>

value: frequency range of the MG369XA model
unit: GH, MH, KH, HZ'

Remarks: Permits setting the frequency offset parameter for the Slave unit. The frequency setting is determined by the frequency range of the particular MG369XA model.

NOTE: Use the SOF parameter entry command *only* to set the frequency offset for a Slave unit that is (1) slave to a Master unit that is connected to a 360B VNA in a source or dual-source configuration or (2) slave to a Master unit that is programmed to perform non-sequential frequency step sweeps.

Front Panel Key: **Frequency** / CW / Master Slave > / Slave Freqs... / VNA > / VNA Offset

SPS Steps data terminator DATA TERMINATOR

Syntax: SPS

SP0 Deselects non-equally spaced step sweep. STEP SWEEP

Syntax: SP0

Related Command: SP1

Front Panel Key: N/A

SP1 Selects non-equally spaced step sweep STEP SWEEP

Syntax: SP1

Remarks: Provides for a step sweep that has non-equally spaced steps. It can be used in any of the available sweep modes (F1-F2, F3-F4, Full, F0-ΔF, F1-ΔF, F5-ΔF, and F6-ΔF). The start frequency in the sweep must be equal to the first frequency programmed with the ZL($X_{000-999}$) command. The intermediate steps can be programmed to be any frequency within the range of the programmed sweep.

Related Commands: ZEL(X000-999), ZN, SP0

Front Panel Key: N/A

SQ0 Disables the SRQ generation function. STATUS

Syntax: SQ0

Remarks: This is the default mode.

Front Panel Key: N/A

SQ1 Enables the SRQ generation function. STATUS

Syntax: SQ1

Remarks: This command allow a status reporting function, that is true and enabled, to pull the SRQ line LOW (true) and request service from the controller.

Front Panel Key: N/A

SQD Scan down to the next lower preset CW frequency. CW FREQUENCY

Syntax: SQD

Remarks: Scans down to next lower preset CW frequency and opens the frequency's parameter for data entry.

Front Panel Key: N/A

SQF Scan to the next higher preset CW frequency. CW FREQUENCY

Syntax: SQF

Remarks: Scans to next higher preset CW frequency and opens the frequency's parameter for data entry.

Front Panel Key: N/A

SQU Scan up to the next higher preset CW frequency. CW FREQUENCY

Syntax: SQU

Remarks: Scans up to next higher preset CW frequency and opens the frequency's parameter for data entry.

Front Panel Key: N/A

SSN(M_{1-9}) Saves the current instrument setup to internal setup memory location M. STORED SETUP

Syntax: SSN(M_{1-9})

M_{1-9}: memory locations 1 to 9

Remarks: Saves the current instrument setup to internal setup memory locations 1 to 9.

Related Command: RSN(M_{1-9})

Front Panel Key: **System** / Setups / Save (enter setup number)

SSP Selects linear step sweep. STEP SWEEP

Syntax: SSP

Remarks: Same as LIS.

SSP, by itself, does not provide a swept-frequency output. It only determines that the swept-frequency output will be a linear step sweep. If, on the other hand, a frequency sweep is being output by the instrument when SSP is received, the sweep will become a linear step sweep.

Related Commands: LGS, LIS, MAN, SWP

Front Panel Key: **Frequency** / Step Sweep / More > / Log/Linear – Linear

Example: `SDT 3 MS SNS 100 SPS SSP SF1 AUT` initiates a continuous linear step frequency sweep between F1 and F2. The sweep consists of 100 steps with a dwell-time-per-step of 3 ms.

Output Commands: OSD returns the dwell time of the step sweep (in ms) to the controller.
OSS returns the number of steps of the step sweep to the controller.
OST returns the sweep time value (in ms) to the controller.

SWT Opens the step sweep time parameter. PARAMETER ENTRY

Syntax: SWT<value><unit>

value: 30 ms to 99s
unit: MS, SEC

Remarks: Permits setting the time for the step sweep.

Related Commands: LIS, LGS, SSP

Front Panel Key: **Frequency** / Step Sweep / More > / Sweep Time

Output Command: OST returns the sweep time value (in ms) to the controller.

SYZ Opens the increment/decrement step size parameter. PARAMETER ENTRY

Syntax: SYZ<value>

value: dependent on the open parameter

Remarks: Each MG369XA parameter has an associated step size that can be used to increment or decrement its value. Parameters that have common units share a common step size. For example, the frequency parameters (F0-F9, M0-M9, and ΔF) have a common step size as do the power level parameters (XL0-XL9, L0-L9, and Level Offset). Other parameters , such as analog sweep time, have individual step sizes.

To set the step size for a parameter, first send the command code to open the parameter, then send the SYZ command. Now set the step size by sending a numeric string with the proper terminator. When the terminator is received, the step size is accepted and the original parameter is again open for entry.

Related Commands: UP, DN

Front Panel Key: **System** / Config / Increment > / Frequency Increment ;
System / Config / Increment > / Level Increment ;
System / Config / Increment > / Time Increment

Example: `F1 4 GH SYZ 10 MH UP UP UP` sets the F1 frequency parameter to 4 GHz, sets the step size to 10 MHz, and increments the F1 frequency three times by the value of the step size to 4.03 GHz.

