

**HP 4396B Network/Spectrum/Impedance Analyzer**  
**HP-IB Command Reference**

**SERIAL NUMBERS**

This manual applies directly to instruments which have the serial number prefix JP1KE.  
For additional important information about serial numbers,  
read "Serial Number" in Appendix A of this Manual.



**HP Part No. 04396-90034**  
**Printed in JAPAN July 1997**

---

## Notice

The information contained in this document is subject to change without notice.

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of the Hewlett-Packard Company.

Hewlett-Packard Japan, LTD.  
Kobe Instrument Division  
1-3-2, Murotani, Nishi-ku, Kobe-shi,  
Hyogo, 651-22 Japan

---

## Manual Printing History

The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates that are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

March 1997 ..... First Edition  
July 1997 ..... Second Edition

---


## Typeface Conventions


**Bold** Boldface type is used when a term is defined. For example: **icons** are symbols.

*Italics* Italic type is used for emphasis and for titles of manuals and other publications.

Italic type is also used for keyboard entries when a name or a variable must be typed in place of the words in italics. For example: copy *filename* means to type the word copy, to type a space, and then to type the name of a file such as file1.

**Computer** Computer font is used for on-screen prompts and messages.

**HARDKEYS** Labeled keys on the instrument front panel are enclosed in .

**SOFTKEYS** Softkeys located to the right of the CRT are enclosed in .

---

## Documentation Map

The following manuals are available for the analyzer.

### **User's Guide (HP Part Number 04396-90031)**

The User's Guide walks you through system setup and initial power-on, shows how to make basic measurements, explains commonly used features, and typical application measurement examples. After you receive your analyzer, begin with this manual.

### **Task Reference (HP Part Number 04396-90030)**

Task Reference helps you to learn how to use the analyzer. This manual provides simple step-by-step instructions without concepts.

### **Function Reference (HP Part Number 04396-90032)**

The Function Reference describes all function accessed from the front panel keys and softkeys. It also provides information on options and accessories available, specifications, system performance, and some topics about the analyzer's features.

### **Programming Guide (HP Part Number 04396-90033)**

The Programming Guide shows how to write and use BASIC program to control the analyzer and describes how HP Instrument BASIC works with the analyzer.

### **HP-IB Command Reference (HP Part Number 04396-90034)**

The HP-IB Command Reference provides a summary of all available HP-IB commands. It also provides information on the status reporting structure and the trigger system (these features conform to the SCPI standard).

### **Option 010 Operating Handbook (Option 010 only) (HP Part Number 04396-90036)**

The option 010 Operation Handbook describes the unique impedance measurement functions of the HP 4396B with option 010.

### **HP Instrument BASIC Manual Set (HP Part Number E2083-90000)**

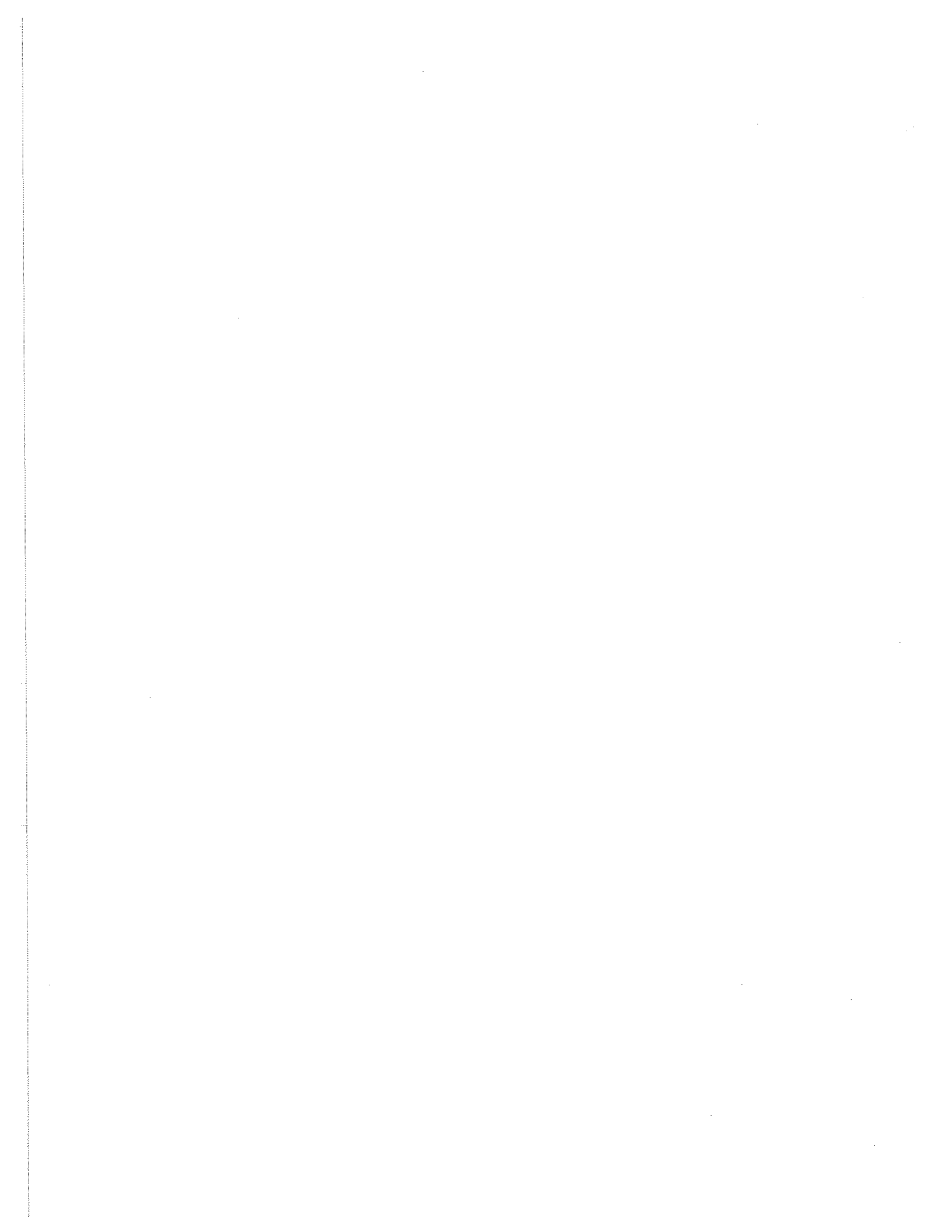
The HP Instrument BASIC User's Handbook introduces you to the HP Instrument BASIC programming language, provide some helpful hints on getting the most use from it, and provide a general programming reference. It is divided into three books, *HP Instrument BASIC Programming Techniques*, *HP Instrument BASIC Interface Techniques*, and *HP Instrument BASIC Language Reference*.

### **Performance Test Manual (HP Part Number 04396-90120)**

The Performance Test Manual explains how to verify conformance to published specifications.

### **Service Manual (Option 0BW only) (HP Part Number 04396-90121)**

The Service Manual explains how to adjust, troubleshoot, and repair the instrument. This manual is option 0BW only.



# Contents

---

<b>1. Introduction</b>	
HP-IB Commands . . . . .	1-3
Simple Commands . . . . .	1-3
SCPI Commands . . . . .	1-3
Common Commands . . . . .	1-3
SCPI Subsystem Commands . . . . .	1-3
Subsystem Command Tree . . . . .	1-4
Command Abbreviations . . . . .	1-5
Program Message Syntax . . . . .	1-5
Case . . . . .	1-5
Program Message Terminator . . . . .	1-5
Multiple Messages . . . . .	1-5
Query and Response Message Syntax . . . . .	1-5
Parameters . . . . .	1-6
Parameter Types . . . . .	1-6
<b>2. Commands Reference</b>	
Simple Commands . . . . .	2-3
ADDRCONT $\square$ $\langle$ numeric $\rangle$ . . . . .	2-3
ANAOCH1 . . . . .	2-3
ANAOCH2 . . . . .	2-3
ANAO DATA . . . . .	2-3
ANAOMEMO . . . . .	2-4
ANARANG $\square$ $\langle$ numeric1 $\rangle$ , $\langle$ numeric2 $\rangle$ . . . . .	2-4
ANARFULL . . . . .	2-4
ATT $\square$ $\langle$ numeric $\rangle$ [DB] . . . . .	2-4
ATTAUTO $\square$ {OFF ON 0 1} . . . . .	2-5
ATTP1 $\square$ $\langle$ numeric $\rangle$ [DB] . . . . .	2-5
ATTP2 $\square$ $\langle$ numeric $\rangle$ [DB] . . . . .	2-5
AUTO . . . . .	2-6
AVER $\square$ {OFF ON 0 1} . . . . .	2-6
AVERFACT $\square$ $\langle$ numeric $\rangle$ . . . . .	2-6
AVERREST . . . . .	2-6
BACI $\square$ $\langle$ numeric $\rangle$ [PCT] . . . . .	2-7
BEEPDONE $\square$ {OFF ON 0 1} . . . . .	2-7
BEEPFAIL $\square$ {OFF ON 0 1} . . . . .	2-7
BEEPWARN $\square$ {OFF ON 0 1} . . . . .	2-8
BLIGHT $\square$ {OFF ON 0 1} . . . . .	2-8
BOTV $\square$ $\langle$ numeric $\rangle$ . . . . .	2-8
BW $\square$ $\langle$ numeric $\rangle$ [HZ KHZ MAHZ] . . . . .	2-9
BWAUTO $\square$ {OFF ON 0 1} . . . . .	2-9
BWSRAT $\square$ $\langle$ numeric $\rangle$ . . . . .	2-10
C0 $\square$ $\langle$ numeric $\rangle$ . . . . .	2-10
C1 $\square$ $\langle$ numeric $\rangle$ . . . . .	2-10
C2 $\square$ $\langle$ numeric $\rangle$ . . . . .	2-11
CALCASSI . . . . .	2-11

CALECPARA	2-11
CALI□{NONE RESP RAI S111 S221 FUL2 ONE2 IMP}	2-11
CALK□{APC7 APC35 N50 N75 USED}	2-12
CALS□<numeric>	2-13
CBRI□<numeric>[PCT]	2-13
CENT□<numeric>[HZ KHZ MAHZ GHZ DBM]	2-13
CHAD□<string>	2-14
CHAN1	2-14
CHAN2	2-15
CIRF□{RI LIN LOG RX GB SWR}	2-15
CLAD	2-16
CLASIMP{A B C}	2-16
CLASS1{A B C}	2-16
CLASS2{A B C}	2-16
CLEL	2-16
CLES	2-17
CNTS□<numeric>[HZ KHZ MAHZ GHZ]	2-17
CNTSAUTO□{OFF ON 0 1}	2-17
COLO□<parameter>	2-17
COLOR□<numeric>[PCT]	2-20
COMC{A B C}	2-20
COMCDAT{A B C}□{OFF ON 0 1}	2-20
COMKDONE	2-21
COMP	2-21
COMS	2-21
COMSDONE	2-21
CONT	2-21
CONV□<parameter>	2-22
COPA	2-22
COPT□{OFF ON 0 1}	2-23
CORR□{OFF ON 0 1}	2-23
COUC□{OFF ON 0 1}	2-24
CRED□<string>	2-24
CRSC□{OFF ON 0 1}	2-25
CWFREQ□<numeric>[HZ KHZ MAHZ GHZ]	2-25
DATAOVAL□<numeric>	2-26
DATGAIN□<numeric>	2-26
DATMEM	2-26
DATOVAL□<numeric>	2-27
DAYYEAR	2-27
DEFC	2-27
DEFEC{R1 C1 L1 C0}□<numeric>	2-28
DEFGO	2-28
DEFS□{1-8}	2-29
DEFSLOAD{R L}□<numeric>	2-29
DEFSOPEN{G C}□<numeric>	2-30
DEFSSHOR{R L}□<numeric>	2-30
DET□{POS NEG SAM}	2-31
DFLT	2-31
DHOLD□{OFF MAX MIN}	2-32
DISA□{ALLI HIHB ALLB BASS}	2-32
DISECIRC	2-33
DISECPARA {OFF ON 0 1}	2-33
DISF□{DOS LIF}	2-34
DISL	2-34



DISLLIST	2-34
DISMAMP $\sqcup$ {UL MD}	2-34
DISMPRM $\sqcup$ {STSP CTSP}	2-35
DISP $\sqcup$ {DATA MEMO DATM}	2-35
DMKR $\sqcup$ {ON FIX TRAC OFF}	2-36
DMKRAUV $\sqcup$ <numeric>	2-36
DMKRPRM $\sqcup$ <numeric> [HZ KHZ MAHZ GHZ DBM]	2-37
DMKRVAL $\sqcup$ <numeric>	2-37
DONE	2-37
DPI $\sqcup$ <numeric>	2-38
DSKEY	2-38
DUAC $\sqcup$ {OFF ON 0 1}	2-39
EDITDONE	2-39
EDITLIML	2-39
EDITLIST	2-40
ELED $\sqcup$ <numeric> [S MS US NS PS FS]	2-40
ENKEY	2-40
EQUCL $\sqcup$ CIR {A B C D E}	2-40
EQUC0? $\sqcup$ <numeric>	2-41
EQUCPARA?	2-41
EQUCPARS?	2-41
EQUCPARS4?	2-41
EQU? $\sqcup$ <numeric>	2-41
ESB?	2-42
ESNB $\sqcup$ <numeric>	2-42
EXPP $\sqcup$ {OFF ON 0 1}	2-42
FILC $\sqcup$ <string1>, <string2>, <string3>, <string4>	2-43
FIXE $\sqcup$ <numeric>	2-43
FIXKDONE	2-43
FIXT $\sqcup$ {NONE HP16191 HP16192 HP16193 HP16194 USED}	2-43
FMT $\sqcup$ <parameter>	2-44
FORM2	2-45
FORM3	2-45
FORM4	2-46
FORM5	2-46
FORMFEED $\sqcup$ {OFF ON 0 1}	2-46
FREQ	2-46
FULS	2-46
FWDI	2-47
FWDM	2-47
FWDT	2-47
GATCTL $\sqcup$ {LEV EDG}	2-47
GATDLY $\sqcup$ <numeric> [US MS S]	2-48
GATLEN $\sqcup$ <numeric> [US MS S]	2-48
GRODAPER $\sqcup$ <numeric> [PCT]	2-48
HOLD	2-49
INID	2-49
INP8IO?	2-49
INPUCALC {1-12} $\sqcup$ <numeric (1)>, <numeric (2)>, ... , <numeric (n)>	2-50
INPUCALK $\sqcup$ <block>	2-50
INPUCOMC {1 2 3} $\sqcup$ <numeric>	2-50
INPUD	2-51
INPUDATA $\sqcup$ <numeric (1)>, <numeric (2)>, ... , <numeric (n)>	2-51
INPUDTRC $\sqcup$ <numeric (1)>, <numeric (2)>, ... , <numeric (n)>	2-52
INPULOAA $\sqcup$ <numeric (1)>, <numeric (2)>, ... , <numeric (n)>	2-52

INPUOPEA	⊔<numeric (1)>,<numeric (2)>, ... ,<numeric (n)>	2-52
INPURAW	{1-4}⊔<numeric (1)>,<numeric (2)>, ... ,<numeric (n)>	2-53
INPUSHOA	⊔<numeric (1)>,<numeric (2)>, ... ,<numeric (n)>	2-53
INPZ	{50 75}[OHM]	2-53
INTE	⊔<numeric>[PCT]	2-54
ISOD		2-54
ISOL		2-54
KEY	⊔<numeric>	2-54
KITD		2-55
LABECOMK	⊔<string>	2-55
LABEFIX	⊔<string>	2-55
LABEFWD	{T M}⊔<string>	2-56
LABEIMP	{A B C}⊔<string>	2-56
LABERES	{P I}⊔<string>	2-56
LABEREV	{T M}⊔<string>	2-57
LABES11	{A B C}⊔<string>	2-57
LABES22	{A B C}⊔<string>	2-58
LABK	⊔<string>	2-58
LABS	⊔<string>	2-59
LANDSCAPE	⊔{OFF ON 0 1}	2-59
LIMCLEL		2-59
LIMD	⊔<numeric>	2-59
LIMEDONE		2-60
LIMIAMPO	⊔<numeric>	2-60
LIMILINE	⊔{OFF ON 0 1}	2-60
LIMIPRMO	⊔<numeric>	2-61
LIMITEST	⊔{OFF ON 0 1}	2-61
LIML	⊔<numeric>	2-61
LIMM	⊔<numeric>	2-62
LIMPRM	⊔<numeric>[HZ KHZ MAHZ GHZ DBM]	2-62
LIMSADD		2-62
LIMSDEL		2-62
LIMSDON		2-63
LIMSEDI	⊔[<numeric>]	2-63
LIMU	⊔<numeric>	2-63
LMAX?	⊔<numeric>	2-63
LMARG	⊔<numeric>	2-64
LMIN?	⊔<numeric>	2-64
LISV		2-64
LVCDT	⊔<numeric>[DB]	2-65
LVLCAL		2-65
MATH	⊔{DATA DDVM DMNM DPLM}	2-65
MAXMLEV	⊔<numeric>[DBM]	2-66
MEAS	⊔<parameter>	2-66
MEASTAT	⊔{OFF ON 0 1}	2-69
MKR	⊔{OFF ON 0 1}	2-69
MKRAMPO		2-69
MKRAUV?		2-69
MKRCENT		2-70
MKRCONT	⊔{OFF ON 0 1}	2-70
MKRCOUP	⊔{OFF ON 0 1}	2-70
MKRCSTE		2-70
MKRDCENT		2-71
MKRDCSTE		2-71
MKRDELA		2-71

MKRSPAN	2-71
MKRL{OFF ON 0 1}	2-71
MKRMIDD	2-72
MKRNOI{OFF ON 0 1}	2-72
MKRO{DATA MEMO}	2-72
MKROFS	2-72
MKRP<numeric>	2-73
MKRPKD	2-73
MKRPRM<numeric>[HZ KHZ MAHZ GHZ DBM]	2-73
MKRREF	2-73
MKRSTAR	2-74
MKRSTOP	2-74
MKRSWPRM	2-74
MKRTHRE	2-74
MKRTIME{OFF ON 0 1}	2-75
MKRVAL?	2-75
MKRZM	2-75
MOD1	2-75
MODICOMK	2-76
MODIFIX	2-76
MONDYEAR	2-76
NA	2-76
NEXP	2-77
NEXPK?	2-77
NUMG<numeric>	2-77
NUMLMAX?	2-78
NUMLMIN?	2-78
OFSD<numeric>[S]	2-78
OFSL<value>	2-78
OFSZ<numeric>[OHM KOHM]	2-79
OMI	2-79
OPEP	2-79
OSE<numeric>	2-79
OSER?	2-80
OSNT<numeric>	2-80
OSPT<numeric>	2-80
OSR?	2-80
OUT8IO<numeric>	2-81
OUTPCALC{1-12}?	2-81
OUTPCALK?	2-81
OUTPCERR?	2-81
OUTPCFIL?	2-82
OUTPCOMC{1 2 3}?	2-82
OUTPDATA?	2-82
OUTPDATAP?<numeric>	2-83
OUTPDMKR?	2-83
OUTPDTRC?	2-84
OUTPDTRCP?<numeric>	2-84
OUTPERRO?	2-85
OUTPFAIP?	2-85
OUTPFILT?	2-85
OUTPLIMF?	2-85
OUTPLIML?	2-86
OUTPLIMM?	2-87
OUTPMAX?	2-87

OUTPMEAN?	2-87
OUTPMEMO?	2-87
OUTPMEMOP?␣<numeric>	2-88
OUTPMIN?	2-88
OUTPMINMAX?	2-88
OUTPMKR?	2-88
OUTPMSTA?	2-89
OUTPMTRC?	2-89
OUTPMTRCP?␣<numeric>	2-90
OUTPMWID?	2-90
OUTPRAW{1-4}?	2-91
OUTPRESF?	2-91
OUTPRESO?	2-91
OUTPRESR?	2-91
OUTPSMKR{1-7}?	2-91
OUTPSWPRM?	2-92
OUTPSWPRMP?␣<numeric>	2-92
OUTPXFIL?	2-92
PARS␣{OFF ON 0 1}	2-93
PEAK?	2-93
PEAKCENT	2-93
PHAO␣<numeric>[DEG]	2-94
PHAU {RAD DEG}	2-94
PKDLTX␣<numeric>[HZ KHZ MAHZ GHZ DBM]	2-94
PKDLTY␣<numeric>	2-95
PKPOL␣{POS NEG}	2-95
PKTHRE␣{OFF ON 0 1}	2-96
PKTHVAL␣<value>	2-96
POIN␣<numeric>	2-97
POLE?␣<numeric>	2-97
PORE␣{OFF ON 0 1}	2-97
PORT1␣<numeric>[S MS US NS PS]	2-98
PORT2␣<numeric>[S MS US NS PS]	2-98
PORTA␣<numeric>[S MS US NS PS]	2-98
PORTB␣<numeric>[S MS US NS PS]	2-99
PORTR␣<numeric>[S MS US NS PS]	2-99
PORTZ␣<numeric>	2-99
POWE␣<numeric>[DBM]	2-100
PREP	2-100
PRES	2-100
PRIC	2-101
PRICFIXE	2-101
PRICVARI	2-101
PRINALL	2-102
PRIS	2-102
PRSOFT␣{OFF ON 0 1}	2-102
PRSMKRS	2-103
PURG␣<string>	2-103
RAID	2-103
RAISOL	2-103
RAIRESP	2-104
RECC	2-104
RECD␣<string>	2-104
REFD	2-104
REFL	2-105

REFP	$\sqcup$ <numeric>	2-105
REFV	$\sqcup$ <numeric>	2-105
REFX	$\sqcup$ <numeric>	2-106
REFY	$\sqcup$ <numeric>	2-106
REPTSMP	$\sqcup$ {OFF ON 0 1}	2-107
RESAVD	$\sqcup$ <string>	2-107
RESC		2-107
RESCOM		2-108
RESD		2-108
RESPDONE		2-108
REST		2-108
REVI		2-108
REVM		2-109
REVT		2-109
RFO	$\sqcup$ {OFF ON 0 1}	2-109
RPLENV?		2-109
RPLHEI?		2-109
RPLLHEI?		2-110
RPLMEA?		2-110
RPLPP?		2-110
RPLRHEI?		2-110
RPLVAL?		2-110
RSCO		2-110
SA		2-111
SADD		2-111
SAUNIT	$\sqcup$ {DBM DBV DBUV W V}	2-111
SAV1		2-112
SAV2		2-112
SAVC		2-112
SAVCAL	$\sqcup$ {OFF ON 0 1}	2-113
SAVCOM		2-113
SAVDASC	$\sqcup$ <string>	2-113
SAVDAT	$\sqcup$ {OFF ON 0 1}	2-114
SAVDDAT	$\sqcup$ <string>	2-114
SAVDSTA	$\sqcup$ <string>	2-114
SAVDSTAC	$\sqcup$ <string>	2-115
SAVDTIF	$\sqcup$ <string>	2-115
SAVDTRC	$\sqcup$ {OFF ON 0 1}	2-116
SAVEUSEK		2-116
SAVIMP		2-116
SAVMEM	$\sqcup$ {OFF ON 0 1}	2-116
SAVMTRC	$\sqcup$ {OFF ON 0 1}	2-117
SAVRAW	$\sqcup$ {OFF ON 0 1}	2-117
SAVUCOMK		2-117
SAVUFIXT		2-117
SCAC	$\sqcup$ {OFF ON 0 1}	2-118
SCAF	$\sqcup$ {DATA MEMO}	2-118
SCAL	$\sqcup$ <numeric>	2-118
SCRN	$\sqcup$ {OFF ON 0 1}	2-119
SDEL		2-119
SDON		2-119
SEAL		2-119
SEAM	$\sqcup$ {PEAK MAX MIN TARG PKSA PKSR PKSL OFF}	2-120
SEANPK		2-120
SEANPKL		2-121

SEANPKR	2-121
SEAR	2-121
SEARSTR	2-121
SEARSTRL	2-121
SEARSTRR	2-122
SEATARG␣<numeric>[DB DEG S OHM]	2-122
SEDI␣<numeric>	2-122
SETCDATE␣<numeric (year)>,<numeric (month)>,<numeric (day)>	2-123
SETCTIME␣<numeric (hour)>,<numeric (minute)>,<numeric (second)>	2-123
SETZ␣<numeric>[OHM KOHM MAOHM]	2-123
SGTRK␣{OFF ON 0 1}	2-124
SIMFCHAR	2-124
SING	2-125
SLOP␣{OFF ON 0 1}	2-125
SLOPE␣<numeric>	2-126
SMKR{1-7}␣{OFF ON 0 1}	2-126
SMKRAUV{1-7}?	2-127
SMKRP{1-7}␣<numeric>	2-127
SMKRPRM{1-7}␣<numeric>[HZ KHZ MAHZ GHZ DBM]	2-128
SMKRVAL{1-7}?	2-128
SPAN␣<numeric>[HZ KHZ MAHZ GHZ DBM]	2-129
SPECFWD{M T}␣<numeric 1>[,<numeric 2>[,... [,<numeric 7>]	2-129
SPECIMP{A B C}␣<numeric 1>[,<numeric 2>[,... [,<numeric 7>]	2-129
SPECRES{I P}␣<numeric 1>[,<numeric 2>[,... [,<numeric 7>]	2-130
SPECREV{M T}␣<numeric 1>[,<numeric 2>[,... [,<numeric 7>]	2-130
SPECS11{A B C}␣<numeric 1>[,<numeric 2>[,... [,<numeric 7>]	2-131
SPECS22{A B C}␣<numeric 1>[,<numeric 2>[,... [,<numeric 7>]	2-131
SPLD␣{OFF ON 0 1}	2-132
SQUI	2-132
STAN{A-G}	2-132
STAR␣<numeric>[HZ KHZ MAHZ GHZ DBM]	2-132
STDD	2-133
STDT␣{OPEN SHOR LOAD DELA ARBI}	2-133
STOD{DISK MEMO}	2-133
STOP␣<numeric>[HZ KHZ MAHZ GHZ DBM]	2-134
SVCO	2-134
SWET␣<numeric>[S MS]	2-134
SWETAUTO␣{OFF ON 0 1}	2-135
SWPT␣{LINF LOGF LIST POWE}	2-135
TARL?	2-136
TARR?	2-136
TERI␣<numeric>[OHM KOHM]	2-136
TESS?	2-136
THRR␣<numeric>	2-136
TINT␣<numeric>	2-137
TITL␣<string>	2-137
TMARG␣<numeric>	2-137
TOPV␣<numeric>	2-138
TRACK␣{OFF ON 0 1}	2-138
TRAD	2-138
TRAN	2-139
TRGEVE␣{SWE POIN}	2-139
TRGP␣{POS NEG}	2-139
TRGS␣{INT EXT BUS VID MAN GAT}	2-140
USKEY	2-140

VBW	□<numeric>[HZ KHZ MAHZ]	2-141
VBWT	□{LIN LOG}	2-141
VELOFACT	□<numeric>	2-141
VIDLVL	□<numeric>	2-142
WIDSIN		2-142
WIDSOUT		2-142
WIDT	□{OFF ON 0 1}	2-142
WIDV	□<numeric>[DB DEG S OHM]	2-143
WIDVTYPE	□{DIVS2 MULS2 DIV2 FIXed}	2-143
ZA		2-143
ZMAPER	□<numeric>	2-144
Common Commands		2-145
*CLS		2-145
*ESE	□<numeric>	2-145
*ESR?		2-145
*IDN?		2-145
*OPC		2-146
*OPT?		2-146
*PCB	□<numeric>	2-146
*RST		2-147
*SRE	□<numeric>	2-147
*STB?		2-147
*TRG		2-147
*TST?		2-148
*WAI		2-148
SCPI Commands With No Equivalent Simple Command		2-149
:CALCulate:MATH1[:EXPRession]:CATalog?		2-149
:CALCulate:MATH2[:EXPRession]:CATalog?		2-149
:CALCulate:PATH?		2-149
:PROGRAM:CATalog?		2-150
:PROGRAM[:SElected]:DEFine	□<block>	2-150
:PROGRAM[:SElected]:DELeTe[:SElected]		2-151
:PROGRAM[:SElected]:DELeTe:ALL		2-151
:PROGRAM[:SElected]:EXECute	□<string>	2-151
:PROGRAM[:SElected]:MALLocate	□{<numeric> DEFAULT}	2-151
:PROGRAM[:SElected]:NAME	□<string>	2-151
:PROGRAM[:SElected]:NUMBER	□<string>,<numeric 1>[,<numeric 2> [, ... [,<numeric n>]	2-152
:PROGRAM[:SElected]:STATe	□{RUN PAUSE STOP CONTINUE}	2-152
:PROGRAM[:SElected]:STRing	□<string (varname)>,<string (value 1)>[,<string (value 2)> [, ... [,<string (value n)>]	2-153
:PROGRAM[:SElected]:WAIT		2-153
:PROGRAM:EXPLICIT:DEFine	□“PROG”,<block>	2-154
:PROGRAM:EXPLICIT:DELeTe	□“PROG”	2-154
:PROGRAM:EXPLICIT:EXECute	□“PROG”,<string>	2-154
:PROGRAM:EXPLICIT:MALLocate	□“PROG”,{<numeric> DEFAULT}	2-154
:PROGRAM:EXPLICIT:NAME	□“PROG”,<string>	2-154
:PROGRAM:EXPLICIT:NUMBER	□“PROG”,<varname>,<numeric 1>[,<numeric 2> [, ... [,<numeric n>] ... ]]	2-154
:PROGRAM:EXPLICIT:STATe	□“PROG”,{RUN PAUSE STOP CONTINUE}	2-154
:PROGRAM:EXPLICIT:STRing	□“PROG”,<varname>,<string 1>[,<string 2> [, ... [,<string n>] ... ]]	2-154
:PROGRAM:EXPLICIT:WAIT	□“PROG”	2-154
:STATUS:PRESet		2-155
:STATUS:QUESTIONable:CONDition?		2-155

:STATus:QUESTionable:ENABle□<numeric>	2-155
:STATus:QUESTionable[:EVENT]?	2-155
:SYSTem:VERSion?	2-155
Service Related Commands	2-156
:DIAG:EREFerence:STATe?	2-156
:DIAG:FREVision?	2-156
:DIAG:INIT:RESult?	2-157
:DIAG:SERVice:BUS:AZERo□{OFF ON 0 1}	2-157
:DIAG:SERVice:BUS:DC□<numeric>	2-157
:DIAG:SERVice:BUS:FREQ□<numeric>	2-158
:DIAG:SERVice:BUS:STATe□{OFF ON 0 1}	2-158
:DIAG:SERVice:BUS:WAIT□<numeric>	2-158
:DIAG:SERVice:CCONstant:FRESponse□{OFF ON 0 1}	2-159
:DIAG:SERVice:CCONstant:IFGain□{OFF ON 0 1}	2-159
:DIAG:SERVice:CCONstant:SOURce□{OFF ON 0 1}	2-159
:DIAG:SERVice:CCONstant:XTAL□{OFF ON 0 1}	2-160
:DIAG:SERVice:IF:ADMX:MODE□{AUTO ALternate DEG0 DEG90}	2-160
:DIAG:SERVice:IF:BPFilter:MODE□{AUTO BW3M BW1M XTAL}	2-161
:DIAG:SERVice:IF:GAIN:MODE□{AUTO MANual}	2-161
:DIAG:SERVice:IF:GAIN:W□{AUTO DB0 DB10}	2-161
:DIAG:SERVice:IF:GAIN:X□{AUTO DB0 DB18}	2-162
:DIAG:SERVice:IF:GAIN:Y□{AUTO DB0 DB6 DB12 DB18}	2-162
:DIAG:SERVice:IF:GAIN:Z□{AUTO DB0 DB2 DB4 DB18}	2-163
:DIAG:SERVice:IF:LPFilter:MODE□{AUTO BW5K BW15K BW50K  BW150K THRough}	2-163
:DIAG:SERVice:IF:RANGE:F□{HIGH LOW}	2-164
:DIAG:SERVice:IF:RANGE:MODE□{AUTO MANual}	2-164
:DIAG:SERVice:IF:RANGE:R□{HIGH LOW}	2-164
:DIAG:SERVice:IF:SHBW:MODE□{AUTO NARRow MIDDLE WIDE}	2-164
:DIAG:SERVice:IF:TLOCal:MODE□{AUTO AC DC}	2-165
:DIAG:SERVice:MODE□{ON 1}	2-165
:DIAG:SERVice:SOURce:ALCLoop□{OPEN CLOSe}	2-165
:DIAG:SERVice:SOURce:ATTenuator□{AUTO DB0 DB10 DB20 DB30  DB40 DB50 DB60}	2-166
:DIAG:SERVice:SOURce:GAIN:DAC:MODE□{AUTO MANual}	2-166
:DIAG:SERVice:SOURce:GAIN:DAC:VALue□<numeric>	2-167
:DIAG:SERVice:SOURce:LEVel:DAC:MODE□{AUTO MANual}	2-167
:DIAG:SERVice:SOURce:LEVel:DAC:VALue□<numeric>	2-167
:DIAG:SERVice:SOURce:MODE□{AUTO MANual}	2-168
:DIAG:SERVice:SYNThesizer:FLOCal:MODE□{AUTO SINGle TRIPle}	2-168
:DIAG:SERVice:SYNThesizer:FN:MODE□{AUTO NARRow WIDE}	2-168
:DIAG:SERVice:SYNThesizer:FREQuency:OFFSet□<numeric>	2-169
:DIAG:SERVice:SYNThesizer:STEP:DAC:MODE□{AUTO MANual}	2-169
:DIAG:SERVice:SYNThesizer:STEP:DAC:VALue□<numeric>	2-169
:DIAG:SERVice:SYNThesizer:STEP:LOOP□{OPEN CLOSe}	2-170
:DIAG:SERVice:SYNThesizer:STEP:MODE□{AUTO MANual}	2-170
:DIAG:SERVice:SYNThesizer:STEP:OUTPut□{OFF ON 0 1}	2-170
:DIAG:SERVice:SYNThesizer:STEP:POLarity□{AUTO POSitive NEGative}	2-170
:DIAG:TEST□<numeric>	2-171
:DIAG:TEST:CONTInue	2-171
:DIAG:TEST:EXECute	2-171
:DIAG:TEST:RESult?□<numeric>	2-172



<b>A. Manual Changes</b>	
Introduction . . . . .	A-1
Manual Changes . . . . .	A-1
Serial Number . . . . .	A-2
Change 1 . . . . .	A-2
<b>B. Command Summary</b>	
<b>C. SCPI Commands Summary</b>	
<b>D. Status Reporting</b>	
OSPT, OSNT . . . . .	D-5
OSPT (Operation Status Positive Transition Filter) . . . . .	D-5
OSNT (Operation Status Negative Transition Filter) . . . . .	D-5
<b>E. Trigger System</b>	
Trigger System . . . . .	E-1
Analyzer Trigger System Configuration . . . . .	E-1
Idle State . . . . .	E-2
Initiate State . . . . .	E-2
Trigger Event Detection State . . . . .	E-2
Sequence Operation State . . . . .	E-2
<b>F. Calibration Types and Standard Classes, and Calibration Arrays</b>	
<b>G. Key Codes</b>	
<b>H. Data Format and Data Levels</b>	
Data Format . . . . .	H-1
Data Levels . . . . .	H-2
Marker Readout . . . . .	H-3
<b>I. Waveform Analysis Commands</b>	
Conventions and Definitions . . . . .	I-2
Waveform Analysis Setup Commands . . . . .	I-3
ANAOCH1 . . . . .	I-3
ANAOCH2 . . . . .	I-3
ANARANG . . . . .	I-4
ANARFULL . . . . .	I-4
ANAODATA . . . . .	I-5
ANAOMEMO . . . . .	I-5
THRR . . . . .	I-6
Maximum/Minimum/Mean Value Search Commands . . . . .	I-7
OUTPMAX? . . . . .	I-7
OUTPMIN? . . . . .	I-7
OUTPMINMAX? . . . . .	I-8
OUTPMEAN? . . . . .	I-8
PEAK? . . . . .	I-9
NEXPK? . . . . .	I-10
NUMLMAX? . . . . .	I-11
NUMLMIN? . . . . .	I-11
LMAX? . . . . .	I-12
LMIN? . . . . .	I-12
TARR? . . . . .	I-13
TARL? . . . . .	I-14

Ripple Analysis Commands . . . . .	I-15
RPLPP? . . . . .	I-15
RPLHEI? . . . . .	I-17
RPLRHEI? . . . . .	I-18
RPLLHEI? . . . . .	I-19
RPLENV? . . . . .	I-20
RPLMEA? . . . . .	I-21
RPLVAL? . . . . .	I-22
POLE? . . . . .	I-23
Filter and Resonator Analysis Commands . . . . .	I-25
OUTPFILT? . . . . .	I-26
OUTPXFIL? . . . . .	I-28
OUTPCFIL? . . . . .	I-31
OUTPRESO? . . . . .	I-34
OUTPRESR? . . . . .	I-36
OUTPRESF? . . . . .	I-38
OUTPCERR? . . . . .	I-40
Equivalent circuit analysis commands . . . . .	I-42
EQUCPARA? . . . . .	I-43
EQUCPARS? . . . . .	I-46
EQUCO? <i>value</i> . . . . .	I-47
EQUCPARS4? . . . . .	I-49

**Messages**

**Index**

## Figures

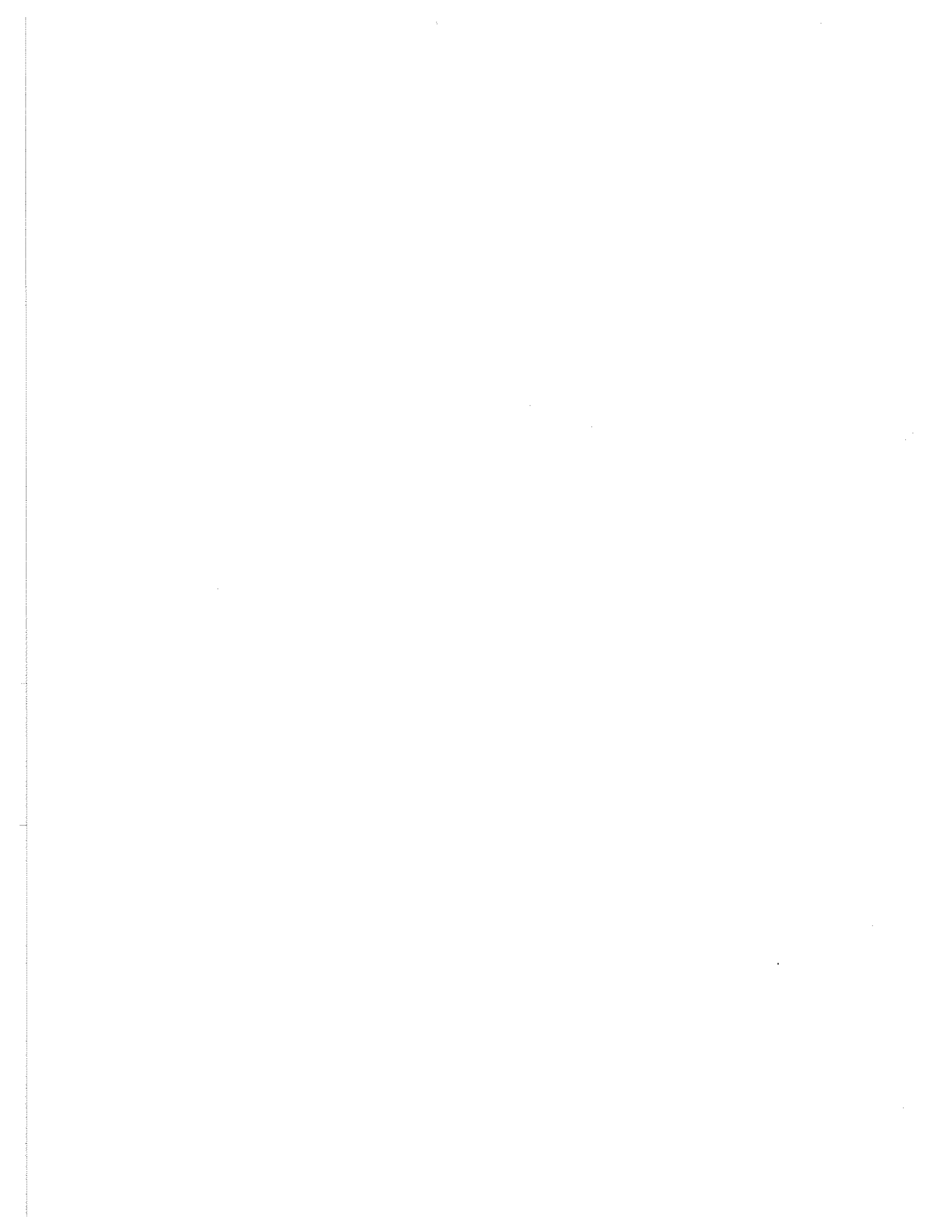
---

I-1. Proper Use of the Colon and Semicolon . . . . .	I-4
A-1. Serial Number Plate . . . . .	A-2
D-1. Status Reporting Structure . . . . .	D-1
D-2. Example of Reading Status Byte (1) . . . . .	D-2
D-3. Example of Reading Status Byte (2) . . . . .	D-2
D-4. Example of Generating a Service Request (SRQ) . . . . .	D-5
E-1. Trigger System Configuration . . . . .	E-1
E-2. Inside an Trigger Event Detection State . . . . .	E-2
G-1. Key Codes . . . . .	G-1
H-1. Form 2 Data Transfer Format . . . . .	H-1
H-2. Form 3 Data Transfer Format . . . . .	H-1
I-1. THRR . . . . .	I-6
I-2. RPLPP? . . . . .	I-15
I-3. RPLHEI? . . . . .	I-17
I-4. RPLRHEI? . . . . .	I-18
I-5. RPLLHEI? . . . . .	I-19
I-6. RPLENV? . . . . .	I-20
I-7. RPLMEA? . . . . .	I-21
I-8. RPLVAL? . . . . .	I-22
I-9. POLE? . . . . .	I-23
I-10. OUTPFILT? . . . . .	I-26
I-11. OUTPXFIL? . . . . .	I-29
I-12. OUTPCFIL? . . . . .	I-32
I-13. OUTPRESO? . . . . .	I-34
I-14. OUTPRESR? . . . . .	I-36
I-15. OUTPRESF? . . . . .	I-38
I-16. OUTPCERR? . . . . .	I-40
I-17. Six-Device Equivalent Circuit of Crystal Resonator . . . . .	I-43
I-18. Four-Device Equivalent Circuit of Crystal Resonator . . . . .	I-49
I-19. Admittance Characteristic Circle Diagram . . . . .	I-50

## Tables

---

A-1. Manual Changes by Serial Number . . . . .	A-1
A-2. Manual Changes by Firmware Version . . . . .	A-1
D-1. Status Bit Definitions of the Status Byte (STB) . . . . .	D-2
D-2. Status Bit Definitions of the Standard Event Status Register (ESR) . . . . .	D-3
D-3. Status Bit Definitions of the Event Status Register B (ESB) . . . . .	D-4
D-4. Status Bit Definitions of the Operation Status Register (OSR) . . . . .	D-4
F-1. Calibration Types and Standard Classes . . . . .	F-1
F-2. Calibration Array . . . . .	F-2
H-1. Marker Readout . . . . .	H-3



# Introduction

---

This manual provides a reference for the Hewlett-Packard Interface Bus (HP-IB) commands used to control the HP 4396B Network/Spectrum/Impedance Analyzer (analyzer). These commands are implemented using an external controller or the HP Instrument BASIC.

The following is a brief description of each chapter and appendix.

Chapter 2 explains all the HP-IB commands.

Appendix A contains the information required to adapt this manual to earlier versions or configurations of the analyzer than the current printing date of this manual.

Appendix B lists all the HP-IB commands sorted by the function (key label).

Appendix C lists all the HP-IB commands in alphabetical order for the Standard Commands for Programmable Instruments (SCPI) commands.

Appendix D provides information about the status reporting structure for service request functions.

Appendix E provides information about the trigger system, which corresponds to the SCPI standard.

Appendix F describes the calibration types and the standard classes, and the calibration coefficients.

Appendix G provides the front-panel key codes for the KEY HP-IB commands.

Appendix H provides information about data formats and data levels.

Appendix I provides detail information about the waveform analysis commands.

Error Messages lists all error messages with an explanation for each error.

See the *HP-IB Programming Guide* for introduction to using the analyzer's HP-IB commands and for a description of how the HP Instrument BASIC works with the analyzer.

---

## Note



You should become familiar with the operation of the analyzer before you attempt to control it using HP-IB commands. See the following documents which are better suited to this task.

For more information concerning the operation of the analyzer, see the following:

*User's Guide*

*Task Reference*

*Function Reference*

*Option 010 Operating Handbook* for impedance measurement mode.

---

---

**Note**

This manual is not intended to teach the BASIC programming language or the Standard Commands for Programmable Instruments (SCPI) commands. It also does not discuss HP-IB theory. See the following documents that are better suited to these tasks.

For more information concerning BASIC, see the manual set for the BASIC version being used:

*BASIC Programming Techniques*  
*BASIC Language Reference*

For more information concerning SCPI, see the following:

*Beginner's Guide to SCPI*

For more information concerning HP-IB operation, see the following:

*BASIC Interfacing Techniques*  
*Tutorial Description of the Hewlett-Packard Interface Bus*  
*Condensed Description of the Hewlett-Packard Interface Bus*

---

---

## HP-IB Commands

Most of the analyzer's functions have two corresponding HP-IB commands. One is unique to the analyzer (called a **Simple command**) and another corresponds to the Standard Commands for Programmable Instruments (called a **SCPI command**). You can use both commands in one program.

- For example, the command to select the analyzer type is as follows:

```
Simple command:  NA
SCPI command:   :INSTRument:TYPE NA
```

The analyzer also has other commands (called **Common command**) that are not measurement related. These include commands for functions such as status register control or synchronization.

- For example, the command to clear status registers is as follows:

```
*CLS
```

## Simple Commands

All the analyzer's front-panel keys have corresponding HP-IB commands. The names of the simple commands are derived from their front panel key titles (where possible). Commands that have no equivalent front-panel key use a similar convention based on the common name of the function.

## SCPI Commands

SCPI is the instrument command language for controlling instrument that goes beyond IEEE 488.2 standard to address a wide variety of instrument functions in a standard manner.

## Common Commands

All common commands begin with an asterisk (\*). Common commands are defined by IEEE 488.2.

---

## SCPI Subsystem Commands

Subsystem commands include all measurement functions and some general purpose functions. Each subsystem is a set of commands that roughly corresponds to a functional block inside the instrument.

Subsystem commands have a hierarchical structure, called a **command tree**, that consists of several key words separated by a colon between each word.

## Subsystem Command Tree

The top of the subsystem command tree is called the **root command**, or simply the **root**. To reach the low-level commands, you must specify a particular **path** (like a DOS file directory path). After Power ON or after presetting, the current path is set to the root. The path settings are changed as follows:

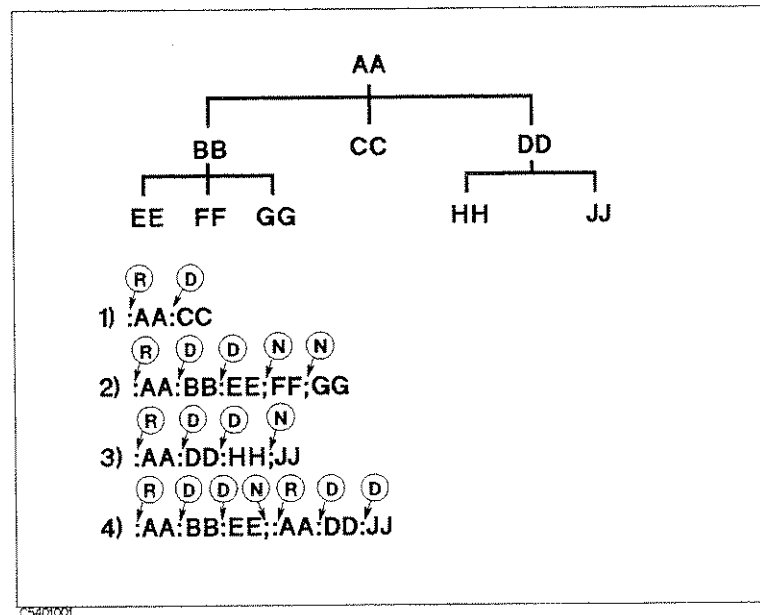
**Program Message Terminator** A program message terminator, such as <new line> character, sets the current path to the root.

**Colon (:)** When a colon is placed between two command mnemonics, the colon moves the current path down one level on the command tree. When the colon is the first character of a command, it specifies that the following command mnemonic is a root-level command.

**Semicolon (;)** A semicolon separates two commands in the same message without changing the current path.

Figure 1-1 shows examples of how to use the colon and semicolon to navigate efficiently through the command tree.

Common commands, such as \*RST, are not part of any subsystem. The analyzer interprets them in the same way, regardless of the current path setting.



C5401001

**Figure 1-1. Proper Use of the Colon and Semicolon**

- Ⓡ sets the current path to the root.
- ⓓ moves the current path down one level.
- Ⓝ does not change the current path.



## Command Abbreviations

Many commands have a long and a short form. In this manual, all commands are spelled out in the long form. The short form is obtained by deleting the lower case letters.

For example, the short form of :INITiate is :INIT and the long form of it is :INITIATE. (SCPI does *not* accept anything in between, such as :INITIA.)

---

## Program Message Syntax

This section provides the construction of program messages. A program message is the message that you send from a computer to an instrument. Program messages consist of commands combined with appropriate punctuation and program message terminators.

### Case

Letter cases (upper and lower) are ignored.

### Program Message Terminator

A program message must end with one of the three **program message terminators**, <new line>, <^END>, or <new line><^END>. <^END> means that End Of Identify (EOI) is asserted on the HP-IB interface at the same time the preceding data byte is sent. For example, the HP BASIC OUTPUT statement is automatically sent after last data byte. If you are using a PC, you can usually configure your system to send whatever terminator you specify.

### Multiple Messages

To send more than one command in the same message, you must separate them with a semicolon:

```
NA;CHAN1
```

### Query and Response Message Syntax

All commands can be queried except the commands described as "no query" in the command reference. To send a query message, add ? after the last command mnemonic.

```
NA?
```

A response message may contain both commas and semicolons as separators. When a single query command returns multiple values, a comma is used to separate each data item. When multiple queries are sent in the same message, the group of data items corresponding to each query are separated by a semicolon. For example, the fictitious query :QUERY1?;QUERY2? might return a response message of:

```
<data1>,<data1>;<data2>,<data2>
```

After the message, <new line><^END> is always sent as a response message terminator.

## Parameters

There must be a <space> between the last command mnemonic and the first parameter in a subsystem command.

CENT␣*parameter*

␣ means a space (ASCII character (decimal 32)).

If you send more than one parameter with a single command, each parameter must be separated by a comma.

## Parameter Types

The analyzer accepts commands and parameters in various formats and responds to a particular query in a predefined and fixed format. Each command reference contains information about the parameter types available for the individual commands.

- <numeric> represents numeric parameters as follows:

100	no decimal point required
100.	fractional digits optional
-1.23, +235	leading signs allowed
4.56e␣3	space allowed after e in exponentials
-7.89E-01	use either E or e in exponentials
.5	digits left of decimal point optional

The analyzer setting programmed with a numeric parameter can assume a finite number of values, so the analyzer automatically rounds off the parameter. For example, the analyzer has a programmable input attenuator value. If you specified 50.1, it would be rounded off to 50.

Query response of <numeric\_value> is always a numeric value in <NR1> (integer) or <NR3> (floating point) format.

- Suffix

When a command has a specified suffix, the suffix multiplier and suffix units can be used with parameters as follows. (The suffix multiplier must be used with the suffix unit.):

Frequency:	HZ (Hz; default), KHZ (kHz), MAHZ or MHZ (MHz), GHZ (GHz)
Power:	DBM (dBm; default)
Attenuator:	DB (dB; default)
Time:	S (second; default), MS (ms), US ( $\mu$ s), NS (ns), PS (ps), FS (fs)
Scale:	DB (dB), DEG ( $^{\circ}$ ), S (second), DBM (dBm), DBV (dBV), DBUV ( $\text{dB}\mu\text{V}$ ), W (watt), V (Volt), OHM ( $\Omega$ ), SIE (siemens)
Phase:	DEG ( $^{\circ}$ ; default)
Capacitance:	F (farad; default)
Percent:	PCT (%; default)
Impedance:	OHM ( $\Omega$ ; default), KOHM (k $\Omega$ )
Loss:	DB (dB; default)

The suffix is optional and can be omitted.

- <string> is a string parameter that contains ASCII characters. A string must begin with a single quote (ASCII 39 decimal) or a double quote (ASCII 34 decimal) and end with the same corresponding character, a single or double quote. The quote to mark the beginning and end of the string is called the delimiter. You can include the delimiter as part of the string by typing it twice without any characters in between.

Example of *<string>* TXT,

```
OUTPUT @Meter;"ASCE 'TXT'"      using single quote  
OUTPUT @Meter;"ASCE ""TXT"""    using double quote
```

The query response is the string between double quote delimiters.

- *<block>* is typically used to transfer large quantities of related data. *<block>* can be sent as the definite length blocks.

General form of block parameters:

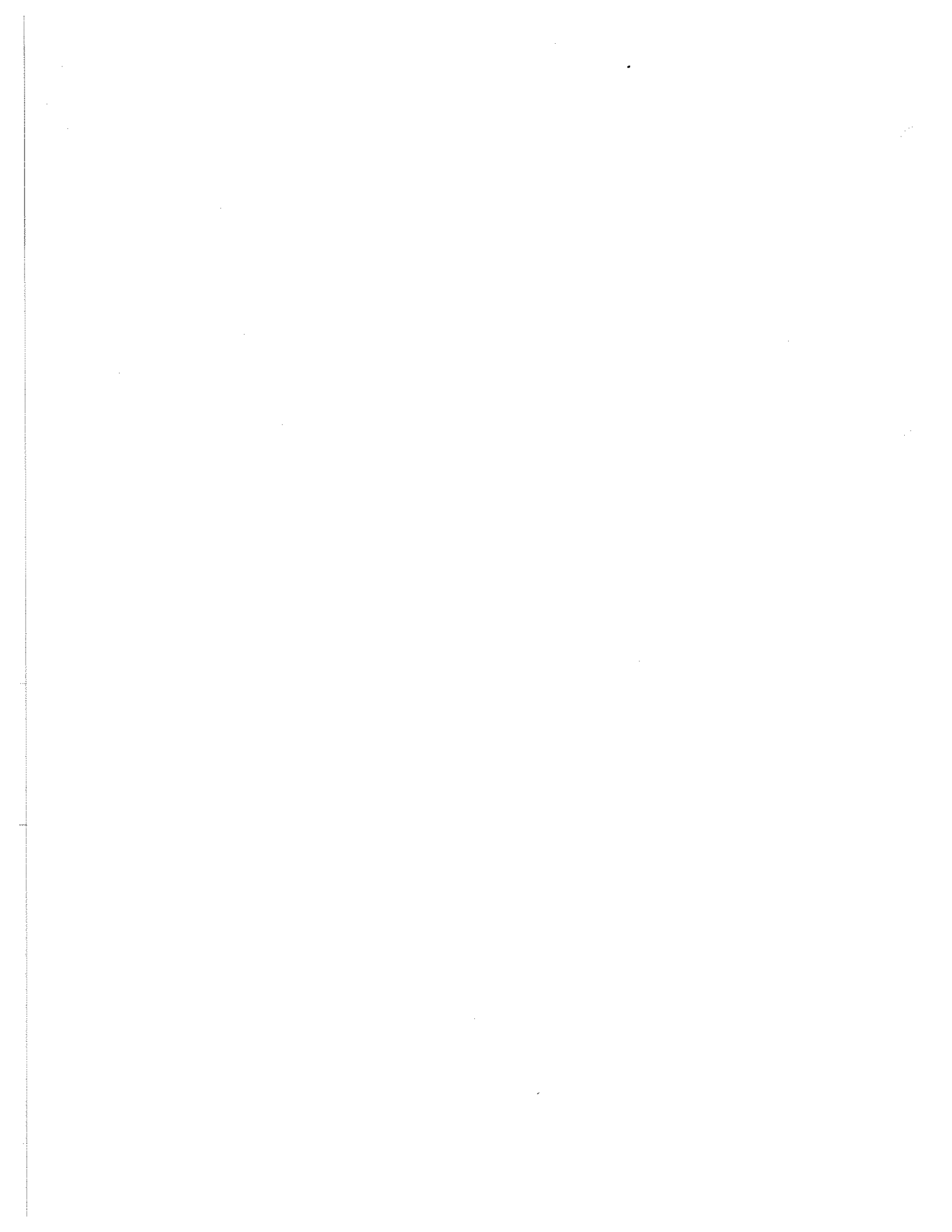
```
#<num_digits><num_bytes><data bytes>
```

The single decimal digit *<num\_digits>* specifies how many digits are contained in *<num\_bytes>*. The decimal number *<num\_bytes>* specifies how many data bytes will follow in *<data bytes>*.

Example of *<block>* ABC+XYZ,

```
OUTPUT @Meter;"#17ABC+XYZ"
```

(1 means one digit follows, 7 means seven bytes follow.)



## Commands Reference

---

This chapter provides a reference for the HP-IB commands of the analyzer. Use this information as a reference to the syntax requirements and general function of the individual commands.

This chapter is organized as follows:

- Simple Commands
- Common Commands
- SCPI Commands With No Equivalent Simple Command
- Service Related Commands

Within each group the commands are listed in alphabetical order. See Appendix B for a functional list of the commands. See Appendix C for a list of the SCPI commands in alphabetical order.

See the *Function Reference* for the details of each function. See *HP-IB Programming Guide* for an introduction to using the analyzer's HP-IB Commands.

The following conventions and definitions are used to describe the commands.

- ① → **AVER**␣{OFF|ON|0|1}  
 ② → Turns the averaging function ON or OFF for the active channel. (**AVERAGING on off** under **(Bw/Avg)**)

③ →

Parameter	Description
OFF or 0	Averaging function OFF
ON or 1	Averaging function ON

- ④ → ■ Query Response  
 {0|1} <new line> <END>  
 ⑤ → ■ Equivalent SCPI Command  
 :SENSe:AVERAge[:STATe] {OFF|ON|0|1}  
 ⑥ → ■ Example
- ```

OUTPUT 717;"AVER ON"
OUTPUT 717;"AVER?"
ENTER 717;A

OUTPUT 717;":SENS:AVER ON"
OUTPUT 717;":SENS:AVER?"
ENTER 717;A
  
```

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ① | <p>Command name and required parameter.</p> <p>Upper case bold characters represent the command that must appear exactly as shown with no embedded spaces. Upper and lower case characters are equivalent.</p> <p>A constant or a pre-assigned simple or complex numeric or string variable transferred to the analyzer. There must be a space between it and the code. (␣ indicates a space.)</p> <p>Characters enclosed in the { } brackets are qualifiers attached to the root mnemonic. There can be no spaces or symbols between the root mnemonic and its appendage. For example, {OFF ON 0 1} means OFF, ON, 0, or 1, and {1-4} means 1, 2, 3, or 4.</p> |
| ② | <p>Description.</p> <p>Key or softkey that has the same function is shown in the brackets. The brackets may include more additional information.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| ③ | <p>Parameter description of the Simple command and SCPI command.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| ④ | <p>Query response of the Simple command and SCPI command.</p> <p>If the query response of the SCPI command differs from the response of the Simple command, the query response of the SCPI command is described in "Equivalent SCPI Command."</p>                                                                                                                                                                                                                                                                                                                                                                                                               |
| ⑤ | <p>Equivalent SCPI command to the Simple command.</p> <p>See "SCPI Commands" in Chapter 1 for more information about the SCPI command. Square brackets indicate that the enclosed information is optional.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| ⑥ | <p>Example of the usage of the Simple command and SCPI command (including their query forms).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Simple Commands

### ADDRCONT $\square$ <numeric>

Sets the HP-IB address the analyzer will use to communicate with the external controller.

(ADDRESS: CONTROLLER under (Local))

| Parameter | Range   | Unit |
|-----------|---------|------|
| <numeric> | 0 to 30 |      |

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:SYSTEM:COMMunicate:GPIB2:ADDRESS  $\square$  <numeric>

### ANAOCH1

Selects channel 1 for waveform analysis. For details, see "ANAOCH1" in Appendix I.  
(Instrument BASIC EXECUTE executable; No equivalent SCPI command)

#### ■ Query Response

| Parameter | Description                    |
|-----------|--------------------------------|
| OFF or 0  | Analysis for channel 1 is off. |
| ON or 1   | Analysis for channel 1 is on.  |

### ANAOCH2

Selects channel 2 for waveform analysis. For details, see "ANAOCH2" in Appendix I.  
(Instrument BASIC EXECUTE executable; No equivalent SCPI command)

#### ■ Query Response

| Parameter | Description                    |
|-----------|--------------------------------|
| OFF or 0  | Analysis for channel 1 is off. |
| ON or 1   | Analysis for channel 1 is on.  |

### ANAODATA

Selects a data trace for waveform analysis. For details, refer to "ANAODATA" in Appendix I.  
(Instrument BASIC EXECUTE executable; No equivalent SCPI command)

#### ■ Query Response

| Parameter | Description                     |
|-----------|---------------------------------|
| OFF or 0  | Analysis for data trace is off. |
| ON or 1   | Analysis for data trace is on.  |

## ANAOMEMO

Selects a memory trace for waveform analysis. For details, refer to “ANAOMEMO” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

### ■ Query Response

| Parameter | Description                       |
|-----------|-----------------------------------|
| OFF or 0  | Analysis for memory trace is off. |
| ON or 1   | Analysis for memory trace is on.  |

## ANARANG□<numeric1>,<numeric2>

Sets the waveform analysis stimulus range by entering the START and STOP values. For details, see “ANARANG” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

| Parameter   | Range                                                                                                                                                                      | Description (Unit)                                                             |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <numeric1 > | 100000 (= 100 k) to 1.82×10 <sup>9</sup> (= 1.82 G) (Network and Impedance analyzer)<br>0 to 1.82×10 <sup>9</sup> (= 1.82 G) (Spectrum analyzer)                           | Start Frequency (Hz)<br>Hz (frequency)                                         |
| <numeric2 > | -70 to 20<br>100000 (= 100 k) to 1.82×10 <sup>9</sup> (= 1.82 G) (Network and Impedance analyzer)<br>0 to 1.82×10 <sup>9</sup> (= 1.82 G) (Spectrum analyzer)<br>-70 to 20 | Start Power (dBm)<br>Stop Frequency (Hz)<br>Hz (frequency)<br>Stop Power (dBm) |

### ■ Query Response

{numeric1},{numeric2}<new line><END>

## ANARFULL

Sets the analysis range equal to the full stimulus range. For details, see “ANARFULL” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

## ATT□<numeric>[DB]

Changes the input attenuation when the S input is selected. Because the attenuators at the R, A, and B inputs are fixed, if either R, A, or B is selected, you can enter the value but not change. (Spectrum analyzer only) (ATTEN under Scale Ref)

| Parameter | Range                     | Unit |
|-----------|---------------------------|------|
| <numeric> | 0, 10, 20, 30, 40, 50, 60 | dB   |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

```
:SENSe:POWer:AC:ATTenuation:AUTO□{OFF|0}
:SENSe:POWer:AC:ATTenuation□<numeric>
```



■ Example

```
OUTPUT 717;"ATT 10DB"
OUTPUT 717;":SENS:POW:AC:ATT:AUTO OFF"
OUTPUT 717;":SENS:POW:AC:ATT 10"
```

**ATTAUTO□{OFF|ON|0|1}**

Sets the automatic and manual spectrum analyzer input attenuator of the S input. (Spectrum analyzer only) (ATTEN AUTO man under [Scale Ref](#))

| Parameter | Description          |
|-----------|----------------------|
| OFF or 0  | Manual attenuator    |
| ON or 1   | Automatic attenuator |

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:SENSe:POWer:AC:ATTenuation:AUTO□{OFF|ON|0|1}

**ATTP1□<numeric>[DB]**

Controls the attenuation at port 1 of an S-parameter Test Set connected to the analyzer. (Network analyzer only) (ATTENUATOR PORT 1 under [Source](#))

| Parameter | Range                         | Unit |
|-----------|-------------------------------|------|
| <numeric> | 0, 10, 20, 30, 40, 50, 60, 70 | dB   |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:OUTPut:ATTenuation1□<numeric>

**ATTP2□<numeric>[DB]**

Controls the attenuation at port 2 of an S-parameter Test Set connected to the analyzer. (Network analyzer only) (ATTENUATOR PORT 2 under [Source](#))

| Parameter | Range                         | Unit |
|-----------|-------------------------------|------|
| <numeric> | 0, 10, 20, 30, 40, 50, 60, 70 | dB   |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:OUTPut:ATTenuation2□<numeric>

## AUTO

Brings the trace data, defined by the SCAF command, in view on the display. (Network and impedance analyzer only) (**AUTO SCALE** under **Scale Ref**); No query)

- Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALe]:AUTOLONCE  
(TRACe[1] for the data trace; TRACe2 for the memory trace.)

## AVER{OFF|ON|0|1}

Turns the averaging function ON or OFF for the active channel. (**AVERAGING ON off** under **Bw/Avg**)

| Parameter | Description            |
|-----------|------------------------|
| OFF or 0  | Averaging function OFF |
| ON or 1   | Averaging function ON  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:SENSe:AVERAge[:STATe]{OFF|ON|0|1}

## AVERFACT{<numeric>}

Makes the averaging factor for the active function. (**AVERAGING FACTOR** under **Bw/Avg**)

| Parameter | Range    | Unit |
|-----------|----------|------|
| <numeric> | 1 to 999 |      |

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:SENSe:AVERAge:COUNT{<numeric>}

## AVERREST

Resets the sweep-to-sweep averaging and restarts the sweep count at 1 at the beginning of the next sweep. (**AVERAGING RESTART** under **Bw/Avg**); No query)

- Equivalent SCPI Command

:SENSe:AVERAge:CLEAr

**BACI**{<numeric>[PCT]}

Sets the background intensity of the display as a percent of the white level.

(BACKGROUND INTENSITY under **Display**)

| Parameter | Range                     | Unit |
|-----------|---------------------------|------|
| <numeric> | 0 to 100 (simple command) | %    |
| <numeric> | 0 to 1 (SCPI command)     |      |

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:DISPlay:CONTRast{<numeric>}

**BEEPDONE**{OFF|ON|0|1}

Sets an annunciator that sounds to indicate completion of certain operations such as calibration or instrument state save. (BEEP DONE ON off under **System**)

| Parameter | Description                     |
|-----------|---------------------------------|
| OFF or 0  | Operation completion beeper OFF |
| ON or 1   | Operation completion beeper ON  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:SYSTem:BEEPer1:STATe{OFF|ON|0|1}

**BEEPFAIL**{OFF|ON|0|1}

Turns the limit fail beeper ON or OFF. When the limit testing is ON and the fail beeper is ON, a beep is emitted each time a limit test is performed and a failure is detected.

(BEEP FAIL ON off under **System**)

| Parameter | Description           |
|-----------|-----------------------|
| OFF or 0  | Limit fail beeper OFF |
| ON or 1   | Limit fail beeper ON  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:CALCulate:LIMit:BEEPer[:STATe]{OFF|ON|0|1}

### BEEPWARN $\square$ {OFF|ON|0|1}

Sets the warning annunciator. When the annunciator is ON, it sounds a warning when a cautionary message is displayed. (BEEP WARN ON off under **System**)

| Parameter | Description        |
|-----------|--------------------|
| OFF or 0  | Warning beeper OFF |
| ON or 1   | Warning beeper ON  |

#### ■ Query Response

{0|1} <new line><END>

#### ■ Equivalent SCPI Command

:SYSTEM:BEEPPer2:STATe  $\square$  {OFF|ON|0|1}

### BLIGHT $\square$ {OFF|ON|0|1}

Sets backlighting the LCD screen ON or OFF.

| Parameter | Description      |
|-----------|------------------|
| OFF or 0  | Backlighting OFF |
| ON or 1   | Backlighting ON  |

#### ■ Query Response

{0|1} <new line><END>

#### ■ Equivalent SCPI Command

:DISPlay:BACKlight  $\square$  {OFF|ON|0|1}

### BOTV $\square$ <numeric>

Defines the bottom border of the display and adjusts the scale value. (BOTTOM VALUE under **Scale Ref**); Impedance analyzer only)

| Parameter | Range                                                                                  | Unit                             |
|-----------|----------------------------------------------------------------------------------------|----------------------------------|
| <numeric> | -1×10 <sup>9</sup> to 1×10 <sup>9</sup><br>-200×10 <sup>6</sup> to 200×10 <sup>6</sup> | y-axis unit<br>y-axis unit (Log) |

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{1|2}:Y[:SCALE]:BOTTom  $\square$  <numeric>

**BW** <numeric> [HZ|KHZ|MAHZ]

Sets the bandwidth value for IF bandwidth reduction, or sets the IF bandwidth of the list sweep table. (Network analyzer and Impedance analyzer) (IF BW under Bw/Avg, or IF BW under Sweep)

Sets the bandwidth value for the resolution bandwidth reduction, or sets the resolution bandwidth of the list sweep table. (Spectrum analyzer) (RES BW under Bw/Avg, or RES BW under Sweep)

| Parameter | Range                                                                                                                                                                                                                                                                                          | Unit |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| <numeric> | 10, 30, 100, 300, 1000 (=1 k), 3000 (=3 k), 10000 (=10 k), 40000 (=40 k) (network analyzer and impedance analyzer)<br><br>1, 3, 10, 30, 100, 300, 1000 (=1 k), 3000 (=3 k), 10000 (=10 k), 30000 (=30 k), 100000 (=100 k), 300000 (=300 k), 1000000 (=1 M), 3000000 (=3 M) (spectrum analyzer) | Hz   |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

Network and impedance analyzer :SENSe:BANDwidth[:RESolution] <numeric>

Spectrum analyzer :SENSe:BANDwidth[:RESolution]:AUTO {OFF|0}  
:SENSe:BANDwidth[:RESolution] <numeric>

IF BW, RES BW under Sweep :SENSe:LIST:SEGment:BANDwidth <numeric>

**BWAUTO** {OFF|ON|0|1}

Sets either the automatic or manual resolution bandwidth ON. (Spectrum analyzer only) (RES BW AUTO man under Bw/Avg)

| Parameter | Description                     |
|-----------|---------------------------------|
| OFF or 0  | Manual resolution bandwidth.    |
| ON or 1   | Automatic resolution bandwidth. |

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:SENSe:BANDwidth[:RESolution]:AUTO {OFF|ON|0|1}

**BWAUTO**  $\square$  {OFF|ON|0|1}

**BWSRAT**  $\square$  <numeric>

Sets the RBW/SPAN ratio that specifies the resolution bandwidth in the AUTO mode. (Spectrum analyzer only) (**RBW/SPAN RATIO** under **Bw/Avg**)

| Parameter | Range                                 | Unit |
|-----------|---------------------------------------|------|
| <numeric> | 0.01 to 10 (of SPAN) (simple command) | %    |
| <numeric> | 0.0001 to 0.1 (SCPI command)          |      |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SENSe:BANDwidth[:RESolution]:RATio  $\square$  <numeric>

**CO**  $\square$  <numeric>

Enters the  $C_0$  term, which is the constant term of the capacitance model equation. (Network and impedance analyzer only) (**CO** under **Cal**; No query)

| Parameter | Range                                 | Unit |
|-----------|---------------------------------------|------|
| <numeric> | -10000 to 10000 ( $\times 10^{-15}$ ) | F    |

■ Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:STANdard:CO  $\square$  <numeric>

■ Query Response

{numeric} <new line><END>

**C1**  $\square$  <numeric>

Enters the  $C_1$  term, which is the constant term of the capacitance model equation. (Network and impedance analyzer only) (**C1** under **Cal**; No query)

| Parameter | Range                                 | Unit |
|-----------|---------------------------------------|------|
| <numeric> | -10000 to 10000 ( $\times 10^{-27}$ ) | F/Hz |

■ Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:STANdard:C1  $\square$  <numeric>

■ Query Response

{numeric} <new line><END>

**C2**{<numeric>

Enters the  $C_2$  term, which is the constant term of the capacitance model equation. (Network and impedance analyzer only) (**C2** under **Cal**); No query)

| Parameter | Range                                 | Unit              |
|-----------|---------------------------------------|-------------------|
| <numeric> | -10000 to 10000 ( $\times 10^{-36}$ ) | F/Hz <sup>2</sup> |

- Equivalent SCPI Command (Query)

```
:SENSe:CORRection:CKIT:STANdard:C2{<numeric>
```

- Query Response

```
{numeric} <new line><END>
```

**CALCASSI**

Shows the tabular listing of the calibration kit class assignment. (Network and impedance analyzer only) (**CLASS ASSIGNMENT** under **Copy**); No query)

- Equivalent SCPI Command

```
:DISPlay[:WINDow]:TEXT3:PAGE{1}
:DISPlay[:WINDow]:TEXT3:STATe{ON|1}
```

**CALECPARA**

Calculates and displays the equivalent circuit parameters. (**CALCULATE EQV PARAMS** under **Display**); No query; Impedance analyzer only)

- Equivalent SCPI Command

```
:CALCulate:EVALuate:EPARameters
:DISPlay[:WINDow]:TEXT18:STATe{ON|1}
```

**CALI**{NONE|RESP|RAI|S111|S221|FUL2|ONE2|IMP}

Selects the measurement calibration type. (Network analyzer and impedance analyzer only) (**CALIBRATE: NONE**, **RESPONSE**, **RESPONSE & ISOL'N**, **S11 1-PORT**, **S22 1-PORT**, **FULL 2-PORT**, **ONE PATH 2-PORT** under **Cal**) of network analyzer mode or **CALIBRATE MENU** under **Cal** of impedance analyzer mode.)

| Parameter | Description                                                            |
|-----------|------------------------------------------------------------------------|
| NONE      | No calibration (Network and impedance analyzer only)                   |
| RESP      | Response measurement calibration (Network analyzer only)               |
| RAI       | Response and isolation measurement calibration (Network analyzer only) |
| S111      | 1-Port measurement calibration at port 1 (Network analyzer only)       |
| S221      | 1-Port measurement calibration at port 2 (Network analyzer only)       |
| FUL2      | Full 2-Port measurement calibration (Network analyzer only)            |
| ONE2      | One-path 2-Port measurement calibration (Network analyzer only)        |
| IMP       | Calibration of the impedance analyzer mode. (Impedance analyzer only)  |

- Query Response

## CAL<sub>U</sub>{NONE|RESP|RAI|S111|S221|FUL2|ONE2|IMP}

{NONE|RESP|RAI|S111|S221|FUL2|ONE2|IMP} <new line><END>

### ■ Equivalent SCPI Command

```
CALUNONE      :SENSe:CORRection1:COLLect:METhodUNONE
CALURESP      :SENSe:CORRection1:COLLect:METhodURESPonse
CALURAI       :SENSe:CORRection1:COLLect:METhodURAIsol
CALUS111      :SENSe:CORRection1:COLLect:METhodUS111
CALUS221      :SENSe:CORRection1:COLLect:METhodUS221
CALUFUL2      :SENSe:CORRection1:COLLect:METhodUTPORT
CALUONE2     :SENSe:CORRection1:COLLect:METhodUOPTPort
CALUIMP      :SENSe:CORRection1:COLLect:METhodUIMPedance
```

### ■ Example

```
OUTPUT 717;"CALI NONE"
OUTPUT 717;"CALI?"
ENTER 717;A$
OUTPUT 717;":SENS:CORR:COLL:METH NONE"
OUTPUT 717;":SENS:CORR:COLL:METH?"
ENTER 717;A$
```

## CAL<sub>K</sub>{APC7|APC35|N50|N75|USED}

Selects one of the default calibration kits available for different connector types. (Network and impedance analyzer only) (CAL KIT: 7mm, 3.5mm, N 50 ohm, N 75 ohm, or USER KIT under Cal)

| Parameter | Description  |
|-----------|--------------|
| APC7      | 7 mm         |
| APC35     | 3.5 mm       |
| N50       | Type-N 50 Ω  |
| N75       | Type-N 75 Ω  |
| USED      | User-defined |

### ■ Query Response

{APC7|APC35|N50|N75|USED} <new line><END>

### ■ Equivalent SCPI Command

```
CALKAPC7      :SENSe:CORRection:CKITUAPC7
CALKAPC35     :SENSe:CORRection:CKITUAPC35
CALKN50       :SENSe:CORRection:CKITUN50
CALKN75       :SENSe:CORRection:CKITUN75
CALKUSED     :SENSe:CORRection:CKITUUDEFined
```

### ■ Example

```
OUTPUT 717;"CALK APC7"
OUTPUT 717;"CALK?"
ENTER 717;A$
OUTPUT 717;":SENS:CORR:CKIT APC7"
```



CENT  $\square$  <numeric> [HZ|KHZ|MAHZ|GHZ|DBM]

CALS  $\square$  <numeric>

Provides the tabular listing of the standard definitions. (Network and impedance analyzer only)  
(STD NO.1 to STD NO.8 under (Copy); No query)

| Parameter | Range  | Unit |
|-----------|--------|------|
| <numeric> | 1 to 8 |      |

■ Equivalent SCPI Command

```
CALS  $\square$ 1      :DISPlay[:WINDow]:TEXT4:PAGEL1
               :DISPlay[:WINDow]:TEXT4:STATe  $\square$ {ON|1}

CALS  $\square$ 2      :DISPlay[:WINDow]:TEXT5:PAGEL1
               :DISPlay[:WINDow]:TEXT5:STATe  $\square$ {ON|1}

CALS  $\square$ 3      :DISPlay[:WINDow]:TEXT6:PAGEL1
               :DISPlay[:WINDow]:TEXT6:STATe  $\square$ {ON|1}

CALS  $\square$ 4      :DISPlay[:WINDow]:TEXT7:PAGEL1
               :DISPlay[:WINDow]:TEXT7:STATe  $\square$ {ON|1}

CALS  $\square$ 5      :DISPlay[:WINDow]:TEXT8:PAGEL1
               :DISPlay[:WINDow]:TEXT8:STATe  $\square$ {ON|1}

CALS  $\square$ 6      :DISPlay[:WINDow]:TEXT9:PAGEL1
               :DISPlay[:WINDow]:TEXT9:STATe  $\square$ {ON|1}

CALS  $\square$ 7      :DISPlay[:WINDow]:TEXT10:PAGEL1
               :DISPlay[:WINDow]:TEXT10:STATe  $\square$ {ON|1}

CALS  $\square$ 8      :DISPlay[:WINDow]:TEXT11:PAGEL1
               :DISPlay[:WINDow]:TEXT11:STATe  $\square$ {ON|1}
```

CBRI  $\square$  <numeric> [PCT]

Adjusts the brightness of the color being modified. (BRIGHTNESS under (Display); No equivalent SCPI command)

| Parameter | Range    | Unit |
|-----------|----------|------|
| <numeric> | 0 to 100 | %    |

■ Query Response

{numeric} <new line><END>

CENT  $\square$  <numeric> [HZ|KHZ|MAHZ|GHZ|DBM]

Defines the center value of the sweep range, or the center value of the segment to be edited in the list sweep table. ((Center), or CENTER under (Sweep))

**CENT**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**|**DBM**]

| Parameter              | Range                                                                                                                                                                                                                                                                          | Unit                                          |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <i>&lt;numeric&gt;</i> | 100k to 1.82G (network analyzer and impedance analyzer)<br>0 to 1.8199999995 G (spectrum analyzer)<br>0 to 1.8199999990234 G (spectrum analyzer with span = 195mHz)<br>0 to 1.82 G (spectrum analyzer with span = 0Hz)<br>-60 to +20 (network analyzer and impedance analyzer) | Hz (frequency)<br><br><br><br><br>dBm (power) |

■ Query Response

{*numeric*}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

**Center** :SENSe:FREQuency:CENTer  $\square$  *<numeric>* (frequency) or  
:SOURce:POWer:CENTer  $\square$  *<numeric>* (power)

**CENTER** under **Sweep** :SENSe:LIST:SEGment:FREQuency:CENTer  $\square$  *<numeric>*  
(List sweep table)

■ Example

OUTPUT 717;"CENT 899.95MAHZ"

**CHAD**  $\square$  *<string>*

Specifies changing the current directory of a DOS format disk. (**CHANGE DIRECTORY** under **Save**); No query)

| Parameter             | Description    |
|-----------------------|----------------|
| <i>&lt;string&gt;</i> | Directory path |

■ Equivalent SCPI Command

:MMEMory:CDIRectory  $\square$  *<string>*

■ Example

OUTPUT 717;"CHAD "" . """

**CHAN1**

Selects channel 1 as the active channel. (**Chan 1**)

■ Query Response

{0|1}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:INSTrument[:SElect]  $\square$  CH2 or :INSTrument:NSElect  $\square$  2  
:INSTrument:STATe  $\square$  OFF  
:INSTrument[:SElect]  $\square$  CH1 or :INSTrument:NSElect  $\square$  1  
:INSTrument:STATe  $\square$  ON

