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Find the *Acces PCI-AI12-16* at our website: *Click HERE*

PCI-AI12-16(A)

16-Channel, 12-Bit
Analog Input Board

FEATURES

- **16 Single Ended / 8 Differential Analog Inputs**
- **12-Bit Resolution, 100kHz A/D Converter**
- **Eight Programmable Voltage Ranges (Unipolar & Bipolar) and 4-20mA Current Range**
- **FIFO Data and Point List Buffers ("A" version). Both FIFO's 2K**
- **On-Board Pacer Clock and Counter Timers**
- **Universal PCI, 3.3V & 5V Compatible**
- **Number of Analog Inputs Can Be Expanded up to 256 by use of our External Signal Conditioners/Sub-Multiplexers**



FUNCTIONAL DESCRIPTION

Model PCI-AI12-16 is a multifunction, high-speed, analog-to-digital converter board for use in PCI-Bus computers. It accepts up to 16 single-ended or eight differential inputs. The board uses a low-noise, multi-layer printed circuit board. Inputs are protected against overvoltage conditions up to ±35 volts and typically survive static discharges beyond 4000 volts. Conversions can be initiated in any one of three ways: (a) software command, (b) external start commands, or (c) on a timed basis using on-board programmable counters. Converted data may be transferred to the computer by one of two software selected methods: (a) polling for the end-of-conversion signal, or (b) by generating an Interrupt when the end-of-conversion signal occurs.

Model PCI-AI12-16A has all of the foregoing plus includes a 2K Samples FIFO data buffer and a 2K words Point List FIFO buffer. Addition of these FIFO's permits background-task-based data acquisition, essential for moderate throughput in Windows. The Point List FIFO contains channel, sub-MUX channel, and voltage range for each analog-input channel (point). The data buffer contains A/D conversion results. When the data buffer becomes half full, an Interrupt can be generated to cause the data to be read into the computer.

INPUT VOLTAGE RANGES

Input analog voltages are amplified by a programmable-gain amplifier. Eight voltage ranges are available: 0-10V, 0-5V, an offset voltage range of +1.25V to +3.75V and 1.25 to 6.25 unipolar and ±10V, ±5V, ±2.5V, and ±1.25V bipolar. Further, by placing jumpers on the board you can manually select a 4-20 mA current range. In that latter case, the current input is converted to a special analog voltage range that will yield full 12-bit resolution and there can be up to eight inputs. In applications that require mixed voltage and current inputs, jumpers are placed only on the channels that are to have current inputs.

INPUT SYSTEM EXPANSION

Up to 256 differential or single-ended analog inputs can be handled through use of external signal conditioner/sub-multiplexers (model AIM-16P). The output of each 16-input sub-multiplexer will connect to one of the A/D single-ended inputs.

DISCRETE DIGITAL INPUT/OUTPUT

There are four ports for discrete TTL-level digital inputs or outputs. When used as outputs, each output line can drive up to 350 mA. Also, there is a 7-bit output register. The latter is intended for use to send address and gain-control commands to external signal conditioner/sub-multiplexers. However, if that expansion capability is not used, then these bits can be used as general-purpose digital outputs.

COUNTER/TIMERS

The board contains a 1 MHz crystal-controlled oscillator and a type 82C54 counter/timer chip that has three 16-bit programmable down counters. Counters 1 and 2 are concatenated to provide 32 bits count capability and the "zero-crossing" output of Counter 2 can be used as a pacer clock for timed start commands to the A/D converter. Frequency generation is easy because Counters 1 and 2 form a 32-bit counter and there is a 1 MHz input. Pulse width measurement of slowly changing signals is easy because the slow-changing signal can be applied to Counter 1's gate input and the 1 MHz oscillator provides a known input frequency. Frequency measurement is simplified because Counter 0 can be used to generate a variable gating signal. Finally, transition counting can be performed by Counter 0 if events to be counted are applied to the clock input. Basically, Counter 0 input is used for frequency measurement and event counting. The Counter 1 gate input is used for pulse measurement and the Counter 2 output is used for frequency generation. In each case, you need to apply or read a signal at only one connector pin.

