PC-CARD-DIO48

48 Digital I/O

User's Guide

MEASUREMENT COMPUTING

PC-CARD-DIO48

Digital I/O Board

User's Guide

Document Revision 5, April, 2007

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About this User's Guide

What you will learn from this user's guide

This user's guide explains how to install, configure, and use the PC-CARD-DIO48 so that you get the most out of its digital I/O features. This user's guide also refers you to related documents available on our web site, and to technical support resources.

Conventions in this user's guide

The following conventions are used in this manual to convey special information:

For more information on …

Text presented in a box signifies additional information and helpful hints related to the subject matter you are reading.

Caution! Shaded caution statements present information to help you avoid injuring yourself and others, damaging your hardware, or losing your data.

<#:#> Angle brackets that enclose numbers separated by a colon signify a range of numbers, such as those assigned to registers, bit settings, etc.

bold text **Bold** text is used for the names of objects on the screen, such as buttons, text boxes, and check boxes. For example:
1. Insert the disk or CD and click the **OK** button.

italic text *Italic* text is used for the names of manuals and help topic titles, and to emphasize a word or phrase. For example:
The *Insta*Cal installation procedure is explained in the *Quick Start Guide*.
Never touch the exposed pins or circuit connections on the board.

Where to find more information

The following electronic documents provide information relevant to the operation of the PC-CARD-DIO48.

- MCC's *Specifications: PC-CARD-DIO48* (the PDF version of the *Specifications* chapter in this guide) is available on our web site at www.mccdaq.com/pdfs/PC-CARD-DIO48.pdf.
- MCC's *Quick Start Guide* is available on our web site at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.
- MCC's *Guide to Signal Connections* is available on our web site at www.mccdaq.com/signals/signals.pdf.
- MCC's *Universal Library User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf.
- MCC's *Universal Library Function Reference* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-functions.pdf.
- MCC's *Universal Library for LabVIEW™ User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/SM-UL-LabVIEW.pdf.

PC-CARD-DIO48 User's Guide (this document) is also available on our web site at www.mccdaq.com/PDFmanuals/PC-CARD-DIO48.pdf.

Introducing the PC-CARD-DIO48

Overview: PC-CARD-DIO48 features

The PC-CARD-DIO48 is a data acquisition and control board for IBM PC compatible computers having PC-CARD/PCMCIA type slots.

PC-CARD-DIO48 features two 82C55 digital I/O chips. The 82C55 chip uses TTL logic.

The digital I/O is organized into two 24-bit groups (24 channels per 82C55). Each 24-bit group is divided into three ports – A, B, and C. Ports A and B are banks of 8 bits. Port C can be configured as two banks of 4 bits or one bank of 8 bits. Each bank is programmable as input or output.

On power up and reset, all I/O bits are set to input mode. All signals pass through a 50-pin high-density connector. The board is completely plug-and-play, with no switches or jumpers to set.

PC-CARD-DIO48 block diagram

PC-CARD-DIO48 functions are illustrated in the block diagram shown here.

