HEWLETT PACKARD

TE-A227

Programming Quick Reference

HP 53310A
Modulation Domain Analyzer

PROGRAMMING QUICK REFERENCE

HP 53310A
Modulation Domain Analyzer

Printed AUGUST 1992

HP PART NO. 53310-90034

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Table of Contents

This quick reference provides the following information for the HP 53310A:

The tables in this quick reference are taken from the HP 53310A Programming Reference Manual. Use that manual for more information about anything included here.

NOTE

All front-panel features are mapped to the equivalent SCPI commands in chapter 1 of the HP 53310A Programming Reference Manual. Use those pages to quickly find the SCPI command to control a front-panel feature.

HP 53310A Programming Quick Reference

Subsystem Commands Summary

Table 1 contains the SCPI subsystem commands to control the HP 53310A functions. For more information, go to chapter 1 of the *Programming Reference Manual.*

Table 1. Subsystem Commands Summary

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
:ABORt		Std	Event; No Query. Aborts measurement in progress. See fig. 1-3.
AUTOSCALE GROUP (not a keyword)			The AUTOSCALE GROUP capability corresponds to the Autoscale key on the front panel (see table 1-2, "Autoscale Group Commands Summary").
:CALCulate		Std	Subsystem. Post acquisition data processing.
:ANALysis		New	Subtree.
:AOFF		New	All off. Disables all analysis functions. See fig. 1-4.
:DELimit[1|2]	ALL | MARKers	New	1= vs Time. 2= Histogram. See figs. 1-12 and 1-13. *RST= ALL.
:IMEan		New	Subtree. This is the Inverse Mean analysis function (1/MEAN). See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST= OFF.
:RESult?		New	Query Only. STATe must be ON to query results.
:IMRate		New	Subtree. Inverse Modulation Rate analysis function (1/MRATE). Use only with vs Time. See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST= OFF.
:RESult?		New	Query Only. STATe must be ON to query results.
:MAXimum		New	Subtree. See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST=OFF.
:RESult?		New	Query Only. STATe must be ON to query results.
:MEAN		New	Subtree. See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST=OFF.
:RESult?		New	Query Only. STATe must be ON to query results.
:MINimum		New	Subtree. See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST=OFF.
:RESult?		New	Query Only. STATe must be ON to query results.
:MRATe		New	Subtree. Modulation Rate analysis function. Use only with vs Time. See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST=OFF.
:RESult?		New	Query Only. STATe must be ON to query results.

NOTE: Figures referenced above are in the Programming Reference Manual

Table 1. Subsystem Commands Summary

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
:CALCulate (Cont.)			
:ANALysis (Cont.)			
:PROBability		New	Subtree. Use only with Histogram. See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST=OFF.
:RESult?		New	Query Only. STATe must be ON to query results.
:PTPeak		New	Subtree. Peak-To-Peak analysis function. See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST=OFF.
:RESult?		New	Query Only. STATe must be ON to query results.
:SDEViation		New	Subtree. Standard Deviation analysis function. See fig 1-4.
[:STATe]	ON|1|OFF|0	New	Maximum of 4 analysis functions enabled at a time. *RST=OFF.
:RESult?		New	Query Only. STATe must be ON to query results.
:DATA?		Std	Query Only. Response is Histogram from vs Time when CALC:HIST ON and sensing vs Time.
:DIMension[1|2]		New	Subtree. 1=frequency/time-interval probability dimension (Y-axis). 2=frequency/time-interval bin dimension (X-axis).
:ENCode		New	Subtree.
:NOValue?		New	Query Only.
:FORMat?		New	Query Only.
:LABel?		New	Query Only.
:OFFSet?		New	Query Only.
:SCALe?		New	Query Only.
:SIZE?		New	Query Only.
:TYPE?		New	Query Only.
:HISTogram		New	Subtree. Histogram from vs Time. Applies when sensing vs Time.
[:STATe]	ON|1|OFF|0	New	ON= Display Histogram from vs Time. OFF= Display vs Time. See figs. 1-11 and 1-14. *RST= OFF.
:ACCumulate	ON|1|OFF|0	New	ON= accumulates if STAT ON or OFF. Coupled to :SENS:HIST:ACC. See figs. 1-11 and 1-14. *RST= OFF.
:SAMPles		New	Subtree. Histogram from vs Time samples.
:ABOVe?		New	Query Only. Number of samples at or above RANG:UPP.
:BELow?		New	Query Only. Number of samples at or below RANG:LOW.
:IN?		New	Query Only. Number of samples in histogram.
:IMMediate		Std	Event; No Query. Recalculates without reacquiring data.
:PATH?		Std	Query Only. Couples to SENSe:FUNCtion.
:CLEar		New	Event; No Query. Clears displayed data; invalidates data available. See fig. 1-3.
:CONFigure		Std	Part of the AUTOSCALE GROUP (see table 2, "Autoscale Group Commands Summary").

