Programmer Manual

Tektronix

PRELIMINARY
AM700
Audio Measurement Set

070-9001-00

This document is for firmware version 1.00

First Printing: October 1994

WARRANTY

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Safety Summary

Please take a moment to review these safety precautions. They are provided for your protection and to prevent damage to the monitor. This safety information applies to all operators.

Symbols and Terms

These two terms appear in manuals:

- CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.
- WARNING statements identify conditions or practices that could result in personal injury or loss of life.

These two terms appear on equipment:

- *CAUTION* indicates a personal injury hazard not immediately accessible as one reads the marking or a hazard to property including the equipment itself.
- *DANGER* indicates a personal injury hazard immediately accessible as one reads the marking.

This symbol appears in manuals:

Static-Sensitive
Devices

These symbols appear on equipment:

DANGER High Voltage	Protective ground (earth) terminal	ATTENTION Refer to manual

Specific Precautions

Power Source

This product is intended to operate from a power source that will not apply more than 250 V_{rms} between the supply conductors or between either supply conductor and ground. A protective ground connection, through the grounding conductor in the power cord, is essential for safe system operation.

Grounding the Product

This monitor is grounded through the power cord. To avoid electric shock, plug the power cord into a properly wired receptacle where earth ground has been verified by a qualified service person. Do this before making connections to the input or output terminals of the monitor.

Without the protective ground connection, all parts of the monitor are potential shock hazards. This includes knobs and controls that may appear to be insulators.

Use the Proper Power Cord

Use only the power cord and connector specified for your product. Use only a power cord that is in good condition.

Use the Proper Fuse

To avoid fire hazard, use only the fuse specified in the parts list for your product, matched by type, voltage rating, and current rating.

Do Not Operate Without a Cabinet

To avoid personal injury, do not operate the instrument unless it is properly installed in a cabinet or rack adapter, such as those listed in the Accessories Section. When power is supplied to the monitor, line voltage will be present in the instrument, even when the POWER switch is set to STANDBY.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere.

Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

1 GPIB and RS–232C I/O

Section 1
GPIB and RS-232C I/O

Remote Operation

The AM700 has very complete and flexible remote control capabilities via its GPIB interface.

Accessories for Remote Control

- GPIB Cable: double shielded in various lengths (user supplied)
- Preliminary Programmer Manual
- Preliminary Programmer Quick Reference

Control Protocol

The AM700 uses SCPI-1994 as its primary control protocol. SCPI (Standard Commands for Programmable Instruments) is an emerging standard promoted by a consortium of test and measurement equipment vendors, including Tektronix. The intent of SCPI is to provide a consistent and standard command language for all test and measurement equipment. SCPI is layered on top of IEEE 488.2, and contains several 488.2 commands and status structures.

Remote control of the AM700 makes it possible to do most of the user interface operations available via the front panel, plus several things that come with a protocol such as SCPI. These other things are:

1. Immediately place an application in a certain state.
2. Query internal data points not directly accessible to a user at the front panel.
3. Place prompting messages on the screen and query for key presses for interactive procedures.
4. Set up timed functions.

The programming language for functions is Tcl. The Tcl commands permit a programmer to build conditional tests and create their own functions. The Tcl interpreter in the AM700 allows imbedding SCPI commands in a function program using the “scpi” Tcl command. The parser directs the SCPI commands appropriately. The Tcl command language is documented in *Part I: The Tcl Language* of the book *Tcl and the Tk Toolkit*, by John K. Ousterhout: Addison-Wesley Publishing Company, 1994.

Control Ports

The instrument may be controlled from the following sources:

1. The user operating the front panel keys, touch panel, and, for certain operations, an external keyboard.
2. The GPIB port; a standard IEEE–488.2 interface.

Though it is not advised, whenever it is not explicitly disabled as part of the protocol it is possible to control the instrument via both the front panel and the GPIB interface port at the same time.

GPIB Interface Information

In normal GPIB remote operation the AM700 is controlled via an external instrument controller. The only time the AM700 will attempt to take control of the GPIB is when a hardcopy is requested from the front panel with the print port configured to 'GPIB'.

IEEE 488.1 Interface Functions. The GPIB interface function set implemented in the AM700 GPIB interface and the capability level is given in Table 2-1.

Table 2-1: IEEE 488.1 Interface Functions Implemented in the AM700.

Function	Implemented	Notes
Source Handshake	SH1	Complete capability
Acceptor Handshake	AH1	Complete capability
Talker	T6	Basic Talker, Serial Poll, Unaddr if MLA
Talker (extended)	TE0	No capability
Listener	L4	Basic Listener, Unaddr if MTA
Listener (extended)	LE0	No capability
Service Request	SR1	Complete capability
Remote Local	RL0	No local lock out

Table 2-1: IEEE 488.1 Interface Functions Implemented in the AM700. (Cont.)

Function	Implemented	Notes
Parallel Poll	PP0	No capability
Device Clear	DC1	Complete capability
Device Trigger	DT0	No capability
Controller	C0	No capability
Electrical Interface	E2	Three-state bus drivers

IEEE 488.2 Commands

Complete details of IEEE 488.2 commands and operation are found in IEEE STD 488.2-1992, *IEEE Standard Codes, Formats, Protocols, and Common Commands.* A brief summary of those implemented in the AM700 is given in the following tables.

Table 2-2: IEEE 488.2 Status Reporting Commands

Command	Name	Function
*CLS	Clear Status Command	Clears status data structures and forces the device to the Operation Completed Command Idle State and the Operation Complete Query Idle State.
*ESE NRf	Standard Event Status Enable Command	Sets the Standard Event Status Enable Register bits.
*ESE?	Standard Event Status Enable Query	Queries the contents of the Standard Event Status Enable Register.
*ESR?	Standard Event Status Register Query	Queries the contents of the Standard Event Status Register. Reading the register clears it.
*SRE NRf	Service Request Enable Command	Sets the Service Request Enable Register bits.

Table 2-2: IEEE 488.2 Status Reporting Commands (Cont.)

Command	Name	Function
*SRE?	Service Request Enable Query	Queries the Service Request Enable Register. Returns an NR1 that is the value of the service request enable register.
*STB?	Read Status Byte Query	Queries the status byte. Returns an NR1 that is the value of the status byte and the master summary message.

Table 2-3: Internal Operation Commands

Command	Name	Function
*IDN?	Identification Query	Queries the id of the AM700.
*RST	Reset Command	Does a AM700 reset.
*TST?	Self-Test Query	This is currently a “NO-OP” It is effect just tests the remote connectivity and does not change the operating state of the AM700.

Table 2-4: Synchronization Commands

Command	Name	Function
*OPC	Operation Complete Command	Causes the AM700 to Generate the operation complete message in the Standard Event Status Register when all pending selected device operations have been finished.
*OPC?	Operation Complete Query	Places an ASCII “1” in the AM700’s output queue when all pending selected device operations have been finished.
*WAI	Wait-to-Continue Command	Prevents the AM700 from executing further commands or queries until the no-operation-pending flag is TRUE.

RS-232C Interface Information

The COM1 and COM2 ports may be configured as serial RS-232C DTE ports. These are DB-9 male connectors. The Serial Interface parameters given in Table 2-5 are user selectable using menu control. If you are connecting the port to another terminal, you will need a null modem connector to make the appropriate connections. A user-supplied printer cable is needed to make the connection between the AM700 and the user's printer.

Table 2-5: Serial Port Protocol

Capabilities	Description
Serial Ports	
COM1 and COM2	RS-232C
Connector	DB-9, male. Configured as DTE ports.
Serial Interface Parameters	
RS-232C	
Baud Rate	User selectable: 300, 600, 1200, 2400, and 9600, 19,200, and 38,400.
Flow Control	XON/XOFF, CTS/RTS, and None.
Signal Bits	7 or 8
Stop Bits	1 or 2
Parity	Odd, Even, and None

Rear Panel I/O Connectors

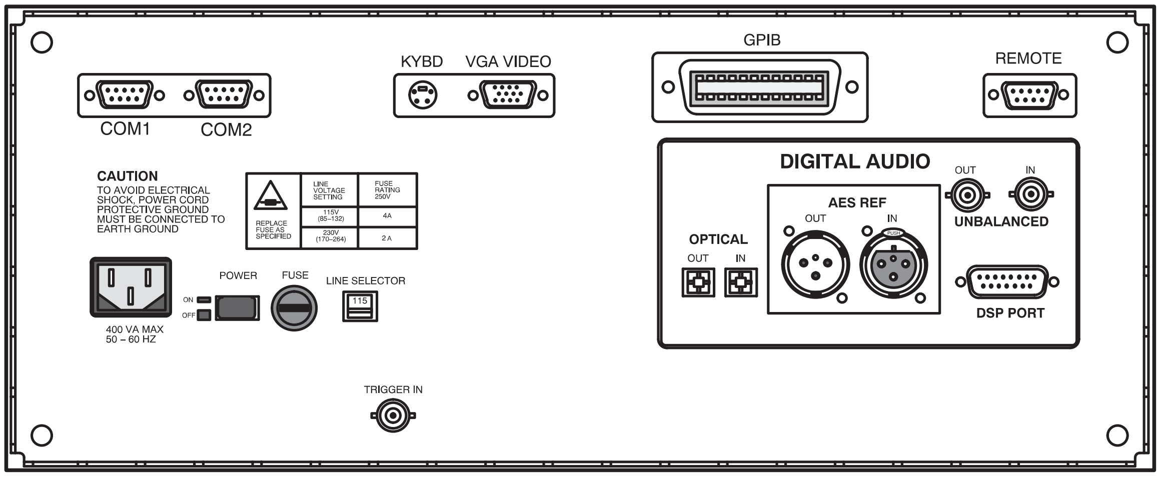


Figure 2-1: AM700 Rear Panel

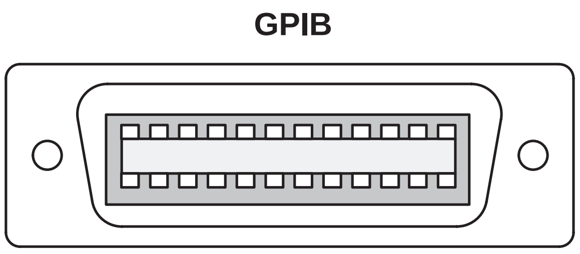


Figure 2-2: GPIB Connector

GPIB. The GPIB connector (shown in Figure 2-2) provides a remote control interface to the AM700. It is a standard IEEE 488 parallel GPIB connector. One- and two-meter, double-shielded GPIB cables are available as optional accessories (see the User Manual).

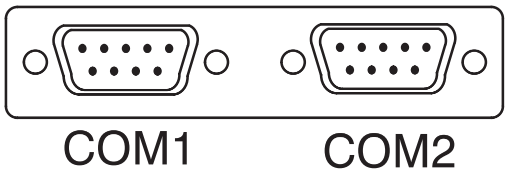
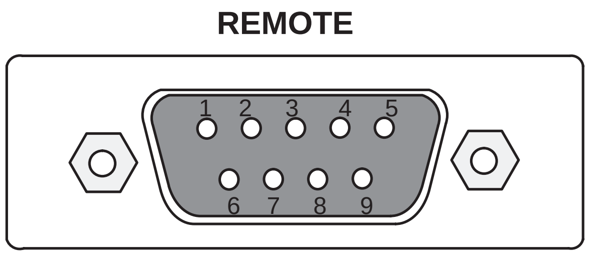


Figure 2-3: COM1 and COM2 Serial Ports

COM1, COM2. These two male DB-9 connectors (shown in Figure 2-3) provide the interface for RS-232C serial output as DTE ports. These connectors support RS-232C printer output.

REMOTE Connector. The Remote connector (shown in Figure 2-4) provides a user interface for contact-closure remote control. The AM700 may use this port to control external devices that are actuated via a contact-closure. The TTL-Level input may be used with external contact-closure relay or switch to initiate an action for the AM700. A possible use of this feature is to use a foot switch to signal the AM700 in a running function for production line testing. This type of operation leaves the operator's hands free to make connections to the equipment under test and operate the AM700 making the measurements without having to have immediate access to the front panel of the AM700. A function program has to be written with the appropriate commands to make use of the remote connector for the operation just described.



DB-9 FEMALE REMOTE CONNECTOR

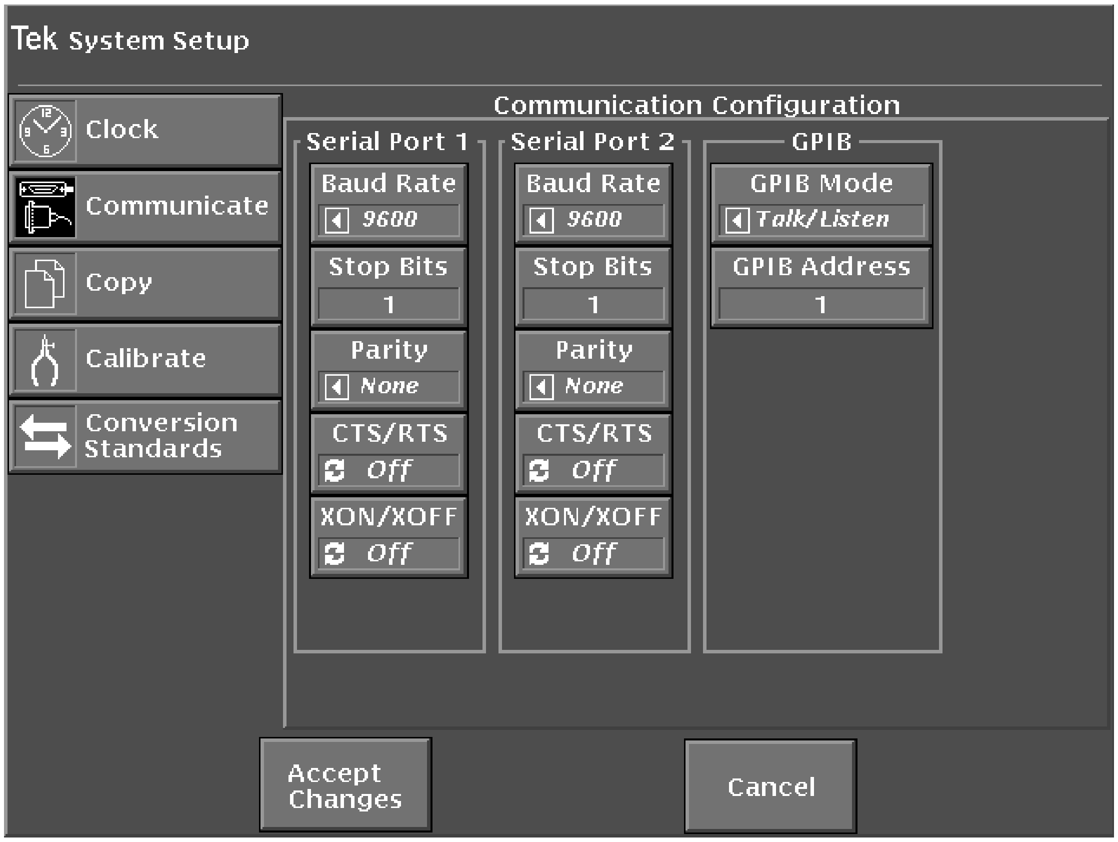
Pin 1	TTL-Level Input
Pins 2, 4, 6, 8	Ground
Pin 3 to Pin 9	Normally Open
Pin 5 to Pin 9	Normally Closed
Pin 7	+5 V Output @ 5 mA

Figure 2-4: Remote Contact-closure Connector

Table 2-6: Remote Connector Pins

Remote Connector	
Control Type	Contact Closure
Connector	DB-9, female
Pin 1, TTL Level Input	0 to +5V, $\leq$ 100 mA. Input is protected. Use the +5 V output of pin 7 to drive this input via an external contact-closure relay. The state of the TTL input (HIGH or LOW) can be read and used as an external trigger input.
Pins 2, 4, 6, and 8	Ground
Pin 3 to Pin 9, Contact Clo- sure	Normally open. Maximum voltage: 220 VDC; Maximum current: 2 A; Maximum power: 60 W. The state of the contact-closure relay (open or closed) is settable from a function key and using SCPI remote control.
Pin 5 to Pin 9	Reserved, normally-closed contact
Pin 7, +5 V Output	+5 V @ 5 mA. This output is provided to drive the TTL-Level input through an external contact-closure relay.

System Communication



Communication Configuration

Serial Port 1
Baud Rate 9600
Stop Bits 1
Parity None
CTS/RTS Off
XON/XOFF Off

Serial Port 2
Baud Rate 9600
Stop Bits 1
Parity None
CTS/RTS Off
XON/XOFF Off

GPIB
GPIB Mode Talk/Listen
GPIB Address 1

Figure 2-5: Configure System Setup Communicate Menu

The Communication selections shown in Figure 2-5 provide the choices needed to define the serial communications parameters for serial ports COM1 and COM2, and setting the GPIB communications mode and the GPIB address. The conventional choices in serial communications of Baud rate, stop bits, parity, hardware handshaking, and software handshaking for RS-232 are provided. With the first release, the serial ports are unidirectional, output only, for support of serial printers.

GPIB choices permit you to select the mode of operation and the GPIB address of the AM700. GPIB modes of operation are Talk/Listen, Hardcopy, and Off Bus. Talk/Listen mode is used for remote control of the AM700 via the GPIB port. Hardcopy is the talk only mode and is used to output screens and data to a GPIB printer. Off Bus turns of the GPIB interface, and the AM700 will not communicate with any other device on the bus.

Connecting Printers

This topic discusses connecting an EPSON LQ, Apple LaserWriter, HP LaserJet, DeskJet, or ThinkJet, or generic ASCII printer to the AM700.

Connecting an EPSON LQ Printer

The default configuration is set for use with the EPSON LQ letter quality printer with serial interface C 823051. The default configuration of the EPSON LQ printer is adequate for use with the AM700. Refer to the user’s manual for your printer for information on any changes you might wish to made to the printer setup.

With the AM700 and printer power off, connect the serial printer cable from the 25-pin DB-25 female connector on the printer’s rear panel to COM2 on the back of the AM700 (a 9-pin DB-9 male connector). If you have not changed the factory default values, all you need to do now is turn on the AM700 and the printer. If you have changed some factory default values, be sure the values shown in the following example are set.

Making Your Own LQ Cable. If the correct printer cable is not readily available, one can be easily constructed. A male 25-pin DB-25 connector, a female DB-9 connector, and an appropriate length of four-conductor cable are the materials needed for the cable. Table 2-7 lists the wiring connections for making a cable to use with an Epson LQ printer.

Table 2-7: Epson LQ Cable Connections

Male DB-25 Connector Pin Number (Epson LQ end)	Female DB-9 Connector Pin Number (AM700 end)
1 (shield ground)	shield ground
3 (RXD)	3 (TXD)
20 (DTR)	8 (CTS)
7 (signal ground)	5 (signal ground)

Connecting an Apple LaserWriter

Note the following when connecting an Apple LaserWriter to a AM700 serial port:

Setting Up The AM700. Set the selected port's Baud Rate to 9600, Flow Control to XON/XOFF, Character Size to 8, Reset Character to Ctrl-D, and Carrier Detect to Disabled.

Setting Up The LaserWriter. Set the rear panel switch to the 9600 position.

The cable connecting the AM700 and the LaserWriter should be wired as described in Table 2-8. The cable must have a female DB-9 connector on the AM700 end and a male DB-25 connector on the LaserWriter end.

Table 2-8: Apple LaserWriter Connections

Male DB-25 Connector Pin Number (Apple LaserWriter end)	Female DB-9 Connector Pin Number (AM700 end)
1 (shield GND)	shield GND
3 (RXD)	3 (TXD)
2 (TXD)	2 (RXD)
5 (CTS)	7 (RTS)
4 (RTS)	8 (CTS)
7 (signal GND)	5 (signal GND)

Connecting an HP LaserJet, DeskJet, or ThinkJet

Setting up the AM700. In Configure menus under System Setup Copy set the Copy Format to HP printer type. Select the output port from the Copy Destination choices.

Setting up the port for communications is done in the Configure menus under the System Setup Communicate choices, shown in Figure 2-5. For the selected port, set the Baud Rate to any value from 300 to 19200, set Protocol to None, Flow Control to XON/XOFF, Reset Character to None, Parity to None, Character Size to 8, and Carrier Detect to Disabled.

Setting up the HP LaserJet, DeskJet, or ThinkJet. Set the baud rate to the same as the AM700.

Making Your Own LaserJet Cable

Table 2-9 lists the wiring connections for making a cable to use with an HP LaserJet printer.

Table 2-9: HP LaserJet Cable Connections

Male DB-25 Connector Pin Number (HP LaserJet end)	Female DB-9 Connector Pin Number (AM700 end)
1 (shield ground)	shield ground
3 (RxD)	3 (TXD)
2 (TxD)	2 (RXD)
7 (signal ground)	5 (signal ground)
5 (CTS), 6 (DSR), and 8 (DCD)	4 (DTR)
20 (DTR)	8 (CTS), 6 (DSR), and 1 (DCD)

Connecting an ASCII Printer

The AM700 can also be configured to operate with a generic ASCII printer. A generic ASCII printer is assumed to only print text; graphic functions are not supported.

Hardcopy Output

Hard copies of data, screens, files, limits, and other data outputs of the AM700 will be available on printers or plotters connected to RS-232C or GPIB ports.

Pressing the Copy button sends a copy of the display in the selected format to the print spooler (temporary memory space) where it is queued for printing. The LED in the Copy button flashes as long as the copy remains in the spooler.

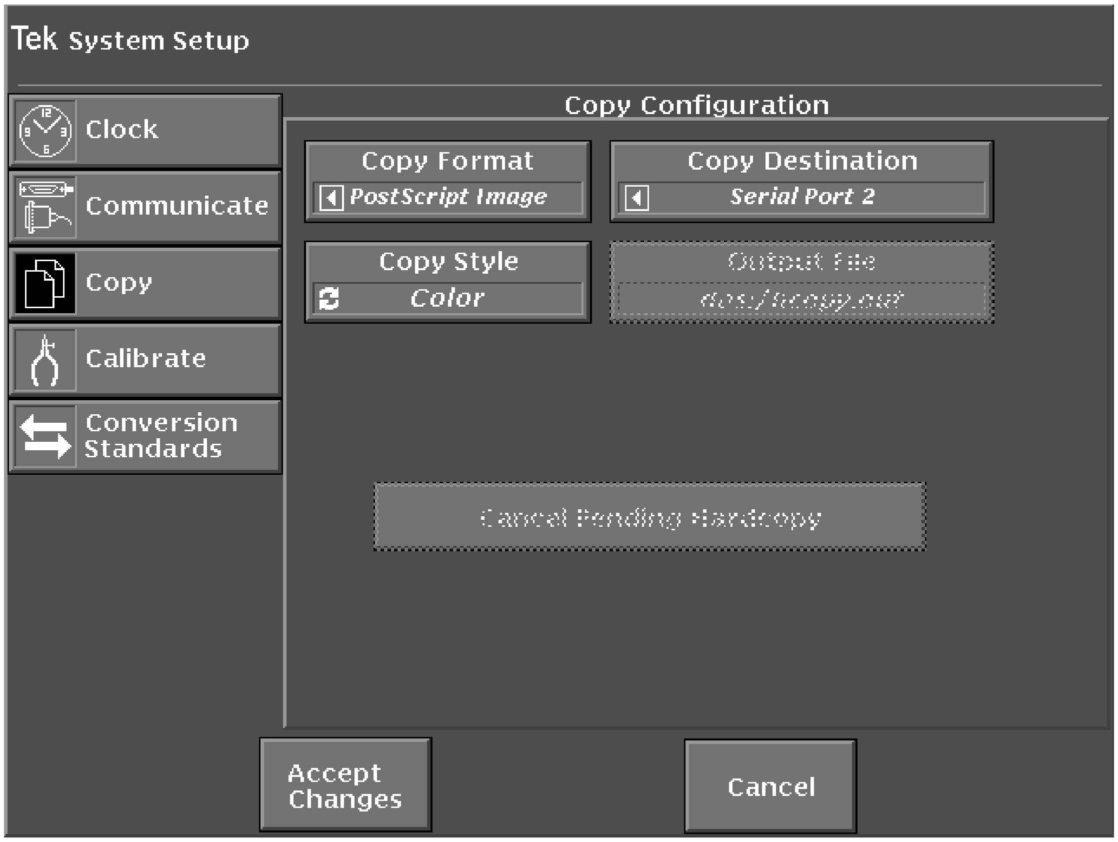
To select the output format for a copy, you must use the menu selections for Copy found in the Configure menu under System Setup. Press and hold the Copy button to display the Copy Configuration screen (see Figure 2-6).

NOTE: *Pressing and holding the Copy button immediately brings up the Configure menu, with the System Setup choices for Copy displayed. This is the same screen that is displayed by pressing the Configure button, then System Setup.*

In this screen you may set the following copy functions:

- Copy output format
- Copy destination
- File name when File is the selected copy destination

After setting copy options, touch the Accept Changes soft key to save your selections, exit the Copy Configuration screen, and return to the measurement display.



Copy Format: PostScript Image

Copy Destination: Serial Port 2

Copy Style: Color

Output File: dos:/hccopy.out

Figure 2-6: The Copy Configuration Menu

To delete all copies from the spooler, press and hold the copy button to display the Copy Configuration menu. Touch the Cancel Pending Hardcopy soft key to delete all the spooled hard copies.

Screen dumps print when you press the Copy button. The image currently on the screen is printed. Graphic displays are printed only when the printer port is formatted for a graphics printer.

Copy Formats

The AM700 supports the following printer and hard-copy types:

PostScript Image

HP DeskJet

Epson (24 pin)

Tag Image File Format (TIFF)

Interleaf Image

When the Copy Format is either PostScript or TIFF the Copy Style may be set to Color.

Copy Destination

Printouts are spooled to the currently selected printer port, which may be one of the following:

GPIB

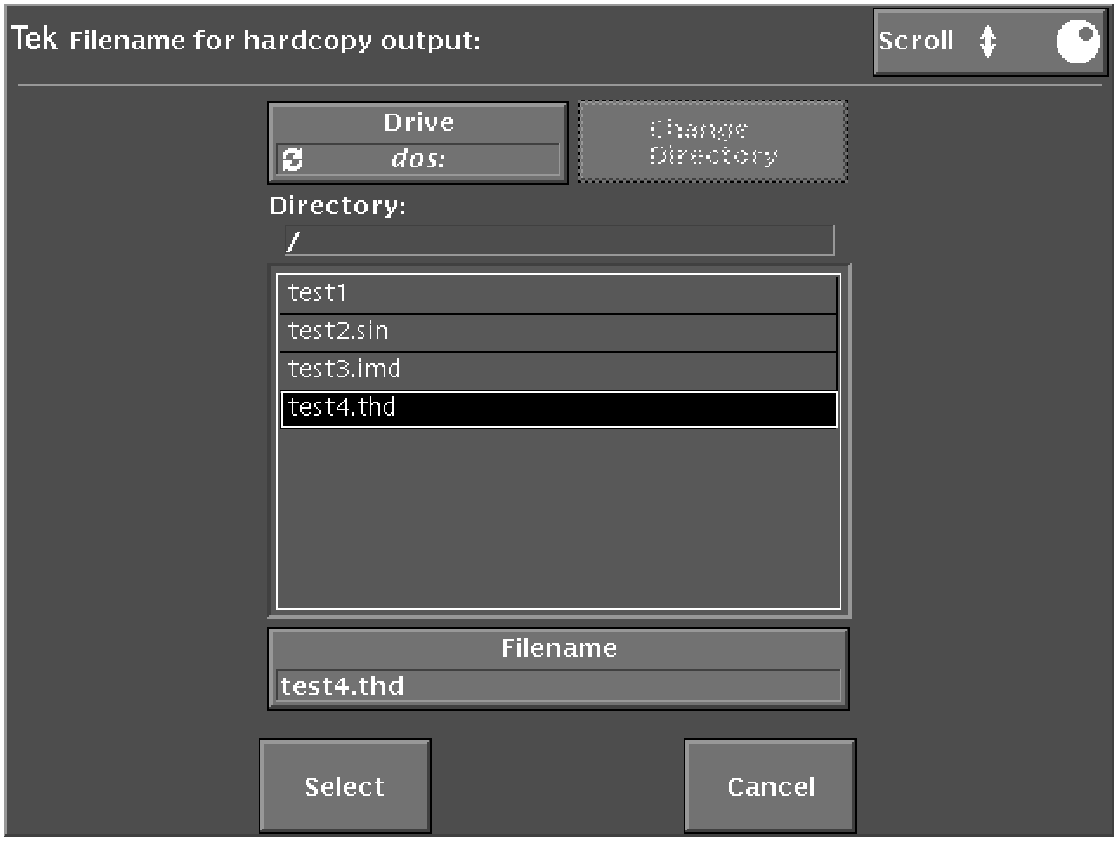
COM 0 or COM 1 (RS-232)

File on floppy disk

File in internal nonvolatile file system

None (This choice disables hard copy output.)

When the Copy Destination is set to File, the Output File selection is active. This choice brings up a file browser, shown in Figure 2-7, to let you select or name the output file name for the hard copy. You may name a file by touching the Filename soft key. This displays a keyboard to type in the new file name. Hard copy files may be sent directly to the floppy disk for later printing. A limited number of screen dumps may be stored in NVRAM for later transfer to a floppy disk. The available memory in the internal NVRAM of the AM700 depends on how much of the memory is used for other user files.



test1
test2.sin
test3.imd
test4.thd

Filename: test4.thd

Figure 2-7: Hard Copy Output File Selector

Copy Styles

This controls the choice of the color output for PostScript and TIFF formatted files. When set to Color, printer output will be color formatted. If a copy format other than PostScript or TIFF is used, the Color state is ignored, and the file is output as monochrome (gray scale) only.

2 SCPI Conformance Information

Section 2
SCPI Conformance Information

The AM700 commands are based on SCPI VERSION 1994.0

SCPI Command Subsystems Implemented in the AM700

Table 3-1: SCPI Subsystems Implemented in the AM700

Subsystem	Use in the AM700
CALCulate	Averaging and FFT parameters
CALIBration	Calibration start and Conversion Factors
DISPlay	Selection and presentation styles for data and controlling the view windows and cursors
FORMat	Sets program names to either character or string data types.
HCOPy	Formatting and output of screen dumps.
INPut	Selection of input parameters
INSTrument	Selection of Application
MMEMory	AM700 memory commands
OUTPut	Selection of output parameters
PROGram	Control of the function programs
ROUTe	Selection of input routing
SENSe	Selection of input processing
SOURce	Selection of generator
STATus	Setting and querying the AM700 status registers
SYSTem	Control of the communication parameters, hardcopy operation, setting the clock
TRACe	Querying the displayed traces for name, number of points, and trace data

Table 3-1: SCPI Subsystems Implemented in the AM700 (Cont.)

Subsystem	Use in the AM700
TRIGger	Starting and stopping the sweep
UNIT	Selection of units for input or output of certain parameters. Trace data does not follow units.