### ■ Example

```
OUTPUT 717;"CHAN1"
OUTPUT 717;":INST CH2"
OUTPUT 717;":INST:STAT OFF"
OUTPUT 717;":INST CH1"
OUTPUT 717;":INST:STAT ON"
```

## CHAN2

Selects channel 2 as the active channel. (Chan 2)

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

```
:INSTrument[:SElect] CH1 or :INSTrument:NSElect L1
:INSTrument:STATe LOFF
:INSTrument[:SElect] CH2 or :INSTrument:NSElect L2
:INSTrument:STATe LON
```

## CIRF{RI|LIN|LOG|RX|GB|SWR}

Selects format to readout the value of a Smith, polar, or admittance chart using markers. (Network and impedance analyzer only) (REAL IMAG, LIN MAG PHASE, LOG MAG PHASE, R+jX, G+jB, SWR PHASE under Utility)

| Parameter | Description                     |
|-----------|---------------------------------|
| RI        | Real and imaginary form         |
| LIN       | Linear magnitude and phase form |
| LOG       | Log magnitude and phase form    |
| RX        | Complex impedance form (R+jX)   |
| GB        | Complex admittance form (G+jB)  |
| SWR       | SWR and phase form              |

### ■ Query Response

{RI|LIN|LOG|RX|GB|SWR} <new line><END>

### ■ Equivalent SCPI Commands

```
CIRF LRI :CALCulate:EVALuate:R:FORMat LRIImaginary
CIRF LIN :CALCulate:EVALuate:R:FORMat LMLIPhase
CIRF LLOG :CALCulate:EVALuate:R:FORMat LMLOPhase
CIRF LRX :CALCulate:EVALuate:R:FORMat LRX
CIRF LGB :CALCulate:EVALuate:R:FORMat LGB
CIRF LSWR :CALCulate:EVALuate:R:FORMat LSWRPhase
```

### ■ Example

```
OUTPUT 717;"CIRF GB"
```

## CLAD

Completes the class assignment and stores it. (Network and impedance analyzer only)  
(**CLASS DONE (SPE'D)** under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:CKIT:SAVE:CLASs
```

- Example

```
OUTPUT 717;"CLAD"
```

```
OUTPUT 717;":SENS:CORR:CKIT:SAVE CLAS"
```

## CLASIMP{A|B|C}

Selects and acquires the impedance calibration classes. (**CALIBRATION OPEN**, **SHORT**, or **LOAD** under **Cal**), respectively; No query; Impedance analyzer only)

The order in which you acquire the **OPEN**, **SHORT**, and **LOAD** is changeable. You can suspend a calibration sequence and do a different operation, and then resume the calibration sequence.

- Equivalent SCPI Command

```
:SENSe:CORRection1:COLLect[:ACQuire] IMP{A|B|C}
```

## CLASS11{A|B|C}

Selects port 1 (S11) calibration standard class: S11A (open), S11B (short), or S11C (load). (Network analyzer only) (**[S11] : OPEN**, **SHORT**, **LOAD** under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]USTANDARD{1|2|3}
```

## CLASS22{A|B|C}

Selects port 2 (S22) calibration standard class: S22A (open), S22B (short), or S22C (load). (Network analyzer only) (**[S22] : OPEN**, **SHORT**, **LOAD** under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]UCS22{A|B|C}
```

## CLEL

Clears the entire list. (**CLEAR LIST** under **Sweep**); No query)

- Equivalent SCPI Command

```
:SENSe:LIST:CLEAr
```

## CLES

Clears the Status Byte register, the Standard Event Status register, the Event Status register B (Instrument Event Status register), and the Operational Status register. (No query)

- Equivalent Common Command

\*CLS

## CNTS $\square$ *<numeric>* [HZ|KHZ|MAHZ|GHZ]

Changes the step size for the center frequency function. (CENTER STEP SIZE under Center)

| Parameter              | Range                     | Unit |
|------------------------|---------------------------|------|
| <i>&lt;numeric&gt;</i> | 0 to $1.8199 \times 10^9$ | Hz   |

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:SENSe:FREQUency:CENTer:STEP[:INCRement]  $\square$  *<numeric>*

- Example

OUTPUT 717;"CNTS 1MAHZ"

## CNTSAUTO $\square$ {OFF|ON|0|1}

Sets CENTER step policy. (STEP SIZE AUTO man under Center)

| Parameter | Description |
|-----------|-------------|
| OFF or 0  | Linear step |
| ON or 1   | 1-2-5 step  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Commands

:SENSe:FREQUency:CENTer:STEP[:INCRement]:AUTO  $\square$  {OFF|ON|0|1}

## COLO $\square$ *<parameter>*

Specifies the display element to change color. (CH1 DATA, CH1 MEM LIMIT LN, CH2 DATA, CH2 MEM LIMIT LN, GRATICULE, IBASIC, PEN 1, PEN 2, PEN 3, PEN 4, PEN 5, PEN 6, TEXT, WARNING under Display)

COLO□<parameter>

| Parameter | Description                             |
|-----------|-----------------------------------------|
| CH1D      | Channel 1 data                          |
| CH1M      | Channel 1 memory and limit lines        |
| CH2D      | Channel 2 data                          |
| CH2M      | Channel 2 memory and limit lines        |
| GRAT      | Graticule and a portion of softkey text |
| WARN      | Warning annotation                      |
| TEXT      | All the non-data text                   |
| IBT       | Text on the BASIC screen                |
| PEN1      | Pen 1                                   |
| PEN2      | Pen 2                                   |
| PEN3      | Pen 3                                   |
| PEN4      | Pen 4                                   |
| PEN5      | Pen 5                                   |
| PEN6      | Pen 6                                   |

■ Query response

```
{CH1D|CH1M|CH2D|CH2M|WARN|TEXT|GRAT|IBT|PEN1|PEN2|PEN3|PEN4|PEN5|PEN6}  
<new line><END>
```

■ Equivalent SCPI Command

- COLO□CH1D :DISPlay:CMAP:COLor1:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□CH1M :DISPlay:CMAP:COLor2:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□CH2D :DISPlay:CMAP:COLor3:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□CH2M :DISPlay:CMAP:COLor4:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□GRAT :DISPlay:CMAP:COLor5:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□WARN :DISPlay:CMAP:COLor6:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□TEXT :DISPlay:CMAP:COLor7:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□IBT :DISPlay:CMAP:COLor8:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□PEN1 :DISPlay:CMAP:COLor9:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□PEN2 :DISPlay:CMAP:COLor10:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□PEN3 :DISPlay:CMAP:COLor11:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□PEN4 :DISPlay:CMAP:COLor12:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□PEN5 :DISPlay:CMAP:COLor13:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>
- COLO□PEN6 :DISPlay:CMAP:COLor14:HSL□<numeric (hue)>, <numeric (sat)>, <numeric (lum)>

| Parameter       | Range                                                                                                                                                                                                | Unit |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| <numeric (hue)> | (Hue) 0 to 100, circular, with a value of 0 resulting in the same hue as a value of 100. The approximate color is (starting at 0): red, orange, yellow, green, cyan, blue, magenta, and back to red. | %    |
| <numeric (sat)> | (Saturation) 0 to 100, with 0 specifying no color (only white or gray, depending on intensity) and 1 specifying no white.                                                                            | %    |
| <numeric (lum)> | (Luminance) 0 to 100, with 0 resulting in black and 1 resulting in the brightest color available.                                                                                                    | %    |

□ Query Response

{numeric (hue)}, {numeric (sat)}, {numeric (lum)} <new line><END>

■ Example

OUTPUT 717;"COLO CH1D"

OUTPUT 717;":DISP:CMAP:COL1:HSL 17,100,100"

COLO $\square$ <parameter>

**COLOR $\square$ <numeric>[PCT]**

Adjusts the degree of whiteness of the color being modified. (COLOR under Display); No equivalent SCPI Command)

| Parameter | Range    | Unit |
|-----------|----------|------|
| <numeric> | 0 to 100 | %    |

■ Query response

{numeric} <new line><END>

**COMC{A|B|C}**

Measures the standards for the fixture compensation. (COMPEN OPEN, SHORT, or LOAD under Cal); No query; Impedance analyzer only)

| Parameter | Description     |
|-----------|-----------------|
| A         | Measures OPEN.  |
| B         | Measures SHORT. |
| C         | Measures LOAD.  |

■ Equivalent SCPI Commands

COMCA :SENSe:CORRection2:COLLect[:ACQuire] $\square$ STANdard1  
COMCB :SENSe:CORRection2:COLLect[:ACQuire] $\square$ STANdard2  
COMCC :SENSe:CORRection2:COLLect[:ACQuire] $\square$ STANdard3

**COMCDAT{A|B|C} $\square$ {OFF|ON|0|1}**

Sets the OPEN, SHORT, and LOAD fixture compensation ON or OFF. (OPEN ON off, SHORT ON off, or LOAD ON off under Cal); Impedance analyzer only)

| Parameter | Description                  |
|-----------|------------------------------|
| A         | Uses OPEN compensation data. |
| B         | Uses SHORT compensation data |
| C         | Uses LOAD compensation data  |
| ON or 1   | Turns on the selected data.  |
| OFF or 0  | Turns off the selected data. |

■ Query response

{1|0} <new line><END>

■ Equivalent SCPI Commands

COMCDATA {ON|OFF} :SENSe:CORRection2:OPEN $\square$ {ON|OFF|1|0}  
COMCDATB {ON|OFF} :SENSe:CORRection2:SHORT $\square$ {ON|OFF|1|0}  
COMCDATC {ON|OFF} :SENSe:CORRection2:LOAD $\square$ {ON|OFF|1|0}



## COMKDONE

Complete modifying the fixture compensation kit. (KIT DONE (MODIFIED) under **Cal**)  
**COMPEN KIT [USER] MODIFY [USER]**; Impedance analyzer only)

- Equivalent SCPI Command

```
:SENSE:CORRection2:CKIT:SAVE
```

## COMP

Call the fixture compensation menu. You need send this command before sending COMC.  
**(COMPEN MENU** under **Cal**) **FIXTURE COMPEN**; No query; Impedance analyzer only)

- Equivalent SCPI Command

```
:SENSE:CORRection2:COLLect:METhod $\downarrow$ IMPedance
```

## COMS

Displays the fixture compensation definition on the display. (**COMPEN KIT DEFINITION** under **Copy**); No query; Impedance analyzer only)

- Equivalent SCPI Commands

```
DISPlay[:WINDow]:TEXT20:PAGE 1  

DISPlay[:WINDow]:TEXT20:STATe ON
```

## COMSDONE

Complete defining the standard for the fixture compensation kit. (**STD DONE (DEFINED)** under **Cal**) **COMPEN KIT [USER] MODIFY [USER]**; Impedance analyzer only)

- Equivalent SCPI Command

```
:SENSE:CORRection2:CKIT:STANdard:SAVE
```

## CONT

Triggers sweep automatically and continuously and the trace is updated with each sweep.  
**(CONTINUOUS** under **Trig**)

- Query Response

```
{0|1} <new line><END>
```

- Equivalent SCPI Command

```
:INITiate:CONTInuous $\downarrow$ {1|ON}
```

## CONT

### CONV $\square$ <parameter>

Selects the measurement data conversion setting (impedance, admittance, or multiple phase). (Network analyzer only) (OFF, Z:Ref1, Z:Trans, Y:Ref1, Y:Trans, 1/S, 4xPHASE, 8xPHASE, 16xPHASE under (Meas))

| Parameter | Description          |
|-----------|----------------------|
| OFF       | Conversion OFF       |
| ZREF      | Z: reflection        |
| ZTRA      | Z: transmission      |
| YREF      | Y: reflection        |
| YTRA      | Y: transmission      |
| ONEDS     | Reciprocal (1/S)     |
| MP4       | Multiply phase by 4  |
| MP8       | Multiply phase by 8  |
| MP16      | Multiply phase by 16 |

#### ■ Query Response

{OFF|ZREF|ZTRA|YREF|YTRA|ONEDS|MP4|MP8|MP16} <new line><END>

#### ■ Equivalent SCPI Command

```
CONV $\square$ OFF      :CALCulate:MATH1[:EXPRession]:NAME $\square$ OFF
CONV $\square$ ZREF     :CALCulate:MATH1[:EXPRession]:NAME $\square$ ZREF
CONV $\square$ ZTRA     :CALCulate:MATH1[:EXPRession]:NAME $\square$ ZTRA
CONV $\square$ YREF     :CALCulate:MATH1[:EXPRession]:NAME $\square$ YREF
CONV $\square$ YTRA     :CALCulate:MATH1[:EXPRession]:NAME $\square$ YTRA
CONV $\square$ ONEDS    :CALCulate:MATH1[:EXPRession]:NAME $\square$ INVS
CONV $\square$ MP4      :CALCulate:MATH1[:EXPRession]:NAME $\square$ MP4
CONV $\square$ MP8      :CALCulate:MATH1[:EXPRession]:NAME $\square$ MP8
CONV $\square$ MP16     :CALCulate:MATH1[:EXPRession]:NAME $\square$ MP16
```

#### □ Query Response

{OFF|ZREF|ZTRA|YREF|YTRA|ONEDS|MP4|MP8|MP16} <new line><END>

#### ■ Example

```
OUTPUT 717;"CONV ZREF"
OUTPUT 717;":CALC:MATH1:NAME ZREF"
```

## COPA

Aborts a print in progress. (COPY ABORT under (Copy); No query)

#### ■ Equivalent SCPI Command

:HCOPY:ABORT

**COPT{OFF|ON|0|1}**

Turns printing time and date (the time stamp function) ON or OFF. (COPY TIME ON off under **Copy**)

| Parameter | Description             |
|-----------|-------------------------|
| OFF or 0  | Time stamp function OFF |
| ON or 1   | Time stamp function ON  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:HCOPY:ITEM:TDSamp:STATe{OFF|ON|0|1}

**CORR{OFF|ON|0|1}**

Turns error correction ON or OFF. (Network and impedance analyzer only)  
(CORRECTION ON off under **Cal**, This softkey is Network analyzer only)

| Parameter | Description          |
|-----------|----------------------|
| OFF or 0  | Error correction OFF |
| ON or 1   | Error correction ON  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:SENSe:CORRection[:STATe]{OFF|ON|0|1}

- Example

```
OUTPUT 717;"CORR OFF"
```

```
OUTPUT 717;"CORR?"
ENTER 717;A
```

```
OUTPUT 717;":SENS:CORR OFF"
```

```
OUTPUT 717;":SENS:CORR?"
ENTER 717;A
```

**CORR**□{OFF|ON|0|1}

**COUC**□{OFF|ON|0|1}

Sets the channel coupling of sweep parameter values. (Between network or between impedance analyzers only) (**COUPLED CH ON off** under **Sweep**)

| Parameter | Description          |
|-----------|----------------------|
| OFF or 0  | Channel coupling OFF |
| ON or 1   | Channel coupling ON  |

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:INSTRument:COUPLe□{OFF|ON|0|1}

**CRED**□<string>

Create a new directory in a DOS format disk. (**CREATE DIRECTORY** under **Save**); No query)

| Parameter | Description                                                                  |
|-----------|------------------------------------------------------------------------------|
| <string>  | Up to 8 characters for directory name (and up to 3 characters for extension) |

■ Equivalent SCPI Command

:MMEMory:CREate:DIRectory□<string>

■ Example

OUTPUT 717;"CRED ""DATA""

OUTPUT 717;":MMEM:CRE:DIR ""DATA""

**CWFREQ**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**]

**CRSC**  $\square$  {**OFF**|**ON**|**0**|**1**}

Selects the destination channel of the marker→ functions. When a marker→ function is performed, the sweep parameter or amplitude value of the destination channel is changed.

(**CROSS CHAN ON off** under **Marker→**)

| Parameter | Description                                                      |
|-----------|------------------------------------------------------------------|
| OFF or 0  | Current active channel as the destination channel                |
| ON or 1   | Current inactive channel as the destination channel <sup>1</sup> |

<sup>1</sup> Can be selected only when the dual channel function is ON.

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:EFFect:ON  $\square$  {1|2}

When channel 1 is active,

| Parameter | Description                                   |
|-----------|-----------------------------------------------|
| 1         | The channel currently active is selected.     |
| 2         | The channel currently not active is selected. |

When channel 2 is active,

| Parameter | Description                                   |
|-----------|-----------------------------------------------|
| 1         | The channel currently not active is selected. |
| 2         | The channel currently active is selected.     |

**CWFREQ**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**]

Sets the frequency for power sweep. (Network and impedance analyzer only) (**CWFREQ** under **Source**)

| Parameter              | Range                                           | Unit |
|------------------------|-------------------------------------------------|------|
| <i>&lt;numeric&gt;</i> | 100000 (=100 k) to $1.82 \times 10^9$ (=1.82 G) | Hz   |

■ Query Response

{*numeric*} <new line><END>

■ Equivalent SCPI Command

:SOURce:FREQuency[:CW]  $\square$  *<numeric>*

■ Example

OUTPUT 717;"CWFREQ 500MAHZ"

**CWFREQ**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**]

**DATAOVAL**  $\square$  *<numeric>*

Defines the imaginary part of the offset value when using the Smith, Polar, and admittance chart format. (**AUX OFFSET** under **Display**)

| Parameter              | Range             | Unit |
|------------------------|-------------------|------|
| <i>&lt;numeric&gt;</i> | -500000 to 500000 |      |

■ Query Response

{*numeric*} <new line><END>

■ Equivalent SCPI Command

:DATA[:DATA] $\square$ AOFF,*<numeric>*

**DATGAIN**  $\square$  *<numeric>*

Defines the gain value of the data math function. (**GAIN** under **Display**)

| Parameter              | Range                           | Unit |
|------------------------|---------------------------------|------|
| <i>&lt;numeric&gt;</i> | -100 to -0.001, or 0.001 to 100 |      |

■ Query Response

{*numeric*} <new line><END>

■ Equivalent SCPI Command

:DATA[:DATA] $\square$ GAIN,*<numeric>*

**DATMEM**

Stores the current active measurement data in the memory of the active channel. (**DATA→MEMORY** under **Display**); No query)

■ Equivalent SCPI Command

:TRACe{1|2}:COPY $\square$ MTRace,DTRace

■ Example

OUTPUT 717;":TRAC:COPY MTR,DTR"

**DATOVALL** <*numeric*>

Defines the offset value. When using Smith, Polar, and admittance chart format, this command defines the real part of the offset value. (**OFFSET** under **Display**)

| Parameter          | Range             | Unit |
|--------------------|-------------------|------|
| < <i>numeric</i> > | -500000 to 500000 |      |

## ■ Query Response

{*numeric*} <new line><END>

## ■ Equivalent SCPI Command

:DATA[:DATA]L<sub>OFFS</sub>, <*numeric*>

**DAYMYEAR**

Changes the displayed date to the “day:month:year” format. (**DayMonYear** under **System**)

## ■ Query Response

{0|1} <new line><END>

(0 for the “month:day:year” format; 1 for the “day:month:year” format.)

## ■ Equivalent SCPI Command

:SYSTem:DATE:MODELDMY

**DEFC**

Returns all the color settings back to the factory-set default values. (**DEFAULT COLORS** under **Display**); No query)

## ■ Equivalent SCPI Command

:DISPlay:CMAP:DEFault

## DEFEC

**DEFEC**{R1|C1|L1|C0}␣<numeric>

Defines the specified equivalent circuit parameter for simulation. (PARAMETER R1, C1, L1, C0 under **Display**); Impedance analyzer only)

| Parameter | Description              |
|-----------|--------------------------|
| R1        | Parameter R <sub>1</sub> |
| C1        | Parameter C <sub>1</sub> |
| L1        | Parameter L <sub>1</sub> |
| C0        | Parameter C <sub>0</sub> |

| Parameter | Range                                     | Unit                    |
|-----------|-------------------------------------------|-------------------------|
| <numeric> | -1×10 <sup>18</sup> to 1×10 <sup>18</sup> | F(C0, C1) H(L1) OHM(R1) |

### ■ Query Response

<numeric> <new line><END>

### ■ Equivalent SCPI Command

:DATA[:DATA]␣EQ{R1|C1|L1|C0}, <numeric>

### ■ Example

```
OUTPUT @Hp4396;"DEFECR1 350HM"
```

```
OUTPUT @Hp4396;"DEFEC C1?"
```

```
ENTER @Hp4396;C1
```

## DEFGO

Returns the gain and offset values back to the default values (gain = 1, offset = 0).

(DEFAULT GAIN & OFS under **Display**); No query)

### ■ Equivalent SCPI Command

:DATA[:DATA]␣GAIN,1

:DATA[:DATA]␣OFFS,0

### ■ Example

```
OUTPUT 717;"DEFGO"
```

```
OUTPUT 717;":DATA GAIN,1"
```

```
OUTPUT 717;":DATA OFFS,0"
```



**DEFS □ {1-8}**

Defines the number of the calibration standards to be modified. (Network and impedance analyzer only) (DEFINE STANDARD under Cal); No query

| Parameter | Description               |
|-----------|---------------------------|
| 1         | Standard no. 1 (SHORT)    |
| 2         | Standard no. 2 (OPEN)     |
| 3         | Standard no. 3 (LOAD)     |
| 4         | Standard no. 4 (DEL/THRU) |
| 5         | Standard no. 5 (LOAD)     |
| 6         | Standard no. 6 (LOAD)     |
| 7         | Standard no. 7 (SHORT)    |
| 8         | Standard no. 8 (OPEN)     |

■ Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:SELEct □ STANdard{1-8}

□ Query response

{ STAN{1-8} } <new line><END>

■ Example

```
OUTPUT 717;"DEFS 1"
OUTPUT 717;":SENS:CORR:CKIT:SEL STAN1"
OUTPUT 717;":SENS:CORR:CKIT:SEL?"
ENTER 717;A$
```

**DEFSLOAD {R|L} □ <numeric>**

Defines the LOAD standard by entering resistance and reactance value. (LOAD: RESIST. (R), INDUCT. (L) under Cal CAL KIT □. Impedance analyzer only)

| Parameter | Description                                                 |
|-----------|-------------------------------------------------------------|
| R         | Resistance value of the LOAD fixture compensation standard. |
| L         | Inductance value of the LOAD fixture compensation standard. |

| Parameter | Range                                   | Unit  |
|-----------|-----------------------------------------|-------|
| <numeric> | -1×10 <sup>6</sup> to 1×10 <sup>6</sup> | Ω (R) |
| <numeric> | -1×10 <sup>6</sup> to 1×10 <sup>6</sup> | H (L) |

■ Query Response

{ numeric } <new line><END>

■ Equivalent SCPI Command

```
DEFSLOADR :SENSe:CORRection2:CKIT:STANdard3:R □ <numeric>
DEFSLOADL :SENSe:CORRection2:CKIT:STANdard3:L □ <numeric>
```

## DEFSOPEN{G|C}□□<numeric>

Defines the OPEN standard by entering conductance and capacitance value.

(OPEN: CONDUCT. (G), CAP. (C) under **Cal** CAL KIT □. Impedance analyzer only)

| Parameter | Description                                                  |
|-----------|--------------------------------------------------------------|
| G         | Conductance value of the OPEN fixture compensation standard. |
| C         | Capacitance value of the OPEN fixture compensation standard. |

| Parameter | Range                                                   | Unit  |
|-----------|---------------------------------------------------------|-------|
| <numeric> | $-1 \times 10^6$ to $1 \times 10^6$                     | S (G) |
| <numeric> | $-1 \times 10^{-6}$ to $1 \times 10^6$ (simple command) | f (C) |
| <numeric> | $-1 \times 10^{-9}$ to $1 \times 10^9$ (SCPI command)   | F (C) |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

DEFSOPENG SENSE:CORRection2:CKIT:STANdard1:G□<numeric>

DEFSOPENC SENSE:CORRection2:CKIT:STANdard1:C□<numeric>

### ■ Example

OUTPUT @Hp4396;"DEFSOPENG OS"

OUTPUT @Hp4396;"DEFSOPENC 53E-6F"

OUTPUT @Hp4396;"DEFSOPENG?"

ENTER @Hp4396;G

OUTPUT @Hp4396;"SENS:CORR2:CKIT:STAN1:G OS;C 53E-6F"

## DEFSSHOR{R|L}□□<numeric>

Defines the SHORT calibration standard by entering resistance and inductance value.

(SHORT: RESIST. (R), INDUCT. (L) under **Cal** CAL KIT □. Impedance analyzer only)

| Parameter | Description                                                  |
|-----------|--------------------------------------------------------------|
| R         | Resistance value of the SHORT fixture compensation standard. |
| L         | Inductance value of the SHORT fixture compensation standard. |

| Parameter | Range                               | Unit  |
|-----------|-------------------------------------|-------|
| <numeric> | $-1 \times 10^6$ to $1 \times 10^6$ | Ω (R) |
| <numeric> | $-1 \times 10^6$ to $1 \times 10^6$ | H (L) |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

DEFSSHORR SENSE:CORRection2:CKIT:STANdard2:R□<numeric>

DEFSSHORL SENSE:CORRection2:CKIT:STANdard2:L□<numeric>

■ Example

```
OUTPUT @Hp4396;"DEFSSHORTR 0OHM"
OUTPUT @Hp4396;"DEFSSHORTL OH"

OUTPUT @Hp4396;"DEFSSHORTR?"
ENTER @Hp4396;R

OUTPUT @Hp4396;"SENS:CORR2:CKIT:STAN2:R 0OHM;L OH"
```

**DET**  $\square$  {POS|NEG|SAM}

Selects the detection mode for the active channel. (Spectrum analyzer only) (POS PEAK, NEG PEAK, SAMPLE under Meas)

| Parameter | Description        |
|-----------|--------------------|
| POS       | Positive Detection |
| NEG       | Negative Detection |
| SAM       | Sample Detection   |

■ Query Response

{POS|NEG|SAM} <new line><END>

■ Equivalent SCPI Command

:SENSe:DETEctor[:FUNction]  $\square$  {POSitive|NEGative|SAMple}

■ Example

```
OUTPUT 717;"DET POS"
```

**DFLT**

Returns the printing parameters to their default values. (DEFAULT SETUP under Copy; No query)

The table below lists the default values.

| Command   | Default value | Unit |
|-----------|---------------|------|
| DPI       | 75            | dpi  |
| FORMFEED  | ON            |      |
| LANDSCAPE | OFF           |      |
| LMARG     | 1.0           | inch |
| TMARG     | 1.0           | inch |
| SKEY      | OFF           |      |

■ Equivalent SCPI Command

:HCOPy:DEFault

## DFLT

### DHOLD□{OFF|MAX|MIN}

Selects the data hold operation. When the format is changed, the value held is initiated.

(HOLD: OFF, MAX, MIN under **Display**)

| Parameter | Description                       |
|-----------|-----------------------------------|
| OFF       | Data hold operation is turned off |
| MAX       | Maximum data hold                 |
| MIN       | Minimum data hold                 |

#### ■ Query Response

{OFF|MAX|MIN} <new line><END>

#### ■ Equivalent SCPI Command

DHOLD□OFF :CALCulate:AVERage:STATe□OFF

DHOLD□MAX :CALCulate:AVERage:TYPE□MAXimum  
:CALCulate1:AVERage:STATe□ON

DHOLD□MIN :CALCulate:AVERage:TYPE□MINimum  
:CALCulate1:AVERage:STATe□ON

#### ■ Example

```
OUTPUT 717;"DHOLD MAX"
```

```
OUTPUT 717;"DHOLD?"
```

```
ENTER 717;A$
```

```
OUTPUT 717;":CALC:AVER:TYPE MAX"
```

```
OUTPUT 717;":CALC:AVER:STAT ON"
```

```
OUTPUT 717;":CALC:AVER:TYPE?"
```

```
ENTER 717;A$
```

```
OUTPUT 717;":CALC:AVER:STAT?"
```

```
ENTER 717;A
```

### DISA□{ALLI|HIHB|ALLB|BASS}

Selects the display allocation mode. (DISPLAY ALLOCATION under **Display**)

| Parameter | Description                                  |
|-----------|----------------------------------------------|
| ALLI      | All instrument                               |
| HIHB      | Half instrument and half HP Instrument BASIC |
| ALLB      | All HP Instrument BASIC                      |
| BASS      | HP Instrument BASIC status                   |

- Query Response

{ALLI|HIHB|ALLB|BASS} <new line><^END>

- Equivalent SCPI Command

```
DISA:ALLI      :DISPlay[:WINDow]:ALLocation:INSTRument
DISA:HIHB     :DISPlay[:WINDow]:ALLocation:HIHB
DISA:ALLB     :DISPlay[:WINDow]:ALLocation:BASic
DISA:BASS     :DISPlay[:WINDow]:ALLocation:BSTatus
```

- Example

```
OUTPUT 717;"DISA HIHB"
OUTPUT 717;"DISA?"
ENTER 717;A$
```

## DISECIRC

Displays the equivalent circuit models. (SELECT EQV CKT [A] under **Display**); Impedance analyzer only)

| Parameter | Description                                         |
|-----------|-----------------------------------------------------|
| OFF or 0  | Turns off the equivalent circuit parameter display. |
| ON or 1   | Turns on the equivalent circuit parameter display.  |

- Query Response

{0|1} <new line><^END>

- Equivalent SCPI Command

```
:DISPlay[:WINDow]:TEXT19:STATeL{OFF|ON|0|1}
```

## DISECPARA {OFF|ON|0|1}

Displays the equivalent circuit parameters. (DISP EQV PARM [ON] or [OFF] under **Display**); Impedance analyzer only)

| Parameter | Description                                         |
|-----------|-----------------------------------------------------|
| OFF or 0  | Turns off the equivalent circuit parameter display. |
| ON or 1   | Turns on the equivalent circuit parameter display.  |

- Query Response

{0|1} <new line><^END>

- Equivalent SCPI Command

```
:DISPlay[:WINDow]:TEXT18:STATeL{OFF|ON|0|1}
```

**DISECPARA {OFF|ON|0|1}**

**DISF□{DOS|LIF}**

Selects the disk format (LIF or DOS) to be used when initializing a new disk. (FORMAT [ ] under **Save**); No equivalent SCPI command)

| Parameter | Description                  |
|-----------|------------------------------|
| DOS       | Disk Operating System format |
| LIF       | Logical Interchange format   |

■ Query Response

{DOS|LIF} <new line><END>

■ Example

OUTPUT 717;"DISF DOS"

**DISL**

Displays the list sweep table on the display. (DISPLAY LIST under **Copy**); No query)

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT{12|13}:PAGE□1  
:DISPlay[:WINDow]:TEXT{12|13}:STATe□{ON|1}

(TEXT12 for the "start & stop" format; TEXT13 for the "center & span" format)

**DISLLIST**

Displays the limit testing table on the display. (DISPLAY LIST under **Copy**); No query)

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT{14|15}:PAGE□1  
:DISPlay[:WINDow]:TEXT{14|15}:STATe□{ON|1}

(TEXT14 for the "upper & lower" format; TEXT15 for the "middle & delta" format)

**DISMAMP□{UL|MD}**

Selects the amplitude format to display the limit testing table to list on the screen. (DISP MODE: UPR & LWR, MID & DLT under **Copy**); No equivalent SCPI command)

| Parameter | Description             |
|-----------|-------------------------|
| UL        | Upper and lower format  |
| MD        | Middle and delta format |

■ Query Response

{UL|MD} <new line><END>

- Example

```
OUTPUT 717;"DISMAMP UL"
OUTPUT 717;"DISMAMP?"
ENTER 717;A$
```

## DISMPRM{STSP|CTSP}

Selects the sweep parameter range format to display the list sweep table on the screen.  
(DISP MODE: ST & SP, CTR & SPAN under **Copy**; No equivalent SCPI command)

| Parameter | Description            |
|-----------|------------------------|
| STSP      | Start and stop format  |
| CTSP      | Center and span format |

- Query Response

```
{STSP|CTSP} <new line><END>
```

- Example

```
OUTPUT 717;"DISMPRM STSP"
```

## DISP{DATA|MEMO|DATM}

Selects the display trace type. (DISPLAY: DATA, MEMORY, DATA and MEMORY under **Display**)

| Parameter | Description                    |
|-----------|--------------------------------|
| DATA      | Current data trace             |
| MEMO      | Memory trace                   |
| DATM      | Current data and memory traces |

- Query Response

```
{DATA|MEMO|DATM} <new line><END>
```

- Equivalent SCPI Command

```
DISPDATA :DISPlay[:WINDow]:TRACe1:STATe{ON|1}
           :DISPlay[:WINDow]:TRACe2:STATe{OFF|0}

DISPMEMO :DISPlay[:WINDow]:TRACe1:STATe{OFF|0}
           :DISPlay[:WINDow]:TRACe2:STATe{ON|1}

DISPLDATM :DISPlay[:WINDow]:TRACe1:STATe{ON|1}
           :DISPlay[:WINDow]:TRACe2:STATe{ON|1}
```

- Example

```
OUTPUT 717;"DISP DATA"
OUTPUT 717;":DISP:TRAC1:STAT ON"
OUTPUT 717;":DISP:TRAC2:STAT OFF"
```

**DISP** {DATA|MEMO|DATM}

**DMKR** {ON|FIX|TRAC|OFF}

Displays the  $\Delta$ marker (ON, FIX, TRAC) at the point of the marker and the marker mode changes to the  $\Delta$ mode. Erases (OFF) the  $\Delta$ marker and the  $\Delta$ mode is turned off. ( **$\Delta$ MKR**, **FIXED  $\Delta$ MKR**, **TRACKING  $\Delta$ MKR**,  **$\Delta$ MODE OFF** under **Marker**)

| Parameter | Description                                                                                             |
|-----------|---------------------------------------------------------------------------------------------------------|
| ON        | Puts the $\Delta$ marker on a current position of the marker.                                           |
| FIX       | Sets a user-specified fixed reference marker.                                                           |
| TRAC      | Puts a $\Delta$ marker at the present active marker position and turns on the tracking $\Delta$ marker. |
| OFF       | Turns off the $\Delta$ mode.                                                                            |

■ Query Response

{ON|FIX|TRAC|OFF} <new line><END>

■ Equivalent SCPI Command

DMKRLON :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative{ON|1}  
:DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative:REFerenceMARKer

DMKRLFIX :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative{ON|1}  
:DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative:REFerenceFIXed

DMKRLTRAC :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative{ON|1}  
:DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative:REFerenceTRACked

DMKROFF :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:RELative{OFF|0}

(TRACe[1] for the data trace; TRACe2 for the memory trace)

■ Example

OUTPUT 717;"DMKR ON"  
OUTPUT 717;":DISP:TRAC:MARK:REL ON"  
OUTPUT 717;":DISP:TRAC:MARK:REL:REF MARK"

**DMKRAUV** <numeric>

Sets the auxiliary amplitude value of the fixed  $\Delta$ marker. This command is used with a polar, Smith, or admittance chart. (Network and impedance analyzer only) ( **$\Delta$ MKR AUX VALUE** under **Marker**)

| Parameter | Range             | Unit |
|-----------|-------------------|------|
| <numeric> | -500000 to 500000 |      |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:REFerence:Y2{numeric}

■ Example

OUTPUT 717;"DMKRAUV 0"



**DMKRPRM**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**|**DBM**]

Sets the sweep parameter value of the  $\Delta$ marker. (**DMKR SWP PRM** under **Marker**)

| Parameter              | Range                     | Unit                          |
|------------------------|---------------------------|-------------------------------|
| <i>&lt;numeric&gt;</i> | Start value to stop value | Hz (frequency)<br>dBm (power) |

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:REFerence:X  $\square$  *<numeric>*

**DMKRVAL**  $\square$  *<numeric>*

Sets the amplitude value of the fixed  $\Delta$ marker. (**DMKR VALUE** under **Marker**)

| Parameter              | Range                           | Format                         |
|------------------------|---------------------------------|--------------------------------|
| <i>&lt;numeric&gt;</i> | -500 to 500 (spectrum analyzer) | (dBm, dB $\mu$ V, dBV formats) |
| <i>&lt;numeric&gt;</i> | -500 to 500 (network analyzer)  | (Log magnitude format)         |
| <i>&lt;numeric&gt;</i> | -500k to 500k                   |                                |

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:REFerence:Y1  $\square$  *<numeric>*

**DONE**

Completes the measurement of the selected standard calibration. (Network and impedance analyzer only) (**DONE: RESPONSE** under **Cal**). When Type-N calkits or user calkit, **DONE: OPEN** **DONE: SHORT** under **Cal**. No query)

- Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE1

## DONE

### DPI $\square$ *<numeric>*

Specifies the printing resolution value for the printer. (DPI under Copy)

| Parameter              | Range     | Unit |
|------------------------|-----------|------|
| <i>&lt;numeric&gt;</i> | 75 to 600 | dpi  |

#### ■ Query Response

{*numeric*}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

#### ■ Equivalent SCPI Command

:HCOpy:DRIVer:DPI  $\square$  *<numeric>*

## DSKEY

Disables the front panel keys and the rotary knob. To enable the keys and knob again, send the ENKEY command. (No query for the Simple command)

#### ■ Equivalent SCPI Command

:SYSTem:KLOCk  $\square$  {1|ON}

#### ■ Example

```
OUTPUT 717;"DSKEY"
```

```
OUTPUT 717;":SYST:KLOC ON"
```

**DUAC**{OFF|ON|0|1}

Selects the display of both measurement channels or the active channel only.

(**DUAL CHAN ON** off under **Display**)

| Parameter | Description         |
|-----------|---------------------|
| OFF or 0  | Active channel only |
| ON or 1   | Both channels       |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

When channel 1 is active,

```
DUACLON      :INSTRument[:SElect]LCH2
              :INSTRument:STATeLON
              :INSTRument[:SElect]LCH1
              :INSTRument:STATeLON
```

When channel 2 is active,

```
DUACLON      :INSTRument[:SElect]LCH1
              :INSTRument:STATeLON
              :INSTRument[:SElect]LCH2
              :INSTRument:STATeLON
```

```
DUACLOFF     :INSTRument[:SElect]L{CH1|CH2}
              :INSTRument:STATeLOFF
              :INSTRument[:SElect]L{CH1|CH2}
```

- Example

```
OUTPUT 717;"DUAC ON"
OUTPUT 717;":INST CH1"
OUTPUT 717;":INST:STAT ON"
OUTPUT 717;":INST CH2"
OUTPUT 717;":INST:STAT ON"
```

**EDITDONE**

Completes editing the frequency sweep list. (**LIST DONE** under **Sweep**); No query)

- Equivalent SCPI Command

```
:SENSe:LIST:SAVE
```

**EDITLIML**

Begins editing the limit line table. (**EDIT LIMIT LINE** under **System**); No query; No equivalent SCPI command)

## EDITLIML

## EDITLIST

Begins editing the frequency sweep list. (**EDIT LIST** under **Sweep**); No query; No equivalent SCPI command)

## ELED<numeric>[S|MS|US|NS|PS|FS]

Adjusts the electrical delay to balance the phase of the DUT. (Network analyzer only)  
(**ELECTRICAL DELAY** under **Scale Ref**)

| Parameter | Range     | Unit |
|-----------|-----------|------|
| <numeric> | -10 to 10 | s    |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:SENSe:CORRection:EDELay2<numeric>

## ENKEY

Reenables the front panel keys and the rotary knob that have been disabled by the DSKEY command. (No query for the Simple command)

### ■ Equivalent SCPI Command

SYSTem:KLOCKL{OFF|0}

### ■ Example

OUTPUT 717;"ENKEY"

OUTPUT 717;":SYST:KLOC OFF"

## EQUC<CIR>{A|B|C|D|E}

Selects the equivalent circuit. (**SELECT EQV CKT**  under **Display**). Impedance analyzer only)

| Parameter | Description                    |
|-----------|--------------------------------|
| CIRA      | For coils with high core loss. |
| CIRB      | For coils and resistance.      |
| CIRC      | For high-value resistors.      |
| CIRD      | For capacitors.                |
| CIRE      | For resonators.                |

### ■ Query Response

CIR{A|B|C|D|E}<new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:EPARameters:CIRCuit<A|B|C|D|E>

### ■ Example

OUTPUT @Hp4396;"EQUC CIRA"

**EQUC0?□<numeric>**

Returns a  $C_0$  at the specified frequency. For more information, see “EQUC0? *value*” in Appendix I. (No equivalent SCPI command; Network analyzer only)

| Parameter | Range                              | Unit |
|-----------|------------------------------------|------|
| <numeric> | 0 to $1.82 \times 10^9$ (= 1.82 G) | Hz   |

- Query Response

<numeric><new line><END>

**EQUCPARA?**

Executes six elements equivalent circuit analysis of a crystal resonator, and outputs parameters. For more information, see “EQUCPARA?” in Appendix I. (No equivalent SCPI command; Network analyzer only)

- Query Response

See “EQUCPARA?” in Appendix I.

**EQUCPARS?**

Executes six elements equivalent circuit analysis of a crystal resonator, and outputs parameters. For more information, see “EQUCPARS?” in Appendix I. (No equivalent SCPI command; Network analyzer only)

- Query Response

See “EQUCPARS?” in Appendix I.

**EQUCPARS4?**

Executes four elements equivalent circuit analysis of a crystal resonator, and outputs parameters. For more information, see “EQUCPARS4?” in Appendix I. (No equivalent SCPI command; Network analyzer only)

- Query Response

See “EQUCPARS4?” in Appendix I.

**EQUM?□<numeric>**

Specifies how many points are used for an approximation of a admittance circle for EQUCPARA? and EQUCPARS? equivalent circuit analysis commands for the crystal resonator. EQUCPARA? (or EQUCPARS?) thins the measured points out for the specified points, then make circle approximation. When the EQUM parameter is set greater than the number of points, EQUCPARA? (or EQUCPARS?) uses all points for the circle approximation. Default value is 8. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Network analyzer only)

| Parameter | Range    | Unit |
|-----------|----------|------|
| <numeric> | 2 to 801 | N/A  |

- Query Response

<numeric><new line><END>

**EQU?**  $\square$   $\langle$ numeric $\rangle$

## ESB?

Outputs the Event Status register B (Instrument Event Status register) value. (Query Only)

### ■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

### ■ Equivalent SCPI Command

:STATus:INSTRument[:EVENT]?

**ESNB**  $\square$   $\langle$ numeric $\rangle$

Enables the bits of Event Status register B (Instrument Event Status register).

| Parameter                   | Range                                                                          | Unit |
|-----------------------------|--------------------------------------------------------------------------------|------|
| $\langle$ numeric $\rangle$ | Decimal expression of the contents of the register, 0 to 65535 ( $-2^{16}-1$ ) |      |

### ■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

### ■ Equivalent SCPI Command

:STATus:INSTRument:ENABLE  $\square$   $\langle$ numeric $\rangle$

**EXPP**  $\square$  {OFF|ON|0|1}

Turns on and off the expanded phase display. (EXP PHASE on OFF under **Format**); Impedance analyzer only)

| Parameter | Description                           |
|-----------|---------------------------------------|
| OFF or 0  | Turns off the expanded phase display. |
| ON or 1   | Turns on the expanded phase display.  |

### ■ Query Response

{0|1}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

### ■ Equivalent SCPI Command

EXPP  $\square$  OFF :CALCulate:MATH1:STATe  $\square$  OFF  
:CALCulate:FORMat  $\square$  PHASe

EXPP  $\square$  ON :CALCulate:MATH1:STATe  $\square$  OFF  
:CALCulate:FORMat  $\square$  UPHASe

**FIXT** {NONE|HP16191|HP16192|HP16193|HP16194|USED}

**FILC** <string1>, <string2>, <string3>, <string4>

Copies files. (COPY FILE under Save); No query)

| Parameter | Description                                          |
|-----------|------------------------------------------------------|
| <string1> | Source file name                                     |
| <string2> | Source device name ("DISK" or "MEMORY") <sup>1</sup> |
| <string3> | Destination file name                                |
| <string4> | Destination device name ("DISK" or "MEMORY")         |

<sup>1</sup> "DISK" for the built-in flexible disk drive; "MEMORY" for the RAM disk memory.

■ Equivalent SCPI Command

:MMemory:COPIE <string1>, <string2>, <string3>, <string4>

■ Example

```
OUTPUT @Hp4396;"FILC ""DAT1.TXT"",""MEMORY"",""DAT1.TXT"",""DISK""
```

```
OUTPUT @Hp4396;":MMEM:COPIE ""DAT1.TXT"",""MEMORY"",""DAT1.TXT"",""DISK""
```

**FIXE** <numeric>

Sets the electrical length of the fixture. (DEFINE EXTENSION under Meas); Impedance analyzer only.)

| Parameter | Range     | Unit |
|-----------|-----------|------|
| <numeric> | -10 to 10 | m    |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SYSTEM:FIXTURE:DISTANCE <numeric>

**FIXKDONE**

Terminates the user fixture setting. (DONE under Meas); No query; Impedance analyzer only.)

■ Equivalent SCPI Command

:SYSTEM:FIXTURE:SAVE

**FIXT** {NONE|HP16191|HP16192|HP16193|HP16194|USED}

Specifies the fixture in use in order to select which electrical length (recorded in the analyzer) is to be used. (FIXTURE:NONE, HP16191, HP16192, HP16193, HP16194, USED under Meas SELECT FIXTURE; Impedance analyzer only.)

■ Query Response

{NONE|HP16191|HP16192|HP16193|HP16194|USED} <new line><END>

■ Equivalent SCPI Command

**FIXT** {NONE|HP16191|HP16192|HP16193|HP16194|USED}

:SYSTem:FIXTure {NONE|HP16191|HP16192|HP16193|HP16194|USED}

**FMT** <parameter>

Selects the display format. (FORMAT: LOG MAG, PHASE, DELAY, SMITH [Re Im], POLAR [Re Im], LIN MAG, SWR, FORMAT: REAL, IMAGINARY, EXPANDED PHASE, ADMITTANCE [Re Im], FORMAT: SPECTRUM, NOISE, LIN Y-AXIS, LOG Y-AXIS, COPLEX PLANE under (Format))

| Parameter | Description                                                  |
|-----------|--------------------------------------------------------------|
| LOGM      | Log magnitude format (Network analyzer only)                 |
| PHAS      | Phase format (Network analyzer only)                         |
| DELA      | Delay format (Network analyzer only)                         |
| SMITH     | Smith chart format (Network and impedance analyzer only)     |
| POLA      | Polar chart format (Network and impedance analyzer only)     |
| LINM      | Linear magnitude format (Network analyzer only)              |
| SWR       | SWR format (Network analyzer only)                           |
| REAL      | Real format (Network analyzer only)                          |
| IMAG      | Imaginary format (Network analyzer only)                     |
| EXPP      | Expanded phase format (Network analyzer only)                |
| ADMIT     | Admittance Smith chart (Network and impedance analyzer only) |
| SPECT     | Spectrum measurement (Spectrum analyzer only)                |
| NOISE     | Noise level measurement (Spectrum analyzer only)             |
| LINY      | Linear Y-axis measurement (Impedance analyzer only)          |
| LOGY      | Log Y-axis measurement (Impedance analyzer only)             |
| COMP      | Complex plane measurement (Impedance analyzer only)          |

■ Query Response

{LOGM|PHAS|DELA|SMITH|POLA|LINM|SWR|REAL|IMAG|EXPP|ADMIT|SPECT|NOISE|LINY|LOGY|COMP} <new line><END>

■ Equivalent SCPI Command

FMT:LOGM :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:MLGARithmetic

FMT:PHAS :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:PHASE

FMT:DELA :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:GDELAY

FMT:SMITH :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:SMITH  
:CALCulate:FORMat:COMPLEX

FMT:POLA :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:POLAR  
:CALCulate:FORMat:COMPLEX

FMT:LINM :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:MLLINEAR

FMT:SWR :DISPlay[:WINDow]:TRACe{[1]|2}:GRATICule:FORMat:RECTangle  
:CALCulate:FORMat:SWR



```

FMT\LREAL      :DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat\LRECTangle
                :CALCulate:FORMat\LREAL

FMT\LIMAG      :DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat\LRECTangle
                :CALCulate:FORMat\LIMAGinary

FMT\LEXPP      :DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat\LRECTangle
                :CALCulate:FORMat\LUPHase

FMT\LADMIT     :DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat\LADMittance
                :CALCulate:FORMat\LCOMPLEX

FMT\USPECT     :SENSe:FUNcTion\L"POWer\L{1|2|3|4}"

FMT\UINOISE    :SENSe:FUNcTion\L"POWer{1|2|3|4}:PSDdensity"

FMT\LINLY      DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat RECTangle
                DISPlay[:WINDow]:TRACe{[1]|2}:Y::SPACing LINear

FMT\LLOGY      DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat RECTangle
                DISPlay[:WINDow]:TRACe{[1]|2}:Y::SPACing LOGarithmic

FMT\LCOMP      DISPlay[:WINDow]:TRACe{[1]|2}:GRATicule:FORMat CPLane
                CALCulate:FORMat:COMPLEX

                (TRACe[1] for the data trace; TRACe2 for the memory trace.)

```

#### ■ Example

```

OUTPUT @Hp4396;"FMT LOGM"

OUTPUT @Hp4396;"FMT?"
ENTER @Hp4396;A$

OUTPUT @Hp4396;":DISP:TRAC:GRAT:FORM RECT"
OUTPUT @Hp4396;":CALC:FORM MLOG"

OUTPUT @Hp4396;":DISP:TRAC:GRAT:FORM?"
ENTER @Hp4396;A$
OUTPUT @Hp4396;":CALC:FORM?"
ENTER @Hp4396;B$

```

## FORM2

Sets the IEEE 32-bit floating point format to transfer trace data via HP-IB. See Appendix H for more information. (No query for the Simple command)

#### ■ Equivalent SCPI Command

```
:FORMat[:DATA]\LREAL,32
```

## FORM3

Sets the IEEE 64-bit floating point format to transfer the trace data via HP-IB. See Appendix H for more information. (No query for the Simple command)

#### ■ Equivalent SCPI Command

```
:FORMat[:DATA]\LREAL,64
```

### FORM3

### FORM4

Sets the ASCII transfer format to transfer the trace data via HP-IB. See Appendix H for more information. (No query for the Simple command)

- Equivalent SCPI Command

:FORMat[:DATA]␣ASCII

### FORM5

Sets MS-DOS format to transfer the trace data via HP-IB. See Appendix H for more information. (No query for the Simple command)

- Equivalent SCPI Command

:FORMat[:DATA]␣PACKed,32

### FORMFEED␣{OFF|ON|0|1}

Sets the printer ON or OFF for delivering printed paper each time printing an entire screen is finished. When the paper orientation is set to Landscape, the setting by this FORMFEED command will not take effect and the printer delivers printed paper screen by screen.

| Parameter | Description                    |
|-----------|--------------------------------|
| OFF or 0  | Does not deliver printed paper |
| ON or 1   | Delivers printed paper         |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:HCOpy:DRIVer:FORMFeed␣{OFF|ON|0|1}

### FREO

Blanks the displayed frequency notation for security purposes. Frequency notation cannot be restored except by sending the :SYSTem:PRESet or \*RST command, or by turning the power OFF and ON. (FREQUENCY BLANK under Display)

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:DISPlay:ANNotation:FREQuency␣{OFF|0}  
:SYSTem:SECurity[:STATe]␣{ON|1}

### FULS

Sets the SPAN to the maximum range. (FULL SPAN under Span); No query)

- Equivalent SCPI Command

:SENSe:FREQuency:SPAN:FULL (frequency) or  
:SOURce:POWer:SPAN:FULL (power)

**FWDI**

Measures  $S_{21}$  isolation. (Network analyzer only) (FWD ISOL'N ISOL'N STD under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire] FWDI
```

**FWDM**

Measures  $S_{11}$  load match. (Network analyzer only) (FWD. MATCH THRU under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire] FWDM
```

**FWDT**

Measures  $S_{21}$  frequency response. (Network analyzer only) (FWD. TRANS. THRU under **Cal**); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire] FWDT
```

**GATCTL {LEV|EDG}**

Specifies the gate trigger mode. (Spectrum analyzer only) (Option 1D6 only)

(GATE CTL: LEVEL, EDGE under **Trigger**)

| Parameter | Description             |
|-----------|-------------------------|
| LEV       | Level gate trigger mode |
| EDG       | Edge gate trigger mode  |

- Query Response

```
{LEV|EDG} <new line><END>
```

- Equivalent SCPI Command

```
GATCTL LEV :SENSe:SWEep:GATed:TRIGger LEV
```

```
GATCTL EDG :SENSe:SWEep:GATed:TRIGger EDG
```

## GATCTL{LEV|EDG}

## GATDLY{<numeric>}[US|MS|S]

Sets the gate delay. (Spectrum analyzer only) (Option 1D6 only) (**GATE DELAY** under **Trigger**)

| Parameter | Range                        | Unit |
|-----------|------------------------------|------|
| <numeric> | 0.000002 (= 2 $\mu$ ) to 3.2 | s    |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:SENSe:SWEep:GATed:DELay{<numeric>}

### ■ Example

```
OUTPUT @Hp4396;"GATDLY 10US"
```

## GATLEN{<numeric>}[US|MS|S]

Sets the gate length. (Spectrum analyzer only) (Option 1D6 only) (**GATE LENGTH** under **Trigger**)

| Parameter | Range                        | Unit |
|-----------|------------------------------|------|
| <numeric> | 0.000002 (= 2 $\mu$ ) to 3.2 | s    |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:SENSe:SWEep:GATed:LENGth{<numeric>}

### ■ Example

```
OUTPUT @Hp4396;"GATLEN 100US"
```

```
OUTPUT @Hp4396;":SENS:SWE:GAT:LENG 100US"
```

## GRODAPER{<numeric>}[PCT]

Sets the aperture for the group delay measurement as a percentage of the span. (Network analyzer only) (**GROUP DELY APERTURE** under **Bw/Avg**)

| Parameter | Range                                 | Unit |
|-----------|---------------------------------------|------|
| <numeric> | 0.25 to 20 (of span) (simple command) | %    |
| <numeric> | 0.0025 to 0.2 (SCPI command)          |      |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:GDAPerture:APERTure{<numeric>}

**HOLD**

Freezes the data trace on the display. the analyzer stops sweeping and taking data.

(**SWEEP: HOLD** under **Trigger**)

- Query Response

{0|1} <new line><END>

| Parameter | Description              |
|-----------|--------------------------|
| 0         | Sweeping (not hold mode) |
| 1         | Hold mode                |

- Equivalent SCPI Command

```
:INITiate:CONTinuous{OFF|0}
:ABORt
```

**INID**

Initializes the disk in the flexible disk drive or the RAM disk memory. (**INITIALIZE** under **Save**); No query) Floppy disks can be initialized in the 2HD format only.

- Equivalent SCPI Command

```
:MMEMory:INITialize<string (msus)>,{LIF|DOS}
```

| Parameter       | Description                                                                              |
|-----------------|------------------------------------------------------------------------------------------|
| <string (msus)> | "DISK" for the internal flexible disk drive<br>"MEMORY" for the internal RAM disk memory |

- Example

```
OUTPUT @Hp4396;":MMEM:INIT ""DISK"",DOS"
```

**INP8IO?**

Inputs data from the 4-bit parallel input to the analyzer, and outputs the data to a controller. (Query only)

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

```
:SYSTEM:COMMunicate:PARAllel[:RECEive]:DATA?
```

## INP8IO?

### INPUCALC{1-12} □ <numeric (1)>, <numeric (2)>, ... , <numeric (n)>

Stores the measurement calibration error coefficient set of real/imaginary pairs input via HP-IB into the analyzer's memory. The command definition changes to INPUCALC{1-3} when used in the impedance analyzer. See Appendix F for calibration array assignments. (Network and impedance analyzer only; No query)

| Parameter | Description                                   |
|-----------|-----------------------------------------------|
| <numeric> | Complex number (Data format: real, imaginary) |

#### ■ Equivalent SCPI Command

:DATA[:DATA] □ UCCO{1-12}, {<numeric (1)>, <numeric (2)>, ... , <numeric(n)> | <block>}

#### ■ Example

```
DIM A(1:201,1:2)          NOP: 201
OUTPUT @Hp4396;"INPUCALC1 ";A(*)  Set the measurement calibration error coefficient.

DIM A(1:201,1:2)          NOP: 201
OUTPUT @Hp4396;":DATA CC01,";A(*)  Set the measurement calibration error coefficient.
```

### INPUCALK □ <block>

Stores the calibration kit data transmitted by the OUTPCALK? command. (Network and impedance analyzer only) (No query)

| Parameter | Description                                                                   |
|-----------|-------------------------------------------------------------------------------|
| <block>   | Block data (Data format: HP 4396B internal format (714 bytes of binary data)) |

#### ■ Equivalent SCPI Command

:DATA[:DATA] □ UCKIT, {<block> | <numeric (1)>, <numeric (2)>, ... , <numeric (n)>}

#### ■ Example

```
OUTPUT @Hp4396;"INPUCALK ";A$
OUTPUT @Hp4396;":DATA CKIT,";A$
```

### INPUCOMC{1|2|3} □ <numeric>

Inputs data into the fixture compensation coefficient arrays. (No query; Impedance analyzer only.)

The analyzer handles a reflection coefficient data for the intermediate processing. Thus, the fixture compensation is performed for the reflection coefficient as follows:

$$\Gamma = \frac{\Gamma_M - A}{B \times (\Gamma_M - A) + C}$$

Where,

$A$ ,  $B$ , and  $C$      Fixture compensation coefficients. (complex)  
 $\Gamma_M$              Measured reflection data. (converted from V and I.)  
 $\Gamma$                  Corrected reflection data.

**INPUDATA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$ 

By using this command, you can change the contents of the fixture compensation coefficient arrays.

| Parameter                   | Description                                   |
|-----------------------------|-----------------------------------------------|
| 1                           | coefficient A                                 |
| 2                           | coefficient B                                 |
| 3                           | coefficient C                                 |
| $\langle$ numeric $\rangle$ | Complex number (Data format: real, imaginary) |

- Equivalent SCPI Command

```
:DATA[:DATA]  $\square$  CMP{1|2|3}, { $\langle$ numeric $\rangle$ 
```

- Example

```
OUTPUT @Hp4396;"INPUCOMC1 ";Dat(*)
```

```
OUTPUT @Hp4396;"DATA CMP1,";Dat(*)
```

**INPUD**

Executes a 3-term calibration by using real data which are set with INPULOAA, INPUOPEA, and INPUSHOA commands. (No equivalent SCPI command; No query; Network analyzer only)

**INPUDATA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$ 

Inputs the error corrected data. (No query)

| Parameter                   | Description                                                                                                     |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------|
| $\langle$ numeric $\rangle$ | Complex number (Data format: real, imaginary) for the Network analyzer<br>Real number for the Spectrum analyzer |

- Equivalent SCPI Command

```
DATA[:DATA]  $\square$  DATA, { $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$  |  $\langle$ block $\rangle$ }
```

- Example

```
DIM A(1:201,1:2) Network Analyzer, NOP: 201
```

```
! Set the error corrected data.
```

```
OUTPUT @Hp4396;"INPUDATA ";A(*)
```

```
DIM A(1:201,1:2)
```

```
! Set the error corrected data.
```

```
OUTPUT @Hp4396;" :DATA DATA,";A(*)
```

**INPUDDATA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$

**INPUDDTRC**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$

Inputs data to DATA TRACE memory. (No query)

| Parameter                   | Description                                                                                                     |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------|
| $\langle$ numeric $\rangle$ | Complex number (Data format: real, imaginary) for the Network analyzer<br>Real number for the Spectrum analyzer |

■ Equivalent SCPI Command

:TRACe[:DATA]LDTR, { $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$  |  $\langle$ block $\rangle$ }

■ Example

```
DIM A(1:201,1:2)           Network analyzer, NOP: 201
! Set the trace data.
OUTPUT @Hp4396;"INPUDDTRC ";A(*)

DIM A(1:201,1:2)
! Set the trace data.
OUTPUT @Hp4396;":TRAC DTR,";A(*)
```

**INPUDDLOAA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$

Inputs the real LOAD data array for a 3-term calibration. (No equivalent SCPI command; No query; Network analyzer only)

| Parameter                   | Description                                   |
|-----------------------------|-----------------------------------------------|
| $\langle$ numeric $\rangle$ | Complex number (Data format: real, imaginary) |

**INPUDDOPEA**  $\square$   $\langle$ numeric (1) $\rangle$ ,  $\langle$ numeric (2) $\rangle$ , ... ,  $\langle$ numeric (n) $\rangle$

Inputs the real OPEN data array for a 3-term calibration. (No equivalent SCPI command; No query; Network analyzer only)

| Parameter                   | Description                                   |
|-----------------------------|-----------------------------------------------|
| $\langle$ numeric $\rangle$ | Complex number (Data format: real, imaginary) |



**INPURAW{1-4}** <numeric (1)>, <numeric (2)>, ... , <numeric (n)>

Inputs raw data. The command definition changes to INPURAW{1} when used in the impedance analyzer and spectrum analyzer. (No query)

| Parameter | Description                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------|
| <numeric> | Complex number (Data format: real, imaginary) for the Network analyzer<br>Real number for the Spectrum analyzer |

- Equivalent SCPI Command

```
:DATA[:DATA] RAW{1-4}, {<numeric (1)>, <numeric (2)>, ... , <numeric (n)> | <block>}
```

- Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
! Set the raw data.
OUTPUT @Hp4396;"INPURAW1 ";A(*)

DIM A(1:201,1:2)
! Set the raw data.
OUTPUT @Hp4396;":DATA RAW1,";A(*)
```

**INPUSHOA** <numeric (1)>, <numeric (2)>, ... , <numeric (n)>

Inputs the real SHORT data array for a 3-term calibration. (No equivalent SCPI command; No query; Network analyzer only)

| Parameter | Description                                   |
|-----------|-----------------------------------------------|
| <numeric> | Complex number (Data format: real, imaginary) |

**INPZ{50|75}[OHM]**

Sets the input impedance. (Spectrum analyzer only) (INPUT Z under Cal)

- Query Response

```
{numeric} <new line> <END>
```

- Equivalent SCPI Command

```
:INPut:IMPedance <numeric>
```

- Example

```
OUTPUT @Hp4396;"INPZ 50"
```

**INPZ**□{50|75}[OHM]

**INTE**□<numeric>[PCT]

Sets the display intensity as a percent of the brightest setting. (INTENSITY under **Display**)

| Parameter | Range                     | Unit |
|-----------|---------------------------|------|
| <value>   | 0 to 100 (simple command) | %    |
| <value>   | 0 to 1 (SCPI command)     |      |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:DISPlay:BRIGhtness□<numeric>

**ISOD**

Completes isolation calibration. The error coefficients are calculated and stored. (Network analyzer only) (ISOLATION DONE under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE7

**ISOL**

Starts the isolation calibration. (Network analyzer only) (ISOLATION under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire]□ISOL2

**KEY**□<numeric>

Sends the key code for a key or a softkey on the front panel. This is equivalent to actually pressing a key. See Appendix G for key codes.

| Parameter | Description |
|-----------|-------------|
| <numeric> | 0 to 52     |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SYSTem:KEY□<numeric>

■ Example

OUTPUT @Hp4396;"KEY 8" *Equivalent to pressing **Chan 1***

**KITD**

Completes the procedure to define user cal kit. (Network analyzer only)  
 (KIT DONE (MODIFIED) under  $\square$ Cal); No query)

- Equivalent SCPI Command  
 :SENSE:CORRection:CKIT:SAVE  $\square$ ALL

**LABECOMK  $\square$  *<string>***

Modifies the label of user defined fixture compensation kit. (Impedance analyzer only)  
 (LABEL KIT under  $\square$ Cal); No query)

| Parameter             | Description         |
|-----------------------|---------------------|
| <i>&lt;string&gt;</i> | Up to 8 characters. |

- Equivalent SCPI Command (Query)  
 :SENSE:CORRection2:CKIT:LABel  $\square$  *<string>*
- Query Response  
 {numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$
- Example  
 OUTPUT @Hp4396;"LABECOMK ""NEW""

**LABEFIX  $\square$  *<string>***

Modifies the label of user defined test fixture. (LABEL FIXTURE under  $\square$ Meas  $\square$ FIXTURE  $\square$ );  
 Impedance analyzer only.)

| Parameter             | Description           |
|-----------------------|-----------------------|
| <i>&lt;string&gt;</i> | Up to ten characters. |

- Query Response  
*<string>*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$
- Equivalent SCPI Command  
 :SYSTEM:FIXTure:LABel  $\square$  *<string>*
- Example  
 OUTPUT @Hp4396;"LABEFIX ""NEW""

## **LABEFIX**□<string>

## **LABEFWD**{T|M}□<string>

Defines the label for the forward transmission (THRU) or the forward match (THRU) calibration. (Network analyzer only) (**LABEL: FWD, TRANS.**, **FWD, MATCH** under **Cal**); No query)

| Parameter | Description           |
|-----------|-----------------------|
| <string>  | Up to ten characters. |

### ■ Equivalent SCPI Command (Query)

**LABEFWDT**□<string> :SENSe:CORRection:CKIT:CLASs7:LABel□<string>

**LABEFWDM**□<string> :SENSe:CORRection:CKIT:CLASs9:LABel□<string>

### ■ Query Response

{*numeric*} <new line><END>

## **LABEIMP**{A|B|C}□<string>

Defines the label for the first class, second class, or the third class required for an impedance measurement calibration. (Impedance analyzer only) (**LABEL CLASS** under **Cal**); No query)

| Parameter | Description           |
|-----------|-----------------------|
| <string>  | Up to ten characters. |

### ■ Equivalent SCPI Command (Query)

**LABEIMPAL**□<string> :SENSe:CORRection:CKIT:CLASs13:LABel□<string>

**LABEIMPB**□<string> :SENSe:CORRection:CKIT:CLASs14:LABel□<string>

**LABEIMPC**□<string> :SENSe:CORRection:CKIT:CLASs15:LABel□<string>

### ■ Query Response

{*numeric*} <new line><END>

## **LABERES**{P|I}□<string>

Defines the label for the response, or the response and isolation calibration. (Network analyzer only) (**RESPONSE**, **RESPONSE & ISOL'N** under **Cal**); No query)

| Parameter | Description           |
|-----------|-----------------------|
| <string>  | Up to ten characters. |

### ■ Equivalent SCPI Command (Query)

**LABERESP**□<string> :SENSe:CORRection:CKIT:CLASs11:LABel□<string>

**LABERESI**□<string> :SENSe:CORRection:CKIT:CLASs12:LABel□<string>

### ■ Query Response

{*numeric*} <new line><END>

## LABES11{A|B|C}□□<string>

### ■ Example

```
OUTPUT @Hp4396;"LABERESP ""RESPONSE""
```

```
OUTPUT @Hp4396;":SENS:CORR:CKIT:CLAS11:LAB ""RESPONSE""
```

## LABEREV{T|M}□□<string>

Defines the label for reverse transmission (THRU) or the reverse match (THRU) calibration. (Network analyzer only) (REV.TRANS., REV.MATCH under **Cal**); No query)

| Parameter | Description           |
|-----------|-----------------------|
| <string>  | Up to ten characters. |

### ■ Equivalent SCPI Command (Query)

```
LABEREVT□□<string> :SENSe:CORRection:CKIT:CLASs8:LABel□□<string>
```

```
LABEREVM□□<string> :SENSe:CORRection:CKIT:CLASs10:LABel□□<string>
```

### ■ Query Response

```
{numeric} <new line><END>
```

## LABES11{A|B|C}□□<string>

Defines the label for the first class, the second class, or the third class required for an S<sub>11</sub> 1-port calibration. (Network analyzer only) (LABEL: S11A, S11B, S11C under **Cal**); No query)

| Parameter | Description           |
|-----------|-----------------------|
| <string>  | Up to ten characters. |

### ■ Equivalent SCPI Command (Query)

```
LABES11A□□<string> :SENSe:CORRection:CKIT:CLASs1:LABel□□<string>
```

```
LABES11B□□<string> :SENSe:CORRection:CKIT:CLASs2:LABel□□<string>
```

```
LABES11C□□<string> :SENSe:CORRection:CKIT:CLASs3:LABel□□<string>
```

### ■ Query Response

```
{numeric} <new line><END>
```

**LABES11**{A|B|C}␣<string>

**LABES22**{A|B|C}␣<string>

Defines the label for the first class, the second class, or the third class required for an S<sub>22</sub> 1-port calibration. (Network analyzer only) (LABEL: S22A, S22B, S22C under Cal); No query)

| Parameter | Description           |
|-----------|-----------------------|
| <string>  | Up to ten characters. |

■ Equivalent SCPI Command (Query)

LABES22A␣<string> :SENSe:CORRection:CKIT:CLASs4:LABel␣<string>

LABES22B␣<string> :SENSe:CORRection:CKIT:CLASs5:LABel␣<string>

LABES22C␣<string> :SENSe:CORRection:CKIT:CLASs6:LABel␣<string>

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT @Hp4396;"LABES22A ""OPENS""
```

```
OUTPUT @Hp4396;":SENS:CORR:CKIT:CLAS4:LAB ""OPENS""
```

**LABK**␣<string>

Defines a label for a new calibration kit. (Network and impedance analyzer only) (LABEL KIT under Cal); No query)

| Parameter | Description             |
|-----------|-------------------------|
| <string>  | Up to eight characters. |

■ Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:LABel␣<string>

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT @Hp4396;"LABK ""7mm""
```

```
OUTPUT @Hp4396;":SENS:CORR:CKIT:LAB ""7mm""
```

**LABS**□<string>

Defines a label for the standard. (Network and impedance analyzer only) (LABEL STD under **Cal**); No query)

| Parameter | Description           |
|-----------|-----------------------|
| <string>  | Up to ten characters. |

- Equivalent SCPI Command

```
:SENSe:CORRection:CKIT:STANdard:LABel□<string>
```

- Example

```
OUTPUT @Hp4396;"LABS ""SHORT""
```

```
OUTPUT @Hp4396;":SENS:CORR:CKIT:STAN:LAB ""SHORT""
```

**LANDSCAPE**□{OFF|ON|0|1}

Sets the orientation of paper landscape or not, using ON or OFF. This setting takes effect for printers which support printing paper placed in the landscape orientation. Setting the paper orientation mode will invalidate the setting by the FORMFEED command. (LANDSCAPE under **Copy**)

| Parameter | Description                                                        |
|-----------|--------------------------------------------------------------------|
| OFF or 0  | The orientation of paper is not set to Landscape. (Thus, Portrait) |
| ON or 1   | The orientation of paper is set to Landscape.                      |

- Query Response

```
{0|1} <new line><END>
```

- Equivalent SCPI Command

```
:HCOPY:DRIVER:LANDScape□{OFF|ON|0|1}
```

**LIMCLEL**

Clears all segments in the limit line. (CLEAR LIST YES under **System**); No query)

- Equivalent SCPI Command

```
:CALCulate:LIMit:CLEar
```

**LIMD**□<numeric>

Sets the limits an equal amount above and below a specified middle value, instead of setting upper and lower limits separately. (DELTA LIMITS under **System**)

| Parameter | Range        | Unit |
|-----------|--------------|------|
| <numeric> | 0 to 5000000 |      |

**LIMD**  $\square$  *<numeric>*

- Query Response  
*{numeric}* <new line><^END>
- Equivalent SCPI Command  
:CALCulate:LIMit:SEGment:DELTA  $\square$  *<numeric>*

## LIMEDONE

Completes editing the limit table. (**DONE** under **System**); No query

- Equivalent SCPI Command  
:CALCulate:LIMit:SAVE

**LIMIAMPO**  $\square$  *<numeric>*

Adds or subtracts an offset in amplitude value. (**AMPLITUDE OFFSET** under **System**)

| Parameter              | Range               | Unit |
|------------------------|---------------------|------|
| <i>&lt;numeric&gt;</i> | -5000000 to 5000000 |      |

- Query Response  
*{numeric}* <new line><^END>
- Equivalent SCPI Command  
:CALCulate:LIMit:OFFSet  $\square$  *<numeric>*

**LIMILINE**  $\square$  {OFF|ON|0|1}

Sets limit lines ON or OFF. (**LIMIT LINE ON off** under **System**)

| Parameter | Description     |
|-----------|-----------------|
| OFF or 0  | Limit lines OFF |
| ON or 1   | Limit lines ON  |

- Query Response  
{0|1} <new line><^END>
- Equivalent SCPI Command  
:CALCulate:LIMit:LINE  $\square$  {OFF|ON|0|1}
- Example  
OUTPUT @Hp4396;"LIMILINE ON"



**LIMIPRMO**<numeric>

Adds or subtracts an offset from the sweep parameter value. (**SWP PARAM OFFSET** under **System**)

| Parameter | Range                                                                             | Unit                         |
|-----------|-----------------------------------------------------------------------------------|------------------------------|
| <numeric> | -1.82×10 <sup>9</sup> (= -1.82 G) to 1.82×10 <sup>9</sup> (= 1.82 G)<br>-60 to 60 | Hz (frequency)<br>dB (power) |

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:CALCulate:LIMit:CONTRol:OFFSet<numeric>

**LIMITEST**{OFF|ON|0|1}

Sets the limit testing ON or OFF. (**LIMIT TEST ON off** under **System**)

| Parameter | Description       |
|-----------|-------------------|
| OFF or 0  | Limit testing OFF |
| ON or 1   | Limit testing ON  |

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:CALCulate:LIMit:STATe{OFF|ON|0|1}

**LIML**<numeric>

Sets the lower limit value for the segment. (**LOWER LIMIT** under **System**)

| Parameter | Range               | Unit |
|-----------|---------------------|------|
| <value>   | -5000000 to 5000000 |      |

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:LOWer<numeric>

**LIML**  $\lfloor$  *<numeric>*

**LIMM**  $\lfloor$  *<numeric>*

Sets the midpoint for delta limits. (**MIDDLE VALUE** under **System**)

| Parameter            | Range               | Unit |
|----------------------|---------------------|------|
| <i>&lt;value&gt;</i> | -5000000 to 5000000 |      |

■ Query Response

*{numeric}*  $\langle$  new line  $\rangle$   $\langle$  END  $\rangle$

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:MIDDLE $\lfloor$  *<numeric>*

**LIMPRM**  $\lfloor$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**|**GHZ**|**DBM**]

Sets the starting sweep parameter value of a segment, using entry block controls. (**SWP PARAM** under **System**)

| Parameter              | Range                                                                                 | Unit                          |
|------------------------|---------------------------------------------------------------------------------------|-------------------------------|
| <i>&lt;numeric&gt;</i> | 100000 (= 100 k) to $1.82 \times 10^9$ (= 1.82 G)<br>(Network and impedance analyzer) | Hz (frequency)                |
| <i>&lt;numeric&gt;</i> | 0 to $1.82 \times 10^9$ (= 1.82 G) (Spectrum analyzer)<br>-60 to 20                   | Hz (frequency)<br>dBm (power) |

■ Query Response

*{numeric}*  $\langle$  new line  $\rangle$   $\langle$  END  $\rangle$

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:CONTRol[:DATA]  $\lfloor$  *<numeric>*

**LIMSADD**

Adds a new segment to the end of the limit list. (**ADD** under **System**); No query)

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:ADD

**LIMSDEL**

Deletes a limit testing segment. (**DELETE** under **System**); No query)

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:DELete

**LIMSDON**

Terminates a limit segment definition. (**DONE** under **System**); No query)

- Equivalent SCPI Command

:CALCulate:LIMit:SEGment:SAVE

**LIMSEDI**□[<numeric>]

Specifies which limit segment in the table to edit. When you want to define or modify the values of the specified segment, you do not have to enter <numeric> (the segment number).

(**SEGMENT**, **EDIT** under **System**)

| Parameter | Description              |
|-----------|--------------------------|
| <numeric> | Segment number, 1 to 18. |

- Query Response

{numeric} <new line><^END>

- Equivalent SCPI Command

LIMSEDI□<numeric> :CALCulate:LIMit:SEGment□<numeric>  
(**SEGMENT**)

LIMSEDI□[<numeric>] :CALCulate:LIMit:SEGment:EDIT□<numeric> (No query)  
(**EDIT**)

**LIMU**□<numeric>

Sets the upper limit value for a limit testing segment. (**UPPER LIMIT** under **System**)

| Parameter | Range               | Unit |
|-----------|---------------------|------|
| <numeric> | -5000000 to 5000000 |      |

- Query Response

{numeric} <new line><^END>

- Equivalent SCPI Command

:CALCulate:LIMit:SEGment:UPPer□<numeric>

**LMAX?**□<numeric>

Outputs the *n*th peak value from the left of the analysis range. See "LMAX?" in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

| Parameter | Range    | Unit |
|-----------|----------|------|
| <numeric> | 1 to 801 |      |

- Query Response

### LMAX?□<numeric>

| Parameter | Description                                   |
|-----------|-----------------------------------------------|
| <numeric> | Complex number (Data format: real, imaginary) |

### LMARG□<numeric>

Specify the value for the left margin of printed paper. (**PRINT SETUP** , **LEFT MARGIN** under **Copy**)

| Parameter | Range  | Unit |
|-----------|--------|------|
| <numeric> | 0 to 5 | inch |

- Query Response  
{numeric} <new line><END>
- Equivalent SCPI Command  
:HCOPY:DRIVER:LEFTMarg:□<numeric>

### LMIN?□<numeric>

Outputs the *n*th negative peak value from the left of the analysis range. See "LMIN?" in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

| Parameter | Range    | Unit |
|-----------|----------|------|
| <numeric> | 1 to 801 |      |

- Query Response

| Parameter | Description                                   |
|-----------|-----------------------------------------------|
| <numeric> | Complex number (Data format: real, imaginary) |

### LISV

Displays a tabular listing of all the measured data points and their current values. (**LIST VALUES** under **Copy**); No query)

- Equivalent SCPI Command  
:DISPlay[:WINDow]:TEXT1:PAGE□1  
:DISPlay[:WINDow]:TEXT1:STATe□{ON|1}

**MKRTIME** [ ] {OFF|ON|0|1}

Sets the x-axis units to time, (the start point is zero and the stop point is the value of the sweep time). (**MKR TIME ON off** under **Utility**)

| Parameter | Description                            |
|-----------|----------------------------------------|
| OFF or 0  | Sets the x-axis to the sweep parameter |
| ON or 1   | Sets the x-axis to time                |

## ■ Query Response

{0|1} <new line><END>

## ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:UNIT:TIME [ ] {OFF|ON|0|1}

## ■ Example

```
OUTPUT @Hp4396;"MKRTIME ON"
```

**MKRVAL?**

Outputs the amplitude value of the measurement value at the marker position. See "Marker Readout" in Appendix H for the amplitude value of each display format. (Query only)

## ■ Query Response

{*numeric*} <new line><END>

## ■ Equivalent SCPI Command

:CALCulate:EVALuate:Y[1]:VALue1?

## ■ Example

```
OUTPUT @Hp4396;"MKRVAL?"
ENTER @Hp4396;A
```

**MKRZM**

Sets the sweep parameter center value of the destination channel to the sweep parameter value of the marker, and changes the sweep parameter span value of the destination channel to "sweep parameter span × zooming aperture." (**MKR ZOOM** under **Marker** →; No query)

## ■ Equivalent SCPI Command

:SENSe:FREQuency:SPAN [ ] MZAPerture (frequency) or  
:SOURce:POWer:SPAN [ ] MZAPerture (power)

**MODII**

Leads to the modify calibration kit menu, where a calibration kit can be user-modified. (Network and impedance analyzer only) (**MODIFY [ ]** under **Cal**); No query)

## ■ Equivalent SCPI Command

:SENSe:CORRection:CKIT:MODify

## MODII

## MODICOMK

Leads to the modify fixture compensation kit menu. (MODIFY [ ] under (Cal) COMPEN KIT [ ] ; No query; Impedance analyzer only.)

- Equivalent SCPI Command

:SENSe:CORRection2:CKIT:MODify

## MODIFX

Leads to the modify user fixture menu. (MODIFY [ ] under (Meas) FIXTURE [ ] ; No query; Impedance analyzer only.)

- Equivalent SCPI Command

:SYSTem:FIXTure:MODify

## MONDYEAR

Changes the displayed date to the "month:day:year" format. (DATE MODE: MonDayYear under (System))

- Query Response

{0|1} <new line><^END>

| Parameter | Description             |
|-----------|-------------------------|
| 0         | "day:month:year" format |
| 1         | "month:day:year" format |

- Equivalent SCPI Command

:SYSTem:DATE:MODELMDY

## NA

Selects the network analyzer as the analyzer type. (NETWORK ANALYZER under (Meas))

- Query Response

{0|1} <new line><^END>

| Parameter | Description                       |
|-----------|-----------------------------------|
| 0         | Network analyzer is not selected. |
| 1         | Network analyzer is selected.     |

- Equivalent SCPI Command

INSTrument:TYPELNA

- Example

```
OUTPUT @Hp4396;"NA?"
ENTER @Hp4396;Na
If 1 THEN PRINT "Network Analyzer Mode is selected."
```

**NEXP**

Displays the next page of information in a tabular listing. (NEXT PAGE under Copy); No query)

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT{1-17}:PAGEUP

| Parameter | Description                   |
|-----------|-------------------------------|
| 1         | List Value                    |
| 2         | Operation Parameter           |
| 3         | Cal Class                     |
| 4 to 11   | Cal Standard No. 1 to No. 8   |
| 12        | Start and Stop                |
| 13        | Center and Span (List)        |
| 14        | Upper and Lower               |
| 15        | Middle and Delta (Limit Test) |
| 16        | Marker List                   |
| 17        | Title                         |

**NEXPK?**

Outputs the maximum peak value and its stimulus next to the peak last found by the PEAK?, or NEXPK? commands. For more information, see "NEXPK?" in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**NUMG□<numeric>**

Triggers a user-specified number of sweeps and returns to the HOLD mode.

(NUMBER OF GROUPS under Trigger); No query)

| Parameter | Description                                                  |
|-----------|--------------------------------------------------------------|
| <numeric> | 1 to 999 (if <numeric> is 0 or less than 0, it is set to 1.) |

■ Equivalent SCPI Command (Query)

```
:INITiate:CONTinuous□{OFF|0}
:ABORt
:SENSe:SWEep:COUNt□<numeric>
:INITiate[:IMMediate]
```

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT @Hp4396;"NUMG 10"
OUTPUT @Hp4396;":INIT:CONT OFF"
OUTPUT @Hp4396;":SENS:SWE:COUN 10"
OUTPUT @Hp4396;":INIT"
```

## NUMLMAX?

Outputs the number of peaks within the analysis range. See “NUMLMAX?” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

- Query Response

*<numeric>**<new line>**<END>*

## NUMLMIN?

Outputs the number of negative peaks within the analysis range. See “NUMLMIN?” in Appendix I. (Instrument BASIC EXECUTE executable; No equivalent SCPI command)

- Query Response

*<numeric>**<new line>**<END>*

## OFSD $\square$ *<numeric>* [S]

Specifies the one-way electrical delay from the measurement (reference) plane to the standard. (Network and impedance analyzer only) (OFFSET DELAY under **Cal**); No query)

| Parameter              | Range     | Unit |
|------------------------|-----------|------|
| <i>&lt;numeric&gt;</i> | -10 to 10 | s    |

- Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:STANdard:ODELay  $\square$  *<numeric>*

- Query Response

{*numeric*} *<new line>**<END>*

## OFSL $\square$ *<value>*

Specifies energy loss, due to skin effect, along a one-way length of coaxial cable offset. (Network and impedance analyzer only) (OFFSET LOSS under **Cal**); No query)

| Parameter            | Range                   | Unit        |
|----------------------|-------------------------|-------------|
| <i>&lt;value&gt;</i> | 0 to $1 \times 10^{19}$ | $\Omega$ /s |

- Equivalent SCPI Command (Query)

:SENSe:CORRection:CKIT:STANdard:OLOSS  $\square$  *<numeric>*

- Query Response

{*numeric*} *<new line>**<END>*



**OFSZ**□<numeric>[OHM|KOHM]

Specifies the characteristic impedance of the coaxial cable offset. (Network and impedance analyzer only) (OFFSET Z0 under Cal); No query

| Parameter | Range                  | Unit |
|-----------|------------------------|------|
| <numeric> | 0.001 to 5000000 (=5M) | Ω    |

- Equivalent SCPI Command (Query)
  - :SENSe:CORRection:CKIT:STANdard:OCIMpedance□<numeric>
- Query Response
  - {numeric} <new line><^END>

**OMII**

Omits correction for isolation of a 2-port calibration. (Network analyzer only) (OMIT ISOLATION under Cal); No query

- Equivalent SCPI Command
  - :SENSe:CORRection:COLLect[:ACQuire]□OMII

**OPEP**

Provides a tabular listing on the display of the key parameters for both channels. (OPERATING PARAMETERS under Copy); No query

- Equivalent SCPI Command
  - :DISPlay[:WINDow]:TEXT2:PAGE□1
  - :DISPlay[:WINDow]:TEXT2:STATe□{ON|1}

**OSE**□<numeric>

Enables the operational status register.

| Parameter | Description                                                                          |
|-----------|--------------------------------------------------------------------------------------|
| <numeric> | Decimal expression of the contents of the register, 0 to 65535 (=2 <sup>16</sup> -1) |

- Query Response
  - {numeric} <new line><^END>
- Equivalent SCPI Command
  - :STATus:OPERation:ENABLe□<numeric>

**OSE**  $\square$  *<numeric>*

## OSER?

Outputs the current value in the event register of an operational status register. (Query only)

- Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:STATus:OPERation[:EVENT]?

