IMAQ

NI-IMAQ Function Reference Manual

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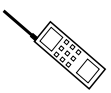

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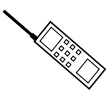

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About This Manual

The *NI-IMAQ Function Reference Manual* is for users of the NI-IMAQ software for PCI bus-based computers. NI-IMAQ is a powerful application programming interface (API) between your image acquisition (IMAQ) application and the National Instruments IMAQ board for PCI bus-based computers.

How to Use the NI-IMAQ Manual Set

Before using this manual, you should read the NI-IMAQ release notes and the *NI-IMAQ User Manual*. The NI-IMAQ release notes contain instructions on how to install your NI-IMAQ software and how to use the online documentation set. The *NI-IMAQ User Manual* contains information on how to program using your National Instruments software. When you are familiar with the material in the *NI-IMAQ User Manual*, use the *NI-IMAQ Function Reference Manual*, which contains detailed descriptions of the NI-IMAQ functions.

Organization of This Manual

The *NI-IMAQ Function Reference Manual* is organized as follows:

- Chapter 1, *Introduction*, contains important information about how to apply the function descriptions in this manual to your programming language and environment.
- Chapter 2, *Generic Functions*, contains a detailed explanation of each generic NI-IMAQ function. The functions are arranged according to the order in which you will use them.
- Chapter 3, *High-Level Functions*, contains a detailed explanation of each high-level NI-IMAQ function. The functions are arranged according to the category of image acquisition procedure—snap, grab, ring and sequence functions, or miscellaneous functions—and then the order in which you will use them.

- Chapter 4, *Low-Level Functions*, contains a detailed explanation of each low-level NI-IMAQ function. The functions are arranged alphabetically under the type of image acquisition procedure—interface (board-specific) functions, session-specific functions, and miscellaneous functions.
- Appendix A, *Attributes and Constants*, describes the attributes and constants used by NI-IMAQ.
- Appendix B, *Status Codes*, describes the status codes returned by NI-IMAQ.
- Appendix C, *Customer Communication*, contains forms you can use to request help from National Instruments or to comment on our products and manuals.
- The *Glossary* contains an alphabetical list and description of terms used in this manual, including abbreviations, acronyms, metric prefixes, mnemonics, and symbols.
- The *Index* contains an alphabetical list of key terms and topics in this manual, including the page where you can find each one.

Conventions Used in This Manual

The following conventions are used in this manual:

» This symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options»Substitute Fonts** directs you to pull down the **File** menu, select the **Page Setup** item, select **Options**, and finally select the **Substitute Fonts** options from the last dialog box.

bold Bold text denotes parameters, menus, menu items, or dialog box buttons or options.

bold italic Bold italic text denotes a note, caution, or warning.

italic Italic text denotes emphasis, a cross reference, or an introduction to a key concept. This font also denotes text for which you supply the appropriate word or value, such as in Windows 3.*x*.

`italic monospace` Italic text in this font denotes that you must supply the appropriate words or values in the place of these items.

`monospace` Lowercase text in this font denotes text or characters that are to be literally input from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, variables, filenames, and extensions, and for statements and comments taken from program code.

Abbreviations, acronyms, metric prefixes, mnemonics, symbols, and terms are listed in the *Glossary*.

National Instruments Documentation

The *NI-IMAQ Function Reference Manual* is one piece of the documentation set for your IMAQ system. You could have any of several types of manuals, depending on the hardware and software in your system. Use the different types of manuals you have as follows:

- Your IMAQ hardware user manual—This manual has detailed information about the IMAQ hardware that plugs into your computer. Use this manual for hardware installation and configuration instructions, specification information about your IMAQ hardware, and application hints.
- Software documentation—You may have both application software and NI-IMAQ software documentation. National Instruments application software includes LabVIEW, LabWindows®/CVI, IMAQ Vision for LabVIEW, and IMAQ Vision for LabWindows/CVI. After you set up your hardware system, use either the application software documentation or the NI-IMAQ documentation to help you write your application. If you have a large and complicated system, it is worthwhile to look through the software documentation before you configure your hardware.
- Accessory installation guides or manuals—If you are using accessory products, read the terminal block and cable assembly installation guides or accessory board user manuals. They explain how to physically connect the relevant pieces of the system. Consult these guides when you are making your connections.

Related Documentation

The following document contains information that you may find helpful as you read this manual:

- Your computer technical reference manual

Customer Communication

National Instruments wants to receive your comments on our products and manuals. We are interested in the applications you develop with our products, and we want to help if you have problems with them. To make it easy for you to contact us, this manual contains comment and configuration forms for you to complete. These forms are in Appendix C, *Customer Communication*, at the end of this manual.

Chapter 1

Introduction

This chapter contains important information about how to apply the function descriptions in this manual to your programming language and environment.

Status Codes

Every NI-IMAQ function is of the following form:

rval = `Function_Name` (parameter 1, parameter 2, ... parameter *n*)

where $n > 0$. Each function returns a status code (**rval**) that indicates the success or failure of the function, as discussed in Appendix B, *Status Codes*.

Variable Data Types

The NI-IMAQ application programming interface (API) is almost identical in Windows 95 and Windows NT, except for some of the parameter data types in each of the environments. LabWindows/CVI uses the same data types as Windows 95 and Windows NT. The following sections describe the notation used in those parameter tables and throughout the manual for variable data types.

Primary Types

Table 1-1 shows the primary type names and their ranges.

Table 1-1. Primary Type Names

Type Name	Description	Range	Type
Int8	8-bit ASCII character	0 to 127, -128 to 0	`char`
uInt8	8-bit ASCII character	0 to 255	`char`
Int16	16-bit signed integer	-32,768 to 32,767	`short`
uInt16	16-bit unsigned integer	0 to 65,535	`unsigned short`
Int32	32-bit signed integer	-2,147,483,648 to 2,147,483,647	`long`
uInt32	32-bit unsigned integer	0 to 4,294,967,295	`unsigned long`

Arrays

When a primary type is inside square brackets (for example, [Int16]) an array of the type named is required for that parameter.

Programming Language Considerations

Apart from the data type differences, there are a few language-dependent considerations you need to be aware of when you use the NI-IMAQ API.

☞ **Note:** ***Be sure to include the NI-IMAQ function prototypes by including the appropriate NI-IMAQ header file in your source code.***

LabVIEW

For information on how to use LabVIEW VIs with your IMAQ system, refer to the *Note to Users, Using Application Software with Your IMAQ Hardware*.

LabWindows/CVI

Inside the LabWindows/CVI environment, the NI-IMAQ functions appear in **Libraries»Image Acquisition**. Each function panel represents an NI-IMAQ function, which is displayed at the bottom of the panel.

Table 1-2 shows how the LabWindows/CVI function panel tree is organized, and the NI-IMAQ function name that corresponds to each function panel.

Table 1-2. The LabWindows/CVI Function Tree for Image Acquisition

LabWindows/CVI Function Panel	NI-IMAQ Function
Generic Functions	
Interface Open	`imgInterfaceOpen`
Session Open	`imgSessionOpen`
Close Object	`imgClose`
High-Level Acquisition Functions	
Snap	`imgSnap`
Snap Area	`imgSnapArea`
Grab Setup	`imgGrabSetup`
Grab	`imgGrab`
Grab Area	`imgGrabArea`
Ring Setup	`imgRingSetup`
Sequence Setup	`imgSequenceSetup`
Session Start Acquisition	`imgSessionStartAcquisition`
Session Stop Acquisition	`imgSessionStopAcquisition`

Table 1-2. The LabWindows/CVI Function Tree for Image Acquisition (Continued)

LabWindows/CVI Function Panel	NI-IMAQ Function
High-Level **Miscellaneous Functions**	
Session Status	`imgSessionStatus`
Session Set ROI	`imgSessionSetROI`
Session Get ROI	`imgSessionGetROI`
Session Get Buffer Size	`imgSessionGetBufferSize`
Low-Level **Interface Functions**	
Interface Query Names	`imgInterfaceQueryNames`
Interface Reset	`imgInterfaceReset`
Interface Lock	`imgInterfaceLock`
Interface Unlock	`imgInterfaceUnlock`
Low-Level **Session Functions**	
Session Configure	`imgSessionConfigure`
Session Acquire	`imgSessionAcquire`
Session Wait	`imgSessionWait`
Session Wait Vertical Blank	`imgSessionWaitVblank`
Session Abort	`imgSessionAbort`
Session Examine Buffer	`imgSessionExamineBuffer`
Session Release Buffer	`imgSessionReleaseBuffer`
Session Save Buffer	`imgSessionSaveBuffer`
Session Copy Buffer	`imgSessionCopyBuffer`

Table 1-2. The LabWindows/CVI Function Tree for Image Acquisition (Continued)

LabWindows/CVI Function Panel	NI-IMAQ Function
Session Clear Buffer	`imgSessionClearBuffer`
Session Copy Area	`imgSessionCopyArea`
Session Set Trigger	`imgSessionSetTrigger`
Session Clear Triggers	`imgSessionClearTriggers`
Session Get Trigger Status	`imgSessionGetTriggerStatus`
Session Set RTSI Map	`imgSessionSetRTSImap`
Session Wait Acquisition Done	`imgSessionWait`
Low-Level Miscellaneous Functions	
Set Attribute	`imgSetAttribute`
Get Attribute	`imgGetAttribute`
Create Buffer List	`imgCreateBufList`
Dispose Buffer List	`imgDisposeBufList`
Lock Buffer List Memory	`imgMemLock`
Unlock Buffer List Memory	`imgMemUnlock`
Create Buffer	`imgCreateBuffer`
Dispose Buffer	`imgDisposeBuffer`
Set Buffer Element	`imgSetBufferElement`
Get Buffer Element	`imgGetBufferElement`
Camera Action	`imgCameraAction`
Show Error	`imgShowError`
Plot Buffer to Window	`imgPlot`

Other Programming Environments

For information on using other programming languages, such as Microsoft Visual C++, with your IMAQ system, refer to the *NI-IMAQ User Manual*.

Code Examples

You can find code examples in the same directory in which you installed the NI-IMAQ driver software. The default directories are `NIIMAQ\SAMPLE\CMNSRC` for source code common to all environments, `NIIMAQ\SAMPLE\CVI` for LabWindows/CVI code examples, and `NIIMAQ\SAMPLE\MSVC` for Microsoft Visual C++ examples.

Geometric Definitions

Here are a few definitions you should be familiar with when performing image acquisition tasks:

- An *acquisition window* is the image size specific to a video standard or camera resolution. The default is 640 by 480 pixels. The window's starting position (0,0) varies according to camera.
- A *region of interest* (ROI) is a hardware-programmable rectangular portion of the acquisition window. This is a specific area of the image to acquire.
- An *area* is a rectangular portion of an ROI that software defines and controls. Figure 1-1 illustrates the geometric relationship of these terms.

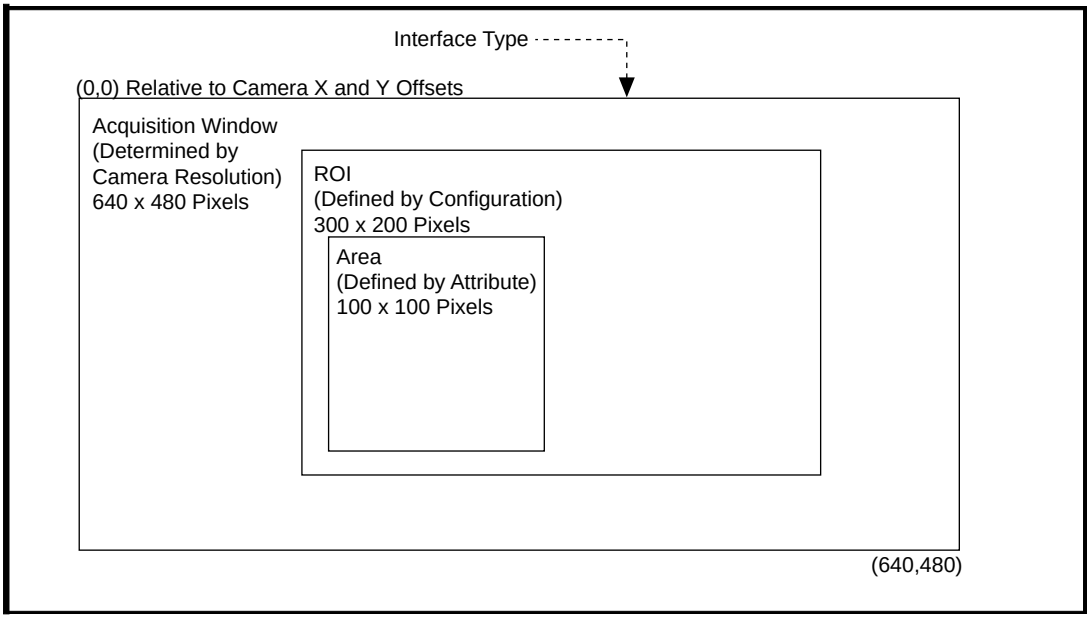

Figure 1-1. Geometric Relationship

Architecture

A block diagram of the NI-IMAQ architecture shown in Figure 1-2 illustrates the low- and mid-level architecture for IMAQ devices.

