

# Quick Reference Card

## NI-488.2M™ Software for Win32

### Status Word Conditions (ibsta)

Mnemonic	Bit	Hex	Type	Description
ERR	15	8000	dev, brd	GPIB error
TIMO	14	4000	dev, brd	Time limit exceeded
END	13	2000	dev, brd	END or EOS detected
SRQI	12	1000	brd	SRQ line is asserted
RQS	11	800	dev	Device requesting service
CMPL	8	100	dev, brd	I/O completed
LOK	7	80	brd	Lockout State
REM	6	40	brd	Remote State
CIC	5	20	brd	Controller-In-Charge
ATN	4	10	brd	ATN line is asserted
TACS	3	8	brd	Talker
LACS	2	4	brd	Listener
DTAS	1	2	brd	Device Trigger State
DCAS	0	1	brd	Device Clear State

### Error Codes (iberr)

Mnemonic	Decimal Value	Meaning
EDVR	0	System error
ECIC	1	Function requires GPIB board to be CIC
ENOL	2	No Listeners on the GPIB
EADR	3	GPIB board not addressed correctly
EARG	4	Invalid argument to function call
ESAC	5	GPIB board not System Controller as required
EABO	6	I/O operation aborted (timeout)
ENEB	7	Nonexistent GPIB board
EDMA	8	DMA error
EOIP	10	Asynchronous I/O in progress
ECAP	11	No capability for operation
EFSO	12	File system error
EBUS	14	GPIB bus error
ESTB	15	Serial poll status byte queue overflow
ESRQ	16	SRQ stuck in ON position
ETAB	20	Table problem

# NI-488 Board-Level Functions

Function	Purpose
<b>ibask</b>	Return information about software configuration parameters
<b>ibcac</b>	Become Active Controller
<b>ibcmd</b>	Send GPIB commands
<b>ibcmda</b>	Send GPIB commands asynchronously
<b>ibconfig</b>	Change the software configuration parameters
<b>ibdma</b>	Enable or disable DMA
<b>ibeos</b>	Configure the end-of-string (EOS) termination mode or character
<b>ibeot</b>	Enable or disable the automatic assertion of the GPIB EOI line at the end of write I/O operations
<b>ibfind</b>	Open and initialize a GPIB board
<b>ibgts</b>	Go from Active Controller to Standby
<b>ibist</b>	Set or clear the board individual status bit for parallel polls
<b>iblines</b>	Return the status of the eight GPIB control lines
<b>ibln</b>	Check for the presence of a device on the bus
<b>ibloc</b>	Go to local
<b>ibnotify</b>	Notify user of one or more GPIB events by invoking the user callback
<b>ibonl</b>	Place the interface board online or offline
<b>ibpad</b>	Change the primary address
<b>ibppc</b>	Parallel poll configure
<b>ibrd</b>	Read data from a device into a user buffer
<b>ibrda</b>	Read data asynchronously from a device into a user buffer
<b>ibrdf</b>	Read data from a device into a file
<b>ibrpp</b>	Conduct a parallel poll
<b>ibrsc</b>	Request or release system control
<b>ibrsv</b>	Request service and change the serial poll status byte
<b>ibsad</b>	Change or disable the secondary address
<b>ibsic</b>	Assert interface clear
<b>ibsre</b>	Set or clear the Remote Enable (REN) line
<b>ibstop</b>	Abort asynchronous I/O operation
<b>ibtmo</b>	Change or disable the timeout period
<b>ibwait</b>	Wait for GPIB events
<b>ibwrt</b>	Write data to a device from a user buffer
<b>ibwrta</b>	Write data asynchronously to a device from a user buffer
<b>ibwrtf</b>	Write data to a device from a file

## Board Options (**ibconfig**)

Constant	Hex Value
<b>IbcAUTOPOLL</b>	07
<b>IbcCICPROT</b>	08
<b>IbcDMA</b>	12
<b>IbcEndBitIsNormal</b>	1A
<b>IbcEOSchar</b>	0F
<b>IbcEOScmp</b>	0E
<b>IbcEOSrd</b>	0C
<b>IbcEOSwrt</b>	0D
<b>IbcEOT</b>	04
<b>IbcHSCableLength</b>	1F
<b>IbcPAD</b>	01

Constant	Hex Value
<b>IbcPP2</b>	10
<b>IbcPPC</b>	05
<b>IbcPPollTime</b>	19
<b>IbcReadAdjust</b>	13
<b>IbcSAD</b>	02
<b>IbcSC</b>	0A
<b>IbcSendLLO</b>	17
<b>IbcSRE</b>	0B
<b>IbcTIMING</b>	11
<b>IbcTMO</b>	03
<b>IbcWriteAdjust</b>	14