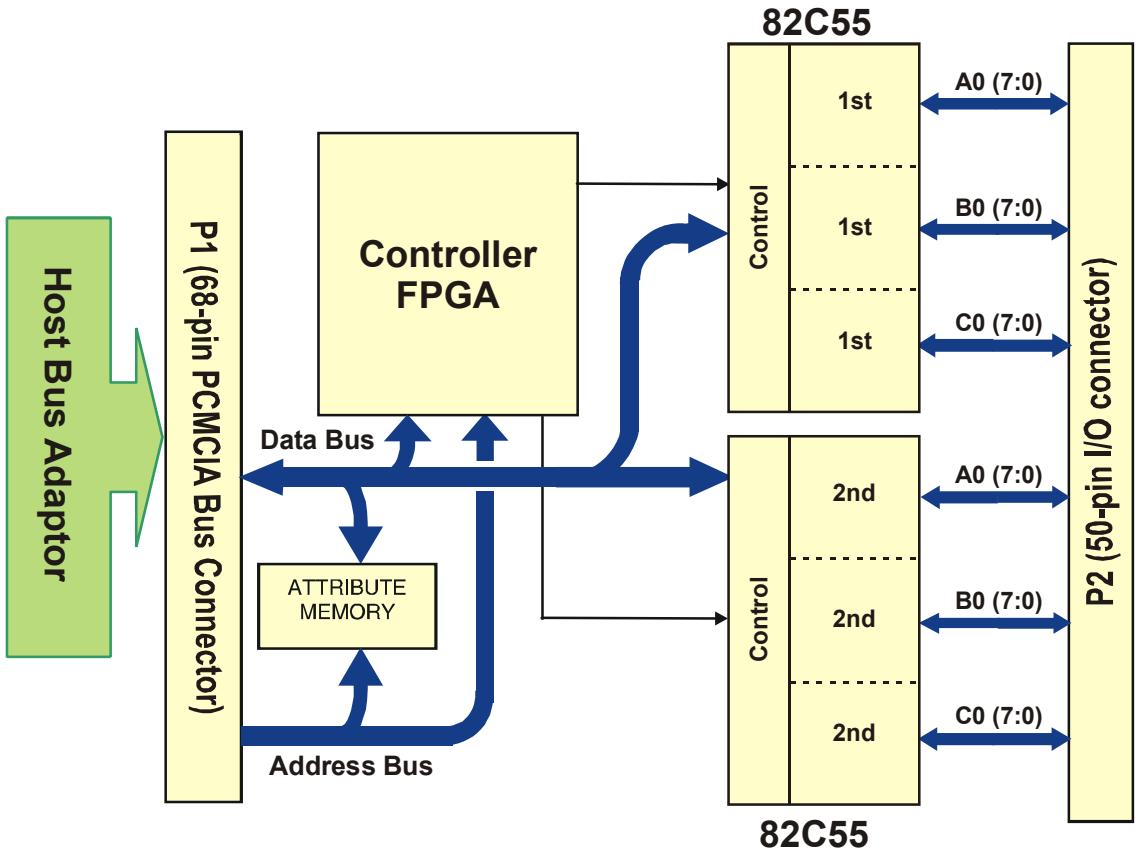


Figure 1. PC-CARD-DIO48 functional block diagram

Software features

For information on the features of *Insta*Cal and the other software included with your PC-CARD-DIO48, refer to the *Quick Start Guide* that shipped with your device. The *Quick Start Guide* is also available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Check www.mccdaq.com/download.htm for the latest software version.

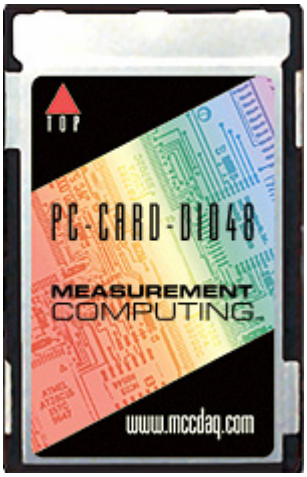
Installing the PC-CARD-DIO48

What comes with your PC-CARD-DIO48 shipment?

The following items are shipped with the PC-CARD-DIO48.

Hardware

- PC-CARD-DIO48



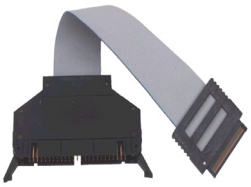
Additional documentation

In addition to this hardware user's guide, you should also receive the *Quick Start Guide* (available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf). This booklet supplies a brief description of the software you received with your PC-CARD-DIO48 and information regarding installation of that software. Please read this booklet completely before installing any software or hardware.

Optional components

- Cables

CPCC-50F-39



CPCC-50M-4

C50FF-x

- Signal termination and conditioning accessories

  MCC provides signal conditioning and termination products for use with the PC-CARD-DIO48. Refer to Field wiring and signal termination on page 15 for a complete list of compatible accessory products.

Unpacking the PC-CARD-DIO48

As with any electronic device, you should take care while handling to avoid damage from static electricity. Before removing the PC-CARD-DIO48 from its packaging, ground yourself using a wrist strap or by simply touching the computer chassis or other grounded object to eliminate any stored static charge.

If any components are missing or damaged, notify Measurement Computing Corporation immediately by phone, fax, or e-mail:

- Phone: 508-946-5100 and follow the instructions for reaching Tech Support.
- Fax: 508-946-9500 to the attention of Tech Support
- Email: techsupport@mccdaq.com

Installing the software

Refer to the *Quick Start Guide* for instructions on installing the software on the *Measurement Computing Data Acquisition Software CD*. This booklet is available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Installing the PC-CARD-DIO48

The PC-CARD-DIO48 board is completely plug-and-play. There are no switches or jumpers to set. To install your board, follow the steps below.

