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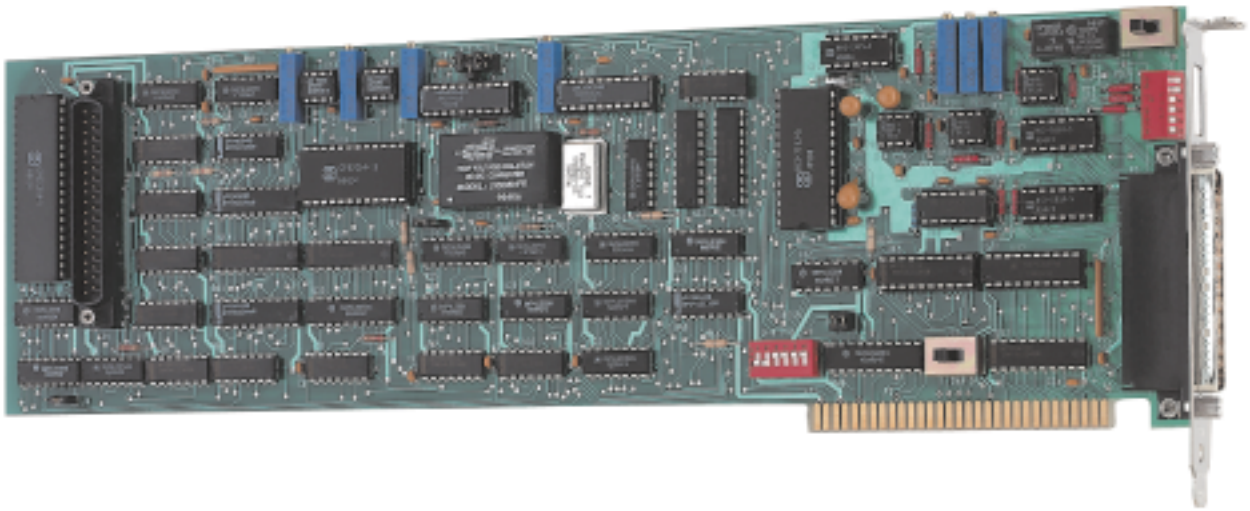
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Find the *Measurement Computing / ComputerBoards CIO-DAS16* at our website: *Click HERE*

CIO-DAS16 & CIO-DAS16/F

High Speed 16 Channel 12 Bit Analog Input, 2 Channel 12 Bit Analog Output with 32 Digital I/O & 3, 16 Bit Counters

This is the tried and true standard of the DAS16 family. For new applications, we recommend the CIO-DAS1600 for better performance and value



DESCRIPTION

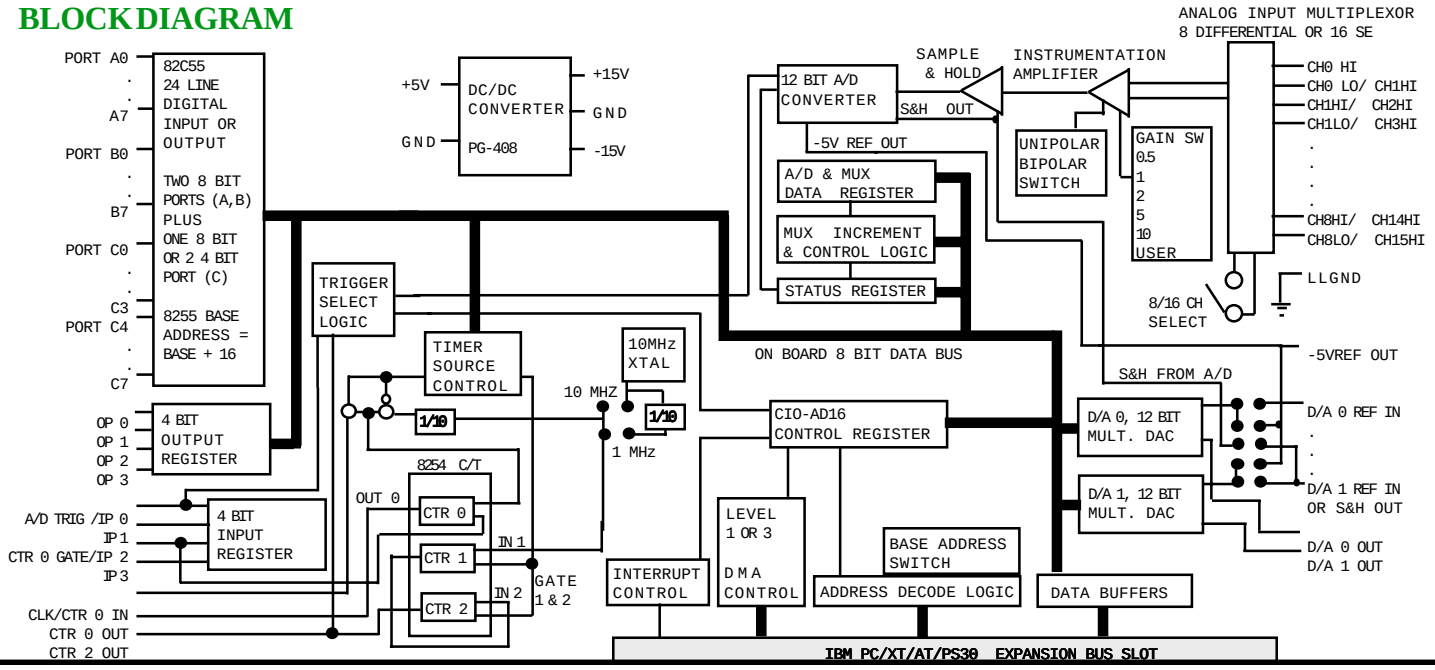
The CIO-DAS16 multifunction analog and digital I/O board is designed to run the same software and use the same connector as MetraByte's popular DAS-16 and provide additional digital I/O.