**OSNT**  $\square$  *<numeric>*

Sets the negative transition filter of an operational status register. For details, refer to Appendix D.

| Parameter              | Description                                                                    |
|------------------------|--------------------------------------------------------------------------------|
| <i>&lt;numeric&gt;</i> | Decimal expression of the contents of the register, 0 to 65535 ( $=2^{16}-1$ ) |

- Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:STATus:OPERation:NTRansition  $\square$  *<numeric>*

**OSPT**  $\square$  *<numeric>*

Sets the positive transition filter of an operational status register. For details, refer to Appendix D.

| Parameter              | Description                                                                    |
|------------------------|--------------------------------------------------------------------------------|
| <i>&lt;numeric&gt;</i> | Decimal expression of the contents of the register, 0 to 65535 ( $=2^{16}-1$ ) |

- Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:STATus:OPERation:PTRansition  $\square$  *<numeric>*

## OSR?

Outputs the operational status register value. (Query only)

- Query Response

*{numeric}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:STATus:OPERation:CONDition?

**OUT8IO**  $\square$  *<numeric>*

Outputs the data to the 8-bit parallel output port. (No query)

| Parameter              | Description |
|------------------------|-------------|
| <i>&lt;numeric&gt;</i> | 0 to 255    |

- Equivalent SCPI Command

```
:SYSTem:COMMunicate:PARallel:TRANsmit:DATA  $\square$  <numeric>
```

**OUTPCALC**{1-12}?

Outputs the active calibration set array of the active channel. Refer to Appendix F for the calibration set array. (Network and impedance analyzer only) (Query only)

- Query Response

*{numeric (1)} {numeric (2)} ... {numeric (n)} <new line><END>* (n is the number of points.)

*numeric* is a complex number (data format: real, imaginary).

- Equivalent SCPI Command

```
:DATA[:DATA]? $\square$ LCCO{1-12}
```

- Example

```
DIM A(1:201,1:2)      NOP: 201
OUTPUT 717;"OUTCALC1?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;" :DATA? CC01"
ENTER 717;A(*)
```

**OUTPCALK?**

Outputs the active calibration kit. (Network and impedance analyzer only) (Query only)

- Query Response

*{block data (714 bytes of binary data)} <new line><END>*

- Equivalent SCPI Command

```
:DATA[:DATA]? $\square$ LCKIT
```

**OUTPCERR?**

Outputs ceramic resonator parameters. See "OUTPCERR?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

## OUTPCFIL?

Outputs ceramic filter parameters. See "OUTPCFIL?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

## OUTPCOMC{1|2|3}?

Outputs data of the fixture compensation arrays. See "INPUCCOMC{1|2|3}□<numeric>" for details about the fixture compensation arrays. (Impedance analyzer only)

### ■ Query Response

{*numeric (1)*} {*numeric (2)*} ... {*numeric (n)*} <new line><END>

(n is the number of points.)

*numeric* is a complex number. (data format: real, imaginary)

### ■ Equivalent SCPI Command

:DATA[:DATA]?□CMP{1|2|3}

## OUTPDATA?

Outputs the error corrected data. (Query only)

### ■ Query Response

{*numeric (1)*} {*numeric (2)*} ... {*numeric (n)*} <new line><END>

(n is the number of points.)

*numeric* is a complex number (data format: real, imaginary) for the Network analyzer, or a real number for the Spectrum analyzer.

### ■ Equivalent SCPI Command

:DATA[:DATA]?□LDATA

### ■ Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
OUTPUT 717;"OUTPDATA?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;":DATA? DATA"
ENTER 717;A(*)
```

**OUTPDATAP?**  $\square$  *<numeric>*

Outputs the error corrected data at the specified point. (Query only)

| Parameter              | Description                                                                                                                                                                                   |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>&lt;numeric&gt;</i> | 1 to "number of points"<br>(If <i>&lt;numeric&gt;</i> is 0 or less than 0, it is set to 1.<br>If <i>&lt;numeric&gt;</i> is greater than "number of points," it is set to "number of points.") |

■ Query Response

*{numeric (real)}* *{numeric (imaginary)}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$  (Network analyzer)

*{numeric (val)}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$  (Spectrum analyzer)

■ Equivalent SCPI Command

:DATA[:DATA]:VALue?  $\square$  DATA, *<numeric>*

■ Example

```
OUTPUT 717;"OUTPDATAP? 1"
ENTER 717;A,B                               Network Analyzer

OUTPUT 717;":DATA:VAL? DATA,1"
ENTER 717;A,B
```

**OUTPDMKR?**

Outputs sweep parameter and measurement value at the  $\Delta$ marker position. (Query only)

■ Query Response

*{numeric (val1)}* *{numeric (val2)}* *{numeric (stimulus)}*  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

■ Equivalent SCPI Command

:CALCulate:EVALuate:REFerence:DATA?

■ Example

```
OUTPUT 717;"OUTPDMKR?"
ENTER 717;A,B,C

OUTPUT 717;":CALC:EVAL:REF:DATA?"
ENTER 717;A,B,C
```

## OUTPDMKR?

## OUTPDTRC?

Outputs DATA TRACE data. (Query only)

### ■ Query Response

{*numeric* (1:*val1*)} {*numeric* (1:*val2*)} {*numeric* (2:*val1*)} {*numeric* (2:*val2*)} ...  
{*numeric* (*n*:*val2*)} {*numeric* (*n*:*val2*)} <new line><END> (Network analyzer)

{*numeric* (1)} {*numeric* (2)} ... {*numeric* (*n*)} <new line><END> (Spectrum analyzer)

(*n* is the number of points.) (Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

### ■ Equivalent SCPI Command

:TRACe[:DATA]?LDTR

### ■ Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
OUTPUT 717;"OUTPDTRC?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;":TRAC? DTR"
ENTER 717;A(*)
```

## OUTPDTRCP?<numeric>

Outputs DATA TRACE data at the specified point. (Query only)

| Parameter | Description                                                                                                                                                         |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <numeric> | 1 to "number of points"<br>(If <numeric> is 0 or less than 0, it is set to 1.<br>If <numeric> is greater than "number of points," it is set to "number of points.") |

### ■ Query Response

{*numeric* (*val1*)} {*numeric* (*val2*)} <new line><END> (Network analyzer)

{*numeric* (*val*)} <new line><END> (Spectrum analyzer)

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

### ■ Equivalent SCPI Command

:TRACe[:DATA]:VALue?LDTR,<numeric>

### ■ Example

```
OUTPUT 717;"OUTPDTRCP? 1"
ENTER 717;A,B

OUTPUT 717;":TRAC:VAL? DTR,1"
ENTER 717;A,B
```

**OUTPERRO?**

Outputs the error message in the error queue.

- Query Response

*{numeric (Error number)}* *{string (Error message)}* <new line><END>

- Equivalent SCPI Command

:SYSTem:ERRor?

- Example

```
OUTPUT 717;"OUTPERRO?"
ENTER 717;A,A$

OUTPUT 717;":SYST:ERR?"
ENTER 717;A,A$
```

**OUTPFAIP?**

Outputs number of the failed point of the limit test. (Query only)

- Query Response

*{numeric}* <new line><END>

- Equivalent SCPI Command

:DATA:POINTs?LLFA

- Example

```
OUTPUT 717;"OUTPFAIP?"
ENTER 717;A

OUTPUT 717;":DATA:POIN? LFA"
ENTER 717;A
```

**OUTPFILT?**

Outputs filter parameters. See "OUTPFILT?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**OUTPLIMF?**

Outputs the limit test results only for the failed points. (Query only)

- Query Response

*{numeric (stimulus 1)}* *{0}* *{numeric (upper\_limit 1)}* *{numeric (lower\_limit 1)}*  
*{numeric (stimulus 2)}* *{0}* *{numeric (upper\_limit 2)}* *{numeric (lower\_limit 2)}*  
 ⋮  
*{numeric (stimulus n)}* *{0}* *{numeric (upper\_limit n)}* *{numeric (lower\_limit n)}* <new  
 line><END> (Form 4)

(n is the number of failed points.)

*{0}* <new line><END> (for no failed points.)

## OUTPLIMF?

### ■ Equivalent SCPI Command

:DATA[:DATA]?LLFA

### ■ Example

```
DIM A(1:201,1:4)          NOP: 201
OUTPUT 717;"OUTPLIMF?"
ENTER 717 USING "%,K";A(*)

DIM A(1:201,1:4)
OUTPUT 717;" :DATA? LFA"
ENTER 717 USING "%,K";A(*)
```

## OUTPLIML?

Outputs the limit test results for each point. (Query only)

### ■ Query Response

*{numeric (stimulus 1)} {numeric (result 1)} {numeric (upper\_limit 1)}*  
*{numeric (lower\_limit 1)}*

*{numeric (stimulus 2)} {numeric (result 2)} {numeric (upper\_limit 2)}*  
*{numeric (lower\_limit 2)}*

⋮

*{numeric (stimulus n)} {numeric (result n)} {numeric (upper\_limit n)}*  
*{numeric (lower\_limit n)} <new line><END> (Form 4)*

(n is the number of points.) (result is 1 for pass, 0 for fail, or -1 for no test.)

### ■ Equivalent SCPI Command

:DATA[:DATA]?LLIS

### ■ Example

```
DIM A(1:201,1:4)          NOP: 201
OUTPUT 717;"OUTPLIML?"
ENTER 717;A(*)

DIM A(1:201,1:4)
OUTPUT 717;" :DATA? LLIS"
ENTER 717;A(*)
```



**LVCDT** {<numeric>} [DB]

Sets the level cal data (adds an offset value to the measured value). (Spectrum analyzer only)  
(**LVL CAL DATA** under **Cal**)

| Parameter | Range     | Unit |
|-----------|-----------|------|
| <numeric> | -10 to 10 | dB   |

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:SENSe:CORRection:OFFSet[:MAGNitude] {<numeric>}

**LVL CAL**

Measures the CAL OUT signal (20 MHz, -20 dBm) at the input selected by the MEAS command (automatically sets the level cal data). After executing this function, the instrument state is returned to the state that existed before executing this function. (Spectrum analyzer only)  
(**EXECUTE LVL CAL** under **Cal**; No query)

## ■ Equivalent SCPI Command

:CALibration:AUTO|ONCE

**MATH** {DATA|DDVM|DMNM|DPLM}

Sets the trace math operation. (**DATA MATH: DATA**, **DATA-MEM**, **DATA+MEM**, **DATA/MEM** under **DATA MATH [ ]** under **Display**)

| Parameter | Description                         |
|-----------|-------------------------------------|
| DATA      | Turns OFF all data math functions.  |
| DMNM      | Subtracts the memory from the data. |
| DPLM      | Adds the memory to the data.        |
| DDVM      | Divides the data by the memory.     |

## ■ Query Response

{DATA|DMNM|DPLM|DDVM} <new line><END>

## ■ Equivalent SCPI Command

MATH|DATA :CALCulate:MATH2[:EXPRession]:NAME|OFF  
 MATH|DMNM :CALCulate:MATH2[:EXPRession]:NAME|SUB  
 MATH|DPLM :CALCulate:MATH2[:EXPRession]:NAME|ADD  
 MATH|DDVM :CALCulate:MATH2[:EXPRession]:NAME|DIV

## ■ Example

OUTPUT @Hp4396;"MATH DATA"

OUTPUT @Hp4396;":CALC:MATH2:NAME OFF"

**MATH**  $\square$  {DATA|DDVM|DMNM|DPLM}

**MAXMLEV**  $\square$  <numeric> [DBM]

Sets the maximum mixer level. (Spectrum analyzer only) (MAX MIXER LEVEL under **Scale Ref**)

| Parameter | Range       | Unit |
|-----------|-------------|------|
| <numeric> | -100 to -10 | dBm  |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SENSE:POWER:AC:RANGE[:UPPER]  $\square$  <numeric>

**MEAS**  $\square$  <parameter>

Selects the parameters or inputs to be measured. (NETWORK: A/R, B/R, R, A, B, Refl: FWD S11 [A/R], Trans:FWD S21 [B/R], Trans:REV S12 [A/R], Refl: REV S22 [B/R], SPECTRUM: S, R, A, B, IMPEDANCE: MAG(|Z|), PHASE( $\theta_Z$ ), RESIST(R), REACT(X), ADMITTNCE:MAG(|Y|), PHASE( $\theta_Y$ ), CONDUCT(G), SUSCEPT(B), REFL.CDEF:MAX(| $\Gamma$ |), PHASE( $\theta_\Gamma$ )), REAL( $\Gamma_X$ ), IMAG( $\Gamma_Y$ ), CAPCITNCE:PRL(Cp), SER(Cs), INDUCTNCE:PRL(Lp) SER(Ls), RESISTNCE:PRL(Rp), SER(Rs), D FACTOR(D), Q FACTOR(Q) under **Meas**)

| Parameter | Description                                           |
|-----------|-------------------------------------------------------|
| AR        | A/R measurement (Network analyzer only)               |
| BR        | B/R measurement (Network analyzer only)               |
| R         | R measurement (Both Network and Spectrum analyzers)   |
| A         | A measurement (Both Network and Spectrum analyzers)   |
| B         | B measurement (Both Network and Spectrum analyzers)   |
| S11       | S11 measurement (Network analyzer only)               |
| S12       | S12 measurement (Network analyzer only)               |
| S21       | S21 measurement (Network analyzer only)               |
| S22       | S22 measurement (Network analyzer only)               |
| S         | S measurement (Spectrum analyzer only)                |
| IMAG      | Z  measurement (Impedance analyzer only)              |
| IPH       | $\theta_z$ (Impedance analyzer only)                  |
| IRE       | R (Impedance analyzer only)                           |
| IIM       | X (Impedance analyzer only)                           |
| AMAG      | Y  (Impedance analyzer only)                          |
| APH       | $\theta_y$ (Impedance analyzer only)                  |
| ARE       | G (Impedance analyzer only)                           |
| AIM       | B (Impedance analyzer only)                           |
| RCM       | \Gamma  (Impedance analyzer only)                     |
| RCPH      | $\theta_\Gamma$ (Impedance analyzer only)             |
| RCR       | $\Gamma_x$ (Impedance analyzer only)                  |
| RCIM      | $\Gamma_y$ (Impedance analyzer only)                  |
| CP        | Parallel Capacitance, $C_p$ (Impedance analyzer only) |
| CS        | Series Capacitance, $C_s$ (Impedance analyzer only)   |
| LP        | Parallel Inductance, $L_p$ (Impedance analyzer only)  |
| LS        | Series Inductance, $L_s$ (Impedance analyzer only)    |
| D         | Disipation Factor, D (Impedance analyzer only)        |
| Q         | Quality Factor, Q (Impedance analyzer only)           |
| RP        | Parallel Resistance, $R_p$ (Impedance analyzer only)  |
| RS        | Series Resistance, $R_s$ (Impedance analyzer only)    |

#### ■ Query Response

```
{AR|RB|R|A|B|S11|S12|S21|S22|S|IMAG|IPH|IRE|IIM|AMAG|APH|ARE|AIM|RCM|RCPH|RCM|RCPH|RCR|RCIM|CP|CS|LP|LS|D|Q|RP|RS} <new line><END>
```

#### ■ Equivalent SCPI Command

```
MEASUAR :SENSe:FUNCTionU"POWer:RATioU3,2"
MEASUBR :SENSe:FUNCTionU"POWer:RATioU4,2"
MEASUR :SENSe:FUNCTionU"POWerU2"
MEASUA :SENSe:FUNCTionU"POWerU3"
MEASUB :SENSe:FUNCTionU"POWerU4"
MEASUS11 :SENSe:FUNCTionU"POWer:S11"
MEASUS21 :SENSe:FUNCTionU"POWer:S21"
MEASUS12 :SENSe:FUNCTionU"POWer:S12"
MEASUS22 :SENSe:FUNCTionU"POWer:S22"
MEASUS :SENSe:FUNCTionU"POWerU1"
MEASUIMAG CALCulate:MATH1[:EXPRession]:NAME IMPedance
CALCulate:FORMat MLINear
MEASUIPH CALCulate:MATH1[:EXPRession]:NAME IMPedance
CALCulate:FORMat PHASe
```

## MEAS<parameter>

|           |                                                                           |
|-----------|---------------------------------------------------------------------------|
| MEAS:IRE  | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat REAL      |
| MEAS:IIM  | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat IMAGinary |
| MEAS:AMAG | CALCulate:MATH1[:EXPRession]:NAME ADMittance<br>CALCulate:FORMat MLINear  |
| MEAS:APHS | CALCulate:MATH1[:EXPRession]:NAME ADMittance<br>CALCulate:FORMat PHASe    |
| MEAS:ARE  | CALCulate:MATH1[:EXPRession]:NAME ADMittance<br>CALCulate:FORMat REAL     |
| MEAS:AIM  | CALCulate:MATH1[:EXPRession]:NAME ADMittance<br>CALC:FORMat IMAGinary     |
| MEAS:RCM  | CALCulate:MATH1[:EXPRession]:NAME OFF<br>CALCulate:FORMat MLINear         |
| MEAS:RCPH | CALCulate:MATH1[:EXPRession]:NAME OFF<br>CALCulate:FORMat PHASe           |
| MEAS:RCR  | CALCulate:MATH1[:EXPRession]:NAME OFF<br>CALCulate:FORMat REAL            |
| MEAS:RCIM | CALCulate:MATH1[:EXPRession]:NAME OFF<br>CALCulate:FORMat IMAGinary       |
| MEAS:CP   | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat CP        |
| MEAS:CS   | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat CS        |
| MEAS:LP   | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat LP        |
| MEAS:LS   | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat LS        |
| MEAS:D    | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat D         |
| MEAS:Q    | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat Q         |
| MEAS:RP   | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat RP        |
| MEAS:RS   | CALCulate:MATH1[:EXPRession]:NAME IMPedance<br>CALCulate:FORMat RS        |

### ■ Example

```
OUTPUT @Hp4396;"MEAS AR"  
OUTPUT @Hp4396;"MEAS?"  
ENTER @Hp4396;A$  
OUTPUT @Hp4396;":SENS:FUNC ""POW:RAT 3,2""  
OUTPUT @Hp4396;":SENS:FUNC?"  
ENTER @Hp4396;A$
```

**MEASSTAT**  $\{OFF|ON|0|1\}$ 

Calculates the mean, standard deviation, and peak-to-peak values in the portion of the displayed trace that is in the search range. (STATISTICS ON off under **Utility**)

| Parameter | Description                             |
|-----------|-----------------------------------------|
| OFF or 0  | Does not display the statistical values |
| ON or 1   | Displays the statistical values         |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:MSTATistics[:STATe]  $\{OFF|ON|0|1\}$

**MKR**  $\{OFF|ON|0|1\}$ 

Sets the marker to active (ON) or inactive (OFF). When the MKR is turned off, the marker, sub-marker, and  $\Delta$ marker are tuned to be off. (**MKR**)

| Parameter | Description                    |
|-----------|--------------------------------|
| OFF or 0  | Turns off the marker function. |
| ON or 1   | Turns on the marker function.  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:ALL:STATe  $\{OFF|ON|0|1\}$

(TRACe[1] for the data trace; TRACe2 for the memory trace.)

**MKRAMPO**

Moves the limits so that they are centered an equal amount above and below the marker at the sweep parameter value. (**MAKER**  $\rightarrow$  **AMP.OFS.** under **System**; No query)

- Equivalent SCPI Command

:CALCulate:LIMit:OFFSetLMARKer

**MKRAUV?**

Outputs the auxiliary amplitude value (value 2) of the measurement value at the marker position. See "Marker Readout" in Appendix H for the auxiliary amplitude value of each display format. (Query only)

- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:Y[1]:VALue2?

## MKRAUV?

## MKRCENT

Sets the sweep parameter center value of the destination channel to the sweep parameter value of the marker and centers the new span about that value. (MKR→CENTER under Marker→); No query)

### ■ Equivalent SCPI Command

:SENSe:FREQUency:CENTer␣MARKer (frequency) or  
:SOURce:POWer:CENTer␣MARKer (power)

## MKRCONT␣{OFF|ON|0|1}

Sets the continuous or discontinuous marker mode. (Network and impedance analyzer only) (MKR [ ] under Marker)

| Parameter | Description                |
|-----------|----------------------------|
| OFF or 0  | Discontinuous marker mode. |
| ON or 1   | Continuous marker mode.    |

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:INTerpolate␣{OFF|ON|0|1}

## MKRCOUP␣{OFF|ON|0|1}

Sets the coupled or uncoupled marker mode. (MKR [ ] under Marker)

| Parameter | Description           |
|-----------|-----------------------|
| OFF or 0  | Uncoupled marker mode |
| ON or 1   | Coupled marker mode   |

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:COUPlE␣{OFF|ON|0|1}

## MKRCSTE

Sets the CENTER step size to the marker's sweep parameter value. (MKR→CNTR STEP under Center); No query)

### ■ Equivalent SCPI Command

:SENSe:FREQUency:CENTter:STEP[:INCRement]␣MARKer

**MKRDCE**

Sets the sweep parameter center value of the destination channel to the difference value between the marker and the  $\Delta$ marker values. (**MKRA-CENTER** under **Center** and **Marker**); No query)

## ■ Equivalent SCPI Command

:SENSe:FREQuency:CENTer $\Delta$ DMARker (frequency) or  
:SOURce:POWer:CENTer $\Delta$ DMARker (power)

**MKRDCE**

Sets the CENTER step size to the difference between the marker and  $\Delta$ marker values. (**MKRA-CNTR STEP** under **Center**); No query)

## ■ Equivalent SCPI Command

:SENSe:FREQuency:CENTer:STEP[:INCRement] $\Delta$ DMARker

**MKRDELA**

Sets the group delay at the marker point of a fixed frequency aperture, 20% of the span, to the electrical delay to balance the phase of the DUT. (Network analyzer only) (**MKR-DELAY** under **Scale Ref**); No query)

## ■ Equivalent SCPI Command

:SENSe:CORRection:EDELay2 $\Delta$ MARKer

**MKRDSPAN**

Sets the SPAN of the destination channel to the difference between the marker and the  $\Delta$ marker values. (**MKRA-CENTER** under **Span** or **Marker**); No query)

## ■ Equivalent SCPI Command

:SENSe:FREQuency:SPAN $\Delta$ DMARker (frequency) or  
:SOURce:POWer:SPAN $\Delta$ DMARker (power)

**MKRL {OFF|ON|0|1}**

Sets the maker list function ON or OFF. (**MKR LIST ON off** under **Utility**)

| Parameter | Description              |
|-----------|--------------------------|
| OFF or 0  | Marker list function OFF |
| ON or 1   | Marker list function ON  |

## ■ Query Response

{0|1} <new line><END>

## ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT16:STATe $\Delta$ {OFF|ON|0|1}

**MKRL** {OFF|ON|0|1}

## MKRMIDD

Sets the midpoint the LIMD command using the marker to set the middle amplitude value of a limit segment. (~~MKR→MIDDLE~~ under **System**); No query)

■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:MIDDLE~~MARKer~~

**MKRNOI** {OFF|ON|0|1}

Sets the noise format of the marker ON or OFF. This marker reads out the average noise level at the marker position (referenced to a 1 Hz noise power bandwidth). (Spectrum analyzer only) (~~NOISE FORM ON off~~ under **Utility**)

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:NOISe[:STATe] {OFF|ON|0|1}

**MKRO** {DATA|MEMO}

Sets a trace from data or memory to be applied for the marker values. (~~MKR ON [ ]~~ under **Marker**)

| Parameter | Description  |
|-----------|--------------|
| DATA      | DATA TRACE   |
| MEMO      | MEMORY TRACE |

■ Query Response

{DATA|MEMO} <new line><END>

■ Equivalent SCPI Command

MKRO~~DATA~~ :CALCulate:EVALuate:ON~~"DTR"~~

MKRO~~MEMO~~ :CALCulate:EVALuate:ON~~"MTR"~~

■ Example

OUTPUT @Hp4396;"MKRO DATA"

## MKROFS

Sets the marker's amplitude value into the offset value. (~~MKR→OFFSET~~ under **Display**); No query)

■ Equivalent SCPI Command

:DATA[:DATA]~~LOFFS,MARKer~~



**MKRP**  $\square$   $\langle$ numeric $\rangle$ 

Moves the marker to the specified data point number.

| Parameter                   | Description           |
|-----------------------------|-----------------------|
| $\langle$ numeric $\rangle$ | 1 to Number of Points |

- Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:CALCulate:EVALuate:Y[1]:XPOSITION:POINT  $\square$   $\langle$ numeric $\rangle$

**MKRPKD**

Sets the peak delta value to the smaller value of the difference of amplitude values between the present marker position and both side display points of the marker. (Network and impedance analyzer only) (**MKR**  $\rightarrow$  **PEAK DELTA** under **Search**); No query)

- Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:EXCursion  $\square$  DMARKer

**MKRPRM**  $\square$   $\langle$ numeric $\rangle$  [HZ|KHZ|MAHZ|GHZ|DBM]

Sets the marker at the point of the specified sweep parameter, when the marker is ON.

| Parameter                   | Range                     | Unit                          |
|-----------------------------|---------------------------|-------------------------------|
| $\langle$ numeric $\rangle$ | start value to stop value | Hz (frequency)<br>dBm (power) |

- Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

- Equivalent SCPI Command

:CALCulate:EVALuate:Y[1]:XPOSITION  $\square$   $\langle$ numeric $\rangle$

**MKRREF**

Makes the reference value of the destination channel equal to the marker's absolute value (regardless of the  $\Delta$ marker value). (**MKR**  $\rightarrow$  **REFERENCE** under **Scale Ref** and **Marker**); No query)

- Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALE]:RLEVELMARKer  
(TRACe[1] for the data trace; TRACe2 for the memory trace.)

## MKRREF

## MKRSTAR

Sets the sweep parameter start value of the destination channel to the sweep parameter value of the marker. (`SEGMENT: MKR→START` under `Sweep`), or `MKR→START` under `Marker→`; No query)

### ■ Equivalent SCPI Command

`SEGMENT: MKR→START` under `Sweep` :SENSe:LIST:SEGment:FREQuency:StARtLMARKer  
`MKR→START` under `Marker→` :SENSe:FREQuency:StARtLMARKer (frequency) or  
:SOURce:POWer:StARtLMARKer (power)

## MKRSTOP

Sets the sweep parameter stop value of the destination channel to the sweep parameter value of the marker. (`MKR→STOP` under `Sweep`), or `MKR→STOP` under `Marker→`; No query)

### ■ Equivalent SCPI Command

`MKR→STOP` under `Sweep` :SENSe:LIST:SEGment:FREQuency:StOPLMARKer  
`MKR→STOP` under `Marker→` :SENSe:FREQuency:StOPLMARKer (frequency) or  
:SOURce:POWer:StOPLMARKer (power)

## MKRSWPRM

Sets the segment sweep parameter value to the present marker sweep parameter value. (`MKR→SWP PARAM` under `System`); No query)

### ■ Equivalent SCPI Command

:CALCulate:LIMit:SEGment:CONTRol[:DATA]LMARKer

## MKRTHRE

Sets the threshold value to the amplitude value of the present marker position. (`MKR→THRESHOLD` under `Search`); No query)

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:THResholdLMARKer

**OUTPLIMM?**

Outputs the limit test result for the marker position. (Query only)

- Query Response

```
{numeric (stimulus)} {numeric (result)} {numeric (upper_limit)} {numeric (lower_limit)}
<new line><END>
```

(result is 1 for pass, 0 for fail, or -1 for no test)

- Equivalent SCPI Command

```
:DATA[:DATA]?LIMAR
```

- Example

```
OUTPUT 717;"OUTPLIMM?"
ENTER 717;A,B,C,D

OUTPUT 717;":DATA? LMAR"
ENTER 717;A,B,C,D
```

**OUTPMAX?**

Outputs maximum value within analysis range. See "OUTPMAX?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**OUTPMEAN?**

Outputs mean value within analysis range. See "OUTPMEAN?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**OUTPMEMO?**

Outputs the memory data from the active channel. (Query only)

- Query Response

```
{numeric (1)} {numeric (2)} ... {numeric (n)} <new line><END>
```

(n is the number of points.)

*numeric* is a complex number (data format: real, imaginary) for the Network analyzer, or a real number for the Spectrum analyzer.

- Equivalent SCPI Command

```
:DATA[:DATA]?LIMEM
```

- Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
OUTPUT 717;"OUTPMEMO?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;":DATA? MEM"
ENTER 717;A(*)
```

## OUTPMEMO?

### OUTPMEMOP?□<numeric>

Outputs the memory data from the active channel at a specified point. (Query only)

| Parameter | Description                                                                                                                                                         |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <value>   | 1 to "number of points"<br>(If <numeric> is 0 or less than 0, it is set to 1.<br>If <numeric> is greater than "number of points," it is set to "number of points.") |

#### ■ Query Response

{real} {imaginary} <new line><END> (Network analyzer)

{numeric} <new line><END> (Spectrum analyzer)

#### ■ Equivalent SCPI Command

:DATA[:DATA]:VALue?□MEM,<numeric>

## OUTPMIN?

Outputs minimum value within analysis range. See "OUTPMIN?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## OUTPMINMAX?

Outputs maximum and minimum value within analysis range. See "OUTPMIN?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## OUTPMKR?

Outputs the sweep parameter and measurement values at the marker position. (Query only)

#### ■ Query Response

{numeric (val1)} {numeric (val2)} {numeric (stimulus)} <new line><END>

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

#### ■ Equivalent SCPI Command

:CALCulate:EVALuate:Y:DATA?

#### ■ Example

```
OUTPUT 717;"OUTPMKR?"
ENTER 717;A,B,C

OUTPUT 717;" :CALC:EVAL:Y:DATA?"
ENTER 717;A,B,C
```

**OUTPMSTA?**

Outputs the marker statistics. (STATISTICS ON off under **Utility**); Query only)

- Query Response

```
{numeric (mean)} {numeric (standard deviation)} {numeric (peak to peak)}
<new line><END>
```

- Equivalent SCPI Command

```
:CALCulate:EVALuate:MSTatistics:DATA?
```

- Example

```
OUTPUT 717;"OUTPMSTA?"
ENTER 717;A,B,C

OUTPUT 717;":CALC:EVAL:MST:DATA?"
ENTER 717;A,B,C
```

**OUTPMTRC?**

Outputs the MEMORY TRACE data. (Query only)

- Query Response

```
{numeric (1:val1)} {numeric (1:val2)} {numeric (2:val1)} {numeric (2:val)} ...
{numeric (n:val1)} {numeric (n:val2)} <new line><END> (Network analyzer)
```

```
{numeric (1)} {numeric (2)} ... {numeric (n)} <new line><END> (Spectrum analyzer)
```

(n is the number of points.) (Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

- Equivalent SCPI Command

```
:TRACe[:DATA]?LMTR
```

- Example

```
DIM A(1:201,1:2)           Network Analyzer, NOP: 201
OUTPUT 717;"OUTPMTRC?"
ENTER 717;A(*)

DIM A(1:201,1:2)
OUTPUT 717;":TRAC? MTR"
ENTER 717;A(*)
```

## OUTPMTRC?

### OUTPMTRCP? $\square$ *<numeric>*

Outputs the MEMORY TRACE data at the specified point. (Query only)

| Parameter              | Description                                                                                                                                                                                   |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>&lt;numeric&gt;</i> | 1 to "number of points"<br>(If <i>&lt;numeric&gt;</i> is 0 or less than 0, it is set to 1.<br>If <i>&lt;numeric&gt;</i> is greater than "number of points," it is set to "number of points.") |

#### ■ Query Response

{*numeric (val1)*} {*numeric (val2)*} <new line><END> (Network analyzer)

{*numeric (val)*} <new line><END> (Spectrum analyzer)

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

#### ■ Equivalent SCPI Command

:TRACe[:DATA]:VALue?  $\square$  MTR, *<numeric>*

#### ■ Example

```
OUTPUT 717;"OUTPMTRCP? 1" Network Analyzer
ENTER 717;A,B
```

f

```
OUTPUT 717;":TRAC:VAL? MTR,1"
ENTER 717;A,B
```

## OUTPMWID?

Outputs the results of the bandwidth search. (Network and impedance analyzer only)

(**WIDTHS ON** off under **Search**); Query only)

#### ■ Query Response

{*numeric (bandwidth)*} {*numeric (center)*} {*numeric (Q)*} <new line><END>

#### ■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTh:DATA?

#### ■ Example

```
OUTPUT 717;"OUTPMWID?"
ENTER 717;A,B,C

OUTPUT 717;":CALC:EVAL:WIDT:DATA?"
ENTER 717;A,B,C
```

**OUTPRAW{1-4}?**

Outputs the uncorrected data arrays for the active channel. (Query only)

- Query Response

*{numeric (1)} {numeric (2)} ... {numeric (n)}* <new line><END>

(n is the number of points.)

*numeric* is a complex number (data format: real, imaginary) for the Network analyzer, or a real number for the Spectrum analyzer.

- Equivalent SCPI Command

:DATA[:DATA]?LRAW{1-4}

**OUTPRESF?**

Outputs resonator parameters. See "OUTPRESF?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**OUTPRESO?**

Outputs resonator parameters. See "OUTPRESO?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**OUTPRESR?**

Outputs resonator parameters. See "OUTPRESR?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)

**OUTPSMKR{1-7}?**

Outputs the measurement values and sweep parameter at the sub-marker position. (Query only)

- Query Response

*{numeric (val1)} {numeric (val2)} {numeric (stimulus)}* <new line><END>

(Val1: Amplitude value, Val2: Auxiliary amplitude value. See "Marker Readout" in Appendix H.)

- Equivalent SCPI Command

```
OUTPSMKR1? :CALCulate:EVALuate:Y2:DATA?
OUTPSMKR2? :CALCulate:EVALuate:Y3:DATA?
OUTPSMKR3? :CALCulate:EVALuate:Y4:DATA?
OUTPSMKR4? :CALCulate:EVALuate:Y5:DATA?
OUTPSMKR5? :CALCulate:EVALuate:Y6:DATA?
OUTPSMKR6? :CALCulate:EVALuate:Y7:DATA?
OUTPSMKR7? :CALCulate:EVALuate:Y8:DATA?
```

## OUTPSMKR{1-7}?

### OUTPSWPRM?

Outputs the sweep parameter data. (Query only)

- Query Response

{*numeric 1*} {*numeric 2*} ... {*numeric n*} <new line><END>

(n is the number of points.)

- Equivalent SCPI Command

:DATA[:DATA]?LSPAR

### OUTPSWPRMP?□<numeric>

Outputs the sweep parameter data at a specified point. (Query only)

| Parameter | Description                                                                                                                                                         |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <numeric> | 1 to "number of points"<br>(If <numeric> is 0 or less than 0, it is set to 1.<br>If <numeric> is greater than "number of points," it is set to "number of points.") |

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:DATA[:DATA]:VALue?LSPAR,<numeric>

### OUTPXFIL?

Outputs crystal filter parameters. See "OUTPXFIL?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only; Network analyzer only)



**PARS**{OFF|ON|0|1}

Sets the partial search of the marker search function ON or OFF. (**PART SRCH ON off** under **Search**)

| Parameter | Description        |
|-----------|--------------------|
| OFF or 0  | Partial search OFF |
| ON or 1   | Partial search ON  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:CALCulate:EVALuate:BAND:FULL[:STATe]{OFF|ON|0|1}

| Parameter | Description        |
|-----------|--------------------|
| OFF or 0  | Partial search ON  |
| ON or 1   | Partial search OFF |

- Example

```
OUTPUT 717;"PARS ON"
```

```
OUTPUT 717;"PARS?"
```

```
ENTER 717;A
```

```
OUTPUT 717;":CALC:EVAL:BAND:FULL OFF"
```

```
OUTPUT 717;":CALC:EVAL:BAND:FULL?"
```

```
ENTER 717;A
```

**PEAK?**

Outputs maximum peak within analysis range, and memorizes its position for the NEXPK? command. See "PEAK?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**PEAKCENT**

Searches for a peak using the marker and then changes the CENTER of the destination channel to the sweep parameter value of that peak. (**PEAK—CENTER** under **Center** or **Marker→**; No query)

- Equivalent SCPI Command

:SENSe:FREQuency:CENTerLTPEak (frequency) or

:SOURce:POWer:CENTerLTPEak (power)

## PEAKCENT

### PHAO <numeric> [DEG]

Adds or subtracts a phase offset that is constant with frequency. (Network analyzer only)  
(PHASE OFFSET under [Scale Ref](#))

| Parameter | Range        | Unit |
|-----------|--------------|------|
| <numeric> | -360 to +360 | °    |

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:SENSe:CORRection:OFFSet:PHASe  <numeric>

### PHAU {RAD|DEG}

Selects the unit of phase format. (PHASE UNIT  under [Format](#); Impedance analyzer only.)

| Parameter | Description |
|-----------|-------------|
| DEG       | Degree.     |
| RAD       | Radian.     |

#### ■ Query Response

{DEG|RAD}<new line><END>

#### ■ Equivalent SCPI Command

:CALCulate:FORMat:UNIT:ANGLE  {DEG|RAD}

### PKDLTX <numeric> [HZ|KHZ|MAHZ|GHZ|DBM]

Sets the peak  $\Delta X$  value that is used to define the peak. (Network and impedance analyzer only)  
(PEAK DEF:  $\Delta X$  under [Search](#))

| Parameter | Range    | Unit           |
|-----------|----------|----------------|
| <numeric> | 0 to 8 G | Hz (frequency) |
|           | 0 to 500 | dBm (power)    |

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:EXCursion:X  <numeric>

■ Example

```
OUTPUT 717;"PKDLTX 1E6"
OUTPUT 717;"PKDLTX?"
ENTER 717;A
OUTPUT 717;":CALC:EVAL:PEAK:EXC:X 1E6"
OUTPUT 717;":CALC:EVAL:PEAK:EXC:X?"
ENTER 717;A
```

**PKDLTY**{<numeric>

Sets the peak ΔY value that is used to define the peak. (PEAK DEF: ΔY under [Search](#))

| Parameter | Range                                                                                          | Format                     |
|-----------|------------------------------------------------------------------------------------------------|----------------------------|
| <numeric> | 0 to 500 (spectrum analyzer)                                                                   | (dBm, dBμV, dBV formats)   |
|           | 0 to 500k                                                                                      | (Watt format, Volt format) |
|           | 0 to 500 (network analyzer)                                                                    | (Log magnitude format)     |
|           | 0 to 500k (any format in network analyzer except log magnitude format, and impedance analyzer) |                            |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:EXCursion:Y{numeric}

**PKPOL**{POS|NEG}

Sets the peak polarity for the marker search functions. (Network and impedance Analyzer only) (PEAK PLRTY pos neg under [Search](#))

| Parameter | Description   |
|-----------|---------------|
| POS       | Positive peak |
| NEG       | Negative peak |

■ Query Response

{POS|NEG} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:POLarity{POSitive|NEGative}

## PKPOL{POS|NEG}

## PKTHRE{OFF|ON|0|1}

Sets the threshold ON or OFF. ([THRESHOLD ON off](#) under [Search](#))

| Parameter | Description   |
|-----------|---------------|
| OFF or 0  | Threshold OFF |
| ON or 1   | Threshold ON  |

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:THReshold:STATe{OFF|ON|0|1}

## PKTHVAL<value>

Sets the threshold values. ([THRESHOLD VALUE](#) under [Search](#))

| Parameter | Range                                      | Unit                                                           |
|-----------|--------------------------------------------|----------------------------------------------------------------|
| <numeric> | -500 to 500                                | (Log mag format)                                               |
|           | $-5 \times 10^6$ to $5 \times 10^6$        | (Phase, Expanded phase, Lin man, Real, Imaginary, SWR formats) |
|           | -0.5 to 0.5                                | (Delay format)                                                 |
|           | $1 \times 10^{-11}$ to 500                 | (Smith chart, Admittance chart, Polar formats)                 |
|           | -100 to 30                                 | (dBm format)                                                   |
|           | -113 to 17 (50 $\Omega$ )                  | (dBV format)                                                   |
|           | -111.2 to 18.8 (75 $\Omega$ )              |                                                                |
|           | 7 to 137 (50 $\Omega$ )                    | (dB $\mu$ V format)                                            |
|           | 8.8 to 138.8 (75 $\Omega$ )                |                                                                |
|           | $1 \times 10^{-13}$ to 1                   | (Watt format)                                                  |
|           | $1 \times 10^{-6}$ to 7.071 (50 $\Omega$ ) | (Volt format)                                                  |
|           | $1 \times 10^{-6}$ to 8.66 (75 $\Omega$ )  |                                                                |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:PEAK:THReshold<numeric>

**POIN**{<numeric>

Sets the number of points for the segment, or sets the number of points for the list sweep table. (NUMBER OF POINTS under **Sweep**)

| Parameter | Description            |
|-----------|------------------------|
| <numeric> | 2 to 801. <sup>1</sup> |

<sup>1</sup> For the spectrum analyzer, <numeric> can be set when the SPAN is set to zero. When the SPAN is not zero, this command is query only.

- Query Response

{numeric} <new line><END>

- Equivalent SCPI Command

:SENSe:SWEEp:POINts{<numeric> or

:SENSe:LIST:SEGment:POINts{<numeric> (List sweep)}

**POLE?**{<numeric>

Outputs the first found negative peaks for both side from the maximum peak. Negative peaks must be lower than the <numeric> down from the maximum peak. See "POLE?" in Appendix I for details, command paramter, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; No query)

**PORE**{OFF|ON|0|1}

Sets the reference plane extension mode ON or OFF. (Network and impedance analyzer only) (EXTENSIONS ON off under **Cal**)

| Parameter | Description                        |
|-----------|------------------------------------|
| OFF or 0  | Reference plane extension mode OFF |
| ON or 1   | Reference plane extension mode ON  |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:SENSe:CORREction:EDELay:STATe{OFF|ON|0|1}

**PORE**  $\square$  {OFF|ON|0|1}

**PORT1**  $\square$   $\langle$ numeric $\rangle$  [S|MS|US|NS|PS]

Extends the reference plane for measurement of  $S_{11}$ ,  $S_{21}$ , and  $S_{12}$ . (Network analyzer only)  
(**EXTENSION PORT 1** under **Cal**)

| Parameter                   | Range     | Unit |
|-----------------------------|-----------|------|
| $\langle$ numeric $\rangle$ | -10 to 10 | s    |

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT1:TIME  $\square$   $\langle$ numeric $\rangle$

**PORT2**  $\square$   $\langle$ numeric $\rangle$  [S|MS|US|NS|PS]

Extends the reference plane for measurement of  $S_{22}$ ,  $S_{12}$ , and  $S_{21}$ . (Network analyzer only)  
(**EXTENSION PORT 2** under **Cal**)

| Parameter                   | Range     | Unit |
|-----------------------------|-----------|------|
| $\langle$ numeric $\rangle$ | -10 to 10 | s    |

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT2:TIME  $\square$   $\langle$ numeric $\rangle$

**PORTA**  $\square$   $\langle$ numeric $\rangle$  [S|MS|US|NS|PS]

Adds electrical delay to the input A reference plan for all A input measurements (including S-parameters). (Network analyzer only) (**EXTENSION INPUT A** under **Cal**)

| Parameter                 | Range     | Unit |
|---------------------------|-----------|------|
| $\langle$ value $\rangle$ | -10 to 10 | s    |

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT4:TIME  $\square$   $\langle$ numeric $\rangle$

**PORTZ**□<numeric>**PORTB**□<numeric>[S|MS|US|NS|PS]

Adds electrical delay to the input B reference plane for all B input measurements (including S-parameters). (Network analyzer only) (**EXTENSION INPUT B** under **Cal**)

| Parameter | Range     | Unit |
|-----------|-----------|------|
| <numeric> | -10 to 10 | s    |

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT5:TIME□<numeric>

**PORTR**□<numeric>[S|MS|US|NS|PS]

Adds electrical delay to extend the reference plane at input R to the end of cable. (Network analyzer only) (**EXTENSION INPUT R** under **Cal**)

| Parameter | Range     | Unit |
|-----------|-----------|------|
| <value>   | -10 to 10 | s    |

## ■ Query Response

{numeric} <new line><END>

## ■ Equivalent SCPI Command

:SENSe:CORRection:EDELay:PORT3:TIME□<numeric>

**PORTZ**□<numeric>

Sets the port extension value. (**EXTENSION VALUE** under **Cal**); Impedance analyzer only.)

## ■ Query response

<numeric><new line><END>

## ■ Equivalent SCPI command

:SENSe:CORRection1:EDELay:PORT6:[:TIME]□<numeric>

**PORTZ**  $\square$   $\langle$ numeric $\rangle$

**POWER**  $\square$   $\langle$ numeric $\rangle$  [DBM]

Sets the power level segment by segment, or sets the power level for the list sweep table.

(POWER under Sweep)

| Parameter                   | Range      | Unit |
|-----------------------------|------------|------|
| $\langle$ numeric $\rangle$ | -60 to +20 | dBm  |

■ Query Response

{numeric}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

:SOURCE:POWER[:LEVEL][:IMMEDIATE][:AMPLITUDE]  $\square$   $\langle$ numeric $\rangle$  or

:SENSE:LIST:SEGMENT:POWER  $\langle$ numeric $\rangle$  (List sweep)

**PREP**

Displays the previous page of information in a tabular listing. (PREV PAGE under Copy); No query)

■ Equivalent SCPI Command

:DISPLAY[:WINDOW]:TEXT{1-17}:PAGE  $\square$  DOWN

| Parameter | Description                   |
|-----------|-------------------------------|
| 1         | List Value                    |
| 2         | Operation Parameter           |
| 3         | Cal Class                     |
| 4 to 11   | Cal Standard No. 1 to No. 8   |
| 12        | Start and Stop                |
| 13        | Center and Span (List)        |
| 14        | Upper and Lower               |
| 15        | Middle and Delta (Limit Test) |
| 16        | Marker List                   |
| 17        | Title                         |

**PRES**

Presets the ANALYZER to the preset default values. See Appendix D of the *Function Reference* for the default values. The PRES command does *not* preset the HP Instrument BASIC.

(PRESET); No query)

■ Equivalent SCPI Command

:SYSTEM:PRESet



**PRIC**

Sets the print command to the color printing. (**COLOR** under **Copy**)

## ■ Query Response

{0|1} <new line><END>

| Parameter | Description           |
|-----------|-----------------------|
| 0         | Single-color printing |
| 1         | Color printing        |

## ■ Equivalent SCPI Command

:HCOPY:DRIVER:COLOR{ON|1}

**PRICFIXE**

Sets the default colors for printing a hard copy. (**PRINT COLOR [FIXED]** under **Copy**)

## ■ Query Response

{0|1} <new line><END>

| Parameter | Description                                     |
|-----------|-------------------------------------------------|
| 0         | Variable colors (colors similar to the display) |
| 1         | Fixed colors (default colors)                   |

## ■ Equivalent SCPI Command

:HCOPY:DRIVER:CMAP:COLOR{FIXED}

**PRICVARI**

Sets the colors used for printing a hard copy as close as possible to the display colors. Refer to "System Accessory Printer" in Chapter 9 of *FuncRef* for the printers which support the variable color printing. (**PRINT COLOR [VARIABLE]** under **Copy**)

## ■ Query Response

{0|1} <new line><END>

| Parameter | Description                                     |
|-----------|-------------------------------------------------|
| 0         | Fixed colors (default colors)                   |
| 1         | Variable colors (colors similar to the display) |

## ■ Equivalent SCPI Command

:HCOPY:DRIVER:CMAP:COLOR{VARIABLE}

## PRICVARI

## PRINALL

Causes an extra copy of the display to be printed. (**PRINT [ ]** under **Copy**); No query)

- Equivalent SCPI Command

:HCOPY[:IMMEDIATE]

## PRIS

Sets the print command to the single color printing. (**PRINT: STANDARD** under **Copy**)

- Query Response

{0|1} <new line><END>

| Parameter | Description           |
|-----------|-----------------------|
| 0         | Color printing        |
| 1         | Single color printing |

- Equivalent SCPI Command

:HCOPY:DRIVER:COLOR{OFF|0}

- Query Response

| Parameter | Description                   |
|-----------|-------------------------------|
| 0         | Default printing (black only) |
| 1         | Color printing                |

## PRSOFT{OFF|ON|0|1}

Sets printing the softkeys displayed in the screen ON or OFF. (**COPY SKEY** under **Copy**)

| Parameter | Description                  |
|-----------|------------------------------|
| OFF or 0  | Does not print the soft keys |
| ON or 1   | Print the soft keys          |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:HCOPY:DRIVER:SKEY{OFF|ON|0|1}

## PRSMKRS

Turns off all markers and cancels all settings of the marker functions. (PRESET MKRS under Marker); No query)

■ Equivalent SCPI Command

```
:DISPlay[:WINDow]:TRACe{[1]|2}:MARKer[1]:ALLUDEFault
(TRACe[1] for the data trace; TRACe2 for the memory trace.)
```

## PURG<string>

Removes the file. (PURGE FILE under SAVE); No query)

| Parameter | Description                                            |
|-----------|--------------------------------------------------------|
| <string>  | File name, up to 10 characters including the extension |

■ Equivalent SCPI Command

```
:MMEMory:DELEte<string (file_name)>[, <string (msus)>]
```

| Parameter       | Description                                                            |
|-----------------|------------------------------------------------------------------------|
| <string (msus)> | "DISK" for the flexible disk drive<br>"MEMORY" for the RAM disk memory |

■ Example

```
OUTPUT 717;"PURG ""TEST_S""
OUTPUT 717;"MMEM:DEL ""TEST_S""
```

## RAID

Completes the response and isolation calibration. Computes and stores the error coefficients. (Network analyzer only) (DONE RESP ISOL'N CAL under Cal); No query)

■ Equivalent SCPI Command

```
:SENSe:CORRection:COLLect:SAVE3
```

## RAISOL

Selects the isolation class for the response and isolation calibration. (Network analyzer only) (ISOL'N STD under Cal); No query)

■ Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]IISOL
```

## RAHSOL

## RAIRESP

Selects the response class for the response and isolation calibration. (Network analyzer only)  
(**RESPONSE** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire]LRESP

## RECC

Recalls the previously saved version of the color set from the non-volatile memory.  
(**RECALL COLORS** under **Display**); No query)

■ Equivalent SCPI Command

:DISPlay:CMAP:LOAD

## RECD<string>

Loads the instrument states or data. (**file name** under **Recall**); No query)

| Parameter | Description                                            |
|-----------|--------------------------------------------------------|
| <string>  | File name, Up to 10 characters including the extension |

■ Equivalent SCPI Command

:MMEMory:LOAD:STATeL<string (file\_name)>[, <string (msus)>] (State)

:MMEMory:LOAD:TRACeLISEL, <string (file\_name)>[, <string (msus)>] (Data)

| Parameter            | Description                                                            |
|----------------------|------------------------------------------------------------------------|
| <string (file_name)> | File name, Up to 10 characters including the extension                 |
| <string (msus)>      | "DISK" for the flexible disk drive<br>"MEMORY" for the RAM disk memory |

■ Example

```
OUTPUT 717;"RECD ""TEST_S""
```

```
OUTPUT 717;"MMEM:LOAD:STAT ""TEST_S""
```

## REFD

Completes with the reflection part of the full 2-port or one-path 2-port calibration. (Network analyzer only) (**REFLECT'N DONE** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE5

**REFL**

Begins the reflection part of the full 2-port or one-path 2-port calibration. (Network analyzer only) (**REFLECT'N** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire]  $\square$  REFL2

**REFP**  $\square$  <numeric>

Sets the position of the reference line on the graticule of a Cartesian display. (Network and impedance analyzer only) (**REFERENCE POSITION** under **Scale Ref**)

| Parameter | Range                                               | Unit |
|-----------|-----------------------------------------------------|------|
| <numeric> | 0 to 10 (simple command)<br>0 to 100 (SCPI command) | Div  |

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1] | 2}:Y[:SCALe]:RPOSition  $\square$  <numeric>

Where,

TRACe1            Data trace  
TRACe2            Memory trace

**REFV**  $\square$  <numeric>

Sets the value of the reference line, moving the measurement trace correspondingly.

(**REFERENCE VALUE** under **Scale Ref**)

| Parameter | Range                                                  | Format                                                         |
|-----------|--------------------------------------------------------|----------------------------------------------------------------|
| <numeric> | -500 to 500 (Network analyzer)                         | (Log mag format)                                               |
| <numeric> | -500 M to 500 M (Impedance analyzer)                   | (Linear magnitude format)                                      |
|           | -500 M to 500 M (Network analyzer)                     | (Phase, Expanded phase, Lin man, Real, Imaginary, SWR formats) |
|           | -0.5 to 0.5 (Network analyzer)                         | (Delay format)                                                 |
|           | $1 \times 10^{-11}$ to 500 (Network analyzer)          | (Smith chart, Admittance chart, Polar formats)                 |
|           | 10 f to 500 M (Impedance analyzer)                     | (Smith chart, Admittance chart, Polar formats)                 |
|           | -100 to 30 (Spectrum analyzer)                         | (dBm format)                                                   |
|           | -113 to 17 (50 $\Omega$ )                              | (dBV format)                                                   |
|           | -111.2 to 18.8 (75 $\Omega$ ) (Spectrum analyzer)      |                                                                |
|           | 7 to 137 (50 $\Omega$ )                                | (dB $\mu$ V format)                                            |
|           | 8.8 to 138.8 (75 $\Omega$ ) (Spectrum analyzer)        |                                                                |
|           | $1 \times 10^{-13}$ to 1 (Spectrum analyzer)           | (Watt format)                                                  |
|           | 2.236 $\mu$ to 7.071 (50 $\Omega$ )                    | (Volt format)                                                  |
|           | 2.739 $\mu$ to 8.66 (75 $\Omega$ ) (Spectrum analyzer) |                                                                |

### REFV□<numeric>

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALe]:RLEVel□<numeric>

Where,

TRACe1          Data trace  
TRACe2          Memory trace

### REFX□<numeric>

Sets the value of the x-axis reference line in complex plane format, moving the measurement trace correspondingly, when the measurement format is set to the complex plane.

(REFERENCE X VALUE under (Scale Ref); Impedance analyzer only.)

| Parameter | Range                                       | Unit |
|-----------|---------------------------------------------|------|
| <numeric> | -5.0×10 <sup>8</sup> to 5.0×10 <sup>8</sup> | U    |

#### ■ Query Response

<numeric><new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{1|2}:X[:SCALe]:RLEVel□<numeric>

Where,

TRACe1          Data trace  
TRACe2          Memory trace

### REFY□<numeric>

Sets the value of the y-axis reference line in complex plane format, moving the measurement trace correspondingly, when the measurement format is set to the complex plane.

(REFERENCE Y VALUE under (Scale Ref))

| Parameter | Range                                       | Unit |
|-----------|---------------------------------------------|------|
| <numeric> | -5.0×10 <sup>8</sup> to 5.0×10 <sup>8</sup> | U    |

#### ■ Query Response

<numeric><new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{1|2}:Y[:SCALe]:RLEVel□<numeric>

Where,

TRACe1          Data trace  
TRACe2          Memory trace

**REPTSMP** □ {OFF|ON|0|1}

Sets the normal or repetitive sampling mode for zero span. (Spectrum analyzer only)  
 (SAMPLING NORMAL repet under Sweep)

| Parameter | Description                      |
|-----------|----------------------------------|
| OFF or 0  | Normal sampling                  |
| ON or 1   | Repetitive sampling <sup>1</sup> |

<sup>1</sup> Can be set only when the trigger source is the external or video trigger, the frequency span is 0 Hz, and the sweep type is linear frequency.

■ Query response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SENSe:DETEctor:CONTinuous □ {OFF|ON|0|1}

**RESAVD** □ <string>

Updates a file that is already saved. (RE-SAVE FILE under Save); No query

| Parameter | Description                                           |
|-----------|-------------------------------------------------------|
| <string>  | File name up to 10 characters including the extension |

■ Equivalent SCPI Command

STATE :MMEMory:DELEte □ <string (file\_name)> [, <string (msus)>]  
 :MMEMory:STORe:STATe □ <string (file\_name)> [, <string (msus)>]

TRACE :MMEMory:DELEte □ <string (file\_name)> [, <string (msus)>]  
 :MMEMory:STORe:TRACe □ SEL, <string (file\_name)> [, <string (msus)>]

| Parameter       | Description                                                            |
|-----------------|------------------------------------------------------------------------|
| <string (msus)> | "DISK" for the flexible disk drive<br>"MEMORY" for the RAM disk memory |

■ Example

```
OUTPUT 717;"RESAVD ""TEST_S""
OUTPUT 717;":MMEM:DEL ""TEST_S""
OUTPUT 717;":MMEM:STOR:STAT ""TEST""
```

**RESC**

Eliminates the need to restart a calibration sequence that was interrupted to access some other menu. (Network and impedance analyzer only) (RESUME CAL SEQUENCE under Cal); No query

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:RESume

## RESCOM

Resume the last measured compensation sequence. (**RESUME COMP SEQ** under **Cal**); No query; Impedance analyzer only.)

■ Equivalent SCPI Command

:SENSe:CORRection2:COLLect:RESume

## RESD

Turns off the tabular listing and returns the measurement display to the screen. (**RESTORE DISPLAY** under **Copy**); No query)

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT{1-17}:STATeLIOFF

| Parameter | Description                   |
|-----------|-------------------------------|
| 1         | List Value                    |
| 2         | Operation Parameter           |
| 3         | Cal Class                     |
| 4 to 11   | Cal Standard No. 1 to No. 8   |
| 12        | Start and Stop                |
| 13        | Center and Span (List)        |
| 14        | Upper and Lower               |
| 15        | Middle and Delta (Limit Test) |
| 16        | Marker List                   |
| 17        | Title                         |

## RESPDONE

Completes the response calibration. Computes and stores the error coefficients. (Network analyzer only) (**DONE: RESPONSE** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE2

## REST

Aborts the sweep in progress and then restarts the measurement. (**MEASURE RESTART** under **Trigger**); No query)

■ Equivalent SCPI Command

:INITiate[:IMMediate]:AGain:ALL

## REVI

Measures  $S_{12}$  isolation for the full 2-port calibration. (Network analyzer only) (**REV ISOL'N ISOL'N STD** under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:COLLect[:ACQuire]LREVI



**REVM**

Measures  $S_{22}$  load match for the full 2-port calibration. (Network analyzer only)  
 (REV. MATCH THRU under **Cal**); No query)

## ■ Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]LREVM
```

**REVT**

Measures  $S_{12}$  frequency response for the full 2-port calibration. (Network analyzer only)  
 (REV. TRANS. THRU under **Cal**); No query)

## ■ Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]LREVT
```

**RFO**{OFF|ON|0|1}

Sets the signal output on the RF OUT port ON or OFF. (RF OUT ON off under **Source**)

| Parameter | Description     |
|-----------|-----------------|
| OFF or 0  | RF OUT port OFF |
| ON or 1   | RF OUT port ON  |

## ■ Query Response

```
{0|1} <new line><END>
```

## ■ Equivalent SCPI Command

```
:SOURce:POWer:STATeL{OFF|ON|0|1}
```

**RPLENV?**

Returns the maximum height between the negative peak and intersection of an imaginary slope line between the adjacent positive peaks. See "RPLENV?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**RPLHEI?**

Returns the maximum difference between adjacent positive and negative peaks. See "RPLHEI?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLLHEI?

Returns the maximum difference between the positive peak and right-hand adjacent negative peak. See "RPLLHEI?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLMEA?

Returns the mean of the difference between adjacent positive and negative peaks within range. See "RPLPP?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLPP?

Returns the maximum difference between the positive peak and the negative peak within range. See "RPLPP?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLRHEI?

Returns the maximum difference between the positive peak and left-hand adjacent negative peak. See "RPLRHEI?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RPLVAL?

Returns the maximum total of the differences between the negative peaks and the adjacent positive peaks on both sides and the stimulus of the corresponding negative peak. See "RPLPP?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## RSCO

Resets the color being modified to the default color. (RESET COLOR under Display); No query)

### ■ Equivalent SCPI Command

DISPlay:CMAP:COLor{1-14}:DEFault

| Parameter | Description                             |
|-----------|-----------------------------------------|
| 1         | Channel 1 data                          |
| 2         | Channel 1 memory and limit lines        |
| 3         | Channel 2 data                          |
| 4         | Channel 2 memory and limit lines        |
| 5         | Graticule and a portion of softkey text |
| 6         | Warning annotation                      |
| 7         | All the non-data text                   |
| 8         | Text on the BASIC screen                |
| 9-14      | Pen 1-6                                 |

**SA**

Selects the spectrum analyzer as the analyzer type. (SPECTRUM ANALYZER under Meas)

- Query Response

{0|1} <new line><END>

| Parameter | Description                        |
|-----------|------------------------------------|
| 0         | Spectrum analyzer is not selected. |
| 1         | Spectrum analyzer is selected.     |

- Equivalent SCPI Command

:INSTrument:TYPE:SA

- Example

```
OUTPUT 717;"SA"
OUTPUT 717;"SA?"
ENTER 717;A

OUTPUT 717;":INST:TYPE SA"
OUTPUT 717;":INST:TYPE?"
ENTER 717;A$
```

**SADD**

Adds a new segment to a list sweep table. (ADD under Sweep); No query)

- Equivalent SCPI Command

:SENSe:LIST:SEGment:ADD

**SAUNIT{DBM|DBV|DBUV|W|V}**

Selects the measurement data unit of the spectrum analyzer on the active channel. (Spectrum analyzer only) (UNIT: dBm, dBV, dB $\mu$ V, WATT, VOLT under Format)

| Parameter | Description |
|-----------|-------------|
| DBM       | dBm         |
| DBV       | dBV         |
| DBUV      | dB $\mu$ V  |
| W         | Watt        |
| V         | Volt        |

## SAUNIT{DBM|DBV|DBUV|W|V}

### ■ Query Response

{DBM|DBV|DBUV|W|V} <new line><END>

### ■ Equivalent SCPI Command

SAUNIT:DBM :CALCulate:FORMat:MLOGarithmic  
:UNIT:POWer:DBM

SAUNIT:DBV :CALCulate:FORMat:MLOGarithmic  
:UNIT:POWer:DBV

SAUNIT:DBUV :CALCulate:FORMat:MLOGarithmic  
:UNIT:POWer:DBUV

SAUNIT:W :CALCulate:FORMat:MLINear  
:UNIT:POWer:W

SAUNIT:V :CALCulate:FORMat:MLINear  
:UNIT:POWer:V

### ■ Example

OUTPUT 717;"SAUNIT DBM"

OUTPUT 717;"SAUNIT?"

ENTER 717;A\$

OUTPUT 717;":CALC:FORM MLOG"

OUTPUT 717;":UNIT:POW DBM"

OUTPUT 717;":CALC:FORM?"

ENTER 717;A\$

OUTPUT 717;":UNIT:POW?"

ENTER 717;B\$

## SAV1

Completes the  $S_{11}$  or  $S_{22}$  1-port calibration. The error coefficients are computed and stored. (Network analyzer only) (DONE: 1-PORT CAL under **Cal**); No query)

### ■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE4

## SAV2

Completes the full or one-path 2-port calibration. The error coefficients are computed and stored. (Network analyzer only) (DONE: 2-PORT CAL under **Cal**); No query)

### ■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE8

## SAVC

Redraws a trace using the current error coefficient array data. (Network and impedance analyzer only) (No query)

### ■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE9

SAVDASC&lt;string&gt;

**SAVCAL**{OFF|ON|0|1}

Selects whether or not to save the calibration coefficients arrays. (CAL ON off under **Save**); No query for the SCPI command)

| Parameter | Description                                        |
|-----------|----------------------------------------------------|
| OFF or 0  | Does not save the calibration coefficients arrays. |
| ON or 1   | Saves the calibration coefficients arrays.         |

## ■ Query Response

```
{0|1} <new line><END>
```

## ■ Equivalent SCPI Command

```
SAVCAL{OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELeteLCO
```

```
SAVCAL{ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELectLCO
```

**SAVCOM**

Calculates the fixture compensation coefficients and store it. (DONE: COMPEN under **Cal**); No query; Impedance analyzer only)

## ■ Equivalent SCPI Command

```
:SENSe:CORRection2:COLLect:SAVE
```

**SAVDASC**<string>

Specifies saving the internal data arrays as an ASCII file. (SAVE ASCII under **Save**); No query)

| Parameter | Description                   |
|-----------|-------------------------------|
| <string>  | File name, up to 8 characters |

## ■ Equivalent SCPI Command

```
:MMEMory:STORe:DINTerchange:TRACeLSEL, <string (file_name)> [, <string (msus)>]
```

| Parameter       | Description                                                            |
|-----------------|------------------------------------------------------------------------|
| <string (msus)> | "DISK" for the flexible disk drive<br>"MEMORY" for the RAM disk memory |

## ■ Example

```
OUTPUT 717;"SAVDASC ""DATA1""
```

```
OUTPUT 717;" :MMEM:STOR:DINT:TRAC SEL, ""DATA1""
```

**SAVDASC**  $\square$   $\langle string \rangle$

**SAVDAT**  $\square$  {OFF|ON|0|1}

Selects whether or not to save the data arrays. (DATA ON off under **Save**); No query for the SCPI command)

| Parameter | Description                    |
|-----------|--------------------------------|
| OFF or 0  | Does not save the data arrays. |
| ON or 1   | Saves the data arrays.         |

■ Query Response

{0|1}  $\langle$ new line $\rangle$   $\langle$ END $\rangle$

■ Equivalent SCPI Command

SAVDAT  $\square$  {OFF|0} :MMEMory:STORE:ITEM:TRACe{1|2}:DELete  $\square$  DATA  
SAVDAT  $\square$  {ON|1} :MMEMory:STORE:ITEM:TRACe{1|2}:SELEct  $\square$  DATA

■ Example

OUTPUT 717;"SAVDAT ON"

**SAVDDAT**  $\square$   $\langle string \rangle$

Specifies saving the internal data arrays which are defined by the SAVRAW, SAVCAL, SAVDAT, SAVMEM, SAVTDAT, and SAVTMEM commands. (SAVE BINARY under **Save**); No query)

| Parameter                | Description                  |
|--------------------------|------------------------------|
| $\langle string \rangle$ | File name up to 8 characters |

■ Equivalent SCPI Command

:MMEMory:STORE:TRACe  $\square$  SEL,  $\langle string$  (file\_name) $\rangle$  [,  $\langle string$  (msus) $\rangle$ ]

| Parameter                         | Description                                                            |
|-----------------------------------|------------------------------------------------------------------------|
| $\langle string$ (msus) $\rangle$ | "DISK" for the flexible disk drive<br>"MEMORY" for the RAM disk memory |

■ Example

OUTPUT 717;"SAVDDAT ""DATA1"""

OUTPUT 717;":MMEM:STOR:TRAC SEL, ""DATA1"""

**SAVDSTA**  $\square$   $\langle string \rangle$

Specifies saving only the instrument states and the calibration coefficients. (STATE under **Save**); No query)

| Parameter                | Description                  |
|--------------------------|------------------------------|
| $\langle string \rangle$ | File name up to 8 characters |

**SAVDTIF**  $\square$   $\langle string \rangle$ 

## ■ Equivalent SCPI Command

:MMEMory:STORe:STATe  $\square$   $\langle string (file\_name) \rangle$  [,  $\langle string (msus) \rangle$ ]

| Parameter                       | Description                                                            |
|---------------------------------|------------------------------------------------------------------------|
| $\langle string (msus) \rangle$ | "DISK" for the flexible disk drive<br>"MEMORY" for the RAM disk memory |

## ■ Example

```
OUTPUT 717;"SAVDSTA ""STA1""
```

```
OUTPUT 717;":MMEM:STOR:STAT ""STA1""
```

**SAVDSTAC**  $\square$   $\langle string \rangle$ 

Specifies saving the instrument states the calibration coefficients and measurement data which are compatible with HP 4196A. (**4396A STATE** under **Save**); No query)

**Note**

The following settings are not saved:



- dpi
- Printer Orientation
- Form feed
- Top Margin
- Left Margin
- Print Softkey

| Parameter                | Description                  |
|--------------------------|------------------------------|
| $\langle string \rangle$ | File name up to 8 characters |

## ■ Equivalent SCPI Command

None

## ■ Example

```
OUTPUT 717;"SAVDSTA ""STA1""
```

**SAVDTIF**  $\square$   $\langle string \rangle$ 

Saves the displayed screen in the TIFF format. (**GRAPHICS** under **Save**); No Query)

| Parameter                | Description                           |
|--------------------------|---------------------------------------|
| $\langle string \rangle$ | File name having maximum 8 characters |

## ■ Equivalent SCPI Command

:MMEMory:STORe:DINTerchange:TIFF  $\square$   $\langle string (file name) \rangle$

**SAVDTIF**  $\square$  *<string>*

**SAVDTRC**  $\square$  {OFF|ON|0|1}

Sets whether or not to save the trace arrays. (DATA TRACE ON off under **Save**); No query for the SCPI command)

| Parameter | Description                     |
|-----------|---------------------------------|
| OFF or 0  | Does not save the trace arrays. |
| ON or 1   | Saves the trace arrays.         |

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SAVDTRC  $\square$  {OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELete  $\square$  DTR  
SAVDTRC  $\square$  {ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELect  $\square$  DTR

**SAVEUSEK**

Stores the user-modified or user-defined calibration kit into memory. (Network and impedance analyzer only) (SAVE USER KIT under **Cal**); No query)

■ Equivalent SCPI Command

:SENSe:CORRection:CKIT:MODify:SAVE

**SAVIMP**

Calculates the error-correction coefficients from the calibration data and stores the coefficients. (DONE:CAL under **CAL**); No query; Impedance analyzer only)

■ Equivalent SCPI Command

:SENSe:CORRection1:COLLect:SAVE

**SAVMEM**  $\square$  {OFF|ON|0|1}

Specifies whether or not to save the memory arrays. (MEM ON off under **Save**); No query for the SCPI command)

| Parameter | Description                      |
|-----------|----------------------------------|
| OFF or 0  | Does not save the memory arrays. |
| ON or 1   | Saves the memory arrays.         |

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SAVMEM  $\square$  {OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELete  $\square$  MEM  
SAVMEM  $\square$  {ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELect  $\square$  MEM



**SAVMTRC**{OFF|ON|0|1}

Specifies whether or not to save the memory trace arrays. (MEM TRACE ON off under **Save**); No query for the SCPI command)

| Parameter | Description                            |
|-----------|----------------------------------------|
| OFF or 0  | Does not save the memory trace arrays. |
| ON or 1   | Saves the memory trace arrays.         |

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SAVMTRC{OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELeteLMTR  
 SAVMTRC{ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELectLMTR

**SAVRAW**{OFF|ON|0|1}

Specifies whether or not to save the raw data arrays. (RAW ON off under **Save**); No query for the SCPI command)

| Parameter | Description                        |
|-----------|------------------------------------|
| OFF or 0  | Does not save the raw data arrays. |
| ON or 1   | Saves the raw data arrays.         |

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SAVRAW{OFF|0} :MMEMory:STORe:ITEM:TRACe{1|2}:DELeteLRAW  
 SAVRAW{ON|1} :MMEMory:STORe:ITEM:TRACe{1|2}:SELectLRAW

**SAVUCOMK**

Stores the user-modified compensation kit into memory. (SAVE COMPEN KIT under **Cal**); No query; Impedance analyzer only)

■ Equivalent SCPI Command

:SENSe:CORRection2:CKIT:MODifySAVE

**SAVUFIXT**

Saves the settings of user difined fixture. (SAVE USER FXTR KIT under **Meas** FIXTURE ); No query; Impedance analyzer only)

■ Equivalent SCPI Command

:SYSTem:FIXTure:SAVE

## SAVUFIXT

### SCAC $\square$ {OFF|ON|0|1}

Couples or uncouples the "DATA" and "MEMORY" traces to be scaled. (D&M SCALE [ ] under Scale Ref);

| Parameter | Description                               |
|-----------|-------------------------------------------|
| OFF or 0  | Uncouples the "DATA" and "MEMORY" traces. |
| ON or 1   | Couples the "DATA" and "MEMORY" traces.   |

#### ■ Query Response

{0|1} <new line><END>

#### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALE]:COUPle  $\square$  {OFF|ON|0|1}

(TRACe[1] for the data trace; TRACe2 for the memory trace.)

### SCAF $\square$ {DATA|MEMO}

Selects one of the "DATA" or "MEMORY" traces to be scaled. (SCALE FOR [ ] under Scale Ref);  
No equivalent SCPI command)

#### ■ Query Response

{DATA|MEMO} <new line><END>

### SCAL $\square$ <numeric>

Sets the response value scale per graticule trace. (SCALE/DIV under Scale Ref)

| Parameter | Range                                           | Format                                                                                            |
|-----------|-------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <numeric> | 0.001 to 500 (Network analyzer)                 | (Log magnitude format)                                                                            |
|           | 1p to 500 (Network analyzer)                    | (Phase format)                                                                                    |
|           | $1 \times 10^{-14}$ to 10 (Network analyzer)    | (Delay format)                                                                                    |
|           | $1 \times 10^{-11}$ to 10000 (Network analyzer) | (Smith chart, Admittance chart, Polar, Lin mag, Real, Imaginary, SWR, and Expanded phase formats) |
|           | 1f to 100M (Network analyzer)                   | (Lin mag, Real, Imaginary, SWR, and Expanded phase formats)                                       |
|           | 0.1 to 20 (Network analyzer)                    | (dBm, dB $\mu$ V, dBV formats)                                                                    |
|           | 1f to 0.1 (Network analyzer)                    | (Watt format)                                                                                     |
|           | 1n to 1 (Network analyzer)                      | (Volt format)                                                                                     |
|           | 1f to 100M (Impedance analyzer)                 | (Log mag, Lin mag, and complex plane formats)                                                     |
|           | 10f to 500M (Impedance analyzer)                | (Smith chart, Admittance chart, and Polar formats)                                                |

- Query Response

{*numeric*} <new line><^END>

- Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{[1]|2}:Y[:SCALe]:PDIVision<*numeric*>

(TRACe[1] for the data trace; TRACe2 for the memory trace.)

