

# Instrument Control Toolbox Release Notes

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The “Instrument Control Toolbox 2.2 Release Notes” describe the changes introduced in the latest version of the Instrument Control Toolbox. The following topics are discussed in these Release Notes:

- “New Features” on page 1-2
- “Major Bug Fixes” on page 1-2
- “Vendor Driver Requirements and Limitations” on page 1-3
- “Upgrading from an Earlier Release” on page 1-8
- “Known Software and Documentation Problems” on page 1-9

The Instrument Control Toolbox Release Notes also provide information about recent versions of the product, in case you are upgrading from a version that was released prior to Release 14SP1+.

- “Instrument Control Toolbox 2.1.2 Release Notes” on page 2-1
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## **Printing the Release Notes**

If you would like to print the Release Notes, you can link to a PDF version.



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## **New Features**

### **Advantech GPIB Supported**

Supported GPIB interfaces now include Advantech GPIB.

For further information, type

```
instrhelp gpib
```

## **Major Bug Fixes**

The Instrument Control Toolbox 2.2 includes several minor bug fixes made since Version 2.1.2.

If you are upgrading from a release earlier than Release 14SP1+, you should also see “Major Bug Fixes” on page 2-2.



## Vendor Driver Requirements and Limitations

The requirements and limitations for the vendor GPIB and VISA drivers supported by the Instrument Control Toolbox are described below.

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**Note** The limitations described in this section are restricted to the limitations directly associated with using the Instrument Control Toolbox.

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### Driver Requirements

You can use the Instrument Control Toolbox with the GPIB and VISA drivers listed below.

Interface	Vendor	Driver Requirements
GPIB	Advantech	Advantech version 1.0 or higher
	Agilent	SICL version H.012.02.00
	Capital Equipment Corporation	CEC-488 version 5.08
	CONTEC	API-GPLV version 1.33
	ICS Electronics	ICS 488.2 version 2.0.3.15 or higher
	IOTech	IOTech version 1.0
	Keithley	Keithley-488 version 5.08
	Measurement Computing Corporation	GPIB-32 version 2.12
	National Instruments	NI-488 version 1.41.7649

<b>Interface</b>	<b>Vendor</b>	<b>Driver Requirements</b>
VISA	Agilent	Agilent IO Libraries version M.01.01.04
	National Instruments	NI-VISA version 3.0
	Tektronix	Tektronix VISA version 2.2

See the following sections for a description of

- “GPIB Driver Limitations” on page 1-4
- “VISA Driver Limitations” on page 1-7

## **GPIB Driver Limitations**

### **Advantech**

The Advantech GPIB driver has these limitations:

- Asynchronous read and write operations are not supported. Therefore, Advantech GPIB objects do not support the following toolbox functionality:
  - The `readasync` function
  - The `async` flag for the `fprintf` and `fwrite` functions
  - `BytesAvailableAction` and `OutputEmptyAction` properties

### **Agilent Technologies**

The Agilent GPIB driver has these limitations:

- Asynchronous read and write operations are not supported. Therefore, Agilent GPIB objects do not support the following toolbox functionality:
  - The `readasync` function
  - The `async` flag for the `fprintf` and `fwrite` functions
  - `BytesAvailableAction` and `OutputEmptyAction` properties

- The End Or Identify (EOI) line is not asserted when the End-Of-String (EOS) character is written to the hardware. Therefore, when the `EOSMode` property is configured to write and the `EOIMode` property is configured to on, the EOI line is not asserted when the `EOSCharCode` property value is written to the hardware.
- All eight bits are used for the EOS comparison. Therefore, the only value supported by the `CompareBits` property is 8.
- A board index value of 0 is not supported.
- An error is not reported for an invalid primary address. Instead, the read and write operations will time out.

### **Capital Equipment Corporation**

The Capital Equipment Corporation (CEC) GPIB driver has these limitations:

- Asynchronous read operations are not supported. Therefore, CEC GPIB objects do not support the following toolbox functionality:
  - The `readasync` function
  - The `async` flag for the `fprintf` and `fwrite` functions
  - The `BytesAvailableAction` and `OutputEmptyAction` properties
- The Handshake and Bus Management line values are not provided. The `BusManagementStatus` and `HandshakeStatus` properties always return the line values as on.
- The EOI line is not asserted when the EOS character is written to the hardware. Therefore, when the `EOSMode` property is configured to write and the `EOIMode` property is configured to on, the EOI line is not asserted when the `EOSCharCode` property value is written to the hardware.
- All eight bits are used for the EOS comparison. Therefore, the only value supported by the `CompareBits` property is 8.
- You should not simultaneously use a GPIB controller address of 0 and an instrument primary address of 0.

