DATA TRANSLATION

UM-14358-J

DT3152
User's Manual

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Radio and Television Interference

This equipment has been tested and found to comply with CISPR EN55022 Class A and EN50082-1 (CE) requirements and also with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Changes or modifications to this equipment not expressly approved by Data Translation could void your authority to operate the equipment under Part 15 of the FCC Rules.

Note: This product was FCC-Certified under test conditions that included use of shielded cables and connectors between system components. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radio, television, and other electronic devices.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n’émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

Table of Contents

About this Manual

This manual describes the features of the DT3152 frame grabber board and how to use the DT3152 Device Driver with the Frame Grabber SDK™ to write an application program.

Intended Audience

This document is intended for engineers, scientists, technicians, or others responsible for programming and/or using the DT3152 board to perform machine vision and/or image analysis operations. It is assumed that you have some familiarity with imaging principles and that you are familiar with the operating characteristics of your video source.

If you are writing application programs using the device driver and the Frame Grabber SDK, it is also assumed that you are familiar with the Microsoft® Windows® 98, Windows Me (Millennium Edition), Windows 2000, or Windows XP operating system and with the Microsoft C compiler.

What You Should Learn from this Manual

This manual provides detailed information about the features of the DT3152 board and the DT3152 Device Driver to allow you to access the board's capabilities using software. It is organized as follows:

- Chapter 1, "Overview," describes the major features of the board, as well as the supported software and accessories for the board.
- Chapter 2, "Principles of Operation," describes all of the board's features and how to use them in your application.
- Chapter 3, "Supported Device Driver Capabilities," describes the capabilities supported by the DT3152 Device Driver and the initialized control values.

- Chapter 4, "Programming Flowcharts," describes the processes you must follow to program the DT3152 board using the DT-Open Layers™ Frame Grabber SDK.
- Chapter 5, "Troubleshooting," provides information that you can use to resolve problems with the board and the device driver, should they occur.
- Appendix A, "Specifications," lists the specifications of the board.
- Appendix B, "Connector Pin Assignments," shows the pin assignments for the connectors on the board.
- Appendix C, "Modifying the Device Driver," describes how to add, modify, and remove a board from the device driver configuration, and uninstall the device driver, if necessary.
- Appendix D, "Asynchronous Reset Cameras," describes additional information on using asynchronous reset cameras with the DT3152.
- An index complete this manual.

Conventions Used in this Manual

The following conventions are used in this manual:

- Notes provide useful information that requires special emphasis, cautions provide information to help you avoid losing data or damaging your equipment, and warnings provide information to help you avoid catastrophic damage to yourself or your equipment.
- Items that you select or type are shown in **bold**.
- `Courier font` is used to represent source code.

Related Information

Refer to the following documents for more information on using the DT3152 board:

- *DT3152 Getting Started Manual* (UM-18302), included on the Imaging OMNI CD™ provided with the DT3152 board, describes how to set up, install, and wire signals to the DT3152 board, how to install the DT3152 Device Driver, and how to verify the operation of the board.
- *Frame Grabber SDK User's Manual* (UM-13442) and online help, included on the Imaging OMNI CD provided with the DT3152 board, describe the Dynamic Linkable Library (DLL) that you can use to write image acquisition application programs.
- *DT-Active Open Layers User's Manual* (UM-17325), available from Data Translation, describes DT-Active Open Layers™, an ActiveX control, which allows you to use Data Translation PCI frame grabber boards within graphical programming environments such as Microsoft® Visual Basic® and Visual C++®.
- *GLOBAL LAB Image/2 User's Manual* (UM-17790) and *GLOBAL LAB Image/2 API Manual* (UM-17792), available from Data Translation, describe how to use GLOBAL LAB® Image/2 and GLOBAL LAB Image/2 Streamline™ to create scientific applications using object-oriented image processing tools.
- *DT Vision Foundry User's Manual* (UM-17755) and *DT Vision Foundry API Manual* (UM-17757), available from Data Translation, describe how to use DT Vision Foundry™ to create machine vision applications using object-oriented image processing tools.
- *PCI Specification:* PCI Local Bus Specification, PCI Special Interest Group, Hillsboro, OR., Revision 2.0, (503) 696-2000.
- Bt254 Monolithic CMOS Triple 8-bit Image Digitizer, Brooktree Corporation, (619) 452-7580.

- SAA7116 Digital Video to PCI Interface, Philips Semiconductors, (800) 234-7381.

Additionally, it may be helpful to read other material in order to gain a better understanding of image processing concepts, algorithms, and their applications. Data Translation's Technical Support Department recommends the following resources for understanding image processing concepts, processing, and coding:

Baxes, Gregory A. *Digital Image Processing, Principles & Applications.* New York: John Wiley & Sons, 1994. Introduction to image processing and hardware/software basics.

Benson, K. Blair, and Donald G. Fink. *HDTV Advanced TV for the 1990's.* New York: McGraw-Hill, 1990. Details high-definition television concepts.

Brooktree Corporation. *Brooktree Applications Handbook - Graphics and Imaging Products.* San Diego: Brooktree Corporation, 1991. Product data book and application examples.

Castleman, K. R. *Digital Image Processing*. Englewood Cliffs, NJ: Prentice-Hall, 1987. Explains major image processing concepts and mathematical concepts involved in digital image manipulation.

Cunningham, John E. *Cable TV.* 2nd ed. Indianapolis: Howard W. Sams & Company, Inc., 1987. Provides the basics of cable television.

Foley, J. D., and A. Van Dam. *Fundamentals of Interactive Computer Graphics*. Addison-Wesley: Reading, MA, 1984. Provides information on geometric functions.

Friedhoff, Richard M., and William Benzon. *The Second Computer Revolution, Visualization.* New York: Harry N. Abrams, Inc., 1989. Covers the history of image processing technology.

Gonzalez, Rafael C., and Paul Wintz. *Digital Image Processing.* Menlo Park, CA: Addison-Wesley, 1987. Explains major image processing concepts and mathematical concepts involved in digital image manipulation, including FFT processing, filtering operations, geometric functions, histograms, and linear equalization.

Held, Gilbert. *Data Compression Techniques and Applications: Hardware and Software Considerations.* 3rd ed. Somerset, NJ: John Wiley & Sons, Inc., 1991. Covers various techniques currently used for data compression; includes programming examples.

Holzmann, Gerard J. *Beyond Photography - The Digital Darkroom.* Englewood Cliffs, NJ: Prentice-Hall, 1988. Introduces and explains image editing; includes programming examples.

Ingram, Dave. *Video Electronics Technology.* Blue Ridge Summit, PA: Tab Books, Inc., 1984. Explains the basic electronics used in video devices.

Kiver, M. S. *Color Television Fundamentals.* New York: McGraw-Hill, 1977. Covers television and video basics.

Lindley, Craig. *Practical Image Processing in C.* Somerset, NJ: John Wiley & Sons, Inc., 1991. Explains basic image processing techniques using C, provides many programming examples, covers TIFF and PICT file formats, and describes how to map images into VGA memory space.

Luther, Arch C. *Digital Video in the PC Environment.* New York: McGraw-Hill, 1991. Explains Digital Video Interactive (DVI) technology.

National Semiconductor Corporation. *Linear Applications Handbook.* Santa Clara, CA: National Semiconductor Corporation, 1986. Explains broadcasting standards and major circuit components of frame grabber boards.

Pratt, William K. *Digital Image Processing.* Somerset, NJ: John Wiley & Sons, Inc., 1991. Detailed text on image processing, including morphological processing, feature extraction, image segmentation, and shape analysis.

Reid, Christopher E. and Thomas B. Passin. *Signal Processing in C.* Somerset, NJ: John Wiley & Sons, Inc.

Rimmer, Steve. *Bit-Mapped Graphics.* Blue Ridge Summit, PA: Tab Books, Inc., 1990. Details digital image file formats and image manipulation after digitizing.

Rimmer, Steve. *Graphical User Interface Programming.* Blue Ridge Summit, PA: Tab Books, Inc., 1992. Covers various techniques currently used for GUI programming; gives insight into how Microsoft Windows was written/implemented along with the design aspects related to windows programming; includes programming examples.

Rosenfeld, Azriel, and Avinash C. Kak. *Digital Picture Processing.* New York: Academic Press, Inc., 1990. Describes image processing techniques and concepts.

Russ, John C. *Computer-Assisted Microscopy,* The Measurement and Analysis of Images. New York: Plenum Press.

Serra, J. *Image Analysis and Mathematical Morphology.* London: Academic Press, Ltd., 1982. Provides information on morphological processing.

Smith, C. Cecil. *Mastering Television Technology.* Richardson, TX: Newman Smith Publishing Company, Inc., 1988. Describes current video technology and concepts.

Tektronix, Inc. *Television Measurements - NTSC Systems.* Beaverton, OR: Tektronix, Inc., 1989. Covers test equipment and broadcasting standards.

Ulichney, Robert. *Digital Halftoning*. Cambridge, MA: The MIT Press, 1987. Describes image manipulation, creation, and analysis in the digital environment.

Watkinson, John. *The Art of Digital Video.* Stoneham, MA: Focal Press, 1990. Provides an in-depth description of digital video fundamentals.

Where to Get Help

Should you run into problems installing or using the DT3152 board, our Technical Support Department is available to provide technical assistance. Refer to Chapter 5 for more information. If you are outside the U.S. or Canada, call your local distributor, whose number is listed in your Data Translation product handbook, or contact the Data Translation web site (www.datatranslation.com).

1

Overview

Features

The DT3152 is a high-accuracy, programmable, monochrome frame grabber board for the PCI bus. It is suitable for both image analysis and machine vision applications.

The DT3152 accepts video signals in many different monochrome and variable-scan video formats, and digitizes the signal. The board either stores the digitized data to the host computer's system memory, or transfers the digitized data to the computer's display controller to display images in real time. The board transfers image data to the host computer using PCI burst transfers.

Key features of the DT3152 board are summarized as follows:

- Operates on the PCI local bus interface;
- Can acquire images up to 4,096 pixels per line by 4,096 lines per frame;
- Digitizes 8-bit monochrome video from any one of four video input channels;
- Supports asynchronous reset cameras; for more information on using the DT3152 board with asynchronous reset cameras, refer to Appendix D;
- Synchronizes to any one of four video inputs or to an external sync input;
- Provides Sync Master mode for driving camera timing;
- Accepts separate horizontal and vertical sync inputs for variable-scan devices;
- Provides a programmable internal pixel clock and accepts an external pixel clock input;
- Provides digital video synchronization for reduced pixel jitter and good VCR/VTR acquisition;
- Accepts an external trigger with selectable polarity;

- Provides hardware clipping;
- Provides real-time scaling via decimation;
- Provides a 256 x 8-bit input look-up-table (ILUT);
- Provides a 256 x 8-bit passthru look-up-table;
- Supports a programmable region-of-interest (ROI);
- Provides a software-selectable chrominance notch filter for 50 Hz and 60 Hz AC-coupled signals;
- Provides programmable A/D reference, offset, and gain (0.5, 1, 2, and 4) settings to adjust black and white levels; and
- Provides eight TTL-level digital output signals for general-purpose use.

Supported Software

The following software is available for use with the DT3152 board:

- **DT3152 Device Driver** –This software is provided on the Imaging OMNI CD, which is shipped with the board. You *must* install this device driver to use a DT3152 board with any of the supported software packages or utilities. Refer to the *DT3152 Getting Started Manual* for information on installing the device driver.
- **DT-Acquire** –This software is provided on the Imaging OMNI CD, which is shipped with the board. This utility allows you to verify the operation of your board during startup. Refer to the *DT3152 Getting Started Manual* for information on installing and using this utility.
- **32-Bit Frame Grabber SDK** –Use this software package, provided on the Imaging OMNI CD, if you want to develop your own application software for the DT3152 board using the Microsoft C compiler in Windows 98, Windows Me, Windows 2000, or Windows XP.
- **DT-Active Open Layers** –Order this optional software package if you want to use an ActiveX control to access the capabilities of the DT3152 board using Microsoft Visual Basic or Visual C++
- **GLOBAL LAB Image®/2** –Order this optional software package if you want to develop scientific applications using object-oriented image processing tools.
- **DT Vision Foundry**™ –Order this optional software package if you want to develop machine vision applications using object-oriented image processing tools.

Refer to Data Translation's imaging product catalog for information on additional software packages available for the DT3152 board.

Accessories

To connect the DT3152 board to your video input source, you need either two EP306 cables (available from Data Translation) or user-designed cables. The EP306 is a 5-foot cable with a 15-pin, D-shell connector on one end and 14 BNC connectors on the other end.

One EP306 cable accommodates all the signals from the J2 connector on the DT3152 board; the other EP306 cable accommodates all the signals from the J4 connector on the board. Refer to Appendix B for connector information.

2

Principles of Operation

This chapter describes the features of the DT3152 board from a functional point of view. To aid the discussions in this chapter, refer to the block diagram of the DT3152, shown in Figure 1.

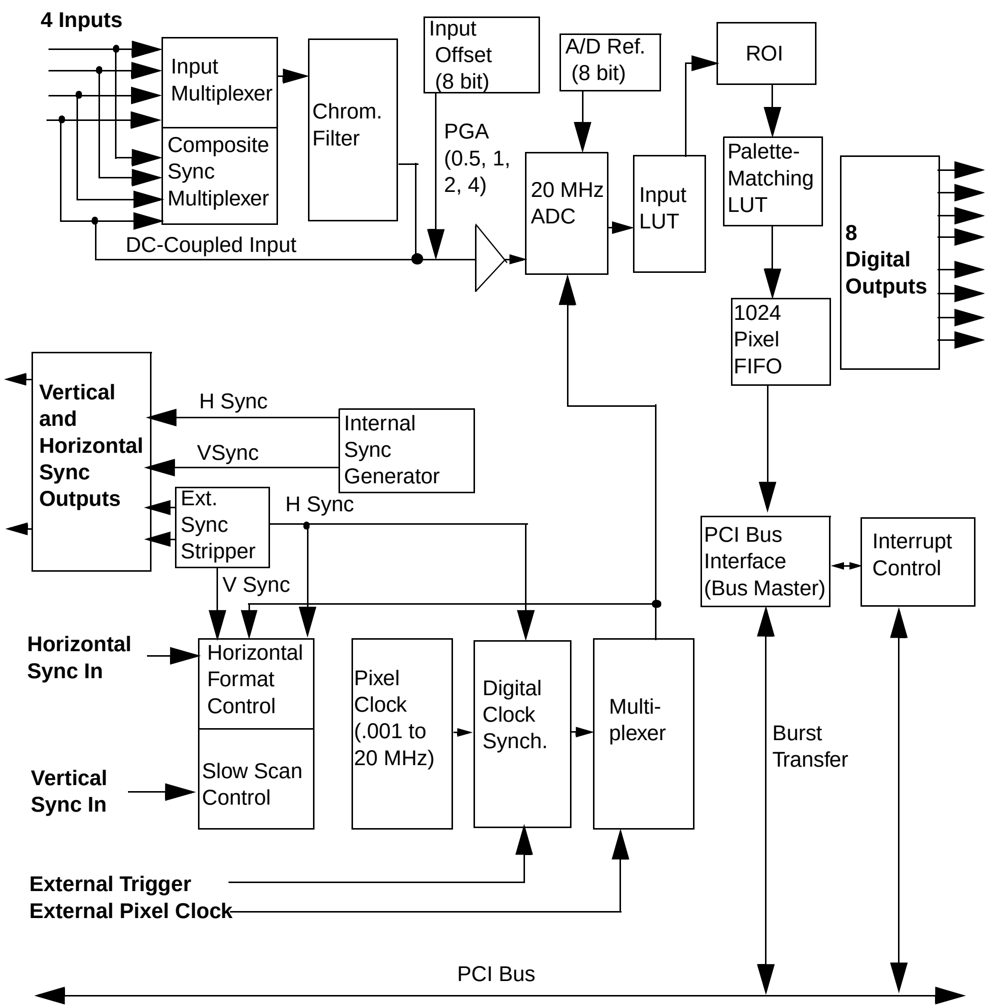

Figure 1: DT3152 Block Diagram

Video Input Signals

This section describes the following aspects of the supported input signals:

- Video signal types,
- Video input channels,
- Chrominance notch filter,
- Black and white levels,
- Pixel clock,
- External trigger, and
- Input look-up table (LUT).

Video Signal Types

The DT3152 can acquire monochrome images from following types of standard, composite video input signals:

- RS-170 –Standard for 60 Hz monochrome video signals. A video frame consists of 525 lines, 480 lines of which are visible.
- CCIR –Standard for 50 Hz monochrome video signals. A video frame consists of 625 lines, 576 lines of which are visible.
- NTSC –Standard for 60 Hz color video signals; color is superimposed over the monochrome RS-170 image. A video frame consists of 525 lines, 480 lines of which are visible.
- PAL –Standard for 50 Hz color video signals; color is superimposed over the monochrome RS-170 image. A video frame consists of 625 lines, 576 lines of which are visible.

In addition, the DT3152 can acquire monochrome images from nonstandard video sources, such as slow-scan, SEM, and high-resolution cameras. These nonstandard video sources must provide their own control signals.

Video Input Channels

The DT3152 supports four monochrome video inputs.

The board can accept an AC-coupled video input signal from one of four software-selectable video channels (0 to 3), or a DC-coupled input from video channel 3 only. The channel is software-selectable.

To accept a DC-coupled signal from channel 3, you must install jumper W1 on the board. Refer to the *DT3152 Getting Started Manual* for more information.

AC coupling allows the video signal to pass through the clamping circuit, while DC coupling causes the signal to bypass the capacitor that is in line with the video signal as well as the clamping circuit before the video multiplexer; refer to Figure 2 for an illustration of the clamping circuit.

By default, an AC-coupled signal type is selected.

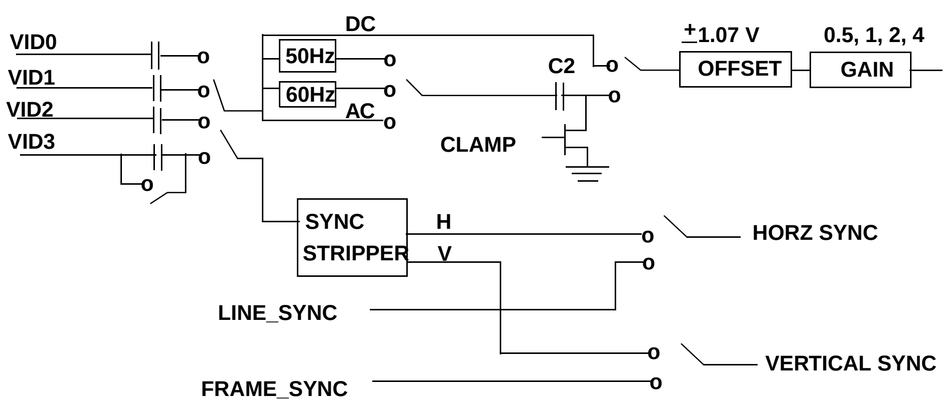

Figure 2: Video Selection

The clamping circuit selectively holds the blanking level portion of the video signal. Refer to page 30 for more information on clamping as it relates to the active image area.

Chrominance Notch Filter

If an AC-coupled video signal has chrominance information on it, as is the case with the NTSC and PAL video formats, you can use software to apply a chrominance notch filter to remove the chrominance information. The chrominance notch filter for 60 Hz is set to 3.58 MHz, while the chrominance filter for 50 Hz is set to 4.43 MHz.

By default, no filter is selected.

Black and White Levels

Black level is defined by DT-Open Layers as the voltage below which all other voltages are digitized to black. W*hite level* is defined as the voltage above which all other voltages are digitized to white. For ease of use, both of these voltages are measured at the camera's output.

On the DT3152 board, if you are using a gain of 1, use software to set a black level and a white level. If, however, you need to use a gain other than 1, use software to set the offset, gain, and reference value.

The following subsections describe how to use the offset, gain, and reference settings on the DT3152 board to adjust the black and white levels of the video signal.

Offset

The offset is the voltage you apply to the minimum value (V_{min}) of your video signal to zero it. The offset is defined as follows:

$offset = -V_{min}$

All data below 0 V is digitized as black pixels.

The DT3152 Device Driver supports a minimum offset of −1.08 V and a maximum offset of 1.07 V, in increments of 8.4 mV. Note, however, that the hardware uses 64 steps of 33.6 mV.

By default, the offset is −53.86 mV for 60 Hz and 0 V for 50 Hz.

Gain

Gain is the value you use after the offset is applied to multiply the amplitude of the signal, thereby increasing or decreasing the overall range of the signal. To maintain the accuracy of the ADC at low light levels and to support a wider range of video inputs, the DT3152 provides gains of 0.5, 1, 2, and 4. By default, the gain is 1.

To determine the gain to use, calculate the maximum voltage of your video signal after the offset is applied. Then, use the values in Table 1 to determine the gain to use.

Table 1: Gain Values

If..	Use a Gain of..
V_{max} + offset > 1.28 V	0.5
0.64 V < V_{max} + offset ≤ 1.28 V	1
0.32 V < V_{max} + offset ≤ 0.64 V	2
V_{max} + offset ≤ 0.32 V	4

Reference

Reference is the maximum voltage (after offset and gain have been applied) that you want to digitize. Reference is defined as follows:

$reference = gain\ (V_{max} + offset)$

The DT3152 board digitizes the signal between 0.0 V and the reference voltage. The DT3152 Device Driver supports a minimum reference of 0 V and a maximum reference of 1.28 V, in 256 steps of 5 mV. Note, however, that the hardware uses 64 steps of 19 mV.

By default, the reference used by the device driver is 660 mV for 60 Hz and 715 mV for 50 Hz.

Note: For proper operation, once offset and gain are applied, the difference between the adjusted minimum voltage (0 V) and the reference voltage should not be less than 500 mV.

An Example Using A/D Offset, Gain, and Reference

Figure 3 shows a signal in which part of the image is below 0.0 V and part is above 1.0 V.