## SCRN{OFF|ON|0|1}

Controls whether the LCD display is visible or not. (No equivalent SCPI command)

| Parameter | Description                                    |
|-----------|------------------------------------------------|
| OFF or 0  | Invisible (only softkey labels are displayed.) |
| ON or 1   | Visible                                        |

- Query Response

{0|1} <new line><^END>

## SDEL

Deletes a segment from a list sweep table. (DELETE under Sweep; No query)

- Equivalent SCPI Command

:SENSe:LIST:SEGment:DELeTe

## SDON

Saves the modified segment of a list sweep table. (SEGMENT DONE under Sweep; No query)

- Equivalent SCPI Command

:SENSe:LIST:SEGment:SAVE

- Example

OUTPUT 717;"SDON"

OUTPUT 717;":SENS:LIST:SEG:SAVE"

## SEAL

Searches the trace for the next occurrence of the target value to the left of the marker. (Network and impedance analyzer only) (SEARCH LEFT under Search; No query)

- Equivalent SCPI Command

:CALCulate:EVALuate:Y:XPOSITION:LTARget

## SEAL

**SEAM** {PEAK|MAX|MIN|TARG|PKSA|PKSR|PKSL|OFF}

Selects the marker search function. (SEARCH: PEAK, MAX, MIN, TARGET, SEARCH: PEAKS ALL, PEAKS RIGHT, PEAKS LEFT under **Search**); No query for the SCPI command)

| Parameter | Description                                         |
|-----------|-----------------------------------------------------|
| PEAK      | Peak search                                         |
| MAX       | Maximum search                                      |
| MIN       | Minimum search                                      |
| TARG      | Target search (Network and impedance analyzer only) |
| PKSA      | Peak all                                            |
| PKSR      | Peak right all                                      |
| PKSL      | Peak left all                                       |
| OFF       | Marker search function OFF                          |

### ■ Query Response

{PEAK|MAX|MIN|TARG|PKSA|PKSR|PKSL|OFF} <new line><END>

### ■ Equivalent SCPI Command

```
SEAM:PEAK      :CALCulate:EVALuate:Y:XPOSition:PEAK
SEAM:MAX       :CALCulate:EVALuate:Y:XPOSition:MAXimum
SEAM:MIN       :CALCulate:EVALuate:Y:XPOSition:MINimum
SEAM:TARG      :CALCulate:EVALuate:Y:XPOSition:TARGet<numeric>
SEAM:PKSA      :CALCulate:EVALuate:Y:XPOSition:PALL
SEAM:PKSR      :CALCulate:EVALuate:Y:XPOSition:PRIGHT
SEAM:PKSL      :CALCulate:EVALuate:Y:XPOSition:PLEft
SEAM:OFF       None
```

| Parameter                               | Range                               | Unit |
|-----------------------------------------|-------------------------------------|------|
| <numeric> for<br>:CALC:EVAL:Y:XPOS:TARG | $-5 \times 10^5$ to $5 \times 10^5$ |      |

### ■ Example

```
OUTPUT 717;"SEAM PEAK"
OUTPUT 717;"SEAM?"
ENTER 717;A$
OUTPUT 717;":CALC:EVAL:Y:XPOS:PEAK"
```

## SEANPK

Moves the marker to the next peak. (NEXT PEAK under **Search**); No query)

### ■ Equivalent SCPI Command

```
:CALCulate:EVALuate:Y:XPOSition:NPEak
```

**SEANPKL**

Moves the marker to the peak to the left of the present marker position. (**NEXT PEAK LEFT** under **Search**); No query)

- Equivalent SCPI Command

:CALCulate:EVALuate:Y:XPOSITION:LPEak

**SEANPKR**

Moves the marker to the peak to the right of the present marker position. (**NEXT PEAK RIGHT** under **Search**); No query)

- Equivalent SCPI Command

:CALCulate:EVALuate:Y:XPOSITION:RPEak

**SEAR**

Searches the trace for the next occurrence of the target value to the right of the marker. (Network and impedance analyzer only) (**SEARCH RIGHT** under **Search**); No Query)

- Equivalent SCPI Command

:CALCulate:EVALuate:Y:XPOSITION:RTARGET

**SEARSTR**

Sets the partial search range to the range between the marker and the Δmarker. (**MKRA→SEARCH RNG** under **Search**); No query)

- Equivalent SCPI Command

:CALCulate:EVALuate:BAND:SPANΔMARKer

**SEARSTRL**

Sets the left (lower) border of the partial search range at the current position of the marker. (**MKR→LEFT RNG** under **Search**); No query)

- Equivalent SCPI Command

:CALCulate:EVALuate:BAND:STARtLMARKer

- Example

OUTPUT 717;"SEARSTRL"

OUTPUT 717;" :CALC:EVAL:BAND:STAR MARK"

## SEARSTRL

## SEARSTRR

Sets the right (higher) border of the partial search range at the current position of the marker. (MKR→RIGHT RNG under **Search**); No query)

■ Equivalent SCPI Command

:CALCulate:EVALuate:BAND:STOPMARKer

■ Example

OUTPUT 717;"SEARSTRR"

OUTPUT 717;":CALC:EVAL:BAND:STOP MARK"

## SEATARG□<numeric>[DB|DEG|S|OHM]

Makes the target value to the active function to enter a value and moves the marker to a specified target point on the trace. (Network and impedance analyzer only) (**TARGET** under **Search**)

| Parameter | Range                                   | Unit |
|-----------|-----------------------------------------|------|
| <numeric> | -5x10 <sup>5</sup> to 5x10 <sup>5</sup> |      |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:Y:XPOSITION:TARGet□<numeric>

■ Example

OUTPUT 717;"SEATARG 0"

## SEDI□<numeric>

Determines the segment of the list sweep table to be modified. (**EDIT** under **Sweep**); No query for the SCPI command)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 1 to 15     |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SENSe:LIST:SEGMENT:EDIT

**SETZ**  $\square$  *<numeric>* [OHM|KOHM|MAOHM]

**SETCDATE**  $\square$  *<numeric (year)>*, *<numeric (month)>*, *<numeric (day)>*

Sets the date of the internal clock. (DATE MM/DD/YY under **System**)

| Parameter                      | Description  |
|--------------------------------|--------------|
| <i>&lt;numeric (year)&gt;</i>  | 1900 to 2099 |
| <i>&lt;numeric (month)&gt;</i> | 1 to 12      |
| <i>&lt;numeric (day)&gt;</i>   | 1 to 31      |

■ Query Response

{*numeric (year)*} {*numeric (month)*} {*numeric (day)*} <new line><END>

■ Equivalent SCPI Command

:SYSTem:DATE  $\square$  *<numeric (year)>*, *<numeric (month)>*, *<numeric (day)>*

■ Example

OUTPUT 717; "SETCDATE 1993,1,1"

**SETCTIME**  $\square$  *<numeric (hour)>*, *<numeric (minute)>*, *<numeric (second)>*

Sets the time of the internal clock. (SETCTIME under **System**)

| Parameter                       | Description |
|---------------------------------|-------------|
| <i>&lt;numeric (hour)&gt;</i>   | 0 to 23     |
| <i>&lt;numeric (minute)&gt;</i> | 0 to 59     |
| <i>&lt;numeric (second)&gt;</i> | 0 to 59     |

■ Query Response

{*numeric (hour)*} {*numeric (minute)*} {*numeric (second)*} <new line><END>

■ Equivalent SCPI Command

:SYSTem:TIME  $\square$  *<numeric (hour)>*, *<numeric (minute)>*, *<numeric (second)>*

■ Example

OUTPUT 717; "SETCTIME 10,30,0"

**SETZ**  $\square$  *<numeric>* [OHM|KOHM|MAOHM]

Sets the characteristic impedance of the coaxial cable offset. (Network analyzer only) (SET Z0 under **Cal**)

| Parameter              | Range        | Unit     |
|------------------------|--------------|----------|
| <i>&lt;numeric&gt;</i> | 0.001 to 5 M | $\Omega$ |

**SETZ**  $\llcorner$  *numeric*  $\llcorner$  {OHM|KOHM|MAOHM}

■ Query Response

{*numeric*}  $\llcorner$  new line  $\llcorner$  END  $\llcorner$

■ Equivalent SCPI Command

:SENSE:CORRection:CIMPedance  $\llcorner$  *numeric*

**SGTRK**  $\llcorner$  {OFF|ON|0|1}

Sets the signal tracking function ON or OFF. (Spectrum analyzer only) (SGNL TRACK ON off under [Search](#))

| Parameter | Description         |
|-----------|---------------------|
| OFF or 0  | Signal tracking OFF |
| ON or 1   | Signal tracking ON  |

■ Query Response

{0|1}  $\llcorner$  new line  $\llcorner$  END  $\llcorner$

■ Equivalent SCPI Command

:SENSe:TRACk:SIGNaL:MARKer  $\llcorner$  {OFF|ON|0|1}

**SIMFCHAR**

Simulates frequency response of the equivalent circuit. (SIMULTE F-CHAR under [Display](#)); No query; Impedance analyzer only)

■ Equivalent SCPI Command

CALCulate:EVALuate:EPARameters:SIMulation



**SING**

Makes one sweep of the data and returns to the hold mode. (Instrument BASIC EXECUTE executable; **SINGLE** under **Trigger**; No query;)

When you execute this command by EXECUTE command of the instrument BASIC, the analyzer sweeps once and then back the control to the analyzer. The program waits the completion of sweep. You can use this method instead of detecting the sweep end by monitoring the status register to synchronize the program with the analyzer.

- Equivalent SCPI Command

```
:INITiate:CONTinuous{OFF|0}
:ABORt
:SENSe:SWEep:COUNt1
:INITiate[:IMMediate]
```

- Example

```
OUTPUT 717;"SING"
OUTPUT 717;":INIT:CONT OFF"
OUTPUT 717;":SENS:SWE:COUN 1"
OUTPUT 717;":INIT"
EXECUTE "SING"
```

**SLOP{OFF|ON|0|1}**

Sets the power slope function ON or OFF. With the slope ON, the output power increases with frequency (starting at the selected power level). (Network analyzer only) (**SLOPE ON off** under **Source**)

| Parameter | Description              |
|-----------|--------------------------|
| OFF or 0  | Power slope function OFF |
| ON or 1   | Power slope function ON  |

- Query Response

```
{0|1} <new line><END>
```

- Equivalent SCPI Command

```
:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]:SLOPe:STATe{OFF|ON|0|1}
```

**SLOPE** {OFF|ON|0|1}

**SLOPE** <numeric>

Compensates for the power loss versus the frequency sweep, by sloping the output power upwards proportionally to the frequency. (Network analyzer only) (**SLOPE** under **Source**)

| Parameter | Range  | Unit   |
|-----------|--------|--------|
| <numeric> | 0 to 2 | dB/GHz |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]:SLOPe<numeric>

**SMKR**{1-7} {OFF|ON|0|1}

Displays the specified sub-marker at the point of the marker (ON), or erases the sub-marker (OFF). (**SUB MKR** {1-7} under **Marker**)

| Parameter | Description    |
|-----------|----------------|
| OFF or 0  | Sub-marker ON  |
| ON or 1   | Sub-marker OFF |

■ Query Response

{0|1} <new line><END>

■ Equivalent SCPI Command

SMKR1 {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer2:STATe {OFF|ON|0|1}  
SMKR2 {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer3:STATe {OFF|ON|0|1}  
SMKR3 {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer4:STATe {OFF|ON|0|1}  
SMKR4 {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer5:STATe {OFF|ON|0|1}  
SMKR5 {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer6:STATe {OFF|ON|0|1}  
SMKR6 {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer7:STATe {OFF|ON|0|1}  
SMKR7 {OFF|ON|0|1} :DISPlay[:WINDow]:TRACe{[1]|2}:MARKer8:STATe {OFF|ON|0|1}

(TRACe[1] for the data trace; TRACe2 for the memory trace.)

**SMKRAUV{1-7}?**

Outputs the auxiliary amplitude value of the measurement value at the sub-marker position. See "Marker Readout" in Appendix H for the auxiliary amplitude value of each display format.

(SUB MKR {1-7}) under **Marker**; Query only)

## ■ Query Response

{*numeric*} <new line><END>

## ■ Equivalent SCPI Command

```
SMKRAUV1? :CALCulate:EVALuate:Y2:VALue2?
SMKRAUV2? :CALCulate:EVALuate:Y3:VALue2?
SMKRAUV3? :CALCulate:EVALuate:Y4:VALue2?
SMKRAUV4? :CALCulate:EVALuate:Y5:VALue2?
SMKRAUV5? :CALCulate:EVALuate:Y6:VALue2?
SMKRAUV6? :CALCulate:EVALuate:Y7:VALue2?
SMKRAUV7? :CALCulate:EVALuate:Y8:VALue2?
```

## ■ Example

```
OUTPUT 717;"SMKRAUV1?"
ENTER 717;A
```

**SMKRP{1-7}□<numeric>**

Moves the sub-marker to the specified data point number.

| Parameter | Description                                                                                                                                                         |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <numeric> | 1 to "number of points"<br>(If <numeric> is 0 or less than 0, it is set to 1.<br>If <numeric> is greater than "number of points," it is set to "number of points.") |

## ■ Query Response

{*numeric*} <new line><END>

## ■ Equivalent SCPI Command

```
SMKRP1□<numeric> :CALCulate:EVALuate:Y2:XPOSition:POINt□<numeric>
SMKRP2□<numeric> :CALCulate:EVALuate:Y3:XPOSition:POINt□<numeric>
SMKRP3□<numeric> :CALCulate:EVALuate:Y4:XPOSition:POINt□<numeric>
SMKRP4□<numeric> :CALCulate:EVALuate:Y5:XPOSition:POINt□<numeric>
SMKRP5□<numeric> :CALCulate:EVALuate:Y6:XPOSition:POINt□<numeric>
SMKRP6□<numeric> :CALCulate:EVALuate:Y7:XPOSition:POINt□<numeric>
SMKRP7□<numeric> :CALCulate:EVALuate:Y8:XPOSition:POINt□<numeric>
```

## ■ Example

```
OUTPUT 717;"SMKRP1 1"
OUTPUT 717;"SMKRP1?"
ENTER 717;A
```

**SMKRP{1-7}**□<numeric>

**SMKRPRM{1-7}**□<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Moves the sub-marker to the specified sweep parameter value. (SUB MKR {1-7}) under (Marker)

| Parameter | Range                     | Unit                          |
|-----------|---------------------------|-------------------------------|
| <numeric> | start value to stop value | Hz (frequency)<br>dBm (power) |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

```
SMKRPRM1□<numeric> :CALCulate:EVALuate:Y2:XPOSITION□<numeric>
SMKRPRM2□<numeric> :CALCulate:EVALuate:Y3:XPOSITION□<numeric>
SMKRPRM3□<numeric> :CALCulate:EVALuate:Y4:XPOSITION□<numeric>
SMKRPRM4□<numeric> :CALCulate:EVALuate:Y5:XPOSITION□<numeric>
SMKRPRM5□<numeric> :CALCulate:EVALuate:Y6:XPOSITION□<numeric>
SMKRPRM6□<numeric> :CALCulate:EVALuate:Y7:XPOSITION□<numeric>
SMKRPRM7□<numeric> :CALCulate:EVALuate:Y8:XPOSITION□<numeric>
```

**SMKRVAL{1-7}?**

Outputs the primary part of the measurement value at the sub-marker position.

(SUB MKR {1-7}) under (Marker); Query only)

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

```
SMKRVAL1? :CALCulate:EVALuate:Y2:VALue1?
SMKRVAL2? :CALCulate:EVALuate:Y3:VALue1?
SMKRVAL3? :CALCulate:EVALuate:Y4:VALue1?
SMKRVAL4? :CALCulate:EVALuate:Y5:VALue1?
SMKRVAL5? :CALCulate:EVALuate:Y6:VALue1?
SMKRVAL6? :CALCulate:EVALuate:Y7:VALue1?
SMKRVAL7? :CALCulate:EVALuate:Y8:VALue1?
```

**SPECIMP**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPAN**□<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Sets the frequency span of a segment about a specified center frequency, or sets the frequency span of the list sweep table. (**SPAN**) or **SPAN** under **Sweep**)

| Parameter | Range                                                                 | Unit                          |
|-----------|-----------------------------------------------------------------------|-------------------------------|
| <numeric> | 0 to 1.8199×10 <sup>9</sup> (=1.8199 G)<br>0 to 20 or 30 <sup>1</sup> | Hz (frequency)<br>dBm (power) |

<sup>1</sup> The maximum range depends on the center value.

#### ■ Query Response

{numeric} <new line><END>

#### ■ Equivalent SCPI Command

**Span** :SENSe:FREQuency:SPAN□<numeric> (frequency) or  
:SOURce:POWer:SPAN <numeric> (power)

**Span** under **Sweep** :SENSe:LIST:SEGment:FREQuency:SPAN□<numeric>  
(List sweep table)

**SPECFWD**{M|T}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the forward match (THRU) or forward transmission (THRU) calibration. (Network analyzer only) (**FWD.MATCH**, **FWD.TRANS.** under **Cal**); No query

| Parameter | Description |
|-----------|-------------|
| <numeric> | 1 to 8      |

#### ■ Equivalent SCPI Command

SPECFWDM :SENSe:CORRection:CKIT:CLASs9:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

SPECFWDT :SENSe:CORRection:CKIT:CLASs7:STANdard□<numeric 1>[,<numeric 2>  
[, ... [,<numeric 7>]

#### ■ Example

OUTPUT 717;"SPECFWDM 1"

OUTPUT 717;":SENS:CORR:CKIT:CLAS9:STAN 1"

**SPECIMP**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the first, second, or third standard class required for an impedance calibration. (**SPECIFY CLASS** under **Cal**); No query. Impedance analyzer only.)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 1 to 8      |

#### ■ Equivalent SCPI Command

**SPECIMP{A|B|C}**□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECIMPA :SENSe:CORRection:CKIT:CLASs13:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECIMPB :SENSe:CORRection:CKIT:CLASs14:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECIMPC :SENSe:CORRection:CKIT:CLASs15:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECRES{I|P}**□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for a response and isolation, or a response calibration. (Network analyzer only) (**RESPONSE & ISOL'N**, **RESPONSE** under **Cal**); No query)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 1 to 8      |

■ Equivalent SCPI Command

SPECRESI :SENSe:CORRection:CKIT:CLASs12:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECRESP :SENSe:CORRection:CKIT:CLASs11:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECREV{M|T}**□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the reverse match (THRU) or reverse transmission (THRU) calibration. (Network analyzer only) (**REV.MATCH**, **REV.TRANS.** under **Cal**); No query)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 1 to 8      |

■ Equivalent SCPI Command

SPECREVM :SENSe:CORRection:CKIT:CLASs10:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECREVT :SENSe:CORRection:CKIT:CLASs8:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECS22**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECS11**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the first, second, or third standard class required for an S<sub>11</sub> 1-port calibration. (Network analyzer only) (SPECIFY: S11A, S11B, S11C under **Cal**); No query)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 1 to 8      |

■ Equivalent SCPI Command

SPECS11A :SENSe:CORRection:CKIT:CLASs1:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECS11B :SENSe:CORRection:CKIT:CLASs2:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECS11C :SENSe:CORRection:CKIT:CLASs3:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECS22**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

Enters the standard numbers for the first, second, or third standard class required for an S<sub>22</sub> 1-port calibration. (Network analyzer only) (SPECIFY: S22A, S22B, S22C under **Cal**); No query)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 1 to 8      |

■ Equivalent SCPI Command

SPECS22A :SENSe:CORRection:CKIT:CLASs4:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECS22B :SENSe:CORRection:CKIT:CLASs5:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

SPECS22C :SENSe:CORRection:CKIT:CLASs6:STANdard□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPECS22**{A|B|C}□<numeric 1>[,<numeric 2>[, ... [,<numeric 7>]

**SPLD**□{OFF|ON|0|1}

Sets the dual channel display mode. (SPLIT DISP ON off under **Display**)

| Parameter | Description                                   |
|-----------|-----------------------------------------------|
| OFF or 0  | Full-screen single graticule display          |
| ON or 1   | Split display with two half-screen graticules |

■ Query Response

{0|1} <new line><^END>

■ Equivalent SCPI Command

SPLD□{OFF|0} :DISPlay[:WINDow]:FORMatLFBACk  
 SPLD□{ON|1} :DISPlay[:WINDow]:FORMatLULOWer

**SQUI**

Terminates editing a segment of the list sweep table. (SEGMENT QUIT under **Sweep**; No query)

■ Equivalent SCPI Command

:SENSe:LIST:SEGment:QUIT

**STAN**{A-G}

Measures the calibration standard in the current standard class. (Network analyzer only)  
 (OPEN, SHORT, THRU, OPEN [ ], SHORT [ ], defined std {1-7} under **Cal**); No query)

■ Equivalent SCPI Command

STANA :SENSe:CORRection:COLLect[:ACQuire]LSTANdard1  
 STANB :SENSe:CORRection:COLLect[:ACQuire]LSTANdard2  
 STANC :SENSe:CORRection:COLLect[:ACQuire]LSTANdard3  
 STAND :SENSe:CORRection:COLLect[:ACQuire]LSTANdard4  
 STANE :SENSe:CORRection:COLLect[:ACQuire]LSTANdard5  
 STANF :SENSe:CORRection:COLLect[:ACQuire]LSTANdard6  
 STANG :SENSe:CORRection:COLLect[:ACQuire]LSTANdard7

**STAR**□<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Sets the start value of a segment, or sets the start value of the list sweep table. (**Start** or **SEGMENT: START** under **Sweep**)

| Parameter | Range                                                                                                                                        | Unit                              |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| <numeric> | 100000 (=100 k) to 1.82×10 <sup>9</sup> (=1.82 G) (Network analyzer)<br>0 to 1.82×10 <sup>9</sup> (=1.82 G) (Spectrum analyzer)<br>-60 to 20 | Hz (frequency)<br><br>dBm (power) |



- Query Response

{*numeric*} <new line><END>

- Equivalent SCPI Command

**START**

:SENSe:FREQuency:START<*numeric*> (frequency) or  
:SOURce:POWer:START<*numeric*> (power)

**SEGMENT: START** under **Sweep**  
(List sweep table)

:SENSe:LIST:SEGment:FREQuency:START<*numeric*>

## STDD

Terminates the standard definition. (Network and impedance analyzer only)

(**STD DONE (DEFINED)** under **Cal**); No query

- Equivalent SCPI Command

:SENSe:CORRection:CKIT:STANdard:SAVE

## STDT{OPEN|SHOR|LOAD|DELA|ARBI}

Defines the standard type. (Network and impedance analyzer only) (**STD TYPE: OPEN , SHORT , LOAD , DELAY/THRU , ARBITRARY IMPEDANCE** under **Cal**)

| Parameter | Description                           |
|-----------|---------------------------------------|
| OPEN      | OPEN                                  |
| SHOR      | SHORT                                 |
| LOAD      | LOAD                                  |
| DELA      | Transmission line of specified length |
| ARBI      | LOAD with an arbitrary impedance      |

- Query Response

{OPEN|SHOR|LOAD|DELA|ARBI} <new line><END>

- Equivalent SCPI Command

:SENSe:CORRection:CKIT:STANdard:TYPE{OPEN|SHORT|LOAD|DELAY|AIMpedance}

## STOD{DISK|MEMO}

Sets the storage device. (**STOR DEV[ ]** under **Save**); No query; No equivalent SCPI command)

| Parameter | Description         |
|-----------|---------------------|
| STODDISK  | Flexible disk drive |
| STODMEMO  | RAM disk memory     |

## STOD{DISK|MEMO}

## STOP□<numeric>[HZ|KHZ|MAHZ|GHZ|DBM]

Sets the stop value frequency of a segment, or the stop value of the list table. (**STOP**) or **STOP** under **Sweep**)

| Parameter | Range                                                              | Unit           |
|-----------|--------------------------------------------------------------------|----------------|
| <numeric> | 100000 (=100 k) to $1.82 \times 10^9$ (=1.82 G) (Network analyzer) | Hz (frequency) |
|           | 0 to $1.82 \times 10^9$ (=1.82 G) (Spectrum analyzer)              |                |
|           | -60 to 20                                                          | dBm (power)    |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

**Stop** :SENSe:FREQuency:STOP□<numeric> (frequency) or  
:SOURce:POWer:STOP□<numeric> (power)

**Stop** under **Sweep** :SENSe:LIST:SEGment:FREQuency:STOP□<numeric>  
(List sweep table)

## SVCO

Saves the modified version of the color set to the non-volatile memory. (**SAVE COLORS** under **Display**); No query)

### ■ Equivalent SCPI Command

:DISPlay:CMAP:STORe

## SWET□<numeric>[S|MS]

Sets the sweep time. (**SWEEP TIME** under **Sweep**)

| Parameter | Range                               | Unit |
|-----------|-------------------------------------|------|
| <numeric> | (depends on the analyzer's setting) | s    |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:SENSe:SWEEP:TIME□<numeric>

**SWETAUTO{OFF|ON|0|1}**

Sets the automatic or manual sweep time. The automatic mode gives the fastest sweep time at the analyzer's current settings of the channel. (SWEEP TIME AUTO man under Sweep)

| Parameter | Description          |
|-----------|----------------------|
| OFF or 0  | Manual sweep time    |
| ON or 1   | Automatic sweep time |

- Query Response

{0|1} <new line><END>

- Equivalent SCPI Command

:SENSe:SWEep:TIME:AUTO{OFF|ON|0|1}

**SWPT{LIN|LOGF|LIST|POWE}**

Selects the sweep type. (SWEEP TYPE:LIN FREQ, LOG FREQ, LIST FREQ, POWER SWEEP under Sweep)

| Parameter | Description                                         |
|-----------|-----------------------------------------------------|
| LINF      | Linear frequency                                    |
| LOGF      | Log frequency (Network and impedance analyzer only) |
| LIST      | Frequency list                                      |
| POWE      | Power (Network and impedance analyzer only)         |

- Query Response

{LIN|LOGF|LIST|POWE} <new line><END>

- Equivalent SCPI Command

SWPT{LINF :SENSe:FREQuency:MODE{SWEep  
:SOURce:POWer:MODE{FIXed  
:SENSe:SWEep:SPACing{LINear

SWPT{LOGF :SENSe:FREQuency:MODE{SWEep  
:SOURce:POWer:MODE{FIXed  
:SENSe:SWEep:SPACing{LOGarithmic

SWPT{LIST :SENSe:FREQuency:MODE{LIST  
:SOURce:POWer:MODE{LIST  
:SENSe:SWEep:SPACing{LINear

SWPT{POWE :SENSe:FREQuency:MODE{FIXed  
:SOURce:POWer:MODE{SWEep  
:SENSe:SWEep:SPACing{LINear

## TARL?

Searches for the point having the parameter-specified value leftward from the right end of the range, and returns its stimulus. See "TARL?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## TARR?

Searches for the point having the parameter-specified value rightward from the left end of the range, and returns its stimulus. See "TARR?" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

## TERI<numeric>[OHM|KOHM]

Specifies the (arbitrary) impedance of the standard. (Network and impedance analyzer only)  
(**TERMINAL IMPEDANCE** under **Cal**); No query)

| Parameter | Range               | Unit     |
|-----------|---------------------|----------|
| <numeric> | 0 to 10000 (= 10 k) | $\Omega$ |

### ■ Equivalent SCPI Command

:SENSe:CORRection:CKIT:STANdard:TIMPedance<numeric>

## TESS?

Outputs the test set identifier. (Network analyzer only) (Query only)

### ■ Query Response

{0|1} <new line><^END>

| Parameter | Description          |
|-----------|----------------------|
| 0         | None                 |
| 1         | S-parameter test set |

### ■ Equivalent SCPI Command

:SYSTem:COMMunicate:TSET?

## THRR<numeric>

Sets threshold ripple height for waveform analysis commands. See "THRR" in Appendix I for details, query response, and examples. (Instrument BASIC EXECUTE executable; No equivalent SCPI command; Query only)

**TINT**□<numeric>

Adjusts the hue of the specified display element. (**TINT** under **Display**); No equivalent SCPI command)

| Parameter | Range    | Unit |
|-----------|----------|------|
| <numeric> | 0 to 100 | %    |

■ Query Response

{numeric} <new line><END>

**TITL**□<string>

Sends the string to the title area on the display. (**TITL** under **Display**)

| Parameter | Description         |
|-----------|---------------------|
| <string>  | up to 53 characters |

■ Query Response

{string} <new line><END>

■ Equivalent SCPI Command

:DISPlay[:WINDow]:TEXT17[:DATA]□<string>

■ Example

```
OUTPUT 717;"TITL ""COMMENT"""  
OUTPUT 717;"TITL?"  
ENTER 717;A$  
OUTPUT 717;":DISP:TEXT17 ""COMMENT"""  
OUTPUT 717;":DISP:TEXT17?"  
ENTER 717;A$
```

**TMARG**□<numeric>

Specify the value for the top margin of printed paper. (**TOP MARGIN** under **Copy**)

| Parameter | Range  | Unit |
|-----------|--------|------|
| <numeric> | 0 to 5 | inch |

■ Query Response

{numeric} <new line><END>

■ Equivalent SCPI Command

:HCOPy:DRIVER:TOPMarg□<numeric>

## TOPV<numeric>

Defines the top border of the display and adjusts the scale value. (TOP VALUE under Scale Ref; Impedance analyzer only.)

| Parameter | Range                                   | Unit        |
|-----------|-----------------------------------------|-------------|
| <numeric> | -1×10 <sup>9</sup> to 1×10 <sup>9</sup> | y-axis unit |

### ■ Query Response

<numeric><new line><END>

### ■ Equivalent SCPI Command

:DISPlay[:WINDow]:TRACe{1|2}:Y[:SCALE]:TOPV<numeric>

## TRACK{OFF|ON|0|1}

Sets the search tracking function ON or OFF. (SRCH TRACK ON off under Search)

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

TRACK{OFF|0} :CALCulate:EVALuate:Y:XPOSITION:TRACkOFF  
TRACK{ON|1} :CALCulate:EVALuate:Y:XPOSITION:TRACk  
{MAXimum|MINimum|TARGet|PEAK|PALL|PLEFt|PRIGHt}

| Parameter | Description    |
|-----------|----------------|
| MAXimum   | Maximum search |
| MINimum   | Minimum search |
| TARGet    | Target search  |
| PEAK      | Peak search    |
| PALL      | Peaks all      |
| PLEFt     | Peaks left     |
| PRIGHt    | Peaks right    |

## TRAD

Completes the transmission calibration of the full or one-path 2-port calibration. (Network analyzer only) (TRANS. DONE under Cal; No query)

### ■ Equivalent SCPI Command

:SENSe:CORRection:COLLect:SAVE6

### ■ Example

OUTPUT 717;"TRAD"

OUTPUT 717;"SENS:CORR:COLL:SAVE6"

**TRAN**

Starts the transmission part of the full or one-path 2-port calibration. (Network analyzer only)  
(TRANSMISSION under Cal); No query)

- Equivalent SCPI Command

```
:SENSe:CORRection:COLLect[:ACQuire]UTRAN2
```

**TRGEVE{SWE|POIN}**

Selects the trigger event mode. (Network and impedance analyzer only) (TRIG EVENT [ ]  
under Trigger)

| Parameter | Description                         |
|-----------|-------------------------------------|
| SWE       | Trigger event on sweep              |
| POIN      | Trigger event on point <sup>1</sup> |

<sup>1</sup> Available only when the trigger source is the HP-IB, Manual, or External trigger.

- Query Response

```
{SWE|POIN} <new line><^END>
```

- Equivalent SCPI Command

```
:TRIGger:EVENT:TYPE{SWEep|POINT}
```

**TRGP{POS|NEG}**

Sets the trigger signal polarity of an external signal connected to the rear panel EXT TRIGGER input. (TRIG PLRTY pos neg under Trigger)

| Parameter | Description                               |
|-----------|-------------------------------------------|
| POS       | Positive trigger (low-to-high transition) |
| NEG       | Negative trigger (high-to-low transition) |

- Query Response

```
{POS|NEG} <new line><^END>
```

- Equivalent SCPI Command

```
:TRIGger:SLOPe{POSitive|NEGative}
```

**TRGP** {POS|NEG}

**TRGS** {INT|EXT|BUS|VID|MAN|GAT}

Selects the trigger source, which is common to both channels. (TRIGGER: [ ] under **Trigger**)

| Parameter | Description                                                   |
|-----------|---------------------------------------------------------------|
| INT       | Internal trigger                                              |
| EXT       | External trigger input from BNC on the rear panel             |
| BUS       | HP-IB trigger                                                 |
| VID       | Video trigger (Spectrum analyzer only)                        |
| MAN       | Manual trigger                                                |
| GAT       | External gate trigger (Spectrum analyzer and option 1D6 only) |

■ Query Response

{INT|EXT|BUS|VID|MAN|GAT} <new line><END>

■ Equivalent SCPI Command

```
TRGS INT      :TRIGger:SOURce INTernal1
               :SENSe:SWEep:GATed {OFF|0}

TRGS EXT      :TRIGger:SOURce EXTernal
               :SENSe:SWEep:GATed {OFF|0}

TRGS BUS      :TRIGger:SOURce BUS
               :SENSe:SWEep:GATed {OFF|0}

TRGS VID      :TRIGger:SOURce INTernal2
               :SENSe:SWEep:GATed {OFF|0}

TRGS MAN      :TRIGger:SOURce MANual
               :SENSe:SWEep:GATed {OFF|0}

TRGS GAT      :TRIGger:SOURce EXTernal
               :SENSe:SWEep:GATed {ON|1}
```

**USKEY**

Displays the user menu of the soft keys. The user menu display returns to the ordinary measurement keys when the program ends. (No query; No equivalent SCPI command)

The USKEY command is equivalent to executing the program shown below;

```
OUTPUT @Hp4396;"KEY 47"
OUTPUT @Hp4396;"KEY 0"
OUTPUT @Hp4396;"KEY 6"
```



**VELOFACT**  $\square$  *<numeric>***VBW**  $\square$  *<numeric>* [**HZ**|**KHZ**|**MAHZ**]Sets the bandwidth of the video bandwidth filter. (Spectrum analyzer only) (**VIDEO BW** under **Bw/Avg**)

| Parameter              | Description                                      |
|------------------------|--------------------------------------------------|
| <i>&lt;numeric&gt;</i> | RBW, RBW/3, RBW/10, RBW/30, RBW/100, and RBW/300 |

## ■ Query Response

*{numeric}* <new line><END>

## ■ Equivalent SCPI Command

```
:SENSe:BANDwidth[:RESolution]:AUTO  $\square$  {OFF|0}
:SENSe:BANDwidth[:RESolution]  $\square$  <numeric>
```

**VBWT**  $\square$  {**LIN**|**LOG**}Selects either the linear or logarithmic video filter. (**VBW TYPE [LIN]** or **[LOG]** under **Bw/Avg**)

## ■ Query Response

{**LIN**|**LOG**}<new line><END>

## ■ Equivalent SCPI Command

SENSe:BANDwidth:VIDeo:TYPE  $\square$  {**LIN**|**LOG**}

## ■ Examples

```
OUTPUT @Hp4396;"SENS:BAND:VID:TYPE LOG"
OUTPUT @Hp4396;"SENS:BAND:VID:TYPE?"
ENTER @Hp4396;Type$
PRINT "Current VBW setting is ";Type$
```

**VELOFACT**  $\square$  *<numeric>*Enters the velocity factor used by the analyzer to calculate the equivalent electrical length. (Network and impedance analyzer only) (**VELOCITY FACTOR** under **Cal**)

| Parameter              | Range   | Unit |
|------------------------|---------|------|
| <i>&lt;numeric&gt;</i> | 0 to 10 |      |

## ■ Query Response

*{numeric}* <new line><END>

## ■ Equivalent SCPI Command

:SENSe:CORRection:RVELOCITY  $\square$  *<numeric>*

## VIDLVL <numeric>

Sets the video trigger level. (Spectrum analyzer only) (VIDEO under Trigger)

| Parameter | Range    | Unit |
|-----------|----------|------|
| <numeric> | 0 to 100 | %    |

### ■ Query Response

{numeric} <new line><END>

### ■ Equivalent SCPI Command

:TRIGger:LEVel<numeric>

## WIDSIN

Searches for the cutoff point on the trace within the current cutoff points. (Network and impedance analyzer only; SEARCH IN under Search); No query

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTh:XPOSition:IN

### ■ Example

OUTPUT 717;"WIDSIN"

OUTPUT 717;":CALC:EVAL:WIDT:XPOS:IN"

## WIDSOUT

Searches for the cutoff point on the trace outside of the current cutoff points. (Network and impedance analyzer only; SEARCH OUT under Search); No query

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTh:XPOSition:OUT

## WIDT {OFF|ON|0|1}

Sets the bandwidth search feature ON or OFF. (Network and impedance analyzer only)

(WIDThS ON off under Search)

| Parameter | Description                                                                                                                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OFF or 0  | Bandwidth search feature OFF                                                                                                                                                                  |
| ON or 1   | Bandwidth search feature ON (calculates the center stimulus value, bandwidth, Q, insertion loss, and cutoff point deviation from the center of a bandpass or band reject shape on the trace.) |

### ■ Query Response

{0|1} <new line><END>

### ■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTh:STATe {OFF|ON|0|1}

**WIDV**  $\square$  *<numeric>* [**DB**|**DEG**|**S**|**OHM**]

Sets an amplitude parameter that defines the start and stop points for a bandwidth search. (Network and impedance analyzer only) (**WIDTH VALUE** under **Search**)

| Parameter              | Range                                                                     | Format               |
|------------------------|---------------------------------------------------------------------------|----------------------|
| <i>&lt;numeric&gt;</i> | -5x10 <sup>5</sup> to 5x10 <sup>5</sup><br>-500 to 500 (Network analyzer) | Log magnitude format |

■ Query Response

*{numeric}* <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTH:Y  $\square$  *<numeric>*

**WIDVTYPE**  $\square$  {**DIVS2**|**MULS2**|**DIV2**|**FIXed**}

Select Maker Width Value Type. When you use **FIXed**, you must specify the bandwidth value by using **WIDV**. (**MKRVAL**/ $\sqrt{2}$ ), **MKRVAL**\* $\sqrt{2}$ , **MKRVAL**/2, or **FIXED VALUE** under **Search**)  
**WIDTH**  $\square$  **WIDHT VALUE**. Impedance analyzer only.)

■ Query Response

{**DIVS2**|**MULS2**|**DIV2**|**FIX**} <new line><END>

■ Equivalent SCPI Command

:CALCulate:EVALuate:WIDTH:Y:TYPE  $\square$  {**DIVS2**|**MULS2**|**DIV2**|**FIXed**, *<numeric>*}

■ Samples

```
OUTPUT @Hp4396;"WIDVTYPE DIV2"
OUTPUT @Hp4396;"WIDVTYPE FIXed"
OUTPUT @Hp4396;"WIDV ";3
```

**ZA**

Selects the impedance analyzer mode. (**IMPEDANCE ANALYZER** under **Meas**)

■ Query Response

{0|1} <new line><END>

| Parameter | Description                              |
|-----------|------------------------------------------|
| 0         | Impedance analyzer mode is not selected. |
| 1         | Impedance analyzer mode is selected.     |

■ Equivalent SCPI Command

:INSTrument:TYPE  $\square$  ZA

## ZA

### ZMAPER $\lfloor$ *<numeric>*

Sets the zooming aperture value as a percentage of the span. (**ZOOMING APERTURE** under

Marker  $\rightarrow$ )

| Parameter              | Range               | Unit |
|------------------------|---------------------|------|
| <i>&lt;numeric&gt;</i> | 0.01 to 100 of SPAN | %    |

#### ■ Query Response

{*numeric*}  $\langle$  new line  $\rangle$   $\langle$  END  $\rangle$

#### ■ Equivalent SCPI Command

:DATA[:DATA]  $\lfloor$  MZAP, *<numeric>*

#### ■ Example

```
OUTPUT 717;"ZMAPER 50"
```

```
OUTPUT 717;"ZMAPER?"
```

```
ENTER 717;A
```

```
OUTPUT 717;":DATA MZAP,50"
```

```
OUTPUT 717;":DATA? MZAP"
```

```
ENTER 717;A
```

## Common Commands

### \*CLS

Clears the Status Byte Register, and the Event Register of the Operation Status Register, the Standard Event Status Register, and the Event Status Register B (Instrument Event Status Register). (No query)

- Example

```
OUTPUT 717;"*CLS"
```

### \*ESE<numeric>

Sets the enable bits of the Standard Event Status Register.

| Parameter | Description                                                                   |
|-----------|-------------------------------------------------------------------------------|
| <numeric> | 0 to 255 (decimal expression of enable bits of the operation status register) |

- Query Response

```
{numeric} <new line><END>
```

- Example

```
OUTPUT 717;"*ESE 1"
OUTPUT 717;"*ESE?"
ENTER 717;A
```

### \*ESR?

Returns the contents of the Standard Event Status Register. (Query only)

- Query Response

```
{numeric} <new line><END>
```

- Example

```
OUTPUT 717;"*ESR?"
ENTER 717;A
```

### \*IDN?

Returns the analyzer's ID.

- Query Response

```
{manufacturer} {model} {serial no.} {firmware rev.} <new line><END>
```

- Example

```
OUTPUT 717;"*IDN?"
ENTER 717;A$
```

### \*IDN?

### \*OPC

Tells the analyzer to set bit 0 (Operation Complete bit) in the Standard Event Status Register when it completes all pending operations.

\*OPC? query places an ASCII character 1 into the analyzer's output queue when all pending operations have been completed.

#### ■ Query Response

{1} <new line><END>

#### ■ Example

```
OUTPUT 717;"*OPC"
```

```
OUTPUT 717;"*OPC?"
```

```
ENTER 717;A
```

### \*OPT?

Queries the options installed. (Query only)

#### ■ Query Response

{parameter} <new line><END>

| Parameter | Description                  |
|-----------|------------------------------|
| (Null)    | None                         |
| 1C2       | HP Instrument BASIC          |
| 1D6       | Time-gated spectrum analysis |

#### ■ Example

```
OUTPUT 717;"*OPT?"
```

```
ENTER 717;A$
```

### \*PCBL<numeric>

Specifies the address of a controller that is temporarily passing HP-IB control to the analyzer. (Option 1C2 only; No query)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 0 to 30     |

#### ■ Example

```
OUTPUT 717;"*PCB 0"
```

**\*RST**

Resets the analyzer to its default values, (see Appendix D of the *Function Reference* for information on the default values), stops sweeping and taking data, and resets the HP Instrument BASIC (option 1C2 only). (No query)

## ■ Example

```
OUTPUT 717;"*RST"
```

**\*SRE** <numeric>

Sets the enable bits of the Status Byte Register.

| Parameter | Description                                                              |
|-----------|--------------------------------------------------------------------------|
| <numeric> | 0 to 255 (decimal expression of enable bits of the status byte register) |

## ■ Query Response

```
{numeric} <new line><END>
```

## ■ Example

```
OUTPUT 717;"*SRE 1"
OUTPUT 717;"*SRE?"
ENTER 717;A
```

**\*STB?**

Reads the Status Byte Register by reading the master summary status bit. (Query only)

## ■ Query Response

```
{numeric} <new line><END>
```

## ■ Example

```
OUTPUT 717;"*STB?"
ENTER 717;A
```

**\*TRG**

Triggers the analyzer when the trigger mode is set to BUS trigger. (No query)

## ■ Example

```
OUTPUT 717;"*TRG"
```

**\*TRG**

**\*TST?**

Executes an internal self-test and returns the test result. (Query only)

■ Query Response

{*numeric*} <new line><END>

| Parameter | Description |
|-----------|-------------|
| 0         | Pass        |
| 1         | Fail        |

■ Example

```
OUTPUT 717;"*TST?"  
ENTER 717;A
```

**\*WAI**

Makes the analyzer wait until all previously sent commands are completed. (No query)

■ Example

```
OUTPUT 717;"*WAI"
```



---

## SCPI Commands With No Equivalent Simple Command

### :CALCulate:MATH1[:EXPRession]:CATalog?

Returns the available parameters that can be used with the :CALCulate:MATH1[:EXPRession]:NAME command. (Query only)

■ Query Response

“OFF,YREF,YTRA,ZREF,ZTRA,INVS,MP4,MP8,MP16” <new line><END>

■ Example

```
OUTPUT 717;":CALC:MATH1:CAT?"  
ENTER 717;A$
```

### :CALCulate:MATH2[:EXPRession]:CATalog?

Returns the available parameters that can be used with the :CALCulate:MATH2[:EXPRession]:NAME command. (Query only)

■ Query Response

“ADD,SUB,DIV,OFF” <new line><END>

■ Example

```
OUTPUT 717;":CALC:MATH2:CAT?"  
ENTER 717;A$
```

### :CALCulate:PATH?

Returns the order in which CALCulate subsystems are to be performed.

■ Query Response

“MATH1,FORM,AVER,MATH2,LIM” <new line><END>

■ Example

```
OUTPUT 717;":CALC:PATH?"  
ENTER 717;A$
```

## **:PROG:CATalog?**

Returns all the defined program names. The program name is always "PROG", because the analyzer's HP Instrument BASIC only executes a single program at a time. This command can be used from an external controller only. (Query only)

### ■ Query Response

```
{ "PROG" } <new line><END>
```

### ■ Example

```
OUTPUT 717; ":PROG:CAT?"  
ENTER 717; A$
```

## **:PROGRAM[:SElected]:DEFine<block>**

Creates and downloads programs. The DEFine query uploads programs. This command can be used from an external controller only.

| Parameter | Description |
|-----------|-------------|
| <block>   | program     |

The <block> must be arbitrary block program data containing the lines of program code. The first line of <block> must be a header, which shows the program size. There are two formats for the header as follows:

- #0            Allows the OUTPUT statement to send program line until END is specified in the OUTPUT statement.
- #NMM... M    Specifies the program size.
  - N specifies the number of digits that define the program size
  - M... M is program size in byte (N digits)

Each line of the program must be separated by <CR> or <CR> <LF>. When the size of the <block> exceeds the amount of available memory in the instrument, the program lines are saved up to the point of memory overflow.

In the response to the DEFine query, the selected program and its size are returned. The selected program must be in either the paused or stopped state for the program to be uploaded. The <block> is uploaded as definite length arbitrary block response data. The program size is returned in the first line as the header, then program lines are returned.

**:PROG**[:SELEcted]:NAME␣<string>

■ Example

```
OUTPUT 717;":PROG:DEF #0"
OUTPUT 717;":10 PRINT ""HELLO!""
OUTPUT 717;":20 END"
OUTPUT 717;":",END

DIM A$[100000]
OUTPUT 717;":PROG:DEF?"
ENTER 717 USING "%,2A";HEAD$ ! Gets the header.
B=VAL(HEAD$[2]) !
FOR I=1 TO B !
  ENTER 717 USING "%,A";HEAD$ !
NEXT I !
ENTER 717 USING "-K";A$ ! Gets the program.
```

**:PROG**[:SELEcted]:DELEte[:SELEcted]

Deletes the program in the BASIC editor of the analyzer. This command can be used from an external controller only. (No query)

■ Example

```
OUTPUT 717;":PROG:DEL"
```

**:PROG**[:SELEcted]:DELEte:ALL

Deletes the program in the BASIC editor of the analyzer. This command can be used from an external controller only. (No query)

■ Example

```
OUTPUT 717;":PROG:DEL:ALL"
```

**:PROG**[:SELEcted]:EXECute␣<string>

Executes the program command. The program must be in either paused or stopped before the EXECute command is allowed. This command can be used from an external controller only. (No query)

| Parameter | Description           |
|-----------|-----------------------|
| <string>  | Legal program command |

■ Example

```
OUTPUT 717;":PROG:EXEC ""STEP""
```

**:PROG**[:SELEcted]:MALLocate␣{<numeric>|DEFault}

Performs no function in the analyzer's HP Instrument BASIC. This command can be used from an external controller only.

**:PROG**[:SELEcted]:NAME␣<string>

Performs no function in the analyzer's HP Instrument BASIC. This command can be used from an external controller only.

**:PROG**[:SElected]:NAME␣<string>

**:PROG**[:SElected]:NUMBER␣<string>,<numeric 1>[,<numeric 2> [, ...  
[,<numeric n>]

Sets or queries the contents of numeric program variables and arrays in the program on the BASIC editor of the analyzer. This command can be used from an external controller only.

| Parameter | Description                                                                                 |
|-----------|---------------------------------------------------------------------------------------------|
| <string>  | Name of an existing variable in the selected program (either character data or string data) |
| <numeric> | Variable value                                                                              |

■ Query Response

{<numeric 1> [{<numeric 2> [ ... [{<numeric n>} ... ]]}] <new line><END>

(n is the number of the array.)

■ Example

```
OUTPUT 717;":PROG:NUMB A,1"
```

```
OUTPUT 717;":PROG:NUMB? A"
```

```
ENTER 717;B
```

**:PROG**[:SElected]:STATe␣{RUN|PAUSE|STOP|CONTinue}

Sets or queries the state of the program in the BASIC editor of the analyzer. The table below defines the affect of setting the state to the specified state from each of the possible current states. This command can be used from an external controller only.

| Desired State | Current State |       |              |
|---------------|---------------|-------|--------------|
|               | RUN           | PAUSE | STOP         |
| RUN           | error (-221)  | RUN   | RUN          |
| CONT          | error (-221)  | RUN   | error (-221) |
| PAUSE         | PAUSE         | PAUSE | STOP         |
| STOP          | STOP          | STOP  | STOP         |

■ Query Response

{"RUN"|"PAUS"|"STOP"|"CONT"} <new line><END>

■ Example

```
OUTPUT 717;":PROG:STAT ""STOP""
```

```
OUTPUT 717;":PROG:STAT?"
```

```
ENTER 717;A$
```

**:PROGram[:SELEcted]:STRing**  $\square$  *<string (varname)>*, *<string (value 1)>* [, *<string (value 2)>* [, ... [, *<string (value n)>* ]]

Sets or queries the contents of string program variables and arrays in the program in the BASIC editor of the analyzer. If a string value is too long it is truncated when stored in the program's variable. This command can be used from an external controller only.

| Parameter                       | Description                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------|
| <i>&lt;string (varname)&gt;</i> | Name of an existing variable in the selected program (either character data or string data). |
| <i>&lt;string (value)&gt;</i>   | Variable value                                                                               |

■ Query Response

*{string 1}* [*{string 2}* [ ... [*{string n}* ... ]]] *<new line><END>*

(n is the number of the array.)

■ Example

```
OUTPUT 717;":PROG:STR A,""HELLO""
```

```
OUTPUT 717;":PROG:STR? A"
```

```
ENTER 717;B$
```

**:PROGram[:SELEcted]:WAIT**

Causes no further commands or queries to be executed until the defined program exits from the RUN state. That is, the program is either stopped or paused. This command can be used from an external controller only.

■ Query Response

*{1}* *<new line><END>*

1 is returned when the program is either stopped or paused.

■ Example

```
OUTPUT 717;":PROG:WAIT"
```

```
OUTPUT 717;":PROG:WAIT?"
```

```
ENTER 717;A
```

**Note**



The following commands under the EXPLicit node perform the specified functions in the same manner as the corresponding commands under the SELEcted node. The EXPLicit commands are included in the analyzer's HP-IB commands to maintain compatibility with other SCPI instruments. Therefore, you can use either the EXPLicit or the SELEcted commands for the analyzer. However, you should select one set and use it consistently to avoid confusion.

**:PROGRAM:EXPLICIT:DEFINE** **“PROG”**, <block>

See “:PROGRAM[:SELETED]:DEFINE **“PROG”**”.

**:PROGRAM:EXPLICIT:DELETE** **“PROG”**

See “:PROGRAM[:SELETED]:DELETE[:SELETED]”.

**:PROGRAM:EXPLICIT:EXECUTE** **“PROG”**, <string>

See “:PROGRAM[:SELETED]:EXECUTE **“PROG”**”.

**:PROGRAM:EXPLICIT:MALLOCATE** **“PROG”**, {<numeric> | **DEFAULT**}

See “:PROGRAM[:SELETED]:MALLOCATE {<numeric> | **DEFAULT**}”.

**:PROGRAM:EXPLICIT:NAME** **“PROG”**, <string>

See “:PROGRAM[:SELETED]:NAME **“PROG”**”.

**:PROGRAM:EXPLICIT:NUMBER** **“PROG”**, <varname>, <numeric 1>  
[, <numeric 2> [, ... [, <numeric n>] ... ]]

See “:PROGRAM[:SELETED]:NUMBER **“PROG”**, <varname>, <numeric 1>, <numeric 2> [, ... [, <numeric n>]”.

**:PROGRAM:EXPLICIT:STATE** **“PROG”**, {**RUN** | **PAUSE** | **STOP** | **CONTINUE**}

See “:PROGRAM[:SELETED]:STATE {**RUN** | **PAUSE** | **STOP** | **CONTINUE**}”.

**:PROGRAM:EXPLICIT:STRING** **“PROG”**, <varname>, <string 1> [, <string 2>  
[, ... [, <string n>] ... ]]

See “:PROGRAM[:SELETED]:STRING **“PROG”**, <varname>, <string (value 1)> [, <string (value 2)>  
[, ... [, <string (value n)>]”.

**:PROGRAM:EXPLICIT:WAIT** **“PROG”**

See “:PROGRAM[:SELETED]:WAIT **“PROG”**”.

**:SYSTem:VERSion?****:STATus:PRESet**

Clears the Operational and Questionable Status Register groups. Both event and enable registers are cleared. (No query)

## ■ Example

```
OUTPUT 717;":STAT:PRES"
```

**:STATus:QUEStionable:CONDition?**

Returns the contents of the condition register of the Questionable Register group. (Query only)  
The analyzer has no operation that reports an event to the questionable register.

**:STATus:QUEStionable:ENABle**  <numeric>

Sets or queries the enable register of the questionable register group.

The analyzer has no operation that reports an event to the questionable register.

**:STATus:QUEStionable[:EVENT]?**

Returns the contents of the event register of the Questionable register group. (Query only)  
The analyzer has no operation that reports an event to the questionable register.

**:SYSTem:VERSion?**

Returns the value corresponding to the SCPI version to which the instrument complies. (Query only)

## ■ Query Response

```
{YYYY.V} <new line><END>
```

| Parameter | Description                  |
|-----------|------------------------------|
| YYYY      | Year-version                 |
| V         | Revision number for the year |

## ■ Example

```
OUTPUT 717;":SYST:VERS?"
ENTER 717;A$
```

---

## Service Related Commands

---

**Note** See the *Service Manual* for more information about each function.



---

### **:DIAG:EReference:STATe?**

Tells whether an external frequency reference signal is connected to the rear-panel EXT REF INPUT connector. (Query only)

■ Query Response

{0|1} <new line><END>

| Parameter | Description                              |
|-----------|------------------------------------------|
| 0         | The external reference is not connected. |
| 1         | The external reference is connected.     |

■ Example

```
OUTPUT 717;":DIAG:EREF:STAT?"  
ENTER 717;A
```

### **:DIAG:FREVision?**

Returns the current firmware revision information. (**FIRMWARE REVISION** under **System**);  
Query only)

■ Query Response

"HP 4396B REVN.NN MON DD YEAR HH:MM:SS" <new line><END>

| Parameter | Description                  |
|-----------|------------------------------|
| N.NN      | Revision number              |
| MON       | Implementation date (month)  |
| DD        | Implementation date (date)   |
| YEAR      | Implementation date (year)   |
| HH        | Implementation time (hour)   |
| MM        | Implementation time (minute) |
| SS        | Implementation time (second) |

■ Example

```
OUTPUT 717;":DIAG:FREV?"  
ENTER 717;A$
```



**:DIAG:SERVice:BUS:DC** $\square$ *<numeric>*

**:DIAG:INIT:RESult?**

Returns the result of the power on test. (Query only)

■ Query Response

{PASS|FAIL} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:INIT:RES?"
ENTER 717;A$
```

**:DIAG:SERVice:BUS:AZERo** $\square$ {OFF|ON|0|1}

Sets the Auto Zero Switch of the Bus Measurement. (AZ SWITCH ON off under **System**)

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:BUS:AZER ON"
OUTPUT 717;":DIAG:SERV:BUS:AZER?"
ENTER 717;A
```

**:DIAG:SERVice:BUS:DC** $\square$ *<numeric>*

Selects the DC Bus Nodes of the Bus Measurement. (DC BUS [ ] under **System**)

| Parameter              | Description |
|------------------------|-------------|
| <i>&lt;numeric&gt;</i> | 0 to 26     |

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:BUS:DC 0"
OUTPUT 717;":DIAG:SERV:BUS:DC?"
ENTER 717;A
```

**:DIAG:SERVice:BUS:DC**  <numeric>

**:DIAG:SERVice:BUS:FREQ**  <numeric>

Selects the Frequency Bus Nodes of the Bus Measurement. (**FREQ BUS** [ ] under **System**)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 0 to 7      |

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:BUS:FREQ 0"  
OUTPUT 717;":DIAG:SERV:BUS:FREQ?"  
ENTER 717;A
```

**:DIAG:SERVice:BUS:STATe**  {OFF|ON|0|1}

Sets the Bus Measurement ON or OFF. (**BUS MEAS ON off** under **System**)

| Parameter | Description         |
|-----------|---------------------|
| OFF or 0  | Bus measurement OFF |
| ON or 1   | Bus measurement ON  |

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:BUS:STAT ON"  
OUTPUT 717;":DIAG:SERV:BUS:STAT?"  
ENTER 717;A
```

**:DIAG:SERVice:BUS:WAIT**  <numeric>

Waits starting the Bus Measurement for the specified count. (**WAIT COUNT** under **System**)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 2 to 32767  |

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:BUS:WAIT 2"  
OUTPUT 717;":DIAG:SERV:BUS:WAIT?"  
ENTER 717;A
```

**:DIAG:SERVice:CCONstant:SOURce**{OFF|ON|0|1}

**:DIAG:SERVice:CCONstant:FRESponse**{OFF|ON|0|1}

Sets the correction constants of the Frequency Response ON or OFF. (FRQ RSP CC ON off under **System**)

| Parameter | Description                                |
|-----------|--------------------------------------------|
| OFF or 0  | Frequency response correction constant OFF |
| ON or 1   | Frequency response correction constant ON  |

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:CCON:FRES ON"
OUTPUT 717;":DIAG:SERV:CCON:FRES?"
ENTER 717;A
```

**:DIAG:SERVice:CCONstant:IFGain**{OFF|ON|0|1}

Sets the correction constant of the IF Gain Error ON or OFF. (IF GAIN CC ON off under **System**)

| Parameter | Description                           |
|-----------|---------------------------------------|
| OFF or 0  | IF gain error correction constant OFF |
| ON or 1   | IF gain error correction constant ON  |

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:CCON:IFG ON"
OUTPUT 717;":DIAG:SERV:CCON:IFG?"
ENTER 717;A
```

**:DIAG:SERVice:CCONstant:SOURce**{OFF|ON|0|1}

Sets the correction constant of the RF Output Level ON or OFF. (SOURCE CC ON off under **System**)

| Parameter | Description                             |
|-----------|-----------------------------------------|
| OFF or 0  | RF output level correction constant OFF |
| ON or 1   | RF output level correction constant ON  |

**:DIAG:SERVice:CCONstant:SOURce**{OFF|ON|0|1}

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:CCON:SOUR ON"
OUTPUT 717;":DIAG:SERV:CCON:SOUR?"
ENTER 717;A
```

**:DIAG:SERVice:CCONstant:XTAL**{OFF|ON|0|1}

Sets the correction constant of the Crystal Filter ON or OFF. (XTAL CC ON off under System)

| Parameter | Description                            |
|-----------|----------------------------------------|
| OFF or 0  | Crystal filter correction constant OFF |
| ON or 1   | Crystal filter correction constant ON  |

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:CCON:XTAL ON"
OUTPUT 717;":DIAG:SERV:CCON:XTAL?"
ENTER 717;A
```

**:DIAG:SERVice:IF:ADMX:MODE**{AUTO|ALternate|DEG0|DEG90}

Sets the A/D Multiplexer of the A6 Receiver IF. (A/D MUX [ ] under System)

| Parameter | Description |
|-----------|-------------|
| AUTO      | Automatic   |
| ALternate | Alternate   |
| DEG0      | 0 °         |
| DEG90     | 90 °        |

■ Query Response

{AUTO|ALT|DEG0|DEG90} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:ADMX:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:ADMX:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:W**{AUTO|DB0|DB10}

**:DIAG:SERVice:IF:BPFilter:MODE**{AUTO|BW3M|BW1M|XTAL}

Sets the IF Band Pass Filter of the A6 Receiver IF. (IF BPF under **System**)

| Parameter | Description |
|-----------|-------------|
| AUTO      | Automatic   |
| BW3M      | 3 MHz       |
| BW1M      | 1 MHz       |
| XTAL      | Crystal     |

■ Query Response

{AUTO|BW3M|BW1M|XTAL} <new line><^END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:BPFilter:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:BPFilter:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:MODE**{AUTO|MANual}

Sets the IF Gain mode of the A6 Receiver IF to Auto or Manual. Setting this mode to Manual enables setting the Gain W, Gain X, Gain Y, and Gain Z values. (IF GAIN AUTO man under **System**)

■ Query Response

{AUTO|MAN} <new line><^END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:GAIN:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:W**{AUTO|DB0|DB10}

Sets Gain W of the A6 Receiver IF. (GAIN W [ ] under **System**)

| Parameter | Description |
|-----------|-------------|
| AUTO      | Automatic   |
| DB0       | 0 dB        |
| DB10      | 10 dB       |

■ Query Response

{AUTO|DB0|DB10} <new line><^END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:W AUTO"
OUTPUT 717;":DIAG:SERV:IF:GAIN:W?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:W**{AUTO|DB0|DB10}

**:DIAG:SERVice:IF:GAIN:X**{AUTO|DB0|DB18}

Sets Gain X of the A6 Receiver IF. (**GAIN X [ ]** under **System**)

| Parameter | Description |
|-----------|-------------|
| AUTO      | Automatic   |
| DB0       | 0 dB        |
| DB18      | 18 dB       |

■ Query Response

{AUTO|DB0|DB18} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:X AUTO"
```

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:X?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:IF:GAIN:Y**{AUTO|DB0|DB6|DB12|DB18}

Sets Gain Y of the A6 Receiver IF. (**GAIN Y [ ]** under **System**)

| Parameter | Description |
|-----------|-------------|
| AUTO      | Automatic   |
| DB0       | 0 dB        |
| DB6       | 6 dB        |
| DB12      | 12 dB       |
| DB18      | 18 dB       |

■ Query Response

{AUTO|DB0|DB6|DB12|DB18} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:Y AUTO"
```

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:Y?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:IF:LPFilter:MODE** { AUTO|BW5K|BW15K|BW50K| BW150K|THRough}

**:DIAG:SERVice:IF:GAIN:Z** { AUTO|DB0|DB2|DB4|DB18}

Sets Gain Z of the A6 Receiver IF. (**GAIN Z [ ]** under **System**)

| Parameter | Description |
|-----------|-------------|
| AUTO      | Automatic   |
| DB0       | 0 dB        |
| DB2       | 2 dB        |
| DB4       | 4 dB        |
| DB18      | 18 dB       |

■ Query Response

{AUTO|DB0|DB2|DB4|DB18} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:GAIN:Z AUTO"  
OUTPUT 717;":DIAG:SERV:IF:GAIN:Z?"  
ENTER 717;A$
```

**:DIAG:SERVice:IF:LPFilter:MODE** { AUTO|BW5K|BW15K|BW50K|  
**BW150K|THRough**}

Sets the IF Low Pass Filter of the A6 Receiver IF. (**IF LPF [ ]** under **System**)

| Parameter | Description |
|-----------|-------------|
| AUTO      | Automatic   |
| BW5K      | 5 kHz       |
| BW15K     | 15 kHz      |
| BW50K     | 50 kHz      |
| BW150K    | 150 kHz     |
| THRough   | Through     |

■ Query Response

{AUTO|BW5K|BW15K|BW50K|BW150K|THR} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:LPF:MODE AUTO"  
OUTPUT 717;":DIAG:SERV:IF:LPF:MODE?"  
ENTER 717;A$
```

**:DIAG:SERVice:IF:LPFILTER:MODE** {**AUTO|BW5K|BW15K|BW50K|BW150K|THROUGH**}

**:DIAG:SERVice:IF:RANGE:F** {**HIGH|LOW**}

Sets Range F of the A6 Receiver IF. (**RANGE F: HIGH, LOW** under **System**)

■ Query Response

{**HIGH|LOW**} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:RANG:F HIGH"
OUTPUT 717;":DIAG:SERV:IF:RANG:F?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:RANGE:MODE** {**AUTO|MANual**}

Sets the Range mode of the A6 Receiver IF to Auto or Manual. Setting this mode to Manual enables setting Range F and Range R. (**IF RANGE AUTO man** under **System**)

■ Query Response

{**AUTO|MAN**} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:RANG:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:RANG:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:IF:RANGE:R** {**HIGH|LOW**}

Sets Range R of the A6 Receiver IF. (**RANGE R: HIGH, LOW** under **System**)

■ Query Response

{**HIGH|LOW**} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:RANG:R HIGH"
OUTPUT 717;":DIAG:SERV:IF:RANG:R?"
ENTER 717;A
```

**:DIAG:SERVice:IF:SHBW:MODE** {**AUTO|NARRow|MIDDLE|WIDE**}

Sets the Sample and Hold of the A6 Receiver IF. (**S/H BW [ ]** under **System**)

■ Query Response

{**AUTO|NARR|MIDD|WIDE**} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:SHBW:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:SHBW:MODE?"
ENTER 717;A$
```



**:DIAG:SERVice:SOURce:ALCLoop□{OPEN|CLOSe}**

**:DIAG:SERVice:IF:TLOCa1:MODE□{AUTO|AC|DC}**

Sets the 3rd Local Oscillator of the A6 Receiver IF. (S/H BW [ ] under **System**)

■ Query Response

{AUTO|AC|DC} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:IF:TLOC:MODE AUTO"
OUTPUT 717;":DIAG:SERV:IF:TLOC:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:MODE□{ON|1}**

Activates the service mode. (SERVICE MODE under **System**)

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:MODE ON"
OUTPUT 717;":DIAG:SERV:MODE?"
ENTER 717;A
```

**:DIAG:SERVice:SOURce:ALCLoop□{OPEN|CLOSe}**

Sets the ALC Loop of the A3A2 ALC. (ALC LOOP ON off under **System**)

■ Query Response

{OPEN|CLOS}

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:ALCL OPEN"
OUTPUT 717;":DIAG:SERV:SOUR:ALCL?"
ENTER 717;A
```

**:DIAG:SERVice:SOURce:ALCLoop**{OPEN|CLOSe}

**:DIAG:SERVice:SOURce:ATTenuator**{AUTO|DB0|DB10|DB20|DB30|DB40|DB50|DB60}

Sets the Output Attenuator of the A3A2 ALC. (OUTPUT ATT under **System**)

| Parameter | Description |
|-----------|-------------|
| AUTO      | Automatic   |
| DB0       | 0 dB        |
| DB10      | 10 dB       |
| DB20      | 20 dB       |
| DB30      | 30 dB       |
| DB40      | 40 dB       |
| DB50      | 50 dB       |
| DB60      | 60 dB       |

■ Query Response

{AUTO|DB0|DB10|DB20|DB30|DB40|DB50|DB60} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:ATT AUTO"  
OUTPUT 717;":DIAG:SERV:SOUR:ATT?"  
ENTER 717;A$
```

**:DIAG:SERVice:SOURce:GAIN:DAC:MODE**{AUTO|MANual}

Sets the Gain DAC mode of the A3A2 ALC to Auto or Manual. Setting this mode to Manual enables setting Gain DAC value. (GAIN DAC AUTO man under **System**)

■ Query Response

{AUTO|MAN} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:GAIN:DAC:MODE AUTO"  
OUTPUT 717;":DIAG:SERV:SOUR:GAIN:DAC:MODE?"  
ENTER 717;A$
```

**:DIAG:SERVice:SOURce:LEVel:DAC:VALue**□<numeric>

**:DIAG:SERVice:SOURce:GAIN:DAC:VALue**□<numeric>

Sets the Gain DAC value of the A3A2 ALC. (**GAIN DAC VALUE** under **System**)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 0 to 15     |

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:GAIN:DAC:VAL 0"
```

```
OUTPUT 717;":DIAG:SERV:SOUR:GAIN:DAC:VAL?"
```

```
ENTER 717;A
```

**:DIAG:SERVice:SOURce:LEVel:DAC:MODE**□{**AUTO**|**MANual**}

Sets the Level DAC mode of the A3A2 ALC to Auto or Manual. Setting this mode to Manual enables setting the Level DAC value. (**LVL DAC AUTO man** under **System**)

■ Query Response

{**AUTO**|**MAN**}

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:LEV:DAC:MODE AUTO"
```

```
OUTPUT 717;":DIAG:SERV:SOUR:LEV:DAC:MODE?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:SOURce:LEVel:DAC:VALue**□<numeric>

Sets the Level DAC value of the A3A2 ALC. (**LVL DAC VALUE** under **System**)

| Parameter | Description |
|-----------|-------------|
| <numeric> | 0 to 4095   |

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:LEV:DAC:VAL 0"
```

```
OUTPUT 717;":DIAG:SERV:SOUR:LEV:DAC:VAL?"
```

```
ENTER 717;A
```

**:DIAG:SERVice:SOURce:LEVel:DAC:VALue**  <numeric>

**:DIAG:SERVice:SOURce:MODE**  {AUTO|MANual}

Sets the Source mode of the A3A2 ALC to Auto or Manual. Setting this mode to Manual enables setting the ALC Loop, Output attenuator, Level DAC, and Gain DAC.

(SOURCE AUTO man under  System)

■ Query Response

{AUTO|MANual} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SOUR:MODE AUTO"
```

```
OUTPUT 717;":DIAG:SERV:SOUR:MODE?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:FLOCAl:MODE**  {AUTO|SINGle|TRIPle}

Sets the 1st Local Oscillator of the A5 Synthesizer. (1st LO OSC [ ] under  System)

■ Query Response

{AUTO|SING|TRIP} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:FLOC:MODE AUTO"
```

```
OUTPUT 717;":DIAG:SERV:SYNT:FLOC:MODE?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:FN:MODE**  {AUTO|NARRow|WIDE}

Sets the Fractional N Oscillator of the A5 Synthesizer. (FN OSC [ ] under  System)

■ Query Response

{AUTO|NARR|WIDE} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:FN:MODE AUTO"
```

```
OUTPUT 717;":DIAG:SERV:SYNT:FN:MODE?"
```

```
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:DAC:VALue**□<numeric>

**:DIAG:SERVice:SYNThesizer:FREQUency:OFFSet**□<numeric>

Sets the Frequency Offset of the A5 Synthesizer. (Network analyzer only) (**FREQUENCY OFFSET** under **(System)**)

| Parameter | Description                                              |    |
|-----------|----------------------------------------------------------|----|
| <numeric> | -8×10 <sup>9</sup> (= -8 G) to 8×10 <sup>9</sup> (= 8 G) | Hz |

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:FREQ:OFFS 0"
OUTPUT 717;":DIAG:SERV:SYNT:FREQ:OFFS?"
ENTER 717;A
```

**:DIAG:SERVice:SYNThesizer:STEP:DAC:MODE**□{AUTO|MANual}

Sets the Step DAC mode of the A5 Synthesizer to Auto or Manual. Setting this mode to Manual enables setting the Step DAC value. (**STEP DAC** under **(System)**)

■ Query Response

{AUTO|MANual} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:DAC:MODE AUTO"
OUTPUT 717;":DIAG:SERV:SYNT:STEP:DAC:MODE?"
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:DAC:VALue**□<numeric>

Sets the Step DAC value of the A5 Synthesizer. (**DAC VALUE** under **(System)**)

| Parameter | Description |  |
|-----------|-------------|--|
| <numeric> | 0 to 4095   |  |

■ Query Response

{numeric} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:DAC:VAL 0"
OUTPUT 717;":DIAG:SERV:SYNT:STEP:DAC:VAL?"
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:DAC:VALue**□<numeric>

**:DIAG:SERVice:SYNThesizer:STEP:LOOP**□{OPEN|CLOSE}

Sets the Step Oscillator Loop of the A5 Synthesizer. (LOOP open close under System)

■ Query Response

{OPEN|CLOS} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:LOOP OPEN"  
OUTPUT 717;":DIAG:SERV:SYNT:STEP:LOOP?"  
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:MODE**□{AUTO|MANual}

Sets the Step Oscillator mode of the A5 Synthesizer to Auto or Manual. Setting this mode to Manual enables setting the Oscillator Output, Loop, Polarity, and Step DAC.

(STEP OSC AUTO man under System)

■ Query Response

{AUTO|MAN} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:MODE AUTO"  
OUTPUT 717;":DIAG:SERV:SYNT:STEP:MODE?"  
ENTER 717;A$
```

**:DIAG:SERVice:SYNThesizer:STEP:OUTPut**□{OFF|ON|0|1}

Sets the Step Oscillator Output ON or OFF of the A5 Synthesizer. (OSC OUT ON off under System)

■ Query Response

{0|1} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:OUTP ON"  
OUTPUT 717;":DIAG:SERV:SYNT:STEP:OUTP?"  
ENTER 717;A
```

**:DIAG:SERVice:SYNThesizer:STEP:POLarity**□{AUTO|POSitive|NEGative}

Sets the Step Oscillator Polarity of the A5 Synthesizer. (POLARITY [ ] under System)

■ Query Response

{AUTO|POS|NEG} <new line><END>

■ Example

```
OUTPUT 717;":DIAG:SERV:SYNT:STEP:POL AUTO"  
OUTPUT 717;":DIAG:SERV:SYNT:STEP:POL?"  
ENTER 717;A$
```

**:DIAG:TEST** *<numeric>*

Selects the diagnostic tests. (TESTS, INTERNAL TESTS, EXTERNAL TESTS, ADJUSTMENT TESTS, DISPLAY TESTS, ALL EXT TESTS under System; No query)

| Parameter | Description                                |
|-----------|--------------------------------------------|
| 0         | First internal test (ALL INT).             |
| 17        | First external test (FRONT PANEL DIAG).    |
| 41        | First adjustment test (DC OFFST/HLD STEP). |
| 48        | First display test (TEST PATTERN 1).       |
| 53        | First ALL EXT test (ALL EXT 1).            |
| 58        | Miscellaneous test (IMPEDANCE TEST KIT).   |

■ Example

OUTPUT 717;":DIAG:TEST 0"

**:DIAG:TEST:CONTInue**

Continues the diagnostic test when the test is paused for user interaction. (CONTINUE under System; No query)

■ Example

OUTPUT 717;":DIAG:TEST:CONT"

**:DIAG:TEST:EXECute**

Runs the selected diagnostic tests. (EXECUTE TEST under System; No query)

■ Example

OUTPUT 717;":DIAG:TEST:EXEC"

**:DIAG:TEST:EXECute**

**:DIAG:TEST:RESult?** [ ] <numeric>

Returns the diagnostic test result. (Query only)

| Parameter | Description          |
|-----------|----------------------|
| <numeric> | Test number; 0 to 67 |

■ Query Response

{ "PASS" | "FAIL" | "BUSY" | "NDON" | "DONE" } <new line> <END>

| Parameter | Description |
|-----------|-------------|
| "PASS"    | Pass        |
| "FAIL"    | Fail        |
| "BUSY"    | In progress |
| "NDON"    | Not done    |
| "DONE"    | DONE        |

■ Example