Install the MCC DAQ software before you install your board

The driver needed to run your board is installed with the MCC DAQ software. Therefore, you need to install the MCC DAQ software before you install your board. Refer to the *Quick Start Guide* for instructions on installing the software.

To install your PC-Card, do the following:

- Insert the card into a free PC Card/PCMCIA type II or III slot. The key helps to insure that the cable is inserted in the correct orientation.

  You do not have to turn the computer off. The system is designed for power-on installation. You should hear an insertion beep when you insert the card.

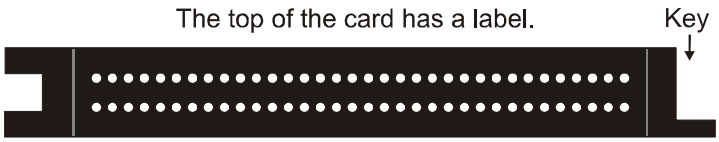


Figure 2. End view of the 50-pin PC-CARD connector showing proper orientation

Windows automatically detects, recognizes, and configures the PC-CARD. You should hear an insertion beep when you insert the card into the slot. To verify that the card is recognized, go to Control Panel\System\Device Manager and the card should now appear under "DAS Component."

If your PCMCIA card is not detected

If the card is not detected by Windows, and you are not prompted for a driver after inserting the card, check that your computer's 32-bit PCMCIA drivers are installed and enabled. Do the following:

1. From your desktop, right-click on My Computer and select **Properties**. The **System Properties** dialog opens.

2. Select the **Hardware** tab and click on the **Device Manager** button.
3. Verify that "PCMCIA adapters" is listed in the Device Manager. If you don't find this entry, or if the properties for the adapter indicate "this device is not working," you need to install or update your PCMCIA adapter drivers.
   - If the PCMCIA adapter is not listed, use the **Add New Hardware Wizard** to install PCMCIA support.
   - If the PCMCIA adapter is listed but not working, use the **Update Driver** option to install the appropriate drivers.

After performing the update procedure, reboot your PC and insert your card again.

Connecting the board for I/O operations

Connectors, cables – main I/O connector

The table below lists the board connector, applicable cables, and compatible accessory products.

Board connector, cables, and accessory equipment

Connector type	50-pin connector
Compatible cables	CPCC-50F-39: 50-pin Micro connector to 50-pin female IDC, one-meter cable (39 inches).
	▪ CPCC-50M-4: 50-pin Micro connector to 50-pin male IDC, 4 inch adapter cable. and ▪ C50FF-x: 50-pin IDC female to female cable. x = length in feet.
Compatible accessory products	CIO-MINI50 CIO-SPADE50 CIO-TERM100 SCB-50 SSR-RACK24 CIO-ERB24 CIO-ERB48 CIO-SERB24 CIO-SERB48

Pin out – main I/O connector

Figure 3 shows a PC-CARD-DIO48 case looking into the male mini-connector. The connector is mechanically keyed to insure that the cable is inserted correctly.

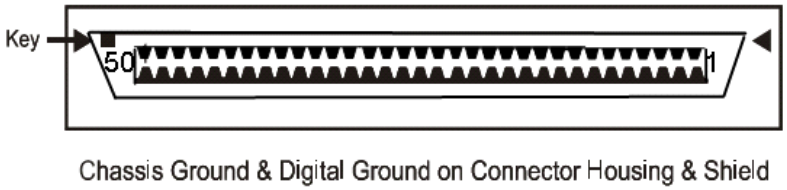


Figure 3. 50-pin I/O mini-connector

Cabling

Measurement Computing offers two cables for connecting the PC-CARD-D24/CTR3 to a screw-type terminal board or other signal conditioning interface board:

- The CPCC-50F-39 cable: 39 inches (990 mm) long; and compatible with standard 50-pin screw terminal products.
- The CPCC-50M-4 cable: four-inch long adapter cable; required when using a C50FF-x series cable.