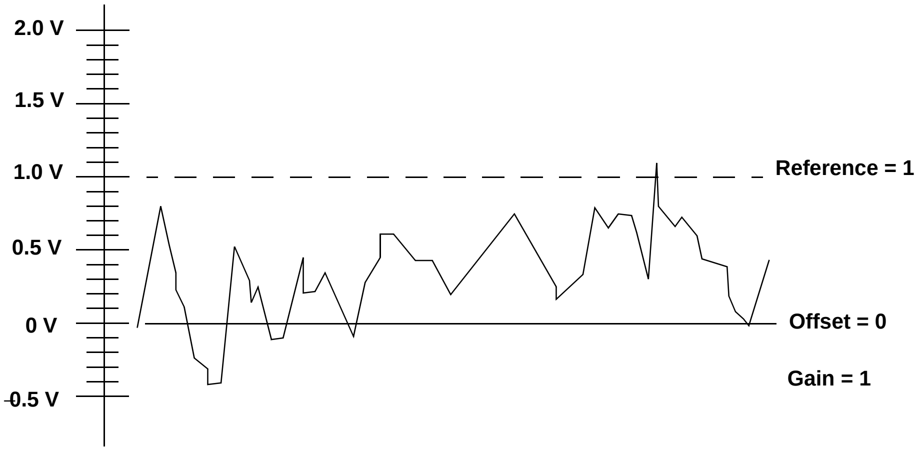

Figure 3: Original Signal

To adjust the black and white levels so that the DT3152 board digitizes the signal between –0.4 V and 1.1 V, perform the steps in the following sections.

Step 1. Adjust the Offset

To digitize the data below 0.0 V, shift the signal up by setting the offset to $-V_{min}$. In our example, $V_{min} = -0.4$ V; therefore, $-V_{min} = 0.4$ V.

Since the voltage step for offset is 8400 µV, and you want an offset as close to 0.4 V (400000 µV) as possible, calculate the best fit based on a step of 8400 µV using the following equations:

400000 µV / 8400 µV = 47.62 //48 (round to nearest whole number)
48 * 8400 µV = 403200 µV // multiply for actual offset
offset = 0.4032 V

Figure 4 shows the effect of using an offset of 0.4032 V.

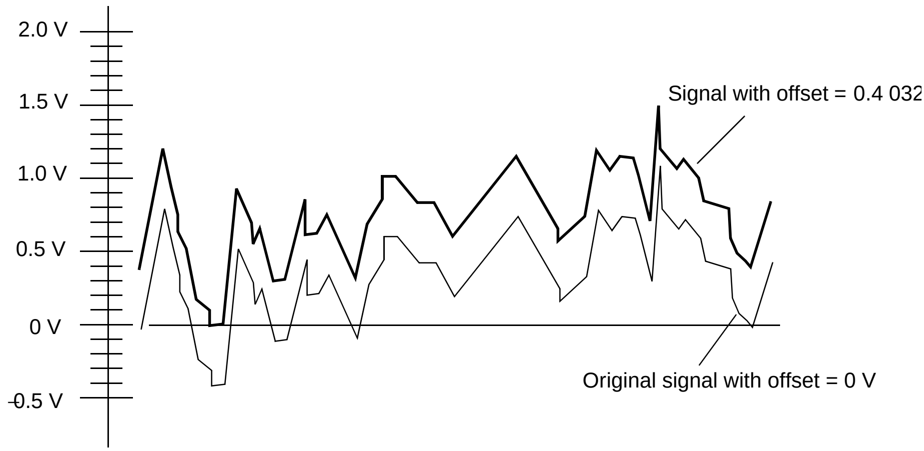

Figure 4: Use of Offset to Adjust the Black Level

Since the image has been shifted up by 0.4032 V, a voltage level of -0.4032 V, relative to the camera's output, is now digitized as black.

Step 2. Apply the Gain

With an offset of 0.4032 V, the maximum point on the signal is now 1.5032 V. However, the ADC on the DT3152 board can digitize voltages between 0.0 V and 1.28 V only. Therefore, to digitize the part of the signal between 1.28 V and 1.5032 V, you need to decrease the amplitude of the video signal. Referring to Table 1 on page 13, since V_{max} + offset = 1.5032 V, which is greater than 1.28 V, use a gain of 0.5. Figure 5 shows the effect of gain on the video signal.

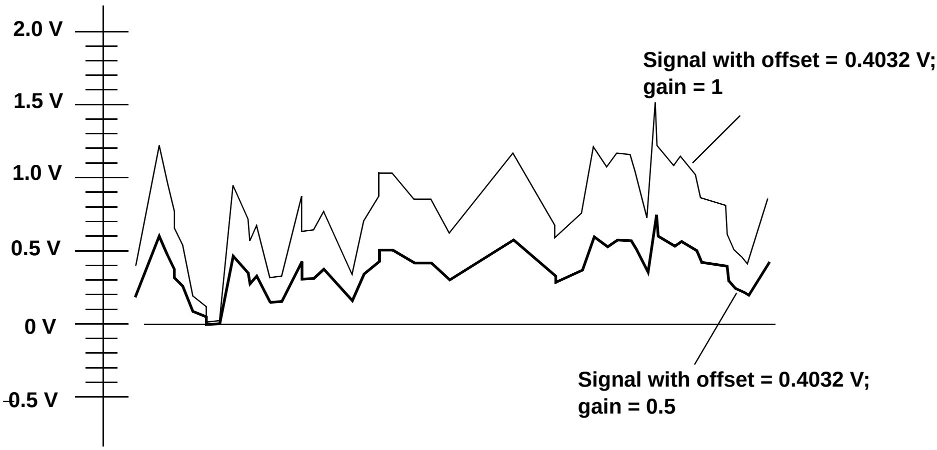

Figure 5: Use of Gain to Adjust the Amplitude of the Signal

Step 3. Apply the Reference

Using the equation *reference = gain (Vmax + offset)*, with the offset equal to 0.4032 V, V_{max} equal to 1.1 V, and the gain equal to 0.5, *reference* is determined as follows:

reference = 0.5 (1.1 V+ 0.4032 V)
reference = 0.7516 V

Since the voltage step for reference is 5000 µV and you want the reference as close to 0.7516 V (751600 µV) as possible, calculate the best fit for reference based on a step of 5000 µV using the following equations:

751600 µV / 5000 µV = 150.32 µV
// 150 (round to nearest whole number)
150 µV * 5000 µV = 750000 µV
// multiply for actual reference
reference = 0.75 V

Values greater than 0.75 V are digitized to white. Figure 6 shows the effect of using a reference value of 0.75 V, a gain value of 0.5, and an offset of 0.4032. The DT3152 board can now digitize the entire video signal from −0.4 V to 1.1 V, relative to the camera output.

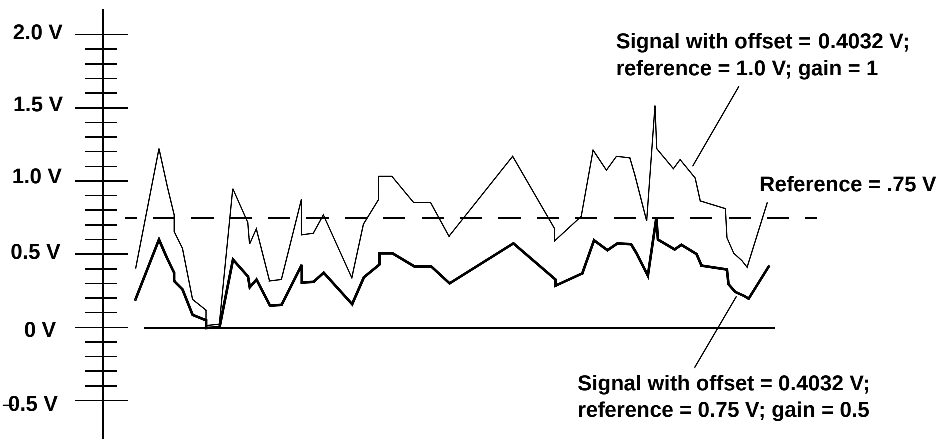

Figure 6: Use of Reference, Offset, and Gain

Pixel Clock

The frequency of the pixel clock determines the video input signal digitization rate. To determine the appropriate pixel clock frequency, divide the number of pixels per line (including the active pixels and blank pixels by the length of the horizontal line (in time).

Note: According to sampling theory (Nyquist Theorem), specify a frequency that is at least twice as fast as the input's highest frequency component. Doing so avoids an error condition called *aliasing*, in which high frequency input components erroneously appear as lower frequencies after sampling. For example, to accurately sample a 20 kHz signal, specify a sampling frequency of at least 40 kHz.

Using the Digital Clock Sync Circuitry, which has no more than ±4 ns jitter, the board synchronizes the pixel clock to the first frame of an asynchronous external video source. Synchronization occurs when a horizontal sync is received or is inserted.

The DT3152 supports an internal and external pixel clock, described in the following subsections.

Internal Pixel Clock

The DT3152 frame grabber board provides a programmable clock that generates the base frequency for video input timing. The clock is subsequently phase adjusted and divided down to produce the desired digitization rate.

You can program the pixel clock for any frequency from 1 kHz to 20 MHz, limited by the granularity of the pixel clock controller. The default frequency is 12.5 MHz for 60 Hz image formats and 15 MHz for 50 Hz image formats.

External Pixel Clock

Pin 1 (EXT_CLK) of connector J2 on the DT3152 board is provided for connecting an external pixel clock. The frequency of the external pixel clock can range between 0 and 20 MHz (200 mV peak-to-peak).

External Trigger

The DT3152 frame grabber provides pin 3 (EXT_TRIGGER) on connector J2 for connecting an external trigger input.

Using an external trigger, you can synchronize an acquisition with an external event. By default, the external trigger is disabled. Through software, you can enable the external trigger and specify whether you want image acquisition to start on a low-to-high edge (rising-edge) transition or a high-to-low (falling-edge) transition on pin 3 of connector J2.

Input Look-Up Table

An input look-up table (ILUT) allows you to change the value of an incoming pixel. When the ILUT gets an input pixel value, it retrieves the output value for that particular pixel from the ILUT and passes the output value to the frame (region of interest). Pixel values range from 0 to 255. The DT3152 frame grabber board supports one ILUT.

Using software, you can specify the relationship between the pixel input value and the ILUT output value by loading the ILUT with different processing setups. For example, you can pass an image unaltered (the default setting, known as identity), or you can perform pixel point operations, such as image multiplication and division, intensity correction, and reverse-video, before passing the image on.

As an example, assume that the ILUT is loaded with the identity pattern. An input value of 0 (black in monochrome mode) has an output value of 0 (black in monochrome mode). An input value of 1 has an output value of 1. An input value of 2 has an output value of 2, and so on, up to an input value of 255 (which has an output value of 255 or white in monochrome mode).

As another example, if you load the ILUT with an inverse or negative pattern, an input of 0 has an output value of 255, an input value of 1 has an output pattern of 254, and so on, up to an input value of 255 (which has an output value of 0 or black in monochrome mode).

Note that in addition to ILUTs, passthru operations make use of passthru LUTs. For more information about passthru LUTs, refer to page 42.

Sync Signals

This section describes the following aspects of the sync signals:

- Sync signal selection,
- Sync signal insertion (Sync Sentinel), and
- Sync Master mode.

Sync Signal Selection

To digitize the incoming video signal, the DT3152 frame grabber requires both a horizontal and a vertical sync signal. Figure 7 illustrates the process of generating the horizontal and vertical sync signals.

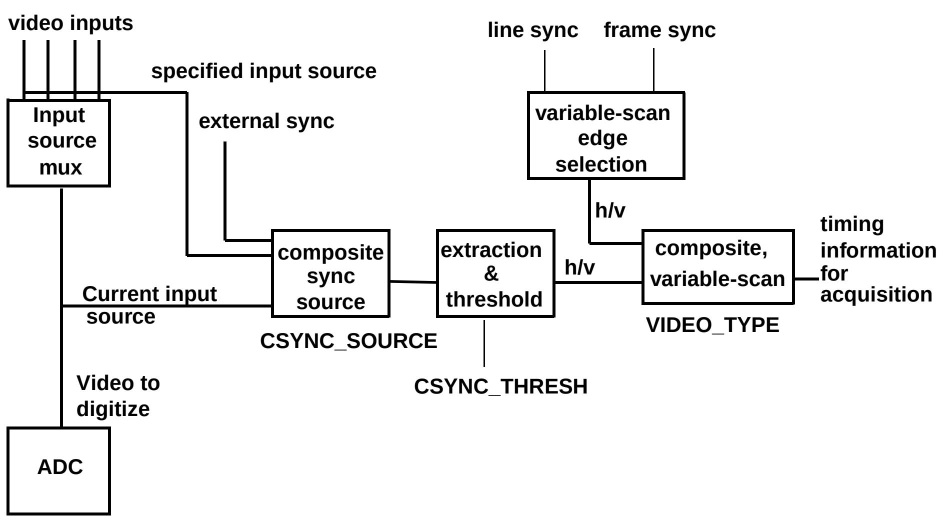

Figure 7: Horizontal and Vertical Timing

The way in which the board determines the sync information depends on whether composite or variable-scan video signals are connected to the board. Refer to the following subsections for more information.

Composite Video Signal

On the DT3152 board, the composite video sync signal can come from one of the following sources:

- The current channel being digitized –In this case, the composite sync signal is stripped from the video signal (by the Sync Stripper circuitry) and fed into the sync circuitry.
- One of the unused video input channels –In this case, the sync signal is fed directly into the sync circuitry.

The voltage level of the analog sync signal is compared with the sync threshold to determine when the sync is asserted. The sync period is defined as the portion of the sync signal that falls below the sync threshold. The sync is then used to generate the horizontal and vertical timing for the input section of the DT3152 board. On the DT3152, you can program the sync threshold. Possible threshold limits are 50 mV, 75 mV, 100 mV, and 125 mV (nominal is 125 mV).

Variable-Scan Video Signals

When using variable-scan video signals, the horizontal (line) and vertical (frame) sync come directly from the video source. Two inputs are provided on connector J2 to accept separate horizontal and vertical sync signals. LINE_SYNC (pin 2) is used to indicate the start of a line. FRAME_SYNC (pin 4) is used to indicate the start of a frame.

By default, the DT3152 uses the rising edge of the external sync signals to reset the horizontal and vertical counters. In cases where the video is referenced to the falling edge of the external LINE_SYNC and FRAME_SYNC signals, you can invert the sync signals on the board using software.

A variable-scan acquisition is initiated and controlled like any other single-frame or multiple-frame acquisition. Figure 8 on page 24 illustrates variable-scan timing and data storage.

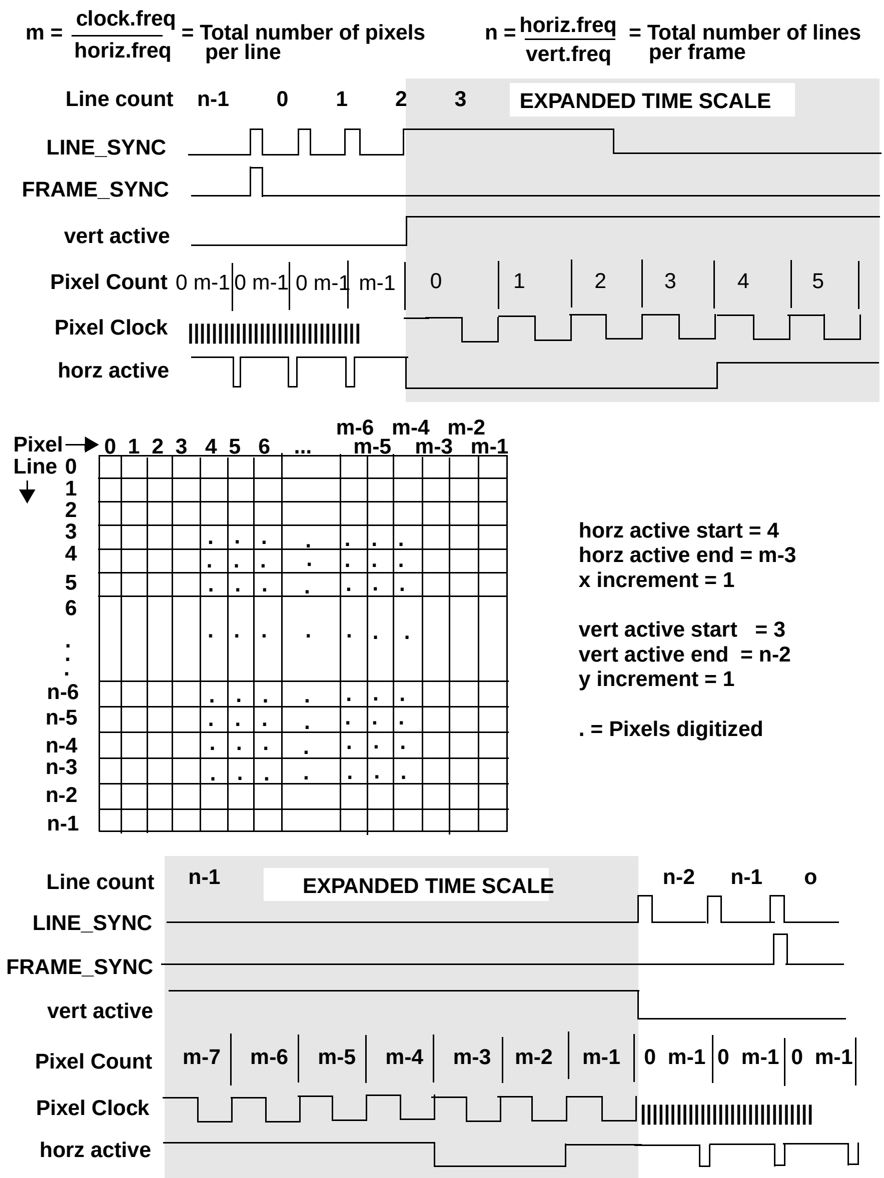

Figure 8: Variable-Scan Timing and Data Storage

Sync Signal Insertion (Sync Sentinel)

The Sync Sentinel circuitry allows you to control when sync signals occur on the board. This is especially useful for noisy input sources such as VCRs, where the DT3152 frame grabber may interpret a noise spike in the video signal as a horizontal or vertical sync, or the board may miss some syncs that are below the threshold.

You can enable or disable the Sync Sentinel through software. By default the Sync Sentinel is enabled.

When the Sync Sentinel is enabled, you determine the window in which the sync can be detected by specifying a horizontal search position, a horizontal insert position, a vertical search position, and a vertical insert position.

The horizontal sync search position is the pixel location within a line at which the DT3152 board begins to search for the horizontal sync. If the horizontal sync is not detected before the horizontal sync insert position is reached, the DT3152 board inserts a horizontal sync to synchronize to the video signal. The default value for the horizontal search position is 95.0% of the total pixels per line. The default value for the horizontal insert position is 101.5% of the total pixels per line.

The vertical sync search position is the line location within a field at which the DT3152 board begins to search for the vertical sync. If the vertical sync is not detected before the vertical sync insert position is reached, the DT3152 board inserts a vertical sync to stay in sync with the video signal. The default value for the vertical search position is 50.0% of the total lines per field. The default value for the vertical insert position is 115% of the total lines per field.

By setting the sync search position immediately before the falling edge of the sync and setting the sync insert position immediately after the falling edge of the sync, you can prevent the DT3152 board from searching for syncs except where they are expected.

If you are switching among multiple input sources that are not synchronized with each other or if the sync signals occur at random intervals, you can disable the Sync Sentinel. This allows the DT3152 board to wait until a sync signal actually occurs before starting the acquisition.

Note: Instead of disabling the Sync Sentinel, you can set the sync search position to a very low value (such as 4) and set the sync insert position as far after the falling edge of sync as possible. This allows the DT3152 board to search for the sync for almost the entire line and/or field.

Enabling Sync Master mode automatically disables the Sync Sentinel. For more information about Sync Master mode, refer to page 26.

If you are using an asynchronous reset camera, make sure that the Sync Sentinel is disabled. For more information about using the DT3152 board with asynchronous reset cameras, refer to Appendix D.

Sync Master Mode

Note: Enabling Sync Master mode automatically disables the Sync Sentinel. For more information about the Sync Sentinel, refer to page 25.

Typically, the camera generates the sync signals (composite or variable-scan) for the DT3152 frame grabber board, and the board locks to them.

If this is not appropriate for your application, you can use Sync Master mode to set up the DT3152 board to generate the sync signals to drive one or more cameras. The video signal from the camera is then digitized as usual, using the syncs generated by the board as the sync basis. This process is called gen-locking. Gen-locking allows you to synchronize signals when switching among channels.

You can enable or disable Sync Master mode through software. When Sync Master mode is enabled, the horizontal sync signal is output on pin 9 (LINE_CLOCK) of connector J4; the vertical sync signal is output on pin 10 (FRAME_CLOCK) of connector J4. Both are active-low, TTL signals.
Using software, you can specify the following:

- **The width of the sync signals** –The width of the horizontal sync signal can range from 250 ns to 950,000,000 ns (nominal is 4,800 ns). The width of the vertical sync signal can range from 250 ns to 950,000,000 ns (nominal is 190,000 ns for 60 Hz image formats and 160,000 ns for 50 Hz image formats).
- **The frequency of the sync signals** –The horizontal sync frequency can range from 1 Hz to 2 MHz (nominal is 15.75 kHz for 60 Hz image formats and 15.625 kHz for 50 Hz image formats). The vertical sync frequency can range from 1 Hz to 200 kHz (nominal is 60 Hz for 60 Hz image formats and 50 Hz for 50 Hz image formats).
- **The phase between the horizontal sync and vertical sync signals** –The phase is specified as a percentage of the horizontal period multiplied by 100 and ranges from 100 (1%) to 9,900 (99%); nominal is 5,000 (50%).

