Modular Computers ®

CP337

Stereo Framegrabber Board
for CompactPCI Systems

Manual ID 19764, Rev. Index 0100
Mar 99

The product described in this manual is in compliance with all applied CE standards.

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Preface

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Revision History

Revision History			
Manual/Product Title:	**CP337**		
Manual ID Number: 19764			
Rev. Index	**Brief Description of Changes**	**Board Index**	**Date of Issue**
0100	Initial Issue	0100	Mar. 99

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Explanation of Symbols



CE Conformity

This symbol indicates that the item described in this manual is in compliance with all applied CE standards. See also the section “Applied standards” of this manual.



Caution!

This symbol and title warn you of hazards due to electrical shocks (> 60 V) when touching products or parts of them. The non-observance of the measures indicated and/or prescribed by the law may cause harm to your product and/or life/health.

See also the section “High Voltage Safety Instructions”.



ESD-Sensitive Device!

This symbol and title inform you that electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Please read also the section “Special Handling and Unpacking Instructions” of this manual.



Attention!

This symbol and title emphasize aspects which, if not read through carefully by the reader, might cause hazards to health and/or damages to material.



Note:

This symbol and title emphasize aspects the reader should read through carefully for his or her own advantage.



PEP Advantage

This symbol and title emphasize advantages or positive aspects of a product and/or procedure.



Troubleshooting

This symbol and title characterize a message containing useful information on troubleshooting and problem solving.

For your safety

Your new *PEP* product was developed and tested carefully to provide all features necessary to ensure the renown electrical safety requirements. It was also designed for a long fault-free life. However, the life expectancy of your product can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interests of your own safety and of the correct operation of your new *PEP* product, you are requested to conform with the following guidelines.

High Voltage Safety Instructions



Warning!

All operations on this device must be carried out by sufficiently skilled personnel only.



Caution!

However, serious electrical shock hazards exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable to avoid exposure to hazardous voltage.
Before installing your new *PEP* product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks.

Special Handling and Unpacking Instructions



ESD Sensitive Device!

Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

- Do not handle this product out of its protective enclosure while it is not used for operational purposes, unless it is otherwise protected.
- Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where safe work stations are not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.
- It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory back-up, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or tracks on the board.

General Instructions on Usage

- In order to maintain *PEP's* product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by *PEP Modular Computers* and described in this manual or received from *PEP* Technical Support as a special handling instruction, will void your warranty.
- This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.
- In performing all necessary installation and application operations, please, follow only the instructions supplied by the present manual.
- Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board please re-pack it as nearly as possible in the manner in which it was delivered.
- Special care is necessary when handling or unpacking the product. Please, consult the special handling and unpacking instruction on the previous page of this manual.

Two Years Warranty

PEP Modular Computers grants the original purchaser of *PEP* products a ***TWO YEARS LIMITED HARDWARE WARRANTY*** as described in the following. However, no other warranties that may be granted or implied by anyone on behalf of *PEP* are valid unless the consumer has the express written consent of *PEP Modular Computers*.

PEP Modular Computers warrants their own products, excluding software, to be free from manufacturing and material defects for a period of 24 consecutive months from the date of purchase. This warranty is not transferable nor extendible to cover any other users or long-term storage of the product. It does not cover products which have been modified, altered or repaired by any other party than *PEP Modular Computers* or their authorized agents. Furthermore, any product which has been, or is suspected of being damaged as a result of negligence, improper use, incorrect handling, servicing or maintenance, or which has been damaged as a result of excessive current/voltage or temperature, or which has had its serial number(s), any other markings or parts thereof altered, defaced or removed will also be excluded from this warranty.

If the customer's eligibility for warranty has not been voided, in the event of any claim, he may return the product at the earliest possible convenience to the original place of purchase, together with a copy of the original document of purchase, a full description of the application the product is used on and a description of the defect. Pack the product in such a way as to ensure safe transportation (see our safety instructions).

PEP provides for repair or replacement of any part, assembly or sub-assembly at their own discretion, or to refund the original cost of purchase, if appropriate. In the event of repair, refunding or replacement of any part, the ownership of the removed or replaced parts reverts to *PEP Modular Computers*, and the remaining part of the original guarantee, or any new guarantee to cover the repaired or replaced items, will be transferred to cover the new or repaired items. Any extensions to the original guarantee are considered gestures of goodwill, and will be defined in the "Repair Report" issued by *PEP* with the repaired or replaced item.

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Chapter 1

Introduction

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1. Introduction

1.1 System Overview

The *PEP Modular Computers* CompactPCI systems described in this chapter operate with the PCI bus architecture to support additional I/O and memory-mapped devices as required by various industrial applications. In the following you will find the most important information on all system relevant CompactPCI features. For more detailed information concerning the CompactPCI standard, please consult the complete Peripheral Component Interconnect (PCI) and CompactPCI Specifications. For further information regarding these standards and their use, visit the homepage of the *PCI Industrial Computer Manufacturers Group (PICMG)*.

1.1.1 Note on CompactPCI

CompactPCI is an extension of the PCI specification. It has been optimized for industrial and embedded applications that require a more robust mechanical form factor as compared to Desktop PCI. CompactPCI systems use industry standard mechanical components and high performance connector technologies to provide systems that are well suited for rugged applications. CompactPCI stands for systems that are electrically compatible with the PCI Specification, allowing low cost PCI components to be used. CompactPCI is an open specification supported by PICMG.

1.1.2 Main Features of CompactPCI Systems

Some of the outstanding features of the CompactPCI systems compliant with Specification 2.0, Release 2.1 are:

- PCI signalling
- 32 and 64 bit data transfer at 33 MHz
- up to 16 PCI slots per backplane
- industry standard software support
- 3U small form factor (100 mm by 160 mm)
- 6U form factor (233 mm by 160 mm)
- Eurocard packaging
- wide variety of available I/O functions
- industry support from over 350 members.
- possibility of PMC modules on some boards



PEP Advantage

PEP Modular Computers' CompactPCI systems are designed as open systems, able to be expanded at any time, so that their backplanes can be equipped with precisely the CPCI boards that correspond to a customer's specific needs. However, in order to supply you with an appropriate choice of workstations, the *PEP* basic equipment is divided into pre-configured sets and custom solutions.

1.2 System Components

PEP Modular Computers have devised their CompactPCI systems as a comprehensive open solution for industrial environments, offering different workstation configurations which are capable of including all the components necessary to fulfill the requirements of virtually all existing system functionalities.

CompactPCI Backplane(s)

- 4-slot backplane;
- 6-slot backplane;
- 8-slot backplane;
- 16-slot backplane.

CPU Function

PEP Modular Computers provides CPU boards corresponding in size and characteristics to the special features of the *PEP* systems.

Display Related Functions

Display related functions such as frame grabbing are supported by dedicated boards.

Communication

Communication boards are provided for the currently relevant industrial communication systems such as Fast Ethernet.

Fieldbus Control

Fieldbus control boards provide data exchange with field control and automation subsystems like *PEP Modular Computers'* SMART2 or VMEbus systems using up-to-date transmission standards for example:

- CAN fieldbus control
- PROFIBUS control

Industrial I/O Functions

PEP's CompactPCI systems support an ever increasing number of industrial I/O functionalities in the fields of:

- Digital I/O
- Analog I/O

Self-Testing

A special *PEP* self-testing board provides a trouble-spotting capability within your *PEP* system.

System Hardware

The *PEP* CompactPCI system hardware includes housings, storage devices, power supply units, network adapters etc. The most important system hardware elements with which to configure your CompactPCI system are as follows:

Multiprocessor

In a CompactPCI multiprocessor system, a system controller communicates with other CPU's through a non-transparent PCI / PCI bridge. *PEP Modular Computers'* Compact-PCI system controllers, CP600/CP610, which are designed to work together with PEP CPU's, CP611/CP612, provide full multiprocessor solutions.

Housings

- Board cages for 19-inch cabinets or wall mounting
- PCI tower
- PCI desktop housing

Mass Storage Devices

- Hard-disk drive
- Floppy-disk drive
- CD-ROM drive

Power Supply Units

- 6U "M", 270 W, 120/230 V AC, 3.3V/30A, 5.1V/20A, 12V/4A, -12V/2A
- 3U "M", 180 W, 120/230 V AC, 3.3V/14A, 5.1V/20A, 12V/2A, -12V/1A
- "ATX", 235 W, 120/230 VAC, 3.3V/14A, 5V/22A, 12V/8A,-12V/1A, -5V/0.5A, 5VSB/0.1A

Form Factors

PEP Modular Computers CompactPCI boards are available in different form factors, mainly as 3U (single-height) and 6U (double-height) boards and as 4HP (single-width), 8HP (double-width), and 12HP (triple-width) boards.

Please note that the following units of measurement are used to express the dimensions of *PEP* CompactPCI card slots:

- Height: 1 U = 44.45 mm
- Width: 1 HP = 5.08 mm

On certain boards/carriers with PMC connectors, PMC add-on modules can also be installed. Please note that the form factor of *PEP Modular Computers* PMC modules is:

- 149mm x 74mm (single-size standard).

