

Data Acquisition Toolbox Release Notes

The “Data Acquisition Toolbox 2.2 Release Notes” on page 1-1 describe the changes introduced in the latest version of the Data Acquisition Toolbox. The following topics are discussed in these Release Notes:

- “New Features” on page 1-2
- “Major Bug Fixes” on page 1-6
- “Upgrading from an Earlier Release” on page 1-7
- “Known Software and Documentation Problems” on page 1-8

The Data Acquisition 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 12.1. If you are upgrading from a release earlier than Release 12.1, you should also see these sections:

- “Data Acquisition Toolbox 2.1 Release Notes” on page 2-1
- “Data Acquisition Toolbox 2.0 Release Notes” on page 3-1

Printing the Release Notes

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



Data Acquisition Toolbox 2.2 Release Notes

1

New Features	1-2
Keithley Adaptor	1-2
Software Oscilloscope	1-2
Parallel Port Adaptor	1-3
Access Objects Using the Workspace Browser	1-4
Additional Hardware Support	1-4
Adaptor Kit	1-5
Major Bug Fixes	1-6
National Instruments Hardware	1-6
Measurement Computing Hardware	1-6
getvalue and putvalue Performance	1-6
daqread Works Correctly with Large Files	1-6
Upgrading from an Earlier Release	1-7
Measurement Computing Hardware	1-7
National Instruments Hardware	1-7
daqhwinfo Function	1-7
daqread Function	1-7
Known Software and Documentation Problems	1-8
Keithley Hardware	1-8

Data Acquisition Toolbox 2.1 Release Notes

2

New Features	2-2
Additional National Instruments Hardware Support	2-2
High Resolution Sound Card Support	2-2
Upgrading from an Earlier Release	2-3

Events, Callbacks, and Function Handles	2-3
Known Software and Documentation Problems	2-4
High Resolution Sound Cards	2-4
The putdata Function	2-4
The daqread Function	2-4
Vendor Limitations	2-4

Data Acquisition Toolbox 2.0 Release Notes

3

New Features	3-2
ComputerBoards Support	3-2
Adaptor Kit	3-2
New Functions and Properties	3-3
Modified Functions and Properties	3-4
Major Bug Fixes	3-5
Upgrading from an Earlier Release	3-6
Vendor Drivers	3-6
Removed and Obsolete Functions	3-6
Two daqhwinfo Fields Removed	3-6
Known Software Problems	3-7
Functions	3-7
Vendors	3-7

Data Acquisition Toolbox

2.2 Release Notes

New Features	1-2
Keithley Adaptor	1-2
Software Oscilloscope	1-2
Parallel Port Adaptor	1-3
Access Objects Using the Workspace Browser	1-4
Additional Hardware Support	1-4
Adaptor Kit	1-5
Major Bug Fixes	1-6
National Instruments Hardware	1-6
Measurement Computing Hardware	1-6
getvalue and putvalue Performance	1-6
daqread Works Correctly with Large Files	1-6
Upgrading from an Earlier Release	1-7
Measurement Computing Hardware	1-7
National Instruments Hardware	1-7
daqwinfo Function	1-7
daqread Function	1-7
Known Software and Documentation Problems	1-8
Keithley Hardware	1-8

New Features

This section summarizes the new features and enhancements introduced in the Data Acquisition Toolbox 2.2.

If you are upgrading from a release earlier than Release 12.1, then you should see “New Features” on page 2-2 in the Data Acquisition Toolbox 2.1 Release Notes.

Keithley Adaptor

The Data Acquisition Toolbox now supports Keithley hardware that uses the DriverLINX driver. You can create device objects associated with the analog input, analog output, and digital I/O subsystems for these boards. A complete list of supported devices is provided by the MathWorks Web site at <http://www.mathworks.com/products/daq/hardware.shtml>.