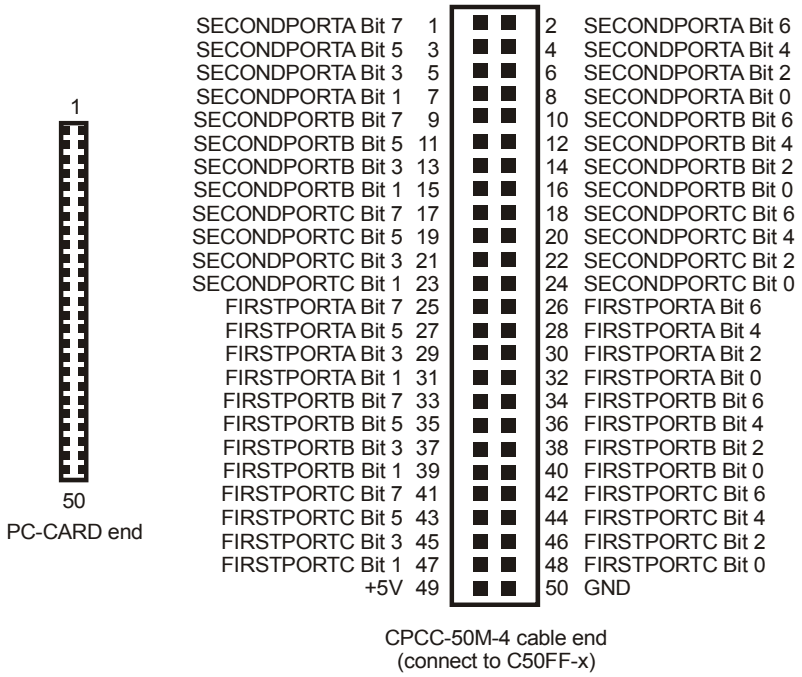


Figure 4. Cable map — PC-CARD to CPCC-50M-4

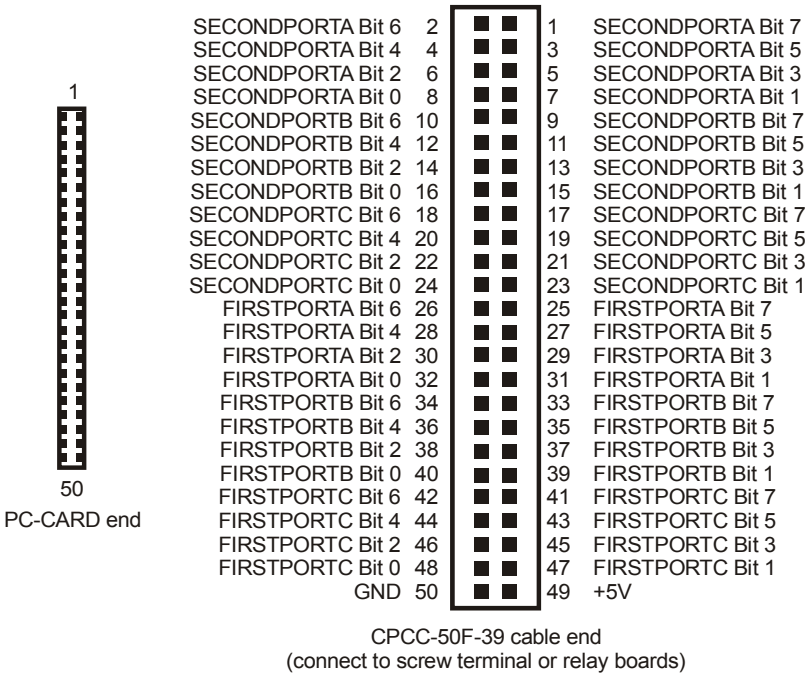


Figure 5. Cable map — PC-CARD to CPCC-50F-39

Figure 6 shows a map of the two methods of cabling the PC-CARD-DIO48 to various screw terminal or signal conditioning boards.

