

Quick Reference Card

NI-488.2™ API

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 |
| EFSS | 12 | File system error |
| EBUS | 14 | GPIB bus error |
| ESRQ | 16 | SRQ stuck in ON position |
| ETAB | 20 | Table problem |
| ELCK | 21 | Interface is locked |
| EARM | 22 | Ibnotify callback failed to rearm |
| EHDL | 23 | Input handle is invalid |
| EWIP | 26 | Wait in progress on specified input handle |
| ERST | 27 | Event notification was cancelled due to a reset of the interface |
| EPWR | 28 | The interface lost power |

Board-Level Traditional NI-488.2

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

Board Options (**ibconfig**)

| Constant | Hex Value |
|--------------------------|-----------|
| IbcAUTOPOLL | 07 |
| IbcDMA | 12 |
| IbcEndBitIsNormal | 1A |
| IbcEOSchar | 0F |
| IbcEOScmp | 0E |
| IbcEOSrd | 0C |
| IbcEOSwrt | 0D |
| IbcEOT | 04 |
| IbcHSCableLength | 1F |
| IbcIRQ | 09 |
| IbcIST | 20 |
| IbcLON | 22 |

| Constant | Hex Value |
|---------------------|-----------|
| IbcPAD | 01 |
| IbcPP2 | 10 |
| IbcPPC | 05 |
| IbcPPollTime | 19 |
| IbcRSV | 21 |
| IbcSAD | 02 |
| IbcSC | 0A |
| IbcSendLLO | 17 |
| IbcSRE | 0B |
| IbcTIMING | 11 |
| IbcTMO | 03 |

Device-Level Traditional NI-488.2

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

Device Options (**ibconfig**)

| Constant | Hex Value |
|-------------------|-----------|
| IbcEOSchar | 0F |
| IbcEOScmp | 0E |
| IbcEOSrd | 0C |
| IbcEOSwrt | 0D |
| IbcEOT | 04 |
| IbcPAD | 01 |

| Constant | Hex Value |
|---------------------|-----------|
| IbcREADDR | 06 |
| IbcSAD | 02 |
| IbcSPollTime | 18 |
| IbcTMO | 03 |
| IbcUnAddr | 1B |

Multiline Interface Messages

| Hex | Dec | ASCII | Msg | Hex | Dec | ASCII | Msg |
|-----|-----|-------|-----|-----|-----|-------|-------|
| 00 | 0 | NUL | | 20 | 32 | SP | MLA0 |
| 01 | 1 | SOH | GTL | 21 | 33 | ! | MLA1 |
| 02 | 2 | STX | | 22 | 34 | " | MLA2 |
| 03 | 3 | ETX | | 23 | 35 | # | MLA3 |
| 04 | 4 | EOT | SDC | 24 | 36 | \$ | MLA4 |
| 05 | 5 | ENQ | PPC | 25 | 37 | % | MLA5 |
| 06 | 6 | ACK | | 26 | 38 | & | MLA6 |
| 07 | 7 | BEL | | 27 | 39 | ' | MLA7 |
| 08 | 8 | BS | GET | 28 | 40 | (| MLA8 |
| 09 | 9 | HT | TCT | 29 | 41 |) | MLA9 |
| 0A | 10 | LF | | 2A | 42 | * | MLA10 |
| 0B | 11 | VT | | 2B | 43 | + | MLA11 |
| 0C | 12 | FF | | 2C | 44 | , | MLA12 |
| 0D | 13 | CR | | 2D | 45 | - | MLA13 |
| 0E | 14 | SO | | 2E | 46 | . | MLA14 |
| 0F | 15 | SI | | 2F | 47 | / | MLA15 |
| 10 | 16 | DLE | | 30 | 48 | 0 | MLA16 |
| 11 | 17 | DC1 | LLO | 31 | 49 | 1 | MLA17 |
| 12 | 18 | DC2 | | 32 | 50 | 2 | MLA18 |
| 13 | 19 | DC3 | | 33 | 51 | 3 | MLA19 |
| 14 | 20 | DC4 | DCL | 34 | 52 | 4 | MLA20 |
| 15 | 21 | NAK | PPU | 35 | 53 | 5 | MLA21 |
| 16 | 22 | SYN | | 36 | 54 | 6 | MLA22 |
| 17 | 23 | ETB | | 37 | 55 | 7 | MLA23 |
| 18 | 24 | CAN | SPE | 38 | 56 | 8 | MLA24 |
| 19 | 25 | EM | SPD | 39 | 57 | 9 | MLA25 |
| 1A | 26 | SUB | | 3A | 58 | : | MLA26 |
| 1B | 27 | ESC | | 3B | 59 | ; | MLA27 |
| 1C | 28 | FS | | 3C | 60 | < | MLA28 |
| 1D | 29 | GS | | 3D | 61 | = | MLA29 |
| 1E | 30 | RS | | 3E | 62 | > | MLA30 |
| 1F | 31 | US | CFE | 3F | 63 | ? | UNL |

| Message Definitions | | | |
|---------------------|-----------------------|-----|-------------------------|
| CFE [†] | Configuration Enable | MLA | My Listen Address |
| CFG [†] | 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 | | |

[†] 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 |

Multi-Device NI-488.2

| 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 | Set up 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 (ibtm0)

| Constant | Decimal Value | Minimum Timeout |
|----------|---------------|-----------------------|
| TNONE | 0 | disabled (no timeout) |
| T10us | 1 | 10 μ s |
| T30us | 2 | 30 μ s |
| T100us | 3 | 100 μ s |
| T300us | 4 | 300 μ 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 |

© 2001–2004 National Instruments Corporation. All rights reserved.

National Instruments™, NI™, ni.com™, and NI-488.2™ are trademarks of National Instruments Corporation. Product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering National Instruments products, refer to the appropriate location: **Help»Patents** in your software, the `patents.txt` file on your CD, or ni.com/patents.



370497B-01

Mar04