Table 3-2: New Command Subsystems Implemented in the AM700

Subsystem	Use in the AM700
AMEasurement	Controls the measurement setups for Audio Analyzer, FFT Analyzer, Digital Interface Tester, and the Audio Monitor.
CMODe	Controls selection of modes within an application
CSTReam	Directs the two measurement channels into the CALC blocks.
GCONtrol	Controls the Audio Generator

SCPI Background Information

Reference: *Standard Command for Programmable Instruments, SCPI 1994.*

Instruments that conform to the 1993 SCPI standard will be able to meet the requirements of *IEEE Std. 488.1-1987 Standard Digital Interface for Programmable Instrumentation* and *IEEE Std. 488.2-1987 Codes, Formats and Common Commands For Use With IEEE Std. 488.1-1987*. Conformance to the standards just mentioned is not required in recognition that some instruments use hardware interfaces other than IEEE 488.1-1987, but SCPI is based on the concepts and terminology used by those standards.

SCPI Goal

SCPI is not a programming language, it is a standard definition for instrument commands, parameters, data, and status. SCPI is intended to reduce the program development time for programmable Automatic Test Equipment. This is accomplished by providing a consistent programming environment for instrument control and data usage. Program messages, instrument responses, and data formats across all conforming SCPI instruments is defined to be common.

SCPI program commands and parameters are sent from a controller to a SCPI instrument using IEEE 488.1, VXIbus, RS-232C, or any other recognized interface. SCPI is layered on top of the hardware-independent portion of the controller-to-instrument interface.

SCPI instruments are very flexible in accepting a range of commands and parameter formats and instrument responses back to the controller can be either data or status information. Data information can be formatted to be device- and measurement-independent.

SCPI Compliance Criteria

All SCPI instruments conform to the specifications for devices in IEEE 488.2, except that certain requirements of that standard are not required when an instrument does not implement an IEEE 488.1 interface. Additionally, a SCPI instrument can parse <compound command program header> and <compound query program header>, to handle the tree structured commands in SCPI.

SCPI References

- *ANSI S1.4*
- *ANSI X3.4-1977*, American National Standard Code for Information Interchange; ISO Std. 646-1983, ISO 7-bit Coded Character Set for Information Interchange
- *ANSI X3.42-1975*, American National Standard Representation of Numeric Values in Character Strings for Information Interchange; ISO Std. 6093-1985, Representation of Numeric Values in Character Strings for Information Interchange
- *ANSI/IEEE Std 181-1977*, IEEE Standard on Pulse Measurement and Analysis by Objective Techniques
- *ANSI/IEEE Std 194-1977*, IEEE Standard Pulse Terms and Definitions
- *ANSI/IEEE Std. 260-1978*, An American National Standard IEEE Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pounds Units, and Certain Other Units); ISO Std. 1000-1981, SI Units and Recommendations for the Use of Their Multiples and Certain Other Units
- *ANSI/IEEE Std 488.1-1987*, IEEE Standard Digital Interface for Programmable Instrumentation
- *ANSI/IEEE Std 488.2-1992*, IEEE Standard Codes, Formats, Protocols, and Common Commands for use with ANSI/IEEE Std 488.1-1987

- *ANSI/IEEE Std 754-1985*, IEEE Standard for Binary Floating-Point Arithmetic
- *Bell Telephone* “Per BTSM 41004”
- *CCIR Recommendation 468-2*
- *CCITT Recommendation P53*
- *Dolby Labs Bulletin No 19/4*
- *Fields and Waves in Communication Electronics*, Ramo, Whinnery, and Van Duzer
- *IEC Recommendation 179*
- *IEEE Micro, Volume 8, Number 4, August, 1988, pp 62-76*
- *ISO Std, 2955-1983*, Information processing-Representation of SI and other units in systems with limited character sets
- *On the Use of Windows for Harmonic Analysis with the Discrete Fourier Transform*, F.J. Harris, Proc. of the IEEE, Vol 66-1, January, 1978, pp 51-83
- *Standard Commands for Programmable Instruments (SCPI), Version 1993.0, February, 1993.* SCPI Consortium, 8380 Hercules Drive, Suite P3, La Mesa, CA 91942.
- *VXI* Consortium INC, VMEbus Extensions for Instrumentation Systems Specification, Revision 1.3
- *TCL and the Tk Toolkit,* John K. Ousterhout:Addison-Wesley Publishing Co. 1994.

AM700 SCPI Control Model

The AM700 functional areas are divided as to task to perform. In a like manner SCPI commands are organized to command the task required in each functional area. The AM700 is logically divided between its hardware functions needed to acquire signals for processing and the display of the results and its software functions that do the signal processing needed to produce the measurement results. The measurement results in most cases, consist of a display trace of the acquired data after processing and numerical values of key features of a measurement. Examples of display numerical value are the amplitude at a frequency, the frequency at a cursor location, the THD + N, etc.

An illustration (see Figure 3-1) of how the AM700 is modeled for SCPI control is a useful start in determining which SCPI System and Subsystem commands are used to control the AM700 functions. After that connection is made, the actual SCPI commands required to perform a measurement task may be developed.

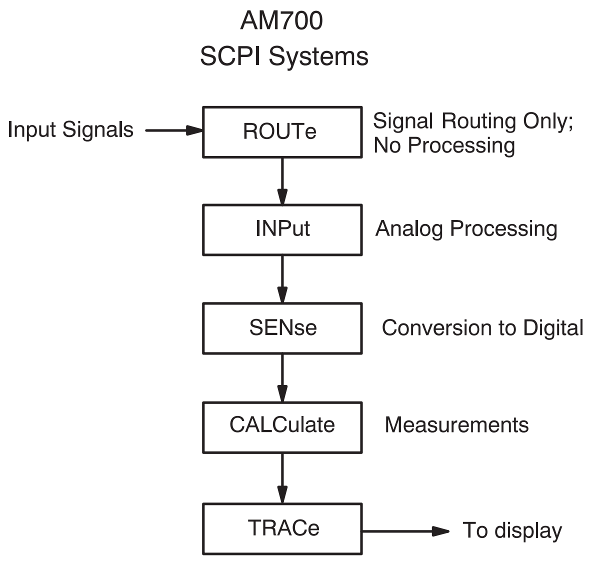


Figure 3-1: AM700 SCPI Systems for Measurements

AM700 Analog Signal Path

In the AM700, the hardware of the analog signal path is organized in functional blocks. These blocks are assigned SCPI System commands related to the functions to be done as shown in Figure 3-2. Signal Routing is shown in Figure 3-3.

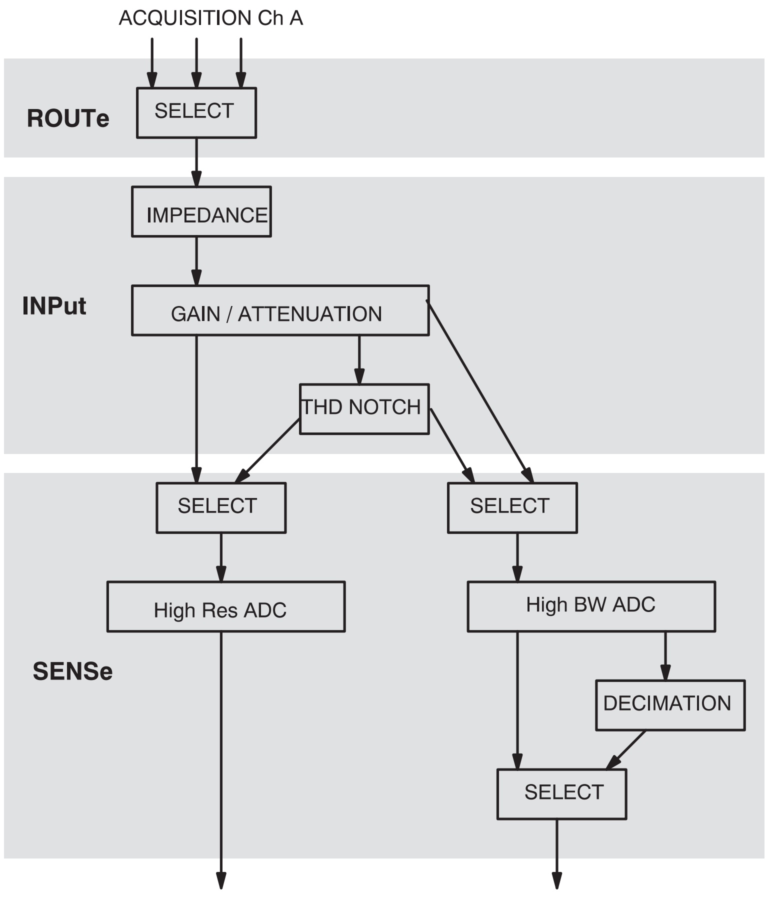


Figure 3-2: Analog Hardware SCPI System Subsytems

Some of the hardware choices are user selectable depending on the measurement application in use. Examples of these choices are the channel to be acquired and whether the measurement will be in High Resolution Mode or in High Bandwidth Mode. Other hardware choices are made as required by the measurement application selected by the user.

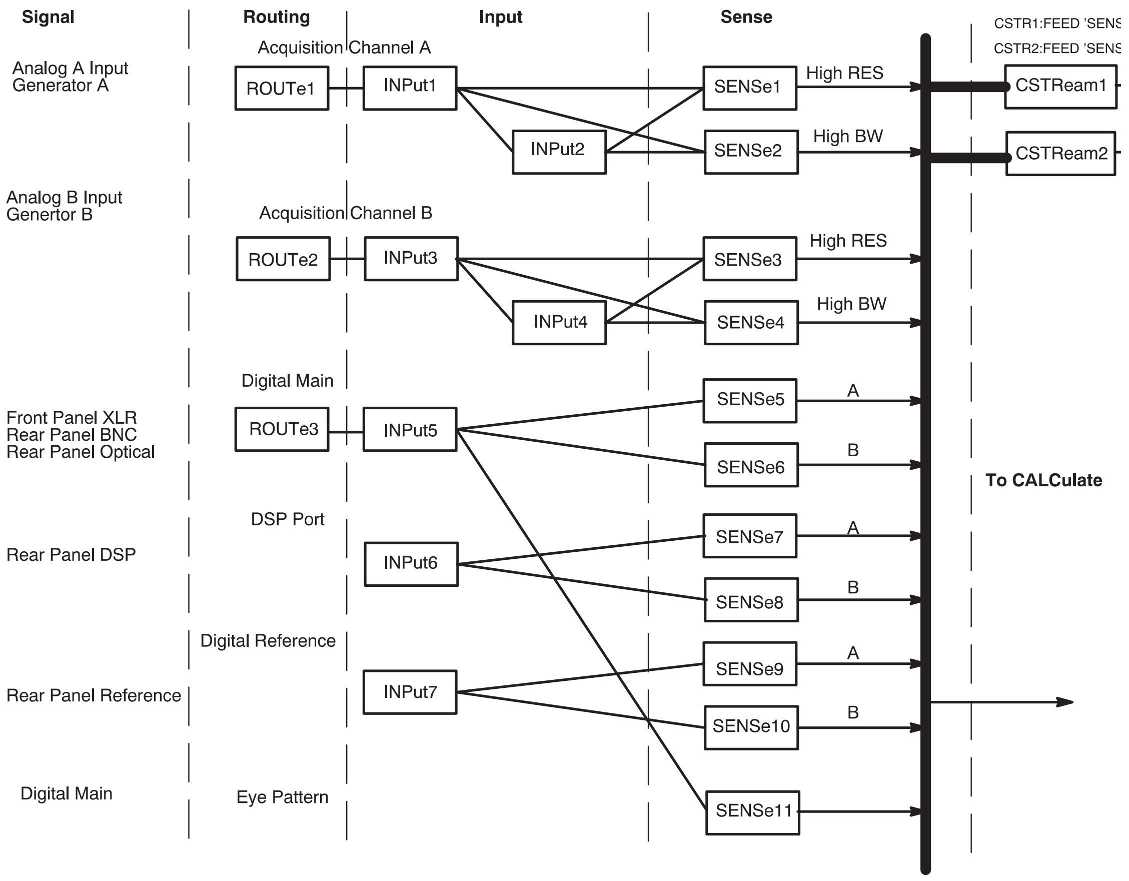


Figure 3-3: AM700 Signal Routing to CSTReam

AM700 Signal Selection and Routing

Signals to acquire must be selected and routed to the CALCulate blocks for measurement. Since the AM700 has multiple input choice for analog and digital signals, the routing commands take on suffixes and channel_list numbers to provide the control needed. Figure 3-3 illustrates the selection paths available in the AM700.

Route Subsystem

The ROUTe Subsystem commands are used for switching signals in the input. No processing is done. To use the ROUTe commands, selectable routes must have a numerical assignments.

In the AM700 the route and close suffix numbers are as follows:

ROUTe suffixes:

1	Analog acquisition channel 'A'
2	Analog acquisition channel 'B'
3	AES/EBU digital audio

CLOSe <channel_list> indices:

1	Analog input channel 'A'
2	Analog input channel 'B'
3	Analog generator channel 'A'
4	Analog generator channel 'B'
6	Balanced (FP) digital audio
7	Unbalanced (RP) digital audio
8	Optical (RP) digital audio
9	AES Generator

Syntax:

```
ROUTe[1|2|3]:CLOSE <channel_list>
or
ROUTe[1|2|3]:CLOSE:STATE?
```

Only certain closures go with a given route: The acceptable routes and closures are:

```
rout1:clos 1|3
rout2:clos 2|4
rout3:clos 6|7|8|9
```

Example: The Close command allows specific individual channels to be closed or queried. To select the generator as the signal source for the Analog A input, the command is:

ROUT1:CLOS 3

The `rout2[1|2|3]:close:state?` query returns the <channel_list> number for the designated route. If all the specified channels cannot be closed (trying to close two channels at the same time if that is not allowed) an execution error is reported. See the ROUTe Subsystem Command description in *Section 3* for complete information on the route command as used in the AM700.

INPut Subsystem

Suffixes:

Suffixes are: INP1	Analog acquisition channel ‘A’
INP3	Analog acquisition channel ‘B’

The Input Subsystem commands set the conditions prior to sampling. Here the choices of input impedance and input range are made. The input choices are also user selectable from within some measurement applications. The choices of selecting the filtered output are not is a measurement choice that will be made as needed by the application. Selections for the notch filter range and use are not selectable via remote control. The syntax for the Input commands is as follows:

Syntax:

```
INPut:RANGe 0.0870 to 173.616
INPUT:IMPedance 150|600|200000
```

Range. The AM700 treats attenuation and gain as joined parameters that define the input range setting. A range window has a dynamic range of approximately 100 dB, but the location of the range window may be positioned within overall dynamic range of approximately +44 to –122 dBu. The numeric value in the Range command is the level at which the input signal will clip (the maximum signal level for the range window). The default range setting is AUTO. In AUTO, the input signal is examined and the range window is positioned to produce a useful measurement on the applied signal. Setting the range to a specified value turns off AUTO.

Syntax:
```
INPUt:RANGe:AUTO <Boolean>|ONCE
INPut:RANGe <numeric_value>
```

Example: The first of the two following examples turns autoranging on; the second sets the signal clipping level at +35 dBu.

```
INPut:RANGe:AUTO ON
INPut:RANGe 43
```

Range: The numerical_value for range is 0.0870 to 173.616 volts in 12, 6 dB steps:

dBu	Volts
–18.9911	0.0870
–12.9911	0.1736
–6.9911	0.3464
–0.9911	0.6911
5.0089	1.3789
11.0089	2.7512
17.0089	5.4893
23.0089	10.9527
29.0089	21.8535
35.0089	43.6034
41.0089	87.0003
47.0103	173.6160

Setting the value for a number that is in between the step settings defaults the range to the next highest valid range step. For example, if you set it for 2 volts, the actual setting will be 2.7512 for clipping at approximately 11 dBu.

IMPedance. Another choice in the Input subsystem is the input impedance setting. The Input command in the AM700 uses suffixes to designate the input that has the impedance setting applied. Syntax for the Impedance command is as follows:

Syntax:
```
INPut:IMPedance <numeric_value>
```

Example: This command sets the input impedance for Analog A to 600 ohms.

```
INPut1:IMPedance 600
or
inp:imp 600
```

Range: The input impedance choices are: 150, 600, and 200000 ohms with 200000 being the power on default.

SENSe Subsystem

The SENSe setup commands are used to control some parameters of the digital audio measurement function, and to query measurements made on the digital interface. Commands in this subsystem are used to control the acquisition methods of the AM700. Commands under the :DATA:DAUDio subnode control how digital audio signals are acquired and queries to determine measurements. The Sense commands uses the following suffixes to direct the action of the Sense command. Analog Sense is controlled by the applications as needed to perform the selected measurements.

Suffixes: SENSe suffixes:

5. Subframe ‘A’ digital audio
6. Subframe ‘B’ digital audio
7. DSP port ‘A’
8. DSP port ‘B’
9. Digital reference ‘A’
10. Digital reference ‘B’
11. Eye Pattern

A few SENSe commands related to the digital audio signal are:

Syntax:

```
SENSe[5–8]:DAUDio:AUDio:SRATe?
         Returns the sample rate of
         the incoming signal.

         LOW is 32 kHz
         MEDium is 44.1 kHz
         HIGH is 48 kHz

SENSe[5–8]:DAUDio:INTerface:BWIDth LOW|MEDium|HIGH

SENSe[5–8]:DAUDio:INTerface:JGAin NORMal|HIGH
```

CSTReam Subsystem

CSTReam commands direct the appropriate Sense output to the measurement channels. The choices are constrained to appropriate selections by the applications. The sense choices are fed to the FFT Analyzer calculate blocks by a CSTReam:FEED command using the following syntax.

Example:

```
CSTReam1:FEED 'SENSe1'
CSTReam2:FEED 'SENSe3'

CSTReam1:FEED 'SENSe5'
CSTReam2:FEED 'SENSe6'

or cstr1:feed 'sens1'
```

etc.

Coupled Commands: In the first example, cstream1 is fed by the output of sense1, the Analog 'A' high resolution A/D converter, and cstream2 is fed by sense3, also the high resolution A/D converter. In example two, the cstreams are fed by the digital audio channel A and channel B signals.

CALCulate Subsystem

A number of independent subsystems comprise the CALCulate subsystem. Each of the subsystems is a sub–block of the CALCulate block. Data flows through the sub–blocks in serial fashion. The CALCulate block has more than one instance of some of the sub–blocks. The same named sub–blocks are differentiated by a numeric suffix. The syntax of the CALCulate subsystem commands are application dependent. One example of the signal flow in show in Figure 3-4. It illustrates the FFT CALCulate subsystem.

Suffixes:

CALCulate1	Trace1 Zoom
CALCulate2	Trace2 Zoom
CALCulate3	Trace1 Average
CALCulate4	Trace2 Average

FFT Analyzer SCPI Commands. In the FFT Analyzer, the calculate blocks are separated by channels and function. Calculate1 is used for the fft zoom functions of channel 1 and is fed by the CSTReam1 feed. Calculate2 is also used for the fft zoom functions, but for channel 2. It is fed by the CSTReam2 feed where the feeds are one of the SENSe signals. Calculate3 and Calculate4 control the averaging commands of the FFT Analyzer. As with calc1 and calc2 there are two channels, and calc3 controls the averaging on channel 1 while calc4 controls the averaging on channel 2.

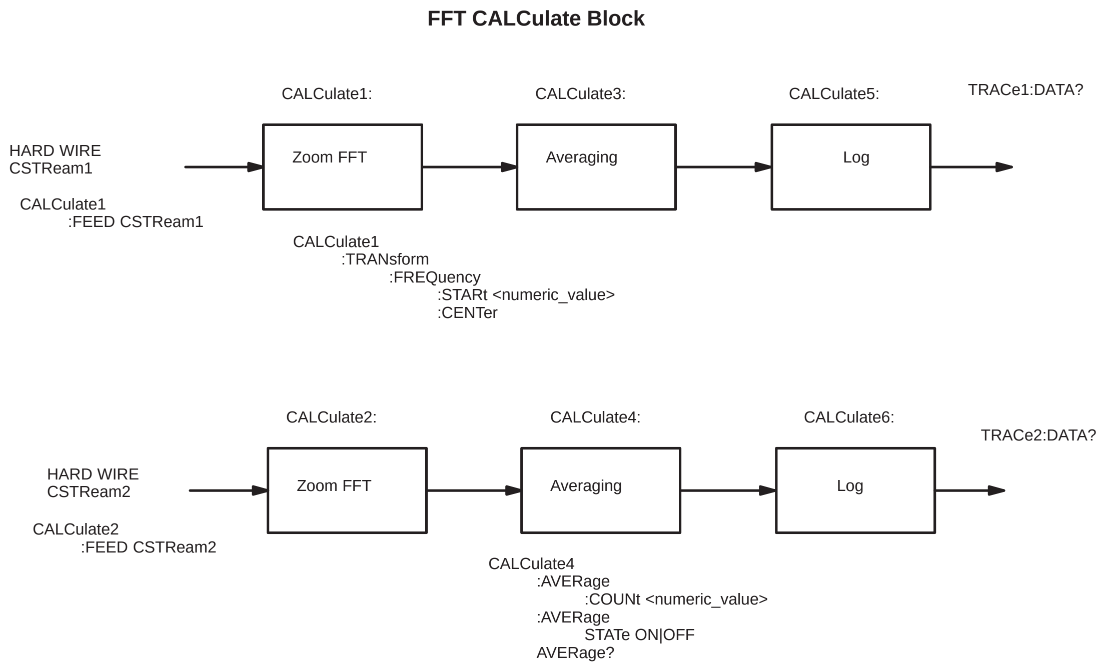

FFT CALCulate Block
CALCulate1:
CALCulate3:
CALCulate5:
TRACe1:DATA?
HARD WIRE CSTReam1
Zoom FFT
Averaging
Log
CALCulate1 :FEED CSTReam1
CALCulate1 :TRANsform :FREQuency :STARt <numeric_value> :CENTer
CALCulate2:
CALCulate4:
CALCulate6:
TRACe2:DATA?
HARD WIRE CSTReam2
Zoom FFT
Averaging
Log
CALCulate2 :FEED CSTReam2
CALCulate4 :AVERage :COUNt <numeric_value> :AVERage STATe ON|OFF AVERage?

Figure 3-4: FFT CALCulate Subsystem Block

The FFT Analyzer application also contains the Multitone measurement calculate blocks. A special SCPI command switches the FFT Analyzer between the two functions as shown in Figure 3-5. The calculate block results are given different trace names. The trace names for the FFT calculate block results are found using the TRACe:CAT? command. The reply to the query is application specific and returns the names for the Audio Analyzer traces when that application is running.

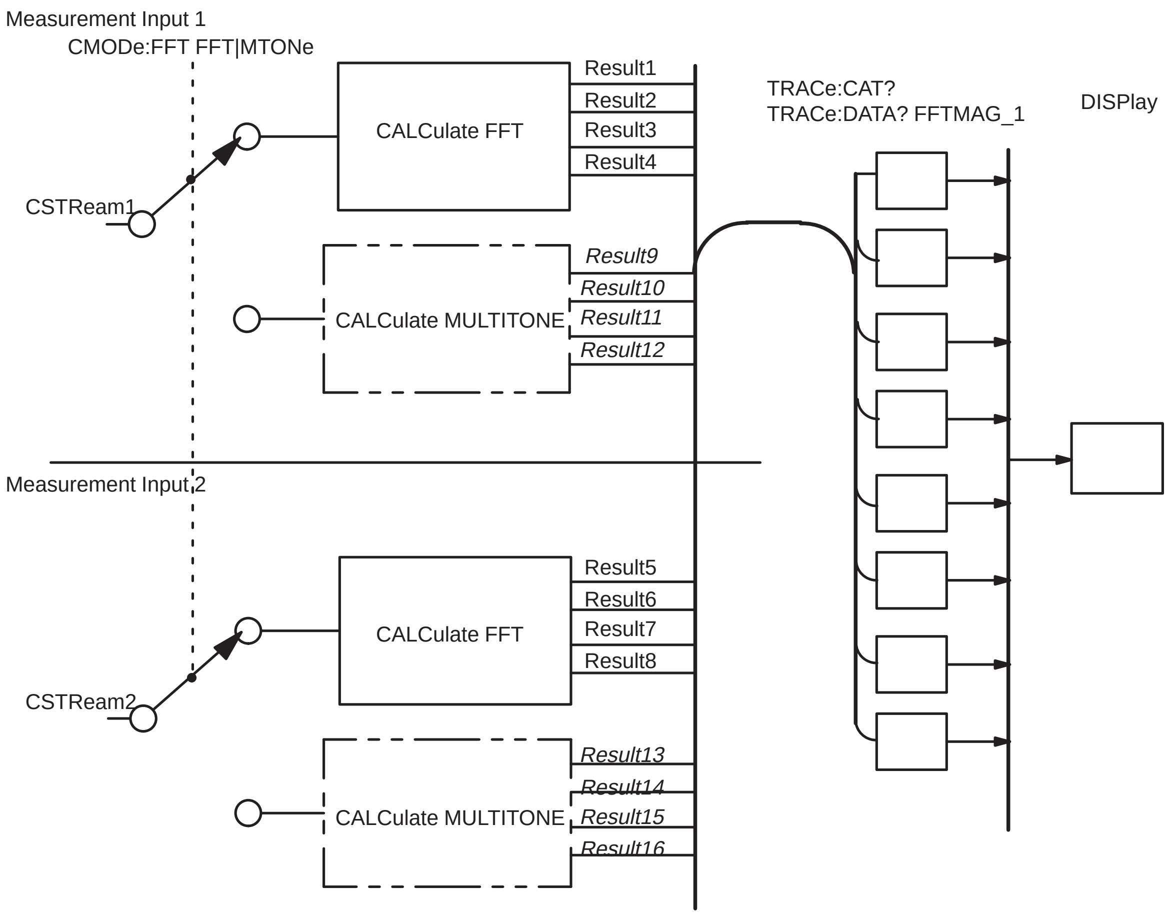


Figure 3-5: Switching Between FFT and Multitone

AMEasure Subsystem

The AMEasure subsystem provide commands that set up the AM700 to perform selected measurements and to control some parameter settings of applications. The commands are application specific. The majority of the AMEasure commands are used for the Audio Analyzer application. These commands include those used to control settleing time, command regulation mode, and select the measurements to be done by the Audio Analyzer.

Suffixes:		
	AME1	MEAS 1
	AME2	MEAS 2
	AME3	MEAS 3
	AME4	MEAS 4

FFT and the AMEasure Subsystem. FFT supports 5 separate measurements. They are:

AMEasure1: FFT on channel 1

AMEasure2: FFT on channel 2

AMEasure3: Configurable Multitone

AMEasure4: Configurable Multitone

AMEasure5: Configurable Multitone

These measurements ‘assignments' are described by the the AME:MODE command. FFT implements AME:MODE, with the following initial values for each suffix combination:

AME1:MODE FFT

AME2:MODE FFT

AME3:MODE MTONe

AME4:MODE MTONe

AME5:MODE MTONe

TRACe Subsystem

The trace subsystem contains measurement results for display and remote query. Trace queries are used to return the measurement data held in a trace. Different traces are selected by trace name; not suffixes. Trace commands are also application specific and will change with the Instrument selection.

A useful query in the Trace subsystem is one that returns the names of the defined traces.

Query:
```
TRACe:CATalog?
or
trac:cat?
```

If there are no named traces, a single empty string is returned. When multiple traces are defined, the names are returned in a comma separated list of trace_name strings. A listing of the possible trace names by application is provided in the TRACe subsytem commands in Section 3 of this manual.

DISPlay Subsystem

`Usage:` The display commands control the number and type of displays that are available for a running application. The adjustments available in the DISPlay subsystem include controlling display brightness, turning on and off view windows (graphs, text, and generator control panel), enabling and positioning cursors, entering text in a text view window (dialog box), assigning X– and Y–axis scales, and switching the graphical plotting methods (point–to–point, linear or logarithmic). The complete set of commands for the DISPlay subsystem are given in Section 3.

Windows 1 through n specify the view windows in the application. Presently, there are four graphical displays, WIN1 through WIN4, the Real Time measurement readouts, WIN5, the Generator Status display, WIN60, the notifier displays, WIN98, and a text dialog box, WIN99.

SYSTem Subsystem

`Usage:` Status, ID, errors, and other required interface type operations related to running the AM700 remotely are included in the SYSTem commands. A useful query of the system commands is:

```
SYSTem:ERRor?
```

This query returns error messages from the error message stack until all messages have been read. If no error exists, it returns “0, NO ERROR.”

Also found in the system commands are the ones used for setting the communications parameters for RS–232 communications (baud rate, data bits, and parity) and the GPIB address and commands for setting and querying the internal clock of the AM700:

```
SYST:TIME?
SYST:DATE?
```

STATus Subsystem

The STATus subsystem controls the status–reporting structures of the AM700. These structures conform to the IEEE 488.2 specification. The different structures may be looked at a set of registers: these are a condition register, an event register, an enable register, and negative and positive transition filters. The AM700 is multiple logical instruments and provides for the QUEStionable and OPERation registers. These registers are further subdivided into other groupings as follows:

QUEStionable:INPut:SUMMary
QUEStionable:SOURce:SUMMary
QUEStionable:INSTrument
QUEStionable:SOURce
QUEStionable:INPut

OPERation:TRIGger
OPERation:SYSTem
OPERation:INSTrument

There is a queue for status. The queue provides a human readable record of instrument events. A programmer may individually enable events into the queue.

INSTrument Subsystem

Within the AM700 thare are multiple logical instruments. The INSTrument subsystem commands provide the controls and queries needed to switch instruments and the find out what the name, number, or short form name.

`Usage:` Commands in this subsystem are used to switch between AM700 applications either by name or number. Several query commands are used to return the names and application numbers. These are the several versions of catalog queries. The catalog queries, INST:CAT, INST:CAT:FULL, INST:LCAT, and INST:LCAT:FULL all return comma separated list of the application name strings. Instruments are selectable by number, short name, and long name.

`Syntax:` `INST:NSEL <app_number>`
`Query:` `INST:NSEL?` returns the number of the selected application.

`Syntax:` `INST:SEL <app_name>`
`Query:` `INST:SEL?` returns a short form name for the selected application.

Syntax: `INST:LSEL 'app_descriptive_name'`

Query: `INST:LSEL?` returns a long descriptive name of the selected application.

Range:

NSEL	SEL	LSEL
1	FFT	‘FFT analyzer’
2	Analyzer	‘Audio analyzer’
3	Monitor	‘Monitor’
4	Digital	‘Digital Interface Tester’
5	Diagnostics	‘Diagnostics’
6	PanelCal	‘Touch Panel Calibration’

MMEMory Subsystem

The Mass Memory subsystem behavior in the AM700 is very similar to to the documented SCPI behavior. One major divergence form standard SCPI is the absence of `'`msus`'` (mass storage unit specifier) support in the AM700. The AM700 allows an optional mass storage unit specifier with any filename given to the MMEMory commands. The syntax of the file name is:

```
<[device:]{/path_name/path_name/}<file_name>
```

The device portion is optional.“device” can be one of “rom”, “nvram”, or “dos”. Once past the device specification, the name looks pretty much like a UNIX file name. Slashes separate the path–name components.

Mass MEMory provides mass storage capabilities for the AM700. Mass storage is either internal or external and the AM700 supports both.

The CLOSe, FEED, NAME, and OPEN commands are used to stream data from anywhere in the data flow into a file for saving HCOPy output.

Mass storage media may be formatted in one of a number of standard formats. The AM700 does not support the SCPI mass storage unit specifier <msus>.