Installed in any IBM PC/XT/AT/PS30 or compatible computer the CIO-DAS16 turns your personal computer into a high speed data acquisition and control station suitable for laboratory data collection, instrumentation, production test, or industrial monitoring.

The CIO-DAS16 is supported by Universal Library for programmed control in C and BASIC from DOS and Windows languages. Many menu controlled data logging, analysis and control programs are available from a number of third party developers. In fact, any software designed for MetraByte's popular DAS-16 will work with the CIO-DAS16; we guarantee it!

In addition, the CIO-DAS16 comes with a complete CIO-DIO24 compatible 8255 and 37 pin connector!

BLOCK DIAGRAM



ANALOG INPUTS

The analog signals are brought on board by a standard 37 pin D connector directly to two multiplexors. The two multiplexors may be configured as 16 channels of single ended input or 8 channels of differential input. Differential inputs can reject noise and ground loops but require a 3 wire hookup as opposed to 2.

A 2 uSec sample & hold captures the signal which is amplified by 0.5, 1, 2, 5 or 10 times before conversion by a 674 (50KHz) or 774 (100KHz) A/D converter. The 12 bit A/D converter provides a resolution of 1/4096 parts of full scale.

SIMULTANEOUS SAMPLE & HOLD

Simultaneous Sample & Hold is an option which allows 16 analog input channels to be triggered simultaneously. This option is important to applications where channel to channel skew is not acceptable, such as audio digitization.

The CIO-DAS16 can trigger an external CIO-SSH16 via the unused D/A REF1 input (pin 26, see block diagram). The CIO-SSH16 reduces channel to channel skew from a minimum of 10 uS (CIO-DAS16/F) to zero with less than 50 nS aperture uncertainty.

TRIGGERING

A Trigger is the event that begins an acquisition/transfer cycle. There are three ways to trigger a CIO-DAS16; software, internal or external. There are also three ways to transfer data from the CIO-DAS16; program, interrupt service routine or DMA.

An internal trigger is useful for synchronizing samples to a known time base; the on board XTAL and 8254 programmable divider. Using an external trigger allows you to synchronize samples to an external event.

ANALOG OUTPUT

Analog voltage output is provided by two 12 bit multiplying D/A converters. This type of converter accepts a reference voltage and provides an output proportional to that. A precision -5V reference from the A/D converter provides an on-board D/A range of 0-5V. Other ranges between +/-10V are possible if you supply a +10V or -10V external reference at pin #10 or #26 of the 37 pin D connector.

The D/A converters do have program and interrupt transfer capability. Interrupts may be initiated by the on-board pacer clock or by external trigger. The D/A converters do not have DMA transfer capability.