### **ICS Electronics**

The ICS Electronics GPIB adaptor only works with their USB GPIB controller. However, you can still use their other controllers (PCI/PCMCIA) by using the `mcc` adaptor. See Solution 1-1BFZ2 on the MathWorks support Web site.

## **IOTech**

The IOTech GPIB driver has these limitations:

- Asynchronous read and write operations are not supported. Therefore, IOTech GPIB objects do not support the following toolbox functionality:
  - The `readasync` function
  - The `async` flag for the `fprintf` and `fwrite` functions
  - The `BytesAvailableAction` and `OutputEmptyAction` properties.
- Incorrect values are returned for the REN and IFC bus management lines. The `BusManagementStatus` property always returns a value of `on` for the `RemoteEnable` and the `InterfaceClear` fields.
- The EOI line is not asserted when the EOS character is written to the hardware. Therefore, when the `EOSMode` property is configured to `write` and the `EOIMode` property is configured to `on`, the EOI line will not be asserted when the `EOSCharCode` property value is written to the hardware.

## **Keithley**

The Keithley GPIB driver has these limitations:

- Asynchronous read and write operations are not supported. Therefore, Keithley GPIB objects do not support the following toolbox functionality:
  - The `readasync` function
  - The `async` flag for the `fprintf` and `fwrite` functions
  - The `BytesAvailableAction` and `OutputEmptyAction` properties
- The Handshake and Bus Management line values are not provided. The `BusManagementStatus` and `HandshakeStatus` properties always return the line value as `on`.
- The EOI line is not asserted when the EOS character is written to the hardware. Therefore, when the `EOSMode` property is configured to `write` and the `EOIMode` property is configured to `on`, the EOI line will not be asserted when the `EOSCharCode` property value is written to the hardware.
- All eight bits are used for the EOS comparison. Therefore, the only value supported by the `CompareBits` property is 8.
- You should not simultaneously use a GPIB controller address of 0 and an instrument primary address of 0.

## Measurement Computing Corporation

The Measurement Computing Corporation GPIB driver does not support asynchronous notification for the completion of read and write operations. Therefore, Measurement Computing Corporation GPIB objects do not support the following toolbox functionality:

- The readasync function
- The async flag for the fprintf and fwrite functions
- The BytesAvailableAction and OutputEmptyAction properties

## VISA Driver Limitations

### Agilent Technologies

The Agilent VISA driver has these known limitations:

- Asynchronous read and write operations for GPIB, GPIB-VXI and VXI VISA objects are not supported. Therefore, the following toolbox functionality is not supported for these objects:
  - The readasync function
  - The BytesAvailableAction and OutputEmptyAction properties
- All eight bits are used for the EOS comparison. Therefore, the only value supported by the CompareBits property is 8.

### National Instruments

The National Instruments VISA driver uses all eight bits for the EOS comparison. Therefore, the only value supported by the CompareBits property is 8.

## **Upgrading from an Earlier Release**

There are no upgrade issues involved in moving from the Instrument Control Toolbox 2.1.2 to Version 2.2.

If you are upgrading from a version earlier than 2.1.2, you should also see “Upgrading from an Earlier Release” on page 4-9 in the Instrument Control Toolbox 2.0 Release Notes.

## Known Software and Documentation Problems

The sections below describe known problems.

### **Serial Port Conflict**

The serial port is not locked by MATLAB, so other applications or other instances of MATLAB can access the same serial port. This might result in a conflict.

### **instrhwinfo Returns Incorrect Vendor Driver Version**

The vendor driver version returned by `instrhwinfo` to the `VendorDriverVersion` field is incorrect for Tektronix VISA and Agilent VISA.

### **instrhwinfo or tmtool Might Show Nonexistent Hardware**

In some cases on Windows machines, `instrhwinfo` or the Test & Measurement Tool (`tmtool`) might list GPIB adaptors as installed for manufacturers that are not actually installed on your machine. If you know this hardware is not present on your machine, it is generally safe to ignore the extra entries. If these entries appear to be causing problems with the toolbox, remove the adaptor for which there is no hardware. The adaptors are located in

```
matlabroot/toolbox/instrument/instrumentadaptors/win32/
```

The adaptors are named `mw<manufacturer>gpib.dll`. For example, if 'contec' was incorrectly appearing, you can remove `mwcontecgpib.dll`.