AM700 File Structure. The upper level of the AM700 files comprise ROM, NVRAM, and DOS logical directories. Under those, other directories or files may exist. Certain directories are accessible by the user for storage use or information.

File Names. The <file_name> parameter in the MMEMory subsystem is a string. The contents of the string are dependent on the needs of the format of the mass storage media. In particular, the file name may contain / for specifying sub–directories.. File names may be absolute, rooted, or relative. Absolute file names use the complete name with device and total path to the file. Rooted file names use the path within a designated device and may be used after changing directory to that device. Relative file names are assumed to be in the current working directory.

Note that this syntax places some restrictions on the <file_name> (for example, commas are not allowed).

The AM700 allows an optional mass storage unit specifier (a logical directory name) with any file name given to the MMEMory commands. The syntax of the file name is:

```
<[device:]{/dir_name/dir_name/}<file_name>

'dos:/directory/filename'
'nvram:/directory/filename'
'rom:/directory/filename'
```

The device and path portions are optional and not needed if the file name is in the current working directory. “device” can be one of “rom”, “nvram”, or “dos”. Legal dos file names are permitted. That is a file name of eight characters maximum length followed by a file extension up to three characters in length. Filenames are not case sensitive and must be single quoted in the SCPI commands. An example is:

```
MMEM:DEL 'nvram:/function/usrtone1.ton'
```

Moving Between Directories. Changing directories is done using the MMEMemory:CDIRectory command as follows:

```
MMEM:CDIR 'dos:/'
MMEM:CDIR 'nvram:/function'
MMEM:CDIR 'rom:/function'

MMEM:CDIR '..'
```

To list the files in a directory use the MMEMemory:CATalog? query. First change directory to the one you are interested in, then cat the directory.

```
MMEM:CDIR 'nvram:/function' or
MMEM:CDIR 'dos:/'

MMEM:CAT?
```

This returns a comma separated list of the directories and files in the directory and the number of bytes they contain.

Copying a file from a floppy disk into the nvram function file is done using the MMEMemory:COPY command as follows:

```
MMEM:COPY 'dos:/filename','nvram:/function/filename'
```

This copies the dos file into the nvram function directory to the filename.

PROGram Subsystem

The PROGram subsystem as implemented in the AM700 is for the selection and running of functions. These commands provide features needed to generate and control one or more user–programmed tasks in the AM700. Functions are files in Tcl programming language permanently included in the “rom:/functions” directory and any user generated files in the “nvram:/functions” directory. The function names are the file names found in those two directories.

Function programs may be loaded either using the DOS file transfer capabilities of the MMEMory subsystem or using the PROGram subsystem commands for unloading via the GPIB interface. Function programs loaded using the GPIB interface must be formatted as arbitrary block program data. Function programs may be loaded from a floppy disk via the DOS interface using the file browser screens called up when the front panel Storage button is pressed. See the *Function* information later in this Section for more information on writing and running functions.

GCONtrol Subsystem

Selection of the generator modes and controlling the output states is done using the special commands of the GCONtrol subsystem. Signal selection is done using the SOURce commands.

GCONtrol MODE Commands. The following commands control the generator signal source. The first sets either the high resolution generator or the high bandwidth generator for the analog signal. The second determine with the digital mode will be from the digital main generator (AES) or the digital signal processor (DSP).

```
GCONtrol:ANALog:MODE HRes|HBW
GCONtrol:DIGital:MODE AES|DSP
```

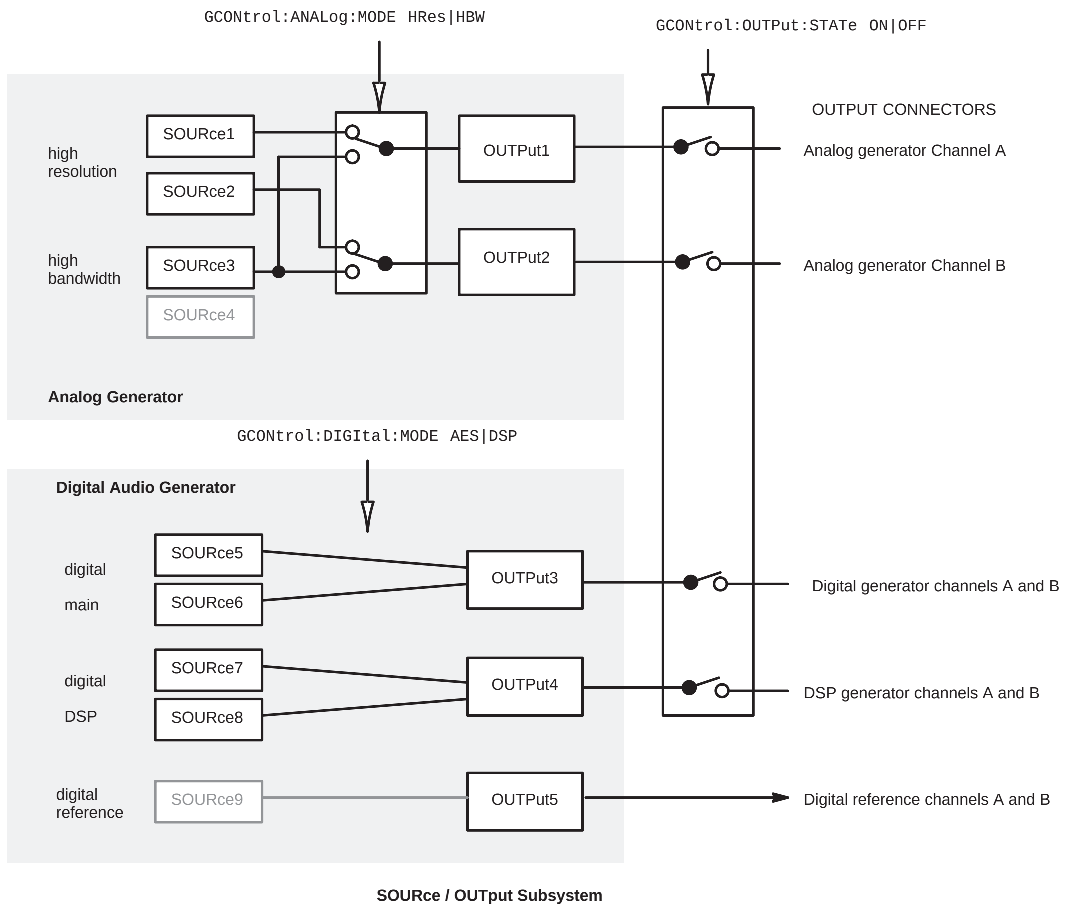

GCONtrol:ANALog:MODE HRes|HBW
GCONtrol:OUTPut:STATe ON|OFF
OUTPUT CONNECTORS
high resolution
SOURce1
SOURce2
high bandwidth
SOURce3
SOURce4
OUTPut1
OUTPut2
Analog generator Channel A
Analog generator Channel B
Analog Generator
GCONtrol:DIGItal:MODE AES|DSP
Digital Audio Generator
digital
main
SOURce5
SOURce6
OUTPut3
Digital generator channels A and B
digital
DSP
SOURce7
SOURce8
OUTPut4
DSP generator channels A and B
digital reference
SOURce9
OUTPut5
Digital reference channels A and B
SOURce / OUTput Subsystem

Figure 3-6: GCONtrol Subsystem for the AM700 Generator

Generator Output Commands. The Output subsystem commands control connecting the generator signals to the appropriate output connector or other signal path.

```
GCONtrol:OUTPut:STATe ON|OFF
GCONtrol:OUTPut:STATe?
```

SOURCe Subsystem Commands

Commands in the source subsystem control the signal selections from the AM700 generator. The commands are divided between those used to control the digital generator and those used to control the analog generator. SOURce suffixes are used to provide the necessary identification.

Suffixes:

SOURce1 is analog generator HR A
SOURce2 is analog generator HR B
SOURce3 is analog generator HB A
SOURce4 is analog generator HB B
SOURce5 is digital generator A
SOURce6 is digital generator B
SOURce7 is DSP A
SOURce8 is DSP B

The generator output for Analog high resolution may be different signals on each channel. For high bandwidth, both channels output either the same signal or either output may be set to send silence.

Setting the type of signal output wanted from the generator is done using commands of the following syntax:

```
SOURce:FUNCtion:SHAPe SINusoid|JSINe|TBURst|CIMD|SIMD|
PRNoise|PCHirp|POLarity|TPolarity|MTONe|USER
```

where each of the shape parameters is a different signal type available from the generator.

Functions

Writing a Function

Functions may be created externally to the AM700 using Tcl programming and loaded via the floppy disk drive into the file system of the AM700. Front panel menus for loading files into the internal file system are called up by the Storage button. Functions may also be loaded through SCPI commands using the PROGram subsystem commands.

Sample Function Program — A function program may be very simple or it may contain many steps. A running function program in interpreted by the Tcl parser. Some Tcl formatting information is required. A few points are mentioned here to show why they are used in the sample. Full information on Tcl programming is found in Part 1 of *Tcl and the Tk Toolkit:* Addison–Wesley Publishing Company, 1994.

- Tcl comments are preceded by a # symbol as the first non–blank character in the line. The # symbol appearing in the line at other locations is treated as any other character.
- If double quote marks are in used in a SCPI command, they must be escaped by a backslash (\“string\”) in order to pass them to SCPI using the Tcl scpi command.
- Precede all SCPI commands with the string “scpi ”.

The Tcl parser looks first to see if it is a Tcl command that it knows about; if so, it runs it as a Tcl command. If not, the parser looks for an *, a ?, or a : in the command lines to see if it is a SCPI command. Putting the letters “scpi” in front of the SCPI commands immediately tells the Tcl parser that it is a SCPI command and passes it to the SCPI parser.

The example function program shown uses some of the commands that may be needed to change application, signals, and displays. Some control changes may not be required, because the default setting is correct for the function. You may use the *RST command to set everything to its default state or the state of controls may be explicitly set to avoid the possibility that the control is not in the default setting.

The following program uses the AM700 digital generator to supply the signal to the AM700 FFT application. The front panel XLR digital output connector must be connected to the front panel XLR digital input connector to complete the setup. In the sample function, the first line labels the function and the second line provides some visual feedback to the front panel in the Function Output window that appears in the Function control panel display.

```
#label: Digital Generator CCIF IMD
puts stdout "Digital CCIF IMD"
#
#Set the AM700 to its default states.
scpi *RST
#
#Select the digital generator for measurement
#CSTR1 has DSF1 and CSTR2 has DSF2
scpi CSTR1:FEED 'sens5'
scpi CSTR2:FEED 'sens6'
#
#Select the CCIF IMD test signal to be generated.
#DSF2 follows DSF1 by default.
scpi SOUR5:FUNC:SHAP CIMD
#
#Make sure the digital input path is the
#front panel XLR connector
scpi ROUT3:CLOS 6
#
#Turn on the generator signal.
scpi GCON:OUTP:STAT ON
#
#Start the Audio Monitor application
scpi INST:SEL MON
#
#Display two measurement windows; view 1 is displayed by default.
scpi DISP:WIND2:STAT ON
#
#The Function Control Panel remains displayed unless it is cleared by
#the front panel control.
puts stdout “Press Clear Menu to see the application display"
```

Running a Function

Functions are stored in two different directories in the AM700. Those stored in rom:/function are permanently stored for specific purposes by the factory. Those stored in nvram:/function are user generated. From the front panel, stored functions may be started using menu choices called up by the Function button. Running a function from remote control using SCPI commands requires the following steps:

1. Send `PROG:CAT?` to get a comma separated list of the available functions. Function names are recovered from the rom:/function and from the nvram:/function directories.
2. Use the `PROG:SEL:NAME <progname>` command to select the function program to run.

   You may also use the `PROG:EXPL:STAT <progname>,RUN` command at this point to start the function named explicitly.

   The syntax of the <progname> file can be used without quotes, unless a period is used in the name to separate the base from the extension. If so, then quotes are required to convey the name to the AM700. Without the quotes, the AM700 will report the command as an error.

   Examples:

   ```
   prog:expl:stat test1,run
   prog:name "t_0044.tcl"
   ```

3. Use the `PROG:SEL:STAT RUN` command to start the named function. Send `PROG:SEL:STAT STOP` to stop the running function if is is not self terminating.

Timed Functions

A timed function may be set to run at certain times by setting a time for it to start using the PROGram commands.

The `PROG:SEL:NAME <progname>` command names the file that a following PROG:SEL:TIMed:SET command associates with the cron_string or strings that are given.

```
PROG:SEL:NAME <progname>

PROG:SEL:TIM[:SET] {'cron_string','cron_string'}

PROG:SEL:TIM:ADD cron_string'{,cron_string'}
```

A cron_string is five fields consisting of the following:

```
MIN HOUR DAY_of_MONTH MONTH DAY_of_WEEK
```

The numerical ranges for the fields are as follows:

Minutes:	0 through 59.
Hours:	0 through 23.
Day of the month:	1 through 31.
Month:	1 through 12.
Day of the week	0 through 6; Sunday is day 0.

Each field may contain any of the follow type entries: a single number, a comma–separated list of numbers, a hyphen–separated pair of numbers, or an *.

A comma separated list in a field specifies multiple occurrence for the timed program to run.

A pair of numbers separated by a hyphen in a field specifies the beginning number, the ending number, and all the integer numbers in between.

An * in a field means to do it on all occurrence. An exception to the * usage is that if both the day of the week and the day of the month fields have an * it just means “every day.” If only one of these two fields has an *, that field is ignored, and if neither has an *, both fields are used.

Example: ’0 0,12 * * *’ specifies a time of midnight and noon every day.

Example:

```
PROG:SEL:TIM:SET '30 * 1,15 5 *','45 17 19 5 *'
```

This sets the times for the timed function at every half past the hour, on the 1st and 15th of May and a again at 17:45, on the 19th of May..

Use the `PROG:SEL:TIM:ADD <cron_string>` command to add new times to the same named function and use the `PROG:SEL:TIM:CLE` command to clear all the times for a named function. If you want other timed functions to run, change the named function and use the `PROG:SEL:TIM:SET` command to set a new cron_string or set of cron_strings for the newly named command.

PROG:EXPL commands are used in the same manner as the PROG:SEL commands but explicitly name the function to which the command applies. See the Section 3 of this manual for further details on the PROGram commands and their use in running functions.

Example: PROG:EXPL:TIM <prog_name>,<cron_string>

PROG[:SEL]TIM:SET and PROG:EXPL:TIM:SET return the current set of cronstrings for a program, and the TCATalog commands return the list of programs with cronstrings attached.

Tcl Programming Changes

Here are some additions, changes, and limitations of the AM700 Tcl environment as it is used for Functions.

Added commands:

Command: `sleep <seconds> [<tenths> [<hundredths>]]`

Usage: Delay for the specified seconds and optional tenths and hundredths of seconds

Command: `notifier <message> <buttons> [notifier | warning | error] [wait]`

Usage: Displays the message in a notifier on the screen, requiring one of the buttons to be pressed. The <buttons> argument is a semicolon–separated list of button names. There are different kinds of notifiers, though 'notifier' 'warning' and 'error' look alike to the Tcl parser.

If `'wait'` is specified, the command returns only after a button has been pressed, and the return value of the command is the number of the button that was pressed (the numbering starts with 1).

If the `"disp:wind98:dism:one"` or `"disp:wind98:dism:all"` (commands are documented in Section 3) command is given, causing a notifier to pop down, the return value from a waiting notifier command is –1.

Command: `condition`

Usage: Usage string returned from Tcl:

```
usage: condition <conditionNr> set
       condition <conditionNr> clear
       condition <conditionNr> <value>
condition <conditionNr> is_set
condition <conditionNr> is_clear
condition <conditionNr>

condition <conditionNr> wait is_set
condition <conditionNr> wait is_clear

condition <conditionNr> wait change
condition <conditionNr> wait change is_set
condition <conditionNr> wait change is_clear
```

The `<conditionNr>` is one of those documented. Things like ‘sweeping’ which is number 103. The usage string should be self–explanatory.

The `<value>` argument sets the condition to that value. A nonzero value means the condition is set, and a zero value means it is clear.

Additionally, the conditions numbered 9100 through 9107 are user– modifiable conditions. These are the only ones that the ‘set’, ‘clear’, or <value> arguments can be used for. The user can use these to signal between functions concurrently or consecutively running.

Command: `event`
Usage: Usage string returned from Tcl:

```
usage: event <eventNr> trigger
       event <eventNr> wait
```

The `<eventNr>` is one of those documented.

The user–modifiable events (on which ’trigger’ can be used) are numbered 9200 through 9207.

Command: `panel`
Usage: Usage string returned from Tcl:

```
usage: panel beep [<count>]
       panel led {<led name> | all} {on | off}
       panel led {<led name> | all} duty <brightness>
```

The `<led name>` is one of: analyzer, average, clear_menu, configure, copy, cursor, digital, display, expand, fft, filter, freeze, function, gen_control, gen_onoff, help, limits, menu, monitor, move, other, rescale, sound, storage, sweep_run, user.

Command:	`rm <file> ...`
Usage:	Removes one or more named[1] files. Error reports are not fully implemented for removing files.
Command:	`scpi`
Usage:	Specifies that the command following is a SCPI command. The Tcl parser passes it immediately to the SCPI command interpreter.

[1] **Further file access (and ’rm’ for that matter) can be accessed through the ’scpi’ command and the MMEMory subsystem.**

3 AM700 SCPI Commands

Section 3
AM700 SCPI Commands

IEEE Mandated Commands

All SCPI instruments implement all the common commands declared mandatory by IEEE 488.2. These are the following:

Table 4-1: IEEE Mandated Commands

Mnemonic	Name	488.2 Section
***CLS**	Clear Status Command	10.3
***ESE**	Standard Event Status Enable Command	10.10
***ESE?**	Standard Event Status Enable Query	10.11
***ESR?**	Standard Event Status Register Query	10.12
***IDN?**	Identification Query	10.14
***OPC**	Operation Complete Command	10.18
***OPC?**	Operation Complete Query	10.19
***RST**	Reset Operation	10.32
***SRE**	Service Request Enable Command	10.34
***SRE?**	Service Request Enable Query	10.35
***STB?**	Read Status Byte Query	10.36
***TST?**	Self–Test Query (A self–test is NOT done)	10.38
***WAI**	Wait–to–Continue Command	10.39

The optional commands described by IEEE Std 488.2 are not required by SCPI.

Required Commands

The following commands are required in all SCPI instruments:

Table 4-2: SCPI Required Commands

Mnemonic	Command Description Section (SCPI Std)	Syntax and Style Section (SCPI Std)
:SYSTem		
:ERRor?	19.7	
:VERSion?	19.16	1991
:STATus	18	5
:OPERation		
[:EVENt]?		
:CONDition?		
:ENABle		
:ENABle?		
:QUEStionable		
[:EVENt]?		
:CONDition?		
:ENABle		
:ENABle?		
:PRESet		

Optional Commands

All other commands in the SCPI "Command Descriptions" are considered optional in that they depend on the capabilities of the SCPI instrument. Commands that are used will be implemented exactly as specified by using the SCPI defined commands. Certain commands, if used, require that other commands also be implemented. If a command is implemented where the instrument will not support all the SCPI alternative parameter values, a subset may be used. If the instrument does not support an alternative value of the complete set, it may generate an error on receipt. However, an instrument must handle all of the parameters in a SCPI command set even if an alternative does not apply to the instrument's capabilities.

Table 4-3: SCPI Command Syntax Symbols

Symbols	Description
[ ]	Used to enclose one or more parameters that are optional when controlling the instrument. Omitting the optional element causes the default action to occur. Also used to enclose suffixes of a command.
{ }	Use to enclose one or more parameters than may be included zero or more times.
?	Use to indicate a query by appending to the last keyword in a command. Not all commands have a query, and some commands are only queries.
|	May be read as “or” and is used to separate alternative parameter options.
< >	Use to enclose a SCPI–defined parameter.
:	Used to separate elements of a SCPI command.
;	Used to separate SCPI commands in a command list.
,	Used to separate arguments in a SCPI argument list.
( )	Used to indicate a range of suffixes available for a SCPI command.

A query is formed by appending a question mark (?) to the last keyword in a command. Not all commands have a query form, and some commands exist only as a query.

The AM700 accepts only the exact short and the exact long forms. Sending a header that is not either shall cause an error to be generated. In the following commands, the CAPITAL letters indicate the short form mnemonic that may be used to reduce the typing required. The AM700 parser will take either uppercase or lowercase letters; it is not case sensitive. Only the command list is given here, refer to *Section 3* for complete documentation of the commands.

Example:

```
CALC:AVER:COUN 32
calc:aver:coun 32
calculate:average:count 32
CALCULATE:AVERAGE:COUNT 32
```

Command Notation in this Manual

In the listing of SCPI commands for the AM700, descriptive headings are used to divide the information into more easily identified parts. Those headings and their content is shown here to aid in interpreting the commands. When a heading does not apply it is omitted to save space and avoid the need to read such things as “No query at this level” and “No *RST action or event.”

`ROOT:SUBSystem:SUBSystem:COMMand` The complete path for a command is given here.

`Usage:`	What the command does and amplifying information is provided in this heading.
`Suffixes:`	If commands are identified by the addition of suffix numbers, the meaning of those numbers is provided in this heading.
`Parameters:`	If the command arguments are data handles, the ones used with the command are provided in this heading.
`Default:`	Where there are default choices or actions, they are given in this heading.
`Range:`	With a <numeric_value> argument, the number range is given in this heading.
`Units:`	When a <numeric_value> argument has units they are given in this heading.
`Resolution:`	The step size of varying the <numeric_value> is given in this this heading
`Query:`	When an command has a valid query, that query and its expected return is provided in this heading.
`Response:`	When there is a range of responses to a query, the list is given in this heading.
`Example:`	An example of the command usage is provided here. Sometimes the short form of the keywords will be used and sometimes lowercase characters are used to remind you that these forms are valid.
`Explanation of Example:`	When the example is not self explanatory, additional explanation is provided in this heading.

`Error:`	Errors actions that may occur are given in this heading. Common errors such as mistyping the command are usually not included in this heading.
`Coupled Commands:`	When additional commands are linked to the possible action of a command is ways that are not obvious, they are given here.
`*RST:`	If there is a state change to an argument as a result of sending the *RST command to the AM700, that is given in this heading.

AM700 SCPI Command Set

The AM700 is a multi–function measurement tool. Many commands are specific to the needs of the measurement function in use, and, as needed, the various SCPI commands will have multiple subsets.

AMEasure Subsystem

The AMEasure subsystem provide commands that quickly set up the AM700 to perform selected measurements and to control some parameter settings of applications. The commands are application specific and are divided as such to make them easier to locate by application. The majority of the AMEasure commands are used for the Audio Analyzer application.

`AMEasure[1–4]:STATe <Boolean>`

`Parameters:` `ON|OFF and 1|0`

`Usage:` Enables the AMEasure for the designated AME.

`Suffixes:`

AME1	MEAS 1
AME2	MEAS 2
AME3	MEAS 3
AME4	MEAS 4

`Query:` `AME[1–4]:STAT?` returns 0 for off or 1 for on for the designated AME.

`*RST:` AME[1–4] State ON

`AMEasure[1–4]:HISTory <numeric_value>`

`Parameters:` 0 to 4

`Usage:` Sets the number of traces to be held as history in a display. 0 is no history, and only the current trace is displayed. A setting of 4 hold four traces as history. Acquring another trace past four deletes the oldest trace.

`Query:` `AME[1–4]:HIST?` returns the current History setting for the designated AME.

***RST:**	Sets HISTory to 0.

AMEasure[1–5]:MODE <char_data>

Parameters:	`XY|REGulation|RTDisplay`
Usage:	Sets or queries the operation mode of the designated AME. AME[1–4] may not be set to RTD. AME5 may only be set to RTD.
Query:	`AME[1–5]:MODE?` returns the operation mode of the designated AME.
***RST:**	AME[1–4] XY AME5 RTD

AMEasure[1–4]:REFerence:SET <event>

Usage:	Command only used to obtain a reference trace for comparison. The front trace of the designated AME is copied for use as a reference.
Query:	No query.
***RST:**	No *RST.

AMEasure[1–4]:REFerence:STATe <Boolean>

Parameters:	`ON|OFF and 1|0`
Usage:	Sets or queries the state of the reference for the designated AME.
Query:	`AME[1–4]:REF:STAT?` returns 0 for off or 1 for on for the designated AME.
***RST:**	References off.

AMEasure[1–4]:XY:TRACkgen <Boolean>

Parameters:	`ON|OFF or 1|0`
Usage:	Sets or queries the state of TRACkgen for the designated AME in XY mode.

Query: AME[1–4]:XY:TRAC? returns 0 for tracking disabled or 1 for enabled.

***RST:** Sets XY mode Track Generator sweeps to disabled.

AMEasure[1–4]:XY:X:INPut <char_data>

Parameters: `CHANnel1|CHANnel2|ANALog1|ANALog2|DIGital1|DIGital2`

Usage: Sets or queries the source of the input to the X–Axis for the designated AME in XY mode.

Query: `AME[1–4]:XY:X:INP?` returns the measurement channel currently supplying input to the designated AME.

***RST:**

AME1	CHANNEL1
AME2	CHANNEL2
AME3	CHANNEL1
AME4	CHANNEL1

AMEasure[1–4]:XY:X:FUNCtion <char_data>

Parameters: `FREQuency|LEVel`

Usage: Sets or queries the measurement function attached to the X–axis in XY mode.

Query: `AME[1–4]:XY:X:FUNC?` returns the measurement functions currently attached to the X–axis of the designated AME in XY mode.

***RST:** AME[1–4] FREQUENCY

AMEasure[1–4]:XY:Y:INPut <char_data>

Parameters: `CHANnel1|CHANnel2`

Usage: Sets or queries the source of the input to the Y–Axis in XY mode.

Query: `AME[1–4]:XY:Y:INP?` returns the currently selected input source for the Y axis in the designated AME in XY mode.

***RST:**	AME1	Channel 1
	AME2	Channel 2
	AME3	Channel 1
	AME4	Channel 1

AMEasure[1–4]:XY:Y:FUNCtion <char_data>

Parameters: `FREQuency|THD|THDN|IMD|PDIFference|SEParation|CROSStalk|LDIFference|LEVel`

Usage: Sets or queries the measurement function attached to the Y–axis of the designated AME in XY mode.

Query: `AME[1–4]:XY:Y:FUNC?` returns the measurement function attached to the Y–axis in XY mode.

***RST:**	AME1	LEVEL
	AME2	LEVEL
	AME3	LDIFFERENCE
	AME4	PDIFFERENCE

AMEasure[1–4]:REGulation:COUNt <numeric_value>

Usage: Sets or queries the Sweep Count setting of the designated AME for the regulation mode sweep count.

Range: 0 to 10000 counts.

Query: `AME[1–5]:REG:COUN?` returns the current setting for the regulation mode sweep.

***RST:** Sets count to 1.

AMEasure[1–4]:REGulation:ERRor <numeric_value>

Usage: Sets or queries the Target Error value of the designated AME for regulation mode operation.

Range: Range of the numeric value depends on the setting of `AME:REG:FUNC <char_data>.`
FREQ range = 0 to 81000
LEV range = –97.7815 to 47.0104
THD range = 0 to 100
THDN range = 0 to 100

Units: Units of the numeric value depend on the setting of `AME:REG:FUNC <char_data>.`
FREQ units = Hz
LEV units = dBu
THD units = %
THD+N units = %

Query: `AME:REG:ERR?` returns the current setting for the regulation Target Error in the default units.

***RST:** –17.7815 dBu

AMEasure[1–4]:REGulation:FUNCtion <char_data>

Parameters: `FREQuency|LEVel|THD|THDN`

Usage: Sets or queries the measurement function attached to the REGulation mode input.

Query: `AME:[1–4]:REG:FUNC?` returns the currently selected function for the designated AME.

***RST:** Sets AME[1–4] Function to LEVEL

AMEasure[1–4]:REGulation:INPut <char_data>

Parameters: `CHANnel1|CHANnel2`

Usage: Sets are queries the input source for REGulation mode for the designated AME.

Query: `AME[1–4]:REG:INP?` returns the input source for the designated AME.

`*RST:`	Sets the AME [1–4] input source to CHANNEL1.

`AMEasure[1–4]:REGulation:TARGet <numeric_data>`

`Usage:`	Sets the Target Value for use in regulation mode.
`Range:`	0 to 173.62 V –97.7815 to 47.0104 dBu –100 to 44.7920 dBV
`Units:`	Units are set by UNIT:VOLT command. Choices are V, mV, dBu, dBFS, and dBV
`Query:`	`AME[1–4]:REG:TAR?` returns the current setting for the regulation Target Value in the units set by the UNIT:VOLT command.
`*RST:`	Sets the regulation target value to 1.000 volt.

`AMEasure[1–4]:REGulation:GENerator <char_data>`

`Parameters:`	`ANAlog1|ANAlog2|DIGital1|DIGital2`
`Usage:`	Sets or queries the generator that will supply the regulation mode signal for the designated AME.
`Query:`	`AME[1–4]:REG:GEN?` returns the generator name supplying the regulation signal for the designated AME.
`*RST:`	Sets generator to ANALOG1.

`AMEasure[1–4]:REGulation:FREQuency:LOWer <numeric_value>`

`Usage:`	Sets or queries the lower frequency setting of a regulation mode sweep signal for the designated AME.
`Range:`	0.00 to 80000 Hz.
`Query:`	`AME[1–4]:REG:FREQ:LOW?` returns the lower frequency setting for a regulation sweep signal.

***RST:**	Set the lower frequency to 1000 Hz.

AMEasure[1–4]:REGulation:FREQuency:MODE <char_data>

Parameters:	`LINear|LOGarithmic`
Usage:	Sets or queries the stepping mode of the regulation test signal. The steps will be either linearly or logarithmically spaced as selected for the designated AME.
Query:	AME[1–4]:REG:FREQ:MODE? returns LINEAR or LOGARITHMIC spacing of the regulation sweep steps for the designated AME.
***RST:**	Set mode to LINEAR.

AMEasure[1–4]:REGulation:FREQuency:POINts <numeric_value>

Usage:	Sets or queries the number of points (frequencies) to use in the regulation frequency sweep.
Range:	2 to 200 points.
Query:	AME[1–4]:REG:FREQ:POIN? returns the current setting for the number of points to be generated in a regulation frequency sweep for the designated AME.
***RST:**	Sets the number of points in a regulation sweep to 10.

AMEasure[1–4]:REGulation:FREQuency:UPPer <numeric_value>

Usage:	Sets or queries the upper frequency setting for a regulation mode sweep signal for the designated AME.
Range:	0.00 to 80000 Hz.
Query:	`AME[1–4]:REG:FREQ:UPP?` returns the higher frequency setting used for a regualtion mode frequency sweep for the designated AME.
***RST:**	Sets the upper frequency to 10000 Hz.

AMEasure[1–4]:REGulation:LEVel:LOWer <numeric_value>

Usage:	Sets or queries the lower amplitude setting for the LEVel.
Query:	`AME[1–4]:REG:LEV:LOW?` returns the lower amplitude setting used for a regualtion mode voltage sweep for the designated AME.
***RST:**	Sets the Voltage Min level to 0.5000 volt.