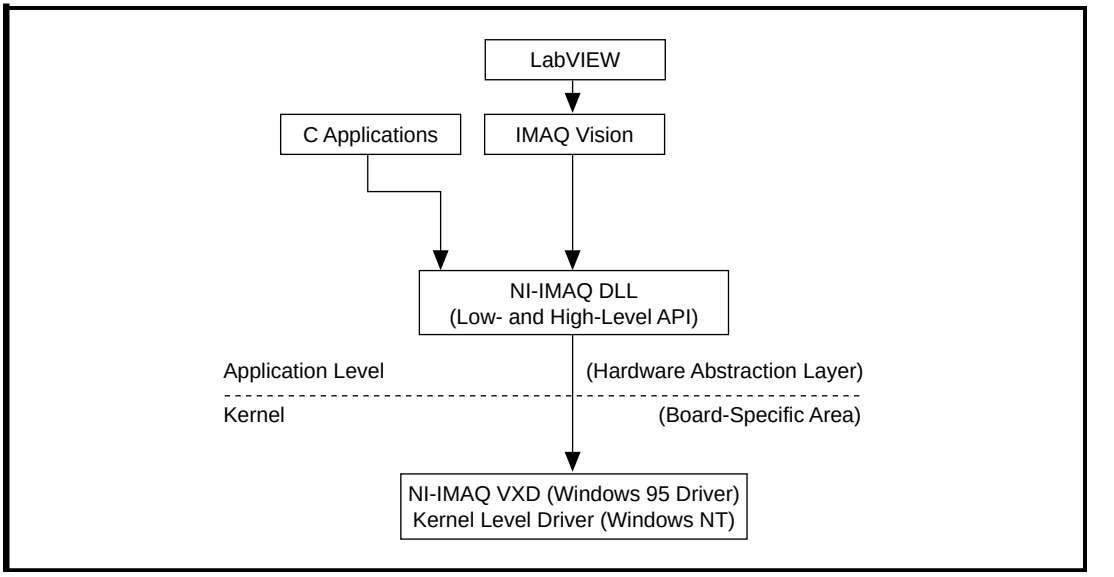

Figure 1-2. NI-IMAQ Architecture

The architecture uses a *hardware abstraction layer*, which separates software API capabilities, such as general acquisition and control functions, from hardware-specific information. This layer lets you use new IMAQ hardware without having to recompile your applications.

Chapter 2

Generic Functions

This chapter contains a detailed explanation of each generic NI-IMAQ function. The functions are arranged according to the order in which you will use them.

Generic functions include `imgInterfaceOpen`, `imgSessionOpen`, and `imgClose`. You will use these functions in combination with both high- and low-level functions. These functions set up your interface and session, and close both when you are finished with your application.

imgInterfaceOpen

Format

rval = `imgInterfaceOpen`**(Int8* interface_name, INTERFACE_ID* pifid)**

Purpose

Opens by name an interface as specified in the NI-IMAQ configuration utility, `IMAQconf`. If it is successful, this function returns an INTERFACE_ID.

Parameters

Name	Type	Direction	Description
interface_name	Int8*	input	null terminates name of interface to open
pifid	INTERFACE_ID*	output	pointer to INTERFACE_ID type variable
rval	Int32	output	status

Parameter Discussion

interface_name needs a null terminated string that is the name of the interface to open `img0`, `img1`, or `img2`.

pifid passes a pointer to an area of memory reserved as an INTERFACE_ID type variable. If the function succeeds, the variable will contain a valid INTERFACE_ID that can be used in subsequent functions.

rval returns the following status codes:

IMG_ERR_BINT	bad interface
IMG_ERR_GOOD	no error occurred
IMG_ERR_OVRN	too many interfaces open
IMG_ERR_PAR1	null pointer
IMG_ERR_PAR2	null pointer

☞ **Note:** ***You can use*** `imgInterfaceQueryNames` ***to retrieve a valid list of interface names.***

imgSessionOpen

Format

rval = `imgSessionOpen`**(INTERFACE_ID ifid, SESSION_ID* psid)**

Purpose

Opens a session of an unknown type and returns a session ID. This function inherits all data associated with the given interface.

Parameters

Name	Type	Direction	Description
ifid	INTERFACE_ID	input	interface ID to open session
psid	SESSION_ID*	output	pointer to a session ID
rval	Int32	output	status

Parameter Discussion

ifid is a valid INTERFACE_ID type variable.

psid passes a pointer to an area of memory reserved for a SESSION_ID type variable. If the function succeeds, the variable will contain a valid SESSION_ID that can be used in subsequent functions.

rval returns the following status codes:

IMG_ERR_BCMF	bad camera file (check syntax)
IMG_ERR_GOOD	no error occurred
IMG_ERR_OVRN	too many interfaces open
IMG_ERR_PAR1	invalid INTERFACE_ID
IMG_ERR_PAR2	null pointer

imgClose

Format

rval = `imgClose`**(uInt32 void_id, uInt32 freeResources)**

Purpose

Closes a session or interface and unlocks and releases all buffers associated with the data type.

Parameters

Name	Type	Direction	Description
void_id	uInt32	input	session or interface ID
freeResources	uInt32	input	cleanup flag
rval	Int32	output	status

Parameter Discussion

void_id is a valid SESSION_ID or INTERFACE_ID type variable.

freeResources is the cleanup flag. If **freeResources** is TRUE, it indicates that all buffers and buffer lists associated with the session are to be released. If **freeResources** is FALSE, it indicates no buffer cleanup should be performed. If **void_id** is an INTERFACE_ID and **freeResources** is TRUE, all sessions associated with that interface will be closed.

rval returns the following status codes:

IMG_ERR_GOOD no error occurred
IMG_ERR_PAR1 invalid INTERFACE_ID or SESSION_ID

☞ **Note:** ***Closing an interface closes all sessions attached to that interface.***

Chapter 3

High-Level Functions

This chapter contains a detailed explanation of each high-level NI-IMAQ function. The functions are arranged according to the category of image acquisition procedure—snap, grab, ring and sequence functions, or miscellaneous functions—and then the order in which you will use them.

Using high-level functions, you can easily perform such functions as acquiring images in single-shot (snap) or continuous (ring) mode without advanced knowledge of the NI-IMAQ low-level function calls and image acquisition details.

Snap Functions

Snap functions include `imgSnap` and `imgSnapArea`. You can use these functions to acquire a single image after opening a valid session, using `imgInterfaceopen` and `imgSessionOpen` to obtain a valid SESSION_ID.

imgSnap

Format

rval = `imgSnap`**(SESSION_ID sid, void* bufAddr)**

Purpose

Performs a single frame or field acquisition. This function uses the following attributes to perform an image acquisition:

IMG_ATTR_ACQWINDOW_LEFT
IMG_ATTR_ACQWINDOW_WIDTH
IMG_ATTR_ACQWINDOW_TOP
IMG_ATTR_ACQWINDOW_HEIGHT
IMG_ATTR_ROI_LEFT
IMG_ATTR_ROI_TOP
IMG_ATTR_ROI_HEIGHT
IMG_ATTR_ROI_WIDTH
IMG_ATTR_ROWBYTES
IMG_ATTR_YOFF_BUFFER

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bufAddr	void*	input	pointer to buffer
rval	Int32	output	no error

Parameter Discussion

sid is a valid SESSION_ID type variable.

bufAddr points to an area of memory in which to store the image.

rval returns IMG_ERR_GOOD if no error occurs.

imgSnapArea

Format

rval = `imgSnapArea`**(SESSION_ID sid, void* bufAddr, uInt32 top, uInt32 left, uInt32 height, uInt32 width, uInt32 rowBytes)**

Purpose

Performs an area-specific frame or field acquisition. This function does not modify any attributes.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bufAddr	void*	input	pointer to the buffer address
top	uInt32	input	top ordinate of the first pixel transferred
left	uInt32	input	left ordinate of the first pixel transferred
height	uInt32	input	height of rectangle to transfer
width	uInt32	input	width of the rectangle to transfer
rowBytes	uInt32	input	used in calculating the address of the next line
rval	Int32	output	status

imgSnapArea

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

bufAddr points to an area of memory in which to store the image. If **bufAddr** points to a NULL pointer, this call will allocate an appropriate size buffer and return the buffer address in the location specified by **bufAddr**.

top indicates the top vertical offset of the first pixel transferred.

left indicates the left horizontal offset of the first pixel transferred.

height indicates the height of area to transfer.

width indicates the width of the area to transfer.

rowBytes indicates the exact byte-width of the horizontal line to acquire. This parameter specifies the number of bytes to add to the line pointer for the next scan line. This value must be greater than or equal to the width parameter. Passing a zero for this value causes it to be ignored.

rval returns IMG_ERR_GOOD if no error occurs.

Grab Functions

Grab functions include `imgGrabSetup`, `imgGrab`, and `imgGrabArea`. You can use the grab functions to perform a continuous acquisition.

To use the grab functions, you must first call `imgGrabSetup` to configure the session for grabbing and optionally start the acquisition process. If you do not start the acquisition via `imgGrabSetup`, you must start it by calling `imgSessionStartAcquisition` prior to calling the `imgGrab` and `imgGrabArea` functions. After the acquisition has started, you obtain an image copy by calling the `imgGrab` and `imgGrabArea`. To stop the acquisition, call `imgSessionStopAcquisition`.

imgGrabSetup

Format

rval = `imgGrabSetup`**(SESSION_ID sid, uInt32 startNow)**

Purpose

Configures and optionally starts a continuous acquisition. This function uses the following attributes to perform an image acquisition:

IMG_ATTR_ACQWINDOW_LEFT
IMG_ATTR_ACQWINDOW_WIDTH
IMG_ATTR_ACQWINDOW_TOP
IMG_ATTR_ACQWINDOW_HEIGHT
IMG_ATTR_ROI_LEFT
IMG_ATTR_ROI_TOP
IMG_ATTR_ROI_HEIGHT
IMG_ATTR_ROI_WIDTH
IMG_ATTR_ROWBYTES
IMG_ATTR_YOFF_BUFFER

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
startNow	uInt32	input	start acquisition after setup completes
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

startNow starts a grab acquisition after setup has been completed. A non-zero value here specifies that the continuous requisition should start immediately. If the value is zero, start the grab acquisition with `imgSessionStartAcquisition`.

rval returns IMG_ERR_GOOD if no error occurs.

imgGrab

Format

rval = `imgGrab`**(SESSION_ID sid, void* bufAddr, uInt32 syncOnVB)**

Purpose

Performs a transfer from a continuous acquisition session. Call this function only after calling `imgGrabSetup`. This function uses the following attributes:

IMG_ATTR_ROI_LEFT
IMG_ATTR_ROI_TOP
IMG_ATTR_ROI_HEIGHT
IMG_ATTR_ROI_WIDTH
IMG_ATTR_ROWBYTES
IMG_ATTR_YOFF_BUFFER

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bufAddr	void*	input	points to a user buffer
syncOnVB	uInt32	input	vertical blank flag
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

bufAddr points to an area of memory in which to store the image. If **bufAddr** points to a NULL pointer, this call will allocate an appropriate size buffer and return the buffer address in the location specified by **bufAddr**.

syncOnVB indicates a wait for a vertical blank. If this parameter is TRUE, the transfer will be done according to and using the video synchronization. Using this option avoids mixing two different time bases within the same video field. If **syncOnVB** is FALSE, the transfer is done without considering the video synchronization.

rval returns IMG_ERR_GOOD if no error occurs.

imgGrabArea

Format

rval = `imgGrabArea`**(SESSION_ID sid, void* bufAddr, uInt32 syncOnVB, uInt32 top, uInt32 left, uInt32 height, uInt32 width, uInt32 rowBytes)**

Purpose

Performs a transfer from a continuous acquisition using the given parameters. This function does not modify any attributes. Call this function only after calling `imgGrabSetup`.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bufAddr	void*	input	pointer to the buffer address.
syncOnVB	uInt32	input	vertical blank flag
top	uInt32	input	top ordinate of the first pixel transferred
left	uInt32	input	left ordinate of the first pixel transferred
height	uInt32	input	height of rectangle to transfer
width	uInt32	input	width of the rectangle to transfer
rowBytes	uInt32	input	used in calculating the address of the next line
rval	Int32	output	status

imgGrabArea

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

bufAddr points to an area of memory in which to store the image. If **bufAddr** points to a NULL pointer, this call will allocate an appropriate size buffer and return the buffer address in the location specified by **bufAddr**.

syncOnVB indicates a wait for a vertical blank. If **syncOnVB** is TRUE, the transfer will be done according to and using the video synchronization. Using this option avoids mixing two different time bases within the same video field. If **syncOnVB** is FALSE, the transfer is done without considering the video synchronization.

top indicates the top vertical offset of the first pixel transferred.

left indicates the left horizontal offset of the first pixel transferred.

height indicates the height of area to transfer.

width indicates the width of the area to transfer.

rowBytes indicates the exact byte-width of the horizontal line to acquire. This parameter specifies the number of bytes to add to the line pointer for the next scan line. This value must be greater than or equal to the width parameter. Passing a zero for this value causes it to be ignored.

rval returns IMG_ERR_GOOD if no error occurs.