TMS Times data terminator DATA TERMINATOR

Syntax: TMS

TR0 Sets 0 dB of attenuation when RF is switched off. CONFIGURATION

Syntax: TR0

Remarks: Sets 0 dB of attenuation when RF is switched off in units with a step attenuator (Option 2) installed.

If Option 2 is not installed, this command produces a syntax error.

Related Commands: TR1

Front Panel Key: System / Config / RF / More > / Term RF Off

TR1 Sets 40 dB of attenuation when RF is switched off. CONFIGURATION

Syntax: TR1

Remarks: Sets 40 dB of attenuation when RF is switched off in units with a step attenuator (Option 2) installed. This provides a better output source match.

If Option 2 is not installed, this command produces a syntax error.

Related Commands: TR0

Front Panel Key: System / Config / RF / More > / Term RF Off

TRG Triggers a single sweep. STEP SWEEP

Syntax: TRG

Remarks: When single sweep triggering is selected for frequency, power level, or list sweeps, a single sweep starts when the TRG command is received.

Related Commands: EXT, TRS, RSS

Front Panel Key: **Frequency** / Step Sweep / More > / Trigger > / Single / Trigger ; *or*
Frequency / List / Sweep > / Trigger > / Single / Trigger ; *or*
Level / Level Sweep / Trigger > / Single / Trigger

TRS — Triggers a single sweep. STEP SWEEP

Syntax: TRS

Remarks: Same as TRG. When single sweep triggering is selected for frequency, power level, or list sweeps, a single sweep starts when the TRS command is received.

Related Commands: EXT, TRG, RSS

Front Panel Key: Same as TRG

TSS — Advances sweep to the next step in dual step sweep mode. STEP SWEEP

Syntax: TSS

Remarks: The dual step sweep mode provides for generating synchronized, step sweep outputs for two MG369XAs at a frequency offset. When operating in the dual step sweep mode, the command, TSS, steps the sweep to the next point.

Related Command: DU1

Front Panel Key: N/A

TST — Starts an instrument self-test. SELF TEST

Syntax: TST

Remarks: When TST is received, the MG369XA performs a self test then places a "P" (for pass) or a "F" (for fail) on the bus. It also generates six self test results bytes. Extended Status Byte 1 bit 0 is set if self test fails; bit 2 is set when self test is complete.

Front Panel Key: **System** / Selftest

Output Command: OSR returns the six self test results bytes to the controller.

UL0 Inhibits RF Unleveled SRQ generation. STATUS

Syntax: UL0

Remarks: Inhibits an SRQ from being generated when the RF Unleveled bit is set. This is the default mode.

Front Panel Key: N/A

UL1 Enables RF Unleveled SRQ generation. STATUS

Syntax: UL1

Remarks: Enables an SRQ to be generated when Primary Status Byte bit 2 (RF Unleveled) is set and SQ1 has been programmed.

Front Panel Key: N/A

UP Increments the open parameter by the step size. PARAMETER ENTRY

Syntax: UP

Remarks: Each MG369XA parameter has an associated step size that can be used to increment or decrement its value. The command, SYZ, is used to set the step size for a parameter. The commands, UP and DN, can then be used to increment and decrement the parameter by the step size.

In the list sweep mode with manual trigger selected, UP increments the list index by one.

Related Commands: SYZ, DN

Front Panel Key: Use the keys **System** / Increment > to access the increment menu. Frequency Increment sets frequency increment value, Level Increment sets power level increment value, and Time Increment sets time increment value. Increment Mode turns increment mode on. Use the front panel ∧ or ∨ cursor control keys or the rotary data knob to increment or decrement the open parameter by the increment value.

US Microsecond (μs) data terminator DATA TERMNATOR

Syntax: US

VM1 Turns on the video marker mode FREQUENCY MARKER

Syntax: VM1

Remarks: When the video marker mode is turned on, the MG369XA generates a pulse ouput at each marker frequency that can be seen on a CRT display.

Related Commands: MK0, ME1, ME0

Front Panel Key: **Frequency** / Step Sweep / Frequency Control > / Marker List... / Video Markers - On

VT Volts data terminator DATA TERMINATOR

Syntax: VT

XL0 Opens the L0 parameter. PARAMETER ENTRY

Syntax: XL0<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L0 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L0 / Edit L0

Output Command: OL0 returns the L0 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL1 Opens the L1 parameter. PARAMETER ENTRY

Syntax: XL1<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L1 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L1 / Edit L1

Output Command: OL1 returns the L1 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL2 Opens the L2 parameter. PARAMETER ENTRY

Syntax: XL2<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L2 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L2 / Edit L2

Output Command: OL2 returns the L2 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL3 Opens the L3 parameter. PARAMETER ENTRY

Syntax: XL3<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L3 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L3 / Edit L3

Output Command: OL3 returns the L3 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL4 Opens the L4 parameter. PARAMETER ENTRY

Syntax: `XL4<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L4 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L4 / Edit L4

Output Command: OL4 returns the L4 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL5 Opens the L5 parameter. PARAMETER ENTRY