# Instrument Control Toolbox 2.1.2 Release Notes

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### Major Bug Fixes

The Instrument Control Toolbox 2.1.2 includes the following bug fixes made since Version 2.1.

If you are upgrading from a release earlier than Release 14SP1, you should also see “Major Bug Fixes” on page 3-3.

#### **instrhwinfo and tmtool Show GPIB Boards**

In earlier versions of the toolbox, `instrhwinfo` and the Test & Measurement Tool (`tmtool`) would not always show your available GPIB boards unless there were instruments connected to the boards and turned on. These functions now properly show the boards reported by the driver, regardless of whether instruments are connected and/or powered on.

#### **tmtool Logs Property Changes to Interface Objects**

In R14, the generated code in the session log for interface objects indicated that it included property changes to the object that were made in the Test & Measurement Tool (`tmtool`). These changes were not actually included in the generated code, but now they are included.

#### **Bug Fixes to tmtool**

A number of minor bugs in the Test & Measurement Tool (`tmtool`) have been fixed.

## **Upgrading from an Earlier Release**

There are no upgrade issues involved in moving from the Instrument Control Toolbox 2.1 to Version 2.1.2.

If you are upgrading from a version earlier than 2.0, you should also see “Upgrading from an Earlier Release” on page 4-9 in the Instrument Control Toolbox 2.0 Release Notes.



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## New Features

This section summarizes the new features and enhancements introduced in the Instrument Control Toolbox 2.1.

If you are upgrading from a release earlier than Release 14, you should also see “New Features” on page 4-2 in the Instrument Control Toolbox 2.0 Release Notes.

### New Instrument Control Blockset Library

The Instrument Control Toolbox includes a Simulink interface called the Instrument Control Blockset library. The new library includes two blocks:

- To Instrument
- Query Instrument

The blocks of the Instrument Control Blockset library provide an interface for sending live data from your Simulink model to an instrument, and for querying an instrument to receive live data into your model.

To open the Instrument Control Blockset library, enter

```
instrumentlib
```

at the MATLAB prompt.

For detailed information about each of the blocks, see the “Block Reference” chapter of the Instrument Control Toolbox User’s Guide. For an introduction to the library with an example of how to use its blocks, see the chapter “Using the Instrument Control Blockset Library” in the Instrument Control Toolbox User’s Guide.

## Major Bug Fixes

The Instrument Control Toolbox 2.1 includes the following bug fixes made since Version 2.0.

If you are upgrading from a release earlier than Release 14, you should also see “Major Bug Fixes” on page 4-8.

### **Functions Failed for *VXIplug&play* and IVI-C Device Objects**

Built-in and device-specific device object functions, such as `connect` and `geterror`, would fail unexpectedly in Version 2.0 for device objects using *VXIplug&play* and IVI-C drivers. This bug has been fixed in Version 2.1.

## **Upgrading from an Earlier Release**

There are no upgrade issues involved in moving from the Instrument Control Toolbox 2.0 to Version 2.1.

If you are upgrading from a version earlier than 2.0, you should also see “Upgrading from an Earlier Release” on page 4-9 in the Instrument Control Toolbox 2.0 Release Notes.



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### **New Features**

This section summarizes the new features and enhancements introduced in the Instrument Control Toolbox 2.0.

If you are upgrading from a release earlier than Release 13, you should see “New Features” on page 5-2 in the Instrument Control Toolbox 1.2 Release Notes.

## Device Objects and Support for Instrument Drivers

Device objects allow you to configure and query an instrument without having to learn the instrument's command set.

You create a device object with the `icdevice` function. `icdevice` requires a MATLAB instrument driver as an argument. Depending on the exact type of driver, you may also have to provide a resource name or interface object. Interface objects provide a connection to the interface associated with your instrument (GPIB, serial, and so on) and were referred to as instrument objects in previous versions of the toolbox. MATLAB instrument drivers are files that contain the instrument's command set. The following drivers are available.

Driver	Description
<code>agilent_33120</code>	Agilent Technologies function generator
<code>agilent_34401a</code>	Agilent Technologies multimeter
<code>agilent_e3648a</code>	Agilent Technologies power supply
<code>tektronix_tds210</code>	Tektronix TDS 210 oscilloscope

Note that you can create new instrument drivers and modify existing instrument drivers with the MATLAB Instrument Driver Editor.

### Device Object Functions

To list all the functions associated with device objects, type

```
instrhelp
```

In addition to new functions, existing toolbox functions have been updated to work with device objects.