Example: Creating a Keithley Analog Input Object

To create an analog input object associated with your Keithley hardware, you must supply the Keithley adaptor name and the hardware device ID to the `analoginput` creation function. Note that you configure the ID with the DriverLINX configuration panel.

```
ai = analoginput('keithley',1);
```

You can use the `set` function to display the properties associated with `ai`.

```
set(ai)
```

Software Oscilloscope

The software oscilloscope is a graphical tool that duplicates and extends the functionality of a real-world oscilloscope. Using this tool, you can access hardware channels, and display and analyze acquired data. To open the software oscilloscope, type

```
softscope
```

Parallel Port Adaptor

The toolbox provides access to your computer's parallel port through a digital I/O object. You create a digital I/O object with the `digitalio` function.

```
parport = digitalio('parallel','LPT1')
```

You can display port-specific information with the `daqwinfo` function.

```
out = daqwinfo(parport)
out =
    AdaptorName: 'parallel'
    DeviceName: 'PC Parallel Port Hardware'
    ID: 'LPT1'
    Port: [1x3 struct]
    SubsystemType: 'DigitalIO'
    TotalLines: 17
    VendorDriverDescription: 'Win I/O'
    VendorDriverVersion: '1.3'
```

The parallel port device object provides access to the three available ports:

- Port 0—Eight input/output lines used for data
- Port 1—Five input lines used for status
- Port 2—Four input/output lines used for control

The parallel port device object contains two device-specific properties—`BiDirectionalBit` and `PortAddress`. Use the `daqhelp` function for a description of these properties.

```
daqhelp BiDirectionalBit
daqhelp PortAddress
```

Access Objects Using the Workspace Browser

You can configure properties and view information associated with device objects via the MATLAB Workspace browser:

- Start the Data Acquisition Property Editor by double-clicking a device object variable.
- Right-click a device object variable and select the **Explore** menu to
 - Display summary information
 - Invoke the Property Editor
 - Display hardware information
 - Display event information
 - List the functions and properties

Additional Hardware Support

Measurement Computing

The following Measurement Computing Corporation devices are supported with Universal Library 5.2.2 or InstaCal 1.16:

- PC-CARD-DAC08
- PCI-DDA06/16
- PCI-DIO24H
- PCI-DIO48H
- PCI-DIO96
- PCI-DIO96H
- PCI-DAS1602/16
- PCI-DAS6025
- PCI-DAS6034
- PCI-DAS6035

National Instruments

The following National Instruments devices are supported with NI-DAQ 6.9.2:

- DAQCard-6034E
- DAQCard-6036E
- DAQCard-6052E
- DAQPad-6024E
- DAQPad-6025E
- DAQPad-6036E
- DAQPad-6052E
- NI 4472-1394
- PCI-4472
- PCI-4474
- PCI-6036E
- PCI-6222
- PCI-6731
- PCI-6733

Adaptor Kit

- Added ComTester tool to verify correct adaptor registration
- Improved the documentation including detailed step-by-step instructions for creating an adaptor

Major Bug Fixes

Note If you are upgrading from a release earlier than Release 12.1, then you should also see “Major Bug Fixes” on page 3-5 in the Data Acquisition Toolbox 2.0 Release Notes.

National Instruments Hardware

For National Instruments hardware, you can now specify any supported trigger condition for external trigger types.

Measurement Computing Hardware

For Measurement Computing hardware, you can take advantage of simultaneous input/output by using the Universal Library 5.2.2 (or later) drivers or the associated release of the InstaCal (1.16) software.

getvalue and putvalue Performance

The performance of `getvalue` and `putvalue` has been enhanced.

daqread Works Correctly with Large Files

`daqread` works correctly with large files, including files greater than 2 GB.

Upgrading from an Earlier Release

This section describes the upgrade issues involved in moving from the Data Acquisition Toolbox 2.1 to Version 2.2.

If you are upgrading from a version earlier than 2.1, then you should see “Upgrading from an Earlier Release” on page 2-3 in the Data Acquisition Toolbox 2.1 Release Notes.