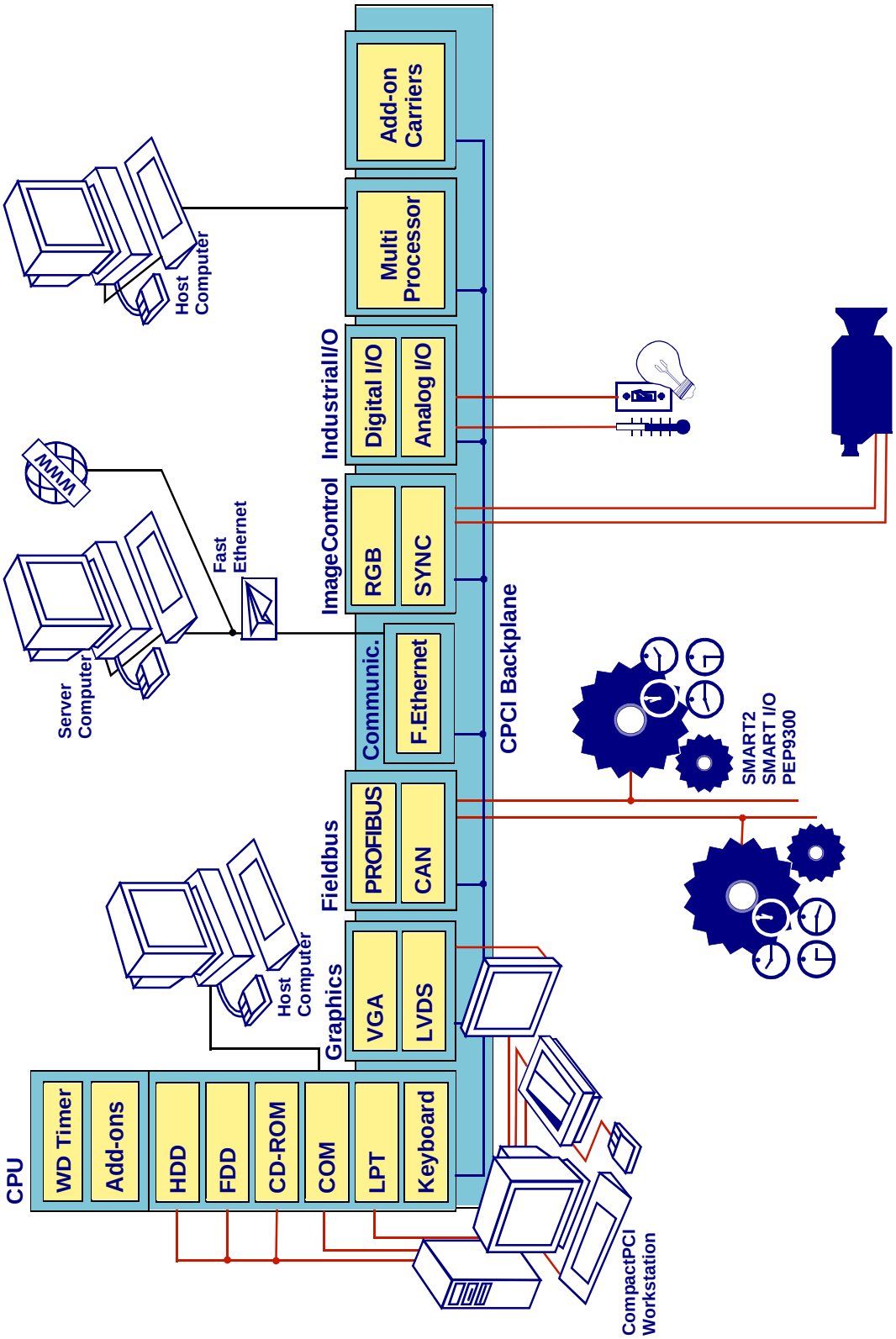
For a detailed description of the *PEP Modular Computers* CompactPCI modules please consult the specific component's manuals or data sheets.



PEP Advantage

As the *PEP Modular Computers* CompactPCI system provides comprehensive open solutions, new features and functionalities may be added to our range. To keep abreast of the latest developments, please contact your local *PEP Sales Office* or visit the ***PEP Web Site***.

Figure 1-1: Example of a *PEP Modular Computers* CompactPCI System



1.3 The PEP Framegrabber Family

The CP336 and CP337 differ in a number of features while an identical software environment is maintained. The CP336 is a framegrabber for color video cameras whereas the CP337 is a board for use with monochrome cameras, but features two independent digitizer channels.

1.3.1 Board Introduction

The CP336 and CP337 are CompactPCI boards specifically designed for use in highly integrated platforms with solid mechanical interfacing for a wide range of industrial environment applications.

Some of the outstanding features common to both the CP336 and the CP337 are listed below:

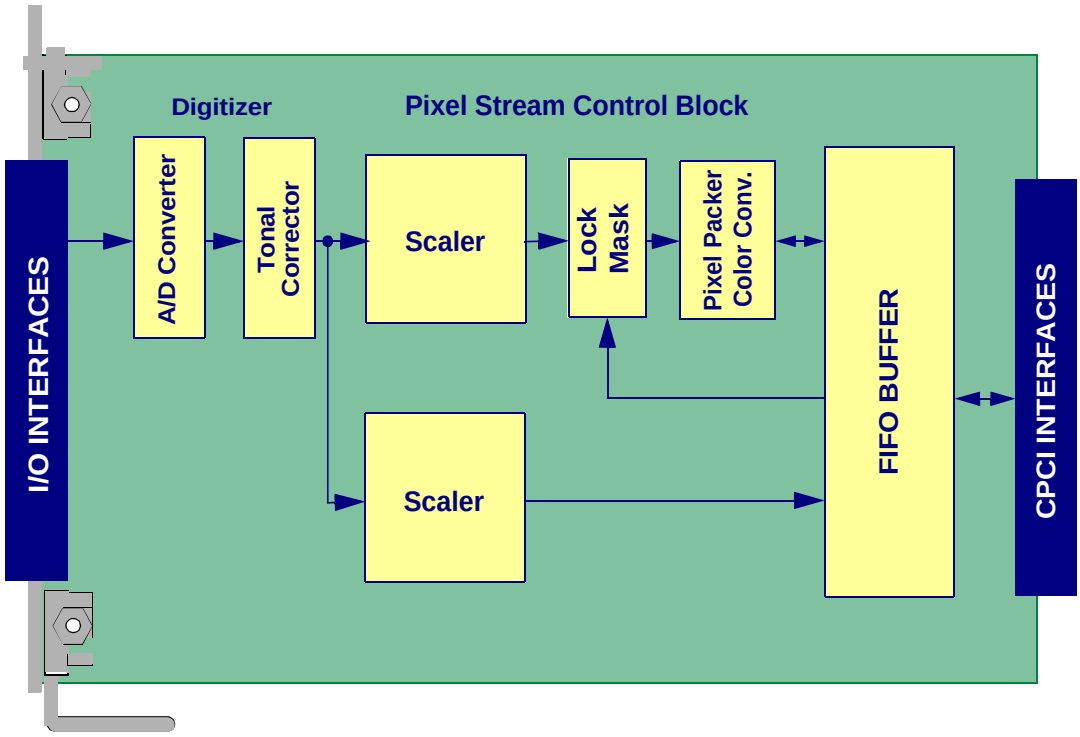
- Compliance with CompactPCI Interface 2.1
- Connectivity: up to 4 video sources
- Real-time image transfer directly to the host or video memory via PCI bus using two independent DMA channels
- Bus master data transfer rates of up to 132 MB/sec
- Programmable hardware state machine for realtime image sequence acquisition
- Vertically and horizontally interpolating scaler for real time image reduction
- Horizontal and vertical image mirroring in real time
- CE compliance.

1.3.2 CP337-Specific Features

- High quality frame grabber for monochrome video sources
- 2 digitizer channels for image acquisition from monochrome RS170, CCIR video signals
- 5 different synchronisation modes and asynchronous mode possible
- Trigger input/output, opto-electronically separated, allows asynchronous image acquisition
- Programmable hardware state machine for realtime image sequence acquisition
- 8-bit image acquisition at sampling rates of up to a maximum of 16 MHz

1.4 Board Overview

Figure 1-2: CP337 Functional Block Diagram



1.5 Main Features

1.5.1 Board Interfaces

The CP337 is equipped with five video input connectors: VID0, VID1, VID2, VID3, and the CUSTOM connector.

1.5.1.1 VID0, VID1, VID2, and VID3 Connectors

The VID0, 1, 2, and 3 connectors are 12-pin HIROSE female connectors for input of the video signals from one source.