## Multiline Interface Messages

Hex	Dec	ASCII	Msg
00	0	NUL	
01	1	SOH	GTL
02	2	STX	
03	3	ETX	
04	4	EOT	SDC
05	5	ENQ	PPC
06	6	ACK	
07	7	BEL	
08	8	BS	GET
09	9	HT	TCT
0A	10	LF	
0B	11	VT	
0C	12	FF	
0D	13	CR	
0E	14	SO	
0F	15	SI	
10	16	DLE	
11	17	DC1	LLO
12	18	DC2	
13	19	DC3	
14	20	DC4	DCL
15	21	NAK	PPU
16	22	SYN	
17	23	ETB	
18	24	CAN	SPE
19	25	EM	SPD
1A	26	SUB	
1B	27	ESC	
1C	28	FS	
1D	29	GS	
1E	30	RS	
1F	31	US	CFE

Hex	Dec	ASCII	Msg
20	32	SP	MLA0
21	33	!	MLA1
22	34	"	MLA2
23	35	#	MLA3
24	36	\$	MLA4
25	37	%	MLA5
26	38	&	MLA6
27	39	'	MLA7
28	40	(	MLA8
29	41	)	MLA9
2A	42	*	MLA10
2B	43	+	MLA11
2C	44	,	MLA12
2D	45	-	MLA13
2E	46	.	MLA14
2F	47	/	MLA15
30	48	0	MLA16
31	49	1	MLA17
32	50	2	MLA18
33	51	3	MLA19
34	52	4	MLA20
35	53	5	MLA21
36	54	6	MLA22
37	55	7	MLA23
38	56	8	MLA24
39	57	9	MLA25
3A	58	:	MLA26
3B	59	;	MLA27
3C	60	<	MLA28
3D	61	=	MLA29
3E	62	>	MLA30
3F	63	?	UNL

### Message Definitions

CFE <sup>†</sup>	Configuration Enable	MLA	My Listen Address
CFG <sup>†</sup>	Configure	MSA	My Secondary Address
DCL	Device Clear	MTA	My Talk Address
GET	Group Execute Trigger	PPC	Parallel Poll Configure
GTL	Go To Local	PPD	Parallel Poll Disable
LLO	Local Lockout		

<sup>†</sup>This multiline interface message is a proposed extension to the IEEE 488.1 specification to support the HS488 high-speed protocol.

## Multiline Interface Messages (Continued)

Hex	Dec	ASCII	Msg
40	64	@	MTA0
41	65	A	MTA1
42	66	B	MTA2
43	67	C	MTA3
44	68	D	MTA4
45	69	E	MTA5
46	70	F	MTA6
47	71	G	MTA7
48	72	H	MTA8
49	73	I	MTA9
4A	74	J	MTA10
4B	75	K	MTA11
4C	76	L	MTA12
4D	77	M	MTA13
4E	78	N	MTA14
4F	79	O	MTA15
50	80	P	MTA16
51	81	Q	MTA17
52	82	R	MTA18
53	83	S	MTA19
54	84	T	MTA20
55	85	U	MTA21
56	86	V	MTA22
57	87	W	MTA23
58	88	X	MTA24
59	89	Y	MTA25
5A	90	Z	MTA26
5B	91	[	MTA27
5C	92	\	MTA28
5D	93	]	MTA29
5E	94	^	MTA30
5F	95	_	UNT

Hex	Dec	ASCII	Msg
60	96	`	MSA0, PPE
61	97	a	MSA1, PPE, CFG1
62	98	b	MSA2, PPE, CFG2
63	99	c	MSA3, PPE, CFG3
64	100	d	MSA4, PPE, CFG4
65	101	e	MSA5, PPE, CFG5
66	102	f	MSA6, PPE, CFG6
67	103	g	MSA7, PPE, CFG7
68	104	h	MSA8, PPE, CFG8
69	105	i	MSA9, PPE, CFG9
6A	106	j	MSA10, PPE, CFG10
6B	107	k	MSA11, PPE, CFG11
6C	108	l	MSA12, PPE, CFG12
6D	109	m	MSA13, PPE, CFG13
6E	110	n	MSA14, PPE, CFG14
6F	111	o	MSA15, PPE, CFG15
70	112	p	MSA16, PPD
71	113	q	MSA17, PPD
72	114	r	MSA18, PPD
73	115	s	MSA19, PPD
74	116	t	MSA20, PPD
75	117	u	MSA21, PPD
76	118	v	MSA22, PPD
77	119	w	MSA23, PPD
78	120	x	MSA24, PPD
79	121	y	MSA25, PPD
7A	122	z	MSA26, PPD
7B	123	{	MSA27, PPD
7C	124		MSA28, PPD
7D	125	}	MSA29, PPD
7E	126	~	MSA30, PPD
7F	127	DEL	

## Message Definitions (Continued)

PPE	Parallel Poll Enable	SPE	Serial Poll Enable
PPU	Parallel Poll Unconfigure	TCT	Take Control
SDC	Selected Device Clear	UNL	Unlisten
SPD	Serial Poll Disable	UNT	Untalk