COUNTER TIMER

The 8254 counter/timer chip has 3 counters of 16 bits each. Much of the 8254 is used by the CIO-DAS16 as a pacer clock to synchronize A/D conversions. One full counter, counter 0, is available for counting, pulse generation or frequency measurement.

The output of counter 2 is available to provide external synchronization to the A/D converter or as a programmable rate source. If you desire additional counters, a 10 counter CIO-CTR10 is available.

GAIN & RANGE SELECTION

Ten range & gain combinations including one user selectable gain are provided by selecting options from the gain & range switches, as seen in the table below.

The gain & range switches are all accessible from the outside of the computer through a cut-out in the mounting bracket.

SWITCH POSITION

S1	S2	S3	S4	S5	GAIN	BIPOLAR S6=RIGHT	UNIPOLAR S6=LEFT	RESOLUTION
L	L	L	L	L	0.5	+/-10V	N/A	4.88 mV/BIT
L	L	L	L	R	1	+/-5V	0-10 V	2.44 mV/BIT
L	L	L	R	R	2	+/-2.5V	0-5 V	1.22 mV/BIT
L	L	R	L	R	5	+/-1V	0-2 V	0.488 mV/BIT
L	R	L	L	R	10	+/-0.5V	0-1 V	0.244 mV/BIT
R	L	L	L	R	0.5<U<20	USER	USER	SEE EQUATION

USER SUPPLIED GAIN: You may install a resistor on the CIO-DAS16 and provide a custom gain that exactly matches your application. There are limits to the achievable gain. The limits, and the formula for selecting a resistor are supplied here.

USER GAIN EQUATION:

$$R_{USER} = \frac{20{,}000 * V_{FS}}{(10 - V_{FS})} \qquad V_{FS} = \frac{10 * R_{USER}}{R_{USER} + 20{,}000}$$

I/O & CONTROL REGISTER MAP

The CIO-DAS16 and MetraByte DAS-16 are software compatible because the I/O registers have identical functions on each board.

I/O ADDR.	CIO-DAS16 FUNCTION READ	CIO-DAS16 FUNCTION WRITE	I/O ADDR.	CIO-DAS16 FUNCTION READ	CIO-DAS16 FUNCTION WRITE
BASE + 0	A/D Low Byte	Start A/D	BASE + 8	A/D Status	NA
BASE + 1	A/D High Byte	NA	BASE + 9	Control Settings	Control
BASE + 2	Mux Settings	Mux Scan Control	BASE + 10	NA	Counter Source Control
BASE + 3	Digital 4 In	Digital 4 Out	BASE + 11	Not Used	Not Used
BASE + 4	NA	D/A0 Low Byte Out	BASE + 12	Counter 0	Counter 0 Load
BASE + 5	NA	D/A0 High Byte Out	BASE + 13	Counter 1	Counter 1 Load
BASE + 6	NA	D/A1 Low Byte Out	BASE + 14	Counter 2	Counter 2 Load
BASE + 7	NA	D/A1 High Byte Out	BASE + 15	NA	8254 Counter Control
	8255 FUNCTION READ	8255 FUNCTION WRITE		8255 FUNCTION READ	8255 FUNCTION WRITE
BASE + 16	Port A In	Port A Out	BASE + 18	Port C In	Port C Out
BASE + 17	Port B In	Port B Out	BASE + 19	NA	8255 Control

SPECIFICATIONS

Channels	16 SE or 8 Differential
A/D Type	Successive Approx. ADx74 Series
Conversion Time	8.5 uS 774, 15 uS 674
A/D Convert & Transfer Speed (DMA)	100KHz AD16/F, 50KHz DAS16
Accuracy	0.01% +/-1 LSB
Integral Linearity	+/-1 LSB
No missing codes guaranteed over temp. range.	
Maximum Overvoltage	+/-35V Continuous
Input Leakage Current	250 nA Max @ 25°C
Gain Drift	+/-25 ppm/Deg C Max
Zero Drift	+/-10 ppm/Deg C Max
D/A Type	Multiplying 4 Quadrant
D/A Setting	30uS to 0.01%
Integral Linearity	+/-1/2 LSB
Differential Linearity	+/-1/2 LSB
Reference Range	+/-10V
Output Range	+/-10V, Reference dependent
R Out	0.1 Ohm Max
I Out	+/-5mA Min
CLK Input Freq	10 MHz Max
TTL Loads	Source 1, Sink 4

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