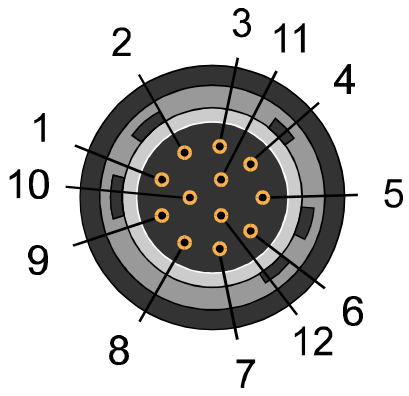
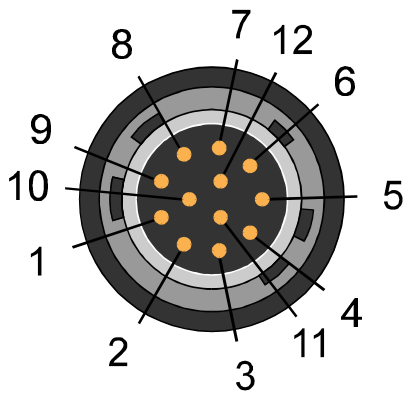


Figure 1-3: HIROSE Female Video Connector (highly enlarged front view)

1.5.1.2 CUSTOM Connector

The CUSTOM connector is a 12-pin HIROSE male connector used as a Universal Camera Connector (UCC) which allows for the input of video signals from two sources..

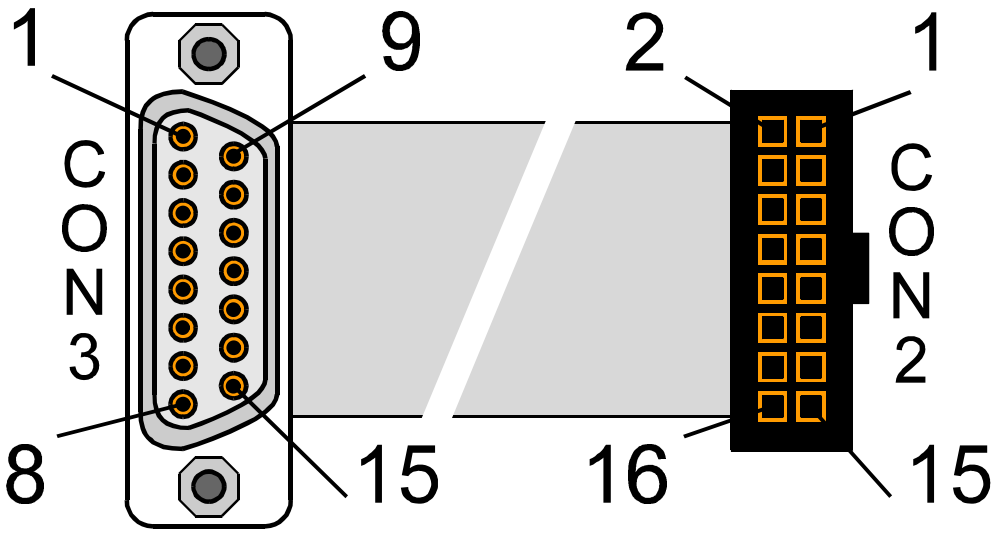
Figure 1-4: HIROSE Male Video Connector (highly enlarged front view)



1.5.1.3 Trigger I/O Adapter

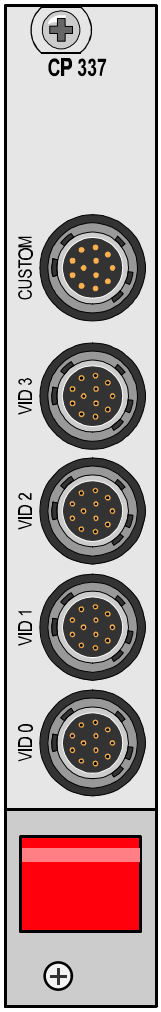
The Trigger I/O Adapter is a special cable arrangement which allows for connection to external triggering devices via a 15-pin DSUB connector mounted on a separate front panel.

Figure 1-5: Trigger I/O Adapter



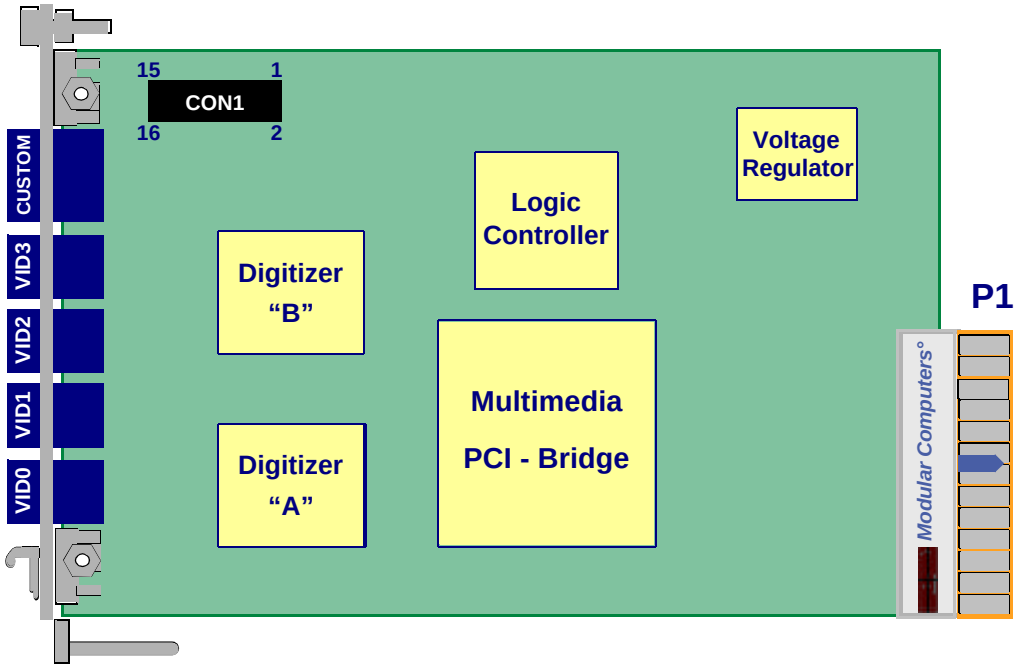
1.5.2 Front Panel

Figure 1-6: CP337 Front Panel



1.5.3 Board Layout

Figure 1-7: CP337 Board Layout



1.6 Main Specifications

Table 1-1: CP337 Main Specifications

CP337	Specifications
Compact PCI Bus Interface	32-bit bus master interface, Rev. 2.1 compatible
Dimensions	100 mm x 160 mm (3U card size)
Power Consumption	350 mA (typical) at +5 V
Temperature Ranges	0° C to + 60° C (standard) -55° C to + 85° C (storage)
Operation Humidity	0% to 90% (non-condensing)
Supporting Software	Windows NT® application libraries (32-bit DLL), twain driver, camera editor (The above mentioned software is available for the CP337, but must be ordered separately)

1.7 Applied Standards

1.7.1 CE Compliance

The *PEP Modular Computers'* CompactPCI systems comply with the requirements of the following CE-relevant standards:

- Emission EN50081-1
- Immission EN50082-2
- Electrical Safety EN60950

1.7.2 Mechanical Compliance

- Mechanical Dimensions IEEE 1101.10

1.7.3 Environmental Tests

- Vibration/Broad-Band IEC68-2-6
  Random Vibration IEC68-2-64 (3U boards)
- Permanent Shock IEC68-2-29
- Single Shock IEC68-2-27

1.8 Related Publications

1.8.1 CompactPCI Systems/Boards

CompactPCI Specification, V. 2.0, Rev. 2.1

1.8.2 PMC Add-On Modules/Carriers

- Draft Standard for a Common Mezzanine Card Family, P1386/Draft 2.0
- Draft Standard Physical and Environment Layers for PCI Mezzanine Cards, P1386.1/Draft 2.0

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Chapter 2

Functional Description

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2. Functional Description

The CP337 framegrabber is provided with synchronization outputs and with a special optocoupler interface.

2.1 Synchronization Outputs

Hsync and Vsync outputs are available on pin 6 and 7 of the 12 pin Custom connector. The signals are TTL level. The synchronisation pulses are the buffered ADC sync outputs and may be disabled when disabling the ADC. The pinout of this connector is described in detail in the “Configuration” chapter of this manual.

2.2 Optocoupler Interface

For synchronisation of events like start/stop, trigger, good/bad, input/output etc. the CP337 offers 1 digital input and output which can be controlled by software. For use in industrial environments, the signals are isolated by the use of optocouplers. To take full advantage of this signal isolation, the optocoupler must be connected to an external power supply. As you see in the following drawings, the optocoupler input is prepared for input signals of 5Volt or 24Volt with the appropriate onboard serial resistors.

For other signal levels an additional serial resistor must be added to guarantee the proper forward current.

The optocoupler output is prepared for external voltage of 5Volt or 24Volt.

This interface is realized through the use of a special 16-to-15 pin adapter for the connection of external trigger devices such as photocells, micro swithches, etc. The pinouts of this adapter are described in detail in the “Configuration” chapter of this manual.

