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Find the *Precision MicroDynamics / Polaris Motion Control MFIO-3A* at our website: ***Click HERE***

High Speed Motion Control Interface Card for PCs

The MFIO-3A high speed interface card for PCs is a low-cost solution to the problem of multi-axis coordinated motion control. The card is ideal for the control of machines and robots used in processing, handling, packaging and assembly for both the semiconductor, other clean room industries and machine tool OEM industries. A rich motion control C library, CMC-SOft-Lib, is available as object and/or source code for flexible implementations and fast project completions.

The motion controller runs as an ISR on the host CPU under DOS® or as a task in QNX®.; Custom algorithms and those modified from our source code are written using floating point math and are compiled with the Microsoft and Borland C compilers for DOS® or Watcom C for QNX®.; Fixed point math and cross-compilation to fixed point DSPs and unusual chip-sets is completely eliminated - delivering you independence from the board manufacturer's libraries and time schedules.

The MFIO-3A has three channels of D/A converters and quadrature decoders, 24 digital I/O, a programmable interval timer and a watchdog timer. All channels are synchronized and multiple boards can be synchronized with the external sync connector.

Many of the board's signals generate PC hardware interrupts - leading to efficient PC programming. The motion controller is written as an interrupt service routine (ISR) or as a task on the host PC's CPU. The MFIO-3A is plug-and-play compatible and software for DOS®, QNX® and Windows is available. These include (i) a C library for accessing the board's registers, (ii) a C library consisting of feedback regulators and path planners for linear circular, helical and cubic-spline interpolation and (iii) third party software from Visual Solutions, Inc. for motion control under Windows-95® and Windows-NT®.;

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Controller Rates

In experiments a double floating point PID feedback regulator and coordinated S-curve profile for two robot axes computes in 160 microseconds using an Intel-386/387, 40MHz system.

The same controller computes in 100 microseconds using an Intel-486/DX66. The controller runs as an interrupt service routine (ISR) under the main line program. The

programmable interval timer (PIT) on the MFIO-3A board determines the controller update frequency. In one application, a PIT interval of 500 microseconds is used which is equivalent to a controller frequency of 2000 Hz. Using this scheme, for each 500 microsecond interval, the main line program instructions running the User Interface are executed for 400 microseconds and the controller instructions are executed for 100 microseconds. This process defines a simple multi-tasking system where most of the time is spent servicing the User Interface. With no other tasks running the controller described runs at 8kHz on the Intel-486/DX66 for both axes.

Example Applications

Two MFIO-3A boards connected to one PC/104 Intel80486 computer provide five axes of coordinated robot motion control with one additional axis free for jig orientation. Fourty eight digital I/O available for interlocks and sequencing.

XYZ Table

One MFIO-3A board connected to your Desktop Intel-80486 computer provides three axes of coordinated servo motion control. Ideal for routers, engravers, sign makers and sheet cutters of all varieties.

Brushless Motor Controller Using Sinusoidal Commutation

Four MFIO-3A boards connected to an embedded PC/104 computer can be used to control six brushless DC-Servomotors. Sinusoidal commutation can be implemented on the PC with a startup algorithm for initial magnetic alignment.

Spatially Redundant Robots

Three MFIO-3A boards connected to one PC/104 or Desktop Intel-80486 computer provides for nine axes of coordinated motion for spatially redundant robots.

Five Axes Milling Machine

Two MFIO-3A boards connected to one PC/104 or Desktop Intel-80486 computer provides for five axes of coordinated motion for milling. Fourty eight additional digital I/O available for part loading and unloading sequences.

Hexapod Milling Robots

Three MFIO-3A boards connected to one PC/104 Intel-80486 with serial connection to an Intel-Pentium Computer can provide for six axes coordinated motion for advanced milling. Three additional motion axes are available for part pose definition. Seventy two

digital I/O available for tool changing, part loading/unloading sequences and synchronization with other machinery.

Mobile Robotics

One MFIO-3A board connected to a embedded PC/104 Intel80486 can provide for a simple, differentially driven mobile robotic system with one additional axis for sensor orientation and 24 digital I/O for reaction to external events.

Specifications

Analog Outputs

- Three 16-bit D/A converters.
- Monotonic, dc-specified.
- Synchronous.
- Output range (±10V)

Quadrature Encoder Inputs

- Three 24 or 32-bit Quadrature Decoders.
- A, B, Z inputs, invertible for phasing and universal index pulse, digitally filtered.
- 24 or 32-bit preload in hardware by index (Z) pulse or software register.
- Each axis input configurable for
    - differential
    - differential terminated
    - single-ended totem-pole
    - single-ened open collector
- power supplied for +5V or +12V encoders

Digital Input/Outputs

- 24-bits programmable as input or output
- 16 lines can generate hardware interrupts

SYNC

- Synchronized D/A, encoder input and digital I/O
- Sync generated by on board timer, external signal or software
- Sync signal passed between multiple boards
- Selectable on board or off board sync signal

Programmable Interval Timer

- 0.25 microseconds to 515 seconds with 0.12 microsecond resolution

- Can generate sync signal and/or PC interrupts

Watchdog Timer

- 3.85 microseconds to 125 milliseconds
- Forces DAC outputs to 0 Volts on timeout and sets a digital output to low for emergency shutdown

Memory

- 512 bytes user accessible EEPROM

Bus Support

- ISA Plug and Play
- PC104

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