

**Model LPCI-A16-16A**

**16-Bit Analog and Digital I/O Card**

**USER MANUAL**

FILE: MLPCI-A16-16A.C1d

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## **WARNING!!**

**ALWAYS CONNECT AND DISCONNECT YOUR FIELD CABLING WITH THE COMPUTER POWER OFF. ALWAYS TURN COMPUTER POWER OFF BEFORE INSTALLING A CARD. CONNECTING AND DISCONNECTING CABLES, OR INSTALLING CARDS INTO A SYSTEM WITH THE COMPUTER OR FIELD POWER ON MAY CAUSE DAMAGE TO THE I/O CARD AND WILL VOID ALL WARRANTIES, IMPLIED OR EXPRESSED.**

## **Warranty**

Prior to shipment, ACCES equipment is thoroughly inspected and tested to applicable specifications. However, should equipment failure occur, ACCES assures its customers that prompt service and support will be available. All equipment originally manufactured by ACCES which is found to be defective will be repaired or replaced subject to the following considerations.

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If a unit is suspected of failure, contact ACCES' Customer Service department. Be prepared to give the unit model number, serial number, and a description of the failure symptom(s). We may suggest some simple tests to confirm the failure. We will assign a Return Material Authorization (RMA) number which must appear on the outer label of the return package. All units/components should be properly packed for handling and returned with freight prepaid to the ACCES designated Service Center, and will be returned to the customer's/user's site freight prepaid and invoiced.

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**First Three Years:** Returned unit/part will be repaired and/or replaced at ACCES option with no charge for labor or parts not excluded by warranty. Warranty commences with equipment shipment.

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# Chapter 1: Overview Functional Description

This card is a high-speed, high-resolution universal PCI data acquisition card. Designed for compatibility with both PCI and PCI-X bus slots as well as Low Profile Computers, the card is perfect for the instrumentation system designer. It is useful for precision measurement and control in applications such as standalone environmental test stations, compact production test equipment, portable testers, avionics and others. The card's ability to trigger the A/D (Analog to Digital) in real time assures precisely timed sampling that is unaffected by other computer operations. This is an essential requirement for signal, vibration and transient analysis where high data rates must be sustained for short periods of time. This high-speed sampling rate is supported by a data FIFO for reducing processor overhead.

Other functions engineered into this card are sixteen parallel bits of digital I/O, a 16-bit counter, and two analog outputs. The card is shipped with a suite of software drivers, samples and support in the most common programming languages.

## Analog Inputs

16 S.E. (Single-Ended) or 8 Diff. (Differential) 16-Bit resolution Analog Inputs are available and configured via a jumper on the card. Any single channel can be acquired at 500,000 samples / second, or any range of channels can be acquired at 450,000 samples / second. The high-impedance Analog Inputs feature hardware / software selectable ranges of 0-1V, 0-2V, 0-4V, 0-5V, 0-10V,  $\pm 0.5V$ ,  $\pm 1V$ ,  $\pm 2V$ ,  $\pm 2.5V$ ,  $\pm 5V$ , and  $\pm 10V$ . All the data from the A/D is placed directly into a 1K Sample FIFO (larger FIFOs available, contact factory) to enhance the maximum throughput of the card. The A/D can be operated in five different modes: software, burst mode, counter timed, external start of timed mode and external trigger control mode.

## Analog Outputs

Two double-buffered 12-Bit Digital-to-Analog (D/A) converter outputs are provided. Output ranges of 0-5V and 0-10V are setup per channel with an on-board jumper.

## Digital I/O

16 Buffered Digital Input/Outputs are provided. Each TTL output can sink 24mA or source 15mA. All 16 lines may be programmed as inputs or outputs or 8 lines may be inputs while the other 8 are outputs. All lines are pulled up to 5 Volts via 10K ohm resistors. These resistors are very useful for reliably reading dry contact closures. Consult the factory to specify special resistor configurations.

## Counter/Timer

The card contains an 82C54 Programmable Interval Timer (three sixteen bit counters). The counters are generally used to time the A/D conversion process, but two can also be used for frequency generation. Consult Chapter 4, Chapter 6, and Appendix B for more information on the A/D, programming, and the counter itself.

## Calibration

This card features digitally controlled potentiometers to adjust the gain and offset of the A/D and the gain of the D/A. This allows both the analog inputs and outputs to be calibrated from software in the field.

In order to obtain accurate data, the proper calibration values must be loaded into the digital potentiometers each time the card is powered. The factory calibrates each card's inputs and outputs prior to shipment. These calibration values are stored in an on-board EEPROM allowing simple reuse of calibration data from one boot to the next. It is highly recommended to calibrate the card in the installed application environment for the most accurate results.

For details refer to Chapter 6 on programming and Appendix C on Calibration.













































