Ring and Sequence Functions

Ring and sequence functions include `imgRingSetup`, `imgSequenceSetup`, `imgSessionStartAcquisition`, and `imgSessionStopAcquisition`. You can use these functions to perform a continuous acquisition that loops or stops after a certain number of images have been captured.

To use the ring and sequence functions, you must first call `imgRingSetup` or `imgSequenceSetup` to configure the session and optionally start the acquisition process. If you do not start the acquisition via `imgRingSetup` or `imgSequenceSetup`, you must call `imgSessionStartAcquisition` to start it.

imgRingSetup

Format

rval = `imgRingSetup`**(SESSION_ID sid, uInt32 numberBuffer, void* bufferList, uInt32 skipCount, uInt32 startNow)**

Purpose

Prepares a session for acquiring continuously and looping into buffer list.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
numberBuffer	uInt32	input	number of buffers used in the ring session
bufferList	void*	input	array of buffer pointers
skipCount	uInt32	input	number of frames or field to skip before each acquisition
startNow	uInt32	input	start acquisition after setup completes
rval	Int32	output	status

imgRingSetup

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

numberBuffer indicates the number of buffers in the buffer list.

bufferList is an array of buffer pointers. If buffer[0] contains a NULL pointer, this call allocates the number of buffers required and returns the buffer addresses in **bufferList[]**.

skipCount indicates the number of frames or field to skip before each acquisition. This number is the same for all acquisitions.

startNow starts a grab acquisition after setup has been completed. A non-zero value for **startNow** specifies that the continuous acquisition should start immediately. If **startNow** is zero, start the grab acquisition with `imgSessionStartAcquisition`.

rval returns IMG_ERR_GOOD if no error occurs.

imgSequenceSetup

Format

rval = `imgSequenceSetup`**(SESSION_ID sid, uInt32 numberBuffer, void* bufferList[], uInt32 skipCount[], uInt32 startnow)**

Purpose

Prepares a session for acquiring a full sequence into the buffer list.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
numberBuffer	uInt32	input	number of buffers used in the ring session
bufferList[]	void*	input	array of buffer pointers
skipCount[]	uInt32	input	array containing the number of frames or field to skip before each acquisition
startNow	uInt32	input	start acquisition after setup completes
rval	Int32	output	status

imgSequenceSetup

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

numberBuffer indicates the number of buffers in the buflist.

bufferList[] is an array of buffer pointers. If buffer[0] contains a NULL pointer, this call allocates the number of buffers required and returns the buffer addresses in **bufferList[]**.

skipCount[] is an array containing the number of frames or fields to skip before each acquisition.

startNow starts a grab acquisition after setup has been completed. A non-zero value for **startNow** specifies that the continuous acquisition should start immediately. If **startNow** is zero, start the grab acquisition with `imgSessionStartAcquisition`.

rval returns IMG_ERR_GOOD if no error occurs.

imgSessionStartAcquisition

Format

rval = `imgSessionStartAcquisition`**(SESSION_ID sid)**

Purpose

Starts a session acquisition identified by **sid**. Use this function with grab, ring, and sequence functions.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

rval returns IMG_ERR_GOOD if no error occurs.

imgSessionStopAcquisition

Format

rval = `imgSessionStopAcquisition`**(SESSION_ID sid)**

Purpose

Stops a session acquisition identified by **sid**. Use this function with grab, ring, and sequence functions.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

rval returns IMG_ERR_GOOD if no error occurs.

Miscellaneous Functions

Miscellaneous functions include `imgSessionStatus`, `imgSessionSetROI`, `imgSessionGetROI`, and `imgSessionGetBufferSize`.

These functions obtain status information on a session, get and set a region of interest, and get the buffer size required for a session based on current attributes.

imgSessionStatus

Format

rval = `imgSessionStatus`**(SESSION_ID sid, uInt32* status, uInt32* bufferNumber)**

Purpose

Gets the current session status.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
status	uInt32*	input	current session status
bufferNumber	uInt32*	input	pointer to an area of memory reserved for the current buffer number
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

status indicates the current session status. If **status** is non-zero, the session currently is acquiring. If **status** is zero, the session is idle. This is the value returned by IMG_ATTR_ACQ_IN_PROGRESS in `imgGetAttribute`.

bufferNumber is a pointer to an area of memory reserved for the current buffer number.

rval returns IMG_ERR_GOOD if no error occurs.

imgSessionSetROI

Format

rval = `imgSessionSetROI`**(SESSION_ID sid, uInt32 top, uInt32 left, uInt32 height, uInt32 width)**

Purpose

Set acquisition origin and dimension. You would typically make this call after creating a session and before calling the `imgSessionStartAcquisition`.

This function modifies the following attributes:

IMG_ATTR_ROI_TOP
IMG_ATTR_ROI_LEFT
IMG_ATTR_ROI_HEIGHT
IMG_ATTR_ROI_WIDTH

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
top	uInt32	output	top ordinate of the first pixel transferred
left	uInt32	output	left ordinate of the first pixel transferred
height	uInt32	output	height of rectangle to transfer
width	uInt32	output	width of the rectangle to transfer
rval	Int32	output	status

imgSessionSetROI

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

top indicates the top vertical offset of the first pixel transferred.

left indicates the left horizontal offset of the first pixel transferred.

height indicates the height of area to transfer.

width indicates the width of the area to transfer.

rval returns IMG_ERR_GOOD if no error occurs.

imgSessionGetROI

Format

rval = `imgSessionGetROI`**(SESSION_ID sid, uInt32* top, uInt32* left, uInt32* height, uInt32* width)**

Purpose

Gets acquisition origin and dimensions.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
top	uInt32*	output	current value of IMG_ATTR_ROI_TOP
left	uInt32*	output	current value of IMG_ATTR_ROI_LEFT
height	uInt32*	output	current value of IMG_ATTR_ROI_HEIGHT
width	uInt32*	output	current value of IMG_ATTR_ROI_WIDTH
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

top indicates the top vertical offset of the first pixel transferred.

left indicates the left horizontal offset of the first pixel transferred.

height indicates the height of area to transfer.

width indicates the width of the area to transfer.

rval returns IMG_ERR_GOOD if no error occurs.

imgSessionGetBufferSize

Format

rval = `imgSessionGetBufferSize`**(SESSION_ID sid, uInt32* sizeNeeded)**

Purpose

Gets the minimum buffer size needed for frame buffer allocation. This function calculates the buffer size by using the following attributes:

IMG_ATTR_ROI_HEIGHT
IMG_ATTR_ROWBYTES
IMG_ATTR_YOFF_BUFFER

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
sizeNeeded	uInt32*	output	buffer size
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

sizeNeeded returns the buffer size needed for an image based on the attributes listed above.

rval returns IMG_ERR_GOOD if no error occurs.

Chapter 4

Low-Level Functions

This chapter contains a detailed explanation of each low-level NI-IMAQ function. The functions are arranged alphabetically under the type of image acquisition procedure—interface (board-specific) functions, session-specific functions, and miscellaneous functions.

Low-level functions let you perform in-depth tasks that require a more advanced understanding of the PCI-IMAQ-1408 and image acquisition, such as directly controlling video parameters like gain and offset level or locking down a buffer during a continuous acquisition.

Interface Functions

Interface functions include `imgInterfaceLock`, `imgInterfaceQueryNames`, `imgInterfaceReset`, and `imgInterfaceUnlock`.

You can use these functions to perform operations specific to an interface. All interface functions require a valid INTERFACE_ID.

Interface functions operate on a board-wide basis. When you make a call to an interface function, it will affect all sessions connected to that interface in all processes. Interface function changes are global and must be done with care.

imgInterfaceLock

Format

rval = `imgInterfaceLock`**(INTERFACE_ID ifid)**

Purpose

Locks a logical interface so that another process cannot use it. To unlock an interface, call `imgInterfaceUnlock`. Each call to `imgInterfaceLock` causes the lock count associated with this interface to be incremented by one.

Parameters

Name	Type	Direction	Description
ifid	INTERFACE_ID	input	interface ID
rval	Int32	output	status

Parameter Discussion

ifid is a valid INTERFACE_ID type variable.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_ILCK	interface locked by another process
IMG_ERR_PAR1	bad INTERFACE_ID
IMG_WRN_ILCK	warning, interface still locked

imgInterfaceQueryNames

Format

rval = `imgInterfaceQueryNames`**(uInt32 index, Int8* queryName)**

Purpose

Returns the interface name identified by the index parameter. To obtain a list of all the available interface names, call this function repeatedly until the function returns an error. Make the first call with the **index** parameter initialized to zero. Each successive call increments the index parameter by one.

Parameters

Name	Type	Direction	Description
index	uInt32	input	interface number to obtain
queryNames	Int8*	input	pointer to an array of strings
rval	Int32	output	status

Parameter Discussion

index is the interface number to obtain.

queryNames is a pointer to an array in memory large enough to hold the interface name returned (INTERFACE_NAME_SIZE).

rval returns the following status codes:

IMG_ERR_EMEM	not enough memory to perform the operation
IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	null pointer

imgInterfaceReset

Format

rval = `imgInterfaceReset`**(INTERFACE_ID ifid)**

Purpose

Performs a hardware reset on the interface type and returns a status, either good or bad. This function sets the hardware associated with the interface to its default state and resets the onboard DMA controller.

Parameters

Name	Type	Direction	Description
ifid	INTERFACE_ID	output	interface ID
rval	Int32	output	status

Parameter Discussion

ifid is a valid INTERFACE_ID type variable.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	bad INTERFACE_ID

imgInterfaceUnlock

Format

rval = `imgInterfaceUnlock`**(INTERFACE_ID ifid)**

Purpose

Unlocks a logical interface, allowing another process to use it. Each call to `imgInterfaceUnlock` causes the lock count associated with this interface to be decremented by one. If the interface is still locked after this call is made, the function will return the warning, IMG_WRN_ILCK.

Parameters

Name	Type	Direction	Description
ifid	INTERFACE_ID	input	interface ID
rval	Int32	output	status

Parameter Discussion

ifid is a valid INTERFACE_ID type variable.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_ILCK	interface locked by another process
IMG_ERR_PAR1	bad INTERFACE_ID
IMG_WRN_ILCK	warning, interface still locked

Session Functions

Session functions include `imgSessionAbort`, `imgSessionAcquire`, `imgSessionClearBuffer`, `imgSessionClearTriggers`, `imgSessionConfigure`, `imgSessionCopyArea`, `imgSessionCopyBuffer`, `imgSessionExamineBuffer`, `imgSessionGetTriggerStatus`, `imgSessionReleaseBuffer`, `imgSessionSaveBuffer`, `imgSessionSetRTSImap`, `imgSessionSetTrigger`, `imgSessionWait`, and `imgSessionWaitVblank`.

You can use the session functions to perform operations specific to a session. All session functions require a valid SESSION_ID.

Session functions operate on a channel basis. *Channels* are a physical connection to a camera. When you make a call to a session function, it affects the camera and the channel associated with your session. If you change a camera-related attribute on a session, you will change the camera setting for *all* sessions, whether in your process or not.

Since you must reprogram the hardware before you can lock the video source, your camera settings become everybody's camera settings for that interface. Be sure you have exclusive control of the interface (if sharing the interface) and channel before changing any camera-specific attributes in your session.

The NI-IMAQ driver software knows only about buffer lists, not sessions. You can have multiple sessions open on the same interface with the same or different buffer lists. If two sessions have the same buffer list, they will have the same buffers. In this case, the driver locks into memory a single instance of the buffers contained in the buffer list.