Syntax: `XL5<value><unit>`

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L5 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / L5 / Edit L5

Output Command: OL5 returns the L5 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL6 Opens the L6 parameter. PARAMETER ENTRY

Syntax: XL6<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L6 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L6, then press Edit Selected

Output Command: OL6 returns the L6 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL7 Opens the L7 parameter. PARAMETER ENTRY

Syntax: XL7<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L7 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L7, then press Edit Selected

Output Command: OL7 returns the L7 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL8 Opens the L8 parameter. PARAMETER ENTRY

Syntax: XL8<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L8 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L8, then press Edit Selected

Output Command: OL8 returns the L8 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XL9 Opens the L9 parameter. PARAMETER ENTRY

Syntax: XL9<value><unit>

value: power level range of the MG369XA model
unit: DM (logarithmic), VT (linear)

Remarks: Permits setting the L9 parameter. The power level setting is determined by the power level range of the particular MG369XA model.

Related Commands: LOG, LIN

Front Panel Key: **Level** / Level / Level Control > / Level List... / highlight L9, then press Edit Selected

Output Command: OL9 returns the L9 power level (in dBm when in log mode; in mV when in linear mode) to the controller.

XP Turns on the pulse modulation function. MODULATION

Syntax: XP

Remarks: Turns on the pulse modulation function (Option 13).

If Option 13 is not installed, this command produces a syntax error.

Related Command: EP0, EP1, PO

Front Panel Key: **Modulation** / Pulse / On/Off to On

Y Equivalent to a Group Execute Trigger (GET) GROUP EXECUTE TRIGGER

Syntax: Y

Remarks: Sending a "Y" is equivalent to sending a GET.

Front Panel Key: N/A

ZL($X_{000-999}$) Loads a CW frequency into a table at location X. FAST-FREQUENCY-SWITCHING

Syntax: ZL(X)

X: table location 000 - 999

Remarks: In the fast-frequency-switching mode, up to 1000 frequencies can be loaded into a table using this command. A table pointer can then be set to point to a specific frequency in the table and the MG369XA commanded to switch from that frequency through the following frequencies to the bottom of the table.

Related Commands: ZEL, ZS($X_{000-999}$)

Front Panel Key: N/A

ZEL Ends frequency loading FAST-FREQUENCY-SWITCHING

Syntax: ZEL

Front Panel Key: N/A

ZPN Sets the table pointer to point to location bbbb. FAST-FREQUENCY-SWITCHING

Syntax: ZPN<bbbb>

bbbb: table location of specific frequency

Remarks: The command ZTL enables loading of up to 3202 frequencies into a table in the fast-frequency-switching mode. Using this command the table pointer can then be set to point to a specific frequency in the table and the MG369XA commanded to switch from that frequency through the following frequencies to the bottom of the table.

Front Panel Key: N/A

ZS($X_{000-999}$) Sets the table pointer to point to location X. FAST-FREQUENCY-SWITCHING

Syntax: ZS(X)

X: table location 000 - 999

Remarks: In the fast-frequency-switching mode, up to 1000 frequencies can be loaded into a table. Using this command, the table pointer can then be set to point to a specific frequency in the table and the MG369XA commanded to switch from that frequency through the following frequencies to the bottom of the table.

Related Commands: ZEL, ZL($X_{000-999}$)

Front Panel Key: N/A

ZTL Loads the frequency table starting at location bbbb. FAST-FREQUENCY-SWITCHING

Syntax: ZTL<bbbb><nnnn><D8D8D8.....D8>

bbbb: table location where the frequency points are to start loading
nnnn: number of frequencies to be loaded
D8: frequency of the frequency point

Remarks: In the fast-frequency-switching mode, up to 3202 frequencies can be loaded into a table using this command. A table pointer can then be set to point to a specific frequency in the table and the MG369XA commanded to switch from that frequency through the following frequencies to the bottom of the table.

Both "bbbb" and "nnnn" are 4 binary byte integers and "D8" is 8 binary bytes of an IEEE-754 double precision floating point number. The order of bytes in each field is most significant byte first.

Related Commands: ZPN

Front Panel Key: N/A

Appendix A
GPIB Quick Reference

A-1 INTRODUCTION

This appendix contains quick reference tables of the MG369XA GPIB programming commands sorted by functional categories. For detailed command descriptions and usage examples, refer to the page references listed.