NOTE: Figures referenced above are in the Programming Reference Manual

Table 1. Subsystem Commands Summary (Continued)

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
:DIAGnostic		Std	Subsystem.
:CALibration		New	Subtree.
:INPut[1|2]		New	Subtree. 1= A and 2= B.
:GAIN		New	Subtree.
:AUTO	ONCE | OFF	New	ONCE calibrates input gain. See fig. 1-17. *RST= OFF.
:OFFSet		New	Subtree.
:AUTO	ONCE | OFF	New	ONCE calibrates input offset. See fig. 1-17. *RST= OFF.
:INTerp		New	Subtree. INTerp is an abbreviation for interpolator.
:AUTO	ONCE | OFF	New	ONCE calibrates interpolators. See fig 1-17. *RST= OFF.
:STATus?		New	Query Only. Returns 0 for calibration completed successfully and 1 for calibration failed.
:DISPlay		Std	Subsystem.
[:WINDow]		Std	Subtree.
:TRACe		Std	Subtree.
:CONNect	ON|1|OFF|0	New	ON= measured samples connected on display. See fig. 1-11. *RST= ON.
:GRATicule		Std	Subtree. Setting any command to OFF, sets all OFF.
:AXIS		Std	Subtree. Only used with vs Time.
[:STATe]	ON|1|OFF|0	Std	ON couples FRAME ON and GRID OFF. See fig. 1-11. *RST= ON.
:FRAMe		Std	Subtree.
[:STATe]	ON|1|OFF|0	Std	ON couples AXIS OFF and GRID OFF. See fig. 1-11. *RST= ON.
:GRID		Std	Subtree.
[:STATe]	ON|1|OFF|0	Std	ON couples AXIS ON and FRAME ON. See fig. 1-11. *RST= OFF.
:PERSistence	SINGle | INFinite	Std	Applies when :SENS:SWE:TIME:REP OFF. See fig. 1-11. *RST= SING.
:PROBability		New	Subtree. Y-axis of Histogram display.
[:SCALe]		New	Subtree.
:AUTO	ON|1|OFF|0	New	ON= display is scaled based on data instead of MIN and MAX. See fig. 1-11. *RST= ON.
:MAXimum	<numeric value> [PCT]	New	See Note 1. See fig. 1-11. *RST= 100.
:MINimum	<numeric value> [PCT]	New	See Note 1. See fig. 1-11. *RST= 0.
:SPACing	LINear | LOGarithmic	New	Type of spacing used on display for Histogram data (Y-axis). See fig. 1-11. *RST= LIN.
:MENU		Std	Subtree.
[:NAME]	STATus| FUNCtion| VERTical| TIMebase| TRIGger| DISPlay| FHIStogram| MARKers| SAMPling| UTILity	Std	Event; no query. Displays selected menu. See fig. 1-3.
:FETCh		Std	Part of the AUTOSCALE GROUP (see table 2, "Autoscale Group Commands Summary").

NOTE: Figures referenced above are in the Programming Reference Manual

Table 1. Subsystem Commands Summary (Continued)

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
:FORMat		Std	Subsystem. Affects queries returning vs Time or Histogram data.
[:DATA]	ASCii | BLOCk	Std	BLOCk format is 16-bit integers for vs Time data and 64-bit real numbers for Histogram data. *RST= ASC
:INITiate		Std	Subsystem.
[:IMMediate]		Std	Event; No Query. Initiates single measurement. See fig. 1-3.
:CONTinuous	ON|1|OFF|0	Std	Event; With Query. Enables/disables repetitive measurements. See fig. 1-3. *RST= OFF.
:INPut[1|2]		Std	Subsystem. 1= A and 2= B.
:COUPling	AC | DC	Std	See fig. 1-6. *RST= DC
:IMPedance	<numeric value> [OHM]	Std	See Note 1. Enter 50 OHM or 1 MOHM. See fig. 1-6. *RST= 1 MOHM
:MARKer		Std	Subsystem.
:FREQuency		New	Subtree. Frequency markers.
[:STATe]	ON|1|OFF|0,	New	Enables/disables frequency markers. See figs. 1-12 and 1-13. *RST= OFF.
:POSition[1|2]	<numeric value> [HZ]	New	See Note 1. See figs. 1-12 and 1-13. *RST= POS1 is 85 MHZ and POS2 is 115 MHZ.
:AUTO	ON|1|OFF|0	New	AUTO ON= Frequency and TI markers track last analysis function enabled. See figs. 1-12 and 1-13. *RST= ON.
:PROBability		New	Subtree. Histogram Probability Markers (Histogram Y-axis).
[:STATe]	ON|1|OFF|0	New	Enables/disables Histogram probability markers. See figs. 1-12 and 1-13. *RST= OFF.
:POSition[1|2]?		New	Query Only because its position is a function of the frequency or time interval marker position. See figs. 1-12 and 1-13.
:TIME		New	Subtree. Time Markers (vs Time X-axis)
[:STATe]	ON|1|OFF|0	New	Enables/disables Time markers. See figs. 1-12 and 1-13. *RST= OFF.
:POSition[1|2]	<numeric value> [S]	New	See Note 1. See figs. 1-12 and 1-13. *RST= POS1 is -0.4E-3 and POS2 is +0.4E-3.
:TINTerval		New	Subtree. Time Interval Markers.
[:STATe]	ON|1|OFF|0	New	Enables/disables time interval markers. See figs. 1-12 and 1-13. *RST= OFF.
:POSition[1|2]	<numeric value> [S]	New	See Note 1. See figs. 1-12 and 1-13. *RST = POS1 is 0.7E-3 and POS2 is 1.3E-3.
:AUTO	ON|1|OFF|0	New	AUTO ON= TI and frequency markers track last analysis function enabled. See figs. 1-12 and 1-13. *RST= ON.
:MEASure		Std	Part of the AUTOSCALE GROUP (see table 2, "Autoscale Group Commands Summary").
:READ		Std	Part of the AUTOSCALE GROUP (see table 2, "Autoscale Group Commands Summary").

