Installing the Model 630044D PIVCAM 4-30 or Model 630045 PIVCAM 10-15 CCD Image Capture System

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Installing the Model 630044D PIVCAM 4-30 or Model 630045 PIVCAM 10-15 CCD Image Capture System

This section gives instructions on how to install and align the Model 630044D PIVCAM 4-30 or the Model 630045 PIVCAM 10-15 CCD Image Capture System.

Notes:

- ❑ *The Model 630045 PIVCAM 10-15 was previously called the Model 630045 1K Crosscorrelation CCD Camera.*
- ❑ *The instructions in this manual are for using the Model 630044D PIVCAM 4-30 or the Model 630045 PIVCAM 10-15* CCD *cameras with the Model 610032 Computer Controlled Synchronizer and* INSIGHT *for Windows NT software. If you are using the Model 610030 Synchronizer, refer to the following manuals for the appropriate installation and operation information:*

Camera	*Manual Part Number*
Model 630044	*1990768 and 1990769*
Model 630045	*1990777 and 1990776*

Scope

After completing this section, you will have done the following:

- ❑ Installed the camera.
- ❑ Connected the camera to the Frame Grabber in the computer and to the Synchronizer.
- ❑ Check out the camera-to-Synchronizer and the camera-to-Frame Grabber connections.

Manufacturer's Declaration of Conformity

TSI Incorporated hereby certifies that, to the best of its knowledge and belief,

- ❑ The instrument documented in this manual meets the essential requirements and is in conformity with the relevant EC Directive(s).
- ❑ The CE Marking has been affixed on the instrument.
- ❑ The Declaration of Conformity certificate is included with the instrument.

Unpacking and Checking the Packing List

Carefully unpack the components of the image capture system, making sure they arrived in good condition. Do ***not*** discard the case. If the camera needs to be shipped back to TSI for repair or service, it ***must*** be returned in this case.

If there are signs of damage, contact the nearest TSI sales office or representative or the Fluid Mechanics Instrument Division at TSI. See "Service Policy" on the Warranty page at the beginning of this manual for further details.

Compare all the components you received with those listed in Table 1. If any parts are missing, contact TSI. See "Getting Help" in *About This Manual* section for the address and phone number.

Table 1
Packing List for the Model 630044D PIVCAM 4-30 CCD Image Capture System

Qty	Model Number	Description	Part Number
1	630044D	PIVCAM 4-30 Camera	1098710
1		Power Cable (12-Pin–2-Pin)	1098758
1		Macro Zoom Lens (18–108 mm FL)	2502524
1		Camera-to-Model 600067 Frame Grabber Cable	1303502
1		Coaxial BNC Cable (4-meter 75 Ω)	1303259

***Note**: The Model 630044D Camera works only with the Model 600067 High-Speed PCI Frame Grabber.*

Table 2
Packing List for the Model 630045 PIVCAM 10-15 CCD Image Capture System with the Model 600067 Frame Grabber

Qty	Model Number	Description	Part Number
1	630045	PIVCAM 10-15 Crosscorrelation CCD Camera	1098717
1		Power Cable (12-pin–2-pin)	1098758
1		Macro Zoom Lens (18–108 mm FL)	2502524
1		Camera-to-Model 600067 Frame Grabber Cable	1303502
1		Coaxial BNC Cable (4-meter 75 Ω)	1303259

Table 3
Packing List for the Model 630045 PIVCAM 10-15 CCD Image Capture System with the Models 600064, 600065, or 600066 Frame Grabbers

Qty	Model Number	Description	Part Number
1	630045	PIVCAM 10-15 Crosscorrelation CCD Camera	1098717
1		Power Cable (12-pin–2-pin)	1098758
1		Macro Zoom Lens (18–108 mm FL)	2502524
1		Mini Cable (31-pin D to 37-pin D)	1303298
1		Camera-to-Frame Grabber Cable (37-pin D to 62-pin D)	1303264
1		Coaxial BNC Cable (4-meter 75Ω)	1303259

***Note:** If you are using the camera without the Model 610032 Synchronizer, use the power supply cable (P/N 1098707) instead of the 12-pin–2-pin power supply cable (P/N 1099758).*

Assumptions

At this point in your system installation, TSI assumes you have completed these steps:

- ❑ The computer system is set up with the INSIGHT software loaded and tested. The Frame Grabber is installed and tested.
- ❑ Your laser system is installed and aligned.
- ❑ The Model 610032 LASERPULSE Synchronizer is connected to the computer and has been tested.