Figure A-1. *Parameter Entry Function Commands (1 of 3)*

Command Code	Function	Page Number
ADD	Opens the GPIB address parameter	2-10, 2-60
CLO	Closes the open parameter	2-10
DN	1. Decrements the open parameter by the step size 2. In list sweep mode with manual trigger selected, decrements the list index by one	2-10, 2-38
DFF	Opens the ΔF parameter (Same as DLF)	2-8
DFM	Opens the ΔF parameter (Same as DLF)	2-8
DLF	Opens the ΔF parameter	2-8
EGI	Opens the Reference Level DAC setting parameter (in external power leveling mode)	2-9, 2-21
F0	Opens the F0 parameter	2-8
F1	Opens the F1 parameter	2-8
F2	Opens the F2 parameter	2-8
F3	Opens the F3 parameter	2-8
F4	Opens the F4 parameter	2-8
F5	Opens the F5 parameter	2-8
F6	Opens the F6 parameter	2-8
F7	Opens the F7 parameter	2-8
F8	Opens the F8 parameter	2-8
F9	Opens the F9 parameter	2-8
FRS	Opens the frequency scaling reference multiplier parameter	2-10, 2-35
LDT	Opens the list sweep dwell time parameter	2-10, 2-38
LOS	Opens the level offset parameter	2-9, 2-21
M0	Opens the M0 parameter	2-8
M1	Opens the M1 parameter	2-8
M2	Opens the M2 parameter	2-8
M3	Opens the M3 parameter	2-8
M4	Opens the M4 parameter	2-8
M5	Opens the M5 parameter	2-8
M6	Opens the M6 parameter	2-8

Table A-1. *Parameter Entry Function Commands (2 of 3)*

Command Code	Function	Page Number
M7	Opens the M7 parameter	2-8
M8	Opens the M8 parameter	2-8
M9	Opens the M9 parameter	2-8
PDT	Opens the power sweep dwell time parameter	2-9, 2-21
PNS	Opens the power sweep number of steps parameter	2-9, 2-21
SDT	Opens the step sweep dwell time parameter	2-9, 2-14
SLDF	Opens the ΔF parameter for the Slave unit	2-9, 2-57
SLF0	Opens the F0 parameter for the Slave unit	2-8, 2-57
SLF1	Opens the F1 parameter for the Slave unit	2-8, 2-57
SLF2	Opens the F2 parameter for the Slave unit	2-8, 2-57
SLF3	Opens the F3 parameter for the Slave unit	2-8, 2-57
SLF4	Opens the F4 parameter for the Slave unit	2-8, 2-57
SLF5	Opens the F5 parameter for the Slave unit	2-8, 2-57
SLF6	Opens the F6 parameter for the Slave unit	2-8, 2-57
SLF7	Opens the F7 parameter for the Slave unit	2-8, 2-57
SLF8	Opens the F8 parameter for the Slave unit	2-8, 2-57
SLF9	Opens the F9 parameter for the Slave unit	2-8, 2-57
SLL1	Opens the main power level parameter (L1) for the Slave unit	2-10, 2-57
SLL2	Opens the alternate sweep power level parameter (L2) for the Slave unit	2-10, 2-57
SLM0	Opens the M0 parameter for the Slave unit	2-9, 2-57
SLM1	Opens the M1 parameter for the Slave unit	2-9, 2-57
SLM2	Opens the M2 parameter for the Slave unit	2-9, 2-57
SLM3	Opens the M3 parameter for the Slave unit	2-9, 2-57
SLM4	Opens the M4 parameter for the Slave unit	2-9, 2-57
SLM5	Opens the M5 parameter for the Slave unit	2-9, 2-57
SLM6	Opens the M6 parameter for the Slave unit	2-9, 2-57
SLM7	Opens the M7 parameter for the Slave unit	2-9, 2-57
SLM8	Opens the M8 parameter for the Slave unit	2-9, 2-57
SLM9	Opens the M9 parameter for the Slave unit	2-9, 2-57
SLV	Opens the main power level parameter (L1) for the Slave unit (Same as SLL1)	2-10, 2-57
SNS	Opens the step sweep number of steps parameter	2-9, 2-14
SWT	Opens the step sweep time parameter	2-9, 2-14
SYZ	Opens the increment/decrement step size parameter	2-12
UP	1. Increment the open parameter by step size 2. In list sweep mode with manual trigger selected, increments the list index by one	2-10 2-38
XL0	Opens the L0 parameter	2-8
XL1	Opens the L1 parameter	2-8

Table A-1. *Parameter Entry Function Commands (3 of 3)*

Command Code	Function	Page Number
XL2	Opens the L2 parameter	2-8
XL3	Opens the L3 parameter	2-8
XL4	Opens the L4 parameter	2-8
XL5	Opens the L5 parameter	2-8
XL6	Opens the L6 parameter	2-8
XL7	Opens the L7 parameter	2-8
XL8	Opens the L8 parameter	2-8
XL9	Opens the L9 parameter	2-8

Table A-2. *Data Entry/Data Terminator Function Commands*

Command Code	Function	Page Number
CLR	Clears data entry	2-10
ADR	GPIB address terminator	2-11, 2-60
DB	dB data terminator	2-11
DM	dBm data terminator	2-11
GH	GHz data terminator	2-11
MH	MHz data terminator	2-11
KH	kHz data terminator	2-11
HZ	Hz data terminator	2-11
SEC	Seconds data terminator	2-11
MS	Milliseconds (ms) data terminator	2-11
US	Microseconds (μs) data terminator	2-11
NS	Nanoseconds (ns) data terminator	2-11
PCT	Percent (%) data terminator	2-11
GV	GHz per volt (GHz/V) data terminator	2-11
MV	MHz per volt (MHz/V) data terminator	2-11
KV	kHz per volt (kHz/V) data terminator	2-11
DV	Decibel/Volt (dB/V) data terminator	2-11
PCV	Percent per volt (%/V) data terminator	2-11
SPS	Steps data terminator	2-11
TMS	Times terminator	2-11
VT	Volts data terminator	2-11