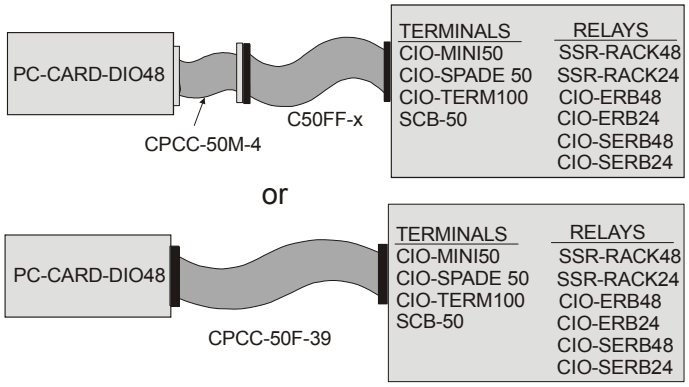


Figure 6. Connecting to screw terminal or relay boards

Figure 7 shows how to connect the PC-CARD-DIO48 to two SSR-RACK24 or CIO-ERB24 relay racks.

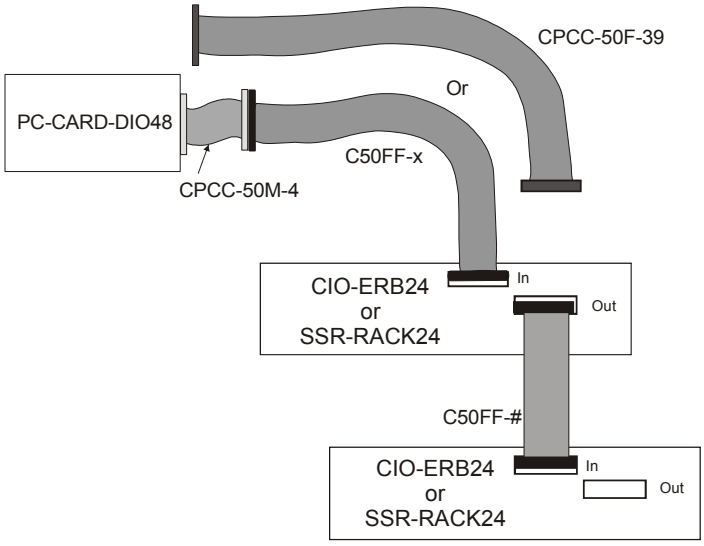


Figure 7. Cable map to the CIO-ERB24 or SSR-RACK24

CPCC-50F-39

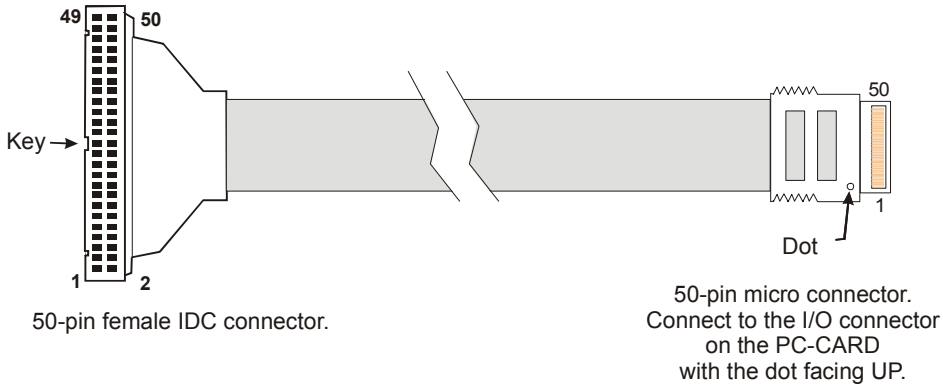


Figure 8. CPCC-50F-39 cable connections

Details on the CPCC-50F-39 cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=105&pf_id=1379.

CPCC-50M-4

If your application requires a cable that is longer than one meter in length, use the CPCC-50M-4 four-inch cable, and connect to a C50FF-*x* cable.

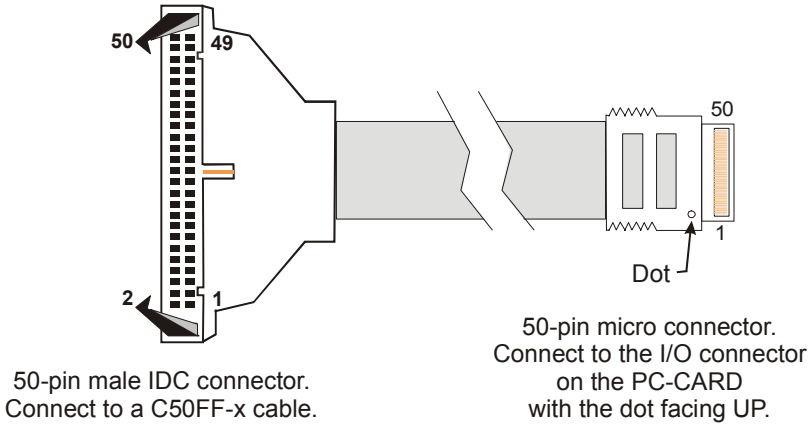


Figure 9. CPCC-50M-4 cable connections

Details on the CPCC-50M-4 cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=96&pf_id=1380.