### Device Object Properties

To list all the properties associated with device objects, type

```
instrhelp icdevice
```

### **New Test & Measurement Tool – tmtool**

Use the Test & Measurement Tool to configure and communicate with any hardware available to the Instrument Control Toolbox. This tool enables you to

- Search of available hardware and drivers
- Create instrument objects
- Configure instrument settings
- Connect to an instrument
- Write data to an instrument
- Read data from an instrument
- Save a log of your session as an M-file

For more information, see the `tmtool` reference page in the Instrument Control Toolbox User's Guide.

## **New MATLAB Instrument Driver Editor – midedit**

Use the MATLAB Instrument Driver Editor to create or modify MATLAB instrument drivers. This tool enables you to

- Add/remove/modify driver properties
- Add/remove/modify driver functions
- Define MATLAB code to wrap around commands sent to instrument by the driver
- Import IVI and VXIplug&play drivers to create MATLAB instrument drivers

For more information, see the “The Instrument Driver Editor” chapter in the Instrument Control Toolbox User’s Guide.

## **New MATLAB Instrument Driver Testing Tool – midtest**

Use the MATLAB Instrument Driver Testing Tool to test your MATLAB instrument drivers. This tool enables you to

- Verify driver property behavior
- Verify driver function behavior
- Save the driver test as a test file, MATLAB code, or driver function
- Export the test results to the MATLAB workspace, figure window, MAT-file, or the MATLAB array editor
- Save test results as an HTML page

For more information, see the “The Instrument Driver Testing Tool” chapter in the Instrument Control Toolbox User’s Guide.

### **GPIB Board ID and Constructor Returned by instrhwinfo**

The `instrhwinfo` function returns the GPIB board ID and the constructor syntax.

```
instrhwinfo('gpib','ni')

ans =
  AdaptorDllName: [1x69 char]
      AdaptorDllVersion: 'Version 2.0'
      AdaptorName: 'ni'
      InstalledBoardIds: 0
      ObjectConstructorName: {'gpib('ni', 0, 1);'}
      VendorDllName: 'gpib-32.dll'
      VendorDriverDescription: 'NI-488'
```

### **TCP/IP and USB VISA Interfaces**

TCP/IP and USB are now supported as VISA interfaces.

For further information, type

```
instrhelp visa
```

### **VISA Aliases**

Support has been added for VISA aliases. You can now assign an alias to a VISA resource name and use either the alias or the VISA resource name when constructing the object. To help with this, an `Alias` property has been added to all types of VISA objects.

For further information, type

```
instrhelp visa
```

### **CONTEC and ICS GPIB Supported**

Supported GPIB interfaces now include CONTEC GPIB and ICS USB GPIB.

For further information, type

```
instrhelp gpib
```

## **New Instrument Object Property – ObjectVisibility**

The `ObjectVisibility` property enables you to hide objects from command-line users. This is useful for application developers who do not want users of their applications to access the instrument objects created by the application. For more information, see the `ObjectVisibility` reference page in the Instrument Control Toolbox User's Guide.

## **Finding Hidden Objects – instrfindall**

The `instrfindall` function enables you to access instrument objects whose `ObjectVisibility` property is set to `off`. For more information, see the `instrfindall` reference page in the Instrument Control Toolbox User's Guide.

## **New Interface for instrcreate and instrcomm**

The `instrcreate` and `instrcomm` tools have been redesigned for Version 2.0. For more information, see the `instrcreate` and `instrcomm` reference pages in the Instrument Control Toolbox User's Guide.

## **Async Read/Write for Agilent VISA**

The Agilent VISA driver now supports the `async` flag for the `fprintf` and `fwrite` functions.

### **Major Bug Fixes**

The Instrument Control Toolbox 2.0 includes the following bug fix made since Version 1.2.

If you are upgrading from a release earlier than Release 13 with Service Pack 1, then you should also see “Major Bug Fixes” on page 5-4.

#### **Using Modal Dialog Box with Tek-VISA Adaptor**

When communicating with an instrument using the Tek-VISA adaptor, MATLAB no longer hangs if a modal dialog box is opened.



## **Upgrading from an Earlier Release**

There are no upgrade issues involved in moving from the Instrument Control Toolbox 1.2 to Version 2.0.

If you are upgrading from a version earlier than 1.2, you should also see “Upgrading from an Earlier Release” on page 5-5 in the Instrument Control Toolbox 1.2 Release Notes.



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## New Features

This section summarizes the new features and enhancements introduced in the Instrument Control Toolbox 1.2.