AMEasure[1–4]:REGulation:LEVel:UPPer <numeric_value>

Usage:	Sets or queries the upper amplitude setting for the Regulation Level.
Range:	0.000 to 173.62 V –97.7815 to 47.0104 dBu
Units:	Units of the query reply or command input follow the setting of `UNIT:VOLT`. The *RST value for `UNIT:VOLT` is V. It does not follow the setting of the Units seen in the display readout or the Units menu selections.
Query:	`AME[1–4]:REG:LEV:UPP?` returns the upper amplitude setting used for a regulation mode voltage sweep for the designated AME.
***RST:**	Sets the Voltage Max to 5.000 volts.

AMEasure:SETTled:COUNt <numeric_value>

Usage:	Sets or queries the number of sweeps that will be used in Regulation Mode, closed loop measurements.
Range:	0 to 10000 sweeps. A setting of 0 is continuous sweeping.
Query:	`AME:SETT:COUN?` returns the setting of the number of sweeps that will be used for the active measurement.
***RST:**	Sets the count number to 1.

AMEasure:SETTled:CROSstalk:RESolution <numeric_value>

Usage:	Sets or queries the global setting for resolution of settled data for the crosstalk measurement.
Range:	0 to 200 dB
Query:	`AME:SETT:CROS:RES?` returns
***RST:**	1.000 dB

AMEasure:SETTled:CROSstalk:TOLerance <numeric_value>

Usage:	Sets or queries the settling tolerance setting of the THD measurement for the designated AME.
Range:	0 to 100%
Query:	`AME[1–4]:SETT:CROS:TOL?` returns
***RST:**	1.000%

AMEasure:SETTled:DELay <numeric_value>

Usage:	Sets or queries the amount of delay time after the generator has changed state to wait before looking for a new data point. This setting is used to accomodate propagation delay and settling of the device under test. This setting is used in Regulation mode when the measurement is closed loop (i.e., the measurement is driving the generator).
Range:	0 to 100 seconds.
Query:	`AME:SETT:DEL?` returns the delay time that will be used when a closed loop measurement is being done. This is the amount of time that the Audio Analyzer waits after changing the generator before it begins looking for a new data point.
***RST:**	Sets the delay time to 0.5 seconds.

`AMEasure:SETTled:ENABle <Boolean>`

Usage:	Sets or queries the state of enabling for settling. When settling is not enabled, any data received will be plotted. When settling is enabled, the settings for minimum level, tolerance, resolution, variation, etc. must be met before a data point is plotted.
Query:	`AME:SETT:ENAB?` returns 1 for enabled or 0 for not enabled.
***RST:**	Set settling to enabled for all AMEasures.

`AMEasure:SETTled:FREQuency:RESolution <numeric_value>`

Usage:	Sets or queries the settling resolution setting of the frequency measurement for the designated AME.
Range:	0 to 1000 Hz.
Query:	`AME:SETT:FREQ:RES?` returns the setting of the global resolution for frequency for settled data.
***RST:**	0.10 Hz.

`AMEasure:SETTled:FREQuency:TOLerance <numeric_value>`

Usage:	Sets or queries the settling tolerance setting of the frequency measurement for the designated AME.
Range:	0 to 100%
Query:	`AME[1–4]:SETT:FREQ:TOL?` returns the global tolerance setting for frequency.
***RST:**	1.000%

`AMEasure:SETTled:IMD:RESolution <numeric_value>`

Usage:	Sets or queries the settling resolution setting of the intermodulation distortion measurement for the designated AME.

Range:	0 to 100%
Query:	`AME:SETT:IMB:RES?` returns the global setting for IMD resolution fo settled data points.
***RST:**	0.010%

AMEasure:SETTled:IMD:TOLerance <numeric_value>

Usage:	Sets or queries the settling tolerance setting of the intermodulation distortion measurement for the designated AME.
Range:	0 to 100%
Query:	`AME:SETT:IMD:TOL?` returns the global setting for IMD tolerance for settled data points.
***RST:**	0.100%

AMEasure:SETTled:LDIFference:RESolution <numeric_value>

Usage:	Sets or queries the settling resolution setting of the level difference measurement for the designated AME.
Range:	0 to 200 dB
Query:	`AME:SETT:LDIF:RES?` returns
***RST:**	0.10 dB

AMEasure:SETTled:LDIFference:TOLerance <numeric_value>

Usage:	Sets or queries the settling tolerance setting of the level difference measurement for the designated AME.
Range:	0 to 100%
Query:	`AME[:SETT:LDIF:TOL?` returns the global tolerance setting for level difference to be considered settled data.

`*RST:`	1.000%

`AMEasure:SETTled:LEVel:MINimum <numeric_value>`

`Usage:`	Sets or queries the minimum amplitude of data to consider in determining if a signal is being received.
`Range:`	–97.7816 to 47.0104 dBu 0 to 173.72 V
`Query:`	`AME:SETT:LEV:MIN?` returns the minimum level of data to be considered in finding a settled data points.
`*RST:`	0.0077 Volts (–40.0517 dBu).

`AMEasure:SETTled:LEVel:RESolution <numeric_value>`

`Usage:`	Sets or queries the global settling resolution setting of the level measurement.
`Range:`	0.0100 mV to 173619.99 mV
`Query:`	`AME:SETT:LEV:RES?` returns the global setting for level resolution for settled data points.
`*RST:`	5 mV

`AMEasure:SETTled:LEVel:TOLerance <numeric_value>`

`Usage:`	Sets or queries the global settling tolerance setting of the level measurement.
`Range:`	0 to 100%
`Query:`	`AME:SETT:LEV:TOL?` returns the global setting for level tolerance for settled data points.
`*RST:`	1.000%

AMEasure:SETTled:PDIFference:RESolution <numeric_value>

Usage:	Sets or queries the global settling resolution setting of the phase difference for settled data points.
Range:	0 to 180 degrees.
Query:	`AME:SETT:PDIF:RES?` returns the global setting for phase difference resolution for settled data points.
***RST:**	1.000 degree.

AMEasure:SETTled:PDIFference:TOLerance <numeric_value>

Usage:	Sets or queries the global settling tolerance setting of the phase difference measurement.
Range:	0 to 100%
Query:	`AME[1–4]:SETT:PDIF:TOL?` returns the global setting for phase difference tolerance for settled data points.
***RST:**	1.000%

AMEasure:SETTled:SEParation:RESolution <numeric_value>

Usage:	Sets or queries the global settling resolution setting of the separation measurement.
Range:	0 to 100%
Query:	`AME:SETT:SEP:RES?` returns the global setting for resolution for settled data points.
***RST:**	1.000 dB

AMEasure:SETTled:SEParation:TOLerance <numeric_value>

Usage:	Sets or queries the global settling tolerance setting of the channel separation measurement.
Range:	0 to 100%
Query:	`AME:SETT:SEP:TOL?` returns the global setting of tolerance used for the separation measurement.
***RST:**	1.000%

AMEasure:SETTled:THD:RESolution <numeric_value>

Usage:	Sets or queries the glopbal settling resolution setting of the total harmonic distortion measurement.
Range:	0 to 100%
Query:	`AME:SETT:THD:RES?` returns the global setting of resolution used for the THD measurement.
***RST:**	0.003%

AMEasure:SETTled:THD:TOLerance <numeric_value>

Usage:	Sets or queries the glopbal settling tolerance setting of the total harmonic distortion measurement.
Range:	0 to 100%
Query:	`AME:SETT:THD:TOL?` returns the settling tolerance percentage used for the THD measurement.
***RST:**	0.003%

AMEasure:SETTled:THDN:RESolution <numeric_value>

Usage:	Sets or queries the settling resolution setting of the total harmonic distortion plus noise measurement.
Range:	0 to 100%
Query:	`AME:SETT:THDN:RES?` returns the global settling resolution setting of the THDN measurement.
***RST:**	0.003%

AMEasure:SETTled:THDN:TOLerance <numeric_value>

Usage:	Sets or queries the settling tolerance setting of the THDN measurement for the designated AME.
Range:	0 to 100%
Query:	`AME:SETT:THDN:TOL?` returns the global settling tolerance setting of the THDN measurement.
***RST:**	0.003%

AMEasure:SETTled:TIMeout <numeric_value>

Usage:	Sets or queries the settling timeout setting. If a settled data point has not been found in the set delay time in a closed loop measurement, the generator is switched to the next step and a the Audio Analyzer looks for a new settled data point.
Range:	0 to 100 seconds
Query:	`AME:SETT:TIM?` returns
***RST:**	Sets the timeout value to 5.00 seconds.

AMEasure:SETTled:TYPE FLAT:EXPonential

Usage:	Sets or queries the settling type selected for the designated AME.
Query:	`AME[1–4]:SETT:TYPE?` returns the selected settling type for the designated AME.
***RST:**	Sets the settling type to EXPonential for all AMEasures.

AMEasure:SETTled:VARiation:AMOunt <numeric_value>

Usage:	Sets or queries the Variation percentage setting in the AA measurements settling menu.
Range:	0 to 100%
Query:	`AME:SETT:VAR:AMO?` returns variation setting in percentage that will be used to determine that settling should be restarted. The parameter being checked for change depends on the setting of the Variation type in the `AME:SETT:VAR:TYPE` command.
***RST:**	Sets variation amount to 2.00%.

AMEasure:SETTled:VARiation:TYPE DEPendent|INDepen-dent|BOTH|EITHer

Usage:	Sets or queries the type of variation being looked for to determine if settling needs to be restarted. The choices are BOTH for both amplitude and frequency, EITHer for either amplitude or frequency, INDependent for looking only for independent axis variations, and DEPendent for looking only for dependent axis variations.
Query:	`AME:SETT:VAR:TYPE?` returns the settling variation type setting for the designated AME. Responses are DEPENDENT, INDEPENDENT, BOTH, EITHER as set for the type.
***RST:**	Sets the settling variation type to independent?? for all measurements.

`AMEasure[1–4]:SWEep:DIRection RISing|FALLing`

Usage:	Sets or queries the direction of the sweep being looked for by the AM700.
Query:	`AME[1–4]:SWE:DIR?` returns RISING or FALLING for the setting of sweep recognition for the designated AME.
***RST:**	Sets sweep detection to Rising sweeps.

`AMEasure[1–4]:SWEep:FREQuency:DELta <numeric_value>`

Usage:	Sets or queries the amount of frequency change to use to determine that a frequency sweep is occurring.
Range:	0 to 500 Hz.
Query:	`AME[1–4]:SWE:FREQ:DEL?` returns the numeric value in Hz or kHz depending on the setting of `UNIT:FREQ Hz|kHz` for the designated measurement.
***RST:**	Set Delta to 10 Hz.

`AMEasure[1–4]:SWEep:LEVel:DELta <numeric_value>`

Usage:	Sets or queries the amount of Amplitude change to use to determine that a voltage sweep is occurring.
Range:	0.00 to 173.62 V 0.00 to 17300.00 mV –97.7816 to 47.014 dBu –100.00 to 44.7920 dBV
Units:	Units of the parameter accepted by the AM700 or reported back by the AM700 depend on the setting of `UNIT:VOLT [V|mV|dBu|dBV|dBFS]`.

NOTE: *Numeric values reported back by the AM700 will match the units set by SCPI, but will not match the displayed values when the front panel set units and the SCPI set units do not match.*

Query: `AME[1–4]:SWE:LEV:DEL?` returns the numeric value of the minimum level change that will be used to recognize that a voltage sweep is occuring. The numeric value reported back matches the units set by SCPI in the UNIT:VOLT command.

***RST:** Set Frequency Min Rise/Fall to 10.00 Hz.

AMEasure[1–4]:SWEep:MODE FREQuency|LEVel

Usage: Sets or queries the type of sweep, frequency or voltage, that will be detected.

Query: `AME[1–4]:SWE:MODE?` returns FREQUENCY or LEVEL for the setting of the sweep type detection for the designated measurement.

***RST:** Sets sweep detection type to Frequency sweep in all measurements.

AMEasure[1–4]:SWEep:STATe <Boolean>

Parameters: `ON|OFF and 1|0`

Usage: Sets or queires the state of the AM700 SWEep recognition, ON or OFF

Query: `AME[1–4]:SWE:STAT?` return 0 for sweep detection disabled or 1 for enabled in the designated measuement.

***RST:** Sets sweep detection to enabled in all measurements.

How FFT Uses The AMEasure Subsystem

FFT supports 5 separate measurements. They are:

AMEasure1: FFT on channel 1

AMEasure2: FFT on channel 2

AMEasure3: Configurable Multitone

AMEasure4: Configurable Multitone

AMEasure5: Configurable Multitone

These measurements 'assignments' are described by the the AME:MODE command. FFT implements AME:MODE, with the following initial values for each suffix combination:

AME1:MODE FFT

AME2:MODE FFT

AME3:MODE MTONe

AME4:MODE MTONe

AME5:MODE MTONe

The AME:MODE values (and hence, the measurement mode) are not changeable within FFT. That is to say, the type of multitone measurement made by measurements 3 through 5 can be altered (via AMEasure), but the measurements can not be configured to make FFT measurements.

NOTE: *AME:MODE accepts other values (XY, REGulation, RTDisplay). These parameters are only applicable in Audio Analyzer.*

Each of the five listed measurements can be individually enabled and disabled. The command to enable/disable the measurements is:

AME[1–5]:STAT <boolean>

All five measurements are enabled when FFT starts.

The FFT measurements (measurements 1 and 2) are not configurable from within the AMEasure subsystem.

The multitone measurements (measurements 3, 4, and 5) are configurable within the AMEasure subsystem.

AMEasure[1–5]:MODE?

Usage: Queries the designated AMEasure to determine what mode it is operating in. These modes are fixed by design so that AME[1,2] always return FFT and AME[3–5] always return MTONE.

Query: `AME[1–5]:MODE?` returns FFT or MTONE depending on the AME queried.

***RST:** No *RST.

AMEasure[1–5]:STATe <Boolean>

Usage: Turns the designated AMEasure (1 through 5) ON or OFF.

Parameters: ON or OFF and 1 or 0.

Query: `AME[1–5]:STAT? returns 1 for on or 0 for off.`

***RST:** Sets AME[1–4] states on.

AMEasure[3–5]:MTONe:FUNCtion LEVel|CROSstalk|LDIFfer-ence|PDIFference|MDIStortion

Usage: Sets or queries the function attached to the MTONe measurement.

Parameters:

LEVel	Multitone Level on AME:MTON:INP channel.
CROSstalk	Crosstalk into AME:MTON:INP channel from the other channel. the AME:MTON:INP channel is the undriven channel.
LDIFference	Level difference between channel 1 and channel 2. AME:MTON:INP value is ignored for this measurement, since both channels must be used to make the measurement.

PDIFference	Phase difference between channel 1 and channel 2. AME:MTON:INP value is ignored for this measurement, since both channels must be used to make the measurement.
MDIStortion	Multitone distortion into AME:MTON:INP channel from the other channel.

Query: `AME[3–5]:MTON:FUNC?` returns the selected measurement for the designated AME.

***RST:**

AME3	LEVEL
AME4	LEVEL
AME5	LDIFFERENCE

AMEasure[3–5]:MTONe:INPut CHANnel1|CHANnel2

Usage: This configures the measurement channel on which the requested multitone measurement is made. The use of this channel is described specifically for each possible MTONe[3–5]:FUNCtion value.

Query: `AME[3–5]:MTON:INP?` returns the input channel for the designated AME.

***RST:**

AME3	CHANNEL1
AME4	CHANNEL2
AME5	CHANNEL1

AMEasure Subsystem (Digital Interface Tester)

The Digital Interface Tester has AMEasure command support for four separate measurements. They are:

AMEasure1: Bit Activity
AMEasure2: Channel Status
AMEasure3: Eye Diagram
AMEasure4: Jitter Spectrum

`AMEasure:DAUDio:CSTatus[1–2]:DATA?`

Suffixes: CST1 is the first or left channel
CST2 is the second or right channel.

Usage: Query only. This query is available only while the Digital Interface Tester is running, and the numbers are updated only when the Channel Status table display is visible. A query made when the Channel Status table is not displayed will give a return, but that return will be the last received data (if any has been received).

Response: This query returns 24 integers, each corresponding to a byte of channel status information for the selected channel. The encoding of the integers is decimal, numeric order. These values correspond exactly with the raw channel status displays.

***RST:** No *RST event.

`AMEasure:DAUDio:PPJitter?`

Usage: Query–only. The data returned by this query is updated only when the eye diagram display is visible on the AM700's screen.

Response: This query returns a floating point value representing the currently measured peak–to–peak jitter measurement.

`AMEasure[1–4]:STATe ON|OFF`

Usage: Turn the designated AMEasure for the Digital Interface Tester on or off.

Query:	`AME[1–4]:STAT?` returns 0 for off and 1 for on for the designated AMEasure.
***RST:**	Sets AME1 state on and AME{2–4] states off.

AMEasure (Audio Monitor)

`AMEasure[1–2]:STATe?`

Suffixes:	AME1	Scope Channel 1
	AME2	Scope Channel 2

Usage: Sets or queries the state of the designated AMEasurement.

Query: `AME[1–2]:STAT?` returns 1 or 0 for ON or OFF.

***RST:** Sets AME[1–2] states on.

CALCulate Subsystem (Average)

Usage:	The CALCulate subsystem for Average control the number of averages, the averaging mode, and turning averaging on and off. Averaging is available in the FFT Analyzer and the Jitter Spectrum display of the Digital Interface Tester.
Suffixes:	CALC3 FFT View 1 and Digital Interface Tester Jitter View. CALC4 FFT View 2

CALCulate[3|4]:AVERage:COUNt <numeric_value>

Usage:	Sets or queries the number of acquisitions to be averaged together for the averaged trace. Exponential averaging is a noise reduction tool used to remove random noise from the acquired data display. Hold MIN and Hold MAX are used to hold the minimum or maximum values for a data point in the trace.
Range:	1 to 9999
Query:	`CALCulate[3|4]:AVERage:COUNT?` returns the number of averages setting from 1 to 9999.
Query:	CALC:AVER:COUN? returns the current setting
***RST:**	Sets the AVER:COUN to 32.

CALCulate[3|4]:AVERage:STATe ON|OFF

Usage:	Sets or queries the state of the averaging for the designated CALC block.
Query:	`CALC[3|4]:AVER:STAT?` returns 0 for off or 1 for on for the designated CALC block.
***RST:**	Sets AVER:STAT to off.

CALCulate[3|4]:AVERage:TYPE MAXimum|MINimum|EXPonential

Usage:	Sets or queries the current averaging mode for the designated CALC block.

Query: `CALC[3|4]:AVER:TYPE?` returns the current setting for the designated CALC block as MAXIMUM, MINIMUM, or EXPONENTIAL.

***RST:** Sets AVER:TYPE to EXPonential.

CALCulate[3|4]:FEED?

Usage: Query to determine the signal feed for the AVERage CALC blocks.

Query: `CALC[3|4]:FEED?` returns the feed for the designated CALC block. FFT CALC3 is fed by `’CALC:TRAN:FREQ:MAG’`, CALC4 is fed by `’CALC2:TRAN:FREQ:MAG’`, and Jitter Spectrum CALC3 is fed by `’SENse 11’`. These feeds cannot be changed.

CALCulate Subsystem (FFT Analyzer)

Usage: This is the CALCulate Subsystem for the FFT Analyzer. The CALCulate subsystem performs post–acquisition data processing. Functions in the SENSe subsystem are related to data acquisition, while CALCulate subsystem operates on the data acquired by a SENSe function.

A number of independent subsystems comprise the CALCulate subsystem. Each of the subsystems is a sub–block of the CALCulate block. Data flows through the sub–blocks in serial fashion. The CALCulate block has more than one instance of some of the sub–blocks. The same named sub–blocks are differentiated by a numeric suffix.

Suffixes:

CALCulate1	Measurement Channel 1, Zoom
CALCulate2	Measurement Channel 1, Zoom
CALCulate3	Measurement Channel 1, Average
CALCulate4	Measurement Channel 1, Average

CALCulate[1|2]:FEED?

Usage: Queries the data flow to the CALCulate block.

Query: `CALC1:FEED?` returns `”CSTM”` and `CALC2:FEED?` returns `”CSTR2”`.

CALCulate[1|2]:TRANsform:FREQuency:STARt <numeric_value>

Usage: Specifies the start frequency of FFT output.

Range: Range and resolution are dependent on the input and sampling rate.

Input	Sampling Rate	Range (Hz)	Resolution (Hz)
High Res	48 kHz	0 to 19781.77	46.875
High BW	192 kHz	0 to 63975.09	187.06
AES	48 kHz	0 to 19781.77	46.875
	44.1 kHz	0 to 18174.5	43.0644
	32 kHz	0 to 13187.8	31.25

Query: `CALCulate[1|2]:TRANsform:FREQuency:STARt?` returns the span start frequency.

***RST:** Sets STARt to 20

CALCulate[1|2]:TRANsform:FREQuency:SPAN <numeric_value>

Usage: Specifies the frequency span of FFT output.

Range: Range of span <numeric_value> is dependent on the input.
Range = (427/512) * Sampling Rate * 0.5 / Zoom Factor.

Input	Sampling Rate	Range (Hz)	Zoom Factor
High Res	48 kHz	200.156	100
		400.312	50
		800.624	25
		1000.78	20
		2000.56	10
		4003.12	5
		5003.9	4
		10007.8	2
		20015.6	1 (Full span)
High BW	192 kHz	16012.5	5
		20015.6	4
		40031.2	2
		80062.5	1 (Full span)
AES	48 kHz	Same as for Hi Res input	Same as for Hi Res input
AES	44.1 kHz	183.894	100
		367.787	50
		735.574	25
		918.468	20

		1838.94	10
		3677.87	5
		4597.34	4
		9194.68	2
		18389.4	1 (Full span)
AES	32 kHz	133.438	100
		266.875	50
		533.75	25
		667.187	20
		1334.38	10
		2668.75	5
		3335.94	4
		6671.87	2
		13343.8	1 (Full span)

Units: Hz

Query: `CALCulate[1|2]:TRANsform:FREQuency:SPAN?` returns the FFT frequency span.

***RST:** Sets the SPAN to full.

CALCulate[1|2]:TRANsform:FREQuency:CENTer <numeric_value>

Usage: Specifies the center frequency of FFT output.

Range: Range is dependent on the input. The actual frequency set depends on the available resolution.

(Span * 0.5) to (Full span – 0.5 * span)

Units: Hz

Resolution: Resolution = Sampling Rate / 1024

Default: Omitting the suffix number of CALC is the same as CALC1.

Query: `CALCulate[1,2]:TRANsform:FREQuency:CENTer?` returns the CENTer frequency setting.

Error: Entering a number for CENTer outside the span range does what? Entering a number that is not on a resolution point does what?

***RST:** Sets CENTer to MID full span.

Example: CALCulate1:TRANsform:FREQuency:CENTer 2500
or
calc1:tran:freq:cent 2500

CALCulate[1|2]:TRANsform:FREQuency:WINDow UNIForm|HANNing|FLATop|KBESsel|BHARris|SRAJan

Usage: This specifies the type of data windowing done prior to the transformation.

Parameters: `UNIForm|HANNing|FLATop|KBESsel|BHARris|SRAJan`

Query: `CALC[1|2]:TRAN:FREQ:WIND?` returns the selected FFT window for the specified calc block.

Default: Omitting the suffix on CALCulate is the same as CALC1.

***RST:** At *RST, the window is set to BHARris (BH4).

CALibration Subsystem

CALibration[:ALL]?

Usage: This query causes the AM700 to initiate a calibration procedure and return a numeric response that indicates the result of the calibration.

Response: A numeric value is returned which represents an error status. A zero is returned if the calibration succeeds.

NOTE: *The “Calibrate Now” button is provided in the user interface as a way to perform the “CAL:ALL?” query. The status code, if nonzero, will be reported on the user interface only if the calibration process was initiated from the user interface. Note that calibration takes several seconds.*

CALibration:INPut:POWer:REFerence:RESistance <numeric_value>

Usage: Set the user’s external resistor values to use in the AM700 display of input power (dBm).

Range: 0.001 to 200000.0

Resolution: 0.001

Units: Ohms (impedance)

***RST:** No change

NOTE: *The input dBm calculation uses this resistance exclusively, and does not include the effects of the AM700’s internal load impedance*

CALibration:OUTPut:POWer:REFerence:RESistance <numeric_value>

Usage:	Set the user’s external resistor values to use in the AM700 display of output power (dBm).
Range:	0.001 to 200000.0
Resolution:	0.001
Units:	Ohms (impedance)
***RST:**	No change

NOTE: *Output dBm calculation takes both this reference resistance and the generator source impedance into account.*

CALibration:VOLTage:FS <numeric_value>

Usage:	Sets or queries the rms voltage corresponding to 0 dBFS. This calibration command is used so the digital generator can follow the analog generator, and to enable analog and digital measurements to be overlayed in the same view.
Units:	Volts
***RST:**	No change

CMODe Subsystem (Audio Analyzer)

Usage: The CMODe:ENABle commands control the display of the real–time measurement readout in the Real Time window of Audio Analyzer. The CMODe:FILTer command select from a set of standard filters for use in making Audio Analyzer measurements.

CMODe:ENABle:CHANnel[1|2] <Boolean>

Usage: Sets or queries the state of the Enables for channels 1 and 2 in the Audio Analyzer.

Query: `CMOD:ENAL:CHAN[1|2]?` returns 0 for disabled or 1 for enabled for the designated channel.

***RST:** Sets Channel Enables to enabled.

CMODe:ENABle:IMD <Boolean>

Usage: Turns the intermodulation distortation measurement on and off in the Real–Time measurement window of Audio Analyzer.

Query: `CMOD:ENAL:IMD?` returns 0 for IMD measurement disabled or 1 for IMD measurement enabled in the Audio Analyzer Real–Time window.

***RST:** Sets IMD measurement enable off.

CMODe:ENABle:STER <Boolean>

Usage: Turns the Stereo measurements on and off in the Real–Time measurement window of Audio Analyzer.

Query: `CMOD:ENAB:STER?` returns 0 for Stereo measurements disabled or 1 for Stereo measurements enabled in the Audio Analyzer Real–Time window.

***RST:** Sets Stereo measurements enable to off.

`CMODe:ENABle:THD <Boolean>`

Usage: Turns the THD measurements on and off in the Real_Time measurement window of Audio Analyzer.

Query: `CMOD:ENAB:THD?` returns 0 for THD measurement disabled or 1 for THD measurement enabled in the Audio Analyzer Real–Time window.

***RST:** Sets the THD enable measurement to off.

`CMODe:ENABle:WOW <Boolean>`

Usage: Turns the Wow and Flutter measurement on and off in the Realtime measurements window of Audio Analyzer.

Query: `CMOD:ENAB:WOW?` returns 0 for WOW measurement disabled or 1 for WOW measurement enabled in the Audio Analyzer Real–Time window.

***RST:** Sets the Wow&Flutter enable to off.

`CMODe:FILTer:STATe <Boolean>`

Usage: Sets or queries the state of the Filter selection of Audio Analyzer. If you wish no filter on either channel, you must set CMODe:FILT:TYPE{1|2} to ’NONE’ for the channel you want to remain unfiltered. This command, `CMOD:FILT:STAT ON|OFF` controls the filter state for both channels.

Query: `CMOD:FILT:STAT?` returns 0 for off or 1 for on. The filter state applies to both Channels.

`CMODe:FILTer:TYPE[1|2] ’filter_name’`

Usage: Selects the filter type used for Audio Analyzer measurements. Note that the parameters are case sensitive and must be entered as indicated in the parameters list in single quotation marks.

Suffixes:

TYPE1	Channel 1 Filter
TYPE2	Channel 2 Filter

Parameters:

'NONE'	No filter type selected
'CCIR468'	CCIR 468
'CCIRARM'	CCIR ARM
'AWeight'	A Weighting
'BWeight'	B Weighting
'CMessage'	C Message
'CWeight'	C Weighting
'FWeight'	F Weighting
'LP15000'	15 kHz low pass
'HP400'	400 Hz high pass

Query: `CMOD:FILT:TYPE[1|2]?` returns the currently selected 'filter_name' in double quotation marks, eg., `"CCIR468"`, for the designated channel.

***RST:** Sets 'filter_name' to "NONE" and turns off the filter selection.

CMODe Subsystem (FFT/MTONe Analyzer)

Usage: Commands under CMODe:FFT are used to switch the FFT Analyzer operations between Zoom mode and Multitone measurements and to designate signal sources for the multitone signal. The CMODe:FFT:WINDow commands permit specifying a user specified window file.

CMODe:FFT FFT|MTONe

Usage: Selects either FFT (Zoom) or Multitone measurements for the FFT Analyzer.

Default: The power on default for CMODe is FFT.

Query: `CMOD:FFT?` returns the selection for the FFT Analyzer measurement as either FFT or MTONe.

***RST:** After *RST, CMODe is set to FFT.

CMODe:FFT:MTONe[1|2]:AVECtor?

Usage: Returns the amplitude of the individual tones used to generate the designated multitone signal.

CMODe:FFT:MTONe[1|2]:FILE:NAME ’file_name’

Usage: Names the file used to generate the designated multitone when file mode is selected.

Query: `CMOD:FFT:MTON[1|2]:FILE:NAME?` returns the file name of the file selected to supply the data used to generate the designated multitone signal.

***RST:** Filename is set to `”asgmton1.ton”` for MTON1 and MTON2.

CMODe:FFT:MTONe[1|2]:FVECtor?

Usage: Returns the frequency of the individual tones used to generate the designated multitone signal.

CMODe:FFT:MTONe[1|2]:NTONes?

Usage: Returns the number of tones making up the designated multitone signal.

CMODe:FFT:MTONe[1|2]:RLENgth?

Usage: Returns the record length of the file used to create the designated multitone signal.

CMODe:FFT:MTONe[1|2]:SOURce GENerator|FILE

Usage: Selects the source of the multitone signal from either the generator or a file. In GENerator mode, the `CMOD:FFT:MTON:SUFFix <numerical_value> command` defines the generator selected for the multitone signal. In FILE mode, the file used is that named in the `CMOD:FFT:MTON:FILE:NAME <file_name>` command.

Query: `CMODe:FFT:MTONe[1|2]:SOURce? returns GENERATOR or FILE as the source of the designated multitone.`

***RST:** Sets the multitone source to GENerator.

CMODe:FFT:MTONe[1|2]:SUFFix <numerical_value>

Usage: Designates the generator used to send the multitone signal when the SOURce is set to GENerator.

Suffixes: SOURce suffixes are:

1	SOUR1	HRES analog generator A
2	SOUR2	HRES analog generator B
3	SOUR3	HBW analog generator A
4	SOUR4	HBW analog generator B
5	SOUR5	Digital generator A
6	SOUR6	Digital generator B
7	SOUR7	DSP A
8	SOUR8	DSP B

Query:	`CMODe:FFT:MTONe[1|2]:SUFFix?` returns the number of the source (generator) designated to send the multitone signal.
Example:	`CMOD:FFT:MTON1:SUFF 5` selects digital generator channel A as the source of the multitone signal for multitone 1.
***RST:**	CMOD:FFT:MTON1:SUFF set to 1. CMOD:FFT:MTON2:SUFF set to 2.

CMODe:FFT:WINDow:FILE:NAME <file_name>

Usage:	Designates the file name for a user–specified window.
Query:	`CMODe:FFT:WINDow:FILE:NAME?` returns the file name that will be used when the WINDow selection is USER.
***RST:**	No *RST change of file name or default. The default file used at power on will not be empty.