With interlaced cameras that accept horizontal and vertical syncs, you can use the phase adjustment to control which field is output. By setting up the board as noninterlaced with a sync phase of 50%, the even field is continuously selected. If the phase is 1%, the odd field is continuously selected.

You can alternate the phase at each vertical sync by setting the phase at 50% and setting up the DT3152 board as interlaced. The even and odd fields are then alternately selected for a true interlaced image. Whenever the board is set up as interlaced, the phase alternates between 1% and whatever phase is specified. These different setups are illustrated in Figure 9.

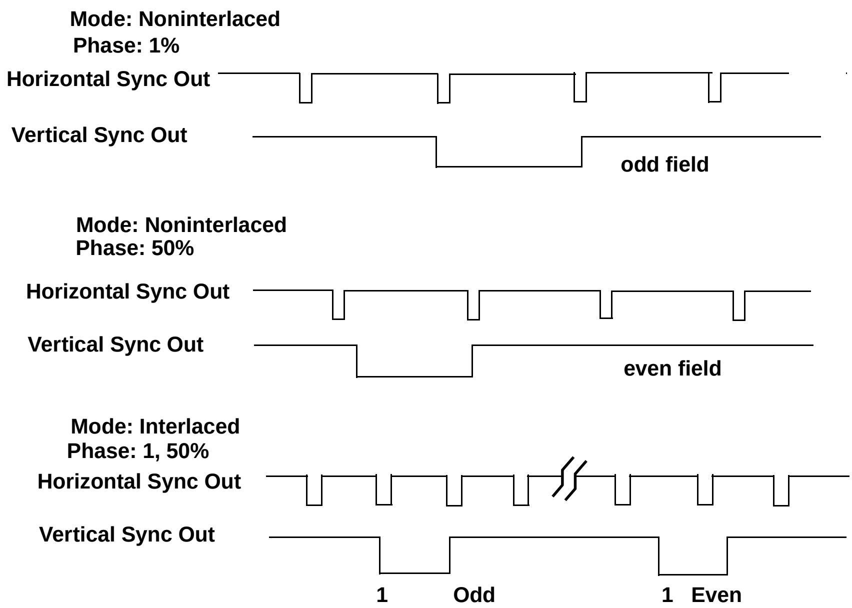

Figure 9: Sync Out Phase Adjustment

Video Area

The video image area is composed of pixels and lines of video. The total video area is the complete set of horizontal and vertical input lines from which you extract the active video area and the frame within the active video area that you want to digitize. The total video area includes all parts of the signal, including nonvisual portions such as horizontal and vertical blanking information. (Blanking information is the data not included in the active video area; it contains sync and other information.)

The total video area is as wide as the total pixels per line (the entire area between two consecutive horizontal sync signals) and as tall as the total lines per field (the entire area between two consecutive vertical sync signals).

The total pixels per line can be calculated as follows:

$$\text{Total pixels per line} = \frac{\text{pixel clock frequency (MHz)}}{\text{horizontal frequency (kHz)}}$$

The total lines per field can be calculated as follows:

$$\text{Total lines per field} = \frac{\text{horizontal frequency (kHz)}}{\text{vertical frequency (Hz)}}$$

You can use software to define the total video area for the DT3152 frame grabber board. Table 2 lists the settings you can program.

Table 2: Total Video Area Settings

Setting	Description	Range	Nominal Values
Total Pixels per Line	The total number of pixels in a single horizontal line of video, where a horizontal line is defined as the area between two consecutive horizontal sync signals.	4 to 4096[a] pixels	50 Hz: 960 60 Hz: 794
Total Lines per Field	The total number of lines in a single field of video, where a field is defined as the area between two consecutive vertical sync signals.	1 to 4096[a] lines	50 Hz: 312 60 Hz: 262

a. The granularity is 1.

The following sections describe the active video area and the frame within the active video area that you want to digitize.

Active Video Area

The active video area floats in the total video area. The active video area is defined as that part of the incoming signal that contains valid video data (not blanking or sync information). Therefore, the active video area consists of the visible portion of those lines containing visible pixel data.

Using software, you can define the active area for the DT3152 board. The following sections describe how to use the settings of the board to define the horizontal and vertical components of the active video area.

2

Horizontal Video Signal

Each line of video contains horizontal sync information, blanking information, and active video. Figure 10 shows the components of a single horizontal line of video. Pixel measurements are relative to the horizontal reference point, which is defined as the beginning of the horizontal sync.

Note that the frame is an area that you establish within the active video area. For more information about frames, refer to page 34.

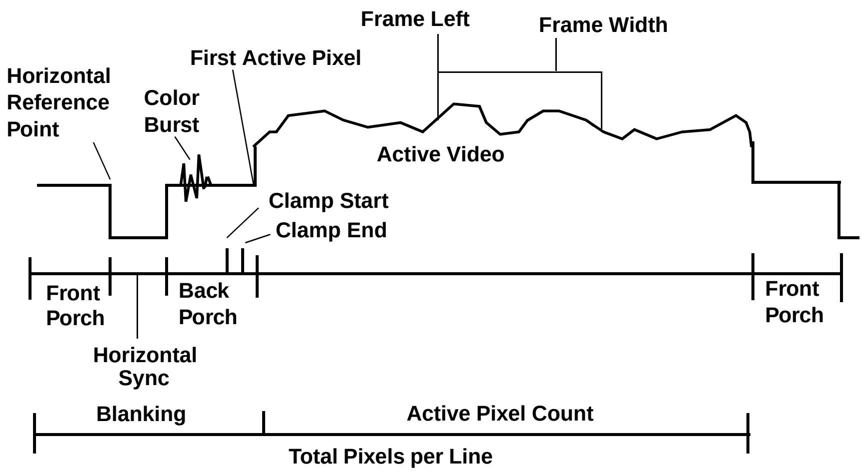

Figure 10: Horizontal Video Signal

In the horizontal video signal, blanking occurs during the horizontal sync and image border periods, which are defined by the front porch (before the horizontal sync) and back porch (after the horizontal sync).

Table 3 lists the horizontal input settings you can program on the DT3152 board.

Table 3: Horizontal Input Settings

Setting	Description	Range	Nominal Values
Back Porch Start	The beginning of that portion of the blanking information that occurs after the horizontal sync signal and before the start of the active video area.	0 to 4095[a] pixels	50 Hz: 80 60 Hz: 60
Clamp Start	The position at which the clamping circuit starts holding the blanking level portion of the video signal to a reference level.	0 to 4095[a] pixels	50 Hz: 90 60 Hz: 93
Clamp End	The position at which the clamping circuit stops holding the blanking level portion of the video signal to a reference level.	0 to 4095[a] pixels	50 Hz: 93 60 Hz: 95
First Active Pixel	The position of the first active video signal on the line, as a pixel value offset from the beginning of the horizontal sync.	0 to 4095[a] pixels	50 Hz: 160 60 Hz: 125
Active Pixel Count	The number of pixels per line in the active video area.	4 to 4096[a] pixels	50 Hz: 768 60 Hz: 640

a. The granularity is 1.

Vertical Video Signal

Each field of video contains vertical sync information, blanking information, and lines of active video. Figure 11 shows the components of a single vertical field of video. Line measurements are relative to the vertical reference point, which is defined as the beginning of the vertical sync.

Note that the frame is an area that you establish within the active video area. For more information about frames, refer to page 34.

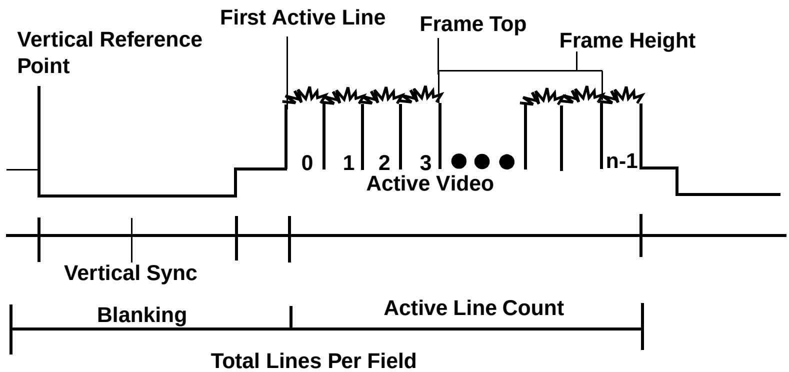

Figure 11: Vertical Video Signal

You can use software to define the vertical input settings for the DT3152. Table 4 lists the settings you can program.

Table 4: Vertical Input Settings

Setting	Description	Range	Nominal Values
First Active Line	The position of the first active video signal within the field, as a line offset from the beginning of the vertical sync.	0 to 4095[a] lines	50 Hz: 20 60 Hz: 16
Active Line Count	The number of lines per field (or noninterlaced frame) in the active video area.	1 to 4096[a] lines	50 Hz: 288 60 Hz: 240

a. The granularity is 1.

Frame (Region of Interest)

The frame is the portion of the active video area that you want to digitize. For this reason, it is sometimes called the region of interest (ROI).

This section describes the following aspects of frames:

- Frame size,
- Frame type,
- Scaling frames, and
- Frame storage modes.

Frame Size

The top of the frame is the first line of video relative to the active video area. The left side of the frame is the first pixel of video relative to the active video area. The width of the frame is the number of pixels per line of video. The height of the frame is the number of lines per field.

Table 5 shows the settings you can program on a DT3152 board to define the frame.

Table 5: Frame Settings for the DT3152 Board

Setting	Description	Range	Nominal Values
Frame Left	The first pixel in the region of interest, relative to the first active pixel, to digitize.	0 to 4095[a]	0
Frame Width	The number of pixels per line of video to digitize.	4 to 4096[b] pixels	50 Hz: 768 60 Hz: 640
Frame Top	The first line of the region of interest, relative to the first active line, to digitize.	0 to 4095[a] lines	0
Frame Height	The number of lines per frame of video (or noninterlaced frame) to digitize.	1 to 4096[a] lines	50 Hz: 576 60 Hz: 480

a. The granularity is 1.
b. The granularity is 4.

Note: The maximum number of pixels allowed in a frame is 4,194,304.

The spatial relationship between the frame, the active video area, and the total video area is shown in page 36.

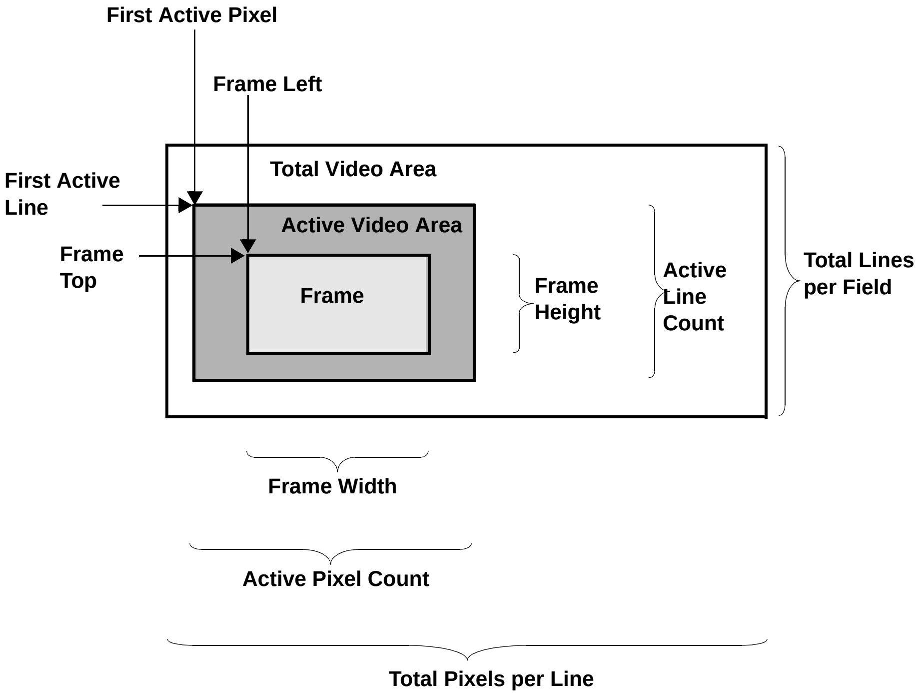

Figure 12: Spatial Relationship

Note: The frame height is specified in lines per frame, not lines per field. If the frame is interlaced, this value may exceed the active line count.

The active line count specifies the number of lines per field for a noninterlaced frame. If the frame is interlaced, the maximum number of lines per frame is the active line count multiplied by 2.

Types of Frames

You can use software to specify the type of frames to acquire. A frame can be either interlaced or noninterlaced, as follows:

- **Interlaced frame** –Consists of two consecutive fields, each containing Active Line Count lines, where the start of each field is identified by the falling edge of the vertical sync. These two fields are acquired to create the complete frame. The even field contains lines 0, 2, 4, and so on; the odd field contains lines 1, 3, 5, and so on.
- **Noninterlaced frame** –Consists of a single field, containing Active Line Count lines, where the start of the field is identified by the falling edge of the vertical sync.

Through software, you can select one of the following types of frame acquisitions:

- Interlaced frames, starting with the next even field (the default),
- Interlaced frames, starting with the next odd field;
- Interlaced frames, starting with the next field (odd or even), or
- Noninterlaced frames.

Scaling Frames

You can scale a frame by discarding pixels, lines, or both through software. This is useful if you want to reduce the size of an image.

You provide a scale factor for both the horizontal direction (range between pixels) and the vertical direction (range between lines).

The minimum scale factor is 1 (the default); the maximum scale factor is 16. For example, to scale an image so that every 16th pixel is displayed, set the horizontal scale factor to 16. To scale the image so that every other line is displayed, set the vertical scale factor to 2. For a one-to-one representation, set the scale factor to 1.

Frame Storage Mode

On the DT3152 board, frame data is stored in monochrome format, or 8-bits per pixel.

Passthru Modes

In a passthru operation, the DT3152 board continuously captures and displays video data until you stop the operation. Typically, you use passthru to view images (in as close to real time as possible for the configuration and passthru method chosen) for the purpose of focusing or positioning the camera.

In addition to displaying passthru data, you can continuously store the data to user-allocated buffers in host memory, if desired. This operation is called continuous-acquire passthru mode.

This section describes the following aspects of passthru operations:

- Passthru modes,
- Source origin,
- Passthru scaling,
- Passthru look-up table, and
- Overlays.

Passthru Modes

The DT3152 board supports bitmap passthru mode and continuous-acquire passthru mode. This section describes these modes.

Bitmap Passthru Mode

The DT3152 board supports both synchronous and asynchronous bitmap passthru mode.

In a synchronous operation, you cannot perform another operation until the operation is stopped. In an asynchronous operation, the operation starts but gives control to you immediately, allowing you to perform other operations while data is displayed.

Bitmap passthru mode requires a frame in device memory into which the image is captured.

Once the image is captured, functions in Windows perform bit copies of the image data to display memory. Functions in Windows handle obstructions to the passthru window by automatically clipping the passthru image to the visible client window region. Therefore, even if the window is obstructed in bitmap mode, the passthru can continue unabated. Once an obstruction has been removed from the passthru window client area, Windows automatically restores the correct underlying image data.

You can add overlays to bitmap passthru operations.

A bitmap passthru operation continues until you stop it. You can stop an asynchronous, bitmap passthru operation using software. To stop a synchronous bitmap passthru operation, click the mouse or press a key.

Continuous-Acquire Passthru Mode

The DT3152 board supports asynchronous, continuous-acquire passthru mode. Since it is asynchronous, the operation starts but gives control to you immediately, allowing you to perform other operations while data is acquired and/or displayed.

Using software, you can set up the continuous-acquire passthru operation so that data is continuously stored and displayed, or continuously stored but not displayed.

If you want to display data in continuous-acquire passthru mode, functions in Windows perform bit copies of the image data to display memory. These functions also handle obstructions to the passthru window by automatically clipping the passthru image to the visible client window region. Therefore, even if the window is obstructed in bitmap mode, the passthru can continue unabated. Once an obstruction has been removed from the passthru window client area, Windows automatically restores the correct underlying image data.

In continuous-acquire passthru mode, data is stored in a circular buffer in device memory.

This mode also has a synchronization mechanism using a WIN32 event object. Using this object, you can synchronize your application with the DT3152 board to process data as it becomes available.

Continuous-acquire passthru operations continue until you stop them using software.

Source Origin

Typically, the upper left corner of the display and the upper left corner of the acquired image are identical. However, you can select any point in the acquired image to become the upper left corner of the display (source origin). This allows you to pan and scroll the image on the display to display part of the acquired image during passthru. Figure 13 illustrates adjusting the source origin.

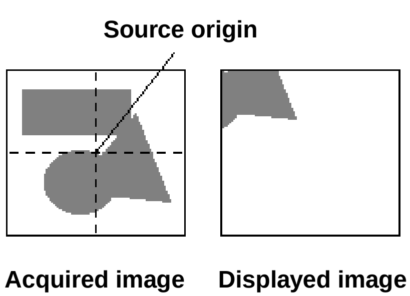

Figure 13: Source Origin Example

The source origin is a pixel position in the image. Values range from 0 (the default) to 4,095 in both directions. When set, the passthru image shifts to the new position.

Passthru Scaling

Using software, you can scale the passthru image to the height and width that most closely match the requested size. Unlike hardware scaling (see page 37), where the hardware scales the image before the image is transferred to system memory, passthru scaling is done in software after the image is transferred to system memory.

For the width, values range from 4 to 4,096 pixels (default is 768 for 50 Hz image formats and 640 for 60 Hz image formats) in increments of 4. For the height, values range from 1 to 4,096 lines (default is 576 for 50 Hz image formats and 480 for 60 Hz image formats) in increments of 1.

Passthru LUT

In addition to the ILUT (described on page 19), you can use the passthru LUT to affect the displayed image during passthru. By using the passthru LUT with the ILUT, you can change the display image without altering the ILUT itself. This allows you to display reversed or otherwise enhanced images without disrupting the underlying color settings.

When using the passthru LUT, the values in the ILUT are applied to the image first. Then the values in the passthru LUT are applied.

By default, passthru operations load the Windows system palette with 128 grayscale RGB values for display and use the default passthru LUT of 256 monotonically increasing grayscales. If desired, you can use software to modify the passthru LUT so that the DT3152 frame grabber board uses false coloring.

For each entry in the passthru LUT, the index of the closest matching RGB value in the Windows system palette is used. If you want an exact color to display during passthru, you can use software to load that color into the system palette. This guarantees that the color is available when the board attempts to find the closest match in the Windows system palette.

Overlays

Note: Overlays can be used for bitmap passthru operations only. They cannot be used for direct passthru operations.

Overlays require a 16-bit color display adapter and Direct Draw Interface (DDI) support.

For bitmap passthru operations only, you can add overlays to the display using software. Overlays allow you to place an image on top of another image that was captured using passthru.

Acquisition Operations

The DT3152 frame grabber board can acquire images either synchronously or asynchronously, as follows:

- **Synchronous acquisition** –All your system resources are devoted to the acquisition. You cannot perform another operation until the synchronous acquisition completes.
- **Asynchronous acquisition** –The operation starts and then returns control to you immediately, allowing you to perform other operations while data is acquired.

The DT3152 board uses the following memory locations:

- **Device memory** –A contiguous location in system memory that is managed by the DT3152 Device Driver. You define the size of this memory location when you configure the device driver.
- **Host memory** –Host memory does not have to be contiguous. You must allocate and manage this memory location.

Both device memory and host memory are volatile memory locations, meaning that their contents may be overwritten with each acquisition.

You can acquire a single frame to either device memory or host memory; you can acquire multiple frames to device memory only.

Digital Output Signals

The DT3152 board provides eight digital output lines on pins 1 to 8 on the board's J4 connector.

These digital output signals are simple register-driven, TTL-level signals that you can use for any purpose, such as controlling or actuating external devices. A bit value of 0 identifies a low TTL level; a bit value of 1 identifies a high TTL level.

Use software to write the digital output values.

3

Supported Device Driver Capabilities

DT3152 Device Driver Capabilities

Because the Frame Grabber SDK is intended to be used with all DT-Open Layers frame grabbers, the DT3152 may not support all of the Frame Grabber SDK capabilities or may support the Frame Grabber SDK capabilities differently from other boards.

To help you determine which capabilities are supported by the DT3152 board, you can use query keys provided by the standard Frame Grabber SDK functions and DT3152 SDK Extension functions. These functions either return information about a specific capability or return the current value of a specific capability.

The tables in this chapter list the capabilities supported by the DT3152 board and the information needed to query the board. The left column of the tables lists the capabilities along with the query key/control used for the listed function. The query's possible returned flags, if any, are indented under the key along with a description. The right column indicates whether the DT3152 board supports the capability or flag or the range of values supported by the capability.

To find the information about a capability more readily, use this information:

For capabilities that apply to ...	Refer to the table starting on ...
All frame grabbers	page 50
Input signals	page 51
Sync signals	page 54
Active video area	page 56
Frames	page 59
Passthru	page 61

For capabilities that apply to ...	Refer to the table starting on ...
Overlay	page 63
Memory	page 64
Acquisition	page 65
Digital I/O	page 67

Note: If your code is intended to be compatible with various Data Translation products, use the query functions to determine that the capability is supported by the installed board, prior to execution.

For more information on the functions, refer to the *Frame Grabber SDK User's Manual* and online help.