Measurement Computing Hardware

- The adaptor name for Measurement Computing (ComputerBoards) hardware is now `mcc`. For this release, you can still use the previous adaptor name (`cbi`), although this name will not be supported in future toolbox releases.
- To take advantage of simultaneous input/output, you should use the Universal Library 5.2.2 (or later) drivers or the associated release of the InstaCal (1.16) software. You can download the software from <http://www.measurementcomputing.com>.

National Instruments Hardware

If you are using National Instruments hardware, you should upgrade to NI-DAQ 6.9.2.

daqwinfo Function

- The `MatlabVersion` field of `daqwinfo` is now `MATLABVersion`. If your scripts or functions use this field, they should be updated accordingly.
- The string values returned by the `ToolboxVersion` and `MATLABVersion` fields have different formatting.

daqread Function

- `daqread` is now available as part of MATLAB. Therefore, toolbox users can share their data files with anyone who owns MATLAB.
- `daqread` works correctly with large files, including files greater than 2 GB.

Known Software and Documentation Problems

This section describes known problems associated with Keithley hardware.

For a list of bugs reported in the previous release that remain open, see “Known Software and Documentation Problems” on page 2-4.

Keithley Hardware

Known problems associated with Keithley hardware are described below. If there is a known resolution, then it is described as well.

Problem	Boards	Comments
Data missed event on output	KCPI-1801/02 KPCI-3110	For high sample rates and large numbers of samples, these boards may drop samples on output. To avoid this problem, try increasing the default <code>BufferingConfig</code> property value.
No output at maximum sampling rate	KPCI-3110	When the sampling rate is set above 600 kHz, the output is corrupted.
Cannot sample properly below 10 Hz	KPCI-3110	For sample rates at or below approximately 10 Hz, the acquisition takes longer than expected. For example, a one second acquisition at 10 Hz takes approximately three seconds. This is due to a limitation in the number of blocks that the hardware device can transfer at a time. To avoid this problem, use software clocking.
Time out on output	Software clocked devices	Some software clocked devices may time out when outputting data. This is due to a limitation in the number of blocks that the hardware devices can transfer at a time.
Queuing data while running	KPCI-1801/02HC KPCI-3110	If an analog output object is running and more data is queued, then no data is output. To avoid this problem, try increasing the default <code>BufferingConfig</code> property value.

Problem	Boards	Comments
Digital triggers are not available	All	Digital triggers are not available if supported in interrupt mode. This applies to both start and stop triggers. Digital triggers are available only if supported in DMA mode.
Limited channel skew values	PCMCIA boards	These boards support only these specific channel skew values: 10 us, 20 us, 40 us.
SS/H not supported for analog output	PCMCIA boards, DDA-08, DDA-16	The analog output subsystems for these boards have simultaneous sample and hold (SS/H) capabilities. However, the toolbox does not support this feature.
Repeating triggers may result in dropped samples	All	If the TriggerRepeat property is nonzero, samples may be dropped during acquisition. To avoid this problem, configure the BufferingConfig property to an exact multiple of the SamplesPerTrigger property.
Analog input subsystem not available	KPCMCIA-16AIAO	N/A

Data Acquisition Toolbox

2.1 Release Notes

New Features	2-2
Additional National Instruments Hardware Support	2-2
High Resolution Sound Card Support	2-2
Upgrading from an Earlier Release	2-3
Events, Callbacks, and Function Handles	2-3
Known Software and Documentation Problems	2-4
High Resolution Sound Cards	2-4
The putdata Function	2-4
The daqread Function	2-4
Vendor Limitations	2-4

New Features

This section introduces the new features and enhancements added in the Data Acquisition Toolbox 2.1 since the Data Acquisition Toolbox 2.0 (Release 12.0).

For information about Data Acquisition Toolbox features that are incorporated from Version 2.0, see “New Features” on page 3-2.

Additional National Instruments Hardware Support

These additional National Instruments boards are supported:

- 445x Dynamic Signal Acquisition (DSA) Series boards
- Analog output boards
- Digital I/O boards (no streaming)

High Resolution Sound Card Support

High resolution (greater than 16-bit) sound cards are supported. You configure the resolution of your sound card with the `BitsPerSample` property. `BitsPerSample` can be 8 or any value between 16 and 32.