NOTE: Figures referenced above are in the Programming Reference Manual

Table 1. Subsystem Commands Summary (Continued)

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
[:SENSe]		Std	Subsystem.
:DATA?		New	Query Only. Response is vs Time or Fast Histogram data (uses :FORMat).
:DIMension[1|2]		New	Subtree. DIM1= Y-axis. DIM2= X-axis. For vs Time: 1=frequency or TI, 2=time. For Histogram 1=frequency or TI probability, 2=frequency or TI bins.
:ENCode		New	Subtree.
:NOValue?		New	Query Only.
:FORMat?		New	Query Only.
:LABel?		New	Query Only.
:OFFSet?		New	Query Only.
:SCALe?		New	Query Only.
:SIZE?		New	Query Only.
:TYPE?		New	Query Only.
:EVENt[1|2]		New	Subtree. 1= A and 2= B.
:HYSTeresis		New	Subtree.
:RELative	<numeric value> [PCT]	New	0 - 100%. See Note 1. See fig. 1-6. *RST= 0
:LEVel	<numeric value> [V]	New	See Notes 1 and 2. See fig. 1-6. *RST= 0 V.
:AUTO	ONCE | OFF	New	Event; with query. ONCE = find 50% voltage threshold of input signal. See fig. 1-6. *RST= OFF.
:FREQuency		Std	Subtree.
:ARM		New	Subtree. Frequency sampling.
:CFINterval[1|2|3]	<numeric value> [S]	New	Sampling interval at Center Frequency for ARM:SOUR AUTO. 1= A, 2=B, and 3= C. See Notes 1 and 2. See fig. 1-15. *RST= 5E-6.
:AUTO	ON|1|OFF|0	New	ON couples interval to SWEep:TIME:SPAN. See fig. 1-15. *RST= ON.
:ECOunt[1|2]?		New	Query only. Returns actual arm event count. 1= A. 2= B. See fig. 1-15.
:ECOunt[1|2]		New	Subtree.
:MULTiplier	<numeric value>	New	Arm event count multiplier. Only applies when SOURce LINK and frequency A or B is selected. 1= A. 2= B. See Note 1. See fig. 1-15. *RST= ECO1 is 2. ECO2 is 1.
:FCFInternal[1|2|3]	<numeric value> [S]	New	Sampling interval at Center Frequency for FREQ:ARM:SOUR FAST. See fig. 1-15. *RST= 5E-6.
:AUTO	ON|1|OFF|0	New	ON couples interval to SWEep:TIME:SPAN. See fig. 1-15. *RST=ON.
:LEVel	<numeric value> [V]	New	External arm level. Only applies when SOURce EXTernal, or SOURce LINK and frequency C selected. See Note 1. See fig. 1-15. *RST= 1.5 V.
:LINK?		New	Query Only. Returns INT, INT2, or EXT for frequency A, B, or C, respectively.
:SLOPe	POSitive | NEGative	New	Ext Arm slope. Only applies when SOURce EXTernal, or SOURce LINK and frequency C selected. See fig. 1-15. *RST= POS.
:SOURce	AUTO | EXTernal | FAST | LINK | TIMer	New	LINK specifies sampling on edge of A or B (frequency A or B, respectively), or external (frequency C). See fig. 1-15. *RST= AUTO.

NOTE: Figures referenced above are in the Programming Reference Manual

Table 1. Subsystem Commands Summary (Continued)

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
[:SENSe] (Cont.)			
:FREQuency (Cont.)			
:ARM (Cont.)			
:TIMer	<numeric value> [S]	New	Time sampling (in SOUR TIMer). See Note 1. See fig. 1-15. *RST= 50.0E-6
:STATus?		New	Returns a 0 or 1. 0 = Use selected time sampling. 1 = selected time sampling < approximate minimum sampling interval.
:RANGe[1|2|3]		Std	Subtree. 1 = A, 2 = B, and 3 = C.
[:UPPer]	<numeric value> [HZ]	Std	See Note 1. See fig. 1-7. *RST= A is 125 MHZ, B is 70 MHZ, and C is 1.375 GHZ.
:AUTO	ONCE | OFF	Std	Event with query. ONCE autoscales UPP and LOW for input signal. See fig. 1-7. *RST= OFF for all three ranges.
:CENTer		New	Subtree.
:AUTO	ONCE | OFF	Std	Event with query. ONCE autoscales UPP and LOW retaining difference. See fig. 1-7. *RST= OFF for all three ranges.
:LOWer	<numeric value> [HZ]	Std	See Note 1. See fig. 1-7. *RST= A is 75 MHZ, B is 30 MHZ, and C is 625 MHZ.
:FUNCtion	"FREQ[1|2|3]" | "FREQ[1|2|3]: HIST" | "TINT" | "TINT:HIST"	Std	Only the short form of the sensor function strings (in quotes) are shown. 1= A, 2= B, and 3= C. HIST corresponds to Fast Histogram. See fig. 1-5. *RST= FREQ.
:HISTogram		New	Subtree. Fast Histogram.
:ACCumulate	ON|1|OFF|0	New	Coupled to :CALC:HIST:ACC. See fig. 1-14. *RST= OFF.
:ARM		New	Subtree. Event that starts Fast Histogram acquisition.
:LEVel	<numeric value> [V]	New	External arm level (SOUR EXT required). See fig. 1-6. See Note 1. *RST= 1.5 V.
:SLOPe	POSitive | NEGative	New	External arm slope (SOUR EXT required). See fig. 1-14. *RST= POS.
:SOURce	IMMediate | EXTernal	New	IMM= as fast as possible. See fig. 1-14. *RST= IMM.
:SAMPles		New	Subtree. Fast Histogram number of samples.
:ABOVe?		New	Query Only. Number of samples above RANG:UPP.
:BELow?		New	Query Only. Number of samples below RANG:LOW.
:IN?		New	Query Only. Number of samples in histogram.
:TRIGger		New	Subtree.
:COUNt	<numeric value>	New	Number of frequency or TI measurements required for Fast Histogram update. See Note 1. See fig. 1-14. *RST= 1000.
:ROSCillator		New	Subtree. Reference Oscillator.
:SOURce?		New	Query only because the Analyzer auto-detects the availability of an external reference oscillator. Returns INT, EXT, or ERR.