Table 6: General Device Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlImgQueryDeviceCaps	
Device Signature OLC_IMG_DC_OL_SIGNATURE	Ox44544F4C
Device ID OLC_IMG_DC_DEVICE_ID	0x2A
Device Name OLC_IMG_DC_DEVICE_NAME	"DT3152"
Device Type OLC_IMG_DC_OL_DEVICE_TYPE Monochrome Frame Grabber OLC_IMG_DEV_MONO_FRAME_GRABBER Color Frame Grabber OLC_IMG_DEV_COLOR_FRAME_GRABBER	 Yes No
Sections Supported OLC_IMG_DC_SECTIONS Supports Input Operations OLC_FG_SECTION_INPUT Supports Linear Memory Operations OLC_FG_SECTION_LINEAR Supports Camera Control Operations OLC_FG_SECTION_CAMCTL Supports Management of Device Memory OLC_FG_SECTION_MEMORY Supports passthru OLC_FG_SECTION_PASSTHRU Supports DDI OLC_FG_SECTION_DDI	 Yes No Yes Yes Yes Yes

Table 7: Input Signal Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryInputCaps	
Number of Input Sources OLC_FG_INPUT_SOURCE_COUNT	4
Supports Input Filter Selection OLC_FG_IC_DOES_INPUT_FILTER	Yes
Supports Input Filter Query OLC_FG_IC_DOES_QUERY_INPUT_FILTER	Yes
Supported Filters OLC_FG_IC_INPUT_FILTER_LIMITS AC Coupled, no Input Filter OLC_FG_FILT_AC_NONE AC Coupled, 50 Hz Input Filter OLC_FG_FILT_AC_50 AC Coupled, 60 Hz Input Filter OLC_FG_FILT_AC_60 DC Coupled, no Input Filter OLC_FG_FILT_DC_NONE	 Yes Yes Yes Yes
Supports Programmable A/D OLC_FG_IC_DOES_PROG_A2D	Yes
Supports Programmable A/D Query OLC_FG_IC_DOES_QUERY_PROG_A2D	Yes
Voltage Range of Black Level, in µV OLC_FG_IC_BLACK_LEVEL_LIMITS	min: –1,066,800[a] max: +1,075,200 nominal: 50 Hz: 0 60 Hz: 53,855 granularity: 8,400

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Table 7: Input Signal Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
Voltage Range of White Level, in µV OLC_FG_IC_WHITE_LEVEL_LIMITS	min: 0[a] max: 1,275,000 nominal: 50 Hz: 700,000 60 Hz: 714,880 granularity: 5,000
Supports Programmable Pixel Clock OLC_FG_IC_DOES_PIXEL_CLOCK	Yes
Supports Pixel Clock Query OLC_FG_IC_DOES_QUERY_PIXEL_CLOCK	Yes
Range of Internal Input Clock Frequency, in Hz OLC_FG_IC_CLOCK_FREQ_LIMITS	min: 1000 max: 20,000,000 nominal: 50 Hz: 15,000,000 60 Hz: 12,500,000
Clock Sources OLC_FG_IC_CLOCK_SOURCE_LIMITS	
Supports Internal Clock OLC_FG_CLOCK_INTERNAL	Yes
Supports External Clock OLC_FG_CLOCK_EXTERNAL	Yes
Provides Trigger OLC_FG_IC_DOES_TRIGGER	Yes
Trigger Types OLC_FG_IC_TRIGGER_TYPE_LIMITS Supports Externally Triggered Acquisition OLC_FG_TRIG_EXTERNAL_LINE	Yes
Multiple Trigger Types OLC_FG_IC_MULT_TRIGGER_TYPE_LIMITS Supports Externally Triggered Acquisition OLC_FG_TRIG_EXTERNAL_LINE	Yes

Table 7: Input Signal Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
Multiple Trigger Modes OLC_FG_IC_MULT_TRIGGER_MODE_LIMITS Trigger Starts Multiple Frame Acquisition OLC_FG_MODE_START Trigger Starts Each Frame Acquisition OLC_FG_MODE_EACH	 Yes Yes
Number of LUTs OLC_FG_ILUT_COUNT	 1
Maximum Index Number Allowed in ILUT OLC_FG_IC_MAX_ILUT_INDEX	 255[b]
Maximum Value Allowed in ILUT OLC_FG_IC_MAX_ILUT_VALUE	 255
Dt3152QueryInputControlValue	
Gain DT3152_INPUT_CTL_GAIN	 50 (for gain of 0.5), 100 (for gain of 1), 200 (for gain of 2), 400 (for gain of 4) nominal: 50 Hz: 100 60 Hz: 100
Reference, µV DT3152_INPUT_CTL_REFERENCE	 min: 0 max: 1,275,000 nominal: 50 Hz: 700,000 60 Hz: 660,000 granularity: 5,000
Offset, µV DT3152_INPUT_CTL_OFFSET	 min: –1,075,200 max: +1,066,800 nominal: 50 Hz: 0 60 Hz: –53,855 granularity: 8,400

a. The legal white level setting is affected by the current black level setting. The maximum white level setting is 2,550,000 greater than the black level setting. The minimum white level setting must be greater than the black level setting.

b. The maximum number of entries allowed in the ILUT is 255, since the index value is zero-based.

Table 8: Sync Signal Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryInputCaps	
Supports Input Video Selection OLC_FG_IC_DOES_VIDEO_SELECT	Yes
Supports Input Video Selection Query OLC_FG_IC_DOES_QUERY_VIDEO_SELECT	Yes
Video Types OLC_FG_IC_VIDEO_TYPE_LIMITS Supports Composite Video Source OLC_FG_VID_COMPOSITE Supports Variable Scan Video Source OLC_FG_VID_VARSCAN Video Sources OLC_FG_IC_CSYNC_SOURCE_LIMITS Composite Sync from Current Input Only OLC_FG_CSYNC_CURRENT_SRC Composite Sync from Any Specified Input OLC_FG_CSYNC_SPECIFIC_SRC Composite Sync from External Sync Line OLC_FG_CSYNC_EXTERNAL_LINE	 Yes Yes No Yes No
Composite Sync Threshold Limits, in mV OLC_FG_IC_CSYNC_THRESH_LIST_LIMITS	min: 50 max: 125 nominal: 125 count: 25
Composite Sync Threshold List OLC_FG_IC_CSYNC_THRESH_LIST	50, 75, 100, 125

Table 8: Sync Signal Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
Supports Sync Sentinel OLC_FG_IC_DOES_SYNC_SENTINEL	Yes
Supports Sync Sentinel Query OLC_FG_IC_DOES_QUERY_SYNC_SENTINEL	Yes
Sync Sentinel Types OLC_FG_IC_SYNC_SENTINEL_TYPE_LIMITS Supports Fixed Sync Sentinel OLC_FG_SYNC_SENTINEL_FIXED Supports Variable Sync Sentinel OLC_FG_SYNC_SENTINEL_VARIABLE	No Yes
Dt3152QuerySyncMasterControlValue	
Horizontal Frequency, Hz DT3152_SYNC_CTL_HORIZ_FREQ	min: 1 max: 2,000,000 nominal: 50 Hz: 15,625 60 Hz: 15,750
Vertical Frequency, Hz DT3152_SYNC_CTL_VERT_FREQ	min: 1 max: 200,000 nominal: 50 Hz: 50 60 Hz: 60
Horizontal Sync Pulse Width, ns DT3152_SYNC_CTL_HPULSE_WIDTH	min: 250 max: 950,000,000 nominal: 50 Hz: 4,800 60 Hz: 4,800

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Table 8: Sync Signal Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
Vertical Sync Pulse Width, ns DT3152_SYNC_CTL_VPULSE_WIDTH	min: 250 max: 950,000,000 nominal: 50 Hz: 160,000 60 Hz: 190,000
Phase,% of total line x 100 DT3152_SYNC_CTL_PHASE	min: 100 (1%) max: 9,900 (99%) nominal: 50 Hz: 5,000 (50%) 60 Hz: 5,000 (50%)

Table 9: Active Video Area Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryInputCaps	
Supports Defining of Active Video Area OLC_FG_IC_DOES_ACTIVE_VIDEO	Yes
Supports Active Video Area Query OLC_FG_IC_DOES_QUERY_ACTIVE_VIDEO	Yes
Range of Back Porch Start Position OLC_FG_IC_BACK_PORCH_START_LIMITS	min: 0 max: 4095 nominal: 50 Hz: 80 60 Hz: 60 granularity: 1

Table 9: Active Video Area Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
Range of Clamp Start Position OLC_FG_IC_CLAMP_START_LIMITS	min: 0 max: 4095 nominal: 50 Hz: 90 60 Hz: 93 granularity: 1
Range of Clamp End Position OLC_FG_IC_CLAMP_END_LIMITS	min: 0 max: 4095 nominal: 50 Hz: 93 60 Hz: 95 granularity: 1
Range of Total Pixels Per Line Control OLC_FG_IC_TOTAL_PIX_PER_LINE_LIMITS Range of First Active Pixel Position OLC_FG_IC_ACTIVE_PIXEL_LIMITS	min: 4 max: 4096 nominal: 50 Hz: 960 60 Hz: 794 granularity: 1 min: 0 max: 4095 nominal: 50 Hz: 160 60 Hz: 125 granularity: 1
Range of Active Pixels Count OLC_FG_IC_ACTIVE_WIDTH_LIMITS	min: 4 max: 4096 nominal: 50 Hz: 768 60 Hz: 640 granularity: 1

3

Table 9: Active Video Area Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
Range of Total Lines per Field Control OLC_FG_IC_TOTAL_LINES_PER_FLD_LIMITS	min: 1 max: 4096 nominal: 50 Hz: 312 60 Hz: 262 granularity: 1
Range of First Active Line Position OLC_FG_IC_ACTIVE_LINE_LIMITS	min: 0 max: 4095 nominal: 50 Hz: 20 60 Hz: 16 granularity: 1
Range of Active Lines Count OLC_FG_IC_ACTIVE_HEIGHT_LIMITS	min: 1 max: 4096 nominal: 50 Hz: 288 60 Hz: 240 granularity: 1

Table 10: Frame Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryInputCaps	
Supports Frame Selection OLC_FG_IC_DOES_FRAME_SELECT	Yes
Supports Frame Selection Query OLC_FG_IC_DOES_QUERY_FRAME_SELECT	Yes
Range of Frame Top Control OLC_FG_IC_FRAME_TOP_LIMITS	min: 0 max: 4095 nominal: 0 granularity: 1
Range of Frame Left Control OLC_FG_IC_FRAME_LEFT_LIMITS	min: 0 max: 4095 nominal: 0 granularity: 1
Range of Frame Height Control OLC_FG_IC_FRAME_HEIGHT_LIMITS	min: 1 max: 4096 nominal: 50 Hz: 576 60 Hz: 480 granularity: 1
Range of Frame Width Control OLC_FG_IC_FRAME_WIDTH_LIMITS	min: 4 max: 4096 nominal: 50 Hz: 768 60 Hz: 640 granularity: 4
Range Between Pixels (Scale factor - horizontal) OLC_FG_IC_FRAME_HINC_LIMITS	min: 1 max: 16 nominal: 1 granularity: 1

Table 10: Frame Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
Range Between Lines (Scale factor - vertical) OLC_FG_IC_FRAME_VINC_LIMITS	min: 1 max: 16 nominal: 1 granularity: 1
Frame Types OLC_FG_IC_FRAME_TYPE_LIMITS Acquire Interlaced Frame Starting on Even Field OLC_FG_FRM_IL_FRAME_EVEN Acquire Interlaced Frame Starting on Odd Field OLC_FG_FRM_IL_FRAME_ODD Acquire Interlaced Frame Starting on Next Field OLC_FG_FRM_IL_FRAME_NEXT Acquire the Even Field OLC_FG_FRM_FIELD_EVEN Acquire the Odd Field OLC_FG_FRM_FIELD_ODD Acquire the Next Field OLC_FG_FRM_FIELD_NEXT Acquire the Next Noninterlaced Frame OLC_FG_FRM_NON_INTERLACED	Yes Yes Yes No No No Yes
Maximum Number of Pixels in Frame OLC_FG_IC_MAX_FRAME_SIZE	4,194,304
Number of Bytes in a Pixel OLC_FG_IC_PIXEL_DEPTH	1

Table 11: Passthru Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryPassthruCaps	
Supports Passthru Section OLC_FG_PC_DOES_PASSTHRU	Yes
Passthru Modes OLC_FG_PC_PASSTHRU_MODE_LIMITS Supports Sync Bitmap OLC_FG_PASSTHRU_SYNC_BITMAP Supports Async Bitmap OLC_FG_PASSTHRU_ASYNC_BITMAP Supports Sync Direct OLC_FG_PASSTHRU_SYNC_DIRECT Supports Async Direct OLC_FG_PASSTHRU_ASYNC_DIRECT Supports Continuous-Acquire OLC_FG_PASSTHRU_ASYNC_BITMAP_EXTENDED	 Yes[a] Yes[a,b] No No Yes
Source Origin OLC_FG_PC_DOES_SOURCE_ORIGIN Available Range For the X Value of the Source Origin OLC_FG_PC_SRC_ORIGIN_X_LIMITS Available range for the Y value of the source origin OLC_FG_PC_SRC_ORIGIN_Y_LIMITS	 Yes min: 0 max: 4095 nominal: 0 granularity: 1 min: 0 max: 4095 nominal: 0 granularity: 1

3

Table 11: Passthru Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
Scaling OLC_FG_PC_DOES_SCALING Range of Legal Values for Height OLC_FG_PC_SCALE_HEIGHT_LIMITS Range of Legal Values for Width OLC_FG_PC_SCALE_WIDTH_LIMITS	 Yes min: 1 max: 4096 nominal: 50 Hz: 576 60 Hz: 480 granularity: 1 min: 4 max: 4096 nominal: 50 Hz: 768 60 Hz: 640 granularity: 4
Passthru LUT OLC_FG_PC_DOES_PASSTHRU_LUT Number of Extra Palette Entries OLC_FG_PC_MAX_PALETTE_INDEX Maximum RGB Value for Palette OLC_FG_PC_MAX_PALETTE_VALUE Maximum Index Number Allowed in Passthru LUT OLC_FG_PC_MAX_PLUT_INDEX Maximum RGB Value for Passthru LUT OLC_FG_PC_MAX_PLUT_VALUE	 Yes 15 255 255[c] 255
Passthru Snapshot OLC_FG_PC_DOES_PASSTHRU_SNAPSHOT	 Yes

a. This mode is available when the graphics adapter is in 256 color mode.
b. This mode is available when the graphics adapter is in 65536 color (16-bit) mode, providing that the graphics adapter supports DDI.
c. The maximum number of entries allowed in the passthru LUT is 255, since the index value is zero-based.

Table 12: Overlay Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryDDICaps	
Passthru with DDI OLC_FG_DDI_FAST_PASSTHRU	Yes
Overlay support OLC_FG_DDI_OVERLAYS	Yes[a]
Translucent overlay capability OLC_FG_DDI_TRANSLUCENT_OVERLAYS	Yes[a]
Color overlay capability OLC_FG_DDI_COLOR_OVERLAY	Yes[a]
Multiple overlay surface capability OLC_FG_DDI_MULTIPLE_SURFACES	Yes[a]
Color keying (filtering) OLC_FG_DDI_COLOR_KEY_CONTROL	Yes[a]
Add overlay to image OLC_FG_DDI_OVERLAY_ON_FRAME	No
User-managed DDI surface support OLC_FG_DDI_USER_SURFACE_PTR	No
Passthru event synchronization support OLC_FG_DDI_PASSTHRU_SYNC_EVENT	Yes

a. This mode is available when the graphics adapter is in 65536 color (16-bit) mode, providing that the graphics adapter supports DDI.

3

Table 13: Memory Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryMemoryCaps	
Memory Types OLC_FG_MC_MEMORY_TYPES Volatile Memory OLC_FG_MEM_VOLATILE Nonvolatile Memory OLC_FG_MEM_NON_VOLATILE	 Yes No
Number of Volatile Buffer Handles OLC_FG_MC_VOL_COUNT	Device memory size divided by maximum number of pixels in frame
Number of Nonvolatile Buffer Handles OLC_FG_MC_NONVOL_COUNT	N/A

Table 14: Acquisition Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryInputCaps	
Acquisition Types	
OLC_FG_IC_SINGLE_FRAME_OPS	
-Single Frame to Host	
Supports Full Frame Acquisition	
OLC_FG_ACQ_FRAME	Yes
Supports Subframe Acquisition	
OLC_FG_ACQ_SUBFRAME	No
Supports Frame-to-Fit Acquisition	
OLC_FG_ACQ_FRAME_TO_FIT	No
-Single Frame to Device	
Supports Full Frame Acquisition	
OLC_FG_ACQ_FRAME	Yes
Supports Subframe Acquisition	
OLC_FG_ACQ_SUBFRAME	No
Supports Frame-to-Fit Acquisition	
OLC_FG_ACQ_FRAME_TO_FIT	No
-*Single Frame to Host (async)*	
Supports Full Frame Acquisition	
OLC_FG_ACQ_FRAME	Yes
Supports Subframe Acquisition	
OLC_FG_ACQ_SUBFRAME	No
Supports Frame-to-Fit Acquisition	
OLC_FG_ACQ_FRAME_TO_FIT	No
-Single Frame to Device (async)	
Supports Full Frame Acquisition	
OLC_FG_ACQ_FRAME	Yes
Supports Subframe Acquisition	
OLC_FG_ACQ_SUBFRAME	No
Supports Frame-to-Fit Acquisition	
OLC_FG_ACQ_FRAME_TO_FIT	No

Table 14: Acquisition Capabilities for the DT3152 Device Driver (cont.)

Capability	DT3152 Support
OLC_FG_IC_MULT_FRAME_OPS -Multiple Frames to Host Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT -Multiple Frames to Device Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT -Multiple Frames to Host (async) Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT -Multiple Frames to Device (async) Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT	 No No No Yes No No No No No Yes No No
Supports Drawing Acquired Frame OLC_FG_IC_DOES_DRAW_ACQUIRED_FRAME	 Yes

Table 15: Digital I/O Capabilities for the DT3152 Device Driver

Capability	DT3152 Support
OlFgQueryCameraControlCaps	
Number of Digital Output Lines OLC_FG_CC_DIG_OUT_COUNT	8

Initialized Control Values

Table 16 lists the default control values after opening or initializing the DT3152 Device Driver.

Table 16: Default Control Values

Control Name	Value
OLC_FG_CTL_INPUT_FILTER	OLC_FG_FILT_AC_NONE
OLC_FG_CTL_BLACK_LEVEL	50 Hz: 0 µV 60 Hz: 53,855 µV
OLC_FG_CTL_WHITE_LEVEL	50 Hz: 700,000 µV 60 Hz: 714,880 µV
OLC_FG_CTL_VIDEO_TYPE	OLC_FG_VID_COMPOSITE
OLC_FG_CTL_CSYNC_SOURCE	OLC_FG_CSYNC_SPECIFIC_SRC
OLC_FG_CTL_CSYNC_THRESH	125 mV
OLC_FG_CTL_SYNC_SENTINEL	TRUE
OLC_FG_CTL_HSYNC_INSERT_POS	10150 (101.5%)
OLC_FG_CTL_HSYNC_SEARCH_POS	9500 (95.0%)
OLC_FG_CTL_VSYNC_INSERT_POS	11500 (115%)
OLC_FG_CTL_VSYNC_SEARCH_POS	5000 (50.0%)
OLC_FG_CTL_FRAME_TOP	0
OLC_FG_CTL_FRAME_LEFT	0
OLC_FG_CTL_FRAME_WIDTH	50 Hz: 768 60 Hz: 640
OLC_FG_CTL_FRAME_HEIGHT	50 Hz: 576 60 Hz: 480
OLC_FG_CTL_HOR_FRAME_INC	1
OLC_FG_CTL_VER_FRAME_INC	1
OLC_FG_CTL_CLOCK_FREQ	50 Hz: 15,000,000 Hz 60 Hz: 12,500,000 Hz

Table 16: Default Control Values (cont.)

Control Name	Value
OLC_FG_CTL_CLOCK_SOURCE	OLC_FG_CLOCK_INTERNAL
OLC_FG_CTL_FRAME_TYPE	OLC_FG_FRM_IL_FRAME_EVEN
OLC_FG_CTL_ILUT	0

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Programming Flowcharts

The following flowcharts show the steps required to perform imaging operations using DT-Open Layers. For illustration purposes, the functions in the Frame Grabber SDK are shown; however, the concepts apply to all DT-Open Layers software.

Note that many steps represent several substeps; if you are unfamiliar with the detailed operations involved with any one step, refer to the indicated page for detailed information. Optional steps appear in shaded boxes.

Note: Although the flowcharts do not show error/status checking, it is recommended that you check for error/status messages after calling each function.

Single-Frame Acquisition

Open the device and get the device ID with **OlImgOpenDevice**.

↓

Set the timeout period with **OlImgSetTimeoutPeriod**.

↓

Choose an input source with **OlFgSetInputVideoSource**.

The input channels can be 0 to 3, corresponding to VID0 to VID3. The default is 0.

↓

Set the standard controls for the input source (see page 85).

↓

Set the DT3152-specific controls for the input source (see page 91).

↓

Enable based source mode with **OlFgEnableBasedSourceMode**.

↓

Write new values into the Input LUT with **OlFgWriteInputLUT**.

The default is identity (the grayscale value is not modified).