```
OUTPUT 717;":DIAG:TEST:RES? 0"  
ENTER 717;A$
```



## Manual Changes

---

### Introduction

This appendix contains the information required to adapt this manual to earlier versions or configurations of the analyzer than the current printing date of this manual. The information in this manual applies directly to the HP 4396B Network/Spectrum/Impedance Analyzer serial number prefix listed on the title page of this manual.

### Manual Changes

To adapt this manual to your HP 4396B, see Table A-1 and Table A-2, and make all the manual changes listed opposite your instrument's serial number and firmware version.

Instruments manufactured after the printing of this manual may be different from those documented in this manual. Later instrument versions will be documented in a manual changes supplement that will accompany the manual shipped with that instrument. If your instrument's serial number is not listed on the title page of this manual or in Table A-1, it may be documented in a *yellow MANUAL CHANGES* supplement.

In additions to change information, the supplement may contain information for correcting errors (Errata) in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest *MANUAL CHANGES* supplement.

For information concerning serial number prefixes not listed on the title page or in the *MANUAL CHANGE* supplement, contact the nearest Hewlett-Packard office.

Turn on the line switch or execute the \*IDN? command by HP-IB to confirm the firmware version. See the "\*IDN?" in Chapter 2 for information on the \*IDN? command.

**Table A-1. Manual Changes by Serial Number**

| Serial Prefix or Number | Make Manual Changes |
|-------------------------|---------------------|
| JPIKE                   |                     |

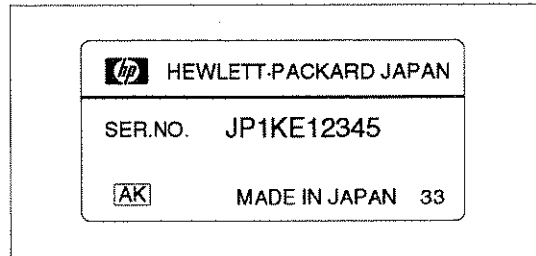
**Table A-2. Manual Changes by Firmware Version**

| Version | Make Manual Changes |
|---------|---------------------|
| 1.00    | Change 1            |

---

## Serial Number

Hewlett-Packard uses a two-part, nine-character serial number that is stamped on the serial number plate (see Figure A-1) attached to the rear panel. The first four digits and the letter are the serial prefix and the last five digits are the suffix.



**Figure A-1. Serial Number Plate**

---

## Change 1

Delete the command of "SAVDSTAC".

## Command Summary

---

This appendix summarizes the HP-IB commands (and SCPI commands) according to the equivalent front panel keys as follows. It also summarizes the HP-IB only commands and the common commands.

- Chan 1
- Chan 2
- Meas
- Format
- Display
- Scale Ref
- Cal
- Sweep
- Source
- Trigger
- Start
- Stop
- Center
- Span
- Marker
- Marker→
- Search
- Utility
- System
- Local
- Copy
- Save
- Recall
- Preset
- HP-IB Only Commands

| Front Panel Key                                                                                                                                                                                                                                       | Simple Command                                                         | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chan 1                                                                                                                                                                                                                                                | CHAN1                                                                  | INSTRUMENT[:SELECT] CH2 or INSTRUMENT:NSELECT 2<br>INSTRUMENT:STATE OFF<br>INSTRUMENT[:SELECT] CH1 or INSTRUMENT:NSELECT 1<br>INSTRUMENT:STATE ON                                                                                                                                                                                                                             |
| Chan 2                                                                                                                                                                                                                                                | CHAN2                                                                  | INSTRUMENT[:SELECT] CH1 or INSTRUMENT:NSELECT 1<br>INSTRUMENT:STATE OFF<br>INSTRUMENT[:SELECT] CH2 or INSTRUMENT:NSELECT 2<br>INSTRUMENT:STATE ON                                                                                                                                                                                                                             |
| Meas<br>Network Analyzer<br>NETWORK: A/R<br>B/R<br>R<br>A<br>B<br>CONVERSION [OFF]<br>→ See Conversion menu<br>S-PARAMETERS<br>→ See S-parameters menu<br>ANALYZER TYPE<br>→ See Analyzer type menu                                                   | MEAS AR<br>MEAS BR<br>MEAS R<br>MEAS A<br>MEAS B                       | SENSE:FUNCTION "POWER:RATIo 3,2"<br>SENSE:FUNCTION "POWER:RATIo 4,2"<br>SENSE:FUNCTION "POWER 2"<br>SENSE:FUNCTION "POWER 3"<br>SENSE:FUNCTION "POWER 4"                                                                                                                                                                                                                      |
| S-parameters menu<br>Ref: FWD S11 [A/R]<br>Trans:FWD S21 [B/R]<br>Trans:REV S12 [A/R]<br>Ref: REV S22 [B/R]<br>CONVERSION [OFF]<br>→ See Conversion menu<br>INPUT PORTS<br>→ See Network input port menu<br>ANALYZER TYPE<br>→ See Analyzer type menu | MEAS S11<br>MEAS S21<br>MEAS S12<br>MEAS S22                           | SENSE:FUNCTION "POWER:S11"<br>SENSE:FUNCTION "POWER:S21"<br>SENSE:FUNCTION "POWER:S12"<br>SENSE:FUNCTION "POWER:S22"                                                                                                                                                                                                                                                          |
| Spectrum Analyzer<br>SPECTRUM: S<br>R<br>A<br>B<br>DETECTION [POS]<br>→ See Detection menu<br>ANALYZER TYPE<br>→ See Analyzer type menu                                                                                                               | MEAS S<br>MEAS R<br>MEAS A<br>MEAS B                                   | SENSE:FUNCTION "POWER 1"<br>SENSE:FUNCTION "POWER 2"<br>SENSE:FUNCTION "POWER 3"<br>SENSE:FUNCTION "POWER 4"                                                                                                                                                                                                                                                                  |
| Impedance Analyzer<br>IMPEDANCE:MAG(—Z—)<br>PHASE( $\theta_Z$ )<br>RESIST(R)<br>REACT(X)<br>ADMITTANCE:MAG(—Y—)<br>PHASE( $\theta_Y$ )                                                                                                                | MEAS IMAG<br>MEAS IPH<br>MEAS IRE<br>MEAS IIM<br>MEAS AMAG<br>MEAS APH | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat MLINear<br>CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat PHASe<br>CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat REAL<br>CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat IMAGinary<br>CALCulate:MATH1:NAME ADMittance<br>CALCulate:FORMat MLINear<br>CALCulate:MATH1:NAME ADMittance<br>CALCulate:FORMat PHASe |

## B-2 Command Summary

| Front Panel Key                           | Simple Command | Equivalent SCPI Command                                       |
|-------------------------------------------|----------------|---------------------------------------------------------------|
| <b>Impedance Analyzer (Continued)</b>     |                |                                                               |
| CONDUCT(G)                                | MEAS ARE       | CALCulate:MATH1:NAME ADMittance<br>CALCulate:FORMat REAL      |
| SUSCEPT(B)                                | MEAS AIM       | CALCulate:MATH1:NAME ADMittance<br>CALCulate:FORMat IMAGinary |
| REFL_COEF:MAG(-Γ-)                        | MEAS RCM       | CALCulate:MATH1:NAME OFF<br>CALCulate:FORMat MLINear          |
| PHASE(θ <sub>Γ</sub> )                    | MEAS RCPH      | CALCulate:MATH1:NAME OFF<br>CALCulate:FORMat PHASE            |
| REAL(I <sub>x</sub> )                     | MEAS RCR       | CALCulate:MATH1:NAME OFF<br>CALCulate:FORMat REAL             |
| IMAG(I <sub>y</sub> )                     | MEAS RCIM      | CALCulate:MATH1:NAME OFF<br>CALCulate:FORMat IMAGinary        |
| CAPCITNCE:PRL(C <sub>p</sub> )            | MEAS CP        | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat CP         |
| SER(C <sub>s</sub> )                      | MEAS CS        | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat CS         |
| INDUCTNCE:PRL(L <sub>p</sub> )            | MEAS LP        | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat LP         |
| SER(L <sub>s</sub> )                      | MEAS LS        | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat LS         |
| RESISTNCE:PRL(R <sub>p</sub> )            | MEAS RP        | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat RP         |
| SER(R <sub>s</sub> )                      | MEAS RS        | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat RS         |
| D FACTOR                                  | MEAS D         | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat D          |
| Q FACTOR                                  | MEAS Q         | CALCulate:MATH1:NAME IMPedance<br>CALCulate:FORMat Q          |
| FIXTURE                                   | MODIFIX        | SYSTem:FIXTure:MODify<br>— See Fixture menu                   |
| ANALYZER TYPE<br>— See Analyzer type menu |                |                                                               |
| <b>Analyzer type menu</b>                 |                |                                                               |
| NETWORK ANALYZER                          | NA             | INSTrument:TYPE NA                                            |
| SPECTRUM ANALYZER                         | SA             | INSTrument:TYPE SA                                            |
| IMPEDANCE ANALYZER                        | ZA             | INSTrument:TYPE ZA                                            |
| <b>Conversion menu</b>                    |                |                                                               |
| CONVERSION OFF                            | CONV OFF       | CALCulate:MATH1[:EXPReSSion]:NAME OFF                         |
| Z:Ref                                     | CONV ZREF      | CALCulate:MATH1[:EXPReSSion]:NAME ZREF                        |
| Z:Trans                                   | CONV ZTRA      | CALCulate:MATH1[:EXPReSSion]:NAME ZTRA                        |
| Y:Ref                                     | CONV YREF      | CALCulate:MATH1[:EXPReSSion]:NAME YREF                        |
| Y:Trans                                   | CONV YTRA      | CALCulate:MATH1[:EXPReSSion]:NAME YTRA                        |
| 1/S                                       | CONV ONEDS     | CALCulate:MATH1[:EXPReSSion]:NAME INVS                        |
| MORE                                      |                |                                                               |
| CONVERSION 4*PHASE                        | CONV MP4       | CALCulate:MATH1[:EXPReSSion]:NAME MP4                         |
| 8*PHASE                                   | CONV MP8       | CALCulate:MATH1[:EXPReSSion]:NAME MP8                         |
| 16*PHASE                                  | CONV MP16      | CALCulate:MATH1[:EXPReSSion]:NAME MP16                        |
| RETURN                                    |                |                                                               |
| RETURN                                    |                |                                                               |

| Front Panel Key                                                                                                                                                                                                 | Simple Command                                                                                                                                                | Equivalent SCPI Command                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Detection menu<br>DETECTION POS PEAK<br>NEG PEAK<br>SAMPLE<br>RETURN                                                                                                                                            | DET POS<br>DET NEG<br>DET SAM                                                                                                                                 | SENSe:DETEctor[:FUNction] POSitive<br>SENSe:DETEctor[:FUNction] NEGative<br>SENSe:DETEctor[:FUNction] SAMPlE                                                                                                                                                                                               |
| Fixture Menu<br>SELECT FIXTURE<br>FIXTURE:NONE<br>HP16191<br>HP16192<br>HP16193<br>HP16194<br>USER<br>RETURN<br>SAVE USER FXTR KIT<br>MODIFY [NONE]<br>DEFINE EXTENSION<br>LABEL FIXTURE<br>KIT DONE (MODIFIED) | FIXT NONE<br>FIXT HP16191<br>FIXT HP16192<br>FIXT HP16193<br>FIXT HP16194<br>FIXT USED<br>SAVUFXT<br>MODIFX<br>FIXE <numeric><br>LABEFIX <string><br>FIXKDONE | SYSTem:FIXTure NONE<br>SYSTem:FIXTure HP16191<br>SYSTem:FIXTure HP16192<br>SYSTem:FIXTure HP16193<br>SYSTem:FIXTure HP16194<br>SYSTem:FIXTure UDEFined<br>SYSTem:FIXTure:SAVE<br>SYSTem:FIXTure:MODify<br>SYSTem:FIXTure:DISTance <numeric><br>SYSTem:FIXTure:LABel <string><br>SYSTem:FIXTure:MODify:SAVE |

| Front Panel Key                                                                                                                                                                                                                                                                                            | Simple Command                                                                                                                    | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Format</b><br>Network Analyzer<br><b>FORMAT:LOG MAG</b><br><b>PHASE</b><br><b>DELAY</b><br><b>SMITH [Re Im]</b><br><b>POLAR [Re Im]</b><br><b>LIN MAG</b><br><b>SWR</b><br><b>MORE</b><br><b>FORMAT:REAL</b><br><b>IMAGINARY</b><br><b>EXPANDED PHASE</b><br><b>ADMITTANCE [Re Im]</b><br><b>RETURN</b> | FMT LOGM<br>FMT PHAS<br>FMT DELA<br>FMT SMITH<br>FMT POLA<br>FMT LINM<br>FMT SWR<br>FMT REAL<br>FMT IMAG<br>FMT EXPP<br>FMT ADMIT | DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>CALCulate:FORMat MLOGarithmic<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>CALCulate:FORMat PHASe<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>CALCulate:FORMat GDELAy<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat SMITH<br>CALCulate:FORMat COMPLEX<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat POLar<br>CALCulate:FORMat COMPLEX<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>CALCulate:FORMat MLINear<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>CALCulate:FORMat SWR<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>CALCulate:FORMat REAL<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>CALCulate:FORMat IMAGinary<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>CALCulate:FORMat UPHase<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat ADMittance<br>CALCulate:FORMat COMPLEX |
| Spectrum Analyzer<br><b>FORMAT:SPECTRUM</b><br><b>NOISE</b><br><b>UNIT: dBm</b><br><b>dBV</b><br><b>dBuV</b><br><b>WATT</b><br><b>VOLT</b>                                                                                                                                                                 | FMT SPECT<br>FMT NOISE<br>SAUNIT DBM<br>SAUNIT DBV<br>SAUNIT DBUV<br>SAUNIT W<br>SAUNIT V                                         | SENSE:FUNCTION "POWER {1-4}"<br>SENSE:FUNCTION "POWER{1-4}:PSDENSITY"<br>CALCulate:FORMat MLOGarithmic<br>UNIT:POWER DBM<br>CALCulate:FORMat MLOGarithmic<br>UNIT:POWER DBV<br>CALCulate:FORMat MLOGarithmic<br>UNIT:POWER DBUV<br>CALCulate:FORMat MLINear<br>UNIT:POWER W<br>CALCulate:FORMat MLINear<br>UNIT:POWER V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Impedance Analyzer<br><b>FORMAT: LIN Y-AXIS</b><br><b>LOG Y-AXIS</b><br><b>POLAR CHART</b><br><b>SMITH CHART</b><br><b>ADMITTANCE CHART</b><br><b>COMPLEX PLANE</b><br><b>PHASE UNIT [DEG]</b><br><b>EXP PHASE ON off</b><br><b>EXP PHASE on OFF</b>                                                       | FMT LINY<br>FMT LOGY<br>FMT POLA<br>FMT SMITH<br>FMT ADMIT<br>FMT COMP<br>PHAU {DEG RAD}<br>EXPP ON<br>EXPP OFF                   | DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>DISPLAY[:WINDow]:TRACe:Y:SPACE LINear<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat RECTangle<br>DISPLAY[:WINDow]:TRACe:Y:SPACE LOGarithmic<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat POLar<br>CALCulate:FORMat COMPLEX<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat SMITH<br>CALCulate:FORMat COMPLEX<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat ADMittance<br>CALCulate:FORMat COMPLEX<br>DISPLAY[:WINDow]:TRACe:GRATICule:FORMat CPLane<br>CALCulate:FORMat:COMPLEX<br>CALCulate:FORMat:UNIT:ANGLE {DEG RAD}<br>CALCulate:FORMat UPHase<br>CALCulate:FORMat PHASe                                                                                                                                                                                                                                                                                        |

| Front Panel Key    | Simple Command     | Equivalent SCPI Command                                                                                                                                                                                                                                        |
|--------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Display</b>     |                    |                                                                                                                                                                                                                                                                |
| DUAL CHAN ON OFF   | DUAC {ON 1}        | When channel 1 is active,<br>INSTrument[:SElect] CH2<br>INSTrument:STATe ON<br>INSTrument[:SElect] CH1<br>INSTrument:STATe ON<br>When channel 2 is active,<br>INSTrument[:SElect] CH1<br>INSTrument:STATe ON<br>INSTrument[:SElect] CH2<br>INSTrument:STATe ON |
|                    | DUAC {OFF 0}       | INSTrument[:SElect] {CH1 CH2}<br>INSTrument:STATe OFF<br>INSTrument[:SElect] {CH1 CH2}                                                                                                                                                                         |
| DISPLAY: DATA      | DISP DATA          | DISPlay[:WINDow]:TRACe1:STATe {ON 1}<br>DISPlay[:WINDow]:TRACe2:STATe {OFF 0}                                                                                                                                                                                  |
| MEMORY             | DISP MEMO          | DISPlay[:WINDow]:TRACe2:STATe {ON 1}<br>DISPlay[:WINDow]:TRACe1:STATe {OFF 0}                                                                                                                                                                                  |
| DATA & MEMORY      | DISP DATM          | DISPlay[:WINDow]:TRACe1:STATe {ON 1}<br>DISPlay[:WINDow]:TRACe2:STATe {ON 1}                                                                                                                                                                                   |
| DATA → MEMORY      | DATMEM             | TRACe:COPIY MTRace,DTRace                                                                                                                                                                                                                                      |
| DATA HOLD (OFF)    |                    |                                                                                                                                                                                                                                                                |
| HOLD: OFF          | DHOLD OFF          | CALCulate:AVERage:STATe {OFF 0}                                                                                                                                                                                                                                |
| MAX                | DHOLD MAX          | CALCulate:AVERage:TYPE MAXimum<br>CALCulate:AVERage:STATe {ON 1}                                                                                                                                                                                               |
| MIN                | DHOLD MIN          | CALCulate:AVERage:TYPE MINimum<br>CALCulate:AVERage:STATe {ON 1}                                                                                                                                                                                               |
| RETURN             |                    |                                                                                                                                                                                                                                                                |
| DATA MATH [DATA]   |                    |                                                                                                                                                                                                                                                                |
| DATA MATH: DATA    | MATH DATA          | CALCulate:MATH2[:EXPReSSion]:NAME OFF                                                                                                                                                                                                                          |
| DATA-MEM           | MATH DMNM          | CALCulate:MATH2[:EXPReSSion]:NAME SUB                                                                                                                                                                                                                          |
| DATA + MEM         | MATH DPLM          | CALCulate:MATH2[:EXPReSSion]:NAME ADD                                                                                                                                                                                                                          |
| DATA/MEM           | MATH DDVM          | CALCulate:MATH2[:EXPReSSion]:NAME DIV                                                                                                                                                                                                                          |
| DEFAULT GAIN & OFS | DEFGO              | DATA[:DATA] GAIN,1<br>DATA[:DATA] OFFS,0                                                                                                                                                                                                                       |
| OFFSET             |                    |                                                                                                                                                                                                                                                                |
| MKR → OFFSET       | MKROFS             | DATA[:DATA] OFFS,MARKer                                                                                                                                                                                                                                        |
| OFFSET VALUE       | DATOVAL <numeric>  | DATA[:DATA] OFFS,<numeric>                                                                                                                                                                                                                                     |
|                    | DATOVAL?           | DATA[:DATA]? OFFS                                                                                                                                                                                                                                              |
| AUX OFFSET VALUE   | DATAOVAL <numeric> | DATA[:DATA] AOFF,<numeric>                                                                                                                                                                                                                                     |
|                    | DATAOVAL?          | DATA[:DATA]? AOFF                                                                                                                                                                                                                                              |
| RETURN             |                    |                                                                                                                                                                                                                                                                |
| GAIN               | DATGAIN <numeric>  | DATA[:DATA] GAIN,<numeric>                                                                                                                                                                                                                                     |
|                    | DATGAIN?           | DATA[:DATA]? GAIN                                                                                                                                                                                                                                              |
| RETURN             |                    |                                                                                                                                                                                                                                                                |



| Front Panel Key                                        | Simple Command              | Equivalent SCPI Command                                                |
|--------------------------------------------------------|-----------------------------|------------------------------------------------------------------------|
| <b>MORE</b>                                            |                             |                                                                        |
| <b>SPLIT DISP ON off</b>                               | SPLD {ON 1}<br>SPLD {OFF 0} | DISPlay[:WINDow]:FORMat ULowEr<br>DISPlay[:WINDow]:FORMat FBACk        |
| <b>DISPLAY ALLOCATION</b>                              |                             |                                                                        |
| <b>ALL INSTRUMENT</b>                                  | DISA ALLI                   | DISPlay[:WINDow]:ALLocation INSTRument                                 |
| <b>HALF INSTR HALF BASIC</b>                           | DISA HIHB                   | DISPlay[:WINDow]:ALLocation HIHB                                       |
| <b>ALL BASIC</b>                                       | DISA ALLB                   | DISPlay[:WINDow]:ALLocation BASic                                      |
| <b>BASIC STATUS</b>                                    | DISA BASS                   | DISPlay[:WINDow]:ALLocation BS'tatus                                   |
| <b>RETURN</b>                                          |                             |                                                                        |
| <b>EQUIV CKT MENU</b><br>→ See Equivalent circuit menu |                             |                                                                        |
| <b>TITLE</b><br>→ See Title menu                       | TITL <string>               | DISPlay[:WINDow]:TEXT17[:DATA] <string>                                |
| <b>ADJUST DISPLAY</b><br>→ See Adjust display menu     |                             |                                                                        |
| <b>FREQUENCY BLANK</b>                                 | FREQ                        | DISPlay:ANNotation:FREQuency {OFF 0}<br>SYSTem:SECurity[:STATe] {ON 1} |
| <b>RETURN</b>                                          |                             |                                                                        |
| <b>Equivalent Circuit Menu</b>                         |                             |                                                                        |
| <b>SELECT EQV CKT (A)</b>                              |                             |                                                                        |
| <b>CKT A</b>                                           | EQUC CIRA                   | CALCulate:EVALuate:EPARameters:CIRCuit A                               |
| <b>B</b>                                               | EQUC CIRB                   | CALCulate:EVALuate:EPARameters:CIRCuit B                               |
| <b>C</b>                                               | EQUC CIRC                   | CALCulate:EVALuate:EPARameters:CIRCuit C                               |
| <b>D</b>                                               | EQUC CIRD                   | CALCulate:EVALuate:EPARameters:CIRCuit D                               |
| <b>E</b>                                               | EQUC CIRE                   | CALCulate:EVALuate:EPARameters:CIRCuit E                               |
| <b>CALCULATE EQV PARAMS</b>                            | CALECPARA                   | CALCulate:EVALuate:EPARameters<br>DISPlay[:WINDow]:TEXT18:STATe {ON 1} |
| <b>SIMULATE F-CHAR</b>                                 | SIMFCHAR                    | CALCulate:EVALuate:EPARameters:SIMulation                              |
| <b>RETURN</b>                                          |                             |                                                                        |
| <b>DISP EQUIV PARM [OFF]</b>                           | DISECPARA OFF               | DISPlay[:WINDow]:TEXT18:STAT {0 OFF}                                   |
| <b>DISP EQUIV PARM [ON]</b>                            | DISECPARA ON                | DISPlay[:WINDow]:TEXT18:STAT {1 ON}                                    |
| <b>DEFINE EQV PARAMS</b>                               |                             |                                                                        |
| <b>PARAMETER R1</b>                                    | DEFECR1 <numeric>           | DATA[:DATA] EQR1,<numeric>                                             |
| <b>C1</b>                                              | DEFEC1 <numeric>            | DATA[:DATA] EQC1,<numeric>                                             |
| <b>L1</b>                                              | DEFEL1 <numeric>            | DATA[:DATA] EQL1,<numeric>                                             |
| <b>CO</b>                                              | DEFECO <numeric>            | DATA[:DATA] EQC0,<numeric>                                             |
| <b>SIMULATE F-CHAR</b>                                 | SIMFCHAR                    | CALCulate:EVALuate:EPARameters:SIMulation                              |
| <b>RETURN</b>                                          |                             |                                                                        |
| <b>CALCULATE EQV PARAMS</b>                            | CALECPARA                   | CALCulate:EVALuate:EPARameters                                         |
| <b>SIMULATE F-CHAR</b>                                 | SIMFCHAR                    | CALCulate:EVALuate:EPARameters:SIMulation                              |
| <b>RETURN</b>                                          |                             |                                                                        |

| Front Panel Key             | Simple Command  | Equivalent SCPI Command                    |
|-----------------------------|-----------------|--------------------------------------------|
| Adjust display menu         |                 |                                            |
| <u>INTENSITY</u>            | INTE <numeric>  | DISPlay:BRIGhtness <numeric>               |
| <u>BACKGROUND INTENSITY</u> | BACI <numeric>  | DISPlay:CONTRast <numeric>                 |
| <u>MODIFY COLORS</u>        |                 |                                            |
| <u>CH1 DATA</u>             | COLO CH1D       | DISPlay:CMAP:COLor1:HSL <hue>,<sat>,<lum>  |
| <u>CH1 MEM/LIMIT LINE</u>   | COLO CH1M       | DISPlay:CMAP:COLor2:HSL <hue>,<sat>,<lum>  |
| <u>CH2 DATA</u>             | COLO CH2D       | DISPlay:CMAP:COLor3:HSL <hue>,<sat>,<lum>  |
| <u>CH2 MEM/LIMIT LINE</u>   | COLO CH2M       | DISPlay:CMAP:COLor4:HSL <hue>,<sat>,<lum>  |
| <u>GRATICULE</u>            | COLO GRAT       | DISPlay:CMAP:COLor5:HSL <hue>,<sat>,<lum>  |
| <u>WARNING</u>              | COLO WARN       | DISPlay:CMAP:COLor6:HSL <hue>,<sat>,<lum>  |
| <u>MORE</u>                 |                 |                                            |
| <u>TEXT</u>                 | COLO TEXT       | DISPlay:CMAP:COLor7:HSL <hue>,<sat>,<lum>  |
| <u>IBASIC</u>               | COLO IBT        | DISPlay:CMAP:COLor8:HSL <hue>,<sat>,<lum>  |
| <u>MORE</u>                 |                 |                                            |
| <u>PEN 1</u>                | COLO PEN1       | DISPlay:CMAP:COLor9:HSL <hue>,<sat>,<lum>  |
| <u>PEN 2</u>                | COLO PEN2       | DISPlay:CMAP:COLor10:HSL <hue>,<sat>,<lum> |
| <u>PEN 3</u>                | COLO PEN3       | DISPlay:CMAP:COLor11:HSL <hue>,<sat>,<lum> |
| <u>PEN 4</u>                | COLO PEN4       | DISPlay:CMAP:COLor12:HSL <hue>,<sat>,<lum> |
| <u>PEN 5</u>                | COLO PEN5       | DISPlay:CMAP:COLor13:HSL <hue>,<sat>,<lum> |
| <u>PEN 6</u>                | COLO PEN6       | DISPlay:CMAP:COLor14:HSL <hue>,<sat>,<lum> |
| <u>RETURN</u>               |                 |                                            |
| <u>RETURN</u>               |                 |                                            |
| <u>RETURN</u>               |                 |                                            |
| <u>DEFAULT COLORS</u>       | DEFC            | DISPlay:CMAP:DEFault                       |
| <u>SAVE COLOES</u>          | SVCO            | DISPlay:CMAP:STORe                         |
| <u>RECALL COLORS</u>        | RECC            | DISPlay:CMAP:LOAD                          |
| <u>RETURN</u>               |                 |                                            |
| Color adjust menu           |                 |                                            |
| <u>TINT</u>                 | TINT <numeric>  |                                            |
| <u>BRIGHTNESS</u>           | CBRI <numeric>  |                                            |
| <u>COLOR</u>                | COLOR <numeric> |                                            |
| <u>RESET COLOR</u>          | RSCO            | DISPlay:CMAP:COLor{1-14}:DEFault           |
| <u>RETURN</u>               |                 |                                            |

| Front Panel Key                                                                                                                                                                                                                                                                                                                                     | Simple Command                                                                                                                                                                                  | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Scale Ref</b><br>Network Analyzer<br><b>AUTO SCALE</b><br><b>SCALE/DIV</b><br><b>REFERENCE POSITION</b><br><b>REFERENCE VALUE</b><br><b>MKR→REFERENCE</b><br><b>SCALE FOR [DATA]</b><br><br><b>D&amp;M SCALE [COUPLE]</b><br><b>ELECTRICAL DELAY MENU</b><br><b>MKR→DELAY</b><br><b>ELECTRICAL DELAY</b><br><b>PHASE OFFSET</b><br><b>RETURN</b> | AUTO<br>SCAL <numeric><br>REFP <numeric><br>REFV <numeric><br>MKRREF<br>SCAF DATA<br>SCAF MEMO<br>SCAC {OFF ON 0 1}<br><br>MKRDELA<br>ELED <numeric><br>PHAO <numeric>                          | Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:AUTO ONCE<br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:PDIVision <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RPOStion <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel MARKer<br><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:COUPle {OFF ON 0 1}<br><br>SENSE:CORRection:EDELay2 MARKer<br>SENSE:CORRection:EDELay2 <numeric><br>SENSE:CORRection:OFFSet:PHASe <numeric>                                                                          |
| Spectrum Analyzer<br><b>ATTEN AUTO man</b><br><b>ATTEN</b><br><br><b>SCALE/DIV</b><br><b>REFERENCE VALUE</b><br><b>MKR→REFERENCE</b><br><b>SCALE FOR [DATA]</b><br><br><b>D&amp;M SCALE [COUPLE]</b><br><b>MAX MIXER LEVEL</b>                                                                                                                      | ATTAUTO {OFF ON 0 1}<br>ATT <numeric><br><br>SCAL <numeric><br>REFV <numeric><br>MKRREF<br>SCAF DATA<br>SCAF MEMO<br>SCAC {OFF ON 0 1}<br>MAXMLEV <numeric>                                     | SENSE:POWer:AC:ATTenuation:AUTO {OFF ON 0 1}<br>SENSE:POWer:AC:ATTenuation:AUTO {OFF 0}<br>SENSE:POWer:AC:ATTenuation <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:PDIVision <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel MARKer<br><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:COUPle {OFF ON 0 1}<br>SENSE:POWer:AC:RANGe[:UPPer] <numeric>                                                                                                                                    |
| Impedance Analyzer<br><b>AUTO SCALE</b><br><b>SCALE/DIV</b><br><b>REFERENCE POSITION</b><br><b>REFERENCE VALUE</b><br><b>MKR→REFERENCE</b><br><b>TOP VALUE</b><br><b>BOTTOM VALUE</b><br><b>MORE</b><br><b>SCALE FOR [DATA]</b><br><br><b>D&amp;M SCALE [COUPLE]</b><br><b>REFERENCE X VALUE</b><br><b>REFERENCE Y VALUE</b><br><b>RETURN</b>       | AUTO<br>SCAL <numeric><br>REFP <numeric><br>REFV <numeric><br>MKRREF<br>TOPV <numeric><br>BOTV <numeric><br><br>SCAF DATA<br>SCAF MEMO<br>SCAC {OFF ON 0 1}<br>REFV <numeric><br>REFY <numeric> | Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:AUTO ONCE<br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:PDIVision <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RPOStion <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel <numeric><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:RLEVel MARKer<br>Display:TRACe{1 2}:Y[:SCALe]:TOP <numeric><br>Display:TRACe{1 2}:Y[:SCALe]:BOTTom <numeric><br><br>Display[:WINDow]:TRACe{1 2}:Y[:SCALe]:COUPle {OFF ON 0 1}<br>Display:TRACe{1 2}:X[:SCALe]:RLEVel <numeric><br>Display:TRACe{1 2}:Y[:SCALe]:RLEVel <numeric> |

| Front Panel Key            | Simple Command      | Equivalent SCPI Command                                                             |
|----------------------------|---------------------|-------------------------------------------------------------------------------------|
| <b>Bw/Avg</b>              |                     |                                                                                     |
| Network Analyzer           |                     |                                                                                     |
| <b>AVERAGING RESTART</b>   | AVERREST            | SENSe:AVERAge:CLEAr                                                                 |
| <b>AVERAGING ON off</b>    | AVER {OFF ON 0 1}   | SENSe:AVERAge[:STATe] {OFF ON 0 1}                                                  |
| <b>AVERAGING FACTOR</b>    | AVERFACT <numeric>  | SENSe:AVERAge:COUNt <numeric>                                                       |
| <b>IF BW [40 kHz]</b>      | BW <numeric>        | SENSe:BANDwidth[:RESolution]:AUTO {OFF 0}<br>SENSe:BANDwidth[:RESolution] <numeric> |
| <b>GROUP DELY APERTURE</b> | GRODAPER <numeric>  | CALCulate:GDAPerture:APERture <numeric>                                             |
| Spectrum Analyzer          |                     |                                                                                     |
| <b>AVERAGING RESTART</b>   | AVERREST            | SENSe:AVERAge:CLEAr                                                                 |
| <b>AVERAGING ON off</b>    | AVER {OFF ON 0 1}   | SENSe:AVERAge[:STATe] {OFF ON 0 1}                                                  |
| <b>AVERAGING FACTOR</b>    | AVERFACT <numeric>  | SENSe:AVERAge:COUNt <numeric>                                                       |
| <b>RES BW AUTO man</b>     | BWAUTO {OFF ON 0 1} | SENSe:BANDwidth[:RESolution]:AUTO {OFF ON 0 1}                                      |
| <b>RES BW [3 MHz]</b>      | BW <numeric>        | SENSe:BANDwidth[:RESolution]:AUTO {OFF 0}<br>SENSe:BANDwidth[:RESolution] <numeric> |
| <b>RBW/SPAN RATIO</b>      | BWSRAT <numeric>    | SENSe:BANDwidth[:RESolution]:RATio <numeric>                                        |
| <b>VIDEO BW</b>            | VBW <numeric>       | SENSe:BANDwidth:VIDeo <numeric>                                                     |
| Impedance Analyzer         |                     |                                                                                     |
| <b>AVERAGING RESTART</b>   | AVERREST            | SENSe:AVERAge:CLEAr                                                                 |
| <b>AVERAGING ON off</b>    | AVER {OFF ON 0 1}   | SENSe:AVERAge[:STATe] {OFF ON 0 1}                                                  |
| <b>AVERAGING FACTOR</b>    | AVERFACT <numeric>  | SENSe:AVERAge:COUNt <numeric>                                                       |
| <b>IF BW [40 kHz]</b>      | BW <numeric>        | SENSe:BANDwidth[:RESolution] <numeric>                                              |

| Front Panel Key                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Simple Command                                                                                                                                                                                                                                               | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cal</b><br>Network Analyzer<br><b>CORRECTION ON off</b><br><b>CALIBRATE MENU</b><br><b>CALIBRATE:NONE</b><br><b>RESPONSE</b><br>→ See Response menu<br><b>RESPONSE &amp; ISOL/N</b><br>→ See Response/isolation menu<br><b>S11 1-PORT</b><br>→ See S11 1-port menu<br><b>S22 1-PORT</b><br>→ See S22 1-port menu<br><b>FULL 2-PORT</b><br>→ See Full 2-port menu<br><b>ONE PATH 2-PORT</b><br>→ See One-path 2-port menu<br><b>RESUME CAL SEQUENCE</b><br><b>CAL KIT [7mm]</b><br><b>CAL KIT:7mm</b><br><b>3.5mm</b><br><b>N 50 ohm</b><br><b>N 75 ohm</b><br><b>USER KIT</b><br><b>SAVE USER KIT</b><br><b>MODIFY [7mm]</b><br>→ See Modify calkit menu<br><b>RETURN</b><br><b>MORE</b><br><b>PORT EXTENSIONS</b><br>→ See Reference plane menu<br><b>VELOCITY FACTOR</b><br><b>SET Z0</b><br><b>RETURN</b> | CORR {OFF ON 0 1}<br><br>CALI NONE<br>CALI RESP<br>CALI RAI<br>CALI S111<br>CALI S221<br>CALI FUL2<br>CALI ONE2<br>RESC<br><br>CALK APC7<br>CALK APC35<br>CALK N50<br>CALK N75<br>CALK USED<br>SAVEUSEK<br>MODII<br><br>VELOFACT <numeric><br>SETZ <numeric> | SENSE:CORRection[:STATe] {OFF ON 0 1}<br><br>SENSE:CORRection:COLLect:METhod NONE<br>SENSE:CORRection:COLLect:METhod RESPonse<br>SENSE:CORRection:COLLect:METhod RAIsol<br>SENSE:CORRection:COLLect:METhod S111<br>SENSE:CORRection:COLLect:METhod S221<br>SENSE:CORRection:COLLect:METhod TPORT<br>SENSE:CORRection:COLLect:METhod OPTPort<br>SENSE:CORRection:COLLect:RESume<br><br>SENSE:CORRection:CKIT APC7<br>SENSE:CORRection:CKIT APC35<br>SENSE:CORRection:CKIT N50<br>SENSE:CORRection:CKIT N75<br>SENSE:CORRection:CKIT UDEFined<br>SENSE:CORRection:CKIT:MODify:SAVE<br>SENSE:CORRection:CKIT:MODify<br><br>SENSE:CORRection:RVELocity <numeric><br>SENSE:CORRection:CIMPedance <numeric> |
| Response standard menu<br><b>defined std 1</b><br><b>defined std 2</b><br><b>defined std 3</b><br><b>defined std 4</b><br><b>defined std 5</b><br><b>defined std 6</b><br><b>defined std 7</b><br><b>DONE: RESPONSE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | STANA<br>STANB<br>STANC<br>STAND<br>STANE<br>STANF<br>STANG<br>RESPDONE                                                                                                                                                                                      | SENSE:CORRection:COLLect[:ACQuire] STANdard1<br>SENSE:CORRection:COLLect[:ACQuire] STANdard2<br>SENSE:CORRection:COLLect[:ACQuire] STANdard3<br>SENSE:CORRection:COLLect[:ACQuire] STANdard4<br>SENSE:CORRection:COLLect[:ACQuire] STANdard5<br>SENSE:CORRection:COLLect[:ACQuire] STANdard6<br>SENSE:CORRection:COLLect[:ACQuire] STANdard7<br>SENSE:CORRection:COLLect:SAVE2                                                                                                                                                                                                                                                                                                                        |

| Front Panel Key                                                                                                                                                                                                                                                                                                                                                                                  | Simple Command                                                                                                                                                                       | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Response/isolation menu<br>RESPONSE<br>→ See OPEN/SHORT/Response standard menu<br>ISOL'N STD<br>DONE RESP ISOL'N CAL                                                                                                                                                                                                                                                                             | RAIRESP<br><br>RAHSOL<br><br>RAID                                                                                                                                                    | SENSE:CORRection:COLLect[:ACQuire] RESP<br><br>SENSE:CORRection:COLLect[:ACQuire] ISOL<br><br>SENSE:CORRection:COLLect:SAVE3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| S11 1-port menu<br>[S11]: OPEN <sup>1</sup><br>SHORT <sup>1</sup><br>LOAD<br>DONE: 1-PORT CAL                                                                                                                                                                                                                                                                                                    | CLASS11A<br>CLASS11B<br>CLASS11C<br>SAV1                                                                                                                                             | SENSE:CORRection:COLLect[:ACQuire] CS11A<br>SENSE:CORRection:COLLect[:ACQuire] CS11B<br>SENSE:CORRection:COLLect[:ACQuire] CS11C<br>SENSE:CORRection:COLLect:SAVE4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| S22 1-port menu<br>[S22]: OPEN <sup>1</sup><br>SHORT <sup>1</sup><br>LOAD<br>DONE: 1-PORT CAL                                                                                                                                                                                                                                                                                                    | CLASS22A<br>CLASS22B<br>CLASS22C<br>SAV1                                                                                                                                             | SENSE:CORRection:COLLect[:ACQuire] CS22A<br>SENSE:CORRection:COLLect[:ACQuire] CS22B<br>SENSE:CORRection:COLLect[:ACQuire] CS22C<br>SENSE:CORRection:COLLect:SAVE4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Full 2-port menu<br>REFLECT'N<br>[S11]: OPEN <sup>1</sup><br>SHORT <sup>1</sup><br>LOAD<br>[S22]: OPEN <sup>1</sup><br>SHORT <sup>1</sup><br>LOAD<br>REFLECT'N DONE<br>TRANSMISSION<br>FWD TRANS THRU<br>FWD MATCH THRU<br>REV TRANS THRU<br>REV MATCH THRU<br>TRANS DONE<br>ISOLATION<br>OMIT ISOLATION<br>FWD ISOL'N ISOL'N STD<br>REV ISOL'N ISOL'N STD<br>ISOLATION DONE<br>DONE: 2-PORT CAL | REFL<br>CLASS11A<br>CLASS11B<br>CLASS11C<br>CLASS22A<br>CLASS22B<br>CLASS22C<br>REFD<br>TRAN<br>FWDT<br>FWDM<br>REVT<br>REVM<br>TRAD<br>ISOL<br>OMII<br>FWDI<br>REVI<br>ISOD<br>SAV2 | SENSE:CORRection:COLLect[:ACQuire] REFL2<br>SENSE:CORRection:COLLect[:ACQuire] CS11A<br>SENSE:CORRection:COLLect[:ACQuire] CS11B<br>SENSE:CORRection:COLLect[:ACQuire] CS11C<br>SENSE:CORRection:COLLect[:ACQuire] CS22A<br>SENSE:CORRection:COLLect[:ACQuire] CS22B<br>SENSE:CORRection:COLLect[:ACQuire] CS22C<br>SENSE:CORRection:COLLect:SAVE5<br>SENSE:CORRection:COLLect[:ACQuire] TRAN2<br>SENSE:CORRection:COLLect[:ACQuire] FWDT<br>SENSE:CORRection:COLLect[:ACQuire] FWDM<br>SENSE:CORRection:COLLect[:ACQuire] REVT<br>SENSE:CORRection:COLLect[:ACQuire] REVM<br>SENSE:CORRection:COLLect:SAVE6<br>SENSE:CORRection:COLLect[:ACQuire] ISOL2<br>SENSE:CORRection:COLLect[:ACQuire] OMII<br>SENSE:CORRection:COLLect[:ACQuire] FWDI<br>SENSE:CORRection:COLLect[:ACQuire] REVI<br>SENSE:CORRection:COLLect:SAVE7<br>SENSE:CORRection:COLLect:SAVE8 |

<sup>1</sup> See OPEN/SHORT/Response standard menu when Type-N calkits or user calkit is selected.

| Front Panel Key                                                                                                                                                                                                                                                                  | Simple Command                                                                                                                  | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| One-path 2-port menu<br>REFLECT'N<br>[S11]: OPEN<br>SHORT<br>LOAD<br>REFLECT'N DONE<br>TRANSMISSION<br>FWD. TRANS. THRU<br>FWD. MATCH THRU<br>TRANS. DONE<br>ISOLATION<br>OMIT ISOLATION<br>FWD.ISOL'N ISOL'N STD<br>REV.ISOL'N ISOL'N STD<br>ISOLATION DONE<br>DONE: 2-PORT CAL | REFL<br>CLASS11A<br>CLASS11B<br>CLASS11C<br>REFD<br>TRAN<br>FWDT<br>FWDM<br>TRAD<br>ISOL<br>OMI<br>FWDI<br>REVI<br>ISOD<br>SAV2 | SENSE:CORRection:COLLect[:ACQuire] REFL2<br>SENSE:CORRection:COLLect[:ACQuire] CS11A<br>SENSE:CORRection:COLLect[:ACQuire] CS11B<br>SENSE:CORRection:COLLect[:ACQuire] CS11C<br>SENSE:CORRection:COLLect:SAVE5<br>SENSE:CORRection:COLLect[:ACQuire] TRAN2<br>SENSE:CORRection:COLLect[:ACQuire] FWDT<br>SENSE:CORRection:COLLect[:ACQuire] FWDM<br>SENSE:CORRection:COLLect:SAVE6<br>SENSE:CORRection:COLLect[:ACQuire] ISOL2<br>SENSE:CORRection:COLLect[:ACQuire] OMI<br>SENSE:CORRection:COLLect[:ACQuire] FWDI<br>SENSE:CORRection:COLLect[:ACQuire] REVI<br>SENSE:CORRection:COLLect:SAVE7<br>SENSE:CORRection:COLLect:SAVE8 |
| OPEN/SHORT/Response standard menu<br>defined std 1<br>defined std 2<br>defined std 3<br>defined std 4<br>defined std 5<br>defined std 6<br>defined std 7<br>DONE: OPENS/SHORTS /Response                                                                                         | STANA<br>STANB<br>STANC<br>STAND<br>STANE<br>STANF<br>STANG<br>DONE                                                             | SENSE:CORRection:COLLect[:ACQuire] STANdard1<br>SENSE:CORRection:COLLect[:ACQuire] STANdard2<br>SENSE:CORRection:COLLect[:ACQuire] STANdard3<br>SENSE:CORRection:COLLect[:ACQuire] STANdard4<br>SENSE:CORRection:COLLect[:ACQuire] STANdard5<br>SENSE:CORRection:COLLect[:ACQuire] STANdard6<br>SENSE:CORRection:COLLect[:ACQuire] STANdard7<br>SENSE:CORRection:COLLect:SAVE1                                                                                                                                                                                                                                                     |
| Reference plane menu<br>EXTENSIONS ON off<br>EXTENSION INPUT R<br>EXTENSION INPUT A<br>EXTENSION INPUT B<br>EXTENSION PORT 1<br>EXTENSION PORT 2<br>RETURN                                                                                                                       | PORE {OFF ON 0 1}<br>PORTR <numeric><br>PORTA <numeric><br>PORTB <numeric><br>PORT1 <numeric><br>PORT2 <numeric>                | SENSE:CORRection:EDELay:STATe {OFF ON 0 1}<br>SENSE:CORRection:EDELay:PORT3:TIME <numeric><br>SENSE:CORRection:EDELay:PORT4:TIME <numeric><br>SENSE:CORRection:EDELay:PORT5:TIME <numeric><br>SENSE:CORRection:EDELay:PORT1:TIME <numeric><br>SENSE:CORRection:EDELay:PORT2:TIME <numeric>                                                                                                                                                                                                                                                                                                                                         |

| Front Panel Key             | Simple Command         | Equivalent SCPI Command                            |
|-----------------------------|------------------------|----------------------------------------------------|
| Modify calkit menu          |                        |                                                    |
| <u>DEFINE STANDARD</u>      |                        |                                                    |
| <u>STD NO.1 [SHORT]</u>     | DEFS 1                 | SENSe:CORRection:CKIT:SElect STANdard1             |
| <u>STD NO.2 [OPEN]</u>      | DEFS 2                 | SENSe:CORRection:CKIT:SElect STANdard2             |
| <u>STD NO.3 [LOAD]</u>      | DEFS 3                 | SENSe:CORRection:CKIT:SElect STANdard3             |
| <u>STD NO.4 [DEL/THRU]</u>  | DEFS 4                 | SENSe:CORRection:CKIT:SElect STANdard4             |
| <u>STD NO.5 [LOAD]</u>      | DEFS 5                 | SENSe:CORRection:CKIT:SElect STANdard5             |
| <u>STD NO.6 [LOAD]</u>      | DEFS 6                 | SENSe:CORRection:CKIT:SElect STANdard6             |
| <u>STD NO.7 [SHORT]</u>     | DEFS 7                 | SENSe:CORRection:CKIT:SElect STANdard7             |
| <u>STD NO.8 [OPEN]</u>      | DEFS 8                 | SENSe:CORRection:CKIT:SElect STANdard8             |
| <u>SPECIFY CLASS</u>        |                        |                                                    |
| <u>SPECIFY: S11A</u>        | SPECS11A <value, ... > | SENSe:CORRection:CKIT:CLASs1:STANdard <n,n, ... >  |
| <u>S11B</u>                 | SPECS11B <value, ... > | SENSe:CORRection:CKIT:CLASs2:STANdard <n,n, ... >  |
| <u>S11C</u>                 | SPECS11C <value, ... > | SENSe:CORRection:CKIT:CLASs3:STANdard <n,n, ... >  |
| <u>SPECIFY: S22A</u>        | SPECS22A <value, ... > | SENSe:CORRection:CKIT:CLASs4:STANdard <n,n, ... >  |
| <u>S22B</u>                 | SPECS22B <value, ... > | SENSe:CORRection:CKIT:CLASs5:STANdard <n,n, ... >  |
| <u>S22C</u>                 | SPECS22C <value, ... > | SENSe:CORRection:CKIT:CLASs6:STANdard <n,n, ... >  |
| <u>MORE</u>                 |                        |                                                    |
| <u>SPECIFY:FWD.TRANS.</u>   | SPECFWDT <value, ... > | SENSe:CORRection:CKIT:CLASs7:STANdard <n,n, ... >  |
| <u>REV.TRANS.</u>           | SPECREVT <value, ... > | SENSe:CORRection:CKIT:CLASs8:STANdard <n,n, ... >  |
| <u>FWD.MATCH</u>            | SPECFWDM <value, ... > | SENSe:CORRection:CKIT:CLASs9:STANdard <n,n, ... >  |
| <u>REV.MATCH</u>            | SPECREVM <value, ... > | SENSe:CORRection:CKIT:CLASs10:STANdard <n,n, ... > |
| <u>RESPONSE</u>             | SPECRESP <value, ... > | SENSe:CORRection:CKIT:CLASs11:STANdard <n,n, ... > |
| <u>RESPONSE &amp; ISO'N</u> | SPECRESI <value, ... > | SENSe:CORRection:CKIT:CLASs12:STANdard <n,n, ... > |
| <u>CLASS DONE (SPEC'D)</u>  | CLAD                   | SENSe:CORRection:CKIT:SAVE CLASs                   |
| <u>CLASS DONE (SPEC'D)</u>  | CLAD                   | SENSe:CORRection:CKIT:SAVE CLASs                   |
| <u>LABEL CLASS</u>          |                        |                                                    |
| <u>LABEL: S11A</u>          | LABES11A <string>      | SENSe:CORRection:CKIT:CLASs1:LABel <string>        |
| <u>S11B</u>                 | LABES11B <string>      | SENSe:CORRection:CKIT:CLASs2:LABel <string>        |
| <u>S11C</u>                 | LABES11C <string>      | SENSe:CORRection:CKIT:CLASs3:LABel <string>        |
| <u>LABEL: S22A</u>          | LABES22A <string>      | SENSe:CORRection:CKIT:CLASs4:LABel <string>        |
| <u>S22B</u>                 | LABES22B <string>      | SENSe:CORRection:CKIT:CLASs5:LABel <string>        |
| <u>S22C</u>                 | LABES22C <string>      | SENSe:CORRection:CKIT:CLASs6:LABel <string>        |
| <u>MORE</u>                 |                        |                                                    |
| <u>LABEL:FWD.TRANS.</u>     | LABEFWDT <string>      | SENSe:CORRection:CKIT:CLASs7:LABel <string>        |
| <u>REV.TRANS.</u>           | LABEREVT <string>      | SENSe:CORRection:CKIT:CLASs8:LABel <string>        |
| <u>FWD.MATCH</u>            | LABEFWDM <string>      | SENSe:CORRection:CKIT:CLASs9:LABel <string>        |
| <u>REV.MATCH</u>            | LABEREVM <string>      | SENSe:CORRection:CKIT:CLASs10:LABel <string>       |
| <u>RESPONSE</u>             | LABERESP <string>      | SENSe:CORRection:CKIT:CLASs11:LABel <string>       |
| <u>RESPONSE &amp; ISO'N</u> | LABERESI <string>      | SENSe:CORRection:CKIT:CLASs12:LABel <string>       |
| <u>LABEL DONE</u>           |                        |                                                    |
| <u>LABEL DONE</u>           |                        |                                                    |
| <u>LABEL KIT</u>            | LABK <string>          | SENSe:CORRection:CKIT:LABel <string>               |
| <u>KIT DONE (MODIFIED)</u>  | KITD                   | SENSe:CORRection:CKIT:SAVE ALL                     |



| Front Panel Key                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Simple Command                                                                                                                                                                                                                                               | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specify offset menu<br>OFFSET DELAY<br>OFFSET LOSS<br>OFFSET Z0<br>STD OFFSET DONE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | OFSD <numeric><br>OFSL <numeric><br>OFSZ <numeric>                                                                                                                                                                                                           | SENSe:CORRection:CKIT:STANdard:ODELay <numeric><br>SENSe:CORRection:CKIT:STANdard:OLOs <numeric><br>SENSe:CORRection:CKIT:STANdard:OCIMpedance <numeric>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Standard type menu<br>STD TYPE OPEN<br>C0<br>C1<br>C2<br>SPECIFY OFFSET<br>→ See Specify offset menu<br>LABEL STD<br>STD DONE (DEFINED)<br>SHORT<br>SPECIFY OFFSET<br>→ See Specify offset menu<br>LABEL STD<br>STD DONE (DEFINED)<br>LOAD<br>SPECIFY OFFSET<br>→ See Specify offset menu<br>LABEL STD<br>STD DONE (DEFINED)<br>DELAY/THRU<br>SPECIFY OFFSET<br>→ See Specify offset menu<br>LABEL STD<br>STD DONE (DEFINED)<br>ARBITRARY IMPEDANCE<br>TERMINAL IMPEDANCE<br>SPECIFY OFFSET<br>→ See Specify offset menu<br>LABEL STD<br>STD DONE (DEFINED)<br>RETURN | STDT OPEN<br>C0 <numeric><br>C1 <numeric><br>C2 <numeric><br>LABS <string><br>STDD<br>STDT SHOR<br>LABS <string><br>STDD<br>STDT LOAD<br>LABS <string><br>STDD<br>STDT DELA<br>LABS <string><br>STDD<br>STDT ARBI<br>TERI <numeric><br>LABS <string><br>STDD | SENSe:CORRection:CKIT:STANdard:TYPE OPEN<br>SENSe:CORRection:CKIT:STANdard:C0 <numeric><br>SENSe:CORRection:CKIT:STANdard:C1 <numeric><br>SENSe:CORRection:CKIT:STANdard:C2 <numeric><br>SENSe:CORRection:CKIT:STANdard:LABel <string><br>SENSe:CORRection:CKIT:STANdard:SAVE<br>SENSe:CORRection:CKIT:STANdard:TYPE SHORT<br>SENSe:CORRection:CKIT:STANdard:LABel <string><br>SENSe:CORRection:CKIT:STANdard:SAVE<br>SENSe:CORRection:CKIT:STANdard:TYPE LOAD<br>SENSe:CORRection:CKIT:STANdard:LABel <string><br>SENSe:CORRection:CKIT:STANdard:SAVE<br>SENSe:CORRection:CKIT:STANdard:TYPE DELay<br>SENSe:CORRection:CKIT:STANdard:LABel <string><br>SENSe:CORRection:CKIT:STANdard:SAVE<br>SENSe:CORRection:CKIT:STANdard:TYPE AIMPedance<br>SENSe:CORRection:CKIT:STANdard:TIMPedance <numeric><br>SENSe:CORRection:CKIT:STANdard:LABel <string><br>SENSe:CORRection:CKIT:STANdard:SAVE |
| Spectrum Analyzer<br>EXECUTE LVL CAL<br>LVL CAL DATA<br>INPUT Z                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | LVLCAL<br>LVCDT <numeric><br>INPZ <numeric>                                                                                                                                                                                                                  | CaLibration:AUTO ONCE<br>SENSe:CORRection:OFFSet[:MAGNitude] <numeric><br>INPut:IMPedance <numeric>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Front Panel Key             | Simple Command     | Equivalent SCPI Command                                                  |
|-----------------------------|--------------------|--------------------------------------------------------------------------|
| Impedance Analyzer          |                    |                                                                          |
| CALIBRATE MENU              | CALI IMP           | SENSe:CORRection:COLLect:MEthod IMP                                      |
| OPEN <sup>1</sup>           | CLASIMPA           | SENSe:CORRection:COLLect[:ACQuire] IMPA                                  |
| SHORT <sup>1</sup>          | CLASIMPB           | SENSe:CORRection:COLLect[:ACQuire] IMPB                                  |
| LOAD                        | CLASIMPC           | SENSe:CORRection:COLLect[:ACQuire] IMPC                                  |
| DONE:CAL                    | SAVIMP             | SENSe:CORRection:COLLect:SAVE                                            |
| RESUME CAL SEQUENCE         | RESC               | SENSe:CORRection:COLLect:RESume                                          |
| FIXTURE COMPEN              |                    |                                                                          |
| COMPEN MENU                 | COMP               | SENSe:CORRection2:COLLect:MEthod IMPedance                               |
| OPEN                        | COMCA              | SENSe:CORRection2:COLLect[:ACQuire] STANdard1                            |
| SHORT                       | COMCB              | SENSe:CORRection2:COLLect[:ACQuire] STANdard2                            |
| LOAD                        | COMCC              | SENSe:CORRection2:COLLect[:ACQuire] STANdard3                            |
| DONE:COMPEN                 | SAVCOM             | SENSe:CORRection2:COLLect:SAVE                                           |
| RESUME COMP SEQ             | RESCOM             | SENSe:CORRection2:COLLect:RESume                                         |
| OPEN on OFF                 | COMCDATA {ON OFF}  | SENSe:CORRection2:OPEN {ON OFF}1 0}                                      |
| SHORT on OFF                | COMCDATB {ON OFF}  | SENSe:CORRection2:SHORT {ON OFF}1 0}                                     |
| LOAD on OFF                 | COMCDATC {ON OFF}  | SENSe:CORRection2:LOAD {ON OFF}1 0}                                      |
| RETURN                      |                    |                                                                          |
| CAL KIT [IMP 7mm]           |                    |                                                                          |
| CAL KIT : IMP 7mm           | CALK APC7          | SENSe:CORRection:CKIT APC7                                               |
| 3.5mm                       | CALK APC35         | SENSe:CORRection:CKIT APC35                                              |
| N 500                       | CALK N50           | SENSe:CORRection:CKIT N50                                                |
| N 750                       | CALK N75           | SENSe:CORRection:CKIT N75                                                |
| USER KIT                    | CALK USED          | SENSe:CORRection:CKIT UDEFined                                           |
| SAVE USER KIT               | SAVEUSEK           | SENSe:CORRection:CKIT:MODify:SAVE                                        |
| MODIFY (IMP 7mm)            | MODI1              | SENSe:CORRection:CKIT:MODify                                             |
| DEFINE STNADARD             |                    |                                                                          |
| → See Define standard menu  |                    |                                                                          |
| SPECIFY CLASS               |                    |                                                                          |
| SPECIFY: IMP A              | SPECIMPA <numeric> | :SENSe:CORRection:CKIT:CLASs13:STANdard <num1>[,<num2>[, ... [,<num7>]]] |
| IMP B                       | SPECIMPB <numeric> | :SENSe:CORRection:CKIT:CLASs14:STANdard <num1>[,<num2>[, ... [,<num7>]]] |
| IMP C                       | SPECIMPC <numeric> | :SENSe:CORRection:CKIT:CLASs15:STANdard <num1>[,<num2>[, ... [,<num7>]]] |
| CLASS DONE                  | CLAD               | SENSe:CORRection:CKIT:SAVE CLASs                                         |
| LABEL CLASS                 |                    |                                                                          |
| LABEL: IMP A                | LABEIMPA <string>  | :SENSe:CORRection:CKIT:CLASs13:LABel <string>                            |
| IMP B                       | LABEIMPB <string>  | :SENSe:CORRection:CKIT:CLASs14:LABel <string>                            |
| IMP C                       | LABEIMPC <string>  | :SENSe:CORRection:CKIT:CLASs15:LABel <string>                            |
| LABEL KIT                   | LABK <string>      | SENSe:CORRection:CKIT:LABel <string>                                     |
| KIT DONE (MODIFIED)         | KITD               | SENSe:CORRection:CKIT:SAVE ALL                                           |
| COMPEN KIT [USER]           |                    |                                                                          |
| → See Compensation kit menu |                    |                                                                          |

1 See OPEN/SHORT/Response standard menu when Type-N calkits or user calkit is selected.

| Front Panel Key  | Simple Command     | Equivalent SCPI Command                         |
|------------------|--------------------|-------------------------------------------------|
| PORT EXTENSIONS  |                    |                                                 |
| EXTENSION ON off | PORE {OFF ON 0 1}  | SENSe:CORRection:EDELay:STATe {OFF ON 0 1}      |
| EXTENSION VALUE  | PORTZ <numeric>    | SENSe:CORRection1:EDELay:PORT6[:TIME] <numeric> |
| VELOCITY FACTOR  | VELOFACT <numeric> | SENSe:CORRection:RVELocity <numeric>            |
| RETURN           |                    |                                                 |

| Front Panel Key       | Simple Command      | Equivalent SCPI Command                      |
|-----------------------|---------------------|----------------------------------------------|
| Compensation Kit Menu |                     |                                              |
| SAVE COMPEN KIT       | SAVUCOMK            | SENSe:CORRection2:CKIT:MODify:SAVE           |
| MODIFY [USER]         | MODICOMK            | SENSe:CORRection2:CKIT:MODify                |
| DEFINE STANDARD       |                     |                                              |
| OPEN CONDUCT(G)       | DEFSOPENG <numeric> | SENSe:CORRection2:CKIT:STNAdard1:G <numeric> |
| CAP(C)                | DEFSOPENC <numeric> | SENSe:CORRection2:CKIT:STNAdard1:C <numeric> |
| SHORT RESIST(R)       | DEFSSHORR <numeric> | SENSe:CORRection2:CKIT:STNAdard2:R <numeric> |
| INDUCT(L)             | DEFSSHORL <numeric> | SENSe:CORRection2:CKIT:STNAdard2:L <numeric> |
| LOAD RESIST(R)        | DEFSLOADR <numeric> | SENSe:CORRection2:CKIT:STNAdard3:R <numeric> |
| INDUCT(L)             | DEFSLOADL <numeric> | SENSe:CORRection2:CKIT:STNAdard3:L <numeric> |
| STD DONE (DEFINED)    | COMSDONE            | SENSe:CORRection2:CKIT:STANdard:SAVE         |
| LABEL KIT             | LABECOMK <string>   | SENSe:CORRection2:CKIT:LABel <string>        |
| KIT DONE (MODIFIED)   | COMKDONE            | SENSe:CORRection2:CKIT:SAVE                  |
| RETURN                |                     |                                              |

| Front Panel Key                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Simple Command                                                                                                                                                                                                                                           | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sweep</b><br>Network/Impedance Analyzer<br><b>SWEEP TIME AUTO</b> man<br><b>SWEEP TIME</b><br>h:ms<br><b>RETURN</b><br><b>NUMBER OF POINTS</b><br><b>COUPLED CH ON OFF</b><br><b>SWEEP TYPE MENU</b><br><b>SWEEP TYPE:LIN FREQ</b><br><br><b>LOG FREQ</b><br><br><b>LIST FREQ</b><br><br><b>POWER SWEEP</b><br><br><b>EDIT LIST</b><br><b>SEGMENT</b><br><b>EDIT</b><br>→ See NA/ZA segment menu<br><b>DELETE</b><br><b>ADD</b><br>→ See NA/ZA segment menu<br><b>CLEAR LIST</b><br><b>LIST DONE</b><br><b>RETURN</b> | SWETAUTO {OFF ON 0 1}<br>SWET <numeric><br><br>POIN <numeric><br>COUC {OFF ON 0 1}<br><br>SWPT LINF<br><br>SWPT LOGF<br><br>SWPT LIST<br><br>SWPT POWE<br><br>EDITLIST<br>SEDI <numeric><br>SEDI [<numeric>]<br><br>SDEL<br>SADD<br><br>CLEL<br>EDITDONE | SENSE:SWEep:TIME:AUTO {OFF ON 0 1}<br>SENSE:SWEep:TIME <numeric><br><br>SENSE:SWEep:POINTs <numeric><br>INSTRument:COUPlE {OFF ON 0 1}<br><br>SENSE:FREQuency:MODE SWEep<br>SOURce:POWer:MODE FIXed<br>SENSE:SWEep:SPACing LINear<br><br>SENSE:FREQuency:MODE SWEep<br>SOURce:POWer:MODE FIXed<br>SENSE:SWEep:SPACing LOGarithmic<br><br>SENSE:FREQuency:MODE LIST<br>SOURce:POWer:MODE LIST<br>SENSE:SWEep:SPACing LINear<br><br>SENSE:FREQuency:MODE FIXed<br>SOURce:POWer:MODE SWEep<br>SENSE:SWEep:SPACing LINear<br><br>SENSE:LIST:SEGment <numeric><br>SENSE:LIST:SEGment:EDIT<br><br>SENSE:LIST:SEGment:DELete<br>SENSE:LIST:SEGment:ADD<br><br>SENSE:LIST:CLEar<br>SENSE:LIST:SAVE |
| NA/ZA segment menu<br><b>SEGMENT: MKR→START</b><br><b>MKR→STOP</b><br><b>NUMBER of POINTS</b><br><b>POWER</b><br><b>IF BW</b><br><b>MORE</b><br><b>SEGMENT: START</b><br><b>STOP</b><br><b>CENTER</b><br><b>SPAN</b><br><b>RETURN</b><br><b>SEGMENT QUIT</b><br><b>SEGMENT DONE</b>                                                                                                                                                                                                                                      | MKRSTAR<br>MKRSTOP<br>POIN <numeric><br>POWE <numeric><br>BW <numeric><br><br>STAR <numeric><br>STOP <numeric><br>CENT <numeric><br>SPAN <numeric><br><br>SQUI<br>SDON                                                                                   | SENSE:LIST:SEGment:FREQuency:STARt MARKer<br>SENSE:LIST:SEGment:FREQuency:STOP MARKer<br>SENSE:LIST:SEGment:POINTs <numeric><br>SENSE:LIST:SEGment:POWer <numeric><br>SENSE:LIST:SEGment:BANDwidth <numeric><br><br>SENSE:LIST:SEGment:FREQuency:STARt <numeric><br>SENSE:LIST:SEGment:FREQuency:STOP <numeric><br>SENSE:LIST:SEGment:FREQuency:CENTer <numeric><br>SENSE:LIST:SEGment:FREQuency:SPAN <numeric><br><br>SENSE:LIST:SEGment:QUIT<br>SENSE:LIST:SEGment:SAVE                                                                                                                                                                                                                  |

| Front Panel Key              | Simple Command        | Equivalent SCPI Command                                                             |
|------------------------------|-----------------------|-------------------------------------------------------------------------------------|
| <b>Spectrum Analyzer</b>     |                       |                                                                                     |
| <b>SWEEP TIME AUTO</b> man   | SWETAUTO {OFF ON 0 1} | SENSe:SWEep:TIME:AUTO {OFF ON 0 1}                                                  |
| <b>SWEEP TIME</b>            | SWET <numeric>        | SENSe:SWEep:TIME <numeric>                                                          |
| h:m:s                        |                       |                                                                                     |
| <b>RETURN</b>                |                       |                                                                                     |
| <b>SAMPLING NORMAL</b> repet | REPTSMP {OFF ON 0 1}  | SENSe:DETEctor:CONTinuous {OFF ON 0 1}                                              |
| <b>NUMBER OF POINTS</b>      | POIN <numeric>        | SENSe:SWEep:POINts <numeric>                                                        |
| <b>SWEEP TYPE MENU</b>       |                       |                                                                                     |
| <b>SWEEP TYPE:LIN FREQ</b>   | SWPT LINF             | SENSe:FREQuency:MODE SWEep<br>SOURce:POWer:MODE FIXed<br>SENSe:SWEep:SPACing LINear |
| <b>LIST FREQ</b>             | SWPT LIST             | SENSe:FREQuency:MODE LIST<br>SOURce:POWer:MODE LIST<br>SENSe:SWEep:SPACing LINear   |
| <b>EDIT LIST</b>             | EDITLIST              |                                                                                     |
| <b>SEGMENT</b>               |                       | SENSe:LIST:SEGment <numeric>                                                        |
| <b>EDIT</b>                  | SEDI [<numeric>]      | SENSe:LIST:SEGment:EDIT                                                             |
| → See SA segment menu        |                       |                                                                                     |
| <b>DELETE</b>                | SDEL                  | SENSe:LIST:SEGment:DELe                                                             |
| <b>ADD</b>                   | SADD                  | SENSe:LIST:SEGment:ADD                                                              |
| → See SA segment menu        |                       |                                                                                     |
| <b>CLEAR LIST</b>            | CLEL                  | SENSe:LIST:CLEar                                                                    |
| <b>LIST DONE</b>             | EDITDONE              | SENSe:LIST:SAVE                                                                     |
| <b>RETURN</b>                |                       |                                                                                     |
| <b>SA segment menu</b>       |                       |                                                                                     |
| <b>SEGMENT: MKR→START</b>    | MKRSTAR               | SENSe:LIST:SEGment:FREQuency:STARt MARKer                                           |
| <b>MKR→STOP</b>              | MKRSTOP               | SENSe:LIST:SEGment:FREQuency:STOP MARKer                                            |
| <b>NUMBER of POINTS</b>      | POIN <numeric>        | SENSe:LIST:SEGment:POINts <numeric>                                                 |
| <b>POWER</b>                 | POWE <numeric>        | SENSe:LIST:SEGment:POWer <numeric>                                                  |
| <b>RESBW</b>                 | BW <numeric>          | SENSe:LIST:SEGment:BANDwidth <numeric>                                              |
| <b>MORE</b>                  |                       |                                                                                     |
| <b>SEGMENT: START</b>        | STAR <numeric>        | SENSe:LIST:SEGment:FREQuency:STARt <numeric>                                        |
| <b>STOP</b>                  | STOP <numeric>        | SENSe:LIST:SEGment:FREQuency:STOP <numeric>                                         |
| <b>CENTER</b>                | CENT <numeric>        | SENSe:LIST:SEGment:FREQuency:CENter <numeric>                                       |
| <b>SPAN</b>                  | SPAN <numeric>        | SENSe:LIST:SEGment:FREQuency:SPAN <numeric>                                         |
| <b>RETURN</b>                |                       |                                                                                     |
| <b>SEGMENT QUIT</b>          | SQUI                  | SENSe:LIST:SEGment:QUIT                                                             |
| <b>SEGMENT DONE</b>          | SDON                  | SENSe:LIST:SEGment:SAVE                                                             |

| Front Panel Key           | Simple Command    | Equivalent SCPI Command                                                                |
|---------------------------|-------------------|----------------------------------------------------------------------------------------|
| <b>Source</b>             |                   |                                                                                        |
| Network Analyzer          |                   |                                                                                        |
| POWER                     | POWE <numeric>    | SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric>                                 |
| SLOPE                     | SLOPE <numeric>   | SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]:SLOPe <numeric>                           |
| SLOPE ON off              | SLOP {OFF ON 0 1} | SOURce:POWer[:LEVel][:IMMediate][:AMPLitude]:SLOPe:STATe {OFF ON 0 1}                  |
| CW FREQ                   | CWFREQ <numeric>  | SOURce:FREQUency[:CW] <numeric>                                                        |
| ATTENUATOR PORT 1         | ATTP1 <numeric>   | OUTPut:ATTenuation1 <numeric>                                                          |
| ATTENUATOR PORT 2         | ATTP2 <numeric>   | OUTPut:ATTenuation2 <numeric>                                                          |
| RF OUT ON off             | RFO {OFF ON 0 1}  | SOURce:POWer:STATe {OFF ON 0 1}                                                        |
| <b>Spectrum Analyzer</b>  |                   |                                                                                        |
| POWER                     | POWE <numeric>    | SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric>                                 |
| RF OUT ON off             | RFO {OFF ON 0 1}  | SOURce:POWer:STATe {OFF ON 0 1}                                                        |
| <b>Impedance Analyzer</b> |                   |                                                                                        |
| POWER                     | POWE <numeric>    | SOURce:POWer[:LEVel][:IMMediate][:AMPLitude] <numeric>                                 |
| CW FREQ                   | CWFREQ <numeric>  | SOURce:FREQUency[:CW] <numeric>                                                        |
| RF OUT ON off             | RFO {OFF ON 0 1}  | SOURce:POWer:STATe {OFF ON 0 1}                                                        |
| <b>Trigger</b>            |                   |                                                                                        |
| SWEEP:HOLD                | HOLD              | INITiate:CONTInuous {OFF 0}<br>ABORt                                                   |
| SINGLE                    | SING              | INITiate:CONTInuous {OFF 0}<br>SENSe:SWEEp:COUNT 1<br>INITiate[:IMMediate]             |
| NUMBER of GROUPS          | NUMG <numeric>    | INITiate:CONTInuous {OFF 0}<br>SENSe:SWEEp:COUNT <numOfGroups><br>INITiate[:IMMediate] |
| CONTINUOUS                | CONT              | INITiate:CONTInuous {ON 1}                                                             |
| TRIGGER:[FREE RUN]        |                   |                                                                                        |
| FREE RUN                  | TRGS INT          | TRIGger:SOURce INTernal1<br>SENSe:SWEEp:GATed {OFF 0}                                  |
| EXTERNAL                  | TRGS EXT          | TRIGger:SOURce EXTernal<br>SENSe:SWEEp:GATed {OFF 0}                                   |
| (HP-B)                    | TRGS BUS          | TRIGger:SOURce BUS<br>SENSe:SWEEp:GATed {OFF 0}                                        |
| VIDEO <sup>1</sup>        | TRGS VID          | TRIGger:SOURce INTernal2<br>SENSe:SWEEp:GATed {OFF 0}                                  |
|                           | VIDLVL <numeric>  | TRIGger:LEVel <numeric>                                                                |
| MANUAL                    | TRGS MAN          | TRIGger:SOURce MANual<br>SENSe:SWEEp:GATed {OFF 0}                                     |
| GATE [LEVEL] <sup>1</sup> | TRGS GAT          | TRIGger:SOURce EXTernal<br>SENSe:SWEEp:GATed {ON 1}                                    |
| GATE CTL:LEVEL            | GATCTL LEV        | SENSe:SWEEp:GATed:TRIGger LEVel                                                        |
| EDGE                      | GATCTL EDG        | SENSe:SWEEp:GATed:TRIGger EDGE                                                         |
| GATE DELAY                | GATDLY <numeric>  | SENSe:SWEEp:GATed:DELay <numeric>                                                      |
| GATE LENGTH               | GATLEN <numeric>  | SENSe:SWEEp:GATed:LENGth <numeric>                                                     |
| RETURN                    |                   |                                                                                        |
| RETURN                    |                   |                                                                                        |
| TRIG EVENT <sup>2</sup>   | TRGEVE SWE        | TRIGger:EVENT:TYPE SWEEp                                                               |
|                           | TRGEVE POIN       | TRIGger:EVENT:TYPE POINt                                                               |
| TRIG PLRTY POS neg        | TRGP {POS NEG}    | TRIGger:SLOPe {POSitive NEGative}                                                      |
| MEASURE RESTART           | REST              | INITiate[:IMMediate]:AGAI:n:ALL                                                        |

1 Spectrum analyzer only

2 Network and impedance analyzer only

| Front Panel Key                                                                                                                                                                         | Simple Command                                                                                                      | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Start</b>                                                                                                                                                                            | STAR <numeric>                                                                                                      | SENSe:FREQuency:STARt <numeric> (Frequency) or<br>SOURce:POWer:STARt <numeric> (Power)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Stop</b>                                                                                                                                                                             | STOP <numeric>                                                                                                      | SENSe:FREQuency:STOP <numeric> (Frequency) or<br>SOURce:POWer:STOP <numeric> (Power)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Center</b><br><b>STEP SIZE AUTO man</b><br><b>CENTER STEP SIZE</b><br><b>MKR→CNTR STEP</b><br><b>MKRA→CNTR STEP</b><br><b>MKR→CENTER</b><br><b>MKRA→CENTER</b><br><b>PEAK→CENTER</b> | CENT <numeric><br>CNTSAUTO {OFF ON 0 1}<br>CNTS <numeric><br>MKRCSTE<br>MKRDCSTE<br>MKRCENT<br>MKRDCEnt<br>PEAKCENT | SENSe:FREQuency:CENTer <numeric> (Frequency) or<br>SOURce:POWer:CENTer <numeric> (Power)<br>SENSe:FREQuency:CENTer:STEP[:INCRement]:AUTO {OFF ON 0 1}<br>SENSe:FREQuency:CENTter:STEP[:INCRement] <numeric><br>SENSe:FREQuency:CENTter:STEP[:INCRement] MARKer<br>SENSe:FREQuency:CENTter:STEP[:INCRement] DMARKer<br>SENSe:FREQuency:CENTer MARKer (Frequency) or<br>SOURce:POWer:CENTer MARKer (Power)<br>SENSe:FREQuency:CENTer DMARKer (Frequency) or<br>SOURce:POWer:CENTer DMARKer (Power)<br>SENSe:FREQuency:CENTer TPEak (Frequency) or<br>SOURce:POWer:CENTer TPEak (Power) |
| <b>Span</b><br><b>FULL SPAN</b><br><b>ZERO SPAN</b><br><b>MKRA→SPAN</b>                                                                                                                 | SPAN <numeric><br>FULS<br>SPAN 0<br>MKRDSPAN                                                                        | SENSe:FREQuency:SPAN <numeric> (Frequency) or<br>SOURce:POWer:SPAN <numeric> (Power)<br>SENSe:FREQuency:SPAN:FULL (Frequency) or<br>SOURce:POWer:SPAN:FULL (Power)<br>SENSe:FREQuency:SPAN 0 (Frequency) or<br>SOURce:POWer:SPAN 0 (Power)<br>SENSe:FREQuency:SPAN DMARKer (Frequency) or<br>SOURce:POWer:SPAN DMARKer (Power)                                                                                                                                                                                                                                                       |



| Front Panel Key                                                                                                                                                                                                                                                            | Simple Command                                                                                                                           | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Marker</b>                                                                                                                                                                                                                                                              | MKR {OFF ON 0 1}                                                                                                                         | DISPlay[:WINDow]:TRACe:MARKer:ALL:STATe {OFF ON 0 1}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Network/Impedance Analyzer<br><b>SUB MKR</b><br>→ See Sub-marker menu<br><b>CLEAR SUB MKR</b><br>→ See Sub-marker menu<br><b>PRESET MKRS</b><br><b>MKR ON [DATA]</b><br><br><b>MKR [UNCOUPLE]</b><br><b>MKR [CONT]</b><br><b>ΔMODE MENU</b><br>→ See NA/ZA Delta mode menu | PRSMKRS<br>MKRO DATA<br>MKRO MEMO<br>MKRCOUP {OFF ON 0 1}<br>MKRCONT {OFF ON 0 1}                                                        | DISPlay[:WINDow]:TRACe:MARKer:ALL DEFault<br>CALCulate:EVALuate:ON "DTR"<br>CALCulate:EVALuate:ON "MTR"<br>CALCulate:EVALuate:COUPle {OFF ON 0 1}<br>CALCulate:EVALuate:INTerpolate {OFF ON 0 1}                                                                                                                                                                                                                                                                                                                                                               |
| Spectrum Analyzer<br><b>SUB MKR</b><br>→ See Sub marker menu<br><b>CLEAR SUB MKR</b><br>→ See Sub marker menu<br><b>PRESET MKRS</b><br><b>MKR ON [DATA]</b><br><br><b>MKR [UNCOUPLE]</b><br><b>ΔMODE MENU</b><br>→ See SA Delat mode menu                                  | PRSMKRS<br>MKRO DATA<br>MKRO MEMO<br>MKRCOUP {OFF ON 0 1}                                                                                | DISPlay[:WINDow]:TRACe:MARKer:ALL DEFault<br>CALCulate:EVALuate:ON "DTR"<br>CALCulate:EVALuate:ON "MTR"<br>CALCulate:EVALuate:COUPle {OFF ON 0 1}                                                                                                                                                                                                                                                                                                                                                                                                              |
| NA/ZA Delta mode menu<br><b>ΔMKR</b><br><br><b>FIXED ΔMKR</b><br><br><b>TRACKING ΔMKR</b><br><br><b>ΔMODE OFF</b><br><br><b>ΔMKR SWP PRM</b><br><b>ΔMKR VALUE</b><br><b>ΔMKR AUX VALUE</b><br><b>RETURN</b>                                                                | DMKR ON<br><br>DMKR FIX<br><br>DMKR TRAC<br><br>DMKR OFF<br><br>OUTPDMKR?<br>DMKRPRM <numeric><br>DMKRVAL <numeric><br>DMKRAUV <numeric> | DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1}<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence MARKer<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1}<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence FIXed<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1}<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence TRACked<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive {OFF 0}<br>CALCulate:EVALuate:REFerence:DATA?<br>CALCulate:EVALuate:REFerence:X <numeric><br>CALCulate:EVALuate:REFerence:Y1 <numeric><br>CALCulate:EVALuate:REFerence:Y2 <numeric> |
| SA Delta mode menu<br><b>ΔMKR</b><br><br><b>FIXED ΔMKR</b><br><br><b>TRACKING ΔMKR</b><br><br><b>ΔMODE OFF</b><br><br><b>ΔMKR SWP PRM</b><br><b>ΔMKR VALUE</b><br><b>RETURN</b>                                                                                            | DMKR ON<br><br>DMKR FIX<br><br>DMKR TRAC<br><br>DMKR OFF<br><br>DMKRPRM <numeric><br>DMKRVAL <numeric>                                   | DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1}<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence MARKer<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1}<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence FIXed<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive {ON 1}<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive:REFerence TRACked<br>DISPlay[:WINDow]:TRACe:MARKer:RELAtive {OFF 0}<br>CALCulate:EVALuate:REFerence:X <numeric><br>CALCulate:EVALuate:REFerence:Y1 <numeric>                                                                                    |

| Front Panel Key                                                                                                                                                                                                                            | Simple Command                                                                                                                                                                         | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sub-marker menu<br>SUB MKR 1 2 3 4 5 6 7<br><br>RETURN                                                                                                                                                                                     | SMKR{1-7} {OFF ON 0 1}<br>SMKRPRM{1-7}<br><numeric><br>OUTPSMKR{1-7}?<br>SMKRPRM{1-7}?<br>SMKRVAL{1-7}?<br>SMKRAUV{1-7}?                                                               | DISPlay[:WINDow]:TRACe:MARKer{2-8}:STATe {OFF ON 0 1}<br>CALCulate:EVALuate:Y{2-8}:XPOSITION <numeric><br>CALCulate:EVALuate:Y{2-8}:DATA?<br>CALCulate:EVALuate:Y{2-8}:XPOSITION?<br>CALCulate:EVALuate:Y{2-8}:VALue1?<br>CALCulate:EVALuate:Y{2-8}:VALue2?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Marker→<br>MKR→CENTER<br><br>MKR→START<br><br>MKR→STOP<br><br>MKR→REFERENCE<br>PEAK→CENTER<br><br>CROSS CHAN ON off<br><br>MORE<br>MKR ZOOM<br><br>ZOOMING APERTURE<br>MKRA→SPAN<br><br>MKRA→CENTER<br><br>CROSS CHAN ON off<br><br>RETURN | MKRCENT<br><br>MKRSTAR<br><br>MKRSTOP<br><br>MKRREF<br>PEAKCENT<br><br>CRSC {OFF ON 0 1}<br><br>MKRZM<br><br>ZMAPER <numeric><br><br>MKRDSPAN<br><br>MKRDCENT<br><br>CRSC {OFF ON 0 1} | SENSE:FREQUENCY:CENTer MARKer (Frequency) or<br>SOURce:POWer:CENTer MARKer (Power)<br><br>SENSE:FREQUENCY:STARt MARKer (Frequency) or<br>SOURce:POWer:STARt MARKer (Power)<br><br>SENSE:FREQUENCY:STOP MARKer (Frequency) or<br>SOURce:POWer:STOP MARKer (Power)<br><br>DISPlay[:WINDow]:TRACe{1 2}:Y[:SCALE]:RLEVel MARKer<br><br>SENSE:FREQUENCY:CENTer TPEak (Frequency) or<br>SOURce:POWer:CENTer TPEak (Power)<br><br>CALCulate:EVALuate:EFFect:ON {1 2}<br><br>SENSE:FREQUENCY:SPAN MZAPerture (Frequency)<br>SOURce:POWer:SPAN MZAPerture (Power)<br>DATA[:DATA] MZAP <numeric><br><br>SENSE:FREQUENCY:SPAN DMARker (Frequency) or<br>SOURce:POWer:SPAN DMARker (Power)<br><br>SENSE:FREQUENCY:CENTer DMARker (Frequency) or<br>SOURce:POWer:CENTer DMARker (Power)<br><br>CALCulate:EVALuate:EFFect:ON {1 2} |



| Front Panel Key                                                                                                                                                                                                                                           | Simple Command                                                                                                                                                                              | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Peak menu<br><b>PEAK</b><br><b>NEXT PEAK</b><br><b>NEXT PEAK LEFT</b><br><b>NEXT PEAK RIGHT</b><br><b>PEAK DEF MENU</b><br>→ See Peak definition menu<br><b>SUB MKR</b><br>→ See Sub-marker menu<br><b>RETURN</b>                                         | <b>SEAM PEAK</b><br><b>SEANPK</b><br><b>SEANPKL</b><br><b>SEANPKR</b>                                                                                                                       | <b>CALCulate:EVALuate:Y:XPOSITION:PEAK</b><br><b>CALCulate:EVALuate:Y:XPOSITION:NPEak</b><br><b>CALCulate:EVALuate:Y:XPOSITION:LPEak</b><br><b>CALCulate:EVALuate:Y:XPOSITION:RPEak</b>                                                                                                                                                                                                                                     |
| Multiple peaks menu<br><b>SEARCH: PEAKS ALL</b><br><b>PEAKS RIGHT</b><br><b>PEAKS LEFT</b><br><b>PEAK DEF MENU</b><br>→ See Peak definition menu<br><b>SRCH TRACK ON off</b><br><b>RETURN</b>                                                             | <b>SEAM PKSA</b><br><b>SEAM PKSR</b><br><b>SEAM PKSL</b><br><br><b>TRACK {OFF ON 0 1}</b>                                                                                                   | <b>CALCulate:EVALuate:Y:XPOSITION:PALL</b><br><b>CALCulate:EVALuate:Y:XPOSITION:PRIGHT</b><br><b>CALCulate:EVALuate:Y:XPOSITION:PLEFT</b><br><br><b>CALCulate:EVALuate:Y:XPOSITION:TRACK {MAXimum MINimum TARGET PEAK PALL PLEFT PRIGHT OFF}</b>                                                                                                                                                                            |
| Peak definition menu<br><b>THRESHOLD ON off</b><br><b>THRESHOLD VALUE</b><br><b>MKR→THRESHOLD</b><br><b>PEAK PLRTY POS neg<sup>1</sup></b><br><b>PEAK DEF: ΔX<sup>1</sup></b><br><b>PEAK DEF: ΔY</b><br><b>MKR→PEAKDELTA<sup>1</sup></b><br><b>RETURN</b> | <b>PKTHRE {OFF ON 0 1}</b><br><b>PKTHVAL &lt;numeric&gt;</b><br><b>MKRTHRE</b><br><b>PKPOL {POS NEG}</b><br><b>PKDLTX &lt;numeric&gt;</b><br><b>PKDLTY &lt;numeric&gt;</b><br><b>MKRPKD</b> | <b>CALCulate:EVALuate:PEAK:THReshold:STATe {OFF ON 0 1}</b><br><b>CALCulate:EVALuate:PEAK:THReshold &lt;numeric&gt;</b><br><b>CALCulate:EVALuate:PEAK:THReshold MARKer</b><br><b>CALCulate:EVALuate:PEAK:POLarity {POSitive NEGative}</b><br><b>CALCulate:EVALuate:PEAK:EXCursion:X &lt;numeric&gt;</b><br><b>CALCulate:EVALuate:PEAK:EXCursion[:Y] &lt;numeric&gt;</b><br><b>CALCulate:EVALuate:PEAK:EXCursion DMARKer</b> |
| Width value menu<br><b>MKRVAL/(√2)</b><br><b>MKRVAL*(√2)</b><br><b>MKRVAL/2</b><br><b>FIXED VALUE</b><br><b>RETURN</b>                                                                                                                                    | <b>WIDVTYPE DIVS2</b><br><b>WIDVTYPE MULS2</b><br><b>WIDVTYPE DIV2</b><br><b>WIDVTYPE FIX</b><br><b>WIDV &lt;numeric&gt;</b>                                                                | <b>CALCulate:EVALuate:WIDTh:Y:TYPE DIVS2</b><br><b>CALCulate:EVALuate:WIDTh:Y:TYPE MULS2</b><br><b>CALCulate:EVALuate:WIDTh:Y:TYPE DIV2</b><br><b>CALCulate:EVALuate:WIDTh:Y:TYPE FIXed,&lt;numeric&gt;</b>                                                                                                                                                                                                                 |
| Search range menu<br><b>PART SECH ON off</b><br><b>MKRA→SEARCH RNG</b><br><b>MKR→LEFT RNG</b><br><b>MKR→RIGHT RNG</b><br><b>RETURN</b>                                                                                                                    | <b>PARS {OFF ON 0 1}</b><br><b>SEARSTR</b><br><b>SEARSTRL</b><br><b>SEARSTRR</b>                                                                                                            | <b>CALCulate:EVALuate:BAND:FULL[:STATe] {OFF ON 0 1}</b><br><b>CALCulate:EVALuate:BAND:SPAN DMARKer</b><br><b>CALCulate:EVALuate:BAND:STARt MARKer</b><br><b>CALCulate:EVALuate:BAND:STOP MARKer</b>                                                                                                                                                                                                                        |

<sup>1</sup> Network and impedance analyzer only

| Front Panel Key                                                                                                                                                                  | Simple Command                                                                                        | Equivalent SCPI Command                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Utility</b><br>Network/Impedance Analyzer<br><b>MKR LIST ON off</b><br><b>STATISTICS ON off</b><br><b>MKR TIME ON off</b><br><b>SMTH/POLAR MENU</b><br>→ See Circle data menu | MKRL {OFF ON 0 1}<br>MEASTAT {OFF ON 0 1}<br>OUTPMSTA?<br>MKRTIME {OFF ON 0 1}                        | DISPLAY[:WINDow]:TEXT16:STATe {OFF ON 0 1}<br>CALCulate:EVALuate:MSStatistics[:STATe] {OFF ON 0 1}<br>CALCulate:EVALuate:MSStatistics:DATA?<br>DISPLAY[:WINDow]:TRACe:MARKer:UNIT:TIME {OFF ON 0 1}                                                  |
| Circle data menu<br><b>REAL IMAG</b><br><b>LIN MAG PHASE</b><br><b>LOG MAG PHASE</b><br><b>R+jX</b><br><b>G+jB</b><br><b>SWR PHASE</b><br><b>RETURN</b>                          | CIRF RI<br>CIRF LIN<br>CIRF LOG<br>CIRF RX<br>CIRF GB<br>CIRF SWR                                     | CALCulate:EVALuate:R:FORMat RIMaginary<br>CALCulate:EVALuate:R:FORMat MLIPhase<br>CALCulate:EVALuate:R:FORMat MLOPhase<br>CALCulate:EVALuate:R:FORMat RX<br>CALCulate:EVALuate:R:FORMat GB<br>CALCulate:EVALuate:R:FORMat SWRPhase                   |
| Spectrum Analyzer<br><b>MKR LIST ON off</b><br><b>STATISTICS ON off</b><br><b>MKR TIME ON off</b><br><b>NOISE FORM ON off</b>                                                    | MKRL {OFF ON 0 1}<br>MEASTAT {OFF ON 0 1}<br>OUTPMSTA?<br>MKRTIME {OFF ON 0 1}<br>MKRNOI {OFF ON 0 1} | DISPLAY[:WINDow]:TEXT16:STATe {OFF ON 0 1}<br>CALCulate:EVALuate:MSStatistics[:STATe] {OFF ON 0 1}<br>CALCulate:EVALuate:MSStatistics:DATA?<br>DISPLAY[:WINDow]:TRACe:MARKer:UNIT:TIME {OFF ON 0 1}<br>CALCulate:EVALuate:NOISe[:STATe] {OFF ON 0 1} |

| Front Panel Key                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Simple Command | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>System</p> <p>IBASIC</p> <p>Step</p> <p>Continue</p> <p>Run</p> <p>Pause</p> <p>Stop</p> <p>Edit</p> <p>ASSIGN @Hp4396</p> <p>OUTPUT @Hp4396</p> <p>ENTER @Hp4396</p> <p>END</p> <p>GOTO LINE</p> <p>RECALL LINE</p> <p>END EDIT</p> <p>ON KEY LABELS</p> <p>[USER DEFINE]</p> <p>[USER DEFINE]</p> <p>[USER DEFINE]</p> <p>[USER DEFINE]</p> <p>[USER DEFINE]</p> <p>[USER DEFINE]</p> <p>[USER DEFINE]</p> <p>[USER DEFINE]</p> <p>CAT</p> <p>SAVE</p> <p>RE-SAVE</p> <p>GET</p> <p>PURGE</p> <p>INITIALIZE</p> <p>MSI [INTERNAL/MEMORY]</p> <p>SCRATCH</p> <p>RENumber</p> <p>LIST</p> <p>COMMAND ENTRY</p> <p>SELECT LETTER</p> <p>SPACE</p> <p>BACK SPACE</p> <p>ERASE TITLE</p> <p>DONE</p> <p>CANCEL</p> |                | <p>PROGRAM[:SElected]:EXECute "STEP"</p> <p>PROGRAM[:SElected]:STATe CONTINUE or<br/>PROGRAM[:SElected]:EXECute "CONT"</p> <p>PROGRAM[:SElected]:STATe RUN or<br/>PROGRAM[:SElected]:EXECute "RUN"</p> <p>PROGRAM[:SElected]:STATe PAUSE or<br/>PROGRAM[:SElected]:EXECute "PAUSE"</p> <p>PROGRAM[:SElected]:STATe STOP or<br/>PROGRAM[:SElected]:EXECute "STOP"</p> <p>PROGRAM[:SElected]:EXECute "EDIT"</p> |

| Front Panel Key   | Simple Command | Equivalent SCPI Command |
|-------------------|----------------|-------------------------|
| CLEAR I/O         |                |                         |
| RESET             |                |                         |
| MEMORY PARTITION  |                |                         |
| mmK RAM nnK BASIC |                |                         |
| mmK RAM nnK BASIC |                |                         |
| mmK RAM nnK BASIC |                |                         |
| mmK RAM nnK BASIC |                |                         |
| mmK RAM nnK BASIC |                |                         |
| mmK RAM nnK BASIC |                |                         |
| DONE              |                |                         |
| CHANGE YES        |                |                         |
| NO                |                |                         |
| CANCEL            |                |                         |

| Front Panel Key      | Simple Command        | Equivalent SCPI Command                     |
|----------------------|-----------------------|---------------------------------------------|
| SET CLOCK            |                       |                                             |
| TIME HH:MM:SS        |                       |                                             |
| HOUR                 |                       |                                             |
| MIN                  |                       |                                             |
| SEC                  |                       |                                             |
| ENTER                | SETCTIME <h,m,s>      | SYSTem:TIME <hour>,<minute>,<second>        |
| CANCEL               |                       |                                             |
| DATE DD/MM/YY        |                       |                                             |
| MON                  |                       |                                             |
| DAY                  |                       |                                             |
| YEAR                 |                       |                                             |
| ENTER                | SETCDATE <y,m,d>      | SYSTem:DATE <year>,<month>,<day>            |
| CANCEL               |                       |                                             |
| DATE MODE:MonDayYear | MONDAYEAR             | SYSTem:DATE:MODE MDY                        |
| DayMonYear           | DAYMYEAR              | SYSTem:DATE:MODE DMY                        |
| RETURN               |                       |                                             |
| BEEPER MENU          |                       |                                             |
| BEEP DONE ON off     | BEEPDONE {OFF ON 0 1} | SYSTem:BEEPer1:STATe {OFF ON 0 1}           |
| BEEP WARN ON off     | BEEPWARN {OFF ON 0 1} | SYSTem:BEEPer2:STATe {OFF ON 0 1}           |
| RETURN               |                       |                                             |
| LIMIT MENU           |                       |                                             |
| LIMIT LINE ON off    | LIMILINE {OFF ON 0 1} | CALCulate:LIMit:LINE {OFF ON 0 1}           |
| LIMIT TEST ON off    | LIMITEST {OFF ON 0 1} | CALCulate:LIMit:STATe {OFF ON 0 1}          |
| BEEP FAIL ON off     | BEEPFAIL {OFF ON 0 1} | CALCulate:LIMit:BEEPer[:STATe] {OFF ON 0 1} |
| EDIT LIMIT LINE      | EDITLIML              |                                             |
| SEGMENT              | LIMSEDI <numeric>     | CALCulate:LIMit:SEGment <numeric>           |
| EDIT                 | LIMSEDI [<numeric>]   | CALCulate:LIMit:SEGment:EDIT                |
| DELETE               | LIMSEDEL              | CALCulate:LIMit:SEGment:DELe                |
| ADD                  | LIMSEADD              | CALCulate:LIMit:SEGment:ADD                 |
| CLEAR LIST           | LIMCLEL               | CALCulate:LIMit:CLEar                       |
| CLEAR LIST YES       |                       |                                             |
| NO                   |                       |                                             |
| DONE                 | LIMEDONE              | CALCulate:LIMit:SAVE                        |
| LIMIT LINE OFFSETS   |                       |                                             |
| SWP PARAM OFFSET     | LIMIPRMO <numeric>    | CALCulate:LIMit:CONTRol:OFFSet <numeric>    |
| AMPLITUDE OFFSET     | LIMIAMPO <numeric>    | CALCulate:LIMit:OFFSet <numeric>            |
| MKR—AMPOFS.          | MKRAMPO               | CALCulate:LIMit:OFFSet MARKer               |
| RETURN               |                       |                                             |
| RETURN               |                       |                                             |
| SERVICE MENU         |                       |                                             |



| Front Panel Key       | Simple Command     | Equivalent SCPI Command                          |
|-----------------------|--------------------|--------------------------------------------------|
| Limit line entry menu |                    |                                                  |
| SWP PARAM             | LIMPRM <numeric>   | CALCulate:LIMit:SEGment:CONTRol[:DATA] <numeric> |
| MKR→SWP PARAM         | MKRSWPRM           | CALCulate:LIMit:SEGment:CONTRol[:DATA] MARKer    |
| UPPER LIMIT           | LIMU <numeric>     | CALCulate:LIMit:SEGment:UPPer <numeric>          |
| LOWER LIMIT           | LIML <numeric>     | CALCulate:LIMit:SEGment:LOWer <numeric>          |
| DELTA LIMIT           | LIMD <numeric>     | CALCulate:LIMit:SEGment:DELTA <numeric>          |
| MIDDLE VALUE          | LIMM <numeric>     | CALCulate:LIMit:SEGment:MIDDLE <numeric>         |
| MKR→MIDDLE            | MKRMIDD            | CALCulate:LIMit:SEGment:MIDDLE MARKer            |
| DCNE                  | LIMSDON            | CALCulate:LIMit:SEGment:SAVE                     |
| <b>Local</b>          |                    |                                                  |
| SYSTEM CONTROLLER     |                    |                                                  |
| ADDRESSABLE ONLY      |                    |                                                  |
| SET ADDRESSES         |                    |                                                  |
| ADDRESS:4396          |                    |                                                  |
| ADDRESS:CONTROLLER    | ADDRCONT <numeric> | SYSTem:COMMunicate:GPIB2:ADDRess <numeric>       |
| RETURN                |                    |                                                  |

| Front Panel Key                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Simple Command                                                                                                                            | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Copy</b></p> <p><b>PRINT [STANDARD]</b></p> <p><b>COPY ABORT</b></p> <p><b>COPY SKEY on OFF</b></p> <p><b>COPY TIME ON off</b></p> <p><b>PRINT SETUP</b><br/>→ See Print setup menu</p> <p><b>ORIENT [PORTRAIT]</b></p> <p><b>FORM FEED ON off</b></p> <p><b>MORE</b><br/>→ See Copy more menu</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>PRINALL</p> <p>COPA</p> <p>PRSOFT {OFF ON 0 1}</p> <p>COPT {OFF ON 0 1}</p> <p>LANDSCAPE {OFF ON 0 1}</p> <p>FORMFEED {OFF ON 0 1}</p> | <p>HCOPY[:IMMEDIATE]</p> <p>HCOPY:ABORT</p> <p>HCOPY:DRIVER:SKEY {OFF ON 0 1}</p> <p>HCOPY:ITEM:TDSAMP:STATe {OFF ON 0 1}</p> <p>HCOPY:DRIVER:LANDSCAPE {OFF ON 0 1}</p> <p>HCOPY:DRIVER:FORMFEED {OFF ON 0 1}</p>                                                                                                                                                                                                                                                                                                                                       |
| <p>Copy more menu</p> <p>Network Analyzer</p> <p><b>LIST VALUES</b></p> <p><b>OPERATING PARAMETERS</b></p> <p><b>CAL KIT DEFINITION</b><br/>→ See Copy cal kit menu</p> <p><b>LIST SWEEP TABLE</b><br/>→ See Copy list sweep menu</p> <p><b>LIMIT TEST TABLE</b><br/>→ See Copy limit test menu</p> <p><b>RETURN</b></p> <p>Spectrum Analyzer</p> <p><b>LIST VALUES</b></p> <p><b>OPERATING PARAMETERS</b></p> <p><b>LIST SWEEP TABLE</b><br/>→ See Copy list sweep menu</p> <p><b>LIMIT TEST TABLE</b><br/>→ See Copy limit test menu</p> <p><b>RETURN</b></p> <p>Impedance Analyzer</p> <p><b>LIST VALUES</b></p> <p><b>OPERATING PARAMETERS</b></p> <p><b>CAL KIT DEFINITION</b><br/>→ See Copy cal kit menu</p> <p><b>COMPEN KIT DEFINITION</b></p> <p><b>LIST SWEEP TABLE</b><br/>→ See Copy list sweep menu</p> <p><b>LIMIT TEST TABLE</b><br/>→ See Copy limit test menu</p> <p><b>RETURN</b></p> | <p>LISV</p> <p>OPEP</p> <p>LISV</p> <p>OPEP</p> <p>LISV</p> <p>OPEP</p> <p>COMS</p>                                                       | <p>DISPlay[:WINDow]:TEXT1:PAGE 1<br/>DISPlay[:WINDow]:TEXT1:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT2:PAGE 1<br/>DISPlay[:WINDow]:TEXT2:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT1:PAGE 1<br/>DISPlay[:WINDow]:TEXT1:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT2:PAGE 1<br/>DISPlay[:WINDow]:TEXT2:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT1:PAGE 1<br/>DISPlay[:WINDow]:TEXT1:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT2:PAGE 1<br/>DISPlay[:WINDow]:TEXT2:STATe {ON 1}</p> <p>DISPlay[:WINDow]:TEXT20:PAGE 1<br/>DISPlay[:WINDow]:TEXT20:STATe ON</p> |

| Front Panel Key                                                                                                                                                                                        | Simple Command                                                               | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Copy cal kit menu<br><u>STANDARD DEFINITION</u><br>→ See Copy standard number menu<br><u>CLASS ASSIGNMENT</u><br><u>RETURN</u>                                                                         | CALCASSI                                                                     | Display[:WINDow]:TEXT3:PAGE 1<br>Display[:WINDow]:TEXT3:STATe {ON 1}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Copy limit test menu<br><u>DISPLAY LIST</u><br><u>DISP MODE: UPR &amp; LWR</u><br><u>MID &amp; DLT</u><br><u>RETURN</u>                                                                                | DISLLIST<br>DISMAMP UL<br>DISMAMP MD<br>DISMAMP?                             | Display[:WINDow]:TEXT{14 15}:PAGE 1<br>Display[:WINDow]:TEXT{14 15}:STATe {ON 1}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Copy list sweep menu<br><u>DISPLAY LIST</u><br><u>DISP MODE: ST &amp; SP</u><br><u>CTR &amp; SPAN</u><br><u>RETURN</u>                                                                                 | DISL<br>DISMPRM STSP<br>DISMPRM CTSP<br>DISMPRM?                             | Display[:WINDow]:TEXT{12 13}:PAGE 1<br>Display[:WINDow]:TEXT{12 13}:STATe {ON 1}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Copy standard number menu<br>→ See Screen menu<br><u>STD NO.1</u><br><u>STD NO.2</u><br><u>STD NO.3</u><br><u>STD NO.4</u><br><u>STD NO.5</u><br><u>STD NO.6</u><br><u>STD NO.7</u><br><u>STD NO.8</u> | CALS 1<br>CALS 2<br>CALS 3<br>CALS 4<br>CALS 5<br>CALS 6<br>CALS 7<br>CALS 8 | Display[:WINDow]:TEXT4:PAGE 1<br>Display[:WINDow]:TEXT4:STATe {ON 1}<br>Display[:WINDow]:TEXT5:PAGE 1<br>Display[:WINDow]:TEXT5:STATe {ON 1}<br>Display[:WINDow]:TEXT6:PAGE 1<br>Display[:WINDow]:TEXT6:STATe {ON 1}<br>Display[:WINDow]:TEXT7:PAGE 1<br>Display[:WINDow]:TEXT7:STATe {ON 1}<br>Display[:WINDow]:TEXT8:PAGE 1<br>Display[:WINDow]:TEXT8:STATe {ON 1}<br>Display[:WINDow]:TEXT9:PAGE 1<br>Display[:WINDow]:TEXT9:STATe {ON 1}<br>Display[:WINDow]:TEXT10:PAGE 1<br>Display[:WINDow]:TEXT10:STATe {ON 1}<br>Display[:WINDow]:TEXT11:PAGE 1<br>Display[:WINDow]:TEXT11:STATe {ON 1} |

| Front Panel Key                                                                                                                                         | Simple Command                                                                                      | Equivalent SCPI Command                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Print setup menu<br>PRINT STANDARD<br>COLOR<br>PRINT COLOR (FIXED)<br>DPI<br>TOP MARGIN<br>LFT MARGIN<br>DEFAULT SETUP<br>RETURN                        | PRIS<br>PRIC<br>PRICFIXE<br>PRICVARI<br>DPI <numeric><br>TMARG <numeric><br>LMARG <numeric><br>DFLT | HCOPY:DRIVER:COLor {OFF 0}<br>HCOPY:DRIVER:COLor {ON 1}<br>HCOPY:DRIVER:CMAP:COLor FIXed<br>HCOPY:DRIVER:CMAP:COLor VARIABLE<br>HCOPY:DRIVER:DPI <numeric><br>HCOPY:DRIVER:TOPMarg <numeric><br>HCOPY:DRIVER:LEFTMarg <numeric><br>HCOPY:DEFault |
| Screen menu<br>PRINT [STANDARD]<br>COPY ABORT<br>COPY TIME ON off<br>PRINT SETUP<br>— See Print setup menu<br>NEXT PAGE<br>PREV PAGE<br>RESTORE DISPLAY | PRINALL<br>COPA<br>COPT {OFF ON 0 1}<br><br>NEXP<br>PREP<br>RESD                                    | HCOPY:DRIVER:LANGUage PCL<br>HCOPY{:IMMediate}<br>HCOPY:ABORt<br>HCOPY:ITEM:TDS'amp:STATe {OFF ON 0 1}<br><br>DISPlay[:WINDow]:TEXT{1-17}:PAGE UP<br>DISPlay[:WINDow]:TEXT{1-17}:PAGE DOWN<br>DISPlay[:WINDow]:TEXT{1-17}:STATe {OFF 0}          |

| Front Panel Key                                 | Simple Command                           | Equivalent SCPI Command                                                                       |
|-------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Save</b>                                     |                                          |                                                                                               |
| STATE                                           | SAVDSTA <string>                         | MMEMory:STORe:STATe <string(file name)>[,<string(msus)>]                                      |
| DATA ONLY                                       |                                          |                                                                                               |
| SAVE BINARY                                     | SAVDDAT <string>                         | MMEMory:STORe:TRACe SEL,<string(file name)>[,<string(msus)>]                                  |
| SAVE ASCII                                      | SAVDASC <string>                         | MMEMory:STORe:DINTerchange:TRACe SEL,<string(file name)>[,<string(msus)>]                     |
| DEFINE SAVE DATA<br>— See Define save data menu |                                          |                                                                                               |
| STOR DEV [DISK]                                 | STOD {DISK MEMO}                         |                                                                                               |
| GRAPHICS                                        | SAVDTIF <string>                         | MMEMory:STORe:DINTerchange:TIFf <string(file name)>[,<string(msus)>]                          |
| 4396A STATE                                     | SAVDSTAC <string>                        |                                                                                               |
| RE-SAVE FILE                                    | RESAVD <string>                          | MMEMory:DELete <file_name>[,<msus>]<br>MMEMory:STORe:{STATe TRACe} [SEL,]<file_name>[,<msus>] |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| PREV FILES                                      |                                          |                                                                                               |
| NEXT FILES                                      |                                          |                                                                                               |
| RETURN                                          |                                          |                                                                                               |
| FILE UTILITIES                                  |                                          |                                                                                               |
| PURGE FILE                                      | PURG <string>                            | MMEMory:DELete <file_name>[,<msus>]                                                           |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| PREV FILES                                      |                                          |                                                                                               |
| NEXT FILES                                      |                                          |                                                                                               |
| —See purge yes no menu                          |                                          |                                                                                               |
| STOR DEV [DISK]                                 | STOD {DISK MEMO}                         |                                                                                               |
| CREATE DIRECTORY                                | CRED <string>                            | MMEMory:CREate:DIRectory <string>                                                             |
| CHANGE DIRECTORY                                | CHAD <string>                            | MMEMory:CDIRectory [<string>]                                                                 |
| COPY FILE                                       | FILC <string>,<string>,<string>,<string> | MMEMory:COpy <string(s)>,<msus>,<string(d)>,<msus>                                            |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| file name                                       |                                          |                                                                                               |
| PREV FILES                                      |                                          |                                                                                               |
| NEXT FILES                                      |                                          |                                                                                               |
| STOR DEV [DISK]                                 | STOD {DISK MEMO}                         |                                                                                               |

| Front Panel Key                                                                                                                                           | Simple Command                                                                                                                                                                                                     | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INITIALIZE DISK<br>INITIALIZE: YES<br>NO<br>FORMAT [LIF]<br>STOR DEV [ ]<br>RETURN<br>STOR DEV [ ]                                                        | INID<br><br>DISF LIF<br>DISF DOS<br>STOD{DISK MEMO}<br><br>STOD{DISK MEMO}                                                                                                                                         | MMEMemory:INITIALize <msus>,{LIF DOS}                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Define save data menu<br>RAW ON off<br><br>CAL ON off<br><br>DATA ON off<br><br>MEM ON off<br><br>DATA TRACE ON off<br><br>MEM TRACE ON off<br><br>RETURN | SAVRAW {ON 1}<br>SAVRAW {OFF 0}<br>SAVCAL {ON 1}<br>SAVCAL {OFF 0}<br>SAVDAT {ON 1}<br>SAVDAT {OFF 0}<br>SAVMEM {ON 1}<br>SAVMEM {OFF 0}<br>SAVDTRC {ON 1}<br>SAVDTRC {OFF 0}<br>SAVMTRC {ON 1}<br>SAVMTRC {OFF 0} | MMEMemory:STORe:ITEM:TRACe:SELEct RAW<br>MMEMemory:STORe:ITEM:TRACe:DELEte RAW<br>MMEMemory:STORe:ITEM:TRACe:SELEct CCO<br>MMEMemory:STORe:ITEM:TRACe:DELEte CCO<br>MMEMemory:STORe:ITEM:TRACe:SELEct DATA<br>MMEMemory:STORe:ITEM:TRACe:DELEte DATA<br>MMEMemory:STORe:ITEM:TRACe:SELEct MEM<br>MMEMemory:STORe:ITEM:TRACe:DELEte MEM<br>MMEMemory:STORe:ITEM:TRACe:SELEct DTR<br>MMEMemory:STORe:ITEM:TRACe:DELEte DTR<br>MMEMemory:STORe:ITEM:TRACe:SELEct MTR<br>MMEMemory:STORe:ITEM:TRACe:DELEte MTR |
| Purge yes no menu<br>PURGE: YES<br>NO                                                                                                                     |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Recall<br>file name<br>file name<br>file name<br>file name<br>PREV FILES<br>NEXT FILES<br>STOR DEV [ ]                                                    | RECD <string><br><br><br><br><br><br>STOD{DISK MEMO}                                                                                                                                                               | MMEMemory:LOAD:STATe <file_name>[,<msus>] (State)<br>MMEMemory:LOAD:TRACe SEL,<file_name>[,<msus>] (Data)                                                                                                                                                                                                                                                                                                                                                                                                  |
| Preset                                                                                                                                                    | PRES                                                                                                                                                                                                               | SYSTem:PRESet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Front Panel Key                                       | Simple Command                                                                                                                                                                                                                                                                                                         | Equivalent SCPI Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HP-IB only commands</b><br>Marker related commands | MKR {ON 1}<br>MKRPRM <numeric><br>OUTPMKR?<br>MKRVAL?<br>MKRAUV?<br>MKRP <numeric><br>SMKRP{1-7} <numeric>                                                                                                                                                                                                             | DISPlay[:WINDow]:TRACe:MARKer:STATe {ON 1}<br>CALCulate:EVALuate:Y:XPOSITION <numeric><br>CALCulate:EVALuate:Y:DATA?<br>CALCulate:EVALuate:Y:VALue1?<br>CALCulate:EVALuate:Y:VALue2?<br>CALCulate:EVALuate:Y:XPOSITION:POINt <numeric><br>CALCulate:EVALuate:Y{2-8}:XPOSITION:POINt <numeric>                                                                                                                                                                                                                                                                                                                                                                                                  |
| 8-bit IO related commands                             | INP8IO?<br>OUT8IO <numeric>                                                                                                                                                                                                                                                                                            | SYSTem:COMMunicate:PARAllel[:RECeive]:DATA?<br>SYSTem:COMMunicate:PARAllel:TRANsmit:DATA <numeric>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| KEY related commands                                  | KEY <NUMERIC><br>ENKEY<br>DSKEY<br>USKEY                                                                                                                                                                                                                                                                               | SYSTem:KEY <numeric><br>SYSTem:KLOCK {OFF 0}<br>SYSTem:KLOCK {ON 1}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Input/output data array related commands              | INPURAW1<br>INPURAW2<br>INPURAW3<br>INPURAW4<br>INPUDATA<br>INPUDTRC<br>OUTPRAW1?<br>OUTPRAW2?<br>OUTPRAW3?<br>OUTPRAW4?<br>OUTPDATA?<br>OUTPDATAP? <numeric><br>OUTPMEMO?<br>OUTPMEMOP? <numeric><br>OUTPDTRC?<br>OUTPDTRCP? <numeric><br>OUTPMTRC?<br>OUTPMTRCP? <numeric><br>OUTPSWPRM?<br>OUTPSWPRMP?<br><numeric> | DATA[:DATA] RAW1,{<block> <numeric> ,<numeric>}}<br>DATA[:DATA] RAW2,{<block> <numeric> ,<numeric>}}<br>DATA[:DATA] RAW3,{<block> <numeric> ,<numeric>}}<br>DATA[:DATA] RAW4,{<block> <numeric> ,<numeric>}}<br>DATA[:DATA] DATA,{<block> <numeric> ,<numeric>}}<br>TRACe[:DATA] DTR,{<block> <numeric> ,<numeric>}}<br>DATA[:DATA]? RAW1<br>DATA[:DATA]? RAW2<br>DATA[:DATA]? RAW3<br>DATA[:DATA]? RAW4<br>DATA[:DATA]? DATA<br>DATA[:DATA]:VALue? DATA,<point><br>DATA[:DATA]? MEM<br>DATA[:DATA]:VALue? MEM,<point><br>TRACe[:DATA]? DTR<br>TRACe[:DATA]:VALue? DTR,<point><br>TRACe[:DATA]? MTR<br>TRACe[:DATA]:VALue? MTR,<point><br>DATA[:DATA]? SPAR<br>DATA[:DATA]:VALue? SPAR,<point> |

| Front Panel Key                               | Simple Command                                                                                                               | Equivalent SCPI Command                                                                                                                                                                                                                                                     |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Calibration and compensation related commands | INPUCALC{1-12}<br><numeric><br>OUTPCALC{1-12}?<br>INPUCALK <numeric><br>OUTPCALK?<br>SAVC<br>INPUCOMC{1-3}<br>OUTPCOMC{1-3}? | DATA[:DATA] CCO{1-12},{<block> <numeric>[,<numeric>]}<br>DATA[:DATA]? CCO{1-12}<br>DATA[:DATA] CKIT,{<block> <numeric>[,<numeric>]}<br>DATA[:DATA]? CKIT<br>SENSE:CORREction:COLLect:SAVE9<br>DATA[:DATA] CMP{1-3},{<block> <numeric>[,<numeric>]}<br>DATA[:DATA]? CMP{1-3} |
| Transfer data format related commands         | FORM2<br>FORM3<br>FORM4<br>FORM5                                                                                             | FORMat[:DATA] REAL,32<br>FORMat[:DATA] REAL,64<br>FORMat[:DATA] ASCi<br>FORMat[:DATA] PACKed,32                                                                                                                                                                             |
| Limit test related commands                   | OUTPLIMF?<br>OUTPFAIP?<br>OUTPLIMM?                                                                                          | DATA[:DATA]? LFA<br>DATA:POINts? LFA<br>DATA[:DATA]? LMAR                                                                                                                                                                                                                   |
| Error related command                         | OUTPERRO?                                                                                                                    | SYSTem:ERRor?                                                                                                                                                                                                                                                               |
| Status byte related commands                  | CLES<br>ESB?<br>ESNB <numeric><br>OSR?<br>OSE <numeric><br>OSER?<br>OSPT <numeric><br>OSNT <numeric>                         | *CLS (Common Command)<br>STATus:INSTrument[:EVENT]?<br>STATus:INSTrument:ENABle <numeric><br>STATus:OPEratiOn:CONDition?<br>STATus:OPEratiOn:ENABle <numeric><br>STATus:OPEratiOn[:EVENT]?<br>STATus:OPEratiOn:PTRansiOn <numeric><br>STATus:OPEratiOn:NTRansiOn <numeric>  |
| Test set related command                      | TESS?                                                                                                                        | SYSTem:COMMunicate:TSET?                                                                                                                                                                                                                                                    |
| LCD display related command                   | SCRN {OFF ON 0 1}<br>BLIGHT {OFF ON 0 1}                                                                                     |                                                                                                                                                                                                                                                                             |



| Front Panel Key                        | Simple Command                                                                                                                  | Equivalent SCPI Command |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Waveform analysis commands</b>      |                                                                                                                                 |                         |
| Waveform analysis setup commands       | ANAOCHI<br>ANAOCH2<br>ANARANG<br>ANARFULL<br>ANAODATA<br>ANAOMEMO<br>THRR                                                       |                         |
| Maximum/Minimum/Mean search commands   | OUTPMAX?<br>OUTPMIN?<br>OUTPMINMAX?<br>OUTPMEAN?<br>PEAK?<br>NEXPK?<br>NUMLMAX?<br>NUMLMIN?<br>LMAX?<br>LMIN?<br>TARR?<br>TARL? |                         |
| Ripple analysis commands               | RPLPP?<br>RPLHEI?<br>RPLRHEI?<br>RPLLHEI?<br>RPLENV?<br>RPLMEA?<br>RPLVAL?<br>POLE?                                             |                         |
| Filter and Resonator analysis commands | OUTPFILT?<br>OUTPXFIL?<br>OUTPCFIL?<br>OUTPRESO?<br>OUTPRESR?<br>OUTPRESF?<br>OUTPCERR?                                         |                         |
| Equivalent circuit analysis commands   | EQUCPARA?<br>EQU<br>EQUCPARS?<br>EQUCO?<br>EQUCPARS4?                                                                           |                         |

| Front Panel Key                    | Simple Command                                                                                                                                  | Equivalent SCPI Command |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>3-term calibration commands</b> | INPUOPEA<br>INPUSHOA<br>INPULOAA<br>INPUD                                                                                                       |                         |
| <b>Common commands</b>             | *CLS<br>*IDN?<br>*OPT?<br>*RST<br>*TST?<br>*OPC<br>*WAI<br>*CLS<br>*ESE <numeric><br>*ESR?<br>*SRE <numeric><br>*STB?<br>*TRG<br>*PCB <numeric> |                         |

## **SCPI Commands Summary**

---

This appendix summarizes the SCPI commands in alphabetical order. It also shows the equivalent simple command when applicable.

| Command              | Parameter           | Note         | Equivalent Simple Command |
|----------------------|---------------------|--------------|---------------------------|
| ABORT                |                     |              | HOLD                      |
| CALCulate            |                     |              |                           |
| :AVERage             |                     |              |                           |
| :STATe               | {OFF ON 0 1}        |              | DHOLD                     |
| :TYPE                | {MAXimum MINimum}   |              | DHOLD                     |
| :EVALuate            |                     |              |                           |
| :BAND                |                     |              |                           |
| :FULL                |                     |              |                           |
| [:STATe]             | {OFF ON}            |              | PARS                      |
| :SPAN                | DMARKer             | [no query]   | SEARSTR                   |
| :START               | MARKer              | [no query]   | SEARSTR L                 |
| :STOP                | MARKer              | [no query]   | SEARSTR R                 |
| :COUple              | {OFF ON 0 1}        |              | MKRCOUP                   |
| :EFFect              |                     |              |                           |
| :ON                  | {1 2}               |              | CRSC                      |
| :EPARameters         |                     | CALECPARA    |                           |
| :CIRCUit {A B C D E} |                     | EQUC         |                           |
| :SIMulation          |                     | SIMFCHAR     |                           |
| :INterpolate         | {OFF ON 0 1}        |              | MKRCONT                   |
| :MStatistics         |                     |              |                           |
| :DATA?               |                     | [query only] | OUTPMSTA?                 |
| [:STATe]             | {OFF ON 0 1}        |              | MEASTAT                   |
| :NOISe               |                     |              |                           |
| [:STATe]             | {OFF ON 0 1}        |              | MKRNOI                    |
| :ON                  | {"DTR" "MTR"}       |              | MKRO                      |
| :PEAK                |                     |              |                           |
| :EXCURsion           |                     |              |                           |
| :X                   | {<numeric> DMARKer} |              | MKRPKD, PKDLTX            |
| [:Y]                 | {<numeric> DMARKer} |              | MKRPKD, PKDLTY            |
| :POLarity            | {POSitive NEGative} |              | PKPOL                     |
| :THReshold           | {<numeric> MARKer}  |              | MKRTHRE, PKTHVAL          |
| :STATe               | {OFF ON 0 1}        |              | PKTHRE                    |

| Command               | Parameter                                           | Note         | Equivalent Simple Command |
|-----------------------|-----------------------------------------------------|--------------|---------------------------|
| CALCulate (continued) |                                                     |              |                           |
| :EVALuate (continued) |                                                     |              |                           |
| :REFErence            |                                                     |              |                           |
| :DATA?                |                                                     | [query only] | OUTPDMKR?                 |
| :X                    | <numeric>                                           |              | DMKRPRM                   |
| :Y1                   | <numeric>                                           |              | DMKRVAL                   |
| :Y2                   | <numeric>                                           |              | DMKRAUV                   |
| :WIDTh                |                                                     |              |                           |
| :DATA?                |                                                     | [query only] | OUTPMWID?                 |
| :STATe                | {OFF ON 0 1}                                        |              | WIDT                      |
| :XPOSITiOn            |                                                     |              |                           |
| :IN                   |                                                     | [no query]   | WIDSIN                    |
| :OUT                  |                                                     | [no query]   | WIDSOUT                   |
| :Y                    | <numeric>                                           |              | WIDV                      |
| :TYPE                 | {DIVS2 MULS2 DIV2 FIXed}                            |              | WIDVTYPE                  |
| :Y{1}                 |                                                     |              |                           |
| :DATA?                |                                                     | [query only] | OUTPMKR?                  |
| :VALue1?              |                                                     | [query only] | MKRVAL?                   |
| :VALue2?              |                                                     | [query only] | MKRAUV?                   |
| :XPOSITiOn            | <numeric>                                           |              | MKRPRM                    |
| :LPEak                |                                                     | [no query]   | SEANPKL                   |
| :LTARget              |                                                     | [no query]   | SEAL                      |
| :MAXimum              |                                                     | [no query]   | SEAM                      |
| :MINimum              |                                                     | [no query]   | SEAM                      |
| :NPEak                |                                                     | [no query]   | SEANPK                    |
| :PALL                 |                                                     | [no query]   | SEAM                      |
| :PEAK                 |                                                     | [no query]   | SEAM                      |
| :PLEFt                |                                                     | [no query]   | SEAM                      |
| :POINT                | <numeric>                                           |              | MKRP                      |
| :PRIGHt               |                                                     | [no query]   | SEAM                      |
| :RPEak                |                                                     | [no query]   | SEANPKR                   |
| :RTARget              |                                                     | [no query]   | SEAR                      |
| :TARGet               | <numeric>                                           |              | SEAM, SEATARG             |
| :TRACk                | {MAXimum MINimum TARGet PEAK PALL PLEFt PRIGHt OFF} |              | TRACK                     |
| :Y{2-8}               |                                                     |              |                           |
| :DATA?                |                                                     | [query only] | OUTPSMKR{1-7}?            |
| :VALue1?              |                                                     | [query only] | SMKRVAL{1-7}?             |
| :VALue2?              |                                                     | [query only] | SMKRAUV{1-7}?             |
| :XPOSITiOn            | <numeric>                                           |              | SMKRPRM{1-7}              |
| :POINT                | <numeric>                                           |              | SMKRP{1-7}                |

| Command               | Parameter                                                                                                                        | Note         | Equivalent Simple Command |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------------|
| CALCulate (continued) |                                                                                                                                  |              |                           |
| :FORMat               | {GDElay REAL IMAGinary <br>MLINear MLOGarithmic PHASe <br>UPHase SWR COMPLex}                                                    |              | FMT, SAUNIT               |
| :FORMat               | {RIMaginary MLIPhase MLOPhase <br>RX GB SWRPhase   MLINear  PHASe <br>UPHase  REAL  IMAGinary <br>CP SC LP LS D Q RP RS COMPLex} |              | FMT, SAUNIT, CIRF, MEAS   |
| :UNIT                 |                                                                                                                                  |              |                           |
| :ANGLE                | {DEG RAD}                                                                                                                        |              | PHAU                      |
| :GDAPerture           |                                                                                                                                  |              |                           |
| :APERture             | <numeric>                                                                                                                        |              | GRODAPER                  |
| :LIMit                |                                                                                                                                  |              |                           |
| :BEEPPer              |                                                                                                                                  |              |                           |
| [:STATe]              | {OFF ON 0 1}                                                                                                                     |              | BEEPFAIL                  |
| :CLEAr                |                                                                                                                                  | [no query]   | LIMCLEL                   |
| :CONTRol              |                                                                                                                                  |              |                           |
| :OFFSet               | <numeric>                                                                                                                        |              | LIMIPRMO, MKRAMPO         |
| :LINE                 | {OFF ON 0 1}                                                                                                                     |              | LIMILINE                  |
| :OFFSet               | {<numeric> MARKer}                                                                                                               |              | LIMIAMPO                  |
| :SAVE                 |                                                                                                                                  | [no query]   | LIMEDONE                  |
| :SEGment              | <numeric>                                                                                                                        |              | LIMSEDI                   |
| :ADD                  |                                                                                                                                  | [no query]   | LIMSADD                   |
| :CONTRol              |                                                                                                                                  |              |                           |
| [:DATA]               | {<numeric> MARKer}                                                                                                               |              | LIMPRM, MKRSWPRM          |
| :DELete               |                                                                                                                                  | [no query]   | LIMSDEL                   |
| :DELta                | <numeric>                                                                                                                        |              | LIMD                      |
| :EDIT                 |                                                                                                                                  | [no query]   | LIMSEDI                   |
| :LOWer                | <numeric>                                                                                                                        |              | LIML                      |
| :MIDDle               | {<numeric> MARKer}                                                                                                               |              | LIMM, MKRMIDD             |
| :SAVE                 |                                                                                                                                  | [no query]   | LIMSDON                   |
| :UPPer                | <numeric>                                                                                                                        |              | LIMU                      |
| :STATe                | {OFF ON 0 1}                                                                                                                     |              | LIMITEST                  |
| :MATH1                |                                                                                                                                  |              |                           |
| [:EXPReSSion]         |                                                                                                                                  |              |                           |
| :CATalog?             |                                                                                                                                  | [query only] | (None)                    |
| :NAME                 | {OFF YREF YTRA ZREF ZTRA <br>INVS MP4 MP8 MP16}                                                                                  |              | CONV                      |
| :NAME                 | {OFF YREF YTRA ZREF ZTRA <br>INVS MP4 MP8 MP16}                                                                                  | (NA)         | CONV                      |
|                       | {OFF IMPedance ADMittance}                                                                                                       | (ZA)         | MEAS                      |



| Command              | Parameter                                 | Note       | Equivalent Simple Command |
|----------------------|-------------------------------------------|------------|---------------------------|
| DIAG (continued)     |                                           |            |                           |
| :SERvice (continued) |                                           |            |                           |
| :IF                  |                                           |            |                           |
| :ADMx                |                                           |            |                           |
| :MODE                | { AUTO ALternate DEGO DEG90}              |            | (None)                    |
| :BPFilteR            |                                           |            |                           |
| :MODE                | { AUTO BW3M BW1M XTAL}                    |            | (None)                    |
| :GAIN                |                                           |            |                           |
| :MODE                | { AUTO MANual}                            |            | (None)                    |
| :W                   | { AUTO DB0 DB10}                          |            | (None)                    |
| :X                   | { AUTO DB0 DB18}                          |            | (None)                    |
| :Y                   | { AUTO DB0 DB6 DB12 DB18}                 |            | (None)                    |
| :Z                   | { AUTO DB0 DB2 DB4 DB18}                  |            | (None)                    |
| :LPFilteR            |                                           |            |                           |
| :MODE                | { AUTO BW5K BW15K BW50K BW150K THRough}   |            | (None)                    |
| :RANGe               |                                           |            |                           |
| :F                   | { HIGH LOW}                               |            | (None)                    |
| :MODE                | { AUTO MANual}                            | [no query] | (None)                    |
| :R                   | { HIGH LOW}                               |            | (None)                    |
| :SHBW                |                                           |            |                           |
| :MODE                | { AUTO NARRow MIDDLE WIDE}                |            | (None)                    |
| :TLOCAl              |                                           |            |                           |
| :MODE                | { AUTO AC DC}                             |            | (None)                    |
| :MODE                | ON                                        |            | (None)                    |
| :SOURce              |                                           |            |                           |
| :ALCLoOp             | { OPEN CLoSe}                             |            | (None)                    |
| :ATTenuator          | { AUTO DB0 DB10 DB20 DB30 DB40 DB50 DB60} |            | (None)                    |
| :GAIN                |                                           |            |                           |
| :DAC                 |                                           |            |                           |
| :MODE                | { AUTO MANual}                            |            | (None)                    |
| :VALue               | < numeric >                               |            | (None)                    |
| :LEVel               |                                           |            |                           |
| :DAC                 |                                           |            |                           |
| :MODE                | { AUTO MANual}                            |            | (None)                    |
| :VALue               | < numeric >                               |            | (None)                    |
| :MODE                | { AUTO MANual}                            |            | (None)                    |



| Command              | Parameter                | Note         | Equivalent Simple Command |
|----------------------|--------------------------|--------------|---------------------------|
| DIAG (continued)     |                          |              |                           |
| :SERvice (continued) |                          |              |                           |
| :SYNThesizer         |                          |              |                           |
| :FLOCAl              |                          |              |                           |
| :MODE                | {AUTO SINGle TRIPle}     |              | (None)                    |
| :FREQuency:OFFSet    | <numeric>                |              |                           |
| :FN                  |                          |              |                           |
| :MODE                | {AUTO NARRow WIDE}       |              | (None)                    |
| :STEP                |                          |              |                           |
| :DAC                 |                          |              |                           |
| :MODE                | {AUTO MANual}            |              | (None)                    |
| :VALue               | <numeric>                |              | (None)                    |
| :LOOP                | {OPEN CLOSE}             |              | (None)                    |
| :MODE                | {AUTO MANual}            |              | (None)                    |
| :OUTPut              | {OFF ON 0 1}             |              | (None)                    |
| :POLarity            | {AUTO POSitive NEGative} |              | (None)                    |
| :TEST                | <numeric>                | [no query]   | (None)                    |
| :EXECute             |                          | [no query]   | (None)                    |
| :CONTInue            |                          | [no query]   | (None)                    |
| :RESult?             | <numeric>                | [query only] | (None)                    |
| DISPlay              |                          |              |                           |
| :ANNotation          |                          |              |                           |
| :BACKlight           | {OFF ON 0 1}             |              | BLIGHT                    |
| :FREQuency           | OFF                      |              | FREQ                      |
| :BRIGHtness          | <numeric>                |              | INTE                      |
| :CMAP                |                          |              |                           |
| :COLor{1-14}         |                          |              |                           |
| :DEFault             |                          | [no query]   | RSCO                      |
| :HSL                 | <hue>,<sat>,<lum>        |              | COLO                      |
| :DEFault             |                          |              | DEFC                      |
| :LOAD                |                          | [no query]   | RECC                      |
| :STORe               |                          | [no query]   | SVCO                      |
| :CONTRast            | <numeric>                |              | BACI                      |

| Command                                                 | Parameter                                         | Note       | Equivalent Simple Command                                    |
|---------------------------------------------------------|---------------------------------------------------|------------|--------------------------------------------------------------|
| DISPlay (continued)                                     |                                                   |            |                                                              |
| [:WINDow]                                               |                                                   |            |                                                              |
| :ALLocation                                             | {INSTRument HIHB BASic BSTatus}                   |            | DISA                                                         |
| :FORMat                                                 | {FBACk ULOWer}                                    |            | SPLD                                                         |
| :TEXT{1-17}                                             |                                                   |            |                                                              |
| [:DATA]                                                 | <title_string><br>(only for TEXT17)               |            | TITL                                                         |
| :PAGE                                                   | {UP DOWN <numeric>}<br>(except TEXT16 and TEXT17) |            | CALCASSI, CALS, DISL,<br>DISLLIST, LISV, NEXP, OPEP,<br>PREP |
| :STATe                                                  | {OFF ON 0 1}<br>(except TEXT17)                   |            | CALCASSI, CALS, DISL,<br>DISLLIST, LISV, MKRL,<br>OPEP, RESD |
| :TEXT18 (18: Equivalent circuit parameters)             |                                                   |            |                                                              |
| :STATe                                                  | {OFF ON 0 1}                                      |            | DESECPARA                                                    |
| :TEXT19 (19: Equivalent circuit model)                  |                                                   |            |                                                              |
| :STATe                                                  | {OFF ON 0 1}                                      |            | DISECIRC                                                     |
| :TEXT20 (20: Fixture compensation kit definition table) |                                                   |            |                                                              |
| :STATe                                                  | {OFF ON 0 1}                                      |            | COMS                                                         |
| :TRACe{[1] 2} (1: Data Trace, 2: Memory Trace)          |                                                   |            |                                                              |
| :GRATticule                                             |                                                   |            |                                                              |
| :FORMat                                                 | {RECTangle POLar SMITH ADMittance}                | (NA)       | FMT                                                          |
| :FORMat                                                 | {RECTangle POLar SMITH ADMittance CPLane}         | (ZA)       | FMT                                                          |
| :MARKer{[1] 2-8} (1: Main Marker, 2-8: Sub Marker)      |                                                   |            |                                                              |
| :ALL                                                    | DEFault                                           | [no query] | PRSMKRS                                                      |
| :STATe                                                  | {OFF ON 0 1} (MARKer{2-8} only)                   |            | MKR                                                          |
| :RELAtive                                               | {OFF ON 0 1}                                      |            | DMKR                                                         |
| :REFerence                                              | {MARKer FIXed TRACked}                            |            | DMKR                                                         |
| :STATe                                                  | {OFF ON 0 1} (Only for MARKer{2-8})               |            | SMKR{1-7}                                                    |
| :UNIT                                                   |                                                   |            |                                                              |
| :TIME                                                   | {OFF ON 0 1}                                      |            |                                                              |
| :X                                                      |                                                   |            |                                                              |
| [:SCALE]                                                |                                                   |            |                                                              |
| :RLEVel                                                 | <numeric>                                         |            | REFX                                                         |

| Command           | Parameter                         | Note       | Equivalent Simple Command     |
|-------------------|-----------------------------------|------------|-------------------------------|
| :Y<br>[:SCALE]    |                                   |            |                               |
| :AUTO             | ONCE                              | [no query] | AUTO                          |
| :BOTTom           | <numeric>                         |            | BOTV                          |
| :COUPle           | {OFF ON 0 1}                      |            | SCAC                          |
| :PDIVision        | <numeric>                         |            | SCAL                          |
| :RLEVel           | {<numeric> MARKer}                |            | REFV, REFY, MKRREF            |
| :RPOStion         | <numeric>                         |            | REFP                          |
| :TOP              | <numeric>                         |            | TOPV                          |
| [:SCALE]          |                                   |            |                               |
| :SPACing          | {LINear LOGarithmic}              |            | FMT                           |
| [:SCALE]          |                                   |            |                               |
| :STATe            | {OFF ON 0 1}                      |            |                               |
| FORMat<br>[:DATA] | {ASCIi REAL,32 REAL,64 PACKed,32} |            | FORM2, FORM3, FORM4,<br>FORM5 |

| Command      | Parameter        | Note       | Equivalent Simple Command |
|--------------|------------------|------------|---------------------------|
| HCOpy        |                  |            |                           |
| :ABORt       |                  | [No query] | COPA                      |
| :DEFault     |                  | [No query] | DFLT                      |
| :DRIVer      |                  |            |                           |
| :CMAP        |                  |            |                           |
| :COLor       | {FIXed VARIable} |            | PRICFIXE, PRICVARI        |
| :COLor       | {OFF ON 0 1}     |            | PRIC, PRIS                |
| :DPI         | <numeric>        |            | DPI                       |
| :FORMFeed    | {OFF ON 0 1}     |            | FORMFEED                  |
| :LANDScape   | {OFF ON 0 1}     |            | LANDSCAPE                 |
| :LEFTMarg    | <numeric>        |            | LMARG                     |
| :SKEY        | {OFF ON 0 1}     |            | PRSOFT                    |
| :TOPMarg     | <numeric>        |            | TMARG                     |
| :ITEM        |                  |            |                           |
| :TDSamp      |                  |            |                           |
| :STATe       | {OFF ON 0 1}     |            | COPT                      |
| INITiate     |                  |            |                           |
| [:IMMediate] |                  | [no query] | NUMG, SING                |
| :AGain       |                  |            |                           |
| :ALL         |                  | [no query] | REST                      |
| :CONTinuous  | {OFF ON 0 1}     |            | CONT, HOLD, NUMG, SING    |
| INPut        |                  |            |                           |
| :IMPedance   | <numeric>        |            | INPZ                      |
| INSTRument   |                  |            |                           |
| :COUPle      | {OFF ON 0 1}     |            | COUC                      |
| :NSElect     | {1 2}            |            | CHAN1, CHAN2              |
| [:SElect]    | {CH1 CH2}        |            | CHAN1, CHAN2, DUAC        |
| :STATe       | {OFF ON 0 1}     |            | CHAN1, CHAN2, DUAC        |
| :TYPE        | {NA SA ZA}       |            | NA, SA, ZA                |

| Command           | Parameter                                    | Note         | Equivalent Simple Command                            |
|-------------------|----------------------------------------------|--------------|------------------------------------------------------|
| <b>MMEMemory</b>  |                                              |              |                                                      |
| :CDIRectory       | <string>                                     | [no query]   | CHAD                                                 |
| :COPY             | <string(src)>, <msus>, <string(des)>, <msus> | [no query]   | FILC                                                 |
| :CREate           |                                              |              |                                                      |
| :DIRectory        | <string>                                     | [no query]   | CRED                                                 |
| :DELete           | <file_name>[, <msus>]                        | [no query]   | PURG, RESAVD                                         |
| :INITialize       | <msus>, {LIF DOS}                            | [no query]   | INID                                                 |
| :LOAD             |                                              |              |                                                      |
| :STATe            | <file_name>[, <msus>]                        |              | RECD                                                 |
| :TRACe            | SEL, <file_name>[, <msus>]                   |              | RECD                                                 |
| :STORE            |                                              |              |                                                      |
| :DINTerchange     |                                              |              |                                                      |
| :TIFF             | <file_name>[, <msus>]                        | [no query]   | SAVDTF                                               |
| :TRACe            | SEL, <file_name>[, <msus>]                   |              | SAVDASC                                              |
| :ITEM             |                                              |              |                                                      |
| :TRACe            |                                              |              |                                                      |
| :CATalog?         |                                              | [query only] | SAVCAL?, SAVDAT?, SAVDTR?, SAVMEM?, SAVMTR?, SAVRAW? |
| :DELete           | {CCO DATA DTR MEM MTR RAW}                   | [no query]   | SAVCAL, SAVDAT, SAVDTR, SAVMEM, SAVMTR, SAVRAW       |
| :SELect           | {CCO DATA DTR MEM MTR RAW}                   | [no query]   | SAVCAL, SAVDAT, SAVDTR, SAVMEM, SAVMTR, SAVRAW       |
| :STATe            | <file_name>[, <msus>]                        |              | SAVDSTA                                              |
| :TRACe            | SEL, <file_name>[, <msus>]                   |              | SAVDDAT                                              |
| <b>OUTPut</b>     |                                              |              |                                                      |
| :ATTenuation{1 2} | <numeric>                                    |              | ATTP1, ATTP2                                         |

| Command     | Parameter                             | Note         | Equivalent Simple Command |
|-------------|---------------------------------------|--------------|---------------------------|
| PROGRAM     |                                       |              |                           |
| :CATalog?   |                                       | [query only] | (None)                    |
| :EXPLicit   |                                       |              |                           |
| :DEFine     | <progrname>,<program>                 |              | (None)                    |
| :DEFine?    | <progrname>                           | [query only] | (None)                    |
| :DELete     | <progrname>                           | [no query]   | (None)                    |
| :EXECute    | <progrname>,<program command>         | [no query]   | (None)                    |
| :MALLocate  | <progrname>,{<nbytes> DEFAULT}        |              | (None)                    |
| :NAME       | <progrname>,<program name>            |              | (None)                    |
| :NUMBer     | <progrname>,<varname><br>[,<nvalues>] |              | (None)                    |
| :STATe      | <progrname>,{RUN PAUSE STOP CONTInue} |              | (None)                    |
| :STRing     | <progrname>,<varname><br>[,<svalues>] |              | (None)                    |
| :WAIT       | <progrname>                           |              | (None)                    |
| [:SELEcted] |                                       |              |                           |
| :DEFine     | <program>                             |              | (None)                    |
| :DELete     |                                       |              |                           |
| [:SELEcted] |                                       | [no query]   | (None)                    |
| :ALL        |                                       | [no query]   | (None)                    |
| :EXECute    | {“RUN” “PAUSE” “STOP” “STEP” “CONT”}  | [no query]   | (None)                    |
| :MALLocate  | {<nbytes> DEFAULT}                    |              | (None)                    |
| :NAME       | <program name>                        |              | (None)                    |
| :NUMBer     | <varname>{,<nvalues>}                 |              | (None)                    |
| :STATe      | {RUN PAUSE STOP CONTInue}             |              | (None)                    |
| :STRing     | <varname>{,<svalues>}                 |              | (None)                    |
| :WAIT       |                                       |              | (None)                    |

| Command       | Parameter                     | Note       | Equivalent Simple Command                                                                                                             |
|---------------|-------------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------|
| SENSE         |                               |            |                                                                                                                                       |
| :AVERage      |                               |            |                                                                                                                                       |
| :CLEar        |                               | [no query] | AVERREST                                                                                                                              |
| :COUNT        | <numeric>                     |            | AVERFACT                                                                                                                              |
| [:STATe]      | {OFF ON 0 1}                  |            | AVER                                                                                                                                  |
| :BANDwidth    |                               |            |                                                                                                                                       |
| [:RESolution] | <numeric>                     |            | BW                                                                                                                                    |
| :AUTO         | {OFF ON 0 1}                  |            | BW, BWAUTO                                                                                                                            |
| :RATio        | <numeric>                     |            | BWSRAT                                                                                                                                |
| :VIDeo        | <numeric>                     |            | VBW                                                                                                                                   |
| :TYPE         | {LINear LOGarithmic}          |            | VBWT                                                                                                                                  |
| :CORRection   |                               |            |                                                                                                                                       |
| :CIMPedance   | <numeric>                     |            | SETZ                                                                                                                                  |
| :CKIT         | {APC35 APC7 N50 N75 UDEfined} |            | CALK                                                                                                                                  |
| :CLASs{1-12}  |                               |            |                                                                                                                                       |
| :STANdard     | <n,r, ... > (max 7 items)     | [no query] | SPECS11A, SPECS11B,<br>SPECS11C, SPECS22A,<br>SPECS22B, SPECS22C,<br>SPECFWDM, SPECFWDT,<br>SPECRESI, SPECRESF,<br>SPECREVM, SPECREVT |
| :LABel        | <string>                      |            | LABEFWD{T M},<br>LABERES{P I},<br>LABEREV{T M},<br>LABES11{A B C},<br>LABES22{A B C}                                                  |
| :LABel        | <string>                      |            | LABK                                                                                                                                  |
| :MODify       |                               | [no query] | MODII                                                                                                                                 |
| :SAVE         | [no query]                    |            | SAVEUSEK                                                                                                                              |
| :SAVE         | {ALL CLASs}                   | [no query] | CLAD, KITD                                                                                                                            |
| :SELEct       | STANdard{1-8}                 |            | DEFS                                                                                                                                  |

| Command                  | Parameter                                                                                                                     | Note       | Equivalent Simple Command                                                                                               |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------|
| SENSe (continued)        |                                                                                                                               |            |                                                                                                                         |
| :CORRection (continued)  |                                                                                                                               |            |                                                                                                                         |
| :CKIT (continued)        |                                                                                                                               |            |                                                                                                                         |
| :CLASs{1-13} (continued) |                                                                                                                               |            |                                                                                                                         |
| :STANdard                |                                                                                                                               |            |                                                                                                                         |
| :C0                      | <numeric>                                                                                                                     |            | C0                                                                                                                      |
| :C1                      | <numeric>                                                                                                                     |            | C1                                                                                                                      |
| :C2                      | <numeric>                                                                                                                     |            | C2                                                                                                                      |
| :LABel                   | <string>                                                                                                                      |            | LABS                                                                                                                    |
| :OCIMpedance             | <numeric>                                                                                                                     |            | OFSZ                                                                                                                    |
| :ODELay                  | <numeric>                                                                                                                     |            | OFSD                                                                                                                    |
| :OLOSs                   | <numeric>                                                                                                                     |            | OFSL                                                                                                                    |
| :SAVE                    |                                                                                                                               | [no query] | STDD                                                                                                                    |
| :TIMPedance              | <numeric>                                                                                                                     |            | TERI                                                                                                                    |
| :TYPE                    | {AIMPedance DELay LOAD OPEN SHORT}                                                                                            |            | STDT                                                                                                                    |
| :COLLect                 |                                                                                                                               |            |                                                                                                                         |
| [ACQuire]                | {CS11A CS11B CS11C CS22A CS22B CS22C FWDI FWDI2 FWDI3 ISOL ISOL2 OMI REFL REFL2 RESP REVI REVM REVT TRAN TRAN2 STANdard{1-7}} | [no query] | CLASS11{A B C}, CLASS22{A B C}, FWDI, FWDI2, FWDI3, ISOL, OMI, RAISOL, RAIRESP, REFL, REVI, REVM, REVT, STAN{A-G}, TRAN |
| :METHod                  | {NONE RESPonse RAIsoI S11I S22I TPORt OPTPORt}                                                                                |            | CALI                                                                                                                    |
| :RESume                  |                                                                                                                               | [no query] | RESC                                                                                                                    |
| :SAVE{1-0}               |                                                                                                                               | [no query] | DONE, ISOD, RAID, REFD, RESPDONE, SAV1, SAV2, SAVC, TRAD                                                                |
| :EDELay[1]               |                                                                                                                               |            |                                                                                                                         |
| :PORt{1-5}               |                                                                                                                               |            |                                                                                                                         |
| [:TIME]                  | <numeric>                                                                                                                     |            | PORT1, PORT2, PORTA, PORTB, PORTR                                                                                       |
| :STATe                   | {OFF ON 0 1}                                                                                                                  |            | PORE                                                                                                                    |
| :EDELay2                 | {<numeric> MARKer}                                                                                                            |            | ELED, MKRDELA                                                                                                           |
| :OFFSet                  |                                                                                                                               |            |                                                                                                                         |
| [:MAGNitude]             | <numeric>                                                                                                                     |            | LVCDT                                                                                                                   |
| :PHASe                   | <numeric>                                                                                                                     |            | PHAO                                                                                                                    |
| :RVELocity               | <numeric>                                                                                                                     |            | VELOFACT                                                                                                                |
| [:STATe]                 | {OFF ON 0 1}                                                                                                                  |            | CORR                                                                                                                    |



| Command           | Parameter                           | Note       | Equivalent Simple Command |
|-------------------|-------------------------------------|------------|---------------------------|
| :CORRection1      |                                     | (ZA)       |                           |
| :CKIT (continued) |                                     |            |                           |
| :CLASs{13-15}     |                                     |            |                           |
| :STANdard         | <num1>[,<num2>[, ...<br>[,<num7>]]] |            | SPECIMP{A B C}            |
| :LABel            | <string>                            |            | LABIMP{A B C}             |
| :COLLect          |                                     |            |                           |
| [:ACQuire]        | STANdard{1 2}                       | [no query] | STAN{A B}                 |
| [:ACQuire]        | IMP{A B C}                          | [no query] | CALSIMP{A B C}            |
| :METHod           | {NONE IMP}                          |            | CALI                      |
| :RESume           |                                     |            | RESCOM                    |
| :SAVE             |                                     |            | SAVIMP                    |
| :EDELay           |                                     |            |                           |
| :PORT6            |                                     |            |                           |
| [:TIME]           | <numeric>                           |            | PORTZ                     |
| :CORRection2      |                                     | (ZA)       |                           |
| :CKIT             |                                     |            |                           |
| :LABel            | <string>                            |            | LABECOMK                  |
| :MODify           |                                     |            | MODICOMK                  |
| :SAVE             |                                     |            | SAVUCOMK                  |
| :SAVE             |                                     |            | COMKDONE                  |
| :STANdard         |                                     |            |                           |
| :SAVE             |                                     |            | COMSDONE                  |
| :STANdard1        |                                     |            |                           |
| :G                | <numeric>                           |            | DEFSOPENG                 |
| :C                | <numeric>                           |            | DEFSOPENC                 |
| :STANdard2        |                                     |            |                           |
| :R                | <numeric>                           |            | DEFSSHORR                 |
| :L                | <numeric>                           |            | DEFSSHORL                 |
| :STANdard3        |                                     |            |                           |
| :R                | <numeric>                           |            | DEFSLOADR                 |
| :L                | <numeric>                           |            | DEFSLOADL                 |
| :COLLect          |                                     |            |                           |
| :METHod           | IMPedance                           |            | COMP                      |
| [:ACQuire]        | STANdard{1 2 3}                     | [no query] | COMC                      |
| :SAVE             |                                     |            | SAVCOM                    |
| :RESUME           |                                     |            | RESCOM                    |

| Command           | Parameter                                                                                                                                              | Note       | Equivalent Simple Command         |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------------------------|
| SENSE (continued) |                                                                                                                                                        |            |                                   |
| :OPEN             | {OFF ON 0 1}                                                                                                                                           |            | COMCDATA                          |
| :SHORT            | {OFF ON 0 1}                                                                                                                                           |            | COMCDATB                          |
| :LOAD             | {OFF ON 0 1}                                                                                                                                           |            | COMCDATC                          |
| :DETECTOR         |                                                                                                                                                        |            |                                   |
| :CONTINUOUS       | {OFF ON 0 1}                                                                                                                                           |            | REPTSMP                           |
| {:FUNCTION}       | {NEGATIVE POSITIVE SAMPLE}                                                                                                                             |            | DET                               |
| :FREQUENCY        |                                                                                                                                                        |            |                                   |
| :CENTER           | {<numeric> TPEAK DMARKER MARKER}                                                                                                                       |            | CENT, MKRCENT, MKRDCENT, PEAKCENT |
| :STEP             |                                                                                                                                                        |            |                                   |
| {:INCREMENT}      | {<numeric> DMARKER MARKER}                                                                                                                             |            | CNTS                              |
| :AUTO             | {OFF ON 0 1}                                                                                                                                           |            | CNTSAUTO                          |
| :MODE             | {FIXED LIST SWEPT}                                                                                                                                     |            | SWPT                              |
| :SPAN             | {<numeric> DMARKER MZAPERTURE}                                                                                                                         |            | MKRSPAN, MKRZM, SPAN              |
| :FULL             |                                                                                                                                                        | [no query] | FULS                              |
| :START            | {<numeric> MARKER}                                                                                                                                     |            | MKRSTAR, STAR                     |
| :STOP             | {<numeric> MARKER}                                                                                                                                     |            | MKRSTOP, STOP                     |
| :FUNCTION         | { "POWER 1" "POWER 2" "POWER 3" "POWER 4" "POWER:S11" "POWER:S12" "POWER:S21" "POWER:S22" "POWER{1-4}:PSDENSITY" "POWER:RATIO 3,2" "POWER:RATIO 4,2" } |            | FMT, MEAS                         |
| :LIST             |                                                                                                                                                        |            |                                   |
| :CLEAR            |                                                                                                                                                        | [no query] | CLEL                              |
| :SAVE             |                                                                                                                                                        | [no query] | EDITDONE                          |
| :SEGMENT          | <numeric>                                                                                                                                              |            | (None)                            |
| :ADD              |                                                                                                                                                        | [no query] | SADD                              |
| :BANDWIDTH        | <numeric>                                                                                                                                              |            | BW                                |
| :DELETE           |                                                                                                                                                        | [no query] | SDEL                              |
| :EDIT             |                                                                                                                                                        | [no query] | SEDI                              |
| :FREQUENCY        |                                                                                                                                                        |            |                                   |
| :CENTER           | <numeric>                                                                                                                                              |            | CENT                              |
| :SPAN             | <numeric>                                                                                                                                              |            | SPAN                              |
| :START            | {<numeric> MARKER}                                                                                                                                     |            | MKRSTAR, STAR                     |
| :STOP             | {<numeric> MARKER}                                                                                                                                     |            | MKRSTOP, STOP                     |
| :POINTS           | <numeric>                                                                                                                                              |            | POIN                              |
| :POWER            | <numeric>                                                                                                                                              |            | POWE                              |
| :QUIT             |                                                                                                                                                        | [no query] | SQUI                              |
| :SAVE             |                                                                                                                                                        | [no query] | SDON                              |

| Command           | Parameter                        | Note       | Equivalent Simple Command         |
|-------------------|----------------------------------|------------|-----------------------------------|
| SENSe (continued) |                                  |            |                                   |
| :POWer            |                                  |            |                                   |
| :AC               |                                  |            |                                   |
| :ATTenuation      | <numeric>                        |            | ATT                               |
| :AUTO             | {OFF ON 0 1}                     |            | ATT, ATTAUTO                      |
| :RANGe            |                                  |            |                                   |
| [:UPPer]          | <numeric>                        |            | MAXMLEV                           |
| :SWEEp            |                                  |            |                                   |
| :COUNT            | <numeric>                        |            | NUMG, SING                        |
| :GATed            | {OFF ON 0 1}                     |            | TRGS                              |
| :DELay            | <numeric>                        |            | GATDLY                            |
| :LENGth           | <numeric>                        |            | GATLEN                            |
| :TRIGger          | {EDGE LEVel}                     |            | GATCTL                            |
| :POINTs           | <numeric>                        |            | POIN                              |
| :SPACing          | {LINear LOGarithmic}             |            | SWPT                              |
| :TIME             | <numeric>                        |            | SWET                              |
| :AUTO             | {OFF ON 0 1}                     |            | SWETAUTO                          |
| :TRACk            |                                  |            |                                   |
| :SIGNal           |                                  |            |                                   |
| :MARKer           | {OFF ON 0 1}                     |            | SGTRK                             |
| SOURce            |                                  |            |                                   |
| :FREQuency        |                                  |            |                                   |
| [:CW]             | <numeric>                        |            | CWFREQ                            |
| :POWer            |                                  |            |                                   |
| :CENTer           | {<numeric> TPEak DMARKer MARKer} |            | CENT, MKRCENT, MKRDCEnt, PEAKCENT |
| [:LEVel]          |                                  |            |                                   |
| [:IMMediate]      |                                  |            |                                   |
| [:AMPLitude]      | <numeric>                        |            | POWE                              |
| :SLOPe            | <numeric>                        |            | SLOPE                             |
| :STATe            | {OFF ON 0 1}                     |            | SLOP                              |
| :MODE             | {FIXed LIST SWEep}               |            | SWPT                              |
| :SPAN             | {<numeric> DMARKer MZAPerture}   |            | MKRDSpan, MKRZM, SPAN             |
| :FULL             |                                  | [no query] | FULS                              |
| :STARt            | {<numeric> MARKer}               |            | MKRSTAR, STAR                     |
| :STATe            | {OFF ON 0 1}                     |            | RFO                               |
| :STOP             | {<numeric> MARKer}               |            | MKRSTOP, STOP                     |

| Command       | Parameter | Note         | Equivalent Simple Command |
|---------------|-----------|--------------|---------------------------|
| STATUS        |           |              |                           |
| :INSTRument   |           |              |                           |
| :ENABle       | <numeric> |              | ESNB                      |
| [:EVENT]?     |           | [query only] | ESB?                      |
| :OPERation    |           |              |                           |
| :CONDition?   |           | [query only] | OSR?                      |
| :ENABle       | <numeric> |              | OSE                       |
| [:EVENT]?     |           | [query only] | OSER?                     |
| :NTRansition  | <numeric> |              | OSNT                      |
| :PTRansition  | <numeric> |              | OSPT                      |
| :PRESet       |           |              |                           |
| :QUEStionable |           |              |                           |
| :CONDition?   |           | [query only] |                           |
| :ENABle       | <numeric> |              |                           |
| [:EVENT]?     |           | [query only] |                           |



| Command                                                   | Parameter                                                                                      | Note | Equivalent Simple Command        |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------|------|----------------------------------|
| TRIGger<br>:EVENT<br>:TYPE<br>:LEVel<br>:SLOPe<br>:SOURce | {POINT SWEEp}<br><numeric><br>{POSitive NEGative}<br>{BUS EXTernal INTernal1 INTernal2 MANual} |      | TRGEVE<br>VIDLVL<br>TRGP<br>TRGS |
| UNIT<br>:POWer                                            | {DBM DBUV DBV V W}                                                                             |      | SAUNIT                           |

# D

## Status Reporting

The Status byte register (STB) summarizes four status registers that indicate the internal condition of the analyzer. Figure D-1 shows the status reporting structure of the analyzer.

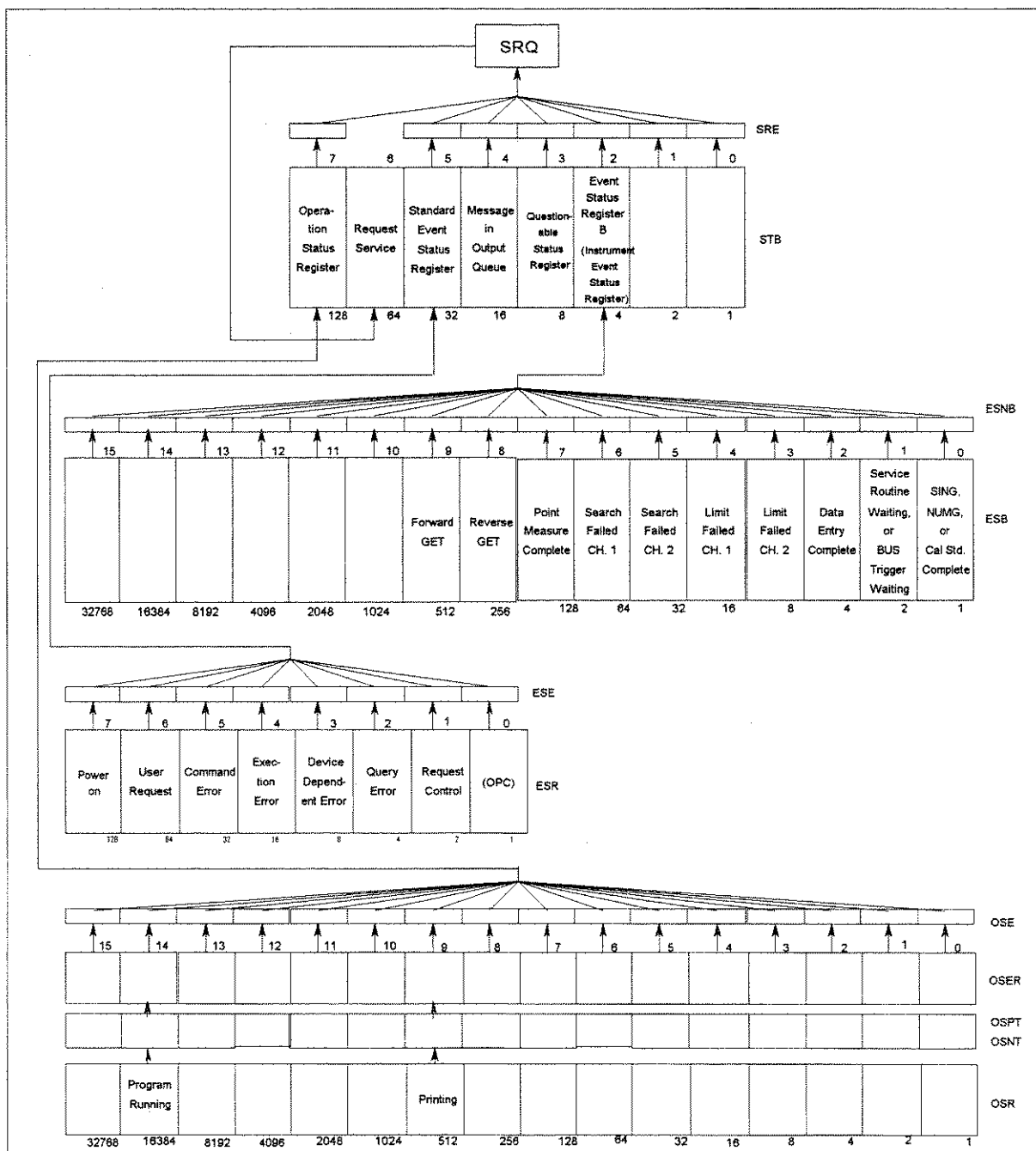


Figure D-1. Status Reporting Structure

The analyzer has a status reporting system to report the condition of the analyzer. The status bytes consist of 8-bit registers, with each bit representing a specific analyzer condition. The value of the Status Byte can be read by using SPOLL(717) statement from an external controller. This command reads a value directly from the analyzer without being set to remote. So, you can operate front panel keys while a controller is reading the Status Byte. Contents of the Status Byte can also be read by using the \*STB? command. Reading the Status Byte does not affect the contents of the Status Byte. Table D-1 shows contents of Status Byte.

**Table D-1. Status Bit Definitions of the Status Byte (STB)**

| Bit | Name                                       | Description                                                                                                                                                                             |
|-----|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2   | Event Status Register B Summary Bit        | One of the enabled bits in Event Status Register B (Instrument Event Status Register) has been set.                                                                                     |
| 3   | Questionable Status Register Summary Bit   | The analyzer has no operation to report the event to the Questionable Status Register group. This register is available to keep the consistency with other SCPI compatible instruments. |
| 4   | Message in Output Queue                    | A command has prepared information to be output, but it has not been read yet.                                                                                                          |
| 5   | Standard Event Status Register Summary Bit | One of the enabled bits in the Standard Event Status Register has been set.                                                                                                             |
| 6   | Request Service                            | One of the enabled Status Byte bits is causing an SRQ.                                                                                                                                  |
| 7   | Operation Status Register Summary Bit      | One of the enabled bits in the Operation Status Register has been set.                                                                                                                  |

For example, to read the contents of Message in the output queue,