WARNING

Do *not* turn the laser on during any of the steps given in this section of the PIV systems manual.

Installation Overview

To install the camera, you need to complete the following steps:

Step 1. Install the camera on a tripod or an optical rail.

Step 2. Connect the camera to the Frame Grabber and to the Model 610032 LASERPULSE Synchronizer.

Step 3. Connect the camera and the Synchronizer.

Step 4. Check out the camera-to-Synchronizer and the camera-to-Frame Grabber connections using the INSIGHT software.

WARNING

The Camera warranty is void if these warnings are not followed:

- ❑ Uncontrolled laser light can seriously damage camera sensors. Do *not* turn the laser on during any of the steps given in this section of the PIV systems manual.
- ❑ Make sure the lens cap is on the camera during and after installation. Remove the lens cap only after the experiment has been suitably set up.
- ❑ Replace the lens cap when making any changes to your experiment.
- ❑ Do not over-saturate the camera pixels. Over-saturation can be seen as streaks around particle images, or objects in the flow grow in size and appear blurred.

Step 1: Installing the Camera on a Tripod or an Optical Rail

This step involves mounting the camera on a sturdy base. You can mount the camera either on a sturdy tripod, or if you are using an image shifter, you can mount it on the optical rail supplied with the image shifter. The optical rail assembly in turn can be attached to a very sturdy tripod, breadboard, or other base capable of holding the weight of the camera and moving mirror.

Mounting the Camera on a Tripod

Follow these steps to mount the camera on a tripod:

1. Attach the tripod to the camera using the ¼–20 tapped screw hole on the bottom of the camera.
2. Screw the macro-zoom lens to the camera.

Mounting the Camera on an Optical Rail

If you have ordered the system with a mirror image shifter, a camera rail and mount are provided with the image shifter to align the camera with the mirror.

1. Attach the camera mount to the camera using one ¼–20 sockethead cap screw, as shown in Figure 1.
2. Attach the camera with mount to the carriage using four ¼–20 sockethead cap screws, as shown in Figure 1.
3. Fasten the camera assembly to the optical rail using the carriage thumbscrew.