↓

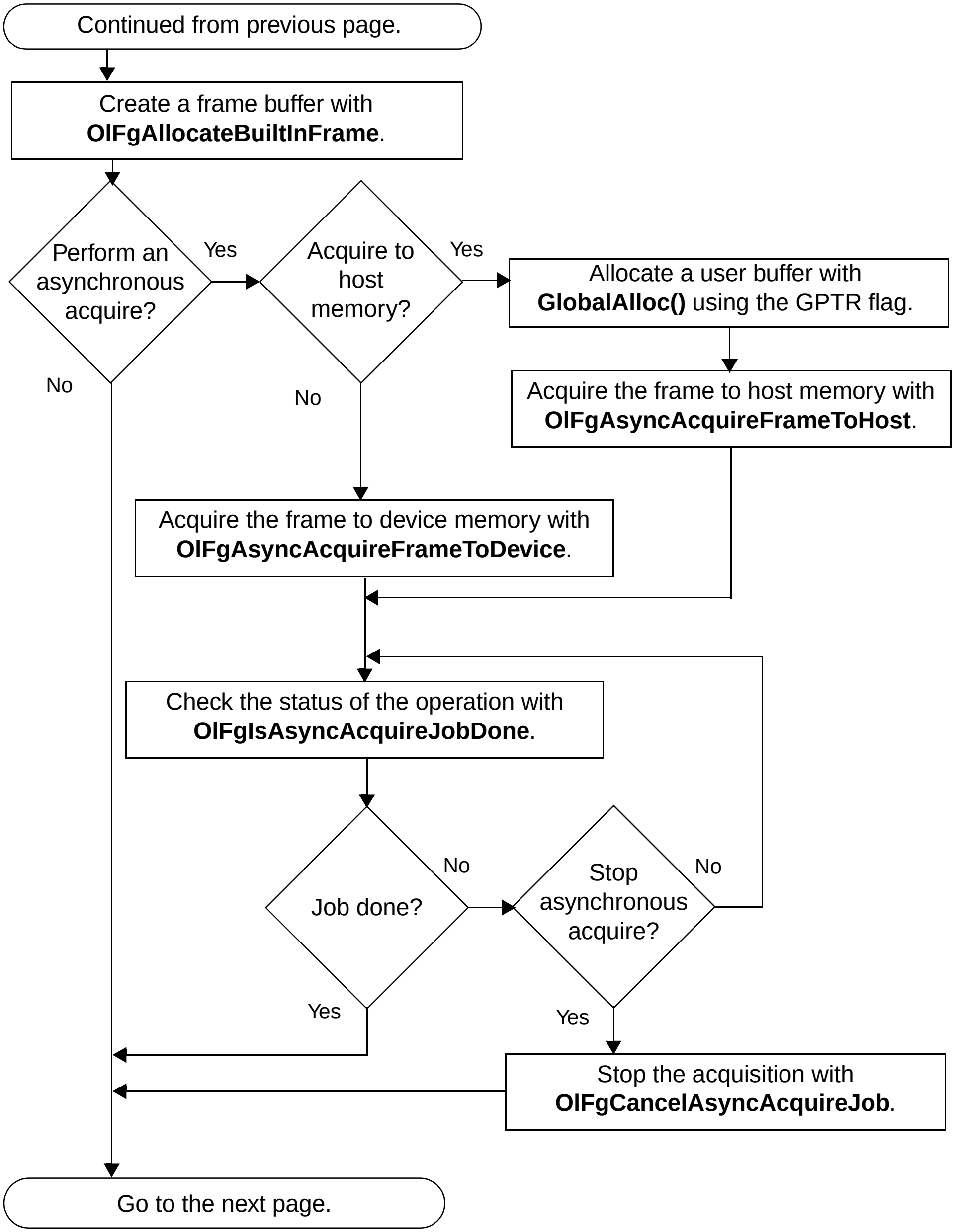
Set up an acquisition trigger for the input channel with **OlFgSetTriggerInfo**.

The default is a software trigger.

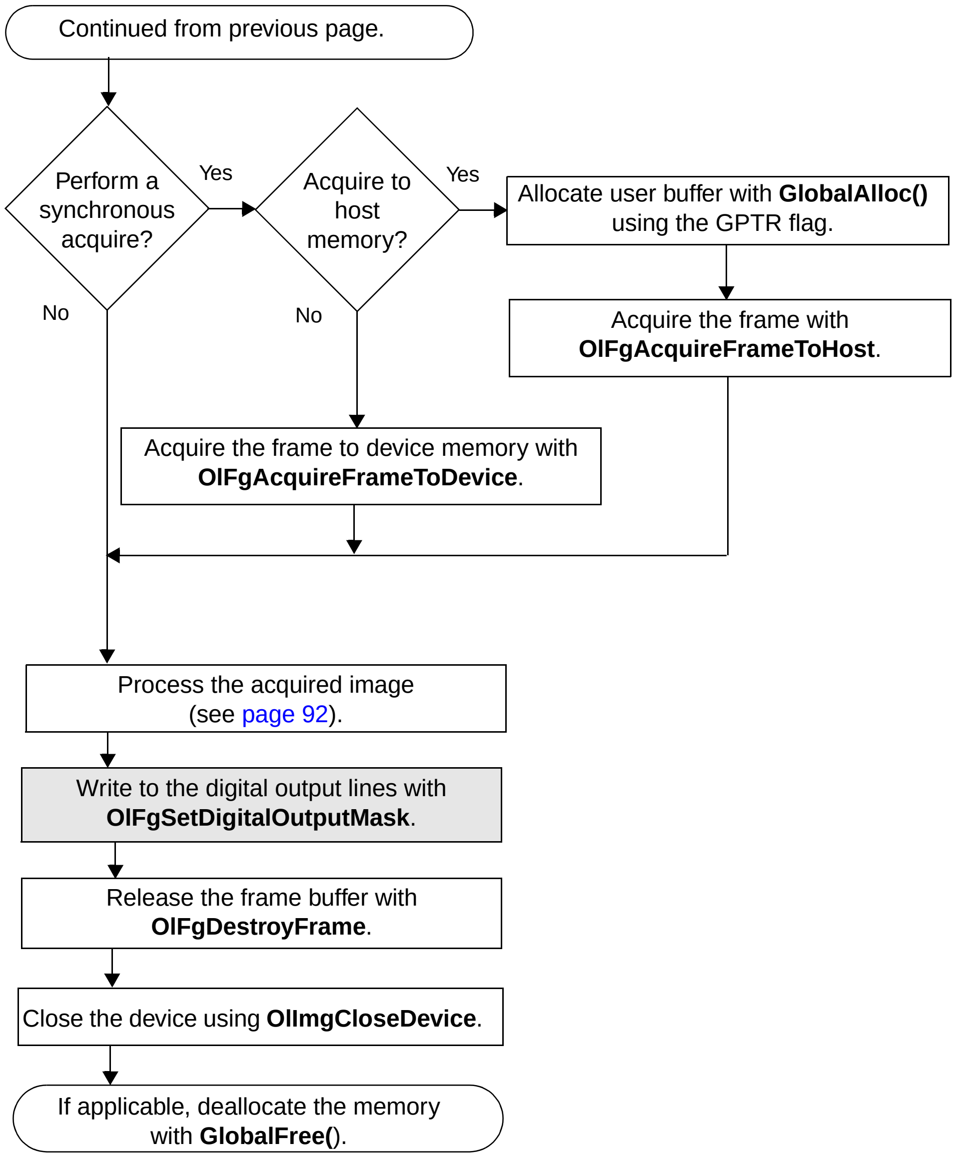
↓

Go to the next page.

Single-Frame Acquisition (cont.)



Single-Frame Acquisition (cont.)



Multiple-Frame Acquisition

Open the device and get the device ID with **OlImgOpenDevice**.

↓

Set the timeout period with **OlImgSetTimeoutPeriod**.

↓

Choose an input source with **OlFgSetInputVideoSource**.

The input channel can be 0 to 3, corresponding to VID0 to VID3. The default is 0.

↓

Set the standard controls for the input source (see page 85).

↓

Set the DT3152-specific controls for the input source (see page 91).

↓

Enable based source mode with **OlFgEnableBasedSourceMode**.

↓

Write new values into the Input LUT with **OlFgWriteInputLUT**.

The default is identity (the grayscale value is not modified).

↓

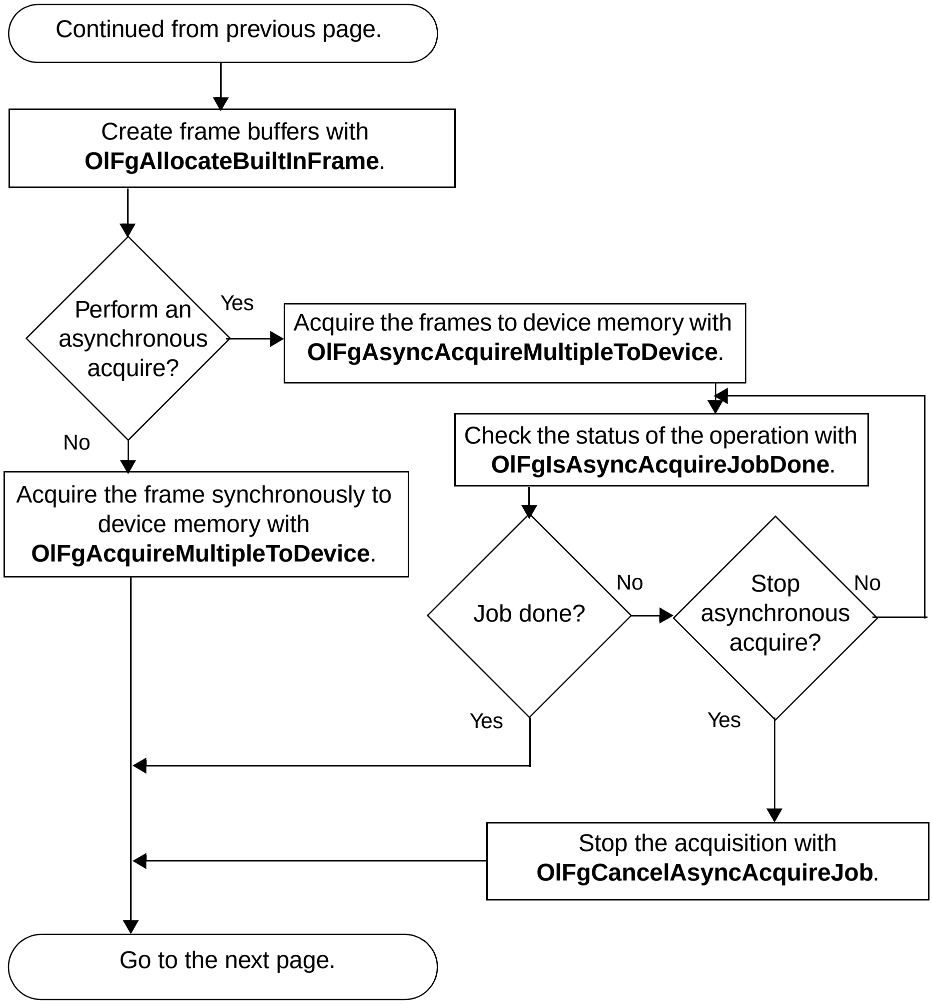
Set up an acquisition trigger for the input channel with **OlFgSetMultipleTriggerInfo**.

The default is a software trigger.

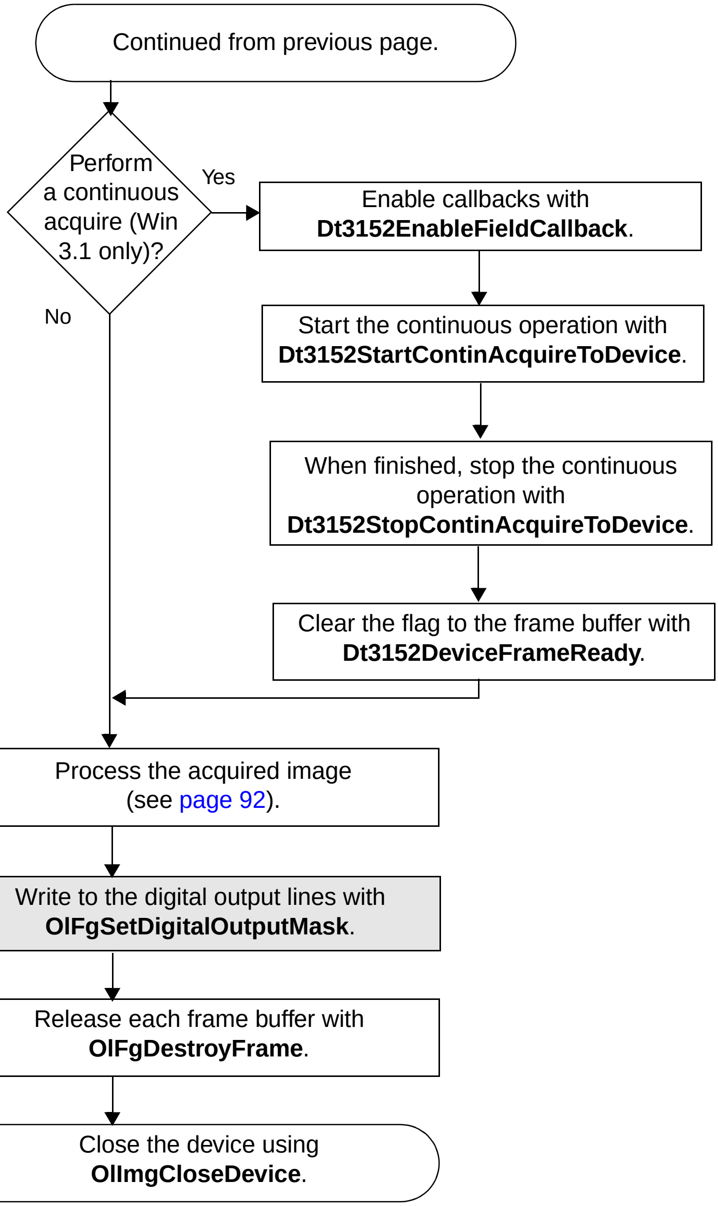
↓

Go to the next page.

Multiple-Frame Acquisition (cont.)



Multiple-Frame Acquisition (cont.)



Passthru without Overlays

Open the device and get the device ID with **OlImgOpenDevice**.

↓

Set the timeout period with **OlImgSetTimeoutPeriod**.

↓

Choose an input source with **OlFgSetInputVideoSource**.

The input channel can be 0 to 3, corresponding to VID0 to VID3. The default is 0.

↓

Set the standard controls for the input source (see page 85).

↓

Set the DT3152-specific controls for the input source (see page 91).

↓

Enable based source mode with **OlFgEnableBasedSourceMode**.

↓

Write new values into the Input LUT with **OlFgWriteInputLUT**.

The default is identity (the grayscale value is not modified).

↓

Set the source origin with **OlFgSetPassthruSourceOrigin**.

The default is 0.

↓

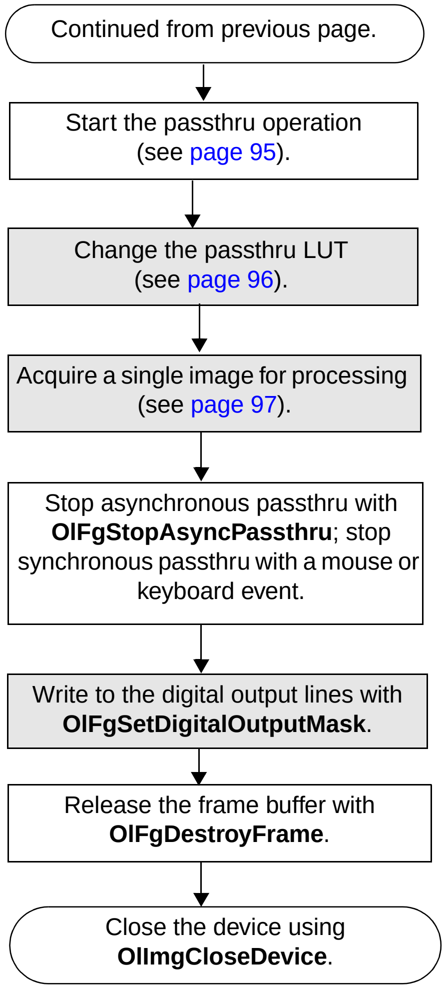
Scale passthru image with **OlFgSetPassthruScaling**.

The default for 50 Hz is 576 by 768. The default for 60 Hz is 480 by 640.

↓

Go to the next page.

Passthru without Overlays (cont.)



Passthru with Overlays

Open the device and get the device ID with **OlImgOpenDevice**.

↓

Set the timeout period with **OlImgSetTimeoutPeriod**.

↓

Choose an input source with **OlFgSetInputVideoSource**.

The input channel can be 0 to 3, corresponding to VID0 to VID3.The default is 0.

↓

Set the standard controls for the input source (see page 85).

↓

Set the DT3152-specific controls for the input source (see page 91).

↓

Enable based source mode with **OlFgEnableBasedSourceMode**.

↓

Write new values into the Input LUT with **OlFgWriteInputLUT**.

The default is identity (the grayscale value is not modified).

↓

Set the source origin with **OlFgSetPassthruSourceOrigin**.

The default is 0.

↓

Go to the next page.

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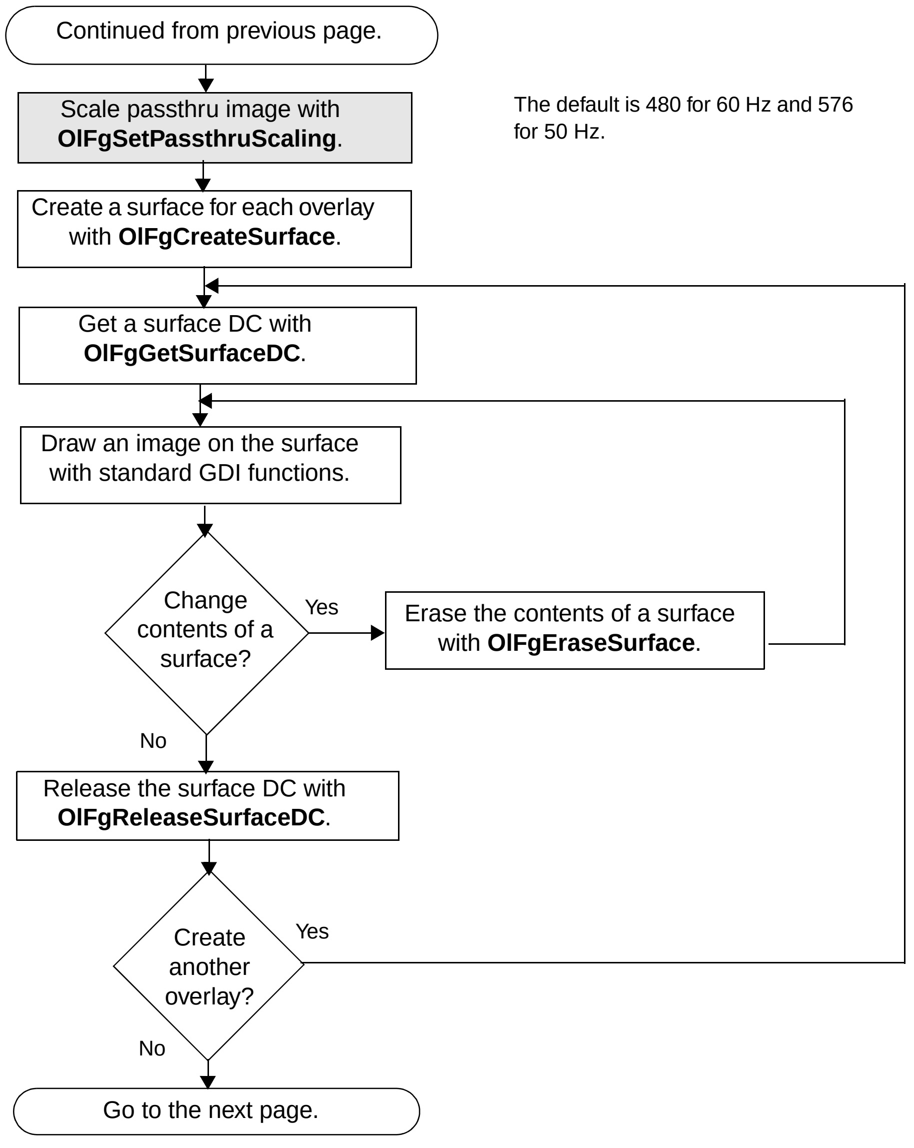
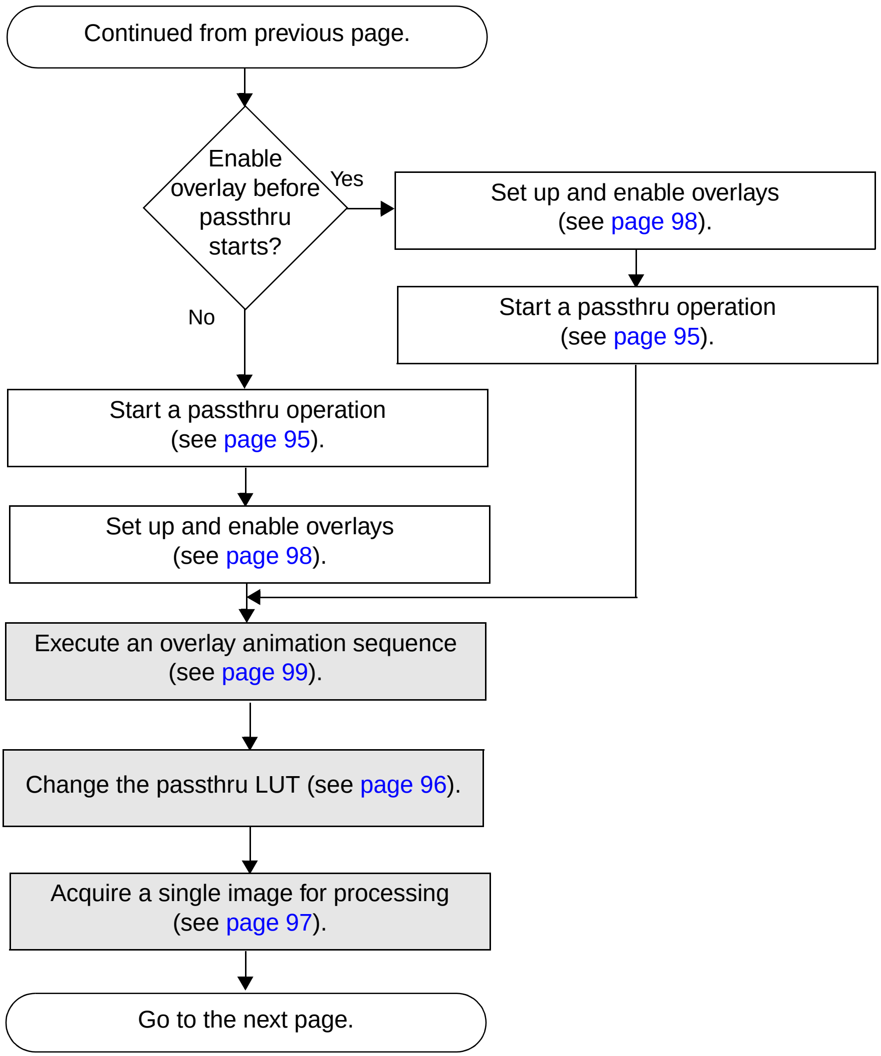
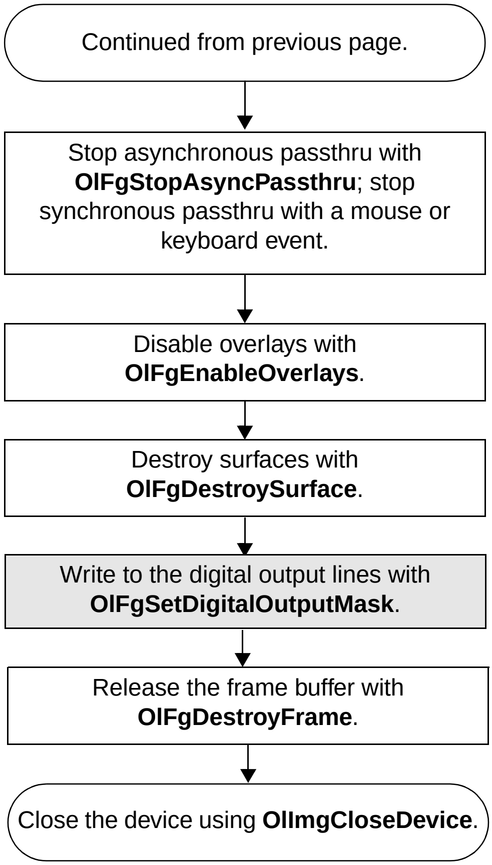
Passthru with Overlays (cont.)