Calling `imgSessionConfigure` essentially calculates the permanent storage of your buffers for any figure acquisitions. No matter how you set up your buffers, after calling `imgSessionConfigure`, there can be only one set of data in the driver associated with that buffer; buffer storage areas in the driver are not allocated on a per process basis. If two sessions with the same buffer list both call `imgSessionConfigure`, the latter call defines the actual configuration for both sessions. If you wish to have multiple sessions open at one time, use different buffer lists for different sessions.

imgSessionAbort

Format

rval = `imgSessionAbort`**(SESSION_ID sid, uInt32* buf_num)**

Purpose

Stops asynchronous acquisition or synchronous continuous acquisition immediately.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
buf_num	uInt32*	output	pointer to the last valid buffer number
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

buf_num points to an area of memory to return the last valid buffer number.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	null pointer

imgSessionAcquire

Format

rval = `imgSessionAcquire`**(SESSION_ID sid, uInt32 async, IMG_CALLBACK callback)**

Purpose

Starts acquisition synchronously or asynchronously to the frame buffers in the associated session buffer list.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
async	uInt32	input	asynchronous flag
callback	IMG_CALLBACK	input	user completion routine
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

async is the asynchronous flag. If **async** is non-zero, it indicates an asynchronous acquisition. If **async** is zero, it indicates a synchronous acquisition.

callback is a pointer to a user completion routine. This routine is called at the completion of the acquisition.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID

imgSessionClearBuffer

Format

rval = `imgSessionClearBuffer`**(SESSION_ID sid, uInt32 bufElement, char pixel_value)**

Purpose

Clears a session's image data to the specified pixel value.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bufElement	uInt32	input	element number of the buffer to clear
pixel_value	char	input	pixel value to set data to
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

bufElement indicates a valid buffer list element number.

pixel_value indicates a pixel value to set all the buffer data with.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_NCFG	invalid action, no buffers configured for session
IMG_ERR_ZBUF	zero buffer size, no bytes filled
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	buffer element number out of range

imgSessionClearTriggers

Format

rval = `imgSessionClearTriggers`**(SESSION_ID sid)**

Purpose

Disables all triggers and trigger modes on the corresponding session.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID

imgSessionConfigure

Format

rval = `imgSessionConfigure`**(SESSION_ID sid, BUFLIST_ID bid)**

Purpose

Specifies the buffer list to use with this session. A valid BUFLIST_ID must be passed. Upon successful completion of this call, you can then call `imgSessionAcquire`.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bid	BUFLIST_ID	input	a valid BUFLIST_ID
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

bid is a valid BUFLIST_ID type variable.

rval returns the following status codes:

IMG_ERR_AIOP	cannot perform request, acquisition in progress
IMG_ERR_ELCK	cannot lock buffers down, no more memory
IMG_ERR_GOOD	no error occurred
IMG_ERR_NCAM	no camera defined for this channel
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid BUFLIST_ID

imgSessionCopyArea

Format

rval = `imgSessionCopyArea`**(SESSION_ID sid, uInt32 bufElement, uInt32 top, uInt32 left, uInt32 width, uInt32 height, Ptr buffer, uInt32 rowBytes, uInt32 vsync)**

Purpose

Copies an area of a session's buffer to a user-specified buffer.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bufElement	uInt32	input	element number of buffer to copy
top	uInt32	input	pixel value to set data to top vertical coordinate of area
left	uInt32	input	left horizontal coordinate of area
height	uInt32	input	height of area
width	uInt32	input	width of area
buffer	Ptr	input	pointer to user image memory
rowBytes	uInt32	input	used in calculating the address of the next line
vsync	uInt32	input	wait until the next vertical blank to perform the copy
rval	Int32	output	status

imgSessionCopyArea

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

bufElement indicates a valid buffer list element number of the buffer to copy from.

top indicates the top vertical coordinate of the area to copy.

left indicates the left horizontal coordinate.

height indicates the height of the area to copy.

width indicates the width of the area to copy.

buffer indicates an address to a buffer that is large enough to hold the data.

rowBytes indicates the exact byte-width of the horizontal line to acquire. This parameter specifies the number of bytes to add to the line pointer for the next scan line. This value must be greater than or equal to the width parameter. Passing a zero for this value causes it to be ignored.

vsync controls when copying occurs. If **vsync** is TRUE, `imgSessionCopyArea` waits until the next vertical blank to perform the copy. If **vsync** is FALSE, `imgSessionCopyArea` does not wait.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid buffer element number
IMG_ERR_PAR3	invalid coordinate
IMG_ERR_PAR4	invalid coordinate
IMG_ERR_PAR5	invalid height
IMG_ERR_PAR6	invalid width
IMG_ERR_PAR7	null pointer
IMG_ERR_PAR8	invalid rowBytes

imgSessionCopyBuffer

Format

rval = `imgSessionCopyBuffer`**(SESSION_ID sid, uInt32 bufElement, char* buffer, uInt32 vsync)**

Purpose

Copies a session's image data to a user buffer format. If the board is capable, a DMA transfer is initiated to the host memory.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bufElement	uInt32	input	element number of buffer to copy
buffer	char*	input	pointer to user buffer
vsync	uInt32	input	wait until the next vertical blank to perform
rval	Int32	output	status

imgSessionCopyBuffer

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

bufElement indicates a buffer list element number that corresponds to the buffer you want to copy.

buffer points to an area of memory to receive the copy.

vsync controls a session's image data transfer. If **vsync** is TRUE, `imgSessionCopyBuffer` waits until a host vertical blank occurs before transferring. If **vsync** is FALSE, `imgSessionCopyBuffer` does not wait for a host vertical blank.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid buffer element number
IMG_ERR_PAR3	null pointer

imgSessionExamineBuffer

Format

rval = `imgSessionExamineBuffer`**(SESSION_ID sid, uInt32 whichBuffer, uInt32 holdBuffer, uInt32 waitANew, uInt32* elementNumber, void* bufferAddrPtr)**

Purpose

Extracts a buffer from a live acquisition. This function lets you lock a buffer out of a continuous loop sequence for processing when you are using a ring (continuous) sequence.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
whichBuffer	uInt32	input	identifies which buffer to get
holdBuffer	uInt32	input	controls the acquisition process
waitANew	uInt32	input	vertical blank flag
elementNumber	uInt32*	input	element number of the returned buffer
bufferAddrPtr	void*	input	a pointer to an address to store the address of the locked buffer
rval	Int32	output	status

imgSessionExamineBuffer

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

whichBuffer identifies which buffer to get. The available options are:

IMG_OLDEST_BUFFER	get the oldest buffer that has been acquired
IMG_LAST_BUFFER	get the latest buffer that has been acquired
IMG_CURRENT_BUFFER	wait for the end of the current buffer acquisition

holdBuffer controls the acquisition process. If **holdBuffer** is TRUE, `imgSessionExamineBuffer` prevents the acquisition process from loading new data into the buffer until it is released.

waitANew is the vertical blank flag. If **waitANew** is TRUE, buffers already have been processed, and `imgSessionExamineBuffer` waits for a new acquisition. If partial buffer data is available, `imgSessionExamineBuffer` waits for the next frame. If **waitANew** is FALSE, `imgSessionExamineBuffer` returns immediately when the buffer is filled.

elementNumber returns the buffer number of the returned buffer. If **waitANew** is FALSE, the returned value may be -1 to indicate there is no new buffer available.

bufferAddrPtr is a pointer to an address to store the address of the locked buffer.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_NBUF	no buffers available, too early in acquisition
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid command
IMG_ERR_PAR5	null pointer or invalid element number
IMG_ERR_PAR6	null pointer

Note: ***Use*** `imgSessionReleaseBuffer` ***to release the buffer being held with*** `imgSessionExamineBuffer`**.**

imgSessionGetTriggerStatus

Format

rval = `imgSessionGetTriggerStatus`**(SESSION_ID sid, uInt32 trig_num, uInt32* status)**

Purpose

Returns a status on a specified trigger line.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
trig_num	uInt32	input	trigger number constant
status	uInt32*	input	pointer to trigger status out
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

trig_num is a valid trigger number as defined by the constants:

IMG_EXT_TRIG0
IMG_EXT_TRIG1
IMG_EXT_TRIG2
IMG_EXT_TRIG3
IMG_EXT_RTSI0
IMG_EXT_RTSI1
IMG_EXT_RTSI2
IMG_EXT_RTSI3

status is a pointer to an area of memory reserved as a trigger status variable. Returns TRUE if the trigger is currently enabled, FALSE if it is not enabled.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid trigger number
IMG_ERR_PAR3	null status pointer

imgSessionReleaseBuffer

Format

rval = `imgSessionReleaseBuffer`**(SESSION_ID sid, uInt32 elementNumber)**

Purpose

Releases a buffer that was previously held with `imgSessionExamineBuffer`. This function has the effect of re-entering a buffer into a continuous ring buffer pool after analysis.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
elementNumber	uInt32	input	buffer number to release
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

elementNumber indicates the buffer number to release as returned by `imgSessionExamineBuffer`.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid element number

imgSessionSaveBuffer

Format

rval = `imgSessionSaveBuffer`**(SESSION_ID sid, uInt32 bufElement, char* file_name)**

Purpose

Saves a buffer of a session to disk in a native operating system-specific format such as `bmp` or `PICT`.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
bufElement	uInt32	input	buffer number to save
file_name	char*	input	null terminated string describing a file name (optional path)
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

bufElement indicates a buffer list element number of the buffer to save.

file_name indicates a file name used to save the image.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid buffer element number
IMG_ERR_PAR3	null pointer

imgSessionSetRTSImap

Format

rval = `imgSessionSetRTSImap`**(SESSION_ID sid, uInt32 RTSImap)**

Purpose

Maps the internal RTSIbus triggers to the external RTSIbus connector lines.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
RTSImap	uInt32	input	a valid RTSIbus map constant
rval	Int32	output	status

Parameter Discussion

sid is a valid SESION_ID.

RTSImap is one of the following RTSI map constants:

IMG_TRIG_MAP_RTSI0_DISABLED
IMG_TRIG_MAP_RTSI0_EXT0
IMG_TRIG_MAP_RTSI0_EXT1
IMG_TRIG_MAP_RTSI0_EXT2
IMG_TRIG_MAP_RTSI0_EXT3
IMG_TRIG_MAP_RTSI0_EXT4
IMG_TRIG_MAP_RTSI0_EXT5
IMG_TRIG_MAP_RTSI0_EXT6
IMG_TRIG_MAP_RTSI1_DISABLED
IMG_TRIG_MAP_RTSI1_EXT0
IMG_TRIG_MAP_RTSI1_EXT1
IMG_TRIG_MAP_RTSI1_EXT2
IMG_TRIG_MAP_RTSI1_EXT3
IMG_TRIG_MAP_RTSI1_EXT4
IMG_TRIG_MAP_RTSI1_EXT5
IMG_TRIG_MAP_RTSI1_EXT6

imgSessionSetRTSImap

(Continued)

IMG_TRIG_MAP_RTSI2_DISABLED
IMG_TRIG_MAP_RTSI2_EXT0
IMG_TRIG_MAP_RTSI2_EXT1
IMG_TRIG_MAP_RTSI2_EXT2
IMG_TRIG_MAP_RTSI2_EXT3
IMG_TRIG_MAP_RTSI2_EXT4
IMG_TRIG_MAP_RTSI2_EXT5
IMG_TRIG_MAP_RTSI2_EXT6
IMG_TRIG_MAP_RTSI3_DISABLED
IMG_TRIG_MAP_RTSI3_EXT0
IMG_TRIG_MAP_RTSI3_EXT1
IMG_TRIG_MAP_RTSI3_EXT2
IMG_TRIG_MAP_RTSI3_EXT3
IMG_TRIG_MAP_RTSI3_EXT4
IMG_TRIG_MAP_RTSI3_EXT5
IMG_TRIG_MAP_RTSI3_EXT6

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid RTSI map parameter

imgSessionSetTrigger

Format

rval = `imgSessionSetTrigger`**(SESSION_ID sid, uInt32 trig_num, uInt32 trig_drive, uInt32 trig_action, uInt32 trig_polarity)**

Purpose

Configures the specified trigger line with a drive, an action, and a polarity. You must set up each individual trigger line to externally drive or internally capture on a trigger assertion. You must also set a trigger mode using `imgSetAttribute` with the IMG_ATTR_TRIGGER_MODE attribute if you want to initiate acquisition as the result of a trigger.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
trig_num	uInt32	input	trigger number constant
trig_drive	uInt32	input	trigger drive constant
trig_action	uInt32	input	trigger action constant
trig_polarity	uInt32	input	trigger polarity constant
rval	Int32	output	status

imgSessionSetTrigger

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

trig_num is a valid trigger number as defined by the constants:

IMG_EXT_TRIG0
IMG_EXT_TRIG1
IMG_EXT_TRIG2
IMG_EXT_TRIG3
IMG_EXT_RTSI0
IMG_EXT_RTSI1
IMG_EXT_RTSI2
IMG_EXT_RTSI3

trig_drive is a valid trigger drive as defined by the constants:

IMG_TRIG_DRIVE_DISABLED
IMG_TRIG_DRIVE_AQ_IN_PROGRESS
IMG_TRIG_DRIVE_AQ_DONE
IMG_TRIG_DRIVE_PIXEL_CLK
IMG_TRIG_DRIVE_ASSERTED
IMG_TRIG_DRIVE_HSYNC
IMG_TRIG_DRIVE_VSYNC

trig_action is a valid trigger action as defined by the constants

IMG_TRIG_ACTION_CAPTURE
IMG_TRIG_ACTION_NONE

trig_polarity is a valid trigger action as defined by the constants:

IMG_TRIG_POLAR_ACTIVEL
IMG_TRIG_POLAR_ACTIVEH

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid trigger number
IMG_ERR_PAR3	invalid trigger drive
IMG_ERR_PAR4	invalid trigger action
IMG_ERR_PAR5	invalid trigger polarity

imgSessionWait

Format

rval = `imgSessionWait`**(SESSION_ID sid)**

Purpose

Waits for an asynchronous acquisition to complete. If a user completion routine has been specified, it is invoked prior to this call returning.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_BDMA	bad DMA transfer
IMG_ERR_FIFO	FIFO overflow caused acquisition to halt
IMG_ERR_TIMO	wait timed out, acquisition not complete
IMG_ERR_PAR1	invalid SESSION_ID

imgSessionWaitVblank

Format

rval = `imgInterfaceWaitVblank`**(INTERFACE_ID ifid)**

Purpose

Waits for the start of the next camera vertical blank before returning.