```

10 Stat=SPOLL(717)
20 Stb4=BIT(Stat,4)
30 PRINT Stb4
40 END

```

**Figure D-2. Example of Reading Status Byte (1)**

or,

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"*STB?"
30 ENTER @Hp4396;Stat
40 Stb4=BIT(Stat,4)
50 PRINT Stb4
60 END

```

**Figure D-3. Example of Reading Status Byte (2)**

The Standard Event Status Register (ESR), Event Status Register B (ESB; Instrument Event Status Register), and Operation Status Register (OSR) are subordinate to the Status Byte. Each



register can set a bit with a condition that is watched by status bit. A status bit is cleared when it is read by query or the CLES or \*CLS command is executed.

**Table D-2.**  
**Status Bit Definitions of the Standard Event Status Register (ESR)**

| Bit | Name                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0   | Operation Complete     | A command for which OPC has been enabled, and completed an operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1   | Request Control        | The analyzer has been commanded to perform an operation that requires control of a peripheral, and needs control of HP-IB.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2   | Query Error            | <ol style="list-style-type: none"> <li>1. The analyzer has been addressed to talk, but there is nothing in the output queue to transmit.</li> <li>2. Data in the Output Queue has been lost.</li> </ol>                                                                                                                                                                                                                                                                                                                                                             |
| 3   | Device Dependent Error | An error, other than a command error, a query error, and an execution error has occurred.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4   | Execution Error        | <ol style="list-style-type: none"> <li>1. A program data element following a header exceeded its input range, or is inconsistent with the analyzer's capabilities.</li> <li>2. A valid program message could not be properly executed due to some analyzer condition.</li> </ol>                                                                                                                                                                                                                                                                                    |
| 5   | Command Error          | <ol style="list-style-type: none"> <li>1. An IEEE 488.2 syntax error has occurred. Possible violations include, a data element violated the analyzer listening formats or a data element type is unacceptable to the analyzer.</li> <li>2. A semantic error that indicates an unrecognized header was received has occurred. Unrecognized headers include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands.</li> <li>3. A Group Execute Trigger (GET) was entered into the Input Buffer of a program message.</li> </ol> |
| 6   | User Request           | The operator pressed a front panel key or an optional keyboard key or turned the rotary knob.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 7   | Power ON               | This bit is set when a power-on sequence occurs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

**Table D-3. Status Bit Definitions of the Event Status Register B (ESB)**

| Bit | Name                                           | Description                                                                                                                                                                                             |
|-----|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0   | SING, NUMG, or Cal Std. Complete               | A single, group sweep, calibration, or compensation has been completed since the last read of the register. Operates in conjunction with SING or NUMG.                                                  |
| 1   | Service Routine Waiting or Bus Trigger Waiting | 1. An internal service routine has completed an operation, or is waiting for an operator response.<br>2. The analyzer has set the manual trigger to the point mode and is waiting for a manual trigger. |
| 2   | Data Entry Complete                            | A terminator key has been pressed.                                                                                                                                                                      |
| 3   | Limit Failed, Ch 2                             | Limit test failed on channel 2.                                                                                                                                                                         |
| 4   | Limit Failed, Ch 1                             | Limit test failed on channel 1.                                                                                                                                                                         |
| 5   | Search Failed, Ch 2                            | A marker search was executed on channel 2, but the target value was not found.                                                                                                                          |
| 6   | Search Failed, Ch 1                            | A marker search was executed on channel 1, but the target value was not found.                                                                                                                          |
| 7   | Point Measurement Complete <sup>1</sup>        | One measurement point of a sweep has been completed.                                                                                                                                                    |
| 8   | Reverse GET                                    | A one-path 2-port calibration is active, and the analyzer has stopped, waiting for the operator to connect the device for a reverse measurement.                                                        |
| 9   | Forward GET                                    | A one-path 2-port calibration is active, and the analyzer has stopped, waiting for the operator to connect the device for a forward measurement.                                                        |

<sup>1</sup> This bit is set only when the related bits of both SRE and ESNB are enabled.

In the case of the manual trigger on point mode, the analyzer accepts the next trigger while the current measurement is in progress (up to the number of points). Use bit 1 and bit 7 correctly to synchronize the measurement and external triggering. For example, 1) wait until bit 1 is set, 2) trigger, and 3) wait until bit 7 is set.

**Table D-4. Status Bit Definitions of the Operation Status Register (OSR)**

| Bit | Name            | Description                                |
|-----|-----------------|--------------------------------------------|
| 14  | Program running | An HP Instrument BASIC program is running. |
| 9   | Printing        | Data is being transferred to the printer.  |

Each status register has a register that enables generating a Service Request (SRQ) with a condition of a status bit. For instance, to generate an SRQ when the analyzer completes the specified number of sweeps, enable ESNB bit 1. Bit 1 of ESNB is the mask register for ESB 0 ("SING, NUMG, or Cal Std. Complete") which shows sweep completion and SRE bit 2. This enables a path from ESB bit 0 to generate an SRQ. Figure D-4 shows a program listing that can be used to generate an SRQ.

```

10 ASSIGN @Hp4396 TO 717
20 !
30 OUTPUT @Hp4396;"CLES"      ! Clears status registers
40 OUTPUT @Hp4396;"ESNB 1"   ! Enables mask register of "SING. NUMG. or
50 !                          ! Cal Std. Complete" of ESB
60 OUTPUT @Hp4396;"*SRE 4"   ! Enables mask register of "Event Status
70 !                          ! Register B" of STB
80 !
90 ON INTR 7 GOTO End        ! Declare SRQ interrupt
100 ENABLE INTR 7;2
110 OUTPUT @Hp4396;"SING"    ! Execute single sweep
120 GOTO 120                  ! Endless loop
130 !
140 End:                      ! Exit from loop when sweep is completed
150 END

```

Figure D-4. Example of Generating a Service Request (SRQ)

## OSPT, OSNT

### OSPT (Operation Status Positive Transition Filter)

Sets the positive transition filter. Setting a bit in OSPT will cause a 0 to 1 transition in the corresponding bit of the associated Operation Status Register (OSR) to cause a 1 to be written in the associated bit of corresponding Operation Status Event Register (OSER).

Bit 14 of the analyzer's OSR is used to show program status. When bit 14 of OSPT is set to 1, starting a program causes a 1 to be written in bit 14 of OSER. (This sets bit 7 of STB to 1.)

### OSNT (Operation Status Negative Transition Filter)

Sets the negative transition filter. Setting a bit in the negative transition filter will cause a 1 to 0 transition in the corresponding bit of the associated Operation Status Register to cause a 1 to be written in the associated bit of corresponding Operation Status Event Register.

Bit 14 of the analyzer's OSR is used to show program status. When bit 14 of OSNT is set to 1, stopping a program causes a 1 to be written in bit 14 of OSER. (This sets bit 7 of STB to 1.)