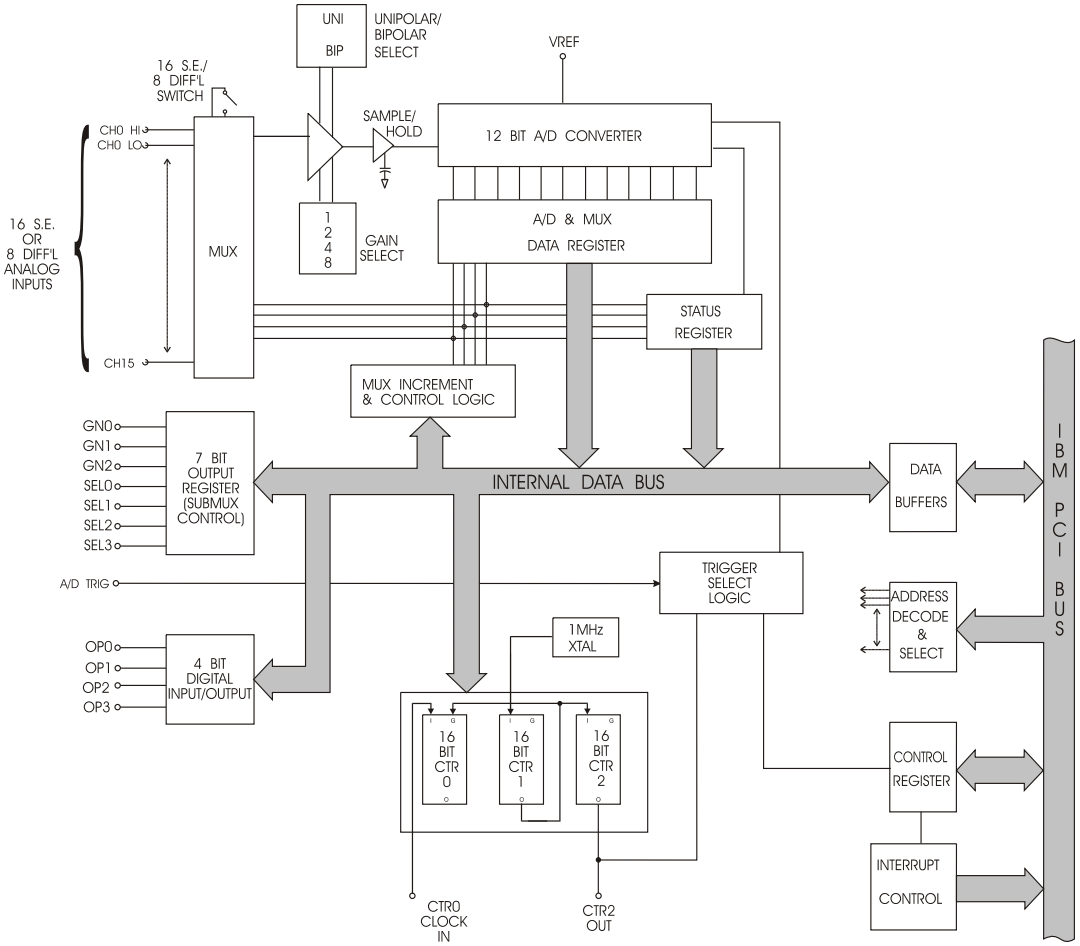
INTERRUPTS

When software enabled, the PCI-AI12-16 board has Interrupt capability. An IntA can be initiated by completion of A/D conversions. In Model PCI-AI12-16A, an Interrupt can be initiated when the FIFO data buffer is half full. The FIFO's used on "A" models permit data acquisition without timing concerns.

PRECISION EXCITATION VOLTAGE

A +10VDC (±0.2V) reference voltage is developed from the A/D converter reference source. That reference voltage is available at the I/O connector for external use and can source up to 200 mA.

BLOCK DIAGRAM



SPECIFICATIONS

A/D Converter

Type: Successive approximation
Resolution: 12 binary bits
Ranges: Unipolar Voltage: 10V, 5V, and 1.25 to 3.75V
Bipolar Voltage: ±10V, ±5V, ±2.5V, and ±1.25V
Current: 4-20 mA. (When this range is selected amplifier gain and offset are automatically adjusted so that full 12-bit resolution is achieved
Conversion Time: 8 µsec maximum, 5.7 µsec typical
Integral Linearity Error: ±0.45 LSB maximum
Differential Non-Linearity: No missing codes
Overall Accuracy: ±0.25%
Sample and Hold Acquisition Time: 2 µsec for a full-scale step input
Aperture Delay: 40 nsec typical
Throughput: Up to 100 Ksamples per second
Zero Drift: ±2 ppm/OC typical
Full Scale Drift: ±5 ppm/OC typical

Sample and Hold Amplifier

Acquisition Time: 1 microsecond to 0.01% typical for a full-scale step function input
Aperture Uncertainty: 0.3 nanosecond typical

Excitation Voltage Output

Voltage: +10 VDC ±0.2 VDC
Temperature Coefficient: ±30 PPM/degr.C
Load Drive: 200 mA maximum

Digital I/O

Four-Bit Digital I/O:
Input Voltage: Logic High is 2.0V min., Logic Low is 0.8V max
Output: 350 mA (sink only) each output with 20 mSec pulse width and a 30% duty cycle
Seven-Bit Digital Output: 25 mA source or sink

Programmable Counter/Timer

Type: 82C54-2
No. of Counters: Three 16-bit down counters. Two are permanently concatenated as a 1 MHz counter with clock from a 1 MHZ crystal controlled oscillator
Output Drive: 2.2 mA at 0.45V
Input Gate: TTL/CMOS compatible
Clock Frequency: Internal: 1 MHz
External: DC to 10 MHZ
Active Count Edge: Negative Edge
Min. Clock Pulse Width: 30 nSec high/50 nSec low
Timer Range: 2.5 Mhz to <1 pulse/hour

Environmental

Operating Temperature Range: 0°C to 50°C
Storage Temperature Range: -20°C to +70°C
Humidity: 5% to 90% RH, Non-condensing
Power Required: +5 VDC @ 900 mA typical
+12 VDC @ 125 mA typical
-12 VDC @ 125 mA typical
Length: 7.5" (191 mm)

SOFTWARE

The PCI-AI12-16(A) is supported for use in most operating systems and includes a DOS, Linux, and Windows 95/98/Me/NT/ 2000/2003/XP compatible software package. This contains sample programs and source code in "C" and Pascal for DOS, and Visual Basic, Delphi, C++ Builder, and Visual C++ for Windows. Also incorporated is a graphical setup program in Windows. Third party support includes a Windows standard dll interface usable from the most popular application programs, along with LabView .VI samples. Linux support consists of installation files and basic samples for programming from user level via an open source kernel driver.

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