

## Ladybug2 Kit Contents

The following items should be included with your *Ladybug2* kit:

- *Ladybug2 Head Unit* and *Ladybug2 Compressor Unit*
- 4.5 meter, 9-pin to 9-pin, IEEE-1394b cable
- 4.5 meter, 6-pin to 9-pin, 1394a-to-1394b cable
- 4.5 meter, 4-pin to 9-pin, 1394a-to-1394b cable
- IEEE-1394b OHCI PCI Host Adapter 3 port-800Mbps card
- 24V 2.5A power supply with standard connector and wall wart
- 10 meter, 62.5/125um fiber optic cable
- 10 meter, 3-pin power link cable
- Ladybug SDK (C/C++ API and device drivers) CD
- *Ladybug2* Getting Started Manual

## Your Ladybug2 Information

## Ladybug2 Specifications

Specification	Description	
Overview	360-degree spherical IEEE-1394b digital video camera system	
Imaging Sensor	Six (6) Sony <a href="#">ICX204AK</a> 1/3" 1024x768 progressive scan CCDs	
A/D Converter	Six (6) Analog Devices AD9849 12-bit analog-to-digital converters	
Data Output	Head Unit	30FPS raw, uncompressed 8bpp (Y8) Bayer-tiled data
	Compressor	See <i>Image Formats</i> section below
Interfaces	Head Unit	1.2Gbps optical link for data transfer to Compressor
	Compressor	1.2Gbps optical link for data transfer from Head 800Mbps IEEE-1394b link for data transfer to PC
Voltage Requirements	8-32V	
Power consumption	Head Unit	Less than 6.5W
	Compressor	Less than 4.7W
Gain	Automatic/Manual Gain modes	
	0 to 26dB	
Shutter	Automatic/Manual Shutter modes	
	0.06ms to 34ms at 30FPS	
Gamma	Range TBD	
Signal To Noise Ratio	TBD	
Dimensions	Head Unit	90mm x 90mm x 110mm
	Compressor	39mm x 43mm x 10mm
Mass	Head Unit	920g
	Compressor	270g
Camera Specification	IIDC 1394-based Digital Camera Specification v1.31	
Emissions Compliance	FCC and CE Class A device	
Operating Temperature	Commercial grade electronics rated from 0° - 45°C	
Storage Temperature	-30° - 60°C	
Camera Upgrades	Firmware upgradeable in field via IEEE-1394b interface.	

## System Requirements



### Minimum Requirements

- Windows XP Service Pack 1
- 512MB of RAM
- Intel Pentium 3 or compatible processor
- AGP video card with 64MB video memory and OpenGL support
- 32-bit standard PCI slot for the IEEE-1394b PCI card
- IEEE-1394a OHCI PCI host adapter card
- IDE hard drive to store streaming image data



### Recommended Configuration

- 1GB of RAM
- Intel Pentium 4 2.0+GHz or compatible processor
- NVIDIA GeForce4 video card with 128MB RAM
- 64-bit PCI or PCI-X slot for the IEEE-1394b PCI card
- Microsoft Visual C++ 6.0 (to compile and run example code)
- SCSI RAID array to store streaming image data

## General Features

- **High Quality Imaging:** Six (6) closely-packed Sony 1024x768 CCDs placed within 20mm of each other help reduce parallax effects common with most omnidirectional cameras. High quality 2.4mm microlenses enable the system to collect video from more than 75% of the full sphere.
- **High-Speed Data Rates:** The *Ladybug2 Head Unit* is capable of acquiring and streaming images to the *Ladybug2 Compressor Unit* at 30FPS. The *Compressor* can perform JPEG compression and stream data to the local hard drive at up to 80MB/sec via the IEEE-1394b interface.
- **Independent Imaging Control:** The camera employs six 12-bit A/D converters that allow the gain, brightness, and white balance settings for all six CCDs to be controlled individually or slaved off one sensor.
- **Onboard Calibration:** Accurate calibration parameters for lens distortions and camera misalignments stored on the Head Unit.
- **Image Processing:** The Ladybug SDK provides a full C/C++ API and demo software for decompressing, stitching and blending image data in real-time or as a post-processing step.
- **System Portability:** The *Ladybug2 Head Unit* can be powered directly via a wall wart or via a power link to the *Compressor*.
- **Upgradeable Firmware:** The camera employs a design that allows in-field firmware upgrades via the IEEE-1394b interface.

## Output Image Formats

The *Ladybug2 Head Unit* is capable of streaming raw, uncompressed Bayer Tiled images at 30fps over the fiber-optic interface to the *Ladybug2 Compressor*. The *Compressor* is able to stream images to the host's local hard drive in the following formats:

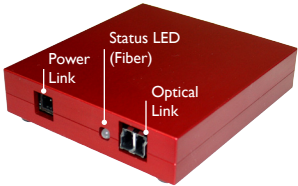
Compression	Data
None	Individual 1024x768 Y8 images (controlled by the PAN register)
None	One (1) 1024x4608 image (made up of 6 uncompressed images)
None	One (1) 512x9216 image (made up of 24 uncompressed images, representing 6 groups of R/G/G/B Bayer tiles)
JPEG	Six (6) JPEG compressed Bayer images
JPEG	One (1) 512x9216 image (made up of 24 JPEG compressed images, representing 6 groups of R/G/G/B Bayer tiles)