Table 2-1: Optocoupler Forward Currents

Current	Min.	Max.
Input forward current I_F	4 mA	20 mA
Output forward current I_F		20 mA

Figure 2-1: Input Circuit

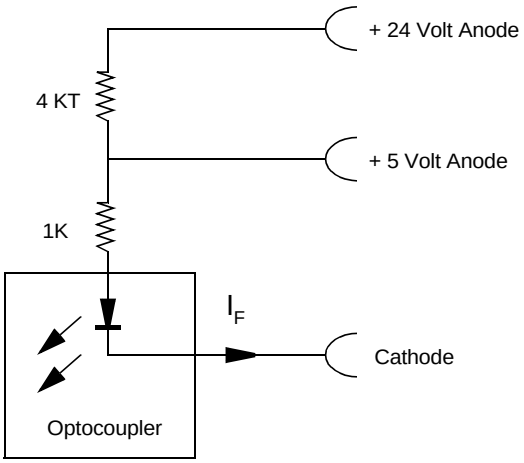
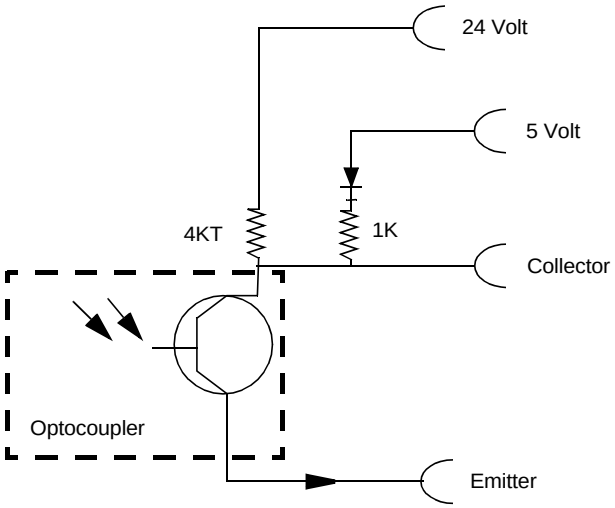


Figure 2-2: Output Circuit



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3. Configuration

3.1 Jumper Settings

The CP337 complies fully with the Plug and Play philosophy. Since it uses a Windows NT driver it does not need any jumpers and, therefore, does not require configuration.

Note:

Useful hints on driver installation and configuration of the CP337 board via software are provided in the “Software” chapter.

3.2 Pinout

3.2.1 Video Input Connectors (VID0, 1, 2, and 3)

The video input connectors (VID0 ... 3) are 12-pin, HIROSE female connectors which allow for the simultaneous input of up to four separate video signals, one per connector.

Attention !

The VID0 and VID1 video inputs are wired parallel to pins 3 and 4 respectively of the CUSTOM connector. Do not use these input connections simultaneously!

The following table illustrates the pinout of the VID0...3 connectors.

Table 3-1: HIROSE Female Connector Pinouts

Pin	I/O	Signal
1	-	GND
2	OUT	+12V DC, 700 mA (cumulative value for VID0 ... 3), protected
3	-	Video input GND
4	IN	Video input Signal
5	-	HSYNC, GND
6	OUT	HSYNC, signal
7	OUT	VSYNC, signal
8	-	Pixel clock input/output, GND
9	IN/OUT	Pixel clock input/output, signal
10	-	GND
11	OUT	+12V DC
12	-	VSYNC, GND

3.2.2 Custom Connector

The Custom video input connector also known as a Universal Camera Connector (UCC) is a 12-pin, HIROSE male connector for the input of video signals from two sources.

Attention !

The VID0 and VID1 video inputs are wired parallel to pins 3 and 4 respectively of the CUSTOM connector. Do not use these input connections simultaneously!

The following table illustrates the pinout of the Custom connector.

Table 3-2: HIROSE Male Connector Pinouts

Pin	Signal
1	GND
2	+12VDC, 700 mA, protected
3	Video 0 input, signal; shared with VID0
4	Video 1 input signal; shared with VID1
5	C/Hsync input, TTL
6	C/Hsync output, TTL
7	Vsync output, TTL
8	Pixel clock output (neg), RS422
9	Pixel clock output (pos), RS422
10	Pixel clock input, TTL
11	reserved
12	Vsync input, TTL

3.2.3 Trigger I/O Adapter

The Trigger I/O Adapter is a special cable arrangement consisting of a 16-wire, flat ribbon cable with a 16-pin, double-row connector (CON2) attached to one end, and a 15-pin DSUB connector (CON3) mounted on a separate front panel attached to the other end. The double-row connector (CON2) is connected to CON1 on the board. The DSUB connector (CON3) allows for connection to external triggering devices.

See also chapter "Optocoupler Interface"

Table 3-3: Trigger I/O Adapter Pinouts

CON2	CON3	SIGNAL
1	1	TAP 5V, external power supply
2	9	TAP 24V, external power supply
3	2	Optocoupler Input A0 + 5V Anode
4	10	Optocoupler Output Collecor
5	3	Optocoupler Input A1 + 24V Anode
6	11	Optocoupler Output Emitter
7	4	Optocoupler Input K Cathode (signal ground)
8	12	Reserved, do not connect
9	5	Reserved, do not connect
10	13	+ 5V power (for test purposes only)
11	6	Reserved, do not connect
12	14	Common ground (+5/12V)
13	7	Reserved, do not connect
14	15	Reserved, do not connect
15	8	+ 12V power (for test purposes only)
16	NC	Reserved, do not connect

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Chapter 4

Installation

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4.2.3 AC Power Connection ..... 4 - 4

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4. Installation

As a sophisticated electronic device, your CP337 must be set up and used correctly to maintain safe and proper functioning. Please follow the instructions in this chapter fully to ensure successful installation and long lasting, trouble-free operation.

4.1 Board Placement

In deciding on a location for the unit which will house your CP337 and of the Compact-PCI slot the board will be placed in, certain environmental factors must be considered.

Thus, your CP337 must not be exposed to direct sunlight, strong magnetic fields, extremely dusty or humid air, extreme heat or cold, or temperature shocks. For detailed guidance on these operating conditions, please consult table 1-1 of this manual.

4.2 Board Installation



Caution!

If your board type is not specifically qualified as hot-swap capable, please switch off the CompactPCI system before installing the board in a free CompactPCI slot. Failure to do so could endanger your life/health and may damage your board or system.



Note:

Certain CompactPCI boards require bus master and/or rear I/O capability. If you are in doubt whether such features are required for the board you intend to install, please check your specific board and/or system documentation to make sure your system is provided with an appropriate free slot to insert the board.



ESD Equipment!

Your CompactPCI board contains electrostatically sensitive devices. Please observe the necessary precautions to avoid damage to your board:

- Discharge your clothing before touching the assembly. Tools must be discharged before use.
- Do not touch components, connector-pins or traces.
- If working at an anti-static workbench with professional discharging equipment, please do not omit to use it.

The CP337 is fully compatible with the Plug and Play philosophy. As it uses standard Windows NT drivers it does not need any jumper setting and, therefore, does not require any hardware configuration.

4.2.1 Camera Connection

To connect the CP337 Framegrabber to a video source use an appropriate cable and insert it into one of the board's sockets as required. Then run the configuration software and install the necessary drivers.

4.2.2 Trigger I/O Adapter Installation

Connect the flat cable of external trigger I/O adapter to the on-board flat cable connector "CON1". Then install the additional front panel with the 15-pin, female DSUB connector in a free slot of the CompactPCI chassis.

4.2.3 AC Power Connection



Attention !

Before reconnecting the system to AC power, replace the dummy front panels. Failure to do so could endanger your life and may damage the board and/or computer.

Chapter 5

Software

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5. Software

The sofware development package is a 32-bit version for use with Windows NT 4.x. The package contains:

- **DAISY** - the software development tools,
- **Direct Capture** – application library.



Note:

The menu items in the programs of the software package do not refer to the relating board names, CP336 and CP337, but bear the original name of the PicPort framegrabber family plus the main feature of the two boards, i.e. ”color” and ”stereo”.

Please refer to the following table for the framegrabber names cross :references:

Table 5-1:

Software Denominator	PEP Framegrabber
PicPort Color	CP336
PicPort Stereo	CP337

5.1 DAISY

The Daisy Software package contains the following parts:

Daisy Library

Daisy library, which is used as a programming interface in C++ for all PEP CompactPCI framegrabbers. The library includes DLLs, import libraries, header files, source files of sample programs, and complete documentation in form of Windows Help file and Word 97 file.

Camera Editor

Camera editor, which enables also non-standard cameras to be connected to the framegrabber.

TWAIN Interface

TWAIN interface that is installed automatically with the Daisy installation. TWAIN can be used to acquire images directly to many third party software products, namely image editors (PhotoImpact, ImagePals, Corel PhotoPaint etc.). Also MS-Office 97 already supports TWAIN for acquiring images to its documents.

DirectCapture

DirectCapture is a language independent software library for the control of PEP image processing boards. DirectCapture is a marriage of the hardware related DAISY software library and Microsoft's Direct Draw with the goal of simplifying the development of user applications.

DirectCapture uses a window paradigm to facilitate the control of the image processing boards. The library allows the creation of On Screen Window and Off Screen Window objects. The On Screen Window objects enable the display of live video on the desktop from the image processing boards with scaling, clipping, mirroring, and overlaid text and graphics. The Off Screen Window objects provide many of these features while directing the video stream directly to system memory instead of the windows desktop.

The software includes a C library (32-bit DLL) for Windows NT® and Windows®95, sample code for Microsoft Visual C, Visual Basic, Borland C and Delphi.

A manual is included as Windows Help file and printable Microsoft Word 97 file.

5.2 Preparing your System

Before you start using the Daisy support for the framegrabber, you have to check the settings of your display adapter.

5.2.1 Resolution

We recommend a resolution of 800x600 or higher. It is possible to work with a resolution of 640x480 only, but you have to scale down the live camera image which will decrease the image quality.