Parameters

Name	Type	Direction	Description
ifid	INTERFACE_ID	input	interface ID
rval	Int32	output	status

Parameter Discussion

ifid is a valid INTERFACE_ID type variable.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_FIFO	FIFO overflow caused acquisition to halt
IMG_ERR_PAR1	bad INTERFACE_ID

Miscellaneous Functions

Miscellaneous functions include `imgCameraAction`, `imgCreateBuffer`, `imgCreateBufList`, `imgDisposeBuffer`, `imgDisposeBufList`, `imgGetAttribute`, `imgGetBufferElement`, `imgMemLock`, `imgMemUnlock`, `imgPlot`, `imgSetAttribute`, `imgSetBufferElement`, and `imgShowError`.

You can use these functions to wait for host- or interface-specific events, change acquisition parameters, create buffers, and dispose of sessions and interfaces.

Miscellaneous functions set up objects such as buffer lists, buffers, and session and interface attributes. When changing buffer list elements, make sure no other sessions depend on that buffer list to be in a known state. When changing attributes, remember that attributes are either interface- or session- (channel) specific.

Some attribute changes such as gain or white reference that are session-specific can take effect while a live acquisition is in progress. In this case, the driver will wait for a vertical blank before making the change. Most session attributes, however, require that you call `imgSessionConfigure` to reconfigure the driver, especially when changing the ROI width or height.

NI-IMAQ will not let you change any attribute that would have a detrimental effect on any acquisition in progress. If NI-IMAQ lets you change an attribute during a live acquisition, you should see the effect of the change immediately. If NI-IMAQ does not let you change an attribute during a live acquisition, stop the acquisition, change the attribute, call `imgSessionConfigure`, and restart the acquisition.

Calling `imgSessionConfigure` reprograms the video hardware and recalculates the DMA based on the attributes of the buffers in the session's buffer list.

imgCameraAction

Format

rval = `imgCameraAction`**(SESSION_ID sid, void* data)**

Purpose

Sends camera control information to a camera (if applicable).

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
data	void*	input	pointer to a camera control data structure
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

data passes a pointer to a valid camera control structure.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_NCAP	function not implemented
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	null pointer

☞ **Note:** ***Reserved for future use.***

imgCreateBuffer

Format

rval = `imgCreateBuffer`**(SESSION_ID sid, uInt32 where, uInt32 bufferSize, void* bufPtrAddr)**

Purpose

Creates a user frame buffer based on the geometric definitions of the associated session. Passing a null or zero for the SESSION_ID is valid. In this case, you must pass a buffer size. If you do not pass a buffer size, the buffer size is computed based on the ROI height*rowBytes for the associated session. An error is returned if the buffer size is smaller than the minimum buffer size required for the session.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
where	uInt32	input	a constant indicating host or device memory
bufferSize	uInt32	input	size of buffer to create
bufPtrAddr	void*	output	pointer to return the buffer address
rval	Int32	output	status

imgCreateBuffer

(Continued)

Parameter Discussion

sid is a valid SESSION_ID type variable.

where is a constant indicating host or device memory. If **where** contains IMG_HOST_MEMORY, `imgCreateBuffer` will create the buffer in the computer's memory. If **where** contains IMG_DEVICE_MEMORY, `imgCreateBuffer` will create the buffer in onboard memory.

bufferSize indicates the size of the buffer you want to create.

bufPtrAddr is a pointer to an area of memory that stores the new buffer address.

rval returns the following status codes:

IMG_ERR_BSIZ	buffer size used is too small for attributes
IMG_ERR_EMEM	not enough memory to perform the operation
IMG_ERR_MXBF	too many buffers already allocated
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid memory constant
IMG_ERR_PAR3	invalid buffer size
IMG_ERR_PAR4	null pointer

imgCreateBufList

Format

rval = `imgCreateBufList`**(SESSION_ID sid, uInt32 numElements, BUFLIST_ID* bidPtr)**

Purpose

Creates a buffer list. This buffer list is passed to `imgConfigureSession`. The buffer list is initialized to an empty default state and must be filled before calling `imgSessionConfigure`.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
numElements	uInt32	input	number of entries in the buffer list
bidPtr	BUFLIST_ID*	output	pointer to the new buffer list
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

numElements indicates the maximum number of elements the buffer list should contain.

bidPtr is a pointer to an area of memory that contains a BUFLIST_ID type variable.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID
IMG_ERR_PAR2	invalid number of elements
IMG_ERR_PAR3	null buffer list ID pointer

imgDisposeBuffer

Format

rval = `imgDisposeBuffer`**(void* buffPtr)**

Purpose

Disposes of a user frame buffer.

Parameters

Name	Type	Direction	Description
buffPtr	void*	input	pointer to a buffer
rval	Int32	output	status

Parameter Discussion

buffPtr is a pointer to a private buffer or a buffer created by `imgCreateBuffer`.

rval returns the following status codes:

IMG_ERR_GOOD no error occurred
IMG_ERR_PAR1 null pointer

☞ **Note:** ***Make sure no active buffer lists contain this buffer before disposing of the user frame buffer.***

imgDisposeBufList

Format

rval = `imgDisposeBufList`**(BUFLIST_ID bid)**

Purpose

Purges all image buffers associated with this buffer list. You must call `imgSessionConfigure` to reconfigure any session that was attached to the purged buffer list.

Parameters

Name	Type	Direction	Description
bid	BUFLIST_ID	input	valid BUFLIST_ID
rval	Int32	output	status

Parameter Discussion

bid is a valid BUFLIST_ID type variable.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid BUFLIST_ID

imgGetAttribute

Format

rval = `imgGetAttribute`**(uInt32 void_id, uInt32 type, void* value)**

Purpose

Returns an attribute for an interface or session.

Parameters

Name	Type	Direction	Description
void_id	uInt32	input	session or interface ID
type	uInt32	input	attribute type
value	void*	input/ output	pointer to a place attribute value
rval	Int32	output	status

Parameter Discussion

void_id indicates an area of memory reserved for a valid SESSION_ID or INTERFACE_ID type variable.

type passes a valid SESSION_ID or INTERFACE_ID attribute type. See Appendix A, *Attributes and Constants*, for valid types.

value passes a pointer to place attribute value.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid INTERFACE_ID or SESSION_ID
IMG_ERR_PAR2	invalid attribute type
IMG_ERR_PAR3	null pointer

imgGetBufferElement

Format

rval = `imgGetBufferElement`**(BUFLIST_ID bid, uInt32 element, uInt32 itemType, void* itemValue)**

Purpose

Gets an element of a specific type from a buffer list.

Parameters

Name	Type	Direction	Description
bid	BUFLIST_ID	input	valid BUFLIST_ID
element	uInt32	input	element number the buffer list
itemType	uInt32	input	element item to set
itemValue	void*	input	new value for item
rval	Int32	output	status

Parameter Discussion

bid is a valid BUFLIST_ID type variable.

element is the element number of the buffer list item to modify.

itemType passes a valid buffer list element type.

itemValue passes a pointer to an area of memory reserved for the return type (32 bits).

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid BUFLIST_ID
IMG_ERR_PAR2	bad element number
IMG_ERR_PAR3	bad item type
IMG_ERR_PAR4	null pointer

☞ **Note:** ***See** Constants **in Appendix A,** Attributes and Constants**, for valid element and command types.***

imgMemLock

Format

rval = `imgMemLock`**(SESSION_ID sid)**

Purpose

Locks all session-associated image buffers in memory in preparation for an acquisition. The buffers must be successfully locked down before an acquisition can begin. The function does not do anything if the buffers exist in onboard memory.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

rval returns the following status codes:

IMG_ERR_BBUF	bad buffer pointer in list
IMG_ERR_ELCK	cannot lock buffers down, no more memory
IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID

imgMemUnlock

Format

rval = `imgMemUnlock`**(SESSION_ID sid)**

Purpose

Unlocks all session-associated buffers.

Parameters

Name	Type	Direction	Description
sid	SESSION_ID	input	session ID
rval	Int32	output	status

Parameter Discussion

sid is a valid SESSION_ID type variable.

rval returns the following status codes:

IMG_ERR_BBUF	bad buffer pointer in list
IMG_ERR_ELCK	cannot lock buffers down, no more memory
IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid SESSION_ID

imgPlot

Format

rval = `imgPlot`(GUIHNDL window, void* buffer, uInt32 leftBufOffset, uInt32 topBufOffset, uInt32 xsize, uInt32 ysize, uInt32 xpos, uInt32 ypos, uInt32 invert)

Purpose

Plots a buffer to a window given a native window handle. This function is an easy way to display a buffer after it is acquired.

Parameters

Name	Type	Direction	Description
window	GUIHNDL	input	window handle
buffer	void*	input	pointer to video data
leftBufOffset	uInt32	input	x-offset into the buffer to start plotting
topBufOffset	uInt32	input	y-offset into the buffer to start plotting
xsize	uInt32	input	width of the buffer
ysize	uInt32	input	height of the buffer
xpos	uInt32	input	x-position to start plotting in the window
ypos	uInt32	input	y-position to start plotting in the window
invert	uInt32	input	TRUE/FALSE
rval	Int32	output	status

imgPlot

(Continued)

Parameter Discussion

window is a native window handle designating the window to plot in.

buffer is a pointer to an area of memory containing a video frame buffer.

leftBufOffset is the left offset into the buffer to start plotting.

topBufOffset is the top offset into the buffer to start plotting.

xsize is the pixel width of the buffer.

ysize is the length of the buffer.

xpos is the left position to start plotting in the window.

ypos is the top position to start plotting in the window.

invert passes TRUE to have the image inverted before plotting pass and FALSE to plot the image in the native plot orientation.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	bad window handle
IMG_ERR_PAR2	null pointer

imgSetAttribute

Format

rval = `imgSetAttribute`**(uInt32 void_id, uInt32 type, uInt32 value)**

Purpose

Sets an attribute for an interface or session.

Parameters

Name	Type	Direction	Description
void_id	uInt32	input	session or interface ID
type	uInt32	input	attribute type
value	uInt32	input	new attribute value
rval	Int32	output	status

Parameter Discussion

void_id indicates an area of memory reserved for a valid SESSION_ID or INTERFACE_ID type variable.

type passes a valid SESSION_ID or INTERFACE_ID attribute type. See Appendix A, *Attributes and Constants*, for valid types.

value passes a pointer to place attribute value.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid INTERFACE_ID or SESSION_ID
IMG_ERR_PAR2	invalid attribute type
IMG_ERR_PAR3	illegal attribute value

imgSetBufferElement

Format

rval = `imgSetBufferElement`**(BUFLIST_ID bid, uInt32 element, uInt32 itemType, uInt32 itemValue)**

Purpose

Sets a buffer list element of a given type to a specific value.

Parameters

Name	Type	Direction	Description
bid	BUFLIST_ID	input	a valid BUFLIST_ID
element	uInt32	input	element number the buffer list
itemType	uInt32	input	element item to set
itemValue	uInt32	input	new value for item
rval	Int32	output	status

Parameter Discussion

bid is a valid BUFLIST_ID type variable.

element is the element number of the buffer list item to modify.

itemType describes the parameter of the element to set.

itemValue indicates the value of the element type to set.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid BUFLIST_ID
IMG_ERR_PAR2	bad element number
IMG_ERR_PAR3	bad item type
IMG_ERR_PAR4	bad command type

☞ **Note:** ***See*** *Constants* ***in Appendix A,*** *Attributes and Constants****, for valid element and command types.***

imgShowError

Format

rval = `imgShowError`**(IMG_ERR error, Int8* text)**

Purpose

Returns a null terminated string describing the error code.

Parameters

Name	Type	Direction	Description
error	IMG_ERR	input	a valid error code
text	Int8*	input	pointer to a character array of no less than 255 bytes
rval	Int32	output	status

Parameter Discussion

error is a valid NI-IMAQ error code.

text is a pointer to an area of memory reserved for an error string.

rval returns the following status codes:

IMG_ERR_GOOD	no error occurred
IMG_ERR_PAR1	invalid error code
IMG_ERR_PAR2	null pointer

Attributes and Constants

Appendix A

This appendix describes the attributes and constants used by NI-IMAQ.

NI-IMAQ Attributes

Attributes describe a specific property of a session or interface. A summary of NI-IMAQ attributes is listed in Table A-1.

Attribute describes the constant name of the attribute. The **type** describes whether the get/set attribute function requires an INTERFACE_ID or SESSION_ID type parameter. **Imd.** describes whether the effect of setting the attribute is immediate (Yes), or whether it requires a subsequent `imgSessionConfigure` to take effect (No). **R/W** describes whether the attribute is read only (R), write only (W), or both(R/W). **Description** describes what values the attribute can take and the effect the setting of the attribute has or what values are returned.

