APPENDIX A
HP-IB COMMAND LIST

NOTE

It is recommended that Section III Part II be read before remote programming the instrument.

Table A-1. HP-IB Command List.

Group	Command: Function	Command: Setting	Description
Input & Trigger	IM	1-3	Input Mode (A, Both, B)
	AC	1-2	A Coupling (1 = AC, 2 = DC)
	BC	1-2	B Coupling (1 = AC, 2 = DC)
	AS	1-10	CH A Sensitivity: 1 CAL; 2 30 V, +30 dBV; 3 10 V, +20 dBV; 4 3 V, +10 dBV; 5 1 V, +0 dBV; 6 .3 V, −10 dBV; 7 .1 V, −20 dBV; 8 30 mV, −30 dBV; 9 10 mV, −40 dBV; 10 3 mV, −50 dBV
	BS	1-10	CH B Sensitivity: 1 CAL; 2 30 V, +30 dBV; 3 10 V, +20 dBV; 4 3 V, +10 dBV; 5 1 V, +0 dBV; 6 .3 V, −10 dBV; 7 .1 V, −20 dBV; 8 30 mV, −30 dBV; 9 10 mV, −40 dBV; 10 3 mV, −50 dBV
	SL	1-2	Slope (1 = +, 2 = −)
	AR		Arm
	RP	0-1	Repetitive
	FR	0-1	Free Run
Frequency & Marker	AD	0-24999	Adjust (Frequency) (0 = 0 Hz, 24999 = 24999 Hz)
	MD	1-4	Mode (1 = 0-25 kHz, 2 = 0 Start, 3 = Set Start, 4 = Set Center)
	SP	1-14	Span: 1 1 Hz; 2 2.5 Hz; 3 5 Hz; 4 10 Hz; 5 25 Hz; 6 50 Hz; 7 100 Hz; 8 250 Hz; 9 500 Hz; 10 1 kHz; 11 2.5 kHz; 12 5 kHz; 13 10 kHz; 14 25 kHz
	MN	0-1	Marker
	MR	0-1	Marker Relative
	MS		Marker Set Ref

Table A-1. HP-IB Command List (Cont'd).

Group	Command		Description
	Function	Setting	
	MB	0–1	Marker / $\sqrt{BW}$
	MT	0–1	Marker Trace
	MF		Marker Set Freq
	MP	0–255	Marker Position (0–127 for dual channel)
	AA	0–1	Amplitude A
	BB	0–1	Amplitude B
	AX	0–1	Amplitude Transfer Function
	SC	1	Scale Linear
	SC	2	Scale 10 dB/Div.
Display	SC	3	Scale 2 dB/Div.
	PA	0–1	Phase A
	PB	0–1	Phase B
	PX	0–1	Phase Transfer Function
	TA	0–1	Time A
	TB	0–1	Time B
	CH	0–1	Coherence
	AM	1–9	Amplitude Ref. Level (Add −10 dB per step, 2 = −10 dB, 9 = −80 dB)
Passband Shape	PS	1	Flattop
	PS	2	Hanning
	PS	3	Uniform
	AV	1	Off
	AV	2	RMS
	AV	3	Time
	AV	4	Peak
Average	RE		Restart
	NU	1	Number 4/64
	NU	2	Number 8/128
	NU	3	Number 16/256
	NU	4	Number 32/Exp
	SH	0–1	Shift
Trace Storage & Recall	TS		Trace 1 Store
	TR	0–1	Trace 1 Recall
	RS		Trace 2 Store
	RR	0–1	Trace 2 Recall
X–Y Recorder	PL		X–Y Plot
	LL		↓←Lower Left & Reset)
	UR		→↑ (Upper Right)

Table A-2. Special Commands (See Section III Part II).