5.2.2 VGA Color Resolution

Daisy will not work with 4 bits per pixel (bpp), i.e.16 colors. At least 8 bpp (i.e. 256 colors) is required. Select the appropriate recommended setting from the following table.

Table 5-2: Recommended Settings for Color Resolution

4 BPP or 16 Colors	8 BPP or 256 Colors	15 BPP or 32k Colors	16 BPP or 64k Colors	24/32 BPP or True Color
No	Recom-mended	OK	OK	OK

Legend:

The “OK” in the table indicates that the framegrabber is capable to work in this format properly, but this format may not be suitable for further real-time processing, as time-consuming format conversion would have to be made. For example, if you have a monochrome camera and 32k colors set on your display adapter, the framegrabber will work properly and you will be able to access the image in memory as a bitmap in RGB

format with 5 bits for each color. However this format may not be suitable for further image processing, which usually requires 8-bit greyscale representation of the image.

5.2.3 Color Setting

To setup the color resolution of your display under Windows NT, run `Start -> Settings -> Control panel`, click on the `Display` icon and select the `Settings` card on the `Display Properties` dialog box. If you do not have installed support for your display adapter yet, press the `Change Display Type...` button. After the display adapter is installed, select the appropriate setting for `Color Palette` (i.e. color resolution) and `Desktop Area` (i.e. screen resolution) according to Table 5-2.

Figure 5-1: Control Pane

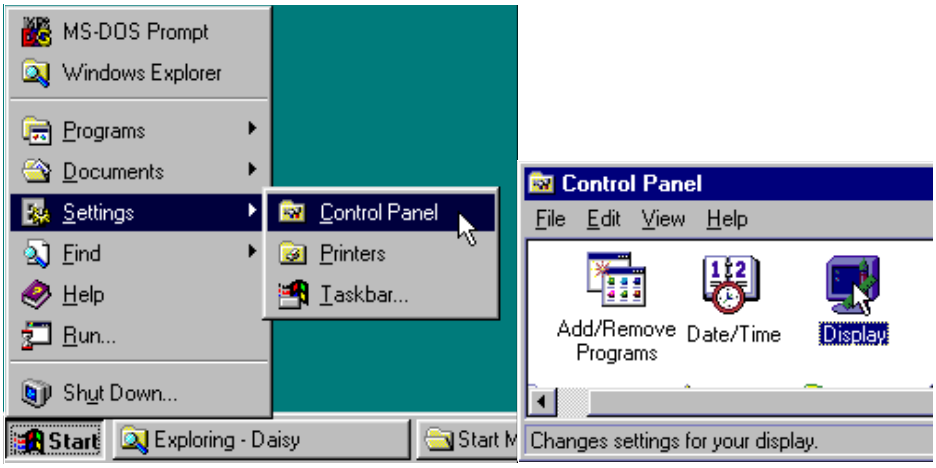
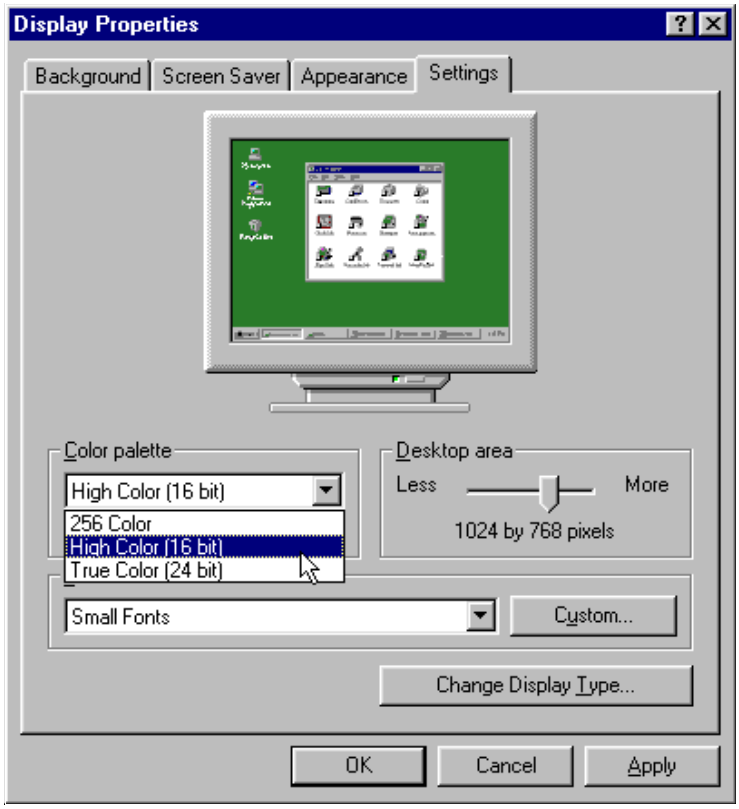


Figure 5-2: Display Properties Settings

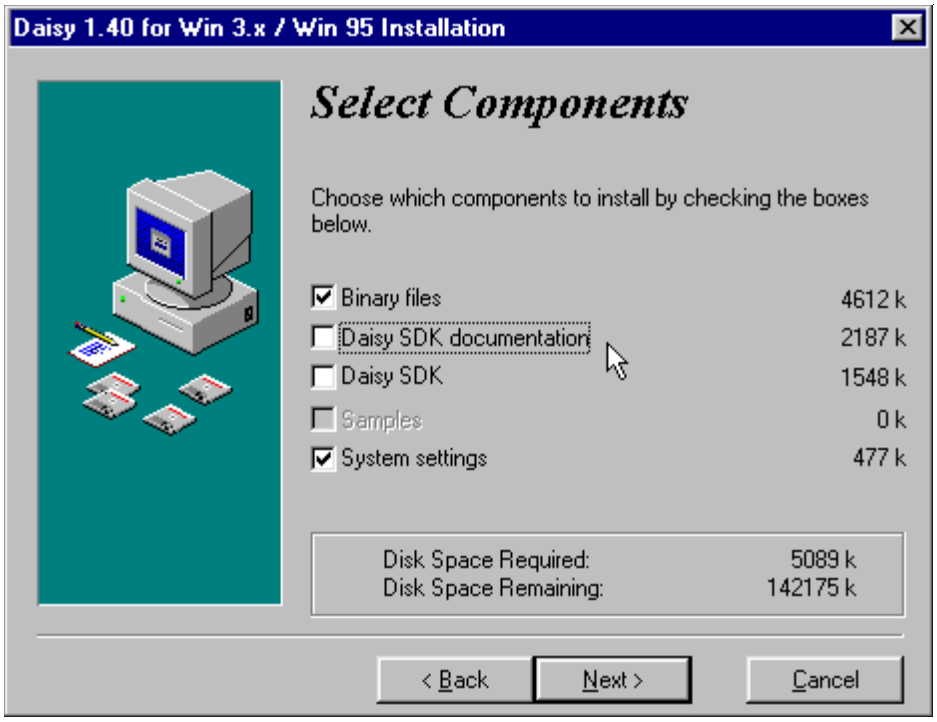


5.3 Installing DAISY

Before installing Daisy it is recommended to mount your framegrabber hardware to the computer. The installation program verifies the firmware version on the boards and may update it to a newer version.

Installation is very simple: start the executable file that is on the installation CD-ROM. This file is the Setup program that installs Daisy on your computer, including the TWAIN driver.

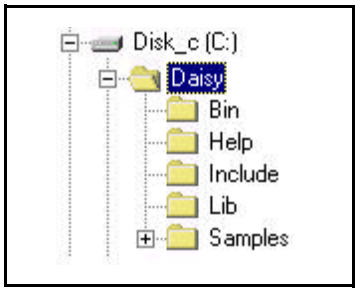
Figure 5-3: Selecting Daisy Components



The setup program asks about the destination folder and for installation options. Please recall that if you want to use TWAIN only, the `Daisy SDK...` check boxes can be unchecked.

In Windows NT 4.0 the setup program adds a new Daisy menu to the `Start -> Programs` menu. You will find the `Camera Editor` application there, Help file describing Daisy functionality, as well as several compiled sample programs.

Figure 5-4: Daisy Installation Directories



Under the destination folder the Daisy Setup program creates the

- `Bin` folder, containing DLLs, executables (Camera Editor, sample programs) and various data files belonging to Daisy (camera definition files, real time application libraries etc.).
- `Help` folder, containing documentation to Daisy SDK in form of Windows Help file and Word for Windows file.