NOTE: Figures referenced above are in the Programming Reference Manual

Table 1. Subsystem Commands Summary (Continued)

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
[:SENSe] (Cont.)			
:SWEep		Std	Subtree.
:TIME		New	Subtree. Timebase Parameters.
:DELay	<numeric value> [S]	New	Main delay. See Notes 1 and 2. See figs. 1-8 and 1-9. *RST= 0.
:LINK	CENTer | STARt | STOP	New	Delay reference. Coupled to SWE:TIME:PAN:DEL:LINK. See figs. 1-8 and 1-9. *RST= CENT.
:PANorama		New	Subtree. Panorama Timebase parameters.
[:STATe]	ON|1|OFF|0	New	Enables/disables Panorama measurements. See fig. 1-9. *RST= OFF.
:DELay	<numeric value> [S]	New	Panorama delay. See Notes 1 and 2. See fig. 1-9. *RST= 0.
:LINK	CENTer | STARt| STOP	New	Coupled to SWE:TIME:DEL LINK. See figs. 1-8 and 1-9. *RST= CENT.
:SPAN	<numeric value> [S]	New	Panorama Timebase. See Note 1. See fig. 1-9. *RST= 1E-3.
:REPetitive		New	Subtree.
[:STATe]	ON|1|OFF|0	New	ON= Repetitive. OFF= Real time. See fig. 1-11. *RST= OFF.
:AVERage	ON|1|OFF|0	New	Applies when SWE:TIME:REP ON. See fig. 1-11. *RST= 0FF.
:SPAN	<numeric value> [S]	New	Main Timebase. See Note 1. See figs. 1-8 and 1-9. *RST= 1E-3.
:TINTerval		New	Subtree.
:ARM		New	Subtree. Time interval sampling.
:ATIMer?		New	Query Only. Returns sample time for ARM:SOUR AUTO in vs Time or Histogram from vs Time. SOUR AUTO required. See fig. 1-15.
:ECOunt	<numeric value>	New	Arm event count (SOUR INT[1|2] required). See Note 1. See fig. 1-15. *RST= 1.
:LEVel	<numeric value> [V]	New	Ext Arm level (SOUR EXT required). See Note 1. See fig. 1-15. *RST= 1.5 V.
:SLOPe[1|2|3]	POSitive | NEGative	New	1= A, 2= B, and 3= Ext when SOUR INT [1|2] or EXT, respectively. See fig. 1-15. *RST= POS.
:SOURce	AUTO | INTernal[1|2] | EXTernal | TIMer	New	AUTO= time sampling coupled to main timebase for vs Time or Histogram from vs Time. See fig. 1-15. *RST= AUTO.
:TIMer	<numeric value> [S]	New	Time sampling (in SOUR TIMer). See Note 1. See fig. 1-15. *RST= 10E-6.
:RANGe		New	Subtree.
[:UPPer]	<numeric value> [S]	New	See Note 1. See fig. 1-7. *RST= 1.4E-3.
:AUTO	ONCE | OFF	New	Event with query. ONCE autoscales UPP and LOW for input signal. See fig. 1-7. *RST= OFF.
:CENTer		New	
:AUTO	ONCE | OFF	New	Event with query. ONCE autoscales UPP and LOW retaining difference. See fig. 1-7. *RST= OFF.
:LOWer	<numeric value> [S]	New	See Note 1. See fig. 1-7. *RST= 600E-6.