Group	Command	Description
Listing Commands	LAD	List frequency adjust value NNNNN.N CRLF
	LMK	List marker amplitude and frequency ±N.NNNE±NN, NNNNN CRLF
	LSP	List span (Hz) NNNNN CRLF
	LAS	List Ch A sensitivity } ±N.NNE±NN CRLF
	LBS	List Ch B sensitivity } ±N.NNE±NN CRLF
	LXS	List transfer function sensitivity } ±N.NNE±NN CRLF
	LDS	List display (128, 256, or 512 points in corresponding units) each point ±N.NNE±NN separated by commas; CRLF
	LAN	List alphanumerics (128 ASCII characters, CRLF; representing the four 32 character lines)
Binary Memory I/O	LFM,M,N	List from memory
	WTM,M,N	Write to memory M = Start Address (Octal) N = Number of words to be transferred (decimal) Input is in 2N 8-bit bytes Most significant byte first
Writing Display Alpha-numerics	WTA 1–4, 32 ASCII Characters	Inputs a 32 character string to alpha line 1 to 4 (top to bottom) of display. Use blanks where needed to complete 32 character count.
Processor Control	HLT	Unconditional halt at next HP–IB branch point
	RUN	Unconditional run
Status Word	LSTØ LST1	List status word (Ø Resets Bits After Reading) One 8-Bit Byte Bit / Value / Meaning 0 / 1 / Diagnostic on screen. Indicates current switch setting is invalid. Set and cleared by 3582. 1 / 2 / Arm light is on. Set and cleared by 3582 to agree with arm light on front panel. 2* / 4 / A overload. Set by 3582 when: 1)Time record is moved to FFT area or time record is complete 2)and hardware overload has occurred 3)and A or BOTH INPUT MODE. 3* / 8 / B overload. Same as A. 4* / 16 / Time record complete. Set when 1024 new time points have been taken since last record complete.

Table A-2. Special Commands (Cont'd).

Group	Command	Description
		5* 32 Single sweep spectrum complete. Set when time complete data has been FFT'D and displayed. Use LST1 to check this flag! It depends on internal flags which are cleared by LSTØ. 6* 64 Average complete. 7* 128 X–Y plot complete.
Preset	PRS	Preset command Causes instrument to go into the following control state: (25 kHz, 1 channel)

Switch	Setting (when applicable)
Coupling	AC (Channels A & B)
Input Mode	Channel A
Sensitivity	30 V (Channels A & B)
Level	Free Run
Repetitive	On
Arm	Off
Trigger Slope	—
Marker	Off
Marker Relative	Off
Marker ÷ $\sqrt{BW}$	Off
Mode	0–25 kHz Baseband
Span	25 kHz
Amplitude	A (B&XFR-OFF)
Scale	10 dB/Div
Phase	None
Time	None
Coherence	Off
Amplitude Ref Lev	Normal
Passband	Flat Top
Average	Off
Average Number	4
Average Shift	Off
Trace 1 Store	Off
Trace 1 Recall	Off
Trace 2 Store	Off
Trace 2 Recall	Off

Table A-3. Memory Locations.

Description	Start Address (M, Octal)	Number of Words (N, Decimal)	Binary Format
Time Record	70000	1024	Numeric
Display	74000	512	Alphanumeric
Front Panel Switches	77454	5	Numeric

APPENDIX C

CONDENSED DESCRIPTION OF META MESSAGES AS THEY APPLY TO THE 3582A

MESSAGE CONCEPTS.

Devices which communicate along the interface bus are transferring quantities of information from one device to one or more other devices. These quantities of information are called messages. Most of the messages consist of two basic parts–the address portion specified by the controller and the information that comprises the message. In turn, the messages can be classified into twelve types. The twelve types of messages are defined in Table C-1.

Table C-1. Definition of Meta Messages.