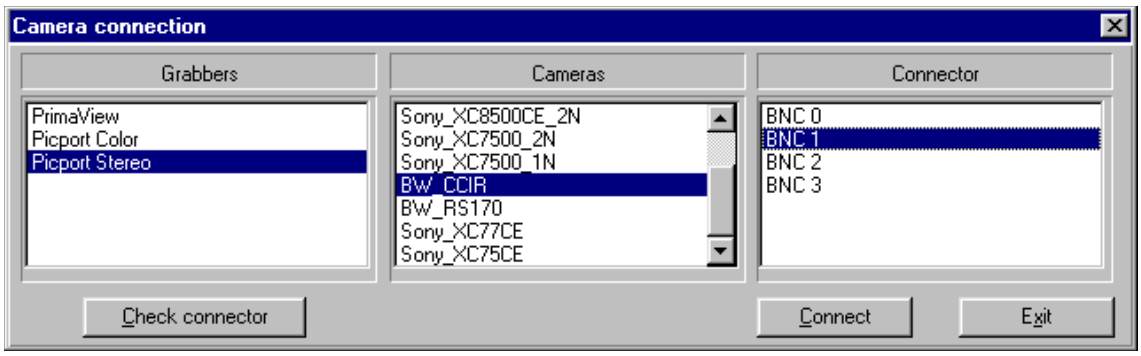
- `Include` folder, containing C++ header files for Daisy SDK.
- `Lib` folder, containing import libraries for Daisy DLLs in versions for Borland C++ and Microsoft Visual C++.
- `Samples` folder, containing the source code of various samples of the SDK usage.
- In the Windows folder the `Twain` or `Twain_32` folder is created (if it did not exist), the `Daisy` folder is created in it, and appropriate files for TWAIN support are placed there.

VxD driver for *PEP Modular Computers* framegrabbers is also installed to Windows.

Testing the installation

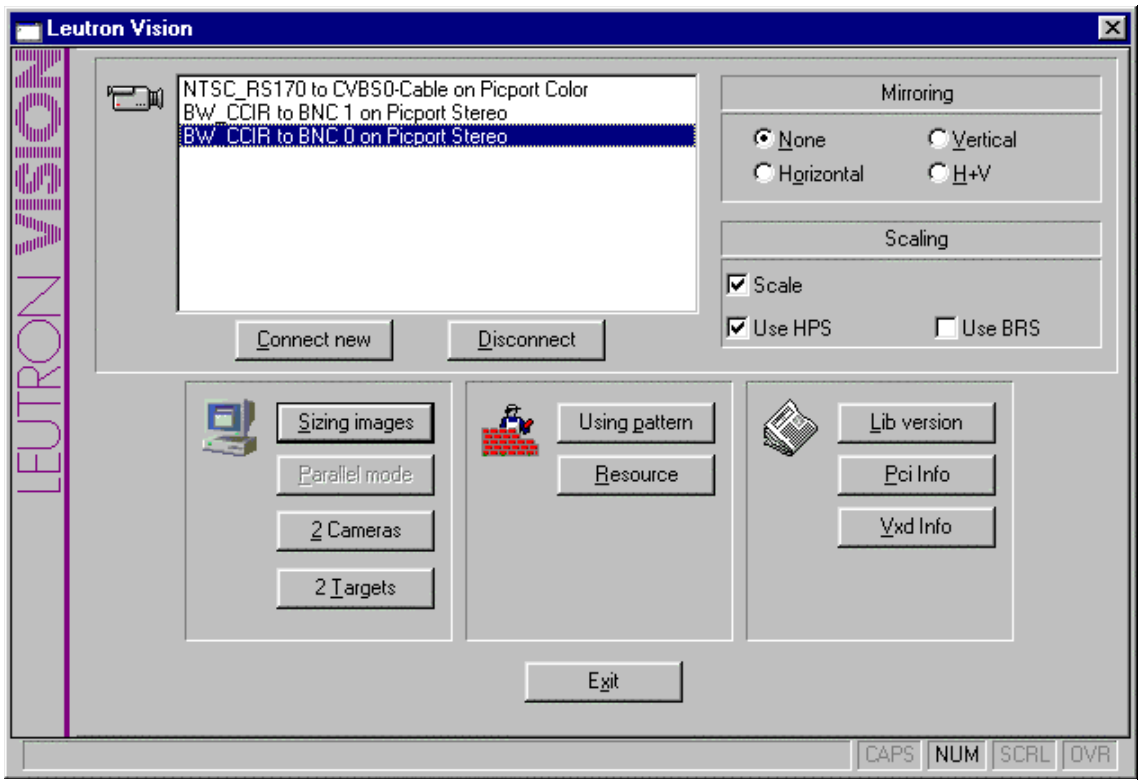
Make sure that the *PEP Modular Computers* CompactPCI Framegrabber (see Table 5-1 for cross references) is installed and the camera is connected with the appropriate cable to one of the video input connectors. Start the LV Sample Borland C++ program. Click on the `Connect New` button to open the `Camera Connection` dialog box.

Figure 5-5: Connection of a Camera



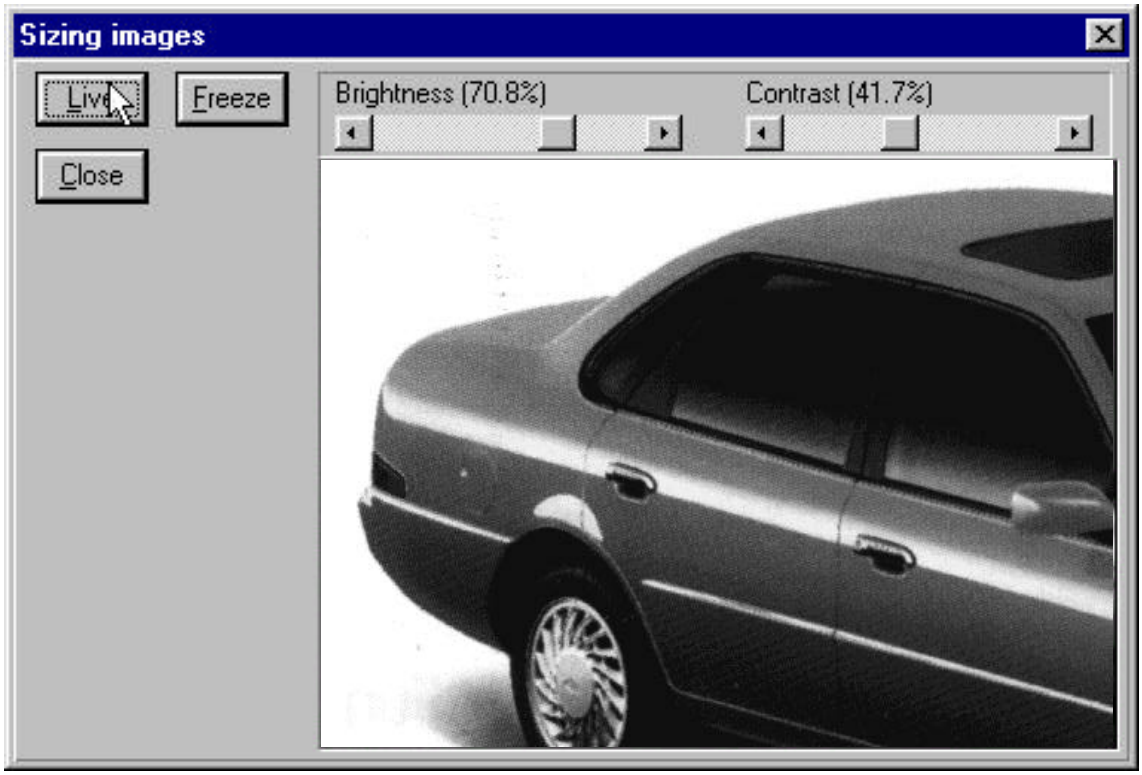
In this dialog box you see the PEP CompactPCI framegrabbers which are recognized as being installed in your system. After selecting the grabber the `Cameras` list box is updated. Select the camera, which you have connected to your framegrabber. After selecting the camera, the possible connectors for this camera are displayed in the `Connector` box. Select the connector to which your camera is actually connected and confirm the selection by pressing the `Connect` button.

Figure 5-6: Daisy Sample Program



In the main dialog box of LV Sample you will see the connection that you specified in the `Camera Connection` dialog box. Select the connection in the list (by clicking on it). Then press the `Sizing images` button to open the `Sizing Images` dialog box. Press the `Live` button and the actual camera image will be displayed.

Figure 5-7: Sizing Images



5.3.1 Problems with Camera Connection

Figure 5-8: Error Message



If the above message appears, first check if the camera is switched on and properly connected to the connector, which you chose in the camera selection box. Verify if the camera type you selected corresponds with your actual camera.

5.4 Acquiring Images Using TWAIN

The TWAIN transfer was originally developed for support of scanners, so some applications supporting TWAIN offer commands like "`Insert image from scanner…`" in their menus to use TWAIN. But in most cases the TWAIN support can be found under an "`Acquire…`" menu.

TWAIN enables to transfer one or more static images from the source to the application. Multiple TWAIN sources can be installed in your system; in such case the source should be selected first.

Many popular graphic editors support TWAIN today; PhotoImpact, ImagePals, Paint Shop Pro or Corel Photo Paint are examples of such editors. Also Microsoft introduced the TWAIN support in Office 97, so you can transfer images from the framegrabber directly to Word, Excel or PowerPoint.

The following chapters describe how to transfer images using TWAIN to PhotoImpact and Microsoft Office 97.

5.4.1 Acquiring Images with ULead PhotoImpact (Windows NT 4.0)

Start PhotoImpact and select the *PEP Modular Computers* CompactPCI framegrabber as your Image Source as is shown in Figure 5-9.