Table A-1. Attribute Summary

Attribute	Type	Imd.	R/W	Description
IMG_ATTR_ACQ_IN_PROGRESS	Session	Yes	R	Returns TRUE if an acquisition is in progress on the camera associated with this session
IMG_ATTR_ACQWINDOW_HEIGHT	Session	No	R/W	Get/set the acquisition window height of the camera/channel associated with this session
IMG_ATTR_ACQWINDOW_LEFT	Session	No	R/W	Get/set the acquisition window left of the camera/channel associated with this session
IMG_ATTR_ACQWINDOW_TOP	Session	No	R/W	Get/set the acquisition window top of the camera/channel associated with this session
IMG_ATTR_ACQWINDOW_WIDTH	Session	No	R/W	Get/set the acquisition window width of the camera/channel associated with this session
IMG_ATTR_BITSPERPIXEL	Session	Yes	R	Returns the bits per pixel value of the camera/channel associated with this session

Table A-1. Attribute Summary (Continued)

Attribute	Type	Imd.	R/W	Description
IMG_ATTR_BLACK_REF	Session	Yes	R/W	Set the black reference value of the channel associated with this session. Values are 0–63.
IMG_ATTR_BYTESPERPIXEL	Session	Yes	R	Returns the bytes per pixel value of the camera/channel associated with this session
IMG_ATTR_CALLBACK	Session	Yes	R	Not implemented
IMG_ATTR_CHANNEL	Session	Yes	R	Returns the current channel selected on the interface (0–3)
IMG_ATTR_CHROMA_FILTER	Session	Yes	R/W	Set the gain value for the channel associated with this session. Values are: IMG_FILTER_NTSC IMG_GAIN_6DB
IMG_ATTR_COLOR	Interface	Yes	R	Returns TRUE if the interface board is color-capable
IMG_ATTR_CURRENT_BUFLIST	Session	Yes	R	Returns the BUFLIST_ID of the buffer list associated with this session
IMG_ATTR_FRAME_COUNT	Session	Yes	R	Returns the number of frames acquired since the start of an acquisition
IMG_ATTR_FRAME_FIELD	Interface	Yes	R/W	Sets/gets the current mode of the interface. IMG_FIELD_MODE sets field mode on the specified interface. IMG_FRAME_MODE sets frame mode on the specified interface.
IMG_ATTR_FREE_BUFFERS	Session	Yes	R	Returns the number of reserved driver buffers currently left
IMG_ATTR_GAIN	Session	Yes	R/W	Set the video gain for the channel associated with this session. Values are: IMG_GAIN_0DB IMG_GAIN_3DB IMG_GAIN_6DB
IMG_ATTR_HASRAM	Interface	Yes	R	Returns TRUE if the interface board has onboard memory
IMG_ATTR_HORZ_RESOLUTION	Interface	Yes	R	Returns the maximum horizontal resolution of the interface

Table A-1. Attribute Summary (Continued)

Attribute	Type	Imd.	R/W	Description
IMG_ATTR_HSCALE	Session	No	R/W	Set/get the horizontal hardware scaling factor for the channel associated with this session. Values are: IMG_SCALE_NONE IMG_SCALE_DIV2 IMG_SCALE_DIV4 IMG_SCALE_DIV8
IMG_ATTR_INTERFACE_TYPE	Interface	Yes	R	Returns the type of interface: IMG_BOARD_INTERFACE IMG_OTHER_INTERFACE
IMG_ATTR_INVERT	Session	No	R/W	Set/get the invert image mode. Beneficial when calling `imgPlot`. Values are: 0 = no invert—image in memory is right-side up 1 = invert—image in memory is upside down
IMG_ATTR_LAST_VALID_BUFFER	Session	Yes	R	Returns a buffer element number of the last received frame buffer
IMG_ATTR_LINE_COUNT	Session	Yes	R	Returns the current line count of the frame being acquired
IMG_ATTR_LUT	Interface	Yes	R/W	Programs the lookup table for the given interface. Pass values 0–6 to indicate the LUT you wish to use or you can pass a pointer to your own LUT. Returns an index 0–6 that indicates which LUT you are using.
IMG_ATTR_MEM_LOCKED	Session	Yes	R	Returns TRUE if the session's buffer list is locked in memory
IMG_ATTR_NUM_BUFFERS	Session	Yes	R	Returns the number of buffers in the buffer list associated with the session
IMG_ATTR_PIXDEPTH	Interface	Yes	R	Returns the maximum pixel depth of the interface board in bytes
IMG_ATTR_RAMSIZE	Interface	Yes	R	Returns the size of the RAM on the interface board
IMG_ATTR_ROI_HEIGHT	Session	No	R/W	Get/set the region of interest height of the camera/channel associated with this session

Table A-1. Attribute Summary (Continued)

Attribute	Type	Imd.	R/W	Description
IMG_ATTR_ROI_LEFT	Session	Yes	R/W	Get/set the region of interest left of the camera/channel associated with this session
IMG_ATTR_ROI_TOP	Session	Yes	R/W	Get/set the region of interest top of the camera/channel associated with this session
IMG_ATTR_ROI_WIDTH	Session	No	R/W	Get/set the region of interest width of the camera/channel associated with this session
IMG_ATTR_ROWBYTES	Session	No	R/W	Set the true width of a horizontal line in memory. Used to calculate the next lines memory offset
IMG_ATTR_START_FIELD	Session	No	R/W	Returns the start field setting of the camera associated with this session
IMG_ATTR_TRIGGER_FRAMEWAIT_MSEC	Session	No	R/W	Get/Set the timeout value for a frame. Values are: IMG_FRAMETIME_STANDARD IMG_FRAMETIME_1SECOND IMG_FRAMETIME_2SECONDS IMG_FRAMETIME_5SECONDS IMG_FRAMETIME_10SECONDS IMG_FRAMETIME_1MINUTE IMG_FRAMETIME_2MINUTES IMG_FRAMETIME_5MINUTES IMG_FRAMETIME_10MINUTES
IMG_ATTR_TRIGGER_MODE	Session	No	R/W	Get/set the trigger mode for the channel associated with this session. Values are: IMG_ATTR_TRIGMODE_NONE IMG_ATTR_TRIGMODE_NOREPEAT IMG_ATTR_TRIGMODE_REPEAT
IMG_ATTR_VERT_RESOLUTION	Interface	Yes	R	Returns the maximum vertical resolution of the interface
IMG_ATTR_VSCALE	Session	No	R	Set/get the vertical hardware scaling factor for the channel associated with this session. Values are: IMG_SCALE_NONE IMG_SCALE_DIV2 IMG_SCALE_DIV4 IMG_SCALE_DIV8

Table A-1. Attribute Summary (Continued)

Attribute	Type	Imd.	R/W	Description
IMG_ATTR_WHITE_REF	Session	Yes	R/W	Set the white reference value of the channel associated with this session. Values are 0–63.
IMG_ATTR_XOFF_BUFFER	Session	No	R/W	Set/get the buffer x-left offset for image displacement. Use this attribute to acquire an image into a private buffer at a different location other than the top-left corner. You must use a private buffer when using this attribute.
IMG_ATTR_YOFF_BUFFER	Session	No	R/W	Set/get the buffer y-line offset for image displacement. Use this attribute to acquire an image into a private buffer at a different location other than the top-left corner. You must use a private buffer when using this attribute.

Constants

Constants help clearly define specific function parameter values. These constants are included in your `niimaq.h` header file. Use these constants when coding the `imgGetAttribute` and `imgSetAttribute` functions when required.

Table A-2 lists the constant name, the function to which the constant applies, and a general description.

Table A-2. Constants Summary

Constant	Use With	Description
IMG_BOARD_INTERFACE	`imgGetAttribute`	Specifies the type of interface is a plug-in board
IMG_BOARD_INTERFACE	`imgGetAttribute`	Specifies the type of interface is not a plug-in board
IMG_BUFF_ADDRESS	`imgGetBufferElement` `imgSetBufferElement`	Specifies the buffer address portion of a buffer list element
IMG_BUFF_COMMAND	`imgGetBufferElement` `imgSetBufferElement`	Specifies the command portion of a buffer list element
IMG_BUFF_SIZE	`imgGetBufferElement` `imgSetBufferElement`	Specifies the size portion of a buffer list element (the buffer's size). Required for private buffers.
IMG_BUFF_SKIPCOUNT	`imgGetBufferElement` `imgSetBufferElement`	Specifies the skip count portion of a buffer list element
IMG_BUFF_TRIGGER	`imgGetBufferElement` `imgSetBufferElement`	Specifies the trigger portion of a buffer list element. Set to TRUE for each buffer that will initiate a capture based on a trigger.
IMG_CMD_LOOP	`imgGetBufferElement` `imgSetBufferElement`	Specifies a buffer list command of LOOP. Used as the command for the last buffer element, this causes an acquisition to perform a continuous type of acquisition such as a ring.

Table A-2. Constants Summary (Continued)

Constant	Use With	Description
IMG_CMD_NEXT	`imgGetBufferElement` `imgSetBufferElement`	Specifies a buffer list command of NEXT. This causes an acquisition to take place on the buffer and to proceed to the next buffer list element.
IMG_CMD_PASS	`imgGetBufferElement` `imgSetBufferElement`	Specifies a buffer list command of PASS. Any buffer list element with this command is ignored. Use to reserved space for fast configuration.
IMG_CURRENT_BUFFER	`imgSessionExamineBuffer`	Specifies to examine current buffer in a live acquisition. Waits until vertical blank to return the buffer to you.
IMG_DEVICE_FRAME	`imgCreateBuffer`	Specifies the new buffer is created in onboard memory
IMG_EXT_RTSI0	`imgSessionSetTrigger`	Specifies the corresponding trigger line
IMG_EXT_RTSI1	`imgSessionSetTrigger`	Specifies the corresponding trigger line
IMG_EXT_RTSI2	`imgSessionSetTrigger`	Specifies the corresponding trigger line
IMG_EXT_RTSI3	`imgSessionSetTrigger`	Specifies the corresponding trigger line
IMG_EXT_TRIG0	`imgSessionSetTrigger`	Specifies the corresponding trigger line
IMG_EXT_TRIG1	`imgSessionSetTrigger`	Specifies the corresponding trigger line
IMG_EXT_TRIG2	`imgSessionSetTrigger`	Specifies the corresponding trigger line
IMG_EXT_TRIG3	`imgSessionSetTrigger`	Specifies the corresponding trigger line

Table A-2. Constants Summary (Continued)

Constant	Use With	Description
IMG_FIELD_EVEN	`imgGetAttribute` `imgSetAttribute`	Specifies the start field of the acquisition as even
IMG_FIELD_MODE	`imgGetAttribute` `imgSetAttribute`	Specifies the acquisition mode as field
IMG_FIELD_ODD	`imgGetAttribute` `imgSetAttribute`	Specifies the start field of the acquisition as odd
IMG_FILTER_NONE	`imgGetAttribute` `imgSetAttribute`	Specifies no video filter
IMG_FILTER_NTSC	`imgGetAttribute` `imgSetAttribute`	Specifies the video filter is NTSC
IMG_FILTER_PAL	`imgGetAttribute` `imgSetAttribute`	Specifies the video filter is PAL
IMG_FRAME_MODE	`imgGetAttribute` `imgSetAttribute`	Specifies the acquisition mode as interlaced
IMG_FRAMETIME_1MINUTE	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 1 minute
IMG_FRAMETIME_2MINUTES	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 2 minutes
IMG_FRAMETIME_5MINUTES	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 5 minutes
IMG_FRAMETIME_10MINUTES	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 10 minutes
IMG_FRAMETIME_1SECOND	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 1 s
IMG_FRAMETIME_2SECONDS	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 2 s
IMG_FRAMETIME_5SECONDS	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 5 s
IMG_FRAMETIME_10SECONDS	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 10 s
IMG_FRAMETIME_STANDARD	`imgGetAttribute` `imgSetAttribute`	Specifies a frame timeout value of 100 ms

Table A-2. Constants Summary (Continued)

Constant	Use With	Description
IMG_GAIN_0DB	`imgGetAttribute` `imgSetAttribute`	Specifies the gain is +0 dB
IMG_GAIN_3DB	`imgGetAttribute` `imgSetAttribute`	Specifies the gain is +3 dB
IMG_GAIN_6DB	`imgGetAttribute` `imgSetAttribute`	Specifies the gain is +6 dB
IMG_HOST_FRAME	`imgCreateBuffer`	Specifies the new buffer is created in host (computer) memory
IMG_LAST_BUFFER	`imgSessionExamineBuffer`	Specifies to examine the last valid buffer in a live acquisition.
IMG_OLDEST_BUFFER	`imgSessionExamineBuffer`	Specifies to examine the oldest buffer in a live acquisition
IMG_SCALE_DIV2	`imgGetAttribute` `imgSetAttribute`	Specifies scaling by divisions of 2
IMG_SCALE_DIV4	`imgGetAttribute` `imgSetAttribute`	Specifies scaling by divisions of 4
IMG_SCALE_DIV8	`imgGetAttribute` `imgSetAttribute`	Specifies scaling by divisions of 8
IMG_SCALE_NONE	`imgGetAttribute` `imgSetAttribute`	Specifies no scaling
IMG_TRIG_ACTION_CAPTURE	`imgSessionSetTrigger`	Specifies the action caused by an external trigger
IMG_TRIG_ACTION_NONE	`imgSessionSetTrigger`	Specifies the action caused by an external trigger
IMG_TRIG_DRIVE_AQ_DONE	`imgSessionSetTrigger`	Specifies that the trigger line is driven on AQ_DONE
IMG_TRIG_DRIVE_AQ_IN_PROGRESS	`imgSessionSetTrigger`	Specifies that the trigger line is driven on AQ_IN_PROGRESS