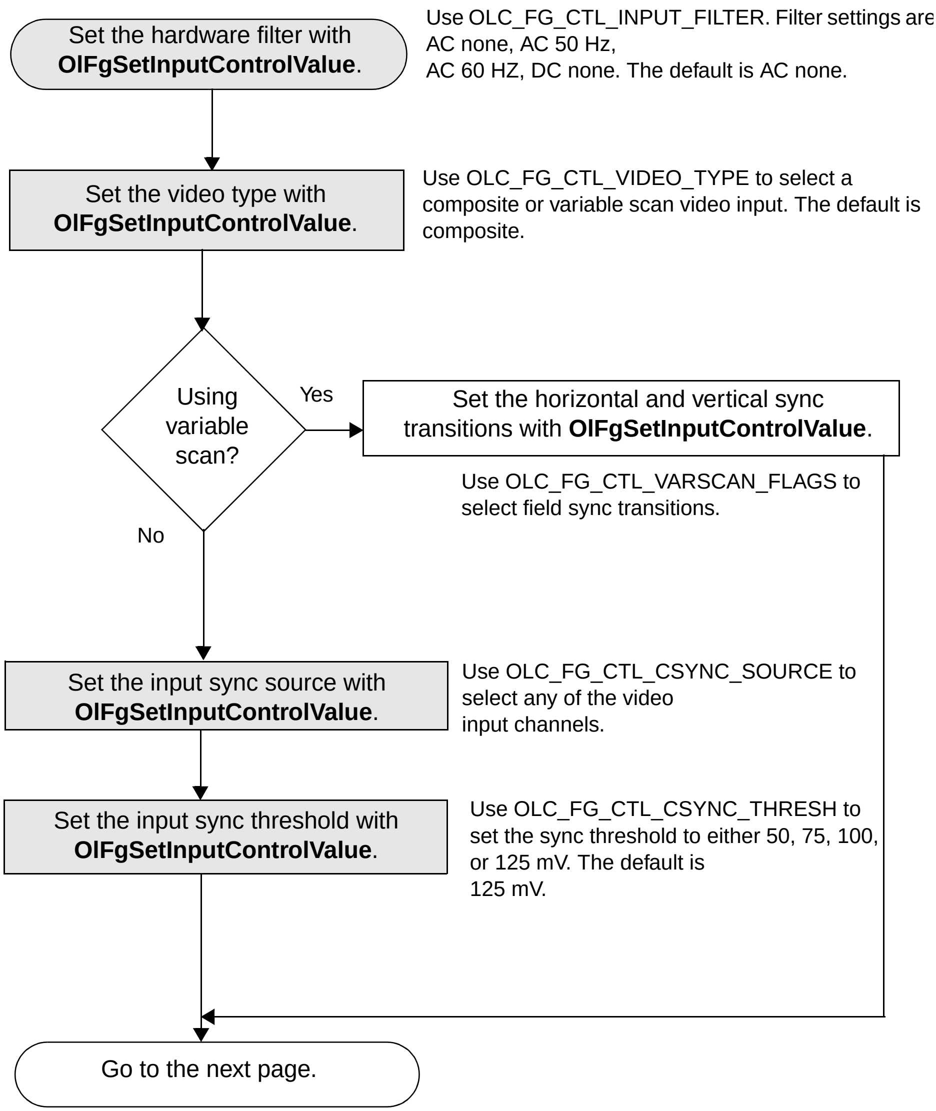
Passthru with Overlays (cont.)



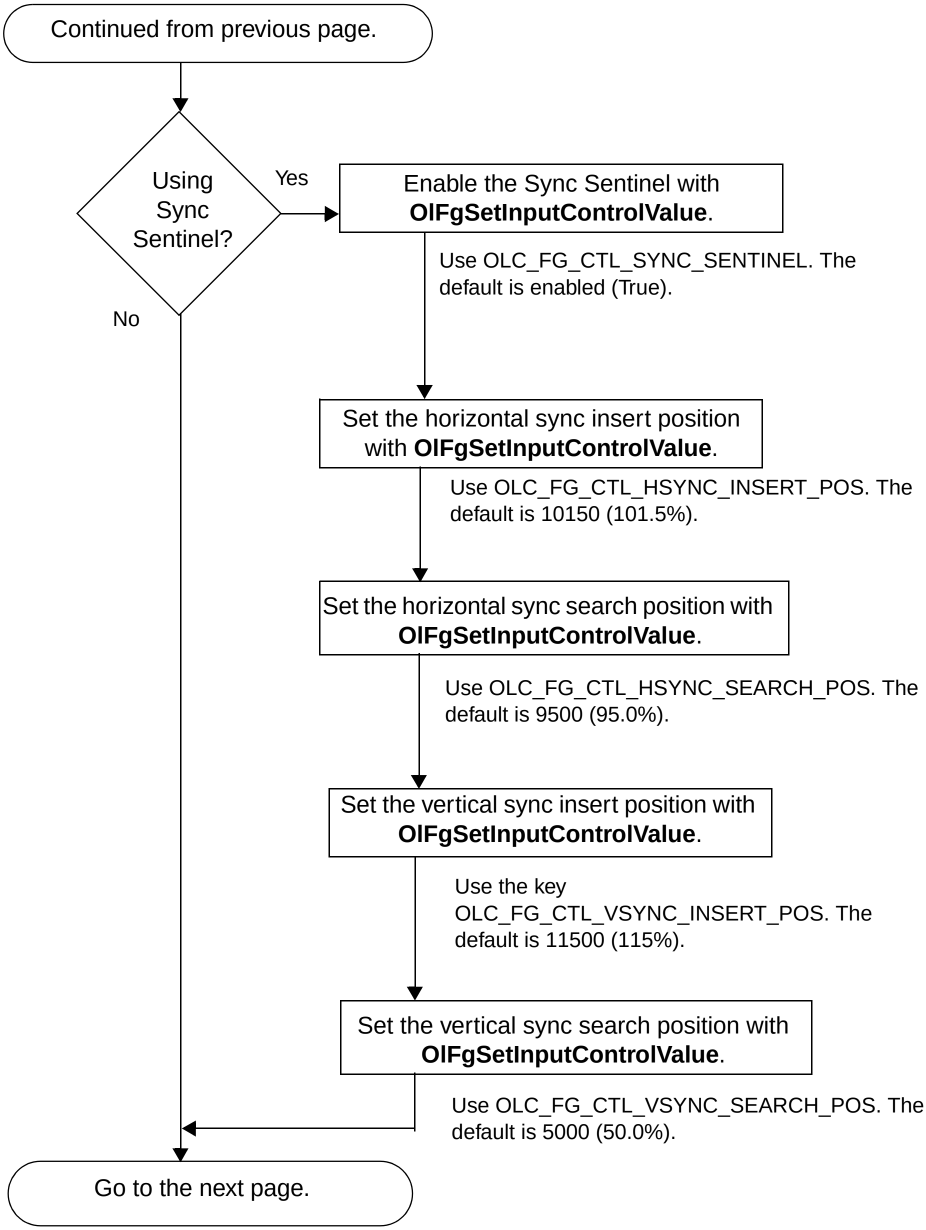
Passthru with Overlays (cont.)



Set the Standard Controls for the Input Source



Set the Standard Controls for the Input Source (cont).



Set the Standard Controls for the Input Source (cont).

Continued from previous page.

↓

Set the back porch start with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_BACK_PORCH_START to set the back porch start position in the horizontal signal. The default value is 60 for 60 Hz and 80 for 50 Hz.

↓

Set the clamp start and end with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_CLAMP_START to set the clamping start position and OLC_FG_CTL_CLAMP_END to set the clamping end position of the active video area. The default clamp start is 93 for 60 Hz and 90 for 50 Hz. The default clamp end is 95 for 60 Hz and 93 for 50 Hz.

↓

Set the first active pixel with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_FIRST_ACTIVE_PIXEL to set the first active pixel on the line. The default is 125 for 60 Hz and 160 for 50 Hz.

↓

Set the active pixel count with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_ACTIVE_PIXEL_COUNT to set the number of pixels per line in the active area. The default is 640 for 60 Hz and 768 for 50 Hz.

↓

Go to the next page.

Set the Standard Controls for the Input Source (cont).

Continued from previous page.

↓

Set the first active line with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_FIRST_ACTIVE_LINE to set the active video signal within the field as a line offset from the beginning of the vertical sync. The default value is 16 for 60 Hz and 20 for 50 Hz.

↓

Set the active line count with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_ACTIVE_LINE_COUNT to set the number of lines per field (or noninterlaced frame) in the active area. The default value is 240 for 60 Hz and 288 for 50 Hz.

↓

Set the total pixels per line with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_TOTAL_PIX_PER_LINE to set the total number of pixels in a single horizontal line of video. The default is 794 for 60 Hz and 960 for 50 Hz.

↓

Set the total lines per field with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_TOTAL_LINES_PER_FLD to set the total number of lines in a single field of video. The default is 262 for 60 Hz and 312 for 50 Hz.

↓

Go to the next page.

Set the Standard Controls for the Input Source (cont).

Continued from previous page.

Set the top of the frame with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_FRAME_TOP to set the first line of video, relative to the active video area, to digitize. The default is 0.

Set the left of the frame with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_FRAME_LEFT to set the first pixel of video, relative to the active video area, to digitize. The default is 0.

Set the height of the frame with **OlFgSetInputControlValue**.

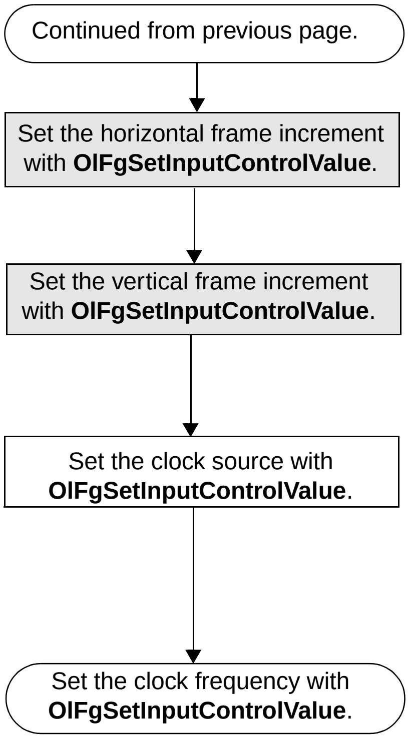
Use OLC_FG_CTL_FRAME_HEIGHT to set the number of lines per field of video (or noninterlaced frame) to digitize. The default is 480 for 60 Hz and 576 for 50 Hz.

Set the width of the frame with **OlFgSetInputControlValue**.

Use OLC_FG_CTL_FRAME_WIDTH to set the number of pixels per line of video to digitize. The default is 640 for 60 Hz and 768 for 50 Hz.

Go to the next page.

Set the Standard Controls for the Input Source (cont).



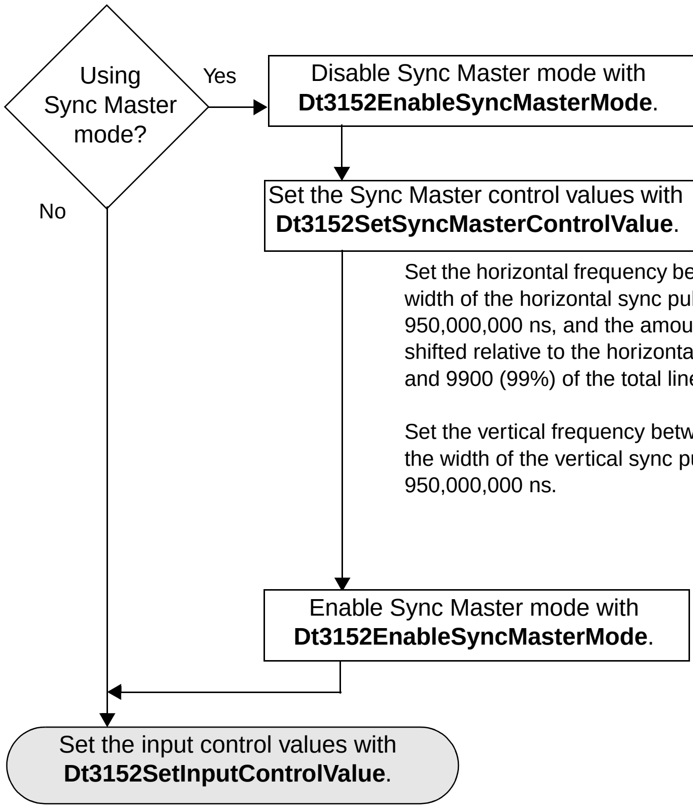
Use OLC_FG_CTL_HOR_FRAME_INC to set the horizontal scale factor.The default is 1.

Use OLC_FG_CTL_VER_FRAME_INC to set the vertical scale factor. The default is 1.

Use OLC_FG_CTL_CLOCK_SOURCE to set the pixel clock to internal or external.
The default is internal.

Use OLC_FG_CTL_CLOCK_FREQ to set the frequency of the internal clock source. The default frequency is 12,500,000 Hz for 60 Hz and 15,000,000 Hz for 50 Hz.

Set the DT3152-Specific Controls for the Input Source



Set the horizontal frequency between 1 Hz and 2 MHz, the width of the horizontal sync pulses between 250 ns and 950,000,000 ns, and the amount the vertical sync is shifted relative to the horizontal sync between 100 (1%) and 9900 (99%) of the total line.

Set the vertical frequency between 1 Hz and 200 kHz and the width of the vertical sync pulses between 250 ns and 950,000,000 ns.

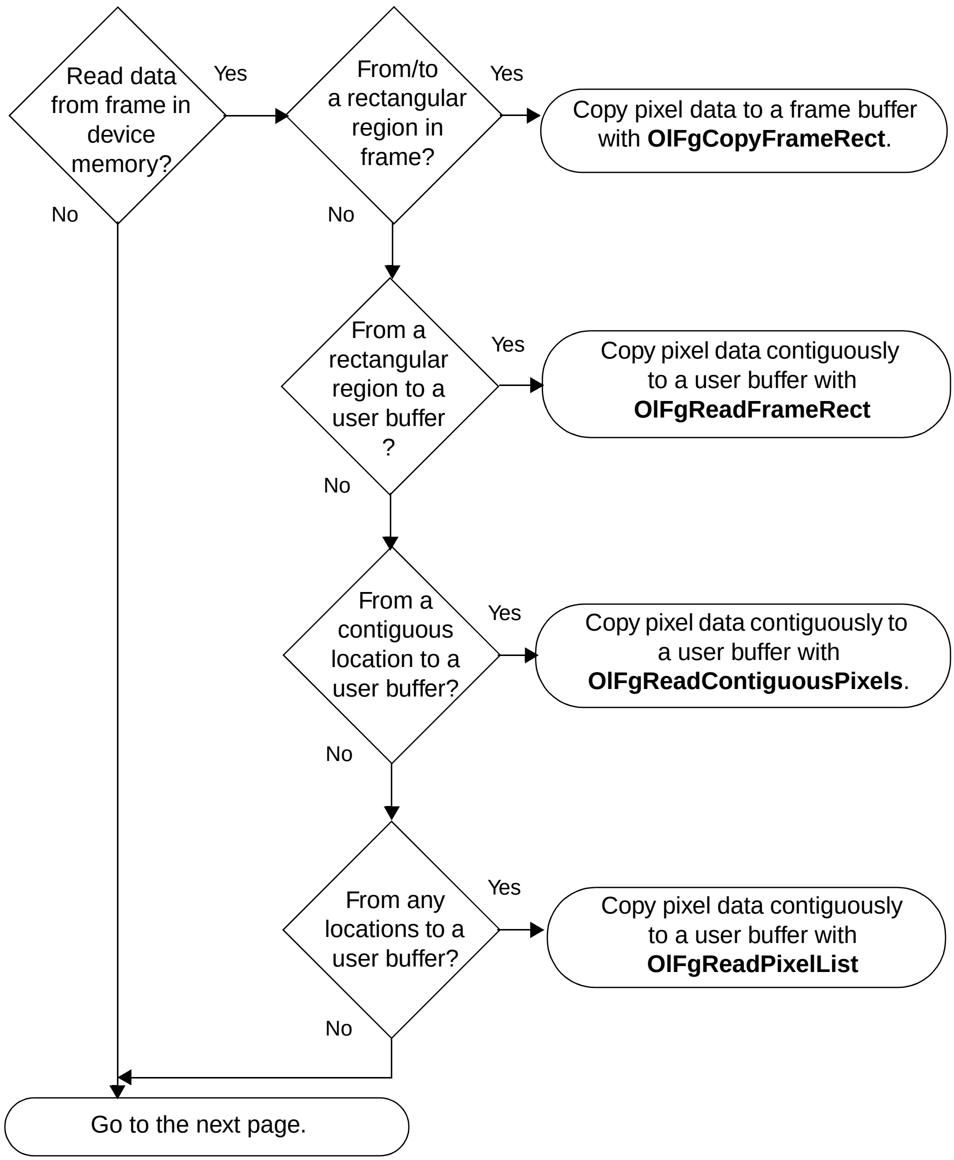
Set the gain to 0.5, (specify 50), 1 (specify 100), 2 (specify 200), or 4 (specify 400); the default is 1.

Set the reference from 0 to 1,275,000 µV. The default for 50 Hz is 700,000 µV. The default for
60 Hz is 660,000 µV.

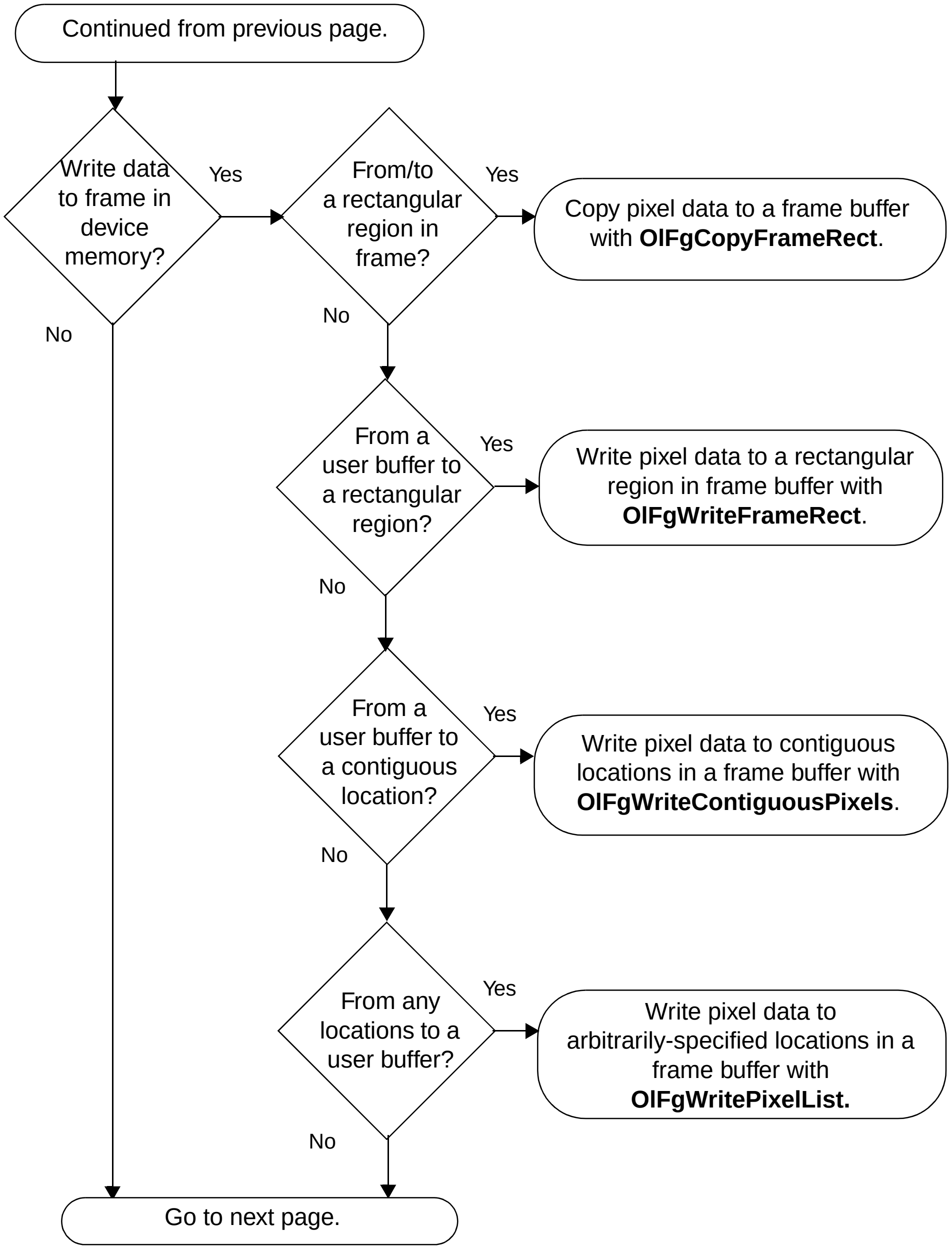
Set the offset from −1,075,200 µV to 1,066,800 µV. The default for 50 Hz is 0 µV. The default for 60 Hz is −53,855 µV.