Figure 5-9: Selecting Twain Source In PhotoImpact

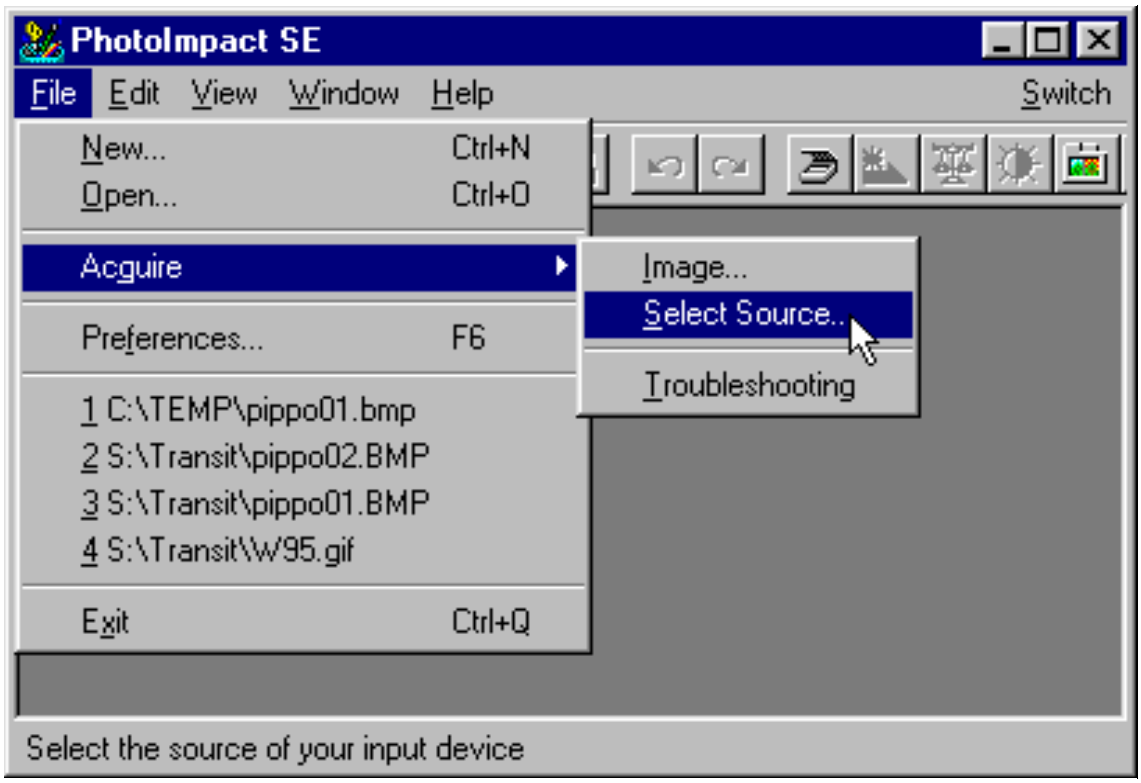
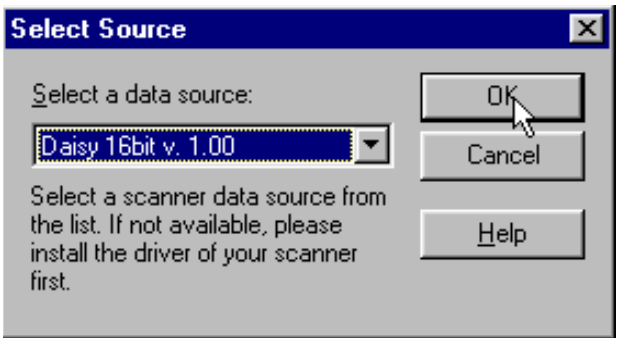


Figure 5-10: Select Source Dialog Box



Now you can start image acquisition as shown in Figure 5-11.

Figure 5-11: Aquiring Image From PhotoImpact

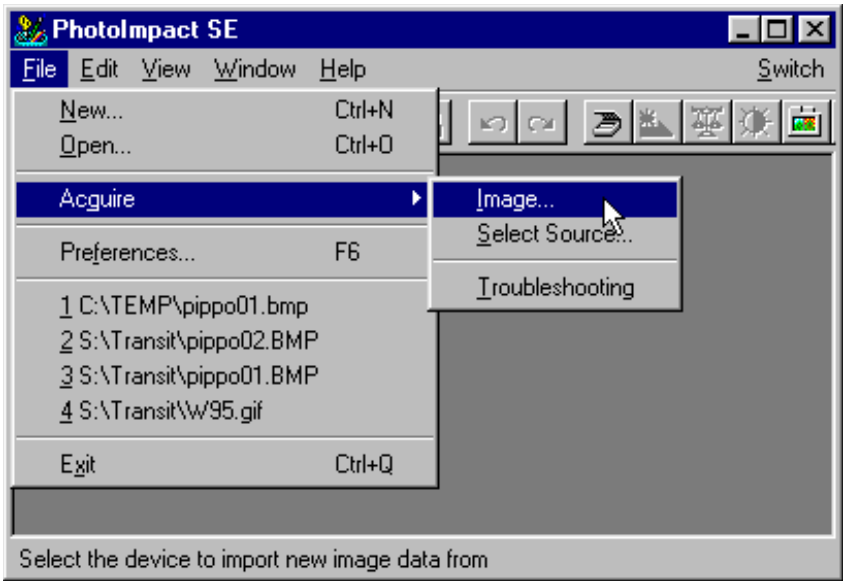
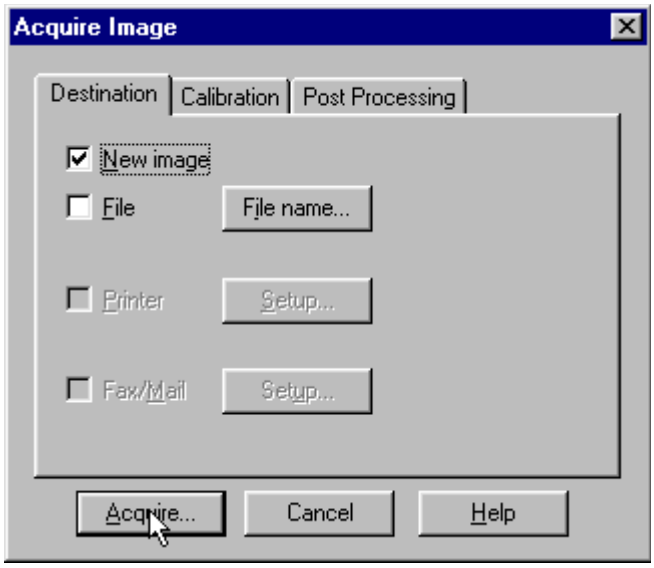
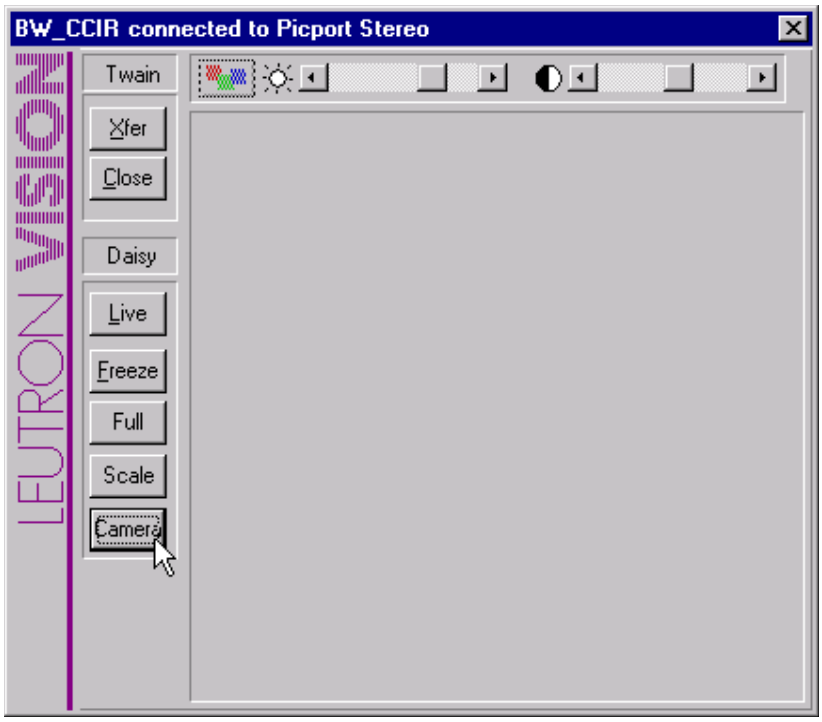


Figure 5-12: Acquire Image Options



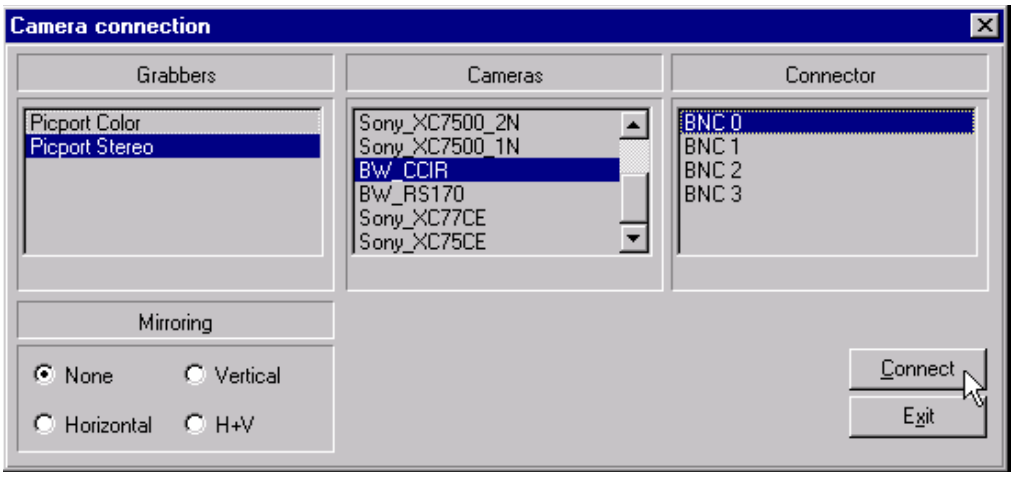
After pressing the Acquire… button, the Daisy TWAIN dialog box for capturing the image is displayed in Figure 5-13. If you do not see it, it might be overlapped by a window of another application. In such case switch to it using the <Alt-Tab> keys.