If you are upgrading from a release earlier than Release 12.1, then you should see “New Features” on page 6-2 in the Instrument Control Toolbox 1.1 Release Notes.

### New Objects for Networked Instruments

The toolbox now includes objects that enable you to control instruments that are available on a network (that is, they have a network address). Two new instrument objects are supported: the TCP/IP and UDP objects.

#### TCP/IP Object

The TCP/IP object allows you to control networked instruments using the TCP/IP protocol. For an example that uses the TCP/IP object, type

```
instrhelp tcpip
```

#### UDP Object

The UDP object allows you to control networked instruments using the UDP protocol. For an example that uses the UDP object, type

```
instrhelp udp
```

### Configure Properties with the Property Inspector

You can use the Property Inspector to configure property values for instrument objects. You open the Property Inspector with the `inspect` function.

```
g = gpib('ni',0,1);  
inspect(g)
```

### Access Objects Using the Workspace Browser

You can configure properties and view information associated with instrument objects via the MATLAB Workspace browser.

- 1 Launch the Property Inspector by double-clicking an instrument object variable.

- 2 Right-click an instrument object variable to
  - Display summary information
  - Invoke the Property Inspector
  - Display hardware information
  - Get instrument help, listing functions and properties

## **Rohde & Schwarz Support**

You can now communicate with Rohde & Schwarz instruments over the network using Rohde & Schwarz's VISA passport by creating a VISA object. The `visa` creation function requires `ni` as the vendor, and `RSIB::remote_host::INSTR` as the resource name, where `remote_host` is the host name or IP address of the instrument.

## Major Bug Fixes

The Instrument Control Toolbox 1.2 includes several bug fixes made since Version 1.1. This section describes the particularly important Version 1.2 bug fixes.

### Memory Leaks

- Memory leaks no longer occur when reading data from an instrument.
- Memory leaks no longer occur when opening and closing the serial port connection.

### Serial Port Issues

- Serial port objects now work with the baud rates 128,000 and 256,000 along with all other standard baud rates listed in the BaudRate property help.
- MATLAB can now find serial ports if the MATLAB root directory contains an underscore.
- On Windows, serial port objects now recognize ports greater than COM4.
- On Solaris, there is no restriction on the number of times that the serial port can be opened.
- On Linux, there is a significant speed increase when writing data to the serial port.

## Upgrading from an Earlier Release

This section describes the upgrade issues involved in moving from the Instrument Control Toolbox 1.1 to Version 1.2.

If you are upgrading from a version earlier than 1.1, then you should see “Upgrading from an Earlier Release” on page 6-4 in the Instrument Control Toolbox 1.1 Release Notes.

### **delete Function**

If you delete an open instrument object, then `fclose` is automatically called and the object is closed before deletion.

### **Measurement Computing GPIB Boards**

The vendor name for Measurement Computing (ComputerBoards) hardware is now `mcc`. For this release, you can still use the previous vendor name (`cbi`), although this name will not be supported in future toolbox releases.





# Instrument Control Toolbox 1.1 Release Notes

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## New Features

This section introduces the new features and enhancements in the Instrument Control Toolbox 1.1, added since the Instrument Control Toolbox 1.0 (Release 12.0). For a brief introduction to the product, refer to “Introduction to the Instrument Control Toolbox” on page 7-2.

### VXI Block and FIFO Read Operations

For VISA-VXI and VISA-GPIB-VXI objects, you can specify if the VXI register offset increments after data is transferred with the `MemoryIncrement` property.

You can configure `MemoryIncrement` to be `block` or `FIFO`. If `MemoryIncrement` is `block`, the `memread` and `memwrite` functions increment the offset after every read and write operation, and data is transferred from consecutive memory elements. If `MemoryIncrement` is `FIFO`, the `memread` and `memwrite` functions always read from or write to the same memory element. Note that the Instrument Control Toolbox 1.0 supported only block data transfer.

### Freeing the Serial Port on Windows Platforms

The serial port object uses the `javax.comm` package to communicate with the serial port. However, due to a memory leak in `javax.comm`, the serial port object is not released from memory. You can use the `freeserial` function to release the MATLAB hold on the serial port.

`freeserial` is necessary only on Windows platforms. You should use `freeserial` only if you need to connect to the serial port from another application after a serial port object has been connected to that port, and you do not want to exit MATLAB.

### Data Parsing

You can parse formatted data read from your instrument with the `scanstr` function. The data is parsed according to the specified delimiters, and is stored in a cell array as either a double or a string.