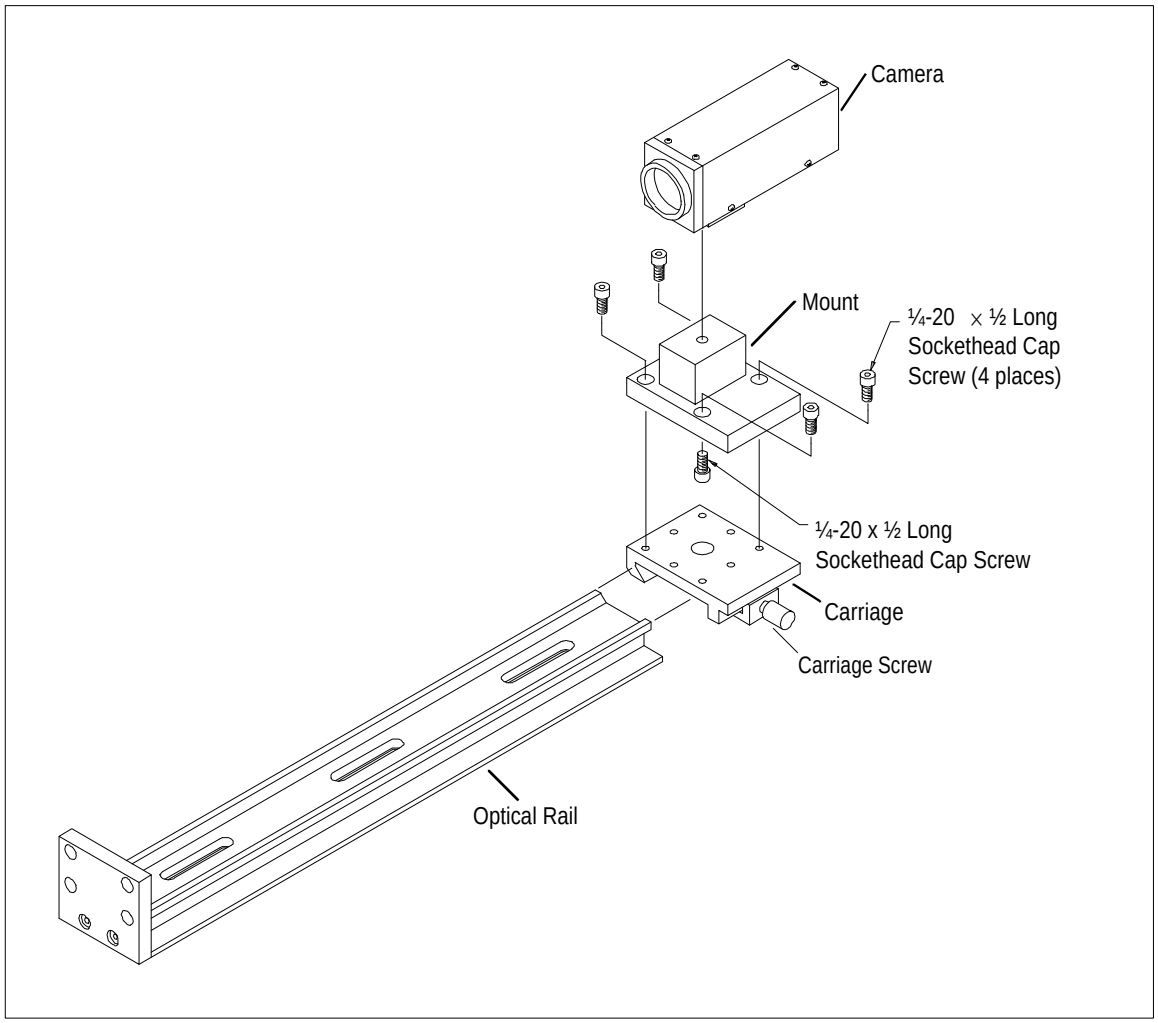

Figure 1
Attaching the Camera to the Mount and the Camera Rail

Step 2: Connecting the Camera to the Frame Grabber

The camera can be used with two series of Frame Grabbers: the Model 600067 High Speed PCI Frame Grabber or the Models 600064, 600065, 600066 Frame Grabbers.

Select the appropriate steps from the following instructions, to connect the camera to the Frame Grabber board that you installed in the computer.

Connecting the Camera to the Model 600067 High-Speed PCI Frame Grabber and the Synchronizer

Follow these instructions if you are using a Model 600067 High-Speed PCI Frame Grabber board:

1. Locate the Frame Grabber-to-camera cable. It has a mini 31-pin D-connector on one end and two connectors on the other end: a 44-pin D-connector and a BNC connector.
2. Connect the 31-pin D-connector to **Digital Out** on the back of the camera. Make the following connections for the two connectors on the other end of the Frame Grabber cable. Refer to Figure 2 as you make these connections.