Table A-3. *CW Frequency Function Commands*

Command Code	Function	Page Number
ACW	Activates currently scanned frequency as CW	2-13
CF0	Set CW mode at F0, Opens F0 parameter	2-13
CF1	Set CW mode at F1, Opens F1 parameter	2-13
CF2	Set CW mode at F2, Opens F2 parameter	2-13
CF3	Set CW mode at F3, Opens F3 parameter	2-13
CF4	Set CW mode at F4, Opens F4 parameter	2-13
CF5	Set CW mode at F5, Opens F5 parameter	2-13
CF6	Set CW mode at F6, Opens F6 parameter	2-13
CF7	Set CW mode at F7, Opens F7 parameter	2-13
CF8	Set CW mode at F8, Opens F8 parameter	2-13
CF9	Set CW mode at F9, Opens F9 parameter	2-13
CM0	Set CW mode at M0, Opens M0 parameter	2-13
CM1	Set CW mode at M1, Opens M1 parameter	2-13
CM2	Set CW mode at M2, Opens M2 parameter	2-13
CM3	Set CW mode at M3, Opens M3 parameter	2-13
CM4	Set CW mode at M4, Opens M4 parameter	2-13
CM5	Set CW mode at M5, Opens M5 parameter	2-13
CM6	Set CW mode at M6, Opens M6 parameter	2-13
CM7	Set CW mode at M7, Opens M7 parameter	2-13
CM8	Set CW mode at M8, Opens M8 parameter	2-13
CM9	Set CW mode at M9, Opens M9 parameter	2-13
SQD	Scan down to next lower preset CW frequency	2-13
SQF	Scan to next higher preset CW frequency	2-13
SQU	Scan up to next higher preset CW frequency	2-13

Table A-4. *Step Sweep Function Commands*

Command Code	Function	Page Number
AD1	Selects F1-ΔF alternate step sweep	2-16
AD5	Selects F5-ΔF alternate step sweep	2-16
AD6	Selects F6-ΔF alternate step sweep	2-16
AF1	Selects F1-F2 alternate step sweep	2-16
AF3	Selects F3-F4 alternate step sweep	2-16
AFU	Selects Full Range alternate step sweep	2-16
AUT	Selects Auto sweep trigger	2-16
DF0	Selects the F0-ΔF step sweep mode	2-16
DF1	Selects the F1-ΔF step sweep mode	2-16
DF5	Selects the F5-ΔF step sweep mode	2-16
DF6	Selects the F6-ΔF step sweep mode	2-16
DU0	Deselects Dual Step sweep mode	2-16
DU1	Selects Dual Step sweep mode on	2-16
EXT	Selects single sweep trigger	2-16
FUL	Selects the Full Range step sweep mode	2-16
HWT	Selects external sweep trigger	2-16
LGS	Selects logarithmic step sweep	2-16
LIS	Selects linear step sweep	2-16
MAN	Selects manual (step) sweep	2-16
RSS	Reset a sweep if in progress	2-16
SDT	Opens the step sweep dwell time parameter	2-9
SF1	Selects the F1-F2 step sweep mode	2-16
SF3	Selects the F3-F4 step sweep mode	2-16
SNS	Opens the step sweep number of steps parameter	2-9
SP0	Deselects non-equally spaced step sweep	2-16
SP1	Selects non-equally spaced step sweep	2-16
SSP	Selects step sweep (linear)	2-16
SWT	Opens the step sweep time parameter	2-9
TRG	Triggers a single sweep	2-16
TRS	Triggers a single sweep (Same as TRG)	2-16
TSS	Advances sweep to next step in dual step sweep mode	2-16

Table A-5. *Frequency Markers Function Commands*

Command Code	Function	Page Number
ME0	Disables the marker at the active frequency	2-20
ME1	Enables a marker at the active frequency	2-20
MK0	Turns off markers	2-20
VM1	Turns on the Video marker mode	2-20

Table A-6. *Output Power Leveling Function Commands (1 of 2)*

Command Code	Function	Page Number
AL0	Set alternate sweep RF output level to L0	2-22
AL1	Set alternate sweep RF output level to L1	2-22
AL2	Set alternate sweep RF output level to L2	2-22
AL3	Set alternate sweep RF output level to L3	2-22
AL4	Set alternate sweep RF output level to L4	2-22
AL5	Set alternate sweep RF output level to L5	2-22
AL6	Set alternate sweep RF output level to L6	2-22
AL7	Set alternate sweep RF output level to L7	2-22
AL8	Set alternate sweep RF output level to L8	2-22
AL9	Set alternate sweep RF output level to L9	2-22
AT0	Deselects step attenuator decouple mode	2-24
AT1	Selects step attenuator decouple mode on	2-24
ATT(xx)	Sets step attenuator value to xx (×10 dB) in ALC step attenuator decouple mode. xx is an unsigned integer between 00 and 11.	2-24
DL1	Selects external detector leveling of the output power	2-23
EGI	Opens the Reference Level DAC setting parameter (in external power leveling mode)	2-9
EGO	Output value of the Reference Level DAC setting (in external power leveling mode)	2-23
IL1	Selects internal leveling of the output power	2-23
L0	Sets RF output power level to L0	2-22
L1	Sets RF output power level to L1	2-22
L2	Sets RF output power level to L2	2-22
L3	Sets RF output power level to L3	2-22
L4	Sets RF output power level to L4	2-22
L5	Sets RF output power level to L5	2-22
L6	Sets RF output power level to L6	2-22
L7	Sets RF output power level to L7	2-22
L8	Sets RF output power level to L8	2-22
L9	Sets RF output power level to L9	2-21