## Trigger System

### Trigger System

This section provides information about the trigger system of the analyzer. SCPI defines a common trigger model for several types of instruments. A trigger system allows you to have control of your measurements.

Information on the trigger system requires more technical expertise than most other topics covered in this chapter. But you can avoid having to learn the information in this chapter by using the :INITiate commands to make your measurements.

### Analyzer Trigger System Configuration

The trigger system synchronizes the analyzer measurement with specified events. Events include an HP-IB trigger command or input pulse on the EXT TRIGGER input. The trigger system also allows you to specify the number of times to repeat a measurement and the delays between measurements.

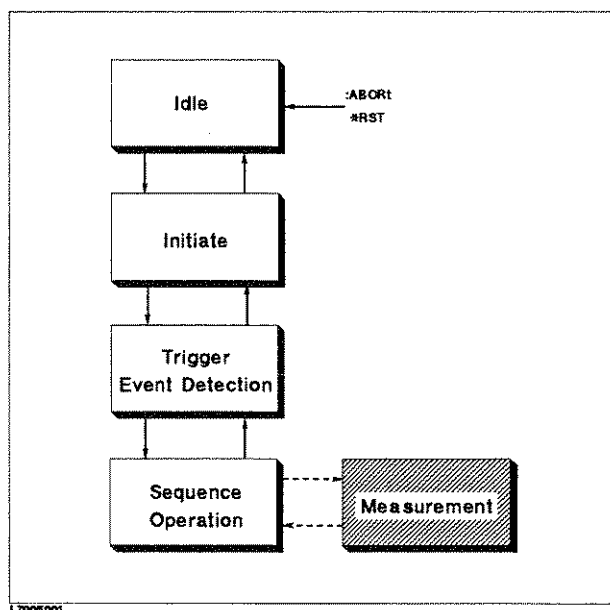


Figure E-1. Trigger System Configuration

Figure E-1 shows the configuration of the analyzer trigger system. Each unshaded block is called a **trigger state**. The analyzer moves between adjacent states depending on its conditions. The power ON state is called the **Idle** state. You can force the analyzer to the idle state using the :ABORT or \*RST command. The **Initiate** and **Trigger Event Detection** state branches to next state, whether the analyzer satisfies the specified conditions or not. The **Sequence Operation** state signals the instrument hardware to take a measurement and listens for a signal saying that the measurement has been taken.

## Idle State

The trigger system remains in the Idle state until it is initiated by :INITiate:IMMediate or :INITiate:CONTinuous ON. Once one of these conditions is satisfied, the trigger system exits downward to the Initiate state. Note that \*RST sets :INITiate:CONTinuous OFF.

## Initiate State

If the trigger system is on a downward path, it travels directly through the Initiate state without restrictions. If the trigger system is on an upward path, and :INITiate:CONTinuous is ON, then it exits downward to an Trigger Event Detection state. If the trigger system is on an upward path and :INITiate:CONTinuous is OFF, then it exits upward to the Idle state.

## Trigger Event Detection State

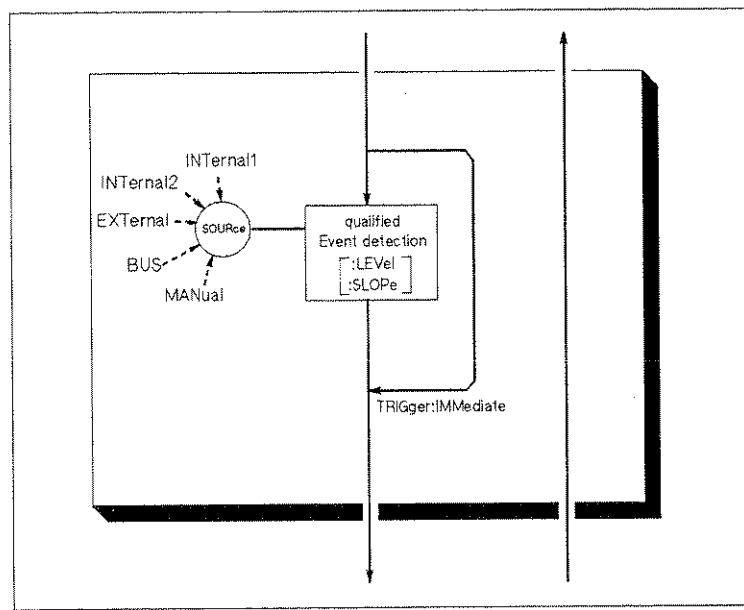


Figure E-2. Inside an Trigger Event Detection State

### SOURCE

The :TRIGger:SOURce command specifies which particular input can generate the event required to continue the downward path. If the source chosen is a nonanalog signal such as IMMEDIATE or BUS, then no further qualifications are required to generate an event. However when an INTERNAL1, INTERNAL2, or EXTERNAL analog signal is chosen, you can specify additional qualifications by using the appropriate LEVEL and SLOPE commands. Sending \*RST sets the SOURCE to IMMEDIATE.

### IMMEDIATE

The :TRIGger:IMMediate command bypasses the event detection and DELAY qualifications one time. The upward path through the Trigger Event Detection state contains only one condition. If the condition is satisfied, the trigger system exits upward.

## Sequence Operation State

The downward entrance to the Sequence Operation state forces the analyzer to start a measurement. An upward exit is not allowed until the measurement is complete.

## Calibration Types and Standard Classes, and Calibration Arrays

Table F-1 lists which standard classes are required for each calibration type. Table F-2 specifies where the calibration coefficients are stored for different calibration types.

**Table F-1. Calibration Types and Standard Classes**

| Class                      | Response | Response and Isolation | S <sub>11</sub> 1-port | S <sub>22</sub> 1-port | One-path 2-port | Full 2-port | ZA calibration |
|----------------------------|----------|------------------------|------------------------|------------------------|-----------------|-------------|----------------|
| Response:                  | •        |                        |                        |                        |                 |             |                |
| Response and isolation:    |          |                        |                        |                        |                 |             |                |
| Response                   |          | •                      |                        |                        |                 |             |                |
| Isolation                  |          | •                      |                        |                        |                 |             |                |
| Reflection: <sup>1</sup>   |          |                        |                        |                        |                 |             |                |
| S11A (opens)               |          |                        | •                      |                        | •               | •           |                |
| S11B (shorts)              |          |                        | •                      |                        | •               | •           |                |
| S11C (loads)               |          |                        | •                      |                        | •               | •           |                |
| S22A (opens)               |          |                        |                        | •                      |                 | •           |                |
| S22B (shorts)              |          |                        |                        | •                      |                 | •           |                |
| S22C (loads)               |          |                        |                        | •                      |                 | •           |                |
| Transmission: <sup>1</sup> |          |                        |                        |                        |                 |             |                |
| Forward match              |          |                        |                        |                        | •               | •           |                |
| Forward thru               |          |                        |                        |                        | •               | •           |                |
| Reverse match              |          |                        |                        |                        |                 | •           |                |
| Reverse thru               |          |                        |                        |                        |                 | •           |                |
| Isolation: <sup>1</sup>    |          |                        |                        |                        |                 |             |                |
| Forward                    |          |                        |                        |                        | •               | •           |                |
| Reverse                    |          |                        |                        |                        |                 | •           |                |
| Impedance analyzer cal     |          |                        |                        |                        |                 |             |                |
| IMPA (OPEN)                |          |                        |                        |                        |                 |             | •              |
| IMPB (SHORT)               |          |                        |                        |                        |                 |             | •              |
| IMPC (LOAD)                |          |                        |                        |                        |                 |             | •              |

<sup>1</sup> These subheadings must be called when doing 2-port calibrations.

Calibration Types and Standard Classes, and Calibration Arrays

**Table F-2. Calibration Array**

| Array | Response <sup>1</sup> | Response and Isolation <sup>1</sup> | 1-port <sup>1</sup> ZA cal | 2-port <sup>1,2</sup> |
|-------|-----------------------|-------------------------------------|----------------------------|-----------------------|
| 1     | $E_R$ or $E_T$        | $E_X (E_D)^3$                       | $E_D$                      | $E_{DF}$              |
| 2     |                       | $E_T (E_R)$                         | $E_S$                      | $E_{SF}$              |
| 3     |                       |                                     | $E_R$                      | $E_{RF}$              |
| 4     |                       |                                     |                            | $E_{XF}$              |
| 5     |                       |                                     |                            | $E_{LF}$              |
| 6     |                       |                                     |                            | $E_{TF}$              |
| 7     |                       |                                     |                            | $E_{DR}$              |
| 8     |                       |                                     |                            | $E_{SR}$              |
| 9     |                       |                                     |                            | $E_{RR}$              |
| 10    |                       |                                     |                            | $E_{XR}$              |
| 11    |                       |                                     |                            | $E_{LR}$              |
| 12    |                       |                                     |                            | $E_{TR}$              |

1 Meaning of first subscript: D=directivity; S=source match; X=crosstalk; L=load match; T=transmission tracking.  
 Meaning of second subscript: F=forward; R=reverse.

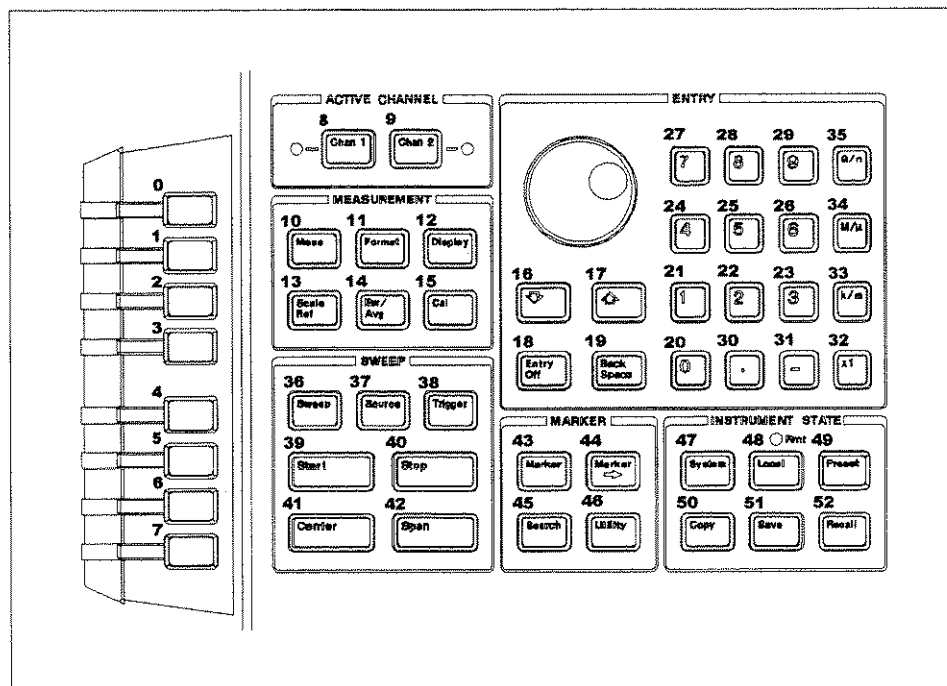
2 One path, 2-port cal duplicates arrays 1 to 6 in arrays 7 to 12.

3 Response and isolation corrects for crosstalk and transmission tracking in transmission measurements, and for directivity and reflection tracking in reflection measurements.



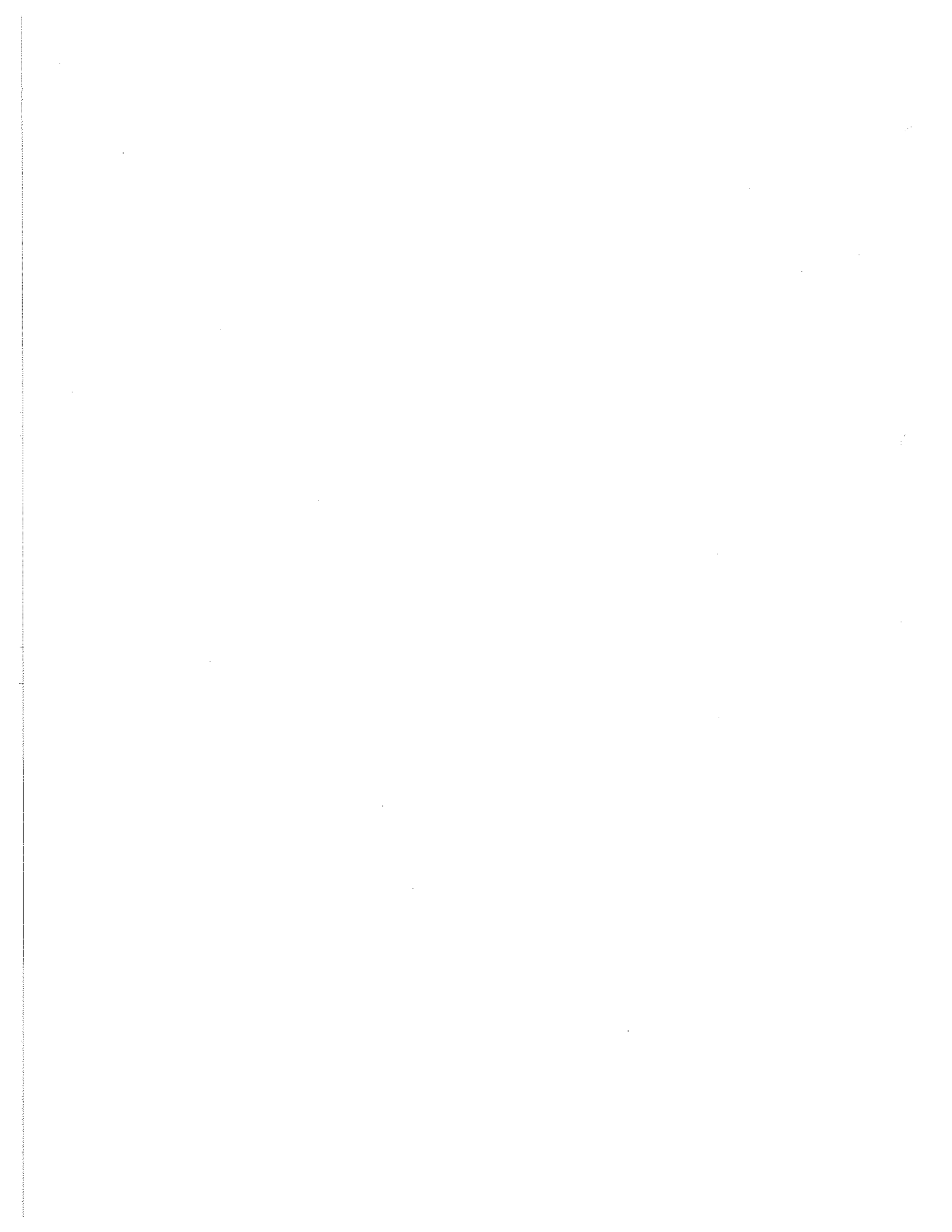
## Key Codes

Figure G-1 shows the codes of the front panel keys for using the KEY HP-IB command.



CB40G001

Figure G-1. Key Codes



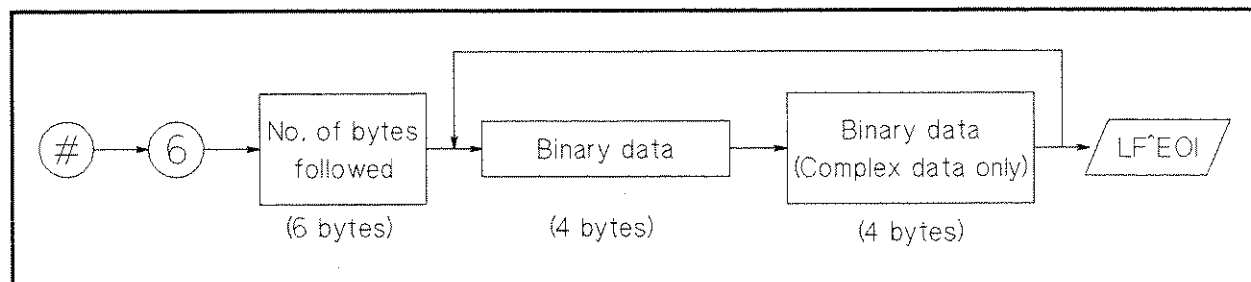
## Data Format and Data Levels

### Data Format

The analyzer can transmit data over HP-IB in four different formats. The type of format affects what kind of data array is declared (real or integer), because the format determines what type of data is transferred.

#### ■ Form 2

IEEE 32-bit floating point format. Figure H-1 shows the data transfer format of Form 2. In this mode, each number takes 4 bytes.

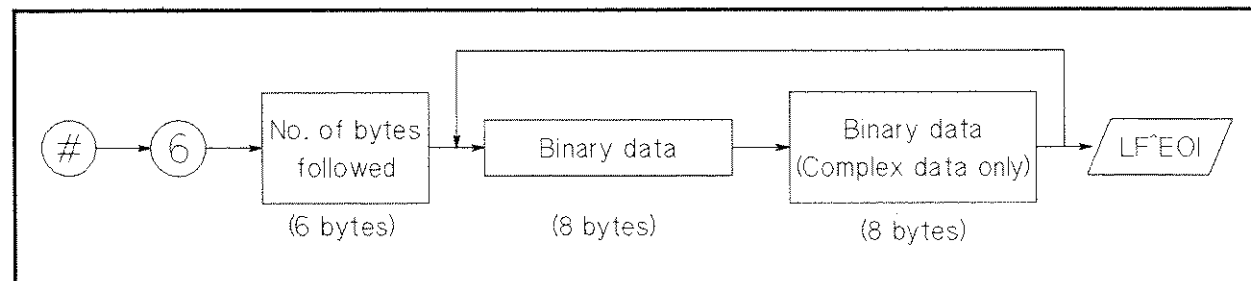


C450204

**Figure H-1. Form 2 Data Transfer Format**

#### ■ Form 3

IEEE 64-bit floating point format. Figure H-2 shows the data transfer format of Form 3. Data is stored internally in the 200/300 series computer with the IEEE 64-bit floating point format, eliminating the need for any reformatting by the computer. In this mode, each number takes 8 bytes.



C450203

**Figure H-2. Form 3 Data Transfer Format**

#### ■ Form 4

ASCII data transfer format. In this mode, each number is sent as a 24-character string, each character being a digit, sign, or decimal point.

- Form 5

MS-DOS<sup>®</sup> personal computer format. This mode is a modification of IEEE 32-bit floating point format with the byte order reversed. Form 5 also has a four-byte header that must be read in so that data order is maintained. In this mode, an MS-DOS<sup>®</sup> PC can store data internally without reformatting it.

---

## Data Levels

The analyzer has the following data arrays in internal memory:

- Raw data

These arrays store the results of all the preceding data processing operations. Note that the numbers here are still complex pairs.

When the Network analyzer mode and the full 2-port error correction are on, the raw data arrays contain all four S-parameter measurements required for accuracy enhancement.

- Error corrected data

The results of error correction are stored in the data arrays as complex number pairs.

- Formatted data

This is the array of data being displayed. It reflects all post-processing functions such as electrical delay, and the units of the array read out depends on the current display format.

- Calibration coefficients (Network and impedance analyzer only)

The results of a calibration are stored arrays of calibration coefficients that are used by the error correction routines. Each array corresponds to a specific error term in the error model. The calibration coefficients are read out with OUTPCALC{1-12}?.

- fixture compensation coefficients (Impedance analyzer only)

The results of a fixture compensation are stored arrays of fixture compensation coefficients that are used by the error correction routines. Each array corresponds to a specific error term in the error model. The fixture compensation coefficients are read out with OUTPCOMC{1-3}?.

Formatted data is generally the most useful, because it is the same information as that seen on the display. However, if post-processing is not necessary, as may be the case with smoothing, error corrected data is more desirable. Error corrected data also gives you the opportunity to load the data into the instrument and apply post-processing at a later time.

For more information of the data processing, refer to "Data Processing Flow" in chapter 12 of the *Reference Manual*.

## Marker Readout

The values specified by the marker, sub-marker, or delta-marker can be read using the following commands.

OUTPMKR?, Amplitude value (Value 1), Auxiliary amplitude value (Value 2), Sweep  
 OUTPSMKR?, Parameter  
 OUTPDMKR?

MKRVAL?, Amplitude value (Value 1)  
 SMKRVAL{1-7}?

MKRAUV?, Auxiliary amplitude value (Value 2)  
 SMKRAUV{1-7}?

The following table lists the amplitude value (value 1) and the auxiliary amplitude value (value 2) for each display format.

**Table H-1. Marker Readout**

| Analyzer Type                           | Display Format          | Parameter of CIRF Command | Amplitude Value (Value 1)                        | Auxiliary Amplitude Value (Value 2) |
|-----------------------------------------|-------------------------|---------------------------|--------------------------------------------------|-------------------------------------|
| Network Analyzer                        | Log Magnitude           | —                         | Log Magnitude (dB)                               | 0                                   |
|                                         | Phase                   | —                         | Phase (degrees)                                  | 0                                   |
|                                         | Expanded Phase          | —                         | Phase (degrees)                                  | 0                                   |
|                                         | Delay                   | —                         | Delay (seconds)                                  | 0                                   |
|                                         | Linear Magnitude        | —                         | Linear Magnitude                                 | 0                                   |
|                                         | SWR                     | —                         | SWR                                              | 0                                   |
|                                         | Real                    | —                         | Real                                             | 0                                   |
|                                         | Imaginary               | —                         | Imaginary                                        | 0                                   |
| Network/impedance Analyzer <sup>1</sup> | Smith Chart             | RI                        | Real                                             | Imaginary                           |
|                                         | Polar                   | LIN                       | Linear Magnitude                                 | Phase (degrees)                     |
|                                         | Addmittance             | LOG                       | Log Magnitude (dB)                               | Phase (°)                           |
|                                         |                         | RX                        | Resistance (Ω)                                   | Reactance (Ω)                       |
|                                         |                         | GB                        | Conductance (S)                                  | Suseptance (S)                      |
|                                         |                         | SWR                       | SWR                                              | Phase (°)                           |
| Spectrum Analyzer                       | Spectrum Measurement    | —                         | Magnitude (dBm, dBV, dBμV, W, or V) <sup>2</sup> | 0                                   |
|                                         | Noise Level Measurement | —                         | Magnitude (dBm, dBV, dBμV, W, or V) <sup>2</sup> | 0                                   |

<sup>1</sup> For the other format than listed above in the impedance analyzer mode, the marker readout has the unit of the selected parameter by **Meas** key.

<sup>2</sup> Unit is specified by the SAUNIT command. (default: dBm)



## Waveform Analysis Commands

---

The HP 4396A has added a command set that can be used to analyze waveforms of specific devices. The waveform analysis commands analyze and output the results using only a single command. This appendix provides information about the added waveform analysis commands.

The commands are divided into five groups as follows:

- Waveform analysis setup commands
- Maximum/Minimum/Mean search commands
- Ripple analysis commands
- Filter and Resonator analysis commands
- Equivalent circuit analysis commands

All of the commands that are described in this appendix are executable using the Instrument BASIC EXECUTE command. By using the EXECUTE command, you can execute the waveform analysis commands much faster than by using the OUTPUT statement. If you use Instrument BASIC, it is recommended that you use EXECUTE with the waveform analysis commands.

For detail information about EXECUTE command, see the *Using HP Instrument BASIC with HP 4396A* manual.

## Conventions and Definitions

This section describes the conventions and definitions that are used to describe the waveform analysis commands.

- ① → **ANARANG**
- ② → Sets the stimulus range for the waveform. . . .
- ③ → **Syntax**      **ANARANG** *start,stop*
- ④ →                      Where,  
                               0      *start*      Start value of the analysis range  
                               1      *stop*       Stop value of the analysis range
- ⑤ → **Query**  
          **Response**
- ⑥ → **Semantics**
- ⑦ → **Note**
- ⑧ → **Examples**

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ① | Command name.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| ② | Command description.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| ③ | <p>Command syntax</p> <p>This part shows the syntax of the command. You must put a space between the command and the parameters.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| ④ | <p>Command parameter description</p> <p>The first column of the table lists the register number that is used by the EXECUTE command. You must put the parameter in the indicated register before using the EXECUTE command. For example (in the above case):</p> <pre style="margin-left: 40px;">WRITEIO 15,0;Start    Put "Start" in register 0. WRITEIO 15,1;Stop    Put "Stop" in register 1. EXECUTE "ANARANG"    Execute "ANARANG".</pre> <p>The second column lists the parameter name that is shown in the <b>Syntax</b> area. The third column describes the parameters.</p> |
| ⑤ | <p>Query response.</p> <p>This part shows what values will be returned as the query response. The description of the query response is similar to the description of the <b>Syntax</b> area shown above.</p>                                                                                                                                                                                                                                                                                                                                                                         |
| ⑥ | <p>Semantics</p> <p>This part describes how the command obtains the values for the query response.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| ⑦ | <p>Note</p> <p>This part describes the required conditions or limitations when using the command.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| ⑧ | <p>Examples</p> <p>This part shows examples of how to use the command. Examples are provided for both HP BASIC on an external controller and Instrument BASIC on the analyzer.</p>                                                                                                                                                                                                                                                                                                                                                                                                   |



## Waveform Analysis Setup Commands

The following commands are used for setting up the conditions for waveform analysis:

- ANAOCH1
- ANAOCH2
- ANARANG
- ANARFULL
- ANAODATA
- ANAOMEMO
- THRR

The settings are effective for all of the waveform analysis commands.

### ANAOCH1

Selects channel 1 for waveform analysis.

**Syntax** ANAOCH1

**Query** *boolean*

**Response** Where,

| Register | Parameter      | Description                                                                     |
|----------|----------------|---------------------------------------------------------------------------------|
| 0        | <i>boolean</i> | 1 or 0. Channel 1 is selected (1) or is not selected (0) for waveform analysis. |

**Note** ■ The ANAOCH1 and ANAOCH2 channel setting is independent of the active channel setting.

### ANAOCH2

Selects channel 2 for waveform analysis.

**Syntax** ANAOCH2

**Query** *boolean*

**Response** Where,

| Register | Parameter      | Description                                                                     |
|----------|----------------|---------------------------------------------------------------------------------|
| 0        | <i>boolean</i> | 1 or 0. Channel 2 is selected (1) or is not selected (0) for waveform analysis. |

**Note** ■ The ANAOCH1 and ANAOCH2 channel setting is independent of the active channel setting.

## ANARANG

Sets the stimulus range for waveform analysis commands by start and stop value.

**Syntax** ANARANG *start, stop*

Where,

| Register | Parameter    | Description                        |
|----------|--------------|------------------------------------|
| 0        | <i>start</i> | Start value of the analysis range. |
| 1        | <i>stop</i>  | Stop value of the analysis range.  |

**Query** *start, stop*

**Response**

**Note**

- The waveform analysis range is independent of the marker search range.
- You can set the range for each channel independently. Therefore, you need to set the analysis channel using ANAOCH1 or ANAOCH2 before using ANARANG.
- The waveform analysis range will be truncated to fit the displayed stimulus range if the setting is exceeded.
- If the displayed stimulus range is changed, the waveform analysis range is set equal to the displayed range.
- Store the waveform analysis range setting using **SAVE ALL** or **STATE ONLY**.
- The waveform analysis range is set to equal to the displayed stimulus range when the power is turned on.

**Examples** For External Controller

```
INPUT "Enter Start for Analysis Range.",Start
INPUT "Enter Stop for Analysis Range.",Stop
OUTPUT @Hp4396;"ANARANG ";Start,Stop
```

For Instrument BASIC

```
INPUT "Enter Start for Analysis Range.",Start
INPUT "Enter Stop for Analysis Range.",Stop
WRITEIO 8,0;Start
WRITEIO 8,1;Stop
EXECUTE "ANARANG"
```

## ANARFULL

Sets the waveform analysis range equal to the displayed stimulus range. (No Query)

**Syntax** ANARFULL

**Note**

- You can set the range for each channel independently. Therefore, you need to set the analysis channel using ANAOCH1 or ANAOCH2 before using ANARFULL.

## ANAODATA

Selects the data trace for waveform analysis.

**Syntax** ANAODATA

**Query** *boolean*

**Response** Where,

| Register | Parameter      | Description                                                                      |
|----------|----------------|----------------------------------------------------------------------------------|
| 0        | <i>boolean</i> | 1 or 0. Data trace is selected (1) or is not selected (0) for waveform analysis. |

**Note** ■ You can select the trace for each channel independently. Therefore, you need to set the analysis channel using ANAOCH1 or ANAOCH2 before using ANAODATA.

## ANAOMEMO

Selects the data trace for waveform analysis.

**Syntax** ANAOMEMO

**Query** *boolean*

**Response** Where,

| Register | Parameter      | Description                                                                        |
|----------|----------------|------------------------------------------------------------------------------------|
| 0        | <i>boolean</i> | 1 or 0. Memory trace is selected (1) or is not selected (0) for waveform analysis. |

**Note** ■ You can select the trace for each channel independently. Therefore, you need to set the analysis channel using ANAOCH1 or ANAOCH2 before using ANAOMEMO.

## THRR

Sets threshold ripple height for waveform analysis commands.

**Syntax** THRR *height*

Where,

| Register | Parameter     | Description                            |
|----------|---------------|----------------------------------------|
| 0        | <i>height</i> | (Peak height) - (negative peak height) |

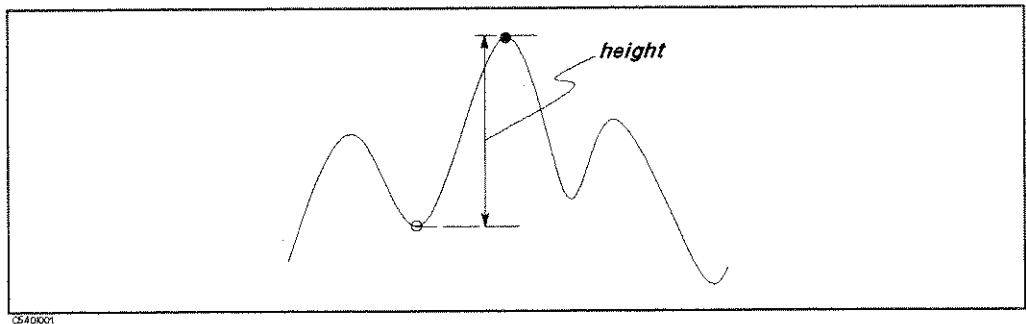


Figure I-1. THRR

**Query** *height*

**Response**

- Semantics**
- Ripple height is defined as the difference between the positive peak and the negative peak.
  - Waveform analysis commands search only for ripples greater than the threshold value, any others are ignored.

**Note** ■ Default threshold value is 0.

**Examples** **For External Controller**

```
INPUT "Enter Pos. Peak Gain [dB].",Local_max
INPUT "Enter Neg. Peak Gain [dB].",Local_min
Height=Local_max-Local_min
OUTPUT @Hp4396;"THRR ";Height
```

**For Instrument BASIC**

```
INPUT "Enter Pos. Peak Gain [dB].",Local_max
INPUT "Enter Neg. Peak Gain [dB].",Local_min
Height=Local_max-Local_min
WRITEIO 8,0;Height
EXECUTE "THRR"
```

## Maximum/Minimum/Mean Value Search Commands

The following commands return the maximum, minimum, and mean value of a trace within the range specified using the ANARANG command.

- OUTPMAX?
- OUTPMIN?
- OUTPMINMAX?
- OUTPMEAN?
- PEAK?
- NEXPK?
- NUMLMAX?
- NUMLMIN?
- LMAX?
- LMIN?
- TARR?
- TARL?

### OUTPMAX?

Returns the maximum point value and its stimulus within the specified range. (Query only)

**Syntax**       OUTPMAX?

**Query**         *MAX, f<sub>max</sub>*

**Response**     Where,

| Register | Parameter              | Description                                    |
|----------|------------------------|------------------------------------------------|
| 0        | <i>MAX</i>             | Maximum value                                  |
| 1        | <i>f<sub>max</sub></i> | Stimulus at maximum point (Frequency or Power) |

#### Examples   For External Controller

```
OUTPUT @Hp4396;"OUTPMAX?"
ENTER @Hp4396;Max_value,F_max
PRINT Max_value,F_max
```

#### For Instrument BASIC

```
EXECUTE "OUTPMAX?"
PRINT READIO(8,0),READIO(8,1)
```

### OUTPMIN?

Returns the minimum point value and its stimulus within the specified range. (Query only)

**Syntax**       OUTPMIN?

**Query**         *MIN, f<sub>min</sub>*

**Response**     Where,

| Register | Parameter              | Description                                    |
|----------|------------------------|------------------------------------------------|
| 0        | <i>MIN</i>             | Minimum value                                  |
| 1        | <i>f<sub>min</sub></i> | Stimulus at minimum point (Frequency or Power) |

## OUTPMINMAX?

Returns the maximum and minimum values and their stimulus values within the specified range. (Query only)

**Syntax**       OUTPMINMAX?

**Query**        *MIN, f<sub>min</sub>, MAX, f<sub>max</sub>*

**Response**     Where,

| Register | Parameter              | Description                                    |
|----------|------------------------|------------------------------------------------|
| 0        | <i>MIN</i>             | Minimum value                                  |
| 1        | <i>f<sub>min</sub></i> | Stimulus at minimum point (Frequency or Power) |
| 2        | <i>MAX</i>             | Maximum value                                  |
| 3        | <i>f<sub>max</sub></i> | Stimulus at maximum point (Frequency or Power) |

### Examples   For External Controller

```
OUTPUT @Hp4396;"OUTPMINMAX?"
ENTER @Hp4396;Min_value,F_min,Max_value,F_max
PRINT "MIN:",Min_value,F_min
PRINT "MAX:",Max_value,F_max
```

### For Instrument BASIC

```
EXECUTE "OUTPMINMAX?"
PRINT "MIN:",READIO(8,0),READIO(8,1)
PRINT "MAX:",READIO(8,2),READIO(8,3)
```

## OUTPMEAN?

Returns the mean value within the specified range. (Query only)

**Syntax**       OUTPMEAN?

**Query**        *mean*

**Response**     Where,

| Register | Parameter   | Description |
|----------|-------------|-------------|
| 0        | <i>mean</i> | Mean value. |

### Examples   For External Controller

```
OUTPUT @Hp4396;"OUTPMEAN?"
ENTER @Hp4396;Mean
PRINT Mean
```

### For Instrument BASIC

```
EXECUTE "OUTPMEAN?"
PRINT READIO(8,0)
```

## PEAK?

Returns maximum peak and its stimulus within the specified range. (Query only)

**Syntax**      PEAK?

**Query**         $MAX_{peak}, f_{maxpeak}$

**Response**    Where,

| Register | Parameter     | Description              |
|----------|---------------|--------------------------|
| 0        | $MAX_{peak}$  | Maximum peak value       |
| 1        | $f_{maxpeak}$ | Stimulus at maximum peak |

**Semantics**   ■ The analyzer defines the searched value and point as a reference point for the next NEXP? command. The reference point is stored using **SAVE** **ALL** or **STATE ONLY**.

**Note**        ■ If the search fails, the analyzer returns 0,0.

### Examples    For External Controller

```
OUTPUT @Hp4396;"PEAK?"
ENTER @Hp4396;Peak,F_maxpeak
PRINT "Peak:",Peak,"[dB]","F_maxpeak,"[Hz]"
```

### For Instrument BASIC

```
EXECUTE "PEAK?"
PRINT "Peak:",READIO(8,0),"[dB]","READIO(8,1),"[Hz]"
```

## NEXPK?

Returns the maximum peak having a value less than the value that was found using last PEAK? or NEXPK? command within the specified range. It also returns the corresponding stimulus value. (Query only)

**Syntax** NEXPK?

**Query** *Peak, f<sub>Peak</sub>*

**Response** Where,

| Register | Parameter               | Description         |
|----------|-------------------------|---------------------|
| 0        | <i>Peak</i>             | Searched peak value |
| 1        | <i>f<sub>Peak</sub></i> | Searched stimulus   |

### Note

- The analyzer defines the searched value and point as a reference point for the next NEXPK? command. The reference point is stored using **SAVE ALL** or **STATE ONLY**.
- If the multiple corresponded points are found, the analyzer returns right-hand nearest peak of the reference point.
- If the search fails, the analyzer returns 0,0.

### Examples For External Controller

```
OUTPUT @Hp4396;"NEXPK?"
ENTER @Hp4396;N_peak,F_npeak
PRINT N_peak,F_npeak
```

### For Instrument BASIC

```
EXECUTE "PEAK?"
I=1
REPEAT
  PRINT I,READIO(8,0),READIO(8,1)
  EXECUTE "NEXPK?"
  I=I+1
UNTIL READIO(8,0)=0
```



**NUMLMAX?**

Returns the number of positive peaks within the specified range. (Query only)

**Syntax** NUMLMAX?

**Query** *n*

**Response** Where,

| Register | Parameter | Description     |
|----------|-----------|-----------------|
| 0        | <i>n</i>  | Number of peaks |

**Note** ■ If the search fails, the analyzer returns 0.

**Examples** For External Controller

```
OUTPUT @Hp4396;"NUMLMAX?"
ENTER @Hp4396;N
PRINT N
```

For Instrument BASIC

```
EXECUTE "NUMLMAX?"
PRINT READIO(8,0)
```

**NUMLMIN?**

Returns the number of negative peaks within the specified range. (Query only)

**Syntax** NUMLMIN?

**Query** *n*

**Response** Where,

| Register | Parameter | Description              |
|----------|-----------|--------------------------|
| 0        | <i>n</i>  | Number of negative peaks |

**Note** ■ If the search fails, the analyzer returns 0.

## LMAX?

Returns the  $n$ th positive peak counted from the left end of the range.

**Syntax** LMAX?  $n$

Where,

| Register | Parameter | Description                                  |
|----------|-----------|----------------------------------------------|
| 0        | $n$       | Peak counted from the left end of the range. |

**Query**  $LMAX_n$

**Response** Where,

| Register | Parameter | Description          |
|----------|-----------|----------------------|
| 0        | $LMAX_n$  | Value of $n$ th peak |

**Note** ■ If the search fails, the analyzer returns 3.40282346639E+38.

**Examples** **For External Controller**

```
OUTPUT @Hp4396;"LMAX? 5"  
ENTER @Hp4396;Lmax  
PRINT Lmax
```

**For Instrument BASIC**

```
INPUT "?",N  
WRITEIO 8,0;N  
EXECUTE "LMAX?"  
PRINT READIO(8,0)
```

## LMIN?

Returns the  $n$ th negative peak counted from the left end of the range.

**Syntax** LMIN?  $n$

Where,

| Register | Parameter | Description                                           |
|----------|-----------|-------------------------------------------------------|
| 0        | $n$       | Negative peak counted from the left end of the range. |

**Query**  $LMIN_n$

**Response** Where,

| Register | Parameter | Description                   |
|----------|-----------|-------------------------------|
| 0        | $LMIN_n$  | Value of $n$ th negative peak |

**Note** ■ If the search fails, the analyzer returns 3.40282346639E+38.

## TARR?

Searches to the right for the point having the specified parameter-value from the left end of the range, and returns its stimulus.

**Syntax**      TARR? *target*

Where,

| Register | Parameter     | Description   |
|----------|---------------|---------------|
| 0        | <i>target</i> | Search value. |

**Query**      *f<sub>target</sub>*

**Response**    Where,

| Register | Parameter                 | Description                        |
|----------|---------------------------|------------------------------------|
| 0        | <i>f<sub>target</sub></i> | Stimulus of the first point found. |

**Note**      ■ If the search fails, the analyzer returns 0.

### Examples    For External Controller

```
INPUT "Enter Target Value.",Target
OUTPUT @Hp4396;"TARR? ";Target
ENTER @Hp4396;F_target
PRINT F_target
```

### For Instrument BASIC

```
INPUT "Enter Target Value.",Target
WRITEIO 8,0;Target
EXECUTE "TARR?"
PRINT READIO(8,0)
```

## TARL?

Searches to the left for the point having the specified parameter-value from the right end of the range, and returns its stimulus.

**Syntax**      TARL? *target*

Where,

| Register | Parameter     | Description   |
|----------|---------------|---------------|
| 0        | <i>target</i> | Search value. |

**Query**      *f<sub>target</sub>*

**Response**    Where,

| Register | Parameter                 | Description                        |
|----------|---------------------------|------------------------------------|
| 0        | <i>f<sub>target</sub></i> | Stimulus of the first point found. |

**Note**      ■ If the search fails, the analyzer returns 0.

## Ripple Analysis Commands

Ripple analysis commands analyze the ripples of the waveform and return the results.

- RPLPP?
- RPLHEI?
- RPLRHEI?
- RPLLHEI?
- RPLENV?
- RPLMEA?
- RPLVAL?
- POLE?

### RPLPP?

Returns the maximum difference between the positive peak and the negative peak within the specified range. (Query only)

**Syntax** RPLPP?

**Query**  $MAX_{diff}$

**Response** Where,

| Register | Parameter    | Description                                            |
|----------|--------------|--------------------------------------------------------|
| 0        | $MAX_{diff}$ | Maximum difference between positive and negative peak. |

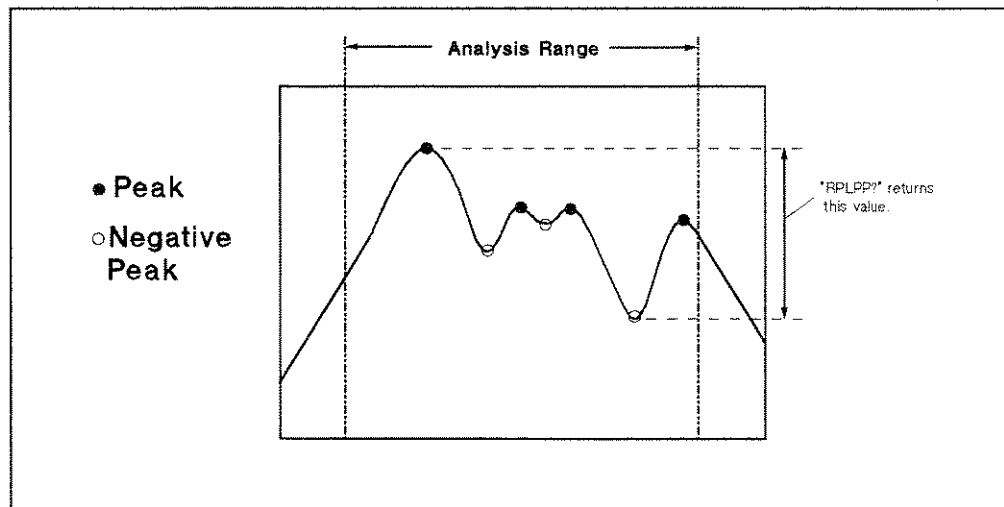


Figure I-2. RPLPP?

**Note** ■ If the search fails, the analyzer returns 0.

**Examples For External Controller**

```

ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAOData"
OUTPUT @Hp4396;"RPLPP?"
ENTER @Hp4396;Max_diff
PRINT Max_diff;"[dB]"
END
    
```

**For Instrument BASIC**

```
EXECUTE "ANAOCH1"  
EXECUTE "ANARFULL"  
EXECUTE "ANAODATA"  
EXECUTE "RPLPP?"  
PRINT READIO(8,0); "[dB]"  
END
```

## RPLHEI?

Returns the maximum difference between adjacent positive and negative peaks. (Query only)

**Syntax** RPLHEI?

**Query** *value*

**Response** Where,

| Register | Parameter    | Description                                                      |
|----------|--------------|------------------------------------------------------------------|
| 0        | <i>value</i> | Maximum difference between adjacent positive and negative peaks. |

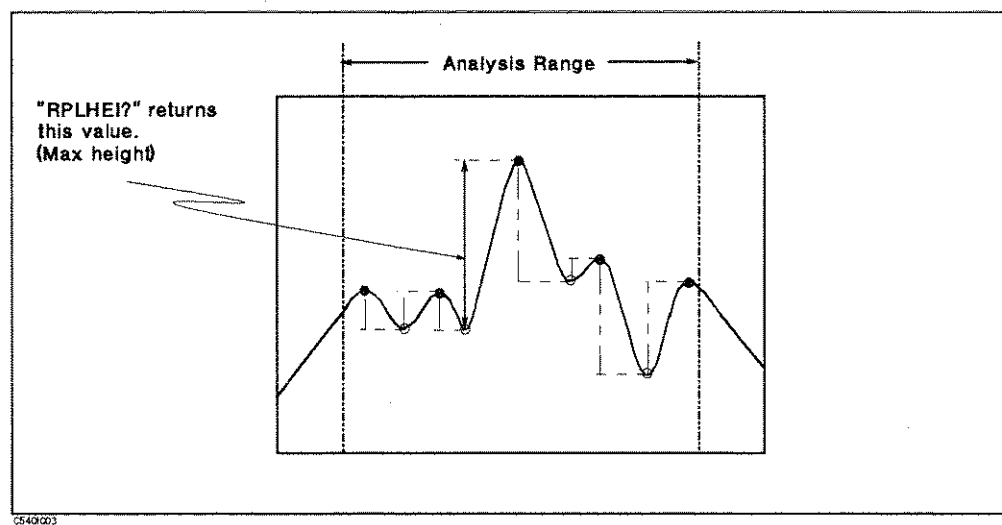


Figure I-3. RPLHEI?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```

ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLHEI?"
ENTER @Hp4396;Adj_diff
PRINT Adj_diff;"[dB]"
END

```

### For Instrument BASIC

```

EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLHEI?"
PRINT READIO(8,0);"[dB]"
END

```

## RPLRHEI?

Returns the maximum difference between the positive peak and the right-hand adjacent negative peak. (Query only)

**Syntax** RPLRHEI?

**Query** *value*

**Response** Where,

| Register | Parameter    | Description                                                                             |
|----------|--------------|-----------------------------------------------------------------------------------------|
| 0        | <i>value</i> | Maximum difference between the positive peak and the right-hand adjacent negative peak. |

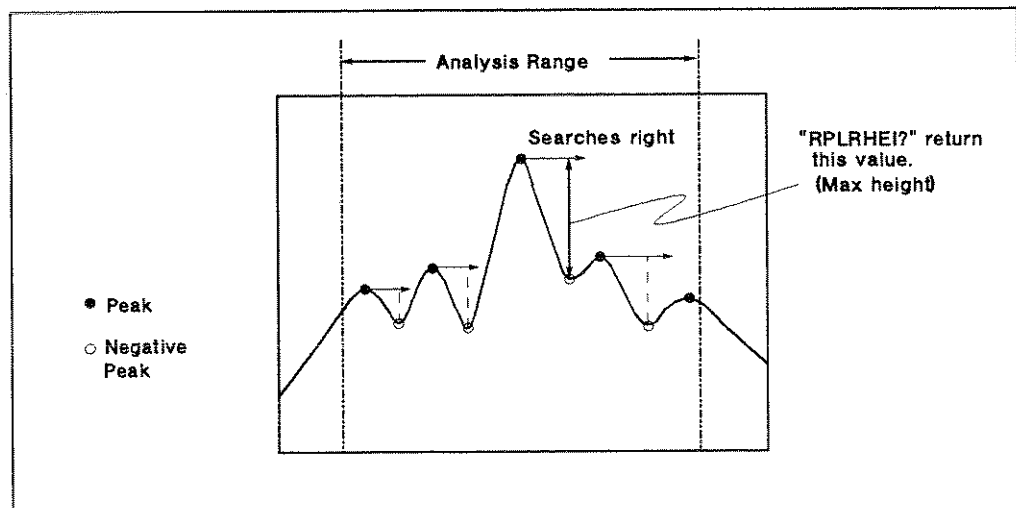


Figure I-4. RPLRHEI?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```
ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLRHEI?"
ENTER @Hp4396;Adj_diff
PRINT Adj_diff;"[dB]"
END
```

### For Instrument BASIC

```
EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLRHEI?"
PRINT READIO(8,0);"[dB]"
END
```



## RPLLHEI?

Returns the maximum difference between the positive peak and the left-hand adjacent negative peak. (Query only)

**Syntax** RPLLHEI?

**Query** *value*

**Response** Where,

| Register | Parameter    | Description                                                                            |
|----------|--------------|----------------------------------------------------------------------------------------|
| 0        | <i>value</i> | Maximum difference between the positive peak and the left-hand adjacent negative peak. |

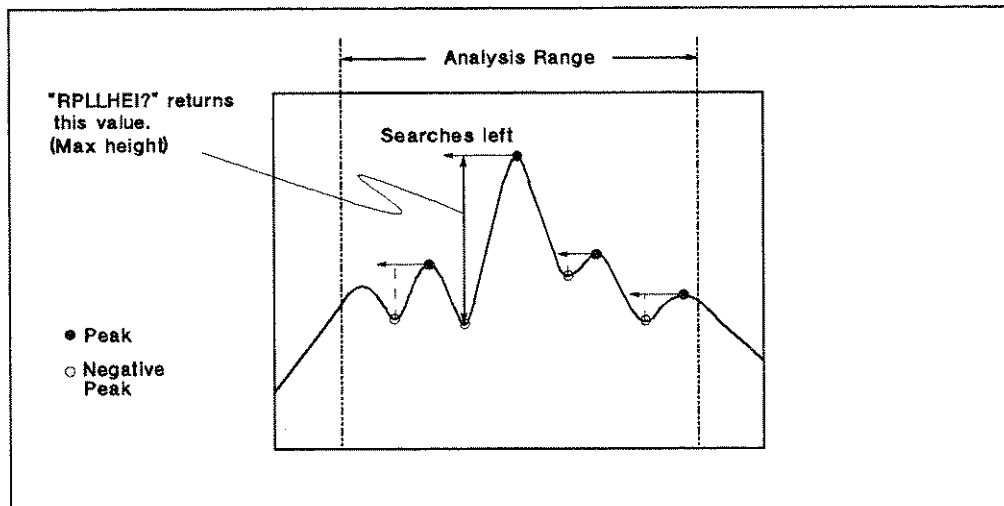


Figure I-5. RPLLHEI?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```

ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLLHEI?"
ENTER @Hp4396;Adj_diff
PRINT Adj_diff;"[dB]"
END

```

### For Instrument BASIC

```

EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLLHEI?"
PRINT READIO(8,0);"[dB]"
END

```

## RPLENV?

Returns the maximum height between the negative peak and the intersection of an imaginary slope line between the adjacent positive peaks. (Query only)

**Syntax** RPLENV?

**Query** *value*

**Response** Where,

| Register | Parameter    | Description                                                                                                                                     |
|----------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 0        | <i>value</i> | Maximum height between the negative peak and the intersection of an imaginary slope line between the adjacent positive peaks. (See Figure I-6.) |

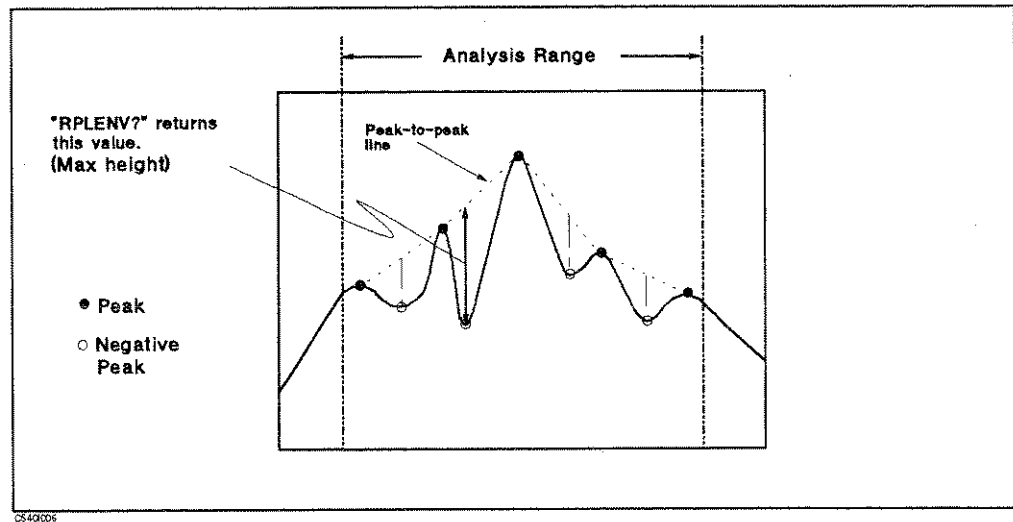


Figure I-6. RPLENV?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```
ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLENV?"
ENTER @Hp4396;Env_diff
PRINT Env_diff;"[dB]"
END
```

### For Instrument BASIC

```
EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLENV?"
PRINT READIO(8,0);"[dB]"
END
```

### RPLMEA?

Returns the mean of the difference between the adjacent positive and negative peaks within the specified range. (Query only)

**Syntax** RPLMEA?

**Query** *value*

**Response** Where,

| Register | Parameter    | Description                                                                               |
|----------|--------------|-------------------------------------------------------------------------------------------|
| 0        | <i>value</i> | Mean of the difference between the adjacent positive and negative peaks. (See Figure I-7) |

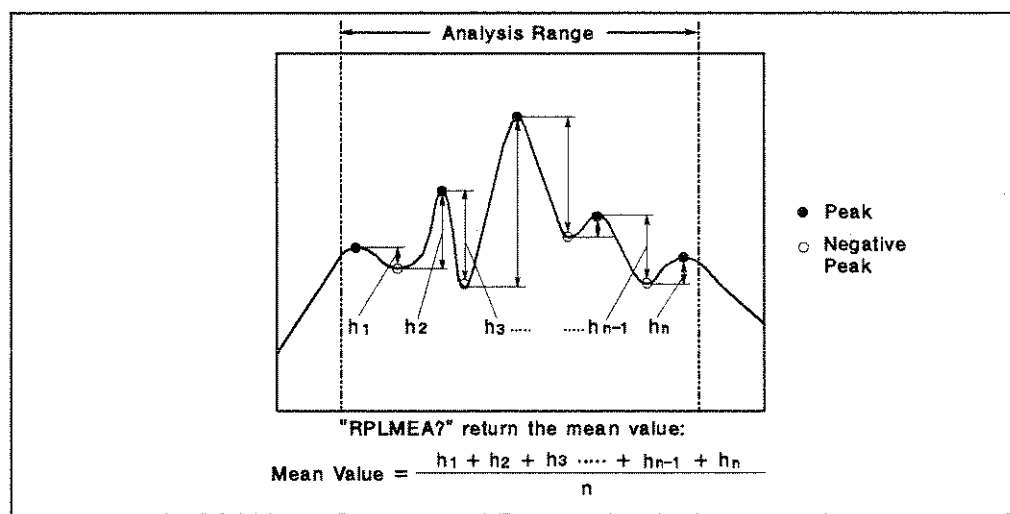


Figure I-7. RPLMEA?

**Note** ■ If the search fails, the analyzer returns 0.

**Examples For External Controller**

```

ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLMEA?"
ENTER @Hp4396;Mean_diff
PRINT Mean_diff;"[dB]"
END
    
```

**For Instrument BASIC**

```

EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLMEA?"
PRINT READIO(8,0);"[dB]"
END
    
```

## RPLVAL?

Returns the maximum total of the differences between the negative peaks and the adjacent positive peaks on both sides and the stimulus of the corresponding negative peak. (Query only)

**Syntax** RPLVAL?

**Query** *Rplval, stimulus*

**Response** Where,

| Register | Parameter       | Description                                                                                                                 |
|----------|-----------------|-----------------------------------------------------------------------------------------------------------------------------|
| 0        | <i>Rplval</i>   | Maximum total of the differences between the negative peaks and the adjacent positive peaks on both sides. (See Figure I-8) |
| 1        | <i>stimulus</i> | Stimulus of the corresponding negative peak                                                                                 |

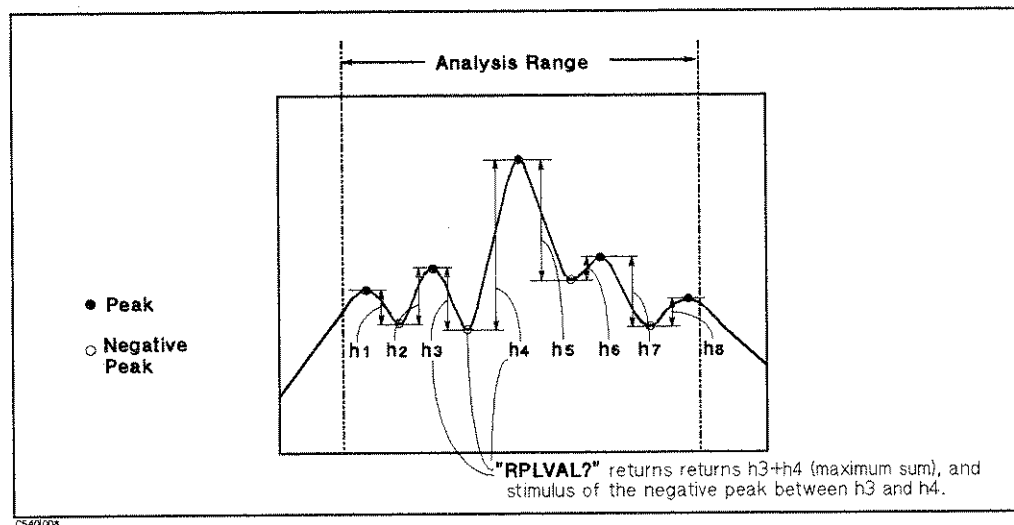


Figure I-8. RPLVAL?

**Note** ■ If the search fails, the analyzer returns 0.

### Examples For External Controller

```
ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
OUTPUT @Hp4396;"RPLVAL?"
ENTER @Hp4396;Val,Stim
PRINT Val;"[dB]";Stim;"[Hz]"
END
```

### For Instrument BASIC

```
EXECUTE "ANAOCH1"
EXECUTE "ANARFULL"
EXECUTE "ANAODATA"
EXECUTE "RPLVAL?"
PRINT READIO(8,0);"[dB]"
PRINT READIO(8,1);"[Hz]"
END
```

## POLE?

Returns the stimulus and value of the first negative peak found on each side of the maximum point that are below the specified value from the maximum peak. (Query only)

**Syntax** POLE? *D*

Where,

| Register | Parameter | Description                       |
|----------|-----------|-----------------------------------|
| 0        | <i>D</i>  | Difference from the maximum peak. |

**Query Response**  $x_1$ ,  $stim_1$ ,  $x_2$ ,  $stim_2$

Where,

| Register | Parameter | Description                |
|----------|-----------|----------------------------|
| 0        | $x_1$     | Left negative peak value.  |
| 1        | $stim_1$  | Stimulus of $x_1$ .        |
| 2        | $x_2$     | Right negative peak value. |
| 3        | $stim_2$  | Stimulus of $x_2$ .        |

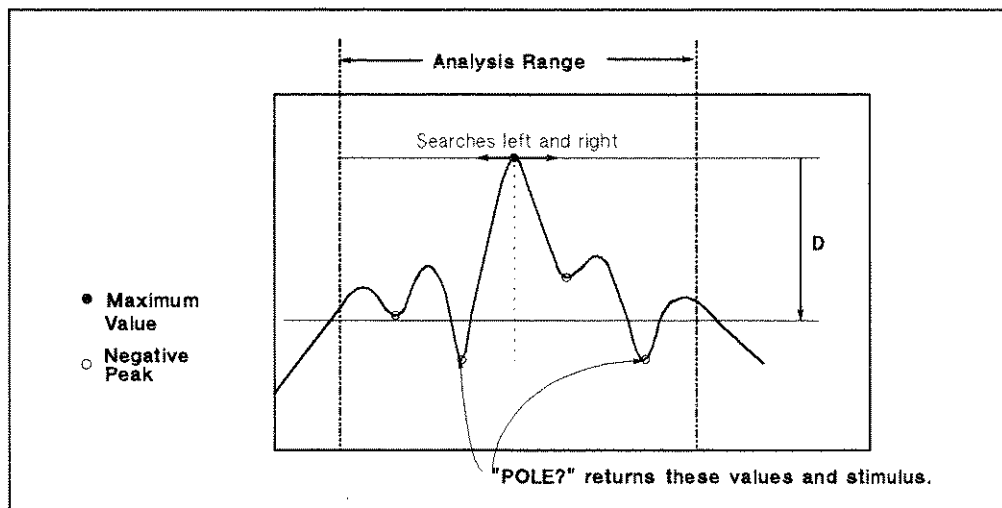


Figure I-9. POLE?

### Note

- If the search fails, the analyzer returns 0.
- Give the command parameter as a negative value. For instance, to specify 50 dB down from the maximum peak as a reference level, the parameter is -50.

### Examples For External Controller

```
ASSIGN @Hp4396 TO 717
OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAOATA"
OUTPUT @Hp4396;"POLE? -50"
ENTER @Hp4396;X1,S1,X2,S2
PRINT "LEFT :";X1;" [dB]";S1;" [Hz]"
PRINT "RIGHT :";X2;" [dB]";S2;" [Hz]"
```

END

**For Instrument BASIC**

```
EXECUTE "ANAOCH1"  
EXECUTE "ANARFULL"  
EXECUTE "ANAODATA"  
WRITEIO 8,0;-50  
EXECUTE "POLE?"  
PRINT "LEFT :";READIO(8,0);"[dB]";READIO(8,1);"[Hz]"  
PRINT "RIGHT:";READIO(8,2);"[dB]";READIO(8,3);"[Hz]"  
END
```

---

## Filter and Resonator Analysis Commands

The following commands are device related. They are easy to use for specific device analysis because they can output many parameters using only a single command.

- `OUTPFILT?`
- `OUTPXFIL?`
- `OUTPCFIL?`
- `OUTPRESO?`
- `OUTPRESR?`
- `OUTPRESF?`
- `OUTPCERR?`

## OUTPFILT?

Analyzes the filter and returns the parameters.

**Syntax**      OUTPFILT? *x*

Where,

| Register | Parameter | Description                             |
|----------|-----------|-----------------------------------------|
| 0        | <i>x</i>  | The dB value down the bandwidth filter. |

**Query Response**      *Loss, BW, f<sub>cent</sub>, Q, Δf<sub>left</sub>, Δf<sub>right</sub>* (Total6)

| Register | Parameter                 | Description                                                                      |
|----------|---------------------------|----------------------------------------------------------------------------------|
| 0        | <i>Loss</i>               | Insertion loss                                                                   |
| 1        | <i>BW</i>                 | <i>x</i> dB down bandwidth                                                       |
| 2        | <i>f<sub>cent</sub></i>   | Center frequency                                                                 |
| 3        | <i>Q</i>                  | Q (Quality factor)                                                               |
| 4        | <i>Δf<sub>left</sub></i>  | Frequency difference between the left cutoff point and the middle of the range.  |
| 5        | <i>Δf<sub>right</sub></i> | Frequency difference between the right cutoff point and the middle of the range. |

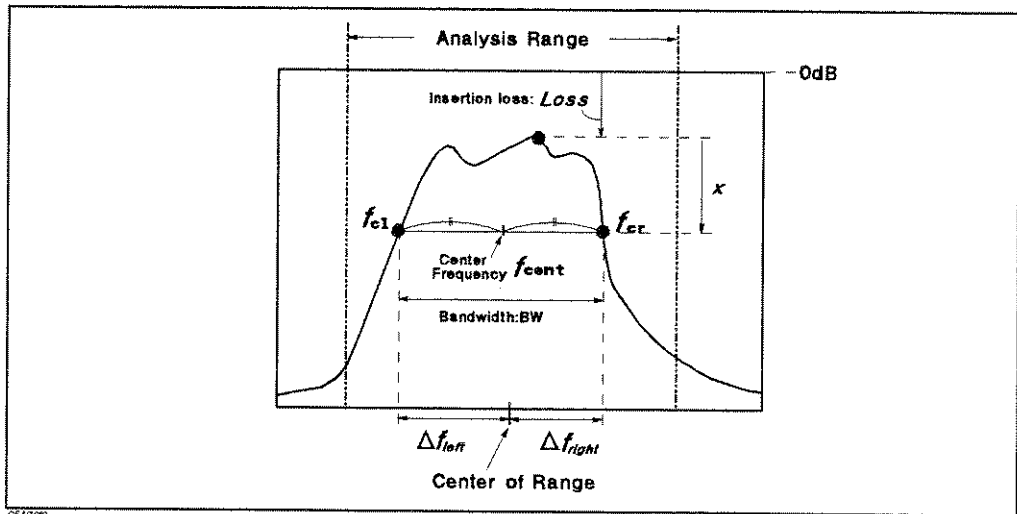


Figure I-10. OUTPFILT?

- Semantics**
- Insertion loss is the maximum value within the specified range.
  - *x* dB bandwidth is the frequency difference between both of the *x*dB down cutoff points.
  - Center frequency is the middle point of both cutoff points.
  - Q is calculated using the following equation:

$$Q = \frac{\sqrt{f_{cl} \times f_{cr}}}{BW}$$

**Note**



- If both of the two cutoff points are not found, the analyzer returns 0 for all values of the query response.

### Examples For External Controller

```

10 ASSIGN @Hp4396 TO 717
20 CALL Sweep(1) ! Goes to the subroutine.
30 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
40 OUTPUT @Hp4396;"OUTPFILT? -3"
50 ENTER @Hp4396;Loss,Bw,Fc,Q,Dfl,Dfr
60 PRINT "Loss: ";Loss;" [dB] BW: ";Bw;" [Hz]"
70 PRINT "fc: ";Fc;" [Hz] Q: ";Q
80 PRINT "Dfl: ";Dfl;" [Hz] Dfr: ";Dfr;" [Hz]"
90 END
100 SUB Sweep(Ch)! Sweep End Detection Subroutine
101           ! (Parameter: No. of channel)
110  ASSIGN @Hp4396 TO 717
120  ON INTR 7 GOTO Sweep_end
130  OUTPUT @Hp4396;"TRGS BUS"
140  OUTPUT @Hp4396;"ESNB 2; *SRE 4"
150  FOR I=1 TO Ch
160    OUTPUT @Hp4396;"*CLS;*OPC?"
170    ENTER @Hp4396;0pc
180    ENABLE INTR 7;2
190    TRIGGER @Hp4396
200    Waiting:GOTO Waiting
210    Sweep_end:!
220  NEXT I
230  SUBEND

```

### For Instrument BASIC

```

10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
30 EXECUTE "SING"
40 EXECUTE "ANAOCH1"
50 EXECUTE "ANARFULL"
60 EXECUTE "ANAODATA"
70 WRITEIO 8,0;-50
80 EXECUTE "POLE?"
90 PRINT "Loss: ";READIO(8,0);" [dB] BW: ";READIO(8,1);" [Hz]"
100 PRINT "fc: ";READIO(8,2);" [Hz] Q: ";READIO(8,3)
110 PRINT "Dfl: ";READIO(8,4);" [Hz] Dfr: ";READIO(8,5);" [Hz]"
120 END

```

## OUTPXFIL?

Syntax OUTPXFIL?  $x_1, x_2, D, f_1, f_2$

Where,

| Register | Parameter | Description                                               |
|----------|-----------|-----------------------------------------------------------|
| 0        | $x_1$     | The dB value down the bandwidth filter. (1) $x_1$ [dB]    |
| 1        | $x_2$     | The dB value down the bandwidth filter. (2) $x_2$ [dB]    |
| 2        | $D$       | Difference from maximum value. (Same as POLE? parameter.) |
| 3        | $f_1$     | Stop frequency of the range for the rejection level.      |
| 4        | $f_2$     | Start frequency of the range for the spurious level.      |

Query  $Loss, BW, f_{cent}, Q, \Delta f_{left1}, \Delta f_{right1}, \Delta f_{left2}, \Delta f_{right2}, Pass, Reject, Spurious, Pole_{x1},$   
 Response  $Pole_{stim1}, Pole_{x2}, Pole_{stim2}$  (15)

| Register | Parameter           | Description                                                                                   |
|----------|---------------------|-----------------------------------------------------------------------------------------------|
| 0        | $Loss$              | Insertion loss                                                                                |
| 1        | $BW$                | $x_1$ dB down bandwidth                                                                       |
| 2        | $f_{cent}$          | Center frequency                                                                              |
| 3        | $Q$                 | Q                                                                                             |
| 4        | $\Delta f_{left}$   | Frequency difference between the left cutoff point ( $f_{cl}$ ) and the middle of the range.  |
| 5        | $\Delta f_{right}$  | Frequency difference between the right cutoff point ( $f_{cr}$ ) and the middle of the range. |
| 6        | $\Delta f_{left2}$  | Frequency difference between the left cutoff point ( $f_{cl2}$ ) and the middle of the range. |
| 7        | $\Delta f_{right2}$ | Frequency difference between the left cutoff point ( $f_{cr2}$ ) and the middle of the range. |
| 8        | $Pass$              | Passband ripple                                                                               |
| 9        | $Reject$            | Rejection level                                                                               |
| 10       | $Spurious$          | Spurious level                                                                                |
| 11       | $Pole_{x1}$         | First negative peak found to the left of the maximum point.                                   |
| 12       | $Pole_{stim1}$      | Stimulus of $Pole_{x1}$ .                                                                     |
| 13       | $Pole_{x2}$         | First negative peaks found to the right of the maximum point.                                 |
| 14       | $Pole_{stim2}$      | Stimulus of $Pole_{x2}$ .                                                                     |

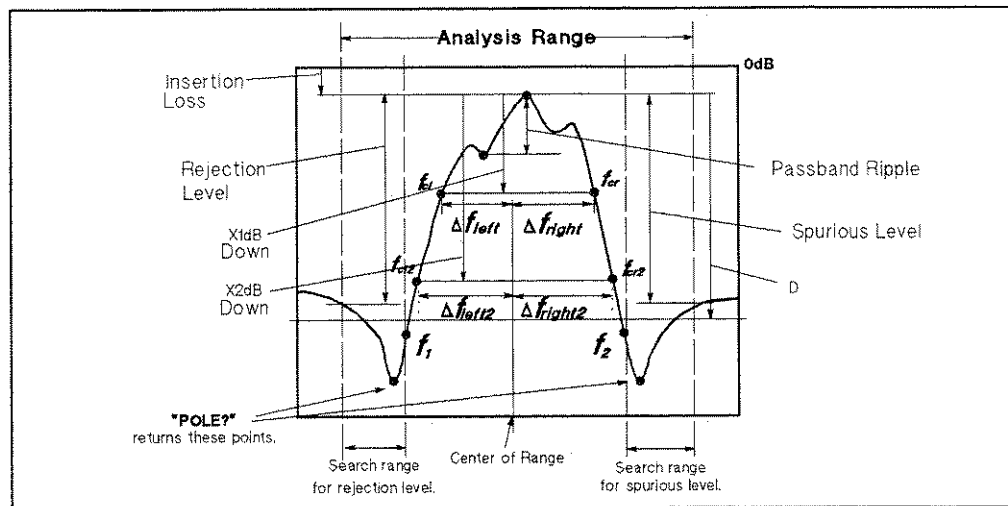


Figure I-11. OUTPXFIL?

- Semantics**
- Insertion loss,  $x_1$  dB bandwidth, center frequency,  $Q$ ,  $\Delta f_{left}$ , and  $\Delta f_{right}$  are the same as the responses of OUTPFILT?.
  - $\Delta f_{left2}$  and  $\Delta f_{right2}$  are the frequency differences between both sides at the  $x_2$  dB down cutoff points ( $f_{cl2}$  and  $f_{cr2}$ ) and the middle of the range.
  - Passband ripple is the frequency difference of the maximum positive peak and the minimum negative peak between the  $x_1$  dB down cutoff points ( $f_{cl}$ ,  $f_{cr}$ ).
  - Rejection level is the frequency difference from the insertion loss to the maximum level in the range from the left edge of analysis range to  $f_1$ .
  - Spurious level is the frequency difference from the insertion loss to the maximum level between  $f_2$  and the right edge of analysis range.
  - $Pole_{x1}$ ,  $Pole_{stim1}$ ,  $Pole_{x2}$ ,  $Pole_{stim2}$  are the same as the query response of POLE? with the parameter  $D$ .

- Note**
- If both of the two  $x_1$  dB down cutoff points are not found, the analyzer returns 0 for all values of the query response.
  - If both of the two  $x_2$  dB down cutoff points are not found, the analyzer returns 0 for  $\Delta f_{left2}$  and  $\Delta f_{right2}$ .
  - If the corresponding peak for POLE? is not found, the analyzer returns 0 for  $Pole_{x1}$ ,  $Pole_{stim1}$ ,  $Pole_{x2}$ , and  $Pole_{stim2}$ .

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
30 CALL Sweep(1) ! Goes to sub routine.
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAOADATA"
50 OUTPUT @Hp4396;"OUTPXFIL? -3,-10,-50,69.98MHz,70.02MHz"
60 ENTER @Hp4396;Loss,Bw,Fc,Q,Df1,Dfr,Df12,Dfr2,Pass,Reject,
Spurious,Pole1,Fp1,Pole2,Fp2
70 PRINT "Loss: ";Loss;" [dB] BW: ";Bw;" [Hz] fc: ";Fc;" [Hz]"
80 PRINT "Q: ";Q;" Df1: ";Df1;" [Hz] Dfr: ";Dfr;" [Hz]"
90 PRINT "Df12: ";Df12;" [Hz] Dfr2: ";Dfr2;" [Hz] Pass: ";Pass;" [dB]"

```

```
100 PRINT "Reject: ";Reject;"[dB] Spurious: ";Spurious;"[dB]"
110 PRINT "Pole (left): ";Pole1;"[dB] ";Fp1;"[Hz]"
120 PRINT "Pole (right): ";Pole2;"[dB] ";Fp2;"[Hz]"
130 END
```

#### For Instrument BASIC

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
30 EXECUTE "SING"
40 EXECUTE "ANAOCH1"
50 EXECUTE "ANARFULL"
60 EXECUTE "ANAODATA"
70 WRITEIO 8,0;-3
80 WRITEIO 8,1;-10
90 WRITEIO 8,2;-50
100 WRITEIO 8,3;6.998E+7
110 WRITEIO 8,4;7.002E+7
120 EXECUTE "OUTPXFIL?"
130 PRINT "Passband Ripple: ";READIO(8,8);"[dB]"
140 PRINT "Rejection Level: ";READIO(8,9);"[dB]"
150 PRINT "Spurious Level: ";READIO(8,10);"[dB]"
160 END
```

## OUTPCFIL?

Analyzes the filter at the nominal frequency, and returns the parameters.

**Syntax**      OUTPCFIL?  $f_c, x_1, x_2, D, f_1, f_2$

Where,

| Register | Parameter | Description                                               |
|----------|-----------|-----------------------------------------------------------|
| 0        | $f_c$     | Nominal frequency                                         |
| 1        | $x_1$     | The dB value down the bandwidth filter. (1) $x_1$ [dB]    |
| 2        | $x_2$     | The dB value down the bandwidth filter. (2) $x_2$ [dB]    |
| 3        | $D$       | Difference from maximum value. (Same as POLE? parameter.) |
| 4        | $f_1$     | Stop frequency of the range for the rejection level.      |
| 5        | $f_2$     | Start frequency of the range for the spurious level.      |

**Query Response**       $Loss, Loss_c, BW, f_{cent}, Q, \Delta f_{left1}, \Delta f_{right1}, \Delta f_{left2}, \Delta f_{right2}, Pass, Reject, Spurious, Pole_{x1}, Pole_{stim1}, Pole_{x2}, Pole_{stim2}$  (Total 16)

| Register | Parameter           | Description                                                                                   |
|----------|---------------------|-----------------------------------------------------------------------------------------------|
| 0        | $Loss$              | Insertion loss                                                                                |
| 1        | $Loss_c$            | Const Loss                                                                                    |
| 2        | $BW$                | $x_1$ dB down bandwidth                                                                       |
| 3        | $f_{cent}$          | Center frequency                                                                              |
| 4        | $Q$                 | Q                                                                                             |
| 5        | $\Delta f_{left}$   | Frequency difference between the left cutoff point ( $f_{cl}$ ) and the middle of the range.  |
| 6        | $\Delta f_{right}$  | Frequency difference between the right cutoff point ( $f_{cr}$ ) and the middle of the range. |
| 7        | $\Delta f_{left2}$  | Frequency difference between the left cutoff point ( $f_{cl2}$ ) and the middle of the range. |
| 8        | $\Delta f_{right2}$ | Frequency difference between the left cutoff point ( $f_{cr2}$ ) and the middle of the range. |
| 9        | $Pass$              | Passband ripple                                                                               |
| 10       | $Reject$            | Rejection level                                                                               |
| 11       | $Spurious$          | Spurious level                                                                                |
| 12       | $Pole_{x1}$         | First negative peaks found to the left of the maximum point.                                  |
| 13       | $Pole_{stim1}$      | Stimulus of $Pole_{x1}$ .                                                                     |
| 14       | $Pole_{x2}$         | First negative peak found to the right of the maximum point.                                  |
| 15       | $Pole_{stim2}$      | Stimulus of $Pole_{x2}$ .                                                                     |

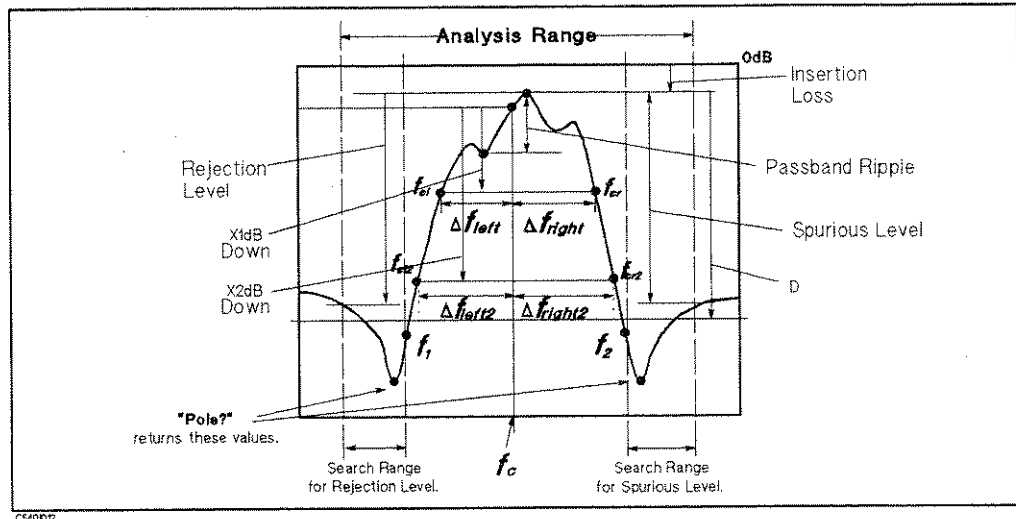


Figure I-12. OUTPCFIL?

- Semantics**
- Insertion loss, rejection level, spurious level,  $Pole_{x1}$ ,  $Pole_{stim1}$ ,  $Pole_{x2}$ , and  $Pole_{stim2}$  are the same as the responses of OUTPCFIL?.
  - The const loss is the value of the point that is specified by command parameter,  $f_c$ .
  - $x_1$  dB bandwidth is the frequency difference between two  $x_1$  dB down cutoff points ( $f_{cl}$ ,  $f_{cr}$ ) from the const loss point.
  - Center frequency is the middle point of  $f_{cl}$  and  $f_{cr}$ .
  - $Q$  is calculated using the following equation:

$$Q = \frac{\sqrt{f_{cl} \times f_{cr}}}{BW}$$

- $\Delta f_{left}$  and  $\Delta f_{right}$  are the frequency differences between both sides at the  $x_1$  dB down cutoff points ( $f_{cl}$  and  $f_{cr}$ ) and  $f_c$ .
  - $\Delta f_{left2}$  and  $\Delta f_{right2}$  are the frequency differences between both sides at the  $x_2$  dB down cutoff points ( $f_{cl2}$  and  $f_{cr2}$ ) and  $f_c$ .
  - Passband ripple is the frequency difference of maximum positive peak and minimum negative peak between  $x_1$  dB down cutoff points ( $f_{cl1}$ ,  $f_{cr1}$ ).
- Note**
- If both of the two  $x_1$  dB down cutoff points are not found, the analyzer returns 0 for all values of the query response.
  - If both of the two  $x_2$  dB down cutoff points are not found, the analyzer returns 0 for  $\Delta f_{left2}$  and  $\Delta f_{right2}$ .
  - If the corresponding peak for POLE? is not found, the analyzer returns 0 for  $Pole_{x1}$ ,  $Pole_{stim1}$ ,  $Pole_{x2}$ , and  $Pole_{stim2}$ .