## binblock Data Transfer

The binary-block (binblock) format is defined as #<N><D><A> where:

- N specifies the number of digits D that follow.
- D specifies the number of data bytes A that follow.
- A is the data to written to the instrument.

You can transfer binblock data between MATLAB and your instrument with the `binblockread` and `binblockwrite` functions.

## Tektronix VISA Support

Tektronix VISA is supported for serial and GPIB interfaces.

## Enhancements to Existing Functions and Properties

### Terminator and EOSCharCode Properties

For serial port and VISA-serial objects, you can configure `Terminator` to a decimal value ranging from 0 to 127, to the equivalent ASCII character, or to empty ("). For serial port objects, you can also set `Terminator` to CR/LF or LF/CR.

For GPIB- and VXI-related objects, you can configure `EOSCharCode` to a decimal value ranging from 0 to 255, or to the equivalent ASCII character.

### Timer Events

Some timer events may not be processed if your system is significantly slowed or if the `TimerPeriod` value is too small. The minimum `TimerPeriod` value is now 0.01 second.

### VXI Register Read and Write Functions

The `memread`, `memwrite`, `mempeek` and `mempoke` functions now handle single precision values.

### CompareBits Property

For VISA-GPIB, VISA-VXI, and VISA-GPIB-VXI objects, the `CompareBits` property no longer exists since its only supported value is 8.

## Upgrading from an Earlier Release

This section describes the upgrade issues involved in moving the Instrument Control Toolbox 1.0 (Release 12.0) to the Instrument Control Toolbox 1.1 (Release 12.1).

### **Events, Callbacks, and Function Handles**

Action properties and action functions are now referred to as callback properties and callback functions. This new terminology is reflected in new names for the associated properties and functions. The general rule for the name changes is to change “Action” to “Fcn” for properties, and “action” to “callback” for functions. For example, `TimerAction` has been renamed `TimerFcn`, and `instraction` has been renamed `instrcallback`.

Additionally, if you want to automatically pass the object and event information to the callback function, then you must specify the function as either a function handle or as a cell array. Note that you can also specify the callback function as a string. In this case, the callback is evaluated in the MATLAB workspace and no requirements are made on the function’s input arguments.

# Instrument Control Toolbox 1.0 Release Notes

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## Introduction to the Instrument Control Toolbox

The Instrument Control Toolbox 1.0 is a new product from The MathWorks that provides a framework for communicating with instruments that support the GPIB interface (IEEE-488, HP-IB), the VISA standard, and the serial port interface (RS-232, RS-422, and RS-485).

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**Note** The toolbox extends the serial port features included with MATLAB.

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### Supported Platforms

The supported platforms and associated toolbox features are given below.

Platform	Supported Toolbox Features
Microsoft Windows 98, Windows 2000, and Windows NT 4.0	All features
Sun Solaris	National Instruments GPIB
	National Instruments VISA
	Serial port
Linux	Serial port

### Object-Based Design

Based on MATLAB object technology, the Instrument Control Toolbox provides functions for creating objects directly associated with your instrument.

You can create objects for instruments that support the GPIB interface, the VISA standard, and serial port interface. For example, the following command creates the GPIB object `g` associated with a National Instruments GPIB controller with board index 0, and an instrument with primary address 1.

```
g = gpib('ni',0,1);
```

`g` contains all the necessary parameters for communicating with the instrument.

---

## Reading and Writing Data

Functions are available for transferring data between MATLAB and your instrument:

- The data can be binary (numerical) or text.
- Text data can be any command used by your instrument such as a command given by the Standard Commands for Programmable Instruments (SCPI) language.
- The transfer can be synchronous and block the command line, or asynchronous and not block the command line.

## Events and Actions

You can enhance the power and flexibility of your instrument control application by using events. An event occurs after a condition is met and may result in one or more actions. For example, you can use events to display a message, display data, or analyze data.

You configure actions through action properties and action functions. All event types have an associated action property. Action functions are M-file functions that you construct to suit your specific application needs.

Event types supported by the Instrument Control Toolbox include error events, timer events, and bytes-available events.

## Data Recording

Functions are provided for recording instrument commands, data, and events to one or more disk files. Recording this information to disk provides a permanent record of your instrument control session, and is an easy way to debug your application.

## Graphical Tools

Tools are provided that facilitate instrument control in an easy-to-use graphical environment. Using these tools, you can:

- Create and configure an instrument object
- Communicate with your instrument via text commands