Table A-6. *Output Power Leveling Function Commands (2 of 2)*

Command Code	Function	Page Number
LIN	Selects linear power level operation	2-22
LOS	Opens the level offset parameter	2-9
LO0	Turns off the Level Offset function	2-23
LO1	Turns on the Level Offset function	2-23
LOG	Selects logarithmic power level operation	2-22
LSP	Selects the Power Sweep mode	2-23
LV0	Turns off leveling of the output power	2-23
PDT	Opens the power sweep dwell time parameter	2-9
PL1	Selects external power meter leveling of the output power	2-23
PNS	Opens the power sweep number of steps parameter	2-9
RF0	Turns off the RF output	2-22
RF1	Turns on the RF output	2-22

Table A-7. *Pulse Modulation Function Commands*

Command Code	Function	Page Number
EP0	Selects TTL-low to turn RF on during pulse modulation	2-25
EP1	Selects TTL-high to turn RF on during pulse modulation	2-25
P0	Turns off the external pulse modulation function	2-25
XP	Turns on the external pulse modulation function	2-25

Table A-8. *Output Function Commands (1 of 2)*

Command Code	Function	Page Number
∗IDN?	Outputs the instrument identification string	2-25
ODF	Returns the ΔF frequency value (in MHz) to the controller	2-27
OEM	Returns the Extended SRQ Mask bytes (3 binary bytes) to the controller	2-28
OES	Returns all three GPIB status bytes to the controller	2-28
OF0	Returns the F0 frequency value (in MHz) to the controller	2-26
OF1	Returns the F1 frequency value (in MHz) to the controller	2-26
OF2	Returns the F2 frequency value (in MHz) to the controller	2-26
OF3	Returns the F3 frequency value (in MHz) to the controller	2-26
OF4	Returns the F4 frequency value (in MHz) to the controller	2-26
OF5	Returns the F5 frequency value (in MHz) to the controller	2-26
OF6	Returns the F6 frequency value (in MHz) to the controller	2-26
OF7	Returns the F7 frequency value (in MHz) to the controller	2-26
OF8	Returns the F8 frequency value (in MHz) to the controller	2-26
OF9	Returns the F9 frequency value (in MHz) to the controller	2-26
OFH	Returns the high-end frequency value (in MHz) to the controller	2-26
OFL	Returns the low-end frequency value (in MHz) to the controller	2-26
OI	Returns the instrument identification string to the controller	2-25
OL0	Returns the L0 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-26
OL1	Returns the L1 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-26
OL2	Returns the L2 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-27
OL3	Returns the L3 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-27
OL4	Returns the L4 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-27
OL5	Returns the L5 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-27
OL6	Returns the L6 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-27
OL7	Returns the L7 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-27
OL8	Returns the L8 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-27
OL9	Returns the L9 power level value (in dBm when in log mode; in mV when in linear mode) to the controller	2-27
OLO	Returns the Level Offset power level (in dB when in log mode; in mV when in linear mode) to the controller	2-27
OM0	Returns the M0 frequency value (in MHz) to the controller	2-26
OM1	Returns the M1 frequency value (in MHz) to the controller	2-26

Table A-8. *Output Function Commands (2 of 2)*

Command Code	Function	Page Number
OM2	Returns the M2 frequency value (in MHz) to the controller	2-26
OM3	Returns the M3 frequency value (in MHz) to the controller	2-26
OM4	Returns the M4 frequency value (in MHz) to the controller	2-26
OM5	Returns the M5 frequency value (in MHz) to the controller	2-26
OM6	Returns the M6 frequency value (in MHz) to the controller	2-26
OM7	Returns the M7 frequency value (in MHz) to the controller	2-26
OM8	Returns the M8 frequency value (in MHz) to the controller	2-26
OM9	Returns the M9 frequency value (in MHz) to the controller	2-26
OPD	Returns the power sweep dwell time (in ms) to the controller	2-27
OPS	Returns the power sweep number of steps to the controller	2-27
OSB	Returns the Primary Status Byte (1 binary byte) to the controller	2-28
OSD	Returns the step sweep dwell time (in ms) to the controller	2-27
OSE	Returns the last GPIB syntax error to the controller	2-27
OSM	Returns the primary SRQ Mask byte (1 binary byte) to the controller	2-28
OSR	Returns the self-test results (6 binary bytes) to the controller	2-28
OSS	Returns the step sweep number of steps to the controller	2-27
OST	Returns the sweep time value (in ms) to the controller	2-27
OVN	Returns the ROM version number string to the controller	2-27
OWT	Returns the GPIB termination status to the controller; 0 = CR, 1 = CRLF	2-27