4

Process the Acquired Image

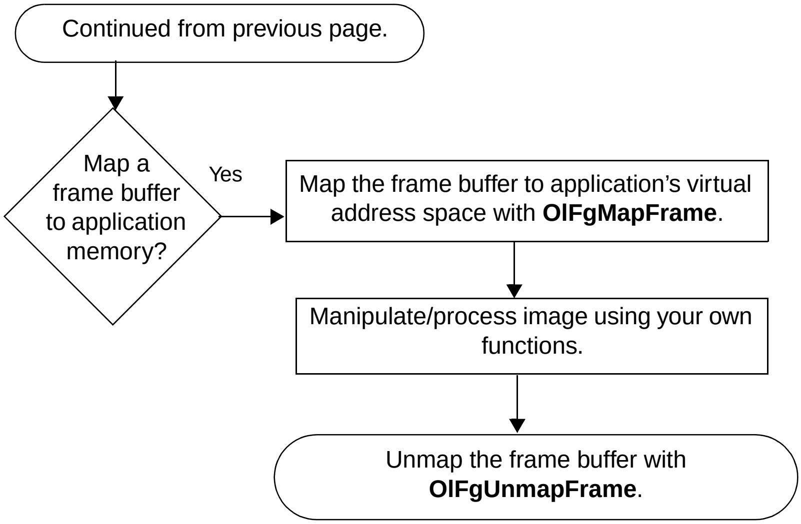


Process the Acquired Image (cont.)

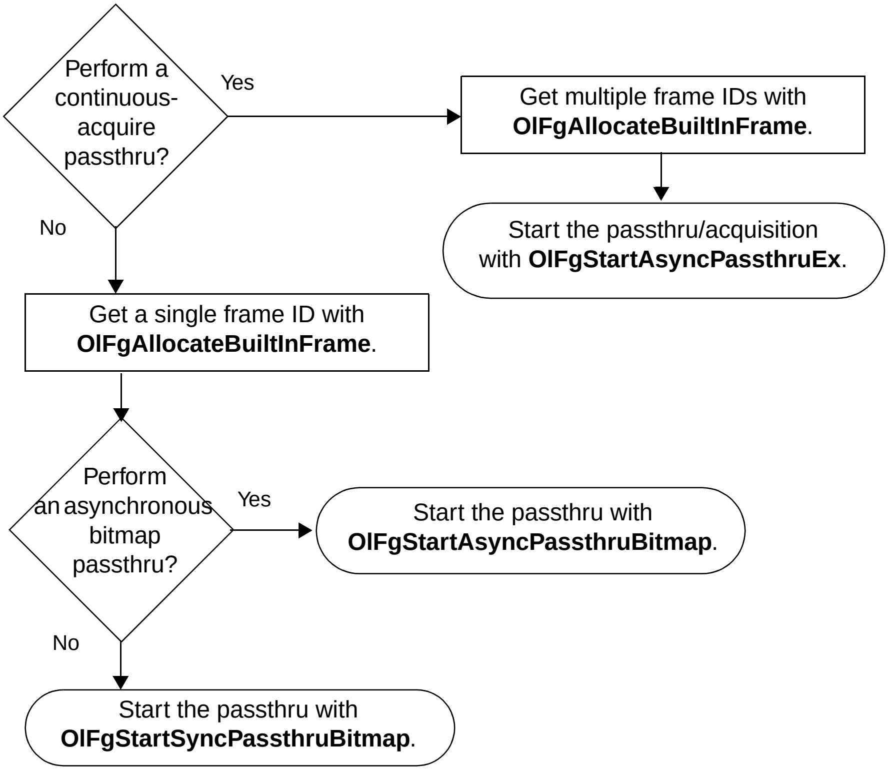


4

Process the Acquired Image (cont.)

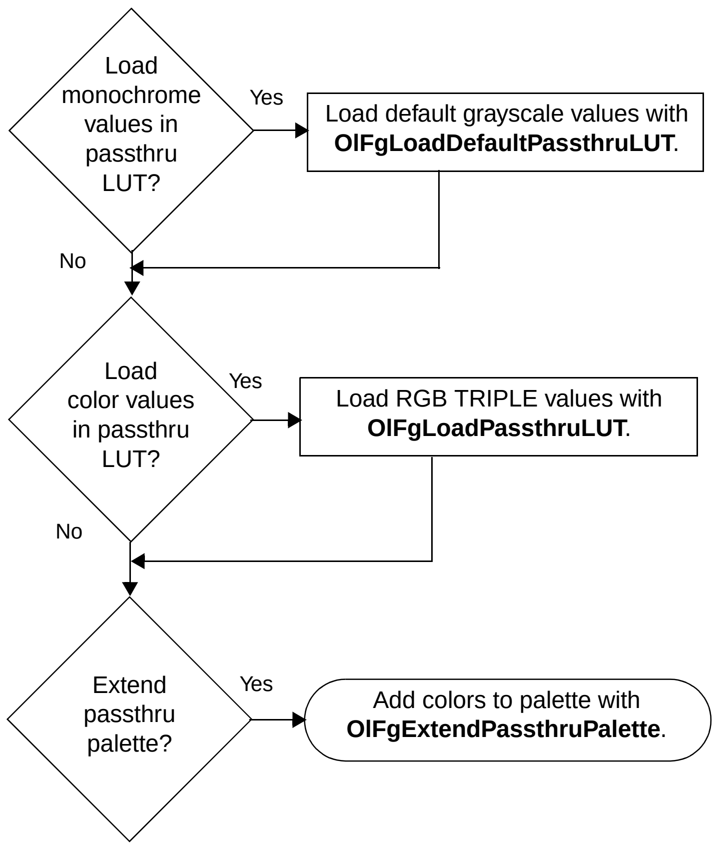


Start the Passthru Operation

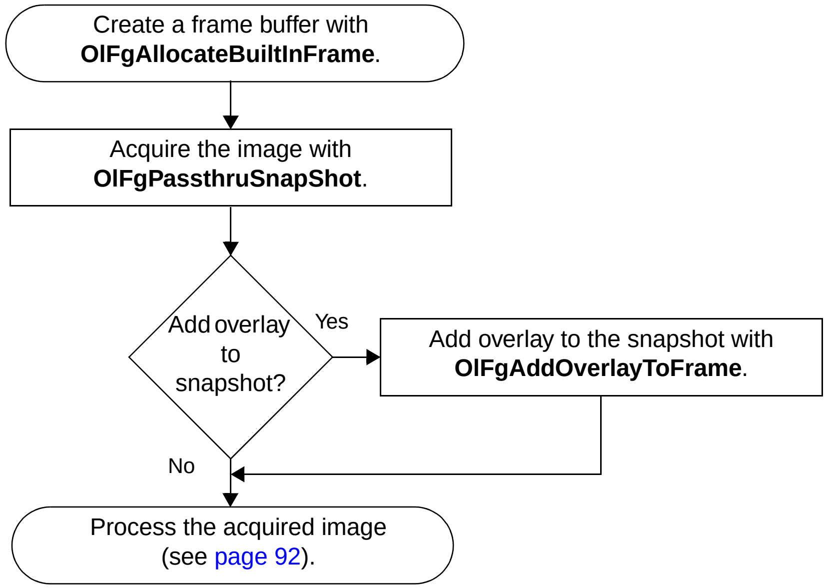


4

Change the Passthru LUT

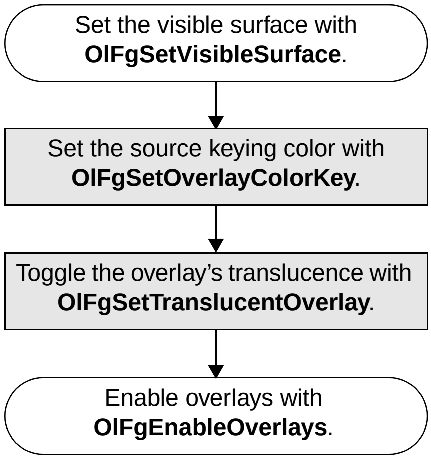


Take a Snapshot

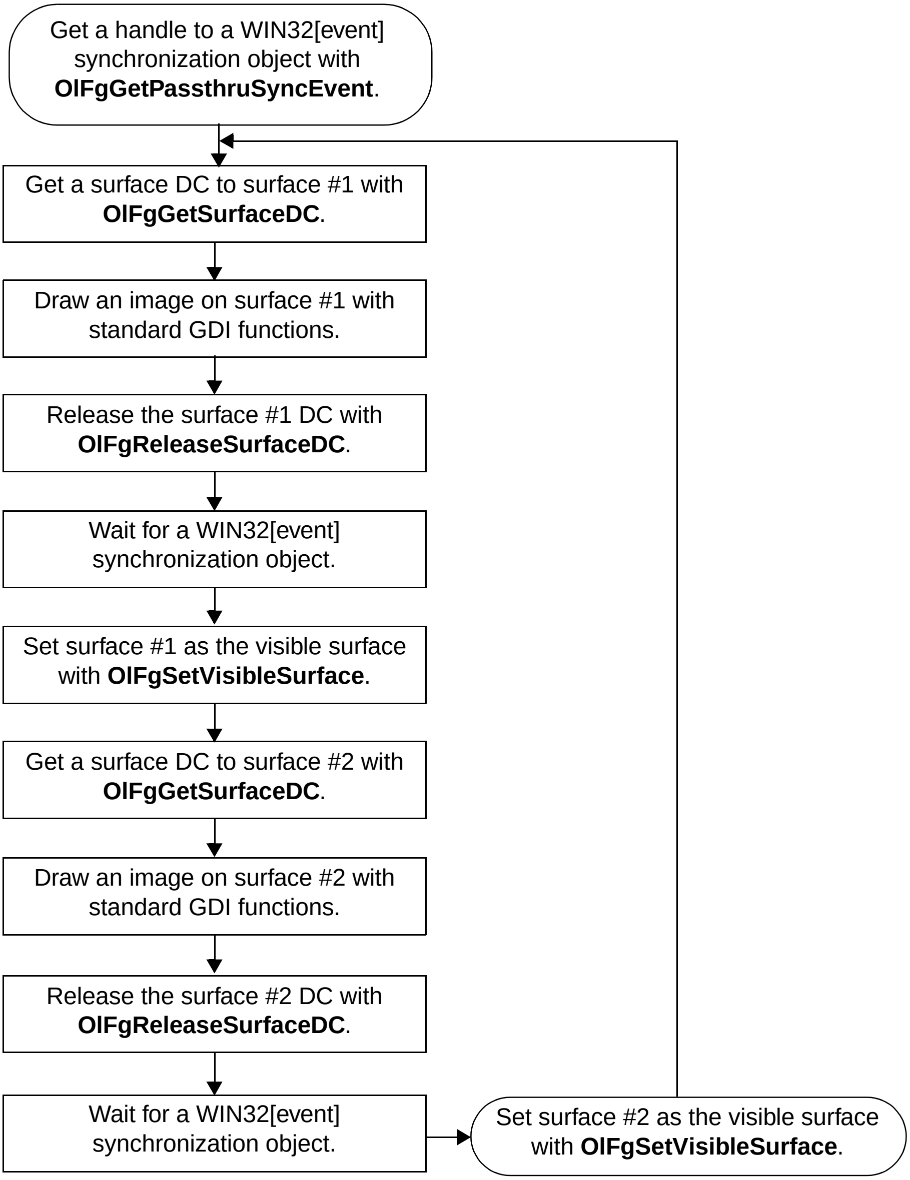


4

Set up and Enable Overlays



Execute an Overlay Animation Sequence



5

Troubleshooting

General Checklist

Should you experience problems using the DT3152 board, please follow these steps:

1. Read all the documentation provided for your product. Make sure that you have added any “Read This First” information to your manual and that you have used this information.
2. Check the Imaging OMNI CD for any README files and ensure that you have used the latest installation and configuration information available.
3. Check that your system meets the requirements stated in the *DT3152 Getting Started Manual*.
4. Check that you have installed your hardware properly using the instructions in the *DT3152 Getting Started Manual*.
5. Check that you have installed and configured the device driver properly using the instructions in the *DT3152 Getting Started Manual*.
6. Search the DT Knowledgebase in the Support section of the Data Translation web site (at www.datatranslation.com) for an answer to your problem.

If you still experience problems, try using the information in Table 17 to isolate and solve the problem. If you cannot identify the problem, refer to page 106.

Table 17: Troubleshooting Problems

Symptom	Possible Cause	Possible Solution
Board does not respond.	The board is incorrectly aligned in a PCI expansion slot.	Check that the slot in which your DT3152 board is located is a PCI slot and that the board is correctly seated in the slot; see the instructions in the *DT3152 Getting Started Manual.*
	The interrupt level is unacceptable.	An interrupt conflict exists in your system. The most common interrupt conflict occurs with a PCI device and a device that is plugged into the ISA bus. To resolve this problem, change the interrupt setting (usually by changing a jumper) on the ISA device. An interrupt conflict can also occur if a PCI device was not designed to share interrupts. To resolve this problem, select a different interrupt for each PCI slot in the PCI BIOS. To do this, enter the system BIOS program; this is usually done by pressing the DEL key when rebooting your system. Once in the system BIOS, enter the PCI/PnP BIOS setup, and select a unique interrupt for each PCI slot. The PCI BIOS assigns the interrupt; the device on the PCI bus does not have control over the interrupt assignment. Some network devices do not share interrupts. If you still have an interrupt conflict, try removing the network device, installing the DT3152 board and rebooting the system, then reinserting the network device.
	The board is damaged.	Contact Data Translation for technical support; refer to page 106.

Table 17: Troubleshooting Problems (cont.)

Symptom	Possible Cause	Possible Solution
Intermittent operation.	Loose connections or vibrations exist.	Check your wiring and tighten any loose connections or cushion vibration sources; see the instructions in the *DT3152 Getting Started Manual.*
	Electrical noise exists.	Check your connections; see the instructions in the *DT3152 Getting Started Manual.*
	The board is overheating.	Check environmental and ambient temperature; consult the board's specifications on page 113 of this manual and the documentation provided by your computer manufacturer for more information.
Data appears to be invalid.	Wiring is not connected properly.	Check your wiring and fix any open connections; see the instructions in the *DT3152 Getting Started Manual.*
Computer does not boot.	Board is not seated properly.	Check that the slot in which your DT3152 board is located is a PCI slot, that the board is correctly seated in the slot, and that the board is secured in the slot with a screw; see the instructions in the *DT3152 Getting Started Manual.*
	The power supply of the computer is too small to handle all the system resources.	Check the power requirements of your system resources and, if needed, get a larger power supply; consult the board's specifications on page 113 of this manual.

Table 17: Troubleshooting Problems (cont.)

Symptom	Possible Cause	Possible Solution
System lockup.	Board is not seated properly.	Check that the slot in which your DT3152 board is located is a PCI slot, that the board is correctly seated in the slot, and that the board is secured in the slot with a screw; see the instructions in the *DT3152 Getting Started Manual.*
	Interrupt level is unacceptable.	An interrupt conflict exists in your system. The most common interrupt conflict occurs with a PCI device and a device that is plugged into the ISA bus. To resolve this problem, change the interrupt setting (usually by changing a jumper) on the ISA device. An interrupt conflict can also occur if a PCI device was not designed to share interrupts. To resolve this problem, select a different interrupt for each PCI slot in the PCI BIOS. To do this, enter the system BIOS program; this is usually done by pressing the DEL key when rebooting your system. Once in the system BIOS, enter the PCI/PnP BIOS setup, and select a unique interrupt for each PCI slot. The PCI BIOS assigns the interrupt; the device on the PCI bus does not have control over the interrupt assignment. Some network devices do not share interrupts. If you still have an interrupt conflict, try removing the network device, installing the DT3152 board and rebooting the system, then reinserting the network device.

Service and Support

If you have difficulty using the DT3152 board, Data Translation's Technical Support Department is available to provide prompt technical assistance. Support upgrades, technical information, and software are also available.

All customers can always obtain the support needed. The first 90 days are complimentary, as part of the product's original warranty, to help you get your system running. Customers who call outside of this time frame can either purchase a support contract or pay a nominal fee (charged on a per-incident basis).

For "priority support," purchase a support contract. Support contracts guarantee prompt response and are very affordable; contact your local sales office for details.

Refer to the Data Translation Support Policy located at the end of this manual for a list of services included and excluded in our standard support offering.

Telephone Technical Support

Telephone support is normally reserved for original warranty and support-contract customers. Support requests from non-contract or out-of-warranty customers are processed after requests from original warranty and support-contract customers.

For the most efficient service, please complete the form on page 108 and be at your computer when you call for technical support. This information helps to identify specific system and configuration-related problems and to replicate the problem in house, if necessary.

You can reach the Technical Support Department by calling (508) 481-3700 x1401.

If you are located outside the USA, call your local distributor. The name and telephone number of you nearest distributor are provided in your Data Translation catalog.

If you are leaving a message to request a support call, please include the following information:

- Your name (please include proper spelling),
- Your company or organization (please include proper spelling),
- A phone number,
- An email address where you can be reached,
- The hardware/software product you need help on,
- A summary of the issue or question you have,
- Your contract number, if applicable, and
- Your product serial number or purchase date.

Omitting any of the above information may delay our ability to resolve your issue.

Information Required for Technical Support

Name:____Phone___________________________

Contract Number: ____

Address: ____

____

Data Translation hardware product(s): ____

serial number: ____

configuration: ____

Data Translation device driver - SPO number: ____________ ___________________________________

____ version: ________________________

Data Translation software - SPO number:________________ ___________________________________

serial number: ________________________________ version:____________________________

PC make/model: ____

operating system: ____________________________ version:____________________________

Windows version: ____

processor: _____________________________________ speed:_____________________________

RAM: ____ hard disk space:______________________

network/number of users: _______________________ disk cache:_________________________

graphics adapter: ____________________________ data bus:____________________________

I have the following boards and applications installed in my system:_______________________________

____

____

I am encountering the following problem(s): ____

____

____

____

and have received the following error messages/codes: ______________________________________

____

____

I have run the board diagnostics with the following results: __________________________________

____

You can reproduce the problem by performing these steps:

1. ____

____

2. ____

____

3. ____

____

E-Mail and Fax Support

You can also get technical support by e-mailing or faxing the Technical Support Department:

- **E-mail**: You can reach Technical Support at the following address: tsupport@datx.com

  Ensure that you provide the following minimum information:

  – Your name,

  – Your company or organization,

  – A phone number,

  – An email address where you can be reached,

  – The hardware/software product you need help on,

  – A summary of the issue you are experiencing,

  – Your contract number, if applicable, and

  – Your product serial number or purchase date.

  Omitting any of the above information may delay our ability to resolve your issue.

- **Fax**: Please photocopy and complete the form on page 108, then fax Technical Support at the following number: (508) 481-8620.

Support requests from non-contract and out-of-warranty customers are processed with the same priority as telephone support requests.

World-Wide Web

For the latest tips, software fixes, and other product information, you can always access our World-Wide Web site free of charge at the following address: http://www.datatranslation.com

If Your Board Needs Factory Service

If your board must be returned to Data Translation, perform the following steps:

1. Record the board's serial number, then contact the Customer Service Department at (508) 481-3700 (if you are in the USA) and obtain a Return Material Authorization (RMA).

   If you are located outside the USA, call your local distributor for authorization and shipping instructions. The name and telephone number of your nearest distributor are listed in your Data Translation catalog.

   All return shipments to Data Translation must be marked with the correct RMA number to ensure proper processing.

2. Using the original packing materials, if available, package the board as follows:

   – Wrap the board in an electrically conductive plastic material. Handle with ground protection. A static discharge can destroy components on the board.

   – Place in a secure shipping container.

3. Return the board to the following address, making sure the RMA number is visible on the outside of the box.

   Customer Service Dept.
   Data Translation, Inc.
   100 Locke Drive
   Marlboro, MA 01752-1192

A

Specifications

The input impedance for the video input signal is 75 Ω

Table 18 lists the digital output electrical specifications for the DT3152 board.

Table 18: Digital Output Electrical Specifications

Feature	Minimum Specification	Maximum Specification
High-Level Output Current (IOH)	-	2.0 mA
Low-Level Output Current (IOL)	-	20 mA
High-Level Output Voltage (VOH)	2.4 V	-
Low-Level Output Voltage (VOL)	-	0.5 V

Table 19 lists the digital input electrical specifications for the DT3152 frame grabber board.

Table 19: Digital Input Electrical Specifications

Feature	Minimum Specification	Maximum Specification
Input High Level (V_{IH})	2.0 V	9.0 V
Input Low Level (V_{LL})	-0.3 V	0.8 V
Input Capacitance (C_{IN})	-	6 pF

Table 20 lists the power specifications for the DT3152 board.

Table 20: Power Specifications

Feature	Specification
+5 V	2 A
+12 V	100 mA
−12 V	100 mA

Table 21 lists the physical and environmental specifications for the DT3152 board.