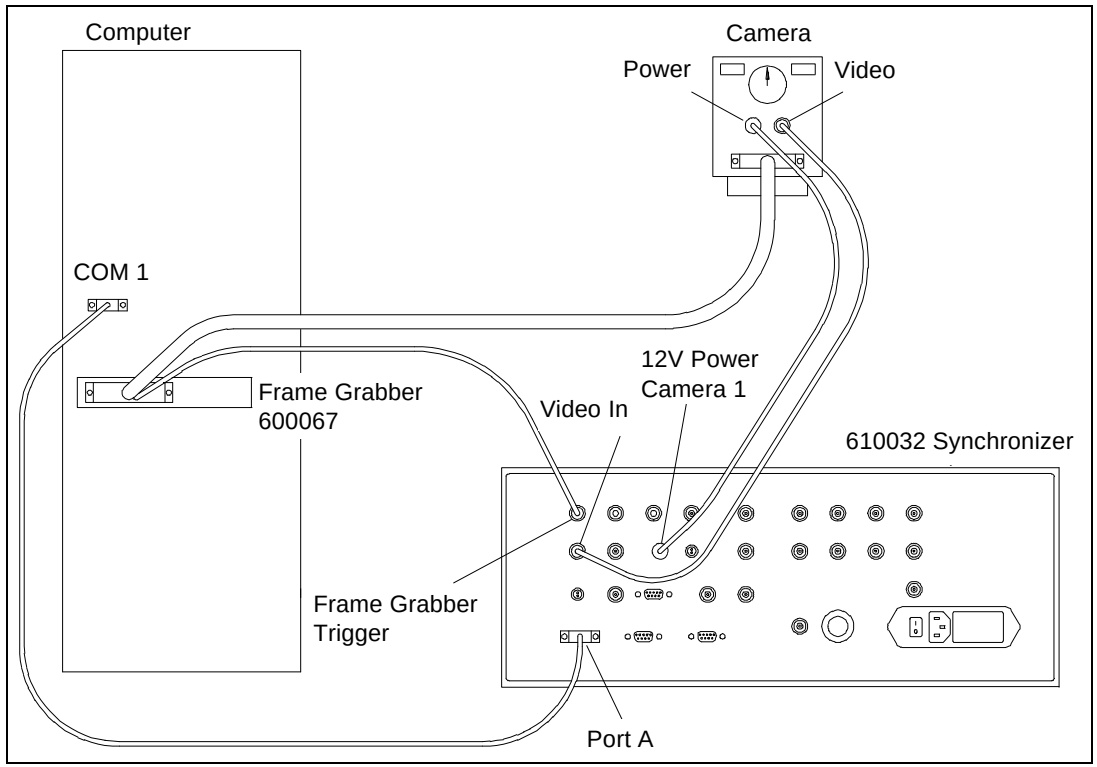

Figure 2
Connecting the PIVCAM Camera to the Model 600067 Frame Grabber and Model 610032 Synchronizer

Connect the	To the
44-pin D-connector	Frame Grabber connector on the back of the computer.
BNC connector	**Frame Grabber Trigger** at the back of the Synchronizer.

WARNING

Do *not* connect or disconnect the Frame Grabber and the camera with either the camera or the computer power on. This would damage the camera and the Frame Grabber.

Connecting the Camera to the Model 600064, 600065, or 600066 Frame Grabber and the Synchronizer

Follow these steps if you are using the Model 600064, 600065, or 600066 Frame Grabber Board.

1. Locate the mini cable with the 31-pin and the 37-pin connectors on each end. Locate the camera-to-Frame Grabber cable with a 62-pin D- and the 37-pin D-connectors on each end.

WARNING

Do *not* connect or disconnect the Frame Grabber and the camera with either the camera or the computer power on. This would damage the camera and the Frame Grabber.

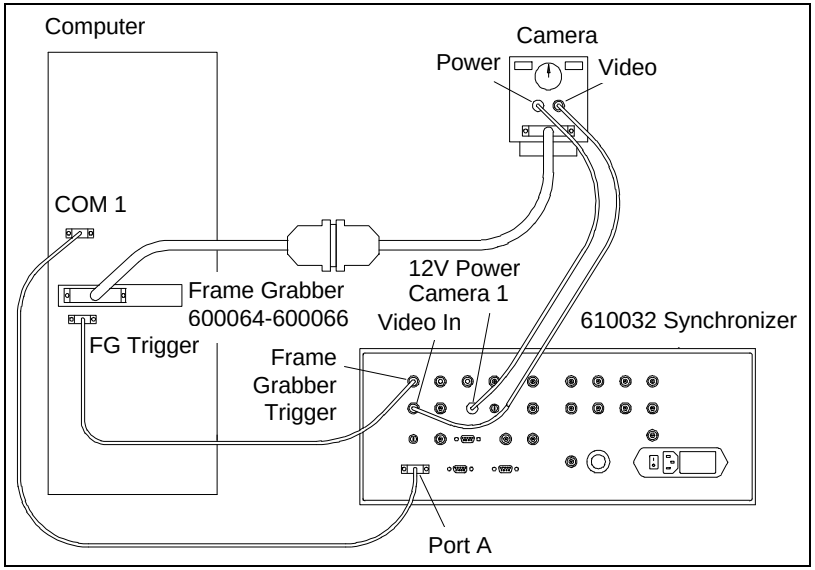

Figure 3
Connecting the Camera to the Model 600066 Frame Grabber and the Model 610032 Synchronizer

2. Connect the 31-pin D-connector on the mini cable to **Digital Out** on the back of the camera. Connect the 37-pin connector on the other end to the 37-pin D-connector on the camera-to-Frame Grabber cable.
3. Connect the 62-pin D-connector on the Frame Grabber cable to the Frame Grabber connector on the back of the computer.
4. Locate the cable with a 9-pin D-connector on one end and a BNC connector on the other end. Connect the 9-pin end to the auxiliary Frame Grabber connector on the back of

the computer. Connect the BNC end to **Frame Grabber Trigger** on the back of the Synchronizer.