Note Some sound card drivers may not support this feature because they are still in beta.

Upgrading from an Earlier Release

Note For issues involved in upgrading from the Data Acquisition Toolbox 1.0.1 to the Data Acquisition Toolbox 2.1, see “Upgrading from an Earlier Release” on page 3-6 in the Data Acquisition Toolbox 2.0 Release Notes.

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 `daqaction` has been renamed `daqcallback`.

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.

Known Software and Documentation Problems

This section updates the Data Acquisition Toolbox 2.1 documentation set, describing known software problems.

See “Known Software Problems” on page 3-7 for information about known software problems in Version 2.0.

High Resolution Sound Cards

To use the high resolution capabilities for some sound cards, you may need to configure `BitsPerSample` to 32 even if your device does not use that number of bits.

The `putdata` Function

You should not modify the `BitsPerSample`, `InputRange`, `SensorRange`, and `UnitsRange` properties after calling `putdata`. If these properties are modified, all data is deleted from the data acquisition engine. If you add a channel after calling `putdata`, then all data will be deleted from the buffer.

The `daqread` Function

Property values specified as a cell array are not returned from a `.daq` file.

Vendor Limitations

Limitations associated with the supported vendors are described in “Vendors” on page 3-7.

Data Acquisition Toolbox

2.0 Release Notes

New Features	3-2
ComputerBoards Support	3-2
Adaptor Kit	3-2
New Functions and Properties	3-3
Modified Functions and Properties	3-4
Major Bug Fixes	3-5
Upgrading from an Earlier Release	3-6
Vendor Drivers	3-6
Removed and Obsolete Functions	3-6
Two daqhwinfo Fields Removed	3-6
Known Software Problems	3-7
Functions	3-7
Vendors	3-7

New Features

This section introduces the new features and enhancements added in the Data Acquisition Toolbox 2.0 since the Data Acquisition Toolbox 1.0.1 (Release 11.1).

ComputerBoards Support

The Data Acquisition Toolbox 2.0 supports ComputerBoards hardware. You can create device objects associated with the analog input, analog output, and digital I/O subsystems for these boards.

You should use the Universal Library 5.1 drivers or the associated release of the InstaCal software with your ComputerBoards hardware (<http://www.computerboards.com/>).

Example: Creating a ComputerBoards Analog Input Object

To create the analog input object `ai` associated with your ComputerBoards hardware, you must supply the ComputerBoards adaptor name and the device ID to the `analoginput` creation function.

```
ai = analoginput('cbi',1);
```

You can use the `set` function to display the properties associated with `ai`.

```
set(ai)
```

Adaptor Kit

An adaptor kit for writing additional adaptors for the toolbox is included with this release. The kit includes source code for an example adaptor and documentation of the API. Additionally, the source code for the ComputerBoards, National Instruments, ComputerBoards, Agilent Technologies, and Windows sound card adaptors is included in the `toolbox/daq/daq/src` directory. You can find the adaptor kit software in the `toolbox/daq/daqadaptor` directory. You can download the adaptor kit documentation via the MathWorks Web page at http://www.mathworks.com/pub/mathworks/toolbox/daq/adaptor_kit/AdaptorKit.pdf.

New Functions and Properties

The new Data Acquisition Toolbox 2.0 functions are described below.

Function	Description
<code>addmuxchannel</code>	Add channels when using a National Instruments AMUX-64T multiplexer.
<code>muxchanidx</code>	Return multiplexed scanned channel index.
<code>waittilstop</code>	Wait for the device object to stop running

The new Data Acquisition Toolbox 2.0 properties are described below.