NOTE: Figures referenced above are in the Programming Reference Manual

Table 1. Subsystem Commands Summary (Continued)

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
[:SENSe] (Cont.)			
:TINTerval (Cont.)			
:ROUTe	COMMon | SEParate	New	See fig. 1-5. *RST= SEP.
:SLOPe[1|2]	POSitive | NEGative	New	1= A (TI start edge) and 2= B (TI stop edge). See fig. 1-5. *RST= POS.
:TYPE	PLUS | PMINus	New	+TI (PLUS)or ± TI (PMIN). See fig. 1-5. *RST= PLUS.
:STATus		Std	Subsystem.
:OPERation		Std	Subtree.
[:EVENt]?		Std	Query Only.
:CONDition?		Std	Query Only.
:ENABle	<NRf>	Std	
:NTRansition	<NRf>	Std	Negative transition.
:PTRansition	<NRf>	Std	Positive transition.
:PRESet		Std	Event; No Query. Presets :STATus Enable and Transition registers.
:QUEStionable		Std	Subtree.
[:EVENt]?		Std	Query Only.
:CONDition?		Std	Query Only.
:ENABle	<NRf>	Std	
:FREQuency		Std	Subtree.
[:EVENt]?		Std	Query Only.
:CONDition?		Std	Query Only.
:ENABle	<NRf>	Std	
:NTRansition	<NRf>	Std	Negative transition.
:PTRansition	<NRf>	Std	Positive transition.
:NTRansition	<NRf>	Std	Negative transition.
:PTRansition	<NRf>	Std	Positive transition.
:SYSTem		Std	Subsystem.
:CLICker	ON|1|OFF|0	New	Enables/disables audible front-panel key click. See fig. 1-16. *RST= ON
:ERRor?		Std	Query Only. Responds with first (oldest) error in error queue.
:KEY	<numeric value>	Std	Simulates front-panel key press. See Notes 1 and 2.
:LOG?		New	Query Only. Response is contents of key queue (empties queue).
:PRESet		Std	Event; No Query. Sets Analyzer to same state as front-panel Preset key. See fig. 1-3.
:PRINt?		New	Query Only. Puts PCL-formatted display image data in Output Queue. See fig. 1-3.
:SSAVer	ON|1|OFF|0	New	Enables or disables screen saver capability. See fig. 1-3. *RST= 0FF.
:VERSion?		Std	Query Only. Returns 1990.0.

NOTE: Figures referenced above are in the Programming Reference Manual

Table 1. Subsystem Commands Summary (Continued)

KEYWORD	PARAMETER FORM	STD/ NEW	COMMENTS, RELATED FIGURES, AND RESET VALUES (*RST=)
:TRIGger		Std	Subsystem. Used to synchronize vs Time measurements.
:AUTO	ON|1|OFF|0	New	ON= auto trigger if necessary. OFF= wait indefinitely for trigger. See fig. 1-10. *RST= ON.
:FREQuency		New	Subtree. Applies when SOUR LINK and measuring frequency.
:EEMode[1|2|3]	AONLy | TREFerence	New	External edge arm only or time reference. TRIG:SOUR EXT required. See fig 1-10. *RST= AONLy.
:LEVel[1|2|3]	<numeric value> [HZ]	New	Frequency-trigger value. 1= frequency on A, 2= frequency on B, and 3= frequency on C. See Notes 1 and 2. See fig. 1-10. *RST= A is 100 MHZ, B is 50 MHZ, and C is 1 GHZ.
:AUTO	ON|1|OFF|0	New	ON couples LEV to center of FREQ:RANG. See fig. 1-10. *RST= ON.
:SLOPe	POSitive | NEGative	New	Trigger on rising (POS) or falling (NEG) edge of frequency vs Time. See fig. 1-10. *RST= POS.
:HFReject	ON|1|OFF|0	New	High Frequency Reject. See fig. 1-10. *RST= OFF.
:LEVel	<numeric value> [V]	New	External-trigger level (SOUR EXT). See Note 1. See fig. 1-10. *RST= 1.5 V.
:LINK?		Std	Query Only. Returns string: "SENS:FUNC"
:SLOPe	POSitive | NEGative	Std	External-trigger slope (SOUR EXT). See fig. 1-10. *RST= POS.
:SOURce	EXTernal|LINK	Std	LINK= frequency or TI value triggering. See fig. 1-10. *RST= LINK.
:TINTerval		New	Subtree. Applies when SOUR LINK and measuring TI.
:EEMode	AONLy | TREFerence	New	External edge arm only or time reference. TRIG:SOUR EXT required. See fig. 1-10. *RST= AONLy
:LEVel	<numeric value> [S]	New	Time-interval-trigger value. See Notes 1 and 2. See fig. 1-10. *RST= 1E-3.
:AUTO	ON|1|OFF|0	New	ON couples LEV to center of TINT:RANG. See fig. 1-10. *RST= ON.
:SLOPe	POSitive | NEGative	New	Trigger on rising (POS) or falling (NEG) edge of TI vs Time. See fig. 1-10. *RST= POS.

NOTE:
1. Can use the MINimum or MAXimum literal parameters instead of <numeric value> [suffix].
2. Acts as a command when a numeric value is specified but also acts as a subtree when a subordinate command is used. For example, :LEV acts as a subtree in :TRIG:FREQ:LEV:AUTO, but as a command in :TRIG:FREQ:LEV 5 MHZ.

NOTE: Figures referenced above are in the Programming Reference Manual

Autoscale Group Commands Summary Table

The Autoscale Group Commands consist of the following subsystems:

- CONFigure Subsystem
- FETCh Subsystem
- MEASure Subsystem
- READ Subsystem

The column definitions for *table 2* are the same as for the Subsystem Commands Summary Table except there is no Parameter Form column. The SCPI Standard requires specific parameters for some of these commands and you can use them, but they are ignored by the Analyzer. However, the Analyzer works fine if you never use these parameters. Therefore, unless you have an explicit problem of program compatibility with existing code, there is no need to use them.