CMODe:FFT:WINDow:FILE:LNAMe?

Usage:	Query only that returns the file name for a user–specified window.
Query:	`CMODe:FFT:WINDow:FILE:LNAMe?` returns the selected window filename with path. Example `”rom:/window/hamming.win”`
***RST:**	No *RST change of file name or default. The default file used at power on will not be empty.

CMODe Subsystem (SOUNd and DAUDio)

Usage:	The CMODe commands found here are used for setting the digital audio sample rate clock source and turning off Sound and selecting the Sound source.

CMODe:DAUDio:SRATe:SOURce CSTatus|CLOCk

Usage:	Selects the users preference for determination of audio sampling rate on input digital audio signals. Digital audio has a sample rate embedded in its channel status block, but can be sent on the interface at a different sampling rate. When this audio is received with the indicated (cstatus) rate different from the interface clock frequency, this command allows the user to tell which to believe.
***RST:**	*rst value is CSTatus. The indicated cstatus rate is believed.

NOTE: *One of the sample rates allowed in AES3 is ”not indicated.” If the user prefers CSTatus mode and the receive channel status is ”not indicated,” the interface clock frequency will be used; but the setting of this command is not changed.*

CMODe:SOUNd:STATe ON|OFF

Usage:	Turns listen on/off (same as front panel Sound button).
Query:	`CMOD:SOUN:STAT?`
***RST:**	Sets Sound State off.

CMODe:SOUNd:SOURce ANALog|DIGital

Usage:	Select what is listened to, the analog signal or the digital signal (a selection in the Sound menu).
Query:	`CMOD:SOUN:SOUR?`
***RST:**	Sets Sound Source to Analog.

CMODe Subsystem (Trigger)

Usage:	The CMODe commands found here are used to control the Trigger modes of the Audio Monitor.

CMODe:TRIGger:LEVel <numeric_value>

Usage:	Sets the trigger level for the Audio Monitor trigger system.
Range:	–173.62 to +173.62 V
Units:	V or mV. Units follows the setting of the UNIT:VOLT command.
Query:	`CMOD:TRIG:LEV?` returns the current trigger level setting in volts or millivolts.
***RST:**	Sets trigger level to 0.00 V.

CMODe:TRIGger:MODE AUTO|NORMal

Usage:	Select Auto or normal trigger mode for the Audio Monitor trigger system. Auto trigger mode permits the acquisition to free run in the absence of a qualified trigger signal and trigger when a qualified trigger signal is received. Normal trigger mode requires that a qualified trigger signal of the correct level and slope be received to trigger an acquisition. In normal mode the trace display is erased in the absence of a trigger event.
Query:	`CMOD:TRIG:MODE?` retuns the current trigger mode setting.
***RST:**	Sets the trigger mode to AUTO.

CMODe:TRIGger:SLOPe RISing|FALLing

Usage:	Selects either the rising or the falling edge of the selected trigger signal as the triggering edge when the Audio Monitor trigger system is enabled.
Query:	`CMOD:TRIG:SLOP?` returns the trigger slope setting.
***RST:**	Sets TRIGger SLOPe to RISing.

CMODe:TRIGger:SOURce CHANnel1|CHANnel2|EXTernal

Usage: Selects the source to supply the trigger signal. When channel 1 and channel 2 are a stereo pair, the phase difference between trace 1 and trace 2 is a measure of the phase difference between the input signals with either a channel 1 or a channel 2 trigger source. If the signals are not a stereo pair, both traces will still be stable even if they are not frequency related. In that case, the phase difference information is not retained in the trace displays.

Query: `CMOD:TRIG:SOUR?`

***RST:** Sets the SOURce to CHANnel1.

CSTReam Subsystem

Usage: CSTReam is used to indicate the two preferred inputs to the measurement applications. The AM700 has many possible input channels and sources, but most applications only can measure two channels of audio, and the CSTReam feeds are constrained as appropriate for the measurement being made.

Range: CSTReam1, CSTReam2

CSTReam1 feeds channel one of the application.
CSTReam2 feeds channel two of the application.

CSTReam[1|2]:FEED <data_handle>

Usage: <data_handle> : the name of the selected audio for this input channel, given as the name of one of the SENSe subsystems.

Parameters: CSTReam1:FEED ‘SENSe1’
CSTReam2:FEED ‘SENSe3’

Parameters: Feed <data_handles> are sense outputs. The possible sense feeds are:

SENS1	Analog A High Res A/D
SENS2	Analog A High BW A/D
SENS3	Analog B High Res A/D
SENS4	Analog B High BW A/D
SENS5	Digital A Main
SENS6	Digital B Main
SENS7	DSP A Port
SENS8	DSP B Port
SENS9	Digital A Ref
SENS10	Digital B Ref

Default: Omitting the suffix on CSTReam is the same as CSTReam1.

Query: `CSTR[1|2]:FEED?` returns the data feed for the designated CSTReam.

Example: Use SENSe1 audio (Analog A high resolution A/D converter output) for the application's channel one measurements:

```
CSTR1:FEED 'SENS1'
```

DISPlay Subsystem

The DISPlay Subsystem controls the selection and presentation of text, graphs, and TRACe information. DISPlay does not modify the way in which data is output to a controller. DISPlays are separated into WINDows. A window consits of three overlapping planes: text, graphics, and traces and all of these may be displayed at the same time in a given window.

`Usage:` Display subsystem commands set various parameters of the display including intensity, views displayed, measurements displayed in the views, number of traces displayed in the views. text strings in the dialog boxes, and generator status display (what will be settable in this window?).

`Error:` If a display command is used that does not apply to a designated window's features, it will not work and an error will be generated.

`DISPlay:BRIGhtness <numeric_value>`

`Usage:` Set the display intensity.

`Range:` <numeric_value> range is 0 to 10 where 0 is full dim and 10 is full bright.

`Query:` `DISPlay:BRIGhtness?` returns the present display brightness level setting.

`*RST:` Sets the BRIGHtness to a visible level.

`DISPlay:ENABle ON|OFF`

`Usage:` Toggles the complete display, both the AM700 and the rear panel VGA output, on and off.

`Parameters:`

0	turns off the display
1	turns on the display

`*RST:` Enable is set to ON

DISPlay[:WINDow(1-n|60|99)][:STATe] <Boolean>

Usage: Controls whether WINDow(n) is visible or not. The command DISPlay ON|OFF refers to this node. Multiple instances of WINDow may exist under a particular DISPlay. Omitting the suffix from WINDow defaults to WINDow1.

Parameters:

0	Turns the designated window off.
1	Turns the designated window on.

Range: Windows 1-n, specify the view windows in application. There are four graphical display windows plus the real time view in Audio Analyzer and two in the FFT Analyzer. Window60 is the Generator Status display, Window98 is the notifier display, and Window99 is the text window. If a command in the following list of commands does not apply to a window’s features, (it won’t work, an error will be generated?)

Query: `DISP:WINDow(1-n|60|99):STATe?` returns 0 for off or 1 for on for the designated window. Omitting the suffix from WINDow defaults to WINDow1. Likewise, omitting all the optional statements as in DISP?, defaults to the state of WINDow1.

***RST:** `DISP:WIND1:STAT` is set to ON.

DISPlay:WINDow98:DISMiss:[ALL]

Usage: Turns off all notifier windows that occur in the display to show a warning or provide some item of information about some event.

Query: No query for this command. The associated DISP:WIND98:STAT? query is used to determine if a notifier window is displayed.

***RST:** All notifiers are removed from the display.

DISPlay:WINDow98:DISMiss:ONE

Usage: Turns off the last notifier window that occurs in the display to show a warning or provide some item of information about some event. If more than one notifier is displayed, a second use of this command then turns off the next to last notifier window in the display. Use the `DISP:WIND98:DISM:[ALL]` command to turn off all the notifiers.

Query: No query for this command. The associated DISP:WIND98:STAT? query is used to determine if a notifier window is displayed.

DISPlay:WINDow98:STATe?

Query: DISP:WIND98:STAT? returns a 1 if there is a notifier being displayed or 0 if not.

DISPlay[:WINDow(1-4)]:TYPe <display_name>

Usage: Controls the method for display of the measurement data in the four graphical views, 1 through 4. The RT view, WIND5, is fixed in the method of display to numerical readouts of the measurement data. The availability of display types is measurement specific.

FFT	Interpolator, Bar Graph, and Spectrogram	
Multitone	Point Plot and Table	
Analyzer	Point Plot and Table	
Monitor	Interpolator only	
Digital Interface Tester		
	Bit Activity	BIT
	Channel Status	CST (See also `DISPlay[WINDow(1-4)]:TRACe[1|2]:STYle:CSTatus` commands)
	Eye Diagram	EYED
	Jitter	Interpolator, Bar Graph, and Spectrogram

Parameters:

INTerpolator	Plot of fft data points with interpolated data for a continuous live trace.
PPlot	Point-to-point plot of frequency-amplitude pairs
BGRaph	Bar graph display of amplitude and fft bin width
SPECtrogram	Time versus Frequency with Z–Axis display of amplitude
TABLe	Tabular display of frequency-amplitude pairs.

Parameters:

BIT	Bit Activity
CST	Channel Status

EYED	Eye Diagram
INT	Interpolator

Query: `DISP:WIND3:TYPe?` returns the type string for the designated window.

***RST:** Sets TYPe to INTerpolator.

DISPlay[:WINDow(1-4)]:FEED(1-10) <data_handle>

Example: DISP:WIND2:FEED2 ’AMEasure2’

FEED[1-10] are supported, but normally FEED1 and FEED2 will be used.

<data_handle> for the FEED are the names of outputs the short cut measurements: AMEasure1 and AMEasure2. From the front panel, the feeds will always be FEED1 ’AME1’ and FEED2 ’AME2’, but the SCPI commands permit you to alter that selection.

Query: `DISP:WIND(1-4):FEED[1|2]?`

***RST:** Sets Window1 to feed 1 ‘ame1’ and Window2 to feed2 ‘ame2’

DISPlay[:WINDow(1–4)]:CURSor[:POSition(1-2)] <x-axis_value>

Usage: Sets the cursor position of the designated cursor in the designated window to a given x-axis value. The x-axis scaling is application specific.

Range: 0 to maximum x-axis value in display.

Query: `DISPlay[:WINDow(1-4)]:CURSor[:POSition[1|2]]?`

***RST:** Sets cursor positions to about 1/4 and 3/4 the x–axis scale total range except in the monitor application. There both cursors are set to 1 second.

DISPlay[:WINDow]:CURSor:STATe <Boolean>

Usage:	Used to turn cursors on and off globally in all windows of an application.
Query:	`DISP:WIND:CURS:STAT?`
***RST:**	Turns cursor state off.

DISPlay[:WINDow(1-4)]:CURSor:CONStrain <Boolean>

Usage:	Constrains cursors to valid trace data points (both real and interpolated) when set to 1. When set to 0, cursors may be positioned to areas of the views that do not have trace data. (This is the Snap to Data choice in the cursor menu.)
Query:	`DISPlay[:WINDow(1-4)]:CURSor:CONStrain?` returns 1 for ON or 0 for OFF.
***RST:**	Sets CONStrain to off.

DISPlay:WINDow60:STATe ON|OFF

Usage:	Sets or queries the display state of the generator status panel.
Query:	`DISPlay:WINDow60:STATe?` returns 0 or 1 for OFF or ON.
***RST:**	Turns off the Generator status window.

DISPlay:WINDow99:STATe <Boolean>

Usage:	Sets or queries the state of the dialog box display.
Query:	`DISP:WIND99:STAT?` returns 0 or 1 for OFF or ON.
***RST:**	Turns off the dialog box display.

DISPlay:WINDow99:TEXT[:DATA] <string>

Usage: Permits entering text in a dialog box. Writing to a display that has been previously written overwrites the current entry. If the new string is shorter that the current string, excess characters are (cleared or remain).

Parameters: Data <string> can be up to eight lines of about 24 characters. Wrapping is done on the text with spaces, and the text is center justified. Strings should not be longer than 24 characters without a space as the overflow text will be outside the display area of the window.

Example: `DISP:WIND99:TEXT:DATA 'THIS IS A TEXT STRING'`

Query: `DISP:WIND99:TEXT:DATA?` returns the text string or an empty string is there is no data.

DISPlay:WINDow99:TEXT:CLEar

Usage: Clears text from the dialog box, WINDow99.

DISPlay[:WINDow(1-4)]:X[:AXIS]:JOIN <Boolean>

Usage: Joins the X-axes of two views. They are normally independent of the traces, though each trace has X and Y positions. Each view has an x-axis that is independent of the traces being displayed.

Query: `disp:wind(1–4):x:axis:join?` returns 1 for joined or 0 for not joined.

***RST:** Sets JOIN for 0.

DISPlay[:WINDow(1-4)]:Y[:AXIS]:DUAL <Boolean>

Usage: Sets or queries the state of the dual-trace display of traces.

Query: `DISP:WINDow2:Y:AXIS:DUAL?` returns 1 for dual ON and 0 for dual OFF (single trace).

***RST:** Set DUAL Off.

`DISPlay[:WINDow(1-4)]:Y[:AXIS]:JOIN <Boolean>`

Usage: Joins the Y–axes of the two views.

Query: `disp:wind(1-4):y:axis:join?` returns 1 for joined or 0 for not joined.

***RST:** Sets JOIN Off.

`DISPlay[:WINDow(1-4)]:TRACe[1|2]:PERSistence <Boolean>`

Usage: Used to set or query the state of persistence in the interpolator traces.

Query: `DISP:WIND1:TRAC2:PERS?` returns the state of trace persistence (1 for ON or 0 for OFF) for trace two in window 1.

***RST:** Sets PERSistence Off.

`DISPlay[:WINDow(1-4)]:TRACe[1|2]:STYle:CSTatus:FORMat <char_data>`

Usage: Used to set or query the format of the Digital Interface Tester Channel Status display. Either option for TRACe may be used, or it may be omitted.

Parameters: Character data values are:

HEXadecimal
BINary
TRANsmit
DECoded

Query: DISP:WIND(1–4):TRAC:STY:CST:FORM?

***RST:** Sets the FORMat to DECoded.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:STYle:CSTatus:SDIFfs <Boolean>

Usage: Used to set show difference between subframe 1 and subframe2 in the Digital Interface Tester Channel Status display on or off for the designated WINDow. When set to on, the differences between the two subframes are underlined in the 1/0 display. Either option for TRACe may be used, or it may be omitted.

Query: `DISP:WIND(1-4):TRAC[1-2]:STY:CST:SDIF?` returns 1 for ON or 0 for OFF for the designated WINDow.

***RST:** Sets SDIFfs ON.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:STYle:CSTatus:SUBFrame A|B|BOTH

Usage: Sets the Digital Interface Tester Bit Activity display to show either A or B subframes or both. Either option for TRACe may be used, or it may be omitted.

Query: `DISP:WIND(1-4):TRAC[1|2]:STY:CST:SUBF?` returns the setting as A, B, or BOTH.

***RST:** Sets SUBFrame to BOTH.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:STYLe:PLOT:LINes <Boolean>

Usage: Sets the Audio Analyzer display of data to be a line graph of the data. Usually both line plot and point plot will be on. One must be, and attempting to set both to zero will cause the other to toggle back to a 1.

Query: `DISP:WIND3:TRAC2:STYL:PLOT:LIN?` returns 0 for off or 1 or on.

***RST:** Sets line plot on.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:STYLe:PLOT:POINts <Boolean>

Usage: Sets the Audio Analyzer display of data to be a point. The position of the point above the baseline is an indication of data point value. Usually both point plot and line plot will be on. One must be, and attempting to set both to zero will cause the other to toggle back to a 1.

Query: `DISP:WIND2:TRAC1:STYL:PLOT:POIN?` returns 0 for off or 1 for on.

***RST:** Sets point plot on.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:X[:SCALe]:AUTO ONCE

Usage: This command scales the X-axis TRACe[1|2] to display the full trace horizontally once for each time this command is used.

Query: `DISP:WIND1:TRAC1:X:SCAL:AUTO?`

DISPlay[:WINDow(1-4)]:TRACe[1|2]:X[:SCALe]:CENTer <numeric_value>

Usage: Sets or queries the valued represented by the center point of the x-axis. This value may be bounded by a range of data. When a new CENTer value is entered, the divisions of the scale remain the same, but the RIGHT and LEFT values are changed.

Query: `DISP:WIND1:TRAC1:X:SCAL:CENT?` returns the center point value for the trace scale.

***RST:** Sets the x–axis scale center value to midrange.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:X[:SCALe]:LEFT <numeric_value>

Usage: Sets or queries the valued represented by the minimum (left) edge of the x-axis. This value may be bounded by a range of data. When a new LEFT value is

	entered, the divisions of the scale remain the same, but the CENTer and RIGHT values are changed.
Query:	`DISP:WIND2:TRAC2:X:SCAL:LEFT?` returns the leftmost point value for the named trace's scale in the designated window.
***RST:**	At *RST the LEFT value is set to the minimum value available for an application, usually 0.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:X[:SCALe]:RIGHt <numeric_value>

Usage:	Sets or queries the value represented by the maximum (right) edge of the x-axis. This value may be bounded by a range of data. When a new RIGHT value is entered, the divisions of the scale remain the same, but the CENTer and LEFT values are changed.
Query:	`DISP:WIND1:TRAC1:X:SCAL:RIGH?` returns the value of the right edge of the x-axis scale of trace 1 in window 1.
***RST:**	At *RST, the LEFT value is set to the maximum value available for the default application, for example 20000 Hz in the FFT analyzer, high resolution mode.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:X[:SCALe]:SPACing <LINear|LOGarithmic>

Usage:	Sets the horizontal scale to either linear or logarithmic display of the trace data.
Query:	`DISP:WIND1:TRAC1:X:SCAL:SPAC?` returns the type of x-axis scaling in use, either LINEAR or LOGARITHMIC, for trace 1 of window 1.
***RST:**	Sets the X spacing to LOG.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:Y[:SCALe]:AUTO ONCE

Usage: This command scales the y-axis of the designated trace to display the full amplitude of the trace data vertically.

Query: This is an event so there is no query.

***RST:** No *RST event.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:Y[:SCALe]:BOTTom <numeric_value>

Usage: Sets or queries the value represented by the minimum (bottom) edge of the display. The value may be bounded by the range of the data.

Query: `DISP:WIND2:TRAC1:Y:SCAL:BOTT?` returns the value of the bottom of the y-axis scale of trace 1 in window 2.

***RST:** Set BOTTom to 0.000.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:Y[:SCALe]:CENTer <numeric_value>

Usage: Sets or queries the value represented by the center point of the y-axis. This value may be bounded by the range of the data. When a new CENTer value is entered, the division values remain the same but the TOP and BOTTom values change.

Query: `DISP:WIND3:TRAC1:Y:SCALe:CENT?` returns the value of the center point of the y-axis scaling.

Error: Setting the <numeric_value> to a non-valid value ***(does what?)***

***RST:** Sets to the midpoint of the scale.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:Y[:SCALe]:TOP <numeric_value>

Usage:	Sets or queries the value represented by the top edge of the display. The value may be bounded by the range of data.
Range:	Depends on y–axis scale units: voltage is 173.62 Volts, dBr is 1.000.
Query:	`DISP:WIND1:TRACe1:Y:SCALe:TOP?` returns the value of the top of the y-axis scale of trace1 in window 1.
***RST:**	Set to the top limit of the scale.

DISPlay[:WINDow(1-4)]:TRACe[1|2]:Y[:SCALe]:SPACing <LINear |LOGarithmic>

Usage:	Sets the Y-axis scaling to either linear or logarithmic. If log units are in effect, the spacing remains linear.
Query:	`DISP:WIND1:TRAC1:Y:SCAL:SPAC?` returns the type of y-axis scaling in use, either LINEAR or LOGARITHMIC, for trace 1 of window 1.
***RST:**	At *RST, SPACing is set to LINear.

FORMat Subsystem

Default units are defined, where applicable, for each SCPI command. The UNIT subsystem provides a mechanism to change the default values. The units selected apply to the designated command parameters for both command and response.

FORMat:PNAMe STRing|CHARacter

Usage: Sets or queries the format for a PROGram name. There are limitations on character data for valid names for files, so it is necessary to use STRing format to input names that are not valid character data.

Query: FORM:PNAM?

***RST:** Set FORMat to CHARacter.

Error: If the currently selected program name is not legal character data, but FORMat:PNAMe is set to CHARacter, a settings conflict error will be returned for the PROG:SEL:NAME? query.

Example:

```
 > prog:name ’joe.fun’
  > form:pnam?
   CHARACTER
  > prog:name?
  –294,”Incompatible type; Program name not character data; prog:name?\n    %

> prog:name?
 >”joe.fun”
```

GCONtrol Subsystem

GCONtrol is the root command for controlling the AM700 audio signal generator. Selection of the generator modes and controlling the output states is done using the special commands of the GCONtrol subsystem. Signal selection is done using the SOURce commands.

The commands under the ANAlog node control the modes of the analog audio generator. Selection of the high resolution or the high bandwidth generator is done with the MODE command.

The commands under the DIGital node control the digital audio generator of the AM700. Selection between AES, the audio standard format, and the DSP, digital signal processor, as the digital audio signal source is done using the special commands of the GCONtrol subsystem. The type of audio signal is selected using the SOURce:FUNCtion:SHAPe commands.

`GCONtrol[1|2]:ANALog:LDIStortion ON|OFF`

Usage:	Sets or queries the state of the analog generator distortion reduction filter.
Suffixes:	GCON1 is Analog Generator A GCON2 is Analog Generator B
Query:	`GCON:ANAL:LDIS?` returns 0 for OFF, and (FAST) and 1 for ON (Low distortion)
***RST:**	Set the low distortion mode to OFF.

`GCONtrol:ANALog:MODE HRESolution|HBW (high bandwidth)`

Usage:	The MODE command for the analog generator selects between the high resolution analog audio generator, HRES, and the high bandwidth generator, HBWAN. In high resolution mode, the generator bandwidth is 0 to 24 kHz; in high bandwidth mode, it is 0 to 80 kHz. The generator output in HRES is true stereo with independent signals possible on both A and B. In HBWAN mode, the signal is the same on both output channels.

Example: `gcon:anal:mode hres` sets the Analog generator to high resolution mode.

Query: `GCON:ANAL:MODE?` returns the selected generator, HRES or HBWAN.

***RST:** Sets the analog mode to high resolution, HRES.

GCONtrol:DIGital:MODE AES|DSP

Usage: Selects between the AES standard format generator or the DSP, digital signal processor, as the source of the digital audio signal.

Query: `GCON:DIG:MODE?` returns the selected digital generator mode, AES or DSP.

***RST:** Sets the digital mode to AES.

NOTE: *Changing the digital generator type also changes the type of digital acquisition. You cannot measure the AES input stream while in DSP mode.*

GCONtrol:OUTput:STATe ON|OFF

Usage: Turns the generator ON or OFF. Equivalent to the front panel generator ON button.

Query: `GCONtrol:OUTput1:STATe?` returns the state, ON or OFF of the signal to the Analog Generator Channel A connector.

`GCONtrol:OUTput:STATe?` returns the state, ON or OFF of audio generator.

***RST:** Sets the generator output state of OFF.

HCOPy Subsystem

The AM700 support for hardcopy is non–standard to the 1994 SCPI manual for hardcopy, but it more closely tracks the way this feature has been previously implemented. In the SCPI manual, the MMEMory:OPEN and HCOPy:CLOSe commands were to be used to open and close the file specified by MMEM:NAME to accommodate feeding data from the HCOPy subsystem. This state–dependent style of feeding data is not used in the AM700.

The AM700 GPIB usage of hardcopy–to–file is as follows. You can send:

```
mmem:name ’file’
hcopy:dest ‘mmem’
hcopy
```

instead of

```
mmem:name ’file’
mmem:open
hcopy:dest ’mmem’
hcopy
mmem:close
```

The spool–to–file procedure is implemented so that the act of creating the hardcopy implicitly opens the file at the start, and closes it at the end.

HCOPY

Usage: This command [HCOPy] immediately initiates the plot or print according to the current Hard COPy setup parameters. All of the items under the ITEM node which are turned ON (STATe ON) are plotted or printed.

Query: Event only, no query.

HCOPy[:IMMediate]

Usage: Causes the currently visible screen to be printed to the currently–selected hardcopy device, using the currently–selected hardcopy format.

Query: Event only, no query.

HCOPy:ABORT

Usage: Aborts any printing currently in progress, and discards any print jobs which are pending. Intermediate files are sent to a spool directory before being spooled. The spool directory can hold 5–10 hardcopy intermediate files. Once a file is spooled to the directory, the application which created the screen dump can go back to making measurements. Hard copy spooling occurs in the background.

Query: Event only, no query.

HCOPy:DESTination <data handle>

Usage: This command allows the destination ”device” for hardcopy output to be set.

The following data handles are legal:

Parameters:
```
’SYSTem:COMMunicate:SERial1’
’SYSTem:COMMunicate:SERial2’
’SYSTem:COMMunicate:GPIB’
’MMEM’ for file
’’ for None
```

The first two <data_handles> direct hardcopy output to the COM1 or COM2 serial ports on the back of the AM700. The third one directs hardcopy output to the GPIB in talk–only mode, and the last one directs the hardcopy to a file named by the MMEM:NAME ’filename’ command in NVRAM. This port will not work for hardcopy output if the GPIB is currently being used for remote control.

Example: `hcop:dest ’syst:comm:ser1’`

Query: No query.

Default: The power up default is SYST:COMM:SER (serial port 1).

***RST:** Sets the copy destination to serial port 1

HCOPy:DEVice:COLor <Boolean>

Usage: Sets or queries the state of the color output for PostScript and TIFF formatted files. When set to ON, printer output will be color formatted. If other formats than PostScript or TIFF or used, the COLor state is ignored, and the file is output as monochrome (gray scale) only.

Query: `HCOP:DEV:COL?` returns 0 for off and 1 for on.

***RST:** Sets COLor to off.

HCOPy:ITEM:ALL[:IMMediate]

Usage: Same as previous command. Causes the currently visible screen to be printed to the currently–selected hardcopy device, using the currently–selected hardcopy format.

Query: Event only, no query.

HCOPy:SDUMp[:IMMediate]

Usage: Same as previous command. Causes the currently visible screen to be printed to the currently–selected hardcopy device, using the currently–selected hardcopy format.

ITEM commands to allow a subset of the screen to be printed are not supported at first release of the AM700 firmware.

Query: Event only, no query.

HCOPy:DEVice:LANGuage <PCL|POSTscript|ELQuality|TIFF|INTerleaf>

Usage: This command allows the hardcopy format to be specified. We support the following formats:

Parameters:	PCL	HP's Printer control language. Good for HP DeskJet and HP LaserJet.
	POSTscript	A 300K output file is spooled even when the output device is PostScript. At 9600 baud, this will take about 5 minutes to emit. This format may be output in color, depending on the setting of HCOP:DEV:COL.
	ELQuality	Epson Letter Quality. Good for various Epson LQ and compatible printers.
	TIFF	Tagged Image File Format. This is a bit–mapped image that may be output in color, depending on the setting of HCOP:DEV:COL.

Default: The power up default is ELQ

Query: `HCOP:DEV:LANG?` returns the hardcopy output language format presently selected.

***RST:** Set language to ELQ.

INPut Subsystem

The commands under the INPut subsystem are used to select the INPut signal source and set the input impedance and range of the analog inputs, A and B. As indicated in the commands, not all INPut suffixes are available for all the commands.

Parameters:

INPut1	Analog A
INPut3	Analog B
INPut5	Digital_Main
INPut6	DSP
INPut7	Digital Reference

INPut[1|3]:IMPedance <numeric_value>

Usage: Set input impedance of the two analog inputs, A and B.

Parameters: Parameter may be 150, 600, 200000.
Units: Ohms (termination impedance)

Query: `INP[1|3]:IMP?` returns the input impedance setting for the designated analog input.

***RST:** No change

INPut[1|3]:RANGe <numeric_value>

Usage: Used to manually select the input range of the analog inputs. Turn off Auto Range first before setting a new input range to maintain the new manually selected input range. If Auto remains on, it will reset the input range according to the applied signal amplitude.

Parameters: <numeric_value> is the rms voltage at the A/D converter clip point.
Range: 0.06 to 122.75 (–19 dBu to +47 dBu) in 12 gain/attenuator range steps:

0.06, 0.12, 0.245, 0.489, 0.975, 1.945, 3.88, 7.74, 15.45, 30.83, 61.52, 122.75

Units: Volts

Resolution: 6 dBu steps.

`Error:`	Entering a numeric_value that is not at one of the range step values causes the range setting to go to the next higher valid range step. No error is generated.
`Query:`	`INPut[1|3]:RANGe?` returns the range setting for designated analog input.
`*RST:`	At *RST, the clipping point is set to 10.954 V peak.

`INPut[1|3]:RANGe:AUTO [ON|OFF|ONCE]`

`Usage:`	Used to control the Auto–range feature for ON, OFF, or ONCE.
`Query:`	`INP[1|3]:RANG:AUTO?` returns 0 for off or 1 for on.
`*RST:`	At *RST, the Autorange feature is turned on.

INSTrument Subsystem

Within the AM700 thare are multiple logical instruments. The INSTrument subsystem commands provide the controls and queries needed to switch instruments and the find out what the name, number, or short form name.

Usage: Commands in this subsystem are used to selected the different AM700 applications by name, number, or descriptive_name. Queries in this subsystem permit you to determine what the available strings are that may be used to select an application.

INSTrument:CATalog?

Usage: Gives list of strings that contain the short-form application names. The names may be used with `INST:SEL` to switch applications.

Query: Query only.

INSTrument:CATalog:FULL?

Usage: Gives a list of application names as with `INST:CAT?` but includes the application number that may be used with `INST:NSEL` to change applications.

Query: Query only.

INSTrument:LSELect <descriptive_name>

Usage: Selects an instrument (application) by long descriptive name. The string data returned by `INST:LCAT?` provides the long descriptive names for the applications.

Example: `INST:LSEL ”Digital Interface Tester”`

Query: `INSTrument:LSELect?` returns the <descriptive_name> of the selected application.

***RST:** *RST has no effect on instrument selection.

INSTrument:LCATalog?

Usage: Gives a list of <descriptive_name> strings is a comma separated list. Application numbers are not included.

Query: Query only. Returns a comma separated list of application name as string data.

INSTrument:LCATalog:FULL?

Usage: Gives a list of <descriptive_names> strings as in LCAT, but includes the application number. The full name of the application and the application number that may be used with INST:NSEL are returned in a comma separated list.

Query: Query only. Returns long names of applications as string data.

```
”FFT Analyzer”,1,”Audio Analyzer”,2,”Audio
Monitor”,3,”Digital Interface Tester”,4,”Diagnos-
tics”,5,”Touch Panel Calibration”,6
```

INSTrument:NSELect <app_number>

Usage: Selects the application to run on the AM700 by number.

Syntax: `INST:NSEL [1|2|3|4|5|6]`

Parameters:

NSEL?	SEL?	LSEL?
1	FFT	”FFT Analyzer”
2	Analyzer	”Audio Analyzer”
3	Monitor	”Audio Monitor”
4	Digital	”Digital Interface Tester”
5	Diagnostics	”Diagnostics”
6	PanelCal	”Touch Panel Calibration”

Query: `INSTrument:NSELect?` returns the application number of the selected application.