Table A-2. Constants Summary (Continued)

Constant	Use With	Description
IMG_TRIG_DRIVE_ASSERTED	imgSessionSetTrigger	Specifies to immediately drive the trigger line asserted
IMG_TRIG_DRIVE_DISABLED	imgSessionSetTrigger	Specifies that the trigger line is not driven
IMG_TRIG_DRIVE_HSYNC	imgSessionSetTrigger	Specifies that the trigger line is driven on HSYNC
IMG_TRIG_DRIVE_PIXEL_CLK	imgSessionSetTrigger	Specifies that the trigger line is driven on PIXEL_CLK
IMG_TRIG_DRIVE_UNASSERTED	imgSessionSetTrigger	Specifies to immediately drive the trigger line unasserted
IMG_TRIG_DRIVE_VSYNC	imgSessionSetTrigger	Specifies that the trigger line is driven on VSYNC
IMG_TRIG_EXTERNAL	imgGetAttribute imgSetAttribute	Specifies the trigger line as external (hardware trigger)
IMG_TRIG_INTERNAL	imgGetAttribute imgSetAttribute	Specifies the trigger line as internal (software trigger)
IMG_TRIG_MAP_RTSI0_DISABLED	imgSessionSetRTSImap	Specifies that the RTSI internal to external mapping is disabled
IMG_TRIG_MAP_RTSI1_DISABLED	imgSessionSetRTSImap	Specifies that the RTSI internal to external mapping is disabled
IMG_TRIG_MAP_RTSI2_DISABLED	imgSessionSetRTSImap	Specifies that the RTSI internal to external mapping is disabled
IMG_TRIG_MAP_RTSI3_DISABLED	imgSessionSetRTSImap	Specifies that the RTSI internal to external mapping is disabled
IMG_TRIG_MAP_RTSI*x*_EXT*x*	imgSessionSetRTSImap	Specifies which internal RTSI trigger maps to the external RTSI lines
IMG_TRIG_NONE	imgGetAttribute imgSetAttribute	Specifies no trigger for the session

Table A-2. Constants Summary (Continued)

Constant	Use With	Description
IMG_TRIG_POLAR_ACTIVEH	`imgSessionSetTrigger`	Specifies the polarity of a trigger as active HIGH
IMG_TRIG_POLAR_ACTIVEL	`imgSessionSetTrigger`	Specifies the polarity of a trigger as active LOW
IMG_TRIGGER_NEG	`imgGetAttribute` `imgSetAttribute`	Specifies the trigger polarity is negative
IMG_TRIGGER_POS	`imgGetAttribute` `imgSetAttribute`	Specifies the trigger polarity is positive
IMG_TRIGMODE_NONE	`imgGetAttribute` `imgSetAttribute`	Specifies a trigger mode of disabled. Triggers will not cause an acquisition to occur.
IMG_TRIGMODE_NOREPEAT	`imgGetAttribute` `imgSetAttribute`	Specifies a trigger mode of no-repeat. Enabled triggers will cause an acquisition to occur on the buffers that have their buffer trigger attribute set. The sequence will not re-arm after the last buffer.
IMG_TRIGMODE_REPEAT	`imgGetAttribute` `imgSetAttribute`	Specifies a trigger mode of repeat. Enabled triggers will cause an acquisition to occur on the specified buffers, and the sequence automatically will re-arm to acquire the sequence again after the last buffer.
IMG_VIDEO_NTSC	`imgGetAttribute`	Specifies the video type is NTSC
IMG_VIDEO_PAL	`imgGetAttribute`	Specifies the video type is PAL
INTERFACE_NAME_SIZE	`imgInterfaceQueryNames`	Specifies the size of each array element in the interface names array

Status Codes

Appendix B

This appendix describes the status codes returned by NI-IMAQ.

Each NI-IMAQ function returns a status code that indicates whether the function was performed successfully. A summary of the status codes is listed in Table A-1.

Table B-1. Status Code Summary

Status Name	Description
IMG_ERR_AIOP	Cannot perform request, acquisition in progress
IMG_ERR_BBLB	A buffer list, buffer is null
IMG_ERR_BBLE	Buffer list does contains an invalid command
IMG_ERR_BBLF	Buffer list does not contain a valid final command
IMG_ERR_BBUF	Bad buffer pointer in list
IMG_ERR_BCMF	Bad camera file (check syntax)
IMG_ERR_BDMA	Bad DMA transfer
IMG_ERR_BINT	Bad interface
IMG_ERR_BROI	ROI width is less than rowbytes
IMG_ERR_BROW	Rowbytes is less than region of interest
IMG_ERR_BSIZ	Buffer size used is too small for attributes
IMG_ERR_BTAC	No trigger action—acquisition will time out
IMG_ERR_BTRG	Trigger loopback problem—cannot drive trigger with action enabled
IMG_ERR_DISE	Error releasing the image buffer
IMG_ERR_DLLE	DLL internal error, bad logic state
IMG_ERR_ELCK	Cannot lock buffers down, no more memory

Table B-1. Status Code Summary (Continued)

Status Name	Description
IMG_ERR_EMEM	Not enough memory to perform the operation
IMG_ERR_FIFO	FIFO overflow caused acquisition to halt
IMG_ERR_GOOD	No error occurred
IMG_ERR_HLPR	Bad parameter to low-level—check attributes and high-level arguments
IMG_ERR_ILCK	Interface locked
IMG_ERR_MXBF	Too many buffers already allocated
IMG_ERR_MXBI	Exhausted buffer IDs
IMG_ERR_NAIP	No acquisition in progress
IMG_ERR_NBUF	No buffers available, too early in acquisition
IMG_ERR_NCAM	No camera defined for this channel
IMG_ERR_NCAP	Function not implemented
IMG_ERR_NCFG	Invalid action, no buffers configured for session
IMG_ERR_NDLL	Unable to load DLL (LabWindows/CVI only)
IMG_ERR_NFNC	Unable to find API function in DLL (LabWindows/CVI only)
IMG_ERR_NINF	No interface found
IMG_ERR_NLCK	Buffer list is not locked
IMG_ERR_NOSR	Unable to allocate system resources (LabWindows/CVI only)
IMG_ERR_NVBL	Not successful because of hardware limitations
IMG_ERR_OSER	Operating system error occurred
IMG_ERR_OVRN	Too many interfaces open
IMG_ERR_PAR1	Function-specific, see function description
IMG_ERR_PAR2	Function-specific, see function description
IMG_ERR_PAR3	Function-specific, see function description
IMG_ERR_PAR4	Function-specific, see function description

Table B-1. Status Code Summary (Continued)

Status Name	Description
IMG_ERR_PAR5	Function-specific, see function description
IMG_ERR_PAR6	Function-specific, see function description
IMG_ERR_PAR7	Function-specific, see function description
IMG_ERR_PAR8	Function-specific, see function description
IMG_ERR_PAR9	Function-specific, see function description
IMG_ERR_PAR10	Function-specific, see function description
IMG_ERR_PLCK	Partial lock—cannot perform acquisition
IMG_ERR_TIMO	Wait timed out, acquisition not complete
IMG_ERR_VLCK	Cannot get lock on video source
IMG_ERR_ZBUF	Zero buffer size, no bytes filled
IMG_WRN_BCAM	Warning, corrupt camera file detected
IMG_WRN_CONF	Warning, change requires reconfiguration to take effect
IMG_WRN_ILCK	Warning, interface still locked

Customer Communication

Appendix C

For your convenience, this appendix contains forms to help you gather the information necessary to help us solve your technical problems and a form you can use to comment on the product documentation. When you contact us, we need the information on the Technical Support Form and the configuration form, if your manual contains one, about your system configuration to answer your questions as quickly as possible.

National Instruments has technical assistance through electronic, fax, and telephone systems to quickly provide the information you need. Our electronic services include a bulletin board service, an FTP site, a FaxBack system, and e-mail support. If you have a hardware or software problem, first try the electronic support systems. If the information available on these systems does not answer your questions, we offer fax and telephone support through our technical support centers, which are staffed by applications engineers.

Electronic Services

Bulletin Board Support

National Instruments has BBS and FTP sites dedicated for 24-hour support with a collection of files and documents to answer most common customer questions. From these sites, you can also download the latest instrument drivers, updates, and example programs. For recorded instructions on how to use the bulletin board and FTP services and for BBS automated information, call (512) 795-6990. You can access these services at:

United States: (512) 794-5422 or (800) 327-3077
Up to 14,400 baud, 8 data bits, 1 stop bit, no parity

United Kingdom: 01635 551422
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

France: 1 48 65 15 59
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

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E-Mail Support (currently U.S. only)

You can submit technical support questions to the appropriate applications engineering team through e-mail at the Internet addresses listed below. Remember to include your name, address, and phone number so we can contact you with solutions and suggestions.

GPIB: gpib.support@natinst.com
DAQ: daq.support@natinst.com
VXI: vxi.support@natinst.com
LabWindows: lw.support@natinst.com
LabVIEW: lv.support@natinst.com
HiQ: hiq.support@natinst.com
VISA: visa.support@natinst.com
Lookout: lookout.support@natinst.com

Fax and Telephone Support

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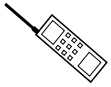

	Telephone	Fax
Australia	03 9879 5166	03 9879 6277
Austria	0662 45 79 90 0	0662 45 79 90 19
Belgium	02 757 00 20	02 757 03 11
Canada (Ontario)	905 785 0085	905 785 0086
Canada (Quebec)	514 694 8521	514 694 4399
Denmark	45 76 26 00	45 76 26 02
Finland	90 527 2321	90 502 2930
France	01 48 14 24 24	01 48 14 24 14
Germany	089 741 31 30	089 714 60 35
Hong Kong	2645 3186	2686 8505
Israel	03 5734815	03 5734816
Italy	02 413091	02 41309215
Japan	03 5472 2970	03 5472 2977
Korea	02 596 7456	02 596 7455
Mexico	95 800 010 0793	5 520 3282
Netherlands	0348 433466	0348 430673
Norway	32 84 84 00	32 84 86 00
Singapore	2265886	2265887
Spain	91 640 0085	91 640 0533
Sweden	08 730 49 70	08 730 43 70
Switzerland	056 200 51 51	056 200 51 55
Taiwan	02 377 1200	02 737 4644
U.K.	01635 523545	01635 523154

Technical Support Form

Photocopy this form and update it each time you make changes to your software or hardware, and use the completed copy of this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

If you are using any National Instruments hardware or software products related to this problem, include the configuration forms from their user manuals. Include additional pages if necessary.

Name _____

Company _____

Address _____

_____

Fax (___)_____ Phone (___) _____

Computer brand _____ Model _____ Processor_____

Operating system (include version number) _____

Clock speed _____MHz RAM _____MB Display adapter _____

Mouse ___yes ___no Other adapters installed _____

Hard disk capacity _____MB Brand _____

Instruments used _____

_____

National Instruments hardware product model _____ Revision _____

Configuration _____

National Instruments software product _____ Version _____

Configuration _____

The problem is: _____

_____

_____

_____

_____

List any error messages: _____

_____

_____

The following steps reproduce the problem:_____

_____

_____

_____

_____

IMAQ Hardware and Software Configuration Form

Record the settings and revisions of your hardware and software on the line to the right of each item. Complete a new copy of this form each time you revise your software or hardware configuration, and use this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

National Instruments Products

IMAQ hardware _____

Interrupt level of hardware _____

DMA channels of hardware _____

Base I/O address of hardware _____

Programming choice _____

NI-IMAQ, IMAQ Vision, LabVIEW, or LabWindows/CVI version _____

Other boards in system _____

Base I/O address of other boards _____

DMA channels of other boards _____

Interrupt level of other boards _____

Other Products

Computer make and model _____

Microprocessor _____

Clock frequency or speed _____

PCI chipset _____

Type of video board installed _____

Operating system version _____

Operating system mode _____

Programming language _____

Programming language version _____

Other boards in system _____

Base I/O address of other boards _____

DMA channels of other boards _____

Interrupt level of other boards _____

Documentation Comment Form

National Instruments encourages you to comment on the documentation supplied with our products. This information helps us provide quality products to meet your needs.

Title: *NI-IMAQ Function Reference Manual*

Edition Date: November 1996

Part Number: 321387A-01

Please comment on the completeness, clarity, and organization of the manual.

_____

_____

_____

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If you find errors in the manual, please record the page numbers and describe the errors.

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Thank you for your help.