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPCFIL?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAOADATA"

```

```
50 OUTPUT @Hp4396;"OUTPCFIL? 70MHZ,-3,-10,-50,69.98MHZ,70.02MHZ"  
60 ENTER @Hp4396;Loss,Lc,Bw,Fc,Q,Df1,Dfr,Df12,Dfr2,Pass,Reject,  
Spurious,Pole1,Fp1,Pole2,Fp2  
70 PRINT "Loss: ";Loss;"[dB] Const Loss: ";Lc;"[dB]"  
80 PRINT "BW: ";Bw;"[Hz] Fc: ";Fc;"[Hz]"  
90 PRINT "Q: ";Q;" DF1: ";Df1;"[Hz] DFR: ";Dfr;"[Hz]"  
100 PRINT "Df12: ";Df12;"[Hz] Dfr2: ";Dfr2;"[Hz] Pass: ";Pass;"[dB]"  
110 PRINT "Reject: ";Reject;"[dB] Spurious: ";Spurious;"[dB]"  
120 PRINT "Pole (left): ";Pole1;"[dB] ";Fp1;"[Hz]"  
130 PRINT "Pole (right): ";Pole2;"[dB] ";Fp2;"[Hz]"  
140 END
```

#### For Instrument BASIC

```
10 ASSIGN @Hp4396 TO 800  
20 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"  
30 EXECUTE "SING"  
40 EXECUTE "ANAOCH1"  
50 EXECUTE "ANARFULL"  
60 EXECUTE "ANAODATA"  
70 WRITEIO 8,0;7.E+7  
80 WRITEIO 8,1;-3  
90 WRITEIO 8,2;-10  
100 WRITEIO 8,3;-50  
110 WRITEIO 8,4;6.998E+7  
120 WRITEIO 8,5;7.002E+7  
130 EXECUTE "OUTPCFIL?"  
140 PRINT "Const Loss: ";READIO(8,1);"[dB]"  
150 END
```

## OUTPRESO?

Returns resonator specific parameters. (Query only)

**Syntax**      OUTPRESO?

**Query**         $Z_r, f_r, Z_a, f_a$  (Total 4)

**Response**    Where,

| Register | Parameter | Description             |
|----------|-----------|-------------------------|
| 0        | $Z_r$     | Resonant impedance      |
| 1        | $f_r$     | Resonant frequency      |
| 2        | $Z_a$     | Anti-resonant impedance |
| 3        | $f_a$     | Anti-resonant frequency |

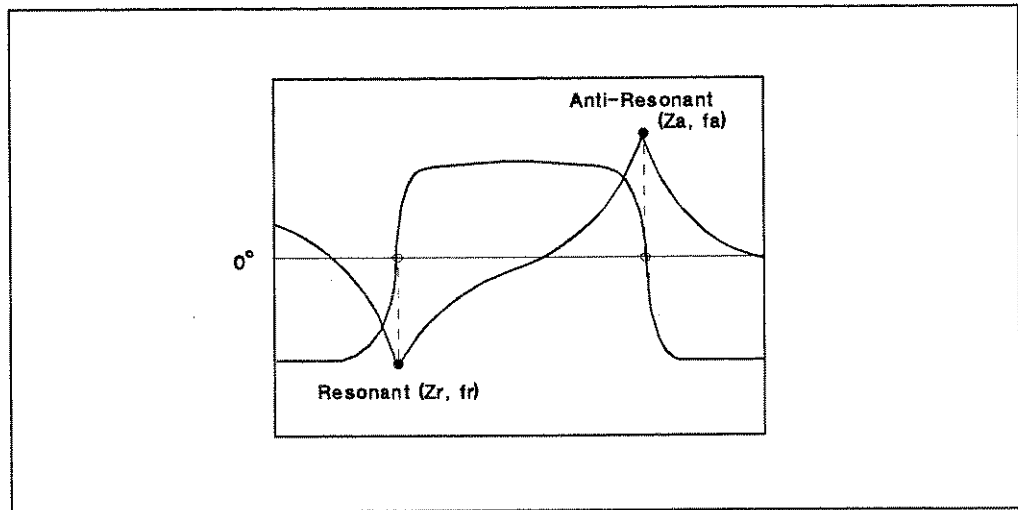


Figure I-13. OUTPRESO?

**Semantics**    ■ OUTPRESO? executes the following actions and returns their values:

1. Searches for the  $0^\circ$  phase point from the left edge of the analysis range.
2. Defines the first point found as the resonant point, and then returns its impedance and its frequency.
3. Defines the next point found as the anti-resonant point, and then returns its impedance and its frequency.

**Note**        ■ You must select the following conditions to use this command:

- Dual Channel & Coupled Channel: ON
  - Impedance Conversion: ON
  - Analysis channel: LOG MAG format
  - Non-analysis channel: Phase format
- OUTPRESO? returns the first two found  $0^\circ$  phase point events if there are more than three corresponding points.
- If there is only one  $0^\circ$  phase point in the range, OUTPRESO? defines that point as a resonant point and returns 0 for  $Z_a$  and  $f_a$ .



- If there is no 0° point, OUTPRES0? returns 0 for all parameters.
- If the impedance conversion is off, OUTPRES0? returns the magnitude (dB) at the 0° phase point.

#### Examples For External Controller

```
10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
60 CALL Sweep(2) ! Goes to sub routine. (See OUTPFILT?)
61             ! Parameter is 2 because of Dual Channel ON.
70 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
80 OUTPUT @Hp4396;"OUTPRES0?"
90 ENTER @Hp4396;Zr,Fr,Za,Fa
100 PRINT "Resonant: ";Zr;" [ohm] ", ";Fr;" [Hz]"
110 PRINT "Anti-Resonant: ";Za;" [ohm] ", ";Fa;" [Hz]"
120 END
```

#### For Instrument BASIC

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
60 EXECUTE "SING" ! This line waits for the end of both channel sweep.
70 EXECUTE "ANAOCH1"
80 EXECUTE "ANARFULL"
90 EXECUTE "ANAODATA"
100 EXECUTE "OUTPRES0?"
110 PRINT "Resonant: ";READIO(8,0);" [ohm] ";READIO(8,1);" [Hz]"
120 PRINT "Anti-Resonant: ";READIO(8,2);" [ohm] ";READIO(8,3);" [Hz]"
130 END
```

## OUTPRESR?

Returns the resonator specific parameters. (Query only)

**Syntax** OUTPRESR?

**Query**  $Z_r, f_r, Z_a, f_a, Rpl_1, Rpl_2, Rpl_3$  (Total 7)

**Response** Where,

| Register | Parameter | Description                                                                               |
|----------|-----------|-------------------------------------------------------------------------------------------|
| 0        | $Z_r$     | Resonant impedance                                                                        |
| 1        | $f_r$     | Resonant frequency                                                                        |
| 2        | $Z_a$     | Anti-resonant impedance                                                                   |
| 3        | $f_a$     | Anti-resonant frequency                                                                   |
| 4        | $Rpl_1$   | Maximum left height of the ripple where is on the left side of the resonant point.        |
| 5        | $Rpl_2$   | Maximum height right of the ripple that is between the resonant and anti-resonant points. |
| 6        | $Rpl_3$   | Maximum height left of the ripple that is on the right side of the resonant point.        |

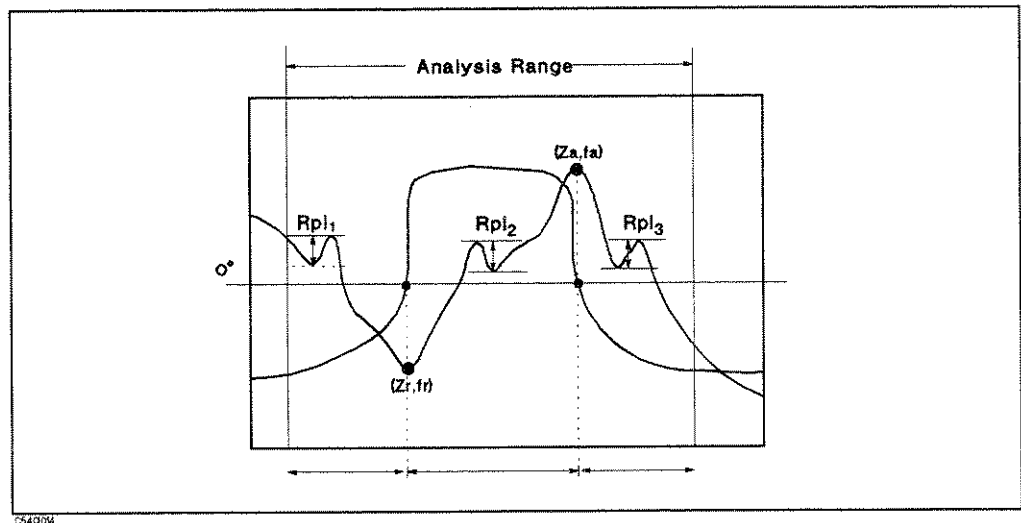


Figure I-14. OUTPRESR?

**Semantics** ■ OUTPRESR? executes the following actions:

1. Searches for the  $0^\circ$  phase point from the left edge of the analysis range.
2. Defines the first point found as the resonant point, and then returns its impedance and its frequency.
3. Defines the next point found as the anti-resonant point, and then returns its impedance and its frequency.
4. Returns the maximum height of the ripple,  $Rpl_1$ , that is the difference between the peak and left adjacent negative peak.
5. Returns the maximum height of the ripple,  $Rpl_2$ , that is the difference between the peak and right adjacent negative peak.

6. Returns the maximum height of the ripple,  $Rpl_3$ , that is the difference between the peak and left adjacent negative peak.

**Note**

- You must select the following conditions to use this command:
  - Dual Channel & Coupled Channel: ON
  - Impedance Conversion: ON
  - Analysis channel: LOG MAG format
  - Non-analysis channel: Phase format
- OUTPRESR? returns the first two 0° phase point events found if there are more than three corresponding points points.
- If there is only one 0° phase point in the range, OUTPRESR? defines that point as a resonant point and returns 0 for  $Z_a$ ,  $f_a$ ,  $Rpl_1$ ,  $Rpl_2$ , and  $Rpl_3$ .
- If there is no 0° point, OUTPRESR? returns 0 for all parameters.

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
60 CALL Sweep(2) ! Goes to sub routine. (See OUTPFILT?)
70 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
80 OUTPUT @Hp4396;"OUTPRESR?"
90 ENTER @Hp4396;Zr,Fr,Za,Fa,R1,R2,R3
100 PRINT "Resonant: ";Zr;"[ohm] ,";Fr;"[Hz]"
110 PRINT "Anti-Resonant: ";Za;"[ohm] ,";Fa;"[Hz]"
120 PRINT "Ripple L: ";R1;"[dB]"
130 PRINT "Ripple M: ";R2;"[dB]"
140 PRINT "Ripple R: ";R3;"[dB]"
150 END

```

**For Instrument BASIC**

```

10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 70MHZ; SPAN 100KHZ"
60 EXECUTE "SING"
70 EXECUTE "ANAOCH1"
80 EXECUTE "ANARFULL"
90 EXECUTE "ANAODATA"
100 EXECUTE "OUTPRESR?"
110 PRINT "Resonant: ";READIO(8,0);"[ohm] ,";READIO(8,1);"[Hz]"
120 PRINT "Anti-Resonant: ";READIO(8,2);"[ohm] ,";READIO(8,3);"[Hz]"
130 PRINT "Ripple L: ";READIO(8,4);"[dB]"
140 PRINT "Ripple M: ";READIO(8,5);"[dB]"
150 PRINT "Ripple R: ";READIO(8,6);"[dB]"
160 END

```

## OUTPRESF?

Returns the resonator specific parameters. (Query only)

**Syntax**     OUTPRESF?  $x_1$ ,  $x_2$

Where,

| Register | Parameter | Description                       |
|----------|-----------|-----------------------------------|
| 0        | $x_1$     | Value down from the maximum peak. |
| 1        | $x_2$     | Value above the minimum peak.     |

**Query Response**      $f_s$ ,  $f_p$ ,  $f_{s1}$ ,  $f_{s2}$ ,  $f_{p1}$ ,  $f_{p2}$  (Total 6)

Where,

| Register | Parameter | Description                                                           |
|----------|-----------|-----------------------------------------------------------------------|
| 0        | $f_s$     | Middle point frequency between $f_{s1}$ and $f_{s2}$ .                |
| 1        | $f_p$     | Middle point frequency between $f_{p1}$ and $f_{p2}$ .                |
| 2        | $f_{s1}$  | Left one of the two points $x_1$ dB down from the maximum peak.       |
| 3        | $f_{s2}$  | Right one of the two points $x_1$ dB down from the maximum peak.      |
| 4        | $f_{p1}$  | Left one of the two points $x_2$ dB above the minimum negative peak.  |
| 5        | $f_{p2}$  | Right one of the two points $x_2$ dB above the minimum negative peak. |

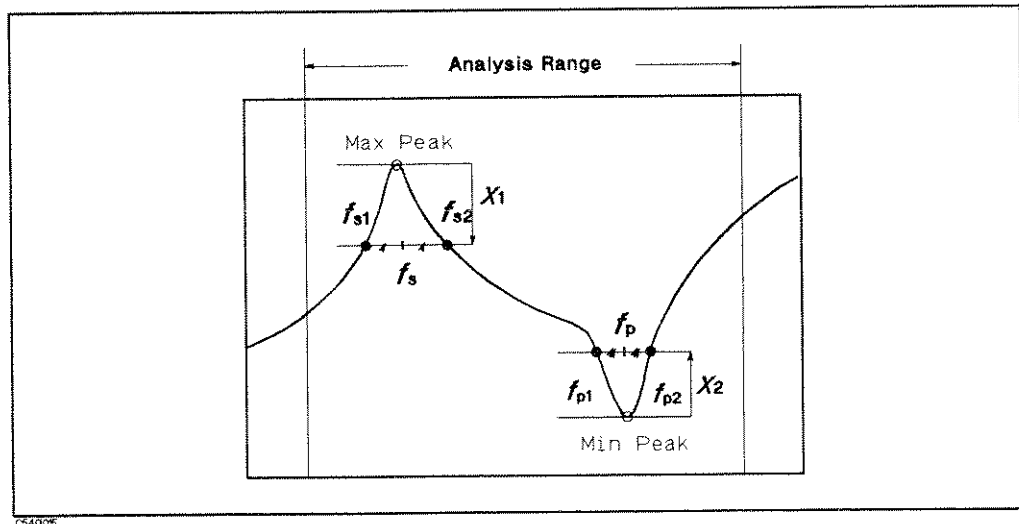


Figure I-15. OUTPRESF?

**Semantics**     ■ OUTPRESF? executes the following actions:

1. Searches for the maximum peak in the analysis range.
2. Searches for the  $x_1$  dB below points on both sides, and defines the first found left and right side points as  $f_{s1}$  and  $f_{s2}$ , respectively.

3. Defines the middle point between  $f_{s1}$  and  $f_{s2}$  to  $f_s$ .
4. Searches for the  $x_2$  dB above points on both sides, and defines the first found left and right side points as  $f_{p1}$  and  $f_{p2}$ , respectively.
5. Defines the middle point between  $f_{p1}$  and  $f_{p2}$  as  $f_p$ .

**Note**

- If there is no corresponding peak in the range, OUTPRESF? returns 0 for all parameters.
- If the maximum peak cannot be found, OUTPRESF? returns 0 for  $f_s$ ,  $f_{s1}$ , and  $f_{s2}$ .
- If the minimum negative peak cannot be found, OUTPRESF? returns 0 for  $f_p$ ,  $f_{p1}$ , and  $f_{p2}$ .
- Specify the negative value for  $x_1$  and positive value for  $x_2$ .

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"FMT LOGM; CENT 60.06MHz; SPAN 20kHz"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPFILT?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
50 OUTPUT @Hp4396;"OUTPRESF? -3dB,3dB"
60 ENTER @Hp4396;Fs,Fp,Fs1,Fs2,Fp1,Fp2
70 PRINT "Series-Resonant: ";Fs;" [Hz]"
80 PRINT "Parallel-Resonant: ";Fp;" [Hz]"
90 END

```

**For Instrument BASIC**

```

10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT LOGM"
30 OUTPUT @Hp4396;"CENT 60.06MHz; SPAN 20kHz"
40 EXECUTE "SING"
50 EXECUTE "ANAOCH1"
60 EXECUTE "ANARFULL"
70 EXECUTE "ANAODATA"
80 WRITEIO 8,0;-3
90 WRITEIO 8,1;3
100 EXECUTE "OUTPRESF?"
110 PRINT "Series-Resonant: ";READIO(8,0);" [Hz]"
120 PRINT "Pararel-Resonant: ";READIO(8,1);" [Hz]"
130 END

```

## OUTPCERR?

Returns the ceramic resonator specific parameters. (Query only)

**Syntax**       OUTPCERR?

**Query**          $Z_r, f_r, Z_a, f_a, Rpl_1, Rpl_2, Rpl_3$  (Total 7)

**Response**     Where,

| Register | Parameter | Description                                                                         |
|----------|-----------|-------------------------------------------------------------------------------------|
| 0        | $Z_r$     | Resonant impedance                                                                  |
| 1        | $f_r$     | Resonant frequency                                                                  |
| 2        | $Z_a$     | Anti-resonant impedance                                                             |
| 3        | $f_a$     | Anti-resonant frequency                                                             |
| 4        | $Rpl_1$   | Maximum height of the ripple that is on the left side of the resonant point.        |
| 5        | $Rpl_2$   | Maximum height of the ripple that is between the resonant and anti-resonant points. |
| 6        | $Rpl_3$   | Maximum height of the ripple that is on the right side of the resonant point.       |

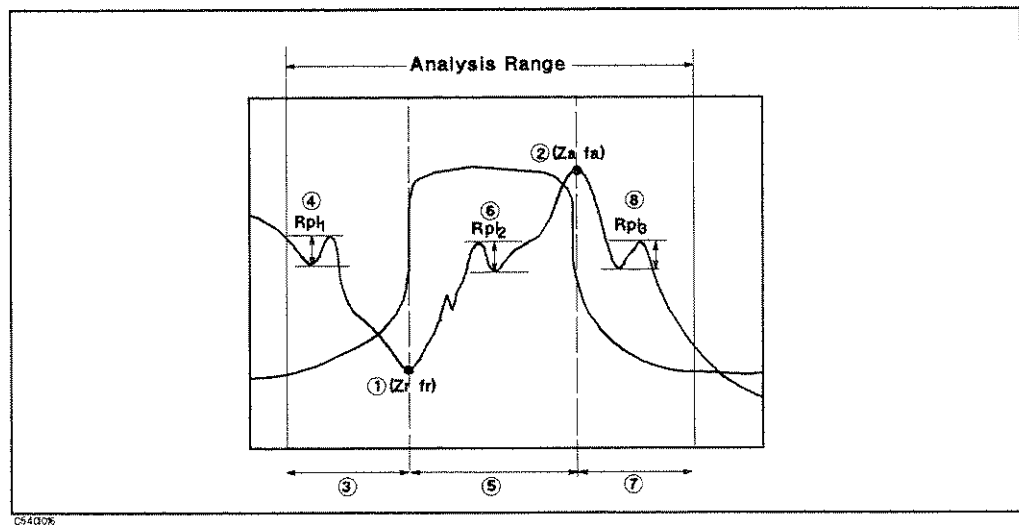


Figure I-16. OUTPCERR?

- Semantics**
- You need to select the LOG MAG format (FMT LOGM) and turn impedance conversion on (CONV ZTRA) to use this command.
  - OUTPCERR? executes the following actions:
    1. Searches for the minimum negative peak in the range and defines it as a resonant point. Then returns the resonant impedance,  $Z_r$ , and resonant frequency,  $f_r$ .
    2. Searches for the maximum peak in the range and defines it as a anti-resonant point. Then returns the anti-resonant impedance,  $Z_a$ , and anti-resonant frequency,  $f_p$ .

3. Returns the maximum height of the ripple,  $Rpl_1$ , that is the difference between the peak and left adjacent negative peak.
4. Returns the maximum height of the ripple,  $Rpl_2$ , that is the difference between the peak and right adjacent negative peak.
5. Returns the maximum height of the ripple,  $Rpl_3$ , that is the difference between the peak and left adjacent negative peak.

**Note**

- This command can be used when the LOG MAG format (FMT LOGM) is selected. If another format is selected, OUTPCERR? returns 0 for all parameters.
- If no corresponding ripple is found, OUTPCERR? returns 0.

**Examples**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"FMT LOGM; CONV ZTRA; CENT 60.02MHz; SPAN 20kHz"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPFILT?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
50 OUTPUT @Hp4396;"OUTPCERR?"
60 ENTER @Hp4396;Zr,Fr,Za,Fa,R1,R2,R3
70 PRINT "Resonant: ";Zr;"[ohm] ,";Fr;"[Hz]"
80 PRINT "Anti-Resonant: ";Za;"[ohm] ,";Fa;"[Hz]"
90 PRINT "Ripple L: ";R1;"[dB]"
100 PRINT "Ripple M: ";R2;"[dB]"
110 PRINT "Ripple R: ";R3;"[dB]"
120 END

```

**For Instrument BASIC**

```

10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT LOGM"
30 OUTPUT @Hp4396;"CENT 60.02MHz; SPAN 20kHz"
40 EXECUTE "SING"
50 EXECUTE "ANAOCH1"
60 EXECUTE "ANARFULL"
70 EXECUTE "ANAODATA"
80 EXECUTE "OUTPCERR?"
90 PRINT "Resonant: ";READIO(8,0);"[ohm] ,";READIO(8,1);"[Hz]"
100 PRINT "Anti-Resonant: ";READIO(8,2);"[ohm] ,";READIO(8,3);"[Hz]"
110 PRINT "Ripple L: ";READIO(8,4);"[dB]"
120 PRINT "Ripple M: ";READIO(8,5);"[dB]"
130 PRINT "Ripple R: ";READIO(8,6);"[dB]"
140 END

```

---

## Equivalent circuit analysis commands

The following commands are for the equivalent circuit analysis. They are easy to use for specific device analysis because they can output many parameters using only a single command.

- EQUCPARA?
  - EQU
- EQUCPARS?
- EQUCO?
- EQUCPARS4?



## EQUCPARA?

Returns the six-device equivalent circuit parameters of the crystal resonator. (Query only)

**Syntax** EQUCPARA?

**Query**  $C_0, C_1, L_1, R_1, G_0, R_0$  (Total 6)

**Response** Where,

| Register | Parameter | Description           |
|----------|-----------|-----------------------|
| 0        | $C_0$     | Parallel capacitance  |
| 1        | $C_1$     | Motional capacitance  |
| 2        | $L_1$     | Motional inductance   |
| 3        | $R_1$     | Motional resistance   |
| 4        | $G_0$     | Electrode conductance |
| 5        | $R_0$     | Electrode resistance  |

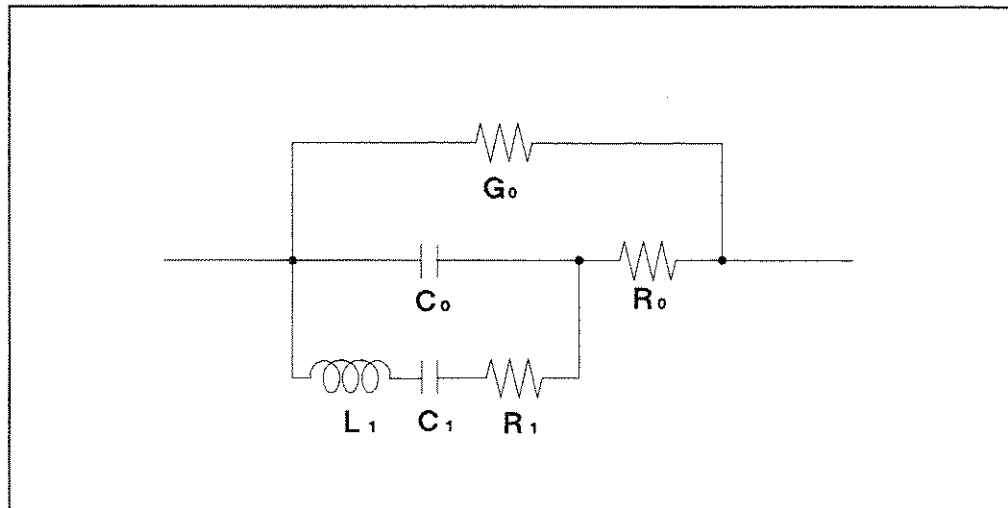


Figure I-17. Six-Device Equivalent Circuit of Crystal Resonator

**Semantics** ■ EQUCPARA? executes the following actions:

1. Obtains the admittance characteristic circle diagram.
2. Obtains the maximum conductance. ( $G_{max}$ )
3. Obtains frequencies  $f_1$  and  $f_2$  ( $f_1 < f_2$ ) of the two points where the conductance is half the maximum conductance ( $G_{max}$ ).
4. Calculates  $f_s$  by  $f_s = \sqrt{f_1 \times f_2}$ .
5. Obtains susceptance  $B_{fs}$  at  $f_s$ .
6. Calculates  $\omega_s$  by  $\omega_s = 2 \times \pi \times f_s$ .
7. Assumes that the frequency at which the phase becomes  $0^\circ$  near the parallel resonance frequency is  $f_a$ , and obtains its conductance  $G_a$ .
8. Calculates  $\omega_a$  by  $\omega_a = 2 \times \pi \times f_a$ .

9. Assumes that the frequency at which the phase becomes  $0^\circ$ \* near the series resonance frequency is  $f_r$ .
10. Calculates the constants using the above values and the following equations:

$$Q_s = \frac{f_s}{f_2 - f_1} \quad C_o' = \frac{B_1 + B_2}{2\omega_s}$$

$$L_1 = \frac{Q_s}{\omega_s G_{max}} \quad R_1 = \frac{C_o'}{C_o G_{max}}$$

$$C_1 = \frac{G_{max}}{\omega_s Q_s} \quad R_o = \frac{1}{G_{max}} - R_1$$

$$C_o = \frac{B_{fs}}{\omega_s} \quad G_o = G_a - \frac{R_1 \omega_a^2 C_o^2}{1 + R_o R_1 \omega_a^2 C_o^2}$$

\* "EQUCPARA?" interpolates the  $0^\circ$  phase points even if it does not exist in measured data.

- If the number of points between the maximum peak point ( $f_{Bmax}$ ) and the minimum peak point ( $f_{Bmin}$ ) of the conductance is less than 10 points, EQUCPARA? approximates an admittance circle. The circle approximation can be performed if there are 3 points for analysis. You can specify how many points are used for circle approximation using the EQU command to reduce the analysis time.
- If EQUCPARA? fails the circle approximation, 0 will be return for all parameters.
- If there are only 2 points for analysis, EQUCPARA? returns four-device equivalent circuit parameters. In this case, EQUCPARA? returns 0 for  $G_o$  and  $R_o$ .
- If there is only 1 point for analysis, EQUCPARA? returns 0 for all parameters.

**EQU**  
*value*

Specifies how many points are used for an approximation of a circle with the EQUCPARA? and EQUCPARS? commands. EQUCPARA? (or EQUCPARS?) thins the measured points out for the specified points, then makes a circle approximation. When the EQU parameter is set greater than the number of points, EQUCPARA? uses all the points for the circle approximation. Default value is 8.  
*value* 2 to 801

**Note**

- You must select the following conditions or Polar format to use this command:
  - Dual Channel & Coupled Channel: ON
  - Impedance Conversion: ON
  - Analysis channel: LOG MAG format
  - Non-analysis channel: Phase format

If another format is selected, 0 will be returned for query response.

**Examples For External Controller**

```
10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"FMT POLA; CONV YTRA; CENT 60.06MHz; SPAN 20kHz"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPFILT?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
50 OUTPUT @Hp4396;"EQUCPARA?"
60 ENTER @Hp4396;C0,C1,L1,R1,GO,RO
70 PRINT "C0:";C0;" C1:";C1
80 PRINT "L1:";L1;" R1:";R1
90 PRINT "GO:";GO;" RO:";RO
100 END
```

**For Instrument BASIC**

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT POLA; CONV YTRA"
30 OUTPUT @Hp4396;"CENT 60.06MHZ; SPAN 20kHz"
40 EXECUTE "SING"
50 EXECUTE "ANAOCH1"
60 EXECUTE "ANARFULL"
70 EXECUTE "ANAODATA"
80 WRITEIO 8,0;4
90 EXECUTE "EQUM"
100 EXECUTE "EQUCPARA?"
110 PRINT "CO:";READIO(8,0);" C1:";READIO(8,1)
120 PRINT "L1:";READIO(8,2);" R1:";READIO(8,3)
130 PRINT "GO:";READIO(8,4);" RO:";READIO(8,5)
140 END
```

## **EQUCPARS?**

Outputs the six-device equivalent circuit parameters of the crystal resonator. (Query only)

**Syntax** EQUCPARS?

**Query**  $C_0, C_1, L_1, R_1, f_s, f_a, f_r, f_1^*, f_2^*, G_0, R_0$  (Total 11)

**Response** \*  $f_1 < f_2$

For information about each parameter, see "EQUCPARA?".

**Note** ■ You must select the following conditions or Polar format to use this command:

- Dual Channel & Coupled Channel: ON
- Impedance Conversion: ON
- Analysis channel: LOG MAG format
- Non-analysis channel: Phase format

If another format is selected, 0 will be returned for query response.

**EQUCO? value**

Returns the parallel capacitance ( $C_0$ ) of the equivalent circuit of the resonator at the specified frequency. (Query only)

**Syntax** EQUCO? *value*

Where,

| Register | Parameter    | Description         |
|----------|--------------|---------------------|
| 0        | <i>value</i> | Frequency for $C_0$ |

**Query**  $C_0$

**Response** Where,

| Register | Parameter | Description          |
|----------|-----------|----------------------|
| 0        | $C_0$     | Parallel capacitance |

**Semantics** ■  $C_0$  is calculated using the following equation:

$$C_0 = \frac{B_s}{\omega_s}$$

Where,

$B_s$  Imaginary part of the point on  $f_s$ .

$\omega_s = 2\pi f_s$

$f_s$  Frequency that is specified by the command parameter.

■ If the impedance conversion is selected,  $C_0$  is calculated using the following equation:

$$C_0 = \frac{-1}{B_s \times \omega_s}$$

**Note** ■ You must select the following conditions or Polar format to use this command:

- Dual Channel & Coupled Channel: ON
- Impedance Conversion: ON
- Analysis channel: LOG MAG format
- Non-analysis channel: Phase format

If another format is selected, 0 will be returned for query response.

■ If the specified frequency is out of analysis range, 0 will be returned.

■ If  $B_s$  is 0 when the impedance conversion is selected, EQUCO? returns 0.

**Examples For External Controller**

```

10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"DUAC ON; COUC ON"
30 OUTPUT @Hp4396;"CHAN2; FMT PHAS"
40 OUTPUT @Hp4396;"CHAN1; FMT LOGM; CONV ZTRA"
50 OUTPUT @Hp4396;"CENT 60.06MHz; SPAN 20kHz"
60 CALL Sweep(2) ! Goes to sob routine. (See OUTPFILT?)
70 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
80 OUTPUT @Hp4396;"EQUCO? 60.06MHz"

```

```
90 ENTER @Hp4396;CO
100 PRINT "CO:";CO
110 END
```

#### **For Instrument BASIC**

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT POLA"
30 OUTPUT @Hp4396;"CENT 60.06MHZ; SPAN 20kHz"
40 EXECUTE "SING"
50 EXECUTE "ANAOCH1"
60 EXECUTE "ANARFULL"
70 EXECUTE "ANAO DATA"
80 WRITEIO 8,0;6.006E+7
90 EXECUTE "EQUO?"
100 PRINT "CO:";READIO(8,0)
110 END
```

## EQUCPARS4?

Returns the 4-device equivalent circuit parameters of the crystal resonator. (Query only)

**Syntax** EQUCPARS4?

**Query**  $C_0, C_1, L_1, R_1, f_s, f_a, f_r, f_1, f_2$  (Total9)

**Response** Where,

| Register | Parameter | Description                                                                   |
|----------|-----------|-------------------------------------------------------------------------------|
| 0        | $C_0$     | Parallel capacitance                                                          |
| 1        | $C_1$     | Motional capacitance                                                          |
| 2        | $L_1$     | Motional inductance                                                           |
| 3        | $R_1$     | Motional resistance                                                           |
| 4        | $f_s$     | Motional (parallel) resonant frequency                                        |
| 5        | $f_a$     | Anti-resonant frequency                                                       |
| 6        | $f_r$     | Resonant frequency                                                            |
| 7        | $f_1$     | Frequency at the point where the half of maximum conductance.                 |
| 8        | $f_2$     | Frequency at the point where the half of maximum conductance. ( $f_1 < f_2$ ) |

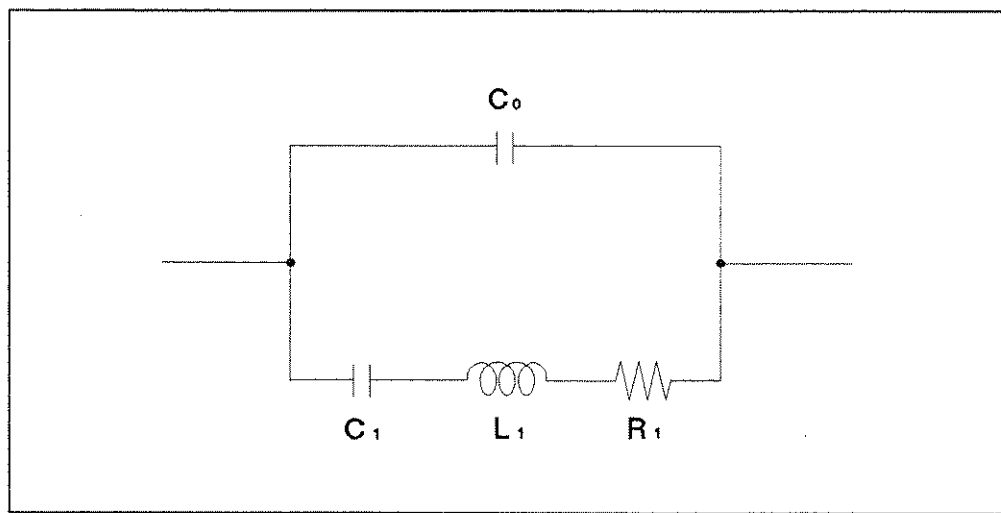


Figure I-18. Four-Device Equivalent Circuit of Crystal Resonator

- Semantics**
- You need to select the polar format (FMT POLA) and turn the admittance conversion on to use this command.
  - EQUCPARS4? executes the following actions:
    1. Obtains the admittance characteristic circle diagram. (See Figure I-19.)
    2. Obtains the susceptance ( $B_{fs}$ ) and its frequency ( $f_s$ ) at the maximum conductance ( $G_{max}$ ) point.
    3. Obtains frequencies  $f_1$  and  $f_2$  ( $f_1 < f_2$ ) of the two points where the conductance is half the maximum conductance ( $G_{max}$ ).

4. Assumes that the frequency at which the phase becomes  $0^\circ$  near the parallel resonance frequency is  $f_a$ .
5. Assumes that the frequency at which the phase becomes  $0^\circ$  near the series resonance frequency is  $f_r$ .
6. Calculates the constants using the above values and the following equations:

$$C_0 = \frac{f_r^2}{f_a^2 - f_r^2} \times C_1$$

$$C_1 = \frac{1}{QR_1 2\pi f_s}$$

$$L_1 = \frac{QR_1}{2\pi f_s}$$

$$Q = \left| \frac{f_s}{f_2 - f_1} \right|$$

$$R_1 = \frac{1}{G_{max}}$$

If there are no  $f_r$  and  $f_a$  points on the admittance chart,  $C_0$  is calculated using the following equation:

$$C_0 = \frac{B_{fs}}{2\pi f_s}$$

Where,  $B_{fs}$  is the susceptance at the  $G_{max}$  point.

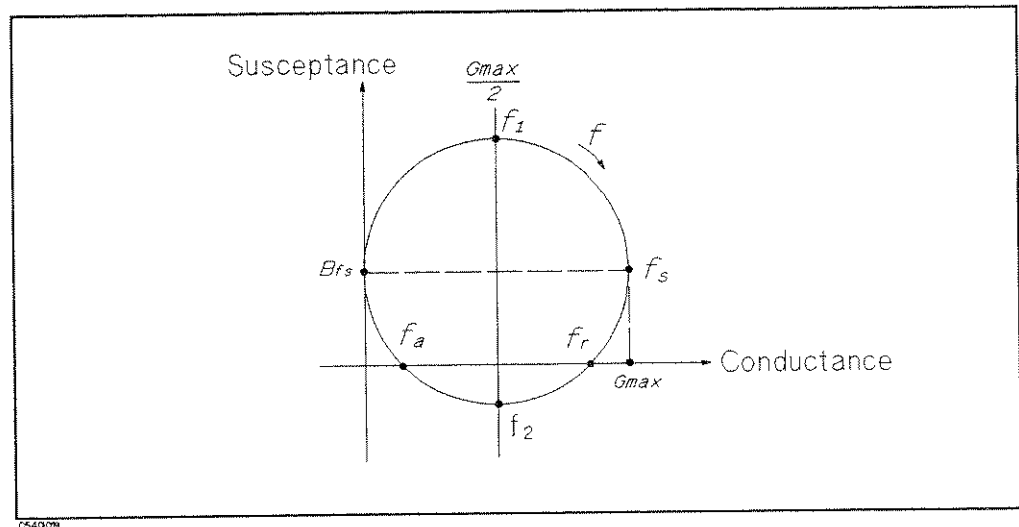


Figure I-19. Admittance Characteristic Circle Diagram

**Note** \* This command is only available when Polar format and the admittance conversion is on. If these are not selected, 0 will be returned.

**Examples For External Controller**

```

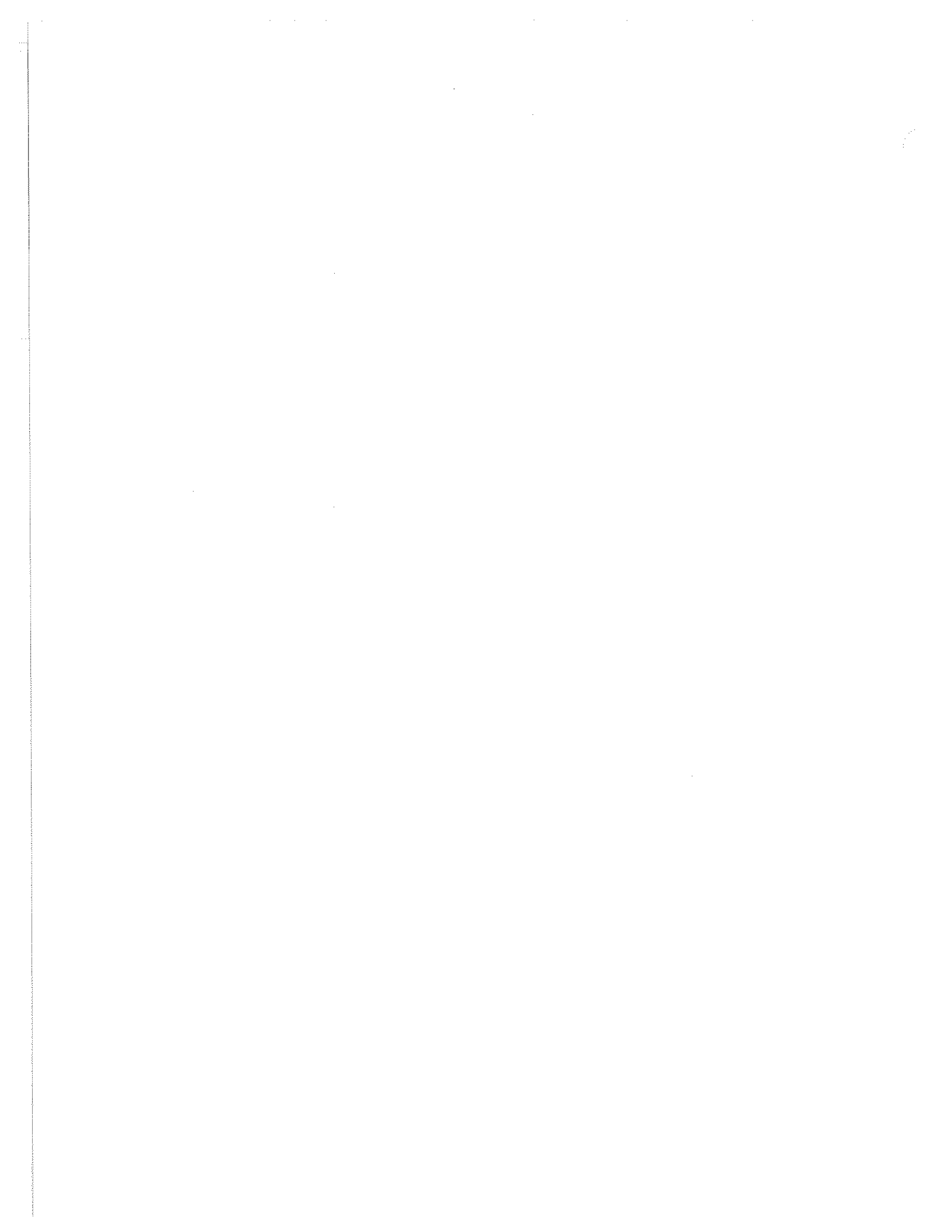
10 ASSIGN @Hp4396 TO 717
20 OUTPUT @Hp4396;"FMT POLA; CONV YTRA; CENT 60.06MHz; SPAN 20kHz"
30 CALL Sweep(1) ! Goes to sub routine. (See OUTPFILT?)
40 OUTPUT @Hp4396;"ANAOCH1;ANARFULL;ANAODATA"
50 OUTPUT @Hp4396;"EQUCPARS4?"
60 ENTER @Hp4396;C0,C1,L1,R1
70 PRINT "C0:";C0;" C1:";C1
80 PRINT "L1:";L1;" R1:";R1
90 END

```



**For Instrument BASIC**

```
10 ASSIGN @Hp4396 TO 800
20 OUTPUT @Hp4396;"FMT POLA; CONV YTRA"
30 OUTPUT @Hp4396;"CENT 60.06MHZ; SPAN 20kHz"
40 EXECUTE "ANAOCH1"
50 EXECUTE "ANARFULL"
60 EXECUTE "ANAODATA"
70 EXECUTE "EQUCPARS4?"
80 PRINT "CO=";READIO(8,0);",C1=";READIO(8,1)
90 PRINT "L1=";READIO(8,2);",R1=";READIO(8,3)
100 END
```



## Error Messages

---

This section lists the error messages that are displayed on the analyzer display or transmitted by the instrument over HP-IB. Each error message is accompanied by an explanation, and suggestions are provided to help in solving the problem. Where applicable, references are provided to the related chapter of the appropriate manual. The messages are listed in numerical order.

In the explanation of many error commands, section numbers of the IEEE standard 488.2 are included. Refer to them for further information about an error with these IEEE section numbers.

### +0 No error

The error queue is empty. Every error in the queue has been read (OUTPERR0? query) or the queue was cleared by power-on or the \*CLS command.

### 1 CAN'T SET RBW AUTO IN ZERO SPAN

The RBW AUTO mode cannot be selected in the zero span. The RBW must be specified manually in the zero span. See Chapter 2 of the *Function Reference*. (spectrum analyzer mode only).

### 10 ADDITIONAL STANDARDS NEEDED

Error correction for the selected calibration class cannot be computed until all the necessary standards have been measured.

### 11 CALIBRATION REQUIRED

No valid calibration coefficients were found when you attempted to turn calibration ON. See *Task Reference* for information on how to perform calibration.

### 12 NO CALIBRATION CURRENTLY IN PROGRESS

The RESUME CAL SEQUENCE softkey is not valid unless a calibration is in progress. Start a new calibration. See "[Ca] key" in the *Function Reference*.

### 13 CALIBRATION ABORTED

The calibration in progress was terminated due to a change of the active channel or stimulus parameters.

### 14 NOT VALID FOR PRESENT TEST SET

The calibration requested is inconsistent with the test set present. This message occurs in the following situations:

- A full 2-port calibration is requested with a test set other than an S-parameter test set.
- A one-path 2-port calibration is requested with an S-parameter test set (this procedure is typically used with a transmission/reflection test set).

**15 EXCEEDED 7 STANDARDS PER CLASS**

A maximum of seven standards can be defined for any class. See "Modifying Calibration Kits" in the *Function Reference*.

**16 CURRENT PARAMETER NOT IN CAL SET**

*HP-IB only.* Correction is not valid for the selected measurement parameter.

**17 BACKUP DATA LOST**

Data checksum error on the battery backup memory has occurred. The battery is recharged for approximately 10 minutes after power was turned on.

**18 NOT ALLOWED IN LIST SWEEP**

The level cal cannot be executed in the list sweep. The sweep type must be the linear frequency (spectrum analyzer mode only). See Chapter 5 of the *Function Reference*.

**19 UNEXPECTED DATA DETECTED: CAL ABORTED**

The signal measured for the level cal is not adequate for the calibration signal. (spectrum analyzer mode only.) See Chapter 5 of the *Function Reference*.

**26 PRINTER: not on, not connected, out of paper**

The printer does not respond to control. Verify power to the printer, and check the interface connection between the analyzer and the printer.

**34 NO VALID MEMORY TRACE**

If a memory trace is to be displayed or otherwise used, a data trace must first be stored to memory.

**44 OVERLOAD ON INPUT B**

**45 OVERLOAD ON INPUT A**

**46 OVERLOAD ON INPUT R**

**47 OVERLOAD ON INPUT S**

The power level at one of the four receiver inputs exceeds a certain level greater than the maximum input level.

**48 PHASE LOCK LOOP UNLOCKED**

Sever error. Contact your nearest Hewlett-Packard office.

**49 POWER FAILED ON *nnn***

Sever error. Contact your nearest Hewlett-Packard office. One or more power is failed. *nnn* is one of -5 V, -15 V, +5 V, +15 V, +65 V, and PostRegHot. It shows that which power line is failed. When this error occurs, the system halts so a controller cannot read this error by HP-IB.

**50 CONT SWITCHING MAY DAMAGE MECH SWITCH**

RF output power switch or input attenuator switch at input S is switching sweep by sweep, because RF power level or the input attenuator setting is different between two channels and the dual channel is turn on. To avoid premature wearing out of the output power switch and input attenuator switch, change trigger type to HOLD, SINGLE, or NUMBER of GROUP to hold sweep after measurement required. Or turn off the dual channel, or set the power level and the input attenuator of both channels to the same setting.

**51 MEASUREMENT INVALID AT  $f \leq 1\text{MHz}$ ,  $\text{IFBW} \geq 10\text{KHz}$** 

This message will displayed when whole frequency measured is less than or equal to 1 MHz and IFBW is set to 10 kHz or 40 kHz because the network measurement performance is not warranted at frequency  $\leq 1$  MHz with 10 kHz or 40 kHz IFBW.

**54 TOO MUCH DATA**

Either there is too much binary data to send to the analyzer when the data transfer format is FORM 2, FORM 3 or FORM 5, or the amount of data is greater than the number of points.

**55 NOT ENOUGH DATA**

The amount of data sent to the analyzer is less than that expected (*HP-IB only*).

**56 OPTION NOT INSTALLED**

This error occurs when an HP-IB command which is optional command is sent and the analyzer is not installed the option (*HP-IB only*). Please confirm options installed to the analyzer using \*OPT? command (see “\*OPT?” in Chapter 2.)

**64 TOO MANY SEGMENTS**

The maximum number of segments for the limit line table is 18. See Chapter 8 of the *Task Reference*.

**74 CURRENT EDITING SEGMENT SCRATCHED**

The current editing segment for the list table and the limit line is scratched when the following cases occur (*HP-IB only*):

- When EDITLIST (edit list table) command is received while editing a segment for the list table.
- When EDITLIML (edit limit line) command is received while editing a segment for the limit line.

Send LIMSDON (limit segment done) or SDON (segment done) to terminate editing segment.

**75 COMMAND IGNORED - SEGMENT NOT DONE YET**

The HP-IB command the analyzer received is ignored, because the segment is editing (*HP-IB only*). Send LIMSDON (limit segment done) or SDON (segment done) to terminate editing segment. (See “LIMSDON” in Chapter 2 and “SDON” in Chapter 2.)

**76 SEGMENT START/STOP OVERLAPPED**

Segments are not allowed to be overlapped. Reenter appropriate value for start or stop value of segments to avoid that segment is not overlapped.

**77 TOO MANY SEGMENTS OR POINTS**

Frequency list mode is limited to 31 segments or 801 points.

**78 TOO SMALL POINTS OR TOO LARGE STOP**

STOP + SPAN/(NOP-1) is out of sweep range. Increase NOP or change STOP value to lower frequency to avoid this error.

**82 CAN'T CHANGE- ANOTHER CONTROLLER ON BUS**

The analyzer cannot assume the mode of system controller until the active controller is removed from the bus or relinquishes the bus. See Chapter 7 of the *HP-IB Programming Guide*.

**83 FORMAT NOT VALID FOR MEASUREMENT**

The conversion function except the 1/S and the multiple phase modes is not valid for the Smith, admittance, and SWR formats.

**84 ANALYZER TYPE MISMATCH**

The analyzer receives a command that is not available for the current analyzer type. Please confirm HP-IB command or change analyzer type before sending the command.

**93 NO DATA TRACE**

The **MARKER ON [DATA]** is selected when the data trace is not displayed.

**94 NO MEMORY TRACE**

The **MARKER ON [MEMORY]** is selected when the memory trace is not displayed.

**95 NO MARKER DELTA - SPAN NOT SET**

The **MKRA→SPAN** softkey requires that delta marker mode be turned ON.

**96 NO MARKER DELTA - RANGE NOT SET**

The **MKRA→SEARCH RNG** softkey requires that delta marker is turned ON.

**98 NO ACTIVE MARKER**

The **marker→** command cannot be execute when no marker is displayed on the screen. Turn on the marker before executing the **marker→** commands.

**99 CAN'T CHANGE WHILE DUAL CHAN OFF**

The Cross channel cannot be turned on when dual channel is off. Turn on the dual channel before the cross channel is turned on.

**110 SAVE ERROR**

A serious error, for example physically damaged disk surface, is detected on saving a file.

**111 RECALL ERROR: INSTR STATE PRESET**

A serious error, for example corrupted data, is detected on recalling a file, and this forced the analyzer to be PRESET.

**112 INVALID FILE NAME**

*HP-IB only.* The file name for the RECALL, PURGE, or RE-SAVE function must have a "\_D" or "\_S" extension for LIF format.

**113 NO STATE/DATA FILES ON DISK**

There are no files on the flexible disk with extensions, "\_D" or "\_S" for LIF format, or "STA" or ".DTA" for DOS format.

**114 CAN'T SAVE GRAPHICS WHEN COPY IN PROGRESS**

If you attempt to save graphics when a print is in progress, this error message is displayed.

**115 LIF-DOS COPY NOT ALLOWED**

If you try to copy a file between the RAM disk and the flexible disk when the format of the RAM disk is different from the format of the flexible disk, this message is displayed.

**116 NO STATE/DATA FILES ON MEMORY**

There are no files on the RAM disk memory with extensions, "\_D" or "\_S" for LIF format, or "STA" or ".DTA" for DOS format.

**119 NO DATA TRACE DISPLAYED**

The **SCALE FOR [DATA]** is selected when the data trace is not displayed.

**120 NO MEMORY TRACE DISPLAYED**

The **SCALE FOR [MEMORY]** is selected when the memory trace is not displayed.

**124 LIST TABLE EMPTY OR INSUFFICIENT TABLE**

The frequency list is empty. To implement the list frequency mode, add segments to the list table.

**125 CAN'T SET SLOPE ON IN POWER SWEEP**

The slope function can be turned on in frequency sweep.

**126 CAN'T CHANGE NUMBER OF POINTS**

The number of points of the spectrum analyzer mode cannot be to change manually, except in zero span.

**127 CAN'T SET SWEEP TIME AUTO IN ZERO SPAN**

The automatic sweep time cannot be in zero span of the spectrum analyzer mode. (The network analyzer mode allows that the automatic sweep time is turned on.)

**128 Repet Smpling : SPAN = 0 ONLY**

The repetitive sampling is turn on when span must be zero, the sweep type must be linear frequency, and the trigger source must be EXT or VIDEO only. Confirm the analyzer setting and set appropriate setting for the repetitive sampling mode.

**129 Repet Smpling : LIN FREQ ONLY**

The repetitive sampling is turn on when span must be zero, the sweep type must be linear frequency, and the trigger source must be EXT or VIDEO only. Confirm the analyzer setting and set appropriate setting for the repetitive sampling mode.

**130 Repet Smpling : TRIG = EXT OR VIDEO ONLY**

The repetitive sampling is turn on when span must be zero, the sweep type must be linear frequency, and the trigger source must be EXT or VIDEO only. Confirm the analyzer setting and set appropriate setting for the repetitive sampling mode.

**131 FREQUENCY SWEEP ONLY**

The sweep type must be frequency sweep when the center step size is set.

**133 CAN'T CHANGE ON LIST SWEEP**

When list sweep is selected, the following parameters are not allowed to be changed:

- CENTER, SPAN, START, STOP
- NOP
- IFBW or RBW
- POWER

Modify the list table to change these parameters in the list sweep.

**134 CAN'T COUPLE IN CURRENT INPUTS**

When one channel measures a ratio measurement, and the other one measures an absolute measurement (for example: A/R and B), **COUPLED CH** can not be turned on.

**135 COUPLED CHAN - BETWEEN NA & NA OR ZA & ZA**

The analyzer types of both channels must be the network analyzer mode when the coupled channel is turned on.

**141 INSUFFICIENT MEMORY**

If a lot of tasks is executed at same time, memory might be insufficient for a while. (For example, running HP Instrument BASIC program, printing a screen, and sending or receiving data array by HP-IB are required at same time.) Please wait until finishing some tasks then execute the next task.

**146 ON POINT NOT ALLOWD FOR THE CURRENT TRIG**

The trigger event mode cannot be changed to the ON POINT mode because the current trigger source setting does not allow the ON POINT mode. The trigger event ON POINT mode is available for only MANUAL, EXTERNAL, and BUS trigger sources of the network analyzer mode.



**154 INVALID DATE**

The date entered to set the real time clock is invalid. Reenter correct date.

**193 POWER ON TEST FAILED**

An internal test fails in the power on sequence (the power on self-test fails). Contact your nearest Hewlett-Packard office or see the *Service Manual* for troubleshooting.

**194 EEPROM WRITE ERROR**

Data cannot be stored properly into the EEPROM on the A1 CPU, when performing the display background adjustment or updating correction constants in the EEPROM using the adjustment program. See the *Service Manual* for troubleshooting.

**195 ALL INT TEST FAILED**

An "internal test 0: ALL INT" fails. See the *Service Manual* for troubleshooting.

**196 FLASH MEMORY CHECK SUM ERROR**

The data (firmware) stored in the A1 flash memory are invalid. This message is displayed in the bootloader menu. See the *Service Manual* for troubleshooting.

**197 BACKUP SRAM CHECK SUM ERROR**

An "internal test 1: A1 CPU" fails. The data (HP-IB Address and so on) stored in the A1 CPU's BACKUP SRAM are invalid. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**198 EEPROM CHECK SUM ERROR**

An "internal test 1: A1 CPU" fails. The data (Correction Constants and so on) stored in the A1 CPU's EEPROM are invalid. See the *Service Manual* for troubleshooting.

**199 DSP CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's DSP (Digital Signal Processor) does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**200 F-BUS TIMER CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's F-BUS (Frequency Bus) timer does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**201 RTC CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's RTC (Real Time Clock) does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**202 KEY CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's front keyboard control chip does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**203 FDC CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's FDC (Flexible Disk drive control) chip does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**204 HP-IB CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's HP-IB chip does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**205 HP-HIL CHIP TEST FAILED**

An "internal test 1: A1 CPU" fails. The A1 CPU's HP-HIL control chip does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**206 CPU INTERNAL SRAM R/W ERROR**

An "internal test 2: A1 VOLATILE MEMORY" fails. The A1 CPU's internal SRAM does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**207 CPU BACKUP SRAM R/W ERROR**

An "internal test 2: A1 VOLATILE MEMORY" fails. The A1 CPU's BACKUP SRAM does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**208 DSP SRAM R/W ERROR**

An "internal test 2: A1 VOLATILE MEMORY" fails. The DSP's SRAM on the A1 CPU does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**209 DUAL PORT SRAM R/W ERROR**

An "internal test 2: A1 VOLATILE MEMORY" fails. The DSP's dual port SRAM on the A1 CPU does not work properly. Replace the A1 CPU with a new one. See the *Service Manual* for troubleshooting.

**210 POST REGULATOR OUTPUT VOLTAGE OUT OF SPEC**

An "internal test 4: A2 POST REGULATOR" fails. A power supply voltage of the A2 post-regulator is out of its limits. See the *Service Manual* for troubleshooting.

**211 GND LEVEL OUT OF SPEC**

An "internal test 4: A2 POST REGULATOR" fails. The voltage of the GND (Ground) at the DC bus node 26 is out of its limits. See the *Service Manual* for troubleshooting.

**212 FAN POWER OUT OF SPEC**

An "internal test 4: A2 POST REGULATOR" fails. The voltage of the fan power supply at the DC bus node 11 is out of its limits. See the *Service Manual* for troubleshooting.

**213 FAILURE FOUND FROM A/D MUX TO A/D CONVERTER**

An "internal test 5: A6 A/D CONVERTER" fails. A trouble is found on the signal path from the A/D multiplexer to A/D converter on the A6 receiver IF. See the *Service Manual* for troubleshooting.

**214 REF OSC TEST FAILED**

An "internal test 6: A5 REFERENCE OSC" fails. The reference oscillator on the A5 synthesizer does not work properly. See the *Service Manual* for troubleshooting.

**215 FRACTIONAL N OSC TEST FAILED**

An "internal test 7: A5 FRACTIONAL N OSC" fails. The fractional N oscillator on the A5 synthesizer does not work properly. See the *Service Manual* for troubleshooting.

**216 STEP OSC TEST FAILED**

An "internal test 8: A5 STEP OSC" fails. The step oscillator on the A5 synthesizer does not work properly. See the *Service Manual* for troubleshooting.

**217 1st LO OSC TEST FAILED**

An "internal test 9: A4A1 1ST LO OSC" fails. The 1st LO OSC (first local oscillator) on the A4A1 1st LO does not work properly. See the *Service Manual* for troubleshooting.

**218 2nd LO OSC TEST FAILED**

An "internal test 10: A3A2 2ND LO" fails. The 2nd LO OSC (second local oscillator) on the A3A2 2nd LO does not work properly. See the *Service Manual* for troubleshooting.

**219 3rd LO OSC TEST FAILED**

An "internal test 12: A6 3RD LO OSC" fails. The 3rd LO OSC (third local oscillator) on the A6 receiver IF does not work properly. See the *Service Manual* for troubleshooting.

**220 SOURCE OSC TEST FAILURE**

An "internal test 13: A3A1 SOURCE OSC" fails. The source oscillator on the A3A1 ALC does not work properly. See the *Service Manual* for troubleshooting.

**221 DC OFFSET TOO BIG ON 0 DEG PATH**

An "internal test 14: A6 3rd IF DC OFFSET" fails. The DC offset on 0° path of the A6 receiver IF is larger than its limit. See the *Service Manual* for troubleshooting.

**222 DC OFFSET TOO BIG ON 90 DEG PATH**

An "internal test 14: A6 3rd IF DC OFFSET" fails. The DC offset on 90° path of the A6 receiver IF is larger than its limit. See the *Service Manual* for troubleshooting.

**223 SAMPLE FREQUENCY OUT OF SPEC**

An "internal test 15: A6 SEQUENCER" fails. The sampling frequency of the sample/hold circuit on the A6 receiver IF is out of its limits. See the *Service Manual* for troubleshooting.

**224 ALC TEST FAILED**

An "internal test 16: A3A1 ALC" fails. The ALC (Auto Level Control) circuit on the A3A1 ALC does not work properly. See the *Service Manual* for troubleshooting.

**225 A3 DIVIDER OUTPUT FREQUENCY OUT OF SPEC**

An "internal test 11: A3A1 DIVIDER" fails. The output frequency of the divider circuit on the A3A1 ALC is out of its limits. See the *Service Manual* for troubleshooting.

**226 FLOPPY DISK DRIVE FAILURE FOUND**

An "external test 18: DSK DR FAULT ISOL'N" fails. The A53 built-in FDD (flexible disk drive) does not work properly. Replace the A53 FDD with a new one. See the *Service Manual* for troubleshooting.

**227 POWER SWEEP LINEARITY OUT OF SPEC**

An "external test 19: POWER SWEEP LINEARITY" fails. See the *Service Manual* for troubleshooting.

**228 OUTPUT ATTENUATOR ACCURACY OUT OF SPEC**

An "external test 20: OUTPUT ATTENUATOR" fails. See the *Service Manual* for troubleshooting.

**229 INPUT ATTENUATOR ACCURACY OUT OF SPEC**

An "external test 21: INPUT ATTENUATOR" fails. See the *Service Manual* for troubleshooting.

**230 RF OUT TO S-INPUT FLATNESS TEST FAILED**

An "external test 22: RF TO S LVL & FLTNESS" fails. See the *Service Manual* for troubleshooting.

**231 S-INPUT TO A-INPUT CROSSTALK TEST FAILED**

An "external test 23: S TO A CROSSTALK" fails. See the *Service Manual* for troubleshooting.

**232 S-INPUT LEVEL COMPRESSION TEST FAILED**

An "external test 24: S INPUT COMPRESSION" fails. See the *Service Manual* for troubleshooting.

**233 S-INPUT RESIDUAL RESPONSE OUT OF SPEC**

An "external test 25: S INPUT RESIDUALS" fails. See the *Service Manual* for troubleshooting.

**234 1st LO LEAKAGE TEST FAILED**

An "external test 25: S INPUT RESIDUALS" fails. See the *Service Manual* for troubleshooting.

**235 S-INPUT NOISE LEVEL OUT OF SPEC**

An "external test 26: S INPUT NOISE LEVEL" fails. See the *Service Manual* for troubleshooting.

**236 FRACTION SPURIOUS OUT OF SPEC**

An "external test 27: FRACTION SPURIOUS" fails. See the *Service Manual* for troubleshooting.

**237 RF OUT TO R-INPUT FLATNESS TEST FAILED**

An "external test 28: RF TO A LVL & FLTNESS" fails. See the *Service Manual* for troubleshooting.

**238 R-INPUT TO A-INPUT CROSSTALK OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**239 R-INPUT TO B-INPUT CROSSTALK OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**240 R-INPUT NOISE LEVEL OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**241 A-INPUT NOISE LEVEL OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**242 B-INPUT NOISE LEVEL OUT OF SPEC**

An "external test 29: NA CROSSTALK & NOISE" fails. See the *Service Manual* for troubleshooting.

**243 R-INPUT LEVEL COMPRESSION TEST FAILED**

An "external test 30: R INPUT COMPRESSION" fails. See the *Service Manual* for troubleshooting.

**244 RANGING ACCURACY TEST FAILED**

An "external test 31: RANGING" fails. See the *Service Manual* for troubleshooting.

**245 A/R RATIO ACCURACY OUT OF SPEC**

An "external test 32: A/R RATIO ACCURACY" fails. See the *Service Manual* for troubleshooting.

**246 A/R RATIO RAW RESPONSE TEST FAILED"**

An "external test 32: A/R RATIO ACCURACY" fails. See the *Service Manual* for troubleshooting.

**247 A-INPUT LEVEL COMPRESSION TEST FAILED**

An "external test 33: A INPUT COMPRESSION" fails. See the *Service Manual* for troubleshooting.

**248 B/R RATIO ACCURACY OUT OF SPEC**

An "external test 34: B/R RATIO ACCURACY" fails. See the *Service Manual* for troubleshooting.

**249 B/R RAW RESPONSE TEST FAILED**

An "external test 34: B/R RATIO ACCURACY" fails. See the *Service Manual* for troubleshooting.

**250 B-INPUT LEVEL COMPRESSION TEST FAILED**

An "external test 35: B INPUT COMPRESSION" fails. See the *Service Manual* for troubleshooting.

**251 SA RES FILTER 3 DB BW OUT OF SPEC**

An "external test 36: RESOLUTION BANDWIDTH" fails. See the *Service Manual* for troubleshooting.

**252 SA RES FILTER SHAPE FACTOR OUT OF SPEC**

An "external test 36: RESOLUTION BANDWIDTH" fails. See the *Service Manual* for troubleshooting.

**253 SA RES FILTER TRACK NOISE TEST FAILED**

An "external test 36: RESOLUTION BANDWIDTH" fails. See the *Service Manual* for troubleshooting.

**254 SA RES FILTER SWITCHING UNC. OUT OF SPEC**

An "external test 36: RESOLUTION BANDWIDTH" fails. See the *Service Manual* for troubleshooting.

**255 IF GAIN SWITCHING UNC. OUT OF SPEC**

An "external test 37: IF GAIN" fails. See the *Service Manual* for troubleshooting.

**256 SIDE BAND LEVEL OUT OF SPEC**

An "external test 38: PHASE NOISE" fails. See the *Service Manual* for troubleshooting.

**257 SA NON-HARMONIC SPURIOUS OUT OF SPEC**

An "external test 39: SPURIOUS" fails. See the *Service Manual* for troubleshooting.

**258 X-TAL FILTER RESPONSE OUT OF SPEC**

An "external test 40: X'TAL FILTER RESPONSE" fails. See the *Service Manual* for troubleshooting.

**259 X-TAL FILTER RAW RESPONSE TEST FAILED**

An "external test 40: X'TAL FILTER RESPONSE" fails. See the *Service Manual* for troubleshooting.

260 **ALL EXT TEST FAILED**

"External tests 63 to 67" fails. See the *Service Manual* for troubleshooting.

261 **IMPEDANCE ADAPTER TEST FAILED**

An error occurred while performing the impedance adapter test. Contact your nearest Hewlett-Packard office or follow the instructions in the *Service Manual* to repair the product.

267 **COMPENSATION REQUIRED**

**OPEN on OFF**, **SHORT on OFF** or **LOAD on OFF** key is pressed when the fixture compensation is not being performed. The fixture compensation is required before you attempt to press these keys.

268 **NO COMPENSATION CURRENTLY IN PROGRESS**

**RESUME COMP SEQ** is pressed when the fixture compensation is not suspended. Press **COMPEN MENU** to start the fixture compensation.

270 **COMPENSATION STD LIST UNDEFINED**

The value of the calibration kit used for the fixture compensation is not defined. Define the value using **MODIFY** .

-100 **Command error**

This is a generic syntax error that the analyzer cannot detect more specific errors. This code indicates only that a command error, as defined in IEEE 488.2, 11.5.1.1.4, has occurred.

-101 **Invalid character**

A syntax element contains a character that is invalid for that type. For example, a header containing an ampersand (**SENSE&**).

-102 **Syntax error**

An unrecognized command or data type was encountered. For example, a string was received when the analyzer was not expecting to receive a string.

-103 **Invalid separator**

The parser was expecting a separator and encountered an illegal character. For example, the semicolon was omitted after a program message unit, **\*RST:TRIG**.

-104 **Data type error**

The parser recognized an unallowed data element. For example, numeric or string data was expected but block data was encountered.

-105 **GET not allowed**

A Group Execute Trigger (GET) was received within a program message (see IEEE 488.2, 7.7).

**-108 Parameter not allowed**

More parameters were received than expected for the header. For example, the \*SRE command only accepts one parameter, so receiving \*SRE 4, 16 is not allowed.

**-109 Missing parameter**

Fewer parameters were received than required for the header. For example, the \*SRE command requires one parameter, so receiving only \*SRE is not allowed.

**-110 Command header error**

An error was detected in the header. This error message is used when the analyzer cannot detect the more specific errors described for errors -111 through -119.

**-111 Header separator error**

A character that is not a legal header separator was encountered while parsing the header. For example, no white space followed the header, thus \*SRE4 is an error.

**-112 Program mnemonic too long**

The header contains more than twelve characters (see IEEE 488.2, 7.6.1.4.1).

**-113 Undefined header**

The header is syntactically correct, but it is undefined for the analyzer. For example, \*XYZ is not defined for the analyzer.

**-114 Header Suffix out of range**

The value of a numeric suffix attached to a program mnemonic makes the header invalid.

**-120 Numeric data error**

This error, as well as errors -121 through -129, are generated when parsing a data element that appears to be numeric, including the nondecimal numeric types. This particular error message is used if the analyzer cannot detect a more specific error.

**-121 Invalid character in number**

An invalid character for the data type being parsed was encountered. For example, an alpha character in a decimal numeric or a "9" in octal data.

**-123 Exponent too large**

The magnitude of the exponent was larger than 32000 (see IEEE 488.2, 7.7.2.4.1).

**-124 Too many digits**

The mantissa of a decimal numeric data element contains more than 255 digits excluding leading zeros (see IEEE 488.2, 7.7.2.4.1).

**-128 Numeric data not allowed**

A legal numeric data element was received, but the analyzer does not accept it in this position for a header.



**-130 Suffix error**

This error, as well as errors –131 through –139, are generated when parsing a suffix. This particular error message is used if the analyzer cannot detect a more specific error.

**-131 Invalid suffix**

The suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for the analyzer.

**-134 Suffix too long**

The suffix contained more than 12 characters (see IEEE 488.2, 7.7.3.4).

**-138 Suffix not allowed**

A suffix was encountered after a numeric element that does not allow suffixes.

**-140 Character data error**

This error, as well as errors –141 through –148, are generated when analyzing the syntax of a character data element. This particular error message is used if the analyzer cannot detect a more specific error.

**-141 Invalid character data**

Either the character data element contains an invalid character or the particular element received is not valid for the header.

**-144 Character data too long**

The character data element contains more than twelve characters (see IEEE 488.2, 7.7.1.4).

**-148 Character data not allowed**

A legal character data element was encountered where prohibited by the analyzer.

**-150 String data error**

This error, as well as errors –151 and –158, are generated when analyzing the syntax of 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 (see IEEE 488.2, 7.7.5.2). 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, as well as errors –161 and –168, are generated when analyzing the syntax of a block data element. This particular error message is used if the analyzer cannot detect a more specific error.

**-161 Invalid block data**

A block data element was expected, but was invalid for some reason (see IEEE 488.2, 7.7.6.2). For example, an END message was received before the length was satisfied.

**-168 Block data not allowed**

A legal block data element was encountered but was not allowed by the analyzer at this point in parsing.

**-200 Execution error**

This is the generic syntax error that the analyzer cannot detect more specific errors. This code indicates only that an execution error as defined in IEEE 488.2, 11.5.1.1.5 has occurred.

**-210 Trigger error**

A trigger related error occurred. This error message is used when the analyzer cannot detect the more specific errors described for errors -211 through -219.

**-211 Trigger ignored**

A GET, \*TRG, or triggering signal 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**

A request for a measurement initiation was ignored as another measurement was already in progress.

**-220 Parameter error**

Indicates that a program data element related error occurred. This error message is used when the analyzer cannot detect the more specific errors described for errors -221 through -229.

**-221 Settings conflict**

A legal program data element was parsed but could not be executed due to the current device state (see IEEE 488.2, 6.4.5.3 and 11.5.1.1.5).

**-222 Data out of range**

A legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the analyzer (see IEEE 488.2, 11.5.1.1.5).

**-223 Too much data**

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 device-specific requirements.

**-224 Illegal parameter value**

Used where exact value, from a list of possibilities, was expected.

**-225 Data out of memory**

The analyzer has insufficient memory to perform the requested operation.

**-230 Data corrupt or stale**

Possibly invalid data. New reading started but not completed since last access.

**-231 Data questionable**

Measurement accuracy is suspect.

**-240 Hardware error**

A legal program command or query could not be executed because of a hardware problem in the analyzer. Definition of what constitutes a hardware problem is completely device-specific. This error message is used when the analyzer cannot detect the more specific errors described for errors -241 through -249.

**-241 Hardware missing**

A legal program command or query could not be executed because of missing analyzer hardware. For example, an option was not installed.

**-250 Mass storage error**

A mass storage error occurred. This error message is used when the analyzer cannot detect the more specific errors described for errors -251 through -259.

**-256 File name not found**

A legal program command could not be executed because the file name on the device media was not found: for example, an attempt was made to read or copy a nonexistent file.

**-257 File name error**

A legal program command or query could not be executed because the file name on the device media was in error. For example, an attempt was made to copy to a duplicate file name. The definition of what constitutes a file name error is device-specific.

**-280 Program error**

A downloaded program-related execution error occurred. This error message is used when the analyzer cannot detect the more specific errors described for errors -281 through -289.

**-281 Cannot create program**

An attempt to create a program was unsuccessful. A reason for the failure might include not enough memory.

**-282 Illegal program name**

The name used to reference a program was invalid. For example, redefining an existing program, deleting a nonexistent program, or in general, referencing a nonexistent program.

**-283 Illegal variable name**

An attempt was made to reference a nonexistent variable in a program.

**-284 Program currently running**

Certain operations dealing with programs may be illegal while the program is running. For example, deleting a running program might not be possible.

**-285 Program syntax error**

A syntax error appears in a downloaded program. The syntax used when parsing the downloaded program is device-specific.

**-286 Program runtime error**

A program runtime error of the HP Instrument BASIC has occurred. To get a more specific error information, use the ERRM\$ or ERRN command of the HP Instrument BASIC.

**-310 System error**

Some error, termed "system error" by the analyzer, has occurred.

**-311 Memory error**

An error was detected in the analyzer's memory.

**-330 Self-test failed**

A self-test failed. Contact your nearest Hewlett-Packard office or see the *Service Manual* for troubleshooting.

**-350 Queue overflow**

A specific code entered into the queue in lieu of the code that caused the error. This code indicates that there is no room in the queue and an error occurred but was not recorded.

**-400 Query errors**

This is the generic query error that the analyzer cannot detect more specific errors. This code indicates only that a query error as defined in IEEE 488.2, 11.5.1.1.7 and 6.3 has occurred.

**-410 Query INTERRUPTED**

A condition causing an interrupted query error occurred (see IEEE 488.2, 6.3.2.3). For example, a query followed by DAB or GET before a response was completely sent.

**-420 Query UNTERMINATED**

A condition causing an unterminated query error occurred (see IEEE 488.2, 6.3.2.2). For example, the analyzer was addressed to talk and an incomplete program message was received by the controller.

**-430 Query DEADLOCKED**

A condition causing a deadlocked query error occurred (see IEEE 488.2, 6.3.1.7). For example, both input buffer and output buffer are full and the analyzer cannot continue.

# Index

---

## B

<*block*>, 1-7

## C

calibration array, F-1  
calibration coefficient, H-2  
calibration type, F-1  
command abbreviation, 1-5  
common command, 1-3  
convention, 2-2

## D

data format, H-1  
data level, H-2  
data transfer, H-1

## E

error corrected data, H-2  
error message, Messages-1  
Event Status Register B, D-1, D-3

## F

formatted data, H-2

## I

Instrument Event Status Register, D-1, D-3

## K

key code, G-1

## M

manual changes, A-1

## N

<*numeric*>, 1-6

## O

Operation Status Negative Transition Filter,  
D-5  
Operation Status Positive Transition Filter,  
D-5  
Operation Status Register, D-1, D-4  
OSNT, D-5  
OSPT, D-5

## Q

Questionable Status Register Bit, D-1

## R

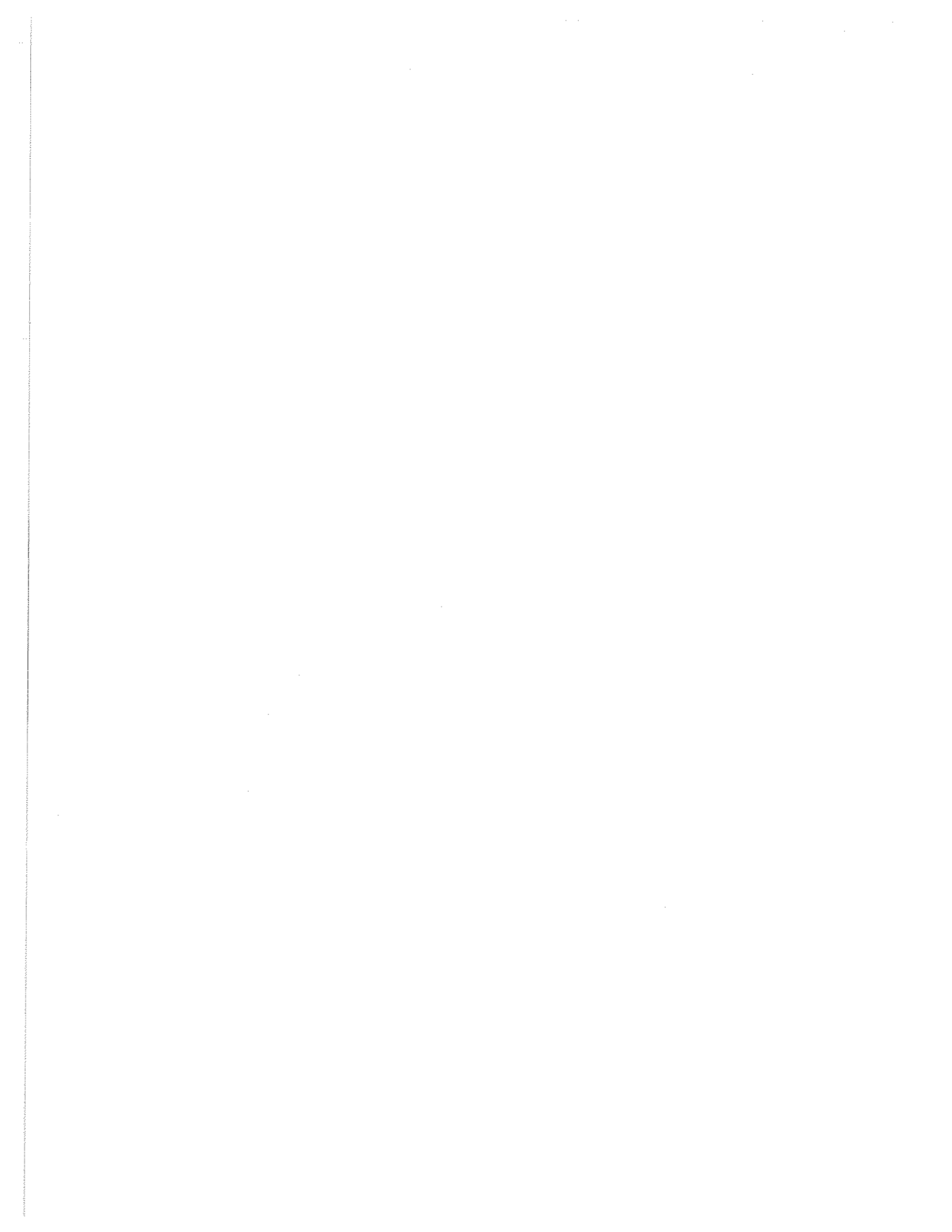
raw data, H-2

## S

SCPI command, 1-3  
serial number, A-2  
simple command, 1-3  
standard class, F-1  
Standard Event Status Register, D-1, D-3  
Status Byte, D-1, D-2  
status reporting, D-1  
<*string*>, 1-6  
suffix, 1-6

## T

trigger system, E-1



## REGIONAL SALES AND SUPPORT OFFICES

*If you need technical assistance with a Hewlett-Packard test and measurement product or application, please contact the Hewlett-Packard office or distributor in your country.*

### **Asia Pacific:**

Hewlett-Packard Asia Pacific Ltd  
17-21/F Shell Tower, Times Square,  
1 Matheson Street, Causeway Bay,  
Hong Kong  
(852) 2599 7070

### **Australia/New Zealand:**

Hewlett-Packard Australia Ltd.  
31-41 Joseph Street  
Blackburn, Victoria 3130  
Australia  
131 347 ext. 2902

### **Canada:**

Hewlett-Packard Canada Ltd.  
5150 Spectrum Way  
Mississauga, Ontario  
L4W 5G1  
(905) 206 4725

**In Europe, Africa and Middle East  
please call your local HP sales office  
or representative:**

Austria/East Central Europe:  
(1) 25000-0

Belgium and Luxembourg:  
(02) 778 34 17

Czech Republic:  
(2) 471 7327

Denmark:  
45 99 10 00

Finland:  
(90) 88 721

France:  
(1) 69.82.65.00

### **Germany:**

(0180) 532 62-33

### **Greece:**

(1) 7264045

### **Hungary:**

(1) 252 4705

### **Ireland:**

(01) 284 4633

### **Israel:**

(03) 5380 333

### **Italy:**

02 - 92 122 999

### **Netherlands:**

(020) 547 6669

### **Norway:**

(22) 73 56 00

### **Poland:**

(22) 37 50 65

### **Portugal:**

(11) 301 73 30

### **Russia:**

(095) 956 2126

### **South Africa:**

(011) 806 1000

### **Spain:**

900 123 123

### **Sweden:**

(08) 444 20 00

### **Switzerland:**

(01) 735 7111

### **Turkey:**

(212) 224 59 25

### **United Kingdom:**

(01344) 366 666

**For European countries  
not listed,  
contact:**

Hewlett-Packard  
International Sales Europe  
Geneva, Switzerland  
Tel: +41-22-780-4111  
Fax: +41-22-780-4770

### **Japan:**

Hewlett-Packard Japan Ltd.  
Measurement Assistance Center  
9-1, Takakura-cho, Hachioji-shi,  
Tokyo 192, Japan  
Tel: (81) 426 48 0722  
Fax: (81) 426 48 1073

### **Latin America:**

Hewlett-Packard  
Latin American Region Headquarters  
5200 Blue Lagoon Drive  
9th Floor  
Miami, Florida 33126  
U.S.A.  
(305) 267 4245/4220

### **United States:**

Hewlett-Packard Company  
Test and Measurement Organization  
5301 Stevens Creek Blvd.  
Bldg. 51L-SC  
Santa Clara, CA 95052-8059  
1 800 452 4844