***RST:** *RST has no effect on instrument selection.

INSTrument:SELect <app_name>

Usage: Used to select the application to run on the AM700 by short name.

Parameters:

FFT	Fast Fourier Transform analyzer
Analyzer	Audio Analyzer
Monitor	Audio Monitor
Digital	Digital Interface Tester
Diagnostics	Diagnostics
PanelCal	Touch Panel Calibration

Example: `inst:sel analyzer`

Selects the Audio Analyzer application to run.

Query: `INSTrument:SELect?` returns the short name for the selected application.

***RST:** *RST has no effect on instrument selection.

INSTrument:STATe?

Usage: The query only command is included for SCPI conformity. STATe cannot be set, and the query just returns : AUTO.

MMEMory Subsystem

The Mass Memory subsystem behavior in the AM700 is very similar to to the documented SCPI behavior. One major divergence form standard SCPI is the absence of ’msus’ (mass storage unit specifier) support in the AM700. The AM700 allows an optional mass storage unit specifier with any filename given to the MMEMory commands. The syntax of the file name is:

```
’[device:]{/path_name/path_name/}<file_name’
```

The device portion is optional.“device” can be one of “rom”, “nvram”, or “dos”. DOS refers to the disk drive.

NOTE: *Diskettes used in the disk drive must be either purchased already DOS formatted or formatted for 1.44 Megs using a DOS machine.*

Once past the device specification, the name looks pretty much like a UNIX file name. Slashes separate the path–name components.

Mass MEMory provides mass storage capabilities for the AM700. Mass storage is either internal or external and the AM700 supports both.

The CLOSe, FEED, NAME, and OPEN commands are used to stream data from anywhere in the data flow into a file; this is particularly useful for saving HCOPy output.

Mass storage media may be formatted in one of a number of standard formats. The AM700 does not support the SCPI mass storage unit specifier <msus>.

Console File. The console file is used to store operating events of the AM700 that may be useful in locating a programming problem. This file is available to the MMEM subsystem with the name: `system:console`. This file can be copied to dos with the SCPI command :

```
mmem:copy ’system:console’,’dos:/console’
```

or it may be transferred using a function called `“contodos”` that is found in the Functions. That function issues the appropriate Tcl command to copy the console file onto an inserted floppy disk.

AM700 File Structure

The upper level of the AM700 files comprise ROM, NVRAM, and DOS logical directories. Under those, other directories or files may exist. Certain directories are accessible by the user for storage use or information. Certain other directories are accessible by AM700 operating system firmware only.

File Names

The AM700 allows an optional mass storage unit specifier (a logical directory name) with any file name given to the MMEMory commands. The syntax of the file name is:

```
'[device:]{/path_name/path_name/}<file_name'
```

The device and path portions are optional and not needed if the file name is in the current working directory. “device” can be one of “rom”, “nvram”, or “dos”.

The <file_name> parameter in the MMEMory subsystem is a string. The contents of the string are dependent on the needs of the format of the mass storage media. In particular, the file name may contain characters for specifying sub–directories (that is, \ for DOS, / for UNIX) and the separator for extensions in DOS (that is a period). File names may be absolute, rooted, or relative. Absolute file names use the complete name with device and total path to the file. Rooted file names use the path within a designated device and may be used after changing directory to that device. Relative file names are assumed to be in the current working directory.

Note that this syntax places some restrictions on the <file_name> (for example, commas are not allowed).

File Name Capacity

The Storage Manager system of the AM700 permits a total of 250 file names maximum in each list for Function files or other user files in a directory.

MMEMory:CATalog?

Usage: The CATalog command is query–only and returns information on the current contents and state of the current working directory. Upon a CATalog? query, the AM700 reads the current working directory and returns its directory information in the following format:

```
<numeric_value>,<numeric_value>{,<file_entry>}
```

Two numeric parameters and as many strings as there are files in the directory list are returned. The first <numeric_value> parameter is the total amount of storage in current use, in bytes. The second parameter shows the total amount of storage available, also in bytes. The <file_entry> is a string, one for each file in the directory list, showing the name, type, and size of the file in the follow form:

```
<file_name>,<file_type>,<file_size>
```

<file_name> is the exact name of a file as it appears in the directory list, including an extension if present. File names are NOT case sensitive. <file_type> is not supported by the AM700, so that field is left blank in the reply. <file_size> is the size of the file in bytes.

Query: `MMEM:CAT?` presently returns the following string:

```
0.0.“quickset,,0”,“multitone,,0”,“function,,0”,
hardcopy,,0”,“reference,,0”,“signals,,0”,
“window,,0”,“cstatus,,0”
```

Example:

```
’756000,1440000,dos:/tests/test1,,2543,dos:/tests/
test2,,3545’
```

MMEMory:CDIRectory ’[device:/]directory_name’

Usage: Changes the working directory in the file system. The <directory_name> parameter is a string. The contents of the <directory_name> parameter are dependent on the file system being accessed. If no parameter is specified, the directory is set to the *RST value

There is a concept of a current directory in the MMEMory subsystem. The current directory is used for the CATalog command, and used as a base directory when evaluating non–absolute file names given to the other MMEMory commands.

Query: `mmem:cdir?` returns the present working directory name.

Parameters: rom:/
nvram:/
dos:/

Example:	mmem:cdir ’nvram:tests’	changes to the tests directory in nvram.
	mmem:cdir ’..’	backs up one level in the directory.
	mmem:cdir ’.’	remains at the current directory level.

When using `’..’` to back up through the directory hierarchy, the cdir action stops when the root directory is reached.

***RST:** Sets the <directory_name> to the rom directory, the root directory for the AM700 file system.

MMEMory:CLOSe

Usage: Closes the file specified in MMEMory:NAME.

Error: An attempt to close a file that is not open causes error –256, (File name not found) to be generated

MMEMory:COPY ’[device:/]{path_name/}source_file’, ’[device:/]{path_name/}destination_file’

Usage: Copies an existing file into a new file. The copy is byte–for–byte, even for text files. When the eol (end of line) convention is different between files as is the case between UNIX and DOS, a problem may occur when copying text files from UNIX to DOS.

Error: An error is generated if the source file does not exist. If the destination file already exist, *(an error is generated or no error is generated,* and the new data overwrites the present data in the destination file.)

Example: mmem:copy ’dos:test1,nvram:/tests/test1’

Explanation of Example: The example command copies the test1 file from dos to nvram into the “tests” directory.

MMEMemory:DATA <filename>,<definite length block data>

Usage: Permits writing to files using immediate data. The filename can either be the complete path, or you may use MMEM:CDIR first to move to the directory you wish to write the file into or read it from. If a single character data filename is used, the <filename> does not have to be set off with single quotes. If the entire path is specified, single quotes must be used around the `’filename’` string.

Example: `MMEM:DATA ’nvram:/function/test’,#223This is a test program.`

Query: MMEM:DATA? <filename> returns the contents of the file in definate length block data format. Again if the filename is a path string, single quotes must be used around the `’filename’` string.

Example: `MMEM:DATA? ’rom:/mtone/asgmton3.ton’` returns the contents of the file used to generate MTONE1.

```
#3113am700 multitone 1.0 12
46.875 0
140.625 0
281.250 0
656.250 0
1031.250 0
2015.625 0
4031.250 0
8109.375 0
15000.000 0
```

The # symbol starts the definite length block data header, the first number signifies the number of bytes used to give the byte count, and the remaining three numbers give the byte count of the file data.

MMEMory:DELete ’[device:/]{path_name/}file_name’

Usage: Deletes the named file.

Example: `mmem:del ’dos:/tests/test1’`

Explanation of Example: The example command deletes the file named ’test1’ in the ’tests’ directory in the ’dos’ mass media device.

MMEMory:FEED ’data handle’

Usage: Sets or queries the <data_handle> to be used to feed data to the file specified in NAME.

New data arriving from <data_handle> overwrites the contents of the specified file.

Parameters: Two data handles are allowed: `""` and `"hcopy"`. If `"hcopy"`, hardcopy output will be written to the file specified by `MMEMory:NAME ['device:]file_name'` (assuming the file has been `MMEM:OPENed`).

Error: If the `<data_handle>` generates new data and the file is not open, error –256, (File name not found) is generated.

Query: `mmem:feed?` returns the data feed name to the file specified in NAME.

***RST:** After *RST, the `<data_handle>` is set to `""`.

MMEMory:NAME ’[device:/]{path_name/}file_name’

Usage: Specifies a filename for use in the OPEN/CLOSE/FEED commands. The file does not have to exist when it is named.

An optional mass storage unit specifier is allowed with any file name given to the MMEMory commands. The syntax of the file name is:

```
'[device:/]name'
```

The device portion is optional.“device” can be one of “rom”, “nvram”, or “dos”.

Example:

```
mmem:name ’rom:test1’
mmem:name ’nvram:/dir1/test2’
mmem:name ’dos:/tests/test1’
```

Query: `mmem:name?` returns the file name, complete with path, that will be used with the CLOSe/OPEN/FEED commands.

MMEMory:OPEN

Usage: Opens the file specified by MMEMory:NAME. This OPEN command is not needed for spooling hardcopy to a file. The act of creating the hardcopy implicitly opens the file at the start, and closes it at the end. This is how the spool–to–file procedure is actually implented in similar instruments.

Error: Attempting to open a file that is already open causes a “File name error” (–256) to be generated.

Example:

```
mmem:name ’nvram:/tests/test1’;mmem:open;mmem:feed
’hcopy’;mmem:close
```

Query:

```
mmem:open?
```

Explanation of Example: The example command names a file named test1 in nvram, opens the named file, and copies the hcopy data to the open file, then closes the named file.

OUTPut Subsystem

Usage: The majority of the OUTPut command control the digital audio generator; two are used to set the analog generator output impedance and select whether the common is floating or referenced to ground. OUTPut commands pertain only to the generator. The DAUDio node contains commands used to control the output of the digital audio generator. Commands under the CLOCk subnode are used to adjust the main to ref clock phasing. set a variable clock frequency, and set a frequency offset between the main and the digital reference clock frequency. The CLOCk commands that are in effect depend on the setting of the `:MODe AUDio|DARS|VARiable` command. Commands under the INTerface subnode are used to control the digital signal parameters not related to the generated audio signal.

Parameters:

OUTput1	Analog generator Channel A
OUTput2	Analog generator Channel B
OUTput3	Digital generator Channels A and B
OUTput4	DSP generator Channels A and B (No commands for DSP)

OUTPut3:DAUDio:INTerface:CLOCk:PHASe:ADJust <numeric_value>

Usage: Used to set the digital main to digital reference phase difference.

Units: Degrees

Resolution: Approximately 1.4 degrees (0.5 UI).

Range: –180 to 178.59 degrees.

Query: `OUTP3:DAUD:INT:CLOC:PHAS:ADJ?` returns the phase difference between the digital main and the digital reference in unit intervals.

***RST:** 0.00 degree

OUTPut3:DAUDio:INTerface:CLOCk:VFRequency <numeric_value>

Usage: Use to set a variable clock frequency when :CLOCk:MODe is set to VARiable.

Parameters:	frequency from 30 kHz to 52 kHz, with a resolution of 0.001 Hz.
Range:	30,000 to 52,000
Resolution:	0.001 Hz
Units:	Hz
Query:	`OUTP3:DAUD:INT:CLOC:VFR?` returns the variable clock frequency setting.
***RST:**	48000.0

OUTPut3:DAUDio:INTerface:CLOCk:FRequency:ADJust <numeric_value>

Usage:	Add a small offset to the digital interface clock frequency when :CLOCk:MODe is set to AUDio or DARS.
Parameters:	Frequency offset in parts per million
Query:	`OUTP3:DAUD:INT:CLOC:FREQ:ADJ?` returns the offset setting.
Range:	–100 to 100 ppm
Resolution:	1 ppm
***RST:**	0 ppm

OUTPut3:DAUDio:INTerface:CLOCk:MODE AUDio|DARS|VARiable

Usage:	Sets the clock mode to audio, digital audio reference signal, or variable. The setting of mode determines which of the CLOCk frequency setting commands is active.
Query:	`OUTP3:DAUD:INT:CLOC:MODE?` return the mode setting.
***RST:**	AUDio

OUTPut3:DAUDio:INTerface:VOLTage:BALanced <numeric_value>

Usage:	Sets the voltage output level at the balanced connectors. The balanced to unbalanced ratio is always 5:1 so the balanced and unbalanced output levels are not independently settable.
Range:	0.01 to 10.23 Vpp
Resolution:	0.01 Vpp
Query:	`OUTP3:DAUD:INT:VOLT:BAL?` returns the voltage setting output to the balanced output connectors.
***RST:**	5.0 Vpp

OUTPut3:DAUDio:INTerface:VOLTage:UBALanced <numeric_value>

Usage:	Sets the voltage output level at the unbalanced connectors. The balanced to unbalanced ratio is always 5:1 so the balanced and unbalanced output levels are not independently settable.
Range:	0.002 to 2.046 Vpp
Resolution:	0.002 Vpp
Query:	`OUT3:DAUD:INT:VOLT:UBAL?` returns the voltage output setting to the unbalanced connectors.
***RST:**	1.0 Vpp

OUTPut:IMPedance 10|150|600

Usage:	Sets the output impedance of the analog generator.
Parameters:	10, 150, or 600 ohms
Query:	`OUT:IMP?` returns the analog generator output impedance setting.
***RST:**	No change.

OUTPut:COMMon FLOat|GROund

Usage:	Selects whether the analog outputs are floating (with no ground reference) or referenced to ground.
Query:	`OUTP:COMM?` returns “FLOAT” or “GROUND”.
***RST:**	Set the output common to GROund.

OUTPut3:FILTer[:LPASs][:STATe] <Boolean>

Usage:	Turns the long cable simulation filter on in the output path.
Query:	`OUTPut:FILTer[:LPAss][:STATe]?` returns 1 for ON and 0 for OFF.
***RST:**	Sets the long cable simulation filter state to OFF

OUTPut3:FILTer[:LPASs]:TYPE?

Usage:	Query only that responds with CABLE. The query is in place to conform to SCPI standard practices.

PROGram Subsystem

These SCPI commands are for the PROGram subsystem as implemented in the AM700 for the selection and running of functions. These commands provide features needed to generate and control one or more user–programmed tasks in the AM700. Functions are files in Tcl programming language permanently included in the “rom:/functions” directory and any user generated files in the “nvram:/functions” directory. The function names are the file names found in those two directories. Do not name a user generated file the same name as one of the provided functions in the rom:/function directory as that will make the function stored in ROM inaccessible.

Function programs may be loaded either using the DOS file transfer capabilities of the MMEMory subsystem or using the PROGram subsystem commands for unloading via the GPIB interface. Function programs loaded using the GPIB interface must be formatted as arbitrary block program data. Function programs may be loaded from a floppy disk via the DOS interface using the file browser screens called up when the front panel Storage button is pressed.

Two methods are provided for accessing a particular function using SCPI commands. One method employs EXPLicit reference for each command. All commands under the EXPLicit node directly reference the desired function by progname. This allows access to a function without having to change the selected program NAME. The <progname> parameter is required for all EXPLicit commands.

The second method allows a specific function to be selected using the PROGram:SELected:NAME <progname> command. Further PROGram:SELected commands relate only the named function.

When using the PROGram:EXPLicit:DEFine <progname>,<program>, the data supplied in <program> must be in arbitrary block data format. Program names that are not character data may be entered as string data with single quotes setting off the progname. When querying using a progname, if it is a legal character data filename, single quotes are not needed around the progname.

PROGram:CATalog?

Usage: This is a query only command that lists all the programs stored in the function directories of both nvram: and rom:. If there are functions of the same name in both directories, only one will be shown. This can be confusing so different names should be used for naming functions in nvram:/functions directory.

Query: `PROG:CAT?` returns a comma separated list of the defined functions. Each string contains the name of a program. If none are defined, a null string is returned.

PROGram:RCATalog?

Usage: Query only used to determine the running functions.

Query: `PROG:RCAT?` returns a comma separated list of the currently running functions. Note: Names of running functions are returned as all capitalized characters. If you are doing a compare between programs that have been asked to be run and those that are running, the comparison should not be case sensitive.

PROGram:TCATalog?

Usage: Query only used to determine the names of timed functions.

Query: `PROG:TCAT?` returns a comma separated list of the timed functions.

PROGram:EXPLicit:DEFine <progname>,<program_data>

Usage: Creates and downloads function files. The <program_data> must be in definite length arbitrary block data format for down loading to the AM700. Block data format looks like #NNN<prog_data> where NNN defines the number of bytes in the program_data. The first N is the number of bytes of the byte count and the remaining N's are the number of bytes of program data. Also, the specified function name must be unique. To download and overwrite an existing function file of the same name, the first file must be deleted. Program names entered as character data are not case sensitive and are reported back as all capitalized characters. Those entered as string data will be reported back as entered.

Query: `PROG:EXPL:DEF? <progname>` returns the contents of the explicitly named function file back to the controller via the GPIB interface in definite length arbitrary block data format.

Error: Attempting to overwrite an existing function name generates an "Illegal program name" error (–282).

Example: `PROG:EXPL:DEF test,#223This is a test program.` explicitly names the program "test" and stores the program data in the file. The definite length arbitrary block data header is the # symbol followed by an ASCII character stating how many of the following bytes specify the byte count of the program data. In the example it is 2 bytes. The following two bytes give the byte count; in the case for this test program, the byte count is 23. You may use more bytes to indicate the byte count as in #3023 or #40023, but when the query is used to return the file the header will be shortened to #223.

PROGram:EXPLicit:DELete <progname>

Usage: Deletes the explicitly named function file.

PROGram:EXPLicit:LABel? <progname>

Usage: Used to determine the label of the function file given by <progname> (if one has been made in the file). This query looks in the first four lines of a function file to find a label. A label consist of the text between the end of the word "label" and the end of the line. Note: "label:" is not case sensitive. Leading and trailing white space (blanks) are not considered part of the label.

PROGram:EXPLicit:STATe <progname>,RUN|STOP

Usage: The explicitly named function is started by setting state to RUN. If the state is already RUN, a second run of the same function is started. When set to STOP, all instances started through this interface or the Function user interface will be stopped. There is a maximum of 10 concurrently running functions.

Query: `PROG:EXPL:STAT?` returns the state of the explicitly named function as RUN or STOP. The PROG:RCAT? query returns a list of the currently running functions.

`PROGram:EXPLicit:TIMed[:SET] <progname>,’cron_string’ {,’cron_string’}`

`Usage:` Set zero or more cron–strings for periodic execution for the explicitly named function.

A cron string is five fields consisting of the following:

```
MIN HOUR DAY_of_MONTH MONTH DAY_of_WEEK
```

Each field may contain any of the follow type entries: a single number, a comma–separated list of numbers, a hyphen–separated pair of numbers, or an *.

A comma separated list in a field specifies multiple occurrence for the timed program to run.

A pair of numbers separated by a hyphen in a field specifies the beginning number, the ending number, and all the integer numbers in between.

An * in a field means to do it on all occurrence. An exception to the * usage is that if both the day of the week and the day of the month fields have an * it just means “every day.” If only one of these two fields has an *, that field is ignored, and if neither has an *, both fields are used.

Example ‘0 0,12 * * *’ specifies a time of midnight and noon every day of the month and every day of the week.

`Query:` `PROG:EXPL:TIM[:SET]? <progname>` returns the set of cron_strings active for the function <progname>

`PROGram:EXPLicit:TIMed:CLEar <progname>`

`Usage:` Remove all the cron–strings for the function explicitly named by ‘progname’.

PROGram:EXPLicit:TIMed:ADD <progname>,'cron_string' {,'cron_string'}

Usage: Adds to the current set of cron–strings for the explicitly named program.

Query: `PROG:EXPL:TIM:ADD?`

PROGram:EXPLicit:WAIT <progname>

Usage: Permits no further commands or queries to be executed until the explicitly named function exits from the RUN state.

Query: `PROG:EXPL:WAIT? <progname>` returns a 1 in NR1 format when the function state is STOP.

PROGram:SELected:DEFine <prog_data>

Usage: Creates and downloads programs to the selected progname. The <prog_data> must be in definite length arbitrary block data format for down loading to the AM700. The program name used is the currently selected program name. The specified program must have a unique name. To download and overwrite an existing program of the same name, the first program must be deleted.

Query: `PROG:SEL:DEF?` returns the contents of the program named by the prog:name <progname> command in arbitrary block data format.

Example: `PROG:SEL:DEF #223This is a test program.` uses the file name given by PROG:SEL:NAME <progname> and stores the program data in the file. See PROG:EXPL:DEF for more information on definite length arbitrary data header.

***RST:** No *RST event.

PROGram:SELected:DELete:SELected

Usage: Deletes the selected downloaded function program. The program name used is designated by the :NAME command.

Query:	No query for this event.
***RST:**	No *RST event.

PROGram:SELected:DELete:ALL

Usage:	Deletes all the downloaded function programs in the AM700.
Error:	If a program is running a "Program currently running" error (–284) is generated and no programs are deleted.
Query:	No query for this event.
***RST:**	No *RST event.

PROGram[SELected]:LABel?

Query:	Query used to determine the label of the selected function file (if a label is included in the file). This query looks in the first four lines of a function file to find a label. A label consist of the non–terminated text and white space between the end of the word "label" and the end of the line. Note: "label:" is not case sensitive.

PROGram:SELected:LNAME?

Usage:	Query only that returns a full pathname that may be used with teh MMEMory subsystem or in Tcl scripts. The returned long name is string data.
Example:	`PROG:SEL:LNAME?` returns the full pathname to the selected <progname>.

```
"nvram:/function/PROG"
```

PROGram:SELected:NAME <progname>

Usage: Names the program to be used as the selected function by the other PROG:SEL commands. If the function name does not exist, the new name will be selected, but a new function is not defined. When you are setting up a timed function, name the function first, then set the times that you want it to run. Multiple timed functions may be set in this manner as the cron_string(s) being set apply only to the function specified by <progname>.

Parameters: <progname> is either character data or a string. <progname> consists of 12 characters or less, starting with alpha, consisting of alpha, digit, and '_'). Legal dos file names will be accepted. Legal DOS file names consist of a maximum of eight characters plus up to a three character file extension. As string data, the file name is not case sensitive and must be quoted in the PROG:SEL:NAME commands as follows:

```
PROG:SEL:NAME 'usrfunc1.fun'
```

Query: `PROG:SEL:NAME?` returns the name of the currently selected function. The return will be either a "string" or character data based on the value set by the FORMat:PNAMe STRing|CHARacter command.

Error: If the currently selected program name is not legal character data, but FORMat:PNAMe is set to CHARacter, a settings conflict error will be returned for the query.

***RST:** Sets the selected NAME to PROG and the FORMat to CHARacter.

PROGram:SELected:STATe RUN|STOP

Usage: The selected function is started by setting state to RUN. If the state is already RUN, a second run of the function is started. When set to STOP, all instances started through this interface or the Function user interface will be stopped. There is a maximum of 10 concurrently running functions.

Query: `PROGram:SELected:STATe?` returns the state of the selected function as RUN or STOP. The PROG:RCAT? query returns a list of the currently running functions.

PROGram:SELected:TIMed[:SET] [<cron_string>] {,<cron_string>}

Usage: Sets cron–strings to time the running of the selected function.

Default: If no cron–strings are given, this command acts the same as CLEar.

Query: `PROG:[SEL]:TIM[:SET]?` returns the set of cron_strings for the selected function. If there are multiple timed functions you what to check, set the name of the functions you what to check with the PROG:SEL:NAME command for each or use the PROG:EXPL:TIM:SET? <progname> command, explicitly naming the function you what to check.

PROGram:SELected:TIMed:CLEar

Usage: Remove all the cron–strings for the selected function.

Query: No query.

***RST:** No *RST event.

PROGram:SELected:TIMed:ADD <cron_string>{,<cron_string>}

Usage: Adds to the current set of cron–strings for the selected function.

Query: `PROG:SEL:TIM:ADD?`

PROGram:SELected:WAIT

Usage: Wait for all instances of the selected function to finish. Permits no further commands or queries to be executed until the selected function exits from the RUN state.

Query: `PROG:SEL:WAIT?` returns a 1 in NR1 format if the selected function state is STOP.

ROUTe Subsystem

Signal routing is the block where the user has access to actual signals.

`ROUTe[1|2|3]:CLOSe <numeric_value>`

`Usage:` Sets the route setting. If all the specified channels cannot be closed, an execution error is reported.

`Parameters:`

ROUTe1	Analog A input
ROUTe2	Analog B input
ROUTe3	Digital main input

`Parameters:` Range of numbers for the CLOSe <numeric_value>

1	analog A input connector
2	analog B input connector
3	analog generator channel A
4	analog generator channel B
6	digital front panel XLR
7	digital rear panel BNC
8	digital rear panel optical
9	AES internal generator

Only specific numeric_values are permitted for each route suffix. You can’t close a route from the Analog A input to the Digital front panel XLR for instance. The acceptable routes and closures are:

```
rout1:clos 1|3
rout2:clos 2|4
rout3:clos 6|7|8|9
```

`Example:` Choose generator for analog B input

ROUTe2:CLOSe 4

`Query:` `ROUTe[1|2|3]:CLOSe? <channel_number>`

You must use a valid channel number (see Parameters) for the designated route to get a return. When the query is correctly stated, the command returns 0 for open and 1 for closed.

Example: `rout1:clos? 1`
returns 1 or 0 for closed or open.

`rout3:clos? 6`
returns 1 or 0 for closed or open.

***RST:** Sets ROUT1:CLOS 1, ROUT2:CLOS 2, and ROUT3:CLOS 6.

ROUTe[1|2|3]:CLOSe:STATe?

Query: `ROUTe:CLOSe:STATe? <numeric_value>` returns the number of the closed route (selected input connector).

***RST:** Sets the ROUTe state to closed (see above).

SENSe Subsystem

The SENSe setup commands are used to control some parameters of the digital audio measurement function, and to query measurements made on the digital interface. Commands in this subsystem are used to control the acquisition methods of the AM700. Commands under the :DATA:DAUDio subnode control how digital audio signals are acquired and queries to determine measurements.

`Parameters:` Sense suffixes are:

5	Digital A Main
6	Digital B Main
7	DSP A Port
8	DSP B Port
9	Digital A Ref
10	Digital B Ref
11	Eye Pattern

`SENSe[5–8]:DAUDio:AUDio:SRATe?`

`Usage:` Queries the digital audio sampling rate for the designated SENSe.

`Parameters:` 0 is LOW for 32 kHz
1 is MED for 44.1 kHz
2 is HIGH for 48 kHz

`Query:` `SENSe[5–8]:DAUDio:AUDio:SRATe?` Query only. Returns the indicated sampling rate of the digital audio signal as encoded in the serial data stream.

`SENSe11:DAUDio:INTerface:BWIDth MEDium|HIGH`

`Usage:` Sets or queries the interface bandwidth used with the eye data sampler.

`Query:` `SENSe11:DAUDio:INTerface:BWIDth?` returns MEDIUM0, or HIGH1, or 2 for the setting of the LFREJ filter used with the eye data sampler.

Parameters: MED for 120 Hz
HIGH for 1200 Hz

The LF REJ filter is always engaged for SENSe11.

***RST:** MED

SENSe11:DAUDio:INTerface:JGAin NORMal|HIGH

Parameters: NORMal is X1 gain
HIGH is X8 gain

Usage: Set or query the gain used in the eye/jitter detection circuitry.

Query: `SENS11:DAUD:INT:JGA?` returns NORMAL or HIGH.

***RST:** NORMAL

SENSe5:DAUDio:INTerface:CORRection:EQualization?

Usage: Query only. Indicates the amount of equalization applied by automatic equalization circuitry.

Query: `SENS5:DAUD:INT:CORR:EQ?` Returns the equalization value in dB.

The automatic equalization circuit is always engaged, except when measuring the jitter spectrum, in which case the equalization state follows `SENSe11:DAUDio:INTerface:JSPectrum:EQualization`.

SENSe[5,7]:DAUDio:INTerface:FREQuency?

Usage: Query only. Used to determine the digital interface clocking frequency.

NOTE: *This value is only updated when measurements are being made on the digital input. This usually means that the digital generator must be in AES mode and CSTReam1 or CSTREAM2 is fed with SENSE5 or SENSe6.*

`Query:`	`SENSe[5,7]:DAUDio:INTerface:FREQuency?` returns the frequency, e.g., 48000.1

SENSe5:DAUDio:INTerface:FREQuency:RATio?

`Usage:`	Query only. Used to determine the ratio of sampling rates of the main digital input with respect to the reference input
`Query:`	`SENS[5–8]:DAUD:INT:FREQ:RAT?` returns the frequency ratio in percent, e.g., 100.0

SENSe11:DAUDio:INTerface:JSPectrum:EQualization <Boolean>

`Usage:`	Set or query whether automatic equalization is performed on the digital interface during jitter spectrum measurements.
`Parameters:`	ON or 1 to engage the equalization, OFF or 0 to bypass
`Query:`	`SENS11:DAUD:INT:JPS:EQ?` returns 1 if equalization is on or 0 if off.
`*RST:`	Set equalization to OFF

SENSe5:DAUDio:INTerface:PHASe:DIFFerence?

`Usage:`	Query only. Used to determine the digital interface phase difference between the main and reference inputs.
`Query:`	`SENS5:DAUD:INT:PHAS:DIFF?` returns the phase difference between the main and the reference signal in degrees.

SENSe5:DAUDio:INTerface:VOLTage:AC?

Usage: Query only. Used to determine the peak-to-peak voltage of the digital main input signal.

Query: `SENS5:DAUD:INT:VOLT:AC?` Query only. returns the voltage of the digital main input in volts peak–to–peak.

SOURce:DAUDio Subsystem

SOURce is the root command in the SOURce Subsystem for the AM700. The SOURce setup commands are divided into several sections. Each section or subsystem deals with controls that directly affect device–specific settings of the AM700; not those related to the signal–oriented characteristics. These commands are referenced through the SOURce node.

Suffixes: SOURce5 is digital generator chan A
SOURce6 is digital generator chan B
SOURce7 is DSP chan A
SOURce8 is DSP chan B

The special commands under DAUDio are used to control the operation of the digital audio signal generator. See GCONtrol for additional commands controlling the audio generator, and OUTPut for commands that control the digital interface parameters.

The special commands under AUDio select the sample rate and word size of the digital audio signal. Also, the shape of the applied dither may be selected as either rectangular or triangular.

SOURce[5–8]:DAUDio:AUDio:SRATe HIGH|MEDium|LOW

Usage: Selects the sample rate used for the digital audio signal from the generator.

Parameters: HIGH = 48 kHz
MEDium = 44.1 kHz
LOW = 32 kHz.

Query: `SOUR[5–8]:DAUD:AUD:SRAT?` returns the identifier for the currently assigned audio sample rate.

Current software in the AM700 forces both channels on a digital interface to have the same sample rate. Changes to one channel will then cause the same change in the other channel.

***RST:** Sets SRATe to HIGH.

`SOURce[5,6]:DAUDio:AUDio:WSIZe <numeric_value>`

`Usage:` Selects the word size used for the digital audio signal from the generator.

`Parameters:` 8 to 24

Current software in the AM700 forces both channels on a digital interface to have the same word length. Changes to one channel will then cause the same change in the other channel.

`Query:` `SOUR[5,6]:DAUD:AUD:WSIZ?` returns the setting for the number of bytes used for generating the digital audio signal.

