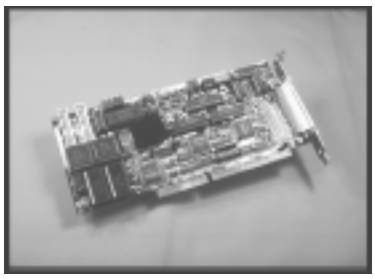
Digimétrie

AT-LAB series

Analog-Digital-Analog converter boards



Features

- 16 S / 8D AD input channels.
- Resolution : 12 or 16 bits.
- Conversion time : 1,25 or 10 µS.
- Programmable input scale from 1,25V to ± 10V (it depends on the board).
- FIFO memory of 2048 samples.
- 3 DMA channels of 16 bits (5, 4, 7).
- 2 DA analog output channels, ± 10V or + 10V, 6 µS (in option).
- 32 TTL lines.
- 3 counters of 16 bits.

4 AD simultaneous channels holding (in option).

Applications

- Acquisition and processing of the analog and digital data.
- Sensor/actuator interface.
- Automatism command and regulation.
- Transient analysis.
- Simultaneous, fast and multichannel acquisition.
- Generation of arbitrary and analog signals.
- TTL interface, TTL level.

Functional description

The AT-LAB range boards are composed of two main modules : a 12 or 16 bits analog-digital conversion module, with a conversion time of 10 µS or fast 12 bits 1,25 µS. A two channels 12 bits digital-analog module. Both modules are associated to a double PIO 8255 input-output interface. There is also two time bases : timer 82C54 (triple downcounter).
The specificity of this range consists in the following features :

- the whole command interface is software programmable except for the base address which is defined by logic switches.
- the analog-digital conversion module may be adapted to various speeds and resolutions continuing to keep the same interface.
- the access to the analog module, in input and in output, is straightly done on 16 bits.
- two options allow to adapt the boards in order to do acquisitions on 4 simultaneous analog input channels and (or) to generate a signal in current 4-20 mA.

So, it allows to :

- measure signals in voltage or in current (possibility to display conversion resistors). Those signals are converted in 12 or 16 bits digital words and interfaced via a FIFO of 2 Kwords of 16 bits on the 16 bits interface bus of the computer. The conversion module may use a 16 bits DMA channel (programmable) in order to increase the transfert speed. One may mea-sure up to 16 inputs (single channels) or 8 inputs (differential channels).
- restore signals in voltage or current (option), resolution 12 bits.
- connect the computer on a peripheral that needs a logic command of TTL type.
- do countings, generate time bases or interrupts.

Technical specifications

Analog-Digital interface

- Resolution : 12 bits (4096 points) or 16 bits (65536 points).
- Input channels : 16 S / 8 D (programmable mode).
- Programmable input scale : bipolar : ±5V, ±2,5V, ±1,25V
  option : Input ±10V.
- Input impedance : 10 GigaOhms // 3pF.
- Protection : 100V / milliseconds.
- Conversion time : 12 bits or 16 bits (10 µS).
- 12 bits : 1,25 µS.
- Precision : 12 bits : ± 1/2 LSB.
- 16 bits : ± 3 LSB.
- Non linearity : 12 bits : ± 1 LSB (input ± 10V).
  16 bits : ± 1 LSB (input ± 10V).
- Programmable gain : 1, 2, 4, 8 V/V (binary on delivered configuration)
- 1, 10, 100, 1000 V/V in option.
- Common mode rejection : > 80 dB gain = 1,10 kOhms.
- Digital coding : binary two complemented.
- Triggering possible by software, timer, external signal (TTL).
- Automatic linear incrementation of the channels.
- Simultaneous sampling (in option) :
  - Inputs number : 4 synchronous channels.
  - Acquisition time : 1µS at ± 0,01% pulse of 10V.
  - Interchannel aperture time : 200 pico second.
  - Linearity error : ± 0,003 % on full scale.
  - Input impedance : 33 GigaOhms // 5,5 pF.
  - Common mode rejection : > 78 dB.
  - Maximum input voltage : ±5V (protection ± 12V without damage)

Digital-Analog interface

- Resolution : 12 bits (4096 points).
- Output channels : 2 independent.
- Output scale, programmable selection : bipolar : ± 10V, unipolar : +10V or 4-20 mA (in option).
- Conversion time : 6 µS max.

Logic Input-Output interface : PIO 8255

32 TTL channels on the connectors P1 and P2 of HE 10 type (26 contacts), 9 channels on the input connector P3.

Timer

- 6 independent 16 bits counters.
- Base rate : 10 MHz, available on the board.
- External clock : 10 MHz max.

Other

- IBM PC-AT 16 bits bus.
- Swichable addressing, on the board, by blocks of 32 addresses in the IBM I/O space from $0 to FF0.
- 8 interrupt levels (IRQ 3, 4, 5, 7, 10, 11, 12, 15). Programmable selection.
- 3 DMA channels 16 bits transfer on channels 5, 6, 7. Programmable selection.
- Female connector of DB 37 points type.

Connector pin assignment

The pictures below shows the analog and logic input-output connectors pin diagrams.
a) Input connector (seen from PC backplane).

CAUTION : Before any connexion, take care of controlling your links. If the application allows it, the logic ground, written DGND will be used for the logic input-output interface, AGND will be used for the analog input channels and GNDA will be used for output analog channels. This allows to reduce the noise introduced by the logic ground on the analog ground.

Logic connectors (located at the opposite side of the input one)

The pins marked N.U are reserved for a future compatibility.
b) Logic connectors located at the bottom of the board :

Programming

The AT-LAB boards are easy to program using any language that has access to the PC input-output bus. An example of program, in Turbo C, that uses all the board functions is listed in the boad manual. The following functions are developped :
Acquisitions : prvoie(); config(); autovoie(); acq16();
DMA use : dma_mem(); init_dma(); end_dma();
dma_mem_disk(); init_dma_disk(); end_dma_disk();
Timer : inithoro(); rhoro();
External acquisitions : acq_ext();acq_tim();
Interrupt management : irq();gestion();

Ordering information

☐ AT-LAB12B : 16 AD channels 12 bits

☐ AT-LAB12B/D : 16 AD channels 12 bits, 2 DA channels 12 bits

☐ AT-LAB12BR : 16 AD fast channels

☐ AT-LAB12BR/D : 16 AD fast channels 12 bits, 2 DA channels 12 bits

☐ AT-LAB16B : 16 AD channels 16 bits

☐ AT-LAB16B /D : 16 AD channels 16 bits, 2 DA channels 12 bits

Options /S : 4 AD channels option with a simultaneous holding
Option /T : AD input scale option in ± 10V for 12 bits AT-LAB boards
Option /C : DA output channel in current output
Option / : free option, current input 0-20 mA or 4-20 mA
Option / : free option, AD inputs with a voltage divider

Extensions (please report to the corresponding technical handbooks) :

* Ex-MUX-32V : external boards (up to 256 AD inputs)
* Bornier DB37
* Cable for DB37

Compatible Digimétrie softwares :

* DigiView series : acquisition - displaying - processing or regulation - test - measure by icons
* DigiTools series : Input/Output routines for DOS and Windows in C, C++ or for Visual Basic 3

The board is delivered with a complete handbook and a list of the corresponding softwares.

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