Table 2. Autoscale Group Commands Summary

KEYWORD	STD NEW	COMMENTS
:CONFigure	Std	Subsystem. Configure for specified measurement.
:HISTogram	New	Subtree. Configure for Fast Histogram measurement.
[:VOLTage]	New	Subtree.
:FREQuency[1|2|3]	New	1 = A, 2 = B, and 3 = C. Configure for frequency Fast Histogram measurement.
:TINTerval	New	Configure for time interval Fast Histogram measurement.
:XTIMe	New	Subtree. Configure for vs Time measurement.
[:VOLTage]	New	Subtree.
:FREQuency[1|2|3]	New	1 = A, 2 = B, and 3 = C. Configure for frequency vs Time measurement.
:TINTerval	New	Configure for time interval vs Time measurement.
:CONFigure?	Std	Returns function configured by last :CONF or :MEAS command.

Table 2. Autoscale Group Commands Summary (Continued)

KEYWORD	STD NEW	COMMENTS
:FETCh	Std	Subsystem. Places measurement data in Output Queue.
[:SCALar]	Std	Subtree. Response is single numeric value in ASCII.
[:VOLTage]	Std	Subtree.
:FREQuency | :TINTerval	New	Subtree.
:IMEan?	New	Query Only. Inverse Mean analysis function.
:IMRate?	New	Query Only. Inverse Modulation Rate analysis function (vs Time required).
:MAXimum?	New	Query Only.
:MEAN?	New	Query Only.
:MINimum?	New	Query Only.
:MRATe?	New	Query Only. Modulation Rate analysis function (vs Time required).
:PROBability?	New	Query Only. Histogram Probability analysis function.
:PTPeak?	New	Query Only. Peak-To-Peak analysis function.
:SDEViation?	New	Query Only. Standard Deviation analysis function.
:HISTogram	New	Subtree. Histogram from vs Time or Fast Histogram (depending on :CONF).
[:VOLTage]	New	Subtree.
:FREQuency?	New	Frequency Histogram data (format determined by :FORMat).
:TINTerval?	New	Time Interval Histogram data (format determined by :FORMat).
:XTIMe	New	Subtree. Vs Time measurement data fetched.
[:VOLTage]	New	Subtree.
:FREQuency?	New	Frequency vs Time data (format determined by :FORMat).
:TINTerval?	New	Time Interval vs Time data (format determined by :FORMat).
:FETCh?	Std	Last function fetched, read, configured, or measured is retrieved.
:MEASure	Std	Subsystem. Stops measuring, configures, makes single measurement, and places measurement data in the Output Queue.
:HISTogram	New	Subtree. Fast Histogram measurement.
[:VOLTage]	New	Subtree.
:FREQuency[1|2|3]?	New	1= A, 2= B, and 3= C. Frequency Fast Histogram data (format determined by :FORMat).
:TINTerval?	New	Time Interval Fast Histogram data (format determined by :FORMat).
:XTIMe	New	Subtree. Vs Time measurement.
[:VOLTage]	New	Subtree.
:FREQuency[1|2|3]?	New	1= A, 2= B, and 3= C. Frequency vs Time data (format determined by :FORMat).
:TINTerval?	New	Time Interval vs Time data (format determined by :FORMat).

Autoscale Group Commands Summary Table

Table 2. Autoscale Group Commands Summary (Continued)

KEYWORD	STD NEW	COMMENTS
:READ	Std	Subsystem. Stops measuring, makes single measurement, and places measurement data in the Output Queue.
[:SCALar]	Std	Subtree. Response is single numeric value in ASCII.
[:VOLTage]	Std	Subtree.
:FREQuency | :TINTerval	New	Subtree.
:IMEan?	New	Query Only. Inverse Mean analysis function.
:IMRate?	New	Query Only. Inverse Modulation Rate analysis function (vs Time required).
:MAXimum?	New	Query Only.
:MEAN?	New	Query Only.
:MINimum?	New	Query Only.
:MRATe?	New	Query Only. Modulation Rate analysis function (vs Time required).
:PROBability?	New	Query Only. Histogram Probability analysis function.
:PTPeak?	New	Query Only. Peak-To-Peak analysis function.
:SDEViation?	New	Query Only. Standard Deviation analysis function.
:HISTogram	New	Subtree. Histogram from vs Time or Fast Histogram (depending on :CONF).
[:VOLTage]	New	Subtree.
:FREQuency?	New	Frequency Histogram data (format determined by :FORMat).
:TINTerval?	New	Time Interval Histogram data (format determined by :FORMat).
:XTIMe	New	Subtree. Vs Time measurement data fetched.
[:VOLTage]	New	Subtree.
:FREQuency?	New	Frequency vs Time data (format determined by :FORMat).
:TINTerval?	New	Time Interval vs Time data (format determined by :FORMat).
:READ?	Std	Last function fetched, read, configured, or measured is retrieved.

Common Commands Summary Table

The Common Commands Summary Table lists and briefly describes the common commands used with the Analyzer. Chapter 3, Common Commands Reference Dictionary (in the Programming Reference Manual), describes these commands in more detail.