C50FF-x

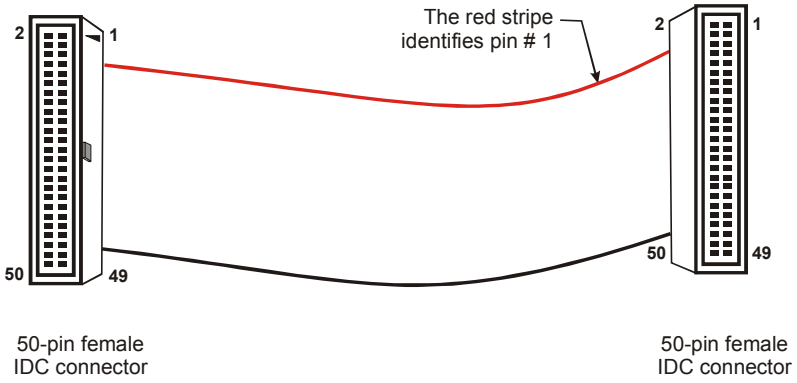


Figure 10. C50FF-x cable

Details on the C50FF-x cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=104&pf_id=136.

Field wiring and signal termination

You can use the following cabling, screw termination, and signal conditioning products with the CPCC-50F-39 cable, or with the CPCC-50M-4 and C50FF-x cables:

- CIO-MINI50 – 50-pin screw terminal board. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=102&pf_id=258.
- CIO-TERM100 – 100-pin screw terminal board (Two 50-pin IDC connectors). Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=102&pf_id=281.
- CIO-SPADE50 — 16" X 4" termination panel which mates with both 37-pin and 50-pin connectors. Details on this product are available on our web site at www.mccdaq.com/pdfs/screw.pdf.
- SCB-50 – 50 conductor, shielded signal connection/screw terminal box provides two independent 50-pin connections. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=196&pf_id=1168.
- SSR-RACK24 – 24-channel, solid-state relay mounting rack for digital signal conditioning. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=122&pf_id=1193.
- SSR-RACK48 – 48-channel, solid-state relay mounting rack with quad-format modules. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=122&pf_id=622.
- CIO-ERB24 – 24 Form C relays, 6 Amp relay accessory board for digital signal conditioning. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=123&pf_id=241.
- CIO-SERB24 – 24 Form C relays, 10 Amp, fault detecting relay accessory board with socketed and field-replaceable relays. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=123&pf_id=678.
- CIO-ERB48 – 48 Form C relays, 6 Amp, relay, 50-pin accessory board for digital signal conditioning. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=123&pf_id=242.
- CIO-SERB48 – 48 Form C relays, 10 Amp relay accessory board with socketed and field-replaceable relays. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=123&pf_id=676.

Information on signal connections

General information regarding signal connection and configuration is available in the *Guide to Signal Connections* (available at www.mccdaq.com/signals/signals.pdf).

Calibrating the PC-CARD-DIO48

No calibration is required. There are no socketed or user-serviceable parts in the PC-CARD-DIO48. The case cannot be opened. Opening the case will void your warranty. If your PC-CARD-DIO48 requires service, contact the factory for an RMA# and return it.

Programming and Developing Applications

After following the installation instructions in Chapter 2, your board should now be installed and ready for use. In general there may be no correspondence among registers for different boards. Software written at the register-level for other models does not function correctly with your board.

Programming languages

Measurement Computing's Universal Library provides access to board functions from a variety of Windows programming languages. If you are planning to write programs, or would like to run the example programs for Visual Basic® or any other language, please refer to the *Universal Library User's Guide* (available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf).

Packaged applications programs

Many packaged application programs now have drivers for your board. If the package you own does not have drivers for the board, please fax or e-mail the package name and the revision number from the install disks. We will research the package for you and advise how to obtain drivers.