Step 3: Connecting the Camera to the Synchronizer

1. Locate the camera power cable. Connect the 12-pin circular connector on this cable to **Power** on the back of the camera. Connect the 2-pin round connector end to **12 V, Power Camera 1** on the back of the Synchronizer.
2. Locate the 75-ohm coaxial cable. Connect one end of this cable to **Video** on the back of the camera. Connect the other end to **Video In** on the back of the Synchronizer.
3. Check the switches on the back of the camera and make sure that they are at the settings specified in either Table 4 or Table 5. Table 4 and Figure 3 refer to the Model 630044D camera settings and Table 5 and Figure 4 refer to the Model 630045 PIVCAM 10-15 camera settings.

Table 4
Model 630044D Camera Settings

NRM/ASY	**NRM**
INT/NON	**NON**
FUNCTION	**0**

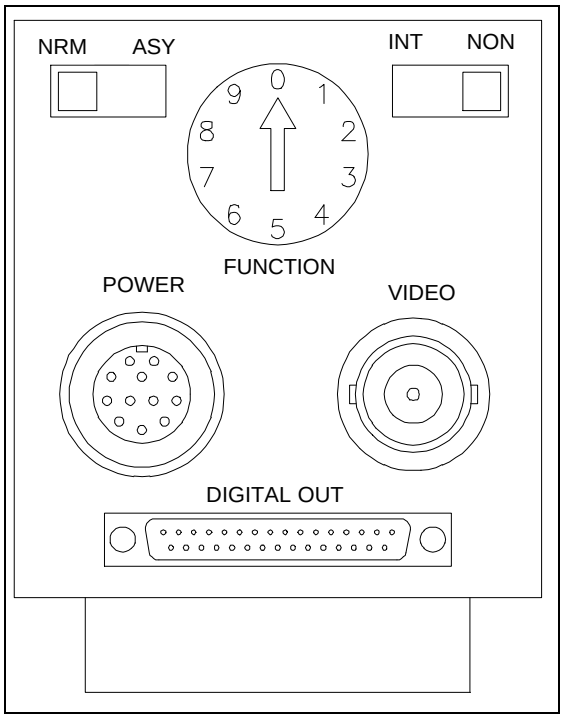

Figure 4
630044D PIVCAM 4-30 Back Panel Settings

Table 5
Model 630045 PIVCAM 10-15 Camera Settings

NRM/ASY	**NRM**
NSP/DSP	**NSP**
FUNCTION	**0**

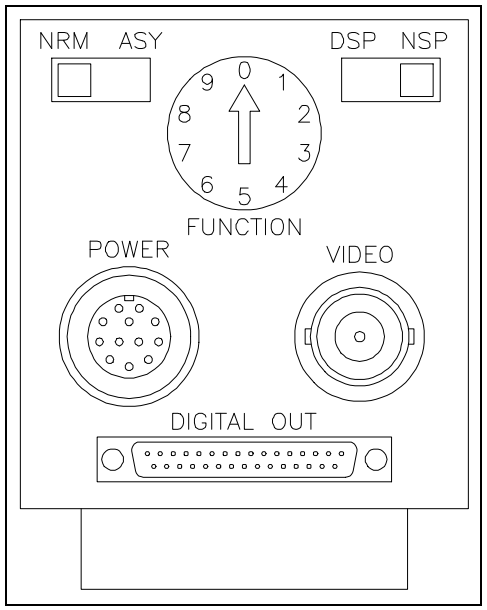

Figure 5
630045 PIVCAM 10-15 Back Panel Settings

Step 4: Checking the Camera Connections

Perform the following steps to verify that all the connections have been made properly:

Note: *During the checkout procedure, you may get camera time-out errors after changing a camera parameter. When this happens, clear the error message by clicking OK and continue with the check-out procedure.*

WARNING

Do *not* have the laser on during the camera installation. All of the checkout procedures are done using room light.