Message	Definition
DATA	The actual information (binary bytes) which is sent from a talker to one or more listeners. The information or data can be in a numeric form or a string of characters.
TRIGGER	The trigger message causes the listening device(s) to perform a device-dependent action.
CLEAR	A clear message will cause a device(s) to return to a pre-defined device-dependent state.
REMOTE	The remote message causes the listening device(s) to switch from local front panel control, to remote program control. This message remains in effect so that devices subsequently addressed to listen will go into remote operation.
LOCAL	This message clears the remote message from the listening device(s) and returns the device(s) to local front panel control.
LOCAL LOCKOUT	The local lockout message is implemented to prevent the device operator from manually inhibiting remote program control.
CLEAR LOCKOUT AND SET LOCAL	This message causes all devices to be removed from the local lockout mode and revert to local. It will also clear the remote message for all devices.

Table C-1. Definition of Meta Messages (Cont'd).

REQUIRE SERVICE	A device can send this message at any time to signify that it needs some type of interaction with the controller. The message is cleared by the device's status byte message if it no longer requires service.
STATUS BYTE	A byte that represents the status of a single device. One bit indicates whether the device sent the required service message and the remaining 7 bits indicate operational conditions defined by the device. This byte is sent from the talking device in response to a "Serial Poll" operation performed by a controller.
STATUS BIT	A byte that represents the operational conditions of a group of devices on the bus. Each device responds on a particular bit of the byte thus identifying a device dependent condition. This bit is typically sent by devices in response to a parallel poll operation. The status bit message can also be used by a controller to specify the particular bit and logic level that a device will respond with when a parallel poll operation is performed. Thus more than one device may respond on the same bit.
PASS CONTROL	This message transfers the bus management responsibilities from the active controller to another controller.
ABORT	The system controller sends the abort message to unconditionally assume control of the bus from the active controller. The message will terminate all bus communications but does not implement the clear message.

INSTRUMENT RESPONSE TO MESSAGES.

Table C-2 indicates the messages and required bus actions which the 3582A is capable of implementing.

HP-IB WORKSHEET.

The HP-IB Worksheet provided in the back of this appendix and Table C-3 can be used to determine the capabilities of this instrument and other instruments participating in the HP-IB System. The sheet should be filled in with message applicability for the controller and each HP-IB device. When the sheet has been completely filled out, the system HP-IB Capabilities will be defined for the system.

HP-IB ADDRESSING.

Certain Meta Messages require that a specific listener and talker be designated on the bus. Each instrument on the bus has its own distinctive listen and talk address. The device address provides the identity to distinguish it from other devices on the bus. The instrument receives programming instructions when addressed to listen. When addressed to talk, the in-

Table C-2. 3582A Implementation of Messages.

Message	Implementation	Interface Functions**		3582A Response
		Sender	Receiver	
DATA	SR	T,SH	L^n,AH	Send or receive data as instructed
TRIGGER	NA			
CLEAR	R	ID–LIST C,SH	DC^n,L,AH	Performs the same function as the "reset" button on the front panel.
REMOTE	R	REMOTE ENABLE ID LIST,C_s,SH	RL^n,L,AH RL,AH	Goes to remote. Can be set to local by local key.
LOCAL	R	C_s,SH	RL^n,AH	Goes to local.
LOCAL LOCKOUT	R	C,SH	RL,AH	Goes to remote. Cannot be set to local by local key.
CLEAR LOCKOUT and SET LOCAL	R	C,SH,C_s	RL	Goes to local from local lockout.
REQUIRE SERVICE	S		C	Set SRQ true.
STATUS BYTE	NA			
STATUS BIT	NA			
PASS CONTROL	NA			
ABORT	NA			

*
S = Send Only
R = Receive Only
SR = Send and Receive
NA = Not Applicable

**
SH = Source Handshake
AH = Acceptor Handshake
T = Talker
L = Listener
SR = Service Request
RL = Remote/Local
PP = Parallel Poll
DC = Device Clear
DT = Device Trigger
C = Any Controller
C_n = A Specific Controller(i.e., C_A, C_B, –)
C_s = System Controller
X^n = Indicates Replication n Times

strument can output measurement data or send programming instructions if it is also the system controller. The address is set via jumpers or switches. Refer to Table C-3 for the allowable program codes.