Table 21: Physical and Environmental Specifications

Feature	Specification
Dimensions	6.875 inches long x 4.2 inches high (not including faceplate and connectors)
Weight	5.3 ounces (150 grams)
Operating temperature	0 to 50° C (32 to 122° F)
Storage temperature	−25 to 70° C (−13 to 158° F)
Humidity	0 to 90%, noncondensing

B

Connector Pin Assignments

Connector J2 Pin Assignments

Connector J2 is a 15-pin, male, D-shell connector that accepts the video input signals through the EP306 cable or a user-designed cable. Figure 14 illustrates the pin locations for connector J2.

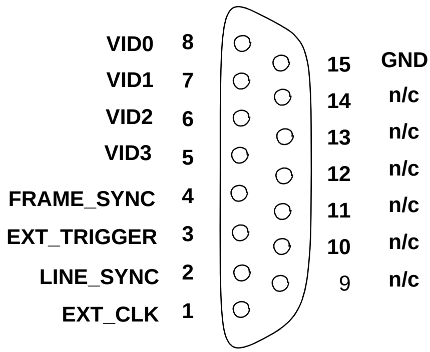


Figure 14: Connector J2

Table 22 lists the J2 pins by signal name, and by the corresponding EP306 BNC connector assignments.

B

Table 22: J2 Connector Pin Assignments

J2 Pin	EP306 BNC Connector	Signal Name
1	7	EXT_CLK
2	6	LINE_SYNC
3	5	EXT_TRIGGER
4	4	FRAME_SYNC
5	3	VID3
6	2	VID2
7	1	VID1
8	0	VID0
9	8	not connected
10	9	not connected
11	10	not connected
12	11	not connected
13	12	not connected
14	13	not connected
15	–	GND

Connector J4 Pin Assignments

Connector J4 is a 15-pin, male, D-shell connector that provides the digital output signals and signals required by many variable-scan cameras through the EP306 cable. Figure 15 illustrates the pin locations for connector J4.

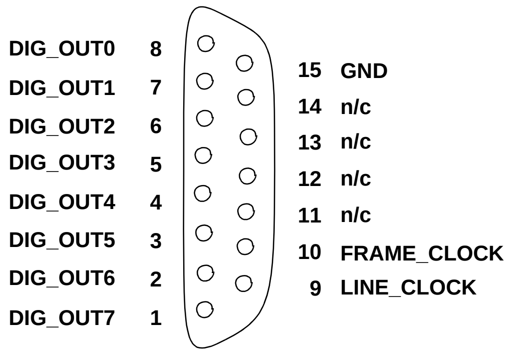


Figure 15: Connector J4

Table 23 lists the J4 pins by signal name and by the corresponding EP306 BNC connector assignments.

Table 23: J4 Connector Pin Assignments

J4 Pin	EP306 BNC Connector	Signal Name
1	7	DIG_OUT7
2	6	DIG_OUT6
3	5	DIG_OUT5
4	4	DIG_OUT4
5	3	DIG_OUT3
6	2	DIG_OUT2
7	1	DIG_OUT1
8	0	DIG_OUT0
9	8	LINE_CLOCK
10	9	FRAME_CLOCK
11	10	not connected
12	11	not connected
13	12	not connected
14	13	not connected
15	-	GND

C

Modifying the Device Driver

Windows 98 and Windows Me Procedures

This section describes the following procedures in Windows 98 and Windows Me:

- Adding a board to the device driver configuration (on this page);
- Modifying the board settings in the device driver configuration (on page 124); and
- Uninstalling the device driver, if necessary (on page 126).

Adding a Board to the Device Driver Configuration

To add a new board to the DT3152 Device Driver configuration after system startup, perform the following steps:

1. If you have not already done so, install the additional board in your computer following the instructions in the *DT3152 Getting Started Manual*, then power up your computer and any attached peripherals.

   Note: On power-up, the PCI bus takes one available interrupt from system resources for the DT3152 board. If any devices are using this interrupt, problems may arise. Verify that no other devices in your system are using the same interrupt that the DT3152 board is using and ensure that PCI interrupts are enabled in your system BIOS.

2. Start Windows 98 or Windows Me.
   The Found New Hardware dialog box appears.
3. Click **Next**.
4. For Windows Me, click **Specify the location of the device (Advanced)**, then click **Next**.

5. Click **Search for the best driver for your device (Recommended)**, then click **Next.**
6. Click **Specify a location** and uncheck all other options.
7. Insert the Imaging OMNI CD into the CD-ROM drive.
8. Click **Browse**, browse to **x:\DRIVERS\DT3152\WIN98** (where *x* is the letter of your CD-ROM drive), and click **Open**.
9. Click **OK**.
10. Click **Next.**
11. Click **Next.**
    The files are copied.
12. Click **Finish**.
13. Remove the Imaging OMNI CD from the CD-ROM, then click **Yes** to restart the system.
    When the system restarts, the driver configuration dialog box appears.
14. Click **OK**, then click **OK**.
15. Click **Add New** to add a DT3152 board to the configuration.
    The DT3152 Installation dialog box appears for the new board.
16. Enter a board name (alias), which can be any name you choose, then click **Add**. (The board name is used by supported software, such as DT-Acquire and the Frame Grabber SDK.) Only one name (alias) per installed DT3152 board is allowed.
    The DT3152 Configuration dialog box appears.
17. Select **Enable Board** to activate the board. If you want to retain the settings but disable the board (and therefore not use the memory), remove the checkmark next to Enable Board.
18. For **Video Format**, indicate the video format of your video input source: 50 or 60 Hz.

19. For **Desired Memory Size**, select the amount of contiguous memory (in MB) that you want to allocate in your system to hold the acquired frames. A 60 Hz, 640-by-480 image requires 308 KB per frame; a 50 Hz, 768-by-576 image requires 443 KB per frame. The actual amount of memory that the device driver can allocate depends on your system resources. It is recommended that you select only as much memory as you need to leave memory for other devices. Once you enter the desired memory size, the device driver allocates as much memory as possible to match the value you entered; the actual memory size allocated is shown in the **Actual Memory Size** text box when you restart your system.

20. Click **Done**.
    The DT3152 Device Driver Configuration dialog box is redisplayed; you can see the name of the board you just added.

21. Click **Close** to end the DT3152 configuration.

22. If you made any changes to the default settings, click **OK** to confirm that you need to restart Windows before the changes will take effect.

23. Click **OK** to restart Windows.
    For proper operation, it is very important that you restart Windows when prompted.

Modifying a Board in the Device Driver Configuration

To modify a board in the device driver configuration, perform the following steps:

1. Open the Control Panel.

2. For Windows 98, double-click **Multimedia**.
   The Multimedia Properties dialog appears.

   For Windows Me, double-click **Sounds and Multimedia**.
   The Sounds and Multimedia Properties dialog appears.

3. Click the **Devices** tab, then double-click **Media Control Devices**.
4. Double-click **DT3152 Mach Series Frame Grabber**.
   The DT3152 Device Driver Properties dialog box appears.
5. Click **Use this Media Control device**, then click **Settings**.
   The DT3152 Device Driver Configuration dialog box appears.
6. Select the name of the DT3152 board that you want to modify.
7. Click **Modify** to modify the board.
   The DT3152 Configuration dialog box appears.
8. Select **Enable Board** to activate the board. If you want to retain the settings but disable the board (and therefore not use the memory), remove the checkmark next to Enable Board.
9. For **Video Format**, indicate the video format of your video input source: 50 or 60 Hz.
10. For **Desired Memory Size**, select the amount of contiguous memory (in MB) that you want to allocate in your system to hold the acquired frames. A 60 Hz, 640-by-480 image requires 308 KB per frame; a 50 Hz, 768-by-576 image requires 443 KB per frame. The actual amount of memory that the device driver can allocate depends on your system resources. It is recommended that you select only as much memory as you need to leave memory for other devices. Once you enter the desired memory size, the device driver allocates as much memory as possible to match the value you entered; the actual memory size allocated is shown in the **Actual Memory Size** text box when you restart your system.
11. Click **Done**, then click **Close** to end the DT3152 configuration.
12. If you made any changes to the default settings, click **OK** to confirm that you need to restart Windows before the changes take effect.
13. Click **OK** to close the **DT3152 MACH Series Frame Grabber Properties** dialog box, then click **OK** to close the **Multimedia Properties** or **Sounds and Multimedia Properties** dialog box.
14. Close the Control Panel.

15. Restart Windows for your changes to take effect.
    For proper operation, it is very important that you restart Windows.

Uninstalling the Device Driver

Generally, you will always require the DT3152 Device Driver. However, if you are no longer using the DT3152 board with the supported software, you can uninstall the DT3152 Device Driver from the system.

To uninstall the device driver, perform the following steps:

1. Click **Start/Programs/Data Translation, Inc/MACHUnLd**.
2. Click **DT3152**.
3. Click **OK**.
   The DT3152 device driver is uninstalled.
4. Click **Cancel** to exit from the MACHUnLd utility.

Windows 2000 Procedures

This section describes the following procedures in Windows 2000:

- Adding a board to the device driver configuration (on this page);
- Modifying the board settings in the device driver configuration (on page 129);
- Removing a board from the device driver configuration (on page 130); and
- Uninstalling the device driver, if necessary (on page 131).

C

Adding a Board to the Device Driver Configuration

To add a board to the DT3152 Device Driver configuration, perform the following steps:

1. If you have not already done so, install the additional board in your computer following the instructions in the *DT3152 Getting Started Manual*, then power up your computer and any attached peripherals.

Note: On power-up, the PCI bus takes one available interrupt from system resources for the DT3152 board. If any devices are using this interrupt, problems may arise. Verify that no other devices in your system are using the same interrupt that the DT3152 board is using and ensure that PCI interrupts are enabled in your system BIOS.

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2. Start Windows 2000.
   The Found New Hardware dialog box appears.
3. Click **Next**.
4. Click **Search for a suitable driver for my device (recommended)**, then click **Next.**

5. Uncheck all checkboxes, then click **Next**.
6. Click **Disable the device**, then click **Finish**.
7. Open the **Control Panel**.
8. Double-click **Sounds and Multimedia**.
9. Click the **Hardware** tab.
10. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
11. Click the **Properties** tab.
12. Double-click **Multimedia Drivers**.
13. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
14. Click **Settings**.
15. Click **Add New**.
16. Enter a name for the device, then click **Add**.
17. Select **Enable Board** to activate the board. If you want to retain the settings but disable the board (and therefore not use the memory), remove the checkmark next to Enable Board.
18. For **Video Format**, indicate the video format of your video input source: 50 or 60 Hz.
19. For **Desired Memory Size**, select the amount of contiguous memory (in MB) that you want to allocate in your system to hold the acquired frames. A 60 Hz, 640-by-480 image requires 308 KB per frame; a 50 Hz, 768-by-576 image requires 443 KB per frame. The actual amount of memory that the device driver can allocate depends on your system resources. It is recommended that you select only as much memory as you need to leave memory for other devices. Once you enter the desired memory size, the device driver allocates as much memory as possible to match the value you entered; the actual memory size allocated is shown in the **Actual Memory Size** text box when you restart your system.

20. Click **Done**.
    The DT3152 Device Driver Configuration dialog box is redisplayed with the name of the board you just added.
21. Click **Close** to finish.
    A dialog box appears, indicating that you must restart Windows 2000 for the changes to take effect.
22. Click **Restart Now** to restart your system.

Modifying a Board in the Device Driver Configuration

To modify the board settings in the DT3152 Device Driver configuration, perform the following steps:

1. Open the **Control Panel**.
2. Double-click **Sounds and Multimedia**.
3. Click the **Hardware** tab.
4. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
5. Click the **Properties** tab.
6. Double-click **Multimedia Drivers**.
7. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
8. Click **Settings**.
9. Select the name of the board that you want to modify, then click **Modify**.
   Another DT3152 Device Driver Configuration dialog box appears.
10. Select **Enable Board** to activate the board. If you want to retain the settings but disable the board (and therefore not use the memory), remove the checkmark next to Enable Board.

11. For **Video Format**, indicate the video format of your video input source: 50 or 60 Hz.
12. For **Desired Memory Size**, select the amount of contiguous memory (in MB) that you want to allocate in your system to hold the acquired frames. A 60 Hz, 640-by-480 image requires 308 KB per frame; a 50 Hz, 768-by-576 image requires 443 KB per frame. The actual amount of memory that the device driver can allocate depends on your system resources. It is recommended that you select only as much memory as you need to leave memory for other devices. Once you enter the desired memory size, the device driver allocates as much memory as possible to match the value you entered; the actual memory size allocated is shown in the **Actual Memory Size** text box when you restart your system.
13. Click **Done**.
    The DT3152 Device Driver Configuration dialog box reappears with the name of the board you just modified.
14. Click **Close**.
15. Restart your system to cause the new configuration to take effect.

Removing a Board from the Device Driver Configuration

To remove a board from the DT3152 Device Driver configuration, perform the following steps:

1. Open the **Control Panel**.
2. Double-click **Sounds and Multimedia**.
3. Click the **Hardware** tab.
4. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
5. Click the **Properties** tab.
6. Double-click **Multimedia Drivers**.

7. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
8. Click **Settings**.
9. Select the name of the board that you want to remove, then click **Remove**.
10. Repeat step 9 until all the DT3152 boards you want to remove are removed.
11. Click **Close**.
    The Drivers dialog box appears. The DT3152 Device Driver is still installed in the system, but the board has been removed.
12. Click **OK**.
13. If you want to uninstall the driver at this point, continue with step 5 on page 131. Otherwise, continue with the next step.
14. Click **OK**, then click **OK** to finish.
15. Restart the system for the changes to take effect.

Uninstalling the Device Driver

Note: Ensure that you remove all the DT3152 boards in your system using the preceding section before uninstalling the device driver.

Generally, you will always require the DT3152 Device Driver. However, if you are no longer using the DT3152 board with the supported software, you can uninstall the DT3152 Device Driver from the system by performing the following steps:

1. Open the **Control Panel**.
2. Double-click **Sounds and Multimedia**.
3. Click the **Hardware** tab.

4. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
5. Click the **Driver** tab, then click **Uninstall**.
6. Click **OK**.
7. Click **OK**.
8. Restart your system to cause the new configuration to take effect.

Windows XP Procedures

This section describes the following procedures in Windows XP:

- Adding a board to the device driver configuration (on this page);
- Modifying the board settings in the device driver configuration (on page 135);
- Removing a board from the device driver configuration (on page 137); and
- Uninstalling the device driver, if necessary (on page 138).

Adding a Board to the Device Driver Configuration

To add a board to the DT3152 Device Driver configuration, perform the following steps:

1. If you have not already done so, install the additional board in your computer following the instructions in the *DT3152 Getting Started Manual*, then power up your computer and any attached peripherals.

Note: On power-up, the PCI bus takes one available interrupt from system resources for the DT3152 board. If any devices are using this interrupt, problems may arise. Verify that no other devices in your system are using the same interrupt that the DT3152 board is using and ensure that PCI interrupts are enabled in your system BIOS.

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2. Start Windows XP.
   The Found New Hardware dialog box appears.
3. Click **Next**.
4. Click **Install from a list or specific location (advanced)**, then click **Next.**

5. Uncheck all checkboxes, then click **Next**.
6. Click **Finish**.
   The Technial Support page appears.
7. Click **Cancel**.
8. Open the Control Panel.
9. Double-click **Sounds and Audio Devices**.
10. Click Hardware.
11. Double-click **DT-Open Layers DT3152 MACH Series Frame Grabber**.
12. Click **Properties**.
13. Double-click **Multimedia Drivers**.
14. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
15. Click **Settings**.
16. Click **Add New** to add a DT3152 board to the configuration.
    The DT3152 Installation dialog box appears for the new board.
17. Enter any unique name (or alias) for the DT3152 board, then click **Add**. Only one alias per installed board is allowed.
    The DT3152 Configuration dialog box appears.
18. Select **Enable Board** to activate the board. If you want to retain the settings but disable the board (and therefore not use the memory), remove the checkmark next to Enable Board.
19. Select the **Video Format** as either 50 Hz or 60 Hz.
20. For **Desired Memory Size**, select the amount of contiguous memory (in MB) that you want to allocate in your system to hold the acquired frames. A 60 Hz, 640-by-480 image requires 308 KB per frame; a 50 Hz, 768-by-576 image requires 443 KB per frame. The actual amount of memory that the device driver can allocate depends on your system resources. It is recommended that you select only as much memory as you need to leave memory for

other devices. Once you enter the desired memory size, the device driver allocates as much memory as possible to match the value you entered; the actual memory size allocated is shown in the **Actual Memory Size** text box when you restart your system.

21. Click **Done**.
    The DT3152 Configuration dialog box is redisplayed; you can see the name of the board you just added.
22. Click **Close** to finish.
    A dialog box appears, indicating that you must restart Windows XP for the changes to take effect.
23. Remove the Imaging OMNI CD from the CD-ROM, then click **Restart Now** to restart the system.

C

Modifying a Board in the Device Driver Configuration

To modify the board settings in the DT3152 Device Driver configuration, perform the following steps:

1. Open the **Control Panel**.
2. Double-click **Sounds and Audio Devices**.
3. Click **Hardware**.
4. Double-click **DT-Open Layers DT3152 MACH Series Frame Grabber**.
5. Click **Properties**.
6. Click the **Properties** tab.
7. Double-click **Multimedia Drivers**.
8. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
9. Click **Settings**.

10. Select the name of the board that you want to modify, then click **Modify**.
    Another DT3152 Device Driver Configuration dialog box appears.

11. Select **Enable Board** to activate the board. If you want to retain the settings but disable the board (and therefore not use the memory), remove the checkmark next to Enable Board.

12. For **Video Format**, indicate the video format of your video input source: 50 or 60 Hz.

13. For **Desired Memory Size**, select the amount of contiguous memory (in MB) that you want to allocate in your system to hold the acquired frames. A 60 Hz, 640-by-480 image requires 308 KB per frame; a 50 Hz, 768-by-576 image requires 443 KB per frame. The actual amount of memory that the device driver can allocate depends on your system resources. It is recommended that you select only as much memory as you need to leave memory for other devices. Once you enter the desired memory size, the device driver allocates as much memory as possible to match the value you entered; the actual memory size allocated is shown in the **Actual Memory Size** text box when you restart your system.

14. Click **Done**.
    The DT3152 Device Driver Configuration dialog box reappears with the name of the board you just modified.

15. Click **Close**.

16. Restart your system to cause the new configuration to take effect.

Removing a Board from the Device Driver Configuration

To remove a board from the DT3152 Device Driver configuration, perform the following steps:

1. Open the **Control Panel**.
2. Double-click **Sounds and Audio Devices**.
3. Click **Hardware**.
4. Double-click **DT-Open Layers DT3152 MACH Series Frame Grabber**.
5. Click **Properties**.
6. Click the **Properties** tab.
7. Double-click **Multimedia Drivers**.
8. Click **DT3152 MACH Series Frame Grabber**, then click **Properties**.
9. Click **Settings**.
10. Select the name of the board that you want to remove, then click **Remove**.
11. Repeat step 10 until all the DT3152 boards you want to remove are removed.
12. Click **Close**.
    The Drivers dialog box appears. The DT3152 Device Driver is still installed in the system, but the board has been removed.
13. If you want to uninstall the driver at this point, continue with step 5 on page 138. Otherwise, continue with the next step.
14. Click **OK**, then click **OK** to finish.
15. Restart the system for the changes to take effect.

Uninstalling the Device Driver

Note: Ensure that you remove all the DT3152 boards in your system using the preceding section before uninstalling the device driver.

Generally, you will always require the DT3152 Device Driver. However, if you are no longer using the DT3152 board with the supported software, you can uninstall the DT3152 Device Driver from the system by performing the following steps:

1. Open the **Control Panel**.
2. Double-click **Sounds and Audio Devices**.
3. Click the **Hardware** tab.
4. Double-click **DT-Open Layers DT3152 MACH Series Frame Grabber**.
5. Click the **Driver** tab, then click **Uninstall**.
6. Click **OK**.
7. Click **OK**.
8. Restart your system to cause the new configuration to take effect.

D

Asynchronous Reset Cameras

Note: If you are using an asynchronous reset camera, make sure that the Sync Sentinel is disabled. For more information about the Sync Sentinel, refer to page 25.

The DT3152 frame grabber board supports asynchronous reset cameras. Asynchronous reset cameras can continuously output frames of data and/or output a single frame of data, as follows:

- **Continuous output** –The camera continuously outputs frames of data along with horizontal and vertical syncs. When the camera is triggered, the current frame is reset and the camera begins to output new frames from the top.

  In this mode, you must use an external trigger with the DT3152 board and the external trigger event must occur before the first line that you want to digitize. If desired, you can use the trigger that resets the camera to also trigger the board. For more information about external board triggers, refer to page 19.

  Figure 16 illustrates the continuous output of frames.

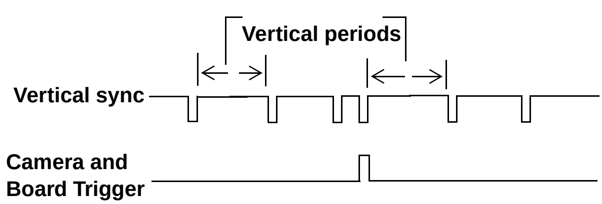

Figure 16: Continuous Output

- **Single-frame output** –The camera does not output data until triggered. When the camera is triggered, the camera outputs a single frame along with a single vertical sync. The board then captures the image and waits for the next trigger (vertical sync).

  Figure 17 illustrates single-frame output.

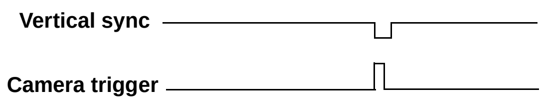

Figure 17: Single-Frame Output

Note that in this mode, the board does not require an external trigger to start acquiring data.

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100 Locke Drive
Marlboro, MA 01752-1192 USA

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