Table A-9. *Stored Setup Function Commands*

Command Code	Function	Page Number
RCF	Readies the MG369XA to receive a new instrument setup from the controller	2-28
RCM	Readies the MG369XA to receive a new instrument setup and new stored setups from the controller	2-28
RSN(M_{1-9})	Recalls an instrument setup stored in internal setup memory location M, where M = 1 to 9.	2-28
SAF	Outputs the current instrument setup to the controller	2-28
SAM	Outputs the current instrument setup and all stored setups to the controller	2-28
SM	Recalls the next stored instrument setup in sequence	2-28
SSN(M_{1-9})	Saves the current instrument setup in internal setup memory location M, where M = 1 to 9	2-28

Table A-10. *Service Request and Status Byte Function Commands*

Command Code	Function	Page Number
CSB	Clears all GPIB status bytes	2-33
EL0	Inhibits updating of the ESB2 bit 4 (RF Unlocked)	2-33
EL1	Enables updating of the ESB2 bit 4 (RF Unlocked)	2-33
ES0	Inhibits End-of-Sweep SRQ generation	2-32
ES1	Enables End-of-Sweep SRQ generation	2-32
FB0	Inhibits Extended Status Byte 1 SRQ generation	2-32
FB1	Enables Extended Status Byte 1 SRQ generation	2-32
II0	Enables updating of the ESB2 bit 7 (Parameter Changed)	2-33
II1	Inhibits updating of the ESB2 bit 7 (Parameter Changed)	2-33
LA0	Inhibits updating of ESB1 bit 7 (RF Leveled)	2-33
LA1	Enables updating of ESB1 bit 7 (RF Leveled)	2-33
LE0	Inhibits Lock Error SRQ generation	2-32
LE1	Enables Lock Error SRQ generation	2-32
LS0	Inhibits updating of the ESB1 bit 3 (RF Locked)	2-33
LS1	Enables updating of the ESB1 bit 3 (RF Locked)	2-33
MB0	Sets the enable mask byte for the Primary Status Byte	2-32
MB1	Sets the enable mask byte for Extended Status Byte 1	2-32
MB2	Sets the enable mask byte for Extended Status Byte 2	2-32
PE0	Inhibits Parameter Range Error SRQ generation	2-32
PE1	Enables Parameter Range Error SRQ generation	2-32
SB0	Inhibits Extended Status Byte 2 SRQ generation	2-32
SB1	Enables Extended Status Byte 2 SRQ generation	2-32
SE0	Inhibits Syntax Error SRQ generation	2-33
SE1	Enables Syntax Error SRQ generation	2-33
SQ0	Disables the SRQ generation function	2-33
SQ1	Enables the SRQ generation function	2-33
UL0	Inhibits RF Unleveled SRQ generation	2-33
UL1	Enables RF Unleveled SRQ generation	2-33

Table A-11. *Configuration Function Commands*

Command Code	Function	Page Number
BPN	Selects –5V for retrace and bandswitch blanking outputs	2-35
BPP	Selects +5V for retrace and bandswitch blanking outputs	2-35
FRS	Opens the frequency scaling reference multiplier parameter	2-35
PPO	Selects normally-open contacts on the pen lift relay	2-35
PPC	Selects normally-closed contacts on the pen lift relay	2-35
RC0	Selects RF off during frequency switching in CW, step sweep, and list sweep modes	2-35
RC1	Selects RF on during frequency switching in CW, step sweep, and list sweep modes	2-35
RO0	Selects RF to be on at reset.	2-35
RO1	Selects RF to be off at reset.	2-35
RT0	Selects RF to be off during retrace	2-35
RT1	Selects RF to be on during retrace	2-35
TR0	Sets 0 dB of attenuation when RF is switched off in units with a step attenuator (Option 2) installed.	2-35
TR1	Sets 40 dB (minimum) of attenuation when RF is switched off in units with a step attenuator (Option 2) installed.	2-35

Table A-12. *Group Execute Trigger (GET) Function Commands*

Command Code	Function	Page Number
GTC	Scans to the next higher preset CW frequency on a GET (Executes a “SQF” command)	2-37
GTD	Steps the open parameter down by the step size on a GET (Executes a “DN” command)	2-37
GTF	Executes a Fast-frequency-switching step on a GET (See “ZL, ZEL” commands)	2-37
GTL	Steps to the next point in a dual step sweep mode on a GET (Executes a “TSS” command)	2-37
GTO	Disables the GET functions	2-37
GTS	Triggers a single sweep on a GET (Executes a “TRS” command	2-37
GTT	Executes a complete CW generator self test on a GET (Executes a “TST” command)	2-37
GTU	Steps the open parameter up by the setp size on a GET (Executes an “UP” command)	2-37
Y	Equivalent to a Group Excute Trigger (GET)	2-37