Property	Description
<code>ManualTriggerHwOn</code>	Control when the hardware starts. Valid values are <code>Start</code> and <code>Trigger</code> . A value of <code>Start</code> starts the hardware after the <code>start</code> function executes. A value of <code>Trigger</code> starts the hardware after the <code>trigger</code> function executes. Use the <code>Trigger</code> value to accurately start multiple hardware devices.
<code>NativeOffset</code>	Specify the offset to use when converting data from native format to doubles.
<code>NativeScaling</code>	Specify the scaling to use when converting data from native format to doubles.

Both `NativeOffset` and `NativeScaling` are channel properties for analog input and analog output objects. Therefore, you can configure these properties on a per-channel basis.

Modified Functions and Properties

The modified Data Acquisition Toolbox functions are described below.

Function	Description
daqhwinfo	The ConversionExtraScaling and ConversionOffset fields have been removed. You can use the NativeScaling and NativeOffset properties to convert native data to doubles.
flushdata	You can now specify that data corresponding to an integral number of triggers is flushed from the data acquisition engine.
getdata	The event data structure includes only the events associated with the data being retrieved. Previously, the entire event structure of the device object was returned.

The modified Data Acquisition Toolbox properties are described below.

Property	Description
TriggerChannel	When using National Instruments 611x series boards, you can now specify any channel in the channel list as the trigger source.
TriggerRepeat	You can now define trigger repeats for hardware trigger types.

Major Bug Fixes

The Data Acquisition Toolbox includes several bug fixes, including the following descriptions (online only) of particularly important bug fixes.

Upgrading from an Earlier Release

This section describes the upgrade issues involved in moving from the Data Acquisition Toolbox 1.0.1 to the Data Acquisition Toolbox 2.0.

Vendor Drivers

If you are not using the latest drivers for your hardware, and you experience problems with the toolbox, then you should upgrade your drivers:

- For National Instruments hardware, you should use NI-DAQ 6.7.0 (<http://www.ni.com/nidaq>). Note that you should be able to use NI-DAQ 6.8, although the toolbox has not been fully tested against this driver version.
- For Agilent Technologies hardware, you should use VXI Plug and Play Drivers version A.06.04 (<http://www.tm.agilent.com>).

Removed and Obsolete Functions

The `nidaq`, `winsound`, and `hpe1432` functions have been removed. The information contained in these M-files is included in these Release Notes.

The `obj2code` function has been renamed to `obj2mfile`. `obj2code` will still work but it now produces a warning.

Two daqhwinfo Fields Removed

The `ConversionExtraScaling` and `ConversionOffset` fields of the `daqhwinfo` function have been removed. You can use the `NativeScaling` and `NativeOffset` properties to convert native data to doubles.

Known Software Problems

This section updates the Data Acquisition Toolbox 2.0 documentation set, describing known software problems.

Functions

The `putdata` Function

You should not modify the `BitsPerSample`, `InputRange`, `SensorRange`, and `UnitsRange` properties after calling `putdata`. If these properties are modified, all data is deleted from the data acquisition engine.

If you add a channel after calling `putdata`, then all data will be deleted from the buffer.

The `daqread` Function

Information that you store in the `UserData` property is not returned from a `.daq` file.

Vendors

National Instruments Hardware

- If you use the Data Acquisition Toolbox and National Instruments' Measurement and Automation (M&A) Explorer at the same time, a conflict will occur and you will not be able to access your board. To avoid a conflict, you should access your board using either the toolbox or the M&A Explorer, and close the other software application.
- If you install NI-DAQ on your computer, and then install LabVIEW 6i on the same computer, you will need to reinstall NI-DAQ.
- You must use the PFI7 pin to input an external STARTSCAN signal. You must use the PFI2 pin to input an external CONVERT* signal.
- When running at a sampling rate of 5000 Hz or higher and with a `TransferMode` property value of `Interrupt`, there may be a considerable decline in system performance.
- You should configure the `SampleRate` property with the `setverify` function just before starting the hardware. Note that the `SampleRate` value depends

on the number of channels added to the device object, and the `ChannelSkew` property value depends on the `SampleRate` value.

