

## Unpacking the CIO-DAC16

As with any electronic device, you should take care while handling to avoid damage from static electricity. Before removing the CIO-DAC16 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](mailto: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/PDFs/manuals/DAQ-Software-Quick-Start.pdf](http://www.mccdaq.com/PDFs/manuals/DAQ-Software-Quick-Start.pdf).

## Configuring the CIO-DAC16

The CIO-DAC16 has one base address switch, one bank of gain switches for each analog output channel, a simultaneous update jumper for each DAC pair, a "power-up state" selection jumper, and one wait state jumper which you must set before installing the board in your computer. The *InstaCal* calibration and test program included with the CIO-DAC16 will show you how to set the switches. Run *InstaCal* before you open your computer and install the board.

The CIO-DAC16 is shipped with the factory-default settings listed in the table below.

Factory-configured default settings

Board label	Switch/jumper description	Default setting
<b>ADDRESS</b>	DIP switch for setting the base address	300h (768 decimal)
<b>WAIT STATE</b>	Jumper to enable a wait state	OFF position
<b>XFER</b>	Jumper to select simultaneous or single channel update for each DAC channel pair	Single channel update
<b>0 through 15</b>	DIP switches to set the analog output range	±5V
<b>PWR UP</b>	Jumper to select the power up and reset state	STD position — standard (undefined output values at power up)

Before installing the CIO-DAC16 in the computer, verify that the board is configured with the settings that you want. Review the following information to change the default configuration of a jumper or switch on the CIO-DAC16 board.

### Base address switch

Before you install the CIO-DAC16 in your computer, set the base address by using the dip switch labeled **ADDRESS** located on the board.

The easiest way to set the base address switch is to let *InstaCAL* show you the correct settings. However, if are already familiar with setting ISA base addresses, you may use the base address switch description below to guide your base address selection.

Unless there is already another board in your system using address 300 hex (768 decimal), leave the switches as they are set at the factory. The example shown in Figure 1 shows the settings for the factory-default base address of 300 hex.

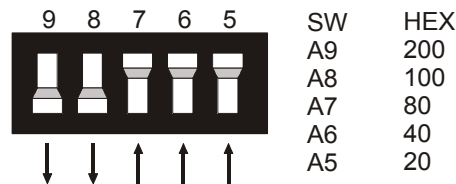


Figure 1. CIO-DAC16 base address switches

In the default configuration shown in Figure 1, addresses 9 and 8 are DOWN, and all others are UP. Address 9 = 200 hex (512 decimal) and address 8 = 100 hex (256 decimal); when added together they equal 300 hex (768 decimal).

**Disregard the numbers printed on the switch**

When setting the base address, refer to the numbers printed in white on the printed circuit board.

PC I/O addresses

Hex Range	Function	Hex Range	Function
000-00F	8237 DMA #1	2C0-2CF	EGA
020-021	8259 PIC#1	2D0-2DF	EGA
040-043	8253 Timer	2E0-2E7	GPiB (AT)
060-063	8255 PPI (XT)	2E8-2EF	Serial Port
060-064	8742 Controller (AT)	2F8-2FF	Serial Port
070-071	CMOS RAM & NMI mask (AT)	300-30F	Prototype card
080-08F	DMA page registers	310-31F	Prototype card
0A0-0A1	8259 PIC #2 (AT)	320-32F	Hard disk (XT)
0A0-0AF	NMI mask (XT)	378-37F	Parallel printer
0C0-0DF	8237 #2 (AT)	380-38F	SDLC
0F0-0FF	80287 numeric CO-P (AT)	3A0-3AF	SDLC
1F0-1FF	Hard disk (AT)	3B0-3BB	MDA
200-20F	Game control	3BC-3BB	Parallel printer
210-21F	Expansion unit (XT)	3C0-3CF	EGA
238-23B	Bus mouse	3D0-3DF	CGA
23C-23F	ALT bus mouse	3E8-3EF	Serial port
270-27F	Parallel printer	3F0-3F7	Floppy disk
2B0-2BF	EGA	3F8-3FF	Serial port

The CIO-DAC16 Base switch can be set for an address in the range of 000-3E0, so it should not be hard to find a free address area for your CIO-DAC16. If you are not using IBM prototyping cards, or some other board which occupies these addresses, then 300-31F HEX are free to use. Addresses not specifically listed, such as 390-39F, are free.