Table 3. Common Commands Summary

COMMAND	DESCRIPTION
*CAL?	Performs an internal interpolator self-calibration.
*CLS	Clears Status data structures (Event Registers and Error Queue).
*ESE <NRf>	Sets the Standard Event Status Enable Register.
*ESE?	Queries the Standard Event Status Enable Register.
*ESR?	Queries the Standard Event Status Register.
*IDN?	Queries the Analyzer identification.
*OPC	Causes Analyzer to set the operation complete bit in the Standard Event Status Register when all pending operations (see note) are finished.
*OPC?	Places an ASCII "1" in the Output Queue when all pending operations (see note) are completed.
*OPT?	Identifies the options installed in the Analyzer.
*RCL <NRf>	Restores state of the Analyzer from a copy stored in local non-volatile memory (0 through 9 are valid memory registers).
*RST	Resets the Analyzer to a known state.
*SAV <NRf>	Stores the current state of the Analyzer in local non-volatile memory (1 through 9 are valid memory registers).
*SRE <NRf>	Sets the Service Request Enable Register.
*SRE?	Queries the Service Request Enable Register.
*STB?	Queries the Status Byte and Master Summary Status bit.
*TRG	This trigger command is the device-specific analog of the IEEE 488.1 defined GET. It initiates a single measurement.
*TST?	Executes an internal self-test and reports the results.
*WAI	Makes Analyzer wait until all pending operations (see note) are complete before executing commands following *WAI command.

Note: Pending operations include measurements in progress.

Program Message Parameter Types

Table 4 contains explanations and examples of parameter types. Parameter types may be numeric value, Boolean, literal, string, or NRf.

Table 4. Program Message Parameter Types

TYPE	EXPLANATIONS AND EXAMPLES
<numeric value>	Accepts all commonly used decimal representations of numbers including optional signs,decimal points, and scientific notation: 123, 123E2, -123, -1.23E2, .123,1.23E-2, 1.23000E-01. Special cases include MINimum and MAXimum (also DEFault in the :CONFigure and :MEASure Subsystems only). MINimum selects minimum value available. MAXimum selects maximum value available. DEFault selects the default value. Queries using MINimum or MAXimum return the associated numeric value.
<Boolean>	Represents a single binary condition that is either true or false: 1 or ON, 0 or OFF (Query response returns only 1 or 0.)
<literal>	Selects from a finite number of choices. These parameters use mnemonics to represent each valid setting. An example is the INPut:COUPling AC|DC command parameters (AC|DC).
<NRf>	Flexible numeric representation. Only positive integers are used for NRf parameters in the Analyzer.
<string>	The <sensor function string> is a string parameter and is enclosed in double quotes. For example, **OUTPUT 712;"FUNC ""FREQ"""""** is a valid program statement using a string parameter.
<non-decimal numeric>	Format for specifiying hexadecimal (#H10FA), octal (#Q1077), and binary (#B10101011) numbers using ASCII characters. Used in :STATus sybsystem commands.

Error Messages

Table 5 lists the errors that are produced by the Analyzer. The error code categories are the following:

- -100 to -199 are command errors
- -200 to -299 are execution errors
- -300 to -399 are device-specific errors
- -400 to -499 are query errors
- +2000 to +2011 are analyzer-specific errors

Table 5. Error Messages

CODE	MESSAGE	CAUSE
+0	No error	The error queue is empty. Every error in the queue has been read (SYSTem:ERRor? query) or the queue was cleared by power-on or *CLS.
–100	Command error	This is the generic syntax error used if the Analyzer cannot detect more specific errors.
–101	Invalid character	A syntactic element contains a character that is invalid for that type. For example, a header containing an ampersand, :INP:COUP& AC.
–102	Syntax error	An unrecognized command or data type was encountered.
–103	Invalid separator	The parser was expecting a separator and encountered an illegal character.
–104	Data type error	The parser recognized a data element different than one allowed. For example, numeric or string data was expected but block data was received.
–105	GET not allowed	A Group Execute Trigger was received within a program message.
–108	Parameter not allowed	More parameters were received than expected for the header.
–109	Missing parameter	Fewer parameters were received than required for the header.
–112	Program mnemonic too long	The header or character data element contains more than twelve characters.
–113	Undefined header	The header is syntactically correct, but it is undefined for the Analyzer. For example, *XYZ is not defined for the Analyzer.
–121	Invalid character in number	An invalid character for the data type being parsed was encountered. For example, a "9" in octal data.
–123	Exponent too large	Number is too large or too small to be represented internally.
–124	Too many digits	The mantissa of a decimal numeric data element contained more than 255 digits excluding leading zeros
–128	Numeric data not allowed	A legal numeric data element was received, but the Analyzer does not accept one in this position for the header.
–131	Invalid suffix	The suffix does not follow the syntax described in IEEE 488.2 or the suffix is inappropriate for the Analyzer.
–138	Suffix not allowed	A suffix was encounted after a numeric element that does not allow suffixes.
–141	Invalid character data	Either the character data element contains an invalid character or the particular element received is not valid for the header.