- When using the 1200 series hardware, you must add channels in reverse order. If you specify invalid channels, the data acquisition engine will create the number of requested channels with valid hardware IDs. You can determine the hardware IDs with the object's `display` or with the `HwChannel` property.
- Only one digital I/O (DIO) object should be associated with a given DIO subsystem. To perform separate tasks with the hardware lines, you should add all the necessary lines to the DIO object, but partition them into separate line groups based on the task.
- All channels contained within an analog input object must have the same polarity. In other words, the `InputRange` property for these channels must have all unipolar values or all bipolar values.
- When using mux boards, you must add channels in a specific order using the `addmuxchannel` function.
- If you have trouble acquiring data with the DAQPad-MIO-16XE-50, you should increase the size of the engine buffer with the `BufferingConfig` property.

ComputerBoards Hardware

- For boards that do not have a channel gain list, an error occurs at startup if all the channel input ranges are not the same or the channel scan order is not contiguous. However, if `ClockSource` is software, this rule does not apply.
- You should configure the `SampleRate` property with the `setverify` function just before starting the hardware. Note that the `SampleRate` value is dependent upon the number of channels added to the device object.
- For boards that do not support continuous background transfer mode (i.e., the board does not have hardware clocking), the only available `ClockSource` property value is software.
- When running at a sampling rate of 5000 Hz or higher and with a `TransferMode` property value of `InterruptPerPoint`, there may be a considerable decline in system performance.

- Most boards do not support simultaneous input and output. However, if software clocking is used, then this limitation does not apply.
- To use hardware digital triggers with the PCI-DAS4020/12 board, you must first configure the appropriate trigger mode with InstaCal.
- Some boards may return erroneous digital I/O ports – usually with an ID of 0.
- Expansion boards are not supported. This includes the CIO-EXP family of products.
- MEGA-FIFO hardware is not supported.

Agilent Technologies Hardware

- When you start an analog input object associated with an E1432A or E1433A board that has the Arbitrary Source Output option, the source is automatically started. Therefore, you should not use a `TriggerType` property value of `Manual` with hardware having this option.
- For analog output objects, you should configure the `SampleRate` and `Span` properties with the `setverify` function just before starting the hardware, since these property values depend on the number of channels contained by the analog output object.
- The first time you connect a device object to an Agilent board, a list of available hardware is determined and all the hardware is initialized. However, this list is not updated during a MATLAB session. Therefore, if you install a new board or remove an existing board while MATLAB is running, you will not see the new configuration. To see the new configuration, you must restart MATLAB. When all device objects are deleted from the data acquisition engine, all the hardware is closed.
- For the E1433A, the minimum sampling rate is 20 Hz and the minimum span is 7.8125.
- The first channel in the `TriggerChannel` property list is used to trigger the object.
- For the E1434A, channels 1 and 2 and channels 3 and 4 share a 56000 DSP. Therefore, certain operational aspects are coupled between the channels in each pair. For example, both channels in each pair will have the same `RampRate` property value.
- You must add channels in increasing order and a channel array cannot contain repeated channels.

- If you create a device object that spans multiple boards, the device object should list the logical addresses using the same order as returned by the `daqwinfo` function. To determine the logical address order, use the `daqwinfo` function with no input arguments and examine the `InstalledBoardIds` field.

Windows Sound Cards

- The maximum sampling rate depends on the `StandardSampleRates` property value. If `StandardSampleRates` is `On`, the maximum `SampleRate` property value is 44100. If `StandardSampleRates` is `Off`, the maximum `SampleRate` property value is 96000 if supported by the sound card.

For some sound cards that allow nonstandard sampling rates, certain value above 67,000 Hz will cause your computer to hang.

- If you are acquiring data when `StandardSampleRates` is `Off`, one of these messages may be returned to the command line depending on the specific sound card you are using:
 - "Invalid format for device winsound" occurs when the sound card does not allow for any nonstandard value.
 - "Device Winsound already in use" occurs when a nonstandard sampling rate is specified and the device takes longer than expected to acquire data.