## Wait state jumper

The CIO-DAC16 board has a wait state jumper which you can set to enable an on-board wait state generator. A wait state is an extra delay injected into the processor's clock via the bus. This delay slows down the processor when the processor addresses the CIO-DAC16 board so that signals from slow devices (chips) will be valid.

This jumper is shown in Figure 2 configured for OFF (wait state is disabled).

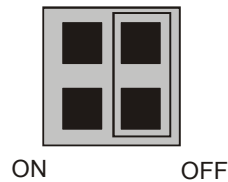


Figure 2. Wait State jumper

The wait state generator on the CIO-DAC16 is only active when the CIO-DAC16 is being accessed. Your PC will not be slowed down in general by using the wait state.

## Individual / simultaneous update jumper

The analog output chips on the CIO-DAC16 are dual DACs (two analog outputs per chip). Each DAC channel pair has an associated jumper that sets both DACs on a single chip to be either simultaneously transferred on a read (XFER), or individually updated when the MSB register is written.

The top of each jumper on the CIO-DAC16 board is labeled **XFER**. Below each jumper are two numbers that indicate the pair of channels that the jumper selects (12, 34, 56, or 78). For example, "12" indicates channels one and two.

Figure 3 shows the jumper block configured for each update mode.

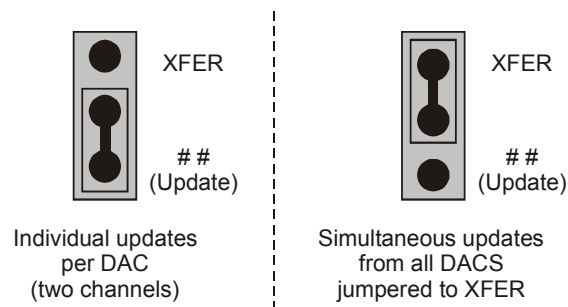


Figure 3. Individual / simultaneous update jumper

- When the jumpers are in the **XFER** position, new output data is held until one or more DACs have been loaded with new digital data. The new data transfers to the voltage outputs as a group. The simultaneous transfers occur when any of the CIO-DAC16 addresses are read (and the jumpers are in the **XFER** position).
- When jumpered to the channel numbers, the DAC channel pair is individually updated.

## Power up and reset jumper

The power up and reset jumper (hardware revision 3 and later) controls the state of the DAC outputs when the CIO-DAC16 board is powered up or reset. This jumper is shown in Figure 4.

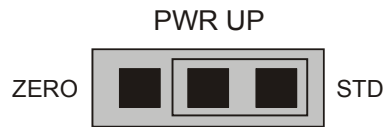


Figure 4. Power up and reset jumper

- When set for **ZERO**, all DACs are cleared to 0 volts,  $\pm 32$  mV on power up and reset. In addition, all DACs are set to simultaneous update mode until first read.
- When set for **STD**, the analog output values are undefined on power up and reset.

## Analog output range switch

The analog output voltage range of each channel can be set with a set of five ganged DIP switches. The switch blocks are located on the board below the calibration potentiometers. The switch blocks are labeled **0** to **15**, and individual switches are labeled **1** through **5**.

Set the switches for each individual channel as shown in Figure 5.

Range	1	2	3	4	5
$\pm 10$	UP	DN	UP	DN	DN
$\pm 5.0$	UP	DN	DN	UP	DN (shown)
$\pm 2.5$	UP	DN	DN	DN	UP
0-10	DN	UP	UP	DN	DN
0-5	DN	UP	DN	UP	DN
0-2.5	DN	UP	DN	DN	UP

Figure 5. Analog output range switch—one per DAC — configured for  $\pm 5$  V

To set a channel to a particular range, read the switch positions as UP or DN (down) from left to right in the row beside the range you want to set.

The switch shown in Figure 5 is configured for  $\pm 5$ V range (switch settings UP>DN>DN>UP>DN).

## Installing the CIO-DAC16

After you configure the board's switches and jumpers, you can install the CIO-DAC16 into your computer. 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.