Figure 5-13: Twain Dialog Box



Before you acquire the first image with a PEP CompactPCI framegrabber, you have to select your camera. To do that, press the `Camera` button. The `Camera Connection` dialog box is then displayed (see Figure 5-14).

Figure 5-14: Camera Connection in Twain



In this dialog box you should see the PEP CompactPCI framegrabbers which are recognized as being installed in your system. After selecting the grabber the `Cameras` list box is updated. Select the camera, which you have connected to your framegrabber. After selecting the camera, the possible connectors for this camera are displayed in the `Connector` box. Select the connector on which your camera is actually connected and confirm the selection by pressing the `Connect` button.

Figure 5-15: Live Image in Twain



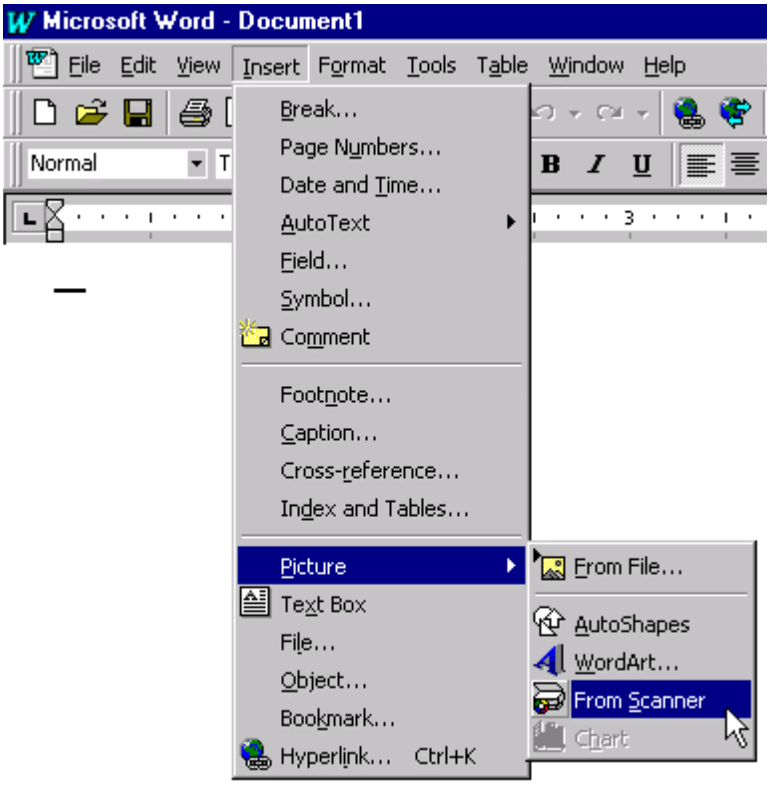
After setting up the camera connection the `Live` button becomes enabled. When you press it, the live image from the camera is displayed. You can resize the dialog box with the live image, you can also switch off the scaling by pressing the `Full` button. When you press the `Xfer` button, the image is transferred to your application (see Figure 5-14). Each time you press the `Xfer` button, the image is sent to PhotoImapact as a new image, so you can aqcuire multiple images. However, you must close this dialog box by the *Close* button before you can continue working with PhotoImpact.

5.4.2 Acquiring Images in MICROSOFT OFFICE 97

Start MS Word. Select `Insert -> Picture -> From Scanner` in the menu (see Figure 5-16). This action will start the MS Photo Editor application, which is used for acquiring images using TWAIN. See the next chapter for details. After the acquiring is done in the Photo Editor (you select `File -> Exit and Return to`… to close the Photo Editor), the image is inserted into the Word document.

The same steps can be used in other Office 97 applications (Excel, PowerPoint etc.).

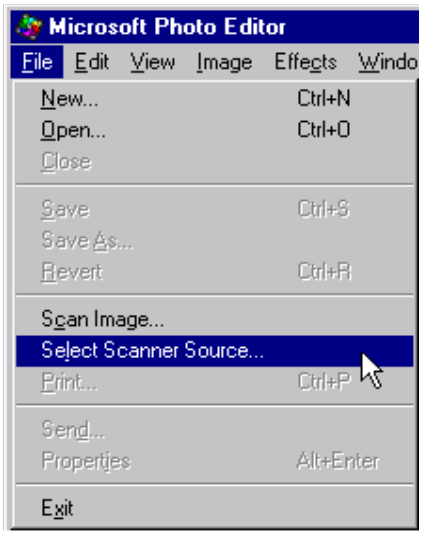
Figure 5-16: Acquiring Images In MS-Office 97



5.4.3 Acquiring Images Using Microsoft Photo Editor

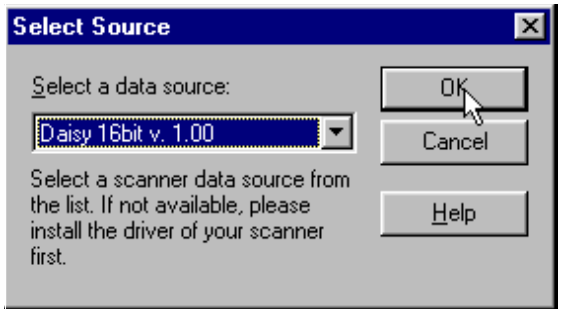
Start Microsoft Photo editor. Select `File -> Select Scanner Source...` in the menu (see Figure 5-17).

Figure 5-17: Acquiring Images In MS-Photo Editor



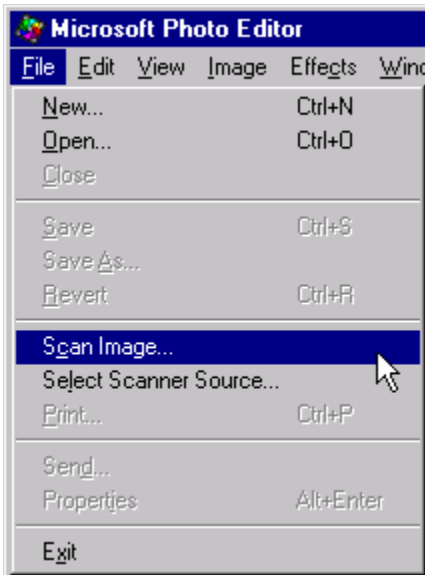
In the `Select Source` dialog box select the `Daisy 16-bit` source (see Figure 5-18).

Figure 5-18: Select Source Dialog Box



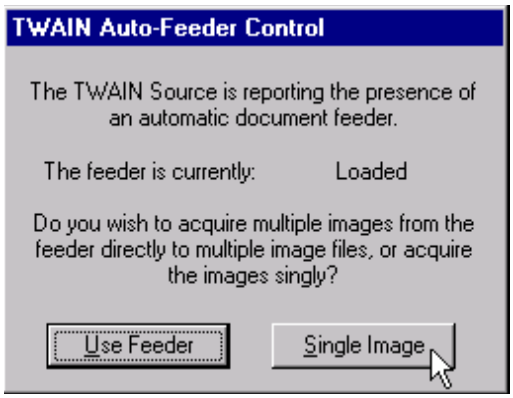
Once the source is selected, you can start acquiring images. Select `File -> Scan Image...` from the menu (see Figure 5-19).

Figure 5-19: MS-Photo Editor File Menu



Daisy supports to transfer multiple images (by repeated pressing the `Xfer` button). This feature is detected as an `automatic document feeder` in TWAIN. If you press the `Use Feeder` button, this functionality will be enabled, i.e. you will be able to transfer multiple images to Photo Editor, until you close the Daisy TWAIN dialog box. If you press the `Single Image` button, the Daisy TWAIN dialog box will be closed automatically after you make one image transfer (using the `Xfer` button).

Figure 5-20: Twain Auto-Feeder Control Dialog Box



After pressing one of these buttons, the Daisy TWAIN dialog box for capturing the image is displayed (see Figure 5-21). If you do not see it, it might be overlapped by a window of another application. In such case switch to it using the <Alt-Tab> keys. The further steps are the same as described by the PhotoImpact editor; see the `Acquiring images with PhotoImpact` chapter for detailed description.