`*RST:` Set WSIZe to 24.

`SOURce[5,6]:DAUDio:CSTatus:MODE PROFessional|CONSumer|NAUDio|FILE`

`Usage:` Determines the contents of the generated channel status bits on the digital interface.

In professional and consumer modes, the AM700 generates channel status blocks typical of professional or consumer equipment. In non–audio mode the channel status blocks consist of zeros, except for the non–audio bit, which is asserted. In file mode all bits of channel status are determined by the contents of a user–specified file. See the *AM700 User Manual* for information on file structure.

Current software in the AM700 forces both subframes on the digital interface to have the same channel status. Changes to one channel will then cause the same change in the other channel.

`Query:` `SOUR[5,6]:DAUD:CST:MODE?` returns the current setting for channel status mode.

`*RST:` Sets mode to PROFESSIONAL.

SOURce[5,6]:DAUDio:CSTatus:FILE:NAME <filename>

Usage: Designates the filename to be used for setting user bits when the `:CSTatus:MODE` command is set to FILE.

Query: `SOUR[5,6]:DAUD:CST:FILE:NAME?` returns the file name without the path.

***RST:** Sets filename to `”cd.cst.”` The path to the default filename is `”rom:/cstatus/cd.cst.”`

SOURce[5,6]:DAUDio:UBITs:MODE NULL|FILE

Usage: Sets or queries the selection for generating user bits on the digital interface.

In null mode zeros are sent in the user bits. In file mode the user bits are determined by the contents of a user–specified file.

Current software in the AM700 forces both subframes on the digital interface to have the same user bits. Changes to one channel will then cause the same change in the other channel.

Query: `SOUR[5,6]:DAUD:UBIT:MODE?` returns the setting for UBITs:MODE.

***RST:** Sets UBITs:MODE to NULL.

SOURce[5,6]:DAUDio:UBITs:FILE:NAME <filename>

Usage: Designates the filename to be used for setting user bits when the `:UBITs:MODE` command is set to FILE.

Query: `SOUR[5,6]:DAUD:UBIT:FILE:LNAME?` returns the name path for the file to be used.

Current software in the AM700 forces both subframes on the digital interface to have the same file name. Changes to one channel will then cause the same change in the other channel.

***RST:** Sets filename to `”null.usr.”`

SOURce[5,6]:DAUDio:UBITs:FILE:LNAME <filename>

Usage: Designates the filename with will path to be used for setting user bits when the `:UBITs:MODE` command is set to FILE.

Query: `SOUR[5,6]:DAUD:UBIT:FILE:LNAME?` returns the name with path for the file to be used.

***RST:** Set long filename to `”rom:/userbits/null.usr.”`

SOURce[5–8]:DITHer:TYPE RECTangular|TRIangular

Usage: Selects the shape of the dither applied to the signal of the designated source. Setting the dither applies for all digital generators. Note: Dither cannot be set to NONE using remote control commands.

Query: `SOUR[5–8]:DITH:TYPE`? returns the current setting for dither type. Note: If dither is set to NONE, the query returns an empty string.

***RST:** Set dither type to RECTANGULAR.

SOURce:FOLLow Subsystem

`SOURce[1–8]:FOLLow[:STATe] <Boolean>`

`Usage:` Turns follow mode on or off for a designated source channel.

`Parameters:` Boolean – ON|OFF or 1|0.

`Suffixes:`

1	Analog generator HR A
2	Analog generator HR B
3	Analog generator HB A
4	Analog generator HB B
5	Digital generator SF 1
6	Digital generator SF 2
7	Digital Signal Processor A
8	Digital Signal Processor B

`Query:` `SOUR[1–8]:STAT?` returns 1 for on and 0 for off for the designated generator.

`*RST:` ON for Sources 2,4,6,8; OFF for others.

SOURce:FREQuency Subsystem

SOURce[1–8]:FREQuency <numeric_value>

Usage: Sets the sine–wave frequency of the designated source. This frequency setting is used as the fixed signal frequency when generating a sine–wave.

Suffixes:

SOURce1	Analog generator HR A
SOURce2	Analog generator HR B
SOURce3	Analog generator HB A
SOURce4	Analog generator HB B
SOURce5	Digital generator DSF 1
SOURce6	Digital generator DSF 2
SOURce7	Digital Signal Processor A
SOURce8	Digtial Signal Processor B

Range: 0 to 20000 on High Resolution and 0 to 80000 on High Bandwidth.

Units: Hz.

Resolution: 0.5 Hz in HRES mode.
11.71875 in HBAND mode.

Query: `SOUR[1–8]:FREQ?` returns the sinusoidal signal frequency for the designated source. If a sine–wave sweep is occurring, the return follows the generator output frequency.

***RST:** Sets the fixed frequency to 1000 Hz.

SOURce[1–8]:FREQuency:MODE CW|FIXed|SWEep|LIST

Usage: Sets the frequency sweep mode for the designated SOURce. CW and FIXed are the same.

Query: `SOUR[1–8]:FREQ:MODE?` returns the operating mode of a designated SOURce as CW or FIXED for non–sweeping, SWEEP for a frequency sweep, or LIST for generating signals from a list of frequencies.

Coupled Commands:	*List:*	`SOURce:LIST:FREQuency` `SOURce:LIST:DWELl`
***RST:**	Sets frequency mode to SWEep.	

SOURce[1–8]:FREQuency:STARt <numeric_value>

Usage:	Sets the start frequency of a frequency sweep for the designated SOURce.
Range:	10 to 20000.00 for the High Resolution and Digital Generators 11.719 to 79992.188 for the High Bandwidth Generators.
Units:	Hz.
***RST:**	Sets STARt to 20,000 Hz (High resolution and digital generators), 79992.188 Hz (High bandwidth generator).

SOURce[1–8]:FREQuency:STOP <numeric_value>

Usage:	Sets the stop frequency of a frequency sweep for the designated SOURce.
Range:	10 to 20000.00 for the High Resolution and Digital Generators 11.719 to 79992.188 for the High Bandwidth Generators.
Units:	Hz.
***RST:**	Sets STOP to 20 Hz (High resolution and digital generators), 11.719 Hz (High bandwidth generator).

SOURce:FUNCtion Subsystem

Usage: The FUNCtion subsystem controls the shape and attributes of the output signal of the AM700 internal signal generator. The switch settings provided by this function are not horizontally compatible and represent what the source can be configured to generate directly. Most of the generated signals are selected using the SOURce:FUNCtion:SHAPe <source–shape> command. FUNCtion:MODE is omitted as the only <source_mode> is VOLTage.

Listed with each <source–shape> (signal) is a description of each user–adjustable parameter. It is important to remember that there are a number of parameters in the SOURce: subsystem, but only a few are meaningful at any time. depending on the signal being generated.

Additionally, the parameter bindings (if any) for the AMPLITUDE and FREQUEN-CY knobs of the AM700 Generator are given.

Suffixes:

SOURce1	Analog generator HR A
SOURce2	Analog generator HR B
SOURce3	Analog generator HB A
SOURce4	Analog generator HB B
SOURce5	Digital generator DSF 1
SOURce6	Digital generator DSF 2
SOURce7	Digital Signal Processor A
SOURce8	Digtial Signal Processor B

SOURce[1–2]:DITHer:TYPE RECTangular|TRIangular

Usage: Selects the shape of the dither applied to the signal of the designated source. Setting the dither applies for both High Resolution analog generators. Dither cannot be applied to the High Bandwidth generators. Note: Dither cannot be set to NONE using remote control commands.

Query: `SOUR[1–2]:DITH:TYPE`? returns the current setting for dither type.

***RST:** Set dither type to RECTANGULAR.

SOURce[1–8]:FUNCtion:SHAPe <signal_name>

Default: The last selected signal type is generated unless the AM700 has been reset. The reset default is a sinusoidal CW signal of 1 kHz at 0 dBu.

Parameters: `<SINusoid|JSINe|TBURst|SIMD|CIMD|SNOise |PCHirp|POLarity|TPOlarity|USER|MTONe>`

Query: SOURce:FUNCtion? returns the shape, frequency, and amplitude of the output signal.

Coupled Commands:
`SOURce:FREQuency`
`SOURce:VOLTage`

Error:

***RST:** At *RST the shape is a sinusoid CW signal of 1 kHz at 0 dBu.

SOURce:FUNCtion:SHAPe SINusoid

Usage: This command generates a single sine–wave tone with variable amplitude and frequency. The sine–wave frequency is set by the SOURce:FREQuency[:CW|FIX] <numeric_value> command, and the sine–wave amplitude is set by the `SOURce:VOLTage[:LEVel][:IMMediate][:AMPlitude] <numeric_value>` command. In addition, the front panel signal generator AMPLITUDE and FREQUENCY knobs have direct control of the signal amplitude and frequency of the assigned generator.

Query: `SOURce:FUNCtion:SHAPe?` returns the current test signal selection.

Example: SOUR:VOLT 3;FREQ[:CW] 2000;FUNC:SHAP SIN

The parameters for amplitude and frequency may be entered separately to change either of those items via remote control. For the assigned generator these parameters are also controlled by the front panel AMPLITUDE and FREQUENCY controls.

Example: SOUR:VOLT 4
SOUR:FREQ 3000

SOURce[5|6]:FUNCtion:SHAPe JSINe

Usage: Used to apply jitter to the digital interface signal from the A and B digital generators (suffix SOURce5 and SOURce6 respectively).

Acts just like sine wave, but puts jitter on the digital interface. The jitter signal is sinusoidal phase modulation of the digital interface clock.

When jittered sine is selected on either digital source channel it forces the other channel to also use jittered sine.

Coupled Commands: Sine–wave amplitude and frequency parameters (SOUR[5|6]:FREQ:CW, etc.) are still active and may be assigned to be controlled by the Generator Amplitude and Frequency knobs.

```
SOUR:JSIN:JFRequency <numeric_value>
SOUR:JSIN:JAMPlitude <mumeric_value>
SOUR:JSIN:JSHape SIN|USER
```

SOURce[5|6]:JSINe:JFRequency <numeric_value>

Parameters:	<numeric_value>	Frequency of the jitter signal in Hz.
Range:	11.782 to 50002.277	
Resolution:	11.782	
Units:	Hz.	

SOURce[5|6]:JSINe:JAMPlitude <numeric_value>

Usage: Assigns the amplitude value applied to the sine–wave modulation of the digital interface clock signal.

Parameters:	<numeric_value>	Amplitude of the jitter signal.
Range:	0.0 to 10.23	
Resolution:	0.01	

Units: UIpp (peak–to–peak unit intervals)

SOURce[1–8]:FUNCtion:SHAPe TBURst

Usage: This command generates a sine–wave burst with variable amplitude, frequency, and on and off times. The burst always begins and ends at the positive sine–wave zero crossing. The generator converts the width–time parameter into the nearest number of cycles of sine wave to generate.

Range:

Frequency	10 Hz to 80,000 Hz
Amplitude	0.0625 V to 19.45 V
Burst Period	64/(sample rate) to 36,000 sec
Burst Width	32/(sample rate) to 18,000 sec

Units:

Frequency	Hz
Amplitude	Volts RMS
Burst Period	Seconds
Burst Width	Seconds

Resolution:

Frequency	0.1 Hz
Voltage	1 μV
Burst Period	32/(sample rate) sec
Burst Width	32/(sample rate) sec

Default: 64 cycles on, 64 cycles off.

Query: `SOURce:FUNCtion:SHAPe?`

Example: sour:volt 3;freq[:cw] 2000;func:shap tbur;burs:per 10;burs:widt 1

The amplitude of the tone burst is controllable using the AMPLITUDE knob of the generator. The frequency of the tone burst is controllable using the FREQUENCY knob of the generator. The parameters of the tone burst signal may be entered separately to effect changes to the test signal.

Example:

```
sour:volt 4
sour:freq 3000
sour:burs:per 5
sour:burs:wid 5e–1
```

SOURce:TBURst:PERiod <numeric_value>

Usage:	PERiod is an integer containing the number of cycles until burst repeats (i.e.: off time = period – width). PERiod is constrained to be greater than WIDTh. The generator converts the width–time parameter into the nearest number of cycles of sine wave to generate.
Range:	64 to 100064
Resolution:	1
Units:	Cycles
Query:	`SOUR[1–8]:TBUR:PER?`
***RST:**	128

SOURce:TBURst:WIDTh <numeric_value>

Usage:	WIDTh is an integer containing the number of cycles of the burst. The generator converts the width–time parameter into the nearest number of cycles of sine wave to generate. The number of cycles are always cycles of sine wave frequency SOUR:FREQ:CW, therefore, the actual time of burst on/off are frequency dependent.
Range:	10 to 100000
Resolution:	1
Units:	Cycles
Query:	`SOUR[1–8]:TBUR:WID?`
***RST:**	64

SOURce[1–8]:FUNCtion:SHAPe SIMD

Usage: Generates a two–tone intermodulation signal with one tone variable in frequency. The IM frequency is 60 Hz for SMPTE. Ratio is the amplitude ratio of the two tones expressed in an integer. The integer expresses the amplitude multiple of the IM–frequency tone with respect to the amplitude of the Frequency tone and is commonly set to 4.

Range:

Variable Frequency	3 kHz to 18 kHz
Amplitude	.000010 V to 24.5 V –97.78 to 30 dBu –100 dBV to 27.78 dBV Note: dBFS range depends on the conversion standard setting for 0 dBFS.
Fixed Frequency	40 Hz to 500 Hz
Amplitude Ratio	1 to 8

Units:

Variable Frequency	kHz, Hz
Amplitude	V, mV, dBu, dBV, dBm, dBFS (Note: units of dBm are not available for reporting or setting via SCPI commands.)
Fixed Frequency	Hz
Ratio	None

Resolution:

Variable Frequency	1 Hz
Amplitude	0.05 V
Fixed Frequency	1 Hz
Ratio	0.1

Query: `SOURce:FUNCtion:SHAPe?`

Coupled Commands:

```
SOURce:VOLTage:LEVel
SOURce:SIMD:IMFRequency
SOURce:SIMD:VFRequency
SOURce:SIMD:RATio
```

Example:

```
SOUR1:VOLT:LEV 3;:SOUR1:SIMD:FREQ
7000;:SOUR1:FUNC:SHAP SIMD;:SOUR1:SIMD:RAT
3;:SOUR1:SIMD:VFR 100
```

***RST:**	Amplitude Ratio	4.0
	Variable Frequency	7000 Hz
	Amplitude	0.00 dBu
	Fixed Frequency	60 Hz

The amplitude of the frequency signal is controllable using the AMPLITUDE knob of the generator. The frequency is controllable using the FREQUENCY knob of the generator. The parameters of the SIMD signal, the IM–frequency, and the ratio may be entered separately to effect changes to the test signal.

Example:

```
SOUR:VOLT:LEV 5
SOUR:SIMD:FREQ 8000
SOUR:SIMD:VFR 3000
SOUR:SIMD:RAT 4

or

SOUR:SIMD:RAT 4;
```

SOURce:SIMD:VFRequency <numeric_value>

Usage: Sets the frequency of the variable tone in the SIMD signal.

Range: 3000 to 18000 Hz

Resolution: 0.1 Hz

Query: `SOURce:SIMD:VFRequency?`

***RST:** 7000 Hz

SOURce:SIMD:IMFRequency <numeric_value>

Usage: Sets the intermodulation frequency tone of the SIMD signal.

Range: 40 to 500 Hz

Resolution: 1 Hz

Query: `SOURce:SIMD:IMFRequency?`

***RST:** 60

SOURce:SIMD:RATio <numeric_value>

Usage: Sets the amplitude ratio between the two frequencies of the SIMD signal.

Range: 1.0 to 8.0

Resolution: 0.1

Query: `SOURce:SIMD:RATio?`

***RST:** 4

SOURce[1–8]:FUNCtion:SHAPe CIMD
SOURce:CIMD:TYPE CCIF

Usage: Generates a two–tone intermodulation signal. Both tones are typically swept in tandem with a constant frequency separation. With appropriate parameter choices, this signal can be used in a CCIF intermodulation distortion test. The frequency setting is the center frequency. The two tones are placed above and below the center frequency with constant spacing between the upper and lower frequency. Ratio is the amplitude ratio of the two tones expressed in an integer. The integer expresses the amplitude multiple of the lower–frequency tone with respect to the amplitude of the upper–frequency tone and is commonly set to 1. Note that the spacing, amplitude ratio, and center frequency are all selectable. Setting the signals to other than those specified by the CCIF standard for your testing make the signal no longer a CCIF standard signal.

Range:

Center Frequency	20 to 20000
Amplitude	
Spacing	00 to 1,000
Ratio	0.01 to 100

Units:

Frequency	Hz
Amplitude	Volts
Spacing	Hz
Ratio	None

Resolution:

Center Frequency	0.1
Amplitude	
Spacing	0.1 Hz
Ratio	0.1

Coupled Commands:

`SOURce:FREQuency:CW`
Sweep: `SOURce:FREQuency`
List: `SOURce:LIST:FREQuency`

`SOURce:VOLTage:[LEVel][IMMediate][AMPlitude]`
Sweep: `SOURce:VOLTage`
List: `SOURce:LIST:VOLTage`

`SOURce:CIMD:CFRequency`
`SOURce:CIMD:SPACing`
`SOURce:CIMD:RATio`

Example: `SOUR:VOLT 10;FUNC:SHAP CIMD;:SOUR:FREQ:CW 13500`

Query: `SOURce:FUNCtion:SHAPe?`
`SOURce:CIMD:TYPE?`

***RST:**

Center Frequency	13500
Ratio	1.0
Spacing	1000

SOURce:CIMD:CFRequency <numeric_value>

Usage: Sets the center frequency between the two frequencies of the CIMD signal.

Query: `SOURce:CIMD:CFRequency?` returns the center frequency setting between the two frequencies of the CIMD signal.

SOURce:CIMD:RATio <numeric_value>

Usage: Set amplitude ratio of one frequency to the other in the CIMD signal. This is nomally 1:1.

Query: `SOURce:CIMD:RATio?` returns the ratio of the amplitudes of the two frequencies of the CIMD signal.

SOURce:CIMD:SPACing <numeric_value>

Usage: Set the frequency spacing between the two frequencies of the CIMD signal.

Query: `SOURce:CIMD:SPACing?` returns the frequency spacing in Hz. between the two frequencies of the CIMD signal.

SOURce[1–8]:FUNCtion:SHAPe SNOise

Usage: Generates a periodic pseudo–random noise signal with a specified spectral distribution.

Coupled Commands:

`SOURce:SNOise:BPASs:TYPE WHITe|PINK`

`SOURce:VOLTage:[LEVel][IMMediate][AMPlitude]`
Sweep: `SOURce:VOLTage`
List: `SOURce:LIST:FREQuency`

Example: `SOUR3:FUNC:SHAP SNO;:SOUR3:VOLT:LEV 5`

SOURce[1–8]:FUNCtion:SHAPe PCHirp

Usage: Generates a periodic sine sweep with a flat spectral distribution (equal energy per Hz of bandwidth). The chirp is generated with frequency band edges determined by that channel's sweep parameters `SOUR:FREQ:STAR` and `SOUR:FREQ:STOP`.

Range:	Start Frequency	20 Hz to 80,000 Hz
	Stop Frequency	20 Hz to 80,000 Hz
Units:	Start Frequency	Hz
	Stop Frequency	Hz
Resolution:	Frequency	0.34 Hz (high res.), 11.7 Hz (high BW)
	Start Frequency	0.34 Hz (high res.), 11.7 Hz (high BW)
	Stop Frequency	0.34 Hz (high res.), 11.7 Hz (high BW)

Coupled Commands:

```
SOURce:FREQuency:STARt <frequency>
SOURce:FREQuency:STOP <frequency>
```

Example: SOUR:VOLT 3;FREQ:STA 30;FREQ:STOP 5,000;FUNC:SHA:PCH

The amplitude of the PCHirp signal is controllable using the AMPLITUDE knob of the generator. There is no frequency knob assignment.

Example:

```
SOUR5:VOLT 2
SOUR5:FREQ:STAR 50
SOUR5:FREQ:STOP 10000
```

SOURce[1–8]:FUNCtion:SHApe POLarity

Usage: Generates the IEC like polarity test signal. The signal resembles a half–wave rectified sine wave with the negative values removed

Range:

Frequency	10 Hz to 20,000 Hz
Amplitude	0.0625 V to 19.45 V

Resolution:

Frequency	0.1 Hz
Amplitude	1 µV

Units:

Frequency	Hz
Amplitude	Volts peak

Coupled Commands:

`SOURce:FREQuency:CW`
Sweep: `SOURce:FREQuency`
List: `SOURce:LIST:FREQuency <freq_list>`

`SOURce:VOLTage:[LEVel][IMMediate][AMPlitude]`
Sweep: `SOURce:VOLTage <voltage>`
List: `SOURce:LIST:VOLTage <voltage_list>`

Example:

```
SOUR1:FUNC:SHA POL;SOUR1:VOLT:LEV 12;:SOUR1:FREQ:CW
2000
```

The generator AMPLITUDE knob controls the test signal amplitude (`SOURce:VOLTage`) and the FREQUENCY knob control the signal frequency (`SOURce:FREQuency:CW`). These parameters may be controlled individually with SCPI commands.

Example: SOUR:VOLT 5E–1
SOUR:FREQ 500

SOURce[1–8]:FUNCtion:SHApe TPOLarity

Usage: Selects the Tektronix Polarity Signal. This signal consists of a sinewave and its 2nd harmonic added in a way that makes its time–domain signal asymmetrical,

SOURce[1–8]:FUNCtion:SHApe USER

Usage: Generates a waveform with user–defined data. The file name must be identified using `SOUR[1–8]:USER:DATA:FILE:NAME <file_name>.`

SOURce[1–8]:FUNCtion:SHApe MTONe

Usage: Generates a multitone test signal. The signal consists of multiple, simultaneously–generated sine waves. The specifications for the frequencies of the tones are obtained either from a user provided file or the current LIST settings for the source channel.

Range: Amplitude

Tones:

Frequencies	10 Hz to 80,000 Hz
Amplitudes	V RMS
Record Length	512, 1024, 2048, 4096, 8192, or 16,384 bytes

Units:

Amplitude	Volts Peak
Frequency	Hz
Record Length	Bytes

Resolution:

Tones	Frequency	(Sampling rate)/(Record Length) Hz
	Amplitude	

Coupled Commands: `SOURce:LIST:VOLTage`

Query: `SOUR[1–8]:FUNC:SHAP?`

The Generator Amplitude knob controls the peak voltage level of the test signal `(SOURce:VOLTage[:LEVel][:IMMediate][:AMPLitude])`. The Frequency control knob is not assigned.

SOURce:LIST Subsystem

Usage: Commands in the SOURce:LIST subsystem permit defining voltage and frequency points and dwell time per point to be used for generating a signal from a LIST. When the generator is set to Multitone, the list of frequencies is looked at to produce the multitone output signal. The default is that all sources use the same list, but a separate list may be entered for each source if separate signals are selected (B does not follow A). Each suffix is a different generator.

Suffixes:

SOURce1	Analog generator HR A
SOURce2	Analog generator HR B
SOURce3	Analog generator HB A
SOURce4	Analog generator HB B
SOURce5	Digital generator DSF 1
SOURce6	Digital generator DSF 2
SOURce7	Digital Signal Processor A
SOURce8	Digital Signal Processor B

SOURce[1 – 8]:LIST:VOLTage <volt_value1,{volt_value2,...volt_value128}>

Usage: Sets the voltage for each point in a list, up to 128 points within the available resolution. For each list definition, volts, frequency, and dwell, each must contain exactly the same number of points if you wish to specify different voltages in the list. If you want the same voltage for each point, enter that value once. Specify level values in the units set by the UNIT:VOLT command.

Example:

```
SOUR1:LIST:VOLT
0.025,0.050,0.075,1.0,1.025,2.0,3.0,2.5,1,5,0.5
```

Query: `SOUR[1–8]:LIST:VOLT?` returns a comma separated list of the point voltages.

***RST:** Sets the level to 2.2185 dBu (1 volt).

NOTE: *When the list is used to generate a multitone test signal, the level setting for each tone is used only to provide the relative amplitude relationship between the individual tones. The absolute value of each tone depends on the generator amplitude setting for the peak value of the multitone test signal. The number of tones, the tone spacing, and the phase of the tones with respect to each other all affects the RMS value of the multitone signal.*

SOURce[1–8]:LIST:FREQuency <freq1{,freq2,...freq128}>

Usage: Sets the frequency of each point in list, up to 128 points within the available resolution. For each list definition, volts, frequency, and dwell, each must contain exactly the same number of points.

Example: `SOUR1:LIST:FREQ 100,200,300,450,500,800,2000,5000, 10000,15000,18000`

Query: `SOUR[1–8]:LIST:FREQ?` returns a comma separated list of the point frequencies.

***RST:** Sets the list to its default number of points and point values: 15000.00, 12000.00, 9984.375, 7500.00, 5015.625, 2015.625, and 515.625 Hz

SOURce[1–8]:LIST:DWELl <time1{,time2,...time128}>

Usage: Sets the dwell times for each point in a list, up to 128 points. Each list definition for the same source list (volts, frequency, and dwell) must contain exactly the same number of points.

Query: `SOURce[1 – 8]:LIST:DWELl?` returns a comma separated list of the point dwell times.

Example: SOUR1:LIST:DWEL .5,.5..8,.8,.8,1,1,1.2,1,.8

***RST:** Sets the dwell time to 1.0 second.

SOURce:MTONe Subsystem

SOURce[1–8]:MTONe:MODE LIST|FILE

Usage: Designates whether the multitone signal from a designated source is generated using the list or a user file.

Query: `SOURce[1–8]:MTONe:LIST?` returns LIST or FILE as the source of the multitone frequency set for the designated source.

***RST:** Sets MODE to LIST for all sources.

SOURce[1–8]:MTONe:DATA:FILE:NAME <file_name>

Usage: Designates a file name to be used for generating a multitone signal when the mode is set to FILE.

Query: `SOURce[1–8]:MTONe:DATA:FILE:NAME?` returns the file name that will be used when generating a multitone signal from the designated source when the mode is set to FILE.

***RST:** Sets file name to `”asgmton1.ton”` for all sources except 3 and 4, which are set to `”sample.ton.”`

SOURce[1–8]:MTONe:DATA:FILE:LNAME <file_name>

Usage: Designates a file name with complete path to be used for generating a multitone signal when the mode is set to FILE.

Query: `SOURce[1–8]:MTONe:DATA:FILE:LNAME?` returns the file name with path that will be used when generating a multitone signal from the designated source when the mode is set to FILE. For example,

```
”rom:/mtone/asgmton1.ton” or
”nvram:/mtone/usrfile1.ton”
```

SOURce:STATe Subsystem

SOURce[1–8]:STATe <Boolean>

Usage: Enables individual sources. When a source is off, its output is silence. This is not the same as GCON:STAT ON|OFF. GCON controls the states of all the generators not individual outputs.

Suffixes:

SOURce1	Analog generator HR A
SOURce2	Analog generator HR B
SOURce3	Analog generator HB A
SOURce4	Analog generator HB B
SOURce5	Digital generator DSF 1
SOURce6	Digital generator DSF 2
SOURce7	Digital Signal Processor A
SOURce8	Digtial Signal Processor B

Query: `SOURce[1–8]:STATe?` returns 0 or 1 for OFF or ON for the designated SOURce.

***RST:** ON.

SOURce:SWEep Subsystem

`SOURce[1–8]:SWEep:COUNt <numeric_value>`

Usage:	Sets or queries the number of sweeps that are enabled by a single trigger event for the designated SOUR.

Suffixes:

SOURce1	Analog generator HR A
SOURce2	Analog generator HR B
SOURce3	Analog generator HB A
SOURce4	Analog generator HB B
SOURce5	Digital generator SF 1
SOURce6	Digital generator SF 2
SOURce7	Digital Signal Processor A
SOURce8	Digtial Signal Processor B

Range: 0 to 1000
0 sets the sweep to run continuously and it must be terminated before any other sweep commands are acted on.

Query: `sour:swe:coun?` returns the count setting for the designated source.

***RST:** Sets sweep count to 1.

`SOURce[1–8]:SWEep:DIRection UP|DOWN`

Usage: Sets the direction of the sweep for the designated source. UP means the sweep goes from the start point to the stop point, DOWN means the sweep begins at the stop point and ends at the start point.

Query: `SOURce[1–8]:SWEep:DIRection?` returns UP or DOWN for increasing or decreasing sweep steps.

***RST:** Sets sweep direction UP.

SOURce[1–8]:SWEep:DWELl <numeric_value>

Usage:	Sets the dwell time for points in a sweep for the designated source. Note that dwell cannot exceed TIME/POINts. Trying to set it to a greater value causes an error. When changing dwell time, the number of points does not change, but the sweep time does to accomodate the new dwell x points time
Range:	<numeric_value> for dwell time is from 0.1 to 600.00.
Units:	Seconds
Resolution:	0.1 seconds
Query:	`SOURce[1–8]:SWEep:DWELl?`
***RST:**	Sets sweep dwell for 1.5 seconds.

SOURce[1–8]:SWEep:POINts <numeric_value>

Usage:	Sets the number of points in a stepped sweep. If points are changed, DWELl will also be changed, but not TIME.
Range:	<numeric_value> is 1 to 128 points.
Query:	`SOURce[1–8]:SWEep:POINts?`
***RST:**	Sets sweep points to 16.

SOURce[1–8]:SWEep:SPACing LINear|LOGarithmic

Usage: Sets the sweep spacing versus time relationship of the sweep.

Parameters: LINear The sweep is incremented or decremented by an equal amount for each step until the sweep limit is reached.

LOGarithmic The sweep is incremented or decremented in a step size determined by a logarithimc curve fitted between the start and stop frequency. Stepping is determined by SWEep:POINts.

Query:	`SOURce[1–8]:SWEep:SPACing?` returns LINEAR or LOGARITHMIC for the spacing setting of the designated SOURce.
***RST:**	Sets spacing to LOGarithmic.

SOURce[1–8]:SWEep:TIME <numeric_value>

Usage:	Sets the sweep time duration. This is interactive with dwell time as the dwell per point adjusts to make the new sweep time.
Range:	Sweep time <numeric_value> is from 1.00 to 1228800.00.
Units:	Seconds
Query:	`SOURce[1–8]:SWEep:TIME?` returns the sweep time in seconds.
***RST:**	Sets sweep time for 24.00 seconds.

SOURce[1–8]:SWEep:TIME:AUTO <Boolean>

Usage:	Sets the sweep timing mode. If TIME:AUTO is ON, and a frequency sweep is generated, the dwell time per point (and therefore the total sweep time) is determined by the AM700 based on the current frequency and other factors. If `TIME:AUTO` is OFF the parameters for `SOUR:SWE:DWELL` and `SOUR:SWE:TIME` are used.
Query:	`SOURce[1–8]:SWEep:TIME:AUTO?` returns 1 for ON, and 0 for OFF.
***RST:**	ON

SOURce:USER Subsystem

SOURce[1–8]:USER:DATA:SCALing[:STATe] <Boolean>

Usage: Turns scaling of the user data on or off. ON causes the user data to be scaled; OFF uses the user data as is for amplitude.