1. Turn on the Synchronizer and the computer and start the INSIGHT software.

   Note: *In the following instructions, LASERPULSE is referred to as a menu option, accessed directly from INSIGHT program's main menu bar. However, if you are running a previous version of INSIGHT, LASERPULSE may be running as a separate program on your computer and hence not accessible from INSIGHT. The LASERPULSE dialog box, however, is the same for both versions of INSIGHT.*

2. In the INSIGHT program, select **LaserPulse** from the menu bar and select **Components.** In the Components dialog box make the following selections:

   Note: *Do* not *press the **Run** button after making these selections.*

Option	Value
Camera Model	630044D PIVCAM 4-30 or 630045 PIVCAM 10-15.
Laser Model	Argon Beam Modulator ***Note**: Select Argon for checking out the camera even if you have a Nd:YAG laser.*
Image Shifter	None
Synchronizer	610032

3. Press **LaserPulse | Stop**. The first camera tests are done with no trigger signals from the Synchronizer.

4. Select **Acquire** from the main menu bar and then **Camera**. In the Camera Control dialog box make the following selections:

Option	Value
Camera Mode	Focus Mode
Trigger	Free Run

   Press **Camera Mode | Start**.

   Images should appear on the monitor. If not, check to make sure the lens cap and lens aperture are fully open, that you have something to focus on, and the room light is on.

   The macro zoom lens has three adjustment rings. The ring closest to the camera sets the lens aperture. Turn it until it is fully open. The middle ring sets the zoom. The ring at the end of the lens barrel adjusts the focus. The macro zoom lens can only focus on objects between 110-mm and 330-mm from the end of the lens.

   If no image appears, try putting a flashlamp close to the lens to make sure the camera is getting some light.

5. Focus the camera looking at the video image on the computer monitor.

6. Select **LaserPulse | Operating Mode** and in the dialog box make the following selections:

Option	Value
Pulse Mode	Argon Pulse Sequence
Timing Master	Video Camera
Image Shift	Off

7. Select **LaserPulse | Timing** and in the dialog box set Pulse Repetition Rate to 1 Hz.

8. Press the **LaserPulse | Run** button.

9. Select **Acquire | Camera** and in the dialog box make the following selections:

Option	Value
Trigger	Locked
Camera Mode	Single Frame

10. Press **Camera Mode | Start**. The camera should take one exposure. Press the **Start** button again to acquire another frame. By having some motion in the field of view you will be able to see if the image is updating each time the Start button is pressed.

11. In the **Camera Control** dialog box change the Camera Mode parameter to Focus Mode.

12. Press **Camera Mode | Start**. The camera should now be acquiring images at 1 Hz.

13. Press the **LaserPulse | Stop** button. After 15 seconds a time-out error message should appear. This verifies that the Frame Grabber trigger is working. Close the time-out error dialog box by clicking on **OK**.

14. Click on the **Camera Control | Free Run** button. A second time-out error box appears.
15. Click on **OK** to clear this box. The monitor displays like video.
16. Select **LaserPulse | Operation Mode** and in the dialog box make the following selections:

Option	Value
Pulse Mode	Argon Pulse Sequence
Timing Master	Video Camera
Image Shift	Off

17. Press **LaserPulse | Run**. The camera should now be acquiring live video images.
18. Select **Acquire | Camera Control** and make the following selections:

Option	Value
Trigger	Locked
Camera Mode	Focus Mode

19. Open the **LaserPulse | Log** dialog box.
20. Disconnect the camera power cable from **Camera 12V, Camera 1** port at the back of the Synchronizer. A time-out error message should appear in the Log window. This verifies that the Synchronizer was locked onto the camera video signal. Close the time-out error dialog box by clicking on **OK**.
21. Reconnect the camera power cable to the **Camera 12V, Camera 1** port on the back of the Synchronizer.
22. Press **LaserPulse | Run** and **Camera Control | Start**, if a camera time-out occurred. Live video images should now be displayed on the monitor.
23. Open the **LaserPulse | Timing** dialog box and set the **Pulse Repetition Rate** to the maximum setting. The image update rate on the monitor should increase.

Next Step

Once the image capture system is installed, the next step is to install the Image Shifter. Refer to *Image Shifter* for details.

However, if you are *not* using an Image Shifter in your PIV system and you have *not* ordered any other additional components, you are ready to use your PIV system.

If you have ordered additional components refer to *Options/Additional Components*.