# NI-488 Device-Level Functions

Function	Purpose
<b>ibask</b>	Return information about software configuration parameters
<b>ibbna</b>	Change the access board of a device
<b>ibclr</b>	Clear a specific device
<b>ibconfig</b>	Change the software configuration parameters
<b>ibdev</b>	Open and initialize a device
<b>ibeos</b>	Configure the end-of-string (EOS) termination mode or character
<b>ibeot</b>	Enable or disable the automatic assertion of the GPIB EOI line at the end of write I/O operations
<b>ibln</b>	Check for the presence of a device on the bus
<b>ibloc</b>	Go to local
<b>ibonl</b>	Place the device online or offline
<b>ibnotify</b>	Notify user of one or more GPIB events by invoking the user callback
<b>ibpad</b>	Change the primary address
<b>ibpct</b>	Pass control to another GPIB device with Controller capability
<b>ibppc</b>	Parallel poll configure
<b>ibrd</b>	Read data from a device into a user buffer
<b>ibrda</b>	Read data asynchronously from a device into a user buffer
<b>ibrdf</b>	Read data from a device into a file
<b>ibrpp</b>	Conduct a parallel poll
<b>ibrsp</b>	Conduct a serial poll
<b>ibsad</b>	Change or disable the secondary address
<b>ibstop</b>	Abort asynchronous I/O operation
<b>ibtmo</b>	Change or disable the timeout period
<b>ibtrg</b>	Trigger selected device
<b>ibwait</b>	Wait for GPIB events
<b>ibwrt</b>	Write data to a device from a user buffer
<b>ibwrta</b>	Write data asynchronously to a device from a user buffer
<b>ibwrtf</b>	Write data to a device from a file

## Device Options (**ibconfig**)

Constant	Hex Value
<b>IbcEndBitIsNormal</b>	1A
<b>IbcEOSchar</b>	0F
<b>IbcEOScmp</b>	0E
<b>IbcEOSrd</b>	0C
<b>IbcEOSwrt</b>	0D
<b>IbcEOT</b>	04
<b>IbcPAD</b>	01

Constant	Hex Value
<b>IbcREADDR</b>	06
<b>IbcReadAdjust</b>	13
<b>IbcSAD</b>	02
<b>IbcSPollTime</b>	18
<b>IbcTMO</b>	03
<b>IbcWriteAdjust</b>	14
<b>IbcUnAddr</b>	1B

## NI-488.2 Routines

Routine	Purpose
AllSpoll	Serial poll all devices
DevClear	Clear a single device
DevClearList	Clear multiple devices
EnableLocal	Enable operations from the front panel of devices (leave remote programming mode)
EnableRemote	Enable remote GPIB programming for devices
FindLstn	Find listening devices on GPIB
FindRQS	Determines which device is requesting service
PassControl	Pass control to another device with Controller capability
PPoll	Perform a parallel poll on the GPIB
PPollConfig	Configure a device for parallel polls
PPollUnconfig	Unconfigure devices for parallel polls
RcvRespMsg	Read data bytes from a device that is already addressed to talk
ReadStatusByte	Serial poll a single device
Receive	Read data bytes from a device
ReceiveSetup	Address a device to be a Talker and the interface board to be a Listener in preparation for RcvRespMsg
ResetSys	Reset and initialize IEEE 488.2-compliant devices
Send	Send data bytes to a device
SendCmds	Send GPIB command bytes
SendDataBytes	Send data bytes to devices that are already addressed to listen
SendIFC	Reset the GPIB by sending interface clear
SendList	Send data bytes to multiple GPIB devices
SendLLO	Send the Local Lockout (LLO) message to all devices
SendSetup	Setup devices to receive data in preparation for SendDataBytes
SetRWLS	Place devices in remote with lockout state
TestSRQ	Determine the current state of the GPIB Service Request (SRQ) line
TestSys	Cause the IEEE 488.2-compliant devices to conduct self tests
Trigger	Trigger a device
TriggerList	Trigger multiple devices
WaitSRQ	Wait until a device asserts the GPIB Service Request (SRQ) line

## Timeout Values (ibtmo)

Constant	Decimal Value	Minimum Timeout
TNONE	0	disabled - no timeout
T10us	1	10 $\mu$ s
T30us	2	30 $\mu$ s
T100us	3	100 $\mu$ s
T300us	4	300 $\mu$ s
T1ms	5	1 ms
T3ms	6	3 ms
T10ms	7	10 ms
T30ms	8	30 ms

Constant	Decimal Value	Minimum Timeout
T100ms	9	100 ms
T300ms	10	300 ms
T1s	11	1 s
T3s	12	3 s
T10s	13	10 s
T30s	14	30 s
T100s	15	100 s
T300s	16	300 s
T1000s	17	1000 s