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Prefix	Meaning	Value
p-	pico-	10^{-12}
n-	nano-	10^{-9}
µ-	micro-	10^{-6}
m-	milli-	10^{-3}
k-	kilo-	10^{3}
M-	mega-	10^{6}
G-	giga-	10^{9}

Numbers/Symbols

%	percent
+	positive of, or plus
+5V	5 V signal
-	negative of, or minus
/	per
±	plus or minus
Ω	ohm

A

A	amperes
AC	alternating current
acquisition window	the image size specific to a video standard or camera resolution
active line region	the region of lines actively being stored; defined by a line start (relative to VSYNC) and a line count
active pixel region	the region of pixels actively being stored; defined by a pixel start (relative to HSYNC) and a pixel count
A/D	analog-to-digital
ADC	analog-to-digital converter—an electronic device, often an integrated circuit, that converts an analog voltage to a digital number
address	character code that identifies a specific location (or series of locations) in memory
ANSI	American National Standards Institute
antichrominance filter	removes the color information from the video signal
API	application programming interface
AQ_DONE	signals that the acquisition of a frame or field is completed
AQ_IN_PROGRESS	signals that the acquisition of video data is in progress
area	a rectangular portion of an acquisition window or frame that is controlled and defined by software
array	ordered, indexed set of data elements of the same type
ASIC	Application-Specific Integrated Circuit—a proprietary semiconductor component designed and manufactured to perform a set of specific functions for a specific customer
aspect ratio	the ratio of a signal's width to its height

B

b	bit—one binary digit, either 0 or 1
B	byte—eight related bits of data, an eight-bit binary number; also used to denote the amount of memory required to store one byte of data
back porch	the area of the video signal between the rising edge of the horizontal sync signal and the active video information
black reference level	the level that represents the darkest an image can get *See also* white reference level.
buffer	temporary storage for acquired data
bus	the group of conductors that interconnect individual circuitry in a computer, such as the PCI bus; typically the expansion vehicle to which I/O or other devices are connected

C

C	Celsius
cache	high-speed processor memory that buffers commonly used instructions or data to increase processing throughput
CCIR	Comite Consultatif International des Radiocommunications—a committee that developed standards for color video signals
chrominance	the color information in a video signal
CMOS	complementary metal-oxide semiconductor
compiler	a software utility that converts a source program in a high-level programming language, such as Basic, C or Pascal, into an object or compiled program in machine language. Compiled programs run 10 to 1,000 times faster than interpreted programs *See also* Interpreter.

conversion device	device that transforms a signal from one form to another; for example, analog-to-digital converters (ADCs) for analog input and digital-to-analog converters (DACs) for analog output
CPU	central processing unit
CSYNC	composite sync signal; a combination of the horizontal and vertical sync pulses
CSYNCIN	composite sync in signal
CSYNCOUT	composite sync out signal

D

D/A	digital-to-analog
DAC	digital-to-analog converter; an electronic device, often an integrated circuit, that converts a digital number into a corresponding analog voltage or current
DAQ	data acquisition—(1) collecting and measuring electrical signals from sensors, transducers, and test probes or fixtures and inputting them to a computer for processing; (2) collecting and measuring the same kinds of electrical signals with A/D or DIO boards plugged into a computer, and possibly generating control signals with D/A and/or DIO boards in the same computer
dB	decibel; the unit for expressing a logarithmic measure of the ratio of two signal levels: dB=20log10 V1/V2, for signals in volts
DC	direct current
default setting	a default parameter value recorded in the driver; in many cases, the default input of a control is a certain value (often 0) that means *use the current default setting*.
DIN	Deutsche Industrie Norme
DLL	dynamic link library—a software module in Microsoft Windows containing executable code and data that can be called or used by Windows applications or other DLLs; functions and data in a DLL are loaded and linked at run time when they are referenced by a Windows application or other DLLs

DMA	direct memory access—a method by which data can be transferred to and from computer memory from and to a device or memory on the bus while the processor does something else; DMA is the fastest method of transferring data to/from computer memory
DRAM	dynamic RAM
drivers	software that controls a specific hardware device such as an IMAQ or DAQ device.
dynamic range	the ratio of the largest signal level a circuit can handle to the smallest signal level it can handle (usually taken to be the noise level), normally expressed in dB

E

EEPROM	electrically erasable programmable read-only memory—ROM that can be erased with an electrical signal and reprogrammed
external trigger	a voltage pulse from an external source that triggers an event such as A/D conversion

F

field	For an interlaced video signal, a field is half the number of horizontal lines needed to represent a frame of video; the first field of a frame contains all the odd-numbered lines, the second field contains all of the even-numbered lines.
FIFO	first-in first-out memory buffer—the first data stored is the first data sent to the acceptor; FIFOs are used on IMAQ devices to temporarily store incoming data until that data can be retrieved. For example, an analog input FIFO stores the results of A/D conversions until the data can be retrieved into system memory, a process that requires the servicing of interrupts and often the programming of the DMA controller. This process can take several milliseconds in some cases. During this time, data accumulates in the FIFO for future retrieval.
flash ADC	an ADC whose output code is determined in a single step by a bank of comparators and encoding logic

frame	a complete image; in interlaced formats, a frame is composed of two fields
front porch	the area of a video signal between the start of the horizontal blank and the start of the horizontal sync
ft	feet
function	a set of software instructions executed by a single line of code that may have input and/or output parameters and returns a value when executed; examples of functions are: y = COS (x) **status** = `AO_config`(**board, channel, range**)

G

gamma	the nonlinear change in the difference between the video signal's brightness level and the voltage level needed to produce that brightness
genlock	circuitry that aligns the video timing signals by locking together the horizontal, vertical, and color subcarrier frequencies and phases and generates a pixel clock to clock pixel data into memory for display or into another circuit for processing
GND	ground signal
GUI	graphical user interface—an intuitive, easy-to-use means of communicating information to and from a computer program by means of graphical screen displays; GUIs can resemble the front panels of instruments or other objects associated with a computer program.

H

h	hour
hardware	the physical components of a computer system, such as the circuit boards, plug-in boards, chassis, enclosures, peripherals, cables, and so on

HSYNC	horizontal sync signal—the synchronization pulse signal produced at the beginning of each video scan line that keeps a video monitor's horizontal scan rate in step with the transmission of each new line
HSYNCIN	horizontal sync input signal
Hz	hertz—the number of scans read or updates written per second

I

IC	integrated circuit
ID	identification
IEEE	Institute of Electrical and Electronics Engineers
`IMAQconf`	a configuration and diagnostic utility included with IMAQ devices
in.	inches
INL	integral nonlinearity—A measure in LSB of the worst-case deviation from the ideal A/D or D/A transfer characteristic of the analog I/O circuitry
interlaced	a video frame composed of two interleaved fields; the number of lines in a field are half the number of lines in an interlaced frame
instrument driver	a set of high-level software functions, such as NI-IMAQ, that controls specific plug-in computer boards; instrument drivers are available in several forms, ranging from a function callable from a programming language to a virtual instrument (VI) in LabVIEW
interpreter	a software utility that executes source code from a high-level language such as Basic, C or Pascal, by reading one line at a time and executing the specified operation *See also* compiler.
interrupt	a computer signal indicating that the CPU should suspend its current task to service a designated activity
interrupt level	the relative priority at which a device can interrupt

I/O	input/output—the transfer of data to/from a computer system involving communications channels, operator interface devices, and/or data acquisition and control interfaces
IRQ	interrupt request

K

k	kilo—the standard metric prefix for 1,000, or 10^3, used with units of measure such as volts, hertz, and meters
K	kilo—the prefix for 1,024, or 2^{10}, used with B in quantifying data or computer memory
kbytes/s	a unit for data transfer that means 1,000 or 10^3 bytes/s
Kword	1,024 words of memory

L

library	a file containing compiled object modules, each comprised of one of more functions, that can be linked to other object modules that make use of these functions.
line count	the total number of horizontal lines in the picture
LSB	least significant bit
LUT	look-up table—a selection in the `IMAQconf` configuration utility that contains formulas that let you implement simple imaging operations such as contrast enhancement, data inversion, gamma manipulation, or other nonlinear transfer functions

M

m	meters
M	(1) Mega, the standard metric prefix for 1 million or 10^6, when used with units of measure such as volts and hertz; (2) mega, the prefix for 1,048,576, or 2^{20}, when used with B to quantify data or computer memory

MB	megabytes of memory
Mbytes/s	a unit for data transfer that means 1 million or 10^6 bytes/s
memory buffer	*See* buffer.
memory window	continuous blocks of memory that can be accessed quickly by changing addresses on the local processor
MSB	most significant bit
MTBF	mean time between failure
mux	multiplexer—a switching device with multiple inputs that selectively connects one of its inputs to its output

N

NI-IMAQ	driver software for National Instruments IMAQ hardware
noninterlaced	a video frame where all the lines are scanned sequentially, instead of divided into two frames as in an interlaced video frame
NTSC	National Television Standards Committee—the committee that developed the color video standard used primarily in North America, which uses 525 lines per frame. *See also* PAL.
NVRAM	nonvolatile RAM—RAM that is not erased when a device loses power or is turned off

O

operating system	base-level software that controls a computer, runs programs, interacts with users, and communicates with installed hardware or peripheral devices

P

PAL	Phase Alternation Line—one of the European video color standards; uses 625 lines per frame. *See also* NTSC.

PCI	Peripheral Component Interconnect—a high-performance expansion bus architecture originally developed by Intel to replace ISA and EISA; it is achieving widespread acceptance as a standard for PCs and workstations and offers a theoretical maximum transfer rate of 132 Mbytes/s
PCLK	pixel clock signal—times the sampling of pixels on a video line
PCLKIN	pixel clock in signal
PFI	programmable function input
PGIA	programmable gain instrumentation amplifier
picture aspect ratio	the ratio of the active pixel region to the active line region; for standard video signals like RS-170 or CCIR, the full-size picture aspect ratio normally is 4/3 (1.33)
pixel	picture element—the smallest division that makes up the video scan line; for display on a computer monitor, a pixel's optimum dimension is square (aspect ratio of 1:1, or the width equal to the height)
pixel aspect ratio	the ratio between the physical horizontal size and the vertical size of the region covered by the pixel; an acquired pixel should optimally be square, thus the optimal value is 1.0, but typically it falls between 0.95 and 1.05, depending on camera quality
pixel clock	divides the incoming horizontal video line into pixels
pixel count	the total number of pixels between two HYSNCs; the pixel count determines the frequency of the pixel clock
PLL	phase-locked loop—circuitry that provides a very stable pixel clock that is referenced to another signal, for example, an incoming HSYNC signal
protocol	the exact sequence of bits, characters, and control codes used to transfer data between computers and peripherals through a communications channel
pts	points

R

RAM	random-access memory
real time	a property of an event or system in which data is processed as it is acquired instead of being accumulated and processed at a later time
region-of-interest	a hardware-programmable rectangular portion of the acquisition window
relative accuracy	a measure in LSB of the accuracy of an ADC; it includes all nonlinearity and quantization errors but does not include offset and gain errors of the circuitry feeding the ADC
resolution	the smallest signal increment that can be detected by a measurement system; resolution can be expressed in bits, in proportions, or in percent of full scale. For example, a system has 12-bit resolution, one part in 4,096 resolution, and 0.0244 percent of full scale.
ribbon cable	a flat cable in which the conductors are side by side
ROM	read-only memory
RS-170	the U.S. standard used for black-and-white television
RTSIbus	Real-Time System Integration Bus—the National Instruments timing bus that connects IMAQ and DAQ boards directly, by means of connectors on top of the boards, for precise synchronization of functions

S

s	seconds
scaling down circuitry	circuitry that scales down the resolution of a video signal
scatter-gather DMA	a type of DMA that allows the DMA controller to reconfigure on-the-fly
SRAM	static RAM

sync	tells the display where to put a video picture; the horizontal sync indicates the picture's left-to-right placement and the vertical sync indicates top-to-bottom placement
syntax	the set of rules to which statements must conform in a particular programming language
system RAM	RAM installed on a personal computer and used by the operating system, as contrasted with onboard RAM

T

transfer rate	the rate, measured in bytes/s, at which data is moved from source to destination after software initialization and set up operations; the maximum rate at which the hardware can operate
TRIG	trigger signal
trigger	any event that causes or starts some form of data capture
trigger control and mapping circuitry	circuitry that routes, monitors, and drives the external and RTSIbus trigger lines; you can configure each of these lines to start or stop acquisition on a rising or falling edge.
TTL	transistor-transistor logic

V

V	volts
VCO	voltage-controlled oscillator—an oscillator that changes frequency depending on a control signal; used in a PLL to generate a stable pixel clock
VI	Virtual Instrument—(1) a combination of hardware and/or software elements, typically used with a PC, that has the functionality of a classic stand-alone instrument (2) a LabVIEW software module (VI), which consists of a front panel user interface and a block diagram program
video line	a video line consists of a HSYNC, back porch, active pixel region, and a front porch

VSYNC	vertical sync signal—the synchronization pulse generated at the beginning of each video field that tells the video monitor when to start a new field
VSYNCIN	vertical sync in signal

W

white reference level	the level that defines what is white for a particular video system *See also* black reference level.

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