Table 5. Error Messages (Continued)

–148	Character data not allowed	A legal character data element was encountered where prohibited by the Analyzer.
–150	String data error	This error can be generated when parsing a string data element. This particular error message is used if the Analyzer cannot detect a more specific error.
–151	Invalid string data	A string data element was expected, but was invalid for some reason. For example, an END message was received before the terminal quote character.
–158	String data not allowed	A string data element was encountered but was not allowed by the Analyzer at this point in parsing.
–160	Block data error	This error can be generated when parsing a block data element. This particular error message is used if the Analyzer cannot detect a more specific error.
–168	Block data not allowed	A legal block data element was encountered but was not allowed by the Analyzer at this point in parsing.
–170	Expression error	This error can be generated when parsing an expression data element. It is used if the Analyzer cannot detect a more specific error.
–178	Expression data not allowed	Expression data was encountered but was not allowed by the Analyzer at this point in parsing.
–200	Execution error	This is the generic syntax error if the Analyzer cannot detect more specific errors. This code indicates only that an Execution Error has occurred.
–210	Trigger error	Used if the Analyzer cannot detect a more specific error from the :INIT, :TRIG, or :ABOR subsystems.
–211	Trigger ignored	Indicates that a GET or *TRG was received and recognized by the Analyzer but was ignored because of Analyzer timing considerations. For example, the Analyzer was not ready to respond.
–213	Init ignored	Indicates that a request for a measurement initiation was ignored as another measurement was in progress.
–220	Parameter error	Indicates that a program data element related error occurred. This error message is used when the Analyzer cannot detect more specific errors.
–221	Settings conflict	Indicates that a legal program data element was parsed but could not be executed due to the current Analyzer state.
–222	Data out of range	Indicates that a legal program data element was parsed but could not be executed because the interpreted value is outside the legal range defined by the Analyzer. Typically, the value is clipped to legal limit.
–223	Too much data	Indicates that a legal program data element of block, expression, or string type was received that contained more data than the Analyzer could handle due to memory or related Analyzer-specific requirements.
–224	Illegal parameter value	Used where exact value, from a list of possible values, was expected.
–230	Data corrupt or stale	No valid data available. New measurements started but not completed.
–240	Hardware error	Indicates that a legal program command or query could not be executed because of a hardware problem in the Analyzer.
–241	Hardware missing	Indicates that a legal program command or query could not be executed because of missing Analyzer hardware. For example, the C-channel option was not installed.

Table 5. Error Messages (Continued)

–300	Device-specific error	This is the generic device-dependent error.
–310	System error	Indicates that a system error occurred.
–330	Self-test failed	Indicates at least one failure occurred when *TST? was executed.
–331	Self-test failed; CPU kernel failure	Power on self-test detected this hardware failure.
–332	Self-test failed; ROM checksum failure	Power on self-test detected this hardware failure.
–333	Self-test failed; RAM address lines failure	Power on self-test detected this hardware failure.
–334	Self-test failed; Display RAM address lines failure	Power on self-test detected this hardware failure.
–335	Self-test failed; NVRAM address lines failure	Power on self-test detected this hardware failure.
–336	Self-test failed; CPU DTACK failure	Power on self-test detected this hardware failure.
–337	Self-test failed; Main Board DTACK failure	Power on self-test detected this hardware failure.
–338	Self-test failed; Interrupt failure	Power on self-test detected this hardware failure.
–339	Power on interpolator calibration failure	Power on self-test detected this hardware failure.
–350	Queue Overflow	Indicates that there is no room in the error queue and an error occurred but was not recorded.
–400	Query error	This is the generic query error.
–410	Query INTERRUPTED	Indicates that a condition causing an INTERRUPTED Query error occurred. For example, a query followed by DAB or GET before a response was completely sent.
–420	Query UNTERMINATED	Indicates that a condition causing an UNTERMINATED Query error occurred. For example, the Analyzer was addressed to talk and an incomplete program message was received.
–430	Query DEADLOCKED	Indicates that a condition causing a DEADLOCKED Query error occurred. For example, both input buffer and output buffer are full and the Analyzer cannot continue.
–440	Query UNTERMINATED after indefinite response	Indicates that a query was received in the same program message after a query requesting an indefinite response (indefinite length arbitrary block response or arbitrary ASCII response) was executed.
+2000	Offset calibration on A failed	:DIAGnostic:CALibration:INPut:OFFSet:AUTO ONCE failed.
+2001	Offset calibration on B failed	:DIAGnostic:CALibration:INPut2:OFFSet:AUTO ONCE failed.
+2002	Gain calibration on A failed	:DIAGnostic:CALibration:INPut:GAIN:AUTO ONCE failed.
+2003	Gain calibration on B failed	:DIAGnostic:CALibration:INPut2:GAIN:AUTO ONCE failed.
+2004	Interpolator calibration failed	:DIAGnostic:CALibration:INTerp:AUTO ONCE, *CAL? failed.
+2005	Oscillator error	Oscillator error detected.
+2006	Hardware failure	Unusual hardware condition detected.
+2007	Recall setup failed	*RCL <NRf> failed.
+2008	Unable to auto configure the frequency or time interval range setup	One of the following commands failed: [:SENSe]:FREQuency:RANGE[1|2|3]:CENTer:AUTO ONCE, [:SENSe]:TINTerval:RANGE:CENTer:AUTO ONCE, [:SENSe]:FREQuency:RANGe[1|2|3]:AUTO ONCE, [:SENSe]:TINTerval:RANGE:AUTO ONCE, :CONFigure (partially), or :MEASure (partially).

Table 5. Error Messages (Continued)

+2009	No signal found on A	One of the following commands failed: [:SENSe]:EVENt:LEVel:AUTOONCE, :CONFigure (partially), or :MEASure (partially).
+2010	No signal found on B	One of the following commands failed: [:SENSe]:EVENt2:LEVel:AUTOONCE, :CONFigure (partially), or :MEASure (partially).
+2011	Analysis function failed	Queried analysis result could not be computed.