Some application drivers are included with the Universal Library package, but not with the application package. If you have purchased an application package directly from the software vendor, you may need to purchase our Universal Library and drivers. Please contact us by phone, fax or e-mail:

- Phone: 508-946-5100 and follow the instructions for reaching Tech Support.
- Fax: 508-946-9500 to the attention of Tech Support
- Email: techsupport@mccdaq.com

Register-level programming

You should use the Universal Library or one of the packaged application programs mentioned above to control your board. Only experienced programmers should try register-level programming.

Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Digital input/output

Table 1. Digital I/O specifications

Digital type	82C55
Configuration	4 banks of 8, 4 banks of 4, programmable by bank as input or output
Number of channels	48 I/O
Output high	3.0 volts min @ -2.5 mA
Output low	0.4 volts max @ 2.5 mA
Input high	2.0 volts min, +5.5 volts absolute max
Input low	0.8 volts max, -0.5 volts absolute min
Power-up / reset state	Input mode (high impedance)

Power consumption

Table 2. Power consumption specifications

+5V operating	37 mA typical, 55 mA max

Miscellaneous

Table 3. Miscellaneous specifications

+5 Volts DC	Available at I/O connector (+5V Power)
	Protected by resettable fuse: ▪ Hold current: 350 mA ▪ Trip current: 700 mA ▪ *Trip and recovery time: 100 mS*

Environmental

Table 4. Environmental specifications

Operating temperature range	*0 to 70 °C*
Storage temperature range	*-40 to 100 °C*
Humidity	*0 to 95% non-condensing*

Connector and pin out

Table 5. Connector specifications

Connector type	50-pin connector
Compatible cables	CPCC-50F-39: 50-pin Micro connector to 50-pin female IDC, one-meter cable (39 inches).
	▪ CPCC-50M-4: 50-pin Micro connector to 50-pin male IDC, 4 inch adapter cable. and ▪ C50FF-x: 50-pin IDC female to female cable. x = length in feet.
Compatible accessory products	CIO-MINI50 CI-SPADE50 CIO-TERM100 SCB-50 SSR-RACK24 CIO-ERB24 CIO-ERB48 CIO-SERB24 CIO-SERB48

Table 6. Connector pin out

Pin	Signal Name	Pin	Signal Name
1	SECONDPORTA Bit 7	26	FIRSTPORTA Bit 6
2	SECONDPORTA Bit 6	27	FIRSTPORTA Bit 5
3	SECONDPORTA Bit 5	28	FIRSTPORTA Bit 4
4	SECONDPORTA Bit 4	29	FIRSTPORTA Bit 3
5	SECONDPORTA Bit 3	30	FIRSTPORTA Bit 2
6	SECONDPORTA Bit 2	31	FIRSTPORTA Bit 1
7	SECONDPORTA Bit 1	32	FIRSTPORTA Bit 0
8	SECONDPORTA Bit 0	33	FIRSTPORTB Bit 7
9	SECONDPORTB Bit 7	34	FIRSTPORTB Bit 6
10	SECONDPORTB Bit 6	35	FIRSTPORTB Bit 5
11	SECONDPORTB Bit 5	36	FIRSTPORTB Bit 4
12	SECONDPORTB Bit 4	37	FIRSTPORTB Bit 3
13	SECONDPORTB Bit 3	38	FIRSTPORTB Bit 2
14	SECONDPORTB Bit 2	39	FIRSTPORTB Bit 1
15	SECONDPORTB Bit 1	40	FIRSTPORTB Bit 0
16	SECONDPORTB Bit 0	41	FIRSTPORTC Bit 7
17	SECONDPORTC Bit 7	42	FIRSTPORTC Bit 6
18	SECONDPORTC Bit 6	43	FIRSTPORTC Bit 5
19	SECONDPORTC Bit 5	44	FIRSTPORTC Bit 4
20	SECONDPORTC Bit 4	45	FIRSTPORTC Bit 3
21	SECONDPORTC Bit 3	46	FIRSTPORTC Bit 2
22	SECONDPORTC Bit 2	47	FIRSTPORTC Bit 1
23	SECONDPORTC Bit 1	48	FIRSTPORTC Bit 0
24	SECONDPORTC Bit 0	49	+5V
25	FIRSTPORTA Bit 7	50	GND

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