Parameters: `ON|OFF|1|0`

Suffixes:

SOURce1	Analog generator HR A
SOURce2	Analog generator HR B
SOURce3	Analog generator HB A
SOURce4	Analog generator HB B
SOURce5	Digital generator DSF 1
SOURce6	Digital generator DSF 2
SOURce7	Digital Signal Processor A
SOURce8	Digtial Signal Processor B

SOURce[1–8]:USER:DATA:FILE:NAME <file_name>

Usage: Sets or queries the user data file name. Data in the file is used to generate the user defined signal.

Query: `sour[1–8]:user:data:file:name?` returns the user data file name specified for the designated source.

SOURce[1–8]:USER:DATA:FILE:LNAME?

Usage: Query only that returns the complete path name to the user data file named by `SOUR[1–8]:USER:DATA:FILE:NAME <file_name>` for the designated source.

Example: `SOUR[1–8]:USER:DATA:FILE:LNAME?` returns

`”rom:/signals/sample.dat”` as the default user data file.

SOURce:VOLTage Subsystem

Usage: The SOURce setup commands are divided into several sections. Each section or subsystem deals with a specific grouping of controls that affect different aspects of the AM700 SOURce commands.

Suffixes:

SOURce1	Analog generator HR A
SOURce2	Analog generator HR B
SOURce3	Analog generator HB A
SOURce4	Analog generator HB B
SOURce5	Digital generator DSF 1
SOURce6	Digital generator DSF 2
SOURce7	Digital Signal Processor A
SOURce8	Digtial Signal Processor B

SOURce[1–8]:VOLTage:MODE CW|FIXed|SWEep|LIST

Usage: Sets the operating mode for the voltage output of the designated generator. CW and FIXed are the same. SWEep causes a voltage sweep based on the settings for the number of points, dwell time per point, and total sweep time. LIST causes the voltage output of the designated SOURce to follow the amplitudes found in a voltage list.

Query: SOURce:VOLTage:MODE?

***RST:** Sets to FIXed.

SOURce[1–8]:VOLTage:STARt <numeric_value>

Usage: Sets the starting voltage for a voltage sweep.

Query: `SOURce:VOLTage:STARt?`

***RST:** Sets STARt to 0.000010. Default unit is volts.

SOURce[1–8]:VOLTage:STOP <numeric_value>

Usage: Sets the stopping voltage for a voltage sweep.

Query: `SOURce:VOLTAGE:STOP?` returns the maximum level of a voltage sweep for the designated SOURce.

***RST:** Sets STOP to 2.0000. Default unit is volts.

SOURce[1–8]:VOLTage[:LEVel] <numeric_value>

Usage: Sets the voltage level of the designated source.

Query: `SOURce[1–8]:VOLTage?` returns the level of the fixed voltage signal for the designated SOURce.

***RST:** Sets LEVel to 0.7747 (0 dBu). Default unit is volts. If a voltage sweep is occurring, the return follows the signal amplitude of the sweep.

SOURce[1–8]:VOLTage[:LEVel][:IMMediate] <numeric_value>

Usage: Used to indicate that the new voltage setting is to be made immediately without waiting for further commands.

SOURce[1–8]:VOLTage[:LEVel][:IMMediate][:AMPLitude] <numeric_value>

Usage: Sets or queries the acutal level of the unswept output signal in terms of the current operating units. The units are set to the default value, or alternately to a different value under the UNIT subsystem. AMPLitude may be used to specify the level for either a time varying or non–time varying signal. The optional nodes are omitted for normal use with the AM700 and the numeric_value directly follows the VOLTage keyword.

STATus Subsystem

The STATus subsystem controls the status–reporting registers of the AM700. These registers conform to the IEEE 488.2 specification. The may be comprised of a condition register, an event register, an enable register, and negative and positive transition filters.

There is a queue for status. The queue provides a human readable record of instrument errors. A programmer may individually enable events into the queue.

Status register bits are classified as either terminal (reporting a single class of events) or summary (reporting several classes of events). The parameters to the commands are described as <NRf> as defined in *IEEE 488.2* and not as SCPI <numeric_values>. UP, DOWN, MINimum, and MAXimum are not accepted for these commands. When a STATus command is queried, the return form is an <nr1> value.

STATus Reporting Structures

In the AM700 the following status reporting register sets are implemented.

- OPERation
- OPERation:INSTrument
- OPERation:SYSTem
- OPERation:TRIGger
- QUEStionable
- QUEStionable:INPut
- QUEStionable:INPut SUMMary
- QUEStionable:INSTrument
- QUEStionable:SOURce
- QUESTionable:SOURce:SUMMary

STATus:PRESet

Usage: Used to configure the SCPI and device–dependent status data registers so that device–dependent events are reported at a higher level through the mandatory part of the status–reporting system. Device_dependent events are summarized in the mandatory structures as defined in part by IEEE 488.2. SCPI–required structures make of the rest of the mandatory reporting system.

The PREset command affects only the enable register, the transition filter registers, and queue enabling for the SCPI–mandated and device–dependent status data mechanisms. The Status Byte and Standard Event Status are not affected by PREset. PREset does not clear any of the event registers or any item from the error/event queue. Those are cleared by the *CLS command.

PREset sets the device–dependent enable register to all 1's; transition filters are set to a device–dependent state (PTR, NTR, or both).

STATus:PRESet enables errors and disables all other events. The summary of the queue is reported in bit 2 of the status byte register.

Query: No query, this is an event.

STATus:QUEue[:NEXT]?

Usage: Returns the next queued error report from the human readable status register.

Query: Query only.

STATus:QUEue:ENABle <parameter>

Usage: Enables the Error Queue list.

Parameters: The parameter may be a decimal number, or it may be sent as a non–decimal numeric mask.

Query: `STAT:QUE:ENAB?`

The following commands can be applied to all SCPI registers by prefixing the command with the node(s) that represent the particular register to be controlled.

`STATus:OPERation[:EVENt]?`

Usage: Returns the content of the OPERation:EVENt register. Reading the register clears it.

Query: Query only.

`STATus:OPERation:CONDition?`

Usage: Returns the contents of the OPERation:CONDition register. Reading this register in non–destructive.

Query: Query only.

`STATus:OPERation:ENABle <numeric_value>`

Usage: Sets the enable mask to allow true conditions in the OPERation register to be reported in the summary bit. If a bit is 1 in the enable register and its associated event bit transitions to true, a positive transition will occur in the associated summary bit.

Range: 0 to 32767 where the numeric_value represents the decimal value of the 16 register bits. The value of 32767 is 2^{15} for all 16 register bits (0 through 15) are set to 1.

Query: Returns the status of the OPERation:ENABle register as an <nr1> value representing the bit states of the OPERation register bits.

`STATus:OPERation:NTRansition <NRf>`

Usage: Sets the negative transition filter. Setting a bit in the positive transition filter causes a 1 to 0 transition in the corresponding bit of the associated condition register to cause a 1 to be written in the associated bit of the corresponding event register.

Parameters: The parameter may be a decimal number, or it may be sent as a non–decimal numeric mask.

Query: Returns the status of the OPERation:NTRansition register as an <nr1> value representing the bit states of the OPERation register bits.

STATus:OPERation:PTRansition <NRf>

Usage: Sets the positive transition filter. Setting a bit in the positive transition filter causes a 0 to 1 transition in the corresponding bit of the associated condition register to cause a 1 to be written in the associated bit of the corresponding event register.

Parameters: The parameter may be a decimal number, or it may be sent as a non–decimal numeric mask.

Query: Returns the status of the OPERation:PTRansition register as an <nr1> value representing the bit states of the OPERation register bits.

Remaining Status Registers

The following status register commands follow the same format as the STAT:OPER registers just defined and those descriptions may be applied by substituting in the command with the node(s) that represent the particular register to be controlled.

Status Operation Instrument Registers

Status Operation Instrument Registers

STATus:OPERation:INSTrument[:EVENt]?

STATus:OPERation:INSTrument:CONDition?

STATus:OPERation:INSTrument:ENABle <numeric_value>

STATus:OPERation:INSTrument:PTRansition <numeric_value>

STATus:OPERation:INSTrument:NTRansition <numeric_value>

STATus:OPERation:INSTrument:MAP <numeric_value>, <numeric_value>

Status Operation Trigger Registers

```
STATus:OPERation:TRIGger
========================
bits 0–2 Unused
bit  3   Waiting for mtone CH1
bit  4   Waiting for mtone CH2
bit  5   Scope triggered   CH1
bit  6   Scope triggered   CH2
(remaining bits unused)
```

STATus:OPERation:TRIGger[:EVENt]?

STATus:OPERation:TRIGger:CONDition?

STATus:OPERation:TRIGger:ENABle <numeric_value>

STATus:OPERation:TRIGger:PTRansition <numeric_value>

STATus:OPERation:TRIGger:NTRansition <numeric_value>

Status Operation System Registers

STATus:OPERation:SYSTem[:EVENt]?

STATus:OPERation:SYSTem:CONDition?

STATus:OPERation:SYSTem:ENABle <numeric_value>

STATus:OPERation:SYSTem:PTRansition <numeric_value>

STATus:OPERation:SYSTem:NTRansition <numeric_value>

STATus:OPERation:SYSTem:MAP <numeric_value>, <numeric_value>

Status Questionable Registers

STATus:QUEStionable[:EVENt]?

STATus:QUEStionable:CONDition?

STATus:QUEStionable:ENAble <numeric_value>

STATus:QUEStionable:NTRansition <numeric_value>

STATus:QUEStionable:PTRansition <numeric_value>

Status Questionable Input Registers

`STATus:QUEStionable:INPut[:EVENt]?`

`STATus:QUEStionable:INPut:CONDition?`

`STATus:QUEStionable:INPut:ENABle <numeric_value>`

`STATus:QUEStionable:INPut:PTRansition <numeric_value>`

`STATus:QUEStionable:INPut:NTRansition <numeric_value>`

`STATus:QUEStionable:INPut:MAP <numeric_value>, <numeric_value>`

Status Questionable Input Summary Registers

`STATus:QUEStionable:INPut:SUMMary[:EVENt]?`

`STATus:QUEStionable:INPut:SUMMary:CONDition?`

`STATus:QUEStionable:INPut:SUMMary:ENABle <numeric_value>`

`STATus:QUEStionable:INPut:SUMMary:PTRansition <numeric_value>`

`STATus:QUEStionable:INPut:SUMMary:NTRansition <numeric_value>`

`STATus:QUEStionable:INPut:SUMMary:MAP <numeric_value>,<numeric_value>`

Status Questionable Instrument Registers

`STATus:QUEStionable:INSTrument[:EVENt]?`

`STATus:QUEStionable:INSTrument:CONDition?`

`STATus:QUEStionable:INSTrument:ENABle <numeric_value>`

`STATus:QUEStionable:INSTrument:PTRansition <numeric_value>`

`STATus:QUEStionable:INSTrument:NTRansition <numeric_value>`

`STATus:QUEStionable:INSTrument:MAP <numeric_value>, <numeric_value>`

Status Questionable Source Registers

`STATus:QUEStionable:SOURce[:EVENt]?`

`STATus:QUEStionable:SOURce:CONDition?`

`STATus:QUEStionable:SOURce:ENABle <numeric_value>`

`STATus:QUEStionable:SOURce:PTRansition <numeric_value>`

`STATus:QUEStionable:SOURce:NTRansition <numeric_value>`

`STATus:QUEStionable:SOURce:MAP <numeric_value>, <numeric_value>`

Status Questionable Source Summary Registers

`STATus:QUEStionable:SOURce:SUMMary[:EVENt]?`

`STATus:QUEStionable:SOURce:SUMMary:CONDition?`

`STATus:QUEStionable:SOURce:SUMMary:ENABle <numeric_value>`

`STATus:QUEStionable:SOURce:SUMMary:PTRansition <numeric_value>`

`STATus:QUEStionable:SOURce:SUMMary:NTRansition <numeric_value>`

`STATus:QUEStionable:SOURce:SUMMary:MAP <numeric_value>,<numeric_value>`

SYSTem Subsystem

Usage: Commands under the COMMunicate node are used to set the communication parameters for the GPIB and RS232 interfaces and the remote connector. The COMMunicate commands are divided into those for the GPIB interface, those for the SERial interface, and those for the remote connector. There are two serial ports: COM1 and COM2, that require parameter settings. The serial ports support printer hardcopy and console (operating system command flow used for diagnostics) output. Other commands under this Subsystem are used to query for system errors, set the AM700 clock (date and time), and control the system save state operation.

SYSTem:COMMunicate:GPIB:ADDRess <0–30>

Usage: Sets the GPIB address of the AM700.

Parameters: <numeric_value> range for the address is 0 to 30.

NOTE: *You will have to reconfigure your GPIB controller to recognize the new AM700 address to be able to talk to it after you change the address.*

Query: `syst:comm:gpib:addr?` returns the GPIB address of the AM700.

***RST:** No *RST event.

SYSTem:COMMunicate:GPIB[:SELF]:MODE TLISten|TONLy|OBUS

NOTE: *You will have to reconfigure your AM700 locally to regain remote control if you set it to TONLy or OBUS from remote control. You should not use this command if you want to retain remote control of the AM700.*

Usage: Sets the GPIB interface mode to talk/listen (the default state), talk only, or off bus. Talk only mode is used to drive a printer connected only to the AM700 GPIB port and it does not reply to controller commands. Off bus ceases remote communication between the AM700 and any other device on the bus.

Query: `SYST:COMM:GPIB[:SELF]:MODE?` returns the current setting for the GPIB mode TLISTEN if it is in the TLISten mode. If the AM700 is in TONLY mode, it does not respond to any controller commands and no reply is sent. If the AM700 is off bus, no reply is sent.

***RST:** TLISTEN is the default, but it *RST cannot be sent unless it is already in TLISTEN state.

SYSTem:COMMunicate:GPIB:RDEVice:FEED <string>

Usage: Sets the source of the data feed to the GPIB bus.

Parameters: Feeds to the GPIB ports are:

Query: `SYST:COMM:GPIB:RDEV:FEED?`

***RST:** `""`

SYSTem:COMMunicate:SERial[1|2]:CONTrol:RTS ON|RFR|IBFull

Usage: Sets or queries the selection for hardware handshaking of the data. On is CTS selected, RFR is CTS off. IBFull is an alias for RFR.

Query: `SYST:COMM:SER[1|2]:CONT:RTS?` returns the current setting for hardware handshaking for the designated serial port.

***RST:** ON

SYSTem:COMMunicate:SERial[1|2]:FEED <string>

Usage: Sets the source of the data feed to the designated serial port.

Parameters: Feeds to the serial ports are:

Query: `SYST:COMM:SER[1|2]:FEED?`

***RST:** `""`

SYSTem:COMMunicate:SERial[1|2]:BAUD <numeric_value>

Usage:	Sets or queries the baud rate used for the designated serial port.
Parameters:	Baud rates supported are: 300, 600, 1200, 2400, 9600, 19,200 and 38,400.
Query:	`SYST:COMM:SER[1|2]:BAUD?` returns the current baud rate setting for the designated serial port.
***RST:**	9600

SYSTem:COMMunicate:SERial[1|2]:BITS <numeric_value>

Usage:	Sets or queries the number of data bits in the serial data word for the designated serial port.
Parameters:	The number of data bits may be set to 7 or 8.
Query:	`SYST:COMM:SER[1|2]:BITS?` returns the stop bits setting, 1 or 2, for the designated serial port.
***RST:**	8

SYSTem:COMMunicate:SERial[1|2]:SBITs <numeric_value>

Usage:	Sets or queries the number of stop bits for the serial data word.
Parameters:	The number of stop bits may be set to 1 or 2.
Query:	`SYST:COMM:SER[1|2]:SBIT?`
***RST:**	1

SYSTem:COMMunicate:SERial[1|2]:PACe XON|NONE

Usage:	Used to select either software data handshaking (XON/XOFF) or NONE.
Query:	`SYST:COMM:SER[1|2]:PAC?`
***RST:**	NONE

SYSTem:COMMunicate:SERial[1|2]:PARity[:TYPE] EVEN|ODD|ZERO|ONE|NONE

Usage: Sets or queries the parity setting for the digital data words.

Query: `SYST:COMM:SER[1|2]:PAR:TYPE?`

***RST:** NONE

SYSTem:COMMunicate:RELay[:STATe] <Boolean>

Usage: Used to set or query to state of the Remote relay on the rear panel of the AM700.

Query: `SYST:COMM:REL:STAT?`

***RST:** Sets state to 0.

SYSTem:DATE <year>,<month>,<day>

Usage: Sets or displays the current AM700 internal calendar date.

Parameters: `<year>` Must be <numeric_value>. The year number value is rounded to the nearest integer. It must be entered as a four–digit number, including century and millennium information: example, 1994.

`<month>` Must be <numeric_value>. The month number value is rounded to the nearest integer from 1 to 12 inclusive. The numbers have the common correspondence to months: example 1 is January and 12 is December, etc.

`<day>` Must be <numeric_value>. The day number is rounded to the nearest integer in the range of numbers based on the <month>. The days of each month are tracked correctly and leap years will have February 29th.

Query: `syst:date?` returns three fields separated by commas:

`<year>` in NR1 format. Range depends on how long the AM700 tracks the calendar.

`<month>` is NR1 format in range of 1 to 12.

`<day>` is NR1 format in the range of 1 to 31, depending on the month.

`*RST:` Date tracking shall not be affected by *RST.

SYSTem:ERRor?

`Usage:` A query returns the last queued error. The queue query message is a request for the next entry from the instrument's error/event queue. Items in this queue conatin an integer in the range [–32768, 32767] denoting an error/event number and associated descriptive text. Negative numbers are reserved for SCPI standard errors. Positive number are instrument–dependent. An error/event value of zero (0) indicates that no error or event has occurred. See Appendix B for a complete listing of error codes and descriptions.

`Example:` `syst:err?` responds with one reply from the error message spool, one error reply for each query until no errors exist. When no errors exist, the reply to the query is `0,NO ERROR`

SYSTem:STATe:SAVE:IMMediate

`Usage:` Triggers a state save. The user editable parameters that have been changed in an application are saved so that when that application is recalled after being using another application, those edits will not have to be repeated. This is not a total state save of the entire state of the AM700 in that on power up, the generator state will not be on if it were on, and the running application will not be restored (FFT Analyzer is the power up default application).

`*RST:` No *RST effect.

SYSTem:TIME <hour>,<minute>,<second>

`Usage:` Sets or displays the current AM700 internal clock time.

`Parameters:` `<hours>` Must be <numeric_value>. The hour value is rounded to the nearest integer in the range of 0 to 23 inclusive in a 24 hour time format.

`<minutes>` Must be <numeric_value>. The minute value is rounded to the nearest integer in the range of 0 to 59 inclusive.

`<seconds>` Must be a <numeric_value> The second value is rounded to the nearest second in the range of 0 to 60. A number of 60 is allowed since rounding may cause a number greater than 59.5 to be rounded to 60. When this element is rounded to 60 it is set to 0, and the minute value is incremented. Carries that advance the time past 24 hours are rippled through the date.

Query: `syst:time?` returns three number fields separated by commas.

<hour> is a NR1 format number from 0 to 23.

<minute> is a NR1 format number from 0 to 59.

<second> is a NR1 format number from 0 to 60.

***RST:** The time setting of the AM700 is not affected by *RST.

SYSTem:VERSion?

Usage: Query only that returns the SCPI version supported: 1994.0.

TRACe Subsystem

A TRACe area is a named entity stored in instument memory. The content of the TRACe memory may be queried to output the trace data.

`TRACe[:DATA]? <trace_name>`

`Query:` Returns the data values contained in the <trace_name>. A TRACe DATA? query requires a <trace_name> argument to specify the trace data to query. Example: `TRACe[:DATA]? FFT_MAG1`

Traces contain different amounts of data. Some may contain only one value, others, such as the multitone distortion + noise measurement contain 8K of data bytes. You may use `TRACE:POINTS? <trace_name>` to determine how many point are contained (and also if there are no points available for a named trace). Some trace data points are returned as x-axis/y-axis pairs so that information like amplitude at a frequency may be determined. This is true of the Audio Analyzer traces and the multitone traces. The fft trace queries return the amplitude of the data, in dBu, in each bin only for each of the bins and the monitor traces return the amplitude of the data points. You should always check the number of data points if you ever query the trace data for monitor. The compressed (unzoomed) display may contain up to 2 seconds worth of data points at the sampling rate.

`TRACe:CATalog?`

`Query:` `TRACe:CATalog?` returns a comma–separated list of strings which contain the names of all traces for a running application. If there are no <trace_names> defined, a single, empty string is returned. The trace names are application specific. Audio Analyzer reports back with 44 or so (16 for RT readout values, 20 for the possible measurement output traces on four views with history, and 4 for the regulation mode traces) while FFT Analyzer reports back with 10 (two for FFT and eight for the possible multitone traces).

`Parameters:` Monitor Trace Data

SCOPEMAG_1	CH1 trace data
SCOPEMAG_2	CH2 trace data

Digital Interface Tester Data

DIT_BAH_X	Bit Activity X Subframe (not viewed)
DIT_BAH_XZ	Bit Activity X/Z Subframe (viewed)
DIT_BAH_Y	Bit Activity Y Subframe (viewed)
DIT_BAH_Z	Bit Activity Z Subframe (not viewed)
DIT_JSPECT	Jitter Spectrum Trace Data

FFT Analyzer Trace Data

FFTMAG_1	FFT bin data of CH1
FFTMAG_2	FFT bin data of CH2
MT_CH1_DIST	Distortion + Noise of CH1
MT_CH1_LEV	Level of CH1
MT_CH1_XTALK	Crosstalk on CH1
MT_CH2_DIST	Distortion + Noise of CH2
MT_CH2_LEV	Level of CH2
MT_CH2_XTALK	Crosstalk on CH2
MT_D_LEV	Level Diff between CH1 and CH2
MT_D_PHASE	Phase Diff between CH1 and CH2

Audio Analyzer Trace Data (AME1 through AME4)

AME1_1	Active trace view 1
AME1_2	1st history trace view 1
AME1_3	2nd history trace view 1
AME1_4	3rd history trace view 1
AME1_5	4th history trace view 1
AME1_6	Unsettled data points of last trace (if any)
AME1_REF	Reference trace view 1

AME2_1 through AME4_REF are the same as AME1, but for views 2 through 4

Audio Analyzer Real Time Measurement

CROS	Crosstalk between channels
FREQ1	Frequency on CH1
FREQ2	Frequency on CH2
IMD1	Intermodulation Distortion on CH1
IMD2	Intermodulation Distortion on CH2
LDIF	Level difference between CH1 and CH2
LEV1	Level on CH1
LEV2	Level on CH2
PHAS	Phase Diff between CH1 and CH2

SEP	Separation of Channels
THD1	Total Harmonic Distortion on CH1
THD2	Total Harmonic Distortion on CH2
THDN1	THD + Noise on CH1
THDN2	THD + Noise on CH2
WOW1	Wow on CH1
WOW2	Wow on CH2

Units: The units of the data returned by the `TRAC:DATA?` query are fixed and do not follow the UNIT commands.

Monitor Trace Data

SCOPEMAG_1	Volts
SCOPEMAG_2	Volts

Digital Interface Tester Data

DIT_BAH_X	None (decimal value between 0 and 1)
DIT_BAH_XZ	None (decimal value between 0 and 1)
DIT_BAH_Y	None (decimal value between 0 and 1)
DIT_BAH_Z	None (decimal value between 0 and 1)
DIT_JSPECT	dBUI

FFT Analyzer Trace Data

FFTMAG_1	dBu
FFTMAG_2	dBu
MT_CH1_DIST	dB
MT_CH1_LEV	dBu
MT_CH1_XTALK	dB
MT_CH2_DIST	dBu
MT_CH2_LEV	dBu
MT_CH2_XTALK	dB
MT_D_LEV	dB
MT_D_PHASE	degrees

Audio Analyzer Trace Data (AME1 through AME_4)
The units of the returned data pairs depend on the measurement setup in the view. The possible choices are: Frequency, Level, THD, THD+N, IMD, Phase Diff, Separation, Crosstalk + Noise, and Level Difference versus either Frequency or Level. The default units for the traces follow those of the real-time measurements units.

AME1_1	Depends on measurement
AME1_2	Depends on measurement
AME1_3	Depends on measurement
AME1_4	Depends on measurement
AME1_5	Depends on measurement
AME1_6	Depends on measurement
AME1_REF	Depends on measurement

AME2_1 through AME4_REF are the same as AME1, but for views 2 through 4

Audio Analyzer Real Time Measurement

CROS	dB
FREQ1	Hz
FREQ2	Hz
IMD1	%
IMD2	%
LDIF	dB
LEV1	Volts
LEV2	Volts
PHAS	degree
SEP	dB
THD1	%
THD2	%
THDN1	%
THDN2	%
WOW1	%
WOW2	%

`TRACe[:DATA]:VALue? <trace_name>,<numeric_value>`

Usage: Returns the data point value of the named data point in the named trace. Two arguments are required for the query.

Example: `TRAC[:DATA]:VAL? fftmag_1,25` returns the amplitude of the 25th data point in the trace. The units of the reply is dBu regardless of the vertical scale setting of the trace in the view.

TRACe:POINTs? <trace_name>

Usage: Queries the number of points of data in the trace given by `<trace_name>`. The trace name must be one of the ones returned by TRAC:CAT? for the running application. This command is useful for determining if there are points in a trace, and, if so, how many there are. The monitor traces may have very many points when fully compressed, and you may not wish to transfer 48 Kbytes of data.

TRiGger Subsystem

The trigger subsystem in the AM700 contains commands only to start and stop a sweep. If a change to a list or sweep is made after a sweep is started, that sweep must either finish naturally or be terminated with STOP before the change is effected and a new sweep started; the change will not be seen in the middle of a sweep in progress.

STARt

Usage: Starts a sweep.

STOP

Usage: Stops a sweep.

UNIT Subsystem

Default units are defined, where applicable, for each SCPI command. The UNIT subsystem provides a mechanism to change the default values. The units selected apply to the designated command parameters for both command and response, but NOT to the displayed units in the AM700 displays.

AM700 Implementation of the UNIT Subsystem

A simple version of the UNIT subsystem is in place in the AM700. It has the global headers: `UNIT:VOLTage`, `UNIT:FREQuency`, `UNIT:POWer`, `UNIT:TIME`, `UNIT:IMPedance`, and `UNIT:RATio`. The use of units are only applied to the query replies or command entries, not to the displayed units in the applicatiion readouts. Trace data queries also do not follow the units commands; traces have fixed unit selections that depend on the measurement and application. The front panel Units selection does not affect the SCPI units setting for a numerical value. The following set of SCPI commands illustrate how the UNIT commands may be used.

Example:

```
unit:freq?
Hz
sour1:freq:cw?
18668.0000
unit:freq khz
sour1:freq:cw?
18.6680
```

UNIT:FREQuency Hz|kHz|MHz

Usage: Sets or queries the unit associated with a FREQuency query reply or command entry.

Parameters: Hz, kHz, MHz

Default: Hz

Query: UNIT:FREQ? returns the current unit setting for FREQuency as Hz, kHz, or MHz.

***RST:** Sets the Frequency units to Hz.

UNIT:IMPedance Ohm|kOhm

Usage:	Sets or queries the unit associated with an IMPedance query reply or command entry.
Query:	`unit:imp?` returns the current IMPedence unit setting as Ohm or kOhm.
***RST:**	Sets the impedance unit to Ohm.

UNIT:RATio PCT|DB

Usage:	Sets or queries the unit associated with a RATio query reply or command entry.
Query:	UNIT:RAT? returns the current unit setting for ratio as either % or dB. Note that the percent response is the ’%’ symbol, but the command must use `PCT`.
***RST:**	Sets the ratio unit to percent (PCT).

UNIT:TIME HOUR|MINute|SECond

Usage:	Sets or queries the unit associated with a TIME query reply or command entry.
Query:	`UNIT:TIME?` returns the time units setting.
***RST:**	Set the time unit to SECOND.

UNIT:VOLTage V|mV|dBu|dBv|dBFS

Usage:	Sets or queries the unit associated with a VOLTage query reply or command entry.
Parameters:	V is the measured voltage, mV is a scaling of the measured voltage. dBu is a voltage ratio of the measured voltage with respect to 0.775 V, the voltage developed across a 600Ω resistor that is dissipating 1 mW. Resistor value are not considered, so dBu and dBm are the same only when a 600 Ω load is used. dBv is a voltage ratio between the measured voltage and 1 V.

dBFS is a voltage ratio between the measured voltage and the full scale voltage calibration factor `CAL:VOLT:FS`. It is primarily intended for digital levels.

`Query:` UNIT:VOLT? returns the current unit setting associated with a VOLTage query reply or command entry.

`*RST:` Sets the VOLTage unit to V.

Appendices

Appendix A: Firmware Release Notes

Firmware Version 1.00 Release Note

There is a possible problem in Firmware Version 1.00 that may occur as a result of some states that may become stored in the NVRAM. This problem causes the AM700 to go into reset continuously, either at power on or when an another application is started. The problem is cleared by removing the stored states from NVRAM, merely restoring factory defaults does not clear the problem.

NOTE: *Clearing the NVRAM also deletes all user–saved files..*

If you have control of the AM700 enough to use the memory manager, you may transfer those user file to DOS for later restoration to the AM700. This may not be possible if the AM700 is constantly resetting.

To clear the NVRAM, you must enter the diagnostics mode and run one of the utilities provided. Do this by following this procedure.

1. Turn off the AM700.

2. Press the MENU front–panel button and hold it in while turning on the power to the AM700. Continue holding in the MENU button until the AM700 beeps twice. You may release the MENU button after the beeps. The AM700 then starts up in the low–level diagnostics mode with the following menu displayed:

```
––– AM700 STARTUP MENU –––

 Key    Selection
–––––––––––––––––––––––––––––––––

H ... Diagnostics –HELP– Menu

R ... Instrument –RUN MODES– Menu

D ... Low Level –DIAGNOSTICS– Menu

U ... –UTILITIES– Menu

F ... –FIRMWARE– Date Codes

––––––––––––––––––––––––––––––––––––––
 = ... Reprint       @ ... Abort Menu
––––––––––––––––––––––––––––––––––––––

Input your selection:
```

3. Use the large knob to select U, then press the Select front–panel button to enter the choice. This brings up the Utilities Menu.

```
      ––– UTILITIES MENU –––


Key     Selection
–––––––––––––––––––––––––––––––––––––––
Z ...   – ZERO –   System NVRAM

F ...   Reprogram   – Flash EEPROMS –

I ...Change Display  – INTENSITY
–––––––––––––––––––––––––––––––––––––––

Input your selection:
```

4. Use the large control knob to select Z, then press the Select front–panel button to enter your selection. This brings up the Zero System NVRAM Utility.

```
          ZERO SYSTEM NVRAM UTILITY
          =========================

### WARNING –– Zeroing system NVRAM will distroy: ###

      ––– All user files: setups, functions,
      GPIB addr, COMM port settings, etc
      ––– Instrument saved state settings
      ––– Instrument console info
      ––– Diagnostics Error log
      ––– Custom Diagnostic sequences

### Instrument will revert to Factory Default
configuration ###

### Press – MENU BUTTON – to zero NVRAM, any other to
abort ###
```

5. After the NVRAM is zeroed, you may use the menu choices and Select button to back out of the menu and select an application to start from the Instrument – RUN MODES – Menu or you may turn the AM700 off and back on again to restart the applications.