Table A-13. *List Sweep Function Commands*

Command Code	Function	Page Number
AUT	Selects Auto sweep trigger	2-38
CTL	Copy current CW frequency and power level to current list index	2-38
DN	Decrements the list index by one (*only* in Manual Trigger mode)	2-38
ELI(xxxx)	Sets list index to xxxx, where xxxx = 4-digit integer between 0000 and 1999	2-38
ELN(x)	Sets list number to x, where x = 1-digit integer between 0 and 3	2-38
EXT	Selects single sweep trigger	2-38
HWT	Selects external sweep trigger	2-38
LDT	Opens the list sweep dwell time parameter	2-10
LEA	Learn list	2-38
LF	Sets list frequencies starting at the list index	2-38
LIB(xxxx)	Sets the list start index to xxxx, where xxxx = 4-digit integer between 0000 and 1999	2-38
LIE(xxxx)	Sets the list stop index to xxxx, where xxxx = 4-digit integer between 0000 and 1999	2-38
LP	Sets list power levels starting at the list index	2-38
MNT	Selects manual trigger	2-38
TRG	Triggers a single sweep (*only* in Single Trigger mode)	2-38
UP	Increments the list index by one (*only* in Manual Trigger mode)	2-38

Table A-14. *Fast-Frequency-Switching Function Commands*

Command Code	Function	Page Number
ZL($X_{000-999}$)	Loads a CW frequency into the stack at location X (fast-frequency-switching mode)	2-42
ZEL	Ends frequency loading (fast-frequency-switching mode)	2-42
ZPN	Sets the table pointer to point to location bbbb (fast-frequency-switching mode)	2-42
ZS($X_{000-999}$)	Sets the stack pointer to point to location X (fast-frequency-switching mode)	2-42
ZTL	Loads the frequency table starting at location bbbb (fast-frequency-switching mode)	2-42

Table A-15. *Power-Offset-Table Function Commands*

Command Code	Function	Page Number
PT0	Disables the Power Offset Table	2-46
PT1	Enables the Power Offset Table	2-46
PTC	Changes a Power Offset Table entry	2-46
PTL	Loads a Power Offset Table	2-46

Table A-16. *User Level Calibration Function Commands*

Command Code	Function	Page Number
LU0	Turns off the active user level calibration table	2-49
LU1	Activates user level calibration table #1	2-49
LU2	Activates user level calibration table #2	2-49
LU3	Activates user level calibration table #3	2-49
LUR	Readies the 690XXB to receive five tables of user level calibration data from the controller.	2-48
LUS	Sends all five tables of user level calibration data to the controller.	2-48
LU4	Activates user level calibration table #4	2-49
LU5	Activates user level calibration table #5	2-49

Table A-17. *Self Test Function Command*

Command Code	Function	Page Number
TST	Starts an instrument self-test	2-58

Table A-18. *Miscellaneous Function Commands*

Command Code	Function	Page Number
ADD	Opens the GPIB address parameter	2-60
CSO	Turns off the CW ramp	2-60
CS1	Turns on the CW ramp	2-60
DS0	Turns on the secure mode (Blanks the front panel display of Frequency and Power Level parameters)	2-60
DS1	Turns off the secure mode and restores front panel display of all parameters	2-60
RL	Returns the instrument to local control	2-60
RST	Resets the instrument to its default settings	2-60
SNR	Enter the instrument serial number (SNRnnnnnnX)	2-60

Table A-19. *Master-Slave Operation Function Commands*

Command Code	Function	Page Number
S0	Turns off the Master-Slave mode of operation	2-56
S1	Turns on the Master-Slave mode of operation	2-56
SLDF	Opens the ΔF parameter for the Slave unit	2-9
SLF0	Opens the F0 parameter for the Slave unit	2-8
SLF1	Opens the F1 parameter for the Slave unit	2-8
SLF2	Opens the F2 parameter for the Slave unit	2-8
SLF3	Opens the F3 parameter for the Slave unit	2-8
SLF4	Opens the F4 parameter for the Slave unit	2-8
SLF5	Opens the F5 parameter for the Slave unit	2-8
SLF6	Opens the F6 parameter for the Slave unit	2-8
SLF7	Opens the F7 parameter for the Slave unit	2-8
SLF8	Opens the F8 parameter for the Slave unit	2-8
SLF9	Opens the F9 parameter for the Slave unit	2-8
SLL1	Opens the main power level parameter (L1) for the Slave unit	2-10
SLL2	Opens the alternate sweep power level parameter (L2) for the Slave unit	2-10
SLM0	Opens the M0 parameter for the Slave unit	2-9
SLM1	Opens the M1 parameter for the Slave unit	2-9
SLM2	Opens the M2 parameter for the Slave unit	2-9
SLM3	Opens the M3 parameter for the Slave unit	2-9
SLM4	Opens the M4 parameter for the Slave unit	2-9
SLM5	Opens the M5 parameter for the Slave unit	2-9
SLM6	Opens the M6 parameter for the Slave unit	2-9
SLM7	Opens the M7 parameter for the Slave unit	2-9
SLM8	Opens the M8 parameter for the Slave unit	2-9
SLM9	Opens the M9 parameter for the Slave unit	2-9
SLV	Opens the main power level parameter (L1) for the Slave unit (Same as SLL1)	2-10