## Compressor Status LEDs

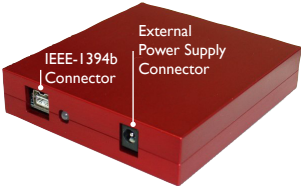
LED Status	Fiber LED	1394b LED
Off	No communication between <i>Head</i> and <i>Compressor</i> over optical connection	No power
Solid green	<i>Head</i> sending images; communication between <i>Head</i> and <i>Compressor</i>	Transmitting images over 1394b
Solid half-red	<i>Head</i> sending images, but no communication between <i>Head</i> and <i>Compressor</i>	Not transmitting images over 1394b
Flashing half-red and full-red pulses	<i>Head</i> not sending images, but communication between <i>Head</i> and <i>Compressor</i>	Accessing <i>Ladybug2</i> registers
Flashing green / red	Firmware update in progress	

## Physical Description

### Compressor (to Head)



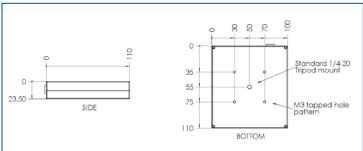
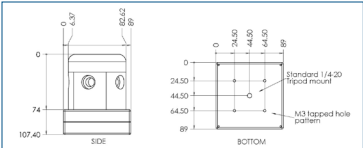
### Compressor (to PC)



### Head Unit



### Dimensional Drawings



# 1 Installation

## 1. Install the IEEE-1394b PCI Card



- Turn the computer off and unplug the power supply.
- Place the IEEE-1394b PCI card in an open PCI slot.
- Connect the 4-pin connector on the card to the PC power supply.
- Turn the computer back on and log into Windows.
- In most cases, the Windows IEEE-1394 drivers will be automatically installed for the card, with no user input required. However, in some cases the *Found New Hardware Wizard* will appear. Follow the prompts given by the Wizard to install the card.
- Open Windows Device Manager by going to the Control Panel > System > Hardware tab > Device Manager. Ensure that the PCI card is properly installed as an *IEEE 1394 Bus host controller*.

## 2. Install the Ladybug Software and Drivers

- Insert the Ladybug software CD-ROM. If the Installation Wizard does not automatically run, browse to your CD-ROM directory and run the *setup.exe* file.
- Follow the installation instructions to install the software.
- A dialog will appear asking if you want to downgrade your Windows XP drivers. If you have installed Service Pack 2, we encourage users to do this. See this Knowledge Base article for further information: <http://www.ptgrey.com/support/kb/index.asp?a=4&q=171>

# 2 Installation

## 3. Connect the Head to the Compressor

- Plug the orange fiber-optic cable that is provided with the KIT into the Optical Link connectors of the *Head* and *Compressor*. NOTE: avoid tight bends in the cable, which can affect data transmission.
- Plug the 10m 3-pin power link cable into the Power Link connectors of the *Head* and *Compressor*.



## 4. Connect the External Power Supply to the Compressor

- Plug the 24V 2.5A external power supply into the *Compressor* External Power Supply Connector. The Status LEDs on the 1394b bus side of the *Compressor* and the *Head* should both turn on (see "Status LEDs" section above).



# 3 Installation

## 5. Connect the 1394b PCI Card and Cable to the Compressor

- Plug the 4.5 meter, 9-pin to 9-pin, IEEE-1394b cable into the 1394b PCI card and the *Compressor* 1394b Connector.
- In most cases, the MS Windows "Found New Hardware Wizard" will appear and prompt you to install the driver. Proceed to Step 6.



## 6. Install the Ladybug Driver

- Click "Install from a list or specific location" and click "Next".
- Select "Don't search. I will choose the driver to install" and "Next".
- Click "Have Disk" and browse to C:\Program Files\Point Grey Research\PGR Ladybug\driver, click "Open", then "OK".
- Select the camera model (e.g. PGR Compressor) then click "Next".
- You will be prompted to continue installation - click "Continue Anyway" then "Finish" to complete installation. Check the Device Manager to confirm that installation was successful.

# 4 Installation

## 7. Test the Installation using LadybugCap

- From the *Start* menu, select *All Programs > Point Grey Research > PGR Ladybug > LadybugCap.exe*.
- The first time *LadybugCap* runs it will warn that a set of alpha masks must be generated then prompt you for the blending width (overlap in pixels between cameras). For simplicity, use the default blending width.
- The *LadybugCap* main window will open and will display the six individual camera images and the spherical and panoramic views.

# 5 Troubleshooting

The Ladybug User Guide (*Programs > Point Grey Research > PGR Ladybug > Documentation*) provides detailed installation information. Our on-line [Knowledge Base](http://www.ptgrey.com/support/kb/) (<http://www.ptgrey.com/support/kb/>) also addresses the following problems:

- Article 91: PGR camera not recognized by system and not listed in Device Manager
- Article 171: Performance of 1394 devices may decrease after installing Windows XP SP2
- Article 188: Image data acquired by my camera is corrupt and displayed images are broken
- Article 21: Troublesome hardware configurations

## Contacting Point Grey Research

- Email:** For all general questions about Point Grey Research please contact us at [info@ptgrey.com](mailto:info@ptgrey.com).
- For technical support (existing customers only) contact us at <http://www.ptgrey.com/support/contact/>.
- Main Office:** **Mailing Address:** Point Grey Research, Inc.  
1205 I Riverside Way  
Richmond B.C. Canada  
V6W 1K7
- Tel:** +1 (604) 242-9937  
**Toll Free** (N.America only):  
+1 (866) 765-0827  
**Fax:** +1 (604) 242-9938  
**Email:** [sales@ptgrey.com](mailto:sales@ptgrey.com)
- Knowledge Base:** Find answers to commonly asked questions in our knowledge base at <http://www.ptgrey.com/support/kb/>.
- Downloads:** Users can download the latest manuals and software from <http://www.ptgrey.com/support/downloads/>.



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Ladybug®2

1394b Spherical Vision System

Getting Started  
Manual